CHEMICAL ABSTRACTS

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—APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

Laboratory equipment of the Division of Chemistry, National Research Laboratories, Ottawa, Canada. F. G. Cullen. *Can. Chem. Process Inds.* **23**, 525–4, 596, 528 (1939). W. H. Boynton 3

Substitute for laboratory oil baths. Averett A. Morton. *Ind. Eng. Chem. Anal. Ed.* **11**, 592(1939). —The advantages of using thick Al pots for air baths, in place of oil baths, are pointed out. H. A. Frediani

Small corrosion-proof laboratory pump. Geo. N. Gleason. *Chemist Analyst* **28**, 69–70(1939). —A pump suitable for handling corrosive liquids is described. Details are given for constructing the pump with a piston of 1-in. diam., a stroke of 1.5 in. which will deliver 23.5 l. per hr. against a 5.5-foot head. W. T. L. 4

Simple filtering apparatus for filtering and washing precipitates upon a microscope slide. H. Jurany. *Mikrochemie* **27**, 185–8(1939). —In a narrow glass tube of 1.5–2-mm. inside diam. an asbestos filter is placed between layers of fritted glass. One end of the filter tube is preferably attached to a glass stopcock which is connected with a water pump. To filter a soln. which is on a slide, it is merely necessary to place the filter tube in contact with the liquid and suck up the liquid. None of the ppt. will get by the filter. The ppt. can be washed in the same way and eventually dissolved and subjected to further examn. W. T. H. 5

An analysis of recent filtration equations—filtration at constant pressure. M. G. Lambert. *Trans. Am. Inst. Chem. Engrs.* **35**, 623–34(1939). —Two filtration equations which were proposed in recent years are compared. It is shown that the difference between the 2 is in the fact that a small correction to be added to observed time is indicated by the one while it is discarded by the other in an implied manner. It is, therefore, possible to reduce both to a mathematically identical form representing the equation of a section of a parabola. Reasons are given to show that both equations are inadequate in many cases, and based upon results obtained in calcg. industrial filtration problems by the use of these as well as of the equation $V = K\theta$, the adoption of the latter is recommended. C. L. Mantell 6

An improved device to demonstrate the laws of frequency distribution—with special reference to liquid flow in packed towers. R. S. Tour and Frank Lerman. *Trans. Am. Inst. Chem. Engrs.* **35**, 709–18(1939). —A new type of instrument for experimentally demonstrating and studying the laws of probability and frequency distribution is described. It is compared in construction and accuracy with the Galton type of instruments previously used for similar exptl. purposes and its inherent advantages over the other instruments are indicated. Data and sample curves are included that show the accuracy with which this new type of instrument approaches the theoretical laws of distribution. The instrument has been found effective in investigations of the underlying principles of bounded and unbounded distribution of liquid over tower packing, and it has possibilities in other lines of research involving the laws of frequency distribution. C. L. Mantell 7

The unconfined distribution of liquid in tower packing. R. S. Tour and Frank Lerman. *Trans. Am. Inst. Chem. Engrs.* **35**, 719–42(1939). —In developing the problem of liquid distribution in packed towers, distinction is made between unconfined distribution and confined distribution. Only unconfined distribution, in which no boundary or wall effect appears, is here considered. The phys. conception of liquid as made up of a no. of portions or streams, each of which flows from a point source and follows a tortuous path down through the packing of a tower, permits the application of the Laws of Probability (or of Frequency Distribution). From the Normal or Gaussian Law, as an approximation of the Binomial Law of Probability, equations are evolved expressing the liquid distribution as functions of the horizontal displacements of the liquid from the vertical center line of flow. The consts. of the equations are interpreted in terms of the phys. dimensions of the packing. Exptl. data are presented as obtained in a research conducted by Hurter in 1893 and the Laws of Probability are shown to hold. Tests by the authors on a coke-packed exptl. tower, 20 in. in diam., are also offered to prove the applicability of the probability equations. C. L. Mantell 8

The distillation industry in the last century. The origin of the continuous column. G. DuBois. *Rev. gén. applications ind.* **1939**, 20 pp.(reprint). E. H. 9

A distillation capillary. Alexander O. Gettler. *Ind. Eng. Chem., Anal. Ed.* **11**, 559(1939). —Sudden violent ebullition in the distn. capillary previously described (*C. A.* **33**, 7150[8]) is avoided by insertion of asbestos fibers in the larger capillary about 1 cm. from the end and tapping them down into the bulb after it is blown. Roster Dee Snell

Microchemical technique. III. Semimicro preparation and purification of organic substances. Geo. F. Wright. *Can. J. Research* **17, B**, 303–7(1939); cf. *C. A.* **32**, 1518[8]. —Several devices convenient in semimicro prepn. and purification of org. substances are described. A modified side-arm test tube is suggested as of general utility in microchem. lab. technique. J. W. Shipley 10

Clarification of liquids. I. Why small impurities produce big effects. Jerome Alexander. *Glass Packer* **16**, 699–700, 717–18(1937). **II. Causes and cures for cloudy liquids** *Ibid.* 762–4. **III. Facts about settling and straining.** *Ibid.* **17**, 41–4. **IV. Preparing liquids for clarification.** *Ibid.* 179–80, 190. **V. Filter aids, equipment, centrifugals and centrifuges.** *Ibid.* 302–3, 310. C. R. Fellers 11

Graphical solution of problems in multicomponent fractionation. Frank J. Jenny. *Trans. Am. Inst. Chem. Engrs.* **35**, 635–77(1939). —A new design method is presented for the complete solution of problems in multicomponent fractionation. The method is based on a graphical solution which is comparable in simplicity to the McCabe and Thiele method (cf. *C. A.* **19**, 1970) for binary mixts. In addn. to the graphical detn. of the no. of trays, the method inherently offers a simple means for detg. a suitable design reflux ratio. C. L. Mantell 12

An empirical relationship between reflux ratio and the number of equilibrium plates in fractionating columns. Geo. G. Brown and Homer Z. Martin. *Trans. Am. Inst. Chem. Engrs.* **35**, 679–708(1939); cf. preceding abstr. C. L. Mantell 13

Automatic absorption gas analyzers. M. M. Kalnberg. *Zavodskaya Lab.* **8**, 255–67(1939). —Various types of analyzers used in the Soviet Union are described and their uses and limitations are pointed out. B. Z. Kamien 14

Attachment for avoiding the sucking over of liquid in the micro-Kjeldahl apparatus of Parnas-Wagner. P. E. 15

...dahl. *Mikrochemie* 27, 195–6(1939).—The attachment serves to equalize the pressure during the steam distn. which removes the NH_3 from the reaction vessel to the receiver. It consists of a U-tube closed at both ends with rubber stoppers. On one side it is provided with a narrow tube which permits the withdrawal of liquid from the U-tube. One arm of the U-tube has the rubber stopper fitted with glass tubing covered with rubber tubing at the top and with a pinch cock, directly under the intermediate tube of the Parnas-Wagner app. The stopper of the other arm carries a long piece of tubing which reaches from near the bottom of the U-tube to a height of about 100 cm and at the top is fastened to an S-shaped bulb tube into which a few drops of dil. H_2SO_4 is placed. W. T. H.

Notes on the treatment of small precipitates. An improved filter and a small precipitating vessel. J. Donau. *Mikrochemie* 27, 189–94(1939).—An efficient filter which weighs only about 1 g. was prepd. by Heraeus from perforated Pt foil and compressed Pt sponge. When working with small quantities of liquid, a very shallow Pt dish is used; this is placed on the filter and is weighed with it. The dish is so shallow that it empties automatically. If larger quantities of liquid are to be handled, or if gaseous precipitants are used, a small cylindrical tap funnel is used instead of the small dish and pptn. takes place in this. The filtration is then accomplished by allowing the liquid to drop on the filter. The old trick of using a small trimmed feather is recommended for the complete removal of all ppt. from the tap funnel and its stem. W. T. H.

Organic chemical operations with small quantities of material. J. Erdos. *Mikrochemie* 27, 211–15(1939).—A review of app. suitable for distn., filtration and extn. of small quantities of material. W. T. H.

Electrolysis outfit. M. Ralph Berke. *Chemist Analyst* 28, 65–6(1939). A satisfactory app. for electroanalysis can be put together at a cost of less than $10. W. T. H.

A four-filter photoelectric colorimeter. B. T. Barnes. *J. Optical Soc. Am.* 29, 448–52(1939). E. H.

Novel metal membranes. A. Brendlin. *Arch. Wärmewirt.* 20, 207–8(1939).—The usual concentrically corrugated plate is made applicable to high pressures by backing it with a support (not attached to it) consisting of concentric rings of semicircular cross section, and a plate which may be segmentally split. Applications to heat-exchanger heads, expansion joints and valve-stem packing are shown. Ernest W. Thiele

Mercury vapor detector. Thomas T. Woodson. *Rev. Sci. Instruments* 10, 308–11(1939); cf. *C. A.* 33, 7622[8]. J. E. D.

Investigations on swing-mills [vibrating mills]. Robert Meldau. *Z. Ver. deut. Ing., Beiheft Verfahrenstech.* 1939, 95–8.—Expts. were made in an attempt to shorten the grinding period and to find the lower limit of fineness. Mills having capacities of 0.3 to 6 l. were used with a frequency of 1500 vibrations per min. and an amplitude of 3 mm. The effects of shape of grinding space and type of grinding balls are discussed. A no. of characteristic fineness curves for various materials and varying grinding periods are shown. Photomicrographs of surfaces of porcelain and glass balls are presented. A theoretical discussion of the grinding mechanism is included. It was possible to establish the presence of fields in the mill which favor extremely fine grinding but a lower fineness limit could not be established. 10 references. Karl Kammermeyer

Comparative grinding tests on crystalline and amorphous quartz; grain distribution and grain forms. K. Wolf, H. Hennicke and A. Smekal. *Z. Ver. deut. Ing., Beiheft Verfahrenstech.* 1939, 119–29.—Cryst. and amorphous quartz under identical grinding conditions give products with identical grain-distribution curves and grain forms. Graphs, photomicrographs and 3 references are given. Karl Kammermeyer

An adiabatic high-temperature calorimeter for the determination of heats of reactions occurring in the formation of alloys. O. Kubaschewski and Alexander Walter. *Z. Elektrochem.* 45, 630–6(1939).—There is described an adiabatic calorimetric system, applicable up to 700°. It consists of (1) the calorimeter proper, constructed of Ni-Cr steel, holding a reaction crucible of Fe or graphite; (2) a heating jacket, also of Ni-Cr steel, wound with a Ni-Cr heating coil; and (3) an enclosing thermostat of asbestos, contg. a heating coil. Thermal equil. between the calorimeter and the jacket is detd. by means of a Ni-Cr thermoelement. Any const. difference in temp. is minimized by an asbestos baffle placed over the heating jacket. The temp. rise of the calor meter is measured by means of a Pt resistance thermometer wound around the calorimeter. The energy equiv. was detd. by the method of mixt., with a Ni sphere. This was checked by detg. the known heats of formation of $MgBi_2$ and $CaAl_2$. The estd. uncertainty of the results is ±2.5%. J. W. Knowlton

A new vacuum adiabatic calorimeter. A. B. Adams, R. S. Brown, V. H. Barnes and O. Maass. *Can. J. Research* 17, B, 41–52(1939).—A new adiabatic calorimeter is described in which transfer of the material under investigation from the thermostat to the calorimeter is effected through an evacuated space. The liquid used in the calorimeter is Hg. An accuracy of better than 0.05% is claimed. J. W. Shipley

Research problems in drying technique. Karl Kröll. *Z. Ver. deut. Ing., Beihft. Verfahrenstech.* 1939, 43–5.—A discussion. Karl Kammermeyer

Solvent extraction and absorption. Werner Mathis. *Z. Ver. deut. Ing., Beiheft Verfahrenstech.* 1939, 76–85.—A graphical solution is shown for the system methylcyclohexane–$NH(CH_2)_6$–C_7H_{16}. Mass transfer at a liquid interface, absorption of CO_2 in H_2O and recovery of H_2S from waste gases are also treated. Data, diagrams and 14 references are given. Karl Kammermeyer

Vacuum-pan design. Colin W. Waddell. *Sugar News* 20, 51–5(1939).—Mech. improvements. W. W. B.

Stability of the distribution of flow in heating surfaces with forced circulation. A. Kleinhans. *Arch. Wärmewirt.* 20, 135–8(1939).—K. discusses mathematically the conditions under which parallel tubes in which liquid is vaporized will tend to take unequal amts. of flow. Ernest W. Thiele

Heat transfer in the radiant section of petroleum heaters. Walter E. Lobo and James E. Evans. *Trans. Am. Inst. Chem. Engr.* 35, 743–78(1939).—A brief review of empirical equations for predicting heat transfer in the combustion chambers of steam boiler and petr. heaters is followed by a study of 85 performance tests on 19 furnaces differing widely in amt. and arrangement of refractory and cold surfaces. Operating conditions are available on furnaces with and without air preheat, with and without flue-gas recirculation, fired with refinery cracked gas or oil fuel, and with a wide range of variation of excess air. The data are correlated by means of a theoretical equation and the deviations are no greater than the probable errors in the test data, and consistently less than those obtained by the empirical equation of Wilson, Lobo and Hottel (*C. A.* 26, 3311). For simplicity of calcn. the equation is presented in graphical form. An illustrative design problem has been included. C. L. Mantell

Contact furnaces and contact equipment in the chemical industry. W. Klempt. *Z. Ver. deut. Ing., Beiheft Verfahrenstech.* 1939, 122–7.—A discussion of the most important types of equipment for catalytic gas reactions with figures and 12 references. Karl Kammermeyer

Computing heat transfer by radiation from flue gas to heating surface. Josef Böhm. *Arch. Wärmewirt.* 20, 209–12(1939).—Charts to facilitate the calcn., based on recent literature, are given. Ernest W. Thiele

Computing flue-gas cooling in water-tube boilers. Alfred Becker. *Arch. Wärmewirt.* 20, 237–9(1939).—Charts for calcg. final flue-gas temp. (const. or variable water temp. is assumed) are presented. E. W. Thiele

The cooling of flue gas in water-tube boilers. Josef Böhm. *Arch. Wärmewirt.* 20, 75–8(1939).—B. presents charts to reduce the trial and error necessary in calcg. heat transfer in boilers. Ernest W. Thiele

An efficiency meter for boiler plants. J. Köchling. *Arch. Wärmewirt.* 20, 169–72(1939).—The flue-gas quantity is measured by a large-flow nozzle in the breeching, and a delicate manometer. The temp. is also meas-

ured. Steam flow is measured with a flow meter. Radiation and combustible losses, and total heat of steam, are assumed const. The calcn. is made electrically and recorded. Two com. installations are operating well.
Ernest W. Thiele

The limits of furnace load and their influence on boiler design. W. Pauer. *Arch. Wärmewirt.* 20, 197–202 (1939). The factors which affect the max. heat release per unit furnace vol., and their relations, are discussed.
Ernest W. Thiele

The character of the valves developed under the influence of hot high-pressure steam. M. Kyöleln. *Arch. Wärmewirt.* 20, 241–5(1939).—In addn. to various mech. features, the resistance to rubbing of various materials for valve seats is discussed. An app. was used in which a known pressure and temp. were applied to a flat ring of the metal, and the no. of rotations before seizure was noted. At 450° nitrided steel was by far the best; stellite was fair. At low temps. bronzes are suitable. Stainless steels are poor.
Ernest W. Thiele

Brines in air conditioning. Adjusting concentrations with chemical dehumidifiers. Stewart C. Coey. *Ice and Cold Stor.* 42, No. 491, 71–2, 76 (1939); cf. *C. A.* **33**, 6091⁵.
A. H. Johnson

Freezing mixtures. L. L. Woods. *Chemist Analyst.* 28, 64–5(1939).—Freezing mixts. are given suitable for cooling to −100°.
W. T. H.

Shell for pressure-extraction apparatus. Joseph D. Christian. U. S. 2,170,547, Aug. 22. Various details of app. suitable for pressing juices from fruits, oils from fish, etc.

Apparatus for testing magnetizable workpieces. Friedrich Jahne (to I. G. Farbenind. A.-G.). U. S. 2,170,371, Aug. 22. An app. for detecting inhomogeneities in magnetizable work pieces, such as welded seams, comprises a ferromagnetic core encircled by a coil, mech. means for moving the core in an eccentric manner and a listening device connected to the coil which indicates the voltage induced in the coil if the coil passes inhomogeneities in the work piece parallel to the surface of which it is moved.

Separatory flask suitable for use in analytical work, for extracting alkaloids, etc. Morris B. Jacobs and Alexander A. Singer. U. S. 2,170,411, Aug. 22. Various structural details.

pH comparators. Donald K. Allison (to National Technical Laboratories). U. S. 2,172,352, Sept. 12. A method of preparing a comparator for use in pH detns. with a particular indicator dye having various color and intensity transmission characteristics at various pH values in soln. comprises: detg. the spectrum-transmission characteristics of a soln. of such a dye at numerous selected pH values throughout the pH range thereof; photographically exposing a photosensitive surface on an elongated transparent member and dye-toning the surface in such manner as to produce a dye-image on the member, of graded intensity, and having various color-transmission characteristics along its length in accordance with the spectrum-transmission characteristics of such indicator dye soln. at the various pH values. Various examples and details are given.

Spherical metal containers such as those for holding carbon dioxide and the like under high pressure. Walter H. Freygang (to Walter Kidde & Co.). U. S. 2,171,111, Aug. 29. Various mfg. details.

Filters. Jacques Muller. Brit. 507,286. June 13, 1939. In a filter element built up of alternate filtering-disks and resilient impermeable clamping disks, the latter are each formed with 2 annular projections and 2 annular depressions, which form bearing surfaces for the adjacent disks.

Filters, e. g., for the filtration of liquids or gases. Philip G. Marr and Yokes Ltd. Brit. 507,762, June 19, 1939. A filtering element is formed of flexible material with radial folds or pleats and with other folds transverse thereto. Filters contg. the elements are described.

Filter-impregnating apparatus. Frank B. Hale and Frank A. Logan. U. S. 2,170,142, Aug. 22. Various details of an app. suitable for impregnating gas and smoke filters with lampblack, etc.

Filter for use in hot-air furnace conduits. Robert L. Kennedy. U. S. 2,171,797, Sept. 5. Various structural details.

Filtering unit for incorporation in a plate-type heat exchanger. Richard Seligman, Hugh F. Goodman and The Aluminium Plant & Vessel Co. Ltd. Brit. 505,698, May 16, 1939. The unit includes a frame forming, with one or more filtering elements, a chamber for the filtered liquid or the liquid to be filtered, and provided with ports for the passage of a heating or cooling liquid.

Gravity-seperation apparatus. Horace Freeman. Brit. 507,412, June 13, 1939. To separate heavier matter from a liquid, e. g., a suspension of paper pulp or china clay, the liquid is introduced under pressure from a pipe through a tapered nozzle into a spiral channel surrounding an outlet tube in a receptacle, so that it is caused to flow downspirally in the outer portion of the vessel and the heavier matter is sepd. centrifugally. From the lower end of the receptacle the suspension of the lighter matter rises, still moving spirally, as a central core and passes away through the outlet tube.

Washing gases. Arthur Ryner. Brit. 506,405, May 26, 1939. Dust and fumes are removed from gases by passing them in a helical path to remove large particles centrifugally and then bubbling them through a liquid to which a wetting agent, e. g., oil, may be added, to remove fine particles. App. is described.

Apparatus for separating gases such as oxygen and nitrogen by centrifugal action. Emery C. Furrer. U. S. 2,170,071, Aug. 22. Various structural and operative details.

Gas analysis. Wm. J. Sweeney (to Standard Oil Development Co.). U. S. 2,170,435, Aug. 22. App. is described, and a process for detecting minute amts. of C_2H and higher hydrocarbons in soil gases by subjecting the gas to combustion, passing infrared rays through the combustion products and observing the amt. of energy absorbed from a band of rays from which CO_2 has the power to absorb energy.

Cell for analyzing gases by the heat-conductivity method. Wm. G. Gow (to Gow-Mac Instrument Co., a partnership). U. S. 2,171,502, Aug. 29. Various structural details.

Gage for measurement of gas pressure. Samuel Palkin and Thomas C. Chadwick (to the People for free use). U. S. 2,169,812, Aug. 15. Various details of a vacuum gage.

Apparatus for measuring and regulating the viscosity of a fluid. The British Thomson-Houston Co. Ltd. Brit. 506,172, June 6, 1939.

Apparatus for bringing liquids into contact with gases especially for cooling one of them. Heenan & Froude Ltd. and Geo. H. Walker. Brit. 505,590, May 15, 1939. The app. comprises several flat plates or strips, preferably of metal, each with conical or pyramidal protuberances pressed or punched out at intervals, the sides of the protuberances being split to form comparatively sharp projections against which the gases strike when flowing over the surface, turbulence being thereby promoted.

Liquid-spray gas-treatment apparatus, suitable for treating air with calcium chloride solution, etc. Harry A. Wintermute (to Research Corp.). U. S. 2,172,304, Sept. 5. Various structural and operative details.

Apparatus for treating liquids with gases (as in treating water with bottles with carbon dioxide). Roger E. Roth (to Société d'étude pour l'acide carbonique). U. S. 2,172,033, Sept. 5. Various structural and operative details.

Apparatus for dispensing liquids such as gasoline or oils. Joseph A. Logan and Warren H. DeLancey (to Gilbert & Barker Mfg. Co.). U. S. 2,171,707, Sept. 5. Various structural and operative details.

Apparatus for heating liquids, e. g., liquid bitumen. T. Sugden Ltd. and Albert Hall. Brit. 506,392, May 25, 1939. The liquid is progressively heated while passing through a tank by superheated steam or other vapo

flowing through serially connected tube coils with intermediate resuperheaters in sep. furnaces.

Float-valve device for use in metering liquids such as fuel oil. Charles K. Bassett. U. S. 2,171,620, Sept. 5. Various structural, mech. and operative details.

Filtering material suitable for use in purifying liquids such as oils or sugar solutions. Stansbury M. Wilson and Wm. H. Waggaman (to Baugh & Sons Co.). U. S. 2,171,601, Aug. 22. A filtering material is prepd. by adding to finely divided phosphatic material, such as ground phosphate rock, a carbohydrate binding material such as starch, glue or molasses and NH_4 phosphate and gradually heating the mass to a temp. sufficiently high (suitably about 500°) to char the carbohydrate binding material and decompose the NH_4 phosphate.

Subjecting liquids to sound vibrations, for homogenizing milk, preparing emulsions, etc. Robert L. Williams (to Submarine Signal Co.). U. S. 2,170,178, Aug. 22. Various details of app. and operation.

Taps for containers such as those for holding liquefied propane and butane. Rosswell W. Thomas (to Phillips Petroleum Co.). U. S. 2,172,310-11, Sept. 5. Various structural details.

Pilot valve for controlling the level of liquids in tanks. Jean E. Christian (to Phillips Petroleum Co.). U. S. 2,171,394, Aug. 29. Various structural, mech. and operative details.

Intermittent control device suitable for controlling the flow of well fluids. Jeddy D. Nixon (50% to Wilson Supply Co.). U. S. 2,171,812, Sept. 5. Various structural and operative details.

Apparatus for atomizing liquids such as lubricating oils for pneumatic tools. Harold Holmboe and Andy B. Cosper. U. S. 2,171,932, Sept. 5. Various structural details.

Liquid-cooling apparatus, suitable for cooling water without freezing. Arthur R. Brown (to Westinghouse Elec. & Mfg. Co.). U. S. 2,171,740, Sept. 5. Various structural and operative details.

Apparatus for filling containers such as bottles with liquid soap compositions. Stanley R. Howard (to Pneumatic Scale Corp.). U. S. 2,172,132, Sept. 5. Various structural, mech. and operative details.

Separating solids from gases. John E. Fulweiler. U. S. reissue 21,185, Aug. 29. A reissue of original patent No. 2,076,815 (*C. A.* **31**, 3746[8]).

Drying apparatus for warps or like materials. Robert W. Moncrieff and Percy H. Miller (to Celanese Corp. of America). U. S. 2,171,731, Sept. 5. Various structural, mech. and operative details.

Apparatus for drying leather, lumber, hair felt, paper, rubber, etc. John B. Ohlson (to Ira M. Jones). U. S. 2,170,763, Aug. 22. Various structural and operative details.

Furnaces. John S. Zink. Brit. 506,509, May 30, 1939. An oil burner and a gas burner are so mounted in a furnace for heating stills, etc., that either can be removed without disturbance of the operation of the remaining burner.

Soaking-pit furnaces. Stein & Atkinson Ltd. and James S. Atkinson. Brit. 506,440, May 30, 1939. The cover of a soaking-pit is rotatably mounted on rollers, which move on a runway, and carries at its outer end a plate, which depends and moves in a trough containg. sand. The cover is provided with an aperture which is closed by a lid provided with a sand and other seal.

Pit-type reheating furnaces. Charles F. Forest. Brit. 505,790, May 17, 1939. They have regenerators at opposite sides and inlet and outlet ports at different levels and so arranged that the heating gases traverse the heating chamber in horizontal streams adjacent the side walls.

Portable heating furnace utilizing oil or gas, etc., as fuel. Raymond B. Millard. U. S. 2,171,941, Sept. 5. Various structural details.

Water cooled tuyères for shaft furnaces. H. A. Brassert & Co. Brit. 506,622, June 1, 1939.

Apparatus for the automatic charging and discharging of a rotary-hearth furnace. Olga Ehrendorff. Brit. 506,144, May 23, 1939.

Fans for circulating the atmospheres of furnaces through different paths. James Macdonald and G. W. B. Electric Furnaces Ltd. Brit. 507,545, June 15, 1939. Divided on 497,480 (*C. A.* **33**, 3745[9]). The fans are movable axially to any one of a no. of positions, in each of which they cooperate with appropriate ducts for a given path, while the ducts corresponding with the other paths are obturated to prevent circulation therethrough.

Burners such as Bunsen burners. Harry M. Ullmann. U. S. 2,171,816, Sept. 5. A metal gas-inlet tube is attached to the burner which has sufficient length that the heat which is transferred to it when the burner "strikes back" is dissipated so as not to damage a connected rubber gas-supply tube.

Blowpipe burners. I. G. Farbenindustrie A.-G. Brit. 506,504, May 30, 1939.

Apparatus for separating suspended particles from furnace fumes by baffling and centrifugal action. Leon Thuillard. U. S. 2,172,133, Sept. 5. Various structural and operative details.

Apparatus for various heat treatments. Geo. E. Markley. U. S. 2,171,340, Aug. 29. Various structural, mech. and operative details.

Heat-exchange apparatus (with adjacent spaced plates) suitable for heating air, etc. Emile Prat. U. S. 2,170,484, Aug. 22. Various structural details.

Straight-tube heat-exchangers. John R. Rylands Brit. 507,995, May 15, 1939.

Apparatus for producing smoke by spraying oil, with or without color and in the presence of a strong current of air, against a heated surface. Thomas M. Kinnear. Brit. 506,159, May 24, 1939.

Air cleaner, for liquid treatment and filtration. Herbert G. Kamrath (to General Motors Corp.). U. S. 2,171,752, Sept. 5. Various details of air cleaners suitable for use with internal-combustion engines.

Homogenizing various pulverulent materials by use of air currents. Edouard Hastert. U. S. 2,171,998, Aug. 29. Various details of app. and operation are described by this patent and by U. S. 2,171,399 (Edouard Hastert (to Louis Peters)).

Apparatus for heating, cooling, kneading, grinding and emulsifying materials such as in margarine manufacture. Lars K. V. Holstrup. U. S. 2,170,303, Aug. 22. Various details of an app. with coacting helically grooved rollers.

Rotary hammer mill for comminuting grain, stocks, seed minerals, etc. Theodore C. Alfred. U. S. 2,172,096, Sept. 5. Various structural, mech. and operative details.

Ball and tube mill for grinding various materials. Georg H. Schierstein. U. S. 2,170,768, Aug. 22. Various structural, mech. and operative details.

Hammer mill suitable for grinding grains, coal, rock, etc. John A. Erickson. U. S. 2,169,681, Aug. 15. Various structural and operative details.

Attrition mills for pulverizing ores, cement, rock, clay, etc. George A. Ainsa (in part to Dolores Ainsa). U. S. 2,171,523-6, Sept. 5. Various structural, mech. and operative details.

Mill with a reciprocating size-reducing chamber suitable for continuous operation in the treatment of ores, coal, cement clinker, etc. Louis A. Maxson (to Sullivan Machinery Co.). U. S. 2,171,515, Aug. 29. Various structural, mech. and operative details.

Apparatus for classifying metal-bearing sands, ores, etc., by flowing water. Charles J. Schifferle (50% to Walter W. Jolliffe). U. S. 2,171,674, Sept. 5. Various structural, mech. and operative details.

Apparatus for reclaiming ore, etc., from storage piles. Morris J. Andrada (to Robins Conveying Belt Co.). U. S. 2,171,528, Sept. 5. Various structural mech. and operative details.

Pressure vessels of material such as welded sheet metal and comprising interconnected hollow spheres. Hermann Dibor (to Dominion Oxygen Co., Ltd.). U. S. 2,171,972-3, Sept. 5. Various structural and mfg. details.

Piston valve for high-pressure reaction vessels. Joseph L. Stecher and Herbert H. Parker (to E. I. du Pont de

Nemours & Co.). U. S. 2,170,353, Aug. 22. Various details of app. suitable for rendering fats or for various chem. reactions.

Safety can for holding and pouring naphtha or other combustible or explosive liquids. Wm. A. Lebus (to Protectoseal Co. of America). U. S. 2,172,142, Sept. 5. Various details of pouring spout and vent construction, etc.

Cutting torch or blowpipe supplied with gas and oxygen Charles F. Carroll. U. S. 2,170,793, Aug. 29. Various structural and operative details.

Apparatus for preheating wet material such as gut strings. Lloyd E. Dimond (to Wilson & Co.). U. S. 2,170,747, Aug. 22. Various structural, mech. and operative details.

Capillary tube and bulb for thermostatic controls. Francis W. Sullivan (to United Wire & Supply Corp.). U. S. 2,170,612, Aug. 22. A method of forming a capillary tube and bulb for a thermostatic control involves reducing the diam. of a tube of relatively large size for a portion of its length to capillary size, leaving the other portion larger, and deoxidizing and dehydrating the entire surface of the unit so formed for its entire length.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Hamilton Perkins Cady. Arthur W. Davidson. *Ind. Eng. Chem., News Ed.* **20**, 660 1(1939).—A brief biography with portrait. E. J. C.

Max von Laue, 9th October, 1939. Max Planck. *Naturwissenschaften* **27**, 605-6(1939).—Sixtieth birthday, portrait. H. J. C. van der Hoeven

Alfred Berthoud 1874-1939. E. Briner. *Helv. Chim. Acta* **22**, 1227-38(1939).—Obituary with portrait and list of publications. G. G.

Willard Dell Bigelow (1866-1939). Fred C. Blanck. *J. Assoc. Official Agr. Chem.* **22**, No. ii-i. (Nov. 15, 1939).—An obituary with portrait. A. P.-C.

Philippe Chuit. J. Bolle. *Helv. Chim. Acta* **22**, 1238-41(1939).—Obituary with portrait and list of publications. G. G.

Volkmar Kohlschütter, 1874-1938. W. Feitknecht. *Helv. Chim. Acta* **22**, 1059-88(1939).—Obituary with portrait and list of publications. G. G.

Georg Lunge, 1839-1923. E. Berl. *J. Chem. Education* **16**, 453-60(1939); cf. *C. A.* **33**, 5242⁸. E. H.

Søren Peter Lauritz Sørensen. Edwin J. Cohn. *J. Am. Chem. Soc.* **61**, 2573-4(1939). An obituary with portrait. A. B. Garrett

Edgard Zunz, 1874-1939. J. La Barre. *Bull. soc. chim. biol.* **21**, 1040-2(1939). Obituary L. E. G.

Forerunners of Lavoisier from Mayow to Felice Fontana. Gino Testi. *Farm. ital.* **7**, 719-22(1939).—Historical. L. E. Gilson

Carl Wilhelm Scheele, the 150th anniversary. Lennart Smith. *Kgl. Fysiograf. Sällskap. Lund, Förh.* **7**, 80-98 (1937)(Pub. 1938)(in Swedish).—Biographical with portrait. W. C. Tobie

Composition and production technique of some Roman silver coins of the third century, A. D. Ernest A. Smith. *J. Inst. Metals* **65**, Advance copy No. 852, 5 pp.(1939).—Ten specimens of a hoard found at Dorchester contained approx. 40% Ag and 60% Cu. The coins had been struck cold from cast blanks with probable slight annealing before striking in the dies in some cases. H. S. v. K.

What are the sources of scientific information? T. E. R. Singer. *Chem. Industries* **45**, 417, 419-421(1939). E. H.

Modern chemistry, modern medicine, and modern food. E. C. Dodds. *J. Roy. Soc. Arts* **87**, 1115-27, 1131-42, 1148-58(1939). E. H.

The course in general chemistry. P. W. Selwood. *J. Chem. Education* **16**, 466-71(1939). E. H.

The essay examination in chemistry. Fred P. Fruechey and B. Clifford Hendricks. *J. Chem. Education* **16**, 491-3 (1939). E. H.

The atomic weight of hydrogen. Frank Brescia and Robert Rosenthal. *J. Chem. Education* **16**, 494-5(1939). —A review. E. H.

Recent work on aerosols, 1937-38; dust, smoke and fog. Karl A. G. Meyer. *Kolloid-Z.* **88**, 348-55(1939).—A review with 213 references. G. G.

The statistical investigation of related phenomena. Carl Boehm. *Chem. Fabrik* **1939**, 433-7, 445-51; cf. *C. A.* **32**, 4396⁶.—Math., with examples. J. H. Moore

Measurements of pH in the Atlantic and Pacific Oceans. Jules Rouch. *Compt. rend.* **209**, 634-5(1939).—Detn. of the pH of surface sea water on a voyage from Havre to San Francisco via the Panama Canal showed a somewhat irregular increase as the latitude was lower, from 8.08 in 50° N to 8.27 in 10°, but an even higher max. (8.26) off the west coast of Mexico and Central America. C. A. Silberrad

Theory of rotation transitions. Klaus Schäfer. *Z. physik. Chem.* **B44**, 127-62(1939).—By assuming a common orientation of coupled rotators in the 2 lowest quantum states, a theory of rotation transitions is obtained which is similar to order-disorder phenomena in mixed crystals. It differs from the latter in the dependence of the energy on the degree of orientation, since this depends not only on the potential energy but also on quantum states and energy values. The theory explains the marked effect of CH_4 on the CD_4 transition (cf. *C. A.* **32**, 6536⁷) as well as various peculiar hysteresis effects which have been observed. G. M. Murphy

Bonds of large molecules. Constantinos Askitopoulos. *Chim. Chronika* (Greece) **4**, 167-74(1939)(in Greek).—Lecture. Lucien V. Dyrenforth

Magnetism of chlorides of the palladium and platinum triads of elements. B. Cabrera and A. Duperier. *Proc. Phys. Soc.* (London) **51**, 845-58(1939).—The magnetic susceptibilities of $RhCl_3$, $OsCl_3$, $IrCl_3$ and $PtCl_2$ were measured by the torsion balance method, with electromagnetic compensation, over a range of approx. 300°, starting at room temp. The results for $RhCl_3$ agree with those previously obtained by C. and Fahlenbrach (cf. *C. A.* **29**, 2410⁵), and the results for all the cations can be represented by an equation of the form $(\chi + K)(T + \Delta) = C$. Expt'l. details of the method and of the special electromagnet used are described fully. The theoretical interpretation of the results is discussed. W. W. S.

Paramagnetic relaxation in gadolinium sulfate. W. J. de Haas and F. K. du Pré. *Physica* **6**, 705-16(1939)(in English).—A mutual inductance bridge is described by which the differential susceptibility of very pure cryst. $Gd_2(SO_4)_3.8H_2O$ in an external magnetic field was detd. at liquid-He temp. The results agree with the theoretical predictions of Casimir and du Pré (*C. A.* **32**, 6918³·⁴) and others. The sp. heat of the spin system and the relaxation time of the spin-lattice equil. were calcd. from these data. For a field of 1350 oersteds, the relaxation times at 4.236°, 3.515° and 2.998° K. are 0.0038, 0.0060 and 0.0080 sec., resp., reliable to approx. 15%. W. W. Stifler

The effect of lattice disturbances on ferromagnetic properties. H. Schlechtweg. *Tech. Mitt. Krupp Forschungsber.* **2**, 163-6(1939).—The ferromagnetic condition of a material is discussed theoretically on the basis of the definition that in this condition every monocrystal of the material is subdivided into zones that are practically spontaneously magnetized to satn. The apparently nonmagnetic state is due to the facts that the different zones are magnetized in different directions and that a definite magnetic condition appears only if the exterior field is sufficiently strong to cause all individual magnetizations to coincide with the magnetizing field. The theoretical discussion and corroborating expts. show that in the proximity of a lattice disturbance the crystal lattice is

inhomogeneous, i. e., is deformed from place to place in different manner; and as no practical material is free of such inhomogeneities in the crystal lattice the magnetic condition changes with the deformities. A formula for the components of the deformation is derived. **Effect of mechanical stresses on ferromagnetic properties.** *Ibid.* 167-70.—The considerations of the previous discussion are extended to mech. stresses, as this might have practical importance, e. g., with steels used in electromagnetic arrangements and subject to stresses due to cold-deformation in operation (permanent magnets, high-permeability steels). The changes in the interior energy distribution of the crystal lattice by mech. stresses in the magnetic state are theoretically investigated. It is derived that a deformation in the crystal lattice leads to a shifting of the place of the energy of the wall sepg. 2 elementary zones, and to the assumption of the existence of one part of the magnetic field strength which is independent of magnetostriction and of the anisotropy of the crystal. Seven references. M. Hartenheim

The validity of the law of Curie for oxygen at high densities. Max Kanzler. *Ann. Physik* **36**, 38-46(1939). — Curie's law is valid for ds. below 0.12 g./cc. (corr. to 20°) at temps. from 290 to 625°K. The Curie-Weiss law is valid at ds. above 0.20 S. Bradford Stone

The velocity of sound in liquid argon. H. W. Liepmann *Helv. Phys. Acta* **12**, 421-42(1939). -The method of obtaining sound velocities in liquids by observing the diffraction of light by ultrasonic waves is adapted for liquid gases at low temp. The velocity v in A is 642 m./sec. at −186.5° and 867 m./sec. at −197° and changes linearly in the interval. For *liquid* N_2 the figures are 868 m./sec. at −197° and 929 m./sec. at −203°. The error is 0.5%. A discrepancy of 20% is found between the compressibility derived from these sound-velocity measurements and that obtained from purely thermal data, which is outside the exptl. error. E. B.

The properties of flow of liquid He II. J. F. Allen and A. D. Misener. *Proc. Roy. Soc.* (London) **A172**, 467-91 (1939); cf. *C. A.* **32**, 1995[2]. The hydrodynamic properties of liquid He II were detd. from measurements of flow through capillaries and fine powder. The flow through capillaries bears no resemblance to ordinary laminar or turbulent flow. The effects of temp., pressure and capillary dimensions were investigated. The results are interpreted in terms of 2 types of flow occurring together in the liquid: a surface flow along the walls independent of pressure and another, predominant in large capillaries, having a viscosity of order 10^{-4} c. g. s. units which increases with decreasing temp. H. C. Thomas

The electrical conductivity of thin films of mercury. E. T. S. Appleyard and J. R. Bristow. *Proc. Roy. Soc.* (London) **A172**, 530-9(1939). - The results of an investigation of the elec. resistance of Hg films deposited in high vacuum on surfaces at 20.4 90°K. indicate that the delayed appearance of cond. as deposition proceeds is due to agglomeration of Hg into solid droplets and that the sudden onset of cond. is due to the touching of these droplets. The temp. coeffs. are pos. and reversible. Films > 500 A. in thickness deposited at 90°K. or lower can be regarded as coherent slices of strained metal. H. C. Thomas

Electrical conductivity and diffusion in semimetallic alloys. IV. Electrical conductivity and thermal potential of α-silver sulfide. H. Remhold and Karl Schmitt. *Z. physik. Chem.* **B44**, 75-97(1939); cf. *C. A.* **33**, 2009[8].—The elec. cond. was measured as a function of S pressure and of temp. Absorption of S as a function of S pressure and temp. was also measured. The e. m. f. of the cell Pt(S)| T_1 α-Ag_2S|Pt(S), T_2 was measured at temps., T_1 = 400° T_2 = 350; 350, 300; 300, 250° and at S pressures between 0.3 and 83 mm. G. A. Murphy

A method for the determination of the rate of dissociation of sulfur vapor. H. Remhold and Karl Schmitt. *Z. physik. Chem.* **B44**, 98-108(1939).—The elec. cond. of α-Ag_2S in the presence of S vapor depends on the shape of the cond. vessel (cf. preceding abstr.). If free communication is permitted between the region contg. the liquid S and the region contg. Ag_2S, the cond. is greater than in a vessel where S vapor reaches the Ag_2S only through a capillary. The effect is shown to be due to the rate of dissocn. and recombination of S vapor. A streaming method is described for measuring both rates. The half-time is of the order of 1 min. G. M. Murphy

Superconductivity of thin films. I. Mercury. E. T. S. Appleyard, J. R. Bristow, H. London and A. D. Misener. *Proc. Roy. Soc.* (London) **A172**, 540-58(1939).—Hg films prepd. in high vacuum were examd. in the superconducting state. The transition temps. to the superconducting state of films previously annealed at 90°K. or higher are close to that of the bulk metal. Films deposited at 4.2°K. and not annealed show displacement of transition temps. downward by about 0.2°K. No evidence of variation of transition temp. with film thickness was found. Crit. longitudinal magnetic fields (H_t) required to restore normal cond. were studied at various temps. $H_t/H_m > 1$ and increases rapidly with diminishing thickness; H_t/H_m increases steeply at the transition temp. (H_m is the crit. field for bulk metal.) Conclusion: There is an increase in field penetration as the transition temp. is approached. H. C. Thomas

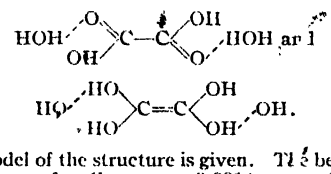
Principal piezoelectric modulus of quartz. André Langevin. *Compt. rend.* **209**, 627-8(1939).—The variations reported in the piezoelec. modulus of quartz, θ, ($4.94-7.18 \times 10^{-8}$) are due to the presence of twins with parallel optic axes, which are not detectable optically but only through the corrosion figures produced by, e. g., HF. When this cause of error is avoided, θ is found to be a true phys. const., roughly equal to 7.10×10^{-8}.
C. A. Silberrad

Modification of crystalline architecture by the action of weak torsion. R. Jacquesson. *Mécanique* **23**, 156-62 (1939).—X-ray patterns produced by a cylindrical crystal specimen of Al subjected to slight degrees of torsion, particularly 2°40', 4°, 5° and 6°, are quantitatively measured and interpreted. It is at once apparent that some planes in the crystal are more profoundly affected than others. The sharp cryst. interferences of the original Laue pattern are pulled out into elongated streaks in varying degree, depending upon the indexes of the planes, by an angular displacement of crystallites in a reticular layer of 45° with the axis of torsion. The results are considered in the light of several theories of deformation.
George L. Clark

Rotation of molecules in the crystal lattice. Chr. Finbak. *Arch. Math. Naturvidenskab* **B42**, No. 1, 71 pp. (1938).—The scattering of x-rays in a system of free electrons, atoms, homogeneous rotating and homogeneous free rotating mols., and of some phys. properties of crystals built up of rotating mols., i. e., thermal properties, dielec. const., deformability, and surface properties are discussed. In continuation of previous investigations on CBr_4, C_2Cl_6 and pentaerythritol (cf. *C. A.* **32**, 1996[5]) there are studied by means of Debye x-ray diagrams, the compds. from the camphor series *d,l*-camphene at about 20°, body-centered cubic, a about 8.00 A., 2 mols. per unit cell, *d,l*-camphor at 150°, a about 10.1 A., borneol at 190°, a about 10.25 A., and bornyl chloride at 110°, a about 10.39 A. The last 3 compds. can be represented best by a face-centered cubic lattice with 4 rotating mols. per unit cell (0,0, 0; ½, ½, 0; ½, 0, ½; 0, ½, ½). Succinic acid nitrile at ordinary temp. has a body-centered cubic lattice, a about 6.40 A., 2 rotating mols. per unit cell (0, 0, 0; ½, ½, ½). Strong blackening of the background was observed in all cases studied. The rotation of the mols. seems not to be completely free but to be coupled to a certain degree to that of other mols. Probably 2 mols. while rotating penetrate into their mutual rotation ranges. This is confirmed for CBr_4 and C_2Cl_6 by calcn. of the distance of the rotation center of one mol. from that of its closest neighbor. Debye diagrams of the compds. detd. directly below and above the m. p. show a great conformity. The arrangement of the mols. in the crystal powder and in the liquid at these temps. must be very similar. This can be explained either by assuming for the liquid a crystal-like structure being in a permanent change

or by attributing to it a compn. of small lattice ranges with a structure similar to that of the solid. G. N.

Studies of chemical bonds by means of Fourier analysis. III. The bond in quartz. R. Brill, C. Hermann and Cl. Peters. *Naturwissenschaften* 27, 676-7(1939); cf. *C.* 4. 33, 4675, 9062[8].—For study of the α quartz lattice a 1-mm. thick milk-quartz plate was used. In order to find electron-d. distribution it was necessary to have one Si-O bond in the projection plane; this is the case when the direction of the double axis is used, the angle between Si-O and the plane is only 30′ There were measured 470 reflexes of the *hOhl* zone, the quartz plate was ground corresponding to 1210. The results are shown of the electron-d. topography and a corresponding model diagram is given. The electron d. indicates that the bond between Si and O is such as would be expected if a spherical Si and a spherical O atom were set up at the specified distance, there is no electron excess at the "saddle point" such as is found in the diamond lattice. Conclusion: The Si-O bond is midway between hetero- and homo-polar. The parameters measured from the diagrams agree with the We[1] (*C. A.* 30, 2820[7]) data: $x_{Si} = 0.465$, $x_0 = 0.415$, $y_0 = 0.272$, $z_0 = 0.120$. P. **The oxygen bond in oxalic acid dihydrate.** *Ibid.* 677-8. Crystals of oxalic acid dihydrate sepd. from a soln. and grown as columns in the *b* axis direction were used for structure detn. About 250 reflexes of the *hOl* zone were used. The distance between C atoms is larger than found by Robertson and Woodward (*C. A.* 31, 1364[4]) probably because of a premature breaking of the Fourier series by them. With the R. and W. projection of zone *Okl* the at. distances found are C—C = 1.53, C—OI = 1.28, C—OII = 1.17, OI—H_2O = 2.51 and 2.96, OII—H_2O = 2.90 and 2.96. The C—C distance is normal; hence the "resonance structure" used by R. and W.[2] is incorrect. The present data indicate resonance of the 2 structures



A space model of the structure is given. The best parameter values are for C $x = -0.0014$, $z = 0.1014$, for OI $x = 0.1153$, $z = 0.1803$, for OII $x = -0.0903$, $z = 0.1634$, for H_2O $x = -0.1384$, $z = 0.4945$.
B. J. C. van der Hoeven

X-ray structure of potassium cupric bromide. Alfred Silberstein. *Compt. rend.* 209, 540-2(1939).—$KCuBr_3$, prepd. by evapg. in vacuum mixed solns. of KBr and $CuBr_2$, the latter in excess, crystallizes in very hygroscopic long thin (5 cm. × 1 mm.) needles. These are holohedral-monoclinic with *a* 4.28, *b* 14.43, *c* 9.71 A. β 108°23′, and 4 mols. in the unit cell, space group $C_{2h}^3(P2_1/m)$.
C. A. Silberrad

The crystal structures of rubidium and cesium sesquioxides. Alfred Helms and Wilhelm Klemm. *Z. anorg. allgem. Chem.* 242, 201-14(1939); cf. *C. A.* 33, 8073[9].—Studies of the higher oxides of the alkalies (cf. *C. A.* 33, 7640[4]) yielded several specimens whose compns., ds. and x-ray diffraction diagrams were consistent with the formulas, Rb_4O_6 and Cs_4O_6, resp. No K analog was encountered. Both are face-centered cubic, space group T_d^2 of the anti-Th_3P_4 type, with $a_0 = 9.30$ and 9.86, resp. Magnetic susceptibilities are consistent with a proportion of 2 O_2^- to 1 O_2^{--}. Twelve O_2 are in 12 (*a*) and 16 Rb or Cs are in 16 (*c*). In each case the parameter *x* is 2/37. Rb-O_2 distances are 3.54 and 2.95 A. Cs-O_2 distances are 3.74 and 3.12 A.
W. F. Bradley

The crystal structure and magnetic properties of metallic holmium. Heinrich Bommer. *Z. anorg. allgem. Chem.* 242, 277-80(1939); cf. *C. A.* 33, 5718[9], 6102[8].—Metallic Ho, prepd. by reducing $HoCl_3$ with K, crystallizes in the hexagonal close-packed arrangement with $a = 3.557 \pm 0.003$ A., $c = 5.620 \pm 0.005$ A., $c/a = 1.580$. The at. radius, with coördination no. 12, is 1.759 A.; the at. vol. is 18.65 cc. and the x-ray d. = 8.764. The magn. susceptibility corresponds to 10.6 Bohr magnetons.
L. L. Quill

Adsorption, flocculation and flotation of oxide minerals. Gust. G. Bring. *Jernkontorets Ann.* 123, 229-65(1939).—The quantity of fatty acid salts adsorbed from soln. was measured for apatite, hematite and quartz. Apatite adsorbed most and quartz least. Large particles adsorbed more per unit surface than small ones. Flotation was more effective with hematite and apatite than with quartz, but there was no good correlation between adsorption and ease of flotation. Reagent losse in flotation were smaller than calcd. on the basis of adsorption. Flocculation improves flotation initially, but with strong flocculation the flotation became less effective.
H. C. Duus

Active substances. XXXVIII. Further investigation of active substances by the method of Otto Hahns. Robert Fricke and Hans J. Bückmann. *Ber.* 72B, 1199-1206 (1939); cf. *C. A.* 33, 6690[8].—The increase in e. m. f. of active substances by H_2O adsorption was investigated. Expts. on the hydration of active MgO showed that the H_2O is first adsorbed and then chemically combined. The e. m. f. increases with the adsorption of H_2O and then decreases. The decrease in e. m. f. for finely divided γ-Fe_2O_3 was investigated up to very high pressures. With strongly pressed γ-Fe_2O_3 a decrease in e. m. f. instead of an increase (owing to H_2O adsorption in unpressed material) was obtained, because the adsorbed H_2O only replaces the air in the small capillaries and causes no change in the secondary structure. The strongly pressed samples take up much less H_2O and hold it more firmly than the unpressed samples. CuO cooled from a higher ignition temp. to room temp. showed, in contrast to slowly cooled CuO, a smaller e. m. f. During the adsorption of H_2O the e. m. f. is high, owing to stronger adsorption.
W. G. P.

Chemical specificity of various activated forms of the same crystalline structure. II. γ-Al_2O_3. Robert Fricke and Heinz Deifel. *Ber.* 72B, 1568-72(1939); cf. preceding abstr.—γ-Al_2O_3 with varying primary particle size adsorbs K^+ and PO_4^{---} from the equiv. K_2HPO_4 soln. in varying molar ratios. With increasing particle size the amt. of K^+ adsorbed increases in proportion to the amt. of H_3PO_4. The acid character of the adsorbent accordingly increases in the ratio of the alkalinity. **III. ZnO and α-Fe_2O_3.** Robert Fricke and Hermann Keefer. *Ibid.* 1573-6.—By measuring the increase of adsorption of K^+ and AcOH from K acetate soln. it was found that the ratio of the strength of the acid to that of the basic properties increases with activated ZnO with decreasing heat content. The trend of these ratios was reversed with activated α-Fe_2O_3. With ZnO increasing heat content was reduced chiefly by irregular lattice disturbances. The particle size (surface area) is important with α-Fe_2O_3.
W. George Parks

Correspondence between changes of state in two and three dimensions. D. G. Dervichian. *J. phys. radium* 10, 333-49(1939).—The states of uninol. films are shown to reproduce in detail the ordinary phys. states of matter. Solid, liquid, liquid-cryst. and gaseous states are considered. In the solid state of the film the correspondence with different cryst. forms is illustrated by the 2 states of films of the glycerides of myristic, palmitic and stearic acids. A theory of liquid films is developed. The existence of a transition state in films analogous to the liquid-cryst. state of matter in bulk is discussed. Crit. temps. for liquefaction and cryst. are introduced for superficial films. A summary of possible cases is given.
H. C. T.

Stability of bitumen emulsions. A. S. Korzhuev and V. V. Gridchina. *Zavodskaya Lab.* 8, 739-42(1939).—The stability of bitumens emulsified mechanically with various amts. of liquid soap, NaOH and water was tested in a centrifuge and the results are given in curves. For the same amt. of NaOH (0.2-0.33%) the emulsions contg. 2-2.4% soap were uniform, finely dispersed and stable, [illegible] is uniform [illegible] amt. of [illegible] content of the emulsifier. The emulsion contg. 2-2.4% soap had

the max. amt. of bound water and was more uniform and highly dispersed. The quality of the emulsions depended also on the pH. The more uniform and stable emulsions were obtained at a pH of 11–12. Conclusion: The quantity of water in the emulsified bitumen can be used to est. the stability of emulsions. B. Z. Kamich

Brownian molecular motion. Eugen Kappler. *Naturwissenschaften* **27**, 649–58, 666–70(1939).—A review of mol. motion, Brownian motion with and without external forces and its math. development. The influence of Brownian motion on measurements and its observation without microscope are discussed in some detail.

B. J. C. van der Hoeven

Determination of crystalline size from the broadening of electron interference. Th. Schoon and R. Haul. *Z. physik. Chem.* **B44**, 109–26(1939).—The size of ultramicroscopic crystals can be detd. from the broadening of electron-interference patterns similar to that with x-rays (cf. *C. A.* **24**, 2043). A standard prepn., which is free from increase of particle size, is needed. The method is most useful for sizes between 70 and 10 A. and for the smaller sizes is more certain than the x-ray method. Crystals of γ-Fe_2O_3, prepd. by the decompn. of $Fe(CO)_5$ in the presence of O at various temps., were studied and the smallest particle was about 17 A. This is the smallest stable nucleus of the oxide. The method is not precise enough to det. lattice consts. The theory of Lennard-Jones (cf. *C. A.* **25**, 1719) concerning the dependence of lattice spacing on crystal size could not be tested.

G. M. Murphy

Determination of the specific surface of fibrous materials. E. J. Wiggins, W. B. Campbell and O. Maass. *Can. J. Research* **17, B**, 318–24(1939).—The Kozeny equation (*Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse*, Abt. IIa, **136**, 271–306(1939)) relating specific surface and permeability of a bed of unconsolidated particles is applicable to fibrous materials such as glass, wool and celanese. The diam. of the constituent fiber may be as small as 0.0006 cm., while the ratio of length to diam. may be indefinitely large. Uniformity of size or of packing is not essential. H_2O and C_6H_6 were the liquids used.

J. W. Shipley

The effect of ultrasonic waves on colloidal phenomena. VI. The effect of ultrasonic waves on the rotation of high-molecular colloidal substances. 2. Experiments with tannin solutions. Naoyasu Sata. *Kolloid-Z.* **88**, 182–4(1939); cf. *C. A.* **33**, 7172⁴.—After exposure of 1, 5 and 15% solns. of tannin in H_2O and EtOH to ultrasonic waves no reduction in their rotation could be observed. However, the aq. solns. became darker and more turbid after exposure. Expts. in vacuum showed that this is due to the O from the air. The hydration layer of tannin is assumed to be thinner than that of gelatin, but firmer; hence the former is not affected by ultrasonic waves.

J. A. Szilard

Capillary systems. XXII. (4) The preparation and characterization of electropositive membranes. Erich Manegold and Karl Kalauch. *Kolloid-Z.* **88**, 257–73(1939); cf. *C. A.* **33**, 7173⁶. Positively charged membranes were prepd. whose dialysis potential in the cell 0.1 *N* KCl—membrane—0.01 *N* KCl amounted to −50 to −50 mv., so that the membranes could be regarded as nearly 100% permeable to anions. From electroosmotic and electrodialytic measurements it appears that the constancy of charge on these cellulose ester membranes, charged by sorption and impregnation, is not great enough to effect displacement of neutrality in solns. flowing through them. The dependence of the dialysis potential on the concn. of electrolytes and the fixed charges on the membrane substance was calcd. anew according to the equation of Meyer and Sievers (cf. *C. A.* **31**, 925¹) for the following values of the mobility quotients: ratio of concn. $c_r = 2$ c_a, u/v = 1000, 100, 10, 0.1, 0.01, 0.001; ratio of concn. $c_r = 10$ c_a, u/v = 1000, 100, 10, 7, 3, 1.67, 1.0, 0.60, 0.33, 0.14, 0.10, 0.01, 0.001, 0.0001. A new procedure is described for measuring the electroosmotic permeability of the membranes to water. If the dil. soln. in the upper cell is replaced with distd. water or with a highly dil. soln. of KCl the potential then measured depends upon whether or not the dil. soln. flows through; if the flow is interrupted the measured potential is always some millivolts neg. It is assumed that a diffusion potential is involved which is superimposed on the dialysis potential. When the customary KCl concn. is used, this effect does not appear. It must be taken into account, however, if the concn. of the fixed charges on the membrane substance is to be calcd. from the dependence of the dialysis potential on the concn. of salt. F. L. B.

The necessity of admitting chemical affinity between solvent and solute. O. Scarpa. *Atti accad. Lincei, Classe sci. fis. mat. nat.* **29**, 247–53(1939).—Math.

A. W. Contieri

Determination of molecular weights of high-boiling oil fractions. K. S. Ramalya and K. A. Shchegrova. *Zavodskaya Lab.* **8**, 404–8(1939).—Expts. by the authors and other workers on the detn. of the av. mol. wt. of pure hydrocarbons and high-boiling oil fractions by the cryoscopic method are reviewed critically. In detg. the temp. depression (Δt) it is necessary to introduce corrections by extrapolating the cooling curve after the start of crystn. The cryoscopic const. of the solvent (C_6H_6) should be detd. experimentally in each case and reduced to zero concn. to make it independent of the nature of the dissolved compd. In view of the effect of the concn. of the dissolved compd. upon the apparent mol. wt. the former should be extrapolated to zero concn. The mol. wts. of α-methylnaphthalene and naphthalene as detd. by this modified method differ from the theoretically calcd. values by less than 0.05%. Tabulated and graphical data of mol.-wt. detns. of solar and lubricating oils are given. Curves are given showing the cooling rates of C_6H_6 and C_6H_6 soln. of naphthalene, cryoscopic consts. of C_6H_6 in various hydrocarbons, and the effect of the concns. of naphthalene and α-methylnaphthalene upon their mol. wts.

B. Z. Kamich

The properties of dipicrylaminates. Jacob Kielland. *J. Am. Chem. Soc.* **61**, 2285–9(1939). A short color analysis of dipicrylaminates (I) was made. The molar vols., ds. of aq. solns., f.-p. depressions, equiv. conds. and heats of soln. of the Na salts were also detd. Strong assocn. effects due to van der Waals forces exist between the anions of I in dil. aq. solns. An interesting case of partial miscibility was noted in mixts. of I with aq. $CaCl_2$ solns.

H. W. Leahy

Electrolytic conductivity and hydrogen bridge formation. P. Vulff. *Naturwissenschaften* **27**, 661(1939).—Recently it was found (*Z. physik. Chem.*, in press) that in the system C_6H_6–EtOH cond. depends upon presence of traces of water. If it is assumed that all this water is dissocd., the protons probably assoc. with OH of the alc. Furthermore it is assumed that polar assocd. complexes with many OH groups are formed. Considering that the proton belonging to one of these OH groups can readily transfer its attachment to a neighboring OH group, it is easy to see how the polar assocn. phenomenon gives rise to cond.

B. J. C. van der Hoeven

The reduction-oxidation potential of earth. Yrjö Kauko and Maija Bonsdorff. *Suomen Kemistilehti* **12B**, 23–4(1939)(in German).—The system Pt|earth|glass electrode|0.09 *N* KCl + 0.01 *N* HCl|quinhydrone|Pt was used for the detn. of the reduction-oxidation potential of earth. The potentials under N_2 and under air for 5 samples of earth with pH values of 5.10, 4.85, 3.50, 3.29 and 5.01 were 518 and 632, 712, 729 and 725, 735 and 742, 745 and 740, and 535 and 550 mv., resp., calcd. against H_2 at 1 atm. pressure.

S. A. Karjala

Equilibrium reactions having high constants. N. A. Tatanac and M. S. Voshchinskaya. *Zavodskaya Lab.* **8**, 788–95(1939).—The reactions $AgBrO_3 \rightleftarrows AgIO_3$, $2AgBrO_3 \rightleftarrows Ag_2CrO_4$ and $Ag_2CrO_4 \rightleftarrows 2AgCl$ proceed to the right, 100% in 10 min. at 22°. For the third reaction the formation of AgCl goes to 100% in the presence of any excess CrO_4^{--}. The reaction $Ag_3Fe(CN)_6 \rightleftarrows 3AgCl$ goes 92.5% to the right and $L_p = 9.79 \times 10^{-26}$ for $Ag_3Fe(CN)_6$. The reaction $Ag_4Fe(CN)_6 \rightleftarrows 4AgBr$ could be

studied from the right to the left only and it proceeded to 2.88% and $L_p = 1.13 \times 10^{-42}$ for $Ag_4Fe(CN)_6$.
B. Z. Kamich

The gas-solid reaction as a function of its factors. E. Wicke. *Z. Ver. deut. Ing., Beiheft Verfahrenstech.* **1939**, 85–95.—Equations for isothermal reactions between gases and solids which are based on a univariable equil. are derived and related by means of pertinent factors. Graphic presentations are discussed. Equations are presented for the case of (1) const. concn. of the reacting gas in the free gas space, (2) const. reaction space and (3) gas stream through a long reaction path. Further subdivision into space reaction and surface reaction is used. 37 references. Karl Kammermeyer

Kinetics of the iodination of acetophenone in sulfuric and perchloric acid solutions. Lois Zucker and Louis P. Hammett. *J. Am. Chem. Soc.* **61**, 2791–8(1939).—The iodination of acetophenone was studied in 2 to 30% aq. $HClO_4$ solns. and in 0.5 to 66% aq. H_2SO_4 solns. The rate is detd. by the rate of enolization of acetophenone in the more dil. solns. and by the rate of the reaction of the enol with I in 51% and more concd. H_2SO_4 solns.; at intermediate acidities these 2 rates are of comparable magnitudes. A. B. Garrett

Trans-cis mutation of some cobaltic complexes. Jules Brüll. *Compt. rend.* **209**, 630–2(1939); cf. *C. A.* **31**, 2118².—The velocity, k, of the transformation *trans*-$[Co\ en_2\ X] \rightarrow$ *cis*-$[Co\ en_2\ X]$ in 0.01 *M* soln. in presence of 0.15 *M* KBr, KCl or KBr, HCl was observed. For X = Cl_2, Br_2 or (Cl, H_2O) $k \times 10^4$ = 1.09, 7.82 and 6.66, resp., the reaction is unimol. With X = $(NH_3)_2$, (NH_3, H_2O) or (NH_3, Cl) no such transformation occurs, but with X = $(H_2O)_2$ transformation is very rapid, being specially sensitive to the presence of acid. C. A. S.

Excitation of chain polymerizations by free radicals. II. Evolution of free radicals by decomposition of an azo compound. G. V. Schulz. *Naturwissenschaften* **27**, 659–60 (1939); cf. *C. A.* **33**, 8000⁶.—The polymerization of styrene by triphenylmethylazobenzene was studied. The azo compd. decomposes at 50–60° yielding free Ph_3C + Ph + N_2, 2 mols. of free radicals per mol.; it is finished in 3 hrs. at 70°. After this period no more polymerization takes place, the thermal polymerization being 10^5 times slower than the one excited by free radicals. Up to concns. of 3×10^{-5} moles azo compd. per mole styrene there is formed 1 mole polystyrene per mole azo compd. This yield drops for higher concns. (up to 66.7×10^{-5} mole per mole) to 31.5% owing to a side reaction consuming free radicals. The primary reaction at low concn. is purely a first-order one at 50 and at 60°, following $k = -(1/t) \log (1 - (x_t/x_\infty))$ with $\log k = 10^{12.2} e^{-23,500/RT}$, the times required for half termination of the reaction (half-period) being 54 and 21 mins. at the above temps. At higher concns. the soln. has a weak yellow-green color owing to a by-product formed from the free radicals as shown from calcd. and measured reaction consts. The degree of polymerization of the styrene as a function of the azo compd. concn. shows that fracture of the reaction chain takes place by 2 mechanisms: (1) 2 growing chains unite, and (2) a free radical joins the chain. The first mechanism requires that (gross reaction rate) × (degree of polymerization) = const.; actually it decreases somewhat with increasing azo compd. concn. With increasing azo compd. concn. the second type fracture predominates more and more, the av. ratio of the 2 types of fracture is 1 to 2–3. The azo compd. as such does not cause chain fracture.
B. J. C. van der Hoeven

Effect of ionic concentration on the degree of hemolysis in neutral salt solution. Hideo Takatuki. *J. Cantonese Med. Assoc.* **29**, 709–93(French abstr., 47)(1939).—The degree of hemolysis of both nucleated and nonnucleated erythrocytes by NaCl, $SrCl_2$, Na_2SO_4 and $MgSO_4$ solns. is proportional not to mol. equiv. or theoretic ionic concns., but to actual ionic concns. of the solns. calcd. from elec. cond., f. p. and Debye-Hückel effect of strong electrolytes.
S. Tashiro

Kinetics of oxidation of iodide by chlorate ion in the presence of catalysts. II. Ruthenium chloride as catalyst. Karl Weber and Ramiza Valić. *Ber.* **72B**, 1485–95 (1939); cf. *C. A.* **33**, 4498⁴.—The reaction velocity was detd. in the presence of varying concns. of HCl and $RuCl_3$. The dependence of the velocity const. on the concn. (0.005 – 0.25 *M*) of $RuCl_3$, $MnCl_2$, Na_2SO_4 and $NiSO_4$ was investigated. The neg. catalysts Na_2SO_4 and $NiSO_4$ were studied over a wide concn. range. The value of the velocity const. (0.05 *M* HCl) is 0.1280 at 25° and 0.3355 at 40°. The temp. coeff. for 10° is 1.90 and the activation energy 11,900 cal. W. George Parks

The physical chemistry of interfacial reactions. E. Wicke. *Z. Ver. deut. Ing., Beiheft Verfahrenstech.* **1939**, 127–30.—A discussion covering the following subjects: adsorption, kinetic processes at the interface, importance of the interface in reactions of solids, catalysis and energy-exchange at the interface. 17 references. K. K.

Catalytic hydrogenation of ethylene on copper-nickel alloys. G. Rienäcker and E. A. Bommer. *Z. anorg. allgem. Chem.* **242**, 302–12(1939); cf. *C. A.* **32**, 4416⁹.—The reaction velocity for the hydrogenation of C_2H_4 on Cu-Ni alloys shows a marked increase when the Ni content reaches 19.2–19.8 at. %. This compn. approximates that at which the alloy changes from red to white. The increase in catalytic activity is greater than is to be expected from the activation energies of Ni and Cu. Possibly it is caused by an increase in the no. of active areas on the surface of the catalyst. J. H. Reedy

Vapor-phase catalytic oxidation of organic compounds. Production of tolualdehyde and phthalic anhydride from xylene. W. Geo. Parks and Chauncey E. Allard. *Ind. Eng. Chem.* **31**, 1162–7(1939); cf. *C. A.* **30**, 2836⁸.—Compds. of Mo, V, Fe, Cr, Sn, Zr, Mg, K, W, Ti and Al were used separately and in various combinations as catalysts in the direct oxidation of xylene either in granular form or on a support of porous Al, activated alumina, asbestos fiber, silica gel, pumice or Alfrax. The effect of temp., time of contact and air/xylene ratio upon the type and amt. of product was studied. Results on 15 catalysts that showed an appreciable effect are reported. With a tin vanadate catalyst at 320°, a time of contact of 0.002 min.; and an air/xylene ratio of 13.4, a yield of 8% phthalic anhydride was obtained. With a V_2O_5 catalyst supported on Alfrax at 530° and an air/xylene ratio of 34, 18% phthalic anhydride was obtained. This catalyst gave yields varying from 45 to 85% phthalic anhydride on the basis of the amt. of xylene oxidized per pass. W. G. P.

Some properties of the dioxane–ethanol system. Robert W. Hopkins, Earle S. Yerger and Cecil C. Lynch. *J. Am. Chem. Soc.* **61**, 2460–1(1939).—The d., n_D and η data for the dioxane ethanol system are presented. The η curve passes through a min. at 50% dioxane concn. The b. ps. and the b. p.-compn. diagram were also detd. A min. b. p. of 78.13° was observed at 9.3% dioxane.
H. W. Leavy

Equilibria in the systems ethanol–water, ethanol–cellosolve and cellosolve–water. E. M. Baker, R. O. H. Hubbard, J. M. Huguet and S. S. Michalowski. *Ind. Eng. Chem.* **31**, 1260–2(1939).—By means of a special still, binary combinations of water, ethanol and cellosolve were distd. at 730 ± 1 mm.. A special head was used to prevent the return to the boiler of any vapors condensed in the upper portion of the column. The vol. of distillate withdrawn for analysis was small in comparison with the amt. of liquid in the still. The compn. of the distillate was detd. by refractometer and pycnometer measurements, and curves for the 3 systems were constructed. The system cellosolve–water has a const. boiling mixt. contg. 92.1 mole % of water, instead of 83.3 mole % as previously reported. J. H. Reedy

Equilibria between liquid and vapor in the system ethanol–cellosolve–water. E. M. Baker, R. E. Chaddock, R. A. Lindsay and R. C. Werner. *Ind. Eng. Chem.* **31**, 1263–6(1939).—By use of the app. referred to in the preceding abstr., *n*-compn. and d.-compn. curves were constructed for the systems ethanol–water, cellosolve–water and cellosolve–ethanol. A tertiary diagram for the whole system was constructed by keeping the mole % of cellosolve const. and varying the relative proportions of

ethanol and water. Corrections were made to adjust the compn. of liquid and vapor before the data were plotted. The accuracy of the data was estd. at 0.5 mole %. There was no evidence of a ternary const.-boiling mixt.
J. H. Reedy

The system NaCl–$NaClO_3$–H_2O. Arrigo Linari. *Ann. chim. applicata* **29**, 189–95(1939).—The equil. diagrams of the system at pressures down to 288 mm. Hg are detd. At 435 mm., b.-p. of the mix = 98.0° and ratio $NaClO_3$/NaCl = 3.841; at 400 mm., b. p. is 93.8°, $NaClO_3$/NaCl = 3.73; 366 mm., b. p. 92.5, ratio 3.89, 330 mm., b. p. 88.1°, ratio 3.80; at 28° mm., b. p. 84.9°, and ratio 3.91.
A. W. Contieri

Phase equilibrium relations in the system, Na_2SiO_3–Li_2SiO_3 SiO_2. F. C. Kracek. *J. Am. Chem. Soc.* **61**, 2863–77(1939); cf. *C. A.* **33**, 8783⁵.—The phase equil. relations, detd. by the method of quenching supplemented by thermal analysis, are described. The inversion temp. of quartz and tridymite of 870 ± 10° was confirmed. The *n*s of glasses of various compns. in the system were measured. Solid-soln. relations of Na and Li compds. in general are discussed and minor revisions are presented for the phase relations in the systems, Na_2SiO_3–SiO_2 and Li_2SiO_3–SiO_2.
A. B. Garrett

Newtonian potential and Carnot theorem. Letterio Labocetta. *Ricerca sci.* **10**, 468–70(1939).—Math.
W. F. Bruce

The problem of standards and mathematical signs in chemical thermodynamics. Erich Lange. *Kolloid-Z.* **88**, 89–96(1939); cf. *C. A.* **31**, 3776².—A simple reversible thermodynamic transition of energy between a substance (system) and an external energy (receiver) is completely characterized by the changes of their energies. This transition of energy can be simplified and sufficiently distinguished only by the standard. The decision between 2 magnitudes that have different initial signs depends on which standard is selected. The problem of transition from the standardless to the standard thermodynamics is discussed. The characteristic of a transition of energy in the sense of a "principle of the pos. abs. no." also in the sense of a "principle of the uniform standard" is considered. General observations are made on the real and historical state and to the desired solution of the problem. A system is suggested. 37 references.
W. G. P.

Calorimetric study of the system SiO_2–CaO–H_2O. Vittorio Cirilli. *Ricerca sci.* **10**, 459–61(1939); cf. *C. A.* **32**, 9428².—Plots of the no. of cal. per g. of CaO (370–520) against the ratio CaO/SiO_2, both dry and hydrated show that the heat of hydration increases with diminution of Ca. Two discontinuities correspond to CaO/SiO_2 = 1 and 1.5, resp. The former corresponds to the compd. SiO_2.CaO.H_2O, the latter, less distinct, to 3CaO.$2SiO_2$.–xH_2O. A plot of CaO g./l. (0.2 to 1.5) shows both discontinuities more clearly, and a study of the rate of dehydration gives like results.
W. F. Bruce

Hydrated calcium aluminates. Vittorio Cirilli. *Ricerca sci.* **10**, 556–62(1939).—The heats of soln. (cal./mol.) and heats of hydration for a series of hydrates are reported as follows: $3CaO.Al_2O_3$, 198.6, —; $12H_2O$, 126.1, 72.5; $9.4H_2O$, 129.8, 68.3; $7.3H_2O$, 34.7, 63.9; $6H_2O$, 140.2, 58.3; $2.7H_2O$, 165.5, 33.1; $1.5H_2O$, 173.1, 25.5; 2CaO.–Al_2O_3, 141.4, —; $8.8H_2O$, 97.6, 43.8; $7.24H_2O$, 103.1, 38.3; $5H_2O$, 108.9, 32.5; $3.8H_2O$, 115.2, 26.2; $1H_2O$, 1?4.0, 7 4; $0.63H_2O$, 137.0, 4.4; $4CaO.Al_2O_3$, 246.28, —; $12.8H_2O$, 154.0, 92.28; $11H_2O$, 158.9, 87.28; 9.46–H_2O, 162.1, 84.18; $8H_2O$, 165.8, 80.48; $4.9H_2O$, 191.6, 54 98; $2.5H_2O$, 2?0.5, 35.78. The intermediate hydrates in the first series are mixts. of dodecahydrate, hexahydrate and anhyd. material, a conclusion supported by Debye spectra. In the second series likewise, $5H_2O$ is held as H_2O of constitution, with various mixts.; but in the higher hydrates some H_2O is held as in zeolites. In the last series, $1H_2O$ is held as H_2O of constitution, the remainder as zeolitic H_2O. The Debye spectra of all these series are very similar.
W. F. Bruce

A new determination of the heat of formation of the oxides of manganese. H. Siemonsen. *Z. Elektrochem.* **45**, 627–43(1939).—The following heats of reaction were measured calorimetrically at 25°; ΔH is expressed in kg.-cal./mol.: $3Mn + 2O_2 = Mn_3O_4$, −336.5 ± 0.2; $3MnO + {}^1/_2O_2 = Mn_3O_4$, −57.0 ± 0.5; $3Mn_2O_3 = 2Mn_3O_4 + {}^1/_2O_2$, −24.8; $3MnO_2 = Mn_3O_4 + O_2$, −39.2. From these values the following heats of formation were deduced at 25°; Mn_3O_4, −336.5 ± 0.2; MnO, −93.1 ± 0.3 (combined with data of Roth[b]); Mn_2O_3, −232.7 ± 0.3; MnO_2, −125.4 ± 1.0 kg.-cal./mol.
John W. Knowlton

Syntheses and crystallographic study of the esters of the nitriles of the camphoric [acid] series and of β-cyanocampholide (Berthois, Vène) **10**. Appearance of color in adsorption on surface-active substances (Weitz, Schmidt) **10**. Action of water on natural Inder borates at various temps. (Selivanova) **8**. Oxidation-reduction potentials as applied to the study of the paragenesis of minerals (Shcherbina) **8**.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F. DUNCAN

The application of thermodynamic considerations to the normal state of the atomic nucleus. Satosi Watanabe. *Z. Physik* **113**, 482–513(1939).—The wave function of the normal state of a true nuclear atom deviates from that of the Hartree approximation in the sense that our knowledge of the state of a nuclear constituent particle is less than in the Hartree model. This makes it possible to characterize the wave function of a constituent particle through the distribution function and the entropy. The improvement in the Thomas-Fermi model of a heavy nucleus brought about by Euler by means of the perturbation calcn. deviates from the formalism of the Hartree model in so far as it approximates to a temp. distribution of impulse. In this investigation the surface effects and the Coulomb force are neglected.
S. Tolansky

The physical interpretation of crystallographic ion radii. H. Jensen. *Angew. Chem.* **52**, 583–6(1939).—The following subjects are covered: summary of theoretical considerations, the at. model of Thomas and Fermi, and theoretical calcns. of ionic radii. Data and 16 references are given.
Karl Kammermeyer

A new determination of the charge on the electron by the method of H. Busch. Egon Goedicke. *Ann Physik* **36**, 47–63(1939).—e/m_0 is $(1.7586 \pm 0.0023).10^7$ e. m. u.
S. Bradford Stone

The atomic constants *e*, *m* and *h*. F. Kirchner. *Ergeb. exakt. Naturw.* **18**, 26–77(1939).—A review, concluding with the present best values $e = 4.803 \pm 0.004 \times 10^{-10}$; $e/m = 1.759 \pm 0.0015 \times 10^7$; $m = 9.108 \times 10^{-28}$; *h* is either 6.626 (calcd. from the foregoing by the Ryd-

G-10221

berg formula) or 6.614 × 10^{-27} (from h/e as detd. by short wave limits in x-ray spectra). The discrepancy in the 2 values of h is left unexplained. 104 references.
C. D. West

Notes upon the electron pressure in the theory of plasma vibrations. R. Seeliger and M. Steenbeck. *Z. Physik* **113**, 526–30(1939).—In the elementary theory of plasma vibration given by Langmuir, the electron pressure is not taken into account. It is shown that the electron pressure plays no quantit. part and that the Langmuir frequency formula is correct from a practical point of view. S. Tolansky

The plasma state of gases. R. Rompe and M. Steenbeck. *Ergeb. exakt. Naturw.* **18**, 257–376(1939).—The first complete review of the subject of gases in the highly ionized state, named "plasma" by Langmuir. 579 references. C. D. West

Excess temperature in the glow discharge. Heinz Fischer and E. Golz. *Z. Physik* **113**, 360–6(1939).—The mean excess temp. in the glow discharge is studied with plane and hollow cathodes. Observations are made with H_2, He, Ne, A and air. Al is used as the cathode material in all cases. The pressure range studied is 0.1 to 8 mm. Cathode-fall energies up to 10 w./sq. cm. are measured. S. Tolansky

Luminescence of mercury vapor along an α-ray pencil, and transfer of nitrogen excitation to mercury. A. Luyckx. *Proc. Roy. Soc.* (London) **A172**, 492–501 (1939).—The green luminescence caused by α-rays in H_2 contg. Hg vapor was found to be due to the Hg triplet (5461, 4358, 4046 A.), a continuum with max. near 4850 A. and the resonance line 2537 A. Persistent phenomena were observed. No luminescence was found in the absence of N_2. The green luminescence was extinguished by air; H_2 had no quenching effect. H. C. Thomas

Total and partial power of emission of certain substances. II. A. Carrelli. *Atti accad. Lincei, Classe sci. fis. mat. nat.* **29**, 381–8(1939).—The emissivity of Pt, Ag, NaCl, LiCl, and KCl and also $CaSO_4$ and Na_2SO_4 were detd. in the temp. range 250–770°. The exponents were found to be 5.16 and 4.55 for Pt and Ag, resp., about 4 for all 3 chlorides, a value greater than 4 for the sulfates, while no definite values could be detd. for ZnO, MgO, CaO and CoO. A. W. Contieri

Energy distribution of secondary electrons at low temperature. Alexandre Bojinesco. *Compt. rend.* **209**, 512–13(1939).—The secondary electrons were obtained by bombarding an Al target with primary electrons of energy 300 e. v. They are captured by a sphere at potential v at the center of which the target is placed. The current thus collected at 90.5° and 293° abs. is plotted against v. Results show 3 groups of electrons: (1) primary electrons reflected at the target; (2) a group of energy 280–45 e. v. due to diffusion of primary electrons by atoms of the metal; and (3) a numerous group of energy 45–0 e. v., the true secondary electrons. The no. of secondary electrons of energy 45–0 is much smaller at the lower temp., while for those of energy 45–300 e. v. the curve for 293° is below that for 90.5°. This is possibly due to change in the cryst. structure of the metal at the lower temp. C. A. S.

An electrostatic high-tension lens of short focus. Manfred v. Ardenne. *Naturwissenschaften* **27** 614–15(1939).
F. J. C. van der Hoeven

The selenium photoelement. III. Properties in the high-frequency circuit. Fritz Goos. *Z. Physik* **113**, 334–49(1939).—A method is described enabling investigations to be made on the Se photoelement in high-frequency fields. The almost momentary photoeffect of the insulating layer with a spectral max. in the yellow-green does not come into action when high-frequency fields are used. The phenomena occur entirely in the base material. Investigations are made of time effect, spectral effect, light intensity and temp. effect. It is shown that there are certain relations between the observations and the properties of ZnS phosphors, from which it is concluded that a similar mechanism operates. The observations are explained as resistance-capacity changes in the semiconducting base material. S. Tolansky

The transformation of impulse voltages. With an appendix upon observations upon the scatter of electrons in the cloud chamber. Egon Heuse. *Z. Physik* **113**, 514–25(1939).—Investigations are made to see how far a transformation of impulse voltage in an air transformer can be used for the production of fast electrons. A voltage impulse is sent through the primary of an air transformer and the voltage produced in the secondary is employed for the acceleration of the electrons. The electron energies are measured with a cloud chamber. As high primary voltage impulses can easily be obtained, the method can possibly be adapted for use. Unfortunately after numerous expts., only a transformation ratio of 1.6 can be obtained. The method is therefore not very practical. In an appendix the paths of the electrons are studied.
S. Tolansky

Light excitation through homogeneous canal rays of low velocity. F. Engelmann. *Z. Physik* **113**, 462–81(1939).—A canal ray app. is described, enabling the light excitation to be studied for the collision of 2 corpuscular bodies. Measurements can be made in the low-voltage region, (1 to 10 kv.). The particles are produced in an arc discharge. By means of multiple acceleration of the ions of the arc, very homogeneous beams of canal rays are created. Both the homogeneity and the ion yield are better than with the usual Wien type of canal ray tube. Collisions of H atoms and ions with He are studied. In collisions of neutral H particles, the Balmer lines are found in the whole excitation voltage region, but the He excitation sets in only at 2000 v. In the case of collisions with H ions, very strong He excitation is observed. In order to distinguish between the effects of the different ions, expts. are made with high arc pressure (H_3^+) and in addn. magnetic analysis is employed. No precise expt. results are found, but it is very probable that the strong He excitation is produced by protons. This fact is in agreement both with other observations and with theoretical considerations. Excitation studies are made upon both light and heavy hydrogen. In a certain region the heavy hydrogen is more effective. In A collisions it is found that both excitations are the same. The observations made here are in agreement with the hypothesis of v. Dopel (cf. *C. A.* **30**, 6637[2]) upon the work involved in corpuscular collisions.
S. Tolansky

The scattering of α-particles in helium. S. Devons. *Proc. Roy. Soc.* (London) **A172**, 559–67(1939); cf. *C. A.* **33**, 8104[7].—The scattering of α-particles in He has been investigated for scattering angles of 27° and 38.5° for energies up to 8.5 m. e. v. The results are consistent with a broad level of Be^8 (which is assumed to possess a mass of 2 α-particles) with spin of 2 quantum units and with an energy of about 3.3 m. e. v. in excess of that of the ground state H. C. Thomas

Shower production by penetrating cosmic rays. A. C. B. Lovell. *Proc. Roy. Soc.* (London) **A172**, 568–82(1939).—A counter-controlled cloud chamber was used to obtain 5000 photographs contg. 463 electronic showers of not fewer than 5 particles. The effects can be accounted for as cascade showers produced by an electron which has been knocked-on by a direct collision with a meson.
H. C. Thomas

Absorption of penetrating cosmic ray particles in gold. J. G. Wilson. *Proc. Roy. Soc.* (London) **A172**, 517–29 (1939).—Absorption measurements of the penetrating component of cosmic radiation in 2 cm. Au indicate that absorption at energies $\sim$700 m. e. v. is due entirely to ionization. A very low energy track gave an estimate of the meson mass (170 ± 20) M_0. At energies >700 m. e. v. a few particles, probably protons, were observed which appeared to undergo greater absorption. It is suggested that a strong absorption of protons with the production of mesons takes place in 2 cm. Au. H. C. Thomas

Variations in great showers of cosmic rays with barometric pressure, altitude and time. Pierre Auger, Robley and Pluvinage, *Compt. rend.* **209**, 526–8(1939); cf. *C. A.* **33**, 3680[5].—From expts. at (I) Paris, and (II) Pic-du-midi (atm. pressure, resp., 10.3 and 7.3 m. H_2O) it is shown that the no. of great showers, N, of cosmic

rays recorded at II is approx. 3 times that at I (180 and 60), while the density of a shower (no. of trajectories/sq. m./hr.) at II is twice that at I (40 and 20); the nos. of coincidences per hr. at the 2 places with 2 counters (n_2) are 24.1 and 7.5/hr., and with 3 counters (n_3) 8.9 and 2.5, resp. Variations in n_2 at the same place follow closely those in barometric pressure, but appear to be quite independent of temp. There is no measurable diurnal variation in N. It may therefore be concluded that the directions of propagation of cosmic rays throughout the energy spectrum are distributed isotropically in space far from any celestial body. C. A. Silberrad

Long-lived radioactive isotopes of cobalt. Giovanna Barresi and Bernardo N. Gaccia puoti. *Ricerca sci.* **10**, 464-6 (1939).- Bombardment of Co or Fe with neutrons or deuterons yielded Co with half life of from 100 days to 5 or 10 yrs. (cf. Livingood, Fairbrother and Seaborg, *C. A.* **31**, 6552[2]; Risser, *C. A.* **32**, 425; L. and S., *C. A.* **32**, 5299[9]). Active Co prepns. from various sources were examd. to det. the half-life periods. Curves covering 450 days are shown for 6 samples. Three distinct types of Co were found: bombardment of Co with neutrons gave a prepn. with a half life of 4.7 yrs., a half life of 264 days and one of 58 days were obtained from Fe + deuterons. In various combinations these 3 account for all the observed results. A sample 17 months old in which the shortest-life portion was practically exhausted allowed exact detn. of the intermediate type. W. F. Bruce

The electron and positron spectrum of radioactive arsenic. W. Schaeffer and P. Harteck. *Z. Physik* **113**, 287-91 (1939).- Previous investigations upon the radioactive $_{33}As^{76}$ atom are extended and certain of the questions relating to the ordering of the thermal scheme are explained S. Tolansky

Relation between the half-life period and atomic weight of β-radioactive isotopes. Mario Ageno. *Ricerca sci.* **10**, 466-8 (1939).- A plot of at. wt. against $1/\log T$ where T is the half-life period often gives for the various isotopes of a given element a linear relation. Graphs for V, Nd and Tl are given. W. F. Bruce

Measurement of β-β coincidences. F. Norling. *Naturwissenschaften* **27**, 593 (1939).—An improved method for observation of β-β coincidences was found by setting up a vertical screen between 2 horizontal counter tubes and fastening the β prepn. above the edge of the screen. Scattering from one tube to the other is thus avoided. Thin-walled counter tubes are used under atm. pressure. A test of this method on Ra E and Au^{196} showed the 10% β emission of the gold in agreement with former work of Richardson (*C. A.* **33**, 6114[6]). B. J. C. v. d. H.

Cleavage of uranium. Bruno Ferretti. *Ricerca sci.* **10**, 471-4 (1939); cf. *C. A.* **33**, 9123[7].- Math. Calcn. of the probability that a given energy of excitation distributed over the 5 fundamental frequencies can call forth energy sufficient to produce rupture of the atom. W. F. B.

Separation of isotopes. W. Walcher. *Ergeb. exakt. Naturw.* **18**, 155-228 (1939).- The following methods of sepg. isotopes are reviewed and compared: electrolysis, diffusion, fractional distn. chem. exchange reactions, diffusion with a thermal gradient, centrifuge, mass spectroscope and photochem. reactions. Methods of detg. isotopic ratios in mixts. are also treated. The 192 references are complete since 1932 C. D. West

Experiments on the separation of isotopes. E. H. Riesenfeld *Arkiv Kemi, Mineral. Geol.* **13A**, No. 16, 11 pp. (1939).—The Hertz diffusion method (cf. *C. A.* **20**, 6774) of sepg. isotopes is improved by using continuous flow in an open system instead of a closed system. The advantages are: the expt. can be stopped at any time, since equil. among the units is established very quickly; the sepn. factor is about double that of the closed app. with the same no. of units; yield of product is increased. With a three-unit system, the sepn. factor for N^{15} is 4.5 and the yield per min. is 0.5 cc. The corresponding figures with a closed system are 2.3 and 0.01. A more powerful pump than the one used here (a Boltwood pump) will further increase the sepn. G. M. Murphy

X-ray emission spectra and electronic structure of

1 **aluminum-copper and aluminum-nickel alloys.** J. Farineau. *J. phys. radium* **10**, 327-32 (1939); cf. *C. A.* **33**, 4510[5].- The distribution of intensity in the x-ray emission bands due to the exterior electrons of Al ($K\beta_{2'}$) and of Ni or of Cu ($L\alpha$) in the alloys Ni-Al and Cu-Al is investigated. The results are discussed in terms of the phys. characteristics of the alloys and the quantum theory of metals. The Brillouin zones seem to exist. H. C. Thomas

2 **X-ray examination of nucleic acids and their structure.** P. Mazza and G. Tappi. *Arch. sci. biol.* (Italy) **24**, 526-31 (1938).—Thymonucleic acid produces 3 rings (r = 11.6; 15.2; 19.4 mm.) in a diffused background. The mixt. of thymonucleic acid (in which β predominates) gives a spectrum typical of the amorphous phase, one ring corresponding to a period of 4.7 A. surrounded by a halo. Various samples of yeast nucleic acid always give amorphous results. Guanylic acid produces 3 rings:
3 r = 17.4 (weak); 19.8 (strong); 21.6 (less weak) with reticular distances corresponding to d = 3.8; 3.4; 3.1 A. The 2 adenylic acids give results which can only be given in a large table. P. F. Metildi

4 **Fine structure of x-ray absorption edges.** G. H. Klaasmer. *Nederland. Tijdschr. Natuurkunde* **6**, 225-33, 241-52 (1939).- Absorption of x-rays is reviewed and the influence of the crystal lattice on the fine structure. In the second part the fine structure of x-ray-absorption by mol. gases is considered and the theoretical results are compared with exp. data. B. J. C. van der Hoeven

5 **The number of lines in a series as a function of electron pressure.** Fred L. Mohler. *Astrophys. J.* **90**, 429-38 (1939).— The no. of lines that appear in a spectral series should be a function of the electron concn. alone for a discharge of high c. d. From previously reported data (*C. A.* **33**, 1207[8]) on the discharge through Cs is derived the relation N_e = 23.06 - 7.5 log n_m, where N_e is the electron concn., and n_m the effective total quantum no. at which the higher series members merge into a continuous spectrum. From this relation values of electron pressures in stars of classes A and B have been calcd. at the limits of the Balmer and Paschen series and at wave length 4340 A., the differences between the pressures depending on the differences in opacity of H at these wave lengths. C. C. Kiess

6 **Ionic depression of series limits in one-electron spectra.** D. R. Inglis and E. Teller. *Astrophys. J.* **90**, 439-48 (1939).—The broadening of the high series members of alk. spectra and their fusion into the continuum near the series limits as described by Mohler (preceding abstr.), are here shown to be the effect of ionization in the atm. surrounding the atoms. The ion density N is correlated with the quantum no. n of the line with which the series
7 terminates by the relation $Nn^{4.5} = 0.027a_0^{-3}$, where a_0 is the radius of the first Bohr orbit. The greater part of the line broadening is due to Stark effect of the pos. ions, to which is added the collisional effect of the electrons; but for temps. under $(10^5/n)$ °K. the broadening due to electronic impacts is small. C. C. Kiess

8 **The chemical nature of the coloration in Jupiter's cloud forms.** Rupert Wildt. *Monthly Notices Roy. Astron. Soc.* **99**, 616-20 (1938).—The atm. of Jupiter is composed largely of NH_3 as revealed by the spectroscope. The colored bands in this atm. are attributed to the formation of solns. of Na in NH_3, which for temps. above −112° are reddish brown in color. The yellowish tints are attributed to $NaNH_2$ into which the Na-NH_3 soln. decomps. slowly with liberation of H. Since the temp. of Saturn is much lower than that of Jupiter the absence of conspicuous belts in its atm. is understood. C. C. Kiess

New identifications of Fe III in the spectra of early B stars. P. Swings, B. Edlén and J. Grandjean. *Astrophys. J.* **90**, 378-86 (1939); cf. *C. A.* **33**, 1589[8].—The spectrum of Fe III was observed with a large quartz spectrograph from 2000 A. in the ultraviolet through the visible region. The analysis previously reported (*C. A.* **33**, 1589[8]) is extended; it leads to an ionization potential of 30.48 v. for Fe^{++}. Many of the new wave length;

agree with hitherto unidentified absorption lines in the spectra of class B stars. C. C. Kiess

Transition probabilities for He I. Leo Goldberg. *Astrophys. J.* **90**, 414-28(1939).—General expressions are derived for the line strengths in the $2s - np$ and $2p - nd$ series of He I. C. C. Kiess

The sodium *D* lines in the light of the night sky. G. Cario and U. Stille. *Z. Physik* **113**, 442-8(1939).— The previously reported observations and hypotheses relating to the yellow glowing layer between dawn and night are discussed. It is to be expected that measurements made upon the line widths of the emitted *D* radiation will throw some light upon the excitation processes and state of the sodium which occurs in the yellow layer. An app. for these measurements is described. S. Tolansky

The third spark spectrum of krypton, Kr IV. A. Balankeswara Rao and S. G. Krishnamurty. *Proc. Phys. Soc.* (London) **51**, 772-7(1939).— The spectrum of a condensed discharge of about 20,000 v. through capillary tubes contg. Kr was studied in the ultraviolet with quartz spectrographs. About 180 lines are ascribed to Kr IV and 60 of these, ranging in wave length from 2677.34 to 3934.29 A., are classified as combinations of 25 levels. Lacking data in the Schumann region to check the analysis of near-ultraviolet data, an attempt is made to identify the $5s\,^4P - 5p\,^4D$ and $5s\,^4P - 5p\,^4P$ multiplets by extrapolating the frequencies of corresponding lines from isoelectronic spectra As I, Se II, Br III. The intervals of the $5s\,^4P$ term are found to be 3100 and 3223 cm.$^{-1}$. W. F. Meggers

Hyperfine structure of spectral lines. H. C. Burger and P. H. van Cittert. *Nederland. Tijdschr. Natuurkunde* **6**, 109-81(1939).—A review. B. J. C. van der Hoeven

Structure of iridium lines. L. Sibaiya. *Phys. Rev.* **56**, 768-9(1939).—The isotopic constitution of Ir was first detd. by Venkatesachar and Sibaiya from a Lummer-Gehrcke interferometer study of the hyperfine structure of its arc line 3513.67 A (*C. A.* **30**, 19[6]). It was shown that Ir consists of 2 odd isotopes of mass nos. 191 and 193, the isotope 191 being half as abundant as 193. It was inferred also that their nuclear spin moments were $\frac{3}{2}(h/2\pi)$ and $\frac{9}{2}(h/2\pi)$, resp. Now the hyperfine structure of 5 Ir lines (3800.10, 3513.67, 2924.81, 2849.74, 2639.70 A.) has been investigated with Fabry-Perot etalon interferometers having aluminized quartz plates. From the level separations of the isotopes it is concluded that the ratio of the nuclear magnetic moments of Ir (191) and Ir (193) is −0.592. W. F. Meggers

The hyperfine structure of the iodine spectrum. Th. Schmidt. *Z. Physik* **113**, 439-41(1939).— The hyperfine structures of the $5p^5(^2D)6p\ ^3F_3$ and $5p^5(^2D)6s\ ^3D_2$ terms of the spark spectrum of I are detd. by observations made upon the hyperfine structures of the lines 6516 and 6127, use being made of a Fabry-Perot interferometer and a water-cooled hollow cathode discharge tube. According to Tolansky (*C. A.* **33**, 4517[5]) deviations from the quadratic law for the position of hyperfine structure levels occur here and are attributed to the existence of an octopole moment. He pointed out that the observations gave too high a value for the latter. According to the measurements reported here, the above terms are completely fitted by the quadratic formula characteristic only of a quadripole moment, no evidence being found for deviations from this formula. S. Tolansky

Recent investigations of the Stark effect. H. Verleger. *Ergeb. exakt. Naturw.* **18**, 99-154(1939).— A review of the Stark effect in the H atom, in rare gases and other atoms and in mols. 182 references. C. D. West

The relative intensities of the Stark-effect components of the helium lines. Lennart Minnhagen. *Z. Physik* **113**, 292-301(1939).—Measurements are reported for the relative intensity ratios of the Stark-effect components of the ortho helium lines $2p\text{-}4q$ (q = *s*, *p*, *d*, *f*). The measurements are made by the canal-ray method in which the canal ray, field strength and direction of observation are at right angles to each other. Measurements are made up to fields of 400 kv./cm.; with the highest fields employed, nearly all the components are resolved. If the total intensity of the *p* components and the total intensity of the *s* components are assumed to be independent of the field for the line group $2p\text{-}4q$, the following is found: $2p\text{-}4s$ exhibits a fall in intensity, $2p\text{-}4p$ shows a rapid growth in intensity with the field strength and this appears to continue beyond the highest field used, $2p\text{-}4d$ loses in intensity when the field rises and $2p\text{-}4f$ quickly attains a max. of intensity such that the intensity of the *s* components remains const. while that of the *p* components falls slightly. The agreement with the theory of Forster is in general not quant. S. Tolansky

The relation between density and shift of the higher lines of alkali series by foreign gases. Chr. Füchtbauer and Gunther Häusler. *Naturwissenschaften* **27**, 658-9 (1939); cf. following abstr.—Fermi's theory (*C. A.* **28**, 3980[7]) of density as well as dielec. effect of a foreign gas on the shift of Na and K lines was further studied. In measuring lines $1s\text{-}14p$ up to $1s\text{-}20p$ of Rb with a Ne pressure of up to 36 atm. (600° abs., relative d. = 15.9) it was found that the violet shift is proportional to the relative d. without any sign of a change of shift to red values. Conclusion: Fermi's assumption of the dielec.-const. influence is erroneous. B. J. C. van der Hoeven

Broadening and displacement of the middle and higher potassium series lines produced by helium at high pressure. Chr. Füchtbauer and W. von Hevesen. *Z. Physik* **113**, 323-33(1939).— Measurements are carried out upon line widths and displacements of 8 potassium lines $1s\text{-}5p$ to $1s\text{-}12p$ in the presence of He to 52 atm. pressure. With $1s\text{-}4p$, only the width was detd. In every case the displacement is exactly proportional to the relative He density, even with the higher series lines. Because of this, doubt is thrown upon the correctness of the Fermi theory, especially upon that part concerned with the influence of the dielec. const. of the perturbing gas. For all observed densities, the max. breadth was attained with the $1s\text{-}4p$ line. Details are given for the behavior of the line widths. The width increases at a rate which is less than linearly proportional to the density. S. Tolansky

The isotope displacement effect in the Tl II spectrum. Peter Kohler. *Z. Physik* **113**, 306-22(1939).—New measurements are reported for the first time for the hyperfine structures of a large no. of lines in the first spark spectrum of Tl. A hollow-cathode discharge is used as a source and a Fabry-Perot interferometer as the high-resolving instrument. Observations are made upon the hyperfine structure isotope displacement. All the sepn. due to nuclear spin (magnetic) and all the isotope displacements can be ordered into a unified term scheme. The observed isotope displacements in the $6s\ ^2S_{1/2}$ term series exhibit good agreement with the inverse cube law for n_a derived from theory. The abs. values of the isotope displacements calcd. by means of the theory of Breit (cf. *C. A.* **27**, 3822, 5640) are too great by a factor of about 2. The displacement of the center of gravity is in the same sense in all the terms, namely the Tl^{203} terms lie deeper than those of Tl^{205}. This is in accord with theoretical prediction. S. Tolansky,

Application to the molecules concerned of the new analysis of molecular spectra. Henri Deslandres. *Compt. rend.* **209**, 612-16(1939); cf. *C. A.* **33**, 1592[1].—D's views are applied to the Raman spectra of PH_3, PD_3, C_6H_6 and C_6D_6. Multiples of his "universal const." 1962.5, such as 1479/(15 × 4), are necessary to secure agreement. C. A. Silberrad

Rotational analysis of the $A'^3\Sigma^+ \rightarrow a^3\Pi$ CO bands. L. Gero and Katalin Loriaczi. *Z. Physik* **113**, 449-61 (1939).—The $c' \rightarrow a$ bands, first found by Asundi (*C. A.* **23**, 5104), have up to now not been studied for rotational structure. The rotational analysis is carried out here. Measurements are made upon the band lines with a dispersion of 1.3 A./mm. Rotational consts. are found and are shown to differ by less than 1.5% from those previously derived from perturbation data alone. This therefore affords strong support for the perturbation method of deriving rotational consts. It is shown that the $a'^3\Sigma^+$

form exhibits a rather large spin splitting. Numerous misprints in previous work are pointed out. An extrapolation results in the following values for the $a'^3\Sigma^+$ term: $B_e = 1.331$ cm.$^{-1}$ and $\alpha = 0.016$ cm.$^{-1}$. S. Tolansky

A $^1\Sigma \rightarrow {}^1\Sigma$ transition of the C_2 molecule. O. G. Landsverk. *Phys. Rev.* **56**, 769–77 (1939).—The 2300-A. band of the carbon arc, previously measured by Heri (*C. A.* **28**, 5333[7]), who attributed it to a C_3 mol., has been accurately measured; photographs were used which were taken on a 30-ft. 34,000 line/in. grating spectrograph with exposures of 2 to 9 hrs. with a 20-amp., 220-v. carbon arc in a low pressure of He. The analysis shows definitely that the structure consists of superposed (0,0), (1,1), (2,2) and (3,3) headless bands of a $\Sigma \rightarrow \Sigma$ transition of C_2 (or possibly C_2^+). Alternate lines are missing in each series, as expected in view of the zero spin of the C nucleus. Most probably the transition is $^1\Sigma_u^+ \rightarrow {}^1\Sigma_g^+$ of C_2. The mol. consts. are very nearly equal for the upper and lower electronic states. They correspond rather closely to the av. values of the same consts. for other known states of C_2. The following values were obtained for the more important consts.: $B_e' = 1.8334$ cm.$^{-1}$, $B_e'' = 1.8223$ cm.$^{-1}$, $\alpha' = 0.0204$, $\alpha'' = 0.0195$, $r_e' = 1.2382$ A., $r_e'' = 1.2419$ A., $\omega_e' = 1748$ cm.$^{-1}$, $\omega_e'' = 1774$ cm.$^{-1}$, $\nu_0^{0,0} = 43{,}227.25$ cm.$^{-1}$. The ω_e values were obtained indirectly from the B and D values, since only one sequence of bands could be analyzed. W. F. M.

Visible and ultraviolet spectra of solid bodies. Georg Joos. *Ergeb. exakt. Naturw.* **18**, 78–98 (1939).—A review of the line spectra of crystals as observed both in absorption and in (fluorescent) emission. 45 references. C. D. West

An apparatus for the study of weak absorption. L. G. Bonner and H. Sponer. *J. Elisha Mitchell Sci. Soc.* **54**, 197–8 (1938).—Structural features of an apparatus for absorption-spectrum studies, especially in the photographic infrared, where large absorption layers are usually required. Colin W. Whittaker

Some optical properties of zinc silicate phosphors. F. A. Kröger. *Physica* **6**, 764–78 (1939) (in English).—When activated with Mn, Zn_2SiO_4 and Zn_2SiO_4-Be_2SiO_4 form solid solns. with Mn_2SiO_4. Solid solns. with less than 50% Mn display, at 25° and −180°, emission bands with max. at 5200 and 6100 A. Emissions are due to electron transitions in the Mn^{++} ion. This same series of solid solns. shows absorption in 3 regions. Excitation in all the absorption regions produces luminescence. **Fundamental absorption of ZnS-MnS and ZnS-CdS-MnS solid solns.** *Ibid.* 779–84 (1939) (in English); cf. *C. A.* **33**, 8483[4].—The fundamental absorption band of ZnS has a long wave-length limit at about 3380 A. Introduction of MnS produces a band with an edge at 3650 A. that is identical with the fundamental band of MnS. Introduction of CdS into ZnS-MnS phosphors displaces the fundamental absorption region of ZnS toward longer wave lengths. G. L. Gerhard

Spectral measurements between 0.2 and 0.5 mm. wave length upon a number of high-frequency insulation materials and oxides. Otto Marr. *Z. Physik* **113**, 415–30 (1939).—An app. is developed for enabling measurements to be made upon the transparency between 200 and 500 . The feeble intensity of the Hg arc can be utilized by using a high-speed spectrometer and a bolometer adapted to the wave lengths studied. From the recorded curves, absorption coeffs., and refraction quotients are derived and the relationship of these to wave length is detd. S. T.

The infrared spectrum and molecular constants of nitric oxide. Alvin H. Nielsen and Walter Gordy. *Phys. Rev.* **56**, 781–4 (1939).—The infrared absorption spectrum of NO has been remeasured under high dispersion with the result that the fundamental at 5.3 μ has been almost completely resolved. The absorption in this region comprises 2 superposed bands arising from a $^2\Pi_{1/2}$, $_{3/2}$ electronic ground state. In the P and R branches a great many of the lines split up into doublets, the components of which belong to these 2 bands, resp. The lines were found to fit the following empirical formulas:

$$\nu_\Omega = {}^3/_2 = 1877.36 + 3.34J - 0.019J^2 \text{ cm.}^{-1}, \text{ where } J = 0, \pm{}^3/_2, {}^5/_2, \ldots$$

$$\nu_\Omega = {}^1/_2 = 1877.00 + 3.42J - 0.019J^2 \text{ cm.}^{-1}, \text{ where } J = 0, \pm{}^5/_2, {}^7/_2, \ldots$$

An expt. curve in percentage absorption against frequency in cm.$^{-1}$ is compared with a theoretical intensity plot of the bands. From the new data some of the consts. have been recalcd., and compared with the results of the electronic band spectra. $I_0 = 1.63 \times 10^{-39}$ g. sq. cm., $r_0 = 1.15 \times 10^{-8}$ cm., $\nu_0 = 1891.3$ cm.$^{-1}$. W. F. Meggers

The adsorption of potential-determining ions. II Influence of the kind and concentration of opposite ions on the adsorption of potential-determining ions. Albin Kellermann and Erich Lange. *Kolloid-Z.* **88**, 341–7 (1939); cf. *C. A.* **32**, 37[8].—A review. G. G.

A hydrogen arc for absorption spectroscopy. A. J. Allen and R. G. Franklin. *J. Optical Soc. Am.* **29**, 453–5 (1939). E. H.

The infrared absorption spectrum of gaseous and liquid sulfur trioxide. L. Gerding and J. Lecomte. *Physica* **6**, 737–62 (1939) (in German); cf. *C. A.* **33**, 3845.—The spectral range investigated extended from 1.5 to 20 μ. Liquid SO_3 was studied in layers 0.01 to 0.2 mm. thick, and the gas in a column 10 cm. long. The gas mol. has a plane symmetrical configuration, with the fundamental frequencies 653, 1068, 1332 and probably 530 cm.$^{-1}$. In the liquid the fundamental frequencies are 530, 653, 1068 and 1378/1402 cm.$^{-1}$. The mols. are apparently assocd. in the liquid, probably forming a polymer contg. 3 mols. of SO_3 arranged in a six-membered ring that is not plane. The bands between 1.5 and 2.5 μ are analyzed in some detail. S. L. Gerhard

Infrared absorption studies of some glycols and ethoxy alcohols. F. T. Wall and W. F. Claussen. *J. Am. Chem. Soc.* **61**, 2679–83 (1939).—The data in the region of 2.8 μ indicate that the ethoxy alcohols can assoc. through the formation of intermol. H bonds, that substituted propanol and butanol can form stable rings and that glycols demonstrate H bonding. A. B. Garrett

The Raman spectra of aluminum and arsenic trimethyl F. Feher and W. Kolb. *Naturwissenschaften* **27**, 615–16 (1939).—The following values for frequencies were found in cm.$^{-1}$: $AlMe_3$ 147 (*m*), 317 (*s*), 457 (*s*), 599 (*w*), 694 (*s*), 687 (*m*), 723 (very *w*), 1231 (*s*), 1261 (very *w*), 1443 (*m*), 2826 (*m*), 2890 (*s*), 2934 (*m*), $AsMe_3$ 238 (*m*), 576 (*s*), 595 (*s*), 786 (*m*), 884 (*m*), 988 (*m*), 1036 (*w*), 1135 (*m*), 1242 (*m*), 1262 (*s*), 1418 (*s*), 2811 (*m*), 2849 (*w*), 2902 (*s*), 3021 (very *s*), 3051 (*w*) and for comparison $SbMe_3$ 188 (*s*), 513 (*s*), 813 (*w*), 1194, 1213 (*m*), 2905 (*s*), 2987 (*w*). If internal vibrations of Me are ignored these trialkyls can be taken as 4 mass bodies that should have 6 basic vibrations. The structure is either in one plane (triangular) with D_{3h} symmetry with 3 basic vibrations expected in Raman spectrum or pyramidal with C_{3v} symmetry and 4 possible Raman vibrations. By attributing frequencies above 1100 per cm. to Me, 7 frequencies are found in both cases. Pyramidal structure is thought likely with disturbance to cause the addnl. lines. Such symmetry disturbance can be due to mutual effects of the mols. in the liquid state or to twisting of the metal-Me bond; in the $AsMe_3$ spectrum doublets are found. The 7th frequency may be attributed to Fermi resonance or to assocn. **Raman spectra of trimethylaluminum etherate.** *Ibid.* 616.—The spectra of Et_2O 454 (*s*), 846 (*s*), 930 (*w*), 1158 (*m*), 1276 (*m*), 1430 (*s*), 1501 (*w*), 2700 (*w*), 2733 (*w*), 2811 (*s*), 2865 (*w*), 2931 (*s*), 2982 (*m*) and of $AlMe_3$-Et_2O 159 (*m*), 202 (*w*), 413 (*w*), 526 (*s*), 573 (*w*), 599 (*w*), 626 (*m*), 725 (*m*), 782 (*w*), 941 (*w*), 906 (*w*), 1003 (*w*), 1071 (*w*), 1098 (*m*), 1195 (*s*), 1340 (*w*), 1461 (*s*), 2783 (very *s*), 2818 (*w*), 2884 (*s*), 2929 (*s*), 2981 (*m*), are compared with that of $AlMe_3$ (preceding abstr.). The etherate spectrum is not additively composed of that of the 2 components. Conclusion: This compd. is a mol. compd. in which Et_2O and trialkyl are closely linked. B. J. C. van der Hoeven

Structure of formaldehyde from electron diffraction. D. P. Stevenson, James E. LuValle and Verner Schomaker. *J. Am. Chem. Soc.* **61**, 2508–10(1939).—Electron-diffraction photographs of monomeric CH_2O made with the use of fast electrons lead to an evaluation of C-O distance of 1.21 ± 0.01 A. From this distance and the accurately known moments of inertia, the C-H distance is 1.09 ± 0.01 A., and the H-C-H angle, 120 ± 1°. George L. Clark

Luminescent materials. II. Fluorescence spectra of zinc sulfide-copper crystal. Yasuo Uehara. *J. Chem. Soc. Japan* **60**, 675–84(1939); cf. *C. A.* **33**, 4522⁴.—The luminescence spectra of ZnS–Cu crystal were taken at −185°, 20° and 150° and the results discussed from the quantum mech. point of view. T. Katsurai

The polarization of the fluorescence of molecules in vapor form and in solution. Franz Suppe. *Z. Physik* **113**, 281–7(1939).—The degree of polarization of anthracene in soln. and in vapor form is detd. for varying concns. and also for varying vapor pressure. The no. of mols. per unit vol. is calcd. for both states of aggregation and the measured degree of polarization is detd., in terms of this. The polarization decreased with the concn. and with the vapor pressure. The degrees of polarization of anthracene dissolved in glycerol and in the vaporized state are practically the same in terms of anthracene mols. per unit vol. S. Tolansky

Sonoluminescence and sonic chemiluminescence. E. Newton Harvey. *J. Am. Chem. Soc.* **61**, 2392–8(1939).—In studying the cause and nature of the phenomenon of sonic chemiluminescence in aq. solns., H. concludes that both chemiluminescence from the activation of dissolved O_2 and luminescence due to elec. discharges assocd. with cavitation can be identified. Sonoluminescence of H_2O and aq. soln. increases in brightness with a decrease in temp., being absent above 40°. The influence, on the sonoluminescence of a large no. of nonmiscible org. liquids, of halogens and of other compds. was detd. R. H. E.

The quantum yield of monochloroacetic acid hydrolysis. R. Nelson Smith, Philip A. Leighton and Wesley G. Leighton. *J. Am. Chem. Soc.* **61**, 2299–2301(1939).—The quantum yield of the monochloroacetic acid hydrolysis is considerably lower than the previously established values, and varies with temp. at 2537 A., from 0.31 at 25° to 0.69 at 69°. It is independent of light intensity and concn. over the ranges studied. A mechanism involving competition between deactivation and decompn. is suggested. P. H. Emmett

The photosynthesis of carbohydrates from hydrated CO_2. II. C. C. Baly. *Proc. Roy. Soc.* (London) **A17**, 445–65; *Chem. Products* **2**, 117–19(1939).—When a surface of NiO contg. ThO_2 in the mol. ratio $1ThO_2$:24NiO adsorbed on kieselguhr is irradiated in the presence of hydrated CO_2 an org. compd. is photosynthesized. The first product of the synthesis, which gives the Molisch reaction after hydrolysis, is unstable and changes slowly at room temp. and rapidly at 60° to a stable compd. This colorless stable compd. can be hydrolyzed by taka-diastase to a reducing sugar and is probably therefore a type of starch. H. C. Thomas

Emission of ultraviolet radiation by, and thermolysis of, ferric azide. Charles Raczy. *Compt. rend.* **209**, 534–6 (1939); cf. *C. A.* **33**, 6162².—Decompn. of $Fe(N_3)_3$ is accompanied by strong ultraviolet emission; the energies of activation are 47 ± 2.5, 33.5 ± 4.5 and 64 ± 5 kg cal.; emission begins at 270° and the transition points are 3.3 ± 4° and 334 ± 5.6°. But if the $Fe(N_3)_3$ has been heated to 310° and cooled emission only begins at 305°, and only 2 energies of activation (34 ± 1 and 75 ± 5) are found. Enclosed in a vessel contg. air or N_2 $Fe(N_3)_3$ explodes at about 200°, the explosion temp. being slightly higher (230°) in N_2; ultraviolet emission is a max. at about 210°, then falling to zero, but reappearing on admission of air. By comparison with results with other azides it is inferred that the processes connected with the energies of activation, 64 and 47 kg.-cal., are independent of the metal, while 33 indicates some different mechanism of thermolysis. C. A. Silberrad

Absorption spectra of some S compds. (Morton, Stubbs) 10. Behavior of the photographic emulsion on illumination with weak ultraviolet light (Kölle) 5. Ag-pitchblende deposit at Contact Lake (Furnival) 8.

Geffcken, Heinrich, and Richter, Hans: Die Photozelle in der Technik. 3rd ed. Berlin: Deutsch-literarisches Institut Schneider. 95 pp. M. 2.50.

Luminescent material suitable for use with cathode-ray tubes. Humboldt W. Leverenz (to Radio Corp. of America). U. S. 2,171,145, Aug. 29. A cryst. luminescent material of different desired properties is represented by the general formula $x(ZnSiO_4)y(ZrSiO_4).Mn$; where the molar ratio x/y may be varied from 1/10,000 to 10,000. Cf. *C. A.* **33**, 2810⁷.

4—ELECTROCHEMISTRY

G. FINK

Electric melting of nonferrous metals and alloys. G. H. Clamer. *Metals & Alloys* **10**, No. 10, A32–2(1939).—A review of ten years' progress. 7 references. I. Hartmann

Electrolysis of fused potassium cyanate. A. Perret and J. Riethmann. *Compt. rend.* **209**, 595–7(1939).—When fused KNCO (at 340°) is electrolyzed the first-formed ions react with undecompd. KNCO: at the cathode $KNCO + 2K = K_2O + KCN$ (1), and $2KNCO + K_2O = K_2NCN + K_2CO_3$ (2), (2) being slower than (1). At the anode $2KNCO + 6NCO = 2KN(CN)_2 + 4CO_2 + N_2$ (3). The $KN(CN)_2$ partially polymerizes to K tricyanomelamine. The results were verified by detn. of the amt. of the products formed per Faraday when electrolysis was effected by passage of 1850 coulombs at the anode s. d. of 0.1 amp./sq. dm. C. A. Silberrad

Porous carbon electrodes. II. Oxidation of arsenite. Milton Janeš. *Trans. Electrochem. Soc.* **77**, 13 pp. (preprint)(1940).—By using a porous C anode in the oxidation of $NaAsO_2$ to Na_2AsO_4 it is possible to obtain conversions as high as 99% and to operate at c. ds. greater than 0.1 amp./sq. cm. while substantially 100% current efficiency is maintained. By employing also an air- or O-depolarized C cathode, deposition of metallic As at the cathode is avoided, the cell voltage is appreciably lowered and, as a result of oxidation of arsenite at the cathode, it is possible to obtain considerably more arsenate per unit of current than calcd. on the basis of anodic oxidation alone. Cathodic oxidation may proceed in 2 ways: in the first the oxidation is essentially "chemical," the rate being approx. equal to that obtained when air is diffused through the C in the absence of current; while in the second oxidation proceeds through H_2O_2 formed by the electrochem. reduction of O. In the latter instance it is possible to obtain over 4 times the yield of arsenate per kw.-hr. that can be obtained with Fe electrodes. The anode potential was found to be a linear function of the log of the c. d. at const. ratio of oxidant to reductant concns., and also a linear function of the log of this latter ratio at constant c. d. C. G. F.

Electroplating. Wm. Blum. *Metals & Alloys* **10**, No. 10, A26(1939).—A review of ten years' progress. 7 references. I. Hartmann

Determination of drag-out loss. Charles C. Conley. *Metal Ind.* (London) **55**, 297–8(1939).—See *C. A.* **33**, 5750⁶. J. E. D.

Electrodeposition of silver-lead alloys for bearings. Charles L. Faust and Beaumont Thomas. *Metal Ind.*

(London) **55**, 253-6(1939).—See *C. A.* **33**, 2814[8]. J. E. D.

Porosity of electrodeposited silver on steel. Frank C. Mathers and Lyle I. Gilbertson. *Metal Ind.* (London) **55**, 295-6(1939). —See *C. A.* **33**, 6768[1]. J. E. D.

The structure of heavy electrodeposits of copper and nickel. J. W. Cuthbertson. *Trans. Electrochem. Soc.* **77**, 19 pp. (preprint)(1940).— C. investigated the structural anomalies revealed from an examn. of a heavy Ni deposit and of several heavy Cu deposits. As regards the Cu specimens, the effect of current interruption was shown to cause semi-discontinuities in the structure, but as to how dangerous this type of defect may prove in practice, it is difficult to say. It is certain that annealing has a deleterious influence on such deposits, greatly increasing the brittleness, as in the case of Ni. So far as could be judged from simple hammering tests, the un-annealed striated deposits were not particularly brittle and in some cases were quite malleable. The un-annealed deposits showed directional variations in the x-ray structure and in the Brinell hardness. Un-annealed Ni specimens cut from the uniform central part of the square cathode, and not incorporating metal from the overgrown edges of the plate, proved to be extremely ductile. Annealing invariably caused rapid loss in ductility and the development of a brittle type of structure. The particular deposit examd. showed wide variations in the crystal grain size from one region to another, but this effect probably would be minimized if suitable precautions were taken in the prepn. of the cathode and throughout the deposition process. Finally, the existence of an intense fiber structure in the electrodeposited Ni, oriented perpendicularly to the cathode, has been demonstrated. C. G. F.

A study of the electrolysis of the sodium cuprocyanide solution. J. V. Petrocelli. *Trans. Electrochem. Soc.* **77**, 9 pp.(preprint)(1940). —The cathode and anode polarization values of Cu in Na cuprocyanide solns. of various concns. were detd. By using Fick's diffusion law as a guide, it is shown how the kinetic electrode potentials can be interpreted from the point of view of the diffusion process as well as from the ratio of Cu to CN ions. Some cathode and anode efficiencies were also obtained to show their dependence on the electrode soln. potential and the diffusion process. C. G. F.

Pretreatment of steel for nickel electroplating. W. Baller. *Schweiz. Arch. angew. Wiss. Tech.* **4**, 289-92 (1938).—The article to be plated is immersed as the anode in 37% H_2SO_4 with a c. d. of 10 amp./sq. dm. until a light-gray surface is obtained. The treatment is repeated until a dark or black color is obtained. A bright surface is next obtained by pickling in a H_3PO_4-H_2CrO_4 soln., and immediately plated in a soln. of 300 g./l. $NiSO_4.7H_2O$, 50 $MgSO_4.7H_2O$, and 17 H_3BO_3 with a c. d. of 3 amp./sq. dm. A. Lloyd Tayler

Nickel plating on cast iron. J. Lemens and J. Dupont. *Ing. chim.* **23**, 73-104, 120-41(1939).— The factors which influence the quality of the deposit were studied: compn. of the bath, temp., pH and c. d. Optimum conditions of the bath are discussed, the app. used and the methods for analyzing the constituents of the bath. A bath of 80% of sirupy industrial phosphoric acid and 20% of H_2SO_4 (53Bé.) gave good results with castings that were difficult to plate. The following formula is recommended for rapid nickel plating: $NiSO_4.7H_2O$ 300-350 g./l.; H_3BO_3 20; NaCl or NH_4Cl 12; H_2O_2 (2%) 1-2 cc./l. For a c. d. of 8-15 amp./sq. dm., the pH should be 4-5 (closer to 4 than to 5) and the bath should be heated to 50°. For cast Fe pieces with rough surfaces the c. d. should be reduced in proportion to the irregularity of the surface. Adherent deposits of a thickness up to 40 microns were obtained. 16 references. M. N. H.

Improvement in quality of metal deposits due to rotation of cathode applies likewise to metal deposits by "displacement." Roberto Piontelli. *Trans. Electrochem. Soc.* **77**, 10 pp.(preprint)(1940).—A careful analysis is made of the various conditions that affect the structure of electrodeposits. Attention is directed in particular to the improved structure of electrodeposits made on rotating cathodes. Metal ppts. obtained by displacement or cementation are likewise investigated, and theoretical considerations lead to the prognostication that rotation of the less noble metal would improve the quality of the cemented metal. Actual expts. fully confirm P.'s deductions. Zn rods were rotated at a peripheral speed of 1.8 m./sec. (5000 r. p. m.) in solns. of Ag, Cu, Pb, Tl and Cd. Compact microcryst., adherent, cemented metal ppts. were obtained. C. G. F.

Pipe protection. Current and voltage requirements for the cathodic protection of bare steel in salt water. Harry J. Keeling. *Am. Gas J.* **151**, No. 4, 54-8(1939).—See *C. A.* **33**, 8507[6]. J. E. D.

Electrical resistance of ferromagnetic amalgams. L. F. Bates and W. P. Fletcher. *Proc. Phys. Soc.* (London) **51**, 778-83(1939).—Amalgams were prepd. by electrolysis; they contain 0.149 to 0.458 g. of Co per 100 g. of Hg. The elec. resistance of thin threads of these amalgams was measured at a no. of temps. from 20° to 340° and compared with the resistance of a similar thread of pure Hg under identical conditions. The results are presented in a series of curves showing $\Delta R/R_T$ as a function of temp., where ΔR is the difference between the resistance of the amalgam thread and the resistance, R_T, of the thread of pure Hg. The type of curve varies somewhat with the concn. of Co, but on the initial heating each shows a sharp change in resistivity in the neighborhood of 340° from a value less than that of pure Hg to a value considerably greater. On subsequent heatings the transition temp. is lower. Two Fe amalgams, containing 0.213 and 0.497% Fe, resp., showed similar changes. The results are compared with those obtained previously for Ni amalgams. W. W. Stifler

Use of sodium-magnesium glass for glass electrodes. A. Pasynskiĭ. *Zavodskaya Lab.* **8**, 803-7(1939).—Glasses containing 27.83-31.3% Na_2O, 5.20-11% MgO and 59-64.69% SiO_2 and no CaO were tested for glass electrodes, measurements being made on the usual potentiometric set-up. The resistance of the electrodes was only 0.1-0.2 megohms. The electrodes acquire the value of the equil. potential very rapidly. For measuring pH of 2.0-9.0 with an accuracy of 0.03-0.05 pH the glass containing Na_2O 28, MgO 8 and SiO_2 64% may be used. Z. Z. K.

Paste compositions for isolated lighting plant lead storage batteries. E. H. Van Kooten and O. W. Brown. *Trans. Electrochem. Soc.* **77**, 9 pp. (preprint)(1940).— Storage batteries are compared in which the pos. plates were made with and without ball-milling the oxides preparatory to making the pastes. The pasted pos. plates were given 2 different curing conditions: one consisted of air-drying at room temp., while the other consisted of a steam vapor treatment. Two methods of preparing neg. pastes are also included which differed in the manner in which the H_2SO_4 was added to the oxide. After 449 cycles, the pos. groups cured at room temp. were essentially of the same capacity whether the oxides were ball-milled or not. Different curing treatments of the pasted pos. plates produced no noticeable difference in capacity when the oxides had not been ball-milled. After 400 cycles the negatives made with dil. H_2SO_4 showed 14% greater capacity than those made by adding H_2O first and later adding H_2SO_4. C. G. F.

The semiconductor theory of the blocking layer and point rectifier. W. Schottky. *Z. Physik* **113**, 367-414 (1939); cf. *C. A.* **33**, 4121[4]. —In the new theory of the unipolar phenomena at the boundary metal-semiconductor, the semiconductor no longer plays the part of a badly emitting electrode of a diode pair in which both glowing electrodes are separated by a potential barrier. Just as in the vacuum of a thermionic valve an electron gas between the electrodes is the carrier. This has current flow properties different from those of the vacuum-gas case. With large layer thicknesses the vacuum analogy fails because of the thermally dissocd. perturbation centers. In this case the semiconductor is much more like a space between 2 thermally emitting electrodes filled with Na vapor. A distinct resistance develops at the boundary metal-semiconductor when the thermal edge density of electrons is

maller than electron density owing to the perturbation centers of the neutral semiconductor. A space charge effect then forms which extends and causes the rectification action. This view is discussed in some detail. A historical survey of the subject is appended.

S. Tolansky

Electrolytic detn. of Zn (Šebor) 7. [Electrolytic] detn. of Cu and Pb in metallic Sb and Sn and in Sn babbit (Chernikhov; Shtutser) 7. Problems of Swedish steel production [electro-processes] (Hofsten) 9. Luminescent material for cathode-ray tubes (U. S. pat. 2,171,145) 3. Alloy for elec. contacts (U. S. pat. 2,170,451) 9. Electrically heated app. for cutting glass sheets (U. S. pat. 2,169,687) 19. Elec. furnaces for heating glass (Brit. pat. 506,696) 19. Tar acids or phenol from tar oil [by electrolysis] (U. S. pat. 2,172,415) 21.

Dry cell. Paul A. Marsal (to National Carbon Co.). U. S. 2,169,702, Aug. 15. Various structural details.

Storage battery. Samuel W. Rolph (to Willard Storage Battery Co.). U. S. 2,169,771, Aug. 15. Structural details.

Lead alloys for storage-battery electrodes. Geo. M. Bouton and Earle E. Schumacher (to Bell Telephone Laboratories, Inc.). U. S. 2,170,650, Aug. 22. Electrodes which have good strength and freedom from corrosion embrittlement are formed of Pb alloyed with Ca 0.01–0.15 and Ba 0.005–0.05%. Sr also may be used.

Electric capacitors. Frank M. Clark (to General Elec. Co.). U. S. 2,170,782, Aug. 22. Armatures such as those of Al foil are used with an intervening paper dielectric impregnated with a material such as a mixt. contg. trichlorodiphenylene oxide about 30–45 and pentachlorobiphenyl about 70–55%, the capacity of the capacitor being substantially const. over a temp. range of 25–75°.

Electric rectifier of the sulfide type. Leslie J. Ellison (to International Standard Elec. Corp.). U. S. 2,170,634, Aug. 22. A dry contact metal rectifier of the sulfide type has an electrode formed of a powd. sulfide such as that of Cu mixed with free S, and a heat-resisting impervious cover comprising an asbestos fabric coated with a heat-resisting and elec.-insulating enamel, paint or varnish.

Single-phase mercury-vapor rectifier. Johannes G. W. Mulder (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,170,482, Aug. 22. Various structural and operative details.

Rectifier tubes. Engbert H. Reerink and Mari J. Druyvesteyn (to N. V. Phillips' Gloeilampenfabrieken). U. S. 2,170,634, Aug. 22. An ionic discharge tube having an arc-like discharge comprises an anode, an envelope and a gaseous filling within the envelope having during operation a pressure between a max. value p_{max} and a min. value p equal to $1/2\pi\, p_{max}$, p_{max} being equal to 0.02 mm. of Hg in the case of A and for other gaseous fillings being values which result in a free path of the atoms of identical order of magnitude, and an incandescible cathode having a plurality of parts spaced apart by a distance at least twice the distance at which the entire cathode participates in the emission, the cathode having an electronemitting current capacity whose value is greater than $0.08 + 0.4p/p_{max}$ amp. per sq. cm. of active cathode surface and below the value at which unsatisfactory tube life is obtained.

Electrodeposition of aluminum. Frank C. Mathers and Robert D. Blue. U. S. 2,170,375, Aug. 22. For electrodeposition of Al upon dissimilar metals such as Fe, Cu and Zn, a d. c. is passed between an Al anode and the dissimilar metal as cathode in an electrolyte composed of the reaction product of benzene, an alkyl halide such as EtBr and an Al halide under a layer comprising benzene.

Electroplating with chromium. Morris Brown, Arthur M. Wagner and William Yonkman (to Western Elec. Co.). U. S. 2,172,344, Sept. 12. Bright heavy Cr coatings are deposited from an aq. bath of the chromic acid type, contg. about 250 g. chromic acid and 1–5 g. of sulfate per l., by passing a current of at least 2 amp. per sq. in. to the article to be plated as cathode, maintaining the temp. of the bath at 40–90° and adjusting the cathode to anode area ratio to about 1 to 3 to obtain a smooth deposit.

Electroplating zinc. Harold J. Barrett and Christian J. Wernlund (to E. I. du Pont de Nemours & Co.). U. S. 2,171,842, Sept. 5. Zn is deposited from a soln. contg. 1 g. per l. or less of polyvinyl alc., to produce a bright Zn deposit.

Electrolytic etching of metal plates such as those of zinc for printing. Francis J. Brislee and Reginald Blackburn (to Insulated Cables Ltd.). U. S. 2,172,158, Sept. 5. App. is described, and a method of etching the surface of a metal plate electrolytically which comprises placing the said surface which forms the anode parallel with a flat cathode, which cathode has an effective area so placed and dimensioned that when this area is orthogonally projected on the anode it lies within the boundary thereof, by an approximately constant distance, which distance varies from about one-fourth to one-half the distance between the anode and the cathode.

Electrolytic apparatus for the production of metallic shapes such as copper gaskets. Vernon L. Tannehill (25% to Walter W. Lepper). U. S. 2,171,437, Aug. 29. Various structural, mech. and operative details.

Decomposing nickel-copper mat. I. G. Farbenindustrie A.-G. Brit. 506,841, June 6, 1939. The mat is decompd. with a $CuCl_2$ soln. contg. sufficient $NiCl_2$ to keep the Cu_2Cl_2 formed in soln. From the solns. obtained, Cu and Ni may be sepd. electrolytically and the decompg. solns. may be reformed by treating with Cl from the deposition of Ni the solns. flowing from the Cu electrolysis, with adjustment of the Ni content if necessary.

Electric furnaces. American Magnesium Metals Corp. Brit. 505,617, May 9, 1939. In a furnace construction as described in Brit. 486,559 (C. A. **32**, 8959[9]), resilient members are provided in connection with the struts, and may consist of helical springs acting against adjustable abutments, or may be formed by elastic diaphragms on the shell, or may be in the struts themselves.

Electric arc furnaces. Kurt Schneider and Hermann Schunck (to I. G. Farbenind. A.-G.). U. S. 2,171,435 6, Aug. 29. Various structural, elec. and operative details.

Electric furnace and electrode mechanism suitable for metallurgical operations. Wm. E. Moore (to Pittsburgh Research Corp.). U. S. 2,169,808, Aug. 15. Various structural details.

Electric induction furnaces for melting aluminum and aluminum alloys. Manuel Tama. Brit. 506,980, June 7, 1939. A circular passage of rectangular cross-section filled with metal acts as the secondary of a transformer and passes around a primary coil with an Fe core.

Electric resistance furnaces. Soc. anon. des manufactures des glaces et produits chimiques de St.-Gobain, Chauny & Cirey. Brit. 507,280, June 13, 1939. The radiant heating-element of an elec. furnace has current leading-in members in the form of metallic chambers in which cooling fluid is insulated

Electric furnace heating elements. Siemens-Schuckertwerke A.-G. Brit. 507,846, June 20, 1939.

Electrically heated thermostatically controlled ovens. The General Electric Co. Ltd. and Olliver Wm. Humphreys. Brit. 507,141, June 5, 1939.

Treating gases and liquids with a high-tension electric field, as for separating suspended or emulsified materials. Harry A. Winternute (to Research Corp.). U. S. 2,171,617, Sept. 5. See Brit. 504,396 (C. A. **33**, 7216[2]).

Making holes or recesses in electric insulators of hard material such as porcelain, corundum or diamond. Patent-Treuhand-Gesellschaft fur elektrische Gluhlampen b. H. (to The General Electric Co. Ltd.). Brit. 507,-1., 1939. The insulator is immersed in an electrolyte, e. g., dil. H_2SO_4, a sharply pointed electrode is maintained in contact with its surface and a potential is applied between this electrode and a 2nd electrode arranged in the electrolyte such that an intermittent current flows. Sparking occurs at the point of the pointed electrode to wear away the insulator.

Cathode-ray tube. Geo. F. Brett and Geo. B. Banks (to Radio Corp. of America). U. S. 2,171,970, Sept. 5.

various details of a tube having a screen member with a mica support, a layer of metal such as Au and a fluorescing material such as Willemite on the metal.

Cathode-ray tube. Albert Rose (to Radio Corp. of America). U. S. 2,171,224, Aug. 29. A process of forming a photoconductive surface on an electrically conductive base such as a metal sheet involves depositing on the base a layer of refractory oxide such as oxide of Al or Zr, exposing the layer to the vapor of an alkali metal such as Cs and heating the base and assocd. layer of deposited alkali metal to photosensitize the layer, and baking the materials to impregnate the layer with the alkali metal and until the layer shows negligible photoelec. emission and negligible electrostatic storage.

Cathode-ray tube and associated apparatus for voltage measurements. Geo. M. Koch (to Radio Corp. of America). U. S. 2,171,216, Aug. 29. Various structural, elec. and operative details.

Cathode-ray discharge device. Wm. H. Painter (to Radio Corp. of America). U. S. 2,170,663, Aug. 22. Structural details.

Secondary electron-emitting electrodes such as those for amplifiers. Willem J. H. Schreinemachers (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,171,227, Aug. 29. A method of making secondary electron-emitting electrodes having high secondary electron emissivity involves producing a cloud of oxide of an alk. earth metal or MgO by burning an alk. earth metal or Mg in an oxidizing atm. and exposing a metal core body such as a cold Ni sheet to the cloud of oxide to form a layer of the oxide on the core body.

Photoelectric cathode. Paul Gorlich (to Zeiss Ikon A.-G.). U. S. 2,172,164, Sept. 5. An oxidized Cu or Ag base carries a layer of alkali metal such as Cs and a thin overlying layer of Pb, Sb or Bi.

Cathode for electron-discharge devices. Erich Wiegand (to Allgemeine Elektricitats-Ges.). U. S. 2,171,249, Aug. 29. A cathode support such as one of an alloy contg. Cu 95% or more and Ni 5% or less is provided with an oxide coating. Ca, Si or Ca boride may be used as a deoxidizing agent.

Glow cathode for heavy-duty discharge devices. Hans Kolligs and Robert Lauter (to Siemens & Halske A.-G.). U. S. 2,172,207, Sept. 5. A cathode is formed of a hollow metal tube such as one of Ni or Cu carrying a layer of sintered particles of Ni, Cu, Ag or Fe and an overlying electron-emitting coating contg. an alkali or alk. earth metal.

Arc-discharge device (with a mercury pool as cathode) suitable for controlling welding apparatus. Ernest G. Bangratz (to Westinghouse Elec. & Mfg. Co.). U. S. 2,172,185, Sept. 5. An auxiliary starting device such as a starting electrode is immersed in a Hg-pool cathode during normal operation of the device, and the Hg pool has a surface freely exposed to the arc from the anode, and damping means for waves on the freely exposed surface of the Hg, such as a mesh screen, is located entirely below the surface.

Luminescent tubes containing neon. Russell B. Leonard and Wm. E. Leonard. U. S. 2,171,705, Sept. 5. Various details of a device contg. Ne under reduced pressure and provided with a capsule contg. a reserve supply of gas which is liberated by rupture of the capsule when abnormally heated owing to depletion of the original gas supply.

Fluorescent or luminescent lamp compositions. Thomas M. Cortese (to Colorescent Laboratories, Inc.). U. S. 2,172,046, Sept. 5. A liquid compn. for coating tubes, bulbs or the like, such as those of elec. lamps and which may be formed of glass, contains about 1.5 g. nitrocellulose having a low viscosity of 50–100 sec., about 0.5 g. of camphor per 100 cc. of a solvent such as AmOAc, and also about 50 g. of powd. fluorescent or luminescent material such as Ca tungstate per each 100 cc. of the liquid binder.

Fluorescent lamp. Samuel Ruben. U. S. 2,170,066, Aug. 22. An ionic discharge lamp comprises a glass vessel filled with gas under low pressure such as Ne and Hg and contg. a mat of glass-wool fibers coated with a fluorescent material such as Cd silicate.

Electric incandescent lamp. Ernst Friederich and Wilfried Meyer (to General Elec. Co.). U. S. 2,170,683, Aug. 22. An incandescible body such as one of UO_2, TiO_2, V_2O_5, Cb_2O_5 or Ta_2O_5 comprising a rare oxidizable metallic oxide, which is conductive at ordinary temps., is used with an atm. comprising inert gas and a small amt. of O sufficient to cause the incandescible body to retain its electronic cond. at temps. of about 2000° but insufficient to cause conversion of such oxide to a higher form of nonconductive oxide.

5—PHOTOGRAPHY

E. R. BULLOCK

Proposal for a new tripack system for color cinematography. I. Guido Jellinek. *Progresso fot.* **45**, 337–8, 341 (1938); cf. *C. A.* **33**, 6735⁸.—In a tripack system for making sepn. negatives the blue-sensitive film is exposed through the support, the green-sensitive film, backed with a yellow filter layer, is exposed through the support, and the red-sensitive film is exposed with its emulsion in contact with that of the green-sensitive film. In order to focus all 3 images sharply, there is placed behind the lens a banded or zoned blue and yellow filter which has cemented on the yellow area a piece of glass thick enough to throw the focus back by a distance equal to the thickness of a film support. **II.** *Ibid.* 372, 375–6.—In making a motion-picture film color print from sepn. negatives a pos. film is first exposed behind the green record negative and color-developed to a magenta image. The Ag is oxidized to AgI, the film is exposed behind a superposed combination of the green and blue record negatives, and the image developed yellow. The Ag is oxidized again and the film is exposed 4 times through different combinations of negatives and is color-developed to a cyan image. The complex arrangements of the blue and red record exposures are intended to cancel out the effect of the absorption of the exposing light by the previously developed color images in the film. C. Ehrenfried

Behavior of the photographic emulsion upon illumination with very weak ultraviolet light. H. W. Kölle. *Fundamenta Radiologica* **4**, 115–31(1939).—The behavior of I. G. Farbenindustrie Emulsion 2000 toward very weak light of wave length 254 mμ is described. Especially pure monochromatic radiation was obtained by quadruple dispersion. A light path of 13.4 m. was used to reduce the intensity of radiation. It was found that in the range from 1×10^6 to 1×10^3 quanta per 0.0196 sq. mm., for times from 10^{-1} to 10^4 sec., the "quantum yield" for threshold ds. was practically const. Therefore, for this region the photographic plate can be used as an integrating receiver for wave length 254 mμ. If regions of higher energy are to be compared, this is possible only by means of a d. surface which is to be detd. for each emulsion under const. conditions of illumination and development. For very small energies, the quantum yields were higher, the longer the radiation acted at correspondingly lower intensities. The emulsion investigated proved to be an excellent qual. integrating receiver. For quant. applications, it is necessary, however, to have recourse to an experimentally detd. d. surface. C. H. Evans

Photoconductance of dye-sensitized silver bromide and the mechanism of dye sensitization. Naoto Kameyama and Tutomu Hukumoto. *J. Soc. Chem. Ind. Japan* **42**, Suppl. binding, 244(1939); cf. *C. A.* **32**, 2837⁷.—K. and H. found that the photoconductance of pure, fused AgBr (in the form of thin plates) shows a max. at 454–458 mμ, and is extremely small at 520 mμ. Sensitization with erythrosin, after first converting the AgBr into the "Ag-body," produces an addnl. max. of the photoconductance

at 560 mμ. Correspondence between the spectral ranges of photographic sensitivity and photoconductance is also shown with cryptocyanine and dicyanine. Conclusion: The latent image of dye sensitization is formed by the elevation of electrons to the conduction band by the energy absorbed by the adsorbed sensitizing dyes, the latter functioning as transmitters of energy. E. R. Bullock

A reversal phenomenon on photolytically formed silver (sodium nitrite bleach-out process). Hans Arens *Z. wiss. Phot.* **38**, 28–37(1939).—Using an otherwise strong v solarizing AgBr emulsion with the addn., before coating, of 0.5 g. of $NaNO_2$ per 100 cc., A. has further investigated the nitrite bleach-out effect (*Z. Elektrochem.* **32**, 498; *C. A.* **23**, 5122). This effect is obtained on darkening the plates by a heavy uniform exposure, washing thoroughly and drying, and then reexposing behind a positive On developing, either chemically or physically, A. now observes a reversal which corresponds with the direct effect. He finds also that the free Ag produced, alike without or after development, tends to increase with increasing exposure, although the no. of darkened particles becomes less in the bleach-out, or reversal, region. He concludes, therefore, that a coalescence of the Ag which seps. in the presence of nitrite, to larger particles, takes place during the 2nd exposure. E. R. Bullock

Coote, Jack H.: Making Colour Prints: Practical Photographic Methods. London: Focal Press. 123 pp. 5s.

Multilayer filter for use in color photography. Karl Schinzel (to Eastman Kodak Co.). U. S. 2,172,262, Sept. 5. A color filter comprises a support and 3 gelatin-Ag halide emulsion layers carried by the support, the layers being differently color sensitive, and substantially colorless filter layers absorbent of ultraviolet between the middle layer and each of the other 2 layers, the ultraviolet filter layers being insol. in ordinary photographic baths.

Photographic developers. Alfred Müller (to Agfa Ansco Corp.). U. S. 2,172,216, Sept. 5. A developing agent such as hydroquinone is used with an alkali metal salt of meta- or pyro-phosphoric acid, and with an aliphatic N-contg. polycarboxylic acid such as tetramethyldiaminomethanetetracarboxylic acid, to prevent "lime fogging."

Hardening photographic gelatin and emulsion layers. Cyril J. Staud and Grafton H. Keyes (to Eastman Kodak Co.). U. S. 2,172,300, Sept. 5. An acetal of an aliphatic aldehyde, such as glyoxal tetraethylacetal, is used as a hardening agent (suitably about 0.4% with a 5% gelatin soln. for an antihalation backing).

Antihalation layers for photographic materials. Olaf F. Bloch (to Ilford Ltd.). U. S. 2,171,911, Sept. 5. See Brit. 499,768 (*C. A.* **33**, 4894[6]).

Coloring photographic materials such as gelatin-silver halide layers. Béla Gáspár. U. S. 2,172,307, Sept. 5. A method is used which comprises dissolving, within the colloid used for the formation of a layer of photographic material, a sol. deriv. of an azo dye, such as a bisulfite addition compd., which contains an O or N atom linked to a C atom of the dye molecule and the radical of a polybasic acid in hydrolyzable linkage with the O or N, and splitting off the azo dye from the dissolved deriv. by hydrolysis. Numerous examples are given.

Coloring photographic materials such as gelatin-silver halide layers. Béla Gáspár. U. S. 2,172,308, Sept. 5. A method of coloring a photographic material with an azo dye involves incorporating into the colloid used a water-insol. azo dye component having an inorg. atom, such as a bisulfite addition compd., and which contains O or N linked to a C atom, and synthesizing the azo dye within the colloid from the insol. component, a hydrolyzing agent being used for splitting off the insol. dye component from the sol. deriv.

Photosensitive device suitable for testing purposes. Earl D. Wilson (to Westinghouse Elec. & Mfg. Co.). U. S. 2,172,232, Sept. 5. A photosensitive device comprises a Cu oxide having a translucent conductive film such as Ag, Au or Pt thereon, a natural resin layer such as rosin on the conductive film, and a conductive material such as an alloy of low m. p. fused to a certain portion only of the natural resin layer extending through the resin layer and making elec. contact with the translucent conductive film, the conductive film and natural resin layer having sufficient area clear of the alloy for the passage of light for the actuation of the device

Photographic desensitizing. Walter Dieterle and Sebastian Gassner (to Agfa Ansco Corp.). U. S. 2,172,192, Sept. 5. A process of desensitizing a light sensitive Ag halide emulsion comprises treating the emulsion with an aq. soln of an ether or thioether, the ether atom of which is linked on one side to an anthraquinone nucleus and on the other side to a member from the class consisting of aliphatic radicals, aromatic radicals, and heterocyclic radicals, the compd. contg. at least one of the groups SO_3Na and SO_3K. Cf. *C. A.* **33**, 641[4].

Masking photographic color-separation negatives. Wm. J. Wilkinson (to Miehle Printing Press and Mfg. Co.) U. S. 2,170,883, Aug. 29. A process of masking a set of color-sepn. negatives of a subject involves making a positive-transparency from one of the color-sepn. negatives, opaquing all tone portions of the positive-transparency leaving all whites transparent thereby providing an opaqued master-mask, coating the emulsions of a plurality of the color-sepn. negatives each with a light-sensitive stratum, registering the master-mask on the strata in turn, and while so registered exposing the corresponding stratum to light through the master-mask, and developing and rendering the exposed parts of the strata opaque, whereby each such treated color-sepn. negative has its own individual mask affixed to its emulsion in proper register.

Reproduction of graining such as that of wood by a photographic method. Frank L. Lee. U. S. 2,171,578, Sept. 5. Various operative details for matrix plate production.

Blueprint coating compositions. Garnet P. Ham (to American Cyanamid Co.). U. S. 2,172,319, Sept. 5. A light-sensitive ferric salt such as ferric NH_4 oxalate is used with a sol. ferricyanide such as that of K or Na and a quaternary NH_4 compd. such as trimethylbenzylammonium hydroxide which serves as a sensitizer. Cf. *C. A.* **33**, 851[9].

Toning photographic prints. Francis H. Snyder and Henry W. Rimbach (to Technico, Inc.). U. S. 2,171,609, Sept. 5. In toning a Ag photographic print with replacement of the Ag image at least in part with a CdS image, the print is immersed in an aq. treating bath contg. a sol. Cd salt, a sol. ferricyanide and a hydroxy aliphatic acid such as citric acid capable of forming a complex metal-acid ion, and the Ag compd. is removed from the print by dissolving it in a soln. of a sol. thiosulfate or thiocyanate, and the print is washed and then immersed in a soln. contg. a sol. sulfide. Numerous similar treatments are described.

Photographic safelight. Earl M. Lowry (to Eastman Kodak Co.). U. S. 2,172,249, Sept. 5. A light filter is used which absorbs red and infrared light, comprising a colloidal medium such as gelatin in which is dispersed Cu acetate or Ni acetate and an ethanolamine

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

Action of ammonia gas on anhydrous or hydrated magnesium chloride. Léon J. Olmer and Marie Louise Quinet. *Compt. rend.* **209**, 513–16(1939).—$MgCl_2.6NH_3$, obtained by passing NH_3 over anhyd. $MgCl_2$, is more conveniently obtained by passing dry NH_3 into a soln. of $MgCl_2$ in anhyd. EtOH, when it is pptd. in white octa-

he a, insol. in C_6H_6 or Et_2O, and stable in a sealed tube, but slowly decompd. in dry air. In a vacuum at 15° it passes into $MgCl_2.4NH_3$, at 111° into $MgCl_2.2NH_3$, and at 800° to $MgCl_2$ with no trace of nitride. A convenient way of prepg. $MgCl_2$ is therefore to dry $MgCl_2.6H_2O$ at 100°, thus forming $MgCl_2.4H_2O$; this is calcined producing $MgCl_2$ contg. 25% MgO; the $MgCl_2$ is dissolved out by EtOH, pptd. by NH_3, the ppt. washed with C_6H_6 and calcined. The action of NH_3 on $MgCl_2$ dissolved in EtOH varies with temp. and concn.; at 70° only MgO and NH_4Cl are formed; at 20° and concn. below 6% $[Mg(NH_3)_6H_2O]Cl_2$ is obtained, which on calcination gives $MgCl_2.MgO$; with concn. above 6% between −20° and +20° $[Mg(NH_3)_5(H_2O)_3]Cl_2$ (cf. Spacu and Ripan, *C. A.* **17**, 2090). MeOH and PrOH can be used in place of EtOH, but less satisfactorily. C. A. Silberrad

Recent developments in the chemistry of the boron hydrides. I. The structure of the boron hydrides. A J E. Welch. *Chemistry & Industry* **1939**, 869–72. E. H.

Graphite and graphite compounds U. Hoffmann. *Ergeb. exakt. Naturw.* **18**, 229–56(1939). A review of the properties and structure of graphite and its compds. with alkali metals (ideal formulas C_8M and $C_{16}M$); with F (CF); with O (C_2O); and with inorg. O acids ($C_{24}HSO_4.2H_2SO_4$). C. D. West

Systematic study of affinity. XC. Germanium phosphide. Maria Zumbusch, Max Heimbrecht and Wilhelm Biltz. *Z. anorg. allgem. Chem.* **242**, 237–48(1939); cf. *C. A.* **33**, 9062[2]. Ge phosphide, GeP, was formed by heating fine Ge with an excess of P to temps. of 400° or more in an evacuated tube. The reaction is incomplete. Ge was detd. in the reaction products by pptg. GeS_2 by H_2S from weak HCl solns. in the presence of reducing agents, to prevent formation of S. X-ray analysis showed that products contg. Ge and P in the at. ratio 1:1 give a pattern distinct from both free Ge and free P. This conclusion is confirmed by tension measurements on mixts. heated to definite temps. The heats of formation are estd.: 4Ge (solid) + P_4 (gas) → 4GeP (solid) + 37 kg.-cals.; Ge (solid) + P (white) → GeP (solid) + 6 kg.-cals. **XCI. Zirconium sulfides.** Erich F. Strotzer, Wilhelm Biltz and Karl Meisel. *Ibid.* 249–71.—Zr sulfides were prepd. by heating metallic Zr with excess of S to about 700° in a closed tube. The Zr in the product was detd by oxidation to ZrO_2 in a stream of air. Five products of the general formula ZrS_n were reported: Z S_3, ZrS_2, Zr_2S_3, and 2 lower sulfides in which n = 0.75 and 0.20–0.33 resp. The description of the lower sulfides is vague; presumably they are solns. of other sulfides in excess S. Pure ZrS_2 was prepd. by the action of H_2S o... $ZrCl_4$ obtained from ZrO_2 in a tube protected against air and moisture. ZrS_3 was made from ZrS_2 by heating with S / ZrS_2 nd ZrS_3 were examd. by tension, x-ray and density methods. The heat of reaction, ZrS_2 (solid) + S (rhombic) → ZrS_3 (solid) + 8.5 kg.-cals., was detd. ZrS_2 is orange-red, ZrS_2 brown, and Zr_2S_3 black with a bluish sheen. The lower sulfides are black to gray. ZrS_2 is saltlike in nature; it shows the reactions of a salt, and its mol. vol. can be calcd. from the at. vols. of its ions. ZrS_3 is regarded as a polysulfide. The lower sulfides are "half-metallic," and approach metals in such properties as color or cond. J. H. Reedy

Fluorination of phosphorus trichloride. Harold S. Booth and Abe R. Bozarth. *J. Am. Chem. Soc.* **61**, 2927–34(1939); cf. *C. A.* **27**, 5018. The chlorofluorides of P were prepd. by (*a*) the Swarts reaction between PCl_3 and SbF_3 in the presence of $SbCl_5$ as a catalyst, (*b*) the reaction between PCl_3 vapor and hot CaF_2, and (*c*) the reaction between PCl_3 and PF_3 in a hot tube. $PFCl_2$ b. 15.85 ± 0.05°, heat of vaporization 5950 cal./mol., Trouton's const. 20.7, m. −144.0 to −144.4°, mol. wt. 122. PF_2Cl b. −47.3°, heat of vaporization 4200 cal./mol., Trouton's const. 19.1, m. −164.8°, mol. wt. 105.5 PF_3 b. −101.1°, heat of vaporization 3 89 cal./mol., Trouton's const. 20.3, m. −151.5° mol. wt. 89. Vapor pressures are tabulated. A. B. Garrett

The fluorination of phosphorus tribromide. Harold S. Booth and Spencer G. Frary. *J. Am. Chem. Soc.* **61**, 2934–7(1939).—The compds., PBr_2F, $PBrF_2$ and PF_3, were obtained in the fluorination of PBr_3 in the vapor state with CaF_2 at 140° or by the action of SbF_3 at 70° and 170° with Br as a catalyst. For $PBrF_2$ and PBr_2F, resp., mol. wts. are 218, 149; m. −115.0°, −133.8°; b. 78.4, −6.1; heats of vaporization 7624, 5721; crit. temps. 254, 113; Trouton consts. 21.7, 22 3; d_0 2.1810, −. A. B. Garrett

The fluorination of phosphoryl trichloride. Harold Simmons Booth and Frederic B. Dutton. *J. Am. Chem. Soc.* **61**, 2937–40(1939).—The fluorination of $POCl_3$ by the Swarts reaction and in the vapor phase by CaF pellets yielded POF_3, POF_2Cl and $POFCl_2$. Resp. consts are b. −39.8°, 3.1°, 52.9°; f. p. −39.4°, −96.4°, −80.1°; liquid d_0 −, 1.6555, 1.5931; gas d. 104.0, 120.5, —; crit. temps. 73.3°, 150.6°, —; crit. pressures (atm.) 41.8, 43.4, —; heats of vaporization 5030, 6090, 7403; Trouton's consts. 21.6, 22.03, 22.7. Vapor pressures are tabulated. A. B. Garrett

Columbium and tantalum. Introduction. P. Klinger. *Tech. Mitt. Krupp Forschungsber.* **2**, 171–3(1939). Cb and Ta form with C stable carbides so that they prevent grain disintegration in austenitic Cr-Ni steels if added to rustless steels in small amts.; besides, they produce a slight increase in tensile strength and toughness. Because of the difficult sepn. of the 2 elements they are added to steel as ferrotantalocolumbium, never as ferrotantalum or ferrocolumbium. Methods of sepn. of Cb and Ta are critically discussed. Twenty references. **Determination and separation of columbium and tantalum in steel by precipitation with benzenearsonic acid or sodium bicarbonate with addition of hydrogen peroxide.** H. Lucke and J Daublander. *Ibid.* 174–8.—Two methods for sepn. of Cb and Ta are described, one is based on pptn. of Ta in H_2O_2-contg. H_2SO_4 soln. with benzenearsonic acid; Cb stays in the soln, from which it is pptd. later after destruction of the H_2O_2 by benzenearsonic acid. The other method seps. the acids of the earth metals in H_2O_2-contg. H_2SO_4 soln. with $NaHCO_3$; Ta ppts first and Cb is sepd in the filtrate with H_2SO_4. A third method describes the simultaneous sepn. of Cb and Ta in steel by detg. the SiO content at the same time. Four references. **Photometric determination and separation of columbium, tantalum and titanium in steel and iron alloys.** P. Klinger and W. Koch. *Ibid.* 179–85.—See *C. A.* **33**, 9186[8]. **The spectrum-analytical determination of columbium and tantalum in high-alloy steels.** O. Schlessmann. *Ibid.* 185–90.—The detn. by the emission spectrum of these elements is very satisfactory, the min. content which can be detd. for Cb is 0.1%, for Ta 1%. The Cb lines used in the spectrograph are 3697.85, 3713.06 and 3726.25. For Ta the lines are 2675 and 2908.9 and Fe 2689; for visual observation alone line Ta 6485.36 is the most suitable. The exact procedure both for detection and detn., is described in full, and comparative spectrograms show the clarity of the lines obtainable with austenitic steels, with and without Cb. The time required for a detn. is about 2–3 hrs. Fifteen references. M. Hartenheim

Alkali uranates, columbates and vanadates prepared by a dry method. Henri Guiter. *Compt. rend.* **209**, 561–2(1939). U_3O_8, Cb_2O_5 and V_2O_5 were fused with alkali carbonates or (V_2O_5 only) alkali sulfates, and the compn. of the product was detd. by wt. and amt. of CO_2 or SO_2 evolved. In this way U_3O_8 and carbonates of Li, Na, K, Rb and Cs gave uranates of compn. M_2UO_4 as difficultly fusible powders; they are, resp., pale rose brown, orange, vermilion and pale vermilion; all are decompd. by acids. Cb_2O_5 similarly formed with carbonates of Li, Na or K, $Cb_2O_5.5M_2O$; with those of Rb and Cs, $Cb_2O_5.4M_2O$. All are sol. in H_2O, those of K, Rb and Cs being deliquescent; all are easily fusible and decompd. by acids. V_2O_5 yielded with carbonates of Li or Na MVO_4, but with those of K, Rb or Cs $M_4V_2O_7$. Fused similarly with alkali sulfates $4Li_2O.5V_2O_5$, $2Na_2O.3V_2O_5$, $2K_2O\ 3V_2O_5$, $Rb_2O.2V_2O_5$ and $Cs_2O.2V_2O_5$ were obtained. All are easily sol. in H_2O, those of Rb and Cs being deliquescent. C. A. Silberrad

Halogen sulfides and halogen selenides of mercury. A. Baroni. *Atti accad. Lincei, Classe sci. fis. mat. nat.* **29**, 76-9(1939).—Double salts of HgS with $HgCl_2$, $HgBr_2$ and HgI_2 are known to exist. B. has prepd. corresponding compds. with HgSe; the compds. $HgSe.HgCl_2$, $HgSe.HgBr_2$, $HgSe.HgI_2$, $2HgSe.HgCl_2$, $2HgSe.HgBr_2$ and $2HgSe.HgI_2$ are shown to be formed when H_2Se dild. with N_2 is passed through the above Hg halides in dil. soln. The ppt. was collected on a film of collodion and examd. by means of electronic rays as previously used in solving problems of polymorphism and isomorphism (*Z. Krist.* **92**, 210(1935); *C. A.* **32**, 8234[3]). A. W. Contieri 1 2

The chemistry of organic metallic complexes and coloring matters. A. Wahl. *Rev. gén. mat. color.* **43**, 321-5 (1939).—A review and discussion of these substances from the point of view of a new classification based on secondary valences, which is called complexocyclics; this group an addnl. one to Beilstein's classifications: acyclics, carbocyclics, heterocyclics. Among these substances are cited Cu glycine, β-aminopropionic acid, metal derivs. of *o*-hydroxyazo compds; the Neolan, Inochrome and Palatin dyes, the Cu compd. of Orange 2, and phthalocyanines. 3 references. Halsey E. Silliman 3

The question of the existence of salts of hexamethylenetetramine in solution. Anna Rattu. *Ann. chim. applicata* **29**, 221-5(1939). From a series of detns. of the f.-p. lowering of solns. of $N_4(CH_2)_6$ with acids, it is shown that the immediate reaction on addn. of acid is one of addn. Later the hydrolytic action of the H^+ ion becomes predominant, with increasing hydrolysis according to the reaction $N_4(CH_2)_6 + 4HCl + 6H_2O = 4NH_4Cl + 6CH_2O$. A. W. Contieri 4

Nickel complex salts containing quadrivalent and sexivalent central atoms. H. Glaser and P. Pfeiffer. *J. prakt. Chem.* **153**, 300-12(1939); cf. *C. A.* **33**, 1389. $Ni(ClO_4)_2$ forms with ethylenediamine and its mono- and dialkyl derivs. violet products, but with trialkylated diamines amorphous basic Ni salts, contg. no N. Upon dehydrating the aquo salts obtained in this way, there is a sharp color change from violet to orange, which indicates that the H_2O group were attached directly to the central atom. The type formula of these salts is therefore assumed to be $[Ni_a(OH_2)_2]X_2$. The following compds. are described: (1) *Triethylenediamine nickel perchlorate* is formed by reaction of $Ni(ClO_4)_2$ with $C_2H_4(NH_2)_2$; it forms red crystals, sol. in hot water and in hot MeOH; the dry salt explodes upon ignition. Violet plates are also obtained if the product is warmed in excess water and the soln. evapd. at room temp. (2) *Diaquo-diethylenediamine nickel perchlorate* is formed by reaction of $Ni(ClO_4)_2$ with ethylenediamine monohydrate; it is a deep-blue soln., decompg. upon heating; upon evapn. at room temp. violet crystals are obtained; at 100°, the product loses H_2O, leaving an orange powder; it explodes violently upon ignition. (3) *Trimonoethylethylenediamine nickel perchlorate* is formed upon adding a soln. of $Ni(ClO_4)_2$ in MeOH to monoethylethylenediamine; it forms violet-blue crystals, slightly sol. in cold water and in cold MeOH, recrystd from hot solns. (4) *Duquo-di-sym. diethylethylenediamine nickel perchlorate* is prepd. by action of concd. $Ni(ClO_4)_2$ on concd. diethylethylenediamine; it forms violet-to-blue crystals, sol. in hot water; sol. in hot MeOH (orange), giving grayish blue ppt. upon cooling; it loses water at 100° (orange), changing back to violet in contact with moist air; it explodes upon ignition. (5) *Di-unsym. diethylethylenediamine nickel thiocyanate* is prepd. by mixing unsym. diethylethylenediamine Ni perchlorate in MeOH with KSCN, heating to 100°, and crystg.; it forms violet-blue crystals, anhyd., dried on clay disk in air; it is sol. in pyridine, slightly sol. in alcs., almost insol. in Me_2CO or $CHCl_3$; it loses water at 160°, forming $Ni(C_2H_4(NH_2)_2.NEt_2)(SCN)_2$; it is decompd. by water, more or less sol. in Me_2CO and in pyridine. J. H. Reedy 5

7—ANALYTICAL CHEMISTRY

W. T. HALL

American Society for Testing Materials, Methods of Chemical Analysis of Metals, 1939. Cf. *C. A.* **31**, 4223[3]. Methods adopted or revised since 1936 are given for the chem. analysis of steel, cast iron, open-hearth iron, wrought iron and ferro-alloys; the sampling of ferro-alloys; and quant. spectrochem. analysis of high-grade pig Pb and of Zn-alloy die castings. G. G. 6

Thermic behavior of compounds which are important in analytical chemistry. I. $CaC_2O_4.H_2O$. J. Kruttinsons. *Z. anal. Chem* **117**, 330-2(1939). For detg. Ca it is often recommended to weigh as $CaC_2O_4.H_2O$ after drying an hr. at 105°. The results of some 16 expts. show that no serious error is introduced if the temp. of the drying oven rises to even 140° although the ppt. shows a distinct vapor pressure even at 105° and loss of wt. becomes noticeable if the drying is continued for several hrs. at 105°. W. T. H. 7

Potentiometric measurements in practice: the use of a new instrument. František Poupě. *Chem. Listy* **33**, 306-8(1939). With Pt or Ag capillary electrodes and with a compensating voltmeter P. was able to study potentiometric titrations under conditions in which the usual methods were not dependable. Frank Marečh 8

Utilization of capillary properties of filter paper in analysis. A. A. Kornfskiĭ. *Zavodskaya Lab.* **8**, 688-92(1939). —By means of NH_4CNS and pyridine it is possible to detect Fe^{+++}, Cu^{++} and Co^{++} in one soln. Fe occupies the lowest portion, Cu the middle, and Co the upper portions of the filter paper. In this manner it was possible to detect 1 γ Fe^{+++} in 0.2 ml. soln. in the presence of 500 γ Cu^{++} (Co does not interfere), 8 γ Cu^{++} in the presence of 200 γ Fe^{+++}, and 10 γ Co^{++} in the presence of 200 γ Fe^{+++}. With $FeCl_3$ it is possible to detect 4 γ $Fe(CN)_6$ in the presence of 1000 γ CNS^- in 0.2 ml. soln. B. Z. K. 9

Colorimetric titration and its application in the metallurgy of aluminum. III. P. Urech. *Helv. Chim. Acta* **22**, 1023-36(1939); cf. *C. A.* **33**, 1155[4]. —Excellent results were obtained with the Zeiss Pulfrich photometer in detg. very small quantities of Si by means of the yellow color produced with $(NH_4)_2MoO_4$ in the presence of acid. Full directions are given for carrying out the analysis. The procedure is applicable to detg. Si in alloys or in clay. W. T. H.

Use of potassium chromate as indicator for the titration of chlorides with silver nitrate. A. J. Berry and J. E. Driver. *Analyst* **64**, 730-4(1939). When neutral alkali chlorides are titrated by Mohr's method (*Ann. Chem.* **97**, 335 (1856)), very accurate results are obtained and up to pH 5.5 the error does not exceed 3 parts in 1000. At greater acidity, the results are high. The presence of NH_4 salt has a slight effect upon the accuracy, particularly when the acid constituent is weak, but NH_4Cl solns. can be titrated by Mohr's method and the results are only about 0.1% higher than when phenosafranine is used as indicator. When HCl soln. is neutralized with $CaCO_3$, and the halide detd. by M.'s method, the results are about 0.2% higher than when Na_2CO_3 is used for neutralization. The solns. used in the titrations described were about 1.5×10^{-3} molar in CrO_4^{--}. Mohr's method is likely to remain a standard method of analysis. W. T. H. 10

***p*-Nitrobenzyl cyanide, as an indicator.** Ladislaus Spitzer. *Ann. chim. applicata* **29**, 219-20(1939).—*p*-Nitrobenzyl cyanide is yellow below pH 11.4; it turns to orange-red with increasing pH up to pH 12.9, beyond which there is no further color change. A. W. C. 11

Use of iodo derivatives of methylene blue in quantitative analysis. L. M. Kul'berg. *Zavodskaya Lab.* **8**, 421-3 (1939). The iodo derivs. of methylene blue were used to detect Ag, Hg, Sn, sulfide, sulfite and thiosulfate ions. In each case a drop of the reagent is placed on filter paper and

tu. a drop of the moderately acid test soln. A blue coloration indicates the presence of the reacting ion. The quantities detd. were 0.002 γ Ag, 0.021 γ Hg and 0.6 γ Sn. The reagent also reacts with $Hg(CN)_2$ and freshly pptd. HgCl. The sensitivities of the reagent for sulfide, sulfite and thiosulfate ions were, resp., 0.025, 0.050 and 0.020 γ. The reagent is prepd. by mixing 1% aq. soln. of methylene blue with an excess 0.1 *N* soln. of I_2 in KI, pulverizing the mixt., allowing it to stand overnight, filtering, and washing first with KI soln. and then with 0.01% H_2SO_4. B. Z. Kamich

Hydroxy- and aminoazonitro compounds. II. The use of α-naphtholazo-*p*-nitrobenzene as indicator for hydrogen ions in nonaqueous solvents. Leonid M. Kul'berg. *J. Gen. Chem.* (U. S. S. R.) **9**, 684–92(1939); cf. *C. A.* **33**, 3781[9]. As previously reported there exists an equil. in alk. solns. of α-naphtholazo-*p*-nitrobenzene (I) between the blue diquinoid form (II) and the yellow monoquinoid form (III). In the presence of nonaq. solvents miscible with water, the equil. is shifted so that the formation of II is favored. The tautomeric system is very sensitive toward H ions. This property as well as the characteristic color change at the transformation point of one form into the other renders I suitable to act as indicator in the microtitration of acids and bases. I is prepd. by diazotizing 5 g. nitroaniline, adding 5.3 g. 1-naphthol in alk. soln. to the diazo salt and, after 1 hr., acidifying the soln. with 20% HCl. The pptd. dye is filtered, washed with 1% HCl and with H_2O to remove Cl ions, and dried at room temp. to give an amorphous brick-red powder. II is obtained by boiling 3 g. I with 50 ml. 20% aq. soda soln. and 50 ml. EtOH until the compd. is completely dissolved. The amt. of EtOH is kept const. by adding new portions of EtOH. The soln. is filtered, the filtrate evapd., the residue is extd. with 96% alc. until all of II is eliminated. The filtered alc. exts. are evapd. and again extd. with alc. The alc. is slowly evapd. whereby II is obtained as black residue. To obtain III, 2 g. I is dissolved in 100 ml. Et_2O and the solu. is shaken with H_2O contg. CO_2. The ethereal layer contg. III is evapd. whereby III is obtained as a yellow-red powder. In the titration expts., the best results are obtained when the reaction is carried out at 100°. Errors, up to 20%, are observed when the titration is carried out at lower temps., such as, for instance, 25°, for 75% alc. solns., and up to 43% for aq. solns. It is required that the amt of H_2O does not exceed 50% of the vol. of the soln. to be titrated. The amt. of indicator used should preferably be 0.05–0.15 ml. of a 0.183% alc. soln. / 5–10 ml. of the soln. to be titrated. The salt error is very small and may be neglected when I is used as indicator. Gertrude Berend

Potentiometric titration of aluminum in silicate rocks. V. M. Tarayan. *Zavodskaya Lab.* **8**, 273–6(1939). Fuse 0.25–0.30 g. of the sample with Na_2CO_3, dissolve in HCl, ppt. the Ti, Al and Fe with NH_3, filter, wash with hot water and dissolve in 1 *N* HCl until acid to methyl orange. Sat. the soln. with NaCl, add an equal vol. alc., sat. with CO_2, add 3–4 drops of cold, satd. $FeSO_4$ soln. and titrate with 0.5 *N* NaF. The potentiometric results are as accurate as in gravimetric results. B. Z. K.

The determination of boron in small amounts and traces. O. Unverdorben and R. Fischer. *Bodenkunde u. Pflanzenernähr.* **13**, 177–91(1939). An improved procedure based upon that of Schulek and Vastagh (*C. A.* **25**, 3932) is described in detail. H_3BO_3 is isolated by distn. as Me borate and finally titrated in presence of mannitol with absolutely carbonate-free NaOH in the presence of phenolphthalein. Twenty-three references. S. J. S.

Determination of small amounts of cadmium in air. S. S. Genvits. *Zavodskaya Lab.* **8**, 424–7(1939).—It is shown that the insufficient sensitivity of colorimetric methods for detg. Cd in air is due to the colloid stabilizers which decrease the intensity of the coloration by 65–70%. To avoid this error the Cd was detd. colorimetrically with a Se photocell in a 20% Na_2S soln. without a stabilizer. The reagent is sensitive for 0.03–0.04 mgt Cd in 25 ml. soln. For the range 0.04–0.36 mg. Cd the error was from −1.4 to +9%. Small amts. of Cd up to 0.3 mg. can thus be detd. in the presence of 15–20 times as much Zn with an error up to 8.6%. B. Z. Kamich

Colorimetric determination of chromium in the form of trioxalatochromic acid. E. Ueberbacher and K. Th. Droscher. *Collegium* **1939**, 433–8.—By boiling solns. of chromic salts or chromates with oxalic acid, trioxalatochrome complexes are formed. About 10 mols. of oxalic acid per mol. of Cr is necessary. The color of the complex is intense blue-violet; it obeys the Lambert-Beer law, and the extinction curve has a max. at about 570. The concn. of Cr can be measured accurately with a "step photometer" or less accurately by prepg. standard solns. of known Cr concn. For Cr in leather take 2.75 g. leather, 5 g. oxalic acid and 100 cc. H_2O, boil 5 min., add kaolin, and bring to boil, cool, filter into a 100-cc. volumetric flask, and det. Cr colorimetrically. The basicity of Cr liquors can be detd. as follows: Boil 50 cc. of Cr salt soln. with 25 cc. *N* oxalic acid; dil. to 100 cc. and det. Cr in 20 cc. (*a* g.); titrate 5 cc. *N* oxalic acid with 0.1 *N* NaOH (*b* cc.); titrate 20 cc. trioxalato soln. with 0.1 *N* NaOH (*c* cc.). Basicity = $0.173\ (b - c)/a$. L. D. Clarke

Determination of small amounts of cobalt in ores, concentrates and tailings. Yu. Yu. Lur'e and E. M. Tal. *Zavodskaya Lab.* **8**, 383–8(1939). A comparative study of various methods indicates that the nitrite method followed by gravimetric detn. gives higher results and cannot be used. The most accurate method is the nitrite procedure followed by colorimetric detn. The method is, however, too long. The method of preliminary sepn. of Ni and Co by electrolysis without an outside current is not as accurate but it is satisfactory for routine analysis. Direct colorimetric test may give results sufficiently accurate for ordinary needs but it requires the addn. of enough pyrophosphate to bind the Fe as $NaFeP_2O_7$. This is the simplest and most rapid method. In case the ratio of Fe/Co is 4000 or more the nitrite-bromometric method is recommended. B. Z. Kamich

α-Nitro-β-naphthol as precipitant for cobalt and palladium. C. Mayr and W. Prodinger. *Z. anal. Chem.* **117**, 334(1939). In a previous paper (*C. A.* **29**, 698), M. claimed that α-nitro-β-naphthol was an excellent precipitant for Co and Pd. The reagent was found satisfactory by a no. of other chemists and the use of it mentioned in at least one standard text. Unfortunately, the method chosen for prepg. the reagent always results in the formation of some α-nitroso-β-naphthol which was recommended by Ilinski and v. Knorre (*Ber.* **18**, 699 (1885)) for detecting Co in the presence of Ni. The perfectly pure nitro compd. will not ppt. Co or Pd. W. T. H.

Rapid method for determining copper in low-grade ores and in flotation tailings. Yu. Yu. Lur'e and L. B. Ginzburg. *Zavodskaya Lab.* **8**, 271–3(1939).—Detn. of Cu in poor ores and flotation tailings by the pyridine-thiocyanate colorimetric method gave equally good results with and without the removal of the insol. residue. The formation of the complex should be carried out in citric acid and not in tartaric acid. B. Z. Kamich

Iodometric determination of copper in nitric acid solution. W. Orlik. *Z. anal. Chem.* **117**, 332–3(1939).—The procedure adopted by Hagen (*C. A.* **33**, 6748[2]) is very similar to that recommended by Orlik and Tietze (*C. A.* **24**, 2596). The use of $Pb(NO_3)_2$ to sharpen the starch-I_2 end point appears to be the only new feature of H.'s method. W. T. H.

Fermanganimetric titration of copper. Hisazi Kato and Tatuo Iwaba. *J. Chem. Soc. Japan* **60**, 703–4(1939). —By adding Fe powder to a soln. of $CuSO_4$, $FeSO_4$ is formed quantitatively and can be titrated with $KMnO_4$. The influence of other salts was studied. T. Katsurai

Rapid determination of copper in the presence of iron by the fluoroiodometric method. G. A. Taratorin. *Zavodskaya Lab.* **8**, 723–4(1939).—The method described is like that of Park (*C. A.* **25**, 660). B. Z. Kamich

Rapid method for determining small amounts of copper in metallic antimony of high purity. A. A. Vasil'ev and N. P. Vorob'eva. *Zavodskaya Lab.* **8**, 269–70(1939).—The method is based on the pyridine-thiocyanate colori-

metric method for detg. small quantities of Cu without previous sepn. of Sb or other elements. The Sb is kept in soln. with tartaric acid. B. Z. Kamich

Determination of copper and lead in metallic antimony and tin and in tin babbitt by electrolysis without an outside current. Yu. A. Chernikhov and E. V. Shtutser. *Zavodskaya Lab.* **8**, 801–6(1939).—Electrolysis was conducted in a modified Sand app. without an outside current. Anodes were Zn, Cd, Fe, Al, Pb and Cu while the cathode was Pt. Pb and Cu were sepd. out from HCl and HF solns. Cu was sepd. out with an Fe anode at room temp. in HCl soln., then the soln. was heated to 40–45° and the Pb was deposited with a Cd anode. The method can be used for detg. Pb and Cu in metallic Sb and Sn, and Sn babbitt, if the Sb and Sn is kept in solns. during electrolysis in the form of fluoride complexes. Eighteen references. B. Z. Kamich

Assay for gold and silver in black copper and in anode slimes. P. N. Maslenitskiĭ. *Zavodskaya Lab.* **8**, 665–8 (1939).—The results show that treatment of the slimes with acids preliminary to smelting results in loss of Au and is not recommended. B. Z. Kamich

Determination of iron, aluminum and magnesium with the aid of 8-hydroxyquinoline. H. Navez. *Ing. chim.* **23**, 1–26(1939).—Current methods were studied. The detns. can be carried out accurately by a modified Berg method (*C. A.* **24**, 801). The titration method is the fastest but gives low results and is unpleasant owing to the use of the CS_2. But the gravimetric method is so long that N. prefers the titration. Thirty-nine references. Ann Nicholson Hird

Colorimetric determination of iron in aluminum, alumina, hydrated alumina and aluminate liquors by means of sodium sulfide Liesolotte Roelen. *Z. anal. Chem.* **117**, 385–91(1939); cf. Ginsberg, *C. A.* **32**, 1601⁴.—The procedure is based upon the bluish green color produced in slightly basic solns. upon the addn. of a little Na_2S soln. Directions for carrying out the analysis with the Pulfrich photometer are given and the results are shown to correspond almost exactly with values obtained in titrating very dil. Fe solns. with $TiCl_3$. W. T. H.

Determination of ferrous iron in vivianites. V. A. Kazarinova-Okunin and N. A. Nikitina. *Zavodskaya Lab.* **8**, 498–9(1939).—Treat a 1–2 g. sample of vivianite with 100–200 ml. 5% HCl, place 10–20 ml. of the clear soln. in a cylinder equipped with a buret, capillary funnel, and a Bunsen valve, add 5–10 ml. of 10% HCl, a few drops of 1% methylene blue soln. and 5 g. $KHCO_3$. Expel air with CO_2, add 100 ml. of a soln. contg. 5 g. NH_4F and 1 g. $K_2C_2O_4$ through the funnel. Oxidize the Fe^{++} with 0.1 *N* I_2 soln. in the presence of starch. B. Z. Kamich

Determination of ferrous and ferric iron in sponge iron. N. I. Stognii. *Zavodskaya Lab.* **8**, 394–5(1939).—The Wilner-Merck method for detg. FeO and Fe_2O_3 was tested with sponge Fe and the results show that it is impossible to det. Fe_2O_3 in the presence of metallic Hg. By removing the metallic Hg and the basic salts from the Fe oxides before their soln. in HCl accurate results were obtained. The Hg is removed by sublimation. The procedure is as follows: Treat 0.5 g. of the sample with $HgCl_2$ under CO_2. Collect the Fe oxides and the metallic Hg on asbestos in a Gooch filter, wash successively with 5% NH_4 tartrate, water, alc., ether and dry in a stream of N_2 at 150° for 1 hr. Heat the ppt. in a stream of Cl_2 at 200–220° for 1 hr. Then dissolve the Fe oxides in HCl in a stream of CO_2, cool, filter and titrate the FeO in the filtrate with dichromate or permanganate. Fe_2O_3 is best detd. by difference. A large C content (over 5%) in the sponge Fe affects the detns. especially in the presence of surface-active C. B. Z. Kamich

Determination of lead in air by means of dithizone. V. M. Prikhnya. *Zavodskaya Lab.* **8**, 283–6(1939).—The detn. of Pb in air by means of dithizone was carried out with modified Palmer tubes containing HNO_3 as an absorbing agent. The set-up consisted of 2 tubes in parallel and one control tube. At an air speed of 10 l./min. the control tube was found to contain no Pb. B. Z. Kamich

Rapid potentiometric method of determining manganese in ores A. M. Avrunina and A. M. Zan'ko. *Zavodska. Lab.* **8**, 659–63(1939); cf. *C. A.* **33**, 4902⁶.—The methods of Lang (*C. A.* **29**, 7217⁵) and Müller for detg. Mn were checked with pure salts, Mn ores, Fe-Mn and spiegel. The former method gave accurate and reproducible results when HPO_3 was used to form the metaphosphate complex. The Muller method (*C. A.* **18**, 1628) also gave good results in the presence of 0.2–0.7 ml. of 0.4% OsO_4 soln. as a catalyst. B. Z. Kamich

Colorimetric determination of mercury in air by means of dithizone N. S. Kuzyatina. *Zavodskaya Lab.* **8**, 174–7 (1939).—The air to be tested is passed through 2 absorption tubes contg. 5 ml. of 0.1 *N* $KMnO_4$ and 5 ml. of 10% H_2SO_4 at the rate of 60–80 l. per hr. After the absorption, an aliquot part of the $KMnO_4$ soln. is taken, the permanganate is reduced to Mn^{++} by the addn. of a slight excess of $H_2C_2O_4$ at room temp. and the Hg^{++} content of the soln. is detd. by shaking with 0.05–0.1-ml. portions of a soln. of 1–2 mg. dithizone in 100 ml. of $CHCl_3$ and comparing the resulting color with that of standards in a colorimeter. Details are given. B. Z. Kamich

Photoelectric method of determining molybdenum in steel A. L. Davydov and V. F. Mal'tsev. *Zavodskaya Lab* **8**, 264–9(1939).—The method is based on the detn. of the complex formed from Mo and KCNS in a photoelec. colorimeter. Dissolve 0.5 g. steel in 10 ml. mixt. (prepd. from 225 ml. H_2SO_4 + 350 ml. HNO_3 + 750 ml. water), heat to expel oxides of N_2, and if carbides remain, add 1–2 ml. of 10% $(NH_4)_2S_2O_8$. If salts sep. out during the soln. of the steel, add 10–20 ml. mixt. (prepd. from 450 ml. H_2SO_4 + 100 ml. HCl + 1450 ml. water) and boil. After the persulfate is destroyed, cool, dil. to 100 ml. with water, and shake. Take 10 ml. of the soln., add 35 ml. of the H_2SO_4 and HNO_3 mixt., 40–45 ml. distd. water, shake, add 3 ml. 50% KCNS soln., 5 ml. of 10% $SnCl_2$ in HCl, dil. to 100 ml. and shake. The soln. is tested in the colorimeter 15 min. after the addn. of the $SnCl_2$. The concn. of Mo is detd. from a calibration chart or from tables previously prepd. An excess of KCNS does not affect the intensity of coloration. The reaction is not affected by the temp. at concns. of 2–3 *N* acidity. The analysis requires 40–45 min. and max. error is 4%. B. Z. Kamich

Vanadometric determination of molybdenum and phosphorus. V. V. Stepin. *Zavodskaya Lab.* **8**, 799–800(1939). —In this method the Mo is converted to Mo^{V} by Hg in a soln. which is 3 *N* in HCl. The soln. is filtered, H_2SO_4 (1:1) is added to make the soln. 7 *N* in H_2SO_4, then 2 ml. of 0.001 *M* phenylanthranilic acid added and the soln. is titrated with NH_4 vanadate to a permanent pink-violet coloration. In the detn. of P the steel sample is dissolved and after oxidation with $KMnO_4$ the P is pptd. as NH_4 phosphomolybdate, dissolved in NH_3, acidified with HCl, reduced with Hg, and titrated with NH_4 vanadate. The method is suitable for detg. small amts. of Mo and P in cast irons, steel., alloys and other materials. B. Z. Kamich

Rapid determination of nickel in steels and cast irons. I. M. Koreuman and G. D. Voronov. *Zavodskaya Lab.* **8**, 664–5(1939).—Dissolve a 0.2–1-g. sample in HNO_3, boil, cool, dil. to 200 ml. and filter. Add 5–25 ml. of 25% Rochelle salt, 5 ml. satd. Br water, 2 ml. of 25% NH_3 and 3 ml. of 1% alc. soln. of dimethylglyoxime to 5–25-ml. portions of the test and standard solns., and compare in a colorimeter after 5 min. B. Z. Kamich

Determination of zinc in sodium zinc uranyl acetate. V. B. Lewin and L. P. Tsentseva. *Trudy Ural. Ind. Inst. im. Kirova* **1938**, No. 5, 68–76; *Khim. Referat. Zhur.* **2**, No. 1, 66(1939).—An attempt to det. Zn as $NaZn(UO_2)_3(AcO)_9.6H_2O$ proved unsuccessful. All Zn was pptd. but the compn. of the ppt. did not correspond exactly to the above formula. It may be convenient, however, to isolate the Zn as the triple acetate and then dissolve the ppt. in dil. HCl and titrate the Zn with $K_4Fe(CN)_6$. It is claimed that the sepn. of Zn as triple acetate can take place in the presence of Ca, Sr, Ba, Fe, Mn, Ni, Cd, Cu, Hg, NH_4, K and Li. W. R. Henn

The electrolytic determination of zinc. Jan. Šebor.

hem. Lasty **33**, 304–5(1939)(French summary).—An attempt was made to det. Zn electrolytically with a current of 1–2 amps. in an electrolyte contg. 3 g. NH_4 citrate, 8 g. KOAc and 3–5 ml. of 10% AcOH, contained in a Ni vessel. During the electrolysis the soln. was stirred and the temp. maintained at 70–80°. The results obtained were about 4% low. The Ni vessel was badly corroded and appreciable quantities of black NiS were formed. Frank Mareshe 1

Determination of halides with ceric sulfate and starch indicator John F. Matejczyk. *Chemist Analyst* **28**, 54–5 (1939). - Add a measured vol. of 0.1 *N* $AgNO_3$ to ppt. the halide in the presence of dil. HNO_3. Filter, wash the ppt and to the filtrate add 5 ml. of 18 *N* H_2SO_4, 3 ml. of 0.5% starch paste and 15 drops of 0.1 *N* $Ce(SO_4)_2$ soln. Titrate the soln. with standard KI soln. until a permanent blue color is obtained. The iodide first serves to ppt. excess Ag and as soon as an excess of KI has been added, it is oxidized to I_2 by the ceric soln. and the end point is shown by a permanent color change. The results in 8 cited analyses of samples contg. 34–76% Cl were all within 0.5% of the wt. of sample taken. Three results were good. W. T. H. 2

Determination of small quantities of free chlorine in phosgene. Hans Martin, W. Oettinger and W. Kuhn. *Z. anal. Chem.* **117**, 305–17(1939).—The method is based upon the fact that $CoCl_2$ does not react with HgI_2 cmp. whereas Cl_2 reacts to liberate I_2. The loss in wt. due to the conversion of HgI_2 into $HgCl_2$ suffices to det. as little as 1 mg. Cl_2 in 10 g. of $CoCl_2$. It would perhaps be better to titrate the liberated I_2 with $Na_2S_2O_3$ but under the conditions studied free I_2 was present at the start. The exptl. work in connection with the prepn. and manipulation of definite known quantities of Cl_2 and the testing of the method is described. W. T. H. 3

Volumetric determination of fluorine by the Greeff method. Ya. P. Berkman and S. Ya. Bystrutskaya. *Zavodskaya Lab.* **8**, 725–6(1939).—In detg. F by the Greeff method (formation of Na_3FeF_6)(*C. A.* **7**, 3939) the optimum $FeCl_3$ concn. was found to be 0.4 *N*. The soln. should be neutralized exactly. In the presence of 1–2% sulfate the detns. are not affected, but higher sulfate concns. cause lower values. B. Z. Kamich 4

The determination of nitrogen in plant materials containing nitrates. E. Rauterberg and E. Knippenberg. *Bodenkunde u. Pflanzenernahr.* **13**, 194–8(1939); cf. *C. A.* **32**, 9326[3]. Expts. are described, with the conclusion that total N in plant materials contg. up to 3.5% nitrate N in dry matter can be detd. accurately. Nitrate is detd. in a sep. sample by the 2,4-xylenol colorimetric method. Org. N (including NH_3) is detd. by digesting a sample equiv. to 2 g. dry matter with 70 ml. H_2O in a 100-ml. Erlenmeyer flask 0.5 hr. on a boiling water bath, cooling and adding 25 ml. 5% AcOH. The mixt. is allowed to stand, filtered the next day and the residue washed a few times with 1% AcOH. The filtrate contg. the nonprotein N is evapd. to dryness and taken up with 5–10 ml. H_2O. About 5 g. powd. $FeCl_2$ is added, then 20 ml. concd. HCl, and the contents of the flask are digested on the boiling water bath for 1 hr. with frequent shaking, to decomp. all nitrate. Spattered solids are washed down and the soln. is evapd. to ½ vol. over a free flame, then transferred to a Kjeldahl flask with the filter and residue for the detn. of total N exclusive of nitrate, boiling off most of the H_2O before adding H_2SO_4, K_2SO_4 and Se catalyst for the digestion. The sum of the 2 detns. is the total N. Six references C. J. Schollenberger 5

The determination of oxygen in air. M. Kauttamaa. *Suomen Kemistilehti* **12A**, 108–9(1939). A satisfactory lab. or lecture expt. for the detn. of O_2 in air is performed by placing a 1-l. bottle with the bottom removed in water in a dish. Suction at the top of the bottle causes the rise of H_2O in the bottle by the removal of air. A triangle of Cu wire, 9 cm. on a side, is placed in the dish as a support for a wire 7 cm. long which holds a 4-cm. ring of Al sheet. Into this ring is placed a porcelain cup contg. burning red P. The bottle is placed over the triangle and the stopper fitted tight. The rise in H_2O is read from a previously prepd. scale on the side of the bottle. S. A. Kaijala 6

Determination of free carbon in carborundum. A. I. Miklashevskii. *Zavodskaya Lab.* **8**, 395–9(1939).—It is shown that the detn. of free C in carborundum by calcg. the wt. loss after ignition at 750–800° gives only approx. results because during the combustion of the C partial oxidation of SiC to SiO_2 occurs. At 800° the graphite burns completely and at 950°, 1000° and 1100° there is oxidation of SiC. It is proposed to det. graphically the free C in SiC and in carbide materials contg. up to 15–20% free C. The method is based on the difference in oxidation velocity between powd. graphite and SiC in a stream of O_2 at high temp. (950°) and involves the absorption of CO_2 gas. By heating for an extended length of time (3–4 hrs.) the oxidation velocity of the carbide drops. This is apparently due to the formation of SiO_2 which decreases the active surface for oxidation. The values for C as obtained by this method were higher than by combustion in a muffle. B. Z. Kamich 7

Determination of carbon and sulfur in carbonaceous pyrites. V. G. Timoshev and A. T. Shoshin. *Zavodskaya Lab.* **8**, 796–9(1939).—Gases formed in the combustion of a 0.25 g. sample were passed through 2 absorbers; the SO_2 was absorbed in 1.5% H_2O_2 in the first absorber and the CO_2 in a second absorber contg. 50 ml. 0.8333 *N* KOH. The H_2SO_4 formed in the first absorber was titrated with 0.3125 *N* KOH or NaOH. BaC_2O_4 was added to the second absorber and the excess KOH titrated with 0.8333 *N* HOAc. The app., procedures and calcns. are given in detail. B. Z. Kamich 8

Hydrolysis of the systems beryllium, aluminum, iron, sodium and potassium. G. Cottin. *Ing. chim.* **23**, 39–61 (1939).—The pptn. of Be, Al and Fe by NaOH, NH_4OH and KOH was studied. For pptg. Be from pure salts, C. prefers NaOH. Complete pptn. of $Be(OH)_2$ requires a min. pH of 7.2, with a mol. ratio: 1 BeO–10 alkali. Between pH 6.8 and 7.2 Al is pptd. quantitatively and is transformed into the aluminate at pH 9.75. As long as the pH is above 9.75 a quant. sepn. of the 2 elements Al and Be is obtained. The optimum mol. ratio is: 1 salt–6 alkali. The direct sepn. of Fe at pH 5 is not advisable. Twenty references. Ann Nicholson Hird 9

Influence of methanol upon the chloride titration with eosin as indicator. Walter V. Burg. *Chemist Analyst* **28**, 52–3(1939). - The ionization const. of eosin is sufficiently great to permit its application as indicator in the argentimetric titration of halogen at a pH somewhat lower than 4 but the adsorption of eosin by the AgCl ppt. is so great in comparison with the adsorption of Cl^- that a distinct color change takes place before the equivalence point is reached, as Fajans has pointed out. Although this would seem to prohibit the use of eosin as indicator for such titrations, it has been found that MeOH added as diluent (50 ml. added to 25 ml. of soln.) modifies the color change so that accurate results can be obtained in titrating 40–80 mg. of Cl^-. The av. error was less than 0.3%. W. T. H. 10

Volumetric determination of chlorate and bromate. C. Mahr and Hertha Ohle. *Z. anal. Chem.* **117**, 389–91 (1939); cf. *C. A.* **33**, 7238[1]. - The oxidation of $CS(NH_2)_2$ to $[NH_2(NH^+)CS]_2$ has been used for detg. the former and for titrating chromate or detg. MnO_2, PbO_2 and percompds. The oxidant is allowed to act upon an excess of $CS(NH_2)_2$ and the excess is measured by titration with $KBrO_3$-KBr soln. in the presence of KI. A similar procedure applies to the titration of chlorate or bromate and $KMnO_4$ can be used just as well as $KBrO_3$ for titrating the excess thiocarbamide. To det. ClO_3^-, mix 20 ml. of 18 *N* H_2SO_4, 5 ml. of 1% KI soln. and a carefully measured vol. of 0.1 *N* thiocarbamide. While rotating the contents of the vessel, add the chlorate soln., heat at 70° for 10–15 min., cool to 35°, add starch indicator soln., dil. to about 80 ml. and titrate with $KBrO_3$-KBr soln. or with $KMnO_4$. To det. BrO_3^-, start with the same mixt. and add the bromate soln. very slowly, almost dropwise. Heating on the water bath is unnecessary but the soln. should be heated to 35° before titrating. The results obtained were all within 0.03 ml. of 0.1 *N* soln. W. T. H. 11

The identification of chromate and permanganate in

mixtures. Luis Rossi and Carlos Vega. *Semana méd.* 1939, II, 628–30.—Sat. the soln. at pH over 3 with H_2S to form Cr^{+++} and Mn^{++}. Add filter paper pulp and filter off S. Add NaOH + H_2O_2 to form MnO_2 and CrO_4^{--}. Filter, test the filtrate for CrO_4^{--} with H_2O_2 and Et_2O. Dissolve the MnO_2 ppt. in hot $H_2C_2O_4$ and make one of the usual tests for Mn^{++}. A. E. Meyer

Critical study of methods for the analysis of hyposulfite preparations. H. Zocher and Hj. Saechtling. *Z. anal. Chem.* 117, 392–400(1939).— The analysis of hyposulfite preps. is complicated by the instability of $H_2S_2O_4$ itself. Thiosulfate and sulfite or bisulfite are formed from it. Wollak (*C. A.* 24, 2400) described a method for the analysis of a mixt. of thiosulfate, sulfite and hyposulfite which depends (1) upon the detn. of the total I_2 required to form tetrathionate, sulfate and bisulfate, (2) a similar titration after the addn. of HCHO which makes the sulfite unattackable and (3) the detn. of thiosulfate by a complicated method which consists of oxidation of $S_2O_3^{--}$ to $S_4O_6^{--}$ by means of excess I_2, treatment with SO_2 to remove excess I_2 and to convert $S_4O_6^{--} + S_2O_3^{--}$, treatment with HCHO to react with excess SO_3^{--} and iodometric titration of the newly formed $S_2O_3^{--}$. Test analyses showed that the first 2 procedures could be made to give consistent results but the third procedure is unreliable. For the detn. of $S_2O_4^{--}$, Seyewitz and Bloch (*C. A.* 2, 2229) recommended measuring its reducing effect upon $Ag(NH_3)_2^+$ whereby Ag and SO_4^{--} are formed and the Ag ppt. can be weighed or dissolved and titrated with thiocyanate. For practical purposes, it is best to disregard the thiosulfate content of hyposulfite preps. Usually very little is present. It is recommended to base the analysis upon the total I_2 consumption, the titration with I_2 after treatment with HCHO and the reduction of $Ag(NH_3)_2^+$ to Ag. Considerable data are given concerning numerous test analyses and the best conditions for carrying out the analysis. W. T. H.

Determination of caustic lime in commercial hydrated lime. Andrew Bender. *Chemist Analyst* 28, 56(1939).— Take 1.351 g. of pure Iceland spar and ignite to CaO. Cool. Dissolve the CaO and, separately, 1 g. of the com. sample in exactly 200 ml. of water to which 20 g. of sucrose has been added. Shake 1 hr. and titrate with 0.15–0.2 *N* acid to a phenolphthalein end point. The ratio of the vols. used for the 2 titrations is the ratio of CaO in the 2 samples. The acid does not have to be standardized. W. T. H.

Amalgam method for analyzing mercuric chloride. V. D. Ponomarev and D. S. Kolotov. *Zavodskaya Lab.* 8, 372–3(1939).— Dissolve the $HgCl_2$ in 25 ml. concd. H_2SO_4 and one l. water, dil. to make the acidity 0.1 *N*, shake an aliquot portion with 3% Zn amalgam in a closed test tube until the Hg is reduced (test with H_2S), and titrate the Cl in a 25-ml. portion with 0.1 *N* $AgNO_3$ by the Volhard method. The results are accurate. B. Z. K.

Determination of free alkali in potassium chromate reagent. L. E. Sabinina and A. A. Fabalova. *Zavodskaya Lab.* 8, 413–16(1939).— It is shown that the detn. of free alkali in K_2CrO_4 reagent by titrating with acid in presence of phenolphthalein gives inaccurate results. Instead the free alkali can be detd. by potentiometric titration with acid and a PbO_2 electrode. The possible error in this method is 0.001–0.002% (OH^-). B. Z. K.

Estimation of carbon disulfide. Angelo Castiglioni. *Ann. chim. applicata* 29, 196–8(1939); cf. *C. A.* 33, 2067⁶.— CS_2 has been shown to form a ppt. with piperazine, of the compn. $C_1H_{10}N_2CS_2$. The reaction is quant. only in the presence of a large excess of piperazine. The reaction takes place best with 95% EtOH as solvent. The ppt. is dried at 105°. Detns. are within 0.1–0.2%. For gaseous CS_2, the gas is bubbled through a concd. alc. soln. of piperazine. L. W. Contieri

Automatic detection and estimation of dangerous concentrations of ammonia and sulfur dioxide in air. B. A. Zalissev. *Zavodskaya Lab.* 8, 679–88(1939).—Various expts. are described for detecting and automatically estg. dangerous amts. of NH_3 and SO_2 in air. A tentative method was developed in which the air and the absorbing liquid are passed through a spiral coil and then through a gas separator from which the liquid is sepd. and its changing pH measured with an automatic photoelec. colorimeter equipped with optical or sound-signal devices. The absorbing liquids were 0.0005 *N* H_2SO_4 and 0.0005 *N* H_2O_2 for NH_3 and SO_2, resp., with 4 mg./l. of bromophenol blue indicator for both. The sensitivity of the app. can be varied by changing the ratio of air velocity to the velocity of the absorbing liquid. Diagrams of the app. are included. B. Z. Kamich

Determination of sulfur dioxide in the presence of nitrogen. G. V. Rabovskiĭ, A. C. Derenkovskaya and L. L. Linde. *Zavodskaya Lab.* 8, 372–8(1939).—A comparative evaluation of various methods for detg. SO_2 in mixts. contg. oxides of N indicates that the methods of Raschig (*C. A.* 23, 2787), of Shults, of Kangun (*C. A.* 28, 5365⁴), and of Ugnyachev (*C. A.* 32, 6176⁵) do not give reliable results. About 1–2 l. of gas is blown at a rate of 3–4 drops per sec., through a Drexel tube contg. 100 ml. of 3% H_2O_2. One-fourth of the soln. is neutralized with 0.1 *N* NaOH to methyl red, heated to boiling, and 0.5 *N* $BaCl_2$ is added dropwise until it is equal to the ml. of 0.1 *N* NaOH added. The soln. is cooled to room temp., 10 ml. alc. is added, then 0.5 ml. of 0.5% alc. soln. of rosolic acid, and the soln. is titrated with 0.05 *N* K_2CrO_4 to disappearance of red coloration. The method takes 20–25 min. and is suitable for use in H_2SO_4 plants. B. Z. Kamich

Method for determining moisture in salts of high electric conductivity. Kh. I. Vorakso, L. I. Grudkova and K. P. Mishchenko. *Zavodskaya Lab.* 8, 837–42(1939).— A method is described for controlling moisture in NaCl, KCl and NH_4NO_3 by measuring the changes in dielec. const. by the method of resonance using a condenser in which the salt to be investigated occupies only a part of the field. Both ultra-short and short waves were used but the latter does not give accurate and sufficiently differentiated results. The moisture is measured with an accuracy of 0.3%. B. Z. Kamich

Spectral analysis of minerals and solutions. A. K. Rusanov and K. N. Vasil'ev. *Zavodskaya Lab.* 8, 832–7(1939).—In the spectral analysis of minerals the powd. materials were "blown" onto an acetylene-oxygen flame and from the intensity of the lines it was possible to est. concn. of Cs and Rb in 0.001, 0.01, 0.1 and 1%. For more accurate results the chloride solns. of Cs, Rb and K contg. Mn as a secondary element were used. Accuracies were ±2.5% for Rb, ±3.0% for K, and ±2.2% for Mn. The min. amt. of soln. necessary is 2 ml. B. Z. Kamich

Geological measurement of time by the analysis of monazite. Edith Thoupa. *Mikrochemie* 27, 165–75(1939).— In monazite the ratio of the Pb to the Th content is important for the measurement of geol. time. Microchem. methods of analysis are recommended because of the economy with respect to both time and material. In the work here described, the Pb was detd. as $PbSO_4$. For the Th detn. treatment with NH_4NO_3 and H_2O_2 served to sep. Th from the rare earths. The ppt. was dissolved in HNO_3, the H_2O_2 removed by evapn., the Th was pptd. by addn. of NH_3 and the ppt. ignited to oxide. UO_2^{++} was also detd. with the aid of oxine. The procedure, which is described, was tested by means of a synthetic monazite contg. known quantities of the various constituents. The results obtained were excellent. W. T. H.

Analysis of zircon sand. M. Axt. *Ing. chim.* 23, 142–5(1939).— Fusion with NaOH disintegrates a ½-g. sample of the sand in 5 min. at a temp. of 600°. Evapn. with H_2SO_4 to white fumes gives perfect results for SiO_2. The $(NH_4)_2AsO_4$ method for detg. ZrO_2 is very exact. This method can be used to analyze other minerals of Zr such as baddeleyite or zirkite. Ann Nicholson Hird

The sensitivity of the picrate paper test (Guignard test) for hydrocyanic acid. Douw G. Steyn. *J. S. African Vet. Med. Assoc.* 10, 65–8(1939).—The limit of the picrate paper test lies at about 0.00052 mg. HCN in 5 cc. soln. The test is more sensitive at high temps. (55–60° for 1.5 hrs. and 37–38° for a further 16 hrs.) than at low temps. (30° for 1.5 hrs. and 15–20° for a further 16 hrs.).

The picrate paper test yields very satisfactory results with plants, but gives unreliable results on animal and human organs and other materials which are likely to contain reducing substances. In such cases the test in which $Fe(CNS)_3$ is formed is the most reliable and most sensitive for HCN. K. D. Jacob

Argentometric titration of selenious acid. Raluca Ripan-Tilici. *Z. anal. Chem.* **117**, 326–30(1939); cf. *C. A.* **32**, 6753⁹.—From 25 to 50 ml. of 0.1 *M* Na_2SeO_3 soln. can be titrated accurately at pH 9.6 with $AgNO_3$ in the presence of fluorescein as adsorption indicator. The soln. should be dild. with 10 vols. of water before titrating. At the start the ppt. of Ag_2SeO_3 assumes a yellowish pink color, but turns fiery red as soon as the equivalence point is reached. Under similar conditions the titration succeeds also with diphenylcarbazone as indicator although some practice is required in detg. the end point. Another possibility consists in adding a measured excess of $AgNO_3$ and detg. the excess Ag gravimetrically, volumetrically or electrometrically. W. T. H.

Volumetric determination of sulfuric acid combined with alkali metal. Albert Krüger. *Z. anal. Chem.* **117**, 333 (1939).—The reaction $Na_2SO_4 + BaCO_3 = BaSO_4 + Na_2CO_3$ can be made to go to completion by treating the cold soln. of Na_2SO_4 with $BaCO_3$ in suspension while introducing CO_2. The ppt. of $BaSO_4$ together with excess $BaCO_3$ can be filtered off and the filtrate titrated with HCl to a methyl orange end point. Details concerning the accuracy and reliability of the procedure will probably be published soon. W. T. H.

New data for the spot-plate detection of certain ions. E. A. Kocsis. *Mikrochemie* **27**, 180–4(1939).—A 0.2% aq. soln. of benzopurpurin 4 B in contact with a drop of soln. contg. Ag^+ gives a brown ring outside the inner red spot which appears like the color of benzopurpurin itself. The test is given with 0.03 mg. of Ag. With 0.04 mg. Hg_2^{++} benzopurpurin gives a bright reddish violet test and with 0.015 mg. Hg^{++} a bluish gray ring. 0.025 mg. Hg^{++} gives a bright reddish brown spot with benzopurpurin and 0.02 mg. Hg^{++} gives a yellow spot with bromophenol blue. With these reagents it is easy to distinguish between Hg_2^{++} and Hg^{++}. Bromophenol blue gives a violet-red ring with Pb^{++} and 0.025 mg. of Pb will give the test. As little as 0.035 mg. of U can be detected by the light-brown ring which UO_2^{++} gives with benzopurpurin. This reagent also serves to detect 0.005 mg. of Al by the reddish brown spot. The morin test for Al will detect as little as 0.001 γ of Al if the reagent, a 0.2% soln. in EtOH, is added to 1 ml. of the soln. to be tested and the mixt. is exaind. under ultraviolet light. W. T. H.

Rapid method for determining magnesium, calcium and barium ions. N. K. Senyuta. *Zavodskaya Lab.* **8**, 721–3(1939).—In this method Ba, Mg or Ca is pptd. by means of a measured vol. of standard Na_2CO_3, NaOH or $Na_2C_2O_4$ soln., resp. The ppt. is removed and the excess Na_2CO_3 or NaOH titrated with standard acid in the case of Ba or Mg and with $KMnO_4$ in the presence of hot, dil. acid in the case of Ca. An immiscible liquid such as $CHCl_3$ or CCl_4 was used for removing the ppts. from the conical tubes in which pptn. took place. The results were within 0.8% of the truth. B. Z. Kamich

Oxalate method for determining sulfate ion. I. G. Lakomkin. *Zavodskaya Lab.* **8**, 416–21(1939).—To det. 50–100 mg. SO_3 in 100 ml. of soln., first remove alk. earths by treatment with Na_2CO_3. Make the soln. neutral by adding HCl and add BaC_2O_4 which forms less sol. $BaSO_4$ and an equiv. wt. of $C_2O_4^{--}$ goes into soln. Filter, make acid and titrate the $C_2O_4^{--}$ with $KMnO_4$ under the usual conditions. B. Z. Kamich

Current microchemical literature. Edith Nadler. *Mikrochemie* **27**, 231–9(1939); cf. *C. A.* **33**, 5771⁴.—The review covers May 5 to June 20, 1939. W. T. H.

Application of salts of complex cations to the microscopic detection of anions. VIII. 1,2-Chloroaquotetramminocobaltic chloride. L. K. Yanowski and W. A. Hynes. *Mikrochemie* **27**, 161–4(1939); cf. *C. A.* **33**, 4548³.—A satd. soln. of $[Co(NH_3)_4(H_2O)Cl]Cl_2$ gives characteristic crystals by reacting with PO_4^{---} or with $P_2O_7^{----}$ ions. With PO_4^{---} the shape of the reaction product varies with the pH of the soln. from which it is formed. W. T. H.

The application of salts of complex cations to the microscopic detection of anions. IX. W. A. Hynes and L. K. Yanowski. *Mikrochemie* **27**, 335–48(1939)(in English).—Roseocobaltic chloride gives characteristic crystals with oxalates, sulfosalicylic acid, dithionates, ferricyanides, ferrocyanides, fluosilicates and phosphomolybdates. Of these only the first 4 mentioned are to be recommended for the identification of the ions in question. W. T. H.

Microdeterminations with ordinary analytical balances. A. A. Benedetti-Pichler and R. A. Paulson. *Mikrochemie* **27**, 339–47(1939).—Five short-arm balances costing on the av. about $65 each, such as are used by students in the U. S. A., were tested. The oldest balance was purchased in 1924 and the newest in 1935. The predictions of a previous paper (*C. A.* **33**, 4083³) were put to a practical test with respect to the extent to which the ordinary balance could be used safely for small samples. The methods studied included the detn. of Na as sulfate in a sample of pure $Na_2C_2O_4$, the detn. of Al in a sample of alum, the detn. of Ca in a pure sample of $CaCO_3$ and the detn. of Mg in a sample of freshly crystd. $MgSO_4.6H_2O$. Samples weighing 5–18 mg. were taken. The largest deviation actually obtained amounted to about 1.0% of the actual content which is somewhat better than was to be expected. W. T. H.

A list of micromethods for the determination of calcium and phosphate. R. S. Manly. *Mikrochemie* **27**, 145–53 (1939).—The elements P and Ca are of such *biol. importance* that no less than 78 papers have appeared recently concerning the microchem. detn. of these elements. The purpose of this compilation is to provide a ready reference list for workers who anticipate carrying out routine work. The principle upon which each procedure is based, the necessary quantity of material, the necessary app. and reagents, as well as the precision and accuracy, are all stated. W. T. H.

Vanadometric microchemical determination of iron. V. V. Stepin. *Zavodskaya Lab.* **8**, 262–4(1939).—In this method the Fe^{++} in the soln. is titrated in 6 *N* H_2SO_4 with 0.01 or 0.0025 *N* NH_4 vanadate in the presence of phenylanthranilic acid indicator. Results of titration on samples of 0.5 g. and contg. as little as 0.04% Fe gave satisfactory results. The method is especially suitable for analyzing limestones, Mn ores and silicates. B. Z. Kamich

The microchemical, gasometric determination of nitrogen in organic compounds. H. Gysel. *Helv. Chim. Acta* **22**, 1085–95(1939).—The method was tested with 1.2–3.5-mg. samples of substance such as strychnine nitrate, barbital, semicarbazone and urea derivs. It is a modification of the Dumas method and makes use of 2 short furnaces of which the front one is movable. In spite of the small samples used and the relatively small vols. of N_2 measured, the results were remarkably accurate. W. T. H.

Microdetermination of sulfur in organic compounds. N. E. Gel'man. *Zavodskaya Lab.* **8**, 673–7(1939).—In a modified Meulen method (cf. *C. A.* **30**, 416⁶) a 3–5-mg. sample is heated in a Pt boat, the vapors of the org. compd. are passed with a stream of H_2 over a heated catalyst of rolled Pt gauze, the H_2S is absorbed in a buffered $ZnSO_4$ soln. and the S is detd. iodometrically. The combustion tube contg. the Pt boat and Pt catalyst is 55 cm. long, 8–9 mm. in diam. (inside), and is made of quartz. The glass absorption tube was bent at 45° with the vertical end connected to the combustion tube and the inclined arm shaped into a series of bulbs. Detns. of S on 8 org. compds. showed close agreement with the theoretical values. The procedure and app. are described in detail. B. Z. K.

Microchemical method for the potentiometric "formol" titration. A. Janke and E. Mikschik. *Mikrochemie* **27**, 176–9(1939).—Amino acids contain at one end of the mol. the basic NH_2 group and at the other end the acid CO_2H group. Just as NH_3 reacts with HCHO to form hexamethylenetetramine, so the NH_2 group loses its basic

properties by reacting with HCHO. The so-called "formol" titration consists in adding HCHO and then detg. the vol. of NaOH required to change the soln. from pH 7 to pH 9. An ingenious app. is shown in which the container also serves as glass electrode. By means of a magnet, the soln. is kept in motion during the titration and the end point is detd. electrometrically. W. T. H.

Chemical microscopy of some toxicologically important alkaloids. W. F. Whitmore and C. A. Wood. *Mikrochemie* **27**, 249-334(1939)(in English).—Many of the available confirmatory tests for alkaloids are not sufficiently reliable. In the work here described, the degree of specificity was detd. for every test and the alkaloids studied included β-eucaine, cocaine, procaine, stovaine, cinchonine, cinchonidine, quinine, quinidine, codeine, dionine, heroine, morphine, narcotine, papaverine, brucine, strychnine, caffeine, theobromine, atropine and nicotine. More than 40 reagents were applied systematically to every one of these alkaloids and by comparison of the results satisfactory specific tests were discovered. All cryst. properties were studied under the polarizing microscope. Birefringency was designated as weak or strong. The angle of extinction was detd. and the sign of elongation observed with the selenite plate. The term pos. elongation is used to indicate the fact that the slower component of light vibrates approx. parallel to the longer direction of the crystal and, conversely, neg. elongation is used to denote vibration of the faster component of light approx. parallel to the outstanding direction of form. Pleochroism was reported and in some cases prolate or silhouette angles were measured. Refractive indexes were not detd. β-Eucaine gave a no. of cryst. complex salts and in general the reagents gave similar ppts. with both β-eucaine and cocaine. Fortunately, since eucaine is used as cocaine substitute, the derivs. of cocaine differ in appearance and optical characteristics from those of eucaine. The bromoplatinate deriv. is best suited for the identification of β-eucaine, particularly in conjunction with the optical properties. Cupferron is a very specific reagent for β-eucaine as it was the only alkaloid studied which gave a cryst. deriv. With cocaine, the most characteristic, cryst. deriv. is the ppt. formed with $NaAgI_2$. No other alkaloid gave crystals with this reagent except brucine and strychnine but the crystals formed with these alkaloids are easily distinguishable from the cocaine ppt. Practically the same is true with respect to the double salt that cocaine forms with HgI_2. H_2PtCl_6 dissolved in 5% HBr is much more useful with cocaine than the usual HCl soln. of this reagent. Procaine yields many ppts. but most of them are not cryst. The most characteristic crystals were obtained with a soln. of Br_2 and KBr. The iodoauric and bromoauric acid salts are next in order of usefulness and the crystals obtained with $CdBr_2$ are of some interest. The test with β-naphthol was not given by any other alkaloid tested. With stovaine, most of the many ppts. would not crystallize. The complex with $AuBr_4^-$, especially when recrystd. from EtOH, is most useful for the identification of stovaine. The most characteristic test for cinchonine was obtained with H_2PtCl_6 in 20% HBr. The perchlorate crystals are also useful but not easy to obtain. K_2HgI_4 is a useful reagent for cinchonine because this reagent gives relatively few cryst. ppts. and only very little cinchonine is required to give the test. The main group of the Pt metals (Os, Ir and Pt) give characteristic tests with cinchonidine and the ppt. obtained with Na_2OsCl_4 is most convenient with respect to size, soly. and optical consts. The crystals obtained with Na_2SnI_4 are useful because few alkaloids react with this reagent. For quinidine, the most characteristic test was obtained with a crystal of K anthraquinone sulfonate added to the test drop and then heated. The crystals obtained were easy to identify. Quinine is characterized by its tendency to ppt. as sulfate from aq. solns. The ppt. formed with H_2PtCl_6 in 20% HBr added to a 1% soln. of quinine sulfate is a useful and unusual test form. With codeine, the best test was obtained with CdI_2 but K_2HgBr_4 is a useful reagent since relatively few alkaloids give ppts. with the neutral soln. of this reagent. With dionine, the most useful test is obtained with H_2PtCl_6 in 5% Br soln. or with Na_2PtF_6. The crystals are easy to obtain and are characteristic. For heroine, the most specific test is obtained with $CdCl_2$. The crystals produced with Na_2PtBr_6 are of value if the optical properties are studied and anthraquinone sulfonate is of some value as a reagent for heroine. Morphine is detected by means of Na_2SnI_4 although codeine and dionine give similar ppts. The test with K_2HgBr_4 is characteristic. Narcotine gives ppts. with many reagents but the test with borax is the most characteristic when the soly. and optical properties of the crystals are studied. The forms produced with $IrCl_4$ are characteristic but not as easily obtained as the ones with borax. Papaverine also gives many ppts. but the most specific test is with CdI_2 although the test with $TiCl_3$ is also specific. Brucine, like strychnine, forms many ppts. and it is difficult to pick out the best test. The formation of crystals with $BiCl_3$ is a test to be recommended and although strychnine gives a similar test the crystals are different in shape and in sign of elongation. $K_2Hg(SCN)_4$ and K xanthate give quite characteristic ppts. Strychnine gives more cryst. ppts. with the 40 reagents used than does any other alkaloid. HSbCl, K H phthalate, $KSbOC_4H_4O_6$ and NH_4VO_3 give ppts. only with strychnine and the SbO deriv. is the most reliable test for the identification of strychnine. The crystals are apparently isotropic which was not true of any of the other crystals studied in this investigation. Caffeine shows little tendency to form insol. ppts. with the various reagents. The most useful crystals were obtained with the alkaloid reagents contg. Br or I. The most specific test is given by Br_2 in NaBr; hexagonal crystals are obtained. The K_2PtI_6 and NaAuBr tests are good but less specific. Theobromine gives many cryst. ppts. but they are not very characteristic. The long needles obtained with Br_2 in NaBr are most specific and useful for distinguishing between caffeine and theobromine. The $KAuI_2$ and $NaAuBr_4$ tests are useful but less specific. Nicotine, like brucine, is characterized by its tendency to form complex metallo-thiocyanates. The Co compd. is most useful for identification purposes. With K_2HgBr_4 crystals were obtained which showed oblique extinction and this is the only case where such crystals were obtained with this reagent. Atropine gives few ppts. and the best reagent was Br_2 in NaBr. A summary of the action of 40 reagents upon all of the alkaloids is given and 138 photographic reproductions of the best tests are shown. W. T. H.

Influence of putrefaction on the detection of alkaloids in cadavers by the absorption spectrograph. Fritz Strieck. *Deut. Z. ges. gerichtl. Med.* **30**, 297-8(1939).—Putrefaction products do not make the identification of alkaloids by absorption spectrum analysis impossible, if the alkaloid is present in greater quantity than the contaminants. Quantitatively, absorption spectra can indicate upper limits only. The method can be used only as an aid to other analyses. Frances Krasnow

Determination of aromatic hydrocarbons by a new method. Aristid V. Grosse and Richard C. Wackher. *Ind. Eng. Chem., Anal. Ed.* **11**, 614-24(1939).—The method was developed for the rapid analysis of hydrocarbon mixts. boiling in the gasoline and naphtha range. It is based upon the detn. of the sp. dispersion of the hydrocarbon mixt. Tables show the dispersion and sp. dispersion of over 50 hydrocarbons. The effect of double bonds and the relation of sp. dispersion and unsatu. is discussed and analyses are given of mixts. contg. conjugated diolefins. The method is proposed for pure hydrocarbon mixts. which boil below 220° but the effects produced by the presence of O, S and halogen compds. are discussed. The percentage of aromatic compds. found by this dispersion method agrees in most cases fairly well with values obtained by H_2SO_4 although in one case the latter method gave a value 50% higher. W. T. H.

Determination of aromatic hydrocarbons in light kerosene by the method of aniline points. V. I. Artyukhin and Ts. L. Glanovskaya. *Zavodskaya Lab.* **8**, 728-30 (1939).—In detg. the aromatic content of light kerosene by the method of aniline points the following precautions should be observed to obtain accurate results: (1) only

freshly distd. aniline should be used, (2) the water bath should be cooled gradually, (3) after stirring the overheating should not be allowed to rise by more than 5-6°, and (4) the ratio of aniline to light kerosene should be carefully maintained at 1:1. B. Z. Kamich

Polarographic method for determining organic peroxides. A. A. Dobrinskaya and M. B. Neiman. *Zavodskaya Lab.* **8**, 280–3(1939).—Polarograms are given of various concns. of H_2O_2, CH_3OOH, diethyl peroxide, formaldehyde, acetaldehyde, and a 2% condensate obtained in cold flame oxidation of acetaldehyde. The results indicate that the polarographic method can be used for qual. and quant. analyses of peroxides, in studying oxidation of aldehydes, cracking gasolines, oils, pharmaceutical prepns., and primary and by-products of the synthetic rubber industry. Nineteen references. B. Z. Kamich

Determination of small amounts of mercury in organic compounds with potassium iodide. N. V. Koshkin. *Zavodskaya Lab.* **8**, 677–9(1939).—The Korenman method (*C. A.* **29**, 71⁶, 2471⁷) for detg. small amts. of Hg in org. compds. by titrating with KI was modified so as to approach the end point from a colorless soln. to a blue coloration. The end point was very sharp and in detns. of 0.2–2 mg. Hg in 1 ml. soln. the av. error did not exceed 3%. Equally good results are obtained by titrating with 0.001 *N* and 0.01 *N* KI but in the latter case the end point is sharper. B. Z. Kamich

Amyl alcohol for the estimation of the nitrogen distribution by Van Slyke's method. Masakazu Sato, Tamotu Hirano and Hirosi Kamati. *J. Agr. Chem. Soc. Japan* **15**, 791–4; *Bull. Agr. Chem. Soc. Japan* **15**, 124–5(1939)(in English).—The exptl. error in the content of basic amino N has often been observed. It is due to the presence of pyridine in com. amyl alc., which is used for the removal of phosphotungstic acid in Van Slyke's method (*C. A.* **5**, 509, 2856.) One part of com. amyl alc. should be washed 3 times with 2 parts of 5% HCl to remove pyridine. Y. Kihara

Determination of ethyl alcohol after preliminary purification of the alcohol vapors by adsorption. E. Schulek and P. Rozsa. *Z. anal. Chem.* **117**, 400–14(1939).—EtOH is often detd. by distn. and measuring the d. or the *n* of the distillate. Such a method is not satisfactory for the examn. of many pharmaceutical prepns. contg. other volatile constituents. The method here described, which was tested with synthetic mixts. and with various prepns. such as spirit of camphor, alc. soln. of salicylic acid, menthol or mustard, cologne water, brandy, wine, mouth washes, han tonic and various tinctures, is a purely chem. procedure. It depends upon the volatilization of 5–15 mg. of EtOH by the passage of considerable air at room temp. The air containing EtOH vapors is passed over a suitable quantity of dry, "amphoteric" activated C which serves to remove interfering vapors. The quantity of C required is detd. by testing its adsorption power toward antipyrine. A quantity sufficient to adsorb 12–15 mg. of antipyrine will not adsorb 5–20 mg. of EtOH. The vapors after the adsorption of impurities are passed into 25 ml. of 0.1 *N* $K_2Cr_2O_7$ soln. to which sufficient H_2SO_4 has been added to make the d. = 1.62. The dichromate oxidizes the EtOH to AcOH. Finally the excess dichromate is detd. iodometrically. A special app. is shown which is suitable for the analysis and various precautions are noted which are essential for carrying out the detn. which is shown to give excellent results. W. T. H.

Determination of the diethylamides of nicotinic and phthalic acids. K. A. Jacobsohn and F. Reitmers. *Z. anal. Chem.* **117**, 415–20(1939). —A common method for the analysis of amides consists in accomplishing hydrolysis by boiling with dil. acid or base followed by titration of the NH_3 formed. This procedure also gives good results with many substituted amides but with coramine (*N,N*-diethylnicotinamide) nicotinic acid and diethylamine are formed. The latter has a b. p. of 56° and is not easy to det. Recently various prepns. were placed on the market and the effective constituent is closely related to coramine. This includes phthalic acid-bis-diethyl amide(neospiran) which has recently come into use. For the detn. of coramine, take a quantity corresponding to about 0.4 g. of this substance, mix with 100 ml. of water and an equal vol. of concd. NaOH soln. in a 1. flask. Add a little pumice and connect with a Kjeldahl distn. flask. Place 25.00 ml. of 0.1 *N* HCl in the 250-ml. Erlenmeyer flask which serves as receiver. Heat the mixt. slowly to boiling and keep barely boiling for 20 min. without much distn. Then heat more strongly and distil off 100 ml. of liquid under good condensation. Then add 25 ml. more of water through a dropping funnel in the neck of the flask and distil until 125 ml. of total distillate has been collected. Titrate with 0.1 *N* borax or NaOH soln. to a methyl red end point. Good results were obtained with the substituted amide of phthalic acid. W. T. H.

The microscopy of the amino acids and their compounds. IV. Picrolonates. Rayburn Dunn, Kazuo Inoue and Paul L. Kirk. *Mikrochemie* **27**, 154–60(1939); cf. *C. A.* **31**, 4356⁹.—Alanine, arginine, aspartic acid, cysteine, cystine, dibromotyrosine, dichlorotyrosine, diiodotyrosine, glutamic acid, glycine, histidine, hydroxyproline, hydroxyvaline, isoleucine, isoserine, leucine, lysine methionine, norleucine, norvaline, phenylalanine, proline serine, tryptophan, tyrosine, valine and *dl*-α-amino-γ-valeric acid all yield cryst. picrolonates which can serve for identification. The predominant crystal habit is acicular and although direct examn. of the crystals under the microscope is not always sufficient for the characterization, it is possible in nearly every case to identify the amino acid by the refractive index. W. T. H.

Determination of furfural in furfural furfuryl alcohol solution. A. P. Dunlop and Floyd Trimble. *Ind. Eng. Chem. Anal. Ed.* **11**, 602–3(1939).—To 5 ml. of soln. in a glass-stoppered flask add 25 ml. approx. 0.1 *N* $NaHSO_3$ soln. Shake, allow to stand 15 min., add starch and titrate with 0.1 *N* I_2 soln. At the same time det. the I_2 consumption of the $NaHSO_3$ soln. under exactly the same conditions with respect to standing, etc. A nomograph for calg. the results is given. W. T. H.

Determination of pyridine in ammonia by means of bromine cyanide and benzidine. R. I. Alekseev. *Zavodskaya Lab.* **8**, 807–9(1939).—Pyridine in NH_3 is detd. colorimetrically by causing it to react with BrCN and benzidine and extg. the colored compd. with isoamyl alc. Before the colorimetric test the NH_3 should be neutralized exactly to *p*-nitrophenol as indicator. The presence of neutral salts has no harmful effect. The optimum pyridine quantity to be detd. colorimetrically is 0.003–0.05 mg. and at least 0.3 γ must be present. Twenty references. B. Z. Kamich

Determination of 8-hydroxyquinoline in the presence of thiosalicylic acid. Angelo Castiglioni. *Ann. chim. applicata* **29**, 315–16(1939). 8-Hydroxyquinoline is detd. by pptn. with silicotungstic acid; it gives a bulky yellow ppt. having the compn.: $12WO_3.SiO_2.4C_9H_7ON.4H_2O$. The silicotungstic acid (10% soln.) is added to an acidified (HCl) soln. of 8-hydroxyquinoline; any thiosalicylic acid present in soln. is not affected. The ppt. settles in 7–8 hrs. and is filtered, ignited, dried at 105° and weighed. As the conversion factor to 8-hydroxyquinoline is 4.903, a small amt. of the latter can be detd. with precision. A. W. Contieri

Nephelometric method for determining nicotine. K. B. Trifonova. *Zavodskaya Lab.* **8**, 731(1939).—Add 10 drops of 1% silicotungstic acid and 3–4 drops of 10% HCl to equal amts. of water in 2 beakers, then add 3 ml. of the test soln. to one beaker and to the other a standard nicotine soln. until an equal opalescence is obtained. The results are satisfactory. B. Z. Kamich

Characterization of acetylsalicylic acid preparations. Iodometric determination of salicylic acid. D. Kruger. *Z. anal. Chem.* **117**, 318–26(1939).—Although acetylsalicylic acid is an old pharmaceutical prepn. and considerable attention has been paid to the detn. of its purity, as is shown by over 30 references, it is a well-known fact that the prepn. is found on the market with very different phys. and medical properties. The difficulties in connection with its analysis are pointed out and, as a result of study, it is

recommended to det. the salicylic acid content by iodometric titration. To about 0.3 g. of sample, add 15 ml. of 0.5 *N* NaOH and allow to stand overnight or heat for some time on the water bath completely to hydrolyze the compd. into Na salicylate. Add 0.5 g. Na_2CO_3, 50 ml. of water and 20 ml. of 0.1 *N* I_2 soln. After 20–30 min. add 2 ml. of 3.5 *N* H_2SO_4 and titrate with $Na_2S_2O_3$. One mole salicylate absorbs 6 atoms of I. For the analysis of tablets it is best to recrystallize from CCl_4. In the analysis of 4 samples, the values 76.48, 76.66, 75.71 and 76.58% were obtained which, by comparison with the theoretical value of 76.67, showed that one sample was quite impure. It is thought that the method gives results within about 0.1% of the truth. W. T. H.

Detection of porphyrin and other organic substances in calcite and aragonite. H. Haberlandt. *Naturwissenschaften* **27**, 615–14(1939).—A pink calcite from Altenburg left a red residue upon treatment with HCl. The soly. of the red residue in EtOAl, other ales. and EtOH + AcOH, the absorption and fluorescence bands of the pin solns. and the bands of the mineral itself make it seem probable that porphyrin is present as a result of bacterial action. A red calcit found in Quincy, France, may also contain porphyrin. B. J. C. van der Hoeven

Mol. compds. of methyl α-naphthol ether and dinitro products [identification of dinitro compds.] (Burmistrov) 10. [Detn. of] Cb and Ta (Klinger) 6.

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Hlika, Josef: Die chemische Analyse. Bd. XLII. Die exakten Methoden der Mikromassanalyse. Edited by W. Bottger. Stuttgart: F. Enke.

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8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Notes on the use of methyl methacrylate "Lucite" in a geological laboratory. James V. Bell. *Econ. Geol.* **34**, 804–11(1939).—The material is especially useful for impregnating fragile or friable specimens, of which thin sections are desired. Detailed directions are given. Michael Fleischer

Disintegration of beryllium minerals. Robert Strauss. *Can. Chem. Process Inds.* **23**, 500–2(1939).—Raw Be minerals are disintegrated by: (1) the aid of F compds., (2) alkali, (3) Cl and (4) CO_2. Each method is outlined and the nos. of several American, French and German patents are appended. W. H. Boynton

Mineral syntheses by detonation of brisant explosives and pneumatolysis. Albert Michel-Lévy. *Bull. soc. géol. France* **9**, 105–10(1939); cf. *C. A.* **33**, 7699⁷.—After a connected account of work previously reported, its bearing on the probable processes that have resulted in the terrestrial formation of similar minerals is discussed, including those connected with condensation from the primordial nebula, those occurring under high pressures in the depths of the earth, etc. Several photomicrographs of the products are given. C. A. Silberrad

Identification of diamond in the Canyon Diablo iron. C. J. Ksanda. *Am. Mineral.* **24**, 677–80(1939).—Black grains, from 0.1 to 0.9 mm. in diam., were identified as diamond by x-ray and microscopic examn. C. H. Hale

Variation of hardness in the diamond. Edward H. Kraus and Chester B. Slawson. *Am. Mineral.* **24**, 661–76(1939).—Crystallographic theory explains the experience of diamond cutters; facets parallel to cube faces are easiest to polish or grind; those parallel to the rhombic dodecahedron are somewhat harder. Facets nearly parallel to the octahedron show greater hardness; when exactly parallel they exhibit max. hardness and no polishing is possible with diamond dust. Growth and soln. phenomena and cleavage are also explained in terms of crystallographic theory. C. H. Hale

Nature and origin of flint. Kenneth P. Oakley. *Science Progress* **34**, 277–86(1939).—A review of the geochemistry of flint with 12 references. J. S. Hepburn

Mineralogical constituents of vredenburgite. S. Deb. *Compt. rend.* **209**, 518–20(1939).—Vredenburgite consists of an intimate union of jacobsite and hausmannite (cf. Fermor, *C. A.* **33**, 2059⁴), the percentage of jacobsite varying from 84.15 to 65.45% in different samples. Though x-rays show no difference in the structure of the jacobsite from that of this mineral when occurring alone, there are distinct differences in the permanent specific magnetization, possibly the result of slight differences in comptn. due to differences in the conditions of formation, which probably resulted from the sepn. into the 2 constituents of an originally homogeneous material through change of temp. and pressure. C. A. Silberrad

Alteration of ilmenite. Joh G. Koenigsberger. *Econ. Geol.* **34**, 811(1939).—K. believes that leucoxene (titanite) is formed from ilmenite by hydrothermal action at 150–250°, not by surface weathering as suggested by Merritt (*C. A.* **33**, 1914⁶). Michael Fleischer

Dolomitization of calcareous sediments. A. Rivière. *Compt. rend.* **209**, 597–9(1939).—The fact that the pH of sea water in contact with $CaCO_3$ decreases, as also the "alkaline reserve" (defined as the no. of cc. of *N* diacid required to neutralize a l. of sea water with an indicator unaffected by CO_2, this indicates the total Ca and Mg in soln as carbonate or bicarbonate) is not explicable as merely due to sepn. of $CaCO_3$ on nuclei thereof from a supersatd. soln. Expts. are described suggesting that the true explanation is based on the fact that $CaCO_3$ in contact with sea water extracts therefrom some of the Mg as $MgCO_3$, partially transforming some of the $CaCO_3$ to $MgCa(CO_3)_2$. Pure chalk left in contact with sea water for 11 months contained 8% dolomite. C. A. S.

Serendibite and associated minerals from the New City Quarry, Riverside, California. Gerald M. Richmond. *Am. Mineral.* **24**, 725–6(1939); cf. *C. A.* **27**, 2653².—The mineral is optically +, $2V$ = nearly 90°; $\alpha = 1.719$; $\beta = 1.722$; $\gamma = 1.724$. Dispersion is extremely strong, r greater than v. C. H. Hale

Demantoid from the ultrabasic rocks of Azerbaidzhan. Mir-Ali-Kashkai. *Compt. rend. acad. sci. U. R. S. S.* **22**, 507–9(1939)(in English).—The comptn. of emerald-green crystals of demantoid from Mt. Shah-Dag (Minor Caucasus) was found to be: SiO_2 34.52, Fe_2O_3 31.33, MgO 0.72 and CaO 33.42%. TiO_2, Cr_2O_3, alkalies and water were not detd. This corresponds to the formula $Ca_3Fe(SiO_4)_3$. Analysis of macroscopically similar crystals differed, indicating an admixt. of andradite. Demantoid is found in much crumpled, metamorphosed serpentinized dunites in the form of thin veinlets in the rock and on the surface of cavities of the ultrabasic Transcaucasus complex. Lester W. Strock

Genesis of montmorillonite and kaolinite and conditions of their joint occurrence in the colloids of soils and clays. I. D. Sedletskii. *Compt. rend. acad. sci. U. R. S. S.* **22**, 510–14(1939)(in English); cf. *C. A.* **32**, 3728⁹.—The minerals montmorillonite, beidelite and sericite constitute the colloids of alk. "solonetz" soils, whereas minerals of the kaolin group are found in the acid "podzol" soils. Solonetz soils from Trans-Volga, the Caspian plain, middle Asia and the Chernigov district; and podzol soils from the Kalinin district, the Moscow district and Kamchatka were investigated. Montmorillonite prevailed in a soda-solonetz whereas beidelite was present in the upper portion of a sulfate-chloride solonetz. The process of desalinization of salt marshes results in a production of $CaCO_3$ from underlying gypsum. Beidelite is found above the gypsum

layers but not below them where the medium is slightly acid. In podzol soils derived from clays, any original montmorillonite is altered to kaolin, which was demonstrated on concretions from Tzikhis-Dziri whose center was alk. and contained montmorillonite. That strata underlying coal beds (org. acid medium) contain kaolin clays was shown for the Uzbekistan deposits. Montmorillonite clays are located in regions which accumulate sol. salts as in Caspian lowlands and the Crimean clays. In general, montmorillonite clays are found in accumulation solonetz regions, while kaolin clays occur in alluvial regions. Lester W. Strock

Action of water on natural index borates at various temperatures. N. M. Selivanova. *Compt. rend. acad. sci. U. R. S. S.* **22**, 499–502(1939)(in English).—The reaction between a 1.5-g. sample of the natural Ca borates: invoite $Ca_2B_6O_{11}.13H_2O$, colemanite $Ca_2B_6O_{11}.5H_2O$ and pandermite $Ca_4B_{20}O_{35}.15H_2O$ and 50 cc. H_2O was studied at 20, 50 and 100°. The ratio of B_2O_3 to CaO in the H_2O always exceeded that of the original mineral which indicates a hydrolysis reaction. The H_3BO_3, $Ca(OH)_2$ and B_2O_3/CaO content of the equil. liquid phase is shown at 20°, 50° and 100° for the 3 minerals. The equil liquids from invoite are richer in H_3BO_3 and $Ca(OH)_2$ than from colemanite solns., so that a mixt. of 2 g. invoite and 1 g. colemanite was transformed to colemanite in 20 days at 20°, in 15 days at 50° and in 10 days at 100°. Similarly 1.5 g. invoite was transformed to pandermite in 15 days at 20°, in 12 days at 50° and in 8 days at 100°. Colemanite transforms more slowly to pandermite. The final products were identified by their chem. analysis, sp. gr. and x-ray diffraction patterns. Corresponding expts: with hydroboracite $CaMgB_6O_{11}.6H_2O$ show that B_2O_3 leaches out to a greater extent than does the bases of which Ca is more easily removed than Mg. Hydroboracite was very slowly transformed into asharite (a hydrous Mg borate). A mixt. of kalihorite ($KMg_2B_{11}O_{19}.9H_2O$), gypsum and H_2O produced hydroboracite and invoite crystals in 10 months at 25°. Lester W. Strock

Barite and celestite in the sedimentary rocks of Sweden. Assar Hadding. *Kgl. Fysiograf. Sallskap Lund, Forh.* **8**, 83–103(1938)(Pub.1939)(in English).—Occurrence and conditions of formation of the minerals in various strata are discussed. Chem analyses and crystallographic data are given for the pyrites. Conclusion: Barite was formed after the deposition of the sediments in which it lies enclosed (cf. below). Chem. analyses and descriptions are given of 2 specimens of celestite from chalk and from gray flint beds. 14 references. **The solubility relations of barium sulfate.** Sven Palmqvist. *Ibid.* 103–9.—The theoretical factors involved are discussed. Conclusion: Ca ions (and also Cl ions) will increase the solv. of $BaSO_4$. 5 references. W. C. Tobie

Pied des Monts uraninite. O. B. Muench. *J. Am. Chem. Soc.* **61**, 2742–4(1939).—The Pb-U ratio was det. as 0.135. This value, when corrected for the common Pb, gives a value of 920 million years for the age of this mineral which is in fairly good agreement with the value calcd from the isotopic detn. of the Pb from this same sample. A. S. Garrett

Oxidation-reduction potentials as applied to the study of the paragenesis of minerals. VI. V. Shcherbin. *Compt. rend. acad. sci. U. R. S. S.* **22**, 503–6(1939)(in English).—The oxidation-reduction potentials of 18 ion pairs are given in v. for a 1 *N* soln. at 18°, including among others: $V^{3+} \rightarrow V^{4+}$ (+0.40 v.); $U^{4+} \rightarrow U^{6+}$ (+0.41 v.); $Fe^{2+} \rightarrow Fe^{3+}$ (+0.75 v.); $Mo^{5+} \rightarrow Mo^{6+}$ (+0.78 v.) and $Pb^{2+} \rightarrow Pb^{4+}$ (+1.80 v.). Any pair is an oxidizer with regard to any other pair of lower pos. potential. The paragenesis of ferrous and ferric compounds is an important guide to the oxidation-reduction state of natural mineral deposits. The ions Ti (3,4); V (3,4); Cr (3); Mo (5,6); Mn (2); Co (2); Ni (2); U (4,6); W (6); and Pb (2) may occur with Fe^{2+} but the ions V (5); Cr (6); Mn (4); Co (3); Ni (3); $(IO_3)^-$; $(SeO_3)^{2-}$; $(NO_3)^-$; and Pb (4) may not occur with Fe^{2+}. The following may occur with Fe^{3+}: Ti (4); V (4,5); Cr (3,6); Mo (5,6); Mn (2,4); Co (2,3); Ni (2,3); U (6); $(IO_3)^-$; $(NO_3)^-$; $(SeO_3)^{2-}$; and Pb (2,4), but Ti (3); V (3); U (4) may not occur with Fe^{3+}. A table is given showing graphically the effect of various ions on each other which is shown to explain the paragenesis of mineral deposits, e. g., Chili "Caliche" beds, blanket ores and the V beds of Sulelman-Saya and Ottavi in which V^{5+} occurs. The genesis of ilzemanite, the formation of stichtite and volkonskoite instead of crocoite when chromite weathers, and failure of V to concentrate in weathering zones of Ural titanomagnetites is explained. Lester W. Strock

Metasomatism of the country near ore-bodies and its possible economic significance. E. de C. Clarke and H. A. Ellis. *Econ. Geol.* **34**, 777–89(1939).—The need for quant. study of the relations between ore abundance and metasomatism is pointed out. The relations existing in the Au mines in W. Australia are summarized. M. F.

Auriferous quartz veins in the Dharwar formation in the western Raichur Doab. S. K. Mukerjee. *J. Hyderabad Geol. Survey* **3**, Pt. 2, 50–88(1939); cf. Krishnamurthy, *C. A.* **32**, 7376⁷.—The area consists almost entirely of schists, gneisses, charnockites, etc. It is intersected by quartz veins, in places auriferous. One vein contains pyrite, arsenopyrite, pyrrhotite, tourmaline and a very little galena, and another chalcopyrite, malachite and Fe ores, but always in small quantities. The origin of the Au and other ores is discussed, and considered to be connected with dioritic and dolerite dikes. C. A. S

A silver-pitchblende deposit at Contact Lake, Great Bear Lake area, Canada. G. M. Furnival. *Econ. Geol.* **34**, 739–76(1939); cf. *C. A.* **33**, 6760⁶.—Several stages of mineral deposition, some sepd. by periods of marked deformation, are recognized. Granodiorite was altered with the formation of chlorite, garnet and much hematite. Dark-gray quartz veins with pyrite, chalcopyrite and arsenopyrite were then intruded, followed by white comb quartz accompanied by much hematite. The vein system was again deformed and carbonates were introduced accompanied by metallic minerals, the paragenetic succession being pitchblende, Co-Ni minerals (cobaltite, safflorite, rammelsbergite, niccolite, breithauptite), Cu and Ag minerals (tetrahedrite, bornite, chalcopyrite, chalcocite, stromeyerite, pearceite), native Bi and native Ag. The early period of mineral formation was high-temp., the later mesothermal, Ag having crystd above 200°. An analysis of the pitchblende gave U 26.31, Pb 2.44, Th trace, which places the age at about 650 million years. Twelve photomicrographs. Michael Fleischer

Manganese mineralization at Tombstone, Arizona. Charles A. Rasor. *Econ. Geol.* **34**, 790–803(1939).—Irregular pipe-like bodies of Mn oxides occurred at intersections of mineralized fissures with steep faults. The ore had a soft core of Fe and Mn oxides with considerable Ag and some Pb and Zn. This core was surrounded by hard, compact Mn oxides, chiefly psilomelane and polianite. Hetaerolite ($ZnMn_2O_4$), pyrolusite and manganiferous carbonates were also present, along with an unknown isotropic mineral contg. Mn and As. All the oxides were probably derived from a single primary Mn mineral, alabandite (MnS). This was oxidized, Mn was transported as sulfate, and ppted. as oxides by limestone in the presence of air. Optical data are given for hetaerolite and the unknown mineral. Michael Fleischer

Asbestos and chromite-deposits of Wyoming. R. H. Beckwith. *Econ. Geol.* **34**, 812–43(1939).—Numerous chrysotile asbestos deposits are described. All are in serpentine near granitic intrusions. Most of the material is short-fibered and some is brittle. Hardness and brittleness in chrysotile are shown by microscopic study to be due to the presence of streaks of silica parallel to the fiber length (cf. Sobolev and Tatarinova, *C. A.* **26**, 3756; **27**, 2400). Chromite occurs at Casper Mt. disseminated in bands and lenses in tremolite-chlorite-talc schist. The best ore requires concn. to meet market requirements. Also in *Geol. Survey Wyo. Bull.* No. 29, 32 pp. (1939). Michael Fleischer

Barite deposit at Pessens near Rodez (Aveyron). J. Durand and E. Raguin. *Bull. soc. géol. France* **8**, 755–64 (1938).—The deposit yielded 100,000 tons in the past 10

years. As extd. the material contains 30% of clay and limestone. Borings show it to extend horizontally over about 50 acres at a shallow depth. Where worked it is 1–2 m. thick, beds of pure barite being intercalated in yellowish marly or siliceous (jasperoid) liassic strata; the latter has resulted from silicification of a dolomitic limestone. Silicification was followed by introduction of the barite by hot solns. The deposit is an extreme case of metasomatosis. More or less similar deposits are fairly common in the neighborhood, the barite in places being accompanied by sulfides, e. g., the deposit at St. Rome-de-Tarn contains sphalerite, galena and chalcopyrite.
C. A. Silberrad

The brown-coal district in northwestern Bohemia. Fritz Pohl. *Z. Berg-, Hütten- u. Salinenw. deut. Reich.* 86, 475–80(1938).—Details of the geol. compn. with special reference to the occurrence, origin and character of the coal found in this district. S. Landeker

Mineral deposits in the Sudeten area. W. E. Petrascheck. *Z. Berg-, Hütten- u. Salinenw. deut. Reich.* 86, 444–74(1938).—A geol. review with details of the occurrence of combustible substances, of ores, minerals and clays. S. Landeker

Magmatic cycles and orogenic epochs. J. H. F. Umbgrove. *Geol Mag.* 76, 444–50(1939).—A discussion, with summary of previous views, offering an explanation of the fact that basic or ultrabasic rocks characterize the axes of geosynclines, acid rocks not appearing at that stage of development. C. A. Silberrad

Graphic granite. Ernest E. Wahlstrom. *Am. Mineral.* 24, 681–98(1939).—Quartz pencils in feldspar form the pattern described variously as graphic granite, runite and Hebraic pegmatite. Bersmann's statement (*Z. Krist.* 69, 77–104(1928)) that the quartz is oriented with a trapezohedron zone coincident with the prism zone of the feldspar is not confirmed by W. Examn. of 30 specimens indicates that there is no consistent orientation of the quartz in the feldspar. Replacement of feldspar by quartz is probably the dominant process in graphic granite formation rather than simultaneous crystn. (cf. Vogt, *C. A.* 26, 5881). C. H. Hale

Granites of the Black Mountain and south Cevennes. Albert Michel-Lévy. *Bull. soc. géol. France* 9, 93–6 (1939).—Complete and proximate analyses of 7 "granites" from this neighborhood are given. They include 3 granites proper; 2 connected laccolitic injections (formerly designated "porphyroids"), characterized by, probably pneumatolytic, increase in alkali; and 2 mylonites (formerly termed blavierites) probably derived from arkoses rather than from granites. The compns. are compared and discussed. C. A. Silberrad

Comparative composition-variation diagrams for the Cainozoic igneous rocks of New Zealand with determinations of the optic axial angles of the pyroxenes and olivines contained therein. W. N. Benson and F. J. Turner. *Trans. Proc. Roy. Soc. New Zealand* 69, Pt. 1, 56–72 (1939).—Optic axial angles were measured for 165 pyroxenes and 64 olivines in thin sections of 39 rocks, mostly olivine-basalts. Very little pigeonite was observed. The results are compared with those of Barth (*C. A.* 25, 5120, 5369), Tsuboi (*C. A.* 27, 686) and Kuno (*C. A.* 30, 6678[8]) on other Pacific rocks. Five new rock analyses.
Michael Fleischer

Deccan trap from the Gulbarga and Osmanabad districts. C. Mahadevan and L. S. Krishnamurthy. *J. Hyderabad Geol. Survey* 3, Pt. 2, 24–49(1938).—Petrological descriptions and porosity detns. of many samples are given. C. A. Silberrad

New type of metamorphic rocks (sakenites) in crystalline schists of south Madagascar. Alfred Lacroix. *Compt. rend.* 209, 609–12(1939).—The sakenites occur at Sakény (Ihosy, Madagascar) as a series of beds up to 10 m. thick, and in one case extending over 5 km., in paragneisses contg. much aluminous mineral (sillimanite, cordierite, almandine, etc.), assocd. with pyroxenites and amphibolites. They are whitish, hard, saccharoidal rocks; the predominant constituent is anorthite or a near plagioclase, assocd. with very aluminous minerals—sapphirine and (or) spinel, and with the latter sometimes corundum and diaspore. In exceptional cases the rock consists of anorthite with practically only corundum, which may occasionally even predominate over the anorthite; elsewhere it may consist almost solely of anorthite. The various types pass into one another with no definite lines of sepn. C. A. Silberrad

Sandy muds and muddy sands. Jacques Bourcart and Claude Francis Boeuf. *Compt. rend.* 209, 568–70(1939); cf. following abstr.—Muddy sand from the Aber (Roscoff) is yellow to a depth of about 1 cm. and below that gray to black. It is composed of varying proportions of (I) sandy material (quartz, tourmaline, micas, etc.) and of (II) mud consisting of fine sand, remains of shells and algae; I and the upper portion of II contain an abundant fauna, and II is characterized by the presence of sulfides, especially of Fe. I placed with sea water in a closed vessel in darkness absorbs O and blackens, but exposed to light it becomes yellow again and evolves some O. The proportion of algae varies from place to place. C. A. S.

Estuary mud. Jacques Bourcart. *Compt. rend.* 209, 542–4(1939); cf. *C. A.* 33, 4918[2].—B. distinguishes, as opposed to "limon" mud resulting from an inundation, and "boue" oceanic mud, "vase," the muds of estuaries along the Atlantic coast of Europe from the Seine to the Gulf of Guinea. These consist of about 70% of inorg. material, partly sandy (diam. of grains 0.1–0.02 mm.) and partly pulverulent (less than 0.02 mm.), which latter may be quartzose or calcareous, with accessory clay minerals. For the remaining 30% the name *algon* is proposed; it consists of finely divided remains of algae or, in the upper parts of the estuary, of land vegetation; it forms a viscous binding material and always contains Fe and evolves H_2S when kept moist. C. A. Silberrad

Lacustrine investigations in the Gaspe Peninsula. A. J. M. Honeyman. *Can. J. Research* 17, D, 212–24(1939).—A study of temp. variations in Ross Lake indicates that it is a typical "second order" lake. The seasonal variations are explicable in terms of the changes of air temp. and the resulting effects on temp. and d. of the water. Thermal stratification is clearly indicated. Seasonal variations in the dissolved O content of the water are largely dependent on temp. changes. The variations in acidity, alky. and pH are dependent chiefly on temp. changes affecting soly. of CO_2, and on the limy nature of the lake bottom. Analysis of the O distribution indicates a eutrophic condition, but there is as yet insufficient quant. information about the biol. conditions to warrant definite conclusions. J. W. Shipley

Water in the Tanezruft. Nicolas Menchikoff. *Compt. rend.* 209, 44–6(1939).—It is probable that below the impermeable surface stratum of greenish salty marl, contg. gypsum and pyrite, there is a water-bearing stratum of sandstone, below which are impermeable cryst. rocks—gneiss, mica schist, etc.—with granitic and rhyolitic intrusions. C. A. Silberrad

Occurrence of sillimanite in Travancore (Singh) 19.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Metallurgical education. Robert F. Mehl. *Metals & Alloys* 10, No. 10, A-56, 52(1939).—A review of ten years' progress. 3 references. I. Hartmann

Powder metallurgy. Fred P. Peters. *Metals & Alloys* 10, No. 10, A-74, 76(1939).—A review of ten years' progress. 4 references. I. Hartmann

Some other major [metallurgical] developments. Edwin F. Cone. *Metals & Alloys* 10, No. 10, A-76, 78

(1939).— A review of ten years' progress in blast furnaces, Bessemer converters, low-alloy, high-strength castings, machine tools, in the uses of Ti, P, Be, Pb, Ag, etc. 12 references. I. Hartmann 1

Problems in Swedish mining practice. J. Kempe. *Jernkontorets Ann.* **123**, 285–336(1939).—Mainly a discussion of costs of various practices in the mining, transportation, handling and concn. of ores. H. C. Duus

Production problems in pig iron manufacture and direct steel-making processes. Edvin Fornander. *Jernkontorets Ann.* **123**, 337–52, 365–85(1939).—A statistical discussion is given of total production blast furnaces in operation, production per furnace, yields, and fuel requirements. Profile drawings of various furnaces are given. Methods of conserving heat are noted. Data are taken from actual Swedish operations. H. C. D. 2

Some aspects of tin research. II. C. O Bannister. *Science Progress* **34**, 302–5(1939); cf. *C. A.*, **32**, 6595⁷. A review of recent researches on the industrial applications of tin and the chemistry involved therein. J. S. H. 3

Open-hearth practice. Leo F. Reinartz. *Metals & Alloys* **10**, No. 10, A-52, 54(1939); cf. *C. A.* **33**, 1640⁶. A review of ten years' progress. 9 references. I. H 4

Waste problems in the nonferrous smelting industry. Robert E. Swain. *Ind. Eng. Chem.* **31**, 1358–60(1939).—A review. S, As, Cd and the rarer elements, and slag are considered. G. G. 5

Waste problems of the iron and steel industries. Willard W. Hodge. *Ind. Eng. Chem.* **31**, 1364–80(1939). The rapid growth of the steel industry from a production in the U. S. A. of 11,838 gross tons of steel in 1860 to 56,433,473 tons in 1929, and of coke from 13,333,714 short tons in 1895 to 59,883,845 tons in 1929 has brought problems in the disposal of wastes, among them being slags, flue dust, ammonia liquor, coal tar, phenolic liquors, H_2S, waste pickle liquor and other materials. Data, tabulated and graphical, are given on production of pig iron, steel, coke, tin and terne plate, slags and flue dust; also chem. analyses of pig iron, blast-furnace, open-hearth and elec. furnace slags, and of spent pickle liquors. Brief reviews are given of processes for the recovery and utilization of slags, flue dust, ammonia and phenolic liquors, H_2S from fuel gases, and products from coal tar. The waste pickle liquor problem (approx. 800,000,000 gallons per year) is treated in more detail, short outlines being given of 12 methods of disposal and some 40 processes for treating the liquors with recovery of by-products. The processes are classified into 10 groups based on by-products recovered, as follows: (1) copperas or siderotilate, (2) copperas and the free H_2SO_4, (3) $FeSO_4.1^1/_2H_2O$ and free H_2SO_4, (4) ferric sulfate and H_2SO_4, (5) H_2SO_4 and iron oxide, (6) electrolytic iron and H_2SO_4, (7) iron oxide for paint pigments and (or) polishing rouge, (8) "Ferron," (9) $(NH_4)_2SO_4$ and iron oxide, sulfide or carbonate, and (10) miscellaneous processes for making other inorg. compds., such as, Na sulfate, Ba sulfate, natrojarosite, and iron phosphate. Wholly inadequate markets for the easily recovered by-products has mitigated against the general installation of waste pickle liquor treating processes by the iron and steel companies. The recent trend toward the use of chlorinated copperas or waste-pickle liquor, and of ferric sulfate in the treatment of water supplies, sewage, and certain org. wastes, is summarized. The general relations of the major waste-disposal problems; sewage, acid mine drainage, anthracite culm, oil-field brines, and wastes from the metallurgical, org. and inorg. manufg. industries are briefly discussed. Much research work is in progress on the waste pickle liquor problem and marked improvements have recently been reported on 5 processes; also possible new uses for the by-products are under intensive investigation. The importance of abatement of stream pollution and recovery of useful by-products from industrial wastes are emphasized as essential to a national economy in the utilization of unreplaceable natural resources. 139 references. W. W. Hodge 6 7 8 9

Problems of Swedish steel production. S. En v. Hofsten. *Jernkontorets Ann.* **123**, 353–85(1939).—Discussion of trends in manuf. with reference to acid Martin, basic Martin, Thomas, acid Bessemer, and electro-processes. Electro-processes are developing rapidly, especially with reference to high-frequency induction furnaces. The significance of various factors for production of quality steel is discussed, such as the grade of raw material, the use of sponge iron, the classification of scrap, and influence of alloying constituents. H. G. Duus

Manufacture of rimming steel by the acid Bessemer process. T. Swinden and F. B. Cawley. *Iron & Coal Trades Rev.* **139**, 443–4(1939); cf. *C. A.* **33**, 8153⁹.—The application of the process at a British steel plant is described. Also in *Engineering* **148**, 482–3(1939). I. Hartmann

Recent advances in industrial metal finishing. E. E. Halls. *Ind. Chemist* **15**, 351–3(1939). E. H

Testing of materials for workability. Walter Reichel *Tech. Zentr. prakt. Metallbearbeit.* **48**, 291–5, 359–62 (1938).—"Workability testing," a new method for testing materials for metal cutting, is described. S. Landeker

Some fatigue problems of the railroad industry. R. W Clyne. *Metals & Alloys* **10**, 316–23(1939); cf. *C. A.* **33**, 7706⁹, 8508⁹.—The majority of railroad springs fail by progressive fracture. The fatigue crack almost always originates at some point on the inside diam. of helical springs; the point of origin is always on the tension side of elliptic spring plates and usually at one of the corners. The surface factors which most severely affect the fatigue resistance of hot-formed spring steels are notches and decarburization, both chemically (corrosively) and mechanically formed notches are of equal importance. Car wheels often fail by disintegration of the tread metal due to fatigue. The defect occurs by means of progressive fracture and is usually found in comparatively soft wheels which operate under heavy axle loads. The fracture may originate at the surface or at some subsurface non-homogeneity, and is due to a combination of effects of stress concn. and static and impact loads. 4 references I. Hartmann

Method of determining the ultimate deformation and ultimate strain in creeping. I. A. Oding *Zavodskaya Lab.* **8**, 856–9(1939). On the basis of an analysis of creep curves O. offers a method for detg. ultimate deformation and ultimate strain in creep by the graphical treatment of the diagram of elongation. It is claimed that these 2 characteristics make it possible to det. the max. length of service of an object under given strain and speed of creep provided the material is not subject to phase or structure changes or intercryst. phenomena which may also result in sudden failure of the object. B. Z. K. 10

Rapid method of regulating oxidation. P. A Rozhdestvenskii. *Zavodskaya Lab.* **8**, 296–8(1939).—The anticorrosion resistance of objects was judged by measuring the e. m. f. between the oxidized specimens and Pt in 0.95% NaCl soln. at 20°. The results are given in graphs. A diagram of the app. is included. B. Z. K. 11

Technique for the x-ray powder photography of reactive metals and alloys, with special reference to the lattice spacing of magnesium at high temperatures. G. V. Raynor and W. Hume-Rothery. *J. Inst. Metals* **65**, Advance copy No. 851, 9 pp.(1939).—Filings of Mg were prepd. in an atm. of A, then sieved and sealed in thin silica capillaries. This arrangement permitted taking lattice measurements up to 400°. For higher temps. up to 500° it was necessary to mix the filings with medicinal paraffin in sealed capillaries. By using thin rods of Mg in silica capillaries R. and H. were able to extend the work to 597°. At low temp. the expansion is approx. proportional to the temp., but above 300° a departure from linearity becomes more pronounced. This temp. is about 63% of the abs. m. p. H. S. v. K. 12

Sintering of copper and tin powders. H. E. Hall. *Metals & Alloys* **10**, 297–8(1939).—Representative samples of Cu and Sn powders of a grade extensively used by bearing manufacturers were mixed with graphite in definite proportions and then compressed at 60,000 lb. per sq. in. to give a bearing approx. 1 in. long, $^3/_4$ in diam. with a $^3/_{32}$ in. wall. After compression the bearings

were heated by sintering at 810°. The bushings were removed at various time intervals to provide a series of bushings that had been subjected to progressively increasing sintering times. The bushings were then sectioned, polished, suitably etched and typically representative fields were photographed at a magnification of 400X on Kodachrome film, to show the various structural stages in the process. Six colored photomicrographs are given.
I. Hartmann

Deformation and heat-treatment of rods of Al-Cu-Mg and Al-Mg-Si alloys. R. Lay and A. Grimm. *Aluminium* 21, 627–37 (1939).—An investigation into the relation of grain size and mech. properties and the degree of reduction in drawing rods and of heat-treatment. The generally accepted rule is that in the manufg. process the finest possible grain should be obtained, for then the anisotropic nature of the individual grain becomes of minor importance and the quasi-isotropic state exists which is detg. for the uniformity of deformation; with coarse grain the vectorial properties of the single grain are predominant and produce scarry, uneven surfaces with a decrease in mech. strength. The present investigation has, however, shown that too fine a grain can also lead to mech. difficulties in Al-Cu-Mg and Al-Mg-Si rods, just as it does in sheets. This occurs particularly in extruding processes where very coarse recrystns. take place under crit. deformations and tensile strength is reduced. The normal values can nearly be restored later by annealing of long duration at hardening temps. whereby the temp. of the quenching bath also has some influence. The highest mech. strength is obtained in fully hardened material by stretching, the higher the degree of stretching (rolling) the higher become elastic limit and tensile strength, while elongation reduces only slightly. M. Hartenheim

Heat-treating in boiler and apparatus construction. E. Schulz and O. Niezoldi. *Arch. Warmewirt.* 20, 141–6 (1939).—Stress-relieved, normalized, and untreated welds in boiler steels were examd. microscopically, by mech. tests, and for corrosion resistance against strong caustic and concd. boiler water, both with and without previous cold work. Though differences in grain size were observable, there was not, on the whole, any difference in result between the 2 types of heat-treatment. F. W. Thiele

Role of nickel in the machine tool industry. J. W. Sands and D. A. Nemser. *Metals & Alloys* 10, 260–8, 311–15 (1939). The effects of the addn. of Ni, Cr and Mo to cast iron and to steel are described. When added to cast iron, Ni like Si acts as a chill reducer; unlike Si, however, Ni controls chill without appreciably coarsening the graphitic structure or grain, without lowering the strength, without decreasing machinability or introducing internal casting stresses. Cr resembles Ni in some features with respect to its effect on iron. It refines the graphite structure of iron and hardens and strengthens it, but Cr increases chilling tendency and promotes the formation of free carbide. Cr, however, acts to build up combined C and Fe and this feature renders it useful in conjunction with Ni in casting of heavy sections. Mo is helpful in increasing strength and toughness of iron; it increases chilling tendency slightly, but not as much as Cr. By alloying cast iron with Ni or with Ni and Cr or Mo, together with appropriate adjustments of the base compn., it is possible to increase greatly the tensile strength and also the elastic modulus of the iron. Ni is completely sol. in the ferrite constituent of steel which it strengthens and toughens without loss of ductility; its effect is independent of the C content of the steel. Ni also lowers the crit. temp. of steel, permitting certain heat-treating operations to be carried out at lower temps.; it also reduces the min. cooling rate required for the development of full hardness on quenching. Ni increases the strength properties of most of the common bronzes, and it raises the proportional limit and yield point. It also increases the fluidity in bronze casting mixts., reduces the tendency toward formation of intercryst. shrinkage pores, and refines the grain structure.
I. Hartmann

Nickel castings. M. Herve. *Métallurgie* 71, 21–4 (Spec. Ed., May, 1939).—The influence of Ni is discussed in: counteracting heterogeneity (e. g., Ni:Cr = 3:1); in increasing the mech. properties of gray cast irons (1–3% Ni); in increasing hardenability in castings (2 to 4% Ni); in increasing hardness of white cast iron (3 to 5% Ni); in increasing the corrosion resistance (12 to 15% Ni, 2 to 3% Cr; sometimes 5% Cu); in increasing the high-temp. resistance (1 to 3% Ni, 0.5 to 2% Cr); in rendering white cast iron nonmagnetic (7 to 10% Ni, 4 to 6% Cr).
Richard P. Seelig

Die castings. Harvey A. Anderson. *Metals & Alloys* 10, No. 1, A24(1939).—5 references. **Metals and alloys in the automotive industry.** A. L. Boegehold. *Ibid.* A26, 28.—5 references. **Metals and alloys in the electrical industry.** P. H. Brace. *Ibid.* A28, 30, 32.—7 references. **Aluminum and magnesium.** Junius D. Edwards. *Ibid.* A33-4, -7 references. **Alloy steels.** H. J. French. *Ibid.* A34, 36.—8 references. **Steel castings.** John H. Hall. *Ibid.* A41 2.—7 references. **Notch effect in testing steels.** S. L. Hoyt. *Ibid.* A42, 44.—15 references. **Metals in airplane construction.** J. B. Johnson. *Ibid.* A44, 46.—8 references. **Gray cast iron.** James T. MacKenzie. *Ibid.* A46, 48.—0 references. **Copper and its alloys.** W. B. Price. *Ibid.* A52.—14 references. **Malleable cast iron.** H. A. Schwartz. *Ibid.* A54, 56.—3 references. **Corrosion.** F. N. Speller. *Ibid.* A56.—Study of corrosion processes and methods of prevention. 7 references. **Vanadium.** Jerome Strauss. *Ibid.* A58.—Application of V in steels. 2 references. **Hard carbides.** Zay Jeffries. *Ibid.* A58, 60. **Low-alloy, high-strength steels.** B. D. Saklatwalla. *Ibid.* A60, 62.—5 references. **Chromium.** J. H. Critchett. *Ibid.* A62, 64. Metallurgical uses of Cr. **Molybdenum.** A. J. Herzig. *Ibid.* A64.—Application of Mo as an alloying element for iron and steel. 3 references. **Nickel and its alloys.** Thos. H. Wickenden. *Ibid.* A64 5.—7 references. **Continuous hot strip and plate mills.** G. G. Beard. *Ibid.* A66.—3 references. **Metals and alloys at high temperatures.** N. L. Mochel. *Ibid.* A66, 68.—7 references. Francis B. Foley. *Ibid.* A68, 70.—4 references. **Endurance limit under repeated stress.** H. F. Moore. *Ibid.* A70.—Study of the mechanism of fatigue of metals. 6 references. **Heat-treating and controlled atmospheres.** H. W. Gillett. *Ibid.* A72.—Reviews of 10 years' progress. 23 references.
J. Hartmann

Kinetics of decomposition of austenites in the upper portion of the intermediate domain. Henri Jolivet and Albert Portevin. *Compt. rend.* 209, 556–8 (1939); cf. *C. A.* 33, 8157⁴.—Further dilatation-time curves are given for (1) a steel of compn. C 0.7%, Mn 0.7, Cr 1.0 and Mo 0.6, showing the decompn. of the austenite to be incomplete after 50 hrs. at 475° or 450°, but complete after 10 min. at 400° and (2) a steel of compn. C 0.6%, Ni 2.7%, Cr 0.7% and Mo 0.6 showing the pearlitic transformation of the residual portion at 600° or 625° to be markedly slackened by a preliminary 8 min. at 400° and quite suppressed for 4 hrs. by 15 min. at that temp.
C. A. Silberrad

Method of determining the number of graphitization centers in malleable cast iron. S. A. Saltykov. *Zavodskaya Lab.* 8, 428–31 (1939).—The formulas suggested by Schwartz (*Metals & Alloys* 7, 278 (1936)) for calcg. the no. of graphitization centers in malleable cast irons are not applicable for cases where the no. of centers has been artificially increased. Instead the following formula is offered relating the no. of graphitization centers per cc. (N) to the no. of centers/sq. mm. (n): $N = 2.38n^{1.5}$. The formula was applied to malleable iron specimens and gave satisfactory results. The av. distance (c) between the centers can be calcd. from $N = \sqrt{2}/c^3$.
B. Z. K.

The influence of temperature on the carbon-oxygen equilibrium in molten steel. G. Phragmén and B. Kalling. *Jernkontorets Ann.* 123, 199–221 (1939).—The equil. was measured experimentally in a high-frequency vacuum furnace with 400 g. molten iron in a crucible of MgO or Al_2O_3. C was added in amts. slightly above or below the expected equil. values. Analyzed mixts. of CO and CO_2 were passed over the mass. Expts. were run at

1550° and 1700° measured by an optical pyrometer. After exposure for 2-4 hrs. the reaction mass was cooled and analyzed. The original sample had the compn. C 0.027, Mn 0.07, S 0.014 and P 0.01%. At 1550° the equil. values were 0.07% C with 2.5% CO_2, 0.035% C with 5% CO_2, and 2.02% C with 7.5% CO_2. At 1700° the values were 0.07% C with 1.7% CO_2, 0.03% C with 3.4% CO_2, and 0.02% C with 5% CO_2. Phase-rule diagrams were constructed for the system on the basis of the above results. H. C. Dews

"Alnico" and related alloys. The metallurgical story. Edwin F. Cone. *Metals & Alloys* **10**, 293-7(1939).—The development of magnetic alloys, their magnetic properties and uses are reviewed briefly; special emphasis is placed on Ni-Al-Co-Fe alloys. The chem. compn of these alloys averages about as follows: Alnico, 20% Ni, 12% Al, and 5% Co, balance Fe; so-called "Alnico," 25% Ni, 12% Al, and balance Fe. The C should range from 0.02 to 0.06%, the Si and Mn from 0 to 0.10% each, or as low as possible and not over 0.15%. To secure the max. magnetic properties, the Alnico castings must be submitted to a definite, carefully controlled heating cycle, inasmuch as Alnico is a pptn.-hardening alloy. It is first heated to a high temp. for a soln. treatment and from this temp. it is cooled at a definite detd. rate to approx. 700°, this rate of cooling depending entirely upon the compn. of the Alnico. Alnico has a coercive force of 400 to 440, with a residual value between 7000 and 7500. I. Hartmann

The examination of the grain of aluminum alloys. Karl Altmannsberger. *Tech. Zentr. prakt. Metallbearbeit.* **48**, 394, 396-7(1938).—In order not to damage the grain, special precautions must be used. A table shows the influence of the compn. of the alloy on the appearance (microscope) of the unetched ground section. S. L.

Low-lead silver alloys for bearings. Some properties pertinent to their use. R. W. Dayton. *Metals & Alloys* **10**, 306-10, 324(1939); cf. *C. A.* **33**, 1646⁴.—Six Ag alloys contg. 0 to 5% Pb were prepd. from double-refined Ag (99.995% Ag) and test Pb. Two melts of each alloy were made, and two bars 3/4 in. diam. and 2 in. long were cast from each melt. The seizure resistance of the alloys was detd. in 4 different conditions of heat-treatment; the corrosion resistance was examd.; the phys. properties, hardness, shear strength and fatigue strength were detd.; and the best lining methods were studied. The test results indicate that bearings made of a Pb-Ag alloy (3 to 4% Pb) are extremely seizure resistant, and have the necessary phys. properties to enable them to carry high loads without mech. failure. The best method of bonding Pb-Ag alloys to steel is by electrodeposition 4 references. I. Hartmann

Silver and its alloys for the arts and industries. J. L. Christie and Don Graf. *Metals & Alloys* **10**, 300-5 (1939).—A review of the uses of Ag, with 16 photographs illustrating typical steps through which Ag and its alloys go during production before release of the final manufd. article. I. Hartmann

The crystal chemistry of tantalum alloys. F. Laves and H. J. Wallbaum. *Naturwissenschaften* **27**, 674-5(1939). —Metallic compds. of type AB_2 will crystallize with 12g6 symmetry ($MgCu_2$, etc.) if the at. radii ratio is about $\sqrt{3}/\sqrt{2} = 1.23$ (*C. A.* **33**, 4175⁶, 9080⁶). $TiMn_2$, $TiFe_2$ and $TiCo_2$ are of 12g6 type, $TiFe_2$ has $a = 4.81$, $c = 7.88$, $c/a = 1.638$. $TiNi_3$, $TiCu_3$ and $TiZn_3$ are of dense spherical packing, $TiNi_3$ has a new structural type, $TiCu_3$ has deformed hexagonal ball packing, $TiZn_3$ is of $AuCu_3$ type with $a = 3.023$. The x-ray diagram of $TiGa_3$ is much like that of $TiZn_3$. In the series of Ti alloys with low Ti content the 12g6 type becomes unstable between Co and Ni. For higher Ti contents compds. of the CsCl type are found: FeTi, CoTi, NiTi, ZnTi. There is no CuTi although there appears to be a Cu-Ti alloy of compn. near 1:1. The highest Ti content is found in the isomorphic alloys $MnTi_3$, $FeTi_3$, $CoTi_3$, $NiTi_3$ and $CuTi_3$; they are cubic, face-centered, with 96 atoms per cell. Replacement of Fe or Ni in Ti alloys by Ru, Os or Pd and Pt produces RuTi and OsTi like FeTi in structure, Pd_3Ti, and Pt_3Ti of Ni_3Ti and Zn_3Ti structure, resp. No PdTi or PtTi is found but isomorphous compds. Pd_3Ti_2 and Pt_3Ti_2 of unknown structure appear. $PdTi_2$ and $PtTi_2$ are of $NiTi_2$ structure. In the system Ag-Ti there is no compd., with Au $AuTi_3$ of the $AuCu_3$ type is formed. Results on Rh and Ir alloys will be published later. B. J. C. van der Hoeven

The development of zinc alloys since 1900 Arthur Burkhardt. *Giesserei* **26**, 484-7, 505-8(1939). E. H.

System γ-iron-carbon. J. Seigle. *Rev. ind. minérale* No. **443**, 293-302; No. **444**, 303-24(1939).—The constitution of the Fe-C alloys between 925 and 1500° is discussed, the chief points being the nature and soly. of cementite, whether it exists in various forms, e. g., $(Fe_3C)_n$, and its stability, whether to the liquidus or decompg. at a lower temp., e. g., about 1300°; the soly. of C as such in Fe, its nature in soln., whether cryst. amorphous or colloidal, and how far this is dependent on the original form of the C. It is also suggested that diamonds of useful size might be produced by seeding a soln. of C in molten Fe with minute diamond particles. Previous investigations and constitutional diagrams are discussed. C. A. Silberrad

Concentration of hydrogen ions in galvanic zinc baths. F. K. Fisher and D. A. Timofeev. *Zavodskaya Lab.* **8**, 276-9(1939).—Tests with H_2, glass and quinhydrone electrodes for detg. H-ion concn. in galvanic Zn baths showed that the last method was most suited for use from the point of view of simplicity of arrangement and technique of manipulation. The potential is established very rapidly (about 3 min.) and the time for a detn. requires 5-8 min. The results are somewhat higher than those obtained by the H_2 and glass electrodes and the readings should be reduced by 0.1 pH. B. Z. Kamush

Corrosion- and heat-resisting steels. W. B. Thompson. *Can. Metals Met. Inds.* **2**, 252-4, 256(1939).—A discussion of certain details of manuf. of some of the stainless alloys, particularly from the casting standpoint. The 18-8 (Cr-Ni) steels have been modified by addns. of Mo, Si, W, Ti or Cb. With the exception of the Mo alloy facilitation of the fabrication of equipment, which, owing to large or irregular size, and thin or uneven sections, is not available to subsequent heat-treatment. A Cb-bearing 18-8 alloy is effective in solving the problem of intergranular corrosion. The Cb content is 10 times the C content. KA2-M0 castings are widely used on account of their resistance to corrosive attack. The compn. is Cr 19-20, Ni 9-10, Mo 3 and C 0.11-0.15%. Intermediate alloys contg. 4-6% Cr, 0.10-0.15% C and 0.5% Mo, 1% W or 0.60-0.70% Ti or Cb possess properties that tend to lessen air-hardening, low toughness and embrittlement, resist mild corrosion at moderately elevated temps., and are extensively used in the oil-refining industry for cracking tubes, tube sheets, valves, etc. Heat-resisting alloys contain higher proportion of Cr and Ni. The 28% Cr, 15% Ni alloy is popular in Canada. Claims are made for alloy addns. similar to those of the corrosion-resisting group. The alloy agents are N, Ti, Cb, W and Al. W. H. Boynton

Aluminum steels resisting corrosion at elevated temperatures. R. Vernier. *Métallurgie* **71**, 15-19(Special Ed., May, 1939).—Alited Fe has Al diffused into the surface by a cementation process. Al oxide forms a protective film. In practical application this material can be used up to 1100°. Al-Fe alloys with 8% Al oxidize 15 times less than pure Fe at 900-1000° during the same period. For a given temp. in order to obtain the same oxidation resistance less Al (by weight) has to be added than either Cr or Si. With increasing temp. this difference is increasingly favorable for Al. Fe-Cr-Al, Cr-Al-Co, Cr-Al-Si, Cr-Mo-Al and Ni-Cr-Al steels are discussed and their applications given. R. P. Seelig

Maintenance of reciprocating parts. (Use of bronze welding in the industry.) C. H. S. Tupholme. *Cold Storage Produce Rev.* **42**, 61-2(1939).—Resurfacing of worn pistons and other moving parts is possible by an application of wear-resisting bronze welding rods to the worn surface and subsequent machining to original size.

Different welding rod compns. are discussed and details of the welding process are given. On steel parts subjected to severe alternating tension and compression stresses bronze-welding should be applied only once, but cast iron parts can be resurfaced as often as desired.

S. Landeker

Welding of some special steels. Schill. *Bull. assoc. franç. techniciens pétrol.* No. 45, 69–98(1938).—The welding of 5 noncorrosive steels, viz., Cr-Cu-Mn (0.34% Cr), Chromesco Cr-Mn (0.36% Cr), 4–6% Cr-Mo, ferritic steel contg. 12–14% Cr, and an 18–8 austenitic steel is discussed from the welder's point of view. Analytical data of the steels are tabulated. The article is replete with photomicrographs of the various steels.

E. J. Mahler

Long carbon arc welding of copper and copper alloys. W. C. Swift. *Welding Engr.* 23, No. 12, 30–3(1938).—The metal is shielded effectively by CO_2. Rapid cooling of the weld area inhibits segregation of Cu_2O. Six photographs.

Ann Nicholson Hird

Evaluation of chrome ores for the manufacture of refractories (Schauer) 19. Brick linings for rotary furnaces. (Downie) 19. Metals for molds (Bachner) 13. Bummen in protecting Fe (Boesenberg) 20. Colorimetric titration and its application in the metallurgy of Al (Urech) 7. Cb and Ta [in steel] (Klinger) 6. Mixed esters of cellulose [for coating metal articles exposed to liquids] (U. S. pat. 2,170,016) 23. Bonding and coating compds. for linings for acid-pickling tanks (U. S. pat. 2,169,814) 13.

Fischer, Oskar: Vorgange und Festigkeiten beim Hartlöten. Neue Versuchsergebnisse aus dem Institut für mechanische Technologie der technischen Hochschule Berlin. Berlin: VDI-Verlag. 40 pp. M. 3.75.

Heyer, Robert H.: Engineering Physical Metallurgy. New York: D. Van Nostrand Co., Inc. 549 pp.

Apparatus for grinding ores with chains and water and separating rock fines by flotation. John Youngman and Harry R. Culp. U. S. 2,171,296, Aug. 29. Various structural, mech. and operative details.

Revolving-drum apparatus for reducing ores. Harlowe Hardinge (to Hardinge Co.) U. S. 2,171,298, Aug. 29. Various structural details.

Melting up light metal scrap. Erich Junker and Wuhbald Leugebel. U. S. 2,170,863, Aug. 29. Light metal scrap such as that of Al or Mg is melted up at a temp. below 690° in the presence of a flux contg. NaCl, cryolite and $BaCl_2$ proportioned to melt between about 520° and 690°.

Process and apparatus for removing surface metal from a billet, etc., by the progressive application of streams of oxidizing gas. Homer W. Jones, James H. Buckman and Edmund A. Doyle (to the Linde Air Products Co.) Brit. 507,262, June 13, 1939.

Method and furnaces for extracting iron and other metals. Hans Gallusser. Brit. 507,494, June 15, 1939. Metal oxides, particularly Fe ores, together with the materials for reduction are heated in a closed metal vessel the annular walls of which form the secondary winding of a transformer with a closed Fe path. The vessel is a horizontal rotary drum and is half filled with the mixt. The furnace forms the subject matter of Brit. 507,531, June 15, 1939, divided on 507,494. In Brit. 507,581, June 16, 1939, addn. to 507,494, a closed metal vessel the annular wall of which forms the secondary winding of a transformer with a closed Fe path is partly filled with an oxide of a metal or nonmetal and is rotated during the heating of the charge by currents induced in the vessel wall, H being supplied to the vessel during rotation to reduce the oxide and the resultant H_2O vapor being conducted away. The H is supplied through the shaft supporting the vessel to a preheating pipe located in the vessel and leading to valves that are periodically immersed in the charge and are under electromagnetic control so that H is fed to the charge when the valve is immersed therein and H_2O vapor flows to a condenser when the valve is uncovered. H carried over to the condenser is returned to the furnace. The furnace forms the subject matter of Brit. 507,532, June 16, 1939, divided on 507,581 and addn. to 507,531.

Blast-furnace operation. Herman A. Brassert (to H. A. Brassert & Co.). U. S. 2,171,353, Aug. 29. App. is described, and a method of utilizing waste heat in hot gases to preheat blast-furnace gas and air by recuperation which comprises transferring heat from the waste gas through refractory walls to air to reduce the gas temp. to a degree non-injurious to metal walls and thereafter reducing the temp. of the gas by the admixture of air, transferring additional heat from the mixt. of waste gas and air to the blast-furnace gas through impervious metal walls.

Metal-heating furnaces, suitable for the heat-treatment of silverware in hydrogen. Carl I. Hayes. Brit. 506,745, June 2, 1939. This corresponds to U. S. 2,101,065 (*C. A.* 32, 901[9]).

Apparatus for the heat-treatment of an assembly of hollow elements, e. g., the cylinders of a multicylinder engine block, by inductive heating coils adapted to be moved into the hollow elements. Howard E. Somes. Brit. 508,027, June 23, 1939.

Furnaces for annealing steel sheets, etc. James C. Woodson (to Lee Wilson Sales Corp.). U. S. 2,171,776-7, Sept. 5. Various structural features.

Furnace and associated apparatus for normalizing and annealing metal sheets such as those of steel. Edward I. Huff (to Huff Equipment Co.). U. S. 2,172,386, Sept. 12. Various structural, mech. and operative details.

Furnace-slag pockets. Irvin C. Johnston. Brit. 506,140, May 23, 1939. The molten slag that collects in the usual slag pocket of, e. g., an open-hearth furnace is drained off into an external receiver connected to the slag pocket through an opening large enough to allow hot gases passing through the pocket to swirl into the receiver, the slag being thus kept in a fluid state until it has passed completely into the receiver, where it solidifies.

Apparatus (with a vibrated riffle box) for recovery of fine particles of metal such as gold from aqueous mixtures. Maurice Constant. U. S. 2,170,069, Aug. 22. Various structural, mech. and operative details.

Refining copper. Herman C. Kenny (to Calumet & Hecla Consolidated Copper Co. of Mich.). U. S. 2,172,009, Sept. 5. A process for refining involves reaction of P with molten Cu in the presence of added Fe or Al in an amt. sufficient to densify the metal but not exceeding 0.1% of the wt. of the Cu, to increase the d. and soundness of the refined product.

Copper powder. Joseph E. Drapeau, Jr. (to Glidden Co.). U. S. 2,170,814, Aug. 29. For producing Cu powder, pieces of substantially pure Cu of large surface area are roasted in an oxidizing atm. to produce a surface oxidation to Cu_2O, the oxidation is stopped while a core of metal remains unoxidized, the Cu_2O is milled and the powd. Cu_2O is sepd. from the Cu, and is reduced to Cu by roasting in a reducing atm. at a temp. below that at which substantial sintering occurs.

Press for extrusion of lead or other metals, as in forming cable sheaths. Geo. T. W. Grieve (to Callender's Cable and Construction Co. Ltd.). U. S. 2,171,062, Aug. 29. Various structural, mech. and operative details.

Joining sheets of aluminum and stainless steel. Richard S. Merritt and Fred Keller (to Aluminum Co. of America). U. S. 2,171,040, Aug. 29. The sheets of different materials are heated together to about 315–480° and subjected to a continuous pressure to produce at least a 5% reduction in the combined thickness of the sheets, and the joined sheets are afterward reheated to about 315–480°. The sheet material thus prepd. may be used for cooking utensils, etc.

Testing materials such as steel rod or wire for vibration fatigue. Alfred V. De Forest (to Research Corp.). U. S. 2,171,303, Aug. 29. Various structural, mech. and operative details.

Decarbonizing metals such as pig iron. Ivar Rennerfelt. U. S. 2,170,158, Aug. 22. For producing low-C iron grains, a charge of small iron granules, obtained by rapidly cooling molten iron in a cooling fluid such as air, water or steam, is heated while stirring the charge by revolution in a combustion zone the atm. of which, contg. CO_2 and CO, is suitably composed for oxidizing only the C but not the Fe of the granules, the heating being sufficient for decarbonization but without melting of the granules.

Graphiting light metals such as aluminum alloys. Heinrich Borofski (50% to Mettmanner Britannia-Warenfabrik W. Seibel). U. S. 2,170,259, Aug. 22. Graphitic C is mixed with a decomposable metal compd. such as Pb acetate and the mixt. is introduced into a melt of a light metal such as an Al alloy and decompn. of the added metal compd. is effected with liberation of metal in close assocn. with the C.

Pickling articles such as those of iron and steel. Richard H. Patch (to E. F. Houghton & Co.). U. S. 2,172,291, Sept. 5. As an inhibitor of metal attack in pickling with a dil. nonoxidizing acid such as H_2SO_4, use is made of a sulfurized cinchona alkaloid such as sulfurized quinoidine and a heterocyclic 5-membered ring compd. contg. both S and N atoms such as 2-mercapto-4 phenylbenzothiazole.

Pickling iron. Walter Heimberger. U. S. 2,171,981, Sept. 5. A method of pickling iron comprises acting on the metal with an aq. soln., heated to at least 50°, which contains free mineral acid in an amt. sufficiently low to permit the metal salts formed to be pptd. by hydrolytic action, an oxidant, and up to about 5% of a salt, the anion of which differs from that of the acid and the cation of which is less noble, in the sense of the electromotive series, than the metal to be treated

Apparatus for surface hardening of metal articles such as dies or tools by heat-treatment and quenching. Albert E. Shorter (to Linde Air Products Co.). U. S. 2,170,876, Aug. 29. Various structural, mech. and operative details.

Hardening refractory metals. Lillian M. Van Note (to Fansteel Metallurgical Corp.). U. S. 2,170,844, Aug. 29. App. is described, and a method of hardening Ta, Cb or their alloys which involves degasifying the metal by heating it at a reduced pressure to 1000–1400°, supplying an atm. of a hardening gas such as air, N or O at a temp. not exceeding 500° until the desired amt. of gas has been taken up, and continuing the heating at a more elevated temp. under a reduced pressure of not more than a few mm. Hg until the absorbed gas has been substantially diffused into the metal body.

Hardening metal articles such as camshafts. Francis S. Denneen and Wm. C. Dunn (to Ohio Crankshaft Co.). U. S. 2,170,130, Aug. 22. A heating and quenching device is used which is provided with an inductor coil adapted to surround a charge to be heated and which is provided on the side adjacent the charge with holes through which a quenching medium is projected with such volume and force as to minimize formation of vapor pockets. Cf. *C. A.* **33**, 8164[6].

Hardening the ends of railway rails. Frank J. Werner (to Inland Steel Co.). U. S. 2,169,776, Aug. 15. App. is described, and a method of hardening the end of a railway rail which is at a temp. below crit. temp. comprising directing and confining a heating medium to the end face portion of the head of the rail from its upper extremity to a point above the lower extremity of the head and the adjacent top portion of the rail to heat the portions of the head above the crit., hardening or transformation temp., and cooling the heated portions of the rail with sufficient rapidity to cause hardening of the portions heated above crit. temp.

Repairing rail ends. Royal E. Frickey (to Welding Service Inc.). U. S. 2,170,859, Aug. 29. A method of repairing rail ends with weld metal involves differentially preheating an end portion of the rail whereby a localized area of the rail surface spaced from the tip of the rail receives more heat than the tip of the rail, applying the weld metal to the end portion of the rail, on the upper surface of the rail ball, to form a layer of weld metal extending longitudinally of the rail, and then utilizing heat to temper a portion of the layer remote from the tip of the rail without tempering the weld metal at the tip of the rail to a comparable degree, thereby avoiding a danger zone of excessive hardness, the heat being residual heat resulting to a substantial degree from the preheating operation.

Cold-drawing metal tubing such as that for hypodermic needles. John W. Ofiutt (to National Tube Co.). U. S. 2,171,595, Sept. 5. Solid wax such as paraffin is used inside the tubing as an internal support during the reducing operation.

Hard tungsten-containing products suitable for tools, etc. Alfred Boecker (to Duradur S. A.). U. S. 2,171,391, Aug. 29. A hard product is prepd. by mixing pulverized W with vanadic acid or titanic acid and with about 8.13% of C but less than the amt. of C theoretically required to form the carbides of the metal components, heating the mixt. to 1500–2000° to form W vanadide or titanide and to carburize the W compd., finely pulverizing the products, making shaped bodies from it, and heating the shaped bodies to 1500–2000°.

Ductile aluminum-coated ferrous metal suitable for drawing and other shaping operations. Marshall G. Whitfield (to Reynolds Metals Co.). U. S. 2,170,361, Aug. 22. A method of rendering ductile an Al-coated ferrous metal, whose Al coating is bonded to its ferrous core by an alloy of Fe and Al, involves subjecting the laminated metal to a plurality of rolling operations at a temp. below that at which there is a material increase in the dispersion of the component metals, which rolling operations successively break the alloy layer into blocks and separate them and then rotate a substantial number of the blocks to embed them in the laminations. Cf. *C. A.* **33**, 8562[1].

Making metal negatives of smooth-surfaced metal objects such as metal patterns for rubber products. Wm. C. Reid (to Metallizing Engineering Co.). U. S. 2,171,503, Sept. 5. A metal object such as a pattern is sprayed with a metal such as Al or bronze while the object is at least at the temp. of incipient adhesion for it and the applied metal, and below the temp. at which inseparable adhesion occurs, at least until the surface is covered with applied metal, thus forming a coherent coating of the applied metal, and this coating is thereafter removed.

Forming products such as copper-coated steel strips. Aaron Simons. U. S. 2,171,132, Aug. 29. Various details of app. and operation.

Forming bright copper surfaces by acid treatment. Walter R. Meyer and Michael F. Dunleavey (to General Elec. Co.). U. S. 2,172,171, Sept. 5. An aq. soln. is used which is formed from concd. H_2SO_4 80–20, concd. HNO_3 20–80, and HCl or a chloride equiv. to concd. HCl 0.1–10 parts; together with chromic acid 5–200 parts.

Extruded products such as pipes or cable sheathing of lead alloy. Brinley Jones (to Goodlass Wall & Lead Industries Ltd.). U. S. 2,171,180, Aug. 29. A Pb alloy is used contg. Te 0.02–0.25% and Cu 0.03–0.1% and is extruded at temps. equal to those customarily employed for extruding ordinary soft Pb to obtain a product which has a fine-grain structure throughout.

Metallic abrasives. John F. Ervin. U. S. 2,171,081, Aug. 29. An abrasive material of high crushing strength and impact resistance, suitable for cutting steel by a blast of the material, comprises an alloy contg. Fe together with C about 3, Mn 0.5, Si 1.5, S 0.1, P 0.4, Cr 0.25–3.0 and Mo 0.1–0.6%. U. S. 2,171,082 relates to otherwise similar alloys contg. Cr 0.1–1.5 and Ni 0.1–3.0%. U. S. 2,171,083 relates to a like alloy contg., instead of the Mo, up to 0.06% of V. Cf. *C. A.* **33**, 3325[4].

Improving the texture of rolled articles such as rails. Franz Bartscherer. U. S. 2,171,074, Aug. 29. The articles are initially formed with local protrusions on at least 2 opposite sides of an ingot which are to have a crystallite arrangement substantially parallel to the surface of the finished article, the protrusions being

spaced from the end of the ingot to facilitate feeding it to the rollers, and the ingot is rolled to reduce the local protrusions and produce the parallel crystallite arrangement.

Roller-rail constructions for use in furnaces for heat-treating metal articles. Henry H. Harris. U. S. 2,172,376-7-8-9-80-1, Sept. 12. Various structural, mech. and operative details.

Metal-containing compositions. Tool Metal Manufacturing Co. Ltd. Brit. 506,964, June 7, 1939. A compn. for cutting-tools comprises a sintered mixt. of Al_2O_3 and 20–40% of a metal, e. g., Fe, Ni, Co. The Fe may contain 0.1–5% of Cr, V, Ti, Co or Ni. The compn. may be of Al_2O_3 and metal oxide, the latter being converted to metal by sintering in a reducing atm.

Metal half-tone screens. Edward O. Norris (to Edward O. Norris, Inc.). U. S. 2,171,276, Aug. 29. Use is made of a thin perforated sheet of metal such as Cu mounted in a rigid frame under tension and having a surface substantially nonreflective to light.

Gold films. Charles S. Gibson. U. S. 2,171,086, Aug. 29. See Brit. 497,240 (*C. A.* **33**, 3753[3]).

Blow-pipe apparatus for removing surface defects from metallic bodies by oxygen jets. James H. Bucknam (to the Linde Air Products Co.). Brit. 507,259, June 13, 1939.

Blowpipe apparatus for removing a surface layer from steel slabs, billets, blooms, etc. James H. Bucknam (to the Linde Air Products Co.). Brit. 507,279, June 13, 1939.

Removing scale from chromium alloy steels. Stephen F. Urban. U. S. 2,172,041, Sept. 5. A pickling soln. for removing scale from chrome steels, chrome-Ni and the like, contg. at least 12% Cr, contains water together with HF 0.5–10%, chromic acid 5–20% and H_2SO_4 1–10% by vol.

Grinding apparatus suitable for smoothing steel rods, etc. Sylvester G. Richardson (to Norton Co.). U. S. 2,171,892, Sept. 5. Various structural, mech. and operative details.

Light-weight construction steel. Byramji D. Saklatwalla. U. S. 2,171,375, Aug. 29. A low-C alloy steel of high phys. properties may contain C 0.01–0.25, Si 0.6–1.5, Cu 0.25–0.6, Ni 0.5–1.25, P 0.1–0.25, Mn less than 0.6 and S under 0.1%, the balance being substantially all Fe and the alloy steel being free from any such amt. of Cr as would materially modify its properties (the Cr present being less than 0.25%); it has a tensile strength in the as-rolled condition of about 65,000 to 80,000 lb. per sq. in., the yield point being over about 70% of the tensile strength, and further characterized by a ductility and deformability at least equal to that of carbon steel of corresponding strength, together with good capability of being welded by the ordinary commercial processes of welding.

Alloy steel. Geo. R. Rich (to Rich Mfg. Co.). U. S. 2,170,267, Aug. 22. An alloy steel of high tensile strength suitable for the manuf. of motor-valve parts contains C about 0.32, Cr 5.5, Si 3.25, Ni 2.42, Mn 0.8, S 0.025 and P 0.025%, the remainder being Fe. U. S. 2,170,268 relates to an alloy of Fe with C 0.25, Cr 6.25, Si 3.25, Ni 1.9, Mn 1.0, and S and P 0.025% each.

Stainless steels. Albert L. Kaye, Robert S. Williams and John C. Wulff (to Chemical Foundation, Inc.). U. S. 2,172,388, Sept. 12. A method of increasing the resistance of stainless steels to electrochem. corrosion in saline media involves preforming on the surface of the metal, prior to service use, a continuous, insol. film of a metal chloride derived (as by the action of a $FeCl_3$ and HCl soln.) from a metal such as Ag or Mo included in the steel. Cf. *C. A.* **33**, 6222[1].

Coloring stainless steel. Clements Batcheller (to Allegheny Ludlum Steel Corp.). U. S. 2,172,353, Sept. 12. A method of coloring the surface of an alloy steel contg. 7% or more of Cr involves subjecting it to the action of a soln. contg. H_2SO_4 and an oxidizing agent and etching-inhibitor which may be vanadic or metavanadic acid or one of their NH_4, K or Na salts, to form a coherent and adherent color film (the H_2SO_4 being of sufficient concn. that if used alone it would dissolve the steel).

Alloys such as ferro-alloys and "inoxidizable" steels. Rene Perrin (to Société d'électrochimie, d'électrométallurgie et des aciéries électriques d'Ugine). U. S. 2,169,741, Aug. 15. In making an alloy such as a ferro-Cr alloy by the reaction of an O compd. of the alloy metal, such as a Cr ore, with a Si reducing agent such as ferro-Si and lime, a portion of the reagents is charged into a mixing receptacle in the molten state and the remainder in the solid state, and the reagents are violently mixed by pouring them back and forth from one chamber to another to initiate and maintain the reaction (the portion of the reagents added in the solid state being sufficiently small as to produce a molten fluid slag).

Hard metal alloys for tools such as those for machining. Paul Schwarzkopf (to American Cutting Alloys, Inc.). U. S. 2,170,432, Aug. 22. A cemented hard metal is used, sintered by heat-treatment and comprising an auxiliary metal of the Fe group such as Ni, Co or Cr 3–22% together with 2 carbides of elements from the 3rd, 4th, 5th or 6th groups of the periodic system such as carbides of Ti and Zr contg. together substantially more than 2.6% C and being present in finely divided form and proportions suitable to yield mixed crystals of approx. greatest hardness on heat-treatment. U. S. 2,170,433 relates to details of prepg. products of generally similar character.

Alloy suitable for electrical contacts. Hans H. Schwarzkopf (to N. V. Molybdenum Co.). U. S. 2,170,431, Aug. 22. An alloy suitable for elec. contacts and for use as a prealloy (suitable together with W, Mo or Ta) for elec. material may contain Cu 94.7, Ag 4, Cd 1 and B 0.3%, the proportions being variable.

Cast bearings of light metal alloys. Carl Steiner (to American Light Corp.). U. S. 2,171,229, Aug. 29. A supporting shell is cast, formed of an Al alloy having great strength such as an alloy contg. Al together with Si 20–22% and within this is cast an inner shell of a light metal alloy having good antifriction properties such as an alloy contg. Al and Sb or Mg so that the alloys are in intimate contact while both are at least in a semiplastic condition.

Bearings of aluminum alloys, suitable for airplane engines. Hans Steudel (to Junkers Flugzeug- und Motorenwerke A.-G.). U. S. 2,170,039, Aug. 22. A process of bearing manuf. involves kneading a material comprising essentially Al as a base and at least one metal of the Fe group, the compn. being hypereutectic and composed of crystals of an intermetallic compd. of Al and an Fe group metal distributed in a matrix of a softer eutectic ground mass, to cause the crystals to assume a smaller, more rounded form and to adhere firmly to the ground mass. The bearing metal may, e. g., contain Al 92–95% with Ni, Co, Cr or Fe, Cu, Zn, Mg, Mo, etc.

Permanent magnets of copper-cobalt-nickel alloys. Dannohl and Hans Neumann (to Siemens & Halske A.-G.). U. S. 2,170,047, Aug. 22. Permanent magnets are formed of alloys contg. Co 15–65, Ni 15–35 and Cu 20–65% and are characterized by a coercive force above 400 oersteds and a remanence above 1000 gausses.

Copper-magnesium-silver alloys. Franz R. Hensel and Earl J. Larsen (to P. R. Mallory & Co.). U. S. 2,171,697, Sept. 5. Alloys which are suitable for elec. contacts, etc., contain Cu together with Mg 0.05–3 and Ag 0.05–15%.

Corrosion-resistant ferrous alloys. Herbert H. Uhlig (to Chemical Foundation, Inc.). U. S. 2,172,421, Sept. 12. A method of treating articles composed of ferrous alloys, contg. components such as Cr and Ni, involves subjecting the articles to the action of a highly active metal solvent (which may also contain $TiCl_4$) having a dissolving action on steel equiv. to that of an aq. soln. contg. about 50% of a mixt. of H_2SO_4 and HCl, for a time sufficient to effect the removal of about 0.000- in. of surface metal to insure a substantially macroscopically smooth surface free from pit-engendering mech. imperfections. U. S. 2,172,423 relates to a method of increasing the resistance of Ni- or Mn-contg. stainless steels to pit corrosion which in-

wlves providing them with an adherent and compacted surface film of Ag and subsequently bringing the Ag into contact with a reagent to form a continuous film of an insol. Ag compd.

Corrosion-resistant ferrous alloys. John C. Wulff (to Chemical Foundation, Inc.). U. S. 2,172,427, Sept. 12. To render Cr-contg. ferrous alloys and steels (such as a stainless steel of the 18 Cr, 8 Ni type) substantially immune to pit corrosion, the cold deformed alloy while in a vacuum is heated to a temp. (suitably about 1000–1200°) which is above the carbide-forming temp., to eliminate surface imperfections which form potential loci for the initiation of pit corrosion. U. S. 2,172,428 (John C. Wulff and Herbert H. Uhlig; to same assignee) relates to reducing the pit-corrosion susceptibility of articles composed of passive ferrous alloys which involves subjecting the articles to a low-temp. annealing under conditions which are effective substantially to reduce nonmetallic inclusions, and subsequently treating with a highly active metal solvent contg. over 50% of a mixt. of H_2SO_4 and HCl to dissolve sufficient surface metal substantially to eliminate loci of pit corrosion.

Iron alloys suitable for electric heating resistances. John D. Gat. U. S. 2,172,023, Sept. 5. Ductile, heat-resistant alloys are formed contg. Fe together with not more than 0.16% C, not less than 6% of Al, and a sufficient amt. of Ti, Mo, Ta or Cb to prevent any substantial presence of carbides at the grain boundaries of the alloy (the quantity of such ingredients not being greater than 6 times the amt. of C nor over 1%), and a total of Mn, S, P and Si not exceeding 2%.

Stabilizing silicon alloys. Ernest F. Doom (to Electro Metallurgical Co.). U. S. 2,171,108, Aug. 29. For prepg. a stable unbonded finely comminuted Si alloy contg. more than 35% Si, such as a ferro-Si alloy for use as a constituent of alk. coating compds., a thin superficial protective oxide coating is formed on the alloy by heating it to 300–1000° for a time too short to cause the oxidation of a major part of the alloy.

Alloys for casting dentures, etc. Cornell J. Grossman. U. S. 2,171,744, Sept. 5. Co is used together with B 0.5–15, Ti 1–30 and Cr 3–45%. Cf. *C. A.* **33**, 8166[1].

Spindle blades for spinning and twisting machines. Harry Mitchell (to Whitin Machine Works). U. S. 2,170,727, Aug. 22. A spindle blade comprises a bar of air-hardened Mo alloy steel of a substantially uniform initial hardness, the blade being formed from the bar entirely by grinding operations and the initial hardness of the steel being substantially maintained during the production of the blade, the steel bar used being initially air-hardened to approx. 60 on the Rockwell C scale and contg. approx. C 0.5, Mn 0.5, Cr 1.0, Ni 1.5 and Mo 0.5%.

Treating aluminum surfaces preparatory to painting, etc. Walter R. Kappes (to Aluminum Co. of America). U. S. 2,171,546, Sept. 5. The surface is treated with an aq. alkali metal carbonate-chromate soln. to produce a substantial oxide coating and this coating is then removed with HNO_3 or chromic acid.

Protective paint coatings on aluminum and its alloys. Junius D. Edwards and Ralph L. Mason (to Aluminum Co. of America). U. S. 2,171,545, Sept. 5. The metal surface is etched with a HCl soln. in which Mn, Fe, Cu, Ni or Co is dissolved, the etched surface is treated with a chromic acid soln., and a paint film is thereafter applied.

Welding materials such as cast iron. Glenn V. Ireland. U. S. 2,171,366, Aug. 29. In welding, with deposition of a single coat of soft ferrous metal on the parts to be welded, without preheating these parts, use is made of a welding electrode which may comprise a rod of ferrous material of low C content carrying a coating contg. a flux such as borax as its principal ingredient (but not exceeding 50%), a ferrous compn. such as Fe oxide, $NaHCO_3$, a deoxidizing agent such as ferro Si or Al, and a binder such as Na silicate.

Welding metal parts such as those of ferrous metals. Thomas S. Gaylord. U. S. 2,170,019, Aug. 22. A metallic weld strip such as one of a Cu alloy having a coating including a corrosion-resistant metal such as Sn, Cr or Ni is melted to form a seam at the juncture of the parts to be welded, the heat for melting the strip at least partially destroying the protective layer of metal along the margins of the seam while the molten corrosion-resistant metal coating of the strip flows to the margins of the seam and into the regions of deteriorated protective layer. App. is described.

Welding magnesium and its alloys. Josef M. Michel (to Magnesium Development Corp.). U. S. 2,171,011, Aug. 29. A flux is used contg. at least one inorg. halide which is nonvolatile at temps. at which welding is carried out, such as KF and LiBr, together with phosphoric, oxalic or boric acid or an acid-reacting salt of such an acid capable of reacting with the halide to cause volatilization of the halogen hydracid derived from the halide, with formation of nongaseous reaction products having no corrosive action upon the metal to be welded. MnO_2, etc., also may be used.

Butt welding thin sheet material such as alloy steels. James E. Fay and Fo Reed (to American Rolling Mill Co.). U. S. 2,172,080-1, Sept. 5. Various details of app. and operation.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Researches on organic chemistry in India, 1896–1923. P. C. Mitter. *Proc. Natl. Inst. Sci. India* **5**, 211–36 (1939). G. G.

Low-molecular polymerization of dienes and trienes. Ernest Harold Farmer. *Trans. Faraday Soc.* **35**, 1034–40 (1939).—The types of structures which are formed by low-mol. polymerization of conjugated and unconjugated dienes and trienes are reviewed. All, save α-phenylbutadiene, which have been so far examd. yield a cyclohexenic dimeric form. Some sort of open-chain dimeric structure but no appreciable amt. of tetramer. Thermal and acid-catalyzed dimerization and trimerization processes are discussed. E. g., the acid-catalyzed 2,3-dimethylbutadiene forms dimeric (29%), trimeric (19.5%), tetrameric (18.4%) and pentameric (15%) fractions which can be easily isolated, leaving a viscous residue which is almost entirely hexamer. The pentadiene $CH_2:CHCH_2CH:CH_2$, is discussed as an example of thermal polymerization of unconjugated dienes. Victor R. Deitz

Dimerization.—Heavy metal sulfides as catalysts for the polymerization of olefin hydrocarbons. E. H. Ingold and A. Wassermann. *Trans. Faraday Soc.* **35**, 1022–4, 1052–3(1939).—Dimerization of cyclopentadiene in paraffin soln. at atm. pressure and 155° was found to take place in the presence of CuS, Cu_2S, Ag_2S, HgS, Tl_2S, SnS, PbS, Bi_2S_3, FeS, $KFeS_2$, $FeCuS_2$, NiS; neg. results occurred with SrS, ZnS, CdS, SnS_2, As_2S_3, MoS_2 and FeS_2. The dimerization of trimethylethylene was found to take place most efficiently with CuS prepd. from $CuSO_4$ and [illegible] to 90%. It is suggested that the catalysis is connected with an oxidation-reduction process—part of the starting substance is converted into CO_2 and H_2O, while the Cu-SO_4 is reduced to SO_2 and Cu or Cu_2O—a peroxidic intermediate compd. taking part. Victor R. Deitz

Dimerization reactions of unsaturated hydrocarbons. Ernst Bergmann. *Trans. Faraday Soc.* **35**, 1025–34, 1052–3(1939); cf. *C. A.* **33**, 5698.—Dimerization of olefins yields cyclobutane derivs. only upon irradiation with

ultraviolet light. "Migratory or catalytic" dimerization of olefins proceeds generally by migration of an H atom. The exptl. evidence (68 references) in favor of these 2 rules is presented. The dimerization of cinnamic acid is an example of the 1st rule, while illustrations of the 2nd are to be found in styrene, α-methylstyrene, dimerization of acetylenes and triphenylallene. The dienes yield products which do not directly correspond to the migration scheme. Victor R. Deitz

Dimerization of petroleum hydrocarbons. W. J. Sparks, K. Rosen and Per K. Frolich. *Trans. Faraday Soc.* **35**, 1047–52, 1053–4(1939).—It has been shown that most of the known products resulting from dimerization of aliphatic unsatd. hydrocarbons can be explained by the 1,3-rearrangement of H. However, all the possible reaction products that could be written according to this mechanism have not been recorded in the literature and may not necessarily be formed. The dimerization of isobutene, the codimers of isobutene and butenes and the polymerization of the *n*-butenes are reviewed. It is shown that the unreliability of the methods used to identify the isomers resulting from the cross-polymerization of isobutene and butene based on the b. p. and *n* may well lead to results which confuse arguments as to mechanism of the reactions. Victor R. Deitz

Butadiene polymers; elucidation of structure by ozonolysis. R. Hill, J. R. Lewis and J. L. Simonsen *Trans. Faraday Soc.* **35**, 1067–73, 1079–89(1939).—Ozonolysis of a butadiene polymer suspended in $CHCl_3$ gave succinic acid, butane-1,2,4-tricarboxylic acid and resinous acids. These results indicate that, in aq. emulsion, butadiene polymerizes by all 3 of the possible additive mechanisms, viz., 1,4-addn., 1,2-addn. and conjoint 1,2- and 1,4-addn., but a quant. discrimination between the various mechanisms is not possible. It is suggested that chain initiation is due to the formation of a "dimer complex" which under normal conditions yields vinyl-3-cyclohexene. Victor R. Deitz

Butadiene copolymers: elucidation of structure by ozonolysis. R. Hill, J. R. Lewis and J. L. Simonsen. *Trans. Faraday Soc.* **35**, 1073–9, 1079–85(1939).—Isolation of 2-methylbutane-1,2,4-tricarboxylic acid, from the ozonolysis of a product obtained by polymerizing equimol. quantities of butadiene and Me methacrylate together in aq. emulsion, establishes a possible copolymer structure. More than half of the essentially linear polymer is composed of alternate units of butadiene and Me methacrylate. In this case butadiene polymerizes in the main by 1,4-addn. It is suggested that the mols. of butadiene and Me methacrylate form a Diels-Alder complex. Chain initiation may then involve an activated complex or possibly the Diels-Alder thermal addn. proceeding in an environment favoring chain growth. The differences between the copolymer and the butadiene polymer are correlated with this theory. Victor R. Deitz

Combination of saturated hydrocarbons and olefins. Some problems associated with olefin-isoparaffin addition reactions. S. F. Birch and A. E. Dunstan. *Trans. Faraday Soc.* **35**, 1013–21(1939); cf. *C. A.* **33**, 8381⁶.—The addn. of olefins to isoparaffins in the presence of H_2SO_4 at a low temp. to give higher paraffins is discussed. Of the paraffins examd. isobutane, isopentane and isohexane (2-methylpentane) react readily, but isooctane (2,2,4-trimethylpentane) fails to do so. The olefins propene, 1-butene and 2-butene, isobutene and its di- and trimerides, the butene-isobutene codimer and trimethylethylene all react smoothly and give excellent yields of isoparaffinic products. The action of the H_2SO_4 is catalytic but in operation its activity falls off, at first slowly and finally rapidly. This is accompanied by progressive darkening of the acid, the vol. of which increases. On dilu. of the acid with H_2O there seps. a highly unsatd. oil. Some possible mechanisms are discussed; that used by Whitmore (cf. *C. A.* **28**, 1324⁹) for the polymerization of isobutene; also the mechanism used by Ingold, Raisin and Wilson (cf. *C. A.* **31**, 653⁸, 666⁷) for exchange reactions between D_2SO_4 and certain paraffinoid hydrocarbons. Victor R. Deitz

The isomerization of carotenes. III. Reconsideration of the change β-carotene to pseudo-α-carotene. Gertrude P. Carter and Albert E. Gillam. *Biochem. J.* **33**, 1325–31(1939); cf. *C. A.* **32**, 1707¹.—The suggestion of Zechmeister and Tuzson (*C. A.* **32**, 9120²) that the isomerization of β-carotene was spontaneous and not due to adsorption was confirmed experimentally. The reverse change of pseudo-α-carotene to β-carotene was found to be more rapid. To reduce the tendency of carotene to isomerize, the solns. should be stored at 0° and concn. of the solns. should only be carried out at low temp. When partial isomerization occurred, one adsorption on alumina just before use gives pure β-carotene. E. W. Scott

Fluorocarbons. The reaction of fluorine with carbon. J. H. Simons and L. P. Block. *J. Am. Chem. Soc.* **61**, 2962–6(1939).—A method for the prepn. of fluorocarbons by the continuous reaction between F and C without explosions is described. Compds. corresponding in mol. wt. to C_3F_8, 2 isomers of C_4H_{10}, decafluorocyclopentane, dodecafluorocyclohexane, and C_7F_{14} (probably cyclic) were prepd. and are described. A. B. Garrett

Chloro compounds obtained by means of aqueous sodium hypochlorite. A. Leulier and R. Cohen. *J. pharm. chim.* **29**, 245–51(1939).—Three compds. are described: dichlorourotropine (I), dichloropiperazine (II) and chloroantipyrine (III). Prepn. (I): To 5 g. $(CH_2)_6N_4$ in 40 cc. H_2O add 8.40 g. $KHCO_3$ and 45 cc. NaOCl (72 g. active Cl per l.); after 5 min. filter the ppt. rapidly, wash with H_2O, 0.02 *N* NaOH, alc. and Et_2O. Yield 77–80%, white scales m. 77° (Maquenne block), decompg. 140°, explosive when heated in a flame. Soly. in 100 cc. H_2O (by Cl detn.) 0.206; Et_2O 2.036; alc. 2.148; $CHCl_3$ 2.282 g. Aq. and alc. solns. lose all Cl in 4 days; $CHCl_3$ in 20 days. The prepn. of II and III is similar, except that more NaOCl is used. Yields of II and III are, resp., 80% and 91.17%. II, m. 74° without decompn., is more stable than I, but entirely volatile in the air. III, recrystd. from acetone and petr. ether, m. 131–2°, not 126–7° as obtained before. S. Waldbott

Organic catalysts for the cleavage of carbon monoxide from formamide. II. Catalysts with alcoholic hydroxyl as the active group. Terje Enkvist, Hella Merikoski and Paavo Tikkanen. *Ber.* **72B**, 1717–23(1939); cf. *C. A.* **33**, 7275⁶.—Complex substances with alc. HO have been tested as to catalytic ability to cleave formamide (I) into CO and NH_3, in the hope of finding in this way by activation according to Langenbeck new catalysts also effective in the synthesis of I. The same method was employed as in part I except that the measurement of the CO was complemented by titration of the liberated NH_3 which sublimed in the CO_2 stream as NH_4 carbamate. Results are given for NaOMe, benzyl and cinnamyl alcs., choline, choline chloride, glycolic acid as Na salt, Et ester, amide, anilide, α- and β-naphthylamides and toluidide, *p*-glycylamino-1-nitrobenzene (m. 183–4°, prepd. from glycolic acid and *m*-nitroaniline at 140°), ethylene and propylene glycols, thiodiglycol, glycerol α-Et and α-Ph ethers, diethanolamine, glycerol, erythritol, pentaerythritol, quercitol, *d*-mannitol, dulcitol, sorbitol, inositol, triethanolamine, α-Me *d*-glucoside, helicin, amygdalin, salicin, sucrose and glycerol diformin. The following showed very little or no activity: undecyl, *sec*-octyl and phenethyl alcs., Ph_2COH, $C_6H_{11}OH$, $C_6H_{11}CH_2OH$, Ph_2CH_2OH, furfuryl, $Et_2NCHMeCH_2OH$, $ClCH_2CH(OH)CH_2OPh$, $AcNH_2$, Et, iso-Am, allyl and pinacolyl alcs., pinacol, Na glycerophosphate, glucose, glucosamine-HCl, fructose, galactose, lactose, maltose, starch, cellulose. In the absence of Na_2CO_3 the alc. HO in no case exerted a detectable catalytic effect on the cleavage of CO. With increasing amts. of Na_2CO_3 the evolution of CO increased in the 1st half hr. until it reached a max. with about 0.5 equiv. Na_2CO_3 per equiv. of the org. catalyst. With only 0.5 equiv. the CO evolution in the later stages of the reaction decreased rapidly at 140° but at 120° it increased somewhat. With more Na_2CO_3 (e. g., 1 equiv.) the decrease in velocity in the later stages was much smaller, and an evolution which had already become slow could be revived by adding more Na_2CO_3. Under

conditions otherwise the same, the reaction velocity varied approx. proportionately with the amt. of org. catalyst. Water even in small amt. almost completely inhibited the catalysis. The velocity of the stream of CO_2 had little influence on the velocity of CO evolution. Apparently about 120° is a temp. threshold below which there is practically no reaction; between 140° and 160°, on the other hand, the van't Hoff rule (2- to 3-fold increase in velocity per 10°) seemed to hold. Since the catalytic effect is exerted only in the presence of Na_2CO_3 the reaction probably proceeds through org. anions; the mechanism

$$HCONH_2 \overset{Na_2CO_3}{\rightleftharpoons} [HCONH]^- + H^+;\ [HCONH] + ROH \rightleftarrows [CO_2R]^- + NH_3;\ [CO_2R] \rightleftarrows [OR]^- + CO;\ [OR]^- + H^+ \rightarrow ROH,$$

is provisionally suggested. Results to date: Substances with primary (pentaerythritol) or secondary (inositol, quercitol) alc. HO can, but only in the presence of alkali, catalyze the cleavage of CO from I, while tertiary alcs. (Ph_3COH, pinacol) do not. Ordinary aliphatic (undecyl, *sec*-octyl) or alicyclic (cyclohexanol) monohydric alcs. do not catalyze the reaction. The following substituents show a weak catalytic action: certain aromatic rings (cinnamyl and benzyl alcs.), amino N (di- and triethanolamines, choline, choline chloride), and carboxyl as the Na salt (Na glycolate). More strongly catalytic are carbethoxy and amide groups, especially anilide, toluidide, naphthylamide (glycolic acid derivs.). Several alc. HO groups in the same mol. activate each other, less in dihydric (glycol and derivs.), more in tri- to hexahydric alcs. (glycerol, erythritol, quercitol, pentaerythritol, mannitol, dulcitol, sorbitol, inositol, all of which have about the same catalytic effect per HO group). The aldehyde and keto groups have a strong inhibiting action; glucose, fructose, galactose, lactose and maltose show no catalytic action, helicin only a little. Ether O, including the bridge O of glucosides and disaccharides, seems to be indifferent or activating (glycerol Et and Ph ethers, α-Me *d*-glucoside, salicin and especially sucrose are strongly catalytic). Ordinary phenol (0.001 mol.) and, even more, pyrogallol (0.00033 mol.) with 0.0005 equiv. Na_2CO_3 and 0.20 cc. I at 140° produce a vigorous evolution of gas (12.6 and 37.2 cc., resp., in 30 min.). C. A. R.

Some amidines and amide oximes with trypanocidal activity. I. D. Lamb and A. C. White. *J. Chem. Soc.* **1939**, 1253–7.—The amide oximes were prepd. by mixing the dinitrile (0.025 mole) in 200 cc. EtOH with 7 g. $NH_2OH.HCl$, adding 2.3 g. Na in 60 cc. EtOH and shaking at 60° for 20–30 hrs. *Dicarboxamide oximes: pentane-1,5-*, m. 142–4° (*di-HCl salt*, m. 150–5°); *heptane-1,7-*, m. 156°; *nonane-1,9-*, m. 167°; *decane-1,10-*, m. 184–6° (decompn.) (*di-HCl salt*, m. 149–58°; *di-Ac deriv.*, m. 129° and is deacetylated by cold dil. HCl); *undecane-1,11-*, m. 166° (*di-HCl salt*, m. 178°) (by-products in this prepn. include *undecane-1-carboxamide-11-carboxamide oxime*, m. 157–8°, whose *HCl salt* m. 144° and the *11-carbonitrile*, m. 87–8°; *HCl salt*, m. 84°); *tridecane-1,13-*, m. 170° (*di-HCl salt*, m. 158–60°), (the *1-carbonitrile deriv.* m. 98°; *HCl salt*, m. 96°); *biphenyl-4,4'-*, m. 245° (decompn.) (*di-HCl salt*, m. 290° (decompn.)); *diphenylmethane-4,4'-*, m. 215° (*di-HCl salt*, decomp. 220°); *bibenzyl-4,4'-*, decomp. about 243° (*di-HCl salt*, pale yellow prisms); *stilbene-4,4'-*, m. above 320° (decompn.), was prepd. from *4,4'-dicyanostilbene*, orange, m. 278° (*di-HCl salt*, chars about 300°). The following *dicarboxamidines* were prepd. from the nitriles by way of the imido esters: *decane-1,4-* (*di-HCl salt*, m. 227–8° (decompn.)); a by-product of the action of KCN on dibromodecane is *decane-1-carbonitrile-10-carboxamide*, m. 87°. *Decanebis-(N,N'-diphenylcarboxamidine)*, m. 163–5°; *N-cyclohexyl analog*, m. 122° (*di-HCl salt*, m. 273°). *Undecane-1-carbonitrile-11-carboxamide*, m. 101°. *Tridecane-1-carbonitrile-13-carboxamide*, m. 103–4°; *tridecane-1-carboxamide-13-carboxamidine-HCl*, m. 164–5°; *tridecane-1,13-dicarboxamide*, m. 176°. *Tetradecanemonocarboxamidine-HCl*, m. 138°; *picrate*, m. 166°. Di-Et decanedicarboxyimidate ether and $C_2H_4(NH_2)_2$ heated 8 hrs. at 70°, give *1,10-bis(4,5-dihydro-2-glyoxalinyl)decane*, m. 181°; *picrate*, m. 223–4°; *HCl salt*, m. 183°. The trypanocidal activity of these compds. has been investigated and data for several are given. C. J. West

Esters of methanesulfonic acid in the sugar group. B. Helferich, H. Dressler and R. Griebel. *J. prakt. Chem.* **153**, 285–99(1939).—Details are given of the prepn. from glucose of tetraacetyl-6-mesyl-β-*d*-glucose (29% yield), of tetraacetyl-β-*d*-glucose 6-iodohydrin (96% yield) and of the α-isomer (I). I (10 g.) in 100 cc. 70% AcOH at 80–5°, treated gradually with 25 g. of Zn dust, gives 35% of *tetraacetyl-α-d-isorhamnose*, m. 119.5° (all mps. cor.), $[\alpha]_D^{19}$ 123.8° ($CHCl_3$); shaking with AcOH-HBr gives 92% of acetobromo-*d*-isorhamnose, m. 143.5–4°. Diacetoneglucose and mesyl chloride in C_5H_5N at 0°, allowed to stand 15 hrs., give 88% of *1,2,5,6-diacetone-3-mesylglucofuranose* (II), m. 83–4°, which with H_2SO_4 in 50% MeOH (refluxing 100 min.) gives 70% of *3-mesyl-d-glucose*, m. 133–4°, $[\alpha]_D^{19}$ 77° (H_2O), changing to 66.9° in 2 days; Ac_2O-AcONa gives 75% of *tetraacetyl-3-mesyl-β-d-glucose* (IIA), m. 169–70°, $[\alpha]_D^{19}$ 1.5° ($CHCl_3$); AcOH-HBr with a little Ac_2O, shaken 2 hrs. at room temp., gives *3-mesyl-2,4,6-triacetobromo-α-d-glucose* (III), $[\alpha]_D^{19}$ 160° ($CHCl_3$), which could not be crystd. II and AcOH-HBr give 25% of *3-mesyl-2,6-diacetobromo-α-d-glucose* (IV), m. 136–7°, $[\alpha]_D^{19}$ 170° ($CHCl_3$). III and Ag_2CO_3 in MeOH, shaken for 10 hrs., give 81% of *triacetyl-3-mesyl-β-methyl-d-glucoside*, m. 128–8.5°, $[\alpha]_D^{19}$ −21.7° ($CHCl_3$), and IV gives 89% of the *2,6-di-Ac analog*, m. 105°, $[\alpha]_D^{19}$ −56.8° ($CHCl_3$). IV in Me_2CO and PhOK in H_2O give 33% of the *2,6-diacetyl-3-mesyl-β-phenyl-d-glucoside* (V), m. 134.5–5°, $[\alpha]_D^{19}$ −56.6° ($CHCl_3$); *2,4,6-tri-Ac analog* (VI), m. 154–4.5°, $[\alpha]_D^{19}$ −27° ($CHCl_3$), 90% yield. V in $CHCl_3$ and 1% MeONa in MeOH, kept 3 hrs. at −20° and 15 min. at room temp., give 80% of *3-mesyl-β-phenyl-d-glucoside*, m. 175°, $[\alpha]_D^{19}$ −28.2° (C_5H_5N); Ac_2O in C_5H_5N gives VI, as does melting IIA, PhOH and *p*-$MeC_6H_4SO_3H$. Warming 15 g. of II with 12 cc. H_2O and 30 cc. AcOH for 2.5 hrs. at 50–3° gives 12.5 g. of *1,2-acetone-3-mesylglucofuranose*, $[\alpha]_D^{19}$ −20.6° (H_2O); *5,6-di-Ac deriv.*, m. 136–6.5°, $[\alpha]_D^{19}$ −2.3° ($CHCl_3$); AcOH-HBr gives 50% of *3-mesyl-2,5,6-triacetobromo-α-d-glucofuranose*, m. 125–3.5°, $[\alpha]_D^{19}$ 191.5° ($CHCl_3$). Diacetonegalactose and mesyl chloride in C_5H_5N give a good yield of *1,2,3,4-diacetone-6-mesylgalactopyranose*, m. 122°, $[\alpha]_D^{19}$ −62° ($CHCl_3$); NaI in Me_2CO at 100° gives diacetonegalactose 6-iodohydrin. C. J. West

Structure of the diacetonedulcitols. Raymond M. Hann, W. Dayton Maclay and C. S. Hudson. *J. Am. Chem. Soc.* **61**, 2432–42(1939).—Pizzarello and Freudenberg (*C. A.* **33**, 3338⁷) have proposed the structure 3,4,5,6-diacetonedulcitol for Fischer's α-deriv. (I) (*C. A.* **9**, 1183⁵) and the 1,2,3,4-isomer for the β-deriv. (II); they pointed out that the structures are enantiomorphous and emphasized the ready sepn. of I and II by fractional crystn.; this fact and the differences in their phys. properties and those of their derivs. seem to exclude this idea and prove that they are structural isomers. The prepn. of I and II is apparently affected by small variations in exptl. conditions, possibly due to cyclic acetal rearrangement of the sensitive I. Finely powd. dulcitol (III) (50 g.) in 975 cc. Me_2CO contg. 24.2 g. of dry HCl, shaken for 24 hrs. at 20°, gives 34% of I; removal of the HCl with basic Pb carbonate and concn. give addnl. I (total yield 48%); the mother liquors yield 45% of crude II. I (from 95% EtOH in 90% yield) m. 144–5° (all m. ps. cor.), n_α 1.503, n_β 1.507, n_γ 1.548; the birefringence is strong and the polarization colors are brilliant. II (from 5 parts Me_2CO and 10 parts petr. ether) m. 111°, n_α 1.488, n_β 1.510, n_γ 1.518; the birefringence is strong and the polarization colors are of the 1st order; the optic sign is neg., $2E = 30°$ (approx.). These properties preclude the possibility that I and II are enantiomorphous forms. On oxidation of I in H_2O with 8 moles of HIO_4 at 20° for 0.25, 0.5, 1, 4 and 22 hrs., 1.83, 2.77, 3.68, 5 and 5.17 moles of oxidant were consumed; thus the Me_2C groups were hydrolyzed and the III thus liberated was completely oxidized (theory, 5 moles of HIO_4). With $NaIO_4$ only 0.35 mole of oxidant was consumed in 20 hrs. at 20°; the acidity is so low that hydrolysis is greatly retarded and the oxidant appears to

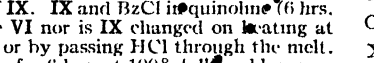
be without action on I itself; $Pb(OAc)_4$ also appears to be without action on unhydrolyzed I. With II 0.94 mole and 5.8 moles of HIO_4 were consumed after 1 and 50 hrs. at 20°; no $NaIO_4$ was consumed at the end of 4 days at 20 and only 0.03 mole of $Pb(OAc)_4$ after 20 hrs., indicating that II is considerably more resistant to hydrolysis than I. The results also show that there is no glycol grouping present in either I or II and therefore the 2 HO groups present in each are not attached to adjacent C atoms; II and Ac_2O in C_5H_5N give a quant. yield of the *1,6-di-Ac deriv.* (IV), m. 134°; the relative insoly. of IV in the acetylating medium affords an easy method for the sepn. of I and II. II and *p*-$MeC_6H_4SO_2Cl$ in C_5H_5N give 96% of the *1,6-ditosyl deriv.* (V), m. 165–6°; *1,6-ditrityl deriv.*, decomp. 233–4°. Heating V with 3 moles of NaI in Me_2CO for 2 hrs. at 100° gives a nearly quant. yield of the *1,6-di-I deriv.*, m. 108–9°. The di-Bz deriv. (VI) of II, m. 183–4° (Fischer designated this as the *α*-deriv.), refluxed 0.5 hr. with 80% AcOH, yields 1,6-dibenzoyldulcitol (VII), m. 209° (the *α*-deriv. of F.), which yields a *2,3,4,5-tetra-Ac deriv.*, m. 225–6°. IV with 10% AcOH, refluxed 1 hr., gives 60% of *1,6-diacetyldulcitol*, m. 167–8°; $Pb(OAc)_4$ oxidation consumes 3 moles of oxidant in 18 or 67 hrs.; with $NaIO_4$ the theory of HCO_2H was formed. VII and $Pb(OAc)_4$ in 10 days gave values showing that 4.90 moles (calcd. 5) of oxidant had been consumed; $BzOCH_2$-CHO was isolated as the semicarbazone in 79% yield. The oxidation behavior of this series shows that the *β*-diacyl derivs. are 1,6-derivs. and that II is 2,3,4,5-, 2,4,-3,5- or 2,5,3,4-diacetonedulcitol; the derivs. possess meso structures, which fact accounts for their lack of optical activity. I with Ac_2O in C_5H_5N on standing overnight and pouring into H_2O gives a quant. yield of the *di-Ac deriv.*, designated *1,4-diacetyl-2,3,5,6-diacetone-D,L-galactitol* (reasons are given for preferring the name galactitol to dulcitol in designating non-meso structures of derivs. of III which carry in their names a numbering of the C atoms), m. 89°; *ditosyl deriv.* (VIII), m. 101°. Reaction with Ph_3CCl in C_5H_5N for 72 hrs. at room temp., followed by Ac_2O for 24 hrs., gives 95% of the *1-trityl-4-acetyl deriv.*, m. 107–8°. VIII with NaI in Me_2CO (1.5 hrs. at 100°) gives 96% of the *1-iodo-4-tosyl deriv.*, m. 120–1°. The di-Bz deriv. (IX) of I, refluxed 30 min. with 80% of AcOH, gives 9.1% of VII and 72.7% of *1,4-dibenzoyl-D,L-galactitol* (X), m. 170–1°, and then 202–3°; *2,6,5,6-tetra-Ac deriv.*, m. 113°. With $Pb(OAc)_4$ or $NaIO_4$ 2 moles of oxidizing agent are consumed but no acid is formed. These results indicate that I contains 1 free primary and 1 free secondary HO group and that it is a racemic form. Heating X at 210° for 15 min. and recrystg. from AcOH gives 90% of VII; this involves an acyl migration in which a racemic form is transformed into a meso form. I with BzCl in quinoline (6 hrs. at 100°) gives 60% of VI and 11% of IX, m. 83–4°; hydrolysis of VI with MeONa in $CHCl_3$ yields II; the formation of VI results from an acetone shift during the benzoylating reaction. In C_5H_5N I and BzCl give 4% of VI and 86% of IX. IX and BzCl in quinoline (6 hrs. at 100°) do not give VI nor is IX changed on heating at 100° for several hrs. or by passing HCl through the melt. Heating I in quinoline for 6 hrs. at 100°, followed by reaction with BzCl, gives 4.4% of VI and 72.5% of IX; however, if quinoline·HCl is present during the heating there results 42.4% of VI and 39% of IX. C. J. West

The production of pure lactic acid. Lee T. Smith and H. V. Claborn. *Ind. Eng. Chem., News Ed.* **17**, 641 (1939).—The sepn. and hydrolysis of lactic acid esters yield pure water white lactic acid which can meet specifications for all grades. One mole of dry Ca lactate, or 2 moles of Na lactate, dissolved in 10–20 moles MeOH and heated at refluxing temps. 4–8 hrs. After again filtering, the MeOH is distd. off at atm. pressure; the H_2O and most of the ester are distd. off *in vacuo*. The residue in the still pot is recovered for use in a subsequent batch. One part distillate is dild. with 2–3 parts distd. water and fractionated slowly at atm. pressure. The lactic acid remaining in the still pot is evapd. *in vacuo* to the desired concn. A yield of 85% is attainable. W. C. Ebaugh

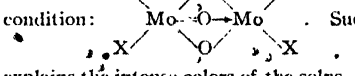
The combination of cysteine with sugars. Maxwell D. Schubert. *J. Biol. Chem.* **130**, 601–3(1939); cf. *C. A.* **30**, 5940[8].—Cysteine combines with arabinose, xylose, glucose, mannose, galactose and lactose in a mole to mole ratio with the elimination of a mole of H_2O in neutral soln. and at room temp. The compds. are similar to the thiazolidines formed from cysteine and simple aldehydes. In a soln. contg. excess $NaHCO_3$ none of the compds. gives a pos. thiol test with Na nitroprusside. No compd. with fructose could be isolated. Arabinose compd. m. 153°, xylose 133°, glucose 167°, mannose 171°, galactose 138°, lactose 130°, all with decompn. A. P. Lothrop

A new synthesis of cystine. John L. Wood and Vincent du Vigneaud. *J. Biol. Chem.* **131**, 267–71(1939).—In the new synthetic method for the prepn. of cystine, $PhCH_2SH$ is condensed with HCHO in the presence of HCl. The benzylthiolmethyl chloride is then condensed with phthalimidomalonic ester and the product is hydrolyzed to produce benzyl-*dl*-cysteine. The benzyl group is removed by Na in liquid NH_3 and the *dl*-cystine is formed from the *dl*-cysteine by oxidation. The method lends itself to the introduction of isotopes into the cystine mol. A. P. Lothrop

Xanthates of metals of Group VI. Lamberto Malatesta. *Gazz. chim. ital.* **69**, 408–16(1939).—To a soln. of 0.2 mol. $(NH_4)_2MoO_4$ and 0.4 mol. $EtOCS_2K$ (I) in 200 cc. H_2O is added about 200 g. ice and a slow current of SO_2 is then passed through. When all the pptn. has occurred and the soln. clears, the gas flow is stopped and the liquid left alone for 4–6 hrs. at the low temp. It is then filtered with suction, washed with EtOH and dried over $CaCl_2$. After dissolving in the least amt. of C_6H_6 at 40–50° and filtering, 2 vols. of ligroin are added and the soln. is cooled without agitation. The green crystals of *Mo ethylxanthate* (II) give intense violet colorations in various solvents, m. 118.5° (slight decompn.), have a magnetic susceptibility χ_M -250×10^{-6} and the formula $Mo_2O_3(CS_2OEt)_4$. Three mols. C_5H_5N react with one of II in C_6H_6 giving an addn. compd. II in dil. soln. treated with KCN in a little H_2O and Me_2CO gives an exchange reaction and the compd. $Mo_2O_3(CN)_4.4H_2O$. II in Me_2CO treated with excess solid KCN gives a green powder which, when washed with abs. EtOH, then MeOH and recrystd. from H_2O, appears to have the formula $K_n[Mo(OH)_2(CN)_4]$ where *n* is 3 or 4. The *methylxanthate* was similarly prepd., decompg. 100 20° without melting, χ_M -202×10^{-6}. *Propylxanthate* (III) was more difficult to crystallize, m. 89–91° (slight decompn.). The *isopropylxanthate*, prepd. as the others, crystallizes more readily than III and is more stable, m. 114°, χ_M -280×10^{-6}. The *butylxanthate*, sepn. from the reaction mass with ligroin, m. 75°; the *isobutylxanthate* m. 106–7.5° (slight decompn.); the *isoamylxanthate* m. 105° (decompn.); the *cyclohexylxanthate* m. 121° (decompn.). Since all these xanthates proved to be diamagnetic, it is believed that the structure



proposed by Montequi (cf. *C. A.* **11**, 2864), is incorrect and the following is advanced, wherein Mo exists in both a sexi- and quadrivalent condition:



Such a structure also explains the intense colors of the solns. of the compds., the metallic appearance of their crystals and the great absorption of light in the visible region. It was impossible to prep. similar compds. of W whether in tri- or quinquevalent condition, which fact apparently indicates their instability or nonformation under normal conditions. A concd. aq. soln. of $MeOCS_2K$ and $UO_2(NO_3)_2$ gave the corresponding reddish orange xanthate in very low yields. The *ethyl-*, *isoamyl-*, *isopropyl-*, *propyl-*, *butyl-*, *isobutyl-* and *cyclohexylxanthates* of U were likewise prepd., ligroin being used to ppt. the crystals from the solvent, usually

ketones. The data obtained which lead to this conclusion are the rates of iodination of these ketones and the ionization consts. obtained from the ultraviolet absorption spectra of their acid solns. A. B. Garrett

The effect of nuclear and side-chain substitution on the oxonium ion-catalyzed iodination of acetophenone derivatives. Lois Zucker and Louis P. Hammett. *J. Am. Chem. Soc.* **61**, 2779–84(1939).—The rates of iodination of several ketones were measured in aq. $HClO_4$ by a colorimetric method. These rates are compared with those reported for some of the same ketones in aq. 75% AcOH 0.5 *M* with respect to HCl. No steric hindrance was found in the iodination of 2,4,6-trimethylacetophenone. A. B. Garrett

3-Chloromethyl-4-methoxybenzaldehyde. Benno Reichert and Karl auf dem Kampe. *Arch. Pharm.* **277**, 361–71(1939).—The present study is undertaken to det. the fitness of this aldehyde to serve in the synthesis of *drug products*. The following derivs. of this aldehyde have been prepd. and characterized: *1-(3'-chloromethyl-4'-methoxyphenyl)-2-nitroethylene*, $C_{10}H_{10}O_3NCl$, greenish yellow, m. 118°; *1-(3'-hydroxymethyl-4'-methoxyphenyl)-2-nitroethylene*, $C_{10}H_{11}O_4N$, yellow, m. 104–5° (*Ac deriv.*, greenish yellow, m. 131–2°); *1-(3'-chloromethyl-4'-methoxyphenyl)-2-nitro-1-propylene*, $C_{11}H_{12}O_3NCl$, yellowish green, m. 80°; *1-(3'-hydroxymethyl-4'-methoxyphenyl)-2-nitro-1-propylene*, $C_{11}H_{13}O_4N$, yellow, m. 90° (*oxime*, m. 119–20°, yields on reduction *β-(hydroxymethyl-4-methoxyphenyl)ethylamine*, $C_{10}H_{15}O_2N$, m. 147–8°); *3-hydroxymethyl-4-methoxycinnamic acid*, $C_{11}H_{12}O_4$, m. 190–1°, gives on catalytic hydrogenation *3-methyl-4-methoxyhydrocinnamic acid*, $C_{11}H_{14}O_3$, m. 98–9° (*Me ester*, m. 45°); *p-methoxyisophthalic aldehyde*, $C_9H_8O_3$, m. 123–4° (*dioxime*, yellow, m. 170–2°), yields on oxidation *p* methoxyisophthalic acid, m. 273° in agreement with the literature. 17 references W. O. E.

Exchange of the amine residue in the inner complex salts of Schiff bases. P. Pfeiffer and H. Glaser. *J. prakt. Chem.* **153**, 265–84(1939).—Salicylaldehydemethylimine Cu complex (I) is conveniently prepd. by warming 12 g. of *o*-HOC_6H_4CHO (II) in 100 cc. MeOH and 13 g. of 25% $MeNH_2$ at 60° with 10 g. $Cu(OAc)_2$ in 80 cc. H_2O; the green needles m. 158°; in 1 case brown leaflets were obtained; from C_5H_5N green prisms with 1 mole C_5H_5N sep. The anil analog (III) of I results from the Cu complex of II and PhNHOH, red-brown needles, m. 234–6°, or dark green crystals with C_5H_5N. The ethylenediimine analog (IV) of I does not react with *o*-$C_6H_4(NH_2)_2$, $MeNH_2$ or $PhNH_2$. The *o*-phenylenediimine analog (V) of I and excess of $C_2H_4(NH_2)_2$ in EtOH or C_5H_5N give IV but it does not react with $MeNH_2$ or $PhNH_2$. I and $C_2H_4(NH_2)_2$ give IV; *o*-$C_6H_4(NH_2)_2$ gives V but $PhNH_2$ does not give III in EtOH or C_5H_5N. III and $C_2H_4(NH_2)_2$ give IV; *o*-$C_6H_4(NH_2)_2$ gives V; $MeNH_2$ gives I. The Cu complex of 2,1-$HOC_{10}H_6CHO$ and $C_2H_4(NH_2)_2$ give the *Cu complex of β-hydroxy-α-naphthaldehyde ethylenediimine* (VI), olive-brown with metallic luster, does not m. 250°; *propylenediimine analog*, yellow needles from Me_2CO or red-brown leaflets from $CHCl_3$; *o-phenylenediimine analog* (VII), red-brown needles, does not m. 250°; *the imine analog* (VIII), olive-green leaflets, m. 246–8°; *methylimine analog* (IX), brown or green, m. 233–4°; heating transforms the green form into the brown; *ethylimine analog* (X), olive-green; *benzylimine analog*, light yellow-olive needles; *anil analog* (XI), red-brown, m. 237–8°. VI and *o*-$C_6H_4(NH_2)_2$ do not give VII; it also does not react with $MeNH_2$ or $PhNH_2$. VII gives a nearly quant. yield of VI with $C_2H_4(NH_2)_2$ but it does not react with $MeNH_2$ or $PhNH_2$. IX and $C_2H_4(NH_2)_2$ give a quant. yield of VI; *o*-$C_6H_4(NH_2)_2$ gives VII and $PhNH_2$ gives XI. XI and $C_2H_4(NH_2)_2$ give VI; *o*-$C_6H_4(NH_2)_2$ gives VII; $MeNH_2$ yields IX. C. J. West

Molecular compounds in the binary system. Benzoic acid and nitrobenzoic, hydroxybenzoic and aminobenzoic acids. E. Vitale. *Atti X° congr. intern. chim.* **3**, 380–90 (1939).—Binary systems of BzOH (I), with nitrobenzoic (II), hydroxybenzoic (III), and aminobenzoic acids (IV) were examd. by means of thermal analysis. I (1 mol.) and the *o*-, *m*- and *p*-isomers of II (1 mol.) gave mol. compds., m. 121°, 139° and 186°, resp. The *o*- and *m*-isomers of III and the *m*- and *p*-forms of IV formed no mol. compds. with I. The *o*-isomer of IV (2 mols.) and I (1 mol.) gave a mol. compd., m. 118° (decompn.). A table of the dissocn. consts. of the various acids is given from which it is shown that Kendall's hypothesis (*C. A.* **8**, 2697) that the formation of a mol. compd. is dctd. by the diverse value of the dissocn. consts. of the reacting substances is confirmed except in the non-formation of a compd. between I and the *o*-form of III, which has a higher dissocn. const. than I. Thus substitution of the NO_2 group by the groups OH and NH_2 makes the formation of mol. compds. dubious. C. R. Addinall

Relation between chemical constitution and local anesthetic activity. III. Substituted cinnamic acid esters of dialkylamino alcohols. W. A. Lott and W. G. Christiansen. *J. Am. Pharm. Assoc.* **28**, 499–502(1939); cf. *C. A.* **32**, 8391⁶.—Eighteen new compds. were prepd., all as *hydrochlorides* (10 β-diethylaminoethyl α- and β-alkylcinnamates: *α-Me*, m. 133.0–4.5°; *α-Et*, m. 145°; *α-Pr*, m. 125–6°; *α-iso-Pr*, m. 152–3°; *α-Bu*, m. 101.5–6.5°; *α-Am*, m. 83–5°; *α-ethyl-o-chloro*, m. 121.5–8.0°; *α-ethyl-p-dimethylamino*, m. 170–1°; *β-Me*, m. 141–2°; *β-Pr* (no m. p. given); 3 γ-diethylaminopropyl α-alkylcinnamates: *α-Et*, m. 143.8–4.4°; *α-ethyl-p-amino*, m. 191–2°; *α-ethyl-o-amino*, m. 160.0–0.5°; 5 *N*-(β-diethylaminoethyl)-α-alkylcinnamamides: *α-Me*, m. 111.0–2.5°; *α-Et*, m. 163–4°; *α-Pr*, m. 134.2–4.9°; *α-Bu*, m. 124.5°; *α-Am*, m. 95–5°). Methods used for their prepn. and purification are indicated, and their m. ps. are given. All had pronounced local anesthetic activity. Lengthening the substituent alkyl group attached to the α-C of the cinnamic radical brings about a progressive increase in anesthetic potency, which is attributable to the increase in the organotropic portion of the mol. Substitution in the β- instead of the α-position did not influence the anesthetic activity very greatly, nor did substitution in the ring by Cl, NMe_2 or NH_2. IV. **Local anesthetics containing an ephedrine-like nucleus.** *Ibid.* 502–6.—The following 6 *new compds.* were synthesized: 1-phenyl-2-dimethylamino-1,3-propanediol 3-benzoate-HCl, m. 181–1.5°; 1-phenyl-2-diethylamino-1,3-propanediol 3-benzoate-HCl, m. 149–50°; 1-phenyl-2-diethylamino-1,3-propanediol 3-α-ethylcinnamate-HCl, m. 203–4°; 1-phenyl-2-diethylamino-1,3-propanediol 3-carbanilate-HCl, m. 177–8°; 1-phenyl-2-diethylamino-1,3-propanediol 3-*p*-ethoxybenzoate-HCl, m. 198–9.5°; 3-phenyl-3-methoxy-2-diethylaminopropyl carbanilate-HCl, m. 215–16°. All 6 proved to be potent local anesthetics in preliminary pharmacol. tests, but no vasopressor activity was observable in actual blood-pressure measurements. A. Papineau-Couture

Aldehydo acids and aldo-enol lactones. I. The possibility of condensation of aconic acid with aldehydes and ketones. M. M. Shemyakin and I. A. Red'kin. *J. Gen. Chem.* (J. S. S. R.) **9**, 442–6(1939).—It is planned to synthesize relatively simple compds. contg. the essential group of the cardiac glucosides and study them pharmacologically. Aconic acid (I) is used so that H_2O-sol. salts can be obtained. When I is heated for 1 hr. at 100–5° with excess 3% *m*-$NO_2C_6H_4CHO$ or furfural in the presence of 5 drops of $EtNH_2$ catalyst, it gives 14.5% *benzalaconic acid*, m. 201–2°, 18.5% *m-nitrobenzalaconic acid*, darkens to 290° but does not melt, or 41% furfuralaconic acid, darkens to 290° without melting, resp. All these compds. are insol. in H_2O but dissolve without change in cold alkali, and all form Ag mirrors. I does not condense with ketones. II. **The synthesis of α-hydroxy-β-phenyl-γ-aldo-enol lactone (3-hydroxy-4-phenylfuran-2-one).** M. M. Shemyakin. *Ibid.* 484–90.—When $PhCH_2CHO$ (I) is heated with $HOCH(OEt)CO_2Et$ (II) and Ac_2O at 140–5° for 20 hrs., it gives 29.5% *Et β-formyl-β-phenylacrylate* (III), b₂ 110–14° (*semicarbazone*, m. 167°), and 13% *acetyl α-hydroxy-β-phenyl-γ-aldo-enol lactone* (IV), m. 140–1°. The first step in this reaction is the elimination of EtOH between I and II with formation of the intermediate $HOCH(CO_2Et)CH(CHO)Ph$, which then decomps. in 2 directions to give III and IV. Hydrolysis of III with 5% HCl gives *β-formyl-β-phenyl-*

acrylic acid (V), m. 161–2°. When IV is hydrolyzed with 10% HCl, the lactone ring is opened and V is also formed. The reaction between I and II can be used to synthesize aldo-enol lactones with substituents on the β-C atom, but it is not general, since when PhCH:CHOCOMe replaces I in the reaction, action is slight and no identifiable products can be isolated. III. **Some specific peculiarities of γ-aldo-enol lactones and unsaturated aldehydo acids.** *Ibid.* 491–5. Compds. of this type do not add Br to the double bond of the lactone ring or to one adjacent to it. Their reactivity in many reactions is very great, however. Thus, acetyl-α-hydroxy-β-phenyl-γ-aldo-enol lactone and β-formyl-β-phenylacrylic acid or its Et ester, when heated for 2–3 min. at 80–90° with 2–4% NaOH give a dibasic acid, $C_{18}H_{16}O_4$, m. 195–6° on slow heating and 206–8° on rapid heating (Me ester, m. 198–9°). It is probably a new truxinic acid. H. M. Leicester

Synthesis of homoisovanillic acid. H. W. Bersch. *Arch. Pharm.* **277**, 271–86(1939).—Isovanillin itself was not used as starting material, since its cyanohydrin is quite unstable, readily suffering cleavage into isovanillin and HCN, but rather carbethoxyisovanillin, RCH:O (R = MeO(EtO$_2$CO)C$_6$H$_3$) (I), m. 58–9°, which is conveniently and quantitatively prepd. from isovanillin and ClCO$_2$Et. The bisulfite compd. of I is convertible to the cyanohydrin (II), m. 98°, which can be transformed into the Me ester (III), a viscous oil which could be crystd., by gaseous HCl in its MeOH-Et$_2$O soln. By way of an imido ester-HCl. The yield of III is only moderate (about 50%). During the passage of HCl gas a part of II is split into HCN and I, which may however be recovered without difficulty and again applied to the prepn. of cyanohydrin and ester. Further transformation of III into the chlorinated ester RCHClCO$_2$Me, reduction to RCH$_2$CO$_2$Me and sapon. to homoisovanillic acid (IV), m. 127–9°, proceeds smoothly. The yields of IV referred to the isovanillin used amt. to 30–40%. In the course of this study the following compds. were prepd. and characterized: *Benzoylvanillin benzoylcyanohydrin*, $C_{24}H_{19}O_5N$, yellowish crystals, m. 146.5–7.5°, by the interaction of vanillin and BzCl in Et$_2$O with aq. KCN; reduction in tetralin with Pd sponge gave *4-benzoyloxy-3-methoxybenzyl cyanide*, $C_{16}H_{13}O_2N$, brownish crystals from ligroin, m. 110°. Similarly, *benzoylisovanillin benzoylcyanohydrin*, viscous oil, from the bisulfite extn. about 60% of the applied isovanillin, m. 74–5°, could be isolated. *3-Hydroxy-4-methoxynitrostyrene*, $C_9H_9O_4N$, m. 155–6°, by interaction of isovanillin, MeNO$_2$ and NaOH soln., followed by addn. of dil. H_2SO_4, gives on reduction with Pd sponge (C_5H_5N as catalyzer) *3-hydroxy-4-methoxyphenylacetaldoxime*, $C_9H_{11}O_3N$, m. 146–7°. Acetisovanillin, $C_{10}H_{10}O_4$, m. 86° (Pschorr (*Ber* **35**, 4387(1902)) gave 61°); *isovanillin triacetate*, $C_{14}H_{16}O_7$, m. 117–18°, both by acetylation with Ac$_2$O. 3-Hydroxy-4-methoxybenzyl alc. (isovanillyl alc.), m. 132°, by hydrogenation of isovanillin, yields with Na and abs. MeOH *3-benzyloxy-4-methoxybenzyl alc.* (benzylisovanillyl alc.), $C_{15}H_{16}O_3$, m. 70–1°, which with CSCl$_2$ gives the corresponding *chloride*, $C_{15}H_{15}O_2Cl$, m. 70–5°. *3-Nitro-4-methoxybenzyl cyanide*, $C_9H_8O_3N_2$, yellow, m. 86–7°, from the corresponding chloride with NaCN, gives on sapon. *3-nitro-4-methoxyphenylacetic acid*, $C_9H_9O_5N$, bright yellow crystals, m. 133–4° (*Et ester* (V), m. 58–9°; *Me ester* (VI), m. 102°), which on reduction yields *3-amino-4-methoxybenzyl cyanide*, yellow, m. 40°, discolors in the light (*HCl salt*, m. 202°). Reduction of V and VI yields yellow oils, b$_1$ 151–2° and 147–8°, resp.; the corresponding *HCl salts* m. 166–7° and 190–1°, resp. W. O. E.

Catechols isolated from tea leaves. W. B. Deijs. *Rec. trav. chim.* **58**, 805–30(1939).—*l*-Epicatechol, catechol gallate and 5′-hydroxycatechol were isolated in a cryst. state from various samples of tea leaves from Java. From 2 to 2.5% of amorphous tannins (I) (on the basis of dry leaves) was also isolated. These show $[\alpha]_D$ varying from −94.3° to −112.3°; 3 Ac derivs., m. 110–23°, 108–23°, 112–24°, and with $[\alpha]_D^{15}$ −93.4°, −92.4° and −70.5°, were prepd. The I could be sepd. into an Et$_2$O-sol. and Et$_2$O-insol. fraction, with $[\alpha]_D$ −123.3° and −101.2°, −123.8° and −108.2°; −100.9° and −82.2°. I with tannase gives 25.6–28.5% gallic acid; with 5% H_2SO_4 the acid split off is not more than 15.2% (after boiling 66 hrs.). Sugar could not be detected in any of the I prepns. In the detn. of tannin by the HCHO-HCl method, no advantage is gained by boiling the ppt. The conversion factor of 0.97 is adopted for the detn. of tannin. The I which dissolves completely or at least to a large extent in H_2O is pptd. with gelatin; the ppt. seps. readily when a satd. soln. of NaCl contg. H_2SO_4 is added, but the filtrate always shows the tannin reaction quite clearly. The portion not pptd. amounts to 8–20% of the total I. Purification of I through the Pb salt still gives an amorphous product, but the rotation and that of the Ac deriv. are higher and the m.-p. range of the Ac deriv. is less extensive. The compn. of I is discussed. C. J. West

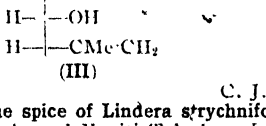
Syntheses of glucosides. XI. Cichoriin. Frank S. H. Head and Alexander Robertson. *J. Chem. Soc.* **1939**, 1266–7; cf. *C. A.* **28**, 1338⁸.—BzCl added to 3.5 g. of esculetin in 2% aq. NaOH at 0° gives 2.7 g. of the *6-O-Bz deriv.* (I), m. 198°, and 1.5 g. of the di-Bz deriv., m. 186°. I with MeI and K_2CO_3 in Me$_2$CO gives 6-benzoyloxy-7-methoxycoumarin, m. 217–18° (Seka and Kallir, *C. A.* **25**, 3980, give 211°); NH_3 in MeOH gives 7-*O*-methylesculetin. I and *O*-tetraacetyl-α-glucosidyl bromide with Ag_2O give *7-O-tetraacetyl-β-glucosidoxy-6-benzoyloxycoumarin*, m. 218°; NH_3 in MeOH gives 6-hydroxy-7-β-glucosidoxycoumarin, m. 213–14°, $[\alpha]_D^{20}$ −104° (3 g. in 100 cc. 50% aq. dioxane); this is identical with natural cichoriin (Merz, *C. A.* **27**, 2685); penta-Ac deriv., m. 218°. C. J. West

Aluminum chloride, a new reagent for the condensation of β-ketonic esters with phenols. IV. The condensation of 4-acylresorcinols with ethyl acetoacetate. C. V. Dehwala and N. M. Shah. *J. Chem. Soc.* **1939**, 1250–3; cf. *C. A.* **33**, 5485.—Respropiophenone (4.2 g.) and 3.25 g. of AcCH$_2$CO$_2$Et in PhNO$_2$ with AlCl$_3$, heated 1 hr. at 120–30°, give 2 g. of *5-hydroxy-6-propionyl-4-methylcoumarin* (I), m. 164–5°; alkali gives a deep-yellow color; *Ac deriv.*, m. 167–8°; *oxime*, m. 257–8°. 5-Hydroxy-4-methylcoumarin and EtCOCl, heated for 10 hrs. (finally at 120°), give the *5-propionoxy deriv.*, m. 100–1°; heating with AlCl$_3$ at 120–30° for 2 hrs. gives I. I with Ac$_2$O and AcONa at 160–70° for 10–11 hrs. gives *2′,3′,4-trimethylchromano-7′,8′,6,5,α-pyrone*, m. 241–2°. Reduction of I with Zn-Hg in EtOH gives *5-hydroxy-4-methyl-5-propylcoumarin*, m. 152°, which gives a deep-yellow color with alkali. Resbutyrophenone (3 g.) and AcCH$_2$CO$_2$Et give 1.5 g. of *5-hydroxy-6-butyryl-4-methylcoumarin* (II), m. 141–2°; FeCl$_3$ gives a deep-red color and alkali a deep-yellow color; *Ac deriv.*, m. 167°; *Me ether*, m. 83–4°; *oxime*, m. 210°. *5-Butyroxy-4-methylcoumarin*, m. 100–1°; with AlCl$_3$ it gives II. Ac$_2$O-AcONa transforms II into *4′,2′-dimethyl-3′-ethylchromono-7′,8′,6,5,α-pyrone*, m. 201–2°. Reduction of II gives *5-hydroxy-4-methyl-6-butylcoumarin*, m. 145–6°; alkali gives a deep-yellow color. 2,4-(HO)$_2$C$_6$H$_3$COCH$_2$Ph (2.3 g.) and AcCHCO$_2$Et give 1.25 g. of *5-hydroxy-6-phenylacetyl-4-methylcoumarin*, m. 172–3°; it gives a strong FeCl$_3$ reaction and turns deep yellow in alkali; *Ac deriv.*, m. 142°; *Me ether*, m. 78–9°; *oxime*, m. 257°. Ac$_2$O-AcONa gives *3′-phenyl-4,2′-dimethylchromono-7′,8′,6,5,α-pyrone*, m. 237–8°. *4-p-Tolylresorcinol* and AcCH$_2$CO$_2$Et give *5-hydroxy-6-(p-toluoyl)-4-methylcoumarin*, m. 204–5°, which gives a reddish brown color with FeCl$_3$ and a yellow color with alkali; *Ac deriv.*, m. 192–3°; *4′-p-tolyl-4-methylcoumarino-7′,8′,6,5,α-pyrone*, m. 238–9°; BzCl does not give the expected Bz deriv. The above 4-acylresorcinols do not condense with AcCH$_2$CO$_2$Et in the presence of H_2SO_4; their reactivity appears to be brought out only in the presence of AlCl$_3$ which has a sp. action in effecting condensation in the otherwise very inaccessible 2-position of the resorcinol mol. C. J. West

Products obtained by saturation of 3-carene with hydrochloric acid gas. V. N. Krestinskiĭ and S. Malevskaya. *J. Applied Chem.* (U. S. S. R.) **12**, 878–85(in French, 885)(1939).—The satn. of 3-carene with an excess of HCl gas yielded mainly monohydrochlorides (83%) and in smaller amts. dihydrochlorides. The monohydrochlorides

represented mixts. of products corresponding to dipentene and sylvestrene; they had a monocyclic structure with an ethylene bond in the ring and Cl at the tertiary position in the isopropyl group. Possibly, the small amt. of monohydrochloride preserved the carene structure. Thus, HCl was added with opening of the 3-membered ring and the ethylene linkage was preserved. The opening of the ring proceeded in 2 directions leading to the formation of dipentene and sylvestrene derivs. Both these hydrocarbons can be isolated from the corresponding hydrochlorides by splitting off HCl (with aniline, for instance). The dihydrochlorides also represented mixts. of dihydrochlorides of dipentene and sylvestrene. The ethylene linkage (in respect to HCl) in carene was more stable than the trimethylene ring. A. A. Podgorny

Menthone series. XVI. *d*-Neoisopulegol. Andrew G. Short and J Hinton Read. *J. Chem. Soc.* **1939**, 1306–9; cf. *C. A.* **33**, 6816⁸.—*d*-Pulegone (200 g.), with α_D^{19} 19.97°, n_D^{19} 1.4859, reduced with (iso-PrO)$_3$Al (the prepn. of which is given), during which a slow const.-vol. distn. is conducted through a 30-cm. Vigreux column, dry iso-PrOH added to replace the distillate, the temp. being kept at 120° for several hrs. and then gradually raised to 170°, gives after 20 hrs. 34 g. of a fraction b_{17} 55–82° and 255 g. of a fraction b_{17} 82–107°, $\alpha_D^{19.5}$ 58.03°, $n_D^{19.5}$ 1.4836. Esterification of the larger fraction with 3,5-$(O_2N)_2C_6H_3$-COCl in C_5H_5N at 0° for 16 hrs., followed by the addn. of 100 cc. of concd. HCl in 100 cc. H_2O, extn. with Et_2O, washing with 2 *N* NaOH and distn. with steam, gives 153 g. of unesterified material (I); after removal of some 3,5-$(O_2N)_2C_6H_3CO_2H$ by shaking the Et_2O soln. with 2 *N* NaOH, the residue is crystd. from MeOH and then from MeOH-$CHCl_3$, giving 11.5 g. (6%) of the *3,5-dinitrobenzoate*, m. 138–9°, α_D^{19} 45° ($CHCl_3$, *c* 1), of *d*-neoisopulegol (II), b_{17} 95°, d_4^{25} 0.9107, n_D^{25} 1.4686, α_D^{18} 25.30°, $[\alpha]_D^{18}$ 39.3° (EtOH, *c* 1), $[R_L]_D$ 47.13 (calcd. 47.24). On catalytic reduction II gives *d*-neomenthol exclusively and thus possesses the mol. configuration III. I was sepd. into 2 fractions by distn.; the 1st is essentially *d*-$\Delta^{3,8(9)}$-*p*-menthadiene; the 2nd b_{17} 100–5°, α_D^{19} 42.7°; it yields a semicarbazone, m. 172°, $[\alpha]_D^{23}$ 68.2° ($CHCl_3$, *c* 1), but it is not α-pulegone, for its *2,4-dinitrophenylhydrazone*, bright red, m. 149–50°, $[\alpha]_D^{19}$ 116° ($CHCl_3$, *c* 0.5). Reduction of this ketonic fraction gives *l*-menthone. Thus the reduction in question appears to consist of a mixt. of pulegols and isopulegols. The isopulegol series contains 4 members: *l*-isopulegol, *d*-neoisopulegol, *d*-isoisopulegol and *d*-neoisoisopulegol.



(III)

C. J. West

Constituents of the spice of Lindera strychnifolia VIII. III. Heisaburo Kondo and Keniti Takeda. *J. Pharm. Soc. Japan* **59**, 504–19(in German, 169–9)(1939); cf. *C. A.* **24**, 5750.— The ether ext. of 210 kg. *Lindera strychnifolia* Vill gave 230 g. crude linderane (I) (0.11%), 290 g. crude linderene (II) (0.14%), 200 g. linderol fraction (III) b_5 70–100° (0.1%), 957 g. ester fraction b_5 100–45° (0.46%), and others (775 g.) b_5 145–70° (0.37%). I, $C_{15}H_{16}O_4$ ($C_{16}H_{18}O_4$ or $C_{12}H_{14}O_3$), m. 187°. Oxidation of I in acetone with $KMnO_4$ gave a syrupy material, differing from the original compd. Catalytic oxidation of I gave a neutral compd., which was not identified. I and O_3 gave AcH, HCHO, and a compd., which gave on oxidation succinic acid. II, $C_{15}H_{18}O_2$ or $C_{16}H_{20}O_2$, m. 145°. Dihydrolinderene and O_3 gave HCHO and an acid which gave 2 Me esters, b_3 130–50° and $b_{0.01}$ 170–90°. Attempts to prep. acid amides failed. Oxidation of II with Cr_2O_3 in the cold gave an acid, $C_{14}H_{18}O_5$, decompg. 192–5°, inactive toward maleic anhydride, semicarbazide and $HONH_2$, a neutral compd., $C_{15}H_{18}O_4$, m. 140°, sol. in KOH, and a neutral compd., $C_{15}H_{16}O_2$, m. 140–60°, which forms a semicarbazone. Dehydrogenation of II with Pd-asbestos gave *linderazulene*, $C_{15}H_{18(16)}$ (?), m. 103–6°. Catalytic reduction of II (35 g.) gave the following *compds.*: (IV) b. 120–40° (12 g.), (V) b_5 150–70° (12 g.), and (VI) $b_{0.05}$ 130–5°, $[\alpha]_D^{23}$ −53.07° (in acetone). V gave 2 compds., one b_5 150° and the other, $C_{15}H_{26(24)}O_2$ (VI), m. 118–19°, $[\alpha]_D^{23.5}$ −34.78° (in abs. alc.). VI forms an Ac deriv. m. 77–9°; Bz deriv., m. 169–70°. Reduction of II in acetone failed to give VI. III, identical with *l*-borneol, $C_{10}H_{18}O$, m. 204°, $[\alpha]_D^{18}$ −36.42°; phenylurethan, m. 139.5°; *p*-nitrobenzoate, m. 136.5°. Oxidation of III with HNO_3 gave a ketone, m. 177.5°, $[\alpha]_D^{17}$ −44.84° (in alc.); oxime, $C_{10}H_{17}ON$, m. 119°. F. I. Nakamura

Camphorone and pulegenone. Products of hydrogenation and their structure. I. Raymond Calas. *Bull. soc. chim.* **6**, 1374–82(1939).—Thermal decompn. of Th *d*-camphorate (I) gives a mixt. of *dl*-2-methylcyclopentanone (II), *dl*-camphorone (III) and slightly active pulegenone (IV). I (200 g.) was heated *in vacuo* in a Pyrex tube by an elec. furnace at 250–400°. The distillate was extd. with Et_2O, yielding 63% of a crude product, $[\alpha]_{5461}^{20}$ 0.13°, fractionated *in vacuo* to give 5% of II, b_{15} 38.40° (semicarbazone, m. 184°); 17% of IV, b_{15} 76° (semicarbazone, m. 184°); and 65% of III, b_{15} 85°, d_4^{20} 0.9325, d_4^{25} 0.9308, n_{5893}^{20} 1.48084, n_{4358}^{20} 1.49884, M. R. 42.18 (calcd. 41.31), η_{22} 1.831, surface tension 34, parachor 863 (calcd. 857) (semicarbazone, m. 197°; semicarbazide addn. compd., m. 134°). Regeneration from the semicarbazone gave IV, b_{764} 190–1°, b_{15} 76°, d_4^{20} 0.9146, d_4^{25} 0.9130, n_{5893}^{20} 1.45916, n_{4358}^{20} 1.47125, M. R. 41.33 (calcd. 41.31), η_{22} 1.515, surface tension 34, parachor 863 (calcd. 857), $[\alpha]_{5893}$ 0.56°, $[\alpha]_{5780}$ 0.60°, $[\alpha]_{5461}$ 0.73°, $[\alpha]_{4358}$ 1.53°. Thus the phys. consts. of IV are less than those of III. Comparison of the exaltations noted with III and IV with those reported for isopropylidenecyclopentane, M. R. 36.74 (calcd. 36.47), exaltation 0.27, and isopropylcyclopentene, M. R. 36.29 (calcd. 36.17), exaltation −0.18, permits the explanation to a certain measure of the differences observed since the conjugation due to the CO group will accentuate the effect already present in the hydrocarbons. The Raman spectra of III and IV show considerable differences. **II. Hydrogenation with sodium in the presence of aqueous ether or of absolute alcohol.** *Ibid.* 1382–91.— III (35 g.) in a mixt. of 800 cc. Et_2O and 1500 cc. satd. $NaHCO_3$ was treated portionwise with 37 g. Na and the washed and dried Et_2O layer was evapd. and distd., yielding 4 g. III; 13 g. of a *pinacol*, $C_{15}H_{31}O_2$, m. 182–3°; and 15 g. of a crude *product* (V), b_{14} 81–2°, which did not give a cryst. *p*-nitrobenzoate but yielded 2 *acid phthalates* (VI, VII), m. 114° and 84°, resp. Sapon. of VI and VII with 15% KOH gave the corresponding *dihydrocamphorols* $C_9H_{18}O$, VIII: b_{15} 82.3, d_4^{23} 0.8926, n_{5893}^{23} 1.4496, n_{4358}^{23} 1.45970, M. R. 42.79 (calcd. 42.39), η_{23} 0.1317, surface tension 30.4, parachor 374 (calcd. 379), (*p-nitrobenzoate*, m. 91°), oxidized by CrO_3 in AcOH to a *dihydrocamphorone*, $C_9H_{16}O$, m. 198°, and IX, b_{15} 82.3 d_4^{23} 0.8968, n_{5893}^{23} 1.45196, n_{4358}^{23} 1.46168, M. R. 42.75 (calcd. 42.39), η_{23} 0.1653, surface tension 30.6, parachor 375 (calcd. 379) (*p-nitrobenzoate*, m. 58°), oxidized by CrO_3 to the above dihydrocamphorone. Sapon. rate measurements gave *K* values of 0.00531 and 0.0153 for VI and VII, resp., and consequently cis and trans structures are assigned to these isomers. Viscosity and reduction studies confirm this conclusion which is contrary to Auwer's rule. Since the alcs. correspond to the *cis*-dihydrocamphorone, the alc. VIII is the *cis,cis*-dihydrocamphorol and IX is the *cis, trans* isomer. Similar reduction of IV with Na in aq. Et_2O gave identical results. Reduction of III or IV by Na in abs. alc. gave similar results but the yield of VIII was smaller and very little pinacol was formed. **III. Hydrogenation in the presence of metal catalysts.** *Ibid.* 1391–1401.—In the presence of metal catalysts the ethylenic bond of III and IV is satd. primarily. With Raney Ni the reduction ceases at the ketone stage with formation of a mixt. of stereoisomeric dihydrocamphorones. Precise studies of hydrogenation under different conditions of dilu., solvent, catalyst and pH, were undertaken. Reduction of 200 g. III in 50 g. batches in 250 cc. alc. in the presence of 20 g. Ni per batch gave an over-all yield of 185 g. of crude *product*, b. 179–81°; semicarbazone, m.

204°. Fractionation from abs. alc. yielded 80% of a *semicarbazone* (X), $C_{10}H_{19}N_3O$, m. 209°, and 20% of an isomeric *semicarbazone* (XI), m. 198°. X and XI are evidently the semicarbazones of 2 stereoisomeric *dihydrocamphorones*, $C_9H_{16}O$. Similar results were obtained by the reduction of IV. C. R. Addinall

A new isomer with the structure of campholic acid, *l*-campholic acid. F. Salmon-Legagneur. *Bull. soc. sci. Bretagne* **15**, 110–16(1938).—Methods of prepn. and properties of the acid and its derivs. are given in detail (cf. *C. A.* **32**, 4969⁶). The alk. earth, ferrous and Ni salts of β-campholic acid are water-sol., the Zn, Cd, Co, ferric, Mn, Cu, Ag, mercuric mercurous, Sn, Pb, Sb, Cr and Al salts are not. The Cu and Co salts are readily sol. in ether, giving an addn. compd. with increased blue-green and intense rose colors, resp. 5 references. W. C. T.

Syntheses and crystallographic study of the esters of the nitriles of the camphoric [acid] series and of β-cyanocampholide. L. Berthois and J. Vène. *Bull. soc. sci. Bretagne* **15**, 117–23(1938).—The syntheses (*C. A.* **32**, 4564⁴; **33**, 5831⁸, 9080²) are very briefly described. The crystals of the α-Me (I) and α-Et (II) esters of β-cyanocampholic acid and β-cyanocampholide (III) were studied. The parameters *a*:*b* :*c* were: I (orthorhombic holohedrons) 0.927:1:0.709; II (2 slightly different forms of orthorhombic hemihedrons) 0.752:1:0.685; III (orthorhombic antihemihedrons) 0.508:1:0.596. Mech. and optical properties are given W. C. Tobie

Polyterpenoid compounds. I. Betulic acid from Cornus florida L. Alexander Robertson, Gabra Soliman and Edmund C. Owen. *J. Chem. Soc.* **1939**, 1267–73.—The bark of *Cornus florida* L. (1 kg.), extd. 3 times with 1 l. H_2O at room temp. for 24 hrs. and washed with 1.5 l. EtOH, then extd. 4 times with 2 l. boiling 95% EtOH for 5–7 hrs., the EtOH evapd. to crystn., the solid extd. with H_2O, dried, extd. with petr. ether and then with Et_2O, gives 300 g. crude acid and 200 g. of a dark oil sol. in petr. ether. Recrystn. from EtOH gives betulic acid (I), m. 316–18°, $[\alpha]^{22}_{5461}$ 7.89° (3.076 g. in 100 cc. C_5H_5N), identical with that from the oxidation of betulin (Ruzicka, *C. A.* **33**, 1703⁵); *Na salt*. Color reactions are given for I. I and Ac_2O in C_5H_5N at room temp. for 2–3 days give the *anhydride* (II) of the *O*-Ac deriv. of I and AcOH, m. 194–6°, which does not react with CH_2N_2; this also results on refluxing I with Ac_2O-AcONa for 1 hr.; with boiling 70% EtOH II gives betulin acetate, m. 289–91°, $[\alpha]^{22}_{5461}$ 7.70° (5.07 g. in 100 cc. $CHCl_3$), which regenerates II on boiling with Ac_2O-AcONa. I and *p*-$O_2NC_6H_4COCl$ in C_5H_5N appear to give the mixed anhydride but it could not be purified; heating in C_5H_5N for 15 min. on the water bath gives the *p-nitrobenzoate*, m. above 330°. I and Me_2SO_4 or CH_2N_2 in Et_2O give the Me ester (III), m. 223–4°, $[\alpha]^{22}_{5461}$ 8.01° (4.11 g. in 100 cc. $CHCl_3$); Ac_2O and C_5H_5N give the acetate, m. 201–2°, $[\alpha]^{22}_{5461}$ 18.06° (6.756 g. in 100 cc. $CHCl_3$), also prepd. from the *O*-Ac deriv. of I and CH_2N_2; deacetylation gives III. III yields a *β-nitrobenzoate*, m. 232–3°, and a *p-toluenesulfonate*, m. 172–4° (decompn.). I gives an *Et ester*, m. 201–2°, $[\alpha]^{22}_{5461}$ 11.44° (4.588 g. in 100 cc. $CHCl_3$); *acetate*, m. 185–6°, $[\alpha]^{22}_{5461}$ 14.33° (2.198 g. in 100 cc. $CHCl_3$). *O*-Acetylbetulic acid in EtOH or AcOH is reduced in 0.5 hr. to the dihydro deriv. (IV), m. 307–10°; Me ester, m. 236–7°, $[\alpha]^{22}_{5461}$ −3.31° (5.37 g. in 100 cc. $CHCl_3$); IV with EtOH-KOH gives the dihydro deriv. of I, m. 316–20°, whose *Me ester* m. 238–40°. *Et ester*, m. 208°; *O-Ac deriv.*, m. 205°. Me *O*-acetylbetulate with BzO_2H gives an *oxide*, $C_{33}H_{50}O_6$, m. 202°; 1 mole of O is required for oxidation; the O no. for the acid is also 1. The gradual soln. of I in AcOH satd. with HBr gives a violet and then a blue color; ppta. with H_2O and crystn. from $CHCl_3$ and then C_5H_5N gives the *acetate*, m. above 350°, of *lactone A*, $C_{32}H_{48}O_3$, m. above 320°, $[\alpha]^{22}_{5461}$ 75.18° (1.37 g. in 100 cc. $CHCl_3$); the acetate is unchanged on heating with Ac_2O-C_5H_5N for 1 hr.; it is also formed by heating the *O*-Ac deriv. of I with 98–100% HCO_2H for 5 hrs. Boiling I with HCO_2H for 5 hrs. gives the *formate*, m. above 350°, of *lactone B*, m. above 330°, $[\alpha]^{22}_{5461}$ 59.05° (2.1 g. in 100 cc. $CHCl_3$). Addn. of 5% Br in AcOH to *O*-acetylbetulic acid in Et_2O gives in 3 hrs. the *lactone* of *O-acetylbromobetulic acid*, $C_{32}H_{49}O_4Br$, m. 290° (decompn.); the reaction in AcOH contg. a little H_2O gives the *di-Br deriv.*, m. 290–5° (decompn.). III gives a poly-Br lactone which has not been obtained pure. C. J. West

Terphenyl series. II. Hydroxy- and methyl-*p*-terphenyls. H. France, I. M. Heilbron and D. H. Hey *J. Chem. Soc.* **1939**, 1283–7; cf. *C. A.* **33**, 5556.—4-Ac(NO)NC_6H_4Ph (I) in PhOMe at 18° for 48 hrs. gives a mixt. of II and III. 2-HOC_6H_4Ph and MeI with KOH in EtOH give *2-methoxy-p-terphenyl* (II), m. 118–19°. 4-$MeOC_6H_4C_6H_4NHAc$ and N oxides in AcOH at 8° give *4′-nitrosoacetamino-4-methoxybiphenyl*, yellow, detonates at 103°; C_6H_6 gives *4-methoxy-p-terphenyl* (III), m. 223–4°. HI (d. 1.7) at 135–40° gives the *4-HO deriv.*, m. 264–5°. I, gradually added to *p*-$C_6H_4(OMe)_2$ at 50–5°, gives *2,5-dimethoxy-p-terphenyl*, m. 159–60°; *2,5-di-HO deriv.*, m. 173–4°. *p*-$C_6H_4(NAcNO)_2$ and *p*-$C_6H_4(OMe)_2$ give *2,5,2″,5″-tetramethoxy-p-terphenyl*, m. 159–60°. *2-Methoxy-N,N′-diacetyl-1,4-phenylenediamine*, m. 220–2°; N oxides in Ac_2O-AcOH-P_2O_5 at 8° give a yellow solid, considered the *5-NO_2 deriv.*, m. 258–9°. I (10 g.) and 800 cc. PhMe at 18° give 0.8 g. of 4-MeC_6H_4Ph (IV), m. 207–8°, 0.1 g. of the *3-Me isomer*, m. 169–70°, and 0.9 g. of the *2-Me isomer* (V), m. 91–2°. 4-$AcNHC_6H_4C_6H_4$-Me-2 gives a yellow oily NO deriv., which with C_6H_6 yields V. CrO_3 oxidation of V gives *2-methylbiphenyl-4′-carboxylic acid*, m. 173–5°. Similarly 4-Ac(NO)NC_6H_4-C_6H_4Me-4 with C_6H_6 gives IV. *p*-$C_6H_4(NAcNO)_2$ and *p*-$C_6H_4Me_2$ give *2,5,2″,5″-tetramethyl-p-terphenyl*, m. 112–13°. III.

Preparation and nitration of *m*-terphenyl *Ibid.* 1288–92.—3-Phenylcyclohexanone (18 g.) and PhMgBr, refluxed 1 hr. and dehydrated with 98% HCO_2H, give *1,3-diphenyl-3-cyclohexene* (and/or the Δ^2-isomer), b_{15} 198–200°; dehydrogenation with boiling quinoline contg. S for 36 hrs. gives 9 g. of *m*-terphenyl (I). The prepn. of 3-$O_2NC_6H_4Ph$ in 63% yield is given. 3-$AcNHC_6H_4Ph$ (10 g.) with N oxides in AcOH-Ac_2O-P_2O_5 gives an oily NO deriv., which with C_6H_6 gives 2.6 g. of I. I (5 g.) and HNO_3 in AcOH at 85–90° for 2–3 hrs. give 4.5 g. of the *4′-NO_2 deriv.* (II), pale yellow, b_{10} 280°; reduction with $SnCl_2$ in HCl gives the *4-NH_2 deriv.*, whose Ac deriv. m. 116–17° (cf. Wardner and Lowy, *C. A.* **26**, 3789). I and HNO_3 (d. 1.42) at 80–90° for 20 min. give a di-NO_2 deriv., m. 213–15° (W. and L. give 214°); some II is also formed. I and HNO_3 (d. 1.5) in AcOH, heated 1 hr. at 100°, give a tri-NO_2 deriv. (III), pale yellow, m. 199–200° (W. and L. give 204°); II with HNO_3 in AcOH at 30° and finally at 90° for 30 min. gives III. Oxidation of II with CrO_3 in AcOH gives 2-nitrobiphenyl-5-carboxylic acid (IV), m. 220–1° (W. and L. give 227°). 4-Nitro-*m*-acetotoluidide gives an oily NO compd. which with C_6H_6 at 35° gives *2-nitro-5-methylbiphenyl*, yellow, m. 86–7°; oxidation with CrO_3 gives IV. Oxidation of the di-NO_2 compd. gives *p*-$O_2NC_6H_4C_6H_4CO_2H$. Structures are suggested for the di- and tri-NO_2 derivs. C. J. West

Aromatic hydrocarbons. XXIII. Zinc dust fusion. A new method for the reduction of organic compounds. E. Clar *Ber.* **72B**, 1645–9(1939); cf. *C. A.* **30**, 8205⁹.—Zn dust even at low temps. (200–90°) often exerts a very strong reducing action when used in a flux of NaCl-$ZnCl_2$. It is well not to use perfectly dry $ZnCl_2$, as a little water favors the evolution of H. Quinones are completely reduced in a few min. The course of the reaction can generally be readily followed by the change in the characteristic colors of the solns. of the quinones in $ZnCl_2$ to those of the hydrocarbons. The yields of spectrally pure hydrocarbons are often as high as 90%. Occasionally bimol. products are formed; the products are easily sepd., after soln. of the melt in dil. HCl, by crystn. As in Zn dust distn., the new method, designated *Zn dust fusion* for convenience, does not remove aromatically bound ether O. The formation of bimol. products increases when dry $ZnCl_2$ and no NaCl are used; it may be as much as 25%. A few examples of the application of the method are given. When Ph_2CO is fused with 1 part NaCl, 5 parts $ZnCl_2$ and 1 part Zn dust and the temp. is raised within a few min. from 220° to 290°, Ph_2CH_2 distils over with moderate

foaming; the last portions are removed *in vacuo*, the residue is taken up in dil. HCl and the undissolved portion, after washing and drying, is sublimed *in vacuo* in CO_2, giving a little Ph_2C CPh_2, m. 221°. From anthraquinone are obtained about 0.8 part anthracene, m. 215°, and 0.1 part bianthryl, m. 310° (evacuated tubes). Phenanthrenequinone gives 0.8 part phenanthrene and 0.1 part *9,9'-biphenanthrylene 10,10'-oxide*, light yellow, m. 299°, slowly sol. in concd. H_2SO_4 with light-green color. From 3,4,8,9-dibenzopyrene-5,10-quinone is obtained more than 80% 3,4,8,9-dibenzopyrene, m. 308° (evacuated tubes). The 3,4,9,10-isomer, m. 280°, is obtained in about 85% yield from the 5,8-quinone. In the same way are obtained anthanthrene, m. 461° (evacuated tubes); violanthrene, m. above 360° (about 85%); *isoviolanthrene*, deep dark red, much darker than violanthrene, with the 1st absorption band in molten naphthalene at 5160 A.; and anthrazine (from indanthrene), vivid yellow.

C. A. R.

The appearance of color in adsorption on surface-active substances; analogy between the action of adsorption and complex formation (preliminary communication). Ernst Weitz and Fritz Schmidt. *Ber.* **72B**, 1740–2(1939).—The same colors which appear when triarylmethyl halides form "double salts" with various inorg. halides ($ZnCl_2$, $AlCl_3$) are produced when the halides in benzene or $CHCl_3$ are brought together with silica gel (ground, dried at about 200° and kept over P_2O_5) or, to a lesser extent, with surface-active Al_2O_3 ("for chromatographic adsorption analysis," Brockmann). When the soln. is poured or sucked off, according to the usual chromatographic technique, there remains an upper colored layer in which the solute is completely retained, while the colorless lower part of the column contains only solvent. On addn. of alc. or acetone, i. e., solvents in which complexes of triarylmethyl halides are incapable of existence, the color of the upper layer is destroyed and the components of the complex are eluted. The tetraaryl-*p*-xylylene dihalides behave in the same way; the tetra-Ph compd. gives an intensely yellow, the tetrabiphenylyl deriv. an intensely violet adsorbate. Here, too, silica gel works better than Al_2O_3, but talc and pptd. $CaCO_3$ also give some color. In the adsorption on silica gel it may be assumed that the adsorbed ("bound") part of the halide is not the halogen but the triarylmethyl residue. The peculiar action of adsorption is shown by an entirely different example. Tri- and di-arylamines behave like NH_4 radicals, adding monovalent acid residues, like ClO_4, to form intensely colored "ammium salts." While $(p\text{-}MeC_6H_4)_3N$ in benzene with Bz_2O_2 (the dimol. radical of BzOH) alone or with silica gel alone gives no color, an intense greenish blue color at once appears when it is brought together with Bz_2O_2 in the presence of silica gel. Ph_2NH, carbazole and *N*-methylcarbazole behave similarly. The last presumably forms the corresponding "ammonium" salt, but with the other 2 (secondary) amines possible oxidation to the tetraarylhydrazines may blot out the picture. These tetraarylhydrazines, like the triarylamines, also add acid residues to form deeply colored "hydrazinium" salts and give with anhyd. $AlCl_3$ or $ZnCl_2$ addn. products of the same color as the salts formed by oxidation, and the same colors as with $AlCl_3$ also appear when the hydrazines in benzene or CCl_4 are treated with dry silica gel (deep violet with the tetra-*p*-tolyl, blue-violet with the tetraanisyl compd.). On chromatographic adsorption on silica gel the $(NPh_2)_2$ forms a dark-green column; with benzene as solvent the color extends as far as the column has been wet, and as more benzene is added the color advances to the lower end of the column and finally there issues from the deep-green column an almost colorless soln. contg. much hydrazine. When benzene-benzine (about 1:1) or pure CCl_4 is used, a colorless zone (contg. only solvent) is observed below the colored zone. With the more strongly adsorbed tetraanisylhydrazine, this colorless zone is obtained with pure benzene also. Acetone in every case destroys the characteristic color of the adsorbate and elutes the hydrazine; the tetraphenyl- and tetratolylhydrazines are recovered almost quantitatively, but with the more easily disproportionated tetraanisylhydrazine only dianisylamine could be isolated in cryst. form after elution. Al_2O_3 gives a color (blue-violet) only with the tetraanisyl compd. C. A. R.

Phenolhomophthalein. Buu-Hoï. *Compt. rend.* **209**, 321–4(1939).—Dehydration of a mixt. of *homophthalic anhydride* and PhOH with $SnCl_4$ at 125° gives *3-p-hydroxyphenylisocoumarin*, m. 211°; *homophthalazone*, m. 243° (decompn.); *acetate*, m. 161°. W. J. Peterson

Reaction of unsaturated and polynuclear aromatic hydrocarbons with sodium and calcium in liquid ammonia. Walter Hückel and Horst Bretschneider. *Ann.* **540**, 147–89(1939).—Wooster and Smith (*C. A.* **25**, 944) state that $C_{10}H_8$ with Na in liquid NH_3 gives tetralin (I), whereas Schlenk and Bergmann (*C. A.* **22**, 4493), claim that the product is Δ^2-dihydronaphthalene (II). $C_{10}H_8$ (3 g.) in 75 cc. Et_2O, treated with 4.8 g. Na and then with about 150 cc. NH_3 at −75° to −65°, at first gives a green color, which changes to orange-red and then to red-orange or red; after about 20 min. the Na complex is decompd. with 6.5 g. MeOH, giving II; at higher temps. there results a mixt. of II and Δ^1-isomer (III); at the b. p. of NH_3 some III is formed. In 1 expt. nearly pure III resulted. II and Na in Et_2O-NH_3 at −60° give III. At −50° III is transformed by Na in NH_3 into I. Ca gives similar results. Ph_2 with Na or Ca in NH_3 at −75° to 70° gives the 3,4-dihydro deriv. (IV), b_{12} 114°; $EtNO_2$ in EtOH at −50°, followed by concd. HCl in EtOH, gives the nitrosochloride, characterized as nitrolpiperidide, 191°. IV with Na at −75° gives the 3,4,5,6-tetrahydro deriv., b. 125–6°. Terphenyl (V) (prepn. given) with Na in NH_3 gives a *3,4-dihydro deriv.*, (VI), m. 70°; the concd. H_2SO_4 soln. has a cinnabar-red color; there also results a *compd.* $C_{18}H_{14}$, m. 152–3°, which is isomeric with V but does not contain a reactive double bond; they are sepd. by crystn. from EtOH, hexahydrotoluene and petr. ether. Catalytic reduction of VI yields 4-cyclohexylbiphenyl. VI reacts easily with Na, giving a red compd., not further investigated. 1,4-Diphenylbutadiene reacts fairly easily with Na or Ca, giving a mixt. of liquid and solid hydrocarbons; apparently the 2 metals give different reaction products. Ph_2CH_2 gives a blue color with Ca and the product yields a small quantity of an unsatd. hydrocarbon. 9,10-Diphenylanthracene (VII) with Na in liquid NH_3 gives an orange or orange-red soln. but de compn. of the complex with NH_4Cl or alc. gives only VII. Phenanthrene reacts only partially with 2 atoms of Na or 1 atom of Ca in liquid NH_3 at −75°, giving an orange-red soln. and ppt.; the resulting product is, principally 1,2,3,4-tetrahydrophenanthrene, which probably is not the primary reaction product. Butadiene and Na in NH_3 give butene and octadiene. C. J. West

Molecular compounds of methyl α-naphthol ether and dinitro products. S. I. Burmistrov. *Trans. Inst. Chem. Tech. Ivanovo* (U. S. S. R.) No. 2, 14–17(1939). — Mol. compds. m. 57.5°, 71°, 96°, 66.0°, 66.5° and 124° were prepd., from α-methoxynaphthalene and 1,3-dinitrobenzene, 2,4-dinitrotoluene, 2,4-dinitrophenol, 2,4-dinitroanisole, 2,4-dinitrochlorobenzene and 3,5-dinitro-4-chlorobenzoic acid by pptg. from a cold alc. soln. The compds. were sufficiently stable, they varied in color from bright yellow to red, and had a sharp m. p. It is suggested that they may be used in the identification of dinitro compds. B. Z. Kamich

Condensation of diarylcarbinols with naphthol ethers. S. I. Burmistrov. *Trans. Inst. Chem. Tech. Ivanovo* (U. S. S. R.) No. 2, 17–20(1939).—Condensation of (1) benzohydrol + α-methoxynaphthalene, (2) phenyl-*p*-xenylcarbinol + α-methoxynaphthalene, (3) phenyl-*p*-xenylcarbinol + α-ethoxynaphthalene, (4) benzohydrol + ethoxynaphthalene, (5) phenyl-*p*-tolylcarbinol + methoxynaphthalene, (6) phenyl-α-naphthylcarbinol + α-ethoxynaphthalene, and 6') di-*p*-xenylcarbinol + α-ethoxynaphthalene gave the following *naphthylmethanes*, resp.: (1) diphenyl-α-methoxy, m. 151°, (2) phenyl-*p*-xenyl-α-methoxy, m. 155°, (3) phenyl-*p*-xenyl-α-ethoxy), m. 163–5°, (4) diphenyl-α-ethoxy, m. 159.5°, (5) phenyl-*p*-tolyl-α-methoxy, m. 132.5°, (6) phenyl(di-α-methoxy),

m. 161–2°, and (7) di-*p*-xenyl-α-ethoxy, m. 114–6°.
B. Z. Kamich

Constituents of natural phenolic resins. XVI. Route to the synthesis of lignandiols. Robert D. Haworth and David Woodcock. *J. Chem. Soc.* **1939**, 1237-41; cf. *C. A.* **33**, 6833[2].—This is a continuation of the work on the synthesis of lignandiols reported in *C. A.* **32**, 5488[2]. 1-Phenylnaphthalene-2,3-dicarboxylic anhydride (I) (26.2 g.) in 600 cc. hot H_2O contg. 10 g. NaOH, treated with 1200 g. 4% Na-Hg and the stirred mixt. heated on the water bath and CO_2 passed in for 12 hrs., gives 27.5 g. of crude 1-phenyl-1,2,3,4-tetrahydronaphthalene-2,3-dicarboxylic acid (II), m. 170-80°; only after repeated crystn. from Me_2CO could a homogeneous acid (III), m. 209°, be obtained. Heating III with 15 parts of AcCl gives 90% of the anhydride (IV), m. 155-6°. Unlike I, IV with cold conc'd. H_2SO_4 is sulfonated and does not yield a ketone acid. Alk. hydrolysis of IV does not give III but an *isomer*, m. 219°. Esterification of II with alc. HCl, 10% alc. H_2SO_4 or refluxing the dry Ag salt with 3 parts alkyl iodide for 6 hrs. gives the *Me ester*, m. 106.9°; distn. of this form or esterification with HCl for 12 hrs. gives a liquid Me ester, b_1 190-5°; *Et ester* (V), $b_{1.5}$ 210–15°. *6,7-Dimethoxy-1-(3',4'-dimethoxyphenyl)-1,2,-3,4-tetrahydronaphthalene-2,3-dicarboxylic acid* (VI) is obtained in a crude yield of 90%, m. 140–55°; wasteful crystn. gives a pure VI, m. 155–8°. VI yields a *Me ester*, m. 146°, from the Ag salt and MeI in 80% yield, or with 1 mole MeOH, m. 110°, on esterification with HCl or H_2SO_4; EtOH-H_2SO_4 gives 20% of the *Et ester* (VII), m. 116–17° (from MeOH), and 50% of an oil, b_3 270–5°; *Et II ester*, m. 122°. *6,7-Methylenedioxy-1-(3',4'-methylenedioxyphenyl)-1,2,3,4-tetrahydronaphthalene-2,3-dicarboxylic acid* could not be obtained in a homogeneous modification; *Et ester* (VIII), $b_{1.5}$ 260–5°. Addn. of 6.2 g. of V in 10 cc. abs. EtOH to 3.76 g. of Na at 180° and after 0.5 hr. addn. of 3 cc. EtOH at 15-min. intervals for 1 hr. give 1.5 g. of *1-phenyl-2,3-di(hydroxymethyl)-1,2,3,4-tetrahydronaphthalene* (IX), which did not crystallize; heating the oil with $KHSO_4$ at 180° for 0.5 hr. gives the *anhydro deriv.* (X), $b_{1.5}$ 180°, m. 85.8°; repeated crystn. gives a form m. 103.4°. Reduction of VII gives 40% of an oil, 10% of which seps. from an Et_2O soln.; repeated crystn. from MeOH-Et_2O gives 5% of the *1-(3',4'-dimethoxyphenyl) analog* (XI) of IX, m. 155.8°; the *anhydro deriv.* m. 126.7°; dehydrogenation with $Pb(OAc)_4$ in AcOH at 70° for 1.5 hrs. gives dehydroanhydrolariciresinol di-Me ether (XII) (*C. A.* **32**, 5488[2]); the Et_2O mother liquor from XI on evapn., dehydration and dehydrogenation gives 40% of XII. X was not dehydrogenated by $Pb(OAc)_4$ and it is possible that the action depends upon the activating influence of MeO groups upon the CH_2 groups adjoining the aromatic nuclei. VIII on reduction with Na and EtOH gives 37% of an oil, from which was isolated 5% of *6,7-methylenedioxy-1-(3',4'-methylenedioxyphenyl)-2,3-di(hydroxymethyl)-1,2,3,4-tetrahydronaphthalene*, m. 183.4°; the *anhydro deriv.* m. 137°. Since the configuration of these acids is modified by esterification in the presence of hydrions, further configurational change under the conditions of the Bouveault-Blanc reduction was anticipated. This has been confirmed by expts. on bis(3,4-dimethoxybenzyl)succinic acid, which exists in 4 modifications (*C. A.* **33**, 2587[3]). Using the Ag salt method, there were prepd. the *meso-Me ester*, m. 136–7°, and the *meso-Et ester*, m. 114–15°; the *dl-Me ester*, m. 65.6° and the *dl-Et ester*, an oil; and the *d-* and *l-Et esters*, m. 65–6°, $[\alpha]_D^{25}$ 26.4° and −26.2°. Reduction of these esters in EtOH with Na at 180° gives *α,δ-bis-(3,4-dimethoxyphenyl)-β,γ-di(hydroxymethyl)-butane* (XIII), an oil distg. unchanged at 2 mm.; it is optically inactive; *diformyl deriv.*, m. 131.2°; *anhydro deriv.*, m. 118–19°; oxidation of XIII gives *dl*-matairesinol di-Me ether. The ester which escapes reduction undergoes stereochem. change and the acidic products recovered from the reduction of the *meso-* and *dl*-forms of the ester contain approx. 35 and 15% of the meso form of the acid.
C. J. West

A derivative of vitamin K_1. H. J. Almquist and A. A. Klose. *J. Biol. Chem.* **130**, 791–3(1939); cf. *C. A.* **33**, 5899[8].—During the alk. hydrolysis of vitamin K_1 no appreciable portion is split off but there is an increase in mol. wt. and a change in the analysis which suggests an addn. of 2 O atoms and perhaps several H atoms. At least 1 of these O atoms is phenolic. The fact that there is no appreciable splitting indicates that the side structure attached to the recognized 1,4-naphthoquinone nucleus is held by a C-to-C bond. The phytyl group is such a logical choice for this side structure that elaborate arguments in its favor seem unnecessary. Several very active preps. of 2-methyl-3-phytyl-1,4-naphthoquinone have been obtained and this compd. is probably identical with vitamin K_1. The purest preps. have shown approx. the same degree of activity as vitamin K_1.
A. P. L.

Indones. XVI. The partial dehalogenation of two α-ethyl-α-chloro-β-phenyl-β-chlorohydrindones. Remo De Faci and Francesco Pirrone. *Gazz. chim. ital.* **69**, 166–71 (1939); cf. *C. A.* **31**, 8531[3].—The partial dehalogenation of an α-methylchloro-β-phenylchlorohydrindone and formation for the 1st time of compds. with a single Cl atom on a cyclostatic double bond adjacent to a CO group (cf. *C. A.* **31**, 6649[4]) made it of interest to learn whether the new reaction holds true also of the α-ethyl-chloro-β-phenylchlorohydrindone (I) which m. 94–6°, and of (II) which m. 115–16°, both of which have been described (cf. *C. A.* **24**, 3779; **26**, 4043; **31**, 8531[3]). Dehalogenation of I was carried out by Cu, $AgNO_3$ and KI at room temp. and in boiling EtOH, and by NH_3 at 0° and at room temp. I in abs. EtOH and Cu turnings allowed to stand in darkness for 20 days, and the decanted soln. evapd. in darkness, yield $C_{17}H_{14}OCl$ (III), m. 145–6°, already prepd. otherwise (*C. A.* **24**, 3779); it does not react with $AgNO_3$ in acetone and does not liberate I from alc. KI; with conc'd. H_2SO_4 it gives a red color with intense green fluorescence; with 90% Cl_3CCO_2H it gives a yellow color with green fluorescence (intensified by heating). I in abs. EtOH and Cu turnings, refluxed for 45 min., and the filtered soln. evapd., yield a *compd.*, $C_{17}H_{14}OCl$ (IV), lustrous, m. 105.6°, and a *compd.*, $C_{17}H_{14}OCl$ (V), lustrous, m. 127.8°. Neither IV nor V liberates I from alc. KI, or forms AgCl from $AgNO_3$ in acetone. I in abs. EtOH and $AgNO_3$, maintained at room temp. in darkness for 10 days, or refluxed for 1 hr., and the filtered soln. evapd., yield only III. I in EtOH and KI maintained in darkness at room temp. for 10 days, the brown-red soln. decolorized by $Na_2S_2O_3$, and poured into water, yield III and IV. I in EtOH and KI, refluxed for ½ hr. (the soln. turns yellow, then brown-red), decolorized by $Na_2S_2O_3$, and dild. with water, yield IV. A 2% soln. of I in EtOH at 0°, satd. with NH_3, yields III. Dehalogenation of II was carried out only in boiling EtOH with Cu and KI. II in abs. EtOH and Cu turnings refluxed for 45 min. (the soln. turns yellow), and the filtered soln. evapd., yield V. A 2% soln. of II in EtOH and KI, refluxed for 1 hr., the brown-red soln. decolorized by $Na_2S_2O_3$ and dild., yield IV and α-ethyl-β-phenylindone (VI). In some cases, by repeated crystn. crystals with different m. ps. from those of III, IV or V were obtained. Neither the mono-Cl deriv. of VI which m. 132–3° nor that which m. 119.20° was obtained in any expt. The position of the Cl atom in III, IV and V was not established.
C. C. Davis

Synthesis of a high-molecular hydroxymethylfurfural derivative. Tosinori Iseki and Tukouru Sugiura. *J. Biochem.* (Japan) **30**, 113–18(1939).—Bis(furfural-2-methyl) ether, which can be easily obtained by warming hydroxymethylfurfural, is changed in the body and eliminated in the urine as bis(carboxyfuran-2-methyl) ether. This substance can also be prepd. from the former by treating with NaOH and NH_3-$AgNO_3$. The bis-(carboxyfuran-2-methyl) ether is converted to the acid chloride, dissolved in pyridine and poured into water. A yellowish substance seps. which solidifies on washing. The substance is a tetrabis(pyromucic acid anhydride-2-methyl) ether.
S. Morgulis

Sugar-amino acid compounds. Tosinori Iseki and Tukouru Sugiura. *J. Biochem.* (Japan) **30**, 119–23

(1939).—Several products were prepd. by condensation of hydroxymethylfurfural with Ni compds. The structural formulas and m. ps. are tabulated, and detailed descriptions of each prepn. are given. S. Morgulis

Isonitrosopyrroles. XI. Transformations of 3-nitroso-2,5-dimethylpyrrole. Tommaso Ajello and Sigismondo Cusmano. *Gazz. chim. ital.* **69**, 207–14(1939); cf. *C. A.* **32**, 4557⁷.—Earlier expts. on the action of acids on β-isonitrosopyrroles (cf. A., *loc. cit.*) showed the influence of aromatic substituents in the formation of isoxazoles from β-isonitrosopyrroles by the action of acids. The present work represents the first study of the influence of aliphatic substituents; a method of prepn. of 2,5-dimethylpyrrole (I) superior to that of Paal (*Ber.* **18**, 2251(1885)) or of Knorr (*Ann.* **236**, 310(1886)) was developed. Acetonylacetone (30 g.), NH_4OAc (40 g.) and glacial AcOH (100 g.) heated on a steam bath for 50 min., boiled for 10 min., poured into excess NH_4OH, extd. with Et_2O, the ext. washed, and dried by Na_2SO_4, yields 20 g. (80%) of I. A soln. of Na (slightly more than 1 g.-equiv.) in abs. EtOH poured onto I, $AmNO_2$ (1 g.-mol.) added (cooling), allowed to stand for 12 hrs., dild. with Et_2O, allowed to stand, decanted from the brown-yellow ppt. and the latter washed with Et_2O, yields N.CMe.C(NONa).CH.C(Me) (II). H_2SO_4 (30%) added to hot aq. II until acidic (the liquid turns orange-red then wine-red), allowed to stand, satd. with NH_4Cl, and extd. with Et_2O, yields MeC(CH.CAc.NO) (III), (cf. Angelico, *Gazz. chim. ital.* **34**, 38(1904)). It is also formed by refluxing MeC(NOH)CH_2C(NOH)C(NOH)Me with 10% aq. HCl, steam-distg., satg. the distillate with $(NH_4)_2SO_4$ and extg. with Et_2O. III does not react with $FeCl_3$, Fehling soln. or NH_3-$AgNO_3$. With I and an alk. carbonate it forms CHI_3. When distd., aq. II yields NH_3 and a liquid distillate which, extd. with Et_2O, yields III. Concd. alc. III and concd. aq. $NH_2OH.HCl$ refluxed for 2 hrs., poured into water, extd. with Et_2O, the residue evapd. and purified by C_6H_6, yield the *oxime*, $C_8H_8O_2N_2$ (IV), m. 117°. IV treated by the Schotten-Baumann method, the product washed with water, dil. H_2SO_4, dil. NH_4OH and water, and purified by C_6H_6, yields the *Bz deriv.*, $C_{13}H_{12}O_3N_2$, m. 180 1°. Alc. III and $PhHNNH_2$ in 50% AcOH, heated for a few min., yield, on standing, the phenylhydrazone, m. 167° (cf. Schmidt and Widmann, *C. A.* **3**, 2310). Alc. III and excess aq. semicarbazide-HCl, boiled for several min., yield the *semicarbazone*, $C_7H_{10}O_2N_4$, lustrous, m. 238–9° (decompn.). Alc. III and aq. $H_2NNH_2.HCl$ heated for several min., more EtOH added, allowed to stand for several hrs., the ppts. washed with water and purified by EtOH, yield the *azine*, $C_{12}H_{14}O_2N_4$, m. 157–8°. Its aq. soln. is yellow, and from it crystallizes a yellow form, which turns white at 120 5°. In conjunction with the earlier expts., the work shows that the reaction of isonitrosopyrroles with acids is a simple hydrolytic process, and also shows that the aliphatic pyrrole, I, is less stable than its phenylated homologs. C. C. Davis

Sulfur analogs of furan types. Arthur L. Jacoby. *Iowa State Coll. J. Sci.* **13**, 70–2(1938); cf. Fabinyi and Szeki, *C. A.* **3**, 1911. Dibenzothiophene was taken as the starting compd. The compds. reported and their consts. include: *2-acetyldibenzothiophene*, m. 111°; *Me dibenzothiophene-2-carboxylate*, m. 74–5°; *dibenzothiophene-4-carboxylic acid*, m. 252–3°; its *Me ester*, m. 95°; a monoacetoxymercuri deriv. of dibenzothiophene, m. 215°; *4-hydroxydibenzothiophene*, m. 167°; a dinitro deriv. of the last-named compd., m. 204°; 4-methoxydibenzothiophene, m. 123°; *4-aminodibenzothiophene*, m. 110°, and its Ac deriv., m. 198°; *1-bromo-4-acetaminodibenzothiophene*, m. 254°; *2-acetaminodibenzothiophene*, m. 178°; a nitroacetamino compd. from the nitration of 2-acetaminodibenzothiophene, m. 209°; a *nitroaminodibenzothiophene*, m. 248–50°; *β-2-dibenzothenoylpropionic acid*, m. 150.5–162°; *γ-2-dibenzothienylbutyric acid*, m. 131°; *1-keto-1,2,3,4-tetrahydrothiobrazan*, m. 178°; and *o-2-dibenzothenoylbenzoic acid* (*unstable hydrate*, m. 120–5°; *Et ester*, m. 105–7°). Dibenzothiophene is best prepd. by heating biphenyl with S in the presence of $AlCl_3$. It reacts with Na in liquid NH_3 to give a dihydro deriv., m. 76°, and a picrate, m. 165°. F. E. Brown

Preparation of certain trimethyleneindole derivatives. R. Gordon Gould, Jr., and Walter A. Jacobs. *J. Biol. Chem.* **130**, 407–14(1939).—3-Amino-1-naphthoic acid sulfate was converted to the *nitrate* (I), m. 225–30° (decompn.); free *Me ester*, m. 72–3° (*Ac deriv.*, m. 136–7°); free *Et ester*, $B_{0.5}$ 170–5° (*Ac deriv.*, m. 175–6°; *HCl salt*, m. 193–4° (decompn.)). Nitration of I gave a mixt. of orange *3-amino-8-nitro-1-naphthoic acid* (II), m. 230–1° (decompn.) (*Ac deriv.*, m. 274–6° (decompn.)), and red *3-amino-5(?)-nitro-1-naphthoic acid* (III), m. 203–8° (decompn.). II on reduction and lactamization gave *3-aminonaphthostyril* (IV), m. 238–40°; *picrate*, m. 245–50° (decompn.); *Ac deriv.*, m. 300–2° (decompn.). Reduction of III gave the *diamino deriv.*; *di-HCl salt*, m. 305–8° (decompn.), *di-Ac deriv.*, m. 323–30° (decompn.). Reduction of IV by Na in BuOH gave *β-amino-3,4-trimethyleneindole*; *picrate*, m. 242–8° (decompn.); *HCl salt*, m. 215–22° (decompn.). Naphthalene-1,4-dicarboxylic acid was nitrated, giving the *5-nitro deriv.*, m. 270–4° (decompn.), which on reduction and lactamization gave *naphthostyril-4-carboxylic acid* (V); *Me ester*, m. 260–1°; *Et ester* (VI), m. 217–18°. Reduction of the NH_4 salt of V by Na in BuOH gave *3,4-trimethyleneindole-γ-carboxylic acid*, m. 142–4°; *picrate*, m. 168–70° (decompn.); *Me ester*, m. 82–4°. Similar reduction of VI gave *γ-hydroxymethylene-3,4-trimethyleneindole*; *picrate*, m. 147–50° (decompn.). Catalytic hydrogenation of VI gave *Et 1,2,3,4-tetrahydronaphthostyril-4-carboxylate* which on saponn., then addn. of HCl, gave *1,2,3,4-tetrahydro-8-aminonaphthalene-1,4-dicarboxylic acid-HCl*, m. 300 9° (decompn.). D. S. Searle

Action of hydrazine hydrate on derivatives of organic acids. M. Freri. *Atti X° congr. intern. chim.* **3**, 150–4 (1939).—The action of $H_2NNH_2.H_2O$ (I) on dimethylacrylic (II), angelic (III), tiglic (IV) and various substituted cinnamic acids was studied in connection with the prosecution of other work. The esters of II gave transparent resins contg. free I, the formation of which was in accordance with the behavior of vinyl derivs. in the presence of alkali. Condensation of 1.1 g. of III Me ester with 0.5 g. I in boiling alc. gave a dimethylpyrazolone, $C_5H_8N_2O$, m. 268°, whereas a similar condensation of IV Me ester gave a viscous product from which the pyrazolone was crystd. out with difficulty. Tiglyl chloride reacted with I to give the sym. dihydrazine, $C_{10}H_{16}N_2O_2$, m. 182–3°. The behavior of the isomeric acids, III and IV, is parallel to that of the crotonic acids; the malenoid form is most capable of pyrazolone ring formation. Of the cinnamic acids the behavior of *p*-nitrocinnamic acid is most interesting. With I, the Et ester gave a *compd.* (V), m. 147°, to which a second mol. of $H_2N.NH_2$ is added to the double bond. Hydrolysis of V with boiling HCl gave the hydrazide HCl salt, $C_9H_9N_3O_3.HCl$, m. 203°. Anisaldehyde, vanillin and piperonal condensed with I to give *products*, m. 198°, 180° and 217°, resp. Boiling 4.2 g. $Ph(EtO)C.CHCO_2Et$ for 2 hrs. with 1.2 g. I in 20 cc. abs. alc. gave golden-yellow crystals of an *addn. product*, $C_{13}H_{20}N_2O_3$, m. 156°, decompd. by HCl with liberation of $H_2NNH_2.2HCl$. C. R. Addinall

Action of organomagnesium mixtures on the phenylhydrazones of cyclanones. Panos Grammaticakis. *Compt. rend.* **209**, 317–19(1939); cf. *C. A.* **33**, 7285⁶, 7285⁸.—*PhMgBr* (I) reacts with *cyclohexanone phenylhydrazone* to give some *1,2,3,4-tetrahydrocarbazole*, B_{10} 190°, m. 120°, but mostly *β-(1-phenylcyclohexyl)-phenylhydrazine* (II), m. 113°; *HCl salt*, m. 215° (decompn.); *oxalate*, m. 186°; *phenylureide*, m. 172°. II, in Et_2O or alc. soln. oxidizes in the air to give the corresponding *azo compd.*, m. 60°. I reacts with *2-methylcyclohexanone phenylhydrazone* to give some *1-methyl-1,2,3,4-tetrahydrocarbazole* and *5-methyl-1,2,3,4-tetrahydrocarbazole*, but mostly a compd. $C_{18}H_{21}N$, m. 102°; *HCl salt*, m. 258°; *oxalate*, m. 165°; *acetate*, m. 93°; *phenylureide*, m. 168°. I, *EtMgBr* and *$PhCH_2$*-

MgCl, each react with *3-methylcyclohexanone phenylhydrazone* to give *2-methyl-1,2,3,4-tetrahydrocarbazole*, beside other products. I reacts with *cyclopentanone phenylhydrazone* to give *2,3-trimethyleneindole*, m. 109°, b_1 160-2°. W. J. Peterson

Action of ammonia upon several 3-substituted 1,5-dibromopentanes. Miho Piantanida. *J. prakt. Chem.* **153**, 257-62(1939).—4-(Diphenylmethylene)tetrahydropyran (5.7 g.) on catalytic reduction gives 2 g. of *4-(diphenylmethyl)tetrahydropyran* (I), m. 138°. 4-Isopropyltetrahydropyran (2 g.) and 40 g. 70% HBr, heated 6 hrs. at 100-10°, give 83% of *3-isopropyl-1,5-dibromopentane* (II), b_{10} 128-30°. 4-(Diethylmethyl)tetrahydropyran gives 78% of *3-diethylmethyl-1,5-dibromopentane* (III), b_{23} 178-80°, b_{18} 157-9°; I gives 70% of *3-diphenylmethyl-1,5-dibromopentane* (IV), m. 82°. II (2.5 g.) and 25 cc. 20% MeOH-NH_3, heated at 130-40° for 4 hrs., give 26% of *4-isopropylpiperidine*, b_{10} 62-4° (*picrate*, yellow, m. 154°; *chloroplatinate*, orange-yellow, m. 180° (decompn.)), and 23% of *4,4'-diisopropylbispiperidiniumspiran bromide* (V), decomp. about 280°; III similarly gives 29% of *4-diethylmethylpiperidine*, b_2 71° (*picrate*, yellow, m. 150.5°; *chloroplatinate*, orange-yellow, decomp. 180°), and 32% of the *diethylmethyl analog* of V, decomp. about 300°. IV similarly gives 36% of *4-diphenylmethylpiperidine*, m. 99° (*picrate*, yellow, m. 150° (decompn.); *chloroplatinate*, orange-yellow leaflets), and 38% of the *diphenylmethyl analog* of V, decomp. above 300°. C. J. West

Absorption spectra of some sulfur compounds. R. A. Morton and A. L. Stubbs. *J. Chem. Soc.* **1939**, 1321-4.—Ultraviolet absorption spectra distinguish between the structures *o*-C_6H_4.S.C(:S).NR (I) and *o*-C_6H_4S.C(SR):N (II) and when R is H the structure corresponds to I rather than II and thus it is a thio ketone. The absorption spectrum of compd. *o*-C_6H_4CMe:CH.C(:S).NH or *o*-C_6H_4.CMe:CH.C(SR):N (III) (R = H) differs widely from those of the alkyl derivs. possessing the structure III (R = Me, Et, iso-Pr) and thus it must be a thio ketone if the ethers can be proved to be substituted thiolquinolines. Comparisons with the spectra of *o*-hydroxycarbanil, 1-hydroxybenzothiazole derivs. and substituted quinolines and quinolones support the interpretation. 2-Thiol-4-methylquinoline and Me_2SO_4 in 10% aq. NaOH give the *2-methylthio deriv.*, b_{14} 170-7°, m. 87°; *Et analog*, b_{14} 170-5°; *2-iso-Pr analog*, b_{12} 160-3°. C. J. West

Polarization in heterocyclic rings with aromatic character. V. Substitution reactions in phenylated heterocyclic rings. Eiji Ochiai, Toyo Kakuda, Iwao Nakayama and Giiti Masuda. *J. Pharm. Soc. Japan* **59**, 462-70 (1939); cf. *C. A.* **33**, 4988⁹.—Thioformamide (30 g.) when treated with 80 g. MeCHBrCOPh in the cold gave 4-phenyl-5-methylthiazole (I), b_2 110-11°; HCl salt m. 172°; HBr salt m. 197°; picrate m. 124-5°. Nitration of 2.5 g. I in the cold with fuming HNO_3 gave 2.8 g. 4-*p*-nitrophenyl-5-methylthiazole (II), $C_{10}H_8N_2SO_2$, m. 98°. Nitration of 5 g. 4-phenylthiazole with fuming HNO_3 gave 4-*p*-nitrophenylthiazole (III), $C_9H_6N_2SO_2$, m. 180° (yield 96%). Catalytic reduction of 0.1 g. III gave a small amt. of 4-*p*-aminophenylthiazole, $C_9H_8N_2S$, m. 99°; HCl salt, decomp. 270-5°; 4-*p*-acetylaminophenylthiazole, m. 165°. Catalytic reduction of II gave 4-*p*-aminophenyl-5-methylthiazole, $C_{10}H_{10}N_2S$, m. 80°; 4-*p*-acetylaminophenyl-5-thiazole, m. 144°. PhCHClCOPh (12 g.) when treated with 5 g. thioacetamide on the water bath for 2 hrs. gave 2-methyl-4,5-diphenylthiazole (IV), $C_{16}H_{13}NS$, m. 51-2°, sol. in ether; picrate, m. 123°. Nitration of 5 g. IV gave 2-methyl-4,5-di-*p*-nitrophenylthiazole, $C_{16}H_{11}N_3S(NO_2)_2$, m. 183°. Oxidation of the above compd. with $KMnO_4$ in alk. soln. gave *p*-nitrobenzoic acid, m. 233°. Nitration of 2,5-diphenylpyrazine gave a compd. (V), $C_{16}H_{10}O_4N_4$, m. 172-3°, and a compd. (VI), $C_{16}H_{10}O_4N_4$, m. 292°. Oxidation of V with $KMnO_4$ in alk. soln. gave the original compd. ω-Chloro-*m*-nitroacetophenone and diphenylpyrazine gave 2,5-di-*m*-nitrophenylpyrazine, $C_{16}H_{10}N_2O_4$, m. 249°. Nitration of 2-phenyl-4,6-dimethylpyrimidine at room temp. gave a mononitro deriv., $C_{12}H_{11}O_2N_3$, m. 155-6°, which on catalytic reduction gave an amino deriv., m. 88-90°; picrate, decompg. 199-200°; acetate, m. 130-2°. The above amino deriv. (m. 88-90°) gave through the diazotization reaction hydroxy-2-phenyl-4,6-dimethylpyrimidine, $C_{12}H_{12}ON_2$, m. 125-7°. 2-Phenyl-4,6-dimethylpyrimidine (1 g.), 2 g. BzH and 0.5 g. $ZnCl_2$ when heated in the sealed tube at 170° for 6 hrs. gave 0.7 g. 2-phenyl-4,6-distyrylpyrimidine, $C_{28}H_{20}N_2$, m. 158.5-9°. VI. **Polarization in the thiazole ring.** 2. Huzio Nagazawa *Ibid.* 471-7.—Bromination of 2-amino-4-methylthiazole (I) (1 g.) in 20% H_2SO_4 with Br gave 0.8 g. 2-amino-4-methyl-5-bromothiazole (II), $C_4H_5N_2SBr$, decompg. 105-8.5°; picrate, decomp. 196°. Bromination of I in $CHCl_3$ with Pr also gave II. Bromination of 0.6 g. 2-hydroxy-4-methylthiazole (III) with Br gave 0.35 g. 2-hydroxy-4-methyl-5-bromothiazole, C_4H_4ONSBr, decompg. 147.5°. In these reactions the bromination takes place at C atom 5 in the thiazole ring. Bromination of 4-methylthiazole in the manner described above failed to give a Br deriv. Attempts to prep. an I deriv. of 2-hydroxy-4-methylthiazole failed. III (4 g.) in ale. and 11 g. AgOAc in aq. AcOH when treated at room temp. for 4 hrs. gave a white ppt. The ppt. when acidified with AcOH and shaken with NaCl soln. for 5 hrs. gave a compd. which on bromination gave a Br deriv., m. 151° (probably 4-methyl-2,5-dibromothiazole). Acetylation of III gave 2-hydroxy-4-methyl-5-acetylthiazole, $C_6H_7O_2NS$, m. 210.5°, sol. in water, ale and MeOH while warm; semicarbazone, decompg. 244°. I when subjected to the Friedel-Crafts reaction gave 0.3 g. 2-acetamino-4-methylthiazole (IV), m. 134°. IV, 2-mercapto-4-methylthiazole and 4-methylthiazole when subjected to the Friedel-Crafts reaction all gave the original compd. III (2 g.) when subjected to the Gattermann reaction gave 0.4 g. 2-hydroxy-4-methylthiazole-5-aldehyde (V), $C_5H_5O_2NS$, decompg. 248°; *p*-nitrophenylhydrazone, decomp. 297-300°. 4-Methylthiazole, however, failed to react. III when subjected to the Reimer-Tiemann reaction also gave V. F. I. Nakamura

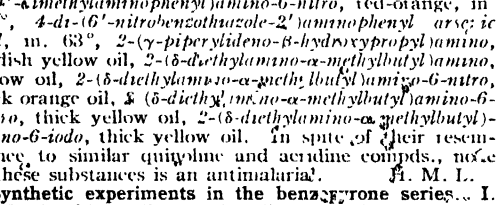
Action of nitric acid on phenacylacetone. S. Cusmano. *Atti X° congr. intern. chim.* **3**, 110-19(1939); cf. *C. A.* **33**, 3792⁶⁷.—Under stated conditions HNO_3 (d. 1.40) transforms phenacylacetone (I) into 3 different substances. I (5 g.) was added to 50 g. of HNO_3 (d. 1.40) and the slightly warm reddish brown soln. was heated on the steam bath for 1-2 min. The reaction mixt. was poured into H_2O and extd. with Et_2O. The washed and dried ext. was evapd. down and the residue was taken up in ale. The soln. was treated with 10% NaOH, dild. and extd. with Et_2O. Dstn. of the ext. with H_2O gave a residue (II), m. 105° (on recrystn. from ale.) and, on evapn., a mixt. of a small amt. of II and heavy prismatic crystals of another product (III), m. 50°. Repetition of the reaction with HNO_3 (d. 1.38) gave a larger yield of III. II is α-phenyl-γ-acetylisoxazole, $C_{11}H_9NO_2$ (*C. A.* **32**, 3557⁶); *oxime*, m. 170°; *Bz deriv.*, m. 158°, was identical with a sample of the known substance. From the structure of I it seemed probable that II and III might be isomeric. III, *α-methyl-γ benzoylisoxazole*, $C_{11}H_9NO_2$ (*phenylhydrazone*, m. 103-5°), was treated with $HONH_2.HCl$ in an equiv. amt. of Na_2CO_3, pptd. with H_2O, made alk. with Na_2CO_3 and extd. with Et_2O. Crystn. of the residue on evapn. from benzene or petroleum ether gave a *furazan oxime* (IV), $C_{11}H_{11}N_3O_2$, m. 110° (*Bz deriv.*, m. 101°), hydrolyzed by boiling for 5 mins. in 25% H_2SO_4 to *phenylacetonylfurazon*, $C_{11}H_{10}N_2O_2$, m. 93° (*p-nitrophenylhydrazone*, m. 158-60°). The alk. mother liquor was acidified and extd. with Et_2O, producing an *isoxazole oxime* (V), $C_{11}H_{10}N_2O_2$, m. 133° (*Bz deriv.*, m. 118-20°), hydrolyzed by boiling with dil. H_2SO_4 for 1 hr. to III. Structural formulas are assigned to II, III, IV and V on the basis of the above transformations. The alk. mother liquor from the separation of the 2 keto isoxazoles was acidified and extd. with Et_2O. The cryst. product was recrystd. from benzene

and gave white needles of *α-phenylisoxazole-γ-carboxylic acid*, $C_{10}H_7NO_3$, m. 162°, converted into cyanoacetophenone, C_8H_7NO, m. 81°, by decarboxylation at about 200°. C. R. Addinall

The action of nitric acid on phenacylacetone. II. Sigismondo Cusmano. *Gazz. chim. ital.* **69**, 214–21 (1939); cf. preceding abstr.—Angeli (*Gazz. chim. ital.* **22**, ii, 328(1892)) reported that by refluxing HNO_3 (d. 1.45) and $BzCH_2CH_2Ac$ (I) for 2 hrs., a compd. $C_{22}H_{18}O_{11}N_4$, m. 210° and insol. in alkalies, is formed. However, by following the procedure of A., the *compd.*, $C_{10}H_8O_6N_2$ (II), m. 210° (decompn.), was obtained. It was sol. in alkalies and was reppd. by acidification. Its aq. suspension liberates I from aq. KI-KIO_3. When fused it decomps. with liberation of CO_2. II, concd. H_2SO_4 and abs. EtOH, refluxed for 10 min., poured into water, neutralized with $NaHCO_3$, made alk. with KOH (the soln. turns brown-red), and the suspended product extd. with Et_2O, yield the *Et ester* (III), $C_{12}H_{10}O_6N_2$, of II, m. 183°, insol. in dil. aq. KOH. It is sapond. to II by heating in EtOH with dil. KOH. $BzCH_2CHAcCO_2Et$ (IV) and excess HNO_3 (d. 1.45), heated at 50° for 15 min. and poured into water, ppts. a *compd.*, $C_{12}H_{10}O_5N_2$ (V), yellowish, m. 183°. It is sapond. in hot EtOH by KOH to II. When IV and HNO_3 are heated thus for 2 hrs., a high yield of II is obtained directly. A hot mixt. of alc. II and $PhHNNH_2$ ppt. the *phenylhydrazine salt*, $C_{16}H_{14}O_5N_4$, of II, yellow, m. 168–70° (decompn.); insol. in aq. alkalies. It is hydrolyzed to II. Aq. 2% $KMnO_4$ added to II in 2% aq. KOH at 100° until permanently violet-red, acidified with H_2SO_4 and extd. with Et_2O yields *p*-$O_2NC_6H_4CO_2H$. $PhCH{:}CHAcC(CO_2Et){:}NO$ (cf. C. and Massara, *C. A.* **33**, 3792[1]), and HNO_3 (d. 1.45), heated at 50° until a clear soln. is obtained and poured into water, ppt. III. A consideration of the results in conjunction with the earlier work makes it certain that II is *α-p-nitrophenyl-γ-isoxazolecarboxylic acid*, *p*-O_2N-$C_6H_4C{:}CH.C(CO_2H){:}NO$. C. C. Davis

Benzothiazole compounds. III. Some derivatives of 2-aminobenzothiazole. N. S. Drozdov and V. I. Stavrovskaya. *J. Gen. Chem.* (U. S. S. R.) **9**, 409–14 (1939); cf. *C. A.* **32**, 2940[2].—Reduction of 2-chloro-6-nitrobenzothiazole with AcOH and Fe gives the corresponding amine (I), m. 164°. If Zn and HCl are used, yellow crystals, m. above 300°, are formed. By the diazo reaction with I are prepd. 2,6-dichlorobenzothiazole, m. 101°, and 2-chloro-6-iodobenzothiazole, m. 137°. In all these compds. the Cl in the 2-position is easily replaced in reactions with amines. By this reaction the following *benzothiazoles* are prepd.: 2-phenylamino, m. 159°, 2-phenylamino-6-nitro, m. 247°, *2-(2'-methylphenyl)amino*, m. 204–5°, *2-(4'-dimethylaminophenyl)amino-6-nitro*, red-orange, m. 234°, *4-di-(6'-nitrobenzothiazole-2'-amino)phenylarsinic acid*, m. 63°, *2-(γ-piperylideno-β-hydroxypropyl)amino*, reddish yellow oil, *2-(δ-diethylamino-α-methylbutyl)amino*, yellow oil, *2-(δ-diethylamino-α-methylbutyl)amino-6-nitro*, thick orange oil, *& (δ-diethylamino-α-methylbutyl)amino-6-chloro*, thick yellow oil, *2-(δ-diethylamino-α-methylbutyl)-amino-6-iodo*, thick yellow oil. In spite of their resemblance to similar quinoline and acridine compds., none of these substances is an antimalarial. H. M. L.

Synthetic experiments in the benzofurone series. I. Synthesis of karanjin-α-carboxylic acid. S. Rangaswami and T. R. Seshadri. *Proc. Indian Acad. Sci.* **9A**, 259–64 (1939).—*Karanjin* isolated from the oil of *Pongamia glabra* is, according to Limaye (*Proc. Indian Sci. Congr.* **1925**, 118, **1926**, 151), *3-methoxyflavono-7,8-furan* (I).

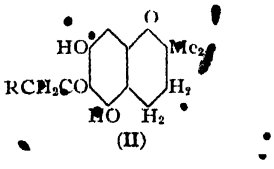


It m. 158°. Demethylation yields *karanjonol*, m. 192–3°; *Ac deriv.*, m. 175–6°; *Bz deriv.*, m. 180°; *Et ether*, m. 125–6°. As a result of a publication by Manjunath, *et al.* (*C. A.* **33**, 2520[8]) R. and S. report on their preliminary expts. on the synthesis of I. To try out the method of Spaeth and Pailer (*C. A.* **29**, 5096[1]) with a simpler compd. the Na salt of 2-methyl-3-methoxy-7-hydroxychromone-8-aldehyde (II), m. 180°, is heated with $BrCH_2CO_2Et$ for 8 hrs. in an oil bath at 170–5°. After distg. off the excess of ester, the solid residue is recrystd. from EtOH. The yield of *carbethoxymethyl ether* of II is 80%; it m. 180° and mixed with II it m. 150 2°. When this method is applied to *3-methoxy-7-hydroxyflavone-8-aldehyde* (III) only poor yields are obtained. When, however, 0.5 g. III is refluxed with 4 cc. $BrCH_2CO_2Et$ in 40 cc. C_6H_6 in the presence of 2 g. K_2CO_3 for 16 hrs., the *carbethoxymethyl ether* (IV) of III is obtained in 70% yield and m. 116–17°. Hydrolysis of 1 g. IV by boiling with 50 cc. 5% KOH for 1 min. and acidification yields *3-methoxyflavono-7,8-furan-α-carboxylic acid* (V) which is purified via its Na salt. The *free acid* m. 224–6°. Like its *Na salt*, V is sparingly sol. in H_2O. The decarboxylation of V is difficult and further attempts are in progress. I. E. Brauns

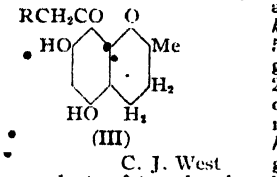
Synthesis of coumarins and chromones. D. Chakravarti. *Proc. Natl. Inst. Sci. India* **5**, 235–42 (1939).—A review with 40 references. G. G.

Rottlerin. III. Thomas Backhouse and Alexander Robertson. *J. Chem. Soc.* **1939**, 1257–61; cf. *C. A.* **32**, 4555[3].—Previous work led to the conclusion that tetrahydrorottlerone (I) had the formula II (R = CH_2Ph) or III (R = CH_2Ph), of which the former was preferred. Syntheses of these compds. show that I is not identical with II or III. 5,7-Dimethoxy-6-formyl-8',2-dimethylchroman (*C. A.* **31**, 3038[8]) yields an *oxime*, m. 181°, which is dehydrated by Ac_2O at 100° in 1.5 hrs. to *6-cyano-5,7-dimethoxy-2,2-dimethylchroman* (IV), m. 126–7°; attempts to synthesize the di-Me ether of II by the action of $PhCH_2CH_2MgBr$ upon IV did give satisfactory results. 5,7-Dihydroxy-2,2-dimethylchroman (IV) and MeCN in Et_2O contg. $ZnCl_2$, satd. with HCl and allowed to stand for 6 days, followed by hydrolysis with H_2O, give a mixt. of *5,7-dihydroxy-6-acetyl-2,2-dimethylchroman* (II, R = H), straw-colored, m. 229°, and giving a purple-violet $FeCl_3$ reaction in EtOH (*2,4-dinitrophenylhydrazone*, dark red, m. 227.5°), and the *8-Ac deriv.* (III, R = H), pale yellow, m. 150°, and giving a purple-violet $FeCl_3$ reaction (*2,4-dinitrophenylhydrazone*, red, m. 228.5°); at first these 2 compds. were isolated by manual sepn. of the large crystals from MeOH; later, 2 g. of the mixt. was heated to boiling with C_6H_6, the ext. immediately decanted and the residue crystd. from C_6H_6 and then from dil. MeOH, giving II (R = H); crystn. of the residue from the C_6H_6 mother liquors from MeOH and then from dil. MeOH gives III (R = H). IV and AcCl with $AlCl_3$ in $PhNO_2$ give II (R = H). III (R = H) and MeI with K_2CO_3 in Me_2CO, refluxed 1 hr., give the *5-Me ether*, pale yellow, m. 78°, which gives a brownish purple color with $FeCl_3$; reaction of the ether with AcOEt and EtONa gives the 8-acetoacetyl deriv., which was not purified but cyclized by HCl in EtOH to *5'-methoxy-2,2',2'-trimethylchromano-8',7',-5,6-γ-pyrone*, m. 168°. III (R = H) and BzH with 50% aq. KOH in EtOH, kept at 50° for 15 min. and then at room temp. for 24 hrs., give *5,7-dihydroxy-8-cinnamoyl-2,2-dimethylchroman*, orange-red, m. 176–7°, which gives a dark brown $FeCl_3$ reaction; catalytic reduction with Pd-C gives *5,7-dihydroxy-8-β-phenylpropionyl-2,2-dimethylchroman* (III, R = CH_2Ph), pale yellow, m. 172°; $FeCl_3$ gives a purple-violet color. IV and $PhCH_2CH_2CN$, treated as above, give III (R = CH_2Ph) and the *6-β-phenylpropionyl isomer* (II, R = CH_2Ph), m. 171°, which gives a purple-violet $FeCl_3$ reaction; methylation gives an oil; the *oxime* of the di-Me ether m. 129.5°. III (R = CH_2Ph) and MeI with K_2CO_3 in Me_2CO give *7-hydroxy-5-methoxy-8-β-phenylpropionyl-2,2-dimethylchroman* (V), m. 104°, $FeCl_3$ gives a brownish violet color; this was not cyclized by Ac_2O-AcONa and did not condense with AcOEt. The corresponding

benzyl ether (VI), m. 112–13°, gives a brownish purple color with $FeCl_3$. V and MeI give the *5,7-di-MeO deriv.*, m. 94°. VI gives the *7-MeO deriv.*, m. 67.5°, debenzylation of which with Pd-C in AcOH gives *5-hydroxy-7-methoxy - 8 - β - phenylpropionyl - 2,2 - dimethylchroman*, 158°



(II)



(III)

C. J. West

Structure of the red oxidation products of tocopherols and related substances. Lee I. Smith, Willa B. Irwin and Herbert E. Ungnade. *Science* **90**, 334–5(1939); cf. *C. A.* **33**, 8613⁹.—When 2,2,5,7,8-pentamethyl-6-hydroxychroman is treated with HNO_3 or $AgNO_3$, a red cryst. compd. (I), m. 109–10°, is obtained. I is the *o*-quinone *2,2,7,8-tetramethyl-5,6-diketochroman*. It forms a phenazine (II), m. 151–2°, with *o*-$C_6H_4(NH_2)_2$. II shows a strong greenish yellow fluorescence in ultraviolet light. The red *o*-quinone from α-tocopherol is an *oil*, which reacts with *o*-$C_6H_4(NH_2)_2$ to give a *phenazine* (III) which is also an oil. Solns. of III show the same fluorescence as shown by II. Tocopherols are converted into analogs of I by treatment with HNO_3 or $AgNO_3$. The formation of red *o*-quinones is not confined to 6-hydroxychromans, but also occurs with 5-hydroxycoumarins and related compds. The mechanism of the reaction is obscure. An alc., primary or secondary, must be used as the solvent and the results indicate that the alc. is probably a reagent as well as a solvent. Felix Saunders

Syntheses of chroman derivatives with the ring system of α-tocopherol. II. Walter John and Philipp Günther. *Ber.* **72B**, 1649–53(1939); cf. *C. A.* **33**, 1731⁸.—In a continuation of efforts to obtain lower homologs of α-tocopherol with any desired side chain in the 2-position a new method of prepg. chroman derivs. was followed. *2,4,5-Trimethyl-3,6-dimethoxybenzylideneacetone* (I) (80% from 10 g. $Me_3(MeO)_2C_6CHO$ (II) (Smith, *C. A.* **28**, 1680⁸) in 90 cc. of 70% acetone treated in the course of 0.5 hr. with 0.4 g. NaOH in 10 cc. water, kept at 15° during the 1st hr. and then 2 hrs. at 20°), faintly yellow, m. 61–2°; as by-product was obtained *hexamethyltetramethoxydibenzylideneacetone*, greenish yellow, m. 188°. I is hydrogenated with Pd sponge in alc. to the *benzyl ketone* (III), m. 76°, converted with MeMgI into the carbinol $Me_3(MeO)_2C_6CH_2CH_2C(OH)Me_2$. Without isolating the carbinol, the product was boiled with HBr (d. 1.49) in AcOH, giving 2,2,5,7,8-pentamethyl-6-hydroxychroman, m. 93–4° (1.4 g. from 2.4 g. III). Unfortunately the method did not prove well adapted to the introduction of longer side chains into the 2-position of the chroman system. Thus, III with $C_{12}H_{25}MgBr$ gave the carbinol, to be sure, but attempts to cleave the ether union were extraordinarily unsatisfactory. It was first attempted to cleave the MeO groups in III before subjecting it to the Grignard reaction, but boiling with HBr in AcOH resulted in simultaneous reduction to *2,5,7,8-tetramethyl-6-hydroxychroman*, m. 145°. *2,4,5-Trimethyl-3,6-hydroquinone di-Et ether* (11.1 g. from 9.9 g. hydroquinone and Et_2SO_4 in boiling abs. EtOH), m. 34°, gives by the Smith method only a moderate yield of *2,4,5-trimethyl-3,6-diethoxybenzaldehyde*, m. 100.5°, becomes, like II, yellow in the air and colorless again in the dark; in the residue from the steam distn. there remain 2 substances sepd. by fractional crystn. from petr. ether.: *2,4,5-trimethyl-3,6-hydroquinone-1-aldehyde*, yellow, m. 149°, and a *mono-Et ether*, m. 99°, of the latter. The synthesis of lower homologs of α-tocopherol was finally effected by 2 methods; one is described in part III below; the other, based on the above acetone condensation process, starting from pseudocumylaldehyde with subsequent introduction of the HO groups, will be reported later. III. **The introduction of a side chain into tetramethylhydroxychroman.** Walter John and Margarete Schmeil. *Ibid.* 1653–6.—2,5,7,8-Tetramethyl-6-hydroxychroman is converted either with $FeCl_3$ (*C. A.* **33**, 2896²) or, better, by boiling with AgOAc in MeOH into 1-γ-hydroxybutyl-3,4,6-trimethylbenzoquinone (I) which is reduced with alk. $Na_2S_2O_4$ to the *hydroquinone*, m. 138°, and is oxidized by CrO_3 in AcOH below 30° to the *1-γ-ketobutylquinone* (II) (2.0 g. from 2.4 g. I), yellow, m. 56°. With Zn dust and a few drops of water in AcOH II gives crystals, $C_{12}H_{18}O_3$, m. 122°, absorption max. at 289 mμ, ε 3520; as the pure product from MeOH is more difficultly oxidized than free hydroquinones by $AgNO_3$ it is probably the (isomeric) *hemiacetal* rather than the *hydroquinone* (III) itself. Reductive acetylation of II gives the *diacetate*, $C_{17}H_{22}O_5$ (IV), m. 94°. I on reductive benzoylation with BzCl in alk. soln. gives a *dibenzoate*, $C_{27}H_{28}O_5$, m. 93°, which with CrO_3 in AcOH at 30° yields almost quantitatively the *dibenzoate*, $C_{27}H_{26}O_5$ (V), of II, m. 143°. III (1.1 g.) in ether, slowly added to MeMgI in boiling ether, boiled 3 hrs. longer, evapd., decompd. with cooled HCl and ice, dissolved in alc. and refluxed with a little Zn dust in a weak current of HCl gives 0.4–0.5 g. 2,2,5,7,8-pentamethyl-6-hydroxychroman, m. 93°. In the same way is obtained the 2-dodecyl analog, isolated as the allophanate (0.3–0.4 g. from 1.1 g. III), m. 180°. IV and V form with Grignard reagents only difficultly sol. addn. products which were not further investigated.

C. A. R.

γ-Substituted derivatives of resorcinol III. Synthesis of 5,6-dimethoxyflavone. Koiti Nakazawa. *J. Pharm. Soc. Japan* **59**, 495–9(1939); cf. *C. A.* **33**, 8186⁹.—2,6-Dihydroxyacetophenone (15 g.) in 120 cc. acetone, 10 g. anhyd. K_2CO_3 and 14 g. MeI when boiled for 6 hrs. under a reflux gave 9.2 g. 2-methoxy-6-hydroxyacetophenone (I), $C_9H_{10}O_3$, m. 58.5°. Oxidation of I in alk. soln. gave 2-methoxy-3,6-dihydroxyacetophenone $C_9H_{10}O_4$, m. 91°, sol. in most org. solvents; di-Bz deriv. (II), m. 102°. II (5 g.) in 100 cc. anhyd. toluene and 10 g. $NaNH_2$ when shaken gave 2.5 g. 2-methoxy-3-benzoxy-6-hydroxydibenzoylmethane (III), $C_{23}H_{18}O_6$, m. 152.5°, sol. in acetone and AcOEt, and MeOH and alc. while warm. III (2 g.) when treated with H_2SO_4 gave 1.2 g. 5-methoxy-6-hydroxyflavone (IV), $C_{16}H_{12}O_4$, m. 185°; 5-methoxy-6-benzoxyflavone, $C_{23}H_{16}O_5$, m. 206°. Methylation of IV gave 5,6-dimethoxyflavone, $C_{17}H_{14}O_4$, m. 199°, sol. in many org. solvents. F. I. Nakamura

Flavonol glucoside of Calystegia japonica Chois. Genitì Hukuti. *J. Pharm Soc. Japan* **59**, 258–60 (English abstr. 85–6)(1939).—The MeOH ext. of the leaves and stems of *Calystegia japonica* Chois gave a flavonol glucoside, $C_{27}H_{30}O_{16}.2H_2O$, m. 223–4°, which on hydrolysis gave an aglucon, $C_{15}H_{10}O_6$, m. 272–4°; acetate m. 181–2°. Glucose and rhamnose were also identified in the hydrolyzate. 2-Hydroxy-4,4',6-trimethylchalcone (1 g.) in MeOH and 15% H_2O_2 and 16% NaOH when treated in the cold gave 3-hydroxy-4',5,7-trimethoxyflavone (I), $C_{15}H_6O_2(OH)(OMe)_3$, m. 150–1°. Methylation of the above glucoside followed by hydrolysis gave a compd., m. 149–50°, which did not depress the m. p. of I.

F. I. Nakamura

Pigments of cotton flowers. VII. Position of the glucose residue in gossypitrin. P. Suryaprakasa Rao and T. R. Seshadri. *Proc. Indian Acad. Sci.* **9A**, 177–80 (1939); cf. *C. A.* **33**, 5396⁵.—The position of the sugar group in gossypitrin (I) is still uncertain. Various attempts at a complete methylation of I have failed. Use of the method of Baker and Robinson (*C. A.* **23**, 2180) of deacetylation and methylation in acetone soln. leads to a product in which all the phenolic OH groups and 1 OH group in the sugar residue are methylated. The methylated I so obtained m. 290° (decompn.). Hydrolysis of this product by refluxing with 7% H_2SO_4 yields a *pentaethylgossypetin*, m. 252–4°, which is identical with 3,5,8,3',4'-pentamethylgossypetin (II) obtained by Baker. Acetylation of II with Ac_2O and AcONa gives *7-Ac deriv.*, it crystallizes with $3H_2O$ and sinters from 100–5° (dehydration) and m. 167–9°. Methylation of II with Me_2SO_4 and NaOH yields *hexamethylgossypetin*, m. 170–2°.

I is therefore a 7-glucoside of gossypetin. **VIII. Constitution of herbacitrin and quercimeritrin.** *Ibid.* 365–9.—Herbacitrin (I), a flavonol glucoside, recently isolated by Neelakantam and Seshadri (*C. A.* **29**, 6625[5]), was tentatively represented as the 7-glucoside of herbacetin (*C. A.* **31**, 4978[9], 6246[3]). To establish its constitution definitely, and since I could not be completely methylated by CH_2N_2 (*C. A.* **33**, 5396[5]), which leaves the 5-OH group unaffected, I is first acetylated and the *acetylated* I, m. 222–4°, methylated in Me_2CO by simultaneous deacetylation and methylation with Me_2SO_4 and 20% NaOH. The completely methylated I was not isolated but is immediately hydrolyzed by refluxing it with 2% H_2SO_4 for 2 hrs. in 70% EtOH. When the EtOH is distd. off, a yellow cryst. product seps. which is identified by its m. p., 269–70°, as *3,5,8,4'-tetramethylherbacetin*. Further methylation gives *pentamethylherbacetin*, m. 156–8°. *Quercimeritrin acetate*, when methylated and hydrolyzed in the same way, yields *3,5,3',4'-tetramethylquercetin*, m. 284–5° which when further methylated yields pentamethylquercetin, m. 151–3°. These results confirm that I is the 7-glucoside of herbacetin and quercimeritrin the 7-glucoside of quercetin. F. E. Brauns

Use of high temperatures in organic preparations. A. J. van Pelt, Jr. *Chem. Weekblad* **36**, 613–14(1939).—The use of high temps. for the prepn. of pyridine derivs and unsatd. hydrocarbons is discussed. F. Saunders

Synthesis of nitrogen-ring compounds. XVIII. Ser. 4. Synthesis of condensed nitrogen-ring compounds. Pt. 3. Synthesis of octahydropyridocoline. Sigehiko Sugasawa and Nanjun Lee. *J. Pharm. Soc. Japan* **59**, 326–8(in English, 113–15)(1939); cf. *C. A.* **33**, 6318[5], 8617[9]. Catalytic reduction of 3 g. Et γ-2-pyridylbutyrate, according to Clemo (*C. A.* **27**, 985), gave 1.7 g. Et γ-2-piperidylbutyrate, b_4 114°, which gave on heating at 200° for 10 min. 1.25 g. 4-ketooctahydropyridocoline (I), b_4 118°. I (1.1 g.) in 300 cc. dry xylene when heated on an oil bath at 80° for 30 min. with 0.85 g. P_2O_5 and 1.25 g. K_2S gave 0.75 g. thiolactam (II), b_3 162°, m. 80°. Electrolytic reduction of 0.7 g. II gave octahydropyridocoline in the form of a picrate, $C_{15}H_{20}O_7N_4$, m. 193°, which did not depress the m. p. of norlupinane picrate of natural origin. F. I. Nakamura

Some derivatives of triacetonamine. Mario Passerini and Giuseppe Losco. *Ann. chim. farm.* (Suppl. to *Farmital.*) Aug., **1939**, 64–7.—In $CHCl_3$ soln. at room temp. 1 mol triacetonamine, 1 mol. *p*-phenetyl isocyanide and 2 mols. BzOH react slowly to form the BzOH salt of 2,2,6,6-tetramethyl-4-benzoxypiperidine-4-carboxy-*p*-phenetylamide, $CH_2.CMe_2.NH.CMe_2.CH_2C(OBz)CO{-}HC_6H_4OEt.BzOH$. An excellent yield of colorless crystals, m. 250°, is obtained after standing several days. This salt is slightly sol. in water, EtOH and C_6H_6. Na_2CO_3 liberates the base, insol. in water. The anhyd. base does not readily crystallize, but a monohydrate, m. 134–8°, readily crystallizes from C_6H_6 contg. a little water. The HCl salt is slightly sol. and the acetate and tartrate are readily sol. in water.

with alc. KOH yields the 2,2,6,6-tetramethyl-4-hydroxypiperidine-4-carboxy-*p*-phenetylamide, nearly insol. in water, colorless crystals from C_6H_6, m. 116–18°. L. E. Gilson

Proof of the steric nature of the ortho effect in the hydrogen-exchange reactions of aromatic tertiary amines. Weldon G. Brown, Alex H. Widiger and Nicholas J. Hetang. *J. Am. Chem. Soc.* **61**, 2597–601(1939).—The decrease of H liability caused by an *o*-F atom is much less than that caused by an *o*-Cl atom. This supports the theory that the ortho effect is primarily a steric effect having to do with the tendency of an ortho substituent to block the formation of quinonoid structures. A more decisive test of the theory is provided by a study of the exchange reactions of cyclic bases *N*-Methylindoline and *N*-methyltetrahydroquinoline, having bicyclic structures which are coplanar, exchange H readily, while *N*-methylhomotetrahydroquinoline, being heterocyclic and probably highly puckered, exchanges H at a relatively slow rate. A. B. Garrett

Synthesis of naphthyridine derivatives. III. Constitution of dihydroxyquinopyrine. Supplement. Alkalolysis of quinolin imide. Eiji Ochiai and Iwao Arai. *J. Pharm. Soc. Japan* **59**, 458–61(in German, 152–5)(1939); cf. *C. A.* **33**, 2525[6].—Et quinolinylglycinate (0.5 g.) and 0.15 g. Na in MeOH when heated in a sealed tube at 100° for 45 min. gave a compd. (I), $C_{10}H_8O_4N_2$, decompg. 219–20°, which did not lower the m. p. of Me 1,4-dihydroxy-2,5-naphthyridine-3-carboxylate; picrate decompg. 220°; monoacetate, $C_{12}H_{10}O_5N_2$, m. 224°. Quinolinimide (1 g.) in 30 cc. abs. alc. and 0.26 g. K in abs. alc. when treated on the water bath for 30 min. with 1.5 g. $BrCH_2CO_2Et$ gave a small amt. of a compd. (II), $C_7H_6O_2N_2(IEt)_2$, m. 98° (quinolinic monoamide mono-Et ester) and 0.7 g. Et quinolinylglycinate, m. 122°. Decompn. of II with HBrO gave aminopyridinecarboxylic acid, $C_6H_6O_2N_2$, decompg. 295–6°. Decompn. of quinolinimide with HBrO gave β-aminopicolinic acid, $C_6H_6O_2N_2$, decompg. 211°. F. I. Nakamura

Ergot alkaloids. XVIII. Production of a base from lysergic acid and its comparison with synthetic 6,8-dimethylergoline. Walter A. Jacobs and R. Gordon Gould, Jr. *J. Biol. Chem.* **130**, 399–405(1939); cf. *C. A.* **32**, 9091[3]; **33**, 1332[3], 6386[9].—The unsatd. lactam, obtained on pyrolysis of dihydrolysergic acid, was catalytically hydrogenated to the satd. lactam which was then reduced by Na in BuOH to give the *base*, $C_{16}H_{20}N_2$ (I), micro m. p. 205–12°; *HCl salt*, $[\alpha]_D^{25}$ −30°. 3-Amino-1-naphthoic acid sulfate, the α,γ-di-Et ether of β-methylglycerol and PhNO were heated in H_2SO_4, giving *3-methyl-5,6-benzoquinoline-7-carboxylic acid* (II), m. 320–4° (decompn.); *Et ester*, m. 85–6°. Nitration of II gave principally the *3'-nitro deriv.*, m. 320–4° (decompn.), which on reduction with $Fe(OH)_2$ followed by lactamization gave the yellow *3-methyl-3'-amino-5,6-benzoquinoline-7-carboxylic lactam* (III), m. 288–9°. III and MeI gave the *1-methiodide*, m. 294–6° (decompn.); *1-methochloride* (IV), m. 290–5° (decompn.). Catalytic reduction of IV gave *1,2,3,4-tetrahydro-1,3-dimethyl-3'-amino-5,6-benzoquinoline-7-carboxylic lactam* (V), m. 249–50° (decompn.). V was reduced with Na in BuOH, giving *6,8-dimethylergoline*, $C_{16}H_{20}N_2$ (VI), m. 222–3°, mixed m. p. with I, 205–20° (the difference in m. p. of I and VI may be attributed to stereochem. factors. 5,6-Benzoquinaldine-7-carboxylic acid was nitrated to give the *3'-nitro deriv.*, which on reduction gave the *3'-amino acid lactam*, m. 319–20° (decompn.). D. S. Searle

Isolobinine, a new alkaloid from Lobelia inflata. Otto Thoma. *Ann.* **540**, 99–103(1939). The fraction T64 of Richter (*C. A.* **33**, 7377[5]) is now termed *isolobinine* (I); it has the formula $C_{15}H_{25}O_2N$, and, cryst. from Et_2O-petr. ether, m. 78°; *HCl salt*, with 1 mole H_2O, m. 132°, anhyd., m. 154°, $[\alpha]_D^{25}$ −76° (2% aq. soln.); phosphate, m. 80°, decomp. in moist air; the *oxime* is amorph., whose *HCl salt* m. 183°. Catalytic reduction gives a *dihydro deriv.* (II), b_4 175°. Thermal decompn. of I at 10 mm. (170–215°) gives an oil (2-butanone?), whose *p*-nitrophenylhydrazone m. 180°. Oxidation of I with CrO_3 gives BzOH (73.4% of 1 mole) and AcOH; II gives 35% of the theory of scopolic acid and 1.68 moles of BzOH. C. J. West

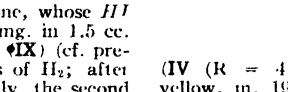
Lobelia alkaloids. VII. Accessory alkaloids of Lobelia inflata. Heinrich Wieland, Walter Koschara, Elisabeth Hane, Jany Renz, Werner Schwarze and Werner Linde. *Ann.* **540**, 103–56(1939); cf. *C. A.* **26**, 989.—The first portion of this paper deals with the methods of fractionation of the alkaloids. *dl*-Lelobanidine (I), $C_{15}H_{29}O_2N$, m. 68°; *HCl salt*, m. 78–9°; *HI salt*, m. 159°; *chloroplatinate*, yellow 6-sided prisms; *methiodide*, m. 162–4°; di-Bz deriv., m. 178° (thus the 2 HO groups are present as HO groups). I (3.6 g.) in 50 cc. AcOH, treated dropwise with 1.7 g. CrO_3 in AcOH during 0.5 hr., gives 1 g. of the *perchlorate*, m. 136°, of *dl-lelobanine* (II), $C_{15}H_{23}O_2N$, an oil; *HCl salt*, m. 142°. Oxidation of II with CrO_3 in H_2SO_4 gives BzOH, AcOH, $EtCO_2H$, scopolic acid and methylgranatic acid (III). Boiling II with excess

of MeI for 20 min. and shaking with Ag_2O (odor of Me_2NH) give a deep-yellow neutral oil, which is catalytically reduced to a glycol, $C_{17}H_{36}O_2$, $b_{0.03}$ 117–18°, m. about 8°; CrO_3 in dil. H_2SO_4 gives *l-benzoyl-7-propionylheptane* (IV), m. 51°. $(CH_2)_7(CO_2Et)_2$ on partial hydrolysis and

C_6H_6 gives IV; *semicarbazone*, m. 186° (decompn.). Therefore I is PhCH(OH)$[CH_2]_4$CH$_2$.CH$_2$.CH(CH$_3$CH-OHEt).NMe. *l*-Lelobanidine I (V) forms a *HCl salt* with 2 moles H_2O, m. 86°, $[\alpha]_D$ −41.5° (0.0351 g. in 1.5 cc. EtOH); *HI salt*, m. 171°; *perchlorate*, m. 176°; *di-Ac deriv. HCl salt*, m. 195–6°; *benzenesulfonyl deriv. HCl salt*, m. 110–15°. V with CrO_3 in AcOH (5 days at room temp.) gives *l-lelobanine* (VI), whose *HCl salt* m. 186°, $[\alpha]_D$ 19.5° (13.6 mg. in 1.5 cc. EtOH). V with CrO_3 in AcOH gives BzOH, $AcOH$, $EtCO_2H$ and *l*-III. I may be resolved through the *d*-camphorsulfonate; the salt is crystd. from EtOH-Et_2O, followed by crystn. of the HCl salt from EtOH-Et_2O. *l*-Lelobanidine gives a *HCl salt* with 1.5 moles of H_2O, m. 102.5°, $[\alpha]_D$ −41.7° (19.8 mg. in 1.5 cc. EtOH); *HI salt*, m. 165°, $[\alpha]_D$ 33° (25 mg. in 1.5 cc. EtOH); oxidation gives VI. *d-Norlelobanidine* (VII), $C_{14}H_{27}O_2N$, m. 90°, $[\alpha]_D$ 62.8° (0.0518 g. in 5 cc. EtOH); *HCl salt*, m. 193°; *HBr salt*, m. 202°; *HI salt*, needles or tetrahedra, m. 190°; *di-m-nitrobenzoyl deriv.*, m. 212°; *monobenzene-disulfonyl deriv.*, m. 150°; Hofmann degradation of the methiodide of *d*-norlelobanine gives III. Methylation of VII with *p*-$MeC_6H_4SO_3Me$ gives V. *d*-Norlelobanine, m. 174°, $[\alpha]_D$ −41.5° (19.6 mg. in 1.5 cc. EtOH). Lobinine VIII (part VI) with CrO_3 in 15% H_2SO_4 gives 1 mole of BzOH and a *base*, $C_8H_{14}NO_4$, m. 207.8°, which is unsatd. toward $KMnO_4$ and absorbs 1 mole of H_2 but a uniform reduction product could not be isolated. VIII with PtO_2 and H_2 gives 25–30% of α-lelobanidine, whose *HI salt* m. 181°, $[\alpha]_D$ −38.2° ± 0.5° (17.2 mg. in 1.5 cc. EtOH); *perchlorate*, m. 152°. Isolobinine (IX) (cf. preceding abstr.) absorbs more than 2 moles of H_2; after absorption of 2 moles (the first very quickly, the second 5–3 times as long), the compd. m. 83°; the perchlorate, m. 176°, and the HCl salt, m. 86°, are identical with those of VI. [illegible] *HCl salt*, m. 161°, which is not identical with lobinol or with XII. Oxidation of IX with CrO_3 in AcOH gives 50% of isolobinanine, whose *HCl salt* m. 151°, $[\alpha]_D$ 11 ± 0.3° (23.8 mg. in 1.5 cc. EtOH); the methiodide quickly liquefies in the air; $NaHCO_3$ gives the unsatd. diketone (X), m. 82–3°, which is also obtained from VI. Lobinanidine, $C_{18}H_{27}O_2N$, m. 95° $[\alpha]_D$ −17.9° (0.0248 g. in 1.5 cc. EtOH); *HCl salt*, m. 169°; *HI salt*, m. 200°; *benzenesulfonyl deriv.*, m. 125°, clears 135°. Oxidation with CrO_3 in AcOH at 70–80° gives lobinaninic, whose perchlorate m. 130°. Hofmann degradation of the methiodide gives X. Oxidation of lobinanidine gives lobinic acid; catalytic reduction gives 60% of α-lelobanidine, whose *HI salt* (XI) m. 174°, $[\alpha]_D$ −37° (50 mg. in 1.5 cc. EtOH); crystal examn. showed that this was not identical with β-lelobanidine, m. 181°. Isolobinanidine (XII) gives a *HCl salt*, with 2 moles H_2O, m. 111°, $[\alpha]_D^{30}$ −28.3° (0.041 g. in 2 cc. H_2O); *HI salt*, m. 164°; catalytic reduction gives V. The following diketones were prepd. for comparative purposes. $AcCHNaCO_2Et$ and 48 g. $(CH_2)_5Br_2$ give 26 g. of 6-carbethoxy-6-acetylhexyl bromide, b_1 180–200°; 40% HBr gives 6-acetylhexyl bromide, b_{30} 202–3°; with $BzCHNaCO_2Et$ there results *7-acetyl-1-benzoyl-1-carbethoxyheptane*, which with KOH in MeOH gives *1-benzoyl-7-acetylheptane*, m. 64.5°; semicarbazone, m. 194°. $EtCO_2(CH_2)_6COCl$, b_{12} 146°, gives $MeCH_2CO(CH_2)_6CO_2Et$, light yellow oil, b_{10} 140°. $MeCH_2CO(CH_2)_6COCl$ and finally *1-propionyl-6-benzoylhexane*, m. 44–5°. *Alkaloid* $C_{19}H_{28}N_2O_3$, m. 232° (decompn.); *HCl salt*, m. 299–300° (decompn.); *HI salt*, m. 279°; *perchlorate*, m. 254–5°; *methiodide*, m. 244° (decompn.), which gives no amine odor with Ag_2O; *Bz deriv.*, light yellow, m. 280° (decompn.); *Br deriv.*, m. 288° (decompn.). *Alkaloid* $C_8H_{19}ON$, m. 85–7°; *alkaloid* $C_{14}H_{21}ON$, m. 103°; these were sepd. by distn., b_{1-2} 118–20° and 135–7°, resp. *Alkaloid* $C_{14}H_{21}ON$, m. 81°; *chloroaurate*, m. 182°; *Bz deriv.*, m. 118°; oxidation gives the *ketone*, $C_{14}H_{19}ON$, whose HCl salt, with 1 mole H_2O, m. 109°; oxidative degradation gives a compd. $C_7H_{13}O_2N$, m. 235°. Another product isolated in this work was β-phenyl-β-hydroxypropionic acid, m. 116°, $[\alpha]_D$ −18.4 ± 0.5°.

C. J. West

Synthesis of 5-substituted rubans. G. R. Clemo and E. Hoggarth. *J. Chem. Soc.* **1939**, 1241–4.—Lepidine (40 g.), 44 g. chloral and 100 cc. C_6H_6N, warmed at 85–90° for 2 hrs., give 80% of γ-trichloro-β-hydroxy-α-(4-quinolyl)propane, m. 178°; adding 65 g. during 2 hrs. to 65 g. KOH in 300 cc. abs. EtOH on the water bath gives 80% of β-4-quinolylacrylic acid, m. 270°; oxidation of 30 g. acid in a soln. of 11 g. Na_2CO_3 in 500 cc. H_2O with 60 g. $KMnO_4$ in 1.5 l. H_2O at −10° gives 58% (overall yield 38–40%) of quinoline-4-aldehyde (I), b_4 122–3°, m. 52°; *picrate*, yellow, m. 179° (contains 1 mole of EtOH). 3-Ketoquinuclidine (II) (C. and Metcalfe, *C. A.* **32**, 1701[3], term it the 2-deriv.) and BzH in abs. EtOH contg. piperidine or KOH, refluxed 8–10 hrs., give *2-benzylidene-3-ketoquinuclidine*, light yellow, m. 133°; *phenylhydrazone*, light yellow, m. 184°. II (0.5 g.) and 0.8 g. I in AcOH, satd. with dry HCl at 0°, and after 2–3 hrs. warmed at 80–5° for 8 hrs., give 0.2 g. *5-keto-6,9-rubanene* (III), deep yellow, m. 153°; III results in 0.4–0.5 g. yield from 0.5 g. II and 0.65 g. I with piperidine acetate in abs. EtOH; after keeping 60 hrs. in the cold and then heating momentarily to boiling; *picrate*, red, m. 209°; *chloroplatinate*, orange needles, decomp. above 260° without melting. Catalytic reduction of 0.5 g. of III with Pd-C in MeOH gives 0.3 g. of *5-ketoruban*



(IV (R = 4-quinolyl)), m. 125–6°; *phenylhydrazone*, yellow, m. 198°; *picrate*, deep yellow, m. 168°. Reduction of 0.5 g. of IV with $(iso\text{-}PrO)_3Al$ in iso-PrOH gives 0.3 g. of *ruban-5-ol*, m. 198°; *picrate*, yellow, m. 188–9°. IV (0.3 g.) with EtMgI in Et_2O at −10° gives 0.03–0.05 g. of *5-ethylruban-5-ol* (V), m. 139°; *picrate*, yellow, m. 161°. III (0.8 g.) and EtMgI in Et_2O at 0° give 0.05 g. of a *compd.* $C_{19}H_{22}ON_2$, m. 164°; *picrate*, deep yellow, m. 150°; cryst. compds. could not be prepd. with $N_2H_4.H_2O$, $PhNHNH_2$, NH_2OH or $H_2NNHCONH_2$; no Me_2CO was detected in an attempted reduction with $(iso\text{-}PrO)_3Al$ and the compd. was unchanged on boiling with HCO_2H or Ac_2O; catalytic reduction did not yield V. C. J. West

Modified cinchona alkaloids. VII. Constitution of niquidine. L. M. Gibbs and T. A. Henry. *J. Chem. Soc.* **1939**, 1294–9; cf. *C. A.* **33**, 3385[8].—In part VI the formula MeCH:C$^{\prime\prime}$HCH$_2$.CH[CH(OH)Q].NH.CH$_2$.CH$_2$ (in which Q is 6-methoxyquinolyl substituted in position 4) was suggested for the 2 geometrical isomers, niquidine (I) and isoniquidine (II), formed in the chalogenation of halodihydroquinidines by $AgNO_3$. Further evidence for this formula is now provided by a study of the oxidation products of "niquidine" (III) (the mixt. of I and II) and dihydroniquidine (IV). Oxidation of III with acid $KMnO_4$ at 0° gives A, quinanic acid (V) and very small yields of 2 *acids*, sepd. with difficulty, $C_{17}H_{11}O_4N_3$ (VI), yellow, m. above 300° (*Me ester*, m. 168°), and $C_{17}H_{20}O_4N_2$ (VII), m. 247° (decompn.); VI is considered to be HO_2CC:CH.C[CH(OH)Q]:NCH:CH, and VII the same structure but with the pyridyl group reduced to piperidyl. Oxidation of IV with H_2O_2 (heating 2 hrs. on water bath) gives a viscous oil which, crystd. from EtOH and extd. with dil. HCl, yields V and the *amine oxide* of V, $C_{11}H_9O_4N$, m. 272° (decompn.); *Et ester*, yellow, m. 141°; this was synthesized from V and H_2O_2 in NaOH by heating 4 hrs.

on the water bath; hydrogenation with Pd-$BaSO_4$ gives III. The H_2O_2 mother liquors contain β-propylglutaric acid (*diamide*, m. 195°; *dianilide*, m. 219°). Dihydroquinidine with H_2O_2 gives V and ω-ethylmethanetriacetic acid (VIII), m. 120°, $[\alpha]_D$ −1.3° (H_2O, *c* 1.006); *trianilide*, m. 280° (decompn.); *dianilide*, m. 222°. VIII was obtained in 25% yield by reacting Et α-cyanobutyrate and Et glutaconate with EtONa and hydrolyzing the crude CN ester (50% yield) with concd. HCl. C. J. West

Alkaloids of the lupines. XVIII.[5] Synthesis of allolupinine. K. Winterfeld and F. W. Holschneider. *Arch. Pharm.* **277**, 221-37(1939); cf. *C. A.* **33**, 3799[4].—This structural isomer of lupinine has now been prepd. and characterized. Starting with δ-chloro-γ-valerolactone, b_{14} 127.9°, the EtO deriv. was obtained by the action of abs. anhyd. NaOEt, the latter thereupon condensed with Et picolinate in C_6H_6 suspension, to *α-pyridyl α'-[δ-ethoxy-γ-valerolactonyl] ketone* (I) by the action of metallic Na. The resulting dark-brown, viscous oil, with an odor very like that of furfural, $b_{0.4}$ 173-5°, as a yellow, faintly odorous viscous oil having the compn. $C_{15}H_{19}O_3N$ (*Reinecke salt* brick-red powder, m. 128-30°; *$HgCl_2$ salt*; m. 100-2° (turbid), 116° (clear); *p-sulfonic acid phenylhydrazone*, faintly rose, m. 234-6°). Saponf., I yields *α-pyridyl α'-[δ-ethoxy-γ-hydroxybutyl] ketone* (II), $C_{12}H_{17}O_3N$, $b_{0.5}$ 110-20°, almost colorless oil becoming quickly dark in the air (*Reinecke salt*, m. 117° (decompg. 175-8°); *2,4-dinitrophenylhydrazone* bright yellow, m. 161-5°)). Hydrogenated, II gives *α-[α'-piperidyl]-α,δ-dihydroxy-ε-ethoxypentane*, (III) bright-yellow viscous oil yielding the *salt* $C_{12}H_{25}O_3N.HCl.HgCl_2$, m. 129°; *Bz deriv.*, $C_{19}H_{29}O_4N$, yellow oil; *Reinecke salt*, m. 129-30°. Cyclization of III to *4-ethoxymethyloctahydropyridocoline* (IV) was effected by progressive treatment with PBr_3, NaOEt, hydrogenation via Busch/Stove, benzoylation and distn., faintly yellow thin oil, b_{11} 142-4° (*aurate*, m. 85-7°; *$HgCl_2$ salt*, m. 125-6°; *Reinecke salt*, m. 143-5°), which reduced with HI (d. 1.7) gave *allolupinine*, viscous, yellow-brown oil with hay-like odor (after standing 2 weeks needle-like crystals were deposited) (*$HgCl_2$ salt*, m. 201° (decompn.); *Reinecke salt*, m. 152-3°; *aurate*, golden-yellow oil without melination to crystallize; *picrate*, similar behavior).

W. O. E

Kurchi alkaloids. II. Preparation of conessine and its secondary alkaloids. Alfred Bertho. *Arch. Pharm.* **277**, 237-57(1939); cf. *C. A.* **27**, 3715.—The prepn. of these bases, some 14 in no., already reported elsewhere is now described anew and at greater length. 17 references.

W. O. E.

Picrotoxin. IV. Ronald W. H. O'Donnell, Alexander Robertson and James C. Harland. *J. Chem. Soc.* **1939**, 1264-6; cf. *C. A.* **33**, 6861[3].—Reduction of picrotoxanin (I) with Pd-C in AcOEt ceased in 30-50 min. with the absorption of less than 50% of the theory of H. The crude non-acidic product (0.8 g. from 5 g. I) on boiling with *N* H_2SO_4 for 23 hrs. gives the β-dihydro deriv. (II) of I (*acetate*, m. 177°), picrotonol (III) and dihydropicrotoxic acid (IV). Since the α-isomer (V) of II is quant. converted into IV with H_2SO_4, the crude product contained both I and V. Reduction of 6 g. I in 250 cc. EtOH is complete in 3-6 hrs., approx. 2 mols H being absorbed. The crude product on boiling with H_2SO_4 gives II, III and IV; if the EtOH soln. is evapd. to about 50 cc. 1.2-1.9 g. of II crystallizes out and the 3 g. obtained on adding H_2O to the filtrate is largely II also. The reduction product can be sepd. into a neutral and acidic fraction with $NaHCO_3$. On boiling with H_2SO_4 the neutral fraction yields II, III and IV. By repeated crystn. from EtOH some V is also isolated. The acidic fraction, boiled with H_2SO_4 and crystd. from H_2O, gives an *acid*, $C_{15}H_{22}O_6.H_2O$, m. 183° (decompn.); *di-Me ester*, m. 164°; this may be a di-HO deriv. of $Me_2CHCH.CH_2.CH_2.CHMe.CH[(CH_2)_3$-$CO_2H].CHCO_2H$; it does not react with 2,4-$(O_2N)_2C_6H_3$-$NHNH_2$. Reduction of I in AcOH contg. HCl ceases in 4-6 hrs. after absorption of 0.4-0.5 mole H; evapn. of the filtered soln. and crystn. from H_2O give a *compd.* m. 232°, which is a eutectic mixt. of V and the precursor (VII) of III; 5% H_2SO_4 gives III and IV. Acetylation of the crude reaction product gives a small yield of the *acetate* of V, m. 190°; boiling with *N* H_2SO_4 gives a quant. yield of III. The mechanism of the formation of VI is discussed. α- and β-Bromopicrotoxinin (VII-VIII) and the corresponding α- and β-bromopicrotoxinic acids (IX, X) cannot be hydrogenated; the absence of an ethylenic linkage is confirmed by the lack of reaction with a mixt. of O_3 and O_2. α-Picrotoxinic acid (XI) is completely hydrogenated in AcOH with a PtO_2 catalyst in 2 min.; the dihydro deriv., $C_{15}H_{20}O_7$, m. 231°. The action of O_3 on XI gives HCHO and a ketone, which on boiling with III and red P yields norpicrotic acid and its HO deriv. and the ketone $C_{13}H_{16}O_2$. The β-isomer of XI cannot be hydrogenated nor is it oxidized by O_3. A mechanism for the formation of the satd. VII-VIII and IX-X is suggested. Treatment of I with Br in $CHCl_3$ gives a highly unstable product, which easily decomp. with evolution of HBr and on warming with H_2O gives a quant. yield of VII-VIII and HBr.

C. J. West

Sulfhydryl groups in proteins. III. The effect on egg albumin of various salts of guanidine. Jesse P. Greenstein, *J. Biol. Chem.* **130**, 519-26(1939); cf. *C. A.* **33**, 4610[9]. The denaturation of certain proteins is characterized in part by the appearance of titratable SH groups and for all of the proteins so far investigated, the greatest proportion of SH groups appears in solns. of guanidine-HCl. In order to compare the relative effects of a no. of anions, egg albumin dissolved in several guanidine salts has been studied. The max. proportion of SH groups appearing in albumin is very nearly the same in the presence of the chloride, bromide and iodide and thiocyanate of guanidine but the effect of revealing these groups begins at a lower concn. with the 3 latter salts. No SH groups appear in solns. of the sulfate and carbonate salts, and only traces in satd. solns. of the acetate. The addn. of K halides to solns. of the protein in the sulfate and carbonate salts results in the appearance of SH groups, probably because of the simultaneous presence of guanidonium and halide ions. Extensive substitution in the guanidonium radical results in a decrease in the denaturing effect of the salt so that it is possible therefore to modify the effects of guanidine salts on the one hand by varying the nature of the anion and on the other by substitution in the guanidonium cation. One definite function can be assigned to the guanidonium cation, the dissolution of the denatured protein, in this respect closely resembling the structurally closely related urea. A. P. Lothrop

Estrogens with oxygen in ring B. I. 7-Ketoestrone and 7-hydroxyestrone. W. H. Pearlman and O. Wintersteiner. *J. Biol. Chem.* **130**, 35-45(1939). Equilin, m. 237-9° (all m. ps. cor.), was converted into the acetate, and the latter was treated with OsO_4 (Serini and Logemann, *C. A.* **32**, 2539[8]), giving equilin glycol (7,8-dihydroxyestrone) (I) which had varying m.-p. ranges (crystal polymorphism). In vacuum distn. lost 1 mol. H_2O, giving *7-ketoestrone* (II), m. 212-12.5°, $[\alpha]_D^{25}$ 167° (1.13% in dioxane); *dioxime*, decompd. 252-3°; *disemicarbazone* (III), no m. p. to 295°; *enol diacetate* (IV), m. 171-1.5°. IV on hydrolysis gave II. Comparison of the absorption spectra of II, IV and *7-hydroxyestrone diacetate* (V) indicated the enol nature of IV. Wolff-Kishner reduction (Na in abs. alc. at 185°) of III gave *desoxoestrone*, m. 135.5-7°; *benzoate*, m. 172.5°. These 2 compds. were identical with those prepd. by the similar reduction of estrone semicarbazone, m. 249° (decompn.), indicating that the configuration of C atom 8 in II is the same as in estrone. Partial hydrogenation of IV, using Pt or Pd black, gave a quant. yield of V, needles, m. 122-3°, blunt prisms, m. 130-2°. Hydrolysis of V gave *7-hydroxyestrone* (VI), m. 265° (decompn.), $[\alpha]_D^{25}$ +34.5° (0.83% in dioxane); *3-monobenzoate*, m. 181°. II and VI each possessed 1/300 the estrogenic potency of estrone. D. S. Searle

The dehydration of cholesterol. J. C. Eck and Ralph L. Van Peursem. *Iowa State Coll. J. Sci.* **13**, 115-25 (1939).—The literature reports dehydration products of cholesterol with a confusing overlapping of properties.

Five products: 2,4-cholestadiene, cholesterilene, dicholesteryl ether, *a*-cholesterilene and *c*-cholesterilene should be recognized. The *a*- and *c*-cholesterilenes were found to be *d*-rotatory. Their presence as impurities in cholesterilene would explain the variable optical rotations reported for cholesterilene. A historical review, 4 pages of tabulated data and a bibliography of 65 references are included. F. E. Brown

Some reactions of α- and β-cholesteryl benzoate oxides. F. S. Spring and G. Swain *J. Chem. Soc.* 1939, 1356 9.—Cholesteryl benzoate (60 g.) in 240 cc. dry $CHCl_3$, treated with 840 cc. of 0.4 *N* BzO_2H in $CHCl_3$ and kept at 0° for 12 hrs. and at 20° for 4 days, the soln. washed with 5% Na_2CO_3 and the residue crystd. from AcOEt, gives 28 g. (46%) of *α-cholesteryl benzoate oxide* (I), m. 168 9°, $[\alpha]_D^{20}$ −31.3° ($CHCl_3$, *c* 1.12); hydrolysis with EtOH-KOH gives α-cholesteryl oxide (II). The mother liquors from I give 23 g. (38%) of the *β-isomer* (III) of I, m. 151 2°, $[\alpha]_D^{20}$ 3.8° ($CHCl_3$, *c* 2.3). 3,5,6-Trihydroxycholestane (IV) with BzCl in C_5H_5N gives a product m. 120–50°, contg. Cl, which could not be separated by crystn. IV and Bz_2O in C_5H_5N, heated on a steam bath for 9 hrs., give *5,6-dihydroxy-3-benzoyloxycholestane* (V), m. 222 3°, $[\alpha]_D^{20}$ −4.9° ($CHCl_3$, *c* 1.33); hydrolysis with MeOH-KOH gives IV. V also results from I and H_2SO_4 in C_6H_6 by refluxing 2 hrs. II (4 g.) and BzCl in C_5H_5N, heated 1 hr. on the steam bath, give 3.5 g. of *6-chloro-5-hydroxy-3-benzoylcholestane* (VI), m. 202 3° (decompn.), $[\alpha]_D^{20}$ −19.5° ($CHCl_3$, *c* 2.3); this also results from I and HCl in C_6H_6-MeOH after refluxing 30 min. Heating 1 g. VI in quinoline at 180° gives 0.5 g. of I. Treating 1 g. VI with 0.2 cc. $SOCl_2$ in C_5H_5N at 0° for 5 min. gives 0.6 g. of *6-chloro-3-benzoyloxy-4-cholestene*, m. 127 8°, $[\alpha]_D^{20}$ 79.4° ($CHCl_3$, *c* 1.03); $SbCl_3$ gives an immediate intense blue color changing to violet. III and HCl in EtOH-C_6H_6 or in $CHCl_3$, treated with HCl and refluxed 30 min., give *5-chloro-6-hydroxy-3-benzoyloxycholestane* (VII), m. 206 7° (decompn.), $[\alpha]_D^{20}$ ±0°; with BzCl in C_5H_5N, VII gives a 5-chloro-3,6-dibenzoyloxycholestane, m. 181°; this also results from β-cholesteryl oxide and BzCl in C_5H_5N. I and P_2O_5 in xylene, refluxed 2 hrs., give 8% of 6-ketocholestanyl benzoate, m. 170–1°; it also results in 10% yield by heating I and alum at 180° and 0.1 mm. for 30 min. C. J. West

Choleic acids V. Choleic acids and aliphatic hydrocarbons. Hemrich Rheinboldt, Paula Braun, Else Flume, Otto Konig and Albert Lauber. *J. prakt. Chem.* 153, 343–56 (1939); cf. *C. A.* 24, 376.—The higher members of the paraffin series readily form cryst. complexes with desoxycholeic acid (I) and apocholeic acid (II), in which they show the characteristically high coördination nos. of 6 and 8. The m. ps. show a gradual increase with the no. of C atoms and fall on a practically straight line. Other compds., such as picric acid, do not form such complexes. Undecane (III) (0.15 g.) and 2.5 g. I in 8 cc. EtOH give the *compd.* III.6I, m. 183°; III.6II, m. 181.5°. *Dodecane*-I, m. 184–5°; -II, m. 183°; *tridecane*-I, m. 186°; -II, m. 185°; *tetradecane*-I, m. 188°; -II, m. 187°; *pentadecane*-I, m. 189.5–90°; -II, m. 188.5–9° (ratio 1:8); *hexadecane*-I, m. 191.5–2°; -II, m. 190–90.5° (ratio 1:8); *pentatriacontane*-I, m. 201.5° (the system shows 2 eutectics, at about 1 and 99% I, m. 72° and 168.5° (m.-p. curves given)); -II, m. 194° (this also shows 2 eutectics, at 1 and 99% II, m. 71.5° and 168° (ratio 1:8)); *tritetracontane*-I, m. about 201° and -II, m. about 195° (m.-p. curves are given; the ratios are 1:8). *Cetylbenzene*-I, m. 189–9.5° (1:8); *p-hydroxyphenyloctadecane*-II, m. 171° (1:8) (the system shows 2 eutectics, at 8 and 98% II, m. 77° and 164°; the m. p. passes through a max. at 171° and 90% II). *Cetene*-I, m. 190° (1:8); -II, m. 189.5–90° (1:8); *13-heptacosene*-I, m. 195.5–6.5°; -II, m. 194° (1:8). C. J. West

X-ray examn. of nucleic acids and their structure (Mazza, Tappi) 3. Nitrones (Kröhnke) 25. Vegetable tannins in Formosa—casuarin, a new catechol (Osima, Ito) 29. Excitation of chain polymerizations by free radicals (Schulz) 2. Electrolytic cond. and H bridge formation (Wulff) 2. New synthetic sympatheticolytic substance [indole compd.] belonging to a chem. group of natural sympatheticolytic substances (Raymond-Hamet) 11H. Studies of chem. bond by means of Fourier analysis (Brill, *et al.*) 2.

Courtot, Ch., Doeuvre, J., Guillaumin, A., and Kipping, F. S.: Traité de chimie organique. T. XIV. Composés azotés de l'acide carbonique. Composés organo-arséniés, organophosphorés ou organosiliciés. Paris: Masson et Cie. 600 pp. Fr. 300.

Purifying hydrocarbons and derivatives thereof. David L. Yabroff (to N. V. de Bataafsche Petroleum Maatschappij). Brit. 506,574, May 31, 1939. The hydrocarbons, etc., are freed from weakly acid-reacting org. substances by extn. with an aq. alk. soln. contg. an aliphatic diamino alc. having 3, 4 or 5 C atoms, e. g., diaminoisopropanol, diamino-*tert*-butanol. Liquids treated are petroleum, C_6H_6, toluene, xylene, chloroethane, tri- or di-chloroethylene, CCl_4, chloropropane, chlorobutylene, PhCl, PhBr, nitroethane, $PhNO_2$, $AmNH_2$, $PhNH_2$, pyridine. Mercaptans, phenols and org. acids are removed by the extn. Aq. solns. of caustic alkali, NH_3, alk. earth bases, alkali metal carbonates or quaternary NH_4 bases may be used. Cf. *C. A.* 33, 7546⁸.

Liquid hydrocarbons from olefinic gases. Karl Finsterbusch (to Pure Oil Co.). U. S. 2,171,523, Sept. 5. An arrangement of app. is described, and a process for converting olefinic gases, contg. hydrocarbons having 1–4 C atoms, to liquid hydrocarbons, involving fractionating the gases under conditions of temp. and pressure suitable for sepg. the gases into a liquid portion consisting chiefly of hydrocarbons having 3 and 4 C atoms and a gaseous portion contg. the major portion of the H, CH_4, C_2H_4 and C_2H_6 present in the gases, and subjecting the liquid portion alone to heat- and pressure-type polymerization at pressures of at least 600 lb. per sq. in. and at elevated temps. suitable for polymerization of butylene and propylene to hydrocarbons of gasoline-boiling range.

Olefins. Adrianus J. van Peski (to Shell Development Co.). U. S. 2,172,228, Sept. 5. An arrangement of app. is described and a process for producing olefins from solid paraffins and highly paraffinic distillates predominating in crystallizable paraffins, which comprises vaporizing the paraffinic material without substantial cracking thereof, subjecting the vapors, by indirect application of heat thereto and in the presence of steam, to a temp. within the approx. range of 540° to 570° for 3–6 sec. and under a pressure below 75 lb. per sq. in., then promptly quenching the heated vapors to prevent continued conversion thereof, and fractionating and condensing the vapors. Cf. *C. A.* 33, 5411².

Polymerizing normally gaseous olefins. Edwin F. Nelson (to Universal Oil Products Co.). U. S. 2,170,275, Aug. 22. An arrangement of app. is described, and a process for polymerizing normally gaseous olefins such as those in cracked hydrocarbon gas mixts. contg. C_3H_6 and C_4H_8 by passing them under polymerizing conditions of temp. and pressure through successive masses of a polymerizing catalyst (such as a solid catalyst formed from kieselguhr and H_3PO_4) whose catalytic activity progressively decreases in the direction of flow of the gas therethrough.

Interpolymerization of olefins. Wm. P. Gage (to Shell Development Co.). U. S. 2,171,928, Sept. 5. An arrangement of app. is described, and a process of producing an interpolymerization product of isobutylene and a secondary butylene which involves bringing into contact a butane-butylene fraction contg. such olefins with a strong polybasic inorg. acid capable of absorbing and polymerizing the olefins under conditions at which between about 25% and about 75% of the isobutylene is absorbed by the acid without substantial isobutylene polymerization, sepg. the absorption product from the unabsorbed hydrocarbon, bringing the latter into contact with a polybasic mineral acid capable of effecting interpolymerization of isobutylene with secondary butylene at a temp. and pressure and for

on the water bath; hydrogenation with Pd-$BaSO_4$ gives III. The H_2O_2 mother liquors contain β-propylglutaric acid (*diamide*, m. 195°; *dianilide*, m. 219°). Dihydroquinidine with H_2O_2 gives V and β-ethylmethanetriacetic acid (VIII), m. 120°, $[\alpha]_D$ −1.3° (H_2O, *c* 1.006); *trianilide*, m. 280° (decompn.); *dianilide*, m. 222°. VIII was obtained in 25% yield by reacting Et α-cyanobutyrate and Et glutaconate with EtONa and hydrolyzing the crude CN ester (50% yield) with concd. HCl. C. J. West

Alkaloids of the lupines. XVIII. Synthesis of allolupinine. K. Winterfeld and F. W. Holschneider. *Arch. Pharm.* **277**, 221-37 (1939); cf. *C. A.* **33**, 3799[8].—This structural isomer of lupinine has now been prepd. and characterized. Starting with δ-chloro-γ-valerolactone, b_{14} 127-9°, the EtO deriv. was obtained by the action of abs. anhyd. NaOEt, the latter thereupon condensed with Et picolinate in C_6H_6 suspension, to *α-pyridyl α'-[δ-ethoxy-γ-valerolactonyl] ketone* (I) by the action of metallic Na. The resulting dark-brown, viscous oil, with an odor very like that of furfural, $b_{0.4}$ 173.5°, as a yellow, faintly odorous viscous oil having the compn. $C_{16}H_{19}O_3N$ (*Reinecke salt* brick-red powder, m. 128-30°; *$HgCl_2$ salt*, m. 100-2° (turbid), 116° (clear); *p-sulfonic acid phenylhydrazone*, faintly rose, m. 244-6°). Saponf., I yields *α-pyridyl α'-[δ-ethoxy-γ-hydroxybutyl] ketone* (II), $C_{12}H_{17}O_3N$, $b_{0.3}$ 140-20°, almost colorless oil becoming quickly dark in the air (*Reinecke salt*, m. 117° (decompg. 175-8°), *2,4-dinitrophenylhydrazone* bright yellow, m. 161.5°). Hydrogenated, II gives *α-[α'-piperidyl]-α,δ-dihydroxy-ε-ethoxypentane*, (III) bright-yellow viscous oil yielding the *salt* $C_{12}H_{25}O_3N.HCl.HgCl_2$, m. 129°; *Bz deriv.*, $C_{19}H_{29}O_4N$, yellow oil; *Reinecke salt*, m. 129-30°. Cyclization of III to *4-ethoxymethyloctahydropyridocoline* (IV) was effected by progressive treatment with PBr_3, NaOEt, hydrogenation via Busch/Stove, benzoylation and distn., faintly yellow thin oil, b_{11} 142-4° (*aurate*, m. 85-7°; *$HgCl_2$ salt*, m. 125-6°; *Reinecke salt*, m. 143-5°), which reduced with HI (d. 1.7) gave *allolupinine*, viscous, yellow-brown oil with hay-like odor (after standing 2 weeks needle-like crystals were deposited) (*$HgCl_2$ salt*, m. 201° (decompn.); *Reinecke salt*, m. 152-3°, *aurate*, golden-yellow oil without melination to crystallize; *picrate*, similar behavior).

W. O. E.

Kurchi alkaloids. II. Preparation of conessine and its secondary alkaloids. Alfred Bertho. *Arch. Pharm.* **277**, 237-57 (1939); cf. *C. A.* **27**, 3715. The prepn. of these bases, some 11 in no., already reported elsewhere is now described anew and at greater length. 17 references.

W. O. E.

Picrotoxin. IV. Ronald W. H. O'Donnell, Alexander Robertson and James C. Harland. *J. Chem. Soc.* **1939**, 1261-6; cf. *C. A.* **33**, 6861[3].—Reduction of picrotoxinin (I) with Pd-C in AcOEt ceased in 30-50 min. with the absorption of less than 50% of the theory of H. The crude non-acidic product (0.8 g. from 5 g. I) on boiling with *N* H_2SO_4 for 23 hrs. gives the *β*-dihydro deriv. (II) of I (*acetate*, m. 177°), picrotonol (III) and dihydropicrotoxic acid (IV). Since the α-isomer (V) of II is quant. converted into IV with H_2SO_4, the crude product contained both I and V. Reduction of 6 g. I in 250-35 cc. EtOH is complete in 3-6 hrs., approx. 2 mols H absorbed. The crude product on boiling with H_2SO_4 gives II, III and IV; if the EtOH soln. is evapd. to about 50 cc., 1.2-1.9 g. of II crystallizes out and the 3 g. obtained on adding H_2O to the filtrate is largely II also. The reduction product can be sepd. into a neutral and acidic fraction with $NaHCO_3$. On boiling with H_2SO_4 the neutral fraction yields II, III and IV. By repeated crystn. from EtOH some V is also isolated. The acidic fraction, boiled with H_2SO_4 and crystd. from H_2O, gives an *acid*, $C_{15}H_{29}O_6.H_2O$, m. 183° (decompn.); *di-Me ester*, m. 161°; this may be a di-HO deriv. of $Me_2CHCH.CH_2.CH_2.CHMe.CH[(CH_2)_3CO_2H].CHCO_2H$; it does not react with 2,4-$(O_2N)_2C_6H_3NHNH_2$. Reduction of I in AcOH contg. HCl ceases in 1-6 hrs. after absorption of 0.4-0.6 mole H; evapn. of the filtered soln. and crystn. from H_2O give a *compd.* m. 202°, which is a eutectic mixt. of V and the precursor (VII) of III; 5% H_2SO_4 gives III and IV. Acetylation of the crude reaction product gives a small yield of the *acetate* of V, m. 190°; boiling with *N* H_2SO_4 gives a quant. yield of III. The mechanism of the formation of VI is discussed. α- and β-Bromopicrotoxinin (VII-VIII) and the corresponding α- and β-bromopicrotoxinic acids (IX-X) cannot be hydrogenated; the absence of an ethylenic linkage is confirmed by the lack of reaction with a mixt. of O_3 and O_2. α-Picrotoxinic acid (XI) is completely hydrogenated in AcOH with a PtO_2 catalyst in 2 min.; the dihydro deriv., $C_{15}H_{20}O_7$, m. 231°. The action of O_3 on XI gives HCHO and a ketone, which on boiling with HI and red P yields norpicrotic acid and its HO deriv. and the ketone $C_{13}H_{16}O_2$. The β-isomer of XI cannot be hydrogenated nor is it oxidized by O_3. A mechanism for the formation of the satd. VII-VIII and IX-X is suggested. Treatment of I with Br in $CHCl_3$ gives a highly unstable product, which easily decomp. with evolution of HBr and on warming with H_2O gives a quant. yield of VII-VIII and HBr.

C. J. West

Sulfhydryl groups in proteins. III. The effect on egg albumin of various salts of guanidine. Jesse P. Greenstein. *J. Biol. Chem.* **130**, 519-26 (1939); cf. *C. A.* **33**, 4610[8].—The denaturation of certain proteins is characterized in part by the appearance of titratable SH groups and for all of the proteins so far investigated, the greatest proportion of SH groups appears in solns. of guanidine-HCl. In order to compare the relative effects of a no. of anions, egg albumin dissolved in several guanidine salts has been studied. The max. proportion of SH groups appearing in albumin is very nearly the same in the presence of the chloride, bromide and iodide and thiocyanate of guanidine but the effect of liberating these groups begins at a lower concn. with the 3 latter salts. No SH groups appear in solns. of the sulfate and carbonate salts, and only traces in satd. solns. of the acetate. The addn. of K halides to solns. of the protein in the sulfate and carbonate salts results in the appearance of SH groups, probably because of the simultaneous presence of guanidonium and halide ions. Extensive substitution in the guanidonium radical results in a decrease in the denaturing effect of the salt so that it is possible therefore to modify the effects of guanidine salts on the one hand by varying the nature of the anion and on the other by substitution in the guanidonium cation. One definite function can be assigned to the guanidonium cation, the dissolution of the denatured protein, in this respect closely resembling the structurally closely related urea. A. P. Lothrop

Estrogens with oxygen in ring B. I. 7-Ketoestrone and 7-hydroxyestrone. W. H. Pearlman and O. Wintersteiner. *J. Biol. Chem.* **130**, 35-45 (1939).—Equilin, m. 237-9° (all m. ps. cor.), was converted into the acetate, and the latter was treated with OsO_4 (Serini and Logemann, *C. A.* **32**, 2539[8]), giving equilin glycol (7,8-dihydroxyestrone) (*I*) which had varying m.-p. ranges (crystal polymorphism). In vacuum distn. lost 1 mol. H_2O, giving *7-ketoestrone* (II), m. 212-12.5°, $[\alpha]_D^{25}$ 167° (1.13% in dioxane); *dioxime*, decompd. 252-3°; *disemicarbazone* (III), no m. p. to 295°; *enol diacetate* (IV), m. 171-1.5°. IV on hydrolysis gave II. Comparison of the absorption spectra of II, IV and *7-hydroxyestrone diacetate* (V) indicated the enol nature of IV. Wolff-Kishner reduction (Na in abs. alc. at 185°) of III gave *desoxoestrone*, m. 135.5-7°; *benzoate*, m. 172.5°. These 2 compds. were identical with those prepd. by the similar reduction of estrone semicarbazone, m. 249° (decompn.), indicating that the configuration of C atom 8 in II is the same as in estrone. Partial hydrogenation of IV, using Pt or Pd black, gave a quant. yield of V, needles, m. 122-3°, blunt prisms, m. 130-2°. Hydrolysis of V gave *7-hydroxyestrone* (VI), m. 265° (decompn.), $[\alpha]_D^{25}$ 134.5° (0.83% in dioxane); *3-monobenzoate*, m. 181°. II and VI each possessed 1/300 the estrogenic potency of estrone.

D. S. Searle

The dehydration of cholesterol. J. C. Eck and Ralph L. Van Peursem. *Iowa State Coll. J. Sci.* **13**, 115-25 (1939).—The literature reports dehydration products of cholesterol with a confusing overlapping of properties,

Five products: 2,4-cholestadiene, cholesterilene, dicholesteryl ether, *a*-cholesterilene and *c*-cholesterilene should be recognized. The *a*- and *c*-cholesterilenes were found to be *d*-rotatory. Their presence as impurities in cholesterilene would explain the variable optical rotations reported for cholesterilene. A historical review, 4 pages of tabulated data and a bibliography of 65 references are included. F. E. Brown

Some reactions of α- and β-cholesteryl benzoate oxides. F. S. Spring and G. Swain. *J. Chem. Soc.* 1939, 1356–9.—Cholesteryl benzoate (60 g.) in 240 cc. dry $CHCl_3$, treated with 840 cc. of 0.4 *N* BzO_3H in $CHCl_3$ and kept at 0° for 12 hrs. and at 20° for 4 days, the soln. washed with 5% Na_2CO_3 and the residue crystd. from AcOEt, gives 28 g. (46%) of *α-cholesteryl benzoate oxide* (I), m. 168–9°, $[\alpha]_D^{20}$ −31.3° ($CHCl_3$, *c* 1.12); hydrolysis with EtOH-KOH gives α-cholesteryl oxide (II). The mother liquors from I give 23 g. (38%) of the *β-isomer* (III) of I, m. 151–2°, $[\alpha]_D^{20}$ 3.8° ($CHCl_3$, *c* 2.3). 3,5,6-Trihydroxycholestane (IV) with BzCl in C_5H_5N gives a product m. 120–50°, contg. Cl, which could not be sepd. by crystn. IV and Bz_2O in C_5H_5N, heated on a steam bath for 9 hrs., give *5,6-dihydroxy-3-benzoyloxycholestane* (V), m. 222–3°, $[\alpha]_D^{25}$ −4.9° ($CHCl_3$, *c* 1.38); hydrolysis with MeOH-KOH gives IV. V also results from I and H_2SO_4 in C_6H_6 by refluxing 2 hrs. II (4 g.) and BzCl in C_5H_5N, heated 1 hr. on the steam bath, give 3.5 g. of *6-chloro-5-hydroxy-3-benzoylcholestane* (VI), m. 202.3° (decompn.), $[\alpha]_D^{20}$ −19.5° ($CHCl_3$, *c* 2.3); this also results from I and HCl in C_6H_6-MeOH after refluxing 30 min. Heating 1 g. VI in quinoline at 180° gives 0.5 g. of I. Treating 1 g. VI with 0.2 cc. $SOCl_2$ in C_5H_5N at 0° for 5 min. gives 0.6 g. of *6-chloro-3-benzoyloxy-4-cholestene*, m. 127.8°, $[\alpha]_D^{20}$ −79.4° ($CHCl_3$, *c* 1.03); $SbCl_3$ gives an immediate intense blue color changing to violet. III and HCl in EtOH-C_6H_6 or in $CHCl_3$, treated with HCl and refluxed 30 min., give *5-chloro-6-hydroxy-3-benzoyloxycholestane* (VII), m. 206.7° (decompn.), $[\alpha]_D^{20}$ ±0°; with BzCl in C_5H_5N, VII gives a 5-chloro-3,6-dibenzoyloxycholestane, m. 184°, this also results from β-cholesteryl oxide and BzCl in C_5H_5N. I and P_2O_5 in xylene, refluxed 2 hrs., give 8% of 6-ketocholestanyl benzoate, m. 170.1°; it also results in 10% yield by heating I and alum at 180° and 0.1 mm. for 30 min. C. J. West

Choleic acids. V. Choleic acids and aliphatic hydrocarbons. Heinrich Rheinboldt, Paula Braun, Else Flume, Otto Konig and Albert Lauber. *J. prakt. Chem.* 153, 333–36 (1939); cf. *C. A.* 24, 376.—The higher members of the paraffin series readily form cryst. complexes with desoxycholeic acid (I) and apocholeic acid (II), in which they show the characteristically high coördination nos. of 6 and 8. The m. ps. show a gradual increase with the no. of C atoms and fall on a practically straight line. Other compds., such as picric acid, do not form such complexes. Undecane (III) (0.15 g.) and 2.5 g. I in 8 cc. EtOH give the *compd.* **III.6I**, m. 183°; **III.6II**, m. 181.5°. *Dodecane*-I, m. 184.5°; -II, m. 183°; *tridecane*-I, m. 186°; -II, m. 185°; *tetradecane*-I, m. 188°; -II, m. 187°; *pentadecane*-I, m. 189.5–90°; -II, m. 188.5–9° (ratio 1:8); *hexadecane*-I, m. 191.5–2°; -II, m. 190–90.5° (ratio 1:8); *pentatriacontane*-I, m. 201.5° (the system shows 2 eutectics, at about 1 and 99% I, m. 72° and 168.5° (m.-p. curves given)); -II, m. 194° (this also shows 2 eutectics, at 1 and 99% II, m. 71.5° and 168° (ratio 1:8)); *triletracontane*-I, m. about 201° and -II, m. about 195° (m.-p. curves are given; the ratios are 1:8). *Cetylbenzene*-I, m. 189–9.5° (1:8); *p-hydroxyphenyloctadecane*-II, m. 171° (1:8) (the system shows 2 eutectics, at 8 and 98% II, m. 77° and 164°; the m. p. passes through a max. at 171° and 90% II). *Cetene*-I, m. 190° (1:8); -II, m. 189.5–90° (1:8); *13-heptacosene*-I, m. 195.5–6.5°; -II, m. 194° (1:8).
C. J. West

X-ray examn. of nucleic acids and their structure (Mazza, Tappi) 3. Nitrones (Kröhnke) 25. Vegetable tannins in Formosa—casuarin, a new catechol (Osima, Ito) 29. Excitation of chain polymerizations by free radicals (Schulz) 2. Electrolytic cond. and H bridge formation (Wulff) 2. New synthetic sympatheticolytic substance [indole compd.] belonging to a chem. group of natural sympatheticolytic substances (Raymond-Hamet) 11H. Studies of chem. bond by means of Fourier analysis (Brill, *et al.*) 2.

Courtot, Ch., Doeuvre, J., Guillaumin, A., and Kipping, F. S.: Traité de chimie organique. T. XIV. Composés azolés de l'acide carbonique. Composés organo-arséniés, organophosphorés ou organosiliciés. Paris: Masson et Cie. 600 pp. Fr. 200.

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a time at which substantial interpolymerization of the unabsorbed isobutylene takes place, and treating the remaining secondary-butylene-contg. hydrocarbon with the previously sepd. isobutylene absorption product at a temp. and for a time at which interpolymerization between the isobutylene and the secondary butylene is effected. Cf. *C. A.* **33**, 5866[1].

Tertiary aliphatic amines. Bruno Christ (to I. G. Farbenind. A.-G.). U. S. 2,170,740, Aug. 22. See Ger. 673,017 (*C. A.* **33**, 6874[9]).

Stabilizing aldehydes. Joseph A. Wyler (to Trojan Powder Co.). U. S. 2,170,625, Aug. 22. Aq. solns. of aldehydes such as acetaldehyde are stabilized by addn. of a minor proportion of an oxalate, e. g., that of Na or Cu.

Unsaturated aliphatic aldehydes. Carl T. Kautter (to Röhm & Haas Co.). U. S. 2,171,727, Sept. 5. An unsatd. aliphatic aldehyde such as β-methylacrolein is prepd. by oxidizing the corresponding unsatd. alc. such as β-methylallyl alc. with use of SeO_2 or selenious acid (suitably with heating to 90°).

Mixed organic acid esters of cellulose such as mixed cellulose acetate-oleate, -linoleate or -stearate, suitable for precipitation and washing with water. Carl J. Malm and Gordon D. Hiatt (to Eastman Kodak Co.). U. S. 2,172,250, Sept. 5. A cellulose compd. contg. free and esterifiable hydroxyl groups, such as an acetone-sol. cellulose acetate, is esterified with a reaction mixt. comprising chloroacetic anhydride, an aliphatic acid contg. at least 6 C atoms, such as stearic acid, in an amt. near to but not more than sufficient to combine with the free hydroxyl groups of the cellulose compd., an inert low-boiling solvent such as methylene chloride and an esterification catalyst such as *p*-toluenesulfonic acid, and the cellulose ester formed is subsequently sepd. by pptn. in water.

Alkoxyacetones. Henry C. Chitwood (to Carbide and Carbon Chemicals Corp.). U. S. 2,170,855, Aug. 29. For the production of an alkoxyacetone such as ethoxyacetone, the vapors of an alkoxyisopropanol such as ethoxyisopropanol are brought into contact in a heated reaction zone with a dehydrogenating catalyst such as one contg. Ag oxide (suitably at a temp. of about 260°). Various examples with details are given.

Mercaptothiazolines. Roger A. Mathes (to B. F. Goodrich Co.). U. S. 2,170,059, Aug. 22. A process for producing a heterocyclic mercapto compd. embodying a ring consisting of at least 3 C atoms, 1 N atom and 1 S atom, one C atom of the ring being directly between the N and S atoms and joined to the S of the non-nuclear mercapto group, such as 2-mercapto-5-methylthiazoline, comprises interacting an amino alkyl sulfuric acid in which the amino group and the sulfuric acid group are sepd. by from 2 to 3 C atoms, such as 2-amino-1-methylethylsulfuric acid, and CS_2 in the presence of an alkali such as aq. NH_3.

Organic cyano compounds. Norman D. Scott and Joseph F. Walker (to E. I. du Pont de Nemours & Co.). U. S. 2,171,869, Sept. 5. An alkali metal addn. product such as Na naphthalene is treated with an aliphatic nitrile having a replaceable H atom such as acetonitrile, in an activating solvent such as dimethyl ether, and the product is subjected to further reaction, as with BuBr for the production of capronitrile or with benzyl chloride for the production of dibenzoacetonitrile.

Reducing cyclic carbonyl compounds to corresponding hydrocarbons. Erich Clar (to E. I. du Pont de Nemours & Co.). U. S. 2,172,020, Sept. 5. Reactions such as the reduction of benzophenone to diphenylmethane and tetraphenylethylene are effected by heating the initial material with Zn dust and $ZnCl_2$ at a reduction temp. (which may be about 290°) and the hydrocarbons produced are isolated from the resulting reaction mass, as by distn. and use of HCl and use of solvents.

Alkali metal derivatives of organic compounds. Norman D. Scott, Virgil L. Hansley and Joseph F. Walker (to E. I. du Pont de Nemours & Co.). U. S. 2,171,867, Sept. 5. At least one H atom of an org. compd. such as aniline, fluorene or *tert*-BuOH is replaced by an alkali metal atom by reaction with an alkali metal addn. compd. of a polycyclic aromatic hydrocarbon such as a Na addn. compd. of naphthalene in an activating solvent such as dimethyl glycol ether. Various examples and details of similar reactions are given. U. S. 2,171,868 (Norman D. Scott and Joseph F. Walker; to same assignee) relates to a like use of Na naphthalene or the like in reactions such as that with C_2H_2, heptyne or the like, to form products which may be further treated with CO_2, etc.

Stabilized diazo salts. Wallace A. Erickson (to E. I. du Pont de Nemours & Co.). U. S. 2,171,976, Sept. 5. A process of prepg. a stabilized product comprises forming a diazo-salt complex by adding to an acid aq. soln. of a diazo salt, such as that from *p*-nitro-*o*-anisidine, an agent such as $ZnCl_2$ capable of pptg. from the soln. a stable addn. product of the diazo salt, forming a moist paste by removing from the ppt. the major part of the resulting aq. soln., dissolving tarry substance and the moisture of the paste by adding an excess of acetone to the paste, removing the major part of the dissolved material by sepg. the acetone soln. until a second paste is formed, and then sepg. a residue of water and acetone from the second paste.

Trialkyl lead salts of nitrophenols. Mario S. Altamura (to Socony-Vacuum Oil Co.). U. S. 2,171,423, Aug. 29. Silica gel is used as a catalyst in prepg. a trialkyl Pb salt of a nitrophenol by the direct reaction between tetraalkyl Pb such as Et_4Pb and a nitrophenol such as picric acid (suitably by slowly heating to 60° in C_6H_6).

Alkyl sulfates. Egi V. Fasce and John J. Owen (to Standard Oil Development Co.). U. S. 2,170,401, Aug. 22. See Can. 380,221 (*C. A.* **33**, 3816[1]).

Organic acids. Joseph F. Walker (to E. I. du Pont de Nemours & Co.). U. S. 2,171,871, Sept. 5. For the production of an org. acid such as phenylacetic acid, a Na addn. compd. such as that of naphthalene is treated with a compd. such as phenylacetic acid in an activating solvent such as dimethyl glycol ether and the product is further treated with CO_2.

Dehydrating acetic, propionic, butyric and other lower aliphatic acids. Donald F. Othmer (to Tennessee Eastman Corp.). U. S. 2,170,834, Aug. 29. App. is described, and a continuous process of dehydrating aq. solns. of the acids by distn. in the presence of various specified ketones or ethers, sepn. of the last part of the water from the acid by straight rectification using the same vaporous heat which is thereafter passed to the azeotropic distn. and keeping the ketone or ether used out of the resulting dehydrated acid. Cf. *C. A.* **33**, 6348[4].

Propionic acid. Donald J. Loder (to E. I. du Pont de Nemours & Co.). U. S. 2,170,825, Aug. 29. EtOH is treated with CO in the presence of BF_3 and water, as the catalyst, at 125-180° and under a pressure of over 25 atm. (suitably 800-900 atm. at 135-165°). Cf. *C. A.* **33**, 996[1].

Purifying naphthenic acids. Harold G. Reiber (to Union Oil Co. of Calif.). U. S. 2,170,506, Aug. 22. A process of purifying crude naphthenic acids contg. phenols and oil, in which the acids are dild. with a low-boiling water-immiscible solvent such as gasoline, treated with H_2SO_4 and recovered by extn. in the form of naphthenate soap from the solvent contg. dissolved oil and phenols by the addn. of alkali to the treated naphthenic acids, includes the step of controlling the amt. of alkali added to the treated naphthenic acids so that the alkali is insufficient in amt. to convert the phenols present into phenolates.

Carbocyclic acids of the cyclopentanopolyhydrophenanthrene series. Max Bockmühl, Gustav Ehrhart and Heinrich Ruschig (to Winthrop Chemical Co.). U. S. 2,171,959, Sept. 5. Compds. such as acetoxypregnenolones, by oxidation of their acetyl radicals with an oxidizing agent such as a hypohalite or chromic acid, yield carboxylic acids of white cryst. character, insol. in water, sol. in alc. and which may be used as intermediates for further synthesis. Several examples with details of procedure are given.

Aliphatic acid anhydrides. Gwyn Benson (to Shawinigan Chemicals Ltd.). U. S. 2,170,002, Aug. 22. An anhydride, such as Ac_2O, is obtained by passing O into the

corresponding aldehyde in the presence of an oxidation catalyst such as Mn acetate and an inert ester diluent such as EtOAc (suitably under pressure at about 50°) and the anhydride produced is sepd.

Removing sulfur and sulfur compounds from anhydrides such as acetic anhydride. Herbert E. Martin (to Celanese Corp. of America). U. S. 2,170,972, Aug. 29. A process suitable for reducing the content of S and labile organo-S compds. in an anhydride, such as Ac_2O for use in cellulose acetylation, from 60–100 parts per million to less than 10 parts per million, involves treating the material with $Ca(OCl)_2$ in the presence of an acetate such as NaOAc and distg. under reduced pressure.

Chlorinating methane. Harry Bender (to Dow Chemical Co.). U. S. 2,170,801, Aug. 29. An arrangement of app. is described, and a process of chlorinating methane without formation of free C which involves passing a mixt. of CH_4 and Cl through an elongated channel between 2 graphite surfaces substantially free of metals, one of which is maintained at a temp. of about 360°, and which are only about 0.03 in. apart to prevent ignition of the gas and produce a product such as CCl_4.

Methoxyacetaldehyde. Nathan L. Drake (to Carbide and Carbon Chemicals Corp.). U. S. 2,170,854, Aug. 29. This compd., a mobile liquid, miscible with water, b_{770} 92.3°, and having a sp. gr. of about 0.98, suitable for use in making methoxyacetic acid, is produced by passing vapors of the monomethyl ether of ethylene glycol into contact with a dehydrogenating catalyst in a reaction zone maintained at a temp. of about 300–425°. Cf. *C.* 11. **33**, 9327[6].

Ethylene oxide. Herbert Langwell and Herbert M. Stanley (to Distillers Co. Ltd.). U. S. 2,172,025, Sept. 5. A process for mfg. ethylene oxide by oxidation of ethylene involves removing the ethylene oxide from the remaining oxidation products by adsorption on active C, treating the C for the removal of the adsorbed ethylene oxide therefrom, drying the C to make it fit for re-use and repeating the foregoing operations until the C has become partially inactive, and then revivifying the partially inactive C by treating it with hot water for a prolonged period, and finally removing the C from the water and completely drying it. Cf. *C. A.* **33**, 5869[4].

Determining the purity of trimethylamine. Le Roy U. Spence (to Röhm & Haas Co.). U. S. 2,171,809, Sept. 5. An arrangement of app. is described, and a process for controlling the amt. of basic impurities during the purification of a trimethylamine, which comprises continuously analyzing the purified product by forming a satd. soln. of the trimethylamine in a countercurrent absorbing system at a temp. at which the trimethylamine is less sol. than the basic impurities, reducing the temp. of the soln., passing it continuously through a cond. cell, measuring the elec. cond. of the soln. and regulating the flow of the trimethylamine from the purification app. in accordance with the measurements.

Isobutane. Robert F. Ruthruff (to Standard Oil Co. of Ind.). U. S. 2,172,146, Sept. 5. A process of producing isobutane from satd. petroleum naphthas b. above 125° involves heating with $AlCl_3$ to above 38° but below 205° (suitably at about 95°) and adding HCl to the mixt. to promote the reaction, the heating being continued for a time sufficient to form a gaseous product consisting mainly of isobutane which is recovered.

Melamine. Gustave Widmer and Willi Fisch (to Soc. pour l'ind. chim. à Bâle). U. S. 2,170,491, Aug. 22. See Brit. 502,148 (*C. A.* **33**, 3350[8]).

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W DOX

Transformation of *d*-tartaric acid into meso-tartaric acid by the action of the pancreas. Mario Betti and Elio Lucchi. *Ricerca sci.* **10**, 463–4 (1939).—See *C. A.* **33**, 6423[6]. W. F. Bruce

Cloud-chamber investigations into post-mortem ions. R. A. Watters and Wm. B. Johnston. *William Bernard Johnston Foundation Biophys. Research, Bull.* **3**, 51 pp. (1939).—Gases liberated by chem. reactions occurring in animal tissues after death contain ionized mols. capable of effecting condensation of moisture in a supersatd. atm. This was demonstrated by killing small animals in a specially constructed cloud chamber. It is suggested that the mols. serving as cloud nuclei are acted upon in some manner, possibly by short-wave radiations, before their release from the specimen. This supposition is suppo. ted by the fact that the CO_2 liberated by fermenting yeast leaves the surface as nuclei of minute water droplets the elec. charge of which can be demonstrated by means of an electrostatic field. A. W. Dox

Serum albumin. I. Preparation and properties of crystalline horse serum albumin of constant solubility. T. L. McKeekin. *J. Am. Chem. Soc.* **61**, 2884–7 (1939).—Carbohydrate-free crystd. serum albumin has been sepd. into 2 fractions by crystg. the sulfates from water. Evidence that this albumin has been sepd. as a chem. individual is obtained from the fact that the soly. in salt soln. of the protein regenerated from the insol. albumin sulfate was found to be essentially independent of the amt. of protein in the system, and of the vol. of solvent with which it was equilibrated. **II. Identification of more than one albumin in horse and human serum by electrophoretic mobility in acid solution.** John A. Luetscher, Jr. *Ibid.* 2888–90.—At pH 4.0, where a fraction of horse-serum albumin crystallizes as a sulfate, the protein exhibits 2 boundaries in the Tiselius electrophoresis app. These boundaries migrate, resp., with mobilities of 6.80 and 6.44 $\times 10^{-5}$ sq. cm./v.-sec. in acetate buffers of $\Gamma/2$ 0.02. Human-serum albumin also consists of at least 2 components migrating with velocities of 7.25 and 5.95 $\times 10^{-5}$ sq. cm./v.-sec., resp., under the above conditions. In normal serums, the faster moving component constitutes nearly two-thirds of the albumin, but in certain pathol. conditions in man, both serum and urinary albumins show a greater migration of the faster component, leaving the slower component preponderant. A. B. Garrett

Invertase inhibitors. Emil Baur. *Helv. Chim. Acta* **22**, 1114–20 (1939); cf. *C. A.* **33**, 7832[8].—Yeast autolyzate preserved with toluene was buffered to pH 4.5 with KH_2PO_4 and the inversion rate curves of sucrose in the presence of various compds. were plotted. Some inhibiting action was found for a great variety of compds. including methylene blue, acridine yellow and various other dyes, aniline, naphthylamine derivs., allylthiourea and barbiturates. The mechanism of the inhibition is uncertain and in most cases the action was weaker than that of the same compds. on oxidases. L. E. Gilson

Recent advances in science: Biochemistry. W. O. Thermack. *Science Progress* **34**, 320–8 (1939); cf. *C. A.* **33**, 4270[6].—A review of recent researches on (*a*) the amino acids of the proteins of cancerous tissue, (*b*) the role of glutamic acid in amino acid metabolism and (*c*) the citric acid cycle and cell oxidation. Joseph S. Hepburn

Chemistry and the medical technician. Colette Corbett. *J. Chem. Education* **16**, 471–5 (1939). E. H.

The effect of zinc and other metals on carboxylase. K. Lohmann and A. J. Kossel. *Naturwissenschaften* **27**, 595–6 (1939).—After washing in alk. Na phosphate soln. carboxylase from dried brewers' yeast requires aneurine diphosphate and Mg or Mn ions for activation; after washing in acid K phosphate the yeast can hardly be inactivated. In low concns. Zn (5×10^{-6} to 5×10^{-3} millimole in 1.7 cc.) inhibits the enzyme, in higher concns. (up to 2×10^{-2}) it is activated, still higher concns. inhibit reversibly. The Zn effect is especially pronounced in acid-washed yeast. In maceration juice the reactivation surpasses the

initial inhibition. In acid-washed yeast an optimum Mn addn. compensated the Zn effect, in the end Mn and Zn act additively, Cd, Ni and Co act like Zn to a lesser extent, Mg, Mn and Fe act only to increase activity, Cu, Hg, Ag, Au more than Al, Cr more than Be, Pb and Sr and least of all Ba, act as inhibitors. It is believed that Zn has a role in carbohydrate metabolism; it influences sugar fermentation by maceration juice; it inhibits lactic acid formation by aq. muscle ext. B. J. C. van der Hoeven

Biochemistry of glutathione. VIII. Method of microdetermination of glutathione in tissue by Okuda and Ogawa and its modification by Huzita and Numata. Masayoshi Ogawa. *J. Agr. Chem. Soc. Japan* **15**, 1–7 (1939); cf. *C. A.* **33**, 4622², 8667⁵.—The reduction of the oxidized form of glutathione by H_2S was nearly as effective as that by Zn dust. The iodate titration value of the reduced form of glutathione in the tissue ext., which was corrected by means of ascorbic acid oxidase treatment, gave higher results compared with that of 2,6-dichlorophenolindophenol in the case of dry beer yeast. **IX. Effect of glutathione on fever.** *Ibid.*, 182–92.—Rabbits became feverish upon the intravenous injection of glucose. The body temp. of the feverish rabbits was lowered to the normal level by intravenous injection of glutathione or cysteine-HCl. The rabbits were cured of fever by 0.5 mg. of glutathione per kg. of body wt. With hypodermic injection, about 2.0 mg. of glutathione per kg. of body wt. were required. **X. Effect of glutathione on fever and glucolysis.** *Ibid.* 775–82.—Rabbits became feverish through hyperglucemia produced by the intravenous injection of glucose. The blood-sugar content and the body temp. rose to the max. at 2–3 hrs. after the injection and then dropped to the normal level after 5–6 hrs. When 0.5 mg. of the reduced form of glutathione per kg. of body wt. was administered intravenously, the amt. of blood sugar decreased and the body temp. dropped to the normal level after about 3–4 hrs. The blood-sugar content and the body temp. were almost const. when glutathione was injected alone. The contents of reduced and oxidized blood glutathione were not affected throughout the expt. In *Bull. Agr. Chem. Soc. Japan* **15**, 4–5, 20, 122–3 (1939) (in English). Y. Kihara

Action of arginase on canavanine and arginine. III. Matunosuke Kitagawa. *J. Agr. Chem. Soc. Japan* **15**, 267–79(1939); cf. *C. A.* **33**, 2545². —The action of arginase was retarded by canaline and ornithine. The retardation of arginase was more noticeable by canavanine than by arginine. Urea did not affect the activity of arginase. Arginase was impeded by some amino acids. *dl*-α-Aminovaleric acid was especially toxic, perhaps because of the combination of amino acid with arginase. Fat acids, acyl derivs. and esters of α-amino acids had no effect on the action of arginase. The retardation of arginase increased with pH value in the case of canavanine, while it decreased in the case of arginine. The combination of amino acid with arginase was proved by detn. of the dissocn. const. Y. Kihara

Influence of monochromatic lights on enzyme action. XII. Influence of ultraviolet rays on enzyme action. 1. Yeast invertase. Reitaro Murakami. *J. Agr. Chem. Soc. Japan* **15**, 291–6(1939).—"Vim ray" blue lamp was used as the light source. The action of yeast invertase was retarded by the ultraviolet ray of 3565–3984 A. and somewhat accelerated by the visible ray of 4100–5500 A. **XIII. Influence of ultraviolet rays on enzyme action. 2. Amylase.** *Ibid.* 296–9.—The action of yeast amylase was retarded by ultraviolet rays, but was accelerated by the visible ray on the ray contg. both the ultraviolet and visible rays. **XIV. Influence of ultraviolet rays on enzyme action. 3. Yeast proteinase.** *Ibid.* 377–9.—The action of yeast proteinase was accelerated more by ultraviolet ray than by visible rays. **XV. Influence of ultraviolet rays on enzyme action. 4. Yeast lipase.** *Ibid.* 380–1.—The action of yeast lipase was accelerated more by ultraviolet rays than by visible rays. **XVI. Influence of ultraviolet rays on enzyme action. 5. Yeast catalase.** *Ibid.* 382–4.—The action of yeast catalase was retarded by ultraviolet rays, but it was accelerated by visible rays. **XVII. Influence of infrared rays on enzyme action. 1. Yeast invertase.** *Ibid.* 435–7.—Infrared rays less than 8000 A. accelerated the action of yeast invertase. The action was greater with rays contg. both visible and infrared ray. **XVIII. Influence of infrared rays on enzyme action. 2. Yeast amylase.** *Ibid.* 437–9.—Yeast amylase was also stimulated by infrared rays and especially by rays contg. both visible and infrared rays. **XIX. Influence of infrared rays on enzyme action. 3. Yeast proteinase.** *Ibid.* 439–41.—The behavior of yeast proteinase toward infrared rays was also similar to that of yeast amylase. **XX. Influence of infrared rays on enzyme action. 4. Yeast lipase.** *Ibid.* 441–2.—The action of yeast lipase was promoted by infrared rays but not so much as by rays contg. both visible and infrared rays. **XXI. Influence of infrared rays on enzyme action. 5. Yeast catalase.** *Ibid.* 442–4.—The action of yeast catalase was the same as that of lipase. In *Bull. Agr. Chem. Soc. Japan* **15**, 45–6, 79–81, 92–4(1939) (in English). Y. Kihara

Absorption spectrum of the vitellin prepared from the yolk of loggerhead turtle eggs. Kinsuke Kondo, Masao Nagasima and Siniti Morisige. *J. Agr. Chem. Soc. Japan* **15**, 737–43(1939).—The yolk of loggerhead turtle eggs, *Caretta olivacea*, was extd. with 10% NaCl soln. and 0.025 *N* NaOH. Four kinds of vitellin were fractionated. These proteins contained 2.0–2.3% of tryptophan and 5.6–5.9% of tyrosine. The yolk has a high nutritive value as it is rich in tryptophan, tyrosine and lipoids. The absorption spectrum may be affected not only by the contents of cyclic amino acids, but also by the method of the prepn. of vitellin. Y. Kihara

The production of cozymase preparations in enzyme experiments. Amandus Hahn, H. Gerstenberger and E. Mehler. *Z. Biol.* **99**, 457–61(1939).—The prepn. of cozymase entailed (1) pptn. of yeast with CCl_3CO_2H, (2) sepn. of impurities from the filtrate with Pb acetate, (3) removal of the cozymase with $Hg(OAc)_2$ according to Warburg's method and then decompg. the Hg compd. with H_2S. After filtration of the HgS, a crude cozymase product is pptd. from the filtrate with MeOH. $CuCl_2$ can be used for purification and the free cozymase obtained by pptn. from soln. with alc. and ether. F. Krasnow

The compounds between phosphatides and basic proteins. Erwin Chargaff and Morris Ziff. *J. Biol. Chem.* **131**, 25–34(1939); cf. *C. A.* **32**, 9110⁹.—Cephalin forms insol. compds. with thymus histone between pH 2 and 7 and with globin below pH 4. Lecithin forms compds. with histone only between pH 7 and 8 but does not react with globin. These compds. are apparently true salts. The basic proteins act as inhibitors of blood clotting while globin has been found to be devoid of anticoagulant action *in vivo* and the ability of the basic proteins to ppt. cephalin at a physiol. pH parallels their inhibitory effect on blood coagulation in a remarkable manner: protamines and histones, in contrast to globin, form insol. cephalin salts at pH 7. These findings supply strong confirmation of the concept that the anticoagulant effect of protamines can be ascribed to their reacting with cephalin which forms a part of the thromboplastic factor. Cephalin (but not lecithin) also forms salts with the basic dyes, methylene blue and thionine (Lauth's violet) but these derivs. are not useful for preparatory purposes because the compds. are so stable that it is almost impossible to recover the phosphatide. **The reaction between cephalin and hemoglobins.** E. Chargaff, M. Ziff and Bruce M. Hogg. *Ibid.* 35–44.—The addn. of neutral emulsions of purified cephalin to solns. of oxy- and CO-hemoglobin brings about a rapid disappearance of the specific absorption bands, disrupting the heme-globin linkage in the following manner: oxyhemoglobin + cephalin ⇌ cephalin-globin + hematin. Hemoglobin, on the other hand, is resistant to rupture. Lecithin emulsions are without effect, another instance of the fundamental biol. difference between cephalin and lecithin. The mechanism of the reaction is discussed. A. P. Lothrop

The separation of cathepsin from malignant and normal rat tissue. Mary E. Maver. *J. Biol. Chem.* **131**, 127–34

(1939); cf. *C. A.* **29**, 5915⁵.—The catheptic enzyme is assocd. with the globulin fraction present in tissue ext. and practically all the proteinase activity is pptd. by 40% satn. with $(NH_4)_2SO_4$ (28 g. per 100 cc.). Most of the enzyme is liberated upon incubation of the globulin ppt. at 38° with citrate buffer at pH 5 in the presence of KCN or cysteine. The proteinase is pptd. in the filtrate from this slightly digested globulin fraction by full satn. with $(NH_4)_2SO_4$. It is readily sol. in H_2O and, after dialysis, can be dried *in vacuo* while frozen. The dried cathepsin is highly autodigestive. Its aq. soln. is heat-coagulable and gives a strongly pos. nitroprusside test for —SH when freshly prepd. It lacks specificity and digests the proteins of other organs as well as fibrin and hemoglobin. It has been isolated from liver and malignant tissue (Jensen rat sarcomata) by the method described. A. P. Lothrop

Autolytic changes in the protein and amino acid content of liver. James M. Luck, John Eudin and Charles C. Nimmo. *J. Biol. Chem.* **131**, 261–9(1939); cf. *C. A.* **32**, 6266².—At pH 5 the globulins (pseudo- and euglobulin) of the salt-sol. fraction serve as the principal substrate for the autoproteolytic enzymes in autolyzing liver. Accompanying amino acid liberation there is partial denaturation of some of the globulin in the salt-sol. fraction with the formation of globulin II. Addn. of KIO_3 lessens considerably the rate of autolysis after the first 2 days. At pH 7.3 globulin II serves as the principal substrate and autolysis proceeds much more slowly. Some of the globulin II disappears by conversion into more sol. globulins of the salt-sol. fraction. The liberation of tyrosine is less rapid than at pH 5 and undergoes destruction by a tyrosine-destroying enzyme which is inactive at pH 5. The proteolysis is still further lessened by the addn. of KIO_3 which itself acts by oxidizing the sulfhydryl groups present in the proteolytic enzymes. A. P. Lothrop

β-Glucuronidase. II. Factors controlling the initial velocity of hydrolysis of some conjugated glucuronides. W. H. Fishman. *J. Biol. Chem.* **131**, 225–32(1939); cf. *C. A.* **33**, 2156¹. The optimum pH is 4.3 for the hydrolysis of Na estriol glucuronidate (I) by ox spleen glucuronidase, 4.4 for Na borneol (II) and 5.0 for Na menthol glucuronidate (III). The dissocn. const. of the enzyme-substrate complex is 0.0005 *M* in the case of the hydrolysis of I, 0.01 *M* for II and 0.004 for III. The enzyme hydrolyzes I at about 3 times the rate of II and III when the conditions of pH and of substrate concn. are optimal in each case. The enzyme provides a useful agent for the assay of estriol glucuronide in urine. The much greater affinity of the enzyme for I is interesting in view of the fact that estriol glucuronide is an important constituent of living mammalian tissue while II and III do not occur normally in the animal body. A. P. Lothrop

The pK'_1 of carbonic acid in concentrated protein solutions and muscle. I. S. Danielson, H. I. Chu and A. Baird Hastings. *J. Biol. Chem.* **131**, 243–57(1939).—When concns. are calcd. as moles per kg. of H_2O, pK'_1 is found not to be significantly influenced by the presence of protein. This finding was not anticipated but, however, the fact that the value is not greatly influenced by the presence of 30% hemoglobin in red blood cells makes the present results not unreasonable. Whether or not one can apply the same value to all tissues rests, of course, on further expts. Until such data are available, however, it is believed not unreasonable to employ the value of 6.10 for pK'_1 at 38° to all tissues for which calcns. are based on concns. expressed in units of H_2O. A. P. Lothrop

The determination of peptide bonds in crystalline lactoglobulin. Rollin D. Hotchkiss. *J. Biol. Chem.* **131**, 387–95(1939).—The no. of peptide bonds in 5-times recrystd. lactoglobulin was estd. by detg. the increase of NH_2 and CO_2H groups when the protein was completely hydrolyzed by (*a*) a succession of enzymes and (*b*) boiling with mineral acid. The av. eq. wt. of peptide bonds corresponded to 115.6 g. of protein. This const. indicates that a mol. wt. unit of 288 amino acid residues is incompatible with the figure 39,000 reported for the mol. wt. of lactoglobulin. Cf. Bergmann and Niemann, *C. A.* **31**, 4350⁵. A. P. Lothrop

The activating effect of glycogen on the enzymic synthesis of glycogen from glucose-1-phosphate. Gerty T. Cori and Carl F. Cori. *J. Biol. Chem.* **131**, 397–8(1939); cf. *C. A.* **33**, 7867¹.—The enzyme, (glycogen)-phosphorylase, which catalyzes the reaction, glucose-1-phosphoric acid → glycogen + H_3PO_4, requires the presence of a minute amt. of glycogen to start activity, a concn. of 0.5 to 10 mg. %, depending on the enzyme prepn. used, being sufficient. This finding explains the differences observed between enzyme preps. from liver and from skeletal and heart muscle and brain since the liver preps. always contain glycogen. A. P. Lothrop

Phosphatases of the liver and spleen. A. Ruffo. *Arch. sci. biol.* (Italy) **24**, 399–404(1938).—The alk. phosphatases of the liver and spleen are sol. in 50% alc., while the corresponding isodynamic acid phosphatases are insol. in alc. of the same concn. The 2 enzymes are therefore different. Mg^{++} has an activating action on the alk. phosphatase (pH 6 to pH 10.5) and none on the acid phosphatase (pH 3.2 to pH 5.5). P. F. Metildi

Photochemical transformations induced by ultraviolet radiation of estrone. M. Laporta and E. La Fratta. *Arch. sci. biol.* (Italy) **24**, 452–68(1938).—The specific rotation with increased exposure to ultraviolet radiation diminishes at first rapidly, then more slowly according to a logarithmic curve. The m. p. is lowered in a rectilinear manner. The absorption spectrum in the ultraviolet of estrone and that of the product of 2-hr. irradiation differ: there is a sensible diminution of transparence between 2500 and 2700 A. and a slight shift of the max. which, while for estroue is 2795 A., for the 2-hr. irradiation product, is 2805 A. The intensity of the color reaction characteristic of phenolic OH is reduced almost to half in the irradiated product. The ketone color reaction is decreased one-fourth. The typical fluorescence changes profoundly and it is possible to obtain a product with an azure fluorescence after irradiation. From alc. solns. of irradiated substance rhombic crystals can be sepd. by concn. while there remains in soln. a brown, resinous substance which has no tendency to crystn. The estrogenic activity assayed by the Miescher, Scholz and Tschopp method (cf. *C. A.* **32**, 9230⁸) remains unchanged. P. F. Metildi

The action of cysteine, Fe^{++} and of the cysteine Fe^{++} system on alkaline phosphatase. F. Del Regno. *Arch. sci. biol.* (Italy) **24**, 532–36(1938).—Cysteine and Fe^{++} separately inhibit phosphatase activity at 0.01–0.001 *M* concn. while they activate it at 0.0001 *M* concn. The inhibition from cysteine at 0.01–0.001 *M* concn., instead of being increased, is partially removed by the presence of Fe^{++} at 0.01–0.001 *M* concn. There is no further increase in activity by Fe^{++} when added to cysteine at 0.0001 *M* concn. The actions, inhibitory or activating, are more pronounced in the dialyzed enzyme. P. F. Metildi

Structure of protein according to Bergmann. F. Cedrangolo. *Arch. sci. biol.* (Italy) **24**, 537–54(1938); cf. B., *C. A.* **32**, 7485⁴.—A review. P. F. Metildi

The esterase action of benzoylcarbinol. C. Lenti. *Arch. sci. biol.* (Italy) **25**, 254–60(1939).—$BzCH_2OH$ has no catalytic action on the hydrolysis of Me butyrate. A method of electrometric titration is described. P. F. M.

Chemical nature of emulsin. C. Malaguzzi-Valeri. *Arch. sci. biol.* (Italy) **25**, 261–9(1939).—Emulsin prepns. which can be obtained from bitter almonds by Willstätter and Csányi's method (cf. *C. A.* **17**, 1251) have an isoelec. pH of 6–1. Dialysis at the isoelec. or lower pH seps. the emulsin into an apo- and a co-enzyme which may be reunited after restoration of enzyme activity. The coenzyme is neither an amino acid nor a polypeptide. It has neither a SH and S group nor amino groups. While the holoenzyme in the anion form is stable, it splits spontaneously into coenzyme and apoenzyme when it is in the form of cation. P. F. Metildi

The action of pancreatic lipase on 2,3-dimethyl-1-stearylglycerol and on 1,3-dimethyl-2-stearylglycerol. F. P. Mazza and C. Malaguzzi Valeri. *Arch. sci. biol.* (Italy) **25**, 270–8(1939).—The method of prepn. and properties of the 2 compds. are described. Both are hydrolyzed by pancreatic lipase which sets the acid free. As an acyl

migration is not discernible, it is concluded that the enzyme can split the ester linkage of the primary and secondary alc. groups. The hydrolysis of the acyl which is bound to the primary alc. group occurs before that of the acyl from the secondary group. Though with a different rate the equil. is reached in both cases when the splitting of the substrate is 15%. P. F. Metildi

The action of hydrogen peroxide on serum proteins in relation to temperature. Mario Calcinai. *Biochim. terap. sper.* **26**, 346–56(1939).—Protein resynthesis by H_2O_2 was studied in rabbit and horse serum. The fraction precipitable with CCl_3CO_2H was either increased or decreased at 0° as well as at 37°, showing that the temp. is not the factor that causes the variations. A. E. Myer

The effect of sterilization upon sugars. J. G. Davis and H. J. Rogers. *Zentr. Bakt., Parasitenk.*, II Abt. **101**, 102–10(1939).—Autoclaving 2% solns. of carbohydrates for 30 min. at 120° is very much more destructive than a "momentary" autoclaving, which consists of raising the temp. to 120° and allowing the autoclave to cool immediately. Sucrose, starch and salicin undergo less marked change in phosphate buffer (pH 6.8) than in distd. water. All other carbohydrates tested show more change in the buffer. Glucose, lactose and maltose show a large change in optical rotation but reducing power is less influenced. Fructose and arabinose show large changes in both characteristics indicating more intense destruction. The most unstable sugars are in the following order, fructose, glucose, arabinose and lactose. Sucrose, raffinose and salicin are quite stable. Maltose, starch and esculin are in an intermediate position. John T. Myers

Electric charge of cell constituents. P. v. Lehotsky. *Arch. exptl. Zellforsch. Gewebezucht.* **23**, 84–94(1939).—Elec. charges were studied by the effect of acids and alkalies on cell areas. When the pH of the medium was 4.2, infusoria died, the pH of the nucleus and protoplasm falling rapidly. At pH 11.0, death also occurred. Protoplasm resisted change in pH better than the nucleus. Maurice M. Rath

Effect of arginase of digestive juices and glands. Masaru Kaizyu. *Tohoku J. Exptl. Med.* **36**, 153–8(1939).—Expts. on the arginase action of the pancreatic and intestinal juices of the dog, rabbit, pig and cow showed that pancreatic arginase activity was greatest in the pig and its activation by Mn was also greatest. After Mn activation, the activity of the arginase from the mucous membrane of the small intestine of the pig and dog was greatest while that of cattle was weakest. The optimal pH for arginase action is pH 9. Practically no arginase effect was found in the pancreatic juice of the dog and cat, while in the intestinal juice of the dog a definite effect (at pH 9) was found which increased upon addn. of Mn. In confirmation of observations of Edlbacher and Pinösch (*C. A.* **32**, 2155[8]), this intestinal arginase is completely inhibited by the addn. of pancreatic juice. Maurice M. Rath

Effect of acylase. VI. Action of α,δ-dibenzoylornithine in the presence of enzyme solutions from various sources. Masaru Kaizyu. *Tohoku J. Exptl. Med.* **36**, 255–7(1939); cf. *C. A.* **33**, 6574.—Rabbit, pig and fowl tissue macerates (4 cc.) were separately mixed with 10 cc. of 0.1 *N* dibenzoylornithine soln. and 6.0 cc. phosphate buffer (pH 7.5). After the mixt. was allowed to digest for 24–32 hrs. at 37°, 4 cc. of the digestion soln. was examd. for increase in acidity, and 2 cc. for amino N (cf. Utzino, Tsunoo, and Mori, *C. A.* **32**, 2156[8]). Tissue macerates (kidney, liver, spleen, pancreas, etc.) gave neg. results. Maurice M. Rath

The influence of ultraviolet rays on the healing of fractures and its relation to thyroid and parathyroid hormones. Kei-gen Tei (Kiu-won Chung). *J. Chosen Med. Assoc.* **29**, 455–64(English abstr. 27)(1939); cf. *C. A.* **33**, 5014[1].—The removal of thyroid or parathyroid glands delays the healing of fracture in rabbits. The hastening effect of ultraviolet ray on the healing is weakened if the animal is deprived of thyroid or parathyroid. S. Tashiro

The effect of ultraviolet radiation and calcium injections on the healing of fractures in splenectomized or parathyroidectomized animals. Kei-gen Tei (Kiu-won Chung). *J. Chosen Med. Assoc.* **29**, 542–52(English abstr., 36–7)(1939).—The Ca injection is beneficial in healing of fracture only in rabbits whose blood Ca is low such as in the cases of irradiated or parathyroidectomized animals, and delays the healing if blood Ca is high as in splenectomy. S. Tashiro

Preparation and bioassay of renin. W. W. Swingle, A. R. Taylor, W. D. Collings and H. W. Hays. *Am. J. Physiol.* **127**, 768–79(1939).—A fractional pptn. method, in which NaCl and $(NH_4)_2SO_4$ are used, for the extn. and purification of renin is described. The product is a nontoxic pressor protein apparently belonging to the globulin group. The protein retains its pressor properties unimpaired for long periods if kept frozen, or if "lyophiled" and kept in the dry state as a powder under vacuum. The frozen or dried material contains 4.6 mg. of solids per cc. The total N content is 15.4–15.7% of the total solids. It is nondialyzable and is pos. for all the standard protein tests. A prepn. of renin was assayed on dogs and a unit established. A renin unit is defined as the min. amt. necessary, when given intravenously over a period of 2–5 sec., to raise the mean arterial pressure of anesthetized dogs an av. of 40 mm. Hg above the starting pressure level. This unit, in terms of the prepn. used is equiv. to 0.1 mg. solid material per kg. body wt. and contained 0.016 mg. N. This renin prepn. was nontoxic even when intravenously injected in large amts. E. D. Walter

Synthesis of a high-mol. hydroxymethylfurfural deriv. [elimination in the body] (Iseki, Sugiura) **10**. Sulfhydryl groups in proteins (Greenstein) **10**.

B—METHODS AND APPARATUS

GLENN E. CULLEN

Application of the Pulfrich photometer to the determination of phosphates by the method of Fiske and Subbarow. A. D. Marenzi. *Anales farm. bioquim.* (Buenos Aires) **10**, 64–9(1939); cf. F. and S., *C. A.* **20**, 1092.—Best results are obtained with filter S 75 which has a max. absorption at 750 mμ. L. E. Gilson

Application of the Pulfrich photometer to the determination of blood magnesium. A. D. Marenzi. *Anales farm. bioquim.* (Buenos Aires) **10**, 70–5(1939).—The Mg is pptd. by the method of Briggs (*C. A.* **18**, 2183), then the P in the ppt. is detd. by a modification of the method of Fiske and Subbarow (*C. A.* **20**, 1092) with a Pulfrich photometer. L. E. Gilson

Photometric estimation of conjugated glucuronides in urine. Marcel Florkin and Roger Crismer. *Compt. rend. soc. biol.* **131**, 1277–80(1939).—The application of the previously described naphthoresorcinol reaction method (cf. *C. A.* **32**, 2406[9]) to normal and diabetic urine is described. L. E. Gilson

The determination of the pH of small quantities of liquid and circulating blood with the use of a glass electrode. A. A. Smirnov. *J. Physiol. U. S. S. R.* **26**, 305–13(in French, 313)(1939).—A description of the prepn. and application of the glass electrode to the detn. of the pH of small amts. of liquid and circulating blood as developed by American and European scientists. S. A. K.

The determination of reducing sugars by the cyanide method. B. O. Lyubin and N. D. Bukhman. *Voprosy Pitaniya* **8**, No. 2, 65–70(1939).—The method of Ionescu-Matiu (*Bull. soc. chim. biol.* **9**, 68(1927)) is the most satisfactory rapid method. For solns. contg. 0.5–2% sugars concns. of $K_3Fe(CN)_6$ and KOH of 46 g./l. are most satisfactory. S. A. Karjala

A simple colorimetric method for the estimation of vitamin A. Kokiti Osima and Siniti Itaya. *J. Agr. Chem. Soc Japan* **15**, 553–62; *Bull. Agr. Chem. Soc. Japan* **15**, 101–2(1939)(in English).—In a test tube 0.5 cc. of liver oil in $CHCl_3$ was mixed with 4.5 cc. of 20% $SbCl_3$ in $CHCl_3$. The blue color which formed was used as a standard for the estn. of vitamin A. The comparison was performed within 30 sec. The mixts. of $CuSO_4$ and $Co(NO_3)_2$ were used as color standards instead of the Lovibond tintometer. Y. Kihara

A simplified procedure for the isolation of lysine from protein hydrolyzates. Eldon E. Rice. *J. Biol. Chem.* 131, 1–4(1939).—A method is described for the prepn. of pure lysine-HCl from protein hydrolyzates by direct pptn. as lysine picrate. The method eliminates the need for special equipment and greatly reduces the labor involved and the yield and quality of the product are as high as those obtained by more complicated procedures. Histidine-2HCl can be readily prepd. from the same hydrolyzate. A. P. Lothrop 1

Electrodialysis of tissue chloride. I. The method and controls. Robert H. Oster and Emily J. Kemp. *J. Biol. Chem.* 131, 13–18(1939).—A method is described for removing chloride from animal tissues by electrodialysis which is based on the method of Joseph and Stadie (*C. A.* 32, 9132[1]) for the simultaneous detn. of chloride and total base in blood serum. Considerable change has been made in the design of the chamber and electrode vessels and in the concn. of the solns. employed. There is good agreement between the recovery of chloride from the tissues by this method and by wet ashing. A. P. Lothrop 2

The determination of coenzyme I in animal tissues. A. E. Axelrod and C. A. Elvehjem. *J. Biol. Chem.* 131, 77–84(1939).—A method is described for the detn. of coenzyme I in animal tissues based upon the principle that the addn. of varying amts. of coenzyme I to a washed yeast prepn. will produce rates of fermentation which are proportional within certain limits to the amt. of coenzyme added. It is a modification of the procedure developed by Myrbäck and v. Euler (*C. A.* 31, 4379[9]). The coenzyme I content of the blood, liver, kidney cortex, brain, gray matter and gastrocnemius muscle from the guinea pig, rat, chicken and dog and of human blood are given. A. P. Lothrop 3

Methods for the determination of submicro quantities of total nitrogen, ammonia, amino nitrogen, amides, peptides, adenylic acid and nitrates. Henry Borsook and Jacob W. Dubnoff. *J. Biol. Chem.* 131, 163–76(1939).—The methods described constitute a "system" of analysis of the common N compds. in animal and plant fluids. For any individual detn. 0.1 ml. contg. 0.0003 mg of N suffices. For the fractionation of a mixt about 2 ml. contg. about 0.5 mg. of N will permit carrying out all the detns. in duplicate. The ordinary disagreement between duplicates and the abs. error of all except the Kjeldahl detns. are under 1%. The difference between duplicates in the Kjeldahl detns. is about ±2% and the recovery of N is the same as in the macro-Kjeldahl procedure. The final procedure in all the methods is an electrometric titration with a glass electrode. All the above fractions have been detd. in duplicate in 6 different solns. in 2 normal working days and all the necessary equipment can be placed on a lab. bench 8 ft. long. The methods have been used over a period of 2 yrs. in the study of the N metabolism of plant seedlings, isolated growing pea embryos, marine invertebrate embryos and thin slices of mammalian tissue. A. P. Lothrop 4

The spectroscopic determination of cytochrome *c* and its distribution in some mammalian tissues. A correction. R. Junowicz-Kocholaty and T. R. Hogness. *J. Biol. Chem.* 131, 187(1939); cf. *C. A.* 33, 7834[8].—The cytochrome content of mammalian tissues previously reported (as γ per g. of tissue) was based upon the assumption that cytochrome contains 0.34% of Fe. Theorell (*C. A.* 33, 7830[4]) reports that cytochrome purified by electrophoresis contains 0.43 rather than 0.34% of Fe so that the results previously reported should be multiplied by 0.79 (0.34/0.43) if pure cytochrome is to be defined as that product which is purified by electrophoresis. A. P. Lothrop 5

The determination of serum total protein, albumin and globulin by the biuret reaction. Geo. R. Kingsley. *J. Biol. Chem.* 131, 197–200(1939).—Total protein is detd. by mixing fresh serum with 10% NaOH soln. in a photoelec. colorimeter tube followed by the addn. of $CuSO_4$ soln. Readings remain stable for at least 1 hr. Globulin is pptd. by 23% Na_2SO_4 soln. and the albumin is detd. in the filtrate in a similar manner. Total protein minus albumin gives the globulin. The colorimeter is standardized by dilg. pooled serum with 0.85% NaCl to give solns. of various protein content as detd. by the Kjeldahl method. A. P. Lothrop 6

The identification and estimation of hexoses in polysaccharides and glycoproteins by the carbazole method. Samuel Gurin and Dorothy B. Hood. *J. Biol. Chem.* 131, 211–23(1939).—The carbazole reaction of Dische (*C. A.* 24, 1879) has been standardized so that glucose, fructose, galactose, mannose and equimol. mixts. of such sugars can be identified by their characteristic $e_{520}:e_{420}$ ratios. The colors obey Beer's law and can be quantitatively estd. The values obtained for galactose and an equimol. glucose-mannose mixt. are nearly identical so they cannot be distinguished without aid of supplementary tests. Dog liver glycogen samples from animals fed high galactose and glucose diets were found to be identical with respect to their glucose content. Meyer's finding that the neutral polysaccharide of gastric mucin is a galactan has been confirmed. The hexose in ovomucoid is mannose and in serum mucoid galactose-mannose. Mixts. of amino acids and gelatin do not appreciably influence the absorption characteristics of the sugars but results with proteins contg. appreciable amts. of tryptophan should be interpreted with caution since fair values can be obtained only when tryptophan is present in very small amts. A. P. Lothrop 7

Colorimetric determination of ammonia with thymol-hypobromite reagent. P. Arne Hansen and Verner Nielsen. *J. Biol. Chem.* 131, 309–15(1939); cf. *C. A.* 24, 2489.—When NH_3 reacts with thymol and hypobromite, a colored compd. is formed which dissolves in isopropyl ether, forming a red soln. which can be used for a colorimetric detn. With the exception of a Pulfrich photometer no special equipment is needed. The method is semimicro and quantities ranging from 20 to 0.5 γ of ammonia N per ml. may be detd. with an error of about 1–2%. A. P. Lothrop 8

Method for quantitative evaluation of hydrogen and dehydrogenase donors in the unit of measure of a tissue substratum. Mario Calcinai. *Arch. sci. biol.* (Italy) 25, 89–99(1939).—The method is based on decolorization of methylene blue which expresses the quantity of natural donors as compared with the amt. reduced to leuco base. P. F. Metildi 9

The Pasteur-Meyerhof reaction. Giovanni Moruzzi and Maria A. Bartoli *Arch. sci. biol.* (Italy) 25, 178–88 (1939).—NaF 10^{-3} mol. which inhibits respiration 26–29% in the catalysis of methylene blue does not stop aerobic glucolysis in the same system; in fact, this increases 75%. At the level of triosephosphoric acid the sepn. of the 2 ways of glucolysis takes place (the fermentative way which results in glucolysis and the oxidative way which is respiration). P. F. Metildi 10

A new mathematical method for the evaluation of endogenous insulin secretion M. M. Miller and O. P. Allen. *Ann. Internal Med.* 13, 636–49(1939).—Voluminous instructions are given for calcg. the dosage of insulin from the blood sugar and the wt. of body soft tissue, by a modification of the method of Hartman. The findings add evidence to the conception that 1 unit of insulin will metabolize 2 g. of glucose. John T. Myers 11

The role of carbon dioxide in the resazurin test. Millard F. Gunderson and Hugh L. Templeton. *J. Bact.* 38, 483–4(1939).—The use of CO_2 accelerated the first color change from blue to mauve, but the change from blue to white was uninfluenced. John T. Myers 12

Pyrotannic acid method for determination of carbon monoxide in the blood. Humio Komatu. *J. Oriental Med.* 30, 775–83(English abstr., 191)(1939).—A 10% error usually attributed to the Sayers method (cf. *C. A.* 20, 60) can be reduced to 1%, if the standard is made up with blood of the same species, CO is first washed through KOH soln., exactly the same concn. of pyrogallol as tannic acid is used in both, the sample blood is dild. 1:20, and the standards are made up in 5% steps. S. Tachiro 13

Enzymic estimation of citric acid with indotrisulfonate as indicator. Herman Gränvall. *Kgl. Fysiograf. Sällskap. Lund, Förh.* 7, 40–79(1937)(Pub. 1938)(in English);

cf. *C. A.* **32**, 2198[8].—Extensive quant. expts. are described which indicate that indigotrisulfonate (I) has the following advantages in the enzymic titration of citric acid in biol. liquids (such as fluids of the eye and sera): In the presence of reduced ascorbic acid the values for citrate are more nearly correct than those obtained with methylene blue (II) (usually low) or with thionine (usually high). The deviations of individual detns. from the average are less than with II or thionine. With I, known amts. of citrate added to biol. fluids can be detd. with good accuracy. II or thionine is decolorized more rapidly in the light than in the dark; I decolorizes at the same rate under both conditions. Addn. of reduced glutathione to vitreous humor of the ox eye retards the decolorization of I and thionine (lowering the apparent citrate value); relatively large amts. have the same value when I is used, but small amts. (such as might normally be present) depress the citrate value very slightly if at all. The use of I has the following limitations: NaCl soln., Ringer soln. and most buffer solns. should not be used for dilns., since they strongly inhibit the reaction. The values obtained in detns. on strongly colored sera may be too high. 42 references. W. C. Tobie

List of micromethods for the detn. of Ca and phosphate (Manly) 7.

Blood-sugar test. Wm. B. Fortune (to Eli Lilly and Co.). U. S. 2,171,961, Sept. 5. A process for testing for blood sugar consists in diluting many times a small quantity of the blood to be tested, pptg. proteins present in the dild. blood with that dild. blood acidulated to an acidity at least as great as pH 4.5, and removing the pptd. proteins, alkalinizing the liquid remaining to approx. pH 10.7, reacting the alkalinized liquid with CH_2O in the presence of Na_2SO_3 to produce formose in an amt. proportional to the original sugar present in the blood, and adding a definite quantity of 2,4-dinitro-1-naphthol-7-sulfonic acid to produce a reaction with the formose which yields a coloration which by comparison with a color chart indicates the quantity of blood sugar in the blood.

Testing for albumin in urine. Wm. B. Fortune (to Eli Lilly and Co.). U. S. 2,171,962, Sept. 5. A process for testing for albumin in urine consists in diluting a fixed quantity of the urine, and adding to the dild. urine Na hexametaphosphate and an acidulating agent of the class consisting of glutamic acid hydrochloride and oxalic acid, to produce a turbidity which by comparison with a turbidity chart indicates the quantity of albumin in the urine.

Analysis of respiration gases. Per F. Scholander. U. S. 2,172,038, Sept. 5. App. is described, and a method for the examination of respiration gases comprising conveying the expiration gas in a closed system of circulation tubes into the lower part of a gas chamber, withdrawing from the upper part of the gas chamber the inspiration gas and replacing the same by the expiration gas which is introduced from below until the chamber is filled to about three-fourths of its capacity with expiration gas, recording the respiratory difference curve during the steps and then detg. the production of CO_2 by absorption of the CO_2 that has accumulated in the circuit.

C—MICROBIOLOGY

LAWRENCE H. JAMES

Function of vitamin B in anaerobic bacterial metabolism. M. Silverman and C. H. Werkman. *Iowa State Coll. J. Sci.* **13**, 107-13(1939).—Vitamin B is necessary for the anaerobic dissimilation of pyruvic acid by the heterocyclic acid bacterium *Lactobacillus mannitopoeus* and stimulates the anaerobic dissimilation of glucose, lactic acid and several other substrates by *Propionibacterium pentosaceum*. 2-Methyl-5-bromomethyl-4-aminopyrimidine-HBr and 4-methyl-5-β-hydroxyethylthiazole cannot replace vitamin B as a growth factor or as a metabolic stimulant in the enzyme system of *P. pentosaceum*. Cocarboxylase or something with a similar action was found in the ext. of several types of bacteria. F. E. B.

Pressure-aeration effects on the dissimilation of glucose by Aerobacter indologenes. M. N. Mickelson and C. H. Werkman. *Iowa State Coll. J. Sci.* **13**, 157–60(1939).—Aeration, especially under pressure, increases the yield of acetylmethylcarbinol at the expense of 2,3-butylene glycol, and increases the yield of CO_2 and AcOH at the expense of EtOH. Added AcOH is reduced in spite of increased pressure of O_2. F. E. Brown

Occurrence of acrolein as an intermediate during the fermentation of glycerol by the coli-aerogenes bacteria. Howard Reynolds, W. M. Hoehn and C. H. Werkman. *Iowa State Coll. J. Sci.* **13**, 275–7(1939).—In a medium contg. only org. salts, glycerol and dimethyldihydroresorcinol added as a fixing agent *Citrobacter freundii* yielded a relatively large quantity of (2,2-[acrylidene] bis[5,5-dimethyl-1,3-cyclohexanedione]). Other cultures of *Citrobacter* and 1 of *Aerobacter* produced this same cryst. deposit. Cultures of *Escherichia* and 2 of *Aerobacter* produced no ppt. With $CaSO_3$ as a fixing agent *Citrobacter freundii* produced pyruvic acid and AcH. F. E. B.

The effect of the concentration of mannitol upon the production of levulose by the action of Acetobacter suboxydans. E. I. Fulmer, J. W. Dunning and L. A. Underkofler. *Iowa State Coll. J. Sci.* **13**, 279–81(1939).—Increasing concns., up to 25% of mannitol, decrease the rate of production but not the final yield of levulose. Decrease of surface vol. ratios from 2.36 to 0.2 decreases the rate but not the yield in the same reaction. Concns. above 30% decrease both rate of reaction and yield. F. E. Brown

Fermentation of glucose by Plectridium tetani. H. J. Boorsma, A. R. Prévot and R. Veillon. *Compt. rend. soc. biol.* **131**, 1137–40(1939).—The organism was grown 7–10 days in broth contg. 2% of glucose. Of the glucose fermented, 13–17% of the C appeared as CO_2, 15–17% as AcOH, 28–32% as $PrCO_2H$, 11–14% as MeOH, 9–12% as EtOH and 18–24% as BuOH. Very small amts. of H_2 and lactic acid were formed, but no CH_4, AcH, Me_2CO, PrOH or $EtCO_2H$. L. E. Gilson

Study of the different radicals of the glycerol molecule with respect to the growth of various strains of human and bovine tubercle bacilli. E. Fernbach and Georges Rulher *Compt. rend. soc. biol.* **131**, 1142–5(1939).—The tubercle bacillus seems to require the entire glycerol mol. for growth *in vitro*. When the glycerol of the media was replaced by PrOH, isopropanol, inositol or ethylene, propylene or trimethylene glycol little or no growth was obtained. L. E. Gilson

Preparation and properties of toxins of B. perfringens, B. oedematiens, B. histolyticus and septic vibrios. Toxin formation in the presence of sodium pyruvate and ascorbic acid. M. Weinberg and Maylis Guillaumie. *Compt. rend. soc. biol.* **131**, 1150–4(1939).—Pptn. of the crude toxins by $(NH_4)_2SO_4$ is discussed. Addn. of Na pyruvate and K_2HPO_4 to the media increases toxin formation; ascorbic acid produces little or no increase. L. E. Gilson

Ethanol as a source of carbon for Friedlandet's bacillus M. Lévy-Bruhl and N. G. Noé. *Compt. rend. soc. biol.* **131**, 1240–2(1939).—The organism utilizes EtOH but not MeOH. The EtOH is not converted to AcOH. L. E. Gilson

Inactivation of the bacteriolysin of Actinomyces by ultraviolet rays. Maurice Welsch. *Compt. rend. soc. biol.* **131**, 1296–9(1939); cf. *C. A.* **32**, 9165[1].—The inactivation is a unimol. reaction and is effected by rays shorter than 300 mμ. L. E. Gilson

Styryl 430 and the glucose metabolism of yeast. Influence of various amounts of sodium nucleinate. Y. Pourbaix. *Compt. rend. soc. biol.* **131**, 1306–9(1939); cf. *C. A.* **32**, 6682[2], 8539[9].—After the respiration of yeast has been reduced to a low level by styryl 430 (2-*p*-aminostyryl-6-*p*-acetylaminobenzoylaminoquinoline methoacetate) the addn. of Na nucleinate to about 0.00073 *M* concn. in the medium restores the respiration to about the normal level. Under normal conditions Na nucleinate does not affect the respiration of yeast. L. E. Gilton

Anaerobiase. Ernst Maschmann. *Naturwissenschaften* **27**, 628–9(1939); cf. *C. A.* **32**, 9151[4].—Anaerobiase from

obligatory anaerobic bacteria has little proteolytic activity; clupein is very little decompd. by it. Addn. of cysteine or other SH compds. to the filtered culture increases the activity of the anaerobiase to split up casein, gelatin and clupein. Addn. of H_2S or of ascorbic acid has no effect. Purified enzyme is completely inactive, cysteine activates it for casein and gelatin decompn. but not for clupein. The latter is attacked only if the fraction removed in purification is added. The material acting as activator is thermostable and diffusible. It was assumed that anaerobiase consists of 2 enzymes, one of which requires the activator as coenzyme. Another function of the activator might be that of H transmitter in the activation of the anaerobiase by SH. The activator is present in the nutrient bouillon and is not necessarily formed by the bacteria; it is formed by yeast and occurs in the animal body (muscle, blood, liver, kidney, heart). In testing various H transmitters it was found that cozymase (diphosphopyridine nucleotide) as well as triphosphopyridine nucleotide have activator qualities for the anaerobiase-SH combination toward clupein. Nicotinic acid amide-iodoacethylate is nonactive. In gelatin, glutin and glutin peptone the activator is normally present; hence addn. of it is not required for these substances as substrates. It also follows that anaerobiase is a single enzyme. The activating substance acts as H transmitter. B. J. C. van der Hoeven

Progress in the study of the typhoid bacillus. A. J. Weil, L. S. Gall and S. Wieder. *Arc. Path.* 28, 71-89 (1939).—A general review with 133 references. Harriet F. Holmes

B. pestis antigens as prophylactic agents. H. Schütze. *Brit. J. Exptl. Path.* 20, 235-44 (1939).—Plague prophylaxis in the rat, by means of heat-killed broth vaccines, where the test dose is a large and toxic one, depends markedly on the presence in the vaccine of envelope antigen. As this antigen is more abundantly produced at higher than at lower temps., vaccines grown at 37° are more effective than those grown at 26°. In the mouse, where the test dose is a small and invasive one, the effect of envelope antigen is less pronounced. Virulent cultures do not result in more potent vaccines for either rats or mice than do avirulent ones, nor are smooth cultures more effective than rough ones, when these vaccines are killed. It has been shown that a smooth avirulent culture used in the form of a living vaccine survives longer in the guinea pig and produces a higher envelope antibody titer in the rabbit than does a rough avirulent culture. No serological distinction was established between virulent and avirulent, smooth and rough, forms. Harriet F. Holmes

Growth factors for Bact. radicicola. II. Ragnar Nilsson, G. Bjälfve and Dagmar Burström. *Lanthbruks-Hogskol. Ann.* 6, 299-326 (1938); cf. *C. A.* 32, 5429[8], 7502[9]; 33, 2170[8].—The earlier indication that the growth-stimulating principle of yeast ext. for *B. radicicola* is composed of more than 1 factor was confirmed by partial fractionation with intensive ether extn. The ether ext. (I) alone possessed slight growth-stimulating activity in KNO_3 medium, but in combination with an alc. ext. (II) of the ether-insol. residue, 1/3 to 1/2 of the activity of the customary yeast ext. was obtained. Vitamin B_1 when added with I or hydrolyzed casein produced essentially as much growth as I and II combined. The active principle of I was partially adsorbed by fuller's earth and Frankonite. Neither lactoflavin nor inositol possessed any activity for *B. radicicola* on KNO_3 or asparagine media, with or without vitamin B_1 and I. These organisms were not stimulated by the combination of pimelic acid, nicotinic acid and β-alanine, which composes the active growth complex for *Corynebacterium diphtheriae* (cf. *C. A.* 32, 2089). III. *Ibid.* 7, 51-61 (1938).—An amyl alc. ext. of yeast was prepd., which at optimum concn. yielded about 1/3 as much growth of *B. radicicola* on KNO_3 medium as the customary yeast or straw ext. An excess of the ext. produced large bacteroid-like cells which was reflected in an increase in the ratio of turbidity to cell no. The simultaneous addn. of vitamin B_1 with suboptimal concns. of the AmOH ext. also increased the size of the cells and had no influence on their growth in no. This effect of vitamin B_1, possibly because of an excess over the growth requirement supplied in the ext., indicates the importance of this growth factor for the production of naturally occurring bacteroid forms in nodules of the host plant. IV. G. Bjälfve, Ragnar Nilsson and Dagmar Burström. *Ibid.* 291-9 (1939); cf. *C. A.* 33, 4283[8].—A variety of strains of *B. radicicola* from different groups were tested for their response toward vitamin B_1. Only 3 strains, all belonging to the clover group and including the one employed in the earlier work, appeared to require this growth factor, when grown either on sucrose-straw ext. gelatin or in liquid medium with ether ext. of yeast. Two other strains from the clover group and 16 from various other groups are apparently able to synthesize vitamin B_1 if it is required. V. Ragnar Nilsson, G. Bjälfve and Dagmar Burström. *Ibid.* 301-31.—The growth-stimulating ether ext. was obtained in cryst. form and identified as succinic acid. Com. succinic acid, however, was inactive. High-vacuum sublimation of the cryst. ext. yielded a purified and inactive prepn. The minute unsublimated residue, which was insol. in abs. alc. and very slightly sol. in H_2O, was highly active; 5γ produced optimum growth of *B. radicicola* when vitamin B_1 was also added. The extent of growth was comparable to that given by the customary yeast or straw ext. The active constituent appears to be identical with Kogl's biotin with respect to stability, occurrence and soly. in ether. Biotin stimulated the growth of *B. radicicola* in dilns. of 1:100,000,000,000 to 1:2,000,000,000. Cultures given biotin had a somewhat longer induction period than those given the ext. The ext. appears to supply a trace of readily available N rather than addnl. growth factors. As evidence for this, asparagine which is more readily available than KNO_3, shortened the induction period of the cultures. Some strains of *B. radicicola* were found to have no requirement for vitamin B_1. This applied when the cultures were given either biotin or the ether ext. C. K. Horner

The variability of Eberth's bacillus in an experimental bacillus carrier. M. E. Vasil'ev. *Z. Mikrobiol., Epidemiol. Immunitatsforsch.* (U. S. S. R.) **1939**, No. 5, 47-52 (in English, 52).—A dog was infected with Eberth's bacillus through a fistula of the bile bladder. Typhoid strains isolated from the bile showed rough variants which reverted to the smooth types by way of intermediate O-forms. Short-lived biochem. variants appeared rapidly. These consisted of maltose-defective strains and strains resembling dysentery bacilli which were unable to ferment glucose, lactose, maltose, mannitol or sucrose. The reactions toward xylose and H_2S formation were unchanged. None of the strains isolated was able to produce indole. An approach in the body to an *R*-form increased the agglutinability of the cultures, which fell as a result of reversion to the *S*-forms. S. A. Karjala

Pigment production by Bac. typhi abdominalis under the influence of bacteriophage. S. S. Rotenburg. *Z. Mikrobiol., Epidemiol. Immunitatsforsch.* (U. S. S. R.) **1939**, No. 5, 61-5 (in English, 65).—A portion of the colonies on sloped agar of 3 strains of *Bac. typhi abdominalis* (I) which were treated in meat peptone broth at 37° for 1 to 2 days with bacteriophage showed the ability to produce a yellowish brown or brownish green pigment. These pigment-producing variants were identical with I in biochem. and serological properties except for a lower agglutinability and the fact that they were lysinogenic. One of the strains showed a reduced virulence toward white mice and an increased resistance toward bacteriophage. S. A. Karjala

The influence of mixed cultivation on the biology of B. dysenteriae Shiga and Bac. typhi abdominalis. S. A. Botvinik. *Z. Mikrobiol., Epidemiol. Immunitätsforsch.* (U. S. S. R.) **1939**, No. 5, 66-9 (in English, 69).—Joint cultivation of *B. pyocyaneus* (I) with *B. dysenteriae* Shiga (II) resulted in the complete suppression of the growth of II. No depressing influence of I was observed on *Bac. typhi abdominalis*. The 2-week-old mucous filtrates of I react in the same way, while nonmucous filtrates have no effect on either I or II. S. A. K.

The determination of the toxicity of B. enteritidis Gärtneri. I. I. Arkhangel'skiĭ. *Z. Mikrobiol. Epidemiol. Immunitätsforsch.* (U. S. S. R.) **1939**, No. 6, 15–21 (in English, 21).—Of 10 strains of *B. enteritidis* Gärtneri grown on spleen broth for 6 days followed by filtration through Chamberland F candles, 7 produced toxic substances capable of killing mice in 1–3 cc. doses. The toxin reacts with specific serum in flocculation tests. No uniform Schwartzmann reaction was observed in skin tests on rabbits. S. A. Karjala

Cultivation of phase I *H. pertussis* in a semisynthetic liquid medium. J. W. Hornibrook. *U. S. Pub. Health Repts.* **54**, 1847–51 (1939).—The formula of a simplified, serum-free liquid medium is given. It supports a heavy growth of Phase I *H. pertussis*. It has been demonstrated that, aside from org. N, 2 groups of substances are necessary for growth of Phase I: (*a*) certain polysaccharides, and (*b*) S-contg. compds. such as glutathione or cysteine. An unknown substance present in yeast ext. stimulates growth but is not essential. Nine references. J. A. K.

Yeasts found in "miso" (bean paste). Masatosi Mogi. *J. Agr. Chem. Soc. Japan* **14**, 951–88, 1175–1206, 1297–1324; *Bull. Agr. Chem. Soc. Japan* **14**, 80–1 (1938) (in English).—Thirty-four stocks of yeasts were isolated from various kinds of miso and investigated morphologically and physiologically. Ten varieties of *Saccharomyces miso*, 6 varieties of *Zygosaccharomyces miso*, 2 varieties of *Debaryomyces miso*, one variety of *Hansenula anomala* var. *miso*, 8 varieties of *Torulopsis miso* and one variety of *Torulopsis albida* Lodder var. *miso* were newly found. *Zygosaccharomyces* were mainly found in the kinds of miso fermented for a long period, while *Debaryomyces* were isolated from the kinds of miso fermented for a short period. Y. Kihara

Molds growing in high concentration of sulfuric acid and copper sulfate. Tatuzo Sato. *J. Agr. Chem. Soc. Japan* **15**, 359–69; *Bull. Agr. Chem. Soc. Japan* **15**, 76–7 (1939) (in English).—Three strains of molds were isolated from H_2SO_4 soln. and one strain was isolated from $CuSO_4$ soln. of Bertrand's reagent. They were, resp., *Oöspora viscosa* nov. sp., *Dematium pullulans* de Bary var. *acidiphylum* nov. sp., *Penicillium cuprophylum* nov. sp. and *Penicillium biforme* Thom var. *vitriolum* nov. var. They grew, resp., in 7% H_2SO_4, 5% H_2SO_4, 19% $CuSO_4$ soln. and 21% $CuSO_4$ soln. The optimum temps. for the growth were, resp., 28°, 30°, 28° and 28°. The optimum pH values were, resp., 5.4, 5.4, 7.6 and 4.4. They did not ferment sugars. Y. Kihara

Acetone-butyl alcohol fermentation. I. Bacteriological properties of Bacillus butanolo-acetoni Yukawa-Horie nov. sp. and the fermentation of cassava by this organism. Matao Yukawa and Sigeyosi Horie. *J. Agr. Chem. Soc. Japan* **15**, 609–23, *Bull. Agr. Chem. Soc. Japan* **15**, 103–5 (1939) (in English).—A new strain of *Clostridium acetobutylicum* (Weizmann) was isolated from maize. It was different in the fermentability of rhamnose and trehalose, the form of sporangia, and the fermentability at low temp. from *Bacillus granulobatter pectinovorum*. Hence it was named *Bacillus buanolo-acetoni* Yukawa-Horie nov. sp. About 7 kg. of acetone, 14 kg. of butyl alc. and 2 kg. of EtOH were produced by the fermentation of 100 kg. of cassava within 72 hrs. In the fermentation of cassava the addn. of rice as a source of N gave a good yield, but the rice bran was unsuitable. The max. limit for the concn. of the mash was 6–8%. In large-scale fermentation the viscosity of the starchy mash should be lowered by the addn. of a small amt. of acid before cooking. For the prevention of putrefaction by lactic acid bacteria, local heating in the sterilization of mash should be avoided, and the use of vigorous stock of acetone bacteria and shortening of the fermentation are recommended. Y. Kihara

The optimum hydrogen-ion concentration for amylase of Aspergillus oryzae. Takeo Nagatomo. *J. Agr. Chem. Soc. Japan* **15**, 753–6 (1939).—There was a deviation of the optimum pH for amylase among various strains of *Aspergillus oryzae*. Y. Kihara

Crystals occurring in the mold membrane in oxalic acid fermentation. Mituo Simo. *J. Agr. Chem. Soc. Japan* **15**, 751–2 (1939).—*Aspergillus niger* Radiumspecy IV was inoculated in a soln. contg. 15% of sucrose, 0.2% of $(NH_4)_2SO_4$, 0.1% of KH_2PO_4 and 0.025% of $MgSO_4$. After 3 days 10% of $NaHCO_3$ and 5% of CH_3COONa were added to make the soln. faintly alk. It was cultured for 15 days at 30°. Two kinds of crystals were observed in the mold membrane. They were identified as $Na_2C_2O_4$ and $NaHC_2O_4.H_2O$. Y. Kihara

Isolation of a yeast from the digestive organ of the grasshopper. Kano Ohtu and Kazuo Yamahuzi. *Bull. Agr. Chem. Soc. Japan* **15**, 30–2 (1939) (in *J. Agr. Chem. Soc. Japan* **15**, No. 3) (in German).—The yeast, easily fermented the sugar soln. The yeast was named *Saccharomyces batta* from its morphological studies. The optimum pH for the growth was 3.5–5.6, and the optimum temp. for the fermentation was 33°. The fermentation ratio was 95%. Cf. *C. A.* **33**, 7040[8]. Y. Kihara

Enzymes in young mycelia of Aspergillus oryzae. Yosio Otani. *Bull. Agr. Soc. Japan* **15**, 59–64 (1939) (in *J. Agr. Chem. Soc. Japan* **15**, No. 4) (in English).—*Aspergillus oryzae* was cultured on a synthetic soln. until sufficient growth of mycelia was obtained. The powd. mycelia were extd. with H_2O at 40° for 4 hrs. Invertase, maltase, lactase, emulsin, α-amylase, β-amylase, papain-type protease, peptide-decompg. enzyme, rennin, urease and catalase were found in the ext. The actions of peroxidase and indophenolase were weak. Y. Kihara

The bacteriological decomposition of 3,5-diiodo-1-tyrosine. Günther Habild. *Z. Biol.* **99**, 421–30 (1939).—*B. coli* strain decompd. 1-diiodotyrosine, splitting off a large part of the organically bound I. Diiodotyrosine first inhibited their growth and then killed them. A relationship seems to exist between the amt. of I split off and injury. *B. coli* cultures quickly decarboxylyzed the tyrosine formed from 1-diiodotyrosine. Frances Krashow

Mathematical representation of the course of yeast growth. R. S. W. Thorne. *J. Inst. Brewing* **45**, 472–86 (1939).—The growth curve is a logistic function (Pearl and Reed, *Proc. Natl. Acad. Sci.* **6**, 275 (1920)) in which the consts. are related to max. growth, rate of growth and seeding rate. The agreement with expt. is within ± 6%. The effects of sucrose, bios, EtOH, NH_4 phosphates and aeration on the consts. are described. Small systematic departures are probably due to acclimatization and autolysis. Quick Landis

Growth factors for bacteria. IX. Studies of a growth factor for Clostridia. D. W. Woolley, L. E. McDaniel and W. H. Peterson. *J. Biol. Chem.* **131**, 381–5 (1939); cf. *C. A.* **33**, 4285[8].—The essential growth factor for certain *Clostridia* which is found in cereal grains is an acid of low volatility, difficult to esterify and destroyed by oxidation. It is not affected by acetylation or methylation. The most active prepns. were detectable when 0.001 γ per cc. was added to an otherwise synthetic medium. Addn. of 0.1 to 0.5 γ per cc. produced max. response. Procedures for the concn. of the factor are described. A. P. Lothrop

Attenuation of granuloma-producing germs with bile and their use as vaccine. Alberto Ascoli and Antonio Bassi. *Biochim. terap. sper.* **26**, 304–17 (1939).—A highly virulent strain of bovine tuberculosis rendered harmless for calves through 80 successive cultures on bile contg. glycerol potatoes is recommended for further immunization of Calmette-Guerin bacillus vaccinated cattle. The culture on bile-contg. media is suitable to decrease the virulence of all granulomata-producing germs especially *Brucella abortus*. This organism loses its virulence within a month and can then safely be used for vaccination of cattle. A. E. Meyer

Pullulomyxa botrytis N. Sp. A. C. Thaysen. *J. Bact.* **38**, 355–66 (1939).—A description is given of the physiol. morphological and cytological characters of this organism which was isolated from decaying vegetable debris. It has previously been shown to be capable of destroying the specific polysaccharides of certain bacterial toxins. Attempts to isolate the enzyme system which destroys these polysaccharides were unsuccessful. Neither

by freezing and thawing nor autolysis could the enzymes be isolated in active form. John T. Myers

Studies on capsule formation. I. The conditions under which Klebsiella pneumoniae (Friedländer's bacillus) forms capsules. J. C. Hoogerheide and Madeline H. Harrison. *J. Bact.* **38**, 367–88(1939).—Friedländer's bacterium was grown in Ostwald viscosity tubes, and from the detns. of relative viscosity and simultaneous bacterial counts, deductions could be made as to the degree of encapsulation. The largest capsules were obtained by cultivation for about 8 hrs. at 37° in a medium contg. 1–4% of peptone and 1% glucose with an initial pH of 7.5. In the absence of sugars capsules were very small. The presence of either glucose, maltose, sucrose, or to a lesser extent pyruvate or glycerol, was necessary to ensure large capsules. Neopeptone, Witte or Bacto peptone served equally well as sources of N. In synthetic media, capsules formed only when the phosphate concn. was below the limits for optimal bacterial growth. J T. Myers

Investigations upon the antigenic relationships among the root-nodule bacteria of the soybean, cowpea and lupine cross-inoculation groups. O. A. Bushnell and W. B. Sarles. *J. Bact.* **38**, 401–10(1939).—A great no. of serological types exist among the nodule bacteria from the above species. The strains within a serological type possess antigenic constituents in common. The antigens are found in whole cells, heated cells, and washed heated cells. Some serological types are made up of strains from only one species of plant, but other types came from 2 or even 3 species. 15 references. John T. Myers

Chemical factors influencing the growth of tubercle bacilli. II. Organic reagents. Ben C. Sher and Henry C. Sweaney. *J. Bact.* **38**, 411–18(1939); cf. *C. A.* **33**, 5439².—The diaryl secondary amines investigated were uniform in their activity as inhibitors regardless of whether "C. P.," "purified" or nonsynthetic medium was used. Each of the dihydroxybenzenes and the aryl-aliphatic secondary amines was more effective in "purified" medium than in "C. P." or meat-broth medium. Some of the aryl-aliphatic secondary amines and dihydroxybenzenes were more effective in "purified" medium than were the diaryl secondary amines. In the "C. P." or meat-broth medium they were less effective. A no. of antioxidants have a tremendous inhibiting effect on bovine and in particular human strains of tubercle bacilli. The effects of oxidation-reduction potentials are being studied. John T Myers

The lack of one of the somatic antigens of typhoid cultures. Lois Almon and W. D. Stovall. *J. Bact.* **38**, 419–30(1939).—Among 170 strains of *Eberthella typhosa*, 2 showed resistance to the action of several bacteriophages which were lytic for the others. The missing antigen was not the one which *E. typhosa* shares with *S. s. hottmülleri*, but one which is normally present in *S. enteritidis*, which is antigen IX of the Kauffmann classification. John T. Myers

The Corynebacterium pyogenes antitoxin content of animal serums. Reginald Lovell. *J. Path. Bact.* **49**, 329–38(1939). John T. Myers

Amino acid utilization by different strains of staphylococci. Franz Lieb and Berta Vallender. *Zentr. Bakt., Parasitenk.*, I Abt., Orig. **144**, 528–30(1939).—All strains of pathogenic, skin and air staphylococci failed to split *d*- and *l*-valine and creatinine. All of the strains used alanine, the pathogens actively and the others sparingly. John T. Myers

Certain film-forming yeasts. L. H. Hohl and W. V. Cruess. *Zentr. Bakt., Parasitenk.*, II Abt. **101**, 65–78 (1939)(in English).—Four nonfermentative and 11 fermentative strains of yeast were studied. Detailed data are given as to alc. production; aldehyde, volatile acid and fixed acid production in wines; tolerance to alc. and SO_2; effect of temp.; carbohydrate fermentation and cell morphology are given. 35 references. J. T. M.

Specificity of aneurin for some microörganisms—action of a homolog of aneurin. W. H. Schopfer. *Ann. inst. Pasteur* **61**, 781–2(1938); cf. *C. A.* **32**, 5431⁸.—The homolog of aneurin in which there is an Et instead of a Me group in position 2 on the pyrimidine ring is very active on *Phycomyces blakesleeanus, Ustilago violarea, Rhodotorula rubra, Dematium nigrum, Parasitella simplex* and *Absidia ramosa*. For the organisms which require pyrimidine, the 2-methyl-4-amino-5-aminomethylpyrimidine can be replaced by 2-ethyl-4-amino-5-aminomethylpyrimidine. The CH_3 group in position 2 of the pyrimidine is not important. The homolog of aneurin studied is more active on Phycomyces than aneurin itself. B. Prescott

Binding power of agglutinin. I. Hemagglutinin. Hisakiti Makino. *J. Chosen Med. Assoc.* **29**, 897–922 (German abstr. 51)(1939). **II. Bacterial agglutinin.** *Ibid.* 1146–83(German abstr. 76–7). S. Tashiro

Hydrogen-ion concentration of histiocytes in their phagocytic function on Bacillus tuberculosis. Sigeru Iwata. *J. Oriental Med.* **30**, 839–50(English abstr. 253–4)(1939). —Of histiocytes found in the peritoneal cavity of mice inoculated interperitoneally with the living strains of typus humanus Frankfurth, or typus bovinus No. I, 50% is the active form (*A*), 30% normal (*B*) and 20% degenerative type (*C*), pH of *A* being 5.2–6.4, *B* 6.4–6.8 and *C* 6.8–7.6. The data for histiocytes found in the cavity injected with the other strains of the acid-fast bacilli are also given. S. Tashiro

The distribution and fate of diphtheria toxin in the rat. Ho Syo Tei. *Japan. Z. Mikrobiol. Path.* **33**, 419–33 (1939).—A considerable amt. of diphtheria toxin was found in the spleen, kidney, liver and suprarenal gland, but not so much in the testicles, brain and muscle after intravenous injection. I. S. Yun

The relationship between diphtheria toxin and reticuloendothelial system. Ho Syo Tei and Kozi Simohori. *Japan. Z. Mikrobiol. Path.* **33**, 434–43(1939).—Diphtheria toxin disappears quickly upon the blockade of the reticulo-endothelial system with 7% India ink soln. after the injection of toxin in the blood of the rat. I. S. Y.

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D—BOTANY

THOMAS G. PHILLIPS

The action of phytohormones on the development of sugar-beet seedling plants. André Willam. *Sucr. belge* **58**, 461–78(1939).—Treatment of sugar-beet seedling plants with aq. solns. of vitamin B_1 (0.66 mg./l. and 0.132 mg./l.) caused no noticeable change during the first leaf stage. Vitamin B_1 (0.2 mg./l.) and heteroauxin (0.2 mg./l.) effected an increase in the size and sugar content during the second leaf stage. The size and sugar content of the seedling plant during the six-leaf stage were increased by vitamin B_1 (0.2 mg./l.) and also heteroauxin (0.1 mg./l.) and decreased by larger quantities of heteroauxin (0.2 mg./l.). Vitamin B_6 (0.5 mg./l.) produced larger plants with lower sugar contents. W. W. B.

On the disease of the sugar-beet heart and its treatment with boron. Gabriel Bertrand. *Sucr. belge* **59**, 3–8, 21–30(1939).—A review with 96 references. W. W. Binkley

Spectroscopic investigation of the state of chlorophyll in the plant, in extracts and in pure preparations. Klaus P. Meyer. *Helv. Phys. Acta* **12**, 349–93(1939).—"Native chlorophyll" exts. are obtained from leaves of *Fontinalis antipyretica* L. by grinding them first with petr. ether for 4 min. to remove carotenoids, then with abs. EtOH for 2 min. Pure $CaCO_3$ added to neutralize plant acids. Addn. of petr. ether and water to the EtOH soln. gives 2 layers, which are sepd. The petr. ether is removed by a current of pure N_2 in the absence of light below 10°. The residue is dissolved in abs. EtOH. Absorption measurements by the method of Halban, Kortüm and Szigeti (*C. A.* **30**, 7454⁵) (photoelec. null method with rotating sector) show that the absorption curve of this native chlorophyll is different from that of the usual pure chlorophyll preps. Pure chlorophyll results from native chlorophyll by aging; it is therefore a deriv. of native chlorophyll. Absorption measurements on chlorophyll in

leaves lead to quite different curves. It is possible to obtain *colloidal* chlorophyll from native chlorophyll which has the same absorption spectrum as that in the leaves. It is concluded that the native chlorophyll is identical with the chlorophyll in the plant and that all solns. thus far obtained by other authors have been degradation products of native chlorophyll. The fine structure of the colloidal chlorophyll in the chloroplasts is discussed. These results cannot be explained by a change of the compn. due to different ratios of chlorophyll a and b, in native chlorophyll and pure chlorophyll. Egon Bretscher

Action of the presence of lead on growth. Vincenzo Rivera. *Ricerca sci.* **10**, (1)61–3(1939).—Lentil seeds set to germinate in a fully enclosed paraffin-sealed glass box showed roots 10 to 12 hrs. before controls when a layer of fresh Pb filings 18 mm. thick in a cardboard box was placed on the glass cover. The sprouts likewise developed 10–15 hrs. before controls and both roots and sprouts grew longer than those of the controls. A 1-mm. layer of Pb filings had little effect. W. F. Bruce

Preliminary data on the storage of Hevea pollen. M. J. Dijkman. *Arch. Rubbercultuur* **22**, 239–59(1938).—Pollen from *Hevea* rubber trees can be successfully stored without serious loss of germinating power at least 19 days at 6° and in air conditioned over 27–35% H_2SO_4. This power is measured 1 hr. after the pollen is spread on a substratum having 10.53–12.11% glucose and 1.5% agar-agar (pH 4.5). D. E. Cable

Studies on the acidity of Western (grown) tomatoes. G. S. Bohart. *Western Canner & Packer, 29th Yearbook* **31**, No. 5, 77(1939).—The variation in pH among 15 varieties of tomatoes grown in Calif. was 4.29–4.59. There was considerable difference in the pH values of tomatoes of the same variety maturing on the same plant. Thus in Early Santa Clara variety the pH varied from 4.61 to 4.33 and in Earliana from 4.93 to 4.37. In the 2 above varieties the pH value was lower by 0.3–0.4 in fully mature fruit as compared with partially colored fruit. Green tomatoes were also somewhat more acid than either the partially or fully ripe tomatoes. C. R. Fellers

Coloring matter of the fruit of the palm Cycas revoluta. Carmela Manunta. *Helv. Chim. Acta* **22**, 1153–4(1939).—The pigment was extd. from the red fruits, sapond. and adsorbed chromatographically on CaO and on alumina. Cryst. zeaxanthin was finally obtained. The only other pigment detected was a trace of carotene. L. E. G.

Recent advances in science: plant physiology. Walter Stiles. *Science Progress* **34**, 346–50(1939).—A review of recent researches on micronutrients. J. S. Hepburn

Constitution of wood polyoses. E. Husemann. *Naturwissenschaften* **27**, 595(1939).—Wood polyoses are generally polysaccharides contg. pentoses such as xylose and arabinose, hexoses like mannose and galactose. Polymerizations detd. osmotically show for xylans from straw or beech 150, mannan from pine 160, arabo-galactan from larch 220 and cellulose from beech 1500. The polyoses can be converted into derivs. such as Bz or Ac compds. without change in polymerization degree. Viscosity detns. show that the K_m consts. of the Staudinger law which indicate the lengths of the mols. are the same for mannan, xylan and cellulose. The const. for arabo-galactan is 20 times smaller, and of the order of that of starch, indicative of strongly branched mols. It was further detd. that xylans from straw or beech contain more than 90% mols. of equal size similar to what was found by Svedberg (cf. *C. A.* **28**, 1065[2]) for certain proteins. B. J. C. van der Hoeven

Low-temperature injury to fruit blossom. I. The damage caused to fruit blossom by varying degrees of cold. C. P. Field. *Ann. Rept., East Malling Research Sta., East Malling, Kent* **26**, 127–38(1938) (Pub. 1939).—Injury of apple blossoms by low temps. (26–28°F.) was decreased considerably by injecting the blossoming shoots on the trees with 1–5% solns. of glycerol; the effectiveness of the treatment increased with the strength of the soln. Similar results were obtained by placing the ends of cut shoots in the solns. Solns. of urea or dextrose were ineffective. K. D. Jacob

Experiments with growth-controlling substances. II. Response of fruit tree cuttings to treatment with synthetic root-forming substances. H. L. Pearse. *Ann. Rept., East Malling Research Sta., East Malling, Kent* **26**, 157–66 (1938)(Pub. 1939); cf. *C. A.* **32**, 3785[6].—Numerous tests with softwood cuttings of several varieties of pear, quince, apple, plum and cherry showed that, with suitable material, root formation is accelerated and increased by immersing the ends of the cuttings for 24 hrs. in solns. (10–40 p. p. m.) of either indolebutyric acid or α-naphthaleneacetic acid. In general, indolebutyric acid caused the production of a more fibrous root system than did α-naphthaleneacetic acid. Application of a soln. of vitamin B_1 (1 mg. per l.) to the treated cuttings, 10–12 days after they were planted, did not increase the no. of cuttings that rooted, but the cuttings so treated grew on more vigorously after removal from the frames in which they were planted. No marked stimulation was obtained from the treatment of hardwood cuttings in the autumn. K. D. Jacob

Some preliminary experiments on the use of root-initiating substances in hop propagation. C. R. Bailey. *J. Southeastern Agr. Coll., Wye, Kent* No. 44, 47–53(1939).—β-Indolylacetic acid (1:10,000) and α-naphthaleneacetic acid (1:20,000) were equally effective in promoting the rooting of hop cuttings soaked therein for 24 hrs. Phenylacetic acid was less effective. K. D. Jacob

The seasonal fluctuation in the manganese content of four grass species. R. L. Wain, I. V. Hunt and G. C. Marsh. *J. Southeastern Agr. Coll., Wye, Kent* No. 44, 114–19(1939).—Throughout the yr. the av. Mn content was highest in the dry matter of creeping bent (*Agrostis alba*, var. *stolonifera* L.), intermediate in timothy (*Phleum pratense* L.) and perennial ryegrass (*Lolium perenne* L.) and lowest in red fescue (*Festuca rubra* var. *genuina* Hack.), all grown on the same soil. Analyses at approx. monthly intervals showed a marked fluctuation in the Mn content of all the species during the yr. and the period of vigorous growth coincided with low Mn content. K. D. Jacob

The chemical composition of the seed and straw of various grasses. R. Probert Davies. *Welsh J. Agr.* **15**, 250–60(1939).—There were considerable differences in the chem. compn. of the seed of the 17 species analyzed, but there appeared to be little relation between the mineral content of the seed and the type of natural habitat in which the various species flourish. The seed of the agriculturally least valuable grasses tend to be richer in crude protein, fat, P and Ca than the seed of the valuable species. The crude protein content is higher, usually much higher, than that of cereal grains. Also, the mineral content, particularly Ca, is usually higher than that of cereal grains. With the exception of Ca, the grass seeds remove smaller quantities of mineral elements from the soil per acre than do cereal grains. The chem. compn. of timothy, cocksfoot and perennial ryegrass straw is similar to that of oat straw, whereas the compn. of red fescue straw is comparable to that of wheat straw. The straw of grasses absorbs much greater quantities of mineral elements from the soil per acre than does the seed of the same species. Cocksfoot, timothy and perennial ryegrass straws take up about twice the quantity of mineral elements from the soil per acre as an av. crop of cereal straw. Grass straws require much more K per acre for their sustenance than do the cereal straws. K. D. Jacob

The formation of amino acids in green plants with nitrate as source of nitrogen. Artturi I. Virtanen and A. A Arhimo. *Suomen Kemistilehti* **12B**, 24(1939)(in English).—When the roots of growing peas or oats are placed in 2–4% KNO_3 soln. for 24 hrs. in either light or dark the presence of nitrite-N and NH_2OH can be detected in the roots. In $(NH_4)_2SO_4$ solns. NH_2OH is not formed, or is formed in amts. too small to be detected. This supports the theory previously described (*C. A.* **33**, 7024[6]) of the formation of NH_2OH by reduction. This reacts with oxalacetic acid (I) and possibly ketoglutaric acid (II) to form the corresponding oximes which are then reduced to aspartic and glutamic acids, resp. If no II is present the NH_2OH is reduced to NH_3. When NH_4^+ salts are used as the source

of N the NH_3 reacts directly with I and II with aspartic acid dehydrase and glutamic acid dehydrase, resp., as catalysts, without oxidation to NH_2OH. S. A. K.

Relation between the nitrogenous compounds of seeds of various crops and the diastatic power of their malts. IV. Barley and naked barley. Hideo Kitagiri and Naratarо Mugibayasi. *J. Agr. Chem. Soc. Japan* **15**, 309–16 (1939); cf. *C. A.* **33**, 7843⁷.—During the germination of barley and naked barley, hordein N or glutelin N changed into the sol. N, although the rate varied with the species of the seeds. The saccharifying power of the germinated barley or naked barley was parallel to the amt. of albumin of the ungerminated seeds. There was a distinct difference in the action of maltase among the species of the seeds. In *Bull. Agr. Chem. Soc. Japan* **15**, 71 (1939) (in English). Y. Kihara

Change in the contents of starch and sugar in tobacco leaves after topping. Takeo Nito and Masamiti Ota. *J. Agr. Chem. Soc. Japan* **15**, 99–103 (1939).—After topping of tobacco leaves, the starch content reached a max. at the ripening period and the sugar content gradually decreased with ripening. Change in N content could scarcely be observed. Y. Kihara

Stimulant for cane-sugar formation in plants. III. Tetutaro Tadokoro. *J. Agr. Chem. Soc. Japan* **15**, 659–60 (1939); cf. *C. A.* **33**, 9365¹.—When lumiflavin or eosin was added to Knop's soln. for the culture of maize, the contents of reducing and nonreducing sugars in the young plant increased by 2 times after 2 weeks, but the growth of roots was retarded. The phenomenon was equally observed with every substance having fluorescence. The action of catalase in the plant growing under such a condition was inferior to that in the normal plant. The difference in the action of peroxidase could not be observed. Y. Kihara

Chemical studies on the roots of Platycodon grandiflorum. VII. The molecular weight and the hydrolysis of platycodin. Magosaburo Tuzimoto and Tuneo Matumoto. *J. Agr. Chem. Soc. Japan* **15**, 690–8; *Bull. Agr. Chem. Soc. Japan* **15**, 113–14 (1939) (in English); cf. *C. A.* **33**, 6418⁸.—The mol. wt. of platycodin was 836 when platycodin alc. soln. was titrated with 0.01 *N* NaOH alc. soln. and the acidity was calcd. as monobasic acid. The mol. wt. by Barger's method was 801. The elementary analysis coincided with the formula $C_{41}H_{68}O_{17}$. The hydrolysis was completed by boiling with 5% HCl for 15 hrs. or with 5% H_2SO_4 for 60 hrs. Only glucose was proved in the hydrolyzate as the sugar constituent. Y. Kihara

Nutritional chemistry of flowers. III. Protein in the flower of wisteria, Kraunhia floribunda Taub. var. typica Mak. Sakae Sinano. *J. Agr. Chem. Soc. Japan* **15**, 723–6; *Bull. Agr. Chem. Soc. Japan* **15**, 118 (1939) (in English); cf. *C. A.* **33**, 7843⁹.—Protein in the flower was extd. with dil. NaOH and pptd. with AcOH. It was purified by repptn. The N distribution in the dry matter of protein was: total N 10.51, hot HCl-insol. N 0.78, ammonia N 0.90, humin N 0.15, arginine N 0.44, histidine N 0.82, lysine N 0.94, cystine N 0.01 and monoamino N 6.53%. The protein contained 2.85% of ash. P 0.17, Fe 0.08, and Cu 0.10% were found in the ash. During the prepn. of the protein most of it was denatured into one insol. in dil. alkali. Y. Kihara

Fractionation of soybean protein. Kinsuke Kondo, Seiiti Hayasi and Siniti Morisige. *J. Agr. Chem. Soc. Japan* **15**, 727–37 (1939).—The protein prepd. by extg. the soybean cake with dil. alkali was dissolved in 40% urea and pptd. by the addn. of alc. The ppt. was sepd. into 3 fractions. The ppt. by dil. alc. and the ppt. by concd. alc. at a definite pH were proved to be single proteins. The absorption spectrum of protein soln. seemed to have some relations to the contents of cyclic amino acids such as tyrosine and tryptophan. Y. Kihara

The effect of ethylene on the respiration and carbohydrate metabolism of potatoes. F. E. Huelin and J. Barker. *New Phytologist* **38**, 85–104 (1939).—The effect of ethylene on respiration and sugar content of potatoes at 15° was detd after varying periods of storage. Respiration increased to a max. during the first 2 days after exposure to ethylene and then fell to a level above that of the control. Increased respiration occurred with treatments of 1 p. p. m. up to 1000 p. p. m. The effect of ethylene was only slight with freshly harvested potatoes but increased with continued storage. Ethylene increased the sugar content in the later periods of storage but not in the early period. H. R. Kraybill

Formation of "fructose" units during starch hydrolysis in the later stages of the growth of the apple. Franklin Kidd and Cyril West. *New Phytologist* **38**, 123–4 (1939).—There is no extensive interconversion of "glucose" units to "fructose" units or the reverse except when starch hydrolysis is known to be occurring. Then there is an active conversion of "glucose" to "fructose." H. R. K.

Sulfur metabolism of plants. J. G. Wood and B. S. Barrien. *New Phytologist* **38**, 125–49 (1939).—The relatio as between the different S compds. of the leaves of plants receiving different supplies of K_2SO_4, NH_4Cl and cystine were studied. An increased supply of sulfate did not increase the cystine or protein S content. An increase in NH_3 increased the content of cystine and protein S as well as the amino and protein N but decreased the sulfate S content. The addn. of cystine to the sand culture increased the sulfate S but did not change the cystine or protein S contents. NH_3 acts as a limiting factor in the formation of protein S from sulfate. A scheme is proposed for the probable sequence of reactions in S metabolism. H. R. Kraybill

Early diagnosis of variation. Henri Colin and Simone Lemoyne. *Compt. rend.* **209**, 426–8 (1939).—Chem. characteristics of variation are inscribed in the grain, but the evolution of the germ of one variety or another is not known. The biochem. diagnosis of variation can only be carried out on young plants. Two varieties of *Betterave*, one used for sugar and the other for forage, were studied. There are morphological, anatomical and chem. differences between the 2. The leaves of the 2 varieties are similar chemically, but the roots show differences, although they are not apparent at first. There is more sugar, less ash, N and org. matter, more vascularization and greater foliage in the sugar variety. The phosphate reaction, Ca and Mg are always present in the sol. ash of the forage variety, while in the sugar variety, all the H_3PO_4 is in the insol. ash. Since sucrose goes into the roots more quickly in the sugar variety, there is a greater amt of ash, N and P in the roots of the forage variety. Thus the difference can be shown in the young plants. Dorothy A. Meyer

Comparison of the metabolism of mosaic-diseased potatoes with that of normal potatoes. Geo. Cockerham. *Ann. Applied Biol.* **26**, 417–39 (1939).—This is a study of the effect of virus X on the carbohydrate and total N contents of leaves from the potato varieties President and Arran Victory over various diurnal and seasonal periods. Gross carbohydrate metabolism is similar in mosaic-diseased and normal leaves. Slight modifications of fundamental metabolism have been found which are expressed as reduced photosynthetic activity, disturbed starch-sugar relationships and an impediment in translocation. These are ascribed to secondary effects arising from pathol. changes brought about by the virus infection. Transient modifications in carbohydrate metabolism have been traced to prematurely retarded growth resulting in a reduced carbohydrate demand by diseased plants. Diseased leaves contain more N at all stages of growth than normal leaves. The pathol symptoms and prematurely retarded growth activities which produce disturbances in carbohydrate metabolism are probably the direct manifestation of disorganized N metabolism. C. H. R.

The relation between production of dry matter and excretion of carbon dioxide through the roots of maize. F. Alten and R. Gottwick. *Bodenkunde u. Pflanzenernähr.* **13**, 353–70 (1939).—Soln. cultures continued for 3 months with maize seedlings in glass vessels of peculiar shape, whereby the bent stem of the plant was inserted through a Hg sealed side opening, and the soln. surrounding the roots could be aerated and the CO_2 excreted collected from the

air stream, are described. The total excretion of CO_2 from the roots averaged 10 times the cation content of the plants with a normal and about 16 times with a deficient K_2O supply. From this inverse relation, it is concluded than an abundant K_2O supply ensures high efficiency in elaboration of dry matter from the CO_2 absorbed by the leaves, other growth factors being favorable. An increased N supply without corresponding increase in K_2O increased the crop, but the efficiency of utilization of CO_2 was less, as indicated by increased excretion through the roots. Of the CO_2 assimilated by the leaves, about 89% was utilized under the most favorable conditions, but with excess N the utilization fell to 77%. The hourly excretion of CO_2 at night was 60–70% of that by day, but this was affected by the fertility level of the soln. and increased therewith to 78–79%. When the supply of nutrients to plants started in a dil. soln. was increased, the CO_2 excretion by the roots was affected consistently. Four references. C. J. Schollenberger

Responses of dormant cuttings of Lonicera tartarica to solutions of indolylacetic acid and nutrient salts. N. H. Grace and M. W. Thistle. *Can. J. Research* **17**, C, 317–20(1939); cf. following abstrs.—Cuttings of dormant *Lonicera tartarica*, collected in March, were treated with a factorial series of indolylacetic acid and nutrient solns. Indolylacetic acid was used at dosages of 0, 10, 50 and 100 p. p. m. in conjunction with 0, 1 and 10 concns. of a modified Hoagland's nutrient soln. Indolylacetic acid treatment significantly increased the percentage of rooting, and the no. and total length of roots, the fresh root wt. and the green wt. of leaf per group of cuttings treated, the higher concns. having the greater effect. The use of nutrient also significantly affected each of the foregoing characters. The results suggest that some dormant cuttings may be deficient in minerals essential for rooting, and that there is an optimum nutrient concn. somewhere below the highest used in this expt. J. W. Shipley

Responses of dormant cuttings of Lonicera tartarica to solutions of cane sugar and indolylacetic acid. N. H. Grace. *Can. J. Research* **17**, C, 334–8(1939).—Cuttings of dormant *Lonicera tartarica*, collected in March, were treated with a factorial series of indolylacetic acid and cane-sugar solns. Indolylacetic acid was used at concns. of 0, 10, 50 and 100 p. p. m., while cane sugar was present at 0, 1, 5 and 10%. Indolylacetic acid treatment greatly increased the percentage of cuttings rooted, the no. and length of roots per rooted cutting, the fresh root wt. and the green wt. of leaf produced. Cane-sugar treatment alone or in combination with indolylacetic acid failed to show any significant effects, suggesting that dormant cuttings of this plant have an adequate reserve of carbohydrate material. Apart from a somewhat greater effect of treatment on the percentage of rooting, the results are in essential agreement with those previously secured from dormant October cuttings. In comparison with a parallel expt. on the dusting of March cuttings propagated in the same frame, soln. treatment had the greater effect on all the responses considered except green wt. of leaf produced, which was greater after dusting. J. W. Shipley

Effects of cane sugar, ethyl mercuric phosphate and indolylacetic acid in talc on the rooting of cuttings. N. H. Grace. *Can. J. Research* **17**, C, 321–33(1939).—Cuttings of 2 herbaceous and 2 dormant woody plants were treated with a factorial series of talc dusts containing cane sugar, Et mercuric phosphate and indolylacetic acid. The effect of the dusts on cuttings of *Coleus blumei* and *Iresine lindeni* was detd. by the no. of roots per rooted cutting, the length of root mass and dry wt. of roots. Each of the 3 factors gave at least 1 significant effect with both plants. *Iresine lindeni* cuttings showed 2 significant interactions, one between org. Hg and indolylacetic acid on the no. of roots per rooted cutting, the other between sugar and indolylacetic acid on the length of root mass. Dormant *Lonicera tartarica* cuttings showed significant effects from indolylacetic acid on the no. of cuttings rooted, the no. and length of roots per rooted cutting, the mean root length and fresh root wts. Green leaf wts. of this plant were significantly affected by sugar, and the sugar × org. Hg, and sugar × org. Hg × indolylacetic acid interactions. Fresh root wts. also gave a significant triple interaction. The no. of *Physocarpus opulifolius* cuttings rooted was significantly increased by org. Hg as were the dry root wts. Root wts. also were affected by sugar treatment. This plant failed to make any significant responses to indolylacetic acid treatment. The results indicate that cane sugar and Et mercuric phosphate, as well as indolylacetic acid, affect some of the rooting responses of plant cuttings. It is suggested that the dust method of treating cuttings may be used to supply factors, other than the recognized growth-stimulating chemicals, that are advantageous to successful vegetative propagation of plants. J. W. Shipley

Rare earths in calcareous algae. Marcel Servigne and Arakel Tchakirian. *Compt. rend.* **209**, 570–2(1939).—Ashes of the calcareous alga, *Lithotamnion calcareum*, from Roscoff (Brittany) were extd. with HNO_3 and the resultant filtered soln. (I) contg. all the Ca and Mg, and the insol. siliceous portion (II) examd. by S.'s phosphorescent $CaWO_4$ method (cf. *C. A.* **31**, 3414[9]). This showed the presence of about 5×10^{-6} part by wt. of Pr, Nd and Sm in II, but of no rare earth in I. C. A. Silberrad

The role of magnesium in chlorosis of peach. J. Carlyle Hackney. *J. Elisha Mitchell Sci. Soc.* **54**, 191–2 (1938).—Analyses showed that leaves from chlorotic trees had a lower Mg content than those from nonchlorotic trees. Application of $MgSO_4$ or MgO increased the Mg in the leaves but not in the twigs or fruit. Trees to which no Mg was applied showed earlier defoliation than those receiving Mg. Colin W. Whittaker

Riclett, Harold W., and Naylor, Ernst E.: Instructions for Laboratory Work in General Botany. 2nd ed. New York: D. Van Nostrand Co., Inc. 102 pp.

E—NUTRITION

PHILIP B. HAWK

The influence of diet on the endogenous production of citric acid. Arthur H. Smith and Curtis E. Meyer. *J. Biol. Chem.* **131**, 45–55(1939); cf. *C. A.* **31**, 7479[4].—Citric acid is a normal metabolite of endogenous origin and rats receiving a predominant proportion of their energy requirements from dextrin or fat excrete a much larger amt. than when protein (lactalbumin) supplies this need. With normal diets it is therefore believed that the citric acid elaborated is derived from metabolic products of fats and carbohydrates rather than of proteins. The ability of foodstuffs to give rise to citric acid appears to be independent of their acid- or base-producing role. A. P. L.

The effect of choline on the ability of homocystine to replace methionine in the diet. Vincent du Vigneaud, Joseph P. Chandler, A. W. Moyer and Dorothy M. Keppel. *J. Biol. Chem.* **131**, 57–76(1939); cf. *C. A.* **33**, 8719[6].—The administration of choline enables the rat to utilize homocystine for growth purposes instead of methionine. Choline apparently makes possible the methylation *in vivo* of homocystine to methionine. That choline is at least in part responsible for the ability of tikitiki and milk vitamin concentrate to enable the animal to utilize homocystine is shown by the actual isolation of choline from these sources. Betaine has a similar effect. A. P. Lothrop

The metabolism of carbohydrate and protein during prolonged fasting. Wm. H. Chambers, Joseph P. Chandler, S. B. Barker and James Evenden. *J. Biol. Chem.* **131**, 95–109(1939).—During prolonged fasting, as the loss in body wt. increases from 40 to 50%, dogs may exhibit either a marked rise or a very slight change in protein metabolism. The "high N" group is characterized by an approx. 3-fold increase in total N excretion, a corresponding basal R. Q. of about 0.81, about a 10-fold rise in creatinuria and a definite fall in ketone body excretion. The "low N" group maintains the low level of N excretion and high ketonuria with R. Qs. of about 0.73 and about a 5-fold increase in creatine excretion. The similarity in basal heat production and difference in length of fasting in the

2 groups suggest a greater store of body fat in the low N group. The response to a glucose meal is similar in both groups. The rise in R. Q. to about 0.89, fall in ketonuria and small excretion of sugar indicate a partial restoration of the ability to oxidize glucose. After fat ingestion the metabolism resembles that of the intermediate fasting period. Ingested fat exerts a marked N-sparing effect which is found only in the animal with depleted fat stores. Normal respiratory metabolism and specific dynamic action are observed after the ingestion of meat although the ketonuria is definitely increased. The specific dynamic action of body protein, characteristic of exptl. diabetes, is not evident in the "high N" group. A. P. Lothrop

Protein metabolism. XI. The metabolic relation of creatine and creatinine studied with isotopic nitrogen. Konrad Bloch and Rudolf Schoenheimer. *J. Biol. Chem.* **131**, P11–19(1939); cf. *C. A.* **33**, 9381[3].—Administration of small amts. of creatine contg. N^{15} is followed by an almost equal distribution of the dietary creatine N over creatine of muscle and internal organs as well as over urinary creatinine, indicating that the latter is derived mainly from the body creatine. When the body creatine of the rat is marked with isotopic N during a preliminary period and then creatine is omitted from the diet in the following period, the isotope content of the urinary creatinine is identical with that of the body creatine. This is a clear indication that body creatine is the only precursor of urinary creatinine on a creatine-free diet. The reaction creatine ⇄ creatinine is biologically irreversible since no isotopic N is found in the body creatine after administration of creatinine contg. N^{15}. There is immediate excretion of most of the isotopic creatinine in the urine. The isotopic creatine was prepd. from isotopic glycine as a starting material. It was shown that the N in creatine is stable and does not exchange *in vitro* with the N of NH_3. A. P. Lothrop

Inhibition of growth of the rat by oral administration of methylcholanthrene, benzopyrene or pyrene and the effects of various dietary supplements. Julius White and Abraham White. *J. Biol. Chem.* **131**, 149–61(1939); cf. *C. A.* **33**, 7385[6].—The inhibition of the growth of the rat by certain org. compds. is a manifestation of the production of a specific deficiency in the S-contg. amino acids, probably by imposing on the organism an increased requirement for org. S, in the form of methionine or cystine, for detoxication purposes. The growth retardation produced by feeding either methylcholanthrene, benzopyrene or pyrene was promptly relieved by dietary supplements of *l*-cystine, *dl*-methionine or *l*-cystine disulfoxide Taurine, Na_2SO_4 and glycine were ineffective. Injection of glutathione also produced an increase in growth rate in animals ingesting the methylcholanthrene-contg. diet. There is as yet no clear indication that the carcinogenic properties of a compd. have any relation to the amt. of this material which will inhibit growth of young rats under the exptl conditions employed. The quantity of a compd. required to produce growth retardation must be detd. by trial and error and appears to be related to the toxicity of the substance. A. P. Lothrop

The availability for growth of *N*-methyltryptophan administered as its acetyl derivative. Wm. G. Gordon, Wm. M. Cahill and Richard W. Jackson. *J. Biol. Chem.* **131**, 189–96(1939); cf. *C. A.* **33**, 7355[2].—Acetyl-*l*-*N*-methyltryptophan is not utilized for growth in the rat ingesting a diet deficient in tryptophan. Inasmuch as both *l*-*N*-methyltryptophan and acetyl-*l*-tryptophan both promote growth, the substitution of the Me group for the amide H of the latter compd. apparently prevents its hydrolytic cleavage in the body. A. P. Lothrop

Vitamin C studies in the rat. The effect of copper and various organic substances. Joseph L. Svirbely. *J. Biol. Chem.* **131**, 233–41(1939); cf. *C. A.* **30**, 6427[6].—Significant amts. of vitamin C were found in all the organs of the rat regardless of the diet fed or the substance administered. Injections of pyridine, camphor, menthol, borneol, thymol and phenylacetic acid to fasting rats or of amidopyrine and antipyrine to animals on a dog chow diet showed high reducing capacities of the liver and gut. Toluenediamine caused a decrease in the liver and gut while phlorizin showed higher values for the gut than for the liver. A marked decrease in the vitamin C content of the adrenals followed feeding of acetanilide, acetophenetidin and, to a smaller extent, amidopyrine and the injection of camphor, borneol, toluenediamine and hydrazine. The concn. of vitamin C per g. of tissue, ordinarily based on the actual wts. of the organs, should be corrected for the variation in wt. of the liver and gut which may result from the administration of foreign substances. This correction can be based on observations on the control animals and the relative wts. of the organs per 100 g. unit of final body wt. A. P. Lothrop

The inversion of *d*-phenylaminobutyric acid and the acetylation of *l*-phenylaminobutyric acid by means of the isotopes of nitrogen and hydrogen. Vincent du Vigneaud, Mildred Cohn, Geo. B. Brown, Oliver J. Irish, Rudolf Schoenheimer and D. Rittenberg. *J. Biol. Chem.* **131**, 273–96(1939); cf. *C. A.* **32**, 1764[1].—In the inversion *in vivo* of *d*-phenylaminobutyric acid contg. N^{15} and conversion to the acetyl-*l*-phenylaminobutyric acid, almost all of the original N of the compd. fed is replaced by new N By feeding the compd. to animals whose D content of the body fluids was raised to approx. 2.5 atom %, it was possible to show that 1 atom of D was taken up in the α position of the amino acid moiety of the excreted compd. during the process. These exptl. facts agree with the hypothesis that the keto acid is an intermediate in the inversion of an unnatural isomer to its enantiomorph. The acetyl-*l*-phenylaminobutyric acid excreted after the feeding of *l*-phenylaminobutyric acid contained a large proportion of the original N in contrast with the *d* isomer. In expts. in which the animals were given D_2O, it was again found that the acetyl-*l*-phenylaminobutyric acid contained 1 atom of D in the α position as in the expt. in which the *d* acid was fed. The various mechanisms that might explain these exptl. observations are discussed in detail. The phenylaminobutyric acid contg. N^{15} was prepd. by catalytic reduction of cinnamoylformic acid with isotopic NH_3. A new resolution of *dl*-phenylaminobutyric acid is described in which the phenylethylamine salt of the carbobenzoxy deriv. is utilized. A. P. Lothrop

Comparison of vitamins A and A_2 by distillation. E. LeB. Gray. *J. Biol. Chem.* **131**, 317–26(1939).—The temp. of the elimination max. of vitamin A_2 is only 3° above that of vitamin A, indicating that the mols. of the 2 vitamins contain the same no. of C atoms. Cf. *C. A.* **32**, 6694[6]. A. P. Lothrop

Vitamin K activity in the benzoquinone series. S. Ansbache and Erhard Fernholz. *J. Biol. Chem.* **131**, 399–400(1939); cf. *C. A.* **33**, 6922[9].—Phlorone (2,5-dimethylbenzoquinone) is apparently the simplest compd. with vitamin K activity investigated to date. Although it is approx. 2000 times less active than 2-methyl-1,4-naphthoquinone, the speed of action and period of efficiency are practically identical for the 2 compds., unit for unit. Cf. Almquist and Klose, *C. A.* **33**, 9382[1]. A. P. L.

Deriv. of vitamin K_1 (Almquist, Klose) **10**.

F—PHYSIOLOGY

HOMER W. SMITH

Further contributions to the study of the chemical activity of the nerves. Quinto Calabro. *Ricerca sci.* **10**, 427–31(1939); cf. *C. A.* **31**, 7954[9].—A discussion of the effects of insulin (I), acetylcholine (II), cardiazole (III) and atropine (IV) on the nervous system. In the rabbit intravenous injection of 50 international units of I followed by removal of the nerve trunk and immersion in eosinated Ringer soln. ($1:6 \times 10^6$) caused activity of the vagus nerve so that it was used to contract a leech prepn. and inhibited the action of a heart prepn. (Bufo). The sciatic nerve similarly prepd. had no action on the leech but activated the heart prepn. Controls showed no activity. One end of the left vagus nerve of a rabbit injected with 0.02 g. of II chloride was immersed in Ringer soln. as above and the right peripheral vagus stump of a second

rabbit was immersed in the same soln. The carotid pressure decreased in 9 cases, was not affected in 13 and was raised in 2 cases. In the cases of diminished pressure, removal of the nerve stump of the second rabbit from the Ringer soln. resulted in a marked increase in pressure, but dipping it into a soln. of II in the Ringer soln. had no effect. The conclusion is drawn that a vagus substance is liberated in the soln. which transmits the effect to the second rabbit. III likewise is able to liberate a substance from nerves if used in convulsion-producing doses. A nerve block often fails to stop the action of IV, manifested finally at the vagal inversion. These observations can be interpreted by assuming the formation of an active substance by the nerves. W. F. Bruce

Endocrine compounds. The pituitary gland. A. Richard Bliss, Jr. *Drug Cosmetic Ind.* **45**, 426–8(1939); cf. *C. A.* **33**, 8736[7].—The prepn. and action of the following principles of this gland are reviewed: thyrotropic, adrenotropic, diabetogenic, ketogenic, blood-sugar raising and parathyrotropic. H. M. Burlage

Phagocytic activity of the leucocytes of preserved placental and retroplacental blood. A. G. Karavanov and N. C. Baksheev. *Méd. exptl.* (Ukraine) 1939, No. 2, 36–40.—Phagocytic activity of the blood (preserved with citrate) was somewhat decreased during the first day after collection (cause unknown) but increased again on the second day, began to decline once more on the third day, and disappeared altogether 5–6 days after collection. The monocytes retained their phagocytic activity for longer periods than the other cells. Retroplacental blood lost its phagocytic activity earlier than placental blood. S. A. Corson

Metabolism of normal preschool children. III. Variations in nitrogen storage on constant diets. Thelma Porter. *J. Am. Dietet. Assoc.* **15**, 427–34(1939).—Forty-three N balances of 3 children $2^1/_2$, $4^2/_3$ and $5^1/_2$ yrs. old are reported. A total of 41 3-day balances were secured. Protein consumption varied from 2.12 g./kg. body wt. for the oldest to 2.68 g./kg. for the youngest child. Protein furnished about 12% of the total cal. The N storage averaged 1.26, 1.14 and 1.30 g./day from the oldest through the youngest child. E. Curzon

Adsorption studies on enamel, dentine and bone. Marian LeFevre Manly and Sylvia R. Levy. *J. Am. Chem. Soc.* **61**, 2588–90(1939).—Quant. measurements on the adsorption of phosphate ion by powd. enamel, dentine and bone indicate that the adsorption power of dentine and bone is about the same and is 7 times greater than that of enamel. These data satisfy exactly the criteria for adsorption according to Freundlich's adsorption isotherm. A. B. Garrett

Variations in plasma potassium in states of hypotension and hypertension. Jorge L. Moglia. *Anales farm. bioquím.* (Buenos Aires) **10**, 26–63(1939); cf. *C. A.* **33**, 8741[8].—In dogs a drop in blood pressure produced by any means (shock, nerve section, drugs, bleeding) causes an increase in plasma K. When the pressure returns to normal the K also returns to normal or nearly so. L. E. Gilson

Biometric study of testicular growth provoked by the injection of serum gonadotropin in hypophysectomized rats. S. Gothié and R. Moricard. *Compt. rend. soc. biol.* **131**, 1212–13(1939).—Graphs. L. E. G.

Hormonal stimulation of meiosis by injection of gonadotropins from serum and anterior hypophysis. R. Moricard and S. Gothié. *Compt. rend. soc. biol.* **131**, 1214–16(1939).—In hypophysectomized rats injections of anterior hypophysis gonadotropin reëstablished normal spermatogenesis. Serum gonadotropin stimulated proliferation of interstitial cells but did not promote spermatogenesis. L. E. Gilson

Oxygen consumption and carbon dioxide production of unanesthetized kidneys grafted on the neck vessels. M. Dor. *Compt. rend. soc. biol.* **131**, 1272–3(1939); cf. *C. A.* **33**, 5047[9].—The results are practically the same as previously reported for dogs anesthetized with chloralosane. **Functional and metabolic recovery of unanesthetized grafted kidneys after prolonged arrest of circulation.** *Ibid.* 1273–4.—The kidneys recovered in a few min. after circulation had been arrested 20–40 min. After 60 min. circulatory arrest recovery was less than 25% complete an hr. after circulation was reëstablished. L. E. G.

Reversible suppression of the effects of excitation of the vagus by active substances of heart [nodal tissue]. R. Cabrera-Malo. *Compt. rend. soc. biol.* **131**, 1284–7(1939).—Perfusion of the frog heart *in situ* with Ringer soln. contg. the active substances of mammalian heart nodal tissue temporarily suppresses the effect of excitation of the right and left vagi. The nodal ext. also antagonizes the action of acetylcholine. L. E. Gilson

Influence of progestin on the gonadotropic function of the hypophysis of the rat. Marc Herlant. *Compt. rend. soc. biol.* **131**, 1315–17(1939).—The effects were irregular and of uncertain significance. **Effects of progestin on the histological structure of the rat hypophysis.** *Ibid.* 1318–21. L. E. Gilson

Identity of an antibacterial factor in the saliva of certain mammalia. S. Leonard Rosenthal, Wallace M. McNabb and Raymond C. Snyder. *J. Am. Dental Assoc.* **26**, 1859–62(1939).—Saliva of normal animals (dog, cat, monkey, horse, rhinoceros) contained a compd. which inhibited the motile oral flora of man, but had little effect on the nonmotile bacteria. Examn. of dog saliva showed this compd. to be Na_2CO_3, which was absent from human saliva; its disappearance from the saliva of normal animals rendered them liable to fusospirochetal infection. Solns. of Na_2CO_3 were of value in the treatment of Vincent's infection. Joseph S. Hepburn

Is muscle contraction an atom-dynamical or a kinetic-statistical process? Edgar Wöhlisch. *Naturwissenschaften* **27**, 678–9(1939).—A theory of muscular contraction based upon the idea of internal pressure. B. J. C. van der Hoeven

The carotenoid nature of yellow pigment in the chicken iris. W. F. Hollander and R. D. Owen. *Poultry Sci.* **18**, 383–7(1939).—The yellow pigment of the chicken iris is composed of carotene and xanthophyll. Carotenoids are not present in the iris of the pigeon. K. D. J.

Regulatory changes in blood chemistry and metabolism under reduced pressure. G. E. Vladimirov, *J. Physiol. U. S. S. R.* **25**, 779–85(in German, 784–5)(1938).—At altitudes of 1250–5590 m. the total electrolyte content of plasma is unchanged. An increase in K^+ and a corresponding decrease in Na^+ are observed. The carbonate content decreases as a result of the decrease in the partial pressure of CO_2 in the lungs and the accumulation of org. acids in the blood. During the 1st few days at high altitudes the blood pH increases. A longer stay, or particularly climbing to still higher altitudes, results in a fall in pH to normal or subnormal levels. Blood lactic acid and excreted ketonic bodies in the urine are increased while Me_2CO, acetoacetic acid and β-hydroxybutyric acid (I) appear in the blood stream as a result of anoxemia. A direct study of the effect of acute anoxemia in guinea pigs showed that the increase in ketonic bodies is a result of disturbance of kidney function. A short period of anoxemia caused an increase in free Me_2CO and I in the liver. S. A. Karjala

The possibility of cortical regulation of the permeability of glandular tissue. M. Ya. Mikhel'son. *J. Physiol. U. S. S. R.* **25**, 857–64(in English, 864)(1938).—The excretion of KI in saliva adjusts itself at a steady level 1–2 hrs. after KI injection provided normal unconditioned salivary secretion is maintained by periodic feeding of meat-biscuit powder or the injection of pilocarpine. The tissue permeability of the salivary glands is altered by impulses originating in the cerebral cortex as a result of food-conditioned stimuli, excitatory impulses decreasing and inhibitory impulses increasing permeability. S. A. Karjala

The influence of the cerebral cortex on the elimination of iodine by the salivary gland upon extinction of the conditioned reflex. V. N. Chernigovskiĭ. *J. Physiol. U. S. S. R.* **25**, 865–70(in French, 870)(1938).—Dogs were given food contg. 0.4–0.6 g. of KI and were injected 2 hrs. later with 8–10 mg. of pilocarpine with the simul-

taneous application of a pos. stimulus (ringing of a bell for 8 sec. at 2-min. intervals 10–16 times). The KI in the saliva collected at 4-min. intervals was detd. During the 1st few min., when the bell served as an excitatory stimulus, the KI in the saliva diminished. A gradual increase in KI excretion indicated a slow but complete extinction of the conditioned reflex. S. A. Karjala

Humoral regulation of gastric and intestinal motility. I. Kurtsin and A. Rogov. *J. Physiol. U. S. S. R.* 25, 877–84 (in English, 884) (1938).—The perfusate obtained from the brain of a surviving fish head during prolonged stimulation of the vagus nerve by induction shocks caused energetic contractions of the pyloric part of the stomach and of the intestine of cats. Perfusates obtained from fish brain during stimulation of the afferent nerves (trigeminus and olfactory) caused inhibition of gastric and intestinal peristalsis. Thus excitation of the central nervous system results in the formation of specific substances or mediators capable of exerting a humoral control over the motor activity of the digestive app.

S. A. Karjala

Fluctuations in the amylolytic index of blood and urine as a result of the periodic activity of the digestive apparatus aside from digestion. G. P. Mushegyan. *J. Physiol. U. S. S. R.* 26, 291-5 (in German, 295) (1939).—The function of the kidney during the course of periodic activity aside from digestion was studied in dogs with intestinal fistulas. At the beginning of a rest period the amylolytic index (I) of the urine is at a max. At the middle of a rest period I begins to fall and reaches a min. at the end of the period. During the time of periodic activity I in the urine remains at a low level or disappears entirely, while in the blood it rises to a max., begins to decrease during the rest period and reaches a min. at the end of the rest period. Acid contractions of the stomach have no effect on the fluctuation of I. I is also independent of fluctuations in the creatinine content of the urine. S. A. Karjala

Vitamin A and carotene in the hen egg during hatching. Paavo Suomalainen. *Suomen Kemistilehti* 12B, 30 (1939) (in English).—The vitamin A (I) content of incubated eggs decreases by 45% during the 2nd and 3rd weeks of incubation, but the carotene (II) content does not decrease during hatching. The developing embryo used 350 I. U. of I during the last 2 incubation weeks, or approx. 25 I. U./day. The 1-week-old embryo contained 0.4%, and the 2-week-old embryo 6.3%, of the total I of the egg. The liver of the newly hatched chick contained 10 I. U. (8.1%) of the total II, and 95 I. U. (21.6%) of the total I of the chick. S. A. Karjala

Composition of the gastric mucous membrane. Heinrich Fuchs. *Z. Biol.* 99, 484–7 (1939).—Gravimetric analysis showed arginine, lysine, tyrosine and leucine occurred free in the gastric mucous membrane of pigs, while histidine was identified qualitatively only. Nicotinic acid and nicotinic acid amide were also found, explaining the beneficial influence of gastric mucous membrane on pellagra. Histamine was detected by Edlbacher's method. Frances Krasnow

Inhibition of lactic acid formation with oxygen. Amandus Hahn, G. Niemer and W. Gasseling. *Z. Biol.* 99, 614–17 (1939).—Oxygen inhibition was restored by addn. of a thermostable substance which had been previously washed out of the muscle pulp. Apparently this is not identical with succinic, fumaric, malic or oxalacetic acids. Frances Krasnow

Acetylcholine and choline esterase in degenerating nerves. Horst Hellauer and Karl Umrath. *Z. Biol.* 99, 624–32 (1939); cf. *C. A.* 33, 9397[8].—Cutting the motor nerves increased the acetylcholine content as long as there was transfer of excitation to the muscle, but the choline esterase remained unaltered. When transfer of excitation to muscle was blocked but nerve action currents still liberated, acetylcholine and choline esterase decreased to a slight end value. (In amphibians the acetylcholine increased when conduction was first blocked.) The action currents liberated in sensory nerves by muscle tension disappeared late in *Rana esculenta* and early in *Rana temporaria*. Frances Krasnow

The possible carrier role of ascorbic acid in animal tissues. M. O. Schultze, Carter J. Harrer and C. G. King. *J. Biol. Chem.* 131, 5–12 (1939); cf. *C. A.* 32, 1770[1].—Ascorbic acid is not a catalytically active, oxidation-reduction carrier in animal tissue. It does not function as a H-transfer agent in a system contg. nicotine hemochromogen, ascorbic acid, coenzyme, glucose dehydrogenase and glucose. The presence of glutathione, either in place of or with ascorbic acid, does not alter the H-transfer results although both reagents are oxidized aerobically in the presence of hemochromogen. Until more conclusive evidence is obtained the concept that ascorbic acid functions in animal tissues as a respiratory carrier remains essentially unsupported by exptl. evidence.

A. P. Lothrop

Electrodialysis of tissue chloride. II. Kinetics of removal of chloride from tissues of the dog. Robert H. Oster and Wm. R. Amberson. *J. Biol. Chem.* 131, 19–24 (1939); cf. *C. A.* 34, 125[2].—The rate at which chloride can be electrodialyzed from brain, stomach, spleen, pancreas and possibly lung tissue is significantly lower than for skeletal muscle, indicating that in these tissues a significant part of the chloride is intracellular while in muscle the chloride is assocd. with the extracellular phase of this tissue. An average of about 5.5% of the total chloride of brain remains in the tissue after long electrodialysis and it is suggested that part of the intracellular chloride may be organically bound. A. P. Lothrop

The effect of a nicotinic acid deficiency upon the coenzyme I content of animal tissues. A. E. Axelrod, Robert J. Madden and C. A. Elvehjem. *J. Biol. Chem.* 131, 85–93 (1939); cf. *C. A.* 33, 4650[9].—There is a significant decrease in the coenzyme I content of liver and muscle tissue in uncomplicated nicotinic acid deficiency in the dog and in the pig. The brain, kidney cortex and blood, however, always maintained their normal coenzyme I content, indicating that a normal level of the enzyme is absolutely essential for life of these tissues. It is not possible to increase the coenzyme I content of rat tissue by the administration of excessive amts. of nicotinic acid.

A. P. Lothrop

The utilization of acetone bodies. II. The influence of sex. Isabelle Grayman, Norton Nelson and I. Arthur Mirsky. *J. Biol. Chem.* 131, 121–6 (1939); cf. *C. A.* 33, 8749[3].—The disappearance of intravenously administered β-hydroxybutyrate from the whole bodies of fed rats, both nephrectomized and normal, were studied to obviate the effects of absorption, diffusion, variable rates of excretion and spontaneous acetone body formation. No significant differences in the rates of utilization were observed in male and female rats. The sex difference reported by others was probably due to variations in endogenous ketone formation. A. P. Lothrop

Metabolism of certain rare sugars. Florence Clarke, Roy Solkot and Ralph C. Corley. *J. Biol. Chem.* 131, 135–8 (1939).—Intestinal administration of melezitose, turanose and trehalose results in an increase in the glycogen of the liver of fasting white rats. Neg. results with raffinose and melibiose indicate the absence of a β-fructosidase and of an α-galactosidase in the alimentary tract of the rat. The pos. results with trehalose indicate the presence of trehalase, an α-glucosidase differing perhaps from maltase, and with the other 2 sugars the presence of an α-glucosidase possibly identical with maltase.

A. P. Lothrop

Nature of the increase in activity of the *d*-amino acid oxidase of rat liver produced by thyroid feeding. J. R. Klein. *J. Biol. Chem.* 131, 139–47 (1939); cf. *C. A.* 33, 5051[4].—The increase in activity of the *d*-amino acid oxidase of rat liver produced by thyroid feeding is not dependent upon a change in the nature of the flavin component nor upon the components of liver sol. in ½ satd. $(NH_4)_2SO_4$ but, is probably due to an increase in the concn. of the protein component of the oxidase. The concn. of the flavin component is not increased by the thyroid feeding. A. P. Lothrop

Action of ketene on gonadotropic hormones. Choh Hao Li, Miriam E. Simpson and Herbert M. Evans. *J. Biol. Chem.* 131, 259–66(1939); cf. *C. A.* 33, 8269⁸.—Ketene reacts rapidly with NH_2, and more slowly with phenolic OH groups in aq. solns. of protein and has been used in acetylating gonadotropically active proteins. The results indicate that the physiol. activity of the pituitary follicle-stimulating and interstitial cell-stimulating hormones and of the gonadotropic hormone in pregnant mare serum is in each case dependent on the free NH_2 groups. On the other hand, the gonadotropic principle found in the urine of pregnant women (human chorionic gonadotropin) resembles insulin and pepsin in that the phenolic OH rather than the free NH_2 groups are essential for the biol. activity. A. P. Lothrop 1 2

Effect of age and fasting on glycogen content of liver and muscle of rats and puppies. Walter Heymann and J. L. Modic. *J. Biol. Chem.* 131, 297–308(1939); cf. *J. Pediat.* 12, 21(1938).—Rats of 3 age groups, 8–11 days, 10–12 weeks and 2–3 yrs., were studied. In rats 8–11 days old the liver glycogen content is 1/3 that for animals in the older groups. The glycogen content of the livers of 6 day-old puppies is also low. This value increases steadily during the 1st 6 weeks, the av. value at 6 weeks being 5.5 g. per 100 g. of fresh liver, a value only slightly higher than the av. (4.6 g.) for full-grown animals. The increase in liver glycogen in baby rats takes place mainly during the nursing period, indicating that the causes for the low content and its rise during infancy are endogenous in nature. The muscle glycogen content is approx. the same at all ages and diminishes after 1 and 2 days fasting in all age groups with the same ease, a finding not supporting the hypothesis that the liver retains its glycogen deposit with greater tenacity during infancy. No hypoglucemia develops after a 2-day fast, a result differing from that observed in human infants and children. The livers of baby rats have the highest H_2O content in spite of having the lowest glycogen content. The diminution in liver glycogen produced by fasting is not accompanied by a corresponding loss in liver H_2O so that the important role which glycogen is supposed to play as a water binder is not evident from these results. The low content of glycogen does not make the liver more vulnerable to CCl_4 poisoning since baby rats tolerate it better than older rats. A. P. Lothrop 3 4 5 6

The influence of folliculin on the energy metabolism of woman. Virginio Piacentini and Francesco Guercio. *Arch. sci. biol.* (Italy) 24, 239–48(1938).—The basal metabolism of control women and those who received 50,000–250,000 units of folliculin did not vary appreciably. Neither was there any change in the R. Q. P. F. Metildi 7

Oxidation of butyric acid and some of its derivatives on the part of isolated sections of the kidney. E. Ciaranfi. *Arch. sci. biol.* (Italy) 24, 319–31(1938).—Butyric acid undergoes a β- and probably also an ω-oxidation in the kidney; the latter occurs only when the carboxyl group is blocked by esterification. This process that transforms butyric acid to succinic, pyruvic and lactic acids, constitutes a stage between fat and carbohydrate metabolism. Free butyric acid probably undergoes only β-oxidation. The process seems purely dehydrogenative; this excludes the possibility that its mol. undergoes a profound demolition in the kidney. The first products of oxidation (crotonic, β-hydroxybutyric and acetoacetic acids) are found only in minute quantities, since they are eventually destroyed. P. F. Metildi

The intestinal absorption of ouabain. C. Lenti. *Arch. sci. biol.* (Italy) 24, 405–10(1938).—In the small intestine ouabain is absorbed slowly. Phlorizin does not change the speed of absorption and monoiodoacetic acid slows it down slightly. The absorption is independent of the formation of phosphoric esters. P. F. M. 8 9

The actual blood reaction of thyro- and para-thyroidectomized animals. A. De Niederhäusern and C. Sisto. *Arch. sci. biol.* (Italy) 24, 471–85(1938).—Thyroidectomy in dogs modifies the physicochem. equil. and shifts it toward acidosis while parathyroidectomy alone or associated with thyroidectomy produces a tendency toward alkalosis. The tetanic manifestations may be due to the alkalosis. P. F. Metildi 1

Protein storage in the liver. F. Av de Moura Campos. *Arch. sci. biol.* (Italy) 24, 500–2(1938).—When the quantity of protein ingested is above the need of the animal for growth, protein is stored in the liver. P. F. Metildi

Chemical state of iron in fertilized hen egg and in the embryo during development. C. Lenti. *Arch. sci. biol.* (Italy) 25, 1–6(1939).—In the yolk Fe is all in the ionic form: in the white it is firmly bound to protein. The formation of Fe-org. compds. in the embryo follows an exponential law. P. F. Metildi 2

The diaphragm muscle and its kinesthesic components. A. Cardin. *Arch. sci. biol.* (Italy) 25, 51–88(1939).—Some problems concerning the motility and sensibility of the diaphragm, the process of phrenic nerve regeneration and the functional modifications were examd. after unilateral and bilateral phrenectomy. P. F. Metildi 3

The significance of the difference in concentration between the white and yolk of hen eggs. V. Capraro and P. Fornaroli. *Arch. sci. biol.* (Italy) 25, 119–25(1939).—The potential between egg white and yolk never exceeds 2–3 mv. instead of about 130 mv. which would be the case if the difference in pH were caused by the Donnan equil. Therefore, the difference in pH in particular and in concn. in general which exists between the yolk and white is the result of a resistance opposed by the egg substances to the passage of diffusible products. This is confirmed by the fact that the coeff. of diffusion of lactic acid into the yolk has been found to be very small. P. F. Metildi 4

Hyperglucemia from bleeding after thyro- and parathyroidectomy. A. Aggazzotti. *Arch. sci. biol.* (Italy) 25, 126–35(1939).—Hyperglucemia after bleeding is inhibited or destroyed in thyro- and parathyroidectomized dogs. A. thinks that these 2 glands act as reënforcers for the cortex. P. F. Metildi 5

Regeneration of the testis in fowls treated with testicular hormone. M. Laporta and P. Miletto. *Arch. sci. biol.* (Italy) 25, 169–77(1939).—Fowls, having minute testicular fragments by incomplete castration, when treated with testosterone propionate may show increased endocrine activity of the regenerated tissue. P. F. M. 6

The chemical composition and physicochemical properties of the seminal fluid. V. Zagami. *Arch. sci. biol.* (Italy) 25, 208–53(1939); cf. *C. A.* 33, 7358⁸.—The following values were obtained at 20°:

	Man	Dog	Rabbit	Cock
Density	1.028	1.011–1.012		
Lowering of f. p.	0.56°–0.58°	0.58°–0.60°		
Specific elec. cond.	88–107 × 10^{-4} mhos	129–138 × 10^{-4}		
pH	7.35–7.50	6.67–6.76	6.59–6.86	7.02–7.18
Relative viscosity	6.45	1.14–1.17		
Surface tension in dynes-cm.	66	64–67		

For a temp. rise from 20° to 38° the seminal fluids of man and dog show an av. decrease in pH of 0.27 and 0.24, resp. The human seminal fluid can be dild. in the ratio of 1:10 without pH variations greater than 0.04. The specific elec. cond. of the seminal fluid of man and dog rises on an av. of 2.51 and 2.31%, resp., for each degree rise in temp. as compared to the cond. at 18°. P. F. Metildi

The metabolism of lactic acid in hen eggs during development. V. Capraro and P. Fornaroli. *Arch. sci. biol.* (Italy) 25, 279–91(1939).—In fertilized eggs incubated at 37–39° and normally developed, the lactic acid concn. in the yolk rises rapidly in the first week up to 205 mg. % and then decreases to the initial value within the 10th–12th day. In the white there is an increase to 50 mg. % in the first 3 days and then a decrease to the initial value on the 5th day. Afterward they are unchanged. In the unfertilized eggs only slight changes were noted. P. F. Metildi

Permeability of the vitellin membrane of the yolk of hen eggs to water and the factors that modify it. Antonietta Orru. *Arch. sci. biol.* (Italy) 25, 292–308(1939).—The permeability of the vitellin membrane to water is diminished by several electrolytes. The greatest effect was produced by salts of bivalent metals. P. F. M.

The chlorine content in symmetrical organs of the rat. A. Salvatori. *Biochim. terap. sper.* 26, 344–5(1939).—The Cl content is identical in symmetrical organs. A. E. Meyer

Physicochemical changes produced in the serum by successive bleedings of the same horse. D. Brocq-Rousseu A. Boutaric and Madelaine Roy. *Bull. acad. méd.* 121, 158–66(1939); cf. *C. A.* 33, 5466⁸.—Viscosity and optical activity, both depending on the protein content, show a rapid decrease during the first 5 bleedings. Thereafter a relative equil. is obtained, with fluctuation, but a trend toward further decrease. A. E. Meyer

Latent carbon monoxide in the blood. Maurice Loeper. *Bull. acad. méd.* 121, 444–50(1939).—Nicloux's method (cf. *C. A.* 24, 5254) permits the detn. of CO in 1 cc. of blood; 1 to 1.5 cc. per l. is normal, values over 2 cc. are pathol. High CO values are found in a variety of diseases, showing endogenous intoxication. It originates from incomplete oxidation of carbohydrates, particularly also of $C_3O_4H_2$. The treatment consists in aeration, altitude and application of methylene blue. A. E. M.

The influence of hepatic catalase on the blood sugar. Henri Werner. *Sang* 13, 348(1939).—The intravenous injection of hepatic catalase results in a reduction of a blood sugar which is attributed to some effect on the oxidation-reduction system. I. Arthur Mirsky

Photoelectric study of blood plasma. Noel Fiessinger and Michel Albeaux-Fernet. *Sang* 13, 456(1939).—When photoelec. cells were used for the examn. of Bengal Rose in blood plasma, difficulty was experienced with the choice of filters, the variations in CO_2 content of plasma, and with variations in known standard solns. of plasma and Bengal-Rose, which seems to prevent the use of electrophotometry for the above problem. I. Arthur Mirsky

Clinical value of determination of coagulability of blood by coaguloretractovisometry during pregnancy and in the course of gynecologic disorders. L. Blacher. *Sang* 13, 624(1939).—By use of a coaguloretractovisometry, it was found that during the final weeks of pregnancy the coagulability of blood is normal. During early pregnancy complicated by vomiting, it is not normal. All reactions of the coagulability of blood are abnormal in extrauterine pregnancy. Variations also occur during the menopause and in various types of gynecological conditions. I. Arthur Mirsky

Bibliography of the German hematological literature for 1938. Hans Schulter and Horst Kuhl. *Folia Haematol.* 63, 100–23(1939); cf. *C. A.* 32, 8532⁸.—About 400 references. John T. Myers

French hematological literature for 1938. Edouard Jequier. *Folia Haematol.* 63, 124–43(1939); cf. *C. A.* 32, 8532⁷.—52 references with brief abstracts. J. T. M.

Some effects of the administration of estrogens on the organs of castrated and noncastrated male rats partially deprived of vitamin A. E. M. Hume, R. Burbank and V. Korenchevsky. *J. Path. Bact.* 49, 291–8(1939).—Moderate doses of estrogen were given to 33 castrated and 23 noncastrated rats which had been subjected to long deprivation of vitamin A. In noncastrated rats, the earliest effect was a decrease in wt. and size of the seminal vesicles, prostate and coagulating glands with a decreased amt. of secretion in the glandular tubules. There was marked stratification of epithelium, squamous metaplasia, keratinization, and papillomatosis of the secondary sex organs and bladder in both castrated and noncastrated rats. In castrated rats there was also fibrous and muscular hypertrophy in the seminal vesicles and prostate. These changes were always more severe if the animals were deprived of vitamin A, and given estrogen at the same time. Severe degeneration of the testes and the formation of bladder calculi were specific for lack of vitamin A. Hypertrophy of fibrous tissue and muscle is specific for the administration of estrogens. John T. Myers

Formation of phenols. D. Yanagihara. *J. Chosen Med. Assoc.* 29, 367–80(German abstr. 21)(1939).—Aligation of the duodenum of rabbits raises the PhOH content (A) of the blood, but that of the small intestine and the lower portion of the colon produces practically no effect, urinary PhOH (B) decreasing in both cases. During starvation, A does not increase until nonprotein N of the blood begins to increase as autolysis sets in, but B declines from the very beginning. A similar increase in PhOH by autolysis is observed in liver, kidney, lung, muscle and brain. The intestinal putrefaction is not the only source of PhOH formation. S. Tashiro

Blood picture of the healthy Koreans. Y. K. Lee and H. K Lee. *J. Chosen Med. Assoc.* 29, 386–91(English abstr. 23–5)(1939).—The analysis of blood of 58 healthy males of 16–52 years old (78% being between 16 and 25), and 43 females of 16–41 years old (88% being 16–25 years) shows that the Koreans have a greater hemoglobin content (99.24% for male, 87.66% for female), a slightly higher eosinophile and lower blood platelets. S. Tashiro

Control of blood indican by nephrohormone. Yositura Atumi. *J. Chosen Med. Assoc.* 29, 514–29(English abstr. 34–5)(1939).—When 1 cc. per kg. body wt. of 1% U nitrate soln. is injected into rabbits, indicanemia occurs in 4–5 days. If the serum of renal arterial blood of a normal rabbit is injected into such an animal, the blood indican gradually increases, but that of renal venous blood decreases, and urinary indican increases. The kidney forms a substance which is secreted in the blood, and lowers pathol. indicanemia, and increases urinary secretion of indican. This substance is a sterol complex, and is produced in tubules, as damage to the glomeruli does not diminish this substance. S. Tashiro

Control of diuresis by nephrohormone. Yositura Atumi. *J. Chosen Med. Assoc.* 29, 669–86(English abstr. 41–2)(1939).—The same nephrohormone has the power to control diuresis. S. Tashiro

The influence of nephrohormone on indican synthesis from indole, and resistance against indole poisoning. Ziro Masuda. *J. Chosen Med. Assoc.* 29, 581–93(German abstr. 37–8)(1939).—Renal venous blood contains a substance which has the power to convert indole to indican. This substance has the power to increase the animal's resistance against indole. It is produced in tubules and is identical with nephrohormone (Tokumitsu). S. Tashiro

Quantitative relationship between stability of erythrocytes and ionic concentration in the aqueous solution of organic salts. Sunao Togo. *J. Chosen Med. Assoc.* 29, 941–61(French abstr. 58–9)(1939).—The detn. of the stability of both nucleated (fowl) and nonnucleated erythrocytes (cattle) in aq. solns. of Na formates, tartrate and citrate shows that the stability is proportional to the theoretical ionic concn. of the salts, not to the actual ionic concn. as detd. from elec. cond., f. p. or from Debye-Hückel effect. S. Tashiro

Significance of ionic concentration in the viscosity change of erythrocyte suspensions in neutral inorganic salt solutions. Syakken Kin. *J. Chosen Med. Assoc.* 29, 962–83(French abstr. 59–61)(1939).—The high concns. of neutral inorg. salt solns. cause a gelatination of nucleated erythrocytes suspension (fowl) and that of nonnucleated erythrocytes (cattle) to a lesser degree. The viscosity of nonnucleated erythrocytes suspension shows a marked increase at the min. hemolytic concn. of the salts, while that of the nucleated a marked decrease. The salt concns. are more significant when expressed by their actual ionic concn. rather than the theoretical. S. Tashiro

Ionic concentrations that control the viscosity of erythrocyte suspensions in aqueous solutions of organic salts. Yosio Egami. *J. Chosen Med. Assoc.* 29, 984–1003 (French abstr. 71–2)(1939).—The concns. of org. salt solns. that influence the viscosity of erythrocyte suspension

are more significant when expressed by their theoretical ionic concns. than the actual. S. Tashiro

A few urinary constituents of healthy Koreans. S. S. Kin and H. K. Lee. *J. Chosen Med. Assoc.* 29, 1004–8 (English abstr. 62–3)(1939).—Av. of analysis of 45 male and 36 female healthy young Koreans shows that as compared with Occidentals, the sp. gr. of urine is slightly lower, total acidity is about ½, total solid is lower and NaCl about twice as much. S. Tashiro

Functional alteration. Changes of splenic and parathyroid functions by administration of specific hormones and their mutual relationship. Ariyesi Mori. *J. Chosen Med. Assoc.* 29, 1307-23(German abstr. 86)(1939).—If a large amt. of splenic ext. is given to rabbits, the splenic vein contains a substance which has the power to diminish blood platelets. When parathormone is injected, the parathyroid produces a compd. which has the power to diminish blood Ca. When parathyroid is transplanted or its hormone is given, the splenic function is suppressed, the effect being neutralized after parathyroidectomy When the spleen is transplanted, or its ext. is given, parathyroid hormone diminishes, but becomes increased after splenectomy. S. Tashiro

Nephrohormone and its variation. Benzo Masuda *J. Chosen Med. Assoc.* 29, 1466–90(German abstr. 95–7)(1939).—The nephrohormone which has the power to decrease blood cholesterol and which is produced by the tubules is present in the renal cortex, but not in the medulla. It disappears after the sympathetic nerves are cut. After sympathectomy, there appears in the renal veins and cortex a substance which has the power to antagonize the nephrohormone. This substance is a protein-like substance, identical with Tokunitsu's contra-nephrohormone; it is also produced by the tubules. S. Tashiro

Specificity of hemoglobins I. Mituko Yasaki. *J Chosen Med. Assoc.* 29, 1504–40(German abstr. 98–9)(1939).—Serological studies. S. Tashiro

Secretion of sex hormones during the embryonic stage. I. Male sex hormone. Yositura Atumi. *J. Chosen Med. Assoc.* 29, 1541–62(English abstr. 99–100)(1939).—A male hormone appears in the umbilical artery of the ox embryo at the 6th month of pregnancy (60 cm.) It is absent in the blood of the umbilical vein and carotid artery of the mother. It appears in the testicles of the embryo at the 46-cm. stage (5 months' pregnancy). This compd. is a sterol deriv. and not identical with gonadotropic hormone of hypophysis. **II. Female sex hormone.** *Ibid.* 1563–92(English abstr. 100)—A female hormone appears in the umbilical artery of the cow embryo at the 63-cm. stage (7th month of pregnancy). S. Tashiro

Influence of experimental nasal obstruction on gastric secretion. Koiti Yuasa. *J. Oriental Med.* 30, 601–15 (German abstr. 176)(1939).—Analysis of gastric juice in Pavlov's stomach pouch shows that closing of both nostrils of dogs reduces the amt. of the secretion and free and total acidities, the digestive power decreasing to one-half. S. Tashiro

Histochemical study of the chick embryo. II. Vitamin C content. Seiti Suzuki. *J. Oriental Med.* 30, 1123–39 (English abstr. 282–4)(1939); cf. *C. A.* 33, 3442[6]. The titration method of 2,6-dichlorophenolindophenol is used and vitamin C is found to appear at the 3rd day of incubation (0.0147 mg.). At the end of the 10th day, it rose to 0.3386 mg. Of few organs exptd., the liver shows the greatest rate of increase of vitamin C, although the brain contains the highest amt. of all from the beginning to the 20th day. S. Tashiro

The influence of hydrogen ions on x-ray effect on antuitary hormone in pregnant woman's urine. Tadahumi Mabuti. *J. Oriental Med.* 31, 179–203(German abstr. 19–20)(1939).—So-called antuitary hormone found in the pregnant woman's urine is partly decompd. by a strong dose of x-ray, the effect being greater in the urinary pH is less than 7. Prolan A is activated by acid and inhibited by alkali, while prolan B is just the opposite. Both prolans suffer practically no effect of x-ray S. T.

Where does vitamin C in the various ocular tissues originate? Diffusion from the blood stream and synthesis in the lens. Hans H. Podestá and Joachim Baücke. *Arch. Ophthalmol.* (Graefe's) 139, 720–31(1938). Frank Urban

Results of autotransplantation of the cornea into the anterior chamber: their significance regarding corneal nutrition. Trygve Gundersen. *Trans. Am. Ophthalmol. Soc.* 36, 207–13(1938).—Corneal epithelium does not live when nourished only by the aqueous and excluded from its tear supply. Under these conditions the corneal stroma lives for a prolonged period; the so-called endothelium not only lives, but proliferates. Frank Urban

The gonadotropic content of the female rat hypophysis in experimental precocious puberty. Henry D. Lauson. *Am. J. Physiol.* 127, 629–36(1939); cf. *C. A.* 33, 2577[9].—The gonadotropic content of pituitaries from immature female rats in which precocious puberty had been induced by gonad-stimulating hormone was studied. The hypophyseal potency was inversely proportional to the degree of sexual development. In all cases in which the wt. of the ovaries exceeded 20 mg., the potency was reduced 33 to 40% below control level. E. D. Walter

The specific dynamic action of protein in sympathectomized cats. H. Haimovici. *Am. J. Physiol.* 127, 642–8(1939).—The results indicate that the sympathetic system does not play any part in the producing of the sp. dynamic action of proteins. E. D. Walter

A qualitative study of normal gonadotropin. Fred E. D'Amour. *Am. J. Physiol.* 127, 649–53(1939).—Normal gonadotropin was found to be similar in its effects to menopause urine. A tentative explanation of the mechanism of ovulation in the human is suggested. E. D. Walter

The glucose and lactic acid exchanges during hypoglucemia. H. E. Himwich, J. F. Fazekas and Sarah Nesin. *Am. J. Physiol.* 127, 685–8(1939); cf. *C. A.* 33, 5512[9].—The glucose and lactic acid exchange of liver, intestine and muscle were studied during hypoglucemia. During hypoglucemia the liver is continually supplying the blood with glucose and the lactic acid exchanges of the various organs are negligible. E. D. Walter

Gonadotropic hormone in the nonpregnant mare. H. H. Cole and H. Goss. *Am. J. Physiol.* 127, 702–9 (1939).—Gonadotropic hormone is present in the blood serum of nonpregnant mares at all phases of the estrous cycle. The hormone could not be distinguished biologically from that found in the pregnant mare. The highest concns. of hormone were found in mares with prolonged cycles or in mares which failed to come to estrus during the observation period. E. D. Walter

The effect of extracts of the adrenal glands on the respiration of isolated brain and liver slices. S. R. Tipton. *Am. J. Physiol.* 127, 710–15(1939).—Exts. of the adrenal whole gland and cortex depressed the O consumption of brain and liver slices of normal and of 3 adrenalectomized rats. The R. Q. of the brain slices was not affected by the ext. An ext. of beef brain also showed depressing effects on the respiration. Cryst. corticosterone in concns. of the same magnitude as the solid matter of the adrenal exts. also showed marked depressing action. E. D. Walter

The effect of the ingestion of glycine, with and without urea, upon creatine-creatinine excretion in the rat and man. Howard H. Beard, Julia K. Espenan and Philip Pizzolato. *Am. J. Physiol.* 127, 716–21(1939); cf. *C. A.* 33, 2571[9].—When glycine is fed to rats, urea can be supplied for the creatine synthesis, and when urea is fed, glycine can be supplied for the same purpose. When glycine is ingested by man, urea can be supplied for the synthesis of the guanidine group of both creatine and creatinine; when urea is ingested, glycine can be supplied for the synthesis of the acetic acid framework and Me group of these substances. It seems probable that in man, both creatine and creatinine can be synthesized from urea and glycine when they are ingested separately or together. E. D. Walter

Ketone body-total carbohydrate utilization ratios and

their relation to the problem of ketosis. J. A. Dye and Jane L. Chidsey. *Am. J. Physiol.* **127**, 745–50(1939).—The rate of ketone body utilization by the tissues is not influenced by the blood-sugar level, the utilization of total carbohydrates, evisceration or pancreatectomy, but by their own concns. in the blood and tissues. The existing evidence for and against the ketolytic and antiketogenic theories of carbohydrate action in relieving ketosis is discussed. The antiketogenic theory is favored. 1
B. D. Walter.

Effect of mare serum hormone on the male and female mouse. Wm. F. Starkey and James H. Leathem. *Am. J. Physiol.* **127**, 751–4(1939).—Mare serum hormone is capable of producing a stimulating effect on the gonads of male and female mice 12 days old. Ovarian wt. increase resulted in mature and immature female mice. Follicular maturation was induced with a few cases of only follicle stimulation but the formation of lutein tissue was predominant. Testis wts. remained unaltered in all males. 2
E. D. Walter

Properties of the substance liberated by adrenergic nerves in the rabbit ear. J. H. Gaddum and H. Kwiatkowski. *J. Physiol.* **96**, 385–91(1939); cf. *C. A.* **33**, 7548.—The evidence that the substance liberated by the adrenergic nerves in a perfused rabbit ear is adrenaline is strengthened by the observation that it stimulates the frog heart and constricts the vessels of the rabbit ear. Estimates of the adrenaline equiv. obtained by these 2 tests agreed with colorimetric estimates. E. D. W. 3

The hematological changes caused by the skin hormone "Esophylaxin." V. Esophylaxin and serum calcium. Seikan Kin. *J. Med. Coll. Keijo* **8**, 400–19 (1938).—The serum Ca content decreased markedly after the injection of Esophylaxin, and the reticuloendothelial system, parathyroid and spleen are necessary for the action of Esophylaxin. I. S. Yun 4

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G—PATHOLOGY

H. GIDEON WELLS

Conservation of some immunobiological properties of blood by means of glucose-citrate and concentrated citrate solutions. I. M. Mstiboskiĭ. *Méd. exptl.* (Ukraine) **1939**, No. 2, 12–16.—Human subjects were immunized by means of streptococcic vaccine, toxin or combined antigen (vaccine and toxin). Conservation of blood by the addn. of small quantities of strong citrate solns. was more effective in preserving the immunobiol. properties of the blood than the addn. of larger quantities of more dil. solns. of citrate. Use of 30% citrate preserved the immunobiol. properties of the blood for 5 days. 6
S. A. Corson

Immunobiological state of scalded patients immediately after the accident. M. I. Kanekevich. *Méd. exptl.* (Ukraine) **1939**, No. 2, 17–23.—Of 65 patients with burns, 80% showed a complete absence of agglutination, 16% showed a pos. reaction (dilu. 1:50), and 4% showed a pos. reaction (dilu. 1:100). Complete absence of complement was found in 22% of the patients, a low titer (0.2–0.1) in 49% and a 0.1–0.04 titer in 29% of the patients. A low phagocyte no. (0–5.0) was exhibited by 43% of the patients, 52.5% had a phagocyte no. of 5–10, and only 4.5% showed phagocyte nos. above 10. Twenty-six % of the subjects had a low opsonic index (up to 0.5), 63% had an opsonic index of 0.6–1.0, and only 11% had an opsonic index above 1.0. It is suggested that rational therapy, among other things, should attempt to stimulate immunogenesis in patients with severe burns. S. A. C. 7

Parasympathetic mediator and cholinesterase during functional disturbances of the autonomic nervous system. E. N. Berger. *Méd. exptl.* (Ukraine) **193.**, No. 2, 58–65.—Observations were made on 40 patients and on 28 healthy human subjects. The concn. of acetylcholinesterase in the blood varied for different subjects but was fairly const. for each individual. Many of the patients with increased activity of the parasympathetic system showed an increased blood content of acetylcholine and of its esterase. Therefore, the presence of greater quantities of acetylcholine is ascribed to an increase in its rate of production, the increase in esterase content being a compensatory phenomenon. S. A. Corson 8

Comparative study of the composition of certain compounds and their relation to immunity. Anastasios A. Christomanos. *Chim. Chronika* (Greece) **4**, 157–63 (1939)(in Greek).—A discussion of certain org. compds. in the light of Ehrlich's theories of immunity. Lucien Y. Dyrenforth 9

Antistaphylococcus immunization with an antigen prepared with aqueous solutions of essential oils. F. de Potter. *Compt. rend. soc. biol.* **131**, 1322–4(1939); cf. *C. A.* **33**, 6524⁸.—Cultures of *Staphylococcus aureus* were treated with geraniol, borneol or oil of cypress 2 days at 37° or 4 days at 20° (this killed the organisms) and then centrifuged. Guinea pigs were successfully immunized by injecting 1–2 cc. of the clear liquid subcutaneously or intracutaneously. L. E. Gilson 10

Recently discovered carcinogenic and anticancer agents. John A. Sampey. *J. Chem. Education* **16**, 461–6(1939).—Review with 151 references. E. H. 11

Studies on the blood-sugar content during fever. Iwao Ohtake. *Japan. J. Exptl. Med.* **17**, 249–67(1939) (in English).—Healthy rabbits exposed to the rays of a radiothermic app. for 30 min. showed a 9% increase. Lengthening of the exposure time showed a corresponding increase. The injection of typhoid, dysentery, vaccine, S or tetranydronaphthylamine caused a hyperglucemia. The blood-sugar content of human subjects during the fever period of various diseases varied according to age. Those over 50 gave the largest increases, while those under 11 gave inconsistent results. Typhoid and paratyphoid caused hyperglucemia in groups of all ages. Charles Jarowski 12

The liver and diabetes. L. S. Shvarts. *Klin. Med.* (U. S. S. R.) **17**, No. 4, 41–7(1939).—The depletion of liver glycogen, which runs parallel to the severity of diabetes, can be easily demonstrated by adrenaline-sugar curves. A depletion in mild or fairly severe cases of diabetes can be traced to hepatogenic or pancreatogenic factors. The depletion affects the functional capacity of the liver, resulting most often in a reduction of urea formation. S. A. Karjala 13

Effects of extract of human urine on tumors in mice. Floyd C. Turner. *U. S. Pub. Health Repts.* **54**, 1855–63 (1939).—A growth-inhibiting substance derived from human urine prevented, to a limited degree, the formation of tumors in mice after injection of cancerigenic chemicals, but the urinary deriv. had little, if any, specific inhibiting effect on transplanted or spontaneous tumors in mice. J. A. Kennedy 14

Physicochemical equivalents in shock. II. Surface tension of serum in insulin shock. I. Scimone. *Arch. sci. biol.* (Italy) **24**, 303–10(1938).—No appreciable difference in static and dynamic surface tension was found in the serum of schizophrenic patients subjected to insulin shock except a slight diminution when the serum was dild. 10 times. P. F. Metildi 15

Gas metabolism after blood transfusion in normal and fasting dogs. Virgilio Martini. *Arch. sci. biol.* (Italy) **24**, 503–16(1938).—In fasting dogs blood perfusion does not increase O_2 consumption. In the same animal blood obtained in the fed-absorbing period and reinjected in the same recipient produces a large gas hypermetabolism. P. F. Metildi 16

Adrenaline. IV. Adrenaline in the blood in arterial hypertension. Cesare Giordano and Pietro Zeglio. *Arch. sci. med.* **68**, 1–30(1939); cf. *C. A.* **33**, 8760⁸.—The adrenaline in normal persons amounts to maximally 3 γ per cc. blood and to 3–4 γ in the plasma. Higher concn. was found in 13 out of 27 cases of essential hypertension, in one out of 12 of secondary nephrosclerosis and in 5 out of 15 patients with hyperthyroidism. There was no direct relationship between adrenaline content and max. or min. pressure. Protein therapy always caused a 17

decrease of the adrenaline level but the reduction in blood pressure was not parallel. Insulin caused a sharp increase in adrenaline which varied with the initial level.
A. E. Meyer

Sulfur in the blood and liver diseases. Paolo Larizza. *Biochim. terap. sper.* **26**, 289-96(1939).—In liver disease there is a moderate increase of the inorg. S in the serum but not in the erythrocytes. The latter show an increment in org. nonprotein S and a decrease in the protein S. The changes are caused by a disturbance of the S-fixing function of the liver and a reduction of the albumin fraction in the blood in favor of the globulin fraction of lower S content. A. E. Meyer

Biochemistry of hypoglucæmic shock. I. The chlorides in plasma and corpuscles. Filippo Romeo. *Biochim. terap. sper.* **26**, 325-37(1939).—The Cl in total blood as well as in the plasma is conspicuously increased especially in cases with lethal prognosis. An increase of Cl in the erythrocytes persists to the end of shock in nonserious cases, whereas there is a final decrease in grave cases. A theoretical discussion is given. A. E. Meyer

The precipitating power against normal human serum of serum from rabbits injected with alcoholic precipitate of normal human urine. R. Waitz. *Bull. acad. méd.* **121**, 131-5(1939).—Normal human urine has marked antigenic power. The ppt. prepd. with EtOH produces precipitins in the rabbit specific to human serum.
A. E. Meyer

Experimental production of prostatic adenoma. Gabriel Petit, Pierre Gley and Étienne Béraut. *Bull. acad. méd.* **121**, 430-44(1939).—Immature dogs were treated with 1000 units of estradiol benzoate daily. Prostate as well as prostatic urethra soon showed signs of stimulation. The prostate itself acquired finally the size and structure of that of the adult animal but did not form an adenoma. The urethra showed proliferation of the epithelium, formation of new glands and development of a structure with all the characteristics of adenoma.
A. E. Meyer

Cancer and dehydroascorbic acid with open lactone ring. The effects of complex iron-sodium salts prepared from the acid on certain clinical features of the neoplastic process. L. Bérard, A. Morel, F. Arloing, A. Josserand and L. Perrot. *Bull. acad. méd.* **121**, 451-6(1939).—Salts of dehydroascorbic acid with Na and Fe were prepd. contg. 11.5, 18.0 and 21.5% of the latter, most as Fe^{+++} but also a small quantity as Fe^{++}. The prepns. were kept as a paste with EtOH and were used dissolved in 0.8% NaCl soln. The daily intravenous dose was 0.02 g. (Fe?). General subjective improvement was obtained, subsidence of pain and reduction of the tumors, facilitating prepn. for surgery. A. E. Meyer

Relation of the iodine contents of water, milk and pasture to the occurrence of endemic goiter in two districts of England. I. Introduction. John B. Orr, *et al.* *Med. Research Council* (Brit.), *Special Rept. Series* No. **217**, 5-7(1936).—The enquiry was designed to provide more definite information concerning the supposed relationship of environmental deficiency of I to the occurrence of thyroid disease, especially to explain the remarkable difference in incidence of thyroid enlargement among school girls in 2 counties. In Suffolk, the incidence was 3%, while in Somerset it was 56%. Results of the investigation show that environmental deficiency of I, as indicated by the I content of the local water, is assocd. with high incidence of goiter. However, in so far as the minor degrees of I deficiency are concerned, the actual amt. of I in the environment is not simply and directly related to the intensity of the incidence of goiter. **III. Analyses of water, milk and pasture samples for iodine. IV. Discussion. V. Summary.** M. G. Crabtree and E. M. Mason. *Med. Research Council* (Brit.), *Special Rept. Series*, No. 217, 13-20 (1936).—Winter, spring and summer samples of milk, water and grazing grasses were collected. The milk was preserved by adding 5 cc. of 10 *N* KOH, while the grasses were dried and ground. The method of Harvey (*C. A.* **29**, 8035[2]) was used for the detn. of I. Difficulty was encountered in the water analyses. No difference was found between the milk and grass from the 2 counties. The water showed 2.9 γ per l. in Somerset and 8.2 γ per l. in Suffolk. However, the environmental deficiency of I in Somerset is not so intense as to be solely responsible for the high incidence of goiter, and so the difference between the 2 counties cannot be solely due to the difference of I in their resp. waters. Insufficient intake of I is partly responsible for the high incidence of goiter in Somerset, but some other factor must be involved, such as the variation in the availability of soil I to herbage and hence to the animal population. Dorothy A. Meyer

The plasma lipides in arteriosclerosis obliterans. Nelsen W. Barker. *Ann. Internal Med.* **13**, 685-92(1939).—The plasma lipides in 73 such cases were compared with 200 normal individuals. The ranges of total lipide and of the fractions were essentially the same in both groups, but the mean values were higher in the patients with arteriosclerosis. This finding may aid in distinguishing between this condition and thromboangiitis obliterans, where the lipides are normal. John T. Myers

Acetone content in the urine of patients with lung tuberculosis. Kaoru Yamazaki. *Tohoku J. Exptl. Med.* **36**, 236-54(1939).—The av. daily urinary excretion of 10 healthy individuals was 12 mg. while that of 110 tuberculous patients was 16.87 mg. The graver the condition, the higher was the acetone excretion. Those patients who received a fat diet for a prolonged period showed an av. value of 17.41 as compared to 15.35 mg./day of those not ingesting an especially high-fat diet. Those cases which as a result of intake of abundant fat exhibited glucosuria had an av. urinary acetone excretion of 19.48 mg./day. Patients with normal temp. showed only slightly higher value than healthy subjects, but those with higher temp. showed an appreciable rise in urinary acetone. Thus, patients with a temp. under 36.9°, excreted 14.87, while those with temps. of 37-38, and 38.1-39.5° excreted 19.25 and 22.3 mg./day on the av. Fat-tolerance tests of healthy persons and of patients with pulmonary tuberculosis and glucosuria increased the acetone content of the urine on the av. by 12.7 and 34.2%, resp. It was also shown that increase in urinary acetone content paralleled the rate of sedimentation of erythrocytes. Twenty-seven references. Maurice M. Rath

Urine chloride concentration in patients with Cushing's syndrome. Abraham Cantarow. *Science* 90, 375-6 (1939).—Patients with Cushing's syndrome and with hirsutism (suspected hyperadrenalism) were unable to eliminate Cl in the urine in as high concn. as patients with various disorders not apparently assocd. with endocrine dysfunction. Felix Saunders

Insulin absorption as a circulatory test in children. H. Hungerland. *Monatsschr. Kinderheilk.* **78**, 157-67(1939). —0.2 units of insulin per kg. of body weight were injected subcutaneously above the lateral malleolus in children 5 to 15 years of age and the blood sugar was detd. with Hagedorn-Jensen's method after 30, 60, 120 and 180 min. on 2 consecutive days, first in a recumbent position and later in a sitting position. The results in 4 different groups of children can be summarized as follows (percentage deviation from fasting blood sugar):

	Group of children	Position	Insulin	9:30 a. m.	10 a. m.	11 a. m.	12 a. m.
I	Normal (40 cases; 1-12 years)	Not given	None	—	− 3	− 4	− 9
II	Normal (10 cases)	Recumbent	At 9:05	−10	−19	−25	−20
		Sitting	At 9:05	−13	−21	−22	−27
III	Cardiac decompensation (11 cases)	Recumbent	At 9:05	−13	−20	−26	−28
		Sitting	At 9:05	− 3	− 4	− 8	−10
IV	Asthenic, vasolabile, orthostatic (9 cases)	Recumbent	At 9:05	−14	−20	−20	−14
		Sitting	At 9:05	− 1	− 6	− 6	− 7

As compared with the normal group, absorption of insulin [1] dependent parts seemed to be deficient in the 2 ups with circulatory disturbances, although there was no way to differentiate between cardiac decompensation and peripheral vasolability with no cardiac insufficiency. H. P. G. Seckel

The pathology of sodium chloride metabolism. G. Fanconi. *Monatsschr. Kinderheilk.* 78, 1–35(1939); cf. *C. A.* 33, 7228.—Methods of testing the NaCl stability were described as consisting of: (1) exam. the level of Cl and Na in the serum, (2) performing NaCl-tolerance tests and (3) giving Liq. Kalii acetici per os (K-tolerance test). According to the distribution of NaCl in the organism, disturbances of NaCl metabolism can be classified as NaCl-congestion, NaCl-deficiency, and transmineralization. From the point of view of pathogenesis, they can be [2]

Minerals	Liver: Actual	Liver: Normal	Liver: % Deviation	Cutaneous blister: Actual	Cutaneous blister: Normal	Cutaneous blister: % Deviation
Dry substance	60 g. %	74.8 g. %	−20	—	—	—
Na	64 mg. %	98 mg. %	−24	193 mg. %	294 mg. %	−35
K	276 mg. %	320 mg. %	−13	20 mg. %	33 mg. %	−39
Cl	—	—		828 mg. %	373 mg. %	−12

tabulated as follows: I. Primary disturbances, due to failure (1) of the diencephalic-hypophyseal control, (*a*) manifest diabetes insipidus, (*b*) occult diabetes insipidus (hyperchloremia, fever in infants with the familial type); (2) of the cortico-adrenal control ("diabetes salinus" in Addison's disease; 5 puerile cases in the world literature!); (3) of the renal filter ("diabetes salinus renalis," e. g., in renal rickets); (4) of the cell-membrane filter ("serous inflammation," e. g., in lobar pneumonia); II. Secondary disturbances, due to (1) extrarenal NaCl-losses from hunger, perspiration, diarrhea, and particularly from severe vomiting as in pylorostenosis ("Coma pyloricum," Seckel), acetonemic vomiting, etc.; (2) flooding with demineralizing fluids, e. g., intravenous glucose injections; (3) alimentary demineralization, e. g., in celiac disease; (4) Cl-displacement from blood into tissue cells by acidosis, e. g., in diabetes, acetonemia, uremia, etc. Except for diabetes insipidus and celiac disease, all disturbances mentioned were shown to be characterized by hypochloremia. Each point was illustrated by most unusual case histories the details of which [3] were published by F. in *Ibid.* 44, 114(1939) and *Verhandl. Kongr. Inn. Med.* 1938. H. P. G. Seckel

Pseudo-chylous effusions. F. Horn. *Monatsschr. Kinderheilk.* 78, 36–44(1939).—The history of a 4-year-old boy with rheumatic polyserositis was reported in which the pseudo-chylous effusion was not caused, as is generally supposed, by a fatty emulsion. The chem. analyses were given in a table:

	Pleural effusion (pseudo-chylous)	Ascites (almost clear)	Blood (clear)
Sp. gr.	1010	1006	—
Reaction	neutral	neutral	-
Ether-sol. parts	0.2395 g. %	0.1846 g. %	- -
Nonprotein N	28 mg. %	18 mg. %	43 mg. %
Proteins	1.4 g. %	1.32 g. %	5.[illegible] g. %
Cholesterol	none	none	157 mg.
Ca	6.3 mg. %	6.8 mg. %	10 mg. %
P	3.35 mg. %	3.59 mg. %	4.3 mg. %
Chlorides (as NaCl)	165 mg. %	150 mg. %	298 mg.

On the basis of over 30 reports from the literature the conclusion was drawn that the pseudo-chylous character of an effusion has no specific diagnostic value whatsoever. H. P. G. Seckel

The pathenogenesis of acetonemic vomiting. W. Goeters. *Monatsschr. Kinderheilk.* 79, 176–9(1939).—A fatal case of acetonemic vomiting (girl 3 years old) was described in which, between the 4th and 6th (last) day of sickness, the following chem. data were obtained: Acetone present in urine and exhaled air, blood (Na-)Cl 276 mg. %, spinal fluid sugar 112 mg. %, hemoglobin 96%, erythrocytes 5.1 millions. After large infusions of glucose and Ringer solns. and parenteral phenobarbital therapy the blood NaCl rose to 612 mg. % and the blood concn. fell. For the last 3 days, a watery-mucous-bloody diarrhea prevailed. At autopsy, only neg. findings were obtained except for a fatty infiltration of the liver and fat-free adrenals. No encephalitis was present on histological examn. of the brain. The fatal outcome was due to a severe disturbance of enteral absorption and exsiccosis (insufficiency of adrenal cortex?). H. P. G. S. [4]

Problems of exsiccosis in infantile toxicoses. V. Uher. *Z. Kinderheilk.* 61, 135–41(1939).—The livers of 9 infants, 3–6 months of age, who died of alimentary intoxication were analyzed, not more than 6 hrs. after death, for dry substance (at 110°), ash (at 600°), total N (Kjeldahl), Na (as K pyroantimonate), K (as Na cobalt-hexanitrite), Ca (as NH_4 oxalate) and Mg (with hydroxyquinoline). Similar studies were made in the watery contents of cantharis blisters produced on the skin of intoxicated infants. The max. diminutions of the various minerals in the 2 series of expts. are:

Ca and Mg contents of the liver were about normal average (12 and 15.4 mg. %, resp.) as were those of the cutaneous blisters (10 and 3 mg. %, resp.). The loss of Na, indicating a loss of extracellular water, was predominant in the milder cases of toxicosis whereas in the severe cases the loss of K, indicating a loss of intracellular water, was even greater than that of Na. The physicochem. significance of this transmineralization for the problem of exsiccosis was discussed. H. P. G. Seckel

The effect of vitamin B_1 on serum anaphylaxis. Sei Syoku Kin and Hei Ki Lee. *J. Chosen Med. Assoc.* 29, 381–5(English abstr. 21–3)(1939).—The injections of vitamin B_1 into guinea pigs reduces not only the symptoms of horse serum anaphylaxis shock, but also delays death. This effect was obvious with a large single injection of 0.25–0.5 cc. (1 cc. = 100 pigeon unit) at one hr. before reinjection, or with a daily injection of 0.1 cc. during the initial and reinjection periods. S. Tashiro [5]

Fluoride poisoning: Mottled enamel formation in rats fed with hot spring water. Yutaka Sugawa. *J. Chosen Med. Assoc.* 29, 1491–1503(English abstr. 97–8)(1939). The mottled enamel, endemic in some hot-spring areas of Korea, is shown to be due to the drinking of hot spring water which contains 6.4–9.2 per million F. The rats given concd. water of these springs or artificial spring water with NaF added produce chalk-white color on labial surface of lower incisors after 11–35 days, and transversal strips after 43–67 days. S. Tashiro [6]

Cholesterol content of myxosarcoma of fowl. Yutaka Uehara. *J. Chosen Med. Assoc.* 29, 1595–5(German abstr. 101)(1939).—The free cholesterol content of myxosarcoma 20 days after transplantation is on the av. 0.019 g. per 15-g. sample; that of myxosarcoma after daily injection of 10 cc. of Ringer soln. (per kg.) is 0.018 g., and that of myxosarcoma after daily injection of the Ringer soln. plus histotoxine is 0.012 g. The conjugated cholesterol content, too, is less in the tissues when histotoxine is injected. S. Tashiro [7] [8]

Skin diseases and vitamin C. II. Intradermal test with 2,6 dichlorophenolindophenol. Seiiti Suzuki. *J. Oriental Med.* 30, 971–86(English abstr. 267–9)(1939).—The time of decolorization of the Rotter skin test with 2,6-dichlorophenolindophenol is inversely proportional to the ascorbic acid content of blood serum, as tested with healthy human subjects and pathol. cases with skin diseases. It is relatively shorter in rabbits than guinea pigs, showing that the former have more vitamin C. S. Tashiro [9]

Formaldehyde-gel reaction. I. Biological studies. Kaoru Mori. *J. Oriental Méd.* 30, 1063–77(German abstr. 278)(1939).—Factors influencing CH_2O-gel reaction are dctd. with 181 samples of serum of various diseases. The optimum amt. of 35% CH_2O is 1 drop to each 1-2 cc. serum; evapn. of H_2O and CH_2O must be prevented; it is best to keep the tube in the dark. Serum irradiated

with ultraviolet gives a stronger reaction; this suggests that a globulin must be responsible for this reaction. S. Tashiro

Cause of endemic goiter. I. The effect of continuous administration of "Goiter water" on the thyroid of guinea pig. Tokihiko Kurata. *J. Oriental Med.* **31**, 1–11 (English abstr. 1) (1939).—When 1–10 cc. of the water obtained from a goiter district (Jehol) is given daily to guinea pigs of nongoiter district (Mukden), the thyroid begins to enlarge after 3 months, showing every symptom of a goiter after 5–6 months. The similar feeding with the water boiled for 30 min. at 100° does not produce the disease. There is a pos. goitrogenic substance in the "goiter" water which is destroyed by boiling. S. Tashiro

Kaschin-Beck disease. III. Hydrogen-ion concentration and acid-combining power of the blood of patients with Kaschin-Beck disease. Taro Yamanaka. *J. Oriental Med.* **31**, 113 25(German abstr. 10–12) (1939).—The blood of pH of these patients is within the normal limit, but the acid-combining power is less. Their blood shows a compensated primary alkali deficit. S. Tashiro

Quantum mechanical resonance attraction and the problem of immunity reactions. P. Jordan. *Z. Physik* **113**, 431–8(1939).—Empirical facts concerning the "active groups" of immunizing "antigens" are discussed from the point of view of whether quantum mech. resonance attraction is applicable to the explanation of serological reactions. It is pointed out that the antigens and antibodies must consist of complex mols. This is discussed, especially from the viewpoint of active groups. The quantum mech. aspects of resonance attraction are discussed. S. Tolansky

The effect of vitamin C on the production of antibodies. I–II. T. Izutumi and I. Sawai. *Japan. Z. Mikrobiol. Path.* **33**, 175 86(1939).—The productions of agglutinin, precipitin and hemolysin was accelerated by the continuous injections of vitamin C. I. S. Yun

The influence of lipoid and bile addition to antigen on the production of agglutinin. M. Isikawa. *Japan. Z. Mikrobiol. Path.* **33**, 1026 33(1939).—The author found that the production of agglutinin was increased by the addn. of lipoid or bile to antigen. I. S. Yun

Presence of an anemic substance in the blood of a patient suffering from anchylostomiasis. Masanori Yamada. *J. Med. Coll. Keijo* **8**, 391 9(1938).—Y. demonstrated the presence of an anemic substance in the blood; it is different from the worm toxin. I. S. Yun

The presence of anemic substance in the blood in pernicious anemia. Mutuyosi Anan and Keisyaku Kin *J. Med. Coll Keijo* **8**, 421 30(1938).—Blood from a patient who had pernicious anemia injected into the ear vein of normal rabbit in the amt. of 2 cc. per kg. of body wt. of the rabbit caused a drop of 1.5–2.0 million per cubic mm. in the red-cell count within 2–6 hrs. after the injection. The same effect was produced in a splenectomized rabbit. There is a specific anemia-producing substance present in the blood in pernicious anemia, which may be elaborated by some organ in the patient. S. S. Yun

H—PHARMACOLOGY

CARL F. SCHMIDT

A preliminary note on the chemotherapy of oesophagostomiasis of sheep with special reference to the efficiency of phenothiazine. Hugh McL. Gordon. *J. Council Sci. Ind. Research* **12**, 203–6(1939).—Phenothiazine, in doses approximating 0.2 g. per kg. of body wt., offers great promise for the treatment of oesophagostomiasis in sheep. Satisfactory results can be obtained without the necessity for insuring that the drug passes direct to the abomasum if a large enough dose be given. Phenothiazine is claimed to be relatively nontoxic and the preliminary expts. show no loss of wt. or appetite among the treated sheep. J. R. Adams

A preliminary note on the anthelmintic efficiency phenothiazine against Haemonchus contortus in sheep. Hugh McL. Gordon and L. K. Whitten. *J. Council Sci. Ind. Research* **12**, 207(1939); cf. *C. A.* **33**, 8823[8].—Doses of 0.3 to 0.75 g. of phenothiazine per kg. of body wt. administered in capsules on 3 successive days showed a 100% anthelmintic efficiency against *H. contortus*. Even a single dose appeared to possess a high degree of efficiency. There was a sufficient concn. of phenothiazine in the feces to destroy the developing preinfective larvae. J. R. A.

A preliminary note on the treatment of oesophagostomiasis in sheep with phenothiazine. F. H. S. Roberts. *J. Council Sci. Ind. Research* **12**, 208 (1939).—Encouraging results were obtained with 5 grown sheep, each of which had received 4 g. of phenothiazine suspended in 1 oz. of 1% Cu sulfate soln. and with heavily infected lambs 4 to 5 months old, each of which had received 2 g. of powder suspended in a little liquid paraffin, after administration of 2 cc. of 10% Cu sulfate soln. No sign of toxicity followed the above dose rates. J. R. Adams

Toxicology of fluorides. Alexander O. Gettler and Lester Ellerbrook. *Am. J. Med. Sci.* **197**, 625–38(1939). After examn. of existing qual. tests for the detection of F in human tissues, there was devised a simpler method based on the pptn. of the La salt from a HNO_3 ext. of tissue and the formation of crystals of Na fluosilicate by the addn. of powd. glass. Examn. of quant. methods indicates that the Th nitrate-alizarin volumetric method is best adapted from a standpoint of accuracy, sensitivity and simplicity of technique. The normal F content of the various human organs and tissues, the distribution of the F among the various organs and body tissues of fatal fluoride cases, and the min. lethal dose of absorbed flubride were detd. 77 references. Ruth E. Black

Iontophoresis. Milton A. Lesser. *Am. Professional Pharmacist* **5**, 559–62, 591(1939).—A review dealing with this form of therapy whereby medication with cholines, histamine, Ca, Ag and Cu is effected. 22 references. H. M. Burlage

Sulfanilamide in tuberculosis: An explanation of certain findings. H. J. Corper, Maurice L. Cohn and Clarence Bower. *Am. Rev. Tuberc.* **40**, 452–66(1939). Large doses of sulfanilamide for long periods of time, given parenterally as well as enterally, begun before or coincident with infection of guinea pigs with virulent human tubercle bacilli, have an apparent, though not real, effect upon the org. tuberculous involvement of these animals which is most strikingly evident in the spleen. These findings explain the earlier studies on enteral treatment by Rich and Follis (*C. A.* **32**, 3029[7]) and those of Greey, *et al.* (*Proc. Soc. Exptl. Biol. Med.* **39**, 22(1938)), which could not be verified by parenteral sulfanilamide treatment studies. The apparent effect noted upon the tuberculosis in the guinea pig is explained as an org. toxic effect of the sulfanilamide since it can also be noted when heat-killed and avirulent human tubercle bacilli are given intravenously in large amts. to animals which are treated as compared with untreated controls. Sulfapyridine was also tested with essentially the same effects. Even in larger doses, sulfanilamide has no appreciable effect upon the spread of tuberculosis in guinea pigs infected by various routes and in various ways with virulent human tubercle bacilli; such effect as is seen can be entirely explained on the basis of the toxic effect of the sulfanilamide and not upon a retardation of the tuberculosis. In elaboration of the view expressed by Shecket and Price (*J. Am. Med. Assoc.* **112**, 823(1939)) that "the use of sulfanilamide in conditions in which its value is not established should be reserved for cases under institutional direction," and that the drug should not be used for long-duration administration, is added that misinterpretation of the effect in chronic diseases especially be avoided by carefully controlled exptl. studies considering the org. toxic action of the drug before application to human treatment. H. J. Corper

Pharmacodynamic study of red squill. A. Tournade, P. Fourment, H. Roques and G. Chardon. *Compt. rend. soc. biol.* **131**, 1204–6(1939).—Infusion of red squill, injected as previously described (*C. A.* **33**, 7489[8]), produces at first a mild hypertension owing to general vaso-

constriction and a slowing of the heartbeat by an action on the medullary nerve centers, and an increase in respiration. Later, as death approaches, the respiration fails and the blood pressure rapidly decreases to zero.
L. E. Gilson

Comparative effects of acetylcholine and direct current on striated muscle. Action of cold and calcium ions. P. H. Benoit and M. Beauvallet. *Compt. rend. soc. biol.* **131**, 1247–50(1939).—After treatment with eserine the isolated sartorius muscle of the frog responds with the same type of contractions to acetylcholine and to prolonged d.-c. stimulus. Decreasing the temp. or increasing the Ca conen. of the Ringer soln. bathing the muscle raises the threshold of sensitivity to either type of stimulus.
L. E. Gilson

Sensitivity of the epoöphoron to testosterone as detected by the colchicine reaction. F. Granel. *Compt. rend. soc. biol.* **131**, 1255–6(1939).—In adult female guinea pigs the injection of 15 mg. testosterone in 15 days has little or no effect on the ovaries, uterus and clitoris but produces a marked hypertrophy of the epoöphoron. Rapid cell division can be detected after the injection of colchicine.
L. E. Gilson

Substances which protect from the toxic action of histamine. Role of glucose. Jean Brunati. *Compt. rend. soc. biol.* **131**, 1256–60(1939). Five mg. of procaine protects the guinea pig from a lethal dose of histamine; 0.25 mg. adrenaline has little or no protective action. A preliminary injection of glucose affords complete protection. Antipyrine increases the toxic action of histamine. 4
L. E. Gilson

Cardiovascular action of urea. Vasodilator action. Action of urea on the contractility of the myocardium. Marin Pavesco. *Compt. rend. soc. biol.* **131**, 1267–70 (1939); cf. *C. A.* **33**, 5506⁸.—Intravenous injection of urea produces intense peripheral vasodilation in rabbits. A 0.5–2.0% soln. of urea in Ringer soln. increases the amplitude of the contractions of the isolated frog heart. 5
L. E. Gilson

Utilization of the electroencephalographic method for the pharmacological localization of evipan [in the brain]. Zénon Drohocki and J. Drohocka. *Compt. rend. soc. biol.* **131**, 1287–91(1939). L. E. Gilson

Modifications of the reaction of the heart to acetylcholine or vagus excitation in presence of sodium bicarbonate. M. Segers. *Compt. rend. soc. biol.* **131**, 1294–6 (1939).—$NaHCO_3$ has little effect on the inotropic and dromotropic actions of acetylcholine or vagus excitation on the frog heart *in situ* but causes a temporary disappearance of the chronotropic action. L. E. Gilson 6

Comparative action of estradiol and dihydroxydiethylstilbene on the pH of human vaginal secretion. J. A. Schockaert, Georges Delrue and Jacques Ferin. *Compt. rend. soc. biol.* **131**, 1309–11(1939).—Small doses of either compd., injected intramuscularly or taken orally, cause a slight decrease in the pH. L. E. Gilson 7

Alkyl nitrites. III. A pharmacologic study of a new series of organic nitrates. John C. Krantz, Jr., C. Jelleff Carr, Sylvan E. Forman and Fred W. Ellis. *J. Pharmacol.* **67**, 187–90(1939); cf. *C. A.* **33**, 7422.—The dinitrates of isomannide, isosorbide and erythritan and the tetranitrates of styracitol, polygalitol, mannitan and sorbitan were prepd. from the corresponding sugar alc. anhydrides. Compared to erythritol tetranitrate they produce a similar but more prolonged drop in blood pressure when injected intravenously in dogs. In general, these nitrates of the sugar alc. anhydrides are more water-sol. and less lipide-sol. than the nitrates of the undehydrated sugar alcs. 8

Isomannide dinitrate, $OCH_2CH(NO_3)CHCHCH(NO_3)-CH_2O$, is readily prepd. in pure cryst. form and is comparatively free from explosive properties. **IV. The pharmacology of isomannide dinitrate.** *Ibid.* 191–200.—Isomannide dinitrate produces a more prolonged depressor response in dogs and man than does glyceryl trinitrate, erythritol tetranitrate or mannitol hexanitrate. It is not hydrolyzed in the blood and does not produce detectable amts. of methemoglobin. It dilates the coronary vessels of the steer and rabbit *in vitro* and of the dog *in situ*. It can be readily prepd. in tablet form for the treatment of hypertension and angina pectoris. L. E. Gilson 9

Influence of disulfanilamide on experimental influenza infections. D. R. Climenko, M. L. Crossley and E. H. Northey. *J. Pharmacol.* **67**, 201–11(1939).—The absorption of disulfanilamide from the alimentary tract of the rabbit, dog or man is so small as to be practically negligible, but the Na salt (I) is rapidly absorbed. The max. conen. in the blood is reached in 3 hrs. or less, and the drug is completely eliminated in the urine within 6 hrs. The toxicity is very low. I in doses up to 1500 mg./kg. daily for 16 days produced no leg weakness or other bad effects. I exerts some protective action against moderate infecting doses of influenza virus in mice. Conens. up to 100 mg. %, in contact for a period of 1 hr., attenuated but did not completely inactivate virus suspensions *in vitro*. More prolonged contact inactivated the virus in some cases. L. E. Gilson

Effects of sulfanilamide on the lower vertebrates. J. T. Litchfield, Jr. *J. Pharmacol.* **67**, 212–23(1939).—The parenteral lethal dose of sulfanilamide for the spiny dogfish is about 100 mg./kg. For chickens the lethal oral dose is about 1 g./kg. The lethal dose for frogs is still larger and increases with the temp. Subtoxic blood levels at 18° become toxic levels at 5°. On the basis of blood conens. it is about 15 times as toxic for the fish as for the frog and about 4 times as toxic for the fish as for the bird. Absorption varies greatly with the mode of administration and in all cases excretion is slow. Conjugation occurred in the fish and chicken but not in the frog. Cyanosis was produced in chickens by chronic intoxication with sulfanilamide. A direct toxic action on the muscles of the frog was observed *in vivo* and *in vitro*. L. E. G.

Physiological adaptations in cardiac slowing by digitalis and their bearing on problems of digitalization in patients with auricular fibrillation. Harry Gold, Nathaniel T. Kwit, Harold Otto and Theodore Fox. *J. Pharmacol.* **67**, 224–38(1939).—Chiefly discussion. L. E. G.

Studies of certain addition characteristics of dihydromorphine ("paramorphan"), dihydrodesoxymorphine-D ("desomorphine"), dihydrodesoxycodeine-D ("desocodeine") and methyldihydromorphinonone ("metopon"). C. K. Himmelsbach. *J. Pharmacol.* **67**, 239–49(1939).—The above compds. were each substituted for morphine in 4 groups of addicted patients. Addiction satisfaction by the first 3 drugs was nearly complete, but decidedly incomplete with the fourth. Variations in intensity and duration of phys. dependence effects were detd. L. E. Gilson

Effect of fluidextract of ergot and of ergotamine on the emptying time of the human stomach. Edward J. Van Liere and Clark K. Sleeth. *J. Pharmacol.* **67**, 250–5 (1939). Two cc. of fluidext. of ergot caused an av. delay of 30% in the gastric emptying time of human subjects. One mg. of ergotamine caused an av. delay of 16.4%. Some of the other alkaloids in the fluidext. are probably more powerful in their action than is ergotamine. The action is probably directly on the stomach muscles and not through the autonomic nervous system. L. E. G.

Combination courses of bismuth administration. Torald Sollmann, H. N. Cole and Katherine Henderson. *J. Am. Med. Assoc.* **111**, 2175–9(1938).—A graded sequence of injections of soln. Bi (iodobismitol and sobismiol) with weekly injections of Bi subsalicylate produces a high initial conen. of Bi as reflected in the urinary excretion, which reaches at the end of 2 weeks a level of 4–12 mg. Bi per day. This form of Bi therapy is particularly useful in the acute stage of syphilis where the patient is sensitive to As.
F. P. Griffiths

Crystalline insulin. Alexander Marble and Ilmari Vartiainen. *J. Am. Med. Assoc.* **113**, 1303–10(1939).—Results from identical dosages of amorphous insulin and a soln. of Zn insulin crystals show a slightly prolonged action from the latter product. Limitation of the insulin on the market to (*a*) a rapidly acting insulin, such as

cryst. Zn insulin, and (*b*) a slowly acting variety, the protamine zinc insulin, is recommended. F. P. Griffiths

Chemotherapy. X. Colorimetric tests for aromatic hydroxylamines and for further oxidation products of aromatic amines. Their demonstration in the urine following sulfanilamide administration. Sanford M. Rosenthal and Hugo Bauer. *U. S. Pub. Health Repts.* 54, 1880–90 (1939); cf. *C. A.* 33, 8305¹.—Most of the sulfanilamide administered to man or animals can be recovered in the urine either free or acetylated. It is of importance to know whether any of it is oxidized during its passage through the body. If, e. g., a hydroxylamine is formed the bacteriol. action of the drug may be due, at least in part, to the fact that the hydroxylamines are active as inhibitors of catalase. It was of special interest to know whether the hydroxylamine deriv. of sulfanilamide is formed in the body. In studying methods for detecting this deriv., it was found that when 4-hydroxylaminobenzoic acid or 5-hydroxylaminobenzene sulfonamide reacts with HNO_2 a diazo compd. is formed which yields as intense color with the usual coupling agents. Moreover, a preliminary acetylation accomplished by shaking the soln. with Ac_2O prevents any free sulfanilamide from taking part in the diazo reaction. After the acetylation of the unchanged sulfanilamide, the soln. can be diazotized with $NaNO_2$ in the presence of NH_4 sulfamate and then some dimethyl-α-naphthylamine or some (1-naphthyl)-ethylenediamine dihydrochloride is added and after some time the color can be read in a colorimeter against suitable standards. The results of this method of analysis showed that after the oral administration of sulfanilamide to man, rabbits, dogs or rats appreciable quantities are found in the urine as hydroxylamine deriv. Glutathione and cysteine reduce 4-nitrosobenzoic acid to 4-hydroxylaminebenzoic acid and to 4-aminobenzoic acid but ascorbic acid reduces it almost entirely to the hydroxylamine. Bibliography of 15 titles. W. T. H.

Physiological observations following induced convulsions. Leo L. Orenstein. *N. Y. State J. Med.* 39, 1921–3(1939).—A study was made of circulatory changes in 15 schizophrenic patients given intravenous injections of metrazole. After a mild metrazole convulsion, the electrocardiogram showed rapid rate, arrhythmia, *T*-wave elevation and depression of the *S-T* segment. After a severe convulsion, the electrocardiogram also showed sinus arrest, shifting of the pace-maker auricular and ventricular premature contractions, coupling of beats, nodal escapes, and rarely a marked bradycardia. The blood pressure showed a rise in systolic and diastolic levels at the beginning of the injection and generally a fall in the diastolic and an elevation in the systolic level after a convulsion. The cerebrospinal fluid after a metrazole convulsion showed a marked rise in pressure and no change in content. When the metrazole was given too slowly to cause a convulsion, no notable effects were produced other than an increase in heart rate. E. J. C.

Theory and results of prophylaxis of endemic goiter in Switzerland. H. Eggenberger and F. M. Messerli. *West. J. Surg. Obstet. Gynec.* 47, 596–9(1939).—The successful use of iodized salt in combating endemic goiter in Switzerland is described. Salt contg. 10 mg. I per 1000 g. was more effective than salt contg. 5 mg. I per 1000 g. The daily dose of I found definitely to prevent endemic goiter is 0.1 mg. per person. E. J. C.

Fowl paralysis. Clifford W. Barber. *Cornell Vet.* 29, 41–4(1939).—Cold-pressed wheat-germ oil, administered orally in gelatin capsules at the rate of 1–2 cc. per bird per day, had no appreciable effect on the duration and severity of the disease. K. D. Jacob

The effect of sulfanilamide on bovine mastitis streptococci Ralph B. Little. *Cornell Vet.* 29, 287–94(1939).—When it was administered at the rate of 108–1261 g./cow, the drug failed to destroy the streptococci in the affected quarters, although during treatment the nos. of streptococci and leucocytes appearing in the milk were greatly reduced. In acute mastitis the drug may aid in alleviating acute symptoms, but repeated attacks may be expected to occur. K. D. Jacob

The effect of sulfanilamide on the course of experimental avian coccidiosis. P. P. Levine. *Cornell Vet.* 29, 309–20(1939).—Sulfanilamide fed at the rate of 0.3 g. daily to 1.5-lb. chickens had no effect on the course of infection with *E. tenella*. Similar treatment of birds infected with a mixt. of *E. mitis*, *E. acervulina* and *E. necatrix* prevented the development of oöcysts of the 1st 2 species but had no effect on the last. Likewise, the drug practically completely suppressed the discharge of oöcysts of *E. praecox*, *E. mitis*, *E. hagani* and *E. maxima*. A few days after the drug was discontinued, oöcysts appeared in the feces but the count reached a max. considerably below that of the control birds. When it was mixed in the mash in concns. of 0.1–0.5% by wt., sulfanilamide prevented the normal wt. gain of growing chickens. Concns. of 0.1–0.2% had no effect on the production and discharge of oöcysts of *E. hagani* and *E. praecox*, but a concn. of 0.3% had a marked inhibitory effect on the oöcyst discharge of birds infected with these species and *E. mitis*. K. D. Jacob

The effect of adrenaline and thyroxine on the absorption of oxygen by the sympathetic ganglion. V. M. Potapova. *J. Physiol. U. S. S. R.* 25, 805–11(in French, 811)(1938).—The absorption of O_2 by the isolated sympathetic ganglion of a cat after the injection of 0.1–8.5 cc./kg. body wt. of 0.1% adrenaline (I) and 0.25 mg./kg. body wt. of thyroxine (II) was increased by 83.5 and 58.5%, resp. No increase was observed on direct treatment of the ganglion *in vitro* with I or II. S. A. Karjala

The effect of neural and humoral heart stimulation. A. Solov'ev. *J. Physiol. U. S. S. R.* 25, 906–18(in English, 917–18)(1938).—Disharmony between the contractions of the auricles and ventricles of the heart can be brought about by stimulation of the "accelerating" nerve (I) and relieved by stimulation of the "reinforcing" nerve (II). When II is stimulated before I no disharmony or dissocn. occurs. Hearts of *Rana temporaria* with intact nerve connections were perfused with Ringer soln. and sep. kymograph recordings taken of auricular and ventricular contractions. The heart, with its vagal system previously inhibited by morphine (III), exhibits disharmony similar to the stimulation of I upon the injection of adrenaline (IV). This is readily relieved by stimulation of the vagus or injection of acetylcholine (V). If the morphinized heart is first treated with V no dissocn. is caused by IV. When IV and V are perfused through a normal heart in succession or simultaneously the cardiac activity resembles the work of a "trained" heart with low frequency and high amplitude of contractions. An increase in the T pike occurs, indicating an increased intensity of metabolic processes. The perfusate of the hind legs of winter frogs is vagomimetic (decreasing the amplitude of cardiac contractions and decreasing aortic pressure) while that of the hind legs of spring and summer frogs is sympathicomimetic (increasing the amplitude of contraction and increasing aortic pressure). S. A. Karjala

The influence of adrenaline and thyreoidin on the excitability of the cerebral cortex. N. I. Bondarev. *J. Physiol. U. S. S. R.* 25, 926–9(in German, 929)(1938).—Intravenous injections of 0.0005 mg./kg. of adrenaline (I) reduce the excitability (II) of the motor centers of the cerebral cortex. Smaller doses increase II. Subdural injections of I cause a sharp drop in II. The direct action of thyreoidin causes a reduction in II while intravenous injection sometimes increases and sometimes decreases II. S. A. Karjala

Alterations in the ammonia content and pH of brain tissue during excitation and depression of the central nervous system with certain pharmacological agents. E. A. Vlaumirova. *J. Physiol. U. S. S. R.* 25, 930–9(in English, 939)(1938).—The N of the av. preformed NH_3 in the brain tissue of normal mice is 0.43 mg. %. The values after the injection of camphor (I), NaBr and urethane were 0.63, 0.87 and 0.26 mg. %, resp. With I the increase in NH_3 is lowered in the stages of relative rest between convulsive fits. Little change from normal was observed in the pH of brain tissue during excitation of the central nervous system with the drugs. S. A. Karjala

The treatment of cutaneous lesions caused by war gases. Z. N. Grzhebin. *Klin. Med.* (U. S. S. R.) 17, No. 6, 83–6(1939).—A review. S. A. Karjala

Chemotherapy of experimental pneumococcus infection. II. N. G. Rabinovich. *Klin. Med.* (U. S. S. R.) 17, No. 6, 89–94(1939).—The injection of 0.08–0.1 cc. of 5% oil of camphor, 0.1–0.2 cc. of 1% quinine-HCl or a mixt. of 0.05 cc. and 0.1 cc., resp., of the 2 within 48 hrs. after the inoculation of mice with types II, III, XIV and XXII pneumococcus led to an increase in the survival rate in mice. The resistance of mice to infection by types I a. d II pneumococcus is increased by the injection of 0.2 cc. of normal horse serum before infection. S. A. Karjala

Hematopoiesis in chronic intoxication by mercury vapors. Alvaro Gori Savellini. *Rass. med. ind.* 10, 552–61 (1939).—A review of the literature since 1906 is followed by original expts. with 6 guinea pigs and 4 rabbits subjected to chronic poisoning and 10 guinea pigs subjected to subacute poisoning. Blood tests showed that subacute poisoning leads to a stimulation of the erythropoietic organs, compensated by a corresponding increase in blood destruction. The granulocytopoietic tissues are also stimulated and this is not compensated by increased destruction of the circulating granulocytes, the no. of which are increased. The lymphopoietic system is stimulated. In chronic poisoning erythropoietic activity is adversely affected and the no. of the circulating red corpuscles are reduced. The granulocytopoietic tissues are also depressed. The lymphopoietic system is not substantially altered. 32 references. A. H. Krappe

The metabolism of nucleoproteins in lead poisoning. G. Michetti and F. Molfino. *Rass. med. ind.* 10, 562–72 (1939).—An outline of past observations on lead poisoning is followed by original research on 10 cases with clinical data (table). They show a pronounced tendency to uricacidemia as a result of recent poisoning, becoming more acute in proportion as the poisoning tends to become chronic. No connection was seen between the degree of uricacidemia and kidney function, and no such connection is likely to exist in cases of recent lead poisoning. 25 references. A. H. Krappe

Significance of nicotine in forensic biology. Bonne. *Deut. Z. ges. gerichtl. Med.* 30, 308–12(1939).—The smoking of strong cigars and cigarets can produce degeneration of the cardiac nerves and brain cells resulting in fatal cerebral paralysis, and disorders of the endocrine glands, liver and sex glands. Frances Krasnow

Histo-toxicological investigations of 3,5-dinitrophenol. Antonio Risi. *Z. Biol.* 99, 431–42(1939).—The min. subcutaneous lethal dose of 3,5-dinitrophenol for guinea pigs is 0.05 g./kg. body wt. Repeated small, sublethal doses had no cumulative effect. The symptoms of poisoning are rapid breathing, tachycardia, raised temp., flaccid paralysis of all limbs, particularly the hind legs, deeply colored urine and hardening of the eyes. These symptoms last 2 hrs., after which death occurs because of cardiac failure. The most important histological changes appear as deep protoplasmic and nuclear degenerations in the liver and kidneys. Frances Krasnow

The nervous and muscular effect of strophanthin. H. Reichel. *Z. Biol.* 99, 590–5(1939).—Strophanthin apparently increased the contraction of the artificially stimulated heart, having a purely muscular effect. On the normally beating heart it had a neg. inotropic, chronotropic and dromotropic influence. On the fatigued normally beating heart, there was a pos. inotropic, but a neg. chronotropic and dromotropic effect. F. Krasnow

Methemoglobin as the principal abnormal pigment in the blood of human subjects showing cyanosis from sulfanilamide. Wm. B. Wendel, Nannette M. Wendel and W. W. Cox. *J. Biol. Chem.* 131, 177–85(1939); cf. *C. A.* 33, 5481[6].—Spectrophotometric and gasometric analyses of fully oxygenated blood from cyanotic patients who had been given sulfanilamide indicate that the abnormal color of the blood was for the most part due to methemoglobin rather than to colored derivs. of sulfanilamide. A. P. Lothrop

Treatment of schizophrenia with glandular extracts. Siegfried Fischer. *Arch. Neurol. Psychiat.* 42, 644–51 (1939).—Exts. contg. anterior pituitary-like substances from the urine of pregnant women have given good therapeutic results in the treatment of schizophrenic patients. Prepns. from the anterior lobe itself were useless. G. H. W. Lucas

Cerebral changes in fatal cases following treatment with barbital, soluble barbital U. S. P., insulin and metrazole. George B. Hassin. *Arch. Neurol. Psychiat.* 42, 679–89 (1939).—Examn. of the brains of persons dying from barbiturate poisoning or from insulin or metrazole shock show morphologic changes in the ganglion cells of the brain, often assocd. with neuronophagia. These changes appear to be most evident in the olivary bodies, but are not specific for these poisons. A more serious evidence of damage is found in a distention of subarachnoid and cerebral tissue spaces. G. H. W. Lucas

Histopathologic changes in the brain after experimental injection of metrazole. Erich Liebert and Arthur Weil. *Arch. Neurol. Psychiat.* 42, 690–9(1939).—In the brains of rabbits injection of large doses of metrazole (a total of 700 mg. in several injections) produced a more or less severe shrinking of both cytoplasm and nuclei of neurons, also hyperplasia and hypertrophy of the different types of glia cells. The pathol. effect was most pronounced in the striatum and hippocampus. G. H. W. Lucas

Mode of action of brilliant Vital Red in epilepsy. Robert B. Aird. *Arch. Neurol. Psychiat.* 42, 700–23(1939).—A protecting action of Vital Red has been demonstrated in epilepties and in animals where convulsions were produced experimentally. It is believed that the endothelium concerned with the formation of cerebrospinal fluid forms an effective protective barrier to the central nervous system and that brilliant Vital Red decreases the permeability of this barrier to convulsant poisons, such as cocaine and picrotoxin. The protective action in epilepsy may be due to a decreased permeability of the barrier to "convulsant toxins" which may contribute to the production of epileptic convulsions. G. H. W. Lucas

Blood lipoids in dementia praecox and during insulin-shock therapy. M. Gerundo and W. W. Corwin. *J. Nervous Mental Disease* 90, 464–82(1939).—In cases which have improved after insulin-shock therapy, the ratio between phospholipins and cholesterol tends to become higher and approach the normal. G. H. W. Lucas

Sulfanilamide: its mode of action and side effects. Chester S. Keefer. *Med. Clinics N. America* 23, 1133–48 (1939).—A review. G. H. W. Lucas

Pharmacologic study of the bronchial musculature. I. Technical contribution to perfusion of the isolated guinea-pig lungs. R. Benelli. *Arch. sci. biol.* (Italy) 24, 249–66 (1939).—Perfusion app. is described. **II. The action of *p*-methylaminoethanolphenol (Sympatol) on the bronchial musculature.** *Ibid.* 267–80.—Sympatol, in the perfused isolated guinea-pig lung, in general has an adrenaline-like action and does not present the qual. characteristic differences that have been demonstrated in the cardiovascular app. The doses employed were 60–200 times those of adrenaline. It is less toxic and its action lasts longer than that of adrenaline. P. F. Metildi

The phospholipide content of the liver during the lipotropic action of choline. F. Cedrangolo and V. Baccari. *Arch. sci. biol.* (Italy) 24, 311–18(1938).—The administration of choline to dogs with fatty liver from phlorizin and almost devoid of glycogen produces a distinct diminution of the phospolipide contents (21.32%). Coincident with this, the balance between glycerol fat acids which disappear and glycogen that is formed makes one suppose that at least part of the glycogen is derived from the acid quota of the glyceride which disappeared. Conclusion: The phospholipides do not represent an intermediate stage in the transformation of glyceride lipides in glucides. P. F. Metildi

The influence of choline on ketonuria. R. Conte-Marotta. *Arch. sci. biol.* (Italy) 24, 396–8(1938).—Choline fed to rats made ketonuric by fasting and phlorizin slightly diminished the ketonuria. Parallel to this

there was a diminution of fat and increase in glycogen in the liver. P. F. Metildi

The toxicity of metallic arsenic in relation to variations in alkaline reserve. Alberto Cannavà. *Arch. sci. biol.* (Italy) **24**, 442–51(1938).—Metallic As absolutely free of oxidation products is toxic subcutaneously. The alk. reserve is lowered in normal animals and in those in alkalosis and acidosis. The toxicity is less in animals in acidosis than in those in alkalosis. P. F. Metildi

The metabolism of sorbitol in the organism. R. Porrati and P. Rowinski. *Arch. sci. biol.* (Italy) **24**, 487–99 (1938).—The ingestion of sorbitol increases the R. Q and the consumption of O_2 above the basal level. The effect is similar in 4 hrs. to that of equal doses of glucose, so that it is not probable that sorbitol is changed to glucose. The reducing power of the blood is unchanged. Sorbitol is not completely utilized. A part of it is excreted in the urine for a few hrs. after ingestion. P. F. Metildi

Pharmacological investigations on β-phenylisopropylamine. R. Marri and G. Franceschini. *Arch. sci. biol.* (Italy) 25, 7–37(1939).—The minimal lethal dose of β-phenylisopropylamine given subcutaneously is 1 mg./g. of frog (*Rana esculenta*), 0.28 g./kg. body wt. for the mouse, and 0.168 g./kg. body wt. for the guinea pig. It has a neg. inotropic and chronotropic action on the frog heart, isolated or *in situ*, and on the isolated guinea-pig heart; this is still seen after vagal paralysis. It augments the tone and sometimes the amplitude of contraction of the isolated duodenum and ileum of the mouse, guinea pig or rabbit. These actions are not dependent on stimulation of the parasympathetic. It produces a marked increase in tone and contractions of the isolated uterus of the guinea pig. In isolated lungs of guinea pigs and those of the cat *in situ* it exercises a weak and inconst. dilatation. No action on the urinary bladder of the cat was observed *in situ*. There is strong vasoconstriction in the isolated ear of the rabbit. In the cat and dog it produces hypertension, in the rabbit hypotension. Successive doses produce dissimilar effects. In both narcotized and nonnarcotized animals it produces increase in amplitude and frequency of resp. movements when given intravenously or by inhalation. P. F. M.

The metabolism of acetic acid. I. The action of acetic acid on alkali reserve compared with that of other acids of metabolic importance. A. Ferrante. *Arch. sci. biol.* (Italy) 25, 38–50(1939).—The behavior of the alk. reserve of the blood after intravenous injection of this acid was compared with the effect of equiv. amts. of other acids (lactic, pyruvic and HCl). With HCl the alk. reserve is lowered constantly and considerably. Pyruvic acid has a slight and transient effect. Lactic acid lowers it significantly and the rate of recovery decreases with lapse of time. AcOH lowers it very little, but the decrease is persistent. AcOH is assumed to be unoxidizable when present in small amts. in the blood. P. F. Metildi

Behavior of cobalt, nickel and copper introduced intravenously in finely divided state. I. Histological investigations and determination of the amount in organs. Alberto Cannavà. *Arch. sci. biol.* (Italy) 25, 309–40 (1939).—Co and Ni produce slight anatomical changes in rabbits while Cu in equal doses is much more harmful. The metals are found for the most part in the lungs and for a short time, after which they are excreted. Co and Ni leave no appreciable alterations. **II. Elimination and action on leucopoiesis.** *Ibid.* 341–59.—Co is excreted principally by the kidneys; Ni and Cu are excreted mostly through the intestines. There is a marked neutrophil leucocytosis after introduction of the metals. **III. Powders of silver, aluminum and zinc. Histological investigations and the action on leucocytes.** *Ibid.* 360–71.—The dosage used was 0.002–0.010 g./kg. in rabbits. No appreciable disturbance was noted with Ag and Zn, but Al occasionally produced death by pulmonary embolism. The lungs showed granulomatous focal lesions, congestion and small hemorrhagic zones. Slight degenerative lesions especially with Ag were evident in the liver and kidneys. Slight leucocytosis was produced by Ag, while the others produced little or no change. P. F. Metildi

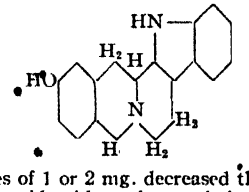
Factors modifying the activity of certain local anesthetics. Alma Salis. *Arch. intern. pharmacodynamie* (Italy) **61**, 271–88(1939).—The cornea of the rabbit was used to measure the topical activity of 0.5% cocaine and 1% procaine. The solns. with a low pH were more stable while those with a high pH were more active. Sterilization of the soln. brings about acidification. At 40° and 50° all the samples became inactive except cocaine with a high pH which kept part of its anesthetic action. The hypo- and hypertonic solns. are more active than the isotonic ones. P. F. Metildi

Pharmacology of strontium. Its actions on circulation and respiration. A. Boriani. *Arch. intern. pharmacodynamie* (Italy) **61**, 289–318(1939); cf. *C. A.* **33**, 5509[8].

In rabbits and dogs the actions of $SrCl_2$ are: Small doses produce hypertension almost exclusively of a cardiac type; in small part this is due to sympathetic stimulation and in large part to muscular action. In large doses it produces cardiac inhibition through a paralysis of the intrinsic rhythmic centers of the heart. With small doses respiratory excitation occurs; with moderated doses it often in the rabbit and not in the dog produces brief apnea from direct action on the respiratory center. With large doses longer apnea is produced. With very large doses there is vasoconstriction through the sympathetic. When these large doses are given intravenously death occurs with cardiac arrest. It is impossible to det. the exact lethal dose since $SrCl_2$ diffuses rapidly. **II. The action on bronchial motility.** *Ibid.* **62**, 1–29.—$SrCl_2$ used on guinea pigs produced a bronchial constriction. There was also a synergistic action with histamine. Atropine has no effect on this action. $SrCl_2$ does not modify the action of adrenaline, while adrenaline prevents the bronchoconstriction of $SrCl_2$. $SrCl_2$ and $BaCl_2$ reënforce their reciprocal actions. $SrCl_2$ antagonized the bronchodilating action of Mg. P. F. Metildi

The source of the energy used by phlorizinized rats in defense against decreased temperature. G. Sarzana and F. Fazio. *Biochim. terap. sper.* **121**, 297–303(1939).—Rats poisoned with high doses of phlorizin and kept at 3.5 to 4° showed a drop in body temp. from 2 to 4°, approx. the same as in normal rats. The av. O consumption per kg. per hr. was in normal rats 4.96 (at normal temp. 1.8 to 2) g. and 4.99 in the phlorizinized rats. The R. Q. was 0.85 in normal and 0.76 in the test animals. Conclusion: Phlorizin-poisoned rats exposed to low temp. are able to utilize material poor in carbohydrates. A. E. Meyer

A new synthetic sympatheticolytic substance belonging to a chemical group of natural sympatheticolytic substances. Raymond-Hamet. *Bull. acad. méd.* **121**, 274–81(1939). An indole compd. resembling in configuration certain yohimbine derivs. of the following structure was



studied. Doses of 1 or 2 mg. decreased the pressor effect of adrenaline considerably and turned the decrease in the vol. of the kidney by adrenaline into an increase in vol. After 5 mg. the pressor effect of adrenaline was insignificant and was immediately followed by a drop to below the initial pressure. This reversed effect of adrenaline was abolished by repeated application of the substance leading to approx. normal pressor response. The substance has a strong vasodilator effect. A. E. Meyer

Chemotherapy of trachoma with a glucose derivative of 4,4′-diaminodiphenylsulfone. The action on pannus. Et. Burnet, E. Cuénod and R. Nataf. *Bull. acad. méd.* **121**, 317–24(1939).—The substance is sol. in H_2O and was used in a 7% soln. filtered through a Chamberland filter. Injections were made below the superior and inferior palpebral as well as the bulbar conjunctiva. The treatment had little success on the conjunctiva, but was quite effica-

cious on the cornea. The visual power was much improved in some cases. This compd. is more effective than the remedies used hitherto ($CuSO_4$, PhOH, HgOCN). A. E. Meyer

The effect of zinc in various conditions of the uterus and the ovaries. Henri Vignes. *Bull. acad. méd.* **121**, 412–15(1939).—In view of the fact that Zn alters the action of some hormones, usually by increasing their effect, the influence of Zn medication in utero-ovarian disturbances was studied. Zn acetate or valerianate was given in doses of 100 mg. daily. The 75 cases of menstrual disorders, menorrhagia and amenorrhea reported showed a high incidence of improvement. One of 2 cases of dysmenorrhea improved. Cessation of treatment was usually followed by relapse. Five cases of abortion were successfully treated but in combination with other treatment. Among 22 cases of sterility 7 were brought to pregnancy. A. E. Meyer

Serotherapy and poisoning with scorpion venom. Etienne Sergent. *Presse méd.* **47**, 1037(1939).—Coma may occur 2–24 hrs. after the sting. Serum treatment was lifesaving in 81% of the cases. A. E. Meyer

Histidine in the treatment of gastroduodenal ulcer. R. Escudero. *Semana méd.* **1939, II**, 680–9.—A review. A. E. Meyer

Action of insulin on the chronaxie of the foot of the snail. Raymond Cahen. *Compt. rend.* **209**, 447–8 (1939).—Insulin, in relation to its hypoglucemic action, stimulates the isolated heart and depresses the isolated intestines. Its effect on the isolated foot muscle of the snail was noted by measuring the chronaxie. Insulin increases the chronaxie, but the effect is not persistent, in spite of the maintenance of the prepn. in contact with hormone. The rheobase was increased equally with the chronaxie. There is spontaneous cessation of the action of insulin after prolonged contact. It diminishes after 35 to 50 min., and tends to regain its initial value after 45 to 65 min. It is not due to a change in insulin, as a new amt. of insulin added to the old again raises the chronaxie. In its effect on muscle, insulin acts as a potential poison. Dorothy A. Meyer

The hematological disturbances in benzene poisoning. F. Mignolet. *Sang* **13**, 268(1939).—A thrombocytopenia with prolongation of coagulation time is an alarming sign in benzene poisoning, the anemias of which are usually of the hyperchromic aplastic type. I. A. Mirsky

Sulfanilamide and meningitis. S. W. Sappington and Grant O. Favorite. *Ann. Internal Med.* **13**, 576–97 (1939).- A review with 60 references. J. T. Myers

Observations upon the experimental and clinical use of sulfapyridine. III. The mechanism of recovery from pneumococcal pneumonia in patients treated with sulfapyridine. W. Barry Wood, Jr., and Perrin H. Long. *Ann. Internal Med.* **13**, 612–17(1939); cf. *C. A.* **33**, 9406⁶.—Type-specific antibodies play an important part in recovery from pneumococcal pneumonia after treatment with sulfapyridine, but they do not appear for several days after the temp. has fallen to normal. Hence relapses will occur if sulfapyridine is discontinued too soon. 17 references. John T. Myers

Observations on toxicity and clinical value of strophanthin. W. A. Brahms, J. S. Golden, A. Sandra and J. Kaplan. *Ann. Internal Med.* **13**, 618–28(1939).—Single intravenous injections of 0.5–0.75 mg. of strophanthin K in normal persons failed to produce significant clinical or electrocardiographic evidence of toxicity. In patients with severe cardiac failure, 0.3–0.5 mg. was not toxic. Daily injections of 0.3 mg. for 24 days were not toxic. Strophanthin is preferable to digitalis in the routine treatment of cardiac failure. 30 references. John T. Myers

Cyanosis and anemia in chronic acetanilide poisoning. P. Meulengracht and I. Lundsteen. *Folia Haematol.* **63**, 89–99(1939).—In chronic acetanilide poisoning there is a characteristic grayish blue-violet cyanosis. It is due to *p*-aminophenol derivs. and not to methemoglobin. An anemia develops later and may become very severe. John T. Myers

The toxicity of lauryl thiocyanate and *N*-butyl-carbitol-thiocyanate (Lethane 384). G. R. Cameron and Cecile R. Doniger. *J. Path. Bact.* **49**, 363–79(1939).—Undild. lauryl thiocyanate produces a severe local skin reaction. It is fatal to mice, rats, guinea pigs and rabbits only when introduced into the body in fairly large amts. Death is due to respiratory failure probably of medullary origin. No characteristic effects are produced on the blood or in the organs. Dilns. such as are used in field work have no ill effects. Lethane 384 produces only a slight local skin reaction but is fatal to animals in much smaller quantities than is lauryl thiocyanate. Otherwise it produces the same effects. John T. Myers

The mode of action of prontosil. Johann Hammerschmidt. *Zentr. Bakt., Parasitenk.*, I Abt., Orig. **144**, 447–9(1939).—When streptococcal lesions are produced in mice by the injection of agar cultures of hemolytic strains, treatment with prontosil causes the formation of a wall of leucocytes about the lesion which prevents the passage of streptococci. No increased phagocytosis occurs. Protective humoral substances, especially antiaggressins, are also produced. John T. Myers

Analeptic action of Pervitin (β-methylamino-α-phenylpropane). C. Püllen. *Munch. med. Wochschr.* **86**, 1001–4(1939).—Pervitin, 6–9 mg., given by mouth exerted antifatigue effects, and was successful in treating alc. intoxication. Increase in arterial pressure occurred when 6 mg. was used. Maurice M. Rath

Toxicity of procaine. L. Riedi. *Schweiz. med. Wochschr.* **69**, 595–6(1939). Severe syncope and respiratory arrest occurred in a healthy girl after 3 cc. of a soln. contg. 0.5% procaine and 1 mg. adrenaline were injected into the soft palate. Maurice M. Rath

Dihydrotachysterol and thallium. A. Bushke and Wladimur Konheim. *Schweiz. med. Wochschr.* **69**, 702–3 (1939).—Tl alone and Tl plus dihydrotachysterol (I) were given to sep. groups of rats. At the end of several months, the animals receiving only Tl appeared stunted in growth and weighed on the av. 85 g. as compared to 250 g. for those receiving I. Rachitic changes and inhibition of growth caused by Tl were counteracted by I. The function of the hypophysis, thyroid, thymus, sex and parathyroid glands is impaired by Tl. I promotes the function of the parathyroid gland as in tetany and tetany cataract. Maurice M. Rath

The toxicity of poisons applied jointly. C. I. Bliss. *Ann. Applied Biol.* **26**, 585–615(1939). Methods for the statistical analysis of toxicity data from poisons administered jointly to animals are described. Types of joint action recognized are: independent joint action; similar joint action; synergistic action. Each is discussed and the statistical treatment is illustrated by an example from the entomological literature. C. H. Richardson

Functional alterations of organs, especially of spleen and parathyroid, by injections of calcium. Ariyoshi Mori. *Chosen Med. Assoc.* **29**, 594–643(German abstr. 38–40) (1939).—An injection of $CaCl_2$ soln. into the rabbit produces diphasic changes, in serum Ca (**A**), and blood platelets (**B**), an increase and subsequent decrease below normal of **A**, and initial decrease, and subsequent rise of **B**. After Ca injection, there appear in the blood 2 substances, one of which has the power to decrease **A**, and the other to diminish **B**, the former being a saponifiable lipide, sol. in org. solvents and insol. in H_2O; and the latter being a protein, insol. in org. solvents, and sol. in H_2O. The Ca-decreasing substance is identical with a substance found in parathyroid, but not parathyroid hormone proper; and the blood-platelet-reducing substance is identical with a substance found in the spleen, but not identical with the splenic hormone proper. Both substances appear in greater amts. during the neg. phase. The functional alteration of the spleen and parathyroid must be considered for the understanding of the effect of Ca injection. S. Tashiro

Relation between phenol and autolysis of various organs of animals poisoned with chloroform, carbon tetrachloride and phosphorus. D. Yanagihara. *J. Chosen Med. Assoc.* **29**, 651–68(German abstr. 41)(1939).—When rabbits are poisoned with $CHCl_3$, CCl_4 or P, the autolysis of liver

and kidney is accelerated, and at the same time blood PhOH increases. The retention of PhOH in cholemia might be explained by these facts. S. Tashiro

Relation between phenol and autolysis of various organs of animals poisoned with cantharidin, uranium and sublimate. D. Yanagihara. *J. Chosen Med. Assoc.* 29, 489–506(German abstr. 31)(1939).—The isolated tissues of rabbits poisoned with cantharidin, U or $HgCl_2$ undergo autolysis much faster than those of the normal, and produce PhOH. This PhOH formation *in vitro* is particularly pronounced in liver and kidney after U poisoning. S. Tashiro

Pharmacological action of thebaine. Kiko Haku. *J. Chosen Med. Assoc.* 29, 860–8(German abstr. 47–9)(1939).

Pharmacological action of morphine. I. The effect on toad heart. *Ibid.* 869–80(German abstr. 49–50).—Judging from their effect on the toad heart, the actions of thebaine and morphine are similar in respect to their behavior against atropine, on vagus and sympathetic nerves, acetylcholine and nicotine. But the actions of adrenaline and $BaCl_2$ on the heart treated by these 2 drugs are different, as well as their effect on perfusion on Nissl bodies of intracardial nerves. The inhibiting action of thebaine on toad heart is due to paralysis of cardiac muscle, that of morphine to action on intracardiac ganglion cells. S. Tashiro

The influence of histotoxin upon the hypoglucemia produced by insulin. Seikei Ri and Hukusei Syu. *J. Chosen Med. Assoc.* 29, 1009–23(English abstr. 64–5)(1939).—An injection of 10 cc. per kg. body wt. of histotoxin (Yasuo and Uehara) into rabbits produces no change in blood sugar, but that of a mixt. of histotoxin and insulin greatly reduces the hypoglucemic effect of insulin. If histotoxin is injected first and then insulin, hypoglucemia results as if the latter is injected alone. If insulin is injected first and histotoxin next, there is no effect unless the latter is injected before the max. hypoglucemia is reached. Boiled egg albumin, glutathione and histamine have a similar effect, but not as strong as that of histotoxin. S. Tashiro

Pharmacological action of morphines. II. The effect of morphine, digitoxins and other autonomic nerve poisons on the hearts of chronically morphinized toads. Kiko Haku. *J. Chosen Med. Assoc.* 29, 1049–60(German abstr. 67–8)(1939).—The perfusion of various autonomic poisons through the hearts of toads that had received morphine (0.07–0.15 g. per 100 g. body wt.) during 3–4 weeks previously shows that such a heart is less susceptible to morphine, nicotine, acetylcholine and adrenaline, but reacts like a normal heart to ergotamine, yohimbine and digitoxin. S. Tashiro

Pharmacological studies with Japanese limulus heart. I. The method of perfusion and the results with various drugs. Kiko Haku. *J. Chosen Med. Assoc.* 29, 1061–83 (German abstr. 68–71)(1939).—The method of perfusion of limulus heart is illustrated with a figure and the results of the perfusion with KCl, adrenaline, acetylcholine, atropine, nicotine, cocaine, papaverine and the effects of glucose concn., temp., pH and viscosity are given. **II. Autonomic contraction of limulus heart.** *Ibid.* 1084–111 (German abstr. 71–3)(1939).—Pharmacol. studies show that 2 sets of nerves, mutually antagonistic, control the heart. The peristaltic movement of autonomic heart beat is also analyzed with the use of drugs. S. Tashiro

Pharmacological study on the uterus of rabbits after repeated injections of uterine extract. Hideo Naozuka. *J. Chosen Med. Assoc.* 29, 1276–306(German abstr. 84–6)(1939).—Uterine ext. is very toxic, 0.13–0.6 cc. 25% Lock soln. ext. of the organ per kg. body wt. killing the rabbits when intravenously injected. Subcutaneous injection is apparently harmless. The uterus of the rabbits to which 0.5 cc. has been thus injected every third day for 10–12 times shows the normal reaction against adrenaline and pilocarpine, but is less susceptible to pituitrin, papaverine and $BaCl_2$. Ovaries and uterus of these animals decrease in wt. and size, but do not show any histological change; they are not fertile. The control injections of muscle exts. do not show such changes. S. Tashiro

Histological changes in parathyroid and thyroid glands in experimental uranium nephritis. Nitizen In and Gentetu Ryo. *J. Chosen Med. Assoc.* 29, 1459–65(English abstr. 94–5)(1939).—In U nephritis the parathyroid undergoes marked changes, showing general engorgement of blood vessels, cloudy swelling of parenchymal cells, vacuolization, karyorrhexis, fatty degeneration and proliferation of interstitial tissue. Thyroid gland shows a slight decrease in colloids, and a little congestion. S. Tashiro

"Histotoxin," especially its action on myxosarcoma of fowl. Yutaka Uehara. *J. Chosen Med. Assoc.* 29, 1601–36(German abstr. 102–6)(1939).—The perfusion fluid of the tissues (toad skin and stomach) injured by acids contains a histotoxin (Osawa) which accelerates the growth of cultures of fibroblasts and osteoblasts and myxosarcoma of fowl. Repeated injections of histotoxin in myxosarcomatous fowl not only prolongs the survival period of the fowl but also cures the disease. The fowl thus cured cannot be reinoculated. S. Tashiro

Toxicity of "Thu Hung," a lip pomade used by Northern Manchurian maidens. Suguru Syozima, Kyotaro Matuoka, Tadasi Ikarasi and Eiiti Saito. *J. Oriental Med.* 30, 567–75(German abstr. 172)(1939).—Various pathol. symptoms produced in rats, dogs, rabbits and guinea pigs by oral administration of this org. dye used by young girls in Northern Manchuria are reported. Whether or not this dye is the cause of "Kozau disease" prevalent in these districts has not yet been detd. S. Tashiro

Influence of hibernation on virulence of the virus of lymphogranuloma inguinale. Tosiwo Akiyama. *J. Oriental Med.* 30, 617–38(English abstr. 177–8)(1939).—Intracranial injection of the virus into the normal Manchurian ground squirrel produces symptoms of typical meningo-encephalities in 5–7 days. With hibernating animals, a similar injection does not cause the symptoms if the animal is allowed to hibernate more than 20 days after the injection and then kept awake. S. Tashiro

A new method of treatment of alkaloid addicts by tetrodotoxin. Nai Shi Hsiang. *J. Oriental Med.* 30, 639–47(German abstr. 179)(1939).—From 1 to 2 cc. of tetrodotoxin ($C_{10}H_{32}O_{16}$) mixed in 20 cc. 20% glucose soln. is given intravenously or orally to 18 subjects of opium and heroine habits, the no. of dosages depending upon the severity of the symptoms, and oral treatment requiring a greater amt. of the drug. Detailed data are given as to various symptoms before and after the treatment, confirming his previous success with 1500 patients. S. Tashiro

The effect of continuous feeding of inorganic iron. I. Ferrous carbonate and reduced iron on blood-iron content and blood pictures. Nobumasa Hayasi. *J. Oriental Med.* 30, 651–91 (English abstr. 181)(1939).—The av. blood-iron contents of normal rabbits vary between 0.063 and 0.097 mg. per cc. when the blood counts are made every other day. When 0.6 g. $FeCO_3$ or 0.3 g. reduced Fe is given daily for as long as 127 days, there is a rise noticeable within 3 days, and then a great fluctuation, sometimes 2–3 times as great, the other time to about normal level. There's no change in the blood picture, except a slight rise in eosinophiles. **II. Decrease of high blood-iron content after the discontinuance of ferrous carbonate feeding.** *Ibid.* 863–73 (English abstr. 257).—The blood iron content becomes normal in 14–16 days after the discontinuance of $FeCO_3$ feeding, regardless of how long the carbonate was fed. **III. Urinary and fecal iron content.** *Ibid.* 1079–99 (English abstr. 279).—A daily urinary excretion of iron by the normal rabbit varies 0–0.1086 mg., and the iron content of feces, 0.64–1.6231 mg. per 1 g. feces. When 0.6 g. $FeCO_3$ is fed daily, urinary iron begins to rise soon after the onset of the feeding, and that of feces rises as much as 46 mg. per g. Fecal iron does not return to normal within 14 days after the discontinuance of iron feeding. S. Tashiro

The effect of chronic opium and narcotic habits on the female genital organs. I. Statistical studies of gynecological disorders among opium and heroine addicts. T. R.

Ko. *J. Oriental Med.* 30, 875–90 (German abstr. 258) (1939). II. **The effect of administration of total opium alkaloid (raw opium) on the sex cycle of female mice.** *Ibid.* 891–903 (German abstr. 259–60). III. **The fertility of female mice.** *Ibid.* 1107–22 (German abstr. 281). IV. **The reactions of isolated uterus of rabbits poisoned with opium against various drugs.** *Ibid.* 1195–217 (German abstr. 289). S. Tashiro 1

The tetany lens under the influence of AT10 (dihydrotachysterol). Walter Rauh. *Arch. Ophthalmol.* (Graefe's) 140, 334–53(1939).—Expts. with parathyroidectomized rats indicate that the early administration of AT10 frequently prevents, or at least attenuates, cataract formation. Frank Urban 2

The content of sulfanilamidopyridine (M. and B. 693) in the ocular fluid of rabbits after administration of the drug. J. Pinkhof. *Z. Augenheilk. (Ophthalmologica)* 97, 356–63(1939).—After oral administration of M. and B. 693 to rabbits in doses of 0.1 g. per kg., the drug was found in the ocular fluids in concns. approaching those in blood. Local application in the conjunctival sac did not result in intraocular resorption. The diffusion into the ocular fluids is rapid. The concns. found may have antibacterial action. Frank Urban 3

The relation of blood pressure and concentration in serum of potassium, calcium and magnesium. Hebbel E. Hoff, Paul K. Smith and Alexander W. Winkler. *Am. J. Physiol.* 127, 722–30(1939); cf. *C. A.* 33, 6963[7].—K, Ca and Mg salts were injected intravenously in dogs and cats at a slow uniform rate until death occurred. The blood pressure showed only minor changes during the K and Ca injections until terminal cardiac failure supervened. There was then an abrupt fall to zero. An immediate fall in blood pressure appeared when Mg was injected. Mg provoked an immediate rise in skin temp., while K and Ca did not. Mg is a powerful vasodilator while K and Ca, similarly given, are without marked effect. The vasodilator effect of Mg is in part due to a change of the concn. of circulating Mg and in part to the presence of higher concn. E. D. Walter 4

The relation of lipocaic to the blood and liver lipides of depancreatized dogs. Lester R. Dragstedt, Paul B. Donovan, Dwight E. Clark, W. Carter Goodpasture and C. Vermeulen. *Am. J. Physiol.* 127, 755–60(1939).—The total serum lipides of insulin-treated depancreatized dogs rise somewhat above normal during the 1st week after pancreatectomy and then gradually decline, reaching a level approx. half of the normal in 5 or 6 weeks. This hypolipemia is coincident with the development of marked fatty infiltration of the liver and the other signs of lipocaic deficiency. The oral administration of lipocaic corrects this hypolipemia within a week and maintains the blood fat at the normal level. E. D. Walter 6 7

The effect of cortin and desoxycorticosterone acetate on the ability of the adrenalectomized rat to inactivate histamine. Bram Rose. *Am. J. Physiol.* 127, 780–4 (1939).—The ability of the adrenalectomized rat maintained on 0.85% saline to inactivate histamine may be restored by the administration of adrenal cortex ext. or of desoxycorticosterone acetate. The maintenance dose of cortin for a rat is wholly inadequate to restore the ability of the animal to inactivate histamine. E. D. Walter 8

A comparative study of the effect of the interaction of ions, drugs and electrical stimulation as indicated by contraction of unstriated muscle. Inderjit Singh. *J. Physiol.* 96, 367–84(1939); cf. *C. A.* 33, 6968[2]. E. D. Walter

The effect of monosaccharides on water absorption from the subarachnoid space. T. H. B. Bedford. *J. Physiol.* 96, 392–6(1939); cf. *C. A.* 32, 9297[9].—Isotonic solns. of glucose, xylose and mannose were without influence on absorption when introduced into the subarachnoid space for 1 hr. Solns. twice the isotonic concn. caused a marked reduction in absorption after 30 min. These sugars have a similar action on water absorption and they are in all probability absorbed by a common process. No evidence was obtained of a specific absorption of glucose such as occurs in the intestine. E. D. Walter 9

The administration of large doses of ascorbic acid and of methionine to the cystinuric. James C. Andrews and Kathleen C. Andrews. *J. Elisha Mitchell Sci. Soc.* 55, 203–7(1939).—A comparison was made of the effect of diuresis, of methionine administration and of ascorbic acid administration on the cystine output of a cystinuric subject. Doses of ascorbic acid up to 6.0 g. per day, with controlled H_2O intake, produced an increase of about 16% over the av. normal figure while doses of methionine up to 5.0 g. caused an increase of 30–35%. This latter increase is greater than was obtained 3 yrs. previously with the same subject when preadolescent. Water drinking, approx. quadrupling the urine vol., increased the cystine output by nearly 50% by the direct Sullivan method (cf. *C. A.* 31, 425[4]) and nearly 70% by the $CuCl_2$ method. Colin W. Whittaker

The histological changes of liver produced by nicotine. J. Inoue. *Japan. Z. Mikrobiol. Path.* 32, 1356–66(1938).—The author found that atrophy and vacuolar degeneration of liver cells, passive hyperemia of blood vessels, and hyperplasia of connective tissues appeared in liver after the injection of nicotine into ear vein in rabbits. I. S. Yun

Further studies on the biological action of arsenite. IV. The spleno-hepatogenous development of anemia. Yanosuke Hiraoka. *J. Med. Coll. Keijo* 9, 75–93(1939); cf. *C. A.* 32, 4226[9].—For the development of anemia, due to arsenite, it is necessary that both liver and spleen be present in the body together, for the anemia does not occur after the loss of one, either by the removal of the spleen or by the cutting out of the liver by means of an Eck fistula. I. S. Yun

Origin of lenticular nucle softening by CO [coal-gas poisoning] (Breitenecker) 21. Soybean-oil foots—manuf. of lactation-promoting medicine and tests of its effects (Okano, *et al.*) 27. Relation between chem. constitution and local anesthetic activity (Lott, Christiansen) 10. Amidines and amide oximes with trypanocidal activity (Lamb, White) 10.

I—ZOÖLOGY

R. A. GORTNER

Relation between the hypophysis and gonads in various teleosteans and selaciens. J. H. Vivien. *Compt. rend. soc. biol.* 131, 1223–4(1939).—The implantation of fish hypophyses into various species of fish accelerated the production of eggs or sperm only when done a few days before the natural spawning period. At other seasons no effect was produced. L. E. Gilson

Antituberculous chemotherapy in insects. Action of sulfanilamide in Galleria mellonella caterpillars. V. Zernoff and L. Kotzovsky. *Compt. rend. soc. biol.* 131, 1250–2(1939); cf. *C. A.* 33, 8825[2].—Sulfanilamide injected simultaneously with tuberculous or paratuberculous organisms protected most of the caterpillars. Infected controls all died. L. E. Gilson

Blood ammonia of some invertebrates. Marcel Florkin and Hubert Renwart. *Compt. rend. soc. biol.* 131, 1274–6 (1939); cf. *C. A.* 32, 9303[2].—Snail blood contains 0.7–2.0 mg. % of NH_3 and the content does not increase when the drawn blood is exposed to air since adenosine deaminase is not present. Lobster blood contains 1.6–1.8 mg. % of NH_3. In the insect, hydrophila, the circulating blood contains no detectable NH_3 but some forms when the drawn blood is exposed to air, as with mammalian blood. L. E. Gilson

Presence of allantoic acid in the celomic fluid and corpuscles of Annelides and Sipunculida. Marcel Florkin and René Huguet. *Compt. rend. soc. biol.* 131, 1276–7 (1939).—Allantoic acid was present in the celomic fluid and corpuscles of the marine worms *Sipunculus nudus*, *Phascolosoma gouldii*, *Polycirrus eximinis* and *Arenicola*. It was not present in the celomic fluid of the holothurian, *Thyone briareus*, the blood of the mollusks *Arca inflata* and *Busycon canaliculatum*, or the blood of the crustaceans *Labinia emarginata* and *Limulus polyphemus*. L. E. Gilson

Extraction and crystallization of the pigment which gives the red color to the integument of certain mites of the genus Trombidium. Carmela Manunta. *Helv. Chim. Acta* **22**, 1154-5(1939).—Red mites (species not stated) were collected from the bark of trees The soft parts were removed and the remainder was extd. with Me_2CO. By the usual methods of sapon., solvent extn. and chromatographic adsorption on CaO the pigment was identified as astacin. L. E. Gilson

Disintegration of cellulose in the alimentary canal of Herbivora. Frank Baker. *Science Progress* **34**, 287-301 (1939).—A review of the biochem. changes produced in cellulose by the flora and fauna of the alimentary tract of herbivora. 55 references. Joseph S. Hepburn

Ammonia in invertebrate sea animals. II. Ammonia in the biological fluids of invertebrate sea animals and tunicates. E. Ya. Heiman (German summary). *J. Physiol. U. S. S. R.* **26**, 110-19(in German, 118-19)(1939); cf. *Ibid.* **20**, 846(1936); *C. A.* **29**, 845².—The ammonia N in the biol. fluids and blood of the bivalve mollusks *Pecten ponticus*, *Mytilus galloprovincialis* and *Ostrea taurica* is 0.026 and 0.107, 0.037 and 0.109, and 0.084 and 0.334 mg. %, resp., while biol. fluids of *Anodonta* sponges (*Renera* sp.), medusa (*Aurelia aurita*) and actinia (*Actinia equina*) contain 0.072, 0.108, 0.129 and 0.129 mg. %, resp. The crustacea *Eryphia spinofrons* and *Carcinus moenas* contain 0.353 and 0.295 mg % of Ammonia N in the blood, and the tunicate *Ascidiella* (*Phallusia*) *aspersa* Müllerei has 4.24 mg. % in the biol. fluids and 12.17 mg. % in the blood. S. A. Karjala

A new animal tetrasaccharide in the eggs of the vineyard snail (Helix pomatia), synthesized from 4-*d*-galactoside-*l*-glucosan (dilactose anhydride(1,6)). F. May and L. Stadelmann. *Z. Biol.* **99**, 462-76(1939).—Eggs of *Helix pomatia* contain a tetrasaccharide which is a dilactose anhydride(1,6), 4-*d*-galactoside-*l*-glucosan. It was isolated from the galactogen in the eggs by boiling with KOH and then pptg. the galactogen with alc. The galactogen of the filtrate was distd. off, the residue dissolved in water and repurified from the remaining galactogen Frances Krasnow

Ionic effects on selachian and teleostean hearts. Hans H. Meyer. *Z. Biol.* **99**, 633-44(1939).—Sea water had a pos. chronotropic as well as inotropic effect which varied with the season. The inotropic and chronotropic influence of Ca injection was dependent upon age and season. In large doses it was almost always injurious. Mg and K had a neg. inotropic and chronotropic effect. Ca injected after Mg was injurious to the selachian heart. With the teleostean heart injury brought about by an overdose of Ca was corrected by Mg.; Ca after Mg was not poisonous. Frances Krasnow

The effect of calcium, magnesium and potassium on the sequence of heart beats of Chrysaora hysoscella L. and Rhizostoma octopus L. Hans H. Meyer. *Z. Biol.* **99**, 645-7(1939).—Hearts of *C. hysoscella* L. and *R. octopus* L. are affected by Ca, K and Mg ions in essentially the same way as vertebrate hearts. Injections of sea water into *R. octopus* L. had a pos. inotropic and chronotropic influence. Frances Krasnow

The rhythm of the dorsal vessel in the fasting larvae of Bombyx mori. Antonio Balli. *Arch. sci. biol.* (Italy) **24**, 339-45(1938).—In the first few days the rhythm is increased; at the end it is decreased. P. F. Metildi

The metabolism of the egg and embryo in anuric amphibians. II. Oxygen consumption. Alberto Stefanelli. *Arch. sci. biol.* (Italy) **24**, 411-41(1938).—After fertilization and to the blastula stage there is a significant increase in O_2 consumption. There is a slight increase in the morula stage, but the increase becomes notable with the beginning of gastrulation up to the formation of the neural plate. From this stage on, the increase is less but after neuralization the consumption increases again to the end of embryonic life. P. F. Metildi

The relation between liver weight and body weight in Lacerta muralis Laur. Antonio Balli. *Arch. sci. biol.* (Italy) **24**, 517-25(1938).—In males, as the weight increases there is a diminution of the ratio liver/body; in females the opposite is true. P. F. Metildi

The chemical composition of the Molluscum contagiosum inclusion bodies. C. E. van Rooyen. *J. Path. Bact.* **49**, 345-9(1939).—The envelope is composed mainly of carbohydrates which are largely removed by preliminary digestion with fresh human saliva but not by boiled saliva. In microincineration the outer covering is burned off completely. The mineral residue is probably mainly derived from the elementary bodies, but some may come from the matrix in which they are embedded. John T. Myers

Growth and survival of Japanese beetle larvae reared in different media. Daniel Ludwig and Henry Fox. *Ann. Entomol. Soc. Am.* **31**, 545-56(1939).—Attempts to rear *Popillia japonica* larvae on molds derived from various plants, soil and peat were largely neg. Molds from the grasses, *Andropogon scoparius* and *A. glomeratus*, however, furnished sufficient food for complete growth and metamorphosis. Addn. of wheat or yeast to a medium increased larval growth. These effects are probably due to the presence of vitamins of the B complex. Yeast is not a complete food for the larvae; it must be supplemented by org. material from another source. C. H. R.

The metabolism of the corn-ear worm. II. Glycogen and moisture. L. P. Ditman and G. S. Weiland. *Ann. Entomol. Soc. Am.* **31**, 578-87(1938); cf. *C. A.* **32**, 8010⁵.—Differences in age of corn does not affect the amt. of glycogen stored at 30° by larvae of *Heliothis obsoleta*. At 21°, prepupae from larvae reared on milk-stage corn contain larger amts. of glycogen than those reared on dough-stage or milk-stage corn at 30°. Glycogen decreases from the time the larva ceases to feed until the adults emerge. At about 5°, the rate of glycogen decrease is greatly reduced in keeping with the slow rate of metabolism. Increase in water during the pupal stage is correlated with a decrease of glycogen; part of this water may be derived from the oxidation of glycogen. Larvae reared on milk-stage corn contain more water than those reared on dough-stage corn. C. H. Richardson

The effect of temperature upon the oxygen requirements of certain adult insects and insect eggs. Virgil N. Argo. *Ann. Entomol. Soc. Am.* **32**, 147-63(1939).—Overwintering males and females of the cluster fly (*Pollenia rudis*) increase their rate of O consumption with increase in temp. This rise in respiratory rate follows a composite curve made up of 2 successive exponential curves. The first curve, between −2.6° and 12.5°, shows a Q_{10} value of 5.50; for the second curve between 12.5° and 33.5° the Q_{10} value is 1.75. Above 33.5° the flies become restless and a purely basal metabolic relationship no longer exists. The large Q_{10} value at hibernating temps. is considered advantageous for the insect in its method of passing the winter. Adult female citrus mealybugs (*Pseudococcus citri*) also increase their rate of O consumption with increase of temp. From 2.25° to 27° Q_{10} is 2.95; above 27° the values for O consumption depart sharply from this curve, and up to 35° they appear to follow a catenary curve where Q_{10} is steadily reduced. A state of basal metabolism does not exist beyond 35°. Eggs of *Oncopeltus fasciatus*, 48-72 hrs. old show increasing O consumption with rise of temp. from 3° to 35°. Beyond 35°, a further increase results in decreased O consumption which becomes more pronounced as the temp. rises. A temp.-O-consumption curve seems to be catenary over the range studied; the van't Hoff theory is not followed. Above 47.5°, the eggs are rapidly killed. Conclusion: The temp.-respiration relationship cannot be expressed by any one curve or formula. It may be influenced by the state of development of the animal and the life habits to which it is adapted. C. H. Richardson

Nutritional studies of the confused flour beetle (Tribolium confusum Duval) and the bean beetle (Acanthoscelides obtectus Say). Shin Foon Chiu. *Ann. Entomol. Soc. Am.* **32**, 164-70(1939).—The nutritional requirements of *Tribolium* are satisfied by a diet of casein, corn starch, yeast, cottonseed oil and the Osborn-Mendel salt mixt. Sucrose is apparently not utilized and invertase is

possibly absent from the intestine. Some factors besides vitamin B_1 seem to be required; but vitamins A and D, and the Et_2O-sol. material from yeast are not necessary. *Acanthoscelides* requires for growth and development a substance found in the Et_2O ext. of kidney beans. Cholesterol can be substituted for fat, but development of the insect is retarded. C. H. Richardson

Digestive enzymes of the larva of the cattle grub Hypoderma lineatum (de Villiers). S. W. Simmons. *Ann. Entomol. Soc. Am.* **32**, 621-7(1939).—Lactase, maltase, invertase, glycogenase, lipase, rennin, trypsin and erepsin were found in the mid and hind intestines of this larva; none was found in the salivary glands or fore intestine. Glycogenase, lipase, trypsin and erepsin are apparently secreted by the larvae; the other enzymes are probably derived from bacteria in the intestine or from cystic exudate. Digestion occurs mainly in the mid intestine where proteins are broken down to amino acids, and fats and glycogen are digested. Small quantities of lipase and erepsin were extd. from the intestine; they may act on fats and peptones escaping from the mid intestine. All regions of the *Hypoderma* intestine are slightly acid except the hind intestine which is predominantly alk. The hemolymph gives a slightly acid reaction (pH 6.6 7.0). C. H. R.

Studies on the lipoprotein system of cyclostome and teleost fish. O. Callamand. *Bull. inst. océanograph.* No. 771, 12 pp.(1939).—The serum of cyclostomes (lamprey eel, *Petromyzon marinus*) and the teleost fish (carp, *Cyprinus carpio;* eel, *Anguilla vulgaris*) contain the 3 groups of lipoproteins described for the higher vertebrates by Macheboeuf (*C. A.* **31**, 5003[3]): (1) a fraction consisting of fats united with more labile complexes extd. by Et_2O or Et_2O cont. small amts. of alc., forming not more than 5% of the total fats; (2) fats extd. in the cold by Et_2O + alc., there being an optimal alc. concn. for max. extn.; (3) fats which are not extractible by Et_2O + alc. in the cold and upon hot extn. they are energetically denaturized. These 3 groups of lipoproteins are found in the serums of the fish studied. In the lamprey eel and carp the first 2 groups are less distinct and they intergrade; in *Anguilla*, however, the relation is like that in the higher vertebrates. The ratio of total fat to fats extd. in the cold does not have the significance in these fish of an albumin index (cf. Delage, Thesis Sci., Paris, 1939). The lipoproteins of these fish have a much higher osmotic pressure than that of the proteins which enter into their compn. Expts. showed that when *Anguilla* passes from fresh water to sea water there is a reduction of total serum fat and of fat extractable in the cold. Since most of the serum fat is lipoprotein material, and this diminishes with increased salinity of the water, it is believed the lipoproteins are important in the osmotic regulation of the blood to changes in salinity. C. H. Richardson

Variation in the molecular and chloride concentrations of the urine of stenohaline teleost fish as a function of variations in salinity of the external medium. Georgette Martret. *Bull. inst. océanograph.* No. 774, 39 pp.(1939); cf. *C. A.* **33**, 4681[8].—The carp (*Cyprinus carpio*) lives normally in fresh water ($\Delta = -0.02$), has a very dil. urine ($\Delta = -0.07$) and blood of $\Delta = -0.50$. Its urine is therefore slightly hypertonic in respect to the external medium. However, it can live in water contg. 17 g. NaCl per l. ($\Delta = -1.02$) if the adaptation is gradual. The kidneys exercise a very important function during adaptation and failure of them to eliminate NaCl leads to death. In saline media, the urine quickly becomes hypotonic; in solns. of Δ less than -0.90 (about 15 g. NaCl per l.) the fish become sick and the mol. concn. of the urine increases less rapidly than that of the blood or external medium, At death, in a medium of $\Delta = -1.04$, the urine has a hypotonicity of 0.14 in respect to the external medium and blood. Death seems to result from invasion of the blood by the external medium; the kidneys fail to continue elimination of NaCl. Expts. with the stenohaline, marine teleost, *Scorpaena porcus*, show that in sea water ($\Delta = -2.16$) the urine has Δ about -0.75, or 0.10 hypo tonic to the blood. The mol. concn. of the blood of this fish is remarkably low; and the hypertonicity of its urine is exceptional among marine teleosts. During adaptation to water less saline than sea water, the urine is very slowly dild. (from $\Delta = -0.75$ to -0.62 on passage from water of -2.16 to -0.54). Death seems to result not from progressive asphyxiation but rather from lesions of the brancheae. C. H. Richardson

Utilization of dextrose by Colpidium, Glaucoma, Chilomonas and Chlorogonium in bacteria-free cultures. John B. Loefer. *J. Expl. Zool.* **79**, 167-83(1938).—The ciliates, *Colpidium campylum* and *Glaucoma piriformis*, consumed dextrose, the former at a greater rate than the latter species. Unit consumption per hr. was greater than for trypanosomes. Acid formation was observed only in some cases when dextrose was used; alkali formation accompanied growth in the absence of sugar. The flagellates, *Chilomonas paramecium* and *Chlorogonium euchlorum*, did not utilize dextrose; but the presence of dextrose in the medium leads to better growth of ciliates and flagellates. The growth-pH relationships of *Chilomonas* and *Chlorogonium* were confirmed (Loefer, *C. A.* **30**, 5308[9]). C. H. Richardson

The rates of excretion of certain substances by the larvae of the meal worm, Tenebrio molitor L. Robert L. Patton and Roderick Craig. *J. Expl. Zool.* **81**, 437-57(1939).—The excretory cycle in this larva follows: The body fluid is filtered through the free portion of the Malpighian tubules, large mols. such as the proteins being rejected; the filtrate passes into the hind intestine and to its rectal region where most of the water and some dissolved substances are returned to the body fluid. No evidence was found that the chlorides of Na, K and Ca, nor the N compds., glycine, glutamic acid, uric acid and urea, are selectively filtered by the Malpighian tubules. Proof of the ion cycle was obtained through the use of radioactive NaCl. Rate of filtration by the tubules in isotonic saline soln. is 2.2 cu. mm. per hr.; it is lower in hypo- or hypertonic saline solns. The body fluid is isotonic with 2.12% NaCl soln. C. H Richardson

Increasing the life span of unfertilized Urechis eggs by acid. Albert Tyler and Frank W. Dessel. *J. Expl. Zool.* **81**, 459-72(1939).—The longevity of unfertilized eggs of the gephyrean worm, *Urechis caupo*, is increased by the addn. of acid to the nonsterile sea water medium. Optimum results are obtained at pH 5.5 either in buffered or unbuffered solns Prolongation of life is attributed to the extended immune period during which the egg is resistant to bacterial action. The acid probably toughens the egg surface. C. H. Richardson

The relation between salts, hydrogen-ion concentration and sensitivity to light in Peranema trichophorum. Landrum B. Shettles. *J. Expl. Zool.* **81**, 473-7(1939).—In solns. of NaCl, KCl, $MgCl_2$ and $CaCl_2$, resp., the photic reaction time of *Peranema* varies inversely with the concn. of the medium. The order of sensitivity to light is: Ca > Mg > K > Na. In solns. of single salts, sensitivity depends on the concn. and kind of salt. Sensitivity of *Peranema* to light is correlated with gelation (*C. A.* **28**, 5540[4]). C. H. Richardson

The ability of various liquids to penetrate the trachese [of insects] and its consequence. Hellmuth Gäbler. *Z. angew. Entomol.* **26**, 1-62(1939).—Penetration depends on low viscosity as well as low surface tension. The morphology of the stigmata is discussed. C. H. Richardson

The action of sex-attracting substances on the vine moths, Clysia ambiguella and Polychrosis botrana. Bruno Götz. *Z. angew. Entomol.* **26**, 143-64(1939).—The unfertilized females give off odorous substances which attract the males. The attraction increases with increased concn. of the substances; it is specific for each insect species. The chem. nature of the substances was not detd. C. H. Richardson

The control of white-reflecting chromatophores in Crustacea. F. G. W. Knowles. *Pub. staz. zool. Napoli* **17**, 174-82(1939) (in English).—Expts. indicated that the white reflecting chromatophores of *Leander serratus*, *L. adspersus* and *L. squilla* react directly (expand) in light but that in *L. adspersus* they are also secondarily affected by a hormone from the eye-stalks and nervous system.

The hormone contracting the white chromatophores may be a stage in the formation of the hormone contracting the red chromatophores. 13 references. W. C. Tobie

life-history and control of the Mediterranean flour moth (Kunike) 12. Factors affecting the resistance of the flour beetle to HCN (Gouch) 12.

12—FOODS

H. A. LEPPER

The proximate chemical analysis of some Philippine foodstuffs. M. Gutiérrez. *Acta Med. Philippina* 1, No. 1, 47–52(1939); *Rev. filipina med. farm.* 30, 346.—Tabulated analyses of native foods are given. L. E. Gilson

Food inspection and analysis in Holland. J. Straub. *Analyst* 64, 717–25(1939).—Recent research work in Holland is reviewed and a bibliography given of 22 papers published during the last 6 yrs. W. T. H.

Decontamination of foodstuffs affected by poisonous gases. A. B. P. Page. *Chemistry & Industry* 1939, 906–9. G. G.

Regulations on standards of identity, quality and fill of container. *Federal Register* 4, 3320 (July 18, 1939).—General regulations are prescribed to emphasize the applicability of adulteration and misbranding sections of the Federal Food, Drug, and Cosmetic Act to food subject to regulations under the section authorizing the promulgation of standards. The general methods for detg. water capacity and fill of containers are detailed. The size and style of type and form of general statements of substandard quality, "Below Standard in Quality. Good Food — Not High Grade" and substandard fill of container, "Below Standard in Fill," are prescribed. H. A. Lepper

Agricultural and cannery waste utilization. Ernest H. Wiegand. *Western Canner & Packer* 29, No. 9, 13–16 (1937).—General. C. R. Fellers

Nutritive value of canned foods. E. F. Kohman, W. H. Eddy, Mary E. White and N. H. Sanborn. *Western Canner & Packer* 29, No. 9, 18(1937); cf. *C.* c1. 31, 7480[3]. C. R. Fellers

Capillary analysis of certified food dyes. Abraham Taub and Mario J. Ortega y Canet. *J. Am. Pharm. Assoc.* 28, 578–84(1939).—The method of capillary analyses has been adapted to the identification of the 13 H_2O-sol. certified food dyes when present individually. A special cabinet is described in which 13 tests can be carried out simultaneously under controlled temp. and humidity conditions. Com. compressed air (which has an extremely low moisture content) is passed through the cabinet at the rate of about 1 l. per min. to give a relative humidity inside the cabinet of 60 ± 5%. Strips (1 × 22 cm.) of S. & S. filter paper No. 604 (preferable to No. 597 or 598 owing to its softer texture) are immersed to a depth of 1 cm in beakers contg. a soln. of the dyes (optimum concn. about 0.1 *M*) with an appropriate electrolyte (for red dyes, approx. 0.25 *M* or 5% $Al(OAc)_3$, but better differentiation of Ponceau 3R and SX is obtained with 0.1 *M* NaCl; for yellow and orange dyes, 0.1 *M* Na_2SO_4, but better differentiation of Naphthol yellow S and tartrazine is obtained with 0.1 *M* HCl; for blue and green dyes, 0.1 *M* Na_2SO_4). After the strips stand for 30 min., they are raised above the soln. and allowed to dry. The nature of the dyes can be detd. from the height of the capillary rise, which should preferably be compared with that of pure dyes detd. simultaneously and under the same conditions of concn. For identification of more than one dye in the presence of each other, a method of successive capillarizations has been developed. After completion of the first capillarization and drying, the colored strip is again capillarized, under similar conditions of humidity, temp. and time, by immersion to a depth of 1 cm in a 0.1 *M* soln. of $CaCl_2$ in 50% Me_2CO; this results in washing up the dye on the lower part of the strip by the capillary action of the colorless reagent, and when several dyes are present discrete bands of color are formed at different levels. Their identities can be confirmed by spectrophotometric exam. A. Papineau-Couture

Regulations on coal-tar colors. *Federal Register* 4, 1935–47(May 9) 3936–40(Sept. 16, 1939).—The Federal Food, Drug, and Cosmetic Act provides the listing of coal-tar colors which are harmless and suitable for use in foods, drugs and cosmetics and authorizes the certification of batches. These regulations define general terms, and provide specifications of impurities, notably As, Pb and heavy metals. Eighteen colors suitable for foods, drugs and cosmetics, 66 for drugs and cosmetics, and 29 for externally applied drugs and cosmetics are listed including lakes. A new system of naming the colors provides the use for which permitted, the predominant shade, and a no. distinguishing the color from others of the same shade for the same use. Each color is identified by the tech. name from the nomenclature adopted by the Am. Chem. Soc. Individual specifications of purity are given. Detailed certification requirements are provided. Corrections are published in *Federal Register* 4, 2255(June 3, 1939) and 4300(Oct. 20, 1939). H. A. Lepper

Iron contents of grains and vegetables of an endemic district of Kaschin-Beck disease. Eikiti Tanabe, Humito Eto and Tuyosi Hukuki. *J. Orientl Med.* 31, 175–8 (English abstr., 18)(1939).—Fe content of the grains produced in the endemic area of this disease is slightly greater than that of other districts, except that of millet which is several times greater. That of vegetables is 10–20 times greater. S. Yashiro

Studies on rice bran. K. Okada. *Münch. med. Wochschr.* 86, 290–2(1939).—Production and uses of rice bran are discussed. Maurice M. Rath

Determination of soybean flour in sausage by nonfermentable sugars. W. B. Hendrey. *Ind. Eng. Chem., Anal. Ed.* 11, 611–13(1939).—The sausage is ground and evapd. with alc. The oil is extd. with petr. ether. Water-sol. sugars are removed with 50% alc. and may be detd. if desired. The residue is hydrolyzed with HCl, by boiling 3 hrs. Insol. sugars can be detd. at this point. A sample of the soln. is fermented with yeast, and the nonfermentable sugars in the filtrate are detd. by A. O. A. C. methods. Amy LeVesconte

Flour granularity. D. W. Kent-Jones, E. G. Richardson and R. C. Spalding. *J. Soc. Chem. Ind.* 58, 261–7 (1939).—Granulation is important because of influence on baking qualities. Some of the principal difficulties encountered in attempting to make and record such measurements are discussed and a method is suggested by which the percentage masses of the particles between various sizes, measured in steps of 10 μ, can be recorded. The method is an adaptation of the sedimentation methods which have been recommended and used satisfactorily in measuring the particle sizes of soils and it rests on the application of Stokes' law. The decrease in the cloudiness of a dil. gasoline suspension of flour is measured at a fixed depth by the increase in the intensity of a beam of light which is measured by means of a photoelec. cell. By the assumption that Stokes' law holds under the conditions of the expt. an actual record of the distribution of particle size between normal limits can be obtained. For practical use by millers the results are also given as the percentage mass of particles larger than 45 μ and smaller than 45 μ. In the av. flour used by bakers about 50% of the particles are larger than 45 μ and 50% smaller. Strong flour made from hard wheat tends to be coarser and to have about 55% of the particles larger than 45 μ. Soft flours, especially those classed as cake flours, often show less than 10% of particles larger than 45 μ, the majority being between 15 and 25 μ. The method can be applied to the various flour streams made in the mill in the process of manufg. commercially sold flours and may indicate to the miller an abnormality that he might otherwise have missed. Otto Johnson

Life-history and control of the Mediterranean flour moth, Ephestia kuehniella Z. (Pyralidae, Phycitinae). Georg Kunike. *Z. angew. Entomol.* **25**, 588–608(1938–9).—Practical control measures are described. C. H. R. 1

Factors affecting the resistance of the flour beetle, Tribrolium confusum Duv., to hydrogen cyanide. H. C. Gouch. *Ann. Applied Biol.* **26**, 533–71(1939).—The order of resistance of the stages of *Tribolium* to HCN is: pupa > adult > larva > egg. Cotton's theory (*C. A.* **27**, 800) might hold for stages other than the egg. Expts. to demonstrate inheritance of individual resistance to HCN showed that offspring of resistant individuals were significantly more resistant than those of susceptible individuals. This difference was maintained over several generations. Resistance was increased if adults were removed from their flour medium about 1 hr. before instead of at once before fumigation. Under certain conditions, the beetles emit a volatile substance which is self-toxic and appears to react with HCN. Methods and variations in the toxicity data are discussed. C. H. Richardson 2 3

Combination baking powders. Simon Mendelsohn. *Food Manuf.* **14**, 313–16(1939).—Formulation and compn. are given. Otto Johnson

The colorimetric estimation of biacetyl and acetoin in dairy products. G. A. Cox and W. J. Wiley. *J. Council Sci. Ind. Research* **12**, 227–31(1939).—The colorimetric method for the estn. of biacetyl as proposed by Pien, Baisse and Martin (cf. *C. A.* **31**, 6751[2]) was investigated and certain modifications and extensions were introduced which are given in detail. The method was found to be reasonably accurate and, on account of its speed and ease of manipulation, preferable to the Ni dimethylglyoxime method. J. C. Jurriens 4

Methylene blue reduction test. I. Raw milk test after Wilson's modification. T. Matuszewski and J. Supińska. *Zentr. Bakt., Parasitenk.*, II Abt. **101**, 45–64 (1939)(in English).—See *C. A.* **33**, 2599[2]. J. T. M. 5

Methylene blue reduction of duplicate samples of raw morning milk held overnight at 40° F. and 60° F. Hannah M. Powell, Elin Jenkins and S. B. Thomas. *Welsh J. Agr.* **15**, 164–8(1939).—Both winter and summer samples of morning milk gave an av. methylene blue reduction time which was 3.5 hrs. longer for portions held overnight at 40° F. than for duplicates held at 60° F. The mean difference in reduction time increased from 54 min. in the case of samples reducing within 2 hrs. after holding at 40° F., to 4.33 hrs. in the case of samples being reduced within 6.5–8.0 hrs. Holding at 40° F. during winter had a retarding effect on methylene blue reduction, whereas holding at 60° F. appeared to be too drastic a treatment in summer; holding at 50–55° F. is recommended for all seasons. K. D. Jacob 6

A comparison of different methods of performing the methylene blue test. A. Mildred Williams, May Davies and S. B. Thomas. *Welsh J. Agr.* **15**, 169–72(1939).—The old methylene blue test was compared with the Wilson modification (cf. *C. A.* **31**, 3162[6]) on 301 samples of raw milk. The modified technique gave little av. difference in reduction time from the old method for samples reducing within 5.5 hrs. A very slight av. increase in reduction time was obtained with the modified test in the case of the poorer-quality samples that reduced within 3 hrs., but there was a marked decrease in reduction time with the better-quality samples. K. D. Jacob 7

The variability of the methylene blue test. G. M. Phillips, W. M. Ashton, G. D. Simons and S. B. Thomas. *Welsh J. Agr.* **15**, 172–80(1939).—In a series of high-grade milk samples examd. by 4 sep. workers during winter, the av. of the max. variations in methylene blue reduction time was 1 hr. and 23 min. and the av. coeff. of variation was 6.5%. In a series of low-grade samples examd. by the same 4 workers during summer, the av. of the max. variations was 46 min. The variations observed during the course of the tests showed a gradual increase according to increasing reduction times. A series of accredited milk samples tested in duplicate by 1 worker showed no variation in samples reducing within 5 hrs.; small variations were observed in the better-quality milk, but the highest av. variation for any group of samples was only 15 min. The magnitude of the variation in reduction time seems to be influenced by the intervals between examn. of the tubes, quality of milk tested, no. of workers and the personal factor. Half-hourly inversion of the tubes improved the reproducibility of the reduction times. K. D. Jacob 8

The resazurin test—a comparison with the modified methylene blue test. Jane Davies, Blodwen F. Thomas and S. B. Thomas. *Welsh J. Agr.* **15**, 181–9(1939).—The resazurin and methylene blue tests were compared on 575 samples of accredited raw milk, with examn. and inversion of the tubes at 30-min. intervals in both tests. The reduction of resazurin to the white stage correlated very well with, but was distinctly slower than, the methylene blue reduction; the av. difference was 35 min. The reduction of resazurin to purple pink also gave a fair statistical correlation with methylene blue reduction, but about 10% of the samples that reduced resazurin to this stage in 1 hr. failed to reduce methylene blue in 7 hrs. The resazurin test can be utilized for advisory purposes, particularly when used in conjunction with microscopic examn., and samples that retain the original blue color for 1 hr. at 37° can be considered satisfactory. K. D. Jacob 9

The value of the Hotis test in detecting mastitis streptococci in milk. James M. Murphy. *Cornell Vet.* **29**, 279–86(1939).—The bromocresol purple test, described by Hotis and Miller (*U. S. Dept. Agr. Circ.* No. **400**(1936)), could not be relied upon to indicate the presence of mastitis streptococci in 95% of cases unless the streptococci were of Minett's group I. If infection with streptococci of other groups greatly predominated in the herd, the efficiency of the test might be reduced to as low as 10%. K. D. Jacob 10

The riboflavin content of cow milk. David B. Hand and Paul F. Sharp. *J. Dairy Sci.* **22**, 779–83(1939); cf. *C. A.* **33**, 5924[7].—The riboflavin content of about 400 samples of milk was detd. by the measurement of the intensity of fluorescence of an acetone filtrate by a photoelec. cell. The riboflavin ranged from 0.60 to 3.42 mg. per l. A neg. skew correlation of 0.830 was found between riboflavin content and milk production. Com. milk in summer contained about 20% more riboflavin than winter milk. Cows, after being fed in winter on phosphoric acid, grass silage, showed no increase in riboflavin when turned out on green pasture. The av. riboflavin content of milk varied with the different breeds, Jersey being highest, Guernsey intermediate and Holstein lowest. A few tests with Ayrshire and Brown Swiss gave riboflavin values intermediate between Holstein and Guernsey cows. A. H. Johnson 11

Effect of ultraviolet ray on vitamin C content of milk. H. Schroeder. *Munch. med. Wochschr.* **86**, 801–2(1939).—Irradiation with a Hg-quartz lamp diminished the vitamin C content of milk to 50% in 10 min. and destroyed all in 1 hr. Maurice M. Rath 12

The influence of the physical character of the roughage on the percentage of fat secreted in the milk. Dwight Espe and C. Y. Cannon. *J. Dairy Sci.* **22**, 799–801 (1939).—The percentage of fat in the milk was not materially influenced by grinding the dry roughage in the ration to a meal. The roughages tested were corn fodder and alfalfa hay. A. H. Johnson 13

The freezing point of milk. Lincoln M. Lampert. *J. Assoc. Official Agr. Chem.* **22**, 768–71(1939).—An examn. of published data and of new data indicates that 0.540° is a more desirable figure than 0.550° for the av. f.-p. depression of pure milk. A. Papineau-Couture 14

Sodium alginate as a stabilizer. Merrill J. Mack. *Food Ind.* **10**, 195–6, 225(1938); cf. *C. A.* **31**, 4733[8].—Na alginate is more effective lb. for lb. than av. high-gelatin when used as a stabilizer in ice cream. Normally, less than 0.5% is used. The use of 0.1–0.2% of Na alginate in cream is effective in decreasing serum drainage. In cheese the amts. suggested are 0.1–0.2%. The mix should be heated to at least 71° before adding the stabilizer to obtain prompt and complete soln. C. R. Fellers 15

Determining riboflavin in dried milk products. Royal

A. Sullivan and L. C. Norris. *Ind. Eng. Chem., Anal. Ed.* **11**, 535–40(1939).—The concn. of riboflavin in an ext. of dried milk powder or whey, first oxidized to destroy unstable colored impurities, is calcd. from the difference of light absorption before and after reduction of the riboflavin to the leuco form. A specially constructed *photoelec. photometer*, utilizing a zero potential circuit in connection with a blocking layer photocell, and having an instrument correction of 15%, is described. To prep. the ext. a 15% soln. of the material in a 75% soln. of acetone in H_2O is acidified to 0.1 *N* with H_2SO_4, treated with 1–3 ml. of 30% H_2O_2 per l. of soln. and refluxed for 20 min. The soln. is cooled and neutralized and 22–24% of buffer soln. added. Buffer of 6.8 is used for dried whey and of 4.6 for dried skim milk and dried buttermilk. Photometer readings are made on the filtered soln. The reducing agent is $Na_2S_2O_4$, which reduces 90% of the riboflavin under the conditions used. The absorption curve for pure synthetic riboflavin is given over the range 4900–5000 A. Its mol. extinction coeff. was found to be 2.78 × 10^4 at 4450 A. The photometric detns. checked well with chick assays. H. K. Salzberg

Factors influencing the quality and chemical composition of butter. R. O. Davies and E. K. Griffiths. *Welsh J. Agr.* **15**, 189–201(1939).—Samples of farmhouse and factory butters marketed in Wales were examd. for quality and chem. compn.; greater uniformity was found in the factory samples. There was no relation between the true moisture in butter and the moisture which exudes on the application of pressure and on which the score for freedom from moisture depends. While factory samples contained less apparent moisture, the actual moisture content exceeded that of farm butter by a wide margin. The chloride and protein contents of the samples fluctuated considerably. Butter that had a high protein content was not necessarily inferior in keeping quality provided it showed freedom from excess of intragranular protein. The keeping quality was closely related to the initial acidity of the butter and decreased with increase in the acid content. During storage of the samples, the contents of both sol. and total acids steadily increased to max. values and then decreased. The Reichert-Meissl no. of Welsh butter showed a definite seasonal change, the max. corresponding to the period of the yr. when most of the freshly calved cows entered the milking herds. The av. carotene content of New Zealand butter was higher than that of Welsh butter. Summer grazing had a marked effect in raising the concn. of unsatd. fat acids and of carotene in Welsh and Danish butter. K. D. Jacob

The formation of biacetyl by starter cultures. I. A comparison of single strain and mixed culture starters for butter manufacture. W. J. Wiley, G. A. Cox and H. R. Whitehead. *J. Council Sci. Ind. Research* **12**, 232–8 (1939).—In a series of buttermaking expts. with cream held with a starter overnight at 7°, it was found that starters without aroma imparted as much "brightness" to the butter as did those possessing a high aroma. This "brightness" correlated well with the biacetyl (*A*) content of the butter and the cream from which it was made. The *A* content of the cream did not correlate with the *A* content of the starter with which it had been inoculated. Lab. expts. showed that: (*a*) *A* production is greater in cream or milk flash-pasteurized and aerated during the cooling process than in steam-sterilized milk; (*b*) that *Str. cremoris* produces about the same proportion of *A* at 7° as at 21°, although its acid production is negligible at the lower temp.; (*c*) that betacocci of a mixed starter have very little influence on the proportion of *A* produced at 7°, although they are known to be mainly responsible for the *A* production at 20°. **II. Rate of biacetyl production by lactic streptococci.** *Ibid.* 239–49.—Single strains of *Str. cremoris* grown in milk at 21° produced proportions of *A* amounting to 1 p. p. m. within 24 hrs. and remained const. for 21 days. When grown at 7° their initial rate of production of *A* was less, but remained const. for a longer period, so that after about 100 hrs. about twice as much was produced as at 21°. Butter cultures contg. betacocci grown in milk at 7° produced *A* in a similar manner to *Str. cremoris*. At 21°, however, there was a rapid production of *A* during the period of logarithmic growth rate of the organisms. The proportion produced was 10 p. p. m. After reaching a peak value it fell rapidly, about 90% of the *A* being destroyed in about 12 hrs. Cultures of betacocci, when grown in milk at 21°, produced no appreciable quantities of *A* over a period of 100 hrs. However, when grown in milk acidified to pH 4.2, they produced and destroyed *A* in a similar manner to butter cultures. Acetoin was destroyed in a similar manner. There is no explanation as yet for the striking phenomenon of rapid production followed by rapid destruction of *A* during such a short period of time. J. C. Jurrjens

Production of margarine. A. V. Hammer. *Kälte-Ind.* **36**, 25–30(1939).—Comprehensive description, 4 photographs, 2 diagrams. S. Landeker

Sodium bisulfite as a stabilizer for hydrogenated cottonseed-oil shortening. K. S. Hoover and H. E. Moore. *Oil & Soap* **16**, 212–14(1939).—Hydrogenated, deodorized cottonseed-oil shortening, when treated with about 0.022% of a satd. soln. of $NaHSO_3$ at 120°F., may be given increased keeping time and lowered peroxide values. The flavor of the treated shortening will be good; but it will contain a trace of SO_2. The keeping time of 1500 g. of shortening when treated with 0.25 cc. of satd. $NaHSO_3$ soln. was increased 48 hrs. and the initial peroxide value lowered about 77%. E. Scherubel

Definitions and standards for egg products. *Federal Register* **4**, 3375–8(July 20, 1939).—Regulations under the Federal Food, Drug, and Cosmetic Act give the identity definitions and standards for liquid (mixed, liquid whole, mixed whole) eggs as the yolks and whites in their natural proportions as broken from the shells; frozen (frozen whole, frozen mixed) eggs as liquid eggs frozen, and dried (dried whole) eggs as liquid eggs dried to a min. solid content of 92%. Egg yolks (liquid egg yolks, yolks, liquid yolks) are yolks of eggs so sepd. from the whites as to contain not less than 43% total egg solids; frozen (frozen egg) yolks are egg yolks frozen and dried egg (dried) yolks are egg yolks dried to a min. of 95% total solids. These egg products are restricted to the eggs of the domestic hen. H. A. L.

What technology is doing for the fishing industry. John R. Manning. *Food Ind.* **10**, 191–2, 222–3(1938).—The applications of chemistry to the technology of fishery products are discussed in the light of the research program carried on by the U. S. Bureau of Fisheries in its several labs. C. R. Fellers

Manufacture and use of ice containing CO_2 for lengthening the storage time of fish. H. Keller. *Z. Fleisch- u. Milchhyg.* **49**, 469–71(1939).—Ice contg. CO_2 (I) was prepd. according to 2 methods: use of ice cell covered with acidone and by bubbling the gas through the cell contents. The absorption of CO_2 was quick when applied under pressure with agitation. Simply bubbling CO_2 in the water-filled ice cell will not yield I. The I melts more quickly than ordinary ice. In comparison tests the I was not superior to ordinary ice for fish preservation and was therefore not recommended. M. M. Piskur

Quick-frozen fish filets. The role of preservatives in enhancing keeping quality. H. L. A. Tarr and P. A. Sunderland. *Ice and Cold Storage* **42**, No. 495, 91–2 (1939).—The comparative preservative actions of Na benzoate, benzoic acid, KNO_2, H_2O_2, $CHCl_3$, boric acid, HCl, SO_2 and *p*-hydroxybenzoic acid Et ester for fresh flounder and frozen halibut are given. A. H. Johnson

Quick freezing and small containers. The commercial problems of packaging materials. E. P. Melhart. *Ice and Cold Storage* **42**, No. 496, 107(1939).—Com. phys. and chem. problems involved in packages to be used for quick-frozen foods are discussed. The chem. aspect embraces the minimizing of chem. and enzymic changes in the product by preventing the entrance of outside air. For strawberries the container must be waterproof; for peaches a container able to withstand a vacuum is desirable. A container capable of controlling desiccation of the product is also necessary. A. H. Johnson

Regulations for inspection of canned shrimp. *Federal Register* **4**, 2397–2401(June 14, 1939).—The revised

regulations applying to inspection of canned shrimp, provided in the amendment to the Federal Food and Drugs Act of 1906, which remains in force under the Federal Food, Drug, and Cosmetic Act of 1938, are promulgated as effective July 1, 1939. H. A. Lepper

Latest investigations in pectin materials. Antonios N. Nikolaos. *Chim. Chronika* (Greece) **4**, 175–7(1939)(in Greek). Lucien Y. Dyrenforth

Effect of oxygen and carbon dioxide on the chemical change in stored apples. Franklin Kidd and Cyril West. *New Phytologist* **38**, 105–22(1939).—The starch and sugar fraction, the alc.-insol. fraction (excluding starch) and the acid fraction contribute to the loss of CO_2 in respiration. The rate of sucrose hydrolysis is not affected by O tension of the atm. but is increased by CO_2. The rate of hydrolysis of the alc.-insol. fraction is decreased by CO_2. The results indicate the existence of a fructosan in the alc-sol. fraction. Fructose units are produced during the hydrolysis of starch. H. R. Kraybill

From apple cider to apple juice. Karl L. Ford. *Canning Age* **19**, 302–4, 320(1938). By washing apples to be used for apple juice with a 1% soln. of HCl, most of the Pb and As residues on the skins is removed. Clarification is best effected by means of Pectinol (a com. pectin-dissolving enzyme). The enzyme should act for 12–18 hours at normal temps. or for 3 hrs. at 120°F. One lb. of enzyme prepn is sufficient for 100 gals. of juice. Apple juice may be satisfactorily canned in special enamel-lined Sn cans. C. R. Fellers

Ethylene of limited value in ripening of Yakima pears. Observations of the effect of ethylene on the softening of Bartlett pears. Wm. Rabak. *Western Canner & Packer* **31**, No. 4, 26–8(1939).—The use of C_2H_4 is of only limited value in artificially ripening Bartlett pears for canning. Pears soften satisfactorily under controlled temp. conditions without using C_2H_4. C. R. Fellers

An objective method for measuring grittiness in canned pears. L. M. Beacham. *J. Assoc. Official Agr. Chem.* **22**, 706–8(1939).—The method consists essentially in allowing the pears to drain, grinding to a homogeneous mass in a food chopper, placing 50 g. in the cup of a malted milk stirrer, adding 200 cc. of water and 25 cc. of 50% NaOH, boiling vigorously for 5 min., stirring 5 min., filtering through a tared 30-mesh monel wire screen, washing copiously with hot water, drying at 100° for 1 hr. and weighing the grit cells. A table is given showing the percentage by wt. of such grit cells in samples of canned Bartlett, Kiefer and Pineapple pears and comparing them with organoleptic examn. of such pears. Pears contg. only cells smaller than 0.02 in. may be chewed and swallowed without any impression of the presence of hard material. Bartlett pears were smooth to the taste and showed a residue of 0.01–0.06% residue; Kiefer pears were gritty to the taste and showed a residue of 0.36–0.54%; Pineapple pears were gritty to the taste and showed a residue of 0.19–0.31%. A. P.-C.

Manufacture of Maraschino cherries. Ernest H. Wiegand. *Western Canner & Packer* **28**, 5–6(1936); **29**, 33–4(1937); cf. *C. A.* **25**, 1919.—For bleaching the cherries a brine contg. 1–1.5% SO_2 and 5 7 lb. of $Ca(OH)_2$ or $CaCO_3$ per 100 gal. is recommended. Strength of the SO_2 soln. is maintained and checked during the storage process by occasional titration with standard 0.1 *N* I_2 soln. The bleaching requires about 30 days. The brining causes a loss in wt. of the fruit of about 7–12% and pitting an addnl. 15–20%. Fresh water leaches out the SO_2 and lime in about 24–48 hrs. To reduce the SO_2 to below 50 p. p. m. the fruit must be boiled for 10 min. For coloring about 0.5–0.7 oz. of Ponceau 2R dye per 100 lb. of fruit is used. The first sirup contains approx. 30% sucrose and 0.4% citric acid. The d. of the sirup is increased by about 5% sugar each day until it reaches 40–45%. C. R. Fellers

A rapid method for (determining) chlorides in tomato products. L. M. Beacham. *J. Assoc. Official Agr. Chem.* **22**, 765–6(1939).—The method consists essentially in adding 5 g. of tomato material to about 50 cc. with 80% alc., adding 1 cc. concd. HNO_3 and 25 cc. of 0.1 *N* $AgNO_3$, making to exactly 100 cc. with 80% alc., centrifuging at 1800 r. p. m. for 5 min., and titrating the excess of Ag in a 50-cc. aliquot by means of 0.1 *N* NH_4CNS. The results obtained by this method are as accurate as those by the present official A. O. A. C. method. A. P.-C.

Copper content of tomatoes and tomato products. F. C. Lamb and P. R. Lloyd. *Western Canner & Packer, 29th Yearbook* **31**, No. 5, 77–8(1939).—Even with a slight or moderate Cu contact of tomato products with Cu-contg. materials, the amt. of Cu present may be 50 p. p. m. The present United Kingdom tolerance is 100 p. p. m. It is recommended that all Cu equipment be thoroughly cleaned before running tomato products through it. Max. metallic contamination occurs at the start of the day's run. C. R. Fellers

The relation of acidity to the vitamin C content of the tomato. Mary Yarbrough and G. Howard Satterfield. *J. Elisha Mitchell Sci. Soc.* **54**, 186–7(1938).—See *C. A.* **33**, 8844⁶. Colin W. Whittaker

Standards for tomato puree and paste. *Federal Register* **4**, 3225–7(July 18, 1939).—Regulations under the Federal Food, Drug and Cosmetic Act provide definitions and standards of identity for tomato puree (tomato pulp) and tomato paste as of red or reddish varieties. Provision is made for optional use of tomato material other than whole tomatoes with appropriate label declaration. With paste, salt, spice, flavoring and $NaHCO_3$ are provided as optional ingredients, with a requirement for label declaration of all except salt. The salt-free tomato solids in puree must be not less than 8.37% but less than 25% and in paste not less than 25%. H. A. Lepper

Conservation of vitamin C in tomato-juice production. N. H. Sanborn. *Glass Packer* **17**, 102–3(1938).—The vitamin C content of raw tomatoes may vary as much as 100% depending on variety and growing conditions. It is essential to exclude air during the manufg. process to retain the max. amt. of ascorbic acid. Each operation should be designed to prevent oxidative changes. Steam pumps beat less air in the juice than centrifugal pumps. Losses occur in holding tanks. In 1 case the loss in a holding tank was 19% in 13 min. The use of viscolizers or colloid mills prevents the sepn. of insol. material in the canned or bottled juice. The most complete conservation of ascorbic acid was found in juice prepd. by the "hot-break" process. C. R. Fellers

Faulty plant equipment, a cause of spoilage in tomato juice. W. E. Pearce and E. H. Ruyle. *Glass Packer* **17**, 243–5, 253(1938).—*B. thermoacidurans*, the organism which causes much of the "flat-sour" spoilage in canned tomato juice, may survive temps. of 212°F. for 30 min. and may therefore survive com. thermal treatments. C. R. Fellers

Standards of fill of container, identity and quality and label statements for canned tomatoes *Federal Register* **4**, 3321–5(July 18, 1939).—Regulations under the Federal Food, Drug, and Cosmetic Act provide a standard of fill of container and a definition and standard for canned tomatoes as of red or reddish varieties. Provision is made for addn. of optional liquid ingredients derived from tomatoes with labeling requirements. Of the optional ingredients, salt, spices and flavoring, the latter 2 must be declared on the label. The standard of quality includes the factors of drained weight, color, amt. of peel and blemishes. Statements for labeling tomatoes substandard in quality or fill of container are provided. H. A. L.

Products from the papaya. Susan Howe Clark. *Glass Packer* **16**, 774–5(1937).—The manuf. of various edible papaya products such as pulp, juice and sirup is briefly described. Papain is obtained only from the unripe fruit or other parts of the plant. C. R. Fellers

Maturity test for peas. S. L. Jodidi. *Canning Age* **19**, 297–300, 336–8(1938); cf. *C. A.* **31**, 5051⁸.—The sp. gr. of peas varies directly with their starch:sugar ratio and since this ratio is known to be a good index of maturity, it follows that the sp. gr. is a good index of quality or maturity in peas in the case of Surprize, Perfection and Alaska varieties. Peas mature very rapidly once they are nearly mature and at proper canning texture. In general,

the sucrose percentage varied directly with the water content, while the starch percentage varied directly with the dry matter content. The percentage of reducing sugar in Perfection peas is usually less than 1%, and often less than 0.5%; wrinkled pea varieties are somewhat higher in reducing sugar content. In chem. compn. the Alaska variety was most variable. Methods of ascertaining pea tenderness and quality are reviewed. App. for making the recommended sp. gr. test on peas is described.
C. R. Fellers

Effect of the rate of freezing on the texture of peas. E. W. Eickelberg. *Canning Age* **19**, 108–9, 512(1938). Quick-frozen peas have fewer ruptured cells and are superior in color and flavor to slow-frozen peas at higher temps. There is a more marked reduction in the nos. of microörganisms in the quick-frozen product. Enzyme activity is likewise reduced materially at the lower temps.
C. R. Fellers

The effect of the culinary treatment of potatoes upon the accessibility of the starch to amylase. F. M. Porodko, E. L. Rosenfel'd and I. Ya. Solovechik. *Voprosy Pitaniya* **8**, No. 2, 109–22(1939). The boiling or baking of potatoes aids in the accessibility of the starch (I) to amylase by destruction of the cell tissue and gelatinization and increase in the thermal hydrolysis of I without materially dehydrating the gel, as occurs when the potatoes are fried.
S. A. Karjala

Use of salad oils in mayonnaise manufacture. R. G. Dressler. *Western Canner & Packer* **29**, No. 10, 32–3 (1937). Mayonnaise consists of 70–80% oil. Characteristics of oils suitable for mayonnaise are described. The free fat acid content of the oil should not exceed 0.05%, color 5 red 35 yellow, clear free from contamination and suspended matter, cold test 5½–15 hrs., bland flavor, good stability and of a type which emulsifies well in the usual mayonnaise formula. The practice of winterizing is to crystallize and filter out the glycerides which solidify on prolonged standing at 40°F., leaving the salad oil contg. only the lower-melting glycerides, which are more homogeneous and stable in mayonnaise emulsions. If a salad oil contains over 0.07% moisture a cloud will appear. The Kreis test is of little value in evaluating oils for use in mayonnaise manuf.
C. R. Fellers

Manganese and caffeine contents of some teas and coffees. D. R. K. Coleman and F. C. Gilbert. *Analyst* **64**, 726–30(1939). Fifteen samples of black teas and 6 samples of raw coffee beans were analyzed to see whether the Mn content had any relation to the caffeine present. The methods of analysis are described fully. In the teas, the Mn content ranged from 0.008 to 0.14% and the caffeine from 2.45 to 4.7%. In general, the higher the Mn content, the lower the caffeine value. With coffee, on the other hand, the caffeine content was fairly const. at 0.90 to 1.3% and the Mn at 0.0014–0.0032%.
W. T. H.

Spices play part in many preserved food products. C. A. Thayer. *Western Canner & Packer* **31**, No. 3, 27–8 (1939). General data on spices.
C. R. Fellers

Problems in the preservation of green fodder. Gutermann. *Chem.-Ztg.* **63**, 645–7(1939). A review. G. G.

The effect of partial field-drying and artificial drying on the chemical composition of grass. T. W. Fagan and R. Probert Davies. *Welsh J. Agr.* **15**, 261–71(1939); cf. *C. A.* **32**, 7598[2]. The wilting of mown grass in the field or under cover had little effect on the percentage of protein in the dry matter. The av. loss of carotene after wilting for 48 hrs. in the field was 26%, whereas the loss was 16 and 11%, resp., when wilting took place under cover or in jute scrim bags. The most serious loss of carotene occurred when the herbage was exposed to rain and sunshine. There was evidence that the loss of carotene was greater in those samples which were originally rich in this constituent. K appeared to be the mineral constituent most liable to loss when herbage wilts under unfavorable conditions.
K. D. Jacob

A modified procedure for the determination of carotene in silage. A. C. Neish, W. D. McFarlane, and W. A. Beechin. *Can. J. Research* **17**, B, 325–30(1939). The pigments in silage which were formed from xanthophyll by acids and which interfere in the detn. of carotene were sepd. by chromatographic methods and found to exhibit solubilities intermediate between those of carotene and xanthophyll. A method based on the partition coeff. of carotene and the interfering pigments in the system hexane–benzyl alc. gave reliable estimates of carotene.
J. W. Shipley

Shark-liver oil a potent source of vitamin A for poultry. L. L. Rusoff and N. R. Mehrhof. *Poultry Sci.* **18**, 339–44 (1939).—Admstd. by expts. on chicks, a sample of shark-liver oil (poultry grade) from Florida contained approx. 9000 U. S. P. XI units of vitamin A per g. K. D. J.

Seasonal fluctuation in the Mn content of four grass species (Wain, *et al.*) **11D**. Chem. compn. of the seed and straw of various grasses (Davies) **11D**. Modern chemistry, modern medicine and modern food (Dodds) **2**. Starch of immature linseed (Dodd) **26**. Relation of the I contents of milk and pasture to the occurrence of endemic goiter (Orr, *et al.*) (Crabtree, Mason) **11G**. App. for heating, cooling, kneading, grinding and emulsifying in margarine manuf. (U. S. pat. 2,170,303) **1**. Subjecting liquids to sound vibrations for homogenizing milk (U. S. pat. 2,170,178) **1**. Laminated paper for wrapping butter, etc. (U. S. pat. 2,171,775) **23**.

Hempel, Bruno, and Kirchhof, Hans: Obst-Halbfabrikate. Einfache Haltbarmachung von Obst zu Pulpe, Mark, Saft durch Rohkonservierung und Trocknen. 2nd. ed. Braunschweig: Berger & Hempel. 78 pp. M. 3.

Cereal preparations. Albert E. Berry. Brit. 507,384, June 14, 1939. In making flaked products from cereal grains, e. g., corn, oats, rice, by conditioning and softening by addn. of H_2O, cracking by passage through rollers to release the germ and form grits, sepg. the grits from the meal and germs and cooking them, e. g., with steam, and flaking by passage between rollers, which may be heated, steep H_2O rich in org. phosphates and protein, produced by steeping corn in H_2O contg. a small percentage of SO_2 in the manuf. of starch from the corn is added at a stage in the process before the finished cereal product is obtained.

Deodorizing gases evolved in roasting grain, etc. Michael M. Jalma and Henri Coutinho. Brit. 505,971, May 18, 1939. Gases given off from the roasting of vegetable materials, e. g., coffee, cacao beans, peanuts, cereals, which gases contain org. compds. of high mol. wt. and no substantial quantity of O_2 are purified by being heated to a high temp. to crack the org. compds. to compds. of lower mol. wt., O_2 being added to the cracked gases and the org. compds. therein being then oxidized. App. is described.

Vitamin preparations. André E. Briod and Bion R. East. Brit. 506,730, June 5, 1939. A prepn. adapted for adding to foods is obtained by emulsifying vitamin D concentrate without extraneous emulsifiers, with unsweetened cream or evapd. milk and thereafter sterilizing the emulsion. The evapd. milk may be replaced by a product of approx. the same compn. made from milk powder. The emulsion may be incorporated in whole milk or in bread or other cereal products, or may be dried, e. g., by spray or roller drying, and added, e. g., to powd. milk.

Short pie-crust doughs, etc. Robert L. Lloyd (to American Maize-Products Co.). U. S. 2,172,211, Sept. 5. In a short-unleavened, baker compn. contg. flour and a relatively large amount of shortening, there is used a substantially dry, comminuted, solidified starch-conversion sirup having a reducing-sugars content calcd. as dextrose of about 30–60% and the remainder principally dextrins, the solidified sirup having the property of caramelizing at a lower temp. than any of the other ingredients in the compn. and imparting to the bakery product made therefrom substantially greater uniformity in browning and substantially greater resistance to moisture absorption from bakery fillings than such product made without the solidified sirup or made with sucrose or dextrose.

Baking powders. Willard L. Morgan (to America

Maize-Products Co.). U. S. 2,170,274, Aug. 22. Phytic acid or an acid salt such as a Ca phytate or acid Na, K or NH_4 phytate is used with other compds. such as $NaHCO_3$ and starch.

Preserving cream or whole milk. Musher Foundation, Inc. Brit. 506,161, May 16, 1939. The cream, etc., is stabilized against oxidative deterioration by being mixed with not exceeding 5% of a raw cereal flour, the amt. used being sufficient substantially to retard development of oxidized tastes and flavors. An ext. obtained by mixing the flour with H_2O or alc., sepg. the starch and cereal fibers and evapg. the H_2O or alc. may be used instead of the flour. Oat, yellow and white maize and barley flours may be used.

Preserving ice creams. Musher Foundation, Inc. Brit. 506,031, May 16, 1939. Divided on 506,161 (preceding abstr.). Fruit-flavored and other ice creams are mixed with an amt. of oat flour or hominy not exceeding 2% but sufficient substantially to retard development of oxidized tastes and flavors. Alternatively, an ext. obtained by mixing the flour or hominy with H_2O or alc., removing the undissolved starch and cereal fibers and, if desired, concg. may be used. The addn. may be made e. g., in admixt. with the sugar, to the ice-cream mix before pasteurization and homogenization or to the fruit, e. g., strawberries, while in gold storage prior to its utilization in the prepn. of the ice cream.

Drying whey. Charles O. Lavett (to Buffalo Foundry & Machine Co.). U. S. 2,172,393, Sept. 12. An arrangement of app. is described, and a method of drying whey which may involve preconcg. the whey under vacuum to a soln. contg. about 40–50% solids, thereafter subjecting the preconed. whey to an intermediate concn. under atm. conditions at about its b. p., to a concn. of about 85–92% solid content, followed by rapid cooling to about 93° and further cooling and crystg. of the preponderance of the lactose content in the form of the alpha hydrate.

Tubing suitable for sausage casings. Richard Weingand and Arnold Muehlinski (to Sylvania Industrial Corp.). U. S. 2,172,426, Sept. 12. A seamless flexible tubing is formed from a colloidal plastic material such as a viscose or nitrocellulose soln. by extrusion (in a described app.), partially hardened, as by a coagulating bath, then expanded 40–100% its original diam., and the hardening is completed after such expansion.

Stabilizing compositions for use with sausage emulsions. Carroll L. Griffith and Lloyd A. Hall (to Griffith Laboratories, Inc.). U. S. 2,171,428, Aug. 29. Blood-serum solids 3–40, milk 97–60 and a vegetable gum such as Irish moss gum 25 parts or less are used together.

Salad dressing. Harry M. Levin. U. S. 2,170,417, Aug. 22. A homogeneous viscous emulsified salad dressing base is formed of ingredients such as milk 100 gal., starch 68 lb., a hydrophillic colloid such as gelatin, locust-bean gum or gum tragacanth 0.75–1.0 lb., and a small proportion of acetic, lactic or citric acid (various details and modifications being described).

Foods such as salad dressings. Albert Musher (to Musher Corp.). U. S. 2,170,518, Aug. 22. A salad-dressing base readily emulsifiable with egg in the presence of aq. material to produce a smooth homogeneous product contains spices as customarily used in salad dressings together with an emulsifying agent such as gum tragacanth or gum arabic and a salad oil.

Tea and coffee for beverage preparation. Clarence G. Lehr. U. S. 2,169,957, Aug. 15. Material such as tea or roasted coffee is pulverized and mixed with (suitably about 30%) of freshly pptd. $Fe(OH)_3$ and the mixt. is further dried and ground, the treatment serving to render insol. the tannic acid present.

Poultry feed. Bernard Jurale. U. S. 2,170,562, Aug. 22. For preventing cannibalism of poultry, a supplemental feed is used having an ingredient of a high keratin content, such as a mixt. of charcoal, molasses and ground cattle horn.

Iodide - containing salt blocks for stock feeding. Douglas S. See (to Leslie-Calif. Salt Co.). U. S. 2,170,611, Aug. 22. Salt blocks are prepd. contg. KI dissolved in a viscous sugar sirup (suitably with conjoint use of Fe oxide, $MgCO_3$ and $MgCl_2$).

13 CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

Filtering media used in gas masks. Mario Sartori. *Chimica e industria* (Italy) 21, 537–41(1939).—Tests on gas masks currently in use show that all have a fibrous material as base, either cellulose or wool fiber. The masks which have a wool fiber base outlasted the masks which have a cellulose base. A. W. Contieri

A case of intracorpuscular sulfhemoglobinemia resulting from occupational nitrobenzene poisoning. Enrico C. Vigliani and Giovanni Donati. *Rass. med. ind.* 10, 534–51 (1939).—Nitrobenzene poisoning as observed in a workman engaged in polishing metals and cleaning metal filters with the hot liquid is described, with clinical data of blood tests, erythrocytometric formulas (table) and a graph showing the erythrocytometric curves. The symptoms were those of intense cyanosis, anemia, mental disorders, etc., combined with intracorpuscular sulfhemaglobinemia, produced by the combined action of the nitrobenzene and the sulfonated H_2 formed by the hydrolysis of the org. S compds. contained in the vulcanized rubber in the metal filters. 12 references. A. H. Krappe

Mechanism of development of lead anemia. IV. The physicochemical nature of the splenic and liver substances which decrease erythrocytes. Syosei Kin. *J. Med. Coll. Keijo* 9, 101–17(1939).—K. found that the spleen and liver contain some specific chem. substances able to decrease erythrocytes after the injection of sugar of lead. He tried to clarify the physicochem. nature of these substances, which were obtained from the splenic and liver vein of the animals after injection of sugar of lead. The anemic action of the splenic substance disappeared after heating an hr. at 100°. The substance was water-sol., but did not dissolve in ether and alc., it was not adsorbed by animal charcoal or kaolin. The effect of the liver substance disappeared after heating an hr. at 100°. This substance was sol. in water and did not dissolve in ether and alcohol, but it was adsorbed easily by animal charcoal or kaolin. The action of this substance was also retained after ultraviolet radiation for 3 hrs. I. S. Yun

Casein plastics. Anon. *Modern Plastics* 17, No. 2, 27–9(1939). —A review. E. H.

Lignin plastic. Robert M. Boehm. *Modern Plastics* 17, No. 2, 65–6(1939).—A review. E. H.

Cellulose acetate [plastics]. H. K. Haviland. *Modern Plastics* 17, No. 2, 34–7(1939).—A review. E. H.

Cellulose acetate butyrate [plastics]. C. H. Penning. *Modern Plastics* 17 No. 2, 38–9(1939).—A review. E. H.

Cellulose nitrate [plastics]. J. M. DeBell. *Modern Plastics* 17, No. 2, 40–2(1939).—A review. E. H.

Ethylcellulose [plastics]. D. R. Wiggam. *Modern Plastics* 17, No. 2, 48–50(1939).—A review. E. H.

Development in bitumen plastics. W. H. Cambden. *Chemistry & Industry* 1939, 867–8. E. H.

Metals for molds [for plastics]. Edward F. Bachner. *Modern Plastics* 17, No. 2, 88–90(1939). E. H.

Coloring materials [for plastics]. W. H. Peacock and R. H. Kienle., *Modern Plastics* 17, No. 2, 46–7(1939).—A review. E. H.

Fillers [for plastics]—asbestos and diatomaceous silica.

A. B. Cummins. *Modern Plastics* **17**, No. 2, 51–2(1939).—A review. E. H.

Fillers [for plastics]—cotton flock and woodflour. Virgil E. Meharg. *Modern Plastics* **17**, No. 2, 53–4(1939).—A review. E. H.

Shellac [use in plastics]. Wm. Howlett Gardner. *Modern Plastics* **17**, No. 2, 94, 98(1939).—A review. E. H.

Compression molding [of plastics]. J. C. Fuller. *Modern Plastics* **17**, No. 2, 224, 226, 228, 230(1939). E. H.

Injection molding [of plastics]. L. T. Barnette. *Modern Plastics* **17**, No. 2, 232, 234, 236, 238(1939). E. H.

Transfer molding [of plastics]. Frank H. Shaw. *Modern Plastics* **17**, No. 2, 240, 242, 244(1939). E. H.

Cold molding compounds. S. Pellerano. *Modern Plastics* **17**, No. 2, 43–5(1939).—A review. E. H.

Properties of high-strength molded articles from synthetic resins. A. Thum and H. R. Jacobi. *Z. Ver. deut. Ing.* **83**, 1044–8(1939).—Discussion of the properties of airplane parts with fabric base and contg. 30–50% PhOH-CH_2O resin: cold flow and creep, effect of rate of loading, deviation from Hooke's law and strength under repeated stresses (flexing). Arnold M. Collins

Bearings of synthetic resins. Ch. Berthelot. *Rev. ind. minérale* **444**, 325–32(1939).—The bearings are composed of celoron, which consists of cloth impregnated hot with synthetic resins - azolone, bakelite, gedelite, progelite, etc.—and subjected to pressure. The cloth is of a coarseness depending on the purpose to which the bearing is to be put—very fine for a bearing for clockwork, very coarse for one for a roller. A sample of celoron has d. 1.4, Brinell hardness 45, rupture strength 7 kg./sq. mm., compression strength 21–28 kg./sq. mm., coeff. of dilatation 0.00001 per degree, coeff. of friction 0.02–0.03 for velocities above 0.2 m./sec.; water is the best lubricant. C. A. Silberrad

Preparation of modified resins by the use of fatty derivatives. Anderson W. Ralston. *Oil & Soap* **16**, 215–18(1939).—The theory of resin formation is discussed as shown by polymerization, condensation or a combination of the two. Fat acid derivs. can be employed for the prepn. of resins which possess distinctive properties such as flexibility. Resin-forming compds. such as styrene, coumarone, indene and phenol can react with fat acid chlorides of high mol. wt. in the presence of $AlCl_3$ to produce acylated compds. which can then be polymerized by heat or catalysts to give resins. These resins possess properties dependent upon the degree of acylation and the type of acyl group which is introduced. Thus there are the styrene, coumarone and indene resins, also Glyptal and phenol-aldehyde resins. In all of these types the long alkyl group is incorporated into the resin structure and the plasticizing agent is an integral part of the resin itself. Whenever these long acyl groups are introduced into a resin formula the resulting product is more flexible than the unmodified resin. E. Scherubel

Acrylic resins. D. S. Frederick. *Modern Plastics* **17**, No. 2, 22–4(1939).—A review. E. H.

Denture base material: acrylic resins. W. T. Sweeney. *J. Am. Dental Assoc.* **26**, 1863–73(1939).—Tests of 3 acrylic resins indicated that they compare favorably with vulcanite in nearly all mech. properties of dental significance, are superior to rubber in ease of curing and in esthetic properties, are color-stable under oral conditions and are as serviceable as rubber in dentures. In the partially polymerized (plastic cake) condition, the material has a short shelf life at room temp., but may be stored satisfactorily for several months at a temp. of 5°, while the liquid and the powder have a shelf life of more than 1 yr. at room temp. Joseph S. Heyburn

Alkyd resins. A. G. Hovey. *Modern Plastics* **17**, No. 2, 25–6(1939).—A review. E. H.

Furfural-phenol resins. B. E. Novotny. *Modern Plastics* **17**, No. 2, 55–6(1939).—A review. E. H.

Paracoumarone-indene resin. J. A. Kenney. *Modern Plastics* **17**, No. 2, 77–8(1939).—A review. E. H.

Phenolic resins (molding type). H. S. Spencer and A. F. Shepard. *Modern Plastics* **17**, No. 2, 82, 84, 89–90(1939).—A review. E. H.

Casting phenolic resins. Otto Hansen. *Modern Plastics* **17**, No. 2, 268, 270, 272(1939). E. H.

Cast phenolic resins. W. R. Thompson. *Modern Plastics* **17**, No. 2, 30–3(1939).—A review. E. H.

Styrene resins. L. E. Humphrey. *Modern Plastics* **17**, No. 2, 100, 102, 104(1939).—A review. E. H.

Urea resins. Wm. H. Machale. *Modern Plastics* **17**, No. 2, 165, 168, 172, 174(1939).—A review. E. H.

Vinyl acetal resins. A. F. Randolph. *Modern Plastics* **17**, No. 2, 176, 180(1939).—A review. E. H.

Vinyl ester resins. G. C. Miller. *Modern Plastics* **17**, No. 2, 182, 184, 186(1939).—A review. E. H.

Wetting and spreading properties of aqueous solutions. Mixtures of sodium carbonate with caproic, caprylic, capric, lauric, myristic and palmitic acids. H. L. Cupples. *Ind. Eng. Chem.* **31**, 1307–8(1939); cf. *C. A.* **31**, 6763[3].—The surface tension, interfacial tension against mineral oil and spreading coeff. of mixts. of Na_2CO_3 with 1% solns. of caproic, caprylic, capric, lauric, myristic and palmitic acids are detd. and plotted against Na_2CO_3-fatty acid mol. ratio. Relative positions of the curves correspond approx. with the order of increasing mol. wt. of the fatty acids. Compared to NaOH mixts., Na_2CO_3 mixts. with oleic and with lauric acids give lower surface and interfacial tensions. With the other fatty acids Na_2CO_3 has only a slight advantage. From characteristics in the surface-tension curves Na_2CO_3 is considered to react as a diacid base with the more highly ionized lower fatty acids and as a monoacid base with the weaker acids of higher mol. wt. A. J. Stirton

Spots versus spot removers. C. A. Taylor. *Glass Packer* **15**, 696–7, 715, 724(1937).—The use of $CHCl_3$, CCl_4, $CHCl.CCl_2$, $C_6H_5CH_3$, various oxidizing agents and saponifiers for cleaning purposes are discussed. C. R. Fellers

Problems concerning the efficiency of oils as mosquito larvicides. II. The spreading power of oils and methods of increasing it. David R. R. Murray. *Bull. Entomol. Research* **30**, 211–36(1939); cf. *C. A.* **33**, 8855[4].—Pure higher paraffins are nonspreading; pure aromatic compds. have only small spreading pressure. Com. petroleum oils owe their spreading properties to the presence of small quantities of impurities. Spreading power is increased by irradiation of very thin layers of oil; a very small fraction of the oil undergoes chem. change by this treatment. Straight-chain fatty acids and ales. increase the spreading pressure of clean oil to a value already attained in the crude oil. Compds. in which a simple group such as -OH is attached to the right hydrocarbon framework will increase the spreading pressure of an oil. E. g., $-SO_3OH$ at the end of simple hydrocarbon (particular one not indicated) was more effective than any other grouping investigated. Water-sol. substances are not good spreaders because they dissolve out of the oil. The max. spreading pressure exerted by a substance in oils is greater in paraffin than in aromatic oils. When oil is shaken with a solvent which sepd. aromatic compds. from paraffins, the spreading constituents pass into the aromatic fraction. In this way strong concns. can be obtained, and the active substances can be transferred from one oil to another. Spreading constituents are entirely removed from petroleum oil by filtration through fuller's earth. C. H. R.

A new mosquito-larvicide oil. M. Kubo and Eiziro Ohito. *J. Oriental Med.* **31**, 407–9 (English abstr. 36)(1939).—A new mosquito-larvicide is an equal mixt. of "Dapus oil" and "Leave oil" (by-products of oil-shale distn.), 1 l. per 1.5–2 acres being suitable for rice field and more being required for ponds and marshes. It kills the larva in 1 day, injures other rice plant insects, but is harmless to the plant. S. Tashiro

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Subjecting liquids to sound vibrations for prepg. emulsions (U. S. pat. 2,170,178) 1.

Couillaud: Gaz de combat. Propriétés chimiques et physiologiques. Protection thérapeutique des intoxica-

tions. Essai de contribution à la défense passive. 2nd ed. Paris: J.-B. Baillière. 175 pp. Fr. 32.

Respirators for use in dust- or smoke-laden atmospheres. B. F. McDonald Co. Brit. 506,168, May 23, 1939.

Packaging plastic materials such as "dentocoll." Clyde A. Nelson. U. S. 2,171,708, Sept. 5. A stick of semirigid "reversible hydrocolloid" such as the dental impression material "Dentocoll" is provided with a loosely fitting flanged ring intermediate the ends of the stick and with end-closures formed from latex and engaging the rim.

Mixed esters of dicarboxylic acids. Carl J. Malm and Charles R. Fordyce (to Eastman Kodak Co.). U. S. 2,170,030, Aug. 22. Mixed esters (suitable for use as *plasticizers* with cellulose acetate, etc.) such as ethylene glycol diethyl and dimethyl diphthalates, hydroquinone diethyl diphthalate, ethylene glycol diethyl disuccinate, glycerol trimethyl triphthalate, and hydroquinone dimethyl disuccinate are produced from the acid dicarboxylic acid esters of polyhydroxy compds. prepd. as described in U. S. 2,023,485 (*C. A.* **30** 732) by reaction with alcs. such as MeOH or EtOH to esterify the remaining carboxyl group. Various details of the production and use of these plasticizers are given.

Apparatus for loosening moldable or plastic material from its support after a drying, hardening or curing process. Horace Allan Wilkinson. Brit. 506,833, June 6, 1939.

Apparatus for molding plastic material, as in forming transmission belts. Edward L. Schick (to B. F. Goodrich Co.). U. S. 2,172,111, Sept. 5. Various structural, mech. and operative details.

Molding transparent resin compositions. Richard F. Warren. U. S. 2,169,825, Aug. 15. In forming articles such as phonograph records, a transparent resin compn. such as one of a vinyl resin is molded, then printed upon, and then further molded with heating to draw the resin over the printing.

Molding lenses, etc., from synthetic resin. Raoul Fritz. Brit. 505,836, May 15, 1939. Optical lenses and prisms are molded from transparent thermoplastic org. substances, e. g., vinyl or acrylic esters, in molds of glass or quartz.

Producing patterned articles such as buttons from molding powders such as "artificial horn." Hans Schafer. U. S. 2,170,931, Aug. 29. A method of producing patterned objects, having the pattern extending throughout the thickness of the object from face to back from molding powders of all kinds, color and granulation, involves introducing by centrifugal action, in a cylindrical mold, successive concentric layers of the powders, each of a different color, and compressing the layers longitudinally; removing the so-formed object from the mold and then applying lateral pressure transversely to the axis of the layers to form an oval coherent body.

Quick-curing resin-fiber composition suitable for molding sheets, etc., with use of heat and pressure. Norman D. Hanson (to Bakelite Corp.). U. S. 2,170,755, Aug. 22. A quick-curing product is prepd. by treating a sheeted mixt. of a fibrous material such as kraft pulp and about 15-40% of a phenol-aldehyde resin in which the reaction was approx. to the gel point, with 5-25% of a free-flowing, quick-curing phenol-aldehyde resin.

Synthetic resinous products. Geo. F. C. Houghton. U. S. 2,172,385, Sept. 12. A resinous compn. comprises in chem. combination a condensation product of a phenol and an aldehyde having incorporated with it 20-30% of rubber together with polymerized vinyl chloride or vinyl acetate; it is capable of being cast or molded under applied heat to a solid having both thermosetting and thermoplastic properties.

Urea-formaldehyde resins. Oskar R. Luddwig (to Resinous Products & Chemical Co.). U. S. 2,171,882, Sept. 5. A process of producing condensation products from urea and formaldehyde comprises heating a nonacidic mixt. of butanol, one mol. equiv. of urea and at least 2 mol. equivs. of aq. formaldehyde until the reaction has at least reached the methylol urea stage, adding to the soln. approx. 0.06% of formic acid based on the anhydrous wt. of the starting materials and refluxing for from ½ to 1 hr., reducing the pressure to a point at which the mixt. will boil at a temp. below 80°, distg. substantially all the water from the mixt. while the butanol also vaporized is replaced, releasing the vacuum and continuing the distn at atm. pressure until a total of approx. 2 mols. of water of reaction separated for each mol. of urea condensed. Products thus prepd. are suitable for use in coating metals, etc.

Resins from phenolic compositions and esters of anacardic acid. Emil F. Novotny (to Durite Plastics, Inc.). U. S. 2,170,950, Aug. 29. A synthetic resin such as a phenol-aldehyde resin or a natural resin such as gum accroides is caused to react (suitably by heating up to about 285°) with crude anacardic ester such as the Me, Et, Am, Bu, Pr or iso-Pr esters which may be derived by esterifying cashew nut-shell liquid, the resulting products being suitable for use in coating compns., adhesives, fabric-impregnating and molding compns., for phonograph records, abrasive wheels, brake linings, elec. insulation, printing plates, etc.

Heat reactive oil-soluble resins suitable for coatings or molded products. Wm. H. Butler (to Bakelite Corp.). U. S. 2,171,914, Sept. 5. By the reaction of a trialkyl phenol such as a trimethylphenol and a methylene-contg. substance such as CH_2O (suitably in the presence of $(CH_2)_6N_4$) there is obtained a heat-reactive resinous material substantially free from components volatile under vacuum at 110° and sol. in drying oils to produce a compn. hardening with heat more rapidly than the drying oil alone.

Resinous condensation products. Israel Rosenblum U. S. 2,169,991, Aug. 15. Products suitable for use with varnish oils are obtained by treating 1 mol. of a phenolic compd. such as amyl phenol with at least 2 mols. of CH_2O and approx. 1 mol. of glycerol until a viscous condensate is obtained and then neutralizing excess glycerol with an acidic natural resin such as rosin.

Oily to resinous condensation products suitable for use with various solvents. Adolf Weihe (to Deutsche Celluloid Fabrik). U. S. 2,171,965, Sept. 5. CH_2O or AcH is treated with iso-Bu carbamate or other ester of a carbamic acid with an alc. contg. more than 2 C atoms at a temp. above about 80° in the presence of a compd. of acid reaction such as HCl. Numerous examples are given.

Stabilizing polymeric vinyl resin coatings on metals. Geo. H. Young (to Stoner-Mudge, Inc.). U. S. 2,169,717, Aug. 15. Coatings such as those of polymerized vinyl chloride and vinyl acetate are rendered more stable to heating by admixture with a small proportion of quinine or other cinchona alkaloid.

Uniting materials such as resin-coated film and paper. Clyde Scott. U. S. 2,171,259, Aug. 29. App. is described, and a method of laminating nonfibrous film to base material, comprising the steps of feeding nonfibrous film having at least one thermo-adhesive surface directly from a supply roll between two pressure-applying rollers; feeding base material from a supply roll into contact with the thermo-adhesive surface of the film between the pressure-applying rollers; applying heat to the film sufficient to render the thermo-adhesive surface directly adhesive, and at the same time applying rigid pressure and resilient counter pressure in opposed relation to the nonfibrous film and the base material to render the adhesive surface of the nonfibrous film adherent to the base material.

Making dentures of materials such as vulcanite, and synthetic resins. Charles S. Pallard. U. S. 2,171,736, Sept. 5. App. is described, and a process of making dentures which includes the steps of encasing a denture model of wax or the like with a foil having form-sustaining characteristics when later brought into contact by a molten metal, pouring molten metal about such foiled model to form, when the metal sets, a separable mold consisting almost entirely of metal, wherein the teeth of the model are held in their relationship as fixed in the model, removing the model material, which has been melted by the heat of the molten metal, and applying heat to denture-forming

material placed within the mold by conduction through the mold. Pb foil may be used.

Electrical insulation. Wm. R. Scigle (to Johns-Manville Corp.). U. S. 2,170,434, Aug. 22. A compressed and hardened elec. insulator sheet suitable for elec. switchboard panels comprises cement, asbestos fibers serving as a reënforcement, and paraffin, Zn stearate or Al stearate serving as a water-repellent agent in a proportion of about 1–3%.

Electrical insulation. Raymond M. Fuoss (to General Elec. Co.). U. S. 2,171,334, Aug. 29. Elec. insulation suitable for use on conductors and with stable elec. losses at elevated temps. comprises a plasticized polymerized vinyl halide and Pb resinate.

Electrical insulating composition suitable for use in transformers, etc. Arthur A. Levine and Oliver W. Cass (to E. I. du Pont de Nemours & Co.). U. S. 2,171,855, Sept. 5. A mixt. of chlorinated iso-Pr benzenes b. 260–310° is used with a diluent mixt. of chlorinated iso-Pr benzenes b. 250–260°.

Insulation in electron-discharge devices. Delos H Wamsley (to Radio Corp. of America). U. S. 2,171,230, Aug. 29. Insulating material such as mica spacers is provided with a coating of alumina monohydrate of a thickness of at least 0.005 in., which serves to reduce secondary emission and leakage.

Insulation for electric heaters. Frank Kuhn and Laurence H. Thomas (to American Electrical Heater Co.). U. S. 2,171,879, Sept. 5. Layers of mica and magnesia are used between a resistor and a surrounding sheathing, with the mica layer in contact with the resistor.

Insulating material suitable for electrical coils, etc Raymond P. Lutz (to Western Elec. Co.). U. S. 2,172,445, Sept. 12. See Brit. 492,420 (*C. A.* **33**, 1839⁶).

Electric apparatus for determining insulating values of various materials. Frank C. Doble and Glenn H. Browning (to Doble Engineering Co.). U. S. 2,170,813, Aug. 29. Various elec. and operative details.

Heat-insulation wall. Fred G. Johnson (to United States Gypsum Co.). U. S. 2,172,048, Sept. 5. Various structural details of walls provided with parallel spaced sheets of heat-reflective material such as Al foil with an intermediate filling of light porous material such as glass wool.

Apparatus for demonstrating the effectiveness of heat insulation. Robert Waldo (to American Flange & Mfg. Co.). U. S. 2,172,229, Sept. 5. Various structural details of a device with a heater and thermometer, between which the material under test is placed.

Clay products such as light-weight heat and sound insulation. Floyd B. Hobart (to Battelle Memorial Institute). U. S. 2,171,290, Aug. 29. A method of making a ceramic product comprises making a suspension of ceramic material in water to effect gelation of a sol. silicate to be subsequently introduced and wherein the suspension has a pH value suitable for attainment of gelation at a desired time, and adding the sol. silicate in powdered form to bring about gelation and consequent conversion of the suspension from a liquid to a solid phase.

Cellular products such as sound and heat insulation. Richard C. Thompson (to F. E. Berry, Jr. & Co.). U. S. 2,170,102, Aug. 22. A granular filler such as limestone and powd. glass is mixed with an aq. alkali silicate soln. and the mixt. is beaten to aerate it and form a foamy, cellular liquid of predetd. increased volume which is then immediately heated at a relatively low temp. to dry it to a solid cellular condition, followed by further drying at a higher temp.

Cellulose pads or bats for use as heat and sound insulation. Charles A. Fourness (to Paper Patents Co.). U. S. 2,170,655, Aug. 22. A bulky, porous, multi-ply pad or bat suitable for use as an insulating material comprises a plurality of superposed, thin, creped, cellulosic sheets each of which contains from 10% to 50% of an asphalt which is relatively brittle at room temp., and which has a m. p. of 60–93°, the asphalt being in the form of small, discreet particles of widely varying dimensions, and substantially all of the particles being individually attached to individual fibers or groups of the fibers making up each of the sheets, whereby the individual fibers in the pad or bat are unequally loaded or weighted, the pad or bat having a stable d. under ordinary mfg. conditions within the range of 1.25 to 2.00 lb. per cu. ft.

Self-setting compositions for heat and sound insulation. Dorothy H. Grunwald. Brit. 506,134, May 23, 1939. These consist of a slurry of $CaCO_3$ and $MgCO_3$ prepd. by carbonation of a suspension of calcined dolomite and removal of excess H_2O, e. g., by decantation. The $MgCO_3$ is obtained as fine crystals by carbonation at about 20–40° with agitation, excess CO_2 being avoided so that no $Mg(HCO_3)_2$ is formed. The setting is accelerated by heating of the molds, preferably to 60–90°. After setting, the products are removed from the molds and dried at 70–200°. Fillers, e. g., asbestos, diatomaceous earth, may be incorporated in the slurry.

Halogenated organic compounds such as those used for insulating. Frank M. Clark and Walter M. Kutz (to General Elec. Co.). U. S. 2,169,872, Aug. 15. Solidification of materials such as chlorinated biphenyl, etc., is inhibited by adding 10% or more of tetrachlorobenzene.

Insulating magnetic particles such as those used for loading coils. Victor E. Legg (to Bell Telephone Laboratories, Inc.). U. S. 2,169,732, Aug. 15. App. is described, and a method of insulating magnetic dust particles such as those of "permalloy" carried in suspension in a liquid medium such as water and maintained in suspension by agitation, which involves directing the material through a zone of restricted cross-sectional area, in admixt. with an insulating material such as a mixt. of colloidal clay, Na silicate, $Mg(OH)_2$ and water while the materials are subjected to trains of compressional elastic waves of high frequency, and the particles are subsequently dried.

Forming coatings of insulating material on metallic surfaces. George S. P. Freeman. Brit. 506,046, May 22, 1939. The surface is oxidized, a layer of insulating material that will wet the oxidized surface is evapd. thereon and the coating is then baked at a temp. near the m. p. of the insulating material. The process may be used for the production of a mosaic electrode for television transmission. As an example, Li borate is evapd. *in vacuo* onto the oxidized surface and the coating vitrified by stoving of the article for a few sec. in an inert atm. at about 10° above the m. p. of the borate.

Liquid dielectric compositions suitable for use in transformers, etc. Gerald H. Coleman and Luther F. Berhenke (to Dow Chemical Co.). U. S. 2,169,995, Aug. 22. A halogenated diphenyl oxide contg. at least 4 atoms of halogen per mol., such as a hexachlorinated diphenyl oxide, is used with a substantial proportion of an alkylated diphenyl oxide having an av. of not more than 4 alkyl groups per mol.

Alkylated diphenyl oxide derivatives. Gerald H. Coleman and Ralph P. Perkins (to Dow Chemical Co.). U. S. 2,176,809, Aug. 29. Products suitable *for use as dielectrics in transformers*, condensers and other elec. app. or as plasticizers with resins and varnishes, etc., are prepd., e. g., by treating an alkyl halide, an olefin, or an alc. other than EtOH with diphenyl oxide in the presence of a catalyst of the Friedel-Crafts type, so as to obtain diisopropyldiphenyl oxide, b. about 158–9° or an alkylated mixt. comprising butyl- and poly-butyl-diphenyl oxides as main constituents. Numerous examples with details are given.

Pressure-sensitive adhesive sheets. Ralph T. K. Cornwell (to Sylvania Industrial Corp.). U. S. 2,171,140, Aug. 29. A pellicle of nonfibrous cellulose hydrate, alkali-sol. cellulose ether or insolubilized gelatin is provided with a pressure-sensitive rubber adhesive coating and with an intermediate coating of gelatin, glue, dextrin or casein in the form of a hydrogel simultaneously formed *in situ* with the rubber coating. Such a material is suitable for use in the manuf. of various laminated products.

Adhesive compositions for sheets of paper, cloth, etc. Willard L. Morgan (to American Maize-Products Co.). U. S. 2,170,273, Aug. 22. Adhesives retaining their flexibility and not becoming hard or brittle comprise an aq. soln. of a water-sol. protein adhesive such as glue,

gelatin or casein and borax, together with a water-sol. aliphatic alkylolamine lactate such as triethanolamine lactate, monoethanolamine lactate or diethanolamine lactate.

Adhesive masking tape. John O. Doty and Paul C. Orcutt (to Minnesota Mining & Mfg. Co.). U. S. 2,171,544, Sept. 5. An adhesive tape is prepd. by providing a flexible backing material such as paper and mixing together a compn. contg. a rubber-base material insol. in the presence of water or the usual solvent vehicles employed in paints and varnishes, forming it into a layer, preforming one surface, as by polished rollers, and moistening the layer compn. on the opposite surface with a solvent such as benzene and then applying it as a thin film to the flexible backing by pressure.

Adhesive sheet material suitable for wrapping foods, tobacco, etc. Willard L. Morgan (to Sylvania Industrial Corp.). U. S. 2,170,949, Aug. 29. Rubber adhesives contg. a resin and used on wrapping tapes or sheets are rendered free from disagreeable odor by mixing with 1% or less of phthalic acid. Various formulas of adhesives are given.

Adhesive-coated paper suitable for gummed tape. Harold R. Dalton (to Postal Telegraph-Cable Co. (New York)). U. S. 2,170,654, Aug. 22. Roll paper is provided on one side with a layer of hygroscopic water-sol. adhesive and over the adhesive is superposed a slightly tacky protective layer of dextrin with which is mixed a relatively small proportion (suitably about 0.5-1.0%) of starch.

Salts of cellulose ether carboxylic acids. Georg Meyer. U. S. 2,171,222, Aug. 29. For the prepn. of salts of cellulose ether, carboxylic acids such as those for an adhesive size, which, with water, yield solns. of increased viscosity, the reaction product obtained by the action of a monohalogen fatty acid such as monochloroacetic acid on alkali cellulose is pptd. with an Al compd. such as alum and the ppt. is washed with water and converted into a water-sol. salt with an alkali such as soda lye.

Glue compositions Curt Schulein. Brit. 505,868, May 18, 1939. Finely ground straw is added as a diluent and improving agent to animal glue, particularly for veneer work. Finely powd. inorg. substances, e.g., dolomite, calcined dolomite, $CaCO_3$, kaolin, calcined gypsum, stone dust, slate dust, may also be added.

Sulfonic acids for use as textile assistants. Hermann Holstein (to I. G. Farbenind. A.-G.). U. S. 2,170,380, Aug. 22. Products suitable for use as assistants in processes such as textile treatments are produced by heating an alkali metal salt of sulfurous acid with the Na salt of octadecyl alc. sulfuric ester or other sulfuric ester of an aliphatic primary alc. contg. at least 8 C atoms, at a temp. of 100-250°. Several examples with details are given.

Sulfonic acids and their salts. Walther Schrauth and Eric Schüm (to "Unichem" Chemikalien Handels A.-G.). U. S. 2,171,117, Aug. 29. For producing a sulfonic acid for use in textile treatments, etc., a sulfuric acid ester of a higher-mol. alc. such as cetyl alc. is treated with NaOH to form a Na ester salt and then with a Na or K compd. to obtain the salt of the sulfonic acid, which may then be further treated to obtain the free sulfonic acid. Also a bromide such as cetyl bromide may be dissolved in 70-80% alc. contg. NH_4 sulfite in soln. (about 3 times as much alc. as bromide is used) and this mixt. may be heated to about 120-4° in an autoclave to convert the bromide to a salt of sulfonic acid.

Sulfocarboxylic acid esters suitable as assistants in the textile and related industries. Fritz Guenther and Karl Saftien (to I. G. Farbenind. A.-G.). U. S. 2,169,998, Aug. 22. Oleyl sulfoacetate and other esters are produced which are suitable for use as cleansing and emulsifying agents and which have the general formula RCOOR′ in which R represents an aliphatic radical contg. up to 7 C atoms and at least one sulfonic radical, and R′ represents a radical of an aliphatic alc. obtainable by reduction of the unsatd. fat acids of vegetable oils and fats.

Benzimidazoles. Charles Graenacher and Jules Meyer (to Soc. pour l'ind. chim. à Bâle). U. S. 2,170,474, Aug. 22. *Wetting, emulsifying, dispersing, purifying, washing, softening* and *foaming agents* are produced by reaction of benzaldehyde, cinnamaldehyde, formaldehyde, lauraldehyde or other aldehydes upon a cyclic amidine of which the μ-C atom carries a substituent consisting of a chain of at least 2 C atoms, wherein the α-C atom is present in the form of a methylene group (this chain being interrupted if desired by a S or a N atom), such as μ-heptadecylbenzimidazole or μ-ethylbenzimidazole. The products may be sulfonated or reduced or alkylated or aralkylated (the latter operation being carried out to the formation of tertiary bases or to the formation of quaternary NH_4 compds.) and these various treatments may be combined with each other, e. g., after condensation with the aldehyde (which may be effected by heating in the presence of boric acid) the product may be first alkylated and then sulfonated or reduced, or first reduced and then alkylated and finally sulfonated. Numerous examples with details are given. Cf. *C. A.* **33**, 1064⁴.

Stable emulsions for sizing and waterproofing. Otto Kress and Charles E. Johnson (to Institute of Paper Chemistry). U. S. 2,172,392, Sept. 12. A method of prepg. a stable emulsion involves adding a liquid waxy material such as paraffin accompanied by agitation to an aq. alk. soln. contg. milk casein and an emulsifying agent such as NH_4 oleate (the casein being present in such quantity relative to the waxy material that the particles thereof are surrounded by a protein film preventing agglomeration of the waxy particles when the emulsion is broken by addn. of acidic material; the ratio of casein to wax is at least about 1:4).

Condensation products suitable for use in tanning or for rayon treatment. Ernst Koch, Christoph Thomsen and Karl Dachlauer (to I. G. Farbenind. A.-G.). U. S. 2,171,963, Sept. 5. By condensing a natural resin such as colophony with a phenolic compd. such as phenol or cresol (suitably by heating in the presence of H_2SO_4 or H_3PO_4) a product is obtained contg. in its mol. the group $-CH_2-SO_3x$, where x stands for a H, an alkali metal or NH_4, and being further characterized by being a viscid to solid substance sol. in water.

Leatherlike surfaces on fabrics. Raymond C. McQuiston and Henry C. Hopewell. U. S. 2,172,028, Sept. 5. A bonding material such as a rubber compn. is applied to fabric, and dry ground leather is deposited continuously on the surface to adhere to it; and the leather is satd. and the interstitial spaces between the leather fibers are filled with a soln. contg. tannable protein materials such as a glue or gelatin compn. and these materials are tanned after satn (suitably by use of a CH_2O soln.).

Fabric-reinforced 'artificial leather" suitable for use in shoe manufacture, etc. Milton O. Schur and Benjamin G. Hoos (to Brown Co.). U. S. 2,171,419, Aug. 29. A felt layer impregnated with rubber latex, etc., is bonded to a cloth reinforcement also impregnated and whose threads have been flattened and compressed markedly and whose face coming into contact with the felt layer has been napped.

Lacquer coatings on materials such as textile fabrics or leather. Steven J. B. ten Cate. U. S. 2,171,389, Aug. 29. A process of providing flexible materials with a coating of lacquer comprises applying to the material at least one priming layer contg. a large quantity of fillers and rubber as the only binder and at least two intermediate layers consisting of a mixt. of a rubber dispersion, a polymerized acrylic acid ester and a cellulose ether emulsion, the first intermediate layer contg. a larger proportion of rubber than the succeeding intermediate layers so as to obtain a firm adherence of the first intermediate layer to the rubber base and of the last intermediate layer to the cellulose lacquer coating, and subsequently applying a coating of cellulose lacquer.

Polymerization products from materials such as polyamides derived from ethylenediamine and sebacic acid or the like. Paul J. Flory (to E. I. du Pont de Nemours & Co.). U. S. 2,172,374, Sept. 12. A process for producing a more highly condensed polymer from a lower-mol. wt. polyamide obtainable from approx. equimol. proportions of

diamine and dibasic acid comprises heating the polyamide at polymerizing temp. below its m. p. under conditions permitting escape of the by-product of the condensation reaction, and continuing such heating until the more highly condensed polymer is formed. Polymers thus prepd. are suitable for making films, filaments, fabrics, molded articles, etc.

Polymers of isobutylene. Michael Otto and Helmuth G. Schneider (to I. G. Farbenind. A.-G. and Standard Oil Development Co.). U. S. 2,172,403, Sept. 12. For producing viscous to plastic polymers of good stability, a highly purified isobutylene is subjected to catalytic polymerization, at a temp. below −40° in the presence of less than 1% of a S compd. such as H_2S.

Polymerizing methyl methacrylate. Otto Röhm and Ernst Trommsdorff (to Röhm & Haas Co.). U. S. 2,171,765, Sept. 5. A process of prepg. a polymeric ester of methacrylic acid in granular form involves forming by means of mech. agitation unaided by any emulsifying agent an aq. suspension of a finely divided polymeric methacrylic ester and an amt. of monomeric methacrylic ester at least ten times as great as that of the polymeric ester, subjecting the continuously agitated suspension to polymerizing influences until polymerization is complete, and discontinuing the agitation to permit settling of the polymeric material.

Distilling polymerizable materials such as vinyl or acrylic esters. Carl T. Kautter (to Röhm & Haas Co.). U. S. 2,171,795, Sept. 5. An arrangement of app. is described, and a process which comprises subjecting to fractional distn. a member of the group consisting of monomeric vinyl, acrylic and methacrylic esters, acrylic and methacrylic nitriles and styrene by feeding the monomeric material into the lower half of a fractionating column, feeding a phenol having a higher b. p. than the monomeric material into the column near the top thereof, the two liquids being fed at such rates that the phenol is about 5% to 12% of the total material in the column and heating the monomeric material, thus causing the vapors to pass upward through the column against a downward flowing stream of the phenol.

Polishes. Robert Easten and Noel Shaw. Brit. 506,771, June 5, 1939. Surfaces of porous structures or articles are polished by application thereto of a layer of a liquid that leaves a hydrated SiO_2 deposit, and subsequent rubbing of the layer into the surface in the manner of French polishing. A suitable liquid is formed by causing an ester, or mixt. of esters, of silicic acid to react with H_2O in the presence of a solvent for the ester that can carry H_2O in soln. or suspension, e.g., alc., Me_2CO, toluene.

Fluid polishing compositions. Boston Blacking Co., G. m. b. H. Brit. 506,425, May 26, 1939. These comprise an aq. liquid vehicle having suspended therein wax particles that have been comminuted, prior to embodiment in the compn., by spraying wax in a liquefied state into an atm. in which the spray particles solidify. The comminuted wax may be colored by means of an oil color, and the polish may include, in addn. to the comminuted wax particles, wax emulsified in the liquid vehicle. A thickening agent may be added. In an example, a polishing compn. comprises comminuted wax, H_2O, an aq. wax emulsion, shellac, dye, sea moss or mucin, and soap.

Bonding and coating compositions suitable for use in linings for acid-pickling tanks, etc. Joseph C. Patrick (to Thiokol Corp.). U. S. 2,169,814, Aug. 15. S and a sulfurized pitch are used with reaction products of an alk. polysulfide and additive compds. of olefins of the general formulas $C_nH_{2n}X_2$ and $OC_nH_{2n}X_2$ in which X is a neg. radical such as Cl (a sufficient amt. of elemental S being present in the compn. to cause the viscosity to increase at elevated temps. in the absence of the pitch).

Coating compositions containing gelatin, etc. Charles M. Boyce (to John R. Ditmars). U. S. reissue 21,195, Sept. 5. A reissue of original patent No. 1,978,406 (*C. A.* 29, 366[7]).

Oil coatings for preventing evaporation of water, as in desert regions. Franklin C. Nelson (to Stanco, Inc.). U. S. 2,170,644, Aug. 22. For inhibiting evapn. from a surface, the surface is coated with a stable soln. of an alkyl phenol such as cresol or heptyl phenol in a satd. mineral oil, which is stable against oxidation and loss on exposure to the atm. and does not contaminate the water.

Chemical heating composition. Nathaniel W. Holmes and Samuel Parness. Brit. 507,070, June 8, 1939. A dry absorbent material, e. g., ground paper, 10 parts is impregnated with 1 part of a 50% soln. of $CaCl_2$, which may contain glycerol. Twenty parts of the impregnated mass is mixed with 1 of MnO_2. Another mixt. is made of finely divided Fe 8 and NH_4Cl 1 part, which is sprinkled with a 5% AcOH soln., the reaction yielding a dry mass. This mass is disintegrated and mixed with the 1st mixt. in equal proportions and packed into metal tubes circumferentially arranged in layers alternating with layers of paper pulp impregnated with $CaCl_2$.

Noncorrosive antifreeze liquid suitable for use in automobile engine cooling systems. Fred R. Whaley (to Carbide and Carbon Chemicals Corp.). U. S. 2,172,075, Sept. 5. With an alc. such as ethylene glycol, there is used a corrosion-preventive aromatic nitro-carboxy compd. having a nitro group directly attached to the aromatic nucleus, such as *p*-nitrobenzoic acid (suitably with $NaNO_3$, $NaNO_2$ and Na_2CO_3).

Brake and pressure fluids. Rudolf Endres. U. S. 2,171,491, Aug. 29. Tetrahydrofurfuryl alc. is used in mixt. with cyclohexanone-glycerol or ricinoleyl alc. or oleic alc. or castor oil (suitably with the addn. also of a small proportion of a high-mol. alkyl amine).

Friction linings for brakes and clutches. Rudolf Oswald. Brit. 505,922, May 19, 1939. These comprise a compressed compn. of Al, steel or other metal wool and a binder of artificial or natural resin, rubber or the like, with or without the addn. of asbestos fibers and powd. fillers.

Air strainer suitable for use with brake systems. Ellis E. Hewitt (to Westinghouse Air Brake Co.). U. S. 2,170,074, Aug. 22. Various structural details.

Laminated gaskets of materials such as sheet metal, asbestos and graphite. Geo. T. Balfe (to Detroit Gasket & Mfg. Co.). U. S. 2,171,530, Sept. 5. Various mfg. details and app. used are described.

Seamless tubing or hose. Robert A. Ramsdell (to E. I. du Pont de Nemours & Co.). U. S. 2,171,761, Sept. 5. Glycerol is applied to the fabric covering of a hose core, and a wet seamless tubing of nonfibrous cellulosic material is shrunk onto the surface of the core by removal of moisture from the tubing, and a rubber covering is vulcanized onto the outer surface of the tubing.

Inlaid articles such as fountain-pen barrels. Charles Schurster (to Nixon Nitration Works). U. S. 2,169,930, Aug. 15. A process of producing a body of plastic material such as a cellulose deriv. compn. having a pattern formed by a plurality of elements such as metal devices on its surface involves forming perforations in a metal tube or the like corresponding to the design desired, inserting the body in the tube and applying a solvent to the areas exposed through the perforations, applying decorative elements through the perforations, removing the tube, and applying a transparent sheath such as one of celluloid compn. to the body.

Collapsible tubes. "Hafta" Handelsgesellschaft für technische Neuheiten m. b. H. Brit. 507,130, June 9, 1939. A container consists of a transparent tube of a cellulose deriv. and a dispensing terminal fixed thereto, the inner surface of the container being provided with a film comprising a nonhardening artificial resin, e. g., polymerized vinyl ester or styrene, and a wax, e. g., beeswax. The tube may be of cellulose acetate and the terminal of "Bakelite." The container is preferably rinsed out with a soln. of the resin and wax in a solvent incapable of dissolving the walls of the container, and dried by hot air.

Printing surfaces. Alfred Schlesinger. Brit. 505,999, May 19, 1939. Zn, Al or other metal printing plates are treated to form on the image a uniform film of a nonresinous drying-oil compn. that is insol. in H_2O or printing ink and substantially insol. in the usual washing liquids. The compn. preferably contains a small proportion of a nondrying oil, e. g., castor oil, and an oxidation catalyst,

e. g., MnO_2, and preferably consists, in addn., of industrial alc., linseed oil and turpentine or C_6H_6. The plate, to which the image has been applied by transfer or photographic methods, is coated with gum which is then removed from the image area, a layer of the compn. being subsequently applied and the gum and overlying compn. finally removed. More than 1 layer of compn. with intervening layers of varnish may be applied; when varnish is applied, the upper layers of compn. may contain a small amt. of solvent for the varnish to facilitate binding. If the image consists of hardened albumin, the 1st layer of compn. is omitted. Adherence between the metal and compn. can be increased by treatment of the image with a nonaq. soln. consisting of alc. and NH_3 or $FeCl_3$ and an acid, to which $CaCl_2$ or sugar may be added to remove any H_2O present.

Toothbrush bristles. Warren E. Hill and Clifford L. McArthur (to Pro-Phy-Lac-Tic Brush Co.). U. S. reissue 21,197, Sept. 5. A reissue of original patent No. 2,099,688 (*C. A.* **32**, 312[9]).

Brushes. I. G. Farbenindustrie A.-G. Brit. 506,358, May 26, 1939. See Ger. 672,431 (*C. A.* **33**, 3934[9]).

Fiberizing inorganic materials. Benjamin C. McClure. U. S. 2,172,153, Sept. 5. App. is described, and a process of producing inorg. fibrous blankets of high inherent resiliency and mass integrity, suitable for insulation, which consists in fiberizing a fused soln. of silica with a fluxing ingredient and a stabilizing ingredient, to produce feltable fibers, and forming a felted product.

Resilient articles such as cushions or tires. Rene Picard (to E. I. du Pont de Nemours & Co.). U. S. 2,171,805, Sept. 5. Within a covering such as cloth or rubber, there is placed a filling comprising continuous threads of material such as regenerated cellulose of at least 100 denier contg. discontinuous bubbles filled with gas, the side walls of the thread surrounding the bubbles being sufficiently thin to make them readily yieldable and resilient.

Conditioning and humectant compositions for treating textiles, leather, tobacco, paper, glue, etc. Kenneth R. Brown (to Atlas Powder Co.). U. S. 2,172,357, Sept. 12. Sorbitol, iditol or talitol is used in a proportion of not more than 70% of the total solids of the compn. together with not more than 70% of the total solids of the compn. together with not more than 50% (similarly based) of branched-chain desoxy hexitols or pentitols, to avoid crystallization or gelatinization of the compn.

Products made from oyster or clam shell material or the like suitable for making buttons, etc. David A. Eolis (50% to Benjamin K. Ury). U. S. 2,172,369, Sept. 12. A mild process for treating shell materials composed of platelets held together by an org. binder to produce a fine powder consisting of platelets free from org. binder, possessing substantially their natural formation, polish and luster, involves dissolving away the outer layer of said shell materials with acid, crushing said cleaned shell material to a convenient size, substantially eliminating, after said acid treatment and crushing, all agitation or harsh treatment by immersing the thus treated shell material without further treatment, in an aq. soln. of a mild alkali, gradually increasing the temp. of said solution to between 25° and 100°, said increase of temp. being gradual enough to eliminate any eddy currents apt to be set up in said soln. from said heating, leaving said shell material at said temp. and at atm. pressure in said soln. with no agitation for a period of at least 3 weeks until said platelets are freed from said binder, gently washing said platelets with a minimum of agitation in water to free said platelets from any remaining impurities.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Tube-well water supplies of Assam and North Bengal. Henry A. C. P. Hetherington. *J. Inst. Civil Engrs.* (London) **9**, No. 8, 373–6(1938).—Water is available in large quantities and at comparatively shallow depths. Ann Nicholson Hird

Mineral waters of the Argentine Republic. V. Province of Jujuy. Miguel Sussini, Enrique Herrero Ducloux, Ramón A. Brandán, Héctor Isnardi, Alfredo G. Galíndez, Manuel Castillo and Franco Pastore. *Ministerio interior, Comisión nacl. climatol. y aguas minerales.* (Argentina) **1939**, 230 pp.; cf. *C. A.* **33**, 4355[7]. E. J. C.

The hot springs of Corniglio (Parma). Giuseppe Illari and Lino Cattadori. *Ann. chim. applicata* **29**, 289–95 (1939).—These are saline springs having a temp. of about 40°. A. W. Contieri

Chemical investigations of hot springs in Japan. II. Hot springs Noboribetsu. 2. Hisateru Okuno. *J. Chem. Soc. Japan* **60**, 685–91(1939); cf. *C. A.* **32**, 7175[8].—Observations on the 5 hot springs in Noboribetsu. T. Katsurai

Report on the comparative study of the density of city water and well water in Japan. Kokiti Goto. *J. Chem. Soc. Japan* **60**, 705–6(1939).—The d. of water from 9 various parts of Japan was detd. by means of a quartz hydrometer. The density is the same within ±0.5 γ. T. Katsurai

Report on the comparative study of the density of city water and well water in the world. Kenzo Okabe and Kokiti Goto. *J. Chem. Soc. Japan* **60**, 707–9(1939); cf. preceding abstr.—The densities of waters from 19 different parts of the world were detd. The d. is the same within ±0.5γ. T. Katsurai

Chemical and physical-chemical analysis of the mineral waters of Villa Gandolfi (Torino). Francesco Biglietti. *Ann. chim. applicata* **29**, 316–32(1939).—These springs are medium mineral bicarbonate-alk. earth waters. A. W. Contieri

Analysis of the mineral waters of Pieve di Cusignano (Parma). Giuseppe Illari and Stefano Beati. *Ann. chim. applicata* **29**, 212–19(1939).—These waters contain I_2, Sr, Ba and Mg in large amts., as well as traces of Li, HBr and HI. A. W. Contieri

Spectrum analysis of the Fonte di Fiuggi waters. Roberto Intonti. *Ann. chim. applicata* **29**, 205–12 (1939).—Spectrum analysis of the Fiuggi waters showed the presence of Ca, Mg, Si, Sr, K, Na, Mn, Cu, P, Fe, Cr and Ba in decreasing amts. in this order; and also traces of Zn, V, Sn, B, Al, Rb, Ag, Pb and Pt. A. W. Contieri

Correlation of various characteristics in a sanitary analysis of well water. W. T. Kuo. *J. Oriental Med.* **30**, 927–37 (English abstr. 263)(1939).—Statistical studies on the correlation of Cl, hardness, solids, bacterial count, turbidity, color, free and saline NH_3, and albuminoid NH_3, nitrate and O_2 of the well water of Mukden. S. T.

The use of hypochlorite in water analysis. F. Dixon and D. C. Jenkins. *Analyst* **64**, 735–6(1939).—Buydens, *C. A.* **29**, 6536[9], suggested that animal and vegetable org. matters can be differentiated by their relative behavior toward $KMnO_4$ and NaOCl. Expts. made with tap water to which peat, leaf mold and tea leaves were added to represent contamination with vegetables and urine and effluent were added to represent impurities of animal origin showed that in the first case the ratio of NaOCl to $KMnO_4$ consumption was 1-2.2:1 and in the latter case it was 7.4-8.4:1. In a more stringent test a soln. was prepd. from water to which a little dil. NaCl soln. in which bran had been soaked was added. This mixt. gave a pos. biuret reaction and the $KMnO_4$ demand was equal to the NaOCl demand provided the soln. was boiled 10 min. after the $KMnO_4$ was added. If the $KMnO_4$ treatment was carried out at 80° for 4 hrs. only 20% as much $KMnO_4$ was required which would have indicated the possible presence of animal matter. W. T. H.

Determination of sulfate in water by the volumetric chromate method. Jean Courtois and Pierre Bonjean. *Ann. chim. anal. chim. appl.* **21**, 229–35(1939).—Wilden-

stein (*Z. anal. Chem.* **1**, 323(1862)) pointed out the possibility of detg. sulfate on the basis of the reaction $BaCrO_4 + SO_4^{--} = BaSO_4 + CrO_4^{--}$. Since both $BaSO_4$ and $BaCrO_4$ are practically insol. in water, the chromate in soln. is a measure of the sulfate originally present. The method has often been studied and it is generally agreed that the results are invariably low and inconsistent. By modifying the procedure slightly, it is possible to det. 37–150 mg. of sulfate with an av. error of −3.5%. The modifications consist in adding a HCl soln. of $BaCrO_4$ to the boiling soln. contg. sulfate. After 5 min. the boiling is stopped and continued again after an interval of 15 min. Now the soln. is neutralized with NH_4OH until the soln loses its orange tint of $Cr_2O_7^{--}$. After this second boiling period of 5 min., the soln. is cooled and an aliquot taken for further analysis. To 100 ml. of the neutralized soln., 5 ml. of 25% H_2SO_4 is added and 5 ml. of 30% KI soln. After 10 min. more, the liberated I_2 is titrated with $Na_2S_2O_3$ soln. W. T. H.

Simplified water testing for plant operators. D. R. Hiskey. *Am. Gas J.* **151**, No. 4, 51–2(1939). E. H.

Fluoride content of well water in Manchuria. F. S. Chang. *J. Oriental Med.* **30**, 649–50(English abstr. 180) (1939).—Fluoride content of 14 samples collected from different regions of Manchuria varied from 1 to 12.5 parts per million according to the Foster method. S. Tashiro

The removal of fluorine from Alberta waters. Osman J. Walker, Gordon R. Finlay and Walter E. Harris. *Can. J. Research* **17, B**, 308–17(1939).—Numerous materials were studied in respect to their capacity for removing fluorides from water sufficiently to prevent mottling of the teeth. Two, specially prepd. Al_2O_3 and freshly pptd. $AlPO_4$, are equally good for removing fluorides as activated Al_2O_3, $Ca_3(PO_4)_2$ and MgO, 3 commonly used adsorbing agents. Good results were obtained by both the filtration and the stirring and standing technique. J. W. Shipley

Chemical-technical advances in the preparation of feed water. E. Schumann. *Chem.-Ztg.* **63**, 638–40(1939). E. H.

Feed [water] heating economies. F. J. Matthews. *Brit. Clayworker* **48**, 191–3(1939).—Corrosion is a more serious problem than deposition since substantial damage may be done before existence of the attack is suspected. In boiler plant operation the major part of any corrosive attack is caused by dissolved gases. These are CO_2 and O. The CO_2 combines with the metal to form a substance which is readily broken down by H_2O and heat to form rust and CO_2. At the end of a series of corroding actions the corrosive gas is regenerated. CO_2 may be removed by the addn. of lime or by heating the feed H_2O to boiling. E. C. Petrie

New viewpoints on the aggressiveness of water with practical examples. H. Mohler and J. Hartnagel. *Schweiz. Ver. Gas- u. Wasserfach., Monats-Bull.* **19**, 121–7, 147–50 (1939).—Aggressiveness of water is partly lime aggressiveness, partly iron aggressiveness. The former is discussed in the light of Strohecker's work (*C. A.* **31**, 1920[6]); the latter is a complex electrolytic problem. The present theories were applied on samples of ground water, lake water, and well water (Zurich). All waters had alk. pH, no aggressive CO_2 and development of iron bacteria. Even in the absence of aggressiveness, bacteria attacked the piping. After changes in water-supply system the free O_2 disappeared and in the presence of nonaggressive CO_2 the water dissolved Fe with formation of $Fe(HCO_3)_2$ which appeared as a brown ppt. in the presence of air. Aeration of the water corrected this condition. B. J. C. v. d. H.

Silica deposits in steam turbines. F. Kaissling. *Arch. Wärmewirt.* **20**, 89–91(1939).—Silica is removed from cold boiler feed water by addn. of equal mols. of $NaAlO_2$ and $MgCl_2$ and settling. The sludge may be recycled. Ernest W. Thiele

Improved oil-engine cooling. F. J. Matthews. *Brit. Clayworker* **48**, 220–1(1939).—Scale deposits are due to ecompn. of the bicarbonates under the influence of heat. The decompn. results in the formation of $CaCO_3$ which is practically insol. The formation of such carbonate deposits can be prevented by the addn. of 1 or 2 lb. of Na metaphosphate per 100,000 gal. of H_2O. Higher amts. may be used at the beginning of the treatment to accelerate the removal of old deposits. In recirculating cooling systems the concn. of bicarbonate may be limited by periodical purge of a portion of the H_2O. In addn. to the advantage of scale prevention and removal of existing deposition, the metaphosphate is an alk. reagent and will protect the engine from any corrosive influences which may enter the H_2O. E. C. Petrie

Progress in water treatment (Trautschold) **25**. Agricultural and cannery waste utilization (Wiegand) **12**. Waste problems in the pulp and paper industry (Skinner) **23**. Waste problems in the fermentation industry (Boruff) **16**. Treatment of liquid wastes from the textile industry (Hoover) **25**. Waste problems in the nonferrous smelting industry (Swain) **9**. Waste problems in the petroleum industry (Hill) **22**. Waste problems of the Fe and steel industries (Hodge) **9**. Cause of endemic goiter—effect of continuous administration of "Goiter water" on the thyroid (Kurata) **11G**. Fluoride poisoning—mottled enamel formation in rats fed with hot spring water (Sugawa) **11G**. Relation of the I contents of water to the occurrence of endemic goiter (Orr, *et al.*) (Crabtree, Mason) **11G**.

Incineration, Carbonization and Reduction of Garbage, Rubbish and Sewage Sludge. A Bibliography. United States Works Progress Administration. New York: New York University. 146 pp. Limited free distribution. Reviewed in *Eng. News-Record* **123**, 430(1939).

Purifying water. Walter Wilson. Brit. 507,553, June 16, 1939. A reagent contg. *Ulmus fulva* (I) is used for flocculating coal-slurry water. A suitable reagent is obtained by mixing I, borax, glycerol and potato starch with boiling H_2O.

Apparatus for deaerating water. The Permutit Co. Ltd. Brit. 506,616, June 1, 1939.

Softening water. Egon Zentner. Brit. 507,750, June 16, 1939. This corresponds to Fr. 826,672 (*C. A.* **32**, 8053[2]).

Apparatus for filtering and base-exchange softening of water. Eric Pick (to Permutit Co.). U. S. 2,170,975, Aug. 29. Various structural and operative details.

Base-exchange materials. Ellis-Foster Co. Brit. 506,807, June 5, 1939. See Fr. 830,787 (*C. A.* **33**, 1428[1]).

Carbonaceous zeolites. Ray Riley (to Permutit Co.). U. S. 2,170,065, Aug. 22. Lignites or soft coals are prepd. for ion-exchange purposes such as use in treating water by impregnating a granular mass of the material with H_2SO_4 at least equal to the wt. of the treated material and dild. to below 70% strength and heating to concentrate the acid and produce chem. action on org. compds. in the material so that its ion-exchange properties are improved, and then washing residual acid from the material.

Compositions for preventing or removing corrosion in boilers. Robert H. Turnbull. Brit. 507,072, June 8, 1939. These comprise a colloidal mixt. of sucrose 10–18, glucose 9–15 and tannin 9–15 in H_2O 20–50%, with or without a small quantity of essential oil, e. g., clove oil, vegetable oil, e. g., castor oil, colloidal graphite, Al_2O_3, Fe oxide, colloidal clay and (or) talc. The solid addns. above comprise up to 5%. One or more of the following may be added to the original colloidal mixt., with or without the solid addns.: Na_2CO_3 2–25, Na phosphates up to 10, Na aluminate 0.25–5 and Na_2SO_3 1–2%.

Apparatus and method for dosing feed water supplied to a storage container with small quantities of liquid reagent, e. g., anticorroding compounds. Robert H. Turnbull. Brit. 505,779, May 16, 1939.

Purifying organically polluted water. Oliver M. Urbain and Wm. R. Stemen (to Charles H. Lewis). U. S. 2,171,203, Aug. 29. App. is described, and a process for the purification of a polluted liquid such as sewage which involves passing the liquid through a bed of scrap iron

simultaneously with SO_2 and diffused air, forming Fe sulfates *in situ*, and thereafter treating the resultant liquid with $Ca(OH)_2$ and passing it to a settling zone.

Treating laundry waste. Oliver M. Urbain and Wm. R. Stemen (to Charles H. Lewis). U. S. 2,171,197, Aug. 29. In purifying laundry waste for discharge or reuse, suspended solids are initially removed, hydrolysis of the soap soln. is effected, as by use of HCl, and the soln. is passed through a filter charged with ZnO to remove, by chem. reaction, the fatty acids freed by the hydrolysis, and the fatty acid-free soln. is then passed through a chlorinated coal filter to effect removal of remaining org. matter. U. S. 2,171,198 relates to the recovery of fatty acids from their solns., such as laundry waste waters, by use of a filter charged with ZnO from which the fatty acids are subsequently recovered, as by use of superheated steam.

Purifying laundry waste. Oliver M. Urbain and Wm. R. Stemen (to Charles H. Lewis). U. S. 2,171,199, Aug. 29. Suspended solids are sepd. from laundry waste, the soap soln. is hydrolyzed, as by use of HCl, and is passed through a filter charged with an oxide such as hydrous ferric oxide at or below its isoelec. point, to remove fatty acids freed by the hydrolysis, and the fatty acid-free soln. is then passed through a chlorinated coal filter to remove remaining org. matter. U. S. 2,171,200 relates to a process which involves removing fatty acids from solns. such as laundry waste waters which involves passing the soln. through a filter charged with an oxide such as hydrous ferric or stannic oxide at or below its isoelec. point and recovering the fatty acids by treatment of the filter material, as by use of steam. U. S. 2,171,201 relates to removing suspended solids from laundry waste, effecting hydrolysis of the soap soln., passing the soln. through a filter charged with TiO_2 to remove freed fatty acids, and further filtering the soln. to remove remaining org. matter. U. S. 2,171,202 relates to a like use of a filter contg. TiO_2 and recovery of the fatty acids from the filter material, as by use of steam.

Fumigation of rooms, etc., to kill insects and micro-organisms. Ivar Rennerfelt. U. S. 2,171,315, Aug. 29. A method of killing insects and microörganisms in a substantially closed space comprises introducing hot non-poisonous gases substantially composed of a mixt. of CO_2, H_2O and air, creating a blast of the gases, initially and continually directing the gas downwardly while the gas is at its highest temp., and causing circulation thereof until the entire space is substantially uniformly filled with the gas at lethal temp.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Soil survey of Wales. Progress report, 1935–8. South Caernarvonshire. D. O. Hughes and Evan Roberts *Welsh J. Agr.* **15**, 272–301 (1939); cf. *C. A.* **30**, 1483.—The soil types are described and chem. and mech. analyses are given. Deficiencies of Ca and P are widespread. K. D. Jacob

Soil profiles developed on limestone of the Great Oolite in the southern part of the Cotswold Hills (Gloucestershire and Wiltshire). A. James Low. *J. Southeastern Agr. Coll., Wye, Kent* No. **44**, 210–20 (1939); cf. *C. A.* **32**, 9360⁸. **Soil profiles developed on the forest marble of the Great Oolite (Middle Jurassic) in Somerset, Wiltshire and Gloucestershire.** *Ibid.* 221–33. **Soil profiles developed on the chalk (Upper Cretaceous) in southwest Wiltshire (Wiltshire Downs).** *Ibid.* 234–45.—The characteristics of the soils are outlined and pH values and $CaCO_3$ contents are given. K. D. Jacob

Comparison of the borers of Hey, Janert and Mitscherlich for taking soil samples of definite volume. B. Grosse. *Bodenkunde u. Pflanzenernähr.* **13**, 320–40 (1939). Sand and sandy loam soils were sampled with the app. of Hey (I) (*Bodenkundl. Forsch.* **6**, 54 (1938)), Janert (II) (*C. A.* **22**, 1644) and the 2 forms (III 1 and III 2) proposed by Mitscherlich (*C. A.* **30**, 8463⁶), and the vol. wts. of the samples were compared with those of cylindrical samples taken from the profile exposed in a pit by the procedure of Nitzsch (IV), the reproducibility of which was proved. III 1 and III 2 furnished rather variable indications, III 1 always low in the upper horizons, nearly correct lower down. III 2 was better near the surface of sandy soils, but tended to high values with deeper sampling. II was unsatisfactory with dry sandy soils, better in loams. I was unsatisfactory in a calcareous loam but good in damp sand and loamy soils, and in general the results therewith agreed best with IV. C. J. Schollenberger

Soil reaction and lime status of apple orchard. Rokuro Kawasima. *J. Agr. Chem. Soc. Japan* **15**, 744–50 (1939). —The reaction and lime-satn. status in the soils of the apple orchards deviated to a great extent. The soils having pH 5.5–6.0 and 50% lime satn. were most suitable for the growth of the apple tree. Y. Kihara

Change of oxidation-reduction potentials of water-logged soils. V. The application of the green manures in different stages of growth. Kisaburo Sibuya, Hideaki Saeki and Kenhan Ryu. *J. Agr. Chem. Soc. Japan* **15**, 133–8, *Bull. Agr. Chem. Soc. Japan* **15**, 17–18 (1939) (in English); cf. *C. A.* **32**, 7629⁹.—When *Pisum sativum* L. or *Sesbania sesban* L. Merrill. was applied as green manure to the water-logged soils at 30°, the younger or more nitrogenous plants reduced the soil potentials, while the matured plants or materials with a large C:N ratio lowered the potentials to a less extent and slightly raised them at a later period. Y. Kihara

Determination of the base-exchange capacity of soil. Alberto Malquori. *Ricerca sci.* **10**, 562–3 (1939).— A modification of the method of Parker (*C. A.* **24**, 452) is recommended for simplicity and accuracy. A table is given with a comparison of 6 methods and 2 types of acid soils, and in addn. 3 of the methods applied to a clay-lime soil pH 7.6. W. F. Bruce

Determination of the exchangeable bases in soil by the steaming method. Christ. Basileiados. *Bodenkunde u. Pflanzenernähr.* **13**, 243–9 (1939); cf. *C. A.* **31**, 7575⁷.— An improved procedure stated to be more rapid, better adapted to work on numerous samples and for calcareous soils is described: Exchangeable Ca and Mg are displaced from a 10-g. sample, previously washed with 200–250 ml. 80% EtOH to remove salts, by adding 150 ml. 2 *N* NaCl and leading in steam for 5–10 min. The mixt. is cooled and washed into a 250-ml. flask with 2 *N* NaCl to vol. Ca is detd. in a 50-ml. aliquot of the filtered soln., and the amt. found corrected for dissolved $CaCO_3$ by deducting the equiv. alky. of a similar aliquot titrated to the methyl orange end point with 0.01 *N* HCl. Mg is detd. in the filtrate from the CaC_2O_4 by pptg. as the oxine compd. (8-hydroxyquinoline) which is dried at 100–105° and weighed. K and Na are detd. in a second ext. made by a similar procedure except that $BaCl_2$ is substituted for NaCl as the displacing salt, and 200 ml. of the ext. is used for the detns. Ba is first pptd. by adding $(NH_4)_2CO_3$ and NH_4OH and the filtrate evapd. and ignited. The residue of salts is taken up in exactly 15 ml. water; one half of this soln. is used for pptg. Na as $NaMg(UO_2)_3(OAc)_9.6H_2O$, which is dried at 110–120° and weighed, and in the other half of the soln. K is pptd. as $K_2NaCo(NO_2)_6$ and titrated by Kramer and Tisdall's method. All the procedures are described in detail. C. J. Schollenberger

Potentialities of minor elements in the soil of canning crops. J. L. Newman. *Canning Age* **20**, 437–40, 456, 460 (1939).—The role of B, Mn, Cu, Fe, Zn and S in crop nutrition is reviewed. No new data. C. R. Fellers

The arsenic content of vineyard soils and the uptake of arsenic from arsenifercus soils by vines. R. Herrmann and H. Kretzdorn. *Bodenkunde u. Pflanzenernähr.* **13**, 169–76 (1939).—For the detn. of As in soil, 5 g. was digested in a 500-ml. Kjeldahl flask of As-free glass with

5 ml. concd. H_2SO_4 and 10 ml. 30% H_2O_2 for about 15 min. The mixt. was then washed into a 200-ml. flask and made to vol. An aliquot of the clear soln. contg. 5γ or less of As, usually 20 ml., was transferred to a 100-ml. Kjeldahl flask for the As detn. by Lockemann's method (*Z. Untersuch. Lebensm.* **72**, 224(1936)), which is described in detail. Although most of the soils tested showed only 1–2 p. p. m. As, exceptionally as much as 64 p. p. m. was found; in no case did the juice and skins of the grapes show a determinable As content, although up to 2.3 p. p. m. As was found in leaves. C. J. Schollenberger

Alteration in physical properties of soil from sewage irrigation. W. Hensel., *Bodenkunde u. Pflanzenernähr.* **13**, 257–304(1939).—Comparisons of soil taken with a cylindrical cutter designed to secure samples with min. disturbance of soil structure from fields receiving Berlin sewage since 1870 (I) and similar adjacent soils never treated with sewage (II) indicated no very distinct effect upon particle size; the fraction less than 0.1 mm. was generally higher in I, but indications for material less than 0.01 mm. varied. Loss on ignition was about 60% higher with I. Fine-pore space was relatively increased in all cases; one soil was definitely injured thereby, but a lighter soil was improved and corresponding changes in permeability to air were noted. Sewage-irrigated soils are wetter in spring and fall and the distribution of moisture in them tends to be less even than in other fields. Samples from I were invariably more easily wetted, an improvement, and show 3–5 fold higher heat of wetting. Samples from II had a single grain structure and sewage treatment rather decreased the tendency to crumb formation. Conclusion: The phys. effects of sewage irrigation are generally unfavorable, but on a light soil this is likely to be concealed by the fertility supplied, so that yields are increased. Forty-eight references. C. J. Schollenberger

A procedure for the serial comparison of physical soil properties of cylindrical samples taken under natural conditions. Wilhelm Schoel. *Bodenkunde u. Pflanzenernähr.* **13**, 305–25(1939).—Certain abnormalities in the growth of crops are assocd. with differences in the phys. properties of soils, demonstrable in a comparative way even when no abs. values can easily be obtained. Rapid procedures for comparing soil profiles sampled by the method of Hey (*Bodenkundl. Forsch.* **6**, 54–64(1938)), for sp. gr., percentage of dispersable, max., min. and capillary H_2O capacity, evapn. loss, rise and permeability to water, etc., are described. Forty references. C. J. Schollenberger

The influence of microörganic activity upon the dynamic behavior of the easily soluble phosphorus, potassium and nitrogen compounds of the soil. D. Feher, M. Frank and G. A. Manninger, Jr. *Bodenkunde u. Pflanzenernähr.* **13**, 341–52(1939); cf. *C. A.* **31**, 8781⁸.—Expts. with 2 soils, incubated at 25° and 25–90% satn. of H_2O capacity for periods of up to 12 months, indicate a connection between available P_2O_5, K_2O and N as detd. by the *Aspergillus* and chem. methods and bacterial and mold nos. developed. At 50–75% satn., bacterial nos. are at max., but molds increase at lower and decrease at higher H_2O contents. Available P_2O_5 and K_2O are highest at medium, nitrate at low medium and ammonia at higher moisture values. Bacterial nos. were more closely related to available P_2O_5 than to K_2O with one soil; with the other the relation was about the same. The data show that with the same soil, indications for available fertility may vary widely with exptl. conditions as these affect biol. growth. Seventeen references. C. J. Schollenberger

Soil microörganisms in North China and Inner Mongolia. I. Distribution of Azotobacter. Kinsi Suminoe and Minbu Tanaka. *J. Sci. Soil Manure, Japan* **13**, 461–2 (1939).—Of 11 soils examd., 8 contained *A. chroöcoccum* and 3 *A. beijerinckii* as well as *A. chroöcoccum*. *A. chroococcum* has more than 3 varieties and *A. beijerinckii* 2 varieties. Y. Kamoshita

Effects of certain minerals on the growth of root-nodule bacteria. I. Kametaro Konisi, Tosihisa Tuge and Akio Kawamura. *J. Agr. Chem. Soc. Japan* **15**, 139–46 (1939).—The quantities of mineral constituents in the bacterial body were estd. by means of the spectrographic method. When the bacteria in the root nodule of soybeans and lupine were cultured on the medium contg. yeast ext. and mannitol, the contents of P and Mg were higher but the content of Na was lower than those in the other microorganisms. Phosphoric acid was usually effective in stimulating the growth of the bacteria, while a large amt. of Ca was unfavorable for the development of the bacteria of soybeans and lupine. The antagonism between Ca and P was recognized as affecting the growth of bacteria. II. *Ibid.* 213–24.—Most of the minor elements in the root nodule had no effect on the growth of nodule bacteria. However, a small amt. of Mn and Cr stimulated the alfalfa bacteria on nitrate medium and a small amt. of Li the lupine bacteria on yeast water media. They also had a good effect on the respiration of nodule bacteria. The aq. ext. of some plants accelerated the growth of some nodule bacteria. The ext. of *Brassica juncea* was more effective than yeast water for alfalfa. The effect of the N content of the ext. of plants was negligible. In *Brassica juncea* the ash in the ext. was also effective. The increase of Na and Ca in the media was desirable. In *Bull. Agr. Chem. Soc. Japan* **15**, 18, 87–8(1939) (in English). Y. Kihara

Boron determination in soils and plants using the quinalizarin reaction. K. C. Berger and E. Truog. *Ind. Eng. Chem., Anal. Ed.* **11**, 540–5(1939).—Available B in soils is detd. by refluxing a 20-g. sample for 5 min., cooling, filtering under suction and evapg. 20 cc. of the clear ext. to dryness with 5 drops of K_2CO_3 soln. or 2 cc. of a satd. $Ca(OH)_2$ soln. The residue is ignited gently and then triturated in 5 cc. of approx. 0.36 *N* H_2SO_4. A 1-cc. aliquot is placed in a comparison vial and 9 cc. of 98.5% H_2SO_4 is added. After cooling, 0.5 cc. of quinalizarin reagent is added to the soln. This is allowed to stand for at least 15 min. and the B is then detd. by comparing with a set of standards. In the detn. of total B, a Na_2CO_3 fusion is made and the resulting melt is dissolved in H_2O and H_2SO_4 added to make the final pH of the soln. 5.5 to 6.0. The bulk of the sulfate is thrown out of soln. by the addn. of alc. The filtered soln. is made alk., evapd. to dryness and the residue ignited. After dissolving in dil. acid, the quinalizarin test is applied. In the detn. of the total B of plants, the plant tissue is ignited to a gray ash which is taken up with dil. acid. The quinalizarin test is then applied to some of the clarified soln. By means of this color reaction it is possible with proper control of the acidity to detect 0.0001 mg. of B. J. R. Adams

The importance of adsorbed magnesium with respect to the observed salinity of the soil. P. M. Breshkovskiĭ *Uchenye Zapiski Kazan Gosudartst. Univ.* **97**, No. 1, 151–76(1937); *Chem. Zentr.* **1938**, I, 972.—Irrigation expts. were carried out to det. the effects of Ca, Mg and Na salts on the structure of the soil. In cases of complete satn. of the soil with a single cation the relative values for Mg and Na, resp., compared with Ca ion = 100, were: dispersion 132, 1358; rate of swelling 226, 5384; reduction in velocity of filtration 223, 6778. Satn. of the soil with more than 1 cation caused fluctuations in values which were dependent on the structure and compn. of the soil, the amt. of org. matter present and the manner in which satn. occurred. With respect to the effect of these cations on the hygroscopicity of the soil, the series Mg > Na > Ca corresponds with the values for the effective radii of these ions. With regard to their influence on the max. hygroscopicity detd. according to Mitscherlich, the series becomes Na > Mg > Ca and corresponds with the hydration values of these ions and their mobility on the surface of the adsorbent. John O. Hardesty

Experiments on the action of calcium and magnesium compounds upon soil and plant. S. Gericke and E. P. v. Polheim. *Bodenkunde u. Pflanzenernähr.* **13**, 232–42 (1939).—Pot expts. with an acid loam, pH_{H_2O} 5.7, pH_{KCl} 5.0, completely fertilized and with sulfates or carbonates of Ca and Mg in addn., indicated that with uncropped soil the sulfates had no significant effect upon pH. Cropped to barley the sulfates proved physiologically acid and tended to reduce the assimilation of P_2O_5 and the proportion of grain in the crop. In general, German soils are amply

supplied with sulfates, and a special fertilization to furnish them is seldom desirable. When Mg is deficient, $MgCO_3$ is a better source than $MgSO_4$. Fifteen references. C. J. Schollenberger

The effect of raw phosphate upon the growth of trees on acid forest soils. W. Jessen. *Bodenkunde u. Pflanzenernähr.* **13**, 249–56(1939).—Expts. with larch seedlings in Neubauer dishes filled with 2 sandy soils at about pH_{KCl} 4 (cf. *C. A.* **33**, 5573[7]) indicated that without liming raw Algerian phosphate was practically as effective as superphosphate or basic slag When limed to pH 5, superphosphate was the best source of P_2O_5 and the raw phosphate almost inactive, especially on the soil contg. most silt. Both soils decreased considerably in exchange acidity and increased slightly in pH during the expt.; except with basic slag this unexplained effect was practically the same with or without a P_2O_5 fertilizer. Seventeen references. C. J. Schollenberger

The relative fertility of certain tomato-producing soils for the canning industry. Jackson B. Hester and F. A. Shelton. *Am. Fertilizer* **90**, No. 10, 5–6, 24, 26(1939); cf. *C. A.* **33**, 1431[5].—Tabulated data are given which show the percentage distribution of the pH value, the org. matter content, and the easily sol. Ca, Mg, P and K, as extd. with dil. $NaC_2H_3O_2$ soln., in tomato-producing soils in 18 states. W. H. Ross

The avoidance of high losses in growing stocks of fir, pine and beech. K. Weinkauff. *Forstwiss. Centr.* **61**, 515–17(1939).—A short discussion of the importance of the phys. and chem. condition of the soil. C. K. H.

The germination of freshly harvested and of stored seeds of sea pea [Lathyrus maritimus Big.]. E. R. Dinnis and S. Jordan. *J. Southeastern Agr. Coll., Wye, Kent* No **44**, 140–2(1939); cf. *C. A.* **32**, 9373[8].—Treatment of fresh seed with concd. H_2SO_4 for not more than 15 min. induced max. germination with min. damage; longer treatments (0.5–1.0 hr.) caused a proportionate increase in damage to the seed. Recently harvested seed, when acid treated, had a slower rate of germination than did seed which had been acid treated after storage for some months. Seed that had been stored for 8 months and then treated with acid showed no deterioration in germination capacity during an addnl. 8-month storage period. K. D. Jacob

Green manuring experiments. IV. F. Perkner, E. Wiese and B. Nowrzella. *Bodenkunde u. Pflanzenernahr.* **13**, 370–84(1939); cf. *C. A.* **33**, 2271[5].—Under present economic conditions in Germany, growing any crop only to be plowed under for green manure is not to be encouraged. A nonbitter variety of lupine is now available, which is relished by stock and equal to the old varieties in all other respects; when fed and the manure returned to the soil, its net value is greater than if plowed under. Crimson clover is even more valuable, as it is a good hay crop and the roots remaining in the soil contribute about 4 times as much org. matter and N as do lupine roots and stubble. Potatoes do especially well after crimson clover. C. J. Schollenberger

Pot experiments for evaluating the phosphoric acid in ammoniated superphosphate and Nitrophoska. W. Lehmann. *Bodenkunde u. Pflanzenernähr.* **13**, 225–31(1939).—In limed pots of slightly acid loam and a similar neutral soil mixed with sand, the P_2O_5 of ammoniated superphosphate (Kalkammonphosphat) with 19.2% N and 19.8% P_2O_5 was about as well utilized by oats as that of ordinary superphosphate, basic slag and the concd. complete fertilizer Nitrophoska. C. J. Schollenberger

Determination of available phosphoric acid in fertilizers. G. S. Blyakher. *Zavodskaya Lab.* **8**, 409–13(1939); cf. *C. A.* **33**, 8888[2].—A review of the literature is followed by a description of B.'s expts. with $(NH_4)_2C_2O_4$ and H_2SO_4 to det. their use as substitutes for tartaric acid in the detn. of the available phosphates and fertilizers. Under certain conditions, $(NH_4)_2C_2O_4$ and 0.1 *N* H_2SO_4 may be used as solvents for available phosphate in apatite concentrates and superphosphates. H_2SO_4 is preferred because it is less expensive and it is advantageous for the rapid detn. of the phosphate. Thirteen references. B. Z. Kamich

Studies on the fertilizing value of Mayon Volcano ash. I. Effects upon plants of liberal applications of the volcanic ash. Rafael B. Espino. *Philippine Agr.* **28**, 133–42(1939).—Mayon Volcano ash applied to Lipa clay loam (cf. *C. A.* **33**, 7020[2,4]) in relatively large amts. (0.8, 1.6, 3.2, 4.8 and 15.6 kg. of ash per 14 kg. of soil) was harmful to young corn, radish and rice plants. It is suggested that the harmful effects were due (1) to changes in the phys. character of the soil brought about by the very fine particles of the ash and the large amts. of Al, Na and K that it contained, (2) to physiol. unbalance of the soil soln., (3) to rendering the soil P insol. by reaction with the Al_2O_3, Fe_2O_3 and CaO of the ash and (4) to Al toxicity. The first 2 effects are the most probable causes. Colin W. Whittaker

A trial of organic fertilizers. N. L. Tinley and D. M. Bryant. *J. Southeastern Agr. Coll., Wye, Kent* No. **44**, 134–9(1939).—In a 3-yr. expt. on successive crops of mangels, potatoes and wheat shoddy, hoof and horn meal, castor meal and dried poultry manure gave results inferior to farmyard manure when applied on an equiv. N basis, but when these materials were supplemented with inorg. fertilizers to contain equiv. P and K the results were similar to those obtained with farmyard manure. All the fertilizers, as well as the farmyard manure (8 tons/acre), were applied only in the 1st yr. of the expt. A complete mixt. of inorg. fertilizers, adjusted to provide equiv. N, P and K to the org. materials, but applied in 3 dressings each equiv. to $^1/_3$ of the org. fertilizer dressings, gave the highest yields in the 2nd and 3rd yrs. of the expt. although it proved inadequate for the mangel crop in the 1st yr. K. D. Jacob

Control of the cochylis moth by the use of chemicals during the winter. O. Tanke and Roesler. *Nachrbl. deut. Pflanzenschutzdienst* **19**, No. 7, 58–61(1939).—Inconclusive results in the effectiveness were obtained on the addn. of nicotine, derris and pyrethrum to emulsions of coal-tar distillates and mineral oil as dormant sprays against the cochylis moth. V. L. Frampton

The control of leaf-cutting ants. K. Escherich. *Z. angew. Entomol.* **25**, 528–30(1938–9).—Review. C. H. R.

The control of hop red spider: some recent experiences. S. G. Jary. *J. Southeastern Agr. Coll., Wye, Kent* No. **44**, 37–8(1939).—The spider is effectively controlled by spraying the hop plants with 1–100 lime-S. With heavy infestations, 2 applications at intervals of 8–10 days are desirable. The spray must not be applied after the cones begin to form or they will be completely browned, otherwise the risk of damage is negligible. No appreciable injury results from the interaction of lime-S and Bordeaux mixt. when applied within a few days of each other. Application of a 5% tar-oil wash to the large cracks in hop poles gave effective *control of mites* hibernating therein. K. D. Jacob

Control of mites by means of adherent substances. P. Steiner *Z. angew. Entomol.* **26**, 180–3(1939).—A spray of 0.5% gelatin and 0.25% of a com. wetting agent gave excellent control of *Tetranychus telarius*. C. H. Richardson

The control of strawberry aphis [Capitophorus fragariae Theo.] and tarsonemid mite [Tarsonemus pallidus Banks]. R. M. Greenslade and A. M. Massee. *Ann. Rept., East Malling Research Sta., East Malling, Kent* **26**, 186–90(1938)(Pub. 1939).—In expts. with a no. of insecticidal materials, the best control of *C. fragariae* was obtained with a spray containing nicotine 8 oz. and soft soap 8 lb./100 gal. In lab. expts. complete kills of *T. pallidus*, without injury to the strawberry plants, were obtained only by dipping the leaves for 5 sec. in solns. of either lime-S 3% plus Lethalate 0.05%, NH_4 polysulfide 3% plus soap 1%, pyridine or nicotine 0.1% plus Lethalate 0.05% or lauryl thiocyanate 1% plus soap 1%. The sprays did not give satisfactory control of the insect under field conditions. K. D. Jacob

A new system of anthelmintic control for gastrointestinal parasites of ruminants. Donald W. Baker. *Cornell Vet.* **29**, 192–7(1939).—Excellent control of small tri-

chostrongyles in calves, sheep and goats was obtained by spraying 2–3 cc. of a 5% $CuSO_4$ soln. into the throat and immediately drenching the animal with a mixt. of equal parts of tetrachloroethylene and mineral oil at the rate of 0.2 cc. per lb. live wt. K. D. Jacob

Further trial of the preparation Naaki for grain weevil control in 1938. Arnold Claus. *Z. angew. Entomol.* **26**, 165–70(1939).—Results of tests with a proprietary insecticide are given. C. H. Richardson

Injury to broad leaf and coniferous trees by Novosil and related dusting materials, and their action on nun moth and Nematus larvae. Hellmuth Gabler. *Z. angew. Entomol.* **25**, 609–27(1938–9).—Results of expts. with a no. of new proprietary dusts contg. cresol derivs. are described. All but 2 of these dusts burned the foliage of the plants tested and all of them appeared to be about equally effective against larvae of the insects tested. C. H. R.

Skin spot (Oospora pustilans Owan and Wakef.) of the potato, and its control by tuber disinfection. T. N. Greeves and A. E. Muskett. *Ann. Applied Biol.* **26**, 481–96(1939). Instantaneous dipping with a com. organo-Hg compd. was the most satisfactory control measure, but steeping 90 min. in 0.1% $HgCl_2$ soln. gave promising results. HCHO was inefficient. A com. dust fungicide was ineffective under exptl. conditions. C. H. Richardson

Apple canker. II. Experiments on the incidence and control of shoot infections. R. W. Marsh. *Ann. Applied Biol.* **26**, 458–69(1939).—Apple shoots sprayed with a Bordeaux-casein-petroleum oil mixt. showed a much lower percentage infection by *Nectria galligena* than unsprayed shoots. As a wound-treating material to protect against entrance of *Nectria* spores, a mixt. of $CuSO_4$.-H_2O, $Ca(OH)_2$ and linseed oil was most promising. C. H. Richardson

Internal black spot of canning beets and its control. J. C. Walker, James P. Jolivette and John G. McLean. *Canning Age* **19**, 489–91, 508(1938).—This defect is caused by a lack of B in the soil and can be corrected by adding 20–60 lb. of borax per acre. The addn. of borax directly in the seed row may injure germination and the young seedlings. C. R. Fellers

Recent investigations on the cause of reclamation disease and the action of copper as a trace element. W. Hoffmann. *Bodenkunde u. Pflanzenernahr.* **13**, 139–55(1939); cf. Arnd and H., *C. A.* **32**, 3881⁹.—From expts. with oats grown in solns., purified glass sand with added humus and HCl- and heat-treated sandy heath soil on which crops are affected by reclamation disease, it is concluded that lack of available Cu is the cause of the characteristic symptoms. Sufficient Cu was absorbed from a soln. painted upon the leaves of the young plants to produce a normal crop without any treatment of the soil. Some soils show insufficient available Cu for a healthy crop under certain conditions, but after being dried out or moderately heated (110–130°) the soil Cu becomes more available; the drying also causes a decrease in pH of the soil in many cases. Cu is not to be considered merely as a plant stimulant or remedy for abnormal conditions, but as an essential plant nutrient although only a trace is required and an excess is very toxic. Fourteen references. C. J. Schollenberger

Experiments on combating the heather moor disease with copper slag. W. Nicolaisen, W. Seelbach and B. Leitzke. *Bodenkunde u. Pflanzenernahr.* **13**, 156–69(1939).—Pot and field expts. with oats on a humus sandy heath soil, pH_{H_2O} 4.2, on which the crop is affected by the so-called heather moor disease (cf. preceding abstr.), indicated that 91 lb. $CuSO_4.5H_2O$/acre applied to the soil is an effective remedy, but 273–819 lb. of a copper refinery slag, essentially $FeSiO_3$ with small percentages of CaO, MgO, Al_2O_3, MnO, ZnO, PbO, CuO (0.5%), S and traces of Ni and Co, is equal in effect. The slag is now a waste product which has found no use except as ballast, but the first-year expts. indicate that when ground to meal it is capable of increasing the productivity of large areas of Cu-deficient soils in northern Germany. C. J. S.

Responses of the blowflies, Cochliomyia americana C. and P. and Phormia regina Meigen, to stimulations of the tarsal chemoreceptors. C. C. Deonier. *Ann. Entomol. Soc. Am.* **32**, 526–32(1939).—Gustatory chemoreceptors are present on the tarsi and proboscis of *Cochliomyia* by which nonvolatile substances such as sugars and salts can be detected. $HgCl_2$ was more repellent to *Cochliomyia* in 0.5 *M* sucrose soln. than in 1.0 *M* sucrose; this compd. was less repellent to *Phormia* which were 48 hrs. old than those 24 hrs. old. The presence of $HgCl_2$ in concns. as low as 0.25% caused a slight lowering of the feeding response. No marked differences in response of the sexes were observed. With sucrose soln. contg. 2% $HgCl_2$ as the only source of food and water, the flies died of starvation. C. H. Richardson

Applied microbiological investigation in cane-sugar manufacture. XV. Rhizosphere of cane. Masasi Adati. *J. Soc. Trop. Agr., Taihoku Imp. Univ.* **10**, 441–5(1938).—When the cane was cultivated on sand with $(NH_4)_2SO_4$, more nitrate than NH_4 salt was found in the roots and the surrounding soil. There was also a large amt. of nitrification bacteria. Y. Kihara

Insect pests of brassica seed crops in Romney Marsh. S. G. Jary and M. D. Austin. *J. Southeastern Agr. Coll., Wye, Kent* No. 44, 73–83(1939).—Pb arsenate (6.4% As_2O_5), derris (0.55% rotenone), pyrethrum (1% of pyrethrum ext. in equal parts of colloidal clay and ground North African phosphate rock) or colloidal SiO_2 dust do not give consistently satisfactory control of *Meligethes aeneus* F. on kale and swede plants under either field or insectary conditions. Ground North African phosphate rock alone had little effect on the beetles. K. D. J.

A note on the germination of St. John's wort seed. A. B. Cashmore. *J. Council Sci. Ind. Research* **12**, 181–2(1939).—St. John's wort seed requires an after-ripening period of some 4–5 months before becoming fully viable. Dipping seed-carrying sheep in standard arsenical dips has no effect on the viability of the seed carried. There is no indication that spraying ripe seed heads with As or chlorate sprays in the field will have any adverse effect on the viability of the seed contained in them. J. R. Adams

Penetration of hydrocyanic acid into packing material for nursery plants. Hermann Fischer. *Nachrbl. deut. Pflanzenschutzdienst* **19**, No. 3, 19–20(1939).—The mortality of the second instar of *Eulecanium pulchrum* King, March, was greater if the insects were exposed directly to HCN gas at a concn. of 10 g./cu. m., at 13° than if they were protected by straw bundles. *Ibid.* No. 4, 32–3.—HCN only slowly penetrated bundles of vegetable materials that were fumigated for insects. V. L. Frampton

The action of coal-tar distillate emulsions with particular regard to the temperature of application. Ferdinand Beran. *Nachrbl. deut. Pflanzenschutzdienst* **19**, No. 4, 1–7(1939).—The effectiveness of dormant sprays made up of emulsions of coal-tar distillates against meal worms and San José scale increases with the b. p. of the distillate and the temp. at which the spray is applied. Vernon L. Frampton

Spray-residue investigations. III. The influence of petroleum oil and of lime-sulfur on the retention of lead arsenate on apples. H. Shaw and W. Steer. *Ann. Repl., East Malling Research Sta., East Malling, Kent* **26**, 199–203(1938)(Pub. 1939); cf. *C. A.* **32**, 7124⁷.—Oil appeared to increase the arsenical residue except where it was used with lime-S sprays. Lime-S by itself had no effect. Fruit growth was checked wherever lime-S, with or without oil, was used. The apparent loss of residue, in terms of As_2O_3 per kg. of fruit, was accounted for by attenuation due to fruit growth and there was no evidence of actual loss by weathering. K. D. Jacob

Use of sulfur in agriculture. III. Effect of sulfur on the physical properties of soil. R. Cultrera and A. Curini-Galletti. *Ann. chim. applicata* **29**, 198–205(1939); cf. **32**, 9368⁹.—Addn. of S to soils rich in org. substances does not give any advantages as the acidity causes coagulation of colloidal matter and otherwise counteracts the effects of the humic substances. Coagulation of the

colloids also affects the permeability and capillarity of the soils. A. W. Contieri

The influence of insecticides and fungicides on bees. III. The action of pyrethrum on the honey bee. Friedrich K. Böttcher. *Z. angew. Entomol.* **25**, 419–41 (1938–9); cf. *C. A.* **33**, 2429.—Pyrethrum is a strong stomach poison for *Apis mellifera;* its action is considerably influenced by temp. At 20°, the min. lethal dose of total pyrethins is 0.03 0.27 γ; at 34.5° it is 0.27 3.3 γ. The corresponding values for other compds. are: As as As_2O_3 0.25 γ; $CuSO_4.5H_2O$ 10 γ; $FeSO_4.7H_2O$ 51 γ nicotine about 60 γ. Pyrethrum is also a contact poison for bees; and its action likewise varies with the temp. Pyrethrum sprays and dusts at total pyrethrin concns. up to 0.009% are not dangerous to honey bees. IV. **The action of derris on the honey bee.** *Ibid.* 681–702.—Derris has a stomach poison and contact action, but not a fumigating action on the honey bee. In both actions there is little effect of temp. As a stomach poison, rotenone gave a min. lethal dose of 0.5 γ to more than 11 γ; the median lethal dose is about 3 γ rotenone. As a contact poison, derris gave variable results; but suspensions contg. 0.02 to 0.1% rotenone killed 25 to 33% of the bees tested. The use of derris dusts contg. 1.75% rotenone and derris sprays contg. 0.04% rotenone do not endanger honey bees. C. H. Richardson

A new contact insecticide for forest pests. Christoph Hofmann. *Z. angew. Entomol.* **25**, 38; 97 (1938 9).—Two proprietary materials, nos. 2152 and 2172 of the I. G. Farbenind. A.-G., were tested on various insects in comparison with dinitro-*o*-cresol. Their insecticidal efficiencies were greater and they were less injurious to plants. C. H. Richardson

Modern methods of seed disinfection. W. A. R. Dillon Weston. *Ann. Applied Biol* **26**, 636–40 (1939).—Review C. H. Richardson

Borax [use on B deficient soils] (Kitchen) **18**. Genesis of montmorillonite and kaolinite and conditions of their joint occurrence in the colloids of soils and clays (Sedletskii) **8**.

Schmitt, Ludwig: Arbeiten des Reichsnährstandes Bd. XXI. Die Kalkdüngung. Berlin: Reichsnährstand Verlags-G. m. b. H. 96 pp. M. 1.65.

Compositions for accelerating plant growth. The Dow Chemical Co. Brit. 506,910, June 1, 1939. These consist of an auxin and a colloidal earth, e. g., bentonite, fuller's earth, auxin and a paraffin emulsion or an emulsion of a wax mixed with a colloidal earth. The mixt. may also include an NH_4 salt of an unsatd. fatty acid having 2 or more double bonds.

Insecticidal sprays containing light mineral oils. Wm. B. Parker (to Calif. Spray-Chemical Corp.). U. S. 2,171,598, Sept. 5. For decreasing the tendency for a light oil spray to be absorbed by plant leaves, there is added to the oil about 1–5% of an oil-sol. Al soap such as Al stearate or the like. Cf. *C. A.* **33**, 3059.

Insecticidal and fungicidal sulfur compounds of glycerides. Frederick E. Dearborn (to the Public for free use). U. S. 2,169,793, Aug. 15. S is introduced into the double bonds of a glyceride of a long-chain unsatd. fatty acid such as triolein or trilinolein by heating the glyceride with S at 135–220° in the presence of I as a catalyst.

Coating particles such as those of insecticides and fungicides with an adhesive such as an oil mixture. Alexander G. Galloway (to the people of the U. S. A. for free use). U. S. 2,172,001, Sept. 5. Particles to be coated while entrained in an air stream are brought into contact with an intersecting air stream carrying the adhesive in finely divided form. App. is described.

Parasiticides suitable for use on plants, etc. James F. Adams and Alexander A. Nikitin (to trustees for the Crop Protection Institute). U. S. 2,172,314, Sept. 5. A Cu fungicidal compd. such as $CuSO_4$ is used with Na zeolite or other alkali or alk. earth metal zeolite, which prevents caking of dusting compns. or creaming or breaking of oleaginous compns. contg. the specified ingredients together with an oil.

16 THE FERMENTATION INDUSTRIES

Production of alcohol from potatoes by the amyloprocess. II. Sinzi Doi. *J. Agr. Chem. Soc. Japan* **15**, 661–8 (1939); cf. *C. A.* **33**, 9531.—The saccharification of dried potato by *Rhizopus javanicus* was most suitable when the potato was heated with city water contg. HCl under pressure of 40 lb. for 60 min. *Rhizopus javanicus* was most preferable for the saccharification. It was recommended that the yeast should be added 2 days after the inoculation of *Rhizopus*. When 3% of rice bran was added to the dried potato, the alc. fermentation was more favorable. Y. Kihara

Production of alcohol by dextrin-fermentable yeast Sinzi Doi. *J. Agr. Chem. Soc. Japan* **15**, 639–44 (1939).—The hydrolysis of the dried potato into achrodextrin was most preferable when it was boiled with 6 times of 0.43% HCl under pressure of 50 lb. for 30 min. The yield of dextrin was 37.5%. The dextrin soln. was neutralized with $CaCO_3$ and was fermented by *Schizosaccharomyces pombe* var. iotocusis II nov. var., *Saccharomyces logos* or *Schizosaccharomyces pombe*. The fermentation ratio was 77.0–80.2%. The fermentation by *Saccharomyces logos* was most suitable. Y. Kihara

Waste problems in the fermentation industry. C. S. Boruff. *Ind. Eng. Chem.* **31**, 1335–7 (1939).—Brewery wastes are disposed of by digestion and secondary aerobic stabilization; yeast wastes by digestion and trickling filters; still wastes from alc. fermentation of molasses by evapn. and incineration; still slop from acetone-butanol fermentation of molasses by anaerobic digestion followed by aerobic stabilization; distillers' slop from bourbon mashes by screening, centrifuging and multiple-effect evapn. at a profit; rye slops similarly with difficulty. Various minor amts. of solids recovered are sold for contents of vitamins. Foster Dee Snell

Decomposition and gas production of cornstalks under anaerobic conditions at 28° to 30°. G. H. Nelson, Robert P. Straka and Max Levine. *Iowa State Coll. J. Sci.* **13**, 161–80 (1939).—Chopped cornstalks and cornstalk flour were: (1) subjected to an active methane-producing seed and (2) sealed in tap water without inoculation. Sometimes daily but usually at the end of 3, of 5, of 10, of 20 and of 30 days analyses were made for: total solids, vol tile solids pentosans, cellulose and lignin. The data are reported in 11 tables and 7 series of graphs. The flour fermented 43% more rapidly (gas production). The gas was 34 5% CO_2 and 55–9% methane. At the 3-, 20- and 30-day periods for the flour, loss of cellulose and pentosans accounted for 95% of the gas: for the chopped stalks only 75%. For the 5- and 10-day periods more cellulose and pentosans were decompd. than could be accounted for by the gas produced. The loss of cellulose and pentosan was greater in the flour and the loss of lignin greater in the chopped stalks. Incubation of corn stalks gives little promise of usefulness in pulp prepn. but fermentation with an active seed does give some promise. F. E. Brown

Improved methods and equipment in the wine industry. V. deF. Henriques and M. W. Turbovsky *Canning Age* **16**, 181–4 (1937).—The modern Calif. wine industry is described. C. R. Fellers

Determination of germinating capacity of brewing barley by means of sodium acid selenite. H. Kipphan.

Allgem. Brauer- u. Hopfen-Ztg. **78**, 995(1938).—The regular (Aubry), dinitrobenzene (Enders, *C. A.* **33**, 9535[4]) and selenite (Eidmann, *C. A.* **32**, 5029[9]) methods for detn. of germinating capacity of barley are compared. Preference is given to the selenite procedure which was found to give results that are in good agreement with the regular method. A modification of the selenite procedure is described. S. Laufer

Varietal differences in barleys and malts. VII. Starch-liquefying activity, autolytic diastatic activity and their correlations with saccharifying and proteolytic activity. Henry R. Sallans and J. Ansel Anderson *Can. J. Research* **17**, C, 361-72(1939); cf. *C. A.* **33**, 8909[1].—Detns. made on 144 samples of malt, representing 12 varieties grown at 12 exptl. stations in Canada, show that varietal differences exist with respect to starch-liquefying activity (max. 768, min. 275 units) and autolytic diastatic activity (max. 958, min. 664 units). Varieties of poor malting quality tend to be low with respect to both properties. The effect of environment is also considerable (liquefying, max. 510, min. 288; autolytic, max. 806, min. 704). The correlation coeffs. (r) among liquefying, autolytic diastatic, saccharifying, and proteolytic activities of malt and total barley-saccharifying activity were studied. Significant intervarietal assocns. exist between each pair of properties, but partial correlation studies suggest that only those between saccharifying activities of barley and malt (r = 0.90), and between liquefying and autolytic activities of malt (r = 0.97) represent real and close relations. The other assocns. between pairs of enzymic activities seem to reflect mainly pos. correlations between each activity and total salt-sol. N in the barleys. Significant intravarietal assocns. also exist between each pair of enzymic activities, and between each activity and total barley N. It appears that environmental factors which tend to increase total N also tend to increase each enzymic activity, but these do not increase regularly with respect to each other and are not closely related. Partial correlations independent of total N suggest that only barley and malt-saccharifying activities (r = 0.67) and liquefying and autolytic activities of malt (r = 0.63) are related within varieties. The rate of autolysis in samples of different varieties from the same station appear to be controlled almost entirely by starch-liquefying activity, but the latter property is not the limiting factor controlling autolysis in samples of the same variety from different stations. Within varieties some other factor, presumably starch resistance, must play an important part. J. W. Shipley

Composition of 1939 malts from viewpoint of brewhouse procedure. Stephen Laufer and Robert Schwarz. *Am. Brewer* **72**, No. 6, 39-45, 52, 56, 62(1939).—A no. of 1939 malt samples received from 3 leading malthouses were subjected to regular analysis including diastatic and proteolytic power. In addn., the sol., permanently sol. and formol N were detd. on the cold-water exts. and lab. worts. On the basis of these analyses and also on that of exptl. brews which were made it was concluded that the 1939 malts are not entirely satisfactory with regard to protein modification. A proper protein rest procedure is recommended. S. Laufer

Determination of germinative, diastatic and proteolytic powers as factors for evaluation of malt. L. Heintz. *Schweiz.-Brau. Rundschau* **50**, 95-109(1939).—Opinions as to allowable limits for germinative power of malt differ widely (6–30%). Expts. conducted with malt samples of high (37.4%) and low (5.6%) germinative power indicated that a kilning temp. of 80° yields no germination, whereas temps. not exceeding 50° give malts with high germinating power. Diastatic power is reduced by temps. of 60–70°, while proteolysis as measured by formol titration needs a temp. of 80° for reduction. Values found for proteolysis showed no relationship to malt modification. S. Laufer

Froedtert experimental malting unit. T. L. Haberkorn. *Am. Brewer* **72**, No. 5, 32, 60(1939).—The unit was designed for the study of malting conditions and methods. It consists of 6 cabinets in which the barley samples are steeped, germinated and kilned. Conditioned air of [illegible] automatically corded. S. Laufer

Extraction of malt husk. L. Heintz. *Schweiz.-Brau. Rundschau* **49**, 111-13(1938).—Extn. of ground malt husks with alc. yielded 9.063%. The ext. was similar in properties to that obtained from hops and barley husks. Tannins were absent. S. Laufer

Errors in hop analysis. C. Enders, G. Nowak and F. Becker. *Z. ges. Brauw.* **61**, 21-2(1938).—Heating of the mill in the course of grinding of the hop sample caused changes in the nature of hop constituents. It is recommended that the 50 g. of hops required for analysis be ground in two 25-g. portions and mixed subsequently, at least 3 min. being allowed for the mill to cool between grindings. For testing excess of Pb acetate employed for pptn. of humulone a soln. of dithizone is suggested in place of K_2S. The great errors resulting from the use of an insufficient amt. of Pb acetate are pointed out. In distn. of volatile solvents rubber stoppers may also be the source of error; all-glass app. is recommended. S. Laufer

Which of the hop constituents is responsible for wort turbidity? L. Heintz. *Schweiz.-Brau. Rundschau* **49**, 47-55(1938).—In line with his earlier work on the constituents of barley husk (*C. A.* **28**, 3831[9]) H. carried out similar investigations on hops. A substance sol. in alc. was obtained, which is claimed to be responsible for the turbidity of wort. The substance is free from tannin. When dried for 4 hrs. at 105° it was found to contain 3.25% N and 4.03% mineral matter. S. Laufer

Cooling turbidity and cold turbidity [of wort]. L. Heintz. *Schweiz.-Brau. Rundschau* **49**, 61-4(1938).—The "cooling turbidity" represents the fine ppt. sepg. at about 55°, while the "cold turbidity" is formed at relatively low temps. Investigations carried out on the ppt. produced in the cold showed it to be free from tannin and to contain Fe, SiO_2 and protein matter. S. Laufer

Production of turbid worts under practical brewery conditions. G. W. A. Brischke. *Z. ges. Brauw.* **61**, 37-40(1938).—The effect of the various wort turbidities (hot, cold, coarse and fine) on yield and quality of the resulting beer is discussed. S. Laufer

Practical research in the brewery. Utilization of by-products. Geo. B. Sippel. *Am. Brewer* **72**, No. 7, 33-6(1939).—A brief discussion is presented of some of the problems confronting the brewing industry. Among the topics touched upon are: prepn. of adjuncts from corn and rice with a readily convertible starch, evaluation of American hops, the question of continuous processing, oxidation, pasteurization, shipping problems and utilization of by-products. S. Laufer

Alterations in the steam and power equipment of a brewery. Fritz Schiffner. *Arch. Warmewirt.* **20**, 131-4(1939).—The power and steam cycle is rather fully described. The alteration was mainly in the use of higher steam pressures. Ernest W. Thiele

New method for sterilization of (brewery) water. M. Hamburg. *Brau- u. Malzind.* **38**, 87-9(1938).—Brewery water was effectively sterilized by passing the water over a material contg. a compd. of the formula $2Ag.MnO_2$ (active O enhancing the oligodynamic action of Ag). Brewery organisms, such as mold spores, yeasts and bacteria, were added to water in large quantities. After passage through this material the water showed practically no growth when plated. A heavily infected filter pulp was rendered sterile when kept for 30 min. in water treated in such manner. It is not recommended to use this method for washing yeast. S. Laufer

Effect of mineral constituents of water [on beer]. M. W. Brenner and S. Laufer. *Am. Brewer* **72**, No. 5, 21-2, 71(1939).—A discussion of the most important mineral constituents of brewing water and their effect on properties of the resulting beer. The importance of correcting not only the mash-in water, but also the sparge water, is stressed. S. Laufer

Microchemical methods for the examination of beer.

Fh. Ghimicescu. *Mikrochemie* **27**, 197–210(1939).—A comprehensive review of recent microchem. work. W. T. H.

Foam stability of beer. Robert Schwarz and Stephen Laufer. *Am. Brewer* **70**, No. 12, 30–4(1937).—Factors affecting foam stability of beers are discussed; good barley quality, slow germination at low temps., restricted protein rest, use of fresh hops of good quality, short kettle boiling, cautious chillproofing and filtration, and proper carbonation influence favorably the head of foam on beer. The methods of Helm (*C. A.* **28**, 3175[3]; **30**, 3582[8]) and of Blom (*C. A.* **29**, 882[2]; **30**, 5720[7], 6505[3]; **31**, 5506[8]) wer modified (see following abstr.); the former was applied for detg. the foam stability of carbonated bottled and canned beer, while the latter served for measuring the foam capacity of uncarbonated beer at any stage of the brewing process. Expts. indicated that prolonged protein rest, sharp filtration, improper chillproofing and improper chillproofing materials, and low foam capacity affect the head of foam. Of various materials tested dextrin increased but slightly the foam capacity, gum arabic had a better and albumin the best effect, while peptones gave no improvement. S. Laufer

Determination of foam stability and capacity of beer. Stephen Laufer and Henry Ziliotto. *Am. Brewer* **72**, No. 8, 25–6; No. 9, 33–5(1939). Modifications of the methods by Helm and Blom are described (see preceding abstr.). For detg. foam stability, the attemperated beer is poured through a funnel into a jacketed foam cylinder (20°), and after 2 and 10 minutes the liquefied beer is withdrawn and weighed. The foam remaining in the cylinder is also ascertained by weighing. Wt. of foam after 2 minutes, in per cent of beer wt., represents foam formation, and wt. of foam after 10 minutes in per cent of beer wt., indicates foam retention. For measuring foam capacity 200 cc. of the decarbonated beer is placed in the jacketed cylinder (20°). The beer is converted into foam by means of CO_2 passing under definite pressure through a standardized filter candle. About 100 cc. of beer is withdrawn leaving only foam in the cylinder. After 5 and 10 minutes the liquefied beer is withdrawn and weighed; the remaining foam is also ascertained by weighing. The ratio of foam wt. after 5 and 10 min., resp., to the wt. of beer used is a measure of the foam capacity of beer. S. Laufer

Preliminary expts. on the use of root-initiating substances in hop propagation (Bailey) **11D**.

Recovering volatile substances from fermentation waste gases. Max Seidel. Brit. 505,940, May 19, 1939. In the culture of yeast and other microörganisms with the employment of aeration, the fermentation gases are washed in a scrubber or column app. to recover escaping products, e. g., EtOH, AcOH, by means of unfermented mash or wort in countercurrent flow to the gases, the enriched mash or wort being later used in yeast or microörganism culture or for fermentation purposes. Cf. *C. A.* **33**, 2649[2].

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

The search for more effective morphine-like alkaloids. Nathan B. Eddy. *Am. J. Med. Sci.* **197**, 464–79(1939).—New morphine-like alkaloids are discussed in this search for a nonaddicting analgesic. No methods of synthesis or chem. characteristics are given. Ruth E. Black

Revision of miscellaneous monographs of National Formulary VI. Anon. *Bull. Natl. Formulary Comm.* **7**, 352–415(1939). One hundred and sixty-five items are covered, of which 5 are deletions, 25 addns. and 137 have been revised. H. M. Burlage

Cosmetic manual. Cold creams. Joseph Kalish. *Drug Cosmetic Ind.* **45**, 430–2, 435(1939); cf. *C. A.* **33**, 8911[6].—These products consist mainly of an oil, H_2O, bees wax and preferably an alkali yielding a water-in-oil emulsion. The following groups of formulas are offered: water-in-oil emulsions without borax (29 formulas), and creams with borax which are superior (80). H. M. B.

Determination of nicotine in cigarets by denicotinization and by neutralization of nicotine. Nikos G. Manthos. *Chim. Chronika* (Greece) **4**, 163–7(1939)(in Greek).—Résumé of work published embracing the amts. of nicotine involved in the smoking of a cigaret (certain European makes), methods of analysis and procedures followed by several European countries. Lucien Y. Dyrenforth

Oxalate formation in ascorbic acid solutions. A. E. Jurist and W. G. Christiansen. *Am. J. Pharm.* **111**, 347–50(1939).—The data presented show that oxalic acid is present in the solns. in amts. from 0.19 to 11.14 mg. per cc. These quantities do not appear to be related to the concn. of the solns. because solns. of almost identical ascorbic acid concns., e. g., of monoethanolamine ascorbate, show widely varying amts. of oxalic acid Further, the nature of the base used, inorg. or org., seems to have little bearing on the formation of oxalic acid, as it was found that all solns. examd. contained oxalates. Finally, since all solns. examd. were stored in sealed, well-filled glass ampoules there is little likelihood that the oxidation of ascorbic acid to oxalic acid could be due to the effect of air but is, in all probability, due to an autoxidation such as referred to by Ghosh (*C. A.* **32**, 5042[9]) and others. It is significant that the amt. of oxalic acid formed appears to be disproportionate to the amt. of ascorbic acid lost by the solns on aging. The exptl. data on which these conclusions are based and the method by which oxalic acid can be demonstrated in solns. of ascorbic acid and its salts are presented. W. G. Gaessler

The biological assay of Philippine fish-liver oils for vitamin A. I. The vitamin A potency of "sanga" (Mobula eregoodoo-tenke) liver oil. M. Gutiérrez. *Acta Med. Philippina* **1**, No. 1, 1–10(1939); *Rev. filipina med. farm.* **30**, 346.—The oil contained 2400 U. S. P. units of vitamin A per g., detd. by the rat-growth method. L. E. Gilson

A new rapid electrical method of extraction of alkaloidal substances. J. F. Leyva. *Acta Med. Philippina* **1**, No. 1, 13–18(1939), *Rev. filipina med. farm.* **30**, 346.—The principle involved in the new method of extn. and the expts. undertaken are described. The automatic electron gage with the extn. cell and accessory app. are illustrated and explained. L. E. Gilson

Carbon monoxide in tobacco smoke. J. G. de Voogd and A. van der Linden. *Het Gas* **59**, 165–6(1939).—The smoke of tobacco has 2.6–3.2% CO for cigarets, 6.0–6.2% for cigars, up to 7.0% for pipe tobacco. The amt. of CO produced by 1 cigaret is around 300 cc. and 1 cigar 750 cc. These quantities are compared with what is produced by gas appliances and considered evidence to support the contention that small amts. of CO in the atm. are harmless. B. J. C. van der Hoeven

Sulfanilamide drugs. M. Nurmia. *Suomen Kemistil ehti* **12A**, 122–3(1939).—A review. S. A. Karjala

Aqueous extracts of crude drugs. M. M. Meyers. *Pharm. Weekblad* **76**, 1099–1128(1939).—The chem. and phys. properties were detd. for a no. of infusions and decoctions prepd. from crude drugs by the methods official in Netherland Pharm. IV and V, and by a variety of unofficial methods. Decoctions of carrageen had pH of 6.4 and showed definite viscosity values; changing the pH to 4.3, 2.3 or 11.1 increased the viscosity. *Althaea* root decoctions had pH about 6.0; changes to 5.5 or 8.0 decreased viscosity. Leaves of *Uva ursi* contained about 7.6% arbutin and 0.2% hydroquinone. Decoctions and infusions had pH values of about 4.9. Changes to pH values of 6.8 to 7.7 did not cause significant alterations. Data on ergot will be presented in a subsequent paper. Infusions of digitalis powder with water had lethal doses

of 20.97 cc. per kg. by the cat method; prepd. in the presence of 0.1% $CaCO_3$, 19.91 cc. (0.5% infusions). These corresponded to 102.2 mg. per kg. for the powder. By the Swiss Pharmacopoeial method, the infusion from this powder corresponded to 85.2 and to 94.9 mg. per kg. Infusions from a second powder by the Netherland Pharm. V method gave values of 88.7 and 77.6 mg. per kg. Studies were made on these same infusions by the heart-weight method and by the chem. methods, with similar results. In studies on senna leaves, the EtOH, MeOH and acetone fractions had cathartic effects on mice. The Netherland Pharm. V infusions had pH values of about 5.45–5.78, and decoctions 5.62. The infusions contained about 30 mouse units per g. and these values were not changed by increasing the pH to 7.8; more alk. solns. were weaker. The folliculi were less potent than the leaves. The infusions and decoctions of cortex chinae showed pH values between 3.0 and 5.4, according to the method of prepn. The total alkaloids varied from 28 to 81.5% of theory and were not assocd. with the pH values. Decoctions made with dil. HCl were most satisfactory. Infusions and decoctions of ipecacuanha contained 86 to 100% of the theoretical total alkaloids. The hemolytic index for a series of 10% decoctions of senega ranged from 1 1500 to 1 3000 and the pH approached 7.8. An infusion of condurango bark obtained by 24-hr. maceration contained 83% of the coldurangin. James C. Munch

The evaluation of germicides by the manometric method. J. O. Ely. *J. Bact.* **38**, 391–400(1939).—Manometric studies of the effects of several germicides on the O consumption of *Es. coli* in a synthetic medium were made and compared with the lethal effects as shown by subsequent cultures. A complete inhibition of respiration was found necessary to render the organisms incapable of growth when subcultured. Neg. cultures always resulted as soon as the respiration reached 0. When germicides were added to suspensions of *Es. coli* the percentage of inhibition of respiration increased during each successive observation until a max. was reached. In none of the cases did the effect recede from the max. The amt. of inhibition of respiration by sulfanilamide without a killing effect was greater than that for merthiolate. John T. Myers

Japanese peppermint oil. IX. Oil of Japanese Mentha viridis L. var crispa Benth. 2. Carvone. Tetu Nagasawa. *Repts. Osaka Imp. Ind. Research Inst.* **19**, No. 4(1938); cf. *C. A.* **32**, 8075⁵. *l*-Carvone, $C_{10}H_{14}O$ (I), obtained from Japanese *Mentha viridis* L. var crispa Benth, b_6 91–2°, d_4^{15} 0.9543, $[\alpha]_D^{15}$ −62.87°; semicarbazone, $C_{11}H_{17}ON_3$, m. 162.3°, $[\alpha]_D^{15}$ −84.28°; oxime, m. 72.8°, $[\alpha]_D^{15}$ −29.61°. Catalytic hydrogenation of I (I_2 + H_2) gave *l*-carvotanacetone (XII), $C_{10}H_{16}O$, b_6 88–8.5°, $[\alpha]_D^{15}$ −60.57°; semicarbazone, m. 173–4°, $[\alpha]_D^{15}$ −16.63°; oxime, m. 76–7°, $[\alpha]_D^{15}$ −10.44°. Reduction of I with Zn gave *d*-dihydrocarvone (II), b_6 87–7.5°, $[\alpha]_D^{15}$ 18.35°; semicarbazone, $C_{11}H_{19}ON_3$, one m. 145–50°, $[\alpha]_D^{15}$ −38.20° (85.7% yield), and another m. 190.1°, $[\alpha]_D^{15}$ 18.91° (11% yield); oxime, m. 88.9°, $[\alpha]_D^{15}$ 14.57° (in $CHCl_3$). Catalytic hydrogenation of I (I_2 + $2H_2$) gave *d*-carvomenthone (III), $C_{10}H_{18}O$, b_6 83–4° (87.2% yield), $[\alpha]_D^{15}$ 17.15°; semicarbazone, $C_{11}H_{21}ON_3$, one (IV) m. 192–3°, $[\alpha]_D^{15}$ 9.85° (in $CHCl_3$) (84.2% yield), and another (V) m. 160–4°, $[\alpha]_D^{15}$ 43.58° (11.6% yield); oxime, m. 98–9°, $[\alpha]_D^{15}$ 36.58° (in alc.) (80% yield). Hydrolysis of 10 g. IV and 4 g. V with oxalic acid gave *d*-β-carvomenthone, $C_{10}H_{18}O$, b_6 87–8°, $[\alpha]_D^{15}$ 11.80° (6.5 g. yield crude), and *d*-α-carvomenthone, b_6 88.9°, $[\alpha]_D^{15}$ 42.05° (yield 3 g. crude). Catalytic hydrogenation of II (II + H_2) gave *d*-carvomenthone (2), $C_{10}H_{18}O$, b_5 83–3.5°; $[\alpha]_D^{15}$ 19.79°. The properties of the semicarbazone and oxime are the same as above. Reduction of XII with Zn and alkali gave *d*-carvomenthone (3), $b_{3.5}$ 76–7°, $[\alpha]_D^{15}$ 16.34° (2 forms of semicarbazone and oxime were prepd.). Reduction of I with (iso-PrO)$_3$Al gave carveol (VI), $C_{10}H_{18}OH$, b_4 96–7°, $[\alpha]_D^{20}$ −109.0°; phenylurethan, one m. 71–2°, $[\alpha]_D^{15}$ −80.49° (90% yield) and another m. 60–3°, $[\alpha]_D^{15}$ −70.49° (10% yield); *p*-nitrobenzoate, m. 58–60 and 84–5°, on hydrolysis gave *l-trans*-carveol, b_4 96–7°, $[\alpha]_D^{15}$ −194.2°. Catalytic hydrogenation of VI gave *l*-carvotanacetol (1) (VII), $C_{10}H_{17}OH$, b_6 99–100°, $[\alpha]_D^{15}$ −75.27°, which gave 2 forms of *p*-nitrobenzoate and phenylurethan. Reduction of XII with (iso-PrO)$_3$Al gave VII. Reduction of I with Na and alc. gave *l*-dihydrocarveol (XI), $C_{10}H_{18}O$, b_4 89–90°, $[\alpha]_D^{15}$ −29.07, which gave 2 forms of phenylurethan and *p*-nitrobenzoate. Catalytic hydrogenation of I (I + $3H_2$) gave *d*-carvomenthol (1) (VIII), $b_{5.5}$ 92.5–3.5°, $[\alpha]_D^{15}$ 31.40°, and *p*-menthane as by-product. VIII gave 2 forms of phenylurethan and *p*-nitrobenzoate. Catalytic reduction of II (II + $3H_2$) gave *d*-carvomenthol (2) (IX), $C_{10}H_{19}OH$, b_6 88–9°, $[\alpha]_D^{15}$ 23.90°, which gave 2 forms of phenylurethan and *p*-nitrobenzoate. IX and anhyd. phthalic acid gave 2 forms of ester, one m. 121–2°, $[\alpha]_D^{20}$ 55.76° (80% yield) and the other m. 88–90°, $[\alpha]_D^{20}$ −57.27° (10% yield). Hydrolysis of the former with alc. KOH gave *l*-neocarvomenthol, $C_{10}H_{20}O$, b_4 95–7°, $[\alpha]_D^{15}$ 41.21°. Catalytic reduction of *d*-carvomenthone (3) gave *d*-carvomenthol (3) (X), $C_{10}H_{19}OH$, b_{3-5} 82–3°, $[\alpha]_D^{15}$ 31.52°. X gave 2 forms of phenylurethan and *p*-nitrobenzoate. Catalytic reduction of XI gave *l*-carvomenthol (4), $C_{10}H_{19}OH$, b_5 89–90°, $[\alpha]_D^{15}$ −15.16°, which gave 2 forms of phenylurethan and *p*-nitrobenzoate. Hydrolysis of the *p*-nitrobenzoate (m. 54–5°) gave *l*-neoisocarvomenthol, $C_{10}H_{20}O$, b_4 87–8°, $[\alpha]_D^{20}$ −32.42°. Catalytic reduction of VI gave *d*-carvomenthol (5), $C_{10}H_{19}OH$, b_{4-5} 87–8°, $[\alpha]_D^{15}$ 12.54°. Catalytic reduction of VII gave *d*-carvomenthol (6), b_4 86–7°, $[\alpha]_D^{15}$ 13.31. Reduction of XII with Na and alc. gave *l*-carvomenthol (7), b_5 88–8.5°, $[\alpha]_D^{15}$ −25.05. Reduction of III with Na and alc. gave *l*-carvomenthol (8), $b_{4.5}$ 85–6°, $[\alpha]_D^{15}$ −15.06°. Reduction of II with Na and alc. gave *l*-carvomenthol (9), $b_{5.5}$ 91.5–2, $[\alpha]_D^{15}$ −13.90°. Reduction of *d*-carvomenthone (3) with Na and alc. gave *l*-carvomenthol (10), b_6 89–9.5°, α_D^{15} −15.07°. Reduction of III with (iso-PrO)$_3$Al gave *l*-carvomenthol (11), b_{5-6} 94.5–9.5°; $[\alpha]_D^{15}$ −7.05°. Reduction of II with (iso-PrO)$_3$Al gave *l*-carvomenthol (12), b_6 95–6°, $[\alpha]_D^{15}$ −6.98°. All these carvomenthols gave 2 forms of phenylurethan and *p*-nitrobenzoate. The use of these compds. is also given. F. I. Nakamura

Methods of analysis of sulfanilamide. R. W. Towne and R. M. Hitchens. *J. Am. Pharm. Assoc.* **28**, 585–8 (1939).—Two simple, rapid and accurate dets. for the assay of sulfanilamide are described. Detn. of the crystg. point (technique described in detail) will detect as little as 0.1 mol. % of sol. impurities, including isomers and other amino compds. The following technique is recommended for the diazotization titration: place 3.4 g. of sample in a 250-cc. beaker, add 20 cc. of concd. HCl and 80 cc. H_2O, cool to 0–5°, add a few crystals of KBr (as catalyst) and about 20 cc. of chipped ice; place the beaker in an ice-bath, insert this mixt. under a mech. stirrer and the electrode system bright Pt-0.1 *N* KCl-AgCl-Ag; place the buret tip beneath the surface of the soln. and add about 38 cc. of 0.5 *N* $NaNO_2$ soln., taking approx. 2 min. for the addn.; from this point read the potential after each 0.05 cc. addn. of reagent; calc. the difference in potential for each addn.; the largest change in potential (at about 425–525 mv.) occurs at the end point. Percentage of sulfanilamide = (cc. 0.5 *N* $NaNO_2$ × 0.0860 × 100)/(wt. of sample). The titration is accurate to 0.1%; the potentiometer may be replaced by starch-iodide indicator with little, if any, loss in accuracy. These 2 dets. combined are a precise method for estg. the purity of sulfanilamide. A. Papineau-Couture

The volatile oil of Comptonia asplenifolia. Romulus De Nicolas and E. V. Lynn. *J. Am. Pharm. Assoc.* **28**, 588–9(1939).—Distn. of fresh leaves and stems of *Comptonia asplenifolia*, Aiton (Myricaceae) gave a total of 31.5 g. (0.054% on the fresh material, 0.14% on the dry basis) of a yellowish brown oil with a cinnamon-like odor, d_{20}^{20} 0.9154, n_{20} 1.4870, congealing point about 5°, acid value 14.04, ester value 13.30, sapon. value after acetylization 58.66. The oil contained about 20% of terpenes, a considerable amt. of cineole and small quantities of esters and alcs., but no aldehydes nor ketones. AcOH and small amts. of unidentified acids and lactones were present.

le chief constituents were high-boiling and may include caryophyllene. A. Papineau-Couture

A comparative study of the three recognized assays for oil of chenopodium. Wm. F. Reindollar. *J. Am. Pharm. Assoc.* 28, 589–91(1939).—A comparative study of the A. O. A. C., B. P. and U. S. P. assays for wormseed oil made upon authentic samples showed that the 2 former methods yield results concordant with each other, but at variance with those obtained by the U. S. P. procedure, which is sometimes higher and sometimes lower than of the 2 other methods. Although aging of wormseed oil results in an increase in d. and alc. soly. and a decrease in ascaridole, the general relationship existing among these factors remains unchanged. A. Papineau-Couture

The heavy-metal test of the U. S. P. M. W. Carey and R. E. Schoetzow. *J. Am. Pharm. Assoc* 28, 592–3 (1939).—The U. S. P. makes no distinction between the heavy-metal test as applied to inorg. and org. substances. It is shown that, in order to obtain reliable results when the test is applied in presence of org. matter, the latter should first be destroyed, and it is recommended that the most suitable method of effecting such destruction should be studied and incorporated in the U. S. P. test.
A. Papineau-Couture

Drug extraction. XXII. The extraction of podophyllum. Wm. J. Husa and D. W. Lee. *J. Am. Pharm. Assoc* 28, 593–7(1939); cf. *C. A.* 33, 3177.—Podophyllum was extd. by various methods. In maceration with an excess of alc., equil. was reached in 36 hrs. By percolation in cylindrical Pyrex glass tubes, the 1st 250 cc. of percolate from 250 g. of drug contained 85 90% of the total resin of the drug. In a method of forcing the menstruum through a long column of drug by means of air pressure, as much as 99% of the resin was obtained in the first 1000 cc. of percolate from 1000 g. of the drug.
A. Papineau-Couture

Hydrogenated castor oil as an ointment base. IV. Hydroxystearic acid. Geo. W. Fiero. *J. Am. Pharm. Assoc.* 28, 598–602(1939); cf. *C. A.* 33, 3072[5].—Salts of hydroxystearic acid obtained from completely hydrogenated castor oil were prepd. and their characteristics reported. Emulsions and cold creams compared with those prepd. with ricinoleic or stearic acids. Vanishing creams were prepd. with hydroxystearic acid and with mixts. of hydroxystearic and stearic acids. Alkylolamine salts of hydroxystearic acid were superior emulsifying agents compared with those of ricinoleic acid and practically equal to those of stearic acid. A. Papineau-Couture

The assay of digitalis. I. Criteria for evaluating various methods using frogs. Lloyd C. Miller, Chester I. Bliss and Herbert A. Braun. *J. Am. Pharm. Assoc.* 28, 644–57(1939).—Further improvements in the digitalis assay on frogs can be facilitated by objective criteria for testing the effectiveness of any proposed modification of procedure. Owing to the nature of the assay, such criteria are necessarily statistical in character and in a well-designed expt. can be computed from the data of a self-contained assay. By transformation of dosages to logs and of percentage effects to probits, the sigmoid dosage-response curves for the 2 materials or procedures involved in the test are fitted by parallel straight lines; then the horizontal distance between them measures with a calculable precision the log-ratio of their potencies, $M \pm S_M$. The computation of these and related parameters is illustrated with a numerical example. Methods are described for increasing the precision of M by an efficient design of the individual assay, by utilizing past experience relative to the slope of the standard curve where applicable and by combining the results of replicated assays to obtain a more precise weighted mean log-ratio of potencies. On the above statistical basis, 4 criteria are proposed for evaluating an assay procedure: (*a*) a value of χ^2 which indicates that the several groups of frogs used in the test were homogeneous and comparable, (*b*) a consistent and relatively steep slope of the parallel dosage-effect curves, (*c*) a consistently low value of the standard error of the log-ratio of potencies, S_M, and (*d*) agreement of replicate detns. of M within the sampling error. In conjunction with a knowledge of the practicability and exptl. objectivity of a procedure, these criteria should be conclusive in the development of an improved technique. These criteria were applied in a comparison of the effects produced by injection of the same sample of digitalis in test dilns. contg. 5 and 23% alc. The apparent potencies of the U. S. P. XI reference digitalis powder and of the International 1926 and 1936 standard digitalis powders were not influenced by this 4-fold change in the alc. content of the injected test dilns., the same digitalis powder when injected with 5% alc. exhibiting a potency of 103 ± 2.54% of that exhibited when injected with 23% alc. The relative effectiveness of digitalis injected intramuscularly was compared with that injected in the lymph sac. One hr. after injection the effective absorption of U. S. P. XI reference digitalis powder from the lymph sac was about one-half that from the thigh muscles and even overnight the potency of digitalis was slightly but significantly greater (106.5 ± 2.3%) by the intramuscular route than via the lymph sac. The difference was less pronounced with the 1936 International standard powder. The overnight assays showed a smaller standard error than the 1-hr. tests because of a consistently steeper dosage-effect curve. A. Papineau-Couture

A comparative study of tannic acid, U. S. P. Clifton E. Miller and L. W. Rising. *J. Am. Pharm. Assoc.* 28, 658–9(1939).—The U. S. P. XI tests for purity were applied to 11 com. samples of fluffy tannic acid, and the wide variation in the results showed that this product is of variable compn. Efforts to develop an assay of tannic acid using m. p., n, surface tension, α, titratable acidity, spectroscopic analysis and color reactions were unsuccessful. A. Papineau-Couture

The volatile oil of Poliomintha incana. A. F. Sievers and C. G. Marshall. *J. Am. Pharm. Assoc.* 28, 659–61 (1939).—Distn. of 53 lb. of dry herb yielded 187 g. (0.78%) of light-brown oil with minty, pennyroyal-like odor, d_{25} 0.9339, sol. in all proportions in 95% and in 80% alc., sol. in 1.5 vol. of 70% alc., α_{25} 17.2° (100-mm. tube), acid no. 2.11, sapon. no. 23.3, Ac no. 42.5. Fractional distn. at atm. pressure indicated that the principal constituent of the oil is pulegone. A. Papineau-Couture

Report on (the analysis of) drugs. L. E. Warren. *J. Assoc. Official Agr. Chem.* 22, 695–706(1939); cf. *C. A.* 33, 1097[1]. A discussion of the reports of the associate referees (cf. following abstracts) of revisions which might be advisable in the status of some of the present tentative and official A. O. A. C. methods for the detn. of drugs, and of new subjects which are recommended for investigation by the Assocn. A. Papineau-Couture

Report on microchemical tests for alkaloids. C. K. Glycart. *J. Assoc. Official Agr. Chem.* 22, 706–9(1939); cf. *C. A.* 33, 1097[2].—Collaborative study of microchem. tests for berberine-HCl (addn. of HCl to a 1:200 or 1:400 soln. of the alkaloid), cotarnine (H_2PtCl_6, $HgCl_2$, $K_4Fe(CN)_6$), narceine (H_2PtCl_6, Wagner's or other iodized reagents gives characteristic blue crystals) and narcotine (liberation of the free acid by alkali such as KOH or preferably NH_4OH) gave satisfactory results, and adoption of the tests as tentative is recommended. The technique of the tests and description of the crystals are given in detail in *J. Assoc. Official Agr. Chem.* 22, 88.
A. Papineau-Couture

Report on microchemical methods for (the identification of) synthetics. Irwin S. Shupe. *J. Assoc. Official Agr. Chem.* 22, 709–12(1939); cf. *C. A.* 33, 1097[3].—A collaborative study of microchem. tests for the identification of diallylbarbituric acid (addn. to the dry powder of $Pb(OAc)_2$ in soln. in triethanolamine, addn. of $Ba(OH)_2$ to the dry powder), mandelic acid (addn. of $Pb(OAc)_2$ or $HgNO_3$ soln. to a 1% aq. soln. of the drug), and sulfanilamide (addn. of benzaldehyde to the dry powder or of $NaNO_2$ soln. to a satd. soln. of the drug in 0.1 N HCl) gave satisfactory results, and adoption of the tests as tentative is recommended. A. Papineau-Couture

Report on (the determination of) hypophosphites (in pharmaceutical preparations). Henry R. Bond. *J. Assoc. Official Agr. Chem.* 22, 712–15(1939); cf. *C. A.*

33, 1097⁵.—A collaborative study of the Bruening Br oxidation method (*C. A.* 30, 2702⁶) adopted for the detn. of hypophosphites in Sirup NH_4 Hypophosphites, Sirup Hypophosphites and Sirup Hypophosphites Comp. gave results in good agreement with the calcd theoretical. Investigation of the reducing action of the nonhypophosphite ingredients of these sirups showed no reducing action by glycerol and Na citrate, and slight reducing action by sucrose and quinine and strychnine; the effect of these ingredients on the Br reagent is so small, however, that it falls within the limits of exptl. accuracy. Results of assays of sirups made 7 months after compounding were as close to the theoretical figure as those obtained from assays of the freshly prepd. sirups, indicating no oxidation of the hypophosphites had occurred. In the Bruening assay, standard bromide-bromate soln. (3 g. $KBrO_3$ and 12 g. KBr per l.) can be used instead of 0.1 *N* Br.

A. Papineau-Couture

1 **Report on daphnia methods.** Arno Viehoever. *J. Assoc. Official Agr. Chem.* 22, 715–18(1939); cf. *C. A.* 33, 1097⁷.—Suggested tentative techniques are described for approx. assays for cannabis (marihuana), approx. bioassay for vitamin E and tocopherols, bioassay for aphrodisiacs and irritants, and bioassay of toxic substances, with daphnia as a biol. reagent. A. Papineau-Couture

2 **Report on (the determination of) hexylresorcinol (in pharmaceutical preparations).** Morris L. Yakowitz. *J. Assoc. Official Agr. Chem.* 22, 719(1939); cf. *C. A.* 33, 1097⁸.—Assay by the previously described method of the same olive-oil soln. of hexylresorcinol after aging for about 1 yr. gave a 96.3% recovery. Investigation indicated that the use of hydrazine in the method may be unnecessary. A. Papineau-Couture

3 **Report on (the determination of) ergot alkaloids.** Lloyd C. Miller. *J. Assoc. Official Agr. Chem.* 22, 719 (1939); cf. *C. A.* 33, 1098¹.—In the previously described colorimetric method extn. of crude ergot in a Soxhlet extractor by the U. S. P. menstruum (Process C percolation with acidified 50% alc.) removes only 50–75% of the amt. of alkaloid that can be extd. with Et_2O.

A. Papineau-Couture

4 **Report on (the determination of) nitroglycerin in (medicinal) mixtures.** Omer C. Kenworthy. *J. Assoc. Official Agr. Chem.* 22, 719–20(1939); cf. *C. A.* 33, 1098³.—The previously described method appeared to be satisfactory, but when submitted to collaborators the results showed shortages of about 30%. Attempts to modify the method to obtain better recovery were unsuccessful.

A. Papineau-Couture

5 **Report on (the determination of) guaiacol.** Kenneth L. Milstead. *J. Assoc. Official Agr. Chem.* 22, 721–2 (1939); cf. *C. A.* 33, 1098⁵.—A collaborative study of the Viebock and Schwappach method, as modified by Clark (*C. A.* 26, 2395), for the detn. of alkoxy groups and for the estn. of guaiacol carbonate and guaiacol gave satisfactory results, and its adoption as tentative is recommended. A. Papineau-Couture

6 **Report on (the assay of) iodine ointment.** Wm. F. Reindollar. *J. Assoc. Official Agr. Chem.* 22, 722–3 (1939); cf. *C. A.* 33, 1098⁶.—A collaborative study was made of the present tentative method for I and the proposed method for organically combined I; a freshly prepd. ointment and one that was 4-yrs. old were used. Results for I by the tentative method were satisfactory, and adoption of the method as official is recommended. Good agreement was obtained for organically combined I in the freshly prepd. ointment, but not in the older sample.

A. Papineau-Couture

7 **Report on the separation of acetylsalicylic acid, acetphenetidin and caffeine.** Donald C. Grove. *J. Assoc. Official Agr. Chem.* 22, 723–6(1939).—A method has been worked out (technique described in detail in *Ibid.* 91) using sepn. of acetylsalicylic acid from acetphenetidin and caffeine by means of $NaHCO_3$; the acetphenetidin and caffeine are then treated with dil. H_2SO_4 which removes all the caffeine plus a small quantity (usually about 75 mg.) of acetphenetidin, leaving the main bulk of the latter behind; the caffeine is then sepd. from the remaining acetphenetidin by means of the acid hydrolysis method. Results of a collaborative study of the method showed agreement between collaborators which is believed to be as satisfactory as could be expected in a mixt. of this type, and adoption of the method as tentative is recommended.

A. Papineau-Couture

8 **Report on (the identification of) gums in drugs.** J. H. Cannon. *J. Assoc. Official Agr. Chem.* 22, 726–8(1939).—A collaborative study was made of the identification of Irish moss, tragacanth, agar, quince, karaya and galagum by means of chlorzinc iodide (to 100 cc. of a soln. of $ZnCl_2$, d. 1.8, add a soln. of 10 g. KI and 0.15 g. I in 10 cc. H_2O; keep a few crystals of I in the soln.), tincture of I (U. S. P.), ruthenium red (to a few cc. of a 10% soln. of $Pb(OAc)_2$ add enough ruthenium red to produce a wine-red color), methylene blue (0.1% soln. in alc., 0.1% soln. in H_2O). The technique of the test and reactions obtained with the several reagents are described in detail in *Ibid.* 92–4. The results were satisfactory and adoption of the method as tentative is recommended.

A. Papineau-Couture

9 **Report on (the determination of) theobromine in the bromine calcium tablets.** P. S. Jorgensen. *J. Assoc. Official Agr. Chem.* 22, 729–30(1939); cf. *C. A.* 33, 1099¹.—A collaborative comparison of the previously described proposed acidimetric method and of the present tentative A. O. A. C. iodometric method showed that the iodometric method gives varying results, while the acidimetric method gives consistent results in the hands of different analysts. It is therefore recommended that the latter method replace the present tentative method.

A. Papineau-Couture

10 **Report on (the determination of) chlorobutanol.** Frank C. Sinton. *J. Assoc. Official Agr. Chem.* 22, 730–2 (1939); cf. *C. A.* 33, 1099⁴.—A collaborative study was made of the previously described method for the assay of chlorobutanol and of its detn. in soln. with some modifications of the details of the distn. (technique described in detail in *J. Assoc. Official Agr. Chem.* 22, 95). For the chlorobutanol crystals the recovery averaged 99.5%; for the soln., 98%. The majority reported no difficulty with the method, which is recommended for adoption as tentative. A. Papineau-Couture

11 **Report on (the analysis of) phenolphthalein and acetylsalicylic acid (mixtures).** Geo. M. Johnson. *J. Assoc. Official Agr. Chem.* 22, 732–4(1939); cf. *C. A.* 33, 1099⁶.—The technique of the previously described method was improved (described in *J. Assoc. Official Agr. Chem.* 22, 95–6). Collaborative study of the improved method gave 96.4–100.6% (av. 98.7%) recoveries of acetylsalicylic acid and 96.2–103.2% (av. 101.0%) recoveries of phenolphthalein. Its adoption as tentative is recommended.

A. Papineau-Couture

12 **Report on (the determination of) aminopyrine and phenobarbital in mixtures.** E. C. Payne. *J. Assoc. Official Agr. Chem.* 22, 735–6(1939); cf. *C. A.* 33, 1100³.—A study on individually weighed samples of the phenobarbital and aminopyrine (without excipients) of the previously described method gave recoveries of 99.6–100.7% and 99.3–99.5%, resp. A method based on extn. of phenobarbital from acid soln. (1 + 9 H_2SO_4) with $CHCl_3$ or Et_2O and later removal of aminopyrine after making alk. with NH_4OH gave incomplete sepn. of the phenobarbital; but further extn. of the original acid soln. with solvent yielded no more ext., which might be explained by a slight interaction between aminopyrine and phenobarbital. A somewhat different technique in which the aminopyrine is extd. as above but the phenobarbital is extd. in a continuous extractor with $CHCl_3$ as solvent gave 100.1–100.3% recovery for aminopyrine and 100.4% for phenobarbital.

A. Papineau-Couture

13 **Report on (the analysis of) terpinol hydrate and codeine.** Jonas Card. *J. Assoc. Official Agr. Chem.* 22, 736–8 (1939); cf. *C. A.* 33, 1100⁹.—The previously described method was modified by providing spontaneous evapn. of the alc.-$CHCl_3$, instead of evapn. in a slow current of air. Collaborative study of the modified method gave better

results than the previous yr., and its adoption as tentative is recommended. A. Papineau-Couture

Report on (the analysis of) emulsions (of cod-liver oil). W. F. Kunke. *J. Assoc. Official Agr. Chem.* **22**, 739–42 (1939); cf. *C. A.* **33**, 1101[1].—A description is given of the development of a method (technique described in detail in *J. Assoc. Official Agr. Chem.* **22**, 96) of detg. cod-liver oil in emulsions, which consists essentially in mixing an amt. of sample contg. about 2 g. of oil with about 10 g. of finely powd. $CaCO_3$, extg. with successive portions of $CHCl_3$ till the last portion exts. not more than 1 mg., evapg. the ext. in a tared beaker on a steam bath and allowing to remain on the bath for about 10 min. after the odor of $CHCl_3$ has disappeared, and drying at 100 to const. wt. (weighing to be made at 5-min. intervals). Collaborative study of the method gave recoveries of 99.5–100.2%. Adoption of the method as tentative is recommended. A. Papineau-Couture

Report on (the assay of) ointment of mercuric nitrate (citrine ointment). H. O. Moraw. *J. Assoc. Official Agr. Chem.* **22**, 743–8(1939); cf. *C. A.* **33**, 1101[2].—Minor changes were made in the directions of the previously described method (modified technique described in detail in *J. Assoc. Official Agr. Chem.* **22**, 96–7) with a view to improving its accuracy. Collaborative study of the revised method showed an av. recovery of 99.7% of the Hg, and it is recommended the method be adopted as official. A. Papineau-Couture

Report on (the determination of) sulfanilamide. Edward M. Hoshall. *J. Assoc. Official Agr. Chem.* **22**, 748–57(1939).—Two methods were developed for the detn. of sulfanilamide. (*1*) *Bromination method:* Place a portion of the sample contg. 0.1–0.3 g. sulfanilamide in a 500-cc. glass-stoppered I-absorption flask, add about 25 cc. H_2O and sufficient 0.1 *N* or 0.5 *N* bromide-bromate soln. to ensure a 10–50% excess of Br; add rapidly 10 cc. of HCl and immediately stopper, swirl the flask, place in the dark for about 5 min., remove the stopper just sufficiently to introduce quickly 10 cc. of 10% KI soln. (avoid escape of Br vapors), stopper, shake thoroughly, remove the stopper, rinse it and the neck of the flask, add about 150 cc. H_2O and titrate with 0.1 *N* $Na_2S_2O_3$, using starch indicator; 1 cc. 0.1 *N* bromide-bromate soln. = 0.004305 g. sulfanilamide. (*2*) *Hydrolysis method:* Place on a 9-cm. folded filter paper in a funnel a portion of the sample contg. about 0.5 g. of sulfanilamide; wash the sol. portion with a fine stream of Me_2CO into a 250-cc. flask, using a total of about 25 cc. of Me_2CO (test for complete extn.), remove the Me_2CO by immersing the flask in water at about 70°, remove from the bath, add 10–12 cc. of 75% (by vol.) H_2SO_4, reflux for 30 min., dil. to about 100 cc., add excess of 50% alkali, distil, collect the NH_3 in excess of 0.1 *N* H_2SO_4 and titrate with 0.1 *N* NaOH, using methyl red indicator; 1 cc. 0.1 *N* acid = 0.01722 g. sulfanilamide. Attempts to develop a method based on reaction with HBrO and formation of a relatively stable sulfondibromamide were unsuccessful. In a collaborative study, the bromination method consistently gave somewhat high results, and investigation of several factors that might be conducive to the production of such excesses disclosed points whereby the method could be modified to give quant. yields. The results of a collaborative study of the hydrolysis method were more satisfactory; they were slightly high, but the av. appeared to be within the analytical error for a detn. of this nature. The method is recommended for adoption as tentative. A. Papineau-Couture

Report on (the determination of) mandelic acid. H. G. Underwood. *J. Assoc. Official Agr. Chem.* **22**, 757–61 (1939).—Two qual. tests for mandelic acid and a method for its detn. in tablets and liquid prepns. were developed and submitted to collaborative study. Addn. of a little 10% $FeCl_3$ soln. to a 2.5% soln. of mandelic acid produces a bright yellow color (general test for hydroxy acids, and not specific for mandelic acid). To 5 cc. of aq. 5% mandelic acid soln. add 5 cc. H_2SO_4, agitate, add 10 cc. H_2SO_4 so as to form 2 layers; a purple color slowly forms at the interface if the test tube is allowed to stand a few min., and a strong odor of benzaldehyde is noticed on shaking. The detn. is based on extg. from acid soln. with a 2 + 1 $CHCl_3$-Et_2O mixt. (7 × 20 cc. usually suffices), evapg. at not over 40° with the aid of a fan, dissolving in CO_2-free water and titrating with 0.1 *N* NaOH with phenolphthalein indicator. The collaborative study gave satisfactory results and adoption of the tests and method as tentative is recommended. A. Papineau-Couture

Report on (the determination of) chloroform in mixtures. John R. Matchett. *J. Assoc. Official Agr. Chem.* **22**, 761–4(1939).—A study of the present tentative A. O. A. C. method (cf. *C. A.* **25**, 5643) showed that: (1) use of the present alkali reagent is satisfactory; (2) the use of 0.1 g. (instead of 1 g.) $CaCO_3$ is satisfactory; (3) carborundum chips are very useful to prevent "bumping" during distn.; (4) the method may be relied upon to show at least 98% recovery of $CHCl_3$ present in the sample; (5) as much as 5% of the $CHCl_3$ present may be lost on pipeting a sample of heavy sirup; (6) by use of special app. recovery might be increased and more concordant results obtained. A. Papineau-Couture

Vitamin A in ling cod-liver oil. L. B. Pett, Marian Lipkind and G. A. LePage. *Nature* **144**, 634(1939).—Absorption curves are given for ling cod-liver oil, Pacific whale oil and for av. halibut- and cod-liver oils. Ling cod-liver oil has a typical absorption around 328 mμ (vitamin A), and is more potent than halibut-liver oil. E. D. Walter

Modern chemistry, modern medicine and modern food (Dodds) **2**. Polarographic method for detg. org. peroxides [in studying pharmaceutical prepns.] (Dobrinskaya, Neĭman) **7**. Characterization of acetylsalicylic acid prepns. (Kruger) **7**. Chem. microscopy of some toxicologically important alkaloids (Whitmore, Wood) **7**. Regulations on coal-tar colors [suitable for drugs and cosmetics] (Anon.) **12**. Soybean-oil foots manuf. of lactation-promoting medicine (Okano, *et al.*) **27**. Separatory flask for extg. alkaloids (U. S. pat. 2,170,411) **1**.

Extracting carotenoids. David D. Peebles. U. S. 2,170,872, Aug. 29. A material such as macerated fresh carrots is digested with alkali under superatm. pressure and at a temp. substantially above 100° and the pressure is then rapidly released and the digested material is subjected to solvent extn. (suitably with "mineral spirits") for removal of carotenoids.

Extraction of saponins from vegetable materials. Frederick H. Waltz (to Eastman Kodak Co.). U. S. 2,172,265, Sept. 5. Vegetable material contg. a saponin, such as soap bark, soapwort or soaproot, is extd. with a solvent such as MeOH which is substantially free from water, in the presence of an alk. compd. such as NH_3 (suitably with heating to the b. p. and filtration while hot).

Dissolving α-naphthol in water. Ferdinand Herb (to Arnold Joerns). U. S. 2,171,555, Sept. 5. For use with water to form antiseptic solns., a concd. soln. is prepd contg. K soap, some water, α-naphthol and an alc. such as iso-Pr alc., the proportion of soap to α-naphthol being at least about 3 to 1 and the soln contg. at least about 20% of the alc. Acetone or $CHCl_3$ also may be used.

Menthyl anthranilate. Marion S. Carpenter (to Givaudan-Delawanna, Inc.). U. S. 2,170,185, Aug. 22. Menthyl anthranilate, b$_3$ 177–9°, may be prepd. by treating a menthol soln. of an alkali metal mentholate with methyl anthranilate. It is suitable for use in cosmetics such as "suntan creams" or "sunburn lotions" as an absorbent of actinic rays.

Disabling liquid suitable for temporary blinding. Charles E. Howett (to Howett Laboratories, Inc.). U. S. 2,171,791, Sept. 5. NH_4 carbonate is used with aq. NH_3 soln., alc., essential oils such as those of lemon, lavender and myristica, and oil of trefle which serves to prevent burning or blistering of tissue in the eye socket.

Molded spheres or ovoids, etc., containing vitaminic liquids. James A. Raynolds, Jr. (to Atlantic Coast Fisheries Co.). U. S. 2,170,520, Aug. 22. App. is de-

scribed, and a mode of operation for prepg. spherical, spheroidal, ovoidal and similarly shaped articles for pharmaceutical and other purposes, and comprising a colloidal matrix having dispersed therein a vitamin-bearing liquid completely enveloped and imprisoned by the colloidal matrix so that there is no free vitamin-bearing liquid on the surface of the product. Gelatin compns. mixed with vitamin C may be used.

Vaccines, etc. Chemische Fabrik vorm. Sandoz. Brit. 506,095, May 23, 1939. Material for inoculation purposes is prepd. by freeing cultures of bacteria, etc., from H_2O by exposure to a high vacuum at below 0° and killing the bacteria, etc., in the moisture-free state by treatment with anhyd. cell poisons or radiations of short wave lengths. Among examples, *Staphylococci* are, after being frozen and dried, killed by a soln. of HCN in C_6H_6.

Antitoxins against bacterial toxins, from the liver and spleen. Carl L. Lautenschlager and Willy Ludwig (to Winthrop Chemical Co.). U. S. 2,171,320, Aug. 29. Slightly acid autolyzed spleen or autolyzed liver is extd. with water or a water-sol. org. solvent of low mol. wt. such as MeOH or with an aq. mixt. of such an org. solvent, and the soln. thus formed is treated with a "ballast-eliminating" heavy-metal compd. such as Fe dialysate and the resulting product is further purified by use of a water-sol. org. solvent such as MeOH (all steps of the process being carried out at a temp. below about 40°).

Antipoliomyelitis serum. John A. Toomey (to Western Reserve University). Brit. 507,376, June 14, 1939. The serum is obtained by immunizing an animal by successive injections of poliomyelitis virus fortified with products of metabolism of intestinal bacteria and obtaining a serum from the blood of the animal. A soln. of the virus in normal saline with which the fortifying material is to be admixed may be obtained by adsorbing the virus on $Al(OH)_3$ gel and eluting the adsorbed virus.

Disinfectant and cleansing compositions. Günther Parizot. Brit. 506,451, May 30, 1939. Tablets for use in cleansing and disinfecting artificial dentures placed in H_2O are made by compressing a mixt. of Na_2O_2 about 2 and NaCl about 3 parts. A substance, e. g., Na phosphate, for pptg. hardening agents from hard H_2O may be added to the mixt. Other agents that do not decomp. Na_2O_2, e. g., Na_2CO_3, calcined soda, may be present.

Absorbent wadding suitable for surgical purposes. Hans Freudenberg (to Carl Freudenberg G. m. b. H.). U. S. 2,169,947, Aug. 15. Wadding consisting of absorbent collagenous fibers substantially free from water is formed of fibers produced by converting animal hide material into a swollen condition in which the fibers may be mechanically isolated, shredding and treating the resulting coarse fibrous material with water-miscible org. liquids such as alc. or acetone, and further finely shredding.

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gases, continuously pumping such liquids, in proper proportion for producing the concd. acid, into a reaction zone maintained at a pressure above atm. pressure and sufficient for the reaction, lubricating the pump used with inorg. colloids such as silicic acid and supplying O to the reaction zone and continuously removing the highly concd. HNO_3 from the reaction zone. An arrangement of app. is described.

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19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

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Use of the electric metal spray gun in glass technology. M. U. Schoop. *Glastech. Ber.* **17**, 217–18(1939).—A small arc fuses the metal which is then atomized by compressed air. Glass wool was also made by use of a Schoop gun. Enamels, glass and quartz coatings have also been made successfully with an acetylene flame. J. F. Hyde

Molecular refraction in glasses. W. Geffcken. *Glastech. Ber.* **17**, 237–40(1939).—The additivity of const.

scribed, and a mode of operation for prepg. spherical, spheroidal, ovoidal and similarly shaped articles for pharmaceutical and other purposes, and comprising a colloidal matrix having dispersed therein a vitamin-bearing liquid completely enveloped and imprisoned by the colloidal matrix so that there is no free vitamin-bearing liquid on the surface of the product. Gelatin compns. mixed with vitamin C may be used.

Vaccines, etc. Chemische Fabrik vorm. Sandoz. Brit. 506,095, May 23, 1939. Material for inoculation purposes is prepd. by freeing cultures of bacteria, etc., from H_2O by exposure to a high vacuum at below 0° and killing the bacteria, etc., in the moisture-free state by treatment with anhyd. cell poisons or radiations of short wave lengths. Among examples, *Staphylococci* are, after being frozen and dried, killed by a soln. of HCN in C_6H_6.

Antitoxins against bacterial toxins, from the liver and spleen. Carl L. Lautenschläger and Willy Ludwig (to Winthrop Chemical Co.). U. S. 2,171,320, Aug. 29. Slightly acid autolyzed spleen or autolyzed liver is extd. with water or a water-sol. org. solvent of low mol. wt. such as MeOH or with an aq. mixt. of such an org. solvent, and the soln. thus formed is treated with a "ballast-eliminating" heavy-metal compd. such as Fe dialysate and the resulting product is further purified by use of a water-sol. org. solvent such as MeOH (all steps of the process being carried out at a temp. below about 40°).

Antipoliomyelitis serum. John A. Toomey (to Western Reserve University). Brit. 507,376, June 14, 1939. The serum is obtained by immunizing an animal by successive injections of poliomyelitis virus fortified with products of metabolism of intestinal bacteria and obtaining a serum from the blood of the animal. A soln. of the virus in normal saline with which the fortifying material is to be admixed may be obtained by adsorbing the virus on $Al(OH)_3$ gel and eluting the adsorbed virus.

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The significance of radiation chemistry and its procedures for the science and technology of glass. H. Freytag. *Glastech. Ber.* **17**, 240–7(1939). J. F. H.

Method of making visible the temperature distribution in glass furnaces. F. Drexler and W. Schutz. *Glastech. Ber.* **17**, 205–7(1939).—A series of colored powders called "Thermo-color" was developed by I. G. Farbenind. A. G., which has the property of changing color at definite temps. By applying to a heated refractory surface the various temp. zones become visible. They should be useful in studying temp. distribution in molds and as warnings against overheating. J. F. Hyde

Use of the electric metal spray gun in glass technology. M. U. Schoop. *Glastech. Ber.* **17**, 217–18(1939).—A small arc fuses the metal which is then atomized by compressed air. Glass wool was also made by use of a Schoop gun. Enamels, glass and quartz coatings have also been made successfully with an acetylene flame. J. F. Hyde

Molecular refraction in glasses. W. Geffcken. *Glastech. Ber.* **17**, 237–40(1939).—The additivity of const.

refraction increments as developed by Biltz and coworkers (cf. *C. A.* **33**, 5140[3]) is of practical use in the field of technically important glasses, but the dependence of the increments on concentration as emphasized by Kordes must be considered in presenting total refraction curves. Biltz and coworkers failed properly to consider the work of Wulff and Majumdar (*C. A.* **30**, 3695[3]) on B_2O_3-N_2O glasses where definite departure from additivity was shown. The similarity in behavior of aq. solns. and glasses is strongly emphasized. G. prefers the use of partial molal quantities in presenting such data compared to the methods of Biltz or Kordes. An example of the use of partial molal quantities is given in detail; the data of Wulff and Majumdar are used for the system B_2O_3 Na_2O.

J. F. Hyde

Quantitative spectral analysis of boric oxide in glass. I. Kenzo Harai. *J. Chem. Soc. Japan* **60**, 668–74(1939). The powd. sample of glass is placed in a Cu electrode. A direct arc is made and the arc is studied spectrographically. It is found that log ($[B_2O_3]/[SiO_2]$) and log ($[B_2O_3/[SiO_2]$) lie roughly in a straight line, where $[B_2O_3]$ is the quantity of B_2O_3 in the glass, and IB_2O_3 is the intensity of spectral line. T. Katsurai

Notes on the chemical analysis of clays. W. Keyser and E. Pahlavouni. *Verre silicates ind.* **10**, 277–80, 293–7 (1939). The method adopted by the A. S. T. M. in 1936 was investigated and the following changes were made: the sample is fused with NaOH in a Ni crucible at about 450°; the nonvolatile residue after attack of the SiO_2 by HF is united with the filtrate from the SiO_2 before pptg. R_2O_3; the double pptn. by NH_3 is used in the presence of a large excess of NH_4Cl; the SiO_2 found in the R_2O_3 is disregarded; the TiO_2 is dctd. colorimetrically and the Fe by permanganic oxidation of the Fe previously reduced by nascent H. Herbert S. Willson

Improvement of clays through pH control. Geo. J. Barker and Emil Truog. *Brit. Clayworker* **48**, 233–6 (1939); cf. *C. A.* **33**, 8372[2].—Many clays can be greatly improved by the adjustment of their pH. Clays which are naturally acid should be adjusted to the range of 6–8.5 pH and nonacid clays fall within the range of 7.3–10.5. Na_2CO_3 is recommended for pH adjustment. The optimum pH may be dctd. as follows: To a series of 20-g samples add 50 cc. of distd. H_2O and varying amts. of Na_2CO_3. The range varies from 0.1 to 1.0% of the dry clay. After stirring occasionally dct. the pH and plot the resulting values. At a certain stage this curve usually flattens out rapidly. The pH at this point is the best. When the base-exchange material is largely satd. with Ca and Mg it tends to flocculate. Satn. partially or wholly with Na greatly facilitates deflocculation. In acid clays, the base-exchange material is usually satd. with varying proportions of H, Ca and Mg and the pH is always below 7. When Na_2CO_3 is added, H is first displaced and the pH rises. When it reaches the range 6–8.5, a sufficient amt. of Na has entered the exchange material to bring about the desired deflocculation. With nonacid clays the base-exchange material is almost completely satd. with Ca and Mg and the pH value is above 7. To displace a sufficient amt. of these cations with Na to promote the desired deflocculation it is necessary to raise the pH still higher through the addn. of Na_2CO_3. In the reaction that follows, the displaced Ca and Mg are pptd. as insol. and therefore inactive carbonates. E. V. P.

Occurrence of sillimanite in Travancore, its importance and uses. S. Dogar Singh. *Govt. Cegam. Ceneerns, Kundara, Travancore, India, Bull.* **1938**, 6 pp.—Sillimanite occurs in grain form along with ilmenite, garnet, monazite and zircon in the beach sands and can be easily sepd. by mech. means. It is also obtainable as a by-product in the washing of china clay. S. develops a theory that when "quartzitic porcelain" is subjected to sudden and repeated temp. changes the amorphous matrix caused by the fusion of silicate does not allow the quartz crystals to expand or contract uniformly in all directions; hence the crystal tends to develop cracks along cleavage planes. This is one cause of breakage of lab. porcelain. Sillimanite crystals resist the attack of feldspar much better than do the crystals of quartz in the early stages of firing. As the temp. rises, they are dissolved. But unlike quartz crystals no allotropic modifications come into existence followed by partial crystn. for sillimanite becomes monotropic after firing. Sillimanitic porcelain is less translucent than quartzitic porcelain because sillimanite crystals are not porous and cell-like. Finely ground sillimanite particles behave exactly like clay particles in their behavior toward electrolytes. Uniform and thinner wares can be produced by using sillimanite. A. P. Som

Progress in the field of refractories in 1938. C. R. Platzmann. *Tonind.-Ztg.* **63**, 256–7, 266–8, 310–11, 348–50, 395–6(1939).—A review. A. E. Beitlich

The evaluation of chrome ores for the manufacture of refractories. Th. Schauer. *Tonind.-Ztg.* **63**, 701–2, 724–5 (1939). Studies of the chem. and mineralogical compn. of various types led to the conclusion that values of [% MgO − (% Al_2O_3 ÷ 2.67)] ÷ % SiO_2 between 1.38 and 5 indicates an ore of good quality for the manuf. of refractories. For chrome-magnesite brick, the ore may contain more SiO_2 (up to 18%) without resulting in the formation of $2FeO.SiO_2$ or free SiO_2. A. E. Beitlich

Refractories in induction furnaces. Bertil Stalhane and Valter Anderson. *Jernkontorets Ann.* **123**, 386–412 (1939). The refractory should have chem. properties approaching those of MgO, which is not affected by the melt and is resistant to CaO-FeO slag. Shrinkage should be minimized by pre-stamping or hydraulic ramming, by a careful choice of grain sizes and by use of homogenizing agents. The thermal expansion around 1300° should be low to avoid formation of cracks. For temps. up to 1900° it is desirable to introduce a slight plasticity; ZrO_2 appears to be a desirable modifying agent. A new refractory, called the *BM mass*, has been developed. H. C. Duus

Refractories for open hearths. Everett C. Hite and Gilbert Soler. *Brick & Clay Record* **95**, No. 2, 54–7; No. 3, 59–60; No. 4, 54–5(1939).—A review and general discussion. Bibliography. E. C. Petrie

Brick linings for rotary furnaces. C. C. Downie. *Mining Mag.* **61**, 137–9(1939).—The adoption of the rotary furnace in England for the smelting of ores and residues has been slow, but its advantages are now being recognized. There is no slag-line as in a reverberatory hearth and the refractories wear away uniformly but slowly. A. W. Furbank

Preparation of crucibles from special refractories by slip-casting. John G. Thompson and Manley W. Mallett. *J. Research Natl. Bur. Standards* **23**, 319–27(1939) (Research Paper No. 1236).—Thin-walled (3 mm.) crucibles of Al_2O_3, BeO, zircon or ZrO_2 and electrically fused ThO_2 were successfully made from aq. slips. Enough plasticity for casting was developed by fine-grinding and treatment with dil. HCl. Most MgO crucibles cast from aq. slips cracked badly during drying and firing. When the MgO was suspended in abs. alc. good crucibles were obtained. Slips with 95% alc. did not produce good results. A. W. King

Refractory and acid-resistant mortars. Reinhart *Tonind.-Ztg.* **63**, 617–19(1939).—A patent review and description of various types: SiO_2 mortars, high-Al_2O_3 cement, magnesite, olivine mortar, chromite and others. A. E. Beithch

Salt glazing in production. Eugene C. Clemens. *Brit. Clayworker* **48**, 226–9(1939).—The NaCl in the presence of heat and H_2O vapor decomps. to form Na_2O and HCl which exerts a fluxing action to form Na-Al silicate glass. The chief requirement of a clay body for glazing is a wide range of chem. compn. to permit a glaze to be formed from the hottest to the coolest portions of the kiln. SiO_2 should be about 65%. Minerals such as gypsum, limestone, dolomite and marl, contg. Ca or Mg, may cause trouble in glazing; finer grinding will distribute them and reduce their chem. activity. Temp. control is essential as sudden increases may cause surface overfiring and sudden decreases may cause "off" color areas in the kiln. Rapid cooling has a tendency to produce brilliant glazes while slow cooling will produce darker and nearly matt glazes. Finely ground bodies take a glaze more rapidly

and with more uniformity of color than coarsely ground clay. Fuels used for firing the kilns should be low in S. The chlorides of Zn and Mn may be mixed with NaCl to produce a darker shade of red. E. C. Petrie

Electromagnetic method of determining enamel thickness. K. Azarov and N. Kharchenkova. *Zavodskaya Lab.* **8**, 508-12(1939).—The method is based on changes in magnetic resistance of a closed circuit contg. an electromagnet and the enameled specimen. The thickness of the layer is estd. by current changes in the coil of the electromagnet. The measurements are made regardless of the thickness of the Fe sheet. The disadvantage of the method (a Cu oxide rectifier is used) is the effect of the outside temp. The app. may be used for lab. control work but corrections should be made for the surrounding temp. Diagram of the set-up and results of tests are given. B. Z. Kanich

Use of Na-Mg glass for glass electrodes (Pasynskii) 4. Firing furnaces for melting glass with natural gas (U. S. pat. 2,171,597) 21.

Glass-melting furnaces. The British Thomson-Houston Co. Ltd. Brit. 506,366, May 26, 1939.

Electric furnaces for heating glass. Soc. anon. des manufactures des glaces et produits chimiques de St.-Gobain, Chauny et Cirey. Brit. 506,696, June 2, 1939. In heating liquid glass by current between electrodes, 1 or more bodies of high cond. are arranged in the glass between the electrodes to produce zones of heat concn.

Apparatus for feeding mold charges of molten glass. Thomas F. Pearson (to Crown Cork & Seal Co.). U. S. 2,171,096, Aug. 29. Various structural, mech. and operative details.

Machines of the suction-gathering type for making hollow glassware. Kent-Owens Machine Co. Brit. 505,965, May 15, 1939. Divided on 503,921 (*C. A.* **33**, 7510[2]).

Automatic machines for making glass bottles. Henry C. Daubenspeck and Thomas B. Kitson. Brit. 506,499, May 30, 1939.

Method of making hollow glass articles, e. g., building blocks. Raymond W. Kell (to Corning Glass Works). Brit. 507,387, June 14, 1939. In making articles from preformed parts by heating the edges of the parts and fusing them together, the heating of the engaging parts is effected by substantially endless gas flames, and the direction and flow of the flames over the engaging parts are controlled by removing the burnt gases from the neighborhood of the flames.

Glass building blocks. John E. Bauer (to Owens-Ill. Glass Co.). U. S. 2,170,602, Aug. 22. App. is described, and a method which consists in producing a hollow glass building block having mortar-bearing surfaces and prior to any great loss of heat from the block applying to such surfaces in a molten state a substantially uniform film of metal such as Al or an Al alloy having an affinity for glass, dispersing a gritty material such as sand over the film of metal while the latter is still plastic and capable of adhesion, and annealing the block.

Glass container. Joseph Szanto. Brit. 505,744, May 16, 1939. In the manuf. of containers by the drawing of tubes, means are provided to insure relative movement between the burner and the tube.

Glass fibers. Vetrocoke (formerly Vetrocoke, Società riunite italiane (vetri e cristalli e italiana coke) anon.). Brit. 505,934, May 19, 1939. In the manuf. of the fibers, the molten material flows through electrically heated orifices, 1 or more of which can be plugged at will, past a cooling device and burners onto a rotary member adjustably mounted on a movable carriage. Cf. *C. A.* **33**, 2667[5].

Coating glass surfaces. The British Thomson-Houston Co. Ltd. Brit. 507,187, June 12, 1939. In an app. for coating a vitreous tube with enamel, the tube with a layer of enameling mixt. applied to its inner surface is mounted around an elec. heating element. The tube is rotated during the heating by rollers and means are provided for introducing gases into the tube. The inner surface may first be etched and a soln. of Na borate or a mixt. of B_2O_3 3, SeO_2 2 and $NaNO_3$ 0.125 mol. parts applied to the surface by the heating process.

Optical glass. Geo. W. Morey (to Eastman Kodak Co.). U. S. reissue 21,175, Aug. 15. A reissue of original patent No. 2,150,694 (*C. A.* **33**, 4754[5]).

Tempering glass. Corning Glass Works. Brit. 505,626, May 11, 1939. A chilling-medium, for use in tempering glass, consists of a molten liquid composed substantially of $Ca(NO_3)_2$, $Ba(NO_3)_2$, $Sr(NO_3)_2$ or (and) $Pb(NO_3)_2$, together with the nitrate of 1 or more alkali metals.

Tempering glass. Corning Glass Works. Brit. 505,627, May 11, 1939. In a method wherein the glass is heated or chilled by immersion in a bath of molten inorg. salt, the heating bath contains a substantial proportion of K_2CrO_4 or (and) Na_2CrO_4 and the chilling bath consists mainly of $K_2Cr_2O_7$ or (and) $Na_2Cr_2O_7$.

Tempering glass. Gilt Edge Safety Glass Ltd., August W. Grotefeld and Jesse J. Shaw. Brit. 506,724, May 26, 1939. The glass is supported while being heated by a device that engages and supports it without deformation, the temp. or condition of each piece of glass being observed and the heating being controlled accordingly.

Tempering glass. Corning Glass Works. Brit. 507,170, June 12, 1939. A chilling bath consists of 1,2,4-trichlorobenzene, diphenyl oxide or lightly chlorinated resin, e. g., a Ph_2 resin known as "Aroclor," or a mixt. of 2 or more of these or of any liquid for which at 20° log (H × 10^6) is 2.56-4.0, where H is K^3P^2BC/U, K being the thermal cond., P the sp. gr., B the coeff. of cubic expansion, C the sp. heat and U the viscosity.

Tempering glass sheets. Pilkington Brothers Ltd. Brit. 505,849, May 17, 1939. To indicate the attainment of the necessary temp. of the sheets, a pair of points are pressed against the sheet and when they have sufficiently penetrated it as a result of its plasticity elec. contact is established to give an alarm.

Tempered glass sheets. Edoardo Ferlito. Brit. 505,857, May 18, 1939. A tempered glass sheet that can be sepd. into 2 or more sections without fracture is produced by forming on 1 or both sides of the sheet, before or during the heating, 1 or more grooves along which the sheet can be divided after the tempering. Cf. *C. A.* **33**, 7510[8].

Devices for supporting glass sheets during tempering. Gilt Edge Safety Glass Ltd., Augustus W. Grotefeld and Jesse J. Shaw. Brit. 506,723, May 26, 1939, and 506,787, May 26, 1939, divided on 506,723.

Electrically heated apparatus for cutting glass sheets. Ival G. Fowler and John L. Drake (to Libbey-Owens-Ford Glass Co.). U. S. 2,169,687, Aug. 15. A device for use in cutting glass sheets includes a supporting surface for the sheet, a template above the supporting surface and an elec. resistance heater carried by the template and which may comprise a plarality of sep. heating elements arranged in end to end relation and cooperating to heat the glass sheet to a relatively high temp. along a substantially closed continuous line of cleavage.

Multi-stage furnace for heating vertical glass plates for tempering. Lewis J. Forbes (to American Securit Co.). U. S. 2,170,749, Aug. 22. Various structural, mech. and operative details.

Increasing the resistance of glass, glazes or enamels to chemical attack. Deutsche Tafelglas A.-G. (Detag). Brit. 506,124, May 23, 1939. Addn. to 454,189 (*C. A.* **31**, 1571[4]). See Ger. 678,340 (*C. A.* **33**, 7980[4]).

Machine for bending vitreous tubes or rods to a predetermined curvature. The British Thomson-Houston Co. Ltd. Brit. 507,734, June 20, 1939.

Bricks, tiles, etc. Frank Humphris. Brit. 505,652, May 16, 1939. Bricks or other materials molded from clay, etc., are produced and dried by feeding the raw material into a slightly inclined drying drum that has a tubular shell with a central conduit, chambers and baffles or shelves therein and is intermittently rotated on rollers by continuously oscillating pawls that are moved by bell-crank levers, connecting rods and a variable stroke crank-pin on a rotary driving shaft, said pawls engaging teeth

on an annular ring on the shell. The granular material is fed from a hopper to rotating angle blades on 1 end of the drum and passes by gravity to the other end, where hot gases enter, the material then passing to a grinding mill and while hot to a molding machine.

Downdraft brick, tile and other kilns. Harold Randle Holding. Brit. 506,586, May 30, 1939. In kilns wherein the bag wall is extended upward to follow more or less the contour of the roof, the extended portion is formed to provide a passage that tapers in the direction of flow of the heating-gases or, alternatively, is flared in the opposite direction.

Ceramic compositions. The British Thomson-Houston Co. Ltd. Brit. 505,830, May 17, 1939. A ceramic mix comprises TiO_2 and a preformed substantially alkali-free glass adapted to bond the TiO_2 particles into a dense mass when the mix is fired to vitrification. The material is suitable for elec. insulation purposes, e. g., in condensers. Part of the preformed glass may be replaced by nonclayey bonding components, e. g., MgO, BeO, Ca Ti silicate.

Ceramic and refractory compositions. Albert P. de Sanno, Jr. Brit. 506,879, June 6, 1939. Ceramic or refractory materials are mixed with an aq. soln. of a protective colloid, e. g., glue, casein, gelatin, soap or a sulfonated C_6H_6 or $C_{10}H_8$ deriv., then incorporated with sufficient rubber latex to serve as a temporary binder, formed into articles and fired to burn out the latex. The ceramic material may be, e. g., a mixt. of clay, flint or feldspar, and the refractory material may be sillimanite, carborundum, fused SiO_2, graphite or "Alundum" together with sufficient clay to form by fusion a permanent binder for the article. Cf. *C. A.* **33**, 7982[5].

Refractory substances. Staatliche Porzellan Manufaktur Berlin. Brit. 506,698, June 2, 1939. Materials of great hardness and elec. resistance are prepd. by mixing 85–50 parts of a pure, alkali-free, nonfused Al_2O_3 with 17–57 of pure hydrated kaolin and, if desired, a little $Al(OH)_3$ and burning the mixt. at 1700–1800° after it has been shaped to form articles such as insulators, ball mills, grinding balls, mortars, nozzles, heating-tubes, crucibles and pyrometer tubes.

Ceramic tubing. John D. Morgan and Russell E. Lowe (to Power Patents Co.). U. S. 2,171,006, Aug. 29. App. is described, and a process for the manuf. of heat-conductant electrically nonconductant tubing, involving immersing a suitably dimensioned textile cord in a bath comprising a fluid suspension of refractory material, removing the textile cord and adhering refractory coating from the bath at a controlled rate, hardening the coating by maintaining the textile cord in a heated stream of gas as it emerges from the bath, building up the coating to a suitable wall thickness and baking the textile cord and coating in an oxidizing atm. to burn out the textile cord and set the refractory forming the walls of the tubing.

Furnace linings. Giovanni Bt. Crespi. Brit. 507,715, June 20, 1939. These are made by ramming pure calcined dolomite ground to the fineness of flour and rice grains, without any addns., and heating to the working temp. of the furnace. Fe wire or rods may be incorporated as a reinforcement. For the formation of steps, gas inlets, etc., Fe molds may be used and the 1st layer to be rammed may be mixed with tar or like adhesive.

Abrasive wheels. Roland J. Goodnow and Donald B. Wilson (to Bay State Abrasive Products Co.). U. S. 2,172,243, Sept. 5. Various mfg. details.

Abrasive articles such as wheels and disks. Norman P. Robie and Walter D. Rossow (to Carborundum Co.). U. S. 2,171,635, Sept. 5. Granular abrasive material is wetted with water and the wetted material is mixed with a dry powd. condensation resin to coat the granules, and the latter are dried and heated to form them into a desired unitary structure.

Apparatus for balancing abrasive wheels during manufacture. Orello S. Buckner and Donald B. Wilson (to Bay State Abrasive Products Co.). U. S. 2,172,006, Sept. 5. Various structural, mech. and operative details.

High-temperature resistant glaze suitable for use on zircon-ferrosilicon refractories, etc. John D. Morgan (to Power Patents Co.). U. S. 2,170,387, Aug. 22. A glaze is formed by the mixing and reaction of finely ground zircon about 90–50 and H_3PO_4 about 10–50 parts, and a small proportion of finely ground ferro-Si.

Enamel composition suitable for use on metal surfaces. Robert T. Hucks (to E. I. du Pont de Nemours & Co.). U. S. 2,170,658, Aug. 22. A protective and decorative coating compn. comprises a polyhydric alc.-polybasic acid resin contg. the acid radical of an oil having drying properties such as perilla oil together with a natural resin such as dammar resin, a plasticizer such as dibutyl phthalate, a pigment and H_3PO_4 about 1% or less, which serves to give good adhesion.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Progress in cement research. C. R. Platzmann. *Zement* **28**, 537–40, 553–7, 581–3, 594–6(1939).—A review. A. E. Beitlich

New developments in the burning of cement. H. Jordan. *Zement* **28**, 524–8, 540–2(1939).—A patent review. A. E. Beitlich

Affecting the initial hardening of high-alumina cements. F. Keil and F. Gille. *Zement* **28**, 195–9(1939).—Prolonging the mixing process from 2.5 to 10 min. causes marked increases in strength. The addn. of LiCl acts similarly, but the effect depends very much on the type of cement and the amt. present. A. E. Beitlich

Influence of the water-cement ratio on the strength of mortars. A. Ceresero. *Ind. ital. cemento* **1939**, No. 2, 51.—With the same qualities of cements different results in strength are obtained depending either on the sand used or the amt. of water. Tests made by C. prove that to affect comparative tests the same sand must be used, otherwise the amt. of water must be varied. A. Giannone

Industrial floors of concrete. A. J. Boase. *Ind. Eng. Chem.* **31**, 1435–6(1939).—Reply to Stratton and Hough (*C. A.* **33**, 3103[1]). Reply. R. C. Stratton and W. A. Hough. *Ibid.* 1436. C. G.

Bitumen in protecting iron and concrete. H. Boesenberg. *IIme Congr. mondial pétrole* **3**, Sect. 4, 432–34 (1937)(in German).—Bitumen can be used effectively in combating corrosion caused by aq. media. Difficulties encountered in the application of bitumen for such purposes are reviewed. A mixt. composed of 40% crushed stone of 3–5 mm. size and 60% of a mixt. composed of 70–75% natural asphalt, 10–15% bitumen and about 15% stone meal is used as a top coating to protect the iron and concrete used in the formation of road beds. E. J. Mahler

Corrosion of concrete. G. Malquori. *Ind. ital. cemento* **1939**, No. 3, 136.—Different types of corrosion of concretes, chiefly by sea water, are summarized. The chem. reactions that occur are described and studied. All the tests now used to evaluate the strength of a cement against corrosion tend to hasten the corrosion phenomenon, that is to shorten the time of the tests; therefore these tests are made in conditions quite different from those of practice. M. advises testing the strength of a cement against corrosion, in conditions as similar to those of employment as possible. A. Giannone

Use of bitumen for waterproofing foundations in construction work. A. Braeutigam. *IIme Congr. mondial pétrole* **3**, Sect. 4, 426–31(1937)(in German).—The use of bitumen as a waterproofing agent in construction work dating back to bible days is reviewed. Results obtained in railroad tunnels, subways, etc., in American and

European cities are cited. Specifications for standard German bitumen for waterproofing are mentioned. 10 references. E. J. Mahler

The German standard specifications DIN 1060 for building limes. Karl Goslich. *Tonind.-Ztg.* **63**, 561–3 (1939).—New specifications for hydraulic limes. A. E. Beitlich

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Refractory and acid-resistant mortars (Reinhart) 19. Rubber powder [for road purposes] (Brit. pat. 506,960) 30.

Apparatus for removing rings from cement kilns. Robert E. Boehler. U. S. 2,172,119, Sept. 5. Various structural, mech. and elec. details of an app. provided with an elec. motor.

Handling powdered materials, as in treating cement with air in a silo. Niels S. Borch (to F. L. Smidth & Co.). U. S. 2,170,258, Aug. 22. Various details of app. and operation

Cement and mortar mixtures. Edward W. Scripture, Jr. (to Master Builders Co.). U. S. 2,169,980, Aug. 15 Waste sulfite liquor is added to a hydraulic cement in a proportion of about 0.5–1.5 pints of liquor per sack of cement, and serves as a plasticizing agent.

Automatic apparatus suitable for weighing water for use in concrete batches. Geo. W. Misner (to Westinghouse Air Brake Co.). U. S. 2,170,249, Aug. 22. Various structural, mech., elec. and operative details.

Sealing or solidifying water-bearing strata. N. V. de Bataafsche Petroleum Maatschappij. Brit. 506,904, June 6, 1939. A soln. of asphalt bitumen in an org. solvent or a mixt. of org. solvents completely miscible with H_2O at the temps. existing is caused to penetrate the H_2O-bearing strata. Suitable solvents are pyridine, diammes, picoline, cinnoline, quinazoline, quinoxaline, ammopyridine or a mixt. such as pyridine and ales. The H_2O-retentive capacity of the strata may be increased as by bringing it in contact with a wetting agent. Fillers, e. g., clay, lime or ground basic slag, or soaps of heavy metals, e. g., Ca oleate or sulfonate or Fe naphthenate, may be added to the bitumen to vary its consistency or its penetration may be assisted by addns. of alkali soaps, sulfonates, naphthenates, etc.

Pavement. John B. Warden (to Barber Asphalt Corp.). U. S. 2,171,153, Aug. 29. A cold compacted stabilized mixt. of earthy materials has dispersed in it without substantial coalescence a solid bituminous compn. in finely divided form and including a water-insol. substance such as clay, which is capable of taking up moisture.

Forming expansion joints in concrete pavements Georg Wieland. U. S. 2,172,042, Sept. 5. Inserts are used formed of heat-conducting material having their side walls covered with fusible material such as bitumen or paraffin, and after embedding these bodies flush with the pavement they are heated for a short time to a temp. above the m. p. of the fusible covering material (after the concrete has become hard) and the insert body is withdrawn when its covering has become fused.

Expansion joints for paving and other constructions. International Latex Processes Ltd. Brit. 506,890, June 6, 1939. The joints are formed in a space between 2 spaced members, e. g., paving slabs, by filling the space, at least partially, with an uncoagulated latex foam and allowing the foam to form a rubber sponge *in situ*. The latex may be a natural latex or a coagulable aq. dispersion of elastic material, including artificial dispersions of rubber. The foam is preferably compounded with a material, e. g., NH_4 fluosilicate, an aq. emulsion of pine tar or a multivalent metal salt, to produce delayed coagulation whereby the foam after being poured into the joint space will gell on standing. The latex compn. also contains a low-temp. accelerator so that the sponge will vulcanize under atm. conditions. Among examples, a compn. consisting of centrifuged latex, KOH soln., S paste, di-Am NH_4 di-Am dithiocarbamate emulsion, ZnO paste and NH_4 linoleate is whipped to a foam in a whipping-machine, an 8% soln. of NH_4 fluosilicate is added and the compd. poured into the joint space.

Bituminous compositions. Baugesellschaft Malchow G. m. b. H. Brit. 506,577, May 31, 1939. Homogeneous mixts. of coal tar and petroleum bitumen are formed by selecting as the bitumen component an oxidized petroleum bitumen or one distd. under a high vacuum. The tar may be a viscous tar, very rich in pitch, of a dropping point above 25° or a tar of a dropping point below 25° and a low content, i. e., less than 40%, of anthracene oil. With a tar of dropping point less than 25° the bitumen employed has a softening point, Kraemer Sarnow, of at least 54°. A proportion of bitumen distd. under normal conditions may also be incorporated. Among examples, (1) a road-dressing comprises 50% of coal tar of dropping point about 30° and 50% of an oxidized petroleum bitumen of softening point 50–60°, and (2) a binder for a bituminous concrete comprises 50% of coal tar of dropping point 40°, 20% of normally distd. petroleum bitumen of softening point 54–58° and 30% of oxidized bitumen of softening point 75–85°. The binders may be used in making mastic-like masses in conjunction with natural asphalt powder or powd. limestone, sand and other aggregates.

Bituminous compositions. Albert E. H. Dussek. Brit. 507,850, June 21, 1939. A road dressing or grouting compn. consists of rock or mastic asphalt or Trinidad or petroleum bitumen to which a mineral filler, e. g., limestone, cement, slate dust, fine sand, has been added, with which ground or broken waste rubber has been incorporated at a temp. insufficiently high for it to dissolve. Particles of rubber may be scattered over the compn. after application.

Artificial stone. Richard Barker and Harold S. Wilson. Brit. 506,897, June 6, 1939. A portland cement-aggregate mixt. is gaged with H_2O contg. an aq. emulsion of whale oil, lime or magnesia and Na salicylate, which may also contain slate dust. The aggregate may be powd. shale, slate dust, residue sand, which may be from glass sand blasting, or granite chippings and the concrete or mortar may be molded into hard nonporous, waterproof blocks, slabs, etc.

Coloring stone. Colas Products Ltd. Brit. 506,934, June 7, 1939. Mineral materials, e. g., stone chippings, large stones, are coated with a thin layer of pigment, if desired with the aid of a liquid, e. g., H_2O, oil, that is fixed on the material by an aq. dispersion of a bituminous substance, e. g., bitumen, tar, that gels or dries to an insol. film. The colored material may be used for covering roads, floors, etc., for roof and wall coverings, for covering roof paper and as an aggregate for colored concrete.

Waterproof paint. Claude V. Smith. U. S. 2,170,163, Aug. 22. A paint suitable for use on surfaces such as cement, stucco, stone or brick is formed of $CaCl_2$, "lye," portland cement and water.

Porous building materials. Pietro Miglavacca. Brit. 506,949, June 7 1939. These are made by agitating or mixing hydraulic cement and H_2O in the presence of an alc. soln. of colophony and a soln. of strong glue while air or gas is injected through holes in the bottom of the mixing vessel. Alternatively, air or gas may be injected into a mixt. of strong glue and alc. soln. of colophony while it is agitated by means of beaters or mixers and the hydraulic binder subsequently added. Sand, powd. pumice, slate or cork, $Ca(OH)_2$ and solns. of bitumen may also be added. The frothed mixt. may be cast in molds which may be lined with bricks that combine with the porous mass to produce composite bricks.

Porous building materials suitable for insulation, etc. Hans Wolf and Hans Saenger (to I. G. Farbenind. A.-G.). U. S. 2,172,076, Sept. 5. A hydraulic binding material such as portland cement is used with about 1% or less of a sulfonic acid of an aromatic compd. contg. an alkyl radical such as a butylnaphthalene sulfonic acid.

Cellular building blocks and heat-insulating walls. Carl B. Robbins (to Calveras Cement Co.). U. S. 2,172,051–2–3, Sept. 5. Various mfg. and structural details.

Roofing granules. Clarence L. Colbert (to Empire Trust Co. as trustee). U. S. 2,170,445, Aug. 22. App. is described, and a method of making roofing granules which involves reducing a raw clay or shale to finely divided condition, mixing with water to form a plastic mass, forming into thin sheets, breaking to granular form, and subjecting to a firing temp. for hardening. 1

Asbestos-cement shingles. Wm. R. Wright, Jr. (to Patent and Licensing Corp.). U. S. 2,171,155, Aug. 29. A method of making shingles or the like from a wet mixt. of hydraulic cement and asbestos fiber comprises accumulating a plurality of superposed thin plies of the cement and fiber mixt. upon a substantially cylindrical but irregular surface to form a layer wherein the ply adjacent said surface has an irregular contour complemental in form to that of the surface and the successive superposed plies exhibit said contour to an increasingly lesser extent with the outermost of said plies substantially smooth, accumulating a plurality of superposed additional plies over the outermost of said first-named plies until a sheet of the desired thickness is built up on said surface, sepg. the sheet from the surface, subdividing said sheet into elements of suitable size and compacting the elements while still wet between surfaces of compressible deformable material to prevent substantial deformation of said irregular contour during compacting. App. is described. 2 3

Apparatus for feeding and distributing sludgy material or to surfaces, e. g., for applying hydraulic cement to shingle tiles. Bakelite Ltd. Brit. 507,012, June 7, 1939.

Preserving wood. John Bryan and Norman A. Richardson. Brit. 507,785, June 21, 1939. The wood is treated with H_2O-sol. Hg and Cr compds., if desired with the aid of vacuum and (or) pressure. Other substances, especially reducing agents, e. g., nitrites, sulfites, may be present. Suitable compns. are (1) $HgCl_2$ and K_2CrO_4, (2) $HgCl_2$, $K_2Cr_2O_7$, $NaNO_2$ and NaOH, etc.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

The combustion of motor fuels. Pekka Heinanen. *Suomen Kemistilehti* **12A**, 118-21 (in German, 121) (1939). A review. S. A. Karjala 4

Divinyl sulfide in commercial acetylene—isolation, identification and removal. D. J. Kennedy and A. C. Holm. *Can. Chem. Process Inds.* **23**, 490-5 (1939).—An org. I compd. was the cause of serious difficulties in certain synthetic processes using C_2H_2 derived from CaC_2. A method for detg. org. S consisted of combustion of the gas with air in a confined space, drawing the products of combustion through a scrubber contg. Na_2O_2 soln., and detg. the S as $BaSO_4$. The apparatus is illustrated and the operation outlined. Over 80% of the org. S was condensable from C_2H_2 gas at −80°. The liquid condensate contg., besides the S-bearing component, a large amt. of water, AcH, some AcOH and probably liquid phosphine. Fractionation of this liquid at reduced temps. and pressures in an apparatus consisting essentially of a boiler fitted with an electromagnetic stirring device, 4 condensers, cooled by dry ice, which could be isolated one from the other by means of Hg valves and a no. of receivers to which the contents of the condensers could be distd. About 95% of the S material was found to be divinyl sulfide. It is probable that the S unaccounted for was divinyl sulfide and some polymerization or decompn. product thereof. The actual divinyl sulfide or other org. S compd. content depends on the temp. of the reacting carbide during the slaking process, the higher temps. giving rise to higher org. S content. The presence of divinyl sulfide appears to have no effect on the stability of C_2H_2 and is of no practical importance in illumination or welding applications. Divinyl sulfide may be removed from C_2H_2 by scrubbing with Chloramine T or H_2SO_4, or by simply passing the gas through a suitable tower filled with activated C. 6

W. H. Boynton

Oxidation of carbonaceous materials to organic acids by oxygen at elevated pressures. R. C. Smith, R. C. Tomarelli and H. C. Howard. *J. Am. Chem. Soc.* **61**, 2398-2402 (1939).—Illinois bituminous coal, graphite and other carbonaceous materials have been oxidized to simple org. acids by O under pressure in aq. alkali at 200-250°. With lower-rank materials simple org. acids were recovered. With materials of higher rank than low-temp. coke, decreasing yields of org. acids were obtained. With graphite the chief product was CO_2. The effects of temp., time, partial pressure of O, catalysts, surface and nature of the alkali on the course of the oxidation of Pittsburgh seam coal were studied. Oxalic, trimellitic, pyromellitic, prehnitic and terephthalic acids were identified. A significant fraction forms nondistillable Me esters, indicating the presence of compds. more complex than the benzenecarboxylic acids. H. W. Leafy 8

Dangerous swelling pressures in carbonization practice. G. B. Foxwell. *Gas World* **111**, No. 2879 Coking Sect., 118-23; No. 2883 Coking Sect., 129-31 (1939).—A review. P. J. Wilson, Jr.

Methods and devices designed for the study of combustion in internal-combustion engines. R. Vichnievsky. *IIme Congr. mondial pétrole* **3**, Sect. 4, 400-5 (1937) (in French).—Review. Edward J. Mahler

Tests on four-cycle Sulzer Diesel with mechanical injection using heavy unrefined oil. Sulzer Co. *IIme Congr. mondial pétrole* **3**, Sect. 4, 390-5 (1937) (in French). Tests were carried out to compare the running periods of several hundred hrs. of a 4-cycle Sulzer Diesel engine equipped with mech. injection when operating on heavy unrefined oil, light fuel oil and unrefined fuel oil. A special arrangement for heating the heavy unrefined oil under pressure has been used successfully on the engine to permit the fuel pumps and injection nozzle to operate normally. While operating on the heavy crude oil the fuel pumps, upper piston rings and cylinder jackets showed evidence of appreciable wear owing to large amts. of clay and impurities in the fuel. Exhaust valves were clean and dry; injection nozzles exhibited no traces of appreciable wear, and no coke formed on the pistons, etc. The tests prove that Diesel engines with airless injection can be operated on crude oil if precautions are taken properly to preheat the oil under pressure. An instance is cited of such operation at a pumping station using Irak crude oil. Edward J. Mahler 5

Inflammability of the atmosphere in the crankcase of Diesel engines. H. Bara. *IIme Congr. mondial pétrole* **3**, Sect. 4, 494-9 (1937) (in French).—Tests were carried out to ascertain whether or not the atm. in the crankcase of Diesel engines was inflammable under normal running conditions. It was concluded that combustion is possible in the crankcase owing to the presence of finely divided droplets of oil projected into the crankcase and mixed therein with air. Hot spots may develop in the crankcase and thereby promote combustion of the oil droplets present. E. g., a substance heated to red heat and plunged into the crankcase will cause combustion if oil vapors are present. Introduction of inert gas into the crankcase is recommended as a remedy for possible explosions in Diesel crankcases. Edward J. Mahler 7

Production of hydrocarbons by synthesis. Werner Held. *Petroleum Z.* **35**, 493-5 (1939).—H. briefly surveys the coal-hydrogenation process and the Fischer-Tropsch hydrogenation of CO. The effect of catalyst, temp. and pressure and in the case of coal, the initial state of the material are discussed. Variations in the nature of the products formed in the hydrogenation of CO under different temp. effects, pressure changes and catalysts are shown in a table. Edward J. Mahler 9

Liquefaction of coal. III. Catalytic liquefaction of coal. Sintake Kurokawa, Kazuiti Hirota, Mituzo Huziwara and N. Asaoka. *Repts. Imp. Fuel Research Inst.*,

Japan No. 39, 79 pp.(1939); cf. Bergius, *C. A.* 20, 1313.—Oxides, chlorides, iodides, bromides and sulfides of various metals were used as catalyst either singly or in combination. In general halides are better catalysts, but they damage the inside of the autoclave. The phys. and chem. properties of the products depend upon the catalyst used. F. I. Nakamura

Experiments on coking properties of coal. H. W. Jackman. *Gas J.* 228, 84–5(1939).—See *C. A.* 33, 8387[7]. P. J. Wilson, Jr.

Influence of drying and grinding of coal on the flame combustion in powdered-fuel furnaces. Karl Cleve. *Arch. Warmewirt.* 20, 181–3(1939).—Fuels high in moisture, such as brown coal, require the addn. of more preheated air to the mill. Finer powdering shortens the flame. Ernest W. Thiele

Laboratory method of determining ash in coals. E. A. Galileeva. *Zavodskaya Lab.* 8, 668–71(1939).—For coals having an ash similar in compn. to clays contg. Fe the temp. at which ash detns. are made can be varied between 800° and 1400° without affecting the result. For brown coals and shales the ash content decreases with rising temp. owing to the decompn. of sulfates but const. results are obtained at 1100–1200°. In making an ash balance in such cases it is necessary to introduce corrections by detg. sulfates in coal and in lab. ash obtained at 800°. Differences between ash detns. in oxidizing and semi-reducing media were insignificant. B. Z. Kamich

Moistening of brown coal fines with steam. Fritz Schiffner. *Arch. Warmewirt.* 20, 92(1939).—The brown coal was heated to improve ignition, and material falling through the grate was reduced, by low-pressure steam admitted over the grate. Ernest W. Thiele

Grass peat and its utilization. Kuhei Kobayasi and S. Murai. *J. Fuel Soc. Japan* 18, 739–51(in English, a69–71)(1939).—Carbonization of grass peat gave the following constituents in percentage: gas 22, coke 40, gas water 30 and tar 8, the latter gave on distn.: distillate 6 and coke 1.6. Gas analysis gave in percentage: H 36.2, CH_4 18.9, CO 13.8, C_mH_n (...), CO_2 11.2, O 0.8, N 17.2 and calorific value of 5154 cal. Hydrogenation of grass-peat tar was carried out with Fe_2O_3 as catalyst; temp. 430°, reaction time 2 hrs., initial and final pressure 50 and 45 atm., resp., and max. pressure 240 atm. The properties of oil produced are: d. 0.820, fraction below 230° 60% and the degree of liquefaction 88%. F. I. Nakamura

Better flame combustion in the furnace by means of flame turbulence. Karl Cleve. *Arch. Wärmewirt.* 20, 149–53(1939).—Greater furnace capacity can be obtained by the use of a turbine-type burner, by the constriction of the furnace cross section above the grate, and by the use of high-pressure secondary air, properly directed. These all depend on good mixing of the flame parts. A diagram is given showing air velocities in front of a three-part turbine-type burner, when the parts are used separately and together. Ernest W. Thiele

Control of the operation of producers. Paul Fuchs. *Arch. Wärmewirt.* 20, 163–5(1939).—An elementary review. Analysis of cold producer gas is not sufficient to characterize the fuel for producers; a carbonization test is recommended. Ernest W. Thiele

Increase in capacity of grate furnaces for raw brown coal. Wilhelm Otte. *Arch. Wärmewirt.* 20, 65–7(1939).—A trough-type grate is provided with a ceramic radiation surface set over the center of the grate, to provide better drying of the feed. Ernest W. Thiele

The maintenance costs of steam-boiler furnaces. E. Uhthoff. *Arch. Warmewirt.* 20, 119–23(1939).—A review of 9 plants using brown coal, divided according to firing method. Apparently these costs are highest for powd. coal. Ernest W. Thiele

Three years at Perth. A. C. Rea. *Gas World* 111, 252–6(1939); *Gas J.* 228, 127–8, 133–4, 136, 138–9.—A bed consisting of 8 Glover-West *vertical retort*, each 50 in. × 10 in. × 25 ft. long, has been erected as the first of 5 proposed new beds. The new setting is heated by a step-grate producer equipped for pressure burning. During a week's working of the bed with combustion chamber temps. of 1200–1250° and a throughput of 4.1 tons of coal per retort per day, the proportion of fuel used (run-of-retort coke) was 8.89%. *Benzene* recovered amounted to 2.36 gal. per ton of coal, an efficiency of over 70%. Along with recovery of the benzene the S in the gas is reduced from 12 down to 7 grains per 100 cu. ft. Two to three months after *gas dehydration* was started the consumers' meters began to gum up. The trouble was relieved in 75% of the cases by application of a special meter oil to the meters *in situ*.

P. J. Wilson, Jr.

Utilization of waste heat in gas-engine cooling. D. W. Reeves. *Gas* 15, No. 11, 31–2(Nov., 1939).—It is more remunerative as regards waste-heat recovery to operate gas-engine cooling jackets at 220–250°F. than at about 160°F. as usual. The uses for steam are more numerous than for hot water and it is easier to maintain a const. jacket temp. at the higher point. A typical layout is described. Addnl. heat may be recovered from the exhaust gases. It is stated that from 4 to 5 lb. of steam at 230°F. can be recovered per brake h. p. R. W. R.

The gas industry in Switzerland. W. Tobler. *Gas World* 111, 280–3(1939).—See *C. A.* 33, 6560[8].

P. J. Wilson, Jr.

Experiments on gas manufacture. Robert Fife. *Gas J.* 228, 78–9, 83–4(1939); *Gas World* 111, 267–9.—Tests were carried out on 2 generators designed to gasify coal either completely or partially. A generator consisted of a vertical retort built on top of the water-gas generator so that the fuel which was charged into the top of the retort would travel down to the generator and on to the coke extractor. When extg. more than 400 lb. of coke per ton of coal charged to a generator with a capacity of 700,000 cu. ft. of gas per day it was frequently found that coal, almost uncarbonized, would appear among the extd. coke. The extractor seemed to be pulling down the central core of coke in the generator. There were indications that an air blast was short-circuiting through the less dense coke in the outer ring adjacent to the generator wall. When the plant was operated with complete gasification the heating value of the gas varied from 290 to 330 B. t. u., but a consistent quality could not be maintained. A generator with a capacity of 150,000 cu. ft. per day responded excellently in respect to gas output and quality. The best results were obtained in a 12-day test during which 500 to 600 lb. of coke was extd. per ton of coal charged. A cycle of 1½ min. blow and 5½ min. up-run, using 5 to 6 lb. of steam per min., was used. Production of a 383 B. t. u. gas amounted to 31,700 cu. ft. per ton.

P. J. Wilson, Jr.

New water-gas plant at Portland, Maine, effects economies. Alfred I. Phillips. *Am. Gas J.* 151, No 4, 21–6(1939). E. H.

Potentialities of future gas-production costs. Leon J Willier. *Gas* 15, No. 11, 15–17(1939).—As a result of a comprehensive study of gas-manufg. processes, the following conclusions were drawn: (1) That the thermal efficiency of present methods used for manufg. gas—coal gas and carbureted water gas—is so high that there is little possibility of materially reducing gas-production costs. (2) That fundamentally the 2 major processes used today in the manuf. of gas are the same as they were when originally developed—with changes and improvements only in design. (3) That a material reduction in gas-production costs is only possible in the production of valuable by-products. (4) That cracking Bunker C oil into gasoline, oil gas and coke; in a regular cracking plant, using the coke for generator fuel, reforming the oil gas and selling the gasoline seems to offer possibilities of a 35 to 40% reduction in the production cost of carbureted water gas. (5) That the max. amt. of gasoline that could be produced by the gas industry by such operation would be a small percentage of the total consumption and would have no effect on the gasoline market. (6) That cracking Bunker C oil as proposed would provide a total market for approx. 50 million barrels of fuel oil per year. R. W. Ryan

A vacuum-cooling system for gas dehydration. W. D.

Shively. *Gas* 15, No. 11, 37–8(1939).—Water cooled by a vacuum produced by steam jets was circulated through an indirect gas cooler of the finned tube type. In this way carbureted water gas compressed to 50 lb. gage was cooled at the holder inlet to 5 to 10°F. below the low temp. of the distribution system, thus partially dehydrating the gas and removing oil condensates. R. W. Ryan

The degree of accuracy of determinations of caloric value of gas by calorimeter. J. A. van Dijk. *Het Gas* 59, 246–50(1939).—A discussion of different types of calorimeters with their possible errors: unequal temp. of the combustion gases and the gas-air mixt. gives an error of ±2 kg.-cal. per cu. m.; difference in the amt. of water vapor entrained with the combustion gases and the amt. taken along by gas-air may produce an error of up to 40 kg.-cal. Radiation losses will occur unless the colorimeter water temp. is 2° lower than room temp. and may amount to 6 kg.-cal. per cu. m., lack of correction for emergent stem on thermometer 15–20 kg.-cal. per cu. m., faulty estn. of thermometer reading ±8 kg.-cal. per cu. m., error in meter 0.5% or ±20 kg.-cal. per cu. m. B. J. C. van der Hoeven

Incomplete combustion and excess air. Niccolò Cesareo. *Arch. Wärmewirt.* 20, 161–2(1939).—Diagrams are given for computing CO in flue gas and excess air ratio when fuel compn. and CO_2 and O_2 in the flue gas are known. Ernest W. Thiele

Total sulfur below 10 grains/100 cu. ft. Practice and results on a 140 million works with the oil-washing process. Norman Hudson. *Gas World* 111, 293–6, 308 11 (1939); *Gas J.* 228, 186, 191, 192–3, 245–8.—The gas, after removal of H_2S, is passed through a rotary brush washer, in which the wash oil is circulated at the rate of 25 gal. per 1000 cu. ft. of gas scrubbed. The enriched oil is treated as in an ordinary benzene plant. The S in the gas is reduced from 22–25 grains down to 7–9 grains per 100 cu. ft. Light oil recovery amounts to 2.5 gal. per ton of coal. P. J. Wilson, Jr.

Origin of lenticular nuclear softening by carbon monoxide. Leopold Breitenecker. *Deut. Z. ges. gerichtl. Med.* 30, 299–305(1939).—Careful observations of coal-gas poisoning showed that contrary to reports of Kalisko and Meixners, softening of the lenticular nucleus appeared in many cases from various Vienna hospitals particularly, if the poisoning had followed a slow course owing to external circumstances. Similar effects due to CO are independent of the toxic period. The Keber formula, poisoning effect equals concn. multiplied by time, is not entirely applicable for CO because the effect produced on the central nervous system by prolonged exposure of a low concn. is greater than that produced during a short interval by high concn. The constancy of localization of softening of the lenticular nucleus is important in medicolegal action. F. K.

The commercial dustproofing of coke. II. Survey of American and European practice. C. H. Noton. *Gas World* 111, 242–3(1939); cf. *C. A.* 33, 7526[5]. P. J. Wilson, Jr.

The influence of the return of fly coke on furnace operation and smoke production of chain grates. P. Noss. *Arch. Wärmewirt.* 20, 233–6(1939).—With coking coals fine combustible recovered from the flue gases can be successfully mixed with fresh fuel. With noncoking coals it is best blown into the furnace from the rear of the grate with secondary air; it then helps to ignite the front of the grate. Examples of this are described. Ernest W. Thiele

The use of coke breeze in producers. S. Qvarfort. *Schweiz. Ver. Gas- u. Wasserfach., Monats-Bull.* 19, 157–62(1939).—In reviewing the literature (e. g., Linsdale and Curtis, *C. A.* 30, 6924[4]) it is pointed out that usually breeze is taken to be coke between 12 and 3 mm. sizes; it has been the author's practice (Stockholm) to use −7-mm. breeze. This material is fired in 10 producers, one Koller, 5 Koppers, 4 AVG type, all of 2.6 m. internal width, conical grate, automatic ash removal, rating varying from 13 to 30 tons of coke per day. With a mixt. of 15–25 mm. coke (11% H_2O, 10% ash) with 33.4% breeze (all through 7 mm., 52% through 3 mm.) (8% H_2O, 14% ash) the daily throughput in a Koller machine was 17.8 tons (gross), lower heating value of gas 1100 kg.-cal. per cu. m., cold efficiency 73.2%, 7.9% carbon in ash. With 32.4% breeze in the same 15–25-mm. coke, breeze with 63% through 3 mm., all through 10 mm., the throughput was 16.8 tons per day in an AVG machine, gas of 1069 kg.-cal., 70.4% efficiency, 12.4% C in ash. With 6–15-mm. coke (9% H_2O, 16% ash) contg. 42.8% breeze (all through 10 mm., 63% through 3 mm., 12% H_2O, 13% ash) a throughput of 13.1 tons per day, 1028 kg.-cal. gas, 69.8% efficiency, 12.4% C in ash was obtained. Expts. with large-size coke contg. breeze showed that a tendency to blowholes appeared (AVG producer) for breeze contents above about 15% and screening out of −12-mm. breeze was necessary. Successful results were obtained with coke of 2.6% on 60 mm., 16.7% 40–60 mm., 32.3% 25–40 mm., 28.8% 15–25 mm., 9.6% 7–15 mm., 10.0% 0–7 mm., gas 1080 kg.-cal. per cu. m., 74.6% efficiency, 22.0 tons per day. In the producers used for the above work the fuel charging was all done with one central bell; only the Koppers producers had a fuel-distribution device. It has been the practice for the last 5 yrs. to add breeze of less than 7-mm. size regularly in amts. of up to 25% of coke of av. size 11 to 20 mm. For an av. throughput of 15 tons per day the allowable amt. of breeze varies with the size of the larger coke and its own breeze content; the max. amt. of material through 7 mm. allowable for this operation is around 30%. The amt. of breeze varies some with the type of producer. During 1938 the amt. of −7-mm. breeze varied between 17.7 and 28.0%, rating 11.5 to 16.5 tons per day, av. C in ash 13.3%, ash in coke (dry) 11.9%, dust loss 0.6%. It is concluded that screening out of −3-mm. breeze dust is not necessary for satisfactory operation. Increased dust content will primarily cause a decrease in rating, secondarily loss in efficiency. Hs. Deringer. *Ibid.* 289.—The above results are confirmed from experience in the Winterthur gas works. In a 2.1-m. producer with a rating of 85 kg. per sq. m. hr. coke of 40% unscreened dust, through 10 mm., was fired. When the 0–1-mm. portion is screened out more dust can be added without difficulties, fractionation of the dust and sandwich charging was found beneficial. At the 85 kg. per sq. m. hr. rating 60% breeze through 12 mm. was used over long periods, the coke analysis being 12% of 1–3 mm., 30% 3–8 mm., 18% 8–12 mm., 40% 12–20 mm., efficiency 75–80%, 4–5.5% CO_2. Small changes in grate construction made it possible to increase the no. of revolutions 50% with improved fire condition (model expts.). B. J. C. van der Hoeven

Regulations on coal-tar colors (Anon.) 12. Heat transfer in the radiant section of [steam heaters] (Lobo, Evans) 1. Waste problems of the Fe and steel industries [production of coke] (Hodge) 9. Brown-coal district in northwestern Bohemia (Pohl) 8. Acidizing gas wells in limestone formations (U. S. pat. 2,171,011) 22. Handling cement slurry in gas wells (U. S. pat. 2,171,840) 22. NH_4NO_3 explosive [for mining coal] (U. S. pat. 2,171,379) 24.

Fuel. Gewerkschaft Mathias Stinnes. Brit. 505,729, May 16, 1939. See Fr. 838,558 (*C. A.* 33, 6567[2]).

Motor fuels. Ivan Lovens. Brit. 506,230, May 24, 1939. The fuels, e. g., gasoline or a mixt. of gasoline, alc., C_6H_6 or heavy oils, are improved by addn. thereto of a product obtained by treating a nondrying oil, e. g., castor, olive, dissolved in a solvent, e. g., C_6H_6, toluene, white spirit, gasoline and MeOH, with O and H brought into contact therewith, e. g., by injection into the soln. Preferably, H and O are used alternately with excess of H. Absorption of the gases is improved by addn. of oleic or caprylic acid, $(AcO)_2Mn$ or C_2H_2 to the oil soln. Antidetonants may be added.

Olefin polymerization for motor-fuel production. Francis M. Archibald (to Standard Alcohol Co.). U. S. 2,171,250, Aug. 29. App. is described, and a process involving passing a mixt. of light hydrocarbons including iso-olefins through a bath of aq. H_2SO_4 of 55 to 85% concn.

at a temp. of from about 60 to 130° whereby polymers are produced, removing the reacted mixt. to a sepn. zone maintained under substantially the same reaction conditions and withdrawing the hydrocarbons from the acid phase.

Use of krypton, etc., for improving combustion in internal-combustion engines. Thomas Marshall, Jr. U. S. 2,169,844, Aug. 15. Combustion of hydrocarbons with air in internal-combustion engines is improved by adding to the fuel-air mixt. a readily ionizable gas such as KA, A, Ne, Xe, or He.

Apparatus for detecting leakage of internal-combustion engine gases, etc. Howe H. Hopkins (to National Carbon Co.). U. S. 2,171,113, Aug. 29. Various structural and operative details.

Apparatus for heating air for the combustion of fuel in suspension. Lambert Kooistra (to Babcock & Wilcox Co.). U. S. 2,170,145, Aug. 22. Various structural details.

Agglomerating fuel. N. V. Persbraadstofsyndicaat Persyn and Leender J. J. Hazelzet. Brit. 506,283, May 24, 1939. Finely divided material, e. g., anthracite, coke dust, brown coal, is mixed with an amylaceous binder and H_2O, kneaded and heated to cook the binder and convert it into a gelatinous paste, the mass being then transferred to another chamber and suddenly subjected to a higher temp. after which it is briquetted. App. is described.

Compressed fuel blocks. Olga Headland. U. S. 2,170,326, Aug. 22. Compressed blocks are formed with lignite and straw and a substantial quantity of alc. and are sealed with paraffin to prevent evapn. of the alc. and to serve as a binder.

Fuel pulverizer suitable for treating fuel fed to furnaces. Paul S. Dickey (to Bailey Meter Co.). U. S. 2,172,317, Sept. 5. Various structural, mech. and operative details.

Treatment of solid carbonaceous material. Hugh Quennell and Frederic Lloyd. Brit. 506,391, May 25, 1939. Noncoking coal is carbonized at 400–500° in an externally heated rotary retort of the kind described in Brit. 454,268 (*C. A.* 31, 1589[7]) and the coke, while still hot, is supplied to the grate of a combustion app. where it is burnt. The gas produced, after extn. of condensible products, is used either in the combustion app. to which the coke is fed, or for heating the retort which may, however, be heated by the waste gases of the combustion app.

Coking or heat-treatment of solid materials. Thomas M. Davidson. Brit. 507,236, June 7, 1939. Addn. to 475,727 (*C. A.* 32, 3590[4]). In a rotary retort of the kind described in 475,727, wherein the charge is heated while compressed into annular channels on the periphery of a cylindrical drum, the drum casing is formed from metal plates jointed to leave gaps between their adjacent edges. The annular members forming the lateral walls of the channels have a clearance from the periphery of the casing and have inwardly extending projections that engage in the gaps.

Carbonizing processes. Humphreys & Glasgow Ltd. and Eric C. Mengel. Brit. 506,994, June 5, 1939. In processes for carbonizing material, e. g., coal briquets, by circulating heated gas therethrough as described in Brit. 469,175 (*C. A.* 32, 753[2]), the material is charged in batches into a carbonizing chamber and rapidly discharged therefrom in batches into a rest chamber closed to the atm., the material being slowly discharged from the rest chamber, e. g., by a slow-running conveyor.

Firing soaking pit of other furnaces with a gas such as natural gas. Geo. M. Parker. U. S. 2,172,105, Sept. 5. A furnace structure is described and a method of firing a furnace with hydrocarbon gas of high calorific value consisting in, preliminarily heating a furnace reaction zone adapted to store and transfer heat to 925–1200°, then conducting hydrocarbon gas of high calorific value and preheated air into the zone, the ratio of gas to air being such as to effect the burning of part of the gas by the air and the reforming of the balance of the gas, with the formation of final products of a comparatively low calorific value and contg. a substantial amt. of free C, adding preheated air to the final products, burning the resultant mixt. in the furnace laboratory and controlling the character of the resultant flame by hydrocarbon gas of high calorific value fed into the laboratory under comparatively high pressure.

Firing furnaces, such as those used for melting glass, etc., with natural gas. Geo. M. Parker. U. S. 2,171,597, Sept. 5. Furnace details are described, and a method of firing a regenerative furnace with natural gas, which consists in introducing to a regenerative chamber, a mixt. of gas with an amount of air distinctly less than the theoretical proportion for complete burning of the gas, maintaining a zone in such chamber at a temp. of an order of 925–1200° to effect partial decompn. and reformation of the gas, exposing the gas-air mixt. to such temp. for a time effective to dissociate it into products including H and CO, with the H substantially preponderating in volume, and also including substantial amounts of free carbon, so that the reformed gas approximates the characteristics of producer gas, maintaining the reformation zone sufficiently free of O and CO_2 throughout the process, to avoid appreciable oxidation of the free carbon resulting from dissociation of the hydrocarbon content of the natural gas, adding air at the burner in a quantity sufficient to provide for complete combustion of the reformed gas and free carbon, in passing a portion of the hot gases resulting from complete combustion through an alternate regenerative chamber, and alternately utilizing a portion of the last said chamber as a high-temp. zone and therein effecting a continuation of said partial decompn. and reformation of the gas for further fuel supply to the furnace.

Continuous process of reforming natural gas. Geo. M. Parker. U. S. 2,171,596, Sept. 5. An arrangement of app. is described, and a continuous process of gas-making consisting in, preliminary heating a heat-transfer medium in a vessel to about 870–1200°, then internally heating said medium and simultaneously conducting natural gas and air into the vessel and into contact with the heat-transfer medium, the ratio of gas to air being such as to effect the burning of part of the natural gas by the air and the reforming of the balance of the natural gas into gas of lower B. t. u. heating value than natural gas, and with the formation of final products of a B. t. u. heating value corresponding to that of producer gas, the internal heating being to such an extent as is necessary to maintain the said temp. conditions and to effect the mentioned results.

Continuous process of gas making. Geo. M. Parker. U. S. 2,172,106, Sept. 5. App. is described, and a continuous process of gas-making consisting in, preliminarily heating a heat-transfer medium in a vessel to 870–1200°, and then applying heat to the medium internally of the vessel and conducting hydrocarbon gas of high B. t. u. heating value and air into the vessel and into contact with the heat-transfer medium, the ratio of gas to air being such as to effect the burning of part of the gas by the air and the reforming of the balance of the gas into gas of comparatively low B. t. u. heating value, with the formation of some carbon, and concurrently admitting steam to the vessel for reaction with said carbon to form blue water gas, with the formation of final products of a B. t. u. heating value of approx. from 120 to 160, the mentioned internal heating being to such an extent as is necessary to maintain the said temp. conditions and to effect the mentioned results.

Water-gas generation. Arthur R. Griggs. Brit. 505,724, May 16, 1939. In the back-running of a carbureted water-gas set by steam admitted to the superheater, the whole of the carburetor, or the upper part thereof, is bypassed by admission of steam to the generator through a pipe that connects the superheater directly or the lower part of the carburetor to the top of the generator. In Brit. 505,789, May 17, 1939, app. for the production of gases, e. g., water gas, by cyclic operation has the outlet side of a valve controlling the flow of air or other combustion-supporting gas subjected, when closed, to a cushion of steam pressure to prevent leakage therefrom or leakage of combustible gas therethrough in the reverse direction.

Oil-gas generators. Foreign Patent Rights, Inc. Brit. 506,776, June 5, 1939. These comprise a chamber housing a moving absorbent means to carry the oil into a combustion space for partial combustion with a controlled mixt. of air and steam, together with a chamber contg. metallic or nonmetallic disks having a catalyzing action to which the gases and vapors from the combustion space are admitted and issue therefrom as a fixed gas. The temp. of the gases in the combustion space is 1800–2800°F. and this temp. is reduced to less than one-third after passage through the catalyzing chamber.

Gas generator utilizing air and a liquid fuel such as gasoline. Wm. R. Robinson. U. S. 2,171,893, Sept. 5. Various structural and operative details.

Apparatus for generation and distribution of gas from materials such as liquefied butane and propane. John T. Dockery (40% to James P. McKey and 60% to Ernest L. Shelton). U. S. 2,172,021, Sept. 5. Various structural and operative details.

Power plant comprising a gas producer and gas engine. James Macdonald. U. S. 2,171,184, Aug. 29. Means are provided for causing a disproportionate variation in the ratio of water to air supplied to the engine while it is adjusting itself to a change in power demand and for thereafter maintaining the ratio of water to air at a valut appropriate to the new demand.

Converting hydrocarbon gas to carbon monoxide and hydrogen. Ernst Karwat (to Linde Air Products Co.). U. S. 2,170,265, Aug. 22. Various details of app. and operation suitable for effecting reaction of a C_nH_4-bearing gas with steam and O in heated coke.

Removing carbon monoxide from gases. Richard Brandt. Brit. 507,120, June 9, 1939. Addn. to 490,920 (*C. A.* **33**, 1478[8]). The method of 490,920 is modified by adding to the initial gas part of the main gas after its subjection to the steam catalysis, so as to allow for the variation of combustible gas produced, e. g., in the coke ovens. The addn. is particularly necessary during charging and discharging of the ovens. The added gas may be freed from CO_2 before admixt. and may be added to the initial gas before the latter is purified from H_2S. An addnl. catalyst that differs from the 2 catalysts of the process of 490,920 may be interposed between them or arranged between the 2 layers of the main catalyst, in order to obtain a refining of C_6H_6 hydrocarbons in combustible gases contg. them in addn. to CO.

Tar acids or phenol from tar oil, etc. Hubert L. Stewart (to Koppers Co.). U. S. 2,172,415, Sept. 12. A cyclic process for producing tar acids or phenol from tar oil or phenol-bearing material involves electrolyzing a Na_2CO_3 soln. in a cell having anolyte and catholyte compartments to produce NaOH in the catholyte compartment and $NaHCO_3$ in the anolyte compartment, continuously withdrawing the NaOH produced and with it producing tar acid salts or phenolates by reaction with tar oil or phenol-bearing material, similarly withdrawing and using the $NaHCO_3$ produced with production of Na_2CO_3 and returning the latter for further regeneration of the anolyte and catholyte solns. App. is described.

Coke ovens. Woodall-Duckham (1920) Ltd. and Francis B. Richards. Brit. 507,574, June 16, 1939. In a concrete supporting-plate for a coke-oven battery comprising a no. of sections supported at their transverse edges on pillars or arches in a manner that leaves expansion gaps, the plates are located relative to the pillars by projections on the latter that engage recesses on the plate edges, projections on intermediate rows of pillars engaging central recesses, and both projections being continuous with raised ribs on the plates built into the battery along its center line and preventing lateral movement of the plates.

Coke ovens. Woodall-Duckham (1920) Ltd. and Francis B. Richards. Brit. 507,576, June 16, 1939. In a coke-oven battery wherein the masonry is free to expand on a supporting pad, the pad is keyed to the masonry by a raised rib extending lengthwise of the battery.

Coke ovens. Woodall-Duckham (1920) Ltd. and Arthur T. Kent. Brit. 507,577, June 16, 1939. In a coke-oven battery supporting pad provided with transverse expansion gaps above alternate rows of edge-supporting pillars, the pad sections are formed integrally with intermediate rows of pillars, outer pillars of which are free if desired.

Regenerative coke ovens. Dr. C. Otto & Co. G. m. b. H. (to Carl Otto). Brit. 507,530, June 16, 1939. In an oven for producing gas and coke and provided with vertical heating-flues, the partition walls sepg. the regenerator chambers are provided with metal inserts to oppose the flow of gas between the chambers.

Coke-oven bracings. Woodall-Duckham (1920) Ltd. and Francis B. Richards. Brit. 507,575, June 16, 1939. A coke oven is braced by buckstays and longitudinal tie-rods, the lower rods being located beneath a composite supporting-plate formed with transverse expansion joints.

Coke-oven doors. Gustaf Edwin Salkvist (to Koppers Co.). Brit. 506,449, May 30, 1939.

Coke-oven door-operating mechanism. Gustaf Edwin Salkvist (to Koppers Co.). Brit. 506,448, May 30, 1939.

Coke-oven charging-hoppers. Heinrich Koppers G. m. b. H. (to Heinrich Koppers' Industrieele Maatschappij N. V.). Brit. 506,020, May 22, 1939.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

Waste problems in the petroleum industry. J. Bennett Hill. *Ind. Eng. Chem.* **31**, 1361–3(1939).— A review.
G. G.

Extraction of oil from asphaltic rocks and bituminous schist. Giorgio Roberti. *Ricerca sci.* **10**, 532–9(1939).— A discussion.
W. F. Bruce

Study of paraffins and petrolatums. Louis. *Bull. assoc. franç. techniciens pétrole* No. **45**, 31–6(1938).— Paraffins and petrolatums were fractionated under cathodic vacuum to ascertain the nature of their compn. and the distn. is followed by means of graphs. The Pechelbronn and Iran paraffins distil within a few degrees of each other. The petrolatums, on the other hand, had a wider but uniform boiling range and gave a larger distn. residue. The m. ps. and d. of the paraffin fractions increase regularly with the temp. The petrolatum produces solid hydrocarbons which differ from the normal paraffin hydrocarbons and oily constituents whose fluidity ranges from that of light oils to that of gels. The mol. wt. of the latter exceeds that of the original petrolatum. By solvent extn. of the petrolatum both solid and liquid products were obtained. The residue has an ointment-like appearance. Properties of the fractions are tabulated.
E. J. Mahler

X-ray spectrography of petrolatums. C. L. Alexanian. *Bull. assoc. franç. techniciens pétrole* No. **45**, 43–6(1938).— Petrolatum fractions furnish x-ray spectra as clearly as paraffins. The law of the no. of C atoms is applicable to petrolatums, but the intensity and no. of lines diminish regularly toward the end of the fractions studied and disappear entirely in the spectrum of the residue. The length of the chain revealed (33 to 49 C atoms) is greater than that appearing from the numerical value of the mol. wt. detd. by the cryoscopic method. It is the longest chains distributed in the mass of each fraction which impose their action upon the course of diffraction by the x-rays. Individual constituents of paraffins or petrolatums cannot be distinguished by diffraction spectra and lines of orientation except with a highly purified higher fraction.
E. J. Mahler

Absorption process of natural gasoline extraction. R. W. Machen. *Petroleum Engr.* **10**, No. 13, 47–8(1939).—

The present status of the process in the U. S. is stated. Filler-type, perforated plate and bubble-cap absorber towers are compared as to efficiency. The process is briefly described. E. J. Mahler

Examination of mineral oil wax crystals in polarized light. Burdet-Berthod. *Bull. assoc. franç. techniciens pétrole* No. 45, 37–42(1938).—Distillates extd. from Alsatian oil are classified into 2 groups: the lighter which are dewaxed on the filter press, and the more viscous distillates which are centrifuged. By microscopic examn., under polarized light, it is observed that the lighter distillates contain wax in the form of long ribbon-like crystals whose dimensions decrease as the viscosity increases. The wax contained in the viscous distillates is in the form of very thin plates. Centrifuging is started the minute long needle crystals begin to appear. Before dewaxing star-like crystals are also found in the distillate. Solvent dewaxing of the light distillate gives a slack wax which is readily sweatable, while the viscous distillate produces a foots-oil which is preferably redistd. to a distillate contg. large ribbon crystals. E. J. Mahler

Properties of wax residues from crude oil. E. Casimir and C. Creangă. *Petroleum Z.* 35, 511–17(1939).—The phys. and chem. properties of waxes obtained from paraffinic crude oils were studied. They contain 77–96% hydrocarbon., the balance being composed of resins, asphaltic materials and impurities. The hydrocarbon content comprises 21–48% higher hydrocarbons m. 91–92°, difficultly sol. in gasoline, Et_2O and other org. solvents, but sol. in $CHCl_3$ from which it is pptd. by abs. alc. at 20°. It is this fraction which forms the hard ceresin. The waxes also contain 6–13% of solid hydrocarbons m. 57–60° which make up the soft ceresin. The remainder of the hydrocarbons are liquids. The hard ceresin from wax resembles ceresin from ozocerites in appearance, sp. gr., soly., absorptive properties, etc. The retention no., which is an indication of the liquid-takeup of ceresins, etc., is defined as the loss of wt. of the ceresin by vaporization in percentage of the amt. of solvent employed. Analytical results are tabulated. Edward J. Mahler

Cracking of ozocerite at ordinary pressure in the presence of aluminum chloride. C. Otin and G. V. Cotruta. *Petroleum Z.* 35, 561–7(1939).—Rumanian ozocerite having the following properties m. p. 70.5°, d^{22} 0.9395, C 85.7, H 13.77 and S 0.14% was cracked in the presence of 2, 5, 15 and 25% $AlCl_3$. The products were distd. at atm. pressure at the rate of 1 drop every 3–6 sec., washed with NaOH and H_2O and dried over $CaCl_2$. The purified product was then weighed and fractionated into gasoline fractions boiling up to 150° and kerosene fractions b. 150–270°, and residue. From a study of the yields the following conclusions are made: The greater the amt. of catalyst the smaller the yield of liquid product, e. g., 300 g. of ozocerite with 2% catalyst yielded 210 g. liquid as against 135.7 g. with 25%. The yield of both gasoline and kerosene decreased with increasing amts. of catalyst except when 2% $AlCl_3$ is used in which case the gasoline yield was much lower than in the other expts. while the kerosene yield was much higher. As the amt. of catalyst was increased the d. of the fraction boiling in the same range decreased. The yield of unsatd. compds. (detd. by the P_2O_5-H_2SO_4 method) decreases with increasing amt. of catalyst. Exptl. results and properties of the products are tabulated. E. J. Mahler

Performance tests of lubricating oils in automobile engines. H. A. Everett and F. C. Stewart. *Penna. State Coll. Bull., Eng. Expt. Sta. Ser., Bull.* No. 44, 50 pp. (1939). E. H.

Influence of volatility and viscosity on the consumption of lubricating oils. C. A. Bouman. *IIme Congr. mondial pétrole* 3, Sect. 4, 487–93(1937)(in French).—Various internal-combustion engine and Diesel engine oils were tested under actual service conditions to det. the effect of the volatility and viscosity of the oil on oil consumption. The general conclusion is drawn that influence of volatility and viscosity on consumption depends to a large extent on the state of the engine and on operating conditions. Usually a decrease in the viscosity of the oil produces greater consumption, but the relation between volatility and consumption is not at all pronounced. E. J. M.

Lubricating-oil addition agents. E. Thomas. *Bull. assoc. franç. techniciens pétrole* No. 45, 49–66(1938).—The proper qualities which a good lubricant should possess and the methods employed by the refiner to produce such a lubricant are mentioned. Oiliness and friction resistance of a lubricant are discussed and methods used in the detn. of the coeff. of friction with extreme-pressure lubricants are described, e. g., the Martens, Wells, Woog and Charon methods. The use of fatty acids, various esters, and halogenated fatty acids to improve the oiliness of an oil and reduce friction is mentioned briefly, as is the use of antioxidants, viscosity-index improvers and pour depressors. A table is given showing the effects of the addn. of Paraflow to a mineral oil. E. J. Mahler

Recent developments in Diesel lubricating oils. G. L. Neely. *S. A. E. Journal* 45, 485–500T(1939).—Performance data are given and a new compounded oil is described. An important characteristic is the "limiting adhesion temp.," above which a given oil does not wet a metal surface with a fluid film of sensible thickness. H. A. Beatty

New Diesel lubricant using Ten-ol compound. A. C. Vobach and Faithe. *IIme Congr. mondial pétrole* 3, Sect. 4, 458–70(1937)(in English).—Ten-ol compd. is prepd. by condensing 1 part of unsatd. aliphatic acid with 2 parts by vol. of aromatic hydrocarbon at 135–50°F. in the presence of $AlCl_3$. The reaction product is washed free of sludge with HCl and steam distd. to recover an overhead product consisting mostly of a substituted fatty acid and some satd. fatty acid, and then sapond. with lime to produce a compd. contg. 1–2% of lime soap. This Ten-ol compd. is then blended with Diesel oils. Properties of Ten-ol Diesel oils and uncompounded oils are tabulated. A test program is described in which the compounded oil was compared with (1) a highly treated stable paraffinic oil, (2) a Gulf Coast naphthenic lubricant, (3) a high-S Smackover lubricant and (4) a 42% raffinate from solvent-treated Gulf Coast lubricating distillate. Lab. inspection tests for these oils are tabulated. Test results for all oils are given showing: total hrs. run, rate of oil consumption, time of blow-by increase, method of inspection during test, reason for shut-down, filter condition, cylinder and piston wear. The Ten-ol oil run lasted 1093.5 hrs. and pistons, rings, and liner were in exceptionally good condition at its completion. E. J. Mahler

Deterioration of lubricants in Diesel engines. Linc. *IIme Congr. mondial pétrole* 3, Sect. 4, 500–13(1937)(in French). After discussing the characteristics of deposits formed on aging and the factors entering into the service qualities of a lubricant, L. gives a summary of the observations made on the nature and extent of deterioration of Diesel lubricants in high-speed, mech. injection engines. Tables are given showing the complete analyses of the oils used in the aging tests. Tables are also given showing the results of analyses of oils used in Diesel motors with precombustion chambers, air reserves, turbulence chambers and direct injection. E. J. Mahler

Measurement of surface temperatures under extreme-pressure lubricating conditions. H. Blok. *IIme Congr. mondial pétrole* 3, Sect. 4, 471–86(1937)(in French).—A math. method is explained in which the temp. is shown to be proportional to $Cf\sqrt{P}V$, where P is the mean pressure, V the gear engaging speed, f the coeff. of friction and C a const. The surface temps. of several types of gears under extreme-pressure conditions have been calcd. and in some instances reach several hundred degrees. A method for calcg. the temp. at all speeds and a method of approx. calcn. are outlined in an appendix. E. J. Mahler

Testing extreme-pressure lubricants. W. J. D. van Dijck and H. Blok. *IIme Congr. mondial pétrole* 3, Sect. 4, 445–51(1937)(in French).—An improved testing device based on the four-ball method is described and its functioning explained. In this method 3 steel balls are clamped together and held at rest in a cup while a fourth ball spinning at a speed of about 1500 r. p. m. is pressed against

them. The friction torque is registered and the wear of the balls is measured for various loads. Two tests are employed, one run for 60 sec. with a heavy load—the so-called minute test—and the other run for several hrs. under a lighter load. Wear curves of typical extreme-pressure lubricants and photographs of wear areas on the balls are given. The efficiency of the method is discussed and compared with other methods. E. J. Mahler

Lubrication of ammonia compressors. C. H. S. Tupholme. *Ice and Cold Storage* **42**, No. 494, 73–5(1939).—A satisfactory oil must not congeal, must not break down and form gummy deposits or gaseous products and must be of sufficient body to lubricate and seal the compressor piston against leakage and avoid being readily atomized or swept out of the cylinder by the flow of refrigerant and so be carried through the system and deposited in the condensing or expansion coils. A. H. Johnson

The effect of extreme viscous friction on the surfaces of propeller blades. Henri Brillié. *Bull. soc. roy. belge ing. ind.* **1939**, 579–621.—A review of erosion and lubrication phenomena and the related theories. The relationship of phys. and chem. properties to lubrication is discussed. S. Bradford Stone

Purification of used motor oils. E. H. Edmund Gracfe. *IIme Congr. mondial pétrole* **3**, Sect. 4, 452–4(1937)(in German).—The main purpose in regenerating used lubricating oils in motor service is to remove foreign matter, e. g., by sedimentation, filtration or centrifuging. G. believes that the oil does not suffer so much as is thought from aging, emulsification and change in color. The extensive use of bleaching earths to restore the color of the oil to its original color is not advised. E. J. Mahler

Measuring the extent of dilution of used motor oils. Boisseaux. *IIme Congr. mondial pétrole* **3**, Sect. 4, 455–7 (1937)(in French).—Two methods are compared, viz., evapg. the volatile materials in a bath heated to 105–110°, and observing loss of wt., and second, distg. the volatile materials with steam and reading off the amt. of volatile matter after condensation. For engines operating on light motor fuels such as gasoline with or without alc., the loss of wt. method gives best results. However, with engines running on gas oils the second method called the "dilution trap" method (A. S. T. M. D-322-35) is more suitable. Test results are described for oils purposely dild. and for oils dild. in actual service. E. J. Mahler

Identification and analysis of asphalts. H. Suida and F. Motz. *Petroleum Z.* **35**, 527–33(1939).—It is pointed out that the present methods employed in the analysis of asphalts, e. g., fractional soln. or adsorption give only arbitrary results depending upon the solvents employed and the exptl. conditions. The authors describe and discuss a method comprising the following steps: The asphalt is first extd. with $CHCl_3$ at 20° to remove residual mineral oil and oil resin. Next follows a treatment with C_5H_5N at 20° to ext. residual asphaltic resin, and lastly, a similar pyridine extn. at 50° to remove residual hard asphalt. All extns. take place in an O_2-free medium and in the presence of continuously stirred adsorbent material e. g., fuller's earth. The method was tested on 4 asphalts, viz., Rumanian 200, Ebano 200, Spramex 200 and Selenizza natural asphalt with good results. Exptl. data are tabulated. The app. is shown diagrammatically. 30 references. Edward J. Mahler

Uses of bitumen in the cable industry. S. Beckinsale and A. King. *IIme Congr. mondial. pétrole* **3**, Sect. 4, 435–44(1937)(in English).—Natural and petroleum residual bitumens and compds. contg. them are widely used in: vulcanized cables, fiber-insulated cables, cable joint box compds., including terminal and outer boxes, insulating tapes, and protective coverings for cables and accessories. They have excellent dielec. and phys. properties. Blown asphalts, though used as constituents of some box compds., have not been used to any great extent for waterproofing cables owing to disappointing results obtained. Bitumen contg. appreciable quantities of wax break down under weathering conditions and their use must be avoided. The following properties of cable joint box compds. are discussed in some detail: soly. in CS_2, softening point, pour point, elec. strength, flash point, penetration, mineral content, segregation, S, acid and water content, power factor, specific insulation resistance and specific inductive capacity. E. J. Mahler

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Heat transfer in the radiant section of petroleum heaters (Lobo, Evans) 1. Polarographic method for detg. org. peroxides [in studying cracking gasolines and oils] (Dobrinskaya, Neiman) 7. Corrosion- and heat-resisting steels [used in oil refining] (Thompson) 9. Detn. of mol. wts. of high-boiling oil fractions (Rankaya, Shchegrova) 2. Stability of bitumen emulsions (Korzhuev, Gridchina) 2. Dimerization of petroleum hydrocarbons (Sparks, *et al.*) 10. App. for heating liquid bitumen (Brit. pat. 506,392) 1. App. for dispensing gasoline or oils (U. S. pat. 2,171,707) 1. Float-valve device for metering fuel oil (U. S. pat. 2,171,620) 1. Liquid hydrocarbons from olefinic gases (U. S. pat. 2,171,522) 10.

Pumping and agitating apparatus suitable for effecting oxidation of petroleum oils with air for producing asphaltic products. Earle W. Gard and Blair G. Aldridge (to Union Oil Co. of Calif.). U. S. 2,170,496, Aug. 22. Various structural and operative details.

Acidizing petroleum-producing formations in oil and gas wells. Robert E. Lee (to Lee Angular Drill Corp.). U. S. 2,171,416, Aug. 29. App. is described, and a method of acidizing petroleum-producing formations which consists initially in boring a vertical hole, then in drilling a plurality of angular openings at predetd. levels and angles from and with respect to the vertical bore hole, in packing off selective groups of said openings, in introducing into unrestricted groups of openings an acidizing agent through said bore hole, in changing the position of the discharge point of said agent with respect to the packing to obtain access to companion groups of openings and in introducing said acidizing agent.

Sulfonated mineral oils rich in sulfur content. Erich A. Wernicke (to Ichthyol Co.). U. S. 2,172,149, Sept. 5. By a process such as described in U. S. 2,121,845 (*C. A.* **32**, 6453[6]), there are obtained sulfonated S-bearing mineral oils which have their original S content substantially unimpaired, of light yellow-brown color, substantially free from objectionable odor, and clearly water-sol. Various examples with details of procedure are given.

Oil refining. Heliodor Rostin and Karl Schuster. U. S. 2,171,009, Aug. 29. In a continuous process, oil vapors, such as those of oils from coal or shale or naphtha oils, and reducing gases such as H or CO are conducted over the oölitic ore, minette, in the presence of steam and at a temp. of 300–450°, the proportion of reducing gases and steam being so adjusted that released S escapes from the reaction chamber in the form of H_2S and does not form permanent sulfide of Fe in the chamber.

Cracking oils. Hans G. Tovote. Brit. 506,532, May 30, 1939. The solidification point of hydrocarbon mixts. contg. paraffin wax is lowered by preheating the raw material, e. g., petroleum residues or distillates, to 752–896°F. and passing it into contact with masses having an extensive surface area for a regulated time of 10–60 min., the temp. and duration of the contact being regulated so that the formation of fractions boiling below 356°F. is restrained. Specified contact materials comprise gas cokes, cokes produced by carbonizing lignites or cracking lignite tars or mineral oils, pumice, blast-furnace slags, limonite, oölitic Fe ore, bauxite or cokes covered with Na silicate. Pressures of 83–440 lb. per sq. in. are used. App. is described.

Cracking and reforming oils. Universal Oil Products Co. Brit. 506,785, May 30, 1939. Divided on 501,560 (*C. A.* **33**, 6037[8]). Hydrocarbon oils are cracked and the cracked vapors are subjected to fractionation in 2 successive stages to recover gasoline fractions of desired boiling range, the fractionation in the 2nd stage being conducted in presence of gasoline fractions introduced from an extraneous source so as to sep. a gasoline fraction of desired boiling range and a heavier fraction which is subjected to

reforming and subsequent fractionation to produce a gasoline of high antiknock value. The cracking stage may comprise a single cracking coil but preferably heavy and light fractions are isolated in the primary fractionating tower of the system as a side cut taken off through a line and as reflux taken off through another line from the bottom of the tower, and these fractions are cracked separately in coils under conditions of temp. and pressure suitable to the respective fractions. App. is described. 1

Cracking and reforming oils. Universal Oil Products Co. Brit. 506,849, June 6, 1939. In a process for cracking and reforming oils comprising a distillate stock consisting substantially of gasoline of low antiknock value, the oils are cracked and reformed in presence of gaseous hydrocarbons and after immediate cooling to arrest further conversion the products formed are fractionated to sep. gasoline of required antiknock value, which is stabilized, the rich gases thus released being absorbed in an oil which is then subjected, together with the absorbed gases, to the cracking step. App. is described. 2 3

Cracking hydrocarbon oils such as topped crude oil. Bernard L. Krämer (to Universal Oil Products Co.). U. S. 2,170,333, Aug. 22. An arrangement of app. is described, and a process wherein an oil of relatively high b. p. is heated to cracking temp. at superatm. pressure in a heating coil, an oil of relatively low-boiling characteristics simultaneously heated to an independently controlled higher cracking temp. at superatm. pressure in a sep. heating coil, resulting heated products from both heating coils are passed through substantially the entire length of an enlarged insulated reaction chamber, also maintained at superatm. pressure, wherein they are subjected to continued cracking, the resulting vaporous and liquid conversion products withdrawn from the reaction chamber and introduced into a reduced pressure vaporizing and sepg. chamber wherein vaporous and residual liquid conversion products are sepd. and wherefrom they are separately removed, the vaporous conversion products subjected to fractionation for the formation of relatively high boiling and relatively low boiling reflux condensates which are returned, respectively, to the first-mentioned and second-mentioned heating coils for further cracking, fractionated vapors of the desired end-b. p. subjected to condensation and the resulting distillate is recovered; this comprises passing fresh charging oil for the process in indirect heat exchange with vaporous products undergoing the fractionation, commingling the thus preheated charging stock with the high-boiling reflux condensate, supplying the commingled materials to the first-mentioned heating coil and passing the low-boiling reflux condensate, prior to its introduction into the second-mentioned heating coil, first, in indirect heat exchange with the vaporous conversion products in the vaporizing chamber and then in indirect heat exchange with the vaporous and liquid conversion products prior to their introduction into the vaporizing and sepg. chamber. 4 5 6 7

Treating cracked hydrocarbon vapors. Horace B. Cooke and Malvin R. Mandelbaum (to Gray Processes Corp.). U. S. 2,172,436, Sept. 12. An arrangement of app. is described, and a method of treating cracked hydrocarbon vapors comprising motor fuel, to remove undesirable gum-forming constituents and impart improved qualities which comprises subjecting the vapors to contact with solid adsorbent catalytic material in a treating zone to effect polymerization of undesirable gum-forming constituents to products having b. ps. higher than that of the desired motor-fuel product, sepg. from said vapors said high-boiling polymers, thereafter condensing the treated vapors, intimately bringing said vapors prior to the aforesaid condensation thereof into contact with a liquid solvent to remove said high-boiling polymers therefrom, said solvent being a hydrocarbon deriv. capable of functioning as a valuable addition ingredient to the treated motor-fuel product to improve the properties thereof, controlling temp. and pressure conditions of said vapors during contact with said solvent to incorporate a portion of said solvent in the treated vapors, and controlling temp. and pressure conditions during condensation of said vapors to effect retention of a portion of said solvent in the condensate. Fuller's earth may be used as a catalyst. 8 9

Fractionating cracked vapors. Universal Oil Products Co. Brit. 506,784, May 30, 1939. Divided on 501,560 (*C. A.* **33**, 6037[8]). In a 2-stage process for the fractionation of cracked vapors comprising 1st- and 2nd-stage fractionating towers, the fractionation in each stage being controlled by recirculating condensate obtained from vapors passing to a subsequent stage, the gases and light vapors remaining uncondensed in the separators are subjected to further strong cooling in coolers to condense substantially all normally liquid components and the condensate obtained is sepd. from gases in a separator and subjected to stabilization. App. is described.

Treating cracked hydrocarbon oil distillates. Jacque C. Morrell (to Universal Oil Products Co.). U. S. 2,170,336, Aug. 22. In order to obtain a refined gasoline, a cracked-oil distillate while in heated vaporous condition is treated with H_2SO_4 contg. a monocarboxy org. acid of relatively low volatility such as chloroacetic acid or sulfanilic acid at a subatm. pressure.

Conversion of hydrocarbon oil. Claude W. Watson (to Texas Co.). U. S. 2,170,169, Aug. 22. An arrangement of app. is described, and a process which comprises introducing a stream of oil comprising liquid and vaporous constituents at cracking temp. into the upper part of an enlarged cracking chamber, maintained at a cracking temp under superatm. pressure, wherein liquid is prevented from accumulating, passing a condensate stock through a heating coil wherein the condensate is heated to a cracking temp. and utilizing the resultant heated products to constitute at least a portion of the stream of oil introduced into the upper part of the enlarged cracking chamber so that conversion of the hydrocarbons occurs by means of the heat supplied by the heated products, causing vapors and nonvaporized oil to flow downwardly in an unobstructed path through the cracking chamber, removing resultant products comprising vaporous and liquid constituents from the lower part of the cracking chamber and introducing them into the lower part of a subsequent cracking chamber wherein conversion is continued and wherein vaporous products rise in an unobstructed path, maintaining the subsequent cracking chamber at a cracking temp. under superatm. pressure, removing liquid residue from the lower part of the subsequent cracking chamber at a rate adequate to prevent the accumulation of liquid therein, removing sepd. vapors from the upper part of the secondary cracking chamber and passing the vapors to a fractionating zone where they are fractionated to sep. out a condensate and subjecting the condensate to cracking. 4 5 6

Dewaxing hydrocarbon oils. Leo D. Jones (to Sharples Corp.). U. S. 2,172,320, Sept. 5. App. is described, and a method of dewaxing a hydrocarbon oil stock which comprises diluting such stock with a solvent consisting of a low-boiling liquid Cl deriv. of an aliphatic hydrocarbon having a higher sp. gr. than the oil stock and with a hydrocarbon diluent of relatively low viscosity in a proportion of at least 25% by volume of hydrocarbon diluent to 75% by volume of normally liquid Cl deriv. diluent, feeding the mixt. so formed to a centrifugal bowl provided with a circumferentially extending filter surface at a temp. sufficiently low to effect pptn. of the major portion of the wax from the soln., sepg. the major portion of the wax from the soln. by centrifugal subsidence while a sufficient volume of oil is maintained within the bowl to avoid accumulation of substantial quantities of wax upon the filter surface, and finally discharging residual oil from the bowl and thereby projecting pptd. wax against the filter surface and separating said wax from such residual oil by filtration. 7

Dewaxing mineral hydrocarbon oils. Albert Schaafsma and Johannes M. Verstaeg (to Shell Development Co.). U. S. 2,170,508, Aug. 22. A process for dewaxing oil by mixing a liquid dewaxing agent of high solvent power for the oily components of the wax-bearing oil but low solv. for its waxy components involves the use of a mixt. of trichloroethylene and $\beta\beta'$-dichloroethyl ether as the de-

waxing agent and chilling of the treated oil mixt. to ppt. waxy components and sepn. of the material thus pptd.

Treating hydrocarbon vapors with zinc chloride for degumming. Franklin E. Kimball. U. S. 2,171,033, Aug. 29. A process is used which comprises bringing hydrocarbon vapors, contg. gum-forming impurities, into contact with a fused treating mixt. contg. approx. 70% $NH_4Zn_2Cl_5$ to prevent sepn. of $ZnCl_2$ and contg. approx. 30% $ZnCl_2$ to prevent sepn. of $NH_4Zn_2Cl_5$ at a temp. below 250° and at a temp. above the fusion temp. of the treating mixt., supplying $NH_4Zn_2Cl_5$ and $ZnCl_2$ to the treating-mixt., sepg. and withdrawing the hydrocarbon vapors from the treating mixt., withdrawing from the treating mixt. a mixt. of $NH_4Zn_2Cl_5$ and $ZnCl_2$ contg. products of treatment, partially liquefying the withdrawn hydrocarbon vapors to degum the hydrocarbon vapors, sepg. and withdrawing the degummed hydrocarbon vapors from the gum-contg. hydrocarbon liquid and withdrawing the gum-contg. hydrocarbon liquid. 3

Inhibiting gum formation in cracked gasoline. Geo. W. Ayers, Jr. (to Gasoline Antioxidant Co.). U. S. 2,171,780, Sept. 5. Formation of gummy substances during storage is retarded by the addn. of about 0.06–0.3% of a polyhydroxyphenanthrene compd. such as dihydroxyphenanthrene.

Gasoline hydrocarbons from gaseous hydrocarbons. Jacque C. Morrell (to Universal Oil Products Co.). U. S. 2,169,809, Aug. 15. A process for producing gasoline-boiling hydrocarbons from normally gaseous isoparaffin and olefin hydrocarbons comprises simultaneously bringing a normally gaseous isoparaffin and a normally gaseous olefin into contact with H_2SO_4 at a controlled reaction temp. and correlating the amt. and concn. of the acid, the reaction temp. and the proportion of olefin to isoparaffin to effect alkylation of the isoparaffin with the olefin as the principal reaction in the process with min. olefin polymerization, thereby chemically combining the normally gaseous isoparaffin and olefin to form a heavier hydrocarbon boiling in the gasoline range.

Gasoline from normally gaseous hydrocarbons. Frederick E. Frey (to Phillips Petroleum Co.). U. S. 2,170,367, Aug. 22. An arrangement of app. is described, and a process for the conversion of normally gaseous hydrocarbon mixts. contg. satd. and unsatd. hydrocarbons, such as those from oil cracking, into normally liquid hydrocarbons of the gasoline range which involves subjecting such a mixt. to a first thermal conversion step under 500–3000 lb. per sq. in. pressure at a temp. of 370–540° for a time to effect an optimum yield of normally liquid hydrocarbons, sepg. the latter from assocd. gases at 260–455° and at a pressure not greater than that of the first step and subjecting the remaining normally gaseous hydrocarbons sepd. to a second conversion at a pressure above 200 lb. per sq. in. and at a temp. of 540–815° for further formation of liquid hydrocarbons. 7

Recovery of gasoline hydrocarbons from gaseous mixtures such as those from oil cracking. David G. Brandt (to Power Patents Co.). U. S. 2,169,959, Aug. 15. An arrangement of app. is described, and a process in which the gases are passed through an absorption tower in countercurrent contact with an absorption medium such as a hydrocarbon oil and which involves passing the resulting rich absorption medium contg. the desired hydrocarbons and some lower-boiling undesired hydrocarbons from the absorption tower into a stabilizer, removing all of the undesired low-boiling hydrocarbons from the upper part of the stabilizer in vapor form and subjecting them to the absorbing action of an absorption oil while the removed hydrocarbon vapors and oil are passed in contact through a cooling zone, and thereafter the resulting cooled mixt. of absorption oil and absorbed lower-boiling hydrocarbons is introduced into the absorption tower as the absorption medium for recovering the desired hydrocarbons from the gases introduced thereinto. 9

Gasoline and fuel oil. John J. Downey and Wm. W. Murray (to Sinclair Refining Co.). U. S. 2,170,795, Aug. 29. An arrangement of app. is described, and a process for the manuf. of gasoline and fuel oil from asphaltic petroleum stocks contg. a high-boiling wax-bearing fraction of the type occurring in Calif. which comprises heating a stream of distillate oil to a high cracking temp. under superatm. pressure and controlling the temp., temp. gradient, pressure and time during the heating to prevent substantial formation of C therein, reducing the pressure on the hot oil products of the heating and bringing them into direct heat-exchange relationship with the asphaltic stock contg. the high-boiling wax-bearing fraction in a vapor-sepg. receptacle without prior heating of the asphaltic stock to a temp. at which substantial decompn. occurs, taking off from the receptacle a residual stock mixt. including the high-boiling wax-bearing fraction and a vapor mixt. including gas oil and gasoline; vaporizing the high-boiling wax-bearing fraction from this residual stock mixt. without substantial decompn. by the contained heat of the oil in an evaporator maintained under a pressure lower than that maintained in the receptacle, and condensing this high-boiling wax-bearing fraction and supplying it to the heating. 1

Apparatus for dispensing liquids such as gasoline from storage tanks. Warren H. De Lancey (to Gilbert & Barker Mfg. Co.). U. S. 2,171,687, Sept. 5. Various structural and operative details.

Hydrocarbon products by thermal conversion of materials such as gas-oil vapors. Mathias Pier, Walter Simon, Rudolf Becker and Fritz Stoewener (to Standard-I. G. Co.). U. S. 2,170,976, Aug. 29. Thermal conversions such as the production of gasoline hydrocarbons from gas-oil vapors are effected in the presence of a catalyst comprising a bleaching earth which can only be brought to swelling by treatment for at least 5 hrs. with a swelling agent such as water at about 100° and which has been subjected to such swelling. 4

Vapor-phase filtration of hydrocarbon vapors. Malcolm P. Youker (to Gray Processes Corp.). U. S. 2,170,180, Aug. 22. App. and various operative details are described for treating hydrocarbon vapors such as gasoline vapors to polymerize and filter out gum-forming and other objectionable constituents, with use of a fuller's earth filter. 5

Catalytic dehydrogenation of hydrocarbons. Alexis Voorhies, Jr. (to Standard Oil Development Co.). U. S. 2,170,437, Aug. 22. An app. is described, and a process for the catalytic dehydrogenation of a hydrocarbon, which involves passing the hydrocarbon through an annular chamber packed with a dehydrogenation catalyst, passing a fluid heating medium over the exterior of the annular chamber in heat-exchange relation therewith in a direction concurrent with the flow of reaction material therethrough whereby a hot zone is established in the reaction space, and then passing the fluid heating medium through the interior of the annular chamber in heat-exchange relation therewith in a direction countercurrent to the flow of reaction material therethrough, and maintaining indirect heat-exchange relation between the countercurrent flowing heating medium and the hydrocarbon for a substantial portion of the travel of the latter before it reaches the hot zone. 6

Purifying still residues of light-oil distillation. Frank W. Corkery (to Pennsylvania Industrial Chemical Corp.). U. S. 2,172,437, Sept. 12. Still residues resultant from the treatment and distn. of light oil derived from the by-product coking of coal which contain metallic sulfonates formed by acid purification and alk. neutralization in the light oil prior to distn. are purified by pptg. sulfonates from the still residue by agitating the still residue with low-boiling aliphatic hydrocarbon, wetting the ppt. by agitating the mixt. with water before the sulfonate ppt. coagulates, effecting stratification of the mixt. and settling of the ppt. expedited by injection of live steam into the mixt. to form a water layer contg. the sulfonates and a hydrocarbon layer contg. the other still residue ingredients in soln., sepg. the layer of still residue solu. and the sulfonate-contg. water layer, and by distn. recovering the still residue from soln. Cf. *C. A.* **33**, 1127[1,2,5]. 8

Apparatus for removing coke deposits from oil-conversion drums, etc. Geo. J. Langmyhr (to Standard Oil

Development Co.). U. S. 2,170,660, Aug. 22. Various structural, mech. and operative details.

Formation tester for oil wells. Christian Iden. U. S. 2,171,000, Aug. 29. Various structural, mech. and operative details.

Treating inorganic mineral slimes in oil wells. Abraham M. Herbsman (to Industrial Patents, Ltd.). U. S. 2,172,083, Sept. 5. An acid or alk. aq. suspension of a sulfonated glyceride such as a sulfonated fish oil or sulforated castor oil is introduced into that portion of a well in which there are accumulations of slime to be removed.

Handling cement slurry in oil and gas wells or the like. Arthur L. Armentrout and Ray Gudie (to Baggah Corp.). U. S. 2,171,840, Sept. 5. Various details of app. and operation, involving use of an elec. resistance device and depth indicator for detg. the position of slurry in a well bore.

Acidizing oil and gas wells in limestone formations. Paul G. Shelley (to Dow Chemical Co.). U. S. 2,171,011, Aug. 29. Aq. HCl is introduced in the presence of a relatively small proportion of a furan such as furfural, furoic acid or furfuryl alc., which serves as a retarder permitting deeper penetration of the acid.

Filter suitable for use with engine fuel oils. Thomas C. Makins (to Ruston & Hornsby, Ltd.). U. S. 2,171,004, Aug. 29. Various structural details.

Lubricating oil. Robert C. Cantelo (to Sinclair Refining Co.). U. S. 2,171,781, Sept. 5. A lubricating oil such as a hydrocarbon motor oil is rendered resistant to sludge formation and is given a reduced pour point by the addn. of about 0.5 3.0% of a metallic salt of erucic acid such as the Al salt.

Lubricating oil. Alfred Henriksen and Bert H. Lincoln (to Lubri-Zol Development Corp.). U. S. 2,172,382, Sept. 12. A lubricating oil of relatively low pour point and high film strength comprises a hydrocarbon oil such as one of 350 viscosity together with a small proportion (suitably about 1%) of a halogenated synthetic hydrocarbon oil obtained by halogenating (as by the action of Cl) to the extent of 5-20%, the condensation product obtained by the addn. of a halogenated wax such as chlorinated paraffin to a mixt. of an aromatic compd. such as naphthalene and a catalyst such as $AlCl_3$.

Refining lubricating oils. Ferdinand W. Breth (to L. Sonneborn Sons, Inc.). U. S. 2,170,628, Aug. 22. A petroleum lubricating oil fraction is brought into contact, at a temp. of about 40 150°, with bauxite activated by heating to about 315–870° and of about 30–60-mesh particle size, derived from bauxite ore having at least 20% of water of constitution and capable of removing asphaltic matter forming constituents to the amt. of at least 3% the quantity of the oil in the time of contact allowed.

Mineral lubricating oil. Arthur B. Brown and Fred F. Diwoky (to Standard Oil Co. of Ind.). U. S. 2,171,646, Sept. 5. A process for producing lubricating oil having a high viscosity index and a low true color from a mineral oil contg. naphthenic and paraffinic constituents involves extracting the mineral oil with an admixture of solvents selected from the group consisting of 60 to 40% chloroaniline and 40 to 60% cresylic acid, 85 to 40% chloroaniline and 15 to 60% of phenol, 60 to 40% of chloropnene and 40 to 60% of cresylic acid, to form two liquid layers, sepg. said layers and removing the solvents from each of the layers. Cf. *C. A.* **33**, 2325[5].

Hydrocarbon lubricating oils. Constantin Skrepinsky (to Standard Oil Development Co.). U. S. 2,170,626, Aug. 22. For producing a stable lubricating oil, a lubricating oil distillate is treated with a gas contg. free O about 5–7 cu. ft. for every 300 g. of oil per hr. at a temp. of about 205–232° for about 3–4 hrs., then treated with 1–30% H_2SO_4, and the acid sludge formed is sepd.

Sulfurized lubricating oil. Bert H. Lincoln and Waldo L. Steiner (to Continental Oil Co.). U. S. 2,172,285, Sept. 5. A lubricant which is corrosive to the Cu strip test, but which is suitable for use under extreme pressures, comprises a hydrocarbon oil together with about 1–4% of a base such as may be prepd. by sulfurizing unsatd. fat acid obtained from wood oil.

Lubricating oils from conversion products of the hydrogenation of carbon monoxide. Herbert Goethel and Heinrich Tramm. U. S. 2,172,441, Sept. 12. An arrangement of app. is described, and a method which involves subjecting the fractions, which are liquid at room temp., boil above 150° and comprise a substantial portion boiling closely above 150°, of hydrocarbon mixts. obtained in the catalytic conversion of mixts. of CO and H to a cracking treatment such as to yield a mixt. of hydrocarbons having a high content of unsatd. hydrocarbons, and subsequently subjecting this mixt. to polymerization in the presence of a catalyst.

Contact filtration of viscous lubricating oils for decolorization. Claude F. Tears (to Petroleum Processes Corp.). U. S. 2,171,377, Aug. 29. An arrangement of app. is described, and a process of treating lubricating oil, which comprises dissolving lubricating oil in a liquefied normally gaseous hydrocarbon solvent under pressure sufficient to maintain the solvent in the liquid state, heating and bringing the soln. into contact with adsorbent clay at a temp. in excess of 50° under pressure sufficient to maintain the heated solvent in the liquid state, sepg. the soln. from the clay under pressure sufficient to maintain the solvent in the liquid state and sepg. the treated oil from the solvent. Liquefied C_3H_8 may be used as the solvent.

Apparatus for testing the "gripping" point of lubricating oils. Charles C. Curtis (to Halstead Products Co.) U. S. 2,171,026, Aug. 29. Various structural, mech. and operative details.

Lubricant Armin J. Kraus (to Richards Chemical Works, Inc.). U. S. 2,169,918, Aug. 15. A highly viscous and stable lubricant suitable for lubricating gears, etc., comprises the product of polymerizing, by means of a catalyst consisting of a soln. of raw rubber in hepta and octa naphthenic acids, a readily sulfurizable mineral wax present in an asphalt base crude oil or a vegetable or animal oil or fat in the presence of a hydrocarbon material such as a naphthenic sludge, contg. naphthenic acids and capable of being polymerized without previous sulfurization.

Extreme-pressure lubricants. Clarence M. Loane and Bernard H. Shoemaker (to Standard Oil Co. of Ind.) U. S. 2,169,700, Aug. 15. A mineral lubricating oil has mixed with it about 10% or less of dodecene dithiocyanate or other org. compd. of the general formula $R(Y)n$ in which R is a substituent aliphatic or aromatic group or a metal, Y is a thiocyano or isothiocyano radical, and n is greater than 1.

Lubricant for gears. Gerald M. Fisher (to Socony-Vacuum Oil Co.). U. S. 2,170,495, Aug. 22. A heavy petroleum residuum is used with 5-20% of the resin remaining after distg. acid-treated and neutralized cracked petroleum distillate, such resin being hard and brittle, of a black color, sol. in heated petroleum oils and having an aromatic odor and the property of imparting adhesiveness to petroleum lubricants.

Voltolized sperm oil, etc., for use as a lubricant or for other purposes. Robert P. Russell (to Standard Oil Development Co.). U. S. 2,170,665, Aug. 22. By subjection of materials such as those contg. liquid wax ester components of sperm oil or spermaceti to a silent elec. discharge, a highly polymerized product is produced which may be used alone or in various mixts. as a lubricant or in coating or plastic compns., etc. The product may be subjected to hydrogenation, heat-treatment with reagents such as $AlCl_3$, BF_3, H_2SO_4 or alkali, and may be refined with clay, charcoal, acid, etc., and free acidic or hydroxyl groups may be esterified or otherwise neutralized. Products of extremely high mol. wt. may be pptd. or extd, from the voltolized product by diln. with solvents such as propane, *sec*-Bu alc., MeOH, acetone or CCl_4, with or without refrigeration or filtration.

Bituminous emulsions. Woodall-Duckham (1920) Ltd. and Edwin Arnold. Brit. 506,300, May 25, 1939. Addn. to 465,589 (*C. A.* **31**, 8153[9]). In the process of 465,589, wherein a H_2O-in-oil emulsion is made from the whole of the tar, pitch or bitumen, etc., and a part of the H_2O and an emulsifying agent, and this emulsion is then reversed by dispersion in concd. aq. solns. of an emulsifying agent,

the emulsifying agent used for the prepn. of the H_2O-in-oil emulsion consists of a soln. contg. farinaceous matter, e. g., starch, and an alkali or alk. salt, e. g., NaOH, Na_3PO_4, or a mixt. of such a soln. with an alkali alginate, and the emulsifying agent used for reversing the emulsion consists of an alkali-sol. protein and a small amt. of free alkali together with either an alk. farinaceous soln. or a mixt. of such a soln. and an alkali alginate. CH_2O may be added as a preservative.

Alkaline bituminous emulsions suitable for brushing or 2 **troweling.** Claude L. McKesson (to American Bitumuls Co.). U. S. 2,170,152, Aug. 22. A bitumen is dispersed in an aq. alk. soln. and a primary emulsifying agent is formed at the interface of the dispersed bitumen and the alk. soln. by reaction of the alkali in the soln. with acidic constituents naturally present in the bitumen, and a stabilizer is formed by the addn. of "calcium casein" to the soln., and the emulsion is neutralized with the acidic decompn. products of milk sugars to bring it to a pH of about 7.5–9.5.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

The network structure of cellulose. O. Kratky. *Silk and Rayon* **13**, 571–2, 634, 638(1939); cf. *C. A.* **33**, 6041[5]. — 3 The network structure of cellulose is considered to be made up of continuous chains of micelles connected by transverse micelles. During deformation, the entire system behaves like a single chain, especially if the proportion of the latter is small. The relative amts. of the crystd. and amorphous components depend on the history of the fiber. Native cellulose is practically all cryst.; a regenerated cellulose filament made from xanthate soln. may be largely amorphous. Soaking fibers in a gold chloride soln. and 4 exposing them to ultraviolet light result in filling the hollow spaces in the fibers with reduced gold. X-ray investigations of such fibers indicate an area of 50 to 70 A. in thickness between which there are narrow hollow spaces. The relation between the mech. properties and the degree of orientation is briefly discussed. Milton Harris

The ontogenesis and chemical structure of the vegetable cell wall. Kurt Hess, Wilhelm Weigin, Heinz Kiessig, Werner Engel and W. Philippoff. *Naturwissenschaften* **27**, 622–8(1939). —A review of development and structure of cotton fibers, differences between the phases of length growth and thickness growth, the change of cellulose from unordered form to regular mol. arrangement as found by x-ray and the presence of waxy material in the young fiber. The qualities of the primary and secondary wall materials 5 are compared in some detail. Whereas in the primary stage (length growth) waxes, phosphatides, protein, etc., 6 are formed in the walls, the second stage is primarily one of formation of cellulose lattice. The primary cellulose, present in small amts., is not in lattice form owing to the presence of the admixts.; removal of the latter spontaneously causes change to lattice form (x-ray, double refraction, swelling and viscosity evidence).

B. J. C. van der Hoeven

Björkman numbers of bleached cellulose. O. P. Golova and A. A. Metsler. *Bumazhnaya Prom.* **17**, 24–6 7 (1939). The Bjorkman no. is practically not affected by the pitch content in the cellulose, but it does vary with the degree of delignization of ordinary tech. cellulose. The lignin content in standard viscose cellulose varies from 0.14 to 0.39% when detd. in previously extd. cellulose by the method of Golova and Katz (cf. *C. A.* **29**, 6755[4]). In the Schwalbe and Becker method it varies from 0.97 to 1.2% without previous extn. The Björkman no. for viscose cellulose varied from 5.8 to 9.8. No conversion factor was found to relate the Bjorkman no. to lignin content as detd. by H_2SO_4. An increase in Bjorkman no. above 10–12 produced difficulties in converting the cellulose to viscose. The method of detg. the Bjorkman no. is given. B. Z. Kamich

Xanthation of cellulose in liquid ammonia. Philip C. Scherer, Jr., Lenard P. Gotsch, *et al. Bull. Virginia Polytech. Inst., Eng. Expt. Sta. Series Bull.* No. 39, 3–21 9 (1939); cf. *C. A.* **25**, 3826.—Cellulose xanthates sol. in H_2O were prepd. from tri-Na cellulosates and CS_2 in liquid NH_3 (I). Na halides accelerated the reaction between Na and cellulose in I. $NaNO_3$ accelerated the reaction between Na cellulosate and CS_2 in I. In the presence of I xanthates with a low degree of xanthation were obtained which decreased with further reaction, probably owing to the formation of ammono acid by-products with the solvent. Xanthation in the absence of I but in the presence of a small amt. of H_2O as catalyst led to the formation of di- and tri-xanthates after prolonged reaction. M. P.

The fast-growing rayon industry chooses the South for plant extensions. Reginald Trautschold. *Southern Power and Ind.* **57**, No. 11, 30–40(1939).—History and statistics are given for the Southern rayon industry, together with descriptions of the process, and flow sheets of the viscose, acetate and cuprammonium processes. In the manuf. of acetate rayon, somewhat less than a lb. of purified cotton linters is required per lb. of rayon, and in the viscose process somewhat more than a lb. of wood pulp; cotton linters are also used in the cuprammonium process. Chem. requirements are discussed. Av. requirements per lb. of rayon for steam are 46 lb., water 100–1000 gals. and electricity an av. of 2.5 kw.-hrs. The locations of the principal plants are given. R. W. Ryan

Safe practice in the viscose rayon industry. Wm. H Chesnut. *Ind. Eng. Chem., News Ed.* **17**, 658–9(1939). — A discussion of methods for ventilation, and control of toxic gases (CS_2 and H_2S) incident to the manuf. of rayon. Places in the manuf. operation where such hazards occur are pointed out and measures required to overcome these hazards are outlined. C. E. Curran

Determination and detection of viscose impurities. Ernst Kuhnel. *Kunstseide u. Zellwolle* **21**, 369–74(1939). —The detn. for routine testing is made by filtering under standard conditions a kg. of viscose dild. first with 500 cc. 5% NaOH and then gradually with 8.5 l. H_2O. A fine screen of Ni wire placed under the filter paper increased filtration speed. Before filtration the paper on the funnel was treated with 250 cc. 1% NaOH to swell the fibers and reduce the size of the pores. After the residue on the filter was washed several times with water it was washed into a beaker with H_2O and centrifuged in 4 portions. The clear liquid was decanted, the residues were combined and again centrifuged in a 100-cc. tube with the addn. of 15 cc. 0.5% rosaniline sulfate. The red-colored residue was transferred with H_2O and centrifuged again in a 15-cc. tube from which its vol. can be read accurately. This figure and the time of filtration give a valuable indication of the behavior of the batch in the plant. The impurities can then be detected microscopically. Mark Plunguian

Digestion with forced circulation at the Syas'sk plant. 8 I. A. Nagrodskii. *Bumazhnaya Prom.* **17**, 10–16(1939); cf. *C. A.* **33**, 5653[8].—By using forced circulation in the digestion operations in accordance with the Lurgi method improved results were obtained at the Syas'sk plant. At the usual density the cellulose was clearer and of somewhat better quality, and the waste was less. The digestion was reduced by 45 min. by increasing the temp. during impregnation to 110–114° and the final temp. to 148°. The SO_2 content in the lye was increased by about 0.5% and the rate of its decrease was less rapid. By using a specially designed thickener with the Lurgi app. the capacity of the digestion tanks was increased by 9%. Operating data are tabulated and graphed. B. Z. Kamich

Pulp woods of Manchoukuo. V. Chemical analysis and cooking experiments of Larix dahurica Turcz. Masuzo Sikata, Motoo Yamane and Hanzyutu Kin. *J. Agr. Chem. Soc. Japan* **15**, 542–6, *Bull. Agr. Chem. Soc. Japan* **15**, 98–101(1939)(in English); cf. *C. A.* **33**, 6044[4].—The

fiber length of the wood of *Larix dahurica* Turcz. was mainly 2.0–4.5 mm. An example of the analysis of the wood was: alc.-benzene ext. 3.70, cold-H_2O ext. 20.22, hot-H_2O ext. 21.31, 1% NaOH ext. 29.61, galactan 8.93, mannan 5.77, pentosan 11.78, hemicellulose 26.48, lignin 25.96, total cellulose 50.92, α-cellulose 37.12, β-cellulose 3.68, γ-cellulose 10.12, N 0.22, ash 0.35 and CH_3O 4.58%. The pulp was prepd. by cooking with Ca bisulfite. The bleached pulp contained α-cellulose 89.53–92.08, pentosan 0.65–3.40, ash 0.11–0.24 and Cu no. 0.50–1.17%. It may be used as the rayon pulp. Y. Kihara

Pulping of "anabiong" by the use of aqueous and alcoholic nitric acid. Mamerto Cruz, Jr., and Lilly Gomez. *Univ. Philippines Nat. and Applied Sci Bull.* **7**, 25–8(1939). —"Anabiong" (*Trema orientalis* (Linn.)), a Philippine wood species, was pulped by refluxing either sawdust or shavings with aq. or with alc. HNO_3, resp., and digesting the resultant product with dil. NaOH under low pressure. Unbleached pulp yields ranging from 27.6 to 35% were obtained under varying conditions. This pulp bleached easily and averaged about 74% α-cellulose. Exptl. papers were produced but no strength or other data regarding them are included. C. E. Curran

Manufacture of bagasse pulp. II. Digestion of bagasse with superheated water and bagasse pulp by soda process. Syosuke Tanaka and Muneo Koriyama. *J. Agr. Chem. Soc. Japan* **15**, 25–32(1939); cf. *C. A.* **33**, 2333[8].—When the bagasse was heated with H_2O under 5–6 atm. pressure for 2 hrs., the decrease of pentosan was most remarkable. When the bagasse was heated with 20% of NaOH under 3 atm. pressure, a superior quality of pulp was prepd. The pentosan content in the pulp was less than 4% and the Cu value less than 1%. There was no difference in the prepn. of pulp between the fresh bagasse and the one stored for half a year. Y. Kihara

Waste problems in the pulp and paper industry. Hervey J. Skinner. *Ind. Eng. Chem.* **31**, 1331–5(1939).—Effluents from paper deinking and strawboard require sedimentation. Sulfite wastes furnish SO_2, lignin, tanning exts., adhesives, cement "fixer," vanillin, etc., notably by the Howard process (*C. A.* **25**, 204; **28**, 4227[8]). The use of closed systems, supplemented by save-alls where necessary, has markedly reduced pollution load and may recover $100 worth of materials daily with a $10,000 investment. Foster Dee Snell

Utilization of rice straw. Nieves C. Portugal and Lilly Gomez. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 29–32(1939).—Rice straw was pulped by first treating with 1% soap soln. and bleaching with NaOCl, followed by digesting for 7 hrs. under 6–8 atm. pressure with a soln. contg. $NaHSO_3$, Na_2SO_3, NaOH and $ZnSO_4$. The resultant pulp, washed acid free, was boiled with 1% NaOH, washed and bleached. The unbleached yield was 37.9%, the bleached yield 26%, cellulose content 92%, pentosans 15–16%, α-cellulose content 91.5% (based on cellulose) and Cu no. 0.04–0.05. Papers were prepd. which had good tearing resistance. C. E. Curran

Controlling the properties of paper. A. R. Mathis. *Ind. chim. belge* **9**, 191–6, 254–8, 385–9, 429–35(1938); **10**, 94–7, 142–51, 188–94, 230–6, 355–6(1939).—After a brief outline of the manuf. of pulp and paper, the principal phys. and mech. tests and a few chem. tests to which paper is generally subjected are described. A. P.-C.

Strong acid. M. V. Muratov. *Bumazhnaya Prom.* **17**, 6–9(1939). - It is shown that the strengthening of acid with 8% SO_2 gas obtained from the pyrite furnaces in the acid department of a large cellulose paper plant is economically possible. B. Z. Hamich

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Cottonseed and the Southern Regional Research Laboratory [studies on cotton cellulose] (Lynch) **27**. Decomp. and gas production of cornstalks under anaerobic conditions at 28° to 30° (Nelson, *et al.*) **16**. Water of constitution and water of hydration of animal and vegetable textile fibers (Baroni) **25**. Modified starch [for sizing paper] (U. S. pat. 2,171,796) **28**.

Goidànich, G., Borzina, G., Mezzetti, A., and Viviani, W.: Researches on the Staining and Preservation of Wood Pulp Destined for Paper Making Carried Out at the Royal Station of Plant Pathology, Rome. Rome: Tipografia del senato del Dott. G. Bardi. 513 pp.

Increasing the reactivity of cellulose to esterification reagents. Arnold Marschall (to E. I. du Pont de Nemours & Co.). U. S. 2,172,447, Sept. 12. Before esterification, cellulose such as that of wood pulp is pretreated with a soln. of NH_4ClO_4 or other salt of Na, K, Li, NH_4, amine or substituted amine with H_2SO_4, HCl, $HClO_4$ or H_3PO_4, and is dried to a moisture content of less than 12%, based on the dry wt. of the cellulose.

Cellulose ethers. Hans T. Clarke and Carl J. Malm (to Eastman Kodak Co.). U. S. 2,170,009, Aug. 22. For etherification, cellulose such as sulfite wood pulp is treated with aq. caustic alkali of at least 40% concn., some of the liquid is removed by pressure and the resulting mass is treated with a bath contg. an etherifying halide such as EtCl and a tert. alc. of 4–5 C atoms such as *tert*-BuOH as a solvent.

Cellulose ethers. Charles R. Fordyce and Joseph G. Stampfli (to Eastman Kodak Co.). U. S. 2,172,242, Sept. 5. Cellulose having a viscosity of at least 20 centipoises is esterified with a bath contg. an acetal such as ethylene formal so as to cause soln. of the ether formed, and the reaction is terminated before the reaction mixt. becomes acidic. Numerous examples with details are given.

Alkali-soluble cellulose ethers. Frank H. Reichel and Walter F. Hindry (to Sylvania Industrial Corp.). U. S. 2,172,109, Sept. 5. See Can. 378,431 (*C. A.* **33**, 2334[8]).

Mixed esters of cellulose containing unsaturated acid radicals. Charles R. Fordyce and Gordon D. Hiatt (to Eastman Kodak Co.). U. S. 2,170,016, Aug. 22. Mixed esters such as a cellulose acetate-oleate-stearate in which the oleyl-stearyl portion constitutes at least 25% and the oleyl 4–19% of the ester are suitable *for coating metal articles exposed to liquids* such as conductors in elec. transformers, articles which are submerged in sea water, etc., and may be prepd. by the reaction on cellulose acetate of stearyl chloride and oleyl chloride (several examples with details of the manuf. of similar prepns. being given).

Apparatus for drying cellulose acetate or other materials in a continuous operation. Clifford I. Haney (to Celanese Corp. of America). U. S. 2,171,652, Sept. 5. Various structural, mech. and operative details.

Drying solid particles, e. g., of cellulose acetate. British Celanese Ltd. Brit. 506,138, May 23, 1939. Solid material in particle form is dried first by mech. means, e. g., passage between rollers or centrifuging, to remove about half the H_2O and then by causing the material to pass through a confined space substantially filled by the material to which internal motion is imparted in the space to prevent the formation of channels or packing and passing a current of drying atm. across the path of the particles.

Plasticized regenerated cellulose suitable for filaments, sheets, films, etc. James F. Power and Ernest G. Almy (to Atlas Powder Co.). U. S. 2,172,406, Sept. 12. Flexibility and softness with widely varying humidity are imparted to regenerated cellulose by treatment with a sorbitol sirup contg. a relatively large proportion of sorbitol and substantial proportions of saccharitols, Na salts of hydroxycarboxylic acids contg. 4–6 C atoms, tetrahydric alcs. and monoanhydrohexitols.

Flexible films, tubes, etc., comprising cellulose or its derivatives, etc. John C. Woodhouse (to E. I. du Pont de Nemours & Co.). U. S. 2,170,845, Aug. 29. Products are formed of regenerated cellulose, glycol cellulose, cellulose glycolic acid, or lowly esterified or etherified cellulose derivs. contg. only one ether or ester group assocd. with several cellulose units, together with a softener such as diethanol formamide or other *N*-hydroxyalkyl amide having a b. p. of at least 175° at a pressure of 760 mm. Hg and a soly. of at least 5% in water at 60–70°.

Cellulose pellicles suitable for use as wrapping tissue. Wm. F. Underwood and Henry S. Rothrock (to E. I. du Pont de Nemours & Co.). U. S. 2,170,827, Aug. 29.

A water-sensitive film suitable for use as a wrapping tissue is formed from an aq. alk. cellulose soln. contg., as a deformation-restricting agent, a softening agent for the film comprising an org. compd. such as bis-ethoxyethyl malate in sufficient amt. to restrict the deformation of the film to a max. of 3.0.

Cellulose films suitable for use as wrapping tissue. Frederick M. Meigs (to E. I. du Pont de Nemours & Co.). U. S. 2,170,828, Aug. 29. A water-sensitive film suitable for use as a wrapping tissue is formed from an aq. alk. cellulose soln. and contains, as a deformation-restricting agent, a softening agent comprising diethylene glycol diethoxyacetate or other ester of a carboxylic acid contg. an ether group having a hygroscopicity of from 1 to 80, a b. p. of at least 135° at a pressure of 12 mm. Hg and a soly. of at least 1% in water at 20°, the ester being in sufficient proportion to restrict the deformation of the film to a max. of 3.0. U. S. 2,170,829 relates to like use of a carbamic acid ester such as butoxyethoxyethyl carbamate.

Apparatus for collecting rayon. Hendrik G. van der Waals and George E. J. Wiessing (to American Enka Corp.). U. S. 2,171,485, Aug. 29. An app. for collecting rayon comprises in combination a spinning pot which is circular in cross section and a member of generally similar cross section located within the pot and of substantially the same height as the inner wall thereof but unattached to the inner wall, the member being provided with recesses in its outer wall to form spaces between the inner wall of the pot and the corrugated member to facilitate simultaneously removal of the member with a thread package formed therein and having inwardly projecting portions of such conformation as to produce a corrugated, endless inner embracing wall, thereby causing the member to form corrugations of sufficient size and shape to introduce slack throughout all parts of the thread package wherein resistance to contraction would otherwise occur whereby when the package is formed and dried, uniform shrinkage is produced.

Apparatus for cutting bundles of continuous rayon filaments into staple lengths continuously with their production from a spinning machine. Vereinigte Glanzstoff Fabriken A.-G. Brit. 507,289, June 13, 1939.

Relief screen and top construction for pulp digesters. Paul Boehm. U. S. 2,172,120, Sept. 5. Various structural details.

Wood pulp. Paul Beyer and Otto Primavesi. Brit. 507,696, June 20, 1939. See Ger. 667,149 (*C. A.* **33**, 2336[4]).

Apparatus for removing water from wood pulp, cellulose, etc. Olaf Qviller (to Fiber Making Processes, Inc.). U. S. reissue 21,201, Sept. 5. A reissue of original patent No. 1,995,011 (*C. A.* **29**, 3158[5]).

Supplying pulp to papermaking machines. Bernard A. Malkin. Brit. 507,131, June 9, 1939. Pulp from a head box enters a pond-chamber supplied with compressed air through a pressure-regulating valve and flow beneath a slice plate with provision for sliding adjustment and for local flexure of the lip to the wire-cloth of the papermaking machine. The top of the pond-chamber is domed to eliminate dead corners and contains a rotary shower pipe to wash the walls and dil. the pulp passing to the wire-cloth.

Cylinder papermaking machines. Walmsleys (Bury) Ltd. and Herbert C. Randell. Brit. 506,844, June 6, 1939. In a machine for making paper or board, wherein pulp is fed over a dam from an inlet compartment, 1 or both walls of the compartment are adjustable to vary the width thereof, the cross section available to pulp approaching the cylinder gradually narrowing.

Suction apparatus for papermaking machines. Ernest Poirier. Brit. 507,797, June 21, 1939. In papermaking machines having a vacuum box in which the vacuum is created by the discharge of H_2O from the box through a drop leg, the degree of vacuum is automatically controlled by a throttle valve regulated by the fluids discharged from the box.

Forming wire support for papermaking machines. Earl E. Berry (to Beloit Iron Works). U. S. 2,170,109, Aug. 22. Various structural features.

Apparatus for processing a Fourdrinier wire for reducing knuckles. Andrew Parves. U. S. 2,170,308, Aug. 22. Various structural, mech. and operative details.

Stock-feed box for papermaking machines. Earl E. Berry (to Beloit Iron Works). U. S. 2,171,739, Sept. 5. Various structural, mech. and operative details.

Single-ply drier felt, with asbestos facing, for paper machines. Wm. A. Barrell (to Lawrence Duck Co.). U. S. 2,172,430, Sept. 12. Various structural and mfg. details.

Treating traveling webs of material such as paper and cellophane, with waxes, dyes or other coating or marking material. Wm. F. Grupe (to Chambon Corp.). U. S. 2,170,140, Aug. 22. Various structural and operative details of an app. having an intaglio cylinder immersed in a heated bath of the treating material and cooperating with an impression cylinder.

Applying sheet-rubber coverings to large rolls such as those of papermaking apparatus. Frank S. Bowker. U. S. 2,172,005, Sept. 5. Various details of app. and operation.

Laminated paper suitable for wrapping butter, etc. Van H. Wilshire (to Specialty Papers Co.). U. S. 2,171,775, Sept. 5. A container for butter or the like comprises a wrapping which is sealed substantially air-tight and formed of a single waterproof and greaseproof pliable composite paper sheet having an inner surface of vegetable parchment and an outer surface of paraffin-contg. opaque paper of light color bonded by a layer of paraffin to the vegetable parchment, the outer layer having a surface coating of paraffin, bonded to the other portions of the wrapping where in contact therewith.

Apparatus and process for making fiberboard, cardboard, pulp board, wallboard, etc. Fulide Products Corp. Brit. 506,656, June 1, 1939. Newsprint, etc., to be made into fiberboard, etc., is placed on conveyors, compressed and defibrinated by pickers, spread into a loosely piled layer, impregnated with binder and compressed.

Cardboard, wallboard, etc. Jean J. Montpellier. Brit. 506,624, June 1, 1939. Heat-insulating cardboard, etc., impervious to hot or cold liquids and gases, e. g., for packing-cases, for preserving foods or for roofing, etc., is made, flat or corrugated, by adding, e. g., to wood pulp, paper pulp, etc., in a pulping machine kieselguhr and $Al_2(SO_4)_3$ and, after, e. g., 10 min., dearin and Na_2CO_3 in hot H_2O, and, after, e. g., a further 10 min., Na silicate in H_2O.

24.—EXPLOSIVES AND EXPLOSIONS

STORM

Making explosives then and now. Ernst Berl. *Chem. & Met. Eng.* **46**, 608–14 (1939).—B. discusses the manuf. of explosives and use of substitute raw materials in Germany during the World War, and reviews the present situation in the U. S. regarding availability of raw materials for explosives and improved methods of manuf. C. G. S.

Sixty-third annual report of His Majesty's inspectors of explosives (for 1938). R. A. Thomas, H. E. Watts, N. Fawcett and C. W. Ede. *Home Office Rept.* (Brit.) 1939, 38 pp.; cf. *C. A.* **32**, 9499[9].—The report discusses accidents with explosives, petroleum products and compressed gasses. In the manuf. of explosives there were 103 accidents (7 killed, 56 injured), while 301 accidents (33 killed, 314 injured) occurred in the use of explosives. Petroleum spirits caused 46 accidents, acetylene 10. Three boys were killed and 4 injured by explosions caused by experimenting with sensitive mixts. contg. S or P, chlorates or nitrates, etc. The explosion of a mixer in the

manuf. of Gelignite killed 6 and injured 29. Twelve explosions occurred in operations connected with the loading of detonators. A marked increase occurred in the use of sheathed explosives in coal mines, the usual sheathing material being $NaHCO_3$. Details of many accidents are discussed, including several abroad. Appendixes to the report include statistical data on accidents. C. G. S.

Velocity of detonation of mixtures of solid explosives with nonexplosive liquids. Tadeusz Urbanski and Tadeusz Galas. *Compt. rend.* **209**, 558–60(1939); cf. *C. A.* **33**, 6047⁶.—When the velocity of detonation, V, of a solid explosive mixed with various liquids is plotted against the percentage of liquid, the curves are mainly of 2 kinds: (1) as for hexogen in glycerol, V first decreases to a min. for about 10% and then increases to a max. for about 30%, and then decreases again; and (2) as for hexogen in $COMe_2$, precisely the opposite of the first, rising to a max. for 10%, then decreasing, etc. The effect seems to depend solely on the coeff. of elasticity of, and therefore on the velocity of, sound (c) in, the added liquid. Thus if V_0 is the velocity of detonation of explosive + liquid, and V_s that of the same amt. of explosive per vol. without the liquid, $V_0 - V_s$ shows increase in velocity owing to replacement of interstitial air by liquid. The values of $V_0 - V_s$ for hexogen with and without 30% of $CHCl_3$, iso-Am alc., castor oil and glycerol are, resp., 1025, 1170, 1380 and 1635, while the velocities of sound in these liquids are 960, 1270, 1450 and 1920; penthrite with 20% of several liquids shows similar results. This apparently confirms the theory that $V = C + W$, where W is the velocity of the explosion wave. C. A. Silberrad

Cleaning-plant safety. J. R. O'Hanlon. *Safety Eng.* **78**, No. 1, 18–20(1939).—Hazards in the dry-cleaning plant and methods of preventing fires and explosions are discussed. Ann Nicholson Hird

Explosives. Walter Friederich (to Dynamit-A.-G., vorm. Alfred Nobel & Co.). U. S. 2,170,943, Aug. 29. Disruptive or brisant explosives which have good stability contain an org. tetrazyl azide such as methyl or ethyl or acetone tetrazyl azides.

Ammonium nitrate explosive. Milton H. Wahl (to E. I. du Pont de Nemours & Co.). U. S. 2,171,379, Aug. 29. A granular detonating explosive suitable *for use in mining coal* contains NH_4NO_3 intermingled with a binding agent and a sensitizing agent such as smokeless powder, and is agglomerated in the form of aggregates of loosely bound structure having a size such that substantially all of them are held on a 50-mesh screen.

Nitrostarch explosives. Jesse B. Bronstein, Jr. (to Trojan Powder Co.). U. S. 2,170,629, Aug. 22. Nitrostarch 25–75 is used with nitroisobutylglycerol trinitrate 75–25% in explosives, coating compns., etc.

Blasting charges. James Taylor and Imperial Chemical Industries Ltd. Brit. 507,328, June 13, 1939. The self-sustained decompn. of a confined blasting charge comprising an alkali metal nitrite and 1 or more NH_4 salts is initiated by introducing into contact with a portion of the mixt. a liquid acid medium of at least 1 molar normal concn. having a H-ion concn. less than that of a 0.5 N HCl soln. and sufficient to decomp. the alkali metal nitrite, the acidic medium being thus capable, as it is consumed, of maintaining in the presence of the charge a pH capable of decompg. the nitrite. The confined charge preferably consists of a stoichiometric mixt. in granular form of $NaNO_2$ and NH_4Cl. The mixt. may be stabilized with a small proportion of soda ash or MgO. The acidic medium is preferably capable of maintaining in the presence of the charge a pH not greater than 5.2 and not less than 1.0. Acids that may be used are HCl, HNO_3, glycolic or butyric acid, AcOH, mono- or trichloroacetic acid, H_2SO_4, H_2CrO_4, $(COOH)_2$, tartaric, maleic, succinic or citric acid or H_3PO_4. Other liquid acidic media include (1) acid salts, e. g., NaH_2PO_4, $NH_4H_2PO_4$, (2) buffer solns., e. g., mixts. of AcOH with AcONa, (3) hydrolyzable salts of acid reaction, e. g., $ZnCl_2$, $ZnSO_4$, $Al_2(SO_4)_3$, $CuSO_4$, $FeCl_3$, $Na_2Cr_2O_7$, $K_2Cr_2O_7$, $(NH_4)_2Cr_2O_7$. $MgCl_2$, $MgSO_4$, $MnSO_4$, $FeSO_4$ and $Pb(NO_3)_2$ are not effective.

Testing for inflammable gases, as in mines. Georg Keinath and Heinz Gruss (to Siemens & Halske A.-G.). U. S. 2,170,056, Aug. 22. The gas to be tested is passed continuously through a reaction chamber, an addnl. combustible such as naphthalene is evapd. to the satn. point into the test gas, and an ignition spark is intermittently supplied to the gas and vapor mixt. (various details of operation being described).

Device for discharging carbon dioxide gas or snow for fire-extinguishing purposes. Soc. anon. Sicli (formerly Soc. anon. des Extincteurs S. I. C. L. I.). Brit. 507,776, June 21, 1939.

Fire extinguishing. Concordia Elektrizitäts A.-G. and Hans Kuhn. Brit. 507,527, June 16, 1939. An extinguishing agent, particularly for burning metals, consists of an emulsion produced by intimately mixing 250 cc. of an oil free from soap with 100–200 g. of MeBr and ethylene bromide and then adding, at short intervals and with vigorous stirring, 200 g. of H_2O at a time until 700 g. has been added. The H_2O is added at 17°.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Estimation of pseudocumidine in acid dyes. C. F. Jablonski. *J. Assoc. Official Agr. Chem.* **22**, 771–2(1939).—The method (technique described in detail) consists essentially in extg. an alk. aq. soln. of the dye with $CHCl_3$, adding N H_2SO_4, evapg. the $CHCl_3$, cooling to 3–5°, adding 0.1 cc. of 10% $NaNO_2$, after 1 hr. pouring into a mixt. of 5 cc. of 1% aq. soln. of Schaeffer's salt (β-naphthol-6-sulfonate) and 45 cc. of 2 N Na_2CO_3, developing the color by heating 1 hr. on the steam bath at 70°, cooling, extg. with AmOH, dilg. the AmOH ext. with an equal vol. of gasoline or ligroin, extg. with H_2O, evapg. on the steam bath, dissolving the residue in 150 cc. of hot water, adding 10 g. Na bitartrate and titrating hot with standard $TiCl_3$ in the presence of a current of CO_2; 1 cc. 0.1 N $TiCl_3$ = 0.00338 g. pseudocumidine. The method gave a 91.1% recovery from Ponceau 3R to which a known amt. of pseudocumidine had been added. A. Papineau-Couture

Alizarin red and alizarates. R. Haller. *Bull. fédération intern. assoc. chim. textile couleur* **3**, 381(1938).—The brightness of alizarin red, applied by a mordanting process, is obtained by a prolonged treatment of the dyed goods in a bath at 105°F. to 107°F. contg. soap, K carbonate and tin salts. The fatty bodies are not only constituent parts of a lake but probably assure its fine dispersion. If the operations could be simplified alizarin red might again compete with the azoic colors. J. E. Smith

Nitrones. V. Certain acyldiphenylmethanes and the dyes therefrom. Fritz Kröhnke. *Ber.* **72B**, 1731–5(1939); cf. *C. A.* **33**, 4246⁷.—$(p\text{-}Me_2NC_6H_4)_2CHBz$ (I) (Staudinger, *C. A.* **8**, 686), faintly yellow, m. 168°, which is readily obtained (88% from $BzCHO.H_2O$ and 2.4 mols. $PhNMe_2$ heated 1 hr. in AcOH on the water bath, or, as the HBr salt, m. 227–8°, in 60% yield from phenacylpyridinium bromide, $PhNO$ and $PhNMe_2$ allowed to stand 10 days in alc. at 20° or in 51% yield from $BzCH{:}N(:O)Ph$, $C_5H_5N.HBr$ and $PhNMe_2$ after 24 hrs. at 20°), is of interest because compds. of this type may be regarded as the leuco bases of dyes differing from those of the Ph_3CH series only by the intercalation of the CO chromophore. The *dye* itself was obtained in the form of the *perchlorate*, a deep-blue powder with Cu surface luster and sol. in org. solvents with deep-blue colors, by treating I in aq. HCl at 2° with a freshly prepd. aq. suspension of PbO_2, adding Na_2SO_4, filtering from the $PbSO_4$

and adding $NaClO_4$; the colorless *carbinol base*, tablets losing 2% at 67°, m. 153 4°, dissolves in AcOH with bright-blue color deepening on standing. The *oxime* of I, yellowish, m. 160°, also yields a deep-blue dye with PbO_2. No phenylhydrazone could be obtained. *Dimethiodide*, from I and MeI in MeOH in pressure flasks on the water bath, tables losing 6% at 39° *in vacuo* (*diperchlorate*, m. 281° (decompn.)). *Benzoyltetraethyldiaminodiphenylmethane* (60% from BzCHO.H_2O and $PhNEt_2$), m. 111–12° (often seps. as a *hydrate*), gives a deep-blue color with PbO_2 and AcOH, is also obtained from phenacylpyridinium bromide, $PhNEt_2$ and PhNO allowed to stand 7 days in alc. *p-Methylbenzoyltetramethyldiaminodiphenylmethane*, m. 125°, obtained in 77% yield as the *HBr salt*, m. 228–9°, from *p*-$MeC_6H_4COCHO.H_2O$, $C_5H_5N.HBr$ and $PhNMe_2$ in alc. on the water bath or from *p*-methylphenacylpyridinium bromide, PhNO and $PhNMe_2$ in alc. *β-Naphthoylbis(p-dimethylaminophenyl)methane* (30% from naphthacylpyridinium bromide after 6 days in alc.), m. 132°. *p-Chlorobenzoyl analog* (61% from the pyridinium bromide, PhNO and $PhNMe_2$ heated 1 hr. in alc. on the water bath), yellowish, m. 148°. *Bis(p-dimethylaminophenyl)acetylthiophene* (46% from the pyridinium bromide after 1 hr. in boiling alc.), yellowish, m. 168–9°. *Trimethylacetylbis(p-dimethylaminophenyl)methane*, from the pyridinium bromide after 5 days in alc. at 20°, m. 158–9°. These dyes give, especially on silk, blue to blue-green, on tannated cotton, green shades but they are hardly faster than the corresponding Ph_3CH dyes; one disadvantage is the ease with which they are hydrolyzed. C. A. R.

The determination of quinaldine in certain coal-tar colors. W. H. King. *J. Assoc. Official Agr. Chem.* 22, 777–81(1939).—A method (technique described in detail) is proposed for the detn. of quinaldine (2-methylquinoline) in dyes (more particularly Quinoline Yellow WS and Quinoline Yellow SS). It is based on the sepn. of quinaldine from the colors by steam distn. followed by extn. from the concd. steam distillate and pptn. from acid soln. as a salt of phosphotungstic acid, which salt may be weighed before and after incineration at 500–50°. Wt. of ash × 0.152 = wt. of quinaldine. The reactions involved are: $3C_{10}H_9N + P_2O_5.24WO_3.xH_2O \rightarrow (C_{10}H_9N)_3PO_4.12WO_3 \rightarrow HPO_3.12WO_3$. The test appears to be sensitive, 1–2 mg. of quinaldine in 100 cc. giving a distinct ppt. with phosphotungstic acid. While com. lots of phosphotungstic acid appear to be remarkably uniform, it seems advisable that each analyst check his own batch of the acid before accepting the recommended factor for conversion of ash to quinaldine. A. P.-C.

Determination of 1,4-dihydroxyanthraquinone in D & C Green No. 5 (Alizarine cyanine green F). G. R. Clark. *J. Assoc. Official Agr. Chem.* 22, 784–5(1939).—The method (technique described in detail) consists essentially in sepg. the intermediate by continuous extn. with Et_2O from a slightly acid soln. of the dye, in turn removing it from the Et_2O by a 5% NaOH soln. (with which it forms a characteristic reddish blue color), and detg. colorimetrically by comparison with a standard soln. of the intermediate in 5% NaOH. A 94% recovery was obtained of a known quantity of the pure compd. added to the dye. A. Papineau-Couture

Effect of light on erythrosin and bromo acid (tetrabromofluorescein). O. L. Evenson. *J. Assoc. Official Agr. Chem.* 22, 773–7(1939).—Aq. solns. of erythrosin fade rapidly when exposed to direct sunlight, while the fading in 47.5% alc. is much slower. I appears to be liberated from the erythrosin mol. and Br from bromo acid by the action of light. Certain other dyes, in the presence of erythrosin, are destroyed, as a result of the action of light on the erythrosin present. A. Papineau-Couture

The dyeing of staple and spun viscose rayon. Charles B. Ordway. *Am. Dyestuff Reptr.* 28, No. 21 (*Proc. Am. Assoc. Textile Chem. Colorists*) P613-15(1939).—The differences in phys. properties of viscose rayon from those of cotton necessitate changes from the established dyeing procedures for cotton. Formanil colors are a range of dyestuffs which are dyed directly as substantive colors and after treated with CH_2O at 49°–60° for 20 min., rinsed hot and finished. W. H. Boynton

Some new dyeing and finishing auxiliaries containing nitrogen grease and water repellents. J. Wakelin. *Silk and Rayon* 13, 740–2(1939).—A description of recently discovered compds. characterized by the grouping —CH_2NH— which offer new possibilities in dyeing and finishing. Milton Harris

Printing metallic effects on acetate rayon cloth. Raffaele Sansone. *Rayon Textile Monthly* 20, 519–20(1939).—Very fine metallic imitations can be obtained on highly lustered acetate rayon cloths by the use of dyestuffs possessing a special affinity for this material, at a low cost and with a fairly simple printing process. Four practical paste formulas and a formula for each of 6 colors for lustrous acetate rayon fabrics are given. *Ibid.* 587,588. Means of obtaining zigzag line effects, scaly or extra glitter effects metallic ground effects, white effects and means of projecting metallic effects for the printing pastes are given. W. H. Boynton

Tintinol process. H. L. Siever. *Am. Dyestuff Reptr.* 28, No. 21, (*Proc. Am. Assoc. Textile Chem. Colorists*) P612-13(1939).—The dyestuffs employed in the tintinol process are selected with the idea of maintaining the max. fugitive value for viscose rayon, acetate rayon, cotton, wool and silk and mixts. of these fibers. The process which is outlined is claimed to be simple in operation, economical and efficient. W. H. Boynton

Physical testing in the textile industry. Erwin J. Saxl. *Am. Dyestuff Reptr.* 28, No. 21 (*Proc. Am. Assoc. Textile Chem. Colorists*) P615-18(1939).—The instruments discussed include: stiffness tester, compressometer single-fiber tester, tension meter, conditioning oven twist tester, waterproofing tester and porosity tester. W. H. B.

An account of a new textile fiber. Claude Diamond. *Silk and Rayon* 13, 538-42(1939).—The constitution and properties of casein fibers are discussed and compared with those of wool. Milton Harris

Guanaco fibers. A. C. Whitford. *Textile Research* 10, 22-3(1939).—Examn. of the nails and the coarse hairs in both guanaco and guanoquito shows no startling variations in the hairs from the ancient and the modern animals. The single const. difference lies in the no. of scales per in., which is somewhat less in the archaeological materials of each class. W. H. Boynton

Determination of artificial fibers (staple fiber) in mixtures containing cotton and other vegetable fibers. Arnaldo Cappelli and Riccardo Tuffi. *Ann. chim. applicata* 29, 231-40(1939).—The method consists in extg. the fibers in a boiling soln. of basic ZnClO, which dissolves the artificial fibers, leaving cotton or other vegetable fibers intact. A 60° Bé. soln. of ZnClO soln. is used (sp. gr. 1.835). A. W. Contieri

A preliminary investigation of the constituents of flax straw during water retting. Jean F. Couchman. *J. Council Sci. Ind. Research* 12, 183–90(1939).—Methods have been devised for the analysis of flax straw, and the detn. of pectin is described in detail. Samples of unretted, partly retted and fully retted straw were analyzed. One sample was removed from the ret at the end of 3 days, and the other sample at the end of 7 days, the temp. of the ret being 33°. The losses due to retting were 11 and 13.2%, resp., for the partly retted and fully retted samples. The total pectin content fell from 2.2 to 0.8% during the course of the ret, most of it being lost during the first 3 days. S. L. Gerhard

The use of hydrogen-ion and acidimetric determinations for indicating the end point of a bacterial ret. A. M. Munro and Jean F. Couchman. *J. Council Sci. Ind. Research* 12, 191–202(1939).—The pH value alone gives only a slight indication of the progress of the ret, and cannot be used as a criterion for the detn. of the end point. Electrometric titrations of the retting liquors from day to day make it possible to regulate the ret so as to produce a fiber of uniform quality. Retting to the point where the amt. of 0.2 *N* NaOH required to raise the initial pH value through one unit remains approx. const. after 24 hrs. produces a uniform fiber for different types of straw, and

may be taken as the earliest point at which a ret may be stopped to produce a shiveless fiber from the scutching machine. S. L. Gerhard

Water of constitution and water of hydration of animal and vegetable textile fibers. A. Baroni. *Gazz. chim. ital.* **69**, 435–43(1939).—Silk (I), wool (II), cotton (III) and rayon (IV) (Bemberg, viscose and acetate) were dehydrated completely by heating the I at 140° and the II, III and IV at 110°, the anhyd. fibers were hydrolyzed at 25° by an air current at various relative humidities and the proportions of water as a function of time were detd. The fibers were then immersed in water in a Dewar thermostat and the increases in temp. measured. This gave the *intermediate heats of swelling*. The *total heats of swelling* were detd. by hydrating in a calorimeter the anhyd. fibers in air satd. with water at 30°, and measuring the increases in temp. as a function of the water absorbed. The curves of total swelling were of the same general character as those of intermediate swelling. The curves of the heat of swelling of the animal fibers (I and II) were different from those of the vegetable fibers (III and IV), i. e., whereas the curves of III and IV had relatively continuous trends, the curves of I and II ascended sharply at 1.5 and 2% humidity, resp. This discontinuity is attributable to the presence in the animal fibers of 2 different types of water viz., water of constitution and water of hydration. Analogous results were obtained by tensimetric examn. of the dehydration of the various fibers. The heat of hydration of the dry fibers diminished rapidly with increase in the water content, and with a water content of 5% the heat of hydration was not over 1/3 of the total heat and with a water content of 10% this heat was only 0.1 of the total. Hence only the 1st part of the water absorbed is responsible for most of the heat evolved. This too indicates the existence of water of constitution and of simple hydration in the animal fibers. The energy expended in the formation of bonds for the water of constitution must represent a quantity of heat greater than that of simple hydration (cf. Champetier, *Bull. soc. chim.* [5], **5**, 577(1939)). C. C. Davis

Experiments on the preservation of ramie lines in sea water by impregnation with latex. B. Markus and J. W. van Dalfsen. *Arch. Rubbercultuur* **22**, 211-22(1938).—Ramie lines are more durable on immersion in water when vegetable-tanned initially than when impregnated with compounded latex alone. Lines treated both ways lose tanning ingredients more slowly, because of encasement in rubber, which retards the leaching action in proportion to its weight ratio. Fibers of the line ultimately putrefy when the tanning agent has all been lost by diffusion. The rubber sheath is still intact when this happens. D. E. Cable

Recent progress in the discovery of auxiliary products for textile industry use. Gordon-Abramov. *Rev. gén. mat. color.* **43**, 349–51(1939).—A review of paterts and some literature. Halsey E. Silliman

Technical evaluation of textile finishing treatments: flexibility and drape as measurable properties of fabric. Lelia J. Winn and Edward R. Schwarz. *Textile Research* **10**, 5–16(1939). W. H. Boynton

Quantitative microscopical analysis of mixed febrics. Hazel M. Fletcher. *Am. Dyestuff Reptr.* **28**, 624–6 (1939).—If one kind of fiber constitutes a very small percentage, microscopical analysis is often better than a chem. analysis. Blends of viscose, rayon and linen, or of viscose, rayon and cotton can be analyzed by dissolving the rayon in $Ca(SCN)_2$, but microscopical analysis is more rapid. Two methods of analyzing microscopically the usual blends of fibers are outlined. The percentage by vol. of each fiber can be expressed by the equation: percentage of fiber $A = 100n_aw_a/(n_aw_a + n_bw_b)$ and percentage by wt. of each can be expressed by the equation: percentage of fiber $A = 100\ n_aw_ag_a/(n_aw_ag_a + n_bw_bg_b)$, where n = no. of fibers, w = av. wt. of camera-lucida drawings of the cross sections and g = sp. gr. of the fiber. A table shows comparisons by chem. and microscopical analysis of several mixed fabrics. W. H. Boynton

Photochemical decomposition of the cystine in wool. Henry A. Rutherford and Milton Harris. *Textile Research* **10**, 17–21(1939).—Data confirm the hypothesis that the primary action of the radiation which results in a change in the state of the S and the corresponding lowering of the cystine content is independent of the moisture in the system. Moisture plays an important role in the secondary process, namely that involving the evolution of H_2S from the irradiated fibers. Decompn. of the cystine resulting from the thermal reactions under the conditions of expts. is negligible. Apparently the initial stage of the photochem. decompn. is an absorption of the radiant energy resulting in the dissocn. of the R–S–S–R group, probably into $R\text{–}S^+$ and $R\text{–}S^-$ ions, a reaction not catalyzed by moisture. A possible secondary reaction would be the reaction of the products of the primary process into water to form RSH and RSOH compds. The latter are unstable and generally decomp. with the liberation of H_2S. Also in *Am. Dyestuff Reptr.* **28**, 655–6, 678(1939); *J. Research Natl. Bur. Standards* **23**, 597–601(1939) (Research Paper No. 1255). W. H. B.

Calibration of silk-porosity meters. J. Teres and Philip Sharnoff. *Rayon Textile Monthly* **20**, 589–90 (1939).—The porosity meter with a rotameter developed at the National Bureau of Standards for calibration insures accurate measurement of porosity. W. H. B.

Sericin. V. Changes of silk proteins by heating with water. 2. Takeo Ito and Kozo Komori. *J. Agr. Chem. Soc. Japan* **15**, 300–4; *Bull. Agr. Chem. Soc. Japan* **15**, 46–8(1939)(in German); cf. *C. A.* **33**, 4793².—When sericin A was heated with H_2O, the viscosity of the soln. decreased. Sericin B dissolved partially by heating with H_2O, and the carbohydrate contents and the N distribution in the H_2O-insol. part were different from those of sericin B. It may be due to the formation of the H_2O-sol. substance in the degradation of sericin B micelle. The quantity of the sol. substance of the cocoon was remarkably affected by the temp. of extn. Y. Kihara

The determination by chemical means of hemp in textiles composed of mixed fibers containing cotton. I. Arnaldo Cappelli and Riccardo Tuffi. *Ann. chim. applicata* **29**, 225–31(1939).—Hemp is dissolved out of mixts. with cotton by means of an ammoniacal Cu soln. The soln. is prepd. by dissolving 10 g. $CuSO_4$ in 100 cc. H_2O. Then 14 cc. concd. NH_4OH is added, drop by drop, until the ppt. first formed is redissolved. One hundred and fifty cc. of 15% NaOH soln. is then added, and the ppt. filtered off. It is redissolved in 20 cc. concd. NH_4OH, and the filter washed with NH_4OH until 250 cc. has been added. This soln. contains 0.85% Cu. The cotton remains undissolved in this reagent. A. W. Contieri

Rot proofing of jute. H. A. Elkin and W. A. S. White. *Textile Mfr.* **65**, 394(1939).—Resistance to air exposure and microörganisms was the object of the tests. They consisted in impregnating the jute, washing with water for 24 hrs. to remove sol. substances, and burying the samples 6 in., folded crease down and, later, washing away the attached soil. The air exposure was for 1 month to sunlight during dry weather. Cu oleate, Cu and Zn naphthenates and Zn oleate were used and the extent of treatment was detd. by estg. the metal content of the proofed samples. Comparative tests on flax and cotton were also made. The percentage loss in strength after 3 weeks in soil at 85°F. was 71, 74, 100 on untreated jute, flax and cotton, resp. When treated with 0.8% Cu, jute lost 4%, flax 17% and cotton (0.1% Cu) 16%. When treated with Zn oleate 1.4%, jute lost 30% and flax 78%. It is noted that Zn compds. give greater antiseptic value to lignin fibers than to the purer ones. Tests on jute alone gave Cu oleate 1.4, 1.3, 1.1, 0.8% Cu a loss of 0, 0, 6, 4%, resp.; Zn oleate 1.4, 1.1, 0.9, 0.8% Zn, a loss of 39, 42, 48, 56%, resp.; Cu naphthenate 1.8, 0.8% Cu a loss of 0 and 3%; Zn naphthenate 1.1, 0.8% Zn, a loss of 0 and 0%; cuprammonium 1.8% Cu, loss 4%; creosote a loss of 10%; cutch chrome 0.3% Cr, loss 63%; paraffin, loss 71%. In rot proofing more than 1% is necessary, and Zn naphthenate is better than Zn oleate but this comparison is not noticeable in the Cu compds. However, a 0.6% Cu proprietary compn. gave complete protection. Jute

sunlight tests showed: 0.6% Cu oleate, loss 22%; Zn oleate 0.6% Zn, loss 18%; Cu naphthenate 1.3 and 0.8% Cu, loss 16 and 12%; Zn naphthenate 1.1 and 0.6% Zn, loss 13 and 14%; cutch chrome 0.3% Cr, loss 0%; untreated jute, loss 18%. In general, it could be said, the impregnations were of little avail, with the exception of the cutch chrome. Halsey E. Silliman

Progress in water treatment. Reginald Trautschold. *Rayon Textile Monthly* **20**, 597-600(1939). Na hexametaphosphate serves well in softening water for *textile use*. The removal of hardness and the control of alky. also are considered. W. H. Boynton

Dry-cleaning aids. John A. Stinson. *Laundry Dry Cleaning J. Can.* **19**, No. 10, 14, 16(1939).—Agents added to dry-cleaning solvent to improve its cleaning efficiency are classified as paste soaps, filter soaps or detergents. Paste soaps are alkali salts of fat acids which are not completely sol. in dry-cleaning solvent. Filter soaps are sol. and hence will pass through a filter. Other types of cleaning aids are called detergents. Good cleaning aids of any type should make the garments cleaner, leave a desirable finish on them, be free-rinsing, and should not interfere in the solvent-recovery system. A theoretical discussion is included. Charles R. Phillips

Treatment of liquid wastes from the textile industry. C. R. Hoover. *Ind. Eng. Chem.* **31**, 1352-8(1939).—A review with 18 references. G. G.

Regulations on coal-tar colors (Anon.) **12**. Capillary analysis of certified food dyes (Taub, Ortega y Canet) **12**. Cleaning-plant safety (O'Hanlon) **24**. Condensation products for rayon treatment (U. S. pat. 2,171,963) **13**.

Chwala, August: Textilhilfsmittel. Ihre Chemie, Kolloid-chemie und Anwendung. Vienna: J. Springer. 475 pp. M. 42; bound M. 45.

Azo dyes. Walter Kern and Richard Tobler (to Soc. pour l'ind. chim. à Bâle). U. S. 2,170,372, Aug. 22. Azo dyes which dye various colors fast to light are formed of components such as a 2,3-hydroxynaphthoic-3-aminopyrene reaction product and diazotized *o*-nitraniline. Numerous examples are given.

Complex metal compounds of azo dyes. Fritz Straub, Peter Pieth and Hermann Schneider (to Soc. pour l'ind. chim. à Bâle). U. S. 2,171,838, Sept. 5. Azo dyes such as the monoazo dye derived from 2-hydroxynaphthalene and 4-nitro-2-amino-1-hydroxynaphthalene-6-sulfonic acid are converted into complex metal compds., as by reaction with a Cr formate soln., which dye wool fast black tints. Several examples are given.

Acetate rayon dyes. W. W. Tatum and Imperial Chemical Industries Ltd. Brit. 506,526, May 30, 1939. H_2O-sol. salts of β-hydroxyethylaminoanthraquinone mono-esters of aliphatic and aromatic dicarboxylic acids having 3-12 C atoms are made by causing a β-hydroxyethylaminoanthraquinone, which may be substituted in the anthraquinone nucleus by Cl, Br, Me, NO_2, NH_2, alkylamino, arylamino, OH or alkoxy groups, to react with an anhydride of 1 of the said dicarboxylic acids, if desired in a liquid medium, e. g., pyridine, $PhNO_2$, and converting the product to a H_2O-sol. salt by soln. of the acid ester in an alk. soln. or by addn. of an alkali metal carbonate to the reactants. The products dye or print acetate rayon blue, red or violet shades. Among examples, (1) succinic anhydride is caused to react with 1-methylamino-4-β-hydroxyethylaminoanthraquinone, etc., and (2) maleic anhydride is caused to react with 2-chloro-1-amino-4-β-hydroxyethylaminoanthraquinone or 1,4-di-(β-hydroxyethylamino)-5,8-dihydroxyanthraquinone.

Increasing the solubility of dyes containing hydroxyl groups. Charles Graenacher, Franz Ackermann and Heinrich Bruengger (to Soc. pour l'ind. chim. à Bâle). U. S. 2,170,262, Aug. 22. Numerous examples are given of the improvement of the soly. of dyes such as azo dyes, which contain at least one hydroxyl group but no carboxyl or sulfonic groups, by treating the dyes, in the presence of pyridine, with acylating agents such as benzoic acid-3-sulfochloride, benzoic acid-3,5-disulfochloride and 1,3,6-naphthalenetrisulfonic acid chloride.

Condensation product from *p*-dichlorobenzene and sulfur trioxide. Willy Seel. U. S. 2,171,166, Aug. 29. A product which may be used as a *dye intermediate* or for *mothproofing wool*, etc., is obtained by treating *p*-dichlorobenzene with 30% oleum at a temp. of 15-25°, dilg. the reaction mass with cold water, and recovering the solid reaction product.

Fur dyeing. Edward Ohsman. U. S. 2,171,277, Aug. 29. Fur skins, for producing shadow effects, are immersed in a dye bath and simultaneously agitated and in part raised out of the bath successively and at intervals during the immersion.

Silk degumming and dyeing bath. Hugh H. Mosher (to Richards Chemical Works, Inc.). U. S. 2,169,881, Aug. 15. A silk degumming and dyeing bath contains soap, a boil-off oil, a degumming alk. salt, a direct dye and an oxidizing color stabilizer having protein coagulation properties sufficiently potent to convert solubilized sericin into insol. colloidal form but not substantially to prevent elimination of sericin from the material being treated, the color stabilizer being a compd. selected from the class consisting of Na or K dichromate, phosphotungstate, or phosphomolybdate or $CdSO_4$.

Apparatus for treating articles with fluids, as in dyeing or washing fabrics. George Kuhn. U. S. 2,171,449, Aug. 29. Various structural details.

Apparatus for decorticating and softening flax and like stalks. The Automatic Flax Production Units. Brit. 507,623, June 16, 1939.

Casein fibers. Stephen P. Gould and Earle O. Whittier (to the People for free use). U. S. 2,169,690, Aug. 15. For producing casein fibers of good strength and water resistance, fine streams of an alk. casein soln. are subjected to the action of an acid bath contg. a soln. of H_3PO_4 and an alk. earth phosphate such as mono-Ca phosphate. Cf. *C. A.* **33**, 9008[6].

Casein fibers. Theodoor Koch and Henricus A. van der Kroon (to American Enka Corp.). U. S. 2,169,955, Aug. 15. Casein fibers are rendered resistant to shrinkage and sticking in hot acid dye baths by treating the fibers with nitrous acid after they have been initially coagulated in an acid ppte. bath.

Polyisobutylene fiber. Peter J. Gaylor (to Standard Oil Development Co.). U. S. 2,170,439, Aug. 22. Fibers suitable for weaving into fabrics, and which have good stability and resistance to wear, comprise an odorless polyisobutylene of a mol. wt. of 100,000 to 250,000 and which may be produced by use of BF_3.

Apparatus and method for stapling threads or bundles of continuous fibers. Courtaulds Ltd. and Wm. Gower. Brit. 508,228, June 28, 1939.

Apparatus for testing the physical properties of fibrous substances, particularly the curling properties. Zellwolle-Arbeitsgemeinschaft G. m. b. H. Brit. 506,729, June 2, 1939.

Yarns and fabrics of mixed fibers. Camille Dreyfus and Wm. Whitehead (to Celanese Corp. of America). U. S. 2,172,439, Sept. 12. Yarns (which may also contain wool) contain at least 50% of a mixt. of fibers of the same org. deriv. of cellulose such as cellulose acetate at least 1.5 in. in length and of 2 different deniers, one of fine and the other of larger denier. Cf. *C. A.* **33**, 3610[2].

Treating yarns with liquid during winding. Universal Winding Co. Brit. 506,756, June 5, 1939. Yarn, fed at progressively varying linear speed during a transfer process, is uniformly treated with a liquid by being brought into contact with a surface whereon a film of the liquid is maintained, the thickness of the film being controlled by a wiper so as to be varied in accordance with the variation in the speed of the yarn.

Rayon yarns. John R. Caldwell (to Eastman Kodak Co.). U. S. 2,169,757, Aug. 15. A highly flexible yarn which is resistant to abrasion and adapted for use as warp in the manuf. of light fabrics comprises filaments each composed of a cellulose org. ester core such as one of cellu-

lose acetate and a size coating composes of a water-sol. cellulose org. acid ester such as cellulose acetate having the same dyeing characteristics as the material of the core and contg. a plasticizer, such as diethylene glycol, which penetrates into and is permanently occluded by the material of the core, so as to render the yarn highly flexible and to give it antistatic properties.

Esterified cellulose filaments, etc. Winfield W. Heckert (to E. I. du Pont de Nemours & Co.). U. S. 2,170,024, Aug. 22. For increasing the elasticity of cellulosic filaments, threads, fabrics or films, such as those formed of cotton or viscose rayon, the material is treated with a bifunctional esterification agent comprising a dianhydride or dichloride of a dicarboxylic acid such as a reaction product of phthalic or adipic acid and benzoyl chloride and the reaction is terminated when the desired increase in elasticity is obtained.

Treating artificial filaments, etc. Henry Dreyfus. U. S. 2,170,190, Aug. 22. For improving the extensibility of filaments, fibers, yarns, ribbons, etc., of materials such as cellulose acetate, they are subjected to saponn. under superatm. pressure with an aq. bath contg. 4-5% of a cyclohexylamine deriv. such as *N*-benzylcyclohexylamine.

Rotary drum apparatus for treating bobbins of yarn with liquid sprays. Robert B. Smith. (to Frank G. North, Inc.). U. S. 2,171,409, Aug. 29. Various structural and operative details.

Device for lateral stretching of webs of textile material. Max Hannig (to Vereinigte Faerbereien und Appretur A.-G.). U. S. 2,171,551, Sept. 5. Various structural and operative details.

Yarn-cheese core. Joseph O. Precourt. U. S. 2,171,890, Sept. 5. A core in the shape of a hollow open-sided cylinder is composed of spiral convolutions spaced a substantial distance apart and formed of a strip of vulcanized fiber having hardened outer surfaces resistant to heat and moisture when subjected for extended periods to the action of boiling dye liquor and a relatively less hard and impervious body portion between the hardened outer surfaces.

Viscose rayon. Walter H. Glover and Geo. S. Heaven (to American Viscose Corp.) U. S. 2,170,752, Aug. 22. About 1% or more of a petroleum product of high b. p. such as a petroleum jelly is used in viscose rayon, and serves to give a reduced luster.

Rayon. Walther Zetzsche, Johannes Giesen and Emmerich von Pongratz (to I. G. Farbenind. A.-G.). U. S. 2,171,324, Aug. 29. A rayon which has a matt luster similar to silk comprises regenerated cellulose contg. a catalytically hydrogenated liquid residue of the production of alc. by a catalytic process such as by reaction of CO and H (this residue comprising mixts. of unsatd. hydrocarbons with branched aliphatic C chains, branched chain lactones, branched chain higher alcs. and complicated org. compds. of unknown structure and b. 100-350°).

Silk treatment. Treat B. Johnson (to Textile Foundation). U. S. 2,171,241, Aug. 29. Acylation of silk fibroin is effected by use of a ketene (suitably at room temp.) to obtain a product which is suitable for dyeing and has good stability.

Ornamented fabric. Henry Dreyfus and Wm. A. Dickie (to Celanese Corp. of America). U. S. 2,171,626, Sept. 5. Ornamental effects are produced by introducing into a closely woven fabric unshrunk cellulose deriv. yarns such as those of cellulose acetate which extend in length by at least 30% when subjected to a finishing treatment in aq. medium, along with yarns which extend to a lesser degree when so treated, and subjecting the material to such a finishing treatment.

Pattern fabrics. Georges Heberlein and Ernst Weiss (to Heberlein Patent Corp.). U. S. 2,171,513, Aug. 29. A swelling agent or shrinking agent is used for treating a fabric contg. inactive formaldehyde cellulose fibers and active fibers woven in a pattern, the active fibers being natural vegetable fibers such as cotton which are active to the treating agent. Cf. *C. A.* **33**, 8036[6].

Pattern effects on fabrics containing nitrated and unnitrated fibers. Georges Heberlein and Georg Heberlein (to Heberlein Patent Corp.). U. S. 2,172,443, Sept. 12. A process of producing fabrics of a transparent character and with pattern effects consists in taking for treatment a fabric contg. unnitrated fibers and nitrated cellulosic fibers, decompg. and removing portions of the nitrated fibers according to a desired design, at least partially denitrating the remaining nitrated fibers, and subjecting the fabric to a transparentizing treatment of a character adapted for rendering natural cellulose fabrics more transparent, and for causing the ends of the yarn of denitrated fibers which collectively form the outlines of the pattern effects to be somewhat thickened, rendering the outlines more pronounced. Desired partial removal of the nitrated fibers may be effected by use of a NaOH paste printed on in a pattern. Cf. *C. A.* **33**, 8036[6].

Fixing cloth finishes. Hilton I. Jones and Llewellyn Jones. U. S. 2,171,475, Aug. 29. For affixing a finish on a textile material such as cloth in the bolt, it is immersed in an aq. bath contg. cornstarch 1-3 and stearate soap 2.5 7.5%, wrung to remove surplus soln., immersed in a 1-5% bath of rare earth acetates such as those of Ce, Th or La and again wrung, and dried.

Fabric-finishing apparatus. Alexander H. Gentle (to Celanese Corp. of America). U. S. 2,170,968, Aug. 29. Various structural and operative details of an app. suitable for finishing pile fabrics by glossing, etc., and treatment with a vapor such as steam.

Laminated fabrics suitable for articles such as collars, cuffs, which are repeatedly laundered. Gustave Klinkenstein (to Maas & Waldstein Co.). U. S. 2,171,505, Aug. 29. Layers of material are joined together by a thermoplastic adhesive, which will soften at a temp. of about 135°, comprising cellulose acetate or nitrate plasticized with about an equal amt. of methyl phthalate of ethyl glycolate. U. S. 2,171,506 relates to generally similar products contg. ethyl phthalate of ethyl glycolate.

Laminated cloth suitable for shirt collars or bosoms, etc. Harry W. Klinger (to Hercules Powder Co.). U. S. 2,170,416, Aug. 22. Articles such as collars are formed of a plurality of layers of cloth adhered by means of a bonding compn. including a cellulose acetopropionate, the cellulose ester constituting the major proportion of the compn. and being characterized by an analysis within the range of about 10% acetyl -34% propionyl to about 26% acetyl— 18% propionyl, a m. p. within the range of about 130° to about 220°, and a moisture absorption of not more than 5.5%, the article being resistant to the action of alk washing solns.

Apparatus for intertwisting strand material into cables, etc. Lester O. Reichelt (to Western Elec. Co.). U. S. 2,171,993, Sept. 5. Various details of an app. the speed of which is controlled in accord with the angular speed of twisting of the material under treatment.

Sizes for rayon. Jean Luria, Emile Luria and Charles Luria (to Luria Soc. à responsabilité limitée). Brit. 506,670, June 2, 1939. Rayon is sized with oxidation products of semidrying or nondrying oils, the oils having been oxidized to such a degree that they are resilient but capable of taking the shape of a vessel contg. them. The oil may be olive, colza, castor, cottonseed, arachis or coconut and may be oxidized by means of air, O or O_3, if desired in the presence of catalysts, e. g., salts of Mn, Co or Pb.

Sizes. L. J. G. Müller & Co. Brit. 507,744, June 20, 1939. Textile fibers or fabrics are sized by fresh or dried blood in aq. solns. The blood may be defibrinated. Known softening or wetting agents may be added.

Rendering textile materials water-repellent. Walther Kaase and Ernst Waltmann (to Heberlein Patent Corp.). U. S. 2,171,791, Sept. 5. A textile material such as one of wool, cotton or rayon is heated with an unsymmetric fatty-acid carbonic-acid ester anhydride such as a benzine soln. of unsym. stearic acid carbonic acid ethyl ester anhydride (the fatty acid radical having at least 10 C atoms and the carbonic acid ester having at least 2 C atoms) to volatilize the carbonic acid radical having the lower number of C atoms and to increase the water-repel-

lence of the textile material. Several examples with details are given.

Liquid treatments such as washing of materials such as rayon in cake form. Harry S. Drum and William C. Dodson (to Smith, Drum and Co.). U. S. 2,171,975, Sept. 5. Various details of app. and operation.

Carroting fur. Constantine F. Fabian (to Non-Mercuric Carrot Co.). U. S. 2,169,997, Aug. 22. Use is made of a soln. contg. as its carroting agent a compn. consisting of a volatile hydrolyzing acid selected from HNO_3, HCOOH and AcOH, and a volatile oxidizer selected from H_2O_2, org. peroxides and org. per acids, the hydrolyzing acid having a pH equiv. at least to that represented by a concn. of 11–12% of HNO_3 of approx. 63% tech. and the soln. being substantially free from non-volatile carroting agents.

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

The Division of Paint and Varnish Chemistry. G. G. Sward. *Ind. Eng. Chem., News Ed.* **17**, 678(1939).—A brief history and description of this Division of the Am. Chem. Soc. E. J. C.

Traffic paint. Leroy Shuger. *Drugs Oils & Paints* **54**, 343–4, 346(1939).—A paper on the specifying, formulating and applying of traffic paints. The following are discussed: (1) essential requirements of a traffic paint—methods of test, (2) comparison of present State Highway specifications and compn., (3) road tests and durability, (4) use of auto colliminating units and (5) present methods used for applying the paint. Points discussed include: settling, consistency, drying time and visibility (day and night). W. H. Boynton

The paint and varnish industry. Pekka Kirjakka. *Teknillinen Aikakauslehti* **29**, 227–35(1939).—A review. S. A. Karjala

Formulation of ink specialties. Charles F. Mason. *Chem. Industries* **45**, 427–9(1939). E. H.

Petroleum naphthas and thinners in paint, varnish and lacquer from the naphtha manufacturers' viewpoint. R. D. Armsbury. *Drugs, Oils & Paints* **54**, 347–8(1939). Naphthas employed in paint, varnish and lacquer industries fall into 3 main classes: (1) straight-run naphtha products, (2) naphthas manufd. by the Edeleanu extn. process which employs liquid SO_2 as the extn. medium and (3) synthetic solvents. The last group is growing rapidly and includes acetone, diacetone alc., isopropyl ether, Me Et ketone, Me iso-Bu ketone, tertiary Bu alc., secondary Bu acetate, the cellosolves, Carbitols and certain high-boiling naphthas or solvents with b. ps. from 204° to 316° and contg. mixts. in considerable portions of hydrogenated naphthalenes and alkyl naphthalenes. Naphtha control tests include the distn. range test, and S or corrosion tests. Solvency power tests include: (1) kauri butanol value, (2) aniline cloud test, (3) blown linseed oil soly. ratio or blown soybean oil soly. ratio, (4) lacquer diln. ratio, (5) toluene-heptane no., (6) solvency of thinner or naphtha on especially selected varnish or synthetic resin base vehicle. W. H. Boynton

Liquid driers—their function, difficulties involved, improvements and methods of test. W. T. Pearce. *Am. Soc. Testing Materials, Bull.* No. 100, 31–2(1939). G. G.

The starch of immature linseed F. Robertson Dodd. *Analyst* **64**, 735(1939).—The starch content of mature linseed is negligible and when starch is found in linseed cake, it is usually taken as evidence of adulteration. Some pods grown in the wet summer of this year contained immature but fully grown seeds contg. starch granules indistinguishable from tapioca starch but a little smaller than those of sweet-potato starch. W. T. H.

Treating Al surfaces for painting (U. S. pat. 2,171,546) 9. Protective paint coatings on Al and its alloys (U. S. pat. 2,171,545) 9.

Paints. Herman B. Kipper. U. S. 2,171,851, Sept. 5. Liquid unsatd. petroleum hydrocarbons or their chlorinated derivs. are used with linseed oil, pigments, paint thinners and an NH_4 halide such as NH_4Cl, as a polymerizing catalyst, 1–20% of the wt. of the pigments used, for drying or polymerizing the paint oils to produce hardened coating films.

Proportional mixing scale (suitable for use in mixing paints or lacquers of different colors). Edward D. Holmes (to Sherwin-Williams Co.). U. S. 2,169,952, Aug. 15. Various details of a device suitable for use with paint cans.

Apparatus (utilizing a water spray) for cleaning air from paint spraying booths, etc. Henry C. Lambert and Squire E. Garnsey (to The De Vilbiss Co.). U. S. 2,171,574, Sept. 5. Various structural and operative details.

White titanium oxide pigment. Roy Dahlstrom (to National Lead Co.). U. S. 2,170,940, Aug. 29. For increasing its reflectance in the shorter wave lengths of the visible spectrum relative to its reflectance in the longer wave lengths of the visible spectrum, a white TiO_2 pigment contg. 0.0001–0.001% of W or Mo is exposed to the action of H at a temp. of about 900° for about 1–5 sec.

Composite titanium dioxide-calcium carbonate pigment. Louis E. Barton (to National Lead Co.). U. S. 2,170,800, Aug. 29. A previously prepd. TiO_2-$CaSO_4$ composite pigment is treated with an aq. soln. of a carbonate such as Na_2CO_3 which reacts to form a sol. sulfate and $CaCO_3$, and the pigment thus formed is sepd. from the resulting mother liquor.

Water printing inks. Hans Hadert (to Michle Printing Press and Mfg. Co.). U. S. 2,170,198, Aug. 22. A process for producing water printing inks consists in prepg. a soln. of water and a water-emulsifiable oil selected from a group consisting of sulfonated castor oil, sulfonated neat's-foot oil and sulfonated olein, prepg. a soln. of an alc.-sol. copal resin, alc. and a water-emulsifiable oil selected from the group mentioned, adding an alkali to the last-mentioned soln. in an amt. necessary to reduce the high acidity of the same, adding an org. base selected from the group consisting of monoethanolamine, diethanolamine and triethanolamine, mixing the solns. and adding to the varnish so produced water-insol. coloring matter.

Lacquer. Walter J. Clarke (to Bell Telephone Laboratories, Inc.). U. S. 2,170,187, Aug. 22. A perspiration-resistant lacquer is formed of volatile solvents together with nitrocellulose 52, alkyd resin 18, dibutyl phthalate 15 and an impalpable powder of silica gel 15 parts.

Lacquers and film-forming compositions containing nitrocellulose, etc. Ralph T. K. Cornwell (to Sylvania Industrial Corp.). U. S. 2,170,632, Aug. 22. A compn. for prepg. flexible transparent and nontacky coatings or films is prepd. with use of a cellulose deriv. such as nitrocellulose 30–70, with other ingredients such as paraffin or an animal or vegetable wax about 2–6, and a plasticizer such as an acetyl deriv. of *o*-benzoylbenzoic acid or other reaction product of a monocarboxylic acid of the benzophenone series with an aliphatic acid, suitable volatile solvents such as EtOAc, BuOAc and toluene.

Substituted biphenyl compositions suitable for plasticizing lacquer and varnish materials. Herbert J. Krase (to Monsanto Chemical Co.). U. S. 2,172,391, Sept. 12 A normally liquid product is used which consists of a mixt. of alkylated biphenyl derivs. having less than 6 C atoms in the alkyl groups obtained by the direct alkylation, in the presence of a Friedel-Crafts catalyst, of biphenyl, hydrogenated biphenyl, chlorinated biphenyls or brominated biphenyls with C_2H_4, C_3H_6 or other alkylating

agent from olefins, alcs. or alkyl halides having less than 6 C atoms in the mol.

Resins soluble in alcohol and suitable for lacquers. Werner Wolff and Karl Vierling (to I. G. Farbenind. A.-G.). U. S. 2,172,305, Sept. 5. Colophony or its resin acids are esterified with 2,2-dimethylol-1-butanol (suitably at 250–260° for 5 hrs.).

Refining rosin. Byron M. Vanderbilt (to Commercial Solvents Corp.). U. S. 2,170,956, Aug. 29. For refining a soln. of rosin in a solvent such as naphtha b. 97–123° is treated with a nitroparaffin, such as nitromethane or nitroethane, which is immiscible with the rosin solvent used and which is used in about 80% the vol. of such solvent, the nitroparaffin used forming a sep. phase with dissolved impurities removed from the rosin. Cf. *C. A.* **33**, 4806[7].

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Antioxidants and the autoxidation of fats. Autoxidation of oleic acid, methyl oleate, oleyl alcohol and *cis*-9-octadecene. F. E. Deatherage and H. A. Mattill. *Ind. Eng. Chem.* **31**, 1425–31(1939).—Peroxides, peracids, aldehydes and substituted ethylene oxides and combinations of these and H_2O are formed by autoxidation of the above fats The O consumption per mole of double bond destroyed is least for oleic acid and most for oleyl alc. Oxido derivs. are the main products of the process and are all of the same geometrical configuration and correspond to the high-melting dihydroxy isomeric deriv. of the original substrate. E. Scherubel

Crystallization of the pigment of flamingo fat. Carmela Manunta. *Helv. Chim. Acta* **22**, 1151–3(1939).—The deep-yellow fat of an African flamingo (probably *Phoenicopterus roseus*) was sapond. and the pigment extd. and adsorbed chromatographically on lime in the usual way. A new carotenoid pigment was finally isolated in red crystals. Names proposed are *phoenocopterin*, or, since it appears to be a xanthophyll, *phoenicoxanthin*. The spectral absorption curve was very similar to that of astacin except that the max. was at 487 mμ instead of 500 mμ. When mixed with astacin it was readily sepd. from the latter by chromatographic adsorption on lime. It is very sol. in C_6H_6, in which astacin is nearly insol., and very sol. in Et_2O, MeOH, petr. ether and $CHCl_3$. The solns. are yellow. Astacin was not present in the fat. L. E. Gilson

Addition (iodine) number of fats. N. Schoorl. *Pharm. Weekblad* **76**, 1295–7(1939).—Various methods for the detn. of I no. of oils were compared. The Winkler method (cf. *C. A.* **21**, 3103; **28**, 1299[7]) gives the most rapid absorption, especially when applied to cod-liver oil. Felix Saunders

How accurate must an official fat stability test be? Egbert Freyer. *Oil and Soap* **16**, 191–4(1939).—The results of 3 years' Comm. testing of coöperative samples by 11 labs. using the Swift Fat Stability Test are tabulated in 3 tables. Four of the participating labs. obtained consistently good results while 2 others failed to show agreement after 1 or 2 yrs.' experience with the test. In the light of the apparent shortcomings of the method, it is discussed from the standpoint of its suitability as an official method of the Society. The question is left unanswered. E. Scherubel

Method for measuring the color of fatty oils. Kokiti Osima and Tatuo Sugawara. *J. Agr. Chem. Soc. Japan* **15**, 653–8; *Bull. Agr. Chem. Soc. Japan* **15**, 110–11(1939) (in English).—The mixts. of $K_2Cr_2O_7$ and $CrK(SO_4)_2 \cdot 12H_2O$, K_2CrO_4 and $Co(NO_3)_2 \cdot 6H_2O$ were used as the standard colors, resp., for brown, yellow and red. These colors did not fade for a long time even under direct sunlight. The colors of the oils can be shown by the combination of these standards. Y. Kihara

Solidification-point curves of binary acid mixtures. I. Capric, lauric, myristic and palmitic. H. A. Schuette and H. A. Vogel. *Oil & Soap* **16**, 209–12(1939).—The solidification point and curves representing mixts. of pure capric-lauric, lauric-myristic and myristic-palmitic acids are recorded as data and in graphs. The practical value of the curves lies in the fact that they would serve as a means of establishing the presence of 2 acids in a mixt. of known mol. wt. By locating on the proper curve the observed solidification temp. of the mixt. of 2 fat acids which have been isolated from a naturally occurring fatty oil the mol. percentage compn. can be read off. E. Scherubel

Chromatographic separation of a mixture of palmitic, stearic and oleic acids. Carmela Manunta. *Helv. Chim. Acta* **22**, 1156–60(1939).—A mixt. of equal parts of the 3 acids was dissolved in petr. ether and percolated through a chromatographic column of dried $MgSO_4 \cdot {}^1/_2H_2O$. A nearly complete sepn. was obtained. The palmitic acid remained in the upper part of the column and the stearic acid in the lower part with a relatively barren zone between. The oleic acid was not adsorbed. Similar results were obtained with a column of franconite. L. E. Gilson

Methods of analysis of mixtures of oleic, linoleic and saturated esters and their application to highly purified methyl oleate and methyl linoleate. R. W. Riemenschneider and D. H. Wheeler. *Oil & Soap* **16**, 219–21 (1939).—Iodine nos. by the Hanus and Wijs methods and thiocyanogen nos. using various absorption periods were detd. on Me oleate and Me linoleate and on mixts. of these esters. It is concluded that I nos. by the Wijs method and 3-hr. thiocyanogen nos. are more satisfactory for Me linoleate and for mixts. contg. large amts. of this ester. Small amts. of higher satd. acids were detd. with a precision of about 0.1 unit percent by means of the Bertram procedure. A purified specimen of Me oleate contained about 0.2% of satd. ester by this method. E. S.

Note on the detection of myristic acid in alfalfa-seed oil. H. A. Schuette and H. A. Vogel. *Oil & Soap* **16**, 223 (1939).—Fractional distn. of the Me esters of the mixed satd. acids yielded a fraction having a mol. wt. suggesting a 2-component mixt. consisting of 65 mol. % myristic ester and 35 mol. % palmitic. The solidifying point of the mixt. was detd. to establish identity and found to be 40.45° which on reference to the binary acid solidifying-point curve for myristic-palmitic acids indicated a myristic acid content of either 64.3 or 80.5 mol. %. The former value is in agreement with that obtained by calcn. Thus acid is a minor constituent of alfalfa-seed oil, only 1.28% having been found. It has never been previously reported. E. Scherubel

Variation in free fatty acid within a seed sample. Proctor Thomson. *Oil & Soap* **16**, 221–3(1939); cf. *C. A.* **33**, 8883.—The A. O. C. S. seed samples for the 1938–39 season were analyzed by Edeler's method and the results on the 10 seed samples and the A. O. C. S collaborators are shown on a graph. There is a fairly close relationship between the scatter of the A. O. C. S. results and the scatter of the 10 seed results. The standard deviation of individual seed calcd. from the collaborators is greater in every case than when calcd. from samples of 10; and this indicates that the sampling of the sample itself is in need of attention. E. Scherubel

Preparation and properties of highly purified methyl oleate. D. H. Wheeler and R. W. Riemenschneider. *Oil & Soap* **16**, 207–9(1939).—Me oleate of high purity was prepd. by fractional distn. and low-temp. crystn. of the Me esters of the acids of olive oil. From the data gathered it is shown that the preliminary distn removed most of the satd. esters which were palmitic. This was followed by (1) removal of most of the linoleic ester by crystn. from acetone at 60°, (2) pptn. of the bulk of the satd. esters from acetone at 37° and removal by filtration, (3) further elimination of Me linoleate by 2 crystns. from

acetone at 60°, (4) fractional distn. *in vacuo* to remove small amts. of remaining Me palmitate, (5) 2 crystns. at 65° from redistd. petr. ether to remove last traces of linoleate. The purity of the final product was 99% or better and had the following properties: n_{20} 1.4522, d, 0.8739 and m. p. 19.9°. E. Scherubel

Preparation of unsaturated higher alcohols by zinc catalyzer. I. Formation of unsaturated higher alcohol from perilla oil. Yuiti Sinozaki and Sizuo Sumi. *J. Agr. Chem. Soc. Japan* **15**, 531–6(1939). —Zn dust was the best catalyzer for the prepn. of unsatd. higher alc. by hydrogenation of oil under high pressure. When perilla oil was heated at 320° under 125 atm. for 2 hrs., the yield was max. A large amt. of linoleyl alc. was obtained from the reaction product. **II. Influence of the addition of lower aliphatic alcohols upon the catalyzer.** *Ibid.* 537–41.—When Me esters of fatty acids or oils were hydrogenated, the formation of unsatd. higher alcs. increased. It may be that the Zn dust was activated by MeOH. When 2 mols. of MeOH and more were added to 1 mol. of soybean oil, the reaction was accelerated. This phenomenon was specific for Zn dust catalyzer; the action of MeOH was the opposite for other catalyzers. While MeOH and EtOH accelerated Zn dust catalyzer, other aliphatic alcs. had the opposite effect. When MeOH was added to Zn dust catalyzer, the yield of unsatd. alc. was 80–90%. Y. Kihara

Sources of oil which have been overlooked previously. E. Wagner. *Seifensieder-Ztg.* **66**, 779–80(1939).—A tabulation of 48 plants growing in Germany, the oil content of their seeds, its properties and uses. A. G.

By-products and residues in producing vegetable oils M. Singer. *Seifensieder-Ztg.* **66**, 720–2, 740–1, 760, 770–1, 800(1939).—Review. A. Guillaudeu

Contact countercurrent bleaching of vegetable oils. John W. Hassler and Ralph A. Hagberg. *Oil and Soap* **16**, 188–91(1939).—After an adsorbent has done its work on an oil it still has reserve power for removing color from unbleached oil; and in order to utilize this reserve adsorptive power the following scheme is employed: (1) The unbleached oil is treated with partially used C and then filtered. (2) The press cake is rejected and the partially bleached oil is treated with fresh C. (3) This is then filtered giving a finished oil and the partially spent carbon. (4) The latter supplies the adsorbent for treating a new batch of unbleached oil. The process can be continued indefinitely. By this countercurrent treatment there is a saving of as much as 40% in the cost of adsorbent and also a gain in the reduced oil retention owing to the use of less adsorbent. Five tables of results are given. E. Scherubel

Cottonseed and the Southern Regional Research Laboratory. D. F. J. Lynch. *Oil and Soap* **16**, 194–7 (1939).—The commodities selected for initial study in the Southern Regional Research Lab. are cotton, peanuts and sweet potatoes, and in addn. to research on cottonseed, studies will be carried out on cotton cellulose, the whole cotton plant, peanut oil and protein, sweet-potato starch and other products and by-products of the assigned commodities. E. Scherubel

Report of the Refining Committee 1938–9. *Oil and Soap* **16**, 197–204(1939). —Results are tabulated for A. O. C. S. Com. coöperative refining tests on 4 samples each of extd. and expeller samples of soybean oil. With 7/8 max. lye (14°Bé.) on extd. oil, 60.5% of the reported results were within 0.5% of the av. and with 2/3 max. lye (14°Bé.) 69.5% were within 0.5% of the av. The Refining Com. recommends, as a result of the work, that the tentative refining methods for expeller and hydraulic soybean oils, as changed and augmented last year and followed in coöperative program for this year, be adopted as official methods of the A. O. C. S. It is further recommended that the tentative methods for extd. oil, as adopted last year be studied further. E. Scherubel

Soybean-oil foots. III. Isolation of flavin. Kozi Okano, Iwao Beppu and Masatosi Ozu. *J. Agr. Chem. Soc. Japan* **15**, 235–7(1939).—The oil foots were extd. with 60% alc. and then pptd. with phosphotungstic acid. Flavin was isolated from the ppt. It was identified by means of the fluorescence spectrum and the absorption spectrum. **IV. Manufacture of lactation-promoting medicine and tests of its effects.** *Ibid.* 238–42.—The oil foots were mixed with 50% alc. at 60–70° and kept for a few hrs. The middle layer consisting of alc. soln. was made alk. by the addn. of $Ca(OH)_2$ to remove resin, coloring matters, etc., and then acidified to remove saponin, etc. The filtrate was neutralized and evapd. to a yellowish brown powder. It contained a large amt. of stachyose and amino acids. It showed lactation-promoting activity for the cow and human subjects. Y Kihara

Saponification value of waxes by use of mixed solvents. Merlin Wand. *Chemist Analyst* **28**, 53–4(1939).—The difficulty in obtaining the sapon. value of a fat such as montan or carnauba is overcome by the addn. of 10 ml. of toluene to dissolve 2 g. of the wax and by heating under reflux condensation with 25 ml. of 0.7 *N* KOH in EtOH. W. T. H.

Formation of wax ester by hydrogenation under high pressure and the solubilities of wax esters in organic solvents. Yuiti Sinozaki and Siniti Asati. *J. Agr. Chem. Soc. Japan* **14**, 1135–43(1938).—The formation of wax esters from various oils was greatly accelerated when Al_2O_3 or ZnO was added to Cu-Cr-O catalyzer for hydrogenation. The wax ester from soybean oil was more easily sol. in EtOH and more difficultly sol. in turpentine oil or benzine than beeswax. The m. p. and viscosity in turpentine soln. were similar to those of beeswax. They can be used as a substitute for beeswax. Y. Kihara

Spontaneous combustion in the oil and soap industries E. J. Better. *Ind. Chemist* **15**, 361–2(1939). E. H.

Soap builders. Joseph M. Vallance. *Soap* **15**, No. 10, 21–4, 109, 111, 113(1939). The use of old and new substances for extending and improving the quality of soaps is described. Among the newer substances are $Na_4P_2O_7$ and $(NaPO_3)_4$ and methylcellulose, cholesterol, lecithin, wool wax and the unsatd. fat acids of linseed oil and lard known commercially as vitamin F. E. Scherubel

Reversed soaps. J. Warwicke. *Soap* **15**, No. 10, 25–6 (1939). When soap ionizes, Na is the cation and stearate the anion or neg. ion, or the anion-active detergent. Sulfated fatty alcs. belong to the anion-active class. Fatty alc. esters and halogen compds. have the property of giving addn. products with tertiary amines to give compds. which are cation-active. Thus cetyl chloride and trimethylamine give cetyl trimethyl NH_4 chloride and pyridine gives cetyl pyridinium chloride. Both of these compds. belong to the cation-active class giving chloride as the anion while the fatty radical makes up the cation. There is a profound difference between these compds. and soap or sulfated fatty alcs. Separately both deterge and wet, but when mixed they neutralize each other, and in equiv. proportions ppt. one another from soln. leaving a foamless liquor. The reversal of the ordinary process of cleansing a fabric is evident when a cationic soap is added in excess to an alk. soln. of an anionic soap contg. dirt in suspension. Neutralization of elec. charges and redeposition of the dirt take place. The obvious conclusion is that cationic soaps should be used for washing in slightly acid media. The cationic soaps do deterge but their range of activity is different from ordinary soaps or sulfated alcs. They are most useful below a pH of 7.0 and they are often slightly acid in reaction and are useful in dentifrices. They may be compounded with citric and tartaric acids and readily emulsify essential and aromatic oils. E. Scherubel

Filtering material for purifying oils (U. S. pat. 2,170,601) 1.

Purifying animal fats. Emil Andersen-Orris. Brit. 506,968, June 7, 1939. "Oleo" is extd. from crude animal fat by heating the fat to 75°, exactly neutralizing the free fatty acid with alkali and removing the sapond. product by spraying with hot brine, whereupon the neutral fat is run into a crystg. tank maintained at 30–50°, whereby steam seps. and is removed through a filter by suction. App. is described.

Removing fat from animal casings. Lucius M. Tolman and Lloyd E. Dimond (to Wilson & Co.). U. S. 2,171,611, Sept. 5. App. is described, and a method of defatting an animal casing which comprises cleaning the casing, hardening it (suitably by drying) and progressively melting fat upon the surface of the hardened casing and progressively removing the melted fat from the hardened casing by a wringing operation. U. S. 2,171,612 relates to the app. for such use. 1

Preserving fish livers. Ferdinand W. Nitardy (to E. R. Squibb & Sons). U. S. 2,171,594, Sept. 5. Fish livers such as those for extraction of their vitaminiferous oils are cooked and mixed with 1–8% of undissolved boric acid or borax.

Toilet soaps. Ervin Pick. Brit. 506,903, June 6, 1939. The soaps are rendered perspiration preventing by adding thereto CrO_3 and $(CH_2)_6N_4$. $(AcO)_3Al$ may also be added.

28—SUGAR, STARCH AND GUMS

J. K. DALE

The sugar industry of Poland. Anon. *Facts About Sugar* **34**, No. 10, 23–4 (1939).—The geographical distribution of sugar factories in Poland is shown on a map, production statistics are given for the yr. 1919 to 1939, and consumption statistics for 1937–38. F. W. Z. 2

Sugar-juice clarification. Edv. W. Welp. *Facts About Sugar* **34**, No. 10, 38 (1939).—The new cane varieties and the higher milling pressures and maceration used at the present time necessitate the use of more efficient clarifying equipment which removes the greatest possible quantity of suspended and colloidal matter. F. W. Z.

Improved [sugar] factory earnings through technical modernization. E. W. Kopke. *Facts About Sugar* **34**, No. 10, 36–7 (1939); cf. Kopke, *C. A.* **33**, 7139[2]. 4
F. W. Zerban

Cottonseed and the Southern Regional Research Laboratory [studies on sweet-potato starch] (Lynch) **27**. Applied microbiol. investigation in cane-sugar manuf. (Adati) **15**. Action of phytohormones on the development of sugar-beet seedling plants (Willam) **11D**. Manuf. of bagasse pulp (Tanaka, Koriyama) **23**. Filtering material for purifying sugar solns. (U. S. pat. 2,170,601) **1**. 5

Active carbonaceous materials for purifying sugar solutions, etc. Pieter Smit (to N. V. Octrooien Maatschappij "Activit"). U. S. 2,171,408, Aug. 29. App. is described, and a process for the manuf. of catalytically active carbonaceous materials having colloidal properties which comprises finely subdividing a solid carbonaceous material yielding C when subjected to dry distn., such as wood, and quickly mixing the finely subdivided product with H_2SO_4 of a concn. of over approx. 60° Bé., so as to avoid formation of lumps and effect an instantaneous reaction throughout the whole mass which is completed to give a final product within a period not exceeding 10 min. and with a substantially instantaneous rise in temp. to 150–250° so that rapid volatilization of secondary condensable products formed in the reaction occurs. 6

Heat-treatment of massecuite in mixer spouts. Walter E. Smith. U. S. 2,172,040, Sept. 5. App. for improving the operation of centrifugal machines when purging sugar-bearing materials that have been heated above atm. temp. in a tank to increase their fluidity includes a tank adapted to contain said heated sugar-bearing materials, a spout extending a substantial distance from the tank for delivering said material to a centrifugal, said spout having a chamber around it, and means for circulating heated fluid through said chamber at a temp. to keep the material in the spout at substantially the same temp. as the material in the tank. 3

Dialysis membranes for the extraction of sugar from molasses. Sylvania Industrial Corp. Brit. 506,889, June 6, 1939. These consist of H_2O-swelling nonfibrous cellulose, preferably regenerated from viscous or a cellulose ester.

Modified starch. Alfred H. Kelling (to Corn Products Refining Co.). U. S. 2,171,796, Sept. 5. A modified starch suitable *for use in sizing paper* is prepd. by subjecting potato, tapioca or sago starch having a moisture content of 25–55% and admixed with about 1–2% of borax, Na_3PO_4, Na_2CO_3 or NaOH to momentary pressure between rolls heated sufficiently to swell and disrupt the starch cells and give the product a soluble content of 30–65%.

Starch compositions such as those used for treating paper or textile fabrics. James F. Walsh and Willard L. Morgan (to American Maize-Products Co.). U. S. 2,170,271, Aug. 22. Starch is used with a water-sol. acid salt of an amide such as urea hydrochloride or nitrate or acetamide hydrochloride or the like proportioned to have a substantial thinning action on the starch. U. S. 2,170,272, relates to a like treatment of starch with compds. such as glycerol nitrate, aspartic acid sulfate, betaine hydrochloride or various hydrochloric, nitric, sulfuric, phosphoric or oxalic acid salts of glycerols, aspartic acid, glutamic acid, lysine, arginine, tyrosine, phenylalanine or betaine.

Treating potato pulp. Willy Schulze (trading as Stärkefabrik Golssen W. Schulze & Co.). Brit. 507,526, June 16, 1939. The cellulose pulp obtained after the extn. of starch from potatoes is pulverized in a dry state by being subjected to a high-speed centrifugal beating action and the pulverized substance is sifted round the beating zone by a sieve having fine openings that increase in size outwardly. App. is described. 7

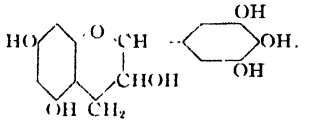
29—LEATHER AND GLUE

HENRY R. MERRILL

Characteristics of vegetable and synthetic tanning materials. XV. Determination of the tanning and combining value of vegetable tanning materials. F. Stather and H. Herfeld. *Collegium* **1939**, 453–6; cf. *C. A.* **32**, 6493[7].—A method for detg. total and fixable tannin, based on the filter method and following com. practice in that the tannin soln. is added gradually to the hide powder, is as follows: Wash 5 g. of hide powder in a filter bell with 1 l. H_2O, which should flow through the powder in 3–5 hrs. Drain and adjust the wt. to 130 g., then add 125 cc. of clear, 6%, tannin soln., either adding 25 cc. of tannin soln. at ½-hr. intervals and shaking for 3 hrs. or adding 25-cc. portions at 1-hr. intervals and shaking for 24 hrs. Filter and evap. 20 cc. of filtrate for nontannin. Also evap. 10 cc. of filtered tannin soln. and obtain total tannin by difference. Wash the tanned powder in the filter bell for 12 hrs. with 9 l. H_2O, dry and weigh the residue to det. irreversibly fixed or fixable tannin. During washing, the bell may be set in a beaker supported in a funnel so that the wash water flows through the hide powder, then up through and overflows the beaker.— I. D. Clarke 9

Vegetable tannins in Formosa. III. Yasuyosi Osima and Hirosi Ito. *J. Agr. Chem. Soc. Japan* **15**, 634–5 (1939); cf. *C. A.* **33**, 6640[6].—The tannin contents in the barks of *Pithecolobium dulce* Benth., *Casuarina equisetifolia* L., *Ficus elastica* Roxb., *Bischoffia javanica* Blume, *Elaeocarpus serratus* L., *Liquidambar formosana* Hance, *Elaeocarpus elliptica* Nakai and *Ficus religiosa* L., and in

the wood of *Melaleuca leucadendron* L. were, resp., 26.6, 16.8, 14.3, 4.4, 18.1, 10.9, 13.8, 8.7 and 2.4%. Tannin from *Casuarina equisetifolia* L., *Ficus elastica* Roxb. and *Bischoffia javanica* Blume were easily adsorbed by hide powder. The adsorption was min. at pH 5. **IV. Casuarin, a new catechol from the bark of Casuarina equisetifolia L.** Yasuyosi Osima. *Ibid.* 636-8.—The bark was extd. with hot H_2O. The ppt. was obtained from the ext. by satg. with NaCl. The filtrate was extd. with EtOAc. From the $CHCl_3$-insol. aq. fraction of the ext., fine colorless needles m. 181-3° were isolated. It had $[\alpha]_D^{23.5°} = +19.7°$ in 50% acetone. It was called casuarin. It showed the reactions of gallocatechol. The hexaacetyl deriv. was a colorless prism m. 127 8°. It had $[\alpha]_D^{19°} = +34.3°$ in acetone. The pentamethyl deriv. gave colorless needles m. 156-8°. It had $[\alpha]_D^{19°} = +29.1°$ in acetone. When the Me deriv. was heated with metallic Na, a colorless plate m. 89° was obtained. It was identified as α-(2,4,6-trimethoxyphenyl)-γ-(3,4,5-trimethoxyphenyl)propane. Hence the constitution of casuarin may be a *d*-form of gallocatechol as follows:



In *Bull. Agr. Chem. Soc. Japan* **15**, 108-9(1939)(in English). Y. Kihara

Ellagitannins. L. Reichel and E. Ulsperger. *Naturwissenschaften* **27**, 628(1939).—Ellagi-type tannins have been prepd. from native materials in cryst. form. Dividivi tannin, $C_{42}H_{26}O_{26}$, on hydrolysis produces 1 mol. ellagic acid and 4 mols. gallic acid; hence it is tetragalloylellagic acid. In similar manner myrobalan, algarobilla, valonia, oak gall and Aleppo tannins are built up. In the leaves of *Quercus pendiculata* tetragalloylellagic acid is likewise found in acid form in the presence of catechol and catechol-like tannins. The carboxyl groups of the depside in the tannins are either free or neutralized with salt formation. B. J. C. van der Hoeven

Studies in aldehyde tannage. II. The mechanism of aldehyde tannage. Edwin R. Theis and Wm. Priestly, Jr. *J. Am. Leather Chem. Assoc.* **34**, 566-89(1939); cf. *C. A.* **31**, 2856².—Theories of HCHO-amino acid combination are reviewed. By assuming combination of HCHO with collagen depends on presence of free NH_2 groups, it is deduced that time of soaking or liming hide should affect subsequent HCHO fixation, owing to (1) liberation of NH_3 groups and (2) deamnization. Skin was soaked 1 to 6 days at pH values of 2 to 10, and subsequently tanned 24 hrs. in 1% HCHO soln. at the same pH values. Combined HCHO was estd. by the Highberger-Retzseeh method (*C. A.* **33**, 3199⁵). At all pH values increasing the soaking time from 1 to 2 days resulted in doubling the wt. of HCHO fixed, but further increase in soaking time resulted in progressive decrease in HCHO fixation. The latter effect was most marked in alk. soln. and least marked in neutral soln. It is assumed that liberation of free NH_2 groups predominates in the early stages of soaking, while deaminization predominates in the later stages. Skin was limed 1 to 15 days either in satd. $Ca(OH)_2$ or in satd. $Ca(OH)_2$ + Na_2S. The resulting pelt, after washing, was tanned 24 hrs. at pH = 8 in 1% HCHO. Again the wt. of HCHO fixed was max. for pelt limed 2 days. Fixation by pelt limed with Na_2S was slightly greater than for pelt limed with $Ca(OH)_2$ only. The effect of pH value in tanning was studied, with bated pelt, tanned 24 hrs. at pH values from 1 to 12 in 1% HCHO. The shrinkage temp. and percentage of contraction of the resulting leathers were detd., as well as wt. of HCHO fixed. Results are in harmony with the idea that HCHO tannage is a 3-fold process (1) combination with imino groups of the "short link" in acid soln., and increasing combination with histidine and some lysine NH_2 groups up to pH = 6; (2) increasing combination with remaining lysine residues between pH 6 and 10; (3) progressive combination with arginine residues above pH = 10. Combined HCHO was almost const. from pH = 3 to 7, and thereafter rose rapidly with pH value. Shrinkage temp. increased with pH value, from 44° for pelt tanned at pH = 1 to 77 for pelt tanned at pH = 3, but further increase in pH value caused a very slight increase in shrinkage temp. However, percentage of contraction dropped stepwise with increasing pH of tannage, from about 66% (pH = 3 to 6) to 60% (pH = 7 to 10), to 45% (pH = 10 to 12). Increasing temp. and increasing concn. both caused increased HCHO fixation, and increase in shrinkage temp., especially at pH = 10, where max. fixation from 5% HCHO exceeded theoretical combining capacity for free NH_2 groups of collagen, probably because of fixation of di- or trimethylol compds. The presence of neutral salts greatly increased HCHO fixation in the pH range 4 to 7, probably because the salt weakens the cross linkage between adjacent NH_3^+ and COO^- groups. In the presence of *N* KCl, the wt. of HCHO fixed was doubled in this pH range, but little affected above pH = 8. H. B. Merrill

Two-bath chrome tanning for the manufacture of kid leather. E. Bělavský. *Collegium* **1939**, 444-52; cf. *C. A.* **28**, 3265⁵.—The basicity of the Cr salt on the fibers of full, smooth kid leather is 90-92%. Such a Cr salt is formed by the reaction $4H_2Cr_2O_7 + H_2SO_4 + 6H_2O = Cr_8(OH)_{22}SO_4 + 6O_2$. Reduction of $H_2Cr_2O_7$ with $Na_2S_2O_3$ may follow 3 paths forming the basic Cr salt and either Na_2SO_4, Na_2SO_4 and S, or Na_2SO_4 and $Na_2S_4O_6$. Two-bath tanning is now done in a drum instead of a paddle, and there is much less loss of material in the spent liquors. The American method is to drum the skins for 6 hrs. in each of the following baths: 2.5% $Na_2Cr_2O_7$ and 1.5% H_2SO_4 (95.6%); 18% $Na_2S_2O_3$ and 4% H_2SO_4. The Russian method is to pickle in 0.5% HCl (30%), 10% NaCl, and 50% H_2O for 15 min., then in 0.65% H_2SO_4 and 10% H_2O for 45 min., and tan in 2.5% $Na_2Cr_2O_7$, 4% alum, 50% H_2O for 2-2½ hrs.; 12% $Na_2S_2O_3$, 50% H_2O for 1 hr., then 2.5% H_2SO_4 (95%) in 20% H_2O in 3 portions at hr. intervals. Koehler (*C. A.* **23**, 5608) prepd. one-bath Cr liquors by using Cr alum to supply the acid necessary for reduction of the dichromate with thiosulfate. A two-bath method based on this principle has been worked out for use with a drum. It is shorter than the old method and gives somewhat better leather. I. D. Clarke

Some notes upon the effect of the orthophosphates upon chrome-tanned leather. Robert M. Lollar. *J. Am. Leather Chem. Assoc.* **34**, 556-66(1939).—Ten-g. samples of dried, commercially tanned Cr leathers were continuously extd. (percolation) with 5 l. of H_3PO_4 (0.01 to 1 *M*), or NaH_2PO_4, Na_2HPO_4 or Na_3PO_4 (0.01 to 0.5 *M*). Time of contact was 6 to 7 hrs. at about 25°. The samples were analyzed before and after treatment, and extent of removal of Cr and SO_4 was calcd. In H_3PO_4, Cr removal (about 75%) was independent of concn. In NaH_2PO_4, Cr removal was less than in H_3PO_4, and increased linearly with concn. In Na_2HPO_4 and in Na_3PO_4, removal of Cr increased rapidly with concn., reaching max. values of 32 and 50%, resp., in 0.5 *M* solns. In Na_2HPO_4 and Na_3PO_4, sulfate removal was complete at all concns. In H_3PO_4 and NaH_2PO_4, sulfate removal increased rapidly with concn. but approached 100% rather slowly. Analyses showed that Cr-bound acid was more readily removed than protein-bound acid. Extns. with mixts. of the 4 orthophosphates at pH values from 2 to 12.2 showed that Cr removal was min. at pH = 6.3 for 0.05 *M* solns., and that the min. shifted toward the acid side with increasing concn. Removal of sulfate increased both with concn. and pH value. H. B. Merrill

The stability of leather as indicated by different Procter and Searle values and by pH values. Roy C. Bowker and Everett L. Wallace. *J. Am. Leather Chem. Assoc.* **34**, 551-5(1939).—Com. vegetable-tanned leathers were adjusted during loading to give Procter-Searle values of 0.85-1.36% apparent mineral acid as H_2SO_4. The pH values of aq. exts. of these leathers varied from 2.98 to 3.26. After storage for 2 yrs., none of the leathers showed appreciable loss in strength, confirming previous conclu-

sions that leathers with pH values of 3 or higher do not undergo acid deterioration regardless of abnormally high Procter-Searle values. H. B. Merrill

The tannin-precipitating action of partially degraded glue and gelatin solutions. Géza Tóth. *Collegium* **1939**, 439–43.—Fixation by gelatin of the sol. tannin in leather is not satisfactory because of the high viscosity, low diffusion velocity, and consequent nonpenetration of the gelatin. Boiling a 10% gelatin soln. contg. either 2% of acetic or 4% of formic acid for as much as 12 hrs. did not decrease its tannin-pptg. power but decreased its viscosity to about half its original value. Strong acids decreased the ability of the gelatin to ppt. tannin. I. D. Clarke

Colorimetric detn. of Cr [in leather] (Uebelacher, Droscher) **7**. Condensation products for use in tanning (U. S. pat. 2,171,963) **13**.

Tanning material. Alfred Russell and John W. Copenhaver (to Röhm & Haas Co.). U. S. 2,171,806, Sept. 5. In prepg. a tanning material suitable for making white leather or for use in retanning, at least one aromatic nucleus of 4,4′-dihydroxydiphenylsulfone is sulfonated to form a water-sol. product and this sulfonated product is condensed with an aldehyde such as CH_2O.

Rotary, glass-lined metal drum suitable for use in dyeing or tanning leather, etc. Melville J. Goodwin (to Pfaudler Co.). U. S. 2,170,712, Aug. 22. Various structural details.

White leather. John A. Wilson (to Hall Laboratories, Inc.). U. S. 2,172,233, Sept. 5. For making white leather, a skin such as a calf skin is bleached, treated with an acid CH_2O soln. and then with an alk. CH_2O soln., thereafter treated with an alkali metal metaphosphate soln. of a pH about 2.0–2.4, and subsequently treated with an alum tanning soln.

Edge staining of materials such as leather. Stig E. Rosenberg. U. S. 2,170,218, Aug. 22. Various details of app. and operation.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

New products of the rubber industry. J. W. Raynolds. *J. Chem. Education* **16**, 486–91(1939). E. H.

The Netherlands' rubber industry. H. C. J. H. Gelissen. *Rubber* (Amsterdam) **2**, No. 5, 4–6(1939). N. B.

Viscosity and creaming capacity of latex. J. W. van Dalfsen. *Arch. Rubbercultuur* **23**, 1–28(1939).—The difference between the dry rubber content of cream and that of the original latex is considered to be the creaming capacity. Measurements were made of this capacity in latexes subjected to various preliminary treatments such as prompt and delayed ammonation of original latex, artificial thickening, addn. of soap (or Igepon) and passage through a centrifuge or colloid mill. The av. creaming capacity increased as the observed viscosity diminished, regardless of the pretreatment. Konjaku flour was used as creaming agent. D. E. Cable

Notes on the method of Roberts for the analysis of raw rubber. G. M. Kraay and R. F. A. Altman. *Arch. Rubbercultuur* **22**, 223–30(in English, 231–8)(1938).—"Caoutchol" as isolated by Roberts (cf. *C. A.* **32**, 4821[8]) is believed to be a complex mixt. of oxidation products of rubber hydrocarbon. Users of the method should guard against oxidation during the sepn. steps, using N gas and peroxide-free solvents where required. This modified method may serve as an indicator of oxidation products in rubber. D. E. Cable

The determination of the dry rubber content of cream serum. G. E. van Gils. *Arch. Rubbercultuur* **23**, 29–31 (1939).—A serious error in finding the dry rubber content of latex or cream serum may be caused by copptn. of proteins. Details are given of a procedure to avoid such a fault. The serum is heated with NaOH. Rubber is pptd. after foam formation caused by acidification with formic acid and the presence of decompg. carbonates. D. E. Cable

Tests on crepe soling. IV. Viscosity, plastic yield and tensile product. T. H. Messenger and J. R. Scott. *J. Rubber Research* **8**, 79–86(1939); cf. *C. A.* **31**, 8250[9].—The tendency of soling crepe with a high tensile product to give highly viscous solns. in C_6H_6, already indicated in earlier expts. (cf. *C. A.* **29**, 6466[8]), was confirmed, and the same relationship was found to be true of solns. in acidified C_6H_6 (cf. Vries, *C. A.* **18**, 2441). However, in neither case was the relationship close enough to make it possible to distinguish crepe with unsatisfactory tensile properties by means of a viscosity detn. The advantages claimed for acidified C_6H_6 as a solvent in viscosity detns. are apparently of no aid in distinguishing rubbers of the same type. The rate of plastic yield of gristly crepes is, in an approx. way, inversely proportional to the tensile product. This relationship is closer than that between viscosity and tensile product, so that a plastic yield test is more satisfactory than a viscosity detn. as a criterion of the quality of gristly crepe. Golden crepe is an exception to this rule. Hence, in spite of the operative disadvantages of the plastic yield test, it should be capable of indicating tensile properties and the tendency of soling crepe to "spread" in service. In view of the great changes which soling crepe undergoes at its several transition temps., it is important to know its normal condition in service. Until this is known, tests of crepe for soling are of limited value. Although "plastic yield" is used to denote continuous deformation under a small load, crepe at 70° is neither a plastic material nor a highly viscous fluid. Judged by tensile and viscosity tests, factory crepes are not inferior to estate crepes, but since both detns. involve heating the crepe, the same relationships are not necessarily true in ordinary service. C. C. Davis

Who was Charles Goodyear and how did he come to discover vulcanization? A. van Royen. *Rubber* (Amsterdam) **2**, No. 5, 14–18(1939). N. Bekkedahl

The vulcanization process of rubber: its development and technical significance between 1839 and 1939. A. van Rossem. *Rubber* (Amsterdam) **2**, No. 5, 7–11(1939). N. Bekkedahl

Polarographic method for detg. org. peroxides [in studying primary and by-products of the rubber industry] (Dobrinskaya, Neiman) **7**. Preliminary data on the storage of *Hevea* pollen (Dijkman) **11D**. Expts. on the preservation of ramie lines in sea water by impregnation with latex (Markus, Dallsen) **25**. Resilient articles such as tires (U. S. pat. 2,171,805) **13**. Applying sheet rubber to large rolls (U. S. pat. 2,172,005) **23**.

Latex compositions. Everett V. Anderson (to United States Rubber Products Inc.). U. S. 2,172,463, Sept. 12. See Can. 379,560 (*C. A.* **33**, 3631[8]).

Rubber compositions. Cunard White Star Ltd., Geo. M. Paterson, John Brown & Co. Ltd. and James M. McNeill. Brit. 506,863, June 6, 1939. A ship's hull or analogous structure has its exposed plate edges faired by fillets of rubber latex compounded with a dehydrating binder and a comminuted filling substance. A suitable compn. is rubber latex 3, cementitious binder 6 and granulated cork 2 parts.

Apparatus for triturating rubber and like materials. Manuel Roca and Enrique Guix. U. S. 2,171,949, Sept. 5. Various structural, mech. and operative details.

Rubber powder. Centrale Vereeniging tot beheer van proefstations voor de overjarige cultures in Nederlandsch-Indie (Jan Willem van Dalfsen, inventor). Brit. 506,902, June 6, 1939. This is made from rubber latex to which has been added S or other vulcanizing agent, ZnO or other

activator of the vulcanizing agent, and a stabilizer, e. g., NH_3-caseinate soln., and which is then allowed to stand, with or without acceleration by heat, until the tensile strength of a dried film or the coherence of a coagulum made from a portion of the mixt. has substantially disappeared, the rubber being then sepd., e. g., by spraying, drying as a film, coagulating and filtering or centrifuging. The product is a powder or may be easily disintegrated. It appears to lie between the vulcanized and unvulcanized states as part of the S is combined, and upon further heating, especially if an accelerator is present, it reacquires tensile strength and the other characteristics of vulcanized rubber. Fillers, softeners, antioxidants, etc., may be added to the latex and, where a large amt. of S is used, the product is suitable for the manuf. of an ebonite press powder. The product may be dispersed in H_2O or salt solns. to produce a latex, or swollen in a solvent to give a dispersion that may be ground to give a nonsticky paste of very high rubber content. The powder may be mixed with asphalt *for road purposes*, or used alone or mixed with artificial resins as a molding powder, or used in the manuf. of rubber derivs.

Controlling the temperature of rubber-mill pans, etc. Fernley H. Banbury (to Farrel-Birmingham Co.). U. S. 2,170,396, Aug. 22. Various structural and operative details of app. which may be cooled or heated by circulating water.

Rubber strips from dispersions. Raymond W. Albright (to American Anode Inc.). U. S. 2,170,441, Aug. 22. App. is described, and a method which comprises continuously passing a surface such as a Zn tape through an aq. dispersion of rubber, depositing a continuous coating of water-contg. rubber coagulum on the surface, severing the coating longitudinally into strip form promptly and before substantial drying of the coagulum has occurred, and drying the strips of coagulum.

Sponge rubber. Expanded Rubber Co. Ltd. and Francis De Lautour. Brit. 506,077, May 23, 1939. In the manuf. of gas-expanded rubber, the rubber is partially vulcanized, e. g., to 2–15% of the final cure, gassed at atm. temp. and subsequently heated in a mold to complete the vulcanization and expansion of the gas. The pressure in the gassing chamber at the completion of the gassing operation is preferably released rapidly to cool the contents of the chamber so they may be readily removed; the cooling effect may be prolonged by conducting the cooled gas through a jacket around the gassing chamber.

Porous rubber products. Edward A. Murphy, Geoffrey W. Trobridge and Albert N. Ward (to Dunlop Rubber Co. Ltd.). U. S. 2,169,847, Aug. 15. In producing an article such as a cushion for upholstery, spaced projections of a former are dipped into a mass of foamed latex to form deposits on the side walls of the projections which are joined together in a continuous structure.

Rubber sheets. Wadysaw Kubica. Brit. 506,942, May 19, 1939. Thin sheets are manufd. in a continuous manner by drying a layer of rubber soln. or of an aq. rubber dispersion on a polished unheated drum that rotates with const. speed and is partly immersed in the soln. or dispersion in a container, the sheet being constantly removed by a roller. The sheet formed on the drum may be continuously applied to a fabric led around a roller pressing against the drum. The fabric may be precoated with thin rubber soln.

Rubber sheets. United States Rubber Products, Inc. Brit. 505,959, May 19, 1939. Sheet material, e. g., inner tubes for pneumatic tires, that is resistant to tearing has a no. of sepns., each having contiguous edges defining closed paths, located over the surface of the sheet and extending partly through the thickness of the sheet. The material may be made by applying a perforated sheet of unvulcanized rubber to an unperforated sheet of unvulcanized rubber, dusting at least the perforations with soapstone, mica, etc., and subjecting the sheets to heat and pressure so as to vulcanize them together and to cause the rubber of the unperforated sheet to flow into the perforations of the perforate sheet.

Use of rubber hydrochloride, etc., as a wrapping and packaging material. Thomas A. McCoy. U. S. 2,168,651, Aug. 8. Materials such as fruits, vegetables, bottles, cartons, etc., are sealed at atm. pressure in a loosely fitting wrapper such as one of rubber hydrochloride stabilized against photochem. disintegration as by $(CH_2)_6N_4$ and the entire surface of the wrapper is heated to a temp. (suitably about 95–110°) and for a time (suitably about 5 sec.) sufficient to shrink the wrapper to fit the contents closely without developing even temporary tackiness.

Laminated conveyer belts of fabric and rubber. Reuben E. Winch (to B. F. Goodrich Co.). U. S. 2,168,013, Aug. 1. Various structural and mfg. details of belts suitable for conveying rock, coal or ore.

Golf balls. Dunlop Rubber Co. Ltd. and Douglas F. Twiss. Brit. 506,205, May 24, 1939. Golf balls having a core filled with a substantially nongaseous material surrounded by tensioned rubber winding and a gutta-percha shell are treated by introducing into the core by means of a hypodermic needle a substance that reacts chemically with that in the core. The reaction may be such as to produce a gas or to liquefy a solid core material, e. g., gelatin. Gas-producing reagents may be NH_4Cl and $NaNO_2$, urea and NaBrO, or an acid soln. of urea and $NaNO_2$. Liquefying reagents for gelatin may be NH_4SCN or urea or a soln. of microorganisms. The injected materials may be heated to help the reaction.

Insulation for cables. P. P. Nikotin, P. N. Gorshkov, G. M. Nodel'man and N. A. Chesnokov. Russ. 51,649, Aug. 31, 1937. A compn. of synthetic rubber, fillers and diphenyl phosphate or ditolyl phosphate is specified.

Rubber-like products. Standard Oil Development Co. Brit. 506,427, May 26, 1939. Vulcanized products are prepd. by treating an isobutylene polymer of mol. wt. below 40,000 with 1–100% of its wt. of S_2Cl_2 or SCl_2 at 80–200° for 10 min.–50 hrs. Fillers and reenforcing agents, e. g., C black, PbO, ZnO, and rubber vulcanization accelerators, e. g., $(CH_2)_6N_4$, di- or tri-phenylguanidine, may be mixed with the polymer before treatment, which may be conducted in the presence of a solvent or diluent, e. g., naphtha, CCl_4, CS_2. The product may be pptd. from the solvent by alc. or Me_2CO and purified by soln. in C_6H_6, addn. of diatomaceous earth and filtration through powd. NaOH. The products may be used for the prepn. of rubber goods, e. g., tires, and high-pressure lubricants.

Gutta-percha cement. A. S. Turbin. Russ. 51,659, Aug. 31, 1937. A stable emulsion in gasoline is obtained by emulsifying gutta-percha without mastication in a mixer or a similar app.

Organic compounds containing sulfur and selenium. Deutsche Dunlop Gummi-Compagnie A.-G. Ger. 677,895, July 6, 1939 (Cl. 12*o*. 23.03). Substituted or unsubstituted aryl selenohalides or selenocyanides are treated with org. S compds. of general formula XSC(S)Y in which X denotes H or metal, especially alkali metal and Y denotes O or N. Thus, *o*-nitrophenyl selenobromide is dissolved in alc. and treated with K isopropylxanthate to give *o*-nitrophenyl isopropyloxythioformyl selenosulfide. The prepn. of benzothiazolyl *o*-nitrophenyl selenosulfide and *o*-nitrophenyl diethylaminothioformyl selenosulfide is also described. The products are used as *vulcanization accelerators*.

Vulcanizing microporous rubber soles. A. P. Pisarenko and G. A. Sandler. Russ. 51,614, Aug. 31, 1937. Addn. to Russ. 47,075. Vulcanization is effected in molds or frames provided with perforations or equipped with a penetrable layer of fabric to facilitate the removal of gases during the process.

Impregnating and vulcanizing elastic belts. Joaquín Montane Marti. Brit. 505,229, May 8, 1939. Endless driving-belts consisting of a skein of rubber threads encased in woven tubular fabric are impregnated with rubber latex by immersion in a bath in which they are alternately stretched and slackened, this motion being continued after removal from the bath, and are then subjected, after they have dried, to pressure under tension by being rolled between pressing plates, 1 of which is stationary while the other oscillates, and are finally vulcanized. App. is described.

CHEMICAL ABSTRACTS

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APPARATUS, PLANT, EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

The concept of "contact" in commercial devices. Jose Piazza. *Anales asoc. quím. argentina* **27**, 145–9(1939).—It is proposed to define "contact" as the relation of surface with respect to vol. The quant. definition of this value, having the dimension l^{-1}, facilitates the study of heat-conducting app., fractional distn., catalysis, crystn., etc. E. M. Symmes

A device for rapid rinsing of absorption towers used in gas-analysis studies. N. F. Childers, D. C. Kiplinger and H. W. Brody. *Science* **90**, 447–8(1939). E. H.

Steam consumption of distilling columns. Paul Vidal. *Bull. assoc. chim.* **56**, 593–9(1939).—A theoretical treatment of the various factors involved is presented, and the practical application of the resulting formulas is discussed. F. W. Zerban

Micro tearing machine for the photomicrographic and microcinematographic examination of materials. Th. Pöschl. *Arch. Eisenhüttenw.* **13**, 189–92(1939).—A small, but very strongly and ruggedly built machine for tensile tests is described with which in particular phenomena at and beyond the flow limit and the flow of materials itself can be observed in detail. A continuous observation of the changes in the fine structure due to mech. stresses and impacts is also possible. Numerous micrographs are reproduced made with a bending test. M. Hartenheim

A hydrogen sulfide recorder. Wilton E. Stackhouse. *Instruments* **12**, 280–2(1939).—The colored soln. resulting from the passage of the gas sample through a reagent specific for H_2S is passed through the liquid cell of a photoelec. photometer. The net photocell output is recorded by means of a potentiometer recorder. The recorder scale covers the range from 0.0 to 0.5 grains of H_2S per 100 cu. ft. of gas, responds to changes in concn. of 0.005 grains within 20 min., and is accurate to ±1%. E. H. Brown

Thermoelements from noble metals. K. W. Fröhlich. *Österr. Chem.-Ztg.* **42**, 356–7(1939).—The Pt-Fe thermoelement has a greater thermotension at a given temp. than the Pt-Rh element. This means higher sensitiveness in the measurement of temp. By the use of the Pt-Rh element, a cheaper millivoltmeter can be used than with the Pt-Rh element with equal accuracy. The Pt-Rh element is best for temp. above 1200°. Joseph H. Wells

An apparatus for taking an average sample of a variable flow of gas. A. Blackie. *J. Soc. Chem. Ind.* **58**, 293–6(1939).—The condition for proportional sampling is attained by maintaining a pressure difference between the receiving vessel and the source equal to the pressure difference between the source and the throat of the Venturi. Two models are described. E. H. Brown

Simple wet combustion method for the determination of carbon, oxygen equivalence and empirical formula by iodic acid oxidation. Bert E. Christensen and J. Fred Facer. *J. Am. Chem. Soc.* **61**, 3001–5(1939).—A simple *app.* for the detn. of O equivalence and percentage of C by means of HIO_3 oxidation is described. A modification of the Pettenkofer method for the detn. of CO_2, using a volumetric principle, has been devised. Equations have been derived by means of which the empirical formula of an org. compd. can be established readily from the data supplied by the above method. C. J. West

Portable apparatus for exact analysis of mine gases, motor exhaust, etc. A. Schmidt. *Glückauf* **75**, 198–203(1939).—A portable app. employing the manometric method of analysis and giving high accuracy with large measuring range is described. A table for pressure corrections, due to changes in temp. during the analysis is given. L. P. Rockenbach

Preparation of pure gases and pentane for cryostats. N. S. Rudenko. *J. Phys. Chem.* (U. S. S. R.) **12**, 668–76(1938).—The prepn. and purification (by low-temp. distn.) of O_2 from $KMnO_4$, N_2 from NH_4NO_2, CO from CH_2O_2, C_2H_4 from $C_2H_4Br_2$, CH_4 from CH_3COONa, and pentane from aviation benzine (by distn., fractional crystn. and washing with H_2SO_4 and NaOH) are described. F. H. Rathmann

Some applications of the Raleigh interferometer. E. C. Craven. *Ind. Chemist* **15**, 354–7(1939).—The compn. of some binary mixts. can be detd. by the direct comparison of interference bands. Analyses of CO_2 in air, AcH in air, higher alcs. in EtOH, explosive petroleum-air mixts. and hydrocarbons in crude H were investigated. CO_2 in air was measured to 0.01%. Two complete O_2 and aldehyde detns. per min. were found possible with the exit air from an AcOH plant. E. H. Brown

Froth flotation economically recovers valuable material from talc waste. W. E. Trauffer. *Pit and Quarry* **32**, No. 4, 28–30(1939).—Economical recovery of 95% pure talc from dry-plant waste (talc 55, magnesite 35 and other impurities 10%) by froth flotation is now possible. Plant equipment and flow-sheet are described. A. G. S.

Measuring flotation reagents. J. C. Williams. *Eng. Mining J.* **140**, 55(Nov., 1939).—Hypodermic syringes furnish uniform drops accurately calibrated. Luer Tuberculine syringes are available in sizes ranging from 0.25 cc. to 50 cc. By the use of interchangeable needles the size of the drop can be varied to suit the reagent used and the requirements of the operator. W. H. Boynton

An automatic carbon dioxide compensator for cupola control. F. K. Vial. *Instruments* **12**, 275–6, 279(1939).—CO_2 is regulated by the operation of an air-supply blower activated by a recording and controlling Orsat type gas analyzer. E. H. Brown

Recirculating air heating for industrial furnaces. Edward Stephenson, Jr. *Metal Progress* **36**, 637–41(1939).—Attention is called to large furnaces operating at temps. up to 1250°F. for process and stress-relieving annealing, and for heat-treatments of steels. Details of burner construction and fan equipment are given. W. A. Mudge

A recirculating radiated waste-heat drier operated under controlled humidity and temperature. H. R. Straight. *Bull. Am. Ceram. Soc.* **18**, 427–9(1939). C. H. Kerr

Direct deduction of average temperature in heat-interchange apparatus. Jose Piazza. *Anales asoc. quím. argentina* **27**, 147–8(1939); cf. *C. A.* **33**, 1995⁹. E. M. Symmes

Graphical determination of heat transmission across a wall. Jean Szczeniowski. *Chaleur et ind.* **20**, 491–4(1939).—Math. H. A. Beatty

Flow and heat-transfer problems in chemical technique and research. Gerhard Damköhler. *Chem. Fabrik* **1939**, 469–77.—A math. discussion of these problems from the phys. chemistry standpoint under the general headings, "Pure flow and heat-transfer problems without direct connection with the chem. process," and "Problems in which the phys. influences of the flow, of diffusion and of heat transfer are directly connected with chem. processes." Examples and data are given, with 11 references. J. H. Moore

App. for agitating, aerating, mixing and purifying liquids or gases (U. S. pat. 2,174,147) 14.

Apparatus for producing substantially saturated solutions, such as those of sodium chloride in water. Kenneth E. Stuart (to Hooker Electrochemical Co.). U. S. 2,173,986, Sept. 26. Various structural and operative details of an app. having a plurality of tanks and float valves for liquid control.

Apparatus (with coacting rotating disks) for intimate mixing of various coarsely premixed pulverulent materials. Paolo Gentilli. U. S. 2,172,704, Sept. 12. Various structural, mech. and operative details.

Apparatus for supplying powdered and other material to a mixing vessel. Wm. G. Simon and Frederick R. Simon. Brit. 507,607, June 19, 1939. In the app., an automatic weighing machine intermittently discharges the weighed quantities into a hopper and the outlet from the hopper is controlled to effect a continuous delivery of the material.

Measuring apparatus for the comparative determination of the dielectric constants of powders, grains, cuttings, etc. Haardt & Co. A.-G. Brit. 506,921, June 6, 1939.

Apparatus for taking samples of milk, water, beer or other liquid and means for transporting the apparatus in a sterile condition. Henry M. Gould. Brit. 508,585, July 4, 1939.

Distillation and rectification process and apparatus. Juan Loumiet et Lavigne. Brit. 507,435, June 14, 1939. Liquids are distd. and rectified by causing their vapors to flow through helical coils with a velocity sufficient to develop a component of centrifugal force several times as great as gravity, injecting rectifying liquid into the vapors and causing it to be atomized, and extg. the rectified liquid. The coils may have straight portions. A double-effect app. for the rectification of alc., etc., is described.

Photoelectric colorimeters. I. G. Farbenindustrie A.-G. Brit. 508,802, July 5, 1939.

Manhole doors of the internal type for pressure vessels. Charles McNeil Ltd. and John McNeil. Brit. 507,563, June 9, 1939.

Boiling pans. Harry Pauling. Brit. 508,993, July 10, 1939. A boiler for concg. H_2SO_4, etc., is fitted with 1 or more cone-shaped inserts, not more than half the depth of the boiler, with their surfaces at an angle of about 45° with the horizontal. The inserts are open at the top and bottom and provided with perforations.

Filters. Johannes Wiebe. Ger. 676,189, May 27, 1939 (Cl. 12*d*. 15.02). Addn. to 671,703 (*C. A.* **33**, 6094[9]). A device for removing filter cakes from rotary cell filters is described.

Oil filter suitable for use with various apparatus. Robert H. Pennebaker. U. S. 2,173,978, Sept. 26. A filter unit for oil comprises a spool-like frame having a pair of end flanges interconnected by a central tubular member perforated for the passage of oil therethrough, a filter screen mounted concentrically about the perforated central tubular member, a screen-like supporting strip having a paste-like filtering medium spread thereon and consisting of a mixt. of fibrous material and finely divided clay wetted by a light-bodied oil, the screen-like strip with the paste-like filtering medium thereon being spirally wrapped about the filter screen for providing a plurality of superimposed layers of filtering medium on the filter unit, the paste-like medium penetrating the meshes of the screen-like strip and uniting adjacent layers of the medium to provide a substantially homogeneous filtering mass over the filter screen.

Filtering apparatus constructed to facilitate backwashing to remove collected residue. Charles W. Andrews (to H. A. Brassert & Co.). U. S. 2,173,060, Sept. 12. Various structural and operative details.

Filtration and clarification of liquids. Hubert F. Jordan (to United States Rubber Co.). U. S. 2,173,256, Sept. 19. Various structural and operative details of an app. in which an endless belt of perforated vulcanized rubber or the like is used as a filtering medium.

Funnel with a splash-preventing flange. Ross L. Perkins. U. S. 2,174,228, Sept. 26. Various details of a funnel with a flange and baffles.

Wet separating. Andrew Pearson. Brit. 507,661, June 15, 1939. In the "sink and float" process for concg. minerals by the use of a substantially stable heavy suspension, the tendency of the viscosity of the suspension to increase during the process is controlled by adjusting the relative proportions of the fine and coarse particles in the dispersed phase while the sp. gr. of the suspension is kept substantially const., the adjustment being effected by removing part of that portion of the dispersed phase the particle size of which is intermediate that approaching Brownian size and that which settles rapidly, and replacing it by a suitable amt. of the dispersed phase of larger particle size. The initial suspension may be prepd. by adding to a stable suspension in a liquid of finely levigated galena or other heavy substance that contains a relatively large approaching Brownian size the same substance of coarser grain size until the desired sp. gr. is attained.

Centrifugal separators. I. G. Farbenindustrie A.-G. Brit. 506,488, May 30, 1939. Pulverulent materials are sorted centrifugally in an eddy formed by a carrier fluid that travels in a chamber from periphery to center; the coarse material leaves at the boundary of the chamber and the fine material is withdrawn axially with the carrier fluid.

Centrifugal separators. Aktiebolaget Separator. Brit. 508,182, June 27, 1939. A separator with 1 or more supply and discharge pipes communicating with the bowl by means of a tightening device has 1 element of the tightening device supported in relation to the other by a bearing.

Centrifugal gas separators. Santo Ghielmi. Brit. 508,161, June 27, 1939. Gaseous mixts., e. g., air, are divided into their constituents by the combined effect of centrifugal force and suction produced by app. having a no. of rotary impellers that increase in diam. from the inlet.

Centrifugal dust separators. Archibald F. Lamb. Brit. 506,778, June 5, 1939.

Apparatus for separating sand, etc., from slimes and slurries. Ralph J. Hall. U. S. 2,172,792, Sept. 12. Various structural and operative details.

Gas purifier. Hans Bischoff and Josef Lerch. Ger. 678,114, July 8, 1939 (Cl. 26*d*. 5). Addn. to 676,803 (*C. A.* **33**, 7157[1]). Details of app. contg. a purifying and filtering element are described.

Apparatus for atomizing various liquids. Albert J. Loepsinger (to American Moistening Co.). U. S. 2,173,072, Sept. 12. Various structural details.

Apparatus for measuring the electric conductivity of liquids. Fritz Lieneweg and Wilhelm Geyger (to Siemens & Halske A.-G.). U. S. 2,173,233, Sept. 19. Various structural, elec. and operative details

Apparatus for mixing liquids in flow proportionately. Bedrich Kresl Brit. 506,576, May 31, 1939. In app. wherein a turbine, etc., driven by 1 liquid drives a pump supplying the other, the pump is mounted on the casing of the turbine and is driven by a crank or eccentric.

Apparatus for producing a pulsating circulation of liquids containing gas-evolving products, as in fermenting grape must. Gilbert L. R. Ducellier and Marcel A. Isman. U. S. 2,174,203, Sept. 26. Various structural and operative details

Photoelectric apparatus for testing liquids. Victor H. Gilbert and Radiovisor Parent Ltd. Brit. 509,061, July 11, 1939. Liquids to be tested are subjected to temp. conditions in a chamber in communication with an observation chamber in which the liquid passes between a source of light and a light-sensitive element. App. is described intended to detect the leakage of NH_3 in a cooler unit comprising a tank, a pump and a sprayer.

Apparatus for adding a liquid in proportionate quantities to a stream of a second liquid. The Permutit Co. Ltd., John G. Milton and Robert Clark. Brit. 507,090, June 9, 1939. The app. comprises electrically operated means, actuated by a meter in the 2nd stream, for moving a shoot that in 1 position supplies the 1st liquid to the stream and

in the other position returns the 1st liquid to storage, the return being effected after a predetd. amt. of the 1st liquid has been added.

Apparatus for purifying liquids. John K. Russell, Wm. B. Collins and Walter W. Boggs. Brit. 507,064, June 6, 1939. Addn. to 476,422 (*C. A.* **32**, 3673[2]). The refining element of the app. comprises a finely divided adsorbent material and a large no. of lumps or wads of a fibrous filtering material which supports the adsorbent material, the said materials being arranged in sep. layers and so that flow-impeding packing or settling of the adsorbent material is substantially prevented. The adsorbent material may be activated, e. g., as described in Brit. 476,421 (*C. A.* **32**, 3673[3]) and 476,422, and may consist of chemically or otherwise activated clay of 1 or more degrees of fineness; fuller's earth, synthetic clay, pumice, infusorial earth, diatomaceous earth, kieselguhr and bentonite are specified. The fibrous material may be mineral, rock or steel wool, asbestos, cotton waste, curled hair or paper. The app. may be fitted in the oil circuit of an internal-combustion engine. 2

Air-conditioning apparatus (utilizing calcium chloride for drying). Charles R. Downs and Joseph W. Spiselman (to Calorider Corp.). U. S. 2,174,186, Sept. 26. Various details of an app. for cooling and drying the air.

Apparatus for drying, moistening or other treatment of webs in chambers. Proctor & Schwartz, Inc. Brit. 507,810, June 21, 1939. 4

Drying. Johannes Barthel and Heinrich Huebner Ger. 676,481, June 5, 1939 (Cl. 82*a*. 1.01). Addn. to 644,635 (*C. A.* **31**, 6064[1]). A method of drying materials by a gas, such as air, carrying a unipolar charge of at least 500 v. is described.

Rotating furnace. Stewarts and Lloyds, Ltd. Ger. 679,819, Aug. 16, 1939 (Cl. 18*c*. 9.03). 5

Heat-exchange apparatus suitable for use with liquids and air. Carl E. Meyerhoefer (to E. A. Laboratories, Inc.). U. S. 2,174,038, Sept. 26. Various structural details

Heat-transfer apparatus suitable for heating oils. James M. Jenkins (to Andale Co.). U. S. 2,173,169, Sept. 19. Various structural and operative details of an app. including a heated tube contg. baffles and through which material to be heated is passed. 6

Plate heat-exchangers. The Aluminium Plant & Vessel Co. Ltd. Brit. 508,261, June 28, 1939.

Apparatus for washing ores, etc Fried Krupp Grusonwerk A.-G. (Paul Bodenstein, inventor). Ger. 676,184, May 27, 1939 (Cl. 1*a*. 12.10). Addn. to 674,863 (*C. A.* **33**, 6665[5]).

Apparatus for testing the hardness of materials. Heinrich Hanemann (to (Firm of) Carl Zeiss). Brit. 507,737, June 20, 1939. The app. comprises a penetrator and a microscope for measuring the impressions.

Grinding apparatus. Arno Andreas. Ger. 676,235, June 12, 1939 (Cl. 50*c*. 17.20).

Ball mills for grinding or blending materials. Wm. H. P. Boll. Brit. 508,123, June 27, 1939. The mills comprise a chamber of cube shape mounted for rotation by diagonally opposite corners in such manner that during rotation individual corners assume in succession the instantaneously lowest position and that the balls roll in a series of straight lines at angles to one another in moving to the lowest corner, and 1 of the mounted corners of the chamber includes an expansion bearing. 3

Roller mills. Arnold Locher. Brit. 507,971, June 23, 1939. In a grinding-roller, the roller body consists of a steel tube of which the outer surface is improved by carbonizing or nitriding to the desired depth and up to about 1000 Brinnel, the axle ends being welded into the ends of the drum.

Porous silicate decolorizing agents, etc. Arthur B. Cummins (to Johns-Manville Corp.). U. S. 2,173,085, Sept. 19. A porous product suitable for decolorizing materials such as oils is prepd. by forming a slurry of an alk. earth carbonate such as $MgCO_3$, a finely divided siliceous material such as diatomaceous earth, and water, heating the slurry for a prolonged period to effect reaction, and sepg. the silicate product from the aq. medium.

Apparatus for measuring the moisture content of material, e. g., sand, by mixing a sample with a definite volume of a testing liquid that is miscible with the water. Geoffrey H. Cheesman, Frederick J. Burren and Richard J. Pike. Brit. 506,996, June 2, 1939. The app. comprises a mixing device in which a measure of defined vol. for the material can be inserted and retained adjacent the mouth, removable closure means for the device, and a hydrometer for ascertaining the change of d. of the testing liquid resulting from the admixt. with H_2O.

Inflammable-gas detectors, of the type wherein a differential gas thermometer having one bulb surrounded by a catalyst is provided with electric contacts operating a signaling circuit. Giuseppe Menozzi. Brit. 507,219, June 12, 1939. Addn. to 480,335 (*C. A.* **32**, 5667[6]).

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Martin H. Fischer on his 60th birthday. Wolfgang Ostwald. *Kolloid-Z.* **89**, 2-12(1939).—Biography with portrait and list of publications. G. G.

Raphael Eduard Liesegang on his 70th birthday. Wolfgang Ostwald. *Kolloid-Z.* **89**, 105-6(1939).—Eulogy with portrait. G. G.

R. E. Liesegang as a photochemist. Karl Schaum. *Kolloid-Z.* **89**, 124-8(1939). G. G.

David Jacobus Hissink; his work as a soil expert. Jac. van der Spek. *Chem. Weekblad* **36**, 732-7(1939).—Biography with portrait and list of publications. G. G.

Robert Hooke, chemist. Clara De Milt. *J. Chem. Education* **16**, 503-10(1939). E. H.

Hans Christian Oersted, a pioneer in the development of aluminum. M. Haas. *Aluminium* **21**, 681-7(1939).—A biography. M. Hartenheim

Karl v. Auwers, 1863–1939. H. Meerwein. *Ber.* **72A**, 111-21(1939).—Obituary with portrait and list of publications. G. G.

Henry le Chatelier, 1850–1936. Max Bodenstein. *Ber.* **72A**, 122-7(1939).—Obituary. G. G.

Henry Turner Lee. H. M. Mason. *Analyst* **64**, 778 (1939).—Obituary. W. T. H.

Wilhelm Normann. v. Lippmann. *Ber.* **72A**, 128-9 (1938).—Obituary. G. G.

Oscar Henry Plant, 1875–1939. Anon. *J. Pharmacol.* **67**, 367-71(1939).—Obituary, portrait and biographical sketch. L. E. Gilson

Sir William Pope. Charles S. Gibson. *Nature* **144**, 810-12(1939).—Obituary. E. H.

Munenari Tanaka. Roland Scholl. *Ber.* **72A**, 130 (1939).—Obituary. G. G.

Lazarus Ercker and his "Probierbuch." Sir John Pettus and his "Fleta minor." Eva V. Armstrong and Hiram S. Lukens. *J. Chem. Education* **16**, 553-62(1939). E. H.

"Electrical television" fifty years ago. Erwin Miehlnickel. *Kolloid-Z.* **89**, 128-35(1939).—Historical. Liesegang's work is emphasized. G. G.

Laboratory work for the chemistry part of a general course in the physical sciences. E. J. Rosenbaum. *J. Chem. Education* **16**, 568-70(1939). E. H.

The effect of the nature of the course on achievement in first-year college chemistry. Paul E. Clark. *J. Chem. Education* **16**, 510-11(1939). E. H.

Chemistry in the education of a forester. Edwin C. Jahn. *J. Chem. Education* **16**, 570-3(1939). E. H.

Selection and organization of content in the first course in organic chemistry. Henry Gilman. *J. Chem. Education* **16**, 565-6(1939). E. H.

Objectives of the first course in organic chemistry. R. Q. Brewster. *J. Chem. Education* **16**, 562–5(1939). E. H.

Laboratory experiments for undergraduate organic chemistry. II. The preparation of lysidine. III. 2,3-Dihydro-5,6-diphenylpyrazine. IV. 2,3-Diphenylpyrazine. Lawrence H. Amundsen. *J. Chem. Education* **16**, 566–7 (1939); cf. *C. A.* **31**, 3451[1]. E. H.

Transference numbers of electrolytes—a bibliography, 1906–1939. D. J. Le Roy. *Univ. Toronto Studies, Papers Chem. Labs.* No. **156**, 52 pp.(1939). E. H.

Oxidation of ammonia to nitric acid—a demonstration. Leroy D. Johnson. *J. Chem. Education* **16**, 594–5(1939). E. H.

A simple determination of the equivalent weights of mercury, copper and zinc. Walfried Seeger. *J. Chem. Education* **16**, 595(1939). E. H.

Relation of vertical stability to salinity and oxygen extremes in the Atlantic. R. B. Montgomery. *Gerlands Beitr. Geophys.* **54**, 194–202(1939).—Converging surface water sinks along surfaces of const. potential d., so that potential d. layers reaching the sea surface in regions of strong convergence may be expected to be thicker (less stable) than those reaching the surface in regions of weak or neg. convergence. This effect was investigated with the aid of von Schubert's stability values for the stations of the "Meteor" Atlantic Expedition. In certain cases the layers of relatively low stability can be attributed to strong convergence at their intersection with the surface. The same layers have high O content, which substantiates the supposition that they are strongly supplied with water from the surface. J. F. Schairer

Oxidation, reduction, electroöxidation and electroreduction. H. G. Bös. *Chem. Weekblad* **36**, 671–5 (1939).—New definitions are proposed for the above-mentioned expressions. H. S. v. Klooster

A new edition of the periodic system. H. G. S. Snijder. *Chem. Weekblad* **36**, 676–7(1939).—A modification of Antropoff's arrangement (cf. *C. A.* **32**, 6115[4]) is suggested. H. S. v. Klooster

A method of obtaining the expanded secular equation for the vibration frequencies of a molecule. E. Bright Wilson, Jr. *J. Chem. Phys.* **7**, 1047–52(1939).—Math. G. M. Petty

Internal rotation of 1,1,2-trichloroethane. Anthony Turkevich and J. Y. Beach. *J. Am. Chem. Soc.* **61**, 3127–30(1939).—Electron-diffraction data indicate that 1,1,2-trichloroethane is not a rigid mol. in the cis or trans configuration, nor does it have a sinusoidal potential barrier to internal rotation with the trans configuration the most stable. The most stable configuration is rotated about 50° from the trans position. A potential barrier calcd. from electrostatic and exchange interactions is in agreement with the expts. The C-Cl distance is 1.75 ± 0.03 A. and the C-C and C-H distances are assumed to be 1.54 and 1.09 A., resp. The Cl-C-Cl angle is 111°30 ± 2°. A. B. Garrett

The electron-diffraction investigation of the molecular structures of the meso and racemic 2,3-dibromobutanes. D. P. Stevenson and Verner Schomaker. *J. Am. Chem. Soc.* **61**, 3173–6(1939).—These data indicate that both racemic and meso 2,3-dibromobutane have "trans" configurations, with respect to the Br atoms, the bromine-bromine distance being 4.60 ± 0.03 A. A model of the structure of this pair of compds., based on the known structure of isopropyl bromide, gives a theoretical scattering curve which is compatible with the photographs. There is evidence of considerable torsional oscillation about the equil. "trans" configuration. A. B. Garrett

Structural analysis and chemical bonds. V. Caglioti and G. Giacomello. *Atti X° congr. intern. chim.* **2**, 176–94 (1938).—In mol. structures the temp. coeff. of intramol. forces is small, whereas that of intermol. forces is appreciable. Hence a study of the temp. coeff. may yield information on the type of bond between 2 mols. The type of structure, whether plane, spherical, or chain-like, but when there is no polymerization, depends on the shape and size of the mols. In polymerization, the structural type varies with the direction of polymerization; e. g., chain mols. may give rise to chain structures, layer structures, or structures of the diamond type, if polymerization takes place in 1, 2 or 3 directions, resp. These concepts are applicable to ionic structures. Thus the purely ionic or triequiv. structure (bonds ionic in all 3 directions) corresponds to the diamond-type mol. structure; ionic layer structures (diequiv.) are known too (CdI_2). It is shown that ionic chain structures also exist; the *structure of cryolite*, $6NaAlF_4.4NaF$, is given as an example. The fundamental structure is built up of chains of $NaAlF_4$ groups, parallel to the *c* axis, forming channels in which the NaF groups are located. The direction of the ionic bond is that of the *c* axis. Finally, the existence of *mixed structures* is demonstrated: in a fundamental structure belonging to one of the simple types, groups of another type may occur, which are bonded to the fundamental groups by van der Waals, Keesom and London forces. E. g., in the *structure of* KHF_2, the F-F distance is the sum of the at. and ionic radii of F. The anisotropic properties of solid substances (optic, elec., magnetic, etc.) are referred to the anisotropy in the bonds, viz., their nonequivalence in all 3 directions. J. D. H. Donnay

Structural analysis and chemical bonds. V. The structure of molecular lattices determined by the Fourier method of analysis. V. Caglioti and G. Giacomello. *Gazz. chim. ital.* **69**, 245–54(1939); cf. preceding abstr.—The present work is concerned with the mol. lattice of the cholein complex (I) formed from desoxycholic acid (II) and palmitic acid (III) and with related inorg. complexes. The III mol. lies parallel to the *c* axis, and the plane contg. the C atoms is parallel to the *ac* plane. It constitutes, therefore, an internal axis around which are II mols., each of which lies around the central axis and forms with the other almost a cylinder which envelopes the III mol. This is possible because of the peculiar structure of II as indicated by the Fourier analysis. The I mol. contains 3 hexatomic rings and 1 pentatomic ring, to which the lateral chain is attached. The 1st 2 hexatomic rings are not in the same plane; this accounts for the arched form of the II mol. The combination of the 1st rings has the type of configuration of *cis*-decalin. The 2nd 2 hexatomic rings and the pentatomic ring form a plane in which the 2nd 2 hexatomic rings have the configuration of *trans*-decalin. The positions of the OH and Me groups are explained in detail with the aid of diagrams. The fundamental property of I is the capacity of the III component to arrange around its mol. a lattice of mol. character, whereby the properties of II are changed. Thus the cryst. form, soly. in hot EtOH, soly. in cold EtOH, soly. in cold AcOH and $[\alpha]_D$ value of I and II, resp., are: rhombic, tetragonal; 1:5, 1:2; 1:18, 1:4; great, slight; 48.28°, 57.02°. The fatty acid in cholein complexes can be removed by extn. with xylene; in such a case a new complex is formed with the xylene. In general, then, a cholein complex is composed of a lattice with mol. bonds, in which the cryst. skeleton is composed essentially of II mols. The fatty acid, however, governs the arrangement of the lattice. When once formed, the III lattice can be readily replaced by a compd. of similar constitution or of differing chem. constitution but with filiform mols. Structures of this character, in which a particular compd. acts as an enveloping shell, are known in inorg. chemistry, in which case the elementary cells have vacant positions occupied by various atoms. Various examples of such inorg. coördination are cited, with particular attention to complexes of NH_4Cl and $CoCl_2$. NH_4Cl-$CoCl_2$ complexes and cholein complexes are analogous in that in each case the intermol. forces differ from the intramol. forces, and in each case the 2 components in the complex are related crystallochemically. In anomalous mixed crystals, NH_4Cl is bound to the other salt by forces different from those which characterize the 2 lattices; on the contrary, in I the 2 chem. types are bound by forces other than intramol. ones, and the crystallochem. relations control the formation of definite compds., which depend on the length, form and position of the functional groups in the coördinated

mol. Complexes of the I type differ essentially from absorption complexes of the anomalous mixed-crystal type by the different dimensions and forms of their mols. The former have a relatively simple, cylindrical coördination; the latter have a relatively complex tridimensional coördination. C. C. Davis

Structure of insulin. Maurice L. Huggins. *J. Am. Chem. Soc.* **61**, 2982–3(1939).—An electron d. projection of the insulin structure is given, by using Crowfoot's *hk.O* x-ray data and assuming (incorrectly) that the true projection has a center of symmetry and that the structure proposed by Wrinch and Langmuir (*C. A.* **32**, 7318[8], 8873[4]) is a sufficiently close approximation for the detn. of the symmetry of the structure factors. C. J. West

The ellipsoids of polarization of bonds and octets. Sheng-Nien Wang. *J. Chem. Phys.* **7**, 1015–15(1939).—Math. By use of the method of Sachsse (*C. A.* **29**, 4984[6]) transverse and longitudinal polarizabilities of bonds and octets occurring in simple org. mols. are calcd. The results are more reliable and more regular than the calcns. of Sachsse. G. M. Petty

The stability of the valency angles of the carbon tetrahedron. Dipole moments of stereoisomeric 2,3-dichloro-2-butenes. G. P. Mikhailov and D. V. Tishchenko. *J. Gen. Chem.* (U. S. S. R.) **9**, 782–7(1939).—The dipole moments of stereoisomeric 2,3-dichloro-2-butenes were detd., whereby it was established that in the aromatic and ethylene series isomers with higher b. ps. show higher dipole moments. From the dipole moment obtained for *cis*-2,3-dichloro-2-butene it is evident that there is no deformation of the C tetrahedron in ethylene compds. Gertrude Berend

The dipole moments and structures of ozone, silicobromoform and dichlorogermane. Geo. L. Lewis and Charles P. Smyth. *J. Am. Chem. Soc.* **61**, 3063–6(1939).—The dipole moment of ozone indicates that the mol. is a bent structure with a very obtuse angle between the bonds of 2 oxygens attached to a central atom. These 2 identical bonds have some polar character as a result of resonance among forms contg. semipolar bonds. The moments of silicobromoform and dichlorogermane indicate that Si compds. tend to have min. moments in the group carbon, Si, germanium and tin compds., which, otherwise, increase in the order named. A. P. Garrett

Dipole variation of ether. Norman C. C. Li. *J. Chem. Phys.* **7**, 1068(1939).—Dipole moments ($\times 10^{18}$) are tabulated for EtOH, 1.70; Et_2O, 1.14; EtOBu, 1.2; *iso*-AmOEt, 1.2; Et phenol ether, 1.0; PhOH, 1.70; PhOMe, 1.20; PhOEt, 1.0; Ph_2O, 1.05. Byers' prediction of these values (*C. A.* **33**, 3222[3]) is accurate. G. M. Petty

The dipole moments and structures of certain nitro compounds and amines. Geo. L. Lewis and Charles P. Smyth. *J. Am. Chem. Soc.* **61**, 3067–70(1939).—Tetranitromethane has a large at. polarization but zero dipole moment, which means that it is not trinitromethyl nitrite as sometimes suggested. The moment of nitroform is consistent with its tetrahedral structure. The moment of cyclohexylamine is of the same size as those of the primary alkyl amines. The moment of morpholine shows that it exists primarily in the *Z*- or chair-forms of the mols. A. B. Garrett

The contact potential of an iodine film on tungsten. M. J. Copley and R. W. Spence. *J. Am. Chem. Soc.* **61**, 3027–30(1939).—The contact p. d. at room temp. between a clean W surface and an I-coated W surface is −0.91 v. This value suggests that the adsorbed I atoms on the surface are highly polarized. The dipole moment of these adsorbed atoms is estd. as 1.0 Debye unit. A. B. Garrett

Determination of the dielectric constants of liquids at radio frequencies. III. Methyl alcohol, water, and alcohol-water mixtures. Theoretical. R. M. Davies and T. Tyssul Jones. *Phil. Mag.* **28**, 289–306(1939); cf. *C. A.* **30**, 2062[8].—The detection of resonance with conducting liquids and the correction for lead inductance are considered. **IV. Methyl alcohol, water, and alcohol-water mixtures. Experimental.** T. Tyssul Jones and

1 R. M. Davies. *Ibid.* 307–27.—Dielec.-const. values (ϵ) were obtained with chlorobenzene as a standard for pure MeOH, pure H_2O and for 6 different mixts. The value of ϵ for MeOH is 33.57 at 20°, with a 5° temp. coeff. of −0.193; for H_2O, $\epsilon_{20} = 80.31$, with a temp. coeff. of −0.363. With mixts. in the concn. range 20–80% alc. $\epsilon_{20} = 81.16 - 0.4656\ p$, where p is the concn. Outside these concn. limits ϵ is not a linear function of p. The 2 agreement of these values with those of other workers is discussed. E. J. Rosenbaum

Magnetic susceptibilities of metallic oxides, with special reference to those of chromium and manganese. S. S. Bhatnagar, A. Cameron, E. H. Harbard, P. L. Kapur, A. King and Bram Prakash. *J. Chem. Soc.* **1939**, 1433–41.—Magnetic data previously reported by various obsers vers for metallic oxides are frequently contradictory and very difficult to interpret theoretically. These earlier 3 results are discussed critically. Then the results of an intensive study of the magnetic properties of the oxides of Cr and Mn over a wide range of temps. by the modified Guoy magnetic balance method, made simultaneously at Lahore and at London, are presented. The simple Curie law, $\mu_B = 2.839\sqrt{\chi_m T}$, neglects interaction between mols., and values of magnetic moment calcd. by this equation are shown to have no theoretical interpretation. 4 However, values of magnetic moment calcd. by the Weiss modification of the Curie law, $\mu_B = 2.839\sqrt{\chi_m(T-\theta)}$, are consistent for specimens prepd. by different methods, and have real theoretical significance. The results are applied to the interpretation of the various formulas suggested for the oxides of Cr and Mn. A magnetic study of the decompn. of CrO_3 shows that there is little change in magnetic susceptibility with variation in compn. in nonstoichiometric oxides, but the nonstoichiometric Cr_6O_9 5 is ferromagnetic. The slight differences in susceptibility found for Cr_2O_3 prepd. by different methods are ascribed to the presence of traces of chemisorbed gaseous elements. The susceptibility of Cr_2O_3 at 32° is $25.6 \pm 0.2 \times 10^{-6}$. W. W. Stifler

Magnetic measurements of hexaphenyldigermane. P. W. Selwood. *J. Am. Chem. Soc.* **61**, 3168–9(1939).—These measurements set upper limits of dissocn. at 1% 6 in the solid and 20% in a nearly satd. benzene soln. at 25°. It is considered improbable that any dissocn. takes place under these conditions. A. B. Garrett

Elementary range of ferromagnetism. R. Haul and Th. Schoon. *Z. Elektrochem.* **45**, 663–71(1939).—γ-Fe_2O_3 was prepd. by oxidation of Fe pentacarbonyl. The magnitude of the primary crystals decreases with decreasing reaction temp. until finally prepns. are obtained amorphous to x-ray. When crystal identification by means of x-ray is no longer possible, electron rays are used. The magnetic susceptibility is measured by the cylinder method with different field strengths. Up to a range of lattice magnitudes of about 30 to 40 A., there is a slight increase in susceptibility, which then rises about 10% to the amt. characteristic of ferromagnetic substances. This experimentally detd. value marks the lowest elementary particle at which spontaneous magnet- 8 ization occurs. H. Stoertz

Partition functions, degree of dissociation and degree of ionization of gases. Karl H. Riewe. *Z. physik. Chem.* **A184**, 393–8(1939).—Theoretical. Formulas for the partition function of partially dissocd. and ionized gases are presented as well as those for calcg. the degree of dissocn. and of ionization. Victor R. Deitz

Thermodynamic functions for a Fermi-Dirac gas. Edmund C. Stoner. *Phil. Mag.* **28**, 257–86(1939).— 9 After an introduction on thermodynamic functions and their relation to statistical formulas, expressions are given for the energy, heat content, Helmholtz and Gibbs free energies and entropy of a gas obeying the Fermi-Dirac statistics. These expressions are obtained in terms of integrals which have previously been evaluated (*C. A.* **32**, 3689[3]). Numerical values are tabulated with characteristic temp. as a parameter. E. J. R.

The statistical mechanics of condensing systems. VI.

The treatment of a system of constant energy. S. F. Streeter and Joseph E. Mayer. *J. Chem. Phys.* **7**, 1025–38(1939); cf. *C. A.* **33**, 1581[6].—Math. Equations for the thermodynamic functions of an imperfect gas are calcd. up to and including the pressure of condensation for a one-component system consisting of chemically satd. mols. G. M. Petty

Density and vapor pressure at low temperatures. II. Nitrobenzene. V. G. Gurevich and K. K. Sigalovskaya. *J. Gen. Chem.* (U. S. S. R.) **9**, 1326–8(1939); cf. *C. A.* **31**, 8283[7].—As the temp. rises from 15 to 53° the vapor pressure of $PhNO_2$ increases from 0.039 to 1.29 mm. of Hg and the d. changes from 0.27 to 7.8 mg. per l. J. L.

Vapor-liquid equilibrium. IV. Carbon tetrachloride-cyclobenzene mixtures. Geo. Scatchard, S. E. Wood and J. M. Mochel. *J. Am. Chem. Soc.* **61**, 3206–10 (1939); cf. *C. A.* **33**, 1562[7].—The vapor-liquid equil. pressure and compns. of CCl_4/C_6H_{12} mixts. were measured at 40 and 70° over the whole compn. range, and at 30, 50 and 60° for approx. equimol. mixts. The ds. were detd. at 25°. Equations are derived for the thermodynamic functions, including the entropy and energy of mixing at const. total vol. The dependence upon compn. agrees with the predictions of the simple theory. The unexplained entropy increase on mixing is only 1/13 as large as for C_6H_6/C_6H_{12} mixts. A. B. Garrett

Pressure of the saturated vapor of two volatile liquids mixed in arbitrary proportions. N. D. Litvinov. *J. Phys. Chem.* (U. S. S. R.) **13**, 119–23(1939).—Using the exptl. data of Zawidzki (*Z. physik. Chem.* **35**, 129 (1900)), L. shows that the consts. of the integrated Duhem-Margules equation can be more simply obtained than as suggested by Margules and Zawidzki. The agreement between the calcd. and the found vapor pressures of arbitrary mixts. of the systems C_6H_6–$C_2H_4Cl_2$, CH_3COO-C_2H_5–CCl_4, CS_2–$CH_2(OCH_3)_2$, CS_2–CH_3COCH_3 and CH-Cl_3–CH_3COCH_3 is very good. F. H. Rathmann

Turbulent liquid motion outside a circular boundary. Manohar Ray. *Phil. Mag.* **28**, 231–40(1939).—Math. E. J. Rosenbaum

Viscosity of liquids at high hydrostatic pressures. R. B. Dow. *Phil. Mag.* **28**, 403–22(1939).—High-pressure viscometry is discussed with reference to both abs. and relative methods. A concentric-cylinder viscometer is described which can be used up to 3000 kg./sq. cm. The results obtained with a Pennsylvania extd. oil agree with those found with a rolling-ball method. Bridgman's falling-ball viscometer was used to obtain viscosity coeffs. for 6 CS_2–CCl_4 mixts. at 30° and at 75° up to a pressure of 10,000 kg./sq. cm. Viscosity is not a simple function of the concn. of the components. There is no indication that the degree of mol. interlocking suddenly changes either with temp. or with pressure. The thermodynamic aspects of high pressures are considered and the deficiencies of known equations of state are pointed out. There is a part of the energy of viscous flow which cannot be measured by thermodynamic quantities and for which there is no adequate theory. E. J. Rosenbaum

Viscosity of nonideal binary liquid systems. M. K. Srinivasan. *J. Indian Chem. Soc.* **16**, 305–7(1939); cf. *C. A.* **32**, 8886[5].—A modification of the cube-root equation of Kendall and Monroe (*C. A.* **11**, 2850), in which $\eta^{1/3} = (\rho_o/100)(n_1{}^{1/3}\nu_1 + n_2{}^{1/3}\nu_2)(\rho_o/\rho_c)^m$, (where n, n_1 and n_2 are viscosities of the mixt. and pure components, ν_1 and ν_2, vols. of pure components in 100 g. of mixt., ρ_o the observed d. of the mixt., ρ_c the d. calcd. from the formula $100/(\nu_1 + \nu_2)$, and m is a const.) is approx. as satisfactory as the equation of Macleod (*C. A.* **17**, 1909, 2072, 2211) and that of Spells (*C. A.* **30**, 4063[6]) for the calcn. of the viscosities of mixts. composed of picoline-water, pyridine-water, lutidine-EtOH, pyridine-C_6H_6, pyridine-EtOH, MeOH-Et_2O, EtOH-phenetole, phenol-aniline, phenol-acetone, EtOH-water and HOAc-water, resp. George Ayers

Problems in mathematical crystallography. N. Nowacki. *Mitt. naturforsch. Ges. Bern* [*Sitzber.*] **1938**, 51–2(1939). W. C. Tobie

Crystal chemistry of nonmetallic inorganic substances. 1 M. F. Machatschki. *Naturwissenschaften* **27**, 685–93 (1939); cf. *C. A.* **32**, 5274[2].—A review with numerous references on the 1937–38 developments in knowledge of crystal structure: complex silicates, phosphates, arsenates, borates, sulfates, antimonates, aluminates, tungstates, halides, cyanides, etc. B. J. C. van der Hoeven

Density and compressibility of solid hydrogen and deuterium at 4.2°K. Helen D. Megaw. *Phil. Mag.* **28**, 129–47(1939).—A pycnometer method was used to 2 obtain d. values at the b. p. of H and at pressures up to 100 atm. At zero pressure d. is 0.0890 ± .0004 g./cc. for H and 0.2059 ± .0010 for D. The av. compressibility in the pressure range 0–100 atm. is 5.0×10^{-4} sq. cm$_t$/kg. for H and 3.3×10^{-4} for D. Grüneisen's law is not valid for these substances, probably because their zero-point energy is relatively very high. E. J. Rosenbaum

The polymorphism of Cu_2S and the relations between the solid phases in the system Cu_2S–CuS. Newton W. 3 Buerger. *J. Chem. Phys.* **7**, 1067–8(1939).—The phase diagram of the system contains 3 compds. (and 6 phases) from 30 to 250°. chalcocite, Cu_2S; digenite, Cu_9S_5; and covellite, CuS. Chalcocite above 105° has a nonisometric completely disordered basic structure; 78–105°, a non-isometric partially disordered basic structure; 52–78°, a nonisometric ordered basic structure; and below 52°, an orthorhombic superstructure. The superstructure phase can dissolve 8 at. % CuS; the ordered basic structure, 2 at. %. Soln. occurs by omission of Cu from CuS structures. Above 47° digenite dissolves Cu_2S or CuS. The orthorhombic-cubic modification of chalcocite reported at 91° was not found. G. M. Petty

Isotope effect in potassium dihydrogen phosphate. A. R. Ubbelohde and I. Woodward. *Nature* **144**, 632 (1939).—KH_2PO_4 and KD_2PO_4 have different crystal 5 structures. KD_2PO_4 is monoclinic; there are 8 mols. per unit cell, $a = 7.37 \pm 0.01$ A., $b = 14.73 \pm 0.01$ A., $c = 7.17 \pm 0.01$ A.; $\beta = 92.0°$. The crystals elongate along the c axis: (100), (010) and (110) are prominent faces. There is a considerable expansion of the lattice when D is substituted for H. G. M. Petty

Gas flow in solids. R. M. Barrer. *Phil. Mag.* **28**, 148–62(1939).—Math. Solutions of the diffusion equation are obtained for the case of diffusion accompanied 6 by phase-boundary processes such as transfer from the gas phase (or an adsorbed layer) into the solid or the reverse process. Both steady and nonsteady states of flow are considered. There can be a large effect of surface process on the permeability and a large concn. discontinuity at surfaces. E. J. Rosenbaum

Permeability of metal membranes to diatomic gases. R. M. Barrer. *Phil. Mag.* **28**, 353–8(1939); cf. preceding abstr.—The permeation rate was calcd. by assuming 7 various processes at interfaces. The flow of gas through a metal can never be infinite whatever the pressure and whatever mechanisms are assumed. If large concn. discontinuities occur at the boundaries of the metal, the permeation rate, even at high pressures, is proportional to the sq. root of the pressure. E. J. Rosenbaum

Effect of surface oxides on the sorptive properties of active charcoal with respect to substances in the vapor state. E. D. Zaverina and M. Dubinin. *J. Phys. Chem.* (U. S. S. R.) **13**, 151–62(1939).—From exptl. data 8 on the adsorption of vapor-phase benzene, pentane, heptane and MeOH and aq. HCl, NaOH, H_2SO_4, formic, acetic, propionic and valeric acids, phenol, methylene blue and Congo red on fine sugar charcoals variously activated in CO_2, air or in vacuum at 350 to 1000° for 1–110 hrs., it is found that the addnl. oxidative activation produces considerable changes in porosity, so that theoretical conclusions based upon direct comparison of the isotherms before and after activation are not permissible. The adsorption potentials of the vapor-phase nonpolar substances calcd. from the adsorption isotherms are independent of the nature of the surface oxides on the charcoal; for polar vapors, the potentials are greater for more polar acidic surfaces. F. H. Rathmann

Exchange adsorption on colloidal titanium dioxide. V. A. Kargin and M. Tolstaya. *J. Phys. Chem.* (U. S. S. R.) 9

13, 211–15(1939).—Exptl. data on the adsorption of H_2SO_4, Na_2SO_4 and NaOH on a TiO_2 soln. obtained by hydrolysis of $TiCl_4$ and partial dialysis are given. For sols with a low Cl^- content, the adsorption of SO_4^{--} with respect to the pH is given by the usual adsorption isotherm; for large concns. of Cl^-, the adsorption isotherm becomes S-shaped, as with iron oxides. Cf. K. and Klimovitskaya, *C. A.* **33**, 4105[1]. F. H. Rathmann

Adsorptive properties of synthetic resins. III. S. S. Bhatnagar, A. N. Kapur and Mahendra Sarup Bhatnagar *J. Indian Chem. Soc.* **16**, 261–8(1939); cf. *C. A.* **33**, 8077[8].—Adsorption of acids by acid-catalyzed phenol-formaldehyde resin (I) or by acid-catalyzed resorcinol-formaldehyde resin (II) increased in the order: HCOOH, CH_3COOH, butyric acid. With NH_3-catalyzed phenol-formaldehyde resin (III), NH_3-catalyzed resorcinol-formaldehyde resin (IV), or *m*-phenylenediamine-formaldehyde resin (V), the above order was reversed. Refluxing IV with HCl did not change the order of adsorption of acids from that of the untreated resin. The differences in adsorption by acid- and alkali-condensed resins are probably due to the inner ultrapores of the latter. Adsorption of HCOOH, CH_3COOH, $CH_3(CH_2)_2COOH$, $(COOH)_2$, $CH_2(COOH)_2$, $(CH_2COOH)_2$, $HOOC(CH_2)_4COOH$, $ClCH_2COOH$, $Cl_2CHCOOH$, Cl_3CCOOH, $PhCH_2COOH$, $CNCH_2COOH$, NH_2CH_2COOH, and $HOCH_2COOH$ by V follows the same general order as the ionization consts. at 25°, except with $HOCH_2COOH$, where the HO-group depresses the adsorption. The same generalization can be made for the adsorption of the first 6 acids named above by III. The introduction of acidic groups into acids increases adsorption by V, whereas the introduction of basic groups decreases it. George Ayers

Electrolyte adsorption and activity coefficient. III. Adsorption of neutral salts. (1.) Wolfgang Ostwald. *Kolloid-Z.* **88**, 144–61(1939); cf. *C. A.* **33**, 7170[4].—Exptl. data of various workers for the adsorption of neutral salts on charcoal of different kinds and electrolyte content, and on MnO_2 gel and washed $Al(OH)_3$ were examd. to see whether they can be represented by the equation $f_x = af_{x,2} = b$ previously found to hold for the adsorption of strong acids on charcoal. f_x is the activity coeff. for the virtual concn. of the soln. being adsorbed, $f_{x,2}$ is the activity coeff. of the equil. soln. and a and b are numerical consts. Excellent agreement was found for salts of the types (1-1), (1_2-2), (2-1_2), (1-4) and (3-1_2) for all 3 adsorbents. The data found for multivalent ions are often much too high to agree with the phys. activity theory. As in the case of acids, only strong electrolytes conform to the new activity-coeff. equation. CdI_2 gives a systematically bent line of the same type as that for AcOH. In MeOH the curves for CdI_2 and AcOH approach that for a strong electrolyte. The new activity coeff. equation makes possible a quant. characterization of the adsorption activity of strong electrolytes. The steepness of the concn. function of the adsorption is characterized by the value of the multiplicative function a. The concn. function is symbatic with a. The abs. amt. of the adsorption is characterized by the size of the const. b. The abs. amt. of adsorption varies antibatically with the value of b. With an actively adsorbed substance such as $A_1(CNS)_3$, a has a large value and b has a small value. For the most active adsorption a should be as large as possible and b as small as possible. Felix Saunders

Comparison of the adsorption, electrolytic and interference methods of measuring film areas. F. H. Constable. *Nature* **144**, 630(1939).—The methods are compared with actual measurements on Ni, Cu and oxidized Cu surfaces. G. M. Petty

New method for determining the rate of diffusion of surface-active molecules on the solid-gas boundary surface. P. F. Pokhil. *J. Phys. Chem.* (U. S. S. R.) **13**, 146(1939).—A method is described based on two-dimensional evapn. of a surface-active substance and readsorption as a film measured by an Adams balance. F. H. Rathmann

Electrical characteristics of molecular films. Francis J. Norton. *J. Am. Chem. Soc.* **61**, 3162–8(1939).—Surface potentials can be put on *X* or *Y* stearate multi-films by applying a voltage while the films are in a conducting medium, as air ionized by Po. The films lose their charge exponentially when the voltage is off. The coulombs represented by the area under the automatically registered discharge curve agree with Langmuir's equation which calcs. potentials resulting from surface charges. Surface potentials exist on Ca stearate *X* films deposited on glass. A. B. Garrett

Mechanical properties of unimolecular layer films on a liquid-liquid boundary. P. F. Pokhil. *J. Phys. Chem.* (U. S. S. R.) **13**, 301(1939).—By means of a rotating-disk method, the strength of myristic and palmitic acid films on the boundary water-kerosene or water-benzine was found to be practically the same as one on a water-air boundary, i. e., ~10 dynes/cm. F. H. Rathmann

A new technique for the spreading of proteins and the "spreading number." D. Dervichian. *Nature* **144**, 629–30(1939); cf. *C. A.* **33**, 7171[6].—When a protein is dissolved in H_2O to which a trace of a capillary-active substance able to lower the surface tension is added, the protein can be spread on the surface of an aq. soln. The meaning of the "spreading number" is discussed. E. D. Walter

Electrocapillary curves of very dilute amalgams. T. Erdey-Grúz and O. Bajor. *Z. Elektrochem.* **45**, 707–12 (1939).—At concns. of less than 10^{-5} g. at./l. of amalgams of Zn, Cd, Tl, Pb, Sn, Bi and Cu the electrocapillary curves, detd. by the drop-wt. method, almost coincide with those of pure Hg. From 10^{-5} to 10^{-4} (10^{-3} for Pb) g. at./l. the surface-tension max. is raised and moved toward more neg. potentials; the shift of potential is generally greater the more noble the metal. The anions in soln. have an appreciable effect with Zn, but with increasing nobility of the dissolved metal this effect is less marked. With Bi and Cu amalgams the position of the potential max. is the same in KI and K_2SO_4 solns. A double layer, involving dissolved metal on the amalgam side and ions on the soln. side of the interface, is apparently set up; the mutual effect of the 2 layers is greatest with Zn and least with the nobler metals. S. Glasstone

Electrical double layer at the interface of two liquids. E. J. W. Verwey and K. F. Niessen. *Phil. Mag.* **28**, 435–46(1939).—Theoretical. A general equation for the potential function in both phases is derived and the partition of the potential drop is considered. The largest part of the potential drop occurs in the phase where the product of ionic concn. and dielec. const. has the smaller value. A very unequal distribution of the potential drop does not necessarily imply that either the thickness of the diffuse layers or the charge ds. on each side of the interface are very different. E. J. Roseribaum

Surface tension and angle of contact of mercury in vacuo. A. E. Bate. *Phil. Mag.* **28**, 252–5(1939).—The angle of contact between Hg and glass is 90°. The surface tension is 490 dynes/cm. at 20°. E. J. R.

Wettability of solid substances as a characteristic of the molecular nature of their surfaces and a new method for its measurement. Z. V. Volkova. *J. Phys. Chem.* (U. S. S. R.) **13**, 224–39(1939).—The method requires considerable calcn., depends on the construction of the curve of the meridian sections of the drops and bubbles and is applicable to bubbles for θ less than 90° and to drops for θ greater than 90°. Exptl. data on talc agree with those found by the method of Meck, and the new method is still applicable to small angles of contact. F. H. Rathmann

Surface activity of hydrophilic colloids. K. F. Zhigach and P. A. Rebinder. *J. Phys. Chem.* (U. S. S. R.) **13**, 94–105(1939).—Exptl. data on the formation of surface layers in gelatin, albumin, saponin, tragacanth, starch and agar-agar sols at 20 and 35° are given in the form of surface-tension-time, σ-τ, curves. The $\log(\sigma_t - \tau_\infty)$ - τ functions for albumin are linear for concns. from 0.05 to 4.0%. The velocity consts. for the unimol. reactions vary with the temp. and with the colloid concn. F. H. R.

New method of absorption of aerosols and gases by liquids. G. P. Luchinskii. *J. Phys. Chem.* (U. S. S. R.)

13, 302(1939).—Difficultly absorbed aerosols and gases such as MgO, ZnO, P_2O_5, H_2SO_4 fumes, NO, NO_2, SO_3, etc., are rapidly absorbed by foams produced by addn. of various surface-active substances to the absorbing liquid. F. H. Rathmann

Method of determining the hiding power of artificial fogs and smokes. Celestino Ficai. *Atti XXVII riunione, Bologna, Soc. ital. progresso sci.* 5, 331–45(1939).—An app. is described utilizing a photoelec. cell and an internal camera for measuring the relative transmissions of light through artificial fogs and smokes as well as their diffusion and "dulling" (ability to prevent photography) powers. Measurements are tabulated for 27 substances or combinations commonly used for the production of artificial smokes. The effect of relative humidity of the air on the hiding power is also discussed. H. A. Fromani

A new electro-optical effect. Hans Mueller and B. W. Sakmann. *Phys. Rev.* 56, 615–16(1939); cf. *C. A.* 33, 3656[8], 6115[5].—The electro-optical birefringence was detd. as a function of field strength (0–150 v./cm.) and of frequency (60, 100, 200, 500 and 15,000 ~) in a monodisperse bentonite sol. The data are discussed. G. M. Petty

Effect of freezing on colloid structure formation of basic aluminum salts. E. I. Kvyat. *J. Phys. Chem.* (U. S. S. R.) 12, 634–8(1938).—Basic Al salt sols were obtained by peptizing freshly pptd. $Al(OH)_3$ with 0.05 *N* HCl and 0.5 *N* CH_3COOH at 100°. During freezing, the resulting increased concn. of the electrolyte in the micelle always produces coagulation of the sols. The viscosity may increase owing to structure formation or decrease owing to transformation from an extended to a compact structure Dialysis or addn. of electrolyte (0.005–0.02 *N* K_2SO_4) decreases the stability of the sols, leading to compact structure formation or eventually to pptn. On remelting, either pptn. or reformation of the sols takes place, but the new gelatinization process is less intense. **Effect of freezing on structure formation in colloidal basic iron salts.** *Ibid.* 660–7.—The viscosity of gels of basic ferric chloride and phosphate alone increases up to 5-fold on freezing; after longer freezing coagulation again leads to a decrease in η. Addn. of electrolytes (K_2SO_4) before freezing fosters formation of a compact structure and decreased values of η. These processes are partially reversible on thawing of the frozen gels. F. H. Rathmann

Solubility of compounds of high molecular weight. V. General characteristics of solutions of compounds of high molecular weight. V. A. Kargin, S. Papkov and Z. A. Rogovin. *J. Phys. Chem.* (U. S. S. R.) 13, 206–10 (1939).—General discussion. F. H. Rathmann

The disintegration of macromolecules by ultrasonic waves. G. Schmid and O. Rommel. *Z. Elektrochem.* 45, 659–61(1939).—The viscosities of solns. of polystyrenes in PhMe are diminished by the continued application of ultrasonic waves; this is attributed to a decrease in mol. wt. of the polymers. Cessation of the waves is accompanied by a relatively small increase in viscosity. The mol. wts., detd. by the Staudinger viscosity method, of 3 fractions with original values of 850,000, 350,000 and 195,000, resp., fall to a limiting value of approx. 30,000 in 2 hrs. The longer mols. are more rapidly disintegrated than are the short ones. Increase of external pressure, up to 15 atms., tends to diminish the depolymerization to some extent. It is considered that the ultrasonic waves are able to break mechanically the C—C bonds in the thread-like mols. when they exceed a certain min. length. S. Glasstone

The viscosity of dilute solutions of long-chain molecules. III. The Staudinger viscosity law. Maurice L. Huggins. *J. Applied Phys.* 10, 700–4(1939); cf. *C. A.* 33, 4848[8].—H.'s theoretical equations, applied to dil. solns. of "randomly kinked" long-chain mols., reduce to the same form as Staudinger's empirical law $\eta_{sp} = k_s nc$ (n is chain length, c concn. of unit groups in the soln., k_s a const. for each type of chain). The effect of the approximations made in deriving the equation is discussed, and it is concluded that they will not appreciably affect the form of the equation, only the effective magnitude of the various theoretical consts. being uncertain. A. O. Allen

Equilibrium between molecularly dispersed and colloidal substances in aqueous soap solutions. II. Temperature dependency of the equilibrium and the solubility curve of soaps. Joachim Stauff. *Z. physik. Chem.* A185, 45–59(1939); cf. *C. A.* 33, 4521.—The hydrolysis curves of Na palmitate between 25° and 90° were detd. in the region 0.0005 to 0.1 mol. A sharp break occurs at a "critical concn." which is taken as a characteristic quantity for the equil. between a colloidal and a molecularly dispersed system. With increasing temp. the equil. is displaced toward mol. dispersion. By detg. the sepn. and the soln.-temps. of Na palmitate solns. of different concns., a soly. curve can be drawn up to concns. of 1 mol./l. The abnormal form of the soly. curve is attributed to the effect of the equil. between colloidal and molecularly dispersed substances. The activity coeff. of the Na ion of Na palmitate solns. of different concns. is deduced. Na stearate and Na myristate solns. are also discussed. Victor R. Deitz

Viscosity relations of aqueous solutions of sodium oleate and various phenols. Ralph G. D. Moore. *J. Am. Chem. Soc.* 61, 2990–5(1939).—The maxima previously observed (cf. *C. A.* 26, 5813; 32, 4046[6]) in the viscosity of Na oleate–phenol–water systems were checked qualitatively but not quantitatively with more rigorously purified Na oleate. Not all phenolic substances produce such maxima. Evidence is adduced that the formation of acid soaps is a minor cause of the observed maxima in viscosity. A. B. Garrett

Solutions of the paraffin-chain sulfonic acids as colloidal electrolytes. Evelyn Laing McBain, Walter R. Dye and Stewart A. Johnston. *J. Am. Chem. Soc.* 61, 3210–16 (1939).—Data are presented for the d., n and elec. cond. of the homologous series of straight-chain sulfonic acids from 2 to 14 C atoms. The data show the gradual transition from the behavior of fully dissocd. electrolytes for the lowest homologs through the intermediate members in higher concn. to the typical behavior of colloidal electrolytes for the higher homologs. The latter approximate complete dissocn. in extreme dilns.; they rather suddenly lose much of their cond. through assocn. of ion-pairs and ions to form colloidal particles of low cond. This interpretation is in agreement with exact f.-p. and diffusion data for dodecylsulfonic acid. A. B. Garrett

Aging phenomena and the molecular size of chain complexes in solution. Wilhelm Wehr. *Kolloid-Z.* 88, 290–318(1939); cf. *C. A.* 33, 9685[1].—The reduction of viscosity of chain complexes, such as condensation polymers (cellulose derivs.), unsatd. vinyl polymers (rubber), and satd. vinyl polymers (polymerized vinyl acetate, polystyrenes, etc.) with age depends on the structure of these complexes. Decompn. of the cellulose derivs. and rubber can be observed at temps. up to 60° in the presence of air, and that of the satd. vinyl polymers in the presence of active O (peroxides). Antioxidants tend to stabilize condensation complexes, such as nitrocellulose, by inhibiting their oxidative decompn.; with polystyrenes, however, high concns. of antioxidants causes rupture of the chain, although lower concns. tend to stabilize the polystyrene by decreasing the effect of the peroxide. The mech. properties of nitrocellulose film increase with increased chain length of the mol. Viscosity tests on denitrated products of nitrocellulose show that the nitrocellulose is built up of reticular rather than simple chain complexes. On the other hand, titration of the end groups of the α-cellulose of the denitrated product indicates only half as large a mol. wt. of the complex. A probable explanation of this apparent discrepancy is given. Ninety-one references. S. I. Aronovsky

The relation between the refractivity of crystalline cellulose and the temperature. A. Frey-Wyssling and K. Wuhrmann. *Helv. Chim. Acta* 22, 981–8(1939).—The refractivity of liquids is more dependent upon the temp. (by approx. a power of 10) than is that of cryst. compds. This remarkable difference in the sensitivity may be correlated with the nature of the bond forces that give their cohesion to the various phases. While in a liquid the coherence of the mols. is caused by van der Waals cohesion

forces, the cohesion in cryst. lattices is due to valency forces 10 times as great. This large difference of the bond forces holds only when the main valency or ion lattices are chosen for comparison. With the mol. lattices of org. compds. the binding forces are of the type of van der Waals cohesion forces as with liquids. It is therefore to be expected that the *ns* of org. mol. lattices are more affected by a change of temp. than those of inorg. crystals. In chain lattices main valency forces act along the chain axis whereas van der Waals forces are active at right angles to it. Chain lattices should therefore occupy an intermediate position with regard to their optical sensitivity toward temp. While the lateral displacement of the chain mols. with changing temps. is quite plausible, only small changes in dimension are possible in the chain direction. In cellulose chemistry, the question is open to discussion (cf. Mark, *C. A.* **33**, 1925[4]) whether the chain mols. are linked together here and there by main valency cross-linkages as, e. g., by O-bridges. Such cross-bridges may explain the limited capability of swelling and the insoly. of cellulose. A large no. of such cross-bridges would then mean that not a chain lattice but a main valency lattice is present in cellulose and the latter should have similar sensitivity to temp. changes as compds. with main valency lattices. With these considerations in mind, the dependence of the 2 main *ns*, of the double refraction, of the dispersion and of the dispersion of the double refraction of cryst. cellulose from ramie fibers upon the temp. were detd. at 0°, 20° and 50°, with Becke's method. Cryst. cellulose occupies an intermediate position between solid and liquid substances as far as the change of the temp. of its refractivity and its thermal expansion are concerned. This supports a chain lattice structure for bast fibers. It indicates that no noteworthy main valency, like cross-linkages, are present between the cellulose thread mols., as otherwise they would more likely behave like solid substances with main valency lattices. The presence of main valency cross-linkages of cellulose mols. in the cell walls is not disputed for they may be destroyed during the isolation and bleaching of the ramie fibers. They are, however, no longer present in the isolated ramie fiber, since the latter swells and even dissolves in concd. $ZnCl_2$ soln. while untreated cell walls do not. F. L. Brauns

Chemical reactions between electrolytes and proteins in the form of sols or gels. I. Introduction. E. J. Bigwood. *Bull. soc. chim. biol.* **21**, 922–35(1939).—The structure of the protein mol. is discussed. **II. Reactions with salts of the alkali metals, especially chlorides and sulfates of sodium and potassium. Methods.** *Ibid.* 936–45.—Methods of detg. Na, K, Cl and SO_4 ions fixed by proteins are described. **III. Experimental results.** *Ibid.* 946–58.—The chlorides and sulfates of Na and K were added to protein soln. or placed in contact with loose fragments of gelatin gel and the amts. of each ion fixed by the protein at several levels of pH detd. The results are in accordance with the Donnan equil. rule. L. E. Gilson

Effect of neutral salts on the position of the isoelectric point. A. Pasynskii and I. Petrov. *J. Phys. Chem.* (U. S. S. R.) **12**, 556–68(1938).—A cataphoretic method without the use of a buffer is described. The isoelec. point of gelatin lies at pH 5.06 in H_2O, 5.38 in 0.02 *M* and 5.10 in 0.06 *M* $BaCl_2$; 4.90 in 0.005 *M* and 4.95 in 0.01 *M* KCNS. Data for KCl, KI, Ag_2SO_4, $BaCl_2$, KCNS and citrate-phosphate buffer are given. The mechanism of adsorption of neutral salts on gelatin is discussed. **Effect of concentration of gelatin on the position of the isoelectric point.** *Ibid.* 569–73.—From exptl. data on cataphoresis of gelatin sols over the range of concn. 0.2 to 1.0% gelatin, there is no justification for the belief that the isoelec. point varies with the concn. of the protein studied. Cf. *C. A.* **33**, 4279[8]. F. H. Rathmann

Electrolysis and electroösmosis in gelatin. Jean Swyngedauw. *Kolloid-Z.* **88**, 318–28(1939); cf. *C. A.* **33**, 2393[9], 3658[8].—A systematic investigation of the electrolysis of gelatin gels is discussed. The results indicate that the isoelec.-point of gelatin is at pH 4.8. A simple elec. process for the prepn. of isoelec. gelatin by electrolysis is described. Exptl. investigation of electroösmosis shows that the Helmholz formula for this phenomenon is incorrect. The exptl. facts can be explained more correctly by the transport of water of hydration. The quantity of water transported by each ion varies, on diln. of the gelatin gel, from a few mols. for a 25% gelatin soln. to many thousand mols. for a 1.7% soln. S. I. A.

Equilibrium between a liquid and a gas at high pressures and temperatures. IV. Solubility of air in water and in sodium hydroxide solutions of various concentrations. M. I. Levina and N. P. Stsibarovskaya. *J. Phys. Chem.* (U. S. S. R.) **12**, 653–9(1939); cf. *C. A.* **32**, 4758[4].—Data are given on the soly. of O_2, N_2 and air in H_2O, and in 0.5, 2.0 and 4.0 *N* solns. of NaOH at 100 kg./sq. cm. pressure and at temps. from 0 to 240°. The soly. is a min. at 75° for both N_2 and O_2 in H_2O and at 35–50° in 4 *N* NaOH. The soly. of O_2 in strong alkali decreases 7-fold at 0°, 4-fold at 240°; of N_2, 7 and 3.5-fold with respect to the soly. in pure H_2O. The ratio $N_2:O_2$ is 2.0 at 0°, and increases from 3.0 to 3.8 with increasing concn. of NaOH at 240°. Exptl. data are given. F. H. R.

Solubility of sodium chloride in mixtures of hydrogen and deuterium oxides. Tsing-Lien Chang and Tsin-Chang Chu. *Z. physik. Chem.* **A184**, 411–15(1939).—The soly. of NaCl at 25° was detd. in H_2O-D_2O mixts. and is given with an accuracy of ±0.1% by the linear expression: $s_n = 6.145 - 0.334\,n$, where s_n is equal to the no. of mols. NaCl that are dissolved in 55.51 mols. of a water mixt. and *n* is the mol. fraction of D_2O. The D_2O that was used had $d_4^{25°} = 1.10496$. V. R. Deitz

Parachor of aluminum bromide in benzene. Isidore Poppick and Alexander Lehrman. *J. Am. Chem. Soc.* **61**, 3237–8(1939).—An attempt was made to det. whether the mol. formula of $AlBr_3$ in C_6H_6 is the same as that detd. for the molten salt (Sugden, *C. A.* **23**, 2423). The mean *P* for Al_2Br_6 in C_6H_6 is 206.6 (mole fraction 0.01737) to 238.3 (mole fraction 0.08325); more concd. solns. could not be used because of the sepn. of a dense, light-red oil. Extrapolation to a mole concn. of 1 gives a value of *P* of 470.4, which corresponds fairly well with S.'s value of 457.6 for molten Al_2Br_6 when the large range of extrapolation is considered. The results tend to indicate that the formula of the salt in C_6H_6 is the same as that for the molten compd. C. J. West

Dispersion and absorption of electric waves in alcohol and aqueous solutions. Karl E. Slevogt. *Ann. Physik* **36**, 141–65(1939).—A transposed audiofrequency bridge was employed that allowed the use of a wire compensating resistance and the usual grounding. A method is described for detg. the dielec. const. for conducting liquids in short-wave regions. During the course of the study a new method was developed for measuring the abs. values of the dielec. const. and absorption coeff. This method was applied to the study of water and aq. solns. of gelatin (1.375%), levulose (78%), cane sugar (30, 50, 65%), acetone (0, 25, 50, 66.9, 100%) and KCl (0.03 *N*), and MeOH, EtOH, PrOH, BuOH and iso-AmOH. Water and the alcs. showed good agreement, but the sugar solns. showed no agreement with the Debye theory. S. L. Gerhard

The viscosity of solutions in chloroform. Amando Clemente and Pedro Gabriel. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 5–18(1939).—Viscosity data at 27–29° on the binary systems MeOH–$CHCl_3$, BuOH–$CHCl_3$, PrOH–$CHCl_3$, EtOAc–$CHCl_3$ and *m*-xylene–$CHCl_3$ indicate the formation of the assocd. mols.: $3MeOH.CHCl_3$, $MeOH.CHCl_3$, $4PrOH.CHCl_3$, $EtOAc.9CHCl_3$, $19C_6H_4Me_2.CHCl_3$, $3C_6H_4Me_2.2CHCl_3$ and $3C_6H_4Me_2.7CHCl_3$. The formation of these assocd. mols. is indicated either by a max. in the viscosity curve, a min. in the fluidity curve, or by the max. decrease in fluidity. George Ayers

Viscosity of mixtures of aqueous solutions of strong electrolytes, as related to the theory of Onsager and Fuoss. Erik Asmus. *Ann. Physik* **36**, 166–82(1939); cf. *C. A.* **33**, 5728[8].—Mixts. of $CuSO_4$ and KCl and of

$CuSO_4$ and H_2SO_4 were studied as a function of the mol. concn. and the total ion concn. For great diln. the relative viscosity of a mixt. of 2 strong electrolytes obeys the relation $\eta/\eta_0 = 1 + a\sqrt{\Gamma} + b\Gamma$. Within the limits of error there was good agreement between the theoretical and exptl. values obtained for the coeff. a. There appears to be no simple mixt. rule for detg. b. S. L. Gerhard

Osmotic pressure. Hermann Frahm. *Z. physik. Chem.* **A184**, 399–410(1939).—From the Maxwell-Boltzmann energy-distribution law there is derived the general of the lowering of vapor pressure and of the osmotic pressure of solns. The laws of Raoult and van't Hoff are found in the thermal energy exchange between solute and solvent mols., while the deviations from these laws are attributed to specific mol. forces. Two examples are considered: NaCl in water and EtOH in water. Victor R. Deitz

Thermodynamic properties of dilute solutions of non-electrolytes. Seizi Kaneko. *J. Chem. Soc. Japan* **60**, 763 8(1939).—Math. T. Katsurai

The electrical conductivity of uni-univalent salts in acetone. J. F. J. Dippy, H. O. Jenkins and J. G. Page. *J. Chem. Soc.* **1939**, 1386–91.—Measurements were made on acetone solns. of KI, NaI, $AgNO_3$, Na and K salicylate, LiBr and NH_4I. The first 2 of these salts are highly dissocd., the cond. attaining the Onsager theoretical values at high dilns.; the next 3 are largely assocd., cond. changing with concn. approx. as predicted by the mass-action law; the last 2 show intermediate behavior. A. O. A.

Triple ions and transference numbers. Malcolm Dole. *Trans. Electrochem. Soc.* **77**, 10 pp.(preprint)(1940).—The effect of the formation of triple ions on the variation of transference no. with change of concn. is discussed and the theoretical equations derived are tested by means of the recent data of Lanning and Davidson (*C. A.* **33**, 1574[2]) on the transference nos. of acetates in anhyd. AcOH. In the triple-ion theory of Fuoss and Kraus (*C. A.* **27**, 5233) it was assumed that the triple neg. ion $(- + -)$ and the triple pos. ion $(+ - +)$ were both formed to the same extent, an assumption which was introduced to explain the min. in cond. data. Conclusion: The data of L. and D. do not necessarily invalidate the hypothesis of equal concns. of pos. and neg. triple ions as made by Fuoss and Kraus. C. G. F.

Transference numbers and diffusion potentials in fused salt mixtures. Karl E. Schwarz. *Z. Elektrochem.* **45**, 740–3(1939); cf. *C. A.* **27**, 5007; **30**, 359[5]. A theoretical treatment of diffusion and transference in fused salt mixts. The following topics are considered: the transference no. of an ion; the opposing effects of transference and diffusion; the diffusion potential; the sign of the transfer; and the significance of transference in liquid metal–fused salt systems. Equations are derived for the ratio of the concns. at anode and cathode and for diffusion potential. S. Glasstone

Properties of electrolytes in mixtures of water and organic solvents. IV. Transference numbers of hydrochloric acid in water and dioxane–water mixtures from 0 to 50°. Herbert S. Harned and Edwin C. Dreby. *J. Am. Chem. Soc.* **61**, 3113–20(1939); cf. *C. A.* **33**, 9095[6,8].—The cation transference number was detd. from data on the e. m. f. of cells of the type Ag-AgCl|HCl (m), dioxane (X), H_2O (Y)|HCl (r), dioxane (X), H_2O, (Y)|AgCl-Ag and from data on cells without liquid junction (cf. *C. A.* **32**, 3240[3]). The limiting transference no. was detd. by extrapolation. Agreement with the limiting law of the Onsager conductance theory was observed in the water, 20, 45 and 70% dioxane-water mixts. A. B. Garrett

The dissociation constants of some nitrophenols in deuterium oxide. D. C. Martin and J. A. V. Butler. *J. Chem. Soc.* **1939**, 1366–9.—The ratio K_h/K_d of the dissocn. consts. in H_2O and D_2O was detd. for 2,6-, 2,5-, 2,4- and 3,5-dinitrophenol and for *o*- and *p*-nitrophenol by comparing spectrophotometrically the extent of dissocn. of the compds. in appropriate acetate or phosphate buffer solns. in light and heavy water. The values of the ratio increase as K_h decreases and lie close to the curve given by Rule and LaMer (*C. A.* **32**, 7328[2]). A. O. Allen

The second ionization constant of oxalic acid from 0 to 50°. Herbert S. Harned and Leslie D. Fallon. *J. Am. Chem. Soc.* **61**, 3111–13(1939).—The ionization const. of $HC_2O_4^-$ was detd. at 5° intervals from the e. m. f. data of the cells $H_2|NaHC_2O_4$ (xm_1), $Na_2C_2O_4$ (xm_2), NaCl (xm_3)|AgCl-Ag. Values of the heat content and heat capacity of the ionization reaction are tabulated. A. B. Garrett

The activity of water in sulfuric acid solutions at 25° by the isopiestic method. H. Sheffer, A. A. Janis and J. B. Ferguson. *Can. J. Research* **17**, B, 336–40(1939); cf. *C. A.* **33**, 8476[5].—The activities of water in aq. solns. of NaCl and of H_2SO_4 were compared by the isopiestic method at 25° over a range of molalities extending up to that of the satd. salt soln. The app., which was of the Sinclair type, proved to be an efficient as any yet devised. The results remove the uncertainties that previously existed in regard to the position of the m_1/m_2 curve and give a qual. indication of the second dissocn. of H_2SO_4. The calcd. activities agree with the best available data. The isopiestic standard chosen by Janis and Ferguson (cf. *C. A.* **33**, 8476[5]) was confirmed over the whole molality range. J. W. Shipley

Activity coefficients in concentrated aqueous solutions of strong electrolytes described by a formula containing the mean ionic diameter as single parameter. I. Theory and application to the alkali chlorides, bromides and iodides. Pierre Van Rysselberghe and Sylvan Eisenberg. *J. Am. Chem. Soc.* **61**, 3030–7(1939).—The activity coeff. is represented by a one-parameter formula in which the Debye-Huckel term and the van der Waals term are represented in terms of the mean ionic diam., a. The resulting formula is then applied to a systematic interpretation of the activity data of the alk. chlorides, bromides and iodides with remarkable success. A set of mean ionic diams. is obtained and various remarks as to the extent of hydration and penetration of ions at contact are derived from a comparison of these diams. with the sums of the standard cryst. radii. Calcd. activity coeffs. agree well with exptl. values. A. B. Garrett

The dissociation of multivalent, macromolecular acids. Werner Kern. *Biochem. Z.* **301**, 338 56(1939); cf. *C. A.* **32**, 4048[6], 8243[1].—The neutralization curves of polybasic acids can be represented by an extension of the dissocn. equation of Michaelis (*C. A.* **14**, 3178). Macromol., multivalent acids can be characterized by 2 consts., the titration exponent and the mean titration const. The validity of the deductions is shown by potentiometric measurements, with H_2 or quinhydrone electrodes, during the neutralization of synthetic multivalent acids, e. g., polyacrylic and polymethylacrylic acids and natural multivalent acids, e. g., polynucleic acids and those of gum arabic and of agar. The H-ion buffering in solns. of multivalent acids is considered. S. Glasstone

Activity of urea in aqueous solutions. A. I. Krasil'shchikov and S. S. Trainina. *J. Phys. Chem.* (U. S. S. R.) **13**, 281–5(1939).—By use of various exptl. data on the vapor pressure and the heats of diln. of urea solns., the activity coeffs. are calcd. from 25 to 90°. At 25°, the ratio a_2/N_2 has the values 1.0 for $N = 0$; 0.995 for 0.002; 0.973 for 0.010; 0.921 for 0.030; 0.821 for 0.100; 0.744 for 0.200; 0.710 for 0.265. F. H. Rathmann

Study of diffusion processes by electrolysis with microelectrodes. H. A. Laitinen and I. M. Kolthoff. *Nature* **144**, 549–50(1939).—The disturbing effects of convection currents on diffusion studies with microelectrodes were detd. Conditions are indicated for the attainment of theoretical diffusion, particularly the shape of the electrode and the direction of the d. gradient. G. M. P.

The behavior of aluminum in cold ammonia solutions. H. Röhrig. *Z. Ver. deut. Ing.* **83**, 1091(1939).—The relation of the action of ammonia solns. of different concns. on Al to the purity of the Al was investigated. 99.5% Al contg. Si 0.15 and Fe 0.23%, and 99.99% Al contg. Si 0.0038, Fe 0.0057, and Cu 0.0007% were ex-

posed at room temp. to aq. solns. of NH_3 of concns. of 0.5, 2, 5, 10, and 21.8% for 1, 2, 4, and 7 days each. The degree of attack was measured by the loss in weight. The results of different series of expts. were tabulated. It was found that in agreement with Calvet (cf. *C. A.* **24**, 578) both Al samples are affected most at medium NH_3 concns. For short periods and for higher NH_3 concns. the pure Al is less attacked than Al 99.5. At medium concns., however, the formation of a surface coating on Al 99.5 samples soon prohibits further effects. This fact renders the use of Al containers for NH_3 solns. practicable. R. Simha

The effect of substituents on the chemical, physicochemical and biological behavior of chemical compounds. A theory of the relation between chemical constitution and biological action. B. Breyer. *Biochem. Z.* **301**, 65–93 (1939).—A theory is developed for predicting the degree of polarity of compds. and of their behavior toward oxidizing or reducing agents, i. e., their reduction-oxidation potentials. This theory is based upon the fact that certain groups affect the d. of the elec. charge on central atoms. Thus, pos. autochromes are groups that increase the polarity of an electropos. central atom, i. e., increase its electrolytic dissocn., in the following order: $—CH_3 < —OCH_3 < —OH < —NH_2 < —NHCH_3 < —N(CH_3)_2 < —NHC_6H_5$, etc. Introduced into compds. with a negatively charged central atom these groups decrease polarity and inhibit dissocn. The presence of pos. autochromes (pos. ionogens) increases the reducing power of compds. and these are oxidized the more easily the more strongly pos. they become. The activity of the NH_2 may be increased by the addn. of alkyls, whereas it is markedly decreased or even abolished by acylation, salt formation, etc. With the OH group its effectiveness is decreased by alkylation, and very much decreased or even abolished by acylation. Neg. autochromes ($—NO$, $—NO_2$, $>CO$, $>SO_2$, $-C{\equiv}N$, $—N{=}N—$, etc.), on the other hand, increase the polarity (ionization) of compds. with an electroneg. central atom, decreasing their reducing power and increasing their ability to become reduced. Finally, amphoteric autochromes (aryl and vinylene groups) increase the heteropolar condition of compds. with either electropos. or electroneg. central atoms. Thus, phenylmercury hydroxide is a strong base, while HgO is an extremely weak base; phenylacetic acid is 3 times as strong as AcOH. The theory, therefore, makes it possible more or less to predict the distribution coeff. of compds. and to alter gradually their soly. in H_2O or lipide until the desired relation is effected. The same applies also to the stability or to the degree of oxidation of these compds. Expts. were made with derivs. of compds. with electropos. ($[C_6H_5Hg]^+$ Cl_3COO^-) and electroneg. ($[C_6H_4NO_3]^-$ H_2) central atoms. With the first it was found that substituents of greater positivity have greater soly. in H_2O, whereas those of greater negativity are less sol. The binding of Hg to C is also a function of the nature of substituted groups, compds. with the strongly pos. groups being unstable whereas those with weakly pos. or neg. groups are stable. Similar behavior was found also in studies on the toxicity of those compds., as predicted by the theory. Studies on benzenearsonic acid derivs. from the point of view of the changes in polarity, degree of reduction, capillary activity and toxicity likewise more or less follow the theoretical prediction. S. Morgulis

Cells without transference for pH determination. Otto Redlich and Hans Klinger. *J. Am. Chem. Soc.* **61**, 2983 (1939).—Cells of the type H_2, H^+X^- + TlBr (satd.), AgBr, Ag are suggested for pH detn. If the soln. forms a ppt. when satd. with TlBr or contains Tl or Br ions in an amt. comparable with the soly. of this salt, an org. Zn salt with Zn-Hg or Ag_2SO_4 with Ag might be used. C. J. West

Potential of lithium amalgam and the activity of lithium ions in isoamyl alcohol. F. I. Trakhtenberg. *J. Phys. Chem.* (U. S. S. R.) **13**, 200–5(1939); cf. *C. A.* **32**, 5683⁹.—Exptl. data are given for the cell $LiHg_x$ | LiCl | AgCl | Ag in isoamyl alc. at 25°, for concns. of LiCl from 0.003 to 0.20 *M*. The cell behaves normally, i. e., LiCl in isoamyl alc. is completely dissocd. The zero potential is 1.800 ± 0.005 v. Some log *f* values are −0.388, −0.440, −0.628, −1.068 and −1.325 for m = 0.00278, 0.00506, 0.0102, 0.534 and 0.1902 resp. The Debye-Hückel law holds with D = 12.9; for $\sqrt{m}$ less than 0.1, the second approximation also holds. The av. ionic radius is 1.72 A. F. H. Rathmann

A thermodynamic study of the zinc–antimony system. The thermodynamic properties of the intermetallic compounds: ZnSb, Zn_3Sb_2 and Zn_4Sb_3. Bernard J. De Witt and Harry Seltz. *J. Am. Chem. Soc.* **61**, 3170–3(1939).—E. m. f. measurements of cells of the type Zn (*l*)|$ZnCl_2$ in LiCl + KCl (*l*)|Zn (in Zn-Sb liquid solns.) made possible the calcn. of the activities and partial molal relative heat contents of Zn and Sb in their liquid melts, the solid soly. of Zn in Sb, the free energies, heats of formation and entropies of ZnSb, Zn_3Sb_2 and Zn_4Sb_3 and the heat of fusion of Zn_3Sb_2. A. B. Garrett

The equilibrium $2COF_2 \rightleftarrows CO_2 + CF_4$. Otto Ruff and Shih-Chang Li. *Z. anorg. allgem. Chem.* **242**, 272–6(1939); cf. *C. A.* **29**, 1346⁶.—The reaction $2COF_2 \rightleftarrows CO_2 + CF_4$ was investigated and its reversibility proved at high temps. The reaction proceeds in the direction of COF_2 with neg. heat of reaction. A. B. Garrett

Apparatus for investigation of oxidation equilibrium of metals by water vapor. Kokiti Sano. *J. Chem. Soc. Japan* **60**, 758–62(1939).—By means of a vertical cylindrical reaction chamber and a spiral manometer the reaction $3Fe + 4H_2O = Fe_3O_4 + 4H_2$ was studied. The results are expressed by $\log K_p = (-1667.4621/T) + 1.492$. The dissocn. pressures of $Sr(OH)_2$ were detd. The results: $\log p_{H_2O}(mm) = (-5405.9738/T) + 8.3846$. T. Katsurai

Reduction by amalgamated zinc. Significant factors in efficiency. Hosmer W. Stone and David N. Hume. *Ind. Eng. Chem., Anal. Ed.* **11**, 598–602(1939).—A detailed study of the effect of nature of oxidant (oxidation–reduction potential, degree of ionization, stability of complexes and tendency to hydrolyze), degree of amalgamation and condition of the amalgam due to age, previous use, method of prepn. and manner of storage on the use of Zn amalgam for reduction in acid soln. With strong oxidants [$Fe_2(SO_4)_3$, $Ce(SO_4)_2$ and $KMnO_4$] reduction was found to be quant. with no deterioration of the amalgam. With oxidants that are not reduced by free Hg [green and violet $CrCl_3$ and $Cr(OAc)_3$, $Cr_2(SO_4)_3$, chrome alum and vanadyl sulfate] there was a pronounced lowering of the rate of reaction after the amalgam had been in use for some time. With these oxidants and with acid concns. of 0.2 *N* or less 0.1% Hg is sufficient. For the stronger oxidants with higher acid concn. as much as 5% Hg is satisfactory. H. A. Frediani

Reactions with atomic oxygen. Peter W. Schenk and Hellmuth Jablonowski. *Z. Elektrochem.* **45**, 650(1939).—An app. similar to that of Geib and Harteck (cf. *C. A.* **26**, 655) was employed in a study of the action of monatomic oxygen upon H_2S, NO_2, Cl_2 and Br_2 at liquid-air temps. With H_2S the reaction proceeded according to the equation, $H_2S + O + O_2 = H_2SO_3$. No free S was formed so long as at. oxygen was present. In the absence of the latter, oxidation to H_2SO_4 was observed. With NO_2 the reaction was $2NO_2 + O = N_2O_5$. Cl_2 and at. oxygen yielded a mixt. of Cl_2O and ClO_2, while Br_2 yielded only BrO_2. No conclusions as to the mechanism of the latter reaction are given. However, it is definitely established that for 1 mol. Br_2 available a max. of $2O_2$ is absorbed. W. A. Cook

The action of strong solutions of potassium ferricyanide. Edward Barnes. *J. Indian Chem. Soc.* **16**, 308–9(1939).—On addn. of 50 cc. of aq. KOH soln. (1:1) to 5 g. of $K_3Fe(CN)_6$ in 10 cc. of water, O_2 of 93.5–95% purity (mixed with a small quantity of N_2) is evolved very slowly at 30°, but briskly at 100°, probably according to the equation, $4K_3Fe(CN)_6 + 4KOH = 4K_4Fe(CN)_6 + 2H_2O + O_2$. The reaction is slower with satd. KOH soln. or with a 1:1.5 soln. of KOH in water, O_2 of 97–8% purity being formed in the latter case. A secondary reaction involving CN groups is indicated by (1) lower yields of O_2 than the

theoretical and (2) the presence of N_2 in the gas liberated. George Ayers

The effect of hydrochloric acid concentration on the reduction of molybdate in the silver reductor. C. F. Hiskey, V. F. Springer and V. W. Meloche. *J. Am. Chem. Soc.* **61**, 3125–7(1939).—The method of Birnbaum and Walden (cf. *C. A.* **32**, 1209[8]) produces quant. reduction of molybdate to the quinquevalent state in the presence of 2 *N* HCl. If the acid concn. is greater than 4 *N*, Mo in the molybdate is reduced mainly to the trivalent state. In high acid concn. as 10 *N*, the reduction shows an apparent valence change as high as 3.1. In a Jones reductor the apparent change of valence for Mo is not greater than 3 even though the acid concn. is as high as 6 *N*. A. B. Garrett

Present problems of chemical kinetics. Luigi Rolla. *Atti XXVII riunione, Bologna, Soc. ital. progresso sci.* **5**, 367–84(1939).—A review of modern developments in soln. kinetics followed by a consideration of the thermodynamic problem of catalysts from a statistical and quantum-mech. point of view. H. A. Frediani

The exchange of hydrogen ions between hydrogen sulfide and methanol. K. H. Geib. *Z. Elektrochem.* **45**, 648–50(1939).—The rates of the H-D exchange reactions between MeOH and D_2S and between MeOD and H_2S were studied at −79°, −97° and −115°, by burning the mixed methanols and detg. the D content of the resulting water by the thermal-cond. method. At −79° the reaction is so rapid that half the equil. concn. is attained in 0.2 to 0.5 min. The heat of activation of the MeOH-D_2S reaction is approx. 7.5–8 kg.-cal., and the process is catalyzed by HCl. The exchange reactions are believed to be prototropic and to involve an ionic mechanism. S. Glasstone

Hydrogen exchange of dimethyl sulfone and sodium-methanesulfonate in alkaline solns. J. Hochberg and K. F. Bonhoeffer. *Z. physik. Chem.* **A184**, 419–28(1939).—Dimethyl sulfone dissolved in alk. D_2O shows a gradual exchange of its H atoms with those of the solvent. For 1 *N* OD-ion concn. the exchange velocity between 0° and 63.5° is given by the expression: $\log k_1(D) = 13.23 - (4035/T)$, where the velocity const. is expressed in reciprocal minutes. The much slower exchange of Na methanesulfonate is given by the following expression for a higher temp. region (100° to 183°): $\log k_1(D) = 12.00 - (5630/T)$. The heat of activation for the D exchange of $CH_3SO_2CH_3$ is 18.5 ± 1 kg.-cal.; for CH_3SO_3Na, 25.7 ± 1 kg.-cal. Victor R. Deitz

Kinetics of reactions of various ion types in solutions. N. V. Sapozhnikova. *J. Phys. Chem.* (U. S. S. R.) **13**, 174–85(1939).—Et and Na monochloroacetates were subjected to various reactions at 15° and 25°. The energies of activation were: $CH_2ClCOOC_2H_5 + Na_2S_2O_3 = EtO_2CCH_2S_2O_3^- + Na^+ + NaCl$, 15.14 Cal.; $ClH_2ClCOONa + Na_2S_2O_3 = NaO_2CCH_2S_2O_3^- + Na^+ + NaCl$, 15.50 Cal.; $CH_2ClCOOC_2H_5 + NaOH = CH_2ClCOONa + C_2H_5OH$, 7.04–7.22 Cal.; $CH_3COOC_2H_5 + NaOH = CH_3COONa + C_2H_5OH$, 11.02–11.62 Cal. For the sapon. of the chloroester by HCl and H_2SO_4, the rate decreases for concns. above 0.5 *N* for both acids; the ratio of the catalytic effect of the 2 acids is practically const. for different concns. For di-Et succinate, the *E* values for the 1st and 2nd stages of sapon. are 14.65 and 9.78 Cal., in agreement with the Moelwyn-Hughes equation. For the reactions $CH_2XCOO^- + NH_3 = CH_2NH_2COO^-$, *E* = 25.85 Cal. for X = Cl, and 22.37 for X = I. F. H. Rathmann

Reaction mechanism of the combustion of carbon from the standpoint of the carbonyl-group theory. V. Sihvonen. *Suomen Kemistilehti* **12B**, 20–3(1939)(in German).—A theoretical discussion, assuming the formation of CO or CCO groups at the solid surface or crystal edges as intermediate products. Gregg M. Evans

The thermal decomposition of biacetyl. F. O. Rice and W. D. Walters. *J. Chem. Phys.* **7**, 1015–18(1939).—The products formed in the decompn. of Ac_2 at 427–470° indicate the reaction $Ac_2 \rightarrow CH_4 + CO + H_2C{:}C{:}O$, followed by some decompn. and polymerization of $H_2C{:}C{:}O$.

1 "The reaction is first order and is only slightly affected by a large increase in the surface-vol. ratio of the reaction vessel. The decompn. has a frequency factor of 10^{17}. A free-radical scheme is proposed for the decompn.: it fails to explain the high-frequency factor. G. M. P.

The homogeneous decomposition of ethyl chlorocarbonate. A. R. Choppin, H. A. Frediani and G. F. Kirby, Jr. *J. Am. Chem. Soc.* **61**, 3176–80(1939).—Et chlorocarbonate decomps. homogeneously and by a unimol. mechanism 2 between 150 and 195° and over a pressure range from 10 to 700 mm. of Hg. A slight effect was noted in the comparison of runs in coated and uncoated vessels. At low pressures the rate const. falls appreciably and the reaction approaches a second-order rate. A. B. Garrett

Kinetics of the thermal decomposition of ethyl formate. R. F. Makens and W. G. Eversole. *J. Am. Chem. Soc.* **61**, 3203–6(1939).—The reaction rates were detd. at 375, 3 400 and 425° for the principal primary reaction which is $HCOOC_2H_5 \rightarrow C_2H_4 + HCOOH$. The energy of activation of this reaction is 40,010 cal. This reaction is followed by the decompn. of formic acid as $HCOOH \rightarrow CO + H_2O$, $HCOOH \rightarrow CO_2 + H_2$ and $2HCOOH \rightarrow CO_2 + HCHO + H_2O$. Several minor primary reactions occur. A. B. Garrett

Kinetics of the sulfonation of nitrobenzene by sulfur trioxide. D. R. Vicary and C. N. Hinshelwood. *J. Chem. Soc.* **1939**, 1372–8.—Solns. of SO_3 in $PhNO_2$ in sealed tubes were opened for analysis after measured peri- 4 ods of time in a thermostat. The reaction goes cleanly to $C_6H_4NO_2SO_3H$, no sulfone being formed. The reaction is of the second order with respect to SO_3, but complicated by a strong retarding effect of the product, owing to formation of an addn. compd. between SO_3 and the sulfonic acid. The activation energy, in the range 25–100°, is 5 11.4 kg.-cal. A. O. Allen

The kinetics of chlorine, iodine chloride and bromine chloride addition to olefinic compounds. E. P. White and P. W. Robertson. *J. Chem. Soc.* **1939**, 1509–15.—Cl reacts with olefins in AcOH and nitrobenzene solns. according to a bimol. mechanism. Br and I, and their chlorides, react according to a trimol. mechanism. When a mol. of olefin, *A*, is struck by the halogen molecule, X_2, a complex, AX_2, is thought to form which reacts with a 6 second mol., *A*. These addn. compds. are theoretically possible when Br and I are involved because these elements are known to be able to expand their outer ring of electrons. Since Cl cannot behave similarly, its reactions must be bimol. From the reaction of olefinic compds. in AcOH with the halogens and halogen halides, it is possible to make the following general comparison of rates: I_2, 1; IBr, 3 × 10^3; ICl, 10^5; Br_2, 10^4; BrCl, 4 × 10^6. The 7 reactions of *cis*- and *trans*-cinnamic acids with Cl are compared. The anomalous behavior of the trans acid is said to be due to its tendency to form the cis acid. This stereoinversion involves the momentary formation of a single link between the ethylene carbons at which moment the mol. is highly reactive. A 1–4 addn. mechanism is proposed for the reaction of $\alpha\beta$ unsatd. aldehydes. F. van S.

The kinetics of bromine addition to olefinic compounds. II. The homogeneous mechanisms. T. K. Walker and P. W. Robertson. *Ibid.* 1515–18; cf. *C. A.* **31**, 4575[2].—The mechanism of the reaction between Br and olefins has been variously reported as bi- and trimol. Actually, the reaction rate is believed to be composite with the trimol. reaction dominant at 25° in the concn. region *M*/40. Diln. favors the bimol. mechanism since the no. of trimol collisions is more affected by concn. changes. For allyl derivs., the bimol. reaction is established at *M*/1000. 9 Increasing the ionization power of the solvent medium also favors the more direct mechanism. One % of H_2O accelerates the reaction between allyl acetate and Br in AcOH at 25° by 95% at *M*/80, and 130% at *M*/1000. A rise in temp. also favors the bimol. reaction which has the higher temp. coeff. This is reflected in a decrease of about 0.2 in the calcd. order of reaction between 17° and 40°. The trimol. mechanism is thought to involve the formation of a complex. F. van Straten

The functional relation between the constants of the Arrhenius equation—the formation of a series of quaternary ammonium salts in benzene-nitrobenzene mixtures. H. C. Raine and C. N. Hinshelwood. *J. Chem. Soc.* 1939, 1378–83; cf. *C. A.* 31, 8291[6]; 32, 7331[8].—Earlier rate studies on quaternary salt formation in C_6H_6–$PhNO_2$ mixts. were extended to evaluate the consts. of the Arrhenius equation for the 4 reactions Me_3N + MeI, Me_3N + iso-PrI, C_5H_5N + MeI and C_5H_5N + iso-PrI over the entire range of solvent compn. In each case, the activation energy E showed max. and min. values when considered as a function of solvent compn., so that there were 2 mixts. in which E has the same value as for pure $PhNO_2$. Differences in the frequency factor, log PZ, in these 3 cases were considered due to a "polarity effect"; when the 3 values of log PZ were plotted against solvent compn., a curve drawn through them gave the polarity effect as a function of solvent compn. Subtracting this curve from the log PZ-solvent compn. curve gave corrected values of log PZ. These corrected values, plotted against E, yield straight lines for each reactant pair; the pos. slopes showed a small regular decrease as the size of the reacting mols. was increased. It was shown that the linear relation is to be expected theoretically if a no. of factors, involving orientation of reactant and solvent mols., must coöperate simultaneously in lowering the value of E. A. O. Allen 1

The Claisen rearrangement. I. A kinetic study of the rearrangement of allyl *p*-tolyl ether in diphenyl ether solution. John F. Kincaid and D. S. Tarbell. *J. Am. Chem. Soc.* 61, 3085–9(1939).—The rate of rearrangement of allyl *p*-tolyl ether in diphenyl ether soln. was measured at 214.7, 200.6 and 185.8°. Over this temp. range and for a five-fold change in concn. the reaction is unimol., and the initial rate of the rearrangement in the pure liquid is the same as in soln. The rearrangement is at least 95% quant. at 200° in soln. The energy of activation is 33.1 kg.-cal./mole. A. B. Garrett 2

Acid- and base-catalysis in light and heavy water. III. Bromination of acetone catalyzed by undissociated acids and by acetate ions. O. Reitz and Johanna Kopp. *Z. physik. Chem.* A184, 429–45(1939); cf. *C. A.* 33, 3240[4].—The bromination of acetone at 25.0° was studied in heavy water with monochloroacetic, glycolic, lactic and acetic acids as catalysts. The bromination was found to be 20 to 30% slower than in light water, with only small differences. Hence in heavy water the catalyzed bromination is twice as fast as in light water. The bromination of heavy acetone (CD_3COCD_3) is slower than that of ordinary acetone by a factor which is practically the same whether the reaction is catalyzed by H ions, by undissocd. acids or by acetate ions; the factor was detd. to be 7.7. The catalyzed bromination of acetone by acetate ions is about 15% slower in heavy water than in light water (solvent effect); the change of bromination velocity as a function of the D content of the acetone is not linear for acetate ion catalysis. Victor R. Deitz 3

The effect of high-tension electrical discharge on catalytic reaction. IV. Reduction of menthone to menthol. Iwao Seto and Mitio Ozaki. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 271–2(1939); cf. *C. A.* 32, 2816[4].—A material contg. 94.06% of *dl*- and *l*-menthone and 6.12% of menthol (free and combined) was dissolved in paraffin oil (2:3) and, after addn. of 3% of Ni on kieselguhr, 60 cc. of the mixt. was hydrogenated under high elec. tension (25 kv. applied voltage; 0.33–0.74 ma. discharging current) at 135–155°, with yields (without isomerization) of menthol up to 78.49%. The optimum temp. was 145° and the time 180 min. In conjunction with the Ni-kieselguhr catalyst, the paraffin oil and elec. discharge were each shown to contribute to the yield, but the reaction hardly occurred with the elec. action alone. **V. Reduction of thymol to menthol.** *Ibid.* 272–4.—In similar expts. made at 120–160° with a 42.13% soln. of thymol in paraffin oil, yields of menthol up to 66–68% were obtained (reaction time, 2–3 hrs.). Thymol probably is hydrogenated first to menthenol, most of which is transformed into menthone and then reduced to menthol. From vacuum distn. of the product and recrystn. of the acid phthalate esters (prepd. from the distillates) from HOAc and petroleum ether-Et_2O, it was concluded that *dl*-neomenthol, *dl*-menthol, *dl*-isomenthol and *dl*-neoisomenthol were all formed from the thymol. George Ayers 4

Catalysis of hydrazine by Raney nickel. Letterio Irrera. *Atti XXVII riunione, Bologna, Soc. ital. progresso sci.* 5, 353–7(1939).—The vol. of gas obtained by the decompn. of hydrazine hydrate in the presence of Raney Ni is always greater than that indicated by the equation, $2N_2H_4 = 2NH_3 + N_2 + H_2$ postulated for the decompn. in the presence of Pt black. Increasing the amt. of Ni increases the quantity of gas obtained approaching the vol. required by the equation, $3N_2H_4 = 2NH_3 + 2N_2 + 3H_2$. From the data obtained it is suggested that H_2O may play a part in the reaction. H. A. Frediani 5

Catalysts for the synthesis of liquid hydrocarbons from carbon monoxide and hydrogen. VI. Selection of catalysts for the synthesis. (2). Sigeru Tutumi. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 36, 251–61(1939); cf. *C. A.* 33, 8934[8], 9103[7].—The activity of a Ni catalyst, prepd. by pptn. from nitrate soln. by K_2CO_3, followed by reduction of the oxide by H, diminished more rapidly with increase of temp. of reduction than that of a similar catalyst prepd. by roasting. Apparently K_2CO_3 and KNO_3 were adsorbed on the active spots. A Ni-10% Al_2O_3-100% kieselguhr catalyst prepd. by the pptn. method was fairly active for the CO-H synthesis, but showed a high optimum reduction temp. (450–500°). Reduction of the proportion of Al_2O_3 to 7.5%, or substitution of about 50% of the Ni by Co, lowered the optimum reduction temp. Ni-10% Al_2O_3 and Ni-10% Al_2O_3-100% kieselguhr catalysts prepd. by pptn. were about as active as a Ni-10% Al_2O_3 catalyst prepd. by roasting, for the hydrogenation of C_6H_6, but were more active for the CO-H synthesis. **VII. Activities of the catalysts used for the synthesis.** *Ibid.* 262–70.—The addn. of 0.2–0.3 g. of $NiSO_4$ to a Ni-10%-Al_2O_3-100% kieselguhr catalyst (prepd. by pptn.), contg. 6 g. of Ni, almost completely suppressed its activity for the CO-H reaction, but did not greatly affect its activity for the hydrogenation of C_6H_6, for the suppression of which 0.8–0.9 g. of $NiSO_4$ was required. A catalyst contg. 0.8–0.9 g. of $NiSO_4$ retained its activity for the hydrogenation of nitrobenzene to aniline and of phorone to valerone, and for the water-gas reaction. When the catalysts were prepd. by roasting, less $NiSO_4$ was required to suppress the activity for the hydrogenation of C_6H_6 (0.2–0.3 g. for Ni(6 g.)-10% Al_2O_3 and 0.04–0.05 g. for Ni (6 g.)). It is inferred that the reaction of CO with H is catalyzed by the most active spots, whereas the hydrogenation of C_6H_6 and the other reactions are accelerated by resp. less-active spots. Wm. E. Trout, Jr. 6

Promoting agents in the catalytic actions of ferric hydroxides. Alfredo Quartaroli. *Gazz. chim. ital.* 69, 443–4 (1939).—Attention is called to the fact that the work of Krause, *et al.* (*C. A.* 33, 4116[6]) on the activating effect of Cu on the catalytic action of ferric hydroxides, particularly in its physical aspects, had already been undertaken by Q. (cf. *C. A.* 27, 12) and by Belfiori (*C. A.* 32, 8899[4]). C. C. Davis 7

Phase transitions. Joseph E. Mayer and S. F. Streeter. *J. Chem. Phys.* 7, 1019–25(1939).—*H-T* and *V-P* curves for various types of phase transition are shown. Second-order transitions and an anomalous first-order transition are discussed. A theory of phase transition is presented. It is shown that the Band-Frenkel (*C. A.* 33, 5249[8], 6674[6]) and Ursell developments are not identical. G. M. Petty 8

Magnetic measurements in the system chromium-arsenic. Haakon Haraldsen and Egil Nygaard. *Z. Elektrochem.* 45, 686–8(1939).—In the system Cr–As, as in Cr–S, Cr–Se and Cr–Te, only 3 intermediary phases are present. The range of existence of these phases is between 30 and 50 at. % As. It was not possible to prep. a compd. with the exact compn. CrAs. Surprisingly, the homogeneity range of the single phase is much smaller in the system Cr–As than in the other 3 systems. H. Stoertz 9

Application of physicochemical analysis to the study of

the equilibrium of liquid phases in three-component systems. I. Equilibrium of the liquid phases in the system acetic acid–aniline–benzine (100–125° fraction). F. Zhuravlev. *J. Phys. Chem.* (U. S. S. R.) **12**, 639–46 (1938).—Exptl. data for the system over the temp. range 15–70° are given. The mol. compd. $2C_6H_5NH_2.CH_3COOH$ has its own characteristic dissocn. soly. curve in benzine different from the soly. curve for its components. Above 60° the soly. curve of the ternary diagram is smoothly closed, below 55° it has discontinuities on crossing the benzine-mol. compd. line and free ends on the aniline-benzine side of the triangle. F. H. Rathmann

The ternary system: benzene–toluene–naphthalene. V. M. Kravchenko. *J. Phys. Chem.* (U. S. S. R.) **13**, 133–45(1939).—Exptl. data on the f. ps. of the systems benzene–toluene (I), toluene–naphthalene (II), benzene–naphthalene (III), and benzene–toluene–naphthalene (IV) are given. The eutectic points are, resp., −100.6°, −96.0°, and −3.6° for I (12.35:87.65), II (97.0:3.0), and III (79.8:20.2), and −6° for IV with a benzene–toluene ratio of 9/1; −12° for the ratio 8/2, −18° for 7/3, −24° for 6/4, −33° for 5/5; −43° for 4/6; −58° for 3/7; −80° for 2/8, and −101° for 1/9. A three-component eutetic exists in IV for the compn. 11.0:87.0:2.0 at −102°. F. H. Rathmann

Viscosity in three-component systems formed in Martin furnace slags. The system FeO–CaO–SiO_2. P. P. Kozakevich, S. P. Leiba and E. P. Komar. *J. Phys. Chem.* (U. S. S. R.) **13**, 248–58(1939).—Exptl. data are given for 75 slags of different compns. at temps. from 1200 to 1450°. For 52 of these the viscosity η is a linear function of the temp., for the acid slags with SiO_2 from 43 to 48%, η is of second or third degree with respect to the temp. Evidence of a max. viscosity for the compd. FeO.CaO.SiO_2 reported by Selivanov (cf. *C. A.* **32**, 4116[5], 9005[9]) was very slight. F. H. Rathmann

The equilibrium diagram iron-iron silicide-tungsten. R. Vogel and H. Töpker. *Arch. Eisenhuttenw.* **13**, 183–8 (1939).—Six sections of the ternary system Fe–Fe silicide – W were examd. thermally and microscopically, namely, the satn. areas (1) primary α-Fe solid solns., (2) crystals of the compd. FeSi, (3) crystals of the compd. FeWSi, (4) crystals of the compd. FeW_2Si, (5) primary W solid solns. (98% W) and (6) crystals of the compd. Fe_2W_3. FeSi forms with W a pseudobinary section on which was found the ternary, congruently melting compd. FeWSi, and on which very likely also a ternary, incongruently melting compd. FeW_2Si exists. The compd. Fe_3Si_2 occurring in the system Fe–Si in the solid state forms with a definite ternary solid soln. of the series Fe_3Si_2–Fe_7WSi, in any proportion, solid solns. in the solid state. This definite solid soln. has the compn. 25.75% W, 19.55% Si, 54.7% Fe, corresponding approx. to the formula Fe_7WSi_5. The crystn. conditions are characterized by 3 transition four-phase planes and 1 eutectic four-phase plane. On another fifth four-phase plane, the definite ternary solid-soln. phase is formed, which forms the before-mentioned gapless series of solid solns. with Fe_3Si_2 in the solidus. Two isothermal sections show the fields of state at room temp. and at 1175°. The chem. reactions connected with the various phases are explained in detail and illustrated by photomicrographs of the different alloys in this ternary system. Six references. M. Hartenheim

Effect of an excitation energy on the specific heat of liquid helium II and its relation to the exchange effect in a non-ideal Bose-Einstein gas. A. Michels, A. Bijl and J. de Boer. *Nature* **144**, 594–5(1939); cf. *C. A.* **32**, 8802[7].—At low temps. the sp. heat of an ideal Bose-Einstein gas should increase $T^{1.5}$; in He, the increase is at least $T^{3.5}$. This difficulty can be eliminated by the assumption of an "excitation energy" which must be added to a condensed particle before it can participate in the velocity distribution of the moving particles. This gives a better representation of the anomaly in the sp. heat. G. M. Petty

Specific heat of a substance showing spontaneous electric polarization. J. Mendelssohn and K. Mendelssohn. *Nature* **144**, 595(1939).—The sp. heat of KH_2PO_4 is shown graphically from 40 to 130°K. It lies nearly on a straight line from 7 cal./deg./mole at 40°K. to 18.5 at 130°K., with an anomaly at the upper Curie point (122°K.). No anomaly occurs at the so-called lower Curie point; evidently at 75°K. the mobility of the dipoles freezes in. The data at the Curie point agree well with those of Stephenson and Hooley (*C. A.* **33**, 6131[1]), but not with those of Bantle and Scherrer (*C. A.* **33**, 6130[9]). G. M. P.

Specific heat of methane under pressure. O. N. Trapeznikova and G. A. Milyutin. *Nature* **144**, 632(1939).—The sp. heat of CH_4 was detd. at 1–2000 kg./sq. cm. and at 12–30°K. An anomaly occurs at 20.6°K. and 1 atm.; it follows a straight-line relation to about 30°K. at 2000 kg./sq. cm. A second anomaly was followed from 18.5°K. at 1000 kg./sq. cm. to 27°K. at 2000 kg./sq. cm. The effect on the position of the first max. of substituting D for H is the same as that caused by an increase in pressure: CD_4 at 1 kg./sq. cm. is equiv. to CH_4 at 1410 kg./sq. cm. The displacement of the maxima is directly assocd. with changes in ω. G. M. Petty

Entropy and heat capacity of propylene. B. L. Crawford, Jr., G. B. Kistiakowsky, W. W. Rice, A. J. Wells and E. B. Wilson, Jr. *J. Am. Chem. Soc.* **61**, 2980–1 (1939).—Powell and Giauque (*C. A.* **33**, 9113[1]) published heat-capacity data on solid and liquid C_3H_6 based on a set of frequencies and a potential barrier hindering rotation of the Me group (700 cal.) given by K., Pacher and Stitt (*C. A.* **32**, 6141[6]). Values of the entropy at the b. p. and the gaseous heat capacity over a range of temps. were calcd. with a barrier of 2119 cal. and a no. of frequencies from 432 to 3000 cm.$^{-1}$. The values for the calcd. torsional heat capacity of C_3H_6 gas form a curve on which the observed values fit very well and the entropy is 59.87 cal. as compared with the exptl. value of 59.93. The value of 2120 cal. for the potential barrier is not final. C. J. West

Transference energies. B. Bružs. *Z. Elektrochem.* **45**, 703–6(1939).—Theoretical considerations, based on thermodynamics, of the energy changes accompanying transference processes, with special reference to diffusion and thermal potentials. S. Glasstone

The disperse state of solid matter and its thermodynamic foundations. II. D. Balarev and N. Kolarov. *Kolloid-Z.* **88**, 288–90(1939); cf. *C. A.* **33**, 9087[8].—By detg. the heats of diln. in water of KCl and KBr crystal powders that had been heated at different temps., it was confirmed that the resp. changes of the energy contents of a cryst. system are reversible. These findings support previous conclusions about the thermodynamic foundation of the disperse state of real crystals. Robert Simha

Latent heats of sublimation and evaporation of certain substances. Wm. Hume-Rothery. *Phil. Mag.* **28**, 465–80(1939).—The ratio of the latent heats of sublimation and evapn. for many substances is a no. which is close to a ratio of integers up to 8. Some tentative explanations of this fact are discussed. E. J. Rosenbaum

Heat of formation of magnesium sulfide. A. F. Kapustinskiĭ and I. A. Korshunov. *J. Phys. Chem.* (U. S. S. R.) **13**, 276–7(1939).—For the reaction [Mg] + [S] rhombic = [MgS] cryst., $\Delta H = -84{,}524 + 1.31\,T - 2.88 \times 10^{-3}\,T^2$ and $\Delta F^\circ = -84{,}524 - 3.02\,T \log T + 2.88 \times 10^{-3}\,T^2 + 12.18\,T$. **Heat of formation of manganese sulfide.** *Ibid.* 278–80.—For the reaction [Mn]$_\alpha$ + [S] rhombic = [MnS] green, $\Delta H_{298} = -48{,}750 \pm 520$ cal. Cf. *C. A.* **33**, 6132[6]. F. H. Rathmann

The heat of combustion of isopropanol. Geo. S. Parks and Geo. E. Moore. *J. Chem. Phys.* **7**, 1066–7(1939).—$\Delta H_{298.16} = -478{,}880 \pm 300$ cal./mole at 25° and 1 atm. const. pressure. For the reaction PrOH (liquid) → iso-PrOH (liquid), $\Delta H_{298.16} = -3350 \pm 380$ cal.: $\Delta F^\circ_{298.16} = -3430 \pm 420$ cal. G. M. Petty

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Dipole moment of the isomeric selenophthenes (Tamamusi, *et al.*) **10**. Kinetic study of the formation of *d*-glucose phenylhydrazone (Orning, Stempel, Jr.) **10**. Mol. structure of aliphatic compds. and their b. ps. (Neyman-Pilat) **10**. Magnetic properties of the compds. ethylisocyanide-ferrohemoglobin and imidazole-ferrihemoglobin (Russell, Pauling) **11A**.

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F.

New form of the quantum equation. M. Fahmy. *Phil. Mag.* **28**, 364-9(1939).—Math. E. J. Rosenbaum

The electron in classical general relativity theory. A. Lees. *Phil. Mag.* **28**, 385-95(1939).—Math. An internal stress system for the electron is derived. E. J. R.

Characteristics of optical illustration by means of electrons and applications (electron microscopy). K. Hoffmann. *Kolloid-Z.* **89**, 59-76(1939).—A review with 42 references. G. G.

Quantization under two centers of forces. I. Hydrogen molecular ion. S. K. Chakravarty. *Phil. Mag.* **28**, 423-34(1939).—Math. The energies of the $1s\sigma$, $2s\sigma$ and $3d\sigma$ states of H_2^+ are calcd. as a function of the internuclear distance. E. J. Rosenbaum

Neutral mesotrons and electron pairs. Jacques Solomon. *Compt. rend.* **209**, 678-80(1939); cf. *C. A.* **33**, 6143[7].—Math. results are given showing that Gamow and Teller's theory (*C. A.* **31**, 2919[2]) of nuclear forces is contained in the general theory of the neutral mesotron, and that a mesotron has a magnetic moment of the order of $^1/_4$ Bohr nuclear magneton, and that two possess energy of mutual interaction (cf. Bethe, *Phys. Rev.* **55**, 1261(1939)). C. A. Silberrad

The meson and cosmology. D. S. Kothari. *Nature* **144**, 548(1939).—Math. The mean life of the meson ($\sim 2.5 \times 10^{-6}$ sec.), the cosmological const. ($\sim 2 \times 10^{9}$ years) and the gravitational const. are connected. G. M. Petty

Connection between the life-time of the meson and the β-decay of light elements. C. Møller, L. Rosenfeld and S. Rozental. *Nature* **144**, 629(1939). The discrepancy between the observed and the calcd. ratio of the life of meson to that of a light radioactive element is removed by combining a vector and a pseudoscalar field for the meson in the calcns. G. M. Petty

Scattering of neutrons by protons. C. Kittel and G. Breit. *Phys. Rev.* **56**, 744-9(1939).—Expressions are derived for the calcn. of (*s*) wave scattering for square wells with Wigner's approx. formula (*C. A.* **29**, 401[9]) as a basis. The (*p*) wave phase shifts have been calcd. by use of Bethe's "neutral" form of meson theory (*Phys. Rev.* **55**, 1261(1939)). An effect of about 50% on the angular distribution is expected at 16 m. e. v. where $\mu = 180\ m$ and $^1/_3$ of this amt. for $\mu = 330\ m$ (μ is the mass of the meson; m is the mass of the electron). E. A. G.

Derivation of the dispersion formula for nuclear reactions. A. J. F. Siegert. *Phys. Rev.* **56**, 750-2(1939).—Math. Earl A. Gulbransen

A simple picture of the binding energies of He^3 and He^6. Katharine Way. *Phys. Rev.* **56**, 556-61(1939).—An approx. application of Wheeler's method (*C. A.* **32**, 2825[1]) of resonating groups to the nuclei He^3 and He^6 makes it possible to evaluate the magnitude of the different contributions to the total energy. H. C. Thomas

A method for improved calculation of energies of two-electron configurations from Hartree functions. Application to 2 p^2 terms in O III. A. F. Stevenson. *Phys. Rev.* **56**, 586-93(1939).—A generalization of the method of the self-consistent field previously given by S. (cf. *C. A.* **31**, 6960[7]) is improved by assuming that the radial functions are identical with the Hartree functions, so saving labor, and by taking the core electrons more accurately into account. About $^1/_3$ of the discrepancy in the sepn. $^1S - {}^1D$ in O III is accounted for. H. C. Thomas

Theory of the metallic state. V. V. Tarasov and B. P. Bering. *J. Phys. Chem.* (U. S. S. R.) **13**, 124-32(1939).—Data are given on the electron nos. and the electron vols. of most of the metals. The values of $B_0 \times 10^{13}$ in the Fermi equation calcd. from exptl. data vary from 0.85 for Sn to 1.25 for Ir; most of the values lie close to the av., 1.00_8 (theoretical value 1.00_8). The relation between the concn. of electron gas and the m. p. is discussed. F. H. Rathmann

Apparatus for the production of acceleration fields for atomic-physical investigations. The cyclotron. R. Elsner and R. Strigel. *Z. Ver. deut. Ing.* **83**, 1083-8(1939); cf. *C. A.* **33**, 9128[6].—A review. Robert Simha

Current densities, lumen efficiency and brightness in argon, nitrogen, helium and hydrogen arcs. C. G. Suits. *J. Applied Phys.* **10**, 730-2(1939); cf. *C. A.* **33**, 5281[1]. A. O. Allen

Influence of the cathode on the sparking potential of hydrogen. F. Llewellyn Jones and J. P. Henderson. *Phil. Mag.* **28**, 185-91(1939); cf. *C. A.* **33**, 5754[4].—Sparking p. ds. were measured at H pressures in the range 1–520 mm. for disk cathodes of clean and oxidized steel, pure and com. Al, Ni and Cu. The sparking p. d. depends on the cathode material but since the change due to a change of cathode material is independent of the pressure, the relative change at a pressure above 1 atm. is small. The min. p.-d. values are 266.5, 280, 295 and 312.5 v. for Al, Ni, Cu and Fe, resp. E. J. Rosenbaum

Mechanism of the spark discharge in hydrogen. F. Llewellyn Jones. *Phil. Mag.* **28**, 192-202(1939); cf. preceding abstr.—The dependence of the sparking p. d. of H on the cathode material is interpreted in terms of the Townsend theory of the discharge. Over a large pressure range the secondary ionization is due mainly to pos. ions; the effect of radiation from the gas is predominant only at the highest pressures. The min. fraction of the total secondary ionization which must be due to emission of electrons is calcd. E. J. Rosenbaum

Influence of the cathode on the sparking potential of heavy hydrogen. F. Llewellyn Jones. *Phil. Mag* **28**, 328-37(1939); cf. preceding abstr.—As with H, the min. sparking p. d. is characteristic of the cathode material and is lowered by slight oxidation of the cathode surface. The min. p. d. with D is about 3% greater than with H. The values obtained after the discharge tubes remained evacuated are higher than those after exposure to the gas. The variation of the sec. Townsend coeff. was studied as a function of the ratio of the field strength to the gas pressure. E. J. Rosenbaum

A differential method applied to the surface ionization of sodium halides on tungsten. A. A. Johnson and T. E. Phipps. *J. Chem. Phys.* **7**, 1039-46(1939).—A differential mol.-beam method for the study of the surface ionization of salts was developed. The method was applied to the study of the ionization of Na halides on W and W-O surfaces. The results disagreed with the simple theory of the ionization of a gaseous Na atom at a W surface: apparently 2–4% of the W surface (varying with the surface and with the halide) held adsorbed halogen atoms up to 2600°K. G. M. Petty

Electron interference in convergent rays. W. Kossel and G. Mollenstedt. *Ann. Physik* **36**, 113-40(1939); cf. *C. A.* **33**, 2027[8].—In order to observe the elementary diffraction phenomena finite openings were introduced in place of the customary parallel beams of electrons. In addn. to the regular reflections and multiple reflections in very thin single crystals a new system of parallel interference lines appears, which are related to the boundaries of the crystal and its finite thickness. These serve as a means for observing the propagation of electron waves in the crystal. S. L. Gerhard

The mechanism of secondary electron emission. R. Suhrmann and W. Kundt. *Naturwissenschaften* **27**, 707(1939).—Metal films of which the secondary electron yield and its change with temp. were recently detd. (*C. A.* **33**, 9132[6]) were studied for penetration power of secondary electrons. A cooled (83° abs.) sensitized Be layer of high yield (S/P between 4 and 5) was covered with a thin film, transparent for slow electrons, of Be, Cu or Ag. Their S/P was detd. at 83° abs. before and after heating to room temp. to cause orientation of the film. It followed that the penetration power is smaller in the irregular condition than in the oriented condition. The no. of emitting centers is larger in the irregular state. It is assumed that the emit-

ting centers are disturbed spots in the compact metal layer, more of which are present in the irregular arrangement than after orientation. Possibly these spots have free atoms in which the electrons are not bound (cf. Mahl, *Jb. AEG Forsch.* **6**, 33 (1939)). B. J. C. van der Hoeven

Secondary electron emission. IV. Compounds with a high capacity for secondary electron emission. H. Bruining and J. H. de Boer. *Physica* **6**, 823–33 (1939) (in English); cf. *C. A.* **33**, 2028⁸.—Any pure alkali metal compd. easily emits secondary electrons, these coming principally from the highest energy level of the nonmetallic element. The metal furnishes cond. electrons. **V. Mechanism of secondary electron emission.** *Ibid.* 834–9.—An energy diagram is used to explain the conclusions in the above article. Gregg M. Evans

Production of a beam of fast neutrons. Paul C. Aebersold. *Phys. Rev.* **56**, 714–27 (1939).—The app. consists of a tapering channel of paraffin lined with Pb on both the inside and outside of the channel, in conjunction with the 8-m. e. v. D-Be source of a cyclotron. Ionization measurements and photographs indicate that the fast neutron effects are localized in the collimated beam. The beam was found suitable for many phys. and biol. expts. Earl A. Gulbransen

Nuclear reactions in stellar evolution. G. Gamow. *Nature* **144**, 575–7, 620–2 (1939); cf. *C. A.* **32**, 4065⁸, 8254⁷.—Values for Q (energy of reaction) and Γ (Γ/h = probability of reaction after penetration of the potential barrier) are tabulated for nuclear reactions of H^1 with H^1, H^2, H^3, Li^6, Li^7, Be^9, B^{10}, B^{11}, C^{11}, C^{12}, C^{13}, N^{14}, N^{15}, O^{16}, F^{19}, Ne^{22}, Mg^{26} or Si^{30}. It is shown that energy production in the sun is due to the cycle: $C^{12} + H^1 \rightarrow N^{13} + h\nu$; $N^{13} \rightarrow C^{13} + e^+$; $C^{13} + H^1 \rightarrow N^{14} + h\nu$; $N^{14} + H^1 \rightarrow O^{15} + h\nu$; $O^{15} \rightarrow N^{15} + e^+$; $N^{15} + H^1 \rightarrow C^{12} + He^4$ (C^{12} and N^{14} are catalysts for the reaction $4H^1 \rightarrow He^4 + 3h\nu + 2e^+$). The positions on the Hertzsprung-Russell diagram of those stars which derive their energy from the C-N cycle and the direction of motion of the sun on that diagram during its evolution are discussed. The positions on the diagram occupied by red giant stars and variable stars and the positions of stars whose sources of energy are principally B^{10}, B^{11}, Be^9, Li^7, Li^6, H^3 and H^2 reactions are indicated. The course of stellar evolution is briefly discussed. The problem of stellar energy sources and the main features of stellar evolution can be considered as practically solved. G. M. Petty

Helium and hydrogen of mass 3. Luis W. Alvarez and Robert Cornog. *Phys. Rev.* **56**, 613 (1939); cf. *C. A.* **33**, 8106⁵.—The isotopic ratios He^3/He^4 are 10^{-5} for gas-well He and 10^{-7} for atm. He. He^{+++} ions, at 24 m. e. v., induce a radioactivity in Si: $_{14}Si^{28} + {}_2He^3 \rightarrow {}_{15}P^{30} + {}_1H^1$; ${}_{15}P^{30} \rightarrow {}_{14}Si^{30} + e^+$. H^3 has a definite activity of long half-life. G. M. Petty

The energies released in the reactions $Li^7(p,\alpha)He^4$ and $Li^6(d,\alpha)He^4$, and the masses of light atoms. Nicholas M. Smith, Jr. *Phys. Rev.* **56**, 548–55 (1939).—The energies of α-particles arising from the reactions $Li^7(p,\alpha)He^4$ and $Li^6(d,\alpha)He^4$ were measured by stopping the particles in a calibrated, variable-pressure, air-filled absorption cell. The energy release of the Li^7 disintegration was found to be 17.28 ± 0.03 m. e. v.; that for Li^6, 22.20 ± 0.04 m. e. v. Taken together with the Be-proton disintegrations the following masses for the light atoms are obtained: Li^6, 6.01682 ± 0.00011; Li^7, 7.01784 ± 0.00009; Be^8, 8.00766 ± 0.90015; Be^9, 9.01486 ± 0.00013. H. C. Thomas

Noninterchange of elementary radiosulfur with carbon disulfide. Robert A. Cooley, Don M. Yost and Edwin McMillan. *J. Am. Chem. Soc.* **61**, 2970–1 (1939).—Results are reported to show that there is practically no interchange between S and CS_2 even at 100°. The extent of any interchange must be less than 2% or less than the exptl. error of the activity measurements. Therefore, CS_2 may be used as a solvent for radio-S without fear of loss by interchange. C. J. West

β-Ray spectra of Mg^{27}, Cu^{62} and the nuclear isomers of Rh^{104}. E. C. Crittenden, Jr. *Phys. Rev.* **56**, 809–13 (1939).—The cloud chamber is used to investigate the β-ray spectra of several radioactive elements. The following results were obtained: (1) the spectrum of Mg^{27} gave an upper limit of 1.8 m. e. v., (2) the spectrum of Cu^{62} gave an upper limit of 2.6 m. e. v., (3) the spectra of the 2 nuclear isomers of Rh^{104} were found to have the same upper limit of 2.3 m. e. v. and the same shape within the exptl. error. The similarity in shape of the 2 spectra leads C. to explain the disintegration of the 4.37-minute isomer as proceeding entirely by a γ-ray transition to the ground state of Rh^{104} followed by a β-ray transition to the ground state of Pd^{104}. Earl A. Gulbransen

Deuteron bombardment of silver. R. S. Krishnan and D. H. T. Gant. *Nature* **144**, 547 (1939).—Pure Ag was bombarded with 9-m. e. v. deuterons. The activities are listed in the order of their prominence. (1) An activity (e^-) of 2.4 min.: $Ag^{107}(d,p)Ag^{108}$. (2) The active ppt. was chemically sepd. into Cd and Ag fractions. The Cd fraction contained a 6.8-hr. substance emitting a soft e^- radiation, x-rays and a very weak γ-radiation. The reaction is $Ag^{107}(d,n)*Cd^{108}$ or $Ag^{109}(d,n)*Cd^{110}$. (3) The Ag fraction contained a 26-min. substance emitting e^+, with an absorption unit of 1.8 m. e. v. This suggests Ag^{106}, but the 8-day period was missing. (4) The Ag fraction exhibited an e^- activity with a life of at least several weeks. (5) No activity shorter than 2.4 min. could be detected. G. M. Petty

Deuteron bombardment of silver. N. Feather. *Nature* **144**, 547 (1939); cf. preceding abstr.—By use of the method of crit. absorption (*C. A.* **33**, 4870¹), the data and interpretations of Krishnan and Gant were confirmed. G. M. Petty

A particular mode of fission of the uranium nucleus. V. G. Khlopin, M. A. Pasvik-Khlopina and N. F. Volkov. *Nature* **144**, 595–6 (1939).—Na pyrouranate was exposed to slow neutrons from Rd-Th + Be for 17 days; the fission products were sepd. chemically. The ppts. and their half-lives were: La + K, 30 min., 9.5 hrs., 45 hrs.; Sr, 20 min., 7.5 hrs. and one isotope of much longer period, Ba, 10 and 50 hrs. A sample of U oxide was irradiated 36 hrs. with slow neutrons in a cyclotron. Some transformation products were gathered from the vessel walls. Radio-isotopes of Kr and Xe are intermediary products of the fission, coming in the middle of the transmutation chain. G. M. Petty

Fission of thorium by neutrons. Y. Nisina, T. Yasaki, H. Ezoe, K. Kimura and M. Ikawa. *Nature* **144**, 547–8 (1939); cf. *C. A.* **33**, 1211⁵.—Th nitrate, carefully freed from MsTh and other disintegration products except RdTh, was exposed 1–5 hrs. in the cyclotron to fast neutrons from D + Li. Chem. sepn. showed the presence of radioactive Bi, Hg, Sb, Sn and Ag: radioactive elements in the alkali, halogen, Mo, Se + Au and Cu + Cd fractions have not been identified. Radioactive Pb and As were absent. The chem. sepn. required 2–3 hrs., so short-lived radioelements escaped detection. Starting with U, radioactive ppts. of Bi, Hg, Ag, Sb + Sn and the Cu + Cd fraction were obtained. G. M. Petty

The radioactivity of potassium as a means for determination of the relative age of elements in meteorites. Hans Suess. *Naturwissenschaften* **27**, 702 (1939).—The radioactivity of K from tectites (*C. A.* **32**, 8920⁹) and from meteorites (1868, 1882 and 1932) was detd.; the K content of the latter was from 0.1 to 0.3%. Geiger-Müller tube measurements on KCl, corrected for cosmic radiation, showed a ratio between activity of terrestrial K and cosmic K of from 0.91 to 1.2. On the average all values are within the limits of error of 5 to 10%. This result of identity of both K species seems to indicate that the elements of the earth were formed at the same time as those of a wide expanse of the universe (catastrophe theory). Difference in age would have been indicated by difference in K^{40} content and in radioactivity. B. J. C. van der Hoeven

Element 87 (moldavium, Ml). Horia Hulubei. *Compt. rend.* **209**, 675–8 (1939); cf. *C. A.* **32**, 421⁹.—Processes deemed likely to conc. this element, in particular that based on differences in the soly. of the alkali chlorides obtained, applied to various minerals, etc., e. g., pollucite, beryl, lepidolite, autunite and various com. samples of

Rb and Cs salts, showed in some cases an undoubted strengthening of the line $L\alpha_1$ attributable to Ml. Results with autunite were the most hopeful. C. A. Silberrad

A precision camera for measuring lattice constants by the powder method. Giulio Cesoni. *Atti XXVII riunione, Bologna, Soc. ital. progresso sci.* **5**, 323–30(1939).—A simplification of the Straumanis and Jevins camera (*C. A.* **30**, 2447[4]) for obtaining Debye-Scherrer photographs is described. Its advantages include rigid connection between the film and sample supports and a camera diam. of 86 mm. for facilitating calcns. A study of Al indicated a precision of from 0.0002 to 0.0008 A., identical with that of S. and J. H. A. Frediani

L spectrum of tungsten: strong lines. Mme. Marcel Rouault (nee Boudin). *Compt. rend.* **209**, 650–1(1939).—Remeasurements of 24 *L* lines of W were made with Cauchois' spectrograph, each line being measured by comparison with the nearest $K\alpha$ lines of other elements on each side. Results generally agree well with those previously obtained, the av. difference being 0.17 X. U. (0.01–0.44) (cf. Friman, *C. A.* **21**, 794, and Idei, *C. A.* **25**, 2638). C. A. Silberrad

Identification of characteristic x-rays associated with radioactive decay. Philip H. Abelson. *Phys. Rev.* **56**, 753–7(1939).—A bent rocksalt crystal spectrograph is applied to the identification of x-rays emitted during radioactive decay. The x-rays assocd. with the disintegration of $_{31}Ga^{67}$, $_{29}Cu^{64}$, $_{35}Br^{80}$ and $_{43}Ma$ have been identified. Earl A. Gulbransen

Magnetic moments of the proton and the deuteron—radiofrequency spectrum of H_2 in various magnetic fields. J. M. B. Kellogg, I. I. Rabi, N. F. Ramsey, Jr., and J. R. Zacharias. *Phys. Rev.* **56**, 728–43(1939); cf. *C. A.* **32**, 5291[8]; **33**, 2802[2].—The mol.-beam magnetic-resonance method is used to measure the magnetic moments of the proton and deuteron. The radiofrequency spectrum of ortho-hydrogen in the first rotational state was obtained and 6 resonance minima were found. The analyzed spectrum yields 9 energy levels, from which are obtained (1) the proton moment from the Larmor precession frequency—$\mu_P = 2.785 \pm 0.02$ nuclear magnetons, (2) the proton moment from the magnitude of the dipole interaction between the 2 magnetic moments $\mu_P/r^3 = 34.1 \pm 0.3$ gausses which gives $\mu_P = 2.785 \pm 0.03$ nuclear magnetons and (3) the value of the spin orbit interaction const. of the proton moment with the rotation of the mol. or the magnetic field H' produced by the rotation of the mol. at the position of the nucleus. $H' = 27.2 \pm 0.3$ gausses. The deuteron magnetic moment was found to be $\mu_D = 0.855 \pm 0.006$ nuclear magnetons. Earl A. Gulbransen

Influence of temperature on the pressure broadening of spectral lines. H. Horodniczy and F. Jabłoński. *Nature* **144**, 594(1939); cf. *C. A.* **33**, 2032[9].—The influence of temp. (420–1300°K.) on the width of the Hg absorption line 2537 A. was found to be 3.6% (the av. of plates which varied from −2.3% to +10%). The const. concn. of Hg was 6×10^{14} atoms per cc., with 1.4×10^{19} atoms of A. per cc. This broadening is substantially smaller than that calcd. from the theories of Lorentz (*Proc. Roy. Acad. Amsterdam* **8**, 591(1906)) or of Weisskopf (*C. A.* **27**, 1830). There was a slight diminution of the asymmetry of the line with increasing temp. G. M. Petty

The forbidden $^3P_0$-$^1D_2$ line of O III in the nebular spectrum of Nova Herculis 1934. J. Dufay and M. Bloch. *Nature* **144**, 593–4(1939); cf. *C. A.* **32**, 7818[3].—The forbidden $^3P_0$-$^1D_2$ line of O III, the transition probability of which is small but not zero, was identified in the spectra of 2 nebulae (Bowen and Wyse, *Public. Astro. Soc. Pacific* **51**, 348(1938)). The line 4932.2 ± 0.6 A., which was observed in the nebular spectrum of Nova Herculis, is attributed to this transition. G. M. Petty

Line absorption spectra of rare earth ions in crystals. E. J. Meehan and G. C. Nutting. *J. Chem. Phys.* **7**, 1002–11(1939).—Absorption spectra of the sulfate octahydrates or Er^{+++} (161 lines) and Ho^{+++} (98 lines) at 14, 20, 78, 169 and 300°K., of Dy^{+++} (99 lines) at 20, 78 and 300°K. and of Tm^{+++} (35 lines) at 20 and 78°K. are tabulated. Energy levels were found in Er^{+++} at 19, 41 and 86 cm.$^{-1}$ above the normal state, and in Dy^{+++} at 22 and 57 cm.$^{-1}$ above the lowest; no such low energy states were found in Ho^{+++} or in Tm^{+++}. G. M. P.

Bands of the first positive system of the nitrogen molecule. René Bernard and Renée Fouillouze. *Compt. rend.* **209**, 647–50(1939); cf. *Thèse*, Paris, (1939).—Intensity-exciting energy (I/E) curves for 3 bands (heads λλ 8546, 6323 and 6071) of the first pos. system of $N_2(1P)$ were detd. by the method used for the bands N_2^+ and $N_2(2P)$, with thoriated-W cathodes. The curves, which are similar for all 3 bands, rise slowly from $E = 7.5$ v. to $E = 10.5$, and then very rapidly to 13.5, at which there is a sharp max.; they then decrease more slowly. Variations in pressure from 0.7 to 0.01 mm. Hg or addn. of He or Ne has no effect. C. A. Silberrad

Apparent anomalous isotopic effect in some bands associated with the Swan bands. Chas. H. Townes. *Nature* **144**, 631(1939).—Heads of bands due to C^{12} were identified at 4770.21, 4836.16 and 4910.95 A.; of C^{13}, at 4764.77, 4827.57 and 4898.92 A. The emitting mol. contains only 1 C atom. The anomalously large isotopic shift indicates the presence of C combined with a persistent impurity; the mol. should not be very complex. G. M. Petty

Absorption spectrum of vapors in presence of a foreign gas (spectrum of ICl). Michel Kantzer. *Compt. rend.* **209**, 675(1939).—The spectrum of ICl in presence of various amts. of H_2, N_2, O_2 or CO_2 was examd. If the pressure of ICl is above 0.1 mm. Hg absorption increased with the proportion of added gas to a limit; if below, it passed through a max. before reaching the limit; both max and min. depend on the nature of the added gas. C. A. S.

The near ultraviolet absorption of substituted benzenes. A. L. Sklar. *J. Chem. Phys.* **7**, 984–93(1939); cf. *C. A.* **31**, 7758[8].—Math.-theoretical. The intensification of ultraviolet absorption in substituted over unsubstituted C_6H_6 is attributed to the destruction of the 6-fold symmetry of C_6H_6 by the partial migration of an electron to the ring or out of it. Calcns. made for PhMe, $PhNH_2$, PhOH and PhF agree with empirical data. The SH group should be particularly effective in intensifying the absorption. G. M. Petty

Absorption spectra of solid substances. Masahisa Kobayasi and Ryutaro Tutida. *J. Chem. Soc. Japan* **60**, 769–73(1939).—The technique of the detn. of light absorption by the single-crystal method, the microscopic method and the reflection method has been worked out. The absorption spectra of Cr alum, $[Co(NH_3)_4Cl^{(1)}_{(2)}]$, $[Co(NH_3)_4CO_3]Cl$, $[Co(NH_3)_4CO_3]NO_3\frac{1}{2}H_2O$, $[Co(NH_3)_4CO_3]_2SO_4.3H_2O$, ZnS, CdS and of Hg are given. T. K.

The infrared absorption by hydrogen selenide, deuterium selenide and deuterium hydrogen selenide. Donald M. Cameron, Wm. C. Sears and Harald H. Nielsen. *J. Chem. Phys.* **7**, 994–1002(1939).—Infrared spectra are reported in graphs and in tables for H_2Se (4.05–4.58 and 8.0–10.3 μ), D_2Se (5.5–6.5 and 11.5–14.2 μ) and HDSe (4.0–4.5, 5.5–6.3 and 10.0–11.6 μ). The fundamental frequencies $\nu_{1,2,3}$ are, in cm.$^{-1}$: H_2Se, 2260, 1074, 2350; D_2Se, 1630, 744, 1696; HDSe, 1691, 905, 2352. The angle H-Se-H is slightly more than 90°. The distances H-Se and H-H are 1.6 and 2.3 A., resp. The product relations of Redlich (*C. A.* **29**, 4673[2]) are used to verify assignments of frequencies and detns. of band centers. G. M. Petty

The spectroscopic determination of the carbon-chlorine distance in methyl chloride. G. B. B. M. Sutherland. *J. Chem. Phys.* **7**, 1066(1939); cf. *C. A.* **32**, 2796[7].—The discrepancy between the diffraction (1.77 ± 0.02 A.) and spectroscopic (1.66 ± 0.05 A.) values for the C-Cl distance in MeCl is increased by the interpretation of the spectrum by Nielsen and Nielsen (*C. A.* **33**, 9138[2]). The newer results are reinterpreted, and the discrepancy is slightly reduced. G. M. Petty

Spectroscopic apparatus. Wm. F. Meggers. *J. Applied Phys.* **10**, 734–40(1939).—A review with 31 references. E. H.

Wide-range intensity-measurements in photoelectric

spectrophotometry. Walter C. Bosch and Barremore B. Brown. *J. Optical Soc. Am.* **29**, 466–9(1939). E. H.

The oscillation frequencies of nitrites. Dudley Williams. *J. Am. Chem. Soc.* **61**, 2987–90(1939).—The infrared absorption spectra of $NaNO_2$, and KNO_2 were studied between 5 and 16 μ. Absorption bands were observed at 7.6, 8.2 and 13.3 μ, which are interpreted as arising from fundamental vibrations of the nitrite group. The valence-force-field proves to be an unsatisfactory approximation for the nitrites. The HNO_2 spectrum is compared with the nitrite spectra. It is suggested that the similarities in these spectra may be accounted for on the basis of OH and NO_2 groups in HNO_2. A. B. Garrett

Rotatory dispersion and absorption spectra of carboxylic acids and hydrocarbons containing a phenyl or a cyclohexyl group. Alexandre Rothen and P. A. Levene. *J. Chem. Phys.* **7**, 975–83(1939).—Max. optical rotations are tabulated for (*a*) MeCHRCOOH, (*b*) MeCHRCH$_2$COOH, (*c*) EtCHRCOOH, (*d*) PrCHPhCH$_2$COOH, (*e*) EtCHPhBu, (*f*) RCH$_2$CHMeCOOH, (*g*) RCH$_2$CHMeCH$_2$COOH, (*h*) PhCH$_2$CHMeEt, (*i*) RCH$_2$CH$_2$CHMeCOOH, (*j*) RCH$_2$CH$_2$CHMeCH$_2$COOH, (*k*) PhCH$_2$CH$_2$CHMeCH$_2$CH$_2$COOH, (*l*) cyclo-C$_6$H$_{11}$CH$_2$CH$_2$CHMeCH$_2$CH$_2$COOH, (*m*) RCH$_2$CH$_2$CHMeCH$_2$CH$_2$CH$_2$COOH, (*n*) PhCH$_2$CH$_2$CHMeEt, where R = Ph, cyclo-C$_6$H$_{11}$ or C$_6$H$_{13}$. Calcd. and observed rotatory dispersions are compared at 3–23 wave lengths between 2300 and 6700 A. for solns. in heptane of all the Ph compds. except *a*, and the cyclohexyl compds. *a*, *b*, *c*, *f* and *g*; and for the cyclohexyl compds. *i*, *j*, *l* and *m* and for *e*, *h* and *n*: rotatory dispersions are plotted ($1/\alpha$ against λ^2) for the Ph compds. *b*, *f* and *m*, and for cyclohexyl compds. *a*, *f* and *i*; the max. mol. rotations are plotted against $\lambda\lambda$ (3900–6300) for cyclo-C$_6$H$_{11}$CHEtCOOH. Absorption spectra are plotted $\lambda\lambda$ (2200–2800) for the Ph compds. *b*, *c*, *f*, *i*, *j*, *m* and *n*; for the cyclohexyl compds. *a*, *l* and *m*; and for PhCHMeBu. Absorption bands (5–7 each) of PhCH$_2$CONH$_2$, Ph(CH$_2$)$_6$CONH$_2$, PhMeCHCOOH, PhCH$_2$CH$_2$CHMeCOOH and PhCH$_2$CH$_2$CHMeCH$_2$COOH are compared. Shifts in the absorption bands of these disubstituted carboxylic acids were studied as a function of the Ph—COOH distance. The first absorption region of the Ph group furnishes no detectable rotatory contribution in this type of acid. The first rotatory contribution is allocated to the COOH group. The Ph and cyclohexyl groups have a vicinal effect similar to that of the hexyl group with respect to the sign of rotation. G. M. Petty

Polarization and resonance in the study of aromatic nuclei. I. Benzene and substituted benzenes. G. B. Bonino. *Gazz. chim. ital.* **69**, 417–35(1939).—In the present paper, certain concepts concerning the constitution of aromatic nuclei, which have already been described (cf. *C. A.* **30**, 2849[4]), are applied to the polarization phenomena of the electronic cloud induced by substituents, and to the resonance phenomena between the electronic wave of the aromatic nucleus and the substituents with analogous symmetry. When the concomitant effect of polarization and of resonance induced by substituents in the aromatic ring results in a "displacement" of the d. of the cloud of the p_z charge of the C_6H_6 nucleus toward the substituent itself, it is of advantage in studying the phenomenon (very complex in itself and difficult to express qualitatively) to regard the electronic group remaining in the aromatic system (p_z) as sep. from the electronic group assocd. with the substituent. In the particular case treated, viz., BzOH, this relatively simple hypothesis is shown to be of aid in evaluating the phenomena in a qual. way. It is also applicable to the study of $C_{10}H_8$ and condensed aromatic nuclei in general. C. C. Davis

Studies in photoelectric photometry. A photoemissive cell specially designed for high-precision measurements. G. A. Boutry and P. Gillod. *Phil. Mag.* **28**, 163–84(1939).—Reasons were studied for deviations from proportionality between the illumination on a photocell and the resulting current. These reasons are the ionization of the residual gas, space charge and the influence of surface charges on the walls of the cell. Two types of cell are described for which the response is strictly linear. One has a disk cathode surrounded by a guard ring, and a parallel anode which is a grid of fine wires. The other consists of a cathode at the end of a Faraday cylinder. This cell has a satn. p. d. of about 0.1 v. and a very small space charge. Both of these cells are used with such a low p. d. that dark current is negligible. E. J. Rosenbaum

Optical activity and magneto-optical activity of crystalline nickel sulfate in the near ultraviolet. F. G. Slack and Philip Rudnick. *Phil. Mag.* **28**, 241–7(1939); cf. *C. A.* **32**, 8938[8].—The rotatory power of the α hexahydrate of $NiSO_4$ in the wave-length range 3400–6300 A. is represented by $\alpha = [0.718/(\lambda^2 - 0.0244)] + [1.834/(\lambda^2 - 0.8156)] + [0.0104/(\lambda^2 - 0.1482)]$. The value of n is given by $n^2 - 1 = 1.2461 + 0.012126/[\lambda^2 - (0.135)^2]$ and the magnetic rotatory dispersion by $n\,\delta = 0.01025\lambda^2/[\lambda^2 - (0.135)^2]^2$. E. J. Rosenbaum

Measurement of light components in mixed phosphors with mixed luminous materials. Peter Brauer. *Ann. Physik* **36**, 97–104(1939).—The contribution of each component to the total light emitted was estd. by measuring the intensity of individual lines in the emission spectrum of the mixt. In CaO-PrSm phosphors the emission from Sm was strongly suppressed by Pr, for several values of the Sm/Pr ratio. Momentary excitation showed that the Sm was nevertheless capable of emitting light. The suppressive effect depends upon the total concn. Applications to other problems in phosphorescence are discussed. S. L. Gerhard

An arrangement of apparatus for the isolation of monochromatic light of high intensity at λ, 254 mμ. Lawrence J. Heidt. *Science* **90**, 473–4(1939). E. H.

Experimental studies of the phenomena accompanying the emission of light. O. Deutschbein. *Ann. Physik* **36**, 183–8(1939).—A study was made of the directional relations of intensity and polarization of the light emitted by Eu ions in crystals of Eu salts, viz., the hexagonal bromate and Et sulfate, the monoclinic sulfate and the triclinic acetate, when excited by ultraviolet light. It was found that some groups of emission and absorption lines can be ascribed to radiation from magnetic dipoles, for which $\Delta J = \pm 1$, and others to emission from elec. dipoles, for which $\Delta J = \pm 2$. S. L. Gerhard

Investigation of the CO-O_2 flame. V. Influence of temperature on the yield of visible light in the spectrum of the 2CO + O_2 flame. E. Kondrat'eva and V. Kondrat'ev. *J. Phys. Chem.* (U. S. S. R.) **13**, 169–73(1939); cf. *C. A.* **33**, 4523[9], 8091[4].—For combustions of less than 10% the yield of light is independent of the flame temp. (620–730°). For greater values of γ, the yield of light decreases with increasing temp. Since the quenching effect of CO_2 was shown to be less than that of CO and O_2 mixts., K. and K. conclude that the decreased yield is due to interaction of the reaction chains at higher temps. F. H. Rathmann

Mechanism of photochemical formation of hydrogen peroxide. K. Yamahuzi, N. Nisioeda and H. Imagawa. *Biochem. Z.* **301**, 404–17(1939).—According to the authors the photochem. formation of H_2O_2 is of 3 types: (I) $2H_2O = H_2O_2 + 2H$; (II) $2H + O_2 = H_2O_2$; (III) $AH_2 + O_2 = H_2O_2 + A$, where A is an oxidizable substance. According to Baur and Neuweiler (*C. A.* **22**, 1104) the presence of O_2 is essential for the photochem. production of H_2O_2 from H_2O, but the authors maintain that this reaction proceeds in the absence of O_2 when biol. photosensitizers are present. In a series of expts. using ZnO, eosin or hematoporphyrin as sensitizers, there was a large increase in H_2O_2 in the presence of glucose, glycerol or glycine only with ZnO. Similarly a large increase in the H_2O_2 formation was found when eosin or hematoporphyrin was illumined in the presence of photosensitizing prepns. from yeast or leaves. With ZnO there was no increase or only a small increase under similar exptl. conditions. Expts. were made in manometers to det. if any O_2 is taken up when ZnO, eosin, hematoporphyrin or the biol. prepns. are illumined, but uniformly the gas vol. (O_2) remained unchanged. The H_2O_2,

which appears in measurable amts. after 5 sec., is shown to be formed even when ordinary room light is used but fails to appear in the dark. The H_2O_2 formation with ZnO, which is not affected by the amt. of sensitizer, is greatly increased by the addn. of glucose, and for a given amt. of ZnO increases progressively with the amt. of added glucose. Temp. affects the quantity of O_2 absorbed but is practically without any effect on the amt. of H_2O_2 formed. Although reaction III would seem to indicate that H_2O is dispensible, nevertheless H_2O is actually indispensible for H_2O_2 formation. Expts. were carried out with various sensitizers (chlorophyll, eosin or hematoporphyrin) with and without an oxidizable substance (olive oil), in the presence and absence of H_2O. Only in the presence of H_2O did H_2O_2 appear on illuminating the system. In view of these expts. it is suggested that reaction III should be represented as follows: $A + OH_2 + O_2 = AO + H_2O_2$.

S. Morgulis

The photolysis of azomethane and of azomethane-acetaldehyde mixtures. Francis F. Blacet and Alvin Taurog. *J. Am. Chem. Soc.* **61**, 3024–7(1939).—The quantum yield of azomethane decompd. by λ 3660 A. at room temp. and in the pressure range 49 to 80 mm. has been found to be 1 and 0.75 when calcd. on the basis of the no. of mols. of free N formed per quantum absorbed and on the basis of the pressure increase, resp. Azomethane will photosensitize the decompn. of AcH when the ratio of AcH to azomethane is greater than 10 to 1. This is interpreted as meaning that free Me radicals produced in the photolysis of azomethane will react with either azomethane or AcH, preferably with the former.

A. B. Garrett

Quantum yields and kinetics of a photosensitized production of reducing sugars from sucrose in aqueous solutions of uranyl sulfate by visible and ultraviolet light. Lawrence J. Heidt. *J. Am. Chem. Soc.* **61**, 3223–9 (1939). —Quantum yields, ϕ, were calcd. as mols. of sucrose decompd. per photon absorbed by the system. The variation of ϕ with the concn. of sucrose was given by $\phi = a[1 - \exp(-g\,[\text{sucrose}])]$. The value of ϕ increased when the solns. were not buffered but is independent of the light intensity over a 200-fold range, the temp. between 10 and 35°, the pH between 3 and 6 and the concn of uranyl sulfate between 0.0008 and 0.008 molar. Beer's law was obeyed. The kinetics of the reaction are discussed.

A. B. Garrett

Relation between absorption spectra in the ultraviolet and the constitution of org. compds. (Dimroth) **10**. Formation of 3-indoleacetic acid by ultraviolet irradiation (Berthelot, *et al.*) **10**. Degradation of oriented cellulose structures by polarized ultraviolet light (Mason, Rosevear) **23**. Chemistry of vitamin E—absorption spectra of tocopherols, chromans, coumarans and related compds (Webb, *et al.*) **10**. Magnetic properties of the compds. ethylisocyanide-ferrohemoglobin and imidazole-ferrihemoglobin [absorption spectra] (Russell, Pauling) **11A**. Photochem. production of reducing sugars from glycosides by ultraviolet light (Heidt) **10**.

Atomic disintegration. Auergesellschaft A.-G. Brit. 508,233, June 28, 1939. In carrying out nuclear reactions, the energy requisite for activating the elementary particles participating is produced in a gas discharge under a mean gas concn. of more than 10^{19} mols. per cc., in which energies of 100 w.-sec. and more are dissipated during intervals of 10^{-6} sec. and less, corresponding to momentary outputs of 10^6 kw. and more. The concn. is preferably that corresponding to a pressure of 1 atm. at 18°. Neutrons are produced by a discharge in D, alone or mixed with H. He is produced by a discharge in Li vapor mixed with H; 2 isotopes are produced. A neutron-producing reaction may take place in a vessel lined with a B compd., e. g., $B(OCH_3)_3$.

Red-fluorescent material. The British Thomson-Houston Co. Ltd. Brit. 507,639, June 19, 1939. The material, more particularly for use with discharge lamps, comprises heat-treated MgO, SiO_2 and an activator such as Mn, prepd. by mixing the finely divided oxides in mol. proportions with addn. of less than 2% of a Mn compd., e. g., oxide, nitrate or carbonate, and firing at about 1250° or less for 1 hr. or longer. The material may be applied to the interior of the envelope of a low-pressure discharge tube filled with rare gas, e. g., A, Kr, Ne, Xe, at a pressure of 1–10 mm. Hg. It may be attached by a bond such as glycerol (I), a mixt. of I and H_3BO_3, K silicate, castor oil, or H_3PO_4, or may be embedded in the glass by heating this to the softening temp.

4—ELECTROCHEMISTRY

COLIN G. FINK

Evolution of the electric arc furnace in metallurgy. R. Berr. *Usine* **48**, No. 36, 23(1939).—Progress in elec. arc furnaces is seen not so much in the type (which is still the old Héroult principle) but mainly in the improvement of refractories for lining and in the roof, as these have to stand 3000–3500°. Silica and chrome-magnesite bricks for the roof are now preferably employed; for bottom and supports siliceous and magnesite products mixed with dolomite are used to give them sufficient thermal resistance against repeated shutting down and heating up. Three principal types of electrodes are used: amorphous carbon, Acheson graphite and Soderberg electrodes; the last two are the more common. The great advantage of elec. steel furnaces lies in improved steel quality, diminished oxidation and diversity of products. In Scandinavia, elec. arc furnaces are used also for the smelting of Fe ore, reduction being made with coke with part of the ore added in powder form. Energy consumption is about 2300 kw.-hrs./ton for acid open-hearth steel, and 2800–3000 kw.-hrs. for pig iron rich in Si. The gas produced in this process is rich in CO and has a heating value of about 2500 cal./cu. m.

M. Hartenheim

Electrolytic preparation of molybdenum phosphides. Jean Lucien Andrieux and Marcel Chêne. *Compt. rend.* **209**, 672–4(1939); cf. *C. A.* **32**, 3269⁴.—Varying proportions (1–20%) of MoO_3 dissolved in molten (800°) $NaPO_3$ to which about 6% NaCl was added were electrolyzed in a C crucible which formed the anode, a rod of C being the cathode, for 15 min. with a current of 15 amp. and 12 v. (c. d. at cathode 0.2 amp./sq. cm.). On cooling, the cathode product was dissolved in HCl aq. when crystals remained undissolved. Their compn. was MoP_2 (Hartmann, *et al.*, *C. A.* **31**, 8384⁸) and PMo_3 according as the bath contained not more than 4% or 11–20% of MoO_3. With more MoO_3, MoO_2 was formed. PMo_3 has d. 6.7 and, like PMo_2, forms fine metallic needles not attacked by HCl but readily so by HNO_3, less so by H_2SO_4, also by molten alkali or oxidizing material.

C. A. Silberrad

Comments on the paper of S. Pletenev and V. Rozov: "Cathode polarization during the electrolysis of fused salts." S. Karpachev. *J. Phys. Chem.* (U. S. S. R.) **13**, 147(1939); cf. *C. A.*, **33**, 3699⁶.—K. contends that the criticism of P. and R. against older methods of measuring cathode polarization is not valid. Cf. K. and Poltoratskaya, *C. A.* **30**, 7045⁹. **Reply.** S. Pletenev. *Ibid.* 148.—P. defends his views, and contends that K. and P. measured not the polarization but the change of potential of the C electrode in their expts. with molten $PbCl_2$.

F. H. Rathmann

A theory for the passivity of chromium. Sister M. Aida Ryan and Herbert Heinrich. *Trans. Electrochem. Soc.* **77**, 20 pp.(preprint)(1940).—In an attempt to discover the true cause of the phenomenon of passivity, numerous Cr electroplates were produced, exposed to various conditions and then tested for their activity. The theories that have previously been advanced do not

take into consideration the behavior of Cr under all of the conditions imposed upon the metal in the authors' expts.; therefore, a theory based on the electronic structure of Cr has been formulated: The atoms on the face of each unit cube of Cr share the electrons in their outermost orbits in such a way as to bring about a stable condition. To this complementary relation is attributed passivity of the metal. C. G. F.

Determination of thickness of electrodeposited chromium. M. M. Beckwith. *Monthly Rev. Am. Electroplaters Soc.* **26**, 769–75(1939).—B. recommends Clarke's modification of the drop test for the thickness of Cr. This test consists in placing a drop of a reagent composed of 20 g. of Sb_2O_3 dissolved in 1 l. of HCl (sp. gr. 1.16) on the Cr-plated surface, and noting with a stop-watch the no. of sec. required for the Cr to dissolve, as indicated by the beginning and cessation of gas evolution. Sb deposits during the test and is said to render the end point sharper. Graphs are given for converting the no. of sec. to coating thickness. The rate of soln. of Cr increases with the temp. At 75–80° F. each second of time is equiv. to 0.000001 in. thickness of Cr. A. Brenner

Current density range characteristics—their determination and application. R. O. Hull. *Monthly Rev. Am. Electroplaters Soc.* **26**, 753–67(1939). The presence of impurities in a plating bath or the effect of brightening agents can be ascertained by examg. the deposits over a range of c. d. A method is described for checking the performance of a plating bath over a wide range of c. d. in a single expt. The app. consisted of a plane cathode and anode in a rectangular plating cell. The anode was at one end of the cell. The cathode was at the other end of the cell and was inclined at an angle to the anode. The c. d. over the cathode was not uniform but varied from about 140 amp./sq. ft. on the projecting part to less than 5 amp./sq. ft. in the vertex of the angle formed by the cathode and the side of the cell. The current distribution over the cathode was detd. by plating Cu or Ni on the cathode. The latter was then cut into strips and the metal on each strip detd. Another method employed consisted in measuring the current through a test strip which was placed in different positions along the cathode. For app. of the specified size, graphs are given showing the current distribution over the cathode for various plating baths; they permit the c. d. at any point on the cathode to be detd. within 5–8 amp./sq. ft. The plating bath which is to be exaind. is placed in the cell and the cathode plated for 10–15 min. The different types of deposits, such as bright, dull or burnt, which are characteristic of different c. d. ranges, are obtained as vertical bands on the cathode. A. Brenner

Bright-silver electroplating. Robert Weiner. *Z. Elektrochem.* **45**, 743–50(1939). A crit. review of the methods proposed for the production of bright electrodeposits of Ag. S. Glasstone

Alkali cleaning as it affects the plating industry. L. C. Camel. *Monthly Rev. Am. Electroplaters Soc.* **26**, 777–85 (1939).—A review. A. Brenner

Electrolytic polishing. W. C. Elmore. *J. Applied Phys.* **10**, 724–7(1939).—The complicated voltage-current relations involved in the Jacquet method (*C. A.* **30**, 2115[4]) for electrolytic polishing of Cu are studied. It is concluded that when conditions are right for polishing the concn. of dissolved Cu at the anode is the highest possible, so that the rate of soln. is controlled entirely by the concn. gradient. As there is greater diffusion from raised areas of the anode because of steeper concn. gradients near them, the surface becomes progressively more nearly level. Details are also given for the electrolytic polishing of Fe with a H_3PO_4 electrolyte. A. O. Allen

Irreversible electrode phenomena of thallium. I. Hydrogen overvoltage in sulfuric acid. I. Milton LeBaron and A. R. Choppin. *Trans. Electrochem. Soc.* **77**, 12 pp.(preprint)(1940).—The overvoltage of Tl in H_2SO_4 solns. was detd. A wide variation in concn. and in temp. was used. A neg. temp. coeff. of about 0.0032 v. was found. No mechanism is proposed, but the data are applied to the math. derivations of Bowden (*C. A.* **24**, 1039). C. G. F.

Electrolytic reactions at the anode as the effect of the hydroxyl. Alfons Klemenc. *Z. physik. Chem.* **A185**, 1–36(1939).—Oxidation at the anode is ascribed to the action of primary charged hydroxyl, free diffusion of which is assumed. A Pt anode is considered as an O_2 electrode, the potential of which is 1.237 v. at 18° detd. from the free energy of the O_2-H_2 reaction. The primary anode process in the electrolysis of water is the discharge of the OH^-. The free OH formed is similar in electron structure to the F atom and its chem. reactivity is similar to that of F. The kinetics of the compd. PtO_{2n} on the anode is discussed along with the problem of overvoltage. Oxidation of hydroquinone at potentials above and below the point of generating O_2 is discussed as well as the temp. dependency of anodic oxidation. The oxidation of H_2SO_4, H_2SO_3, Na thiosulfate, aliphatic acids and ester acids and the monomeric behavior of persulfates and of hydroperoxides are also discussed. Victor R. Deitz

Cathode polarization of nickel. O. Esin and M. Loshkarev. *J. Phys. Chem.* (U. S. S. R.) **13**, 186–93 (1939).—Exptl. data for the overvoltage of Ni in an air-free system are given for $NiSO_4$ solns. from 0.4 to 2.0 *N* at temps. from 0 to 60°, current strengths of 0.03 to 29 milliamp. and with saddns. of acetate, borate, NH_4^+ or OH^- ions. F. H. Rathmann

Overvoltage in the electrodeposition of mercury on tantalum. I. M. Malkin. *J. Phys. Chem.* (U. S. S. R.) **13**, 194–9(1939).—The electrodeposition on Ta previously treated with HNO_3 of Hg from an acetate soln. was studied alone and in the presence of iso-amyl alc. and butyric acid. No definite relation could be found between overvoltage and surface tension on the Hg-soln. interface, but a definite relation to the shape of the Ta electrode was shown. From the exptl. data M. concludes that the overvoltage is due to delayed discharge in accord with the theory of Erdey-Grúz and Volmer (cf. *C. A.* **26**, 1197). F. H. Rathmann

Effect of air on the hydrogen overvoltage of cadmium. M. Straumanis and N. Brakss. *Z. physik. Chem.* **A185**, 37–44(1939).—The H overvoltage curve for Cd upon admission of air to a 0.1 *N* H_2SO_4 was investigated. The overvoltage is lowered by O_2 but only in the low c. d. range. For c. ds. of about 0.3 milliamp./sq. cm. the measured potential is partly dependent on the c. d., $\epsilon = e(I - a_1)/b_1$. However, if the O_2 for the oxidation of the H generated no longer suffices, the curve becomes exponential, $\eta = a + b \log I$. Victor R. Deitz

Influence of hydrated aluminum hydroxide on the overvoltage of hydrogen. F. A. Manusova. *J. Phys. Chem.* (U. S. S. R.) **12**, 647–52(1938).—The curve $\eta/\log I$ for the H overvoltage on a smooth Pt electrode in solns. of H_2SO_4, $Al_2(SO_4)_3.18H_2O$, NaOH and $NaAlO_2$ obeys Tafel's equation with b = 0.10–0.13, 0.25–0.30, 0.16–0.17 and 0.25–0.30, resp. The value of b, when colloidal Al is present, is considerably higher than required by the theory for a delayed discharge. M. suggests that the theory of Volmer and Erdey-Grúz (cf. *C. A.* **25**, 452) is applicable if allowance is made for the change in the electrode surface produced by the colloid. F. H. R.

Application of the theory of absolute reaction rates to overvoltage. H. Eyring, S. Glasstone and K. J. Laidler. *J. Chem. Phys.* **7**, 1053–65(1939). G. M. Petty

Electrolytic migration in metallic surfaces. Karl E. Schwarz. *Z. Elektrochem.* **45**, 712–14(1939); cf. *C. A.* **28**, 5731[4].—Under a potential gradient of about 0.2 v./cm. metallic Po, deposited on the surface of a fine Ag wire cleaned in HNO_3 or H_2SO_4, migrates to the anode at 350–400°. The rate of migration increases as the temp. is raised. The movement is sensitive to slight changes in the Ag surface owing to etching or to impurities. S. Glasstone

Chemical behavior of hydrogen and nitrogen in the glow discharge with a graphite electrode not previously outgassed. Reino Näsänen. *Suomen Kemistilehti* **12B**, 19–20(1939) (in German).—If the electrode contains O, the discharge even in H forms carbon oxides, no hydrocarbons

being recognizable. In N a brown ppt. is formed, which could not be identified. Gregg M. Evans

Oxidation of a graphite electrode in highly rarefied water vapor. V. Sihvonen and R. Näsänen. *Suomen Kemistilehti* **12B**, 25–6(1939) (in German).—In H_2O vapor the primary product is CO. This is further oxidized by the H_2O. Gregg M. Evans

Preparation of acetylene in the interrupted discharge. M. Ya. Kushnerev and A. B. Shekhter. *J. Phys. Chem.* (U. S. S. R.) **13**, 259–66(1939).—On passing an impulse discharge through anthracene oil, a gas contg. 22–30% C_2H_2 is obtained. The energy required is 11–12 kw. per cu. m., and is practically independent of the capacity from 5.10^{-6} μF. to 0.25 μF. F. H. Rathmann

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Prepg. steel bumper bar for Ni and Cr plating (U. S. pat. 2,173,092) 9. Alloys for elec. leading-in wires (U. S. pat. 2,172,148) 9. Complex metal amine salts [for electroplating processes] (U. S. pat. 2,173,823) 10. Impregnating compns. [for elec. purposes] (Brit. pat. 507,855) 12. Sealing leading-in conductors into ceramic material (Brit. pat. 506,530) 19. Sealing leading-in conductors into vitreous material (Brit. pat. 506,469) 19. Sealing leading-in wires through walls of vitreous envelopes (Brit. pat. 506,562) 19.

Storage batteries. Henri G. Andre. Brit. 506,731, May 23, 1939. Addn. to 491,782 (*C. A.* **33**, 1222[3]). The grids or screens for receiving deposited metal in the battery of 491,782 are made of flattened strips that are arranged normally to the surface of the adjacent neg. electrode except at the points where they cross, where they are oblique.

Storage-battery electrolytes. Max Hartmann. Brit. 507,035, June 8, 1938. These are made by adding to hydrated silica, contg. approx. 86% H_2O, sufficient concd. H_2SO_4 to produce a paste contg. 30–32% H_2SO_4. The paste is then allowed to swell or ripen, during which process more 30–32% H_2SO_4 may be added. Ripening may be accelerated by the passage of a weak elec. current and terminated by the addn. of $MgSO_4$ and (or) by heating to 60–90°. To diminish self-discharge of the finished cell, about 0.1% of $BeSO_4$ may be added during the ripening.

Grid-like separators for batteries. Josef Grabec and Adalbert von Ledofsky. Brit. 507,117, June 9, 1939. The horizontal and vertical members of the separators are of rounded or triangular form to provide line contact with the adjacent electrode.

Electrical rectifier. Richard A. Hartley and Craig M. Bouton (to Union Switch & Signal Co.). U. S. 2,172,887, Sept. 12. An asymmetric unit is used consisting of a Cu disk having a layer of Cu oxide formed on one side, with which is brought into contact an electrode consisting of a mixt. of fibrous material such as cellulose fiber and cond. material such as a pulverized metal.

Dry rectifiers. Patentverwertungs G. m. b. H. "Hermes." Brit. 508,177, June 27, 1939. These have tubular units such as Cu tubes with an outer layer of Cu_2O covered by a coating of Zn, the outsides being insulated from one another by a moisture-repelling insulating medium.

Dry-plate rectifiers. The British Thomson-Houston Co. Ltd. Brit. 508,180, June 27, 1939. Addn. to 497,034 (*C. A.* **33**, 3707[2]). The method of 497,034 is modified in that the treatment to which the light metal base is subjected takes place with the use of C as the material for the deposit, the electrode being preferably placed for a short time in the vicinity of a C arc burning under reduced pressure.

Copper oxide rectifiers for alternating currents. Roger H. Cubitt (to Union Switch & Signal Co.). U. S. 2,172,576, Sept. 12. In making a Cu oxide rectifier, a Cu blank is subjected to an oxidizing temp. to form an oxide layer on it, then exposed to cold air for about one min., in order to facilitate the process, and then subjected to an annealing temp.

Single-phase mercury-cathode rectifier. Johannes G. W. Mulder (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,173,023, Sept. 12. Various structural details.

Electroplating articles of aluminum, magnesium and their alloys. Langbein-Pfanhauser-Werke A.-G. Brit. 507,342, June 14, 1939. The articles are coated with a nonconductive lacquer or varnish, preferably of neutral reaction, on which a conductive layer, e. g., of Ag, is then deposited by treatment with reducible metal salt solns.; the metallized surface is then electroplated, e. g., with Cu from an acid bath. Ni or Cr may be finally deposited. The article may be roughened, e. g., by anodic oxidation in a H_2SO_4 bath, before application of the lacquer.

Depositing metals by electric discharge. Bernhard Berghaus. Brit. 508,278, June 28, 1939. In metallizing metal articles, the cathode is cooled and the input of energy is such that the articles, which may form the anode or may not be connected to any source of potential, acquire a temp. of at least 300°. Thus, a Cu article is degassed, cleaned and heated for 5 min. to 950° by cathodic bombardment in H, a slight deposition of Ag from the cathode accompanying the heating; subsequently, the gas pressure is increased, e. g., to 2–3 mm., and the loading is adjusted so that the article is heated to 800° and Ag is deposited; the Ag alloys with the Cu; after 30 min., the temp. of the article is reduced to 600° and then slowly to 400° to form a layer of pure Ag. In another form, the Ag is deposited at a temp. at which it only diffuses into the surface and the alloy is not formed, the article being heated subsequently to form the alloy. Cf. *C. A.* **33**, 3705[4].

Separating plating from iron. Metallgesellschaft A.-G. (Max Wohlwill, inventor). Ger. 679,931, Aug. 18, 1939 (Cl. 40b, 1). Nonferrous heavy metals or alloys are removed from Fe or steel plated with them, by making the Fe or steel plate the anode in an electrolytic bath of a nitrate or nitrite, preferably of an alkali- or alk.-earth metal or of Mg, and having a porous diaphragm sepg. the anode and cathode. Thus, Fe coated with Cu or Zn is electrolyzed in $NaNO_3$ soln. to dissolve off the Cu or Zn.

Recovering tin from stannic chloride. Jesse O. Betterton and Yurii E. Lebedeff (to American Smelting and Refining Co.). U. S. 2,173,268, Sept. 19. App. is described, and a process for recovering Sn from $SnCl_4$ which involves adding sufficient water to the $SnCl_4$ to produce an electrolyte therefrom while avoiding production of solid products of hydrolysis, placing the resulting electrolyte into an electrochemical cell including a metal electropositive to tin as an anode and a metal electronegative to tin as the cathode, enclosing the anode in a permeable diaphragm for retaining solid materials sepd. from the anode, electrically connecting the anode and cathode to form a shorted cell and allowing the tin to ppt. at the cathode as a sludge.

Zinc dust. I. G. Farbenindustrie A.-G. Brit. 506,590, May 30, 1939. See Ger. 677,992 (*C. A.* **33**, 9159[3]).

Copper-calcium alloys. Siemens-Schuckertwerke A.-G. Brit. 506,922, June 7, 1939. The electrodes of a spark-gap, particularly for use in a converting system, are constructed of a Cu-Ca alloy to reduce the voltage drop across the gap during operation. The gap is preferably surrounded by A, Xe, Kr, He or like medium, for the same purpose.

Apparatus for extracting or concentrating, by electrolysis, elements in solution or in suspension in liquids. Jules W. A. Convert and Pierre P. J. F. Mommen. Brit. 507,397, June 19, 1939. The app. is provided with electrode chambers, the filtering walls being completely immersed and being disposed at or near the base of these chambers, combined with means for the withdrawal of liquid from inside the chambers to set up a hydrostatic pressure across the filtering walls toward the electrodes. Back diffusion may be restricted by the provision of intermediate compartments, and the filtering walls that delimit the said compartments may have surfaces that are different and calcd. to assist in regulating the flow of the liquids.

Electrodes for arc converters, electric welding, etc. Allgemeine Elektricitäts-Gesellschaft. Brit. 507,757,

June 16, 1939. These consist of an alloy of 2 or more metals and are operated in a mixt. of gases 1 of which attacks 1 of the constituents of the alloy to form a thin coating on the surface of the electrode, which reduces disintegration of the electrode and improves the burning of the arc. Thus, the electrode may consist of a eutectic mixt. of Cu and Ag burning in a mixt. contg. O; the Ag acts as an O carrier and produces a coating of sep. layers of the 2 oxides of Cu.

Carbon electrodes and other articles. Walter A. Cloud. Brit. 508,008, June 23, 1939. C for electrodes, etc., is made by mixing finely ground anthracite coal having a fixed C content of approx. 90% and 1% ash, bituminous coal, calcined flame lampblack and petroleum still coke with coal tar and (or) pitch as a binding agent, reducing the mixt. to a plastic mass by heat, molding or extruding the mass to the desired shape and then baking the articles, the process being initiated at 212°F. and conducted thereafter at a gradually increasing temp. up to about 2000°F. For a softer grade of C, caramel from cane sugar or carbonized sugar may be used as a binder instead of the tar or pitch and, if desired, foliated graphite may be incorporated in the mixt.

Electrode system of unsymmetrical conductivity. Gilles Holst and Willem C. van Geel (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,173,904, Sept. 26. An electrode system for the detection or amplification of elec. currents comprises a pair of main electrodes in spaced relation, one of which has a high emitting capacity and is made of Ag, Cu or Al, and the other of which has a low emitting capacity and is made from Se, a plurality of control electrodes also in spaced relation interposed between the main electrodes, and thin layers of insulating material interposed between and coming into contact with the surfaces of adjacent control electrodes and the surfaces of adjacent main and control electrodes.

Electrode materials. Siemens & Halske A.-G. Brit 507,589, June 13, 1939. A secondary electron-emissive material consists of 1 or more of the sulfides, oxides or selenides of the alk. earth metals mixed with not more than 0.1% of a finely divided metal such as Cu, Bi, Pb, Mn, Ni or Sb. The material is similar in compn. to known Lenard phosphors but with 2–3 times as much heavy metal. Preferably, not more than 10% of a fusible flux, e. g., Li, Na or K phosphate, NaCl, KCl, MgF_2, NaF or CaF_2, or mixts. of these, is added. If the alk. earth oxide is added as hydroxide, the flux may be dispensed with. The emissive material may contain up to 50% of alk. earth sulfates, carbonates or nitrates as diluents. The mixt. is prepd. in aq. or alc. soln., any insol. compds. being ground up or pptd. so as to be capable of suspension or reduced to colloidal form, e. g., a colloidal soln. of $CaCO_3$ is prepd. by passing CO_2 through a suspension of CaO in MeOH.

Electrode materials. Electrical Research Products, Inc. Brit. 508,995, July 10, 1939. In prepg. photosensitive surfaces for discharge devices by oxidizing a Ag or Cu surface that is afterward treated with Cs vapor, the O is supplied in the form of moist O_2.

Electrode for use in liquids for control of a pump, etc. Robert D. McIntosh (to Imperial Brass Mfg. Co.). U. S. 2,174,109, Sept. 26. Various structural details.

Alloy electrodes for electric discharge devices. Jan H. de Boer and Gottfried B. Jonas (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,172,967, Sept. 12. A gas-free electrode which sets free substantially smaller quantities of gas than Ni when heated in a vacuum is formed of Ni alloyed with Zr 0.05–3.0%. U. S. 2,172,968 relates to the like use of an alloy of Cu with a small proportion of Zr.

Electrodes for gaseous discharge devices. Jean Lecorguillier (to Soc. anon. pour les applications de l'électricité et des gaz rares établissements Claude-Paz & Silva). U. S. 2,173,208, Sept. 19. An electrode for gaseous discharge devices comprises 2 ribbons, one of refractory metal such as Ta and the other of a Pt or Ni group metal, alternate layers of which are sepd. by a layer of emissive material such as BaO_2 (various structural details being described).

Cleaning the surfaces of etched electrodes, particularly electrodes for electrolytic condensers. Siemens & Halske A.-G. Brit. 508,075, June 22, 1939. Electrodes that are roughened by etching to increase their effective surface area are cleansed by connecting the electrode as a cathode in a cleaning electrolyte liquid that is substantially free from constituents of the etching bath used prior to the cleansing. Preferably, the cathode and anode are sepd. by a suitable diaphragm, and the process may be supplemented by a further washing both of anode and cathode spaces with a liquid free from foreign ions, e. g., distd. H_2O, glycerol, glycol. The ions removed from the electrolyte surface may be removed by a colloidal or colloidal-chem. process, which may comprise, if the acid used for etching is HCl, (1) chem. deposition of the Cl ions freed by the cleansing, (2) conversion of added substances to complex compds. by the freed ions, (3) conversion of substances of ionic character into nonionic substances or (4) absorption of the freed ions and sepn. into flocculent form by means of colloids. Process (1) may be conducted by adding an appropriate salt or compd. to the bath, e. g., Ag_2O, $HgNO_3$, $Pb(NO_3)_2$ or $(AcO)_2Pb$ to ppt. AgCl, HgCl or $PbCl_2$, or by use of a counter-electrode of an appropriate metal, e. g., Ag, Sb, Pb or Bi to give AgCl, SbOCl, $PbCl_2$ or BiOCl; process (2), by adding $PtCl_4$, $Cr(OH)_3$, Pd NH_4 chloride or $PdCl_2$; process (3), by adding to the anode compartment benzene diazonium hydroxide, which is converted to benzene diazonium chloride by the freed Cl ions, which immediately loses N to give PhCl; and process (4), by adding colloidal $Fe(OH)_3$, $Al(OH)_3$, $Cr(OH)_3$, TiO_2 or ZrO_2. Diaphragm materials specified are leather, parchment paper, viscose and cellophane.

Electric condensers. Siemens & Halske A.-G. Brit. 507,242, June 7, 1939. In condensers wherein the dielec. consists of sheets of a polymerized vinyl compd., the condenser is sealed against moist air by being dipped in or brought into contact with a suitable liquid that has a solvent action on the polyvinyl compd., the product of this action being subsequently consolidated by the driving off of the volatile constituents or by polymerization. Suitable liquids may be pure solvents, e. g., Me_2CO, or unsatd. solns. of polymerizable products, e. g., a soln. of polystyrene in styrene.

Electric condensers. Standard Telephones and Cables Ltd., Thomas R. Scott and Archibald A. New. Brit. 508,057, June 26, 1939. These are prepd. having as insulator, preferably in tape form, a mixt. of a solid polymerized olefin, such as polystyrene, polyisobutylene or polyethylene, and finely comminuted inorg. particles having a permittivity greater than 5. Mica, marble, Iceland spar, $PbCO_3$, rutile, AgCl, AgBr, zircon, cassiterite, pyromorphite, HgCl, corundum, cerussite, Rochelle salt, PbO, Tl chloride, Tl bromide, CuO, sintered Al_2O_3, quartz, fused SiO_2, com. steatite, ultrasteatite and fused TiO_2 are specified. Examples are given of mixts. contg. polystyrene, rubber and ceresin wax with mica, Iceland spar, rutile or $PbCl_2$.

Apparatus and method for treating articles with liquids. Robert Barlow and Peter Renold. Brit. 508,384, June 29, 1939. An article, e. g., a can end, the surface of which is to be treated with a liquid is mounted on a chuck and is lowered into contact with the surface of the liquid which is supplied to a tray by a central pipe and overflows over its walls. The treatment may comprise electroplating, electrophoretic deposition of wax or lacquer, anodic oxidation or electrolytic cleaning, the chuck and tray being in these cases insulated and appropriately connected as electrodes. Alternatively, the treatment may comprise coating with lacquer by contact with the lacquering liquid.

Luminous signs with translucent display characters of methyl methacrylate resin. James Penoyer. U. S. 2,173,371, Sept. 19. Various details.

Electrical resistance units of materials such as tinned copper. Torrence A. Swartz and Wilmer P. Uhler (to The S. S. White Dental Mfg. Co.). U. S. 2,173,186, Sept. 19. Various structural and mfg. details.

Electrolytic recording paper suitable for use with telegraphic apparatus, etc. Paul Talmey (to Radio Inventions, Inc.). U. S. 2,173,141, Sept. 19. A supporting sheet is used of material such as paper contg. a substantially insol. oxyhalide of Sb or Bi, such as $Sb_4O_5Cl_2$, and also contg. a soln. of an electrically conducting compd. such as KCl in sufficient quantity to render the sheet conducting.

Electric fusible lead for fuses. Eduard Grünwald (50% to Helmut Lenk). U. S. 2,173,200, Sept. 19. A body of Mg is used with a surrounding shell of good elec. cond. and contacting metal such as Cu in intimate contact with the Mg along its entire length.

Asymmetric electrode system for photoelectric cells. Jan H. de Boer and Willem C. van Geel (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,173,249, Sept. 19. Bi 1.5 and I 3.0%, based on the wt. of Se used, are mixed with equal quantities of melted amorphous Se, forming a compd. of Bi iodide in the Se, and the mixt. is applied to a metal base such as brass or to carbon as a coating of about 0.05 mm. thickness, cooled for solidification, and then heated to about 200° for a suitable time (which may be about 10 hrs.) to convert the amorphous Se to the cryst. form; an insulating coating such as polystyrene is applied to the Se coating, and a conducting coating such as Wood metal is applied to the insulating coating.

Active metal compound suitable for "getters" of vacuum tubes. Ernest A. Lederer (to Radio Corp. of America). U. S. 2,173,258, Sept. 19. As a source of Ba free of products of decompn., a product of Ba and Be chemically combined with O is coated upon a refractory core such as one of Ta, W, Mo, Ti or V which is capable of reducing the Ba-Be compn.

Active metal compounds suitable for "gettering" of vacuum tubes. Ernest A. Lederer (to Radio Corp. of America). U. S. 2,173,259, Sept. 19. A source of Ba comprises a core of Fe, Ni, Cb, chrome iron, Ni-Fe-Cr alloy, Mo or W carrying a coating including O compds. of Ba and Be mixed with about 10% of powd. Al, Cb, W, Mo, Th, Ta or Si.

Discharge lamps. The General Electric Co. Ltd. and Basil N. Clack. Brit. 507,519, June 16, 1939. In a Na vapor lamp, the electrodes are formed from a W wire of 0.1-mm. diam. wound upon a mandrel of 0.2-mm. diam. W wire, the whole being made into 2 concentric helices of stated turns and diams.; the helices are coated with a suspension of $BaCO_3$ and $SrCO_3$.

High-pressure metal-vapor electric discharge lamp. Victor J. Francis and John W. Ryde (to General Elec. Co.). U. S. 2,172,839, Sept. 12. A sheath contg. not less than 80% of ZrO_2 (and which may also contain MgO or ThO_2 and CaO) and which is permeable to light is interposed between a sealed envelope and the discharge path between thermionic electrodes, the sheath being pervious to the gaseous filling and serving to prevent deviation of the discharge from a substantially straight path between the electrodes.

Arc lamp cathodes. Le Carbone-Lorraine. Brit 509,291, July 13, 1939. A cathode for a high-intensity arc having an anode with a mineralized core of known type is provided with a core of C mixed with a compd. of an alkali metal not contg. O, e. g., a halide, fluoborate or fluosilicate; this inhibits the formation of carbides of the metals contained in the anode core, which carbides interfere with the burning of the arc. The compd. is preferably such that the core contains 1 atom of alkali metal to 2.5–7.5 of C.

5—PHOTOGRAPHY

E. R. BUI

Photographic "negative" material and light filters for "photomicrography." Hermann Schopf. *Phot. Korr.* **75**, 8–15(1939). E. R. Bullock

Hypersensitization. Georges Steenackers. *Photo* (Belgium) **6**, 85–7(1939). S describes the procedure in the methods of hypersensitizing by (1) bathing in NH_3 soln., (2) fuming with NH_3 vapor, (3) bathing in ammoniacal $AuCl_3$ soln. as recommended by Gevaert and (4) leaving, for a comparatively long time, over Hg in a closed container; and summarizes the results obtained. In the last case the treatment if given, alternatively, after the light exposure, intensifies the latent image. E. R. Bullock

Desensitization. E. Katsenelenbogen. *Sovet. Foto* 1939, No. 8, 28–9.—The most common photographic desensitizers are pinacryptol green and pinacryptol yellow. Both are produced in the U. S. S. R. *Pinacryptol green* is prepd. as dark-green crystals, which do not stain hands or emulsion, and do not affect the latent image or the time of keeping of developing solns. Too prolonged bathing in solns. of this desensitizer without immediate development tends to destroy the latent image. This soln. acts in proportion to its concn. After bathing a certain no. of films in pinacryptol green, the latter becomes exhausted. Solns. should be kept in the dark and not longer than 10 days. Foam which occasionally forms on the surface of these solns. must be removed before treating films. The presence of developing solns. greatly increases the action of this desensitizer. Dilns. up to 1:25,000 in metol-hydroquinone are more effective than that of 1:5000 in H_2O. Not all developers can be used. Modified Kodak and Agfa developing formulas with addn. of pinacryptol green are given. *Pinacryptol yellow* is a yellow powder, less cryst. than pinacryptol green. Its action on panchromatic film is greater than that of pinacryptol green. Since it is destroyed by Na_2SO_3, it cannot be used in developing solns. The film must be bathed in aq. solns. of the desensitizer prior to immersion in the developer. Films treated in 1:1000 solns. for 2 min. may be developed in yellow-orange light at a distance of 60–80 cm. Expts. showed that films could be developed in white light (10–15 w. at 50-cm. distance), if development was not longer than 2 min. W. R. Eichler

Empirical relations between sensitometric and size-frequency characteristics in photographic emulsion series. A. P. H. Trivelli and W. F. Smith. *Phot. J.* **79**, 330–8 (1939).—A photographic emulsion series is defined, and a detailed description is given of the emulsion-making technique employed for these expts. A distinction is made between single-grain-layer and multigrain-layer coatings in exposure to (visible) light. In the latter case, the total projective area, as such, is not of primary importance. The av. thickness and the total surface, both derived from the total projective area, are important, however, in the study of grain development and physicochem. reactions on the sensitivity of photographic materials. The most important size-frequency characteristics are the av. grain size ($\bar{a}$), the total no. of grains per cc. of emulsion, and the standard deviation. The most important sensitometric characteristics are speed and gamma. From the data obtained, a series of equations was derived. They were of the exponential type in all cases except 3, in which a direct proportionality was shown to exist. The direct proportionality between the H. & D. speed (S) and the av. grain size, gives as $S/\bar{a}$ a measure of the av. sensitivity factor of the gelatin used in these emulsion series.

Authors

Empirical relations between Hurter and Driffield speed and average grain size of photographic emulsions. A. P. H. Trivelli and W. F. Smith. *Phot. J.* **79**, 463–8(1939); cf. preceding abstr. and *C. A.* **33**, 8513⁶.—An extended investigation concerning the direct proportionality between H. & D. speed and av. grain size shows that this relation holds for a wide range of grain sizes in which, in different emulsion series, the AgI content, the time of finishing the emulsion and the time of development were varied. The emulsion-making technique was the same as

that described in the previous paper. Deviations were found with pure AgBr emulsions having extremely large grains and with large grain Ag bromoiodide emulsions made with gelatin having a low sensitivity factor.

Authors

Image reversal on photobromides. Lüppo-Cramer. *Phot. Ind.* **37**, 919–22(1939).—L.-C. discusses in detail the phenomena of color adaptation or bleaching of light-darkened AgBr and of synthetic photobromides. He describes his own recent tests on the Arens' nitrite bleaching-out process (*C. A.* **34**, 37[1]), and points out that, because of the higher order of magnitude of the exposure necessary for the direct darkening in this case as compared with that for the 1st reversal of the latent image, the increase in particle size reported is not conclusive for the "coagulation" theory of ordinary solarization.

E. R. Bullock

Color print processes. II. Duxochrome. Geo. L. Wakefield. *Process Engraver's Monthly* **46**, 257–8(1939); cf. *C. A.* **33**, 4533[8], 9163[3].—A disadvantage of the Duxochrome process is that exposure is different for each of the 3 positives and the positives cannot be checked with a densitometer at an early stage as in Carbro or the Eastman Wash-Off Relief process. The tanning developer is somewhat unstable and any process using developed relief is apt to be uncertain. Fixing is not necessary. The process can give very rich prints, with brilliant colors, highly suitable for reproduction purposes. A. M.

The procyanines. I. Diquinolyls and procyanines: the 2,3′-quinoline-procyanines. E. Calzavara. *Science ind. phot.* **10**, 193–8(1939). A yellow base is obtained when quinoline is heated with $NaNH_2$. This is stated to be 1,2,3,4,1′,2′,3′,4′-octahydro-2,3′-diquinolyl, which C. calls "2,3-quinoline-procyanine." [This substance contains no acidic radical and is not a member of the cyanine dye series.] The base forms a brick-red hydrochloride. Various substituted derivs. are also described as well as a product derived from β-picoline and quinaldine. These bases sensitize both AgCl and AgBr emulsions and also can act as photographic developers. L. G. S. B.

Ultrarapid drying. Don M. McCutcheon. *Am. Phot.* **33**, 496, 498–9(1939).—Films can be rapidly dried without the support badly curling or the gelatin becoming damaged if heat rays are used which are absorbed strongly by the H_2O but only weakly by the film base. Suitable wave lengths lie between 0.6 μ and 5 μ. These are furnished by heater-type coils fitted with 0.5–1.0 mm. clear glass or by the use of standard C filament infrared lamps. Infrared-treated film dries 40–100% faster than untreated film. R. A. Purdy

The early scientific daguerreotypists. Luppo-Cramer. *Phot. Ind.* **37**, 177–8(1939).—Some account is given of the observations and opinions of Edm. Becquerel, Gaudin and Lerebours, F. Moser and Donné, with a short discussion of the actual nature of the latent photographic image.

E. R. Bullock

Densitometry of photographic paper positives. W. Falta. *Z. wiss. Phot.* **37**, 247–58(1938).

Hypersensitizing papers for speed and artistry. J. Kairow. *Am. Phot.* **33**, 321–2, 324(1939). The speed of contact paper can be increased 20–100%, and that of enlarging paper 80–225%, by treatment with Hg vapor. These speed increases depend on the kind of paper and the time of treatment. R. A. Purdy

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Color photography. Geoffrey B. Harrison (to Ilford Ltd.). U. S. 2,173,110, Sept. 19. A method of producing pictures in color from exposed light-sensitive photographic material comprising two light-sensitive layers, the first arranged to record substantially only one of the three primary colors and contg. a latent color-sepn. record of that color and the second arranged to record the other two primary colors and contg. latent color-sepn. records of those two colors produced by exposure through a two-color screen the colors of which are respectively (*a*) one of the two primary colors other than that which the first layer is arranged to record and (*b*) the color complementary to (*a*) involves treating the first layer to convert the latent record into an image in color complementary to the color of which it is a record and treating the second layer to convert the latent records of that layer into an image in the color which was recorded by the first layer.

Color photography. I. G. Farbenindustrie A.-G. Brit. 507,009, June 7, 1939. Photographic material comprises a support carrying on 1 or both sides Ag halide emulsions of different sensitivity and contg. dye-formers, at least 1 of the emulsions being in the form of finely subdivided particles and at least 1 other in the form of a continuous layer. Two or more differently sensitized emulsions may be distributed as fine particles in a gelatin layer and 1 or more differently sensitized emulsions having different dye-formers may be arranged as continuous layers above this. Brit. 507,142, June 12, 1939. Uniform prints of multi-colored drafts or designs are prepd. by printing the colored original onto a photographic material comprising 1 or more Ag halide emulsions contg. dye components fast to diffusion and subjecting the material to color development. The components may be in emulsion layers arranged on 1 or both sides of a support or contained in a mixed-particle emulsion on a support. The dye components are described in Brit. 458,400 (*C. A.* **31**, 3405[5]), 465,823 (*C. A.* **31**, 7777[1]), 479,838 (*C. A.* **32**, 5320[4]), 483,000 (*C. A.* **32**, 7358[6]), 484,698 (*C. A.* **32**, 7358[9]), 489,093 (*C. A.* **33**, 603) and 489,274 (*C. A.* **33**, 612).

Color photography. Béla Gáspár. Brit. 507,151, June 9, 1939. Multilayer material comprises several differently sensitized Ag halide emulsion layers, at least 1 of which contains an image-forming dye that can be locally bleached by a Ag image, and at least 1 other layer arranged behind said colored layer contains a filter dye of the same color that is destroyable by a photographic developer. In the example, a paper support carries in superposition a blue-green layer, a magenta layer and a yellow layer, sensitized to red, green and blue, resp. The top layer contains Xylenewalkgelb G (I), the next layer contains Tuchechtbrillantrot 2B (II) and an auxiliary yellow dye 4,4′-methenylbis[1-(*p*-sulfophenyl)-3-methyl-5-pyrazolone], and the 3rd layer contains Pontamine sky blue 5BX (III) and, in addn., either the dye from 1-(*p*-sulfophenyl)-3-methyl-5-pyrazolone and β-anilinoacrolein-anil or the sulfonic acid derived from methenylbis[hydroxythianaphthene]. The material may be exposed behind colored or black and white pos. part images or behind a multicolor master positive, the auxiliary filter dye decolorized by use of a developer of alk. reaction, and the image-forming dyes destroyed at the image points by acid thiocarbamide soln. or 5% HBr. In Brit. 507,152, June 9, 1939, at least 1 layer of a multilayer sensitive material is dyed to a color d. higher than that required for accurate color reproduction by a dye that is fast to ordinary photographic treating solns. but capable of being locally bleached in the presence of metallic Ag, said layer comprising also either metallic or colloidal Ag or a Ag salt which is uniformly exposed or sensitized, e. g., to infrared, so that it can ultimately be exposed, for the purpose of removing the excess dye. In the example, the film comprises on 1 side of the support a blue-sensitive emulsion colored blue-green with III and on the other side a red-sensitized emulsion colored yellow with I and a blue-sensitized emulsion contg. the magenta dye II. The yellow dye is in excess of that required for correct image formation. The 2 other layers may also contain excess. Cryptocyanine may be used to sensitize the layers to infrared. The images and the exposed Ag salt are both transformed by dye destruction with either HBr or thiocarbamide soln. Brit. 507,211, June 9, 1939. An addnl. colloid layer that is mounted in front of 1 of several Ag halide emulsion layers in a color photographic material contains an acid dye of appropriate color and resistance to ordinary photographic treating solns. and an evenly distributed substance that assists in the bleaching of the dye by dye-destroying agents, e. g., finely distributed Ag, colloidal Ag, fogged Ag halide emulsion, exposed Ag halide or color-sensitized Ag halide. The Ag halide emulsion layer behind the colloid layer is sensitive to light that

is absorbed by the colloid layer but is sensitized to light transmitted by the latter. Among several examples, (1) a blue-sensitive layer in front of green- or red-sensitive layers contains the surplus yellow dye on the rear part, the emulsion in this part being exposed during the coating operation; the coating operation for each of the layers may be avoided by the formation of 2 sep. strata in a single dyed emulsion layer by surface illumination, and (2) the front element of a bipack has a blue-sensitive layer and a green-sensitive layer sepd. by an intermediate gelatin layer contg. Milling Yellow G and an amt. of exposed AgBr emulsion; after development and fixation, the element is dyed by being soaked in a 1% soln. of Pontamine Sky Blue and the dyes in the layers are then destroyed by acid thiocarbamide soln. or HBr and the Ag is removed by bleaching; the intermediate layer is consequently decolorized and the gelatin is tanned by the bleaching; the film is fixed and dried, and the upper layer treated with Na hyposulfite soln.; the decolorized upper layer is then colored at the unhardened places by a H$_2$O-sol. dye. Brit. 507,418, June 9, 1939. Multilayer material comprises at least 1 sensitive layer that is colored with a dye that transmits the light to which the layer is sensitized and absorbs the light to which the layer above it is sensitive and that is capable of being bleached by the Ag image, the layer contg. an addnl. dye of the same color, which is, however, totally removed by the treating solns. which are harmless to the image-forming dye. Alternatively, the addnl. dye is 1 of similar properties to the image-forming dye and is destroyed in the presence of finely divided Ag. The concn. of the 1st dye is sufficient for coloring the most intensely colored parts of the image while the concns. of both dyes are together sufficient to absorb all the light to which the front layer is sensitive. The auxiliary dye may be in a sep. colloid layer. In an example, a green- or red-sensitized emulsion dyed by a mixt. of Xylenewalkgelb and 4,4′-methenylbis[1-(*p*-sulfophenyl)-3-methyl-5-pyrazolone] is arranged between a blue-sensitive Ag halide emulsion layer dyed magenta with a salt of Tuchechtbrillantrot (I) and a blue-sensitive Ag halide layer dyed blue-green with Pontamine Sky Blue 5BX (II). The support may be adjacent 1 of the outer layers or between the layers. The dye is decolorized by an alk. developer or by sulfite or bisulfite compds. and the dye images are produced as in Brit. 415,040 (*C. A.* 29, 1339[1]). In a 2nd example, a support is coated with a Ag halide layer colored blue-green with a quinolinium salt of II and sensitized with Cryptocyanine for infrared light and contg. also a destructible dye obtained from 1-(*p*-sulfophenyl)-3-methyl-5-pyrazolone and glutaconic dialdehyde dianilide. The destructible dye may be in a sep. thin gelatin layer. An emulsion layer sensitized to red with pinacyanol and colored magenta with a quinolinium salt of I is coated directly on the blue-green layer. The magenta layer or a sep. layer lying above it contains a red dye which may be the diphenylguanidine salt of the sulfonic acid of methenylbis[hydroxythianaphthene]. A yellow-colored layer sensitized to green is coated above this layer. The auxiliary layers may be light-sensitive and the dyes therein destroyed after a diffuse illumination, which allows a sep. exposure of the auxiliary layers. Brit. 507,485, June 9, 1939. A multilayer light-sensitive material comprises a support carrying a plurality of superimposed Ag halide emulsion layers each differently sensitized and at least 1 of the layers contg. a dye that is fast to ordinary photographic treatment solns. but can be locally bleached in the presence of a Ag image and absorbs the light rays for which the layer is predominantly sensitized, another layer being arranged behind this colored layer and sensitive to these light rays so that a removable light filter dye of substantially the same color as the other dye is present in a layer in front of the 2nd dye but not in front of the 1st layer. The concn. of the image-forming dye is sufficient for the color intensity at the most intensely colored parts of the image. The filter dye may be one that is destroyed by the photographic developers and is included either in the 1st layer or in a sep. layer of clear colloid between the 2 layers. In the example, a paper support carries a blue-green emulsion sensitized to red light, a magenta-dyed emulsion sensitized to green and a yellow-dyed emulsion sensitive to blue. The top layer contains Xylenewalkgelb G in the form of its Ca salt, and in the same layer or in a sep. gelatin layer the yellow dye 4,4′-methenylbis[1-(*p*-sulfophenyl)-3-methyl-5-pyrazolone]. The magenta layer contains Tuchechtbrillantrot 2B as its methylnaphthoquinolinium salt and in the same or a sep. layer either the sulfonic acid derived from methenylbis[hydroxythionaphthene] or the red dye obtained from 1-(*p*-sulfophenyl)-3-methyl-5-pyrazolone and β-anilino-acrolein-anil. The next layer is panchromatic and contains Pontamine Sky Blue 5BX. The material is exposed behind colored or black and white pos. part images and the image-forming dyes are locally destroyed by an acid thiocarbamide soln. or 5% HBr, the other dyes being destroyed in the development.

Multilayer material for color photography. Béla Gáspár. Brit. 507,357, June 14, 1939. The material comprises at least 1 colored Ag halide emulsion layer that has a considerably lower sensitivity to the light absorbed by the dye in the layer and is used for the exposure of the superimposed layer or layers. In an example, 3 AgBr gelatin emulsion layers are arranged upon 1 or both sides of a transparent support, the middle-layer emulsion being unripened and having an inherent blue-sensitivity that is about 0.1 that of the other emulsion. The unripened emulsion is dyed yellow with an image-forming dye, which may be Chrysophenin G rendered insol. by treatment with triphenylguanidine lactate, and is sensitized to green with Erythrosin. The 2 outer layers are not specially sensitized and are dyed blue-green and magenta with Pontamine Sky Blue and Tuchechtbrillantrot 2B, resp. This material is used for printing, exposure being from both sides. If neither or only 1 of the other layers is colored, 1 of them may be sensitized to red, and in this case the support may be opaque with all the layers on 1 side and sepd. by clear gelatin layers, exposure being from the side of the blue layer. The dye images are prepd. as described in Brit. 408,991 (*C. A.* 28, 6074[6]).

Tone-and-color synthesis in color photography. Francisco G. Yanes. U. S. 2,173,490, Sept. 19. A cinematographic film is prepd. suitable for projection carrying four color sepn. positive part images of subtractive character provided with their corresponding pigments and representing the same subject, the part images so arranged in the film that one picture space shows a green and a magenta part image in register while the adjacent picture space shows a yellow and a blue-violet part image in register, and so in successive picture spaces of the film.

Fine-grain photography. John R. Weber (to Du Pont Film Mfg. Corp.). U. S. 2,173,739, Sept. 19. A method for producing a properly graded fine-grained photographic image comprises developing a latent image in a Ag halide emulsion to metallic Ag to a gamma not greater than approx. 0.5 with a color-forming developer comprising a photographic developing agent and a dye coupling component to form a dye image *in situ* with the Ag image and subsequently printing the combined Ag and dye image onto another sensitized layer.

Cinematography. Fred W. Jackman (to Warner Bros. Pictures, Inc.). U. S. 2,173,518, Sept. 19. App. is described, and a method of producing a cinematographic picture showing a tonal change of successive kinematic phases of action which comprises arranging portions of the action in different colors, simultaneously photographing the action upon two cinematographic films while suppressing the color value of one of the different colors as photographed upon one of the films, and prepg. a cinematographic picture by conjoining successive images of a portion of the action on one of the films wherein the color [illegible] suppressed [illegible] portion of the action on the other of the films wherein the color value is not suppressed.

Producing fractional density combinations between differing aspects of a scene in cinematography. Ivan M. Terwilliger. U. S. 2,173,866, Sept. 26. A method of printing a positive film strip from a negative film strip

bearing on successive frames the variant component images of stereoscopic image sets comprises printing the images on the negative to partial d. on the positive film strip, and varying the quantity of printing light such that the ds. of successive images so printed on the positive alternate between two values, then again printing the positive film strip from the negative, but with the positive shifted an integral number of frame lengths with reference to the negative, whereby slightly differing images become superposed on the positive, and in such second printing, so varying the quantity of printing light that the images on the negative are printed to partial ds. on the positive, whereby the positive frames receive superposed component images in partial ds., making up successive composite images of substantially normal densities.

Stabilizing photographic sensitive materials. John D. Kendall (to Ilford Ltd.). U. S. 2,173,628, Sept. 19. As fog inhibitors for light-sensitive Ag halide gelatin emulsions, use is made of 2-amino-4-hydroxy-pyrimidine, alkyl, aryl, aralkyl and arylene substituted 2-amino-4-hydroxy-pyrimidines or their tautomeric compds. or salts.

Oxazole trimethinecyanines. Wilhelm Schneider (to Agfa Ansco Corp.). U. S. 2,173,486, Sept. 19. Photographic Ag halide emulsions are sensitized by incorporating in the emulsion a symmetrical or unsymmetrical benzoxazole-trimethinecyanine dye which is substituted in one or both benzene rings of the benzoxazole nuclei and may contain a substituent in the trimethine chain linking the benzoxazole nuclei. Suitable substituents for the benzene rings of the benzoxazole nuclei are: alkyl groups, hydroxy groups, alkoxy groups, halogens and amino groups; the H atoms of the amino groups may be substituted by alkyl groups, acetyl groups, propionyl groups or other org. acid radicals. The substituted dyes used are well suited for the orthochromatic sensitization of photographic Ag halide emulsions. As compared with the unsubstituted benzoxocarbocyanines, they produce a maximum of sensitivity which is displaced toward the long wave region of the spectrum. Furthermore, the aforesaid substituted dyes are distinguished by an increased intensity of sensitization. Numerous examples with details are given.

Photographic diazotype layers. S. C. & P. Harding Ltd. and Werner P. Leuch. Brit. 507,153, June 9, 1939. Light-sensitive layers contain diazo compds. derived from amines of the type 1-amino-2,5-dialkoxy-4-*N*-alkyl (or -aralkyl)-acylaminobenzene. In place of alkoxy groups, β-alkoxy-alkyl ether groups may be used. Suitable acyl groups are Bz, Ac, carboalkoxy, *p*-toluenesulfonyl and substituted Ac groups such as alkoxyacetyl or phenoxyacetyl groups. Among examples, the $ZnCl_2$ double salts of (1) 4-diazo-1-*N*-ethylbenzoylamino-2,5-diethoxybenzene and (2) 4-diazo-1-*N*-butylacetylamino-2,5-dipropoxybenzene are used. Paper so sensitized may be developed with a soln. of phloroglucinol, BzONa, HCOONa, tartaric acid and saponin. In the case of papers to be developed by NH_3 gas, slow-coupling azo components such as R-salt and Schaeffer-salt are included in the layer.

The compds. are prepd. by converting an aminohydroquinone dialkyl ether into the monoalkylamine by treatment with an alkyl ester of *p*-toluenesulfonic acid, acylation of the amino group, mononitration of the product, reduction of the NO_2 group with Fe and HCl or AcOH, and diazotization of the resulting amine.

Developing images on a diazo layer with use of steam. Roelof J. H. Alink and Johannes Aninga (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,172,783, Sept. 12. Various details of app. and operation.

Photographic fixing salts. Kodak A.-G. Ger. 677,381, June 26, 1939 (Cl. 57*b*. 13.04). Addn. to 638,735 (*C. A.* **31**, 2952[9]). A fixing salt (thiosulfate) compn. resistant to decompn. by acids is made by dry-mixing a solid acid with a fixing salt and adding alkali sulfite or sulfonate, together with NH_3, borax or amines. Thus, the mixt. may contain $(NH_4)_2S_2O_3$, anhyd. $Na_2S_2O_3$, borax and boric acid.

Photographic film. Martin Marsco (to Du Pont Film Mfg. Corp.). U. S. 2,172,801, Sept. 12. A transparent support such as one of a nitrocellulose compn. carries a light-sensitive layer, and an intermediate layer of a synthetic resin formed by the action of an aldehyde such as CH_2O on a hydrolyzed polyvinyl acetate to which has been added a soln. contg. benzene 20–40, BuOH 5–15 and Bu lactate 15%, etc.

Motion-picture film with printed marginal indicia such as footage numbers. John H. Clewell and Frank H. McCormick (to Du Pont Film Mfg. Corp.). U. S. 2,173,505, Sept. 19. A roll of film is made which comprises a film base having on one side nonsmearing, permanently indelible, ink-printed marginal indicia, with the other side supporting an unexposed light-sensitive Ag halide emulsion unfogged and unimpaired by its close assocn. with such indicia, and provided with marginal perforations spaced from the indicia and undistorted by the application of the ink used.

Photographic printing paper. I. G. Farbenindustrie A.-G. Brit. 507,168, June 12, 1939. A metal soap of a sulfonated castor oil that is insol. in the treatment baths to be used is incorporated in 1 or more layers of the paper. Suitable salts are the Al, Ba, Ca and Mg salts. The soaps may be added to the emulsion, to the baryta loading, to a backing, adhesive or protective layer, or to the paper pulp. In an example, methylcellulose (I) in aq. soln. is mixed with sulfonated castor oil and a mixt. of I and Al_2O_3 in aq. AcOH soln. is added, the resulting dispersion being mixed with the photographic emulsion.

Protective layers on photographic pictures. Adolf Jung (to Agfa Ansco Corp.). U. S. 2,173,480, Sept. 19. A photographic material having a gelatin emulsion layer contg. a developed, fixed and washed picture, such as one on a support of film material, is provided with a protective layer by applying to it, while still moist, an aq. dispersion of a highly polymeric compd., such as polyacrylic acid methyl ester, adapted to form a uniform film with a hard surface of natural or artificial org. colloidal character, and drying the coating layer.

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

Polyborates. I. Alkali borates. Adolfo Ferrari and A. Magnani. *Gazz. chim. ital.* **69**, 275–84 (1939).—In spite of numerous investigations, the structure of alkali polyborates is not clear, and different workers have obtained discordant results. In view of this, the following polyborates were prepd. and their constitutions studied. *Metaborates.*—$K_2B_2O_4.3H_2O$, $Rb_2B_2O_4.3H_2O$, $Cs_2B_2O_4.7H_2O$. *Tetraborates.*—$K_2B_4O_7.4H_2O$, $Rb_2B_4O_7.5H_2O$, $Cs_2B_4O_7.5H_2O$, $(NH_4)_2B_4O_7.4H_2O$. *Decaborates.*—$K_2B_{10}O_{16}.8H_2O$, $Rb_2B_{10}O_{16}.7$ or $8H_2O$, $Cs_2B_{10}O_{16}.7H_2O$, $(NH_4)_2B_{10}O_{16}.7$ or $8H_2O$. In prepg. the borates, the procedures described in the literature were followed. Only *Cs tetraborate* and *Cs decaborate* are new. Although the literature describes successful attempts to prep. hexaborates, octaborates and dodecaborates, none of these could be prepd. by F. and M. by following the procedures described. The H_2O contents of the borates were in general higher than the value corresponding to the general formula of thallous borates, $Tl_2B_{2n}O_{3n+1}.nH_2O$, already found by F. and Ciccioli (*C. A.* **32**, 4456[5]) and the compn. of the borates prepd. in the present work corresponded to $M_2B_{2n}O_{3n+1}.(n+2)H_2O$. Although the borates are derived from the acid $H_2B_{2n}O_{3n+1}.nH_2O$, they contain 2 extra H_2O mols. because each of their cations is capable of hydration. The greater tendency to hydrate and the greater electrostatic character of the alkali cations compared with those of Tl cannot be attributed to the smaller sizes of these cations because the radius of the Tl ion is

almost equal to that of Rb and is less than that of Cs, although it should lie within the electronic sphere of Tl. The very large no. of external electrons of Tl acts therefore as a more effective screen than in the case of alkali metals against the pos. charge of the nucleus, to which the attraction of the H_2O mols. to O and hence hydration of the cations is attributable. The anomalies shown by $Cs_2B_2O_4.7H_2O$, $Rb_2B_4O_7.5H_2O$ and $Cs_2B_4O_7.5H_2O$ are discussed. They are difficult to explain, but further light may be thrown on the problem by an x-ray study. **II. Tetraalkylammonium borates.** A. Ferrari and G. Pareti *Ibid.* 284–90.—Since only 1 tetraalkylammonium borate has been described (cf. Milbauer, *C. A.* **7**, 2544) and the H_2O in this does not conform to the formula assigned by F. and Ciccioli to tetraboric acid (cf. *C. A.* **32**, 4456[8]), other borates of this type were prepd. and studied. Attempts to prep. $(NMe_4)_2B_4O_7$ by the method of Milbauer (*loc. cit.*) and also with other proportions of NMe_4OH and H_3BO_3 were unsuccessful, and if this compd. exists it is too sol. to isolate. Similarly a definite compd. could not be isolated from NEt_4OH and H_3BO_3, although in this case a solid product was obtained. Because with increase in the B_2O_3 content of borates of a given base the soly. diminishes, it was found to be possible to prep. decaborates. The following new borates were prepd., in each case by pptn. from a boiling aq. mixt. of H_3BO_3 and the particular alkylammonium base. *Tetramethylammonium decaborate*, $(NMe_4)_2B_{10}O_{16}.nH_2O$; *trimethylethylammonium decaborate*, $(NMe_3Et)_2B_{10}O_{16}.nH_2O$; *dimethyldiethylammonium decaborate*, $(NMe_2Et_2)_2B_{10}O_{16}.nH_2O$; *methyltriethylammonium decaborate*, $(NMeEt_3)_2B_{10}O_{16}.nH_2O$; *tetraethylammonium decaborate*, $(NEt_4)_2B_{10}O_{16}.nH_2O$, where n is 4 or 5. In each case there was doubt whether $4H_2O$ or $5H_2O$ was present. The general formula is therefore either $(NR_xR'_{4-x})_2B_{10}O_{16}.4H_2O$ or $(NR_xR'_{4-x})_2B_{10}O_{16}.5H_2O$. Either formula makes impossible the formula assigned by Menzel to decaboric acid. However, the degree of hydration conforms to the general formula $H_2B_{2n}O_{3n+1}.nH_2O$ attributed by F. to polyboric acids. At 16° satd. aq. solns. of $(NH_4)_2B_{10}O_{16}.nH_2O$, $(NMe_4)_2B_{10}O_{16}.nH_2O$ and $(NEt_4)_2B_{10}O_{16}.nH_2O$ contained 0.1408, 0.1195 and 0.2593 mol., resp., per l. of soln. C. C. Davis

Phosphoryl bromofluorides. Harold S. Booth and Charles G. Seeguiller. *J. Am. Chem. Soc.* **61**, 3120–2 (1939).—The fluorination of phosphoryl tribromide with SbF_3 yields POF_3, POF_2Br and $POFBr_2$. These compds. have been isolated and purified. The b. ps., vapor pressure data, gaseous and liquid ds. of POF_2Br and $POFBr_2$ and some of their chem. properties are described. A. B. Garrett

The polymerization and depolymerization of phosphonitrile chloride. O. Schmitz. *Z. Elektrochem.* **45**, 651 (1939). Phosphonitrile chloride, $NPCl_2$, is one of the few inorg. compds. for which a series of polymers exists. The lowest member of the series is triphosphonitrile chloride, which, when heated above 250°, as is the case with the other polymers, yields a rubber-like polymer of high mol. wt. Although the structure of the latter is established the polymerization process has been studied very little. S. reports the related exptl. work dealing with equil. relations. On heating 1 g. of the trimer in a sealed 100-cc. quartz tube at 600° polymerization occurs in a homogeneous gas phase without the formation of the rubber-like polymer of high mol. wt. The reaction mixt. contains appreciable quantities of a tetramer besides higher polymeric cryst. and liquid forms and also unchanged trimer. Systems of similar compn. are obtained when the tetramer or the rubber-like polymer is subjected to the same exptl. conditions. Thus a true equil. is believed to exist. If true equil. exists between the individual polymers, an increase in concn. or an increased pressure must cause an increase in the quantity of higher polymer formed in the system. This is established by exptl. work. Increase of temp. for certain compns. of the mixt. favors the formation of the rubber-like form. With increasing temp., the quantity of the higher polymeric form existing in equil. decreases. Accordingly polymerization is an exothermal process. From the above it follows that the rubber-like polymer must depolymerize completely. This is accomplished by heating *in vacuo* at 380°. Heating phosphonitrile chloride to higher temps. induces irreversible reactions of a secondary type in which traces of a nitrilophosphonitrile chloride and an inelastic polymer of high mol. wt. were observed. W. A. Cook

The reaction of gallium and perchloric acid and the preparation and properties of gallium perchlorate hydrates. Laurence S. Foster. *J. Am. Chem. Soc.* **61**, 3122–4 (1939).—Ga dissolves rapidly in hot concd. $HClO_4$ and in $KClO_4$-H_2SO_4 mixts. Prepn. and properties of $Ga(ClO_4)_3.6H_2O$ and $Ga(ClO_4)_3.9.5H_2O$ are described. A. B. Garrett

The periodates of copper. R. K. Bahl and Surjit Singh. *J. Indian Chem. Soc.* **16**, 269–72 (1939).—Quaternary Cu paraperiodate (Cu_2HIO_6) was obtained as a yellowish green cryst. powder by drying at 45° the ppt. formed from (1) treating an aq. suspension of Cu carbonate with paraperiodic acid or (2) boiling an aq. suspension of $Na_2H_3IO_6$ with excess of $CuSO_4$ soln.; it is stable at 120° (in air) or at 110° (*in vacuo*). Deep-green Cu paraperiodate heptahydrate $[Cu_5(IO_6)_2.7H_2O]$ was formed by drying at 45° the ppt. formed by the addn. of paraperiodic acid to dil. Cu acetate soln.; at 74° (65° *in vacuo*) water was slowly lost with formation of the pentahydrate. The vapor pressures of the heptahydrate and pentahydrate at 74° were 5 and 3 mm., resp. George Ayers

The aquation of carbonato pentammine cobaltic bromide. Arthur B. Lamb and Roger G. Stevens. *J. Am. Chem. Soc.* **61**, 3229 33(1939).—Conductance data indicate that carbonato pentammine bromide, $[Co(NH_3)_5CO_3]Br_3$, undergoes a slow aquation to give an equil. mixture of bicarbonato, $[Co(NH_3)_5HCO_3]Br_2$, aquo, $[Co(NH_3)_5H_2O]Br_3$ and hydroxo pentammine bromides, $[Co(NH_3)_5OH]Br_2$. Bicarbonato pentammine salts undergo a much more rapid aquation. The velocity consts. were computed for these aquation and anation reactions. The mechanism of these reactions is discussed. A. B. Garrett

The stereochemistry of complex inorganic compounds. V. The reaction of carbonates with dichlorodipropylenediamine cobaltic chloride. A new method of determining relative configurations. John C. Bailar and J. P. McReynolds. *J. Am. Chem. Soc.* **61**, 3199–3203 (1939); cf. *C. A.* **33**, 8135[6].—Two diastereoisomeric forms of carbonato di-*l*-propylenediamine cobaltic carbonate were prepd. by a Walden inversion method. A comparison of rotatory dispersion curves for these compds. and analogous compds. in the diethylenediamine series made it possible to det. which of the 2 carbonato forms is obtained. A mechanism for the production of the 2 forms of the carbonato complex has been advanced. The noninverted form is produced through the preliminary displacement of the chloride ions in the *cis*-dichloro-di-*l*-propylenediamine cobaltic chloride by water mols., followed by the displacement of the water mols. by carbonato groups. The inverted form is produced by direct substitution of the carbonato group for the chloride ions within the complex. It was found possible by varying the reaction conditions on the basis of this mechanism to produce either form with either Ag carbonate alone or K carbonate alone. Further it was found possible to produce the inverted form of carbonato diethylenediamine cobaltic carbonate with K carbonate for the first time. A. B. Garrett

Cis-trans interconversion among coördination compounds. I. Investigation of the isomeric dichlorobisethylenediaminocobaltic chlorides by means of a radioactive isotope of chlorine. G. W. Ettle and C. H. Johnson. *J. Chem. Soc.* **1939**, 1490–6.—The mechanism of the interconversion of green 1.6$[Coen_2Cl_2]Cl$ (I) and violet 1:2-$[Coen_2Cl_2]Cl$ (II) was studied by means of the redistribution of Cl ions in the presence of radioactive Cl obtained by mixing $RaCl_2$ and powd. $Be(_{17}Cl^{35} + {}_0n^1 \rightarrow {}_{17}Cl^{36})$. Intramol. rearrangement is improbable. In hot H_2O, the Cl in the coördination sphere is replaced by H_2O, and the

isomers are then obtained after evapn. The relative amts of the isomers appear to be controlled largely by the soly. The *cis*-chloride (II) is less sol. than the *trans*-(I); this accounts for the I → II conversion in hot H_2O. The *trans*-chloride forms a sparingly sol. addn. compd. with HCl; this explains the action of HCl in the II → I conversion.
Wm. E. Trout, Jr.

Color in relation to chem. constitution of inorg. salts of isonitrosopyrazolones and isoxazolones (Dutt, Dass) 10.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Titration with polarometric indication of the end point. A. Neuberger. *Arch. Eisenhüttenw.* **13**, 171-4(1939); cf. *C. A.* **33**, 3715⁸.—In many cases it is not necessary to resort to the lengthy polarographic analysis which accomplishes the detn. of different ions in a soln. one after another by applying a gradually increasing voltage to the soln. and photographing (or recording) the satn. currents. If only one single ion is to be detd. polarographically it is sufficient to start with a certain voltage across the cell and add the titration agent; the deflection of the galvanometer decreases and as soon as this remains const. the end of the titration is reached. The simple visual observation, no recording, of the current in the galvanometer gives an accurate indication in short time. A practical example of the titration of Cu with salicyl aldoxime in a sample of steel is described in detail. Ten references. M. Hartenheim

Rapid method for the volumetric titration of copper in bronze, etc. Ursula F. Willis. *Analyst* **64**, 816-17 (1939). Dissolve 1 g. of the sample in 10 ml. of a mixt. prepd. from 250 ml. concd. HCl and 50 ml. of concd. HNO_3. Heat gently until the dense brown fumes have evapd. Cool, add 40 ml. of cold water and 7 g. of urea. To the cold soln. add 5 g. of KI and titrate with $Na_2S_2O_3$ soln. which contains 40 g. of the crystd. salt and 1 g. Na_2CO_3 per l. The thiosulfate should be standardized against Cu in the same way. W. T. H.

Rapid method for iron in open hearth slags. Chas. H. Cramer. *Chemist Analyst* **28**, 59(1939).—The usual method of titrating Fe with $KMnO_4$ in the presence of HCl is described; the novelty consists in first treating 0.3 g. of the sample with 2 ml. of water, 5 ml. of 70% $HClO_4$ and 3 ml. of HF. After fuming 2 min. the usual procedure is followed. W. T. H.

Silicosis and the analyst. F. S. Fowweather. *Analyst* **64**, 779-87(1939).—The various aspects of this disease are considered and it is shown that, as a rule, the chemist can give very little help to the physician and radiologist. Occasionally, however, an abnormally high SiO_2 content of the lungs may give a clue to the existence of the disease although the lungs may not show any fibrosis. Directions are given for ashing lungs and detg. the SiO_2 content along orthodox lines. W. T. H.

Determination of manganese by means of 8-hydroxyquinoline in presence of magnesium. G. Stanley Smith. *Analyst* **64**, 787-94(1939).—According to Gotô, *C. A.* **32**, 2863⁴, oxine ppts. Mn completely at pH 5.87-10.0 but Mg is not pptd. below pH 7. It should, therefore, be possible to ppt. Mn in the presence of Mg with oxine. The method which S. proposed for detg. Al, *C. A.* **33**, 8519⁸, was applied to the detn. of Mn. As a result of considerable experimentation, the conclusion is drawn that 5-30 mg. of Mn can be sepd. by a single pptn. with oxine provided only 10 mg. of Mg is present, but with larger quantities of Mg (0.1-0.5 g.) a double pptn. is necessary. W. T. H.

Detection of germanium in ores and industrial wastes. S. A. Borovik and S. K. Kalinin. *Soviet Geol.* **9**, Nos. 4-5, 140-1(1939).—Spectral data are given for ores and residues from Zn, Cd, Pb and Cu smelters from various parts of the U. S. S. R. F. H. Rathmann

Centrifugal-volumetric determination of metals as oxinates. Yasumitu Uzumasa and Isao Kayama. *J. Chem. Soc. Japan* **60**, 839-44(1939).—A simple, though not very accurate method for detg. Ni, Co, Zn, Mn and W consists in forming a ppt. with 8-hydroxyquinoline and measuring the vol. of ppt. in a graduated centrifuge tube.
T. Katsurai

Composition of lithium and potassium salts precipitated by the uranyl acetate reagents for sodium. Earle R. Caley and W. O. Baker. *Ind. Eng. Chem., Anal. Ed.* **11**, 604-7(1939).—Triple acetates, analagous to those of Na, are formed by Li in the presence of uranyl acetate and Mg, Co, Ni, Fe(ous) and Mn. No ppts. were obtained with Cd, Hg and Cu. Sensitivity studies of these reagents with Na and Li indicate that the triple acetate formed with Cu should be the most satisfactory qual. reagent for Na since the other more sensitive reagents are also sensitive to Li. From concd. K solns. $KUO_2(OAc)_3$ is pptd. by all uranyl acetate reagents for Na. H. A. Frediani

The hypochlorites of calcium of high titer and their preservation. A. Guillaume and Y. Nicolas. *Ann. chim. anal. chim. appl.* **21**, 261-6(1939).—In France, bleaching powder is evaluated in terms of Gay-Lussac degrees which represent the l. of Cl_2 which can be obtained from 2 kg. of the powder. Four large French supply houses furnish "chloride of lime" equiv. to 220° under the names, *Jav, Chlorfix, Perchlorfix* and *Perfix*. In Nov., 1938 expts. were started which were meant to cover 1 yr. but were terminated in July because of the impending war. These expts. show that bleaching powder of 220° has excellent keeping qualities in an unlighted ice chest and is much more stable under all conditions than are ordinary samples of bleaching powder. Three methods of iodometric titration were employed in the tests: (1) treatment with KI and AcOH followed by titration with $Na_2S_2O_3$ soln., (2) treatment with HCl in place of the AcOH and (3) substitution of $KHCO_3$ for the acid. The Pontius method, which uses $NaHCO_3$, gives somewhat higher values than are obtained when HCl is used and the results are a little higher with HCl than with AcOH, but the difference rarely exceeds a few Gay-Lussac degrees. Diln. with $CaCO_3$, Na_2CO_3 and $NaHCO_3$ caused more rapid deterioration of the product in the order named. Diln. with sand or talc had no effect upon the keeping qualities. The keeping qualities are excellent when the samples are kept in sandstone or metallic containers and there is much less loss of Cl_2 than with ordinary bleaching powder over a period of several months. W. T. H.

Determination of hydrocyanic acid by the picric acid method and the KWSZ photometer. J. T. Sullivan. *J. Assoc. Official Agr. Chem.* **22**, 781-4(1939). A procedure (technique described in detail) is proposed for the detn. of small quantities of HCN in individual white clover plants. It consists essentially in autolyzing 10 g. of fresh clover leaves in a 500-cc. short-necked Kjeldahl flask by allowing to stand several days at room temp. with 5 cc. C_7H_8, steam-distg. 80-90 cc. into 5 cc. of 2% KOH, making to 100 cc., adding a 20-cc. (or smaller) aliquot to 10 cc. of aq. alk. picrate soln. (25 g. Na_2CO_3 and 5 g. picric acid per l.), heating in boiling water for exactly 5 min., placing in 1 absorption cell of the KWSZ photometer and placing in the other cell a blank prepd. by heating 10 cc. of the alk. picrate soln. with 20 cc. of H_2O or of 0.1% KOH, balancing the instrument against the blank (with a 10% aq. soln. of $CuSO_4.5H_2O$ as a light filter), reading the transmission of the unknown in the other cell and converting the percentage of transmission into wt. of HCN by means of a curve previously prepd. from standards. The method can measure amts. of 0.01-0.20 mg. HCN. A comparison with the alk. titration method gave results averaging 8% higher by the picrate method. The various steps of the procedure, especially the conditions of autolysis and distn., need further study, particularly if the method is applied to plants other than white clover. A. P.-C.

The catalytic microchemical reaction of Denigès for

detecting hydrocyanic acid and its application to the study of uric acid. Ardoino Martini. *Pub. inst. investigaciones microquím., Univ. nacl. litoral* (Rosario, Argentina) 1, 61–4(1937).—If uric acid is oxidized with HNO_3 the alloxan thus produced can be detected by transforming it to an oxaluramide by means of the HCN-catalyzed reaction of Denigès (*C. A.* 21, 2628). The use of various amines instead of NH_3 in the formation of the oxaluramide increases the sensitivity of the reaction; butylamine gives the most sensitive test. Aprox. 1 γ of uric acid can be detected in this way. T. H. Dunkelberger

The microchemistry of the rare earth metals. Ardoino Martini. *Pub. inst. investigaciones microquím., Univ. nacl litoral* (Rosario, Argentina) 1, 71–5(1937).—The behavior of each of the rare earth metals toward Na_2SO_4, K_2SO_4, NH_4 succinate (I), RbCl, CsCl and $K_4Fe(CN)_6$ is redetd. and the sensitivity of each reaction is found. The most sensitive is that with I (about 1 γ of each element). By means of CsCl and RbCl, separately, in concd. H_2SO_4 it is possible to differentiate microscopically between the Ce and Y subgroups. Yt can be differentiated from Er by means of the neg. reaction of the latter with Na_2SO_4; similarly, Th can be distinguished from the rare earths by its neg. reaction with $K_4Fe(CN)_6$. T. H. D.

Microiodometric determination of nitrogen. S. M. Strepkov. *Ann. chim. anal. chim. Appl* 21, 257–60(1939).—To det. 2.5–0.1 mg. of N in org. materials, it is recommended to heat 10–15 min. with concd. H_2SO_4 with occasional addn. of H_2O_2 to oxidize all C compds. and convert the N into NH_4HSO_4. After this treatment, cool and add water to exactly 25 ml. Mix and take 10 ml. aliquots for further analysis. To the aliquot add 3 ml. of 0.1 *N* $KBrO_3$ and 1 ml. of 10% KBr soln. Mix, add 3–3.2 ml. of 5 *N* NaOH, shake well and then add 1 ml. of 10% KI and 3–3.5 ml. of 5 *N* HCl. After 20 min. in the dark, titrate the liberated I_2 with 0.01 *N* $Na_2S_2O_3$. At the same time run a control expt. with the same quantities of reagents. The ml. of $Na_2S_2O_3$ equiv. to the $KBrO_3$ required to oxidize NH_4^+ to N_2 (3 equiv. for each N) is detd. by the difference between the vol. used in the control expt. and that of the analysis. W. T. H.

Colorimetric determination of carbon disulfide. W. Demann and A. Adelsberger. *Gluckauf* 75, 556–60(1939). The CS_2 content of benzene or of motor fuel has usually been detd. by the xanthate method in which the CS_2 reacts with EtOH and KOH and the product with Cu^{++}. Tischler, *C. A.* 26, 1212, proposed a somewhat simpler method which is the same in principle as the patented process of Robinson Bros., Parkes and Mitchell (*C. A.* 31, 8847[1]) for removing small quantities of CS_2 from vapors. The procedure here described is based on the same reaction, but it is more accurate than the xanthate method for detg. small concns. of CS_2. The gas is made to react with a soln. of piperidine in monochlorobenzene whereby pentamethyldithiocarbamic acid is formed. This acid in the presence of Cu^{++} is converted into a brown salt which, at low concns., can be used for the colorimetric detn. of CS_2. The method is suitable for detg. 0.01–0.07% CS_2 in benzene after the removal of H_2S and mercaptans by washing with NaOH soln. Thiophenes up to 20% do not interfere. A simple device is described for mixing 1 ml. of benzene with 21.5 ml. of the reagent. L. P. Rockenbach

Detection of barbital in exhumed decaying corpses. E. Weinig. *Deut. Z. ges. gerichtl. Med.* 31, 189–93(1939).—W. discusses available methods for detg. barbital in decaying material and recommends a few minor changes in the procedure for obtaining the chloroform ext. Frances Krasnow

Determination of nicotine in fatal poisoning. Knud O. Møller and Margarethe Simensen. *Deut. Z. ges. gerichtl. Med.* 31, 55–9(1939).—Nicotine picrate analysis was found dependable in detg. the cause of death. F. K.

A method for the determination, in the form of ammonia, of amido and nitrile nitrogen. Léon Palfray, Sébastien Sabetay and Santiago Rovira. *Compt. rend.* 209, 483–5(1939).—The N of amides or nitriles can be measured more accurately as NH_3 liberated by hydrolysis than by measuring the amt. of alkali hydroxide consumed in the hydrolysis. Take a sample contg. 0.01 atom of N, boil 1 hr. with 100 cc. BzOH and 10 g. KOH, collect the liberated NH_3, in H_2O, and titrated with 0.1 *N* H_2SO_4 in the presence of methyl orange. Rachel Brown

Determination of ethyl alcohol in the presence of methyl alcohol, isopropyl alcohol and acetone. E. J. Boorman. *Analyst* 64, 791–4(1939).—MeOH, isopropyl alc. and EtOH are often present in solvents and lacquers. They are not removed completely by the Thorpe and Holmes method (*J. Chem. Soc.* 83, 314 (1903)) and their presence lowers the d. of the distillates and increases the apparent EtOH content. The prepn. of a distillate contg. the 4 compds. just mentioned is obtained easily by the method of T. and H. It has been shown by Denigès (*C. A.* 4, 1725[1]) and later by Hoskins (*C. A.* 31, 6583[6]) that AcMe forms an insol. compd. with $HgSO_4$. The method here proposed depends upon the formation of an analogous compd. with $HgCr_2O_7$ which will completely ppt. acetone. These Hg compds., however, are sensitive to shock or heat when dry. For this reason the proposed method should only be used when other methods are inconvenient and then only by skilled workers. To the distillate obtained by preliminary purification, which has been dild. if necessary, add 100 ml. of a reagent which has been prepd. by dissolving 100 g. HgO in 250 ml. concd. H_2SO_4 and dilg. to 2 l. with water contg. 135.7 g. of $K_2Cr_2O_7$. After 30 min. in a well-stoppered flask, boil the soln. under reflux for 15–20 min. If AcMe or isopropyl alc. is present a heavy red ppt. is obtained; the isopropyl alc. is oxidized to AcMe during the treatment. Allow the contents of the flask to cool somewhat and obtain 500 ml. of distillate by distg. with steam. The MeOH has been oxidized to CO_2 and the EtOH to AcOH. Finally titrate the AcOH in the distillate with 0.1 *N* NaOH to a phenolphthalein end point. W. T. H.

Bromine number of cinnamic derivatives. A. Lespagnol, R. Herlemont and G. Stern. *J. pharm. chim.* 29, 447–59 (1939); cf. *C. A.* 31, 6820[9]; 33, 9545[1].—In Br titration (cf. Volmar and Samdahl, *C. A.* 22, 2476), $Na_2S_2O_3$ is replaced by aq. SO_2 soln. in removing excess of Br, so as to avoid pptn. of S. (*a*) Tentative sapon. of PhCHBr·CHBrCO$_2$H (*A*), m. 200° by boiling with concd. alc. KOH shows that heating should last at least 8 hrs. (not 5 hrs.) for complete removal of Br_2. Also, a new reaction is found: An alc. soln. of *A* gives with $AgNO_3$ soln. quant. pptn. of 1 mol. of AgBr, with formation of ω-bromostyrolene (PhCH:CHBr) and 2 bromocinnamic acids of steric difference. (*b*) Quant. bromination of PhCH:CHCO$_2$H (*B*) to obtain *A* takes place very slowly (cf. Duquénois, *C. A.* 31, 2185[7]). Dissolve 0.20 g. *B* in 20 cc. Et_2O cooled by a freezing mixt., add 0.8 g. Br (= 3 times in excess) and leave it for 24 hrs. at lab. temp. in diffused light. Remove excess of Br with dil. aq. SO_2 and wash the Et_2O soln. with H_2O (test with $AgNO_3$). Evap. the Et_2O. Warm the residue with 95% alc., bring to 100 cc. and det. Br in an aliquot, after boiling for 10 hrs. with alc. KOH. (*c*) In brominating benzyl cinnamate, and cinnamyl cinnamate, a large excess of Br than with *B* (3–5 times) and 24 hrs.' contact are needed for quant. addn. of Br; removal with alc. KOH is the same as with *B*. The $AgNO_3$ reaction in both cases even after 24 hrs. is far from quant. S. Waldbott

Analytical functional study of nucleic acids. J. A. Sanchez. *J. pharm. chim.* 29, 529–44(1939).—Two colorimetric methods for detg. nucleic acid (*A*) are given. (*a*) By acid hydrolysis of *A*, purine and pyrimidine bases are set free, capable of coupling with the *p*-nitraniline diazo reagent (to 5 cc. of soln. of 0.5 g. *p*-$NH_2C_6H_4NO_2$ in 100 cc. H_2O contg. 0.5 cc. concd. H_2SO_4 add 1 drop of 10% $NaNO_2$). After making alk., a yellow color is formed. The procedure is described in detail. (*b*) Morphine-HCl, a 1% soln. in 50% H_2SO_4, forms with solid *A* a strongly red-violet, stable color, proportional in intensity to the concn. of *A*. From a type soln. of 0.1 g. *A* in 100 cc. of 50% H_2SO_4 a scale of standards from 0.0001 to 0.0005 g. of *A* is made, and compared with 0.2 and 0.5 cc. of solns. of the

unknown in 50% H_2SO_4. (*c*) Modifications of other known reactions of *A* are also given. S. Waldbott

Studies on the microdetermination of glucose, free and conjugated glucuronic acid. I. Determination of free and conjugated glucuronic acid in the presence of glucose in aqueous solutions. Saburo Kakinuma. *J. Pharm. Soc. Japan* **59**, 635-47 (in English, 244-6) (1939).—The colorimetric method of Ogata and Yamanouchi (*C. A.* **23**, 4718; **25**, 1861) for the microdetn. of free and conjugated glucuronic acid in aq. solns. or in urine does not work in presence of glucose. This difficulty, however, can be easily overcome if the glucose present in the sample is decompd. by fermentation with yeast, previous to the application of the colorimetric method. In the preliminary expts. which are described in this paper and which deal only with ingredients in aq. solns., K. dils. the samples so that the glucose concn. becomes 1% or less, adds NaCl to 0.5–1.0%, and decomposes the glucose by fermenting it for 18 hrs. at 28° by means of *Saccharomyces saké* No. 2. After centrifuging off the yeast, the colorimetric method of O. and Y. for the detn. of free and conjugated glucuronic acid is applied. Nao Uyei

Chromium in the soils of Western Samoa and Niue Island [detn. of small amts.] (Farrell, *et al.*) **15**. Effect of HCl concn. on the reduction of molybdate in the Ag reductor (Hiskey, *et al.*) **2**. Reduction by amalgamated Zn (Stone, Hume) **2**. Sulfanilamide derivs. [analytical studies] (Crossley, *et al.*) **10**.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Dolomitization of calcareous sediments. A. Rivière. *Compt. rend.* **209**, 691-2 (1939); cf. *C. A.* **34**, 584[4].—Sea water left in contact with $CaCO_3$ loses much more Mg than is deduced from decrease in the "alkaline reserve," especially when the pH is maintained at a high value, e. g., by removal of CO_2. Any action tending to raise the pH, e. g., circulation or disturbance of the sea by wind or tide, or removal of CO_2 by photosynthetic action, increases the effect. This explains the almost total absence of dolomitization in an undisturbed area, its large amt (up to 17%) in some calcareous sands of the Bahamas Islands, in some dead corals, and in some extremely dolomitized (up to 30–40%) reefs in the Dead Sea. C. A. S.

Differential thermal analysis of kaolinite. S. Caillère and S. Hénin. *Compt. rend.* **209**, 684-6 (1939); cf. *C. A.* **28**, 75[9]; **31**, 8448[8].—Expts. are briefly described showing the influence on the differential thermal analysis curves, particularly the portion indicating the exothermal phenomenon at 1000°, of kaolinite from Djebel Debar (Constantine, Algeria) (1) of the size of the particles (greater or less according as the diam. is above or below 2μ), (2) of various ions introduced by base exchange (Ca, K, Fe, the effect decreasing in this order, the phenomenon with Fe being less than in untreated kaolinite), and (3) of the amt. of base fixed and method of fixation (the effect decreases as the amt. fixed increases, but is increased by subsequent dialysis). Interpretations are not discussed. C. A. Silberrad

The influence of stresses on the arrangement of quartz and crystobalite crystallites in chalcedony, quartzine and lussatite. Fritz Laves. *Naturwissenschaften* **27**, 705-7 (1939).—X-ray work showed that the cryst. part of the blue "chalcedonies" of Weitendorf (near Graz) consists of cubic or quasi-cubic cristobalite. This chalcedony has a lower *n* (1.48) than normal, it is pos. in the fiber direction and has been called quartzine (Meixner). Fiber diagrams of the cristobalite showed that it is weakly deformed cubical and the product is optically pos. like tetragonal crystobalite. The Weitendorf chalcedony has the cristobalite fibers perpendicular to its fiber direction and is a parallel to ordinary chalcedony, which has neg. quartz crystals with *c*-axis perpendicular to its fiber direction. The Mallard name of lussatite is recommended for the chalcedony contg. cristobalite; lussatine is recommended for it if the fibers are optically neg. Further work on specimens contg. chalcedony showed that during crystn. the *c* axes always orient themselves in the direction of the stresses. Quartzine with the reverse optical activity is formed when spherulites crystallize in an opal medium such that the spherulites are not compressed but expanded in the crystn. process. The *c* axes then arrange themselves parallel to the fiber direction. B. J. C. v. d. H.

Chemical and mineralogical study of a new titanium mineral from Nellore District. N. Jayaraman and K. R. Krishnaswami. *Quart. J. Geol., Mining Met. Soc. India* **10**, 97-108 (1938).—Black, opaque, magnetic grains occur as inclusions in garnet. In reflected light they are steel-gray, tinged with pale violet. Chem. analysis gave SiO_2 0.12, TiO_2 65.90, FeO 18.88, Fe_2O_3 15.27 and total 100.17. The results from chem. and phys. investigations show the presence of ilmenite ($FeTiO_3$) and magnetite (Fe_3O_4) mols. with a high content of TiO_2 probably in solid soln., indicating a possible wide range of miscibility between the mols. $FeTiO_3$, Fe_3O_4 and TiO_2. J. F. Schairer

Caledonian tectonics and metamorphism in Skye. E. B. Bailey. *Bull. Geol. Survey, Gt. Brit.* **2**, 46-62 (1939).—The MnO content of the garnets in the Moine rocks near Tarskavaig (Skye) is about 4.2%, and n = 1.80. The relations between the compn. of this garnet and the biotite of the contg. rock and the grade of metamorphism are discussed with references to similar occurrences elsewhere. Cf. Elliot, *et al.*, *C. A.* **32**, 2056[4]. C. A. Silberrad

Discovery of analogs to carnotite sands in northern Fergana. V. I. Popov. *Soviet Geol.* **9**, Nos. 4-5, 32-9 (1939).—The geochem. nature of these sands is very similar to that of the Mesozoic carnotite sands of Colorado and Utah. F. H. Rathmann

Magnetic survey of hematite ore in south Cumberland and Furness. A. F. Hallimond and J. T. Whetton. *Bull. Geol. Survey, Gt. Brit.* **2**, 1-17 (1939).—A magnetic survey of a hematiferous area near Millom (Cumberland), in which the position of the hematite deposits was fairly known through their being worked, showed that the ore is appreciably magnetic, and that it should be possible to detect in this way a vein 10 ft. wide under 60 ft. of cover, but caution is necessary as the magnetic values observed are much less than those due to many dike rocks, being comparable to those due to large boulders in boulder clay or magnetic country rocks. C. A. Silberrad

Cupriferous chalk deposits of Kugitang. V. S. Domarev *Tsvetnye Metal.* **1939**, No. 1, 5-16.—Geol. occurrence and genesis of cupriferous deposits of Kugitang, South-West Turkomania, Russia, are described. Mineralized gypsum lenses are embedded in formations of argillite. The minerals are chalcocite in the sulfide zone, and, probably, malachite and atacamite in the oxidized zones. The Cu contents of the deposits, as far as the preliminary exploration indicates, is too low to justify com. exploitation at the present. B. N. Daniloff

Deposits of copper at Outokompu, Finland and its treatment. Achille Mestre. *Génie civil* **112**, 417-18 (1938).—Ann Nicholson Hird

Copper-bismuth deposits of Adrasman. E. M. Yanishevskiĭ and M. I. Kharitonov. *Soviet Geol.* **9**, Nos. 4-5, 78-94 (1939).—Chalcopyrite is assocd. with quartz, pyrite, hematite, bismutite and emplectite ($CuBiS_2$). F. H. Rathmann

Copper-containing magnetite deposits of the Urals and their exploitation. V. A. Glazkovskiĭ. *Soviet Geol.* **9**, No. 6, 96-101 (1939).—The deposits contain 59% Fe; Cu can be obtained as a by-product. F. H. R.

Nickel and cobalt content of the manganese ores of the U. S. S. R. I. I. Ginsburg. *Soviet Geol.* **9**, Nos. 4-5,

60–77(1939).—Ni and Co enrichment is found in continental Mn and Mn-Fe ores (weathered serpentinites) but not in deposits of marine origin. F. H. R.

Nickel oxide deposits in the Urals. Basile Bogitch. *Compt. rend.* **209**, 652–3(1939).—The chief deposit occurs near Orsk in the southern Urals. It extends horizontally, some 4–20 m. thick, over several 100 km. at a moderate depth below a stratum, rich in Fe_2O_3, 1–4 m. thick. The ore as worked contains about 2% Ni present mainly as garnierite, and has resulted from concn. by atm. action from underlying serpentine, which in the unaltered state contains 0.01 to 0.1% Ni. The total Ni available is estd. at 300,000 tons. Less important deposits occur in the middle Urals within 100 km. of Sverdlovsk. The ore, likewise derived from serpentine, encloses a large mass of marble, which has greatly affected the decompn. of the serpentine, the Ni content varying from 10 to 15% in immediate contact therewith to 1–1.5% at a few m. distance. The ore as worked averages 2–3% Ni, and the amt. available is estd. at 100,000 tons. C. A. S. 2

Ore deposits of southeast Bulgaria. Walther E. Petrascheck. *Metall u. Erz* **36**, 481–4(1939).—A description of the geology of chrome serpentine and Pb-Zn deposits of Bulgaria. H. Stoertz 3

Molybdenum in ores of Kazakhstan (Russia). I. P. Novokhatskii and S. K. Kalinin. *Tsvetnye Metal.* **1939**, No. 4–5, 46–9.—Mo occurs widely distributed as admixt. in various ores of Kazakhstan, particularly in assocn. with Pb ores. The presence of Mo in some of the Cu ore deposits points to its origin from granodiorite-monzonite magmas. In some localities the concns. of wulfenite are of com. interest. B. N. Daniloff 4

Tungsten-molybdenum ore deposits at Lyangar (Russia). I. I. Surnin. *Tsvetnye Metal.* **1939**, No. 4–5, 50–2.—A description of occurrence and mineralogy of W and Mo ores in the Lyangar deposits, Uzbek Republic, Russia. Minerals observed were scheelite, molybdenite and others. No estimate of com. possibilities is given. B. N. D. 5

Coal deposits of the Eastern Urals. V. S. Shekhunov. *Soviet Geol.* **9**, No. 6, 18–30(1939). **New coal deposits in Kirgizia (Fergana).** N. V. Shabarov. *Ibid.* 31–47. **X-ray studies of coal.** I. D. Seletskii. *Ibid.* 48–63.—X-ray data are given for various bituminous and anthracite coals, graphite, humic acids and lignin. **Report on coal and shale deposits. Dublikanskii coals.** A. K. Matveev. *Ibid.* 114–15. F. H. Rathmann 6

Oil occurrences in southwest Lancashire. T. Wolverson Cope. *Bull. Geol. Survey, Gt. Brit.* **2**, 18–25(1939).—Investigation of the oil seepage near Formby (Lancashire) with a peat auger put down 16 ft. showed alternate strata of peat and silty clay both contg. oil, examn. of which gave d. 0.885, initial b. p. 205°, and amts. distg. to 225°, 250°, 275°, 300° and 325°, resp., 1.5, 7, 15, 23.5 and 33.5%; cracking began at 350°. The low sapon. value (1.2 mg. KOH/g.) indicates a probable mineral origin from a deep source, possibly from Carboniferous beds below the underlying Trias. This is rendered more probable by the fact that examn. of the algae of the peat showed that though some are oil-producing, the quantity of such is insufficient to account for the oil found. C. A. S. 1

Perspectives for oil deposits in Turkmenia and Western Uzbekistan. M. I. Varentsov and P. G. Suvorov. *Soviet Geol.* **9**, No. 6, 64–91(1939).—The gases contain 90–98% CH_4 and 0.3 to 0.8% noble gases. Data are given on oil, bitumen and S content. **Combustible shales of the Far East.** A. Z. Lazarev. *Ibid.* 116–18. F. H. Rathmann 2

Heavy mineral assemblages of the Burma oilfields. S. Krishnaswamy. *Quart. J. Geol., Mining Met. Soc. India* **10**, 109–21(1938).—The source rocks of the sediments of the Burma oilfields were cryst. schists and related metamorphic rocks as indicated by heavy mineral assemblages described. J. F. Schairer 3

Petrology of the Permian rocks of the vale of Eden. Henry C. Versey. *Quart. J. Geol. Soc. London* **95**, 275–98 (1939).—The relative amts. of the heavy minerals in these beds (including zircon, rutile, garnet, anatase, staurolite, barite and a little fluorite, sphene aplite and cassiterite) were detd., and their source is discussed. The origin of the red coloration (due to Fe_2O_3), especially of the Penrith sandstone, is discussed, as also the nature and origin of the cementation. C. A. Silberrad 4

Economic geology of Panchet Hill. B. C. Roy. *Quart. J. Geol., Mining Met. Soc. India* **10**, 209–14(1938).—Three analyses of dolomitic limestones are given. Red ocher, fireclay, ironstone, graphite, building stones and road materials are also found in the area. J. F. S. 5

Geology of Jamkhandi (Deccan). Y. T. Apte. *Quart. J. Geol., Mining Met. Soc. India* **10**, 123–33(1938).—Petrographic descriptions of granite gneiss, hornblende-schist, dolerites, traps and some sedimentary rocks are given. J. F. Schairer

Geology of Vengurla Peta. B. G. Deshpande. *Quart. J. Geol., Mining Met. Soc. India* **10**, 167–78(1938).—Two analyses of the Vengurla granite-gneiss are included. J. F. Schairer 6

Report of the imperial agricultural chemist [on soils] (Nath) **15**. Radioactivity of K as a means for detn. of the relative ages of elements in meteorites (Suess) **3**.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Use of activated charcoal in hydrometallurgy and in flotation. S. M. Yasukevich. *Tsvetnye Metal.* **1939**, No. 6, 54–69.—Y. describes the results of his investigation of methods of prepn. of activated charcoal and its use in hydrometallurgy and in flotation. Various gases were tried for the activation of raw birch, pine and spruce charcoals. The best results were obtained by treatment of birch or pine charcoal in a CO_2 atm. in a rotating muffle furnace for 4 hrs. at 800°. Methylene blue was used for the detn. of adsorptive power of the product. The yield of activated charcoal increased from 50% to obtain the specific surface of 180 sq. m. per g. of charcoal, to 87% to obtain the specific surface of 5 sq. meters per g. The following applications of activated charcoal were investigated: (1) Adsorption of Au and Ag from solns. One hundred % extn. of Au and Ag was obtained in lab. from cyanide solns. of low concns. with large amts. of charcoal. With agitation, 150 mg. charcoal of 142 sq. m. surface per g. is required per g. of Au to effect a practically complete extn. of Au from solns. contg. 0.2–16 mg. Au per l. Best results were obtained at temps. of +5 to +20°. Further expts. showed that still better results can be obtained in the extn. of Au from chloride solns. and Ag from nitrate solns. Charcoal pulverized to 100- to 200-mesh was found to be most effective, and also convenient for flotation. When percolation of solns. is employed, 20-mesh is recommended. The above tests were made in the lab. with pure solns., but tests made on actual flotation mill materials confirmed the above results. (2) Flotation. A study of flotability of activated charcoal showed that the more adsorbent the charcoal the more difficult it is to float. Of the various reagents tested, kerosene, pine tar and shale oil were found satisfactory. From 90 to 95% extn. was obtained with charcoals of lower specific surfaces (5 to 12 sq. m./g.), the consumption of the reagents varying from 160 to 180 kg./ton of Au-carrying charcoal. Extn. decreases with increasing liquid/solid ratio, but the purity of the concentrate increases. Neutral or acid flotation pulp produces the best results. (3) Treatment of Au-charcoal concentrates. After various methods of recovering Au were tried, the following method was selected as the most satisfactory: The Au charcoal concentrate is mixed with water (50%) and pressed into briquets at 70–75 atm. pressure. The briquets are then 8 9

ignited in iron burners in air. The product is then melted into Doré metal. (4) Purification of industrial waters. Activated charcoal is useful for purification of circulating flotation water, and for removal of excess oil. The treatment increases the output in flotation of Cu and Zn ores.
B. N. Daniloff

Extraction of minerals by means of selective grinding. F. N. Belash, V. I. Saltanov and E. V. Vinokurova. *Tsvetnye Metal.* **1939**, No. 1, 55–6.—With a view of improving the sepn. of molybdite by flotation the authors propose a selective method of grinding molybdite ores, which takes advantage of the low hardness of molybdite, 1 to 2 on Mohs' scale, as compared to 6 to 7 of the gang minerals, quartz and feldspar. The grinding was done in a rod mill with pulp d. of 50% and the weight of rods 2.4% of the weight of ore. The rods were covered with rubber sheaths. It was found that the gang was not ground appreciably whereas a considerable proportion of molybdite passed through 325-mesh. The enrichment ratio of 5.8 to 6.45 was obtained with the extn. of 84–85%. This method was also tried on urano-radium sulfidic ores whereby 65% of the mineral was sepd. into −325 class.
B. N. Daniloff

Present milling practice on Kirkland Lake [gold] ores. Harry Hanson. *Can. Mining J.* **60**, 596–9(1939).
W. H. Boynton

Milling lead-zinc-gold ores in Marinduque. Lee E. Blinzler. *Eng. Mining J.* **140**, 51–3(Nov., 1939).—The project of Mineral Resources, Inc. on Marinduque in the Philippines yields a concentrate of low metal content which necessitates close control of operation. Mine capacity is 150 tons, turning out Pb and Zn concentrates and a Au bullion. The flow sheet is shown.
W. H. Boynton

Howe Sound's new Holden mill H. A. Pearce and V. A. Zanadvoroff. *Eng. Mining J.* **140**, 31–4, 35(Nov., 1939).—The Holden orebody is primarily a Cu deposit, but contains important Au as well as minor Ag values The capacity of the recently enlarged concentrator now exceeds 2000 tons per day. The use of deep matless air-lift cells is a feature of the flotation section. Flowsheets are shown.
W. H. Boynton

Flash-roasting and losses in cyanidation of calcined concentrate. H. C. Baghurst and H. W. Gartwell *Chem. Eng. Mining Rev.* **32**, 13–14(1939).—Hard spherical grains found on calcining Kalgoorlie flotation concentrates are presumably caused by unintentional flash-roasting. Support is given to the suggestion that these grains might be a source of loss by being impenetrable to cyanide solns.
W. H. Boynton

Treatment of Kalgoorlie ore. Straight cyanidation. R. C. Buckett. *Chem. Eng. Mining Rev.* **31**, 489–90 (1939).—Straight cyanidation is claimed to have the following advantages over the precyanidation process: (1) in a new mill, it is cheaper in first cost; (2) on straight sulfide ore as treated by Lake Shore and Star, Ltd. the flotation process as outlined yields tailing carrying negligible amts. of sulfide and no free Au particles. Exptl. tests of straight flotation followed by cyaniding the tailing and also precyaniding followed by flotation gave identical results. **Precyanidation process.** J. Cornelius. *Ibid.* 490.—Factors favoring this process are: (1) higher recovery, (2) less locking up of Au in the grinding circuit and concentrate and calcine circuits and (3) incomplete flotation of pyrite does not mean higher tails. Disadvantages are: (1) loss of sol. Au in the flotation tailings, (2) more difficult flotation and higher reagent costs and (3) higher constructional costs. **Great Boulder experiences.** J. R. Hylton. *Ibid.* 490–1.—The 2 outstanding factors that play the most important part in effecting recoveries are widely divergent head values and the differential actions of different types of ore in the flotation circuit. Temp. control in the roasting section avoiding temps. in excess of 600° is necessary for good Au recovery. At Great Boulder the gain by precyanidation has been approx. 8 shillings per ton with the extra recovery offsetting the extra cost of treatment.
W. H. Boynton

Noamundi Iron Mine. F. G. Percival *Trans. Mining Geol. Met. Inst. India* **35**, 143–52(1939).—A very complete chem. analysis of the hematite ore is given. 250 million tons of ore of average Fe content over 60% are available.
J. F. Schairer

Autoclave process of extraction of tungsten from concentrates. I. N. Maslenitskiĭ. *Tsvetnye Metal.* **1939**, No. 4–5, 140–3.—M. conducted lab. and semicom. tests with the purpose of developing a chem. process of extn. of W from scheelite concentrates contg. about 10% WO_3 by the use of autoclaves. Preliminary tests were made with mixts. of scheelite ground to −200 mesh, and Na_2CO_3. It was found that at 200° and 15 atm. pressure the ratio $Na_2CO_3 . WO_3 = 3$ should be used to effect an almost complete (98%) decompn. of scheelite according to the formula $CaWO_4 + Na_2CO_3 \rightleftarrows Na_2WO_4 + CaCO_3$. Further tests showed that ore concentrates with various concns. of scheelite require greater amts. of Na_2CO_3 than pure scheelite mixts.; for 90% decompn. of $CaWO_4$ the ratio should be from 3 to 4.5 the poorer the concentrates. On semicom. scale 85% decompn. of $CaWO_4$ was obtained. Extn. of W from solns. gave ppts. contg. 50–63% WO_3. The work is being continued to establish the technique of the autoclave process on com. scale.
B. N. Daniloff

Neutralization of injurious effects of oxygen and carbon dioxide in the flotation of copper-zinc ores. V. A. Malinovskiĭ. *Tsvetnye Metal.* **1939**, No. 1, 44–50.—In earlier reports (*C. A.* **33**, 9221[8]) it was stated that CO_2 decomps. Cu cyanide ions to form Cu^{++} ions; these deposit on the surface of Zn blende and activate it, and thus raise the Zn content of the Cu concentrate. M. developed a new group of reagents (catalytic adsorbers) for neutralization of the injurious effects of Cu^{++} ions. These reagents are colloidal sulfides of Fe, Zn, Pb and Ni. They were prepd. by mixing the sulfides of these metals with Na sulfide. Colloidal sulfides were introduced into a soln. of $CuSO_4$. Results of numerous expts. showed that ZnS is the most efficient deactivating reagent; it improves selectivity and does not decrease the extn. of Cu into the Cu concentrate. Analyses of filtrates showed 0.01 to 0.015 g. Cu per l.; without the addn. the Cu content was 0.20 to 0.30 g. per l. The action of these colloidal sulfides is due to the adsorption of Cu^{++} ions on their surface. Sponge iron is also used for pptg. Cu^{++} ions, but the colloidal sulfide reagents are superior to it. These results were corroborated by tests on com. scale, and the method has been adopted in some of the flotation mills. It is claimed that the extn. of Zn was increased from 61 to 72% and that of Cu from 81 to 86%.
B. N. D.

Features of the Zinc Corporation's new mill. M. A. Mawby. *Chem. Eng. Mining Rev.* **32**, 27–8(1939).—A brief description of the new mill of Zinc Corporation Ltd. at Broken Hill, N. S. W. Capacity is 10,000 tons weekly. Pb, Ag and Zn are recovered by flotation methods.
W. H. Boynton

Agglomeration of pyrite dross. V. Bezhanishvili. *Novosti Tekhniki* **1939**, No. 13–14, 30.—Pyrite dross contg. Fe 52.56, SiO_2 12.20, Cu 0.81, Mn 0.25, P 0.39, S 4.02 and moisture 10.2% was agglomerated with Krivorog ore in the following proportions: 25:75, 40:60 and 60:40. The second type of charge gave the largest yield of agglomerate. The charge was 200 mm. thick and it contained 4% C and 7.5% moisture. The output was higher and the fuel consumption and use of gas for ignition were lower than in the agglomeration of the ore without the dross. The 1.20% S in the charge was reduced to 0.08% in the agglomerate. The Fe content in the agglomerates obtained with the above 3 charges was 61.3, 61.0 and 60.5%, resp.
B. Z. Kamich

Sintered, high-melting hard substances. Willibald Machu. *Kolloid-Z.* **88**, 373–84; **89**, 92–104(1939).—A review of patents.
G. G.

Notes on steel foundry practice. S. Leetch. *Foundry Trade J.* **61**, 182–3, 197–8, 214–16(1939).—A general description of British foundry practice.
I. H.

Serious manganese poisoning among Egyptian manganese miners. E. W. Baader. *Arch. Gewerbepath. Gewerbehyg.* **9**, 477–86(1939).—Mn poisoning caused mental disorders which developed after several years in

men who worked in Mn ore mines when drilling was done by hand. With mech. drilling the mental disorders occurred after 3 weeks to 5 months. Many deaths from pneumonia were noted. Maurice M. Rath

The occurrence of occupational manganese poisoning in the steel industry (apropos of manganese poisoning in a grinder of ferromanganese). H. Voss. *Arch. Gewerbepath. Gewerbehyg.* 9, 453–63(1939).—A ferromanganese grinder after several months developed manganism in which a mask-like face, amyostatic symptoms, disturbances in speech and walk, monocytosis and mild polyglobulism were noted. Considerable improvement occurred in the nervous lesions. Maurice M. Rath

Progressive bulbar paralysis and amyotrophic lateral sclerosis after chronic manganese poisoning. H. Voss. *Arch. Gewerbepath. Gewerbehyg.* 9, 464–70(1939).—Mn caused this condition in a man who worked 15 years with MnO_2. Maurice M. Rath

Metallic materials in the telephone system. Earle E. Schumacher and W. C. Ellis. *Metal Progress* 36, 617–22 (1939).—Qual. chem. compns. and uses of alloys of Pb, Cu, Zn, Ni, Fe, Co, Mo, Cr and Al are given. W. A. M.

Recrystallization of pure aluminum. Masahide Kosaki. *Nippon Kinzoku Gakkai-Si* 3, 349–58(1939).—A new recrystn. diagram of Al was constructed from the measurement of grain sizes of 0–10% worked and annealed Al plates. Grain-growth after recrystn. occurs generally in specimens which were subjected to a large degree of deformation and annealed at high temp. Conclusion: This phenomenon is induced by mutual relation between the difference in potential energy of neighboring crystals and intercryst. diaphram of impurity. H. N.

Some metallurgical features of joining processes for copper and aluminum. F. A. Fox. *Machinery* (London) 54, 681–1(1939).—If Cu plate or sheet is heated with a blowpipe to temp. between 950° and 1050° for a min. or two the oxide globules will segregate to the main boundaries and the strength of the metal will be reduced by as much as 50%. The heating time must be short. The flame is to be neutral. Filler rods contain P as deoxidizer and may contain small quantities of Ni, Ag and V. Hot-hammering is recommended. Al is welded with slight excess of acetylene. H_2 causes embrittlement. If the filler rod is not of the same metal the weld will anodize differently. A 5% Si alloy is widely used. Hammering improves the mech. properties but reduces the corrosion resistance. In bronze welding the use of rods of different analysis from the base metal may lead to local electrolytic corrosion. In the brazing of stainless steel the flow point of the alloy must be above 850°, i. e., above the range where the steel tends to carbide formation. A steel article which has been pickled can only be efficiently brazed (with molten brass) after a period of time has elapsed or after annealing at 700–750°. H_2 must be allowed to escape. If Cu jointed with Sn solder is subject to heat the intermetallic compound layer may grow, and thus affect the strength of the joint. Richard P. Seelig

Properties and methods of manufacture of oxygen-free copper. P. I. Baranov. *Tsvetnye Metal.* 1939, No. 1, 73–83.—A review and discussion of the manuf. and properties of O-free Cu are followed by a description of results of expts. made with the purpose of developing a process of manuf. with the use of Li and Be and by melting under CO_2 atm. Wire bars 5.5 × 5.5 × 55 cm. cast from cathode Cu melted under charcoal and deoxidized with 0.012% Li or Be have high d., good mech. properties and workability. Two-mm. wire drawn from these bars has elec. cond. not lower than that of O-free Cu, but lower ductility. Bars cast from cathode Cu under charcoal without addn. of Be or Li are porous and low in mech. properties. Wire made from these has satisfactory cond. and ductility. Cathode Cu melted in CO_2 atm. and cast into vertical molds possesses good mech. properties and d.; wire made from these bars also possesses good mech. properties and good cond. Cu melted in a H atm. is lower in cond. and mech. properties, particularly in the form of cold-drawn or annealed wire. 15 references. B. N. Daniloff

Laboratory test for machinability. A. S. Kenneford. *Metal Ind.* (London) 55, 269–74(1939).—Previous work is reviewed. This paper deals with the Oxford-Airey machine which measures the work required to remove 1 cu. in. of metal. Depth of cut has slight effect on the results; increasing the feed from 0.005 to 0.02 in. decreases the work required by about half. This was true of several alloys tested, including 6% Sn bronze, 80:20 cupro-nickel, 60:40 brass and Mg. Addns. up to 1% Pb to 70:30 and 60.40 brasses reduced the specific work required by half. Further addns. up to 5% Pb had a considerably smaller effect in the same direction. 4 references. J. N. Lynn

Cementation equilibrium and cementation reaction in CO-gas current. Osamu Madono. *Tetsu-to-Hagane* 25, 134–44(1939).—In view of a wrong representation of the cementation equil. by formula $3Fe + 2CO = Fe_3C + CO_2$, M. discussed the fact that the cementation velocity can never exceed the satn. point of solid soln. Agr and the cementation phenomena never occur below the A_1 point. The reason is that Fe is the most conspicuous catalyzer which augments the dissocn. of CO and at the moment of contact with Fe the equil. $2CO \rightleftarrows C + CO_2$ is attained with the instantaneous dissocn. of CO; hence the actual action of pure CO and Fe is impossible even in CO gas current. Fe_3C might, however, occur at a temp. below 500°, as the dissocn. velocity becomes small at a comparatively low temp. The action of cementation in the CO gas current becomes weak when the current velocity becomes small. This is due to the diffusion layer made on the surface of the specimen by CO_2 which is generated by the cementation reaction. M. Ishida

Influence of heating and quenching conditions on mechanical properties and microstructures of high-tensile steel rivets. Genziro Mima. *Tetsu-to-Hagane* 25, 721–33(1939).—Some of the effects of the operation for rivet-making and riveting on the mech. properties and microstructures of high-tensile steel rivets are described. Overheating accentuates blue-brittleness, secondary brittleness and transformation brittleness of high-tensile steel rivet bar. The high-tensile rivets always decrease in tensile strength and elongation with the quenching operation within the blue-brittleness and secondary-brittleness ranges. The best temps. of heating are: for ordinary riveting, 900°; for pneumatic riveting, 1,050° (10–30 sec.) when heating is in an elec. furnace, 1,100° (1–3 sec.) when heating is in a coke-fired furnace. M. Ishida

Heating and liquid quenching massive sections. II. Joseph A. Duma. *Heat Treating Forging* 25, 505–8 (1939); cf. *C. A.* 33, 8541[2].—There are 2 fundamental methods of liquid quenching for steel; these are austempering, and direct quenching in either brine, water and oil baths, or interrupted quenching utilizing 2 baths. Austempering is good for small sections, but has not yet been applied commercially to heavy sections. The second method is almost invariably employed in large work. Cooling data are given and tempering treatments are described. 11 references. I. Hartmann

Continuous wire annealing in open gas flame. Harry W. Smith, Jr. *Heat Treating Forging* 25, 513–16; *Wire and Wire Products* 14, 643–5, 662(1939).—The principle of open flame annealing is outlined and a new app. is described which includes the first continuous wire annealing indicator mechanism. I. Hartmann

A precise method of measuring heat conductivity applicable to either molten or solid metals. Thermal conductivity of zinc. Charles C. Bidwell. *Phys. Rev.* 56, 594–8(1939).—A metal rod or hollow vertical graphite cylinder contg. molten metal is packed in silocel contained in an outer iron cylinder. Downward heat flow is established and vertical and radial gradients are measured differentially by thermojunctions. Previously published values for solid Zn are verified and extended through the m. p. to 730°. The cond. of liquid Zn decreases slightly with rise in temp. H. C. Thomas

Solid impurities in metals. L. Guillet, Jr. *Rev. universelle mines* 15, 511–18(1939).—In general, the non-additive properties, as soln. potential, elec. and thermal

conds., crystn. velocity and mech. properties, are most sensitive to impurities. If the impurity is in soln. in the metal its effect is the greater the farther impurity is from the base material in the periodic system. If the impurity is insol. in the metal a second phase appears which exerts a noticeable effect on corrosion, brittleness and malleability. Numerous examples illustrate the various conditions and effects. Twenty-five references. M. Hartenheim

Motor-car rear-axle design and production. G. W. H. Nash. *Machinery* (London) **54**, 653–6(1939).—Steel S. A. E. 4620 is used for carburized rear axle gears. It is necessary to anneal the gears after forging: heated to 1010°, held for 1 hr., cooled in air blast to 540°, then at 40° per hr. to 315°, then in still air. Both the box and the gas carburizing methods may be used for gears and pinions. In the first case the charge is carburized at 925°, cleaned, quenched in quenching press, and, in some cases, drawn at 135°. The press holds the pieces in a die while they are immersed in the oil to keep them round and flat. If gas carburizing is used the parts are quenched directly from the furnace; no cleaning is necessary. Richard P. Seelig

Restoration of artificially removed or disfigured metal stamps. J. Dettling. *Deut. Z. ges. gerichtl. Med.* **31**, 1–11(1939).—Suitable methods of corrosion can be used to bring marks into temporary or permanent relief which may be photographed. Frances Krasnow

A note on the effect of the addition of molybdenum, tungsten and titanium, together with calcium silicide, to cast iron. J. E. Hurst. *Foundry Trade J.* **61**, 265–6, 280 (1939).—Oxides of the alloying elements Mo, W and Ti were added in powder form to molten refined pig iron, in conjunction with the reducing agent $CaSi_2$. The metal was cast into test bars and expts. were made to det. the modulus of rupture, tensile strength, hardness, etc. The results are tabulated. Of special interest are the very high tensile and transverse strengths obtained by the addn. of CaSi and both MoO_3 and FeMo. CaSi addn. alone reduces the S content, but this effect is greatly enhanced when FeMo or MoO_3 is also added. Addn. of WO_3 does not cause so great an increase in strength nor so marked a reduction in S as MoO_3. Addn. of CaSi and TiO_2 reduces the combined C content considerably, but it has little effect on S or on strength. I. Hartmann

Hydrogen in steel. Sasaburo Kobayasi. *Tetsu-to-Hagane* **25**, 745–73(1939).—Vacuum extn. at 800° is the most suitable for the estn. of H in steel. The sampling of specimens for accurate analysis is discussed. The variation of H_2 and other elements in various stages of steel melting and the means for decreasing H are explained. The relation of H in steel in the course of melting to that in slag was investigated, and the mechanism of intrusion of the H was studied. M. Ishida

Isothermal transformation in steels. Edmund S. Davenport. *Metal Progress* **36**, 623–9(1939).—Illustrated extracts from the annual Campbell Memorial Lecture are given. W. A. Mudge

Manufacture and use of stainless steel wire. Stanley P. Watkins. *Wire and Wire Products* **14**, 527–38(1939). George Ayers

Properties and application of acid-resistant chromium and chrome-nickel steel castings. F. Schulte. *Giesserei* **26**, 477–84(1939).—By addn. of at least 12% Cr to Fe a steel can be produced whose surface can easily be passivated. It is rust-proof and to a certain extent resists oxidizing chemicals, e. g., HNO_3. Eighteen Cr steels resist HNO_3 at elevated temp. within a wide range of concn. The toughness of low-C Cr-steels is low; somewhat higher Cr content and C render heat-treatment possible (e. g., 15% Cr, 0.2% C, f. p. 1400°, practically no interval). These heat-treating steels are somewhat low in impact strength although their elongation is good. Complete nonrusting properties are obtained only with polished surfaces. Rough surfaces form a rust film which does not penetrate further. Applications are: steam armatures, turbine parts, ship propellers, app. for the food industry. 1.5% Ni and 1.5% Mo may be added for safety and better chem. resistance. Higher-C alloys must be used in the hardened condition for best corrosion resistance (e. g., plunger and valve steel with 18% Cr, 0.5% C, 2% Mo, quenched from 1000° in oil, yields 60 Rockwell C). Steels for wear resistance have 1 to 2% C and 14 to 22% Cr; they are rust-proof if hardened (Ledeburite Cr-steels used for pump gears, grinding and pulverizing machinery, etc.). On account of its rust resistance and good castability chrome-casting (1 to 2% C, 30 to 35% Cr) is sometimes used instead of bronze; it is also applied where severe wear and corrosion resistance are required; it stands up well in mixed HNO_3 and H_2SO_4. Cr-Ni steels can be made pptn. hardening by Ti, Be, Al, B addns. This is little used as the resulting heterogeneous structure is less corrosion-resistant than pure austenite. 18/8 with Mo is used mainly in the sulfite wood pulp industry. For H_2SO_4 and HCl, Si castings are usually used (14–16% Si) which are rather brittle. Ten % Cr, 20% Ni, 4% Mo and 4% Cu steel resists H_2SO_4 in all concns. at room temp. and up to 70 and 80° at almost all concns. For highest resistance to HCl Ni-Mo-Fe alloys are used. Richard P. Seelig

The hardening of chromium-molybdenum and chromium-nickel case-hardening steels. A. Pomp and A. Krisch. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* **21**, 309–26(1939); cf. *C. A.* **32**, 7877⁴.—Two Cr-Mo, 1 Cr-Ni-Mo and 2 Cr-Ni steels were case-hardened and the cores of the case-hardened pieces (diams. varying from 5 to 60 mm.) were examd. by hardness (Brinell and Vickers), tensile, notch-impact and fatigue-bending tests. There were only slight differences in surface hardness; these were due to C different contents and chem. compns. Differences over the section were found to 30 units in the 5 10-mm. rods. The hardness of 30-mm. rods was in general 10 units lower than that of 20-mm. rods. The required tensile strength for these steels of 90–110 kg./sq. mm. was reached only in the 5- and 10-mm. rods; the 20- and 30-mm. rods showed only 68–85 kg./sq. mm.; the differences over the section were slight. The ratio of elastic limit to ultimate strength was in all cases not quite 0.70. Elongation at fracture was better in all cases than the required min. of 8–10% and notch-impact strength higher than 7.5 kg./sq. cm. Reduction of area was 47–59%. Most steels had a fine martensitic hardening structure, but some specimens had ferritic spots due to incomplete transformation. The frequency curve of the ratio tensile strength/Vickers hardness is an asymmetric curve with a max. at 0.35; that of tensile strength/Brinell hardness is more regular with the max. at 0.35 and 0.36. M. Hartenheim

A permanent magnetic alloy with anisotropic magnetic properties. H. G. Muller. *Z. Elektrochem.* **45**, 674–8 (1939).—The alloy investigated contained Fe 20, Ni 20 and Cu 60%. It can be homogenized at about 1100° and is made magnetic by quenching from the homogenizing temp. and then annealed for 10 to 20 hrs. at 600° or ½ hr. at 700°. Study of the magnetic properties of this alloy shows that magnetic anisotropy of cold-worked Fe-Ni-Cu permanent magnet alloys is produced by a strained condition which can be attributed to an anisotropic distribution of heterogeneous infiltrations. Crystallographic structure, therefore, has no relation to this anisotropy. The rolled structure and the anisotropic distribution of sepd. phases are both produced by plasticity changes during cold working. H. Stoertz

Abnormal magnetic properties of hardenable alloys. H. Bumm. *Z. Elektrochem.* **45**, 671–4(1939).—The alloys investigated had the compn. Fe 51.5, Ni 35.5, Cu 13 and Fe 50.5, Ni 34.5 and Cu 15.0%. They were heated at 1000° in H_2 for 1 hr. and cooled rapidly in H_2. The effect of heat-treatment upon the initial premeability and the increase in permeability was detd. Resistance measurements show that Cu sepn. occurs while permeability rises. Abnormal permeability increase therefore causes a dispersion of Cu atoms. The consts. of the fundamental lattice are altered, but the sepd. phase is in such a fine state of division that the newly produced lattice is not discernible either microscopically or by x-ray. Only when the sepd. phase is coagulated are new inhomogene-

ous strains produced which cause a decrease in permeability. Variation in heat-treatment and annealing of these alloys produces such changes in magnetic properties that almost any desired combination of initial and increasing permeability can be obtained in this manner. H. Stoertz

X-ray examination of light alloy castings. Sinkiti Sekito and Tomoki Inoue *J. Metals* (Japan) **9**, 559–61 (1939).—Application of x-ray radiography to light alloy castings is described. M. Ishida

Irregularities in the precipitation-hardening curves of aluminum-copper-magnesium alloys. H. Kostron. *Aluminium* **21**, 687–90(1939).—Curves taken with a *new automatically recording hardness tester* of the increase of hardness with time of pptn.-hardening alloys of the Al-Cu-Mg type have shown quite irregular, wavy form which might indicate that periods of hardening and dehardening alternate during storage in room temp. after quenching. A closer investigation of many such curves and expts. with cooling and stressing by different means (bending, rolling) seem to lead to the conclusion that the irregularities are, probably to be ascribed to local deformations which are caused by quenching stresses and by the inevitable straightening after the quenching process The expts. are described. M. Hartenheim

Thermal conductivities of some industrial alloys of copper and of nickel. J. W. Donaldson. *Engineering* **148**, 539–40(1939).—See *C. A.* **33**, 9256[9]. E. J. C.

Columbium-iron alloys. R. Genders and R. Harrison. *Engineering* **148**, 514–15(1939).—See *C. A.* **33**, 8550[5]. E. J. C.

Acid resistivity of iron-nickel-molybdenum alloys. Takezirō Murakami and Tatui Satō *Nippon Kinzoku Gakkai-Si* **3**, 325–7(1939); cf. *C. A.* **33**, 3738[1].—A series of corrosion tests of Fe-Ni-Mo alloys contg. 50%, 60%, 70% and 90% Ni with varying Mo content about 1–10% and a trace of C was examd. in 10% aq. solns. of HNO_3, HCl and H_2SO_4 at 25° by measuring the loss in weight. The effect of Mo on the loss by HNO_3 is remarkable, though that by H_2SO_4 or HCl is very small. Hideo Nishimura

Constitution of the precipitant from the Corson alloy by artificial aging. Masazo Okamoto. *Nippon Kinzoku Gakkai-Si* **3**, 336–48(1939).— As given by M. G. Corson a pseudo-binary system is not formed on the line $Cu-Ni_2Si$ and the Cu solid soln. and the γ' solid soln. coexist in the compn. range of the Corson alloy. Hence the second phase pptd. from the supersatd. α solid soln in the Corson alloys is not the Ni_2Si, but the γ', which is a phase formed by Ni_6Si_2 contg. about 35% as max. of Cu in the form of solid soln. The κ phase existing in the Cu-Si system at the compn. range of Si from about 4.5 to 7.5% does not appear in the Corson alloy. H. N.

Free-turning brass (machinability) Maurice Cook and E. Davis. *Metal Ind.* (London) **55**, 241–5(1939).—See *C. A.* **33**, 9257[6]. *Ibid.* 275–7.—The distribution of Pb particles in extruded rod was quite uniform both microscopically and in machinability ratings. Annealing caused no appreciable coalescence or effect on either of these factors. J. N. Lynn

Electric resistance wires. C. L. Mantell. *Wire and Wire Products* **14**, 543–9(1939).—The manuf. of Ni-Cr, Ni-Cr-Fe and Ni-Cu alloys and of elec. resistance wire is described. George Ayers

Metallic protective coatings. E. Raub. *Mitt. Forsch.-Inst. Edelmetalle staatl. hoheren Fachschule schwab. Gmund* Aug., 1939, 1–16.—A general discussion of theory and practice, particularly from the point of view of the electrochem. theory of corrosion Examples are described of the plating of Fe with Ni and Zn and of Mg and its alloys with Se. M. Hartenheim

Corrosion of various copper alloys in solutions of 0.1 *N* sodium chloride and 0.1 *N* sodium chloride-0.3% hydrogen peroxide. Akira Itagaki and Eizyun Kuwahara. *Nippon Kinzoku Gakkai-Si* **3**, 327–36(1939).—The corrosion resistance of some Cu alloys and a few Ni alloys to 0.1 *N* NaCl-0.3% H_2O_2 solns. was detd. The corrosion resistance of the alloys in the soln. was better, the higher the Ni content. Among the alloys which contains no Ni or a little, Barberite, Silzin Bronze, Ambrac and Tempaloy were comparatively good resistant alloys; the former 2 especially showed a good resistance in both solns. The corrosion resistance of 10% Al-Cu alloy, which showed an excellent resistivity in dil. HCl, was not so good. Hideo Nishimura

Corrosion protection of magnesium and its alloys. B. Wullhurst. *Mitt. Forsch.-Inst. Edelmetalle staatl. hoheren Fachschule schwab. Gmund* Aug., 1939, 16–25.—The protection of Mg from corrosion by alloying with other metals can be obtained only with a limited no. of metals because of its very strongly electroneg. nature (−2.35 v.), that is only with those in its neighborhood in the potential series. Ag, Cu and Ni can, in general, not be used as their soly. in Mg is only slight and an excess of undissolved metal remains which leads by its higher potential to corrosion; they are used only where the alloys cannot come in contact with electrolytes. The most important alloying metals for Mg are Al, Mn, Zn, Si and, lately, Ca. Al and Zn increase mech. strength, Si and Mn produce fine grain, and Mn and Ca especially have a corrosion-retarding effect. An addn. of Pb (0.5–22%) and of 1–10% Cd to Mg alloys with subsequent aging at 175° is said to produce high corrosion resistance (U. S. pats. 2,124,537, *C. A.* **32**, 7012[1], and 2,124,571, *C. A.* **32**, 7012[5]), or also 0.05% Sb or Bi to Al-Mg and Zn-Mg alloys. Be effects an extraordinary increase of corrosion resistance in amts. of 0.005–0.5%; this upper limit is at the same time the max. soly. of Be in Mg. Be makes coarser grain; this can, however, be counteracted by addn. of Ti or Zr, the latter in amts. of 0.005–0.5%. The elements of the alk earth group have also been proposed to reduce corrosion. Ba is used in alloys for the getter material in electron tubes. Ca increases corrosion resistance of Mg considerably; an alloy with 1% Ca does not decompose water vapor, which explains its corrosion resistance in humid air. Mg with 3% Li shows a considerable increase in mech. strength, and corrosion did not take place after a longer time of storage. According to Brit. pat. 489,320 (*C. A.* **33**, 1171), Mg alloys with 1–5% K or Na are proposed. Protection of Mg by coatings of fluorides, phosphates, silicates and chromates are often used now, especially chromates and phosphates; methods for their production are described. Electrochem. generation of protective films, similar to the eloxation process for Al, have given a limited success; a good adhesion is difficult to obtain and requires very careful pretreatment of the metal. Methods are described, especially for elec. treatment of an alloy of 97.08% Mg with 2.5% Mn, 0.045% Fe and 0.01% Cu in *N* NaOH soln. with d. c. M. Hartenheim

Cold welding of silver. II. G. R. Van Duzee and J. M. Thomas. *Trans. Electrochem. Soc.* **77**, 9 pp. (preprint)(1940).—Pressure welding of Ag sheet was studied at temps. from room temp. to red heat. By preheating the Ag to redness, then allowing it to cool, complete welds were secured at room temp. both with "999.3 fine" Ag and with spectroscopically pure Ag. When the spectroscopically pure Ag was preheated, complete welding took place at room temp. under a pressure of 4950 kg./sq. cm. applied for 30 sec. Similarly treated 999.3 fine Ag sheet showed only slightly lower weldability. The spectroscopically pure Ag which had not been preheated before welding showed a much lower weldability than when heated to redness immediately before pressure was applied. When there had been a preheating treatment, welds were obtained consistently when 4950 kg./sq. cm. was applied for 30 sec.; without preheating no welds at all were formed under the same conditions and the welds formed under a pressure of 7000 kg./sq. cm. applied for 30 sec. were unsatisfactory. Good welds were obtained, however, at 9100 kg./sq. cm. Comparative tests with Au sheet showed similar advantages obtained by heating to redness before pressure application. Results of welding tests with 999 fine Ag powder and "proof" Ag powder are given. C. G. F.

Soldering of light metals. R. Schulze. *Aluminium*

21, 710–12 (1939).—Soft-soldered joints often show a poor adhesion of solder to metal. Numerous solders in the market are investigated with regard to compn., m. p. and metallization. Most solders are based on Zn, Sn or Cd and contain Cu and Ag. Sn and Cd up to 50–80% are present in some with m. p. between 120 and 260°. Zn solders with addns. of Cu and Ag m. 400–500° and have a hard-solder character Al solders with low m. p. do not destroy the oxide film and give satisfactory joints only if they are brushed on with a hard wire brush and overheated very strongly. This, however, injures the base metal. Sn-rich solders have too low a m. p.; those rich in Zn have m. p. that is too high so that hardened metals are softened. The most suitable temp. for soldering as far as the base metal is concerned is about 300°, for then the oxide film is easily removed and a good metallic connection between solder and metal obtained. The solder should have a similar m. p. and a narrow melting range, and should flow readily and alloy easily with the Al base. The eutectic Al-Zn alloy (Ger. pat. 677,568, *C. A.* **33**, 9278[7]) with addn. of Sn and Cd fulfils these requirements. The tensile strength of such butt joints is 3 kg /sq. mm. Overlapping joints (about 12 mm.) gave with Al-Cu-Mg sheets a tensile strength of 32 kg./sq. mm. referred to the section of the specimen with fracture through the joint. Photomicrographs of etchings show the transition zones of the joints. M. Hartenheim

Wire solder—its manufacture and uses. Robert A. Gardiner. *Wire and Wire Products* **14**, 551–2 (1939).—The history, development and uses of wire solder are discussed. George Ayers

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Ability of monel to withstand corrosion in the oil and fat industry (Muller) **27**. Assocn. of sulfate reduction in the soil with anaerobic Fe corrosion (Pont) **15**. Decompn. of blast-furnace slag (Naumann) **15**. Primers for nonferrous metals (Eastwood, *et al.*) **26**. Mo in ores (Novokhatskil, Kalmin) **8**. Behavior of Al in cold NH_3 solns. (Röhrig) **2**. Alloy electrodes (U. S. pat. 2,172,967) **4**.

Froth flotation of ores. Wolf Kritchevsky (to Ninol, Inc.). U. S. 2,173,909, Sept. 26. An ore such as an oxidized Pb ore contg. Au in quartz is subjected to froth flotation in the presence of an aq. medium contg. a relatively small proportion of a condensation product of an alkylolamine such as mono-, di- or tri-ethanolamine and a higher org. acid substance such as stearic or oleic acid. Numerous examples are given. 6

Treating ore deposits such as those of copper ore with circulating molten sulfur in mining operation. Howard L. Reed (11.3% to Fohs Oil Co.). U. S. 2,172,683, Sept. 12. App. is described, and a method of circulating molten S through an ore deposit and treating the S as it comes from the deposit to remove minerals which it has taken up. 7

Treating ores and tailings for recovery of metals such as gold and silver. John Allingham (50% to Wm. N. Rossberg). U. S. 2,173,090, Sept. 19. App. is described, and a process in which a fluid ore pulp is subjected in the presence of an electrolyte to the action of a mass of materials such as particles of Fe and Zn forming a voltaic couple and of a size such that the materials are brought into intimate contact with the mass, thereby depositing mineral particles on one of the couple materials, these particles being then sepd. from the couple into the fluid pulp and the pulp being sepd. from the couple, and the particles being finally recovered from the pulp. 8

Apparatus for utilizing molten lead for separating gold from sand. Albert Trayman. U. S. 2,172,718, Sept. 12. Various structural and operative details. 9

Treating iron ores. Kaiser-Wilhelm-Institut fur Eisenforschung e. V. Brit. 507,572, June 14, 1939. A magnetic ore-dressing process for $FeCO_3$ ores comprises roasting the ores in an atm. that contains no O or only a small quantity of free O, cooling and finally submitting to a magnetic sepn., the cooling of the hot roasted material being effected by means of a gas that contains no, or almost no, free O, the max permissible O content in each case being 1.8%. In a modification, the cooling below 550° may be effected in a gas contg. free O, e. g., air. The roasting temp. may be 600° and the roasting period 25 min.–3 hrs. The cooling atm. may be a mixt. of N_2 and CO_2, with or without 3% of CO. Cf. *C. A.* **33**, 1256[9].

Obtaining uranium and vanadium from ores. Ralph D. Nye and Dana J. Demorest (to Utah Alloy Ores, Inc.). U. S. 2,173,523, Sept. 19. A process of obtaining U and V from their ores involves subjecting the ore to crushing, sepg. desired mineralized fines normally contg. aluminous material and acid neutralizing elements by a dry pneumatic sepn., subjecting the remaining mineralized tailings only from such sepn. to a moistening and dampening treatment with an acid reagent such as a dil. H_2SO_4 soln., storing the acid-treated tailings in piles to age them and permit reaction of the acid with U and V compds. present, and dissolving out the desired metal values. An arrangement of app. is described. 3

Apparatus for melting metals such as magnesium. Claire S. Harris (to Dow Chemical Co.). U. S. 2,173,063, Sept. 12. An app. for melting readily oxidizable metals such as Mg and its alloys comprises a melting pot, a double-walled dome-shaped cover for the pot, the walls of which are spaced apart to form a closed chamber in which to generate a protective gas or vapor, with an aperture through both walls of the cover of sufficient size to admit a ladle (various other structural details also being described). 4

Roasting metal sulfide fines such as those of iron. Bernard M. Carter (to General Chemical Co.). U. S. 2,174,185, Sept. 26. An arrangement of app. is described, and a method which comprises introducing metal sulfide fines, metal sulfate fines and oxidizing gas into a combustion zone heated to above the ignition point of the sulfide fines, forming in the combustion zone a dispersion of the sulfide and sulfate fines in the oxidizing gas, roasting the sulfide fines while in gaseous suspension, regulating the amount of sulfate introduced so as to avoid reducing combustion zone temp. below that at which sulfide fines introduced into the combustion zone ignite and oxidize in the presence of O, causing the sulfide and sulfate fines to pass through the combustion zone so as to maintain such fines in suspension for a sufficient time interval to roast the sulfide fines and to decompose the sulfate fines to form from the sulfide and sulfate fines SO_2 gas and substantially desulfurized metal oxide cinder, withdrawing SO_2 from the combustion zone, and discharging cinder therefrom. 5

Shaft furnace for fusing metals. Wolfgang Zoller. Ger. 678,261, July 12, 1939 (Cl. 31*a*. 1.01). Addn. to 676,804 (*C. A.* **33**, 7264[2]).

Insulated wall for open-hearth furnaces. Edward J. Parsons. U. S. 2,173,764, Sept. 19. Various structural features.

Bessemer converters. Herman A. Brassert and H. A. Brassert & Co. Ltd. Brit. 507,200, June 8, 1939. In a Bessemer converter having a tuyère box of circular cross-section, the plain upper face of the bottom merges into the spherical wall portion, this portion also merging into a frustoconical belly portion, and the ratio of the vol. of metal in an imaginary cylinder above the tuyères to the vol. of the annulus surrounding this cylinder is not greater than 3.1 in a newly lined converter, this ratio applying to all cylinders and annuli extending up to the max. diam. of the converter. At the height of the bath at the max. diam., which in ordinary converters is 750 mm. above the bottom of the converter, the ratio of the radius of the converter to the radius of the tuyère box is not less than 3:2.

Twin oven unit for annealing castings for malleableizing. Cecil F. Herington (to Amco, Inc.). U. S. 2,173,586, Sept. 19. Various structural features.

Apparatus for continuous extrusion of metals such as lead or its alloys, as in forming electric cable sheaths. Percy Dunsheath (to Henley Extrusion Machine Co., Ltd.). U. S. 2,172,651, Sept. 12. Various structural, mech. and operative details.

Reclaiming manganese from blast-furnace dust in manganese alloy production. Charles B. Francis. U. S.

2,173,535, Sept. 19. Mn-bearing dust is sepd. from blast-furnace gas, mixed with an Fe oxide waste or by-product from the steel mills, and the mixt. is formed into small compact masses, charged into a basic steel-making furnace, and resulting slag is tapped from the furnace and is re-charged into the blast furnace.

Metal powders suitable for making electrical brushes, bearings, etc. Joseph E. Drapeau, Jr., and James O. Johnstone (to Glidden Co.). U. S. 2,173,100, Sept. 19. A substantially dry, nonsegregating, free-flowing metal powder such as mixed Cu and Sn has assocd. with it about 0.0025–0.03% of a nonreactive liquid such as kerosene which serves to inhibit segregation.

Apparatus for polishing metal powders. Henry H. Mandle. Brit. 508,485, June 30, 1939.

Iron powder. Deutsche Gold- und Silber-Scheideanstalt vormals Roessler. Brit. 507,277, June 13, 1939. In the production of Fe powder by the reduction of Fe oxide by H, powd. Fe is moistened with H_2O in the presence of small quantities of an Fe halide, e. g., $FeCl_3$, and exposed to the action of the air, preferably with stirring, a moderate temp., e. g., 120–200°, being maintained, the oxidation product so obtained being reduced by H at 500–600°. Before reduction, the oxidation product may be heated to 350–400°, preferably in the presence of air, e. g., in a rotary furnace.

Magnesium. Henri L. Gentil. Brit. 506,485, May 30, 1939. Oxidized compds. of Mg are reduced by means of a sulfide of a metal that is nonvolatile at the temp. of reduction, e. g., Fe, Mn, Ni, Sn. If Sn sulfide is used, the Sn can be completely sepd. from the other elements present and recovered. The reaction may be conducted under reduced pressure.

Treatment of anodized magnesium. Robert W. Buzzard. Brit. 506,466, May 30, 1939. The corrosion resistance of coatings produced on Mg or Mg base alloys by anodic treatment is improved by immersion in a hot acid-reacting soln. contg. (a) a chromate or dichromate and (b) a sol. sulfate, phosphate, borate or fluoride or a salt of Cr or Mn or a combination of these salts. Suitable baths contain (1) $Na_2Cr_2O_7$, $K_2Cr_2O_7$ or $(NH_4)_2Cr_2O_7$ 1–30 with $MnSO_4$ 8–12 or CrF_3 0.25–10%, (2) $Na_2Cr_2O_7$, $K_2Cr_2O_7$ or $(NH_4)_2Cr_2O_7$ 8–12 with Na borate 3–7 or Na phosphate 8–12% and (3) $ZnCrO_4$ 1–3, $Na_2Cr_2O_7$ 3–7 and CrF_3 1–3%. The treatment may comprise immersion in a bath contg. a chromate and (or) dichromate and a phosphate followed by immersion in a bath contg. a dichromate, $MnSO_4$ or CrF_3.

Extracting nickel from nickel-copper mat. I. G. Farbenindustrie A.-G. Brit. 507,792, June 23, 1939. Ni-Cu mat, prior to extn. of Ni by acids, salt solns., chlorination or a carbonyl process, is subjected to a protracted heat treatment in a neutral atm. at 400–900°, whereby the soly. and reactivity of the Ni are increased.

Extracting chromium from alloys of iron and chromium. Marvin J. Udy. Brit. 507,558, June 16, 1939. The alloys, which may be in scrap or other form, are treated at a melting temp. with CaO and SiO_2 under oxidizing conditions so that Cr is selectively oxidized to form a molten Ca silicochromite of formula $3CaO.Cr_2O_3.nSiO_2$, where n is less than 3, and a metal contg. unoxidized Fe and, if desired, some Cr. The process may be conducted in an elec. furnace, blast furnace or converter and the CaO and SiO_2 may be added as limestone and quartzite, resp. The oxidizing agent may be O, CO_2, Fe_2O_3 or Fe ore. Sufficient coke should be present to maintain a concn. of CO to prevent oxidation of the Fe, and the exothermic nature of the reaction may be increased by the addn. of Si, Fe-Si or an oxidizing agent such as $NaNO_3$. The silicochromite may be used in the manuf. of chromates, dichromates, CrO_3, Cr_2O_3 and $Cr_2(SO_4)_3$, or in making Ni-Cr and Co-Cr alloys, pure Cr (by reduction with Si in the presence of addnl. CaO), or alloys of Cr and Fe. In the latter case, the silicochromite may contain Fe and is granulated, briquetted with a nonearbonaceous reducing agent, e. g., Fe-Si or Si, and added to a bath of low-C steel. Cf. *C. A.* **33**, 1259[9].

Beryllium articles. Deutsche Gold- und Silber-Scheideanstalt vormals Roessler. Brit. 508,028, June 23, 1939. See Fr. 831,520 (*C. A.* **33**, 1651[2]).

Cleaning and oiling metal. Morris D. Stone (to United Engineering and Foundry Co.) Brit. 507,692, June 20, 1939. The rusting of metal articles that may occur during the normal method of drying after a hot-H_2O rinse subsequent to pickling and prior to oiling is avoided by rinsing them in cold H_2O after the pickling and then, without permitting them to dry, oiling them.

Phosphoric acid baths. René J. Kahn. Brit. 507,355, June 14, 1939. See Fr. 829,686 (*C. A.* **33**, 1258[3]).

Preparing hard metals such as tungsten, columbium or vanadium and mixed carbides such as those of these metals. Gustav Boecker and Johann G. Boecker (to Charles A. Bolton). U. S. 2,173,749, Sept. 19. A mixt. of materials such as W, Cb, V and C is subjected to heat treatment at progressively increasing temp. in stages, the temp. stages corresponding to the temps at which the individual constituents most readily combine (suitably about 1450° and 2200°).

Hard metal carbide articles. Metal Carbides Corp. Brit. 506,728, June 1, 1939. See U. S. 2,167,544 (*C. A.* **33**, 8557[2]).

Creep-resistant structural elements subject to high temperature in use, such as oil-still-tube supports. Edmund M. Wise and James T. Gow (to International Nickel Co.). U. S. 2,174,025, Sept. 26. Load supporting elements are made of a creep- and heat-resistant austenitic Cr-Ni-Fe alloy having an austenitic matrix and relatively stable fine carbides distributed in the grains, the alloy contg. Fe together with Cr 10–30, Ni 8–50, C 0.25–0.75, and Cb 0.5–3%, such elements having a creep rate in the second stage less than 0.00024% per hr. under a stress of 2000 lb per sq. in. at a temp. of about 980°.

Treating metal sheets with liquids. Remy, van der Zypen & Co. Brit. 508,086, June 26, 1939. In pickling, rinsing, and other treatment of metal sheets, the sheets being guided in guiding members through the liquid contained in a tank, the sheets are, to protect the parts thereof that lie upon the guiding members, during their passage through the liquid lifted wholly or partly from the members by means of the liquid itself producing a lift upon the sheets.

Magnetic material in sheet form and of high permeability. Gunter Wassermann (to Siemens & Halske, A.-G.). U. S. 2,173,240, Sept. 19. A method of mfg. magnetic materials of high permeability in sheet form from materials such as Fe with body-centered cubic atom lattices consists in first cold rolling the specimen to reduce it to about one-eighth to one-tenth of its original thickness, subsequently cold rolling it in a direction 90° from the first rolling direction to reduce it to about half the thickness attained after the first rolling, and then heat-treating at a temp. of 600–1000°.

Preparing metals such as steel for working, as by rolling or drawing. Michael W. Freeman. U. S. 2,172,533, Sept. 12. The surface of the metal is treated with a soln. having as its principal active constituent an org. sulfonic acid which is substantially devoid of inorg. acid content, and which serves as a lubricant. Numerous examples are given.

Melting and refining steel in an open-hearth furnace. Wm. A. Morton and Howard F. Spencer (to Amco, Inc.). U. S. 2,173,592, Sept. 19. Details of furnace construction are described and of a method of melting and refining steel in an open hearth furnace which comprises placing a charge on the hearth structure, directing a melting flame to substantially the level of the charge from opposite ends of the charge to blanket the charge with the products of combustion and withdrawing the products of combustion downwardly through substantially the center of the charge to keep the heating medium in intimate contact with the charge at all times.

Deoxidizing steel. Röchling'sche Eisen- und Stahlwerke G. m. b. H. Brit. 508,012, June 20, 1939. This corresponds to Fr. 831,275 (*C. A.* **33**, 2476[3]).

Deoxidizing steel baths. Otto Johannsen (to Röchling'sche Eisen- und Stahlwerke G. m. b. H.). U. S. 2,173,205, Sept. 19. For deoxidizing finished steel out-

side the furnace, use is made of a mixt. of CaC_2 40–60 and fluorspar 60–40%, suitably with cryolite 10%.

Composite bearings of steel and Babbitt metal or the like. Randolph L. Strickland and Jerome J. Frank. U. S. 2,173,985, Sept. 26. Various structural details.

Preparing steel bumper bars, etc., for nickel and chromium plating. Edwin M. Baker (to Houdaille-Hershey Corp.). U. S. 2,173,092, Sept. 19. A method of prepg. steel bumper bars, etc., for subsequent Ni and Cr plating (with need for polishing largely eliminated) involves hot rolling an ingot of Cu alloy steel contg. Cu 0.5–3.0 and C 0.05–0.7%, air quenching the resulting semifinished sheets to retain the Cu content in soln. in the alloy, pickling, cold rolling and forming the semifinished sheets into bumper bars, cleaning the bars and subjecting them in a nonoxidizing environment to heat treatment to effect pptn. of the Cu content while maintaining the smooth surface characteristics of the bars produced by cold rolling.

Lining vessels such as those of steel with a different metal. Wayne A. Howard and Turner C. Smith (to Socony-Vacuum Oil Co.). U. S. 2,172,819, Sept. 12. Various mfg. details for utilizing sheet metal linings.

Alloy steels. Schoeller-Bleckmann Stahlwerke A.-G. Brit. 506,640, May 26, 1939. Welded constructional elements, e. g., for aircraft, having a min. strength at the weld of 60 kg. per sq. mm. without brittleness are made from steel capable of pptn.-hardening and contg. C 0.05–0.25, Mn 0.3–0.8, Si 0.1–0.5, Mo 0.2–2.0, V 0.1–1.0 and Cu 0.25–3.0%, but no Ti. The steel may be subjected to pptn. hardening by being tempered at about 400–800°, with or without a previous normalizing treatment, or it may be normalized only. In Brit. 506,641, May 26, 1939, the steel contains C 0.05–0.25 and Cu 0.25–5.0 with 1 of the following addns.: Mn 0.8–10.0, Si 0.5–3.0, Cr 0.2–3.0, Ni 0.5–5.0, Mo 0.5–3.0, V 0.2–1.0, W 0.5–3.0, Zr 0.1–0.5 or P 0.1–0.5%, but no Ti. Two or more of the addnl. elements may be present in lesser quantities to give the desired properties.

Steel alloys. Fried. Krupp A.-G. Brit. 506,905, June 6, 1939. Articles that have to be welded during manuf. at 500–900°, e. g., parts of chem. or cooking app., spoons, forks, knives and parts for interior decoration, are made from austenitic steel alloys contg. Cr 10.5–16, Mn 10.5–15, N 0.05–0.35 and C up to 0.15%, with or without Ni 2.5% and with or without up to a total of 3% of Ti, Ta, Cb, V, W, Mo, Zr, Co, Si, Cu and (or) Al.

Steel alloys. Kohle- und Eisenforschung G. m. b. H. Brit. 507,321, June 9, 1939. Articles that do not readily rust are produced from steel or Fe that contains more than 0.11% S and 0.3–1% Cu, with C in normal proportions, the remainder being Fe, with or without Si 0.2% or less and Mn not exceeding 1%. Addns. of P 0.06–1 and (or) Cr up to 1% may be made to the alloy.

Alloy steels for high-speed tools. Deutsche Edelstahlwerke A.-G. Brit. 507,983, June 23, 1939. These contain C 0.7–1.8, Ta and (or) Cb 2.1–15 and V 0.3–5%, with or without Cr up to 6, Co up to 20 and W and (or) Mo up to 5%. The Ta or Cb may be partly replaced by the same amt. of Ti.

Alloys. Henry L. Whitman. Brit. 507,903, June 16, 1939. See Fr. 830,183 (*C. A.* **33**, 1259[7]).

Alloys for electrical leading-in wires, etc. Paul Schwarzkopf. U. S. 2,172,548, Sept. 12. There are used together Ni about 20–30, Co about 10–20 and Fe about 50–70%, with impurities such as Si, Mn and C below 0.3%, the components being sintered together in their "chemically purest" state at about 1300–1400°.

Alloys for resistance wire for electric heaters, etc. British Driver-Harris Co. Ltd. and Wm. M. Kay. Brit. 507,167, June 12, 1939. Alloys of the type comprising Ni and Cr or Ni, Cr and Fe, with or without W, Mo, Co, Mn, Al or U, contain also Th 0.01–2 and Si 0.25–3%, with or without any of the following: a rare earth metal, e. g., Ce, 0.01–2, alk.-earth metal, e. g., Ca, 0.01–0.5 and Zr 0.01–1%. Mg to the extent of 0.01–0.5% may be added for deoxidizing purposes.

Magnetic alloy. Siemens & Halske A. G. (Hans Neumann, inventor). Ger. 678,161, July 10, 1939 (Cl. 40*b*. 14). Addn. to 676,838 (*C. A.* **33**, 7268[9]). An alloy with a high permeability and small coercive effect consists of Fe, Ni and Cu in which 1–10% of the Fe is replaced by Mo. A suitable alloy contains Ni 69, Cu 17.5, Fe 10.5 and Mo 3%.

Aluminum alloy. N.-V. Philips' Gloeilampenfabrieken. Brit. 507,382, June 14, 1939. Electrodes of elec. discharge devices starting with a glow discharge that changes to an independent arc are of Al contg. 5% of Mg.

Aluminum alloy. Rolls-Royce Ltd. Ger. 679,860, Aug. 16, 1939 (Cl. 40*b*. 18). An alloy very resistant to fatigue consists of Fe 1.65–3.0, Mg 0.7–2.2, Cu 0.5–2.5, Si 1.0–3.0% and the rest Al. If the alloy is to be used for slide bearings, 2.2–3.45% of Mg_2Si is added. The alloy may also contain up to 0.2% of Ni. Cf. *C. A.* **33**, 6786[5].

Aluminum-nickel alloys. Metallurgica Bresciana già Tempini. Brit. 506,571, May 31, 1939. The alloys are prepd. by bubbling gaseous $Ni(CO)_4$ through molten Al. The CO liberated has a degasifying and deoxidizing effect.

Copper alloys suitable for electric conductors. Werner Hessenbruch (to Heraeus-Vacuumschmelze A.-G.). U. S. 2,172,639, Sept. 12. Cu is used with Be 0.5–2.5 and Co 0.1–1%.

Copper alloys suitable for welding electrodes, etc. Franz R. Hensel and Earl I. Larsen (to P. R. Mallory & Co.). U. S. 2,173,254, Sept. 19. Alloys of Cu with 0.05–3% of Be and 0.002–0.1% of Li are used with or without Ag, Co, Mn or Cd 1%.

Magnesium alloys. Fritz Christen. Brit. 507,294, June 13, 1939. See U. S. 2,166,039 (*C. A.* **33**, 8166[2]).

Alloys containing palladium, silver, etc. James A. Kilgallon. U. S. 2,172,512, Sept. 12. Alloys which are suitable for use in dental work contain Al 1.5–1.75, Cu 10–15, Ag 30–45, and Pd 58–38 parts.

Resilient articles such as springs from alloys containing nickel and iron, etc. Robert B. Wasson and Alfred V. De Forest (to John Chatillon & Sons). U. S. 2,174,171, Sept. 26. An annealed alloy which may contain Ni about 35–37, Fe 50–60, Cr 7–8, Mn 0.45–0.75, Mo 0.35–0.65, Si 0.3–0.6, and C not over 0.2% is cold worked to reduce its cross section "by over about 85%," and is hardened by heat treatment.

Silicon-iron alloys suitable for use in electric transformers, etc. Wilhelm Rohn and Werner Hessenbruch (to Heraeus-Vacuumschmelze A.-G.). U. S. 2,173,312, Sept. 19. Alloys having a relatively low energy-loss measurement of between 0.48 and 0.60 w./kg. contain Fe together with Si 2–5% and small but effective amts. up to 0.8% of at least one of the metals Cu, Al, Zr and Ti, are substantially free from metallic compds. of O, N and H and are degasified under reduced pressure.

Magnetic material for use in powder cores and the like. Jacob L. Snoek (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,172,626, Sept. 12. An alloy is used contg. Fe together with Si 7–9 and Mn 6–11%.

Coating metals. Institut für physikalische Chemie der Metalle am Kaiser-Wilhelm-Institut für Metallforschung. Brit. 507,341, June 14, 1939. To avoid the formation of brittle intermetallic compds. when introducing a metal B into the surface of a metal A by cementation there is used instead of B itself an alloy of A with B that corresponds approx., and preferably exactly, with the compn. of that intermetallic compd. that in accordance with the phase diagram of the system A-B is coexistant as a sep. phase with A or with the solid soln. of A with B, if any, rich in A. Instead of the alloy, a mixt. of the components in the same proportions may be used. If it is desired to introduce into A 2 or more metals B, B_1, B_2, etc., the compn. of the cementation powder will depend on whether B_1, B_2, etc., form or do not form compds. with A. If A contains alloying constituents A_1, A_2, etc., the cementation material may or may not contain these metals according to whether it is or is not desired to prevent diffusion of these constituents. Cf. *C. A.* **33**, 1261[5].

Coating magnesium and its alloys. The Dow Chemical Co. Brit. 506,836, June 6, 1939. A protective and

decorative coating is formed upon articles of Mg or of its alloys by treatment with an aq. soln. contg. $Cr_2(SO_4)_3$ and an alkali metal chromate or dichromate. The soln. preferably contains 1–20% alkali metal chromate and 0.5–20% $Cr_2(SO_4)_3$. K or NH_4 chromic sulfate may be the source of the $Cr_2(SO_4)_3$. Other salts, e. g., NaCl, $MgCl_2$, Na_2SO_4, $MgSO_4$, may be present. The article, e. g., a Mg alloy with Al 10, Mn 0.1 and Si 0.5% is cleaned, immersed in the soln. for 0.5–60 min., rinsed and dried. 1

Coating with metals. Siemens-Schuckertwerke A.-G. Brit. 508,014, June 20, 1939. A firmly adhering metal coating adapted to form a foundation for a soldered or welded joint is applied to a ceramic body by first heating the body to a temp. at or near, preferably immediately below, the m. p. of the metal to be applied, and then applying the metal by spraying, e. g., by the Schoop process. The coating applied by spraying may be thin, and may be brought to the required thickness by means other than spraying, e. g., electrolysis. In the preferred method, a nonmetallic intermediate layer, e. g., a glaze, is first applied to the ceramic body, this layer having a softening point that lies below the m. p. of the metal coating so that it is softened during the preheating. When coating with Fe, glazes such as feldspar glazes having softening temps. of about 1200° may be used; for coating with Cu the softening temp. of the glaze may be about 900°. When a metal member is to be soldered onto the coated ceramic body, the softening temp. of the glaze should be above the m. p. of the solder. 2

Coating with metals. Mitteldeutsche Stahlwerke A.-G. Brit. 508,117, June 27, 1939. In coating tubes, sheets and other Fe articles by the Pb-Zn process, wherein the objects are introduced into the Pb and withdrawn through the layer of Zn floating on the Pb, the objects are introduced into the Pb bath immediately after pretreatment with an aq. soln. of NH_4Cl and $ZnCl_2$, which are preferably in the proportions 1:5–10. The container for the molten bath is preferably made of Fe poor in C and the articles are introduced into the Pb through a frame made of a material not attacked by Pb or Pb-Zn alloy.

Hard facings on surfaces such as steel, bronze, monel or aluminum. Robert L. Lerch and Wm. A. Wissler (to Haynes Stellite Co.). U. S. 2,173,484, Sept. 19. For producing a wear-resistant coating of substantial thickness on a metal article, successive portions of the surface of the article are melted to an appreciable depth by use of a gas welding flame, with simultaneous impingement of particles of difficultly fusible material such as W carbide or Si carbide, and the hard-faced surface thus formed is subsequently covered with a layer of fusion-welded matrix metal deposited from a welding rod, the cycle of operations being repeated to produce a surface layer of desired thickness and desired ratio of surfacing materials. App. is described. 3

Testing the thickness of metal coatings such as zinc, bronze, nickel or copper on steel, etc. Sydney G. Clarke (to British Non-Ferrous Metals Research Association). U. S. 2,174,053, Sept. 26. App. is described, and a method of testing the thickness of a coating of metal deposited on a basis metal, by causing a continuous stream of a corroding liquid under const. head to impinge upon a spot in the coating and measuring the time or amt. of liquid required to penetrate the coating, the liquid used being a soln. contg. $FeCl_3$, $CuSO_4$ and HOAc in specified proportions. 4

Hot galvanizing ferrous metal articles such as wire or strip metal. John R. Daesen and Albert F. Bradley (to Northwestern Steel and Wire Co.). U. S. 2,172,933, Sept. 12. App. is described, and a process of hot galvanizing a ferrous metal article involving passing the article through a molten Zn bath maintained at a temp. of about 455–480° to form a Zn coating on the article and then heat-treating the coated article in a molten salt bath at the same or a higher temp. to increase the ferro-Zn alloy content of the coating. 5

Apparatus (with a rotary cylinder) for recovering metals such as the zinc of galvanizing coatings. Claude E. Bowers. U. S. 2,173,546, Sept. 19. Various details of an app. suitable for treating scrap galvanized metal with an H_2SO_4 soln. 6

Soldering, brazing and welding. The Automatic Gasflux Co. Brit. 507,632, June 16, 1939. In soldering, etc., by a gas torch, a liquid fluxing-agent other than an alkyl borate is entrained as a vapor in the gas supplied to the torch so as to provide a fusible stable flux that flows over and covers the heated area and is not oxidizable or corrosive. Thus, either the combustible gas or the oxidizing gas may be bubbled through a fluxing agent dissolved in a vaporizable solvent or through a vaporizable ester of an inorg. acid other than an alkyl borate. App. is described. 7

Soft soldering of aluminum and aluminum-magnesium alloys. Fritz Kohler, Eduard Rouette and Wilhelm Standop. U. S. 2,172,979, Sept. 12. A soldering compn. is used comprising a complex salt contg. a stannic halide and a hydrohalide of a H-rich amine base such as triethylamine-chlorostannate in reactive combination with at least one stannous halide such as $SnCl_2$ and at least one Zn halide such as $ZnCl_2$, and during the soldering procedure forms a vaporizable compd. and a Sn-Zn alloy. 8

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Molecular structure of aliphatic compounds and their boiling points. E. Neyman-Pilat. *J. Am. Chem. Soc.* **61**, 3235–6(1939); cf. Kinney, *C. A.* **33**, 1261[8].—A discussion of the method of K. for the detn. of "boiling-point numbers." **Calculation of the boiling-point numbers of aliphatic compounds.** Corliss R. Kinney. *Ibid.* 3233–7.—A reply. C. J. West

Relationships between absorption spectra in the ultraviolet and the constitution of organic compounds. Karl Dimroth. *Angew. Chem.* **52**, 545–56(1939).—A comprehensive discussion covering the following subjects: theory and measurements, the C:C bond in aliphatic compds., aromatic compds., the C:O group and the carboxyl group. Applications to polyenes, sterols and steroids are presented. Many data and over 77 references. Karl Kammermeyer

The determination of branched isomers in mixtures of paraffin hydrocarbons. Ulrich von Weber. *Angew Chem.* **52**, 607–10(1939).—The method is based on the following factors: branching depresses the b. p. of the normal compds. by an av. of 7° per unit of branching; the degree of branching is expressed by the branching no. Z, which is defined as the mol. fraction of branches, i. e., Z for n-C_7H_{16} is zero, for 2,4,4-trimethylpentane $Z = 3$, and for a 50% mixt. of the two $Z = 1.5$; the paraffins form ideal solns. with each other, i. e., follow Raoult's law. The detn. of Z is carried out as follows: the paraffin mixt. is fractionally distd., in a column having at least 10 theoretical plates, with a reflux ratio of 10:1. The gaseous components are boiled off before fractions are taken. The fractions are cut at 5° above the b. p. of the normal paraffins: at 41, 74; 103, 131, 156, 175 and 200°. Each fraction n should contain at least 10 cc. The amt. G_n, the mol. wt. M_n and b. p. Kp_n are detd. The evaluation is based on a diagram of temp. T vs. M_n. The points corresponding to Kp_n and M_n of the normal paraffins are connected by a series of straight lines (points are: 36.0, 72.1–86.1, 68.8–98.4, 100.1–125.6, 114.1–150.7, 128.2–173.8, 142.2–195.8, 156.2). This curve represents the calibration curve. The Z no. Z_n of the individual fractions is obtained from the equation: $Z_n = \frac{[T_0 - Kp_n]}{7.0}$, where T_0 is the temp. taken from the calibration curve which corresponds to M_n. The Z no. of the whole distil- 9

late is obtained by: $Z = \Sigma Z_n \frac{U_n}{M_n} \Sigma M_n/\Sigma G_n$. App. for the fractional distn. and the detn. of Kp_n on small samples are described. Data, diagrams and 20 references are given.
Karl Kammermeyer

Isolation of 2,2-dimethylbutane from natural gas and determination of its physical properties. Mildred M. Hicks-Bruun, Johannes H. Bruun and W. B. Mason Faulconer. *J. Am. Chem. Soc.* **61**, 3099–101 (1939).—Previous work (*C. A.* **32**, 855[6]) indicated the presence of 2,2-dimethylbutane (I) in the 38–58° cut from the natural gas originating in the Clendenin Field in W. Va. Details are given of the method of distn. of this fraction and the isolation of I, b. 49.72 ± 0.03°, f. p. −98.7 ± 0.2°, 1st transition point −99.7° (?), 2nd transition point about −146°, d_4^{20} 0.6494, d_4^{25} 0.64475, n_D^{20} 1.3689, n_D^{25} 1.36615. The calcd. amts. of isomeric hexanes in natural gas are: I 168 ml. of liquid per cu. m. of natural gas; 2,3-isomer 74, 2-methylpentane 420, 3-isomer 196. C. J. West

The mechanism of the oxygen effect on hydrogen bromide reacting with ethenoid compounds. Yosiyuki Urusibara and Osamu Simamura. *Bull. Chem. Soc. Japan* **14**, 323–36 (1939). –Based upon expts. involving the action of HBr and O on (1) catechol, (2) allyl bromide and (3) stilbene, the conclusion is drawn that in either normal or abnormal addn. of HBr to double bonds the H or Br atom of the HBr first adds to the particular C atom assocd. with the least steric hindrance, giving momentarily a free radical which may (1) react with HBr, liberating either Br or H (depending on the atom already added) and consequently initiating a chain reaction, or (2) react with O to give a peroxide, which may oxidize HBr to H_2O and Br which in turn adds to another double bond to give a di-Br deriv. The normal reaction requires that H be added first, the abnormal requires Br addn., both reactions probably being chain reactions. Pt black as well as ferromagnetic catalysts such as reduced Fe or Ni accelerate the normal reaction. Normal and abnormal reaction chains may cancel one another (during the induction period), the one which remains in excess being propagated freely. Cis-trans isomerization of isostilbene to stilbene by HBr and O possibly proceeds through addn. of a Br atom, followed by inversion and final loss of the Br atom. If the 2 C atoms of the double bond are alike in properties, both normal and abnormal addn. may take place with either C atom, resulting in approx. equal yields of the isomers. George Ayers

Substituted acetylenes. XXXV. Hydrogenation of substituted acetylenes with Raney nickel. Kenneth N. Campbell and Michael J. O'Connor. *J. Am. Chem. Soc.* **61**, 2897–900 (1939); cf. *C. A.* **33**, 6236[1].—All acetylenes (I) studied are readily reduced with Raney Ni at room temp. and a pressure of 3–4 atm. H; at the beginning, at least, the reaction is markedly exothermic. A relation is shown between the symmetry of the mole and the course of reduction. The reduction curve for monoalkyl derivs. of I showed a slight change in slope at half reduction, whereas the dialkyl derivs. showed a more pronounced change in slope. The Ph and Ph Me derivs. of I showed no change in slope in the reduction curve at half reduction; the Ph_2 deriv. readily adsorbed 1 mole equiv. of H and the reaction stopped with the formation of isostilbene. By stopping the reduction when 1 mole equiv. of H is absorbed it is possible to isolate the corresponding olefin in most cases. When the reduction is carried to completion satd. hydrocarbons are obtained. While the configuration of the olefins was not detd., it is believed to be cis. When H_2PtCl_6 and alkali are used as a promoter, reduction occurs more rapidly in the case of the Am deriv. of I, but there was no significant change in the velocity of reduction of the di-Bu deriv. The following compds. are new: *ethylisoamylacetylene*, b_{97} 92°, n_D^{25} 1.4280, d_4^{20} 0.7599, 35% yield; *Pr analog*, b_{97} 104.5°, n_D^{20} 1.4311, d_4^{20} 0.7681, 35%; *butylamylacetylene*, b_{61} 113°, n_D^{20} 1.4360, d_4^{20} 0.7760, 60%; *4-octene*, b_{746} 127°, n_D^{20} 1.4128, d_4^{20} 0.7184, 66%; *3-nonene*, b_{760} 147.4°, n_D^{20} 1.4173, d_4^{20} 0.7294, 74%; *5-decene*, b_{746} 169.6°, n_D^{20} 1.4249, d_4^{20} 0.7385, 77%; *7-methyl-3-octene*, b_{746} 140.7°, n_D^{20} 1.4168, d_4^{20} 0.7278, 77%; *8-methyl-4-nonene*, b_{746} 163.2°, n_D^{20} 1.4229, d_4^{20} 0.7400, 70%; *5-undecene*, b_{760} 191.2°, n_D^{20} 1.4295, d_4^{20} 0.7516, 86%.
C. J. West

The synthesis of piperylene from furfural. I. A. M. Berkenheim and T. F. Dankova. *J. Gen. Chem.* (U. S. S. R.) **9**, 924–31 (1939).—The synthesis of piperylene (1,3-pentadiene) (I) from furfural has been undertaken with the view to use I as starting material in the manuf. of *synthetic rubber*. To a mixt. of 350 g. tech. furfural, 910 ml. H_2O and 910 ml 40% HCHO, cooled to 5°, there is added 840 g. 50% NaOH soln. within 27–30 min. The temp. is not allowed to rise above 15–20°. After the NaOH soln. has been added the mixt. is heated for 5 hrs. to 40–45° while stirring, then allowed to stand for 16–18 hrs. and finally extd. with ether. Furfuryl alc. (II), b_{18} 81–2°, (yield, 90–1%), is obtained after evapn. of the ether and distn. of the residue *in vacuo*. II (100 g.) in 130 ml. H_2O + 15 ml. alc. is introduced into 1635 ml. 0.5 *N* HCl while boiling for 15–20 min. The reaction mixt. is then cooled rapidly, filtered and evapd. *in vacuo*. Levulinic acid (III) distils at 144–6° and 14 mm. in 62–4% yield. To 30 g. III in 190 g. 10% NaOH 300 g. 4% Na-Hg is added in small portions at 35–40° while stirring. The mixt. is kept overnight and then another portion of 225–30 g. Na-Hg is added under the same conditions. After the reduction is finished the reaction mixt. is sepd. from Hg, filtered, acidified with concd. H_2SO_4 and boiled for 20–30 min. After cooling, the reaction mixt. is extd. repeatedly with ether. The ether soln. is dried, the ether evapd. and the residue distd. γ-Valerolactone (IV), b. 202–4°, is obtained in 81.5% yield. III may also be reduced to IV electrically, the yield of IV being 63–5%. IV (20 g.) in 30 g. abs. alc. is quickly introduced at 60° into a mixt. of 120 g. xylene and 28 g. Na that has been previously heated to 90°. Then 100 ml. abs. alc. is added, stirring is continued until the Na has dissolved, 40 ml. 50% alc. is added and the mixt. is boiled for 15–20 min. Alc. and xylene are eliminated from the mixt. by means of steam. The residue, after cooling, is satd. with potash and the resulting 1,4-pentanediol (V) extd. with ether. V, b. 220–2°, is obtained in 59% yield (based on IV). 1,4-Dibromopentane (21 g.), obtained from V on heating with HBr satd. at 0°, is treated slowly at 175–80° with 21 g. PhNMe$_2$. The reaction product b. 110–20°. The distillate is purified by distn. The bromopentene, b. 127–8°, d^{15} 1.2547, is isolated in 59–60% yield. Monobromopentene (15 g.) is added to 10 g. KOH in 15 g. 90% alc. while stirring and heating. I distils from the reaction mixt. and b. 40.5–1.5°, d_0^0 0.6964, after purification. The yield is 60%. I yields a tetrabromide, m. 114°. The by-product formed is the unsatd. ether C_5H_9OEt, b. 120–3°.
Gertrude Berend

Organic parachors. IV. Constitutive variations of the parachors of a series of tertiary chlorides. Osborne R. Quayle, Katherine Owen and Ellington M. Beavers. *J. Am. Chem. Soc.* **61**, 3107–11 (1939); cf. *C. A.* **33**, 4190[8]. —Values are given for d., γ and *P* at 0–75° for the following compds.: Me_3CCl, Me_2EtCCl, $MeEt_2CCl$, Et_3CCl, Et_2PrCCl, $EtPr_2CCl$, Pr_3CCl, Me_2PrCCl, $MePr_2CCl$, $MeEtPrCCl$, Me_2BuCCl, $Me_2(C_6H_{13})CCl$, $MeEt(C_6H_{13})CCl$, $MePr(C_6H_{13})CCl$, $MeBu(C_6H_{13})CCl$, $MeAm(C_6H_{13})CCl$. *P* shows a decrease with temp. of approx. 0.2% per 10° rise in temp. The effect of substitution in Me_3CCl is of the same order as that with Me_3COH. Values for the individual CH_2 groups in the tertiary chlorides are approx. the same as those obtained for the corresponding CH_2 groups in the tertiary carbinols. The similarity of the values for the chlorides and alcs. indicates that assocn. is not an important factor in the *P* values of the alc. series. The calcd. and observed values for the tertiary branching are in closer agreement than the values previously used. C. J. West

Bromination of hexane. W. Flörke. *Z. physik. chem. Unterricht* **52**, 100–1 (1939).—When Br is added to C_6H_{14} in direct sunlight, in a bright room, or under a 500-w. lamp, bromination occurs. Over a 3-hr. period 170 g. of Br was added to 33 g. of C_6H_{14}. F. E. Brown

The peroxide effect in the addition of reagents to unsaturated compounds. XXI. "Normal" and "abnormal"

additions of hydrogen bromide. M. S. Kharasch, Sarah C. Kleiger and Frank R. Mayo. *J. Org. Chem.* 4, 428–35 (1939); cf. *C. A.* 33, 6791[7].—In the earlier papers of this series, the products formed by addn. of HBr to unsatd. compds. when the reaction is carried out in the absence of O or peroxides (in the presence or absence of an antioxidant) are regarded as "normal" addn. products, while those formed in the presence of O or peroxides are designated "abnormal" addn. compds. The difficulty of designating as "normal" or "abnormal" any given addn. product of HBr to CCl_2:CHCl, MeCH:CHCl or MeCH:CHBr is discussed. The results of the addn. of HCl or HBr to MeCH:CH_2, Me_2C:CH_2, CH_2:$CHCH_2Br$, CH_2:$CHCH_2Cl$, MeCBr:CH_2, $MeCCl$ CH_2, CH_2:CHBr, CCl_2:CHCl, MeCH:CHBr and MeCH:CHCl in the presence of $FeCl_3$ indicate that only the "normal" addn. products are formed and in all cases except the last 3 the addn. products are identical with those obtained in the presence of antioxidants. These must therefore be the "normal" addn. products. $FeCl_3$ greatly accelerates the rate but does not change the "normal" direction of the addn. of HCl or HBr. It appears evident that in such addn. reactions antioxidants and metallic halides are neg. and pos. catalysts, resp., and that their concordant influence upon the direction of addn. is adequately elucidated by the fact that the former retard or suppress the "abnormal" addn. reaction whereas the latter accelerate the "normal" reaction. F. E. Brauns

Peroxide effect in the addition of reagents to unsaturated substances. XXII. The addition of hydrogen bromide to trimethylethylene, styrene, crotonic acid and ethyl crotonate. Cheves Walling, M. S. Kharasch and F. R. Mayo. *J. Am. Chem. Soc.* 61, 2693–6(1939); cf. *C. A.* 33, 6791[7].—Me_2C CHMe adds HBr in the absence of O and peroxides to give *tert*-AmBr; under conditions of peroxide catalysis the product contains as much as 64% of the abnormal product, 2-methyl-3-bromobutane. PhCH CH_2 adds HBr in the absence of O and peroxides to give PhCHBrMe; under conditions of peroxide catalysis and in the presence of solvent the product contains as much as 80% of $PhCH_2CH_2Br$. In the presence or absence of peroxides, crotonic acid and its Et ester yield only β-bromobutyric acid and its Et ester, resp. **XXIII. The reaction of styrene with bisulfite.** M. S. Kharasch, Remsen Ten Eyck Schenck and F. R. Mayo. *Ibid.* 3092–8.—PhCH CH_2 and NH_4HSO_3, O-catalyzed, give $PhCH_2CH_2SO_3H$ (I), PhCH:$CHSO_3H$ (II) and *2-hydroxy-2-phenylethanesulfonic acid* (III). The reaction is dependent upon the pH of the original aq. salt soln.; the addn. occurs under more extreme conditions of acidity and alky. than was formerly believed but such variations are ineffective in causing appreciable changes in the ratio of products formed. Salts of the NH_4 group, including all the alkylammes tested, give somewhat more II at the expense of I than do those of the alkali metals. The rate of the reaction is effectively independent of the salt employed but is closely related to the O concn.; the over-all yield of org. sulfonates shows an inverse relationship to the O tension. Increasing O pressure favors the substitution reaction at the expense of the addn. reaction. Replacement of O by NO_2 or perdisulfate ion results in complete suppression of the substitution reaction, the proportion of both the addn. product and III being at the same time slightly increased. Over-all yields are to some extent influenced by the rate at which the oxidant is introduced but are no better than those from O at 1 atm. pressure. NO_2 was of little value as an oxidant. It is considered that I–III are primary reaction products. The reaction mixt. is evapd. to dryness and extd. with 1 l. of boiling 70% alc. per mole of sulfite consumed; evapn. of the filtrate and extn. with 10 cc. boiling 90% EtOH per g. gives nearly pure III, which may be recrystd. from 70% EtOH. The filtrate contains a mixt. of the Na salts of I and II, which may be purified by crystn. from 85–90% EtOH or better as the Ba salt (of II, with 1 mole of H_2O). The 2 salts cannot be sepd. in an approx. equimol. mixt.; a small amt. of II cannot be sepd. from a mixt. rich in I. Styrene bromo- or iodohydrin and aq.-Na_2SO_3 give III (as the *Na salt*); III is stable to both acid and alk. $KMnO_4$ oxidation in the cold and even at 90–100° the oxidation is relatively slow. *Phenylhydrazinium salt* of III, yellow, m. 180–1° (decompn.). Reaction of III with PCl_5 and refluxing the chloride with satd. aq. Na_2CO_3 give II. The Na salt of II, $NaHSO_3$ and NaOH, shaken with O, give *di-Na 2-phenylethane-1,1-disulfonate*, with 2 moles H_2O; this also results from styrene dibromide and Na_2SO_3; PCl_5 causes extensive decompn.; *phenylhydrazinium salt*, yellow, m. 187–8° (decompn.). A mechanism involving O has been proposed to explain the substitution of bisulfite in styrene and one independent of the nature of the oxidant to account for the formation of the HO deriv. Cf. preceding abstr. C. J. West

Allylic rearrangements. IX. The isolation and rearrangement of primary and secondary pentenyl, hexenyl and heptenyl bromides. Wm. G. Young, Lawrence Richards and Julian Azorlosa. *J. Am. Chem. Soc.* 61, 3070–4(1939); cf. *C. A.* 33, 1693[6].—The bromide mixts. were prepd. by the action of 240 ml. 48% HBr and 24 ml. 95% H_2SO_4 on 1 mole of the carbinol at room temp. for 2 days. They contained 80–90% of the primary bromide (RCH·$CHCH_2Br$), which was readily sepd. by low-temp. fractionation; the secondary bromides (RCHBrCH.CH_2) were isolated by distn. of an accumulation of the proper fraction. In some cases the primary fraction was heated until equil. was established, freed of the primary fraction and used for the secondary fraction. 1-Bromo-2-pentene (I), b_{30} 43.5°, n_D^{25} 1.4777, d_4^{25} 1.2606; 3-bromo-1-pentene (II), b_{30} 30.5°, n_D^{25} 1.4626, d_4^{25} 1.2417; 1-bromo-2-hexene (III), b_9 28°, n_D^{25} 1.4761, d_4^{25} 1.2049; 3-bromo-1-hexene (IV), b_9 22°, n_D^{25} 1.4627, d_4^{25} 1.1849; 1-bromo-2-heptene (V), b_3 32°, n_D^{25} 1.4745; 3-bromo-1-heptene (VI), b_3 23–5°, n_D^{25} 1.4560–1.4590 (contains some heptadiene). Heated in a sealed tube at 100° until no further change in *n* was observed, I and II gave an equil. mixt. with 80.1% I; III and IV, 85.5% of III; V and VI, 89% V (estd.). The *n* method of analysis of such bromide mixts. has been shown to be valid. The rearrangements of these bromides are very sensitive to minute traces of catalytic substances and it is impossible to secure reproducible results for abs. mobilities or rates of rearrangements. Qual. observations at 100° indicate that the order of decreasing mobility is butenyl, hexenyl, pentenyl, heptenyl, resp. Conflicting reports in the literature concerning the compn. of bromides made from the alkylvinylcarbinols are discussed. C. J. West

Dimorphism of normal long-chain alcohols. Ken-iti Higasi and Masazi Kubo. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 36, 286–300(1939).—Crude cetyl alc. was acetylated. Fractional distn. gave cetyl acetate (I), $b_{1.5}$ 156.8°, and octadecyl acetate (II), $b_{1.5}$ 172.4°. Hydrolysis of I gave cetyl alc., which, purified by 7 recrystns. from MeOH and high vacuum distn., $b_{0.01}$ 125–35°, m. 49.1–49.2°. Saponn. of II, followed by a similar purification of the cleavage product, gave octadecyl alc., $b_{0.9}$ 160°, m. 57.60–7.75°. Thermometric, dilatometric and dielec. const. measurements all indicated cetyl and octadecyl alcs. to be dimorphic. The ax transition temps., detd. by these methods are, for cetyl alc., 42.4°, 44.5°, 44°; for octadecyl alc., 52.8°, 54.5°, 55°, resp. W. Gordon Rose

The isomerization of geranyl acetate. V. I. Isagulyants and G. A. Serebrennikov. *J. Gen. Chem.* (U. S. S. R.) 9, 917–23(1939).—Pure geraniol, b_8 107°, d^{15} 0.8830, n_D^{20} 1.4768 (300 g.) yields, at room temp. on reaction with 300 g. Ac_2O in the presence of a catalyst consisting of 90 parts Ac_2O + 10% H_3PO_4 (d. 1.7), 342 g. pure geranyl acetate (I), b_7 114–15°, d^{15} 0.9160, n_D^{20} 1.4655. I gives cyclogeranyl acetate (II) and terpin hydrate when it reacts with 85% H_3PO_4 at −5° whereas practically no isomerization is observed under the above conditions in the presence of toluene or by using toluenesulfonic acid, an aq. soln. of $ZnCl_2$ and of HCO_2H as catalyzing agents. When 92% H_3PO_4 is used only II is formed. Cyclogeranyl butyrate, b_6 106°, d^{20} 0.9435, n_D^{20} 1.4660, is obtained by adding 12 g. PrCOCl to 10 g. cyclogeraniol and 8 g. pyridine at 0°. Cyclogeranyl caproate, b_4 126°, d^{20} 0.9344, n_D^{20} 1.4662. Cycloger-

aniol, b_4 73°, d^{20} 0.9382, n_D^{20} 1.4843, is obtained from II on sapon. with alc. KOH. Gertrude Berend

The preparation of ethers. Philip G. Stevens and Sidney A. V. Deans. *Can. J. Research* **17B**, 290–2 (1939).—A new modification of Williamson's (*Ann.* **77**, 37–49(1851)) ether synthesis, in which Na naphthalene is used to form the metal alcoholate, is described, by which the yields and ease of prepn. of ethers have been improved. J. W. Shipley

Polysulfones. X. Vinyl chloride polysulfone. C. S. Marvel and L. H. Dunlap. *J. Am. Chem. Soc.* **61**, 2709-10(1939); cf. *C. A.* **33**, 6237³.—Hydrolysis of vinyl chloride polysulfone (I) (*C. A.* **33**, 125⁸) with 20% aq. NaOH gives 6.2% AcH; at the same time all the Cl is removed from the org. mole as NaCl and practically all of the S remains in org. combination. This leads to the structure $-(SO_2CHClCH_2CHClCH_2)_n-$ for I. The pyrolysis of I in dioxane is a very complex reaction, SO_2 and HCl being lost. Liquid NH_3 removes the Cl from I, forming NH_4Cl; considerable SO_2 is also removed; definite polymeric products could not be isolated from the reaction mixt.

XI. The compound $C_{10}H_{16}SO_2$ from 1-pentyne polysulfone and some experiments on other acetylene polysulfones. C. S. Marvel and W. W. Williams. *Ibid.* 2710-14.—Pyrolysis of 1-pentyne polysulfone (I) (M. and Ryder, *C. A.* **30**, 8184⁹) in dioxane proceeds to some equil. stage; if unchanged I is isolated and pyrolysis in fresh dioxane is repeated, there finally results 22% of the compd. $C_{10}H_{16}SO_2$ (II). Other cryst. compds. have not been isolated from I and it has not been possible to obtain a similar product from other acetylene polysulfones. That II has an α,β-unsatd. sulfone linkage follows from its addn. of $CHNa(CO_2Et)_2$, which gives the *compd.* $C_{17}H_{28}O_6S$, m. 104.5–5°. II does not add Br but decolorizes alk. $KMnO_4$. II is considered to be a dipropylthiophene oxide. Reduction of II with Zn and AcOH gives a *dihydro deriv.*, m. 49–50°; this reaction must proceed by a 1,4-addn. of II with a resulting shift of the double union to the 3,4-position in the ring as otherwise this reduction would be expected to give a tetrahydro deriv. Catalytic reduction of II gives a 2nd *dihydro deriv.*, m. 56.5 7°; this must be the 1,2-addn. product, although it could not be further reduced with Zn and AcOH. I is not reduced by Zn in AcOH (boiling 13 hrs.), by H with PtO_2-Pt black catalyst, and did not add $CHNa(CO_2Et)_2$ in the cold (degradation on warming); EtMgBr gives amber to red solns. with evolution of gas; recovery of I showed that considerable degradation had taken place. Other polysulfones behaved similarly. X-ray diffraction diagrams are given for I and the hexyne, heptyne, nonyne and pentadecyne polysulfones. Attempts to prep. acetylene polysulfone were not successful.

XII. Synthesis of 3,4- and 2,5-dipropyltetrahydrothiophene 1,1-dioxides. *Ibid.* 2714–16.—The syntheses of III and IV were carried out to have reference compds. in the study of the pyrolysis compd. discussed in Part XI. $PrCH(CO_2Et)_2$, $PrCHBrCO_2Et$ and Na in EtOH, heated 15 hrs., give 59% of *4,4,5-tricarbethoxyoctane*, b_1 182-3°, d_{20}^{20} 1.0170, n_D^{20} 1.4393; hydrolysis with 40% aq. KOH (refluxing overnight), acidification with HCl at 0° and warming to room temp. give a nearly quant. yield of α,α'-dipropylsuccinic acid (cis form, m. 115–17°; trans form not isolated pure); EtOH-H_2SO_4 gives the mixed *di-Et ester*, b_1 86-7°, d_{20}^{20} 0.9568, n_D^{20} 1.4302. Catalytic reduction (Cu-Cr oxide) of 70.7 g. of the ester in dioxane under 300 atm. pressure at 260° (20 hrs.) gives 54.2% of *3,4-dipropyltetrahydrofuran* (I), b_1 40-2°, d_{20}^{20} 0.8683, n_D^{20} 1.4369, and a small amt. of *2,3-dipropylbutane-1,4-diol*, b_1 103°, d_{20}^{20} 0.9378, n_D^{20} 1.4563. I and HBr in AcOH (satisfactory conditions not developed) give *1,4-dibromo-2,3-dipropylbutane* (II), b_1 95°, d_{20}^{20} 1.3834, n_D^{20} 1.4971; with EtOH-Na_2S (II added during 1 hr. and boiled an addnl. 10 hrs.) there results 77.5% of *3,4-dipropyltetrahydrothiophene*, b_1 65–6°, d_{20}^{20} 0.9129, n_D^{20} 1.4830; this is oxidized by H_2O_2 in AcOH (heating on steam bath for 2 hrs.) to the *1,1-dioxide* (III), m. 57–9.5°. (i-PrMgBr)₂ and PrCHO give 41.8% of *5-decyne-4,7-diol*, b_1 113–14°, d_4^{20} 0.9462, n_D^{20} 1.4678; catalytic reduction gives 71% of 4,7-decanediol, m. 79–80°; passing dry HBr through the glycol for 4 hrs. at 45–60° and for 18 hrs. at 105–15° gives 85.3% of *4,7-dibromodecane*, b_1 106–9°, d_4^{20} 1.3354, n_D^{20} 1.4920; Na_2S gives 77% of *2,5-dipropyltetrahydrothiophene*, b_1 74–5°, d_4^{20} 0.8958, n_D^{20} 1.4795; *1,1-dioxide* (IV), b_1 123–5°, d_4^{2} 1.0408, n_D^{20} 1.4719. The refractive const. for the SO_2 group is calcd. to be 8.7. C. J. West

Formation of bis(β-diethylaminoethyl) sulfide. Elton S. Cook and Cornelius W. Kreke. *J. Am. Chem. Soc.* **61**, 2971–2(1939).—Heating 150 g. $Na_2S.9H_2O$ at 130° for 15 min., satg. with H_2S, cooling to 60–5° with continued passage of H_2S, adding 10.2 g. of $BrCH_2CH_2NEt_2$.HBr with stirring, maintaining the temp. at 55° for 15 min., cooling, extg. with 3 portions of 100 cc. of Et_2O, drying the oily residue and satg. with HCl give 2.12 g (36%) of $(Et_2NCH_2CH_2)_2S.2HCl$, m. 245.5–7.5° (cor.); the *di-HBr salt* m. 237.3–7.8° (cor.). C. J. West

Utilization of aliphatic nitro compounds. I. Production of amines. II. Production of oximes. Kenneth Johnson and Ed. F. Degering. *J. Am. Chem. Soc.* **61**, 3194–5 (1939).—All the nitroparaffins available from the nitration of propane, butane and isobutane have been reduced to the corresponding amines by the use of Fe and HCl or by catalytic hydrogenation (92–8%). These processes produce easily purified products and require only simple technique. The results indicate that primary, secondary and tertiary nitroparaffins can be reduced to give almost quant. yields of the corresponding amines. Nitroparaffins may be reduced to oximes by refluxing with Zn in AcOH (6 hrs. with 1-nitropropane); hydrolyzing with dil. H_2SO_4 gives the aldehyde, the yield of which is 43%. C. J. West

Alkylation of α-sulfonylamides. Austin Pomerantz and Ralph Connor. *J. Am. Chem. Soc.* **61**, 3139-45 (1939); cf. *C. A* **32**, 1672³.—The alkylation in alc. of α-alkanesulfonylamides is complicated by the fact that the compds. are not acidic enough to form Na derivs. satisfactorily in the presence of a considerable amt. of alc. In inert solvents alkyl halides are not very reactive but Et_2SO_4 reacts readily with the Na deriv. of I. $BuSO_2CH_2CONH_2$ (I) and EtBr with EtONa gives 11% of $BuSO_2CHEtCONH_2$ (II), with the recovery of 20% of I. I and BuBr with EtONa in EtOH give 15% III. Refluxing the Na deriv. of I and EtI in C_6H_6 for 55 hrs. gives 33% II; BuBr in PhMe, refluxed 25 hrs., gives 19% of *α-butanesulfonylcaproamide* (III), m. 110.5 11°; reaction with $AgNO_3$ indicated 56% reaction. *α-p-Toluenesulfonylcaproamide*, m. 165.5°, results in 25% yield from *p*-$MeC_6H_4SO_2CH_2CONH_2$ and BuBr in PhMe (19 hrs.); $PhCH_2Cl$ in PhMe (18 hrs.) gives 44% of *α-benzyl-α-p-toluenesulfonylacetamide*, m. 203–4°. The Na deriv. of I and Et_2SO_4 in PhMe, refluxed 7 hrs., give 30% of II; 7% of $BuSO_2CH_2CONHEt$ (III) and 0.4% of $BuSO_2CHEtCONHEt$ (IV); the remainder was probably a mixt. of III and IV. Refluxing 31 g. III and EtONa in PhMe for 2.5 hrs., adding 28.2 g. Et_2SO_4 and refluxing for an addnl. 2.5 hrs. gives 47% IV; likewise II gives 47% IV. $BuSCH_2CONH_2$ (V), as the Na salt, and Et_2SO_4 probably give $BuSCH_2CONHEt$, which is oxidized by H_2O_2 to III. I is recovered to the extent of 84% after refluxing with EtONa in C_6H_6 for 2.5 hrs.; V is recovered to the extent of 69%. V is prepd. in 90% yield from $ClCH_2CO_2Na$ and BuSNa; oxidation with H_2O_2 in 1.1 Ac_2O-AcOH in the cold and then at room temp. gives 77% of *α-butanesulfonylacetic acid*, m. 67.5–8.5°; reaction with $SOCl_2$ and then with $EtNH_2$ gives 53% of *α-butanesulfonyl-N-ethylacetamide*, (III), m. 73–3.5°. The m. ps. are cor. The results may be interpreted as evidence that in the system $-CH_2.CO.NH_2$ of this series, 2 types of Na derivs. are formed and that the $-CH_2-$ and $-NH_2$ groups are activated to about the same extent. Introduction of an alkyl substituent on either $-CH_2-$ or $-NH_2$ decreases the relative reactivity of the group to which the alkyl substituent is attached and subsequently alkylation occurs on the other active group. C. J. West

Silicoörganic compounds. I. The preparation of silicon analogs of certain aliphatic ortho esters. Howard W. Post and Charles H. Hofrichter, Jr. *J. Org. Chem.* **4**, 363–4(1939).—Some aliphatic *orthosilicopropionates* (I),

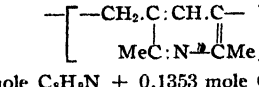
-butyrates (II) and *-benzoates* (III) are prepd. *Et* I (IV), prepd. according to Andrianov and Gribanova (*C. A.* **32**, 7892[8]) in 83.7% yield, b. 158–60°, d_4^{22} 0.928, n_D^{22} 1.3853; *Pr* I, prepd. by refluxing IV with PrOH, b. 202–4°, d_4^{23} 0.896, n_D^{23} 1.4017, n_D^{19} 1.4060; *Bu* I, b. 235–8°, d_4^{24} 0.878, n_D^{24} 1.428, n_D^{19} 1.4174; *Am* I, b. 285°, d_4^{23} 0.891, n_D^{23} 1.4210, n_D^{19} 1.4262; *iso-Am* I, b. 266–9°, d_4^{24} 0.891, n_D^{24} 1.4170, n_D^{19} 1.4222; *Et* II, prepd. from $Si(OEt)_4$ (V) and PrMgBr, b. 179–80°, n_D^{19} 1.4076, d_4^{26} 0.852; *Et* III, prepd. from V and PhMgBr, b.$_{4}$ 235–8°, d_4^{19} 1.0055; *Pr* III, obtained by treating $PhSiCl_3$ with PrOH, b$_7$ 192°, d_4^{20} 1.036, n_D^{19} 1.5025; $Si(OC_7H_{15})_4$, prepd. by refluxing $SiCl_4$ with $C_7H_{15}OH$ in 53.5% yield, b$_4$ 213.5°, n_D^{25} 1.4300, d_4^{25} 0.876.
F. E. Brauns

Tetraethyllead. Manufacture and use. Graham Edgar. *Ind. Eng. Chem.* **31**, 1439–46(1939). G. G.

Redistribution reaction. I. The random intermolecular exchange of organic radicals. Geo. Calingaert and Harold A. Beatty. *J. Am. Chem. Soc.* **61**, 2748–54(1939). —A hitherto unrecognized type of reaction is described, in which all the radicals or atoms of 1 kind, present in a mixt. in which they are linked to 1 or more central groups or atoms of another kind, are interchanged between all the central groups present. This process, which is termed the *redistribution reaction*, takes place smoothly at low temps. in the liquid phase under the influence of a catalyst. The yield is quant. and the compn. of the resultant mixt. can be calcd. from that of the reactants on the basis of a random distribution of the interchanged radicals or atoms: this reaction product is therefore termed a *random equil. mixt.* The reaction presents interesting possibilities for theoretical investigation into the nature and behavior of covalent bonds and the mechanism and kinetics of their reactions; also, the reaction provides novel methods of prepn. of various org. compds. The following topics are discussed: exchange of radicals in organometallic halides, equil. interchange of radicals in metal alkyls, characteristics of the reaction, random distribution (application of the laws of probability), exptl. confirmation of random equil. mixts. **II. The analysis of metal alkyl mixtures and the confirmation of random distribution.** Geo. Calingaert, Harold A. Beatty and Herbert R. Neal. *Ibid.* 2755–8.—This paper describes the anal. method used for volatile metal alkyls, including a test of its accuracy and gives a quant. demonstration of random distribution. With known mixts. of Me_4Pb, Me_3EtPb, Me_2Et_2Pb, $MeEt_3Pb$ and Et_4Pb, the standard deviation between the taken and observed values for a group of 10 values was 0.6% and the max. deviation was 0.7%. The proportion of the alkyls present in a given mixt. is detd. by fractional vacuum distn. after removal of the catalyst and halide salts (if any) by filtration and washing or extn.; the distn. equipment and method are described and illustrated. With r for the mole fraction of Me and $1-r$ as that of the Et radical, the predicted mole fractions are Me_4Pb r^4, Me_3EtPb $4r^3(1-r)$, Me_2Et_2Pb $6r^2(1-r)^2$, $MeEt_3Pb$ $4r(1-r)^3$, Et_4Pb $(1-r)^4$. The differences found are scattered at random and do not appear to be a function of the compds., of their concn. or of r. Large effects result from a change in the relative proportions of Me and Et radicals. Data are given for Me_4Sn + Et_4Sn, $C_2H_4Cl_2$ + $C_2H_4Br_2$, Et_4Si + Pr_4Si, Me_2Hg + Et_2Hg and AcOMe + $PrCO_2Et$. In these systems the deviations appear to be well scattered and random and show no significant trends. Vapor pressures of Pb alkyls, $\log_{10} P(\text{mm. Hg}) = A - B/(t+230)$, A, B and t at 50 mm. being given: Me_4Pb 6.9381, 1378.7, 33.2°; Me_3EtPb 7.2760, 1602.5, 57.3°; Me_2Et_2Pb 7.5903, 1810.7, 77.4°; $MeEt_3Pb$ 7.8768, 2000.5, 93.8°; Et_4Pb 8.1547, 2184.6, 108.4°. **III. Determination of a material balance.** Geo. Calingaert and Harold Soroos. *Ibid.* 2758–60.—By detn. of an accurate material balance, the redistribution of a mixt. of Me_4Pb and Et_4Pb in hexane is shown to be quant. The recovery is 98.5%; the remaining 1.5% is R_3PbCl; a trace of $PbCl_2$ is formed (decompn. of R_3PbCl); no Pb is formed. When $AlCl_3$ is used as the catalyst, it is found to react irreversibly with the Pb compds., forming alkyl lead compds. in very small quantities, equiv. to about 1.5 moles per mole of catalyst. Me_2AlCl or $MeAlCl_2$ give values of 0.04 and 0.10 mole of Pb chlorides per mole of catalyst. The results show that the redistribution reaction is quant., apart from such irreversible interaction with the catalyst as may be imposed by the selection of 1 particular catalyst or another. C. J. West

Reaction of organic hydroxy and oxo compounds with ammonia. I. Comparative reaction velocities of ketones with liquid ammonia. S. S. Dragunov. *J. Gen. Chem.* (U. S. S. R.) **9**, 693–7(1939).—The reaction velocity of various oxo compds., such as Me_2CO, MeCOPr, MeCOPh, 3- and 4-methylcyclohexanones and BzH with liquid NH_3 was investigated. When the duration of reaction was prolonged and when the temp. was raised, compds. with higher N content were obtained. Hexaphenylmethane and triphenylmethyl in benzene did not react with gaseous NH_3. Gertrude Berend

Structure of vinyl polymers. IV. The polymers of the methyl α-haloacrylates. C. S. Marvel and John C. Cowan. *J. Am. Chem. Soc.* **61**, 3156–60(1939); cf. *C. A.* **33**, 6797[2].—Me α,β-dibromopropionate and quinoline give 82% of *Me α-bromoacrylate* (I), b_{78} 72.5–4°, d_{20}^{20} 1.61, n_D^{20} 1.4840; Me α-chloroacrylate (II), b_{55} 57.9°, d_4^{20} 1.189, n_D^{20} 1.4400, 73% yield. Diethylglutaric acid, reacted with $SOCl_2$ for 25 hrs., treated with Br (heating at 70° for 5 hrs.), poured into abs. EtOH and distd., gives 48% of the *Br lactone*, b_3 134–8°, d_{20}^{20} 1.358, n_D^{20} 1.4775; satn. with HBr in abs. EtOH gives *Et α,α'-dibromo-α,α'-diethylglutarate* (III). I on standing at room temp. for 3 weeks gives a clear, pale amber, brittle solid; I (20 g.) in 100 g. dry dioxane and 0.48 g. Bz_2O_2, warmed at 35° for 48 hrs., Bz_2O_2 again added, the mixt. allowed to stand an addnl. 48 hrs. and poured into 500 cc. Et_2O, give 15 g. of a polymer (IV). II gives a similar polymer (V) (3 g. from 10 g. II). Both polymers are sol. in Me_2CO and dioxane. Viscosity measurements on 0.606% (0.0368 *M*, based on monomeric unit) solns. indicated a mol. wt. of about 11,500. IV or V, treated with KI in peroxide-free Me_2CO or dioxane, liberates I. This reaction is characteristic for 1,2-dihalo compds. and indicates that IV and V have the structure $-[-CH_2CX(CO_2R)CX(CO_2R)CH_2-]_n$. A comparison is given of the amt. of I liberated from KI by $(CHBrCO_2Et)_2$ (VI), $CH_2(CHBrCO_2Et)_2$ (VII), III and IV. Evidence to support the "head to head, tail to tail" formulation of these polymers was obtained by the use of Zn; this reagent readily removed 97% of the Br from IV, an amt. far above that which could be removed from a 1,3-di-Br polymer; the debrominated polymer decolorizes aq. $KMnO_4$ in 4 hrs. Addnl. evidence supporting the 1,2-dihalo structure of IV is found in a comparison of the effect of heat on IV, VI and III. IV and VI lost HBr at a much lower temp. (110–50° for IV and 130–70° for VI) than did III (175–200°); V on heating at 330°/3 mm. for 1 hr. gives a Cl-free product. Heating IV with quinoline removes half of the Br as HBr. The structure is further supported by the ultraviolet absorption spectra of IV, VI and VII. Hydrolysis of IV with aq. NaOH yields the Na salt of a 1,2-di-HO dibasic acid, which reduces HIO_4 to HIO_3 in approx. 48 hrs. (characteristic of 1,2-glycols); the amt. and rate of oxidation varied with different samples of the polymers but in every test some oxidation occurred. **V. Some reactions of the polymer of methyl vinyl ketone.** C. S. Marvel and Charles L. Levesque. *Ibid.* 3234.—The oxime (3.2 g.) of the polymer (I) of Me vinyl ketone in 50 cc. concd. HCl and 135 g. HCl in 500 cc. EtOH, heated to boiling, 40 cc. H_2O added to complete soln. and refluxing for 19 hrs., gives 2 g. of the polypyridine



(0.4323 mole C_8H_9N + 0.1353 mole C_4H_6O). I (2.8 g.) in dioxane and NaOCl, mixed at 0° and stirred at room temp. for 6 hrs., the aq. layer concd. and acidified with concd. HCl, give 1.15 g. of the brown polyacid, $-[-CH_2-CH(CO_2H)CH_2CH(CO_2H)-]_n-$; analysis indicated that about 90% of the Me ketone groups were oxidized.
C. J. West

Intramolecular oxidation of linoleic acid. Mario Brambilla. *Ann. chim. applicata* 29, 303–14(1939); cf. *C. A.* **33**, 9683⁶.—When linoleic acid is heated 3 hrs. at 320–5° in an inert atm. (N), intramol. oxidation takes place with formation of propionic, butyric, caproic and glutaric acids, water, CO_2, certain acids recognized as sebacic acids, an unsaponifiable portion contg. ethylenic hydrocarbons and a tarry residue. This behavior is similar to that found when oleic acid is heated.
A. W. Contieri

Esters of aliphatic thio acids of high molecular weight. A. W. Ralston, E. W. Segebrecht and S. T. Bauer. *J. Org. Chem.* **4**, 502–5(1939).—A review of the previous work on the prepn. of thio esters shows that this has been confined to thio esters of aromatic acids and of aliphatic acids of low mol. wt. and some doubt arises as to whether the esters of higher aliphatic acids are stable. To check this, some esters of each of the following acids, thiolauric, thiomyristic, thiopalmitic, thiostearic, and thioöleic, are prepd. by the interaction of the acid chlorides and the resp. mercaptans. The acid chlorides are obtained from the acids and SO_2Cl_2 in 80% yield. The Me esters are prepd. in the following way: to a mixt. of 0.1 mol. Bu_3N and 0.12 mol. MeSH cooled to −30°, 0.1 mol. acid chloride is added, drop by drop, over a period of 0.5 hr. The mixt. is then kept at −15° for 12 hrs., then at 4° for 23 hrs. and at room temp. for another 24 hrs. It is then dissolved in Et_2O, washed with H_2O until neutral to litmus, dried and distd. *in vacuo*. The other esters are prepd. by mixing 1.1 mols mercaptan and 0.1 mol. acid chloride at 0° until the evolution of HCl has ceased, the mixt. is slowly heated to 50°, kept for 1 hr. at this temp. and then heated for 0.5 hr. at 80°. The ester is isolated as before. *Thiolaurates.*—*Me*, b_1 112–15°, n_D^{25} 1.4642, n_D^{60} 1.4496, d^{60} 0.8734; *Et*, b_1 115–17°, n_D^{25} 1.4626, n_D^{60} 1.4478, d^{60} 0.8645; *Pr*, b_1 126–8°, n_D^{25} 1.4628, n_D^{60} 1.4478, d^{60} 0.8610; *Bu*, b_1 133–5°, n_D^{25} 1.4640, n_D^{60} 1.4493, d^{60} 0.8595. *Thiomyristates.*—*Me*, m. 34–5°, n_D^{60} 1.4507, d^{60} 0.8668; *Et*, b_1 134–6°, n_D^{25} 1.4632, n_D^{60} 1.4488, d^{60} 0.8609; *Pr*, b_1 148–50°, n_D^{25} 1.4627, n_D^{60} 1.4485, d^{60} 0.8568; *Bu*, b_1 149–51°, n_D^{25} 1.4642, n_D^{60} 1.4501, d^{60} 0.8570. *Thiopalmitates.*—*Me*, m. 44–5°, n_D^{60} 1.4521, d^{60} 0.8644; *Et*, b_1 172–5°, n_D^{25} 1.4648, n_D^{60} 1.4513, d^{60} 0.8547; *Pr*, m. 27–8°, n_D^{25} 1.4642, n_D^{60} 1.407, d^{60} 8559; *Bu*, m. 29–30°, n_D^{25} 1.4646, n_D^{60} 1.4505, d^{60} 0.8579. *Thiostearates.*—*Me*, m. 50–1°, n_D^{60} 1.4526, d^{60} 0.8624; *Et*, m. 38–9°, n_D^{60} 1.4514, d^{60} 0.8550; *Pr*, m. 34–5.5°, n_D^{60} 1.4509, d^{60} 0.8508; *Bu*, m. 31–2°, n_D^{60} 1.4529, d^{60} 0.8534; *Pr thiooleate* b_1 175–8°, n_D^{25} 1.4713, n_D^{60} 1.4577, d^{60} 0.8643. These esters are stable and boil *in vacuo* without decompn.
F. E. Brauns

Loss of optical activity in the reaction of the optically active *erythro*- and *threo*-3-bromo-2-butanols with hydrobromic acid. S. Winstein and H. J. Lucas. *J. Am. Chem. Soc.* **61**, 2845–8(1939); cf. *C. A.* **33**, 6241⁶.—There is complete loss of optical activity when active *erythro*- or *threo*-3-bromo-2-butanol is converted to 2,3-dibromobutane. This confirms the mechanism previously proposed in connection with the conversion of *dl*-*erythro*- and *dl*-*threo*-3-bromo-2-butanol to *meso*- and *dl*-2,3-dibromobutane, resp. The mechanism consists of the production of a butylenebromonium ion, and the subsequent reaction of this ion with bromide ion, 2 inversions occurring in the transformation. Other possible mechanisms for the transformation of bromohydrin to dibromide are discussed and rejected.
C. J. West

Reaction of olefin oxides and sulfur monochloride. M. S. Malinovskiĭ. *J. Gen. Chem.* (U. S. S. R.) **9**, 832–9(1939).—Ethylene oxide (I) and S_2Cl_2 react with the formation of $ClCH_2CH_2Cl$, $MeCHCl_2$, CH_2ClCHO, $HOCH_2CH_2Cl$, and 63.9% $(CH_2ClCH_2O)_2SO$ (based on I); propylene oxide (II) and S_2Cl_2 with the formation of MeCH(OH)CH_2ClCH_2Cl, $MeCHClCHO$ and 41.3% $(CH_3CHClCH_2O)_2SO$ (based on II); and epichlorohydrin and S_2Cl_2 with the formation of 33% $(CH_2Cl)_2CO$ and 67% $(CH_2Cl)_2CHOH$.
Gertrude Berend

Preparation and cyclization of monoacylethylenediamines. II. Samuel R. Aspinall. *J. Am. Chem. Soc.* **61**, 3195–7(1939); cf. *C. A.* **33**, 4210⁴.—An ester (RCO_2Et) may be converted into the corresponding 4,5-dihydroimidazole in an over-all yield of about 75% when R is Me, Et, Am, Et_2CH, $(iso\text{-}Am)_2CH$, Ph, *p*-MeC_6H_4 or $PhCH_2$. The procedure is illustrated by the following: 48 g. Et_2CHCO_2Et and 60 g. $C_2H_4(NH_2)_2$ are heated at 215° for 24 hrs. and the low-boiling material is removed by distn.; the mixt. of 39 g. of mono- and diamide is heated with 94 g. of CaO at 225° for 15 hr. in N atm.; the *2-diethylmethyl-4,5-dihydroimidazole* (I) is extd. with alc., distd. and crystd. from petr. ether. Caproylethylenediamine (II), 80% yield; *picrate*, m. 93° (all m. ps. cor.); *HCl salt*, m. 141°; *phenylurea*, m. 171°; when it is distd. the temp. falls from 135° (probably the b. p. of II) to 108° (both at 7 mm.), the b. p. of 2-amyl-4,5-dihydroimidazole (picrate, m. 127°). *Diethylacetyl analog* of II, b_7 113°, 60% yield; *picrate*, m. 123°; *HCl salt*, m. 133°; *phenylurea*, m. 179° (this apparently exists in dimorphic forms, 1 form m. at any temp. between 150 and 179°). I m. 86°, b_9 97°, 70%; *picrate*, m. 106°; *HCl salt*, m. 245°; *phenylurea*, m. 133°. *Diisoamylmethyl analog* of I, b_6 123°, m. 103°; *picrate*, m. 125°; *phenylurea*, m. 82°. *Phenylacetyl analog* of II forms a *picrate*, m. 133°; *HCl salt*, m. 142°; *phenylurea*, m. 191°. *Phenylmethyl analog* of I, b_6 134°, m. 68°, 75% yield; *picrate*, m. 149°; *HCl salt*, m. 174°. *Diphenylmethyl analog* of I, m. 137°, 35% yield; *picrate*, m. 185°. A study is reported of the ease of dehydration of monoacylethylenediamines.
C. J. West

Alkanolamines. VII. Condensation products of monoethanolamine and the isomeric dichloronitrobenzenes. Chester B. Kremer and Aaron Bendich. *J. Am. Chem. Soc.* **61**, 2658–61(1939); cf. *C. A.* **33**, 6259².—Details are given of the prepn. of 3,5-, 2,6-, 2,4- and 2,3-$Cl_2C_6H_3NO_2$. Reaction of the $Cl_2C_6H_3NO_2$ with $HOC_2H_4NH_2$ was carried out in a solvent, usually BuOH, in some cases using MgO as an acid binder. Reduction of the NO_2 compds. was carried out with $Na_2S_2O_4$ in a weakly alk. soln. The following *2-anilinoethanols* were prepd.: *6-chloro-2-nitro*, b_2 155–7°; *5-chloro-2-nitro*, m. 116° (m. ps. cor.); *4-chloro-2-nitro*, m. 107.5°; *3-chloro-2-nitro*, m. 78.5°; *6-chloro-4-nitro*, m. 120°; the yields are 60, 88, 70, 13 and 64%, resp.; *6-chloro-2-amino*, b_2 135–7°; *5-chloro-2-amino*, m. 104.5°, 90%; *4-chloro-2-amino*, m. 122.5°, 90%; *3-chloro-2-amino*, m. 74°, 85%; *6-chloro-4-amino*, decomps. at 185°/1 mm. 3,4- and 2,4-$Cl_2C_6H_3NO_2$ give the same product, showing that the Cl atom ortho to the NO_2 group is mobile. The 2,6-di-Cl deriv. is the least reactive; the 2,5-di-Cl deriv. is more reactive than the 3,4-compd.
C. J. West

X-ray and thermal examination of the glycerides. VII. Unsymmetrical mixed triglycerides, $CH_2(OCOR)CH(OCOR)CH_2(OCOR')$. M. G. R. Carter and T. Malkin. *J. Chem. Soc.* 1939, 1518–21; cf. *C. A.* **33**, 7732⁴.—M. ps. for the vitreous, α-, β′- and β-forms are reported as follows: *α-decodimyristin* 15, 32, 38, 43.5°; α-laurodipalmitin 32, 45, 49.5, 54°; α-myristodistearin 44, 54, 57.5, 62°; *α-myristodidecoin* 3, 20, 31, 34.5°; α-palmitodilaurin 20, 33, 43, 46.5°; *α-stearodimyristin* 36, 46, 43, 46.5°; α-decodipalmitin 23, 37, 41, 45.5°; α-laurodistearin 36, 47, 52°, —; *α-palmilodidecoin* 2, 24, 32, 35°; α-stearodilaurin 20, 31, 32, 35°; *α-stearodidecoin* 13, 32, 38, 41°; α-decodistearin 33, 42.5, 46, 49°. The poor cryst. appearance of unsym. compared with sym. ones is most marked and should afford a valuable clue of identity in compds. from natural products. M. ps. of many of these derivs. are so close to those of their sym. isomers that differentiation between pairs of isomers by m. ps. alone would be almost impossible; the 2 types are readily distinguished by their x-ray data. The x-ray data for long and side spacings are given. The majority of the long spacings of β-forms are too large to correspond with layers of single mols. but smaller than would be expected from layers of double mols. The regularities in m. p. and x-ray data and the small increase in length per C atom on passing up any particular group favor the view that tilt of the mol. is mainly responsible. Side spacings are of the normal type. All the glycerides exhibit typical spherulite formation.
C. J. West

Synthetic glycerides of unsaturated fat acids. I. Mono- and trilinolein. Howard C. Black and Charles A. Overley. *J. Am. Chem. Soc.* **61**, 3051-2(1939).—9,10,-12,13-Tetrabromostearic acid (80 g.) at 120°, treated with 15 g. of $SOCl_2$ during 1 hr., gives 78 g. of the *chloride* (I), m. 59.5–60°; addn. of 45 g. of I in 20 ml. $CHCl_3$ to a cold soln. of 10 g. of acetoneglycerol and 9.6 g. of quinoline and allowing to stand 48 hrs. gives 35 g. of the condensation product, m. 51-2°; concd. HCl in Et_2O in an ice bath gives 26 g. of *mono(9,10,12,13-tetrabromo)stearin* (II), m. 101.5-20°; reaction of 45 g. of I and 2.2 g. of $C_3H_5(OH)_3$ in quinoline gives 30.5 g. of *tri(9,10,12,13-tetrabromo)stearin* (III), m. 81–1.5°. Debromination of 20 g. of II with Zn and EtOH gives 8.9 g. of monolinolein (IV), m. 14–15°, n_D^{25} 1.4758; III gives trilinolein (V), m. −5 to −4°, n_D^{25} 1.4709. With 0.4 *N* $EtOH$-HCl some Et linoleate was formed. IV and Br give 40–5% of II and some oily material. No homogeneous product could be isolated from the reaction of V and Br. C. J. West

Acetylene chlorohydrins and the corresponding dioxides and erythritols. N. A. Hershtein. *J. Gen. Chem.* (U. S. S. R.) **9**, 361-8(1939).—($BrMgC{:}$)$_2$ in Et_2O with $ClCH_2OMe$ in an atm. of N or acetylene gave *dichlorotetramethylbutynediol* (I), viscous yellow oil, which could not be purified. I in Et_2O with powd. KOH, added in small portions, gave 2 stereoisomeric forms of the *oxide* $C_8H_{10}O_2$; *cryst. form* (II), m. 44.5–5.0°; *liquid form* (III), b_{12} 95–6°, b_{18} 104.5–5.0°, d_4^{20} 1.0022, n_D^{25} 1.4065, M. R. 36.73 (calcd. 36.03). Isomerization of II and III with $ZnCl_2$ proceeded with explosive force to give a polymeric product, not purified, which gave pos. aldehyde tests. III oxidized with 1 2% $KMnO_4$ at 5° or with 3–5% O_2 in $CHCl_3$-H_2O gave α-methylglyceric acid (IV), m. 99.5°, isolated as the K salt. II with O_3 also gave IV. The hydration of II in the presence of traces of HCl gave *2,5-dimethyl-3-hexene-1,2,5,6-tetraol* (*acetylene erythritol*) (V), m. 113.5–4.0°, which with Ac_2O gave the *tetra-Ac deriv.*, $C_{16}H_{22}O_8$, b_6 171°. III underwent hydration with greater difficulty to give the stereoisomer of V, m. 130–1°; *tetra-Ac deriv.*, b_9 193–4°. An attempt to hydrate V in the presence of Hg salts gave a glassy mass, insol. in org. solvents, probably a mixt. of condensation products.

John Livak

Oxidation of 1,2-glycols or 1,2,3-polyalcohols by means of lead tetraacetate in aqueous solution. Erich Baer, J. M. Grosheintz and Hermann O. L. Fischer. *J. Am. Chem. Soc.* **61**, 2697-9(1939).—Oxidation with $Pb(OAc)_4$ can be carried out quantitatively in aq. soln. and in H_2O-contg. solvents; this observation enlarges the field of its application. The same oxidation products are obtained in H_2O as in org. solvents, except in rare cases where secondary hydrolysis products may be formed. $Pb(OAc)_4$ (4.43 g.) in 25 cc. glacial AcOH, added to 2.6 g. of 1,2,5,6-diacetone-*d*-mannitol in 60 cc. H_2O, causes instantaneous oxidation to acetone-*d*-glyceraldehyde, hydrolyzed quickly to *d*-glyceraldehyde (I) and Me_2CO (98.8% yield). Similarly pinacol gives 95% of Me_2CO. Me quinate gives a nearly quant. yield of the dialdehyde (II) and HCO_2H, with 2 moles $Pb(OAc)_4$. II can be oxidized by Br to citric acid (86% yield). Oxidation of I with Br gives 76% of glyceric acid (III), characterized as the Me ester and the Ca salt. The above procedure is a convenient method for prepg. III. C. J. West

Acetylation of lactic esters by ketene. H. V. Claborn and Lee T. Smith. *J. Am. Chem. Soc.* **61**, 2727-8(1939). —The esters of lactic acid can be acetylated with ketene in the presence of a trace of H_2SO_4 as catalyst, the yields being practically quant. *Pr α-aceloxypropionate*, b_7 77–9°, b_{763} 196°, d_{25}^{25} 1.0163, n_D^{25} 1.4123, 97% yield with ketene, 87% with Ac_2O; *iso-Bu ester*, b_9 90–2°, b_{763} 205°, d_{25}^{25} 0.9952, n_D^{25} 1.4140, 94, 87% yields; *iso-Pr ester*, b_8 74–8°, b_{763} 183°, d_{25}^{25} 0.9920, n_D^{25} 1.4069, 96.5 and 86% yields; *Am ester*, b_9 101–3°, b_{763} 227°, d_{25}^{25} 0.9822, n_D^{25} 1.4199, 97 and 87% yields; *iso-Am ester*, b_{12} 107–10° b_{763} 222°, d_{25}^{25} 0.9838, n_D^{25} 1.4190, 96, 90% yields; *benzyl ester*, b_7 145–8°, 96 and 70% yields; *β-acetoxyethyl ester* (*glycol monolactate diacetate*), b_{10} 141–5°, b_{763} 265°, d_{25}^{25} 1.1489, n_D^{25} 1.4297, 86% with ketene. C. J. West

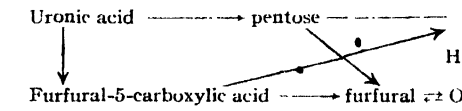
Rotatory power of zinc lactate. W. Dayton Maclay, Raymond M. Hann and C. S. Hudson. *J. Am. Chem. Soc.* **61**, 3234-5(1939); cf. *C. A.* **33**, 6805².—New values are given for the rotation of Zn L-lactate dihydrate; the concn. in H_2O and $[\alpha]_D^{25}$ are: 1.5, −8.7°; 3, −7.9°; 4, −7.5°; 5, −7.1°; 7, −6.6°; $[\alpha]_D^{25}$ −9.2° + 0.4(*c*) in aq. soln. Irvine's procedure (*J. Chem. Soc.* **89**, 935(1906)) for the prepn. of Zn lactates does not cause racemization and is preferable to the more laborious procedure previously reported by M., H. and H. C. J. West

Catalytic hydrogenation of oxides of unsaturated acids. I. G. V. Pigulevskiĭ and Z. V. Rubashko. *J. Gen. Chem.* (U.S.S.R.) **9**, 829-31(1939).—$Me(CH_2)_7CH{-}CH{-}(CH_2)_7CO_2Et$ (3.26 g.) yields 6.1 g. $Me(CH_2)_7CH(OH)$-$CH_2(CH_2)_7CO_2Et$ (I), m. 43–4°, on treatment with H in 30 ml. cold abs. alc. in the presence of 0.3 g. Pd black. On sapon., I gives 10-hydroxystearic acid, m. 82.5°.

Gertrude Berend

The action of nitrous acid on α-substituted butyrolactones. I. V. V. Feofilaktov and A. S. Onishchenko. *J. Gen. Chem.* (U. S. S. R.) **9**, 304-13(1939).—The action depends on the nature of the substituent in the α-position. α-Acetobutyrolactone (I), b_{18} 130–2°, n_D^{20} 1.4590, d_4^{20} 1.1846 (*semicarbazone*, m. 166–7°), prepd. from $O.CH_2.CH_2$ (II) and $AcCH_2CO_2Et$, with HNO_2 at 0–5° gave the unstable α-nitroso deriv. (blue), which underwent immediate decompn. to give AcOH and α-nitrosobutyrolactone. The latter under the exptl. conditions isomerized to the *anti*-α-oximino deriv. (III), m. 192–3° (70% yield); phenylhydrazone, m. 223°. The reduction of III with Sn and HCl gave (36% yield) α-aminobutyrolactone as the HCl salt (IV), m. 198–200°; chloroplatinate, dark yellow, darkens at 170°, decomps. at 195–7°. α-Carbethoxybutyrolactone (V) with 10% NaOH gave the α-carboxy deriv. (VI), which with HNO_2 also gave III. V, b_{10} 140°, n_D^{17} 1.4500, d_4^{17} 1.1870, prepd. by a modification of Traube's method (*Ber.* **34**, 1976 (1901)), proved to be more stable than I or VI and with HNO_2 at room temp. gave the *α-nitroso deriv.* (VII), obtained partly as a liquid but chiefly (50–6% yield) as a cryst. coupd., m. 97 8° (decompn.), probably the *dimer* (VIII). V satd. with N_2O_3 at 0–5° also gave the 2 forms of VII, but in much lower yield. VIII, insol. or difficultly sol. in org. solvents, when heated in EtOH in a CO_2 atm. readily underwent decompn. to give CO, NO and a *cryst. cmpd.* $C_{20}H_{27}O_{12}N$, m. 162–3° (decompn.), not identified further. VIII saponf. with 20% NaOH gave the α-nitroso deriv. of VI (not isolated), which with dil. acid underwent decompn. and isomerization to give CO_2 and α-oximino-α-hydroxybutyric acid (IX), m. 124-5°; the latter kept in a desiccator for several months slowly isomerized to give III. *α-Cyanobutyrolactone* (X), thick pale yellow oil, b_8 176–8°, n_D^{20} 1.4686, d_4^{20} 1.2501, prepd. from $NCCH_2CO_2Et$ and II in NaOEt (30.4% yield) with HNO_2 at 0–5° gave $C_{10}H_9N_3O_5$, m. 167° (decompn.), apparently a *dimer*, which gave neg. tests for the NO and oximino groups. **The action of phenyldiazonium chloride on α-substituted butyrolactones. II.** *Ibid.* 314-24.—The action parallels that of HNO_2 but differs in that the reaction is not accompanied by polymerization and isomerization. I with PhN_2Cl (XI) at 0–3° underwent cleavage of the Ac group to give (90-6% yield) the phenylhydrazone (XII) of α-ketobutyrolactone, pale yellow, m. 223–4° (decompn.), also obtained in 73% yield from the Na deriv. of I with XI. XII with concd. H_2SO_4 and $K_2Cr_2O_7$ gave a violet coloration (Bulow's reaction for phenylhydrazones). VI with XI under the same conditions as for I also gave XII. Reduction of XII with Sn and HCl gave α-amino-γ-hydroxybutyric acid (XIII) as the HCl salt and this with an excess of freshly pptd. Ag_2CO_3 gave (60–5% yield) XIII, m. 176–7°; reduction of XII with Al or Na amalgams gave $C_{10}H_{12}N_2O_2$, probably the *lactol form* of the phenylhydrazone of α-keto-γ-hydroxybutyraldehyde. XIII with a slight excess of concd. HCl gave IV in quant. yield. V with XI proved

to be stable and gave the *α-phenylazo deriv.* (**XIV**), not purified. To prove its structure **XIV**, which gave a neg. Bülow reaction, was sapond. with dil. NaOH and the sapon. product decarboxylated with dil. H_2SO_4 to give the phenylhydrazone (**XV**) of α-keto-γ-hydroxybutyric acid, bright yellow, m. 162° (decompn.), also obtained by the sapon. of **XII**. **XV** gave a pos. Bülow reaction. **The reaction of α-cyanobutyrolactone with phenyldiazonium chloride. III.** *Ibid.* 325–30.—**X** with **XI** behaves in a manner analogous to that of the monoalkylcyanoacetic esters studied by Favrel (*Bull. soc. chim.* [3], **27**, 193 (1902)). **X** added to a soln. of **XI** at 0–3° gave (98 95% yield) *α-phenylazo-α-cyanobutyrolactone* (**XVI**), bright yellow, m. 101–2° (decompn.), which gave a neg. Bülow reaction. **XVI** with alc. or aq. NaOH underwent ring cleavage and loss of CO_2 to give the phenylhydrazone (**XVII**) of α-keto-γ-hydroxybutyronitrile, pale yellow, m. 168 70°. **XVII** gave a pos. Bülow reaction. **XVII** with 10% HCl gave a HCl salt (**XVIII**), canary-yellow, m. 147–8° (decompn.), which probably exists in 2 tautomeric forms, as the HCl salt of **XVII** and as the HCl salt of 2-imino-3-oxotetrahydrofuran phenylhydrazone. **XVIII** neutralized with aq. KOH gave **XVII**, but with boiling water the product was **XII**. **XVII** with boiling water gave the amide of **XV**, m. 162–3°, which heated with dil. HCl gave **XII**. **Synthesis of hydroxyproline** (γ-hydroxy-

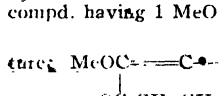


pyrrolidine-α-carboxylic acid). **IV.** *Ibid.* 331–9.—See *C. A.* **33**, 1725[1]. John Livak

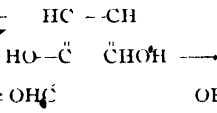
Enzymic preparation of *d*-galacturonic acid. H. H. Mottern and H. L. Cole. *J. Am. Chem. Soc.* **61**, 2701–2(1939).—Polygalacturonic acid (I) is obtained in 75–80-g. yield from 100 g. powd. apple or citrus pectin by wetting with 250 cc. 95% EtOH, adding 10 g. $CaCl_2$ in 250 cc. H_2O and, as soon as the aq. soln. is taken up, 250 cc. 3 *N* NaOH; after stirring 15 min., the clear liquor is decanted and the mixt. is treated with HCl to give a concn. of 1.5% acid and boiled for 10 min.; the I is washed with H_2O contg. 10 cc. concd. HCl per l., then with 50% EtOH and with Et_2O. I (75 g.) in 750 cc. H_2O is treated with 75 cc. 3 *N* NaOH with stirring and the pH adjusted to 3.7 4.0 with NaOH or H_2SO_4, then treated with 3.75 g. of "Pectinol 100D" and PhMe (to prevent mold growth) and kept at 35–40° for 10 days; addn. of dil. H_2SO_4 liberates the galacturonic acid, which is purified by addn. of 95% EtOH and Et_2O and crystn.; the yield is 20 g. C. J. West

Preparation of *d*-galacturonic acid. Ira A. Manville, Francis J. Reithel and Paul M. Yamada. *J. Am. Chem. Soc.* **61**, 2973–4(1939).—Various modifications and suggestions are given for the prepn. of *d*-galacturonic acid from polygalacturonic (pectic) acid by the method of Mottern and Cole (cf. preceding abstr.); yields of 36% have been obtained. C. J. West

Decomposition products of substances containing uronic acid. III. Reductic acid. Kiyosi Aso. *J. Agr. Chem. Soc. Japan* **15**, 161–70(1939).—When the substances contg. uronic acid were heated with mineral acid in an autoclave, reductic acid (I) was produced. Laminaria powder (850 g.) was soaked in 1% HCl overnight and then washed with H_2O. The residue was mixed with H_2O contg. 100 g. of H_2SO_4, dild. to 3 l., and heated at 155–60° for 2.5 hrs. **I**, m. 208°, was isolated from the product. It was sol. in H_2O, alc. and acetone and difficultly sol. in ether, C_6H_6 and ligroin. Anilide, yellow needles, m. 197°; phenylhydrazone, reddish brown needles, m. 246–7°; osazone, yellowish brown plates, m. 208°; trioxime, colorless plates, m. 198–9° (decompn.). A mono-Me ether (**II**), prisms, m. 130–1°, and di-Me ether, colorless sirup, b_{12} 117–18°, were obtained by methylating I with CH_2N_2. The di-Me ether was sapond. to the mono-Me ether, m. 134°. When I was methylated with $MeSO_4$, only the mono-Me ether, m. 134°, was obtained. *p*-Bromophenacyl ester of **II**, needles, m. 91–2°; phenylhydrazone of **II**, yellowish brown plates, m. 208°; trioxime, plates, m. 198–9° (decompn.). The Me group of **II** seemed to be easily removed in the prepn. of the phenylhydrazone and oxime. When I in water was reduced at 190° under 100 atm. pressure for 5 hrs., with Ni as a catalyst, a cryst. product, m. 30°, b. 117–20°, was obtained. It was oxidized to glutaric acid, m. 95–6°, by $KMnO_4$. The product obtained may be 1,2-cyclopentanediol. When I and II were oxidized with alk. $KMnO_4$, succinic acid was obtained. By the oxidation with acid $KMnO_4$ soln. or Ag_2CO_3 colorless plates, m. 183°, were obtained. The formula $C_{12}H_{14}O_6$ is given. The presence of 2 MeO groups was proved. The product is named methylreductic acid oxide (**III**). It was changed into II by dil. HCl and into colorless needles, m. 243–5°, by alc. KOH. The compd. m. 243–5° was an acidic compd. having 1 MeO group. **III** is assigned the structure



The mechanism of the formation of I from uronic acid is represented as follows:



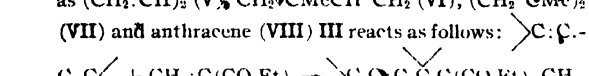
Y. Kihara

The synthesis of *l*-ascorbic acid (vitamin C). V. I. Maksimov, V. V. Nikonova, A. F. Lazarev and L. A. Zvereva. *J. Gen. Chem.* (U. S. S. R.) **9**, 936–43(1939).—A review is given on the different methods used for the synthesis of *l*-ascorbic acid. The most convenient method was found to be that starting with *l*-sorbose via diacetone-2-keto-*l*-gulonic acid. *l*-Sorbose (200 g.), obtained from *l*-sorbitol, which was prepd. from *l*-glucose by catalytic hydrogenation in the presence of Ni at a H pressure of 8 30 atm., gives diacetone-*l*-sorbose (I), m. 77–8°, $b_{0.1-0.3}$ 130–5°, in 90–2% yield, when treated with 4 l. dry acetone, 490 g. dry $CuSO_4$ and 10 g. concd. H_2SO_4 at room temp. for 40 5 hrs. I (600 g.) is dissolved in 6 l. 5% KOH, and 564 g. $KMnO_4$ in 12 l. H_2O is added within 2 hrs. at 18–20° while stirring vigorously. The mixt. is stirred for 4 hrs., filtered, the residue washed with hot H_2O, the filtrate + washing waters neutralized with 15% H_2SO_4 and the soln. evapd. *in vacuo* at 60° to about 1 l. I is extd. by means of $CHCl_3$ or Et_2O. To the aq. soln. of K diacetone-2-ketogulonate are added at 0° 410 g. concd. HCl + 400 g. ice while stirring. The hydrate of diacetone-2-keto-*l*-gulonic acid (II), m. 96–8°, is obtained in 436 456.5 g. yield. *l*-Ascorbic acid is obtained from II either by means of alc. HCl, or on treatment with H_2SO_4 or H_3PO_4.

Gertrude Berend

Diethyl methylenemalonate. G. B. Bachman and H. A. Tanner. *J. Org. Chem.* **4**, 493–501(1939).—A review of the previous work on the reaction of HCHO (I) and $CH_2(CO_2Et)_2$ (II) shows that the yield of di-Et methylenemalonate (III) varies from 0 to 20% owing to the many side reactions which may take place. An extensive study of this reaction is carried out under various conditions. The reaction between I and II in a vapor phase under changing conditions using different catalysts is not improved. The following procedure gives III in 40–45% yield: 200 g. AcOH is added to a mixt. of 30 g. paraformaldehyde, 80 g. II, 5 g. $Cu(AcO)_2$ and 5 g. AcOK. The mixt. is heated on a steam bath until clear and for 1 hr. longer, then distd. at 35 mm. until a b. p. of 130° is reached. After the receiver is changed, the distn. is continued until a b. p. of 200° is reached. The greenish yellow distillate solidifies on standing to a waxy polymer. Redistn. gives a fraction b. 205–15° of almost pure **III**. This is pure enough for further expts. Further purifica-

tion is achieved by repeated fractionation. The purest III b_{760} 210°, n_D^{25} 1.432, d_4^{25} 1.052. III may be considered as an ethylene deriv. with 2 neg. substituents unsymmetrically placed. Such compds. polymerize readily with the formation of resinous products. Unlike maleic anhydride (IV) III does not copolymerize easily. Impure III polymerizes readily to waxy polymers and it becomes more stable on purification. Such impurities which catalyze the polymerization are acrylic acid and Et acrylate. The polymer obtained from highly purified III is a colorless transparent glass which soon becomes a hard brittle porcelain-like solid. It is sol. in AcOH, Me_2CO and EtOH and is pptd. from these solns. as a white powder by pouring into H_2O or petr. ether. It decomps. at 230–40° with formation of the monomer and higher-boiling products. Pure III also copolymerizes with unsatd. compds. such as vinyl acetate, Me methacrylate, Me_2 itaconate, IV, MeCOPr, styrene and vinyl Et ether, with Bz_2O_2 as catalyst. The yields vary from 35 to 90%. III does not resemble IV either in the ease or completeness of its copolymerization with other olefin derivs. With dienes such as $(CH_2{:}CH)_2$ (V), $CH_2{:}CMeCH{:}CH_2$ (VI), $(CH_2{:}CMe)_2$ (VII) and anthracene (VIII) III reacts as follows:



III and V react at room temp. on standing for 24 hrs. to give *1,1-dicarbethoxy-3-cyclohexene* in 80% yield, b_6 117°, n_D^{25} 1.452, d_4^{25} 1.020. III and VI when heated at 100° for 3 hrs. yield *1,1-dicarbethoxy-3(or 4)-methyl-3-cyclohexene* in 86% yield, b_6 127°, n_D^{25} 1.456, d_4^{25} 1.030. III and VII give under the same conditions, *1,1-dicarbethoxy-3,4-dimethyl-3-cyclohexene* (IX) in 91% yield, b_6 136°, n_D^{25} 1.460, d_4^{25} 1.038. Sapon. of IX with alc. NaOH yields *1,1-dicarboxy-3,4-dimethyl-3-cyclohexene* (X) in 86% yield, m. 186.5–88° (CO_2 evolution). When heated at 205° until the CO_2 evolution has ceased, X gives, in 85% yield, *3,4-dimethyl-3-cyclohexene-1-carboxylic acid*, m. 80–1°. III and VIII heated at 220° give a condensation product in 54% yield, m. 126–7°. F. E. Brauns

Substituted dialuric and hydurilic acids. C. M. Manberg and D. W. Stanger. *J. Am. Chem. Soc.* **61**, 2736–7 (1939). 5-Isoamylbarbituric acid (I) (2.1 g.) and 25 cc. of 3% H_2O_2, refluxed 1 hr., give about 2 g. of *5-isoamyldialuric acid* (II), m. 179.5. I (12.7 g.) in 100 cc. H_2O and 1.5 cc. concd. H_2SO_4, oxidized by slow addn. of 0.2 *N* $KMnO_4$ (600 cc., with addn. of 1 cc. H_2SO_4 after 400 cc. $KMnO_4$ has been used), give a ppt. from which Me_2CO exts. 5.3 g. of *5,5'-diisoamylhydurilic acid* (III), m. 290° (decompn.), and from the filtrate 3.4 g. of II. *5-Bz deriv.* of II, m. 210.5–16°. Hydrolysis of II gives isoamyltartronic acid. Solns. of the Na salts of I and II and of the corresponding Et compds. have no appreciable effect when injected into rats. C. J. West

Alkylacetanilidobarbituric acids. II. *p*-Ethoxy derivatives. John A. Timm. *J. Am. Chem. Soc.* **61**, 2962 (1939); cf. *C. A.* **30**, 7552⁷.—The appropriate 5-alkylbarbituric acid and *p*-$EtOC_6H_4NHCOCH_2Cl$, 1.5 mol. proportion of AcONa and 0.25 mol. proportion of KI in 70% EtOH, heated 24 hrs., give the following *5-p-ethoxyacetanilidobarbituric acids* (all m. with decompn.): *5-Et* m. 194–205°, 60%; *5-iso-Pr* m. 210–15°, 20%; *5-Bu* m. 231–2°, 40%; *5-iso-Bu* m. 217–19°, 50%; *5-iso-Am* m. 219–20°, 80%; *5-allyl* m. 215–18°, 60%. C. J. West

Preparation of *d*- and *l*-ribosidodihydroxyacetone tetraacetates with an ortho-ester structure. Clarence W. Klingensmith and Wm. Lloyd Evans. *J. Am. Chem. Soc.* **61**, 3012–15(1939); cf. *C. A.* **30**, 482¹; **33**, 143⁸.—*l-Ribose tetraacetate* (I), m. 109.5–10° (all m. ps. cor.), $[\alpha]_D^{25}$ 56° ($CHCl_3$, *c* 3.5). A mixt. of I and the *d*-isomer gives the *dl-compd.*, m. 88–90°, which is probably a mol. compd. I gives 69–70% of *acetobromo-l-ribose* (II), m. 94.5–5.5°, $[\alpha]_D^{25}$ 224.8° ($CHCl_3$, *c* 3.1). The *d*-isomer of II in C_6H_6, added to $AcOCH_2Ac$ contg. I as a catalyst, gives 18–20% of *di-Ac d-ribose-1,2-ortho-3'-acetoxyacetonyl acetate* (III), m. 97–8°, $[\alpha]_D^{25}$ −11.6° ($CHCl_3$, *c* 1.8); it is very sensitive to HCl in $CHCl_3$, a very rapid change in rotation taking place in 6 min. (−0.32 to −3.03°); the soln. apparently contains acetochloro-*d*-ribose (IV). Similarly II gives the *l-isomer* of III, m. 97–8°, $[\alpha]_D^{25}$ 11.8° ($CHCl_3$, *c* 3.2); with HCl in $CHCl_3$ the rotation changes from 0.95 to 9.45° in 5 min. and the presence of the *l*-isomer of IV is indicated. The *dl-isomer* of III m. 124.5–5° and is a true racemate. These are the 1st examples of ortho-ester derivs. which contain a group other than the Me and Et groups as a part of the ortho structure. A possible explanation for the high A_D values of III by the Kunz and Hudson method is presented. C. J. West

Action of titanium tetrachloride on benzyl glucopyranoside tetraacetates. E. V. Piel and C. B. Purves. *J. Am. Chem. Soc.* **61**, 2978–9(1939).—The reaction of $TiCl_4$ with tetraacetyl-β-benzylglucopyranoside (I) in $CHCl_3$ (refluxing 75 min.) gives an equil. mixt. contg. 90% of the α-isomer (II); the same equil. mixt. is obtained from II. By attention to tech. details 60% yields of II may be obtained from acetobromoglucose. Although colored addn. compds. were formed with tetraacetyl-β-methylfructopyranoside, sucrose acetate or tetraacetyl-β-glucosan, the $TiCl_4$ compds. are apparently too stable to rearrange under the exptl. conditions and the original materials were recovered unchanged. C. J. West

Photochemical production of reducing sugars from glycosides by ultraviolet light. Lawrence J. Heidt. *J. Am. Chem. Soc.* **61**, 2981–2(1939).—Aq. solns. of α- and β-Ph, α- and β-benzyl and β-(β-phenylethyl) glucopyranosides and of β-benzyl fructopyranoside (I) were illuminated with ultraviolet light in quartz tubes; reducing sugars were formed. Three samples of I showed 9, 14 and 18% hydrolysis as detd. by change in rotation or by detn. of the reducing sugar. The photochem. efficiency was independent of the light intensity when 5 to 700 × 10^{16} photons were absorbed per min. by 11 cc. of soln. and also of pH between 3.5 and 6.5. Gross quantum yields were independent of the initial concn. of glycoside but decreased as the liberated alc. or phenol absorbed a large fraction of the light incident on the soln. C. J. West

The antiketonic action of glucose. Giuseppe Illari. *Biochim. terap. sper.* **26**, 380–90(1939).—Glucose and $AcCH_2CO_2Et$ react in an aq. medium slightly alk. with KOH. The optimal condition, as detd. by measuring the optical rotation, is found in dil. solns. when glucose, ester and KOH are present in the mol. proportion 1 2.1. This supports Schaffer's theory that the antiketonic effect of glucose is due to a reaction with $AcCH_2CO_2H$. A. E. Meyer

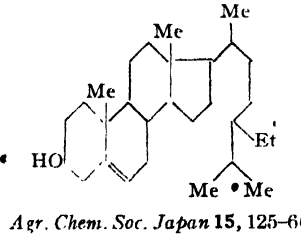
A kinetic study of the formation of *d*-glucose phenylhydrazone. A. Orning and G. H. Stempel, Jr. *J. Org. Chem.* **4**, 410–17(1939).—The reaction between equil. *d*-glucose and a mixt. of $PhNHNH_2$ and its HCl salt is studied under carefully controlled conditions, a specially designed polarimeter tube being used. The results, which are given in tables and curves, are discussed and the kinetics of the reaction is expressed by math. equations. When all the oxidizing agents, including dissolved air, are eliminated, there is no evidence for the formation of an osazone. From the results it is concluded that the formation of *d*-glucose phenylhydrazone is due to a reaction between $PhNHNH_3^+$ and an intermediate substance which is symmetrically related to the isomeric form of *d*-glucose. The reverse reaction is an acid-catalyzed hydrolysis. F. E. Brauns

Ketone sugar series. IX. The validity of Hudson's rules of isorotation in the *l*-sorbose series. β-Ethyl sorboside and its tetraacetate. Eugene Pacsu. *J. Am. Chem. Soc.* **61**, 2669–74(1939); cf. *C. A.* **31**, 6620⁶.—It is shown that Hudson's rules of isorotation hold closely in the *l*-sorbose series provided that the a_x consts. for the ketoses are applied separately to the α- and β-derivs. The rotations of the α- and β-isomers can be calcd. by introduction of a factor *F* in the equations: $[M]_\alpha = -a_x + (b_{\alpha,\beta} + F)$ and $[M]_\beta = a_x + (b_{\alpha,\beta} - F)$. The numerical value of *F* has been detd. to be 6850 for the acetylated and 8800 for the deacetylated products. Similarly, by introduction of a factor (*F*) in the equations, the rotation of α-

and β-mannose can be calcd. from the "normal" A_{OH} value for the aldoses. It is suggested that *F* represents the numerical value of the contribution of a new optical factor (ring conformations) to the total rotation of the mole. The reaction between α-acetochlorosorbose and MeOH or EtOH gives rise to ortho esters, as the main products and only to a small quantity of the true β-alkyl sorboside tetraacetates. The *β-isomer* m. 86°, $[\alpha]_D^{20}$ 82.7°, $[\alpha]_C^{20}$ 66°, $[\alpha]_{Hg1}^{20}$ 98° (0.200 g. in 10 cc. $CHCl_3$). The pyranoid ring structure of α-Me and β-Et sorboside is proved by the HIO_4 oxidation method of Jackson and Hudson. **X. The synthesis of a new disaccharide, 1-β-glucosidofructose, and the structure of turanose and melezitose.** Eugene Pacsu, E. Justin Wilson, Jr. and Ladislas Graf. *Ibid.* 2675-9.—The present structures of turanose and melezitose are based on the supposed 1,3,4-trimethylfructose, a sirupy product obtained by Zemplén and Braun (*C. A.* **21**, 392) and by Leitch (*C. A.* **21**, 1969) from the fully methylated melezitose. The existence of the true, cryst. 1,3,4-trimethylfructose and the no. and properties of the octaacetates and other derivs. of turanose indicate that neither C atom 5 nor 6 of the fructose part of turanose can carry the glucosidic linkage. C atom 4 is also eliminated because turanosazone is not identical with maltosazone. If C atom 1 were the position of the linkage, 1-β-glucosidofructose would be the β-glucosidic isomer of turanose. β-Diacetonefructose (26 g.) and acetylbromoglucose with Ag_2O in $CHCl_3$ give 30.5 g. of *1-tetraacetyl-β-glucosido-2,3,4,5-diacetone-β-fructopyranose* (I), m. 162–3°, α_D^{25} −32.9° ($CHCl_3$, *c* 2.374); with MeOH-MeONa 60 g. I gives 42 g. *1-β-glucosido-2,3,4,5-diacetone-β-fructopyranose*, m. 174.5°, $[\alpha]_D^{20}$ −45.6° (H_2O, *c* 0.986); heating with 5% AcOH at 100° for 6 hrs. gives *1-β-glucosidofructose*, which seps. from H_2O as the dihydrate, m. 132-5°, $[\alpha]_D^{25}$ −59.2° (H_2O, *c* 1.3328). This new sugar is entirely different from turanose and, unlike the latter, it does not give an osazone except for a small quantity of glucosazone. Turanose, therefore, must be 3-α-glucosidofructose and melezitose the corresponding sucrose deriv. Based on the true formula of turanose, the correct structures of the more important turanose derivs are given. C. J. West

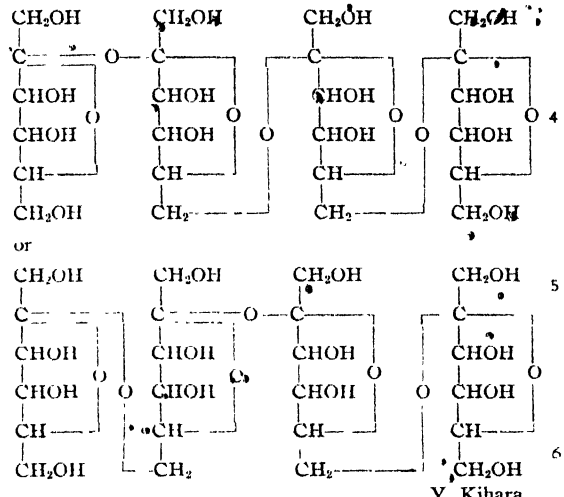
Relations between rotatory power and structure in the sugar group. XXXIV. The possibility of different conformations of the pyranoid ring. C. S. Hudson. *J. Am. Chem. Soc.* **61**, 2972(1939); cf. *C. A.* **33**, 6804⁸.—The agreement of rotational differences within the α- and β-series, when coupled with the known disagreement across the α-β pair, probably indicates differences in pyranoid ring conformation. Cf. preceding abstr. C. J. West

Waxy substances of sugar cane. III. A new sterol and a new sterol ketone in the unsaponifiable matter of cane wax. Tetuo Mitui. *J. Agr. Chem. Soc. Japan* **15**, 526-30(1939); cf. *C. A.* **32**, 6254⁸.—The unsaponifiable matter of cane wax was treated with acetone to remove the cryst. substances. A reddish brown oil was extd. with cold MeOH. By treating the ext. with C_6H_6, a cryst. product, m. 206°, was obtained. The formula $C_{29}H_{52}O_2$ is given. It is named α-saccharostanediol. The yield was 4% for the wax. A dibenzoate, m. 158 60°, and di-*m*-dinitrobenzoate, m. 171° (decompn.), were prepd. α-Saccharostanediol gave no reaction with $C(NO_2)_4$ or Br. It showed a Co-blue color with $SbCl_3$-$CHCl_3$. One alc. residue may be present at C atom 3 of the sterol nucleus. The mother liquor of α-saccharostanediol was kept at 0° and satd. with HCN. Sitosterol allophanate crystd. out, by treating the filtrate of sitosterol allophanate with acetone and MeOH, colorless scales, m. 106°, were obtained. The formula $C_{29}H_{48}O$ is given. The substance is named β-saccharostenone. The yield was 0.1–0.2% of the wax. An oxime, m. 163-5°; 2,4-dinitrophenylhydrazone, m. 211°, and tribromide, m. 160°, were prepd. It showed a yellow color with $C(NO_2)_4$-$CHCl_3$. **IV. Diol derivatives of cane sitosterol and stigmasterinol.** *Ibid.* 795–804.—Cane sitosteryl acetate (I) was oxidized with SeO_2 and then the product was acetylated. When it was treated with Ac_2O, a cryst. mixt. (II) was isolated from the insol. part, and a cryst. compd., m. 249°, (III) from the sol. part. II was sepd. into 1 part of a compd. m. 198° and 2 parts of a compd. m. 164°. The former was identified as 5-stigmastene-3,4-diol diacetate and the latter as 5-sitostene-3,4-diol diacetate. The latter was hydrogenated with Pt oxide as the catalyst and then sapond. with alkali. Crystals m. 199° were obtained. The compd. was difficultly sol. in ether and showed no Liebermann-Burchard reaction. It was identified as cane sitostane-3,4-diol. From the fraction easily sol. in ether, a cryst. product m. 84° was obtained. It was identified as sitostane. III was identified as cane 4-sitostene-3,6-diol. When it was acetylated and then hydrogenated, only sitostane was obtained. From stigmasteryl acetate, 5-stigmastene-3,4-diol and 4-stigmastene-3,6-diol, m. 236°, were prepd. by a similar process. The catalytic hydrogenation of 5-stigmastene-3,4-diol diacetate, m. 198°, gave stigmastane-3,4-diol, m. 236° and stigmastane, m. 84°. The former gave no depression of the m. p. by heating with cane sitostane-3,4-diol. The latter was also identified with stigmastane prepd. from stigmastanol or cane sitostane. When 4-stigmastene-3,6-diol was hydrogenated, only stigmastane was obtained. When I was treated with fuming HNO_3, the nitrate, m. 72°, was obtained. It was changed into 6-oxositostanyl acetate m. 129°, by treating with Zn and glacial AcOH. Sitostane-3,6-diol, m. 215°, was prepd. by reducing it with PrONa. It formed colorless scales difficultly sol. in ether. Stigmastane-3,6-diol was also prepd. from stigmasteryl acetate through the nitrate, m. 127°, Δ^{22}-6-oxosteryl acetate, m. 140°, and Δ^{22}-stigmastene-3,6-diol, m. 200°. It formed scales, m. 213°, and was identified as sitostane-3,6-diol. I was oxidized with CrO_3 in AcOH to 7-oxositosteryl acetate, m. 170°. It was dissolved in the mixt. of ether and AcOH and then hydrogenated, with a small amt. of Pt oxide. 7-Oxositostanyl acetate, m. 162°, was obtained. It was reduced to sitostane-3,7-diol, m. 176°, by means of NaOPr. It crystd. in plates from the ether soln. Simultaneously sitostanol, m. 128–33°, was obtained. Stigmasteryl acetate was also oxidized to 7-oxostigmasteryl acetate, m. 183°, by treating with CrO_3, and then hydrogenated to 7-oxostigmastanyl acetate, m. 161°. It was reduced to stigmastane-3,7-diol with NaOPr. It forms crystals, m. 174°, and was also identified as sitostane-3,7-diol. Di-3,5-dinitrobenzoate, m. 207.5°. α-Saccharostanediol was not identical with these diol derivs. prepd. The diol derivs. of sitostane were identical with those of stigmastane. Hence the constitution of the side chain of cane sitosterinol may be —$CHMeCH_2CH_2CH$-$EtCHMe_2$. **V. Oxidation of cane sitostanyl acetate and stigmastanyl acetate by chromic acid.** *Ibid.* 805-8.—Sitosteryl acetate was hydrogenated into sitostanyl acetate and then oxidized with CrO_3 and AcOH. From the neutral fraction of the oxidation products, the semicarbazone, m. 261-2°, was prepd. It was identified as *trans*-androsterone acetate semicarbazone. From the acid fraction a Na salt was isolated. It was sapond. to an acid m. 221-2°. Me ester, m. 154°; Me ester acetate, m. 158°. The acid was identified as 3-hydroxynorallocholanic acid. Simultaneously a cryst. product m. 238° was isolated from the acid fraction; di-Me ester, m. 78°. The substance was identified as 3-hydroxyetiobilianic acid. These compds. were also isolated from the oxidation products of stigmastanyl acetate. Hence the constitution of cane sitosterol may be 22-dihydrostigmasterinol having the following formula:



Also in *Bull. Agr. Chem. Soc. Japan* **15**, 125–6(in German) Y. Kihara

Carbohydrates of the bulbs of Allium. IX. Yosiziro Kihara. *J. Agr. Chem. Soc. Japan* **15**, 348–52(1939); cf. *C. A.* **31**, 8605⁹.—Half of scorodose was hydrolyzed when it was kept with *N* H_2SO_4 at 20° for 220 min. A few products were prepd. by the partial hydrolysis of scorodose. They were *l*-rotatory. Scorodose was scarcely hydrolyzed by cold 10% AcOH, while it was easily hydrolyzed by hot 2.5% AcOH. Methylscorodose was hydrolyzed with oxalic acid on the water bath for 15 hrs. The hydrolyzate was methylated with MeOH contg. HCl and then distd. into fractions in a high vacuum. A large amt. of colorless sirup $b_{0.10}$ 81–9° was obtained. It was identified as 1,3,4,6-tetramethylmethylfructoside. From the fraction $b_{1.7}$ 102–5°, a faint yellow sirup was obtained, $[\alpha]_D^{20}$ 13.0° in H_2O. It may be 1,3,4-trimethylmethylfructoside. It was hydrolyzed with HCl and then oxidized with Br. The change of the optical rotatory power was slow. Trimethylfructose may be 1,3,4-trimethylfructofuranose. From these facts the constitution of scorodose is assumed to be



or

Y. Kihara

Cyclopropanone. N. Ya. Dem'yanov and V. V. Feofilaktov. *J. Gen. Chem.* (U. S. S. R.) **9**, 340–60(1939) — Repetition of Ingold's synthesis (*C. A.* **16**, 3068) of cyclopropanone (I) gave neg. results. Et 1-cyanocyclopropane-1-carboxylate (II), b. 208–11°, with EtOH-HCl underwent cleavage of the ring to give chiefly *di-Et ω-chloroethylmalonate*, $Cl(CH_2)_2CH(CO_2Et)_2$, viscous oil, b_{24} 145°, $n_D^{16.5}$ 1.4416, $d_4^{16.5}$ 1.13105, M. R. 52.01 (calcd. 52.94), and only a small amt. of $(CH_2)_2C(CO_2Et)_2$ (III). II with alk. 10% H_2O_2 at room temp. for several days gave 40–1% $(CH_2)_2C(CONH_2)CO_2Et$, m. 125°, which with concd. NH_4OH gave 80% $(CH_2)_2C(CONH_2)_2$ (IV), m. 192–4°, whose Br deriv., $C_5H_6N_2Br_2$ (V), pale yellow, decomps. 158–9°. III, b. 216–17°, prepd. from $(CH_2)_2Br_2$ and $CH_2(CO_2Et)_2$, with concd. NH_4OH, also gave 72–5% IV. V with MeONa gave 5-cyclopropanespirohydantoin, m. 213–14°, from which 1-carbamidocyclopropane-1-carboxylic acid (VI) was obtained by heating with NaOH and acidifying with HCl. VI with HNO_2 gave the 1-nitroso deriv.; the filtrate from this deriv. contained 1-aminocyclopropane-1-carboxylic acid, isolated as the HCl salt (VII), m. 220–1° (decompn.). The action of alkali on the NO deriv. or of HNO_2 on the NH_2 deriv. gave 1-hydroxycyclopropanecarboxylic acid (VIII), m. 109–10°, whose acetate m. 96–7.5°. VIII with concd. H_2SO_4 at 125–30° or heated up to 320° failed to give either I or acrolein. VIII with HBr in a sealed tube at 100° for 4 hrs. gave a dibasic acid, $C_8H_{10}O_6$, m. 154.5–5.0° (decompn.), the structure of which was not detd. VIII with HBr in a sealed tube at 170° for 3.5 hrs. gave α-aminobutyrolactone as the HBr salt, m. 216–22.5° (decompn.), which with freshly pptd. Ag_2CO_3 at 35° gave α-amino-γ-hydroxybutyric acid, m. 189–90° (Cu salt, blue-violet). Although VIII behaved as a monobasic HO acid, further study revealed that it readily decolorized $KMnO_4$, underwent oxidation with great ease, and gave a characteristic reddish brown coloration with $FeCl_3$. These unusual properties suggested the possibility that in the prepn. of VIII from VII rupture of the nucleus and isomerization had occurred to give an unsatd. acid, possibly *trans*-γ-hydroxycrotonic acid (IX), m. 106.5–7.0°, whose acetate m. 94°. IX was synthesized by the method of Rambaud (*C. A.* **27**, 2423) but its mixed m. p. (68–71°) with VIII proved the nonidentity of the 2 compds. The structure assigned to VIII requires further study. 42 references. John Livak

The behavior of the cis and trans forms in the dehydration of 1-methyl-1,2-cyclopentanediol and in the dehalogenation of the corresponding halohydrins. Marc Tiffeneau and Georges Vajssière. *Compt. rend.* **209**, 449–53 (1939).— By treatment of *cis*-2-chloro-1-methylcyclopentanol, b_{18} 61–4°, in anhyd. Et_2O with BrMgEt, the corresponding bromomagnesium deriv. was produced with the simultaneous liberation of C_2H_6. Upon heating the reaction product on a water bath until the ether was removed and decompg. with H_2O, 2-methylcyclopentanone was formed. The trans form yielded the same product when treated similarly. Dehydration of *cis*-1-methyl-1,2-cyclopentanediol by heating with 10% H_2SO_4 yields 2-methylcyclopentanone, b_{18} 44°; semicarbazone, m. 184°. The trans glycol, m. 64°, when treated similarly with hot dil. H_2SO_4, yielded a resinous material. Passage of the vapors at 20 mm. of the trans glycol over Al heated at 300° yielded an unsatd. volatile hydrocarbon and a resin resulting from polymerization of the former, and also a small quantity of 2-methylcyclopentanone. Thus the principal reaction consisted in an elimination of 2 OH group and H from an adjacent CH_2 group, yielding an unsatd. hydrocarbon which was then polymerized. The distant positions of the OH groups in the trans form and their adjacent position in the cis form accounts for the differences noted in the dehydration studies. W. A. Cook

Synthesis of *tert*-butyl- and *tert*-amylcyclopentane and of their intermediate products. Herman Pines and V. N. Ipatieff. *J. Am. Chem. Soc.* **61**, 2728–30(1939).—Hydrogenation of 10 parts of *p-tert*-BuC_6H_4OH with 1 part of Ni under 100 atm. H at 125° in an Ipatieff-type electrically-heated rotating autoclave gives 4-*tert*-butylcyclohexanol (I), m. 82°; *4-tert-amylcyclohexanol*, b_{10} 154–5°, m. 24–5°, d_4^{20} 0.9034; *α-naphthylurethan*, m. 113°. Heating 1 mole of I with 560 cc. of 50% HNO_3 and 0.5 g. NH_4 vanadate gives 87% of *β-tert-butyladipic acid* (II), m. 117°; *β-tert-amyladipic acid*, m. 77–8°, 95% yield. II (180 g.) and 18 g. $Ba(OH)_2$, heated at 280°, give 64–70% of *3-tert-butylcyclopentanone* (III), b_{759} 200–1°, d^{20} 0.9031, n_D^{20} 1.4505 (*semicarbazone*, m. 194–4.5°; *2,4-dinitrophenylhydrazone*, m. 139°); *3-tert-amylcyclopentanone*, b_{27} 120°, d^{20} 0.9159, n_D^{20} 1.4601 (75–80% yield) (*semicarbazone*, m. 189°; *2,4-dinitrophenylhydrazone*, m. 174.5°). Reduction of 10 parts of III with 1 part of Ni catalyst at 80° and 100 atm. initial H pressure gives *3-tert-butylcyclopentanol* (IV), b_{744} 196–8°, d^{20} 0.9096, n_D^{20} 1.4574 (*α-naphthylurethan*, m. 95°); *3-tert-amylcyclopentanol*, b_{738} 217°, d^{20} 0.9114, n_D^{20} 1.4656 (*α-naphthylurethan*, m. 82°). IV was dehydrated by passing it over 40 g. activated Al_2O_3 at a rate of 40 cc. per hr. and a temp. of 345°; the yield is quant.; *tert-butylcyclopentene* (V), b_{760} 139.6°, dT/dP (770 to 730 mm.) = 0.048°/mm., d^{20} 0.8021, d^{40} 0.7861, n_D^{20} 1.4421, $n_{H\beta}^{20}$ 1.4486, $n_{H\alpha}^{20}$ 1.4397, Δ^{20} (dispersion) 88.8, δ^{20} (sp. dispersion) 110.7; *tert-amylcyclopentene*, b_{743} 163–5°, d^{20} 0.8256, n_D^{20} 1.4554, $n_{H\beta}^{20}$ 1.4618, $n_{H\alpha}^{20}$ 1.4527, Δ^{20} 90.8, δ^{20} 110. Catalytic reduction of V with Ni and 100 atm. H gives *tert-butylcyclopentane*, m. −96 ± 0.2°, b_{760} 145.2°, dT/dP (770 to 730 mm.) = 0.052°/mm., d^{20} 0.7911, d^{40} 0.7753, n_D^{20} 1.4341, $n_{H\beta}^{20}$ 1.4396, $n_{H\alpha}^{20}$ 1.4320, Δ^{20} 76.4, δ^{20} 96.6. *tert-Amylcyclopentane*, b_{760} 173.9°, dT/dP (770 to 730 mm.) = 0.054°/mm., d^{20} 0.8071, d^{40} 0.7923, n_D^{20} 1.4457, $n_{H\beta}^{20}$ 1.4511, $n_{H\alpha}^{20}$ 1.4433, Δ^{20} 78, δ^{20} 96.6. C. J. West

Sulfonation reactions with sulfuryl chloride. M. S.

Kharasch and Alice Tanner Read. *J. Am. Chem. Soc.* **61**, 3089–92(1939).—Chlorination reactions with SO_2Cl_2 (*C. A.* **33**, 7728[8]) occur with many types of org. moles with a peroxide catalyst. If the mechanism is a chain reaction involving the formation of Cl atoms and SO_2Cl free radicals then sulfonation as well as chlorination should take place by the direct action of the SO_2Cl radical on the hydrocarbon. Results are given for cyclohexane with a large no. of catalysts and for PhMe, PhEt, heptane, C_6H_6, *tert*-BuPh and methylcyclohexane with selected catalysts. The catalyst, more than any other factor, dets. the course of the reaction. Under similar conditions of light and low SO_2Cl_2 concn., peroxides give chlorination only; anthraquinonesulfonic acids give almost entirely chlorination; mercaptans and org. N compds. give chlorination and sulfonation, the best yields of sulfonation product being obtained with the aromatic ring compds. With any 1 catalyst, the most favorable conditions for sulfonation are a strong light and a low concn. of SO_2Cl_2 in the reaction mixt. at any 1 time. O, which might be expected to inhibit chlorination, inhibits both reactions in diffused light and has no appreciable effect in strong light, except in the case of the C_5H_5N type of catalyst, where chlorination is somewhat inhibited but the yield of cyclohexanesulfonyl chloride is increased. SO_2, which in excess favors sulfonation when a mixt. of SO_2 and Cl is used, has no effect with SO_2Cl_2 in strong light and inhibits both reactions in diffused light. The mechanism of the reaction is discussed. C. J. West

The addition of hydrogen to acetylene derivatives. XXXI. Catalytic hydrogenation of acetylene γ-glycols containing cyclopentyl radicals. Yu. S. Zal'kind and I. M. Gverdtsiteli. *J. Gen. Chem.* (U. S. S. R.) **9**, 855–62 (1939); cf. *C. A.* **33**, 4195[2].—To (ClCMgBr)$_2$, prepd. from 12 g. Mg, 55 g. EtBr and CHCl, there is added 42 g. cyclopentanone while cooling and stirring. After 24 hrs. the mixt. is decompd. and the reaction product extd. with Et_2O. The residue from Et_2O gives bis(1-hydroxycyclopentyl)acetylene (I), m. 109.8–10.8°, in 45.2% yield. I yields acetylene on warming with 40% KOH soln. and gives a violet color with concd. H_2SO_4. It is slightly sol. in C_6H_6, rather sol. in alc. and Et_2O. The filtrate from I gives 1-ethynyl-1-hydroxycyclopentane, b. 145–50°. I in alc. contg. colloidal Pd is hydrogenated to bis(1-hydroxycyclopentyl)ethylene (II) which is obtained in 2 isomeric forms, m. 129.6–30.6° (III) and 82–3° (IV), resp. Both isomers give a bright-violet color with H_2SO_4. 1,2-Bis(1-hydroxycyclopentyl)ethane (V), m. 131.2–1.4°, is obtained from I on hydrogenation in the presence of Pt. III and IV yield the γ-oxide, m. 81–2°, on heating with a crystal of I; it is also obtained on warming III with H_2SO_4. The diacetate of I, m. 44.5–5.5°, prepd. by heating 12 g. I, 36.5 g. Ac_2O and 1 g. NaOAc, is easily sol. in alc., Et_2O, ligroin and MeOH and yields on hydrogenation in the presence of colloidal Pd the diacetate of V, b_7 108 10° (partial decompn.), d^{16} 1.0004, n_D^{18} 1.47507. When the hydrogenation is stopped after the addn. of 2 atoms H, the diacetate of II is obtained, b_7 126.5–9° (partial decompn.), d^{13} 1.072. To EtMgBr prepd. from 24 g. Mg and 110 g. EtBr is added in small portions 42 g. dimethylethynylcarbinol within 1.5 hrs. while cooling and stirring. The mixt. is heated for 15 min. and allowed to stand for 2–3 hrs. Then 42 g. cyclopentanone is added slowly while cooling. After 24 hrs. the mixt. is heated with moist Et_2O. The residue from Et_2O is distd. with steam, and the residue from the steam distn. is extd. with Et_2O. After evapn. of the Et_2O dimethyl(1-hydroxycyclopentylethynyl)carbinol (VI) m. 56–8°, b_6 125–6°, is obtained, which is easily sol. in org. solvents. Hydrogenation of VI in the presence of colloidal Pd gives dimethyl(1-hydroxycyclopentylvinyl)carbinol, m. 89–90°. G. B.

Hydrogenation of cyclohexene with copper catalysts. Sigeru Tutumi. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 360–2(1939); cf. *C. A.* **33**, 9104[2].—The activities of the following catalysts were tested by the flow method: Cu-66% kieselguhr, Cu-100% kieselguhr, Cu-133% kieselguhr, Cu-10% Al_2O_3, Cu-10% Al_2O_3-100% kieselguhr, Cu-10% Cr-100% kieselguhr, Cu-10% ThO_2-100% kieselguhr, and Cu-10% MgO. Al_2O_3, ThO_2, and Cr were superior promoters. An 81.8% yield was obtained with a Cu (6 g.)-10% Al_2O_3 catalyst at 170° and atm. pressure. In all cases the optimum temp. was 170°. The catalysts were prepd. by pptn. from mixed nitrates by K_2CO_3 in the presence or absence of kieselguhr, washing with hot water, drying at 200°, and reducing at 200° for 1 hr. Wm. E. Trout, Jr.

The catalytic conversion of 5-cyclohexyl-1-pentene and 5-cyclohexyl-1-pentyne. R. Ya. Levina, G. B. Golub and K. M. Smirnov. *J. Gen. Chem.* (U. S. S. R.) **9**, 825–8(1939); cf. *C. A.* **31**, 4652[1,5].—β-Cyclohexylethyl alc., b_{22} 105–7°, d_4^{20} 0.9189, n_D^{20} 1.4656, obtained from $C_6H_{11}CH_2MgI$ and CH_2O, was transformed to $C_6H_{11}CH_2CH_2I$, b_{11} 98–100°, d_4^{20} 1.4530, n_D^{20} 1.5230. 5-Cyclohexyl-1-pentene (I), b_{14} 83–4°, d_4^{20} 0.8168, n_D^{20} 1.4550, was obtained from $C_6H_{11}CH_2CH_2MgI$ on reaction with CH_2:$CHCH_2Br$. I conducted over platinized charcoal (25% Pt) at 200–5° in a weak CO_2 current at a rate of 2–3 drops a min. is completely transformed into a mixt. of amylcyclohexane (II), b_{750} 198–9°, d_4^{20} 0.8018, n_D^{20} 1.4438, and amylbenzene (III), in the ratio 2:1. 5-Cyclohexyl-1-pentyne, b_8 73–4°, d_4^{20} 0.8464, n_D^{20} 1.4627, prepd. by the method of Bourguel (cf. *C. A.* **19**, 3476) via the intermediates $C_6H_{11}CH_2C{:}CH \rightarrow C_6H_{11}CH_2C{:}CMe \rightarrow C_6H_{11}CH_2CH_2C{:}CH \rightarrow C_6H_{11}CH_2CH_2C{:}CMe \rightarrow C_6H_{11}CH_2CH_2CH_2C{:}CH$, when conducted over platinized charcoal under the same conditions as I, yielded II and III in the ratio 1:2. Gertrude Berend

Hydrogenation velocities of aromatic hydrocarbons. III. Reaction velocity and structure of hydrocarbons. A. V. Lozovoĭ and M. K. D'yakova. *J. Gen. Chem.* (U. S. S. R.) **9**, 895–901(1939); cf. *C. A.* **32**, 5286[4], 5287[4].—Hydrogenation velocities were detd., with Ni + Al_2O_3 as a catalyst, of a no. of aromatic hydrocarbons to establish the influence of the structure on hydrogenation velocity. A comparison of the hydrogenation velocities of benzene homologs, such as toluene up to octylbenzene, showed that the lengthening of the aliphatic side chain from 1 to 8 C atoms had little influence on the velocity with which H was absorbed by the aromatic ring. The hydrogenation velocities of AmPh, iso-AmPh, *p*-$Pr^iC_6H_4Me$ and *p*-cymene revealed that branching of the side chain did not influence the hydrogenation velocity. *o*-Xylene, tetralin and *o*-$Pr^iC_6H_4Me$ absorb H with the same velocity. From the present and previous expts. it is concluded that neither the length nor the structure of aliphatic side chains exerts any practical influence on H absorption by the benzene nucleus in the presence of a Ni catalyst. The hydrogenation velocity is, however, influenced by the no. of substituents present in the benzene nucleus, e. g., the absorption of H becomes more difficult with an increasing no. of substituents. Gertrude Berend

The synthesis and properties of α-methylheptylbenzene, α-butylamylbenzene and α-hexylheptylbenzene. A. D. Petrov, A. P. Baĭdanov, N. N. Zakotin and P. I. Suntsov. *J. Gen. Chem.* (U. S. S. R.) **9**, 509–12(1939).—$C_6H_{13}MgBr$ and MeCOPh give *methylhexylphenylcarbinol*, b_{12} 136–7°, d_4^{14} 0.9426, n_D^{15} 1.50214, M. R. calcd., 64.776, M. R. found, 64.55. When this is heated with I, it gives *2-phenyl-2-octene*, b_{10} 121–2°, d_4^{17} 0.8810, n_D^{17} 1.49459, M. R. calcd., 62.784, M. R. found, 62.64. Hydrogenation gives *2-phenyloctane*, b_{18} 125–7°, d_4^{17} 0.8626, d_{20}^{20} 0.8526, n_D^{17} 1.48790, M. R. calcd., 63.251, M. R. found, 63.39, η_{20} 2.460, η_{50} 2.009. At −80° this is a thick, glassy mass. In a similar way, BuMgBr and BzOEt give *phenyldibutylcarbinol*, b_{7-8} 130–2°, d_{16}^{16} 0.9437, n_D^{18} 1.50602, which dehydrates to *5-phenyl-4-nonene*, b_6 117–21°, d_{20}^{20} 0.8882, n_D^{20} 1.5012, M. R. calcd., 67.4, M. R. found, 67.02, and this is hydrogenated to *5-phenylnonane*, b_{12} 126–7°, d_{20}^{20} 0.8596, d_{50}^{50} 0.8477, $n_D^{18.5}$ 1.4874, M. R. calcd., 67.87, M. R. found, 67.63, η_{20} 2.747, η_{50} 2.078. *Dihexylphenylcarbinol*, b_6 165–70°, d_6^{16} 0.8175, n_D^{16} 1.50149, M. R. calcd., 87.86, M. R. found, 88.74, dehydrates to *7-phenyl-6-tridecene*, b_8 153–4, d_{15}^{15} 0.8774, n_D^{18} 1.49810, M. R. calcd., 85.87, M. R. found, 86.26. On ozonolysis this gives caproic aldehyde and Ph hexyl ketone. It hydrogenates to give *7-phenyltridecane*, b_{20} 183–4°, d_{20}^{20} 0.8723, d_{50}^{50}

0.8604, n^{25}_D 1.49307, M. R. calcd., 66.34, M. R. found, 66.68, η_{20} 8.651, η_{60} 5.618, a thick, glassy substance at −78°. Thus, as the branching of the chain increases, the solidification point falls and the viscosity index changes very slightly. H. M. Leicester

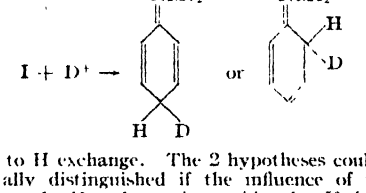
Polymerization ability of substituted styrenes in relation to their structure. II. P. P. Shorygin and N. V. Shorygina. *J. Gen. Chem.* (U. S. S. R.) 9, 845–54 (1939); cf. *C. A.* 29, 6885⁶.—*p*-Bromotoluene, obtained from *p*-toluidine, was oxidized with CrO_2Cl_2 in CS_2 to BrC_6H_4CHO, which was condensed with MeMgI in Et_2O to give *p*-$MeCH(OH)C_6H_4Br$ (I), b_{20} 145°, d^{17} 1.379, n^{17}_D 1.562. *p*-$BrC_6H_4CH:CH_2$, b_{20} 102–4°, d^{18} 1.408, n^{18}_D 1.586, was obtained from I on heating with $KHSO_4$ at 130–40° for 4 hrs. *o*-$BrC_6H_4CH(OH)Me$, obtained in a similar way from *o*-$MeC_6H_4NH_2$, b_{15} 128°, d^{17} 1.4008, n^{17}_D 1.566. *o*-$BrC_6H_4CH:CH_2$, b_{22} 102–4°, d^{16} 1.409, n^{16}_D 1.592. *p*-$MeOC_6H_4CH:CH_2$, b_{20} 104°, d^{17} 1.0015, n^{17}_D 1.560. *o*-$MeOC_6H_4CH:CH_2$, b_{15} 85°, d^{16} 1.009, n^{16}_D 1.556. *p*-$H_2NC_6H_4CH:CH_2$, b_{10} 125–7°, d^{14} 1.0216, n^{14}_D 1.619. *o*-$H_2NC_6H_4CH:CH_2$, b_{12} 102–4°, d^{15} 1.015, n^{15}_D 1.608. $PhCBr:CH_2$, b_6 67–8°, d^{17} 1.425, n^{17}_D 1.591. $PhCH:CHBr$, b_{20} 108°, d^{18} 1.462, n^{18}_D 1.605. $C_6H_{11}CH:CH_2$, b. 126–8°, d^{17} 0.8186, n^{17}_D 1.4475. $C_6H_{13}CH:CH_2$, b. 122–3°, d^{17} 0.7271, n^{17}_D 1.4165. Ph_2 (II) was nitrated by means of HNO_3 in AcOH or of N_2O_4. In the latter case 50 g. II was treated with 200 g. N_2O_4 in the cold and the mixt. of *o*- and *p*-$O_2NC_6H_4Ph$ (III) sepd. by fractional crystn. III, m. 112–13°, was obtained in a yield of 45%. *p*-$H_2NC_6H_4Ph$, from III on reduction with Sn and HCl, yielded *p*-IC_6H_4Ph, m. 110–11°, b_4 180°, which gave PhC_6H_4MgI. The latter compd. was condensed with ethylene oxide in C_6H_6 to yield *p*-$HOCH_2CH_2C_6H_4Ph$, m. 93–4°. The study of the thermal polymerization of substituted styrenes at 100° and 170° in the absence of catalysts revealed that substituents in the α- and β-positions exerted a hindering influence on the polymerization ability. This ability decreases with increasing mol. wt. and length of the aromatic residue attached to the ethylene mol. The polymerization is accelerated at elevated temp. but simultaneously the degree of polymerization is decreased. Gertrude Berend

Decomposition of some iodonium salts. Reactions with mercury, tellurium and antimony. R. B. Sandin, F. T. McClure and F. Irwin. *J. Am. Chem. Soc.* 61, 2944–6 (1939). Lucas, *et al.* (*C. A.* 30, 1753⁷), have suggested that the decompn. of $(o\text{-}MeC_6H_4)_2I_2$ at 155° to give *o*-MeC_6H_4I involves as an intermediate a pos.-charged *o*-MeC_6H_4 ion in which the pos. charge is carried by a C atom; this ion then combines with the neg. ion of the iodonium salt to form a mol. of *o*-MeC_6H_4I. To account for the following reactions, it is suggested that at least a part of the iodonium salt decomps. by way of a non-ionic mechanism. Ph_2ICl and $(p\text{-}MeC_6H_4)_2ICl$ with Hg in boiling PrOH give PhHgCl and *p*-MeC_6H_4HgCl; with Te they give Ph_2Te and $(p\text{-}MeC_6H_4)_2Te$; heating Ph_2ICl and finely divided Te gives Ph_2TeCl_2. Diphenyliodonium sulfide decomps. at room temp. in the presence of Te and Sb to give Ph_2Te and triphenylstibine sulfide.
C. J. West

Nitration of diphenyliodonium nitrate. R. B. Sandin, F. T. McClure and F. Irwin. *J. Am. Chem. Soc.* 61, 3061–3 (1939).—Ph_2INO_3 with HNO_3-H_2SO_4 gives about 18.5% of para nitration (thermal analysis); at least 10% of the reaction mixt. can be isolated as *p*-$IC_6H_4NO_2$ and by taking into consideration the solvent effect of the EtOH, the amt. of para nitration can be shown to be at least 14%. This confirms the work of Challenger and Rothstein (*C. A.* 28, 6429⁸). G. J. West

Cleavage of quaternary ammonium salts by sodium sulfide. II. H. R. Snyder and J. C. Speck. *J. Am. Chem. Soc.* 61, 2895–7 (1939); cf. *C. A.* 33, 3345⁷.—It has been shown that $Me_2Ph(PhCH_2)NCl$ (I) with Na_2S gives $(PhCH_2)_2S$ and $PhNMe_2$. Other groups than $PhCH_2$ attached to the N atom play an important part in the cleavage. $PhCH_2NMe_3Cl$ (II) is not affected under conditions which bring about rapid decompn. of I. $PhCH_2Cl$ and *N,N*-diethylcyclohexylamine give *benzyldicyclohexyldiethylammonium chloride*, m. 179° (decompn.); this resists the action of aq. Na_2S. $PhNMe_3I$ and Bu_4NI (III) also failed to undergo cleavage and $(PhCH_2)_2Et_2NI$ was only very slightly cleaved. Benzylpyridinium chloride undergoes rapid scission to C_6H_5N and $(PhCH_2)_2S$. It appears, therefore, that the linkage between an alkyl group and the N atom is attached to or is a part of an aromatic system. *Allyldimethylphenylammonium bromide*, very hygroscopic, is rapidly cleaved by aq. Na_2S. II gives 50% of cleavage products when the reaction is carried out at 135–50° (in diethylene glycol); III is cleaved to the extent of at least 75% at 175°. I and $Na_2S_2O_4$, refluxed 15 min., give 58% of $PhNMe_2$ and 60% of $(PhCH_2NPhMe_2)(SO_3SCH_2Ph)$. C. J. West

Exchange reactions in deuterioalcohol. II. Weldon G. Brown, M. S. Kharasch and W. R. Sprowls. *J. Org. Chem.* 4, 442–55 (1939); cf. *C. A.* 31, 5755⁶.—In the previous paper, the mechanism of the exchange reactions between EtOD and $PhNMe_2$ (I) was discussed and it was pointed out that while the normal reaction of I with a dil. acid would be the formation of an NH^+ salt, this salt would not necessarily be an intermediate in the exchange reaction which would give rise to tautomeric forms. The free base as a resonance hybrid may accept a proton at any one of the 2 *o*-positions or the *p*-position. The products formed would be tautomeric forms and it will be evident that dissoen. of the quinoid forms of the salt will



give rise to H exchange. The 2 hypotheses could be experimentally distinguished if the influence of the base strength on the H exchange is considered. If the normal salt is an intermediate in the exchange reaction, then structural changes which decrease the basicity of the mol. should also inhibit the exchange reaction. If, however, the structural change decreases the basic strength mainly by increasing the no. of the stability of the zwitterion resonance forms, the exchange reaction should be favored. Ph_2N (II) therefore should have the same rate of H exchange as I in spite of the enormous difference in base strength since substitution of Ph for Me groups will increase the no. of points at which a proton may become attached. The exptl. results obtained from I, Ph_2NH (III), II, *o*-, *m*- and *p*-$NO_2C_6H_4NMe_2$ (IV, V and VI) and *m*-$BrC_6H_4NMe_2$ (VII) are found, as a whole, to be in accordance with the hypothesis that quinoid forms of the salts act as intermediates. Repetition of the expts. with I shows that in an acid soln. 3 H atoms are involved in the exchange reaction while in neutral or alk. solns. no appreciable exchange takes place. II exchanges 1 H atom, presumably the *N*-H, in the absence of acid and 6 H atoms in acid soln. The most probable value for the exchange no. is 7 and it is likely that the *o*- and *p*-positions in each ring and the *N*-H are involved. III behaves similarly; the observed exchange no. is 7.9, corresponding to the exchange of 9 H atoms. IV, V and VI show very striking differences in the lability of the H in the ring. Assuming that only the H in *o*- and *p*-positions to the Me_2N group is labile, the theoretical limit for the no. of exchangeable H atoms would be 2 for IV and VI and 3 for V. Actually IV shows no exchange at all under the exptl. conditions applied, while in VI the exchange is almost complete in acid soln. and in V the value lies under the theoretical value and V can therefore be regarded as intermediate in reactivity. In neutral and alk. solns. V and VI show almost no exchange. VII in acid soln. has an exchange no. of 2. The next group investigated comprises fluorene (VIII), 9-fluorenol (IX), 9-methoxyfluorene (X), 9-aminofluorene (XI) and 9-dimethylaminofluorene (XII). Of these, VIII in alk. soln. exchanges 2 H atoms, IX in

neutral soln. exchanges the H of the OH group, in alk. soln. a 2nd H, presumably that at the 9-position, while in acid soln. **IX** is decompd. **X** does not exchange in alk. soln. and decomps. in acid soln. **XI** and **XII** decomp. in acid and alk. solns. In connection with earlier expts., acetophenone (**XIII**), acetomesitylene (**XIV**), quinaldine (**XV**) and styrene (**XVI**) are retested and it is found that **XIII** has an exchange no. of 2.15 in alk. and 1.6 in acid soln., **XIV** 1.2 in neutral, 2.19 in alk. and 2.1 in acid soln. With **XV** and **XVI** the earlier results are confirmed. A tentative explanation for these exchange reactions is advanced. F. E. Brauns

Thioacyl derivatives of primary amines. (The synthesis of acyclic carbocyanine dyes.) I. L. Knunyants and L. V. Razvadovskaya. *J. Gen. Chem.* (U. S. S. R.) **9**, 557–70 (1939). $PhCH_2NHAc$ heated with P_2S_5 in C_6H_5 gives *55% thioacetylbenzylamine*, m. 71°. When this is refluxed with MeI it gives 100% *thioacetylbenzylamine S-Me ether-HI*, m. 104–6°, from which KOH liberates 64% of the free *base*, b_4 115 8°, d^{28} 1.0575, n_D^{28} 1.5652, M. R. calcd., 55.141, M. R. found, 55.0. When this is mixed with MeI at −10° for 2 hrs. and then allowed to stand at room temp. for 2.5 days, it gives 38% of *thioacetylbenzylamine S-Me ether-MeI* (I), m. 120°. By a similar series of reactions starting from MeNHAc are obtained 43% *thioacetylmethylamine*, m. 58°, 100% *thioacetylmethylamine S-Me ether-HI*, m. 119°, 69.5% of its free *base*, b_{748} 132–3°, d^{20} 0.9459, n_D^{20} 1.492, and the *methiodide* (II), a hygroscopic solid. I and II condense with $HC(OEt)_3$ (III), anilinomalonaldehyde anil (IV), anilinoglutaconaldehyde anil (V) and $Me_2NC_6H_4CHO$ (VI) in the presence of acetates to give acyclic carbocyanine dyes which are similar to the analogous dyes prepd. from thiazole compds. The compd. from I and III is yellow and has an absorption max. at 420 mμ. I and IV give a red dye, absorption max. 580 mμ, sensitizing max. for an AgBr emulsion at 610 mμ. I and V give a blue-green dye, absorption max. 630 mμ, sensitizing max. 676 mμ. This normally changes to a violet dye, absorption max. 548 mμ, sensitizing max. 580 mμ, but sometimes, for unexplained reasons, this change does not occur. I and VI give an orange-red dye, absorption max. 500 mμ. Similarly, II and III give a yellow dye, absorption max. 400 mμ; II and IV give a clear red dye, absorption max. 560 mμ, sensitizing max. 580 mμ, and II and VI give a clear orange-red dye with absorption max. at 475 mμ. H. M. Leicester

Preparation of diazo compounds by means of organometallic compounds. J. G. Makarova and A. N. Nesmeyanov. *J. Gen. Chem.* (U. S. S. R.) **9**, 771–9(1939).—Based on the assumption that the reaction mechanism between N_2O_3 (I) and organometallic compds. proceeds with the dissocn. products of I, $I \rightarrow N_2O_4$ (II) + 2NO (III) according to the equations: $Ph_2M + 2II \rightarrow 2PhNO + M(NO_3)_2$ and $PhNO + 2III \rightarrow PhN_2NO_3$ (IV), expts. were carried out with I and III simultaneously and the following organometallic compds.: Ph_2Hg, Ph_4Sn, Ph_3SnCl, Ph_2SnCl_2, $PhSnCl_3$, Ph_4Pb, Ph_3PbCl and Ph_3Bi. The yields of IV were 85%, 40%, 48%, 49%, 80%, quant., 50%, 54%, resp., as compared with 23%, not investigated, 8%, 5%, 10%, 24%, 18%, 10%, resp., when I was used alone. Ph_2TiCl reacts with I with the formation of 8% IV. $PhMgBr$ (V) yields 15% IV on reaction with I. When 1 mol. $ZnCl_2$ is added to 2 mols V, the yield is increased to 20%. About the same increase is observed after the addn. of $CdBr_2$. In the 2 latter cases the simultaneous addn. of III did not increase the yield. From the reaction products of Ph_2Zn with I + III, and of PhLi, Ph_3As and Ph_3Sb, resp., with I, phenyldiazonium compds. could not be isolated. Ph_4Si and Ph_2PbCl_2 did not react with I. Gertrude Berend

Alleged cis-trans isomerism of α- and β-*p*-azophenol. W. M. Lauer, H. P. Klug and S. A. Harrison. *J. Am. Chem. Soc.* **61**, 2775–9(1939).—Willstatter and Benz (*C. A.* **1**, 302) reported the existence of cis-trans isomeric forms of *p*-azophenol (I); this view was supposed to be supported by the study of the absorption spectra (Hantzsch, *C. A.* **4**, 3234) and by its behavior on nitration and bromination (Robertson, *C. A.* **7**, 3751); more recently, Dostrovsky and Le Fèvre (*C. A.* **33**, 5248[3]) found that the dipole moments were identical and this, with the work reported below, shows that the so-called α- and β-forms of I are identical. Hydrated I gives anhyd. I which exists in 2 solid modifications, brick-red (II) and green (III). The transformation of the metastable II to III is subject to various influences (e. g., impurities) which were not investigated. X-ray diffraction studies of the α- and β-forms prepd. according to W. and B. showed that the hydrated varieties (IV) are identical, that the II prepd from them are identical but different from III and IV, and that III from the 2 sources are identical but have a different crystal structure from II. A study of the rise in b. p. on addn. of 1 compd. to the satd. soln. of the other showed that the α- and β-forms, as usually prepd. and purified, are not pure. The pure α-form, prepd. by chromatographing an AcOEt soln., gives no rise in b. p. when added to the β-form in Et_2O. Polarographic studies showed that both forms of I give the same cathodic or anodic waves; I is reduced at pH 5.75 and oxidized at pH 9.2. Nitration of either form of II gives the same di-NO_2 deriv. (V), yellow, m. 235–6°; V yields a *di-Br deriv.*, m. 281–2°. The tetra-NO_2 deriv. results from V and fuming HNO_3 at 0°. Both forms of I give the same *tetra-Br deriv.*, m. 273–4°; its *diacetate* m. 263–4° and its *dibenzoate* m. 297–8°. C. J. West

The reaction between triphenylbenzylphosphonium bromide and metallic sodium. L. N. Parfent'ev and A. A. Shamshurin. *J. Gen. Chem.* (U. S. S. R.) **9**, 865–7(1939).—Dry $Ph_3(PhCH_2)PBr$ (I), obtained in almost quant. yield from Ph_3P and $PhCH_2Br$ in toluene, was warmed (8.19 g.) with 0.43 g. Na powder in 250 ml. ether for 2 days while stirring, after which time moist air was introduced into the reaction mixt. for 4 hrs. while stirring. The ether soln. was sucked off, the residue was washed 3 times with fresh ether and then filtered off. The solid mixt. was treated with alc. whereby 1.920 g. I was extd. The residue consisted of 0.6721 g. NaBr. The ether soln. contained 2.022 g. Ph_3PO, m. 150–1°, and toluene. These results indicate that $Ph_2P\cdot CHPh$ is the primary reaction product from I and Na. G. B.

Reaction of diphenylmercury with organic monobasic acids. M. M. Kotou. *J. Gen. Chem.* (U. S. S. R.) **9**, 912–16(1939); cf. *C. A.* **33**, 4969[6].—Ph_2Hg was found to react with org. monobasic acids, according to the equation $Ph_2Hg + RCO_2H \rightarrow C_6H_6 + RCO_2HgPh$. HCO_2HgPh, m. 135–8° (decompn.). AcOHgPh, m. 147°. $EtCO_2HgPh$, m. 80–1°. $MeCH(OH)CO_2HgPh$, m. 151–5°. $PrCO_2HgPh$, m. 91°. $EtCH(OH)CO_2HgPh$, m. 159°. $C_{11}H_{11}CO_2HgPh$, m. 82–3°. $C_{17}H_{35}CO_2HgPh$, m. 90–2°. BzOHgPh, m. 97–8°. $C_6H_4(OH)CO_2HgPh$ (phenylmercuric salicylate), does not melt 200°. Gertrude Berend

Purification of *p*-acetaminobenzenesulfonyl chloride. L. H. Pence and H. C. Winter. *J. Am. Chem. Soc.* **61**, 2977–8(1939).—The crude *p*-$AcNHC_6H_4SO_2Cl$ (I) from 67.5 g. PhNHAc is dissolved in 1000 cc. Et_2O and washed with H_2O until free from sulfates; the Et_2O soln. is dried over Na_2SO_4 for 1 hr., concd. to 300 cc. and 1000 cc. C_6H_6 is added; after cooling, the filtered ppt. is washed with 200 cc. C_6H_6, giving 70 g. pure I, m. 149°. The m. p. did not change in 7 months. C. J. W.

Sulfanilamide derivatives. IV. N^1,N^4-Diacylsulfanilamides and N^1-acylsulfanilamides. M. L. Crossley, E. H. Northey and Martin E. Hultquist. *J. Am. Chem. Soc.* **61**, 2950–5(1939); cf. *C. A.* **32**, 8382[6].—The most generally applicable method for the synthesis of N^1-acylsulfanilamides and that giving the best yield consists in the use of acyl halides and N^4-acetylsulfanilamide (I) in C_5H_5N, followed by alk. hydrolysis, the yield based on the halide averaging 60%. Acid anhydrides may also be used, Ac_2O giving 60% of the di-Ac deriv., hydrolysis of which gives 32% of the N^1-Ac deriv. (soly. in H_2O at room temp., 0.9%). The N^1-Na deriv. of I, prepd. from I and NaOH with recrystn. from H_2O and dehydration *in vacuo* at 60–70°, was used in earlier work but was discarded in favor of the C_5H_5N method. Dry fusion of

I and acyl halides led in general to decompn. products together with the desired N^1-acyl derivs. I and BzCl in PhMe, refluxed 20 hrs., give 40% of the N^1-Bz deriv. Attempts to prep. N^1-alkyl-N^1-acylsulfanilamides by hydrolysis of the corresponding N^4-Ac derivs. resulted in complete hydrolysis of the N^1-Ac deriv. Such derivs. were prepd. by acylating N-alkylnitrobenzenesulfonamides and reducing with Fe and AcOH in PhMe. In the series of derivs. of fatty acids, the lower members were moderately H_2O-sol.; on ascending the series, the H_2O soly. decreased and the soly. in fat solvents increased; H_2O soly. of derivs. having chains of 12 C or more was less than 0.001 g./100 cc. All of the derivs. in which a H remained on the amide N formed very sol. Na salts, which were neutral for the lower members of the series but became increasingly alk. for the higher members. All of these compds. could be titrated quantitatively to a phenolphthalein end-point, however, while sulfanilamide itself cannot be so titrated, since its Na salt is highly hydrolyzed at this pH. In general, the derivs. could be hydrolyzed quantitatively to the org. acid and the amide (or sulfanilic acid) by boiling with alc. HCl or more rapidly by heating to 180–200° with 65% H_2SO_4. The lower members of the series could be titrated quantitatively by diazotization of the N^4-NH_2 group. Alkylation of the N^1-N gave derivs. which no longer formed salts with cations; these had increased soly. in org. solvents. These derivs. were sensitive to hydrolytic agents and in this resembled the N^1-alkyldisulfanilamides (*C. A.* **32**, 8382[4]). In the tables of data qual. data are given for the solv. and the cryst. form. *N^1-Acylsulfanilamides:* Ac (II) m. 182–4°, *propionyl* m. 131–5°, *butyryl* m. 125.4–6.6°, *isobutyryl* m. 198.5–200°, *2-ethylbutyryl* m. 189–93.5°, *hexanoyl* m. 129.2–9.9°, *heptanoyl* m. 121.8–3.6°, *2-ethylhexanoyl* m. 165.5–8°, *octanoyl* m. 101–3°, *decanoyl* m. 119–21°, *hendecanoyl* m. 112.5–14.5°, *dodecanoyl* (III) m. 127–8.5°, *tetradecanoyl* m. 113.5–17.7°, *octadecanoyl* m. 98–102°, *9-octadecenoyl*, amorphous, *hexahydrobenzoyl* m. 195.5–200°, *chaulmoogryl* m. 97.9–9°, *Bz* m. 181.2–2.3°, *p-nitrobenzoyl* m. 235–40°, *p-aminobenzoyl* m. 197.8–9°, *hydrocinnamoyl* m. 160.3–1.5°, *cinnamoyl* m. 130–3° and then 174–5°, *1'-carboxybenzoyl* m. above 225° (decompn.), *mandelyl* m. 192.5–4.5° (decompn.), *diphenylacetyl* m. 210.5–12°, *furoyl* m. 191.5–2°, *2-phenylcinchoninyl* m. 305–10°, *nicotinyl* m. 256–7.5°, *3-hydroxy-2-naphthoyl* m. 245–50°. *N^1-Acetylmetanilamide*, m. 153.5–5.5°; *tetradecanoyl analog*, m. 113.5–14.2°. *N^1-Methyl-N^1-dodecanoylsulfanilamide*, m. 59.3–60.5°. *N^1-Acyl derivs. of N^1-acetylsulfanilamides:* Ac m. 253.5–5°, *propionyl* m. 242.5–4.3°, *isobutyryl* m. 247–8°, *butyryl* 238.2–40°, *isovaleryl* m. 215–17.5°, *2-ethylbutyryl* m. 270–3°, *hexanoyl* m. 191–3°, *heptanoyl* m. 205–7.5°, *2-ethylhexanoyl* (IV), m. 214–15.6°, *octanoyl* m. 195–7.6°, *decanoyl* m. 143.2–4.8°, *hendecanoyl* m. 153.2–5°, *dodecanoyl* m. 130–6°, *tetradecanoyl* m. 144.2–5°, *9-octadecanoyl* m. 131–5°, *chaulmoogryl*, *Bz* m. 280–5°, *hexahydrobenzoyl* m. 210–22°, *p-nitrobenzoyl* m. 270–2°, *p-aminobenzoyl* m. 260–3°, *hydrocinnamoyl* m. 160° and then 202.8–5.4°, *cinnamoyl* m. 228–9.5°, *diphenylacetyl* m. 248.5–51°, *furoyl* m. 240.5–41.5°, *2-phenylcinchoninyl* m. 166–70°, *nicotinyl* m. 295–300°. *N^1,N^4-Didodecanoylsulfanilamide*, m. 144–5°, *N^1-dodecanoyl-N^4-(N-acetylsulfanilyl)sulfanilamide*, m. 120° and then 150–2°; *N^1-dodecanoyl-N^4-sulfanilylsulfanilamide*, m. 102–4°. The *Na salt* (with 1 mole H_2O), NH_4 and Et_2NH_2 salts of II and the Ag, Hg'' and Ca salts of III and the Na and Mg salts of IV were prepd. and analyzed. Preliminary *pharmacol. results* indicate that III is effective in mice against infections by β-hemolytic streptococci and arrests the spread of tuberculous infections in cavies. C. J. West

Chemistry and chemotherapy of 4,4'-diaminodiphenyl sulfone, 4-amino-4'-hydroxydiphenyl sulfone and related compounds. G. W. Raiziss, L. W. Clemence, M. Severac and J. C. Moetsch. *J. Am. Chem. Soc.* **61**, 2763–5 (1939).—*p*-$ClC_6H_4NO_2$ and Na_2S in H_2O, refluxed 23 hrs., give 80% of 4-$O_2NC_6H_4SC_6H_4NH_2$-4 (I), orange-yellow, m. 145°; reduction with Sn in HCl (1:1) gives 80% of $(4\text{-}H_2NC_6H_4)_2S$, m. 108°; di-Ac deriv., m. 223–4°, oxidation of which gives 63% of $(4\text{-}H_2NC_6H_4)_2SO_2$ (II), pale yellow, m. 285°; the free di-NH_2 deriv. m. 175°. I gives an Ac deriv., pale yellow, m. 198°; oxidation with $K_2Cr_2O_7$ gives 81% of *4-nitro-4'-acetylaminodiphenyl sulfone*, cream, m. 229–30°; reduction with $SnCl_2$ in EtOH gives 66% of the *4-amino deriv.*, pale yellow, m. 242–3°; the diazo reaction yields 66% of *4-amino-4'-hydroxydiphenyl sulfone* (III), m. 193–4°; *4-acetylamino deriv.*, m. 274–5°; *4-acetylamino-4'-acetoxydiphenyl sulfone*, m. 171–2°. II is superior, while III and the Ac derivs. are about equal to sulfanilamide in their therapeutic effect. C. J. West

The Raschig process for the preparation of phenol. W. Mathes. *Angew. Chem.* **52**, 591–2(1939).—The process is represented by the following equations: $C_6H_6 + HCl + 0.5O_2 = PhCl + H_2O$, and $PhCl + H_2O = PhOH + HCl$. The process works continuously, without pressure and catalytically. The catalyst developed consists of an activated Al hydroxide in combination with Cu salts and permits operation at about 250° and with 15–20% aq. HCl. The sapon. of PhCl is carried out at 450–500°. Process yields are such that large-scale operation is economically sound. Karl Kammermeyer

Binary systems with hydrazine. III. Thermal analysis of the system hydrazine-phenol. V. I. Semishin. *J. Gen. Chem.* (U. S. S. R.) **9**, 788–91(1939); cf. *C. A.* **33**, 4597.—The system hydrazine–phenol was investigated by means of thermal analysis, and the presence of a new compd. $N_2H_4 \cdot 2C_6H_5OH$, m. 63.6° (partial decompn.), was thus established. The compds. $N_2H_4 \cdot C_6H_5OH$ (cf. Curtius and Thun, *J. prakt. Chem.* **4**, 190(1891)) and $N_2H_4 \cdot 4C_6H_5OH$ (cf. Cazaneuve and Moreau, *Compt. rend.* **129**, 1255(1899)) could not be detected by this method. Gertrude Berend

Molecular compounds of picric acid. Mme. R. Râşcanu. *Ann. sci. univ. Jassy*, Pt. I, **25**, 395–423(1939)(in French).—A review, with 58 references, of work on the constitution of picrates. Table of all those prepd. to date, including complex combinations and metallic salts of picric acid. The following *picrates*, all yellow, were made (1:1 combination): *dimethylaniline*, m. 157–8° (turns green in several months; red, brown and green forms also prepd.); *diethylaniline*, m. 139–40°; *benzalaniline*, m. 159°; *benzalaminoantipyrine*, m. 160°; *ethylbenzylaniline*, m. 120–1°; *benzidine*, m. 190–2°. Work on other colored forms and complex combinations to follow. P. M. Apfelbaum

Rearrangement of phenyl allyl ethers. III. Synthesis of α-(*o*-methoxyphenyl)propionic acid. Walter M. Lauer and Louis I. Hansen. *J. Am. Chem. Soc.* **61**, 3039–43 (1939); cf. *C. A.* **30**, 6722[1].—It has been shown that $PhOCH_2CH_2 \cdot CHEt$ is rearranged into *o*-$HOC_6H_4CHEt\text{-}CH \cdot CH_2$ and *o*-$HOC_6H_4CHMeCH\ CHMe$ (I), the structure of which was proven by conversion into *o*-$MeOC_6H_4\text{-}CHMeCO_2H$ (II). Two syntheses of II are reported. *o*-$MeOC_6H_4CH_2OH$ was converted through the chloride and cyanide to *o*-$MeOC_6H_4CH_2CO_2Et$, m. 123–4° (Et ester (III), b_{13} 137–8°). Reaction of $(CO_2Et)_2$ and III with EtONa in EtOH and heating the Et *o*-methoxyphenyloxalacetate at 15° up to 175° gives *di-Et o-methoxyphenylmalonate* (IV), $b_{4.5}$ 162–4°. Reaction of MeI with the Na deriv. of IV and removal of the unchanged IV by fractional hydrolysis with 4.5% KOH gives *di-Et o-methoxyphenylmethylmalonate* (V), $b_{2.5}$ 150–1°; hydrolysis with 10% KOH gives the *free acid*, m. 148.5–9° (decompn.), which gives II on refluxing in xylene for 2 hrs. IV and EtI give *di-Et o-methoxyphenylethylmalonate*, m. 66.7°; hydrolysis and decarboxylation give *α-(o-methoxyphenyl)butyric acid*, b_{10} 165–6°, m. 56.7°. The *p-MeO isomer* of V $b_{3.5}$ 160–1°, n_D^{25} 1.4990; the free *acid* m. 149.5–50°. In the 2nd synthesis of II 4-methylcoumarin was converted to *o*-$MeC_6H_4CMe \cdot CHCO_2H$, which was reduced by 4% Na-Hg in H_2O at 50° to *o-methoxy-β-methylhydrocinnamic acid*, b_9 172°, m. 49–50°; *Et ester*, b_9 153–4°; PhMgBr gives the *carbinol*, *o*-$MeOC_6H_4CH\text{-}MeCH_2C(OH)Ph_2$, which could not be crystd.; refluxing with Ac_2O gives *o*-$MeC_6H_4CHMeCH\ CPh_2$, a yellow oil, which is oxidized by CrO_3 in AcOH to II. These syntheses prove the structure of I. IV. **An examination of the py-**

rolysis product of phenyl allyl ether for evidence of para rearrangement. Walter M. Lauer and Robert M. Leekley. *Ibid.* 3042-3.—*o-* and *p*-Allylphenols are not easy to sep. but the corresponding HOC_6H_4CHO are easily sepd. since the *o*-isomer forms a Cu deriv. but the *p*-deriv. does not; with this test 70 mg. of the *p*-isomer was recovered from a mixt. of 10 g. of the *o*- and 100 mg. of the *p*-isomers. The rearrangement product obtained by the pyrolysis of Ph allyl ether was converted to the corresponding HOC_6H_4CHO by isomerization with KOH followed by ozonolysis; no trace of *p*-HOC_6H_4CHO could be found. A sample of *o*-allylphenol prepd. by decarboxylation of 3-allyl-4-hydroxybenzoic acid was compared with one prepd. by rearrangement of the ether; there were no significant differences in *n* or in m. ps. of the crude phenylurethans of the 2 products. **V. The isomeric ethyl *p*-(α- and γ-propylallyloxy)benzoates.** *Ibid.* 3043-7.—*p*-$HOC_6H_4CO_2Et$ (I) in Me_2CO with 3-chloro-1-hexene and K_2CO_3, refluxed 12 hrs., gives a mixt. of esters (about 75% of IV), which $b_{0.05}$ 105-6°; hydrolysis and crystn. from C_6H_6 and petr. ether give *p*-(γ-*propylallyloxy*)-*benzoic acid* (II), m. 138.9°, and from the mother liquor (crystn. from MeOH) the *α-isomer* (III), m. 76.7°; if the melted III is chilled, it gives an allotropic form, m. 35-8°, which can be converted to the higher-melting form. III with O_3 gives HCHO. *Et ester* (IV) of III, $b_{0.5}$ 95.7°, n_D^{25} 1.5130. Pyrolysis of IV at 220-46° and 40 mm. gives *Et 3-*(γ-*propylallyl*)-*4-hydroxybenzoate* (V), m. 75-6.5°; this does not reduce $Hg(OAc)_2$ in AcOH. V with Me_2SO_4 and MeONa in MeOH gives the *4-MeO deriv.* (VI) of V, m. 107-8°; O_3 gives PrCHO. Catalytic reduction of VI gives *3-hexyl-4-methoxybenzoic acid*, m. 113.5-14°. Heating V with KOH gives *3-*(*1-hexenyl*)-*4-hydroxybenzoic acid*, m. 134-5°, which gives a ppt. with $Hg(OAc)_2$ in AcOH. I and 1-chloro-2-hexene with Me_2CO contg. K_2CO_3 give the *Et ester* (VII) of II, $b_{0.2}$ 115-16°, m. 14.1°, n_D^{25} 1.5197; hydrolysis gives II, which is reduced to *p-hexyloxybenzoic acid*, m. 105.5-7°; this was also prepd. from I and hexyl bromide with EtONa in EtOH. Pyrolysis of VII gives a mixt. of *Et 3-*(α-*propylallyl*)-*4-hydroxybenzoate* (VIII) and Et 3-(α-methyl-γ-ethylallyl)-4-hydroxybenzoate (IX), b_5 183-8°, n_D^{25} 1.5367; O_3 gives a mixt. of HCHO and EtCHO. Methylation of the mixt. of esters with Me_2SO_4 and EtONa in EtOH and repeated crystn. from petr. ether gives *3-*(α-*propylallyl*)-*4-methoxybenzoic acid* (X), m. 142.5-3.5°, and *3-*(α-*methyl*-γ-*ethylallyl*)-*4-methoxybenzoic acid* (XI), m. 113-14°. XI and O_3 give EtCHO; X gives HCHO. Catalytic reduction of XI gives *3-*(*1-methylamyl*)-*4-methoxybenzoic acid*, m. 125-6°, and X gives *3-*(*1-ethylbutyl*)-*4-methoxybenzoic acid*, m. 145-6°. Hydrolysis of the rearrangement product of VII gives VIII, m. 133-4°; the more sol. IX could not be isolated. The formation of IX constitutes an addnl. example of an abnormal Ph allyl ether rearrangement and supplies evidence for the view that, in an abnormal rearrangement, the aromatic residue becomes attached to the β-C atom, whereas the normal rearrangement leads to a transposition of the aromatic residue to the γ-C atom. **VI. The isomeric ethyl *p*-(α- and γ-ethylallyloxy)benzoates.** W. M. Lauer and H. E. Ungnade. *Ibid.* 3047-9.—Et *p*-(α-ethylallyloxy)benzoate (I), heated at 200-36° and 40 mm., gives some 1,3-pentadiene (II) and *p*-$HOC_6H_4CO_2Et$ (II) and the normal rearrangement product, Et 3-(γ-ethylallyl)-4-hydroxybenzoate, whose *4-MeO deriv.* m. 117-17.5°; O_3 gives EtCHO. III (61.6 g.) and 40 g. 1-chloro-2-pentene in Me_2CO with K_2CO_3 gave 41 g. *Et p-*(γ-*ethylallyloxy*)-*benzoate* (IV), $b_{0.1}$ 108-9°, m. 34.1°; *acid* (V), m. 157-8°; reduction of V gives *p*-$AmOC_6H_4CO_2Et$; V with O_3 gives EtCHO. Pyrolysis of IV gives a mixt. of Et 3-(α-ethylallyl)-4-hydroxybenzoate (VI) and Et 3-(α,γ-dimethylallyl)-4-hydroxybenzoate (VII), with 13.3% of II; methylation of this mixt. gives only 1 pure product, the *MeO deriv.* of VI, m. 164.5-5.5°. The mixed methylation product gives HCHO and AcH with O_3, indicating the presence of VII. III (37.5 g.) and 23.5 g. 4-chloro-2-pentene give 16.5 g. of *Et p-*(α,γ-*dimethylallyloxy*)*benzoate* (VIII), $b_{0.1}$ 108-14°; the *acid* m. 131-2°. Pyrolysis of VIII at 40 mm. and 208-23° gives 58.5% of II and III; methylation of the rearrangement product, followed by hydrolysis, yields a product which upon crystn. shows the properties of a mixt.; O_3 gives AcH and a small quantity of HCHO. If ozonolysis can be relied upon, then it must be concluded that VIII also yields an abnormal as well as a normal rearrangement product.

C. J. West

Iodo derivatives of phenyl ether. II. Studies in orientation. R. Q. Brewster and H. S. Choguill. *J. Am. Chem. Soc.* **61**, 2702-4(1939); cf. *C. A.* **28**, 1674⁷.—This work was undertaken to obtain information on orientation in the Ph_2O series, the effect of the MeO group being studied. 4-$MeOC_6H_4OPh$ (I) gives 70% of the 3-NO_2 deriv. (II), but iodination gives *4-methoxy-4'-iododiphenyl ether* (III), m. 115°, which was also prepd. from the 4'-NH_2 deriv. by the Sandmeyer reaction. I (10 g.) and $AlCl_3$ give 75% of *p*-HOC_6H_4OPh, whose Bz deriv. m. 97°; III gives 4-$HOC_6H_4OC_6H_4I$-4', whose *Bz deriv.* m. 122°. Catalytic reduction of II gives *4-methoxy-3-aminodiphenyl ether* (IV), m. 70° (*Ac deriv.*, m. 148°); the Sandmeyer reaction gives the *3-I deriv.* (V), m. 76°; the *3-Br deriv.* (VI) b_{10} 182-7°, m. 55°. Bromination of III or iodination of VI gives *4-methoxy-3-bromo-4'-iododiphenyl ether*, m. 88°. Iodination of III or V or the application of the Sandmeyer reaction to VII gives *4-methoxy-3,4'-diiododiphenyl ether*, m. 101°. Iodination of II or nitration of III yields *4-methoxy-3-nitro-4'-iododiphenyl ether*, m. 92°; reduction with Fe in AcOH gives the *3-NH_2 deriv.* (VII), m. 85°. *o*-$ClC_6H_4NO_2$ and *p*-$MeOC_6H_4OH$ give *4-methoxy-2'-nitrodiphenyl ether* (VIII), m. 77°; *4'-I deriv.*, m. 70°; *4-methoxy-2'-amino-4'-iododiphenyl ether*, m. 102°. VIII on nitration yields *4-methoxy-2',3-dinitrodiphenyl ether*, m. 132°; the isomeric *2',4'-di-NO_2 deriv.*, m. 110°, results from 2,4-$(O_2N)_2$-C_6H_3Cl and *p*-HOC_6H_4OMe. *2-Methoxy-4'-iododiphenyl ether* (IX), b_{28} 228°; the *5-NO_2 deriv.* (X) m. 115°. 2-$MeOC_6H_4OC_6H_4NO_2$-4' and I give *2-methoxy-5-iodo-4'-nitrodiphenyl ether*, m. 109°, which also results from 4-$O_2NC_6H_4F$ and 5,2-I(MeO)C_6H_3OK. 2,5-MeO(O$_2$N)-$C_6H_3NO_2$ and PhOK give *2-methoxy-5-nitrodiphenyl ether*, m. 72° (Lea and Robinson, *C. A.* **20**, 1608, prepd. this by nitration of 2-$MeOC_6H_4OPh$ and considered it to be the 6-NO_2 deriv.); iodination yields X. The effect of the MeO group in these reactions is discussed.

C. J. West

Hydrogen bonding by S-H. VII. Aryl mercaptans. M. J. Copley, C. S. Marvel and Emanuel Ginsberg. *J. Am. Chem. Soc.* **61**, 3161-2(1939); cf. *C. A.* **33**, 6258⁸.—No heat of mixing was observed with heptyl mercaptan in $AcNMe_2$ (I), Et_2O (II), Me_2CO (III) or C_6H_6 (IV). PhSH: I 572 cal. per mole of soln. at 3° for equimol. mix.; II 173, III 150, IV 0. PhC:CH I 644, II 272, III 200, IV 0; $CHCl_3$ I 920, II 700, IV 0. These results afford evidence of H bonding to donor O and N atoms by PhSH but not by heptyl mercaptan. The failure of aryl mercaptans to show assocn. is a result of the weak donor ability of the S atom for H bonding and not from any lack of acceptor ability on the part of the H of the S-H link. It is pointed out that whenever a H is attached to another atom by a sufficiently ionic link, H bonding is possible.

C. J. West

Preparation of seleno-*o*- and *m*-cresols. Duncan G. Foster. *J. Am. Chem. Soc.* **61**, 2972-3(1939).—*Seleno-o-cresol*, b_{26} 99°, results in 41% yield from *o*-MeC_6H_4MgCl and Se in a current of H; the *m-isomer*, b_{16} 89°, results in 47% yield; these rapidly turn yellow in air and were analyzed as the corresponding acids, $MeC_6H_4SeO_2H$, m. 123-5° (*o*) and 118-19° (*p*).

C. J. West

Use of triiodophenyl ethers for the identification of alkyl halides. Robert D. Drew and Julian M. Sturtevant. *J. Am. Chem. Soc.* **61**, 2666(1939).—2,4,6-$I_3C_6H_2OH$ (5 g.) and an equiv. amt. of the alkyl halide with 22 cc. EtONa (12.3 g. Na in 1 l. abs. EtOH) are refluxed 30 min. or until a ppt. of NaX is formed. The soln. is filtered, cooled, and dild. with H_2O, the ppt. being recrystd. from EtOH. *2,4,6-Triiodophenyl ethers.*—Me m. 98.5° (m. ps. cor.), Et m. 83.5°, Pr m. 82°, *iso-Pr* m. 43°, *Bu* (m.

66°, *iso-Bu* m. 48°, *Am* m. 47°, *hexyl* m. 44.5°, benzyl m. 122.5°, *β-phenylethyl* m. 88°, *γ-phenylpropyl* m. 63.5°, *p-nitrobenzyl* m. 207.5°, *hydroxyethylene* m. 137.5°; $BrCH_2CO_2Et$ gives a compd. m. 124° and $MeCHBrCO_2Et$ a *compd.* m. 80.5°. In all cases where the m. ps. are close together a mixed m. p. shows a large depression.
C. J. West

Iodination of organic compounds with the aid of oxidizing agents. T. D. Aldoshin and V. S. Chalykh'yan. *J. Gen. Chem.* (U. S. S. R.) 9, 748-52(1939).—Iodination of phenol and phenol derivs. by means of free and bound I has been carried out in the presence of KClO, H_2O_2, HNO_3, $KMnO_4$, K_2CrO_4, AcNHCl, *N,N*-dichloropentamethylenetetramine, and chloroamine B and T. To a mixt. of 0.0005 mol. of a 0.1 *N* soln. of the compd. to be iodized and the corresponding amt. of 0.1 *N* alc. I is added the equiv. amt. of the oxidizing agent in 0.1 *M* soln. The reaction proceeds according to the equation $O_2 + 2I_2 + 4RH \rightarrow 4RI.2H_2O$. The amt. of absorbed I 5, 10, 20, 30 and 60 min. after the reaction has started, is detd. by titrating the free I by means of $Na_2S_2O_3$ soln. The reaction was carried out either in 50% AcOH or in neutral soln. (96% EtOH). The reaction temp. was 20° and 30°. The reaction proceeded faster in neutral soln. As regards the activity, the oxidizing agents range $CaOCl_2 > H_2O_2 > HNO_3 > PhSO_2NCl_2$ in neutral and $MeC_6H_4SO_2NaNCl > CaOCl_2 > K_2CrO_4 > H_2O_2 > KMnO_4 > PhSO_2NCl_2 > HNO_3$ in acid soln.
Gertrude Berend

The condensation product of toluhydroquinonecarboxylic acid and its derivatives. Gilbert Flumiani. *Rad Jugoslav. Akad. Znanosti Umjetnosti* 232, 165-71; *Chem. Zentr.* 1938, I, 1353.—The product formed by the condensation of toluhydroquinonecarboxylic acid (I) in concd. H_2SO_4 was freed from by-products by dissolving in KOH and then acidifying. It was converted into dimethylanthracene by distg. with Zn dust in a current of H. From the latter or dimethylanthraquinone the following compds. were prepd.: *1,5-dinitro-2,6-dimethylanthraquinone, 1,5-diamino-2,6-dimethylanthraquinone* (dark-red needles, m. 255°), *diazonium iodide* (orange needles, m. 272°); *2,6-dimethyl-1,5-dianthraquinonylaminoanthraquinone; 2,6-anthraquinonecarboxylic acid* (m. above 400°), *chloride* (yellow needles, m. 198°), *acid amide* (crystals from HOAc, m. above 380°); and *2,6-di-α-naphtholanthraquinone* (microscopically small needles, m. 183°). The structural formula for the condensation product from I is given as *2,6-dimethyl-1,4,5,8-tetrahydroxyanthraquinone.*
W. A. Moore

Some selenium derivatives of benzyl. G. Speroni and B. Simi. *Atti X° congr. intern. chim.* 3, 358-63(1939).—Poggi and Speroni (*C. A.* 29, 1060[6]) prepd. bis(*p*-chlorbenzyl) and bis(*p*-bromobenzyl) diselenides by agitating a mixt. of Se in aq. Na_2S with the required halogen-substituted benzyl halide. On treating $o\text{-}O_2NC_6H_4CH_2Cl$ in the same way a well-crystd., orange-yellow *compd.* (I) with the compn. $3[(o\text{-}O_2NC_6H_4CH_2Se)_2].2[(o\text{-}O_2NC_6H_4CH_2S)_2]$, ($C_{38}H_{30}N_6O_{10}Se_8S_2$)$_2$, was obtained. I was also formed by crystg. a mixt. of $(o\text{-}O_2NC_6H_4CH_2)_2Se_2$ (II) and $(o\text{-}O_2NC_6H_4CH_2)_2S$ (III) from benzene. A similar compd. was obtained from $2,5\text{-}Cl(O_2N)C_6H_3CH_2Cl$. Thermal analysis of a mixt. of II and III showed the existence of a compd. contg. 60% of II which sepd. into its components in the liquid phase. Accordingly II and III present in their mixt. an example of monotropic dimorphism.
C. R. Addinall

The acetylation of aldoximes. II. The inversion of configuration in the preparation of carbanilino aldoximes from phenyl isocyanate and *syn*-aldoximes. A. E. Ramsford and C. R. Hauser. *J. Org. Chem.* 4, 480-92(1939); cf. *C. A.* 30, 1762[3].—The reaction of α- and β-aldoximes with various acylating reagents and the action of bases on the acyl derivs. are studied. According to Brady and McHugh (*C. A.* 20, 179) PhNCO (I) is capable of converting certain α-aldoximes into carbanilino β-derivs. It is generally believed that the acyl derivs. of β-aldoximes only give nitriles with alkali while the acyl derivs. of α-aldoximes regenerate with alkali the original α-aldoximes. There are, however, some acyl α-aldoximes which with alkali give partially or even largely nitrile. In certain cases in which the isomeric β-derivs. cannot be isolated, acyl α-aldoximes which give considerable amts. of nitrile with alkali may be mistaken for β-isomers, e. g., the carbethoxy-α-aldoximes were formerly assigned the β-configuration, but when treated with cold alkali or $BuNH_2$ (cf. *C. A.* 30, 6723[6], 7556[3]) they give quantitatively the original α-aldoxime. The same is shown with the diphenylcarbamyl deriv. The reaction of I with aldoxime is carried out in a neutral soln., giving the β-, or a mixt. of α- and β-derivs. with α-aldoximes, and the β-deriv. with β-alloximes. Brady's statement that α-aldoximes reacting with I are capable of causing inversion of the configuration while naphthyl isocyanate (II) apparently is not, is confirmed by the pyridine and $BuNH_2$ test. A study of the I derivs. of α- and β-3,4-methylenedioxybenzaldoxime (III and IV), α- and β-4-methoxybenzaldoxime (V and VI), α- and β-3-nitrobenzaldoxime (VII and VIII), and the α-4-dimethylaminobenzaldoxime (IX) prepd. under various conditions show that III chiefly gives the β-acyl deriv. while IV gives only the β-acyl deriv. as shown by the formation of 3,4-methylenedioxybenzoic acid with hot alkali. This is supported by the pyridine and $BuNH_2$ test. When III reacts with I in 4-5 times the min. amt. of Et_2O, only *carbanilino-α-3,4-methylenedioxybenzaldoxime*, m. 127°, crystallizes. V and I give a ppt. which consists, when formed immediately, mostly of the β-, when it seps. out in 10-15 min., entirely of the *α-deriv.*, m. 110°, while VI gives the β-deriv. VII gives a mixt. of α- and β-derivs. from which the pure *α-compd.*, m. 148°, is obtained by recrystn. from EtOH. VIII gives the pure β-deriv. IX gives only the *β-deriv.*, m. 118°, which, when heated with EtOH, is converted into the α-form. The mechanism for the inversion of the configuration taking place in the reactions between I and α-aldoximes is discussed and from this it is predicted that no inversion should occur when the reaction is carried out in the presence of sufficient base strength to prevent the formation of an intermediate with a pos. charge on the N atom. A series of expts. is carried out in the presence of Et_3N, Pr_3N, $C_6H_4(NMe_2)CHO$ (X), $PhNMe_2$ (XI), and pyridine (XII). The results are given in a table. Only X and XII are insufficiently basic to prevent inversion. IX in the presence of a relatively large amt. of XI gives with I only the α-deriv. which is recovered unchanged from XII and m. 150-2°. This confirms the above prediction.
F. E. Brauns

Constitution of natural tannins. VI. Coloring matters derived from 2,5-dihydroxyacetophenone. Alfred Russell and Samuel F. Clark. *J. Am. Chem. Soc.* 61, 2651-8(1939); cf. *C. A.* 31, 3897[7].—Syntheses are described of polyhydroxychalcones, flavanones and anthocyanidins from $2,5\text{-}(HO)_2C_6H_3Ac$ (I) and various HO aldehydes; I was selected because of the occasional occurrence of quinol as a decompn. product of natural materials, suggesting a benzopyran compd. hydroxylated in the 6-position. *m-Benzoyloxybenzaldehyde* (II), m. 37-8°, *resorcylaldehyde dibenzoate* (III), m. 98°; *orcylaldehyde dibenzoate* (IV), m. 134-5°. Benzoyloxychalcones were prepd. by passing dry HCl into a soln. of I and the aldehyde benzoate in AcOEt for 2-5 days at 0°, the soln evapd. to a thick red syrup and triturated with EtOH. Hydroxychalcones were prepd. by adding aq. KOH to the boiling EtOH soln. of the Bz derivs. over a period of 40-60 min., distg. off the original vol. of EtOH used, cooling and acidifying with dil. H_2SO_4; the BzOH was sepd. by cold $NaHCO_3$ or by ext. with hot C_6H_6; flavanones were removed by fractional crystn. from dil. EtOH. II dibenzoate (V) and *p*-$BzOC_6H_4CHO$ give 78% of *4,2',5'-tribenzoyloxychalcone*, pale yellow, m. 134-6°; *tri-HO deriv.*, orange-yellow, m. 222-4°, 50% yield. V and II give 67% of *3,2',5'-tribenzoyloxychalcone*, light yellow, m. 174-5°; *tri-HO deriv.*, orange, m. 204-6°, 20% yield; there also resulted 12% of *6,3',-dihydroxyflavanone*, pale yellow, m. 234-6°. V and vanillin benzoate give 88% of *4,2',5'-tribenzoyloxy-3-methoxychalcone*, pale yellow, m. 145-7°; *tri-HO deriv.*, dark orange, m. 172-3°, 46%. V and protocatechualdehyde dibenzoate give 78% of

3,4,2',5'-tetrabenzoylchalcone (VI), pale yellow, m. 182–4°; *tetra-HO deriv.*, dark orange, m. 225–7°, 66%; *6,3',4'-trihydroxyflavanone* (VII), pale yellow, m. 218–20° (decompn.). V and *o*-$BzOC_6H_4CHO$ give 82% of *2,2',5'-tribenzoyloxychalcone*, bright yellow, m. 137–9°; on debenzoylating 27.5 g., there was obtained less than 1 g. of *2',5'-dihydroxy-2-phenylbenzopyrylium chloride*, purified by extn. with Et_2O, red, m. 175°; the acid soln. is red, the Na_2CO_3 soln. is blue; *6,2'-dihydroxyflavanone*, pale yellow, m. 178–80° (decompn.); the chalcone is formed only in traces. V and III give 80% of *2,4,2',5'-tetrabenzoyloxychalcone*, yellow, m. 137–9°; debenzoylation gives 39% of *7,2',5'-trihydroxy-2-phenylbenzopyrylium chloride*, dark red, m. 190° (decompn.). V and IV give 86% of *2,4,2',5'-tetrabenzoyloxy-6-methylchalcone*, pale yellow, m. 125–7°; *7,2',5'-trihydroxy-5-methyl-2-phenylbenzopyrylium chloride*, dark-red, iridescent plates, m. 285–7° (decompn.). V and phloroglucinaldehyde tribenzoate give *2,4,6,2',5'-pentabenzoyloxychalcone*, a yellow oil, which yields *5,7,2',5'-tetrahydroxy-2-phenylbenzopyrylium chloride*, brownish red, m. above 300°. Reduction of VII or of a mixt. of VII and VI with Zn and HCl in EtOH gives *bis(5,3',4'-trihydroxy)flavopinacol*, light-red friable solid; this is qualitatively indistinguishable from such natural phlobatannins as hemlock and mimosa tannins. C. J. West

Fluorinated aromatic mercurials. Melvin F. W. Dunker and Edgar B. Starkey. *J. Am. Chem. Soc.* **61**, 3005–7(1939); cf. *C. A.* **31**, 3809.—PhF, $Hg(OAc)_2$ and AcOH, refluxed 12 hrs., cooled and treated with dil. HCl, the ppt. extd. with AcOH and the ext. crystd. from MeOH, give about 11% of *o-fluorophenylmercuric chloride* (I), m. 159–60°; no other product could be isolated. I is also obtained in 24% yield from *o*-$FC_6H_4NH_2$ through the diazonium fluoborate; the *p*- and *m*-isomers result in 24 and 28% yields, resp. *p*-FC_6H_4OH (13 g.) and $Hg(OAc)_2$ in Ac_2O contg. a little AcOH give 34 g. of *4-fluoro-2-acetoxymercuriphenol*, m. 193–4° (decompn.). *p*-$FC_6H_4CO_2H$ gives a poor yield of *4-fluoro-3-chloromercuribenzoic acid* (II), m. 239° (decompn.); it could not be crystd. Catalytic reduction of 4,3-$F(O_2N)C_6H_3CO_2H$ gives 98% of *3-amino-4-fluorobenzoic acid*, tan, m. 182–3° (decompn.); *HCl salt*, m. 240–3°; *Ac deriv.*, m. 245–6° (decompn.); on slow heating the Ac deriv. decomps. at 200°; through the diazo reaction there results 77% of *2-fluoro-5-carbethoxybenzenediazonium fluoborate*, cream, decomps. 185°; this gives a poor yield of II; above its m. p. II gives I. C. J. West

Ethers of *p*-hydroxybenzoic acid as derivatives for the identification of alkyl halides. W. M. Lauer, P. A. Sanders, R. M. Leekley and H. E. Ungnade. *J. Am. Chem. Soc.* **61**, 3050(1939).—*Ethers* of *p*-$HOC_6H_4CO_2H$ were prepd. from the Et ester in EtONa and the alkyl halides by refluxing 0.5–1 hr., distg. off part of the alc., adding H_2O to dissolve the ppt. NaCl, extg. with Et_2O and hydrolyzing the ester with KOH in MeOH. M. ps. are given for those ethers reported in the literature; the following appear to be new but no analyses are given: *sec*-Bu m. 121–3°, α-methylallyl m. 155–6°, γ-isomer m. 176.5–8°, α-ethylallyl m. 108–9°, γ-isomer m. 156.5–8°, α,γ-dimethylallyl m. 131–2°, α-propylallyl m. 74.5–5°, γ-isomer m. 139.5–40°. C. J. West

The crystallization of salicylic acid from mixtures of salicylic acid and α-naphthol. Angelo Castiglioni. *Gazz. chim. ital.* **69**, 444–7(1939).—Since the system α-naphthol (I)-salicylic acid (II) behaves in an ideal way with respect to sepn. of II from both dil. and concd. solns. (cf. *C. A.* **31**, 8528[2]), it was of interest to ascertain whether the system follows the crystn. law of Volmer (*C. A.* **16**, 4119) in its logarithmic form: $\log v = \log k + n \log c$. Rather than det. directly the no. of crystal germs as a function of time, the times of crystn., i. e., the reciprocal of the times for the appearance of the 1st germs, were detd. by the method of Othmer (*C. A.* **9**, 1866). Mixts. of I and II in various proportions were heated to 175°, then maintained at various temps. (23°, 33°, 41°, 51°, 66°, 71° and 80°) and the times for the appearance of the 1st germs detd. As recorded graphically, with $\log v$ as a function of $\log c$, the curves for the various temps. show that the law of Volmer does not hold true for all temps. or all concns. of II. Thus at 80° the curve has no straight section, and even at the low temps. the curves are straight only at relatively high concns., e. g., at 71° the straight section is limited to 80–100% concn. of II and at 23° to 40–100% concn. of II. This adherence to the law of Volmer only between definite limits of temp. and concn. was found to be true also of palmitic acid-stearic acid mixts. (cf. Rawitzer, *C. A.* **23**, 1322). C. C. Davis

Acetylsalicylic acid and its methods of preparation. Ignazio Mininni Jannuzzi. *Farm. ital.* **7**, 729–33(1939).—Descriptive. L. E. Gilson

Metabolic products of Aspergillus ochraceus. III. Synthesis of isoöchracin. Teiiti Tamura. *J. Agr. Chem. Soc. Japan* **15**, 685–9; *Bull. Agr. Chem. Soc. Japan* **15**, 112–13(1939)(in English).—7-Nitro-3-ethylidenephthalide, m. 178°, was prepd. from 3-nitrophthalic anhydride and $(EtCO)_2O$. When it was treated with NaOH and Na-Hg, 7-amino-3-ethylphthalide was obtained. Its HCl salt, m. 168–70°, was treated with dil. H_2SO_4 and 10% $NaNO_2$. 7-Hydroxy-3-ethylphthalide, m. 81°, was isolated. There was no depression of the m. p. when it was mixed with isoöchracin, m. 79°. Colorless prisms (I), m. 125°, were prepd. from 3-methoxyphthalic anhydride and $(EtCO)_2CO$. Colorless feather-like crystals, m. 58° (II), were isolated by treating I in alk. soln. with Na-Hg. When isoöchracin was treated with CH_2N_2, an oily substance giving no $FeCl_3$ reaction was obtained. It could not be crystd. Hence I and II may be, resp., 4-methoxy-3-ethylidenephthalide and 4-methoxy-3-ethylphthalide. Y. Kihara

Benzoylformic acid from styrene. Charles D. Hurd, R. W. McNamee and Frank O. Green. *J. Am. Chem. Soc.* **61**, 2979–80(1939).—$PhCH{:}CH_2$ (I) (18 g.) and 9 g. NaOH in 100 cc. H_2O, treated with 75 g. $KMnO_4$ in 1500 cc. H_2O in 6 portions at 70°, give 55% of $PhCOCO_2H$ (II). I from drip oil (about 50% purity) gives 39% of II (based on the content of I). C. J. West

The constitution of barbatolic acid. Eero E. Suominen. *Suomen Kemistilehti* **12B**, 26–8(1939)(in German).—The extn. of 500 g. of the lichen *Alectoria implexa* f. *fuscidula* for 5 days with Et_2O in a Soxhlet app., concn. of the ext. to 200 ml. and filtration yields 32 g. of a brown solid. This is extd. by boiling twice with C_6H_6 and once with Me_2CO, after which the residue is crystd. from 200 parts of dioxane, yielding 15.5 g. (3.1%) of *barbatolic acid*, $C_{18}H_{16}O_{10}$ (I), m. 205–6°, white crystals from dioxane, difficultly sol. in most org. solvents, easily sol. in alkalies and $NaHCO_3$ to give intensely yellow solns., and giving a red-brown color in EtOH with $FeCl_3$. The dioxime of I (see Schopf, Hetek and Duntze, *C. A.* **26**, 1275), m. 207–8°, gives a violet color in EtOH with $FeCl_3$. Splitting of I with alkali gives atranol (II) (cf. Pfau, *C. A.* **21**, 1289), barbatol and barbatorin. Methylation of 2.5 g. of I in 500 ml. of dioxane and 1250 ml. of Et_2O in the cold with CH_2N_2, concn. to small vol. and treatment with 2 parts of H_2O yielded 2 g. of *Me barbatolate*, $C_{19}H_{16}O_{10}$ (III), m. 193° (from AcOH). It dissolves in alkalies to give a yellow color and gives a brown-red color in EtOH with $FeCl_3$. On heating 0.25 g. of III with AcOH in a sealed tube at 140–5° for 15 hrs., and evapn. to dryness *in vacuo*, 220 mg. of cryst. product was obtained. Sublimation of the crystals at 0.02 mm. yielded fractions at 90–130° and 130–80°. The 1st fraction after crystn. from H_2O gave 85 mg. of II, m. 118–19° (greenish yellow crystals), which gave no m.-p. depression with authentic II obtained from atranorin. The 2nd fraction (100 mg.), crystd. from H_2O as a light-brown powder, sol. in hot EtOH, Me_2CO and H_2O, difficultly sol. in Et_2O, m. 243–4° (decompn.), consisted of *barbatolcarboxylic acid*, 3,6,2,4-$OHC(HOCH_2)(HO)_2C_6HCO_2H$ (IV). IV gives a wine-red color with $FeCl_3$ in EtOH. The reduction of 0.125 g. of III in AcOH with HI and Zn at 70° and extn. with Et_2O of the combined products of 2 reductions yielded 0.2 g. of an oil which gave the *reduction product* $C_{19}H_{20}O_8$ (V), m. 189–90° (decompn.), by soln. in 9:1 MeOH-

dioxane and pptn. with 25 parts of H_2O. V is easily sol. in EtOH and Et_2O, and sol. in hot C_6H_6. V in alc. gives a violet color with $FeCl_3$, while its alk. soln. is colorless. The reduction mother liquors yielded small amts. of β-orcinol and the Me β-orcinolcarboxylate. V (0.5 g.) was treated in abs. Et_2O with small amts. of CH_2N_2 twice a week until a portion in EtOH no longer gave a color with $FeCl_3$ (2 months). The soln. was evapd. to dryness, yielding 0.6 g. of oil which was taken up in petr. ether, filtered from 0.06 g. of insol. residue, evapd. again to dryness, taken up in Et_2O and cooled in Me_2CO-CO_2 snow. The soln. was filtered from a white flocculent ppt., the filtrate evapd. to dryness and the residue taken up in petr. ether and again cooled. Repeated soln. in petr. ether and cooling gave 340 mg. of the *methylated product* $C_{18}H_{14}O_4(OMe)_4$ (VI), and oil at room temp. A high MeO value indicated that a small amt. of $C_{18}H_{13}O_3(OMe)_5$ might be present. Concd. EtOH solns. of VI gave a violet color with $FeCl_3$. Splitting of VI was accomplished by boiling 0.1 g. with 10 ml. of 0.2 *N* alc. KOH for 3 hrs. under reflux. The alk. soln. was acidified, extd. with Et_2O and the Et_2O soln. extd. with $KHCO_3$. Acidification of the $KHCO_3$ soln. with HCl and extn. with Et_2O yielded 40 mg. of a mixt. of rhizoninic acid (2,5-dimethyl-4-methoxy-5-hydroxybenzoic acid) (VII) and the Me ether of VII. The Et_2O soln. after extn. with $KHCO_3$ was extd. with 8% NaOH. Concn. of the Et_2O soln. yielded 42 mg. of the *2-hydroxymethyl-4,6-dimethoxy-5-methylbenzoic lactone* (VIII), m. 173.5°, white crystals from dil. EtOH. Acidification of the NaOH soln. and extn. with Et_2O yielded 10 mg. of oily yellow crystals consisting mainly of VIII. VIII gave no color with $FeCl_3$. The data indicate that I is 6,3,2,4-$ROCH_2(OHC)(HO)_2C_6HCO_2H$, not 6,3,2,4-$HOCH_2(OHC)(OH)(RO)C_6HCO_2H$ (R = 6,3,2,4-$Me(OHC)(OH)_2C_6HCO$), as suggested by S., H. and D.

S. A. Karjala

Constitution of halogenated resaceto- and resopropiophenones. Duhkhaharan Chakravarti and Niranjan Chakravarty. *J. Indian Chem. Soc.* **16**, 144-50(1939); cf. *C. A.* **32**, 1255¹.—4-Chlororesorcinol (25 g.) was added to a soln. of freshly fused $ZnCl_2$ (25 g.) in 25 cc. AcOH and the mixt. heated to 145° for 3 min. Treatment with 25 cc. concd. HCl and 25 cc. H_2O gave 10 g. of *5-chloro-resacetophenone* (I), m. 171°; *semicarbazone*, m. 315°. I (5 g.), Zn-Hg (40 g.) and HCl (1 2, 120 cc.) were refluxed for 4 hrs. Et_2O extn. of the filtered soln. gave 3 g. of *4-chloro-6-ethylresorcinol* (II), m. 84°. II (1 g.) and $AcCH_2CO_2Et$ (1 g.) were condensed in the presence of 2 cc. H_2SO_4 in the cold. After 12 hrs. the soln. was poured into crushed ice to give *6(or 8)-chloro-5-hydroxy-4-methyl-8(or 6)-ethylcoumarin* (III), m. 175°; *acetate*, m. 100°. III was also prepd. with P_2O_5 instead of H_2SO_4. *6(or 8)-Chloro-5-hydroxy-3,4-dimethyl-8(or 6)-ethylcoumarin*, m. 183°, was obtained by condensing II with *Et methylacetoacetate* in presence of H_2SO_4. II may be prepd. by adding SO_2Cl_2 slowly to *4-ethylresorcinol* in ice-cooled ether. *5-Chlororesopropiophenone* (IV), m. 90°, was prepd. like I. Clemmensen's reduction of IV gave *4-chloro-6-propylresorcinol*, m. 63°; the mother liquor gave some *4-propylresorcinol* (V), m. 77°. V was also obtained by Clemmensen's reduction of resopropiophenone. 6-Propylresorcinol was condensed with Et acetoacetate using H_2SO_4, to give *6-propyl-4-methyl-7-hydroxycoumarin*, m. 174°. Similar treatment of IV gave *6(or 8)-chloro-5-hydroxy-4-methyl-8(or 6)-propylcoumarin*, m. 185°. Clemmensen reduction of *5-bromoresacetophenone*, m. 167° (*semicarbazone*, m. 255°), gave *4-ethylresorcinol* (VI), m. 97°. VI with Et acetoacetate gave *7-hydroxy-6-ethyl-4-methylcoumarin*, m. 210°. Dry HCl gas was passed into 10 g. chloroörcinol in dry Et_2O and $PhCH_2CN$ (10 g.) contg. fused $ZnCl_2$ (4 g.) and the mixt. was set aside for 2 days. The Et_2O ext. gave 3 g. of a *ketone* (VII), $C_{15}H_{14}O_3$, m. 140°. Clemmensen reduction of VII gave a product m. 127°. When orcinol is used in the above reaction a *ketone*, m. 160°, is obtained, which on reduction gives a *compd.* m. 72°. Clemmensen reduction of coumarin gives a colorless compd., m. 235°.

W. J. Peterson

Limited applicability of Kostanecki's reaction. The influence of halogen atoms on the reaction. Duhkhaharan Chakravarti and Brojeswar Majumdar. *J. Indian Chem. Soc.* **16**, 151-9(1939).—*4-Chloro-2-methylphenyl acetate* (20 g.) was mixed with powd. $AlCl_3$ (20 g.) and the mixt. heated at 120° for 20–30 min. After decompn. with dil. HCl and steam distn., 15 g. of *5-chloro-3-methyl-2-hydroxyacetophenone*, m. 70°, was obtained; *semicarbazone*, m. 283°. The following were similarly prepd.: *5-chloro-3-methyl-2-hydroxypropiophenone*, m. 61° (*semicarbazone*, m. 205°); *3-chloro-4-hydroxypropiophenone*, m. 80° (*acetate*, b. 155°); *3-bromo-4-hydroxypropiophenone*, m. 130°; *5-bromo-2-hydroxypropiophenone*, m. 78°. The general method for the acetylation, propionylation and butyrylation of the aceto- and propiophenones was as follows: A mixt. of the *o-HO ketone* (4 g.), fused Na salt of the *fatty acid* (6–10 g.) and the *anhydride* of the acid (30–40 g.) was heated at 170–80° for 12 hrs. The mixt. was then poured into H_2O and heated at 100° for 0.5 hr. The solid was then crystd. from an appropriate solvent. The following compds. were prepd.: *6-chloro-2,8-dimethyl-3-acetylchromone*, m. 139°; *8-chloro-2,6-dimethyl-3-acetylchromone*, m. 131°; *6-chloro-2,3,8-trimethylchromone*, m. 124° (*styryl deriv.*, m. 166–7°); *8-chloro-2,3,6-trimethylchromone*, m. 154-6° (*styryl deriv.*, m. 183°); *6-chloro-2,3-dimethylchromone*, m. 86–7° (*styryl deriv.*, m. 144–5°); *6-bromo-2,3-dimethylchromone*, m. 113°; *6-chloro-3,4,8-trimethylcoumarin*, m. 94°; *8-chloro-3,4,6-trimethylcoumarin*, m. 157°; *6-chloro-3,8-dimethyl-2-ethylchromone* (I), m. 85°; *8-chloro-3,6-dimethyl-2-ethylchromone*, m. 74–5°; *6-chloro-2-ethyl-3-methylchromone*, m. 65–6°; *6-bromo-2-ethyl-3-methylchromone*, m. 87°; *6-chloro-3,8-dimethyl-2-propylchromone*, m. 95°; *8-chloro-2-propyl-3,6-dimethylchromone*, m. 68–71°; *6-chloro-2-propyl-3-methylchromone*, m. 85°; *6-bromo-2-propyl-3-methylchromone*, m. 83–4°. I was let stand in alc. NaOEt for 12 hrs. After acidification with HCl and extn. with Et_2O the Et_2O ext. was washed repeatedly with cold alkali (5%) and then with H_2O. Acidification of the alk. wash with HCl gave *5-chloro-2-hydroxy-3-methylpropiophenone*, m. 61°. A mixt. of *5-chloro-2-hydroxyacetophenone* (0.5 g.), and $EtCO_2Et$ (22 g.) was added to molecular Na (3.5 g.) with cooling. After heating for 1 hr. at 100° and decompn. with ice, the dried Na salt was methylated in Me_2CO with MeI to give a sticky mass, which, after drying and heating with AcOH and HBr (1 cc.) for 1 hr. on the water bath, gave *6-chloro-3-methyl-2-ethylchromone*, m. 123°.

W. J. Peterson

Monoalkyl phthalates from normal aliphatic alcohols. James F. Goggans, Jr., and J. E. Copenhaver. *J. Am. Chem. Soc.* **61**, 2909-10(1939).—The following esters show sufficient variation in the m. ps. through the dodecyl compd. so that they could be used as checks on the identification of the individual ales. Up to the decyl ester the m. ps. give a curious pattern; above this ester the curve exhibits regular alternations. *Monoalkyl phthalates* were prepd. by refluxing the anhydride and alc. for varying periods from 30 min. to 2 hrs., depending upon the mol. wt. of the alc. The m. ps. given are cor.: Me 82.4–2.7°, *Pr* 54.1–4.4°, *Bu* 63.1–3.5°, *Am* 75.4–5.6°, *hexyl* 24.6–5.4°, *heptyl* 16.5–17.5°, *octyl* 21.5–2.2°, *nonyl* 42.4–2.6°, *decyl* 37.8–8.0°, *undecyl* 43.8–4.1°, *dodecyl* 50.2–50.4°, *tridecyl* 52.4–2.7°, *tetradecyl* 59.8–60°, *pentadecyl* 60.3–60.5°, hexadecyl 66.7–6.8°, *heptadecyl* 66.6–6.8°, *octadecyl* 72.4–2.6°, *nonadecyl* 70.8–1°, *eicosyl* 77.1–7.3°.

C. J. West

Reaction of the Grignard reagent with homophthalic anhydride. Charles C. Price, Frederick M. Lewis and Morris Meister. *J. Am. Chem. Soc.* **61**, 2760-2(1939).—*o*-$MeC_6H_4CO_2H$ is transformed into the chloride by $SOCl_2$ (refluxing 2 hrs.) which with Br at 185–95° (added during 1–2 hrs.) followed by cooling and addn. of abs. EtOH yields *o*-$BrCH_2C_6H_4CO_2Et$; refluxing with NaCN for 5 hrs. gives 71–6% of *α-carbethoxyphenylacetonitrile*, b_{16} 170–70.5°, d_{25}^{25} 1.1246, n_D^{25} 1.5172. Hydrolysis with 50% H_2SO_4 (12 hrs. at 100°) gives over 90% of *o*-$HO_2CC_6H_4CH_2CO_2H$, which with AcCl gives 95% of homophthalic anhydride (I). Another method for the prepn. of I is to

start with phthalide which with KCN at 180–90° gives 82% of *o*-$NCCH_2C_6H_4CO_2H$, the remainder of the synthesis being as above. Reaction of I with MeMgI does not lead to *o*-$AcC_6H_4CH_2CO_2H$ (II) but 50% of the starting material is recovered and the other half is converted to dimethylhomophthalide. In a few cases the possible presence of II was indicated. The course of the reaction is outlined. C. J. West

Oxidation of terpenes. R. Dupont. *Ind. chim. belge* 10, 307–19(1939).—Review with numerous references. John F. Lontz

Addition of oxygen to double bonds. Syoko Tanaka. *Mem. Coll. Sci., Kyoto Imp. Univ.* A22, 97–127(1939). 3-*p*-Menthene (I), made by dehydrating menthol over Al_2O_3 at 300°, was oxidized by the calcd. amt. of BzO_2H (II) or AcO_2H (III) in $CHCl_3$ or Et_2O at 0° to *3,4-menthene oxide* (IV), b_{14} 74–5°, d_4^{25} 0.8946, n_D^{25} 1.4460, $[\alpha]_D$ 54.21°, for which the mol. refraction, heat of combustion, and parachor correspond to the structure assigned I was not oxidized by Caro's acid, menthene ozonide, or BzO_2Na, which liberates O under the exptl. conditions, indicating that "active O" does not take part in the formation of IV. IV shaken with 10% H_2SO_4 at 0° gave *menthene glycol (3,4-dihydroxymenthene)*, m. 75 6°, converted to *i*-menthone (V) by 10% H_2SO_4 on a H_2O bath. IV passed over Al_2O_3 at 250° gave V and a *terpene*, b. 171–3°, d_4^{25} 0.8294, n_D^{25} 1.4647. To 30 g. of I in 500 cc. of NaOCl soln. contg. 3.6 g. of available O, 200 cc. of 2% $ZnSO_4$ soln. was slowly added. Extn. with Et_2O gave a very unstable *menthene chlorohydrin* (VI). I in moist Et_2O with HgO and I gave a similar *menthene iodohydrin* (VII). VI and VII were converted to IV by powd. KOH. Attempts to form acyl derivs. by warming VII with AcOAg and BzOAg likewise gave IV, indicating that the formation of IV from I may consist of addn. of II or III to form the unstable esters, which then lose AcOH or BzOH to form IV. IV heated with a trace of AcOH at 100–20° gave a viscous, non-distillable *polymer*. 2,6-Dimethyl-2-octene, I, C_9H_{18}-CHO, PhCH CH_2, and BzH were oxidized by III at decreasing rates in the order named. Arnold M. Collins

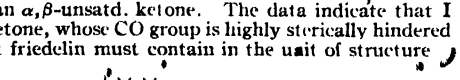
Bicyclic structures prohibiting the Walden inversion. Replacement reactions in 1-substituted 1-apocamphanes. Paul D. Bartlett and Lawrence H. Knox. *J. Am. Chem. Soc.* **61**, 3184–92(1939).—*Apocamphane-1-carboxamide* (I) has been converted by the Hofmann reaction into *1-aminoapocamphane* (II). Although the NH_2 group is so situated that it cannot possibly be replaced in any reaction involving a Walden inversion, this compd. readily reacts with HNO_2 to yield *apocamphan-1-ol* (III) and with NOCl to yield *1-chloroapocamphane* (IV). III and IV cannot be interconverted. The alc. forms loose mol. compds. with HCl and HBr, whereas IV withstands 48 hrs. of boiling with $AgNO_3$ in dil. EtOH soln. without producing any opalescence. It is concluded from the reactions of the amide and amine that the Walden inversion, in which the neg. substituent replaces another on the opposite side of the same C atom, is not a universal necessity for the occurrence of a "neg. substitution" reaction. The inertness of the bridge-head HO group and Cl atom may be interpreted as indicating either that a Walden inversion is absolutely necessary in the replacement of these groups or that in a carbonium ion the central C atom and the 3 atoms forming bonds with it must be coplanar. Certain drawbacks to the former of these interpretations are pointed out. Oxidation of 100 g. of *dl*-camphor-10-sulfonyl chloride by adding it in 3 portions with stirring to 1000 g. of a 10% soln. of Na_2CO_3 heated on the steam bath, together with the 3 corresponding portions of a hot soln. of 100 g. of $KMnO_4$ in 600 cc. H_2O and heating for 1 hr., gives 38–43% of *dl-ketopinic acid* (V), m. 233–4°. Reduction of V by the Wolff-Kishner or the Clemmensen method gives 62 and 50%, resp., of *apocamphane-1-carboxylic acid*, m. 217–18°; the Clemmensen method is better for larger quantities. Refluxing with $SOCl_2$ and reaction with NH_3 give 92% of I, m. 185°. I (25 g.) and 7 g. Na in 385 cc. MeOH, cooled and treated with 24 g. Br (dropwise with stirring), finally refluxed 15 min., give 60% of *Me 1-apocamphylcarbamate*, m. 93–4°; refluxing with KOH in MeOH gives 82.7% of II, m. 175° (HCl salt, discolors at 235–40° and does not m. 320°); *Ac deriv.*, m. 132°; *Bz deriv.*, m. 112°. II and HNO_2 give 66.6% of III, m. 161–2°; *p-toluenesulfonate*, m. 93°. III and HBr give a *solid*, $C_{18}H_{33}O_2Br$, m. 83–4°, which fumes strongly in the air. With PCl_5 III gives a *compd.*, $C_{18}H_{33}O_2Cl$, m. 157–68°; it is not IV. II and NOCl give IV, m. 154–6°, in 45% yield. After refluxing IV 21 hrs. with 30% KOH in 80% EtOH 70% of IV was recovered unchanged and no III could be obtained by a H_2SO_4 extn. A Grignard reagent could not be prepd. with IV. Bornyl chloride and $AgNO_3$ in EtOH, refluxed 60 min., show 84% reaction; this corresponds to a bimol. velocity const. (in hrs.) of 11.25, thus certainly at least 10^{10} greater than the corresponding const. for IV. From these expts. it appears that III and II are unique among known alcs. and satd. chlorides in their resistance to replacement of their functional groups and that this uniqueness can be assocd. only with the location of these groups on the bridge-head of a bicyclic ring system. *tert*-BuCEt_2OH and HCl at 0° give *2,2-dimethyl-3-ethyl-3-chloropentane*, b_6 53–4°; hydrolysis at 25° in 80% EtOH gives a unimol. velocity const of 0.4206 (in hrs.). C. J. West

4-Methylbornylene and its hydration. A. I. Shavrygin. *J. Gen. Chem.* (U. S. S. R.) 9, 516–21(1939).—Dehydration of 4-methylborneol and 4-methylisoborneol (I) by the xanthate method gives only 4-methylbornylene. When this is heated with AcOH in the presence of H_2SO_4 or $ZnCl_2$, only the acetate of I is obtained. This is easily sapond. to give I. Since no new alc. is obtained, doubt is cast on the work of Achmatowicz (*C. A.* **22**, 4517) and Krestinskii and Eshchenko (*C. A.* **31**, 4304[3]). H. M. L.

Intramolecular transformations during the dehydration of ditertiary bicyclic glycols of the camphane series. I. L. Ya. Bryusova. *J. Gen. Chem.* (U. S. S. R.) 9, 905–11 (1939).—4-Methylcamphorquinone (15 g.) in Et_2O was added in small portions with cooling to a soln. of MeMgI, prepd. from 6 g. Mg, 40 g. MeI and 30 ml. abs. Et_2O. The reaction product, worked up in the usual manner, gave 12 g. 2,3,4-trimethyl-2,3-dihydroxycamphane (I), m. 132 5°. I (12 g.) was treated on an oil bath with 35 g. $KHSO_4$ and 5 g. Na_2SO_4 at 150–5° for 5 hrs. The reaction mixt., after treatment with steam, yielded an unsatd. ketone (6-isopropylidene-2,2,3,3-tetramethylcyclohexanone or 3-isopropylidene-2,2,6,6-tetramethylcyclohexanone), b_{20} 126–7°, d_4^{20} 0.9602, n_D^{19} 1.4890, which gave a semicarbazone, m. 193 4°. Camphorquinone (30 g.) on treatment with MeMgI gave 28 g. 2,3-dimethyl-2,3-dihydroxycamphane (II), m. 132°. This amt. of II was heated with 80 g. $KHSO_4$ and 12 g. Na_2SO_4 at 150–5° for 5 hrs. The reaction product, after treatment with steam, vacuum distn., and reaction with semicarbazide, gave the semicarbazone (III), m. 180–1°, of an unsatd. ketone (6-isopropylidene-2,2,3-trimethylcyclohexanone or 3-isopropylidene-2,2,6-trimethylcyclohexanone) (IV). IV, obtained from III on treatment with 50% H_2SO_4 and steam distn., b_{10} 104.8–5°, b_{26} 128.2 9°, d_4^{20} 0.9390, n_D^{19} 1.4840. To 1 g. IV in 4 ml. 96% alc. were added 4 g. $NH_2OH.HCl$ in 4 ml. H_2O and 4 g. KOH in 4 ml. H_2O and the mixt. was warmed for 15 hrs. on the water bath, whereby the oxime of IV, m. 108–12°, was formed. Reduction of IV by means of Na and abs. alc. yielded the corresponding alc., b_{10} 122–3°, b_{20} 136 7°, d_4^{20} 0.9485, n_D^{19} 1.4961. Catalytic hydrogenation of IV, using Raney Ni as a catalyst, gave the corresponding satd. ketone, b_{12} 110–15°, d_4^{20} 0.942, n_D^{19} 1.4851. IV was not changed when treated with cold concd. H_2SO_4 for 2–3 min. Gertrude Berend

Cerin and friedelin. V. Study of friedonic acid. Nathan L. Drake and John K. Wolfe. *J. Am. Chem. Soc.* **61**, 3074–8(1939); cf. *C. A.* **30**, 7572[2].—Details are given of the prepn. of friedonic acid (I) (cf. *C. A.* **31**, 7571[9]) in 48% yield. In some expts. an *isomer* (II), m. 126–7°, is obtained; this also results in small yield by treating I with EtONa in EtOH for 48 hrs. I and Me_2SO_4 with MeONa in MeOH or CH_2N_2 or the Na salt with MeI give the *Me ester* (III), m. 157–8°; this also results from II, Me_2SO_4 and MeONa. Heating I in an atm. of N for 2.5 hrs. at 250° gives *norfriedelene* (IV), $C_{29}H_{48}$, m. 228.5–

30°; 1 mole each of CO_2 and H_2O are lost in the reaction; a yellow color with $C(NO_2)_4$ indicates unsatn.; catalytic reduction of IV gives *norfriedelane*, m. 220-1°, needles having a slight oblique extinction (about 3.2°). Oxidation of III with $KMnO_4$ in AcOH gives *norfriedonic acid* (V), $C_{29}H_{48}O_3$, m. 215-17°; *Me ester* (VI), m. 166-7°; *oxime*, m. 270.5-3° (*Me ester*, m. 193-5°); III and 2,4-$(O_2N)_2C_6H_4NHNH_2$ give the *2,4-dinitrophenylhydrazone* of VI, bright yellow, m. 233-4°. I and $SOCl_2$, refluxed for 30 min., give an amorphous chloride, which is catalytically reduced to *norfriedelanylformaldehyde*, (VII), $C_{30}H_{50}O$, m. 222-5° (prisms with a slight oblique extinction, ca. 19.4°); *oxime*, m. 255-9°; *2,4-dinitrophenylhydrazone*, bright yellow, m. 312-14°. VII and CrO_3 in AcOH give *norfriedelanylformic acid*, $C_{30}H_{50}O_2$, m. 307-8°; *Me ester*, m. 230-1.5°. I shows an absorption max. at 2900 A. (log ε 1.55); the absorption curve in cyclohexane (1%) is given; this confirms the earlier belief that I is not an α,β-unsatd. ketone. The data indicate that I is an ε-ketone, whose CO group is highly sterically hindered and that friedelin must contain in the unit of structure



C. J. West

Bromination of 4-phenylphenyl acetate. Stewart E. Hazlet and Harry A. Kornberg. *J. Am. Chem. Soc.* **61**, 3037-9(1939); cf. *C. A.* **33**, 6282². 4-PhC₆H₄OAc (I) in AcOH at 100°, treated with a trace of Fe powder and 1.5 moles of Br over 30 min. and heated an addnl. 10 hrs., gives 57% of the *2-Br deriv.* (II), m. 74-5°; II was also prepd. in 90% yield from 2,4-BrPhC₆H₃OH and Ac_2O-AcONa on heating 5 hrs. at 100°. I and 2 moles Br at 110° for 8 hrs. give 16% of the *2,6-di-Br deriv.* (III), m. 81-3°; III was also prepd. from 2,6,4-$Br_2PhC_6H_3OH$ with Ac_2O-AcONa. 4-$O_2NC_6H_4Ph$ (IV) was converted through the 4'-Br deriv. to 4-$BrC_6H_4C_6H_4NH_2$-4 and then to 4-$BrC_6H_4C_6H_4OH$-4 (V); Ac_2O-AcONa gives a poor yield (based on the IV used) of *4-(4-bromophenyl)phenyl acetate*, m. 128-9°; V prepd. by the hydrolysis of 4-$BrC_6H_4C_6H_4OSO_2Ph$-4 (VI) gives a crude yield of 92% of the acetate (based on the VI used). These results are in keeping with a previous suggestion that steric effects may det. the positions taken by substituents entering an ester mole.

C. J. West

Odor of alkoxybiphenyls. C. M. Brewster and Ivan J. Putman, Jr. *J. Am. Chem. Soc.* **61**, 3083-5(1939).—*o*-HOC_6H_4Ph (I) (15 g.) and 3.8 g. NaOH in 85 cc. Me_2CO, refluxed for 1 hr. and treated with 15 g. PrBr (refluxed 6 hrs.) give 17 g. of *2-biphenylyl Pr ether*, b. 303°; it has a faint aromatic odor; the Me ether, b. 288°, has a faint, slightly pungent fruity aromatic odor; the Et ether has a somewhat sweeter and more flowerlike odor than the Me ether. The *iso-Pr ether*, b. 315-17° (10 g. from 10 g. I), has a faint aromatic odor; the *allyl ether*, b. 312° (13 g. from 12 g. I), has the same odor as the Pr ether; *benzyl ether*, b. 324° (4 g. from 12 g. I), pleasant nut-like odor at 100°. *4-Biphenylyl Et ether*, m. 76°, quant. yield; *Pr ether*, m. 76-7° (9 g. from 10 g. phenol); *iso-Pr ether*, m. 73° (4 g. from 10 g. phenol); *allyl ether*, m. 86° (14 g. from 12 g. phenol); *Bu ether*, m. 74-5° (13 g. from 10 g. phenol); *benzyl ether*, m. 136° (18 g. from 12 g. phenol). The *p*-ethers are odorless. C. J. West

Stereochemistry of biphenyls. XLVIII. Comparison of the racemization rates of three isomeric 2,2',6-nitro-, carboxy-, methyl-biphenyls. Roger Adams and J. B. Hale. *J. Am. Chem. Soc.* **61**, 2825-8(1939); cf. *C. A.* **33**, 7767⁶.—2,3-$Br(O_2N)C_6H_3CO_2Me$ and *o*-IC_6H_4Me, treated with Cu powder at 225° for 1 hr. and then heated to 230° for 30 min., give 15% of *2-carboxy-6-nitro-2'-methylbiphenyl*, m. 162-3°. 2-Nitro-6-carboxy-2'-methylbiphenyl was resolved with quinine in 60% EtOH; crystn. 3 times from 50% EtOH gives a solvated *l-salt*, m. 135-40°, $[\alpha]_D^{25}$ −124.2° (0.05 g. in 15 cc. $CHCl_3$), and a dry *l-salt*, m. 168-71°, $[\alpha]_D^{25}$ −133.5° (0.05 g. in 15 cc. $CHCl_3$); the mother liquor yields a *d-salt*, m. 128-31°; the solvated salt m. 118-23°, $[\alpha]_D^{25}$ −105° (0.1 g. in 15 cc. $CHCl_3$). The *l-acid* m. 153.5°, $[\alpha]_D^{25}$ −65° (0.1 g. in 25 cc. EtOH); the *d-acid* m. 153-6°, $[\alpha]_D^{25}$ 61.5° (0.464 g. in 15 cc. EtOH). 2,3-$IMeC_6H_3CO_2$-Me and *o*-$IC_6H_4NO_2$ with Cu at 245-50° give 50% of *2-methyl-6-carboxy-2'-nitrobiphenyl*, pale yellow, m. 157°; brucine in MeOH gives a less-sol. salt, m. 165-7°, $[\alpha]_D^{25}$ 48° (0.05 g. in 15 cc. $CHCl_3$), and a more sol. salt, m. 153-60°, $[\alpha]_D^{25}$ −51° (0.05 g. in 15 cc. $CHCl_3$); the *d-acid* m. 179-81°, $[\alpha]_D^{25}$ 73.5° (0.05 g. in 15 cc. $CHCl_3$); *l-acid*, m. 175-9°, $[\alpha]_D^{25}$ −72.6° (0.0485 g. in 15 cc. $CHCl_3$). 6-Nitrodiphenic acid (I) yields *d*- and *l*-acids with $[\alpha]_D^{25}$ 39° and −37.5°. 2,3-$Br(O_2N)C_6H_3CO_2Me$ and *o*-$IC_6H_4NO_2$ with Cu at 220-5° give 30% of *2,2'-dinitro-6-carboxybiphenyl* (II), m. 164°; *quinine salts*, m. 195-7°, $[\alpha]_D^{25}$ 52.5° (0.05 g. in 15 cc. $CHCl_3$), and m. 121-5°, $[\alpha]_D^{25}$ −238° (0.1 g. in 15 cc. $CHCl_3$); the *d*-acid m. 135-7°, $[\alpha]_D^{25}$ 201.5° (0.1 g. in 15 cc. EtOH); the *l*-acid m. 127-30°, $[\alpha]_D^{25}$ −199.5° (0.05 g. in 15 cc. EtOH). The following values are for $[\alpha]_D^{25}$ and half-life period (in min.) in the solvent indicated: 2,6-$Me(HO_2C)C_6H_3C_6H_4NO_2$-2, 75.7° (0.1 g. in 15 cc. EtOH), —; 49.5° (0.1 g. in 20 cc. AcOH), 1075; 73° (0.1 g. in 20 cc. BuOH), 913. 2,6-$O_2N(HO_2C)C_6H_3C_6H_4Me$-2, 61.5° (0.0464 g. in 15 cc. EtOH), —; −65° (0.1 g. in 25 cc. AcOH), 179; −73.8° (0.1 g. in 25 cc. BuOH), 166. 2,6-$Me(O_2N)C_6H_3C_6H_4$-CO_2H-2, −68.4° (0.095 g. in 25 cc. EtOH), —; −86.6° (0.084 g. in 15 cc. AcOH), 2007; −72° (0.0583 g. in 15 cc. BuOH), 2510. I, 3.90° (0.05 g. in 15 cc. EtOH), —; −84° (0.1 g. in 20 cc. AcOH), 91; −27.2° (0.195 g. in 20 cc. BuOH), 101, 107; 293° (0.05 g. in 25 cc. 0.1 *N* NaOH), 4.6. II, 201.5° (0.1 g. in 15 cc. EtOH), 2000; 202° (0.07 g. in 25 cc. AcOH), 125; 218° (0.07 g. in 25 cc. BuOH), 91, 86; −93° (0.2 g. in 25 cc. 0.1 *N* NaOH), 91. The half-life periods do not correspond to what might be anticipated merely from the relative size of the groups as deduced from x-ray data or from the rates of racemization of previously studied biphenyls. The relative positions of the groups have a marked effect on the stability of the mole. The rate of racemization is modified by the solvent used. **XLIX. Comparison of the racemization rates of the 2,2',6'-nitro-, carboxy- and methoxy-biphenyls.** Roger Adams and G. C. Finger. *Ibid.* 2828-30.—2,3-$I(MeO_2C)C_6H_3OMe$ (5 g.), 4.3 g. *o*-$IC_6H_4NO_2$ and 10 g. Cu bronze, refluxed for 2 hrs. at 200° and the crude product refluxed with Na_2CO_3-NaOH in EtOH, give 5 g. of *2-methoxy-6-carboxy-2'-nitrobiphenyl* (I), m. 234-6°; 0.72 g. I gives 0.92 g. of the *brucine salt*, m. 222-5°, $[\alpha]_D^{25}$ −47.1° (0.106 g. in 20 cc. $CHCl_3$); the half-life period calcd. on the basis of a monomol. reaction is 99 ± 11 min.; dil. HCl gives *l*-I, m. 229-32°, $[\alpha]_D^{25}$ −213.3°, half-life period 371 min. 2,3-$Cl(O_2N)C_6H_3OMe$ (II) and *o*-IC_6H_4-CO_2Me at 275°, treated with Cu in 5-g. lots, followed by hydrolysis, give a mixt. of *2,2'-dimethoxy-6,6'-dinitrobiphenyl*, yellow, m. 226-8° (also prepd. from II and Ph-NO_2 with Cu bronze at 200-30°), and *2-methoxy-6-nitro-2'-carboxybiphenyl* (III), pale cream, m. 196-8°; the brucine salt m. from 70 to 90° and decomps. 108-25°, the salt had practically a 0 rotation and no mutarotation was observed over a period of several hrs.; hydrolysis with alkali gives the *l-acid*, m. 195-9°, $[\alpha]_D^{25}$ −127.9°, half-life period 219 min. (this value may be in error more than usual); hydrolysis with HCl gives an acid with a half-life period of 28 min. 2-Nitro-6-carboxy-2'-methoxybiphenyl proved to be unstable and the least stable of the 3.

C. J. West

The bitolyl series. VII. A. Angeletti. *Atti accad. sci. Torino, Classe sci. fis. mat. nat.* **72**, I, 373-7(1937); *Chem. Zentr.* **1938**, I, 3770; cf. *C. A.* **30**, 3426².—Passage from the biphenyl system to the fluorene system (cf. *C. A.* **32**, 4565⁴) is impossible when the compds. are tetra-*o*-substituted. In order to substantiate this statement further the decompn. of the diazonium derivs. of *2-chloro-2'-amino-6,6'-bitolyl* (I) and of *2-bromo-2'-amino-6,6'-bitolyl* (II) by water was studied. I was diazotized in 6% HCl with $NaNO_2$ at 0-4°. After diazotization the ppt. was filtered, washed and warmed on the water bath without allowing the temp. to rise above 90°. The red-brown resinous product was dissolved in ether, the ether

soln. washed with dil. NaOH, and the alk. soln. sepd. from the ether layer. Upon acidifying the NaOH soln. with HCl a red-brown ppt. was obtained which gave a slight amt. of yellow needles, m. 192° from petr. ether. These crystals could not be analyzed. After evapn., the ether soln. yielded a red-brown residue which was distd. with steam. The prisms from alc., m. 119°, were *2,2'-dichloro-6,6'-bitolyl*, $C_{14}H_{12}Cl_2$. The same compd. was also obtained when the diazonium soln. was poured into a soln. of CuCl in concd. HCl. II was diazotized in an analogous manner and decompd. with water to give *2,2'-dibromo-6,6'-bitolyl*, as prisms, m. 109–10°. W. A. Moore

3,3'-Dimethyl-4,4'-dihydroxybenzophenone. Max H. Hubacher. *J. Am. Chem. Soc.* **61**, 2664–5(1939).—Fusion of 10 g. *o*-cresolphthalein and 70 g. KOH at 260–5° (10 min.) gives 69% of *3,3'-dimethyl-4,4'-dihydroxybenzophenone* (I), m. 247–7.8°; NaOH or concd. H_2SO_4 gives a yellow soln.; *di-Ac deriv.*, m. 106.8–7.2°. Similarly, *o*-cresolbenzein gives 61% of I (Doebner and Schroeder, *Ann.* **257**, 74(1890), state that a compd. m. 138° is formed in this reaction). I (2.42 g.) and 5 g. Me_2SO_4 in 60 cc. *N* MeONa, refluxed 1 hr., give 0.85 g. of the *di-MeO deriv.*, m. 113.7–14.2° (*oxime*, m. 160.9–1.2°), and 1.6 g. of the *4-MeO deriv.*, m. 203.7–4.2°. Fusion of I with KOH at 280° for 110 min. gives *o*-MeC_6H_4OH and 3,4-$Me(HO)C_6H_3CO_2H$. C. J. West

Preparation of di-*o*-tolylchloromethane. Eugene B. Reid. *J. Am. Chem. Soc.* **61**, 3238(1939).—*Di-o-tolylchloromethane*, m. 70–1°, results in 90% yield from the carbinol in C_6H_6 and concd. HCl on standing 2 days. C. J. West

Synthesis of iodinated benzoylbenzoic acids and anthraquinones. Robert W. Higgins and C. M. Suter. *J. Am. Chem. Soc.* **61**, 2662–4(1939).—4,5-Diiodophthalic anhydride (I) (5 g.), 3.6 g. $AlCl_3$ (slight excess over 2 moles) and 40 ml. C_6H_6, refluxed 24 hrs., give 4.8 g. (80%) of *2-benzoyl-4,5-diiodobenzoic acid* (II), m. 244–5° (all m. ps. cor.); the 3,4-isomer of I gives 65% of the *3,4(?)-isomer* (III) of II, m. 223–4°; the yield was about the same after 9 hrs. heating; *3,6-isomer* (IV) of II, m. 218–20°, 60%. 3,4,6-Triiodophthalic anhydride (32.6 g.) gives a mixt. of *2-benzoyl-3,4,6-* (V) (16.3 g.) and *-3,5,6-triiodobenzoic acids* (VI) (14.4 g.), m. 257–8° and 225–7°, resp., I (2 g.), gradually added to 40 g. 100% H_2SO_4 at 140° during 30 min., cooling to 70–80° and addn. of ice, gives 80% of *2,3-diiodoanthraquinone*, m. 291–2°; *1,2-isomer*, from III, orange-red, m. 236–7°; *1,4-isomer*, from IV, m. 218–19°, 60%. *1,2,4-Triiodoanthraquinone*, m. 202–3.5°, results in 25% yield from 2 g. of either V or VI in 60 g. 100% H_2SO_4 at 105° (added over 30 min. and heated an addnl. 30 min.). $C_6H_4(CO)_2O$ could not be condensed with *m*-$C_6H_4I_2$. PhOMe and *o*- and *m*-MeC_6H_4OMe condense readily with I or the tetra-I deriv. Veratrole and 4-chloroveratrole do not condense with I derivs. of $C_6H_4(CO)_2O$. I was detd. by the Stepanow method, consistent results being obtained after digesting the AgI ppt. with dil. HNO_3 for several hrs. C. J. West

Triarylcarbinols. VII. 4'-Dimethylaminobiphenylyldiphenylcarbinol and its relation to the theory of color of dyes. Avery A. Morton and Wm. H. Wood. *J. Am. Chem. Soc.* **61**, 2902–5(1939); cf. *C. A.* **32**, 2524².—4-$Me_2NC_6H_4C_6H_4Br$-4 (4 g.) and 2 6 g. Ph_2CO in C_6H_6, refluxed 3 hrs. while 0.7 g. Na is added and then 15 hrs. longer, give 36% of *4'-dimethylaminobiphenylyldiphenylcarbinol* (I), m. 177–8°. This gives a strong red color with concd. H_2SO_4 and a yellow color with $HClO_4$ in AcOH; the absorption max. is at 484 mμ. Titration with $HClO_4$ showed that in the presence of I halochromism is not displayed until enough acid has been added to neutralize the basicity of the Me_2N group; in absence of this compd. it can be observed with the 1st drop of acid. These results are not in accord with those predicted from the carbenium theory of Ph_3CH dyes. The titration data show that trixenylcarbinol (II) is definitely stronger than such weak bases as $AcNH_2$ and $BzNH_2$ as contrasted with Ph_3COH which has been shown to be weaker. Of the 3 $O_2NC_6H_4NH_2$ the *m*-compd. is by far the strongest base. **(4-$Me_2NC_6H_4C_6H_4$)$_3$COH** from $BrC_6H_4C_6H_4NMe_2$ and Et_2CO with Na in C_6H_6 were not successful. Yields of II of 48% may be obtained from 19 g. *p*-ClC_6H_4Ph and 5 g. Et_2CO in 50 ml. C_6H_6 by adding 5 g. Na chips to the boiling soln. during 0.5 hr. and refluxing for an addnl. 12 hrs. Best yields (42–5%) of 4-$BrC_6H_4C_6H_4NMe_2$-4 were obtained when 10 g. of the amine, 9 g. MeOH and 3 g. concd. HCl were heated in sealed tubes 36 cm. long at 140–50° for 12 hrs. **VIII. Occurrence of color with trixenylcarbonium salts.** Avery A. Morton and L. F. McKenney. *Ibid.* 2905–8.—Trixenylcarbinol (I) in AcOH gives only a slight color when satd. with HCl; addn. of a few drops of H_2O gives a pronounced red color; removal of the H_2O by $CaSO_4$ decreases the color. Other compds., such as $MeNO_2$, MeCN, $HCONH_2$, $CO(NH_2)_2$, MeOH, $(ClCH_2CH_2)_2O$, HCONHPh, PhNHAc, also intensify the color. In all cases the intensity of color goes through a max. as the quantity of agent is increased. The action suggests a complex formation but only I could be crystd. from the solns. and the position of the max. absorption band was not displaced in the case of agents with which the color was intense. AcOH does not form a color with $HClO_4$ unless the soln. is heated. HNO_3 in AcOH produces a color with $MeNO_2$ but not with H_2O; $HClO_4$ and I in Ac_2O give a *perchlorate* (II), $(PhC_6H_4)_3CClO_4.HClO_4$, green, m. 219.5–20°; the C_6H_6 soln. is colorless but becomes colored on heating; the *sulfate*, $(PhC_6H_4)_3CHSO_4.H_2SO_4$, forms dark red crystals with green iridescence, which are hygroscopic; the *nitrate* is a red amorphous mass. Upon electrolysis of II in $MeNO_2$, $PhNO_2$ or AcOH, the cathode rather than the anode portion becomes colorless; this is also true for an AcOH soln. of I contg. H_2SO_4, a $MeNO_2$ soln. of Ph_3CClO_4 or the sulfate, nitrate and chloride of I. In the electrolysis of a dil. (colorless) soln. of II in $PhNO_2$, color appeared at the anode rather than at the cathode. The behavior is in agreement with the view that the triarylcarbonium ion, or triarylcarbinol, is not capable of being colored if the ClO_4 ion is removed by electrolysis and will appear colored once more when the ion is added. Electrolysis of crystal violet in $MeNO_2$ was poor; in this case the cation remained colored and was deposited and reduced on the Pt anode. The anode compartment became less colored from migration of the colored cation toward the cathode. C. J. West

Structure of fluorescein, sulfonefluorescein and some of their halogenated derivatives. R. B. Sandin, A. Gillies and S. C. Lynn. *J. Am. Chem. Soc.* **61**, 2919–21(1939).—The regulated bromination of fluorescein (I) gives the 4,5-di-Br deriv. (II). This behavior is believed to be an indication of ring stabilization. Formulas are proposed on the basis of a lactoid and a quinoid structure for I. In the case of sulfonefluorescein only a 4,5-di-Br deriv. (III) results; it is conceivable that ring stabilization is much more pronounced than in the case of I. 2,7-Dichlorofluorescein (IV) also gives a *4,5-di-Br deriv.* (V). Hydrolysis of II and III gives 2-bromoresorcinol (this may be distinguished from the 3-isomer by its behavior on sublimation; the 2-isomer sublimes much more readily in the form of long needles, whereas the 3-isomer forms colonies of compact crystals). Reduction of the tetra-Br deriv. of I in dioxane, concd. HCl and AcOH with $SnCl_2$ (refluxing 15–25 hrs.) gives *2,7-dibromofluorescein*, yellow, m. 300–1°; *diacetate*, m. 259°; hydrolysis yields 4-bromoresorcinol and what is believed to be *2-(5'-bromo-2',4'-dihydroxybenzoyl)benzoic acid*, m. 240–1°. Reduction of V gives IV. I in AcOH, refluxed with $SnCl_2$ and concd. HCl for 15 hrs., is unchanged; evidently $SnCl_2$ has a negligible effect on the conjugated system of double bonds as found in the quinoid form of I. It is suggested that these compds. have fixed structures according to the Mills and Nixon theory (*C. A.* **25**, 694). C. J. West

Effect of substitution on the dissociation of hexaarylethanes. VIII. The disproportionation of tri-*p*-tolylmethyl. C. S. Marvel, Wm. H. Rieger and Max B. Mueller. *J. Am. Chem. Soc.* **61**, 2769–71(1939); cf. *C. A.* **33**, 7770⁸.—(*p*-MeC_6H_4)$_3$CCl (I), carefully purified and treated with Ag in C_6H_6, gives a light orange soln. of the ethane; magnetic susceptibility measurements showed that this is dissocd. to the extent of at least 16 ± 2%

(0.08 *M* soln.); if the soln. is allowed to stand at 24–30° for a few hrs. the color disappears entirely and no free radical remains. The glassy residue from the distn. of the C_6H_6 in a mol. still at 85° and 10^{-4} mm. gives $(p\text{-MeC}_6H_4)_3\text{-CH}$; the residue (II) is polymeric in nature and may be $CH_2{:}C_6H_4{:}C(C_6H_4Me)_2$. Removal of HCl from I by C_5H_5N (refluxing 5 min. in a N atm.) leads to a polymer apparently identical with II; the color of the soln. is qual. indistinguishable from that of the free radical. These facts are used to explain the course of the disproportionation reaction. IX. **The disproportionation of hexa-*p*-alkylphenylethanes and the effect of *o*-, *m*- and *p*-alkyl groups on dissociation of hexaarylethanes.** C. S. Marvel, Max B. Mueller, Chester M. Himel and Julius F. Kaplan. *Ibid.* 2771–5.— $(p\text{-EtC}_6H_4)_3CCl$ and Ag in C_6H_6, shaken for 15 min., give a soln. contg. 17% of free radical (as detd. by magnetic susceptibility measurements); at 30° all of the radical disappeared in 24 hrs. That the color does not change (fade) appreciably during the disproportionation indicates that in the series above Me the quinoid hydrocarbon $MeCH{:}C_6H_4{:}C(C_6H_4Et)_2$ does not polymerize. The color of the soln. is qualitatively the same as that of the soln. obtained from the chloride and C_5H_5N. The dissocns. of higher derivs. are: Pr 21, iso-Pr 26, iso-Bu 27, *sec*-Bu 33 (all ±2). The rates of disproportionation are given as curves; the order of increasing stability of the various free radicals agrees exactly with the order of increasing dissocn. Hexa-*m*-tolylethane is stable more or less indefinitely; it exists to the extent of at least 40% as the free radical. $o\text{-MeC}_6H_4CClPh_2$ with Ag gives a stable ethane, which is dissocd. to the extent of 25%; thus 1 *o*-Me is more effective in producing dissocn. than are 3 *p*-Me groups. Directions are given for the prepn. of *p-tert*-BuC_6H_4Br in 60% yield. *p-Isopropylphenyldiphenylchloromethane* (I), m. 90–1°; *p-tert-butylphenyl analog* (II), m. 133–4°. The ethane from II does not undergo disproportionation, since there are no H atoms on the C atom attached to the ring; this ethane showed 8–9% dissocn. and that from I 8–10%. I and the *p*-Me analog show the disproportionation reaction but both decompd. more slowly than the corresponding tri-*p*-alkylphenylmethyl radicals. The effects of *o*- and *m*-substituents must be due in part to steric factors. The following *peroxides* were prepd.: *o-tolyldiphenylmethyl*, m. 148–9°; *p-isopropylphenyldiphenylmethyl*, m. 139–40°; *p-tert-butylphenyldiphenylmethyl*, m. 156–7°. The O absorption (%) on shaking the chloride with Ag in the presence of O is: $p\text{-MeC}_6H_4CClPh_2$, 4 min., 83, 15 min., 84; *o*-isomer, 7 min., 90; I, 10 min., 83, 30 min., 96; $(p\text{-EtC}_6H_4)_3CCl$, 10 min., 80, 15 min., 82; $(p\text{-iso-PrC}_6H_4)_3CCl$, 8 min., 90, 23 min., 93; $(p\text{-iso-BuC}_6H_4)_3CCl$, 15 min., 80; $(p\text{-}sec\text{-BuC}_6H_4)_3CCl$, 3 min., 83, 20 min., 90. The degree of dissocn. of the ethanes was measured by the magnetic susceptibility method; data are given for χ_a and α. Equations are given for the calcn. of the rate of decompn. of the ethanes.
C. J. West

Synthesis of α-2-methoxyphenyl-β,β,β-triphenylethane. H. A. Iddles, K. S. French and E. F. Mellon. *J. Am. Chem. Soc.* **61**, 3192–4(1939).— Schorigin (*C. A.* **20**, 748; **21**, 579) postulated the structure $o\text{-Ph}_3CCH_2C_6H_4OH$ (I) for a compd. obtained as a by-product in the synthesis of $o\text{-MeC}_6H_4OCPh_3$ and by direct rearrangement of the ether on heating with Na. Parsons and Porter (*C. A.* **26**, 981) reported a synthesis of the Me ether (II) of I, m. 172° which was also obtained on methylation of I. Boyd and Hardy (*C. A.* **22**, 1970) questioned the structure of I. Details are given of the prepn. of I (m. 182–3°) and of its methylation to II (m. 162–3°), the properties of the Me ether agreeing with those of B. and H. $o\text{-MeOC}_6H_4CO_2H$ is electrolytically reduced in 54.7% yields to $o\text{-MeOC}_6H_4\text{-}CH_2OH$; $o\text{-MeOC}_6H_4CH_2Cl$ results in 27.5-g. yield from 34 g. of the alc. and concd. HCl in Et_2O; it was also prepd. with $SOCl_2$. $o\text{-MeOC}_6H_4CH_2MgCl$ and Ph_3CCl give *α-2-methoxyphenyl-β,β,β-triphenylethane*, m. 140–2°; this was also prepd. from the chloride and Ph_3CNa in Et_2O. This is not identical with II. This result supports the evidence of B. and H., who concluded that the migrating radical does not enter the side chain when $o\text{-MeC}_6H_4OCPh_3$ undergoes rearrangement.
C. J. West

Light-sensitive nitro compounds. VI. Some derivatives of nitronaphthalene with *o*- and *p*-substituents containing sulfur. N. N. Vorozhtsov, V. V. Kozlov and I. S. Travkin. *J. Gen. Chem.* (U. S. S. R.) **9**, 522–5(1939); cf. *C. A.* **32**, 4959⁵.—α-Nitro-β-naphthylamine (I) is best prepd. by nitration of acet-β-naphthalide. When I undergoes the Gattermann reaction with SO_2 in the presence of H_2SO_4, it gives *1-nitronaphthalene-2-sulfinic acid* (II), m. 119.5°. If HCl is used instead of H_2SO_4 in this reaction, the product is *1-chloronaphthalene-2-sulfinic acid*, m. 137.1°. II is moderately light-sensitive. Nitration of acet-α-naphthalide gives a mixt. of the 2- and 4-nitro derivs. These are best sepd. by dissolving the mixt. in 6% KOH, dilg., adding the ppt. to dry $PhNO_2$ and passing in a stream of dry HCl. Under these conditions, 1,4-nitronaphthylamine is obtained. By the Gattermann reaction this gives *1-nitronaphthalene-4-sulfinic acid*, m. 132.5°, which is oxidized by H_2O_2 to the corresponding sulfonic acid. Both these acids are weakly sensitive to light. *2-Nitronaphthalene-1-sulfonic acid* is prepd. by the Sandmeyer reaction from 2-naphthylamine-1-sulfonic acid. It is a hygroscopic yellow powder whose Hg, Fe and Ag salts are insol. It is not sensitive to light.
H. M. Leicester

The catalytic oxidation of naphthalene to phthalic acid anhydride. Eckhard Bonitz. *Z. physik. chem. Unterricht* **52**, 60–1(1939).—In a 150-cc. distn. flask place 4 g. naphthalene, 30 cc. of H_2SO_4 (93–96%), 13 g. H_2SO_4 (65% SO_3) and 0.5 g. Hg. The reaction is more rapid if the Hg is heated with 2 cc. H_2SO_4 until $HgSO_4$ forms before it is introduced. The yield is 30%.
F. E. Brown

Structure of some naphthalene, hydrindene and tetralin derivatives. R. B. Sandin and T. H. Evans. *J. Am. Chem. Soc.* **61**, 2916–19(1939).— The reaction of Br compds. with $SnCl_2$ and HCl is proposed as a method for detecting ring stabilization. The important point in connection with the work is that an arrangement in an aromatic compd. of a Br atom and an NH_2 group in such a way that they are sepd. by a double bond or a conjugated system of double bonds gives rise to a so-called "pos." Br atom. $1,2\text{-BrC}_{10}H_6NH_2$, on boiling 1 hr. with $SnCl_2$ in HCl, gives 90% $\beta\text{-C}_{10}H_7NH_2$, 90% of the Br being removed; $4,1\text{-BrC}_{10}H_6NH_2$ gives 90% of $\alpha\text{-C}_{10}H_7NH_2$ as does $2,4,1\text{-Br}_2C_{10}H_5NH_2$, 90% of the Br being removed. $1,3,2\text{-Br}_2C_{10}H_5NH_2$ gives 95% of $3,2\text{-BrC}_{10}H_6NH_2$ (I), 90% of the 1-Br being removed; I is recovered after boiling 10 hrs. 4,5-Dibromo-5-aminohydrindene in 0.5 hr. gives 80% of 4-bromo-5-aminohydrindene (II), m. 54–5°, 80% of the 6-Br being removed; a reaction period of 5 hrs. gives only 25% II; boiling II for 6 hrs. gives 30% of unchanged II. 5-Bromo-6-aminotetralin lost 60% of the Br in 1 hr.; the Ac deriv. in 2 hrs. gives 85% of 6-aminotetralin, m. 34–5°; $o\text{-BrC}_6H_4NH_2$ loses 56 and 75% of Br in 1 and 2 hrs., resp. The results indicate that the structures of the $C_{10}H_8$ derivs. are based on the Erlenmeyer formula and that the preferred structures for the hydrindene derivs. are based on the Mills and Nixon formula (*C. A.* **25**, 694). No definite conclusion was reached regarding tetralin.
C. J. W.

Two isomeric β-acetyldecahydronaphthalenes. Germaine Cauquil. *Compt. rend.* **209**, 441–3(1939).—Chlorination of decalin contg. both the cis and the trans stereoisomers yielded β-chlorodecalin, b_{18} 115°, d_4^{24} 1.0315, n_{5893}^{25} 1.4989, mol. refraction 49.09 (calcd. 48.84). By comparison with Ferrero and Kehlmann's data (*C. A.* **23**, 1407), the latter product is obviously a mixt. of cis form (b_{18} 110–12°) and trans form (b_{18} 120–22°). The product thus described was made to react with Mg in the presence of abs. Et_2O and when treated with AcH and worked up in the usual manner produced a methyldecahydronaphthylcarbinol, b_{14} 136–8°, d_4^{16} 0.9805, n_{5893}^{16} 1.49334, mol. refraction 54.06 (calcd. 54.74), in 45% yield. Attempts to fractionate the phthalate and phenylurethan derivs. of the alc. were unsatisfactory and hence the above alc. was oxidized to its corresponding ketone, b. 128–32°, with CrO_3 and AcOH. The latter ketonic stereo

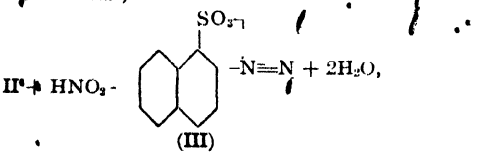
mixt. when treated with semicarbazide-HCl + AcONa yielded a semicarbazone product which was separable into its components because of a differential soly. in abs. EtOH. The 2 ketonic forms regenerated from their semicarbazones yielded the following data: (*A*), b_{22} 142 3°, m. 27°, n_{5893}^{27} 1.4789, d_4^{27} 0.9542, mol. refraction 53.39 (calcd. 53.22), α 27° 39 dynes/cm., parachor 472 (calcd. 455); semicarbazone, m. 242°; oxime, m. 104°. (*B*), b_{22} 138°, n_{5893}^{27} 1.48348, d_4^{27} 0.9710, mol. refraction 53.01, α 27° 39.4 dynes/cm., parachor 463; semicarbazone, m. 196°; oxime, a liquid. W. A. Cook

Reductive alkylation of aromatic primary amines. II. Wm. S. Emerson and W. D. Robb. *J. Am. Chem. Soc.* **61**, 3145–6(1939); cf. *C. A.* **32**, 8380⁶.—By use of the previous method (reducing the aniline and an aldehyde with Raney Ni and AcONa in EtOH), α-$C_{10}H_7NHEt$ was obtained in 88% yield and β-$C_{10}H_7NHEt$, β-$C_{10}H_7NHBu$, β-$C_{10}H_7NHCH_2Ph$, p-MeC_6H_4NHEt and p-MeC_6H_4NHBu were obtained in 50–64% yields. There was also isolated 19% of p-$MeC_6H_4NBu_2$. *N-Butyl-α-naphthylamine*, b_8 155–67°, d_{20}^{20} 1.001, n_D^{20} 1.5963, 80%; *HCl salt*, m. 151–2°. *N-Ethyl-p-anisidine*, b_{20} 135–40°, d_{20}^{20} 1.017, n_D^{20} 1.5444, 51%; *p-bromobenzenesulfonamide*, m. 113–14°. *N-Butyl-p-anisidine*, b_6 142–5°, d_{20}^{20} 0.963, n_D^{20} 1.5207, 65%; *HCl salt*, m. 187.5–8°. Benzyl-α-naphthylamine gives a *Bz deriv.*, m. 103–4°. p-$MeOC_6H_4NBu_2$ results in 25% yield. C. J. West

Reaction of a thiophene derivative with maleic anhydride. Daniel B. Clapp. *J. Am. Chem. Soc.* **61**, 2733–5(1939).—2,3,4,5-Di(1,8-naphthylene)thiophene (I) (from the fusion of acenaphthene and S) and maleic anhydride (II), heated for 15 min. at 225°, give 60% of *3,4,5,6-di(1,8-naphthylene)phthalic anhydride*, yellow, decomps. about 385°. I and stilbene, heated at 310–20° for 9 hrs., give 14% of *1,2-diphenyl-3,4,5,6-di(1,8-naphthylene)benzene*, greenish yellow, m. 290–1° (cor.), which has a pronounced yellow-green fluorescence in ultraviolet light. Thionessal does not react with II. C. J. W.

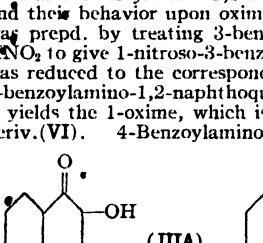
Reaction between diphenylketene and phenylacetylene. Lee Irvin Smith and Harvey H. Hoehn. *J. Am. Chem. Soc.* **61**, 2619–24(1939). Contrary to the statement of Staudinger (*C. A.* **2**, 102), 1.94 g. diphenylketene and 1.02 g. of PhC:CH, on standing 3 days at room temp., give 2.4 g. of *3,4-diphenyl-α-naphthol* (I), m. 143–4°; it is readily sol. in MeOH-KOH, gives a pos. PhOH reaction (Folin), contains 1 active H atom and does not add the Grignard reagent. In petr. ether the reaction is much slower and the yield is only 50%. I appears to exist in 2 forms, m. 143–4° and 154°. *Acetate* of I, m. 162–2.5°; *Me ether* of I, m. 203–3.5°; the Me ether in AcOH yields a *2-NO_2 deriv.*, yellow, m. 202°. I and $Pb(OAc)_4$ in AcOH, refluxed for 5 hrs., give *3,4-diphenyl-1,2-naphthoquinone* (II), orange-red, m. 249–50°. I could not be nitrated, the HNO_3 oxidizing I to II and uncrystallizable oils. $K_2Cr_2O_7$ in AcOH (refluxing 8 hrs.) gives BzOH and *o*-$BzC_6H_4CO_2H$. $KMnO_4$ or CrO_3 under mild conditions gives a product insol. in K_2CO_3, whose structure has not been detd. Reduction of II by Zn and AcOH or by $NaHSO_3$ gives colorless solns., which give II on allowing the Et_2O ext. to stand in the air. Reductive acetylation of II gives *1,2-diacetoxy-3,4-diphenylnaphthalene*, m. 166–7°. II and *o*-$C_6H_4(NH_2)_2$ give the *phenazine*, $C_{28}H_{18}N_2$, yellow, m. 274–5°. I couples with diazotized sulfanilic acid to give a red azo dye, reductive cleavage of which yields II. I and Br in Et_2O give the *2-Br deriv.* (III), m. 157–8°, which forms an *Ac deriv.*, m. 199–200°, and a *Me ether*, m. 209–10°. Oxidation of II with CrO_3 gives II. 1,4-Naphthoquinone and PhMgBr give *4-hydroxy-3,4-diphenyl-α-tetralone* (IV), m. 207°, to which Franssen (*C. A.* **19**, 3268) ascribed the structure 1,4-diphenyl-1,4-dihydroxynaphthalene; *oxime*, m. 196–7°. With AcOH-H_2SO_4 or Ac_2O IV yields I or its acetate. Oxidation of IV gives *o*-$BzC_6H_4CO_2H$, BzOH and a very small amt. of II. The reaction between diphenylketene and acetylenes appears to be quite general, although no solvent, or quite concd. solns. must be used in order to bring about a reaction. As yet the mechanism of the reaction is not known, but observations to be reported later indicate that an acetylenic H atom is not involved because Ph_2C_2 also reacts with the ketene. C. J. West

Synthesis of 2-nitronaphthalene-1-sulfonic acid. I. S. Travkin. *Wiss. Werke moskaut. mendelejeff. chem.-tech. Inst.* **1938**, No. 3–4, 73–5; *Khim. Referat. Zhur.* **2**, No. 1, 43(1939).—The object of the expt. was to det. whether or not 2-nitronaphthalene-1-sulfonic acid (I) possesses the same light sensitivity as the 1,2-isomer and its salts. The synthesis was performed according to the method of Sandmeyer, starting with 2,1-$H_2NC_{10}H_5SO_3H$ (II) (the amino acid of Tobias)

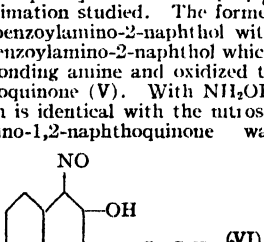


and III + $NaNO_2$ + catalyst → I + N_2. As catalyst $Cu_2SO_3.CuSO_3.2H_2O$ was used. The Na salt of the I is a yellow powder, very hygroscopic, sol. in water and in aq. alc. The investigation of the light sensitivity gave neg. results. W. R. H.

Oximation of some derivatives of β-naphthoquinone Henri Goldstein, H. Radanovitch, P. Kpetschet, O. Duboux, A. Kaehr, Ph. Gardiol and G. Genton. *Bull. soc. vaud. sci. nat.* **59**, 271–7(1937); *Chem. Zentr.* **1938**, I, 3466 7; cf. *C. A.* **32**, 2526². β-Naphthoquinone (I) reacts with NH_2OH to form the 2-oxime, which is identical with 2-nitroso-1-naphthol. Nevertheless, certain derivs. of I are known which, upon oximation, react in the 1-position. E. g., *4-amino-1,2-naphthoquinone* (II) reacts in alk. soln. to give the 1-oxime, an anomaly which is explained by assuming that the compd. reacts in the tautomeric form of 2-hydroxy-1,4-naphthoquinonimine It was shown that *4-anilino-1,2-naphthoquinone* (III) behaves like the 4-amino deriv., forming the 1-oxime. It can here be assumed that the substance reacts in the tautomeric *p*-quinoid form (IIIa). II and III are oximated in the 1-position even in acid soln., while *4-acetamino-1,2-naphthoquinone* reacts in the 2-position to form an oxime which is identical with *2-nitroso-4-acetamino-1-naphthol*. Analogous behavior is observed in the condensation reactions of I and its corresponding derivs., which form colored azines and oxazines. *5-Acetamino-1,2-naphthoquinone* reacts with NH_2OH to give an oxime identical with 2-nitroso-5-acetamino-1-naphthol, whereas the 1-oxime is not formed. Thus in I and its 4- and 5 AcNH derivs the CO group in the 2-position is most reactive, while in the 4-NH_2 and the 4-PhNH derivs. the most reactive group is that in the 1-position. In other words, I and its 5-AcNH deriv. possess an *o*-quinoid structure (which is also probable for the 4-AcNH deriv.), whereas the 4-NH_2 and the 4-PhNH derivs. are tautomeric compds. whose tendency to react in the *p*-quinoid form explains the resulting condensation in the 1-position. Oximation of *3-acetamino-1,2-naphthoquinone* (IV) gives the 1-oxime, which is identical with *1-nitroso-3-acetamino-2-naphthol*. *3-* and *4-Benzoylamino-1,2-naphthoquinones* were prepd. and their behavior upon oximation studied. The former was prepd. by treating 3-benzoylamino-2-naphthol with HNO_2 to give 1-nitroso-3-benzoylamino-2-naphthol which was reduced to the corresponding amine and oxidized to 3-benzoylamino-1,2-naphthoquinone (V). With NH_2OH V yields the 1-oxime, which is identical with the nitroso deriv. (VI). 4-Benzoylamino-1,2-naphthoquinone was



(IIIA)



(VI)

prepd. in an analogous manner by converting 4-benzoylamino-1-naphthol into the nitroso deriv., reducing this

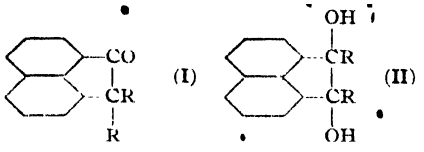
compd., and then oxidizing. The 2-oxime formed upon oximation is identical with *2-nitroso-4-benzoylamino-1-naphthol*. This compd. reacts in the normal manner, as the corresponding Ac deriv. does. In contrast to the behavior of these compds. is that of IV and V. This anomaly is attributed to steric hindrance. Probably in the derivs. of I the presence of a substituted group in the 3-position interferes with the reaction of the neighboring CO group, so that the CO group in the 1-position reacts in preference. The behavior of I itself is to be explained in an analogous manner: in the *o*-position to a CO group, the *o*-quinone ring contains as a substituted group the C chain forming the 2nd ring. Therefore a reduction in the reactivity of the CO group in the 1-position results and the CO group in the 2-position reacts in preference. W. A. Moore

Naphthoquinones of the vitamin K_1 type of structure. Louis F. Fieser, Wm. P. Campbell, Edward M. Fry and Marshall D. Gates, Jr. *J. Am. Chem. Soc.* **61**, 3216–23 (1939).—The synthesis of various allyl derivs. of α-naphthoquinone by utilization of the Claisen rearrangement reaction was undertaken to provide model substances of the structural types postulated for vitamins K_1 and K_2. One scheme tried without success consisted in the attempted addn. of a Grignard reagent to a naphthoquinone oxide. Details are given of the prepn. of the 2-Me and 2-Et derivs. of naphthoquinone in 29 and 39% yields, resp., and of the corresponding hydroquinones with $SnCl_2$ in HCl or with $Na_2S_2O_4$; the diacetates were prepd. by reductive acetylation with Zn and Ac_2O in C_5H_5N at 0°; the dibenzoates were similarly prepd. Oxides were prepd. by the use of 30% H_2O_2 in EtOH at 15°, followed by aq. Na_2CO_3; 2-Me (I), m. 95.5–6.5°; *2,6-di-Me* (II), m. 97–8°; *2,7-di-Me*, m. 91–2°. II and ClH_2CHCH_2-MgBr (III) did not give the expected 3-allyl deriv. but *2,6-dimethyl-1,4-naphthoquinone bromohydrin* (IV), m. 116–8°; IV also resulted in 73% yield from II and $MgBr_2$ in Et_2O; refluxing IV with AcONa in AcOH gives *3-bromo-2,6-dimethyl-1,4-naphthoquinone*, yellow, m. 114–14.5°. IV and III gives a small quantity of II, showing that the cleavage reaction is reversible. I and MeMgI give an oil which, boiled with concd. HCl in EtOH, gives the *compd.* $C_{17}H_{18}O_3Cl$, m. 141.5–2°; it decomps. when heated slowly. Attempts were made to introduce a β-unsatd. group by direct C-alkylation of a phenolic salt. 2-Methylnaphthohydroquinone (V) (2 g.), 4 g. $PhCH_2Cl$ and 20 cc. Me_2CO with 4 g. K_2CO_3, shaken at room temp. for 25 hrs., give 72% of the *dibenzyl ether* (VI), m. 74.5–5°; using 1 equiv. of $PhCH_2Cl$, 1 g. V gives 3 mg. of the *monobenzyl deriv.*, m. 159–60°, and 0.34 g. of VI. Refluxing 2 g. V and 4 g. $PhCH_2Cl$ with 4 g. K_2CO_3 in 20 cc. Me_2CO for 15.5 hrs. gives 0.3 g. of *2-methyl-3-benzyl-1,4-naphthoquinone*, (VIA), bright yellow, m. 107.5–8°. There was no indication of C-benzylation. V (3 g.), 10 cc. 2,3-dimethylbutadiene and 3 g. $(CO_2H)_2$ in 30 cc. dioxane, refluxed 24 hrs., give 29% of the hydroquinone (VIB) corresponding to VII and 15% of a *naphthotocopherol* (VIII), $C_{19}H_{20}O_2$, m. 73–3.5°, if $MeOCH_2CH_2OH$ is used as the solvent at 70°, 38% of V is recovered and the yield of VIB is decreased to 15%; some VIII also results. Oxidation of VI gives *2-methyl-3-(β,γ,γ-trimethylallyl)-1,4-naphthoquinone* (VIIa), bright yellow, m. 95–5.5°; crude VI with Ac_2O-AcONa gives the *naphthohydroquinone diacetate*, m. 119–20°; it also results from VII with Zn and Ac_2O in C_5H_5N, at 0°, together with the *acetate* of VIII, m. 128.5–9°. VIII forms no picrate or $C_6H_3(NO_2)_3$ deriv.; it is sol. in EtOH-KOH with a deep yellow color. V (3 g.), 1.54 g. $PhCH{:}CHCH_2OH$, 2 g. $(CO_2H)_2$ and 20 cc. dioxane, refluxed 22 hrs. and the hydroquinone oxidized with Ag_2O and Na_2SO_4 give 22% of *2-methyl-3-cinnamyl-1,4-naphthoquinone* (IX), bright yellow, m. 127–7.5°; EtOH-KOH in the cold gives an intense indigo-blue color which persists for 15 min. and then fades to a brown; Cl_3CCO_2H may be used in place of $(CO_2H)_2$; the *hydroquinone diacetate* m. 167.5–8°. The *Et analog* of IX m. 118–8.5° (9.4% yield); *hydroquinone diacetate*, m. 123.5–4.5°. Condensation of V and isoprene, oxidation with $FeCl_3$ and reductive acetylation give *2-methyl-3-γ,γ-dimethylallyl-1,4-naphthohydroquinone diacetate*, m. 104.5–5.5°. From V and $PhCH_2OH$ with $(CO_2H)_2$ in dioxane there resulted only a few mg. of VIA. VIA is inactive at a dosage level of 100 γ and the corresponding 3-trimethylallyl compd. is inactive at a level of 200 γ; IX is active at a dosage of 100 γ but not at 10 γ. C. J. West

The structure of "α,α'-binaphthyl," a by-product in the preparation of perylene. B. N. Lundin. *J. Gen. Chem.* (U. S. S. R.) **9**, 682–3 (1939).—In the prepn. of perylene according to Ger. pat. 386,040, as modified by Sharvin and Soborovskiĭ (cf. *C. A.* **23**, 4695) a by-product (I) (up to 50%) was isolated, which was considered to be α,α'-binaphthyl (II). After repeated crystn. I is obtained in yellowish needles from alc., m. 154°, which could not be rendered colorless by chromatographic purification. A comparison with pure II showed the difference of the 2 compds. The mixed m. p. is 138–40°. I yields a picrate, bright-red needles, m. 158°, whereas II does not give a picrate; I shows a bright yellow-green fluorescence and II a slight blue-violet one. These results and those of the elementary analysis indicate that I is 1,1'-binaphthylene 2,2'-oxide (cf. Brass and Patzelt, *C. A.* **31**, 6226⁹). Gertrude Berend

The condensation of acenaphthenequinone with monohydric phenols; cyclic pinacols; reduction and autoxidation products. Hélène Bogdan. *Ann. sci. univ. Jassy*, Pt. I, **25**, 645–79 (1939) (in French).—Condensation of acenaphthenequinone with phenols in concd. H_2SO_4 yields compds. of type I (6 equivs. of acid) and of the pinacol type (II) (1 equiv.). The latter undergo transformation to pinacolones. Compds. of type I with free OH groups are reduced by Zn + NaOH to the corresponding secondary alcs. which autoxidize to derivs. of a reduced naphthalic anhydride and finally to naphthalic anhydride derivs. These act as indicators (cf. phthaleins) in aq. soln. Acenaphthenequinone (III) (7.2 g.) + 12 g. *p*-cresol (IV) heated with 9 cc. H_2SO_4 yield 12 g. *anhydro-1,1-bis(2'-hydroxy-5'-methylphenyl)-2-oxoacenaphthene*, from toluene or xylene, m. 333°. III (10.8 g.) + 21 g. IV + 1.5 cc. acid yield 15 g. *anhydro-1,1-bis-(2'-hydroxy-5'-methylphenyl)acenaphthene-1,2-diol*, from alc., AcOH or toluene, m. 225°; pinacolone, from toluene, m. 333°. III (1.8 g.) + 3 g. α-naphthol (V) + 2 drops acid yield 2 g. *anhydro-1,1-bis(2'-hydroxynaphthyl)-2-oxoacenaphthene*, from toluene or xylene, m. 337°; 7.2 g. III + 12 g V with 200 cc. alc. and 80 cc. concd. HCl yield 10.5 g. *anhydro-1,2-bis(2'-hydroxynaphthyl)acenaphthene-1,2-diol*, from alc., m. 182°; *pinacolone*, from toluene, m. 337° III (3.6 g.) + 5 g. *as-m*-xylenol in 40 cc. concd. AcOH + 5 cc. concd. H_2SO_4 yield 4.8 g. *anhydro-1,1-bis(2'-hydroxy 3',5'-dimethylphenyl)-2-oxoacenaphthene*, from nitrobenzene, m. 350°, and *anhydro-1,2-bis(2'-hydroxy-3',5'-dimethylphenyl)acenaphthene-1,2-diol*, from acetone, m. 282°. III (3.6 g.) + 6 g. *m*-cresol with 35 cc. alc. and 20 cc. concd. HCl yield *di-m-cresolacenaphthenone*, from MeOH, m. 165°; *di-Ac deriv.*, m. 230°. III (3.6 g.) + 6 g. *o-cresol* with 100 cc. alc. and 36 cc. concd. HCl yield 5.6 g. *di-o-cresolacenaphthenone*, from alc. and chloroform, m. 216–17°; *di-Ac deriv.*, m. 105–20°(?). III (3.6 g.) + 6 g. *α-naphthol* + 100 cc. concd. HCl give a quant. yield of *di-α-naphtholacenaphthenone*, from MeOH and H_2O, m. 218° (decompn.); *di-Ac deriv.*, m. 192° (decompn.). III (3.6 g.) + 5 g. *o-xylenol* + a few drops concd. H_2SO_4 in AcOH yield *anhydro-1,1-bis(2'-hydroxy-4',5'-dimethylphenyl)-2-oxoacenaphthene*, from pyridine and acetone, m. 301°. III (3.6 g.) + 5 g. *p*-xylenol + 3 cc. concd. H_2SO_4 in AcOH yield *di-p-xylenolacenaphthenone*, from alc. and H_2O, m. 167–71° (alc. of crystn.), m. 247°; *di-Ac deriv.*, m. 198°. III (3.6 g.) + 6 g. thymol + 1 cc. concd. H_2SO_4 yield *dithymolacenaphthenone*, from toluene and ligroin, m. 195–7°; *di-Bz deriv.*, m. 107°. Reduction and autoxidation products: 4 g. diphenolacenaphthenone + 4 g. Zn + 40 cc. 5% NaOH after filtration, air oxidation and pptn. with concd. HCl yield *di(p-hydroxyphenyl)-2-carboxynaphthylcarbinol*, m. 239–40°, red-violet in alkali. Similar reduction of di-*o*-cresolacenaphthenone in H or CO_2 in a special setup yields *1,1-bis(3'-methyl-4'-hydroxyphenyl)-2-acenaphthol*, m. 117°. Air oxidation of di-*o*-cresolacenaphthenone and pptn. with concd. HCl

yield *di-o-cresoldihydronaphthalic anhydride* (VI), m. 230° (decompn.); *di-Bz deriv.*, m. 230°. VI absorbs O for several days to form *di-o-cresolnaphthalein*, m. under 100°. Reduction of di-α-naphtholacenaphthenone followed by autoxidation gives *di(4'-hydroxynaphthyl)-2-carboxynaphthylcarbinol*, m. 200° (decompn.), green in alkali; *di-Bz deriv.*, m. 180°. Reduction of di-*p*-xylenolacenaphthenone followed by autoxidation gives *di(2',5'-dimethyl-4'-hydroxyphenyl)-2-carboxynaphthylcarbinol*, m. 233° (decompn.), blue in alkali; *di-Bz deriv.*, m. 164°.

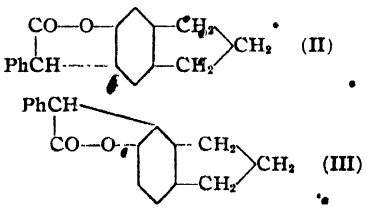


P. M. Apfelbaum

Labile union of oxygen and carbon: spontaneous dissociation of the photoöxide of diphenyldimethoxyanthracene. Charles Dufraisse, Léon Velluz and Mme. Léon Velluz. *Compt. rend.* 209, 516–18(1939); cf. *C. A.* 33, 6294⁷.—The spontaneous dissocn. in a closed vessel with evolution of O of the photoöxide of 9,10-diphenyl-1,4-dimethoxyanthracene is a unimol. reaction until about 1/3 of the O has been evolved; the rate then steadily decreases, probably on account of the photoöxide forming a solid soln. in the product of dissocn. The course of the reaction is unaffected by increase of the pressure of O to 140 atm. It is inferred that such dissocn. is irreversible which would imply that the O emitted by the photoöxide must be in a state of activity differing from that of ordinary O. Although this view was not supported by formation by such O of the photoöxide of tetraphenylnaphthacene, or any reaction with H_2, a pos. result was obtained with a photographic plate, the photoöxide causing a distinct blackening when in contact therewith, while no such result occurred with 4 other photoöxides which are not dissocd. in the cold. Possible explanations are discussed. C. A. Silberrad

1,2-Benzanthracyl-10-acetic acid. Alfredo Dansi and Cesare Ferri. *Ricerca sci.* 10, 178(1939).—Reaction of 1,2-benzanthracene with $ClCH_2CO_2Et$ in the presence of Cu powder gave after hydrolysis *1,2-benzanthracylacetic acid*, m. 273°; *Et ester*, m. 85°. Decarboxylation gave 10-methylbenzanthracene. The satd. water soln. of the Na salt contains 0.3%. Cf. *C. A.* 33, 7296¹. W. F. Bruce

The Mills-Nixon effect. Condensation of mandelic acid with 5-hydroxyhydrindene and with *ar*-tetrahydro-β-naphthol. B. I. Arventi. *Ann. sci. univ. Jassy*, Pt. I, 25, 692–8(1939)(in French).—Equal parts of mandelic acid (I) and 5-hydroxyhydrindene heated to 200–40° yield 50–55% of a lactone (II), from alc., m. 115° (corresponding acid, colorless oil, stable), and 1–2% of a lactone (III), from alc., m. 105° (acid, unstable); this shows a distinct M.-N. effect. I and *ar*-tetrahydro-β-naphthol, equal parts at 225–30°, yield 50% of a mixt. of equal parts of one lactone, structure like II, from alc., m. 110°, and another, structure like III, from alc., m. 140°; here there is no evidence of a M.-N. effect.



P. M. Apfelbaum

The anthraquinone group. II. Phthaloylation. Giunio B. Crippa and Raoul Caracci. *Gazz. chim. ital.* 69, 768–75(1939); cf. *C. A.* 27, 3463; 33, 4233⁷.—The phthaloylation of anthraquinone monoamines has not previously been recorded, although phthalimides have been prepd. by indirect methods. The present expts. were carried out to det. whether primary amines can be easily phthaloylated, for if so, the protection afforded the amine group would make possible various otherwise impracticable transformations. To correlate with earlier expts. (*C. A.* 33, 4233⁷), 1-amino-2-methylanthraquinone (I) was chosen as a starting material. I did not behave in the normal manner on phthaloylation, viz., $RNH_2 \rightarrow RN<\begin{matrix}OC\\OC\end{matrix}>C_6H_4$, but formed a phthalamide. I and $C_6H_4(CO)_2O$ (II) (equimol. wts.), maintained at 235° for 5 hrs., and the product purified from AcOH, yielded *(2-methyl-1-anthraquinonyl)-phthalamide* $C_6H_4[CONHC_6H_2Me(CO)_2C_6H_4]_2$ (III), orange, m. 221–2°, sol. in H_2SO_4. It and 5% aq. NaOH, refluxed for 2 hrs., and the ppt. extd. with Et_2O, yield I. The residue from the Et_2O extn. is Na (2-methyl-1-anthraquinonyl)phthalimidate, which, with mineral acids, forms the corresponding acid. III and Ac_2O (3 parts by wt.), refluxed for 4 hrs. (the soln. turns brown-red, then green-yellow), filtered and allowed to stand, ppt. *1-phthalimido-2-methylanthraquinone* $C_6H_4(CO)_2NC_6H_2Me(CO)_2C_6H_4$ (IV), light yellow, m. 261°, sol. in H_2SO_4 (repptd. by water). The mother liquor from the prepn. of V yields 1-acetylamino-2-methylanthraquinone, m. 176° (cf. *Ber.* 16, 699(1883)). IV and concd. H_2SO_4, heated at 100° for 8 hrs. (the soln. turns brown-red), poured into ice water, o-$C_6H_4(CO_2H)_2$ extd. by an alkali from the dark-red mass and the residue purified by AcOH, yield I. IV was not dehydrated by heating at various temps. up to 280° and for various times to 24 hrs. Up to 120° IV is not attacked by KOH, but above this temp. sapon. progresses at a rate which increases with the temp., e. g., at 185° in 2.5 hrs. it is completely transformed into K (2-methyl-1-anthraquinonyl)phthalimidate. At 225° for 5 hrs. a dark product was obtained, from which no definite compd. was isolated. IV, P_2O_5 and $PhNO_2$, refluxed for 24 hrs., do not react; not even prolonged heating of V with P_2O_5 gives any reaction. These results show the inertia of the Me H atoms in the intermol. dehydration. Furthermore dehydration between 2 mols., with formation of an ethylene bond as with 2-methylanthraquinone, does not take place. The impossibility of phthaloylating I in the normal way shows that only one of the amino H atoms is mobile, and that the other is so inert that it becomes reactive only with an energetic agent like Ac_2O. This must depend on a peculiar structure, which differs from that of all other aromatic amines. Possibly an oxime structure is formed from the keto-amine structure in the initial condensation reaction, i. e., tautomerism may be involved. The condensation reaction with 1-amino-2-phenylazomethine-(*C*)-anthraquinone (V) was next studied. In this case both amino H atoms are mobile and open to phthaloylation. Consequently the unsatd. azomethine group is a center of attraction which nullifies the CO group and reëstablishes the normal reactivity of the NH_2 group with II. V and II, heated at 240° for 3 hrs. (water is evolved), the product extd. with Et_2O, and the residue purified by $PhNO_2$, yield *1-phthalimido-2-phenylazomethine-(C)-anthraquinone*, $C_6H_4(CO)_2NC_6H_2(CH{:}NPh)(CO)_2C_6H_4$ (VI), violet-brown, m. 315°, sol. in C_6H_5N and $PhNH_2$. It colors cond. H_2SO_4 brown. The $PhNO_2$ mother liquor yields a relatively small amt. of *1-phthalimidoanthraquinone-2-aldehyde* (VII), brown-red with metallic reflection, m. 338°. When heated in $PhNH_2$ for 6 hrs. at 184°, VII forms VI. The formation of VII shows that the H_2O mol. which is liberated in the phthaloylation saponifies part of the V. C. C. Davis

Some derivatives of 1,2-benzanthraquinone-4'-sulfonic acid. Antonio Sempronj. *Gazz. chim. ital.* 69, 448–53 (1939).—Heller and Schulke prepd. a SO_3H deriv. (I) of 1,2-benzanthraquinone but did not identify either its constitution or that of its sulfonyl chloride or even describe the method of prepn. of the latter (cf. *C. A.* 3, 318; German pat. 263,340). The present work is concerned with the identification of I and the prepn. of various derivs. I was prepd. by the method of H. and S. and was

isolated as its K salt (II). This, heated with KOH (4 parts) at 260° for 15 min., the product dissolved in water, clarified, acidified with HCl and allowed to stand for a long time, ppts. successively BzOH and 5-hydroxy-2-naphthoic acid. This shows rupture of the quinone ring of I and that the SO_3H group is in the 4'-position. Hence I is *1,2-benzanthraquinone-4'-sulfonic acid*. This was confirmed by further expts. II (58 g.), PCl_5 (40 g.) and $POCl_3$ (200 g.), heated for 1 hr. at 120°, the $POCl_3$ distd., the residue poured onto ice and the ppt. dried *in vacuo*, and purified by PhMe and PhCl, yield 85% of *1,2-benzanthraquinone-4'-sulfonyl chloride* (III), m. 263°; its solns. in concd. H_2SO_4 are yellow, and when heated evolved HCl. III, heated at 275° until acid vapors are no longer evolved, the product dissolved in concd. H_2SO_4, poured into water, the dried ppt. extd. with AcOH, the ext. clarified and crystd., yields 4'-chloro-1,2-benzanthraquinone (IV), m. 230–1° (cf. Fieser, *C. A.*, **26**, 5300); its solns. in concd. H_2SO_4 are olive-green. IV is more readily prepd. by adding concd. HCl (170 cc.) dropwise to boiling aq. II (46 g. in 1200 cc.), then adding during 3 hrs. aq. $NaClO_3$ (40 g. in 200 cc.), heating for 2 more hrs. and purifying the ppt. by AcOH; the yield is 80%. II (54 g.), Zn (162 g.), concd. NH_4OH (435 cc.) and water (150 cc.), heated briefly at 50°, then for 10 hrs. at 85° (the mixt. turns red, then colorless), filtered, and the Zn in the residue destroyed by HCl, give 85-90% of *1,2-benzanthracene-4'-sulfonic acid* (V), insol. in org. solvents; its alk. salts are almost insol. in water, e. g., the soly. of the *K salt* is 1 g. in 2 l. V (5.5 g.), PCl_5 (4 g.) and $POCl_3$ (10 g.), allowed to stand for 1 hr., then heated for 1 hr. at 65–70°, poured onto ice, filtered, the dried residue extd. with anhyd. Me_2CO, the ext. clarified, evapd. and the product purified by PhMe and C_6H_6, yield 30% of *1,2-benzanthracene-4'-sulfonyl chloride* (VI), yellowish, m. 193°. It is decompd. by hot EtOH. VI (1.5 g.), dissolved in abs. EtOH (500 cc.) by standing for 3 weeks, filtered, dild. with water and allowed to stand for 24 hrs., ppts. *Et 1,2-benzanthracene-4'-sulfonate*, m. 157°. V and excess KOH, heated for 30 min. at 300°, digested in water, the filtrate acidified by HCl and the ppt. purified by C_6H_6, yield *4'-hydroxy-1,2-benzanthracene* (VII), m. 230°. With hot Me_2SO_4 and KOH in MeOH, VII forms *4'-methoxy-1,2-benzanthracene*, m. 163°. With Ac_2O and NaOAc, VII forms *4'-acetoxy-1,2-benzanthracene* (VIII), m. 193-4°. VIII (8.4 g.) in AcOH (100 cc.) and aq. $K_2Cr_2O_7$ (7.5 g. in 20 cc.), refluxed for 30 min., poured into water and the ppt. purified by C_6H_6 and dioxane, yield 80% of *4'-acetoxy-1,2-benzanthraquinone* (IX), silky yellow, m. 202–3°; its solns. in concd. H_2SO_4 are green. A soln. of IX in hot 2 *N* NaOH, acidified with AcOH, and the ppt. purified by xylene, yields *4'-hydroxy-1,2-benzanthraquinone*, red, m. 224-5°; its solns. in concd. H_2SO_4 are green.

C. C. Davis

Application of the Pschorr reaction to α-(*p*-xylylene)-2,5-di(6'-aminodimethylcaffeic acid). The synthesis of 9,10-dimethyl-2',3',6',7'-tetramethoxy-1,2,5,6-dibenzanthracene. Jack T. Cassaday and Marston T. Bogert. *J. Am. Chem. Soc.* **61**, 3058–61(1939).—K *p*-xylylene-2,5-diacetate (*C. A.* **31**, 6650[3]) and 6-nitroveratraldehyde in Ac_2O give 85% of *α-(p-xylylene)-2,5-di(6'-nitrodimethylcaffeic acid)*, pale yellow, decomps. above 300°; reduction with $FeSO_4$ and NH_4OH gives 50–60% of the *NH_2 deriv.* (I), pale yellow, decomps. above 300°; the diazo soln. gives a deep-purple soln. with H acid. Through the diazo reaction there results 66% of *α-(p-xylylene) - 2,5 - di(6' - hydroxydimethylcaffeic acid)*, pale brown, decomps. 245–55°; a Me ether could not be prepd. Distn. of the acid at 3 mm. and about 360° gives *2,5-di(2'-hydroxy-4',5'-dimethoxystyryl)-p-xylene*, decomps. 55–60° and becomes gummy in the presence of H_2O. The diazo soln. from I in dioxane stirred into NaH_2PO_2 in H_2O with some Cu powder gives 59% of *9,10-dimethyl-2',3',6',7'-tetramethoxy-1,2,5,6-dibenzanthracene-4,8-dicarboxylic acid*, decompg. 315–17°; refluxing with quinaldine and basic Cu carbonate for 6 hrs. (250°) gives 25–30% of *9,10-dimethyl-2',3',6',7'-tetramethoxy-1,2,5,6-dibenzanthracene* (II), pale yellow, m. 137–8° (cor.); its solns. exhibit a pale blue fluorescence; dry distn. of the acid with Cu powder alone was not suitable. II with HI or HBr did not yield a pure tetra-HO deriv., although some alc. exts. of the products gave green colors with $FeCl_3$; a *tetraacetate*, decompg. 300–50°, was obtained but not in sufficient quantity to saponify.

C. J. West

Reactions of tetrahydrophenanthrene. The synthesis of triphenylene and methyltriphenylene. W. E. Bachmann and W. S. Struve. *J. Org. Chem.* **4**, 472-9(1939).—In the Friedel-Crafts reaction phenanthrene (I) is usually substituted in the 3-position, sometimes in the 2-position. To obtain derivs. substituted in other positions, partially hydrogenated I is used, e. g., 9,10-dihydrophenanthrene gives 2-substituted derivs. (cf. Burger and Mosettig, *C. A.* **30**, 7570[6]). *1,2,3,4-Tetrahydrophenanthrene* (II), prepd. according to Haworth and Mavin (*C. A.* **27**, 501), is condensed in a Friedel-Crafts reaction with AcCl and with succinic anhydride (III). When 50 g. naphthalene, 25 g. III and 69 g. $AlCl_3$ in 190 cc. $PhNO_2$ react, 52 g. of a mixt. of *β-(1- and 2-naphthoyl)propionic acids* is obtained which is reduced by heating it with 100 g. amalgamated Zn, 75 cc. H_2O, 175 cc. concd. HCl in 100 cc. PhMe and 5 cc. AcOH for 24 hrs. with an addnl. 150 cc. concd. HCl being added in small amts. over this period. Distn. of the residue after evapg. the PhMe gives 38 g. of a mixt. of *γ-(1- and 2-naphthyl)butyric acids* (IV). When to a soln. of 38 g. IV in 200 cc. abs. Et_2O and 5 drops pyridine, 40 cc. SO_2Cl_2 is added and after standing for 0.5 hr. at room temp. the Et_2O and SO_2Cl_2 are distd. off, an oily acid chloride is obtained. This is dissolved in 200 cc. dry C_6H_6, cooled in ice and 30 cc. $SnCl_4$ is added and the mixt. allowed to stand in ice for 15 min. After hydrolysis of the addn. compd. with ice-cold dil. HCl, the C_6H_6 layer is washed with H_2O and dil. NH_4OH and the residue distd. at 0.4 mm. A mixt. of *1-* and *4-keto-1,2,3,4-tetrahydrophenanthrene* (V) in a yield of 26 g. is obtained. Reduction of V with amalgamated Zn, AcOH and HCl gives II in 70% yield. It m. 32.5–3.5°; *picrate*, m. 111° (cf. Schroeter and co-workers, *C. A.* **23**, 3703). When to a soln. of 13.5 g. $AlCl_3$ and 4.5 g. AcCl in 46 cc. $PhNO_2$, 10 g. II is added at −10°, the mixt. kept at 0° for 24 hrs., then decompd. with ice and HCl and the $PhNO_2$ removed by steam distn., 11.5 g. cryst. product, m. 45–50°, is obtained from which by vacuum distn. and recrystn. from MeOH-EtOH, 7.9 g. *9-acetyl-1,2,3,4-tetrahydrophenanthrene* (VI), m. 56.5–8°, is isolated. Dehydrogenation of VI by heating with S for 3 hrs. at 210–20° gives *9-acetylphenanthrene*, m. 70–3° (cf. *C. A.* **30**, 4852[2]), indicating that the Ac group actually is in the 9-position. This is further proved by the reduction of 1 g. VI with amalgamated Zn to *9-ethyl-1,2,3,4-tetrahydrophenanthrene* (VII), m. 22–4°; *picrate*, m. 124–6°. VII is also synthesized from 5.4 g. 1-ethylnaphthalene, 3.5 g. III and 8.5 g. $AlCl_3$, whereby 6.5 g. *β-[1-(4-ethylnaphthoyl)]propionic acid* (VIII), m. 129.5–31° after 3 crystns. from C_6H_6, is obtained. Reduction of VIII gives *γ-[1-(4-ethylnaphthyl)]butyric acid*, m. 115–16.5°, in 94% yield, which on cyclization with SO_2Cl_2 in pyridine yields *1-keto-9-ethyl-1,2,3,4-tetrahydrophenanthrene* (IX), m. 52–3°, in 77% yield. Reduction of IX with amalgamated Zn gives VII. Its pure *picrate* m. 125.5-6.5°. Dehydration of VII with Pd charcoal at 300–20° gives *9-ethylphenanthrene*, m. 63.5-4.5°, in 75% yield; *picrate*, m. 120.5-2.5° (cf. Mosettig and van de Kamp, *C. A.* **27**, 4792). Bromination of VI with Br in abs. Et_2O yields *ω-bromo-9-acetyl-1,2,3,4-tetrahydrophenanthrene* (X), m. 90.5–1:5°, in 72% yield. Condensation of X with $CHNa(CO_2Et)_2$ in C_6H_6 gives *β-[9-(1,2,3,4-tetrahydrophenanthroyl)]propionic acid* (XI), m. 167–9°, in 66% yield. XI is also obtained in 78% yield by the reaction of III with tetrahydrophenanthrene in the presence of $AlCl_3$. Reduction of XI with amalgamated Zn gives *γ-[9-(1,2,3,4-tetrahydrophenanthryl)]butyric acid* (XII), m. 133–4°, in 96% yield. Dehydrogenation of the *Me ester* of XII, prepd. with CH_2N_2, with Pd charcoal at 250–70° gives *γ-(9-phenanthryl)butyric acid* (XIII), m. 171–2°, in 90% yield (cf. Bergmann and Blum-Bergmann, *C. A.* **31**, 6646[4]). Cyclization of XIII with SO_2Cl_2 in pyridine gives

1-keto-1,2,3,4,9,10,11,12-octahydrotriphenylene (**XIV**), m. 121–2°, in 95% yield, which when reduced with amalgamated Zn gives *1,2,3,4,5,6,7,8-octahydrotriphenylene* (**XV**), m. 120.5–2°, in 74% yield; *picrate*, m. 193–5°. Dehydrogenation of **XV** with Pd charcoal at 300–20° gives *triphenylene*, m. 196.5–7.5° in 75% yield. Reaction of MeMgI prepd. from 0.56 cc. MeI and 0.19 g. Mg with 1.75 g. **XIV** gives 0.45 g. *1-methyl-1-hydroxy-1,2,3,4,9,10,-11,12-octahydrotriphenylene* (**XVI**), m. 104–5°, after 2 crystns. from C_6H_6-petr. ether. Heating of **XVI** with Pd charcoal for 2 hrs. at 300–20° gives *1-methyltriphenylene*, m. 93–4°, in 90% yield; *picrate*, m. 172.5–4°.

F. E. Brauns

Synthesis of phenanthrene derivatives. IV. 9,10-Cyclopenteno- and 9,10-cyclohexenophenanthrene. Charles K. Bradsher. *J. Am. Chem. Soc.* **61**, 3131–2 (1939); cf. *C. A.* **33**, 7777[1].—1-(2-Biphenylyl)-1-cyclopentene (2 g.) in Et_2O, cooled in an ice bath, treated with 0.019 mole of *o*-$HO_2CC_6H_4CO_3H$ in Et_2O and then allowed to stand 12 hrs. at room temp., gives the cyclopentene oxide; removal of the Et_2O, soln. in AcOH, addn. of 34% HBr and refluxing 24 hrs. give 0.31 g. of 9,10-cyclopentenophenanthrene [cf. Bachmann and Kloetzel (*C. A.* **32**, 539[9]) who did not obtain this compd. by the use of $AlCl_3$]. Similarly 3.4 g. 1-(2-biphenylyl)-1-cyclohexene gives 1 g. (30%) of 9,10-cyclohexenophenanthrene. C. J. W.

Synthesis of some new 1,4-dimethylphenanthrenes structurally related to morphol. Jack T. Cassaday and Marston T. Bogert. *J. Am. Chem. Soc.* **61**, 3055–7 (1939); cf. *C. A.* **33**, 8607[1].- K *p*-xylylacetate (32.4 g.), 33.5 g. 2-nitroveratraldehyde and 285 g. Ac_2O, heated 8 hrs. at 105–10°, give 67% of *α-(p-xylyl)-2-nitrodimethylcaffeic acid* (**I**), m. 205.5–6.5° (all m. ps. cor.); 2-nitroacetovanillin gives 50% of *α-(p-xylyl)-2-nitro-3-methoxy-4-acetoxycinnamic acid* (**II**), pale greenish tint, m. 211–14°. Reduction of **I** with $FeSO_4$ and NH_4OH gives 61–7% of the corresponding *2-NH₂ deriv* (**III**), a light-gray product which could not be purified; the *HCl salt* decomps. at 110°; **II** gives 80% of *α-(p-xylyl)-2-amino-3-methoxy-p-coumaric acid* (**IV**), lemon, m. 203–4°. Using the previously described method, **III** gives 50% of *1,4-dimethyl-5,6-dimethoxyphenanthrene-10-carboxylic acid* (**V**), m. 180.5–1.5°; the MeO groups could not be removed by HBr or HI, only black tars resulting. Similarly, **IV** gives 47% of *1,4-dimethyl-5-methoxy-6-hydroxyphenanthrene-10-carboxylic acid* (**VI**), which could not be purified; *Ac deriv.*, m. 170.5–1.5°. Distn. of 5 g. **V** and 1 g. Cu powder at 25 mm. gives 47% of *1,4-dimethyl-5,6-dimethoxyphenanthrene*, m. 73.5–4°; attempts to remove the Me groups failed; the CO_2H group could not be removed by refluxing with quinaldine and basic Cu carbonate. **VI** gives 42% of *1,4-dimethyl-5-methoxy-6-hydroxyphenanthrene*, m. 136.5–7°; the Me groups could not be removed by HBr or HI.

C. J. West

***o*-Quinone monoöxime inner complexes.** Helmut M. Haendler and Geo. McP. Smith. *J. Am. Chem. Soc.* **61**, 2624–6(1939); cf. *C. A.* **33**, 1558.- The following complexes were prepd. by treating a hot EtOH soln. of the oxime with an EtOH or H_2O soln. of a metallic acetate (or $NiCl_2$) and adjusting the pH with NH_4OH or AcOH until coagulation of the ppt. occurred. The ppts. were purified by extn. with EtOH. The complexes are extremely stable, sol. in warm glacial AcOH with decompn. and only slightly attacked by mineral acids in most cases. In addn. to the name of the color, the color plate reference of Maerz and Paul "Dictionary of Color" is given. Phenanthrenequinone monoöxime (**I**) derivs.: *Cd*, brownish orange (5-D-12), 80%; *Cu*, chocolate-brown (7-E-11), 80%; *Pb*, light-brown (7-C-12), 85%; *Mn*, yellowish brown (15-J-8), 80%; UO_2, with 2 moles EtOH, bright-yellow (9-L-8), 95%; heating at 100° splits off the EtOH, giving the UO_2 *deriv.*, brick-red (5-J-11), 90%. Chrysenequinone monoöxime (**II**) derivs.: *Cu*, red-brown (8-J-5), 80%; *Pb*, red-brown (8-J-7), 70%; *Mn*, olive-green (15-L-7), 95%; *Ni*, green-brown (16-A-12), 75%; UO_2, with 2 moles EtOH, yellow-orange (9-L-10), 80%; without EtOH, orange-brown (5-H-12), 75%. Cr, Hg, Pd, Rh and Zn also form complexes. Retenequinone monoöxime exhibits the same reactive tendencies as **I** and **II** but the colors are somewhat duller than those of **I** and not as dark as those of **II**.

C. J. West

Methyl homologs of triphenylene. Louis F. Fieser and Lloyd M. Joshel. *J. Am. Chem. Soc.* **61**, 2958–61 (1939).—In order to investigate the possibility that the introduction into triphenylene of suitably located alkyl groups might lead to carcinogenically active hydrocarbons, methods have been developed for the synthesis of the 1- and 2-Me and the 1,2- and 1,4-di-Me derivs. Details are given of the prepn. of *β*-(9-phenanthroyl)propionic acid (45% yield), *γ*-(9-phenanthryl)butyric acid (79% yield by the Clemmensen method) and 1-keto-1,2,3,4-tetrahydrotriphenylene (**I**) (87% by the use of HF at 0°). I with MeMgI, followed by dehydration at 200–20° and dehydrogenation with S at 230–50°, gives 42.5% of *1-methyltriphenylene*, m. 93.4–4.2° (all m. ps. cor.); *picrate*, orange, m. 177.2–8.2°. The Grignard reagent from 9-bromophenanthrene (**IA**) and methylsuccinic anhydride give 33% of *α-methyl-β-(9-phenanthroyl)propionic acid*, m. 155–6°; the structure follows from the alkali cleavage of the brominated compd. to 9-acetophenanthrene. Reduction gives 77% of *α-methyl-γ-(9-phenanthryl)butyric acid*, m. 136.6–7.4°; HF gives 92.5% of *2-methyl-1-keto-1,2,3,4-tetrahydrotriphenylene* (**II**), m. 85–6.5°; dehydrogenation with Pd-charcoal at 300–10° (N atm.) for 7 hrs. gives 73% of *2-methyltriphenylene* (**III**), m. 102.6–3.6°; *picrate*, light orange, m. 192.4–3°. Clemmensen reduction of **II** gives 77.5% of *2-methyl-1,2,3,4-tetrahydrotriphenylene*, m. 116.2–16.8°, which yields **III** on heating with Pd-C. Reaction of **II** with MeMgCl and heating the crude carbinol with Pd-C at 290–315° for 1.25 hrs. give 58% of *1,2-dimethyltriphenylene*, m. 86.8–7.4°; *picrate*, orange, m. 154–5°. The Grignard reagent of **IA** and MeOCH$_2$CN give 66% of *methoxymethyl 9-phenanthryl ketone*, m. 67.2–8°, b_3 220–5°. Reaction with MeMgCl yields 95% of *methylmethoxymethyl-9-phenanthrylcarbinol*, b_1 192–5°, m. below 0°; heating with $KHSO_4$ at 180° gives 58% of *α-(9-phenanthryl)propionaldehyde*, m. 66.2–7.2°; this reacts with $CH_2(CO_2H)_2$ in C_5H_5N-piperidine to give 80.5% of *γ-methyl-γ-(9-phenanthryl)crotonic acid*, m. 178.8–9.4°, which is reduced by Adam's catalyst (87.5% yield) to *γ-(9-phenanthryl)-valeric acid*, m. 83–5°; ring closure with HF at room temp. yields 82% of *4-methyl-1-keto-1,2,3,4-tetrahydrotriphenylene*, m. 99–100.5°, from which *1,4-dimethyltriphenylene*, m. 108.4–9.2°, results in 35% yield; *picrate*, orange-red, m. 148.4–9.4°.

C. J. West

The synthesis of derivatives of chrysene. W. E. Bachmann and W. S. Struve. *J. Org. Chem.* **4**, 456–63 (1939).— In a previous paper (*C. A.* **30**, 7570[1]) the prepn. of *β*-(2-phenanthroyl)butyric acid (**I**) for the synthesis of *2-methylchrysene* (**II**) was described. This synthesis is now completed. A mixt. of 2 g. **I**, 5 g. amalgamated Zn, 5.7 cc. AcOH, 7.5 cc. concd. HCl and 4 cc. PhMe is refluxed for 36 hrs. with the addn. of 10 cc. more HCl in small quantities during this period. The PhMe layer is evapd. and the oily residue sublimed at 0.4 mm. and 250°. Recrystn. of the sublimate gives 0.96 g. *γ-(2-phenanthryl)-β-methylbutyric acid* (**III**), m. 127.5–9°. When **III** is treated with SO_2Cl_2 and the resulting acid chloride is treated with $SnCl_4$, cyclization takes place with the formation of *2-methyl-4-keto-1,2,3,4-tetrahydrochrysene* (**IV**) in 86% yield. **IV** m. 141–2° after 2 crystns. from C_6H_6-petr. ether. Reduction of **IV** by refluxing 0.23 g. with 5 g. amalgamated Zn, 7.5 cc. AcOH, 7.5 cc. concd. HCl and 2 cc. PhMe for 24 hrs. gives *2-methyl-1,2,3,4-tetrahydrochrysene* (**V**), m. 141.5–2°, in 83% yield. Its *hemipicrate* m. 145.5–6°. Dehydrogenation of **V** by heating a mixt. of 0.18 g. with 0.03 g. Pd charcoal (cf. Zelinsky and Turowa-Pollak, *C. A.* **19**, 3053) at 300–20° for 1 hr. gives **II**, m. 224.5–5.5° (229–30°, cor.) in 90% yield. Its *picrate* m. 143–6°. 2-Propionylphenanthrene when reduced like **IV** yields *2-propylphenanthrene* (**VI**), which is isolated as its picrate in 83% yield. **VI** m. 35–6°; *picrate* m. 92–3°. 3-Propionylphenanthrene yields *3-propylphenanthrene* in 77% yield; *picrate* m. 107–8°. *γ-[2-(9,10-Dihydrophenanthryl)]butyric acid* (**VII**), m.

91–2°, is obtained in 92% yield by reduction of β-[2-(9,10-dihydrophenanthroyl)]propionic acid with amalgamated Zn in the same way as above. For the prepn. of γ-(*2-phenanthryl*)*butyric acid* (VIII), HCl is passed into 10 g. VII in 300 cc. MeOH for 0.5 hr. and the soln. refluxed for 1 hr. HCl is passed again into the cool soln. for 0.5 hr. and the soln. is refluxed for another hr., the MeOH is distd. off and C_6H_6 is added. The *Me ester* is washed with H_2O and the C_6H_6 distd. off. The residue is directly dehydrogenated by heating with Pd charcoal at 240–60° for 2 hrs. The residue is extd. with C_6H_6, the latter evapd., the residue hydrolyzed with hot 40% KOH and VIII ppt'd. with HCl in 90–95% yield. VIII m. 133–4° (Haworth and Mavin, *C. A.* **27**, 5329, found 134–5°). VIII is cyclized via its acid chloride in the same way as IV and gives *4-keto-1,2,3,4-tetrahydrochrysene* (IX), m. 125–6°, in 74% yield. When to 1 g. IX in 10 cc. dry C_6H_6 a Grignard reagent prepd. from 0.25 g. Mg and 0.75 cc. MeI in 10 cc. abs. Et_2O is added and the addn. decompd., 0.87 g. *4-methyl-4-hydroxy-1,2,3,4-tetrahydrochrysene* (X), m. 124–5°, is obtained. Dehydrogenation of X with Pd charcoal at 300–20° for 1 hr. gives *4-methylchrysene*, m. 149–9.5° (151–1.5°, cor.) in 92% yield; *picrate*, m. 131–5°. *4-Hydroxy-1,2,3,4-tetrahydrochrysene* (XI) is obtained when to a soln. of $(iso\text{-}PrO)_3Al$, prepd. from 1 g. Al, 25 cc. dry iso-PrOH, 5 drops CCl_4 and a pinch $HgCl_2$, 2.75 g. IX in 25 cc. PhMe is added. The mixt. is refluxed for 4 hrs., 25 cc. iso-PrOH is added and distd. off. The Al compd. is decompd. with 10% H_2SO_4, the PhMe layer sepd., washed with dil. NH_4OH and evapd. XI is obtained in 76% yield, m. 160–2°. Methylation of XI with MeOH and H_2SO_4 yields *4-methoxy-1,2,3,4-tetrahydrochrysene*, m. 79–80.5°, in 86% yield; the *Ac deriv.* of XI, prepd. by heating it with Ac_2O and pyridine, m. 119–20.5°. When HCl is passed into XI in cold dry C_6H_6 in the presence of $CaCl_2$, *4-chloro-1,2,3,4-tetrahydrochrysene* (XII) is formed in 80% yield. XII m. 115–17° (decompn.), then solidifies and remelts 174–8°. Refluxing of XII with pyridine gives *1,2-dihydrochrysene*, m. 58% yield, m. 182.5–4.5°; *picrate*, m. 155–6°. IX reduced with amalgamated Zn gives *1,2,3,4-tetrahydrochrysene* (XIII), m. 180.5–1.5°; *picrate*, m. 134–5.5°. Dehydrogenation of dihydrochrysene with Pd charcoal in a N atm. at 320° yields chrysene, m. 247–9°. This is also formed on dehydrogenation of XIII. F. E. Brauns

A new synthesis of picene. Nathan L. Drake and W. C. McVey. *J. Org. Chem.* **4**, 464–71 (1939). Alkylated picenes are found in the dehydrogenation products of many triterpenoids. The synthesis of picene derivs. is therefore of interest. A new synthesis of picene (I) which may lead also to the synthesis of alkylated I is described. *β-1-Naphthoylpropionic acid* (II) is prepd. according to a modified method of Fieser and Peters (*C. A.* **27**, 82) and m. 132–3°. Reduction of II by the Clemmensen method gives *γ-1-naphthylbutyric acid* (III), m. 107.5–8.5°. To convert III into *1-keto-1,2,3,4-tetrahydrophenanthrene* (IV), 50 g. III is suspended in 500 cc. dry C_6H_6, 50 g. PCl_5 is added with stirring, the mixt. is heated for 1.5 hrs., cooled to 0–5° and 34 g. anhyd. $AlCl_3$ is added at this temp. over a period of 30 min. The mixt. is allowed to warm up to room temp., kept overnight, then refluxed for 2.5 hrs. and, after cooling, it is poured into ice-cold HCl. IV is extd. with C_6H_6, washed with Na_2CO_3 soln. and distd. It b_1 145–50°. The yield is 81%. Its *2,4-dinitrophenylhydrazone* m. 283–5° (decompn.). *2-(β-Hydroxyethyl)toluene* (V), prepd. from *o*-BrC_6H_4Me and $(CH_2)_2O$ (cf. Dreger, *C. A.* **20**, 3280) in 62% yield, b_1 99–105°, d_{20}^{20} 1.0195, n_D^{20} 1.5349. *β-2'-Tolylethyl 3,5-dinitrobenzoate* m. 126–8°. *4-(β-Hydroxyethyl)toluene* (VI), prepd. from *p*-BrC_6H_4Me in 53% yield, b_1 100–6°, b. 235°, d_{20}^{20} 1.0008, n_D^{20} 1.5282; its *3,5-dinitrobenzoate* m. 147–9°. When to an ice-cold mixt. of 34 g. V in 61 g. $PhNMe_2$, 60 g. SO_2Cl_2 is added and allowed to stand overnight at room temp., then heated on a steam bath for 1 hr., the mixt. then decompd. with H_2O, extd. with Et_2O, washed with 5% Na_2CO_3 soln., dried and distd., *2-(β-chloroethyl)toluene* (VII) is obtained in 85% yield. VII b_1 80–4°, b. 223°, d_{20}^{20} 1.0553, n_D^{20} 1.5313. *4-(β-Chloroethyl)toluene* (VIII), prepd. in the same way as VII, b_1 81–5°, b. 222°, d_{20}^{20} 1.0370, n_D^{20} 1.5251. *3,4-Dihydro-1-phenethylphenanthrene* (IX) is prepd. by allowing a Grignard reagent prepd. from 6 g. Mg and 37 g. phenethyl bromide to react with 32 g. IV. After the reaction is complete, the mixt. is refluxed for 1 hr., the Et_2O distd. off until the soln. reaches 75° and refluxed for 5 hrs. The addn. compd. is decompd. with ice and HCl, extd. with Et_2O, and the ext. dried and distd. At 0.5–1 mm. and 185–7°, 24 g. IX is collected. Recrystd from EtOH, IX m. 62–3°. Its *sym-trinitrobenzenate* m. 91–2°. In a similar way *3,4-dihydro-1-(β-2'-tolylethyl)-phenanthrene* (X) is prepd. in 79% yield from VII, $b_{0.6-1}$ 190–5°, m. 57–8° after recrystn. from 95% EtOH; *trinitrobenzenate*, m. 101.5–2.5°. *3,4-Dihydro-1-(β-4'-tolylethyl)phenanthrene* (XI), prepd. from VIII, $b_{0.6-1}$ 200–5°, m. 79.5–81°; *picrate*, m. 101–2°. Dehydrogenation of IX by heating it with Pd charcoal (cf. Diels and Gaedke, *C. A.* **21**, 1649) at 300–20° gives a residue which is extd. with EtOH, the latter is concd. and the crude *1-phenethylphenanthrene* (XII) is dissolved in petr. ether and the soln. filtered through a 9-in. column of "hydralo." Recrystd. from MeOH, XII m. 86.5–9.5°. Its *trinitrobenzenate*, contg. 2 mols. $C_6H_3(NO_2)_3$, m. 149–51°. All attempts to cyclize XII by treatment with $AlCl_3$ in CS_2 have failed. Cyclization of IX with $AlCl_3$ in CS_2 yields 2.9 g. of a viscous oil, $b_{0.6-1}$ 205–15°. It solidifies after standing for several weeks without crystg. It is dehydrogenated with Pd charcoal at 300–400°, the residue first extd. with Et_2O, then with $CHCl_3$, the $CHCl_3$ ext. evapd., the residue extd. again with Et_2O and the insol. residue sublimed at 270–90°. Recrystn. from hot $CHCl_3$ gives I in 1% yield, m. 367–8.5°. Cyclization of X in the same way with $AlCl_3$ yields 7.5 g. of an oil, $b_{0.5-1}$ 205–10°, d_{20}^{20} 1.097, n_D^{20} 1.6440, which, when dehydrogenated with Pd charcoal at 380–400° and worked up as above, gives 230 mg. I, m. 367–9°. The Me group is split off in the cyclization process. Attempts to cyclize XI give an oil, $b_{0.6-1}$ 210–20°, from which on dehydrogenation no I can be isolated. F. E. Brauns

1,4-Dimesityl-2-phenyl 1,4-diketones. Robert E. Lutz and Charles J. Kibler. *J. Am. Chem. Soc.* **61**, 3010–12 (1939). The following series of compds. has been made in order to study the effect of terminal mesityl groups on the reactions of the satd. and unsatd. 1,4-diketone systems and on the ease of furan ring closure and ring fission. 1,4-Dimesityl-2-phenyl-1,4-butanedione (I) did not yield *2,5-dimesityl-3-phenylfuran* (II) by the usual procedure using Ac_2O and H_2SO_4; however 0.2 g. I and 1 cc. HI (d. 1.7), heated 1 hr. at 145–50°, gave 74% of II, and 1 g. I in 25 cc. AcOH and 1 cc. H_2O, refluxed gently and HCl passed through for 30 hrs., gave 0.87 g. of II, m. 154–5.5° (all m. ps. cor.); the 2-Ph group in I definitely facilitates furan ring closure as do the 2-Ph and 2-mesityl groups when substituted in CH_2Bz_2. II could not be oxidized with HNO_3 in AcOH; the product is the *4(?)-NO_2 deriv.*, m. 164–5°. Ditrimethylbenzoyl)ethylene and 3 equivs. of PhMgBr, refluxed for a few min., cooled to 0° and added slowly to I in Et_2O at 0–10°, gave 46% of *1,4-dimesityl-2-phenyl-2-butene-1,4-dione* (III), $C_9H_{11}COCH\ CPhCO\text{-}C_9H_{11}$, pale yellow, m. 109–10°; I may be substituted by quinone; reduction with Zn in AcOH gives I. III does not react with Ac_2O and H_2SO_4 at 50° and at higher temps. gives intractable resins; AcCl gives similar results but at 0–25°. C. J. West

1,4-Diphenyl-2-mesityl 1,4-diketones. Robert E. Lutz and Charles J. Kibler. *J. Am. Chem. Soc.* **61**, 3007–10 (1939). —The prepn. of this series of compds. was undertaken in order to study the effect of reactions of a mesityl group substituted directly at the ethylene linkage of the unsatd. 1,4-diketone system and to det. the effect of this group on the tautomerism of the corresponding triketone enol and hydroxyfuranone. $(CHBz)_2$ and $Me_3C_6H_2MgBr$ in Et_2O give 56% of *2,5-diphenyl-3-mesitylfuran* (I), m. 157.5–8°; there was no indication of the expected ketone, $BzCH_2CH(C_9H_{11})Bz$. The mesityl group not only offers no hindrance to furanization but actually facilitates the

reaction considerably. I reacts with PCl_5 on heating at 100° for 1 hr. or at 120° for 5 min., the product on hydrolysis giving largely I with some III; PBr_5 at room temp. gives a red oil, which yields 64% of IV on hydrolysis. I and HNO_3 in AcOH at 10° for 1 hr. give 90% of *cis-1,4-diphenyl-2-methyl-2-butene-1,4-dione* (*dibenzoylmesitylethylene*) (II), m. 98.5–9.5°. II is easily reduced by Zn in AcOH, $Na_2S_2O_4$ and catalytically, giving I. II and dry HCl in AcOH at room temp. gives 77% of the *4-Cl deriv.* (III) of I, m. 102.5–3.5°; with HNO_3 in AcOH at room temp. there results the *3-Cl deriv.* of II, m. 127.5–8°; reduction gives I. II and HBr in AcOH give 65% of the *4-Br deriv.* (IV) of I, m. 126–7°; this also results from II and PBr_5 at 0°; oxidation with HNO_3 gives the *3-Br deriv.* of II, m. 103–4.5°. II and Ac_2O-H_2SO_4 give 70% of the *4-AcO deriv.* of I, m. 124.5–6.5°. C. J. West

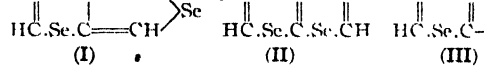
Reaction of tetrahydrofuran and 2,5-dimethyltetrahydrofuran with acyl halides. John B. Cloke and Frederick J. Pilgrim. *J. Am. Chem. Soc.* **61**, 2667–9(1939).—Tetrahydrofuran (I) and AcCl, boiled 12 hrs. and the recovered mixt. boiled an addnl. 12 hrs. (repeated twice), give 42.5% of $AcO(CH_2)_4Cl$ (II), a *compd.* $AcO(CH_2)_4O(CH_2)_4Cl$(?), b_{24} 165–7°, d_4^{20} 1.0471, n_D^{20} 1.44474, and a *compd.* $AcO(CH_2)_4O(CH_2)_4O(CH_2)_4Cl$(?), b_{10} 175–8°. I (50 g.) and 65 g. AcCl with 10 mg. $ZnCl_2$, refluxed 1.5 hrs., give 76% II; shorter refluxing or the use of more $ZnCl_2$ decreased the yield; $AlCl_3$ is not a suitable catalyst. I and EtCOCl with $ZnCl_2$ give 73% of *δ-chlorobutyl propionate*, b_{15} 93.5–4.5°, b_{20} 101.5–2.5°, d_4^{20} 1.0537, n_D^{20} 1.43640; PrCOCl gives 62% (heating 1.5 hrs.) of the *butyrate*, b_{15} 105.5–6.5°, b_{20} 112.5–13.5°, d_4^{20} 1.0302, n_D^{20} 1.43791; BzCl gives 54.5% of the *benzoate*, b_4 140–2°, d_4^{20} 1.1429, n_D^{20} 1.52028. I and AcBr did not give pure $AcO(CH_2)_4Br$; BzBr gives 76% of $BzO(CH_2)_4Br$, b_9 155–7°, d_4^{20} 1.3539, n_D^{20} 1.53694. The 2,5-di Me deriv. of I and AcCl give 77% of *α-methyl-δ-chloroamyl acetate*, b_{15} 85.5–7°, b_{20} 94–5°, d_4^{20} 1.0132, n_D^{20} 1.43288; AcBr did not give a pure Br analog. II (60 g.), 120 cc. MeOH and 0.7 cc. coned. HCl, heated at 40° for 3.5 days, give 80% of $Cl(CH_2)_4OH$. C. J. West

The cyclic acetals of furfural. Einar J. Salmi and I. J. Jansson. *Suomen Kemistilehti* **12B**, 28–30(1939)(in German); cf. *C. A.* **32**, 9051[3]. The following acetals of furfural were prepd. in C_6H_6 soln. with *p*-$MeC_6H_4SO_3H$ as a catalyst (the values after the b. p. refer to d_4^{20} and *n* at 20° for α, D, and β): *ethylene acetal*, $C_7H_8O_2$ (70% yield), b_{16} 91.0–3.0°, 1.1941, 1.48212, 1.48544 and 1.49385; *trimethylene acetal*, $C_8H_{10}O_2$ (yield practically quant.), b_{15} 111.8–16.5°, 1.1678, 1.48852, 1.49192 and 1.49987; *propylene 1,2-acetal*, $C_8H_{10}O_2$ (78% yield), b_{19-21} 97–9°, 1.1414, 1.47347, 1.47674 and 1.48495; and *butylene 1,3-acetal*, $C_9H_{12}O_2$ (yield practically quant.), b_{18-20} 121.5–2.5°, 1.1188, 1.48119, 1.48464 and 1.49230. S. A. Karjala

Secondary α-furfurylamines. J. E. Zanetti and J. T. Bashour. *J. Am. Chem. Soc.* **61**, 3133–4(1939).—Furfuryl bromide (*C. A.* **33**, 7779[1]) in Et_2O, added to an amine standing over crushed KOH, gives 50–65% yields, assuming the yield of the bromide to be 70% of the theory. *α-Furfurylmethylamine*, b_{761} 149–9.5°, d_{25}^{25} 0.992, n^{20} 1.4729 (HCl salt, m. 144–6°); *α-furfurylethylamine*, b_{761} 165–7°, d_{25}^{25} 0.963, n^{20} 1.4688 (HCl salt, m. 127–8°); *α-furfurylbutylamine*, b_{768} 198–200°, d_{25}^{25} 0.935, n^{20} 1.4669 (*HCl salt*, m. 189–91°); *α-furfurylamylamine*, b_{755} 214–16°, d_{25}^{25} 0.927, n^{20} 1.4668 (*HCl salt*, m. 185–8°); *α-furfurylphenylamine*, $b_{0.5}$ 109–10°, d_{25}^{25} 1.110, n^{20} 1.5834 (*HCl salt*, m. 150–1° (decompn.)). The aliphatic amines form picrates. C. J. West

Preparation of 2,5-dimethylpyrrole from the corresponding monocarboxylic ester. N. M. Timoshevskaya. *J. Gen. Chem.* (U. S. S. R.) **9**, 766(1939).—2,5-Dimethylpyrrole (I) has been obtained by heating 2,5-dimethylpyrrolecarboxylic ester with an excess of slightly moist soda lime in the presence of a small amt. of ether. A temp. of 80–90° is kept for 10–15 min.; it is then raised until distn. of H_2O starts. The distillate contains I in the form of an emulsion. Most of the distn. is carried out at 100–20°. The end temp. is 135–40°. I is extd. by means of ether, the ether ext. is washed with H_2O, dried over $CaCl_2$, the ether is evapd. and the residue is distd. *in vacuo*. I, b_{25} 78°, is obtained in 60–70% yield. In the same way, 2,4-dimethylpyrrole (yield 35%) has been prepd. from 2,4-dimethyl-3,5-pyrroledicarboxylic ester and 1,2,5-trimethylpyrrole (yield 20%) from 1,2,5-trimethylpyrrolecarboxylic ester. G. Berend

Dipole moment and structure of the isomeric selenophthenes. Bun-iti Tamamusi, Hazime Akiyama and Sumio Umezawa. *Bull. Chem. Soc. Japan* **14**, 318–22 (1939); cf. *C. A.* **33**, 9064[8].—Three isomeric selenophthenes, (I), (II) and (III), were obtained from the residue remaining after distn. of the selenophene from the crude product formed by the action of C_2H_2 on Se. I, which crystallizes from the residue after standing approx. 1 month, m. 123–4.5°, μ 1.07 × 10^{-18}; picrate, m. 163–5°; tetra-Br deriv., m. 246–7.5° (cor.). II, obtained by steam distn. of the filtrate from I, is an oil, b_{14} 93°, d_4^{25} 1.9354, n_D^{25} 1.6586, μ 1.52 × 10^{-18}; tetra-Br deriv., m. 271–2° (cor.); II does not form a picrate. III, which is not volatile with steam, m. 51–1.5°; picrate, m. 154–5.5°; tetra-Br deriv., m. 252.5–3° (cor.); $\mu \cong 0$. The structures of the isomers, as shown by dipole moment data, are as follows:



(I) (II) (III)

The dipole moment data are compared with those for the corresponding S compds. The values for mol. and sp. exaltation of II are −0.78 and −0.53, resp., differing in sign from the corresponding values for naphthalene and thionaphthene. George Ayers

Formation of 3-indoleacetic acid [from tryptophan] by ultraviolet irradiation. Albert Berthelot, Germaine Amoureux and Suzanne Deberque. *Compt. rend. soc. biol.* **131**, 1234–6(1939); cf. *C. A.* **32**, 4161[6]. That part of the spectrum between 220 and 234 mμ was most active in converting tryptophan to indoleacetic acid but some conversion was effected by wave lengths as long as 280 mμ. J. E. Gilson

Derivatives of coumaran. VI. Reduction of 2-acetobenzofuran and its derivatives. R. L. Shriner and John Anderson. *J. Am. Chem. Soc.* **61**, 2705–8(1939); cf. *C. A.* **33**, 8609[5].—2-Acetobenzofuran (I) and Br in CS_2 give 91% of the *ω-Br deriv.* (II), m. 90–1°; refluxing 25 g. of II with 50 g. $AcONa.3H_2O$ and 5 cc. of 6 *N* HCl in 500 cc. 50% EtOH for 1.5 hrs. gives 74% of the *ω-Ac deriv.* (III), yellow, m. 86–7°. Catalytic reduction of I with PtO_2 in EtOH at 2–3 atm. pressure for 6 hrs. gives a nearly quant. yield of 2-(1-hydroxyethyl)benzofuran (IV), b_{19} 147°, m. 41° (phenylurethan, m. 102–3°) (Stoermer and Shaffer, *Ber.* **36**, 2869, 2871(1903), give 37 and 126°, resp.). Catalytic reduction of IV or I with Raney Ni (14 and 36 hrs., resp.) gives 81 and 90% of 2-(1-hydroxyethyl)coumaran (V), b_{20} 145°, d_{25}^{25} 1.1138, n_D^{25} 1.5475 (phenylurethan, m. 115–16°; S. and S. give 73°). Hydrogenation in the presence of colloidal Pt gives a mixt. of 2-ethylbenzofuran and 2-ethylcoumaran, b_{19} 99–100°, and of IV and V, b_{19} 144–5°. This is further evidence that catalytic reduction of α,β-unsatd. ketones occurs by 1,2-addn. and not by 1,4-addn. as is the case on reduction by chem. means. Oxidation of V with CrO_3 in AcOH gives 2-acetocoumaran, whose semicarbazone m. 168–9°; this also results by Na-Hg reduction of I. III with PtO_2 in EtOH with H at 3 atm. pressure absorbs 1 mole equiv. of H in 10 min., giving I and AcOH; after 48 hrs. 1.8 mole equivs. of H are absorbed, giving a mixt. of I and its reduction products. III is not reduced in the presence of Raney Ni in cyclohexane and only slowly in EtOH at 2–3 atm. pressure. Na-Hg reduction of III in AcOH also results in a cleavage of the Ac group and the formation of a mixt. of the reduction products of I. It seemed possible that this cleavage reaction might be general for phenacyl esters but catalytic reduction of phenacyl acetate gives a good yield of *1-phenyl-2-acetoxy-*

ethanol, b_6 136–7°, d_{20}^{20} 1.1438, n_D^{20} 1.5260, and a very small quantity of PhMeCHOH and AcOH. C. J. West

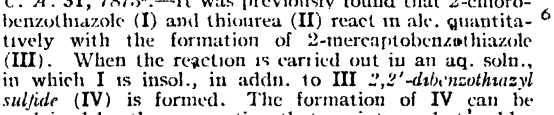
Color in relation to chemical constitution of the organic and inorganic salts of isonitrosopyrazolones and isoxazolones. Sikhibhushan Dutt and Ione Nitravati Dharam Dass. *Proc. Indian Acad. Sci.* **10A**, 55–64(1939).—Isonitroso-3-methylisoxazolone (I) and isonitroso-3-phenylisoxazolone (II) are almost colorless, dissolve to colorless solns. in H_2O and org. solvents, but I forms intense magenta and II intense-violet salts with org. and inorg. bases owing to a change from the oximino-ketonic to the nitroso-enolic structures, confirming Dutt's theory of color (cf. *C. A.* **21**, 3194) based on mol. strain. The color change is sufficiently sharp and intense to make I and II excellent indicators. The corresponding isonitroso-3-methyl- (III) and -3-phenylpyrazolone (IV), although of closely analogous molecular structure to I and II, can exist in the less-strained oximino-enolic configuration and thus yield less intensely colored salts than I and II. I, II, III and IV are prepd. by new methods in much higher and purer yields than heretofore. I, recryst'd. from Et_2O, m. 150°; II, recryst'd. from H_2O, m. 130° (instead of 120°); IV, from H_2O, m. 188°; and III, from acetoacetic ester heated under reflux with $N_2H_4.H_2O$ and a little EtOH, cooled, filtered and satd. with N_2O_3 (from $NaNO_2$ and H_2SO_4), crystd. from boiling H_2O (yield 85% of theory), m. 217° (instead of 130° reported by Curtius).

A. P. Sachs

Synthesis of the isoxazole nucleus from fulminic acid and substances with triple bonds. Adolfo Quilico and Giovanni Speroni. *Ricerca sci.* **10**, 170–1(1939).—Fulminic acid with C_2H_2 and Me_2CO in acid medium condensed to give α-isopropenylisoxazole (I). The constitution of I was detd. by oxidation with CrO_3 to α-carboxyisoxazole and with $KMnO_4$ to α-acetylisoxazole, from which by MeMgI a carbinol was prepd. This substance on dehydration with P_2O_5 gave I. A mechanism for the reaction is suggested. A preliminary report.

W. F. Bruce

Reactions in the thiazole series. II. The reaction of 2-chlorobenzothiazole with thiourea in aqueous media. Geo. W. Watt. *J. Org. Chem* **4**, 436–41(1939); cf. *C. A.* **31**, 7873.—It was previously found that 2-chlorobenzothiazole (I) and thiourea (II) react in alc. quantitatively with the formation of 2-mercaptobenzothiazole (III). When the reaction is carried out in an aq. soln., in which I is insol., in addn. to III *2,2'-dibenzothiazyl sulfide* (IV) is formed. The formation of IV can be explained by the assumption that an intermediate addn. compd. (V) is formed which reacts with the 2nd mol. of I.



(V) (IV)

When 17 g. I and 7.6 g. II in 50 cc. H_2O are stirred for 80 hrs. and the white ppt. is washed with H_2O and 10% NaOH, 5.83 g. IV, m. 98.7–99.1° (cor.), is formed. From the alk. washing after extn. with Et_2O and acidification, 0.55 g. III, m. 179.2–80° (cor.), is isolated. By changing the exptl. conditions, such as concn., time, temp. and the nature of the reaction medium, it is possible to direct the reaction in such a way that either III or IV predominates. The variation of these conditions is studied in detail. When the reaction is carried out in liquid NH_3 at −33.5° or at room temp. in the presence or absence of NH_4Br, no I or II is formed. It has been shown that the formation of IV is dependent upon the formation and ionization of the intermediate addn. compd. F. E. Brauns

Synthesis of 4-methyl-5-hydroxyethylthiazole and its homologs. A. G. Pesina. *J. Gen. Chem.* (U. S. S. R.) **9**, 804–13(1939).—$AcCH_2CH_2CH_2OH$ (28 g.) in 140 ml. H_2O was treated dropwise with 43.8 g. Br at room temp. while stirring for 2–3 hrs. The aq. reaction layer was extd. with Et_2O, the ext. dried over Na_2SO_4, the Et_2O distd. off and $AcCHBrCH_2CH_2OH$ (I) obtained in 49.7% yield. I is unstable and decomps. on keeping. $HCSNH_2$ (II) was obtained from $HCONH_2$ and P_2S_5 in 36% yield as oil which crystallizes after purification, m. 28–9° (yield 16–18%). $MeCSNH_2$ (III), m. 106–8°, was prepd. by heating a mixt. of 5 moles $AcNH_2$ and 1 mole P_2S_5 with 4–5 parts benzene on a water bath for 5–10 min. The benzene layer is decanted and the residue extd. again with boiling benzene. This process is repeated until the benzene ext. is colorless. Yield 35–40%. $EtCSNH_2$ (IV), m. 41–3°, from $EtCONH_2$ and P_2S_5 in 5–6% yield. $PrCSNH_2$ (V), from 14 g. $PrCONH_2$ and 7.2 g. P_2S_5 in 50 ml. benzene on heating on a water bath for 30 min. Crude I (22 g.) and 9.5 g. crude II in 7 ml. alc. are kept overnight at room temp., then heated for 1 hr. on a water bath, after which time 40–50 ml. H_2O is added. The mixt. is extd. with a little Et_2O, then 35 g. KOH is added and 4-methyl-5-hydroxyethylthiazole (VI), b_{5-6} 116–17°, d_4^{24} 1.1890, n_D^{24} 1.5420, is extd. with Et_2O. Yield, 28–30%. Picrate, m. 160–2°; picrolonate, m. 179°. To a soln. of 11.6 g. Na in 50 ml. abs. alc. are added within 1 hr. 65 g. $AcCH_2CO_2Et$ and 100 g. $BrCH_2CH_2Br$ and the mixt. is warmed for 10 hrs. while stirring continuously. The mixt. is neutralized with alc. HCl. The NaBr is pptd. with 350–400 ml. abs. Et_2O and filtered off. The filtrate is evapd. *in vacuo* at 28–30°. $AcCH(CH_2CH_2Br)CO_2Et$ (VII), b_{5-6} 67–75°, d_4^{22} 1.0899, is obtained in 39.6% yield. VII (20 g.) is shaken with 13 g. SO_2Cl_2 at 0° for 40 min. Shaking is continued until a temp. of 20–5° is reached. Then 50 ml. Et_2O is added and the mixt. is heated until the evolution of SO_2 and HCl ceases. The Et_2O is distd. off and the residue distd. *in vacuo* to give $AcCCl(CH_2CH_2Br)CO_2Et$ (VIII), b_{7-9} 119–23°, in 79.8% yield. To 18 g. VIII is added a mixt. of 36 ml. glacial AcOH and 36 ml. 15% H_2SO_4 and the whole boiled for 4 hrs. An equal amt. of water is added to the reaction mixt. which is then extd. repeatedly with Et_2O. $AcCHClCH_2CH_2OH$ (IX), b_{6-9} 90–103°, d_4^{28} 1.1921, n_D^{25} 1.4605, is obtained in 20.7% yield. Crude II (1.8 g.) is caused to react with 2.8 g. IX, first at room temp., then on the water bath, and H_2O is added to the mixt. which is extd. with Et_2O. The aq. layer to which 3 g. KOH is added is extd. with Et_2O whereby VI is obtained in 4.6–5.1% yield. VI is also obtained in 2.3% yield from $AcCHNaCO_2Et$ + $BrCH_2CH_2OH$ → $AcCH(CH_2CH_2OH)CO_2Et$ + SO_2Cl_2 → $AcCCl(CH_2CH_2OH)CO_2Et$ + H_2SO_4 + AcOH → $AcCHClCH_2CH_2OH$ + II → VI. To 11.2 g. I is added 6 g. III in 25 ml. abs. alc. while cooling. The mixt. is heated on a water bath, 30 ml. H_2O is added, the mixt. is extd. with Et_2O, 20 g. KOH is added to the aq. layer which is then extd. with Et_2O. 2,4-Dimethyl-5-hydroxyethylthiazole, b_{7-8} 130–1°, d_4^{20} 1.150, n_D^{20} 1.5325, is obtained in 11.2% yield. It is easily sol. in H_2O, alc., Et_2O and gives a picrolonate, m. 139–40°. 4-Methyl-2-ethyl-5-hydroxyethylthiazole, b_{8-9} 133–6°, d_4^{24} 1.102, n_D^{24} 1.5220, is obtained from 5.2 g. I and 3.4 g. IV. It is easily sol. in alc. and Et_2O, slightly sol. in H_2O, and yields a picrolonate, m. 149–51°. 4-Methyl-2-propyl-5-hydroxyethylthiazole, b_{8-9} 140–2°, is obtained from 6.4 g. I and 4.6 g. V. $AcCH_2CH_2OH$, prepd. according to Ger. pat. 223,207, b_{15-6} 90–3°, d_4^{24} 1.1089, n_D^{24} 1.4585, in aq. soln. on treatment with Br gives $AcCHBrCH_2OH$ (X), unstable oil, d_4^{22} 1.66, n_D^{25} 1.505, in 23.7% yield. X (0.9 g.) and 0.65 g. II yield 4-methyl-5-hydroxymethylthiazole, liquid, n_D^{25} 1.5435, in 7.2% yield. It is easily sol. in H_2O, alc. and Et_2O and gives a picrolonate, m. 196–7°, insol. in alc. and $CHCl_3$.

Gertrude Berend

Dihydro-1,4-pyrans. VI. Opening and closing the ring. R. C. Fuson, R. E. Christ, and C. K. Bradsher. *J. Org. Chem.* **4**, 401–9(1939); cf. *C. A.* **31**, 6869.—Dihydro-1,4-pyrans (I), $ArC{:}C(CN).CH_2.CH_2CH(COAr).O$, may behave as vinyl ethers and the opening of the ring by acids should offer no difficulty. Derivs. of I in which Ar = Ph, *p*-MeC_6H_4 or *p*-$MeOC_6H_4$ have, however, proved refractory and *2-mesityl-5,6-dihydro-1,4-pyran-6-carboxylic acid* (II) is found to be a more tractable type of I having properties similar to those of I; but II

also can undergo ring opening when heated with MeOH and H_2SO_4, while on heating the open-chain *α-hydroxy-(2,4,6-trimethylbenzoyl)valeric acid* (III) is cyclized again. III is prepd. by addn. of 1.7 g. 2,3,6-$Me_3C_6H_2COCl$ to a mixt. of 0.23 g. Na in 10 cc. abs. EtOH, 50 cc. dry Et_2O and 3.26 g. Et α-hydroxysorbate (IV). The *Et α-hydroxy-δ-(2,4,6-trimethylbenzoyl)sorbate* (V) is obtained in 2.7-g. yield and m. 109°. V (23 g.) in 100 cc. EtOH is hydrogenated in the presence of 1 g. Raney Ni at 40-lb. pressure for 5 hrs. The solns. from 3 hydrogenation expts. are combined and concd. and the residual oil is refluxed for 12 hrs. with 700 cc. 10% Na_2CO_3 soln. and the cooled mixt. extd. with Et_2O. After acidification of the aq. soln., II is extd. with Et_2O, dried, evapd. and the residue distd. at 20 mm. in 44% yield, m. 149–50°. II cannot be hydrogenated either with Ni, Pd or Pt at 70° or by means of Na-Hg. Reduction of II with red P and HI yields adipic acid. Alk. H_2O_2 has no effect on II. O_3 or dil. HNO_3 with II gives 2,4,6-$Me_3C_6H_2CO_2H$, m. 152°. Bromination of II in CCl_4 yields a *mono-Br acid*, m. 139°. Nitration of II in H_2SO_4 forms *2-(3,5-dinitromesityl)-3-nitro-5,6-dihydroxy-1,4-pyran-6-carboxylic acid*, m. 250° (decompn.), which contains some H_2O of hydration which is removed by repeated crystn. from C_6H_6; it then m. 255° while its *Me ester* (VI) m. 162–3°. Esterification of II by refluxing 10 g. with 200 cc. MeOH and 7 cc. concd. H_2SO_4 gives 6.5 g. *Me α-hydroxy-δ-(2,4,6-trimethylbenzoyl)valerate* (VII), m. 43–4°. VII can be distd. unchanged under reduced pressure. III with α-naphthyl isocyanate gives a *urethan*, m. 145–6°. Oxidation of the Me ester (VIII) of III with alk. $KMnO_4$ followed by nitration with HNO_3 and H_2SO_4 gives 2,4,6,3,5-$Me_3(O_2N)_2C_6CO_2H$, m. 230 1°, while with fuming HNO_3, 2,4,6,3-$Me_3(O_2N)$ C_6CO_2H, m. 181–2°, is formed. Nitration of VIII with HNO_3 and H_2SO_4 yields VI. Treatment of VIII with PhMgBr gives a condensation product, m. 134–5°. With liquid NH_3 the *amide* of III, m. 111.5–12.5°, is formed. Hydrogenation of V by means of Adams' catalyst (cf. *C. A.* **22**, 1715) in acid abs. EtOH yields 10–15% II and an oil. The latter is dissolved in Na_2CO_3, the soln. faintly acidified with HCl and refluxed with *p*-phenylphenacyl bromide in EtOH for 1 hr. Addn. of H_2O ppts. the *p-phenylphenacyl δ-(2,4,6-trimethylbenzoyl)valerate*, m. 79°. In another hydrogenation expt. the residual product is fractionally distd. and the highest-boiling fraction sapond. separately with 10% KOH. From the acidified mixt. a *keto acid* is obtained which must be $Me_3C_6H_2CH(OH)(CH_2)_3COCO_2H$, m. 81°, since an ε-keto group cannot form a phenylhydrazone owing to steric hindrance. Its *phenylhydrazone* m. 103–4°. *δ-(2,4,6-Trimethylbenzoyl)valeric acid* (IX) is prepd. by slow addn. of a soln. of adipic anhydride, from 70 g. acid, to a mixt. of 150 g. $AlCl_3$, 350 cc. $PhNO_2$, 200 cc. CS_2 and 140 cc. mesitylene at 10° and stirring the mixt. for 14 hrs. at room temp. After decompn. with ice and steam distn. the residual oil is taken up in Et_2O and washed with HCl and 5% KOH. Acidification of the alk. soln. gives 35 g. IX, m. 60°. From the Et_2O soln. on evapn., 18 g. *1,4-di-(2,4,6-trimethylbenzoyl)butane*, m. 106° (cf. Kao, *C. A.* **29**, 4756[3]), is isolated. Bromination of IX yields *δ-bromo-δ-(2,4,6-trimethylbenzoyl)valeric acid*, m. 90–2°, which on oxidation with $KMnO_4$ gives succinic acid, m. 182°, and mesitylglyoxylic acid, m. 117°. F. E. Brauns

The chemistry of vitamin E. XIII. Specificity and relationship between chemical structure and vitamin E activity. H. M. Evans, O. H. Emerson, G. A. Emerson, Lee Irvin Smith, H. E. Ungnade, W. W. Prichard, F. L. Austin, H. H. Hoehn, J. W. Opie and S. Wawzonek. *J. Org. Chem.* **4**, 376–88(1939); cf. *C. A.* **33**, 7791[6].—The compds. so far tested for vitamin E activity are listed in a table grouped in classes as follows: chromans including tocopherols, coumarans, coumarins, coumarones, *o*-allylic phenols, quinones and hydroquinones, alcs. and ethers of phenols and hydroquinones. From a comparison of these compds. it seems that the probable requirements to show vitamin E activity are: a certain structural element must be present with the function of a ready conversion of a substance into an oxidation-reduction system with a potential within certain limits; further accessory groups of such a nature must be present that the compd. has the proper fat soly. so it can be absorbed and transported to the place where it is to be used; and it must be assumed that the organism can carry out the necessary biol. transformations such as cleavages, hydrolyses, dehydrations, hydrations, dehydrogenations and reductions (cf. John and coworkers, *C. A.* **33**, 1731[1]). Expts. for the detn. of the surface tension and parachors and a polarographic investigation of the potentials involved when these compds. are oxidized are under way. XIV. **Absorption spectra of tocopherols, chromans, coumarans, and related compounds.** T. J. Webb, Lee Irvin Smith, W. A. Bastedo, Jr., Herbert E. Ungnade, W. W. Prichard, Harvey H. Hoehn, S. Wawzonek, J. W. Opie and F. L. Austin. *Ibid.* 389–96.—After a review of the previous work on the ultraviolet absorption spectra of vitamin E compds., the absorption spectra of 15 compds. including the tocopherols, chromans and coumarans are given and the relationship between their structure and the vitamin E activity is discussed. XV. **An extension of the analytical method of Furter and Meyer.** Herbert E. Ungnade and Lee I. Smith. *Ibid.* 397–400.—The colorimetric method of Furter and Meyer (*C. A.* **33**, 4612[9]) for the detn. of tocopherols has been extended to a no. of simpler chromans and coumarans. The results are given in a table and a no. of curves. From these it appears that the method is specific not only for all of the tocopherols but also for 6-hydroxychromans in general. By means of this method it seems possible to distinguish clearly between 6-hydroxychromans and 5-hydroxycoumarans. F. E. Brauns

Chemistry of vitamin E. XVIII. Condensation of phenols and hydroquinones with allylic alcohols, allylic halides and conjugated dienes. Lee Irvin Smith, Herbert F. Ungnade, J. R. Stevens and C. C. Christman. *J. Am. Chem. Soc.* **61**, 2615–18(1939); cf. *C. A.* **33**, 8613[9].—Claisen (German pat. 394,797(1924)) has reported that allylic carbinols, as well as appropriate diols which give dienes when catalytically dehydrated, condense with phenols to give chromans. G. implied that when the carbinols and diols condensed with phenols, the 1st step involved formation of the diene which then condensed with the phenol. Trimethylhydroquinone (I), CH_2:CH-CH_2OH and $ZnCl_2$ in C_6H_6, heated 3.5 hrs. at 200°, give 2,1,6,7-tetramethyl-5-hydroxycoumarone. I and Me-CH(OH)CH:CH_2 (3 hrs. at 200°) give the *2,3,4,6,7-tetra-Me analog* (II), m. 119.5–20.5°; it gives a greenish yellow color with cold concd. H_2SO_4, changing to orange-yellow with $FeCl_3$; it reduces alc. $AgNO_3$ slowly. In order to reach a decision as to whether the diene was an intermediate, I was condensed with EtCH(OH)CH CH_2 (III) and with MeCH CHCH CH_2 (IV); the products should be the same if the diene (IV) is an intermediate. This is not the case. III gives *2,4,6,7-tetramethyl-3-ethyl-5-hydroxycoumaran*, m. 88–9°; it gives a red color with alc. HNO_3 and a bright greenish yellow color with cold concd. H_2SO_4. IV gives *2,5,7,8-tetramethyl-2-isohexyl-6-hydroxychroman(?)*, b_{10-4} 110–15°; it gives a yellow color with concd. H_2SO_4. *m*-Xylohydroquinone (V) and CH_2 $CHCH_2OH$ give an oil, which was not purified, but is considered to be mostly 2,4,6-trimethyl-7-allyl-5-hydroxycoumaran (VI). The synthesis of α-tocopherol from I and phytol by an improved method is also described. I and 1,3-pentadiene with $ZnCl_2$ and H_2SO_4 in AcOH (refluxed 1 hr.) give *2-ethyl-5,7,8-trimethyl-6-hydroxychroman*, m. 115–16°, and giving a yellow color with concd. H_2SO_4. A mechanism is proposed for these condensations which, though not proven, correlates the facts well. CH_2:$CHCH_2Cl$ reacts with I under the same conditions as the bromide and gives the same product. Crotyl chloride gives a mixt. consisting predominantly of II (explained by an isomerization of the halide); it also reacts with I in C_6H_6 ($ZnCl_2$ as catalyst) at atm. pressure and in an inert atm. V and CH_2:$CHCH_2Br$ give VI. XIX. **Alkenylation of phenol with 4-chloro- and 4-bromo-2-hexene; rearrangement of the phenyl ether.** Lee Irvin Smith, Herbert E. Ungnade, Walter M. Lauer and Robert M. Leekley. *Ibid.* 3079–83.—Hurd

and Cohen (*C. A.* **25**, 2982) obtained PhOCHEtCH: CHMe (I) from PhOH and 4-chloro-2-hexene (II) with K_2CO_3 in Me_2CO. Repetition of the work showed that the product is a mixt. of I with mono- (III) and dialkylphenols (IV). PhOH (183 g.) and 229 g. II give after 8 hrs. 60 g. I, 45 g. III and 48 g. IV; 94 g. PhOH and 111 g. II after 24 hrs. give 47 g. I, 22 g. III and 5 g. IV. III was extd. by aq. alkali and IV by Claisen's alkali. I undergoes rearrangement at a measurable rate at 100° (0.88% in 24 hrs.); at 120° in 24 hrs. 9.6% is rearranged. I b_{10-9} 34.5–5.5°, b_{18} 116–20°, n_D^{20} 1.5059. III b_{10} 135–7°, n_D^{20} 1.5296; IV b_{11} 175–9°, n_D^{20} 1.5224. Refluxing III with C_5H_5N.HCl for 60 min. causes cyclization; the product b_{10} 106–8°, n_D^{20} 1.5225, and is insol. in alkali. Action of O_2 on III and IV showed the products to be mixts. With $BrCH_2CO_2Et$ III yields a mixt. of *o*- and *p*-(*α-ethylcrotyl*)-*phenoxyacetic acids*, m. 110–10.5° and 92.5–6°, resp., sepd. by about 30 crystns. alternately from petr. ether and aq. AcOH. Reduction yields *o*- and *p*-(3-hexyl)phenoxyacetic acids (V and VI), m. 75–6° and 82–3°, the structures of which follow from their syntheses: *o*-$MeOC_6H_4MgBr$ and 3-hexanone give a carbinol which, distd. with H_2SO_4, gives a mixt. of *o-hexenylanisoles*, b_{14} 120.5°; catalytic reduction yields *o-3-hexylanisole*, b_9 104–5°, n_D^{20} 1.4975, d_{20}^{20} 0.9242; refluxing with HI in AcOH-Ac_2O for 2 hrs. gives *o-3-hexylphenol*, b_{10} 109–11°, n_D^{20} 1.5223; $BrCH_2CO_2Et$ gives V. *p-Hexenylanisoles*, b_{15} 125–30°, n_D^{20} 1.5223; *p-3-hexylanisole*, b_{15} 125–5.5°, n_D^{20} 1.4988; *p-3-hexylphenol*, b_{14} 134–45°; with $BrCH_2CO_2Et$ this yields VI. IV (2,6-diallylated phenols) showed vitamin E activity in 50-mg. doses; I, II and the cyclized products from II were inactive. C. J. West

Coloring matters in soybean. I. Isolation of four kinds of isoflavone from soybean. Kozi Okano and Iwao Beppu. *J. Agr. Chem. Soc. Japan* **15**, 645–52, *Bull. Agr. Chem. Soc. Japan* **15**, 110(1939)(in English).—Lecithin was removed from the alc. ext. by the addn. of NaCl, and then a crude saponin was pptd. with acid from the filtrate. The crude saponin was dissolved in alc. and pptd. with Pb acetate. The Pb was removed from the filtrate and a mixt. of EtOH and ether was added to the soln. Yellow needles (IV), m. 265°, were isolated from the insol. part. Colorless needles (I), m. 318°, faintly yellow needles (II), m. 298°, and faintly yellow lustrous needles (III), m. 255°, were obtained from the sol. part. I was insol. in H_2O, C_6H_6 and ether, difficultly sol. in alc., sol. in MeOH. The $FeCl_3$ reaction was yellowish brown. The formula $C_{16}H_{12}O_6$ is given. I is named *latorin*. Di-Ac deriv., colorless needles, m. 185°. Mono-Me ether, yellowish needles, m. 160–3°; di-Me ether, colorless needles, m. 165°. Cresorcinol, HCO_2H and *p*-hydroxyphenylacetic acid were isolated by heating I with 5% KOH for 15 min. 1-Methyl-2-hydroxy-4-methoxybenzene, m. 63°, and 4-methoxyphenylacetic acid, m. 85°, were isolated from the di-Me ether of I by alkali fusion. I may be 8-methyl-5,4′-dihydroxyisoflavone. II was insol. in H_2O, ether and C_6H_6 and sol. in EtOH, MeOH and alkali. The $FeCl_3$ reaction was violet or violet-brown. The formula $C_{16}H_{12}O_6$ is given. II is called *methylgenistein*. Tri-Ac deriv., m. 184°; di-Me ether, m. 125–31°; tri-Me ether, m. 154.5°. Methylphloroglucinol, m. 214°, HCO_2H and *p*-hydroxyphenylacetic acid were isolated from the products of decompn. of II by alkali. 1-Methyl-2-hydroxy-4,6-dimethoxybenzene, m. 60°, and 4-methoxyphenylacetic acid, m. 85°, were isolated from the tri-Me ether of II by alkali fusion. II may be 8-methyl-5,7,4′-trihydroxyisoflavone. III was sol. in alc. The $FeCl_3$ reaction was reddish violet. The formula $C_{22}H_{22}O_{10}$ is given. III is named *methylisogenistin*. It was hydrolyzed to glucose and an aglucone, m. 301–2°. The formula $C_{16}H_{12}O_5$ is given for the aglucone. The $FeCl_3$ reaction was violet-red. Ac deriv., m. 188°; di-Me ether, m. 242°; tri-Me ether, m. 152–3°. Methylphloroglucinol, HCO_2H and *o*-hydroxyphenylacetic acid, m. 144°, were isolated by the decompn. of the aglucone with KOH. The aglucone may be 8-methyl-5,7,2′-trihydroxyisoflavone, an isomer of II. IV was insol. in H_2O, difficultly sol. in hot H_2O. The $FeCl_3$ reaction was red or reddish purple. The formula $C_{21}H_{20}O_{10}$ is given. IV is named *isogenistin*. It was hydrolyzed into glucose and an aglucone, m. 302°. The aglucone is named *isogenistein*. It formed faintly yellowish needles sol. in EtOH and MeOH, and insol. in H_2O. The $FeCl_3$ reaction was violet. The formula $C_{15}H_{10}O_5$ is given. Tri-Ac deriv., colorless needles, m. 189°; di-Me ether, colorless needles, m. 120–5°. Phloroglucinol, HCO_2H and *o*-hydroxyphenylacetic acid were isolated from the decompn. product of isogenistein by KOH fusion. Isogenistein may be 5,7,2′-trihydroxyisoflavone, an isomer of genistein. Y. Kihara

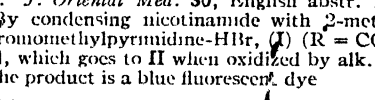
Osage-orange pigments. II. Isolation of a new pigment, pomiferin. M. L. Wolfrom, F. L. Benton, A. S. Gregory, W. W. Hess, J. E. Mahan and P. W. Morgan. *J. Am. Chem. Soc.* **61**, 2832–6(1939); cf. *C. A.* **32**, 3408⁸.—The dried meal of the fruit of the osage-orange tree (*Maclura pomifera* Raf.) was extd. with petr. ether and Et_2O and the Et_2O-sol. material was recrystd. repeatedly from xylene, giving *pomiferin* (I), yellow, $C_{25}H_{24}O_6$, m. 200.5°; the mother liquor gives osajiin (II), $C_{25}H_{24}O_6$, m. 189°. Both I and II give only a yellow color with pyroboroacetate in Ac_2O and with EtOH-Ni$(OAc)_2$. I or II in Et_2O in a CH_4 atm. with 10% NaOH gives an aq. layer with a greenish yellow color of alk. II; CO_2 regenerates the yellow color of II. II gives a *mono-p-toluenesulfonate*, golden yellow, m. 152°; it gives a green color with alc. $FeCl_3$. II (5 g.) in 75 cc. boiling AcOH, treated dropwise with 3 cc. concd. H_2SO_4 or concd. HCl and the soln. allowed to stand overnight, gives 4.66 g. of *isodosajin* (III), m. 285° (decompn.); $FeCl_3$ gives no color; it reduces Fehling soln. and in C_5H_5N Tollens reagent; it is sol. in warm 20% KOH to give a greenish yellow soln. from which acidification ppts. III; H_2SO_4 in AcOH gives a yellow color. I yields a *di-p-toluenesulfonate* (IV), m. 148° (the previously described deriv. of II). I and H_2SO_4 in AcOH give *isopomiferin* (V), m. 265°; $FeCl_3$ gives a green color; V reduces Fehling soln. and Tollens reagent. The isomerism of IV gives the *di-p-toluenesulfonate* (VI) of V, m. 194°; $FeCl_3$ gives no color and the deriv. does not reduce Fehling soln. or Tollens reagent; it is unchanged by boiling with Ac_2O and AcONa for 2 hrs. VI also results from V and *p*-$MeC_6H_4SO_2Cl$ in C_5H_5N. I (1 g.) and 24 cc. Ac_2O in 12 cc. C_5H_5N, kept at 0° overnight, give 1 g. of the *diacetate* (VII), bright yellow, m. 134.5°; alc. $FeCl_3$ gives a green color; hydrolysis with NaOH at 0° gives I. Refluxing 1 g. I with 75 cc. Ac_2O and 6 g. AcONa for 3 hrs. gives 1.2 g. of I *triacetate*, m. 154°, which gives no color with alc. $FeCl_3$; this also results from VII. II, similarly treated, gives the previously described diacetate, m. 164°. I and Me_2SO_4 in MeOH-KOH at 0° give I *di-Me ether*, m. 132°; $FeCl_3$ gives a green color; AcOH-H_2SO_4 gives an orange color; refluxing with Ac_2O and AcONa for 3 hrs. gives the *di-Me acetate*, m. 128–9°. Methylation of I in boiling Me_2CO with Me_2SO_4-KOH gives the *tri-Me ether*, m. 139.5°. Absorption spectra are given for I, II, III and V; a single band spectrum was obtained for each compd. C. J. West

Pyridine series. I. An improved synthesis of 2,3 dimethylpyridine and the conversion of the latter into an analog of thiamine. J. Finkelstein and R. C. Elderfield. *J. Org. Chem.* **4**, 365–75(1939).—According to Erlenmeyer, Berger and Leo (*C. A.* **27**, 4842) a bivalent S atom contains a shell of orbit electrons similar to that of the "pseudo-atom" $-CH{:}CH-$ and this may explain the similarity of the phys. and chem. properties between members of the C_6H_6 and the thiophene series. When E.'s theory of isosterism is applied to vitamin B_1 or thiamine, the thiazole ring changes into a pyridine ring and a study of the physiol. properties of such a substance should be of interest. Its synthesis requires a method for the prepn. of 2,3-disubstituted pyridines. *2,3-Dimethylpyridine* (I) is synthesized and, by making use of the activity of the H atom in the Me in the 2-position, I is condensed with HCHO to *2-(2-hydroxyethyl)-3-picoline* which in turn is condensed with pyrimidine. Since the methods hitherto reported for the prepn. of I are unsatisfactory a new method has been developed. $BrCH_2CH_2CH_2OEt$ (400 g.) is condensed with Et sodio-*α*-methyl-

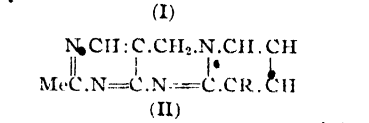
acetoacetate from 300 g. ester and 57.5 g. Na in dioxane soln. After the mixt. has been heated for 60 hrs. and the NaBr removed by centrifuging, the dioxane is distd. off and the residue fractionated *in vacuo*. The fraction b_{16} 111–3° is *Et α-methyl-α-(γ-ethoxypropyl)acetoacetate* (II). The yield is 200 g. The residue of this distn. gives 32 g. of a product, $b_{0.5}$ 128–30°, which is not further investigated. When this condensation is carried out in abs. EtOH soln., *Et α-methyl-δ-ethoxyvalerate* (III), b_{18} 96–7°, n_D^{25} 1.4168, is obtained (cf. Dieckmann, *Ann.* **317**, 27(1901); Vavon and Horeau, *C. A.* **30**, 2025). Sapon. of III gives *α-methyl-δ-ethoxyvaleric acid*, b_{11} 137–9°, n_D^{25} 1.4289. Hydrolysis of 33 g. II with 6.8 g. NaOH in 33 g. H_2O in a bomb under 1000 lb. H pressure at 250° for 8 hrs (cf Adkins and Connor, *C. A.* **26**, 4796) gives *3-methyl-6-ethoxyhexan-2-one* (IV), b_{17} 96–9°, in 75% yield. In addn. 5 g. of a product, b_{17} 111–3°, is obtained. When a soln. of 11 g. IV in 80 cc. AcOH is satd. at 0° with HBr, then heated for 2 hrs. on a steam bath and the mixt. poured after cooling on 300 cc. cracked ice, 6 g. *3-methyl-6-bromohexan-2-one* (V) is extd. with $CHCl_3$ and $b_{0.5}$ 70–4°. When 20 g. V is allowed to stand at room temp. in 200 cc. 10% abs. alc. NH_3 for 18 hrs. and the mixt. is then neutralized with HCl, salts crystallize on cooling and are then filtered off. The filtrate is concd. under reduced pressure and dissolved together with the salts in a sufficient amt. of H_2O. The soln. is made alk. and steam distd. The distillate is satd. with KOH and extd. with Et_2O, the Et_2O soln. is dried and the *2,3-dimethyltetrahydropyridine* (VI) is distd. and b. 151–7°. The yield is 7.5 g. In agreement with Sachs (*Ber.* **32**, 62(1899)) and Lipp and Wimmann (*C. A.* **9**, 1759) its picrate m. 151–5°. Dehydrogenation of VI by Zn distn. gives poor yields of I. The application of the dehydration method of Orekhov and Menshikov (*C. A.* **25**, 3847) by heating 2-picoline (VII) with AcOAg results in a demethylation. Hydrogenation of pyridine with palladized asbestos at 150° leads to piperidine but at 250° this reaction is reversed. When aldehydocollidine is shaken in AcOH with Adams and Shriner's catalyst under 3 atm. H, *2-methyl-5-ethylpiperidine* (VIII), b. 160°, is obtained. Its chloroplatinate m. 145–7°. When VIII is slowly passed over palladized asbestos at 275°, *aldehydocollidine*, b. 177–8°, is obtained in excellent yield. Its picrate m. 164–5°. VI, when passed over Pd asbestos in the same way gives I, b. 162–4°, in 90% yield. Its picrate m. 187–8°. The condensation of I with HCHO according to Koenigs and Bernhart (*Ber.* **38**, 3049(1905)), or Oparina (*C. A.* **25**, 3651) offers difficulties, but the substitution of the reactive H in the Me group in the 2-position by Li is achieved by interaction of 12 g. VII with $PhLi$ prepd. from 20.7 g. PhBr. Addn. of 6.5 g. freshly prepd. HCHO with stirring for 45 min. at room temp., followed by refluxing for 45 min. and decompg. with HCl and ice, gives 8 g. *2-(2-hydroxyethyl)pyridine* (IX) which is extd. with $CHCl_3$ and distd. at 2 mm. It b. 88–90°; chloroplatinate, m. 176° (decompn.). Oxidation of IX with $KMnO_4$ yields *picolinic acid*, m. 216°. When the same method as for IX is applied to I, *2-(2-hydroxyethyl)-3-picoline* (X), b_1 94–5°, is obtained; picrate, m. 137–8°. When to a suspension of 100 mg. *2-methyl-4-amino-5-bromoethylpyrimidine-HBr* (XI) in 10 cc. light petrolatum, heated on a water bath, a 10% excess of IX is added with const. stirring and the mixt. is heated for 1 hr., *2-[(4-amino-2-methyl-5-pyrimidyl)methyl]-2-(2-hydroxyethyl)pyridinium bromide-HBr* (XII) crystallizes. It is purified by pptn. from its EtOH soln. with Et_2O. It m. 240–5° (decompn.). It also decomps. on drying at 100° at 10 mm. Condensation of XI with X instead of IX gives *1-[(4-amino-2-methyl-5-pyrimidyl)methyl]-2-(2-hydroxyethyl)-3-picolinium bromide-HBr* (XIII), m. 240–2° (decompn.). XII and XIII do not show antipolyneuritic activity but approximate the activity of thiamine as measured by CO_2 evolution in the yeast test. F. E. Brauns

Formation of β-hydroxypyridine derivatives from hexoses and ammonium salts. I. Kiyosi Aso. *J. Agr. Chem. Soc. Japan* **15**, 629–33; *Bull. Agr. Chem. Soc. Japan* **15**, 107–8(1939) (in English).—Glucose or sucrose aq. solns were heated with $(NH_4)_2SO_4$, NH_4Cl or NH_4 oxalate at 155–65° for 1–3 hrs. The product was extd. with ether. The ether ext. contained levulinic acid. Three bases were isolated from the ether-insol. part. The base m. 166–7° was identified as 2-methyl-5-hydroxypyridine. The base m. 201–2° and the base m. 124–5° may be, resp., 2- or 3-methyl-5,6-dihydroxypyridine and 2-hydroxymethyl-5-hydroxypyridine. Y. Kihara

Synthesis of a pyridine derivative of biological interest. Siro Morii. *J. Oriental Med.* **30**, English abstr. 169–70 (1939). By condensing nicotinamide with 2-methyl-6-amino-5-bromomethylpyrimidine-HBr, (I) (R = $CONH_2$) is obtained, which goes to II when oxidized by alk. $K_3Fe(CN)_6$. The product is a blue fluorescent dye



(I)



(II)

S. Tashiro

Utilization of alkoxy ketones in the synthesis of quinolines by the Pfitzinger reaction. Loy B. Cross and Henry R. Henze. *J. Am. Chem. Soc.* **61**, 2730–3(1939); cf. *C. A.* **33**, 6315². Isatin (I) (46 g.) and 32 g. $EtOCH_2Ac$ with 200 g. 33% KOH, heated 24 hrs. on a steam bath, give 44% of *3-ethoxy-4-quinaldinecarboxylic acid* (II), m. 243° (decompn.) (all m. ps. cor.). I and $EtOCH_2COEt$ give 92% of *2-ethyl-3-ethoxycinchoninic acid* (III), m. 199–201° (decompn.). 5-Methylisatin and $EtOCH_2COEt$ give 33% of the *6-Me deriv.* of III, m. 222° (decompn.). Heating II at 250° gives 59% of 3-ethoxyquinaldine (IV), m. 68–9°; III gives 47% of *2-ethyl-3-ethoxyquinoline* (V), b_{7-8} 138–40°, m. 58.5°. II (2 g.) and concd. HCl, heated 2 hrs. at 150°, give 1.25 g. of *3-hydroxy-4-quinaldinecarboxylic acid*, m. 242.4° (decompn.). Heating IV and concd. HCl at 180° for 3 hrs. gives 81.5% of 3-hydroxyquinaldine (VI), m. 260°; V gives 93% of *2-ethyl-3-hydroxyquinoline* (VII), m. 206–8° (decompn.). IV, HI and red P, refluxed for 7 days at 150°, give a mixt. of VI and quinaldine; 6.6 g. of V gives 3 g. of the *HI salt* (VIII) of V, m. 193–8° and 1 g. of VII. III, HI and red P, heated at 125° for 24 hrs., give *2-ethyl-3-hydroxycinchoninic acid* (IX), yellow, m. 208.9° (decompn.); in a 2nd expt. the mixt. was refluxed at 140–50° for 18 hrs.; the chief product was IX, with a small amt. of VIII. Reduction of VII by heating it with concd. HCl for 5 hrs. at 175°, adding addnl. concd. HCl and treating with Sn, gives 21% of 2-ethyl-1,2,3,4-tetrahydroquinoline, b_7 125–7°, n_D^{25} 1.5652, d_4^{20} 1.0178; *picrate*, bright yellow, m. 143–5°. VI and $C_6H_4(CO)_2O$, heated 3 hrs. at 200°, give the phthalone, $C_{18}H_{11}NO_3$, dark orange, m. 264.6°; this also results from II in 31% yield. C. J. West

Synthesis of certain substituted quinolines and 5,6-benzoquinolines. R. Gordon Gould, Jr., and Walter A. Jacobs. *J. Am. Chem. Soc.* **61**, 2890–5(1939).—A convenient method of synthesis of certain 4-hydroxyquinoline and 4-hydroxy-5,6-benzoquinoline derivs. has been found in the condensation of $PhNH_2$ and β-$C_{10}H_7NH_2$ derivs. with $AcCH(CO_2Et)_2$ (I) or ethoxymethylenemalonic ester (II) followed by cyclization at 250°. 3,1-$H_2NC_{10}H_6CO_2H$ and $AcCH_2CO_2Et$ in MeOH give a quant. yield of *Et (3-naphthyl-1-carboxylic acid)-β-aminocrotonate*, m. 157–8°; cyclization in 10–30 parts of mineral oil at 250–65° in an atm. of dry N gives a nearly quant. yield of *4-hydroxy-5,6-benzoquinaldine-7-carboxylic acid* (III), which does not m. 360°; *HCl salt*; *Me ester*, m. 295–6° (decompn.); *Et ester*, m. 295–7°. 3-Amifonaphthostyril (IV) (2.5 g.) and $AcCHCO_2Et$ give 3.2 g. of *Et N-(3-naphthostyryl)-β-aminocrotonate*, m. 180–2°; cyclization gives *4-hydroxy-3'-amino-5,6-benzoquinaldine-7-carboxylic lactam*, does not m. at 360°; *HCl salt*. $PhNH_2$ and I give 30% of the *Et ester*, m. 104–7°, of 4-hydroxyquinaldine-3-carboxylic acid, m. 247–8°. IV and I, several months at

room temp., give *α-carbethoxyacetoacetyl-3-aminonaphthostyril*, m. 268–70° (decompn.). Anilidomethylenemalonic ester on cyclization in mineral oil gives 60% of 4-hydroxyquinoline-3-carboxylic acid, m. 267–8°. 3,1-$H_2NC_{10}H_6CO_2Me$ and II, heated 15 min. at 100°, give *Et N-(3-naphthyl-1-carbomethoxy)-β-amino-α-carbethoxyacrylate*, m. 89–90°; cyclization at 250° gives *4-hydroxy-5,6-benzoquinoline-3,7-dicarboxylic acid*, does not m. 360°. IV and II give 75% of *Et N-(3-naphthostyryl)-β-amino-α-carbethoxyacrylate*, light yellow, m. 231–2°; cyclization gives a nearly quant. yield of *4-hydroxy-3'-amino-5,6-benzoquinoline-3,7-dicarboxylic lactam*, does not m. 360°; it is sol. in dil. $NaHCO_3$ and from concd. solns. forms a sparingly sol. Na salt; refluxing with Zn-Hg in AcOH for 5 hrs. gives the *2,3-dihydro deriv.*, does not m. 350°. I (11 g.), 60 cc. 50% KOH, 5 cc. CCl_4, a little EtOH and 1 g. Cu, refluxed for 24 hrs. and the product extd. with 1% HCl, give 3 g. of *4-hydroxy-5,6-benzoquinaldine-3,7-dicarboxylic acid* (V), does not m. 360°; *mono-Me ester*, from MeOH and HCl, m. 290–5° (decompn.); *di-Me ester* (VI), from MeOH and H_2SO_4, m. 239–40° (decompn.); CH_2N_2 gives the *4-MeO deriv.* of VI, m. 142–4°. V yields a mixt. of isomeric NO_2 derivs., which is reduced by $Fe(OH)_2$ to about 30% of *3'-amino-4-hydroxy-5,6-benzoquinaldine-3,7-dicarboxylic lactam*, orange-yellow, which does not m. 360°, and about 70% of an *NH_2 deriv.* of V, which does not m. 360°; these were sepd. by extn. with half-satd. $NaHCO_3$. 3,1-$H_2NC_{10}H_6CO_2Me$, $AcCO_2H$ and AcOH in EtOH, refluxed 4–5 hrs., give the *7-Me ester* (VII), m. 265–6° (decompn.), of *5,6-benzoquinaldine-4,7-dicarboxylic acid*, m. 298–9° (decompn.); oxidation of VII with SeO_2 in C_5H_5N gives the *7-Me ester*, m. 199–200° (decompn.), of *5,6-benzoquinoline-2,4,7-tricarboxylic acid*, m. 285–6° (decompn.). II, AcH and $AcCO_2H$ in EtOH, refluxed 4 hrs., give a poor yield of *3'-amino-5,6-benzoquinaldine-4,7-dicarboxylic lactam*, m. 340 2° (decompn.). 2-$C_{10}H_7NH_2$ and epichlorohydrin give *3-hydroxy-1,2,3,4-tetrahydro-5,6-benzoquinoline*, m. 82 3°; *HCl salt*. II yielded an anomalous product. HCHO in the above expts. gave only complex bimol. products. C. J. West

Synthesis in the 1,2,3,4 - tetrahydroquinoline series. Wm. S. Emerson and J. W. Davis. *J. Am. Chem. Soc.* **61**, 2830–2(1939). 2,8-Dimethylquinoline (I), b. 215–55°, n_D^{25} 1.5955, d_4^{20} 1.036, gives a *zinc chloride-HCl double salt*, $2I.2HCl.ZnCl_2$, m. 270° (decompn.). Reduction of 39 g. I in 100 cc. H_2O and 200 cc. concd. HCl with excess of Sn (refluxing 19 hrs.) gives 69% of *2,8-dimethyl-1,2,3,4-tetrahydroquinoline* (II), b. 250–5°, d_4^{20} 1.000, n_D^{25} 1.5610; *picrate*, yellow, m. 159.5–61°; *$ZnCl_2$-HCl salt*, m. 270° (decompn.); *Bz deriv.*, m. 118.5–20°. II and MeI on standing 16 hrs. give 70% of the *HI salt*, m. 154.5–5.5°, of *1,2,8 trimethyl-1,2,3,4-tetrahydroquinoline*, b_{21} 130°, n_D^{25} 1.5450, d_4^{20} 0.9826; *picrate*, m. 177–8°; *$ZnCl_2$-HCl salt*, m. 213–14°. 2,6-Dimethylquinoline (III) gives a *$ZnCl_2$-HCl salt*, m. 211.5–13°; reduction gives 70% of crude *2,6-dimethyl-1,2,3,4-tetrahydroquinoline* (IV), b_{25} 142–9°; the crude product (6 g.) in 10 cc. concd. HCl and 30 cc. H_2O, treated with 3 g. $NaNO_2$, the oil extd. with Et_2O and the residue added with cooling to 15 g. $SnCl_2$ and 75 cc. concd. HCl, gives 2.5 g. III, b_{21} 147–9°; the picrate when first prepd. m. 126–8°; 2 crystns. from EtOH raised the m. p. to 165–9°; the mother liquor contains the picrate of III. The Bz deriv. of IV m. 104–5°; the $ZnCl_2$-HCl salt m. 187–95°. IV reacts vigorously with MeI, giving the *HI salt*, m. 187–8.5°, of *1,2,6-trimethyl-1,2,3,4-tetrahydroquinoline*, b_{20} 145°, n_D^{25} 1.5611, d_4^{20} 0.9906, which is obtained in 64% yield by refluxing 1,2,6-trimethyl-1,2,3,4-tetrahydroquinoline-HI with excess Sn and HCl for 7 hrs.; *picrate*, yellow, m. 141–2°. IV is much more unstable and reactive than II; however, its *N*-Me deriv. is stable. C. J. W.

Nitrogen compounds in petroleum distillates. XV. Countercurrent acid extraction of kero bases. Isolation of 2,4-dimethyl-8-propylquinoline. W. Nelson Axe and J. R. Bailey. *J. Am. Chem. Soc.* **61**, 2609–12(1939); cf. *C. A.* **33**, 5402[1].—Details are given of the method and app. for countercurrent extn. of petr. bases. The 292–3° fraction was sepd. into 7 fractions, the component fractions being transformed into the picrates in Me_2CO and sepd. into Me_2CO-sol. and -insol. fractions; the latter were recrystd. from glacial AcOH and the former from EtOH; the free bases were liberated and transformed into the $ZnCl_2$ salts. The Me_2CO-insol. picrates yielded in several fractions 2,3-dimethyl-8-ethylquinoline and the 8-Pr analog and the $ZnCl_2$ salts yielded *2,4-dimethyl-8-propylquinoline* (I). Yields are given for the 292–3°, the 303° and the 280–3° fractions. The 303° fraction gives 4.7% of I by the countercurrent extn. and 1.8% by the fractional degassing method. I b_{747} 298°, d_4^{20} 0.9992, n_D^{20} 1.5748; *$ZnCl_2$ salt*, m. 225–6°; heating with $C_6H_4(CO)_2O$ for 4 hrs. gives the orange-yellow *phthalone*, $C_{22}H_{19}O_2N$, m. 198–9°. Oxidation of I with CrO_3 yields 2,4-dimethylquinoline-8-carboxylic acid. I was synthesized from Ac_2CH_2 and *o*-$PrC_6H_4NH_2$. **XVI. Use of multiple acid extraction in isolation of 2,3,4-trimethyl-8-ethylquinoline.** Richard A. Glenn and J. R. Bailey. *Ibid.* 2612–13.—The fraction b. 305–15° was sepd. into 10 fractions by multiple acid extn. and into 95 fractions by fractional distn. Fractions b. 314–19°, with d_4^{20} from 1.0174 to 1.0386 and n_D^{25} 1.5841 to 1.5920, were transformed into the picrates and crystd. from 60% AcOH, giving the *picrate*, lemon, m. 216°, of *2,3,4-trimethyl-8-ethylquinoline*, (I), b. 320°, m. 52.3–3°, n_D^{25} 1.5798; MeOH is a selective solvent for recrystn. of this compd. Oxidation gives 2,3,4-trimethylquinoline-8-carboxylic acid. I and $C_6H_4(CO)_2O$, heated 4 hrs. at 190°, give the *phthalone*, $C_{23}H_{19}O_2N$, yellow, m. 253°. I yields a *nitrate*, m. 159.5–60° (decompn.); an *acid sulfate*, m. 245–6°; and a *HCl salt*, m. 203–4°. I can be synthesized from Ac_2CHMe and *o*-$EtC_6H_4NH_2$. **XVII. The use of multiple acid extraction in isolation of 2,3,4-trimethyl-8-propylquinoline.** Leslie M. Schenck and J. R. Bailey. *Ibid.* 2613–15.—Multiple acid extn. of the kero bases yields an aromatic base with n_D^{25} 1.5841; further processing yields fractions b. 323 and 326° with n_D^{25} 1.5807, which with HNO_3 in 1:10 Me_2CO-Et_2O yield the *nitrate*, m. 160.1° (decompn.), of *2,3,4-trimethyl-8-propylquinoline*, b. 330°, m. 69–70°, n_D^{25} 1.5618, n_D^{25} 1.5731; *picrate*, lemon, m. 211–11.5°; *acid sulfate*, m. 230.5–1°; *HCl salt*, m. 221–2°. Oxidation yields 2,3,4-trimethylquinoline-8-carboxylic acid. The base was synthesized from Ac_2CHMe and *o*-$PrC_6H_4NH_2$. C. J. West

Azeotropic mixtures of dioxane and its preparation. A. DeMol. *Ing. Chim.* **22**, 262–73(1938).—In order to investigate a new prepn. of dioxane it is important to study the azeotropic mixts. which can produce dioxane. Mixts. of dioxane with the following were studied: H_2O, H_2O and glycol, glycol, EtOH, cyclohexanol, cyclohexanone, acetone, cyclohexane, toluene, benzene, CS_2. The lab. prepn. and phys. and chem. properties of dioxane are discussed. Prepn. of dioxane by direct distn. is not feasible. The usual distn. method was used except that instead of treating the liquid with $CaCl_2$ it was placed directly in the rectifying app. mixed with the calcd. amt. of CS_2. About 85% of the dioxane was recovered.
Ann Nicholson Hird

Monoalkyldioxanes. R. K. Summerbell and R. R. Umhoefer. *J. Am. Chem. Soc.* **61**, 3016–19(1939).—Chlorodioxane (I) is best prepd. (68.5% yield) by passing dry HCl into dioxene at 0°; Et_2O or C_6H_6 as a solvent decreases the yield. Dropwise addn. of I to a Grignard reagent in Et_2O gives monoalkyldioxanes (II), purified by distn. over Na: *Me* (II), $b_{746.5}$ 109–10°, d_4^{20} 0.977, n_D^{20} 1.4188; *Et* (IV), b_{760} 132.5–3°, d_4^{20} 0.955, n_D^{20} 1.4263; *Pr* (V), b_{746} 155.6–7.1°, d_4^{20} 0.943, n_D^{20} 1.4298; *Bu* (VI), b_{735} 178–9°, d_4^{20} 0.932, n_D^{20} 1.4436; *allyl*, $b_{747.6}$ 156–8°, d_4^{20} 0.937, n_D^{20} 1.4442, 72.5% yield. $(CH_2OH)_2$ is formed in the reaction between II and Na. If $ZnCl_2$ is used with BuMgBr the yield of VI is 11%; a by-product in this reaction is a compd., m. 101–2°, which may be *2-butyl-3-dioxanyldioxane*, $O.CH_2.CH_2.O.CH_2.CHCH.CHBu.O.CH_2.CH_2.O$; the reaction of I and EtMgBr gives the *Et analog*, m. 97.5°. III is infinitely sol. in H_2O, IV is sol. to a considerable extent and V and VI are not appreciably sol. The II have a slightly displeasing ethereal odor, which increases

in the higher members. II do not form addn. compds. with picric acid or hydroquinone. The relation of *n* and d appears to be uncommon, in that the slope of the plot of *n vs.* d. is neg. $MeCHClOCH_2CH_2Cl$ treated with 1 mole Br at 0° during 2.5 hrs. gives 73% of *β-chloroethyl α,β-dibromoethyl ether* (VII), b_{12} 108°, fumes in the air and turns yellow in a short time. VII, added to EtMgBr in Et_2O at 0°, gives 25% of *β-chloroethyl α-ethyl-β-bromoethyl ether* (VIII), b_{12} 92–3°, d_4^{20} 1.388, n_D^{20} 1.4770. Refluxing 30 g. VIII with 30 g. KOH in 270 cc. H_2O for 26 hrs. and then at 200–5° for 3.5 hrs. gives 17% of IV. 2,3-Dichlorodioxane (IX) and Mg + MgI_2 in dry Et_2O give 49% of dioxene (X). The yield of X varies with the ratio of I to IX as follows: 1.20 31%; 1·10 44%; 1.5 49%. C. J. West

Dioxadiene. R. K. Summerbell and R. R. Umhoefer. *J. Am. Chem. Soc.* **61**, 3020–2 (1939).—The reaction product of 23 g. Mg turnings and 80 g. I in 500 cc. Bu_2O was heated to 140° and 35.5 g. of 2,3,5,6-tetrachlorodioxane (I) added in 1-2-g lots; the reaction was vigorous and was accompanied by distn. of the *dioxadiene* (II) and the Bu_2O; after 100 cc. distillate had collected 100 cc. Bu_2O was added and after the I had reacted the temp was raised to 155°; distn. of the 300-cc. distillate gave 64% of II, b_{746} 75°, d_4^{20} 1.115, n_D^{20} 1.4350. II is insol. in H_2O. It polymerizes in 2–3 weeks to a hard colorless solid which does not m. 250°; its mol. wt. was not detd. because of its insoly. in H_2O and org. solvents; it reacts slightly with Br. In CCl_4 II reacts with 2 atoms Br, giving 87% of the *di-Br deriv.*, $C_4H_4O_2Br_2$, m. 58°, which decomps. over a period of several weeks when exposed to the atm. II and Cl in CCl_4 give I. II and HCl in CCl_4 give 2,5-dichlorodioxane. II and $HgCl_2$ give a *compd.* $C_4H_2O_2Hg_2Cl_2$(?), with an indefinite m. p. II did not result from the treatment of diglycolic acid anhydride and glycolide with Zn and the pyrolysis of the acetate of dimeric glycolaldehyde. C. J. West

Derivatives of aminomethanethiol. Arthur Binz and Leland H. Pence. *J. Am. Chem. Soc.* **61**, 3134–9 (1939).—Shaking 10 g. piperidine and 20 cc. of 37% aq. HCHO with 10 g. K_2CO_3, filtering off the 1-piperidinomethanol and treating it with H_2S for 3.3 hrs. (temp. rise to 68°) gives 88% of *1-piperidinomethanethiol* (I), $CH_2(CH_2CH_2)_2NCH_2SH$, m. 12.5–15°; *HCl salt* (II), m. 195–205°. On heating I at 150–70° and 4 mm., there results $(C_5H_{10}N)_2CH_2$ and a brittle brownish mass, m. 228 31°, with 58.4% S. Refluxing I with dil. HCl give trithioformaldehyde (III). I and $HgCl_2$ in EtOH give 97% of $O(CH_2S)_2Hg$ (IV), decomps. 95–105°; $Cu(OAc)_2$ gives 91% of *capric methylenedimercaptide* (V), $CH_2(S)_2Cu$, decomps. 105–10°. Treating I with H_2S at 0° for 1.5 hrs. gives *1,3-di(1'-piperidino)-2-thiapropane* (VI), m. 48.5–50.5°; *di-HCl salt* (VII), m. 171–5° (decompn.). Morpholine (VIII) (17.5 g.) with 18 cc. 37% aq. HCHO and 17 cc. concd. HCl, treated with H_2S at 55° for 2 hrs., gives 5.3 g. of *4-morpholinomethanethiol* (IX), $O(CH_2CH_2)_2NCH_2SH$, m. 86–8°; refluxing IX with concd. HCl gives 94% of III; IX and $HgCl_2$ give 94% of IV and $Cu(OAc)_2$ gives V. A by-product in the prepn. of IX, which is obtained in 7.6-g. yield from 8.75 g. VIII and HCHO in C_6H_6 with H_2S with cooling, is probably *1,7-di(4'-morpholino)-2,4,6-trithiaheptane* (X), $[O(CH_2CH_2)_2NCH_2SCH_2]_2S$, m. 77–84°. Reaction of $O(CH_2CH_2)_2NCH_2OH$ with H_2S at 0° gives *1,3-di(4'-morpholino)-2-thiapropane* (XI), m. 107–8°; a by-product is probably *3-(4'-morpholino)-2-thiapropanethiol* (XII), $O(CH_2CH_2)_2NCH_2SCH_2SH$, m. 72–82°, which is also obtained by dissolving XI in H_2O at room temp. Adding $(HOCH_2CH_2)_2NH$ to 37% aq. HCHO with cooling and treating with H_2S for 0.5 hr. gives the *compd.* $(HOCH_2CH_2)_2NCH_2S]_2H$ (XIII), m. 224–6°; it is sol. in 20 parts boiling $(HOCH_2CH_2)_2NH$ and is not pptd. by H_2O. H_2S, passed into a suspension of 18 cc. 37% HCHO and 3 g. $(HOCH_2CH_2)_2NH$ in 175 cc. H_2O at 65°, gives 7 g. of a compd. with a N:S ratio of 1:14.4 which does not m. 230–3°. I and VI in 0.04% aq. soln. killed paramecia immediately and daphnia in 20 min.; lethal doses of IX, XI, XIII, II and VII are 0.025, 0.021, 0.165, 0.05 and 0.083 mg. per g. of body wt. when injected intravenously into mice. C. J. West

Derivatives of piperazine. XVIII. Synthesis of substituted piperazines and the hydrolysis of amines. J. P. Bain and C. B. Pollard. *J. Am. Chem. Soc.* **61**, 2704–5 (1939); cf. *C. A.* **33**, 2138⁶.—This is a continuation of the work of B. and P. (*loc. cit.*) who showed that piperazines may be prepd. from amino alcs. by catalytic alkylation. Cyclohexylamine (I) and $(C_2H_4)_2O$ give *N*-cyclohexylethanolamine (II), b. 118°, n_D^{25} 1.4832, and *N*-cyclohexyldiethanolamine (III), b. 178°, n_D^{25} 1.4927. Heating 1 mole $PhNH_2$ and 2 moles of propylene oxide in 300 cc. dioxane for several hrs. gives *N-phenyldiisopropanolamine* (IV), straw-colored liquid, b_{10} 184–5°; *N-p-tolyl analog* (V) of IV, pink, m. 112°. One mole each of I and II or III in 600 ml. of dioxane with 25 g. Cr-Cu oxide catalyst, heated to 250–70° and shaken 3-4 hrs. in H at 34 atm. pressure, give 20 g. cyclohexanol (VI), 19 g. of a fraction, b_{10} 109–10° and 20% of *1,4-dicyclohexylpiperazine*, m. 118°. I and IV give 20% of *1-cyclohexyl-2,6-dimethyl-4-phenylpiperazine*, b_2 205–10°; I and V give 15% of the *4-p-tolyl analog*, b_5 175–230°. The above were analyzed as the *di-HBr salts*. Heating 60 g. of I, 300 ml. dioxane, 20 ml. H_2O and 20 g. Cu-Cr oxide for 4 hrs. at 260–70° under 34 atm. pressure gives 26% of VI. Diethylcyclohexylamine yields 33% of VI on heating 78 g. in 300 ml. 50% aq. dioxane and 23 g. catalyst at 270–80° without H pressure; there also results a mixt. of mono- and diethylcyclohexylamines. C. J. West

Heteropolar compounds. V. The variation of the dielectric constant of solutions of 2-thio-3-phenyl-4-ethoxy-1,2,3,4-tetrahydroquinazoline with temperature. Alex. Cişman and C. V. Gheorghiu. *Ann. sci. univ. Jassy*, Pt. I, **25**, 424–32 (1939) (in French); cf. *C. A.* **32**, 2943¹.—Measurements were made in PhBr, α-$C_{10}H_7Br$, and MeCOPh solns.; the dielec. const., measured by the movement of the armature of a cylindrical condenser, is less than that of the pure solvent. The curves are almost parallel, the const. of the solns. decreasing less as the temp. rises and the reversible coloration appears. This is in accord with the hypothesis made previously of a reversible heteropolar decyclization between N-3 and C-4 to accompany the appearance of color. On heating above 60° 70°, the color produced is not discharged on cooling and the variation of the dielec. const. with temp. is exactly parallel to that in the pure solvent. This may be due to a change in the quinazoline structure with no decyclization; in MeCOPh soln. the quinazoline reacts with the solvent to yield *2-thio-3-phenyl-4-phenacyl-1,2,3,4-tetrahydroquinazoline*, m. 237°, which shows no reversible coloration and cannot undergo decyclization as suggested. This is also true for 2-thio-3-phenyl-4-oxo-1,2,3,4-tetrahydroquinazoline for which the dielec. const. curves in PhBr are parallel P. M. Apfelbaum

Erythrina alkaloids. VI. Constitution of erythramine. Karl Folkers and Frank Koniuszy. *J. Am. Chem. Soc.* **61**, 3053–5 (1939); cf. *C. A.* **33**, 5405⁵.—Erythramine (I), $C_{18}H_{21}NO_3$, contains a MeO and a CH_2O_2 group; thus all 3 O atoms exist in ether linkages; this is confirmed by the lack of reaction of I with Ac_2O or BzCl. The free I cannot be stored because of progressive decompn.; I is not decompd. by boiling in approx. 5% NaOH in H_2O contg. a little EtOH for 2 hrs.; the hydrohalide salts are stable either dry or in soln. In prepg. derivs. it is essential that the HI salt m. 245° (slow bath) and have $[\alpha]_D$ 220 1°. I forms a *methiodide* (II), yellowish white, m. 96–8°, $[\alpha]_D^{25}$ 176° (H_2O, *c* 0.355). I.HI could not be reduced by the Adams catalyst at room temp.; I in 50 ml. H_2O and 2 ml. concd. HCl is reduced at 2 atm. H pressure in 1 hr., giving the *dihydro deriv.* (III), m. 89–90°, isolated as the *HI salt*, m. 214 15° (decompn.), optically inactive; the *HBr salt*, with 1 mole H_2O, m. 240°; the *methiodide*, with 0.5 mole H_2O, m. 160–1°; these derivs. could not be dehydrated without decompn. The N atom of I is tertiary and is probably common to 2 nuclei of the mole. The unsatn. consists of 1 benzenoid nucleus

and 1 ethylenic double bond. The mole appears to contain 4 6-membered nuclei exclusive of the CH_2O_2 bridge. II is about 1/5 as active and III about 1/30 as active as natural I for curare-like action in frogs. C. J. West

Structure of monocrotaline, the alkaloid in Crotalaria spectabilis and Crotalaria retusa. I. Roger Adams and E. F. Rogers. *J. Am. Chem. Soc.* **61**, 2815–19(1939).—Two kg. of *Crotalaria spectabilis* seed are extd. with 95% EtOH for 72 hrs., the green-black soln. acidified with citric acid (Congo paper), the solvent removed *in vacuo* and the residue taken up in 400 cc. H_2O; the fat is extd. with Et_2O and $CHCl_3$; the aq. soln. is then treated with 200 cc. $CHCl_3$ and satd. aq. Na_2CO_3 until the soln. is alk. to litmus and the monocrotaline (I), $C_{16}H_{23}O_6N$, is extd. with $CHCl_3$ and purified by crystn. from abs. EtOH; the yield of I is 65 g. (3.2%); Neal, Rusoff and Ahmann, *C. A.* **30**, 1182[8], give the formula $C_{16}H_{26}O_6N$. I m. 197–8° (decompn.) (all m. ps. cor.), $[\alpha]_D^{25}$ −54.7°, (0.5054 g. in 10 cc. $CHCl_3$); I does not react with HNO_2; MeN and MeO groups are absent. No evidence is obtained of the presence of any other alkaloid. *Crotalaria retusa* gives 1.89% of I. *HCl salt* of I, m. 184° (decompn.), $[\alpha]_D^{25}$ −38.4° (1.3 g. in 25 cc. H_2O); *methiodide*, with 3 moles MeOH, m. 205° (decompn.), $[\alpha]_D^{25}$ 23.4° (0.31 g. in 10 cc. MeOH). Refluxing 20 g. of I and 40 g. $Ba(OH)_2.8H_2O$ in 250 cc. H_2O for 1 hr. gives 4.2 g. (48%) of *monocrotic acid* (II), $C_7H_{12}O_3$, b_{18} 145–6°, $n_D^{17.5}$ 1.4449, d_4^{26} 1.072; *p-bromophenacyl ester*, m. 78°. The aq. soln. after extn. of II by Et_2O is evapd. to dryness, the sirup dissolved in 100 cc. abs. EtOH and the residue from the ext. with EtOH gives 87% of the *HCl salt*, m. 161 2°, $[\alpha]_D^{25}$ −15.4° (1.2 g. in 25 cc. EtOH), of retronecine, m. 121°, $[\alpha]_D^{25}$ 49.3° (1.3316 g. in 25 cc. EtOH); *diacetylretronecine picrate*, yellow, m. 146°. I (10.8 g.) in 10 cc. AcOH and 40 cc. EtOH, reduced with PtO_2 and 2 3 atm. H, absorbs 2 moles H in 5 hrs., giving *monocrotalic acid* (III), $C_8H_{12}O_5$, m. 181-2°, $[\alpha]_D^{25}$ −5.33° (1.1734 g. in 25 cc. H_2O); *p-bromophenacyl ester*, m. 162 3°, $[\alpha]_D^{25.5}$ −14.1° (0.142 g. in 3.74 cc. EtOH); the other product of the hydrogenation is *retronecanol*, $C_8H_{15}ON$, b_{40} 140°, m. 95-6°, $[\alpha]_D^{25}$ −91.1° (1.524 g. in 25 cc. EtOH); *HCl salt*, m. 210° (decompn.); *methiodide*, m. 193° (decompn.), $[\alpha]_D^{27}$ −52.8° (0.473 g. in 10 cc. MeOH); *picrate*, yellow, m. 210°. Heating 5 g. of III with 30 cc. 10% aq. NaOH for 1 hr. gives II. A table of known alkaloids of the acid-alkanolamine type is given. II. **Monocrotic acid obtained by alkaline hydrolysis of the alkaloid.** Roger Adams, E. F. Rogers and F. J. Sprules. *Ibid.* 2819–21.—Monocrotic acid (I) with CH_2N_2 gives a *Me ester* (II), b_{18} 94–6°, $d_4^{25.5}$ 0.9968, n_D^{25} 1.4273, 90% yield; the *2,4-dinitrophenylhydrazone* of II m. 95-6°, 85% yield; this indicates the presence of a ketone group. I with I-KI and 10% aq. NaOH gives CHI_3, indicating an Ac group. Oxidation of I with NaOBr gives a mixt. of *meso-* (III) and *dl-α,α'*-dimethylsuccinic acids (IV). III and IV give *half anilides*, m. 169–70° and 135–6°, resp. The *p-bromophenacyl ester* of III m. 155 6°; IV yields an *anhydride*, m. 88°. These results show that I is *α,β-dimethyllevulinic acid*, $MeCHAcCHMeCO_2H$. I, heated at 240-50°, gives *α,β,γ-trimethylangelicalactone* (V), b_{20} 121°, n_D^{19} 1.4665, n_D^{19} 1.4640, d_4^{20} 1.024; V decolorizes $KMnO_4$ and gives a pos. test with Tollens reagent and with Na nitroprusside. Refluxing IV with 10% EtOH-KOH gives I. Catalytic reduction of IV at 120° and 133 atm. with Raney Ni gives *α,β-dimethyl-γ-valerolactone*, b_{20} 106 7°, n_D^{19} 1.4382, n_D^{19} 1.4348, d_4^{27} 0.987; this also results from the hydrogenation of II (7 hrs.). The formation of III and IV from I is probably due to rearrangements taking place during the reaction. III. **Monocratalic acid.** Roger Adams, E. F. Rogers and R. S. Long. *Ibid.* 2822-4.—Monocratalic acid (I) with CH_2N_2 in $CHCl_3$-Et_2O at 10° gives 97% of the *Me ester* (II), m. 79-80°, $[\alpha]_D^{19}$ −16.24° (0.502 g. in 10 cc. abs. EtOH); it contains 1 active H atom. Heating I at 200° gives *α,β,γ*-trimethylangelicalactone (III) (part II). Heating II at 200-10° until the evolution of H_2O is complete gives *Me anhydromonocratalate* (IV), b_2 115–16°, n_D^{19} 1.4700, d_4^{19} 1.131, $[\alpha]_D^{19}$ 25.74°, and a small amt. of III. Hydrolysis of IV with concd. HCl (refluxing 8 hrs.) gives III. Catalytic reduction of IV contg. III gives *α,β*-dimethyl-γ-valerolactone and the *dihydro deriv.* (V) of IV, b_1 115–17°, n_D^{19} 1.4510, d_4^{28} 0.996; pure IV gives pure V. Hydrolysis of V with concd. HCl (refluxing for 5 hrs.) gives 63% of *α-carboxy-α,β-dimethyl-γ-valerolactone*, m. 131–2°, $[\alpha]_D^{19}$ 3.80° (0.303 g. in 10 cc. abs. EtOH); *p-bromophenacyl ester*, m. 142–3°, $[\alpha]_D^{19}$ −3.89° (0.2315 g. in 5 cc. Me_2CO). The possible structure of I is discussed, with the conclusion that it is optically active *α-carboxy-α,β-dimethyl-γ-hydroxy-γ-valerolactone*, $MeCH.C(OH)Me.O.CO.C(CO_2H)Me$. C. J. West

The alkaloids of Mitragyna rotundifolia. I. Geo. Barger, E. Dyer and L. J. Sargent. *J. Org. Chem.* **4**, 418-27(1939).—On extn. of air-dried leaves of *Mitragyna rotundifolia* (Roxb.) O. Kuntze (*M. diversifolia*, Hook, f.) with 95% EtOH, 2 cryst. alkaloids, $C_{22}H_{28}N_2O_4$ (I) and $C_{22}H_{28}N_2O_5$ (II), were isolated. I m. 208–9°, $[\alpha]_D^{15}$ −14.5° (*c* 2.5, $CHCl_3$), and is identical with *mitrinermine* (cf. Raymond-Hamet and Millat, *C. A.* **30**, 1379[8]) and with *rhynchophylline* (cf. Kondo, Fukuda and Tomita, *C. A.* **22**, 3166). Hydrolysis of I with alc. KOH yields an amorphous amphoteric acid, *rhynchophyllic acid* (III), which sinters at 140° and decomps. gradually above 150°. When III is heated with CaO at 1–2 mm. at 180°, a sublimate (IV) with the formula $C_{10}H_9NO$ is obtained and at 210–30° a yellow oil is formed. IV, after recrystn. from Et_2O, sinters at 180° and m. 182–4°. IV does not contain any MeO groups and is sol. in boiling alkali. On heating with Zn dust it yields a substance which gives a pos. Ehrlich reaction. It is assumed that IV is a *Me deriv.* of *carbostyril*. Degradation of III by heating with soda-lime at 220–355° gives a mixt. of NH_3, oxygenated indoles and a pyridine-like base, a negligibly acidic, a neutral (V) and a basic fraction (VI). Redistn. of V gives 2 fractions, *A*, b_{18} 110–20°, and *B*, b_{18} 145–55°. Both resemble skatole in odor, in the pine-splinter reaction and in their behavior toward Ehrlich's reagent in the cold. *B*, when reduced with Zn dust according to Schlieper (*Ann.* **239**, 229(1887)), gives a base, b_{18} 75–85°, which gives a *picrate*, m. 140 2°, and a neutral oil, b_{18} at a bath temp of 100–38°. VI b_{18} 85–95° and gives a *picrate*, m. 123 5° after sintering at 115°. The *free base* of VI has the compn. C_8H_9NO or $C_8H_{11}NO$. Boiling of I with 30% H_2SO_4 results in a loss of CO_2. II m. 233–4°, $[\alpha]_D^{15}$ 124° (*c* 2.14, $CHCl_3$). It is stable to $KMnO_4$ but decolorizes Br in $CHCl_3$, gives with $FeCl_3$ in a non-hydroxylic solvent a deep garnet-red coloration indicating the presence of an enolic OH group. It does not react with semicarbazide. Hydrolysis of II yields amorphous *rotundifolic acid* (VII) which softens at 160°, effervesces above 165° and darkens at 170°. Distn. of VII with CaO at 200–50° at 1-2 mm. yields a cryst. base, $C_{20}H_{24}N_2O_3$, which sinters at 198° and m. 200-2°. Degradation of II with soda-lime yields a mixt. of indoles, NH_3 and pyridine-like bases. Boiling with 30% H_2SO_4 splits off CO_2. Dehydrogenation of II with Se and distn. of the C_6H_6 ext. give 3 fractions, *C* b_{11} 85–135°, *D* b_{14} 150–75° and *E* b_{14} 180-210°. *C*, on redistn., gives a base $C_9H_{13}N$, b. 195–200°, which forms a *picrate* m. 134–5°. *D* and *E* have not yet been investigated. Ultraviolet absorption measurements of I and II are compared with those of yohimbine and show less relationship to the latter than would be expected. F. E. Brauns

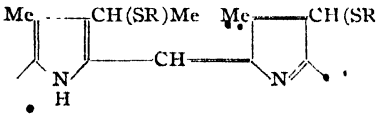
Lactonization of dihydro-*l*-abiatic and dihydro-*l*-pimaric acids. Elmer E. Fleck and S. Palkin. *J. Am. Chem. Soc.* **61**, 3197–9(1939).—Dihydro-*l*-pimaric acid, m. 144-6°, $[\alpha]_D^{19}$ 35°, added to 10 cc. concd. H_2SO_4 at −5° to −10° and stirred for 45 min., gives a lactone (I), m. 131-2°, $[\alpha]_D^{19}$ −4°, identical with lactonized dihydroabietic acid (*C. A.* **33**, 5405[9]); this also appears to be formed from dihydro-*l*-abietic acid with $[\alpha]_D^{19}$ 108°. Hydrolysis of I with 10% BuOH-KOH gives tetrahydroxyabietic acid (II), m. 164–5°; *Me ester*, b_2 175–80°, m. 50–1°, $[\alpha]_D^{25}$ 21°. II is conveniently prepd. by adding 1 g. I to 4 g. 88% KOH at 200° and heating for 15 min. **Oxidation and acylation expts. indicate the C-13 position**

as a more probable point of lactonization than C-10. Rotations were measured in 2% EtOH soln. C. J. West

Saponins and sapogenins. XIII. The precipitability of steroid sapogenins by digitonin. C. R. Noller. *J. Am. Chem. Soc.* **61**, 2717–19(1939); cf. *C. A.* **33**, 8620[8].—In view of the extensive use of the digitonin (I) test it seemed desirable to establish a more definite criterion of compd. formation with I. The relative soly. of the compd. and its component is the only property that can be used conveniently in the steroid sapogenin series and it would seem that to show compd. formation it is necessary to show that the soly. of the digitonide is less than that of either of its components. If a soln. of cholesterol (II) or of β-cholestanol (III) in 90% EtOH, satd. at room temp., is mixed with an equal vol. of a satd. soln. of I in EtOH, a ppt. forms almost immediately. Under the same conditions tigogenin (IV) yields a ppt. after about 20 min., gitogenin (V) after 15 hrs., while sarsasapogenin (VI), chlorogenin (VII), epicoprosterol (VIII) and epidihydrocholesterol (IX) give no ppt. after standing for 5 days. If, however, the solns. of the last 4 compds. are concd. to half vol. to bring the concn. of the compd. and of I to that of satd. solns., all except VIII give some ppt. after standing for 5 hrs. It is seen, therefore, that neither condition gives a satisfactory test since before concn. VI, which is known to give a less-sol. digitonide than its epimer, did not ppt. whereas after concn. IX, which has the α-configuration, also was pptd. The soly. in 90% EtOH (g. per 5 cc.) was detd. as follows: I 0.0412, III 0.0174, IV 0.0051, V 0 0181, VI 0.0170, VII 0.0404, VIII 0.0524, IX 0.0120. The soly. of the digitonides of steroid sapogenins varies considerably and is much greater than that of those of II and III. Thus the soly. product of the digitonide of VI, which is known to be the less-sol. of 2 epimeric forms, is practically the same (9.7×10^{-6} mole per l.) as that of the digitonide of IX (9.4×10^{-6}), which ordinarily is considered as not precipitable by I. V digitonide has a smaller soly. product (4.7×10^{-6}) than VI and hence V provisionally must be considered as being the epimer that is pptd. by I. The digitonide of VII has a much larger soly. product (3.1×10^{-5}) than that of VI and until its epimer is prepd. and shown to give a more-sol. digitonide, VII must be considered as the isomer not precipitable by I. The soly. product of IV is 1.6×10^{-7}; those of I and II are small and that of VIII is large. The soly. products of steroid digitonides vary so widely that qual. tests for pptn. are without meaning unless the behavior of both isomers can be compared. **XIV. The so-called pyridazine derivatives of steroid diones.** *Ibid.* 2976–7.—Marker and Rohrmann (*C. A.* **33**, 4263[4]) postulated that the HO groups of chlorogenin (I) occupy the 3,6-positions in the sterol nucleus on the basis of the formation of a pyridazine deriv. (II) (Noller, *C. A.* **31**, 5368[3]). Three prepns. of II showed mol. wts. of 1410, 1980, 2770 (calcd. for a monomol. compd. 425). It is evident, therefore, that the formation of condensation products with N_2H_4 does not prove that the HO groups of I are in the 3,6-positions, although the fact that the condensation products are polymol. does not exclude these positions. The so-called pyridazine deriv. of cholestane-3,6-dione, amorphous, m. 210–20°, showed a mol. wt. in freezing C_6H_6 of 2999 (calcd. 396). C. J. West

Porphyrin studies. III. The structure of the porphine ring system. Paul Rothemund. *J. Am. Chem. Soc.* **61**, 2912–15(1939); cf. *C. A.* **30**, 3833[3].—In the prepn. of porphine (I) from pyrrole and HCHO, it was observed that there was present a porphyrin with a HCl no. of 0.5; this is designated *isoporphine* (II); details of the sepn. of II are given; recrystd. from C_5H_5N-Et_2O (1 + 9 vols.) it decomps. above 250°. Proposed formulas for I and II and their Mg complexes are given but their designations are arbitrary at present. The *Mg salt* of II (*isoporphine phyllin*), $C_{20}H_{12}N_4Mg$, is not stable when heated with 5% HCl on the steam bath. The *hemin* and the *Cu salt* of II are also reported. Absorption spectra are given for II in Et_2O, the Mg salt in Et_2O and in alk. reaction mixts. and for the hemin and Cu salt in C_5H_5N-Et_2O and as chart gives the values for I and its corresponding salts. In view of this isomerism of I and II the synthesis of α,β,γ,δ-tetrasubstituted porphines (part II) was checked with respect to a possible formation of 2 isomers. The following HCl nos. were found: I and II 3.3 and 0.5; tetra-Me deriv. 0.5 and 0.075; tetra-Pr deriv. about 8, 2.3; tetra-Bu deriv. about 14, 7; tetraiso-Bu deriv. ?, 5.2; tetra-Ph deriv. 13.5, 8.5; tetrakis(3-methoxy-4-hydroxyphenyl) deriv. 1.04, 0.45; tetrakis(*o*-hydroxyphenyl) deriv. 15.7, ?; *m*-isomer 6, 12.2; *p*-isomer 4, 16.8 (the ? indicates that purification has not been sufficient to det. the HCl no.). C. J. West

The constitution of the prosthetic group of cytochrome c. K. Zeile and H. Meyer. *Naturwissenschaften* **27**, 596–7(1939).—From cytochrome c, hematoporphyrin and mesoporphyrin were prepd. (*C. A.* **28**, 185[4]). A further study was made of the side chains which tend to make porphyrin from cytochrome hydrophilic. Resynthesis such as found by Theorell (*C. A.* **33**, 188[6], 8638[7]) was avoided in the decompn. of the cytochrome by use of very low cytochrome concns.; the products were fractionated by use of an org. solvent and water of varying pH. A dicysteine-protoporphyrin was prepd. from protoporphyrin with HBr melted together with *l*-cysteine-HCl in order to study the qualities of such a S compd. (mol. wt. 860.6) as a tetra-Me ester, $C_{44}H_{56}N_6S_2O_8$. After sapon. of cytochrome c in 2×10^{-5} *M* soln., methylation and fractionation, 65% of an ester fraction was obtained which seemed to have the same properties as the synthetic substance according to previously worked-out tests (Z. and Rau, *C. A.* **32**, 2964[1]). It apparently is $C_{44}H_{56}N_6S_2O_8.H_2O$ (mol. wt. 878.6). The natural compd. in 0.1% HCl at 17°, white light, has a specific rotation of −172°, the synthetic product 27°. This difference is readily understood considering the no. of possible stereoisomers of protoporphyrin-HBr. The absorption spectra of the 2 compds. agree. The structure of the tetra-Me ester is



(R = $CH_2CH(NH_2)CO_2H$) for the half-mol. The Fe complex salts of the natural or the synthetic compd. give hemochromogens upon reduction, which have principal absorption bands corresponding to those of natural cytochrome c. No addn. of N base is required for this absorption; it takes place in neutral soln. In this hemochromogen evidently all 6 coördination places of the Fe are occupied by N from the mol. itself: 4 by pyrrole N, 2 by amino N. It was shown that the NH_2 groups are not on the Fe of neighboring mols. B. J. C. v. d. H.

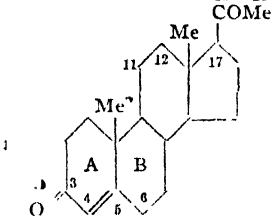
The melanoidins and their relation to humic acids. Curt Enders and Karl Theis. *Brennstoff-Chem.* **19**, 360–5, 402–7, 439–49(1938); cf. *C. A.* **31**, 4048[1], 5100[4]; **32**, 2285[3]; **33**, 3660[3].—The literature is reviewed with particular regard to observations of the similarity of these substances. Details of the prepn. of a standard melanoidin from glycine and glucose by an unpublished method of E. and Emmerich, its properties, colorimetric detn. in aq. soln., kinetics of formation and relation of pH thereto are described in detail. Elementary analysis of the prepn. dried at 105° corresponded to $C_{67}H_{76}O_{32}N_8$. The mol. contains 5 carboxyl groups, a small no. of double bonds, 8 alc. OH groups, 3 phenolic OH groups and 2 carbonyl groups, and a MeO content of 17.07%. In a series of coalifications of the prepn., at 150° and 1 at 220° for 1–6 hrs. progressive changes indicating aromatization were noted. This occurred more readily than with brown coal humic acids. Oxidation of the prepn. with HNO_3 gave first a H_2O-insol. material sol. in acetone. Stronger acid produced material conforming to $C_8H_{14}O_8N_4$, m. 156°, and oxalic, glycolic, succinic, picric and dihydroxybenzenedicarboxylic acids. Oxidation with H_2O_2 produced NH_3 and formic, glycolic, acetic, succinic and possibly tartaric

acids. The action of ClO_3 did not produce maleic acid. F. W. Jung

The connection between bitter taste and chemical constitution. Charonnat. *Union pharm.* **1939**, 27.—3,7,12-Triacetoxycholanic acid is more bitter than the tri-HO acid. 7,12-Diacetoxycholanic acid is not bitter. The Ac group at position 3 necessary for a Legal aceto-reaction, —CO— or CHOH between 2 secondary C atoms causes bitterness if the compd. is sol. Glucosides, cardiotonics and related saponins, cyclohexanol, cyclohexanone, glycyrrhetic acid (alc. group next to a quaternary C) cholatrienic acid (no alc. group) are not bitter. J. McAfee

Sterols. LXXII. Urane derivatives. Russell E. Marker and Ewald Rohrmann. *J. Am. Chem. Soc.* **61**, 2719-22(1939). Cf. *C. A.* **33**, 8621[6].—Uranc-3,11-dione (I) forms a *Br deriv.*, m. 202-3° (decompn.); refluxing with C_5H_5N for 3.5 hrs. gives a *pyridinium salt*, does not m. 300°; heating this salt at 5–10 mm. gives *urenedione*, m. 168–70°. Reduction of I with (iso-PrO)$_3$Al in iso-PrOH or catalytically in EtOH with the Adams catalyst (2 hrs. at 25°) gives *uran-3(β)-ol-11-one* (II), m. 205–7° (*acetate*, m. 170.5–2°); the epi fraction was not investigated. II also results on oxidation of urane-3(β),11-diol with CrO_3 in AcOH at room temp. II does not form a semicarbazone. Refluxing uranediol with (iso PrO)$_3$Al in cyclohexanone-toluene for 10 hrs. gives a small yield of *uran-11-ol-3-one*, m. 169.5–71°; *acetate*, m. 195–7°; *semicarbazone*, m. 251.3° (decompn.). Reduction of I with Zn and HCl in EtOH gives a quant. yield of *uran-11-one*, m. 135–6.5°; this does not form a semicarbazone; catalytic reduction yields *uran-11-ol*, m. 110° (*acetate*, m. 140.2°). If amalgamated Zn is used in the reduction of I the main product is urane. Mild Clemmensen reduction of uranetrione yields *urane-11,20-dione*, m. 199–201°. **LXXII. Oxidation products of sarsasapogenin. C_{19} dibasic acid.** *Ibid.* 2722-4.—The hydrolyzed acidic fraction obtained from the oxidation of sarsasapogenin acetate (*C. A.* **33**, 5107[5]) with twice its wt. of CrO_3 at 85° was taken up in Et_2O, the C_{22} keto acid allowed to sep. and the filtrate evapd. to a sirup; addn. of $CHCl_3$ ppts. the *dibasic acid* $C_{19}H_{30}O_5$ (I), m. 220-2°; this was also obtained in nearly 12% yield by oxidation of sarsasapogenoic acid (II) acetate at 90-5° with CrO_3 and in poor yield from the CrO_3 oxidation at 90-5° of the acetylation product of tetrahydrosarsasapogenin in C_5H_5N in the cold. Refluxing I with Ac_2O for 30 min. gives the *acetate anhydride*, $C_{23}H_{30}O_6$, m. 203–4°; it also results from Ac_2O and C_5H_5N after 20 hrs. at room temp.; EtOH-KOH gives I. CH_2N_2 gives the *di-Me ester* of I, m. 121-2°, whose *acetate* m. 103-4°. Oxidation of I with CrO_3 in AcOH at room temp. for 1 hr., followed by Clemmensen reduction, yields the *desoxy acid* (III), $C_{19}H_{30}O_4$, m. 230-2°; this also results from oxidation of desoxysarsasapogenin with CrO_3 at 90–5°. Refluxing III with Ac_2O for 30 min. and sublimation at 120–40° give the *desoxy anhydride*, $C_{19}H_{28}O_3$, m. 205.5–7°. I is probably 3-hydroxyetiobilianic acid. The fact that II is oxidized easily to I suggests that it is an intermediate in the oxidation of sarsasapogenin to the bilianic acid. III is very probably identical with etiobilianic acid (Wieland, Schlichting and Jacobi, *C. A.* **21**, 590). **LXXIII. Reactions of digitogenin and gitogenin.** *Ibid.* 2724-6.—The filtrate after removal of chlorogenin and tigogenin from *Chlorogalum pomeridianum* was evapd. to dryness, acetylated and recrystd. from Me_2CO, giving the diacetate (I), m. 241–3°, of gitogenin (II), m. 266–8°. I is not affected by boiling with Zn-Hg and HCl in AcOH for 6 hrs. Digitonin (III) (50 g.), boiled in 500 cc. MeOH, 100 cc. H_2O and 100 cc. concd. HCl for 8 hrs., gives digitogenin (IV), m. 278°; this is recovered essentially unchanged after treatment with Zn-Hg and HCl in EtOH for 5 hrs. I in glacial AcOH with the Adams catalyst and H (3 atm.) for 12 hrs. at 70°, followed by hydrolysis, gives *dihydrogitogenin*, m. 195–7°; it gives a ppt. with III, does not react with SeO_2 and yields a *tri-p-nitrobenzoate*, pale yellow, m. 189–91°. IV yields a *dihydro deriv.*, m. 184–6°. I and Br in AcOH contg. a little HBr give a *Br deriv.* (V), m. 219–20°; reduction with Na and abs. EtOH gives II; V does not react with SeO_2 in AcOH. *Bromodigitogenin triacetate*, m. 142° (decompn.). The triacetate of IV and CrO_3 in AcOH at 95° (CrO_3 added during 1 hr. and the product heated an addnl. 90 min.) give *digitogenin lactone triacetate*, m. 281-3°; hydrolysis with EtOH-KOH gives the *tri-HO lactone*, $C_{32}H_{34}O_8$, m. 279–82°. *Gitogenin lactone diacetate*, m. 248–51°; the *lactone* m. 276-8° and forms a *dibenzoate*, m. 275–8°. Both II and IV yield insol. digitonides. **LXXIV. Acetic acid derivatives of estrone and α-estradiol.** *Ibid.* 2974.—Estrone (I) and $ClCH_2CO_2Et$ with EtONa (refluxed 14 hrs.) give 1,3,5-estratrien-17-one-3-hydroxyacetic acid, m. 209–11°; *oxime*, m. 230–2° (decompn.); *Me ester*, m. 130–2°. 1,3,5-Estratriene-3,17(α)-diol gives *1,3,5-estratrien-17(α)-ol-3-hydroxyacetic acid*, m. 182-4°; *Me ester*, m. 94-6°. I and $MeCHClCO_2Et$ give *1,3,5-estratrien-17-one-3-hydroxymethylacetic acid*, m. 195–8°; *Me ester*, m. 137–9. **LXXV. Cholesterol derivatives.** *Ibid.* 3022-4.—7-Ketocholesteryl chloride in Et_2O, shaken with H at 3 atm. for 4 hrs. at 25° (Adams catalyst), gives 7-ketocholestyl chloride, m. 136–8° (*oxime*, m. 152–4°). Reduction of the acetate of 5-cholesten-3(β)-ol-7-one in Et_2O gives the *acetate* (I), m. 147–8°, of *cholestan-3(β)-ol-7-one*, m. 128–30° and then 157–9° (*oxime*, m. 232–3°). Catalytic reduction of 7-ketocholesteryl acetate in AcOH with the Adams catalyst and hydrolysis of the reduction product yield cholestane-3(β),7(α)-diol, m. 164-6°; this also results from I and (iso-PrO)$_3$Al in iso-PrOH on refluxing 14 hrs. 7-Hydroxycholesteryl chloride with Na in AmOH gives 5-cholesten-7-ol (II), m. 105–6°; benzoate, m. 145–7° (Dimroth and Trautmann (*C. A.* **30**, 4506[4]) give 93.4° and 108-9°, resp.); catalytic reduction gives cholestan-7-ol. Bromination of II followed by mild oxidation with CrO_3 and subsequent debromination give *5-cholesten-7-one*, m. 125–6°. Cholesteryl acetate in C_6H_6 and SeO_2 in 98% AcOH give *3-acetyl-4-hydroxycholesterol*, m. 163–5°; the AcOH filtrate deposits a polymorphic form, m. 189–91°; both forms give the same diacetate, m. 162–3°. C. J. West

Steroids. I. 6-Oxoprogesterone and the stereochemical configuration of several 3,5,6-triols. Maximilian Ehrenstein. *J. Org. Chem.* **4**, 506–18(1939).—Introduction of an OH group into the side chain at C atom 21 as in 21-hydroxyprogesterone causes a decrease in the progestational and an increase in the "cortin" activity. No systematic attempt has been made to exam. progesterones with OH groups in the ring system except 1,2-hydroxyprogesterone (cf. Ehrhart, Ruschig and



Aumueller, *C. A.* **33**, 6327[8]), and this has apparently not been examd. for "cortin" action. To investigate the physiol. properties of these progesterones oxygenated in the ring, 6-oxoprogesterone (I) is prepd. Butenandt and Riegel (*C. A.* **30**, 5234[6]) prepd. 6-oxotestosterone acetate and 4-androstene-3,6,17-trione (II) by oxidizing 5-androstene-3,17-diol 17-monoacetate and dehydroisoandrosterone (III), resp., with Cr_2O_3 in AcOH, but they do not show androgenic properties. In addn. to these compds. a white cryst. substance is obtained which they consider to be a hydrate of the resp. 6-oxo compds. On the other hand, Ushakov and Lyutenberg (*C. A.* **32**, 1871, 5774) subjected III to a series of reactions and obtained a compd. which is presumably identical with II. Since no definite comparison of these substances has been made E. reinvestigates the various oxidations of

III. III (200 mg.), in 6 cc. AcOH and 280 mg. Cr_2O_3 in a few drops H_2O and addnl. 3 cc. AcOH, is shaken for 7 hrs. at 29°, dild. with H_2O and extd. with Et_2O. The Et_2O exts. are washed with 2 *N* Na_2CO_3, dried with Na_2SO_4 and evapd. The yellow partially cryst. residue is extd. with C_6H_6, concd. *in vacuo* and the residue treated with EtOH, which leaves the white cryst. product partially undissolved. The part which is dissolved in the EtOH is recovered by concn. The total white cryst. product is recrystd. from hot EtOH, from which 1.8 mg. *androstane-3,6,17-trion-5-ol* (IV) is obtained, which m. 248–9° in agreement with B. and R., $[\alpha]_D^{23}$ 54.6° (Me_2CO). II is not isolated. IV is also obtained from *dehydroisoandrosterone acetate* (V) which in turn is prepd. by acetylation of III with pyridine and Ac_2O. V m. 171–2°. Oxidation of 200 mg. V by heating it with 0.2 cc. 30% H_2O_2 in 1 cc. AcOH gives 48.7 mg. *androstan-17-one-3(β),5,6-(trans)-triol* (VI), m. 295–8°. When 50 mg. VI is oxidized with 37.5 mg. Cr_2O_3 in 5.5 cc. AcOH at room temp. for 22 hrs. and 2 cc. EtOH is added and the mixt. then concd. *in vacuo*, 22.1 mg. IV, m. 249.5–50.5°, is obtained after recrystn. from EtOH. From the mother liquor another 3.9 mg., m. 247–8.5°, $[\alpha]_D^{25}$ 62.2° (4.5 mg. in 2 cc. Me_2CO), is isolated. The identity of U.'s and B.'s compds. is therefore established. U. and L. oxidized III with OsO_4 according to Criegee (*C. A.* **30**, 3811[1]) and obtained *androstan-17-one-3(β),5,6(cis)-triol* (VII) which they claimed is different from VI and it is interesting to det. the actual configuration of the OH groups at C atoms 5 and 6. Since oxidation of VI and VII both give IV, the configuration of the OH at C atom 5 is the same and the assignment of a definite configuration to C atom 5 would automatically fix the configuration at C atom 6 (cf. Butenandt and co-workers, *C. A.* **33**, 5862[8], and Westphal, *et al.*, *C. A.* **33**, 7306[4]). U. and L.'s expt. is repeated by treating 350 mg. III with 350 mg. OsO_4 in 53 cc. abs. Et_2O. The mixt. is kept at 28–30.5° for 3 days, the Et_2O evapd. and the soln. of 2.5 g. Na_2SO_3 in 25 cc. 95% EtOH and 50 cc. H_2O is added and the mixt. refluxed for 2.5 hrs. The filtered soln. is concd. *in vacuo*, satd. with NaCl and extd. 4 times with $CHCl_3$. The $CHCl_3$ ext. is washed with H_2O, dried and evapd. From the residue 133.5 mg. VII, m. 243–5.5°, $[\alpha]_D^{25}$ 79.5° (19 mg. in 2 cc. MeOH), is obtained. When 100 mg. VII is oxidized in 8 cc. AcOH and 75 mg. Cr_2O_3 in 3 cc. AcOH at room temp. for 18.5 hrs., 38.9 mg. IV, m. 249–50.5° (decompn.), is formed. In the derivs. of III in which the OH group at C atom 3 is covered by AcO, the 5,6-double bond is inert to the addn. of OsO_4. Since the OH group at C atom 3 in these compds. is in the β-position, esterification of the OH group should sterically hinder the addn. of OsO_4 provided that the latter leads to a cis linkage of rings A and B. Expts. analogous to those with III have been carried out on 5-pregnen-20-on-3-ol (VIII). Oxidation of 396.2 mg. VIII in 15 cc. AcOH with 506 mg. Cr_2O_3 in a trace of H_2O and 3 cc. AcOH at 27° for 5.5 hrs. gives 38.7 mg. *pregnane-3,6,20-trion-5-ol* (IX) m. 267–8°. IX is also obtained from *5-pregnen-20-on-3-ol acetate* (X), prepd. by acetylation of VIII with Ac_2O and pyridine, m. 144.5–6.5°. X (400 mg.) is first oxidized with H_2O_2 in AcOH to give *pregnan-20-one-3(β),5,6(trans)-triol* (XI), m. 256–8°. Oxidation of XI with Cr_2O_3 in AcOH gives IX. IX is also identical with a product which is obtained from VIII via *pregnan-20-one-3(β),5,6(cis)-triol* (XII). To a suspension of 340 mg. VIII in 27 cc. Et_2O 310 mg. OsO_4 in 31 cc. Et_2O is added, giving 341.5 mg. of a mixt of XII and unchanged VIII, m. 190°. It is therefore retreated with OsO_4 in dioxane and gives then 170.3 mg. XII, m. 231–2.5°, $[\alpha]_D^{25}$ 59.8° (14.8 mg. in 2 cc. MeOH). Oxidation of XII with Cr_2O_3 gives IX, m. 267–8.5°. The prepn. of an identical trione from either X or XII proves that the 2 triols have the same configuration at C atom 5. Since VIII has the same β-configuration at C atom 3 as III, its acetate is inert toward OsO_4. When IX is dehydrated in $CHCl_3$ with dry HCl, *4-pregnene-3,6,20-trione* (*6-oxoprogesterone*) (XIII) is formed, m. 185–8°. When X is treated with OsO_4 in Et_2O, chiefly VIII is recovered, which on acetylation gives X again. The ultraviolet absorption curve of XIII has been detd. A biol. test on mice shows a moderate estrogenic reaction. F. E. B.

Steroids. XXIII. Homologs of sex hormones. 1. K. Miescher and A. Wettstein. *Helv. Chim. Acta* **22**, 1262–8(1939); cf. *C. A.* **29**, 6898[8]; **33**, 8208[1].—Since androstenedione, regarded as the lowest homolog of progesterone, is the prototype of a strongly androgenic hormone, and 17-methyltestosterone (I), a homolog of testosterone, is one of the most potent androgens, a new homolog of testosterone, *Δ⁴-17-hydroxymethylandrosten-3-one* (II), was prepd. It is an isomer of I. Starting with the reduction of Me 3-hydroxy-5-etiocholenate (III) (cf. *C. A.* **32**, 947[8], 7922[1]), the method of Ruzicka and Jacobs, employed in the polyterpene series (cf. *C. A.* **32**, 7441[4]), was used. The resulting *Δ⁵-17-hydroxymethylandrosten-3-ol* (IV), $C_{20}H_{32}O_2$, m. 209–11° (cor.), gave a *diacetate*, $C_{24}H_{36}O_4$, m. 136–7°. For its oxidation 1.015 g. of IV was suspended in 20 cc. glacial AcOH and 0.533 g. Br in 13.5 cc. glacial AcOH was added with cooling. After addn. of 0.5 g. Cr_2O_3 in 5 cc. 90% glacial AcOH and agitation for 16 hrs. the soln. was heated for 10 min. with 5 g. Zn dust at 70–80°, cooled and filtered. The filtrate was poured into water and extd. with ether, washed with *N* alkali, dried and evapd. This fraction is still under study. The alk. eluates of the ether ext. were acidified, the pptd. acid fraction was extd. with ether, the ext. washed and dried and a soln. of CH_2N_2 in ether was added. On standing at room temp. until the evolution of N ceased the ether ext. was shaken with *N* soda (?) soln. and water, dried and evapd. The residue was treated with Girard's reagent (cf. *C. A.* **31**, 1006[4]) and, recrystd. from hexane, gave *Me Δ⁴-3-ketoetiocholenate* (V), $C_{21}H_{30}O_3$, m. 134–5°. The same compd. was obtained also by boiling 1 g. of III for 2.5 hrs. with 1 g. (iso-PrO)$_3$Al, 50 cc. toluene and 8 cc. cyclohexanone, and sepg. the ketonic portion from the nonevaporable part of the product according to Girard. The V was sapond. by boiling 4 hrs. with 7% KOH in MeOH. The mixt. was poured into water, extd. with ether, the aq. phase freed from ether by heating, acidified and the flocculating *Δ⁴-3-ketoetiocholenic acid* (VI) purified by sublimation at 220° (0.001 mm.) and recrystn. from dil. acetone, giving $C_{20}H_{28}O_3$, m. 258–62°. For dehydration 1.4 g. of IV was refluxed for 1.5 hrs. with 80 cc. of toluene, 1.6 g. (iso-PrO)$_3$Al and 12 cc. cyclohexanone. After steam distn. of the mixt. for 2 hrs. the residue was acidified with 2 *N* H_2SO_4, extd. with ether, the ext. shaken out with 40% bisulfite soln., water, *N* soda (?) soln. and water. On evapn., the residue was treated with Girard's reagent and a ketonic fraction (1.27 g.) obtained. This was heated 5 hrs. with 2.5 g. of anhyd. succinic acid and 12.5 cc. pyridine. On cooling the soln. was poured into 100 cc. of 2 *N* soda (?) soln. and exhausted with ether. The ext. (HO-free ketonic fraction) was washed with dil. H_2SO_4 and water, dried and evapd. The residue was dissolved in hexane-benzene (3:1) and chromatographed on Al_2O_3. After elimination of a sticky fraction the recrystd. compd. yielded a by-product, $C_{26}H_{36}O_2$, m. 190–93°. The alk. soln. of the succinic acid ester was acidified and exhausted with ether. The ether soln. was washed with dil. acid and water, dried and evapd. *in vacuo*. The residue was heated with 2% KOH in MeOH, the sapond. soln. poured into water, extd. with ether, the exts. were washed, dried and evapd. The ketone-alc. fraction (1 g.) was dissolved in hexane-benzene (1:1), filtered through a 30-g. column of Al_2O_3 and washed with 500 cc. of the hexane-benzene mixt. The final product (II) was extd. by benzene-ether (1:1) and crystd. from dil. acetone; $C_{20}H_{30}O_2$, m. 158–9°; *acetate*, $C_{22}H_{32}O_3$, m. 114–15°; *acetate semicarbazone*, $C_{23}H_{35}O_3N_3$, m. 214–15°. On oxidation with Cr_2O_3 at room temp. II gave VI. Its physiol. action will be described later. T. Laanes

Chemical constitution of cholesterol. Isomerization with hydrobromic acid. Francesco Pirrone. *Ricerca sci.* **10**, 416–21(1939); cf. De Fazi, *C. A.* **32**, 6660[8].—An alc. soln. of 30 g. of cholesterol (I), with neg. Rosenheim reaction, was added at ordinary temp. to

200 cc. of 24% HBr. Spontaneous evapn. gave a cryst. solid m. 130–135°, which by crystn. from EtOH gave an *isomer* (II) of I, m. 138.5–9°, slightly sol. in alc., and 2 other fractions (III and IV) in small amt., m. 125° and 104–5°, resp. A mixt. of I and II m. 125–30°. II gave no Rosenheim reaction within an hr.; the Salkowski reaction gave a yellow color in $CHCl_3$, changing to blood-red; the Liebermann reaction was immediate and permanent. II had the compn. $C_{27}H_{46}O$, $[\alpha]$ −32° (2.125% in C_6H_6). To a soln. of 1 g. of II in 10 cc. of Et_2O was added 4 cc. of a 10% soln. of Br in HOAc. The *dibromide* (V), crystd. from Et_2O and Me_2CO, m. 97° and gave pos. tests in the above reactions. Upon debromination by KOAc in alc. V gave I, as shown by the mixed m. p. 146–8°. With boiling Ac_2O, II gave an Ac deriv., m. 113–14° after crystn. from Me_2CO, $[\alpha]$ −40.13° (2.06% in $CHCl_3$). This was shown to be identical with the Ac deriv. of I by mixed m. p. and hydrolysis to I. The same Ac deriv. was formed by treating II with Ac_2O and P_2O_5 at 7 8°. From 1 g. of II and 5 cc. of HCO_2H after boiling 3 hrs. a *formyl deriv.*, m. 84–6°, was obtained by crystn. from Me_2CO, $[\alpha]$ −46.27° (2.25% in $CHCl_3$). The color reactions of this substance were the same as those of I. From 2 g. of II with 2 g. of Bz_2O and 50 cc. of alc. was obtained after 2 hrs. boiling a *Bz deriv.* of II, m. 143–4°, $[\alpha]$ −13.94° (2.15% in $CHCl_3$), which on saponn. with alc. KOH gave I, m. 147–8°. Satn. of a soln. of 2 g. of II in 30 cc. of alc. and 30 cc. of Et_2O with dry HCl gave the *hydrochloride* of II, m. 118–20° (decompn.). After crystn. from alc. III and IV were obtained in too small amt. for study. An Osram lamp immersed in a C_6H_6 soln. of II lowered the m. p. of II in 2 hrs. to 125–8°, in 8 hrs. to 120–5°, in 24 hrs. to 76–8°, with bright-blue Rosenheim reaction. These mixts. were sepd. into unchanged II, one fraction from Me_2CO m. 102–3°, and one m. 85–7°. The latter two gave a violet-blue color in the Rosenheim reaction.

W. F. Bruce

Stigmasterol 22,23-dibromide. Erhard Fernholz and Homer E. Stavely. *J. Am. Chem. Soc.* **61**, 2956–7 (1939).– Stigmasteryl acetate tetrabromide (5 g.) in 75 cc. C_6H_6 and 3 g. NaI in 25 cc. EtOH, allowed to stand 20 hrs. at room temp., give 60% of the *acetate*, m. 212–13°, $[\alpha]_D^{25}$ 30° (15.3 mg. in 2 cc. $CHCl_3$), of *stigmasterol 22,23-dibromide* (I), m. 209–10°. Refluxing 3.6 g. of I and 5 g. (*tert*-BuO)$_3$Al in 150 cc. C_6H_6 and 40 cc. Me_2CO overnight gives 2.6 g. of *stigmastadienone 22,23-dibromide* (II), m. 182–4°, $[\alpha]_D^{25}$ 53° (18.8 mg. in 2 cc. $CHCl_3$). Reduction of 200 mg. of II with Zn and AcOH (heating 1 hr. on the water bath) gives 45 mg. of *stigmastadienone* (III), m. 124–5°, $[\alpha]_D^{25}$ 63° (27.7 mg. in 2 cc. $CHCl_3$); *semicarbazone*, m. 235–7°. III also results from stigmasterol (IV) with (iso-PrO)$_3$Al in cyclohexanone and PhMe on refluxing 2 hrs. (cf. *C. A.* **32**, 4174[8]). Marker and Wittle's stigmastenone (*C. A.* **32**, 949[5]), prepd. from IV by catalytic dehydrogenation with Cu, should be III, but it m. 94°; no explanation of the difference is given.

C. J. West

Lignin and related compds. (Dorland, *et al.*) **23.** Azo dyes and their intermediates (Ruggli, Leupin) **25.** Procyanines (Calzavara) **5.** Distribution of astaxanthin in the animal and plant kingdom (Kuhn, *et al.*) **11A.** Electron-diffraction investigation of the mol. structures of the meso and racemic 2,3-dibromobutanes (Stevenson, Schomaker) **2.** Stability of the valency angles of the C tetrahedron—dipole moments of stereoisomeric 2,3-dichloro-2-butenes (Mikhailov, Tishchenko) **2.** Ellipsoids of polarization of bonds and octets (Wang) **2.** Dipole moments and structures of certain nitro compds. and amines (Lewis, Smyth) **2.** Substances of a green alga which det. sex (Kuhn, *et al.*) **11D.** Catalysts [for the conversion of CO and H to CH_4] (Brit. pat. 517,419) **18.**

Separating hydrocarbons. I. G. Farbenind. A.-G. (Richard Gerlach, inventor). Ger. 679,088, July 28, 1939 (Cl. 26*d*, 10.10). Addn. to 677,864 (*C. A.* **33**, 9602[2]). Gases contg. hydrocarbons are passed through a tower contg. a mixt. of liquid hydrocarbons to sep. the low-boiling constituents from the high-boiling ones. Thus, a mixt. of ethane, propane and butane is washed with a mixt. of propane and butane to sep. the ethane, which goes off unchanged in the vapor phase.

Catalytic dehydrogenation of hydrocarbons, as in producing butylenes from butane. Aristid V. Grosse (to Universal Oil Products Co.). U. S. 2,172,534, Sept. 12. In the dehydrogenation of hydrocarbons by subjecting them to dehydrogenating conditions in the presence of a mixt. of Al_2O_3 with a minor proportion of a dehydrogenating catalyst of greater activity such as Cr_2O_3, a relatively small amt. of an alkali metal oxide such as that of Na is incorporated into the Al_2O_3 prior to the addn. to it of the dehydrogenating catalyst mentioned, and serves to lessen C deposition.

Oxidation of paraffin hydrocarbons. Wilhelm A. Farenholtz, Gustav Hubbe and Herbert Hubbe (trading as Vereinigte Oelfabriken Hubbe & Farenholtz). Brit. 507,521, June 16, 1939. Paraffins that are liquid under the conditions of treatment are oxidized in the presence of salts of metals of the 6th, 7th or 8th group of the periodic system together with free higher carboxylic acids, e. g., fat (stearic or linoleic), resinic or naphthenic acids, if desired with the addn. of compds. (fat or resinic acid salts, carbonates or bicarbonates) of the alkali or alk.-earth metals, Mg included. Mn or Co oxalate, palmitate or stearate, Co resinate, Fe naphthenate, $MnCl_2$, $FeCl_3$, bichromates and U nitrate are suitable salts.

Aromatic hydrocarbons from aliphatic hydrocarbons. Aristid V. Grosse and Jacque C. Morrell (to Universal Oil Products Co.). U. S. 2,172,535, Sept. 12. For the production of aromatic hydrocarbons from aliphatic hydrocarbons contg. 6–12 C atoms, they are heated to about 400–700° for about 0.1–20 sec. in the presence of a mixt. of oxides of V, Cr and Mo. Cf. *C. A.* **33**, 6338[3].

Aromatic hydrocarbons from aliphatic alcohols. Vasili I. Komarewsky (to Universal Oil Products Co.). U. S. 2,172,540, Sept. 12. For producing aromatic hydrocarbons, such as toluene, from aliphatic alcs., such as heptyl alc., contg. at least 6 C atoms in straight chain arrangement, the alc. is brought into contact, at a dehydrating and dehydrogenating temp. (suitably about 300–500°) with a mixt. of a dehydrating catalyst such as activated alumina and a dehydrogenating catalyst such as an oxide of Cr, Mo, V or W.

Unsaturated hydrocarbons; chlorinated hydrocarbons. I. G. Farbenindustrie A.-G. Brit. 508,417, June 30, 1939. Paraffins or olefins having 3–8 C atoms per mol., or their partially chlorinated derivs., are hydrogenated by exposure in the gas phase to a temp. of 500–800° in admixt. with 0.3–2 mol. proportions of Cl per mol. of hydrocarbon, the reaction products being stabilized by cooling and then treated to sep. the dehydrogenation products. In a modification, the cooled mixt. is treated with more Cl to form Cl addn. products of the olefins produced, and the olefin chlorides may then be converted to diolefins, e. g., as described in Brit. 484,660 (*C. A.* **32**, 7353[7]). The materials to be dehydrogenated are mixed intimately with the Cl and, if desired, with dilg.-gases, e. g., chlorinated hydrocarbons, N, H_2O-vapor, CO_2. Filler bodies and catalysts may be used.

Polymerizing olefins. Standard Oil Development Co. Brit. 507,439, June 14, 1939. In polymerizing olefins with H_2SO_4 to produce dimers and trimers, the yield of dimer is increased by adding trimer to the polymerizer feed. The process is particularly applicable to the copolymerization of *n*- and iso-butenes with H_2SO_4 of 60–75% concn. at 150–300°F. and 200–600 lb. per sq. in. pressure to maintain the liquid phase. App. is described.

Polymerizing unsaturated hydrocarbons such as ethylene, propylene and butylenes. Emil Keunecke and Wilhelm Muench (to I. G. Farbenindustrie A.-G.). U. S. 2,173,482, Sept. 19. For the production of liquid hydrocarbons by polymerization, low-mol. unsatd. hydrocarbons are brought into contact with a catalyst comprising a polymerization-promoting agent such as H_3PO_4 which is applied to an activated wood charcoal having,

at a grain size of from 2 to 4 mm., a filling wt. of at the most 20 g. per 100 cc. of filling volume. Several examples with details are given.

Olefin oxides. I. G. Farbenindustrie A.-G. Brit. 507,538, June 16, 1939. In the production of olefin oxides by oxidation of olefins with O, the catalyst consists of Ag contg. a metal of the Pt group with or without other metals or compds. known as addns. to Ag catalysts for this reaction. Among examples, solns. of $AgNO_3$ and H_2PtCl_6 are dropped into a soln. of $(COONH_4)_2$ and KOH and the ppt. is boiled in glycol, washed and dried in O at 450°; a mixt. of C_2H_4 and air with or without steam is led over this catalyst at 300–320°. Cf. *C. A.* **33**, 5865[5].

Hydrating olefins to produce alcohols. Herbert G. Tanner (to E. I. du Pont de Nemours & Co.). U. S. 2,173,187, Sept. 19. A process for the production of alcs. such as EtOH comprises bringing a mixt. of an olefin such as C_2H_4 and water vapor at a temp. between 150° and 325° and under superatm. pressure into contact with a catalyst comprising a porous supporting material such a silica gel impregnated with phosphotungstic acid or other heteropoly acid, the complex ion of which includes an element of group VI, sub-group A of the periodic table, the reaction being carried out in the presence of an inert gas such as CO_2.

Unsaturated alcohols. I. G. Farbenindustrie A.-G. Brit. 508,062, June 20, 1939. Alcs. contg. acetylenic linkages are prepd. by bringing aldehydes or ketones into contact with C_2H_2 hydrocarbons of the formula RC:CH, R being H or the radical of a hydrocarbon, in the presence of Cu, Ag, Au or Hg or a compd. thereof, particularly their C_2H_2 compds. Agents capable of binding acids, e. g., formates, acetates, carbonates, bicarbonates or hydroxides of alkali or alk. earth metals or Mg, ZnO, $ZnCO_3$ or alkali metal phosphates or silicates, may also be present. The absorption of C_2H_2 is favored by the addn. of substances having large surfaces, e. g., kieselguhr, silica gel or active C, which may be impregnated with a soln. of the heavy metal salts. Examples are given of the prepn. of 1,4-butynediol and propargyl alc. from CH_2O, 1,4-dimethyl-2-butyne-1,4-diol and 3-butyn-2-ol from AcH, 1-phenyl-2-propyn-1-ol from BzH, 1,4-tetramethyl-2-butyne-1,4-diol and 2-methyl-3-butyn-2-ol from Me_2CO, etc.

Dehydrogenating alcohols. Rudolph L. Hasche (to Eastman Kodak Co.). U. S. 2,173,111, Sept. 19. Reactions such as the production of propionaldehyde and propionic acid from PrOH are effected by heating the alc. to about 275–300° and bringing it into contact with a dehydrogenating catalyst which has a low tendency to dust and which comprises water-quenched pellets obtained from blown cuprous oxide maintained at a slightly higher temp. than the preheating temp. Various details of app. and operation are described.

Aldehydes. I. G. Farbenind. A.-G. (Otto Schmidt, Karl Huttner and Georg Käb, inventors). Ger. 679,257, Aug. 1, 1939 (Cl. 12*o*. 7.03). Addn. to 660,735 (*C. A.* **32**, 6666[7]). High-mol. unsatd. aldehydes are prepd. by passing formic acid and unsatd. carboxylic acids contg. at least 10 C atoms over a catalyst at below 1/20 atm. pressure. Thus, formic and oleic acids, together with CO_2 are passed over a catalyst of pumice impregnated with $Mn(NO_3)_2$ to give olealdehyde.

Indole aldehydes. I. G. Farbenindustrie A.-G. and Wilfred W. Groves. Brit. 506,797, June 1, 1939. Addn. to 438,278 (*C. A.* **30**, 2577[5]). To introduce an aldehyde group, indoles contg. (a) in the 2-position an alkyl group having not more than 3 C atoms or an aryl group and which is unsubstituted in the 3-position but may or may not be substituted at the N atom, or (b) a substituent at the N atom, a reactive CH_2 group in the 2-position and 2 alkyl groups in the 3-position are caused to react with a condensation product of $COCl_2$ and a *N*-formyl compd. of a secondary aromatic amine. The $COCl_2$ condensation products may be made by introducing $COCl_2$ into a soln. of the formyl compd. in a solvent, e. g., toluene, PhCl, CCl_4, dichloroethylene. In an example, $COCl_2$ is introduced into a C_6H_6 soln. of *N*-methylformanilide and 1,3,3-trimethyl-2-methyleneindoline is then added drop by drop; 1,3,3-trimethyl-2-methyleneindoline-ω-aldehyde is obtained by adding alkali to the product and distg.

Aldehydes, ketones and alcohols. I. G. Farbenindustrie A.-G. Brit. 506,850, June 6, 1939. See Fr. 832,072 (*C. A.* **33**, 2534[3]).

Aldehydes, ketones and alcohols. I. G. Farbenindustrie A.-G. Brit. 507,204, June 7, 1939. Aldehydes or ketones of high mol. wt. are obtained by the condensing action of a secondary amine or a salt thereof on (a) an aldehyde contg. a reactive CH_2 or CH_3 group, or a mixt. of such aldehydes with 1 another or with other aldehydes, or (b) a mixt. contg. an aldehyde of any kind and a ketone contg. a reactive CH_2 or CH_3 group, the reaction being effected under such conditions that the H_2O formed is continuously removed. Among examples, (1) crotonaldehyde is condensed in the presence of morpholine acetate and the H_2O formed is removed by azeotropic distn. with the aid of C_6H_6; a mixt. of unsatd. aldehydes contg. 8 C atoms or more is obtained and is hydrogenated in octyl alc. in the presence of a Ni catalyst; the products include dodecyl and cetyl alcs., and (2) a mixt. of cyclohexanone and BzH is condensed in the presence of piperidine acetate and the H_2O formed is removed by azeotropic distn. with toluene, 2,6-dibenzylidenecyclohexanone being obtained.

Polymeric α-halovinyl methyl ketones. Lothar W. Metzger and Otto Bayer (to I. G. Farbenind. A.-G.). U. S. 2,173,066, Sept. 12. Polymeric α-chloro- or α-bromovinyl methyl ketones are produced from the corresponding monomeric compds. even on standing and are suitable for use as intermediates for various reactions.

Isobutenylamines. Miroslav W. Tamele and Herbert P. A. Groll (to Shell Development Co.). U. S. 2,172,822, Sept. 12. A process for the production of isobutenylamines involves treating isobutenyl chloride with more than an equiv. quantity of NH_3 or an amine in the presence of *sec*-Bu alc. at a temp. of about 80–250° under a superatm. pressure at least equal to the combined vapor pressures of the constituents of the reaction mixt. at the operating temp. Details are given of the production of isobutenylamine, b. about 78°, diisobutenylamine, b. about 149°, triisobutenylamine, b. about 194–5°, isobutenylphenylamine, b_{10} about 105–6°, *N*,*N*′-diisobutenylethylenediamine, b_{10} 91.8–94.8°, isobutenylcrotylamine and diisobutenylcrotylamine; and general mention is made of reacting materials for the production of numerous other products by similar reactions.

Separating aromatic amines from pasty reduction mixtures derived from nitro compounds. Harold G. Mow (to National Aniline and Chemical Co.). U. S. 2,174,008, Sept. 26. An arrangement of app. is described, and a method of sepg. an aromatic amine (such as aniline or *m*-phenylenediamine or α-naphthylamine) from a pasty mixt. also contg. Fe oxide as formed by reducing a nitroaromatic compd. with Fe in the presence of aq. $FeCl_2$, which involves heating the mixt. at an abs. pressure below 10 in. Hg in a rotary mill to distil off the amine and simultaneously subjecting the mixt. to the action of freely movable, ponderous agitators, such as balls of Fe or steel.

Diamidines. May & Baker Ltd., Arthur J. Ewins, Harry J. Barber, George Newbery, Julius N. Ashley and Alan D. H. Self. Brit. 507,565, June 12, 1939. Diamidines are prepd. from dicyano compds. of formula NCRXRCN, where each R is a C_6H_6 nucleus and X is a simple linkage or a group $(CH_2)_n$ wherein *n* is 1–12 and 1 or more of the CH_2 groups may be replaced by O or S or by NH. The dicyano compds. are treated in soln. in an anhyd. aliphatic alc. with dry HCl or HBr, optionally in the presence of an addnl. solvent, whereby the corresponding imino ether hydrohalides are obtained; the latter are then converted into amidines by reaction with NH_3, optionally in alc. soln. Among examples, diamidines are prepd. from (1) 4,4′-dicyanodiphenylmethane, prepd. from 4,4′-diaminodiphenylmethane by the Sandmeyer reaction, (2) 4,4′-dicyanodiphenyl sulfide, prepd. from 4,4′-diaminodiphenyl sulfide, (3) 4,4′-dicyano-α,β-di-

phenoxyethane, prepd. by condensing *p*-hydroxybenzonitrile (I) with ethylene dibromide, and (4) *p,p'*-dicyano-1,5-diphenoxypentane, prepd. from I and pentamethylene dibromide.

Amino glycols. Henry B. Hass and Byron M. Vanderbilt (to Purdue Research Foundation). U. S. 2,174,242, Sept. 26. 2-Amino-2-ethyl-1,3-propanediol, m. about 38°, 2-amino-2-propyl-1,3-propanediol, m. 58°, and 2-amino-2-isopropyl-1,3-propanediol, m. 74° (solns. of which are suitable *for absorbing CO_2 and H_2S from industrial gases*) are prepd. by reduction or catalytic hydrogenation of the corresponding nitro compds. Various details of procedure are given.

Crotonic acid esters. The Distillers Co. Ltd. and Hanns Peter Staudinger. Brit. 507,778, June 21, 1939. Esters of crotonic acid with aliphatic, cycloaliphatic and aromatic alcs., e. g., BuOH, glycerol, glycol, cyclohexanol, benzyl alc. (II), are made by causing crotonaldehyde (I), alc. and O to react in the presence of a nonacidic oxidizing catalyst, e. g., Mn crotonate or phosphate, Cu crotonate. In an example, I, II, C_6H_6, MnO_2 and H_3PO_4 are heated in a flask and air is introduced, H_2O being carried away by the C_6H_6.

Polyglycol esters of fatty acids. Lever Brothers & Unilever Ltd. and Reginald Furness. Ger. 679,971, Aug. 17, 1939 (Cl. 12*o*. 11). Crude esters contg. unesterified OH groups and free glycerol or polyglycerol are heated to 80–100° with an aq. soln. of an inorg. salt such as Na_2SO_4 to form a polyglycerol ester. In the example a crude ester from coconut oil contg. 23% ester and 77% unesterified polyglycerol is heated with an aq. soln. of Na_2SO_4.

Cyclic formals. I. G. Farbenindustrie A.-G. Brit. 507,571, June 14, 1939. These are prepd. by causing 1 mol. of an aliphatic monoolefin, e. g., C_3H_6, C_4H_8 or C_5H_{10}, to react with preferably about 2 mols. of CH_2O or its equiv. of a substance that yields CH_2O) in the presence of a strong mineral acid or a metal salt thereof having an acid reaction or an org. acid derived from a strong mineral acid, e. g., $ZnCl_2$, HCl, H_2SO_4, $KHSO_4$, H_3PO_4, phosphotungstic acid or benzene- or toluenesulfonic acid. Aq. CH_2O may be used. An indifferent org. solvent may be employed. Among examples, (1) $ZnCl_2$ soln., paraformaldehyde, C_3H_6 and methylene chloride are caused to react at 120° for 12 hrs. under pressure, the resulting butylene glycol formal being sepd. by fractional distn.; and (2) trimethylethylene, aq. CH_2O and concd HCl are refluxed for 10 min. to produce the trimethylbutylene glycol formal.

Quaternary ammonium bases. Heinrich Ulrich and Ernst Ploetz (to I. G. Farbenind. A.-G.). U. S. 2,173,069, Sept. 12. For the production of a quaternary NH_4 compd., an alkylene oxide such as ethylene oxide is treated with triethanolamine or other tertiary amine of the general formula $R_1N(R_2)R_3$, where R_1 stands for a hydroxy lower alkyl group, and R_2 and R_3 are from the class consisting of aliphatic hydrocarbon radicals, hydroxy lower alkyl, cycloalkyl and aralkyl groups, and aliphatic radicals which, together with the N atom, form a heterocyclic ring, in an aq. medium the pH of which is between about 8 and about 9 at the beginning of the reaction. Numerous examples are given. Cf. *C. A.* **33**, 1961[9].

Unsaturated carbonyl compounds. N. V. de Bataafsche Petroleum Maatschappij. Brit. 508,435, June 30, 1939. Carbinol-contg. carbonyl compds. are dehydrated to the corresponding unsatd. carbonyl compds. by distn. in the presence of a dehydrating catalyst, H_2O being added to the still head or distn. column to form an azeotrope. The unsatd. carbonyl compd. is drawn off as top product. Thus, diacetone alc. is converted to mesityl oxide, 2,6-dimethyl-3-hepten-4-on-6-ol and triacetone alc. to phorone, propionoin to ethyl propenyl ketone, acetobutyl alc. to 4-hexen-2-one, hydracetal acetone to ethylidene acetone, hexane-2,5-dion-3-ol to 3-hexene-2,5-dione, 2,5-chloral acetone to trichloroethylidene acetone, 2,5-dimethylolcyclohexanone to 2,5-dimethylenecyclohexanone, α-hydroxyethyl phenyl ketone to acrylylbenzene, etc. Catalysts used are alkali metal acid sulfates, I, HCl, tungstic acid, H_2SO_4, H_3PO_4, $(COOH)_2$, ZnO, Al_2O_3, Cr oxide, phosphates of Al and Na, $ZnCl_2$, $CaCl_2$.

Separation and purification of carbonyl compounds. Karl Miescher and Werner Fischer (to Soc. pour l'ind. chim. à Bâle). U. S. 2,172,590, Sept. 12. A process for the sepn. and purification of homologous satd. and unsatd. carbonyl compds. obtainable by the side-chain degradation of steroids by reaction with carbonyl reagents contg., in addn. to the group capable of condensing with the carbonyl group, a group selected from the class consisting of a salt-forming group and a group capable of conversion into a salt-forming group, sepn. and subsequent decompn. of the condensation products, comprises causing the mixt. of the homologous carbonyl compds. to react with the carbonyl reagents and decompg. the condensation products obtained, carrying out at least one of these steps partially.

Acetylacetic acid derivatives. Anthony H. Gleason (to Standard Oil Development Co.). U. S. 2,174,239, Sept. 26. For making an acetylacetic acid deriv. such as methyluracil, diketene is treated with urea or with a hydroxy amine, and during the reaction undesirable side reactions are inhibited by preventing undue rise of temp. (the temp. of the reacting materials suitably being maintained below about 80–100°).

Anthraquinone derivatives. Henry C. Olpin. Brit. 507,065, June 7, 1939. Leuco-1-amino-4-hydroxyanthraquinones are made by acting with NH_3 on leuco-1,4-dihydroxyanthraquinones free from amino groups and discontinuing the reaction before any substantial proportion of the corresponding 1,4-diaminoanthraquinone is produced. The reaction may be effected in presence of H_2O or an org. liquid. The leuco compd. first obtained may be oxidized by free O in presence of pyridine or piperidine, with H_2SO_4 with or without $PhNO_2$, or with substantially anhyd. H_2SO_4 according to Brit. 501,341 (*C. A.* **33**, 5871[6]). In an example, leucoquinizarin is treated with aq.-alc. NH_3, followed by oxidation with 96% H_2SO_4, with or without $PhNO_2$.

Anthraquinone compounds. Henry C. Olpin and Charles F. Topham. Brit. 507,206, June 8, 1939. Leuco-1,4-di(monosubstituted-amino)anthraquinones, in which the substituents in the 2 amino groups differ, are made by causing to react with 2 different primary amines together or in succession a leuco-1-amino-4-hydroxyanthraquinone in the form of the reaction mixt. in which it has been prepd. by the action of NH_3 on a 1,4-dihydroxyanthraquinone free from amino substituents, the NH_3 having been used in excess of that theoretically required to replace 1 OH group by an NH_2 group (cf. Brit. 507,065 (preceding abstr.)). The leuco compds. so obtained may be oxidized to the parent materials. In an example, leucoquinizarin is caused to react with excess NH_3 in EtOH to give 1,4-aminohydroxyanthraquinone which is then treated without isolation with a mixt. of NH_2Me soln. and monoethanolamine to give leuco-1-methylamino-4-hydroxyethylaminoanthraquinone, which is oxidized by adding $CuSO_4$ and pyridine and blowing in air.

Guanidine derivative. Chemische Fabrik von Heyden A.-G. (Rudolf Gebauer, inventor). Ger. 679,972, Aug. 17, 1939 (Cl. 12*o*. 17.04). Addn. to 665,510 (*C. A.* **33**, 1104[6]). Pure di-*p*-phenetyl(6-ethoxy-3-pyridyl)-guanidine (I) is prepd. by sepg. it from a mixt. with triphenetylguanidine (II) by using the different degrees of soly. of their HCl salts. Thus, di-*p*-phenetylthiourea and 2-ethoxy-5-aminopyridine are heated to boiling in CCl_4. The resulting mixt. of the I and II is sepd. by treatment with concd. HCl. The di-salt crystallizes out, leaving the tri-salt in soln. The HCl salt of the I m. 183°.

Methylene ether derivatives of xylosonic acid. F. Hoffmann-La Roche & Co. A.-G. (Tadeus Reichstein and Roger Prince, inventors). Ger. 679,975, Aug. 18, 1939 (Cl. 12*q*. 24). Methylene ether derivs. of *d*-xylosonic acid or its salts or esters are prepd. by oxidizing a monomethylene ether deriv. of *d*-xyloketose, in alk. soln. at the lowest possible temp. to convert a primary OH group into a COOH group, and sepg. the resulting acid or ester. Thus, monoacetone-*d*-xyloketose is dissolved in dil. KOH

and treated with $K_2Mn_2O_8$ to give 2,3-monoacetone-*d*-xylosonic acid, m. 264 5°.

Naphthylamine derivatives. Imperial Chemical Industries Ltd Brit. 506,928, June 6, 1939. β-Naphthylamine (I) or tetrahydro-I is hydrogenated at 250-300° under a pressure eventually not less than 2000 lb. per sq. in. in the presence of a catalyst contg. Ni and in the presence or absence of an inert solvent to produce decahydro-I or bis(decahydro-β-naphthyl)amine.

Naphthalene derivative. I. G. Farbenind. A.-G. (Alfred Riecke and Walter Rudolph, inventors). Ger. 679,340, Aug. 3, 1939 (Cl. 12*p*. 10). Addn. to 659,881 (*C. A.* **32**, 7058[9]). 8-Amino-2-naphthol unsubstituted in the NH_2 group is heated with a dehydrogenating agent to give dehydrobinaphthalenediimine. Examples are given.

Naphthalene derivatives. I. G. Farbenind. A.-G. (Werner Zerweck and Wilhelm Kunze, inventor). Ger. 679,977, Aug. 11, 1939 (Cl. 12*q*. 33). 4-Hydroxy-1-aminonaphthalene-8-carboxylic acid or 4-hydroxynaphthostyril is prepd. by coupling 5-naphthol-1-carboxylic acid with a diazo compd. and reducing the resulting monoazo compd. Thus, *p*-toluidine is diazotized and coupled with 5-naphthol-1-carboxylic acid in alk. soln. The product is reduced by $Na_2S_2O_4$ to give 4-hydroxy-1-ammonaphthalene-8-carboxylic acid. By treating this with HCl, 4-hydroxynaphthostyril is formed.

Complex metal amine salts. Frederick C. Bersworth (to Martin Dennis Co.). U. S. 2,173,823, Sept. 26. Complex metal amine salts such as those *for use in tanning* or *electroplating processes* are produced by a method which involves the reaction together of a hydrocarbon halide such as ethylene dichloride, NH_4OH and a hydroxide of a metal capable of forming a Werner complex such as that of Cr.

Alkyl halides. Friedrich Rothweiler (to I. G. Farbenind. A.-G.). U. S. 2,172,568, Sept. 12. See Ger. 664,321 (*C. A.* **33**, 645[1]).

Alkyl bromides. David J. Pye and Harry H. Purcell (to Dow Chemical Co.). U. S. 2,173,133, Sept. 19. For the production of an alkyl bromide such as MeBr, a satd. aliphatic alc. such as MeOH is heated with Br and SO_2 in the presence of sufficient water to dil. the H_2SO_3 produced so that sulfation of the alc. is substantially avoided. An arrangement of app. is described.

Guanidine nitrate. Robert Burns, Peter F. Gay and Imperial Chemical Industries Ltd. Brit. 507,498, June 15, 1939. This is prepd. by the interaction of NH_4NO_3 and a cyanamide salt in the presence of a proportion of H_2O not less than 4%, calcd. on the wt. of NH_4NO_3.

Crystalline basic phenylmercury nitrate. Josef Kathöl (to Schering-Kahlbaum A.-G.). U. S. 2,173,845, Sept. 26. A method of producing a cryst. basic nitrate of hydroxymercuribenzene of the general formula $(C_6H_5)_2Hg_2(ONO_2)(OH)$, comprising the step of isolating the same from aq. HNO_3 solns. of crude prepns. obtained on producing nitrates of hydroxymercuribenzene. Isolation may be effected by cooling to effect pptn.

Ring closure of aromatic compounds with use of hydrofluoric acid. Wm. S. Calcott, John M. Tinker and Adrian L. Linch (to E. I. du Pont de Nemours & Co.). U. S. 2,174,718, Sept. 26. Ring closure such as in the production of anthrone from diphenylmethane-2-carboxylic acid is effected with use of a proportion of concd. HF sufficient to leave an acid residue of not less than 43% HF strength after the ring closure. Numerous examples with details are given.

Glycolic acid. E. I. du Pont de Nemours & Co. Brit. 508,383, June 29, 1939. See U. S. 2,153,064 (*C. A.* **33**, 5006[4]).

Sulfonic acids. Chemische Fabrik R. Baumheier Kom.-Ges. (Rudolf Kern, inventor). Ger. 678,134, July 8, 1939 (Cl. 12*o*. 23.01). Addn. to 663,983 (*C. A.* **33**, 280[9]). The process of 663,983 for prepg. nuclear-substituted fatty aromatic sulfonic acids is modified by carrying out the reaction at 40-75°. Thus a mixt. of tetrahydronaphthalene, benzyl chloride, castor oil, BuOH and $H_2SO_4.H_2O$ is heated to 45-50° to give a product useful as a *washing and foaming agent*. Other examples are given.

Acid anhydrides. Horace F. Oxley and Edward B. Thomas. Brit. 507,592, June 19, 1939. These are made by introducing the vapor of a lower anhydride, e. g., Ac_2O, below the surface of a liquid higher acid maintained in the liquid phase (if desired by means of solvent) and allowing the vapor of the lower acid to escape. The process may be applied to the production of anhydrides of propionic, *n*- and iso-butyric, caproic, caprylic, capric and myristic acids, acids contg. aromatic groups, e. g., BzOH, phenylacetic and naphthoic acids, unsatd. acids such as oleic and cinnamic acids and polycarboxylic acids such as succinic acid.

Ethylene. I. G. Farbenindustrie A.-G. Brit. 506,832, June 6, 1939. See U. S. 2,154,676 (*C. A.* **33**, 5416[9]).

Olefins. I. G. Farbenindustrie A.-G. Brit. 507,567, June, 13, 1939. Gaseous olefins are obtained from the products of the catalytic hydrogenation of CO, the constituents of which contain more than 1 C atom and may or may not contain O, by leading them at elevated temp. with H over a hydrogenation catalyst and cracking and/or dehydrogenating the resulting hydrocarbons. The initial products may be led with H at 180-200° and ordinary or elevated pressure over metals of groups 6 to 8 or their compds., e. g., Ni, on carriers. The subsequent cracking is effected in known manner, e. g., at above 700°, with use of app. that inhibits C deposition, e. g., comprising coatings of Si or Ti or Cr steels as described in Brit. 403,647 (*C. A.* **28**, 3414[9]) and 469,101 (*C. A.* **32**, 4758[8]). The products may be sepd.; liquid products are returned to the hydrogenation or constituents boiling at 80-120°, mainly aromatic hydrocarbons, are removed. Gaseous products may be treated to remove acetylenic compds., olefins then being sepd. with ammoniacal cuprous salts. C_2H_4 may be sepd. by pressure distn. and the higher olefins hydrogenated as described in Brit. 506,832 (preceding abstr.) and wholly or in part subjected to cracking or dehydrogenation. In an example, an oil obtained from CO and H is hydrogenated at 200° and 180 atm. with use of a Ni-Al catalyst and led with cracking gas through a packed tube of Cr steel at 750°, a gas contg. C_2H_4 35, higher olefins 20, H 10, CH_4 30, CH_4 homologs 5% and an oil contg. C_6H_6 hydrocarbons being obtained.

Ethylene from hydrocarbons such as those of gas oil. Donald A. Rogers (to Solvay Process Co.). U. S. 2,174,196, Sept. 26. App. is described, and a process for the manuf. of C_2H_4 from hydrocarbons of higher mol. wt. by a cyclic regenerative process of thermal cracking in the presence of steam wherein heat of hot combustion gases is supplied to a cracking zone in one period of a cycle and steam and hydrocarbon to be cracked are supplied to the zone in another period of the cycle and cracked therein to form a reaction mixt. at a temp. between 780° and 1050°, which comprises passing air into contact with hot refractory A to heat the air and cool the refractory, burning a fuel with the heated air to form hot combustion gases, passing the hot combustion gases into contact with refractory B to heat the refractory to at least the cracking temp. of the hydrocarbon to be cracked and cool the gases, and removing the cooled combustion gases apart from products of cracking, in the one period, and in the other period passing steam and hydrocarbon into contact with refractory B to heat the steam and hydrocarbon to the cracking temp. of the hydrocarbon to be cracked, passing the resultant mixt. into contact with refractory A to transfer the heat absorbed from refractory B to refractory A and thereby cool the products of cracking, and recovering the cooled products apart from combustion gases.

Dehydrating ethanol. Alan Marples (to Carbide and Carbon Chemicals Corp.). U. S. 2,173,692, Sept. 19. An arrangement of app. is described, and a process for dehydrating aq. EtOH which comprises distg. it in the presence of diisopropyl ether; removing from the distg. app. a vaporous three-component mixt. consisting of ether, alc., and less water than is contained in the ternary azeotropic mixt. of these substances; condensing and sepg. the mixt. into an upper ether layer and a lower water layer; returning the ether layer as reflux to the

column, substantially no other reflux being employed; and recovering substantially anhyd. alc. as a still bottom.

Diethyl ether. Pape & Co. G. m. b. H. Ger. 679,970, Aug. 17, 1939 (Cl. 12*o*. 5.09). In making Et_2SO_4 by treating EtOH with dil. H_2SO_4, the acid sludge from mineral oil refining processes may be used as the dil. H_2SO_4. An example is given.

Vinyl methyl ketone. I. G. Farbenindustrie A.-G. Brit. 508,080, June 23, 1939. This is prepd. continuously from vinylacetylene (I) and H_2O in the presence of a catalyst by causing a liquid contg. the catalyst and I to flow in circuit in countercurrent, e. g., in a countercurrent trickling app., during which operation vinyl methyl ketone and steam are continuously withdrawn and a new quantity of catalyst and H_2O is continuously added, while part of the catalyst together with resinous polymerizate formed is continuously removed. App. is described. Cf. *C. A.* **33**, 7822[4].

Separating divinylacetylene and ethynylbutadiene. Albert S. Carter (to E. I. duPont de Nemours & Co.). U. S. 2,173,272, Sept. 19. An aq. H_2SO_4 soln. of $HgSO_4$ is used for removing assocd. ethynylbutadiene from divinylacetylene (suitably with fractional distn. following steam distn.).

Thiourea. Richard O. Roblin, Jr. (to American Cyanamid Co.). U. S. 2,173,067, Sept. 12. A cyclic method for the manuf. of crystals of thiourea involves synthesizing thiourea in the presence of a soln. of thiourea, cooling the liquid reaction product to a temp. sufficiently low to "drop out" crystals of thiourea, sepg. such crystals from mother liquor, and returning the mother liquor to the cycle. An arrangement of app. is described, and the process may involve adding H_2SO_3 to a reaction slurry formed from Ca cyanamide and H_2S under 1.5–2 atm. pressure and at a temp. of 70–80°.

Treating benzene with chlorine and sulfur dioxide, and similar reactions. Cortes F. Reed (50% to Charles L. Horn). U. S. 2,174,111, Sept. 26. By bubbling Cl and SO_2 through benzene in suitable proportions, at a temp. of 0–20°, there is produced *p*-chlorobenzene chlorosulfite; at 20–70°, a mixt. of this product and *p*-dichlorobenzene; and above 70°, polymerization products; and analagous reactions are effected by use of SeO_2 or TeO_2 instead of SO_2 and by use of other halogens instead of Cl.

Diphenylamine. Société des usines chimiques Rhone Poulenc and Igor Scriabine. Brit. 507,860, June 22, 1939. Diphenylamine is prepd. by causing PhCl or an alkali benzenesulfonate to react with $PhNH_2$ in the presence of caustic alkali and removing the eliminated H_2O as fast as it is formed. The presence of a small quantity of Cu and (or) CuO and (or) Cu salt favors the reaction.

***l*-Piperitone.** Howards & Sons Ltd., John W. Blagden and Walter E. Huggett. Brit. 508,001, June 26, 1939. This is isolated from crude mixts. thereof with piperitone racemate by causing it to crystallize from a solvent at below −40°. The solvent may comprise the nonketonic substances present in the crude starting material, or may be a liquid of low f. p., e. g., petroleum ether, which is added before the cooling operation or in a cooled condition after that operation.

Tripropionin and other esters. Lester W. A. Meyer and Frederick R. Conklin (to Eastman Kodak Co.). U. S. 2,173,124, Sept. 19. A process for treating a lower aliphatic acid with a higher alc. having a higher b. p. than the acid, to produce an org. ester having a higher b. p. than the acid, comprises treating alc. with a 75–300% excess of a lower aliphatic acid, distg. water and a substantial amt. of acid from the reaction mixt. during the reaction period, whereby the degree of esterification is increased, condensing the distillate, refluxing a portion of the condensate to the reaction mixt. at a predetd. rate, decreasing the rate of reflux as the esterification reaction proceeds to completion, and then subjecting the reaction mixt. after substantially all the water has been removed to a distn. treatment under reduced pressure to remove any unreacted acid. Numerous examples are given.

1,4,5,8-Tetraminoanthraquinone. Société Rhodiaceta Brit. 507,302, June 13, 1939. See Fr. 831,229 (*C. A.* **33**, 2542[5]).

Butadiene. I. G. Farbenindustrie A.-G. Brit. 507,847, June 20, 1939. Butadiene is produced by heating dimethyl- or ethylacetylene with basic oxides or hydroxides or alkali salts having an alk. reaction, e. g., alkali and alk. earth oxides and hydroxides, Al_2O_3, bauxite, ZnO and alkali carbonates, phosphates and silicates, or mixts. thereof. The walls of the reaction chamber may be coated with alkalies or alk. earths. Diluents are preferably present. Among examples, ethylacetylene is led at 460° and 35 mm. through MgO.

Styrene and alkylstyrenes. The Distillers Co. Ltd., Herbert M. Stanley and John B. Dymock. Brit. 507,984, June 23, 1939. Addn. to 495,023 (*C. A.* **33**, 2622[9]). Styrene (I) and (or) a nuclear alkyl deriv., or derivs., of I are sepd. from a mixt. thereof with an α-alkylstyrene and (or) a nuclear alkyl deriv., or derivs., thereof (other than a mixt. of I and α-methyl-I) by subjecting the mixt. to the action of concd. H_2SO_4 at ordinary temp., whereby substantially only the compds. contg. an α-alkyl substituent are polymerized, and sepg. the polymerized substance from the unpolymerized substances. Among examples, a mixt. of *p*-isopropyl-I (II), α-methyl-II and a residue of *p*-diisopropylbenzene (III), such as may be obtained by the noncatalytic pyrolysis of III, is agitated with 70% H_2SO_4, the II and the III being then fractionally distd. from the viscous oily polymer of the α-methyl-II.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W. DOX

A sketch of the earliest studies of biological chemistry. Gabriel Bertrand. *Bull. soc. chim. biol.* **21**, 876–86 (1939). — An address. L. E. Gilson

The roles of active hydrogen and of water in biological oxidation phenomena. T. Thunberg. *Bull. soc. chim. biol.* **21**, 887–903 (1939). — A discussion of oxidation by dehydrogenation with subsequent hydration of the double bond. L. E. Gilson

Twenty years of biological chemistry. Michel Polonovski. *Bull. soc. chim. biol.* **21**, 904–21 (1939). — An address. L. E. Gilson

Isolation of 3-glyceraldehydephosphoric acid during the enzymic degradation of hexosediphosphoric acid. III. O. Meyerhof. *Bull. soc. chim. biol.* **21**, 965–77 (1939); cf. *C. A.* **33**, 2543[4]. — Addnl. data and discussion. During glucolysis much 3-glyceraldehydephosphoric forms, then changes (reversibly) to dihydroxyacetonephosphoric acid. At equil. about 1.1% of the total triosephosphoric acid is in the aldehyde form. L. E. Gilson

Porphyrins in biology and pathology. V. Formation of porphyrins by yeast poisoned with sulfonal. J. Thomas. *Bull. soc. chim. biol.* **21**, 1033–8 (1939); cf. *C. A.* **33**, 998[9]. — Sulfonal, trional, barbital and C_6H_6 increased the formation of coproporphyrin by beer yeast; acetanilide, amidopyrine and phenylhydrazine did not. L. E. Gilson

Activation and inhibition of cholinesterase. L. Massart and R. Dufait. *Bull. soc. chim. biol.* **21**, 1039 (1939); cf. *C. A.* **33**, 8643[8]. — The action of cholinesterase was largely but not completely inhibited by Na oxalate, citrate, fluoride, arsenite and pyrophosphate in 0.02 *M* concns. NaSCN and NaCN had no inhibiting action. When horse serum was dialyzed against dil. $NaHCO_3$ soln. 40% of the cholinesterase activity was lost, but was restored by addn. of ionic Ca, Mg or Mn. Sr had a slight

reactivating action, Ba and Cd had no action, and Co and Cu caused a further loss of activity. L. E. Gilson

Incorporation (in vitro) of fat acids in phospholipides of intestinal mucosa. Richard H. Barnes, Elmer S. Miller and Geo. O. Burr. *Proc. Soc. Exptl. Biol. Med.* **42**, 45–7 (1939). An emulsion contg. bile acids, pancreatic lipase, water and tagged fat (cf. *C. A.* **33**, 8652[6]) was injected into the duodenum in live rats. After 15 min. allowed for absorption, the small intestine was removed, washed, allowed to stand *in vitro* at room temp. 2–6 hrs., then frozen dried and extd. A small fraction of the tagged fat acids was found in the form of phospholipides in the ext. L. E. Gilson

Precipitation of insulin with rhodamine-B. H. Gershberg and J. C. Forbes. *Proc. Soc. Exptl. Biol. Med.* **42**, 95–6(1939).—The dye rhodamine-B ppts. insulin from aq. soln. at pH 7.2. The ppt. is sol. in very dil. HCl. Very little of the hypoglucemic activity is lost. L. E. G.

Proteolytic enzymes and the question of protein storage. U. S. Ashworth. *Proc. Soc. Exptl. Biol. Med.* **42**, 145–6 (1939). The arginase activity of the liver, the tryptic activity of the pancreas and presumably the activity of the other proteolytic enzymes of the rat body are gradually lowered during protein starvation. This would account for the continued drop in the endogenous N excretion and would support the hypothesis that there is no strictly min. level of N excretion. L. E. Gilson

Acceleration of hemolysis in relation to chemical structure. II. The straight-chain alcohols. Eric Ponder and Chester Hyman. *Proc. Soc. Exptl. Biol. Med.* **42**, 320–2(1939); cf. *C. A.* **33**, 6364[6]. For the primary alcs. contg. 3–9 C atoms there is a logarithmic relation between the no. of C atoms and the power to accelerate the hemolytic action of very dil. saponin solns. L. E. Gilson

Dopa decarboxylase. P. Holtz *Naturwissenschaften* **27**, 725(1939). The kidney and liver of many animals contain an enzyme which decarboxylates dihydroxyphenylalanine (dopa) to hydroxytyramine (*C. A.* **33**, 8629[8]); it also occurs in the small intestine of guinea pigs and is preformed in the fetal organs. Its reactions include increase in blood pressure by the hydroxytyramine, which can be amplified by cocaine, splitting off of CO_2 in Warburg app. during amine formation, isolation and identification of hydroxytyramine as Bz compd. For a guinea-pig kidney content of 100%, pig kidney contains 75%, in equal amts. of tissue, rabbit kidney 25–20%. With 2 cc. phosphate ext. from guinea-pig kidney (1:5) 2 mg. dopa is converted quantitatively in 30 min. Only *l*-dopa is attacked. In the presence of O_2 the reaction yields dihydroxyphenylacetaldehyde owing to the presence of aminoxidase. The aldehyde lowers the blood pressure. The complete system decarboxylase + aminoxidase is a *l*-amino acid desaminase. Oxidative demolition of the amino acid is prevented by octyl alc., HCN inhibits the decarboxylase, if the first part of the reaction takes place without O_2 the second part will follow even in the presence of HCN. The *d*-dopa, not occurring in nature, is attacked by the system like other artificial amino acids: it is decompd. by the *d*-amino acid desaminase of organ exts. in the presence of HCN or octyl alc. Guinea-pig kidney has little of the *d*-enzyme, rat kidney has no decarboxylase but ample *d*-desaminase; other individual differences for different animals are found. Dopa decarboxylase is nonidentical with histidine or tyrosine decarboxylase (*C. A.* **32**, 3466[9], 3470[3], 7545[6,8]; **33**, 5420[8]), as shown by adsorption behavior: the tyrosine decarboxylase is adsorbed on kaolin, the others are not. Rabbit kidney has as much histidine decarboxylase as guinea-pig kidney but 1/4 as much dopa decarboxylase. By successive decarboxylation, oxidation and methylation conversion from dihydroxy-phenylalanine to adrenaline is possible and this is considered important for the adrenaline formation in the organism. B. J. C. van der Hoeven

Glucosone as a substrate for glyoxalase. P. G. Efendi and A. P. Ryzhova. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 335–8(1939)(in German).—Fresh aq. exts. of rabbit liver (20 ml. of ext. dild. 1:5 with H_2O) in phosphate buffer at pH 6 were treated at 37° with varying amts. of glucosone (I) to det. whether glyoxalase (II) has a specific action toward substances of the general type RCOCHO. The solns. were then treated with 2,4-$(NO_2)_2C_6H_3NHNH_2$ after removal of protein to det. the unconverted I. II was inactive if more than 1.5 mg. of I/cc. of ext.-buffer soln. was used. In concns. of 0.5–1.0 mg. of I/cc. a slow decrease in I was observed in 4–6 hrs., while the control of 0.5 mg./cc. of methylglyoxal (III) showed a 40% decrease in III in 30 min. The addn. of 0.2–0.3 mg./cc. of reduced glutathione (IV) increased the rate of I decompn. The coenzyme activity of IV was specific. The end products of the reaction are gluconic and mannonic acids. S. A. K.

Variations in the active reaction of the blood and cerebrospinal fluid as a result of the irradiation of the brains of dogs with ultra-short waves. V. Efimov and R. Rutberg. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 388–91(1939)(in French).—The application of ultra-short waves to the brain of a dog for 30 min. caused a reduction in the pH of the blood and cerebrospinal fluid which appeared 2–3 hrs. after irradiation, reached a min. of 7.15–7.17 in 12–24 hrs. and returned to the normal of 7.35–7.46 in 36–48 hrs. S. A. Karjala

The chemical nature of anticatalase. I. The relation between the action of anticatalase of animal tissues and their content of reducing substances. A. Charikova. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 418–51(1939)(in French).—Amts. of EtOH and AcH of 1:10,000, and the thermostable philocatalase destroy the inhibiting properties of anticatalase (I) toward catalase (II), and to some extent restore activity to inactivated II. I is not an enzyme, is thermostable and is not dialyzable. No relationship was observed between I and the amt. of reducing substances (calcd. as glutathione (III)) in the tissues. A slight parallelism between I and the oxidized III in the tissues was noted. S. A. Karjala

Enzymic action of nucleotide-like substances. I Tetutaro Tadokoro and Naomoto Takasugi. *J. Agr. Chem. Soc. Japan* **15**, 876–8(1939). Pyridine nucleotide prepd. from yeast had a strong ascorbic acid oxidase action. Catalase action was observed in pyridine nucleotide, guanylic acid and adenylic acid. Pyridine nucleotide also had a strong peroxidase action and its optimum pH was 5.4. Inosinic acid showed no enzyme action. Y. Kihara

Enzymes in rice malt. Hirohisa Munakata. *J. Agr. Chem. Soc. Japan* **15**, 891–902(1939). The actions of amylase, α-glucosidase, β-glucosidase, sucrase, pectinase, protease, glycerophosphatase, phytase, lipase, lecithinase, esterase, catalase, peroxidase, oxygenase and urease were demonstrated in germinated rice. Tannase and reductase was absent. Especially the activities of glycerophosphatase, phytase and catalase were noted. Protease consisted of the pepsin or papain type having the optimum pH at 3.0–4.2, the trypsin type having the optimum pH at 6.8–7.0, the erepsin type at 8.0–8.5, and another type having the optimum pH at 7.0–7.5. Y. Kihara

Separation of phosphatases into protein and prosthetic groups. I. Separation of alkaline kidney phosphatase D. Albers. *Z. physiol. Chem.* **261**, 43–54(1939).—By dialysis of a phosphatase soln. from kidney (*C. A.* **29**, 3693[6]) the enzyme is sepd. into apoenzyme (nondialyzable) (I) and coenzyme (dialyses). Combining the 2 produces activity of 96% of the original compared to 8% in I alone. Mg^{++} is an addnl. factor in activating the holoenzyme formed from I and II and not as previously believed the sole dialyzable activator or coenzyme. Milton Levy

Specificity of sweet almond emulsin preparations variously manufactured. Wm. W. Pigman. *Z. physiol. Chem.* **261**, 82–6(1939); cf. *C. A.* **33**, 7826[8].—Relative activities of sweet almond prepns. to phenol glucosides were detd. The prepns. were the untreated ext., ext. treated with C, Ag-purified, Ag-purified, C-treated and tannin-purified. The last shows a relatively greater α-mannosidase activity than the others, indicating the independence of this activity and the β-glucosidase activity. Milton Levy

The physiological role of enzymes. N. M. Sisakyan. *Bull. acad. sci. U. R. S. S., Sér. biol.* **1939**, 33–42(in

English, 42).—Review and discussion of reversible enzymic processes in plant tissues with 45 references. J. Livak

Nicotinic acid amide and cozymase in the blood. Hans v. Euler and Fritz Schlenk. *Klin. Wochschr.* **18**, 1109–11 (1939).—A summary of analytical methods for the detn. of these substances and of the amts. present in blood, tissues and excreta. H. L. Mason

The presence of glycerophosphatase in human feces. L. Koster. *Acta Med. Scand.* **101**, 482–90(1939); cf. *C. A.* **33**, 2915[4].—Method: Rub about 5 g. fresh stool in a mortar with 10–15 cc. physiol. saline to a homogeneous mass. Transfer to a flask and make up the total vol. of saline exactly to 25 cc. Shake for an hr. and filter. Measure 0.2 cc. filtrate into a 5-cc. tube contg. 2 cc. barbital-glycerophosphate buffer pH 8.6, and incubate for 1 hr. A second similar tube, contg. in addn. 1.8 cc. 10% CCl_3CO_2H, serves as control. After incubation add 1.8 cc. 10% CCl_3CO_2H to the first tube. Pipet from each tube 1.5 cc. into small test tubes and treat with 1.2 cc. molybdic reagent and 0.3 cc. $SnCl_2$ The color developed in 15 sec. (max.) is compared in a colorimeter. Human feces were found to contain a glycerophosphatase which is activated by Mg ions from the food. The enzyme may be influenced by administered drugs. In nontropical sprue the enzyme content is diminished or may be lacking On the contrary, in myeloid leucemia high values are found. S. Morgulis

Chondroitinsulfuric acid, heparin, albuminuria, amyloid and serum proteins. M. Ch. Ehrström: *Acta Med Scand.* **101**, 551–65(1939). -No causal relation was found between albuminuria and chondroitinsulfuric acid. A mixt. of human serum and the Ca salt of mucoitinsulfuric acid was kept sterile for 2 months. On drying, a substance was obtained which resembled amyloid in some respects. It is also pointed out that the presence of chondroitinsulfuric acid in serum may so alter the pptn. of the proteins that one may even get an apparent hyperglobulinemia. Both chondroitinsulfuric acid and heparin, added to blood *in vitro*, cause a pos. formaldehyde-gel reaction, increase in sedimentation rate, pos. Takata-Ara reaction, increased viscosity and coagulability at relatively lower temp. These results, however, do not prove yet that similar effects are produced *in vivo*. S. Morgulis

Magnetic properties of the compounds ethylisocyanide-ferrohemoglobin and imidazole-ferrihemoglobin. Charles D. Russell and Linus Pauling. *Proc. Natl. Acad. Sci. U. S.* **25**, 517-22(1939). -Et isocyanide combines easily with ferrohemoglobin to give a compd. with an absorption spectrum consisting of 2 narrow bands, at about 5540 and 5250 A. Ethylisocyanide-ferrohemoglobin is completely diamagnetic, and accordingly contains no electrons with unpaired spins. The substance is shown to have the ratio isocyanide to heme iron equal to unity. It is probable that the isocyanide mol. connects the Fe and C atoms. Imidazole combines with ferrihemoglobin to form a compd. with spectrum differing little from that of ferrihemoglobin hydroxide. Data from magnetic titrations at pH 6.86, 8.20 and 10.30 can be interpreted on the assumption of the simple equil. $HHbIm^+ \rightleftarrows HHb^+ + Im$ in which the symbol HHb^+ is used to represent the ferrihemoglobin cation. The values found at 25° for the equil. const. $K = (HHb^+)(Im)/(HHbIm^+)$ are the following: at pH 6.86, 2.5×10^{-3}; pH 8.2, 2.0×10^{-3}; pH 10.3, 0.31×10^{-3}. The bonds to Fe in the imidazole-ferrihemoglobin mol. are of the octahedral covalent type. W. J. Peterson

Distribution of astaxanthin in the animal and plant kingdom. Richard Kuhn, Jörgine Stene and Nils Andreas Sörensen. *Ber.* **72B**, 1688–701(1939).—A table is given showing all sources, ranging from green algae to birds, from which cryst. astacin (I), m. 228° (cf. *C. A.* **32**, 9053[6]), has been isolated. Especially noteworthy is its occurrence in the green alga, *Hematococcus pluvialis* (II), for it has hitherto been generally regarded as an animal pigment. The euglena rhodone (III) isolated by Tischer (*C. A.* **33**, 6361[9]) from the spores of II and which he considered to be 4,6,4′,6′-tetraketo-β-carotene, isomeric with I, agrees in cryst. form and all other properties with I, but he states that it forms no phenazine with o-$C_6H_4(NH_2)_2$. Using the same material and procedure the authors obtained his ester A (IV), which with alcoholate in a high vacuum gave a blue-black soln. immediately changing to red in air; the course of the changes, as regards time and color, was exactly like that of lobster astaxanthin (V), m. 216°, and its fat acid esters. As III itself, like I, gives no such color reaction but forms an orange-red K salt, it is evident the native IV cannot be an ester of a tetraketone. This made T.'s structure for III questionable, for no autoxidizable tetraenol corresponding to V can be derived from a 4,6,4′,6′-tetraketone. The carotenoid obtained by alk. sapon. of IV was identical in all respects with the I from lobsters and gave with o-$C_6H_4(NH_2)_2$ the known phenazine, m. 222-3°. Debye-Scherrer pictures of the 2 pigments likewise showed no differences. T. regarded IV, which m. 100–1°, as a dipalmitate, but the synthetic dipalmitate of V m. 72°. As a matter of fact, IV is a *mono ester;* analysis, catalytic hydrogenation and colorimetric mol.-wt. detns. indicate the acid residue contains 16 C atoms and 1 double bond. The synthetic *monopalmitate* of V m. 113.5-14.5° (cor.). Ester C was obtained in cryst. form, m. 34–6°, and proved to be a diester of V, probably with the same acid as in IV. Brockmann and Völker (*C. A.* **28**, 4454[2]) isolated I from the "roses" of pheasants. The authors, avoiding alk. sapon., found that here, too, V and its esters are present exclusively. The food of the pheasant, both wild and in various zoos, is known quite exactly and contains no V, indicating that the pheasant is capable of synthesizing it from other carotenoids. Wald and Zussmann (*C. A.* **31**, 7103[8]) were able to obtain I, with other carotenoids, from the retina of chickens. The opinion already expressed that this was an artefact has been confirmed. The pigment isolated without the use of alkali gave with alcoholate the color reaction of V. Chromatographic analysis on sucrose showed the retina of the hen contains at least 2 different esters of V. V was obtained in 23.6-mg. yield from a liver (1080 g.) of *Regalecus glesne*. The synthetic *dipalmitate* of I m. 121°; the name *astacein* for the supposed dipalmitate in the lobster (Karrer, Loewe and Hübner, *C. A.* **29**, 2544[1]) is now superfluous. C. A. R.

Isocitric acid dehydrogenase and glutamic acid synthesis in higher plants and in yeast. Hans v. Euler, Erich Adler, Gunnar Günther and Larissa Elliot. *Enzymologia* **6**, 337–41(1939)(in German).—Higher plants and yeast contain a coenzyme II-specific dehydrogenase for isocitric acid. The reaction catalyzed by this enzyme is activated by Mn and Mg ions. The enzyme corresponds completely to the isocitric acid dehydrogenase previously isolated from animal tissues. The glutamic acid dehydrogenase of higher plants acts specifically with coenzyme I, thereby differing from the animal dehydrogenase which acts with either coenzyme I or coenzyme II, and the dehydrogenases from yeast and *B. coli* which act only with coenzyme II. Felix Saunders

Specificity and field of action of the phosphatase of the sweet almond. II. Action of some chemical compounds on the hydrolysis of different substrates. Jean Courtois and Jacqueline Manouvrier. *Enzymologia* **6**, 342–51 (1939)(in French); cf. *C. A.* **33**, 6883[4], 8644[8].—The hydrolysis of the Me, Pr and Bu monoorthophosphates by the phosphatase of the sweet almond is weakly inhibited by Mg and NaF. Fe, Cu and Ca salts do not affect the enzyme nor does dialysis. The hydrolysis of these esters or β-glycerophosphate is not affected by ascorbic acid. Ascorbic acid oxidized by methylene blue or by $Fe(NO_3)_3$ has little or no effect on the phosphatase. Oxidation of the phosphatase by I causes a definite but weak inhibition. Ascorbic acid oxidized by Cu salts strongly inhibits. All the substrates behave the same way toward the inhibitors. Bu phosphate is the most sensitive. In the lowest concns. the phosphatase of the type A_3 of takadiastase is activated by ascorbic acid. At other concns. it is inhibited by the acid oxidized by I and $CuSO_4$ but not when oxidized by methylene blue. Felix Saunders

Blockage and the transfer of reducing hydrogen. I. Reducing hydrogen of dichlorophenolindophenol. L. Genevois and P. Cayrol. *Enzymologia* **6**, 352–74(1939)

(in French). —The transfer of the reducing H of SH derivs. or hydrazines to dehydroascorbic acid or alloxan can be brought about by means of blockage reactions. The transfer is remarkably rapid. It is completed by a small excess of the reducing substance. Glutathione is an indispensable protector of ascorbic acid in tissues. Glutathione cannot be replaced by cysteine which is too sensitive to ketones. The concn. of the glutathione must be at least 3 times that of the ascorbic acid, a condition which is realized *in vivo*. Felix Saunders

Kinetics of the formation of chymotrypsin from crystalline chymotrypsinogen and of trypsin from crystalline trypsinogen. M. Kunitz. *Enzymologia* **7**, 1-20(1939)(in English); cf. *C. A.* **33**, 2153⁹. Chymotrypsinogen is transformed into chymotrypsin by means of minute amts. of trypsin but not by enterokinase or chymotrypsin. The formation of chymotrypsin by means of trypsin follows the course of a unimol. catalytic reaction. Trypsin is formed from trypsinogen by trypsin itself in the range of pH 5.0-8.0 and by mold kinase at pH 2.5-4.0. The transformation of trypsinogen into trypsin by means of either trypsin, or enterokinase at pH above 6.0 is accompanied by the transformation of a part of the trypsinogen by means of the trypsin formed into an inert protein which cannot be changed into trypsin. The formation of trypsin from trypsinogen by means of mold kinase at pH 3.0 or by means of enterokinase in the range of pH 5.0-6.0 follows the course of a catalytic unimol. reaction just like the process of formation of chymotrypsin by means of trypsin. The process of formation of trypsin by means of trypsin is essentially autocatalytic in character. The kinetics of the reaction is, however, complicated by the secondary catalytic reaction, namely the formation of inert protein. The formation of trypsin by means of enterokinase at pH above 6.0 is greatly affected by the complication due to the partial transformation of the trypsinogen into inert protein, the more so the lower the concn. of enterokinase used. As a result, the ultimate amt. of trypsin formed is less as the concn. of enterokinase used is decreased. Felix Saunders

Stearic specificity of glutamic acid dehydrogenase. Hans v. Euler and Erich Adler. *Enzymologia* **7**, 21-4 (1939)(in German). Irradiation of an enzyme prepn. from liver decreases somewhat the activity toward *l*(+)-glutamic acid and still more the activity toward *d*(−)-glutamic acid. Irradiation of a mixt. of substrate and apodehydrogenase or *d*(−)-glutamate alone had no effect on the reaction velocity. Felix Saunders

Enzymic deamination of amino acids and its physiological significance. A. E. Braunshtein. *Enzymologia* **7**, 25-52(1939)(in German); cf. *C. A.* **33**, 5015⁹. The specificity, possible reaction mechanisms and physiol. significance of deamination are discussed. The prepn. of 2 new enzymes which deaminize glutamic acid and asparagine, resp., is described. These enzymes, known as *aminopherases*, differ from previously known enzymes concerned with amino acid metabolism. F. Saunders

Tributyric esterase activity of plasma and red blood cells. Effect of citric and oxalic acids, hydrogen-ion concentration and amount of blood used. G. Scoz. *Enzymologia* **7**, 82-7(1939)(in Italian). Oxalic acid and citric acid increase the activity of the lipases of red cells and blood plasma by about 400%. Both lipases work best at pH 8. The erythrocyte lipase is much more sensitive than the plasma lipase to pH changes. The relation between the amt. of blood plasma and its lipolytic power (p) can be expressed by the equations $p = K \log E$ and $p = K\sqrt{E}$, where E is the amt. of enzyme. For the red cells the equation $p = KE$ holds. Felix Saunders

Existence of a lipase in the suprarenal gland of the ox. G. Scoz and B. Mariani. *Enzymologia* **7**, 88-96(1939)(in Italian).—The cortex of the suprarenal gland of the ox has a tributyric lipase activity. It will hydrolyze tributyrin but not olive oil. The medulla has a true lipase activity. Both activities have their optimum at pH 9.3. Their activity is inhibited by quinine, atoxyl, NaF and chloral hydrate. The activity (p) of these enzymes with respect to time (t) and amt. of enzyme (E) can be expressed by the equations $p = kt$ or $p = kE$. Under certain conditions the equations $p = k \log t$, $p = k \log E$, $p = k\sqrt{t}$ or $p = k\sqrt{E}$ hold. Felix Saunders

Influence of the ultrashort wave irradiation on the growth of rabbit sarcoma. VII. Influence of local irradiation on the entire body of an individual. Noboru Nobuoka. *Gann* **33**, 294-315(1939).—The ultrashort wave irradiation not only retarded the growth of primary Kato rabbit sarcoma in animals, but also inhibited the growth of nonirradiated secondary tumors and the formation of metastases. It requires much more irradiation to kill rabbit sarcoma *in vitro* than *in vivo*. The metabolism of irradiated tumor tissue is greatly reduced as seen by decrease in glucolysis. The 4.5 m. waves had the strongest inhibitory effect upon the tumor growth. K. Sugiura

Experimental studies on the excretion and distribution of radium D, E and F, introduced into the organism, and on their biological action. Mituo Miwa and Hisao Yamasita. *Gann* **32**, 395-431(1938).—About 100 mc. of radon was kept sealed in a glass tube with 20 cc. of distd. water and was allowed to change into Ra D, E and F. The soln. was injected intravenously into adult rabbits in 20-120-cc. amts., in single or divided doses. In young albino rats, 1.0-5.0 cc. was injected intravenously. Rabbits showed a slight decrease in body wt., but no diarrhea. In young rats, it caused a marked disturbance in nutrition or even death. Ra D was excreted in the urine very rapidly and in the feces less rapidly. Blood examn. showed a marked decrease in the no. of both red and white cells, but especially of lymphocytes. Among the changes in the internal organs, atrophy of the spleen, lymph nodes and thymus was most striking. Although the injected Ra D, E and F are excreted, some remained in the body for a fairly long time, the amt. retained varying in different organs. K. Sugiura

Condensation of the hexapeptide ester of glycine into the 96- and higher (3×2^n) peptide esters. Eugene Pacsu. *Nature* **144**, 551(1939). The condensation by heat of the hexapeptide ester of glycine gives 12-, 24-, 48- and other peptide esters, the no. of glycine mols. being expressed by the general formula 3×2^n. The condensation at 102° goes through a series of bimol. reactions with 10^4 $K = 150$ and has an activation energy of 38 kg.-cal. Neither "cyclol 6" nor nonapeptide is formed in the reaction. The substances are suggestive of denatured protein and give a strong biuret reaction. E. D. Walter

Catalase. R. Lemberg, M. Norrie and J. W. Legge. *Nature* **144**, 551-2(1939). Catalase contains 1 bile pigment hematin group, similar to verdohematin, in addn. to 3 protohematin groups. By splitting with acids, biliverdin is isolated from cryst. catalase. Evidence is given to support the view that the bile pigment hematin is an essential part of the enzyme mol. E. D. Walter

Decomposition of hydrogen peroxide by catalase. Frank H. Johnson and K. L. van Schouwenburg. *Nature* **144**, 634-5(1939). An app. and procedure are described whereby H_2O_2 was decompd. by catalase under anaerobic conditions. Attention is directed to the use of luminous bacteria as a means of detecting the presence of O_2. E. D. Walter

Galactose-1-phosphoric acid in galactose metabolism. H. W. Kosterlitz. *Nature* **144**, 635-6(1939); cf. *C. A.* **33**, 8176⁴. The role of galactose-1-phosphoric acid as an intermediate in the metabolism of galactose in liver and in yeast is discussed. This ester is fermented by dried galactose-adapted *S. cerevisiae* Frohberg at approx. the same rate as glucose, while galactose is fermented very slowly. The metabolism of galactose in the liver differs from fermentation by dried yeast in that galactose-1-phosphoric acid accumulates in the liver. E. D. Walter

Inactivation of tyrosinase in the oxidation of pyrocatechol. B. J. Ludwig and J. M. Nelson. *J. Am. Chem. Soc.* **61**, 2601-6(1939).—It has been found when tyrosinase (I) from *Psalliota campestris* is inactivated in the oxidation of pyrocatechol (II) that the inactivation at 25° involves a const. uptake of O: 100 ± 5 cu. mm. per unit of enzyme or 3.3

$\times 10^4$ cu. mm. per γ of Cu. This amt. of O is independent of the rate of oxidation of the II, the concn. of O, the H-ion concn. between pH 5 and 7.5 or the ratio of catecholase (III) activity to cresolase activity but is dependent on temp. The inactivation is not due to any products known to be formed in the oxidation of the II but occurs at the time the II is oxidized. I from different sources consumes different amts. of O per unit of III inactivated. The total O consumed in the inactivation of purified prepns. from *Lactarius piperatus* at 25° is 400 ± 15 cu. mm. per unit or 1.7×10^4 cu. mm. per γ of Cu. Hydroquinone, when used in excess with low concn. of II, besides serving as a reductant for o-benzoquinone (IV), exerts a protective influence against inactivation of the enzyme. Ascorbic acid, also a reductant toward IV, exerts no protective influence. BzOH exerts a retarding influence on the activity of I toward II but has no protective action.

C. J. West

Tyrosinase from the wild mushroom, Lactarius piperatus. H. R. Dalton and J. M. Nelson. *J. Am. Chem. Soc.* **61**, 2946–50(1939).—A method is described for prepg. highly purified prepns. of tyrosinase (I) from *Lactarius piperatus*. I is shown to be a Cu protein; the purest prepn. contained 0.23% Cu and had a dry wt. of 1 mg. per 1000 cresolase units and 0.0027 γ of Cu per cresolase unit. The Fe present in the crude prepns. of I can be removed by adsorption methods. Purified I prepns. showed no definite absorption bands in the visible region of the spectrum, differing in this respect from the hemocyanins; 2 absorption bands were observed in the ultraviolet region: a band due to protein at 273 mμ and one at about 330 mμ probably due to Cu. A cryst. material was obtained, from rather crude as well as from purified prepns. of I, having a Cu content of 0.25% and 13.6% N; these crystals were colorless and belonged to the isometric system; the av. size was about 0.01 mm. Solns. of the crystals were only slightly active toward *p*-cresol and catechol. This slight activity showed a tendency to increase when the solns. were permitted to stand for some time. Certain solns. of the freshly prepd. I also showed this tendency to increase in activity on standing. The ratio of activities of the I prepns. toward *p*-cresol and catechol could not be altered by various methods of purification but always remained 10 to 1, resp. The ratio of the 2 activities in the case of the solns. of the cryst. material was also 10 to 1. Compn., similarly in absorption spectra, the slight increase in activity when solns. are allowed to stand, all point to a close relationship between the crystals and the highly purified I prepns.

C. J. West

Molecular weight and association of the enzyme urease. David B. Hand. *J. Am. Chem. Soc.* **61**, 3180–3(1939).—From the osmotic pressure the av. particle wt. of cryst. urease solns. is found to be 700,000. From the rate of diffusion, particles with a wt. as low as 17,000 are shown to possess urease activity. There is no evidence to show in which form urease exists at the time that it exerts its catalytic action.

C. J. West

Synthesis of a pyridine deriv. of biol. interest (Morii) **10**. Effect of substituents on the biol. behavior of chem. compds. (Breyer) **2**. Structure of insulin (Huggins) **2**. Constitution of the prosthetic group of cytochrome c (Zeile, Meyer) **10**.

B—METHODS AND APPARATUS

GLENN E. CULLEN

Vitamin K. Methods for determination of thrombin of the blood. K. K. Nygaard. *Nord. Med.* **4**, 3372–3 (1939).—A brief survey is given of methods for detn. of thrombin of the blood in connection with vitamin K treatment.

V. Aschehoug

Estimation of ammonia in feces. Adolfo E. Raices. *Rev. méd.-quir. patol. femenina* **14**, 881–8(1939).—The ammonia contained in 10 cc. of an aq. suspension of feces (5%) should be distd. by steam for 7–10 min. into a tube contg. 3 cc. of 0.1 *N* HCl. Add 1 cc. of 10% NaOH to the suspension and liquid paraffin to avoid foaming. Det. the ammonia colorimetrically after nesslerization.

E. S. G. Barron

Detection of alkaloids in animals by spectroscopic analysis of saliva. Ramon G. Loyarte and Jacinto Placeres. *Roentgen* **1**, No. 7, 12 pp.(1938).—To detect the presence of alkaloids in horses injected with small amts. (as in horse races), the ultraviolet absorption spectrum of saliva is recommended. Place the saliva in 96% alc.; centrifuge it for 20 min. at 3000 r. p. m. Evap. the filtrate in the water bath at 60°, adding small amts. of water up to 10 cc. of fluid. Filter, washing the filter 3 times with hot water; evap. to dryness at 60°; dissolve with 10 cc. abs. alc. which is reduced to 5 cc. in the water bath; filter; wash the evapg. dish and filter twice with 1 cc. warm abs. alc.; dry at low temp.; dissolve in 1% AcOH; filter, evap. to dryness at 60°; dissolve in alc. Cocaine and morphine can be detected in the spectrograms when the horse has received an injection of 0.1 g. Caffeine can be detected after a 1-g. injection; strychnine after a 0.004-g. injection.

E. S. G. Barron

Determination of cholinesterase and its potential significance. H. M. Eberhard and W. S. Silverman. *Rev. Gastroenterol.* **6**, 239(1939).—0.5 cc. of serum is incubated with 150 mg. acetylcholine bromide. The AcOH formed is titrated with 0.01 *N* NaOH.

E. Borek

Application of the Proteus test to the determination in the urine of nicotinic acid and its derivatives. C. Lataste. *Bull. soc. path. exotique* **32**, 784–91(1939).—A modification of the method of Lwoff, Querido and Lataste (cf. *C. A.* **33**, 6379[1]) was used. The daily excretion of free nicotinic acid or amide in the urine of normal man was 0.5–1 mg. After hydrolysis of the urine for 3 hrs. at 130° or at room temp. for many days, 3–5 mg. was found. The *Proteus* test is specific for nicotinic acid or amide and its hydrolyzable derivs. in the urine.

E. Curzon

Ascorbic acid determinations on tissues by the dichlorophenolindophenol and methylene blue methods. A. Giroud, E. Géro, M. Rabinowicz and E. Hartmann. *Bull. soc. chim. biol.* **21**, 1021–32(1939); cf. *C. A.* **33**, 7359[5].—Results of detns. by both methods are given for all the important tissues of the steer and guinea pig. In all cases the methylene blue method gave slightly lower values.

L. E. Gilson

Microtechnical demonstration of phosphatase in tissue sections. G. Gomori. *Proc. Soc. Exptl. Biol. Med.* **42**, 23–6(1939).—A fixing and staining method of showing the presence or absence of phosphatase in the individual cells is described.

L. E. Gilson

Isolation of glutathione from thymus glands. Norwood K. Schaffer and Wm. M. Ziegler. *Proc. Soc. Exptl. Biol. Med.* **42**, 93–4(1939).—A small amt. was isolated in cryst. form from calf thymus. The method is described.

L. E. Gilson

Separation of lipides in gravimetric acetone method for plasma total protein. Eldon M. Boyd. *Proc. Soc. Exptl. Biol. Med.* **42**, 263–4(1939).—It is suggested that the Bierry and Vivarro method, as outlined in the book by Peters and Van Slyke (cf. *Quant. Clinical Chemistry, C. A.* **26**, 3275), be modified so that 3 cc. plasma is added to 75 cc. Me_2CO instead of 10 cc. in the initial step. When plasma is dild. with 20–25 vols. Me_2CO the Me_2CO ext. contains amts. of lipides identical to those in the EtOH-Et_2O ext. of the same plasma prepd. by Boyd's method (*C. A.* **30**, 4890[1]). Less Me_2CO exts. less lipides.

L. E. Gilson

Thiochrome method for the determination of vitamin B_1. Luigi Callegari. *Boll. soc. ital. biol. sper.* **14**, 487–8 (1939).—In comparing standard aneurine solns. with the unknown (by the Ritsert method (cf. *C. A.* **33**, 7333[8])) it was shown that the best results were obtained when the vols. of the alk. soln. and of the isobutyl alc. soln. were equal and when the NaOH concn. was kept const.

Helen Lee Gruehl

Improved method for the wet ashing of biological materials. M. W. Brenner and P. L. Harris. *Chemist Analyst* **28**, 55–6(1939).—To the weighed sample in a small Kjeldahl flask, add 5 ml. of concd. HNO_3 and heat until brown fumes are evolved. Carefully add 3 ml. of concd. H_2SO_4

and heat until the sample is charred and all excess HNO_3 is removed. Then add 1 2 ml. of 70% $HClO_4$ and heat again. W. T. H.

New and more specific albumin reagent. Jonas Kamlet. *Chemist Analyst* **28**, 62–3(1939).—Dissolve 25 g. com. NH_4 molybdate, 15 g. sulfosalicylic acid and 85 g. citric acid in 1 l. of water. Add 2 ml. of $CHCl_3$ to prevent formation of molds. This reagent will detect 0.005% albumin in urine, and the approx. quantity of albumin can be estd. An Esbach graduated tube adds to the accuracy. W. T. H.

Student apparatus for analysis of respiratory gases. J. Max Little and Herbert S. Wells. *Science* **90**, 425–6 (1939). E. H.

A method for determination of nicotinic acid (pyridine derivatives) in urine. I. G. Porjé. *Nord. Med.* **2**, 1108 10(1939).—The method is based on the reaction of Konig: 5 to 20 cc. urine is dild. with a phosphate buffer (pH = 6.1) to 20 cc. Four cc. satd. aq. soln. of fresh BrCN and 4 cc. satd. aq. soln. of aniline are added. The mixt. is allowed to stand for 7 to 10 min. and the yellow color is then measured in the Pulfrich photometer, screen S 47. If the urine is strongly colored, the detn. can be made by extg. the resulting colored reaction product with AmOH and measuring the color of the ext. In the urine of normal persons 1.2 to 20 mg. nicotinic acid was excreted per day. In the urine of a patient suffering from pellagra, no nicotinic acid could be detected. When 50 mg. nicotinic acid was given (perorally), the output of nicotinic acid in the urine was strongly increased in the following 3 hrs. H. Kringstad

Determination of sulfanilic acid amides Margrethe Hejde Sunesen. *Nord. Med.* **2**, 1663–5(1939). A modification of the method of Marshall and Hecht for detn. of sulfanilic acid amide in blood and urine is described. By injection of sulfanilic acid amide in rats and detn. of sulfanilic acid amide in the body, it was shown that the method yielded good quant. results. H. Kringstad

A method for the determination of blood acetone bodies Richard H. Barnes and Arne N. Wick. *J. Biol. Chem.* **131**, 413–23(1939).—In the method described for the detn. of blood acetone bodies, acetoacetic acid and β-hydroxybutyric acid are oxidized to Me_2CO with H_2SO_4 and $K_2Cr_2O_7$ and the Me_2CO is pptd. as a Hg complex. After centrifuging, the Hg-Me_2CO ppt. is decompd. in HCl and the Me_2CO is distd., collected in alk. I soln. and titrated by the Messinger technique. A. P. Lothrop

Photometric determination of estrogens. I. A modified Kober reaction for determining the total estrogens in a mixture of estrogenic steroids. Carl Bachman. *J. Biol. Chem.* **131**, 455 62(1939); cf. *C. A.* **25**, 5908.—The Kober reaction for the development of colors with estrogenic steroids and phenolsulfonic acid was modified by substituting for the original reagent a dilu. of the sulfonic acid with H_2O and running the reaction at 150° instead of 100°. A mixt. of estrone, α-estradiol and estriol can be accurately detd. under the conditions described. **II. A new color reaction for estriol.** *Ibid.* 463–8. A specific, stable violet-pink color is produced when estriol is heated at 150° with a reagent made up of a soln. of Na *p*-phenolsulfonate in H_3PO_4. A method is described for detg. estriol in the presence of estrone which has been used with pregnancy urine exts. A. P. Lothrop

A new method for the determination of the ether-soluble constituents of the cerebrospinal fluid. Carl Riebeling. *Klin. Wochschr.* **18**, 1162–3(1939).—The substances extd. with ether are oxidized with dichromate-H_2SO_4 mixt. and the excess dichromate is detd. iodometrically. H. L. M.

Studies on blood coagulation. I. Method for the determination of coagulation time. Eugen Hecht. *Acta Med. Scand.* **102**, 79–84(1939).—Description of an app. for detg. coagulation on 5 drops of liquid. The details of the manipulations are discussed. **II. Experiments on the determination of coagulation time.** *Ibid.* 85–100 (1939).—The spontaneous coagulation of chicken plasma (whole or dild. to 75, 50 or 25% with physiol. saline) is delayed according to its diln. and age. It will coagulate even after 7 days but very slowly. However, on the addn. of a drop of embryonal juice fairly rapid coagulation takes place even in plasma 11 days old, the coagulation time varying inversely with the diln. The addn. of 1 drop 8% NaCl greatly increases the coagulation time. The spontaneous coagulation is also delayed through the addn. of $CaCl_2$, the delay becoming longer with increasing concn. Similarly, the spontaneous coagulation proceeds more rapidly with rising temp. within the range of 30° to 40°. The relation between coagulation time and concn. of coagulation activators is formulated mathematically. S. Morgulis

A collaborative investigation of the spectrophotometric method for assay of vitamin A. C. L. Barthe, F. F. Berg, E. B. Carter, D. M. Copley, R. J. Fosbinder, T. Lewis and F. O. Taylor. *J. Am. Pharm. Assoc.* **28**, 661–72 (1939).—In the detn. of vitamin A potency by phys. instruments, the conversion factor is of paramount importance. To achieve the greatest degree of accuracy in results, the E value of the U. S. P. reference oil, its unsaponifiable fraction and (or) any other suitable standard, should be detd. every day and the conversion factor calcd. to check the constancy of conditions necessary for accurate operation of the instrument. In this manner errors due to conditions in the lab., the instrument or the human element can be obviated or at least reduced to a min. Under specified and well-controlled conditions of operation of the phys. instruments, capable of accurate measurement, results can and should be obtained which are in closer agreement than those obtainable by biol. assay. When there is any doubt or question as to the source of the oil under consideration, the optical detn. should be made on the unsaponifiable residue. The suggestion that a spectrophotometric method be adopted as an alternate for the biol. assay is discussed. A. Papineau-Couture

Elimination of diacetyldiaminodiphenylsulfone in the urine. J. Trapl. *Acta Dermato-Venereol.* **20**, 248–56 (1939). A method for finding the presence of diacetyldiaminodiphenylsulfone (I) is reported; it is based on a reaction of the free amino group which, joined with phenol, gives an azo dye. Five cc. of cool acid urine is mixed with 3 grains of $NaNO_2$; after dissolving and shaking with 3 grains of hydroxyquinoline, NaOH is added until the color changes from pink to red. Two hrs. after taking ½ g. of I, its presence could be detected in the urine. Secretion stopped after 24 hrs. Maurice M. Rath

Evaluation of oxalate solutions for the determination of packed cell volume in human blood. Jane M. Leichsenring, Eva G. Donelson, Lucille M. Wall and Margaret A. Ohlsoff. *J. Lab. Clin. Med.* **25**, 35–44(1939).—With all the blood samples (subjects, women, ages 17 to 50 yrs.), 1.6% K oxalate, prepd. from dried salt, was found to be more nearly isotonic, both when the samples were obtained with the subjects under basal and nonbasal conditions, than other salt concns. observed (1.4% and 1.8% K oxalate and 1.2% Na oxalate). Howard W. Robinson

Clinical demonstration of iron in the skin in hemochromatosis. Hamilton R. Fishback. *J. Lab. Clin. Med.* **25**, 98 9(1939). Equal parts of sterile solns. of 0.5% $K_4Fe(CN)_6$ and 0.01 *N* HCl were mixed and injected intradermally so as to form a wheal. A blue color was obtained within 5 min. that disappeared in about 2 weeks. The test is without any evident injurious effects, is specific for hemochromatosis, and is also pos. after death. The neg. test showed a white wheal that disappeared in about the same time. Howard W. Robinson

A ring test for urine bromides. Alex Blumstein, Paul M. Zoll and Jesse J. Mayer. *J. Lab. Clin. Med.* **25**, 99 101(1939).—One cc. of 20% CCl_3COOH soln. is mixed with approx. 5 cc. of urine and the mixt. overlayered with a 0.5% $AuCl_3$ soln. A bromide concn. over 50 mg. % gives a yellow to a reddish orange ring at the interface. Bile and iodides when present in the urine interfere. The test may also be done on spinal fluid and on blood serum after the protein is removed by CCl_3COOH. H. W. R.

Rapid extractor for urinary androgens. Factors to be considered in the preparation of extracts for colorimetric assay. Nathan B. Talbot and George O. Langstroth. *Endocrinology* **25**, 729–36(1939).—A small and convenient

app. which permits extn. of about 90% of urinary androgens in 1 hr. with C_6H_6 is described. Recovery expts. made in part with the aid of this app. show that a significant amt. of androsterone and dehydroisoandrosterone is lost in the prepn. of urine exts. for colorimetric assay. The chief loss occurs when the Et_2O ext. is cleared with decolorizing charcoal. The amt. of androgenic "sterone" substances detd. by the usual colorimetric methods which include treatment with decolorizing charcoal as part of the procedure are not an accurate index of the original "sterone" content of the urine. Felix Saunders

Calibrating Matthes' oxygen meter with alveolar air. Hermann Becker-Freyseng, Ulrich Luft and Erich Opitz. *Luftfahrtmed.* **3**, 30–13 (1939).—Matthes' instrument was calibrated by calcn. of arterial satn. from alveolar O tension and the Henderson nomogram, and also by direct arterial puncture. The former method is inaccurate at very low O tensions. D. B. Dill

Urinary sulfate test in the supervision of workers exposed to benzene (Jephcott, Bulmer) **13**. Studies on the metodetn. of glucose, frye and conjugated glucuronic acid (Kakinuma) **7**.

C—MICROBIOLOGY

LAWRENCE H. JAMES

The chemistry of the lipides of tubercle bacilli. LVIII. Firmly bound lipides of the so-called leprosy bacillus. Walton B. Geiger, Jr., and Rudolph J. Anderson. *J. Biol. Chem.* **131**, 539–48(1939); cf. *C. A.* **26**, 1316; **30**, 4148[8]; **33**, 7337[9].—After exhaustive extn. with alc.-Et_2O the so-called leprosy bacillus contains 19.2% of firmly bound lipides which can be removed by extn. with Et_2O and $CHCl_3$ after the partly defatted cells have been treated with dil. HCl. These extd. lipides can be sepd. into 3 main fractions. The least sol. fraction, which is a white amorphous powder, m. 175–85°, gives 40.5% of carbohydrate and 66.4% of Et_2O-sol. compds. on sapon. The latter compds. are mainly hydroxy acids similar to leprosinic acid but there is also a small amt of lower fatty acids together with unsaponifiable or neutral material contg. *d*-eicosanol-2 and *d*-octadecanol-2. The hydroxy acid is optically active but is apparently a mixt. since no definitely pure acid could be isolated. When heated *in vacuo* to 250 70° the acid decomps. and 15.2% of cryst. acids distil off. From these volatile acids a cryst. tetracosanoic acid, m. 76–7°, having probably a branching chain structure, can be isolated. **LIX. The composition of the polysaccharide of the firmly bound lipides of the leprosy bacillus.** R. J. Anderson and M. M. Creighton. *Ibid.* 549–54.—The polysaccharide of the firmly bound lipides of the leprosy bacillus consists principally of pentosans, *d*-arabinose being the chief constituent together with about 7% of some other pentose or pentoses which could not be identified. A small amt. of *d*-galactose is also present. The sugars isolated account approx. for the total amt. of reducing sugars liberated on complete hydrolysis but represent only about 1/2 of the polysaccharide but the nature of the other nonreducing cleavage products could not be detd. A. P. Lothrop

Metabolic products of *Aspergillus ochraceus* (Yamura) **10**.

D—BOTANY

THOMAS G. PHILLIPS

Plant viruses. The influence of recent knowledge on methods for their control. Rupert J. Best. *J. Australian Inst. Agr. Sci.* **5**, 162–8(1939).—Recent investigations showing that quite a no. of viruses are proteins may have a marked influence on the search for control measures for virus diseases. J. R. Adams

Vitamin C content of hips. Haakon Natvig. *Tids. Norske Laegeforen.* **59**, 847–60(1939).—Vitamin C was detd. in hips by titration, and biologically. Great variations were found according to the maturity of the hips: Light yellow hips ascorbic acid 1140 mg. %, light red 1668, red 1900, deep red 2200, dark red (overripe) 625, dark red (thin skinned) 440 and dark red to dark 230 (detd. in skin of dried hips). V. Aschehoug

Variation in the vitamin C content of hips of different degrees of maturity. Bergliot Qviller. *Tids. Norske Laegeforen.* **59**, 860–5(1939).—Vitamin C was detd. by titration. The ascorbic acid content increases during maturation and decreases when hips are overripe. *Rosa rugosa* shows higher vitamin C content than *R. glauca* and *R. coriifolia*. V. Aschehoug

Formation of abnormal tissue in chestnut and filbert branches damaged by toxic gas. A. Biraghi. *Boll. staz. patol. vegetale* **18**, 455–70(1938); cf. *C. A.* **33**, 9360[8]; Neger, *C. A.* **14**, 3442.—Near a chem. factory strange growths were observed on the branches of chestnut trees and were ascribed to SO_2 injury. 9 illustrations. **Serious lesions produced on filbert branches by toxic gas.** *Ibid.* 497–508. 6 illustrations. W. F. Bruce

Sulfur content of juice pressed from nondeciduous leaves at different seasons. A. Leulier, L. Revol and L. Tuarze. *Compt. rend. soc. biol.* **132**, 8–9(1939).—Juice pressed from cherry-laurel leaves contained total S in Feb. 49, May 25, June 27.5, July 44, Oct. 47.5, Nov. 47 and Dec. 43 mg. %. Old leaves contain more than young leaves, possibly because they are less hydrated. L. E. Gilson

Remark on the communication of Wergin: Direct observation of 0.2 μ structural elements of the vegetable cell wall. Max Lüdtke. *Naturwissenschaften* **27**, 693–4 (1939); cf. *C. A.* **33**, 1782[8].—Priority claims. **Reply.** W. Wergin. *Ibid.* 694. B. J. C. van der Hoeven

Nutrition experiments with haplonts of Tilletia tritici. Maria Lange-de la Camp. *Kuhn-Arch.* **48**, 179–90 (1939).—A no. of monosporidial lines of *Tilletia tritici* were cultured in a variety of media to det. the influence of nutrition on the intensity, form and color of growth and spore formation. Increasing concns. of rock candy with decreasing peptone was without influence. Optimum growth with peptone was obtained with 1–2%. Changing the pH between 5.9 and 7.0 had little influence on the growth. Dextrose and sucrose proved to be good energy sources; levulose, galactose, maltose and lactose were unsuitable. Inorg. N salts were not utilized. Of the org. N compds., asparagine was the most favorable for growth and spore formation. Nucleic acid, peptone, albumin and casein provided good growth but allantoin was not utilized. C. K. Horner

The course of indicative conditions in the graft propagation of apples. Gerhard Friedrich. *Kuhn-Arch.* **48**, 191–232(1939).—Press juice of the bark and leaves of graft cultivations of several types of apple trees was analyzed for dry matter, monosaccharides, total sugar, osmotic pressure, sol. N and elec. cond. The detns. were made during 6 characteristic growth periods: bud swelling, leaf unfolding, twig development, height of vegetation, autumn leaf fall and winter dormancy. The cultivation on weak growing types resulted generally in greater concns. of sugar and N as well as a higher osmotic value and more dry wt. This did not appear to be due to an obstruction of substances in the graft juncture. The importance of physiol. changes as indicators for the state of development of fruit trees in general is discussed. Sixty-eight references. C. K. Horner

Sclerotium rolfsii Sacc. in the sugar beet. Heinrich Krüger. *Kuhn-Arch.*, **48**, 233–81(1939).—The employed strain of *Sclerotium rolfsii* was isolated in Spain and appears to be identical with numerous other tested strains of this fungus. It attacks not only the sugar beet but wild beets and other Chenopodiacae as well. The organism grows first into the intercellular spaces of the host and later penetrates the cell wall. The destructive agency appears to be due to both an enzymic dissolving factor and a toxic element. Oxalic acid is excreted by the fungus and it combines with the Ca of the cell wall of the host, replacing the normal pectin. The presence of both pectinase and cellulase was demonstrated in cultures of the fungi in nutrient solns. of known chem. constitution. Beet cellulose was more readily attacked than paper cellulose. The organisms do not penetrate collodion membranes. Ni-

trates and NH_3 salts stimulated the development of both sclerotia and mycelium; asparagine and urea favored the latter but depressed the former. As C sources, pectin and cellulose produced the normally observed round form of growth with sclerotia, which occurs under natural conditions. Other carbohydrates (mannitol, dextrin and xylan) allowed good mycelium growth but no sclerotia. The mycelia of germinating fungi were killed at a temp. of −2° to −5° but new mycelia were formed when the cultures were returned to optimum temp. Fifty-six references. C. K. Horner

The influence of the reaction of hydrochloric acid upon the catalase activity in germinated millet seeds. Chi-Chin Liang. *Bull. Chinese Botan. Soc.* **3**, No. 1, 45–52 (1937).—In solns. having pH values greater than 2.9, HCl had no effect on the germination of millet seeds at 22°. At lower values the germination power decreased with the pH and the germinated seeds finally died. There was a close correlation between the catalase activity and the germination power of the seeds, as affected by pH. The catalase activity in distd. water and in HCl solns. of pH 2.9–5.4 tended to increase during the 1st 24 hrs. and the ratio of the activity of treated seeds to that of dry seeds was greater than 1. In the case of seeds treated with HCl solns. having pH values less than 2.9 the ratio rapidly fell below 1. The internal pH of the seeds remained const. at 6.2 when the seeds were soaked for 24 hrs. in solns. having pH values of 2.9–5.4 or in distd. water. The internal pH showed progressive decrease as the pH of the external soln. was decreased below 2.9 and the aq. ext. of the ground seeds lost its colloidal properties. K. D. Jacob

The influence of environmental factors on the development of anthocyanin and the physiological significance of this pigment in Amaranthus cordatus. Chi-Yuen Chia. *Bull. Chinese Botan. Soc.* **3**, No. 1, 119–20 (1937).—A 50% reduction of daylight in the greenhouse caused a considerable decrease in the production of anthocyanin (I) and its formation was completely suppressed under the continuous illumination of a 60-w. Champion lamp. With a 50% reduction of daylight the plant was stimulated to develop I when grown in Knop's nutrient soln. and supplied aseptically with 2% of dextrose. The short wave lengths of the ultraviolet spectrum had no effect on the production of I. Under similar light conditions, induced green plants consumed more O_2 and produced more CO_2 than did normal red plants. Under artificial light, evolution of CO_2 by normal red plants of the same I content increased with the intensity of the illumination. Irradiation of plants with a Hg-vapor lamp caused an increase in the rate of O_2 consumption. K. D. Jacob

The rooting of tung oil tree cuttings with the aid of heteroauxin. Hung-Chang Yin *Bull. Chinese Botan. Soc.* **3**, No. 1, 121–2 (1937).—Formation of roots on tung tree cuttings was greatly increased by soaking the severed ends for 20 hrs. in a soln. contg. 0.2 mg. β-indoleacetic acid per cc. The compd. was slightly injurious at a concn. of 0.4 mg./cc. K. D. Jacob

Fusarium stem rot of the carnation. H. L. White. *Exptl. Research Sta., Turner's Hill, Herts, Ann. Rept.* **24**, 53–5 (1938) (Pub., 1939).—Rooting of carnation cuttings in sand cultures inoculated with spores of *F. culmorum* was not improved by pre-immersion of the severed ends of the cuttings for 15 hrs. in a soln. contg. 40 p. p. m. of α-naphthaleneacetic acid and there was a marked proliferation of the tissues of the stem base assocd. with splitting of the stem and a tendency to rot. Cuttings dipped in a soln. (40 p. p. m.) of a proprietary growth substance showed uniformly good root development and less extensive tissue proliferation and stem splitting and rot. Root development was depressed by watering the planted cuttings with solns. (10 p. p. m. of K) of either KNO_3 or K_2SO_4. K. D. Jacob

Report of the plant physiologist for 1938. F. R. Tubbs. *Tea Research Inst., Ceylon, Bull.* No. 19, 38–56; cf. *C. A.* **31**, 1847[3,4].—No significant effect on the no. of cuttings surviving or the no. rooting in 18 weeks was obtained by immersing the severed ends of tea-bush cuttings for 17 hrs. in a soln. contg. dextrose 2.0 and urea 0.1%. Phenylacetic acid also had no effect on the rooting of tea-bush cuttings and β-indolylacetic acid treatments did not favor the survival, rooting or growth of cuttings of *Camellia sinensis*. K. D. Jacob

Cell-wall constituents of soybeans. II. Chemical constituents of the seed coat. Syuiku Sasaki and Syotaro To. *J. Agr. Chem. Soc. Japan* **15**, 624–8; *Bull. Agr. Chem. Soc. Japan* **15**, 105–6 (1939); cf. *C. A.* **33**, 6903[5].—The seeds consisted of 85–90% embryo and 5–10% seed coat. The analysis of the seed coat was: pectin 17–20, hemicellulose (4% NaOH ext.) 5.6–10.3, crude fiber 51.9, α-cellulose 31.2, β-cellulose 18.2, γ-cellulose 2.5, crude protein 11.7, crude fat 0.96 and ash in dry matter 4.3%. Pectin was prepd. by extn. with 0.5% NH_4 oxalate. The yield was 15–19%. It contained H_2O 2.4, ash 2.7, MeO group 4.7 and uronic acid anhydride 45.5%. Galacturonic acid was found in the hydrolyzate of pectin. Y. Kihara

Growth-factor requirements of four species of isolated roots. James Bonner and Philip S. Devirian. *Am. J. Botany* **26**, 661–5 (1939); cf. *C. A.* **33**, 1784[1] and following abstr.—Isolated pea, radish, flax and tomato roots were cultivated in a mineral nutrient soln. contg. sucrose, vitamin B_1 and nicotinic acid. Addns. of adenine, pantothenic acid, vitamins B_2, B_6, E and K did not increase the growth rate of radish or pea roots. Addns. of β-alanine, ascorbic acid and theelin caused no increase under these conditions in the case of pea roots and asparagine, glutamic acid, glycine, isoleucine, leucine, tryptophan and valine in the case of radish roots. Vitamin B_1 was necessary but nicotinic acid and vitamin B_6 were not needed to cause growth of flax roots. Vitamins B_1 and B_6 were necessary for growth of excised tomato roots and the addn. of nicotinic acid increased the growth rate. Nelson McKaig, Jr.

A second growth factor for excised pea roots: nicotinic acid. Frederick T. Addicott and Philip S. Devirian. *Am. J. Botany* **26**, 667–71 (1939); cf. *C. A.* **33**, 1784[1] and preceding abstr.—Excised pea roots may be grown for an indefinitely large no. of weekly transfers in a soln. contg. only $Ca(NO_3)_2$, $MgSO_4$, KNO_3, KCl, KH_2PO_4, Fe tartrate, sucrose, vitamin B_1 and nicotinic acid. Other elements including pea ash and 20 amino acids singly and in combination could not sustain growth indefinitely in this soln. in absence of nicotinic acid. N. McK., Jr.

Alcohol extraction of growth hormone from plant tissue. Geo. S. Avery, Jr. *Am. J. Botany* **26**, 679–82 (1939).—Growth hormone is extd. from 3-g. portions of corn endosperm or dormant seed by fine grinding in a glass mortar with 15–30 g. of abs. EtOH, followed by filtration and evapn. of the filtrate at 50–55° under reduced pressure. The residue is taken up with water and 1-cc. portions are dild. with 1 cc of hot 3% agar. Further dilns. to bring the concn. of the ext. within the proportionality range are made with 1.5% agar. The final material is cut into blocks and applied to decapitated *Avena* coleoptiles for test by the "deseeded" method. The use of ether in taking up the ext. gives low results and should be avoided. Nelson McKaig, Jr.

A review of the subgenus Diholcos of the genus Astragalus. C. L. Porter. *Am. J. Botany* **26**, 690–3 (1939).—Four species of this Se indicator plant are described. Nelson McKaig, Jr.

Experiments on bud inhibition with 3-indoleacetic acid. Folke Skoog. *Am. J. Botany* **26**, 702–7 (1939).—*Pisum* buds 2.0–3.5 mm. long were grown in a high humidity dark room at 25° in nutrient solns. contg. different amts. of 3-indoleacetic acid (I) to det. whether the inhibition of auxin is direct or indirect. At first all treated plants grew slower than the controls, then plants in lower concns. of I grew as fast or faster than controls. Growth remained inhibited on const. exposure to concns. above 0.1 mg./l. of I. Exposures to 0.1 and 10 mg./l. of I for 65 hrs. stimulated growth after transfer to plain nutrient soln. Applications of 2–4 mg. of I per g. of lanolin to decapitated *Pisum* stems inhibited development of lateral buds for 7 days when applied to the cut surfaces, was 70% effective when applied below the cut surfaces and was ineffec-

tive when applied below the lateral buds. Conclusion: I can inhibit growth directly in buds and I applied to decapitated stems inhibits lateral buds. N. McK., Jr.

Respiration and fermentation in the carrot, Daucus carota. I. Respiration. Paul B. Marsh and David R. Goddard. *Am. J. Botany* **26**, 724–8(1939).—The respiration of carrot root is reversibly inhibited by 10^{-2} – 10^{-5} *M* KCN at pH 5.9 and 10^{-3} *M* NaN_3 at pH 4.5–5.7. Respiration inhibition by CO is reversed by light, indicating that pyrocatechol oxidase is not the enzyme involved. The enzyme which combines with CO has an O affinity 9–13 times its CO affinity. Carrot roots killed by boiling do not consume O but give a pos. Nadi reaction and oxidize a mixt. of *p*-phenylenediamine and catechol. Respiration of immature (less than 3 cm.) carrot leaves is inhibited by NaN_3, HCN and CO but mature (25 cm.) leaves are not affected. Nelson McKaig, Jr.

Response of tomato plants to β-naphthoxyacetic acid. S. C. Bausor. *Am. J. Botany* **26**, 733–6(1939).—Lanolin contg. 1% β-naphthoxyacetic acid causes neg. curvature of tomato stems and petioles below the point of application and pos. curvature in the treated region. A 0.1% paste causes neg. curvature below the point of application and initially in the treated area, which later becomes pos. A 0.01% paste causes a neg. curvature in the treated area only. A 0.001% paste has no effect. Root primordia develop and growth is inhibited after application of 1% and 0.1% pastes. The effects are noticeable within 1 hr. Nelson McKaig, Jr.

Early root and shoot growth in 2 varieties of Avena sativa in relation to growth substances. Samuel Kaiser and Harry G. Albaum. *Am. J. Botany* **26**, 749–54 (1939).—The difference in effect of 3-indoleacetic acid on the varieties Black Norway (I) and Fulghum (II) was studied. Aq. solns. contg. 0.01–5.0 mg./l. of 3-indoleacetic acid showed the same max. inhibition and the same time of max. inhibition at low concns. but was later for II than for I at higher concns. Concns. up to 50 mg./l. increased root growth similarly in the 2 varieties but concns. below 0.002 mg./l. were relatively ineffective. Shoots of I grew rapidly when treated with concns. between 0.002 and 2.0 mg./l., shoots of II were unaffected I was more sensitive to the *Avena* coleoptile test. Apparently II normally produces auxin at a faster rate than I. Nelson McKaig, Jr.

The daily cycle of apparent photosynthesis in a submerged aquatic. Bernard S. Meyer. *Am. J. Botany* **26**, 755–60(1939).—An app. is described for the hourly detn. of apparent photosynthesis of a submerged aquatic without disturbing the plant in any way. The daily curve of apparent photosynthesis is closely correlated with solar radiation, although the frequent skewing of the curves toward the morning hrs. suggests the influence of an internal factor on the course of daily photosynthesis of *Ceratophyllum demersum* L. Nelson McKaig, Jr.

The substances of a green alga which determine sex. Richard Kuhn, Franz Moewus and Gerhard Wendt. *Ber.* **72B**, 1702–7(1939); cf. Hartmann, *et al.*, *C. A.* **33**, 8317⁴.—Along with the gamones active in the process of fertilization proper, gametes secrete still other substances, which det. sex in organisms of mixed sex. In the monozoic culture of *Protosiphon botryoides*, the ratio of male to female cells can be altered by changes in temp. and pH (Moewus, *Biol. Zentr.* **55**, 293(1935)). These phenomena of nonhereditary sex detn. are exhibited even more strikingly in *Chlamydomonas eugametos* f. *synoica* (Moewus, *Biol. Zentr.* **1939** (in press); cf. *C. A.* **33**, 4630⁶·⁸. When the alga is treated with the filtrate of the ♀¹-gametes, all the cells become *female;* if the filtrate of the ♂¹-gametes is added, there are obtained only *male* cells. In this case, changes of temp. or pH are not necessary. These facts show that the gametes secrete sex-detg. substances which are designated *termones* (*andro-* (I) and *gynotermones* (II)). It has not yet been possible to isolate them from the active filtrates, in which their concn. is of the same order of magnitude as that of the motility and coupling gamones. Moreover, to all appearances they have no pigment character. After even long exposure to blue and violet light they can still be detected in undiminished activity long after the coupling gamones have been completely inactivated by conversion into *trans*-crocetin di-Me ester. However, it has been possible to establish that (1) I is sol. in ether and volatile with steam; (2) II cannot be extd. from water with ether and is not volatile with steam; (3) heating with dil. H_2SO_4 or $Ba(OH)_2$ destroys II, and parallel with this inactivation appears the ether-sol. and steam-volatile I. This made it probable that II bears to I the relation of a glucoside to its aglucone. Although the hydrolysis of glucosides by dil. alkalies is unusual, picrocrocin (III) is cleaved to safranal and *d*-glucose. A test of cryst. III, m. 152–3°, from saffron showed that it can replace II. If synoecious cells are placed in a soln. contg. 0.02 γ or more of III in 1 cc. water, in 10 min. all the cells have become capable of coupling with ♂¹-gametes. Again, if 0.1 mg. III in 25 cc. water is treated with 50 cc. of 2% H_2SO_4 or of 3% $Ba(OH)_2$ and steam-distd. at such a rate that 100 cc. distillate passes over in 20 min., neither distillate shows any trace of II activity but both are highly active in I. The limit of activity is reached only when the distillates have been dild. about 10^8-fold. Expts. with safranal prepd. from the purest semicarbazone, m. 174°, with $C_6H_4(CO)_2O$, confirmed these results. As the no. of cells of the alga was 2×10^6 per cc., 10–20 mols. safranal is capable of masculinizing 1 cell. Its action is highly specific; citral, α- and β-cyclocitrals treated in the same way have no effect even in concns. 10^9 times higher, and it is believed that I is safranal. II, however, is not III. When solns. of III and filtrates of ♀¹-cells are adjusted to the same activity in II and then hydrolyzed with dil. H_2SO_4 or $Ba(OH)_2$ the distillate obtained from III is 1000 times higher in I activity. This indicates the filtrate from the cells contains a II 1000 times more powerful than III. The authors believe it to be a substance closely analogous to III, contg. instead of glucose some other sugar, perhaps gentiobiose or a similar disaccharide. The limit of activity of III is at a concn. of 8×10^{12} mols. per cc. and that of a ♀¹-filtrate at 2×10^3 gametes per cc. If II were identical with III this would indicate that each gamete secretes 4×10^9 mols. III. Previous work has shown that under these conditions the gametes secret only 4×10^6 mols. of *cis*- and *trans*-crocetin di-Me esters (crocin). Crocin and III are decompn. products of a carotenoid (protocrocin) with the normal no. of 40 C atoms and the ratio of pigment to bitter principle in fresh saffron is approx. 1:2. In *Chlamydomonas* there would seem, from the above calcns., to be formed 1,000 times as many mols. of II as of crocin; this difficulty is cleared away if it is assumed that II is 1000 times more active than III. The chem. relationship between the fertilization (gamones) and sex-detg. (termones) substances of the alga is shown schematically. C. A. R.

Methods of tissue preparation for analysis in physiological studies with plants. T. C. Broyer. *Botan. Rev.* **5**, 531–45(1939).—A review. Felix Saunders

(Changes in) reducing power of the juice of fruits during the course of maturation. Melle L. Gatet. *Enzymologia* **6**, 375–86(1939)(in French).—The juice of oranges contains free ascorbic acid and ascorbic acid in a form which is easily hydrolyzed in the cold in 8 days. There is also another substance with antiscorbutic properties which will reduce dichlorophenol. The substance may be a form of ascorbic acid which is difficultly hydrolyzable or a polyphenol reducer. Felix Saunders

Spectral sensitivity of spores and sporidia of Ustilago zeae to monochromatic ultraviolet light. Ernest W. Landen. *J. Cellular Comp. Physiol.* **14**, 217–26(1939). Felix Saunders

The influence of phosphoric acid upon the metabolism of young oats plants. W. U. Behrens. *Bodenkunde u. Pflanzenernähr.* **14**, 59–70(1939).—Oats seedlings were started in a P_2O_5-deficient soil or sand and peat, and after a time some pots were top dressed with phosphate. The latter were harvested at 2 later periods with unfertilized pots for comparison and the plants analyzed. Conclusions: P_2O_5 caused an accumulation of total sugar, monosac-

charides and in particular disaccharides. The plants grown with deficient P_2O_5 contained significantly lower percentages of total N, protein and nitrate N in dry matter, but the effect upon amide and α-amino N was uncertain; Et_2O and EtOH-sol. substances were lower. Twenty-two references. C. J. Schollenberger

Development and assimilation of nutrients by flax. K. Opitz. *Bodenkunde u. Pflanzenernahr.* **14**, 172–95 (1939); cf. Opitz, *Forschungsdienst* **1**, 848(1936).—From field and pot expts. with fiber- and oil-flax varieties with analyses of the crop at approx. weekly intervals during the growing season it is concluded: Development of both types of flax is similar up to full bloom; after this stage, oil-flax develops more slowly, owing to the requirements for heavier seed production. Dry matter production by fiber-flax reaches 60%, but the uptake of K_2O is 80% and of N about 70% by blooming time; P_2O_5, CaO and generally MgO are less rapidly assimilated, 60–70% in this period. In the earlier stages of growth, the need for N is greater than for K_2O, although the latter is absorbed more rapidly. Fiber-flax differs principally in forming more dry matter before the assimilation of minerals, except N, has proceeded so far; its need for CaO is less, for K_2O is greater than with oil-flax. The pot and field expts. were in general agreement, and both are considered reliable indications of the plants' need for nutrients at different stages of growth, although differences were less marked with the pot expts.; nutrients were absorbed more slowly and dry matter was produced more rapidly, and there was evidence of greater resorption of minerals with the latter. Considerable losses of K_2O, N and CaO, in magnitude decreasing in that order but dependent upon weather conditions at the time of ripening, were noted in these expts. Twelve references. C. J. Schollenberger

Variations in the potassium content of flax plant ash in the light of the newer biochemical knowledge. Vladimír Kyzlink. *Bodenkunde u. Pflanzenernahr.* **14**, 196–204 (1939); cf. *C. A.* **33**, 7023⁹.—Oil-flax was grown in pots of very poor soil, variously fertilized and limed. Roots, stems with leaves and seeds were ashed separately and K_2O was detd. in a study of the distribution and resorption of K in the plant. Conclusions: Nitrate favors resorption of K_2O and its movement from roots to aerial parts; if the concn. of nitrate N exceeds that of K_2O in the soil soln., seed and stem are equally well supplied with K_2O; if nitrate is deficient relative to K_2O, seeds will contain less K_2O. As observed with other plants, Ca^{++} in the plant tissues is antagonistic to the entrance of K^+; this effect is most marked in the roots, where Ca tends to accumulate at the approach of maturity or from intensive fertilization with nitrate. With an unbalanced fertilization, lacking nitrate, K_2O is high in roots and seeds but low in the stems and leaves, while the latter are higher in CaO; consequently, less K_2O can enter the leaves, and the formation of dry matter is limited. The foregoing observations apply to Ca in the plant; liming a soil is likely to increase the available K_2O by exchange, so that flax stems grown on limed soils are usually higher in K_2O content. Eight references. C. J. Schollenberger

Investigations on the origin of the "zone of root influence" with seedlings of Lupinus luteus. Helmut Schander. *Bodenkunde u. Pflanzenernahr.* **14**, 346–80 (1939); cf. *C. A.* **33**, 2942¹.—The factors which may operate to enable a plant to control the pH of a soil zone adjacent to its active roots and the necessity for such control of root environment are discussed. Expts. are described, from which it is concluded that the problem of root excretions can be solved. A study of the incidence of chlorosis in young lupine plants grown on a plot of soil highly variable with respect to $CaCO_3$ content and pH, including pH and other tests on soil samples taken to several depths at close and regular intervals, so that maps of the soil characteristics both at the surface and beneath might be compared with a similar chlorosis map, showed no striking correlation, possibly because the sampling stations were too widely spaced. It is concluded that pH and salt concn. relations in the root zone are the principal factors in chlorosis, that is to say, along the entire length of all roots; it is not enough that some of the roots are in a favorable environment, but practically all must be. The influence of the subsoil, at least to the full depth of root penetration, 1 m. or more, is therefore, as great as that of the surface soil. Besides the influence of the soil's buffer capacity toward acids, soil structure and water relations also have a role in the tendency to chlorosis. 30 references. C. J. S.

The nitrogen nutrition of Graminea in mixed culture with legumes. Werner Scholz. *Bodenkunde u. Pflanzenernahr.* **15**, 47–73(1939).—In field and sand pot expts., rye with peas or serradella and oats with lupines were grown as mixed crops. The outcome of the field expts. was neg., owing to the soil's naturally abundant supply of available N. The pot expts. with sand showed that the N content of the latter was increased by N excreted from nodules on the legume roots, presumably as amino acids, but grain yields were not thereby increased. Conclusion: The excreted N is immediately utilized by bacteria rather than by the assocd. nonlegume, and benefits ony a following crop. Twenty references. C. J. Schollenberger

Physiological activity of a series of indolyl acids. N. H. Grace. *Can. J. Research* **17**, C, 373–6(1939); cf. *C. A.* **33**, 8697⁸.—The physiol. activity of a series of indolyl acids, from the acetic to the valeric, including 5-methylindolylpropionic, was detd. by the rooting responses of *Lonicera tartarica* cuttings treated with solns. of each. Indolylbutyric acid was the most active chemically, affecting the no. and length of roots per rooted cutting, the mean root length, the green wt. of leaves, and the fresh root wts. Indolylacetic acid had significant effects on the no. and length of roots per rooted cutting. Slight activity was shown by indolylpropionic acid, but neither indolylvaleric acid nor 5-methylindolylpropionic showed any significant treatment effects. None of the acids affected the no. of cuttings rooted. J. W. Shipley

The effect of leaf rust on the yield and quality of Thatcher and Renown wheat in 1938. B. Peturson and Margaret Newton. *Can. J. Research* **17**, C, 380–7(1939).—A study was made at Winnipeg in 1938 to det. the effect of leaf rust on the yield and quality of Thatcher and Renown wheat. In one expt., Thatcher and Renown were sown late in 1/400-acre plots; in another, Thatcher only was used and was sown early in rod-row plots. Half the plots of each variety were kept as free from leaf rust as possible by frequent applications of S dust, but the remaining half became heavily infected. In the 1/400-acre plots, leaf rust reduced the yield of Thatcher and Renown by 51.17 and 29.61%, resp.; in the rod-row plots of Thatcher, it reduced the yield by 37.02%. The decrease in yield was due more to reduction in kernel wt. than to reduction in no. of kernels per head. All the nondusted plots ripened approx. 3 days earlier than the dusted, and the grain from them graded one grade lower than that from the corresponding dusted plots. In both varieties, the protein content was diminished while the carotene content was increased. J. W. Shipley

Identification of the Columbian plant pinic-pinic. Maurice Marie Janot and Ramon Mendoza. *Compt. rend.* **209**, 653–6(1939); cf. Raymond-Hamet, *ibid.* 384.—The pinic-pinic of Columbia is shown botanically, chemically and pharmacodynamically to be identical with the chalchupa of Guatemala, both being *Rauwolfia heterophylla* (Roem. and Schult). Both alike are used by the native inhabitants as antidotes to snake poison and as febrifuges. C. A. Silberrad

A marine Porphyridium. Harald Kylin. *Kgl. Fysiograf. Sällskap. Lund, Forh.* **7**, 119–23(1937)(Pub., 1938) (in German).—A new species *Porphyridium marinum* is described. Spectrographic analyses of alc. and aq. exts. indicate the presence of floridian (not cyanophycean) phycoerythrin, also carotene and xanthophyll. Phylloxanthin is absent. 8 references. **The pigments and the colors of Cyanophyceae.** *Ibid.* 131–58.—A review on chlorophyll, carotenoids, phycoerythrin, phycocyan, cell-wall pigments, regional distribution of Cyanophyceae and complementary chromatic adaptation. Two new species are described. 86 references. **The hydrogen-ion concentration in the vacuoles of some marine algae.** *Ibid.* **8**, 194–204

(1938) (Pub., 1939); cf. *C. A.* **24**, 1406; **32**, 3787[1].—Mainly a review and discussion (with some apparently new data) of the apparent pH of the vacuoles and other structures of a large no. of species of seaweeds investigated by K. and others by the method of vital staining. Brilliant Cresyl Blue (Cresyl Blue) is taken up by the vacuoles more rapidly than is Neutral Red. Mangenot's test for I (formation of red cryst. deposits in the vacuoles by Cresyl Blue) (*C. A.* **23**, 3950) should not be regarded as pos. unless the red crystals liquefy into green flocks when H_2O_2 is added. The use of vital stains in testing for various inorg. ions is discussed. The report by M. Chadefaud (*Le cytoplasme des algues vertes et des algues brunes, ses éléments figurés et ses inclusions.* Thèse, Paris, 1935) that the vacuoles of *Desmarestia viridis* contain oxalate ions, is not confirmed. The crystals obtained by treatment with a soln. of KCl are apparently K_2SO_4. 10 references.

Fucosan vesicles of the Phaeophyceae. *Ibid.*, 205–14.—Evidence regarding the chem. nature of fucosan is critically reviewed. Fucosan is related to the tannins. 33 references. W. C. Tobie

The distribution of anthochlor in the Compositae. Otto Gertz. *Kgl. Fysiograf. Sallskap. Lund, Förh.* **8**, 62–70 (1938) (Pub., 1939) (in German).—Many yellow flowers, especially in the Compositae, contain pigments of the anthochlor (xanthein) group (cf. Klein, *C. A.* **16**, 3110, 4247). These pigments become red in the presence of alkali. Heat also produces a red color; the yellow color is restored by cooling. A convenient test is to touch the flower with the tip of a burning cigar; in this case the color change is [partly] due to NH_3 in the cigar smoke. The color change is obscured if anthocyanin pigments are also present. The test [with alkali?] may be applied to dried flowers; specimens over 300 years old gave a pos. test. The reaction is especially strong in the Coreopsidinae group. Species giving a pos. reaction with NH_3 or KOH are listed in detail (nos. in parentheses below indicate the no. of species tested in each genus): *Guizotia* (6), *Microlecane abyssinica*, *Coreopsis* (49), *Dahlia* (5), *Hidalgoa ternata*, *Inostigma* (4), *Chrysanthellum* (6), *Glossogyne* (2), *Heterospermum* (5), *Thelesperma* (11), *Bidens* (76), *Cosmos* (13). Species giving a neg. or a doubtful reaction are also listed. The results are discussed in relation to other species not classified among the Coreopsidinae but giving pos. reactions. The test is of systematic value, some reclassifications are suggested. 14 references.

The application of anthochlor in botanical microtechnique. The relationship between anthocyanins and anthochlor. *Ibid.* 71–82.—Exts. contg. anthochlor were made by boiling the flowers of *Primula elatior*, *Linaria vulgaris*, *Dahlia variabilis*, *Coreopsis verticillata*, *Guizotia abyssinica*, *Baeria chrysostoma*, *Helenium autumnale*, *Helichrysum arenarium*, *Lotus corniculatus* or *Celosia plumosa* in distd. water and filtering the soln. About 3 drops of H_2SO_4 was added per 10 cc. The exts. were used to stain fresh sections cut from the vegetative portions of 17 widely differing plants and trees. Pb acetate soln. was usually applied after staining to ppt. the pigment as yellow to brown-red granules. In general (with some exceptions) the parts which took the stain were the lignified portions which also stain with phloroglucinol and HCl. Conclusion: Since the same portions of plant tissue also stain with anthocyanins, the anthochlor pigments are probably related chemically to the anthocyanins. 22 references.

The use of anthochlor as an indicator. *Ibid.* 215–24.—For use as indicators, the flower exts. (cf. preceding abstr.) should contain no H_2SO_4 but a trace of phenol should be added to restrain mold growth. Common flowers which may be used are *Dahlia variabilis*, *Coreopsis lanceolata*, *Cosmos sulphureus*, *Guizotia abyssinica* and *Baeria chrysostoma*. Extensive lists are given of bases giving a red color and acids restoring the yellow color. The exts. are sensitive to very low concns. of H and OH ions. $FeCl_3$ gives a deep-black color. Concd. strong mineral acids give a red color, but the yellow color returns upon dilu. If the exts. turn brown (owing to mold growth or polymerization of the pigment) they still give the same color reactions. Indicator papers may be made, but should be stored in the dark. Dahlia ext. becomes red above 50°. Chem. compn. of anthochlor pigments is reviewed. 12 references. W. C. Tobie

Estimation and occurrence of keto acids in green plants. Artturi I. Virtanen, A. A. Arhimo and Heikki Suomalainen. *Nature* **144**, 597 (1939); cf. *C. A.* **33**, 6911[2].—The method described for detn. of keto acids in plants is based on the formation of 2,4-dinitrophenylhydrazone and its reduction with Na amalgam in alc. soln. to amino acids corresponding to the keto acids. In this way ketoglutaric acid, oxalacetic acid and pyruvic acid have been detd. in plants. E. D. Walter

Effect of ethylene on Magnifera indica. B. K. Kar and H. N. Banerjee. *Nature* **144**, 597–8 (1939).—The effect of different concns. of C_2H_4 on *Magnifera indica* is more pronounced in the pre-climacteric stage of the developing fruit than in the post-climacteric phase. The effect is seen in the rapid increase in the respiration rate, strong hydrolysis of starch, increased concn of total and reducing sugars and decrease in titratable acidity and alc.-insol. residue. The action of C_2H_4 seems to be of a respiratory nature, and is dependent on the available substrate, which depends on the stage of the maturity of the fruit. E. D. Walter

Coloring matter of the yellow flowers of Thevetia nerifolia (Apocyanaceae). R. D. Desai and Zafaruddin Ahmad. *Proc. Natl. Inst. Sci. India* **5**, 261–2 (1939).—The yellow flowers of *Thevetia nerifolia* (yellow oleander) contain 2 glucosides; hydrolysis gives a small quantity of an amorphous brown powder; it does not m. at 360°. The 2nd product is a *4'-Me ether* (?) of quercetin, yellow, m. 260° (*tetra-Ac deriv.*, pale yellow, m. 165°); concd. H_2SO_4 gives a pale-yellow soln. with an intense green fluorescence; $FeCl_3$ gives a green-black color. Demethylation gives quercetin. C. J. West

Changes in the photosynthetic activity of plants during their growth and development (Katunskiĭ) **15**. Effect of Co compds. on the Co content of supplementary fodder crops (Kidson, Maunsell) **15**. Report of the imperial agricultural chemist [on anthocyanin pigments in the rind of sugar canes] (Nath) **15**.

E —NUTRITION

PHILIP B. HAWK

Vitamin K. Henrik Dam. *Nord. Med.* **3**, 2375–9 (1939). A review of the problems concerning vitamin K. V. Aschehoug

A case of sprue treated with vitamin K. Hans Hult. *Nord. Med.* **3**, 2428–30 (1939).—A case of sprue was complicated by a K avitaminosis, which rapidly disappeared after vitamin K treatment. V. Aschehoug

Investigations on the transformation of carotene to vitamin A in the liver of rats, especially concerning the velocity of the process. Torben K. With. *Nord. Med.* **3**, 2901–3 (1939).—Expts. were carried out on rats which were fed carotene oil contg. 3000 I. U. per g. per rat, and killed after different intervals of time. The livers were analyzed and the results show that the transformation of carotene to vitamin A takes place almost entirely in the livers. This process begins after 2 hrs. Similar expts. with vitamin A show that after ½ to 1 hr. vitamin A could be identified in the liver. V. Aschehoug

Examinations of colloidal solutions of vitamin A and carotenoids. Torben K. With. *Nord. Med.* **3**, 2903–6 (1939). The prepn., analysis and keeping quality of colloidal solns. of vitamin A and carotenoids are discussed. V. Aschehoug

The effect of vitamin A given parenterally. Torben K. With. *Nord. Med.* **3**, 2906–8 (1939).—Expts. on rats, guinea pigs and chicks show that subcutaneous and intramuscular injections of vitamin A or carotene (dissolved in oil or in colloidal aq. soln.) were less effective than when the same amts. were given *per os*. V. Aschehoug

Silver foxes need the antigray hair vitamin. Gulbrand Lunde and Hans Kringstad. *Norsk Pelsdyrblad* **13**, 500–4 (1939).—Expts. carried out on silver foxes show that for the normal development of the pelt the antigray hair

vitamin called B_x belonging to the vitamin B complex is needed. This vitamin is also necessary for rats (cf. *C. A.* **32**, 5456[9]). While liver of mammals is the richest source of this vitamin, yeast also contains the antigray hair vitamin, but in varying amts. Fish liver is a fair source. Meat of mammals, fish flesh, wheat germ, maize and whale flesh meal are poor sources. V. Aschehoug

Vitamin C and blood changes. Raffaele D'Alessandro. *Minerva med.* **1939**, II, 273–8.—Ascorbic acid injected subcutaneously into normal rabbits (0.2 g. daily for 12 days) increased slightly the no. of red cells while that of white cells remained the same. When ascorbic acid was injected into rabbits which had been bled to produce a secondary anemia, the increase of red cells was greater, the increase being accompanied by the appearance of reticulocytes and nucleated red cells. E. S. G. B.

Vitamin C determinations in health and in chronic polyarthritis, scurvy and leucemia. G. A. K. von dem Borne. *Nederland. Tijdschr. Geneeskunde* **83**, IV, 5265–73(1939).—The normal vitamin C content of the blood is assumed to be 8 mg. per l. Satn. should occur after 8 oral doses of 300 mg. In spring small shortages are repeatedly encountered pointing to a seasonal shortness in vitamin C. In chronic polyarthritis vitamin C is on the normal level. In scurvy the level is below 4 mg. per l., in some cases down to less than 2 mg. per l. In leucemia vitamin C is above the normal level, probably because of the high vitamin content of the leucocytes. R. Beutner

The effect of the ingestion of irradiated yeast, molds and ergosterol on the antirachitic potency of ewe milk. Wm. G. Kirk. *Iowa State Coll. J. Sci.* **13**, 235(1939).—Summer feeding conditions did not increase the content of vitamin D in the milk of nursing ewes, but the addn. of irradiated ergosterol increased the antirachitic activity considerably and the addn. of irradiated yeast and molds produced twice the effect of equal amts. of ergosterol. The potency decreased rapidly when supplemental feeding was discontinued. F. E. Brown

Biological assay of feeding stuffs in a basal ration for coccidium-growth-promoting substance. III. Dried fish meal, alfalfa meal and white wheat flour. Elery R. Becker and Philip C. Waters. *Iowa State Coll. J. Sci.* **13**, 213–7(1939), cf. *C. A.* **32**, 5037[6].—Addn. of these substances to a basal ration does not produce the same proportional change in the weights of the rats as it does in the no. of oöcysts produced in the rats. This confirms the findings based on expts. with 11 other feeding stuffs. F. E. Brown

Vitamins and vitamin preparations in small animal practice. M. L. Morris and W. C. Russell. *J. Am. Vet. Med. Assoc.* **95**, 555–65(1939).—A review with 30 references. Rachel Brown

Availability of serum fat. I. Availability of unsaturated fat and of fat in general, in healthy young adults. J. W. Duyff. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 190–2(1939). The mean values for total fat and for fat in the cold ether ext. of oxalate plasma from 16 healthy 20–22 yr. old males after 10 hrs. fast were, resp., 515 and 65 mg./100 cc. Hence the mean availability ratio was 8.5. The mean BP values (100 cc.) for total ext. and for cold ether ext. were, resp., 3.37 and 0.36, with a mean availability ratio of 10.4. **II. Influence of fat ingestion on availability in young adults.** *Ibid.* 192–5.—Alimentary hyperlipemia in the above-mentioned subjects reached a max. 4 hrs. after ingestion of 250 g. of cream; after 8 hrs. fasting values were nearly regained. E. Curzon

The biological activity of synthetic *dl*-α-tocopherol and of natural *d*-α-tocopherol (vitamin E). Chr. Engel and A. Emmerie. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 197(1939).—The biol. activity of these 2 substances, compared on vitamin E-deficient female rats, was nearly the same. E. Curzon

Experimental hyperchromic anemia in rats. G. A. Overbeek and J. B. M. Vismans. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 206–7(1939). Hyperchromic anemia was produced in 6 out of 36 thyroidectomized rats after a few weeks on a diet free from "extrinsic factor." Remnants of thyroid gland were found in almost all animals who did not become anemic. E. Curzon

The spleen and the level of plasma iron. A. Ballière. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 225–7(1939).—See *C. A.* **33**, 8736[3]. E. Curzon

Edema due to dietary deficiencies in Morocco. E. Pouhin. *Bull. soc. path. exotique* **32**, 769–79(1939). E. Curzon

Amount and digestibility of the bacterial protein produced by zymogenic symbiosis in the paunch of ruminants on the basis of slaughtering results. Edgar Studt. *Z. Tierzucht. Zuchtungsbiol.* **44**, 253–61(1939). In the paunch of sheep slaughtered after fasting 18 hrs. and previously fed a diet in which molasses amides or ammonia supplied all the N except for a small amt. in straw protein, 8–14 times as much protein (75% digestible) was found as was in the daily ration. The dry matter found in the paunch amounted to only about twice the straw in the daily ration. The amt. of bacterial protein increases simultaneously with the wt. of the paunch contents. E. Curzon

The influence of ascorbic acid on the behavior of the organism at rest. A. R. Ratsimamanga. *Travail humain* **7**, 303–21(1939).—In guinea pigs on a diet deficient in ascorbic acid, liver and muscle glycogen decreases to 1/5 normal, adrenal ascorbic acid to 1/10 and phosphocreatine to about 1/2 normal, while muscle and blood lactate tend to increase. The rates of return to normal are roughly proportional to concn. of ascorbic acid added to the diet. D. B. Dill

Utilization of energy of wheat products by chickens. G. S. Fraps and E. C. Carlyle. *J. Nutrition* **18**, 385–98(1939); cf. *C. A.* **33**, 7851[4].—The feeds under comparison were fed as 1/3 of a ration otherwise const. in compn. for a 3-weeks test. With the cornmeal ration as standard, 3 tests were made with patent flour and low-grade flour, 2 with wheat bran and 1 with cornmeal. Productive energies were as follows: cornmeal 225 per 100 g., patent flour 188, low-grade flour 187, wheat brown shorts 86 and wheat bran 61. The relative productive energy values of effective digestible nutrients averaged, with cornmeal 278, patent flour 236, low-grade flour 251, wheat brown shorts 179 and wheat bran 173. The relative productive energy values of metabolizable energy were with cornmeal 61, patent flour 53, low-grade flour 57, wheat brown shorts 41 and wheat bran 41. When measured by gains of energy in protein and fat of growing chicks, neither the total nutrients, the digestible nutrients nor the metabolizable energy are correct measures of the feeding values of cornmeal, wheat flour, wheat brown shorts and wheat bran. C. R. Fellers

Effects produced by an increase in the calcium and phosphorus content of the diet on the calcium and phosphorus balance and on various bodily constituents of the rat. John Haldi, Geo. Bachmann, Winfrey Wynn and Charles Ensor. *J. Nutrition* **18**, 399–409(1939).—When large amts. of Ca and P were added to the rations nearly all the excess Ca was recovered in the feces, while the P in the feces was considerably less than the excess intake. A little of the excess of absorbed Ca was stored in the body; none of the P was so stored. The percentage gain in body wt. was not affected by the high Ca and P intake; however, the body dry wt. was lower. The body fat content was reduced by the increased intake of Ca and P. The diminution in the total fat and dry wt. was approx. the same. Both the fat and dry wt. of the body showed a progressive decline with a progressive increase in the Ca and P intake. C. R. Fellers

Simultaneous appearance of a positive line test and radioactive phosphate deposition in the rachitic rat metaphysis. Kenneth Morgareidge and Marian LeFevre Manly. *J. Nutrition* **18**, 411–21(1939).—After a single dose of Na_2HPO_4 contg. the radioactive isotope (P^{32}) accompanied by a single dose of vitamin D_2, detns. were made of the radioactive P of the whole blood and of the tibial diaphysis and metaphysis of rachitic rats. Vitamin D has no influence on the entrance of P into the blood or

into the diaphyseal portion of the tibia. In the metaphysis the healing produced by vitamin D occurs concomitantly with a significant increase in the content of radioactive P. These effects in the metaphysis are seen only after an elapse of 54–72 hrs. subsequent to the administration of the vitamin D. These results support the conclusion that the mode of action of vitamin D is not limited to the control of intestinal absorption of the elements concerned in calcification. C. R. Fellers

Effect of heat and solvents on the nutritive value of soybean protein. L. Margaret Johnson, Helen T. Parsons and Harry Steenbock. *J. Nutrition* **18**, 423–34(1939).—S and N balances on rats showed that the nutritive value of soybean protein is improved by heat. The claim that treatment with certain solvents such as hexane and MeOH have a similar effect was not substantiated. Soybeans contain a S- and N-contg. complex which is absorbable but cannot be used for tissue-building purposes. Heating the soybeans makes it available. 25 references. C. R. Fellers

Pathology of B_6 deficiency in the rat and response to treatment with 2-methyl-3-hydroxy-4,5-dihydroxymethylpyridine (synthetic vitamin B_6). Wm. Antopol and Klaus Unna. *Proc. Soc. Exptl. Biol. Med.* **42**, 126–7(1939).—The skin lesions resulting from lack of vitamin B_6 are described. They were promptly cured by a single dose of 100 γ of synthetic B_6. L. E. Gilson

Effects of vitamin C deficiency and diphtheria toxin on cellular blood constituents of the guinea pig. Alex Sigal. *Proc. Soc. Exptl. Biol. Med.* **42**, 163–7(1939).—Accompanying the anemia of scurvy there was a progressive decrease in hemoglobin and erythrocytes and a slight increase in leucocytes. Guinea pigs receiving 3 mg. vitamin C per day and given subcutaneous injections of diphtheria toxin showed less disturbance in their blood cell count than similarly injected animals receiving 0.5 mg. or less of the vitamin per day. The changes in the latter group were characterized by chromatophilia, anisocytosis and poikilocytosis. L. E. Gilson

Vitamin B_6 deficiency in chicks. Thomas H. Jukes. *Proc. Soc. Exptl. Biol. Med.* **42**, 180–2(1939).—The symptoms of vitamin B_6 deficiency in chicks are slow growth, depressed appetite and inefficient utilization of food, followed in some cases by spasmodic convulsions and death. These are prevented by the addn. of 0.3 mg. synthetic B_6 to 100 g. of diet. A suitable diet for such studies is described. L. E. Gilson

Nutritional achromotrichia. J. J. Oleson, C. A. Elvehjem and E. B. Hart. *Proc. Soc. Exptl. Biol. Med.* **42**, 283–5(1939).—The dietary factor which prevents nutritional achromotrichia (defective hair pigmentation) in colored rats is present in liver ext. It is distinct from pantothenic acid, factor W, and all factors of the vitamin B complex thus far identified and assocd. with any specific function in the nutrition of rats. L. E. Gilson

Phenanthrene in relation to growth of rats maintained on a low-casein diet. Jakob A. Stekol. *Proc. Soc. Exptl. Biol. Med.* **42**, 328–30(1939).—Phenanthrene was fed at the rate of 0.5 g per 100 g. diet to growing rats on a low-casein diet. Growth ceased, but was resumed when *l*-cystine or *dl*-methionine was added to the diet. Taurine did not bring about a resumption of growth. It is assumed that phenanthrene is detoxicated in the rat to yield a mercapturic acid, and this detoxication takes precedence over the needs of the animal for growth purposes. L. E. Gilson

Vitamin B_1 content and antineuritic properties. I. Studies on sunflower seeds. Luigi Callegari. *Boll. soc. ital. biol. sper.* **14**, 484–6(1939).—Sunflower seeds contained 3.40 γ (1.7 international units) vitamin B_1 by chem. test. Comparative biol. tests with pure vitamin B_1 showed that all the vitamin in the seeds was not available when they were ingested. **II. Studies on the fruit of Rosa canina.** *Ibid.* 486–7.—The vitamin B_1 content of the dried fruit was 1.2 γ per g. The addn. of *Rosa canina* to a deficient diet caused no protection against avitaminosis B_1. Helen Lee Gruehl

Changing concepts of deficiency diseases. V. P. Sydenstricker. *J. Med. Assoc. Alabama* **9**, 105–9(1939).—This review, with 11 references, emphasizes the endogenous factors which may contribute to vitamin-deficiency diseases. E. J. C.

The use of vitamins in eye, ear, nose and throat practice. Ralph M. Clements and Harvey B. Searcy. *J. Med. Assoc. Alabama* **9**, 109–13(1939).—A review with 20 references and a summary of original experience of C. and S. E. J. C.

The protein problem in the efficient feeding of hens. Arthur Rdatz. *Kuhn-Arch.* **49**, 389–94(1938).—A protein ratio in the feed of 1.5 results in the best egg production. Animal protein (fish and meat meal) appears to be more efficient than plant protein (bean). C. K. H.

Acetonemia—observations on clinical and nonclinical cases. J. F. Bullard. *Cornell Vet.* **29**, 377–83(1939).—In tests made on 589 samples of urine taken during a 60-day period from a herd of 55 dairy cows, 1 or more pos. reactions for ketones were obtained on 31 animals but only 6 showed visible clinical symptoms of acetonemia. Cows that received a ration contg. as much as 50% soybeans in combination with corn and oats showed less evidence of acetonemia than did those fed much smaller amts. of soybeans, but there was a noticeable increase in the incidence of acetonemia when the corn was left out of the ration. K. D. Jacob

The significance of amino acids in nutrition. J. S. C. Marais. *J. S. African Vet. Med. Assoc.* **10**, 23–8(1939).—A review of recent investigations, with 22 references. K. D. Jacob

The stability of vitamin A from cod-liver oil in mixed feeds. R. C. Holder and S. K. Ford. *Poultry Sci.* **18**, 345–9(1939).—Cod-liver oil was added to a vitamin A-deficient ration at varying levels and the mixed feed was stored for 60 days in burlap bags at 70–80°F. in a well-ventilated room. On 8-week tests with chicks no loss of vitamin A was detected, but there was an indication of a slight loss from the stored feed when the test was continued for 10 weeks. K. D. Jacob

The importance of riboflavin in reproduction in poultry. A. E. Schumacher and G. F. Heuser. *Poultry Sci.* **18**, 369–74(1939).—Hatchability was influenced within a very short time (frequently in 1 week or earlier) by changes in the riboflavin content of the ration. With hens that received rations contg. 230 γ riboflavin per 100 g. feed, an addnl. oral supplement daily of 100 γ cryst. riboflavin for 4 weeks caused only small improvement in hatchability; greater improvement was obtained when the ration contained smaller amts. of riboflavin. Birds with the lower initial hatchability within a lot showed greater relative improvement, but a small no. of hens which gave no hatchability during the entire period showed no improvement even when the supplemental feeding of riboflavin was increased to 200 γ daily. Riboflavin injection of hens and eggs had no effect on hatchability. K. D. Jacob

The stability of vitamins A and D in mixed feed ingredients. II. Vitamin A. F. D. Baird, A. T. Ringrose and M. J. MacMillan. *Poultry Sci.* **18**, 441–8(1939); cf. *C. A.* **33**, 2946⁷.—Vitamin A from fortified cod-liver oil, when mixed in the ration to provide 100–300 units per 100 g., was not completely destroyed when the feed was stored in burlap bags at summer temps. for 25 weeks, although it underwent progressive destruction as the storage period advanced. When it was incorporated in the ration fresh weekly, 150 units vitamin A from fortified cod-liver oil was sufficient to meet chicks' requirements, but 200 units per 100 g. ration fed after storage for 8 weeks was insufficient. Incorporation of 300 units vitamin A in 100 g. of ration that was subsequently stored for 21 weeks at summer temps. provided sufficient vitamin for practically normal growth and prevented outward symptoms of deficiency in chicks to 8 weeks of age, though the amt. of urates in the kidneys increased at and after 12 weeks' storage. K. D. J.

A method for determining the gross value of protein concentrates [for chickens]. Victor Heiman, J. S. Carver and J. W. Cook. *Poultry Sci.* **18**, 464–74(1939).

—The chicks are first subjected to a depletion period on a diet contg. 8% protein from cereal sources (except for the vitamin G complex supplement). They are then standardized as to body wt. and duplicate groups are given an exptl. diet contg. 3% protein from the supplement. The increase in body wt. of chicks on the exptl. diet over that of chicks on the neg. control diet is used as a measure of the gross protein value. Compared to casein as 100, the gross protein values of soybean meal (Manchurian hydraulic press), herring meal, dried skim-milk, alfalfa leaves (10-in. plants), alfalfa leaves (24-in. plants) and alfalfa hay (10-in. plants) were 56.3–58.5, 93–105, 88, 13, 5 and 14, resp. K. D. Jacob

The utilization of simple nitrogenous compounds such as urea and ammonium bicarbonate by growing calves. E. B. Hart, G. Bohstedt, H. J. Deobald and M. I. Wegner. *J. Dairy Sci.* **22**, 785–98(1939); cf. *C. A.* **33**, 5896⁴.—Expts. involving the utilization of urea and NH_4HCO_3 nitrogen with 10 growing calves are described. It is indicated that such N can be used for at least a partial supply of protein N. The most probable explanation is the production of protein by bacterial cell multiplication in the rumen and later digestion in the fourth stomach and intestine. Apparently most efficient utilization occurs when some sol. sugar such as corn molasses is fed in the ration. With urea N constituting 43% of the N ration the growth rate was but slightly less than that secured with a ration contg. 66% of its N as casein N. This does not imply that urea N in the ration used was superior to casein N. When casein N constituted 43% of the total N of the ration, the growth rate over a period of 16 weeks was 1.5 lb. daily compared with 1.3 lb. daily for the comparable level of urea N. The N of NH_4HCO_3 was also utilized. Analysis of the tissues at the end of the expt. indicated that the increments in wt. with urea or NH_4HCO_3 nitrogen were of normal compn. with a protein content similar to that of the casein-fed animal.
A. H. Johnson

Carotene intake, level of blood-plasma carotene, and the development of papillary edema and nyctalopia in calves. L. A. Moore. *J. Dairy Sci.* **22**, 803–12(1939).—Calves placed on low carotene rations at 40 to 90 days of age developed nyctalopia in 48–73 days. Papillary edema developed at approx. the same time although there were some variations. An intake of about 9 γ of carotene per lb. of body wt. was not sufficient to prevent nyctalopia or an increase in papillary edema. An intake of about 16 γ per lb. of body wt. was sufficient to maintain the plasma carotene at 0.2 γ per cc. and above in Holstein and Ayrshire calves and was sufficient to prevent nyctalopia and maintain fair general health. When the plasma carotene fell below about 0.13 γ per cc. nyctalopia and papillary edema followed. The carotene requirements of Guilbert and Hart for the bovine animal are approx. correct when nyctalopia is used as the criterion.
A. H. Johnson

The influence of nutrition upon the formation of inheritable mutations. H. Stubbe. *Angew. Chem.* **52**, 599–602(1939).—Exptl. results are described on the effect of variations in nutrition upon *Antirrhinum majus* both by soilless growth and soil culture. The increase in mutation rate is not detd. so much by deficiencies in nutrition as by the disturbances in the food metabolism. Short-wave radiation (x-ray) also affects the mutation rate. 17 references. Karl Kammermeyer

A preliminary note on defective tooth structure in young albino rats as a result of vitamin A deficiency in the maternal diet. Helen Mellanby. *Brit. Dental J.* **67**, 187–94(1939).—Young albino rats born of mothers who had received a diet deficient in vitamin A for 5–7 months showed (1) degenerated enamel organs of the incisors and molars, (2) poorly calcified dentine, (3) groups of ossifying cells in the pulp and (4) abnormal mandible.
Frances Krasnow

Nutrition and disease. J. C. Spence. *Brit. Dental J.* **67**, 329–40(1939).—Coördinated clinical observations and controlled lab. expts. are necessary for studying nutrition in its relation to dental disease. Data assembled should consist of serial examns., seasonal variation in incidence of caries, correlation of bodily growth with dental structure and caries, influence of preceding diseases on dental diseases and influence of endocrine glands on teeth.
Frances Krasnow

Carbohydrate metabolism in kidney pulp. Amandus Hahn and H. Gerstenberger. *Z. Biol.* **99**, 618–23(1939).—Results show that (1) formation of lactic acid from glycogen is trifling in liver pulp and absent in kidney pulp; (2) diastatic decompn. of glycogen occurs in liver pulp, but not in muscle or kidney pulp; (3) cleavage of glyceric acid-phosphoric acid into pyruvic and phosphoric acids takes place readily in muscle pulp, but only slightly in liver and kidney pulp; (4) in muscle, liver and kidney pulp, addn. of glycerophosphoric acid together with pyruvic acid causes lactic acid formation through dismutation; (5) production of lactic acid from glucose was observed only in kidney pulp and was not influenced by O_2 while production of lactic acid from glycogen in muscle pulp was checked or entirely inhibited by O_2 and (6) in liver pulp production of lactic acid from hexose diphosphate is minimal while in kidney pulp it takes place to a greater extent, the process not being influenced by O_2.
Frances Krasnow

A review on vitamin B_1 (aneurin). Valentin Fürst, Jr. *Tids. Norske Laegeforen.* **59**, 667–85(1939). H. K.

The preventive action of paraffin oils in the utilization of vitamin A-active substances. Torben K. With. *Nord. Med.* **3**, 2468–70(1939).—Expts. on rats with vitamin A or carotene dissolved in paraffin oil and the same dose of vitamin A in a saponifiable oil show that the utilization of carotene in paraffin oil was reduced about $^1/_{40}$ to $^1/_5$, of vitamin A to about $^1/_2$. H. Kringstad

B avitaminosis. Ruth Wegelius. *Nord. Med.* **4**, 3208–10(1939).—A case of beriberi and pellagra is described. By treatment with a B vitamin prepn. (Ido-B-Granulate) the patient recovered. After 3 weeks a new outbreak of pellagra took place. This is declared as a result of antagonism. By injection of nicotinic acid the pellagra symptoms disappeared. H. Kringstad

Recent advances in nutrition. Jennie I. Rowntree. *J. Home Econ* **31**, 635–43(1939).—A review with bibliography. Amy LeVesconte

The vitamin E activity of α-tocoquinone. Oliver H. Emerson, Gladys A. Emerson and Herbert M. Evans. *J. Biol. Chem.* **131**, 409–12(1939).—The vitamin E potency of α-tocoquinone, obtained by oxidation of natural α-tocopherol with $FeCl_3$, is substantially identical with that of tocopherol. A. P. Lothrop

The curative factor (vitamin H) for egg-white injury with particular reference to its presence in different foodstuffs and in yeast. Paul György. *J. Biol. Chem.* **131**, 733–44(1939); cf. *C. A.* **32**, 5447⁸.—Quant. data are presented concerning the distribution of the curative factor (vitamin H) for egg-white injury in different foodstuffs. The main sources of the factor are liver, kidney, yeast and to a lesser extent cow milk. Winter milk is not as potent as summer milk. The curative factor appears to be part of a compd. of higher mol. wt. which is insol. both in H_2O and in fat. It can be freed by autolysis of yeast in the presence of C_7H_8 but not in that of $CHCl_3$, indicating that yeast seems to possess the enzyme necessary for its liberation. **Attempts to isolate the factor (vitamin H) curative of egg-white injury.** P. György, Richard Kuhn and Edgar Lederer. *Ibid.* 745–59.—Vitamin H can be liberated from the dry liver powder remaining after the removal of the liver ext. in the com prepn. of campolon by digestion with papain and autoclaving at high pressure in combination or each by itself, with or without the addn. of acid. It is not set free during autolysis of liver. Further concn. and purification can be effected by pptn. with alc. or Me_2CO, adsorption on charcoal and subsequent pptn. with phosphotungstic acid after elution and the use of a no. of other precipitants. In the most highly purified concentrates 1 rat day dose (daily dose bringing about complete cure in 4 weeks) was contained in 30–40 γ of org. dry residue. The vitamin is inactivated by benzoylation and treatment with

HCHO, HNO_2 and ketene. Its activity was impaired in several concentrates by oxidation with H_2O_2, although not consistently. It was freely dialyzable in papain digests of liver powder or in yeast autolyzates, especially after hydrolysis with H_2SO_4. **Physicochemical properties of the factor (vitamin H) curative of egg-white injury.** T. W. Birch and P. György. *Ibid.* 761–6.—Electrodialysis indicates that vitamin H has an isoelec. point between pH 2 and 4, the actual value appearing to be between 3 and 3.5. The Na salt is sol. and the Ca and Ba are insol. in abs. EtOH. It is not pptd. by alkaloids. Aq. solns. of the highest purity concentrates are unstable and often lose their activity in 4–6 weeks from undetd. causes. S and P are not present and even the most active concentrates are amorphous and gum-like with a brownish color. A. P. Lothrop

The nutritive value of powdered whole milk. R. C. Hutchinson. *Med. J. Australia* **1939, II,** 392–400.—A study of Australian whole milk powder has shown that while it could not replace fresh cow milk it compared favorably chemically and biologically with fresh whole milk. G. H. W. Lucas

Relation between the vitamin C picture in the blood and fever metabolism. F. X. Hausberger and N. Nevensch, wander-Lemmer. *Klin. Wochschr.* **18,** 1119–23(1939).—Although injected ascorbic acid rapidly disappears from the blood of normal persons it disappears even more quickly in patients with a high fever. The concn. in the blood returns to the initial level within an hr. owing to rapid absorption by the tissues which have been depleted of ascorbic acid by the fever. H. L. Mason

Alimentary ketone body formation and liver glycogen. Silvio Markees. *Klin. Wochschr.* **18,** 1123–6(1939).—The level of ketone bodies in the blood of rabbits after feeding Na butyrate was not dependent on the amt. of glycogen in the liver but rather on the amt. of peripheral glycogen. H. L. Mason

Applicability of the thiochrome method for study of the vitamin B_1 economy. Joachim Baucke. *Klin. Wochschr* **18,** 1128–31(1939).—Examn. of Ritsert's procedures (*C. A.* **32,** 6280[1]; **33,** 212[3]) leads B. to conclude that R.'s values are too high by about 7 γ % and that when this correction is made the normal excretion of vitamin B_1 is 25–75 γ, av. 45 γ, in 24 hrs. There are 2 types of response to loading: in one the daily excretion rises quickly, then falls and finally rises again to a plateau; in the other the excretion rises slowly to a high level. The excretion after administration of 1 mg. affords an indication of the degree of satn. of the tissues with the vitamin. H. L. Mason

Loading studies with vitamin B_1. Imre Magyar. *Klin. Wochschr.* **18,** 1157–60(1939).—Normal individuals excrete in 24 hrs. more than 18% of a single large dose (10 mg.) of vitamin B_1 given parenterally. A lesser excretion is indicative of hypovitaminosis. When the vitamin administration is repeated daily the excretion of the hypovitaminotic person increases while that of the normal person decreases. Impairment of kidney function does not reduce the total amt. excreted but delays the excretion somewhat. H. L. Mason

Ascorbic acid and liver glycogen. A. Morelli and L. D'Ambrosio. *Arch. sci. biol.* (Italy) **24,** 351–6(1938).—Ascorbic acid injected subcutaneously in guinea pigs produces an increase in liver glycogen which is more evident when 100 mg. is given. P. F. Metildi

The action of vitamin C on glucemic curves by glucose, adrenaline, insulin and thyroxine. F. Addarii and F. Volpe. *Arch. sci. biol.* (Italy) **25,** 372–92(1939).—Normal and scorbutic guinea pigs weighing 250–300 g. were given 30 mg. ascorbic acid after injection of glucose, adrenaline, insulin and thyroxine. The hyperglucemia after glucose is lower; the action of adrenaline and insulin is increased and that of thyroxine decreased. The authors suggest that ascorbic acid has an amphotonic neurovegetative action, but that the glycopexic power is particularly obvious when large quantities of glucose are given or in glycogen deficiency of the organism (scurvy, diabetes). P. F. Metildi

The glucoregulating action of ascorbic acid in avitaminosis. F. Addarii and F. Volpe. *Arch. sci. biol.* (Italy) **25,** 393–403(1939).—In scorbutic guinea pigs there is a diminished basal glucemia and an insulin-like effect when vitamin C is injected. The basal hypoglucemia is explained by insufficient sorption and metabolism of glucose; the insulin-like effects by rapid improvement of the glycopexic power of the tissues which are almost deprived of glycogen. P. F. Metildi

Calcium deficiencies. Jacques Decourt. *Ann. méd.* **45,** 361–79(1939).—Ca deficiencies are caused by dietary insufficiency or defective absorption in digestion. Physiopathology, symptoms, hypoparathyroidism and hyperparathyroidism produced by reaction are discussed. Treatment consists primarily in the regulation of diet and digestion. Medical treatment by mouth is of little value, since little is retained. Parenteral treatment with $CaCl_2$ and gluconate is more efficacious, but elimination is too rapid unless vitamin D is given simultaneously. A. E. Meyer

The photodynamic hemolysis by chlorophyll of the erythrocytes of herbivorous, carnivorous and omnivorous animals alimented with and without chlorophyll. Orazio Reggiannini. *Biochim. terap. sper.* **26,** 365–79(1939).—The photodynamic hemolysis by chlorophyll cannot be compared with that caused by other photodynamic substances. The degree of hemolysis changes in the different species and within each species from one animal to another. It also changes with variation in alimentation: prolonged feeding with green vegetables augments the globular resistance to a max. The erythrocytes of carnivorous animals are more resistant than those of herbivores. A. E. Meyer

The action of vitamin excess and of deficiency diets on the thyroid. G. Carrière, J. Morel and P. J. Gineste. *Bull. acad. méd.* **121,** 324–8(1939).—Daily doses of 10,000 to 25,000 units of vitamin A and 50 to 100 mg. ascorbic acid subcutaneously inhibited the activity of the thyroid in the rabbit and finally led to a gland of the same structure as is found in colloid goiter. Similar effects are seen in rats. Vitamin B_1 in doses of 10 to 20 mg. per day caused a moderate stimulation in guinea pigs. The vesicular epithelium became cylindric and hypertrophic. Several mg. of vitamin D produced intense hyperplasia with numerous mitoses in the rabbit. Prolongation of this treatment led finally to degeneration of the gland. Deficiency of A in the rat led to histological signs of hypersecretion with gradual decrease in colloid and ending in desquamation of the epithelial elements and atrophy. C deficiency in guinea pigs is assocd. with hyperactivity of the thyroid. Conclusions: A and C are recommended in hyperthyroidism. D and heliotherapy are contraindicated in hyperthyroidism but seem to be useful in hypothyroidism. Clinical observations seem to substantiate these results obtained in expts. A. E. M.

Resistance of ascorbic acid (vitamin C) to the action of heat. Jean Pien and Herbert Meinrath. *Compt. rend.* **209,** 462–4(1939).—Vitamin is destroyed by heating in the presence of O_2. But it is easily oxidized even by cold air. If heated in the absence of air, however, it is stable. Ascorbic acid in solns. of pH 0.64 to 8.0 was heated at 120° for 5–30 min. in O_2, air, N or CO_2. In O_2, 2% of the initial ascorbic acid was recovered at pH 8.0 to 13% at pH 3.2; in air, 51% was recovered at pH 8.0 to 60% at pH 3.2; while in N or CO_2, 88% was recovered at pH 8.0 to 96% at pH 3.2. In all atms., there was a decrease in the amt. of ascorbic acid recovered with an increase in time of heating and in alky. Dorothy A. Meyer

Vitamin C in blood and urine by intravenous saturation. Leo Skurnik and Heinz Groth. *Acta Med. Scand.* **101,** 321–32(1939).—Ascorbic acid was injected intravenously into rabbits in amts. of 150 to 500 mg. and the ascorbic acid in blood and urine was detd. at short intervals afterward. These studies suggested that within 5 min. a considerable portion of the vitamin C was fixed by the tissues, and this was borne out by an actual examn. of tissues of animals killed 5 min. after the injection as compared with the same tissues from control animals. A

large increase was found in the liver, small intestine and muscles, while the brain did not show any marked increase. With the muscles a max. concn. was obtained with an injection of 250 mg. ascorbic acid. Where the tissues of the animal were already satd. with ascorbic acid, injection brought about a great rise in the blood but had no effect on the tissues. S. Morgulis

Intravenous saturation with vitamin A. Heinz Groth and Leo Skurnik. *Acta Med. Scand.* **101**, 333–7(1939). - Vitamin A finely emulsified with Na oleate and physiol. saline was used for intravenous administration. To det. vitamin A in blood saponify 2 cc. serum with 2 cc. 40% KOH for 1 hr. on the water bath in a N_2 atm.; cool, add 4 cc. alc. and shake in a separatory funnel; again shake with 4 cc. petr. ether. Remove the ether layer, wash several times with H_2O and dry with Na_2SO_4. After evapg. in a N_2 atm. the residue is dissolved in $CHCl_3$ and used to det. vitamin A by the Carr-Price (cf. *C. A.* **20**, 3020) procedure. Initially the rabbit blood contained 270–570 international units per 100 cc. serum and on injecting of even immense quantities of vitamin A the blood serum content did not show any marked increase, even right after the injection. In expts. where the rabbits were given up to 360,000 units intramuscularly, then on the following day 36,000 units intravenously, the serum vitamin A content did not go above 2040 units per 100 cc. It is concluded that the tissues take up vitamin A with exceptional rapidity, as none appears in the urine. Similar results were obtained on a man. S. Morgulis

The experimental production of nephritis in rats by means of parathyroid hormone and of vitamin D. Bruce Chown, Margaret Lee, John Teal and Robert Currie. *J. Path. Bact.* **49**, 273–90(1939).—Nontoxic vitamin D in very large doses may occasionally lead to chronic nephritis in the rat. Parathyroid hormone nephritis is due to the deposition of Ca within and around the tubules, with obstruction leading to atrophy of some nephrons and dilatation of others. 24 references. John T. Myers

Vitamin F. F. Grandel. *Fette u. Seifen* **46**, 150–2 (1939).—The vitamin nature of certain unsatd. higher acids and the utility of the Shepherd-Linn biol. test for vitamin F were confirmed. Comparative tests show that the esters and soaps of a fatty acid prepn. having pronounced vitamin F activity must be hydrolyzed within the body to the free acid before exerting vitamin F activity. Cf. S. and L., *C. A* **30**, 5267[5]. J. W. Perry

Prophylactic and curative effect of vitamin K in hemorrhagic disease of the newborn (hypothrombinemia hemorrhagic neonatorium). K. K. Nygaard. *Acta Obstet. Gynecol. Scand.* **19**, 361–70(1939).—Preliminary studies showed the prothrombin time to be normal at the time of birth. From the second half of the first day to the 6th day of life, a physiol. transitory hypothrombinemia occurred. In the majority of the newborn with hemorrhagic disease, the onset of hemorrhage occurred during this period. The administration of vitamin K immediately after delivery successfully prevented the development of transitory hypothrombinemia. Vitamin K administered to 3 cases of hypothrombinemia hemorrhagic neonatorum exhibited a therapeutic effect equaling that of blood transfusion. Maurice M. Rath

Optimal and minimal vitamin C requirements of the human subject. H. Rietschel. *Munch. med. Wochschr.* **86**, 811–15(1939); cf. *C. A.* **33**, 2565[6]. M. M. R.

Use of vitamin C against infection. Alfred Enders. *Munch. med. Wochschr.* **86**, 822(1939). M. M. R.

Creatinuria in vitamin E deficiency and its cure by *dl*-α-tocopherol acetate (synthetic vitamin E). F. Verzar. *Schweiz. med. Wochschr.* **69**, 738–41(1939); cf. *C. A.* **33**, 8714[8]. - Rats fed a diet lacking vitamin E for a no. of months developed muscular dystrophy and creatinuria. Daily administration of 50 mg. of synthetic vitamin E produced some effect in these animals, but it took 200 mg. daily to restore normal creatine values. V. believes that creatinuria in this condition is a result of disturbed muscular metabolism on the one hand and reduced secretions of the anterior lobe of the pituitary and sex glands on the other. Vitamin E counteracts this disturbance and fixes creatine in the tissues. Thirty-eight references. Maurice M. Rath

Effects of ketogenic diet. M. Julesz and E. Winkler. *Schweiz. med. Wochschr.* **69**, 807–10(1939). -A ketogenic diet diminished the alkali reserve of both asthmatic and nonasthmatic groups from 1 to 20%. No quant. difference in NH_3 secretion between controls (650 mg.) and the asthmatic patients (630 mg.) was observed. Phosphoric acid also did not have any appreciable effect. A ketogenic diet in nonasthmatic controls increased the NH_3 elimination by 45–50% as compared with the standard diet. The increased NH_3 excretion continued for 1 to 3 weeks with acetonuria and then decreased at which time not even increased ketosis could enhance NH_3 excretion. J. and W. differentiate between 4 kinds of effects on ammonia excretion in asthmatic patients who are on a ketogenic diet. Maurice M. Rath

The significance of vitamin C in the treatment of Addison's disease. Jaroslav Pojer. *Schweiz. med. Wochschr.* **69**, 872–4(1939).—Vitamin C (1 g. given daily) diminished the K blood level in 2 cases of beginning Addison's disease. Na and chloride levels did not show any significant variation. General improvement and diminishment of pigmentation were observed. Maurice M. Rath

Effect of vitamin C upon glycogen depot. Susumu Simizu. *Tohoku J. Exptl. Med.* **36**, 211–30(1939). - Lecithin given intravenously depleted the glycogen depot in the liver of the rabbit but increased the vitamin C content. $CHCl_3$ depleted the glycogen and also diminished the vitamin C. Rabbits fed a vitamin C-rich diet showed increased vitamin C in the liver which paralleled an increase in glycogen. The glycogen depot of these animals resisted the action of lecithin and $CHCl_3$. M. M. R.

The effect of fever therapy upon carbohydrate metabolism. Melvin B. Kirstein and Leon Bromberg. *J. Lab. Clin. Med.* **25**, 7–10(1939). - The results show an increase in the sugar and nonprotein N concns. and a decrease in the inorg. P concn. in the blood of patients during fever therapy. The hypoglucemia is not due to blood concn. (Simpson, *J. Am. Med. Assoc.* **100**, 67 (1933); Hench and Slocumb, *Proc. Staff Meet. Mayo Clin.* **10**, 202(1935)) but to disturbances in carbohydrate metabolism. The rate of glucose utilization is increased. With this concept such patients should receive liberal carbohydrate diets before and between treatments. H. W. Robinson

The value of the bones of canned salmon in the prevention and cure of rickets. Basil E. Bailey. *Fisheries Research Board Can., Progress Repts. Pacific Stas.* No. 41, 17–19(1939). Expts. were conducted to det. whether the bone in canned salmon, which is made edible by the canning process, can be utilized by the body, as evidenced by the prevention and cure of rickets in young albino rats. The backbone and large rib bones were taken from canned pink salmon, adhering flesh was carefully removed, and the bones were extd. with ether to remove vitamin D. The dried and pulverized product contained 4.9% Ca and 6.5% P. Rats receiving a rachitogenic diet developed severe rickets in 23 days, whereas other animals receiving the same diet to which 2% pulverized salmon bones was added developed no rickets in 23 days, and were only slightly rachitic after 30 days. Curative tests showed that addn. of 1% salmon bones to the rachitogenic diet was without effect, 2% caused slight recalcification and 1% resulted in very definite, but still incomplete, recalcification. W. Gordon Rose

Studies on dietary requirements for lactation. VIII. Effect of withdrawal of vitamin L_1 during lactation. Waro Nakahara, Humito Inukai and Saburo Ugami. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 312–17 (1939); cf. *C. A.* **32**, 5457[5].—Withdrawal of vitamin L_1 supplement from the diet of rats that have been receiving this vitamin in amts. barely sufficient to maintain lactation results in serious interference with the lactation process, and consequent death of the young during the third week. If the previous supply of the vitamin in the diet was quite adequate, subsequent removal of the vitamin from the diet is without effect. None of the young

suckled up to the end of the second week died during the third week if the minimal supply of the vitamin was continued during this period. **IX. Vitamin L deficiency in mice.** Waro Nakahara, Humito Inukai, Saburo Ugami and Kenzo Takahasi. *Ibid.* 318–26.—Mice are less susceptible than rats to vitamin L deficiency and must be maintained on a deficient diet 90 days prior to parturition to produce a low level of lactation. **X. Notes on the methods for vitamin L tests.** Waro Nakahara, Humito Inukai and Saburo Ugami. *Ibid.* 327–34.—Satisfactory vitamin L tests can only be obtained if appropriate conditions are observed. Only virgin female rats must be used. The proper source of vitamin B (acid earth adsorbate of bakers' yeast) must be used, since bakers' yeast contains vitamin L_2 and brewers' yeast contains both vitamins L_1 and L_2. The failure of Foltoy, *et al.* (*C. A.* **33**, 3430[8]) to duplicate Nakahara's results is attributed to the inclusion of brewers' yeast in the diet used by the former. The constituents of 3 different types of vitamin L-deficient diets are listed.
W. Gordon Rose

Multiple nature of the rat "filtrate factor" - a component of vitamin B_2. Adi Mohammad, Oliver H. Emerson, Gladys A. Emerson and Herbert M. Evans. *Science* **90**, 377(1939).—The MeOH-sol. fraction from cane molasses was adsorbed on fuller's earth. The filtrate was acidified and extd. for 72 hrs. with Et_2O in a continuous extractor (Prepn. I). The residue was subjected to a 2nd 72-hr. extn. (Prepn. II). These extns., as well as the residue (Prepn. III), were fed to female rats maintained on a vitamin B complex-deficient diet supplemented with thiamin, riboflavin and a source of B_6 in the form of a wheat-germ eluate. Each prepn. was fed for 56 days at the equiv. of 3 g. daily of the original molasses. The gain in wt. (above that of the controls) was: Prepn. I, 60 g., Prepn. II, no gain, Prepn. III, 58 g. Black, gray and hooded rats which received Prepn. I showed no change in pelage coloring. Those which received Prepn. III showed a marked graying of black hair and a lightening of gray hair, although the nutritive state and growth were essentially the same in groups I and III. An iso-AmOH ext. of a rice bran prepn. was prepd. Its activity was not destroyed by heating at 100° for 1 hr. in *N* NaOH. The factor extractable with iso-AmOH is not identical with the "chick dermatitis factor." F. Saunders

Investigations on the gastric emptying time of heated and acidified breast milk in premature infants. H. K. Birmele. *Monatsschr. Kinderheilk.* **78**, 201–10(1939). — When fed to premature infants raw, sterilized, briefly heated, and acidified breast milks did not show any differences in gastric emptying time, the averages being 2.7, 2.7, 2.6 and 2.7 hrs., resp. H. P. G. Seckel

Bringing up of premature infants on raw breast milk to which gelatin or carbohydrates were added. H. Kohl. *Monatsschr. Kinderheilk.* **78**, 211–20(1939).—In 31 premature infants it was shown that by adding 2% gelatin, i. e., certain protein mols. such as glycine, lysine, arginine, to genuine breast milk, the weight growth of premature infants could be improved almost without exception, often to a considerable degree. No such effect was seen in a control group of premature infants fed on breast milk to which equicaloric amts., i. e., 2%, of Dextromaltose or "Dextropur" were added. H. P. G. S.

Incurable rickets. S. Liebe. *Monatsschr. Kinderheilk.* **78**, 221–6(1939).—A boy 2½ years old who had a birth wt. of 3.5 kg. and whose father twice had had spontaneous fractures (blood P 2.0 mg. %, Ca 7.9 mg. %) was shown to have all clinical, röntgenological, and chem. signs of acute rickets. He remained uninfluenced by 15 weeks' treatment by mouth and intramuscularly with various types of vitamin D, D_2 and D_3. All this time the blood P varied between 1.9 and 3.0 mg. %, the blood Ca between 7.3 and 8.5 mg. % (with the exception of one 9.5 figure). After 5 months without treatment, 12 injections of 0.3 cc. each of parathormone were given in 6 weeks; at the end of this period the blood P was 3.1 and the Ca 7.2 mg. %. No change in the x-ray findings took place during the treatment. The urinary tract of the boy was normal. The fat absorption from the bowels was 96.7% of the intake. A familial constitutional anomaly of the bones or the absence of a link in the anti-rachitic mechanism was suggested as an explanation for this case. H. P. G. Seckel

Effect of water deficiency on carbohydrate metabolism. Ö. Kerpel-Fronius and A. Fekete. *Monatsschr. Kinderheilk.* **78**, 349–52(1939); cf. *C. A.* **33**, 8739[2].—Nine young albino rats weighing 99–140 g. were divided into 3 groups of 3 animals each. All of them were kept fasting for 48 hrs., group I with free access to water, group II without water, and group III without water plus "repeated" gavaging of a 15% soln. of urea. At the end of this period, 2 cc. of a 40% glucose soln. was given by gavage to all 3 groups of rats. After 3 hrs., the animals were killed and analyzed for glucose retention in the intestine (according to Cori) and total liver glycogen (according to Pflueger; Hagedorn-Jenssen). Av. figures found in the 3 groups were:

Group No.	Fasting condition	Weight loss, %	Intestinal glucose retention, %	Total liver glycogen	Glycogen built up from glucose, %
I	Access to water	13	7 5	102 mg	16.7
II	Thirst	17	16.6	82.5 mg.	15 3
III	Thirst plus urea	21	42.4	122 mg.	31.0

Intestinal absorption of glucose is, therefore, inhibited by, and corresponding to the degree of exsiccosis. Nevertheless, liver glycogen is built up from absorbed glucose in normal or even increased abs. amts. during severe exsiccosis, probably because of a decrease in peripheral utilization or storage of glucose. H. P. G. Seckel

Effect on winter rickets and spasmophilia of 3 mg. vitamin D_2 and D_3 "shock" therapy. H. Brieger. *Monatsschr. Kinderheilk.* **79**, 216–29(1939).—In 29 infantile cases of acute rickets without or with either latent or manifest spasmophilia 3 mg. vitamin D_2 or D_3 was given by mouth as a single dose. The results can be summarized in the following table:

Stage of disease	Vitamin D	Days required for cure: Bones	Blood P	Blood Ca	Tetan
Acute rickets	D_2	18	12–16	12–16	..
	D_3	18	8–12	8–12	..
Acute rickets with latent tetany	D_2	11–14	longer	longer	.
	D_3	11–14	shorter	shorter	.
Acute rickets with manifest tetany	D_2	10–12	..	8–12	4–5
	D_3	7	...	8–12	2–3

Complicating diseases prolong the cure. Two cases of rickets in premature infants could not be cured by this treatment. H. P. G. Seckel

Efficiency of vitamin D in different solvents. S. Liebe. *Monatsschr. Kinderheilk.* **78**, 376–83(1939).—In rat expts. Gerstenberger's view concerning better efficiency of peroral than of parenteral application of vitamin D was confirmed, the liver apparently being indispensable for its full effect. Given by both routes, the effect of vitamin D seemed to be independent of the solvents used (sesame oil or propylene glycol) in babies as well as rats. Routine detns. of Ca and P were made in the blood. H. P. G. Seckel

The influence of vitamin C on the growth of Brown-Pearce rabbit carcinoma of the testicle. Gentetsu Ryo. *J. Chosen Med. Assoc.* **29**, 1184–92(English abstr. 77–8)(1939).—A daily abdominal subcutaneous injection of 50 mg. vitamin C per kg. body wt. for 5 days prohibits the growth of a tumor inoculated in the testicle. When the right testicle is inoculated with a suspension of tumor cells alone, and the left is inoculated with it together with 100 mg. vitamin C, both testicles show the absence of tumor cells, although strong inflammatory reactions occur in both. S. Tashiro

The influence of vitamins A and D on abnormal bone growth caused by continuous feeding of inorganic iron. Sakae Taniguti. *J. Oriental Med.* **30**, 945–6(English abstr. 265)(1939).—Iron rickets produced by continuous feeding of $FeCO_3$ or reduced Fe can be prevented if A and D are added to the diet. S. Tashiro

Dietary therapy against calcium oxalate stones in the urinary tract. Greta Hammarsten. *Kgl. Fysiograf. Sällskap. Lund, Forh.* **7**, 37–9(1937)(Pub. 1938)(in German); cf. *C. A.* **31**, 7999[2]; **33**, 698[6].—A diet rich in Ca and Mg and in vitamins A, B, C, D and E was fed to 6 rats with kidney and bladder stones (demonstrated röntgenologically). At autopsy 2 months later, partial or complete cures were found. Conclusion: Ca oxalate stones are principally caused by a deficiency in Ca, Mg and vitamins A and D. W. C. Tobie

Boron in animal nutrition. E. Hove, C. A. Elvehjem and E. B. Hart. *Am. J. Physiol.* **127**, 689–701(1939).—A colorimetric method for the detn. of B in biol. materials is described. This method is subject to a 10% error between 0.5 and 5 γ. The milk from 22 cows was analyzed for B. There is no significant difference between breeds, nor for different periods of the lactation cycle. It is possible to increase the B concn. of the milk tenfold in the 1st 24 hrs. after feeding 13 g. of boric acid. Normal egg whites contain 8–10 times more B than egg yolks. This ratio is not altered significantly when the hens are placed on a high B ration, although the abs. amts. increase greatly. B, fed as boric acid, can pass through the placenta and into the milk of rats. Boric acid fed to rats is eliminated with extreme rapidity. The addn. of B to milk does not produce better growth in young rats. The addn. of B to a dry ration which allows only 0.8 γ of B per rat per day does not result in better growth. If B is needed for the growing rat then this amt. of B per day satisfies that requirement. E. D. Walter

The influence of vitamin C on the growth of tissue in vitro. S. Nakano and I. Sawai. *Japan. Z. Mikrobiol. Path.* **33**, 279–89(1939).—A vitamin C soln. of high concn. inhibits the growth of the cardiac tissue of chicken embryo or splenic tissue *in vitro*, and accelerates it at low concn. I. S. Yun

Effects of sucrose in the diet upon the growth of albino rats. Kosaburo Hirokawa. *J. Med. Coll. Keijo* **9**, 135–48 (1939).—The growth of animals fed on a diet contg. 50% sucrose was in all cases inferior to the growth of animals fed on a normal sucrose-free diet. Animals fed on a diet contg. 50% of sucrose, with dry brewery yeast or vitamin B_1 prepn. (powdered Oryzanin) showed nearly normal growth. When liquor was substituted for Oryzanin powder growth was subnormal. Conclusion: Some special dietary factor contained in dried brewers' yeast is needed to maintain the normal metabolic process of animals fed diets contg. a large amt. of sucrose. I. S. Yun

Use of cull apples as feed for dairy cows (Knott) **12**. Chemistry of vitamin E (Evans, *et al.*) **10**. Naphthoquinones of the vitamin K_1 type of structure (Fieser, *et al.*) **10**.

F—PHYSIOLOGY

HOMER W. SMITH

Effect of progesterone on the mouse ovary as influenced by gestation. Hans Selye. *Anat. Record* **75**, 59–73 (1939).—One mg. daily for 5 days causes corpus luteum involution and marked ovarian atrophy. The gonadotropic hormone of the placenta which maintains the corpora lutea of gestation is not inhibited by progesterone. Delivery and onset of lactation are not prevented by massive doses. Philip D. Adams

Effect of sex hormones on the gonads of frog larvae (Rana clamitans); sex inversion in females; stability in males. C. L. Foote and Emil Witschli. *Anat. Record* **75**, 75–83(1939).—In sexually differentiated larvae transformation of ovaries into testes is induced by testosterone propionate. Estrogenic hormones have little effect on the structure of the testes. Philip D. Adams

Action of estrone on sexual organs of immature male cats. W. F. Starkey and J. H. Leatham. *Anat. Record* **75**, 85–9(1939).—Hypertrophy of the glandular epithelium of the prostate resulted in immature male cats treated with estrone. Metaplasia of the urethral and ductal epithelium also occurred in the absence of leucocytic infiltration. Philip D. Adams

Reduction of osmic acid as an indicator of adrenal activity in the rat. Louis B. Flexner and Arthur Grollman. *Anat. Record* **75**, 207–21(1939).—Reduction in adrenal activity was induced by the administration of various amts. of cortical hormone; activity was stimulated by unilateral adrenalectomy, heat, cold, tetrahydro-β-naphthylamine, thyrotropic hormone or inanition. Philip D. Adams

Measurement of the gonadotropic activity of prehypophyseal extracts. Raymond Cahen and Pierre Ardoint. *Compt. rend.* **209**, 490–1(1939).—The gonadotropic activity of prehypophyseal exts. was measured by 3 methods: (1) the percentage of estrus caused in a no. of hypophysectomized rats, (2) the increase in the size of the comb of immature cocks and (3) the increase in wt. of the testicles of immature cocks. The first method is difficult, the second relatively simple but not very accurate while the third is accurate but also onerous. Rachel Brown

The influence of internal secretion on the vitamin C content of the aqueous humor and various organs. III. The influence of the Zondek "prolan" of the anterior pituitary. Experiments on adult female rabbits. N. Itikawa. *Folia Endocrinol. Japon.* **15**, 31–2(1939)(in German).—The exptl. procedure was the same as in *C. A.* **33**, 9391[2]. Prolan was prepd. from human pregnancy urine by the Zondek method of alc. pptn. The amt. of prolan injected daily corresponded to 10 cc. original urine. The vitamin C content of the aq. humor of normal or ovariectomized rabbits was decreased on the 5th day of injection and, to a greater degree, on the 10th day; 1–2 weeks after the last (10th) injection the vitamin C gradually increased and approached its initial level. The percentage ratio (vitamin C content per organ wt.) decreased immediately as well as 2 weeks after the 10th injection, the decrease being greatest in the adrenal, smaller in the spleen and liver and smallest in the ovary. The vitamin C in the aq. humor increased 1 week after ovariectomy and then gradually decreased to the initial level. IV. **The influence of the so-called Zondek "prolan." Experiments on adult male rabbits.** *Ibid.* 33–4.—If the prolan was injected into normal or orchidectomized rabbits daily for 10 days, the vitamin C content of the aq. humor decreased slightly on the 5th day of injection and, to a greater extent, on the 10th day immediately after the injection; it gradually decreased up to a week after the last (10th) injection and only began to increase slowly 2 weeks after the last injection. The percentage of vitamin C in the organs decreased immediately as well as 2 weeks after the 10th prolan injection, the percentage decrease being greatest in the adrenal, smaller in the spleen and liver and smallest in the testes. The vitamin C content of the aq. humor gradually increased 7–12 days after orchidectomy; on the 19th and 26th days after the operation the vitamin C decreased and approached its initial value. V. **The nature of the action of the Zondek "prolan."** *Ibid.* 35.—In order to avoid the direct effect of the operation, prolan was not injected into the rabbits until 4 weeks after a thyroidectomy or until 3 weeks after a splenectomy. The prolan (injected once daily for 10 days) decreased the vitamin C content of the body of thyroidectomized but not of splenectomized rabbits. The action of prolan on the vitamin C metabolism is splenotropic in nature; it does not require the presence of the thyroid or sex glands. Ruth Berggren

The influence of various endocrine disturbances on the action of the gonadotropic hormone of the anterior pituitary. III. The relation between the gonadotropic hormone and functional anomalies of the thymus. Y. Yamao. *Folia Endocrinol. Japon.* **15**, 36(1939)(in German); cf. *C. A.* **33**, 9390[8,9].—In young white rats weighing about 30 g. the accelerating action of the gonadotropic hormone on the development of the ovary and uterus was slightly lowered after thymectomy or by preliminary feeding with thymus powder. The thymus exerts no direct hormonal regulatory action on the ovary. IV. **The relation between the gonadotropic hormone and**

functional anomalies of the spleen. *Ibid.* 37.—The gonadotropic hormone from pregnancy urine was injected once daily for 5 days into white rats weighing 30–45 g. Splenectomy had no effect on the accelerating action of the gonadotropic hormone on the development of the ovary and uterus for 10 days after the operation. If the gonadotropic hormone was not injected until 1 month after splenectomy, its effect on the ovary and uterus was distinctly inhibited. Ruth Berggren

The influence of the so-called anterior pituitary hormone (prolan) on the tissue oxidases in white rats. I. Experiments on normal female and male white rats. Yosiro Yamao. *Folia Endocrinol. Japon.* **15**, 40–1(1939)(in German).—In the female rats the oxidase content of the heart, liver and kidney, detd. by the Vernon method (*C. A.* **6**, 2251), was increased during estrus. Upon prolonged subcutaneous injection of the gonadotropic hormone of the anterior pituitary from human pregnancy urine the oxidase content of these organs decreased, the decrease being greater in the female than in the male rats. **II. Experiments on castrated, splenectomized and splenectomized-ovariectomized rats.** *Ibid.* 41–2.—Gonadotropic hormone of the anterior pituitary, corresponding to about 40 cc. original urine, was injected subcutaneously beginning usually 2 weeks after castration and continuing for 13 successive days. Some of the rats were simultaneously splenectomized and ovariectomized. The rest of the exptl. procedure was the same as that given above. The gonadotropic hormone caused a decrease in the tissue oxidases of the heart, liver and kidney in ovariectomized rats and of the liver and kidney in orchidectomized rats, but produced an increase of the oxidase content of the heart in the latter. The gonadotropic hormone did not cause a lowering of the oxidase content of these organs in splenectomized male or female rats. The oxidase-lowering action of the gonadotropic hormone is splenotropic in nature. Ruth Berggren

The effect of diethylstilboestrol in the male organism. J. H. Gaarenstroom and S. E. deJongh. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 178–81 (1939); cf. *C. A.* **33**, 3854⁷.—Tests on immature male mice and rats and on full-grown male rats showed that 5 γ of diethylstilboestrol had the same antimasculine and paradoxical effects on the sex organs as did 5 γ of estrone. Rats injected with diethylstilboestrol grew more slowly than did those injected with estrone. E. Curzon

The optimum range of oxygen tension. R. Brinkman and A. H. J. Wildschut. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 187–90(1939).—Quant. measurements of O_2 consumption in the skin were made by measuring the rate of reduction of oxyhemoglobin in the finger with stopped circulation and at const. temp. During the expt. gas mixts. low in O_2, normal air and pure O_2 were breathed. Results indicated inhibition of oxidative metabolism in the skin during conditions of low- or high-O tension. E. Curzon

Effect of the thyreotropic hormone on the basal metabolism of the rabbit. Jacques Mahaux. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 209–12 (1939); cf. *C. A.* **33**, 7057.—Rabbits 2–3 yrs. old injected with 100–200 Heyl and Laquer units of thyreotropic hormone show an elevated metabolism for 12–16 days. If, shortly after the metabolism has returned to normal, thyreotropic hormone is again injected, no such elevation is seen. Conclusion: The degree of modification of thyroid gland activity which results from the administration of a given dose of thyreotropic hormone appears to depend on the quantity of an inhibiting principle present in the injected animal. E. Curzon

Circulatory modifications during experimental hypothyroidism in the dog. Jean Lequime. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 233–5(1939).—In exptl. hypothyroidism in 2 dogs a considerable decrease in the cardiac debit is observed, owing to a decrease in tissue metabolism and to the increase in the arteriovenous difference. E. Curzon

Influence of the sino-carotid reflex on the blood flow of the kidney and on diuresis. H. Handovsky and Adli Samaan. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 243–5(1939). E. Curzon

The possible therapeutic influence of work metabolism in low pressure. A. Rühl, W. Kühn and G. Müller. *Luftfahrtmed.* **3**, 285–301(1939).—Criteria of success in metabolic adjustments to O lack were increased max. O intake, lower work R. Q., decreased work acidosis, and fewer respiratory disturbances. Repeated work expts. had therapeutic value as judged by these tests. Cardiazole and coramine were useful only in collapse. While the addn. of about 5% CO_2 increased the max. O intake in low pressure, the extra strain thus placed on the respiratory center is objectionable. D. B. Dill

Variations throughout 24 hours in the elimination of the principal substances of urine. Simone Belluc, J. Chaussin, H. Laugier and Thérèse Ranson. *Travail humain* **7**, 62–73(1939); cf. *C. A.* **33**, 7358⁴.—In one subject on a const. diet, urinary output of water, Cl and uric acid varied with one another in 4-hr. periods throughout the day, while NH_3 output fell as the vol. increased. Urea was excreted at a rate reflecting its const. production. D. B. Dill

Influence of long-continued exercise on the functional activity of the adrenal cortex of man. Gr. Benetato. *Travail humain* **7**, 153–62(1939).—Injection of histamine produced smaller changes in blood pressure in trained than in untrained subjects. In the latter there was some correlation of the response with body build. D. B. Dill

Effects of drinking large volumes of water on urinary excretion. Simone Belluc, J. Chaussin, H. Laugier and Thérèse Ranson. *Travail humain* **7**, 163–75(1939).—Drinking 2.4 l. of distd. water or 2 l. of Évian increased urea excretion 15 and 20%, resp., during the period in which the excess water was eliminated. Other constituents were unaffected. D. B. Dill

Blood oxalate. A. Leulier and J. Dorche. *Compt. rend. soc. biol.* **132**, 5–7(1939).—Large samples of serum were digested with pepsin and HCl, then filtered and oxalic acid was detd. as previously described (*C. A.* **33**, 192¹). Horse serum contained 2.3–2.7 mg. $H_2C_2O_4$ per l., beef serum 2.18–2.76 and sheep serum 3.02–3.86. L. E. G.

Osmotic resistance of reticulocytes. Z. Beranek. *Compt. rend. soc. biol.* **132**, 22–4(1939).—It was not found possible to sep. reticulocytes from erythrocytes by fractional hemolysis of rabbit blood. L. E. Gilson

Carbohydrate metabolism of the crystalline lens. Roger Weekers. *Compt. rend. soc. biol.* **132**, 36–8(1939).—In Ringer or Tyrode soln., without glucose, the isolated lens of the rabbit begins to turn opaque after 2–3 days at 36.5°. The addn. of 0.1% of glucose to the soln. delays opacification about 3 days; levulose and galactose have no such effect. L. E. Gilson

Lactogen content of female guinea-pig pituitary. R. P. Reece. *Proc. Soc. Exptl. Biol. Med.* **42**, 54–6(1939).—The lactogen content increased very slightly in pregnancy and showed a small further increase during the lactation period. The max. observed was 16.5 bird units per whole gland. L. E. Gilson

Plasma pH, blood carbon dioxide and "tissue gas" tensions during hibernation. R. T. Stormont, Mark A. Foster and Carl Pfeiffer. *Proc. Soc. Exptl. Biol. Med.* **42**, 56–9(1939).—During hibernation of ground squirrels (*Citellus tridecemlineatus*, Mitchill) arterial blood CO_2 increased to an av. of 85.7 vol. % (normal is 45.5) and plasma pH decreased to 7.1 from a normal av. of 7.43. The tensions of CO_2 and O_2 in the peritoneal gas pocket decreased significantly. L. E. Gilson

Coagulation time of blood in normal and adrenal-medullated rats. Dwight J. Ingle and Warren C. Corwin. *Proc. Soc. Exptl. Biol. Med.* **42**, 82–4(1939).—After removal of the adrenal medulla the rats responded like normal rats in respect to the coagulability of the blood after emotional excitation and after Et_2O anesthesia. L. E. Gilson

Some effects of testosterone on sexual differentiation of female albino mice. C. D. Turner, Rita Haffen and Helen Struett. *Proc. Soc. Exptl. Biol. Med.* **42**, 107–10 (1939).—Prenatal and postnatal treatment produced

intersexual forms. Changes in the genital tract are described. L. E. Gilson

Influence of age of animal and nature of injected hormone preparation on antihormone production. Albert S. Gordon, Irving Levenstein and Harry A. Charipper. *Proc. Soc. Exptl. Biol. Med.* **42**, 121–6(1939).—Mature rats (only females were used) produce more antihormone in response to injections of anterior pituitary-like gonadotropic prepns. than rats which are immature when treatment is begun. Of 2 gonadotropic prepns. tested, the one contg. much protein (pregnant mare serum) evoked less antihormone production but more precipitins than the one contg. less antigenic material (ext. of human pregnancy urine). L. E. Gilson

Effect of age on the cellular phases of skeletal muscle. H. M. Hines and G. C. Knowlton. *Proc. Soc. Exptl. Biol. Med.* **42**, 133–5(1939).—Detns. are given of the Cl, fat and water contents of gastrocnemius muscles and serum from 7 groups of rats ranging from 15 to 365 days old. Values characteristic of adult tissue are found at 90 days of age. Thereafter the compn. is practically const. The muscle contains 40% connective tissue at 15 days and 15% at 90 days. The water content of muscle cells decreases during the growth period. L. E. Gilson

Effects of activity on tissues of the rat. J. T. McClintock, H. M. Hines and Dorothy P. Jordan. *Proc. Soc. Exptl. Biol. Med.* **42**, 139–42(1939). The muscles of adult male and female rats kept in revolving activity cages contained about 20% more tissue hemoglobin than those of rats not allowed to exercise. There were no significant differences in the N and creatine of the muscles of the 2 groups. L. E. Gilson

[Unsuccessful] attempts to demonstrate vasopressor properties in the serum of hypertensive dogs. M. F. Mason and J. D. Rozzell. *Proc. Soc. Exptl. Biol. Med.* **42**, 142–4(1939). L. E. Gilson

Is pantothenic acid essential for the growth of rats? J. J. Oleson, D. W. Woolley and C. A. Elvehjem. *Proc. Soc. Exptl. Biol. Med.* **42**, 151–3(1939). Rats require the intact pantothenic mol. Alkali-treated concentrates contg. both the β-alanine and dihydroxy acid fractions are not sufficient. L. E. Gilson

Absorption of water by liver slices from physiological saline solutions. Warren M. Sperry and Florence C. Brand. *Proc. Soc. Exptl. Biol. Med.* **42**, 147–50(1939). Rat liver slices absorb water rapidly from 0.9% NaCl, Tyrode and Krebs solns. Within 10 min. an amt. of water equal to the dry matter wt. of the tissue is usually absorbed. A moist chamber for storing and slicing tissues is described. L. E. Gilson

Metabolism of human spermatozoa. John MacLeod. *Proc. Soc. Exptl. Biol. Med.* **42**, 153–5(1939). In Ringer phosphate soln. respiration is too slow to be measurable. In Ringer glucose soln. metabolism is almost exclusively glucolytic and not respiratory. Aerobic lactic acid production is 80% of the anaerobic and falls off with time, whereas anaerobic glucolysis is linear for many hrs. Max. motility is maintained for over 3 hrs. under anaerobic conditions but decreases markedly in the same period in presence of air or pure O_2. This suggests that O has an inhibiting effect on the normal function of human spermatozoa. L. E. Gilson

Relaxation of the pelvic ligaments of the guinea pig induced by progesterone. Hans O. Haterius and N. W. Fugo. *Proc. Soc. Exptl. Biol. Med.* **42**, 155–7(1939).—Cryst. progesterone is quite effective in inducing relaxation of the pelvic ligaments when administered to the oöphorectomized guinea pig previously primed with repeated large doses of estradiol benzoate. Estradiol benzoate alone was ineffective. L. E. Gilson

Lipide distribution in rat liver after partial hepatectomy. Stephan Ludewig, G. R. Minor and J. C. Mortenstine. *Proc. Soc. Exptl. Biol. Med.* **42**, 158–61(1939).—Liver injury produced by partial hepatectomy causes a marked disturbance in lipide metabolism in the liver. Neutral fat, phospholipides, cholesterol and cholesteryl esters increase; total fat-free solids decrease. The I no. of the phospholipides increases. The return to normal is nearly complete in 7 days. L. E. Gilson

Intestinal secretion during anoxia. David W. Northup and Edward J. Van Liere. *Proc. Soc. Exptl. Biol. Med.* **42**, 162–3(1939).—Decrease in atm. O_2 tension to 53 mm. Hg (equiv. to altitude 28,000 ft.) had no significant effect on secretion of succus entericus in dogs. This indicates a low energy requirement for intestinal secretion. L. E. Gilson

The diffusible organic blood-clotting factor. Anthony J. Glazko and David M. Greenberg. *Proc. Soc. Exptl. Biol. Med.* **42**, 177–8(1939).—The factor (cf. Larson and Greenberg, *C. A.* **30**, 5636[1]) is thermolabile. It acts as a thromboplastin in accelerating coagulation. L. E. G.

Further evidence for a mammogenic factor in the rat hypophysis. Ralph P. Reece and Samuel L. Leonard. *Proc. Soc. Exptl. Biol. Med.* **42**, 200–2(1939); cf. *C. A.* **32**, 5462[3].—In rats of both sexes the hypophysis contains a factor capable of inducing growth of the mammary glands in castrated hypophysectomized immature female rats. The administration of estrogens does not influence this "mammogenic factor" when tested on hypophysectomized rats. L. E. Gilson

Reduction of dehydroascorbic acid in the stomach and small intestine. C. J. Harrer, M. O. Schultze and C. G. King. *Proc. Soc. Exptl. Biol. Med.* **42**, 233–6(1939).—No reduction, absorption or decompn. was detected in the guinea-pig stomach. In the small intestine reduction and absorption proceeded rapidly. L. E. Gilson

Tests of mammalian gonad-stimulating hormones on gonads of fishes. Mychyle W. Johnson and Oscar Riddle. *Proc. Soc. Exptl. Biol. Med.* **42**, 260–2(1939).—Gonad-stimulating hormone from beef hypophyses, powd. dried pregnant mare serum and com. human pregnancy urine ext. known to be potent were injected daily for 21 or 15 days into immature rainbow trout aged 11 or 16 months. No measurable stimulation of either testes or ovaries was found. The gonad-stimulating hormone elaborated by fish hypophyses probably differs from that of mammals. L. E. Gilson

Andromimetic effect of estrogen on the clitoris of the rat. C. Donnell Turner and W. L. Burkhardt. *Proc. Soc. Exptl. Biol. Med.* **42**, 267–70(1939). L. E. Gilson

Cholinesterase activity in various portions of the rabbit heart. Wm. Antopol, Susi Glaubach and David Glick. *Proc. Soc. Exptl. Biol. Med.* **42**, 280–2(1939).—The auricles contained 2–10 times as high a concn. of cholinesterase as the ventricles. L. E. Gilson

Hypersecretion of gonadotropic hormone of rat pituitary resulting from treatment with antigonadotropic serum. Roland K. Meyer and Herbert S. Kupperman. *Proc. Soc. Exptl. Biol. Med.* **42**, 285–8(1939).—Pretreatment of young female rats with antigonadotropic rabbit serum induced a hypersecretion of pituitary gonadotropic hormone, shown by precocious development of the ovaries of the treated rat after discontinuing the injections, and by the ovarian hypertrophy occurring in female rats paired in parabiosis to pretreated male or female littermates. The possible mechanism of the action is discussed. L. E. G.

Site of formation of citric acid in the dog. Arthur H. Smith, James M. Orten, C. G. Johnston and L. C. Bauguess. *Proc. Soc. Exptl. Biol. Med.* **42**, 288–91 (1939); cf. *C. A.* **33**, 3857[8].—Na *dl*-malate was injected into the artery of the exteriorized dog kidney. No conversion to citric acid by the kidney was detected. L. E. Gilson

Uterine effects from single treatments of stilbestrol and ethinylestradiol in monkeys (Macacus rhesus). Earl T. Engle and Roger C. Crafts. *Proc. Soc. Exptl. Biol. Med.* **42**, 293–6(1939); cf. *C. A.* **33**, 7385[7].—In adult ovariectomized monkeys uterine bleeding occurred in 11–28 days after a single oral or intramuscular dose of 1–200 mg. diethylstilbestrol. Oral doses exert as prolonged estrogenic action as intramuscular injections and 5–10 mg. doses are as effective as 100–200 mg. After oral doses of 0.5 mg. ethinylestradiol uterine bleeding occurred on days 18–20. No toxic effects were observed in any of the expts. L. E. Gilson

The pH of normal conjunctival sac secretion determined by the glass electrode. K. C. Swan, R. E. Trussell and J. H. Allen. *Proc. Soc. Exptl. Biol. Med.* **42**, 296–8 (1939).—The pH of normal human lachrymal fluid is 7.17–7.42, av. 7.32. Stimulation increases the flow and raises the pH to 7.5–7.9. L. E. Gilson 1

Effect of adrenalectomy on fat absorption measured by fat excretion in the stool. Wm. G. Clark and Arne N. Wick. *Proc. Soc. Exptl. Biol. Med.* **42**, 336–8(1939); cf. *C. A.* **33**, 8258⁴.—With adequate food and NaCl intake, removal of the adrenals does not affect the excretion of fat in the feces of rats. L. E. Gilson 2

Effect of heterologous antigonadotropic serums on the course of pregnancy in rats. B. Zondek, A. Hochman and F. Sulman. *Proc. Soc. Exptl. Biol. Med.* **42**, 338–41 (1939).—Large amts. of antigonadotropic serums (goat) active against human pregnancy urine prolan and human hypophyseal prolysan were injected daily in rats. This did not interfere with the normal cycle or with impregnation, nidation, delivery and normal breeding. Species specificity is indicated. L. E. Gilson 3

Does the antigonadotropic factor occur in the organism under physiological and pathological conditions? Bernhard Zondek and Felix Sulman. *Proc. Soc. Exptl. Biol. Med.* **42**, 342–5(1939).—Expts. indicate that no antiprolan is produced in the human organism during pregnancy. No antiprolan has been found in individual organs or blood of normal, amenorrhoic or sterile women or of patients with tumors. Antiprolan is elaborated in the animal organism, as a protective mechanism, after a type of prolan foreign to the species has been administered. L. E. Gilson 4

Mechanism of lipoid excretion through the enteric mucosa. G. Liguori. *Boll. soc. ital. biol. sper.* **14**, 445–6 (1939). Helen Lee Gruehl 5

Physiological variations of blood cholesterol with age. Bruno Manca. *Boll. soc. ital. biol. sper.* **14**, 446–7(1939).—In guinea pigs there was a slow and gradual increase in blood cholesterol titer with increased age. H. L. G.

Utilization of lactic acid by eviscerated dogs. L. Milla and V. Capraro. *Boll. soc. ital. biol. sper.* **14**, 469–71 (1939).—The liver was found of little importance in the lactic acid cycle in the organism. Helen Lee Gruehl

Estrogenic substances in the gastric juice. G. Michetti and G. Beltrami. *Boll. soc. ital. biol. sper.* **14**, 513–14 (1939).—No estrogenic substances were demonstrable in the gastric juice of 10 women in advanced pregnancy. Helen Lee Gruehl

The fat-soluble pigment of the cow colostrum and its behavior during the colostral period. Fridolin Richter *Kuhn-Arch.* **49**, 269–90(1938).—The amt. of fat-sol. pigment (principally carotene) in the colostrum and colostral fat depends chiefly on the time of year as well as on the feeding. There appears to be no correlation between the fat and pigment contents of either the colostral fat or milk. The pigment content decreases logarithmically as the colostrum is transformed into mature milk. A direct relationship exists between the I content and the amt. of pigment in the colostral milk. 127 references. C. K. Horner 7

The pH of the contents of the digestive canal of the equine. E. E. Leasure, R. P. Link and J. H. Whitlock. *Cornell Vet.* **29**, 362–6(1939).—The detns. were made on numerous horses, 10 or more years of age, within 8–20 min. after they were slaughtered. The av. pH values were: stomach 4.458, duodenum 7.130, jejunum 7.467, ileum 7.548, cecum 7.235, large colon 7.09 and rectum 6.24. The range of pH varied within wide limits in animals that were assumed to be normal. The values were considerably higher when the contents of the gut contained large quantities of catarrhal or mucilaginous exudate. K. D. Jacob 8

The hydrogen-ion concentration of vaginal secretions of cows. S. H. McNutt, L. H. Schwarte and D. F. Eveleth. *Cornell Vet.* **29**, 415–19(1939).—The limited data indicate that the pH is likely to be at or above 7.0 during estrus but that, in general, the pH of the secretions is not of much significance for diagnostic purposes in diseases connected with breeding. K. D. Jacob 9

The method of direct action on the central nervous system, and more particularly on the vegetative cerebral centers. L. S. Shtern. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 267–70(1939)(in French).—One of the determining factors of the functional state of the vegetative nervous centers of the brain is the K/Ca ratio. Increase of the ratio by direct injection of an ext. of the posterior lobe of the hypophysis, adrenaline or K salts into the cerebral ventricles results in excitation of the nervous centers, while decrease of the ratio by the injection of kidney extract or Ca salts results in inhibition. Shock is accompanied by a decrease in K and inorg. P and an increase in Ca, and can be relieved by direct injection of K and P salts. Injection of the salts into the blood stream is not always effective because of the resistance of the hematoencephalic barrier. S. A. Karjala

The influence of brain metabolites on the secretory and motor functions of the stomach. K. A. Guerchikova. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 315–18(1939) (in French).—The intravenous injection of small concns. of the protein-free ultrafiltrates of brain metabolites into dogs causes an increase in gastric juice secretion, an increase in total acidity and free HCl, and a decrease in digestive capacity. Large doses decrease the secretion of gastric juice but have no effect on total acidity, free HCl or digestive capacity. In all cases gastric secretion was obtained only with the simultaneous administration of milk as a stimulant. Depending upon the functional state of the motor app. of the stomach, injection of brain metabolite solns. may increase or decrease motor activity. If the stomach is in a state of relative rest the injections increase the activity, but if it is at max. activity they decrease activity. S. A. Karjala

The influence of brain metabolites on the oxidation process of animal tissues. E. Govorovich and M. Tikhaya. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 339–43(1939) (in French).—There are no differences in the action of brain metabolites isolated during rest or during induction coil excitation on the respiration of the brain, kidney liver or muscles of cats. S. A. Karjala

The oxidation-reduction potential of the blood. I. A. Givin. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 344–8(1939) (in English). The symbol E_H is more satisfactory for the oxidation-reduction potential than E_S (cf. Serezhskiĭ and Schneerson, C. A. **33**, 2579⁹) since it refers the potential to the normal H electrode and is also not limited to the blood potential. Attempts to obtain E_H *in vivo* give more neg. results than *in vitro* since the value obtained is the sum of the potentials of the blood and the tissues directly in contact with the electrodes, and the E_H of tissue is more neg. than that of blood. The E_H of blood in a syringe electrode or under paraffin oil reaches a steady value of 205–220 mv. in 3–15 min. and not in 1.5 hrs. as stated by Serezhskiĭ (*C. A.* **33**, 2580⁹). Pt and Ir-Pt electrodes give stable values in 5–10 min. while the Hg electrode reaches a steady value, 5% higher than that of Pt, only in 25–35 min. Pt syringe needles give steady values in 10 min. but they are 10% high. Au-plating of Pt and Ir-Pt electrodes does not change the E_H, while Au-plating of Pt syringe needle electrodes reduces E_H, to the normal for Pt. Cu electrodes give an E_H of 60 mv. for blood, while Au-plating of Cu causes a rise in E_H to 160 mv. Microscopic examn., however, of the Au-Cu electrode indicated an uneven Au layer, and the above value may be a result of exposed Cu. The E_H of the blood is a very inert value which is changed only by extremely serious disturbances in oxidative processes. The lability of the potential described by S. and S. was not confirmed. S. A. Karjala 6

Morphology of glycogen distribution and transformation. III. Cytology of glycogen accumulation in the motor cells of the normal nervous system. A. L. Shabadash. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 353–7(1939) (in English); cf. *C. A.* **33**, 6373⁵.—The normal resting or recently recovered nerve cell contains glycogen (I), although variations in carbohydrate metabolism from one

kind of nerve cell to another gives rise to many types of I accumulation. All the motor cells of a definite level of the motor nucleus show the same typical degree of I accumulation at the same time. The granules of "normal" I are characteristic and readily distinguished from pathol. I inclusions which appear as large coarse structureless deposits which distort the shape of the cells. I is found as a normal component of the Nissl tigroid, where it is probably combined with protein. **IV. Glycogen in the cells of the gasserian and spinal ganglions of normal animals.** R. V. Reentovich and A. L. Shabadash. *Ibid.* 8, 29–31.—The normal, pseudounipolar nerve cells of the gasserian and spinal ganglions of mammals in a relatively quiescent state and under proper conditions of nutrition contain glycogen. S. A. Karjala

The correlation between the ovary and the cortical substance of the adrenal gland. M. Solovei. *Bull. biol. méd. exptl. U. R. S. S.* 7, 358–60(1939)(in English).—Foxes were given 5 injections of 200–280 mouse units of prolan (I) on alternate days, starting immediately after exptl. estrus. Dissections on the 1st and 3rd days after beginning the injections of I showed the ovaries contained follicles in various stages of luteinization, with large accumulations of lipoids in the cortical substance of the adrenals. Foxes dissected on the 5th and 7th days after injection of I contained large follicles strongly distended with follicular fluid (cystiform follicles). A slight increase in the amt. of lipoids in the cortical substance was observed. Foxes dissected on the 9th day showed a much reduced liberation of lipoids and indicated that I affects the activity of the adrenal glands indirectly through the sex glands. S. A. Karjala

The condition of potassium within the erythrocytes. B. N. Tarusov and E. V. Burlakova. *Bull. biol. méd. exptl. U. R. S. S.* 7, 400–1(1939)(in English).—Hemolysis of rabbit blood by dil'n. with 20% of H_2O does not change the elec. cond. nor increase the amt. of unbound K. Hemolysis with saponin causes a drop in the polarization capacity of the blood and increases the K content of the serum from 19 to 23 mg. % to 65–95 mg. %. Thus it is not the cellular membrane which prevents escape of K from the cell, and K does not exist as the free ion in the cell, but is undoubtedly combined with cell proteins. S. A. Karjala

The gonadotropic activity of the anterior pituitary of cow embryos. L. N. Daineko. *Bull. biol. méd. exptl. U. R. S. S.* 7, 422–5(1939)(in English).—The amt. of gonadotropic hormone per g. of anterior pituitary in cow embryos of approx. ages 3, 3.5, 3.5–6.0, 6.0–6.5, 6.5–7.5, 7.5 and 8–9 months and in full-grown cows is 16, 50, 40, 50, 100, 330, 200 and 100 mouse units, resp. No traces of the hormone were detected in other embryonic tissues in biol. tests. S. A. Karjala

The effects of the products of nervous stimulation upon phagocytosis. G. G. Golodets and N. Pushkov. *Bull. biol. méd. exptl. U. R. S. S.* 7, 436–9(1939)(in English).—The perfusate of an isolated frog leg, collected during stimulation of the sympathetic nervous system with an induction coil, when added to a suspension of leucocytes in Ringer soln., caused an increase of 6–15% in the phagocytizing power of the leucocytes. S. A. Karjala

The oxidation process in the organism at various ages. (Carbon, nitrogen, and the carbon-nitrogen ratio in the urine.) S. N. Sinitsyn. *Bull. biol. méd. exptl. U. R. S. S.* 7, 444–7(1939)(in German).—The C and N elimination in g. and the av. C/N ratio of the urine of 2.5–6 months, 0.5–1 yr., full-grown and 15–17-yr.-old dogs are 0.38–1.26, 0.72–2.20 and 0.60, 1.08–2.48, 1.44–3.84 and 0.67, 1.92–4.30, 2.40–5.70 and 0.80, and 3.52–6.00, 2.71–5.60 and 1.13, resp. The same values for the urine of human beings in the age groups 6–10, 10–14, 14–19, 30–60 and 60–97 were 1.62–5.71, 2.23–8.7 and 0.69, 4.07–7.05, 5.75–10.33 and 0.70, 5.15–8.1, 6.25–11.33 and 0.75, 7.26–12.0, 10.36–13.5 and 0.85, and 5.7–18.25, 5.2–13.9 and 1.29, resp. S. A. Karjala

Ontogenetic changes in cholinesterase activity in the skeletal muscles of rabbits. Rachael Leibson. *Bull. biol. méd exptl. U. R. S. S.* 7, 514–17(1939)(in English).—The femoral muscles of embryonic and newborn rabbits, and small portions of the muscles of adult rabbits were treated with acetylcholine (I) solns. of known concn. and the time necessary to split 50% of I was detd. The muscles of rabbits on the 24–25th day of embryonic life split 50% of I in 2 min., those of newborn rabbits in 30–40 sec., while the enzyme extd. from adult muscles required 12–20 min. The cholinesterase (II) content of the muscles of young rabbits reaches the level characteristic of adult rabbits only in 2 months. It is suggested that the curve thus obtained of the activity of II plotted against age is a product of 2 curves, one curve slowly increasing until the 10th day after birth and then leveling off, representing the increase in the content of II, and a rapidly decreasing curve leveling off about the 30th day after birth, representing the diminution in mass of the "receptive substance" into which II concentrates. S. A. Karjala

The effect of denervation on the cholinesterase content of the skeletal muscles of rabbits. Rachael Leibson. *Bull. biol. méd. exptl. U. R. S. S.* 7, 518–20(1939)(in English).—The cholinesterase content of the muscles of rabbits falls to 60% of normal 6 days after denervation of the muscle. It then begins to rise, and in 3 weeks is at the level found in embryonic tissue, and in 2 months is 20–25 times the normal. S. A. Karjala

The reciprocally contradictory interaction of the thyreotropic function of the hypophysis and thyroid. M. M. Zavadovskiĭ and E. I. Vorob'ev. *Bull. biol. méd. exptl. U. R. S. S.* 7, 524–7(1939)(in English).—The feeding of male rats with thyroid prepns. causes a decrease in the wt. and function of the thyroids of the exptl. animals. S. A. Karjala

The reciprocally contradictory interaction of the gonadotropic function of the hypophysis and genital glands. I. The decrease in gonadotropic activity of the hypophysis after the administration of a gonadotropic agent. M. M. Zavadovskiĭ and T. A. Lipgart. *Bull. biol. méd. exptl. U. R. S. S.* 7, 528–32(1939)(in English).—The injection of the serum of pregnant mares into rats as a gonadotropic agent results in a decrease in the gonadotropic activity of the hypophysis. **II. Is the influence of the serum of pregnant mares or of prolan on the hypophysis accomplished through the genital glands or in other ways?** *Ibid.* 533–6.—The injection of the serum of pregnant mares into castrated infantile female or adult male rats causes little or no decrease in the gonadotropic activity of the hypophysis. S. A. Karjala

Transient weakening of organ function caused by the administration of homonymous organotherapeutic preparations and the dynamics of this phenomenon. M. M. Zavadovskiĭ. *Bull. biol. méd. exptl. U. R. S. S.* 7, 537–9(1939)(in English).—A review of the available data showing that the injection of any organotherapeutic prepn. results in a temporary inhibition of the activity of the gland responsible for excretion of the organotherapeutic agent. S. A. Karjala

The gonadotropic function of the hypophysis of pregnant women. Does the hypophysis of pregnant women contain a luteinizing factor? P. A. Wunder and K. H. Wiebe. *Bull. biol. méd. exptl. U. R. S. S.* 7, 540–3(1939)(in English).—Combinations of the hypophysis of pregnant women with that of nonpregnant women and with the gonadotropic hormone obtained from the serum of pregnant mares do not show an increase in the gonadotropic reaction. While a dose of 0.1 mg. of the hypophysis of nonpregnant women produces estrus in 92.4%, combination with that of pregnant women produces estrus only in 47% of the cases. No evidence was found to support the suggestion that the hypophysis of pregnant women is rich in a luteinizing factor. S. A. K.

The permeability of the placenta to the thyroid and thyreotropic hormones. S. Theresa. *Bull. biol. méd. exptl. U. R. S. S.* 7, 544–8(1939)(in French).—The thyroid and thyreotropic hormones of the hypophysis permeate the placenta and activate the thyroid gland of the embryo. S. A. Karjala

The quality of the catalase of the rabbit embryo in the course of its development. A. V. Vadova. *Bull. biol.*

méd. exptl. U. R. S. S. **7**, 554–6(1939)(in English).—The velocity const. $Q_{10} = K_{20}/K_{10}$ and activation energy E_A of the decompn. of H_2O_2 by the catalase of the embryonic tissues of rabbits are const. during the interval 18–30 days growth of the embryo and average 1.53 and 7000 cal. The Q_{10} and E_A of H_2O_2 decompn. by the muscle tissue of pregnant females 20 and 30 days after pregnancy are 2.22 and 13,000 cal. and 1.9 and 11,000 cal., resp., while embryonic tissue at 20 and 30 days gives the values 1.51 and 7000 cal. and 1.57 and 7300 cal., resp. The same values for the muscle tissue of newborn rabbits are 1.06 and 900 cal. S. A. Karjala

The cholinesterase content of embryonic muscles. N. M. Shamarina. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 67–9(1939)(in English).—An ext. of the auricles of adult rabbits required 40 min. to decomp. 80% of the acetylcholine in a soln. of known concn., while that of the auricles of embryonic rabbits on the 24th day of growth required 120 min. No cholinesterase (I) activity was observed before the 18th day of embryonic life. On the 28–30th day of the embryo the concn. of I in the auricles is slightly lower than that in adult auricles. Immediately after birth the value falls to a min. on the 4–6th day after birth, followed by a rise to the value found in adult auricles on the 9–10th day after birth. S. A. Karjala

Cholesterol formation in muscle. D. E. Yankelevich. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 77–80(1939)(in English).—Of 228 detns. of the cholesterol (I) content of the arterial and venous blood of the hind leg, lumbar and tongue muscles of dogs, no difference was found in 59 cases, in 31 cases an av. of 7 mg. % of I was retained by the muscles and in 138 cases an av. of 7.35 mg. % of I was liberated in the blood stream. S. A. Karjala

Gastric juice amylase. A. I. Tumass. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 89–91(1939)(in English).—The elimination or weakening of the nervous connections of the stomach and their subordination to humoral influences in regulating the action of the stomach causes the appearance of amylase (I) in the gastric juice. Transplanted stomachs, whose regulative mechanism is controlled mainly by humoral factors, gives the highest value of I, while the Heidenhain pouch and isolated pylorus, in which the nervous connections are through the sympathetic fibers, are rather low in I. S. A. Karjala

The liberation of glucolytic enzyme by the mucosa of the pyloric part of the stomach. A. I. Tumass. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 92–4(1939)(in English).—The gastric juice secreted by the isolated pylorus of dogs after feeding meat, bread or milk contains a glucolytic enzyme capable of splitting glycogen with the formation of lactic acid. S. A. Karjala

Aneurin and phosphorus compounds of blood. Gilberto Guimarães Villela. *Z. physiol. Chem.* **261**, 20–3 (1939).—Aneurin (I) (1 mg.) added to blood (5 cc.) *in vitro* causes the acid-sol. P to increase and the lipoid P to decrease. The same changes are observed *in vivo* on injection of 10 mg. of I but they are transitory. It is believed that I activates corpuscle phosphatase. Repeated I dosage (14 to 16 mg. in 4 days) in rabbits leads to a decrease in blood pyrophosphate, probably through utilization for tissue fixation of I. Milton Levy

Occurrence and properties of the lactation hormone. E. Rabald and H. E. Voss. *Z. physiol. Chem.* **261**, 71–81 (1939).—Livers from healthy cattle and swine contain a substance with chem. and biol. properties very similar to prolactin from the anterior pituitary. While the concn. is lower, the amt. obtainable per animal is much greater from liver than from pituitary. To prep. prolactin from liver, ext. 20 kg. of ground liver with 30 l. of 70% EtOH at pH 9.5, filter and bring the filtrate to pH 5.5–6, increase the EtOH concn. to 90% and cool well for 24 hrs. Dissolve the centrifuged ppt. in H_2O at pH 9.5 and adjust to 5.5–6. Centrifuge and wash the active ppt. with 96% EtOH and 100% Me_2CO. It can be purified by soln. in glacial HOAc and after removal of the insol. material, pptn. with 10–20 vols. of Et_2O. The substance contains N 3.7, C 47, H 6.9 and ash 2%, and shows all the reactions for proteins except those for tryptophan. All these figures and reactions are similar to those of prolactin from pituitary. The activity of the best liver prepn. is only 0.05 that of the pituitary material. Milton Levy

Composition of the blood of horses as related to their working capacity. Kh. F. Kushner. *Bull. acad. sci. U. R. S. S., Sér. biol.* **1939**, 103–16(in English, 116); cf. *C. A.* **33**, 8262⁹.—The chief constituents of the blood responsible for its oxidizing functions (no. of erythrocytes, hemoglobin content and blood alky.) show the highest indexes in race horses, then in cavalry horses, next in trotters and, least of all, in draft horses. These differences are correlated with the character of the phys. labor ordinarily performed by animals of the 4 types. 47 references. John Livak

The free choline and phospholipide of hepatic and gallbladder bile. Chas. G. Johnston, J. Logan Irvin and Clarence Walton. *J. Biol. Chem.* **131**, 425–37(1939).—Only small amts. of free choline are present in fresh hepatic and gallbladder bile of human beings, dogs and hogs but they contain large amts. of combined choline. On standing in an icebox the choline compd. decomps. rapidly with the formation of free choline even in the presence of C_7H_8 and $CHCl_3$. Vacuum sublimation of H_2O from frozen hog gallbladder bile causes decompn. of most of the combined choline compd. The presence of the free choline in this dried bile may account for part of its stimulatory effect on the gastrointestinal tract. A portion of the combined choline, which is a phospholipide having a mole ratio of choline to P of 1:1, may be extd. with Et_2O-alc. mixts. The isolation of lecithin from this fraction is a finding not in agreement with the report of Jones and Sherberg (*C. A.* **31**, 3114¹) that lecithin is either entirely absent from dog and hog bile or is present only in traces. The possibility of the presence also of sphingomyelin or some other phospholipide with the same choline:P ratio has not been excluded. **The comparison of desiccated and normal hog gallbladder bile.** J. L. Irvin, Harvey Merker, Carl E. Anderson and C. G. Johnston. *Ibid.* 439–45.—After desiccation of fresh hog gallbladder bile by a vacuum process, no significant changes are found in the chem. and phys. characteristics except that free choline increases and the phospholipide correspondingly decreases. The dried bile is quite sol. in H_2O, giving a soln. similar to normal bile. A. P. Lothrop

The red blood cell as a source of the iron and bilirubin of the blood plasma. Georg Barkan and Burnham S. Walker. *J. Biol. Chem.* **131**, 447–54(1939); cf. *C. A.* **21**, 3942.—Simultaneous transfer of Fe and bilirubin from red cells to plasma occurs *in vitro*, the amts. transferred being of the same order of magnitude, with Fe usually being in slight excess. The rate of transfer is variable but the rates are inadequate to account for more than a small fraction of the daily production of bile pigment. The main portion of bile pigment appears to be formed elsewhere than in circulating blood and it seems logical to proceed on the working hypothesis that in general the pseudohemoglobins of Barkan and Schales (*C. A.* **32**, 5890⁹)—compds. in which the porphyrin ring is opened without loss of Fe or denaturation or sepn. of the globin—are the intermediate products between hemoglobin and bilirubin, regardless of the place in which the degradation occurs. There is no evidence that the conversion results from the action of an enzyme (cf. Czike, *C. A.* **24**, 3545). A. P. Lothrop

The excretion of kynurenic acid by members of various families of the order Carnivora. Richard W. Jackson. *J. Biol. Chem.* **131**, 469–78(1939); cf. *C. A.* **30**, 2589³.—After the administration of tryptophan, kynurenic acid was excreted by the hyena, coyote, wolf, fox and badger and not by the serval, cheetah, civet, genet, bear, raccoon and sea lion. The data, insofar as they deal with more than 1 species of 1 family, are compatible with the hypothesis that the excretion of kynurenic acid or its failure to be excreted may be entirely uniform for each family of the Carnivora. A. P. Lothrop

Comparative studies of the metabolism of the amino acids. VIII. Glycine precursors. Availability of *N*-methylglycine, *N*,*N*-dimethylglycine and betaine for the syn-

thesis of hippuric acid by the rabbit. Lynn DeForrest Abbott, Jr., and Howard B. Lewis. *J. Biol. Chem.* **131**, 479-87(1939); cf. *C. A.* **17**, 3695.—*N*-Methylglycine (sarcosine) increases the rate of excretion of hippuric acid when fed to a rabbit along with BzOH but the effect is not as great as that of glycine. There is no formation of methylhippuric acid. *N,N*-Dimethylglycine and betaine do not increase hippuric acid excretion under the same conditions. This utilization of sarcosine in the detoxication mechanism is interpreted as evidence of the biol. conversion of sarcosine to glycine. A. P. L.

Choline metabolism. I. The occurrence and prevention of hemorrhagic degeneration in young rats on a low-choline diet. Wendell H. Griffith and Nelson J. Wade. *J. Biol. Chem.* **131**, 567-77(1939); cf. *C. A.* **33**, 8247[2].—A choline deficiency can be produced in white rats within 10 days on a low-choline diet and is characterized by an extremely toxic state during which there occurs a marked hemorrhagic degeneration of the kidneys, a regression of the thymus and an enlargement of the spleen. The renal lesions can be prevented by amts. of choline which are insufficient for the prevention of fatty livers. These findings demonstrate that choline has a more fundamental role as a dietary essential than its function in the regulation of the fat and cholesterol content of tissues, particularly of the liver. The requirement for choline was found to be greater in young than in older rats.
A. P. Lothrop

The creatine, phosphorus and collagen content of different sections of the dog heart. Harvey E. Alburn and Victor C. Myers. *J. Biol. Chem.* **131**, 713-16(1939).—Analyses of samples from 7 different areas of 8 dog hearts for creatine, total inorg., total acid-sol., and total P and of 2 hearts for collagen N showed the concns. of all these to be quite uniform within the individual ventricles. The left ventricle averaged 7.3% higher in creatine and 9.7, 11.0 and 8.4% higher, resp., in the 3 P fractions. The right ventricle contained 8.2% more collagen N.
A. P. Lothrop

The curves of buffer coefficients of serum. Madeleine Gex. *Bull. acad. med.* **121**, 525-9(1939).—The structure of buffer coeff. bands of serum between pH 5 and 9 is detd. by 2 factors: (1) the presence of certain dissociable electrolytes, 2 of which have been identified as bicarbonates and phosphates, and others of pK 5 (8), 7.6 and 8 (2) and (2) a phenomenon of phys.-chem. disturbance caused by changes in the colloidal structure of the serum and depending on the position of the isoelec. points.
A. E. Meyer

Blood content of inactive hemoglobin with special consideration of hemoglobin standardization. Esther Ammundsen and Mogens Trier. *Acta Med. Scand.* **101**, 451-60(1939).—The hemoglobin detns. by the gasometric and colorimetric methods do not yield concordant results, the max. discrepancy being 13%. In certain persons an inactive fraction was found to be present in the hemoglobin which can combine with CO only after preliminary reduction with $Na_2S_2O_4$. If this inactive fraction is taken into consideration, the max. difference between the gasometric and colorimetric hemoglobin detns. is diminished to only 6%. It is, therefore, recommended to substitute the CO-combining power for the O_2-binding power in standardizing colorimetric hemoglobinometers.
S. Morgulis

An electrophoretic study of normal and pathological body fluids. Lennart Hesselvik. *Acta Med. Scand.* **101**, 461-4(1939).—The proteins of serum can be sepd. into 4 components as regards electrophoretic motility, the fastest migrating component being albumin and the slower α, β and γ globulins, resp. In plasma a fifth component, apparently fibrinogen, was found migrating between α- and β-globulin. An examn. of a variety of body fluids (urine, pleural effusion, aqueous humor, or pericardial, cerebrospinal, ascites and hydrocele fluids) reveals the presence of electrophoretically well-defined protein components, but here only 3 and sometimes even 2 distinct boundaries are regularly found. It is possible that the missing components were merely at too low a concn. to be detected.
S. Morgulis

Studies on the influence of vomiting and nausea upon the renal function. Johs. Clausen. *Acta Med. Scand.* **102**, 22-30(1939).—Nausea and vomiting, apart from decreasing diuresis, cause a marked fall in the urea and creatinine clearance. Since the urea clearance is affected more, the urea clearance/creatinine clearance ratio diminishes. This can only be due to an increased reabsorption of urea in the tubules. This study indicates the limitations of the kidney-function tests in the presence of vomiting or nausea.
S. Morgulis

Studies in sulfate clearance. Tage Bjering and Ejnar Øllgaard. *Acta Med. Scand.* **102**, 55-78(1939).—The sulfate clearance in normal persons was found to be 37 cc. on the av., but is generally less in persons affected by kidney disease. The diminished clearance corresponds to the decrease in creatinine or in urea clearance, except in patients with amyloid kidney degeneration where the urea clearance decreases more than the sulfate clearance. About 0.8 to 0.9 mg. of blood sulfate is probably in combination with protein as it does not go through the glomerulus, and this is the same in healthy or diseased persons. On the administration of sulfate the clearance increases up to a const. value which falls between the urea and creatinine clearances. After correcting for the nonfilterable portion of blood sulfate, the sulfate clearance is about the same as that of inulin, the creatinine/sulfate and creatinine/inulin ratios both being about 1.4. The urea/sulfate ratio is 0.73-0.74. The similarity of the inulin and sulfate clearances indicate that the sulfate may be taken as a measure of filtration.
S. Morgulis

A pharmacognostical study of the parathyroid. I. Heber W. Youngken. *J. Am. Pharm. Assoc.* **28**, 638-43 (1939).—A description is given of the whole fresh and desiccated parathyroid glands of cattle, of their histology and the appearance of the cells after treatment with various stains. Several qual. colored tests for powd. parathyroid and thyroid are described.
A. P.-C.

The catabolism of fatty acids by the living organism. P. E. Verkade. *Fette u. Seifen* **46**, 521-9(1939).—Review of the literature on the reaction mechanism of the progressive oxidation of fats in animal tissues. Attention is devoted to the effect of chem. structure, viz., no. of C atoms in the fatty acid, presence and position of unsatd. linkages and form of combination of the fatty acid. Over 70 references.
J. W. Perry

The effect of gastric mucin on the hemoglobin regeneration in anemic dogs. H. S. Wigodsky, R. A. Bussabarger and S. J. Fogelson. *J. Lab. Clin. Med.* **25**, 13-18(1939).—The procedure employed was essentially that of Whipple and Robscheit-Robbins (*C. A.* **30**, 5634[9]). In each of 2 series of 4 anemic dogs mucin stimulated hemoglobin production 55 to 70% more than could be accounted for by the amt. of Fe present in the prepn. The stimulus was not as great as when beef liver was fed. Whipple's method (*loc. cit*) of calcn. of hemoglobin formation and one devised by the authors were compared. Conclusion: The procedure of Whipple for detg. the effect of substances on hemoglobin regeneration in anemic dogs is only a qual. rather than a quant. one, unless sufficient data are obtained to permit statistical analysis.
H. W. R.

The absence of acute effects of sex hormones. Macdonald Dick and Charles W. Hooker. *J. Lab. Clin. Med.* **25**, 33-4(1939).—Intravenous administration of 50 mg. of testosterone propionate, 50,000 I. U. of estradiol benzoate, or 400 I. U. of theelin to male and female dogs, both castrated and intact, under morphine-sodium barbital anesthesia produced no change in respiration, heart rate or blood pressure.
Howard W. Robinson

Treatment of hypogenitalism in the male with the gonadotropic principle of pregnant mare serum. Ralph H. Kunstadter. *Endocrinology* **25**, 661-9(1939).—Intramuscular administration of pregnant mare serum gave definite improvement in boys with hypogenitalism.
Felix Saunders

Comparison of four methods of bioassay for the gonadotropic factors. Robert T. Frank and Rose L. Berman.

Endocrinology **25**, 683–8(1939).—The follicle-stimulating factor is concd. by all the methods currently employed. Luteinization effect is lost or greatly diminished except by the Me_2CO or acid alc. method of concn. The acid alc. method of concn. gives a more complete evaluation of conditions present. Vaginal opening is unreliable for bioassay. Ovarian wt. increase indicates the amt. of follicle-stimulating factor present but does not permit evaluation of the luteinizing factor. Ovarian values appear to give the most comprehensive picture of the gonadotropic forces at work. Felix Saunders

Hyperfunction of the anterior pituitary in a strain of rats. Ben K. Harned and Versa V. Cole. *Endocrinology* **25**, 689–97(1939).—Rats of the Yale and Wistar strains grown on the same diet and under the same conditions for 3 generations were compared. The Yale rats show a higher fasting blood sugar, a lower glucose tolerance, a greater hyperglucemic response to adrenaline, an initial resistance to insulin, a larger vol. of urine per unit of body wt., a more rapid growth and larger size, a greater incidence of sterility and a higher percentage of body fat. These findings can be explained by the assumption of a hyperfunction of the anterior pituitary in the Yale rats. Felix Saunders

Behavior and antomical changes produced in rats by pancreatectomy. Curt P. Richter and Edward C. H. Schmidt, Jr. *Endocrinology* **25**, 698–706(1939).—Loss of pancreatic secretion results in reduced food intake which leads to atrophy of the endocrine glands. Felix Saunders

Antithyroid principles. Julius Bauer, Wm. G. Fisher and Geo. Gutman. *Endocrinology* **25**, 721–3(1939). By the use of a method described a principle antagonistic toward thyroxine has been found in sheep and human serum. Diiodotyrosine, olive oil and theelin do not exhibit such an effect. The method is not appropriate for the detection of thyroid hormone in excess in the blood of hyperthyroid subjects. Felix Saunders

Somatic growth-depressing effect of testosterone propionate. H. S. Rubenstein, A. A. Kurland and M. Goodwin. *Endocrinology* **25**, 724–8(1939).—Testosterone propionate given in doses of 1 mg. intraperitoneally 26–80 days significantly depresses body wt. and length of the male rat. Felix Saunders

Responses of the female to male hormone substances. Behavior of hens and newly hatched chicks. James B. Hamilton and Walter R. C. Golden. *Endocrinology* **25**, 737–48(1939).—Administration of cryst. male hormone substances can produce definite cock-like behavior in either newly hatched female chicks or in the mature hen. Felix Saunders

Colchicine test as a method for determining the time of onset and the duration of action of male active substances. Richard Tislowitz. *Endocrinology* **25**, 749–53(1939).—Colchicine permits a finer analysis of the effect of male hormones on the seminal vesicles than can be obtained by the usual methods in which the enlargement of the whole vesicle is observed. Felix Saunders

Urinary excretion of estrogens, androgens and follicle-stimulating hormone following the administration of testosterone to human female castrates. Ira T. Nathanson and Lois E. Towne. *Endocrinology* **25**, 754–8(1939).—Testosterone propionate when administered to human female castrates results in (*a*) a discernible increase in the urinary total estrogen levels, (*b*) a slight rise in the urinary androgen excretion, (*c*) a decrease in the urinary FSH levels, (*d*) a cornified vaginal smear and (*e*) symptomatic relief from the vasomotor symptoms of the menopause. Felix Saunders

Influence of anterior pituitary extracts on the proteins of the liver. O. Boyd Houchin. *Endocrinology* **25**, 759–67(1939).—Injection of an initial ext. of the anterior lobe of cattle pituitaries (1–20 mg.) does not cause a true hypertrophy of the entire liver. The dehydrated, defatted wt. of the liver per 100 g. body wt. is similar to the normals. The percentage of water in the liver does not vary significantly. The alkali-sol. protein of the liver is decreased 35–53% by a principle (protein-metabolism hormone) present in the anterior pituitary. Acetone-dried prepns. have a slight activity. Fractions of the initial ext. rich in the lactogenic hormone and in the thyrotropic, carbohydrate-metabolism and gonadotropic hormones contain little or no protein-metabolism hormone. The protein-metabolism hormone was further shown to be an entity by its being inactivated by 0.1 *N* NaOH at 60° for 90 min., while the potency of the fat-metabolism hormone remained const. Felix Saunders

Effect of pituitary extracts on ketonuria, fat content and fat distribution in the liver and tissues of mice. A. H. Neufeld and J. B. Collip. *Endocrinology* **25**, 768–74(1939).—In 24-hr. fasted mice active ketogenic prepns. produce a fatty infiltration of the liver. Total body wt. does not change appreciably. In 48-hr. fasted animals the high liver fat is assocd. with a low total body fat. Prepns. contg. the specific metabolic stimulant produce an appreciable loss of total body fat which is assocd. with a low liver fat content in 24-hr. fasted animals. Preliminary expts. on the administration of ketogenic prepns. together with the specific metabolic stimulant show an enhanced loss of total body fat in mice. Felix Saunders

Antagonist to adrenaline hyperglucemia in pituitary extracts. A. H. Neufeld and J. B. Collip. *Endocrinology* **25**, 775–81(1939); cf. *C. A.* **33**, 5904[8]. Certain posterior pituitary prepns. produce, on administration to mice, rats, rabbits, monkeys and a dog, an antagonism to adrenaline hyperglucemia. Numerous properties of the substance are given. The evidence available does not indicate a relationship of this substance to other well-known pituitary principles. Felix Saunders

Effect of androgens on the survival of adrenalectomized rats. Charles L. Spurr and Charles D. Kochakian. *Endocrinology* **25**, 782–6(1939).—The month-old male adrenalectomized rat has an av. survival time of 8.7 days which is decreased to 7.1 days by injecting twice daily with 0.1 cc. of sesame oil. The administration of urinary androgenic ext., androstenedione, testosterone acetate and testosterone propionate resulted in a marked decrease in survival time which was roughly proportional to their physiol. activity. Felix Saunders

Properties of ovarian extracts. H. W. Marlow. *Endocrinology* **25**, 793–7(1939).—The uterine response to exts. of follicular fluid and of the residual ovary resembles more nearly that of estrone than estradiol. Felix Saunders

Use of colchicine in the assay of androgens. Walter Fleischmann. *Endocrinology* **25**, 798–800(1939).—By arresting mitosis with colchicine the stimulating effect of androgens on the seminal vesicle of the castrate rat is sharply defined. A pos. test is given by 0.5 mg. androsterone and by 0.05 mg. testosterone propionate. Felix Saunders

Analysis of the relation between basal metabolism and summated tissue respiration in the rat. John Field, 2nd, Harwood S. Belding and Arthur W. Martin. *J. Cellular Comp. Physiol.* **14**, 143–57(1939).—Basal metabolic rate (BMR) was detd. for postpubertal rats 98–120 days old. No significant correlation between BMR (unit wt. basis) and sex, age or wt. was found. The BMR values (cor. for activity) were 21.3–33.1 l. O, normal temp. and pressure, per kg. body wt. per day, av. 26.36. Mean values of Q_{O_2} were detd. for 20 organs and tissues of these animals. The values were detd. (by extrapolation) at the time of sacrifice of the animal and at various subsequent intervals. A quant. evaluation of the differences in mean Q_{O_2} between the 20 organs and tissues was made. The mean value for summated tissue respiration, calcd. from mean values of Q_{O_2} for the several organs and tissues, was 110.08 ml. O, normal temp. and pressure, per 150 g. rat per hr. or 65.85% of the mean BMR. When the latter value was cor. for min. functional activity, it was found that the summated tissue respiration would account for 89% or more of the respiration of the intact animal. The percentage contribution of the several organs and organ systems to BMR and to body wt. was evaluated. In decreasing order, the 4 most important

contributors to BMR are skeletal muscle, liver, integument and alimentary canal; while the 4 most important contributors to body wt. are skeletal muscle, integument, skeleton and blood. Felix Saunders

Tolerance of chick heart tissues to a time-temperature factor before explantation in tissue culture. Duncan C. Hetherington and Jane Stanley Craig. *J. Cellular Comp. Physiol.* **14**, 197–203(1939).—Survival of chick embryo heart muscle and fibroblasts is dependent upon time-temp. and mass factors. Small fragments of heart may be stored in Ringer-Tyrode soln. at 0° for as long as 15 days and at 20° for 11 days with little apparent effect on viability. Subzero temps. rapidly kill cells as do temps. of 50–52°. Felix Saunders

Presence of nonoxygen-combining (inactive) hemoglobin in the blood of normal individuals. Esther Ammundsen. *Science* **90**, 372 3(1939).—About 3.5% of the hemoglobin from normal persons is in a form that is capable of binding CO only after reduction by Na hyposulfite. Felix Saunders

Essentiality of primary amino groups for specific activity of the lactogenic hormone. Choh Hao Li, Wm. R. Lyons, Miriam E. Simpson and Herbert M. Evans. *Science* **90**, 376–7(1939); cf. *C. A.* **33**, 8269⁸.—A 1.5% soln. of a highly purified lactogenic prepn. was dissolved in 0.5 *M* acetate buffer (pH 4) and treated 30 min. with an equal vol. of 2 *M* $NaNO_2$ at 22° or 0°. The mixt. was then adjusted to pH 5, centrifuged and the ppt. redissolved and repptd. isoelectrically. The crop-stimulating activity of the prepn. was completely destroyed. Felix Saunders

Comparison of chemical composition of hepatoma and normal liver tissues. VIII. Lipoids. Sanzi Kisi, Tadasi Huziwara and Waro Nakahara. *Gann* **33**, 332–41(1939); cf. *C. A.* **33**, 2206².—Cholesterol crystals were isolated from normal rat liver and from transplantable rat hepatoma of Iikubo strain. A comparison of the absorption spectra showed that about $^1/_{15}$ of hepatoma cholesterol crystals consisted of ergosterol or 7-dehydrocholesterol, i. e., provitamin D. Cholesterol, isolated from normal rat liver, did not reveal spectrographically the presence of ergosterol or 7-dehydrocholesterol. K. Sugiura

Specificity of hemoglobins. II. Mituko Yasaki. *J. Chosen Med. Assoc.* **29**, 1657–85(German abstr. 108–9) (1939); cf. *C. A.* **34**, 151⁵. S. Tashiro

Urinary excretion of nephrohormone. Ziro Masuda. *J. Chosen Med. Assoc.* **29**, 1686–708(German abstr. 109–10)(1939).—Normal urine contains an active sterol complex which has the power to change indole to indican, to promote elimination of blood indican, to reduce blood cholesterol and Ca contents, to regulate hyperglucemia, to cause diuresis and to increase blood pressure. This compd. is identical with Tokumitsu's nephrohormone which is present in renal cortex and renal vein. The urinary content of nephrohormone is increased by diuretics. S. Tashiro

Morphology of liver function. II. Relation between liver and kidney fatty degenerations. Syozo Oda. *J. Chosen Med. Assoc.* **29**, 1855–72(German abstr. 116–17) (1939).—Morphological study showing that there is no definite relationship between the 2. S. Tashiro

The effect of the female sex hormone on genital organs of female guinea pigs infected with tuberculosis. I. The sex cycle of tuberculous guinea pigs. Tadahumi Mabuti. *J. Oriental Med.* **31**, 229–40(German abstr. 22)(1939).—The infection of guinea pigs with human tuberculosis bacillus influences the sex cycle. **II. The effect of castration. III. The effect of pelanins.** *Ibid.* 241–67, 269–93 (German abstr. 23–4).—The castration of female guinea pigs increases their resistance to tuberculous infection, and the injection of the ovarian hormone (pelanins) also increases the resistance. S. Tashiro

Enzymic action of human milk. Preliminary. Protein-free filtrate. S. Masutani, S. Okuda, Y. Kuriyama and S. Izumi. *J. Oriental Med.* **31**, 389–63(English abstr. 31–4)(1939).—Protein of free milk (prepd. by the modified Almén method, AcOH and tannic acid instead of gallic acid) of healthy mothers shows amylolytic action; peptic action only with the Fuld and Levison method (cf. *C. A.* **2**, 1156), not with the method of Mett; weak tryptic, lipolytic, catalase, peroxidase but no rennin actions. **I. Optimum reaction of amylolytic action.** S. Masutani. *Ibid.* 539–64(English abstr. 41–2).—The protein-free milk is examd. by Wohlgemuth's starch method (**A**), Izumi and Sonobe's dextrin method (**B**), and Rona and Van Eweyk's glycogen method (**C**), for amylolytic activity. Optimal pH for **A** with the filtrate is 8.0–9.0, but there is a second optimal range at pH 5.9–6.5. With **B**, the optimum is pH 6.5 and with **C**, pH 7.4. The amylolytic activity is shown to be the least with **C**. With **A** and **B**, the reducing sugar is produced but not with **C**. The sides of the nipple and lapses of lactation are not a factor for the variation of amylolytic activity of human milk. S. Tashiro

Vegetative nerves and the alveolar resorption of lung. I. The influence of nerve sections on the alveolar resorption. A. Resorption of dyes. Kiyosi Hurui. *J. Oriental Med.* **31**, 569–601(English abstr. 44)(1939).—A cervicothoracic sympathectomy of rabbits retards the resorption of dyes (Azorubin S, Scarlet R, phenol red and others) in alveoli of the lung, and cervico-vagatomy hastens it. When both nerves are cut, more retardation was shown than in the control, but less as compared to that of animals with sympathectomy alone. S. Tashiro

The mechanism of glycogenolysis. D. Bach. *J. pharm. chim.* **29**, 585–605(1939).—A review. The complicated chem. transformations involved are clearly shown in 2 "flow" diagrams. The remarkable similarity of lactic fermentation of muscle and alc. fermentation of yeast is pointed out; the absence of Neuberg's carboxylase in muscle limits the decompn. of pyruvic acid to lactic acid. S. Waldbott

Inactivation of diethylstilbestrol in the organism. Bernhard Zondek and Felix Sulman. *Nature* **144**, 596–7 (1939).—Expts. with infantile rats indicate that stilbestrol is rendered inactive in the organism only to a small extent, resembling the hormone esters. Like the hormone esters it remains deposited at the site of injection for a considerable time and from there it is slowly absorbed. Stilbestrol is distinguished from the hormone esters in that large amts. are eliminated in the excreta, particularly in the urine. E. D. Walter

Radioactive iron and its excretion in urine, bile and feces. P. F. Hahn, W. F. Bale, R. A. Hettig, M. D. Kamen and G. H. Whipple. *J. Exptl. Med.* **70**, 443–51 (1939).—By use of radioactive Fe as ferrous gluconate it is found that there is an initial extra output in urine and feces during a few days (3–15) after Fe injection by vein and this may total 2–8% of the injected Fe; after this initial reaction the urinary excretion of radio-Fe (I) drops to traces or even to 0. The feces always contains measurable amts. of I—in 5 dogs receiving 100–250 mg. of I the fecal excretion per day settled down to 0.05–0.4 mg. per day. Blood destruction (PhNHAc) causes a definite increase in I eliminated in the feces (0.1–1 mg. per day); probably most of this excess Fe comes through the biliary tract (bile fistula); the bile under usual conditions contributes very little Fe to the intestine (0.01 mg. I per day or less). The body controls its Fe stores by absorption or lack of it rather than by its capacity to eliminate it. The evidence is overwhelming that the dog excretes Fe with difficulty and in small amts. (even in the plethoric state) by means of the biliary and gastrointestinal tracts. C. J. West

Gonadotropic inhibitory substance and precipitins in the blood of monkeys receiving gonadotropic hormone preparations. Roland K. Meyer and Harold R. Wolfe. *J. Immunol.* **37**, 91–102(1939).—The antigonadotropic effect and precipitin titer of the blood of monkeys, which were injected with relatively small amts. of pregnant mare serum having gonadotropic activity, or with a highly purified gonadotropic hormone prepd. from pregnant mare serum, or with the serum of the nonpregnant mare, were detd. The results show that the antigonadotropic substance can be produced by the injection of relatively small amts. of hormone and also indicate that precipitins are not

responsible for the antigonadotropic action of the serums. Charles A. Zittle

Steroids—6-oxoprogesterone (Ehrenstein) 10. Steroids—homologs of sex hormones (Miescher, Wettstein) 10.

G—PATHOLOGY

Recent advances in the chemistry of tumors. P. E. Simola. *Nord. Med.* 3, 2133–9(1939).—A brief review of the progress of chem. cancer research. The following problems are dealt with: (1) chem. constituents and metabolism of tumors, (2) carcinogenesis, (3) diagnosis of cancer and (4) chem.-biol. cancer therapy. Particular attention is given to the studies on cancer-producing chem. compds. and biol. agents. V. Aschehoug

Absorption and excretion of ascorbic acid in patients with pulmonary tuberculosis. B. Groth-Petersen and E. Groth-Petersen. *Nord. Med.* 3, 2141–5(1939).—By use of the methylene-blue method, serum ascorbic acid and urine ascorbic acid were detd. to ascertain why patients with pulmonary tuberculosis show a lower concn. of serum ascorbic acid than healthy persons, and why in some patients the quantity of serum ascorbic acid cannot be materially raised by an increased addn. of vitamin C. The results of these examns. show that the difference generally is due neither to a defective absorption nor to an abnormal renal excretion, but must be due to another endogenous cause; in a few patients only there is a lack of absorption. V. Aschehoug

The effect of the thyrotropic and growth hormones of the anterior pituitary on the growth of the transplanted rat sarcoma. H. Morikawa. *Folia Endocrinol. Japon.* 15, 23–4(1939)(in German).—The thyrotropic and growth hormones were prepd. by alc. and Me_2CO pptn. from fresh bovine pituitary glands. The exptl. procedure was similar to that described in the earlier papers (*C. A.* 33, 9417[5,6]). The hormones were injected daily for 17 days into male white rats weighing 70–80 g. beginning immediately after transplantation of the sarcoma. The growth of the sarcoma decreased slightly after thymectomy or injection of the thyrotropic hormone. The growth hormone produced a rather distinct increase in sarcoma growth both in thymectomized and nonthymectomized rats, the effect being slightly greater in the latter. R. Berggren

The effect of the thymus and sex glands on the metabolism (tissue respiration and glucolysis) of the rat sarcoma. H. Morikawa. *Folia Endocrinol. Japon.* 15, 24–5(1939)(in German); cf. *C. A.* 33, 9417[5,6].—The sarcoma (Fujinawa strain) was removed between the 9th and 13th day after transplantation into male white rats weighing 70–80 g. and its respiration and glucolysis were estd. by the Warburg method. The respiration of the sarcoma was not appreciably influenced by thymectomy, orchidectomy or prolonged injection of thymoglandol (thymus ext.); it was increased slightly after feeding thymus powder or after prolonged injection of androstin (testicular hormone). The aerobic and anaerobic glucolysis was decreased after feeding thymus powder or after prolonged injection of thymoglandol and increased after thymectomy or prolonged injection of androstin. On direct addn. of thymoglandol to the extirpated sarcoma tissue *in vitro* the respiration increased regardless of the concn. of the added thymus ext.; the glucolysis was accelerated by a low concn. of thymus ext. and slightly inhibited by a high concn. The respiration also increased after direct addn. of androstin but the glucolysis did not change. Ruth Berggren

The significance of the cholesterol partition of the blood serum in surgery of the gall bladder. Otto C. Pickhardt, A. Bernhard and Irving L. Kohn. *Ann. Surg.* 110, 701–22(1939).—The detn. of the cholesterol partition of the blood serum, particularly the changes in percentage of free cholesterol, has been used as a measure of the functional reserve of the liver. A patient who exhibits a low functional reserve is a poor operative risk. The cholesterol partition has prognostic value in surgery of the gall bladder and biliary tract. R. Brown

The blood picture in hog cholera. H. C. H. Kernkamp. *J. Am. Vet. Med. Assoc.* 95, 525–9(1939).—The blood picture in hog cholera is characteristic of a severe leucopenia. No significant change in the nos. of erythrocytes or in the amts. of hemoglobin per unit vol. of blood occurs. Rachel Brown

Possible carcinogenic effect of anthracene and chrysene and some of their compounds. I. The effect of painting on the skin of mice. Joseph A. Polhia. *J. Ind. Hyg. Toxicol.* 21, 219–20(1939).—Chrysene, anthracene, oil-sol. chrysene red, water-sol. chrysene blue and water-sol. anthracene green when painted on mice failed to produce any characteristic cancerous changes on the skin. A. L. Elder

Prophylaxis of benzopyrene cancer; action of heavy doses of vitamin B_1, nicotinic acid or a phosphorylating enzyme system. J. Maisin, Y. Pourbaix and J. Camerman. *Compt. rend. soc. biol.* 132, 87–90(1939); cf. *C. A.* 33, 5482[6].—Skin cancer was produced in mice by application of benzopyrene soln. to the skin. Heavy doses of either vitamin B_1 or nicotinic acid, given with Na pyrophosphate, had some inhibiting action, as also did a yeast prepn. rich in active phosphorylating enzyme and the necessary accessory substances. L. E. Gilson

Standardization of the antiviral content of immune globulin from placental extract. Geoffrey Rake. *Proc. Soc. Exptl. Biol. Med.* 42, 9–11(1939).—Preliminary report. L. E. Gilson

Photoöxidation of blood plasma and tissues in buckwheat disease. Hans Smetana. *Proc. Soc. Exptl. Biol. Med.* 42, 60–4(1939).—There was no abnormal increase of O consumption during irradiation, by infrared, visible and ultraviolet light, of plasma and tissues of various organs of guinea pigs sensitized to light by prolonged feeding of buckwheat. No evidence was found that the susceptibility to light in buckwheat disease is due to a photodynamic substance. L. E. Gilson

Protective value of immune rabbit serum and its globulin fraction against experimental murine infection with Hemophilus pertussis. Henry W. Scherp, Wm. L. Bradford and Mary Wold. *Proc. Soc. Exptl. Biol. Med.* 42, 172–6(1939).—Immune rabbit serum protected mice against exptl. intranasal infection with *H. pertussis*. By pptn. in half-satd. Na_2SO_4 at 37° a globulin fraction was prepd. which had essentially the same protective capacity and agglutinating titer as the original serum but only 1/3 the protein content. L. E. Gilson

Listerella monocytogenes in relation to the Wassermann and flocculation reactions in normal rabbits. John A. Kolmer. *Proc. Soc. Exptl. Biol. Med.* 42, 183–6(1939).—Immunization of rabbits with living and heat-killed avirulent strains (4428 and F302) of *Listerella monocytogenes* did not produce complement fixing or flocculating reagins for antigens commonly employed in the serum diagnosis of syphilis. Neither strain produced sheep corpuscle agglutinin. Both produced complement-fixation antibodies and agglutinins for antigens of homologous strains of *Listerella*. L. E. Gilson

Bilirubin resorption in obstructive jaundice. B. G. P. Shafiroff, H. Doubilet and W. Ruggiero. *Proc. Soc. Exptl. Biol. Med.* 42, 203–5(1939).—Preliminary. L. E. Gilson

Preferential mottling of the enamel of rat molars [by fluoride]. Sara F. Dixon and Gerald J. Cox. *Proc. Soc. Exptl. Biol. Med.* 42, 236–7(1939).—Preliminary. L. E. Gilson

Tachyphylaxis to renin. E. G. McEwen, S. P. Harrison and A. C. Ivy. *Proc. Soc. Exptl. Biol. Med.* 42, 254–7(1939).—A method is given for obtaining a reliable, relatively stable, active renin prepn. from hog kidney. The production of the tachyphylaxis tolerance phenomenon by repeated injections at intervals of less than 2 hrs. in dogs is described. L. E. Gilson

Relation between latent period and growth rate in chemically induced tumors. Austin M. Brues, Albert E. Weiner and Howard B. Anderson. *Proc. Soc. Exptl. Biol. Med.* 42, 374–7(1939).—A high degree of correlation was found between the malignancy of chemically induced tumors, as measured by growth rate and mitotic

index, and shortness of the latent period before appearance of palpable tumors. This was true in the various responses of different strains of mice to the same agent, and in responses to different agents and modes of administration. Possibly the growth rate of a tumor in the microscopic stage is the main factor detg. the latent period.
L. E. Gilson

Calcium and phosphorus excretion in the urine of patients with renal or ureteral calculi. R. H. Flocks. *J. Am. Med. Assoc.* **113**, 1466–71(1939).—The Ca and P urinary excretion of 35 patients with renal calculi was studied. In 23 patients high urinary Ca was found. All patients with rapidly growing stones had high urinary Ca excretion. Patients with high urinary Ca responded to an acid ash diet with an excessively increased Ca output as compared with patients with low urinary Ca. A modified vitamin D intake increased the Ca output. A slight pathol. change in the kidney was assocd. with increased Ca; marked pathol. change was usually assocd. with lowered urinary Ca. Increased fluid intake merely dild. the Ca concn. of the urine. F. P. Griffiths

The enzyme problem and cancer. A. v. Christiani. *Z. Krebsforsch.* **49**, 221–30(1939). —Normal serum contains a substance with lytic action on carcinoma cells, which seems to be anchored in the albumin fraction. The enzyme nature of this substance is indicated by its thermolability, its insoly. in ether and the marked dependence of its activity on the H-ion concn. Carcinoma serum, with the exception of skin cancer, has no similar lytic effect on carcinoma cells. The substance present in the carcinomatous organism which protects the carcinoma cells from the lytic enzyme is a definite chemical substance, cholesterol butyrate. This substance is found in the carcinomatous organism in the serum and in the organs affected with carcinoma but not in normal serum or organs. The normal organism contains a dehydrase which changes the butyric acid normally formed and prevents the formation of cholesterol butyrate. Cholesterol butyrate has a marked affinity for cancer cells, is readily absorbed and probably takes part in the building up of the tumor. The substance in the normal organism that inactivates cholesterol butyrate in case it is formed in cell metabolism is a definite oxidation product of ergosterol. This combination acts as an inactivator and is present in very minute amt. The formation of this compd., very important physiologically, is due to the presence and activity of oxidases. It is probable that here too as with the carcinolytic agent there is present a coenzyme anchored in the organism to some protein as carrier. In the carcinomatous organism these oxidases are absent and so the ergosterol does not undergo oxidation and form an inactivator. After Ra or x-ray irradiation, which bring about direct oxidation, the inactivator is produced in the carcinomatous organism. E. Maier. *Ibid.* 231–5.—Two carcinomatous cases are cited which confirm the work of v. Christiani that before treatment no inactivators were present, and after Ra irradiation or electrocoagulation inactivators could be demonstrated. In expts. *in vitro* cancer cells of different origin showed different amts. of inactivators after Ra irradiation. Cancer cells that undergo spontaneous autolysis *in vitro* autolyze even more rapidly after Ra irradiation and inactivator is found after the irradiation. In this group are skin cancers and metastases from various cancers and these are sensitive to Ra. Other cancer cells do not readily undergo spontaneous autolysis *in vitro*, are not destroyed by Ra irradiation and do not form inactivator. In this group are cancers of the alimentary tract and forms of squamous cell carcinoma refractory to irradiation. Two cases are cited of clinical improvement after injection of inactivator and the application of dressings satd. with inactivator soln., in one case combined with Ra irradiation. In a no. of cases of carcinoma of the skin oxidases were absent before treatment and present after Ra irradiation. In this form of cancer there seems to be disturbance in the oxidase system while other enzymes, such as the dehydrases, are intact. As irradiation produces a destruction of leucocytes it is possible that the oxidases are set free from the destruction of the leucocytes. Further work, both chem. and clinical, should in the not far distant future yield new insight in cancer metabolism and indicate in what way irradiation therapy may lead to even greater success than at present. H. F. Holmes

The mineral content of the lungs of normal sheep as compared with that of the lungs in "lunger" disease. H. Marsh and D. P. Wilson. *Cornell Vet.* **29**, 345–51 (1939).—As compared with lungs of healthy sheep, those of diseased animals showed increased quantities of Si, Fe, Al, Ca, Mg and P, ranging from 17 to 90%, but there seemed to be no justification for assuming that this difference indicated any causal relation between these elements and the pathol. condition. K. D. Jacob

The role of concentration of ketone bodies in the processes of ketogenesis and antiketogenesis. The action of ketogenic substances. S. M. Leites. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 327–9(1939)(in English).—Hypodermal injections of a neutralized alk. ext. of acetone-treated pituitary powder, of adrenaline, of the "lipocaic substance" (Dragstedt) of the pancreas, or of the ultrafiltrate of an aq. ext. of acetone-treated liver powder generally gives rise to hyperketonemia only when the initial level of ketone bodies is below a "threshold value" (I) (7–10 mg. % in human subjects and dogs, calcd. as acetoacetic acid, and 7–10 mg. % in rabbits, calcd. as Me_2CO). When the initial value exceeds I a weak ketogenic effect, or, as in the majority of cases, hypoketonemia, occurs. Depletion of liver glycogen raises I. A 2nd injection of the ketogenic substance at the height of hyperketonemia produced by the 1st injection often results in hypoketonemia, while if injection at a high initial ketone body level is followed by hypoketonemia, a 2nd injection produces a profound hyperketonemic effect.
S. A. Karjala

The relation between proteolysis and protein synthesis in normal and Jensen's sarcoma tissue. B. I. Shomin. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 330–1(1939)(in German).—Protein synthesis in tissue slices, pastes or exts. of liver tissue was followed by the increase in substances precipitable by CCl_3COOH or sulfosalicylic acid or by the increase in residual N and free NH_2 groups. In all cases the synthetic and proteolytic processes alternated periodically. Protein synthesis by Jensen's sarcoma tissue was twice that of normal liver tissue. An ext. of the sarcoma tissue stored 25 days in the cold lost all its synthetic properties but retained the capacity to split protein substrates. The same alternation in synthesis and proteolysis was observed in autolyzates of rat, rabbit and chicken muscles. S. A. Karjala

Proteolytic autolysis of normal and malignant tumor tissue. A. S. Konikova. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 332–4(1939)(in German).—The proteolytic autolysis of mixts. of rat and rabbit muscle tissues is higher than that of each taken separately. Sarcoma tissue alone gives a high value, indicating that it is fundamentally different from normal tissue. Mixts. of tissues of heterogeneous tumors show no increase in proteolytic autolysis.
S. A. Karjala

Blood phosphatase changes in certain diseases. G. M. Vasil'ev. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 349–52 (1939)(in English).—A description of the detn. of blood phosphatase (I) by the Na_2PO_3OPh method of King (*C. A* **28**, 7285[1]). A distinct increase in I was observed in hepatic diseases. A proportional relationship between bilirubin and I in cases of increased I in cholecystitis was not always observed, although it was generally found in parenchymc cholecystitis and hepatic cirrhosis. No appreciable change in I was found in diabetes mellitus.
S. A. Karjala

The sulfur content of the hair of malignant tumor patients. K. S. Kosyakov. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 407–10(1939)(in English).—The normal S content of the hair of women 15–44 yrs. of age is 2.59% while that of men is 2.84%. In the age group 45–55 the values are 2.86 and 2.93%, resp. In the case of cancer in women no change is observed in the S content of the hair, while sarcoma causes an increase in S. In men

cancer causes a decrease in S which is greatest for cancer of the digestive tract, while sarcoma causes no change. S. A. Karjala

The cause of sterility in experimental athreosis. M. G. Sachs. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 521–3 (1939) (in English).—The basal metabolism of thyroidectomized rabbits falls to 1.56 cal. per kg./hr. compared to the normal 2.47 cal. per kg./hr. within 1 month after operation. An av. increase in wt. of 470 g. was observed. Ovulation, fertilization and development of the ovum are normal, but the advanced embryo dies. The injection of thyreoidin caused a slight increase in wt. with little change in the basal metabolic level. However, 2 parenteral injections of 1 mg. each of pure thyroxine (I) resulted in a rapid rise in the basal metabolic rate to 3.32 cal per kg./hr. and an av. loss in wt. of 320 g. Another injection of I after mating led to normal pregnancy and normal birth. Addnl. injections of I on the 13 18th day of pregnancy had no effect, indicating that I was no longer necessary after the thyroid gland of the embryo began to function. S. A. Karjala 2 3

The influence of an extract of the anterior pituitary on the development of experimental pancreatic diabetes. V. G. Baranov. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 32–4 (1939) (in English).—The administration of an ext. of the anterior pituitary to dogs 2.5–12 months after partial removal of the pancreas led to glucosuria which disappeared when administration of the ext. was stopped. Repeated administration led to a stable glucosuria and pancreatic diabetes. S. A. Karjala 4

Factors influencing carcinogenesis with methylcholanthrene. II. Lack of effect of foster nursing. Michael B. Shimkin and Howard B. Andervont. *U. S. Pub. Health Repts.* **54**, 2080–5 (1939); cf. *C. A.* **33**, 8287[4].—Foster nursing of male mice of a strain (C_3H) highly susceptible to the induction of subcutaneous sarcoma with 0.5 mg. methylcholanthrene in lard by mice of lower susceptibility to the agent (I and Y strains), or the foster nursing of male mice of strains more resistant to the action of methylcholanthrene on 1.0-mg. doses (Y strain) by mice of a highly susceptible strain (C_3H), does not alter the susceptibilities of the animals to formation of tumors with the hydrocarbon. Twelve references. J. A. Kennedy 5

Human serum as a stabilizer of scarlet fever streptococcus toxin diluted for the Dick test. Milton V. Veldee. *U. S. Pub. Health Repts.* **54**, 2131–7 (1939). The presence of 1 500 human serum, when added to the 10% phosphate buffer in normal saline commonly used in the country for the prepn. of the Dick toxin, effectively protects the skin-reacting factor against deterioration for an interval of time considerably over the present allowable dating period, within a temp. of 5–37°, and a pH level of 6.6–7.4. There is no evidence that the presence of so small a quantity of human serum significantly influences the resulting skin reaction in the human or the rabbit. J. A. Kennedy 6

Polarographic cancer diagnosis. Ernst Waldschmidt-Leitz and Karl Mayer. *Z. physiol. Chem.* **261**, 1–19 (1939).—Tabulated clinical data on cancer diagnosis by means of the polarograph on serum after a variety of treatments leads to the following method as most specific. The serum (0.5 cc.) is dild. with 1 cc. of H_2O, kept at 100° for 10 min., deproteinized by addn. of 1.5 cc. of 25% sulfosalicylic acid, filtered through hardened paper and 0.5 cc. of the filtrate mixed with 5 cc. of a soln. contg. 0.02675 g. $Co(NH_3)_6Cl_3$, 10 cc. of *N* NH_4Cl and 20 cc. of *N* NH_3 per 100 cc. The increase of the polarographic wave above normal is the diagnostic sign. Fevers are often accompanied by false positives. M. Levy 7 8

Chemistry of tumors. II. Isolation of glutamic acid from tumor proteins. Fritz Kögl, Hanni Erxleben and A. M. Akkerman. *Z. physiol. Chem.* **261**, 141–53 (1939); cf. *C. A.* **33**, 5060[6].—Racemic glutamic acid-HCl is twice as sol. as is *l*-glutamic acid-HCl. A ternary diagram of the system *d*-glutamic acid, *l*-glutamic acid and 20% HCl at 0° shows that no racemate exists. The failure of Chibnall (*C. A.* **33**, 7376[2]) to confirm the authors' previous work is due to the high losses on recrystn. of glutamic acid-HCl and to the preliminary isolation as the Ca salt from 90% alc. *dl*-Ca glutamate is at least 10 times as sol. as Ca-*l*-glutamate. Artificial mixt. of *l*- and *dl*-glutamic acid subjected to Chibnall's procedure result in pure *l*-glutamic acid. Calf embryos yield *l*-glutamic acid by Kögl's method and on adding *dl*-glutamic acid and applying Chibnall's method only *l*-glutamic acid was isolated. Kögl's method gave 59% of the added *d*-component. The exact process used by Kögl is described as follows. The aq. residue of the hydrolyzate after butanol and propanol extn. is concd. to 1 ml. per g. original protein, satd. with HCl at 0° and set aside for some days, sometimes after seeding with *l*-glutamic acid and with *dl*-glutamic acid. The ppt. after 3–4 days is filtered and washed on sintered glass filters with HCl satd. H_2O at 0°. The filtrate is brought to $^2/_3$ of the original vol. *in vacuo* and again satd. with HCl at 0° and set aside. After crystn. and filtration, a third crop may sometimes be obtained. The raw crystals are united, dried *in vacuo* over MeOH and recrystd. from 20% HCl, sometimes using C to remove color. Recrystn. losses should not exceed 10%. Partially racemized glutamic acid prepns. from tumors were treated with yeast and pure *d*-glutamic acid was isolated. The same was done by mech. sepn. of large crystals obtained by seeding supersatd. solns. of the racemic mixt. **III. Stereo chemistry of myoma and other tumors.** Fritz Kögl and Hanni Erxleben. *Ibid.* 154–71.—The amino acids isolated from 2 uterus myomas were racemized in part. One gave no glutamic acid, in the other the *l*-glutamic acid was found. From 4 to 10% racemization of leucine, hydroxyglutamic acid and hydroxyproline was found. An osteosarcoma gave amino acids with the following amts. of the *d*- form: arginine 3.8, glutamic acid 39, leucine 4.5, lysine 4.8, hydroxyproline 5.4 and valine 3.3%. Similar results are reported for a rabbit myoxoma (Sanarelli virus), a secondary carcinoma of the spleen and a carcinoma of the lung. The relation of extent of racemization and malignancy is not confirmed. There is probably a relationship between kind of tumor and racemization. Milton Levy 9

Biologic test for hyperpituitarism by determination of the dilatation of the melanophores produced in the hypophysectomized frog. G. Jeannenev, L. Servantie, G. Hirtz and J. Bentejac. *Bull. acad. méd.* **121**, 762–8 (1939).—The test of Collin and Drouet (cf. *C. A.* **29**, 4448[9]) is modified in that the urine sample is injected into the hypophysectomized frog and the effect on the melanophores is measured after 1 hr. The test is rendered quant. by comparison with a standard of pituitary powder. Only frogs are used which give a min. reaction with $^1/_{50}$ to $^1/_{100}$ of an international unit. A. E. Mayer

Blood glutathione in pulmonary tuberculosis. Oscar P. Aguilar and Ignacio J. del Villar. *Semana méd.* (Buenos Aires) **1939**, **II**, 1018–27.—The blood glutathione is increased in 80% of cases of pulmonary tuberculosis with a tendency of reversal of the ratio oxidized:reduced glutathione. High values are found especially in grave cases, in patients with artificial pneumothorax and mostly in coincidence with increase of sedimentation of the erythrocytes. A. E. Meyer

Clinical and experimental investigations on creatine metabolism. Erling Wang. *Acta Med. Scand.*, Suppl. **105**, 338 pp. (1939).—A review of the entire subject of creatinuria. The exptl. work was done on urine, blood and muscles both in patients and in animals. On the usual hospital food it was found that the av. daily creatine excretion for men was 18 mg. and for women 48 mg., though the max. amts. were about 4 to 5 times as large. The creatine excretion in thyreotoxicosis was independent of the basal metabolism but seemed to be related to thyroxine itself. During treatment with I_2 the creatinuria decreases about parallel to the general improvement. At the same time the creatinine excretion diminishes somewhat in direct ratio to the severity of thyreotoxicosis and during I_2 treatment it remains unaltered. Creatinuria is frequently assocd. with fevers but does not seem to depend so much upon the severity of the febrile condi-

tion as upon the extent to which the patient is affected. The creatinine elimination in fever is also below normal. So far as pathol. states such as uremia, hypertension, cardiac insufficiency, etc., are concerned, the creatine and creatinine excretion apparently are unaffected, creatinuria being frequently present only when patients are in a bad general condition. Phlebitis profonda is assocd. with extensive creatinuria, which increases and decreases parallel to the clinical symptoms. The creatinine elimination in these cases is again low. In poliomyelitis creatinuria is present which is proportional to the extent and severity of the disease. During improvement of patients the creatinuria recedes practically in a parallel manner. Here the creatinuria is believed to serve as a measure of the severity of the disease. Generally, in the early stages of the disease, the creatinine excretion decreases. In patients with fractures or with sciatica, but not with arthritis assocd. with muscle atrophy, there is an increased elimination of creatine but the excretion of creatinine is not affected in any significant way. In cases of creatinuria there is generally an elevation of the serum creatine content. Expts. on rabbits show that in exptl. thyrotoxicosis produced by thyroxine injections the creatine content of muscles, and especially the phosphocreatine, is much lowered. Intravenous injection of creatine does not alter the creatine and phosphocreatine content of their muscles, and when this is injected in combination with thyroxine the effect is no different than in rabbits treated with thyroxine alone. Thyroidectomized rabbits manifest a somewhat higher muscle creatine and phosphocreatine content than control animals. It is, therefore, concluded that creatinuria is due to loss of creatine from the muscles. Creatinuria is an entirely unspecific condition but is of clinical importance as an index of the condition of the muscles affected in various diseases. S. Morgulis

Transient calcinosis, accompanying ulcerative colitis. Håkon Rasmussen. *Acta Med. Scand.* **101**, 491–5 (1939).—A case of colitis is described with multiple subcutaneous calcinosis which disappeared with the cure of the ulcerative colitis condition. The relation of this to the excretion of Ca and P is discussed. S. Morgulis

Transplantation of the hypophysis in a diabetes insipidus patient. Eskil Kylin. *Acta Med. Scand.* **101**, 566–7(1939).—A hypophysis transplantation by K.'s method was made into a young man suffering from diabetes insipidus. On the day after the operation the diuresis decreased from about 5 l. per day to a vol. less than a l. and the sp. gr. increased from 1.00 to 1.020. The improvement was found to persist about 2 months later when the article was published. S. Morgulis

Sucrosuria. A rare metabolic error. A. W. Elmer, M. Kasowska and L. Ptaszek. *Acta Med. Scand.* **101**, 596–608(1939).—Sucrosuria may be regarded a rare metabolic freak. So far only 5 instances have been described. There are 2 types of this metabolic error: (1) the sucrosuria of exogenous origin, even when very small amts. are ingested, which is attributed to the probable loss of the sucrose enzyme in the alimentary tract, the absorbed sucrose being eliminated in the urine unchanged; (2) an endogenous sucrosuria, entirely independent of any sucrose intake, which is perhaps assocd. with an alteration in pancreatic or hepatic function. S. Morgulis

Etiology of gallstones. A critical survey of the literature and a study of the applicability of the various theories in two hundred and thirty-nine operative cases. E. Franklin Carter, Carl H. Greene, J. Russell Twiss and Richard Hotz. *Arch. Surg.* **39**, 691–710(1939).—The compn. of hepatic bile or of bile obtained by duodenal drainage is not related to changes in the chem. compn. of the blood, nor is the cholesterol content of the bile related to that of the blood. 84 references. John T. Myers

Some problems concerning the pathogenesis of allergic eczemas elucidated by experiments on sensitization with dinitrochlorobenzene. H. Haxthausen. *Acta Dermato-Venereol.* 20, 257–72(1939).—The skin of normal persons was sensitized to dinitrochlorobenzene (I) by painting an area of the epigastrium with a 30% soln. Intensive ultraviolet light irradiation did not prevent the sensitization when this area was painted the next day. Moderate freezing with CO_2 snow immediately after the painting to 8 days later prevented desensitization in 80% of the cases. The expts. indicated that the epidermal cells play a decisive role in sensitization, probably by producing an antibody when they are exposed to I, and that this antibody possesses a highly developed specificity. Maurice M. Rath

The Lange test. I. The influence of particle size and hydrogen-ion concentration of gold sols upon Lange test readings on paretic spinal fluids. P. K. Glasoe and C. H. Sorum. *J. Lab. Clin. Med.* **25**, 1–7(1939).—The sensitivity of the test for paresis increases with an increase in the particle size of the Au sol. and decreases with an increase in pH. Large particles are less stable, sizes above 40 mμ give sols that are too murky to be suitable. The results indicate that the optimum combination is a sol of small particle size with a relatively low pH (about 6). Howard W. Robinson

Is there a platelet-reducing substance in the spleen of thrombocytopenic purpura? Ralph H. Major and C. J. Weber. *J. Lab. Clin. Med.* **25**, 10–13(1939).—Intravenous injections of the exts. of the spleens from 2 patients into rabbits failed to confirm the findings of Troland and Lee (*C. A.* **32**, 3018[1]; *J. Am. Med. Assoc.* **111**, 221 (1938)). Variations in the platelet counts of the rabbits were no greater than what might occur during the injection of a variety of materials. Howard W. Robinson

Local allergic changes in rabbit sarcoma tissue Nitizen Inand Gentetu Ryo. *J. Chosen Med. Assoc.* **29**, 1645–56(English abstr. 107–8)(1939).—A morphological study, showing that injections of horse serum before and after inoculation of rabbits with sarcoma emulsion produce inflammatory processes of sarcoma tissues which are caused by the anaphylactic toxin, resulting in a partial disappearance of tumor cells, and proliferation of connective tissue. S. Tashiro

Anemia, and deterioration of ferrous sulfate and ascorbic acid solutions. H. W. Tomski and L. J. Waller. *Pharm. J.* **142**, 239–41(1939).—Biochem. methods, hematological tests, gastric analysis and urine tests (ascorbic acid (*A*) excretion) are important in the modern study of anemia, which is discussed. The stability of *A* in aq. solns. of various concns. was detd; stability of excreted *A* in normal urine was attained in 2–4 hrs. after a loss of, resp., 6.7 and 15.4% (cf. *C. A.* **32**, 5042[1]). The therapeutic value of Fe^{++} vs. Fe^{+++} prepns. in anemia is reviewed (cf. *C. A.* **26**, 4880, 5664). Addn. of *d*-glucose to $FeSO_4$ soln. tends to stabilize it. A "stable" $FeCl_2$ prepn. (Brit. Pharm. Addendum, 1936) developed fungus growth within a week. With a similar mixt. of 2.5% $FeSO_4$, 0.2% citric acid and 2% dil. H_2SO_4, no such growth will form. A flavored mixt. based on this compn., and including *d*-glucose, kept for 6 months. S. W.

Blood clearance of free chloral in normal and liver-damaged dogs. B. Mukerji and R. Ghose. *Nature* **144**, 636(1939); cf. *C. A.* **33**, 7335[6].—In recently induced and chronic liver damage, a significant increase in free chloral concn. occurs in the blood within an hr. after the oral administration of chloral hydrate to dogs. Blood clearance of free chloral may, therefore, be used as a test for detoxicating efficiency of the liver. E. D. Walter

Inhibition of transplantable mouse tumor growth by tissue extracts and their protein fractions. D. A. MacFadyen, Ernest Sturm and James B. Murphy. *J. Exptl. Med.* **70**, 475–83(1939).—Mammary tissue of pregnant rabbits contains an agent which inhibits the growth of Bashford adenocarcinoma 63 in mice but this material is without effect on the Crocker sarcoma 180. Of the tissues so far studied the mammary gland of rabbits yielded the most active product. The factor is found, with diminished activity, only in the protein fraction obtained from the aq. ext. by full satn. with $(NH_4)_2SO_4$. C. J. West

Production and preservation of specific antiserums for blood-group factors A, B, M and N. Wm. C. Boyd. *J. Immunol.* **37**, 65–75(1939).—Methods are given for

the production of the specific antiserums. For the preservation and identification of the serums 1% solns. of neutral acriflavine (0.015 cc. to 1.0 cc. serum) or brilliant green (0.02 cc. to 1.0 cc. serum) were used. In several instances such serums have been preserved in usable condition for more than 5 years. Charles A. Zittle

A note on the calculation of antibody-antigen ratio. Alfred E. How. *J. Immunol.* **37**, 77–83(1939).—A theoretical calcn. of the antibody-antigen ratio involving the mol. wt. of the antigen and antibody is given which furnishes a simpler equation than previously obtained (Boyd and Hooker, *C. A.* **28**, 3788[8]). There is included a correction factor obtained from the comparison of actual systems of spheres with these theoretical calcns. Charles A. Zittle

The specific protein in rabbit antipneumococcal serum and its relation to the increase of serum protein during immunization. M. Bjørneboe. *J. Immunol.* **37**, 201–6(1939).—The specific protein and total protein content of rabbit antipneumococcal serums were detd. For the specific protein the method of Heidelberger and Kabat (*C. A.* **29**, 1127[6]) for agglutinin N was used. The nonprotein N, detd. after pptn. of the protein with 5% trichloroacetic acid (2 cc. serum + 5 cc. 5% acid), of normal serums and immune serums was very nearly the same (mean 0.30 and 0.27 mg. per cc., resp.) indicating the increase in total N during immunization and the increase in protein N are identical. Fifty-six serums of different types were analyzed for total N (10.3–13.5 mg. per cc.) and specific N (0.08–3.29 mg. per cc.); a difference in the 2 values of 10.2 ± 0.45 (S. D.) mg. per cc. was found. Analysis of 11 normal serums gave a mean of 10.3 ± 0.73 (S. D.) mg. per cc. The conclusion is drawn that the specific N is equal to the total N of the antiserum in question minus total N of normal sera or that the antibody-protein is identical with the increase in serum protein during immunization. All serums studied were pools from at least 5 rabbits; it is stressed that the above relation is only applicable for such serums. C. A. Zittle

Behavior of acid-treated antipneumococcal rabbit antibodies. A. J. Weil, A. M. Moos and Frances L. Clapp. *J. Immunol.* **37**, 413–24(1939).—Solns. of pneumococcal rabbit antibody of various types (types 1, 2, 3, 5, 7, 8, and 14) were acidified to various pH (4.4 to 2.7) with lactic, hydrochloric or sulfuric acids. The nature of the acid was found to be of no importance. The ppts. obtained were removed and were always found to contain no antibody. The acidified antibody solns. were neutralized, and dialyzed against 0.85% NaCl for 48 hrs. Antibody solns. treated as described showed an increase in the N precipitable by specific polysaccharide (up to 50%), and a shift in the antigen-antibody combining ratio occurred at the same time; the ratio of mouse-protective value/N specifically pptd. was lowered. The complement-fixing quality was impaired or lost when this last ratio was lowered. Loss of complement-fixing quality was also observed with antibody refined by partial peptic digestion; these serums also had low mouse-protective values. The properties of causing capsular swelling and of eliciting passive anaphylactic shock were unimpaired in acid-treated serums. The implications of the observations are discussed. The use of substituted naphthalenesulfonic acids for purification of pneumococcal antibodies is described. Such purified antibody solns. responded similarly to acid treatment. Charles A. Zittle

Serological differences of the group character A in different parts of the human organism. V. Friedenreich, G. Thyssen and G Hartmann. *J. Immunol.* **37**, 435–43 (1939).—Serological tests, with isoagglutinin anti-A and rabbit immune anti-A serums, of human A blood corpuscles and of human A saliva show that the A antigens of these 2 sources are not identical. Aq. exts. of submaxillary glands of group A reacted like the saliva; exts. of other glands, and gastric juice and semen reacted like the corpuscles. The A substance of ox saliva reacted like the A substance of human corpuscles. C. A. Zittle

Role of "auto-antigens" in the pathogenesis of physical allergy. S. Karády. *J. Immunol.* **37**, 457–61(1939).—Expts. are presented which seem to indicate a new mechanism in the production of phys. allergies by which the organisms own protein can be changed by various phys. agents, such as heat and cold, so that it requires antigenic properties and becomes an "auto-antigen." Charles A. Zittle

Studies on meningococcal infection. XI. A quantitative study of the precipitative reaction between type I polysaccharide and antimeningococcal horse serums. Henry W. Scherp. *J. Immunol.* **37**, 469–87(1939).—The immunological properties of a polysaccharide prepd. from type I meningococci (*C. A.* **29**, 5145[1]) and of antimeningococcal horse serums were studied by means of quant. analysis of the precipitative reaction; equations and graphs are given relating the mg. of polysaccharide added and the mg. of antibody-N pptd. The results showed that the polysaccharide was a mixt. of precipitinogens. The data indicated that the polysaccharide contained not only a type-specific component but also a group specific one; that the univalent type I serum which was studied contained only type-specific antibody; and that the multivalent sera which were studied contained more group- than type I-specific antibody. C. A. Z.

H—PHARMACOLOGY

CARL F. SCHMIDT

Effects of continuous intravenous injection of dextrose in increasing amounts on the blood-sugar level, pancreatic islands and liver of guinea pigs. C. Arthur Woerner. *Anat. Record* **75**, 91–105(1939); cf. *C. A.* **32**, 5492[6].—The liver cells were filled with glycogen. The increase in blood-sugar level was very variable. There appeared to be some correlation between terminal blood-sugar level and the condition of the cells in the islands of Langerhans. There was also some correlation between the liver glycogen and fat and the condition of the island cells. Philip D. Adams

Sulfonamide treatment of experimental tuberculosis in guinea pigs. Konrad E. Birkhaug. *Beretninger Chr. Michelsens Inst.* 9, 3(1939).—Expts. on 48 guinea pigs were carried out, the guinea pigs being inoculated subcutaneously with approx. 600 viable bovine tubercle bacilli. Half of these animals received daily intramuscular injections of 0.44 cc., increasing gradually to 2.2 cc. per kg. of the 2.5% soln. of "prontosil sol." (10.9 to 54.4 mg. of the sulfonamide compd. per kg.) during 21 post-inoculation weeks. The development and degree of tuberculin allergy were significantly delayed during the first 4 weeks as a result of the sulfonamide treatment. Thereafter the tuberculin hypersensitiveness remained the same in the treated and untreated animals. The prolonged sulfonamide treatment caused no appreciable change in the leucocyte count nor any eosinophilia. All the numerical data were analyzed statistically. The inhibitory action exerted by the sulfonamide compd. "prontosil sol." on the progress of tuberculous changes is due to a bacteriostatic effect which renders the virulent tubercle bacillus temporarily impotent and thus allows the natural defence mechanism of the body to dispose of the disabled mycobacteria by phagocytosis. The huge dose of "prontosil sol." required to bring about this indirect effect on virulent tubercle bacilli (2.0 to 2.5 cc. per kg. of a 2.5% soln., or 100 to 125 cc. daily in a person weighing 50 kg.) makes it obvious that this form of sulfonamide falls short of the ultimate goal in the chemotherapy of clinical tuberculosis. V. Aschehoug

Sulfanilamide intoxication. Erik Vogt. *Nord. Med.* **4**, 3369–71(1939).—A review of the most important toxic symptoms of sulfanilamide and a report of a case of nonfatal sulfanilamide intoxication. V. Aschehoug

The effect of anterior pituitary on tissue respiration, especially the influence of various pharmaceutical agents on this effect. III. The influence of potassium iodide and diiodotyrosine. M. Aisawa. *Folia Endocrinol. Japon.* **15**, 25–6(1939)(in German); cf. *C. A.* **33**, 8791[6,7].—The O consumption (estd. by the Warburg method) of the liver, spleen, thyroid and kidney of male white rats

weighing about 150 g. was increased after injection of saline ext. of the anterior pituitary for 5 days. This increase was distinctly reduced by the simultaneous injection of KI or, to a smaller extent, by diiodotyrosine. IV. **The influence of insulin and of saline extract of the adrenal cortex.** *Ibid.* 26–7.—The adrenal cortex ext. was prepd. as follows: The adrenal cortex was carefully sepd. from the medulla and ground. Ten times its wt. of physiol. saline was added and the mixt. was allowed to stand, with occasional shaking, for 24 hrs. Any adrenaline present was destroyed by passing O through the ext. for 3 hrs. Male white rats, weighing about 150 g., received daily one injection of 0.2 cc. adrenal cortex ext. per 100 g. body wt. for 10 or 20 days or one injection of 0.005 cc. insulin (0.05 unit) per 100 g. body wt. for 10 days. Beginning on the 6th or 16th day of injection and continuing for 5 days a daily dose of 0.4 cc. saline ext. of the anterior pituitary was also injected into each rat. The increase in O consumption of the liver, spleen, thyroid and kidney observed after simple injection of the anterior pituitary ext. was distinctly lowered by the pretreatment with insulin or with the adrenal cortex ext., the effect of the latter being greater after injection for 20 days than after that for 10. V. **The influence of arsenious acid, sodium fluoride and borax.** *Ibid.* 39–40.—One daily dose of 0.03 mg. arsenious acid, 1.0 mg. NaF or 20 mg. borax, each per 100 g. body wt., was injected subcutaneously into male white rats for 10 days. Beginning on the 6th day of injection and continuing for 5 days a daily dose of 0.4 cc. 5% saline ext. of the anterior pituitary was also injected into each rat. The rest of the exptl. procedure was the same as in the previous papers. The increase in O consumption of the liver, spleen, thyroid and kidney observed after simple injection of the anterior pituitary ext. was lowered by the pretreatment with arsenious acid, NaF or borax. Ruth Berggren

Decurvon, a pectin-insulin, with a prolonged action. B. Brahn and T. Langner. *Nederland. Tijdschr. Geneeskunde* **83, III,** 4621–31(1939).—Protamine insulin or similar insulin prepns. have the disadvantage that the velocity of insulin mobilization varies. The authors prefer a prepn. which contains the insulin uncombined and which is free from protein, hence cannot give rise to allergic reactions such as sometimes occur after injection of protamine. Also the irritating zinc salt is absent. Pectin insulin is more slowly absorbed merely because of the increased viscosity of its soln., as is demonstrated by expts. on rabbits and men. In rabbits the blood-sugar level is reduced by 19% 4 hrs. after injection of 1 unit of pectin-insulin. R. Beutner

Hemostatic drugs as prophylactics in tonsilectomy and adenectomy. L. B. W. Jongkees. *Nederland. Tijdschr. Geneeskunde* **83, III,** 4640–8(1939).—One or two hrs. after ingestion of 3 to 5 g. of $CaCl_2$, as an unsweetened but flavored 10% soln. the clotting time of blood is markedly shortened; it is not necessary to administer $CaCl_2$ for several days. A pectin prepn. was found to be inefficient. The bleeding time is not influenced. R. Beutner

Consequences of narcosis or of asphyxia? Experimental data on the influence of nitrous oxide and of oxygen-lack on the central nervous system. H. R. van der Molen. *Nederland. Tijdschr. Geneeskunde* **83, IV,** 4921–9 (1939).—Inhalation of a N_2O + O_2 mixt. with less than 8% O_2 for several hrs. causes serious degeneration of the ganglion cells of the cerebrum. The same holds for a 100-hr.-narcosis with a mixt. contg. 20% O_2. R. Beutner

Lead-bismuth and bismuth lines in Indonesians and their histochemical identification. H. B. G. Broijer, G. O. E. Lignac and W. L. C. Veer. *Nederland. Tijdschr. Geneeskunde* **83, IV,** 5041–8(1939).—The lead line proved to contain lead and bismuth. By well-known chem. methods and by the reaction of Feigl lead and bismuth lines in the tissues can be differentiated. R. Beutner

Encephalopathy produced by manganese. Fr. Grewel and E. Sassen. *Nederland. Tijdschr. Geneeskunde* **83, IV,** 5464–71(1939).—Mn poisoning leads to simultaneous cerebral and liver disturbances. R. Beutner

Cardiometric study of the influence on cardiac contraction of the inhalation of carbon dioxide and of oxygen. Influence of oxygen therapy in the myocardiac intoxication from chloroform. L. Dautrebande and R. Charlier. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9,** 214–19(1939).—Tracheal inhalation of moderate doses of CO_2 or O_2 by the anesthetized dog causes a considerable increase in the frequency and amplitude of cardiac contractions; large doses of CO_2 cause a progressive decrease. O_2 inhalation decreases somewhat the toxic effect of $CHCl_3$ on the myocardium. E. Curzon

Early reaction of the hepatic parenchyma after inhalation of carbon tetrachloride. S. Zylberszac. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9,** 240–1(1939). E. Curzon

Effect of phenylisopropylamine (benzedrine) on the metabolism of the nonanesthetized dog. A. L. Delaunois and R. Marri. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9,** 242–3(1939).—Five fasting dogs were intramuscularly injected with 0.5–1.0 mg. benzedrine per kg. Ten min. after injection both O_2 consumption and CO_2 output had increased markedly and R. Q. had fallen an av. of 0.042. In about 45 min. the values were back to normal. E. Curzon

The physiological response to isopropyl ether and to a mixture of isopropyl ether and gasoline. W. Machle, E. W. Scott and Joseph Treon. *J. Ind. Hyg. Toxicol.* **21,** 72–96(1939).—Ingestion of 7–9 cc. of isopropyl ether per kg. body weight (rabbits) produces death. A concn. of 6.0% by vol. in air is rapidly fatal to monkeys, rabbits and guinea pigs; 3.0% produces incomplete anesthesia; 1% mild intoxication. Gasoline-isopropyl ether blends produced less intense but not significantly different effects. A. L. Elder

Toxic effects upon rabbits of pentachlorophenol and sodium pentachlorophenate. Robt. A. Kehoe, Wm. Deichmann-Gruebler and Karl V. Kitzmiller. *J. Ind. Hyg. Toxicol.* **21,** 160–72(1939).—Rabbits absorb lethal amts. of these through the skin. 0.22 mg. per kg. of body weight taken internally is fatal. Workmen handling lumber treated with pentachlorophenol should wear suitable protective clothing. A. L. Elder

The toxicology of some glycols and derivatives. E. P. Laug, H. O. Calvery, H. J. Morris and G. Woodward. *J. Ind. Hyg. Toxicol.* **21,** 173–201(1939).—The order of increasing toxicity is propylene glycol, diethylene glycol, ethylene glycol, diethylene glycol monoethyl ether, dioxan and ethylene glycol monoethyl ether. Studies were made on rats, mice and guinea pigs. Propylene glycol may be converted into a normal body constituent Bibliography. A. L. Elder

Fixation of toxic substances in the endocrine glands. René Fabre. *Bull. soc. chim. biol.* **21,** 959–64; *Bull. acad. méd.* **121,** 544–59(1939).—In dogs anesthetized with $CHCl_3$ the amts. of $CHCl_3$ fixed per g. of fresh tissue decreased in the order, adrenal cortex, adrenal medulla, thyroid, blood, pancreas and testicles. In an 18-kg. dog given 1 g. barbital daily for 10 days the amts. found in the tissues were, thyroid 11.2, adrenals 9.7, liver 8.5, brain 5.8, pancreas 4.8, blood 4.4 and testicles 2.4 mg. % of barbital. In dogs with chronic dichromate poisoning the Cr contents of the tissues were, hypophysis 2.5, liver 2, adrenals 0.4, thyroid 0.15 and testicles 0.072 mg. %. In rabbits ingesting NaF over long periods the values were, hypophysis 82.3, adrenals 1.56, liver 0.52, blood 0.95 and testicles 0.33 mg. % F. L. E. Gilson

Influence of absorption of glucose on the free sugars and glycogen of the liver. F. Rathery and P. M. de Traverse. *Bull. soc. chim. biol.* **21,** 978–1020(1939).—After ingestion or injection of glucose the liver glycogen of normal dogs often decreased while the free glucose increased. Changes in the muscle glycogen were also irregular. In phlorizinized dogs the slow intravenous injection of glucose lowered liver glycogen without affecting the free sugar level, while in depancreatized dogs the same treatment sometimes

increased liver glycogen and the free glucose of the liver tissue. L. E. Gilson

Influence of temperature on the contraction of guinea-pig intestine provoked by histamine. Rudolf Zadina. *Compt. rend. soc. biol.* **132**, 28–31(1939).—The contraction produced by 0.5 γ histamine per 100 cc. (in Locke soln.) is greater in amplitude at 31–32° than at lower or higher temps. Throughout the temp. range 21–38° the duration of the contraction decreases with increase in temp. according to a logarithmic curve. **Influence of the condition of the isolated intestine on contractions provoked by histamine.** *Ibid.* 31–2.—The most sensitive prepn. is the intestine from a young (200–250 g.) guinea pig which has fasted 5–6 hrs. Longer fasting decreases sensitivity. L. E. Gilson

Influence of sodium evipan narcosis on urinary secretion in the dog. Maurice Plumier. *Compt. rend. soc. biol.* **132**, 34–6(1939).—Urine vol. and the concn. of Cl and phosphate decrease to less than 1/8 the normal; urea concn. increases or does not change. L. E. Gilson

Transient experimental changes in the refractive power of the media of the eye. Roger Weekers. *Compt. rend. soc. biol.* **132**, 39–41(1939).—Feeding galactose to rats causes polydypsia, polyuria and an increase in the dioptric power of the eye which approaches myopia. The cryst. lens is especially affected. The symptoms disappear when the galactose is discontinued, except that prolonged treatment produces cataract. L. E. Gilson

Fate of indole in the dog. G. Barac. *Compt. rend. soc. biol.* **132**, 41–3(1939).—Intravenously injected indole is converted to indoxyl in the liver. L. E. Gilson

The pharmacological action of deuterium oxide. VIII. Action on the central nervous system. Julian B. Herrmann. *J. Pharmacol.* **67**, 265–75(1939); cf. *C. A.* **33**, 3884⁴.—Application of D_2O to the cerebral cortex produces a marked state of catalepsy in cats and monkeys. Injected D_2O disappears from the cerebrospinal fluid within 30 min. Encephalographic detns. parallel the objective findings of cerebral depression. Application of D_2O to the spinal centers of cats and frogs has no apparent effect on nerve impulse transmission. Application of D_2O to nerve or muscle of nerve-muscle has no obvious effect on nerve impulse transmission or muscle contraction. L. E. Gilson

The depressant action of picrotoxin and metrazole. James M. Dille and Lloyd W. Hazleton. *J. Pharmacol.* **67**, 276–89(1939).—Picrotoxin and metrazole may, in addn. to their stimulant action, produce depression in rats and rabbits. This depression is manifest in rabbits by loss of placement reactions which indicates that cortical function is impaired. It appears with doses of picrotoxin which approach but do not reach convulsive levels. With convulsive doses the depression appears before the convulsive attack and lasts for a considerable time afterward and is apparently independent of the convulsions. The depressive action of metrazole is less marked. L. E. Gilson

Blood concentration in morphine addicts. Edwin G. Williams. *J. Pharmacol.* **67**, 290–8(1939).—In man morphine addiction is assocd. with blood hydration. L. E. Gilson

Effect of liver damage on the blood level and action of paraldehyde. Harry Levine, A. J. Gilbert and M. Bodansky. *J. Pharmacol.* **67**, 299–306(1939).—The hypnotic effects and the blood paraldehyde curve obtained with a given dose of paraldehyde are definitely prolonged in dogs with liver damage produced by 90-min. deep $CHCl_3$ anesthesia 2 days previously. Similar blood levels of paraldehyde produced the same degree of narcosis in normal dogs and dogs with liver damage. L. E. Gilson

Protective effect of sulfapyridine, sodium sulfapyridine, and sulfanilamide in pneumococcus infection types I, II and III. G. W. Raiziss, M. Severac, J. C. Moetsch and L. W. Clemence. *Proc. Soc. Exptl. Biol. Med.* **42**, 12–17 (1939).—The compds. delayed but did not prevent death in infected mice. Sulfanilamide was the least effective. L. E. Gilson

Effect of carbon tetrachloride on the serum amylase of dogs. J. O. Hanson. *Proc. Soc. Exptl. Biol. Med.* **42**, 21–2(1939).—The normal values for serum amylase in dogs are much higher than those for human serum. Each dog has its own level of normal variation. Repeated doses of 2–10 cc. CCl_4, given orally every 2–3 days, caused a 50–70% decrease in serum amylase, with recovery of the normal level a week after treatment was discontinued. The CCl_4 did not affect blood-sugar levels. L. E. Gilson

Recovery of carbon monoxide-poisoned rats after x-ray treatment. John A. Cameron. *Proc. Soc. Exptl. Biol. Med.* **42**, 29–30(1939).—Immediate exposure to x-rays for 5–10 min. seemed to hasten the recovery of CO-poisoned rats in some cases. L. E. Gilson

Carotid body reflexes in the dog. C. F. Schmidt, J. H. Comroe, Jr., and R. D. Dripps, Jr. *Proc. Soc. Exptl. Biol. Med.* **42**, 31–2(1939).—Previous conclusions (cf. *C. A.* **32**, 1778⁵) are modified. Carotid chemoreceptors of vagotomized dogs anesthetized with morphine and chloralose are sometimes continuously active. L. E. Gilson

Heparin and plasma albumin in relation to thromboplastic action of trypsin, cephalin and brain extracts. John H. Ferguson. *Proc. Soc. Exptl. Biol. Med.* **42**, 33–7(1939); cf. *C. A.* **33**, 6993⁶, 8226⁸, 8258¹. Sufficient heparin can greatly delay plasma coagulation even under conditions most favorable for the action of trypsin, namely, abundance of cephalin and Ca. Clotting eventually occurs in all cases. Thrombin formed in the presence of heparin is fully potent. Fresh tissue exts. have a much greater thromboplastic potency than can be accounted for on the basis of their phospholipide content. Plasma albumin acts synergistically with heparin in delaying clotting. L. E. Gilson

Sugar tolerance of alcoholic patients. Karl M. Bowman, Joseph Wortis, Leo L. Orenstein and Walter Goldfarb. *Proc. Soc. Exptl. Biol. Med.* **42**, 37–40(1939); cf. *C. A.* **33**, 7385³. On admission there was a marked decrease in the sugar tolerance of a group of 18 alc. patients, probably because of undernutrition. After one week in the hospital on a normal diet the sugar tolerance was improved. L. E. Gilson

Effect of sulfanilamide and sulfapyridine on experimental infections with Listerella and Erysipelothrix in mice. J. R. Porter and Wm. M. Hale. *Proc. Soc. Exptl. Biol. Med.* **42**, 47–50(1939).—Either compd. saved about 80% of the mice infected with *Listerella monocytogenes* but neither had any protective action whatever in mice infected with *Erysipelothrix*. L. E. Gilson

Administration of heparin by mouth. Albert Fischer and Tage Astrup. *Proc. Soc. Exptl. Biol. Med.* **42**, 81–2(1939); cf. *C. A.* **33**, 6272³.—In mice heparin is not absorbed from the alimentary tract but is excreted unchanged in the feces in the course of about 2 days. L. E. Gilson

Gynecomastia associated with cirrhosis of the liver. Hugh A. Edmondson, Samuel J. Glass and Sydney N. Soll. *Proc. Soc. Exptl. Biol. Med.* **42**, 97–9(1939).—In several chronic alcoholics atropic cirrhosis of the liver was accompanied by ascites, testicular atrophy, gynecomastia and abnormally high urinary estrogen and androgen contents. It is suggested that the gynecomastia is the result of the liver becoming unable to inactivate sex hormones. L. E. Gilson

Calcium creosotate. V. Nature of phenols eliminated in urine. Edwin J. Fellows. *Proc. Soc. Exptl. Biol. Med.* **42**, 103–7(1939).—Large single doses or repeated therapeutic doses of Ca creosotate produced bacteriostatic urine in rabbits or in normal human subjects. Rabbits excreted practically all of the creosote in conjugated form. No conclusive evidence of removal of methoxy groups was found. Cf *C. A.* **31**, 6339¹. L. E. Gilson

Quantitative comparison of responses of isolated and of intact intestine to seven sympathomimetic amines. K. W. Aumann and W. B. Youmans. *Proc. Soc. Exptl. Biol. Med.* **42**, 111–12(1939); cf. *C. A.* **33**, 5517⁶.—On

dog and rabbit intestines the inhibiting actions of *l*-adrenaline, *dl*-arterenol and cobefrine were of about the same order of potency. The potency of *l*-neosynephrine, epinine and kephrine was 0.1–0.01 that of adrenaline, and the potency of *dl*-synephrine about 0.001 that of adrenaline. L. E. Gilson

Effect of cobalt on erythropoiesis in anemic rabbits. Wm. Kleinberg, Albert S. Gordon and Harry A. Charipper. *Proc. Soc. Exptl. Biol. Med.* 42, 119–20(1939).— Co salts injected into animals subjected to repeated bleedings or treated with C_6H_6 promote a rapid recovery from the anemia by stimulating the formation of erythrogenic precursors in the bone marrow. L. E. Gilson

Antihormone effects in pancreatic diabetes. F. C. Dohan and F. D. W. Lukens. *Proc. Soc. Exptl. Biol. Med.* 42, 167–71(1939).—Two completely depancreatized dogs injected with anterior pituitary ext. for 30 or more days showed, after cessation of injections, a much less severe diabetes during fasting than before the injections. Two other depancreatized dogs given intraperitoneal injections of serum from a dog treated over 9 months with anterior pituitary ext. showed a marked decrease in glucosuria, thus demonstrating the passive transfer of a principle antagonistic to the diabetogenic hormone of the anterior pituitary. Some expts. with cats are also reported. L. E. Gilson

Relation of concentrations of free to conjugated sulfapyridine in the blood of patients. Armine T. Wilson, Delores Kaely and Glenn E. Cullen. *Proc. Soc. Exptl. Biol. Med.* 42, 187–9(1939).—Patients show wide variation in blood content of free and total sulfapyridine when receiving standard dosage by wt. but the conjugated drug in most cases is present in about 2–3 mg. per 100 cc. blood. In a very few cases a high total level was accompanied by a high level of conjugated drug. L. E. Gilson

Action of apomorphine hydrochloride on the intact intestine in unanesthetized dogs. Chas. M. Gruber, Victor G. Haury and Miles E. Drake. *Proc. Soc. Exptl. Biol. Med.* 42, 193–7(1939).—When injected intravenously apomorphine may either increase or decrease the general tonus of the intact intestine. Large individual variations are found. L. E. Gilson

Central nervous system stimulant effects of *d*-amphetamine sulfate. Myron Prinzmetal and Gordon A. Alles. *Proc. Soc. Exptl. Biol. Med.* 42, 206–7(1939).—*d*-Amphetamine (*d*-benzedrine) is 2–4 times as active a stimulant as *l*-amphetamine and 1.5–2.0 times as active as *dl*-amphetamine (benzedrine). L. E. Gilson

Mechanism of estrogen effect on nasal mucosa in atrophic rhinitis; successful treatment with prostigmine. Samuel Soskin and L. B. Bernheimer. *Proc. Soc. Exptl. Biol. Med.* 42, 223–4(1939).—Preliminary note. L. E. Gilson

Nature of the pilomotor response to acetylcholine. Julius M. Coon and Stephen Rothman. *Proc. Soc. Exptl. Biol. Med.* 42, 229–31(1939).— In cats and man the local pilomotor or goose-flesh action after intradermal injection of acetylcholine is due to a nicotine-like action. Acetylcholine, nicotine and other drugs possessing nicotine-like action exert this influence through an axon reflex the receptor end of which has several properties characteristic of autonomic ganglia and the effector end of which is evidently adrenergic. **Nature of a sweat response to drugs with a nicotine-like action.** *Ibid.* 231–3.—Localized sweat secretion is provoked by intradermal injection of drugs with a nicotine-like action. It is accomplished through a peripheral axon reflex mechanism which is easily differentiated experimentally from the direct muscarinic action of acetylcholine on the sweat glands. L. E. Gilson

Comparison of different types of central stimulation from analeptics. J. W. Schulte, M. L. Tainter and J. M. Dille. *Proc. Soc. Exptl. Biol. Med.* 42, 242–8(1939).— The effects of metrazole, picrotoxin, coramine, caffeine and cocaine in rats are compared. L. E. Gilson

Colloidal sulfur to modify extirpation diabetes. Harry Greengard and Garr J. Burt. *Proc. Soc. Exptl. Biol. Med.* 42, 253–4(1939).—The administration (by stomach tube) of colloidal S in daily doses of 250–500 mg. had no effect on the diabetic state of the depancreatized dog. L. E. Gilson

Distribution and excretion of sulfapyridine in the guinea pig. Konrad E. Birkhaug. *Proc. Soc. Exptl. Biol. Med.* 42, 270–5(1939).—Orally administered sulfapyridine is almost completely absorbed from the guinea-pig stomach in 4 hrs. Very little passes into the intestine. The drug is distributed to every liquid, tissue and organ in the body, mostly in the free form. Graphs are presented showing the rise and fall in concn. in various fluids and tissues. About 70% of the ingested drug is excreted in the urine in 36 hrs. and resorption from the mucosa of the larger gut may account for the discharge of the rest of the feces. L. E. Gilson

Effect of cooling on the mechanism of insulin action. David B. Tyler. *Proc. Soc. Exptl. Biol. Med.* 42, 278–80(1939).—Insulin hypoglucemia is prolonged by cooling the animal. The survival period of rabbits receiving lethal doses of insulin was prolonged by cooling to body temps. of 25–30°. The cooling decreases metabolic activity. L. E. Gilson

Effect of spinal anesthesia on intestinal activity. C. L. Burstein. *Proc. Soc. Exptl. Biol. Med.* 42, 291–3(1939). —Procaine spinal anesthesia increases the amplitude of the intestinal contractions in the normal, unmedicated dog. L. E. Gilson

Sulfanilamide and sulfapyridine in treatment of experimental B. Friedländer (Klebsiella pneumoniae) infections of mice. John A. Kolmer and Anna M. Rule. *Proc. Soc. Exptl. Biol. Med.* 42, 305–7(1939).—The protective action of sulfanilamide was very slight. Sulfapyridine was somewhat more effective and saved about 25% of the infected mice. **Sulfanilamide and sulfapyridine in treatment of experimental Escherichia coli infections in mice.** *Ibid.* 307–9.—The protective action of either drug was almost negligible with the particular strain of *Es. coli* used. L. E. Gilson

Electrocardiographic changes in ethylene glycol poisoning. O. Leonard Huddleston. *Proc. Soc. Exptl. Biol Med.* 42, 312–15(1939).—Electrocardiograms of poisoned adult dogs and pups are shown. L. E. Gilson

Effects of morphine sulfate on hypothalamus of the cat. Jules H. Masserman. *Proc. Soc. Exptl Biol. Med.* 42, 315–17(1939).—Morphine caused little or no change in the sensitivity of the hypothalamus to elec. stimulation. L. E. Gilson

Effect of sulfanilamide on the isolated frog heart. W. L. Mendenhall and K. E. Shreeve. *Proc. Soc. Exptl. Biol. Med.* 42, 317–18(1939).—Dil. solns. produce a stimulation followed by depression. L. E. Gilson

Reduction in experimental rat caries by fluorine. Harold C. Hodge and Sidney B. Finn. *Proc. Soc. Exptl. Biol. Med.* 42, 318–20(1939).—Young rats fed a 30% casein diet contg. as little F as possible developed numerous carious teeth. Litter mates on the same diet but given 3 mg. F (as KF) daily developed few or no bad teeth. L. E. Gilson

Sulfapyridine potentiation of narcotic and toxic effects of papaverine in rats and rabbits. Susi Glaubach. *Proc. Soc. Exptl. Biol. Med.* 42, 325–7(1939).—Sulfapyridine potentiates the action of papaverine-HCl and often causes a therapeutic dose to produce death. L. E. Gilson

Decreased tolerance of mice to intraperitoneal glucose injections in certain neurotropic virus infections. Anson Hoyt, Margaret Holden and Ruth A. Rawson. *Proc. Soc. Exptl. Biol. Med.* 42, 332–6(1939).—Mice in the symptomatic stages of neurotropic virus infections (fixed rabies virus, a neurotropic strain of herpes, St. Louis encephalitis and Western equine encephalomyelitis) are much more easily killed by intraperitoneal glucose than normal mice. L. E. Gilson

Pharmacology of the venom of Bothrops jararacussu. Elda Pecciarini. *Boll. soc. ital. biol. sper.* 14, 427–9 (1939).—The venom is a protein with enzyme characteristics. In concns. greater than 1:100,000 it hemolyzes

blood and in concns. greater than 1:8,000,000 it completely coagulates oxalated or citrated blood *in vitro*. It first stimulates and then inhibits potato oxidase and has little effect on alc. fermentation. The M. L. D. for frogs is 0.3–0.5 mg., for rats 3 mg. given subcutaneously and for rabbits 0.80–0.1 mg./kg. given intravenously. Helen Lee Gruehl

Minimal doses of various drugs reacting on isolated frog or toad heart. I. Simon. *Boll. soc. ital. biol. sper.* **14**, 448(1939).—Folinerin (glucoside extd. from *Nerium oleander*) is active in concns. of 1:10 billions and quinine dihydrochloride in concns. of 1:2500 billions. Helen Lee Gruehl

Gastric elimination of sodium chloride and sodium sulfate after intravenous injection of hypertonic solutions of the two salts. I. Simon. *Boll. soc. ital. biol. sper.* **14**, 448–9(1939).—Under such conditions the vol. of urine eliminated exceeded the vol. of injected soln. while the amt. of salts eliminated was less. NaCl increased in the gastric contents, blood and all tissues. H. L. G.

Site of action of ergometrine. I. Antagonism with adrenaline. R. Senti. *Boll. soc. ital. biol. sper.* **14**, 459–61(1939).—In smooth-muscle expts. ergometrine acted differently from adrenaline and ergotamine. The sympathetic nerve endings were therefore excluded as the site of its action. Helen Lee Gruehl

Effect of eserine on the hypoglucemizing power of insulin. Luigi Liaci. *Boll. soc. ital. biol. sper.* **14**, 461–3(1939).—Eserine definitely increased the hypoglucemizing power of insulin. Helen Lee Gruehl

Sulfamine preparations in therapy of diseases of the biliary tract. Luigi Liaci. *Boll. soc. ital. biol. sper.* **14**, 463–4(1939).—*p*-Aminophenylsulfamine and *p*-succinylaminophenylsulfamide, administered orally or parenterally to rabbits, was found in greater concn. in the bile than in the blood. These substances proved efficacious in treating certain biliary diseases. H. L. Gruehl

Utilization of pyruvic acid in heart-lung preparations. P. Fornaroli and V. Capraro. *Boll. soc. ital. biol. sper.* **14**, 472–4(1939).—Pyruvic acid was almost completely utilized within an hr. This diminution was accompanied by a corresponding increase in lactic acid. H. L. G.

Glycogen and cardiac function. Piero Gomarasca. *Boll. soc. ital. biol. sper.* **14**, 476–7(1939).—In mice treated with caffeine the glycogen diminished in inverse ratio to the dose administered. Helen Lee Gruehl

Therapy of acute barbituric intoxication. Lanfranco Zancan. *Boll. soc. ital. biol. sper.* **14**, 490–3(1939).—Favorable antitoxic effects were obtained in rabbits by phleboclysis alone or combined with camphor, coramine, benzedrine or strychnine. The last 3 were the most effective. Helen Lee Gruehl

Pharmacology of the urinary tract. "Leonardo Donatelli. *Boll. soc. ital. biol. sper.* **14**, 498–500(1939).—Expts. on the effect of different concns. of adrenaline, sympathol, ephedrine, suprifen, veritol and benzedrine on rabbit urinary app. showed varying reactions in sphincter and detrusor activity. Helen Lee Gruehl

Chronic fluorine intoxication in domestic animals. A. W. Peirce. *Nutrition Abstracts & Revs.* **9**, 253–61(1939).—A review with 122 references. E. H.

The efficacy of chaulmoogra oil in the treatment of bovine paratuberculosis. Robert Graham, L. E. Boley and Norman D. Levine. *Cornell Vet.* **29**, 352–6(1939).—Results obtained in feeding chaulmoogra oil (8–99 oz. administered at the rate of 1–3 oz. weekly) to 61 cows that reacted positively to the paratuberculosis test indicated that this treatment has no effect on the results of subsequent paratuberculosis tests as compared with a control group. K. D. Jacob

Accidental phosphorus poisoning of a dog. H. D. Pritchett. *Cornell Vet.* **29**, 391–4(1939).—A case report on an animal that completely recovered from the effects of ingestion of approx. 6 grains white P in the form of a rat paste. K. D. Jacob

The origin of acetylcholine contracture. II. Conditions underlying the origin of twitches and contracture upon administration of acetylcholine. S. P. Narikashvili. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 286–8(1939)(in English); cf. *C. A.* **34**, 5283.—Preliminary treatment of muscles with isotonic NaCl soln. increases the effect of acetylcholine (I), nicotine and lactic acid on the muscle, apparently by increasing membrane permeability and allowing rapid penetration of the substances. Isotonic $CaCl_2$ solns. decrease permeability and inhibit the effect of I. S. A. Karjala

The influence of antipyrine on reflex gastric secretion under various modes of application. S. Sh. Sakanyan. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 312–14(1939)(in English).—Antipyrine exerts a sharp local irritating action when administered either *per os*, hypodermally or *per rectum*. Intravenous injection is the most satisfactory method of administration. S. A. Karjala

Changes in the velocity of blood in the lesser circulation and in the temperature of subcutaneous tissues in rabbits after poisoning by inhalation of nitric oxide. A. T. Timofeev. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 308–11(1939)(in German).—The inhalation of NO by rabbits results in dyspnea, with a decrease in the alk. reserve of blood by 12–54% in 3–5 hrs., a 2–6-fold reduction in the complement titer in 24 hrs., a decrease in body temp. of 0.5–3.6°, a decrease in the velocity of blood in the pulmonary circulation and a decrease in the temp. of subcutaneous tissue amounting to 1.3–5.4°. S. A. K.

The role of lung tissue in the destruction of the adrenaline circulating in the blood. G. E. Batrak. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 426–9(1939)(in German).—The injection of adrenaline (I) into the pulmonary artery of the isolated heart-lung system of dogs gives the same rise in blood pressure as injection of I into the left heart chamber, indicating that lung tissue does not destroy I in circulating blood. S. A. Karjala

The significance of the dissimilar sensitivity of acetylcholine and cholinesterase to parabiotic agents. O. V. Seidlits. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 432–5(1939)(in English).—In the presence of a parabiotic agent ($CHCl_3$, cocaine, PhOH or strychnine) no change was observed in the action of acetylcholine (I) in frog blood serum even after 1–1.5 hrs. of exposure. Cholinesterase was inhibited, resulting in a 30–50% decrease in the destruction of I, the resulting accumulation of I then being responsible for the parabiosis of the altered nerve region. NH_3 increases the effect of I. S. A. Karjala

The influence of tetanus toxin on the regulatory function of the hematoencephalic barrier. A. Yakovchuk. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 461–5(1939)(in French).—The subcutaneous injection of 400–1600 M. L. D. of tetanus toxin into dogs results in an immediate slight drop in K in the serum and cerebrospinal fluid, followed by a rise above normal. The Ca decreases on the 2nd–3rd day after injection and then slowly returns to normal. Inorg. P shows a steady increase with the course of the disease. No change was observed in Cl. The K/Ca ratio in the cerebrospinal fluid decreases at the onset, but with progress of the disease it gradually increases. Essentially the same results were obtained after intravenous injection of the toxin. S. A. Karjala

The effect of insulin on gastric secretion. N. G. Lesnoi and S. N. Nikolaichuk. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 483–5(1939)(in English).—The injection of 0.5 I. U. of insulin (I) into gastroesophagotomized dogs when the gastric glands were in a quiescent state induced marked gastric secretion with a high digestive power (Mett) and acidity. Nervous (reflex) stimulation 2 hrs. after the injection of I caused a sharp drop in the amt. of juice, a decrease in free HCl and a slight increase in digestive power. Humoral stimulation by injection of 0.5 mg. of histamine before I injection caused a large increase in juice secreted, with slight increases in acidity and digestive power. S. A. Karjala

Changes in blood complement in rabbits after poisoning by inhalation of nitric oxide. A. T. Timofeev. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 478–82(1939)(in German).—The inhalation of NO by rabbits results in a sharp drop in blood complement, which returns to normal after recovery. S. A. Karjala

The influence on the animal of thyroid metabolites introduced into the cerebral ventricles. I. Their influence on the composition of the blood and cerebrospinal fluid. G. N. Kassil, T. G. Plotitsina and Ch. Volkovis-skaya. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 51–5(1939) (in French).—The injection of thyroid metabolites and thyroxine (I) into the cerebral ventricles of dogs results in a reduction in the K/Ca ratio and a decrease in P in the cerebrospinal fluid and blood. I also lowers the concn. of reducing substances in the fluid and blood serum. The injection of diiodotyrosine (II) causes a lowering in K, Ca, P and K/Ca in the blood and a lowering in K and Ca with an increase in P and a slight increase in K/Ca in the cerebrospinal fluid. The injection of small doses of metabolites, I or II directly into the blood stream results in an increase in reducing substances, P and K/Ca. S. A. Karjala 1

4,5-Dimethylaspirin. Leonhard Birkofer. *Z. physiol. Chem.* **261**, 87–92(1939).—4,5-Dimethylaspirin (I) is less toxic to rabbits and has the same antipyretic and analgesic actions as aspirin. I, m. 122°, was prepd. by acetylation of 4,5-dimethylsalicylic acid (II), Me ester of II m. 33°, phenol ester m. 85°, Me ester of I m. 74 5°. Milton Levy 2

The effect of metrazole by perlingual and enteral administration. H. Kuschel. *Klin. Wochschr.* **18**, 1131 (1939). Metrazole is readily absorbed by the mucosa of the tongue and gastrointestinal tract. The duration of the effect is about 3 times that following intravenous injection. H. L. Mason 3

Sulfanilamides, especially sulfapyridine Eubasinum, in the treatment of epidemic meningitis; their theoretical importance, ability to pass into the cerebrospinal fluid and results of their use. Gerhard Säker. *Klin. Wochschr* **18**, 1141–5(1939).—The successful results of treatment of meningitis with Eubasinum are due to the ease with which this substance passes into the cerebrospinal fluid. Prontosil album and sulfanilamide also possess this property. Uliron, a sol. hexose sulfamide, and the Na salt of Eubasinum penetrate with such difficulty that satisfactory concns. cannot be attained. H. L. Mason 4

Fractionated doses of medicinal substances injected at short intervals in experimental trypanosomiasis. L. Launoy. *Bull. acad. méd.* **121**, 550–6(1939).—Repeated small intravenous doses lead to a tolerance of larger total quantities of the therapeutic agent than when a single dose is given. At a given dose of Sb in mice infected with trypanosomes the survival no. was increased from 32.4 to 84.6%. The substances used were Na orsammine and anthiomaline (Li-Sb-thiomalate). A. E. Meyer 5

The mechanism of chemotherapeutic action of some sulfur-containing aromatic compounds in infections with Friedländer bacilli. C. Levaditi, A. Vaisman and D. Krassnoff. *Bull. acad. méd.* **121**, 730–50(1939). The compds. tested were p-sulfaminophenylazosalicylic acid, 4-nitrodiphenylsulfone - 4′ - azo - 2 - naphthol - 3,6-disulfonate of Na and 4-nitrodiphenylsulfone-4′-azo-7-acetylamino-1-naphthol-3,6-disulfonate of Na. All 3 substances were effective. The primary effect, as tested in mice, was production of involutive changes in the microbes and interference with the formation of capsules and multiplication. The second effect was increased phagocytosis. The capsule is a protective coat which makes the virulent germ resistant to phagocytosis. A. E. Meyer 6

Clinical studies on the mechanism of the action of β-(*p*-hydroxyphenyl)isopropylmethylamine (veritol). Gaspare Pona and Filippo Muratori. *Acta Med. Scand.* **101**, 465–81(1939).—Although the blood-pressure-raising effect of veritol is a complex phenomenon, the direct action on the heart muscle plays a fundamental part. In addn. there is probably a vasoconstrictor effect and mobilization of blood from the depots. S. Morgulis 7

Studies on man of the constipating action of morphine, opium and of an opium preparation of the pantopon type. Nils Alwall. *Acta Med. Scand.* **101**, 419–32(1939).—A no. of healthy, vigorous medical students served as subjects. The drugs were administered in pills before retiring. Blank pills were also used, and subjects had no knowledge of the nature of the pill administered. The doses were as follows: 10 mg. morphine-HCl; 20 mg. "Pantopon," and 1 g. tincture of opium. A constipating effect was found in 20% of the cases after morphine, and in 40% after the other drugs. With a double dose the effect manifested itself in 50%, and 70–75% of the subjects. The constipating effect lasted 1–1½ days. S. Morgulis 8

Treatment of exogenous pellagra with stomach preparations, and considerations on the possible identity of the vitamin B_2 complex with the "cyanide insensitive enzyme complex." Erik Bandier. *Acta Med. Scand.* **101**, 496–510 (1939).—A study was made on a no. of patients (Rumanian peasants) suffering from nutritional pellagra; a combination of stomach prepns. (ventriculin, pylorin or fundin) was used with HCl. The results, manifested by a prompt beneficial effect on the gastro-intestinal symptoms, mucous membranes, appetite and general condition, were as remarkable as in endogenous pellagra. It is pointed out that exptl. studies have revealed that, besides nicotinic acid and riboflavin, certain amino acids are also essential to obtain therapeutic results in pellagra. The idea is developed that the vitamin B_2 complex may be identical with the so-called "cyanide insensitive system" of enzymes which comprises the yellow respiration enzyme (a protein mol. bound to a *d*-riboflavinphosphoric acid), cozymase (a di- or tri-phosphopyridine nucleotide contg. *d*-ribosephosphoric acid and nicotinic amide) and finally the intermediate enzyme consisting of special proteins. This idea is supported by the observation that the cozymase content of blood in pellagrins is low but is increased on the administration of nicotinic acid. On this view the pellagra condition would be regarded as an enzyme deficiency. S. Morgulis 9

Successful treatment of giardiasis in man with Acranil—a hydrochloride of a new acridinic compound. Paolo de Muro. *Acta Med. Scand.* **102**, 17–21(1939).—Acranil has proved itself an efficient parasiticide against the trophozoit *Giardia intestinalis*, and produced no toxic symptoms. S. Morgulis 10

Disturbance of sugar metabolism in acute carbon monoxide poisoning. Sven Moeschlin. *Acta Med. Scand.* **102**, 140–59(1939).—In 57% of the patients suffering from CO poisoning there was a marked rise in the blood sugar, up to 390 mg. %, which usually persisted for 1–2 days. In one case it lasted 8 days. Although the hyperglucemia was more common among the severe cases of intoxication, no relation exists between the degree of intoxication and the degree of hyperglucemia. Glucosuria was found in only 17%, and the urinary diastase was not increased. In about two-thirds of the samples of cerebrospinal fluid examd. there was a definite increase in sugar. S. Morgulis 11

Effect of thyroxine on the rat hypophysis. André Neuhaus. *Endokrinologie* **22**, 90–112(1939).—In male rats, made hyperthyroid by injection of thyroxine, the hypophysis showed degenerative changes in the chromophile cells. In the basophile cells the alterations were less pronounced. The changes are similar to those observed in the hypophyses of patients with Basedow's disease. S. Morgulis 12

Morphologic changes in the ovaries of infantile rats under long administration of prolan. Werner Reiss. *Endokrinologie* **22**, 112–36(1939).—Long administration of prolan to young rats causes the corpora lutea to persist. At first, the prolan treatment produces violent reactions with massive formation of corpora lutea and inhibition of follicle development, but this is followed by a stage, lasting 24 to 72 days, free from reaction during which the corpora lutea undergo regression. Then the reaction starts once more, marked by an irregular cycle, with the formation of large ripe follicles and new corpora lutea. This suggests that antibodies to prolan are formed, and so long as they are not in excess the prolan maintains the corpora lutea and thus prevents the ripening of new follicles. But 13

when the antibodies are in excess, the prolan effect is abolished, the old corpora lutea disappear and follicles ripen under the influence of the gonadotropic substances produced by the hypophysis of the animal which meanwhile has attained sex maturity. This occurs usually at a larger wt. in treated animals (103 g.) as compared to that of controls (80 g.). However, the first spontaneous estrus occurs in either at about 8–9 weeks. S. M.

Hyperinsulinism. R. Thomae. *Münch. med. Wochschr.* **86**, 1261–4(1939).—Observations of a type of sugar-deficiency disease based on an island cell adenoma are described. T. reports mild, moderate and severe hypoglucemic episodes. The mild attack is characterized by sensations of hunger, sudden sweats, visual disturbances, fatigue and irritability. Severe attacks are accompanied by threatened collapse, fainting, temporary paralysis and blindness. In treating such conditions, T. recommends a diet in which numerous small meals with high carbohydrate content are given. Insulin, although seemingly paradoxical, is recommended. T. reasons that the exogenous administration of insulin induces hypofunction of the insular cells. A diet with a high fat content and injection of insulin after every meal gave encouraging results. T. reports hypoglucemic attacks are more frequent than realized and he suggests that sugar metabolism be investigated in patients with repeated attacks of fainting, as well as of persons, particularly children, who are easily fatigued. Maurice M. Rath

Effect of rectally administered insulin suppositories in diabetic patients. F. Wuhrmann. *Schweiz. med. Wochschr.* **69**, 787–9(1939).—Blood-sugar curves of 14 diabetic patients and of 4 normal subjects were studied after the rectal administration of insulin suppositories. One suppository unit was made equal to 10 injection units. W. concludes that measurable and effective quantities of insulin can be administered in this manner. Less-refined forms can be employed since the presence of protein substances does not constitute a hindrance. M. M. R.

Chemical observations in toxic conditions. G. Francom. *Schweiz. med. Wochschr.* **69**, 921–7(1939).—Lecture describing toxic conditions in hypoglucemia, spontaneous hypoglucemia, diabetes mellitus, hypochloremic conditions, hypocholesteremenia, hypo- and hyperphosphatemia. Maurice M. Rath

The effect of sodium bromide on the nutrition and the gastrointestinal tract of epileptic patients. Alex J. Arieff. *J. Lab. Clin. Med.* **25**, 19–24(1939).—Few toxic cases were observed in these patients with blood bromide concns. around 200 mg. per 100 cc. When there was no anorexia or bromide toxicosis producing an inadequate caloric intake, this blood level caused no wt. loss, had no effect on nutrition and produced no abnormal change in the basal metabolic rate. Gastric analyses showed that the chloride ion was displaced by bromide from 25 to 50%. In expts. *in vitro* HBr slightly retarded peptic digestion but not enough to produce clinical symptoms and had no effect on tryptic digestion. Howard W. Robinson

An experimental study of the rectal administration of mercurial diuretics. I. J. Brightman and Robert A. Lehman. *J. Lab. Clin. Med.* **25**, 56–66(1939).—An exptl. procedure was developed to study the toxicity, Hg absorption and excretion in cats who had received salyrgan or mercurin suppositories, and salyrgan suppositories modified by the addn. of theophylline or the acid of salyrgan. The results obtained with the various prepns. are compared and the lesions which they may produce in the colon of the cat are described. H. W. R.

Effect of thyroglobulin and thyroxine on the oxygen consumption of tissues in vitro. Attilio Canzanelli, Ruth Guild and David Rapport. *Endocrinology* **25**, 707–11(1939).—At lower levels of metabolism thyroglobulin stimulates the O consumption of guinea-pig kidney, testis and heart. There is a ceiling above which thyroglobulin can no further elevate the O uptake, and this ceiling is higher, in the case of kidney and heart, in serum than in a salt buffer mixt. Thyroxine generally had no stimulating effect in either the salt buffer mixt. or the serum. In 2 expts. in serum a stimulating effect appeared, raising the possibility that thyroxine under certain circumstances may be made physiologically active by contact with serum. Felix Saunders

Relief of myxedema with proteins of extrathyroidal origin. J. Lerman and W. T. Salter. *Endocrinology* **25**, 712–20(1939).—Successful responses in myxedema and cretinism and thyroidectomized rabbits were produced by iodinated serum protein and its acid-insol. degradation products. This material was produced by the brief treatment of blood proteins with compd. soln. of I. In terms of total mass, the activity of the iodoprotein was about 20% of that of whole thyroid; in terms of I, the activity was about 1/400. The acid-insol. iodopeptone was about one-half as active as whole thyroid in terms of total mass, but only 1/200 as active in terms of I. The material can be fractionated by enzymes or by alk. hydrolysis into thyroxine-like (*T*) and into diiodotyrosine-like (*D*) fractions. All the activity of the original protein is in *T*. *D* yields no thyroxine-like amino acid after drastic treatment with hot $Ba(OH)_2$ soln., whereas *T* yields, under such treatment, material which resembles iodothyroxine derivs. Felix Saunders

The effect of chronic opium and narcotic habits on the female genital organs. V. Growth of fetal and suckling mice born of mothers with opium habits. T. R. Ko. *J. Oriental Med.* **31**, 333–44(German abstr. 28)(1939); cf. *C. A.* **34**, 1729.—The growth is greatly retarded, and puberty is delayed. **Supplement. Chemical and biological studies of crude opium.** *Ibid.* 345–51(German abstr. 29).—The crude opium used in these expts. contained 21% morphine and 3.75% H_2O. Comparative studies were made between this crude opium and pure morphine in amts. corresponding to that contained in the crude opium, as to tail-lifting dosages, the duration of the maintaining positions, and death dosages. S. T.

Nature of the pressor action of renin. Irvine H. Page. *J. Exptl. Med.* **70**, 521–42(1939).—Tachyphylaxis occurs when renin is repeatedly injected into dogs and cats regardless of whether they are normal, anesthetized, pithed, hepatectomized, suprarenalectomized, nephrectomized or eviscerated. The pressor response of renin in brief expts. is independent of the height of the arterial pressure or the presence of the suprarenals. Evisceration and large doses of ergotamine reduce the response. It is largely uninfluenced by pithing, intracisternal injection of renin, cocaine, strychnine, caffeine and infusion of $NaHCO_3$ or HCl. It may be slightly increased by large blood transfusions or hepatectomy, but the result is short lived. There is no parallelism between the pressor responses to carotid sinus stimulation, adrenine and tyramine on the one hand and renin on the other. Intracisternal injection of renin elicits no significant rise in blood pressure or other circulatory manifestations. Renin alone causes no vasoconstriction when perfused with Ringer soln. but renin plus renin-activator restores activity. Renin tachyphylaxis is due to loss of renin-activator and development of an "anti-substance" (antipressor state or loss of some substance necessary for the chem. reactions which culminate in the pressor action of renin) in the blood. C. J. W.

Effect of histaminase treatment on histamine and anaphylactic shock in guinea pigs. S. Karády and J. S. L. Browne. *J. Immunol.* **37**, 403–8(1939).—The intravenous injection, in guinea pigs, of histaminase 15 min. before the intraäbdominal injection of 4 mg. of histamine, prevented in most instances the symptoms of histamine shock. Also similar treatment prevented shock after the administration of egg white to previously sensitized guinea pigs. Charles A. Zittle

Compn. of the fruits of *Mespilus germanica* [use in dysentery] (Sartory, *et al.*) **12**. *Pseudocinchona africana*—therapeutic utilization (Raymond-Hamet) **17**. Sulfanilamide derivs. (Crossley, *et al.*) **10**. Chemistry and chemotherapy of 4,4′-diaminodiphenyl sulfone, 4-amino-4′-hydroxydiphenyl sulfone and related compds. (Raiziss, *et al.*) **10**. Derivs. of aminomethanethiol [pharmacol. effect] (**Binz, Pence**) **10**.

I—ZOÖLOGY

R. A. GORTNER

Studies on the reproductive system of the alligator. V. Effect of injections of testosterone propionate in immature alligators. Thomas R. Forbes. *Anat. Record* **75**, 51–7 (1939); cf. *C. A.* **33**, 2442,3. Philip D. Adams

Phosphatase of the bone and growth of the skeleton in the sardine (Clupea pilchardus Walb). Jean Roche and Jacqueline Collet. *Compt. rend.* **209**, 530–2 (1939).—Measurement of the phosphatase activity of different parts of the skeleton in different stages of development of the sardine shows that this enzyme plays an important part in rapid osteogenesis but only a secondary role in slow ossification. Rachel Brown

Effect of alkaloids of the veratrine group. Z. M. Bacq. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 232–3 (1939).—Veratrine sensitizes the muscles of many classes of invertebrates to the action of ions of the K family and to Ba. Aconitine has a similar effect on muscle to that of veratrine except in the Coelenteres and Echinodermes. E. Curzon

Use of acid dyes in studying the problems of permeability. Observations on the alevin of the trout. R. Cordier. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 236–9 (1939).—The diffusibility and dialyzability of the dyes used markedly affect the results obtained as to the permeability of the membranes. E. Curzon

Functional metabolism of the melanocytes of frog skin. Jan Belehradek. *Compt. rend. soc. biol.* **132**, 20–2 (1939); cf. *C. A.* **32**, 2049.—Expansion of the melanophores is dependent on some process of anaerobic glucolysis. KCN stops all aerobic respiration but does not hinder the expansion of the melanophores provoked by pituitrin. Possibly the pigment granules receive an elec. charge which causes them to repel each other and scatter. Very dil. CH_2ICO_2H inhibits the action of pituitrin and adrenaline on the melanophores. L. E. Gilson

Relation between amphibian water-retention principle and oxytocic activity of pituitary extracts. Eldon M. Boyd and Edward G. Mack. *Proc. Soc. Exptl. Biol. Med.* **42**, 70–3 (1939); cf. *C. A.* **33**, 3467.—Twelve com. lots of posterior pituitary ext. contained 4–10 times as many amphibian water-retention units per ml. as international oxytocic units. The method of estn. is described. L. E. Gilson

Hydrolysis of acetylcholine by turtle blood. J. M. Little. *Proc. Soc. Exptl. Biol. Med.* **42**, 197–200 (1939).—Laked whole blood of *Pseudemys elegans* has considerable cholinesterase activity while the plasma has little or none. Prostigmine completely inhibits the activity of laked blood. Unlaked whole blood has 18–59% more activity than laked whole blood and this extra activity is not inhibited by prostigmine. L. E. Gilson

Estrogenic properties of extracts of ovaries of certain marine invertebrates. J. K. Donahue. *Proc. Soc. Exptl. Biol. Med.* **42**, 220–2 (1939).—Sexually mature ovaries of sea urchins (*Lytechinus variegatus* and *Echinometria*), holothurians (*Stichopus mobii*) and lobsters (*Palinurus argus*) from Bermuda contained small amts. of estrogenic substances extractable by alc. L. E. Gilson

Effects of administering mouse anterior pituitary to the newt and frog. A. Elizabeth Adams, Elizabeth M. DeForest and Barbara Granger. *Proc. Soc. Exptl. Biol. Med.* **42**, 354–9 (1939).—*Triturus viridescens* (a newt) ovulated out of season after implants of mouse anterior pituitary averaging 12.6 mg., although the reaction was slower and less complete than after approx. 0.84 mg. of newt whole pituitary. In *Rana pipiens* implants of 35–230 mg. mouse anterior pituitary produced no ovulatory response. L. E. Gilson

Specific morphoses in Drosophila induced by chemical compounds. J. A. Rapoport. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 415–17 (1939) (in English).—Sublethal doses of HgI_2, $HgSO_4$ and $HgCl_2$ in the nutrition medium of *Drosophila melanogaster* at the egg or larval stage produce the minute morphosis. Slightly sol. Hg compds. (cinnabar) give no morphoses. $SbCl_3$, $K_4Sb_2O_7$ and $SbCl_5$ produce lighter eyes of the brown or light type with changes in body color and wing structure resembling the mutation "ski." The H_3AsO_4, $(CH_3)_2AsO_2Na$, atoxyl, arsphenamine and neoarsphenamine morphoses resemble the tumor mutation. Compds. of B produce morphoses which resemble the mutation eyeless, while Ag lactate and other Ag compds. cause a marked bleaching of body color similar to the yellow mutation. NH_4CNS, KCNS, NaCNS and $Cr_2K_2(SCN)_{12}$ cause a marked shortening of the pupa and K_2SeO_4 and $(NH_4)_2SeO_4$ produce morphoses similar to the mutation "abdomen abnormal." Colchicine changes the eyes to those of the mutation "rough." S. A. Karjala

Acetylcholine contracture of the muscles of invertebrates. S. P. Narikashvili. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 283–5 (1939) (in English).—The threshold concns. of acetylcholine (I) and nicotine (II) for contracture of the smooth muscles of the invertebrates *Arenicola marina*, *Cucumaria frondosa* and *Styela rustica* are $1:10^6$ and $1:10^7$, $1:10^7$ and $1:20$, and $1:10^8$ and $1:125$, resp. The circular muscle of *Cyanea arctica*, the adductor of *Pecten islandicus* and the muscles of the segments and claws of *Hyas araneus* were insensitive to I and II. All of the invertebrate muscles were insensitive to lactic acid and $CHCl_3$. S. A. Karjala

Discharge of an acetylcholine-like substance by the isolated frog heart treated with adrenaline. M. Ya. Mikhel'son. *Bull. biol. méd. exptl. U. R. S. S.* **7**, 289–91 (1939) (in English).—The isolated heart of *Rana temporaria* begins to excrete an acetylcholine-like substance 7–12 min. after the injection of adrenaline. S. A. Karjala

Changes of inheritance characteristics through chemical influence. H. Dotterweich. *Umschau* **43**, 783–6 (1939).—A brief discussion of the work done in connection with the Timofeéff-Ressovsky, Zimmer and Delbrück view of the stability of the atom structure of genes and the effect on the spontaneous mutation rate of *Drosophila* in various nutritions media—i. e., solns. of hypophysis, progynon, sea water, vitamin C and tincture of Jaborandi. H. K.

Demonstration of the melanophore hormone in the fish hypophysis. Hans H. Meyer. *Endokrinologie* **22**, 137–44 (1939).—An aq. ext. from the hypophyses of *Gadus morrhua* contains a substance which frequently causes an expansion of the chromatophores of various fishes. This could be best demonstrated with the flat fish. It is active even after the destruction of the central nervous system. The ext. causes the fish to darken after a preliminary bleaching. S. Morgulis

Crystalline echinochrome and spinochrome: their failure to stimulate the respiration of eggs and of sperm of strongylocentrotus. Albert Tyler. *Proc. Natl. Acad. Sci. U. S.* **25**, 523–8 (1939).—Ground sea urchin testes are extd. with neutral alc. and then Et_2O. The test material is then added slowly to 0.5 *N* HCl under Et_2O. The Et_2O ext. is dried and filtered through a column of $CaCO_3$. Two layers are formed; the upper layer contg. *spinochrome* (I), m. 187–8°, the lower layer *echinochrome* (II), m. 220–1°. I and II are present as Ca salts in the test of the sea urchin. Solns. of I and (or) II produced no change in the rate of O_2 consumption when added to unfertilized sea urchin eggs in sea water, or in Ca-free sea water at pH 8. The rate of O_2-uptake of sea urchin spermatozoa is not affected by 10γ/cc. of I or II in ordinary sea water (buffered), but the rate is definitely inhibited by high concns. (10 mg./cc.). W. J. Peterson

Comparative value of pollen and pollen substitutes. I. Bee bread and cottonseed meal-dry skim milk mixtures. Mykola H. Haydak. *J. Econ. Entomol.* **32**, 663–5 (1939).—Colonies of honeybees fed a mixt. of 4 parts by wt. of cottonseed meal and 1 part dry skim milk (spray process) equaled in resp. of development of the bees, no. and quality of the bees reared and in mortality of the bees those colonies which were fed the natural bee bread. C. H. R.

Nutritive value of certain foods for the adult honeybee. R. M. Melampy and S. E. McGregor. *J. Econ. Entomol.* **32**, 721–5 (1939).—A carbohydrate diet such as honey or invert sirup is inadequate for the newly emerged adult bee. In lab. expts., fresh pollen was a better supplement to a carbohydrate diet than any cereal or milk product

used. A low relative humidity and reasonably high temp. are conducive to long life of adult bees under controlled conditions. C. H. Richardson

Action of certain stimulating and inhibiting substances on the respiration of the grasshopper embryo, Melanoplus differentialis. Loren D. Carlson and Joseph H. Bodine. *J. Cellular Comp. Physiol.* **14**, 159–72(1939).—The rate of O consumption of diapause and postdiapause grasshopper embryos is altered by the addn. of pyocyanine and various respiratory inhibitors either separately or in combinations. The addn. of 10^{-3}–10^{-4} *M* pyocyanine to diapause embryos increases the rate of O consumption. The increase over the normal diapause level of respiration is 100–30%, and over the normal postdiapause, 60–100%. The increase in rate of O consumption due to pyocyanine is independent of the action of the inhibitors used, i. e., the pyocyanine increment is approx. the same for the inhibited and control embryos. The R. Q. of the embryo inhibited by any one of the various inhibitors was increased in all cases. The R. Q. for the embryo stimulated by pyocyanin is 0.89. When embryos inhibited by carbamate or veronal are treated with CO_2, there is little or no further inhibition. The pyocyanine increment for material treated in such a manner is similar to that for controls. F. Saunders

Enzymes in ontogenesis (Orthoptera) VIII. Changes in the properties of the natural activators of protyrosinase during the course of embryonic development. Joseph H. Bodine, O. Malcolm Ray, Thomas H. Allen and Loren D. Carlson. *J. Cellular Comp. Physiol.* **14**, 173–81(1939); cf. *C. A.* **33**, 7906[3].—The potency of a naturally occurring activator of protyrosinase decreases during particular periods of the embryonic development of the egg of the grasshopper, *Melanoplus differentialis*. There is no direct relation between the vol. of the lipoidal material with which it is associd. and the potency of the activator. **IX. Influence of various solutes on the activity of tyrosinase.** Thomas H. Allen and Joseph H. Bodine. *Ibid.* 183–8.—Three prepns. of tyrosinase from the eggs of *M. differentialis* vary in the presence of a NaCl soln. with respect to their ability to catalyze the tyramine HCl-melanin reaction at 25°. The activities of 2 of these prepns., "heat" tyrosinase and "Na oleate" tyrosinase, decrease logarithmically through a certain range of increase in concn. of this NaCl soln. The activity of "heat" tyrosinase is characteristic, irrespective of the solute concn., for the particular kind of electrolyte or nonelectrolyte. Felix Saunders

Partition of nitrogen in the developing eggs of Urechis caupo. N. H. Horowitz. *J. Cellular Comp. Physiol.* **14**, 189–95(1939).—The eggs and embryos of the marine worm, *U. caupo*, were analyzed for total nonprotein, amino peptide NH_2 and amide N at several stages of development. No change in total N was found during the first 24 hrs. of development. At this time the egg has developed into a swimming larva. A decrease in total N occurs at the 30th hr. of development. This decrease corresponds with the onset of feeding by the larvae. Synthesis of protein, amounting to 6.4% of that present in the unfertilized egg, occurs during the first 24 hrs. of development. The ratio of protein to nonprotein N is higher in the tissues of the adult than in the embryonic stages studied. Felix Saunders

Electrolytes in the axoplasm of the giant nerve fibers of the squid. Richard S. Bear and Francis O. Schmitt. *J. Cellular Comp. Physiol.* **14**, 205–15(1939).—Direct analytical studies of the total solids, total base, K, Cl, N (total, protein and nonprotein) and total P of the axoplasm of squid giant fibers show (1) the internal K concn. of these fibers is 18 times as great as that of squid blood (2) There are considerable osmotic and elec. deficiencies within the axoplasm, the total known ion concn. being 63 and 71%, resp., of that found in blood and sea water. Cations are present in a concn. 4 5 times that of the known anions (chiefly Cl). (3) The cation excess (about 0.5 *N*) is too great to be balanced by common anions, such as HCO_3, OH, SO_4, HPO_4 and lactate. The protein present is also insufficient to supply the anion deficiency. Conclusion: Axoplasm must contain rather large amts. of unknown org. anions of moderate mol. wt. (4) The Cl-ion concn. is 0.13 milliequiv. per g of axoplasm water. Felix Saunders

Activity of protozoa at low oxygen tensions. J. A. Kitching. *J. Cellular Comp. Physiol.* **14**, 227–36(1939).—The contractile vacuole of the peritrich ciliates *Cothurnia kellicottiana* (from fresh water) and *Zoothamnium* sp (from brackish water) rapidly stopped all activity in pure H. On readmission of sufficient O there was a rapid recovery of activity. No correlation was found between the min. O tensions necessary for activity of protozoa and sensitivity of these organisms to cyanide. Felix Saunders

Comparative permeability to water and certain solutes of the egg cells of three marine invertebrates, Arbacia, Cumingia and Chaetopterus. Baldwin Lucké, H. Keffer Hartline and Renato A. Ricca. *J. Cellular Comp. Physiol.* **14**, 237–52(1939). Felix Saunders

Second intermediate host of Clonorchis sinensis in the Mukden area. Sukio Miyanaga. *J. Oriental Med.* **31**, 565–8(English abstr. 43)(1939).—Of 15 species of freshwater fishes of the Mukden area, 6 species (*Carassius auratus, Hemiculter clupeoides, Leucogobio herzensteini, Pseudogobio rivularis, Pseudorasbora parva*, and *Rhodeus notatus*) were found to be infected with cysts. of *Clonorchis sinensis*. S. Tashiro

12—FOODS

H. A. LEPPER

A fluorometric method for determining the riboflavin content of foodstuffs. A. Z. Hodson and L. C. Norris. *J. Biol. Chem.* **131**, 621–30(1939).—A fluorometric method for detg. the riboflavin content of foodstuffs is described which gives results in good agreement with those secured by the microbiol. method of Snell and Strong (*C. A.* **33**, 6371[9]). A. P. Lothrop

Pyrophosphates in foodstuffs. Louis Weil. *Ann. fals.* **32**, 250–2(1939).—A brief discussion of the use of pyrophosphates in baking powders. Attention is drawn to the necessity of studying the action on the human system of unchanged pyrophosphate residues in cakes, etc. A. Papineau-Couture

Fructose as a food. Erik M. P. Widmark. *Kgl. fysiograf Sallskap. Lund, Forh.* **7**, 22–31(1937)(Pub., 1938).—A lecture, including a discussion of the com. production of fructose (I), especially from the tubers of the Jerusalem artichoke, (*Helianthus tuberosus*), and the biol. properties and use of I as a substitute for cane sugar. I is suitable for use in the diet of diabetic patients. Because of the higher osmotic pressure and sweetening power of its solns. less I than sucrose is required in preserving. Marmalades, jams and marzipan do not crystallize when made with I. A possible drawback to the use of I is the ease with which it ferments. Ruth Berggren

Report on the quality, for bread-making purposes, of wheats harvested in 1938 at the headquarters and substations of the National Institute of Agricultural Botany. E. A. Fisher. *J. Natl. Inst. Agr. Botany* **4**, 372–88 (1939).—The customary chem. analyses of the wheats and flours are tabulated and results of baking tests are given K. D. Jacob

Quality tests on hard, red winter wheats. R. K. Larmour, E. B. Working and C. W. Ofelt. *Cereal Chem.* **16**, 733–52(1939).—Data show that within a given season the potential strength of the principal hard, red winter wheat varieties is related to protein content in linear fashion, and is highly correlated with it. It is shown that it is possible to obtain an expression of baking strength by means of a single formula applied under one set of fixed conditions. The formula involves the use of yeast 2, sugar 6, dry milk solids 6, $KBrO_3$ 0.004 and shortening 3%

with mixing to optimum consistency and using the standard fermentation and proof times of the A. A. C. C. Mixing curves obtained by the Swanson-Working instrument reveal certain marked distinctions between varieties within the hard winter wheat class as well as within varieties in the class. The greatest usefulness of the mixing curves provided the protein content is known is to characterize the type to which the flour belongs. L. H. Bailey

The amount of vitamin B_1 and B_2 (riboflavin) in ordinary Norwegian cereals and bread. Gulbrand Lunde, Hans Kringstad and Alf Olsen. *Nord. Med.* **3**, 2533 8(1939).—B_1 was detd. biologically (bradycardia method) and chemically (thiochrome method). B_2 was estd. colorimetrically. The following values in γ per g. were found for B_1 and B_2, resp.: 73% wheat flour 0.90, 0.40; wheat (wholemeal) 3.90, 1.40; wheat bran 5.85, 2.80; wheat germ 2.60, 4.40; 65% rye flour 1.89, 0.60; rye bran 5.25–6.30, 3.10; rye (wholemeal) 4.20, 1.60; oats (wholemeal), on an av., 4.55, 2.20; oats bran 3.75, 2.60; barley, on an av., 5.50, 3.00. Forty % wheat flour had 0.96, rolled oats 2.73, maize 5.40, white bread 0.63, wholemeal bread 1.89, rye bread, ordinary 0.93 and wholemeal bread 1.92 γ B_1 per g. V. Aschehoug

Biochemical indexes of the baking quality of grain and flour. A. I. Oparin. *Bull. acad. sci. U. R. S. S., Sér. biol.* **1939**, 43-67(in English, 67–70).—The baking quality of flour depends not only on its initial chem. compn. but also on the rate at which the chem. processes detd. by the amt. and activity of the enzymes contained in the flour and by the susceptibility of the substances in the flour to fermentative action, take place in the dough during mixing, fermentation and beginning of baking. John Livak

Milling, baking and chemical properties of Colorado-grown Marquis and Kanred wheat stored 9 to 17 years. D. W. Robertson, C. C. Fifield and Lawrence Zeleny. *J. Am. Soc. Agron.* **31**, 851 6(1939). The protein content of Marquis wheat varied from 11.3% in the 1925 harvest to 14.5% in the 1927 crop and from 12.9 to 14.3 in the Kanred wheat. Fat acidity values on Marquis ranged from 26.2 for the 1929 samples to 47.7 for the 1921 samples and on Kanred from 26.7 for the 1929 samples to 37.5 for the 1921 samples. There was a definite and fairly regular increase in fat acidity with storage. All lots of wheat made satisfactory bread. J. R. Adams

The estimation of potato meal in wheat meal. W. Neuwohner. *Z. Tierernahr. Futtermittelk.* **3**, 1–5(1939).—A method similar to that of Klauss (*Vorratspflege u Lebensmittelforsch.* **1**, Nos. 6 and 7(1938)) is described in which a sample dild. with H_2O is treated with K in Kl soln. and an aliquot transferred to a microscopic slide where the amt. of potato starch grains could be estd. by means of their particular intensity of color. J. O. H.

Starch in relation to some baking properties of flour. R. M. Sandstedt, C. E. Jolitz and M. J. Blish. *Cereal Chem.* **16**, 780-92(1939).—Starch and gluten which have been washed from flour can be recombined to form a dough with baking characteristics similar to those of original flour doughs. Various combinations of starch and gluten fractions, and of various treatments can be suitably studied by this technique. The starch from flour can be sepd. into 2 fractions, by centrifuging. One of the fractions is relatively pure starch and the other (smaller fraction) contains dextrins produced by the action of the amylases of the flour on the readily available starch; this fraction is tentatively designated as amylodextrin. The amylodextrin fraction of the flour is a factor in absorption and dets. to a marked extent the handling characteristics of flour doughs. It is closely assocd. with stickiness of doughs and with tenderness of crumb in the baked loaf. The improving effect of malt on many flour doughs is due not to its proteolytic action but to the action of α-amylase on the starch. Certain undesirable baking characteristics of some exceedingly hard wheat starches are due to damage to the starch in milling. Some com. wheat starches seemingly owe their poor baking properties to hypochlorite treatment. The detrimental effect of the hypochlorite may be overcome by treatment with large quantities of malt, the effective agent apparently being the α-amylase component of malt. L. H. Bailey

Changes in flour on storage with special reference to the effect of different types of bags. Wm. H. Cathcart and Edward J. Killen. *Cereal Chem.* **16**, 798–817(1939).—Two different samples of chemically bleached and matched flour were stored separately in 4 different types of bags, viz., ordinary cotton, paper-lined, jute and grain. They were stored under av. com. bakeshop conditions. The samples were analyzed at regular intervals for moisture, ash, protein and absorption, and baking tests were made. The kind of bag had little effect on the analyses or the baking quality of the flour. In all cases absorption increased during storage, ash and protein showed no change, and the baking quality in one sample fell off after the fourth month and in the other after the sixth month. Deterioration in the latter case was due to infestation. The effects incidental to storage are in general agreement with the work of other investigators. L. H. Bailey

The French official method for the determination of fat in flours, pastries and the like. Enid A. M. Bradford. *Analyst* **64**, 817–18(1939).—The French method is described in the *Service de la Répression des Fraudes* but as this is not accessible to many chemists, an English translation of the procedure and description of the app. is given. W. T. H.

Starch as a factor in dough formation. Olof E. Stamberg. *Cereal Chem.* **16**, 769–80(1939).—Upon dilu. of a flour with the various sizes of starch granules, the absorption necessary to produce doughs of a min. mobility of 500 farinograph units at various protein levels was determined. The minima of the resulting absorption curves were at different protein levels when the various starches were used. By calcg. the starch surface area per mg. of protein at these minima the values were 19.8, 20.3, 20.1 and 23.3 sq. cm. for the rice, corn, wheat and potato starch curves, resp., with an av. value of 20.9. Thus the starch surface area was found to be the factor involved at the minima of the absorption curves. It was concluded that for dough formation in the farinograph mixer the protein content of a flour must be over 7.5% (15% moisture) or on a dry basis the ratio of flour protein to starch must be greater than 0.1. Further work is suggested on the possibility of a relationship of flour strength and baking quality to the starch-granule size distribution in flours of various grades and from different sources, since the information now available is incomplete and conflicting. L. H. B.

Gas retention as affected by including shortening in the tentative A. A. C. C. basic test bake formula. W. L. Heald. *Cereal Chem.* **16**, 817–20(1939). It may be concluded that with the app. used and with the patent and straight grade flours, bleached and unbleached, gas retention (as detd. in percentage of total gas retained in the dough) was reduced by the use of shortening. While in the bleached clear flour 2% shortening had a tendency to increase retention, 4% shortening did not materially change the percentage of gas retained over the 2% In all cases of patent straight and clear flours the total rate of gas per hr. was slightly reduced. In the case of patent and straight grades the time to the elastic limit was also reduced. In the clear bleached flour the time to the elastic limit was increased, while in the unbleached it was reduced quite materially. H. believes that the inclusion of shortening in the A. A. C. C. formula would tend to make the baking results more satisfactory on a flour that exhibits bucky characteristics. However, the tendency to mask this bucky effect might render the test bakes less useful. In spite of this fact and knowing that the baker uses a rather liberal amt. of shortening in his formula, H. recommends 3% shortening as being a very desirable amt. to use in the A. A. C. C. baking formula. L. H. Bailey

Standardization of the scoring of test cakes. Olof E. Stamberg. *Cereal Chem.* **16**, 764–8(1939).—Photographs are reproduced showing grain standards and the scoring for symmetry or shape of test cakes, also a table showing the numerical score for cake vols. ranging from 640 cc. to 940 cc. for cakes made from 325 g. batter with the

A. A. C. C. formula. The vol. score is 0 for 640 cc. or less and increases by 1 for every 20-cc. increase in vol. so that a cake having a vol. in the range of 920 and 940 cc. will have a score of 15. L. H. Bailey

Study of checking and pH in cracker and biscuit products. Jan Micka. *Cereal Chem.* **16**, 752–64(1939).—Checking in cracker and biscuit products is assocd. with flour condition and is caused by internal stress and brittleness. The governing factor is pH not only in checking but in the whole process of manufg., i. e., in mixing, machining and baking as well as in the quality of the finished product. A pH on the acid side is responsible for checking and for the unstable condition of the doughs, causing them to become tough with a decrease of elasticity and plastisity. A pH slightly on the alk. side is responsible for the increase of elasticity and plasticity of the dough, causing easier machining with no checking in the finished product. However, if the flour is mistreated in mixing, fermentation and machining, or if there is improper baking (particularly underbaking), cooling, or an unbalanced formula, checking may occur. In soda crackers a blend of soft winter and hard spring wheat flour always causes checking. High absorption and high shortening content have a favorable effect on the stability of the doughs with a tendency to prevent checking. L. H. Bailey

A comparison of methods for the determination of proteolytic activity. F. C. Hildebrand. *Cereal Chem.* **16**, 792–8(1939).—The rate of gelation and viscometric methods of detg. proteolytic activity recently proposed by Landis and Frey (*C. A.* **32**, 3035[8]) and by Koch, Nelson and Ehrnst (*C. A.* **33**, 1872[5]) were investigated in comparison with the Ca pptn. and formol titration procedures; in the last case both gelatin and a flour suspension were used as substrates. This comparison was carried out with a series of samples comprising a reasonably wide variety of cereal products. The gelation-rate and viscometric methods gave results substantially different from those obtained by the other procedures. It may be presumed that the first 2 methods measure proteinase activity, while in the other types of procedure dipeptase and (or) polypeptidase action have the most effect on the results obtained. In these expts. the gelation-rate and viscometric methods had the same expt. error, but the former seems preferable because of its better differentiation between samples. The use of the gelation-rate procedure is limited by its requirement of relatively elaborate and costly app. The modified Ritthausen Cu-pptn. and formol titration methods used were found to give essentially the same relative results. In the formol titration procedure the use of gelatin as a technique leads to lower expt. error and better differentiation between samples. L. H. Bailey

Some factors affecting the stability of certain milk properties. II. Effect of succulent roughages and of storage conditions on color. O. F. Garrett, R. B. Arnold and G. H. Hartman. *J. Dairy Sci.* **22**, 813–20(1939); cf. *C. A.* **33**, 8836[6].—The feeding of properly ensiled grass silage produces a milk higher in total color than does corn silage or beet pulp, corn silage being superior to beet pulp in this respect. There is a small but definite progressive loss of total yellow color of milks in storage. This loss is somewhat accelerated by the pasteurization process and still more by the presence of sol. Cu. The yellow color of high-colored milks is more stable in stored milks and toward catalytic Cu than is that of low-colored milks. The yellow color of milk produced on molasses grass silage is more stable in storage than is that of milk produced on either beet pulp or corn silage. Less loss of color occurs in Guernsey than in Holstein milk during storage. It is suggested that the loss in yellow color in milk is due to deterioration of xanthophyll and zeaxanthin rather than carotene and that these 2 carotenoids exhibit antioxidative protection toward carotene in butterfat. The feeding of molasses grass silage appears to be an excellent means of maintaining a comparatively high level of yellow color in milk during winter months. A. H. Johnson

The determination of chloride in milk. Geo. P. Sanders. *J. Dairy Sci.* **22**, 841–52(1939).—The direct titration of Cl in milk by modifications of Mohr's method, with $AgNO_3$ and K_2CrO_4 indicator yields results which are high and variable. The direct titration method with dichlorofluorescein indicator yields somewhat lower results, but results which are still too high and variable. Indistinct end points with either indicator, and adsorption of Ag by the protein are pointed out as important sources of error. An easy and quantitatively precise modification of the Volhard method is described for detg. Cl in milk. One combined reagent contg. standardized $AgNO_3$, HNO_3 and ferric alum indicator is added to the sample and the percentage of Cl is obtained by titration with standardized KCNS. Sources of error and methods of improvements in other methods as well as conditions necessary for accurate Volhard titrations are described. A. H. Johnson

The phosphatase test. A review of the literature on its application for detecting irregularities in the pasteurization of milk and dairy products. L. H. Burgwald. *J. Dairy Sci.* **22**, 853–72(1939). A. H. Johnson

The determination of milk solids and its application in the dairy industry. L. A. Burgess. *Queensland Agr. J.* **52**, 299–309(1939).—The hydrometer method for detn. of milk solids is described in detail. Methods for detecting adulteration of milk and for detn. of fat losses in buttermilk are discussed. K. D. Jacob

Feed flavors and practical means of controlling them in dairy products. C. E. Wylie and Thomas B. Harrison. *Milk Dealer* **29**, No. 1, 132–4(1939).—The various off-flavors derived from feeds and pastures are described. Onion flavor is the most common feed flavor which gets into milk produced in the southern states. Allyl sulfide is responsible for the onion flavor in the milk. It can be removed by extg. the milk with mineral oil or by aerating the milk. Allyl sulfide being oil-sol. remains with the butterfat on sepn. of the milk. The skim milk contains little if any off-flavor and may be used in the manuf. of cottage cheese. Certain Cl compds. can be used to remove the onion flavor from cream before churning. A. H. Johnson

Similarity of the oxidized flavor from three sources. D. H. Nelson and C. D. Dahle. *Milk Dealer* **29**, No. 1, 62–6(1939).—Pure milk fat free from phospholipides was isolated from fresh sweet cream. This fat was autoxidized in the dark until it had a peroxide value of 25 and then homogenized into skim milk to yield a milk of 4% fat. Such milk dild. with fresh milk of the same fat content had the same oxidized flavor as milk in which the off-flavor was induced by adding Cu to the extent of 2 p. p. m. A. H. Johnson

Proper methods of manufacture and testing of lactic casein. Walter Müller and G. Lichtenberger. *Milchw. Ztg. Alpen-, Sudeten- u. Donauraum* **47**, 105–9(1939).—Detailed directions are given for making casein by the self-sour method and by a method using high-acid whey as precipitant. Directions are given for sampling the pressed curd and detg. total solids and acidity. E. O. Whittier

Production of textile casein from skim milk and the preparation of the residue resulting therefrom (whey). Fr. Richter. *Molkerei-Ztg.* (Hildesheim) **53**, 1163–8(1939).—In the production of textile casein, H_2SO_4 is added to the milk as a pptg. agent. Before the whey can be used in animal feeding it must be neutralized. $CaCO_3$ alone is not a satisfactory neutralizing agent, but the addn. of 100 g. $CaCO_3$ + 100 g. $Ca(OH)_2$ per 100 l. of whey produces a satisfactory feed. E. Curzon

The relation of the refractive index of evaporated and condensed milk serum to the total solid content. S. G. Menefee and O. R. Overman. *J. Dairy Sci.* **22**, 831–40(1939).—Data are presented to show that a linear relationship exists between the total solids and the n of the serum of evapd. and condensed skim milk. The formula developed for one type of product cannot, however, be used to compute quantitatively the total solids in every sample of that product. The variation in compn. of

normal milk and factors such as heat, standardization and acidity that bring about changes in chem. compn. must be considered. The development of acidity in a product is one of the most important problems. Useful refractometer readings can only be made on fresh products.
A. H. Johnson

Feeding of dried whey. H. Bünger, E. Fissmer, W. Harre, H. Schmidt, K. Boehm and F. Reising. *Molkerei-Ztg.* (Hildesheim) **53**, 1447–50(1939); *Biedermanns Zentr.* **11**, 276–300.—Dried whey contains about 90% dry matter, 9% digestible protein and 68% total nutrients. Daily, not more than 0.5–0.6 kg. can be fed to swine and 0.5 kg. to young cattle. E. C.

Change in aroma of butter during storage. W. Mohr, E. Schrimpl and A. Arbes. *Molkerei-Ztg.* (Hildesheim) **53**, 1501–3(1939).—Fresh sweet-cream butter contains little biacetyl (I), the compd. giving butter its characteristic aroma and taste. After storage for 6 months sweet-cream butter contains almost no I. Fresh sour-cream butter contains more I than fresh sweet-cream butter. During storage I may decrease or remain const. Salted and unsalted butter show no differences. Neither storage in CO_2 nor kind of packing material used had any effect on the content of I. Fe and Cu introduced into the butter from the app. increase the content of I during storage and may cause the development of bad flavor.
E. Curzon

Factors affecting amount of mold mycelia in butter. J. Adams and E. H. Parfitt. *Natl. Butter Cheese J.* **30**, No. 10, 29–36(1939); cf. *C. A.* **33**, 7410⁷.—Mold mycelia require O for their growth. In order to reduce mold growth fresh cream should best be added to accumulated cream without mixing as such mixing introduces O into the cream. Molds develop more readily in cream of low fat content than in cream of high fat content. The pH limits (pH 6.0 to pH 8.0) to which cream is neutralized under com. conditions did not influence the amts. of mold mycelia retained in the butter. A. H. Johnson

Quick method for the determination of iron and copper in storage butter. Ritterhoff. *Molkerei-Ztg.* (Hildesheim) **53**, 1478–9(1939).—Butter contg. more than 5 γ iron or 1 γ Cu per g. does not keep well. To det. Fe melt 10 g. butter in an Al beaker and transfer to a white vessel. Add 5 cc. 25% HCl, 5 cc. 10% KCNS and 3 drops of 3% H_2O_2. If the color which develops in the watery layer is yellow or only faintly red less than 5 γ Fe/g. is present; if it is bright red more than 5 γ is present. To det. Cu melt 10 g. butter and boil gently to destroy the catalase. Avoid browning the fat. Add 5 cc. of 10% KCNS and 10 drops of fresh Schrödter's guaiacum reagent. The color may range from colorless through green to blue. The first trace of blue color indicates a Cu content of more than 1 γ/g. E. Curzon

Suggestions on making process cheese. C. R. Barker. *Natl. Butter Cheese J.* **30**, No. 10, 24–6(1939).—An important asset in maintaining the uniformity of process cheese is the control of acidity. This is best controlled by judicious use of acid cheese in the blend. Such emulsifiers as are necessary should be used sparingly.
A. H. Johnson

Factors affecting activity and heat resistance of Swiss cheese starter cultures. II. Influence of culture medium. P. R. Elliker and W. C. Frazier. *J. Dairy Sci.* **22**, 821–30(1939); cf. *Ibid.* **21**, 801–13.—*L. helveticus*, *L. lactis* and *Lactobacillus* sp. all developed more actively in freshly prepd. than in old sterile reconstituted milk. The age of the sterile reconstituted milk used as a culture medium had no significant influence on growth of *Str thermophilis*, *Str. lactis* and *E. coli*. Substances such as peptone, tomato juice, yeast water and lactic filtrate stimulated growth of *L. helveticus* in both old and freshly prepd. sterile reconstituted milk. The oxidation-reduction potential of steamed, freshly prepd., sterile reconstituted skim milk was significantly lower than that of steamed old sterile reconstituted milk. Addn. of a reducing substance, neutralized thioglycolic acid, to old sterile reconstituted skim milk stimulated development of certain lactobacilli but did not significantly stimulate development of *Str. lactis*, *Str. thermophilis* and *E. coli*.
A. H. Johnson

Cheese swelling. Hans Roeder. *Molkerei-Ztg.* (Hildesheim) **53**, 955–7(1939).—Addns. of chicken egg white, peptones and heavy metals may affect the rennet coagulation of milk; urea inhibits it markedly. Urea added to milk samples not contg. rennet does not coagulate the milk in spite of the great increase in acidity. Heating the milk + urea or the urea soln. before adding it to the milk does not affect the swelling. Hence changes due to bacterial action, but not affected by pasteurization may make milk unsatisfactory for cheese making. E. C.

The continuous production of margarine. Lars Erlandsen. *Fette u. Seifen* **46**, 536–40(1939).—Modern methods for producing margarine are reviewed and the advantages of the continuous process are pointed out.
J. W. Perry

Egg solids. M. A. Widland and M. J. Mack. *Ice Cream Trade J.* **35**, No. 10, 21, 48, 56 (1939).—Ice cream contg. egg solids has improved whipping properties, is more firm when drawn from the freezer, withstands heat shock well, and has a smooth compact appearance, relatively free from visible air cells. The egg powder blends appear to be of value to the extent that they contain egg-yolk solids. These blends appear to contain egg-yolk solids along with milk-solids-not-fat and albumin or whole egg solids. A modified Mojonnier procedure was described for the detn. of fat in egg-yolk products. The protein content of egg yolk or egg powder blends can be detd. by the Kjeldahl method. By detg. protein and fat a satisfactory appraisal of an egg-yolk product can be made. The detn. of the egg-yolk solids of a product is difficult and usually gives results that are lower than the actual amt. of egg-yolk solids actually present.
A. H. Johnson

A practical method of determining color in fresh and frozen egg yolks. A. W. Turner and V. Conquest. *U. S. Egg Poultry Mag.* **45**, 668–70(1939).—Color comparison is made between an acetone ext. of the yolks with standard $K_2Cr_2O_7$ solns. H. A. Lepper

The composition of local and imported citrus fruit. A. W. R. Joachim and D. G. Panditteseker. *Trop. Agr.* (Ceylon) **93**, 14–24(1939).—The detn. of total solids, acidity, sugars, vitamin C and pH in 62 samples of local and imported grapefruit and oranges showed that Ceylon citrus fruits are similar in compn. to citrus from other countries. Ceylon fruits were inferior in such characteristics as color, thickness of rind, facility of peeling, character of rag and seedlessness. John O. Hardesty

Boron status of New Zealand apples. H. O. Askew and R. H. K. Thomson. *New Zealand J. Sci. Tech.* **21A**, 128–9(1939).—Apples from Auckland, Hawke's Bay, Marlborough, Canterbury and Central Otago districts were analyzed for B. All except those from the last district showed a satisfactory B status. The fruit from all districts was free from internal cork. J. O. H.

Removal of nicotine-bentonite spray residues from apples at harvest. Jack E. Fahey, Harold W. Rusk, L. F. Steiner and R. F. Sazama. *Trans. Indiana Hort Soc.* **78**, 114–15(1938)(Pub. 1939).—One lot of fruit, which had received 7 sprays of a mixt. of 40% nicotine sulfate 1 pint, bentonite 5 lb., soybean oil 1 quart and Na lauryl sulfate 0.5 oz./100 gal. and which carried a harvest residue load of 0.026 grain nicotine per lb., was washed in a machine of the underbrush type with 5 different solns. A 5% Na silicate wash at 60–100°F. reduced the nicotine residue to less than 0.001 grain per lb. and completely removed the visible residue. Washes contg. 0.25% of wetting agent alone or in combination with 1.1% HCl reduced the residue to 0.004–0.006 grain per lb. but left appreciable visible residue on the fruit.
K. D. Jacob

Warehouse ventilation and gas storage [of apples and pears]. C. A. Eaves. *Ann. Rept. Nova Scotia Fruit Growers' Assoc.* **74**, 48–51(1937).—When the Cox Orange and Ribston varieties of apples were subjected to an atm. of 100% N_2 for 4 days before storage there was a marked retardation in the yellowing of the ground color and the

fruit was much firmer than comparable lots that had been stored in air from the time of picking. The treatment also prevented Ribston apples from becoming greasy. Equally good results were obtained by treating McIntosh apples with pure CO_2 for 3 days or with pure N_2 for 4 days. Treatment of Russet apples for more than 8 days with either CO_2 or N_2 seemed to be necessary to prevent shrinkage. Clapp Favorite and Bartlett pears were benefited by treatment with N_2 but CO_2 was ineffective. Prolonged holding of McIntosh apples in 5% CO_2 under cellar conditions resulted in very good keep and the elimination of a corticle browning that appears in this variety under ordinary conditions. Russet apples also responded to this treatment but it was ineffective with the Cox Orange and Ribston varieties. K. D. Jacob

The effect of recent increase in government lead tolerance on spray practice. C. L. Burkholder. *Trans. Indiana Hort. Soc.* **78**, 85(1938)(Pub. 1939).—The increase in Pb tolerance from 0.018 to 0.025 grain per lb. of fruit, with no change in the As tolerance of 0.01 grain per lb., has given growers only a slight increase in margin of residue safety but no grounds on which to base hopes that more or heavier sprays can be applied without washing or that there can be any let-up in washing efficiency, especially if the fruit is to go into interstate shipment. K. D. Jacob

Observations with reference to arsenic [and lead] on apples and other foodstuffs. Ira D. Cardiff. *Proc. Wash. State Hort. Assoc.* **33**, 153–68(1937).—A review and discussion of the occurrence of As and Pb in foodstuffs, beverages, plants, etc., the effects of As and Pb on the animal organism, discrepancies and errors in the detn. of these elements in food products, and the activities of the Food and Drug Administration in enforcing the regulations concerning tolerances for Pb and As in food products, particularly apples. K. D. Jacob

The composition of the fruits of Mespilus germanica. R. Sartory, E. Weil and S. Aziz. *Bull. acad. méd.* **121**, 885–6(1939).—The fresh fruit contains 2.59% of tannin which justifies its use in dysentery. A table of compn. is given. A. E. Meyer

Vitamin C in fruit-juice products. I. Influences of the process of preparing canned tomato juice on the vitamin C content. Tyoten Inagaki. *J. Agr. Chem. Soc. Japan* **15**, 903–14; *Bull. Agr. Chem. Soc. Japan* **15**, 136(in German)(1939).—Ascorbic acid-oxidizing enzyme was found in canned tomato juice. Its action was completely checked by heating at 65° for 10 min. The vitamin C content was 21.5 mg. % in the fresh tomato pulp and 27.9 mg. % in the peel or the seeds. When the tomato juice was sealed in a can with varnish lining, there was a large decrease in vitamin C and all of it was lost during storage for 6 months. Sterilization by heating for a short time was recommended from the viewpoint of the vitamin C content. Y. Kihara

Maturity studies of soft fruits. J. E. Britton. *Proc. Wash. State Hort. Assoc.* **33**, 55–8(1937).—Bing, Lambert and Victor cherries, picked at max. wt., contained 21.3, 17.0 and 17.5% sugar, resp. More mature fruit showed a further increase in sugar but a slight decrease in wt., shorter storage life and a tendency to shrink and lose brightness. Fruit contg. under 16% sugar shriveled in storage, had a poor flavor and soon became unattractive in appearance. Peach plums contg. 12.5% sugar had the best keeping qualities. Sugar content was not a reliable maturity test for peaches. A sugar content of 17% for the Italian prune appeared to be a safe guide to quality when picking. In all cases, the sugar content was detd. by means of the Zeiss refractometer. K. D. Jacob

The drained weight of English canned fruits. F. Hirst and W. B. Adam. *Univ. Bristol, Fruit Vegetable Preservation Research Sta., Campden, Ann. Rept.* **1938**, 17–31.—Shrinkage and shriveling were seldom very noticeable unless sirups of 55–65° Brix were used, but cherries were affected at densities as low as 40–45° Brix. The temp. at which the sirup was allowed to enter the can had little or no effect on the subsequent drained wt. 1 The decreases in drained wts. that occurred during the 1st 1–2 weeks of storage tended to be overcome with further storage. K. D. Jacob

The vitamin C content of edible Argentine vegetables. Osvaldo M. Repetto. *Anales asoc. quím. argentina* **27**, 140–4(1939).—See *C. A.* **33**, 7905[9]. E. M. Symmes

The composition and texture of dried peas. III. W. B. Adam. *Univ. Bristol, Fruit Vegetable Preservation* 2 *Research Sta., Campden, Ann. Rept.* **1938**, 60–7; cf. *C. A.* **33**, 2641[8].—Artificial drying of shelled mature peas for 6–7 hrs. at 120–160°F. appeared to toughen the texture very slightly. The time required for the ashing of dried peas in a muffle furnace to complete disappearance of the C was 24, 18, 8 and 2 hrs. at 500, 630, 750 and 900°C., resp. Peas ashed at 500° and at 900°, resp., contained 2.86 and 2.68% ash. The percentages of CaO, MgO and P_2O_5 in the ash increased and those of K_2O decreased 3 with increase in the temp. of ashing. The P content of peas, obtained by wet digestion, was 7% higher than that obtained by ashing. K. D. Jacob

Vitamin C in potatoes at Batavia. J. H. de Haas and O. Meulemans. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 181–4(1939).—Potatoes grown in Batavia had an av. vitamin C content of 13–15 mg.% when raw and 8–9 mg. % when boiled. E. Curzon

Polish honey from the chemical point of view. Jadwiga Podgórska. *Arch. Chem. Farm.* **4**, 23–36(in German, 4 36)(1939).—P. performed complete analyses of about 50 samples of domestic honey. The results of these analyses are given in 4 tables. In Polish honey of good quality the so-called ratio no. of Auerbach and Bodländer (L = (levulose/glucose) × 100) amounts to 88–116. 12 references. Edward A. Ackermann

The hygroscopic properties of honey. E. C. Martin. 5 *J. Econ. Entomol.* **32**, 660–3(1939).—Honey exposed to air establishes an equil. in water content with the air moisture. The uptake of water is at first rapid and then proceeds more slowly as equil. is reached. The exchange of water between honey and air is a surface phenomenon; but the change in water content occurs throughout the honey by diffusion. Through the formation of a surface film, the change in moisture content of honey in dry atms. is retarded. The optimum relative humidity for drying honey is not 0; and while not detd. exactly it lies 6 between 0 and 20%. Cryst. honey changes water content more rapidly than liquid honey. When cryst. honey is exposed to a moist atm. a steady liquefaction of the dextrose crystals takes place. Liquid honey contg. 17.4% H_2O is in equil. with the water vapor in air of 58% relative humidity; cryst. honey attains equil. at a slightly higher relative humidity. Honey is best stored at relative 7 humidities of not over 60%. Moisture exchange occurs through the capping of honey in the comb. The hygroscopic qualities of honey are due chiefly to the presence of levulose; but the other ingredients play some part. C. H. Richardson

Time and temperature in relation to the destruction of sugar-tolerant yeasts in honey. G. F. Townsend. *J. Econ. Entomol.* **32**, 650–4(1939).—The vegetation stages of *Zygosaccharomyces mellis, Z. nussbaumeri, Z. richteri, Z. nectarophilus* and *Torula mellis*, which are a common 8 cause of fermentation in Canadian honeys, are destroyed in honey contg. 18.6% moisture by heating 3 min., 35 sec. at 68.3° and by heating 180 min. at 54.4°. Intermediate times and temps. are shown in a graph. C. H. R.

The sugar concentrations of western nectars. Geo. H. Vansell. *J. Econ. Entomol.* **32**, 666–8(1939).—Nectars taken by pipet from various flowers, or from the honey 9 sacks of honeybees after they had visited the blossoms, were examd. by a refractometer for sugar content. Nectars from 8 varieties of plums showed from a trace to 28.4% sugar; nectar from 6 varieties of vetch 22.6–56.5%. Red filaree, black locust and several species of willows gave the highest values (60–65%), while several varieties of apricots, *Cleome lutea*, and madrone gave the lowest (10–12%). The av. sugar concns. in nectars from 76 plants in Western U. S. A. are tabulated. The data

represent an index of the theoretical honey value of the plants. C. H. Richardson

Analysis of ground pimento. Mme. Dumas. *Ann. fals.* **32**, 247-50(1939).—Analysis of 9 samples of the ground dried fruit of *Capsicum annuum* gave the following results: H_2O 6.79–13.07, nonvolatile oil 9.35–12.80, volatile oil 0.16–0.39, ash 5.80–6.99, carbohydrates (reducing matter in water-sol. ext.) 8.70–14.40, proteins (N × 6.25) 14.88–16.65, crude fiber 20.65–24.50%. The ash had the following compn.: H_2O-sol. 80.05–83.75, H_2O-insol. 16.25–19.95, alky. of ash (as K_2CO_3) 57.65–66.80, SO_3 2.95–3.48, P_2O_5 15.80–16.83, SiO_2 4.11–5.60, Fe_2O_3 + Al_2O_3 17.92–20.94, CaO 4.68–6.07, MgO 7.65–8.82, K_2O 33.28–35.87% and Mn trace. The nonvolatile oil was a deep-red, viscous liquid, with sharp taste, exhibiting no fluorescence under filtered ultraviolet light, possessing considerable drying properties, and having the following characteristics: n_{20} 1.4812–1.4836, I value 131.9–141.6, acid value 15.85–25.95, sapon. value 184–195 and ester value 164.40–173.25. A. P.-C.

Cacao powder: quality depends on important processes. K. E. Langwill. *Mfg. Confectioner* **19**, No. 10, 18–19 (1939).—The effects of various steps in processing cacao powder upon the quality of the product are discussed. George Ayers

Biochemical control of tea manufacture. A. L. Kursanov. *Bull. acad. sci. U. R. S. S., Sér. biol.* **1939**, 71–84(in English, 84).—Several easily detd. chem. and phys. values are proposed as indexes for the guidance of the processes involved in tea manuf. In particular, it is shown that the end of dry-curing can be detd. by the amt. of residual water, rolling by the percentage of crushed tissue, and fermentation by the decrease in sol. tannin. The optimum limits are 60–1% residual water, 77–85% crushed tissue, and 12–16% tannin. Tea processed in this manner is of higher quality than tea processed by the usual methods of production control. John Livak

Report of the biochemical department for 1938. [Tea manufacture.] Roland V. Norris. *Tea Research Inst., Ceylon, Bull.* No. **19**, 65–75.—Exts. prepd. from tea manufd. by the Clivemeare process contained slightly less caffeine, theotannin and sol. material than did those manufd. by the customary process. The better and stronger color of the Clivemeare ext. appeared to be due to some change in the character of the sol. materials and not to their total amt. As compared to that obtained by the customary process, the leaf leaving the Clivemeare roller had a higher enzymic activity and fermented more rapidly. K. D. Jacob

From which fodder plants and at what cutting times, is the greatest quantity of digestible protein harvested under the continental climatic conditions of central Germany? Alfred Gertler. *Kühn-Arch.* **48**, 56–124 (1939).—The protein contents and starch values of 9 legumes and several mixed grasses were detd. for various field and harvesting conditions. Plots which were mowed 5 times beginning in April yielded 12–55% more protein than those cut later and less often. The ratio of protein: starch value increased from 1.5.2 for the former to 1·14.2 for the latter. The drying of hay resulted in a loss from the green material of about 50% protein and 19% starch. Hay which was cut late (after the end of May) decreased 60% and 21% in protein and starch, resp. The red lupine was the best protein producer (2763 kg./ha.). The starch values of the different legumes did not parallel their protein contents. The max. protein formation in sweet vetch and soybean required 14–30 days longer than for max. starch production; their rates of formation in the grasses were more nearly parallel. Fifty-four references. C. K. Horner

The digestibility of fresh lucern, lucern hay, lucern meal and fermented lucern with sheep. K. Scharrer and R. Schreiber. *Z. Tierernähr. Futtermittelk.* **3**, 27–44 (1939).—The digestibility of dry matter, org. matter, crude protein and N-free ext. did not vary greatly in the hay, meal or fresh lucern, but was somewhat less for all of the constituents except crude protein in lucern silage which had been acidulated with either org. or inorg. acids. The digestibility coeff. for fat in the hay was 43.38 and in the meal, 48.13%. The digestibility coeff. for crude fiber was highest (52.42%) in the fresh lucern. The fat in the silage was more digestible than that in the untreated lucern. Acidulation of the silage with org. acids produced better digestibility of crude fiber than that with inorg. acids. The digestible protein content was high in both the hay and the meal but the starch value was higher in the meal. High values for starch and digestible protein were obtained with silage which was acidulated with either org. or inorg. acids. J. O. H.

The formic acid content of samples of fermented feeds and the error caused by formic acid in the determination of acetic, butyric and lactic acids. Oscar Flieg. *Z. Tierernähr. Futtermittelk.* **3**, 53–66(1939).—In the usual methods of detg. acetic, butyric and lactic acids in fermented feeds some HCO_2H is carried over into the distillate and influences the results of analyses. The HCO_2H content ranged from 0 to 0.09, with an av. of 0.032%, in 42 different samples of silage prepd. in various ways with addn. agents such as sugar and mineral acids. The HCO_2H content ranged from 0.011 to 0.348, with an av. of 0.172%, in 75 different samples which had been fermented in the presence of *Amasil*, a prepn. contg. 1 part of 90% HCO_2H in 20 parts H_2O. No relation was established between the HCO_2H content of the fermented feed on the one hand and the amt. of *Amasil* supplied, the kind of feed used, H_2O content of the green material, season of the year or duration of fermenting period on the other. The errors due to the presence of HCO_2H in feeds free from *Amasil* were negligible. With fermented fodder contg. *Amasil* the max. errors for acetic, butyric and lactic acids were, resp., +0.404, −0.078 and −0.204%. To avoid the direct detn. 3 equations for evaluating the HCO_2H content are proposed which operate in connection with the analytical procedure for the detns. of acetic and butyric acids. From the data obtained corrections can be made for the av. errors in the analytical results for acetic, butyric and lactic acids. Spoiled samples can be detected because of their low contents of HCO_2H. Applying the corrections to analytical data obtained on fermented feeds treated with *Amasil* gave reliable results in a large majority of cases. John O. Hardesty

The use of cull apples as feed for dairy cows. J. C. Knott. *Proc. Wash. State Hort. Assoc.* **33**, 43–6(1937).—Silage made from a mixt. of chopped apples 80 and chopped alfalfa hay 20% averaged 23.8% dry matter which contained crude protein 9.4, crude fiber 29.1, ether ext. 3.2, N-free ext. 51.2 and ash 7.1%. In a 2-yr. expt. on dairy cows, the digestibilities of the constituents of the silage were: dry matter 58, protein 51, fiber 49, ether ext. 47 and N-free ext. 70%. *Effect of Pb arsenate on cows.* Cows that were fed 30 lb. apples and 0.75–1.5 g. Pb arsenate (equiv. to 0.23–0.46 grain Pb and 0.083–0.166 grain As per lb. of fruit) per day for 2 months showed no ill effects except that they seemed to be more subject to digestive disturbances. Most of the As was excreted in the urine and little or none in the milk. Only traces were found in the blood. K. D. Jacob

Further studies on the nature of the effective supplements for soybean-oil meal in chick rations. J. B. Christiansen, H. J. Deobald, J. G. Halpin and E. B. Hart. *Poultry Sci.* **18**, 481–5(1939).—Flavin and possibly other vitamins appear to be factors supplied in inadequate amts. by soybean-oil meal. K. D. Jacob

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Detn. of fats in fatty products used in baking (Schmalfuss) **27**. Fractionation of the $CHCl_3$ ext. of maple sirup (Sair, Snell) **28**. [Report of] molasses lab. (Lamb) **16**. Recent developments in stored foods (Page, Lubatti) **1C**. App. for taking samples of milk and means for transporting the app. in a sterile condition (Brit. pat. 508,585) **1**.

Bleaching powder-dispensing device for flour mills. Paul E. Sage. U. S. 2,174,138, Sept. 26. Various structural, mech. and operative details.

Homogenizing apparatus for treating milk, etc. Wilfred

K. Krauss. U. S. 2,172,661, Sept. 12. Various structural, mech. and operative details.

Drying whey by the drum process. Geo. C. Supplee (to Borden Co.). U. S. 2,173,922, Sept. 26. There is added to whey an org., nongel-forming, nongelatinized, water-insol., antimelassigenic substance adapted to give porosity to the drying film, such as a diatomaceous earth, and the mixt. is desiccated by heating it to above about 93° on a drying cylinder.

Coating cheese to prevent mold growth. Ronald Wood. U. S. 2,172,781, Sept. 12. To prevent mold growth and loss of moisture and fat, the outer surface of cheese is softened by immersing it in an alk. soln. such as one of Na_2CO_3 at a temp. of about 88° until a portion of the cheese surface has been converted to an alkali caseinate coating of such thickness that when dry it is capable of preventing fat from sweating out through it, followed by drying the surface to harden the coating.

Fermentation process for improving odor, taste, stability and consistency of margarine or the like. Willy Ekhard. U. S. 2,172,531, Sept. 12. A process for improving margarine comprises treating the fat prior to churning with microörganisms of the class consisting of bacteria which produce an org. acid, and yeasts, in the presence of a carbohydrate which can be fermented by means of the microörganisms, and then treating the fat so as substantially to sep. the foreign fermentation products, the foreign fermentation products substantially being alc. and lactic acid formed by the action of the microörganisms. Details are given of the treatment of whale oil, peanut oil, soybean oil and tallow.

Preserving eggs. S. A. C. S. A. (Società anonima conservazione sterilizzazione alimentari). Brit. 507,524, June 16, 1939. See Fr. 838,999 (*C. A.* **33**, 6983[4]).

Use of salts and ultraviolet rays in curing meats. Hugh E. Allen (50% to Albert G. McCaleb). U. S. 2,173,992, Sept. 26. Curing salts such as a mixt. of NaCl with a minor proportion of $NaNO_2$, $NaNO_3$ and mono-Na glutamate, etc. (suitably in aq. soln.) are treated with rays such as those from a Hg-vapor quartz lamp before use in curing meats, which enables the curing process to be satisfactorily carried out at higher temps. (up to about 24°) than without the use of such actinic rays. Numerous examples are given.

Preservative tissue paper for wrapping citrus fruits. Robert G. Mispley and Wm. R. Barber (to Crown Zellerbach Corp.). U. S. 2,173,453, Sept. 19. A preservative tissue paper fruit wrapper contains about 0.0175 to 0.0297 of its wt. of biphenyl bonded to the sheet by a solvent carrying the biphenyl and consisting of liquid paraffin oil fortified with paraffin wax, the biphenyl-carrying solvent approximating between 7% and 9% of the wt. of the paper, the wrapper having resistance to disintegration by contact with moisture and capacity to prevent the dissipation and thus the loss in effect of the biphenyl by volatilization for a relatively long period of time, the wrapper permitting respiration of the fruit wrapped in it yet controlling evapn. of the fruit through its pores.

Apparatus for extracting juice from grapes without crushing the stems or seeds. Abele Ferrari, Mario Scalione and Cesare Rafanelli. U. S. 2,172,790, Sept. 12. Various details of an app. having an apertured drum and spiral beating blades mounted on a shaft within the drum.

Controlling the jelling properties of extracted pectins. Herbert T. Leo, Clarence C. Taylor and John W. Lindsey (to Mutual Citrus Products Co.). U. S. 2,173,260, Sept. 19. A method of controlling the temp. of set of pectin at a specified pH value comprises subjecting pectin to the action of an aq. acid soln. of a pH of about 1.25 at a temp. between about 60° and 77°, removing and testing a sample of the resulting soln. to det. the temp. of set of the pectin content at the specified pH value of such sample at the time of its removal, and, when the test indicates a satisfactory temp. of set at the specified pH value, interrupting the action of the aq. acid soln. by diln. with cold water and the addition of a buffer salt numerically to increase the pH of the soln. above about 2.7 to recover pectin having the desired temp. of set at the specified pH value, the temp. of set of the recovered pectin being equiv. to a temp. of set of about 103° at a pH of 2.30.

Food production from oleaginous seeds such as soybeans. Martin Cohn. U. S. 2,172,699, Sept. 12. App. is described, and a process which comprises swelling raw seeds in whole condition by soaking with water, pressing the raw, whole seeds into extremely thin skin-like films by forcing them under pressure through a very narrow gap between heated, revolving surfaces and retaining the films in contact with one of the heated surfaces until dry.

Cooking salt. Chematex Ltd. Brit. 507,904, June 19, 1939. In cooking, i. e., boiling, steaming, baking, grilling and frying, meat, vegetables, cereals and other foods normally cooked with NaCl, a prepn. is used that consists substantially of NaCl and contains 4–10% of Na or (and) K orthophosphate, the prepn. being in soln. alk. to methyl orange. The prepn. is applied directly to the foodstuff or dissolved in its cooking liquor. Sol. sulfates and (or) bicarbonates, e. g., 1-25% Na_2SO_4 or 1-10% $NaHCO_3$, may be included. Cf. *C. A.* **32**, 4291[4].

Gum confections. Arthur D. Fuller (to National Adhesives Corp.). U. S. 2,173,878, Sept. 26. Sugars are used with a chlorinated reaction product, formed from a starch and an alkali hypochlorite contg. excess alkali; it gives to the confection longer shelf life, greater jelling characteristic, increased transparency, and quicker drying characteristic than are possessed by gum confections employing thin or thick cooking starches.

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

Vocational guidance in chemistry and chemical engineering. Anon. *Ind. Eng. Chem., News Ed.* **17**, 701-6(1939). —Report of a committee of the Am. Chem. Soc. There is an extensive bibliography. E. J. C.

New chemical engineering building at Case School of Applied Science. E. A. Arnold and D. O. Hubbard. *Ind. Eng. Chem., Anal. Ed.* **11**, 675–7(1939). G. G.

Why we are storing manganese. W. T. Cobb. *Barron's* **19**, No. 46, 20 (Nov. 13, 1939).—Most of our supply comes from distant countries. Improvements in processes may make U. S. low-grade deposits more important.
A. M. Patterson

Tests available for the identification of small quantities of the war gases. H. E. Cox. *Analyst* **64**, 807–13(1939). —Notes are given for the detection of the following by known reactions: Cl, $COCl_2$, $COCl.OCCl_3$, $ClCOOCH_3$, $GCl_3.NO_2$, $C_6H_5.CH_2Br$, CH_3COCH_2Br, $CH_2Br.CO_2C_2H_5$, $CH_2I.CO_2C_2H_5$, $C_6H_5CHBr.CN$, $C_6H_5COCH_2Cl$, $[C_6H_5]_2$-AsCl, $[C_6H_4]_2NH.AsCl$, $[C_6H_5]AsCN$, $[C_6H_4]_2NH.AsCN$, $[CH_2CH_2Cl]_2S$, CHCl $CHAsCl_2$, $C_2H_5AsCl_2$, CH_3AsCl_2, $C_6H_5NCCl_2$, CH_3SO_3Cl and $C_2H_5SO_3Cl$. The question whether food that has been exposed to war gas is poisonous when taken internally will usually resolve itself into the detn. of the cyanide or As content. For the purpose of assessing the harmfulness it will be well to evaluate the poisonous properties in terms of HCN or As_2O_3. W. T. H.

Detection methods of war materials proposed in literature. Geo. Dultz. *Wien. Pharm. Wochschr.* **72**, 548–52 (1939).—A review dealing with β,β'-dichloroethyl sulfide, war chemicals contg. As (aliphatic and aromatic), $COCl_2$, Perstoff and chloropicrin. 20 references.
H. M. Burlage

Antidotal rocks and silicosis. F. Bremner. *Can. Mining J.* 60, 589–95(1939).—Many aluminous rock dusts are capable of reducing the soly. of quartz to a marked degree when mixed together in equal proportions. Dialyzable Al_2O_3 can be readily leached from many aluminous rocks and mineral dusts under conditions quite comparable with those existing in body fluids. This dialyzable Al_2O_3 is capable of forming stainless aluminous coatings on fractured quartz surfaces. The formation of this coating is the most important factor in reducing the true rate of soln. of quartz particles. The modifying effect of these dusts on the action of free SiO_2 in the lung is believed to be chiefly due to their coating ability. These aluminous dusts are not recommended as protector dusts when a more concd. and active form such as metallic Al is available. W. H. Boynton

Identification of hydrated alumina films of importance in silicosis prevention. L. H. Germer and K. H. Storks. *Ind. Eng. Chem., Anal. Ed.* 11, 583–92(1939).—Electron-diffraction diagrams are employed for the detection and identification of thin protective films of hydrous alumina on silica, as encountered in studies of the prevention of silicosis (cf. *C. A.* 31, 6369[8]; 33, 3019[8]). Films of silica about 200 A. thick were prepd. by vaporization onto thin condensed films of gold on glass, the gold being dissolved off as needed. Fragments of these films were then floated upon the surface of water in which aluminum powder was immersed and maintained for 1 or more days at 38°. Films so treated, and supported when necessary on an auxiliary film of "Formvar," yielded electron-diffraction diagrams of α-AlOOH, or *boehmite*. Substitution of $Al(OH)_3$ for Al in the treatment yielded much thinner films, but of the same compn. Silica or Formvar films alone gave amorphous ring patterns. In each case the α-AlOOH was more or less perfectly oriented with normals to a 6.2 A. spacing normal also to the films. Scums which formed on the water surface during prepn. of samples were identified in some cases (with paraffined beakers) as Al soaps or mixts. of Al soaps with α-AlOOH, and in others (with Bakelite beakers) as α-AlOOH. Attention is called to the fact that the hydrous alumina films are probably altered to α-AlOOH by the drying process preceding diffraction registration, not deposited as such. W. F. Bradley

Determination of the particle sizes of dusts. A. Winkel. *Chem. App.* 26, 265–9, 281–3(1939).—A review of methods of particle-size detn. with special reference to the application to chem. industries. 30 references. G. W. S.

The shattering of dust particles by the impinger. D. G. Beadle. *J. Ind. Hyg. Toxicol.* 21, 109–20(1939).—Large dust particles are shattered by the impinger method, thereby producing high dust counts. A. L. Elder

Further observations on the possible systemic toxicity of certain of the chlorinated hydrocarbons with suggestions for permissible concentrations in the air of workrooms. Cecil K. Drinker. *J. Ind. Hyg. Toxicol.* 21, 155–9(1939); cf. *C. A.* 31, 8681[8].—A high-Ca diet has no protective effect against liver lesions. Administration of xanthine does not prevent liver injury. High urinary chlorides follow the feeding of hexachloronaphthalene to dogs. The permissible limits of these compds. in air of workrooms is 0.5–10.0 mg./cu. m. A. L. Elder

Decomposition of halogenated hydrocarbon vapors by smoking. Hervey B. Elkins and Leo Levine. *J. Ind. Hyg. Toxicol.* 21, 221–5(1939).—Smoking cigarets, cigars and a pipe in air contg. 500–1000 p. p. m. of halogenated hydrocarbons yield little halide and on the basis of decompn. of compds. does not constitute a health hazard. A. L. Elder

Fatal subacute occupational lead poisoning. W. Ehrhardt. *Arch. Gewerbepath. Gewerbehyg.* 9, 407–13(1939).—A man working with Pb sprays suffered colic, vomiting, diarrhea, salivation, weakness of muscles and transitory paresis of the legs. Necropsy showed kidney and liver damage. Pb content of the blood was 185 γ %, that of the kidneys 370 γ in 10 g. of dry substance. M. M. R.

The urinary sulfate test in the supervision of workers exposed to benzene. C. M. Jephcott and F. M. R. Bulmer. *J. Ind. Hyg. Toxicol.* 21, 132–40(1939).—Data on 68 workers exposed to C_6H_6 indicate that the urinary sulfate test has some value in estg. the relative degree of exposure to C_6H_6 but is not a measure of the effect of C_6H_6 on the worker. A. L. Elder

The plastics industry. V. E. Yarsley and E. G. Couzens. *Mem. Proc. Manchester Lit. & Phil. Soc.* 83, 161–74 (1938–39); cf. *C. A.* 33, 4343[4]. E. H.

The measurement of the technical pressing properties of hardenable synthetic resin plastic materials. M. Krahl. *Kunststoff-Tech. u. Kunststoff-Anwend.* 9, 339–42(1939).—A review of testing methods with eight references. T. E. R. Singer.

How can a control laboratory check 100% phenolic resins accurately? J. B. Heymes. *Am. Paint J.* 24, 45–8(Dec. 4, 1939).—A table groups these resins: (1) those neither heat-reactive nor oil-reactive, (2) those that are oil-reactive, (3) those that are heat advancing or resin hardening and (4) dark low-cost or cresol resins. Characteristics are tabulated of 3 resins of each group. Improved control tests and uniform methods of testing should be established. W. H. Boynton

Analysis of synthetic resins containing maleic acid. Erik Sadolin. *Ind. Eng. Chem., Anal. Ed.* 11, 608–10 (1939).—Alkyd resins made with maleic acid and rosin (0.2-g. sample) were dissolved in 5 cc. benzene and refluxed 1 hr. with 20 cc. *N* KOH in 90% EtOH. After evapn. of EtOH and benzene, free rosin was pptd. by acidifying to Methyl Red. The rosin-maleic acid addn. product (I) remaining in soln. was pptd. by $Pb(OAc)_2$ as a mixt. of 33% $(C_{24}H_{31}O_6)_2Pb_3$ and 67% $(C_{24}H_{32}O_6)Pb$. Rosin alone and PhOH-CH_2O resins give no Pb ppts. in this procedure, while phthalate resins give a cryst. ppt. of $C_6H_4(COOH)COOK$ after the acidification step. The amt. of I decreases from 100 to 60% of the theory during resin prepn. at 260°. Arnold M. Collins

Polymeric resins in surface coatings. Arthur K. Doolittle. *Drugs, Oils & Paints* 54, 382–4(1939).—The most obvious difference between cross-linked or 3-dimensional structure and linear structure is that the former gives in general infusible resins and the latter thermoplastic resins. Where the growth of the large mols. involves ester linkages the chem. and water resistance of the coating is much less than where the growth takes place by satd. C-C linkages as in the polymerization of vinyl compds. Similarities and differences of several of the polymeric type resins are pointed out. The structural formulas of rubber chloride, copolymer vinyl chloride-acetate, depolymerized and cyclized rubber and polyacrylates and methacrylates with emphasis on the properties of vinyl resins are indicated. W. H. Boynton

Heat insulation. E. A. Allcut. *J. Can. Ceram. Soc.* 8, 4–9(1939).—The best insulators are those that combine high resistance to passage of heat, durability, resistance to fire, moisture and vermin. The "K" factor or cond. is defined as the quantity of heat that will pass through 1 sq. ft. of material in 1 hr. if the thickness is 1 in. and the temp. difference between the 2 surfaces is 1°. The reflection of radiant heat from bright metallic surfaces such as Al and Cu is frequently used for insulating purposes. Crumpled foil is also used to break up air spaces into small cells. Metallic paints are used on fiber, gypsum and other insulating boards but the effectiveness of such methods may be greatly reduced if the bright surface is obscured by dust or corrosion. The purpose of insulation is to get low fuel costs. This is generally obtained by blending still air and solid materials having low cost and low conductance, assisted in some cases by the use of reflective metallic surfaces. E. C. Petrie

Peat fiber fabrics as a base for artificial leather, oilcloth and linoleum. Felix Fritz. *Nitrocellulose* 10, 183–4 (1939).—A review. E. M. Symmes

Finishing fancy and saddle leather substitutes made from synthetic rubber. M. E. Slepyan. *Kozhevenno-Obuvnaya Prom.* 18, No. 3, 29(1939).—The following compn. was used satisfactorily for finishing fancy and saddle leather substitutes made from synthetic rubber: casein 6 kg., petrolatum 10% (of casein), stearin 6%, glycerol 80%, liquid ammonia 6% and formalin 15%. B. Z. Kamich

Chemistry's new "building blocks." Sydney B. Self. *Barron's* **19**, No. 49, 13–16(Dec. 4, 1939).—A description of some of the new products of the principal chem. companies. A. M. Patterson

Acryloids. W. T. Pearce. *Drugs, Oils & Paints* **54**, 382(1939).—Acrylates are polymers of the esters of acrylic and methacrylic acids. All are of water-white color, good color retention in direct sunlight, diffused light or when baked at normal temps., all possess good elec. properties and are very resistant to water, acids, alkalies and chem. fumes. Solns. of these resins are thermoplastic. These resins are compatible with nitrocellulose, most chem. plasticizers, aromatic hydrocarbons, ketones, esters, ether alcs. and ether esters. Several grades are noted. A 25% dispersion in water of an acrysol is marketed which is especially useful for application to rubber or rubberized surfaces. W. H. Boynton

Determination of dry residue in shoe dressings. P. S. Kofman and P. S. Kopelovich. *Kozhevenno-Obuvnaya Prom.* **18**, No. 3, 19(1939).—A sample of the shoe dressing is carefully spread out by rubbing between two 9 × 12 cm. weighed glass plates; the plates are then weighed and dried in an oven at 100–150°. If the dry residue is 30–40% or higher a 1.5–2-g. sample should be used, if 15–30% a 0.75–1.5-g., and if 10–15% a 0.2–0.75-g. Differences between detns. do not exceed 0.2% and the accuracy is sufficient for control work. B. Z. Kamich

Recent developments in the fumigation of buildings, stored foods and other materials. A. B. P. Page and O. F. Lubatti. *Chemistry & Industry* **1939**, 1001–6. E. H.

Fireproofing mine shafts. Joseph R. Guiteras. *Can. Mining J.* **60**, 606–8(1939).—A review of various methods. W. H. Boynton

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Synthetic plastics (Marty) **21**. Silicosis (Fowweather) **7**. Formation of abnormal tissue in chestnut and filbert branches damaged by toxic gas (Biraghi) **11D**. Bituminous materials and their uses in the elec. industry (Heilmann) **22**. Semiresin finishes for cotton piece goods (Trowell) **25**. Toxic effects on rabbits of pentachlorophenol and Na pentachlorophenate (Kehoe, *et al.*) **11H**. Adsorptive properties of synthetic resins (Bhatnagar, *et al.*) **2**. Soap goes through the mill—comparison of wetting agents (Hulme) **27**. Viscosity reduction method for com. evaluation of hydrocarbon solvents for synthetic varnish resins (Huff, *et al.*) **26**. Ornamental woven elastic fabric [to simulate leather] (U. S. pat. 2,173,976), **25**.

Fog or mist suitable for military camouflage or plant protection. Paul Kronenberg. U. S. 2,173,756, Sept. 19. App. is described, and a process of producing fog or mist which comprises applying in divided liquid form an org. substance which leaves no solid residue when burned and selected from the group consisting of crude paraffin oil, solid paraffin, lignite oil, crude petrolatum, naphthalene, anthracene, oleic acid, mineral oils, tallow, tar and pitch, to an oxidizing catalyst consisting of a metallic oxide on a porous carrier in the presence of air, such substance being applied in such quantities as will produce a partial and flameless combustion.

Plastic, molding and coating compositions. Jack D. Robinson (to National Aniline & Chemical Co.). U. S. 2,173,181, Sept. 19. Resins or gums or cellulose esters or ethers are plasticized with the alpha-phenyl ether of diacetin or other aryl ethers of glyceryl mono- and diacetates, propionates, butyrates, laurates, lactates, benzoates, cresotinates, salicylates, naphthoates or cyclohexanoates.

Granular plastic material suitable for molding. Robert C. Hills and Maxwell M. Barnett. U. S. 2,174,000, Sept. 26. A granular plastic material is produced by dissolving an alkali metal sulfide and S in water 500 cc., heating the resulting soln. to 90°, treating it with 500 cc. of a 37% formaldehyde soln., filtering, washing and drying.

Oil compositions. Bakelite Ltd. Brit. 507,770, June 20, 1939. Oil compns. comprise a processed oil and a special oil-sol. phenol-aldehyde resin. The processed oil is obtained by bodying by blowing or oxidizing drying or semidrying oils and the resin is obtained by condensing a substituted phenol with CH_2O in the presence of a basic catalyst until a resin is formed that has a m. p. not less than 50° and is curable at 160° in 1–10 min. The compns. may be used as *coating, molding, calendering, floor covering* and *impregnating compns.* Among examples, a resin obtained by condensing (1) a high-boiling phenolic compd. with aq. CH_2O in the presence of $(CH_2)_6N_4$ is blended with heated blown soybean oil with or without blown fish oil, and (2) *p*-phenylphenol with aq. CH_2O in the presence of $Ba(OH)_2$ is blended with blown fish oil in the presence or absence of fillers (asbestine, clay, wood flour, cotton flock), pigments (C black, TiO_2) and hardening agents (PbO, $(CH_2)_6N_4$ or paraform).

Resins. Bakelite Ltd. Brit. 507,013, June 7, 1939. Resins are produced by causing a phenol to react with a polyvinyl compd. and causing the product to react with an aldehyde. The products may be dissolved in org. solvents to form coating compns. and adhesives and may be used in laminated bodies, e. g., safety glass. Among examples, PhOH and polyvinyl acetate are refluxed and the product is then condensed with paraformaldehyde to a rubbery material.

Synthetic resins. Wm. H. Moss. Brit. 506,999, June 5, 1939. Resins are prepd. by causing a phenol, an aromatic sulfonamide and a compd. contg. at least 2 halogen atoms attached to different C atoms of an aliphatic grouping to react. The reaction may be conducted in aq. alkali under reflux or on the fiber of textile materials such as cotton, linen, regenerated cellulose or cellulose derivs., e. g., di-(4-hydroxyphenyl)dimethylmethane and *p*-toluenesulfonamide (I) in mildly alk. soln. are applied to cellulose acetate, followed by glycerol dichlorohydrin (II). The products may be molded, used in *coating compns.*, or for *crease-proofing textiles.* In examples, resins sol. in Me_2CO, alc. and C_6H_6 are prepd. by condensing diphenylolpropane, I and *sym*-II in the mol. proportions (1) 1:1:2 and (2) 1:1:1, and cellulose acetate rayon is crease-proofed by immersion in an alc. soln. of the product of (1). Compns. may comprise the resins together with film-forming substances, e. g., nitrocellulose, org. esters of cellulose, cellulose ethers and vinyl resins. The resin may be pptd. from soln. onto a finely divided cellulose deriv. or may be absorbed thereby from soln. or dispersion. Solns. of these compns. in volatile solvents, with or without plasticizers, medium- or high-boiling solvents, natural or synthetic resins, fire retardants, pigments, dyes or effect materials may be used as adhesives or coating or impregnating compns., e. g., for protecting rubber or other insulation, or as insulating materials. Solns. contg. the resins and cellulose esters or ethers may be formed into threads or films or used as *airplane fabric dopes.* Those contg. coloring materials may also be used as *printing inks for plastic material*, e. g., cellulose acetate films. The compns. may be molded.

Synthetic resins. I. G. Farbenind. A.-G. (Karl Keller and Werner Zerweck, inventors). Ger. 679,341, Aug. 7, 1939 (Cl. 12*p*. 10). Addn. to 669,807 (*C. A.* **33**, 5547[2]). Amino and hydrazine compds. contg. two 5-membered rings in the mol. are condensed with low mol. fatty aldehydes to give resins. Thus, guanazoguanazole (obtained by heating an aq. soln. of guanazole-HCl with dicyanodiamide) is condensed with CH_2O. Other examples are given. In each case, the structural formula of the double-five-membered ring compd. used as the starting material is given.

Synthetic resins. Soc. pour l'ind. chim. à Bâle (Wilhelm Kraus, inventor). Ger. 679,874, Aug. 17, 1939 (Cl. 12*o*. 17.05). Hardenable resins produced by condensing $(CH_2)_6N_4$, CH_2O and urea or thioureas are caused to react with low-mol. carboxylic acid amides or urethans in less than equimol. amts. to give water-free press masses. Examples are given.

Synthetic resin compositions. Vernay Patents Co. Brit. 507,501, June 15, 1939. Elements for use as the

control element of a thermostat are prepd. by dissolving a synthetic rubber in a molten normally cryst. material, e. g., Ph_2, dibromo- or dichloro-benzene, the m. p. of which is below the decompn. temp. of the synthetic rubber and is such that it melts or fuses in the temp. range over which the thermostat is to operate, uniformly distributing in the mixt. a finely divided solid material that is a good conductor of heat, e. g., graphite, C, Sb, Al, Cu, and forming the mixt. into a body of the desired shape. Suitable synthetic rubbers are polymers of vinyl chloride or chlorobutadiene.

Synthetic resinous products. R. P. R. Association (formerly Rubber Producers Research Association), Cyril A. Redfarn and Philip Schidrowitz. Brit. 507,995, June 23, 1939. These are obtained by treating rubber (I) simultaneously with maleic anhydride (II) and a phenol at elevated temp. and then further condensing the I-II-phenol product with an aldehyde. The 1st stage may be accelerated by the presence of O or air and catalysts, e. g., H_2SO_4 or $(COOH)_2$; the 2nd stage may be conducted in acid or alk. medium. Molding compns. are obtained by incorporating fillers, mold lubricants, coloring substances and hardening agents with the resin by hot milling. Rubber vulcanizing ingredients may be added to the molding compns.

Synthetic resinous products. R. P. R. Association, Ernest H. Farmer and Jack W. Barrett. Brit. 507,996, June 22, 1939. Products ranging from elastic, rubber-like materials through fibrous substances to brittle resins are obtained by causing maleic anhydride (I) to react with rubber (II) in soln. and maintaining the mixt. at elevated temp. Catalysts or condensing agents, e. g., Bz peroxide, Bz tolnyl peroxide, may be used in amts. up to 30% of the wt. of the II. As a modification, the I and II may be heated together with a vinyl compd., e. g., styrene, vinyl acetate, Et α-methacrylate. The II is preferably in dil. soln. in a solvent such as toluene, xylene, decalin, cyclohexane or C_6H_6.

Vinyl resin compositions. I. G. Farbenindustrie A.-G. Brit. 507,600, June 19, 1939. Compns. for impregnating and insulating, e. g., for cables, condensers and transformers, comprise chlorinated $C_{10}H_8$ or chlorinated Ph_2 and not more than 11% thereof of polyvinyl carbazole.

Phenolic resinous product. Victor H. Turkington and Wm. H. Butler (to Bakelite Corp.). U. S. 2,173,346, Sept. 19. A process for producing a sol. condensation product capable of undergoing further substantial condensation on the application of heat and of forming uniform homogeneous products when treated with an excess of substantially neutral resins, drying oils or mixts. thereof, comprises treating (1) a phenol substituted in the para-position by a hydrocarbon radical having 4–7 C atoms, in the absence of unsubstituted phenol and (2) a substantial excess of CH_2O over the equimol. proportion, the reaction being carried out with the aid of a strong alk. catalyst.

Resinous products from aldehydes and acrylic amides. Daniel E. Strain (to E. I. du Pont de Nemours & Co.). U. S. 2,173,005, Sept. 12. Products which are suitable for coatings or molded articles are formed by the reaction of monomeric amides of the acrylic acid series having the general formula $H_2C{-}C(R)COOH$ in which R may be H or a hydrocarbon radical, with aliphatic aldehydes of lower mol. wt. such as CH_2O.

Polyvinyl acetal resin compositions. Dr. Alexander Wacker Gesellschaft für elektrochemische Industrie G. m. b. H. Brit. 507,247, June 13, 1939. Materials, e. g., for hats, are stiffened by treatment with a compn. comprising a H_2O-insol. polyvinyl alc. ester-acetal resin that is prepd. from a polyvinyl alc. or ester having a viscosity of 100 or less; it contains 50–70% acetal groups, 10–30% ester groups and 15–25% OH groups, or has a viscosity above 100 and contains said groups in the proportions 40–60, 25–50 and 5–15%, resp. The resins may be prepd. by simultaneous sapon. of a polyvinyl alc., e. g., acetate, and acetalization, e. g., with AcH; or by acetalization of polyvinyl alc. in the presence of a carboxylic acid, e. g., AcOH. Alternatively, H_2O-insol. polyvinyl alc.-ester-acetals in general may be used, in conjunction with EtOH-sol. urea-CH_2O resins, acetylated polyglycols or polyglycerols, bleached shellac, or interpolymers of vinyl compds., e. g., esters, with drying or semidrying oils, or mixts. thereof. Among examples straw hats are treated with a soln. in EtOH, AcOEt and toluene of polyglycerol acetate and a resin prepd. from polyvinyl acetate of viscosity about 500 and contg. acetal groups 65, ester groups 25 and OH groups 10%.

Synthetic resin coating compositions. Bakelite Ltd. Brit. 507,769, June 20, 1939. A coating compn. capable of giving oil- and grease-resistant films comprises a blown and (or) polymerized oil, a heat-convertible synthetic resin and a nonheat-convertible synthetic or natural resin. Among examples, compns. are prepd. contg. (1) a condensate of tar acids and CH_2O prepd. in the presence of NH_3, blown fish oil and oxidized abietic acid, the blend being aftertreated with paraformaldehyde or the initial oxidized abietic acid and blown oil being treated with glycerol if desired, and (2) a condensate of *p*-phenylphenol and CH_2O prepd. in the presence of an acid catalyst, $(CH_2)_6N_4$, cumar resin and blown fish oil. The compns. may be used to coat paper, cardboard, pulp board, cloth, asbestos, canvas and the coated material used to manuf. boxes, oilproof and chemically resistant containers, etc.

Polyvinyl acetal resin films. The Fiberloid Corp. Brit. 508,105, June 19, 1939. A continuous sheet of polyvinyl acetal resin is prepd. by homogeneously mixing resin and a compatible plasticizer therefor and simultaneously or subsequently softening by heat and extruding the mixt. through the slot of a die, all in the absence of a volatile solvent. Specified mixes contain a polyvinyl acetate about 90% hydrolyzed and about 80–85% acetalized with CH_2O, mixed with diethyleneglycol dipropionate with or without camphor or glycol laurate.

Decomposition products of synthetic resins. Phillips Petroleum Co. Brit. 507,339, June 14, 1939. The complex products obtainable by the reaction of SO_2 with aliphatic compds. contg. an olefinic linkage are decompd. by reaction with an inorg. or org. basic reagent or a soln. thereof. The products so obtained include neutral oils contg. C, H, S and O and salts of S-contg. org. acids, probably sulfinic acids; the latter may be oxidized, e. g., with air, O or $KMnO_4$. The oily products may be used (a) *for extg. aromatic hydrocarbons from hydrocarbon mixts.*, e. g., cracked gasolines, (b) *for sepg. lubricating oils from paraffin*, (c) *as plasticizers* for the complex compds. obtainable from SO_2 and unsatd. compds., or (d) *as rubber softeners*. The alkali salts of the S-contg. acids may be used as soap substitutes and emulsifying agents. Among examples, butene-2, allyl alc. or undecylenic acid is treated with an equimol. proportion or more of SO_2 in sunlight or ultraviolet light or in the presence of a catalyst, e. g., nitrate of Ag, Li, NH_4 or K; excess SO_2 is allowed to evap. and the residual resin is treated with hot NaOH soln.; the product is extd. with Et_2O to recover neutral reaction products and the residue from the Et_2O extn. is acidified and extd. again, with or without intermediate oxidation.

Resinous condensation products. I. G. Farbenindustrie A.-G. Brit. 508,016, June 21, 1939. These are obtained by esterifying glycolic or lactic acid with a polyhydric alc., e. g., glycol, glycerol, 1,1,1-trimethylolpropane, erythritol, pentaerythritol, and then condensing with a polybasic acid, e. g., phthalic, succinic, adipic, methyladipic, maleic, fumaric and a monocarboxylic acid free from alc. OH groups, e. g., stearic, linseed or wood oil acids, montanic, abietic, BzOH or monocarboxylic acids obtained by the oxidation of paraffin. A solvent is advantageously added and H_2O removed by azeotropic distn., removal being accelerated by a current of indifferent gas. The resins obtained have good compatibility with pigments, e. g., ZnO, and with nitrocellulose.

Phenol-aldehyde condensation products. I. G. Farbenindustrie A.-G. Brit. 507,208, June 8, 1939. Masses capable of hardening rapidly in the cold are prepd. by mixing a liquid phenol-CH_2O resin with an acid or neutral hardening agent and at least 1 aliphatic ester of an inorg.

acid. The hardening agent and the ester may be added separately. In an example, a mixt. of *p*-toluenesulfonyl chloride, $BaSO_4$ and powd. quartz is mixed with a liquid PhOH-CH_2O resin and glycolchlorohydrin, dichlorohydrin, dichloropropanol, epichlorohydrin, ethylene chloride or Et_2SO_4 and the resulting mass allowed to harden.

Phenol-acetaldehyde condensation products. Ellis-Foster Co. Brit. 507,658, June 14, 1939. Phenol-AcH resins are heated to at least 180° in the presence of a small amt. of an oxalate or $(COOH)_2$ to decolorize them. The condensation of the phenol and AcH is preferably effected in the presence of an acid having a dissocn. const. of $2\ 10^{-1}$–$1\ 10^{-3}$, e. g., $(COOH)_2$, and acid of P, and the phenol may be pretreated with or treated simultaneously with the condensation with a small amt. of an aldehyde of greater mol. wt. than AcH, or with methyl ethyl ketone or a higher ketone or with a diphenylolbutane or other diphenylol-substituted hydrocarbon. Among examples, (1) cresylic acid is condensed with paraldehyde in the presence of $(COOH)_2$, heated to 220°, blended by being heated with tung oil and dissolved in naphtha *to yield a varnish*, and (2) xylenol is condensed with a mixt. of gaseous AcH and hydrocarbon gases in the presence of $(COOH)_2$ and the condensate, after having been heated to 210°, is blended with linseed and tung oils and dissolved in naphtha to *yield a varnish*.

Urea-aldehyde condensation products. I. G. Farbenindustrie A.-G. Brit. 507,175, June 12, 1939. Masses for embedding specimens or tissues and for filling up parts of optical app., etc., are produced by an acid condensation of urea and (or) thiourea with CH_2O in the presence of a polyhydric alc. or partial ester or ether thereof, or of sugar and H_2O, H_2O being distd. off during and after condensation and the final H_2O content of the resin being 10–50%. At least 2 mols. CH_2O is employed per mol. of urea, the amt. of polyhydric alc., etc., being 0.5–4 times the wt. of urea. Among examples, (1) a soln. of urea in aq. CH_2O is allowed to flow, under reduced pressure, into glycerol in which is dissolved a small amt. of phthalic anhydride, the temp. being maintained at 70–75° and H_2O being vaporized continuously; the resulting resin is dild. with alc. to a dry resin content of 75%, a little aq. $(COOH)_2$ soln. is added, and the soln. is degasefied under reduced pressure and allowed to flow into a display glass in which is arranged, e. g., a bunch of heather, the filled glass being sealed with rubber, and (2) a resin soln. is prepd. from urea dissolved in aq. CH_2O and a glycol mixt., consisting mainly of monodiglycol ether, with a little adipic acid and is used as in (1).

Urea-formaldehyde condensation products suitable for lacquers. Sydney L. M. Saunders and Leonard W. Coveney. U. S. 2,174,012, Sept. 26. A process for prepg. a synthetic resin compn. comprises heating in the presence of an acid catalyst a primary condensation product of urea and CH_2O dispersed in a monohydric alc. solvent having at least one H atom attached to the hydroxyl C in the presence of sufficient CH_2O to bring the total CH_2O present in both the free and combined state into excess of that corresponding to dimethylol urea, and distg. off alc. solvent along with water, both any originally present in the reaction ingredients and that formed during the condensation reaction; the heating is continued until the product is sol. in hydrocarbon solvents and the acidity of the alc. solvent is maintained throughout the heating.

Condensation products. Compagnie nationale de matières colorantes et manufactures de produits chimiques du Nord réunies établissements Kuhlmann. Ger. 679,956, Aug. 17, 1939 (Cl. 12*o*. 26.02). Condensation products from polyhydric alcs., polybasic acids, natural resins and drying oils are obtained by (1) condensing excess of a polyhydric alc. with a polybasic aromatic acid and a natural resin or a mixt. of natural resins, (2) heating the product to above 210° in an autoclave with linseed oil, till a homogeneous mass is obtained. Thus, glycerol, phthalic anhydride and colophony are condensed and the product is condensed with linseed oil to give a thick fluorescent product. Other examples are given.

Electric insulation. Karl E. Prindle (to Dobeckmun Co.). U. S. 2,173,726, Sept. 19. There is used, in a dynamo-elec. machine having a core and windings, a resilient laminated material insulating the core from the windings and having at least 2 coextensive plies thermoplastically secured together, one formed of paper consisting essentially of rag and sulfite fibers and the other of cellulose acetate.

Electric insulation. The British Thomson-Houston Co. Ltd. Brit. 506,560, May 31, 1939. Insulation comprises a porous cellulosic material impregnated with a dielec. substance consisting wholly or partly of a chlorinated diphenylene oxide that is solid at normal temps., particularly with a mixt. of chlorinated diphenylene oxide and pentachlorobiphenyl. Direct chlorination of diphenylene oxide, e. g., at 125–180°, in the presence of a catalyst, e. g., Fe, Sb or Fe or Sb chloride, produces solid products of wax-like consistency and high dielec. consts.

Heat insulation. Theodore B. Slisz and Clyde C. Schuetz (to United States Gypsum Co.). U. S. 2,173,815, Sept. 19. A sheet of metal foil is adhesively secured to a base material such as paper or sheet asbestos, and the material is thereafter indented to a depth sufficient to cause rupture of the metal foil adjacent the indentations.

Magnesia heat insulation. Earle R. Williams (to Johns-Manville Corp.). U. S. 2,172,861, Sept. 12. Insulation is prepd. by a method which involves treating a dil. aq. suspension of finely divided MgO with CO_2 to form $MgCO_3$, mixing the resulting aq. product with asbestos fibers and a small proportion of a water-sol. soap, molding, heating to form Mg basic carbonate and effecting setting for retention of shape, removing the product from the mold and further heating it for drying.

Insulating compositions. Standard Telephones and Cables Ltd., Thomas R. Scott and Archibald A. New. Brit. 508,035, June 26, 1939. Insulating materials, which may be in the form of plates, tapes or films, comprise glass or quartz fibers or filaments embedded in a solid polymerized olefin. An org. dust having a permittivity greater than 5 may also be present, e. g., glass, mica, quartz or ceramic dusts.

Impregnated material suitable for insulation, containers, etc. Christopher Luckhaupt. U. S. 2,173,882, Sept. 26. Porous material such as paper or pulp board, which is insol. at elevated temp. in terpinol hydrate mixed with triphenyl phosphate, is impregnated with these substances so that it is rendered nonpermeable to water and alc. App. for effecting the treatment is described.

Alkylated chloro aromatic hydrocarbon mixtures. Robert R. Dreisbach (to Dow Chemical Co.). U. S. 2,174,069, Sept. 26. A product which may be used as a dielectric or for plasticizing synthetic resins, etc., is produced by treating, in the presence of a Friedel-Crafts catalyst such as $AlCl_3$, at least one chlorinated aromatic hydrocarbon of the benzene series having not more than 4 Cl atoms attached to the benzene nucleus, such as chlorobenzenes, with a complex mixt. of gaseous olefins such as may be obtained by cracking a petroleum fraction.

Cold-workable dielectric composition suitable for sealing cable conduits, etc. Silvio Pellerano. U. S. 2,174,164, Sept. 26. A plastic, adhesive, cold-workable non-setting, waterproof dielectric compn. is formed of a coumarone-indene resin, chlorinated paraffin, a heavy solvent plasticizing oil and inert fillers such as asbestos and powdered soapstone.

Cables. Vereinigte Aluminium-Werke A.-G. and Siemens-Schuckertwerke A.-G. Brit. 508,015, June 20, 1939. Cables are sheated with Al of at least 99.9% purity, which, owing to this high purity, has a tensile strength of 3–10 kg. per sq. mm. and an elongation of 30–50%. The Al, which may be formed by subjecting normal electrolytic Al to a form of fusing electrolysis in the so-called 3 layer system, may be applied to the cable by extrusion or in the form of bands.

Cables. Standard Telephones and Cables Ltd., Thomas R. Scott and John K. Webb. Brit. 508,034, June 26, 1939. A power cable comprises lappings of fibrous material impregnated with polymerized material, cable compd. permeating the space between the lappings.

Lappings of fibrous material impregnated with compd. may also be included, either between the polymer-impregnated lappings and the sheath or interleaved with the polymer-impregnated lappings. The cable may be mass impregnated or oil filled. The polymer may be polystyrene, which may be plasticized as described in Brit. 490,814 (*C. A.* **33**, 1062[7]) or blended with other polymers, or the insulation may comprise material treated as described in Brit. 454,923 (*C. A.* **31**, 1909[7]).

Cables. British Insulated Cables Ltd., Francis J. Brislee and Laurence Macfarlane. Brit. 508,916, June 29, 1939. A cable comprises 1 or more conductors insulated with siliceous material dried at 350–600° and enclosed in a sheath of Al or an alloy in which Al predominates. Asbestos may be applied as a roving and impregnated with Na silicate soln.

Adhesives. Wingfoot Corp. Brit. 507,327, June 13, 1939. These comprise a natural or artificial rubber latex as the disperse phase of an emulsion with a soln. or dispersion of a condensation deriv. of rubber as the continuous phase. The latex may be vulcanized or may contain polymerized chloroprene, and the rubber condensation deriv. is obtained by treating rubber with the halide of an amphoteric element, e. g., as described in Brit. 306,390 (*C. A.* **23**, 5062). Emulsifying agents, e. g., solns. of casein or rosin, may be used. The adhesive may be applied to rayon that is to be incorporated in rubber tires or belts.

Wetting agent. Böhme Fettchemie-G. m. b. H. (Heinrich Bertsch, inventor). Ger. 676,343, June 1, 1939 (Cl. 8*o*). Addn. to 659,528 (*C. A.* **32**, 6773[5]). The products obtained by esterifying low mol. monohydric aliphatic alcs. contg. up to 8 C atoms, with the H_2SO_4 esters of unsatd. fatty acids, or with hydroxy fatty acids contg. the H_2SO_4 ester group or the COOH group or both, and with a no. of C atoms corresponding to castor oil, are used as wetting agents in the form of their NH_4 salts. Examples mention the NH_4 salt of hydroxystearic sulfuric acid isopropyl ester, the NH_4 salt of the product from BuOH, and castor oil fat acid, and the NH_4 salt of ricinoleic sulfuric acid Bu ester.

Wetting agents, etc. I. G. Farbenindustrie A.-G. Brit. 507,207, June 8, 1939. Hydrohalides of substituted isothioureas are made by causing thiourea or a deriv. thereof contg. at least 1 reactive H atom and capable of reacting in the iso-form to react with a halomethyl compd. of formula $RXCH_2Y$ or $R'X'CH_2Y$, where R is an aliphatic, aliphatic-cycloaliphatic or aliphatic-aromatic radical contg. at least 11 C atoms, which may contain substituents and (or) may contain an O, S or N atom as a hetero-atom in an aliphatic C chain or as a bridge directly linking an aliphatic portion of the radical to a cycloaliphatic or aromatic nucleus, R′ is an alkyl radical, which may contain a substituent, X is hydroxyphenyl in which the OH group is in *o*- or *p*-position to the halomethyl group, or is -CON(R″)- or -OCON(R″)- or -NHCON(R″)-, X′ is -CON(R)- or -OCON(R)-, R″ is H or alkyl and Y is a halogen atom. The products are sol. in, or capable of being emulsified with, H_2O and may be used in the *treatment of textiles*. Among examples, thiourea is caused to react with the chloromethyl compds. obtained by the reaction of H halides and paraformaldehyde on (1) stearic acid amide, (2) 9,10-dichlorostearic acid amide, (3) *N*-dodecylacetamide, (4) *p*-isotetradecylphenoxyacetic acid amide, and triethylthiourea is caused to react with the *N*-chloromethyl compd. of the amide from hardened train oil fatty acid.

Wetting agents, etc. Edmund Waldmann and August Chwala. Brit. 507,766, June 20, 1939. Addn. to 460,858 (*C. A.* **31**, 4748[8]). Products having wetting, dispersing, cleansing and foaming properties are obtained by heating to about 100–220°, so far as possible in the absence of H_2O, a salt of an aliphatic halohydroxysulfonic acid contg. at least 3 C atoms with an imidazoline having at least 10 C atoms. The imidazoline bases may be liberated from their salts by the addn. of anhyd. AcONa or anhyd. alk. salts, e. g., Na_2CO_3, borax, Na_3PO_4. In an example, powd. Na γ-chloro-β-hydroxypropane-α-sulfonate is heated with heptadecenylimidazoline and calcined, powd. Na_2CO_3 stirred into the resulting mass.

Sulfated alkoxy cyclohexanols. Herbert A. Lubs (to E. I. du Pont de Nemours & Co.). U. S. 2,174,131, Sept. 26. *Wetting, dispersing, deterging* and *emulsifying agents* suitable for use as *dye-bath aids* and in general as textile assistants, etc., are produced by sulfonating dodecyloxycyclohexanol and various related compds. The products form stable Na salts.

Acid-substituted hydroxy alkylamines. Wolf Kritchevsky. U. S. 2,173,058, Sept. 12. Compds. which may be used as *emulsifying, dispersing* or *wetting agents*, e. g., for dispersing vat dyes or oils in aq. media, and which may involve the substitution of one, two or three H atoms of the OH groups of triethanolamine or the like by a higher fatty acid radical such as stearyl, linoleyl, abietyl or lauryl, are produced by condensing a hydroxy alkylamine with a higher fatty acylating compd., as by heating triethanolamine for several hrs. at 150–175° with stearic acid or oleic acid.

Sulfated acyloins. Clyde O. Henke and Joseph L. Richmond (to E. I. du Pont de Nemours & Co.). U. S. 2,174,127, Sept. 26. By the sulfation of capryloin, caproin or mixed acyloins, *wetting, dispersing, deterging* and *emulsifying agents* are obtained, suitable for use as *dye-bath assistants* and in general as textile assistants. Several examples with details are given.

Alkylolamine derivatives (detergent, emulsifying and flotation agents, etc.). Morris B. Katzman and Albert K. Epstein (to Emulsol Corp.). U. S. 2,173,448, Sept. 19. Reaction products having a light color and substantial freedom from odor result from the reaction of an alkylolamine and higher carboxylic acids contg. at least 6 C atoms, their esters, anhydrides, and mixts. thereof, at temps. above 100° while steam is passed through the reaction mass, and the reaction mixt. rapidly cooled while a steam atm. is maintained at least until partial temp. reduction has been effected. Among the higher carboxylic acids which may be employed in the reaction as such or in admixtures of any two or more or in the form of their anhydrides are the following: caproic, capric, caprylic, hydroaromatic acids such as abietic acid, aromatic acids such as benzoic, benzoylbenzoic, naphthoic, toluic, and naphthenic acids, hydroxystearic acids, montanic acid, satd. and unsatd. fatty acids of higher mol. wt. particularly those derived from natural fats and oils, such as palmitic acid, stearic, lauric, myristic, melissic, oleic, ricinoleic, linoleic, or mixed higher fatty acids derived from animal or vegetable fats and fish oils such as lard, oleo oil, coconut oil, corn oil, cottonseed oil, soybean oil, partially or completely hydrogenated vegetable oils such as cottonseed oil, corn oil, sesame oil, and fatty acids of various waxes such as beeswax and carnauba wax. Among the esters of higher carboxylic acids which may be utilized in the reaction, most important are the naturally occurring triglyceride oils and fats and the waxes which are esters of higher carboxylic acids and monohydric alcohols. These may be derived from animal and vegetable sources and include the following: cottonseed oil, coconut oil, corn oil, sesame oil, soybean oil, lard, oleo oil, stearin, fish oils such as sardine oil, and the oils whether partially or completely hydrogenated, beeswax, carnauba wax, etc. Others include the esters of lower mol. wt. alcs. and higher carboxylic or higher fatty acids, examples of which esters are ethyl stearate, butyl laurate, propyl palmitate, ethyl oleate, etc. Particularly satisfactory products have been obtained with coconut oil. Various examples with details are given for the obtainment of products suitable for use in *cosmetic creams* and for other purposes.

Condensation products suitable for use as wetting or cleansing agents, etc. Albert F. Bowles and Saul Kaplan (to Richards Chemical Works). U. S. 2,172,747, Sept. 12. Urea, thiourea or gelatin is condensed with an alkylene oxide such as ethylene oxide and with an aldehyde contg. 8–20 C atoms, such as "cocoanut aldehyde" (suitably by heating at 180–200° in the presence of an

alkali metal hydroxide or acetate). Numerous examples with details are given.

Condensation products. I. G. Farbenind. A.-G. (Heinrich Ulrich, inventor). Ger. 676,407, June 3, 1939 (Cl. 12*p*. 15). Addn. to 656,934 (*C. A.* **32**, 4356[8]). In making products by the method of 656,934, by condensing a ketone with polymerized ethylenimine and C_3H_4O, β-keto carboxylic acid esters are used as the ketone. The example mentions acetoacetic ester. The products are used as *assistants in the leather, textile, varnish* and *rayon industries*.

Leather substitute. I. G. Farbenind. A.-G. (Hans Fikentscher, inventor). Ger. 679,825, Aug. 15, 1939 (Cl. 39*b*. 4.02). Leather waste is mixed with an aq. emulsion contg. unsatd. polymerized aliphatic compds., the water removed and the resulting mass brought to desired shape. Thus, a 25% aq. dispersion of polymerized Et acrylate, obtained by polymerizing the monomeric acrylate in the presence of the Na α-hydroxyoctodecane sulfonate and H_2O_2, is mixed with chrome leather chips to form a paste which is dried and pressed between hot rollers. Cf. *C. A.* **33**, 6999[1].

Polymerized compounds. I. G. Farbenind. A.-G. (Christoph Dörfelt and Kurt Billig, inventors). Ger. 679,944, Aug. 16, 1939 (Cl. 39*b*. 4.02). Alkylideneacetic acid esters are polymerized and mixed with other polymerizable compds. Thus, a mixt. of vinyl acetate and ethylideneacetic acid esters is treated with benzoyl peroxide to give a polymerization product comprising a transparent, colorless, glassy block. Other examples are given.

Polymerized masses. Deutsche Celluloid-Fabrik. Ger. 679,896, Aug. 15, 1939 (Cl. 39*b*. 4.02). The resistance to light and heat of synthetic polymerizates contg. Cl is improved by extg. with org. liquids which do not cause swelling and which dissolve out the low-mol. constituents. Thus, chlorinated polyvinyl chloride is extd. with 94% alc. contg. 2% toluene at 40° in powder form.

Polymerization products of vinyl esters. I. G. Farbenind. A.-G. (Arthur Voss and Werner Heuer, inventors). Ger. 679,943, Aug. 16, 1939 (Cl. 29*b*. 4.02). Addn. to 666,866 (*C. A.* **33**, 2216[8]). Mixts. of org. vinyl esters and other unsatd. org. compds. are polymerized by using peroxides of fatty acids with at least 4 C atoms in the mol. Thus, a mixt. of vinyl acetate and the dimethyl ester of maleic acid is treated with oleic acid peroxide to give a viscous product. Other examples are given.

Vinyl polymerization products. The Distillers Co. Ltd., Herbert M. Stanley and Hanns P. Staudinger. Brit. 506,812, June 5, 1939. Elec. insulation members are formed from a material prepd. by polymerizing polystyrene in a solvent, e. g., isopropylbenzene, contg. 0.001–1% of a diolefin hydrocarbon contg. at least 2 aliphatic >C :CH_2 groups sepd. by at least 2 C atoms, e. g., *p*-divinylbenzene, α,α′-dimethyl-*p*-divinylbenzene, divinylacetylene, 4,4′-divinylbiphenyl, 1,4-divinylnaphthalene, *p*,*p*′-divinylstilbene, 1,3,5-hexatriene.

Vinyl polymerization products. I. G. Farbenindustrie A.-G. Brit. 506,926, June 6, 1939. Rubber-like products are obtained by incorporating *N*-vinylcarbazole with a preponderant amt. of solid, highly polymerized isobutylene, the amt. of the carbazole being at least 2% of the mixt., and heating the mixt.

Polymerized vinyl compounds. I. G. Farbenind. A.-G. (Rudolf Bappert and Georg Wick, inventors). Ger. 679,897, Aug. 18, 1939 (Cl. 39*b*. 4.02). A continuous method for prepg. polymerization products from vinyl compds. consists in passing the monomeric vinyl compd. through a tube of emulsified substance such as Na α-hydroxyoctodecanesulfonate, the solid polymerizate being collected at the end of the tube. An example is given.

Hydrocarbon polymer compositions. Kabelwerk Vacha A.-G. Brit. 506,855, June 6, 1939. An elec. insulating material consists of a mixt. of polystyrene and polyisobutylene, the latter being 10–95% of the mixt., with or without an addn. of bitumen. The ingredients are mixed in a kneader at an elevated temp., e. g., 100–200°, and are worked up by extruding or calendering while they are hot. A suitable solvent, e. g., CCl_4, or monomeric styrene, may be added to facilitate extrusion, the styrene being polymerized during the subsequent shaping.

Hydrocarbon polymer compositions. Standard Telephone and Cables Ltd., Thomas R. Scott and Malcolm C. Field. Brit. 507,323, June 9, 1939. An elec. insulating material is prepd. by adding a polymerized aliphatic monoolefin contg. less than 6 C atoms to a monomeric or partially polymerized mononuclear aromatic vinyl hydrocarbon, allowing the olefin to swell or dissolve in the aromatic compd. and then subjecting the mixt. to the action of heat to polymerize the aromatic compd. Alternatively, the material may be prepd. by dissolving the polymerized olefin and the polymerized vinyl hydrocarbon in a common solvent and then heating the soln. to drive off the solvent. The monoölefin may be C_2H_4, C_3H_6, C_4H_8 or C_5H_{10} and the vinyl hydrocarbon may be styrene. Addnl. substances may be incorporated in the insulating material, e. g., by admixt. with the vinyl hydrocarbon prior to polymerization thereof, or by dissolving in the soln. Specified addns. are rubber, balata, guttapercha, with or without a rubber plasticizer such as ceresin, hydrocarbon waxes, and, when the material contains polystyrene, a plasticizer comprising a stable homocyclic C compd. having 2 or 3 fused rings, a b. p. higher than 240°, a low elec. moment and capable of swelling polystryrene, e. g., phenanthrene, isoamylnaphthalene, α-propylnaphthalene, fluorene or β-naphthyl methyl ether.

Textile cleansing and wetting compounds, etc. Meindert D. Rozenbroek. U. S. 2,173,638, Sept. 19. A compd. suitable for use in various textile treatments is produced by the reaction of an ether made from a polyhydric alc. and an aliphatic alc. of high mol. wt., such as the monostearyl or monolauryl ether of glycol, or an ester made from a polyhydric alc. and an aliphatic acid of high mol. wt., with an inorg. acid derived from P, or PCl_3 or P_2O_5, and sulfonating the resulting inorg. acid ester.

Detergent compounds. Cortes F. Reed (50% to Charles L. Horn). U. S. 2,174,110, Sept. 26. A method of forming substitution products contg. S, Se or Te and O and a halogen, from hydrocarbon-contg. compns. such as paraffin, involves treating the latter with a mixt. of a halogen such as Cl and a dioxide of S, Se or Te, hydrolyzing the reaction product, and treating the resulting compd. with an oxidizing agent such as air.

Coating compositions. Dunlop Rubber Co. Ltd., Alfred Niven, Edward A. Murphy and Evelyn W. Madge. Brit. 506,931, June 7, 1939. Matt surface finishes on articles are prepd. by coating them with a suspension obtained by forming a soln. of a resinous substance in a volatile solvent and adding to the soln. a further solvent in which the resinous substance is less sol. but which is miscible with the original solvent. In examples, coating compns. are obtained by dissolving (1) a vinyl resin in C_6H_6 or AcOEt and mixing the soln. with EtOH, and (2) shellac or colophony in alc. and mixing the soln. with H_2O.

Coating compositions. Alexander D. Macdonald (to B. B. Chemical Co. Ltd.). Brit. 507,637, June 19, 1939. The gelling tendency of liquid adhesives comprising solns. of plastic polymerized chloroprene in a solvent is diminished by the addn. of $NHEt_2$ and an ethanolamine. The chloroprene may be the product described in Brit. 468,435 (*C. A.* **32**, 833[9]) and the solvent may be C_6H_6, trichloroethylene, toluene, xylene or CCl_4. The compn. may also contain ZnO, MgO, S and an accelerator, e. g., a butyraldehyde-$PhNH_2$ condensation product. The product may be used in uniting outsoles to shoe bottoms.

Coating agents, priming and knifing compositions and putties. I. G. Farbenindustrie A.-G. Brit. 506,796, June 1, 1939. These contain as a binding agent an aq. dispersion of a polyvinyl compd., a resin soap and a chemically drying film-forming substance. Addnl. substances that may be added are resins, high mol. fatty acids, org. solvents, softening agents and pigments. Among examples, a putty that does not smear glass is made from an aq. dispersion of Me polyacrylate 31.8, H_2O 15.9, resin soap 15.9, a soln. of a condensation prod-

uct of phthalic acid, linoleic acid and glycerol in toluene or xylene 28, a resin oil obtained in the distn. of colophony 63.6, sperm oil fat acids 17.8 and whiting 827 parts.

Coating surfaces. Bakelite Ltd. Brit. 507,768, June 20, 1939. Articles are coated by immersing them successively in a mass of a heat-hardenable coating material, e. g., phenol-aldehyde resins, polyhydric alc.-polybasic acid resins, in liquid form and then, without intermediate exposure, in a mass of a heating liquid immiscible with the coating material. Molten alloys, molten wax, oils and other inert relatively nonvolatile org. liquids or melted solids may be used as heating liquids. App. is described.

Coating pipes, containers and agitating apparatus. Robert Wighton Moncrieff and Alfred Richmond. Brit. 507,488, June 14, 1939. App. for the storage, transport or treatment of liquids is given a surface resistant to aq. AcOH by forming on the surface a coating comprising an acetate of cellulose of Ac value about 58% or more. Where the surface is one to which the cellulose acetate does not readily adhere, e. g., of Fe or other metal, it is advantageous to apply 1 or more priming coats contg., e. g., nitrocellulose or a synthetic resin. In an example, a wooden vat is coated with a soln. of cellulose triacetate in $CHCl_3$.

Coated and impregnated paper suitable for table covers, building purposes, etc. Nicholas E. Oglesby. U. S. 2,173,129, Sept. 19. A process of treating a porous absorbent paper involves treating the paper with a water-resistant satg. medium which is flexible when set and selected from semidrying oils, drying oils and resins in the presence of above substantially 18% of water, the percentage of water being figured on the base paper wt., to incorporate therein solids to the extent of 50–150% of the base paper wt., drying the satd. paper and applying to the satd. paper a flexible, water-resistant finishing coating selected from paints, lacquers, varnishes and resins, whereby a durable waterproof composite article is formed which is not subject to cracking when bent and in which the bond between the finishing coat and the base is maintained when the article is subjected to flexing and bending in normal handling and use. U. S. 2,173,130 involves a flexible coated paper including a paper backing contg. an agent adapted to impart wet strength to the sheet and an agent adapted to soften the sheet, contg. semidrying oil present to the extent of 20–50% of the base paper wt. and a surface coating selected from paints, lacquers, varnishes and resins, the composite article being durable and water-resistant and not subject to cracking when bent, the bond between the surface coating and the treated base paper being of a nature to resist cracking and peeling when the article is subjected to flexing and bending in normal handling and use.

Zein films and coatings. Corn Products Refining Co. Brit. 507,807, June 21, 1939. Zein films, either cast or in the form of coatings, or other zein bodies, contg. a volatile solvent for zein are made resistant to H_2O and other liquids by being brought into contact, while in an incompletely dried but nontacky state, with steam at substantially atm. pressure. The solvent may be MeOH, EtOH, iso-PrOH, and a plasticizer, e. g., diethylene glycol, di-Bu tartrate, may be used. For increased hardness, CH_2O may be incorporated in the soln. The soln. may be used for lining paper containers, etc.

Impregnating compositions. Siemens & Halske A.-G. Brit. 507,855, June 21, 1939. An impregnating and sealing medium for elec. purposes is made by partially depolymerizing a hydrogenated "rubber hydrocarbon" (I) having a high degree of polymerization (I denoting a polymerization product of butadiene and its homologs, e. g., isoprene or dimethylbutadiene, or assocd. mixed polymerizates) by heating it, with exclusion of O from the atm., to such an extent that it is rendered readily sol., particularly in liquid benzine hydrocarbons or chlorinated hydrocarbons, and readily fusible without the use of a solvent and without decompn., and preferably to such an extent that the viscosity of a 10% soln. of the product is so low that the soln. is filterable through paper without the aid of pressure. Among examples, hydrogenated highly polymerized isoprene rubber in solid insol. form (obtained by heating isoprene with Na in a closed vessel and treating the product at 180–200° with H under 70 atm. pressure in the presence of a catalyst consisting of finely divided Ni) is heated, e. g., at 270°, in an autoclave contg. H at moderate pressure, e. g., 10 atm.; the product is dissolved in com. benzine, the soln. is passed over highly active Al_2O_3 under reduced pressure, liquid paraffin is added and the solvent is then removed by distn. under reduced pressure in several steps.

Press masses. Soc. pour l'ind. chim. à Bâle (Wilhelm Kraus, inventor). Ger. 679,873, Aug. 17, 1939 (Cl. 12o. 17.05). Hardenable masses are produced by condensing CH_2O, $(CH_2)_6N_4$ and urea or a mixt. of urea with other substances which react with CH_2O. The condensation takes place at a pH value of 3 with absorption of heat. Only sufficient $(CH_2)_6N_4$ is present to allow the reaction to remain acid at first, the whole being added subsequently. Examples are given.

Masses containing absorbents for the liquid constituents. N. V. W. A. Scholten's Aardappelmeelfabrieken. Brit. 506,929, June 7, 1939. A fibrous material obtained by washing potatoes until the remaining fibers contain 15% or less of starch and then drying and comminuting the fibers is used as an absorbent for the liquid constituent of plastic, explosive and other compns. comprising a liquid or liquefied constituent. Thus, the fibrous material may be used as a *substitute for cork meal in the production of linoleum, for wood meal* as a *filler in synthetic resin compns.* and *for diatomaceous earth* as an *absorbent for nitroglycerin*, etc., *in the manuf. of explosives.*

Bodying tung oil for use with fibrous material such as paper gaskets. Leander H. Hills (to Vellumoid Co.). U. S. 2,172,974, Sept. 12. Tung oil is heated to about 280° and then, before gellation occurs, cooled rapidly to below 175° in the absence of resin.

Compound sheet materials. Theophil Graser Brit. 508,210, June 28, 1939. Layers of wood veneer and fabric with an interposed foil of a cellulose deriv. are pressed together under heat to produce a reinforced veneer. A veneer may be provided with a triple layer of cellulose deriv., fabric and cellulose deriv. on both sides.

Plastic packing suitable for stuffing boxes. Frank E. Payne (to Crane Packing Co.). U. S. 2,173,744, Sept. 19. A packing is formed comprising an elongated compressible curved body contg. long fibers of heat-resistant materials such as asbestos with graphite and a binder of vulcanized rubber-like material, with a superficial reinforcing fabric.

Compressed powder magnetizable cores. Siemens & Halske A.-G. Brit. 506,878, June 6, 1939. A process for improving the permeability of compressed-powder cores produced by extrusion comprises adding to the mixt. of magnetic powder particles and binding agent, substances that improve the flowing capacity of the binding agent at the extrusion temp. so that a smaller proportion of binding agent is needed. Suitable substances are natural and artificial resins and salts of org. acids of high mol. wt., e. g., Ca stearate.

Transparent bodies. Patent-Treuhand Ges. für elektrische Glühlampen m. b. H. (John H. Partridge and Marcello Pirani, inventors). Ger. 679,916, Aug. 16, 1939 (Cl. 80*b*. 8.07). Glass-like bodies of m. p. above 1500° are made by sintering a powd. mixt. contg. at least 85% Al_2O_3 and SiO_2, at least 1% ThO_2 and at least 2% of BeO or MgO or both. The powder is sintered below the m. p.

Light-polarizing sheets. Edwin H. Land and Howard G. Rogers (to Polaroid Corp.). U. S. 2,173,304, Sept. 19. A transparent sheet which polarizes light by differential absorption of transmitted components comprises oriented long-chain mols. of an org. plastic such as dehydrated polyvinyl alc. some of which are dichroic and some of which are negligibly dichroic, the dichroic mols. being the product of an alteration within the sheet of the mol. structure of negligibly dichroic mols. and consisting only of atoms of elements present in the negligibly di-

chroic mols. Such alteration may be effected by heating while undergoing stretching.

Wax-like substances. I. G. Farbenindustrie A.-G. Brit. 507,244, June 13, 1939. These are produced by condensing aliphatic amines, having at least 1 hydrocarbon or hydroxylated hydrocarbon chain of 8 C atoms and at least 1 H atom attached to N, with cyclic polycarboxylic acids not capable of forming inner anhydrides, or functional derivs., e. g., halides or esters, thereof. Part of the amine may be replaced by an aliphatic polyamine, e. g., ethylenediamine, triethylenetetramine, or mixts. thereof. The materials may be condensed by heating together in the presence or not of high-boiling solvents or alkalies and with or without the addn. of oils, fats, waxes or the acids therefrom. Solvents for the products are turpentine and its substitutes, alcs., aromatic hydrocarbons, mineral-oil fractions, oils, fats, paraffin, ozocerite, ceresin and natural or synthetic waxes. The products may be purified, e. g., by active C, bleaching earths, sulfurous acid or H_2O_2; they may be used alone or in compns. for impregnating paper and textiles, and in wax compns., e. g., polishes and shoe creams. Among examples, terephthalic acid is condensed with octodecylamine (I), di-Me terephthalate is condensed with dodecylamine, and trimesic acid is condensed with I.

Antifreeze compositions. Wm. R. Canfield. U. S. 2,174,220, Sept. 26. A compn. having a freezing point below −45° contains NH_4Cl and Na_2CO_3 approx. 1 part each, a water-miscible polyhydric alc. such as glycerol 2–3 parts, and at least sufficient alkali metal hydroxide to neutralize acidity produced by other constituents, in an aq. soln.

Noncorrosive antifreeze liquid. Headlee Lamprey (to Carbide and Carbon Chemicals Corp.). U. S. 2,173,689, Sept. 19. An alc. such as EtOH or ethylene glycol is used with a corrosion inhibitor comprising a nitrite such as $NaNO_2$ and an alkali metal salt of maleic, crotonic, cinnamic or furyl acrylic acid, etc. Cf. *C. A.* **34**, 200².

Cooling medium for internal-combustion engines and heat-exchange systems. I. G. Farbenindustrie A.-G. Brit. 508,437, June 30, 1939. The medium consists of an aq. soln. contg. at least 10% of 1 or more neutral alkali metal fluorides with the addn. of 0.1–5% of the wt. of the fluoride(s) of an alkali metal silicate or chromate to lessen the corrosion, or comprise an aq. soln. of a fluoride of about 10% concn. and a monohydric alc. up to 50% by vol. of the soln., with or without the addn. of the silicate or chromate.

Sharpening files, rasps and the like with use of acid. Emanuele Zoppi. U. S. 2,173,218, Sept. 19. A method is employed which involves: (1) subjecting the articles to the degreasing action of a boiling 5% aq. NaOH soln.; (2) removing the articles from the NaOH soln. and rinsing them; (3) placing the articles in a bath consisting of about equal amounts of HCl and water, in which they are left for about 12 hrs. at normal temp.; (4) removing the articles from the acid bath and rinsing them; (5) placing the articles in a bath formed of HNO_3 of 42°Bé. 20 and water 80 parts in which they remain for 5–10 min. at normal temp.; (6) removing from the acid, rinsing and neutralizing any adhering acid in a milk of lime bath.

Apparatus for applying cellulose acetate solution, etc., to strands of material such as textile-covered wire. Waldemar C. Ewaldson and Heinz Kress (to Western Elec. Co.). U. S. 2,172,837, Sept. 12. Various structural, mech. and operative details.

Permanent waving of hair. Myles W. Fletcher (to Utility Sales Corp.). U. S. 2,173,297, Sept. 19. A mixt. which may comprise a chlorate such as $KClO_3$ about 3 and a powd. metal such as Al of a fineness of about 30 mesh about 1 and a powd. metal oxide such as Cu oxide about 1 part is used with a heat-producing soln. of NH_4Cl, etc.

Heat-generating materials for use in waving hair. Abraham R. Goldfarb and Edwin B. Michaels (to Lawrence R. Bruce, Inc.). U. S. 2,173,683, Sept. 19. A package for use in waving hair comprises a container of paper or cloth holding a filter of Al or other metal such as Zn or Mg and a mercurous salt such as HgCl which generate heat when moistened with a water-sol. NH_4 compd. Various examples are given.

Printing. Gerhard G. W. Madaus, Friedemund J. N. Madaus and Johannes M. T. Madaus (trading as Dr. Madaus & Co.). Brit. 508,166, June 27, 1939. Freshly printed matter is sprayed with a soln. in H_2O and alc. of a substance chemically related to the cellulose of the paper, e. g., hydrophilic colloids such as methylcellulose or other cellulose ethers. The soln. is obtained by swelling up the cellulose ether in H_2O, homogenizing the soln. and mixing it with alc. Thus, a soln. contg. 200 g. methylcellulose dissolved in 10 kg. H_2O, to which 2 kg. alc. is added, is made up and this soln. dild. before use.

Covering for printing rollers. Gustave Auvray. U. S. 2,172,491, Sept. 12. A composition for the manuf. of coverings for printing rollers, etc., consists essentially of an intimate admixt. of about 100 parts of satd. aq. $MgCl_2$, 95 parts of com. wheat starch having a water content of about 0.5–9%, the starch having had an original water content of about 13%; $MgCl_2$ in an amt. corresponding to the difference in wt. between the first-mentioned water content of the starch and its original water content; and 2 to 10 parts of a slightly drying oil.

Inking rollers for lithographic printing machines. Coates Brothers & Co. Ltd. and Lancelot Coates. Brit. 508,239, June 28, 1939. The rollers comprise a steel or other metal body having a surface of Cu that is not liable to be rendered ink repellent by the etches or gum arabic used in the printing. The rollers preferably comprise a Cu-plated steel roller that has been cleaned with a soln. of 1 in alc., provided with a film of bituminous wash-out and finally washed with paraffin or other ink solvent.

Hectograph roll or blanket. Wm. Hoskins, Jr. (to Ditto, Inc.). U. S. 2,172,873, Sept. 12. A duplicating sheet comprises a flexible backing such as paper or cloth, a layer of hectograph compn. applied to the backing and an adhesive compn. contg. an adsorbent inorg. colloidal material such as bentonite securing the hectograph compn. to the backing.

Electrotype matrices. Herbert Libberton (to Tenak Products Co.). U. S. 2,172,563, Sept. 12. A method of making a molded tablet for use as an electrotype matrix consists in applying a layer of plastic material upon an Al sheet of predetd. stiffness and then forming the tablet throughout its entire thickness, including the Al sheet, to the general contour of a master pattern while the specific configuration of the pattern is impressed upon a surface of the layer of plastic material. U. S. 2,172,564 relates to a moldable tablet for use in the prepn. of electrotype, comprising a sheet of Al of predetd. stiffness, a binding film on a surface of the sheet, a layer of moldable material secured to the sheet by the binding film and a parting layer in the exposed surface of the moldable material.

Inhibiting screw-thread seizure. Charles E. S. Place (to Clare L. Brackett). U. S. 2,173,003, Sept. 12. A covering coating of graphite is rolled into the thread surfaces. U. S. 2,173,004 also relates to the use of a thread-surface coating of a stable, nonoxidizing, heat-resistant material such as graphite.

Lightning arrester. Syuhei Huzitaka and Tositaro Takenouti. U. S. 2,173,625, Sept. 19. Plates of Cu covered with Cu sulfide are used in direct and intimate contact with plates of Al.

Air-permeable soles for footwear. Karl Mayer and Richard Haupt. Brit. 508,824, July 6, 1939. These comprise a basic material of felt, thick fabric, air-permeable paper, etc., uniformly impregnated with a soln. of an artificial resin and dried without hardening of the resin so as to preserve pliability. A nonhardening resin, e. g., polyvinyl acetate, is preferably used. A small quantity of nitrocellulose may be admixed with the impregnating soln.; also softening agents, e. g., tritolyl phosphate, or fillers, e. g., chalk.

Stiffening fabrics such as those for toes of shoes. Bjorn Andersen (to Celluloid Corp.). U. S. 2,173,821, Sept. 26. In the use of a stiffening material such as muslin contg. cellulose acetate, there is applied to an article such

as a box toe blank comprising an outer layer such as leather and the stiffening material a softening soln. contg. a solvent for the cellulose deriv. such as acetone, and an alkali such as NH_4OH which has a softening action on the outer layer, and the treated article is shaped and dried.

Stiffening sheet material such as that for box toes of shoes. Roy S. Ritchie (to Celluloid Corp.). U. S. 2,173,861, Sept. 26. A process of mfg. a sheet material capable of being made adhesive, flaccid, shaped and stiffened comprises prepg. a soln. of a cellulose deriv. such as cellulose acetate in a low-boiling solvent such as acetone, impregnating a base sheet material such as muslin with the soln. and then speedily pptg. the cellulose deriv. by applying a heated vapor of a pptg. agent such as steam to the impregnated sheet material.

Stiffening material for box toes of shoes, etc. Ernest Schweizer (to Celluloid Corp.). U. S. 2,174,170, Sept. 26. An arrangement of app. is described, and a method of forming a stiffening material comprising a base such as a suitable fabric impregnated with a cellulose deriv. compn. (such as one of cellulose acetate) which involves impregnating the base with a liquid medium comprising the deriv. of cellulose, a volatile solvent for the deriv. of cellulose and water, and applying steam to the impregnated material under such conditions that at least the bulk of the volatile solvent is removed while the water content of the impregnated material is increased whereby the deriv. of cellulose is pptd. on the base in a porous form, all steps being performed in substantial absence of air.

Insect-repellent materials. Albert Smith. Brit. 508,163, June 27, 1939. A prepn. for application to stockings, etc., comprises sucrose octoacetate and an insect repellent, e. g., oil of citronella, with or without menthol and thymol, and in some cases with the addn. of quinine, which may also replace the oil of citronella. The ingredients are made up with a base of soap flakes when for use as an aq. wash, or with spirit, e. g., methylated spirit, when intended as a spray.

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14—WATER, SEWAGE AND SANITATION

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15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Report of the Imperial Agricultural Chemist. B. Viswa Nath. *Sci. Repts. Imp. Agr. Research Inst., New Delhi* **1937–38**, 85–104; cf. *C. A.* **32**, 4265[5], 4206[1].—*Soils.*—The black soils of India, although differing in their geol. origin, are characterized by their high clay content with high values for Al silicates. Under the influence of large diurnal differences in temp. and high satn. deficit, they have developed profiles with high SiO_2:Al_2O_3 ratios, high base-exchange capacity and relatively high exchangeable Na and Mg in lower depths. The red, brown and laterite soils, irrespective of their origin, are characterized by low clay content, low exchange capacity and lower SiO_2:Al_2O_3 ratios. The pinkish soils of the Indus basins and valleys and their tributaries, which are probably derived from granitic syenites or other massive rocks yielding syenites during the early stages of decompn., show alky. to a greater or less extent. Their profiles indicate varying degrees of decompn., setting free alkali, and Fe and Al moving into lower layers. In arid and semiarid regions Ca constitutes 70–80% of the total exchangeable bases while Mg, Na and K together vary between 5 and 15%. In regions with high rainfall the exchangeable Ca is lower at the surface than in deeper layers. The black soils have the highest total exchange capacities, the red soils intermediate and the laterites the lowest values. Soils that in 6 weeks fail to nitrify more than 25% of the N added as oil-free mustard cake occur in a strip running east to west, the entire width of the northern strip of Peninsular India, and comprise practically all types of soils and climatic regions. The defective nitrification cannot be correlated with any of the soil characteristics so far detd. *Fixation of atm. N by cereal crops.*—Expts. with maize and wheat, grown in ignited and washed sand in an atm. free from combined N, indicated that these cereals are able to fix atm. N to the extent of about 40–57% of the total N present in the crop. *Effect of org. manures and fertilizers on the nutritive quality of wheat.*—Grain from plants fertilized only with cattle manure contained more total protein, had a higher net protein value, a decidedly higher digestibility coeff. and a slightly higher biol. value than did that from plants receiving only mineral fertilizers or no fertilizer. In all cases the values obtained

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Septic tank sludge ejector. Duer H. Buckley (to J. W. Swanson). U. S. 2,173,932, Sept. 26. Various details of app. provided with a sludge pump.

Removing phenol from waste water. Hydrierwerk Scholven A.-G. (Wilhelm Urban, inventor). Ger. 679,974, Aug. 18, 1939 (Cl. 12*q*. 14.01). PhOH is removed from waste water from hydrogenation processes by using the PhOH-rich water as the washing liquid in the high-pressure washing system at the point where the vaporized hydrogenated oil has been condensed by cooling. The oil then removes the phenol.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Report of the Imperial Agricultural Chemist. B. Viswa Nath. *Sci. Repts. Imp. Agr. Research Inst., New Delhi* **1937–38**, 85–104; cf. *C. A.* **32**, 4265[8], 4266[1].—*Soils.*—The black soils of India, although differing in their geol. origin, are characterized by their high clay content with high values for Al silicates. Under the influence of large diurnal differences in temp. and high satn. deficit, they have developed profiles with high SiO_2:Al_2O_3 ratios, high base-exchange capacity and relatively high exchangeable Na and Mg in lower depths. The red, brown and laterite soils, irrespective of their origin, are characterized by low clay content, low exchange capacity and lower SiO_2:Al_2O_3 ratios. The pinkish soils of the Indus basins and valleys and their tributaries, which are probably derived from granitic syenites or other massive rocks yielding syenites during the early stages of decompn., show alky. to a greater or less extent. Their profiles indicate varying degrees of decompn., setting free alkali, and Fe and Al moving into lower layers. In arid and semiarid regions Ca constitutes 70–80% of the total exchangeable bases while Mg, Na and K together vary between 5 and 15%. In regions with high rainfall the exchangeable Ca is lower at the surface than in deeper layers. The black soils have the highest total exchange capacities, the red soils intermediate and the laterites the lowest values. Soils that in 6 weeks fail to nitrify more than 25% of the N added as oil-free mustard cake occur in a strip running east to west, the entire width of the northern strip of Peninsular India, and comprise practically all types of soils and climatic regions. The defective nitrification cannot be correlated with any of the soil characteristics so far detd. *Fixation of atm. N by cereal crops.*—Expts. with maize and wheat, grown in ignited and washed sand in an atm. free from combined N, indicated that these cereals are able to fix atm. N to the extent of about 40–57% of the total N present in the crop. *Effect of org. manures and fertilizers on the nutritive quality of wheat.*—Grain from plants fertilized only with cattle manure contained more total protein, had a higher net protein value, a decidedly higher digestibility coeff. and a slightly higher biol. value than did that from plants receiving only mineral fertilizers or no fertilizer. In all cases the values obtained

on grain from unfertilized plants were higher than those on grain from plants receiving mineral fertilizers. *Anthocyanin pigments in the rind of sugar canes.* The pigments isolated from the rind of colored canes, such as Purple Mauritius, Red Mauritius and Badila (Fiji B), appeared to be mostly monomethyl derivs. of *delphenidine*. The coloring matters were successfully eliminated in sulfitation sugar factories by heavy liming and then using $Al(OH)_3$. K. D. Jacob

Colloid chemical investigation on the soils near the Osaka Harbor. I. Test on the solidity. Noriyosi Morita and Tosizo Titani. *J. Chem. Soc. Japan* **60**, 826–30(1939).—The results of the compression test of the soils collected from various parts and various depths of the Osaka Harbor are given. It has been shown that the soil from a certain depth shows min. compressibility. **II. Water content, velocity of drying and contraction ratio.** *Ibid.* 831–4.—The results of the detn. of water content, velocity of drying and contraction ratio are given. T. K.

The quantity, distribution and composition of the organic matter and available nitrogen in Egyptian soils. David S. Gracie and Fahmy Khalil. *Ministry Agr. Egypt, Tech. Sci. Service, Bull.* 222, 42 pp.(1939).—Samples taken from 24 profiles at depths of 0–25, 25–50, 50–75 and 75–100 cm. averaged 0.84, 0.64, 0.57 and 0.53% org. C and 0.074, 0.053, 0.044 and 0.039% total N, resp. The surface soils, to a depth of approx. 10 cm., averaged 0.95% org. C and 0.086% total N. The org. matter consisted principally of hydrolyzable protein, resistant protein and lignin. The increase in the C:N ratio with depth was assocd. with an increase in the proportion of lignin and a decrease in the hydrolyzable and resistant protein. The C:N ratios and the total amts. of org. matter in the soils as originally laid down were likely the same in all layers, but the C:N ratio in the surface has become reduced through the accumulation of residues high in protein. In different years and with various crops the sum of the nitrate N and NH_4 N in the surface soils ranged from 18.6 to 27.4 p. p. m. and the hydrolyzable N (N converted into NH_3 by heating 50 g. soil with 500 cc. 0.1 *N* H_2SO_4 in an autoclave under 1 atm. pressure for 0.5 hr.) from 15.1 to 20.3 p. p. m. The hydrolyzable N and the sum of the nitrate N and NH_4 N both decreased with increase in depth and the ratio of nitrate N + NH_4 N to hydrolyzable N also decreased. The total available N (nitrate N + NH_4 N + hydrolyzable N) in the soil increased during the period of drying between crops, but the beneficial effect of the drying period on the accumulation of available N tended to be lost by irrigation too soon before the succeeding crop was planted, apparently as a result of the assimilation of N by the soil microorganisms. Expts. with wheat showed that the nitrate and NH_4 N of the soil are effective mainly on the straw and that the hydrolyzable N acts principally on the grain. Owing to variations in climatic conditions, there was a significant difference in the efficiency of nitrate and NH_4 N for straw production in different years. There were indications that all the available N down to a depth of 1 m. is of importance to the wheat plant. Twenty-four references. K. D. Jacob

Organic matter in orchard soils. Geo. H. Dickson. *Ann. Rept. Nova Scotia Fruit Growers' Assoc.* 75, 108–9, 111–13, 115(1938).—Over a period of 8 yrs., apple trees were mulched with green alfalfa hay twice each yr. with supplemental addns. of old hay from time to time. At the end of this time the 0–6, 6–12 and 12–18-in. depths of soils under mulch contained readily available K 50, 20, 20 p. p. m., nitrate 313, 136.5, 95 p. p. m. and water 10.9, 8.8, 4.9%, resp. The soil between the trees contained readily available K 15, 5, 5 p. p. m., nitrate 54.6, 27.8, 21.7 p. p. m. and water 5.7, 6.8, 4.5%, resp. K. D. J.

The decomposition of organic matter in soils at different initial pH. R. S. Dyal, F. B. Smith and R. V. Allison. *J. Am. Soc. Agron.* **31**, 841–50(1939).—A study was made of the decompn. of green crotalaria and green natal grass harvested at 2 different stages of growth in Norfolk loamy fine sand of varying degrees of acidity from pH 3.71 to 7.05. All plant materials decompd. more rapidly and more completely in soils at pH 5.94 to 7.05 than at pH 3.71 to 4.59. The detrimental effect of acidity on decompn. was more pronounced in soils treated with natal grass than in soils treated with crotalaria. The acidity of the soils treated with crotalaria was decreased markedly in the soils at low pH in the beginning of the expt. The addn. of N as KNO_3 to the natal grass-treated soils in an amt. sufficient to bring the total N content of these soils to that of crotalaria-treated soils did not increase the decompn. of the natal grass. Decreased nitrification in the soils at pH 3.71, 4.26 and 4.59 was undoubtedly brought about by the microörganisms utilizing the NH_3 in the decompn. of the carbonaceous materials and also partly by the detrimental effect of the increased acidity on the nitrifying bacteria. A deficiency of available Ca in the strongly acid soils could possibly have caused this decreased nitrification observed in the soils at low pH. Plant materials contg. large percentages of the hemicellulose, cellulose and lignin fractions decompd. more slowly than those contg. the smaller percentages of these constituents. J. R. A.

Some Nigerian cacao soils. F. Hardy. *Ann. Rept. Cacao Research* 8, 23–6(1938)(Pub., 1939).—The characteristics of 6 soil types and subtypes are described. Summarized results on surface 6-in. samples, representing 19 profiles, showed org. matter 0.9–4.9%, C:N ratio 9.1–15.2, pH 4.1–7.0, available P_2O_5 (Truog test) 2–1387 p. p. m. and available K_2O (extractable by 0.5 *N* AcOH) 38–472 p. p. m. K. D. Jacob

Soil demands of Kalanchoe blossfeldiana (var. selecta). F. Vogel, C. Biermann, R. v. Hösslin and K. Schneble. *Gartenbauwiss.* **13**, 327–50(1939).—Various soil and compost mixts. were tested in pot expts. to det. their effect on the growth and keeping qualities of *Kalanchoe blossfeldiana*. The optimum range of soil reaction for growth was between pH/KCl 5.5 and 7.0. A mixt. of equal amts. of strongly acid heath soil and compost produced the strongest growth. The compost alone when brought to the same pH with H_2SO_4 or $CaCO_3$ was less favorable. $CaCO_3$ had a slight beneficial effect in the pure compost but acted oppositely in the heath soil. The addn. of crude peat mull or loam to leaf soil caused 1 or more of the following: weak vegetative development, delayed blooming and poor keeping qualities of the flowers. More favorable results were obtained with a mixt. of the soils or the replacing of the peat mull with various kinds of peat humus or manure. Peat humus prepd. with org. fertilizers was better than that with mineral fertilizers. The reaction of the employed soil mixts. varied between pH/KCl 7.18 and 5.42, the total acidity between 0 and 2.45 and the $CaCO_3$ content between 0.02 and 0.70%. C. K. H.

The reciprocal relations between some soil properties in the light of a simple calculation of correlation. Vladimir Gossl. *Bodenkunde u. Pflanzenernahr.* **14**, 247–56(1939).—A math. study of the relation between certain phys. properties, e. g., pore vol. and H_2O capacity, with percentage of dispersable constituents and available K_2O of a no. of soils indicated no close correlation. Conclusion: Soils cannot be characterized by any "single value." Fourteen references. C. J. Schollenberger

Experimental investigation on the penetration of radiant energy into the soil. Franz Frischmann. *Bodenkunde u. Pflanzenernahr.* **14**, 257–90(1939).—Photoelec. measurements indicate that the energy of light of any wave length does not penetrate more than 8 mm. into soil, except as heat. C. J. Schollenberger

The relation of soil reaction, erosion and aggregation of silt and clay in Clarksville loam. H. T. Rogers. *J. Am. Soc. Agron.* **31**, 915–23(1939).—Increasing sheet erosion was observed on Clarksville loam as the acidity increased from pH 7.41 to pH 4.46, irrespective of $Al_2(SO_4)_3$ or other treatment. A highly significant neg. correlation was found between aggregation and H-ion concn. Increasing quantities of sol. Al were accompanied by decreasing quantities of silt and clay aggregated into units larger than silt size. No significant relationship existed between total org. matter and degree of aggregation or observed erodibility. The addn. of ground limestone to Clarksville loam up to the quantity required to produce a

neutral reaction definitely improved the phys. condition of the soil and its resistance to erosion. J. R. Adams

The oxidation-reduction potential of alkaline calcareous soils in relation to puddling and organic matter decomposition. T. F. Buehrer, W. P. Martin and R. Q. Parks. *J. Am. Soc. Agron.* **31**, 903–14(1939).—The Eh-pH relationship in arid alk. soils could be more satisfactorily studied by making use of the pH change due to simple diln. with water than by adding acid or alk. solns. Puddling causes a marked decrease in the reduction-oxidation potential, particularly when the soil has been treated with alfalfa. A sharp initial drop in the potential occurs in both puddled and unpuddled soils that have been treated with alfalfa. Measurements of reduction-oxidation potential made in an atm. of N and O, resp., give evidence of the existence of an oxygen potential, inasmuch as the reduction-oxidation potential drops sharply when N is bubbled through and increases in the presence of O. J. R. Adams

Some problems connected with fertilization of alkali soils. W. T. McGeorge. *Calif. Citrograph* **24**, 380, 424 (1939).—The effect of alky. in the alk. calcareous soils of Arizona is not one of direct toxicity from Na_2CO_3 or hydroxyl-ion concn. but rather one in which the nutritional balance and absorptive process of the plant are seriously disturbed. The continuous use of acidulated fertilizers will promote a normally balanced nutrition of both field and orchard crops on these soils. J. R. Adams

Availability, fixation and liberation of potassium in high-lime soils. Hubert Allaway and W. H. Pierre. *J. Am. Soc. Agron.* **31**, 940–53(1939).—A study of the high-lime soils of north central Iowa shows that the productive soil in any given field contains from 31 to over 700% more exchangeable K than the unproductive soil. The unproductive soil is generally higher in $CaCO_3$ and, in every case, shows a greater K-fixing power than the productive soil. Eight of the 12 productive soils contain less than 15% $CaCO_3$ in the surface 6 in. In 4 out of 5 fields the productive soils show a more rapid liberation of nonexchangeable K, although the differences are relatively small. Thus, differences in the amts. of exchangeable K present may account, at least in part, for the differences in plant growth between unproductive high-lime soils and adjacent soils which support normal plant growth. The high-lime soils of Iowa apparently require more exchangeable K to support good crop growth than do the normally acid soils of central U. S. Excessively high concns. of $CaCO_3$ and $Ca(HCO_3)_2$ may contribute to the low productivity of these soils. The study indicates that soils of north central Iowa which contain more than 15% $CaCO_3$ and less than 175 lb. of exchangeable K per acre will likely show signs of extreme K deficiency and respond markedly to K fertilization. The high K-fixing power of unproductive high-lime soils may be responsible for the relatively low amts. of exchangeable K in these soils which no doubt explains the small residual effects obtained from applications of K fertilizers. J. R. Adams

The polarographic estimation of alkalies and calcium in the electro-ultrafiltrate from forest soils poor in bases. L. Mainzhausen. *Bodenkunde u. Pflanzenernahr.* **14**, 290–6 (1939).—The app. and procedure of Heyrovský and Shikata (*C. A.* **19**, 2905) are recommended for rapidly detg. the minute quantities of Na, K and Ca sometimes occurring, and more concd. solns. can be dild. Six references. C. J. Schollenberger

The fixation and release of applied potash on three coastal plain soils. J. M. Blume and E. R. Purvis. *J. Am. Soc. Agron.* **31**, 857–68(1939).—The amt. of K fixed, when applied at the rates of 0, 50, 100, 200, 400, 800 and 1600 lb. of K_2O per acre to 3 different soils, varied greatly from month to month indicating that the properties of a soil which affect fixation are dynamic in nature. Under controlled conditions, the amt. of K held in the replaceable state remained const. over a 5-month period in Portsmouth and Elkton soils, while the fixed fraction varied greatly, the variation being reflected in the H_2O-sol. fraction. Monthly removal of the H_2O-sol. K by leaching greatly reduced the replaceable and fixed fractions of K in all 3 soils tested. J. R. Adams

Heat conductivity as an index of soil moisture. Byron Shaw and L. D. Baver. *J. Am. Soc. Agron.* **31**, 886–91 (1939).—A diagram and description are given of an adaptation of the Wheatstone bridge for measuring the changes in heat cond. of a soil at varying moisture contents. Heat cond. gives a reliable index of the moisture content of the soil. Changes in salt concn. of the soil soln. do not materially affect the heat cond. of the soil. J. R. Adams

A soil-moisture tensiometer with a compact manometer. L. A. Richards and R. W. Pearson. *J. Am. Soc. Agron.* **31**, 986–9(1939).—An illustration and the method of manipulation are given for a compact form of manometer, which can be used on tensiometers installed in greenhouse pots, to aid in detg. when water is needed and the amt. to be applied. J. R. Adams

The influence of soiling and silage crops in the rotation upon the moisture supply of the soil and yields of main crops. K. Opitz and E. Tamm. *Bodenkunde u. Pflanzenernahr.* **15**, 1–46(1939).—Extensive plot tests with frequent detns. of the H_2O content of the soil indicate that green crops harvested by late fall do not seriously deplete the soil moisture for the next crop, but if growth continues into the next spring, yields of the main crop following are likely to be less in seasons of normal rainfall. The N supplied by residues from a leguminous intercrop may overcome the adverse effect; a rye-vetch mixt. is one of the best for the purpose, under German conditions. C. J. Schollenberger

Queensland Cotton Research Station, Biloela. Progress report for the season 1937–38. [Effect of cropping system on moisture and nitrogen in soils.] W. G. Wells. *Empire Cotton Growing Corpn., Progress Repts. Expt. Stas.* **1937–38**, 1–10(1939).—Detns. of moisture and nitrate were made during the period July-Oct. on soils where cotton had been grown continuously (I) and where cotton followed cotton following 3 seasons of growth of Rhodes grass (II). The moisture content was consistently higher in II. The nitrate content progressively increased from 0.25 to 5.10 p. p. m. in II and from 6.1 to 10.5 in I; it was consistently lower in II until the end of the following June. K. D. Jacob

An investigation of the problems of salt accumulation on a mallee soil in the Murray Valley irrigation area. J. E. Thomas. *Australia Council Sci. Ind. Research, Bull.* No. **128**, 88 pp.(1939).—A contour, vegetation, soil and salt survey was made of the selected virgin mallee area. The 3 soils in this area are Coomealla loam, Coomealla sandy loam and Barmera sand (cf. Marshall and Walkley, *C. A.* **31**, 8780[4]). The salt, mainly NaCl, distribution is irregular with a well-marked tendency to increase with depth. Apart from the general assocn. of the mallee communities with areas of high salinity and the natural assocn. of the bluebush with the low-lying areas of low surface salinity, there appears to be no general relation between vegetation and soil salinity. The development of salt after irrigation is assocd. with several features which include the original salinity, the soil type, the design of the holding, and the methods of irrigation. The original salinity appears to be of lesser importance than the soil type. Salty areas appear first on permeable soils in which free water accumulates at a relatively early stage. The significance of a free water table is discussed, and it is concluded that on soils of this type the surface concn. of salt at any time represents the net result of the upward movement of salt from the water table and the downward movement by leaching at irrigation. Extensive data and discussion are given on the field expts., factors affecting salt accumulation, soil changes under irrigation and on the method of salt prevention and soil reclamation. J. R. Adams

"Slick spots" in Nebraska. J. W. Fitts, H. F. Rhoades and E. S. Lyons. *J. Am. Soc. Agron.* **31**, 823–31(1939).—Mech. analysis, carbonates, pH, exchange capacity, exchangeable Ca, Mg, Na and K and percentage of satn. with Na and K are reported for slick spots and normal soils from 4 fields in the North Platte and Platte valleys of Nebraska. No consistent difference was found between

the $CaCO_3$ content of the particles less than 0.005 mm. of slick spots and normal soils. The slick spots were consistently higher than the normal soils in percentage of satn. with Na and K. The poor phys. properties of the slick spots were attributed to the higher content of exchangeable Na and K. A close relationship was found between the pH of the slick spots and normal soils and their resp. percentages of exchangeable univalent ions and $CaCO_3$. J. R. Adams

The cation effect upon the color values of humus materials. G. Halfter. *Bodenkunde u. Pflanzenernahr.* **14**, 322–45(1939).—Expts. with Merck's *acidum huminicum*, Cassel brown, *Rohstoff* from brown coal and peat showed that NaOH in addn. to that used in extn. invariably increased the depth of color to a max. corresponding to the *T*-value (total base absorptive capacity) of each material. Extn. with equimol. solns. of Li, Na and K oxalates gave color intensities decreasing in that order, and corresponding to the resp. dispersive powers. The effects of Ca to ppt. humus substances are best avoided by extg. with a mixt. of NaOH and $Na_2C_2O_4$. Mg has relatively slight effects compared to Ca. The Mg compd. with *acidum huminicum* is rather sol. in H_2O; those with Cassel brown and *Rohstoff* are practically insol. The form in which Ca occurs in soil is important in its effect upon humus extn. procedures; if as $CaCO_3$, Na_2CO_3 + $Na_2C_2O_4$ may be used for extn., but sorbed Ca produces NaOH, which has a greater solvent power. Thirty-five references. C. J. Schollenberger

The nitrogen economy of wheat soils. With special reference to nonsymbiotic nitrogen fixation. H. L. Jensen. *J. Australian Inst. Agr. Sci.* **5**, 154–9(1939).—*Azotobacter* is only sparsely represented in the soils of the wheat belt of New South Wales. In these soils the conditions for N fixation by *Azotobacter* are generally far from favorable, largely owing to acid soil reaction and P_2O_5 deficiency. Other microörganisms hardly come into consideration as nonsymbiotic N fixers of any significance. Nonsymbiotic N fixation on the basis of residues from crops, spontaneous vegetation, etc., could account for only about $^1/_4$ to $^1/_3$ of the N requirements of the wheat crop. It thus appears that nonsymbiotic N fixation is a minor and mostly a quite insignificant factor in maintaining the N content of soils under wheat cultivation. Rain water may bring down in 5 to 6 yrs. sufficient N for an av. wheat crop. J. R. Adams

Chromium in the soils of Western Samoa and Niue Island. K. S. Birrell, F. T. Seelye and L. I. Grange. *New Zealand J. Sci. Tech.* **21A**, 91–5(1939).—Lateritic soils high in total Cr are described. Methods for the *detn. of small amts. of Cr* in HCl and weak acid exts. are discussed. Cr in the soils of Samoa and Niue Island does not occur in exchangeable form and is considered to be nontoxic to plants. John O. Hardesty

Selenium in Canada. Horace G. Byers and H. W. Lakin. *Can. J. Research* **17B**, 364–9(1939).—The existence of an enormous area of seleniferous soil is revealed through the results of a reconnaissance examn. of portions of Alberta, Saskatchewan and Manitoba provinces of Canada. About 300 samples of shales, soils and plants were collected at 90 different locations. The Se content of the shales varied from 0.3 to 3.0 p. p. m., of the soils from 0.1 to 6 p. p. m. and of the vegetation from 3 to 4190 p. p. m. J. W. Shipley

The seleniferous Astragalus osterhoutii Jones. O. A. Beath. *Am. J. Botany* **26**, 729–30(1939).—*A. osterhoutii* grows only on seleniferous soils and can absorb Se in toxic quantities. The growth of *A. lonchocarpus* is not confined to seleniferous soils and it does not absorb Se in toxic amts. from such soils. Nelson McKaig, Jr.

Association of sulfate reduction in the soil with anaerobic iron corrosion. Edwin G. Pont. *J. Australian Inst. Agr. Sci.* **5**, 170–1(1939).—The presence of sulfate-reducing bacteria, high concn. of sulfides and low concn. of sulfates in the neighborhood of corroded pipes under the soil indicates that biol. sulfate reduction produces the free O which increases corrosion. J. R. Adams

The effect of soil reaction on the chemical composition of mulberry leaves and the growth of mulberry trees. Kiyotoki Kato and Sadatoku Miwa. *J. Sci. Soil Manure, Japan* **13**, 591–6(1939).—The mulberry grew best on a soil which had sufficient lime and had a weak acid reaction. The chem. compn. of mulberry leaves was influenced by the reaction of soils and was normal on soil of weak acid reaction. Y. Kamoshita

Boron in horticulture. E. L. Overholser, F. L. Overley and Len B. Wooton. *Proc. Wash. State Hort. Assoc.* **33**, 73–85(1937).—Samples of *water* from wells and springs in the vicinity of Wenatchee, Wash. contained only 0.02–0.08 p. p. m. of B. Cork spot of d'Anjou pears was not corrected by either tree injections or soil applications of either H_3BO_3, $Na_2B_4O_7$ or NH_4 borate, but CuB_2O_4 caused a significant reduction in the incidence of the disease. B treatments did not definitely improve the hard-end and black-end conditions of Bartlett pears, but there were indications that Mn may be helpful in reducing hard-end. The literature is reviewed. 31 references. K. D. J.

The effect of boron on sugar beets. Natalie Saru. *Kühn-Arch.* **48**, 1–51(1939).—H_2O economy, Ca metabolism and the effect of B on young plants in sand and H_2O cultures were studied before the symptoms of heart- and dry-rot became marked. The concn. of B giving the optimum effect was greater with increasing addns. of Ca. Root development was especially favored by B. Increasing the concns. of B to 5–10 mg. per pot improved the H_2O economy of the plants, giving a greater green wt. The dry wt. was hardly affected and the sugar content was lowered somewhat. B deficiency was compensated to a large extent by excess K. Variable pH values of the nutrient soln. from 5 to 8 had a negligible effect on the susceptibility of the plants toward the disease. The physiol. role of B in the plant is discussed and the hypothesis proposed that B is involved in the regulation of the K:Ca ratio. Fifty-three references. C. K. Horner

Brown-spotting of apricots, a boron-deficiency disease. H. O. Askew and W. R. Lloyd Williams. *New Zealand J. Sci. Tech.* **21A**, 103–6(1939).—B deficiency caused a browning of the flesh of apricots. Damage was most evident near the stem end of the fruit. A marked increase in the B content of the fruit, following treatment with 0.1% borax spray soln. or top-dressing with borax at the rate of 0.5 lb. per tree, was correlated positively with freedom from browning of the flesh. John O. Hardesty

The effect of cobalt compounds on the cobalt content of supplementary fodder crops. E. B. Kidson and P. W. Maunsell. *New Zealand J. Sci. Tech.* **21A**, 125–8(1939).—Turnips, swedes, rape and oats showed a marked increase in Co content as a result of using cobaltized superphosphate or $CoCl_2$ either for drilling with the seed or for top-dressing over the young plants. The increase in Co content appeared to be proportional to the amt. of Co applied. The effect of Co dressings persisted for several months. John O. Hardesty

The reciprocal action of the nutrients potassium and calcium dependent upon the crop plant, as with oats and flax. Egon Penner. *Bodenkunde u. Pflanzenernahr.* **14**, 204–30(1939).—Oats and flax were grown in Mitscherlich pots of sand and sand-soil mixts. completely fertilized and with K_2O and $CaCO_3$ addns. varied widely. In sand with a little $CaCO_3$, flax became chlorotic at an early stage, whereas in even the most heavily limed sand-soil mixts. the plants developed normally except for slight yellowing. Oats was not harmed by liming at any rate, nor by fertilization with KCl, which was always harmful to flax, attributed to increased mobilization of Ca. Oats and flax differ in degree of assimilation of nutrients at different stages of development. Young flax is highly sensitive but older plants are more tolerant to excess Ca. Fiber flax shows a heavy demand for K_2O at a later stage of growth, required for fiber production; much Ca must previously be assimilated and is utilized in forming the plant's mineral skeleton. The plant is able to take whichever element it requires at each stage of growth. The slightly developed capacity to utilize K_2O in the seedling stage is assocd. with a low assimilation of CaO; the process is not merely the selection of a certain material from soln., but

is accomplished through a considerable shift in the concn. of the ions of the substrate produced by internal growth factors. Fifty-two references. C. J. Schollenberger

The effect of calcium arsenate upon the yield of cotton on different soil types. Clarence Dorman and Russell Coleman. *J. Am. Soc. Agron.* **31**, 966–71(1939).—Cotton yields on Houston clay loam, Memphis silt loam, Sarpy silty clay loam, and Sarpy fine sandy loam were unaffected even by an application of 1600 lb. of $Ca_3(AsO_4)_2$ per acre. A beneficial effect was obtained on Ruston sandy loam from light applications and a detrimental effect from heavy applications of $Ca_3(AsO_4)_2$. However, the As toxicity was reduced with time. The beneficial effect was attributed to the applied Ca acting as a nutrient, the As liberating insol. P, and the $Ca_3(AsO_4)_2$ stimulating bacterial activity. The ability of the unaffected soils to render As insol. was probably due to their high pH and high colloidal content. J. R. Adams

Pot experiments with food plants. Arthur Taubitz. *Gartenbauwiss.* **13**, 354–405(1939).—In pot expts. the av. error appeared to depend upon yield. Greater accuracy was obtained by having a large no. of replicates or by using a particular type of plant which gives the most favorable response toward the nutrient. The exptl. accuracy was also increased by increasing contents of humus. Pure quartz sand was unsuitable as a substrate for the plants; the addn. of 1% peat mull acted very favorably, apparently improving the phys. condition and relative concn. of nutrients. The peat mull had no direct influence on the plant response toward N, K or P. Certain plants were found to be more favorable than others for studying the response toward a particular element. Low moor soil when mixed with the sand gave the same harvest yield and magnitude of error as the sand and peat mull mixt. Low moor soil inhibited the effect of P but not that of K. 45 references. C. K. Horner

Changes in the photosynthetic activity of plants during their growth and development as related to the problem of carbon dioxide fertilization. V. M. Katunskiĭ. *Bull. acad. sci. U. R. S. S., Sér. biol.* **1939**, 85–101(in English, 101–2).—Smoke gases, prepd. by catalytic combustion of fuel oil, wood, etc., and contg. up to 15% CO_2, are suitable for the atm. fertilization of plants. Fertilization with CO_2 gas is most effective if applied at those stages of development, different for different plants, when the accumulation of org. substances in the plant is greatest. For beans, peas and hemp this corresponds to the stage when the flower buds are just beginning to form. For oats it is at the tillering stage. John Lĭvak

Some factors controlling the yield of young cacao. II. F. W. Cope. *Ann. Rept. Cacao Research* **8**, 4–15(1938) (Pub., 1939).—Attempts to analyze the effects of fertilizers on the various stages which make yield possible gave no statistically significant results, except that K was beneficial in enhancing pod yields. Self-incompatible trees were benefited more than self-compatible trees by the application of fertilizers. K. D. Jacob

Investigations on the influence of fertilizing on the growth and development of the soybean. F. Alten and R. Gottwick. *Ernähr. Pflanze* **35**, 277–84(1939).—Comparative plot expts. were carried out over a period of 3 yrs. with soybeans receiving the following different treatments: unfertilized, N and P only, 3 types of complete fertilizer contg. different forms of K, namely, kainite, 40% K_2O salts and $K_2Mg(SO_4)_2$. The beans from plots receiving complete fertilizer contained more fat and lecithin and less crude protein than those from plots receiving no fertilizer or only N and P. The form of K had no effect on the fat content of the beans. The lecithin content of the beans was highest with complete fertilizer contg. $K_2Mg(SO_4)_2$. K fertilizers did not affect the K and P contents of the beans but increased the K content of the straw. Nutrient requirements of soybeans are discussed. J. O. H.

Reëstablishing and maintaining cover crops in apple orchards. O. M. Morris. *Proc. Wash. State Hort. Assoc.* **33**, 67–70(1937).—In greenhouse expts., addn. of Pb arsenate at the rate of 1 ton/acre to soil, collected from fields that had never grown an orchard nor been sprayed for any other crop, decreased the growth of alfalfa about 50%, as compared to that obtained on untreated soil. Only slight growth was obtained with larger quantities (2–5 tons/acre) of Pb arsenate. Neither F compds. nor Ca arsenate, at the rate of 1–5 tons/acre, had any ill effects on plant growth. With phenothiazine (1 ton/acre) a crop of weak, short-lived plants was produced and no crop was obtained with larger quantities. As_2O_3 (1–5 tons/acre) produced results similar to those obtained with Pb arsenate. Pb acetate (1–5 tons/acre) had no adverse effect, whereas $Pb(NO_3)_2$ (1–5 tons/acre) produced a distinctly better crop than was obtained on the untreated soil. An application of nitrogenous fertilizer, together with liberal quantities of easily decomposable org. matter, appeared to be the best procedure for overcoming the adverse effects of Pb arsenate on the growth of alfalfa in apple orchards. K. D. Jacob

Studies on the nutrition of tulips and narcissi. C. Bould. *J. Pomology Hort. Sci.* **17**, 254–74(1939).—Nutrition expts. on tulips and narcissi grown in sand over a period of 3 yrs. are described. The treatments were: complete nutrient soln., solns. omitting N, P and K, resp., and H_2O only. Omission of N produced typical deficiency symptoms in the foliage and a significant reduction in bulb-wt. increase. Omission of K caused a reduction in bulb-wt. increase but did not produce leaf scorch or affect the quality of the flowers. The treatments had no significant effect on the carbohydrate content of the bulbs during the 1st yr. but produced marked changes in their content of inorg. constituents. Data on the N, P and K contents of dormant bulbs may be useful in assessing the quality of an unknown stock. J. O. H.

Nutrient uptake of the tomato plant. A. H. Lewis and F. B. Marmoy. *J. Pomology Hort. Sci.* **17**, 275–83 (1939).—The course of uptake of N, P, K, Ca, Mg, Na, Fe, Mn, Cu, B, Cl and S by the tomato crop was studied. The relative proportion of nutrients in the crop was fairly const. throughout its whole life. The rate of nutrient uptake paralleled the rate of dry matter production, i. e., nutrient uptake was slow in the early stages, rose to a max. in June to July and then declined. The results suggest that a nutrient supply of const. compn. (N: P_2O_5: K_2O = 1.1 2) might be used and applied in amts. corresponding to the stage and rate of growth. John O. Hardesty

Fertilizer requirements of the potato on different soils of Alabama. L. M. Ware. *Am. Potato J.* **16**, 259–66 (1939).—Applications of K, P and N were necessary for highest yields on all soil types. Where no K had been applied to a Norfolk soil since clearing, only 56% of a full yield was obtained in the 1st 3 yrs. and only 37% in the 6th through 8th yrs. Only 7% of the max. yield was obtained the 1st yr. on newly cleared land that had never been fertilized with P. Without N the yield was 21% of the max. in the 1st yr. after clearing the land, 76% in the 2nd yr. and approx. 40–50% in the next 3 yrs. K. D. Jacob

Fertilizer experiments on cacao in Trinidad—summary of results for 1938. F. Hardy. *Ann. Rept. Cacao Research* **8**, 27–34(1938)(Pub., 1939); cf. *C. A.* **32**, 8058⁸.—The constituent of pen manure that causes increased yields of cacao on shaded trees is generally not N but K, though the cellulosic and other carbohydrate components and occasionally P may play a part. Apparently, trees of the Immortel, variety, as normally distributed in cacao fields in Trinidad and Tobago, are capable of providing, by the fall of leaves, twigs, flowers and fruits, sufficient N for the needs of the cacao crop and the soil's supply of N is enhanced by the presence of N-fixing organisms in the root nodules. On P-deficient soils superphosphate and other sol. phosphates give the quickest responses. In the case of available P_2O_5 (Truog test) the lower limits of adequacy in the surface 6-in. layer of cacao soils in Trinidad and Tobago are 50 p. p. m. for air-dry clay soils (index of texture above 25) and 30 p. p. m. for sandy soils (index of texture below 25). For available K_2O (exchangeable K, extractable by 0.5 *N* AcOH) the limits are 175 and 100 p. p. m., resp. The value and reliability

of these tests as a means of deciding initial deficiencies of P and K in such soils have been fully demonstrated. A remarkable response to an application of sucrose (3000 lb./acre) to an acidic alluvial sandy soil, where the yield of cacao was increased 24% in 1 yr., gave further evidence of the pos. relation between high yield and high C:N ratio. On black clay soil, applications of gypsum (6 lb./tree) had a small, but significant, depressing effect on yields of cacao, which was partially overcome by the simultaneous application of either superphosphate or double superphosphate. K. D. Jacob

Report of the Agricultural Chemist for 1938. [Decomposition of green material.] T. Eden. *Tea Research Inst., Ceylon, Bull.* No. 19, 57–64; cf. *C. A.* **32**, 2672⁵. —Under aerobic conditions, materials such as straw, gliricidia and weeds develop mucilaginous substances readily and the quantity increases with increase in the pH of the compost. Owing to the presence of tannin, refuse tea and tea pruning leaf produce little or none of these substances regardless of the pH and similar results are obtained when decompg. gliricidia is kept moist with an aq. ext. of tea leaf instead of plain water. The presence of tannin also completely inhibits formation of NH_4 compds. and nitrites during the aerobic fermentation of tea leaf, whereas a considerable portion of the N in green manures is converted into these forms. The pH values of 69 samples of various types of composts ranged from 6.0 to 8.0 and higher. K. D. Jacob

Phosphoric acid fertilization. Werner Selke. *Bodenkunde u. Pflanzenernähr.* **14**, 28–59(1939).—Three-yr. pot expts. with oats on neutral humus loess loam indicate that the citric acid-sol. P_2O_5 of ammoniated superphosphate with 7% N is inferior both to the P_2O_5 of basic slag sol. in the same soln. and to the H_2O-sol. P_2O_5 of plain superphosphate. The percentages of the P_2O_5 applied in these carriers which were utilized were 15.8, 31 and 39, resp. In similar expts. with barley on a sandy soil, pH_{KCl} 4.35, if the utilization of the P_2O_5 of Rhenania phosphate was rated at 100, that of the carriers named was, in order, 54, 106 and 29. Liming this soil changed the relative figures to 100, 76, 94 and 89, resp., but the liming released so much of the native P_2O_5 of the soil that the relative recovery of P_2O_5 was 76 when none was applied, indicating no return from ammoniated superphosphate. Seventeen references. C. J. Schollenberger

The activity of various newer phosphoric acid fertilizers compared with that of the forms previously used. R. Thun. *Bodenkunde u. Pflanzenernahr.* **14**, 112–32(1939). —In addn. to the new products discussed in the following abstrs., pot and Neubauer tests with the "Kaliglühphosphat" of Messerschmidt are included. It is made by calcining a mixt. of K_2SO_4 and Kola apatite, which is ⅓ nephelite; thus a silicophosphate similar to "Rhenania" is obtained. All the tests confirm the inferiority of "Réno" except on strongly acid soils, where it is better than raw phosphate rock. The other products are satisfactory P_2O_5 fertilizers for German soils in general. C. J. Schollenberger

The action and aftereffects of new phosphates. L. Schmitt. *Bodenkunde u. Pflanzenernähr.* **14**, 83–112 (1939).—The prepn. and compn. of the new P_2O_5 fertilizers discussed in the following abstr. are given in greater detail. Similar 3-yr. pot expts. with oats and red clover indicate that "Wasag" is equal to superphosphate on a sandy soil at pH 4.3, also when limed to pH 5.5 and 7.0. Detns. of soil pH indicated that it is physiologically neutral, but the tests indicate that it is the equal of basic slag for red clover. Essentially the same conclusions apply to "Lübeck" also, and in addn. it has a pos. value in overcoming soil acidity. "Réno," which is stated to be an imported product, is not adapted for use on any but strongly acid soils, mineral or org. The results with this product indicate that evaluation of raw or incompletely converted phosphates from soly. in 2% citric acid or citrate soln. is defective; only vegetation tests are trustworthy. C. J. Schollenberger

Pot experiments to ascertain the action of some newer phosphoric acid fertilizers. F. Giesecke, G. Michael and L. Kuhn. *Bodenkunde u. Pflanzenernähr.* **14**, 70–82 (1939).—"Réno" I and II are calcined Tunisian phosphate with 25 and 29% total, 11 and 14% P_2O_5 sol. in 2% citric acid soln., none sol. in H_2O, and basicity equiv. to 10 and 8% CaO, resp. "Lübeck" is made by calcining phosphate rock with Na_2SO_4 and coal dust, giving a product different from "Rhenania," also calcined but with Na_2CO_3 and SiO_2. "Wasag" is similar to superphosphate but is made with min. H_2SO_4 so that it contains no free H_3PO_4. "Lübeck" has basicity equiv. to 22% CaO, with 23.3% total P_2O_5, 22.6% P_2O_5 sol. in 2% citric acid and 1.2% P_2O_5 sol. in H_2O. "Wasag" contains 18.9% total, 17.6% citric acid-sol. and 15.3% H_2O-sol. P_2O_5, and has no basicity. Resp. figures for "Rhenania" and basic slag are 25.0 and 15.7; 23.3 and 14.8; 0.2 and 0.0; 11 and 25% CaO equiv. basicity. The foregoing and 18.5% P_2O_5 superphosphate (18.8% P_2O_5 sol. in H_2O) were compared in 2-yr. tests with oats in Mitscherlich pots, filled with glass sand, sand plus 2% peat, acid sandy heath soil, calcareous low moor soil and neutral loam, with the conclusion that all are satisfactory P_2O_5 fertilizers for German soils, excepting "Réno," which seems adapted only to acid humus soils. C. J. S.

The phosphoric acid fractions in oats grain and spinach leaves as affected by different phosphate fertilizers. A contribution on the problem of influencing quality by fertilization. G. Michael. *Bodenkunde u. Pflanzenernahr.* **14**, 148–71(1939). Oats grain grown in Mitscherlich pots used for a test on the utilization of P_2O_5 from various carriers (cf. preceding abstr.) was ground to meal and extd. with Et_2O, EtOH, $CHCl_3$, AcOH, HCl, etc., to sep. the different P_2O_5 compds. The methods so worked out were afterward applied to spinach similarly grown. Conclusions: The EtOH- and $CHCl_3$-sol. P_2O_5 appear to be identical, probably phosphatides, and the quantity in oats is fairly const. and independent of the total P_2O_5. Oats seedlings are especially rich and spinach leaves rather variable in their content of this fraction. The AcOH-sol. P_2O_5 is accompanied by most of the Ca and Mg of the material, and probably includes both org. and inorg. compds.; it varies markedly, but consistently with the total P_2O_5. HCl-sol. and residual P_2O_5 are likewise variable, but less so than the AcOH-sol. fraction, and are believed to be assocd. with nucleoproteins. Twenty-seven references. C. J. S.

Investigations on Wasag phosphate. L. Meyer. *Bodenkunde u. Pflanzenernahr.* **14**, 133–40(1939).— Observations and tests on the new P_2O_5 fertilizer "Wasag" (I) (cf. 2nd preceding abstr.) indicate good storage qualities, caking less and not reverting much more than standard superphosphate (II), and in mixts. with 40% K_2O salt or kainite the mech. properties are better. Extn of small samples with pure and CO_2-satd. water shows slower removal of P_2O_5 than from II, but Neubauer tests with various soils known to have strong fixing powers for P_2O_5 indicate equal availability of the P_2O_5 from each after 6 months in the soil. C. J. Schollenberger

Pot experiments for evaluating some new phosphoric acid fertilizers—Wasag and M (Lübeck) phosphates. F. Nieschlag and C. Windorf. *Bodenkunde u. Pflanzenernähr.* **14**, 141–8(1939).—Mitscherlich pots of 3 acid soils limed and completely fertilized with 100, 300 and 900 lb. P_2O_5/acre in various carriers mentioned in the 3rd preceding abstr. were seeded to oats. Yields and compn. of the crop indicated that "Wasag" is equal to superphosphate, and the value of the P_2O_5 in this material corresponds to the NH_4 citrate soly. The "M (Lübeck)" phosphate gave inferior results, perhaps because of the liming. C. J. Schollenberger

Production and action of a mixed fertilizer containing urea from calcium cyanamide and potassium sulfate. H. Kappen. *Bodenkunde u. Pflanzenernahr.* **14**, 380–4(1939).—A concd. fertilizer can be prepd. by the reactions

$$Ca(HCN_2)_2 + K_2SO_4 + H_2O \rightarrow 2KHCN_2 + CaSO_4 \quad (1)$$
$$KHCN_2 + H_3PO_4 \rightarrow KH_2PO_4 + H_2CN_2 \quad (2)$$
$$H_2CN_2 + H_2O\ (MnO_2\ \text{catalyst}) \rightarrow CO(NH_2)_2 \quad (3).$$

The final soln. is evapd. to obtain a residue contg. about 15% N (0.7% N still in $(H_2CN_2)_2$), 27% P_2O_5 and 25% K_2O. Mitscherlich pot tests with summer barley, comparing the above product and the usual fertilizers carrying the same nutrients, indicated that it is equal to any fertilizer. C. J. Schollenberger

Manufacture of boron-magnesium fertilizers from mother liquors of boric acid manufacture. L. Berlin. *Novosti Tekhniki* **1939**, No. 3, 39-40.— The mother liquors obtained in the crystn. of H_3BO_3 from Inder borates contg. H_3BO_3 2, free H_2SO_4 0.6 1, $MgSO_4$ 21–24, and admixts. under 1% are neutralized with $CaCO_3$ and dried until solid. The product contains 6–8% H_3BO_3 and may be used as a fertilizer. B. Z. Kamich

Industrial and agricultural utilization of defecation slime. O. Spengler. *Centr. Zuckerind.* **47**, 762(1939).— Moist defecation slimes were too viscous to give uniform distribution in lime-deficient soils. Attempts to recover lime and other useful products from dried slimes failed. W. W. Binkley

The decomposition of blast-furnace slag. Günther Naumann. *Bodenkunde u. Pflanzenernahr.* **15**, 74–126 (1939).—Slags of varied compn. and mech. treatment from many German furnaces and generally of fineness such that 65–90% was within the limits 0.02–0.2 mm. were investigated as to soly. of the CaO and MgO with 1 g. substance/1 l. of plain and carbonated water, and behavior on hydrothermal treatment and electrodialysis with the app. of Loddesol (*C. A.* **26**, 1160), including x-ray spectra of the residues. Equil. expts. indicated that up to 16% in the case of sprinkling-cracked slags, 11% and 6% of the CaO of massive and granulated slags, resp., were sol. in H_2O; in CO_2-satd. H_2O, these figures were about 4 times as high, and considerable MgO also appeared in soln. The time curve of decompn. by these solvents, as measured by bases dissolved, was approx. logarithmic. Rate and abs. soly. increased with temp., and the influence of surface as detd. by particle size and of the ratio of water to slag was great. The rate and extent of decompn. were greatly increased by electrodialysis, and SiO_2, Al_2O_3, FeO and MnO were thereby brought into soln. Examn. of the residues for H_2O content and soly. in KOH soln. showed that electrodialysis caused the formation of colloidal substances; except with one glassy slag, no recrystn. of the gels was shown by x-ray examn. after hydrothermal treatment, but the spectra indicated that under conditions resembling those of the soil, the originally coarsely cryst. slag particles in time became finely cryst. It is concluded that the rate of attack by solvents in the soil decreases with time, from the formation of a protective envelope of colloidal SiO_2 and Al_2O_3 over the particles, as well as for other reasons. The productivity of soils can be improved by the colloids and bases supplied, and ground slag is considered a promising liming material, possibly excepting the granulated material, which was indicated by this work to be less sol. than others of comparable fineness and compn. Twenty-nine references. C. J. Schollenberger

Control of the purple scale and the Florida red scale. Max R. Osburn. *J. Econ. Entomol.* **32**, 688–90(1939).— A spray of 2% lime-S soln. and 5 lb. wettable S in 100 gals. water reduced populations of purple scale (*Lepidosaphes beckii*) but was ineffective against the red scale (*Chrysomphalus aonidum*). A petroleum oil spray (an emulsion contg. 83% of light-medium oil; 92% sulfonated residue), used at 1.6% concn., was more effective than the S spray against purple scale but did not furnish satisfactory control of the red scale. C. H. Richardson

Insecticides for June beetle control. Bernard V. Travis and G. C. Decker. *J. Econ. Entomol.* **32**, 607–11 (1939).— In lab. tests with adult *Phyllophaga implicita*, light applications of $PbHAsO_4$ (1–1.5 lb. per tree) killed 74–90% of the beetles, moderate applications (3 lb. per tree) 81–95% and heavy applications (4.5 lb. per tree) 88–98%; Ca arsenate was less effective, light, moderate and heavy applications killing 18–52%, 36–70% and 51–84%, resp., of the beetles; Ca arsenate was also less effective in field tests. Mg arsenate and Na_2SiF_6 were ineffective. The beetles fed longer on foliage dusted with $PbHAsO_4$ than with Ca arsenate. Sprays of the arsenates used were less effective than the dusts, the waxy coating of the leaves preventing an even coating of the leaf surfaces. C. H. Richardson

Control of borers in newly set shade trees. M. D. Farrar. *J. Econ. Entomol.* **32**, 634–8(1939).—Mech. protection by wrapping paper was superior to a $C_{10}H_8$ repellent, a nicotine soln. and a miscible oil contg. *p*-$C_6H_4Cl_2$. C. H. Richardson

Further studies with ethylene dichloride emulsion for the control of the peach borer. Oliver I. Snapp. *J. Econ. Entomol.* **32**, 683–5(1939); cf. *C. A.* **33**, 2273[2].— This emulsion continues to give better results than *p*-$C_6H_4Cl_2$ against *Conopia exitiosa*. A new simplified formula for making the emulsion requires the addn. of 8 vols. of water to 1 vol. of K-fishoil soap (contg. approx. 30% soap) and then 9 vols. of ethylene dichloride. The mixt. is emulsified by pumping in the cold. C. H. R.

Soil treatments for the control of the fire ant, Solenopsis geminata (F.). Bernard V. Travis. *J. Econ. Entomol.* **32**, 645–50(1939).— NaCN, $Ca(CN)_2$, $C(NO_2)Cl_3$, CS_2, CCl_4, SO_2, S, NaF and derris were used in various ways to control this insect. Repeated applications of aq. solns. of NaCN into the nests greatly reduced the no. of ants but failed to eliminate them, and actually increased the no. of colonies. Solid NaCN was less effective than the solns. $Ca(CN)_2$, as a dust, gave slightly better results than NaCN but was more expensive. S, NaF and derris were ineffective; the other compds. controlled the ants only when the applications were so large that the expense was prohibitive. C. H. Richardson

Experiments using several insecticides with and without wetting agents and stickers for boll-weevil control. C. F. Rainwater. *J. Econ. Entomol.* **32**, 700–3(1939); cf. *C. A.* **33**, 2273[1].—Cotton plants infested with *Anthonomus grandis* were dusted with the following insecticides: Ca arsenate, nicotine bentonite, nicotine bentonite + nicotine tannate, finely ground synthetic cryolite contg. 90.8% Na_3AlF_6, coarsely ground cryolite contg. 78.3% Na_3AlF_6, and a mixt. of Ca arsenate and $CaCO_3$ without spreader or sticker. The following com. wetting agents and stickers were used: Na salt of an alkylated naphthalenesulfonate, monosodium sulfonate of butylphenylphenol, a sulfonated alkylated biphenyl, a synthetic liquid sticker and spreader, and a dry gum contg. a tapioca base. None of the wetting agents or stickers increased the effectiveness of Ca arsenate or the nicotine prepns.; the synthetic liquid sticker made the finely ground cryolite equal in effectiveness to Ca arsenate. The nicotine prepns. were inferior to Ca arsenate and cryolite. Cryolite might become a satisfactory substitute for Ca arsenate; it should have good dusting qualities and a high content of Na_3AlF_6. C. H. Richardson

The use of phenothiazine in the medication of cattle for the control of horn flies. W. G. Bruce. *J. Econ. Entomol.* **32**, 794–6(1939).—This is a continuation of studies previously reported (Knipling, *C. A.* **32**, 7650[6]). The min. dose of the compd. fed in bran to cattle which would kill all the larvae of *Haematobia irritans* was 22 mg. per kg. of body wt. of the animal. The manure from animals fed this dose was unfavorable for the development of horn-fly larvae for approx. 24 hrs. beginning 12 hrs. after administration. Mixed directly with the droppings the min. lethal dose was 4 mg. per 100 g. droppings. C. H. Richardson

The control of Diaprepes abbreviatus L. and Lachnosterna (Phytalus) smithi arrow, in Barbados surveyed over a period of eleven years. R. W. E. Tucker. *Agr. J.* (Barbados) **8**, 8–18(1939).—Tests with soil fumigants and contact insecticides (9 different treatments) against root borers and brown hard backs give little promise. The soils of Barbados are too heavy and impervious to warrant soil treatments. The control of these 2 pests depends upon (*a*) hand collection of adults and egg masses in cane fields and (*b*) cultural methods. J. R. A.

Report of the Imperial Entomologist. Hem Singh Pruthi. *Sci. Repts. Imp. Agr. Research Inst., New Delhi*

1937–38, 113–28.—Hoppers and adults of *Poecilocerus pictus* on brinjal plants were effectively controlled by spraying with Na arsenite (2 lb./100 gal.). Pb arsenate sprays, Na_2SiF_6 baits or Na_2SiF_6 and lime dusts were ineffective. Na_2SiF_6 baits were highly effective in controlling crickets (*Gryllus domesticus*) damaging rayon in a textile mill. Sugar-cane setts were protected against white ants by immersing the setts, immediately before planting, for 0.5–1.0 min. in either 5% Pb arsenate soln. or 2% soln. of Paris green mixed with 4% soln. of lime and drying in the shade. Attack of the ants was deterred but not prevented by treating the setts with 5% soln. of Na_2SiF_6 or smearing the ends with coal tar. Young cucurbit crops were protected against the pumpkin beetle (*Aulacophora foveicollis* (Lucas)) by dusting 2–3 times at weekly intervals with a 1.80 mixt. of Paris green and wood ashes. K. D. Jacob

The use of chlorinated nitrobenzenes for the control of club-root disease of Brassica. Margaret J. Smieton. *J. Pomology Hort. Sci.* **17**, 195-217(1939).—Pentachloronitrobenzene (I), trichloronitrobenzene (II) and $HgCl_2$ were compared in seed-box expts. for the control of club-root disease (*Plasmodiophora brassicae*). I and II were com. prepns. contg. 20% active ingredient. II was sometimes as efficient as $HgCl_2$ and was superior to I. In outdoor seed-bed trials II, applied at the rate of 1.5 to 3 oz. per sq. yd., gave a varying degree of control depending on the degree of soil contamination. Substantial control of the disease was obtained by the addn. of a small amt. of II, dild. with soil, to the dibble hole at the time of transplanting. These fungicides are liable to check the growth of the plants. A method of applying the fungicides by dipping the plant roots in a wet mixt. of fungicide and soil previous to transplanting was inferior to the standard dibble-hole method. Promising results were obtained by broadcasting the fungicides. John O. Hardesty

South Africa Cotton Experiment Station, Barberton. Progress report for the season 1937–38. Rotation crops. [Grain moth and weevil control in stored maize.] M. F. Rose. *Empire Cotton Growing Corpn., Progress Repts. Expt. Stas.* **1937–38**, 23–7(1939).—In expts. with borax, $Ca(OH)_2$, Na_2SiF_6, flaked naphthalene and NaF, the best control was obtained with NaF used at a 1 1000 wt. ratio. As compared to results obtained with maize fumigated with CS_2 (3 lb./1000 cu. ft. at monthly intervals), a single application of NaF (wt. ratio of 2 1000), mixed with the grain approx. 4 months before planting, delayed germination, reduced the percentage of seeds germinating and markedly retarded growth of the plants in the early stages. In tray expts., CS_2 had a definite stimulating action on germination. K. D. Jacob

Animal pests. Rose thrips (Thrips fuscipennis Hal.). E. R. Speyer. *Exptl. Research Sta., Turner's Hill, Herts, Ann. Rept.* **24**, 64–6(1938)(Pub. 1939).—In lab. expts., rose leaves dusted with pyrethrum produced paralysis of the thrips in 10–20 min. and a total mortality in 2 days. In sunlight the lethal action was lost in 24 hrs., but a deterrent effect persisted for at least 3 days. A 1% soln. of potash soft-soap contg. 0.2% nicotine was very effective during the 24-hr. period following its application but rapidly lost its toxic action thereafter. Derris sprays and dusts gave erratic results. **Leaf-miners of glasshouse plants.** *Ibid.* 67–73.—Tomato leaves sprayed with solns. contg. 0.15–0.25% Na_2SiF_6 and 2.0–2.5% sugar were lethal to the adult tomato leaf-miner (*Phytomyza solani* Macq.). Nicotine sulfate sprays (nicotine concn. 1:650–800) with saponin (4 oz./100 gal.) as a spreader were also lethal to adult insects, but neither these sprays nor combinations thereof with derris controlled the larval stages in mined leaves. Adults of *P. atricornis* Mg., *P. ranunculi* Mg. and *Delia brunnescens* Zett. were attracted to and killed by foliage that had been sprayed with a soln. of Na_2SiF_6 0.2 and sugar 2.0%. **Angle-shades moth (Brotolomia meticulosa L.).** *Ibid.* 73–4.—The insect was controlled on chrysanthemums by spraying the plants with Pb arsenate (6 oz. paste per 100 gal. water) up to a period of 3 weeks before the blooms were ready for the market. Later appearances of the caterpillars were controlled by lightly dusting the open blooms with finely powd. cryolite unmixed with a filler. **Yellow underwing moth (Triphaena pronuba L.).** *Ibid.* 74–5.—The larval stages of the insect were quickly killed when fed either carnation plants dusted with derris powder or a bait contg. bran 28, Paris green 1 part and sufficient molasses (5–7% soln.) to moisten. **Aphids in glasshouses.** *Ibid.* 76–7.—The rose aphis (*Macrosiphum rosae* L.) was controlled in com. nurseries by applications of pyrethrum powder. The chrysanthemum black-fly (*Macrosiphum sanborni* Gill.) was destroyed on young plants by a single application of a spray contg. nicotine (95–98%) 10 fluid oz. and soft soap 8 lb./100 gal. water. Fumigation of glasshouses with $Ca(CN)_2$ (0.25 oz./1000 cu. ft.) did not control the arum green-fly (*Mygus circumflexus* Buckt.). **Mushroom flies.** *Ibid.* 77.—There was evidence that Sciarid flies are attracted to baits contg. a mixt. of ale and treacle, but Phorid flies principally to treacle alone. Male Sciarids, but not the females, appeared to be repelled by baits contg. 1% AmOAc. **Control of the carnation Tortrix moth (Tortrix pronubana Hb.) on pot plants.** O. B. Orchard. *Ibid.* 77–8.—Satisfactory results were obtained by spraying nonflowering plants with Pb arsenate paste 10 and saponin 0.5 oz./100 gal. Nicotine and derris sprays and dusts were ineffective. **Control of capsid bugs [Lygus pratensis L.] on chrysanthemums.** *Ibid.* 79–82.—Derris, S and nicotine dusts were ineffective. Nicotine sprays were highly efficient when applied during periods of sunshine. The insect was satisfactorily controlled by fumigating glasshouses with Cyanogas (0.33 oz./1000 cu. ft.). **The use of derris extracts in combination with petroleum oil emulsions.** W. H. Read. *Ibid.* 82–3.—Petroleum oil emulsions, dild. to 1:100 and contg. 0.007% rotenone, gave complete control of tomato-moth caterpillars (*Polia oleracea*). Combination sprays of petroleum oil emulsion and derris ext. gave better control of *red spider mites* than did those contg. derris alone. **The control of red spider mites on carnations.** *Ibid.* 84–5.—Good control of the mites, including eggs, without injury to the foliage was obtained by spraying with either a 0.17% soln. of dodecyl thiocyanate or a synthetic wax emulsion consisting of an emulsified soln. of chlorinated naphthalene in benzene used at a dilu. of 1:160 with addn. of 0.125 fluid oz. of spreader (Liquid Agral Wetter). The latter spray was somewhat more injurious than the former to the petals of open flowers. **Cucumber root fly maggot investigations.** *Ibid.* 85–6.—Control of the maggots of *Plastosciara perniciosa* and *Pnyxia scabiei* in cucumber beds was not obtained with a wide variety of insecticides, including nicotine-contg. emulsions of either sulfonated petroleum oil or tar acids. K. D. Jacob

Toluene compounds to control plant disease. Helen Hart and J. L. Allison. *Phytopathology* **29**, 978–81(1939).—Toluenesulfonylamides proved very effective in greenhouse expts. in controlling leaf rust as *Puccinia triticina*. R. C. Burrell

Damping-off of lettuce. H. L. White. *Exptl. Research Sta., Turner's Hill, Herts, Ann. Rept.* **24**, 56–8(1938)(Pub. 1939).—Damping-off of lettuce seedlings in soil cultures contaminated with *Rhizoctonia* was not prevented by pretreating the soil with either Cu_2O dust or aq. solns. of Cheshunt compd. The fungicides had no deleterious effect on germination of the seed. K. D. Jacob

Verticillium wilt of the carnation. H. L. White. *Exptl. Research Sta., Turner's Hill, Herts, Ann. Rept.* **24**, 49–53 (1938)(Pub. 1939).—Growth of *V. cinerescens* (the causal organism) on agar enriched with Richard's soln. was prevented by the presence of a 1:100,000 concn. of malachite green. Control of the disease on carnation cuttings was not effected, however, by immersing the severed ends of the cuttings overnight in a 1:50,000 aq. soln. of the dye, because of failure of the dye to penetrate the cutting to a sufficient depth. K. D. Jacob

Yellow patch of tobacco seedlings. L. F. Mandelson and E. C. Tommerup. *Queensland Agr. J.* **52**, 280–94 (1939).—In affected seedbeds the germination of the seed

is poor, patches or groups of plants are dwarfed and may turn pale green or yellow about 10 days after emergence, before they eventually die, thereby causing a poor and uneven stand of seedlings. The condition appears to be a physiol. disease assocd. with the use of excessive quantities of org. N in mixed fertilizers applied to the seedbeds and is probably caused by the accumulation of free NH_3 in the soil. Application of 0.1 oz. N as dried blood per sq. yd. retarded growth and practically none of the seedlings survived when the application exceeded 0.5 oz. Although the toxicity was not permanent and disappeared in time, it could not be rectified by adding either $KMnO_4$, MnO_2 or $CuSO_4$ to the soil. Yellow patch did not develop when only $NaNO_3$ was used in various quantities as the source of N. K. D. Jacob

Further investigations on the leaf edge disease of currant caused by chlorides. Karl Boresch. *Bodenkunde u. Pflanzenernähr.* **14**, 230–47(1939); cf. *C. A.* **33**, 3027.— Chloride fertilizers frequently cause currant leaves to show a blighting at the edges resembling a symptom of K_2O deficiency, when the latter may be present in sufficient amt. for normal requirements but not sufficient to combine with all the Cl in the leaves; the excess Cl is combined with Ca, and an antagonism between K and Ca produces the symptoms of K starvation. Pot expts. with CaO and NaCl addns. showed that red currants and *Ribes alpinum* are sensitive to Cl and excess CaO, whereas black currant is not. Ten references. C. J. Schollenberger

Study and control of antirrhinum rust. Amin Fikry. *Ministry Agr. Egypt, Tech. Sci. Service, Bull.* **223**, 16 pp. (1939).—Complete control of the disease, caused by *Puccinia antirrhini*, was obtained by dusting the plants at intervals of 2-3 weeks with S or by spraying with a mixt. of colloidal S 0.5 and soap 0.25%, beginning immediately after the fungus made its appearance. Lime-S, colloidal Cu, Bordeaux mixt., Burgundy mixt. and $CuSO_4$ sprays were only partially effective. K. D. Jacob

Effect of sulfuric acid treatment on fungi and bacteria present on cottonseed from diseased bolls. Douglas Bain. *Phytopathology* **29**, 879-84(1939).—Cottonseeds from bolls infected with *Bacterium malvacearum* were treated with concd. H_2SO_4 for 15, 30, 45 and 60 min. With the longer acid treatment, fewer fungi and bacteria were obtained when the seeds were cultured on potato-dextrose agar. Addnl. treatments with $HgCl_2$, 1 to 1000 in 50% alc., had no marked effect upon the nos. of seed-borne organisms. R. C. Burrell

Tests with various elm-wood traps for bark beetles. R. R. Whitten and W. C. Baker. *J. Econ. Entomol.* **32**, 630–4(1939).—Elm trees were treated with $NaClO_3$, $FeSO_4$ and $CuSO_4$ by a method (Lantz, *C. A.* **32**, 5988[8]) which introduces solns. of the compds. into the living tree. Trees treated with $NaClO_3$ were most attractive to bark beetles (*Scolytus multistriatus; Hylurgopinus rufipes*); the trees so treated were more attractive to these beetles than felled trees. C. H. Richardson

Habits of the June beetle, Phyllophaga lanceolata (Say) in Iowa [and response to aromatic compounds]. Bernard V. Travis. *J. Econ. Entomol.* **32**, 690–3(1939).—Of 24 org. compds. tested, mostly esters, alcs., aldehydes and amines, only one, isoamylamine, proved attractive, and this one only to the males. The response of the males to this compd. was similar to that produced by crushed or sexually active females. C. H. Richardson

Poisoned bait tests against the fire ant, with special reference to thallium sulfate and thallium acetate. Bernard V. Travis. *J. Econ. Entomol.* **32**, 706–13(1939).— Tl_2SO_4, in bait concns. of 1 to 2%, was toxic in lab. tests to *Solenopsis geminata* but not in the field. Tl acetate in bait concns. of 2–4% was very effective in lab. and field tests. A large no. of other insecticides gave neg. results. The addn. of Na benzoate and tartaric acid to the baits rendered them repellent. Insol. insecticides could not be studied adequately since the ants suck the liquid material out of the baits and avoid the solid particles. C. H. Richardson

Effects of acid arsenate of lead used against the termite, Reticulitermes flavipes (Kollar). Thomas J. Headlee and D. Manley Jobbins. *J. Econ. Entomol.* **32**, 638–40(1939). —Field tests showed that $PbHAsO_4$ protected white pine boards buried in soil contg. 0.05 lb. or more arsenate per cu. ft. from termite infestation. Protection endures for a long time even when the soil is fully exposed to weathering. The method appears to be cheap and practical. C. H. Richardson

Effects of heat-treatments of some calcium arsenates on their toxicities to silkworms and bean plants. J. W. Bulger and O. A. Nelson. *J. Econ. Entomol.* **32**, 615–19 (1939).—Pure Ca arsenates of 4 different CaO/As_2O_5 ratios (I, $CaO.As_2O_5.2H_2O$; IIa, $2CaO.As_2O_5.3H_2O$; IIb, $2CaO.As_2O_5.5H_2O$; III, $3CaO.As_2O_5.8H_2O$; IV, $4CaO.As_2O_5.xH_2O$) were prepd.; a sample of each was ignited to a glowing red to obtain the corresponding anhyd. compd. The hydrous and anhyd. compds. were tested for toxicity to silkworm larvae (*Bombyx mori*) by a leaf sandwich method, and to bean plants (variety Red Valentine) when applied as sprays (3 lb. in 100 gal. water). All the hydrous compds. were fairly toxic to the larvae (median lethal dose (M. L. D.) 0.04 to 0.18 mg. per g. body wt.) while the anhyd. compds. were practically nontoxic. Toxicity to bean plants paralleled that to the larvae. Compd. III when heated 3 hrs. at 500° did not show a great loss of toxicity to the larvae; but when heated 3 hrs. at 800° it became relatively nontoxic. Compd. IV gave M. L. D. 0.10–0.12 and no plant injury. It was therefore used in subsequent expts., com. samples of it being subjected to autoclave and dry-heat treatment at various temps. Autoclaved at 100° for 1 hr. and dried at the same temp. for ½ hr., IV was still fairly toxic; but when autoclaved for 3 hrs. and dried 1 hr., or autoclaved at 182° for 1 hr. or more, the compd. became relatively nontoxic. Dry heating of IV at 100° and 180° for 3 hrs. had little effect on toxicity while heating at 500° for ½ hr. or more made the compd. relatively nontoxic. Compds. I, IIa and IIb were about equal in toxicity to the larvae and about twice as toxic as compds. III and IV. Ignition decreased the percentage of sol. As in the compds.; but there was no evident correlation between percentage of sol. As and toxicity to insects or plants. C. H. R.

Lead and arsenic residues resulting from several spray schedules and materials, Lafayette, 1937. C. L. Burkholder, O. W. Ford and D. L. Johnson. *Trans. Indiana Hort. Soc.* **78**, 139–43(1938)(Pub., 1939).—Data are given on the Pb and As residues on apples at various periods during the use of 7 different spray programs. The spray deposit can be increased during the 1st brood codling-moth egg hatch by adding 0.5% of summer oil to the Pb arsenate spray, but such treatment has the disadvantage that the spray deposit is much higher at harvest in seasons of normal rainfall than is that obtained with Pb arsenate-lime sprays. The value of soybean flour as a builder and sticker with lime and Pb arsenate has not been definitely proved. Sprays composed of Pb arsenate, lime and soybean flour can be rendered more resistant to weathering by the addn. of 1 pint soybean oil per 100 gal. K. D. J.

Some types of injury to apples and pears from spraying and washing. F. L. Overley and E. L. Overholser. *Proc. Wash. State Hort. Assoc.* **33**, 143–52(1937).—Five types of injury are described and their causes are discussed. K. D. Jacob

Residue-removal studies for 1937. F. L. Overley, Kermit Groves, E. L. Overholser and J. L. St. John. *Proc. Wash. State Hort. Assoc.* **33**, 137–41(1937).—Data are given on the effectiveness of various washing procedures in removing As, Pb and F from apples sprayed with Pb arsenate, Ca arsenate or cryolite. Soda ash was equal to Na silicate in removing Pb from early washed fruit but was not so effective later in the season after the soft wax had developed. Tandem HCl washes were not so effective as tandem washes with either Na silicate or soda ash and HCl. Stored fruit was cleaned more readily when Na silicate was used with HCl than with other combinations. Fruit difficult to clean at harvest time without producing injury was successfully cleaned with a tandem wash of Na silicate and HCl after a period in storage at higher temps.

with less injury than when washed shortly after harvest. K. D. Jacob

Ease of residue removal from late and early spray applications of lead arsenate to apples. Jack E. Fahey, Harold W. Rusk, Loren F. Steiner and R. F. Sazama. *J. Econ. Entomol.* **32**, 714–17(1939).—The residue at harvest from $PbHAsO_4$ sprays increases as the time of spray application approaches harvest time. A final spray may leave at harvest a residue load equal to the load from 4 first-brood sprays. Residues from 2nd-brood sprays are more easily removed than those from the same no. of first-brood sprays. The use of oil adhesives with org. insecticides in 2nd-brood sprays makes the $PbHAsO_4$ from first-brood applications as difficult to remove as the residues from $PbHAsO_4$ used throughout the season. HCl solns. were used to wash the apples in these expts. C. H. Richardson

Aftereffects of the contact dust "Lipan" on the pine moth surviving the poisoning. Fritz P. Müller. *Forstwiss. Centr.* **61**, 538 44(1939).—Surviving moths, chrysalis, larvae and eggs, which were gathered from trees that had been dusted, showed but slight differences in viability and development over those obtained from sections that had not been treated. The chief differences were a somewhat greater mortality of the younger larvae and a lower wt. of the pupae. C. K. Horner

Increases in citrus scale infestations from heavy residue and from copper spray mixtures. Herbert Spencer. *J. Econ. Entomol.* **32**, 686 8(1939).—Heavy residues on citrus from sprays contg. $Ca(OH)_2$ increase the infestations of purple scale (*Lepidosaphes beckii*) and Florida red scale (*Chrysomphalus aonidum*); the presence or absence of Cu is unimportant. The results of expts. suggest that scale increases after application of Bordeaux mixt. may be reduced by decreasing the $Ca(OH)_2$ in the sprays to a quantity as low as horticultural or pathol. considerations will permit. Charles H. Richardson

A bibliography of cyanide compounds used as insecticides, 1933. H. D. Young. *U. S. Dept. Agr., Bur. Entomol. Plant Quarantine* **E-493**, 40 pp.(Sept., 1939); cf. *C. A.* **31**, 1943¹.—Abstracts of 191 papers and patents. **A bibliography of cyanide compounds used as insecticides, 1934.** H. D. Young and R. L. Busbey. *Ibid.* **E-494**, 57 pp.(Oct., 1939).—Abstracts of 269 papers and patents. K. D. Jacob

Chlorine gas as a seed disinfectant. R. W. Leukel and O. A. Nelson. *Phytopathology* **29**, 913–14(1939).—The effect of Cl_2 gas on smuts, wheat bunt and weevils was studied. It was not adaptable to the continuous type of seed-treatment equipment in common use. R. C. B.

Some results from insecticides. A. Kelsall. *Ann. Rept. Nova Scotia Fruit Growers' Assoc.* **75**, 59–61(1938).—Pyrethrum and derris sprays were entirely ineffective against rosy aphids and lauryl thiocyanate sprays were only partially effective. The best results were obtained by the use of either nicotine sulfate (1 pint per 100 gal.) in combination with fungicidal sprays or by coal-tar oil sprays. Arsenical insecticides, in addn. to acting as poisons against insects, appreciably improved the fungicidal value of flotation S sprays. The value of flotation S sprays was not impaired by the addn. of 3–5 lb. hydrated lime per 100 gal. and the lime prevented arsenical injury when such sprays were used in combination with Ca arsenate. Effective control of the gray banded leafroller was obtained with sprays of either Ca arsenate or Pb arsenate, particularly the latter. Derris, pyrethrum, cryolite, phenothiazine, nicotine sulfate and Black Leaf 155 (an insol. combination of nicotine sulfate and bentonite) were ineffective. Applications of Black Leaf 155 prevented deer from feeding on the foliage of treated trees. K. D. Jacob

The laboratory-field method for testing codling-moth insecticides. L. F. Steiner. *U. S. Dept. Agr., Bur. Entomol. Plant Quarantine* **E-488**, 10 pp.(Sept., 1939).—A discussion of the advantages and disadvantages of the so-called apple-plug method (cf. Lathrop and Sazama, *C. A.* **26**, 2815; Siegler and Munger, *C. A.* **27**, 4017). K. D. Jacob

Estimation, by the rotenone determination, of the insecticidal value of plants containing rotenone. A. Guillaume and G. Hervé. *Rev. botan. appl. agr. trop.* **19**, 552–64(1939).—In detg. the rotenone content of plants care must be taken to obtain a representative sample, as different parts of the same root do not contain the same quantity of rotenone and small roots are richer in rotenone than large roots. The method of detg. rotenone by crystg. a rotenone salt from a solvent and weighing the crystals is very unsatisfactory. The estn. of rotenone by measuring the MeO groups or by the colorimetric method is discussed and some modifications are suggested. J. R. Adams

The use of pyrethrum in the control of fruit insects. A. Kelsall. *Ann. Rept. Nova Scotia Fruit Growers' Assoc.* **74**, 84–7(1937).—Excellent control of the blunt-nose leafhopper was obtained by dusting cranberry bogs with a mixt. of pyrethrum 30 and gypsum 70% at the rate of 100 lb./acre. Applications of the dust (50–90 lb./acre) to apple trees gave effective control of the green apple bug and the red apple bug. Pyrethrum spray (3 lb./100 gal.) controlled the green apple bug, but its effectiveness seemed to be reduced by addn. of Fe sulfate. The apple leafhopper was readily controlled by either pyrethrum dust or spray. K. D. Jacob

Codling-moth insecticide investigations in 1938 at the Vincennes laboratory. L. F. Steiner, J. E. Fahey and S. A. Summerland. *Trans. Indiana Hort. Soc.* **78**, 86–99 (1938)(Pub. 1939); cf. *C. A.* **32**, 293⁶.—The best control was obtained with a tank-mixed combination of 40% nicotine sulfate 1 pint, soybean oil 1 quart, Na lauryl sulfate 0.25–0.50 oz. and Wyoming bentonite 5 lb./100 gal. The schedule started with the 1st hatch of larvae and included 8 cover sprays, the last 4 with the nicotine sulfate and bentonite reduced to 0.67 pint and 3.3 lb., resp., per 100 gal. Na lauryl sulfate could be omitted from the formula if the pellet form of bentonite was used, although there was some evidence that its presence was helpful in maintaining a higher efficiency during long periods of weathering. The substitution of mineral oil 2 quarts, nicotine sulfate 0.67 pint and bentonite 1 lb./100 gal. for the standard tank-mixed spray in the 3 second-brood sprays eliminated the necessity for washing the fruit without seriously lowering the insecticidal efficiency. Late oil-nicotine sprays were most helpful in masking and softening the visible bentonite deposits on nonwaxy varieties of apples. Varieties that form considerable wax before harvesting may require washing with a soln. of 5% Na silicate and 0.5% oil in a brush machine. Trees sprayed with Pb arsenate retained at harvest 66% of the total deposit applied, with tank-mixed nicotine-bentonite 20%, with com. nicotine-bentonite 18% and with phenothiazine 11%. Nicotine treatments weakened more rapidly around the calyx end of the apple than did Pb arsenate treatments, because more of the early cover spray deposits were dissipated before late summer. K. D. Jacob

Substitutes for lead arsenate [for codling-moth control]. R. L. Webster. *Proc. Wash. State Hort. Assoc.* **33**, 111–17(1937).—A review of results obtained in Wash. State with nicotine, pyrethrum, rotenone, phenothiazine, F compds. and Ca arsenate. K. D. Jacob

The role of calcium hydroxide in preventing hydrogen sulfide from decomposing lead arsenate. J. M. Ginsburg and L. E. Perlgut. *J. Econ. Entomol.* **32**, 612–15(1939).—Small quantities of H_2S present in spray mixts. readily decomp. $PbHAsO_4$, releasing large amts. of sol. As (G. and P., *New Jersey Agr. Exptl. Sta. Bull.* **655**(1938)). The sources of the H_2S are many: spray water from stagnant pools and polluted wells; from the S fungicides used in arsenical sprays; from the action of certain org. reducing substances (glutathione) in leaf tissues and fungous spores on the S deposited on plants by fungicidal sprays. $Ca(OH)_2$ reacts directly with H_2S forming CaS. An excess of $Ca(OH)_2$ is necessary to prevent the decompn. of $PbHAsO_4$ by H_2S since CaS in low concns. itself tends to decomp. $PbHAsO_4$. C. H. Richardson

Tandem doses of calcium cyanide for controlling insects on plants. W. E. McCauley. *J. Econ. Entomol.* **32**, 729–30(1939).—In preliminary expts., chrysanthemum

plants and *Thrips nigropilosus* were fumigated with 0.5 oz. $Ca(CN)_2$ per 1000 cu. ft. for 1 hr.; then ventilated 3 hrs. and again treated with the same dose and exposure time. The results were encouraging. It is possible that resistant insects on tender plants can be controlled by the use of successive small doses of $Ca(CN)_2$ for short exposures with intervening periods of ventilation. C. H. R.

Fungicide investigations. W. H. Read. *Exptl. Research Sta., Turner's Hill, Herts, Ann. Rept.* **24**, 62–3 (1938) (Pub. 1939); cf. *C. A.* **32**, 8064[b].—A Cu Zn silicate (Cu 25, Zn 4%) when used at 0.2% concn. in combination with a petroleum oil emulsion gave good control of tomato leaf mold (*Cladosporium fulvum*) without noticeable marking of the foliage or fruit. Control of the mold by 0.2% Cu Zn silicate with a sol. wetting agent was not effective and left a more readily visible deposit than when used with an oil emulsion. K. D. Jacob

Comparisons of orchard fungicides, 1938 J. F. Hockey. *Ann. Rept. Nova Scotia Fruit Growers' Assoc.* **75**, 53–5, 57–8 (1938).—Results obtained with a wide variety of fungicides are summarized. K. D. Jacob

Comparisons of spray materials in 1937. J. F. Hockey. *Ann. Rept. Nova Scotia Fruit Growers' Assoc.* **74**, 73–8 (1937).—No injury to apple trees was caused by the addn. of borax to Bordeaux mixt. sprays at the rate 5 lb./100 gal. Although borax has no special virtue as a fungicide against apple scab, its use in standard Bordeaux sprays may be effective in overcoming B deficiencies in the trees. K. D. Jacob

Observations on the chemistry of sulfur sprays. J. L. St. John and Kermit Groves. *Proc. Wash. State Hort. Assoc.* **33**, 128–34 (1937).—A review, with 26 references. K. D. Jacob

Further experiments with inverted or "dynamite" spray mixtures [in codling-moth control]. James Marshall and Kermit Groves. *Proc. Wash. State Hort. Assoc.* **33** 119–27 (1937); cf. *C. A.* **33**, 5578[3,6].—Inversion of Pb arsenate mixts. was speeded up and the spray deposit improved in the early cover sprays by adding 0.5 oz. $ZnSO_4$ (23% Zn) per 100 gal. $ZnSO_4$ in amts. up to 3 oz. per 3 lb. Pb arsenate did not affect the toxicity of the latter. As much as 2 oz. $ZnSO_4$ per 100 gal was required to stabilize the last cover spray. Inverted sprays made from ZnO and oil were very effective in preventing the entrance of codling-moth larvae into apples but were not toxic to the worms. Sperm oil, peanut oil and cottonseed oil of certain specifications were satisfactory substitutes for herring oil in conjunction with kerosene and Pb arsenate to make certain types of inverted sprays and stove oil was an effective substitute for kerosene. Petroleum oils varying from 70 to 80% unsulfonatable residue, and of less than 70 sec. Saybolt viscosity, gave satisfactory results when used at 0.5% concn. in inverted Pb arsenate mixts. Monoethanolamine was superior to either triethanolamine or NH_3 as a base for use with oleic acid in prepg. inverted Pb arsenate sprays. Cryolite was successfully used as an inverted mixt. and it was possible to obtain a wide range of spray deposit with such mixts. K. D. Jacob

A method for testing the value of chemical mixtures as repellents of the Gulf Coast tick [Amblyomma maculatum Koch]. Arthur L. Brody. *U. S. Dept. Agr., Bur. Entomol. Plant Quarantine* **ET-152**, 4 pp. (Oct., 1939).—Definite nos. of male and female ticks are confined to the chemically treated ears of the animal by means of an adjustable headgear and 2 cylindrical cages held tightly in place, one over each ear. K. D. Jacob

Experiences with sulfonated oil. J. A. McClintock. *Trans. Indiana Hort. Soc.* **78**, 128–9 (1938) (Pub. 1939).—A satisfactory product for use in preventing rodents from attacking the trunks of young fruit trees was prepd. by heating raw linseed oil to 350°F. in a large container and slowly sifting into the hot oil 300-mesh S at the rate of 12 oz./gal. Effective combination of the S with the oil was obtained. K. D. Jacob

Cleansing chlorate-contaminated pots. O. Owen. *Exptl. Research Sta., Turner's Hill, Herts, Ann. Rept.* **24**, 88 (1938) (Pub. 1939).—**The chlorate was effectively removed by soaking the pots for 2 hrs. in a 5% soln. of** $Na_2S_2O_3.5H_2O$ and then rinsing with cold water. The cleaned pots produced no injurious effects, either from chlorate or from thiosulfate on plants grown therein. K. D. Jacob

Development and assimilation of nutrients by flax (Opitz) **11D.** Removal of nicotine-bentonite spray residues from apples at harvest (Fahey, *et al.*) **12.** Effect of recent increase in government Pb tolerance on spray practice (Burkholder) **12.** Compns. for destroying slugs and other pests (Brit. pat. 508,125) **13.** Fog or mist for plant protection (U. S. pat. 2,173,756) **13.** Product having insecticial and pest-destroying properties (Brit. pat. 508,407) **17.**

Fertilizers. Ottomar Weber. Brit. 508,127, June 27, 1939. A readily transportable fertilizer is obtained from sea slime or like slime-like masses that form in river estuaries, rivers, seas and ponds by dehydrating the slime into a pulp that is still sufficiently thin to flow and then mixing it with such quantities of nonabsorptive or slightly absorptive and finely grained substances, e. g., sand, ground granite, ground basic slag, that a loose mixt. is obtained that is easily penetrable by air.

Fertilizers. Kai Petersen. Brit. 508,145, June 27, 1939. A granular and pulverulent biol. composite fertilizer is obtained by subjecting household and town refuse and like solid waste materials to a mech. disintegration with simultaneous and (or) subsequent intermixing and sepn. of noncrushable components, subjecting the product so obtained to a temporary thermophile fermentation to kill the pathogenic bacteria present, admixing therewith a waste material aerobically biologically activated in the state of a pulpy mass and drying the product prior to, during or after the admixt. The aerobically activated waste material may be obtained by treating sewage sludge and nightsoil as described in Brit. 476,772 (*C. A.* **32**, 4271[8]).

Calcium metaphosphate fertilizer. Harry A. Curtis. U. S. 2,173,826, Sept. 26. A process of making Ca metaphosphate readily available as a fertilizer, from a Ca-contg. material such as rock phosphate, reactive with H_2PO_4 to produce mono-Ca phosphate, and H_3PO_4 involves making a mixt. of the fine Ca-contg. material and an aq. soln. contg. 30 to 45% of H_3PO_4, in substantially stoichiometrical proportion for the formation of mono-Ca phosphate; feeding the mixt. through a plurality of heated zones; maintaining the heated mixt. at an increasing temp. gradient up to 1000–1200° adapted successively to remove the free water from the mixt. and produce mono-Ca phosphate, to convert the mono-Ca phosphate into a metaphosphate, which is only partially available as a plant food, and to fuse the metaphosphate thereby making it entirely and readily available as a plant food and cooling the fused metaphosphate to solidify and maintain it readily available as plant food.

Insecticides. Walter C. O'Kane (to Spray Base Corp.). U. S. 2,172,689, Sept. 12; Brit. 507,902, June 16, 1939. An insecticidal concentrate suitable for prepg. sprays for use on foliage comprises a fixed oil such as corn oil together with a contact insecticide such as a pyrethrum extract and a volatile liquid such as turpentine in which the contact insecticide is sol. and which is itself sol. in the oil, and emulsifying agent such as "Emulphur A" which is sol. in the concentrate. U. S. 2,172,690, Sept. 12; Brit. 508,003, June 16, 1939, relates to generally similar insecticidal concentrates in which the oil used is a mineral oil.

Insecticides. Tiffany Lind (to Lin-Tox Corp.). U. S. 2,173,849, Sept. 26. Insecticides suitable for combating the Japanese beetle contain an aq. soln. of a soap of a drying oil fat acid such as the K soap of linseed oil fat acids (suitably together with about 0.007% of rotenone).

Insecticidal and fungicidal compositions. The Dow Chemical Co. Brit. 508,768, July 5, 1939. See U. S. 2,145,259 (*C. A.* **33**, 3516[9]).

Copper xanthates. Roscoe H. Carter (to the people of the U. S. A. for free use). U. S. 2,173,383, Sept. 19. **Details are given of the production of Cu xanthates of the**

monomethyl and monoethyl ethers of ethylene glycol (insecticidal and fungicidal compds.) and mention is made of the similar production of xanthates of the corresponding Pr, Bu and Am ethers of ethylene glycol. U. S. 2,173,384 relates to the production of corresponding Cu xanthates of alkyl ethers of diethylene glycol. The K xanthate is first formed and then made to react with $CuSO_4$.

Fumigating growing corn against insects. Geo. W. Barber (to the people of the U. S. A. for free use). U. S. 2,173,293, Sept. 19. Within the internal silks of each ear of corn there is inserted an insecticidal fumigant tablet, such as one of hexachloroethane, and the ear is sealed above the tablet so that the gases from the tablet are forced to flow between the ear and the surrounding husks.

Herbicide suitable for use along roads, etc. Harold R. Offord (to the people of the U. S. for free use). U. S. 2,173,236, Sept. 19. "Technical" furfural satd. with a "technical" grade of NH_4CNS is used with an equal or larger proportion of Diesel oil of 27–32°Bé., and this mixt. is applied as a spray or soil drench.

Weed-killing compositions. Chipman Chemical Co. Ltd. Brit. 507,514, June 16, 1939. These consist of a mixt. of a chlorate of a metal of the alkali or alk. earth group, an alkali or alk. earth salt of an aliphatic carboxylic acid having not more than 4 C atoms in the mol., e. g., HCOOH, AcOH, butyric acid, and $CaCl_2$ or $MgCl_2$. The org. acid salt preferably has a metal ion in common with the chlorate. A preferred compn. consists of $NaClO_3$, AcONa and $CaCl_2$.

Weed killer. I. G. Farbenind. A.-G. Ger. 679,862, Aug. 15, 1939 (Cl. 45*l*. 5). In using chlorate soln., especially $NaClO_3$ soln., as a weed killer, fire-preventing substances such as $CaCl_2$ or $MgCl_2$ are also added to the soln.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Manufacture of alcohol from Jerusalem artichoke. IV. Alcohol fermentation of the rhizome of Jerusalem artichoke. 1. Tosinobu Asai. *J. Agr. Chem. Soc. Japan* **14**, 545–64(1938); cf. *C. A.* **32**, 1041⁵.—The hydrolysis of the rhizome was most favorable when the rhizome was heated with 0.5% H_2SO_4 or 0.3% HCl under 40 lb. at 139–41°. The hydrolyzate was fermented by alc. yeast M 1 for 70 hrs. The yield of alc. was 82.3%. **VIII. Influence of the storage of the rhizome on alcohol fermentation.** Tosinobu Asai and Susumu Kikuti *Ibid.* **15**, 33-42(1939); cf. *C. A.* **33**, 5979⁷.—During the storage underground, the contents of H_2O and reducing sugar gradually increased while those of total sugar, nonreducing sugar, N and ash decreased. The pH was changed from 6.5 to 5.9. In the earlier stage the carbohydrates sol. in cold H_2O decreased and the nonreducing sugar increased, while in the latter stage the amt. of reducing sugar increased. There was not a large decrease in carbohydrates sol. in hot H_2O during storage. There was a large decrease in nonprotein N content. The fermentation ratio by *Schizosaccharomyces pombe* was equal at every period of storage. The rhizome was easily dried without any loss. There was no difference in fermentation ratio between the air-dried rhizome and the one dried by heat. **IX. Alcohol fermentation of the rhizome of Jerusalem artichoke. 4.** *Ibid.* 115–27.—When the fresh rhizome was heated with 0.05–0.2% HCl at 100–20° for 1 hr., no loss in sugars was observed. The amino N content decreased with the concn. of acid and the temp. When the rhizome was steamed and directly fermented, 9.97 l. of alc. was obtained from 100 kg. of the fresh rhizome. **X. Alcohol fermentation of the rhizome of Jerusalem artichoke. 5.** *Ibid.* 563–74; *Bull. Agr. Chem. Soc. Japan* **15**, 102–3(in English).—In the direct fermentation the addn. of peptone increased the fermentation ratio, while that of $(NH_4)_2SO_4$, soybean cake, rice bran or fish-oil cake had no effect. When 0.01–0.02% of peptone was added to the mash as a N source, it was most suitable. The effect of the addn. of K_2PO_4 was not great. When the alc. yeast no. 35 was used with *Schizosaccharomyces pombe*, the beginning of fermentation was accelerated and the *fermentation* ratio was also increased. The prepn. of the mash by the diffusion method was recommended as the carbohydrates were completely extd. with hot H_2O. Y. Kihara

Alcoholic fermentation at Chateauneuf-du-Pape. Gaston Mathieu. *Compt. rend. acad. agr. France* **25**, 500–3 (1939); cf. *C. A.* **32**, 7203⁹.—A secondary fermentation caused a 40% decrease in the volatile acid content of a wine. J. R. Adams

β-Hydroxyglutamic acid in soy sauce. Yukio Tomiyasu. *J. Agr. Chem. Soc. Japan* **15**, 871–5; *Bull. Agr. Chem. Soc. Japan* **15**, 133–4(in German)(1939).—The concd. soy was treated with basic lead acetate and then phosphotungstic acid in dil. H_2SO_4 soln. The ppt. by phosphotungstic acid was filtered and the filtrate was neutralized with $Ba(OH)_2$. The ppt. of $BaSO_4$ was eluted with 1% HCl. The soln. was evapd. and alc. was added to sep. the Ba amino dicarboxylate. From the alc.-insol. part glutamic acid-HCl was removed by satg. with dry HCl gas. The filtrate was evapd. to a sirup and then oxidized with chloramine T. *p*-Nitrophenylosazone m. 298° was prepd. from the oxidation product. It was identified as *p*-nitrophenylosazone of malic semialdehyde. Hence β-hydroxyglutamic acid may be present in the soy sauce. Y. Kihara

Denatured and fuel alcohol. C. Mariller. *Bull. assoc. chim.* **56**, 600–6(1939).—Alc. used as household or motor fuel, and also the denaturants employed should be free from corrosive impurities, notably acids, esters, SO_2 and other S compds.; it should not be colored with dyestuffs contg. NaCl. F. W. Zerban

Amino nitrogen and amido nitrogen in Bordeaux wines. E. Peynaud. *Ann. fals.* **32**, 228–43(1939).—The methods used for the analyses are described and discussed. Analysis of 35 red and 36 white Bordeaux wines of known purity and good quality gave the following max., min. and av. values (in mg. per l.): total N 143–666 (330), 77–377 (185); ammonia N 1–71 (17.9), 0–14 (5); amino N 41–131 (80), 10–67 (33.6); amido N 1.4–5.6 (3.48), 1.1–3.3 (2.6); amino N as percentage of org. N 18.6–42.2 (26.4), 9.8–26.2 (18.3); amido N as percentage of org. N 0.6–2.3 (1.2), 0.6–5.1 (1.7). The results are discussed. A. Papineau-Couture

Rapid determination of the esters of volatile fatty acids (in wine). L. E. Grandchamp and J. Vollaire-Salva. *Ann. fals.* **32**, 244–7(1939).—Det. the volatile acidity of the wine by the French official (steam-distn.) method. Neutralize a second 10-cc. portion of wine with *N* NaOH and add 2 cc. in excess, let stand 1 hr. at about 20°, acidify with 10 drops of H_3PO_4, distil as in the official volatile acidity detn. and titrate the distillate. The difference in volatile acidity of the wine as such and sapond. is a measure of the volatile fatty acid esters, which are expressed as EtOAc. A. Papineau-Couture

Polarographic method for determining SO_2 in wine must. M. Salvarezza. *Ann. chim. applicata* **29**, 345–50 (1939).—The active SO_2 can be detd. by electrometric titration, the e. m. f. changing rapidly when the value of the reduction potential of the SO_2 present is reached. A. W. Contieri

Determination of acetic ester in deteriorated wines that are unfit for consumption. P. Archinard. *Ann. fals.* **32**, 254–60(1939).—The following method is a modification of that of Peynaud (*C. A.* **32**, 7659⁶): neutralize 50 cc. of wine to litmus, add 25 cc. of Peynaud's buffer soln. (25 g. K_2HPO_4 and 50 cc. *N* NaOH per l.), distil 15 cc., collecting in a 50-cc. volumetric flask contg. 20 cc. 0.1 *N* NaOH and 15 cc. H_2O, stopper the receiving flask, heat 15 min. in a water bath at 50°, transfer to an

Erlenmeyer flask, add exactly 20 cc. 0.1 *N* H_2SO_4 (to neutralize the NaOH), boil for about 30 sec., cool and titrate with 0.05 *N* NaOH in presence of phenolphthalein. Results are given to show that acidity is not a reliable criterion of the sourness of wine, and that in this respect the EtOAc content is in much better agreement with organoleptic tests. A. Papineau-Couture

Potato drying. Varinois. *Bull. assoc. chim.* **56**, 631–40(1939).—Drying of potatoes makes it possible to prevent deterioration and to utilize them as raw material for beet distilleries during the off-season. Two drying systems are described. F. W. Zerban

[Report of] molasses laboratory. A. R. Lamb. *Proc. Hawaiian Sugar Planters' Assoc., Rept. Comm. in Charge Expt. Sta.* **58**, 116–17(1938)(Pub. 1939); cf. *C. A.* **32**, 6394⁷.—A process has been developed for the production of dried *yeast* from final molasses, the yeast to be used for human or animal food. A lactic acid organism has been isolated which grows well in molasses solutions, and produces only *d*-lactic acid. A. R. Lamb

Enzymes in rice malt (Munakata) **11A.** Changes in fat and theobromine content of the kernel of the cacao bean during fermentation (Humphries) **27.** App. for taking samples of beer and for transporting the app. in a sterile condition (Brit. pat, 508,585) **1.** App. for producing a pulsating circulation of liquids contg. gas-evolving products, as in fermenting grape must (U. S. pat. 2,174,203) **1.**

Citric acid. Walter K. Lorenz. Ger. 679,847, Aug. 15, 1939 (Cl. 6*b*. 16.02). Nutritive solns. contg. growth-promoting substances, such as molasses or milk, are treated with vitamin-destroying substances such as peroxides, nascent O, catalytically excited H or lyes, and acid is added to produce an optimum H-ion concn. for fermentation of the liquor by mold fungus, to produce citric acid. Examples are given.

Clarifying wine, etc. I. G. Farbenind. A.-G. (Engelbert Sailer, inventor). Ger. 679,969, Aug. 18, 1939 (Cl. 6*c*. 1). Wine, beer, etc., is clarified by heating with an absorption agent such as Fe_2O_3 at 40–50°.

Apparatus and method for supplying wort to a fermentation vat. Svenska Jästfabriks Aktiebolaget. Brit. 507,608, June 19, 1939.

Beer wort. Gottfried Jakob. Ger. 676,328, June 1, 1939 (Cl. 6*b*. 14). Addn. to 626,535 (*C. A.* **30**, 5722¹). A method of filtering hot wort by first filtering through spent hops or malt, or pumice, and then through a fine filter mesh, is described.

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Pseudocinchona africana A. Chev., its chemical composition and therapeutic utilization. Raymond-Hamet. *Rev. botan. appl. agr. trop.* **19**, 564–9(1939).—Chem. analysis differentiates between *Pseudocinchona* and *Corynanthe paniculata*. The former contains both corynaphine and corynantheine while the latter contains yohimbine. Corynanthine has a very marked aphrodisiac action and it appears that *Pseudocinchona africana* has very marked therapeutic value. J. R. Adams

Investigation on the vitamin content in oil of sticklebacks (Gasterosteus). Ruth Wegelius. *Nord. Med.* **3**, 2716(1939).—Vitamin A was detd. biologically and colorimetrically, vitamin D biologically. The oil showed no biol. vitamin A potency. Colorimetrically a value of 50 I. U. per g. was found. The amt. of vitamin D in the oil was 50 to 100 I. U. per g., corresponding to an av. fish-liver oil. V. Aschehoug

The determination of phenols in essential oils. F. D. Dodge. *Am. Perfumer* **39**, No. 4, 35–6(1939).—The detn. of phenols in oils by alk. extn. is unsatisfactory especially for oils of low phenol content because of their variation in acid strength. The following method is fairly accurate especially for oils contg. up to 30% phenol. Thirty cc. *N* $NH_2C_6H_4SO_3Na$ (or K) (slight excess to prevent the presence of free HNO_2) in a 250-cc. flask of the cassia-oil type with neck graduated 10 cc. in tenths is chilled in ice and treated with 25 cc. *N* HCl and 25 cc. *N* $NaNO_2$ (or KNO_2). After 30 min., 10 cc. of oil (note temp.) and four 25-cc. portions of *N* NaOH are added and shaking is continued 30 min. at 0°. The phenol present reacts with the diazosulfanilic acid formed to give a sulfonic acid which will dissolve quantitatively in the alk. soln. The flask is filled with *N* NaOH and allowed to return to normal temp. For thymol mixts. the nonphenol usually seps. clearly and the vol. may be read off. For eugenol mixts. the results are not satisfactory because of the sepn. of an insol. by-product. If some oil sticks to the flask, most of the oil can be removed by a pipet, the soln. decanted into a 2nd flask and the 1st flask washed with a few drops of Me_2CO which is dissolved on shaking and the recovered oil estd. A separatory funnel may be used. Janet E. Austin

Native poisons and native medicines of Tanganyika. W. D. Raymond. *J. Trop. Med. Hyg.* **42**, 295–303 (1939).—A review with 44 references. R. Brown

Pectin. M. A. Lesser. *Drug Cosmetic Ind.* **45**, 549–51, 554(1939).—The therapeutic applications of this substance are reviewed. Two formulas for hair pomades and one for a tooth paste are offered. 29 references. H. M. Burlage

Cosmetic manual. Vanishing creams. Joseph Kalish. *Drug Cosmetic Ind.* **45**, 555–6, 561(1939); cf. *C. A.* **33**, 8911⁶.—These creams may be of the liquefying type which do not contain H_2O and of the emulsified type contg. a large proportion of mineral oil. Products contg. emollients (27 formulas) and products of the cold-cream (14), lanolin (14) and vanishing-cream types (13) are discussed. H. M. Burlage

East Africa and its aromatic plants. Alfons M. Burger. *Riechstoff Ind. Kosmetik* **14**, 153–8(1939); cf. *C. A.* **33**, 5121⁸.—The oils of *Aframomum mala* K. Schum (leaves, seeds and rind), *A. amaniense* Loes. (leaves and seeds), *Cinchona* species, *Coleus*, *Conopharyngia holstii* Stapf, *Cymbopogon afronardus*, *Eucalyptus citridora* Hook, *Geranium*, *Pelargonium radula* (rosea), *P. capitatum*, a *Zanthoxylum* species, *Brachylaena hutchinsii*, *Hoslundia opposita*, *Ocimum menthaefolium* Hochst. and its other species, *Ocotea usambarensis* Engl. and mawah are discussed including their chem. and phys. constants. H. M. Burlage

Peru balsam. Karl Dopf. *Riechstoff Ind. Kosmetik* **14**, 159–62(1939).—A discussion. H. M. B.

Care of the hands. Hugo Janistyn. *Riechstoff Ind. Kosmetik* **14**, 163–6(1939); cf. *C. A.* **33**, 8911⁶.—The following prepns. are discussed: modern Swedish glycerols (3 formulas), a glycerol jelly with the aid of gelatin, one with pectin, a citroglycerol, a cream with glycerol and starch, one with a stearate base for the hands, one with a base of glycerol and stearate, one with a base of triisopropanolamine, a cream for whitening the hands, an acid cream for the hands, a mother-of-pearl liquid cream, a hand massage cream, a cream with a lanolin base of superior quality, a liquid hand cream, two hand lotion creams, two with absorption bases, a cream with a base of propylene glycol monostearate, a nail polisher and nail lacquers. *Ibid.* 175–7(1939)(in French).—Formulas (21) are offered for nail varnishes, varnish removers, cuticle removers, cuticle oil, special creams for brittle and stiff nails, polishing agents (powders, creams and sticks), white (nail and moon), bleaches and a balm for injured nails. H. M. B.

The use of vitamins and hormones for the production of biologically active cosmetic products. W. Rehdern. *Riechstoff Ind. Kosmetik* **14**, 171–4(1939); cf. *C. A.* **33**,

9547. Vitamins and hormones are discussed and formulas (6) with detailed procedures are offered for the following types of creams: hormone breast creams, vitamin skin vanishing creams, hormone creams (solid and liquid), a vitamin face lotion and milk. H. M. B.

A reaction for the distinction of procaine and larocaine as well as the detection of pantocaine. F. Biedebach and H. Weigand. *Scientia Pharm.* **10**, 140(1939).—Dissolve 0.01 g. of the substance in 30 drops of H_2O, add 1 drop $NaNO_2$ soln. (1:10) and a drop of 2.5% HCl and immediately 20 drops of 2% C_6H_5OH in H_2O. An orange-red color appears at once in the liquid. With procaine (*A*) small shiny golden-yellow leaflets begin to form at once; with larocaine (*B*) they appear only after 10 min. Crystals with *B* appear as yellow bundles of numerous needles which begin to decomp. with discoloration and the evolution of gas at 120° while those of *A* appear as small flat leaves of irregular outlines, are colorless and begin to decomp. at 150°. With *tutocaine* (*C*) no crystals appear even upon long standing. The deriv. of *A* was found to be an azo dye: *p*-$HOC_6H_4N.NC_6H_4$-*p*-$CO_2C_2H_4NEt_2$-*p*. For the identification of pantocaine (*D*) dissolve a small amt. in a small drop of H_2O and add a drop of $NaNO_2$ soln. and a mass of long colorless needles often with notched ends appears. The same test was applied to *A*, *B*, *C*, cocaine, nupercaine, psicaine and only psicaine gives upon the addn. of much reagent an oily sepn. which did not solidify on long standing. The compd. with *D* possesses the characteristic anesthetic action of *D*, m. 104–5°, soly. in H_2O (1:80) and its soly. is strongly lowered by an excess of nitrite indicating that the nitrite of *D* is formed, $C_{16}H_{24}O_2N_2.HNO_2$. H. M. Burlage

The examination of homeopathetic preparations with dithizone. B. Bleyer, G. Nagel and J. Schwaibold. *Scientia Pharm.* **10**, 121–4(1939). A simple method for the qual. and quant. testing of homeopathetic heavy metals including Cu, Ag, Hg, Zn, Pb, Cd, Bi, Au and Co is outlined and the results obtained with 18 com. products—9 dilns. and 9 triturations are tabulated. It is established that in the manuf. of higher dilns. there is many times a diminution and occasionally a complete disappearance of the content of the active constituent. H. M. Burlage

Most important drugs occurring in European trade, their identification, adulteration and use. Franz Berger. *Scientia Pharm.* **10**, 140–4(1939); cf. *C. A.* **33**, 5988[8].—The following drugs were studied and their pharmacognostic features and tests described: (1) Jalap root which should have an ash of 6.5% (max.), ether-sol. portion 1.2%, resin portion at least 10%. Adulterants include *Ipomoea orizabensis* Ledan, *I. simulans* Hanbury and *I. operculata* Mart., (2) the root of *Cymbopogon iwarancusa* Schult (*Andropogon iwarancusa* Jones), which contains 0.4–0.9% volatile oil, resin and bitter principle, (3) root of kava-kava, (4) radix *Lapathi acuti* coming from *Rumex obtusifolius* L. and *R. crispus* L., (5) the root (rhizome) of *Levisticum officinale* Koch which contains 0.6–1% volatile oil, sugar, starch, gum and an acid, (6) licorice root of which 3 trade varieties are described: Russian, Spanish and Asia Minor, (7) the root of *Meum athamanticum* Jacq. contg. 0.76% volatile oil, resin, gum, starch, fatty oil and wax. H. M. B.

History and nomenclature of celandine. Karl Daniel. *Wien. Pharm. Wochschr.* **72**, 522–4(1939). H. M. B.

Bactericidal action in vitro of gold thioglucose and gold calcium keratinate on homogenous cultures of human tubercle bacillus. P. Pichat. *Compt. rend. soc. biol.* **132**, 13–14(1939).—Au thioglucose (50% Au) was bactericidal in concns. of $^1/_{10,000}$–$^1/_{1,000,000}$ and Au Ca keratinate (14% Au) in concns. of $^1/_{5000}$–$^1/_{250,000}$. Both higher and lower concns. than the above were not bactericidal. L. E. Gilson

The comparative activity of desoxycorticosterone and other crystalline derivatives and of purified extracts of the adrenal cortex. Arthur Grollman. *J. Pharmacol.* **67**, 257–64(1939).—Synthetic desoxycorticosterone acetate has an activity of one rat unit per mg. when assayed on the immature adrenalectomized rat. Its use as a standard reference substance for the assay of adrenal cortical exts. is suggested. It is quite effective when given orally. In some minor respects its action is not identical with that of cortical ext. Corticosterone is comparatively inactive. A simple method is described for prepg. a potent adrenal-cortical ext. A cryst. steroid (cf. *C. A.* **32**, 8530[6]) has been isolated from the ext., the comparatively high potency of which suggests it to be the true cortical hormone. Several other cryst. compds. isolated from adrenal exts. were inactive. L. E. Gilson

Stabilization of easily oxidized drugs. L. Donatelli. *Boll. soc. ital. biol. sper.* **14**, 429–32(1939).—Adrenaline solns. were rendered stable without affecting their properties by the addn. of ascorbic acid, Na ascorbate, sucrose and Me *p*-hydroxybenzoate. H. L. Gruehl

Extract of malt with cod-liver oil. Determination of oil and vitamin A. D. C. Garratt. *Analyst* **64**, 795–806(1939).—The detn. of the oil content and of the vitamins is of considerable importance to buyers o this pharmaceutical prepn. The present paper is concerned with the extn. of the oil from the emulsion and secondly the suitability of the extd. oil for the vitamin A detn. Seven different methods for extg. the oil were studied and the most satisfactory procedures were those of Rose-Gottlieb and of Gunn and Venables (*C. A.* **31**, 808[7]) For fresh prepns. both methods gave satisfactory but with older prepns. the method of G. and V. gave lower values. Objection to this last statement was raised in the discussion of the paper. The vitamin A content of the extd. oil was detd. spectrophotometrically and corresponding values were obtained by the Rose-Gottlieb method. It is recommended, therefore, in the assay of *Extract of Malt with Cod-Liver Oil* and of vitamin A in the extd oil, to make use of the Rose-Gottlieb method modified by the use of the centrifuge and with precautions to prevent oxidation. W. T. H.

A new method for estimating total alkaloids in cacao. E. C. Humphries. *Ann. Rept. Cacao Research* **8**, 36–7 (1938)(Pub. 1939). Mix 5 g. fat-free cacao powder with 2.5 g. freshly calcined MgO and add about 10 cc. water dropwise until all the particles are wetted. Partially dry the mixt. by heating in a porcelain dish on the water bath for about 0.5 hr. Mix the residue thoroughly, wrap in a No. 41 Whatman filter paper, place in an extn. thimble and ext. in a Soxhlet app. with $CHCl_3$ for 20 hrs. Evap. the solvent and dry the residue at 100°. Allow the residue, which contains the alkaloids and some fatty material, to stand overnight in 100 cc. petr. ether, collect the insol. material in a tared Gooch crucible, dry at 100° and weigh. Remove the caffeine by allowing the dried residue to stand for a few hrs. in 100 cc. benzene, collect the solid residue (theobromine) in an asbestos-lined Gooch crucible and weigh. The precision of the method is good and a 20-hr. extn. is sufficient to remove all the alkaloids from the powder. The method gave results for theobromine and caffeine in cacao powders from different varieties of beans as follows: Criollo (variety V_0) 2.15 2.31, 0.90–1.05; Criollo (variety 48) 1.05–1.23, 0.51–0.99; good Forastero 2.46, 0.24; and Calabacillo 2.85–2.90, 0.71–0.74%, resp. K. D. J.

A critical investigation of the tetrachloroethane extraction method for determining theobromine in cacao. E. C. Humphries. *Ann. Rept. Cacao Research* **8**, 38–9 (1938)(Pub. 1939).—The relative merits of the Wadsworth (*C. A.* **15**, 1170) and McDonald (*C. A.* **32**, 969[8]) methods were investigated and the latter was found to be more satisfactory. MgO is not essential for mixing with the fat-free powder when $C_2H_2Cl_4$ is used as solvent. K. D. Jacob

The alkaloids of the cortex of Aspidosperma quebracho-blanco. Rafael A. Labriola. *Anales asoc. quim. argentina* **27**, 150–9(1939).—Aspidospermine, quebrachine (yohimbine), quebrachamine, aspidospermatine and hypoquebrachine were studied. E. M. S.

Strong solution of ammonium acetate, Brit. Pharm. 1932. R. D. Kotwal. *Pharm. J.* **142**, 276(1939).—To obtain a prepn. of required strength when the NH_4

carbonate (*A*) prescribed is below standard, put 400 g. of *A* (i. e., 70 g. in excess) into a wide-mouthed bottle, add 350 ml. H_2O and 453 g. AcOH in small portions without stirring. After the reaction has subsided, e. g., after 2 hrs., shake occasionally and set aside for 12 hrs. When a residue of *A* is left, decant the mixt. and add to the liquid a sufficient quantity of strong NH_3 soln. as directed by the Pharm. If, however, all *A* is dissolved, add about 20 g. more *A* and shake the mixt. to insure a residue of *A* before decanting and adding NH_4OH to finish the prepn. S. Waldbott

Isotonic solutions. E. J. Schorn. *Pharm. J.* **142**, 383–4(1939).—The difficulties in precalcg. isotonicity of a soln. are pointed out. The method of Wokes (cf. *C. A.* **31**, 809[2]) based on the effect of the finished injection on red blood cells is recommended. H. Treves Brown. *Ibid.* 452.—Since in the Wokes method the ratio of hemolyzing to isotonic concn. varies for different substances from about 2 to 3.2, calcns. of isotonicity by this method might introduce grave errors, much larger than those resulting from the Brit. Pharm. Codex method, which is recommended. In support, the Swiss Pharm. V statement is quoted that for solns. not very far removed from 1%, the depression is, as a rule, very closely proportional to the concn.; any error caused by the divergence is physiologically insignificant. S. Waldbott

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Changes in fat and theobromine content of the kernel of the cacao bean (Humphries) **27**. New machines and app. for the cosmetic industry (Meyer) **27**. Anemia, and deterioration of ferrous sulfate and ascorbic acid solns. (Tomski, Waller) **11G**. Identification of the Columbian plant pinic-pinic (Janot, Mendoza) **11D**. Alkylolamine derivs. [for use in cosmetic creams] (U. S. pat. 2,173,448) **13**. Sulfones [intermediates for the manuf. of pharmaceutical products] (Brit. pat. 507,378) **25**.

Therapeutic preparations. Johannes Heller. Brit. 508,149, June 27, 1939. The prepns. are made from chlorophyll-contg. plants by irradiation of the plant substance with ultraviolet light for 3–4 hrs. at below 0°, followed by drying at above 0° and below 40° with exclusion of daylight.

Therapeutic cysteine hydrochloride compositions. Ferdinand W. Nitardy (to E. R. Squibb & Sons). U. S. 2,174,009, Sept. 26. Stable, noncaking prepns. suitable for dispensing in ampoules and for use with water in treating open wounds contain cysteine-HCl together with a buffering agent such as borax, Na citrate or Na phosphate to give the aq. soln. a pH between 3 and 5 (preferably between 3.5 and 4).

Emulsions; medicinal preparations. Garth W. Boericke and Wm. W. Young. Brit. 508,288, June 28, 1939. A fat sol is prepd. by agitating a fat with EtOH, mixing with approx. 3 times its vol. of distd. H_2O, expelling all but a small proportion of the EtOH by heat and filtering the emulsion. Wool fat is preferred, and glucose may be added. Kekuni nut and lecithin sol may be used. Phosphates, sulfates and $CaCO_3$ may be added to the sols. The sol, the colloidal particles of which are substantially 1 μ in size, is used as a detoxicant therapeutically, either subcutaneously or intravenously.

Lactation-stimulating preparations. Abraham Herschel. Brit. 507,825, June 21, 1939. These consist of a mixt. of isoleucine and cystine or the physiologically equiv. substances, cysteine, glutathione, methionine, etc. The compds. are advantageously admixed with edible oils, e. g., wheat-germ or cod-liver oil.

Triethanolamine salts. Fritz E. E. Stockelbach. Brit. 508,818, July 6, 1939. The triethanolamine salt of *o*-cresotic acid is prepd. by causing the amine to react with about an equimol. proportion of the acid, suitably at 100°. The triethanolamine salt of 2,3-hydroxynaphthoic acid is prepd. similarly. The salts absorb ultraviolet light and may be used for prepg. cosmetic creams and lotions for preventing sunburn and for promoting tan pigmentation of the skin.

Phytyl bromides. F. Hoffmann-La Roche & Co. A.-G. Brit. 508,292, June 28, 1939. See Swiss 203,-135 (*C. A.* **33**, 9553[9]).

Heavy-metal compounds of sulfhydryl keratinic acid. Ernst Sturm and Richard Fleischmann (to Firma Johann A. Wülfing). U. S. 2,172,717, Sept. 12. Various examples with details are given of a process for prepg. chemotherapeutic compds. derived from keratin which are rich in heavy metal, consisting in hydrolyzing keratin material with acid at least to the stage of formation of a gelatinous product, reducing the product with a metal, freeing the reduced product from metal, treating the product with a sol. salt of Au, Ag, Hg, Cu, Pb, Sb, Sn, Zn or Fe, the quantity of metal used being at least about double that necessary for satg. the sulfhydryl groups of the keratin degradation product, neutralizing the mixt. with alkali and filtering off any deposit which may form as a result of the neutralization, introducing the soln. into an org. solvent, and sepg. the compd. rich in heavy metal which is deposited.

Artificial peppermint oil. Dr. Hittel G. m. b. H. Brit. 507,257, June 13, 1939. A compn. of similar flavor and smell to peppermint oil consists of a mixt. of synthetic menthol (I), menthone (II), menthyl acetate (III) and menthyl isovalerate, e. g., in the proportions of 50, 35, 12 and 3%, resp. There may be added 3–5% of the initial and final fractions obtained from com. peppermint oil, eucalyptus oil, mint oil and similar oils, which improve the flavor. The ingredients of the compn. may be made by (1) partially hydrogenating thymol to form a mixt. of I and II, which is then treated with a restricted amt. of glacial AcOH to convert part of the I into III, the mixt. being then distd. to obtain fractions rich in II and III, (2) hydrogenating piperitone in the presence of Ni to form II and some iso-II, which is allowed to remain in the compn.; a part of this mixt. is removed and the remainder further hydrogenated and heated to 180° to form I as described in Brit. 238,314 (*C. A.* **20**, 2049); part of the I is heated with Ac_2O and isovaleric acid to form the esters. The products obtained are then mixed, together with the initial distillate from Japanese peppermint oil.

Vitamin B_1. Karl Merck, Louis Merck, Wilhelm Merck and Fritz Merck (trading as Firma E. Merck). Brit. 507,918, June 22, 1939. See Ger. 669,187 (*C. A.* **33**, 2657[1]).

Vitamin concentrates from materials such as tuna-liver oil. Nicholas A. Milas (to Research Corp.). U. S. 2,173,629, Sept. 19. App. is described, and a process for the extn., concn. and fractional sepn. of the vitamin A and D contents of naturally occurring substances which comprises saponifying the saponifiable constituents thereof, sepg. the unsaponifiable portion by extn. using a selective solvent, sepg. the phosphatide content of the unsaponifiable portion by selective solvent action, subjecting the remainder of the unsaponifiable portion comprising vitamins A and D together with sterols and other inert materials to a systematic fractionation which comprises progressively cooling and fractionally crystg. and filtering at successively lower temps. a soln. thereof thereby sepg. a soln. of vitamin A in substantially pure form from a series of residues contg. vitamin D, vitamin A, sterols and other inert materials, redissolving and recrystg. and filtering the residues in sequence including discarding the residue from the highest temp. crystn., thereby sepg. a second series of residues from a soln. of substantially pure vitamin A, repeating the redissolving, recrystg. and filtering sequence upon the residues in a plurality of series whereby to dissolve from the residues substantially all the vitamin A and to purify the same by low-temp. crystn. to sep. from the residues substantially all the sterols and other inert materials by discarding the residue from the highest temp. crystn. in each series, leaving the final residues as substantially pure vitamin D.

Hormones. Chemische Fabrik Promonta G. m. b. H. Brit. 508,453, June 30, 1939. See Ger. 677,844 (*C. A.* **33**, 9555[1]).

Cortical hormones. Soc. pour l'ind. chim. à Bâle.

Brit. 508,024, June 23, 1939. Hormone compds. are prepd. by treating compds. of the cortical hormone series, except those designated as Fa, M, C and D (see abstr. from *Helv. Chem. Acta* in *C. A.* **32**, 5792), with esterifying or etherifying agents. Esterification may be conducted with an acid, an anhydride, halide or ester thereof or with a ketone. Etherification is conducted in the usual manner and aryl, aralkyl or alkyl residues may be introduced. Esterification or etherification is preferably conducted in the presence of an acid-binding agent, e. g., pyridine, dimethylaniline or a trialkylamine, or an alkali carbonate. In the processes, the 21-OH group always enters into reaction. Under more energetic conditions, derivs. may be obtained of compds. of this series contg. more than 1 OH group or even of the enolic form of keto groups. The invention may be applied to the purification of compds. of the said series by forming derivs. by the process of the invention, purifying the derivs. by distn. and then regenerating the starting material. Compds. that may be used as starting materials have a ketol grouping in the 17-position, e. g., Δ^4-21-hydroxypregnene-3,20-dione, Δ^4-11,21-dihydroxypregnene-3,20-dione, Δ^4-11-keto-21-hydroxypregnene-3,20-dione and Δ^4-17,21-dihydroxypregnene-3,20-dione. Among examples, corticosterone is treated with Ac_2O in the presence of pyridine for a long time at room temp. to give corticosterone acetate.

Sex hormones. Schering A.-G. Brit. 506,859, June 6, 1939. A 17-alc. of the cyclopentanopolyhydrophenanthrene series of low physiol. activity is oxidized to the corresponding ketone and then reduced to give a mixt. of *cis*- and *trans*-17-ales., from which the isomer of high physiol. activity is isolated. Among examples, (1) a *cis-trans*-estradiol mixt. is benzoylated, oxidized with CrO_3 in glacial AcOH and then reduced according to Brit. 449,461 (*C. A.* **30**, 8533[7]), (2) androstene-3-*trans*-17-*cis*-diol (I) is oxidized with Al isopropylate in anhyd. cyclohexanone and reduced as in (1), (3) I is oxidized by CrO_3 with intermediate protection of the nuclear double link by Br and then reduced as in (1).

Sex hormones. Schering A.-G. Brit. 508,305, June 26, 1939. Addn. to 445,189 (*C. A.* **30**, 6514[4]). The process of 445,189 for the production of pregnenediones by the oxidation of pregnenolones is modified by the use of isopregnenolone (I) as starting material, the product being pregnenedione of formula $C_{21}H_{30}O_2$, which is the corpus-luteum hormone. The oxidation is preferably conducted with intermediate protection of the nuclear double bond by a halogen, e. g., Br, or a H halide, e. g., HCl; in the latter case, the removal of the H halide after the oxidation can be effected by pyridine bases, alkali acetates in alc. soln. or other alk.-acting agents, while in the former, the halogen can be removed by Zn dust in acid or neutral soln., by treatment with NaI in Me_2CO according to the method of Finkelstein, careful hydrogenation in the presence of catalysts, e. g., Pt, Ni or basic reagents. In an example, I obtained by the isomerization of pregnenolone with methyl alc. KOH is oxidized at room temp. with CrO_3, with intermediate protection of the nuclear double bond by Br, which is subsequently removed by Zn dust in glacial AcOH, the progesterone being isolated by Et_2O extn.

Monoformate of androstenediol. Leopold Ruzicka, Albert Wettstein and Hans Kaegi (to Soc. pour l'ind. chim. à Bâle). U. S. 2,173,425, Sept. 19. The monoformate of androstenediol is produced by reducing the keto group of the formate of dehydroandrosterone to a carbinol group with H in the presence of a nonnoble hydrogenating metal catalyst such as Ni or Co in a neutral medium such as an aliphatic alc. of low mol. wt. Various examples of similar reactions also are given, for the production of therapeutic compds. active in the testing of sexual activity.

Sexual hormone products. Karl Miescher and Albert Wettstein (to Soc. pour l'ind. chim. à Bâle). U. S. 2,173,337, Sept. 19. Prepns. for parenteral use having enhanced sexual hormone action are obtained by combining testosterone, androstanediol, androstenediol, 17-methyltestosterone, estrone, estradiol or androstenedione with an aliphatic carboxylic acid, aliphatic hydroxy carboxylic acid or aliphatic alc. Numerous examples are given.

Gonad-stimulating product. Hubert R. Catchpole and William R. Lyons (Lyons to Hubert R. Catchpole). U. S. 2,173,353, Sept. 19. A product capable of stimulating and developing the gonads of males and females and sufficiently free from allergic-reaction-producing substances to be suitable for human use is derived from the placenta of a mare obtained between the 37th and 130th day of gestation, by extraction with acetone contg. NH_3, etc.

Immunizing vaccine for treatment of range paralysis or leucemia in poultry. Orley J. Mayfield (to Dr. Salsbury's Laboratories). U. S. 2,173,440, Sept. 19. A vaccine is prepd. from cultures taken from affected parts of poultry or birds afflicted with range paralysis or leucemia and sterilized after a period of growth sufficient to establish the property of immunizing individuals from these diseases.

Product having antiseptic, insecticidal, pest-destroying and medicinal properties. Thomas L. Shepherd. Brit. 508,407, June 30, 1939. The product is obtained by heating a mixt. of thymol 3 and salol 1 parts to the m. p. and cooling the mass so that crystals are formed. The product may be dissolved in various org. solvents or in terpineol or ti-tree oil, or may be dissolved in H_2O in presence of a sol. salt of cinnamic acid as described in Brit. 491,567 (*C. A.* **33**, 9943), or dissolved in H_2O by means of soaps and sulfonated fatty substances. An aq. prepn. may consist of the crystals, terpineol, Turkey-red oil and H_2O. The molten compn. or a soln. of the crystals may be finely atomized to sterilize the atm., and solns. may be used as general disinfectants, or for impregnating bandages, towels and handkerchiefs. The product may also be used as an internal disinfectant, as a curative to be applied to wounds or as an ingredient of gargles, toothpastes, etc. Solns. in paraffin, terpineol or ti-tree oil may be sprayed for destroying insects, used to impregnate insect-infested fabrics, etc.

Cosmetic creams. Benjamin R. Harris. U. S. 2,173,203, Sept. 19. A cosmetic of the vanishing-cream type comprises a plastic emulsion of oleaginous and aq. material and includes a compd., such as monostearate of diethylene glycol, having oleophilic and hydrophilic groups, the oleophilic group contg. at least 6 C atoms and the compd. having good wetting and lubricating properties, being miscible with water and capable of penetrating through the natural greasy layer on the skin and facilitating the softening of the hair when applied to the skin.

Tooth paste. Thomas I. Taylor. U. S. 2,172,743, Sept. 12. Na perborate is used with a boric acid ester of glycerol or of a glycol (suitably also with talc, tri-Ca phosphate, etc.)

Nail enamel. Henry C. Fuller. U. S. 2,173,755, Sept. 19. An org. ester of cellulose such as cellulose acetate butyrate 10 parts is dissolved in a mixt. contg. ethylene dichloride 25 and diethylene dioxide 40 parts, etc.

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

E. M. SYMMES

Contact sulfuric acid manufacture. XIX. Effect of H_2O and CO_2 gas on the oxidation of SO_2 by the V_2O_5 catalyst. Mototarō Matui and Raisaku Kiyoura. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 274(1939); cf. *C. A.* **33**, 9556[9].—In expts. with a gas mixt. contg. SO_2 7, N_2 73.5 and O_2 19.5%, H_2O vapor increases the

rate of oxidation over V_2O_5 catalyst at 400–425°, but CO_2 has no definite influence on the reaction. G. Ayers

Calcination of lime. XII. Effect of the addition of alkali chlorides, alkali fluorides, alkaline earth chlorides, and alkaline earth fluorides on the crystal growth of calcium oxide. Tōkiti Noda. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 265(1939); cf. *C. A.* **33**, 9558[1].—When chlorides or fluorides of Li, Na, K, Ca, Sr, Ba and Mg, resp., were added in the vapor state to $CaCO_3$, or mixed with it during calcination at 1100° for 3 hrs., LiF most effectively increased the cryst. size of the CaO formed, while with $MgCl_2$, NaF, KF, CaF_2, LiCl and MgF_2 vapor, the av. crystal size was 7 μ or larger. **XIII. Rate of hydration of calcium oxide calcined in the presence of vapors of alkali chlorides, alkali fluorides and alkali earth chlorides.** *Ibid.* 265.—The rate of hydration of CaO depends approx. on the size of the crystals. **XIV. Effects of adding sodium salts to calcium carbonate before calcining on the rate of hydration and on the microstructure of lime.** *Ibid.* 266–7.—Salts increase the crystal size of CaO, during calcination of $CaCO_3$, in the order: Na_2SO_4, Na_2CO_3 < $NaNO_3$, NaI, NaOH < NaCl <NaF. The rate of hydration of the resulting lime depends on (1) cryst. size, (2) state of aggregation, (3) velocity of soln. of the salts present, (4) quantity of mixed salts, and other factors. George Ayers

The helium content of common salt (halite) and sylvite. Berta Karlik. *Mikrochemie* **27**, 216–30(1939).—A review. W. T. H.

Exfoliation of vermiculite by chemical means. R. C. Groves. *Nature* **144**, 554(1939).—Vermiculite is completely exfoliated by cold, 20-vol. H_2O_2. The mech. strength of the wet product is low; when dry, it is about the same as that of the heat-treated material. Partial and slower exfoliation was obtained with various other oxidizing and reducing agents, such as $KMnO_4$, $K_2Cr_2O_7$, H_2CrO_4, NaBrO, Cl from $KMnO_4$ + HCl, and aq. SO_2. G. M. Petty

Studies of carbon black. V. The effect of gas composition on the production and properties of carbon obtained by nonimpingement (lampblack) methods. L. M. Pidgeon. *Can. J. Research* **17**, B, 353–63(1939); cf. *C. A.* **31**, 5114[8].—Lampblack has been produced from C_2H_4, C_3H_8, CH_4 and various mixts. of these gases. C liberated from the flame of burning olefins is similar to C black in its ability to reinforce rubber, while C from paraffins resembles lampblack and does not reinforce rubber. The production of a reinforcing pigment by nonimpingement methods is assocd. with a gas having a neg. heat of formation. J. W. Shipley

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Manuf. of B-Mg fertilizers from mother liquors of H_3BO_4 manuf. (Berlin) **15.** Boiling pans [for concg. H_2SO_4] (Brit. pat. 508,993) **1.**

Phosphoric acid purification. Raymond J. Kepfer and Wm. R. Devor (to E. I. du Pont de Nemours & Co.). U. S. 2,174,158, Sept. 26. In the manuf. of secondary and tertiary Na orthophosphates by neutralization of crude H_3PO_4 with a Na base, a method of removing Pb and As impurities, whereby secondary and tertiary Na orthophosphates contg. less than 1 p. p. m. each of Pb and As can be obtained, comprises pptg. the Pb and As as sulfides by adding Na sulfide after at least 8% and before 63% neutralization, pptg. the Pb and As sulfides from the phosphate soln. before further neutralization and after a settling period of about 15–24 hrs., and thereafter further neutralizing to at least the di-Na phosphate stage and recovering solid Na phosphate.

Sulfuric acid. Carlten D. Koolman, Wolfhart Siecke and Max Wohlwill (to American Lurgi Corp.). U. S. 2,172,617, Sept. 12. An arrangement of app. is described, and a process for the manuf. of high-strength H_2SO_4, which comprises bringing into contact with a V oxide catalyst gases contg. SO_2, O and water vapor materially in excess of that required to react with the SO_3 equiv. to the SO_2 to form sulfuric acid monohydrate, withdrawing the gas mixt. comprising SO_3 and water vapor from contact with the catalyst while at a temp. above the dew point of the mixt., fractionally condensing liquid H_2SO_4 of a higher strength than corresponds to the amount of water present by cooling through the temp. range between the dew point of the mixt. and about 140°, while so obstructing the free flow of the gases as to maintain a high degree of turbulence in the gas mixt., which maintains substantial uniformity in temp. (excess water vapor remaining in the vapor phase in the uncondensed residue of the mixt.), and withdrawing the uncondensed residue from the condenser at a temp. between 140° and the b. p. of water.

Sulfuric acid. Earl S. Ridler and John F. W. Schulze (to E. I. du Pont de Nemours & Co.). U. S. 2,173,916, Sept. 26. For the catalytic production of SO_3, a mixt. contg. SO_2 and O is passed in contact with a Pt catalyst on a silica gel carrier and then in contact with a Pt catalyst on a $MgSO_4$ carrier.

Sulfuric acid. Société générale métallurgique de Hoboken. Brit. 508,055, June 26, 1939. Divided on 498,631 (*C. A.* **33**, 4748[1]). In the production of H_2SO_4 by the chamber or N oxide method with the use of 1 or several spaces or towers provided with filling material for the production of acid, followed by a Gay-Lussac space, which may also be provided with filling bodies, and with a space that is sprayed with a soln. of nitrosylsulfuric acid for the regeneration of N oxides, inserted between the production space(s) and the Gay-Lussac space, the 3 spaces (production, regeneration and absorption) are combined into 1 space or tower, the concn. of the acid for spraying this space or tower being maintained practically const. at 56–58° Bé. The filling materials may be irregular grains of an acid-resisting substance, e. g., quartzite. The middle or regeneration zone of the tower may be provided with a filling material having only a 4th of the surface of the filling bodies of the production zone. The lower part of the tower (production zone) and the upper part (absorption zone) may be provided with filling bodies having a surface as large as possible. The production zone should be sufficiently tall to ensure that the gases passing to the regeneration zone are cool.

Purifying sulfuric acid. Joseph P. Leemans and Société générale métallurgique de Hoboken. Brit. 508,302, June 26, 1939. Black or dark H_2SO_4 is bleached at about 260–300° by the action of SO_3 in the form of fuming H_2SO_4 or as a gas.

Sulfuric acid. Appareils & evaporateurs Kestner. Ger. 679,850, Aug. 16, 1939 (Cl. 12*i*. 25). Impure H_2SO_4, especially the waste acid used in petroleum refining, is purified by complete oxidation of the impurities by adding HNO_3 and sufficient concd. H_2SO_4 to bring the strength of the acid up to 75% of H_2SO_4, heating to about 200° and distg. off the impurities. The HNO_3 may be added as oxides of N. App. layout is indicated.

Diaphragms, particularly for use in the production of persulfuric acid or persulfates. E. I. du Pont de Nemours & Co. Brit. 508,045, June 26, 1939. These consist of a fabric woven from threads comprising a plurality of glass fibers. They may be formed as a cylinder enclosing the anode and surrounded by a helical tubular cathode, through which a cooling liquid is passed.

Sulfur dioxide recovery from gas mixtures, such as those from ore roasting. Arthur M. Clark, William E. Batten and Charles F. R. Harrison (to Imperial Chemical Industries Ltd.). U. S. 2,173,877, Sept. 26. An arrangement of app. is described, and a regenerative absorption process for the recovery of SO_2, which comprises absorbing SO_2 in an aq. soln. of basic Al sulfate in which the SO_3 to Al_2O_3 ratio is such that the SO_3 is insufficient to form the normal sulfate, but sufficient at least to keep substantially all the Al_2O_3 in soln., whereby substantially all the absorbed SO_2 may be regenerated without substantial pptn. of basic Al sulfate, and regenerating SO_2 therefrom.

Alkali chromates. Walter Hene. Brit. 507,362, June 14, 1939. In the production of alkali chromates, 100 parts of pulverized chrome ore is mixed with 10–20 of a powd. loosening material, e. g., CaO, MgO or residues

from a previous operation, and with not more than 75 of NaOH, or an equiv. quantity of other caustic alkali, and the mixt. is heated to 550–750° under oxidizing conditions. The caustic alkali may be mixed with the other materials in the form of a hot, concd. lye. 1

Peroxides. I. G. Farbenindustrie A.-G. Brit. 508,081, June 23, 1939. In a cyclic process for the production of peroxides, e. g., of alkali metals or H, by subjecting org. compds. that are oxidizable by O_2 under ordinary conditions in a liquid medium to such oxidation, with the formation of peroxides, sepg. the bulk of the peroxides formed from the reaction liquid and catalytically reducing the org. oxidation products to the initial org. compds., an essential part of the remainder of the peroxide and O dissolved in the reaction liquid is removed prior to the reduction. This may be effected by treating the reaction liquid prior to the reduction with oxidizable substances, e. g., $FeSO_4$, $MnSO_4$, an alk. suspension of $Fe(OH)_2$ or with substances that bind peroxides, e. g., NaOH, $NaBO_2$, Na_2CO_3, or with a catalyst that decomposes peroxides, e. g., Fe, Ni, Cu, Ag, Pt, Pd, PbO. The decompn. may be effected in conjunction with the removal of dissolved O by conducting the treatment with the decompg. catalyst in the presence of the reduced operating substance, which may be provided by not completing the preceding oxidation step or by branching off a portion of the reduced reaction liquid from the main cycle. The latter method of operation may be modified by treating the liquid with the decompg. catalyst in the absence of reduced operating substance, but in the presence of H and a reducing catalyst, e. g., Pd, Ni. The reducing catalyst may also serve as a decompg. catalyst. Dissolved O may also be removed by reducing the O pressure over the reaction liquid, e. g., by contact with an indifferent gas, e. g., H, or by reducing the pressure. The resulting mixt. contg. solvent vapor and O may be treated with a soln. of the reduced operating substance, which, by the absorption of O, restores the indifferent gas for further use in the process. The gas mixt. contg. expelled O may also be sucked off by means of a jet pump operated by the soln. of reduced operating substance. A plurality of the above methods may be used. An example gives a soln. of 2-ethylanthraquinone in a mixt. of C_6H_6 and methylcyclohexanol as the operating substance. 2 3 4 5

Aluminum-fluorine compounds. Rutgerswerke A.-G. (Veit Schwemmer, inventor). Ger. 679,849, Aug. 15, 1939 (Cl. 12*i*. 10). See Fr. 828,223 (*C. A.* **33**, 329[4]). 6

Ammonium nitrate. Wm. B. Gideon and Thorvald W. Hauff (to E. I. du Pont de Nemours & Co.). U. S. 2,174,238, Sept. 26. A process of producing substantially dry NH_4NO_3 of low d. and a puffed porous texture involves introducing into a closed chamber a hot melt of NH_4NO_3 of sufficiently low water content to be solid at ordinary temps., spreading the melt into a film over a heated surface within the chamber and subjecting the molten material to a pressure sufficiently below atm. pressure to remove substantially all of the water from the material and solidify it. App. is described. 7

Ammonium sulfate. Thomas B. Smith and Dorman, Long & Co. Ltd. Brit. 507,351, June 14, 1939. In the production of $(NH_4)_2SO_4$ by passing NH_3-contg. gases or vapors through a satd. soln. of $(NH_4)_2SO_4$ contg. free H_2SO_4, where the fall of the crystals is retarded by the maintenance of upwardly directed currents in the body of the soln., the currents are produced by injecting into the lower part of the saturator 1 or more streams of a satd. soln. of $(NH_4)_2SO_4$ from a point exterior to the saturator, with maintenance during the injection of an equiv. outflow of soln. from the upper layers of the body thereof in the saturator. App. is described. 8

Barium hydroxide. Albert T. Mertes (to E. I. du Pont de Nemours & Co.). U. S. 2,173,912, Sept. 26. For producing Zn-free, relatively pure $Ba(OH)_2$, a soln. of Ba sulfide is treated with a substantially equimol. proportion of ZnO or $Zn(OH)_2$ at temps. of about 103–200° under about 5–250 lb. superatm. pressure. 9

Beryllium fluoride free from oxide. Carlo Adamoli (to Perosa Corp.). U. S. 2,173,290, Sept. 19. See Can. 383,438 (*C. A.* **33**, 8367[2]).

Multiple-hearth furnace suitable for production of calcium metaphosphate from phosphate rock and phosphate reduction furnace gas. Harry A. Curtis and Roy C. Heaton. U. S. 2,173,825, Sept. 26. Various structural and operative details.

Cupric oxychloride. I. G. Farbenindustrie A.-G. Brit. 507,919, June 22, 1939. See U. S. 2,162,091 (*C. A.* **33**, 7503[2]).

Preparing normal ferric sulfate. Wm. S. Wilson and John F. White (to Monsanto Chemical Co.). U. S. 2,173,144, Sept. 19. Fe_2O_3 is treated with a substantially theoretical proportion of H_2SO_4 of sufficient concn. to form directly a dry ferric sulfate product, by mixing and grinding the ingredients under conditions whereby the temp. of the mixt. increases, and the reaction is completed with the materials in a quiescent state and under conditions whereby a temp. not substantially less than 140° is attained, so that a solid, substantially dry product is obtained, which is substantially completely caused to react to normal ferric sulfate, and the product is then ground or pulverized and subsequently agglomerated by the addition of water to form pellets of hydrated ferric sulfate, and the pellets are finally calcined to drive off the water. Cf. *C. A.* **33**, 8367[7].

Magnesium and calcium carbonates. Geo. Becze. Brit. 507,091, June 9, 1939. A loose cryst. product consisting of $CaCO_3$ and $MgCO_3$ is made by burning dolomite or other raw material contg. $CaCO_3$ and $MgCO_3$, forming an aq. suspension of the burnt material having an oxide content of not more than 8%, treating it with CO_2 or gases contg. CO_2 at at least 75° and preferably at 90° until neutral to phenolphthalein, sepg. the solid from the advantageously cooled suspension and drying and powdering it. In a modification, the neutral suspension is dild. to a MgO content of about 1%, CO_2 is again introduced until about a fourth of the $MgCO_3$ has dissolved, the suspension is heated and the carbonates that sep. are dried and powd. In a further modification, the neutral suspension is cooled, dild. with H_2O to about 3 times its vol., treated with CO_2 until the $MgCO_3$ has dissolved and basic Mg carbonate is pptd. from the sepd. soln. by boiling. The pptn. is preferably effected after the addn. of solid basic Mg carbonate or $Mg(OH)_2$. The products of the above 3 processes are suitable for heat-insulating purposes. The residue obtained on sepn. of the $Mg(HCO_3)_2$ soln. may be suspended in H_2O and treated with CO_2 to remove any residual $MgCO_3$, whereby a pure $CaCO_3$ is obtained.

Recovery of zinc values from galvanizers' skimmings. Robert J. Campbell (to E. I. du Pont de Nemours & Co.). U. S. 2,173,876, Sept. 26. A process for the recovery of Zn values from galvanizers' skimmings contg. NH_4Cl, $ZnCl_2$, basic Zn chloride and metallic Zn involves ball milling the skimmings with water to make a slurry contg sol. and suspendable matter, treating with lime to ppt. basic Zn chloride, filtering at a temp. not substantially higher than about 52° and with a concn. such that the filtrate has a d. not substantially greater than 5° Bé., reslurrying the filter cake obtained, treating the slurry with an excess of lime to convert Zn to $Zn(OH)_2$, sepg. the $Zn(OH)_2$ and dissolving it in H_2SO_4 to produce $ZnSO_4$.

Hydrogen peroxide. Antoine C. Semidei. Brit. 507,121, June 9, 1939. See Fr. 833,228 (*C. A.* **33**, 3087[2]).

Separating columbium from tantalum. François Cuvelliez and Société générale métallurgique de Hoboken. Brit. 507,124, June 9, 1939. Materials contg. Cb and Ta in oxide form are treated in a current of Cl or Cl-contg. gases, but in the absence of reducing gases, at approx. 1050° to volatilize the Cb as chloride or oxychloride, the Ta oxide being unaffected. Prior to the chlorination, the material may be mixed with a base, which is preferably CaO but may be BaO, NaOH or KOH. The base may be added as a carbonate and the mixt. heated to 800–1200° before the chlorination, with or without admission of air or in an inert or reducing atm., to cause the base to combine with the tantalic acid. The reducing atm., if used, should be free from carbonaceous gases.

Silicon from fluosilicate compounds. Josef Eringer. U. S. 2,172,969, Sept. 12. A compd., such as Na_2SiF_6, is

mixed with at least one finely divided metal more electropos. than Si, such as Na, and the mixt. heated to 500–1000° in a N atm., the reaction product is treated with acid, such as dil. H_2SO_4, to decompose the produced metal fluoride, and the Si is sepd. as an amorphous powder contg. about 96–97% Si and obtained in approx. 87% of the theoretical yield.

Hydrogen. James H. Shapleigh (to Hercules Powder Co.). U. S. 2,173,984, Sept. 26. App. is described and a process for prepg. H which involves passing reactants comprising gaseous hydrocarbons and steam downwardly through elongate vertical tubes contained in a heating zone, simultaneously heating the reactants indirectly by introducing hot flaming gases into the heating zone at a plurality of vertically spaced points along and adjacent to and substantially tangentially to the tubes, and withdrawing the resulting combustion gases at a point adjacent the top of the zone, whereby the flaming gases follow an upwardly ascending rotary path around the tubes, which are thereby uniformly heated without substantial flame impingement thereon. A catalyst of Ni on diaspore may be used.

Carbon black. Daniel Gardner. Brit. 507,516, June 16, 1939. C black is obtained from gases contg. C but no O, which may consist of satd. hydrocarbons and which may include vaporized hydrocarbons that are solid or liquid at normal temps. or natural gas from which any CO_2 has been removed, by mixing such gases with about 20% of N or CS_2 and heating to 1000–1200°. The furnace and cooling chambers may be made of graphite or carborundum.

Carbon black and carbon monoxide-hydrogen gas mixtures from natural gas, etc. Forrest C. Reed. U. S. 2,173,695, Sept. 19. An arrangement of app. is described, and a process which comprises alternating the periods of combustion and dissociation of hydrocarbons within closed retorts, sepg. CO_2 from the gases of combustion, subjecting hydrocarbons to dissociating temps. during said dissociating periods for producing a gas mixt. of CH_4 and H, utilizing said CO_2 to cool the products of dissociation by heat exchange therewith, catalyzing any unsatd. compds. present to CH_4, then adding said CO_2 to said CH_4 and H and subjecting the resultant mixt. to high temps. to produce said CO_2-H gas mixts.

Catalysts. Walter H. Groombridge and John E. Newns. Brit. 507,419, June 9, 1939. Metallic compns., particularly for use as catalysts, e. g., in the hydrogenation of C compds., especially CO, are obtained by heating a mixt., preferably finely divided, of a heavy metal oxide with another metal of higher affinity for O, so as to obtain a porous structure of 1 heavy metal oxide permeated with and acting as a support for an oxide of the other heavy metal, which is then reduced with a gaseous reducing agent to form a porous nonfriable structure of the heavy metal of lower affinity for O, permeated with the metal of higher affinity for O. Examples describe the prepn. of catalysts by heating CuO with Ni or Co at 900°; the products are broken to about 0.25-in. mesh and reduced by water gas at 350°; the catalysts may be used for the *conversion of CO and H to CH_4*. Other substances may be applied to or incorporated in the metallic compns., e. g., ThO_2 may be applied or incorporated to give a catalyst suitable for synthesizing hydrocarbons from CO and H. The catalysts are also suitable for other reactions, e. g., the conversion of EtOH to Me_2CO, or reactions in which the metals combine with and remove O and halogens from compds. In Brit. 507,420, June 9, 1939, a metallic compn. comprising Fe and Cu is obtained by heating a mixt. of finely divided Fe and CuO to above 600° to form a hard, sintered mass comprising Cu_2O permeated with Fe oxide, which is, after being broken into granules, reduced, e. g., with water gas or producer gas at 500–800°. The product is used particularly for the manuf. of H from steam, as in the Lane process, or from liquid H_2O under pressure, as in the Bergius process.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

More recent researches on the history of the glass industry in the Sudeten District. H. Kühnert. *Gla tech. Ber.* **17**, 271–5(1939). J. F. Hyde

Beneficiation of some Alabama glass sands. R. F. Havell and T. N. McVay. *Bull. Am. Ceram. Soc.* **18**, 129–31(1939).—Tests showed that by tabling, the Fe content could be reduced from a range 0.093–0.169 to 0.057–0.066% Fe_2O_3. Small amts. of zircon, kyanite, ilmenite and rutile may be recovered as by-products. C. H. K.

The state of aggregation of glass. R. E. Liesegang. *Glastech. Ber.* **17**, 269–71(1939).—Various prevalent conceptions of the state of aggregation are briefly discussed. Simplification would seem to result if glass were considered to be a mixt. of particles varying in size from coarse down to mol. dimensions. The mol. sizes in the viscous condition impart to the coarser aggregates a certain mobility, thus acting as a lubricant. A detn. of the aggregate size distribution would be of more importance than defining the state of aggregation. It is no mistake to call glass "solid," if the expression "solid state of aggregation" is avoided. In any case the idea prevails at present that classification of materials as solid, liquid or gas is too superficial. J. F. Hyde

High-temperature viscosities of soda-silica glasses. H. R. Lillie. *J. Am. Ceram. Soc.* **22**, 367–74(1939).—A study of glasses composed of SiO_2 and 22–40% Na_2O showed that viscosity-compn. isotherms were smooth curves. The sharp minima at about 34% Na_2O (and possibly at about 26% Na_2O) observed by Preston (cf. *C. A.* **32**, 7229[2]) were absent. Neither time nor shearing stress had any effect upon observed viscosities in the region investigated so long as temp. constancy had been established. Deviations of individual points from the smooth isotherms were all within the limits of exptl. error. C. H. Kerr

Vanadium as a glass colorant. W. A. Weyl, A. G. Pincus and A. E. Badger. *J. Am. Ceram. Soc.* **22**, 374–7(1939).—In a wide range of types of glass, V, as a glass colorant, acts much like Cr. Ordinarily it leads to green tints owing to the superposition of the green of trivalent V and the yellow of quinquevalent V. Large excess of alkali leads to the formation of colorless vanadates. Under special conditions solarization will develop the lavender color of bivalent V. Melting conditions may have considerable influence upon the color. C. H. Kerr

Effect of firing schedule on quality of glass color decorations. Campbell Robertson and Daniel O. Koch. *Bull. Am. Ceram. Soc.* **18**, 422–6(1939).—A study was made of the effect of the firing schedule on the quality of vitrifiable glass color decorations applied by the screen process. An exptl. gas-fired decorating lehr with a 30-ft. tunnel was used. The firing schedule was varied widely. The medium was effectively removed in the shortest time at about 1075°F. Different media showed considerable variation in firing behavior, and this seems to offer a means for control of results. As a factor in firing, the effect of the medium is at least as important as the firing cycle itself. Thickness of color application is also a factor. C. H. Kerr

Effect of alumina on devitrification of soda-lime-silica glasses. W. B. Silverman. *J. Am. Ceram. Soc.* **22**, 378–84(1939).—The effect of the substitution of Al_2O_3 for the oxides of Na, Ca and Si on the liquidus temps. and phase relations was detd. for glasses lying within the compn. range Na_2O 11–19, CaO 6–18, SiO_2 59–79, and Al_2O_3 0–8%. The results of 137 individual detns. show that the substitution of Al_2O_3 for CaO permits wollastonite to be the primary phase in glasses of relatively low CaO content. As the Al_2O_3 increases the $Na_2O.3CaO.6SiO_2$–$CaO.SiO_2$ boundary shifts to lower CaO contents and the decompn. of $Na_2O.3CaO.6SiO_2$ to $CaO.SiO_2$ takes place at lower temps. In compns. with tridymite as a primary

Cutting and firing sized ceramic particles from materials such as plastic clay. Earnest T. Hermann. U. S. 2,172,638, Sept. 12. Various details of app. and operation.

Press suitable for molding ceramic materials. Stuart M. Phelps (to Ceramic Products Co.). U. S. 2,173,593, Sept. 19. Various structural and operative details.

Ceramic flatware articles. Robert E. Gould. U. S. 2,173,107, Sept. 19. A process of making a plurality of ceramic flatware articles such as china or porcelain articles which have substantially identical dimensions involves superposing for subsequent firing a plurality of ceramic elements comprising a plurality of leather hard ceramic articles, preformed from plastic material, a leather hard ceramic sepg. element, preformed from a plastic material which has substantially the same physical properties as the plastic material from which the ceramic articles are formed, supporting each ceramic article in the zone of greatest potential deformation during firing, a leather hard setter being used, preformed from a plastic material of like physical properties with at least a part of the obverse of the setter substantially identical to the obverse of the leather hard ceramic articles, and a fired refractory setter the obverse of which is complementary to the reverse of the leather hard setter. Cf. *C. A.* **33**, 3098[9].

Fusing and working quartz. Franz Skaupy and Gustav J. Weissenberg. Brit. 508,013, June 20, 1939. Articles of vitreous sintered quartz are produced in a process wherein the quartz is so heated that it does not remain longer than 15 min. within the region of crystobalite formation, particularly within the range 1470–1710°. The temp. may be raised for a short time above 1710° immediately after the sintering operation to increase the d. of the surface of the article. Small amts. of alkali may be added to the quartz to reduce the sintering temp. The powd quartz may be mixed with a plasticizer, e. g., cellulose dissolved in AcOAm, and a proportion of the powder may consist of coarser grains to prevent shrinkage. Colored articles may be made by mixing suitable metal compds. with the quartz. Shaped parts of metal or of refractory oxides may be inserted in the molded quartz and if W, Mo or Ta inserts are used they may be given a coating of metal of the Pt group before insertion to make a vacuum-tight joint. A *spinneret for making rayon* may be made by embedding Pt pins in the shaped quartz and drilling them out after the sintering. Cf. *C. A.* **33**, 1901[9].

Textile threads from quartz. W. C. Heraeus G. m. b. H. Brit. 507,951, June 23, 1939. A continuous fine thread of quartz is made by feeding a coarse thread into a hot gaseous stream in the direction of flow of the gas, whereby the coarse thread is softened and drawn into a continuous thread of microscopic fineness. The fine threads may be made into yarns, felt or fabrics or may be used for filtering, elec. or thermal insulation or sound damping.

Blunging crude kaolin. Sanford C. Lyons (to Bird Machine Co.). U. S. 2,173,975, Sept. 26. App. is described, and a method of blunging crude kaolin of intrinsically fine particle size and contg. oversized impurities of the nature of sand and mica, which comprises streaming such kaolin in the form of an aq. suspension contg. a substantial fraction of palpable aggregates of the ultimate kaolin particles in between and out of the sphere of action of relatively moving resilient surfaces clearing each other by such small definite gap and at such high relative speed as is attended by shearing and rubbing action on the aggregates and liberation in the aq. suspending medium of the ultimate intrinsically fine particles while the oversized impurities are preserved in essentially unreduced size.

Surface-colored chinaware. Edward Schramm (to Onondaga Pottery Co.). U. S. 2,174,198, Sept. 26. A method of producing surface-colored American vitreous chinaware involves shaping the ware from body material in a moist condition and of such compn. as to be fused and sintered by a biscuit-firing operation into a hard vitreous body characteristic of American vitreous chinaware, drying the shaped ware and thereafter coating the ware surface to be colored with an engobe comprising a pigmented material, biscuit firing the coated ware, the pigmented material being of such compn. that it is fused and sintered by the biscuit-firing operation into a colored surface portion of the ware in permanent adherence, and similar in hardness and in its vitreous character, to the fused and sintered body, applying a decorative design to the engobe-treated surface of the biscuit-fired ware, then coating the ware with glaze-forming material and then glaze firing the ware at a temp. below the biscuit-firing temp.

Asbestos tiles. Gertrude Schless (nee Winkler). Ger. 679,968, Aug. 17, 1939 (Cl. 80*b*. 17.05). Both sides of asbestos tiles are coated with a glossy covering contg. inorg. material such as a mixt. of $CaCO_3$ and nitrocellulose.

Ceramic insulator. Steatit-Magnesia A.-G. (Ernst Albers-Schonberg, inventor). Ger. 679,917, Aug. 18, 1939 (Cl. 80*b*. 8.08). An insulator for installing elec. steam boilers consists of MgO 5–18, Al_2O_3 30–50 and SiO_2 40–65%. An addn. of 2–6% Fe_2O_3 may be given.

Balanced draft and flash wall for kilns such as those used for burning ceramic products. Lawrence R. Robinson (to United Combustion Corp.). U. S. 2,173,614, Sept. 19. Various structural details.

Refractory mass. Didier-Werke A.-G. Ger. 679,915, Aug. 16, 1939 (Cl. 80*b*. 8.01). Magnesite or substances contg. MgO, and Cr ore are finely ground and intimately mixed. Part of the mixt is molded, fired and granulated. The rest is added to this and the whole molded and fired, to form refractory stone.

Abrasive coated paper. Nicholas E. Oglesby (to Behr-Manning Corp.). U. S. 2,173,796, Sept. 19. Abrasive grits are attached, by a water-sol. adhesive, such as an animal glue, to a paper backing sheet contg., as a softening agent, triethanolamine oleate or sorbitol.

Abrasive articles such as grinding wheels. Wm. P. Fitz-Randolph (to The Carborundum Co.). U. S. 2,173,833, Sept. 26. Diamonds are used with a sintered metal bond consisting principally of Sn with an alloying agent such as Cu or Sb which hardens the Sn. U. S. 2,173,834 relates to the use of an abrasive comprising diamonds and a bond comprising a sintered mixt. of Sn and Fe powders contg. not more than about 30% Fe. U. S. 2,173,835 (Wm. P. Fitz-Randolph and John A. Boyer, joint inventors; to same assignee) relates to the use of abrasive particles such as diamonds with a sintered bond consisting principally of an alpha solid soln. in which the metal forming the basic lattice structure is a metal of the Fe group and the metal retained in solid soln. is Al, Zn or Sn (suitably in a quantity up to about 33% that of the Fe group metal).

Grinding wheels. Herbert W. Wagner and Kenneth F. Whitcomb (to Norton Co.). U. S. 2,173,461–2, Sept. 19. Various structural and mfg. details of grinding wheels formed of abrasive material and a binder.

Grinding wheels. Deutsche Norton-G. m. b. H. (Lowell Haines and Robert Hamilton, inventors). Ger. 679,918, Aug. 18, 1939 (Cl. 80*b*. 11). App. for molding grinders from matrix and diamond powder is described.

Grindstones. Horbach & Schmitz. Ger. 679,919, Aug. 16, 1939 (Cl. 80*b*. 11). Grinders are made from quartz and granulated or powd. pumice, with a MgO cement as the binding agent.

Glazes. Dietrich Harkott. Ger. 679,866, Aug. 17, 1939 (Cl. 80*b*. 23.03). A ceramic glaze or enamel contains a substance which is oxidizable above 650°, such as metal carbide or powd. Al. Thus the glaze may consist of 2–3% of SiC and varying amts. of chalk, fluorspar, B_2O_3, galena, sand, etc.

Glasses, glazes and enamels. Auergesellschaft A.-G. Brit. 507,823, June 21, 1939. The compn. of silicate melts e. g., glasses, etc., that are opacified by ZrO_2 and are subjected to prolonged heat-treatment during manuf. is so selected that the ZrO_2 is not absorbed, or does not form double compds. with other constituents of the melt, under the prolonged heating. In particular, with aluminous silicate melts the proportions of SiO_2 and Al_2O_3 should not exceed 7:1. The ZrO_2 can be produced during fusion from double compds. that yield the ZrO_2 under heat, e. g., NaZr silicate or Pb zirconate.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Mineralizers in cement—results of recent investigations on the use of mineralizers in the manufacture of portland cement. E. P. Flint. *Rock Products* 42, No. 10, 40–2, 52 (1939).—A continuation of the Bates and Klein and the Flint and Wells studies of the effect of small proportions of fluxes (CaF_2, $BaCO_3$, etc.) on the compn. and calcining temps. of portland cement clinker. The fluxes used in the present studies, which are being continued for long-time strength data, are $CaCO_3$, granular silica gel, Fe_2O_3, Al_2O_3, $MgSiF_6.6H_2O$, CaF_2, Ca phosphate, B_2O_3 and Na_3AlF_6. Results obtained with CaF_2 fit the theory proposed by Eitel (*C. A.* 32, 9429[3]); the advantages of $MgSiF_6$ as a flux useful in the manuf. of portland cement clinker are discussed in detail. This study shows that the calcination of sulfate-resistant portland cements in which the Al_2O_3 and Fe_2O_3 were reduced to 3% can be facilitated by the addn. of so-called mineralizers (catalysts, fluxes) already mentioned. A. W. King

The effect of the addition of finely ground inert material to concrete. Robert Chapman and Paul E. Olsen. *J. Inst. Engrs. Australia* 11, 263–78(1939). G. Ayers

Possible relationship between tarring of highways and the increase of incidence of pulmonary primary cancer. André Kling, N. Samssonov and Marguerite Heros. *Bull. acad. méd.* 121, 784–91(1939); cf. *C. A.* 33, 8779[6].—Since tar contains benzopyrene, a recognized cancerigenic agent, it cannot be considered as inoffensive. Expts. on mice definitely confirm this assumption. A. E. Meyer

The preservation of wooden telegraph poles in the German postal service. K. Winnig. *Holz Roh- u. Werkstoff* 2, 272–8(1939).—The experience of the German postal service with standard processes and materials for preserving wood are briefly summarized. $ZnCl_2$ and $CuSO_4$ are about equally effective; $HgCl_2$ is slightly superior. A complete impregnation with coal-tar creosote is more economical than these salts because of a nearly double service life. Tanalith is the most effective of the modern preservatives used. Some data on internal pressure prevailing in the Boucherie process are given. R. H. B.

A new method of impregnating green fence posts. A preliminary report. W. C. Nettles. *J. Econ. Entomol.* 32, 703–1(1939).—The following method was used to treat nondurable green pine posts with sol. preservatives in order that they would resist insects and decaying organisms. Six-foot posts are immersed, immediately after cutting, top end down in a trough for 3 hrs. A 1-in. disk is sawed off the basal ends of the posts to remove resinous material. The basal ends are then placed in a soln. of $CuSO_4$, 2 lb. per gal. As soon as the soln. is absorbed (24–48 hrs.) remove the posts from the trough and reverse ends. Let the posts stand up for 2–4 weeks and preferably till thoroughly seasoned. About 0.75 lb. of soln. is required for each cu. ft. of wood. The investigation is being continued. Charles H. Richardson

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Economic geology of Panchet Hill [building stones and road materials] (Roy) 8.

Hydraulic cement mixtures. Kaspar Winkler. U. S. 2,174,051, Sept. 26. A process of treating mortar-like binding agents to reduce the water-cement factor thereof consists in increasing the fluidity of the suspensoids thereof by treating the binding agents with up to approx. 2%, based on the wt. of the hydraulic cement, of a nonfoaming org. carboxylic acid compd. contg. at least two hydroxy groups combined by aliphatic groups in the nucleus, such as saccharic acid.

Cooling cement clinker. Einar Ronne (to F. L. Smidth & Co.). U. S. 2,173,182, Sept. 19. App. is described, and a method of cooling cement clinker produced in a rotary kiln which involves adding cooled clinker to that in the kiln at a point beyond the clinkering zone.

Floorings of cement, etc. William C. Treuhaft (to Tremco Mfg. Co.). U. S. 2,172,628, Sept. 12. A method of prepg. a composite floor structure comprises applying a mortar composed essentially of an aggregate, hydraulic cement and an emulsified bituminous material to a suitable surface to form a foundation layer, leveling the layer and permitting it partially to dry until it is capable of sustaining the wt. of an ordinary individual without forming appreciable foot marks, applying a thin upper layer composed essentially of a hard, wear-resisting aggregate, a pigment and hydraulic cement in an amt. sufficient to bind the aggregate and pigment together when set, and compressing the upper layer upon the foundation layer to force upper-layer particles into the pores of the lower layer and to cause the hydraulic cement to draw sufficient moisture from the lower layer to bind the pigment and aggregate together and to cement the upper layer to the lower layer. U. S. 2,172,629 relates to a method of prepg. a flooring having a terrazzo effect, which comprises mixing a minor portion of a hydraulic cement with a major portion of ornamental chips to form a uniform mortar of av. consistency, mixing emulsified asphalt with the mortar in an amt. substantially in excess of the hydraulic cement, applying the compn. to a foundation, levelling the compn., allowing the compn. to stand until it can be floated and then floating the compn. to bring a portion of the ornamental chips to the surface.

Sintering or calcining raw materials such as those for cement production. Nikolai Ahlmann (to F. L. Smidth & Co.). U. S. 2,174,066, Sept. 26. App. is described, and a process for sintering or calcining raw material which comprises forming a layer of porous fine-grained heat-recuperative material on a traveling gas-pervious support, forming on top of the first-named layer a porous fine-grained layer of the material to be sintered or calcined, passing a heated gas transversely through the layers as at least a part of the sintering or calcining operation, thereafter passing downwardly through the layers an unheated gas which transfers the heat contained in the top layer of the material to the underlying heat-recuperative layer, then removing the top layer of material from the underlying layer, thereafter passing a cooling gas through the recuperative layer from which the top layer has been removed to absorb in the gas the heat in the recuperative layer, and utilizing the last-mentioned gas as the first-mentioned heated gas which is used as part of the sintering or calcining operation.

Concrete. Hermann Leitz, Carl Unverzagt and Paul Betzler. Ger. 679,914, Aug. 15, 1939 (Cl. 80*b*. 4.08). A cement made from granular MgO or Mg salts and granular flux material is used as concrete for fixing Fe and steel girders in buildings. $MgCl_2$ and ground $CaCO_3$ or dolomite may be used.

Pavement expansion joint with an asphalt and copper seal. Robert R. Robertson (to Translode Joint Co.). U. S. 2,172,773, Sept. 12. Various structural details.

Expansion joints; rubber compositions. International Latex Processes Ltd. Brit. 507,731, June 20, 1939. An expansion joint is formed in a space between 2 constructional members, e. g., paving slabs, by insertion of a compressible and expansible material in the space and anchoring it to the members by the formation *in situ* between the material and the members of a deposit of solids from an uncoagulated "latex" compn., the term "latex" signifying a coagulable aq. dispersion of elastic materials, including artificial dispersions of rubber as well as natural rubber. Suitable latex compns. are (1) centrifuged latex, KOH soln., S paste, diamylammonium diamyldithiocarbamate (I) emulsion, Na silicate, whiting and ZnO paste, (2) rubber reclaimed from tires, whiting, rosin, ZnO, S, NaO and tetramethylthiuram monosulfide (II). The I and II act as low-temp. accelerators. A further compn. comprises the ingredients of I with the addn. of casein soln., a china clay aq. dispersion and aluminous cement, to which may be added a 33⅓% dispersion of Na_2SiF_6 as a delayed coagulant before pouring into the joint. The Na_2SiF_6

dispersion may be replaced by an aq. emulsion of pine tar or a polyvalent metal salt. The latex compd. may be made heat-sensitive by the addn. of polyvalent metal salts, disubstituted guanidines or an NH_4 salt of a strong acid and ZnO. In the case of a heat-sensitive latex that is not coagulable at normal temps., the compd. may be heated *in situ*, e. g., by playing hot steam on the joint, to produce more or less immediate gelling. 1

Coating compositions. Granitese (Great Britain) Ltd., Grenville J. Staples and James C. B. McGuffie. Brit. 508,025, June 23, 1939. A cold-glazing prepn., for application to brick, stone, concrete, plaster, etc., comprises a mixt. of portland cement and an aq. emulsion of china-wood oil. A pigment may be added. The surface to be treated is preferably first set with a mixt. contg. sand, portland cement and a waterproofing agent and the glazing prepn. is then sprayed thereon. After hardening, the glaze may be coated with a waterproofing medium, e. g., an emulsion contg. H_2O, beeswax, K_2CO_3 and fish glue. 2

Artificial stone. Louis Czajko. Ger. 679,920, Aug. 16, 1939 (Cl. 80*b*. 17.05). A mixt. of disintegrated asbestos fiber, cement and other optional materials is moistened in a rotating drum and molded under pressure to form stone slabs.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

Calculating water in combustion of gaseous fuels. J. F. Anthes. *Gas Age* **84**, No. 8, 67–8(1939).—A 10-cc. sample of gas mixed with a measured vol. of air is exploded or burned by slow combustion. The contraction is noted and the amt. of CO_2 and excess O are detd. A sample of the same gas is analyzed for CO_2, CO, O and illuminants. The cu. ft. of water vapor per cu. ft. of gas burned = 2{[(0.209 × cc. air used per 10 cc. gas burned − cc. excess O)/10 − 0.5 cu. ft. of CO per cu. ft. of gas + cu. ft. O per cu. ft. of gas] − [(cc. CO_2 produced per 10 cc. gas burned)/10 − cu. ft. of CO_2 per cu. ft. of gas − cu. ft. of CO per cu. ft. of gas]}. Joseph H. Wells

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Sulfur study of some Tertiary coals of Khasi Hills, Assam. N. N. Chatterjee. *Quart. J. Geol., Mining Met. Soc. India* **10**, 135–41(1938).—Proximate analyses of coals from Cherapunji, Laitringow and Thanginat are given with addnl. detailed data on S content. Big lumps of pyrites were picked out and eliminated, before the coals were analyzed. S retained by the coke is very high and these cokes are not suitable for metallurgical operations. J. F. Schairer

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This study was continued on a practical basis, confirming earlier findings. The boxes were grouped in 2 series, pre-purification and after-purification. In the pre-purifier boxes it was possible to reach a S content of 55% before discarding the purifying material as against 48% in previous practice. In a new plant the boxes would be designed so that the after-purifiers could be placed in the pre-purification state after partial fouling. The change in gas velocity through the purifier boxes had no effect on final O concn. of the gas; this was high owing to leaks at retort doors. R. W. Ryan

Gas for syntheses from peat. A plant trial in the Tiefstack plant of the Hamburg gas works. Gustav Keppeler. *Chem. Fabrik* **1939**, 457–62; cf. *C. A.* **33**, 1911[8], 5630[9].—The Pintsch-Hillebrand process for producing water gas is discussed, and a vertical section through the producer, a flow-sheet and an elevation of the plant are shown. The app. was used on ordinary raw peat contg. 28–30% H_2O, which was charged just after using lignite briquets, the expts. beginning about 70 hrs. after starting to charge the peat, with temps. of 1200 and 1300°. Data are given on heat balance, peat consumption, gas yields and analyses, the latter averaging about 15, 27, 54, 2.5 and 1.8% CO_2, CO, H, CH_4 and N, resp. Estd. plant and production costs based on Pintsch data are given, and it is concluded that a synthetic gas plant is feasible in peat regions. Five references. J. H. Moore

The clinker problem in small gas producers. R. Rasch. *Glückauf* **75**, 239–42(1939).—A study of the clinker problem in small gas producers for motor vehicles has shown that the melting property of the ash in connection with the "fire-clay refractory" is dependent upon the CaO content. Ash low in CaO has little effect upon the refractory, but because of its high soly. effect forms clinkers. For this type of fuel, water-cooled producers are preferable. High CaO content retards the formation of clinker, so that for such fuels a producer lined with fire clay is best. L. P. Rockenbach

Determination of hydrogen sulfide and hydrocyanic acid in manufactured gas. Theo Payer and Adolf Lehrenkrauss. *Gas- u. Wasserfach* **82**, 713–15(1939).—When an attempt is made to apply the Tutweiler I titration method to the detn. of small amts. of H_2S in purified manufd. gas, erroneous results are obtained owing to HCN forming ICN. The method has been modified to give more accurate results and also to permit the detn. of HCN as well. When HCN is not to be detd. starch soln. is added to approx. 500 cc. of gas in the Tutweiler app. and the soln. titrated to faint permanent blue with 0.01 gas-normal I soln. (1 cc. of a gas-normal soln. = 1 cc. of gas constituent to be detd., under standard conditions). The Tutweiler app. is then washed out into a flask and 1 cc. of fresh 5% KI soln. added, after which the soln. is acidified with a little dil. HCl. The soln. is then titrated with 0.01 gas-normal $Na_2S_2O_3$ solution. This titration is subtracted from the first to give the value for H_2S, and when this difference is multiplied by 2.84 the product is g. of H_2S per 100 cu. m. For detn. of HCN, the method is modified by adding a known excess of I soln. to the Tutweiler app. after the faint blue color appears. Results for HCN by this method check well with those by the Feld method. R. W. R.

Supervision of [Diesel] exhaust gases. H. Kuhlman. *Glückauf* **75**, 350–1(1939).—The CO content of a Diesel exhaust can be rapidly detd. by means of a Drager type T-CO measuring app. This outfit employs a catalytic cartridge which rises in temp. as air contg. CO is passed through it. From a linear relationship between temp. and CO content the exact amt. of CO is detd. L. P. R.

Carbon monoxide content in Diesel exhaust. H. H. Müller-Neuglück. *Glückauf* **75**, 337–46(1939).—The formation of CO is affected by the ignition characteristics and chem. compn. of the oil, faults of injection or other mech. defects. A complete review of the methods of obtaining and analyzing samples of mine air and Diesel exhaust is given. A ventilating air supply of 6 cu. m. (215 cu. ft.) per h. p. per min. provides a large margin of safety above the toxic limit. L. P. Rockenbach

Condensation of moisture from boiler flue gases. A. C. Walshaw. *Eng. Boiler House Rev.* **53**, 307(1939).—Calcn. of the temp. at which moisture (and subsequent corrosion from acid solns. formed) will be deposited from flue gases involves (1) estn. of the partial pressure of water vapor in the gases, and (2) use of steam tables to find the corresponding satn. temp. George Ayers

Refining regenerator gas tar by thermal treatment. A. Jäppelt and A. Steinmann. *Glückauf* **75**, 596–601 (1939).—The tar obtained from the distn. of poor- or non-coking coals in regenerator-type coke ovens is not suited for use as fuel oil without some treatment such as hydrogenation or distn. Expts. with these tars have shown that by reheating up to about 370° there is a decrease in sp. gr. and viscosity. Above this temp. the sp. gr. and viscosity increase rapidly and the tar acid yield decreases. The effect of time of heating on the tar is also important. Seven sec. appears to be the optimum time of heating. Tar thus treated at a comparatively low cost has the same ignition pt., higher heating value and lower sp. gr. and viscosity than the original tar and does not change appreciably during long periods of storage. L. P. R.

Portable app. for analysis of mine gases, motor exhaust, etc. (Schmidt) **1**. Colorimetric detn. of CS_2 [in motor fuel] (Demann, Adelsberger) **7**. Isolation of 2,2-dimethylbutane from natural gas (Hicks-Bruun, *et al.*) **10**. Coal deposits of the Eastern Urals (Shekhunov) **8**. Amino glycols [for absorbing CO_2 and H_2S from industrial gases] (U. S. pat. 2,174,282) **10**. C black and CO-II gas mixts. from natural gas, etc. (U. S. pat. 2,173,695) **18**. Drilling gas wells (U. S. pat. 2,174,027) **22**.

Motor fuel. Lebbeus C. Kemp and Rufus L. Savage, Jr. (to Texas Co.). U. S. 2,172,560, Sept. 12. An arrangement of app. is described, and a process for the manuf. of high antiknock motor fuel, which comprises stabilizing cracked naphtha to remove therefrom substantially all hydrocarbons of less than 5 C atoms, thereby producing a stabilized cracked naphtha of lower volatility than com. gasoline and a normally gaseous hydrocarbon fraction contg. butane, isobutane and olefins, subjecting the fraction to the action of concd. H_2SO_4 whereby the isobutane is alkylated by the olefins to produce high antiknock normally liquid hydrocarbons within the gasoline-boiling range, sepg. the normally liquid hydrocarbons from residual normally gaseous hydrocarbons, fractionating the residual normally gaseous hydrocarbons to produce a fraction rich in normal butane and a fraction rich in isobutane with the stabilized naphtha to increase its volatility and recycling the fraction rich in isobutane to the alkylation operation. Cf. *C. A.* **33**, 8395[2].

Pitches from coal and petroleum tars. Wilfred M. Bywater (to Barrett Co.). U. S. 2,174,184, Sept. 26. An arrangement of app. is described, and a method of producing from coal and petroleum tars, pitches of lower temp. susceptibility than ordinary tar pitches of the same m. p. comprising suspending finely pulverized coal in regulated amt. in a liquid comprising coal tar or petroleum tar, or its distn. products, which liquid is capable of forming pitch on distn., agitating the liquid and mechanically suspended coal, recirculating the liquid and coal through a heating coil to effect the decompn. of the coal, and continuing the decompn. process until a pitch product of the desired m. p. and temp. susceptibility is obtained.

Apparatus for generating gas from coal, etc. Ernst Mahlkuch. Ger. 679,858, Aug. 14, 1939 (Cl. 24*e*. 3.03).

Apparatus for generating water gas from solid fuel. Braunkohlen- und Brikett-Industrie A.-G. "Bubiag." Ger. 679,961, Aug. 18, 1939 (Cl. 26*a*. 5).

Chamber furnace for producing gas and coke. C. Otto & Co. G. m. b. H. Ger. 679,872, Aug. 17, 1939 (Cl. 10*a*. 13).

Water gas. Willy Linder (to Koppers Co.). U. S. 2,172,740, Sept. 12. An arrangement of app. is described, and a process of continuously producing water gas free of hydrocarbons from distillable solid fuels, which comprises maintaining in a bed of continuously descending fuel a lower water-gas-reaction zone and an upper predistn.

dispersion may be replaced by an aq. emulsion of pine tar or a polyvalent metal salt. The latex compd. may be made heat-sensitive by the addn. of polyvalent metal salts, disubstituted guanidines or an NH_4 salt of a strong acid and ZnO. In the case of a heat-sensitive latex that is not coagulable at normal temps., the compd. may be heated *in situ*, e. g., by playing hot steam on the joint, to produce more or less immediate gelling. 1

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This study was continued on a practical basis, confirming earlier findings. The boxes were grouped in 2 series, pre-purification and after-purification. In the pre-purifier boxes it was possible to reach a S content of 55% before discarding the purifying material as against 48% in previous practice. In a new plant the boxes would be designed so that the after-purifiers could be placed in the pre-purification state after partial fouling. The change in gas velocity through the purifier boxes had no effect on final O concn. of the gas; this was high owing to leaks at retort doors. R. W. Ryan

Gas for syntheses from peat. A plant trial in the Tiefstack plant of the Hamburg gas works. Gustav Keppeler. *Chem. Fabrik* **1939**, 457–62; cf. *C. A.* **33**, 1911[8], 5630[9].—The Pintsch-Hillebrand process for producing water gas is discussed, and a vertical section through the producer, a flow-sheet and an elevation of the plant are shown. The app. was used on ordinary raw peat contg. 28–30% H_2O, which was charged just after using lignite briquets, the expts. beginning about 70 hrs. after starting to charge the peat, with temps. of 1200 and 1300°. Data are given on heat balance, peat consumption, gas yields and analyses, the latter averaging about 15, 27, 54, 2.5 and 1.8% CO_2, CO, H, CH_4 and N, resp. Estd. plant and production costs based on Pintsch data are given, and it is concluded that a synthetic gas plant is feasible in peat regions. Five references. J. H. Moore

The clinker problem in small gas producers. R. Rasch. *Glückauf* **75**, 239–42(1939).—A study of the clinker problem in small gas producers for motor vehicles has shown that the melting property of the ash in connection with the "fire-clay refractory" is dependent upon the CaO content. Ash low in CaO has little effect upon the refractory, but because of its high soly. effect forms clinkers. For this type of fuel, water-cooled producers are preferable. High CaO content retards the formation of clinker, so that for such fuels a producer lined with fire clay is best. L. P. Rockenbach

Determination of hydrogen sulfide and hydrocyanic acid in manufactured gas. Theo Payer and Adolf Lehrenkrauss. *Gas- u. Wasserfach* **82**, 713–15(1939).—When an attempt is made to apply the Tutweiler I titration method to the detn. of small amts. of H_2S in purified manufd. gas, erroneous results are obtained owing to HCN forming ICN. The method has been modified to give more accurate results and also to permit the detn. of HCN as well. When HCN is not to be detd. starch soln. is added to approx. 500 cc. of gas in the Tutweiler app. and the soln. titrated to faint permanent blue with 0.01 gas-normal I soln. (1 cc. of a gas-normal soln. = 1 cc. of gas constituent to be detd., under standard conditions). The Tutweiler app. is then washed out into a flask and 1 cc. of fresh 5% KI soln. added, after which the soln. is acidified with a little dil. HCl. The soln. is then titrated with 0.01 gas-normal $Na_2S_2O_3$ solution. This titration is subtracted from the first to give the value for H_2S, and when this difference is multiplied by 2.84 the product is g. of H_2S per 100 cu. m. For detn. of HCN, the method is modified by adding a known excess of I soln. to the Tutweiler app. after the faint blue color appears. Results for HCN by this method check well with those by the Feld method. R. W. R.

Supervision of [Diesel] exhaust gases. H. Kuhlman. *Glückauf* **75**, 350–1(1939).—The CO content of a Diesel exhaust can be rapidly detd. by means of a Drager type T-CO measuring app. This outfit employs a catalytic cartridge which rises in temp. as air contg. CO is passed through it. From a linear relationship between temp. and CO content the exact amt. of CO is detd. L. P. R.

Carbon monoxide content in Diesel exhaust. H. H. Müller-Neuglück. *Glückauf* **75**, 337–46(1939).—The formation of CO is affected by the ignition characteristics and chem. compn. of the oil, faults of injection or other mech. defects. A complete review of the methods of obtaining and analyzing samples of mine air and Diesel exhaust is given. A ventilating air supply of 6 cu. m. (215 cu. ft.) per h. p. per min. provides a large margin of safety above the toxic limit. L. P. Rockenbach

Condensation of moisture from boiler flue gases. A. C. Walshaw. *Eng. Boiler House Rev.* **53**, 307(1939).—Calcn. of the temp. at which moisture (and subsequent corrosion from acid solns. formed) will be deposited from flue gases involves (1) estn. of the partial pressure of water vapor in the gases, and (2) use of steam tables to find the corresponding satn. temp. George Ayers

Refining regenerator gas tar by thermal treatment. A. Jäppelt and A. Steinmann. *Glückauf* **75**, 596–601(1939).—The tar obtained from the distn. of poor- or non-coking coals in regenerator-type coke ovens is not suited for use as fuel oil without some treatment such as hydrogenation or distn. Expts. with these tars have shown that by reheating up to about 370° there is a decrease in sp. gr. and viscosity. Above this temp. the sp. gr. and viscosity increase rapidly and the tar acid yield decreases. The effect of time of heating on the tar is also important. Seven sec. appears to be the optimum time of heating. Tar thus treated at a comparatively low cost has the same ignition pt., higher heating value and lower sp. gr. and viscosity than the original tar and does not change appreciably during long periods of storage. L. P. R.

Portable app. for analysis of mine gases, motor exhaust, etc. (Schmidt) **1**. Colorimetric detn. of CS_2 [in motor fuel] (Demann, Adelsberger) **7**. Isolation of 2,2-dimethylbutane from natural gas (Hicks-Bruun, *et al.*) **10**. Coal deposits of the Eastern Urals (Shekhunov) **8**. Amino glycols [for absorbing CO_2 and H_2S from industrial gases] (U. S. pat. 2,174,242) **10**. C black and CO-H gas mixts. from natural gas, etc. (U. S. pat. 2,173,695) **18**. Drilling gas wells (U. S. pat. 2,174,027) **22**.

Motor fuel. Lebbeus C. Kemp and Rufus L. Savage, Jr. (to Texas Co.). U. S. 2,172,560, Sept. 12. An arrangement of app. is described, and a process for the manuf. of high antiknock motor fuel, which comprises stabilizing cracked naphtha to remove therefrom substantially all hydrocarbons of less than 5 C atoms, thereby producing a stabilized cracked naphtha of lower volatility than com. gasoline and a normally gaseous hydrocarbon fraction contg. butane, isobutane and olefins, subjecting the fraction to the action of concd. H_2SO_4 whereby the isobutane is alkylated by the olefins to produce high antiknock normally liquid hydrocarbons within the gasoline-boiling range, sepg. the normally liquid hydrocarbons from residual normally gaseous hydrocarbons, fractionating the residual normally gaseous hydrocarbons to produce a fraction rich in normal butane and a fraction rich in isobutane with the stabilized naphtha to increase its volatility and recycling the fraction rich in isobutane to the alkylation operation. Cf. *C. A.* **33**, 8395[2].

Pitches from coal and petroleum tars. Wilfred M. Bywater (to Barrett Co.). U. S. 2,174,184, Sept. 26. An arrangement of app. is described, and a method of producing from coal and petroleum tars, pitches of lower temp. susceptibility than ordinary tar pitches of the same m. p. comprising suspending finely pulverized coal in regulated amt. in a liquid comprising coal tar or petroleum tar, or its distn. products, which liquid is capable of forming pitch on distn., agitating the liquid and mechanically suspended coal, recirculating the liquid and coal through a heating coil to effect the decompn. of the coal, and continuing the decompn. process until a pitch product of the desired m. p. and temp. susceptibility is obtained.

Apparatus for generating gas from coal, etc. Ernst Mahlkuch. Ger. 679,858, Aug. 14, 1939 (Cl. 24*e*. 3.03).

Apparatus for generating water gas from solid fuel. Braunkohlen- und Brikett-Industrie A.-G. "Bubiag." Ger. 679,961, Aug. 18, 1939 (Cl. 26*a*. 5).

Chamber furnace for producing gas and coke. C. Otto & Co. G. m. b. H. Ger. 679,872, Aug. 17, 1939 (Cl. 10*a*. 13).

Water gas. Willy Linder (to Koppers Co.). U. S. 2,172,740, Sept. 12. An arrangement of app. is described, and a process of continuously producing water gas free of hydrocarbons from distillable solid fuels, which comprises maintaining in a bed of continuously descending fuel a lower water-gas-reaction zone and an upper predistn.

zone, and withdrawing the hydrocarbon-free water gas from the fuel bed at a zone intermediate the upper distn. zone and the lower water-gas zone; introducing the fuel to be degasified at the top of the bed and withdrawing the residue as solids from the bed below the water-gas-reaction zone; and effecting the maintenance of the zones of the fuel bed by traversing the upper distn. zone with a preheated gaseous heat-carrier medium and circulation of the medium from the upper distn. zone together with hydrocarbons therefrom and steam through a sep. gas heating-up stage to reheat the medium and thence back to the fuel bed through the lower water-gas-reaction zone for the water-gas-reaction therewith; and which involves: introducing the gaseous heat-carrier medium for each of the upper and lower zones as sep. streams individual to the respective zones, and independently of the other zone, and in quantities for the respective zones to supply the heat for the respective zones by the sep. streams therefor.

Catalytic purification of gases. Walter H. Groombridge and Ronald Page. Brit. 507,593, June 19, 1939. Gas mixts., particularly CO and H, are freed from S by passage at an elevated temp., e. g., 400–600°, over a catalyst comprising Fe_2O_3 and ZnO, e. g., Fe_2O_3 60–80 and ZnO 40–20%. In the gas of gas mixts. such as water gas the ratio between CO and H may be altered to make the product suitable for conversion into CH_4 or higher hydrocarbons or oxygenated compds. such as aliphatic alcs. by conducting the process with the addn. of H_2O vapor. Where possible, the catalytic treatment is preceded by a washing with alkali soln. to remove as much as possible of the S, and it is followed by a similar washing to remove the remaining S.

Centrifugal gas cleaners. Leon Thuillard. Brit. 507,243, June 13, 1939. Gases are cleaned from impurities by being subjected to centrifugal action and then to passage through a decelerating zone before being discharged to the atm.

Acetylene, etc Johann Schwarz. Ger. 679,885, Aug. 18, 1939 (Cl. 26*b*. 44.01). A mixt. of C_2H_2 and other gaseous hydrocarbons, suitable for use as fuel for motors, is obtained by adding a mixt. of liquid hydrocarbons and alc. or ketones to the CaC_2 and generating the C_2H_2 by adding water. App. is described.

Oven for coking coal. Firma Carl Still. Ger. 678,407, July 14, 1939 (Cl. 10*a*. 19.01). Addn. to 632,850 (*C. A.* **31**, 244[5]). A device for leading off the gases and vapors is described.

Regenerator unit for coking-retort oven. Heinrich Koppers (to Koppers Co.). U. S. 2,172,736, Sept. 12. Various structural features.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

The determination of the aromatic hydrocarbons in the middle fractions of petroleum. Costin D. Nenitzescu, Dimitrie A. Isăcescu and Alexandru C. Isopescu. *Österr. Chem.-Ztg.* **42**, 350, 352–3 (1939). The fraction of petroleum from Gura-Ocnitei b. 150–260° contains 28% aromatic hydrocarbons b. between 200° and 260°. Prehnitol, α- and β-methylnaphthalene, 2,6- and 1,6-dimethylnaphthalene were identified. The presence of 2,7-dimethylnaphthalene is indicated. Joseph H. Wells

Naphthenic acids (from Grozny petroleum). I. I. Lapkin. *J. Gen. Chem.* (U. S. S. R.) **9**, 1332–41 (1939).—Based on the elementary compn. of the Me esters, a mixt. of naphthenic acids, b_4 138–230°, obtained from Grozny petroleum contained: monocyclic C_{10} and C_{11} acids, a mixt. of mono- and bicyclic C_{12} and C_{13} acids and bicyclic C_{14}–C_{18} acids. The presence of tri- and polycyclic acids could not be demonstrated. Detn. of the max. crit. temp. of soln. in aniline of the hydrocarbons obtained by reduction of the naphthenic acids revealed the absence of fatty acids. From the parachor values obtained for the Me esters the presence of 5- and 6-membered nuclei was indicated. Based on the rate of etherification with iso-BuOH (Menshutkin, *J. Russ. Phys. Chem. Soc.* **12**, 82 (1880)) all of the acids contd. a primary CO_2H group. 24 references. John Livak

Power and steam plants for oil-refinery service. C. E. Steinbeck. *Trans. Am. Soc. Mech. Engrs.* **61**, 733–40 (1939). E. H.

Calculation of internal reflux when superheated steam is used in distillation. S. M. Volokh. *Neftyanoe Khoz.* **1938**, No. 9, 29–33.—Calcns. dealing with petroleum bubble towers. A. A. Boethlingk

Gasolines with high nondetonating power, their character, practical interest and manufacture. IV. Industrial processes for the manufacture of gasolines by polymerization. Y. Mayor. *Rev. industrielle* **69**, 305–6 (1939), cf. *C. A.* **33**, 9610[8].—The catalytic process of the Universal Oil Products Co. is described. **V. Trend of recent investigations.** *Ibid.* 306–8.—Fuels with higher octane nos. than those obtained by the preceding processes can be made by (1) adding antidetonating agents to gasoline, and (2) blending gasoline with synthetic materials such as isooctane or isopropyl ether. $PbEt_4$ may be added to the latter blends in order further to increase the octane no. George Ayers

Chemical composition and detonation properties of shale gasoline. N. V. Ershov. *J. Applied Chem.* (U. S. S. R.) **12**, 867–9 (in French, 870) (1939).—The gasoline (octane no. = 70) obtained from the Gdovsk kukkersite belongs to the olefin-paraffin gasoline and has the following compn.: unsatd. 62.0, aromatic 11.4, naphthenes 8.0 and paraffins 18.6%. The gasoline was fractionated into 16 fractions (5° interval) from 40 to 130° and an octane no. and sp. gr. of each fraction was detd. An octane no of gasoline freed from unsatd. and aromatic substances was also detd. Conclusions: The carrier of antidetonation properties of the shale gasoline is the low boiling fraction (according to the phys compn.) and unsatd. hydrocarbons (according to chem. compn.) A. A. Podgorny

The electrical properties of kerosene. B. M. Hokhberg and M. V. Glikina. *J. Tech. Phys.* (U. S. S. R.) **9**, 730–6 (1939).—By purifying kerosene with H_2SO_4, with clay or cement it is possible to increase its specific resistance ρ to 10^{14} ohm cm. at 50 kv./cm. or 10^{13} ohm cm. at 120 kv./cm. Acidity of kerosene up to 10 mg. KOH per g. does not affect ρ. Humidity decreases it. The breakdown voltage of purified kerosene is 230–280 kv./cm. J. J. Bikerman

Selecting solvents for dewaxing residual oils from Surakhany and Koschaguyl crude oils. V. K. Lebedeva, A. V. Druzhinina and E. E. Pisarevskaya. *Neftyanoe Khoz.* **1938**, No. 12, 31–5.—Extn. with MeEtCO in a mixt. with aviation gasoline, acetone in aviation gasoline and a chlorinated solvent in aviation gasoline gives yields of oil decreasing in that order. These solvents when applied at −30° may produce oils of pour point −27 to −29°. These oils usually have a lower viscosity index than oils of higher pour point. The quality of the oil and its yield are lowered when the contents of MeEtCO, acetone and chlorinated solvent in the extn. mixt. are above 35%. The exact nature of the chlorinated solvent is not stated. A. A. Boehtlingk

Improvement of natural lubricating oils. Franz Krczil. *Chem. App.* **26**, 220–2, 237–9 (1939).—Lubricating properties of oils can be improved by addn. of small amts. of polymerization products of high viscosity. Methods for producing products of such high viscosity are described. G. W. Stroebe

Bituminous materials and their uses in the electrical industry. R. Heilmann. *Rev. gén. élec.* **46**, 229–34 (1939).—Classifications and definitions of terms and compns. as used in England, France and America, the characteristics of bituminous materials at different temps., their plasticity, ductility, adhesiveness and melting behavior

are described in detail and testing methods for their properties and those of mixts. are discussed.
M. Hartenheim

Naval stores, 1919–1939. Eldon Van Romaine. *Chem. Industries* **45**, 402–8(1939). E. H.

The production of alcohol from wood. H. Roschier. *Suomen Kemistilehti* **12A**, 116–18(1939).—A discussion of the tech. and economic aspects of the production of alc. from wood. S. A. Karjala

Tetraethyllead (Edgar) **10**. Oil occurrences in southwest Lancashire (Cope) **8**. Heavy mineral assemblages of the Burma oilfields (Krishnaswamy) **8**. Perspectives for oil deposits in Turkmenia and Western Uzbekistan (Varentsov, Suvorov) **8**. N compds. in petroleum distillates (Axe, Bailey) **10**. Report on coal and shale deposits (Matveev) **8**. Porous silicate decolorizing agents [for decolorizing oils] (U. S. pat. 2,173,085) **1**. Polymerizing unsatd. hydrocarbons [for production of liquid hydrocarbons] (U. S. pat. 2,173,482) **10**. Decompn products of synthetic resins [for extg. aromatic hydrocarbons and sepg. lubricating oils] (Brit. pat. 507,339) **13**. Adsorbent material for treating oils and sludges [for reconditioning used mineral oils] (U. S. pat. 2,174,177) **27**. Olefins (Brit. pat. 507,567) **10**.

Recovering valuable products from spent soda used in petroleum refining. Hans G. Vesterdal (to Standard Oil Development Co.). U. S. 2,174,023, Sept. 26. Residual materials obtained from the neutralization of an acid oil, as by use of NaOH, are treated with a gas contg. CO_2 to remove substantially free alkalies as bicarbonates and to produce a sepn. into an oily layer and an aq. layer contg. the bicarbonates, and an oil and a wetting agent are recovered separately from the oily layer.

Cracking and hydrogenating oils. I. G. Farbenindustrie A.-G. Brit. 507,999, June 23, 1939. Divided on 503,602 (*C. A.* **33**, 7552[4]). Nonknocking motor fuels are obtained by subjecting paraffin hydrocarbons together with C_6H_6 and (or) its light-boiling homologs and (or) light-boiling hydroaromatic hydrocarbons to a heat-treatment at 300–700°, preferably in the presence of a rigid catalyst having a splitting, and advantageously polymerizing, action and, if desired, in the presence of H. Light-boiling homologs of C_6H_6 and light-boiling hydroaromatic hydrocarbons are those boiling in the boiling range of benzines, i. e., up to 225°. In an example, BuH, C_6H_6 and H at 530° and under 250 atm. pressure are led over a splitting and polymerizing catalyst comprising H_2MoO_4, ZnO and MgO to obtain a liquid product the fraction of which boiling up to 180° may be used to improve the nonknocking properties of motor fuels.

Cracking and polymerization of hydrocarbons such as those from oil cracking. Peter J. Gaylor (to Standard Oil Development Co.). U. S. 2,174,024, Sept. 26. An arrangement of app. is described, and a process for the production of liquid hydrocarbons of the gasoline-boiling range from a mixt. of normally gaseous hydrocarbons ranging from CH_4 to C_4H_{10} and including relatively small amts. of butylenes and larger amts. of C_3H_6 and C_2H_4, which comprises subjecting the gas mixt. to cracking at a temp. between about 480° and 800°, passing the cracked products through a polymerization zone maintained at a temp. of 400–565° and under a pressure ranging from 600 lb. per sq. in. to 3000 lb. per sq. in., removing the polymers so formed boiling within the gasoline range and higher, and subjecting the resulting gas mixt. to a temp. of 700–1200° at substantially atm. pressure in the absence of C-forming substances, and recovering the polymers so formed boiling within the gasoline range and higher.

Cracking and coking oils. Universal Oil Products Co. Brit. 507,389, June 14, 1939. In a multi-stage process for cracking and optionally coking oils, the gasoline produced in the process is stabilized, a cooled condensate produced in the fractionation of the cracked vapors is used to absorb rich gases set free in the stabilization and the thus enriched condensate is fed as cooling medium to 1 or more points in the cracking system between the conversion zone and the fractionation zone. App. is described.

Polymerizing olefins such as those from oil cracking. Sumner H. McAllister (to Shell Development Co.). U. S. 2,174,247, Sept. 26. A process for producing olefin polymers comprises maintaining a hydrocarbon mixt. contg. different olefins of at least 3 C atoms at least one of which is a tertiary olefin in contact with an aq. soln. of a strong inorg. S acid of 55 to 80% concn. at a polymerizing temp. of about 120 to about 70° until substantial conjunct polymerization between the olefins takes place. Polymerization products may thus be obtained which constitute antiknock motor fuels.

Liquid hydrocarbons from normally gaseous hydrocarbons such as those from oil cracking. Pike H. Sullivan (to Process Management Co.). U. S. 2,173,456, Sept. 19. An arrangement of app. is described, and a method of converting normally gaseous hydrocarbons to normally liquid hydrocarbons including gasoline constituents which comprises subjecting normally gaseous hydrocarbons to elevated conditions of temp. and pressure to effect conversion thereof to normally liquid hydrocarbons, sepg. the products of conversion into a gaseous phase and a liquid phase including the normally liquid constituents of the conversion products, passing at least a portion of the normally gaseous hydrocarbons thus sepd. through a primary scrubbing zone in intimate contact with a scrubbing medium consisting of normally liquid hydrocarbon oil, admixing enriched scrubbing medium from the primary scrubbing zone with the hot products of conversion to cool the hot products, passing unabsorbed gases from the primary scrubbing zone through a secondary scrubbing zone in intimate contact with a scrubbing medium consisting of liquefied normally gaseous hydrocarbons, and subjecting enriched liquid scrubbing medium from the secondary scrubbing zone to the elevated conditions of temp. and pressure. Cf. *C. A.* **33**, 3579[2].

Hydrocarbon synthesis. Metallgesellschaft A.-G. and Wilhelm Herbert. Brit. 507,366, June 14, 1939. In the synthesis of hydrocarbons, mainly paraffinic and olefinic, from CO and H with catalysts known for the synthesis of benzene, oil and solid paraffin and at temps. below those yielding only CH_4, the gas throughput is kept greater than 1 l. (calcd. at normal pressure and temp.) per hr. per g. of hydrogenating metal in the contact mass and the reaction chamber or the pressure, or both, is made so large that the time of contact of the gas with the contact mass is greater than 45 sec. while the temp. is so regulated that the heat generated, calcd. as heat load per sq. m. of cooling surface of the cooling members embedded in the contact mass, at the gas pressure of p atm. does not exceed 500 $\sqrt[3]{p}$ kg.-cal. per hr. Recycling of gases, if desired after removal of reaction products, increases the catalyst life and reduces the formation of solid paraffin. Among examples, a Co-Th-kieselguhr catalyst, prepd. by pptg. a mixt. of the metal nitrate solns. and kieselguhr with K_2CO_3, granulating and reducing, and contg. Co 33, ThO_2 6 and kieselguhr 61%, is used; the contact chamber is divided into 2 stages, part of the reaction products being withdrawn immediately; gases contg. H_2 2 to CO 1 vols. are caused to react at 180° and normal pressure, the throughput being 1 l. per hr. per g. of Co, the time of stay 36 sec. and the heat load per sq. m. 240 kg.-cal. per hr.

Apparatus for conserving low-boiling hydrocarbon vapors of centrifuged oil. Hans O. Lindgren (to De Laval Separator Co.). U. S. 2,172,513, Sept. 12. App. is used which includes the combination with a centrifugal separator for refining low-boiling liquid hydrocarbons and collecting vessels surrounding the separator and closed to the atm. and adapted to receive the sepd. constituents and each provided with a single fluid outlet, of a recovery system for condensing condensable hydrocarbon vapors, receivers for the sepd. liquids, closed fluid passages between the respective outlets from the collecting vessels and the respective receivers for conveying to the latter both sepd. liquid constituents and vapors, and a closed vapor passage connecting the vapor spaces of the receivers with the recovery system.

Oil-refining apparatus for use with internal-combustion engines. Johnnie A. Niedens. U. S. 2,173,631, Sept. 19. An engine oil-refining app. includes a casing, a filtering chamber within the casing contg. filtering material and having an inlet communicating with the engine crank case, a vaporizing chamber below the filtering chamber having an outlet for return of oil to the crank case, means for passing oil from the filtering chamber to the vaporizing chamber, an exhaust gas receiving chamber below the vaporizing chamber for heating the latter, a vapor outlet for the vaporizing chamber, and a device such as a float-actuated valve for preventing the escape of oil through such vapor outlet.

Refining paraffin. The Burmah Oil Co. Ltd. and Charles R. S. Harley. Brit. 507,761, June 16, 1939. Paraffin is refined by impregnating a carrier of absorbent and reinforcing material therewith to form a solid film, heating the impregnated carrier and subjecting it to momentary pressure to release and remove the sweats. The carrier may be an endless band of cotton duck or a similar wool fabric and may be heated and pressed at successively higher temps. App. is described.

Obtaining organic compounds from acid sludge of oil refining. Karl Bauer, Waclaw J. v. Piotrowski, Hugo Burstin and Jozef Winkler. U. S. 2,172,784, Sept. 12. App. is described, and a process for obtaining org compds. from sludge such as that obtained by treating mineral oil with H_2SO_4 which comprises melting the fusible org. compds. present by heating the sludge to about 200–300°, and sepg. the molten compds. from the inorg. residue.

Treating gasoline distillates Bernard S. Greensfelder and Monroe E. Spaght (to Shell Development Co.). U. S. 2,174,174, Sept. 26. An arrangement of app. is described, and a continuous process of neutralizing a cracked hydrocarbon distillate contg. a S acid and alkyl phenols, involving treating the distillate with an excess over the equiv. to the S acid of an aq. alkali metal carbonate-bicarbonate soln. contg. small amts. of alkyl phenols under conditions to form an aq. layer contg. an alkali metal salt of the S acid, and a distillate layer substantially free from the S acid contg. alkyl phenols, sepg. the layers and treating the distillate layer with an amt. of aq. alkali metal hydroxide of 30 to 50% concn. slightly in excess of the equiv. of the alkyl phenols to produce an ext. comprising an aq. alkali metal alkyl phenolate soln. and a residual distillate, sepg. the ext. from the distillate, carbonating the ext. to liberate alkyl phenols and to produce an alkyl phenol phase and an aq. carbonate-bicarbonate soln. phase contg. a portion of the liberated alkyl phenols, sepg. the liberated alkyl phenol phase from the resulting aq. soln. phase and returning the latter to treat further amts. of the cracked distillate contg. S acid and alkyl phenols.

Motor fuels from refinery gases. James R. Rose. U. S. 2,173,374, Sept. 19. An arrangement of app. is described, and a process which comprises subjecting petroleum refinery gases contg. saturates and unsaturates to a pressure of 800–1500 lb. per sq. in. and to a cooling action for liquefaction, subjecting the resulting liquid under the pressure mentioned to a cracking temp. of 425–815°, and subjecting the resulting material while under the pressure to a polymerization catalyst which may be formed of carnotite 27, phosphate rock 27, Floridan clay 27, Zn phosphate 5, $BaCl_2$ 4 and fire bond 10 parts. U. S. 2,173,375 relates to a generally similar process, in which the cracked products under pressure are passed in contact first with carnotite and then in contact with a mixt. of phosphate rock, Floridan clay, Zn phosphate, a Ba halide and fire bond in specified proportions. U. S. 2,173,376 relates to catalysts for such use and which may be formed from phosphate rock 10–50, Floridan clay 10–50, Zn phosphate 5–30, a Ba halide 5–30, waterglass 10–40 parts, and carnotite 25–100% of the total wt. of all the other ingredients. Cf. *C. A.* **33**, 8005[8].

Antiknock motor fuel. Sylvan R. Merley (to Power Patents Co.). U. S. 2,173,452, Sept. 19. An arrangement of app. is described, and a process of mfg. a high antiknock motor fuel by bringing unsatd. olefinic hydrocarbons into contact with concd. H_2SO_4, and which comprises continuously introducing a stream composed of a mixt. of liquid hydrocarbons produced by cracking petroleum oil and contg. paraffinic and primary, secondary, and tertiary olefinic hydrocarbons having a boiling range up to approx. 135° into the first of a series of interconnected contact zones, introducing a stream of relatively cool concd. H_2SO_4 into the last of the series of zones, continuously passing the hydrocarbons and H_2SO_4 through the zones countercurrent to each other and in intimate contact with each other in each zone, maintaining the first zone of the series at a temp. of about 20°, and the last zone of the series at a temp. of about 0°, whereby reaction products formed from the hydrocarbons and H_2SO_4 in the last zone of the series are carried with the acid toward the first zone of the series and subjected to gradually increasing temps., thereby converting portions of the olefinic hydrocarbons into higher-boiling products of relatively high octane number, and removing an improved high-antiknock motor fuel product from the last zone of the series.

Antiknock agents for fuels of gasoline boiling range. Standard Oil Development Co. Brit. 507,246, June 13, 1939. Addn. to 445,503 (*C. A.* **30**, 6025[7]) and 504,837 (*C. A.* **33**, 8006[1]). These consist of branched ethers of dihydric or trihydric alcs., which boil above 95°. Aliphatic radicals contg. a tertiary or quaternary C atom are preferred. Glycol ethers specified are mono-*tert*-butyl, mono- and di-isopropyl, isopropyl *tert*-butyl, ethyl or methyl *tert*-butyl, branched mono- and di-amyl ethers with or without Me, Et or iso-Pr groups and branched butyl amyl ethers. The corresponding ethers of propylene- or butylene-glycol may be used. Glycerol ethers specified are of the type $ROR_1(OR_2)OR_3$, where R_1 is an alkyl radical of at least 3 C atoms, R_2 and R_3 are H or alkyl, and R is alkyl. $PbEt_4$ may also be present.

Drilling oil and gas wells. Robert J. Ball. U. S. 2,174,027, Sept. 26. In drilling with the aid of a mud circulation, alginic acid or an alginate such as that of Na is added to the circulation, and serves to give improved wall building and sealing effects.

Extracting materials such as oil-bearing shale. Wm. L. Horner (to Core Laboratories, Inc.). U. S. 2,173,842, Sept. 26. An arrangement of app. is described, and a process for extg. sol. material from pores of a permeable porous noncomminuted structure by inducing circulation of a solvent in the pores comprising the steps of heating the structure to vaporize volatile substances in the pores, subsequently cooling the structure to cause the vapors to condense in the pores while the structure is immersed in a liquid solvent, and repeating the cycle until the extn. is carried to the extent desired. CCl_4 or acetone, etc. may be used as the solvent in the treatment of shale or limestone, etc.

Stripping oil remaining in subterranean oil pockets. Hiram W. Hixon. U. S. 2,173,556, Sept. 19. App. is described, and a method of stripping the oil remaining in a subterranean oil pocket consisting in continuously forcing gas and air under pressure into a closed combustion chamber located above ground, continuously burning within said chamber the gas and air mixt. in jet formation to produce heated fluid products of combustion, conveying the products of combustion by the pressure thus developed therein from the combustion chamber to the oil pocket to effect by the heat thereof the freeing of the oil from the oil-bearing sand and to cause by the pressure thereof the driving of the freed oil toward one or more pumping wells tapped into the pocket and then removing the oil through the pumping wells.

Heat-exchange apparatus (with a contact mass) suitable for oil conversion, etc. Eugene J. Houdry (to Houdry Process Corp.). U. S. 2,173,844, Sept. 26. Various structural features.

Device for taking samples of oil from different depths in storage tanks. Wm. L. Walker. U. S. 2,174,100, Sept. 26. Various structural and operative details.

Blowing asphalt-producing petroleum base materials. Philip Subkow (to Union Oil Co. of Calif.). U. S. 2,172,821, Sept. 12. App. is described, and a process of blowing asphalt-producing petroleum base materials which in-

volves introducing a stream of material to be treated at an elevation into a reaction chamber, sepg. the stream into pools having a gravity downward flow, injecting sep. currents of an oxidizing gas at selected elevations into the reaction chamber, withdrawing the residual gases from the reaction chamber, withdrawing the oxidized petroleum base material from the reaction chamber and recirculating at least a portion thereof through the reaction chamber.

Polymerizing olefins. Jacque C. Morrell (to Universal Oil Products Co.). U. S. 2,172,542, Sept. 12. An olefin-contg. gas such as one from oil cracking, at a polymerizing temp. (suitably about 190–290°), is subjected to the catalytic action of a salt of pryosulfuric acid, such as the Na salt mixed with kieselguhr. Cf. *C. A.* 34, 114[7].

Polymerization of olefins. Standard Oil Development Co. Brit. 508,070, June 22, 1939. *Lubricating oils* are produced by polymerizing an isoölefin while dissolved in at least 10% by vol. (calcd. on the isoölefin when in liquid phase) of a polymer thereof contg. not more than 5 mols. of the isoölefin and in the presence of a Friedel-Crafts catalyst, e. g., BF_3, at −50 to 100°. Thus, isobutene or mixts. contg. it, e. g., a C_4 cut, may be polymerized in di- or tri-isobutene.

Lubricating composition. Chemische Fabrik Flörsheim A.-G. Ger. 676,040, May 24, 1939 (Cl. 23*c*. 1). Addn. to 639,886 (*C. A.* 31, 4107[1]). Blown or thickened fatty oils or castor oil sol. in mineral oil are given an addn. of normally ground graphite and allowed to stand till the graphite becomes colloidal. The product is added to mineral oils.

Lubricating compositions. Standard Oil Development Co. Brit. 507,636, June 16, 1939. A lubricant for use by itself or as an addn. to ordinary lubricating oils consists of a thickened and hydrogenated org. ester or mixt. of esters. The thickening is effected by polymerizing by the influence of heat or voltolization. The hydrogenation is preferably conducted at 100–250° in the presence of an active hydrogenation catalyst, the final product having a viscosity of over 500 sec. at 210°F. The esters are those of polyhydric alcs., or of polybasic acids, or synthetic esters of polyhydroxy compds. such as are obtained by esterifying glycerol or glycol with the acids obtained by the oxidation of wax or with ricinoleic or stearic acid. The esters di-Bu phthalate, tricresyl phosphate or Et dibenzyl malonate are also included. In an example, linseed oil is thickened by heating for 10 hrs. at 575°F. in a glass vessel and the product is partly hydrogenated by treatment with H in the presence of an activated Ni catalyst at 2000 lb. per sq. in. pressure and at 212–225°F.; to remove solid suspended matter, the thick oily product is dissolved in 5 vols. of Et_2O, cooled to −40°F. and filtered.

Sulfurized lubricating compositions. Standard Oil Development Co. Brit. 507,385, June 14, 1939. Lubricants resistant to high pressure are made by treating substantially nonparaffinic solvent ext. concentrate of a petroleum oil with a sulfurizing-agent and blending the product with a lubricating oil of fatty or mineral character. The solvent ext. may be sulfurized by heating to 300–375°F. with free S for a time sufficient to dissolve the S and then rapidly chilling to below 250°F. to prevent further reactions. The blend of oil and sulfurized solvent ext. may be further heated with a sulfurizing-agent. Pb naphthenate may be added to the final product.

Apparatus for testing the quality of lubricating oils used in internal combustion engines. Herman L. Thwaites (to Standard Oil Development Co.). U. S. 2,174,021, Sept. 26. App. used comprises an inverted metal cone having an inclined circumferential groove on its inner surface adapted to allow the oil to be tested to flow slowly on the top of the groove around the inner surface of the cone and through an outlet at the bottom of the cone (which is heated, as by an elec. heater).

Refining oils such as petroleum lubricating oils with solvents such as "chlorex." David F. Renshaw (to Socony-Vacuum Oil Co.). U. S. 2,173,915, Sept. 26. An arrangement of app. is described, and a process of treating oil with a solvent reagent selectively to dissolve and remove therefrom naphthenic constituents comprising the following steps: flowing oil and solvent in countercurrent through a system comprising a plurality of stages each consisting of a contacting step and a settling step, removing from each settling stage an "extract" consisting of naphthenic constituents dissolved in a substantial amt. of solvent, which "extract" is introduced into the stage next preceding in the direction of oil flow, removing an "extract" consisting of naphthenic constituents dissolved in a substantial amt. of solvent from the stage in which oil is first introduced, admixing at least a portion of the "extract" last named with the "extract" withdrawn from the next succeeding stage in the direction of oil flow, and thereby initially bringing the oil to be treated into contact with solvent at a solvent/oil ratio controllably increased over the ratio at which solvent and oil are fed to the system. Cf. *C. A.* 33, 3138[7].

Fractionating hydrocarbon oils such as crude or lubricating oils. Willem R. van Wijk, Willem J. D. van Dijck and Abel J. C. Bart (to Shell Development Co.). U. S. 2,173,460, Sept. 19. A process of sepg. hydrocarbon fractions having m. ps. below that of paraffin wax and contained in a hydrocarbon mixt. which is free from paraffin wax, involves mixing said mixt. with a solvent mixt. contg. a selective solvent which has a preferential solvent action for the less satd. hydrocarbons and at the sepg. temp. is at least partly immiscible with the most paraffinic constituents of the oil, and a soly.-promoting solvent which promotes the miscibility of the selective solvent and the hydrocarbon mixt., and cooling the hydrocarbon mixt. to a temp. between −25° and −125° sufficiently low to solidify a fraction of said mixt. without solidifying the solvent mixt., and sepg. the solidified fraction from the resulting soln. of the unsolidified fraction and the solvent mixt. Acetone or EtOAc, etc., may be used as the selective solvent with toluene, etc. as the "soly.-promoting" solvent (numerous examples being given).

Wax-modifying agents suitable for use in waxy lubricating oils. Eugene Lieber and Martin M. Sadlon (to Standard Oil Development Co.). U. S. 2,174,246, Sept. 26. A process for producing wax modifiers by condensation of chlorinated paraffin wax and aromatic compds. with catalysts of the Friedel-Crafts type, involves prepg. a mixt. of the aromatic compd. and the catalyst in a satd. polyhalogenated hydrocarbon solvent of 2–3 C atoms, adding thereto chlorinated paraffin wax and maintaining the temp. below 93° to effect the reaction, then sepg. the catalytic material.

Chlorinated diphenyl sulfide. Frank M. Clark (to General Elec. Co.). U. S. 2,172,954, Sept. 12. By a described chlorination process, a mixt. of isomers of tetrachlorodiphenyl sulfide is produced which is suitable for use with lubricating oils to increase their load-carrying capacity.

Lubricants. James W. Johnson, Jr. (to Atlantic Refining Co.). U. S. 2,173,117, Sept. 19. A hydrocarbon oil is mixed with about 1–10% of a carboxylic acid ester of a hydroxy ether such as a naphthenic acid ester of diethylene glycol mono-Bu ether, which serves to give improved "oiliness" and viscosity index.

Lubricants. Standard Oil Development Co. Brit. 508,326, June 29, 1939. A cohesive grease consists of oil, 2–20% of Al stearate, a linear polymer thickener of mol. wt. exceeding 800 and glycerol not exceeding 2%. The glycerol may be replaced by polyglycerol or polyglycol. In an example, the grease consists of oil 89.92, Al stearate 8, glycerol 0.08 and polymerized isobutylene of approx. wt. 70,000 2%.

Lubricating greases. Standard Oil Development Co. Brit. 507,980, June 23, 1939. These comprise mineral oil and 10–40% of a mixt. of Na and Ba soaps. The mixt. of soaps consists of 10–1 parts of Na soap to 1 of Ba soap. In an example, stearic acid 425 and a mineral lubricating oil of viscosity 200 sec. Saybolt at 100°F. 500 parts are thoroughly mixed in a grease kettle at 140–150°F.; when the acid has completely melted and dissolved, 25 parts of $Ba(OH)_2$ in approx. satd. aq. soln., are stirred in, the temp. is then raised to about 360°F. while 62 parts of

NaOH (30% aq. soln.) is stirred in and, when sapon. is complete and H_2O substantially completely eliminated, the product is cooled to about 200°F. and worked at that temp. for 2–3 hrs

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Recently developed sources of cellulose. L. G. S. Hebbs. *J. Soc. Dyers Colourists* **55**, 550–9(1939).—A review. In addn. to spruce and hemlock as sources of cellulose, Spanish grass (*Arundo donax*) is a raw material for rayon pulp in Italy, while beechwood is employed in Germany to produce staple fiber. The pulping of reeds and of the stems of the soybean plant has not been encouraging because of the short fiber length (0.6 mm. av.). Fifteen references. W. H. Boynton

X-ray studies of polymer-homolog cellulose fibers. E. Plötze and H. Person. *Naturwissenschaften* **27**, 693 (1939).—Polymer-homolog series of cellulose prepd. by oxidative or hydrolytic demolition were studied by x-ray. Both ramie and cotton fibers were used. The degree of polymerization ranged from 200 to 3000. The Debye-Scherrer diagrams for all of the series were identical; hence the structure was unchanged. A quant. value for the crystallite orientation was obtained (Hosemann, *C. A.* **31**, 8316[4]) by calcg. the half widths of the equator interferences from blackening measurements. The half-width is for ramie 15°, for cotton 32°. B. J. C. van der Hoeven

Preparation of fibrous triacetylcellulose. I-II. I. Sakurada, I. Tukahara and T. Morita. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 252(1939).—Cotton and ramie were acetylated and the effects of temp., amts. of H_2SO_4 and Ac_2O, and type of solvent were studied. An increase in reaction temp. or in the amt. of H_2SO_4 increased the speed of acetylation (I) but resulted in decreased viscosity (II) of the product. The amt. of Ac_2O had no effect on I, but low amts. of the anhydride caused a decrease in II. If the compn. of the acetylating mixt. (C_6H_6, Ac_2O, H_2SO_4) is kept const., the amt. of cellulose used affects neither I nor II. The amt. of AcOH adhering to the cellulose prior to acetylation can be reduced to 30% of the dry wt. of cellulose without effect on I. The type of cellulose influences neither I nor the properties of the acetylated product. Trichloroethylene, monochlorobenzene, nitrobenzene, *o*-dichlorobenzene and petr. ether were compared with C_6H_6 as solvent for the reaction, and trichloroethylene was found to be best suited for this purpose; the cellulose is acetylated more speedily in this solvent and II of the acetylated product is very good. No appreciable difficulties were met on acetylating batches up to 2 kg. at one time. S. I. Aronovsky

The homogeneous saponification of triacetylcellulose by means of sulfuric acid in acetic acid solution. K. Seki. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 253–4 (1939).—Purified triacetylcellulose was dissolved in a 95.72% aq. soln. of AcOH to a concn. of 2.5%. The effects of the H_2SO_4 concn. (0.148–1.44%) and reaction temp. (20°–60°) on the velocity of sapon. were studied. The sapon. reaction takes place according to the unimol. equation, $dx/dz = k(a - x)$, where x represents the degree of sapon. in moles AcOH per 100 moles $C_6H_{10}O_5$, a represents 300 for triacetylcellulose with the theoretical AcOH content, and k is the velocity const. which varies with x. The soln. becomes turbid as the value for x approaches 150. The velocity const. increases with the concn. of H_2SO_4, and with increasing temp. of reaction. The heat of the sapon. reaction was calcd. to be 14.4 kg. cal. per mole AcOH. S. I. Aronovsky

The heterogeneous saponification of fibrous triacetylcellulose by acids, and the solubility of the partly saponified products in acetone. I. Sakurada, I. Tukahara and T. Morita. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 254–5(1939); cf. *C. A.* **33**, 2703[3].—High-viscosity triacetylcellulose was prepd. from cotton linters in trichloroethylene. The acetylated cellulose was sapond. at various temps. (15°–95°), as follows: 20 g. (dry basis) triacetylcellulose was placed in a 1-l. flask with 500 cc. HNO_3 soln. (0.2–5.0 *N*). The Ac content and Me_2CO-soly. were detd. on 2-g. samples taken at various intervals. The heterogeneous sapon. of the acetylated cellulose takes place in accordance with the equation, $x = kz^m$, where x represents the degree of conversion in moles ester groups per 100 moles $C_6H_{10}O_5$, z represents the duration of the reaction, and k and m are consts. The AcOH confent of the acetylcellulose decreases with increase in sapon. time while the Me_2CO-soly. increases in 8 days to a max., at an AcOH content of 57 ± 1%. Lower sapon. temps. favor the increased Me_2CO-soly. of the ester. The heat of sapon. of the acetylcellulose is 14.4 kg. cal., similar to that obtained with homogeneous sapon. S. I. Aronovsky

The degradation of oriented cellulose structures by polarized ultraviolet light. C. W. Mason and F. B. Rosevear. *J. Am. Chem. Soc.* **61**, 2995–3001(1939).—Parallel ramie fibers were irradiated with polarized ultraviolet light in a cell contg. metallic Na to eliminate air or moisture that might cause secondary nondirectional reactions. With light vibrating crosswise of the fiber, degradation was greater than with vibrations lengthwise by about 25%, as measured by the Cu no. detd. on 10-mg. samples. Conclusion: Photochem. degradation of cellulose chains is greatest if they are oriented so that the light energy vibrates in the direction in which they are most deformable. A. B. Garrett

Lignin and related compounds. XLVI. The action of ozone on isolated lignins. Rodger M. Dorland, W. Lincoln Hawkins and Harold Hibbert. *J. Am. Chem. Soc.* **61**, 2698–701(1939); cf. *C. A.* **33**, 7562[2].—Isolated lignins, obtained by extn. with HCO_2H and AcOH, and which are normally insol. in aq. $NaHSO_3$ soln., yield sol. sulfonic acids after a prior treatment of the lignin with O_3. An increase in soly. in aq. $NaHSO_3$ and a decrease in MeO content of HCO_2H lignin take place with increasing ozonization. Sulfonic acids obtained in this manner from birch HCO_2H and AcOH lignins yield vanillin and acetovanillone on alkali cleavage. This is probably the first time that acetovanillone has been obtained from a lignosulfonic acid prepd. from a hardwood. C. J. West

Detection and determination of viscose impurities Ernst Kuhnel. *Kunstseide u. Zellwolle* **21**, 394–8(1939); cf. *C. A.* **34**, 260[5].—By means of photomicrographic illustrations the following impurities that are found by centrifuging are described: incompletely dissolved fibers, undissolved resistant fiber fractions, coagulated viscose particles, cryst. particles such as $CaSO_4$, $CaCO_3$ or SiO_2 and Fe or rust particles. Other photomicrographs and descriptions follow the pulp through every stage of the viscose process and indicate some of the irregularities that may occur. The recommendations may be summarized as follows: (1) detn. of the cause of filtering difficulties, (2) detn. of the optimum amts. of assistants, which may be different for different pulps, (3) detn. of optimum reaction temps., (4) control of the filtering effects of different filtering media by detn. of impurities before and after filtering, (5) detn. of the rate of filtration of viscose, (6) detn. of the optimum soly. of the xanthate, (7) control of mercerization and xanthation and (8) ultimately the possibility of judging the suitability of a particular pulp for viscose prepn. M. Plunguian

Stability of nitrocellulose made from hemp. Mario Tonegutti and Enzo Brandimarte. *Ann. chim. applicata* **29**, 350–6(1939).—Nitrocellulose made from cotton or hemp cellulose has approx. the same stability, both being less stable than the product made from Cl-extd. hemp. Possibly this increased stability is due to a different orienta-

tion of the crystals in the nitrated deriv. of the Cl-treated hemp cellulose. A. W. Contieri

Ten years' experience with industrial hygiene in connection with the manufacture of viscose rayon. H. L. Barthélémy. *J. Ind. Hyg. Toxicol.* **21**, 141–51 (1939).—See *C. A.* **33**, 9627⁶. A. L. Elder

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Aging phenomena and the mol. size of chain complexes [cellulose derivs.] in soln. (Wehr) **2**. Relation between the refractivity of cryst. cellulose and the temp. (Frey-Wyssling, Wuhrmann) **2**. Fusing and working quartz [making a spinneret for rayon] (Brit. pat. 508,013) **19**. Dyeing, bleaching or other liquid treatments of paper stock (U. S. pat. 2,174,178) **25**. Condensation products [as assistants in rayon industries] (Ger. pat. 676,407) **13**.

Cellulose process. Zellstofffabrik Waldhof (Friedrich W. Kahle, inventor). Ger. 677,084, June 17, 1939 (Cl. 55*b*. 3.40). Addn. to 671,984 (*C. A.* **33**, 6538⁸). The waste SO_2 from sulfite cellulose digesters is completely recovered by releasing the pressure and allowing the sealing liquid of the gasometer to dissolve the liberated SO_2.

Refining cellulosic materials. Johann W. Eggert. Brit. 506,875, June 6, 1939. Straw and other plant materials contg. SiO_2 are subjected to treatment with an aq. soln. of a salt having a reducing action, e. g., Na_2SO_3, at 120–30° to remove all H_2O-sol. constituents. The extn. liquid may also contain a phosphorus salt. The materials are then subjected to treatment with a soln. of NaOH contg. a reducing salt at 140–60°. The lye is subsequently removed rapidly and completely from the treated cellulose while in a hot state. The material may then be subjected at not exceeding 17° to the action of Cl of 0.43–1% concn. in aq. soln. Buffer substances are present during the chlorination to prevent acid formation. The material may then be subjected to a further treatment with alkalies, alk. earths or alk. salts. The final alk. treatment may be effected with concd. alkalies or alk. earth hydroxides at low temp. An antichlor may be added to the soln. and the alkali may then be washed out by means of low-pressure wet steam. The cellulose pulp may be acidified before the last washing process. The pulp may be used for making cellulosic solns.

Hydroxyalkylation of cellulose materials. Aubrey E. Broderick (to Carbide and Carbon Chemicals Corp.). U. S. 2,173,470, Sept. 19. Vapors of an alkylene oxide such as ethylene or propylene oxide are brought into contact with a cellulose such as alpha wood pulp or cotton linters in the presence of a tertiary amine catalyst such as trimethylamine under subatm. pressure and with regulation of the rate of introduction of the alkylene oxide in accord with the rate of its reaction with the cellulose to prevent the pressure from rising substantially above atm. pressure. The products may be readily esterified. U. S. 2,173,471 relates to the reaction of a vaporous alkylene oxide such as propylene oxide with a mixt. of an unmercerized cellulose such as cotton linters contg. about 35–60% of water in the presence of between 0.5% and 8% of an etherification catalyst such as NaOH while the temp. is maintained between atm. temp. and 60° and under a pressure not more than about 6 lb. per sq. in., in the substantial absence of air.

Cellulose derivatives. British Celanese Ltd. Brit. 507,722, June 20, 1939. Cellulose org. derivs. are stabilized by being treated while in a finely divided or dispersed form with a H_2O-insol. nonresinous morpholine compd. The treatment imparts stability against the deteriorating influence of light, heat or industrial gases. The treated substances and articles made therefrom are more resistant to fading or color change when dyed, e. g., with H_2O-insol. aminoanthraquinone dyes. Phenylenedimorpholine, phenylaminomorpholine, phenylmorpholine and *p*-hydroxyphenylmorpholine may be used. The morpholine compd. may be dispersed in an aq. medium which may also contain a mono- or poly-hydric alc.

Cellulose derivative and regenerated cellulose shims for milling-machines. Arthur Schoenwerk. Brit. 508,111, June 27, 1939. Shims or spacers of annular shape as used in milling operations when mounted on milling arbors are made from film, ribbon, foil, plate, etc., of cellulose acetate, celluloid or other cellulose ester or ether, or regenerated cellulose such as that obtained from viscose.

Alkali cellulose. Schlesische Zellwolle A.-G. Brit. 508,338, June 29, 1939. Matured alkali cellulose is produced by subjecting cellulose pulp, obtained by the alk. digestion of wood, straw, etc., in the highly dild. condition in which it leaves the digester, to extn., alkalization, pressing, disintegration and maturing in a continuous working operation. App. is described.

Apparatus for the manufacture of alkali cellulose, etc. Wilhelm Grötzinger (to Baker Perkins Co.). U. S. 2,174,241, Sept. 26. App. for the manuf. of alkali cellulose and the like comprises in combination a conveyor having a horizontal treating run and a return run, containers for cellulose material mounted on the conveyor, a vat for treating soln. beneath the treating run through which the conveyor carries the containers in a step-by-step travel, means for pressing excess soln. from the cellulose after it passes through the vat and for discharging the cellulose from the containers.

Apparatus for production of cellulose xanthate from alkali cellulose and carbon disulfide. Teunis Dokkum (to American Enka Corp.). U. S. 2,174,056, Sept. 26. Various structural and operative details.

Cellulose ethers and xanthates. Leon Lilienfeld. Brit. 507,137, June 7, 1939. Cellulose ethers that are wholly or partially sol. in caustic alkali soln. and insol. or sparingly sol. in H_2O and are incapable of forming films, or incapable of forming films of practical value, are prepd. by treating an alkali-sol. alkyl, hydroxy-alkyl or hydroxy-acid cellulose ether, or a cellulose ether obtained from halo-olefins, with a hydrolyzing or degrading and (or) oxidizing agent until the desired product is obtained. The products obtained may be xanthated. The products, or the xanthated products, may be applied, in the form of a soln. or paste, to a fibrous material, e. g., a textile material, if desired together with other finishing, impregnating, dressing, coating, filling, weighting, printing or sizing agents. When the product is applied from soln. it may be further treated with a pptg. or coagulating agent, e. g., H_2O or a soln. of an alkali carbonate. Textile materials treated by the process are not impaired as regards their feel and appearance even in the absence of softening agents or when applied in large amts. In an example, a cellulose ether prepd. according to any 1 of 30 processes cited is mixed with HCl of 0.5% concn. and heated to 50–100°, the product is dissolved in NaOH soln. at from 5° to −10°, applied to a woven fabric and coagulated in a pptg. bath. Other examples illustrate the use of HCl of 0.05, 0.1, 0.2, 1 and 2% concns., H_2SO_4, chloride of lime and of alk. and neutral $KMnO_4$ in the process.

Cellulose ethers. Desmond C. Mandeville, Albert A. Houghton and Imperial Chemical Industries Ltd. Brit. 507,203, June 6, 1939. Low-substituted cellulose ethers are obtained by the actn. of a liquid etherifying medium in the form of a fine mist, an atomized soln. or an atomized emulsion in a suitable liquid medium to comminuted and agitated alkali cellulose. The cellulose ethers so produced may be subjected to further alkylation to produce H_2O-sol. forms. Among examples, comminuted sulfite wood pulp is added to a soln. of NaOH in a shredding machine; after some hrs. a soln. of ethylene chlorohydrin in H_2O is atomized into the machine for 2 hrs. and the temp. then gradually raised to 30°; the product is aged, acidified, centrifuged and washed; it dissolves completely in 7.5% NaOH soln. when cooled to −7° with subsequent gradual rise of temp.

Preparing cellulose for esterification. Courtaulds Ltd. and John P. Stoneman. Brit. 507,946, June 23, 1939. The cellulose is treated with a little concd. HCOOH, not more than 1 part of acid to 1 of cellulose, at above 50° under conditions that prevent loss of HCOOH; uncombined HCOOH is removed and the pretreated cellulose is then dried and is finally esterified. Uncombined HCOOH

is removed by evapn. or by washing with a liquid in which the acid is sol. or with which it is miscible. Among examples, 30 parts of 90% HCOOH is mixed with 100 of bleached cotton linters and heated in a closed container at 65° for 18 hrs.

Mixed organic acid esters of cellulose. Carl J. Malm (to Eastman Kodak Co.). U. S. 2,173,945, Sept. 26. A process for prepg. a mixed ester of cellulose contg. acetyl and acid groups of 3–4 C atoms comprises presoaking cellulose with HOAc, adding acid of 3–4 C atoms, cooling the mass to a temp. of not more than 15° but not to a point where solidification of the liquid occurs, adding an anhydride-free soln. of H_2SO_4 in an acid of 3–4 C atoms and maintaining the mass at a temp. of 5–15° for a short time; subsequently adding an impelling anhydride and esterifying the cellulose, the bath contg. at least 20% of propionyl or butyryl based on the total acyl content of the bath.

Cellulose esters. British Celanese Ltd. Brit. 507,126, June 9, 1939. Cellulose acetates and other org. esters of cellulose are stabilized by being subjected, after ripening, to a treatment with a tertiary amine in which at least 2 aryl or aralkyl radicals are attached to a tertiary N atom, e. g., diphenylaniline, dibenzylaniline, benzylethylaniline, benzylphenylaniline. During the ripening process, small quantities of inorg. salts, e. g., $AlCl_3$, $ZnCl_2$ or HCl may be added since these assist in reducing the formation of unstable compds. The catalyst used for esterification may be wholly or partly neutralized before addn. of the amine. Cellulose esters that are to be treated after pptn. may during pptn. be treated with hypochlorite, etc., to improve their color.

Degraded celluloses. Leon Lilienfeld. Brit. 507,138, June 7, 1939. Textile materials are finished by applying to them a soln., colloidal suspension, paste or magma of at least 1 degradation product of cellulose in a liquid medium capable of dissolving at least a portion of such product, the product being of such a nature that its solns., dispersions, pastes or magmas in NaOH are incapable of yielding coherent films. The materials are thereafter treated with a pptg. or coagulating agent, e. g., an agent capable of coagulating viscose, or H_2O or a soln. of alkali carbonate. The degradation product may be prepd. by treating cellulose with at least 1 degrading, hydrolyzing or oxidizing agent. Before being degraded, the cellulose may be treated with a mercerizing agent. The degradation product may be applied in conjunction with filling or softening agents, or with an alkali-sol. cellulose deriv., e. g., viscose. Among examples, wood pulp is treated with HCl of 0.5% concn. at 100° for 6–12 hrs., the product is treated with NaOH of 9% concn., applied to a fabric and coagulated in a bath used in the viscose art, e. g., a Müller bath.

Washing bands or films. Ernest Bleibler. Brit. 508,408, June 30, 1939. Washing vats for bands in continuous manuf., particularly for films of cellulose hydrate, are divided into compartments contg. 1 or more runs of the film, and the liquid is taken from the lowest point of 1 compartment and carried to the top or near the surface of the preceding compartment. Each compartment slopes toward the point where the liquid leaves it, and the liquid travels by gravity in countercurrent to the direction of travel of the band. One or more slots are provided between the vats and the outer metal frames for overflowing liquid.

Bleaching cellulose fibers. Buffalo Electro-Chemical Co., Inc. Brit. 507,664, June 16, 1939. Bleaching of cellulosic fibers, natural or artificial, including paper pulp, is effected by satg. them with a soln. contg., per l., at least 20 cc. of H_2O_2, 30% by vol., or equiv. amts. of per compds. normally generating H_2O_2 in soln., and an alkali content equiv. to at least 5 g. NaOH, the soln. being maintained at room temp., i. e., up to 125°F., and the goods being permitted to bleach without any substantial evapn. of the soln. Specified alkalies are Na silicate, $Na_4P_2O_7$, Na_2HPO_4, Na_3PO_4, $NaHCO_3$ and borax, and to the bath so obtained may be added other substances, including other alkalies, e. g., NaOH, Na_2CO_3, NH_3, org. bases, and soaps, sulfonated oils, solvents or wetting-out agents. Cf. *C. A.* **32**, 2764[4].

Viscose. Vereinigte Glanzstoff-Fabriken A.-G. Brit. 508,172, June 27, 1939. Viscose of low hemicellulose (I) content is obtained from ground, preliminarily ripened or unripened alkali cellulose (II). The tufts of II, of low I content if any, are moistened or worked up to a dough with not exceeding 3 times their wt. of 8–12% NaOH. After standing 1 or more hrs., the alkali together with dissolved I is pressed out and the II is loosened again. It is then treated with a mercerizing lye of 18% or more of NaOH, excess alkali being pressed off, and the material is again loosened. The II is then xanthated and dissolved in alkali to form viscose, which may be extruded into an acid spinning bath and the filaments obtained may be subjected to a high degree of stretching.

Viscose artificial threads. Alsa Soc. anon. Brit. 508,285, June 28, 1939. Threads having hollow filaments are produced from a viscose contg. Na_2CO_3, any tendency for the formation of an insol. double carbonate of Na and Ca being removed by incorporation in the viscose, prior to filtration, of substances for pptg. the traces of Ca introduced, e. g., by the wood pulp. Pptn. of the Ca may be effected by means of oxalates, secondary orthophosphates, metaphosphates, borates, hyposulfites, aluminates and their mixts. with silicates, or by means of soaps. Instead of soap, glycerides or other esters of higher fatty acids, or the acids themselves, may be used. In an example, stearic acid is incorporated in a viscose contg. Na_2CO_3, any Ca stearate formed being removed during the subsequent filtration.

Artificial filaments, etc. I. G. Farbenindustrie A.-G. Brit. 508,049, June 26, 1939. Filaments, bands, films, foils, etc., are made by spinning into a pptg. liquid a crude soln. of a primary cellulose acetate, which soln. has been hydrolyzed so that the actual AcOH content of the cellulose acetate is diminished but remains above 59%. In an example, cellulose is acetylated in a bath contg. Ac_2O, methylene chloride and H_2SO_4 and hydrolyzed by addn. of 50% AcOH in slight excess over that required to destroy the residual anhydride. The hydrolysis is continued until the cellulose acetate contains 60–61% of AcOH, after which the soln. is neutralized and spun into a pptg. liquid.

Apparatus (with a funnel and revolving spinning can) for production of twisted artificial threads. Giovanni Campolunghi. U. S. 2,173,621, Sept. 19. Various structural and operative details.

Rayon. Albert Wagner, Erich Thiess and Thüringische Zellwolle A.-G. Ger. 677,429, June 26, 1939 (Cl. 29*a*. 6.02). Addn. to 668,695 (*C. A.* **33**, 5186[3]). A process for stretch-spinning Cu silk is described.

Rayon, films, etc. I. G. Farbenindustrie A.-G. Brit. 506,803, June 2, 1939. Pigmented artificial fibers, etc., are made by incorporating in an aq. spinning soln. or in the solvent or other liquid miscible with the spinning soln. a pulverulent or coarse-grained prepn. made from a kneadable mass produced by intensive mech. working of the pigment with a H_2O-sol. carrier in a kneading machine, e. g., rollers. Among examples, the prepn. is made from (1) TiO_2 70 and the Na salt of a condensation product of β-naphthalenesulfonic acid with CH_2O 30 parts, and (2) TiO_2 40, sulfite cellulose waste liquor 40, Na_2SO_4 20 parts and H_2O.

Liquid treatment of rayon. Geo. M. Allen, Henry J. McDermott and John W. Pedlow (to American Viscose Corp.). Brit. 508,340, June 29, 1939. Rayon in the form of cakes or hanks is supported for liquid treatment on hollow tubes with a substantially flat longitudinally extending surface, through perforations in which the treating liquid is forced under pressure. The tubes may be intermittently rotated and the direction of rotation from time to time may be reversed to ensure even treatment.

Recovering copper. British Bemberg Ltd. Brit. 508,142, June 27, 1939. Lime-contg. Cu mud obtained in working up Cu-contg. waste waters from the cuprammonium rayon industry, e. g., by pptn. of ammoniacal Cu-contg. spinning H_2O with lime, is treated with NH_3 and

an alkali metal or $(NH_4)_2CO_3$ and preferably with NH_4 salts such as $(NH_4)_2SO_4$ or NH_4Cl so that the Cu is converted into a tetramine compd. and $CaCO_3$ pptd., the $CaCO_3$ carrying down impurities. The soln. is heated (1) at, e. g., 80–85° until all the NH_3 has escaped, the Cu sepg. as a basic salt, e. g., carbonate or sulfate, or (2) with addn. of NaOH, the Cu depositing as CuO, which may be worked up to any basic salt. The NH_3 is led back to the circuit in process (2), partly after conversion into the desired NH_4 salt. In process (1) $(NH_4)_2SO_4$ soln. contg. a relatively small amt. of Cu, sepd. from the basic salt is also introduced into the circulating process. The mud may be previously treated with a deficiency of acid to form a basic salt. 1

Wood pulp. Kübler & Niethammer and Chemische Fabrik Coswig-Anhalt Hans Schraube (Kurt Schwabe, inventor). Ger. 678,230, July 11, 1939 (Cl. 55*a*. 1.40). Addn. to 677,504 (*C. A.* **33**, 9643[5]). The method of 677,504 for making pulp from resinous wood by adding $Ba(OH)_2$ during the pulping is modified by replacing the $Ba(OH)_2$ by other sol. Ba compds. such as the chloride or nitrate. 2

Wood pulp for chemical use. Raphael L. Stern (to Hercules Powder Co.). Brit. 507,040, June 8, 1939. Addn. to 463,437 (*C. A.* **31**, 6006[6]). Cellulose is obtained in a form suitable for chem. treatment by chipping, according to the method of 463,437, felted wood pulp sheets contg. less than 8% moisture. In examples, wood pulp chips so obtained are converted to nitrocellulose and cellulose acetate. 3

Paper pulp. Ernest T. McGregor. Brit. 507,791, June 21, 1939. For producing de-inked paper stock from printed paper, the latter, after soaking in H_2O, is agitated with a soln. of Na_3PO_4 at or below atm. temp. After agitation, it is convenient to add such a quantity of H_2O as will cause the oil, C, etc., to float to the surface, whereupon these impurities are drained off. After the sepn., the pulp is washed, pressed, etc., and the soln. is filtered, strengthened and returned for reuse. 4

Sizing paper pulp. Pattilloch Processes, Inc. Brit. 509,002, July 10, 1939. This corresponds to U. S. 2,147,213 (*C. A.* **33**, 4035[7]).

Paper from groundwood pulp. Rexford W. Hovey (to Oxford Paper Co.). U. S. 2,173,167, Sept. 19. Paper is made from a furnish contg. groundwood pulp as part of the fibrous constituents and alk. carbonate filler, the major portion of the balance of the fibrous constituents of the furnish consisting of at least one pulp of sulfite pulp and soda pulp, the groundwood being present in the paper to the extent of at least 20% of the fibrous constituents of the paper and the alk. carbonate filler being present in the paper in excess of 10% of the wt. of the paper, the brightness of the paper being enhanced by the presence of the alk. carbonate filler, which may be $CaCO_3$. 5

Felt conditioner for papermaking apparatus. Frederick W. Vickery. U. S. 2,173,317, Sept. 19. Various structural and operative details. 6

Suction rolls of papermaking machines. Wm. H. Millspaugh. Brit. 508,964, July 7, 1939.

Automatic electric control systems for regulating the temperature of furnaces, etc., or the moisture content of paper, etc., during manufacture. Siemens & Halske A.-G. Brit. 444,673, Mar. 25, 1936, and 508,266, June 28, 1939, addn. to 444,673.

Clarifying waste water. Fritz Arledter and Hanns Arledter. Ger. 679,906, Aug. 18, 1939 (Cl. 55*d*. 13.01). App. for mechanically clarifying waste water contg. fibers and filling materials from papermaking plant is described. 7

Paper. Wellington G. Reynolds (to Reynolds Mfg. Co.). U. S. 2,174,095, Sept. 26. A sheet of writing paper having a highly calendered but nonglare surface is formed from paper stock consisting of a mixt. of approx. 20% soda pulp and 60% bleached sulfite and about 20% unbleached sulfite and contg. about ¾ of an oz. of American Blue, Index No. 1288, and about 6¾ oz. of Paper Yellow C. H., Index No. 365, to every 1700 lb. of the stock. 8

Safety paper. Francis L. Simons (to George La Monte & Son). U. S. 2,172,856, Sept. 12. A safety paper has incorporated in it an alkali metal bromide and diphenyl thiourea or other substituted thiourea contg. an aromatic or heterocyclic substituent. 9

Unified paper. Richard G. Drew (to Minnesota Mining & Mfg. Co.). U. S. 2,173,829, Sept. 26. A method for the provision of a unified paper highly resistant to splitting or lamination which comprises impregnating a porous web of paper of the character which is normally bibulous and approaching blotting paper in texture with a proteinous soln. of water contg. a plasticizing agent to the point where impregnation is regulated to contain 24 to 27 parts of the soln. to 15 parts of the paper, the soln. contg. approx. 1 part glue, 1.75 to 4 parts plasticizing agent, 3.5 to 6 parts of water, drying the web to the point where it approx. retains from 48 to 40 parts of impregnant to 52 to 60 parts of paper, with the plasticizing agent from 1.7 to 3 times the quantity of the proteinous agent. Glycerol may be used as the plasticizing agent. 10

Containers for oils, of cellulosic materials such as paper. Everett C. Hughes (to Standard Oil Co. of Ohio). U. S. 2,173,517, Sept. 19. A container of material such as paper is provided with an inner coating which may contain Na silicate 80–95, glycero 2.5–15, gum arabic 1–4 and an alkali metal soap such as K oleate about 0.2% or less. 11

Stiff vegetable-fiber board. Geo. H. Ellis (to Insulite Co.). U. S. 2,173,391, Sept. 19. A stiff, homogeneous, board-like product is produced by a process involving simultaneously applying heat and pressure to a moist vegetable-fiber board, the initial temp. being above 315° and progressively decreasing as the moisture content decreases and the pressure increasing progressively as the moisture content decreases. App. is described. Cf. *C. A.* **33**, 7568[7]. 12

24—EXPLOSIVES AND EXPLOSIONS

C. G. 1

Method of measuring velocity of propagation of deflagration. Raymond Zouckermann and Leon Heyberger. *Compt. rend.* **209**, 680–2(1939).—The method is applicable to cases where there is no flame capable of affecting the eye or a photographic film. The essential points are that the gaseous mixt. is contained in a tube of glass or Fe at least 2 m. long and 2–5 cm. diam., along which bolometers consisting of fine (0.04 mm. diam.) Ni wire are distributed. These are mounted in series in one branch of a Wheatstone bridge one diagonal of which is connected with a source of a. c., and the other with a registering oscillograph. With this arrangement moist mixts. of O_2 and H_2 contg. amts. of H_2 near the limit for which propagation of deflagration is possible were examd., showing that the min. proportion of H_2 for such propagation is independent of the diam. of the tube, and that the velocity of propagation increases with the proportion of H_2 and the diam. of the tube. C. A. Silberrad

Removal of nitrous fumes from mine air. H. C. Dod. *Chem. Eng. Mining Rev.* **31**, 494–5(1939).—"Bullets" of chemical used with the explosive liberate NH_3 which removed NO_2 by the formation of the nitrate and NH_4NO_3. W. H. Boynton

The use of firedamp detectors in coal mines. K. Nehring. *Glückauf* **75**, 259–62(1939).—A review of the practice and methods for testing for fire damp shows that the flame safety lamp is the most reliable and is in general use. L. P. Rockenbach

Explosibility of gases from (coal) mine fires. R. Kattwinkel. *Glückauf* **75**, 302–5(1939).—A study of the ignition data for CH_4-CO_2-air and CH_4-N_2-air shows that for air contg. 7% CH_4 the addn. of 17.5% CO_2 or 29.0% N_2 is required to inhibit ignition. Air contg. 8% CH_4 requires 19% CO_2 or 23.5% N_2. The greater inhibiting power of the CO_2 is attributed to its larger heat capacity. At least 15% O_2 is necessary for ignition to take place. L. P. Rockenbach

Masses contg. absorbents for the liquid constituents [for absorbing nitroglycerin in the manuf. of explosives] (Brit. pat. 506,929) **13.**

Electric blasting cap. Lawton A. Burrows (to E. I. du Pont de Nemours & Co.). U. S. 2,173,270, Sept. 19. An elec. blasting cap of the bridge-plug-bead type comprises a charged metal shell, a firing circuit, and an ignition compn. comprising a double salt of lead hypophosphite with lead nitrate, the bridge wire of the firing circuit being embodied in a bead of the ignition compn., the firing circuit being provided with a discharging means in that each leg wire of the firing circuit is bent away from the shell wall at a point between the place of emergence of the wire from the plug material and the locus of the ignition bead, permitting the harmless discharge of static electricity to the shell wall at a point outside the locus of the ignition bead. U. S. 2,173,271 relates to an ignition compn. which comprises Ca hypophosphite and an oxidizing agent such as $KClO_3$ or KNO_3.

Fire extinguishers. Joseph M. F. Bouillon (known as Yves Bouillon). Brit. 508,222, June 28, 1939.

Fireworks. Alberto Cimorosi. U. S. 2,174,202, Sept. 26. A device which forms a jet of flame, such as a skyrocket, comprises a compressed pellet of pyrotechnic material and a coating including Na silicate, whiting and charcoal.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Azo dyes and their intermediates. XXI. Substantivity of several azo dyes with J acid as coupling component. Paul Ruggli and Oskar Leupin. *Helv. Chim. Acta* **22**, 1170–7(1939); cf. *C. A.* **32**, 7902⁸. The substantivity of dyes in which J acid and its derivs. serve as coupling components and $PhNH_2$ serves as the diazo component are compared. Five monoazo and 2 disazo dyes were prepd. and studied. The diazo soln. was prepd. in the usual way from 4.65 g. (0.05 mol) freshly distd. $PhNH_2$ and then added dropwise at 0–5° with stirring to a similarly cooled alk. coupling soln., followed by further stirring for 4 hrs. in the cold and for 1–8 hrs. at room temp. and then estg. the purity by titration with $TiCl_3$. The following dyes were prepd.: *A* ($PhNH_2$ → J acid), obtained in 18-g. yield (crude) from a coupling soln. contg. 13.1 g. 91% J acid (0.05 mol), 100 cc. H_2O and 25 g. Na_2CO_3, recrystd. from 72 cc. hot H_2O, 100% pure, orange crystals, dyes cotton orange; *B* ($PhNH_2$ → Ph-J acid), obtained in 23-g. yield (crude) from 20 g. 79.5% Ph-J acid (0.05 mol), 100 cc. H_2O and 25 g. Na_2CO_3, recrystd. from 150 cc. 50% alc., 99.5% pure, dark-violet needles, dyes cotton turbid-red; *C* ($PhNH_2$ → Bz-J acid), obtained in 23-g. yield from 22.2 g. 77.4% Bz-J acid (0.05 mol), 100 cc. H_2O and 25 g. Na_2CO_3, recrystd. from 150 cc. 50% alc., 102% pure (high value due to dye being difficult to reduce), red powder, dyes cotton red-orange; *D* ($PhNH_2$ → *m*-$H_2NC_6H_4CO$-J acid), obtained in 25-g. yield from 19.3 g. 93% *m*-$H_2NC_6H_4CO$-J acid (0.05 mol), 100 cc. H_2O and 25 g. Na_2CO_3, recrystd. from 250 cc. 50% alc., 100% pure, orange-red flakes, dyes cotton bright orange; *E* (1 mol $PhNH_2$ → J acid-imine), obtained in 23-g. yield from 26.5 g. 87% J acid-imine (0.05 mol), 100 cc. H_2O, 30 g. crystd. AcONa and 15 cc. 10% AcOH, recrystd. by dissolving in 80 cc. hot H_2O and adding 200 cc. hot alc., 103% pure (difficult to reduce), violet powder, dyes cotton bluish red; *F* (2 mol $PhNH_2$ → J acid-imine), obtained in 10-g. yield from 13.3 g. 87% J acid-imine (0.025 mol), 50 cc. H_2O and 25 g. Na_2CO_3, recrystd. by dissolving in 40 cc. hot H_2O and adding 100 cc. hot alc., 94.5% pure, brown-red powder, dyes cotton bluish red; *G* (2 mol $PhNH_2$ → J acid urea), obtained in 11-g. yield from 17.2 g. 73.9% J acid urea (0.025 mol), 50 cc. H_2O and 25 g. Na_2CO_3, recrystd. from 100 cc. 60% dioxane, 90% pure, brown-red powder, dyes cotton red-orange. Since an accurate detn. of soly. according to previous practice (cf. *C. A.* **25**, 2294) is subject to several sources of error, only the results obtained during the purification were used for basis of comparison. The dye *A* appeared to be the most readily sol. in H_2O. *E* and *F* show approx. the same soly. and are easily sol. in H_2O, but difficultly sol. in 75% alc. *B* and *C* are difficultly sol. in H_2O, while the most difficult is *D*. The diffusion velocities of the various dyes in 2% gelatin were detd. after 24, 48 and 72 hrs. and from the tabulated results it appears the distance of diffusion is the greatest in the case of *A* with practically a progressively decreasing order from *A* to *G*. The individual values for substantivity were detd. by use of the equation: adsorption − desorption = substantivity. In a previous study (cf. *C. A.* **25**, 2295) the first 2 values were detd. by titanometric estn. of the residual dye liquor and colorimetric estn. (resp.) of the extd. soln. after a hot H_2O treatment of the dyed and cold-rinsed skein of cotton, thus giving a range of values from 0 to 100 for the substantivity of a given dye. Since in this case the dyes had poor to moderate substantivity, it appeared more practical to det. colorimetrically the desorption and substantivity directly and then calc. the adsorption. Results, obtained with and without 20% Na_2SO_4 and which are tabulated, confirm the often repeated observation that substantivity and diffusion oppose one another. On the basis of the substantivity measurements given, the monoazo dyes with J acid as the coupling component are not regarded as being substantive since most of them are below a threshold value of 15 in 20% Na_2SO_4. The dye *E* has a value of 19 while *G*, regarded as having "ordinary" substantivity, has a value of 27 compared with 56 of Congo red. The opinion is expressed that the often emphasized "substantive" property of J acid is generally not as valid as assumed but that certain substituents as well as the diazo components, or rather the entire combination of components, are of great importance. John F. Lontz

Azoic dyes. J. A. Wallwork. *J. Soc. Dyers Colourists* **55**, 477–80(1939). A summary. "Solunaphthols" are a series of products all members of which can be used for cotton and, with one exception, for wool and union fabrics. They are not Na salts but are fine powders which actually produce the sol. naphtholates in presence of boiling water only. They enable the Naphthol soln. to be very easily prepd. Compared with the ordinary Naphthols, the Solunaphthol solns. have better wetting and penetrating power, are more resistant to hard water and give solns. of fixed alkali contents. A general procedure is outlined. Azoic colors were best applied to cellulose acetate rayon by: (1) low alky. of the impregnating soln. or suspension and (2) a high temp. during impregnation—conditions exactly the reverse of those generally used for dyeing cotton and other cellulose fiber. It is apparently necessary to apply the Naphthol to cellulose acetate rayon as the Na salt, but without excess alkali and not as the free aryl amides, to obtain max. color strength. Two procedures are outlined. Eight references. W. H. B.

Application of vat dyes and viscose rayon. I. Introduction. J. Boulton and T. H. Morton. *J. Soc. Dyers Colourists* **55**, 481–2(1939).—A study involving the measuring of the rates of exhaustion and the relative rates of diffusion of the dyes into the interior of viscose rayon.

The results show that, even though the main body of vat dyes may exhaust at approx. equal rates, some individual vat dyes will produce well-penetrated dyeings with greater ease. **II. Investigation of the kinetics of vat dyeing: development of methods.** *Ibid.* 482–9.—A method of estg. a vat dye by colorimetry of a stable colloidal soln. of the insol. oxidized coloring matter has been developed and applied to the study of the kinetics of absorption of vat dyes by viscose rayon. The absorption-time curves are similar in type to those obtained for the absorption of direct dyes by viscose rayon yarn. The leuco-dye absorption is controlled by a diffusion process. This has been confirmed on the diffusion of the leuco dye in sheet cellulose by a method which yields a relative diffusion const. for all dyes. The development is studied in 2 steps: (*A*) quant. investigation of vat dye absorption and (*B*) relative diffusion rates of vat dyes into viscose. The conception which regards the process of vat dyeing as an absorption or combination of the leuco dye and cellulose, the progress of which is conditioned by the relatively slow diffusion of the dye mols. to the interior of the cellulosic filament is the best at the present time. **III. Diffusion and exhaustion rates for a range of dyes—their importance in practice.** *Ibid.* 489–95.—Measurements of exhaustion rate, degree of exhaustion and diffusion rate have been made on a range of com. vat dyes and the dyes classified according to the results obtained. The data have been correlated with the behavior of the dyes in practice, their behavior being characterized by a dyehouse test for penetrability and levelness. The vat dyeing material has 2 phases: (1) absorption of dye by part of the dyed material, which causes the dye bath to become rapidly and more or less completely exhausted and (2) a process of leveling dependent for its speed upon the ease of diffusion of the dye in viscose rayon. The study includes the effect of dye-bath conditions on exhaustion rate, and the degree of exhaustion and diffusion rate as well as the importance of temp. and other factors in the control of vat dyeing. Any modification tending to lower the extent to which exhaustion takes place in the first few moments of dyeing must lead to improved results by way of level dyeing. The rate at which exhaustion takes place is smaller at lower temps. The success of certain "leveling agents" depends upon the lowering of the capacity of the dye to exhaust, and to this extent, their use involves waste of dye which may be considerable and possibly prohibitive. The padding method gives better penetration since the dye is unreduced and the fine particles are evenly distributed between the threads before dyeing commences. **IV. A classified list of vat dyes.** *Ibid.* 496–7.—The strike test described in (III) is suggested as a dyehouse lab. method for the classification of vat dyes according to their capacity to penetrate and give level dyeings. A classified list is given of 81 common dyes. Twelve references.

W. H. Boynton

The application of naphthol dyes to cotton and other textiles. I. Joseph Lindsay. *Cotton* (Atlanta) **103**, 59–61 (Nov., 1939).—Four important steps are involved in the general procedure for dyeing naphthols: (1) impregnation (naphtholation), intermediate treatment, development and aftertreatment. Each step is outlined. The developers of these naphthol dyes are aromatic amines which are changed by diazotization into sol. diazonium salts and these active diazo salts couple readily with naphthol or phenol bodies to give insol. colored ppts.

W. H. Boynton

The prevention of dull shades due to the presence of iron in the dyebath, when dyeing with chrome dyes. I. Iron in the water supply. C. L. Bird and E. Molloy. *J. Soc. Dyers Colourists* **55**, 560–4 (1939).—Three products were recommended recently for preventing the deleterious effects of Fe in the dyebath: (1) Calgon T consisting of $(NaPO_3)_6$ 80% and $Na_4P_3O_{10}$ 20%; (2) $Na_2H_2P_2O_7$ and (3) Trilon B—a white powder, probably the Na salt of trimethylamine-α,α',α''-tricarboxylic acid together with some Na_2CO_3. 0.4 part of Fe per 1,000,000 parts water will dull the shade of a chrome dye while 1 part per 1,000,000 parts will completely alter the shade of the dyeing. The effect of varying conditions on the efficiency of these compds. has been studied. It has been confirmed that in the metachrome and chrome bath processes the presence of $K_2Cr_2O_7$ or $KCrO_4$ throughout the dyeing process affords good protection against Fe. It is less effective when dyeing on a chrome mordant. W. H. Boynton

Dyeing of staple fibers. A. M. Serebryakov. *Sherstyanoe Delo* **1939**, No. 2–3, 25–9.—Results are given on the dyeing of staple (cuprammonium and viscose) fibers on lab. and large scale with S dyes, indanthrenes and indigosols. S dyes were used satisfactorily on lab. scale. Most indigosols gave good results while indanthrenes differed. In all cases the cuprammonium fibers were more intensely colored than the viscose. Stability against light was good. Dyeing with 0–11% S dyes in an Obermeyer app. had very little effect upon the strength of the fibers, giving a small elongation. B. Z. Kamich

The dyeing of jute. D. Carter. *Textile Recorder* **57**, 43, 45–6 (Oct., 1939).—The demand for a higher standard of fastness, particularly to light, has necessitated the use of faster and more expensive dyestuffs for furnishing fabrics. Methods of dyeing jute are outlined, also types of dyes used. W. H. Boynton

Sleaziness and the pH control of the knitting dyehouse. Milton J. Hoffman. *Cotton* (Atlanta) **103**, 170, 172 (Oct., 1939).—The origin and correction of sleaziness are discussed. The one-bath method of dyeing and degumming is preferable to the 2-bath and the split-bath methods. The operation of the pH control system is performed as follows: The pH of the water to be used in dyeing and finishing is detd. The dyeing soln. is checked at 10.2. After 30 min. of degumming, the gum removed, being acid in character, reduced the pH to 9.6, at which point the hose are thoroughly degummed. Sufficient buffer salt is added to reduce the pH to 8.5, at which the degumming operation stops, while a very good dyeing condition exists for mercerized yarn and pure silk in combination. W. H. Boynton

Microscopic observations of wool dyeing. H. E. Millson, G. L. Royer and M. E. Wissemann. *Am. Dyestuff Reptr.* **28**, No. 22, *Proc. Am. Assoc. Textile Chem. Colorists* P632 8 (1939).—Results obtained by the use of the microscope and color photography are indicated as regards the blending of wool, fiber selectivity, the effect of strong H_2SO_4 on wool hairs, chrome dyeing, ultraviolet microscopic examns., the effect of moisture on shade, redyeing, dyeing at low temps., mildew and com. dyeing.

W. H. Boynton

Wool-dyeing phenomena. R. H. Kienle and G. L. Royer. *Am. Dyestuff Reptr.* **28**, No. 22, *Proc. Am. Assoc. Textile Chem. Colorists* P638–9 (1939); cf. preceding abstr.—The pertinent details in connection with the set-up for taking colored microscopic moving pictures are given and the assembled app. is illustrated. W. H. Boynton

Significance of temperature in wool dyeing. II. A study of the acid-combining capacity of wool. F. L. Goodall and C. Hobday. *J. Soc. Dyers Colourists* **55**, 529–49 (1939); cf. *C. A.* **32**, 3156⁸.—The effect of temp. on the dyeing properties of the molecularly dispersed Acid Orange GG and the colloidal Polar Yellow Conc. was reinvestigated under more stringent and more comprehensive exptl. conditions than formerly. The effect of temp. on the fundamental acid and acid dye-combining capacities was reviewed and is found to fail in the consideration of possible decompn. of fiber and (or) dye in the course of expt. at high temps. Such decompn. renders the detn. of sorbed acid and dye by these methods unreliable and makes impossible the detn. of wt. of wool present when the exptl. dyeing systems have reached equil. The final fiber wt. can only be detd. by weighing the dyed wool and subtracting therefrom the wt. of dye and colorless acid present and detd. by other means. The colorless acid detn. required a method specific for the anion concerned and a reliable value for combined wt. of wool and dye could then be calcd. These detns. required the sepn. of fiber and dye in a manner to permit either or both of these components to be separately detd. The procedure is outlined for the expts. in 0.01 *N* HCl with Acid Orange GG and Polar Yellow R with varied dyeing conditions and conducted at

maintained for several hrs. with an addn. of NaCl or Na_2SO_4, whereupon the material is rinsed and dried.

Azo dyes. I. G. Farbenindustrie A.-G. Brit. 507,169, June 12, 1939. *o*-Hydroxyazo dyes are made by coupling a Pr or Bu ester of 2-hydroxynaphthalene-6-carboxylic acid (obtainable by esterifying the 2-hydroxynaphthalene-6-carboxylic acid described in Brit. 257,815 (*C. A.* **21**, 3058) with a Pr or Bu alc.) with a diazotized 2-aminobenzene-1-carboxy ic acid contg. a SO_3H group. They dye wool red by the chroming process. In examples, 2-amino-5-sulfobenzoic acid is coupled with the Pr and Bu esters and 2-amino-4-sulfobenzoic acid is coupled with the iso-Bu ester.

Monoazo dyes. Emmet F. Hitch, Swanie S. Rossander and Donovan E. Kvalnes (to E. I. du Pont de Nemours & Co.). U. S. 2,173,052, Sept. 12. From components such as 5-nitro-2-aminoanisol and *N*-methyl-*N*-sorbitylaniline, monoazo compds. are formed in which one member is a radical of the benzene or naphthalene series and the second member is the radical of a tertiary aryl amine in which the aryl nucleus is from the benzene or naphthalene series and the amino N is connected to an alkyl group and a polyhydroxyalkyl group having 4–6 C atoms and one less hydroxy group than carbons, with an azo bridge para to the tertiary amino group connecting the component radicals. Such dyes dye yellow to red shades, etc., and numerous examples are given.

***o*-Hydroxyazo dyes.** Achille Conzetti and Abram Oulevay (to J. R. Geigy A.-G.). U. S. 2,173,410, Sept. 19. From components such as a diazotized *o*-aminophenol and 3-amino-8-sulfo-2-naphthoic acid, water-sol. dyes are obtained which dye wool in an acid bath by the after-chroming method green shades of good fastness to fulling, potting and light. Several examples with details are given.

Anthraquinone acid wool dye. Henry R. Lee (to E. I. du Pont de Nemours & Co.). U. S. 2,172,763, Sept. 12. A blue dye is prepd. by condensing 1-amino-2-methyl-4-bromoanthraquinone with cresidine and then sulfonating for the introduction of one sulfonic acid group into the mol. Various details are given.

Oxazine dyes. I. G. Farbenind. A.-G. (Fritz Hess and Heinz Pardon, inventors). Ger. 679,984, Aug. 19, 1939 (Cl. 22*c*. 4). Water-sol. oxazine dyes are prepd. by heating substitution products of 2,4,6-trinitrobenzene contg. an exchangeable substituent adjacent to an amino group, with *o*-aminophenols which contain solubilizing groups, in the presence of acid-binding agents, till the oxazine ring is closed. Thus, the HCl salt of 3-amino-2-hydroxybenzoic acid is dissolved in water and heated with crystd. AcONa and picryl chloride in the presence of soda to give a dye. Other examples and the structural formulas of the dyes produced are given.

Sulfur dyes. I. G. Farbenind. A.-G. Ger. 679,985, Aug. 18, 1939 (Cl. 22*d*. 1). 4-Hydroxydiarylamines are sulfurized first with Na_2S and S, or with S alone, in optional presence of a catalyst at a high temp., to form a thiazine compd., and by heating the thiazine compd. in an aliphatic or cyclic alc. with fused S, and Na_2S, and optionally an oxidizing agent, to give sulfur dyes. Thus, 4′-hydroxyphenyl-2-aminonaphthalene is heated with S and Na_2S. The product is dissolved in BuOH and treated with S and Na_2S to give a dye coloring cotton in a Na_2S bath in black shades. Other examples are given.

Thioindigo dyes. John E. Cole (to E. I. du Pont de Nemours & Co.). U. S. 2,173,506, Sept. 19. A thioindigo of high tinctorial value is produced by oxidizing a thioindoxyl compd. such as 4-methyl-6-chlorothionaphthene in the presence of an isopropylnaphthalene alkali sulfonate. Several examples are given.

Brown vat dyes. I. G. Farbenindustrie A.-G. Brit. 506,761, June 5, 1939. Dyes that are quinones of the carbazole series are obtained by causing 1,4- or 1,2-naphthoquinones that are unsubstituted in the quinonoid nucleus or 1,2-naphthoquinones having in 4-position a SO_3H radical and being unsubstituted in 3-position to react at elevated temp. with such 1,2,3-triazoles as are derived from aromatic *o*-diamines, N being split off. An oxidizing agent may be present in the reaction mixt. Among examples, (1) β-naphthoquinone is caused to react in $PhNO_2$ or glacial AcOH with 1,2,3-benzotriazole in the presence of PbO_2, or in $PhNO_2$ with the azimido compds. derived from 1,2-naphthylenediamine, 4-chloro-1,2-phenylenediamine, 1,2-diamino-5-benzoylaminoanthraquinone, 4-nitro-1,2-phenylenediamine, 3,4-diaminobiphenyl, 3,3′-diaminobenzidine, 1,2-diamino-4,6-dichlorobenzene and 4-chloro-1,2-naphthylenediamine, and (2) K β-naphthoquinone-4-sulfonate is caused to react with 1,2,3-benzotriazole in cyclohexanol in presence of KOAc.

Color lakes. Alfred Siegel (to E. I. du Pont de Nemours & Co.). U. S. 2,173,699, Sept. 19. Color lakes consisting principally of a water-insol. phthalocyanine coloring material such as Cu phthalocyanine pigment and a metallic resinate such as Ba resinate have relatively easy grinding qualities and *produce printing inks* of greater length, lower consistency and better flow than those prepd. from the same toner without the resinate. Numerous examples with details are given.

Hydroxybiphenylene oxide. I. G. Farbenind. A.-G. (Karl Zahn and Kurt Schimmelschmidt, inventors). Ger. 679,976, Aug. 19, 1939 (Cl. 12*q*. 24). 3-Hydroxybiphenylene oxide and its substitution products are prepd. by treating 2′-halo-2,5-dihydroxybiphenyl with an alkali. Thus, 2′-chloro-2,5-dihydroxybiphenyl is treated with fused KOH to give 3-hydroxybiphenylene oxide. The prepn. of 7-methyl-, 7-chloro-7-methoxy-, 6-chloro-, 6-methyl-3-hydroxybiphenyl, and 3,6-, 3,5- and 3,8-dihydroxybiphenyl is also described. The compds. are used as *dye intermediates*.

Sulfones. I. G. Farbenindustrie A.-G. Brit. 507,378, June 14, 1939. Divided on 490,043 (*C. A.* **33**, 6142). *m*-Halogenated *o*- and *p*-amino sulfones are prepd. by the action of NH_3 or an agent that sets free NH_3 on polyhaloaryl sulfones of formula *m*-halo-*o*(or *p*-)-haloaryl-SO_2R, where R is an alkyl, aralkyl or aryl residue and further substituents, e. g., alkyl, hydroxyalkyl and aryl groups, further halogen atoms but no NO_2 groups may be present. In the examples, 3-chloro-4-aminophenyl methyl sulfone, 3-chloro-4-aminophenyl ethyl sulfone, 2-amino-5-chlorophenyl ethyl sulfone and 3-chloro-4-aminodiphenyl sulfone are obtained, resp., from 3,1-dichlorophenyl methyl sulfone, 3,1-dichlorophenyl ethyl sulfone, 2,5-dichlorophenyl ethyl sulfone and 3,4-dichlorodiphenyl sulfone. The products are *useful as intermediates for the manuf. of azo dyes* and *pharmaceutical products*.

Dyeing cellulose textiles. Courtaulds Ltd. and Ernest E. Tallis. Brit. 506,793, May 30, 1939. The dyeing properties of textile materials comprising cellulose or its derivs. that do not contain protein substances or their derivs. or basic amino or imino groups, e. g., cotton, rayon and linen, are improved by incorporation therein of a product obtained by causing $CNNH_2$ and CH_2O to react under acid or neutral conditions. Alternatively, the materials are impregnated with a soln. obtained by the admixt. of solns. of $CNNH_2$ and CH_2O, maintained slightly acid, and are subsequently dried and heated to cause condensation. Alternatively, the condensation products may be incorporated in the solns. from which artificial threads are produced. Among examples, crude $CaCN_2$ is extd. with H_2O, filtered, neutralized with strong H_2SO_4, the $CaSO_4$ is filtered off and CH_2O soln., NH_4SCN and H_2O added to the filtrate; viscose staple fiber is steeped in this soln., centrifuged, dried and heated for 20 min. at 140°, whereupon it is dyed with Azo-geranine 2GS in a bath contg. H_2SO_4. The process increases the affinity of the material for substantive, S, vat, azoic, basic and acid dyes and for cellulose acetate, dyes, etc. Intensifiers or other compds. known to increase the affinity of the material for certain direct dyes may be added to the treatment solns.; when such compds. are basic, e. g., NEt_3, they are neutralized before being added.

Dyeing acetate rayon. Wm. J. Grubb, Cecil Shaw, Reginald H. Sennett and Imperial Chemical Industries Ltd. Brit. 507,748, June 20, 1939. Acetate rayon is dyed black shades by applying thereto from an aq. bath 1-amino-4-*p*-nitroanilinoanthraquinone-2-sulfonic acid (I) or a sol. salt thereof. Among examples, acetate rayon

yarn is scoured in a very dil. soln. of soap and NH_3, washed in cold H_2O and entered into an aq. bath contg. I, the temp. is then raised to 80°, NaCl is added and the temp. maintained at 80–85° for 45 min., whereupon the yarn is washed and dried to obtain a greenish black dyeing.

Dyeing textile materials such as those of cellulose acetate. Robert W. Moncrieff and Albert W. M. Cooke (to Celanese Corp. of America). U. S. 2,173,178, Sept. 19. A process for coloration of textile materials having a basis of an org. deriv. of cellulose with an azo dye by applying a diazotizable amine and an aryl amide of hydroxynaphthoic acid to the materials and forming the azo dye in the materials from such components involves applying the two components to the materials while they are in package form by passing through the package a soln. of the components in an org. solvent medium which comprises 75 to 90% of CCl_4 or petrol and 10 to 25% acetone or EtOAc.

Dyeing, bleaching or other liquid treatments of textile materials, paper stock, hides, leather, etc., in a closed kier. Henry C. Nichols. U. S. 2,174,178, Sept. 26. App. is described, and a method of treating pervious material in a closed kier, wherein the treating fluid is continuously circulated throughout the treatment in a closed path and under pressure through the material, while maintaining a substantially uniform pressure differential at opposite sides of such material throughout the treatment by bypassing a portion of the fluid around the material.

Developing colors on fabrics with use of steam and acid vapors. Albert S. Jones (to Arnold Print Works). U. S. 2,174,227, Sept. 26. Various details of app. and operation.

Vat color printing pastes for use on textiles such as cellulosic materials. Charles F. Miller (to E. I. du Pont de Nemours & Co.). U. S. 2,174,005, Sept. 26. A vat dye such as C. I. No. 1184 or No. 1217 is used with acetaldol, which serves to prevent "scumming" and "livering."

Printing pastes for textile fabrics. Alan A. Claflin. U. S. 2,172,833, Sept. 12. A printing paste for use in fixing color on a fabric by a steaming process contains a dye together with Na lactate for thickening the paste and for preventing the printed design from drying out before its color is fixed by the steaming process.

Locust-bean thickening for use in textile printing preparations. Durand & Huguenin A.-G. Brit. 508,135, June 27, 1939. A thickening in which the proportion of locust-bean flour to H_2O is not greater than 1 :20 is improved by incorporating therein a protein, e. g., egg albumin, glue, or a degraded protein or a substance contg. such. A suitable thickening contains locust-bean flour 20, glue, advantageously degraded by boiling with H_2O, 10, salicylic acid, as preservative, 1 and H_2O 969 parts. Among examples of its use, (1) wool is printed with an aq. paste contg the dye 4-nitroaniline-2-sulfonic acid → (acid) 1,8-aminonaphthol-3,6-disulfonic acid (alk.) ← 3-amino-4-sulfobenzeneazosalicylic acid, PhOH, glycerol, the thickening, $(COONH_4)_2$, urea and Cr lactate and steamed and further treated as usual, and (2) cotton is printed with an aq. paste contg. Indanthrene Brilliant Green 4G, urea, molasses, the thickening, K_2CO_3 and Hydrosulfite NF and steamed and further treated as usual.

Tank and rack suitable for treating fabrics or yarn cops with dye solutions, etc. Adolf Schrey. U. S. 2,174,016, Sept. 26. Various details of an app. having a rack connected to means for effecting its oscillation in the soln. used.

Casein artificial fibers. Giuseppe Donagemma, Piero Donagemma and "Snia-Viscosa" (Società nazionale industria applicazioni viscosa). Brit. 507,114, June 9, 1939. Fibers are produced by spinning a NaOH soln. of casein contg. a borate of Na, e. g., borax, or a phenol, or a homolog of PhOH, or creosote, or a mixt. of any of these substances. The presence of these substances in the spinning soln. renders a sep. treatment of the coagulated casein fibers with a fixing agent, e. g., CH_2O, unnecessary. Viscose, cellulose acetate or cuprammonium cellulose may be incorporated in the casein spinning soln.

Stapled fibers. Paul Nikles and Franz Wiskemann. U. S. 2,173,789, Sept. 19. App. is described, and a method of producing stapled fibers, comprising feeding a strand of spun artificial filaments to be cut in appropriate lengths of staple fiber, directing two fluid jets onto the moving strand, one of the jets being directed rotationally thereby imparting a turning effect to the strand, controlling the turning effect for twisting the individual filaments of the strand in the manner of a twisted rope as tightly as permissible, and cutting the twisted rope into appropriate lengths of staple fiber in timed relation with its feed movement while guided by the jets, the second jet longitudinally surrounding the twisted portion of the rope to steady the portion while being cut.

Viscose staple fibers. Schlesische Zellwolle A.-G. Brit. 507,128, June 9, 1939. Viscose fibers are curled or loosened by treatment with hot dil. solns. of alkali metal carbonates before, during or after stapling. The treatment may be conducted before the spinning acid has been removed from the fibers or when it has been partly removed. A further modification is first to remove completely the spinning acid, then reacidify with a volatile org. acid, e. g., AcOH, and finally treat with the hot carbonate soln.

Treating artificial threads. Courtaulds Ltd., John H. McKeown and Eric A. Morton. Brit. 507,953, June 23, 1939. A continuous tow of artificial threads, filaments, etc., is treated with washing, bleaching and desulfurizing liquids by means of a grid onto which the tow falls and which comprises fixed longitudinal bars and intermeshing bars that have an up-and-down and longitudinal to-and-from movement so that the tow forms a blanket of overlapping small coils.

Apparatus for twisting threads or filaments. Eric A. Morton (to Courtaulds Ltd.). U. S. 2,173,762, Sept. 19. Various structural and operative details.

Liquid treatment of yarns and other textile materials. Wm. B. Brown. Brit. 508,147, June 27, 1939. Air is entrained by a jet of steam as it is injected actually into the liquid in a dye or other liquid treatment bath or in a chamber from which the jet or each jet of a mixt. of steam and air is discharged into the liquor in which yarns or other loose textile materials, piece goods or *leather* is being treated, to cause circulation of the liquor throughout the bath.

Liquid treatment of hanks of yarn. Wm. Oliver and John Marsden. Brit. 507,763, June 20, 1939. Pole marking of hanks during dyeing or other liquid treatment is prevented by intermittently raising the hanks on their supporting poles by means of air or other gas during the treatment and allowing the hanks to sink back onto the poles between these intermittent periods.

Treating sewing thread such as that of cotton. Alfred Burgeni (to Clark Thread Co.). U. S. 2,173,997, Sept. 26. App. is described, and a method of treating sewing thread of native cellulosic fibers which involves thoroughly wetting the thread without substantially changing its chem. compn., then stretching the wet thread beyond its elastic limit and short of its breaking point, releasing the tension on the thread, and drying it in its condition of released tension. This treatment serves to give better and more uniform tensile strength. U. S. 2,173,998 (Alfred Burgeni, Wm. M. Camp and Frederick W. Thomas, joint inventors, to same assignee) describes app. and a method of treating sewing thread of cotton fibers which involves thoroughly wetting the thread with an alk. soln. contg. one or more water-insol. cellulose derivs. such as cellulose methyl, ethyl or glycol ether without substantially changing the chem. compn. of the fibers, then stretching the wet thread beyond its elastic limit and short of its breaking point, and releasing the tension.

Treating textiles. I. G. Farbenindustrie A.-G. Brit. 508,079, June 23, 1939. Textile materials are treated with a product of the reaction of an aliphatic or cycloaliphatic amine contg. a radical having more than 8 C atoms with a compd. obtainable by causing a 1,2-alkylene oxide to react with $CNNH_2$ or a salt thereof. The products are useful as washing agents, preferably in an acid bath, for imparting a full feel to rayon, for enhancing the fastness of dyes, or in any textile treatment that utilizes dispersing agents. In examples, (1) viscose rayon is treated with a

maintained for several hrs. with an addn. of NaCl or Na_2SO_4, whereupon the material is rinsed and dried.

Azo dyes. I. G. Farbenindustrie A.-G. Brit. 507,169, June 12, 1939. *o*-Hydroxyazo dyes are made by coupling a Pr or Bu ester of 2-hydroxynaphthalene-6-carboxylic acid (obtainable by esterifying the 2-hydroxynaphthalene-6-carboxylic acid described in Brit. 257,815 (*C. A.* **21**, 3058) with a Pr or Bu alc.) with a diazotized 2-aminobenzene-1-carboxy ic acid contg. a SO_3H group. They dye wool red by the chroming process. In examples, 2-amino-5-sulfobenzoic acid is coupled with the Pr and Bu esters and 2-amino-4-sulfobenzoic acid is coupled with the iso-Bu ester.

Monoazo dyes. Emmet F. Hitch, Swanic S. Rossander and Donovan E. Kvalnes (to E. I. du Pont de Nemours & Co.). U. S. 2,173,052, Sept. 12. From components such as 5-nitro-2-aminoanisol and *N*-methyl-*N*-sorbitylaniline, monoazo compds. are formed in which one member is a radical of the benzene or naphthalene series and the second member is the radical of a tertiary aryl amine in which the aryl nucleus is from the benzene or naphthalene series and the amino N is connected to an alkyl group and a polyhydroxyalkyl group having 4–6 C atoms and one less hydroxy group than carbons, with an azo bridge para to the tertiary amino group connecting the component radicals. Such dyes dye yellow to red shades, etc., and numerous examples are given.

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Color lakes. Alfred Siegel (to E. I. du Pont de Nemours & Co.). U. S. 2,173,699, Sept. 19. Color lakes consisting principally of a water-insol. phthalocyanine coloring material such as Cu phthalocyanine pigment and a metallic resinate such as Ba resinate have relatively easy grinding qualities and *produce printing inks* of greater length, lower consistency and better flow than those prepd. from the same toner without the resinate. Numerous examples with details are given.

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yarn is scoured in a very dil. soln. of soap and NH_3, washed in cold H_2O and entered into an aq. bath contg. I, the temp. is then raised to 80°, NaCl is added and the temp. maintained at 80–85° for 45 min., whereupon the yarn is washed and dried to obtain a greenish black dyeing.

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Dyeing, bleaching or other liquid treatments of textile materials, paper stock, hides, leather, etc., in a closed kier. Henry C. Nichols. U. S. 2,174,178, Sept. 26. App. is described, and a method of treating pervious material in a closed kier, wherein the treating fluid is continuously circulated throughout the treatment in a closed path and under pressure through the material, while maintaining a substantially uniform pressure differential at opposite sides of such material throughout the treatment by bypassing a portion of the fluid around the material.

Developing colors on fabrics with use of steam and acid vapors. Albert S. Jones (to Arnold Print Works). U. S. 2,174,227, Sept. 26. Various details of app. and operation.

Vat color printing pastes for use on textiles such as cellulosic materials. Charles F. Miller (to E. I. du Pont de Nemours & Co.). U. S. 2,174,005, Sept. 26. A vat dye such as C. I. No. 1184 or No. 1217 is used with acetaldol, which serves to prevent "scumming" and "livering."

Printing pastes for textile fabrics. Alan A. Claflin. U. S. 2,172,833, Sept. 12. A printing paste for use in fixing color on a fabric by a steaming process contains a dye together with Na lactate for thickening the paste and for preventing the printed design from drying out before its color is fixed by the steaming process.

Locust-bean thickening for use in textile printing preparations. Durand & Huguenin A.-G. Brit. 508,135, June 27, 1939. A thickening in which the proportion of locust-bean flour to H_2O is not greater than 1 20 is improved by incorporating therein a protein, e. g., egg albumin, glue, or a degraded protein or a substance contg. such. A suitable thickening contains locust-bean flour 20, glue, advantageously degraded by boiling with H_2O, 10, salicylic acid, as preservative, 1 and H_2O 969 parts. Among examples of its use, (1) wool is printed with an aq. paste contg the dye 4-nitroaniline-2-sulfonic acid → (acid) 1,8-aminonaphthol-3,6-disulfonic acid (alk.) ← 3-amino-4-sulfobenzeneazosalicylic acid, PhOH, glycerol, the thickening, $(COONH_4)_2$, urea and Cr lactate and steamed and further treated as usual, and (2) cotton is printed with an aq. paste contg. Indanthrene Brilliant Green 4G, urea, molasses, the thickening, K_2CO_3 and Hydrosulfite NF and steamed and further treated as usual.

Tank and rack suitable for treating fabrics or yarn cops with dye solutions, etc. Adolf Schrey. U. S. 2,174,016, Sept. 26. Various details of an app. having a rack connected to means for effecting its oscillation in the soln. used.

Casein artificial fibers. Giuseppe Donagemma, Piero Donagemma and "Snia-Viscosa" (Società nazionale industria applicazioni viscosa). Brit. 507,114, June 9, 1939. Fibers are produced by spinning a NaOH soln. of casein contg. a borate of Na, e. g., borax, or a phenol, or a homolog of PhOH, or creosote, or a mixt. of any of these substances. The presence of these substances in the spinning soln. renders a sep. treatment of the coagulated casein fibers with a fixing agent, e. g., CH_2O, unnecessary. Viscose, cellulose acetate or cuprammonium cellulose may be incorporated in the casein spinning soln.

Stapled fibers. Paul Nikles and Franz Wiskemann. U. S. 2,173,789, Sept. 19. App. is described, and a method of producing stapled fibers, comprising feeding a strand of spun artificial filaments to be cut in appropriate lengths of staple fiber, directing two fluid jets onto the moving strand, one of the jets being directed rotationally thereby imparting a turning effect to the strand, controlling the turning effect for twisting the individual filaments of the strand in the manner of a twisted rope as tightly as permissible, and cutting the twisted rope into appropriate lengths of staple fiber in timed relation with its feed movement while guided by the jets, the second jet longitudinally surrounding the twisted portion of the rope to steady the portion while being cut.

Viscose staple fibers. Schlesische Zellwolle A.-G. Brit. 507,128, June 9, 1939. Viscose fibers are curled or loosened by treatment with hot dil. solns. of alkali metal carbonates before, during or after stapling. The treatment may be conducted before the spinning acid has been removed from the fibers or when it has been partly removed. A further modification is first to remove completely the spinning acid, then reacidify with a volatile org. acid, e. g., AcOH, and finally treat with the hot carbonate soln.

Treating artificial threads. Courtaulds Ltd., John H. McKeown and Eric A. Morton. Brit. 507,953, June 23, 1939. A continuous tow of artificial threads, filaments, etc., is treated with washing, bleaching and desulfurizing liquids by means of a grid onto which the tow falls and which comprises fixed longitudinal bars and intermeshing bars that have an up-and-down and longitudinal to-and-from movement so that the tow forms a blanket of overlapping small coils.

Apparatus for twisting threads or filaments. Eric A. Morton (to Courtaulds Ltd.). U. S. 2,173,762, Sept. 19. Various structural and operative details.

Liquid treatment of yarns and other textile materials. Wm. B. Brown. Brit. 508,147, June 27, 1939. Air is entrained by a jet of steam as it is injected actually into the liquid in a dye or other liquid treatment bath or in a chamber from which the jet or each jet of a mixt. of steam and air is discharged into the liquor in which yarns or other loose textile materials, piece goods or *leather* is being treated, to cause circulation of the liquor throughout the bath.

Liquid treatment of hanks of yarn. Wm. Oliver and John Marsden. Brit. 507,763, June 20, 1939. Pole marking of hanks during dyeing or other liquid treatment is prevented by intermittently raising the hanks on their supporting poles by means of air or other gas during the treatment and allowing the hanks to sink back onto the poles between these intermittent periods.

Treating sewing thread such as that of cotton. Alfred Burgeni (to Clark Thread Co.). U. S. 2,173,997, Sept. 26. App. is described, and a method of treating sewing thread of native cellulosic fibers which involves thoroughly wetting the thread without substantially changing its chem. compn., then stretching the wet thread beyond its elastic limit and short of its breaking point, releasing the tension on the thread, and drying it in its condition of released tension. This treatment serves to give better and more uniform tensile strength. U. S. 2,173,998 (Alfred Burgeni, Wm. M. Camp and Frederick W. Thomas, joint inventors, to same assignee) describes app. and a method of treating sewing thread of cotton fibers which involves thoroughly wetting the thread with an alk. soln. contg. one or more water-insol. cellulose derivs. such as cellulose methyl, ethyl or glycol ether without substantially changing the chem. compn. of the fibers, then stretching the wet thread beyond its elastic limit and short of its breaking point, and releasing the tension.

Treating textiles. I. G. Farbenindustrie A.-G. Brit. 508,079, June 23, 1939. Textile materials are treated with a product of the reaction of an aliphatic or cycloaliphatic amine contg. a radical having more than 8 C atoms with a compd. obtainable by causing a 1,2-alkylene oxide to react with $CNNH_2$ or a salt thereof. The products are useful as washing agents, preferably in an acid bath, for imparting a full feel to rayon, for enhancing the fastness of dyes, or in any textile treatment that utilizes dispersing agents. In examples, (1) viscose rayon is treated with a

soln. of the imidazoline deriv. from 2 mols. of stearylamine-HCl and aminochloromethyloxazoline-HCl, washed and dried; a full feel results, and (2) a viscose material dyed with Direct Deep Black EW Extra is treated with a soln. of stearylaminoaminoöxazoline hydrochloride; the dyeing is rendered fast to H_2O.

Treating textiles. Tootal Broadhurst Lee Co. Ltd., Harry Corteen and Frederick Charles Wood. Brit. 506,783, May 30, 1939. Textile materials that have been rendered H_2O-repellent by impregnation with an org. N compd. that can be made from a tertiary N base, CH_2O and a fatty alc., amine, amide or urethan contg. at least 10 C atoms, are treated with a neutral or alk. swelling agent. The handle, strength and wearing properties are thus improved. Suitable swelling agents are NaOH, KOH, cuprammonium hydroxide, quaternary NH_4 bases, sulfonium bases, caustic alkalies, with CS_2 and caustic alkalies with ethylene oxide for cellulosic materials, Me_2CO and H_2O for cellulose acetate materials, and caustic alkalies or NH_4OH for wool and silk materials. The materials may also be subjected to further textile finishing processes, e. g. delustering, rendering crease-resisting, shrinking. Among examples, linen is made H_2O-repellent with octadecyloxymethylpyridinium chloride or *N*-carbomethoxyheptadecylaminomethylpyridinium chloride, wetted and immersed in NaOH soln. The swelling may also be applied to a material that has been made H_2O-repellent and impregnated with resin or a reactive aldehyde.

Ennobling textile materials. Walther Kaase and Ernst Waltmann (to Heberlein Patent Corp.). U. S. 2,172,475, Sept. 12. A textile material such as one of cotton or rayon has applied to it asymmetric stearic acid-acetic acid anhydride or other asymmetric fatty acid anhydride contg. a long acyl radical of at least 10 C atoms and a considerably shorter acyl radical capable of being split off upon heating, followed by heating to effect such splitting and to cause a reaction of the textile material with the remainder of the anhydride.

Desizing textile materials. Josef Müller. U. S. 2,173,040, Sept. 12. A textile material such as a cotton fabric which carries a sizing of a polymeric carbohydrate such as a starch sizing is treated with an aq. soln. of a persulfate such as that of Na or K at a temp. above ordinary room temp. (suitably about 50–100°).

Treating fibrous materials such as cotton, wool, rayon or asbestos with aqueous dispersions such as those of waxes and resins. Howard A. Young (to United States Rubber Products, Inc.). U. S. 2,173,241, Sept. 19. A process for waterproofing, sizing, etc., involves assocg. fibrous material with an aq. dispersion contg. 6–30% of colloidal treating materials such as a wax, causing the fibrous material to entrain therein an amt. of the aq. dispersion which ranges from 40–250% of the wt. of the fibrous material and which is less than that required for "wet satn." of the fibrous material so that the fibrous material holds its entire treating bath, the treating bath being capable of depositing on the fibrous material in which it is held substantially all its colloidally dispersed particles under normally noncoagulative conditions for the dispersion, and maintaining the treating bath in the fibrous material under normally noncoagulative conditions for the dispersion until the desired amt. of the dispersed material has deposited on the fibrous material. U. S. 2,173,242 relates to a similar process in which a latex compn. having a solids concn. of 3–30% is used for treating the fibrous material. U. S. 2,173,243 relates to a process which involves assocg. a bath of an aq. dispersion of colloidal treating material which is at a pH in approx. its isoelec. zone with fibrous material under normally noncoagulative conditions for the dispersion, the dispersion being stable in the absence of fibrous material but capable of depositing substantially all of its dispersed particles of treating material on the fibrous material under normally noncoagulative conditions for the dispersion, and maintaining the fibrous material assocd. with the bath under normally noncoagulative conditions for the dispersion until the desired amt. of treating material has been sorbed on the fibrous material. U. S. 2,173,244 relates to a generally similar process in which a latex compn. is used for sorption of rubber on the fibrous material.

Treating cellulose-derivative fabrics. British Celanese Ltd. Brit. 506,862, June 6, 1939. Fabrics contg. yarns comprising a mixt. of fibers of an org. deriv. of cellulose and animal fibers are treated for about 4–6 min. at 10–13° with an aq. soln. of a thiocyanate of an alkali metal, alk. earth metal or NH_3 that has a d. of 6–10°Bé. in order to modify their handle. The fabrics treated may contain other fibrous materials such as regenerated cellulose filaments and the treatment bath may contain, besides the thiocyanate and H_2O, oily materials such as sulfonated or sulfated fatty alcs., vegetable or mineral oils, wool fat or oil. In examples, fabrics consisting of yarns made of about 70 parts cellulose acetate fibers and about 30 parts wool fibers are treated with NH_4SCN soln.

Pile-surfaced materials. Harry A. Wintermute (to Behr-Manning Corp.). U. S. 2,173,032, Sept. 12. App. is described, and a method which comprises establishing an elec. field of periodically alternating polarity, positioning an adhesive-surfaced foundation material such as cloth or paper in this field and bringing comminuted fibrous material into the field in condition to be deposited so as to produce a pile on the adhesive-surfaced material.

Forming pile surfaces on sheet materials. Archibald F. Meston (to Behr-Manning Corp.). U. S. 2,173,078, Sept. 12. App. is described, and a method which comprises providing an elec. field of intermittently varying strength, positioning an adhesive-surfaced material in the field, and applying fibers for forming a pile surface to the field.

Apparatus for taking samples from cotton in bat form. Geo. E. Gaus and Russell G. McWhirter (to the Secretary of Agriculture of the U. S. A.). U. S. 2,173,071, Sept. 12. Various structural, mech. and operative details.

Artificial wool. Joseph Carlier. Brit. 506,895, June 6, 1939. Artificial wool and artificial fibers of high thermal capacity are prepd. by mixing together at least 2 of the following solns., spinning the mixt. into HCl soln. and insolubilizing the threads obtained, e. g., in glycerol-CH_2O. The solns. are (a) a colloidal soln. of a nonthermally reactive fusible PhOH-CH_2O resin in an aliphatic or aromatic alc., a ketone, AcOEt, AcOBu, AcOAm or tricresyl phosphate, (b) a colloidal soln. of Ca or phospho-Ca alginate in H_2O contg. Na_2CO_3, (c) a colloidal alk. soln. of wool or wool waste and (d) a colloidal alk. soln. of casein.

Compound fabrics. Benjamin Liebowitz. Brit. 508,040, June 26, 1939. A continuous process for uniting layers of fabric comprises superposing 2 layers of fabric with a beam of parallel independent yarns of adhesive agent arranged therebetween, applying to the superposed layers a solvent for the adhesive agent, applying a sustained pressure and finally subjecting to successive pressing and airing stages for evapg. the solvent. The yarns may be of cellulose deriv., may contain or be treated with plasticizer and may be spaced apart by cotton or other nonadhesive yarns. App. is described.

Coated fabrics. Eberhard Andreae and Weberei-Beteiligungs G. m. b. H. Brit. 508,711, July 5, 1939. Textiles are rendered H_2O-proof by being treated with a CH_2O-urea or CH_2O-thiourea resin to render them crease-resistant and then being coated on 1 side with a soln. or dispersion of polyvinyl or polyacrylic resin free from fillers or plasticizers. One or more layers may be applied. Stickiness of the applied layer may be reduced by powdering with talcum and treating with a H_2O-repelling agent, e. g., a soln. or dispersion of wax or wax-like substances, e. g., paraffin, Al soaps, preferably contg. dispersing agents, e. g., soap, albuminoid substances. $(HCOO)_3Al$ or $(AcO)_3Al$ or Zn or Th salts may also be present.

Rubberizing textiles. Dunlop Rubber Co. Ltd., Evelyn W. Madge and Edward A. Murphy. Brit. 507,493, June 15, 1939. When impregnating with rubber materials that are formed wholly or partly of cotton, e. g., duck for belting and tire cord, the adhesion of the rubber is assisted by initially dewaxing the cotton and subsequently applying thereto as an adhesive an aq. dispersion of rubber contg. an addn. of resorcinol resin.

Ornamental woven elastic fabric. John V. Moore (to Moore Fabric Co.). U. S. 2,173,976, Sept. 26. An ornamental elastic fabric suitable for embossing to simulate *leather* is formed of interwoven warps and wefts, the warps comprising rubber warp threads entirely buried below the face of the fabric and addnl. nonelastic binder warp threads, and the wefts consisting of nonelastic yarn having an initial coating of a substance which is relatively hard but not brittle, the coating being applied to the weft yarn before the yarn is woven in the fabric and being capable of receiving and retaining a permanent surface alteration, and the coated wefts wholly overlying and concealing the rubber warp threads in the fabric and being collectively embossed with an ornamental design and being free for transverse movement relative to each other after such embossing.

Treating canvas for belting. Walter H. Tolsey (to Main Belting Co.). U. S. 2,174,022, Sept. 26. A method of producing belting comprises folding and stitching a length of canvas, impregnating the canvas with a mixt. including a drying oil and a mineral jelly, permitting the drying oil to oxidize partially and before the drying oil has completely oxidized filling the canvas with a mixt. including a drying oil, a cereal flour and casein, permitting the drying oil to oxidize partially and before the drying oil has completely oxidized coating the treated canvas with a varnish.

Treating packaged rayon to effect bleaching, etc. Adrian J. L. Moritz, Willem J. D. van Dobbenburgh, Alfred E. Sunderland and Gilbert I. Thurmond (to American Enka Corp.). U. S. 2,172,516, Sept. 12. A method of aftertreating dried twisted rayon threads in package form, the outer convolutions of which have been unable to shrink to the same extent as the inner layers, comprises moistening the outer surfaces only of the package so that the outer layers of thread will acquire from 40% to 100% moisture and thereafter redrying the same.

Bleaching fibrous materials. Martin Evoy. U. S. 2,173,474, Sept. 19. Animal, vegetable or artificial fibrous materials are wetted, at a temp. not substantially above 38°, with a sufficient quantity of an acid, aq. soln. of H_2O_2 to render the material moist, and the material is maintained moist for a period of not less than 2 hrs. and until the bleaching is substantially complete, and is then dried.

Starch solutions for textile sizings, etc. Josef Müller. U. S. 2,173,041, Sept. 12. Starch is heated with water and a persulfate such as that of K (suitably also with an alk. per compd. such as Na percarbonate) until the starch is substantially dissolved, the persulfate being used in such small amount that the acid reaction products produced from its decompn. are substantially neutralized by such basic substances as are commonly present in undistd. water and in the starch used. Several examples are given.

Waterproofing textiles. Courtaulds Ltd. and Edwin H. Sharples. Brit. 508,701, July 5, 1939. Cellulose textile material, e. g., cotton, regenerated cellulose, that has been dried until it is practically free from moisture but which contains a small proportion, e. g., 0.1%, of a fatty substance, is subjected to the action of dry Cl after which an insol. metallic compd. of a fatty acid is formed therein. The fatty substance may be normally present in natural fibers, but in the case of artificial fibers it is added to the soln. from which the threads are made or by aftertreatment. In an example, viscose woven fabric is treated with Na oleate soln., dried at 60° for 6 hrs., placed in an atm. contg. 0.3% Cl for 1 hr. at 60°, removed, immersed in a soap soln., e. g., Na oleate, centrifuged and rinsed in hard H_2O contg. 10–30 parts of Ca or Mg compds. per 100,000 of H_2O.

Waterproofing and creaseproofing textiles. Färberei-A.-G. vo mals E. Stolte Nachfolger & Wm Missy, Ernst Waltmann and Edgar Wolf. Brit. 508,173, June 27, 1939. Divided on and addn. to 494,761 (*C. A.* **33**, 3184[8]). There are used in place of the quaterna y NH_4 compds. of 494,761 quaternary NH_4 compds. of the halomethyl ethers of urethans, hydrazides and partially acylated ureas of formula $ROCONH_2$, $RCONHNH_2$ and $RCONHCONH_2$, where R is an aliphatic residue of at least 10 C atoms, which compds. may be prepd. as described in Brit. 492,699 (*C. A.* **33**, 1961[9]).

Waterproofing wool. Merkel & Kienlin G. m. b. H. Ger. 678,144, July 11, 1939 (Cl. 8*k*. 3). Addn. to 661,-673 (*C. A.* **32**, 8798[9]). The method of 661,673 for waterproofing wool fibers by impregnating them with a Cl-yielding agent is modified by using a waterproofing bath contg. the Cl-yielding agent. Thus, wool yarn is immersed in an impregnating bath consisting of an aq. soln. of $(NH_4)_2SO_4$, $CaCl_2$ and HCl. After rinsing, the wool is treated with a bath of soap and paraffin emulsion.

Rendering textile materials water-repellent. Ernst Waltmann and Edgar Wolf (to Heberlein Patent Corp.). U. S. 2,173,029, Sept. 12. A process for "ennobling" textile materials such as viscose rayon for raincoats comprises impregnating the material with stearic acid isocyanate or other isocyanic acid esters having the formula RCO-N=C=O in which R represents an alkyl, cycloalkyl or aralkyl radical contg. a satd. alkyl radical of at least 10 C atoms or represents a satd. or unsatd. radical of an alc. of the sterol series, followed by heating of the impregnated material (suitably for 5 min. at 140°). Cf. *C. A.* **34**, 2748.

Fire-, water- and mildew-proofing cotton fabrics, etc. Edwin C. Clayton and Lawrence L. Heffner (to Wm. E. Hooper & Sons Co.). U. S. 2,172,698, Sept. 12. See Can. 378,801 (*C. A.* **33**, 2351[1]).

Quaternary ammonium compounds. Max Flores and Wilhelm Essers. Brit. 507,687, June 20, 1939. A compd. of formula $RXNH_2$, where R is an alkyl, aryl, cycloalkyl or aralkyl radical and X is CO or SO_2, is condensed with CH_2O or $(CH_2O)_3$ and the product is treated first with a fatty acid chloride or chlorocarbonic ester contg. an aliphatic radical of at least 10 C atoms and then with a tertiary base. The final products are H_2O-sol. quaternary NH_4 compds. that may be used *for waterproofing textile materials* or *for aftertreating textile materials that have been dyed* with substantive dyes, to increase their resistance to washing. Among examples, *p*-toluenesulfonamide is fused with $(CH_2O)_3$ and the product is treated with stearoyl chloride and then with pyridine.

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

The manufacture of paint and allied products. A. Brothman and H. Kaplan. *Natl. Paint Bull.* **3**, 18–21 (Oct., 1939).—A tech. discussion from the standpoint of the mixing operation. The conclusions are: that the improvement of mixing equipment lags far behind the other aspects of paint production in tech. advance. W. H. Boynton

Aluminum paint leaf retention. Cornelius S. Fleming and Wm. Mellema. *Am. Paint J.* **24**, Convention Daily, 8 (Nov. 3, 1939).—A 149° oven test and the boiling water-bath test are dependable tests to det. the loss or leafing of Al pastes and powders. The use of smaller amts. of paste than usually required for paints is a dependable accelerated method for testing leafing of Al pastes, powders and vehicles. Exposure of Al paints to the heat of the sun in open or closed cans is a suitable accelerated test for Al paints, the method of exposing open cans being the faster. The boiling water-bath test is a quick simple dependable method for detg. the relative leafing retention of Al paints. W. H. Boynton

The loss of drying power of black paints caused by aging. J. E. Rose and H. A. Bennett. *Am. Paint J.* **24**, Convention Daily, 10–11, 12, 17 (Nov. 2, 1939).—Methods of correcting the loss of drying power were studied and drying rate curves prepd. for treated samples. The theory and

procedure are outlined. Carbon black, bone black, lampblack and graphite pigments were compared. Carbon black causes the greatest losses in drying power of the linseed-oil mixts. with the other pigments following in order of listing. W. H. Boynton

Analysis of paint decomposition due to weathering. Henry A. Ball. *Am. Paint J.* 24, Convention Daily, 12–13, 14–15, 16–17(Nov. 3, 1939).—A study purporting to make a complete analysis of all the products during the breakdown of films of 2 different paints. The exact mechanism of the deterioration can be shown by periodic chem. analysis of the residual film, the chalk and the washed off material. Analytical results are tabulated. W. H. B.

Technique of the painting process in the Bagh caves in the Gwalior State. S. Paramasivan. *Nature* 144, 554–5 (1939); cf. *C. A.* 31, 7266[6]; 32, 6885[9].—Chemical analyses and particle size distributions are given for the earth plaster and lime plaster coats. The pigments were yellow and red ochers, C, lime and gypsum, terreverte and lapis lazuli. The binding medium on the earth plaster was animal glue; the pigments were in lime medium on the lime plaster. G. M. Petty

Loss in drying power in brown paints—Kansas City Paint & Varnish Production Club. *Am. Paint J.* 24, Convention Daily, 17, 18(Oct. 26, 1939).—A study of brown house paints made with Pb, Mn and Co naphthanate driers, and pigments drawn from lampblack, red iron oxide, yellow iron oxide, asbestine, china clay and silica. The oil was neutral linseed, acid no. less than 0.30. All reasonable combinations of these pigments were tried. Iron oxide was the worst offender and only lampblack was inert. The usual methods for detg. the pigments were employed. Co was detd. colorimetrically when less than 10 γ per ml., with a 1% soln. of 1-naphthol-2-nitroso-4-sulfonic acid. Under conditions outlined Co can be detd. down to 0.0003%. Three tables show the results. W. H. Boynton

Moisture peeling of house paints. Effect of structural details. J. W. Iliff and R. B. Davis. *Ind. Eng. Chem.* 31, 1407–12(1939); cf. following abstr.—A test house with interior humidified and thermostatically controlled is described for studying moisture peeling of house paints. For studying moisture peeling caused by condensation of inside moisture the house is effective only during cold weather. Use of tar paper (kind of tar paper not reported) between siding and sheathing does not prevent moisture failure. Blocking of air circulation in walls behind painted areas by fire stops or with insulation increases the danger of moisture peeling of the paint. Use of effective vapor barriers properly placed in exterior walls and attic floors protects against moisture peeling. Circulation of external air immediately behind painted woodwork, as by furring out and venting siding, is very effective in preventing moisture peeling but somewhat impairs thermal insulation. F. L. Browne

Condensation problems in modern buildings. L. V. Teesdale. *Illinois Eng. Expt. Sta. Circ.* 37, 104–17 (1939); *U. S. Forest Products Lab. Mimeograph* R1196; cf. preceding abstr.—Temp. and vapor pressure gradients through sidewalls as affected by permeability of the building materials to moisture and by thermal insulation are discussed and illustrated on the basis both of the theory and of studies made with the Forest Products Lab. test house. Comparative resistance of common building materials to vapor transmission is tabulated. Proper installation of vapor barriers permits enjoyment of the economies and comforts of modern methods of construction without danger of damage to the structure, and incidentally to the exterior paint, from condensation within the sidewalls. F. L. Browne

Chlorinated rubber paints and varnishes. F. Sarx. *Fette u. Seifen* 46, 580–3(1939).—Further discussion (cf. *C. A.* 33, 2353[6]) emphasizes the ability of protective coatings formulated with chlorinated rubber to withstand attack by chemicals and to serve as anticorrosive coatings. Formulation with and without drying oils is discussed. J. W. Perry

Fire prevention in paint and varnish plants. Kenneth Tyson. *Am. Paint J.* 24, Convention Daily, 8(Nov. 3, 1939).—Causes of such fires are: (1) spontaneous combustion, (2) flashing of materials which have been heated beyond their ignition point and (3) flashing of combustion vapors generally set off by sparks. The Fognozzle is a nozzle that breaks the water supply into extremely fine particles evenly distributed over a given area and being steam immediately upon hitting the fire and because of its great expansion in vol. in conversion to steam the amt. of available O to permit combination is greatly lessened. W. H. Boynton

The influence of variations of barium sulfate extender particle size on the hiding power of titanium dioxide paints. Henry D. Piper. *Am. Paint J.* 24, Convention Daily, 17, 18, 20–1(Nov. 2, 1939).—A study was made of the hiding power of paints consisting of 75% boiled linseed oil and 25% solids (TiO_2 and $BaSO_4$) by vol. For each $BaSO_4$ sample of different particle size, paints were prepd. in which 85%, 75%, 65% and 50% of the total vol. of solids present were sulfate. The remainder of solids was TiO_2. The total vol. was always 25% of the total vol. of the paint. The most general conclusion is that in TiO_2-$BaSO_4$ system paints up to about 35% TiO_2 concn. of pigment vol., there is no indication that variations of $BaSO_4$ particle size have any effect whatsoever on hiding power. At concns. above 35% slight discrepancy is evident in the curves of the graph and this may possibly be somewhat larger above 50%. There was no indication that the larger sulfate particles provided better hiding power—the coarsest size tried apparently decreasing the hiding considerably. No adsorption of TiO_2 to sulfate surface is apparent. The effect of adding $BaSO_4$ extender seems to be only to decrease the hiding of the actual pigment in proportion to the vol. of extender present in the paint. W. H. B.

Primers for nonferrous metals—Golden Gate Paint & Varnish Production Club. Harry Eastwood, *et al. Am. Paint J.* 24, Convention Daily, 11, 12(Nov. 1, 1939).—A study of the primers for Al and Mg and their alloys, particularly those used in airplane construction. The finishing procedure was one coat of primer over the entire panel, followed after drying 1 week in the lab. by one finishing coat over 80% of the panel. Primer coats were sprayed. The finish coat in all cases was made by adding a lb. of standard Al paste to 1 gal. of Navy VIOC spar varnish. Twenty-six references. W. H. Boynton

Effect of pigment concentration on hiding power of white pigments—Baltimore Paint & Varnish Production Club. E. B. Schuler, *et al. Am. Paint J.* 24, Convention Daily, 14–15, 16–17(Oct. 26, 1939).—A study was made of several pigments at a no. of pigment-binder ratios by a method which expressed the results in fundamental phys. units easily duplicable. The method is outlined and results are tabulated for 7 pigments. The following general conclusion is: (1) it is futile to attempt to assign abs. hiding values to pigments either from exptl. data collected under one set of conditions or values derived from optical or empirical calcns., (2) the hiding power of a given wt. of pigment is different at different pigment concns., (3) there is a pigment concn. where a given wt. of pigment has a min. hiding power as the pigment concn. is increased or decreased (from this point there is an accompanying increase in hiding power for the given wt. of pigment) and (4) the relative hiding power varies depending not only upon the pigment-nonvolatile ratio but also upon the thickness at which the paint is to be applied. W. H. Boynton

The wetting of pigments by linseed oils and paint vehicles. Charles A. Murray and F. E. Bartell. *Am. Paint J.* 24, Convention Daily, 17, 18, 20–1(Nov. 3, 1939).—The effect is indicated of the adsorbed layer on the wetting and dispersion of pigments in linseed oil. A no. of different processes which depend upon the wetting characteristics of the liquid phase, and the results of the different expts. have been compared and correlated. The interfacial tension of linseed oils against water of oil absorption values of the same oils against standard pigments, of sedimentation vols. of the pigment in the oils, of grinding and dispersion of the pigments in the oils, and of the wetting characteristics of adsorbed layers of the oils on the pigment surfaces.

It seems certain that adsorbed layers of constituents from the oil affect every process in which a pigment or other solid becomes wetted by a drying oil or one of the usual paint vehicles. W. H. Boynton

Nonchalking titanium dioxides. R. L. Wharton. *Am. Paint J* 24, Convention Daily, 8(Nov. 3, 1939). W. H. Boynton

Some new slants on dry colors. D. H. Parker. *Drugs, Oils & Paints* 54, 378-9, 380, 381-2(1939).—See *C. A.* 33, 7599[2]. W. H. Boynton

Pigment pH value. A. H. Stuart. *Paint Manuf.* 9, 306-9(1939).—Light from an ordinary elec. lamp bulb is made to pass vertically down a 50-cc. Nessler tube in a dark box, a suitable diaphragm being placed above and below the tube. The emerging light falls on a photoelec. cell which operates a microammeter. The device is standardized for pH measurements by means of a series of solns. of known pH values contg. Universal indicator. The pigment is shaken with a measured quantity of distd. water and filtered through a paper known to be neutral. W. H. Boynton

Oxidation of vegetable drying oils. The ketol and peroxide groupings. R. S. Morell and E. O. Phillips. *Fette u. Seifen* 46, 541-6(in English)(in German, 546 *bis*)(1939).—Work by M. and others on the reaction mechanism of drying oil oxidation is reviewed. In general, the "remote" double linkages form peroxides whose rapid polymerization leads to gel formation, while the "neat" double bonds oxidize more slowly to form peroxides which gradually pass over into a ketol linkage. 28 references. Cf. *C. A.* 29, 8374[1]; 30, 6224[2]. J. W. Perry

Some studies in the drying of vegetable oil films. L. L. Carrick, G. E. Knudson, J. V. Porter and H. J. Thompson. *Am. Paint J.* 23, 58, 60-2(May 1, 1939).—A review of the literature on means of studying gain in wt. of objects on which oil films were drying. Conditions were not identical for all observers. *Ibid.* 18, 21, 56, 58, 60(May 15, 1939).—The various structures accredited to tung oil are shown. The principal unsatd. acids formed in perilla, linseed and the semidrying oils are oleic, linoleic and linolenic. Eleostearic, linoleic and linolenic acids are the important acids as regards the oxidation of drying oils. Their behaviors toward O are indicated. *Ibid.* 54, 56, 58, 60, 62(May 29, 1939).—Largely a review of the work of other investigators. *Ibid.* 14, 16, 18(June 12, 1939).—Further reviews. *Ibid.* 21-4(June 26, 1939).—Phys. and chem. consts., chem. analysis and combustion analysis are shown for raw tung, perilla and linseed oils. *Ibid.* 16, 18, 21, 44-5(July 10, 1939).—In studying the drying the film thickness was calcd. from the wt. of the oil, the area and the sp. gr. of the oil. The combustion-train assembly is pictured and curves show: percentage increase in wt. of raw tung oil films with age and the same data for raw perilla and raw linseed; and the relation of age of raw tung films to the percentage of O found by combustion analysis on each of these oils. *Ibid.* 45-50(July 31, 1939).—A study of films without drier. Changes undergone in the tung oil in assuming the solid phase and those in the subsequent aging of the film are slow enough to emit a deeper insight into the mechanism involved, from an application of the accumulated data. Complete frosting required 69-72 hrs. The Br no. curves for films without drier are peculiar because it appears as though the amt. of unsatn. increases with the O absorption instead of decreasing—a phenomenon that can be explained by assuming that the steric conditions which prevent addn. of Br to the 3rd double bond of eleostearic acid in the original oil are removed by the addn. of a slight amt. of O. On this basis the O absorption of the film at the max. Br no. has been calcd. The theoretical Br no. of the unoxidized oil is 231.4 if addns. occurred at all 3 double bonds. The max. Br no. at 2.5 days is 204. The relations between age of raw tung oil films and Br no., thiocyanate no. and the corrected diene no. are shown in curves. *Ibid.* 16-17, 43-5(Aug. 14, 1939).—Curves show: the relation between age of raw tung oil films and peroxide no., also the relation between film age and sapon. no. and acid no. with similar information for perilla oil films. The I nos. are lower than the thiocyanate nos. probably because the peroxides rearrange to give some ketones. The thiocyanate then adds to the enol form of these ketones, but the Wijs soln. does not add on as it is not in contact with the film long enough to cause an appreciable amt. of the ketone to be shifted to the enol. *Ibid.* 46-7, 50-1(Aug. 28, 1939).—The relation between the age of raw perilla oil films and acetone-insol. and the relation between the age of these films and sapon. no. and acid no. are indicated. The research on these films neither proves nor disproves any of the existing theories as the mechanism of the 2nd step in the drying process but indicates that the process is colloidal. The percentage compn. and I no. of the film and of the acetone-insol. portion of the film are essentially the same. *Ibid.* 16, 18, 21-2, 53, 56-8(Sept. 11, 1939).—Exptl. data show that the actual max. increase in wt. of a vegetable oil film based on the total C and H content of the dried film is much larger than that obtained on the basis of every possible double bond being satd. with peroxide O. Discrepancies obtained by comparing the results obtained when based on the I no. and on the combustion analysis detn. indicate that an addnl., and as yet little suspected, type of O absorption has taken place which cannot be ascribed entirely to peroxide formation at the original double bonds. The excess O may be adsorbed according to the gas coagulation theory of secondary O added to new double bonds formed by keto-enol shifts. Curves show: the relation between age of raw linseed oil films and the peroxide O, the I no., the acid no., sapon. no., the thiocyanate no. and the percentage of acetone-insol. A table is included of diene no. (maleic anhydride value) of raw linseed oil fims without drier. Four general conclusions are: (1) the driers merely acted as an oxidation accelerator—the only difference being in the rate of oxidation and absorption, (2) with raw linseed and raw perilla oils: (*a*) there is a discrepancy between the total O absorption and retention and the total amt. capable of being absorbed on the basis of peroxide formation at the original double bonds, (*b*) a theory is advanced for the increase in acid nos. and sapon. nos. in dried linseed oil or perilla films which is consistent with the excess O content noted in the oil, (*c*) the drying processes of raw linseed oil and raw perilla-oil films consist primarily of oxidation followed by colloidal assocn. rather than polymerization, (3) in raw tung oil (*a*) the combustion analysis, the Br no., the thiocyanate no. and the diene no. of dried oil films all show that the oxidation of the 1st two double bonds of eleostearic acid is rapid and the oxidation of the 3rd much slower, (*b*) the diene no. shows that the center double bond of the conjugated system of eleostearic acids was still open after the addn. of 1 mol. of O, (*c*) oxidation of the 3rd double bond results in the evolution of volatile products and in the formation of products sol. in acetone, (*d*) acid and sapon. nos. indicate that the oxidation of the 3rd double bond resulted in the formation of acids and compds. that were sapond. to a greater extent than the original triglycerides, (*e*) the oxidation products from max. O absorption correspond to the addn. of 2 atoms of O to each of the double bonds of the eleostearic acid and the linoleic acid-glyceride present and (4) an explanation of the increase in sapon. nos. and acid nos. appearing to be consistent with observed data. Bibliography. W. H. B.

Chinawood-oil substitution. Wm. A. Gerhardy. *Am. Paint J.* 24, Convention Daily, 8(Nov. 3, 1939). W. H. Boynton

Proximate analysis of hydrocarbon thinners. II. Philadelphia Paint & Varnish Production Club. *Am. Paint J.* 24, Convention Daily, 23-4(Nov. 3, 1939); cf. *C. A.* 33, 885[2].—To improve precision and thoroughly to test accuracy, extn. of aromatic substances by silica gel was substituted for treatment with fuming H_2SO_4 in dealing with low-solvency thinners. Synthetic blends were analyzed. Methods of analysis are outlined. Refractive indexes are tabulated for com. thinners. Proximate compns. in percentage of the whole thinner are tabulated for 4 blends. W. H. Boynton

The measurement of adhesion of dried coatings—New York Paint & Varnish Production Club. Robert J. Moore,

et al. Am. Paint J. **24**, Convention Daily, 18, 19, 20–1, 22–3 (Oct. 26, 1939).—An outline tending to classify the important quant. methods devised for measuring adhesion, and a sep. treatment of each type of test covering its salient features, technique and possible value as a standard method. Three methods studied experimentally are: (1) tensile method involving elongation of the base, (2) tensile method involving direct measurement of force needed to strip the film from the base and (3) a knife method involving an instrument for quant. measurement of the knife pressure required to strip the film from the base.

W. H. Boynton

Varnish losses in weight and in volume—Chicago Paint & Varnish Production Club. R. J. Gnaedinger, *et al. Am. Paint J.* **24**, Convention Daily, 12–13 (Oct. 26, 1939).—Losses in wt. and in vol. occurring during the heat processing of varnish were studied. Ten typical resins and 2 drying oils were included. There is less consistent indication of vol. shrinkage when oils are thinned with mineral spirits or xylene than with resins and results indicate no shrinkage. The max. shrinkage of varnish bases is 0.5%, the av. being 0.2%. In general, any shrinkage in vol. occurring when an oleoresinous base is thinned is too slight to be of practical interest. Most of the resins become less soln. and give more viscous and darker solns. as working time and temp. are increased. Notable exceptions, giving lower viscosity with heating, are maleic esters, one modified phenolic resin and coumarone resin

W. H. Boynton

A study of natural resins in combination with synthetic resins for floor varnishes—New England Paint & Varnish Production Club. B. H. Kropel, *et al. Am. Paint J.* **24**, Convention Daily, 12–13, 14–15, 16 (Nov. 2, 1939).—The properties of 6 natural, 4 treated natural and 4 synthetic resins were studied, also certain blends. Better wearing varnishes can be made by utilizing the good adhesion and wearing qualities of the natural resins, pale East India, Batu, Pontianok and esterified Congo. Modification of these natural resins with low percentages of phenolic resins, except heat-reactive phenolic, is desirable with a view to increase water-, alkali- and gas-checking resistance. Test methods and cooking methods are reviewed.

W. H. Boynton

"A viscosity reduction method" for commercial evaluation of hydrocarbon solvents for synthetic varnish resins—Los Angeles Paint & Varnish Production Club. Ralph H. Huff, *et al. Am. Paint J.* **24**, Convention Daily, 12–15, 16 (Nov. 1, 1939).—The two variables used for purposes of solvent power expression should consist of: (1) a solvent compatible with the dissolved material but of relatively weak actual solvent power and (2) a very high strength of a type known to be compatible with a wide variety of substances used by the industry. Phenolic and modified phenolic resinous products were investigated. Expts. were performed with oil-dispersed resinous bases. All modified phenolic resins were dispersed by a method common to standard varnish practice in an equal wt. of heat-bodied linseed oil. With 100% phenolic resins, the oil-to-resin proportion was 3 parts by wt. of bodied linseed oil and 1 part by wt. of the resin. By computing the solution to the bases of nonvolatile and volatile content by vol. the graphs drawn on semilogarithmic graph paper were consistently uniform curves. Several curves showing percentage solids by vol. and viscosity in poises are given and tables give inspection data relative to: limed rosin and ester gum modified phenolic resins, oil modification of these and solvents used in prepg. viscosity test solns. Conclusions drawn from the investigation are: (1) solvent strength of hydrocarbon thinners can be reliably measured by detg. the effect of solvents upon a compn. of a type similar to that which it is intended that the solvent is to dissolve in actual practice, (2) solvent strength of any given solvents or combinations are a function of an area bounded by a graph of viscosity *vs.* nonvolatile by vol. relative to a selected base lime, (3) viscosity characteristics of semicolloidal solns. (or dispersions) are a function of relative vols. of various components, not of relative wts., (4) viscosity measurements of varnish oils and resin base solns. are a direct logarithmic function of the vol. of nonvolatile within the viscosity ranges at which these materials are customarily used, and for purposes of solvent strength calcns. should be plotted on semilogarithmic paper. A complete correlation between the viscosity-reducing character of solvents and "aniline point" does not seem to be indicated, at least insofar as the solvents are used as varnish thinners. Exptl. procedure is appended.

W. H. Boynton

Effect of resins on kauri reduction—Louisville Paint & Varnish Production Club. A. E. Rheineck, *et al. Am. Paint J.* **24**, Convention Daily, 11, 12 (Oct. 26, 1939).—Kauri reduction values of varnishes made with several resins and oil lengths are tabulated and plotted. The zero reduction values of these resins were found, the kauri reduction values of several oils detd. and all resins except 100% phenolics shown to have an embrittling action on oil greater than might be expected.

W. H. Boynton

Cellulose derivatives in lacquers. C. Maters. *Oil Colour Trades J.* **96**, 919–21 (1939).—The compatibility of cellulose derivs. with resins generally varies inversely with the degree of polymerization of the resin. They are particularly useful with the oil-modified resins because of their effect of increasing the rate of drying of the film. Cellulose acetate, mixed esters and cellulose ethers are discussed, also water emulsions of lacquer bases. It is claimed that these lacquers may be applied at the high solids concn. of synthetic resin finishes with resultant elimination of baking ovens and a lacquer which sands and patches easily.

W. H. Boynton

Peat fiber fabrics as a base for oilcloth and linoleum (Fritz) **13**. Some studies in the drying of safflower-oil films (Carrick, Murfin) **27**. Economic geology of Panchet Hill [red ocher] (Roy) **8**. App. and method for treating articles with liquids [coating with lacquer] (Brit. pat. 508,384) **4**. Masses contg. absorbents for the liquid constituents [substitute for cork meal in production of linoleum] (Brit. pat. 506,929) **13**. Synthetic resins [printing inks for plastic material] (Brit. pat. 506,999) **13**. Synthetic resin coating compns. (Brit. pat. 507,769) **13**. Phenol-acetaldehyde condensation products [in varnish] (Brit. pat. 507,658) **13**. Coating compns. (Brit. pat. 506,931) **13**. Oil compns. [used as floor covering] (Brit. pat. 507,770) **13**. Azo dyes [used in paints and lacquers] (U. S. pat. 2,173,920) **25**. Color lakes [for printing inks] (U. S. pat. 2,173,699) **25**. Condensation products [assistants in the varnish industry] (Ger. pat. 676,407) **13**. Urea-CH_2O condensation products for lacquers (U. S. pat. 2,174,012) **13**. Treating rubber for use in varnishes (U. S. pat. 2,171,395) **30**.

Paints. Robert S. Edwards (to Rumford Chemical Works). U. S. 2,172,997, Sept. 12. A vehicle such as drying oils and turpentine and a pigment such as TiO_2, ZnO and white lead are used with a pigment "extender" consisting of a noncatalyzed, nondissocd. $CaSO_4$ derived from a gypsum or anhydrite treated prior to calcination at temps. of 980–1260° substantially to eliminate anhydrite recrystn. and dissocn., which on application of the paint is catalyzed by the pigment to form a toughened paint film.

Paint compositions containing casein, etc. Joseph V. Reardon (to Reardon Co.). U. S. 2,174,094, Sept. 26. A dry powd. paint compn., which when mixed with water, applied and dried becomes washable, comprises casein and a water-sol. aluminate, such as that of Na, Ba or Ca, which is active both as a solubilizer and insolubilizer for the casein and which is of substantially neutral reaction, the compn. being substantially devoid of ingredients which after being mixed with water, applied and dried, are sol. in water.

Treating wool fat to form paint bases. Howard W. Smith and Sydney G. Campbell. Brit. 507,337, June 14, 1939. The unsaponifiable matter from wool grease is heated to 500°F. with caustic alkali or other condensing agent, e. g., $CaCl_2$, anhyd. $CuSO_4$, $ZnCl_2$, $Ba(OH)_2$, to improve its drying properties; if saponifiable matter is

present, a nonbasic condensing agent is used. The products may be mixed with drying oils to form a paint.

Pigments. Mrs. Else Albert (trading as Vereinigte Werke Dr. Rudolf Alberti & Co.). Brit. 507,472, June 12, 1939. In the production of white paints contg. aq. binders, H_2O-insol. mineral substances, e. g., heavy spar, limestone, chalk, marble, fluorspar, celestine, witherite, are ground to a fineness of about 60% below 2 μ and the ground product is mixed as a pigment (as opposed to a filler) with the binder and H_2O.

Pigments. I. G. Farbenind. A.-G. (Ekbert Lederle and Max Günther, inventors). Ger. 679,959, Aug. 17, 1939 (Cl. 22*f*. 3). A light-fast chrome-yellow pigment is prepd. by pptg. a Pb soln. with a chromate soln. and heating the suspension to cause the mixed crystals of $PbCrO_4$ and $PbSO_4$ to change from the rhombic to the monoclinic form. The solns. are caused to react at below 60°. Thus, an aq. soln. of $Pb(NO_3)_2$ is treated with an aq. soln. of $K_2Cr_2O_8$, K_2CrO_4 and K_2SO_4 at 15°. The resulting suspension is heated to about 60°. On sepg. and drying the ppt. a greenish chrome-yellow pigment is obtained.

Grading pigments. Bird Machine Co. Brit. 507,700, June 20, 1939. Pigments or extenders, e. g., lithopone, ZnS, TiO_2, $CaSO_4$, $BaSO_4$, that are prepd. by processes involving pptn., calcination and ball-milling in the presence of H_2O are further treated by centrifuging the pigment suspension from the ball mill under substantially const. solid-depositing conditions and under substantially const. effective centrifugal force to remove coarse particles, which may be returned to the ball mill, and obtain a suspension of the fine particles from which a pigment whose particles may be less than 2 μ in size is recovered. Centrifuging may be effected in a continuous-flow centrifuge of the type shown in Brit. 484,992 (*C. A.* **32**, 7785[8]) and recovery of the fine pigment effected either by the continuous electrophoretic centrifuging treatment described in Brit. 456,353 (*C. A.* **31**, 2051[6]) or by treatment with a flocculating agent, e. g., $MgSO_4$, followed by centrifuging or filtration on a rotary filter or in a filter press.

Iron oxide pigments. Willy Glaser. Brit. 507,316, June 13, 1939. Fe oxide is prepd. by the thermal decompn. of $FeSO_4$ in the presence of H_2O-insol. cellulosic substances, e. g., sawdust, waste paper, straw, waste textile materials. Thus, 1000 l. of cold satd. $FeSO_4$ soln. is heated at 70° in an agitator tank and $FeSO_4$ 4000 and sawdust 3000 kg. are added. After complete soln. of the $FeSO_4$, the mass is cooled while being stirred and the sawdust impregnated with fine crystals is centrifuged and decompd. in known manner by being heated to redness in an excess of air; the product is dried and ground. In a modification, 400 kg. of $ZnSO_4$ is added to produce a yellowish red Fe oxide, the $ZnSO_4$ being recovered by being washed from the product of the thermal decompn.

Lead chromate pigments. Omar F. Tarr and Winslow H. Hartford (to Mutual Chemical Co. of America). U. S. 2,173,457, Sept. 19. A process of producing Pb chromate pigments comprises gradually adding, to a rapidly agitated suspension in water of a Pb oxide, carbonate or hydroxide, a mixt. of an acid and a chromate or dichromate, in an amount and in proportions sufficient to convert the Pb compd. into the desired pigment, the mixt. being added at a rate not exceeding the rate of soln. of the Pb compd. so as to maintain an alk. reaction in the suspension throughout the process, the amt. of water in the suspension being sufficient to permit substantially complete reaction of the difficultly sol. basic Pb compd.

Titanium oxide pigment. Henry A. Gardner. U. S. 2,172,505, Sept. 12. About 0.15–1.0% of phthalic anhydride is used with a Ti oxide pigment.

Titanium pigments. Titan Co., Inc. Brit. 507,506, June 16, 1939. Addn. to 499,153 (*C. A.* **33**, 5209[6]). In the production of stable white TiO_2 pigments, with modified color tone, by a process including the step of calcining a Ti pigment contg. a trace of W and (or) Mo, the Ti pigment contg. the W and (or) Mo is exposed to reducing conditions at 700–1000° for a short time only while the pigment is being calcined, while cooling subsequent to calcination or during a special reheating of the calcined pigment. Reducing conditions may be obtained by providing an atm. of H, CO or water gas, or by adding a small amt. of carbonaceous material that liberates reducing gases on ignition. The process is applicable also to the production of composite Ti pigments, e. g., TiO_2-$BaSO_4$ and TiO_2-$CaSO_4$ pigments.

Improving the color of off-color cadmium red pigments. James J. O'Brien (to Glidden Co.). U. S. 2,173,128, Sept. 19. The particles of an off-color Cd sulfide selenide pigment are coated with pptd. Cd sulfide selenide and the mixt. is calcined.

Sulfide pigments. James E. Booge (to E. I. du Pont deNemours & Co.). U. S. 2,173,895, Sept. 26. A process for producing an insol. sulfide pigment compn. involves treating in aq. soln. an alk. earth metal thiosulfate such as that of Ca with a sol. salt of Zn, Cd or Sb, heating a soln. of the resultantly formed thiosulfate compd. and effecting its decompn. in the substantial absence of SO_2 evolution and in the presence of an alk. agent such as lime adapted to neutralize the acidity which develops during the decompn., and recovering the pptd. pigment.

Pigmented resin base for paints, etc. Max R. Vogel (to Binney and Smith Co.). U. S. 2,173,430, Sept. 19. A ground intermixt. is formed of a pigment such as carbon black with a solid, plastic, water-insol. resin such as an alkyd resin, and a stable, sol., org. amine contg. a plurality of unsubstituted —NH_2 groups, such as triethylenetetramine, which serves as a dispersing agent for the pigment.

Cellulose ether pigmented base suitable for use in lacquers, etc. Robert L. Zapp (to Binney and Smith Co.). U. S. 2,173,444, Sept. 19. A product suitable for various uses comprises a ground intermixt. of C black with a plasticized cellulose ether such as cellulose ethyl or benzyl ether, plasticized as with dibutyl phthalate and Ni soap dispersing agent such as Ni oleate sol. in the cellulose ether mass. U. S. 2,173,445 relates to similar compns. contg. a soap of Ca, Ba or Sr, such as Ca palmitate or Sr oleate.

Ink for transparent projection strips. Millard Demarest and Kirtland Flynn (to Celluloid Corp.). U. S. 2,172,465, Sept. 12. An ink adapted for use in printing on transparent strips such as those of cellulose acetate consists of a coloring material such as Methyl Violet dispersed in a liquid consisting of a nonhygroscopic solvent plasticizer for cellulose derivs. and which may be triacetin, an ethyl toluenesulfonamide, dimethyl phthalate, dibutyl tartrate or monomethyl xylenesulfonamide.

Polymerized fat acids. N. V. Industrieele Maatschappij Voorheen Noury & van der Lande. Ger. 679,875, Aug. 15, 1939 (Cl. 12*o*. 26.02). Drying or semidrying oils are polymerized and the fats sepd. from the product, or the fat acids are sepd. from the oils and then polymerized. The mixt. of polymerized and nonpolymerized fat acids are subjected to distn. *in vacuo*, with or without the aid of steam, to remove the nonpolymerized acids. The polymerized acids remaining may be converted to their glycerides by esterification. In examples, linseed and soybean-oil fat acids are polymerized.

Drying oils. I. G. Farbenindustrie A.-G. Brit. 507,786, June 21, 1939. The drying properties of oiticica oil are improved by treating it with the theoretical amt., or less, of semicarbazide (I), or a deriv. thereof, to react with the keto group in the oil. The raw oil or heated oil (stand oil) or mixts. thereof with other drying oils may be treated and thio-I, aminoguanidine or I-HCl and a basic substance may be used instead of I.

Naphthenate driers. Arthur Minich. Brit. 507,361, June 14, 1939. Basic salts of naphthenic acid with drying metals, e. g., Co, Mn, Pb, are prepd. by causing a soln. of an alkali metal naphthenate contg. free alkali to react with a H_2O-sol. salt of the metal contg. sufficient metal to combine with the naphthenic acid and react with the free alkali present. After being washed and dried, the pptd. basic salt is obtained as a powder insol. in oil or H_2O and, by reason of its high metal content, it forms an efficacious drier, particularly for printing inks.

Varnish coatings on wood. Wilhelm O. Maisch (to

Firma Hermann Frenkel). U. S. 2,174,132, Sept. 26. A process for producing water- and weather-resistant coatings on wood involves coating the wood with a varnish consisting of a soln. in an org. solvent of a mixt. of a hardenable phenol-formaldehyde resin obtained by alkali condensing one mol. of phenol with at least 1.5 mols. of CH_2O together with an artificial resin from the urea-aldehyde resin group amounting to 5–100% calcd. on the phenol-formaldehyde resin and with an acid hardening agent, and hardening the resin mixt. in the air at normal temp.

Coating compositions. Howard W. Smith and Sydney G. Campbell. Brit. 507,335, June 14, 1939. A coating compn. or paint vehicle includes, as essential ingredients the unsaponifiable matter of wool grease, which has been subjected to the action of caustic alkali or other condensing agent at a high temp., and a Mg soap, e. g., that produced from wool grease fatty acids, Mg resinate.

Coating compositions. Hardman and Holden Ltd., Howard W. Smith, Sydney G. Campbell and Henry S. Land. Brit. 507,336, June 14, 1939. Wool grease is heated with oxide or hydroxide of Ca, Sr, Ba or Mg, without added H_2O, whereby the neutral esters contained are sapond. The product has drying properties and may be used for coating or impregnating compns.

Composition for coating or impregnating porous materials. Ivor M. Colbeth (to Baker Castor Oil Co.). U. S. 2,172,955, Sept. 12. A substantially solidified castor oil which may be prepd. by oxidation or sulfurization and which is insol. in ether, alc., acetone, C_6H_6, CS_2, water and turpentine is used with sufficient alkali ricinoleate to form an emulsion when dild. with water.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The present status of the Italian fat and fat-product industries. St. Fachini. *Fette u. Seifen* **46**, 518–19(in Italian)(in German, 519–20)(1939).—Recent developments are (1) increased domestic production of fats with import requirements reduced by a third and (2) modernization and expansion of Italy's fat-processing industry. J. W. Perry

The oxidation of fats. E. Glimm. *Fette u. Seifen* **46**, 348–50(1939).—This lecture reviews modern theories concerning reactions involved in the rancidification of fats, their catabolism in the animal body and film formation by oxidation of drying oils. Forty references. J. W. Perry

The bleaching of fats and the recovery of oils from bleaching earths in relation to the problem of obtaining the highest possible yields of edible fats when refining raw oils F. Wittka. *Fette u. Seifen* **46**, 344–5(1939).—When bleaching earths are used to refine fatty oils, it is poor practice to attempt to recover the last drop of oil from the bleaching earth press cake by prolonged blowing with air, as the oil so recovered is partially oxidized and very susceptible to rancidification. To avoid such impairment of quality, the press should be blown with low-pressure air for a short time only and the oil then remaining in the bleaching earth press cake recovered by extn. and recycled through the refining process. J. W. Perry

A note on the estimation of fat in cacao. E. C. Humphries. *Ann. Rept. Cacao Research* **8**, 39–40(1938)(Pub. 1939).—Three 5-g. portions of a very carefully ground sample of cacao were extd. with petr. ether (b. 50–60°) for 20 hrs. in the usual manner. The values for fat thus obtained were 52.74, 52.14 and 53.35%. The residues from the petr. ether extn. were each mixed with 2.5 g. freshly calcined MgO and then further extd. with $CHCl_3$ for 20 hrs. Addnl. quantities of fat, detd. by subtracting the wt. of total alkaloids extd. by the $CHCl_3$, amounting to 2.08, 2.73 and 1.60%, resp., were obtained and the values for total fat were brought into much better agreement. Extn. with petr. ether alone for 40 hrs. gave values that were approx. 1% higher than those obtained by extn. for 20 hrs. with this solvent. The fat fraction extd. by $CHCl_3$ appeared to be different from ordinary cacao fat and tended to darken on keeping. K. D. Jacob

Changes in fat and theobromine content of the kernel of the cacao bean during fermentation and drying. E. C. Humphries. *Ann. Rept. Cacao Research* **8**, 34–6(1938)(Pub., 1939).—The fat content of the fermented beans increased until about the 5th day, with a total increase of approx. 4% on the oven-dry basis. Sun-drying after fermentation caused a slight decrease in fat. The fat content of beans that were sun-dried only did not alter appreciably. The theobromine content decreased during fermentation and tended to reach a const. value in 12 days. When the beans were sun-dried after fermentation, the theobromine content increased slightly. The theobromine content increased in beans that were subjected only to sun-drying. K. D. Jacob

International standardized fat analysis methods. H. P. Kaufmann. *Fette u. Seifen* **46**, 499–517(1939).—A detailed description is given in both the Ger. and French languages of the methods standardized to date, namely, (1) for oils and fats, d., *n*, water and volatile components, impurities, acidity, ash content, insol. fat acids, sapon no., unsaponifiable content, oxidized acids, I no., poly bromide no., OH no. and (2) for soaps, taking of sample, moisture content, alc.-insol. components, total fat acid content, total alky. and total free alky. J. W. Perry

Determination of fats in shoe wax. M. M. Katsin *Kozhevenno-Obuvnaya Prom.* **18**, No. 6, 26–7(1939).—Heat a 5-g. sample of the shoe wax with 50 ml. distd. water in a porcelain cup, add 15 ml. HCl (1.19) and boil for 1 hr. Filter while hot (with decantation), wash the residue with hot water until the filtrate is colorless, dry to const. wt., and ext. in a Soxhlet app. with petr. ether. The results were 2–3% above the actual values but these were within exptl. errors. B. Z. Kanich

The determination of fats in fatty products used in baking. H. Schmalfuss. *Fette u. Seifen* **46**, 331–3(1939).—A compn. consisting of rape oil 8, tallow 39, Palsgaard oil (I) (an emulsifying oxidized, polymerized oil product) 3, skim milk 10 and an 80% glucose soln. 40% was analyzed for fat in the usual way by rubbing up with anhyd. Na_2SO_4 and extn. with ether. Only 48% fat was found. Systematic search for the cause of this low result showed (1) that extn. with benzene or $CHCl_3$ gave more nearly the correct result than extn. with ether owing to poor soly. of I in ether and (2) that the low result was caused by the sugar soln. preventing complete extn. of I by any of the solvents used. J. W. Perry

Determining the unsaponifiable in fats and oils. W. Holwech. *Fette u. Seifen* **46**, 551–4(1939).—Exptl. data show that increasing the concn. of soap in the aq. phase increases the ratio, concn. of unsaponifiables in the soap soln. to concn. of unsaponifiables in the ether used for extn. Hence, complete extn. of the unsaponifiables from a more concd. soap soln. requires greater no. of extns. or larger amts. of ether per extn. or both. Limitations as to accuracy in weighing small amts. of unsaponifiables with an ordinary balance, the inconvenience of handling large vols. of aq. soap solns. and the desire to reduce ether consumption to a min. are factors also considered. For ordinary work, the method (cf. *C. A.* **32**, 9536[1]) of using 3 extns. with 180 cc. of ether in all and double sapon. is recommended. With such a method, 1.54–1.59% unsaponifiables were found in a whale-oil sample contg. 1.63%. For greater accuracy, use of a continuous extn. app. is recommended. The soap concn. of the aq. phase should be kept below 8 g. per 100 cc. as otherwise excessively long extn. periods are necessary. J. W. Perry

The ability of monel to withstand corrosion in the oil and fat industry. R. Müller. *Fette u. Seifen* **46**, 346–8(1939).

—Tabulated data show the excellent resistance of monel to corrosion by fat acids, caustic, H_2SO_4 and fats. Since monel also has very high mech. strength and good weldability, it is very desirable as a material for construction in the oil and fat industry. J. W. Perry

New machines and apparatus for the oil, fat and cosmetic industry. A direct-action emulsifying machine. W. Meyer. *Fette u. Seifen* **46**, 359–60(1939).—The "Zenith" emulsifier turns out fine-grain emulsions directly from the component liquids without requiring preliminary prepn. of a coarse emulsion. J. W. Perry

The continuous extraction of seeds and suitable apparatus. K. Hildebrandt. *Fette u. Seifen* **46**, 350–2(1939).—This lecture discusses problems involved in (1) extg. from crushed oil seeds as much oil as is economically feasible, (2) recovering solvents in oil-extn. plants and (3) freeing the extd. seed pulps of residual solvent. J. W. Perry

The analysis of olive oil. G. B. Martinenghi. *Fette u. Seifen* **46**, 333–7(1939).—Various testing methods applicable to olive oil are reviewed with special attention to methods helpful in (1) detecting adulterations, (2) distinguishing between the different grades officially established in Italy (cf. *Gazzetta Ufficiale del Regno d'Italia*, Decree No. 1986, Sept. 27, 1936), and (3) estg. the proportions of such grades present in mixts. The significance to be attached to the various analytical results when a final conclusion is drawn is discussed. J. W. Perry

Detection of semidrying oils in olive oil. Vizern and Guyot. *Ann. fals.* **32**, 252–4(1939).—Free petr. ether b. below 70° of unsatd. hydrocarbons by shaking with concd. H_2SO_4 and distg.; to 100 cc. of the purified petr. ether cooled to 0° add about 4 cc. of Br, drop by drop, while stirring. Pour 1 cc. of the oil sample in a dry test tube (1 m. in diam.), dissolve in 10 cc. of petr. ether, allow to stand in an ice bath for about 15 min., add in small successive portions (with shaking) sufficient Br reagent (generally about 10 cc.) to ensure excess of Br (as shown by the brown color of the liquid); presence of a turbidity (due to pptn. of tetrabromides of linoleins) after standing for 1 hr. in an ice bath indicates the presence of at least 5% of soybean oil, 5% sunflower-seed oil or 10% corn oil.
A. Papineau-Couture

Some studies in the drying of safflower-oil films. L. L. Carrick and A. T. Murfin. *Am. Paint J.* **24**, 53–4, 56–8 (Oct. 23, 1939).—Films of uniform thickness were placed on plates and at predetd. intervals detns. were run as follows: net increase in wt., I no., thiocyanate no., peroxide no., Ac no., diene no., acid no., sapon. no., percentage of acetone insol., and ultimate analysis. Results are shown in curves. *Ibid.* 54–6, 58, 60(Nov. 6, 1939).—The increase in acid no. of oil films shows that free acids are being formed, probably by a cleavage of the peroxides or of the hydroxy compds. formed by rearrangement of the peroxides. The increase in sapon. no. seems to show that esterification of some type is taking place in the films as they dry. Explanation is offered of the mechanism of gelation. Curves show the relation between the age of raw safflower-oil films and the acid no., the sapon. no., the percentage of acetone insol., and the percentage of O obtained by difference from the combustion analysis.
W. H. Boynton

Sterols of alfalfa-seed oil. I. L. Carroll King and Charles D. Ball, Jr. *J. Am. Chem. Soc.* **61**, 2910–12 (1939).—Alfalfa seed (*Medicago sativa* L.), extd. with Et_2O, gives 11.8% of a greenish oil with n_D^{15} 1.4820. Hydrolysis of 100 g. of this oil with EtOH-KOH (refluxing 1 hr.) gives 4 g. of unsaponifiable material. Fractionation by crystn. from petr. ether gives a fraction (I) m. 164.4–4.8°; one (II) m. 160–1° and a 3rd (III) m. 155–6°; there remained 65% of the material as a reddish oil. Fraction I is either α-spinasterol (IV) or very closely related to it. The following desivs. of IV were prepd.: *acetate*, m. 180–1°; *benzoate*, m. 196–7°; *p-nitrobenzoate*, m. 211–13°; *phenylurethan*, m. 173–4°; *butyrate*, m. 123–5°. These check closely with values reported in the literature. Br in Et_2O or CS_2 transforms IV or its acetate into a sol. oil. II and III are probably mainly IV but the m. ps. of derivs. were lower than those of IV. C. J. West

Composition of the seeds of Sapindus drummondii. O. C. Dermer and L. T. Crews. *J. Am. Chem. Soc.* **61**, 2697–8(1939).—The seeds of *Sapindus drummondii* H. and A. (western soapberry or wild chinaberry) contain 23–4%, the seed kernels 42.7% of Et_2O-sol. materials. The oil was extd. with Et_2O or petr. ether or was pressed hydraulically. The oil was greenish brown to yellow-brown in color; it did not become rancid readily. The following values give the limits with different means of extn.: d_{25}^{25} 0.903–0.917, n_D^{25} 1.4704–1.4722, acid value 0.3–0.9, sapon. value 213–19, I no. (Hanus) 81.5–3.5, SCN no. 63.9–7.2, unsaponifiable matter 1.2%, Reichert-Meissl no. 0, Polenske no. 0, Ac value 14.5, unsatd. acids 74–7% (from I no.), 82% (by sepn. and correction for impurities), satd. acids 17–20% (from I no.) and 13% (by sepn. and correction for impurities). The air-dried exhausted meal contains 21.3% protein, 18% crude fiber, 3.7% ash and 8.4% moisture. The fatty acids present consist chiefly of oleic acid, accompanied by smaller amts. of linoleic, palmitic and stearic acids. C. J. West

Oil of Setaria italica Beauv. Hannemon Ito. *J. Agr. Chem. Soc. Japan* **15**, 879–84, *Bull. Agr. Chem. Soc. Japan* **15**, 134–5(1939). Analysis of German millet gave H_2O 12.83, ash 1.96, crude fat 3.55, crude protein 9.59 and starch 76.19%. One kg. of the oil was obtained from 33 kg. of powd. grains. The properties of the oils of glutinous and common German millet were, resp., d_{15} 0.9195, 0.9193; n_{30} 1.4710, 1.4710; acid value 51.95, 41.94; sapon. value 164.03, 159.60; I value 131.82, 105.07; Hehner value 93.30, 94.45; Reichert-Meissl value 0.43, 0.48; Polenske value 1.3, 1.4; Ac value 33.14, 31.37; unsaponifiable matter 2.13%, 2.39%; solid fat acids 17.40%, 15.05%; liquid fat acids 72.45%, 70.03%. Palmitic, carnaubic, oleic, linoleic and isolinoleic acid were isolated from the oil. Phytosterol and squalene were also found. Y. Kihara

Oil of Phaseolus vulgaris L. Hannemon Ito. *J. Agr. Chem. Soc. Japan* **15**, 885–90, *Bull. Agr. Chem. Soc. Japan* **15**, 135–6(in English)(1939).—When 16 kg. of *Phaseolus vulgaris* L. was extd. with hot ether, 195 g. of oil was obtained. The properties of the oil were: $d_{15.6}$ 0.9603, n_{30} 1.4808, acid value 20.5, sapon. value 132.6, I value 149.8, Reichert-Meissl value 1.03, Polenske value 2.00, unsaponifiable matter 7.0%, solid fat acids 19.0% and liquid fat acids 63.3%. A large amt. of palmitic acid and a small amt. of carnaubic acid were isolated from the solid fraction, while oleic, linoleic and linolenic acids were sepd. from the liquid fraction. The unsaponifiable matters were sepd. by their soly. in alc. into the easily sol. part m. 137–8°, $[\alpha]_D^{15}$ −33.6°, and the difficultly sol. part m. 151–3°, $[\alpha]_D^{15}$ −45.0°. Y. Kihara

Factors controlling the rate of oxidation of fish oils. J. Jánv. *Fette u. Seifen* **46**, 340–3(1939).—Films of sardine oil, herring oil, cod oil, whale oil and shark oil on raw sheepskin showed 6 to 15 times as much O_2 absorption as similar oil films on chrome leather or cotton batting. Similar relationships held also for herring oil contg. 0.1% 1.0% of Co linoleate drier (I). Evidently, the raw hide has an accelerating influence on oil oxidation reactions occurring during oil tanning. The effects of adding increasing amts. of I to herring oil on its oxidation rate during the first 6 hrs. were (1) a very great increase in the initial oxidation rate and (2) with amts. of I greater than 0.5%, a leveling off to a low rate of oxidation after attaining a degree of oxidation which was lower as the amt. of I was further increased. The rate of O_2 absorption of fish oil was reduced by sulfonating them or by addns. of free fish-oil fat acids or of mineral oil. J. W. Perry

Process for producing fish oil, tallow, meat scrap or fish meal. E. Langer. *Fette u. Seifen* **46**, 161–2(1939).—Extn. with di- or trichloroethylene is recommended as an excellent process for working up fish or other fatty animal material into oils and fats and valuable protein products.
J. W. Perry

The analysis of whale oil. E. Glimm and K. Giese. *Fette u. Seifen* **46**, 387–40(1939).—Whale oil (having the consts. d_4^{20} 0.92614, n 1.46178, sapon. no. 197.3, acid no. 5.1, I no. 111.9 (Kaufmann), 111.6 (Hanus), thiocyano-

gen no. 74.93, unsaponifiable 1.58%) was sapond. with exclusion of air, the satd. and unsatd. acids were sepd. by the Twitchell Pb soap methods, the free acids converted to their Me esters and then fractionally distd. The satd. acid esters were sepd. by repeated fractional distn. into fractions from which pure myristic, palmitic and stearic acids were obtained on sapong. The lower-boiling fractions of the Me esters of the unsatd. acids contained considerable amts. of esters of the satd. acids which were removed by the Twitchell method and the unsatd. acids then sepd. into mono-unsatd. and poly-unsatd. fractions by repeated partial pptn. of their Li soaps with acetone or alc. Mono-unsatd. acids contg. 14, 16, 18 and 20 C atoms per mol. were detected, the bulk of these acids being oleic and zoömaric acids. The only poly-unsatd. acids detected contained 20 or 22 C atoms per mol. Polybromides corresponding to the acids $C_{20}H_{32}O_2$ and $C_{22}H_{34}O_2$ were isolated. Owing to losses during distns., etc., no attempt was made to draw conclusions of a quant. nature. J. W. Perry

Some factors that affect the accuracy of the determination of the thiocyanogen value (of an oil). H. N. Sher and R. H. Coysh. *Analyst* **64**, 814–16(1939).—The main purpose of the expts. described was to det. to what extent variations in the length of time allowed for the interaction of oil and thiocyanogen affect the magnitude of the value obtained. The reagent used was prepd. by taking 12.5 g. of thoroughly dry $Pb(SCN)_2$ in a brown reagent bottle, adding 500 ml. of anhyd. AcOH and allowing the mixt. to stand for as long as possible before use. When needed, 1.5 ml. of pure Br_2 was added, the mixt. was shaken for an hr. and it was then filtered. Thus prepd., the reagent was clear and colorless. Quantities of oil from 0.1 to 0.14 g. were weighed into 250-ml. stoppered flasks and 20 or 25 ml. of the reagent was added at 20°. After standing in the dark for the specified time, the reaction mixt. was poured into 10 ml. of 10% KI soln. and titrated with 0.05 0.055 *N* $Na_2S_2O_3$. The reaction time was varied from 1 to 30 hrs. The results show that for olive oil, in which oleic acid constitutes about 80%, a max. thiocyanogen value was obtained in about 5 hrs. Almond oil and teaseed oil were preferably allowed a 15-hr. period and this time should be allowed for vegetable oils which have a high content of linolic acid relative to the content of oleic and other monoethylenic acid. For the more unsatd. oils, less satisfactory results were obtained but periods of 20–24 hrs. seem advisable. The reagent should not be more than 5 days old and a reaction period of more than 28 hrs. is inadvisable in all cases. W. T. H.

The evolution of the candlestick maker's trade into the wax industry. G. Buchner. *Fette u. Seifen* **46**, 160–1 (1939).—Historical. J. W. Perry

Extraction of soap solutions with ether. H. W. Weedon. *Fette u. Seifen* **46**, 400–1(1939).—See *C. A.* **33**, 7606[2]. J. W. Perry

The saponification reaction in the manufacture of soaps. L. Lascaray. *Fette u. Seifen* **46**, 533–6(1939).—German text of *C. A.* **33**, 9696[3]. J. W. Perry

Soap goes through the mill. V. A comparison of wetting agents and detergents. A. E. Hulme. *Textile Recorder* **57**, 46(Oct., 1939); cf. *C. A.* **33**, 8433[8]. A résumé of the methods of comparing these wetting agents and detergents. Proprietary products for various uses are listed. W. H. Boynton

Raw-wool treatment [soaps] (Williams) **25**. Washing, cleaning and polishing materials (Smither) **25**. Vegetable oils as Diesel motor fuels (Ilieff) **21**. Vitamin F [nature of certain unsatd. higher acids] (Grandel) **11E**.

Treating oils and fats to retard oxidation and the development of rancidity. Eastman Kodak Co. Brit. 507,471, June 12, 1939. Oxidation, etc., in animal and vegetable fats and oils are retarded by adding a quantity of a fraction, possessing antioxidant properties, taken from the 1st 20% of the distillate obtained by high-vacuum short-path distn. of vegetable oils or raw materials, e. g., seeds, nuts, from which said oils are derived, without hydrogenation. The process is particularly applicable to the treatment of lard, olive oil and of refined natural fats. The antioxidant may be derived from corn, soybean, cottonseed, wheat germ or apricot kernel oils. The antioxidant may, before use, be concd. and purified by redistn. under vacuum and may be purified by means of absorption agents or nondestructive chem. treatment.

Solvent extraction of seeds, etc. Hansa-Mühle A.-G. Brit. 507,465, June 15, 1939. In an extn. process wherein sieve-bottom containers holding the raw material mounted on an endless conveyor are treated with solvent, solvent is supplied to each container equals or exceeds the amt. passing out through the bottom so that the container is filled with solvent during a substantial part of the cycle. The outflow of solvent through the container is controlled by adjustable openings therein.

Extracting fish-liver oils. Gorton-Pew Fisheries Co. Ltd. Brit. 507,742, June 20, 1939. The preferably comminuted livers are treated with an alk. buffer soln. to give a mixt. of pH 8.5–12.5, whereupon the liberated oil is sepd. from the aq. part. Na_3PO_4, K_3PO_4, borax, $Na_2B_4O_7$ or NH_4OH is specified as buffer substance, dil. alkali metal hydroxide solns. and alkali salts that hydrolyze to form insol. ppts., e. g., Na silicate, being excluded. Free alkali may be present with the alkali salts. App. is described.

Adsorbent material for treating oils and sludges. Henry R. Kraybill, Pearl H. Brewer and Max H. Thornton (to Purdue Research Foundation). U. S. 2,174,177, Sept. 26. A process of prepg. an adsorbent suitable for removing phosphatides, mucilages, sterols, pigments and assocd. substances from vegetable oils and vegetable-oil sludges, refining vegetable oils and reconditioning used mineral oils involves mixing a water soln. of Na silicate with a water soln. of an acid-reacting Al salt, to form a gelatinous ppt., and using solns. of such concn. and keeping the amt. of water present prior to the formation of the gelatinous ppt. sufficiently small that almost but not quite all of it is taken up in the ppt., mixing the ppt. before the mass has time to form a gel with addnl. water in sufficient quantity to prevent the whole from forming a gel on standing, then letting the whole stand, filtering to remove excess water, and drying.

28—SUGAR, STARCH AND GUMS

J. K. DALE

The automatic regulation of temperatures and pressures in the sugar factory. A. Douaze. *Bull. assoc. chim.* **56**, 614–18(1939).—A system for such control is described and illustrated. F. W. Zerban

Residual waters of the sugar industry. Henri Devos. *Sucr. belge* **58**, 169–75, 190–2(1939).—When the solns. from the sugar-beet pulp presses are allowed to pass through a 400-mesh rotary screen and treated with a soln. of lime (0.05 g./l.), losses due to fermentation before and during diffusion are decreased. W. W. Binkley

The possible effect of reducing sugars on the polarization of sugar-beet juices. J. Zamarón. *Bull. assoc. chim.* **56**, 607–13(1939).—Analyses of beets and cossettes have shown that the ratio between direct polarization and actual sucrose is quite variable. For better control the sucrose and the reducing sugars should be detd. The Pb subacetate used for the clarification of beet juices causes errors in the direct polarization, especially with frozen and other beets contg. considerable quantities of reducing sugars. F. W. Zerban

The practicability and advantages derived from accelerating the diffusion. G. Oplatka. *Sucr. belge* **58**, 387–96 (1939); cf. *C. A.* **33**, 5219[1].—Accelerated circulation permitted approx. 50% more juice to pass through the

diffusers and decreased the consumption of carbon and lime. W. W. Binkley

Is high or low temperature necessary during diffusion? The action of heat on fresh sugar-beet pulp. F. Staudinger. *Sucr. belge* **58**, 426–33(1939); cf. *C. A.* **21**, 337.—Rapid heating of sugar-beet pulp in water to 92–5° rendered the pulp more favorable for osmotic diffusion, destroyed undesirable enzymes and microörganisms, aided circulation of the juices, and accelerated diffusion. W. W. Binkley

Heat of solution of sucrose. Philip Lyle. *Intern. Sugar J.* **41**, 390–3(1939).—Certain discrepancies in the heat balance of the refinery were traced to the effects of the heats of soln. and crystn. of sucrose. The existing information on the subject has been reviewed and correlated and the following equation for the calcn. of the heat of soln. at any concn. and temp. has been developed: $Qs, t = \frac{50\,(1 + 2s)}{9\,(9 + s)} - \frac{19\,(258 + t)}{4\,(1000)}$ Qs, t is the heat of soln. of 1 g. of sucrose in sufficient water to give a soln. of concn. s at a temp. $t°$. D. P. Langlois

Fractionation of the chloroform extract of maple sirup. Louis Sair and J. F. Snell. *Can. J. Research* **17**, B, 281–9(1939).—A method of fractionating the $CHCl_3$-sol constituents of maple sirup has been devised. Marked differences were observed among Quebec sirups of different years. Fat constituted half the wt. of the ext. of the 1935 sirup but was completely absent in the 1936, and present in very small quantity in the 1937, product. Crystals of carbonyl compds. having vanillin odor were isolated from bisulfite fractions of the 1935 and 1936 exts., but the crystals from the 2 years' sirups differed from each other in m. p. and chem. behavior. Vanillin was not found. An odorless fraction constituting 35% in 1935 and 65% in 1936 had a compn. and a behavior similar to those of lignin. The substance chiefly responsible for maple odor is indicated to be an enolic viscous oil, volatile at 0.03 mm., and present in the 1936 and 1937 sirups in the proportions of 0.6 g. per 100 gal. of sirup or about 1 p. p. m. J. W. Shipley

Report of the Imperial Agricultural Chemist [on anthocyanin pigments in the rind of sugar canes] (Nath) **15**. Waxy substances of sugar cane (Mitui) **10**. Industrial and agricultural utilization of defecation slime (Spengler) **15**.

Apparatus for making starch suspensions. The Distillers Co. Ltd. and Philip D. Coppock. Brit. 506,501, May 31, 1939. Suspensions of amylaceous materials in H_2O are made by passing a stream of cold H_2O through an injector and inducing the material, in the form of a gelatinized paste, from a receptacle. Valves for controlling the rates of supply are provided and the discharge pipe is furnished with a grid.

29—LEATHER AND GLUE

HENRY B. MERRILL

Rapid method of determining moisture in oak wood extract. M. E. Artamonov. *Kozhevenno-Obuvnaya Prom.* **18**, No. 5, 39–40(1939).—Cut a 5-g. sample of the dry ext. into small pieces, place in a 50-cc. porcelain crucible or beaker, and add 10 cc. of boiling water. Cool to 22°, place in a wooden thermostat, add 5 cc. strong H_2SO_4 (1.8), stir with a glass, and record the temp. rise. The temp. at which the Hg begins to drop is taken as the end of the detn. which lasts 30–40 min. The moisture is equal to $t°K$ where $t°$ is the temp. and K is 0.2045 for oak ext. B. Z. Kamich

Heat resistance of red oak leather at temperatures over 100°. N. I. Egorkin. *Kozhevenno-Obuvnaya Prom.* **18**, No. 3, 21–2(1939).—Effect of temp. on red oak leather was investigated with a lab. press, the specimens being heated to 130° in about 12 min. while some were kept at 50° for periods of 30 min. to 6 hrs. and then heated at 130° after which they were cooled, kept in a desiccator, and subjected to mech. tests. The leather that previously was dried showed no decrease in strength after the press treatment and sometimes even an increase was observed whereas those that were not predried showed a decreased strength. B. Z. Kamich

Leathers for service boots. D. Jordan Lloyd. *Leather World* **31**, 1026–7(1939).—Requirements for different branches of military service are discussed. J. H. H.

Decontamination of leather. D. Jordan Lloyd. *Leather World* **31**, 939–41(1939).—Leather contaminated with mustard gas (blister gas) is reclaimed by soaking 6 hrs. in H_2O at 48, and refinishing. F. O'Flaherty

Rapid method of determining chromium in leather, fur and sheepskin. E. M. Gurevich. *Kozhevenno-Obuvnaya Prom.* **18**, No. 4, 56(1939).—To det. Cr_2O_3 dissolve a 0.20–0.35-g. sample in 5 cc. concd. H_2SO_4 (1.84) and 2 cc. 30% H_2O_2 soln., oxidize with 3% $KMnO_4$, add 0.1 N hyposulfite until the soln. is orange-pink. Filter the soln., destroy the excess $KMnO_4$ with 1–2 drops of hyposulfite and analyze the filtrate iodometrically. B. Z. Kamich

Surface tension and foam formation in glue solutions. E. Sauer and W. Aldinger. *Kolloid-Z.* **88**, 329–40(1939).—The degree of foaming of a series of com. glues (4 from hides and 6 from bone) was detd. by a simple agitation method. The fat content, acid or alkali content, viscosity and pH values were detd. on these glues. The surface tension of the glue solns. was detd. with the Cassel capillarimeter by the method of max. bubble pressure. Neutral fats and free fatty acids greatly reduce the foaming of glue solns. On the addn. of soaps, the degree of hydrolysis of the latter affects the foam formation, the foaming being inhibited to a greater extent by soaps contg. larger amts. of free acid. There is no direct relationship between the foaming properties and surface tension of glues. The decompn. products of glue do not increase its foaming tendency, and have but little effect on its surface tension. The effect of pH on the surface tension is not uniform. The foaming tendency of glue solns. decreases in the alk. range. S. I. Aronovsky

Constitution of natural tannins (Russell, Clark) **10**. Complex metal amine salts [for tanning processes] (U. S. pat. 2,173,823) **10**. Dyeing, bleaching or other liquid treatments of leather (U. S. pat. 2,174,178) **25**. Condensation products [assistants in the leather industry] (Ger. pat. 676,407) **13**.

Tanning. I. G. Farbenindustrie A.-G. Brit. 508,716, July 5, 1939. See Fr. 832,311 (*C. A.* **33**, 2756[8]).

Purifying tanning extracts such as those produced from chestnut chips. Charles R. Oberfell (to The Mead Corp.). U. S. 2,173,977, Sept. 26. A process of purifying a heated tannin ext. through the addn. of albumin thereto while the formation of lumps of albumin is avoided involves adding the albumin in dil. soln. of low concn. of albumin to the tannin ext. heated to a temp. above the normal coagulating temp. of the albumin, and controlling the addn. of the albumin soln. to secure an intimate and thorough intermixture thereof with the heated ext., with resultant coagulation of the albumin and pptn. of the impurities from the ext.

Coating leather. Morris C. Lamb. Brit. 508,369, June 29, 1939. Leather strips or diaphragms, e. g., for governors or gas meters, are protected against deleterious chem. influences by being coated with a finely ground insol. metal oxide made into a paint-like mixt. with an oil or oleaginous agent, e. g., almond, peach-kernel, castor or olive oil or grease. The oxide may be Cr_2O_3, Al_2O_3,

ZnO, MgO or CaO. In an example, Cr_2O_3 prepd. from pptd. $Cr(OH)_3$ is ground with sulfonated oil in a pebble mill before being mixed with the oil.

Apparatus for solidifying liquid gelatin, glue, etc., in films or sheets. Thomas B. Downey. Brit. 508,752, July 5, 1939.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Practical aspects of variations in latex. Five simplified tests. J. W. Malden. *Rubber Age* (London) **20**, 255, 257(1939).—The quality and uniformity of shipments of latex can usually be controlled by 5 tests: (1) dry rubber content, (2) viscosity, (3) color, (4) NH_3 content and (5) stability. Simple reliable procedures for testing these properties are described. C. C. Davis

The specific gravity of rubber in Hevea latex. O. de Vries. *India-Rubber J.* **98**, 422, 424(1939); cf. *C. A.* **29**, 4621[4].—The d. of 0.904 for acid-coagulated rubber from cream with dild. serum obtained by van Gils (*C. A.* **33**, 9041[4]) is unexpectedly higher than the 0.901 value of Rhodes (*J. Rubber Res. Inst. Malaya* **6**, 150(1935)) for acid-coagulated rubber from cream with normal serum. However, both values are open to criticism in 2 respects: (1) the influence of serum substances pptd. by acid; (2) changes which occur during storage, e. g., pptn. of a sludge; and (3) changes caused by NH_3, which are unexplained but which can be detected by changes in the rate of vulcanization and in the viscosity in C_6H_6. The true d. of rubber particles in normal *Hevea* latex is still unknown. A comparison of the chem. compn. of electrodeposited rubber with that of rubber from latex cream should be of aid in correlating d. and chem. compn. of rubber. C. C. Davis

Use of flocks in the rubber industry. II. Flock as a surface coating. M. A. Foley. *Rubber Age* (N. Y.) **46**, 27–8(1939); cf. *C. A.* **33**, 9714[6].—A description of present practice. C. C. Davis

New technique in [rubber] glove testing. R. W. Chadbourn and W. H. Meade, Jr. *Rubber Age* (N. Y.) **46**, 31–3(1939).—Practical expts. show that the use of a high-voltage d. c. gives a more effective, reliable and economical method than does a high-voltage a. c. in searching for imperfections and potential hazards in general. C. C. Davis

Gutta-percha and balata. I. Purification in the factory. H. J. Stern. *Rubber Age* (London) **20**, 245–9 258(1939).—An illustrated description of processes used at the present time. Much of the detailed information on the app. and technique has not been published heretofore. C. C. Davis

Chlorination of Soviet natural and synthetic rubbers. F. F. Koshelev, V. N. Provorov and A. S. Solov'eva. *Caoutchouc and Rubber* (U. S. S. R.) **1939**, No. 8, 21–4, 88.—Chlorination of Soviet natural and synthetic rubbers is best conducted in dichloroethane. All attempts to chlorinate natural rubbers in the absence of a solvent proved fruitless. Chlorination of natural rubbers was accelerated by I, $SbCl_5$ and $AlCl_3$. Chlorination in the presence of I increased the stability of chlorinated rubbers; $AlCl_3$ and $SbCl_5$ increased the percentage of fixed Cl. Chlorination of synthetic rubber in solns. contg. Fe reduced the stability and soly. of the product; Pb decreased the soly. but not the stability of the product. Both Fe and Pb had no effect on the amt. of Cl which combined. Heating the products for 12 hrs. at 60–80° did not reduce their stability. B. Z. Kamich

Finishing fancy and saddle leather substitutes made from synthetic rubber (Slepyan) **13**. Impregnation of textile fibers with latex (Harold) **25**. Synthesis of piperylene from furfural [use in manuf. of synthetic rubber] (Berkenheim, Dankova) **10**. Chlorinated rubber paints and varnishes (Sarx) **26**. Aging phenomena and the mol. size of chain complexes [rubber] in soln. (Wehr) **2**. Decomposition products of synthetic resins [as rubber softeners] (Brit. pat. 507,339) **13**. Synthetic resin compns. [using synthetic rubber] (Brit. pat. 507,501) **13**. Impregnating compns. [by depolymerizing a hydrogenated rubber hydrocarbon] (Brit. pat. 507,855) **13**. Expansion joints [using rubber compns.] (Brit. pat. 507,731) **20**. Treating fibrous materials with aq. dispersions [of rubber] (U. S. pat. 2,173,241) **25**. Rubberizing textiles (Brit. pat. 507,493) **25**. Adhesives [use of rubber latex] (Brit. pat. 507,327) **13**.

Apparatus for forming filaments of rubber from latex. Wm. M. Spencer (to Filatex Corp.). U. S. 2,172,018, Sept. 5. Various structural, mech. and operative details.

Casting rubber articles from latex. Ernst A. Hauser (to "Semperit" Oesterreichisch-Amerikanische Gummiwerke A.-G.). U. S. 2,171,552, Sept. 5. A process of casting rubber articles involves forming a mixt. of a water dispersion of rubber and dead burned gypsum in amount to produce a pourable mixt., thereafter further agglomerating the rubber dispersion by adding an agglomerating agent in amount such as will not immediately substantially reduce the pourability of the mixt., molding the mixt. and vulcanizing.

Coating materials such as paper, cloth or wood, with latex rubber. Gladstone W. Worrall (to Imperial Chemical Industries Ltd.). U. S. 2,170,013, Aug. 22. A process for prepg. an adherent, flexible and nonabsorbent coating comprises coating a base material with a mixt. consisting of rubber latex and Na silicate soln., allowing the coating to dry, treating the same with an acidic insolubilizing agent, applying one or more addnl. coats of a coating material from the class consisting of rubber latex and sheet rubber, and incorporating a wax into the coating.

Manufacture and use of rubber thread. Kenneth R. Shaw (to Easthampton Rubber Thread Co.). U. S. 2,169,886, Aug. 15. See Brit. 494,081 (*C. A.* **33**, 2762[2]).

Treating rubber for use in varnishes, etc. Ernest H. Farmer, Henry P. Stevens and James W. Rowe (to British Rubber Producers' Research Association). U. S. 2,171,395, Aug. 29. A soln. of BF_3 in HOAc is added to a soln. of rubber in an inert org. solvent such as CCl_4 (the HOAc serving as a dehydrating agent) and the mixt. is subjected to boiling.

Forming products such as gloves, from aqueous rubber dispersions. Stephen B. Neiley (to Dewey and Almy Chemical Co.). U. S. 2,172,400, Sept. 12. A dispersion is used contg. a "potential coagulant" such as a Zn NH_4 chloride and a stabilizing excess of a water-sol. amine and after coating a form with this dispersion the excess of amine is exhausted from the coating or treated to cause the "potential coagulant" to become active and coagulate the coating.

Rubber articles such as tire covers. Bernard J. Habgood and Leslie B. Morgan (to Imperial Chemical Industries Ltd.). U. S. 2,170,947, Aug. 29. A process for the manuf. of composite rubber articles and materials comprising vulcanized natural rubber bonded to a vulcanized synthetic rubber-like material made by polymerizing halogen-substituted 1,3-butadiene comprises taking unvulcanized compounded natural rubber and unvulcanized compounded synthetic rubber-like material made by polymerizing halogen-substituted 1,3-butadiene along with an interposed unvulcanized compounded synthetic rubber-like material comprising a halogen deriv. of natural rubber and polymerized 2-chloro 1,3-butadiene, bringing the materials into good contact and then vulcanizing. Numerous examples with details are given.

CHEMICAL ABSTRACTS

Vol. 34 FEBRUARY 10, 1940 No. 3

I--APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

A reflux regulator and head for laboratory rectifying columns. Frederick D. Rossini and Augustus R. Glasgow, Jr. *J. Research Natl. Bur. Standards* **23**, 509–14 (1939) (Research Paper No. 1249). A still head is described embodying a nonlubricated glass valve manipulated through a flexible partition, min. column above long rectifying column, means of obtaining const. and controllable rate of removal of distillate, means of estn. of throughput and rate of removal of distillate, and a thermometer well. Earl H. Brown

Evaporating apparatus with artificial circulation. A. M. Lastovtsev. *Khim. Mashinostroenie* **1938**, No. 2, 5–14; *Khim. Referat. Zhur.* **2**, No. 1, 121(1939). Several evaporators with inner and with outer circulation pumps are described. The coeff. is increased several times (5–6 times in evapg. NaOH, and 6–7 times in evapg. glycerol solns.) as compared with evaporators with natural circulation. The heating surface and the wt. of the app. can be considerably reduced. An evaporator with natural circulation with a heating surface of 450 sq. m. and weighing 28 tons has been replaced by an app. with artificial circulation of the same capacity with a heating surface of 80 sq. m. and weighing 8.7 tons. The saving in first cost amply covers the cost of the circulating pump. Such evaporators are used successfully with very small temp. differences. An 85% glycerol soln. with a η of 25 centipoises was evapd. with a temp. difference of 10–12°. The steam saving amply covers the cost of power for the pumps. The deposition of scale is very small, and no crystals are formed on the heating surface. Liquid contg. up to 20% of solid substances can be evapd. with success. The work of these evaporators is especially effective with solns. with a reversible curve of soly. (sepg. scale as gypsum, Na_2SO_4, sugar molasses, etc.), with those solns. whose soly. increases little on heating and which crystallize considerably on evapn. (NaCl), with viscous solns. (sugar, glycerol), with corroding substances, etc. The manuf. of such app. with artificial circulation offers no difficulties. For the usual evaporator with a heating surface of 10–100 sq. m. a series of propeller pumps with a capacity of 2–20 cu. m./min. and with a pressure of 5–6 m. of water is necessary. W. R. Henn

Nessler cylinders of lead glass. British Standards Institution. *Analyst* **64**, 877(1939).—The difficulty encountered by McLachlan (*C. A.* **33**, 8452[9]) should not arise with Nessler tubes which correspond to British standards, because the maker of the tube is obliged to state that the tubes contain Pb when such is the case. W. T. H.

Effect of foam on entrainment in cap-plate columns. V. N. Stabnikov. *Khim. Mashinostroenie* **8**, No. 6, 17–21 (1939).—The effect of foaming on entrainment was studied with cap-plate columns 200, 300 and 445 mm. high, 232 mm. in diam., and having 2 plates equipped with feed and draw-off pipes, the distances between the plates being 227, 327 and 500 mm. The upper plate contained water and the lower plate, through which air was blown, contained 1 *N* NaOH or 1 *N* NaOH + soap soln. The air speeds were 0.054–0.360 m./sec. Up to an air speed of 0.25 m./sec. the entrainment of foaming liquids was greater than for nonfoaming ones, but at higher speeds the reverse was true. The carry-off of foam also started at speeds higher than 0.25 m./sec. The results are given in tables and graphs. B. Z. Kamich

Constant-level still for redistillation of water. D. A. Wilson and H. S. Strickler. *Ind. Eng. Chem., Anal. Ed.* **11**, 636(1939). An all-glass still is described permitting continuous redistn. of H_2O. H. A. Frediani

Semimicro Kjeldahl distillation apparatus. C. E. Redemann. *Ind. Eng. Chem., Anal. Ed.* **11**, 635–6 (1939).—A 100-ml. Pyrex Kjeldahl flask assembly is described that permits rapid cleaning, prevents liberation of NH_3 until the app. has been swept with steam and is suitably trapped to prevent sucking back of standard acid. H. A. Frediani

Electromagnetic separator for mineral powders. R. C. Evans. *Mineralog. Mag.* **25**, 471–8(1939).—The special points of the app., which is described and figured and in principle resembles that of Hallimond (*C. A.* **25**, 3203), are its robustness, ease of cleaning and freedom from trouble connected with the elec. contacts. It will run automatically for hrs. on end when large quantities of material have to be treated. C. A. Silberrad

Apparatus for determining the melting curve of a small quantity of material. W. M. Smit. *Chem. Weekblad* **36**, 750–2(1939).—The principle of the app. is to heat the sample slowly by maintaining a const. difference of temp. between the sample and its surroundings. The app. is suitable for checking the purity of org. materials. It operates with a sample of 200 to 300 mg. and in a temp. range of 0 to 300°. The melting curves (the temp. of the material plotted as a function of the time) are reproducible to within 3%. N. Bekkedahl

Construction of manometers for measuring flow. A. D. Loring. *Ind. Eng. Chem., Anal. Ed.* **11**, 626–8(1939). Modifications of U-tube principle manometers permitting direct reading are described. H. A. Frediani

Pressure regulator for dynamic gaseous systems. Johannes H. Bruun. *Ind. Eng. Chem., Anal. Ed.* **11**, 628 (1939).—A glass capillary into which a brass, Pt or glass wire can be inserted for varying depths is sealed in series with the gas outlet, the frictional resistance in the capillary controlling the pressure (higher than atm.) in the reaction system. H. A. Frediani

Apparatus for constant-temperature control. R. Tiollais and A. Pédron. *Ann. chim. anal. chim. appl.* **21**, 285–9(1939).—The set-up as described will keep the temp. const. within 0.01° in the range 20–120°. As in other types, the heating is accomplished electrically and the making and breaking of the circuit governing the auxiliary heating are accomplished by the contraction and expansion of a column of Hg. W. T. H.

An improved method of calculation of drying time. J. C. Brier. *Trans. Am. Inst. Chem. Engrs.* **35**, 797–800 (1939).—This paper presents a simplified calcn. of the time required for drying solids under const. condition and shows that a logarithmic mean drying rate can be applied to the falling-rate period of drying, if the drying-rate curve is a straight line. Application of the method to that portion of the drying cycle in which the rate curve is not a straight line is discussed. C. L. Mantell

The importance of the atmosphere in industrial furnaces. R. Martin. *J. usines gaz* **63**, 389–403(1939).—A review of modern developments in heat-treating furnaces in which specified atms. are maintained. B. J. C. v. d. H.

Biophysical problems of air conditioning. C. P. Mom. *Chem. Weekblad* **36**, 717–22(1939). Felix Saunders

The construction of an inexpensive power washer and

designing of economical brushes for the cleaning of laboratory glassware. Harry E. Morton. *J. Lab. Clin. Med.* 25, 211–15(1939).—An app. is described that saves much time in the cleaning process and reduces glass breakage. Howard W. Robinson

Porous rubber for filter sheets (U. S. pat. 2,175,708) 30.

Continuous rotary filter suitable for oils, etc. Henry M. Hunter (to Goslin-Birmingham Mfg. Co.). U. S. 2,174,748, Oct. 3. Various structural and operative details.

Receptacle with a filtering bag suitable for filtering various liquids. Le Roy O. Brown (to Justrite Mfg. Co.). U. S. 2,175,714, Oct. 10. Various structural details.

Spring take-up for glass-fiber air and gas filter units, etc. Jan S. Irvine (to Owens-Corning Fiberglas Corp.). U. S. 2,175,195, Oct. 10. Various structural details.

Container for pouring out measured portions of contained liquids such as lubricating oil. Fred R. Walrod. U. S. 2,175,933, Oct. 10. Various details of a can or the like with a valved measuring compartment.

Adsorber for recovery of solvent vapors from their mixtures with air. Leonard A. Logan (to Carbide and Carbon Chemicals Corp.). U. S. 2,174,666, Oct. 3. Various structural details of an app. suitable for use of granular activated carbon.

Apparatus for agitating bottles containing liquids to mix their contents. Henry J. Chilton (to Liquid Carbonic Corp.). U. S. 2,174,256, Sept. 26. Various structural, mech. and operative details.

Sealing plugs for ampoules, bottles or the like. Conrad Hofmann and Alex Kneip (to Winthrop Chemical Co.). U. S. 2,174,855, Oct. 3. Within the neck of a container such as an ampoule, a sealing ball or the like is provided, which may be formed of alloys such as "Wood's metal" or "Rose metal" or their alloys with Hg 5–10% (supported by wadding or glass wool if desired); or sealing may be effected with water glass cements, cements of Pb oxide and glycerol or fused resins.

Sealing minute openings in pressure vessels such as those of impact arresters or vapor motors. John S. Baker (to Cook Elec. Co.). U. S. 2,175,373, Oct. 10. There is injected into the vessel a liquid which will form a solidified mass when exposed to the atm., and a gas is also injected which will not cause solidification of the liquid, and the liquid is caused to flow over the inner surface of the vessel while under the action of the gas, to fill any pores with solid material.

Centrifugal separator suitable for separating solids from liquids. Mikael Vogel-Jorgensen (to F. L. Smidth & Co.). U. S. 2,174,857, Oct. 3. Various structural details.

Classifying finely divided solids such as ore constituents in liquid suspension. Arthur C. Daman (to Mining Process and Patent Co.). U. S. 2,174,553, Oct. 3. Various details of app. and operation.

Ball mills for wet or dry grinding of coal, limestone, cement clinker, etc. Harry R. Collins. U. S. 2,174,933–4, Oct. 3. Various structural, mech. and operative details.

Rotary-drum mill for pulverizing and classifying various materials, with use of air under pressure. Harlowe Hardinge (to Hardinge Co., Inc.). U. S. 2,174,630, Oct. 3. Various structural and operative details.

Rectangular bell-type furnace suitable for annealing. Frederick R. J. Davis (to Westinghouse Elec. & Mfg. Co.). U. S. 2,175,829, Oct. 10. Various details of hood construction.

Protecting furnace walls. John N. Pyster and Carl W. Stuke. U. S. 2,174,597, Oct. 3. For increasing the life of a furnace wall, its inner face is provided with a thin coating of a metal such as Al, the oxide of which is highly refractory.

Coating interior surfaces of smelting furnaces. John A. Heskett. U. S. 2,175,291, Oct. 10. See Brit. 492,860 (*C. A.* **33**, 2000⁷).

Apparatus such as that with headers and tubes for heat exchange. Hugh Rodman (to Universal Oil Products Co.). U. S. 2,175,412, Oct. 10. In an app. such as one with tube headers, return bends, etc., having a port for the reception of a tubular member and a circumferential groove in the metal walls of the port into which metal of the walls of the tubular member is forced, there is provided a resilient gasket, which may be formed of asbestos and disposed within the groove so that it may be compressed by expansion of the tube walls and prevent leakage.

Heat conversions such as those in thermal pumps Vannevar Bush and Edwin L. Rose (to Research Corp.). U. S. 2,175,376, Oct. 10. Various details of structure and operation of an app. with a regenerator.

Clock suitable for the control of heating or other apparatus. John B. Schroeder (to John W. Silbaugh). U. S. 2,174,331, Sept. 26. Various structural, elec. and operative details.

Refrigerating apparatus suitable for use with mercury and aqueous liquids. Lyman F. Whitney (to Stator Corp.). U. S. 2,174,301, Sept. 26. Various details of an app. having a cooler with walls of metal such as a stainless steel which do not cause the formation of sludge when in contact with the Hg and refrigerant. U. S. 2,174,302–3 also relate to various details of refrigerating and water-heating app.

2– GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

John Jacob Abel, 1857–1938. Anon. *J. Pharmacol.* **67**, 373–406(1939).—Biography and list of works. L. E. Gilson

Waldemar Lindgren. L. C. Graton. *Econ. Geol.* **34**, 850a–850f(1939).—Obituary, with portrait. Michael Fleischer

The twentieth anniversary of the death of Emile Forcault. J. M. Muhleg. *Glastech. Ber.* **17**, 285–6(1939). J. F. Hyde

What preceded the discovery of the daguerreotype. K. Pejml. *Chem. Listy* **33**, 335–7(1939).—P. reviews the work of the alchemists and the contributions of Scheele, Charles, Senebier, Wedgewood, Davy, Niepce and Herschel to the discovery of the daguerreotype. F. M.

The atomic weight of iron. O. Hönigschmid and Chuan Liang Shu. *Z. anorg. allgem. Chem.* **241**, 361–71(1939).—The at. wt. of Fe was detd. as 55.850 as the av. of 18 analyses of $FeBr_2$ synthesized from its pure components and compared with Ag and AgBr. L. P. Hall

Determination of atomic distances from optical refraction. I. A simple relation of ionic refraction, ionic radius and atomic number of the elements. Ernst Kordes. *Z. physik. Chem.* **B44**, 249–60(1939); cf. *C. A.* **33**, 4131⁷. —The Born repulsion exponent was detd. empirically and used to calc. univalent ionic radii for all of the elements. These results were then used in K.'s empirical relation to obtain ionic refractions which were compared where possible with those calcd. by other methods. II. *Ibid.* 327–43.—The same relation gives good results in the calcn. of at. distances in compds. If both the ionic distance and the mol. refraction are known, the radius and refraction of single ions can be calcd. G. M. Murphy

Magnetic anisotropy of nickel at 20°K. H. J. Williams and R. M. Bozorth. *Phys. Rev.* **56**, 837(1939).—The magnetic anisotropy of Ni was measured at 20 and at 77°K. The formula of Brukhatov and Kirensky (*C. A.* **32**, 2797⁶), based on measurements from 77 to 350°K., is valid to 20°K.: the exptl. data of Honda, Masumoto and Shirakawa at this temp. (*Sci. Repts. Tohoku Imp. Univ.*, First Ser. **24**, 391(1935)) is erroneous. G. M. Petty

Measurement of dielectric loss and high-frequency conductivity. VII. H. Schwindt. *Z. physik. Chem.*

B44, 344–50(1939); cf. *C. A.* **32**, 6518⁴.—It is shown how the previous app. can be used for measurements on liquids of high dielec. const. The energy loss in the comparison condenser is discussed and a method of measuring this quantity is described. Measurements on liquid condensers in which the resistance of the elec. leads cannot be neglected are also discussed. VIII. P. Wulff and H. Schwindt. *Ibid.* 351–8.—The construction of a distn. app. and a quartz condenser for hygroscopic liquids is described. Measurements on benzene-EtOH mixts. were made and the effect of water on the results is discussed. G. M. Murphy

The dielectric constants of polar liquids. J. Norton Wilson. *Chem. Rev.* **25**, 377–406(1939).—If Onsager's theory (*C. A.* **30**, 7002⁷) of liquid dielectrics is modified to include the effect of optical anisotropy, the deviations of the modified theory from agreement with expt. can be consistently correlated with a qual. discussion of the effect of mol. structure on intermol. assocn. in polar liquids. The results indicate that in liquid Et_2O, EtOH and H_2O the mols. are assocd. in such a way that the effective mean square dipole moment is greater than that of a free mol.; in liquid aryl halides and alkyl monohalides, on the other hand, the effective mean square moment is less than that of a free mol. Louise Kelley

Dipole moment of the aminobenzoic acids in dioxane. Lloyd Van Blaricom and E. C. Gilbert. *J. Am. Chem. Soc.* **61**, 3238–9(1939).—Data are given for d_4^{25}, n_D^{25} and η^{25} for 3 concns. of the 3 isomeric $H_2NC_6H_4CO_2H$ in dioxane, from which values of μ are calcd. to be: *o* 1.51, *m* 2.70, *p* 3.51; the values for the Me esters are 1.0, 2.40, 3.30. Although in H_2O the *m*-acid is the only one that is predominantly of the zwitter-ion type, its solns. showing characteristically different behavior from the others, in the nonpolar dioxane it assumes the expected intermediary position between the *o*- and *p*-isomers. C. J. West

Transport phenomena in mixtures of gases. E. J. Hellund and E. A. Uehling. *Phys. Rev.* **56**, 818–35 (1939).—Math. Gregg M. Evans

Relation between viscosity and elasticity of amorphous substances. Adolf Smekal. *Z. physik. Chem.* **B44**, 286–98(1939).—The extension of a relation of Maxwell between viscosity and elastic properties of liquids, which was given recently by Kuhn (cf. *C. A.* **33**, 3225²), and some remarks of S. (*Glastech. Ber.* **16**, 198(1938)) are further generalized. The theory is applied to 6 different silicate glass melts. G. M. Murphy

Some experiments showing the directional reactivities of single crystals of copper. Allan T. Gwathmey and Arthur F. Benton. *Trans. Electrochem. Soc.* **77**, 8 pp. (preprint)(1939).—New expts. were made which show the variations in reactivities of surfaces prepd. parallel to the different crystal planes of a single crystal of Cu. A striking etch-pattern was obtained when a single crystal in the form of a sphere was immersed in Hg for 4 hrs. and the Hg evapd. from the surface by heating in a vacuum. The influence of dissolved gases such as O, H and CO_2 on the etch-patterns produced by the corrosion of Cu by liquids was investigated. The variations in reactivity of surfaces parallel to the different crystal planes are shown to be of importance in the problem of corrosion. The effects of variations in c. d., concn., and nature of the electrolyte on the patterns obtained when a single crystal was electrolytically etched were studied. Quant. measurements were made of the different rates of electrolytic etching of surfaces parallel to the different crystal planes. C. G. F.

Evaporation process of aluminizing optical surfaces. Fred L. McMillan and Wm. M. Craig. *Proc. Okla. Acad. Sci.* **19**, 131–2(1939).—A vacuum chamber is described in which Al can be vaporized from a W filament and condensed on optical surfaces. W. F. Bradley

The effect of intense sound waves on metallic melts. II. The significance of frequency and intensity of the sound waves on the diminution of grain size. Gerhard Schmid and Albert Roll. *Z. Elektrochem.* **45**, 769–75 (1939); cf. *C. A.* **31**, 7315⁹.—The effect was studied of sonic and ultrasonic waves, of frequency 50, 9,000 and 284,000 cycles per sec. and intensity from 1 to 40 w./sq. cm., on the crystn. of Bi alloys of low m. p., e. g., Wood's metal. The diminution of grain size is readily studied by observations of the shortening of the needle-like crystals. The more intense the waves the smaller the crystals; frequency appears to play only a secondary part. It is concluded that the sonic waves do not affect crystn. directly; they break up the larger crystals which would normally be obtained. Calcns. based on the Stokes-Oseen equation are in harmony with the view that the decrease of crystal size is related to the frictional force between the melt and solid. S. Glasstone

Hole theory of diffusion. R. P. Johnson. *Phys. Rev.* **56**, 814–18(1939).—The movement of solute-hole mols. rather than movement of holes alone, is preferred as an explanation of diffusion in metallic solns. G. M. E.

Addition to our work: "The structure of solid hydrogen fluoride." Paul Günther and Kurt Holm. *Z. physik. Chem.* **B44**, 474(1939); cf. *C. A.* **33**, 8073⁶.—Fredenhagen (*C. A.* **28**, 4646⁸), from measurements of vapor d. of HF, concluded that the dissocn. isotherms could be explained only by the presence of a series of different mol. compds., prior to the work of Bauer, Beach and Simons (*C. A.* **33**, 1559⁹). G. M. Murphy

Structure of ferromagnetic ferric oxides, γ-Fe_2O_3. R. Hafl and Th. Schoon. *Z. physik. Chem.* **B44**, 216–26 (1939); cf. *C. A.* **34**, 298⁶.—X-ray studies of γ-Fe_2O_3 prepd. from Fe_3O_4, from an iron arc and from $Fe(CO)_5$ resulted in the values, $a_0 = 8.316 \pm 0.004$, 8.333 ± 0.004 and 8.3 A., resp. No essential difference was found in lattice const. or intensity distribution in the 3 samples. Both x-ray and electron-diffraction powder diagrams showed new interference patterns. They can be explained on the assumption of lower symmetry or a larger elementary cell. Similar results were found in Al_2O_3. G. M. Murphy

Calorimetric study of physical and activated adsorption of hydrogen on nickel. A. Eucken and W. Hunsmann. *Z. physik. Chem.* **B44**, 163–84(1939).—The heat of adsorption of H_2 on Ni was studied calorimetrically between 20 and 273°K. Desorption was also measured in the same temp. range with a hot-wire manometer. Two heats of activation for desorption were detected. One corresponds to 14% of the adsorbing centers and amounts to 9–10 kg.-cal. per mole; the other accounting for the remaining 86% is 18–22 kg.-cal. per mole. The heat of adsorption increases linearly from 4 to 21 kg.-cal. per mole. The van der Waals heat of adsorption is about 800 cal. per mole and depends strongly on the density of coverage of the surface. Low-temp. tunnel effects could not be detected. G. M. Murphy

Calculations of the adsorption behavior of argon on alkali halide crystals. Wm. J. C. Orr. *Trans. Faraday Soc.* **35**, 1247–65(1939).—Theoretical. There are calcd.: (1) the heats of adsorption and the equil. distances of A atoms at various positions on the surface of KCl and CsI crystals; (2) the variation of the heat of adsorption as a first layer of atoms builds up and as a second layer begins. For A on CsI the total energy of adsorption in a hexagonally close-packed layer is 2877 and 2737 cal., resp., on Cs^+ and I^- surfaces; A on KCl gives a mean value for the heat of adsorption normal to the surface in a hexagonally packed layer of 1412 cal. with a total variation over the 100 plane of 534 cal. in excess of the value for square packing thus to make the hexagonal arrangement the more probable configuration. Victor R. Deitz

The damping of energy in films of surface-active substances. R. N. Ivanov. *Bull. acad. sci. U. R. S. S., Sér. géograph. géophys.* **1938**, No. 1, 29–41; *Khim. Referat. Zhur.* **2**, No. 2, 18–19(1939).—In films of soap soln. stretched between 2 wire rings, the equil. force (composed of the force of elasticity φ and the force of resistance f_0) depends on the mech. properties of the film (η, elasticity, etc.). The force of resistance is supposedly proportional to the velocity of the displacement of the ring $yf_0 = \alpha y_1$. In this equation the value of the "damping const." α dets. the damping properties of the given film. In order to verify these conclusions an app. was constructed by means of which the value of the power w_0 of a unit of the surface

film during a complete cycle of vibrations can be measured. During slow and reversible vibrations w_0 is the work done against the force of resistance only, i. e., $w_0 = f_0 v_0$. Thus the previous supposition that $f_0 = \alpha_0 v_0$ is verified. The const. α_0 was measured for a no. of soaps and oils. Numerically in all cases it was close to the "damping const." α. The expts. also showed a large effect of the specific chem. properties of the films on their damping properties. Thus, α for the investigated substances varies from several hundreds (for oils, K laurate) to 6.37 (for K palmitate).
W. R. Henn

Capillary systems. XIX. (9). **The specific permeability and the void structure of packed spheres and of spheres and grains poured together.** Erich Manegold and Karl Solf. *Kolloid-Z.* **89**, 36–47(1939); cf. *C. A.* **32**, 4855⁴.—The av. and free cross section and length of the voids in different modes of packing of spheres of uniform size are calcd. Formulas are then derived for the sp. permeability of these modes of packing, in which there appear only the square of the radius of the spheres and a const. characteristic of the structure. The formulas were tested experimentally for spheres and grains poured together and used to calc. an equiv. radius. The equiv. radius calcd. for poured spheres agrees well with the radius calcd. according to Bjerrum and Manegold (cf. *C. A.* '22, 11) for canal-like void systems with unoriented pore structure. Poured sand exhibits a different behavior: at times the agreement of the 2 pore radii is poor, at other times satisfactory. The radii calcd. according to B. and M. are considered the more reliable. Finally a general filtration equation is calcd. that can be used in many special cases.
F. L. Browne

General chemistry of colloid-colloid reactions. VII. Highly purified protected Sb_2S_3 sols. Wo. Pauli and H. Zentner. *Trans. Faraday Soc.* **35**, 1234–9(1939); cf. *C. A.* **32**, 2809⁶.—Electrodecantation of a mixt. of a highly purified dextrin sol and a highly purified Sb_2S_3 sol gives, after repeated replacements of the top layer with cond. water, a dextrin-free top layer. The small amt. of dextrin remaining fixed on the sol particles is sufficient to preserve the initial protective power. The surface of the particles of the purified protected sol has the electrochem. constitution of the pure Sb_2S_3 sol, but the charge is reduced to half.
Victor R. Deitz

Entropy of mixing for systems with long-chain compounds and its statistical explanation. Kurt H. Meyer. *Z. physik. Chem.* **B44**, 383–91(1939).—The entropy of mixing of a liquid and a chain polymer is greater than the ideal entropy of mixing.
G. M. Murphy

Polarimetric study of the effect of temperature on aqueous solutions of *l*-malic acid. R. Descamps. *Bull. soc. chim. Belg.* **48**, 293–314(1939).—The expts. at 75° previously described (*C. A.* **33**, 9093⁴) are extended to the temps. 20°, 45°, 55° and 95°. For concd. aq. solns. increasing temp. accelerates the establishment of the equil. *l*-malic acid ⇄ active dehydration products + water and displaces the equil. toward the formation of dehydration products. The reversibility is demonstrated by the fact that the $(\alpha)^{20}_{\lambda 61}$ of a soln. decreases on heating at 75° because of the formation of active dehydration products and increases on further heating at 45°. In some cases on prolonged heating fumaric acid crystallizes out and the products depend on the duration of heating as well as on temp. If concd. solns. heated for 161 hrs. at various temps. between 45° and 109° are converted to 7.7 g. per 100 g. soln., examn. of the rotatory power of these secondary solns. indicates that the primary solns. undergo modifications whose nature depends on the temp. Since the rotatory power of aq. solns. of *l*-malic acid develops spontaneously at all temps. and even at ordinary temp. at least in concd. solns. it is necessary to read the polarimetric points as soon as possible after soln. especially in concd. solns. and at high temps.
Janet E. Austin

Inulin and its molecular weight. S. Bezzi. *Atti X° congr. intern. chim.* **3**, 39–46(1939).—From 25 g. com. inulin (I) (0.13% ash) purified by the somewhat modified method of Irvine and Steele (cf. *C. A.* **16**, 2850) was obtained 15 g. I (0.01% ash, $[\alpha]_D^{19}$ −34.45°) with no reducing power for Fehling's soln. Cryoscopic measurements were made in H_2O with a thermometer accurate to 0.002° and a const.-temp. bath (±0.02°). Osmotic pressures of I in H_2O were measured at 20° with a modified Ulmann method with a temp. maintained const. to within ±0.001°. Viscosity was detd. also by use of the capillary viscometer of Ostwald. F.-p. measurements, which gave a mol. wt. of 3764, were not considered very reliable for polymers. This value is about one-half that (7777) obtained by the second method, the latter being in accord with the value of Haworth and collaborators using a chem. method. From viscosity results it is believed that the mol. of I in soln. has a thread-like or straight-chain shape rather than a spherical one, which fact precludes application of the dialysis method because the former type of mol. gives exaggerated mol. wts. by this method (cf. Staudinger and Lohmann, *C. A.* **30**, 4379⁹; Herzog and Kudar, *C. A.* **28**, 2243⁹; H., *C. A.* **29**, 3576⁹).
J. C. Lo Cicero

Remarks on the work of G. V. Schulz on the osmotic pressure and the state of the solvent in the system acetone - nitrocellulose. Ch. G. Boissonnas and Kurt H. Meyer. *Z. physik. Chem.* **B44**, 392–6(1939).—The osmotic pressure measurements of S. (cf. *C. A.* **33**, 5265⁶) are erroneous and unsuitable for calcn. of heats and entropies of dilu.
G. M. Murphy

Activity coefficients of some alkali halides at 25°. R. A. Robinson. *Trans. Faraday Soc.* **35**, 1217–20(1939). A set of activity coeffs. of KCl for isopiestic data at 25° is assumed which agree with the e. m. f. detns. of Harned and Cook (*C. A.* **33**, 3663¹) and of Shedlovsky and MacInnes (*C. A.* **31**, 3764⁴). The isopiestic data then give a set of activity coeffs. for NaCl agreeing with the values of Harned and Cook; similarly for NaBr and KBr. The plot of the isopiestic ratio (m_{KCl}/m_{NaCl} of equal vapor pressure) against m_{NaCl} between 1 *M* and 4 *M* at 25° agrees with the equation: $m_{KCl}/m_{NaCl} = 1.0082 + 0.03237\, m_{NaCl}$.
Victor R. Deitz

Relative osmotic coefficients of sodium and potassium chloride in deuterium oxide at 25°. R. A. Robinson. *Trans. Faraday Soc.* **35**, 1220–2(1939). Data are presented in the concn. range 0.5 to 4 *M* giving the molalities of KCl and of NaCl (mols. per 1000 g. D_2O) that are isopiestic. A plot of the isopiestic ratios against the molality of NaCl shows that the ratio is considerably higher in D_2O (99.6% purity) than in H_2O at the same molality, the difference increasing with increasing salt concn.; e. g., at 3 *M* NaCl the isopiestic ratio is 1.105 in H_2O and 1.122 in D_2O. When correction is made for the 10% difference in mol. wt. of the solvents by expressing the concns. in mol. ratios of salt to solvent, a much smaller difference remains at corresponding mol. ratios. A difference of 0.5% in these osmotic ratios exists at the highest concns.
Victor R. Deitz

Heat content and heat capacity of sodium chloride solutions. R. A. Robinson. *Trans. Faraday Soc.* **35**, 1222–8(1939).—The isopiestic ratio of KCl and NaCl was detd. over the concn. range 0.1 to 4 *M* NaCl at 5° intervals between 15° and 60°. The results valid above 1 *M* NaCl are given by: $m_{KCl}/m_{NaCl} = 1.00633 + 0.00019(t - 15) + (0.03337 - 0.0001(t - 15))m_{NaCl}$. Below 1 *M* NaCl there is a temp. coeff. of $0.0001 m_{NaCl}$ per degree. The results agree with the e. m. f. detns. of Harned and Nims (*C. A.* **26**, 1500; **33**, 3663⁴) and the b.-p. detns. of Smith (*C. A.* **33**, 5727⁸). From the activity coeffs. there are calcd. the partial molal heat content of NaCl in terms of the heat content at 25°, the partial molal heat capacity, and its temp. coeff. For NaCl good agreement is obtained with the direct calorimetric measurements of the partial molal heat content.
Victor R. Deitz

Activity coefficients of sulfuric acid and lanthanum chloride in aqueous solution at 25°. R. A. Robinson. *Trans. Faraday Soc.* **35**, 1229–33(1939).—The activity coeffs. of H_2SO_4 solns. were detd. by the isopiestic method at 25° between 0.2 and 3 *M*; that of $LaCl_3$ between 0.2 and 1.5 *M* with addnl. data from e. m. f. of cells with transport. The results agree well with e. m. f. and direct vapor-pressure detns.
Victor R. Deitz

Strong and weak dipole formers. K. L. Wolf and H.

Harms. *Z. physik. Chem.* **B44**, 359–73(1939).—Non-electrolytes can be divided into 2 classes corresponding to strong and weak electrolytes. They can be distinguished by the concn. dependence of the orientation polarization and the mol. wt. as well as a few other properties of the soln. in ion-free and dipole-free liquids. G. M. M.

Kinetics of chain polymerization. VIII. Branching reactions. G. V. Schulz. *Z. physik. Chem.* **B44**, 227–47 (1939); cf. *C. A.* **33**, 9104[3].—From various expts., it is concluded that the polysterene mols. are branched. The degree of branching increases with the polymerization temp. The mol. is characterized by a principal axis, from which shorter side branches grow. Branching and netting processes are distinguished and it is shown that insol. products are obtained in general in the latter reaction while sol. products are obtained in pure branching reactions. The statistical distribution of the mol. wt. may be described for branching reactions by the same function that is used for normal polymerization reactions. G. M. Murphy

Kinetics of the decomposition of hydrogen peroxide by means of gold sols of different degrees of dispersion. I. S. Teletov and N. A. Braunshtein. *Trudy Inst. Khem. Khar'kov. Derzhavn. Univ.* **3**, 7–13(1938); *Khim. Referat. Zhur.* **2**, No. 2, 4(1939).—The sols of Au used in the investigations were prepd. by reduction of $AuCl_3$ with alc., ether soln. and tannin, and by interaction between $AuCl_3$ and H_2O_2. The sols were dialyzed for 2–3 days and were examd. in a tyndallmeter and in a colorimeter. In a neutral medium none of the sols decompd. H_2O_2. The catalytic decompn. takes place only in the presence of NaOH (as was detd. previously by Bredig and Reinders for the sol obtained by the electrolytic method). The velocity of decompn. of H_2O_2 was max. in $N/32$ NaOH. The velocity const. (calcd. from the equation of the first order) has different values for sols obtained by different methods. The catalytic decompn. of H_2O_2 by sols of the same concn. increases with the increase of their dispersion. W. R. Henn

Preparation of colloidal rhenium and its catalytic properties. C. Zenghelis and Catherine Stathis. *Compt. rend.* **209**, 797–9(1939); cf. *C. A.* **33**, 8081[2].—A more active, though less so than that of Rh (*C. A.* **32**, 4060[6]), colloidal soln. of Re, stable for several months, is prepd. by dissolving 1 g. K_2ReCl_6 in 10 cc. H_2O, adding 100 g. soln. of gum arabic, followed by 66 cc. 1% hydrazine. The mixt. is heated to 45–50° and 3 cc. of 35% formaldehyde dropped in and the whole heated for 30 min., dialyzed and concd. to 100 cc. at 40–45°. Such a soln. absorbs H_2, accelerates decompn. of H_2O_2, causes formation of NH_3 from its elements, and hydrogenation of maleic or cinnamic acids. The Re appears to be present as metal and not as suboxide. C. A. Silberrad

The copper-manganese system. G. Grube, E. Oestreicher and O. Winkler. *Z. Elektrochem.* **45**, 776–84 (1939).—The data obtained from thermal analysis, elec. cond., hardness, microscopic and x-ray studies are used to draw the complete phase diagram for the Cu-Mn system. The first solids to sep. from the melts are solid solns. contg. either 0–75.5% γ-Mn or 75.5–100% δ-Mn. The solidus and liquidus curves have a min. at 871° and 36.5% Mn. On cooling the δ-solid solns. decomp. at the peritectic point (1113°) forming γ-solid solns. The $\beta \rightleftarrows \gamma$ and $\gamma \rightleftarrows \delta$ transition points of Mn are lowered by Cu, but the $\alpha \rightleftarrows \beta$ transition temp. at 750° is unaffected. The results differ to some extent from those previously described by Pommer (cf. *C. A.* **24**, 5703). S. Glasstone

The structure of the γ-solid solutions in the palladium manganese system: a correction. G. Grube and O. Winkler. *Z. Elektrochem.* **45**, 784–7(1939); cf. *C. A.* **31**, 934[6], 938[6].—The γ solid solns. obtained between 1070° and 1160° were reinvestigated by means of x-rays. The tetragonal face-centered γ-form of Mn, which according to previous workers was supposed to be stable between 1191° and the m. p., is identical with the γ-form existing between 1070° and 1160°. Between the latter temp. and the m. p. the δ-form of Mn is stable. S. Glasstone

Phase equilibria in hydrocarbon systems. The methane ethane system in the gaseous region. B. H. Sage and W. N. Lacey. *Ind. Eng. Chem.* **31**, 1497–1509 (1939); cf. *C. A.* **33**, 30[4].—The sp. vol. of 5 gaseous mixts. of methane and ethane was detd. at 6 temps. between 70° and 250°F. and at pressures up to 4750 lb. per sq. in. The results are presented in tabular form. The partial volumetric behavior of methane and ethane in this system was calcd. From these data, together with other pertinent published information, the partial thermodynamic behavior of these components was calcd. throughout the above-mentioned ranges of pressure and temp. The fugacity, partial vol., and partial enthalpy of methane and ethane are presented in graphical and tabular form. F. L. Browne

5—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F. DUNCAN

The mesotron. Giovanni Gentile. *Scientia* **66**, 165–75 (1939).—A nonmath. discussion. L. E. Gilson

Deviation from the Coulomb law for a proton. H. Frohlich, W. Heitler and B. Kahn. *Phys. Rev.* **56**, 961–2 (1939); cf. *C. A.* **33**, 6135[4].—Reply to Lamb, *C. A.* **33**, 8101[5]. G. M. Petty

The equality of the proton-proton and proton-neutron interactions. Frederick W. Brown and Milton S. Plesset. *Phys. Rev.* **56**, 841–2(1939).—It is shown that either (1) the ranges of the ^1S and ^3S neutron-proton interactions are unequal, or (2) the ^1S proton-proton interaction does not equal the ^1S proton-neutron interaction. G. M. Petty

Analysis of proton-proton scattering data. E. Creutz. *Phys. Rev.* **56**, 893–4(1939).—An extension of the analysis of Breit, Thaxton and Eisenbud (cf. *C. A.* **33**, 6135[6]) to include coeffs. for every 50 c. kv. and every $2^1/_2°$ from 15° to 45°, and a fitting of the data of Hafstad, Heydenburg and Tuve (cf. *C. A.* **32**, 3256[9]) in the sense of least squares. Bernard Lewis

Effects of shape of potential energy wells detectable by experiments on proton-proton scattering. L. E. Hoisington, S. S. Share and G. Breit. *Phys. Rev.* **56**, 884–90 (1939).—The shapes of several types of potential wells giving approx. agreement with proton-proton scattering expts. are discussed. The approx. equality of the proton-proton and proton-neutron interactions is discussed, and the close agreement in the case of the meson potential is shown to be due to the large attraction at small distances. Bernard Lewis

The thermionic and adsorptive properties of the surfaces of a tungsten single crystal. S. T. Martin. *Phys. Rev.* **56**, 947–59(1939).—The thermionic emission from a spherical W single crystal has been observed. Photographs and diagrams show qualitatively the dependence of this emission on crystallographic direction. Nearly all the max. and min. lie on a 110 zone. Similar observations have been made on the same crystal when Cs and Ba were adsorbed thereon. Adsorption forces are largest for Cs on surfaces of highest work function. For Ba the adsorption forces appear to be more dependent on surface structure, as the force between the ion and its image contributes the major part of the adsorption energy. The behavior of adsorption as a function of crystallographic direction is such that the sphere surface may be approximated by that which would be obtained by carving the sphere from a perfect lattice. There is no evidence for a faceted or step-like microstructure. Emission from the spherical crystal when Cs is adsorbing on contaminated complex surfaces is more complicated in its dependence on crystallographic direction than when the surface is clean, and a map of the emission over the crystal changes its configuration with

temp. This behavior is not observed when the surface is clean or only slightly contaminated. Bernard Lewis

Emissive and thermionic characteristics of uranium. W. L. Hole and R. W. Wright. *Phys. Rev.* **56**, 785-7 (1939).—The emissivity below the m. p. is 0.51 (λ = 0.67 μ); the thermionic work function is 3.27 ± 0.05 v., with a Richardson A of about 6; m. p. 1700 ± 25° and the av. coeff. of expansion, 25 1000°, 4 × 10^{-6}. Gregg M. Evans

The scattering of neutrons from the C + D reaction. E. Amaldi, D. Bocciarelli, F. Rasetti and G. C. Trabacchi. *Phys. Rev.* **56**, 881-4(1939).—The scattering cross section for neutrons emitted by bombarding C with 600-e. kv. deuterons was measured for 39 elements. Bernard Lewis

Scattering of photoneutrons from deuterium by the nuclei of atoms of light elements. T. Goloborod'ko and A. I. Leĭpunskiĭ. *Phys. Rev.* **56**, 891 2(1939).—The cross sections for the scattering of photoneutrons of different energies by at. nuclei were investigated. The photoneutrons were derived from deuterium irradiated by γ-rays from Ra-Th. Results are given for 17 elements from H to Ca. Bernard Lewis

The disintegration of mesotrons. Bruno Rossi, H. Van Norman Hilberry and J. Barton Hoag. *Phys. Rev.* **56**, 837 8(1939); cf. *C. A.* **33**, 1208[9].- The absorption of the mesotron component of cosmic radiation was compared in air and in C. The data give definite evidence of mesotron disintegration: their lifetime is 2 × 10^{-6} sec. G. M. Petty

Density distribution and energy spectrum of B-electrons. III. Further studies of the box model. (Cylindrical ring, compression of B-electrons.) Otto Schmidt and Heini Schmidt. *Z. physik. Chem.* **B44**, 185-93(1939); cf. *C. A.* **33**, 4131[9].—The previous calcns. are extended to hydrocarbons, C_nH_n, where n is greater than 6. For benzene, the model is a full cylinder but in the cases studied here it is a cylindrical ring. The boundary conditions required are const. potential within the box, freedom of B-electrons and infinitely high, steep potential barriers. The results are similar to those obtained by Huckel (*C. A.* **26**, 25) with a different model. Eight-membered rings are unstable but 10- and 12-membered rings are stable. The plane mol. $C_{10}H_{10}$ has aromatic character. **IV. Mechanism of the excitation process in cancerous and healthy cells.** Otto Schmidt. *Ibid.* 194 202.- The energy consumption in the mutation theory of tumor formation corresponds to an excitation and is of the order of a few e. v. The lowest energy of activation corresponds with excitation of the loosely bound B-electrons of the C= O double bond of an amino acid group of a protein mol. With this assumption, the racemization results of Kögl and Erxleben (cf. *C. A.* **33**, 9421[4]) can be explained. G. M. Murphy

The color of organic substances. Gilbert N. Lewis and Melvin Calvin. *Chem. Rev.* **25**, 273 328(1939). Absorption of light is due to the excitation of electronic oscillations. In a mol. of the "ideal" type, such as a paraffin, the energy of excitation is high but diminishes as the mol. is strained. A great strain is produced by double bonds, which differ from one another in this regard. Color ordinarily appears in conjugated systems, where the 2 detg. factors are the no. of electrons involved and electron mobility. The mobility is small in a mol. whose properties correspond to a formula in which all electrons are paired and there is no "formal" charge on any atom. When such a structure is the major contributing form of a resonating mol., the mobility is still small. When, however, the actual state of a mol. differs considerably from a classical or an ideal structure, the mobility is greatly increased. In other words, displacement from the ideal structure makes further displacement easier. Strong color is obtained when 2 important resonance forms are such that the change from one to the other involves the movement of an elec. charge. This is a unit charge in many dyes of the ionic type, but there are many neutral dyes in which that part of the mol. in which an oscillation can occur acquires some pos. or neg. charge from the rest of the mol. In such cases any change in the mol. which increases that charge enhances the color of the mol. Louise Kelley

Changes in intensity and composition of cosmic rays with magnetic latitude. P. Auger, R. Grégoire, R. Maze and B. Goldschmidt. *Compt. rend.* **209**, 794-7(1939).—By means of a pair of counters placed vertically above each other, or on the same level 5.4 cm. apart, with 10 cm. of Pb suitably placed variations in the hard and soft components of cosmic radiation were measured on a voyage from Marseilles to Tahiti via Panama. Results show great constancy in the compn. of the radiation as regards the relative proportions of mesotrons and electrons, and support the hypothesis of spontaneous decompn. of the mesotrons. C. A. Silberrad

Electronic energy bands in metallic tungsten. Millard F. Manning and Marvin I. Chodorow. *Phys. Rev.* **56**, 787-98(1939); cf. *C. A.* **32**, 5299.—Curves and contours for the various bands and an equation for the electronic specific heat are given, with discussions of the differences between W and Ta. Gregg M. Evans

Measurements of the mobility of potassium ions at high field intensity and low pressure. Allen V. Hershey. *Phys. Rev.* **56**, 908-15(1939). -The mobility of K ions in the gases H_2, He, N_2 and A was measured by the Townsend method (T. and Tizard, *C. A.* **8**, 2103). Bernard Lewis

A theory for the mobility of ions of high velocity. Allen V. Hershey. *Phys. Rev.* **56**, 916 22(1939). - The theories of Langevin (*Ann. chim. phys.* **8**, 245 (1905)) and of Hasse and Cook (cf. *C. A.* **23**, 5077; **25**, 5833) for the mobility of ions in weak fields have been generalized to fields of any strength. The random energy of the ions is assumed to have a Maxwellian distribution, and the drift and random energies are both evaluated by momentum and energy balances. Bernard Lewis

Search for β- and delayed γ-radiation from the deuteron-deuteron reaction. M. H. Kanner and W. T. Harris. *Phys. Rev.* **56**, 839 40(1939). -If an excited He^3 exists, its lifetime for positron emission is greater than 10 days; for γ-ray emission, greater than 15 min. The possibility of internal conversion or of short-lived positron radioactivity was eliminated G. M. Petty

Low-energy γ-radiation from lithium bombarded with protons. W. A. Fowler and C. C. Lauritsen. *Phys. Rev.* **56**, 841 2(1939); cf. preceding abstr.—The radiation from $Li^7 + H^1$ was investigated as a function of proton energy (0 1.4 m. e. v.). With bombarding proton energies of 1080 and 1290 e. kv., γ-rays of 495 ± 25 e. kv. are emitted. G. M. Petty

Disintegration of beryllium by electrons. Geo. B. Collins, Bernard Waldman and Eugene Guth. *Phys. Rev.* **56**, 876 80(1939); cf. *C. A.* **33**, 2798.—The Be nucleus was disintegrated by fast electrons whose energies exceeded the photoelec. threshold. The electron source was a 1.8-m. e. v. Van de Graaff generator. Neutrons were produced and the radioactivity that these neutrons produced in Ag was used as a measure of the rate of disintegration. The yield curve for disintegration by electrons was obtained, and fixed the threshold for this process at 1.63 ± 0.05 m. e. v. At 1.73 m. e. v. the cross section was found to be 10^{-31} sq. cm., in good agreement with theory. The yield curve for photodisintegration by continuous x-radiation was also obtained, and the threshold was found to be identical with that for disintegration by electrons. Bernard Lewis

Magnetic spectrograph investigation of N^{13} γ-radiation. G. E. Valley. *Phys. Rev.* **56**, 838(1939).—Several authors have reported that the decay of N^{13} is accompanied by a γ-ray of 280 ± 30 e. kv. in addn. to the positron annihilation (Richardson, *C. A.* **32**, 4872[6]; **33**, 6144[6]; Lyman, *Phys. Rev.* **55**, 1123(1939); Watase and Ito, *C. A.* **33**, 8492[5]). In this region there are not more than 0.05 γ-rays per disintegration: at no point from 200 to 325 e. kv. is there more than 0.11 γ-ray per disintegration. G. M. Petty

Pair emission from fluorine bombarded with proton. W. A. Fowler and C. C. Lauritsen. *Phys. Rev.* **56**, 840-

1(1939).—A relative intensity—proton energy (0–1.4 m. e. v.) curve is given for electron pairs from F bombarded with protons. These pairs occur at resonance energies which do not coincide with the γ-ray resonances. The pairs are not produced by internal conversion of γ-rays in the usual sense, but are emitted directly from a nucleus in an excited state. Presumably this is a state in O^{16}; possibly some or all of the pairs observed originated from a transition in Ne^{20}. G. M. Petty

Coincidences between β- and γ-rays in Na^{24}. Lawrence M. Langer, Allan C. G. Mitchell and Paul W. McDaniel. *Phys. Rev.* **56**, 962–3(1939); cf. *C. A.* **33**, 8107[3], 9125[5].—The end of the β-spectrum occurs at 1.43 ± 0.05 m. e. v. There are 3.0 β-γ coincidences per 1000 β-rays from 0 to 1.3 m. e. v.: this means that the β-spectrum of Na^{24} consists of a single group. Furthermore, Mg^{24} is formed in an excited state. The av. no. of γ-rays per disintegration is 2.36. G. M. Petty

Mass and energy levels of S^{33}. Ernest Pollard. *Phys. Rev.* **56**, 961(1939).—S, bombarded by 3.1-m. e. v. deuterons gave proton groups with energy change values of +6.60, +3.70 and +1.02 m. e. v.: $S^{32} + H^2 \rightarrow S^{34} + H^1$. The mass of S^{34} is 32.9818 ± 0.0030. G. M. Petty

The internally converted γ-rays of several radioactive elements. G. E. Valley and R. L. McCreary. *Phys. Rev.* **56**, 863 71(1939).—The conversion electron spectra of a no. of radioactive elements produced by proton and deuteron bombardment in the cyclotron have been investigated. The results are: Br^{80} (4.4 hrs.) 3 conversion lines observed corresponding to 2 γ-rays, one of 48.9 ± 0.4 e. kv. and a second of either 37.1 or 25.3 e. kv., both arising in the isomeric transition to the 18-min. state. Br^{75} (6.3 min., e^+) *K* and L_1 conversions in Se of 2 γ-rays of 45.8 ± 0.4 and 107.7 ± 0.9 e. kv.; $Cd^{107 \text{ or } 109}$ (6.4 hrs., *K* capture) *K*, L_1 and M_1 conversions of a γ-ray of 92.6 ± 0.8 e. kv. In this case there is an anomalously high L_1 conversion since the *K* and L_1 lines have nearly equal intensity. Also a 530-e. kv. γ-ray, possibly annihilation radiation, although no positrons are observed. Ga^{67} (78 hrs., *L* capture) *K* and L_1 conversions of a γ-ray of 92.5 ± 0.8 e. kv.; Ga^{70} (18.5 min., e^- and possibly *K* capture) *K* and L_1 conversions of a γ-ray of 53.8 ± 0.5 e. kv. and probably a second line of about 117 e. kv. Bernard Lewis

Radioactivities produced by proton bombardment of palladium. T. Enns. *Phys. Rev.* **56**, 872-6(1939).—Proton bombardment of Pd produces the 3 known Ag periods of 2.3 min. (Ag^{108}), 25 min. and 8 days (Ag^{106}), and 3 new periods of 16.3 min. (+), 73 min. (+) and 45 days (*K* capture). The latter are assigned tentatively to Ag^{107}, Ag^{104} and Ag^{105}, resp. Excitation functions for the isomeric 25-min. and 8-day periods give *p-n* thresholds of 3.8 and 3.9 m. e. v., resp. The former agrees with the known positron spectrum of the short period. The higher threshold for the 8-day period indicates that this state lies above the 25-min. state. This activity is accompanied by probably 3 γ-rays of which 2 of 0.62 and 1.06 m. e. v. have been identified with a γ-ray spectrograph. Since no positrons accompany this activity it must decay mainly by *K*-electron capture to Pd^{106} rather than to the lower isomeric state. Four γ-rays of about 0.29, 0.42, 0.50 and 0.69 m. e. v. accompany the 45-day period. B. Lewis

Radium content of an ocean-bottom core. C. S. Piggot and W. D. Urry. *J. Wash. Acad. Sci.* **29**, 405–10(1939).—A new sampler has been developed which makes it possible to probe below the ocean-bottom surface and to det. the radioactive relationship between the ocean troughs and the continents. An Atlantic core, 2.85 m. long and extremely uniform in compn. both chemically and lithologically, was exam'd. A Ra content corresponding approx. to that of granite, with no increase with depth, was found. Conclusion: Chem. deposition played no role in the radioactivity of this particular core. M. Farnsworth

The separation tube. I. Principles of a new method of gas and isotope separation by thermal diffusion. K. Clusius and G. Dickel. *Z. physik. Chem.* **B44**, 397–450 (1939); cf. *C. A.* **33**, 4748.—Complete details of the method are given. Preliminary expts. were made with CO_2-H_2 mixts., air and a partial sepn. of the Ne isotopes was obtained. Two lecture demonstrations with Xe-H_2 and Br_2-He mixts., resp., are described. Theoretical conclusions were tested with CO_2-free air. The transport of enriched component in the tube is proportional to the following factors: the sepn. factor at the place of entrance of fresh gas; the time; the square of the pressure; the fourth power of the radius of the tube; the square of the temp. difference for small temp. difference; it is independent of the length of the tube. The end concn. is inversely proportional to the fourth power of the radius of the tube and the square of the pressure and directly proportional to the sepn. factor. Possible applications of the method are, sepn. of azeotropic mixts., purification of gases, detn. of assocn. in gases, sepn. of fogs in gases, sepn. of isosteric and isomeric gas mixts., sepn. of isotopes, sepn. of liquid mixts. **II. Separation of the chlorine isotopes.** *Ibid.* 451 73; cf. *C. A.* **33**, 6148[4].—The method was applied to HCl in a tube of 36 m. length. At.-wt. detns. were made to measure the extent of sepn. The final product of 480 cc. HCl contained 99.6% Cl^{35} with an at. wt. of 34.979 and 635 cc. HCl, contg. 99.4% Cl^{37} of at. wt. 36.956. The energy required per mol. of HCl was 3.7 × 10^{10} cal. and the theoretical efficiency was 9 × 10^{-9}. Comparison is made with other methods of sepg. isotopes. G. M. Murphy

Disorder phenomena in manganese oxides according to the Hahn emanation method. Robert Jagitsch. *Z. physik. Chem.* **B44**, 209–15(1939).—Interaction between solids and gases results in a change of the temp. dependence of the emanation power owing to the probability of formation of nuclei. The dissocn. of MnO_2 into Mn_2O_3 results in the absorption of 25.3 kg.-cal. G. M. M.

The inversion of alkali doublets. Gentaro Araki. *Proc. Phys.-Math. Soc. Japan* **21**, 508–16(1939).—It is shown that if the electromagnetic screening of an at. core is greater than the at. no. the signs of the displacements of levels in the doublet splitting are reversed, resulting in the inversion of the doublet. The effect is greater for a neutral atom than for one that is ionized. A general formula is derived for the doublet levels of the alkalies. Applied to the $4f^2F$ term of Cu I it gives a calcd. doublet interval of −4.0 $cm.^{-1}$ in good agreement with the observed interval of −3.6 $cm.^{-1}$. C. C. Kiess

Spectra of M supergiant stars. Lyman Spitzer, Jr. *Astrophys. J.* **90**, 494 540(1939).—Line widths and central intensities have been measured for some multiplets of Fe I, Mn I, Sc II, V I and Co I in the spectra of the class-M supergiant stars α Orionis and α Herculis. From these data it is found that the at. absorption coeff. is given by the usual radiation-damping formula with a damping const. approx. 500 times greater than the classical value. C. C. Kiess

Physical processes in gaseous nebulae. VIII. The ultraviolet radiation field and electron temperature of an optically thick nebula. Lawrence H. Aller, James G. Baker and Donald H. Menzel. *Astrophys. J.* **90**, 601–10 (1939); cf. *C. A.* **33**, 9135[4].—A numerical example, in which a star radiating as a black body at 80,000° illuminates a nebular shell of optical thickness 3.0 at the limit of the Balmer series of H, is solved to illustrate the use of the formulas given previously (*C. A.* **33**, 6150[8], 9135[4]). C. C. Kiess

Negative ions of hydrogen and the opacity of stellar atmospheres. Rupert Wildt. *Astrophys. J.* **90**, 611–20 (1939).—The effect of neg. H ions in increasing the absorption coeff. of stellar atms. is discussed. For stars of class F5, and later (including the sun), the effect is to remove the discontinuity at the limit of the Balmer series of H, and to confirm Russell's deduction (*C. A.* **28**, 3302[8]) that the abundance ratio of H to metallic vapors in the sun's atm. is of the order 1000:1. C. C. Kiess

The cyanogen discriminant between giant and dwarf stars. Dorrit Hoffleit. *Astrophys. J.* **90**, 621–4(1939).—The presence or absence of the cyanogen band at 4144–84 A. in the spectra of stars of classes *G* and *K*, proposed by Becker as a discriminant for distinguishing giant from

dwarf stars, is confirmed from studies of Harvard observations of stellar spectra. C. C. Kiess

The continuous spectrum of stars with extended atmospheres. D. Barbier and D. Chalonge. *Astrophys. J.* **90**, 627 9(1939).—The presence of a continuous spectrum at the limit of the Balmer series of H in a star's spectrum is an indicator of an extended envelope in which H is as conspicuously present as in the photosphere. C. C. Kiess

Interstellar calcium and color excess. Jesse L. Greenbaum and Otto Struve. *Astrophys. J.* **90**, 625–6(1939).—The star HD 147889 shows only a trace of the *K* line of Ca II in its spectrum although it is situated in very dense dark nebulosity and has a color excess of +1.8 magnitude. These facts illustrate the nondependence of the intensity of the interstellar Ca lines on the amt. of interstellar reddening. C. C. Kiess

Note on the interstellar band at λ 4430. Frances Sherman. *Astrophys. J.* **90**, 630 2(1939).—The interstellar absorption line at 4430 A., as yet of unknown chem. origin, appears with highest intensity in stars that appear reddened by the absorption of interstellar matter. C. C. Kiess

Discontinuous molecular spectra. II. Rudolf Frerichs. *Physik regelmassig. Ber.* **7**, 153 67(1939). - A discussion of advance in the exptl. study of spectra, quant. spectral analyses, rotation spectra, rotation-vibration bands, isotope effects of the band spectra, hyperfine structure and the nuclear spin in band spectra, predissocn., diffused bands, Zeeman and Stark effects of band spectra, disturbances, temp. and intensity sepn. of band spectra, fluorescence and resonance, absorption and emission band spectra, spectra of polyatomic mols., radicals, active modifications and flames, and band spectra in the earth atm. and in the cosmic rays. A no. of references are given. W. R. Henn

Continuous spectra. II. Wolfgang Finkelnburg. *Physik regelmassig. Ber.* **7**, 143 52(1939); cf. *Ibid.* **4**, 35(1936).—A general discussion of the newest developments in the study of continuous spectra. Electronic spectra (ionization spectra, emission spectra, etc.), mol. spectra (theory of the spectra of mol. in general and of the spectra of the diatomic and of the polyatomic mol.), and general emission spectra are included. W. R. H.

Electronic states of diatomic carbon, and the C—C bond. Robert S. Mulliken. *Phys. Rev.* **56**, 778 81(1939). - Energies and internuclear distances are tabulated for low-energy states of C_2 and C_2^+. Bonding to other atoms shortens the C—C and C= C bond. Similar effects appear in N compds. Gregg M. Evans

The band spectrum of tin fluoride (SnF) in emission. Tosiko Yuasa. *Proc. Phys.-Math. Soc. Japan* **21**, 497–507(1939).—A discharge through a Geissler tube contg. SnF_4 at a temp. of 700° excited the emission of a system of bands, shaded toward the red, between 4599 and 6301 A. They represent a $^2\Sigma - {}^2\Pi$ transition, the levels of the low $^2\Pi$ state being sepd. by 2318 cm.$^{-1}$, and are reproduced by the formula $\nu_0 = \left.\begin{matrix}20132\\17814\end{matrix}\right\} + (418n' - n'^2) - (580n'' - 2n''^2)$ where $n' = v' + {}^1/_2$ and $n'' = v'' + {}^1/_2$. C. C. Kiess

Note on the atmospheric oxides of nitrogen. Arthur Adel. *Astrophys. J.* **90**, 627(1939). - It is suggested that the absorption bands in the earth's atm. at 7.77 μ and 8.57 μ are produced by joint absorption of N_2O and N_2O_5 since they agree in position with bands absorbed by these gases in lab. expts. C. C. Kiess

The high-frequency perpendicular fundamental vibration of the ammonia molecule. G. B. B. M. Sutherland. *Phys. Rev.* **56**, 836–7(1939).—Barker's interpretation of the band at 4 μ (*C. A.* **33**, 6156[7]) is questioned; this band is probably $\nu_3 + \nu_4$. G. M. Petty

The rotation-vibration energies of tetrahedrally symmetric pentatomic molecules. I. Wave H. Shaffer, Harald H. Nielsen and L. H. Thomas. *Phys. Rev.* **56**, 895–907(1939); cf. *C. A.* **33**, 5280[4].—A complete theory for the rotation-vibration energies of tetrahedrally pentatomic mols. has been derived to second-degree approximation for certain vibration states. The elements of the matrix *H* are given for the states $V_1\nu_1$, ν_3, $V_1\nu_1 + \nu_3$, $V_1\nu_1 + \nu_4$, $\nu_2 + \nu_3$ and $\nu_2 + \nu_4$. The selection rules governing what transitions may take place have been detd. with relations for the intensities. Bernard Lewis

Absorption spectra of a few benzene derivatives in the near infrared with large layer thicknesses. K. Rumpf and R. Mecke. *Z. physik. Chem.* **B44**, 299–312(1939). — Absorption spectra were obtained in the photographic infrared between 7000 and 10,000 A. and light paths of 1 to 3 m. The compds. studied were benzene, phenol, nitrobenzene, aniline, toluene, xylene, naphthalene, tetralin, decalin, cyclohexanone and dioxane. The 6 H atoms of the benzene ring are probably not in the plane of the ring. Coupling of the CH-valence vibration is very small in benzene so that constitutional effects of derivs. are easy to detect. Combination bands of this frequency with other vibrations are very faint. NO_2 and OH groups tighten the CH bond while NH_2 and CH_3 groups loosen it. Combination bands with the ring frequencies 1000, 1250, 1430 and 1600 cm.$^{-1}$ were found. These were also found as stable ring frequencies in the Raman effect. G. M. Murphy

Molecular associations of cholesterol and their near infrared absorption spectra. Cécile Stora and René Freymann. *Compt. rend.* **209**, 752–4(1939); cf. *C. A.* **31**, 3784[7]; **33**, 3694[4].—Examn. of the absorption spectra in the region of 0.96 μ of cholesterol at 150°, and of solns. thereof of various strengths in CCl_4, $COMe_2$, $CHCl_3$, C_6H_6, $PhNMe_2$ and a mixt. of the first 2 shows the molten cholesterol to be assocd. and that in the solns. it is assocd. with the solvent. Ovolecithin in $CHCl_3$ or CCl_4 shows no OH band, indicating the probability of either an internal anhydride or chelation; and a mixt. of ovolecithin and cholesterol shows no assocn., but the solvent used was CCl_4, and so nonaqueous. C. A. Silberrad

Physical chemical properties of the chromophoric groups, vinylene (—CH=CH—) and bivinylene (—CH=CH—CH=CH—). Complete analysis of the absorption spectrum. I. Eduard Hertel and Herta Luhrmann. *Z. physik. Chem.* **B44**, 261–85(1939).—Combination of reaction-rate expts. with other information has made it possible to analyze the absorption spectra of stilbene, diphenylbutadiene and various derivs. The total absorption can be sepd. into single regions, which can be assocd. with chromophoric groups in the mol. The effect of substituents on the absorption and the properties of the mol is discussed. G. M. Murphy

The chlorine-sensitized photochemical oxidation of chloral. W. A. Alexander and H. J. Schumacher. *Z. physik. Chem.* **B44**, 313–26(1939); cf. *C. A.* **33**, 9145[1].—The reaction was studied between 70 and 90°; it is a homogeneous chain reaction. The overall reaction is $2CCl_3CHO + O_2 = 2COCl_2 + 2HCl + 2CO$. The rate is independent of total pressure, of pressure of reaction products and, at least down to a few mm. of Hg, also of chloral and O pressure. The quantum yield at 70° is about 3×10^3 mols. per quanta. The temp. coeff. for a temp. rise of 10° is 1.14. A reaction mechanism is presented and the rate consts. and activation energies of the intermediate steps are obtained. G. M. Murphy

Comparative experiments on the decomposition of azomethane by x-rays and by light. Paul Günther and Fritz Gebert. *Z. physik. Chem.* **B44**, 203–8(1939); cf. *C. A.* **32**, 6551[9].—Mixts. of azomethane and Xe were irradiated with x-rays and with ultraviolet light, 3670 A. The dependence of photochem. decompn. on the reaction mixt. is different in the two cases. G. M. Murphy

Effect of x-rays on liquid water and ice. Paul Günther and Luise Holzapfel. *Z. physik. Chem.* **B44**, 374–82(1939); cf. *C. A.* **33**, 3682[8].—Liquid water is decompd. by x-rays with the liberation of H. The no. of H mols. is about equal to the no. of ion pairs that would be formed by an equal absorption of x-ray energy in air. At −180°, no effect could be detected with ice. The chem. behavior of water to x-rays and α-particles is similar. G. M. M.

The nature of visual observations at low light intensities. W. M. Latimer and H. A. Young. *Phys. Rev.*

56, 963–4(1939).—Magneto-optic minima are not reproducible (*C. A.* **28**, 36[8]). The causes of erroneous observations are discussed. It is possible that the optical nerve centers which respond to low-order stimuli lack the usual power of discrimination. Also, initial readings set a pattern which then becomes reproducible; an element of suggestibility or hypnotism is evidently present.
G. M. Petty

Phototropy of anils and phototropy of solns. of the leucocyanides of malachite and brilliant greens (Gaouck, Le Fèvre) **10**. Isolation and chem. constitution of bonelline [absorption and fluorescence spectra] (Lederer) **10**. Photoreactions between phenanthraquinone and aromatic aldehydes (Schönberg, Moubacher) **10**.

Intensifying and fluorescent screen for x-ray work. John Eggert and Fritz Luft (to Agfa Ansco Corp.). U. S. reissue 21,216, Sept. 26. A reissue of original patent No. 2,076,984 (*C. A.* **31**, 3792[9]).

4—ELECTROCHEMISTRY

COLIN G. FINK

New material for high-frequency furnaces. V. Maklinov. *Novosti Tekhniki* **1939**, No. 2 3, 22.—A crucible material which lasted for 150 heats in a 500-kg. high-fre- or nonferrous metallurgy was prepd. from ground quartz 56, marshallite 20, ground glass 12 and white refractory clay 12%. B. Z. Kamich

The electrolysis of fused salts: reply to an article by P. Drossbach. A. v. Zeerleder. *Z. Elektrochem.* **45**, 787(1939); cf. D., *C. A.* **33**, 6722[9]. A claim for priority over Wöhr (*C. A.* **27**, 5648) for a method of measuring the resistance of electrolytic baths. S. Glasstone

Rapid method of anodic oxidation of aluminum and its alloys. F. V. Kozlenkov. *Avtaprom yshlennost* **1939**, No. 6, 32–8.—Up to 1938 the Bengough and aloxal methods of lic oxidation of Al and its alloys were used extensively in Russia. In 1938 a rapid method (30 min.) of anodic oxidation in 10% chromic acid was introduced. The specimen is cleaned, washed in water and made the anode at 37 + 2° at a const. voltage of 40 v. and c. d. of 0.3–0.4 amp./sq. dm. Best results are obtained at a pH of 0.18 to 0.60–0.70 and a specific elec. cond. of 0.1400 to 0.0900 at 37°. B. Z. Kamich

Electroforming. Samuel Wein. *Product Eng.* **10**, 486–8(1939).—The process is discussed, the care of the plastic casts and the compn. of the electrolyte. A table shows a selected list of fusible metals. Ann N. Hird

Electrodeposition of metals from solutions with sulfamic acid or its salts. Roberto Piontelli and Alessandro Giulotto. *Chimica e industria* (Italy) **21**, 478–91(1939).—L. Cambi and R. Piontelli (*Rend. inst. lombardo sci.* **72** (1938–39)) pointed out the possibilty of utilizing solns. of HSO_3NH_2 in electrometallurgy. P. and G. detd. the current densities and other conditions necessary to obtain satisfactory deposits of various metals. The following metals give satisfactory protective or ornamental coatings: Cu, Fe, Ni, Co, Cd and Rh; the following can be refined electrolytically in sulfamic acid solns.: Cu, Ag, Fe, Ni, Co and Pb. Optimum conditions for depositing each metal are noted. Cu gives satisfactory deposits at up to 550 amp./sq. m. at temps. of 12–30°; at 37° and 300 amp./sq. m. a specular deposit is obtained. $CuCO_3$ is dissolved in the acid to give 1 *M* soln. of Cu. Ag solns. are also prepd. from Ag_2CO_3 or by reaction of Ag_2SO_4 and $Ba(SO_3NH_2)_2$. At temps. of 20–60° and currents of 40–130 amp./sq. m. deposits of Ag can be obtained. At 20° and 100 amp./sq. m. compact, finely cryst. deposits almost as good as from cyanide solns. can be obtained. Fe is deposited at 17–50° and 100–1000 amp./sq. m., the best deposits being obtained at 17° and 310 amp./sq. m. Ni is deposited at 12–40° with currents of 70–350 amp./sq. m. Excellent thin or medium coats of Ni can be obtained. Extra-heavy deposits tend to flake off. Pb in 1–2 *M* soln., with fish glue as protective colloid, can be electrolyzed from soln. with practically complete sepn. from Bi, As, Sb or Sn. Temps. of 13–22°, at 50–150 amp./sq. m., were used. The higher temp. gives more compact deposits. Th at 19° and 100 amp./sq. m. gives needle-like deposits which makes possible the prepn. of the pure metal, but adherent deposits were not obtained. Zn was electrolyzed at 14–40° and 77–1000 amp./sq. m. Deposits correspond with those obtained with sulfate solns., with no particular advantage in using sulfamate. Cd behaves like Zn. Rh solns. contg. 10–20 g./l. Rh and with excess free acid were electrolyzed at room temp. and 50–100 amp./sq. m. with Cu or Pt cathodes, and gave very good deposits of Rh. All known salts of sulfamic acid except the basic Hg salt are sol. in water. Attempts at depositing Sn, Mn, Bi, Cr, Sb and As were unsuccessful, in fact salts of Bi, Sb and As are not known, while the Sn salt is very slightly sol. Manganous salts oxidize very readily. The possible deposition or refining of Pt or Au by means of sulfamic salts is still under investigation, as well as possible applications to quant. analysis.
A. W. Contieri

The electrodeposition of silver from thiosulfate solutions. Robert Weiner. *Z. Elektrochem.* **45**, 757–9(1939); cf. *C. A.* **34**, 3277[7].—Bright electrodeposits of Ag can be obtained from a bath contg. 40 g. Ag (as AgCl), 170 g. $Na_2S_2O_3.5H_2O$, 20 g. $NaHSO_3$ and 50 g. Na_2SO_4 per l., at c. ds. of 0.3–0.5 amp./sq. dm. The $NaHSO_3$ prevents oxidative decompn. of the Ag-S_2O_3 complexes, and the Na_2SO_4, which may be replaced by Cl^-, acetate or citrate, facilitates soln. of the anode. NH_4Cl, Na_2CO_3, NaOH, NaCNS and NH_3 are harmful, but CN and PO_4^{---} have a small beneficial effect. Capillary-active substances, e. g., Turkey-red oil, and colloids have little or no effect on the deposits. S. Glasstone

The electrolytic preparation of silver oxide. Kálmán Mérei. *Magyar Chem. Folyóirat* **45**, 123–30(1939).—Various expts. were made. The optimum conditions for the electrolytic prepn. of Ag_2O are those of Lorenz (*Z. anorg. Chem.* **12**, 436(1896)): concd. electrolyte (25–30% $NaNO_3$) at a low c. d. (0.5 amp./sq. dm.) at room temp. and anodes of pure Ag and cathodes of Ni or Fe closely spaced. The potential of the cells ranged from 1.7 to 2.8 v. For 1 g. Ag_2O 0.417–0.664 watt-hrs. were required; current efficiency 91.1 to 98.4%. In 18–60 min. 1.491–2.282 g. Ag_2O was produced. S. S. de Finály

A graphic method for the calculation of the current density at a given point during electroplating. I. Ya. Bogorad. *Korroziya* **4**, No. 2, 155–8(1938); *Khim. Referat. Zhur.* **2**, No. 1, 78(1939).—The detn. of the cathode c. d. at a given point is important to obtain deposits of a definite quality, especially for Cr-plating relief surfaces. The graphical method permits detn. of the c. d. from the velocity of the deposition of the metal on the cathode, which is measured at the same point. The velocity of the deposition on the surface of the cathode is detd. by $\delta = (KPD)/d \times 1000$ where δ is the thickness of the deposit in mm. deposited in 1 hr., K the electrochem. equiv., P the current efficiency, D the cathode c. d. in amp. per sq. dm., and d the density of the deposited metal. With a current efficiency of less than 100% the yield changes with the change of the c. d. The formula thus contains 2 unknown quantities. The dependence of the yield on D is found graphically. On the basis of exptl. data a curve is constructed of the yield depending on the current for $D = 1$. Another curve $\delta = f(D, P)$ is constructed from points detd. from the formula and from curve 1; from this the c. d. is detd. depending on the velocity of deposition at a given point. By detg. the deposition velocity from curve 2 the cathodic c. d. is found, and then from curve 1 the current efficiency is detd. Thus, the detn. of the deposition velocity is

simplified to the detn. of the thickness at a given point by one of the usual methods. W. R. Henn

The antimony electrode. Yrjö Kauko and Laina Knappsberg. *Z. Elektrochem.* **45**, 760-9(1939).—See *C. A.* **33**, 6726[1]. S. Glasstone

Cathodic polarization during deposition of metals from nonaqueous solutions. A. I. Levin and O. A. Esin. *Trudy Ural. Ind. Inst.* **1938**, No. 6, 43-51; *Khim. Referat Zhur.* **2**, No. 2, 10(1939).—Curves for the cathode potential *vs.* c. d. were prepd. based on the exptl. data for the discharge of Cu^{++} and Cu^{+} ions and for Ag^{+} and Zn^{++} ions. The expts. are described. Formamide and pyridine were used as solvents. The polarization in the Cu^{++} discharge was studied with a $CuSO_4$ soln. in formamide; and in the Cu^{+} discharge, with a CuCl soln. In both cases free HCOOH was present. Polarization during the discharge of Ag^{+} was studied in a 0.1 *N* $AgNO_3$ soln. in pyridine. Pyridine was also solvent for the ZnI_2 solns. The curves show that during the discharge of Cu ions a considerable chem. polarization takes place (besides the usual concn. polarization) which is expressed by the Erdey-Gruz and Volmer equation which presupposes that the retardation of the formation of the crystal grains is the cause for the polarization. During the deposition of Ag a chem. polarization is also observed, but its abs. value is considerably smaller than that for Cu. For Zn^{++} as well as for Cu^{+} only the concn. polarization is observed. Curves are shown for the change in cathode polarization with time, for the discharge of Zn^{++} on a Zn cathode from solns. of ZnI_2 in pyridine and of $ZnCl_2$ in acetone. These curves indicate a special initial polarization which had been found by L. and E. previously in the study of cathodic polarization during the deposition of Cu from aq. solns. W. R. Henn

Electrolysis of mixtures of pivalic acid salts with nitrates. Fr. Fichter and Raymond Gunst. *Helv. Chim. Acta* **22**, 1300-7(1939).—The electrolyte (150 cc.) contained 40.8 g. pivalic acid, 16 g. NaOH and 17 g. $NaNO_3$ and was placed in the anode compartment with Pt anode. The cathode compartment contained 2 *N* Na_2CO_3. Electrolysis was carried on for 5 hrs. at 4 amp. (0.174 amp./sq. cm. of anode). The following products of the electrolysis were definitely identified: Me_3CONO, Me_3CCOOH, Me_3COH, $Me_2C{:}CH_2$, $Me_2C(ONO_2)CH_2ONO_2$, $Me_2COH\text{-}CH_2OH$, $Me_3CCOOCMe_3$, $Me_2C(ONO_2)OCMe_3$ and $Me_2COHCH_2OCMe_3$ Oden E. Sheppard

The formation of formaldehyde by acetate electrolysis. Emil Baur. *Helv. Chim. Acta* **22**, 1120-3(1939).—Electrolysis of 50% AcOEt, 25% AcOH and 25% AcOK at 0.2 amp. for 80 min. without a diaphragm and with stirring gave concns. of 14.7 mg. HCHO per l. and with a diaphragm only 8.8 mg. Omission of AcOEt resulted only in traces of HCHO being formed. The primary anodic product is probably AcO_2Ac which on hydrolysis forms AcO_2H and cathodic reduction of this yields CH_4 and HCO_2H which decomps. to HCHO and O_2. O. E. S.

Chemical action of the electrical discharge. XVIII. Production of nitric oxide in the high-frequency arc. Refinements and new results. E. Briner, J. Desbaillets, F. Richard and H. Paillard. *Helv. Chim. Acta* **22**, 1096-1107(1939); cf. *C. A.* **31**, 3247, 6136; **33**, 1221[6].—Methods of analysis used in previous work in this field reported by the authors have been found unreliable for NO at low pressures and so previous values are in error. By use of the Devarda alloy method for detg. NO, new values were obtained with pressures of 28 to 710 mm., arc frequencies about 10^7 per sec., various concns. of N and O, various current densities and various oscillator connections. Good yields are obtained by circulating equal molar mixts. of N and O at reduced pressures through the arc at as low c. d. as will maintain a stable arc. Oscillator connection was studied as it exerts a marked effect on yield. Best yields were of the order of 200 g. HNO_3 per kw.-hr. Oden E. Sheppard

Modern vacuum practice in electronics. Richard S. Morse. *Electronics* **12**, No. 11, 33-6(1939).—The success of the electron tube is dependent upon the production of high vacuum. The lowest pressure attainable with a vapor pump corresponds to the vapor pressure of the working liquid. Tests are recorded to demonstrate the advantages and the stability of Octoil and Octoil-S (low vapor pressure fluids) with a 4-compartment, 3-jet all-glass fractionating pump. C. G. F.

Miniature battery tubes. Kenneth G. Bucklin. *Electronics* **12**, No. 11, 27-8(1939).—For the 45 v. "B" battery portable radios new tubes have been developed about $^3/_4$" in diam. and $2^1/_8$" long. With the exception of the output tube, which contains 2 filaments in parallel, the new tubes have a filament rating of 50 milliamp. at 1.4 v. C. G. F.

Ceramic spacer material for electron-discharge devices (U. S. pat. 2,175,707) **19**. Dewaxing oils [by electrodeposition] (U. S. pat. 2,174,938) **22**. Porous rubber for battery separators (U. S. pat. 2,175,798) **30**.

Primary electric battery. Albert 1. Eddy (to Thomas A. Edison, Inc.). U. S. 2,175,885, Oct. 10. Various details of a battery which may have electrodes of Zn and Cu oxide and an electrolyte such as KOH soln.

Dry cell. Albert I. Eddy (to Thomas A. Edison, Inc.). U. S. 2,175,686, Oct. 10. Various structural details.

Storage battery. Lester E. Lighton (to Elec. Storage Battery Co.). U. S. 2,175,993, Oct. 10. Structural details.

Electric condenser. Preston Robinson and Wm. M. Allison (to Sprague Specialties Co.). U. S. 2,174,840, Oct. 3. A combined electrode and dielec. layer for an adjustable condenser comprises a conductive layer of film-forming metal such as Al and a dielec. layer immediately adhering and baked to the conductive layer and consisting of an oxide of the metal and having a hard outer surface and a portion less hard and more elastic adjacent to the conductive layer.

Electrolytic condensers. Preston Robinson (to Sprague Specialties Co.). U. S. 2,174,841, Oct. 3. A process for the manuf. of electrolytic condensers involves subjecting an etched foil of a film-forming metal such as Al to a surface treatment with a soln. having a small amt. of undissocd. acid such as oxalic acid the anions of which are substantially entirely univalent ions and which comprises as main constituent an acid, forming in the soln. a porous film having a thickness of about 5-15 microns on the metal, and, without intermediate hydrolyzation of the so-treated surface, subjecting the foil to a surface treatment in a second soln. such as a dil. NH_4 soln. to change, in the first soln. remaining on the foil, the univalent ions to bivalent ions, and thereafter subjecting the foil to a dielec. film formation.

Electrolytic cleaning of iron or steel wire in dilute sulfuric acid. Ferdinand A. Herrmann. U. S. 2,174,722, Oct. 3. Various details of operation.

Electric arc device for burning in furnace linings such as those of metal or glass-melting furnaces. Wm. E. Moore and William B. Wallis (to Pittsburgh Research Corp.). U. S. 2,174,927, Oct. 3. Various structural and operative details.

Electroprocessing apparatus with tanks and work carriers. Guerin Todd (to Hanson-Van Winkle-Munning Co.). U. S. 2,175,788, Oct. 10. Various structural, mech. and operative details.

Apparatus for effecting the electrostatic separation of materials such as dust and smoke from air or flue gases. Harold W. Bartlett (to Rosenberg Bros. & Co.). U. S. 2,174,681, Oct. 3. Various structural, elec. and operative details.

Selenium rectifier with carrier electrodes of light metal such as aluminum. Fritz Brunke and Werner Koch (to General Elec. Co.). U. S. 2,175,873, Oct. 10. A method of producing dry-plate elements of the Se type involves providing a carrier electrode composed of a light metal such as Al, Mg or Be having on it an oxide film, applying a plurality of particles of finely divided C to the surface of the film, applying a layer comprising Se to the C-treated surface, and applying a counter electrode such as Wood's metal to the layer (the amt. of C being so limited that the

light metal acts chemically with the Se layer). Cf. *C. A.* **33**, 7677[8].

Dry-plate electric rectifiers. Fritz Brunke (to General Elec. Co.). U. S. 2,175,016, Oct. 3. A method of producing an element for a dry-plate device having a carrier electrode comprising Al, Mg or Be or one of their alloys involves exposing the electrode to a mixt. of Se vapor and I vapor in the presence of a chemically neutral gas such as N (suitably under superatm. pressures).

Electric fuse comprising lead salts of nitrophenols. Lawton A. Burrows and Walter E. Lawson (to E. I. du Pont de Nemours & Co.). U. S. 2,175,250, Oct. 10. An elec. fuse comprises a metal fuse bar assocd. in heat-transfer relation with a Pb salt of a nitrophenol contg. not more than 2 nitro groups, such as Pb dinitro-*o*-cresylate.

Generating electricity in a gas cell. Herbert H. Gregger. U. S. 2,175,523, Oct. 10. A process of generating electricity comprises introducing a fuel gas into a gas cell at one electrode thereof where it comes into contact with an electrolyte comprising a fused mixt. of alkali and alk. earth metal carbonates and halides and reacts chemically therewith, releasing electrical charges to the electrode and simultaneously introducing at least one gas contg. O and a CO_2-contg. gas at the other electrode where it comes into contact with the electrolyte and reacts chemically therewith, releasing electrical charges which are imparted to the other electrode.

Protective cut-offs or warning signals for electrical devices. Charles F. Hill (to Westinghouse Elec. & Mfg. Co.). U. S. 2,175,893, Oct. 10. A dielectric such as $FeCl_3$ is used which when decompd. by an elec. arc evolves a gas such as HCl which reacts with a metallic hydroxide such as $Fe(OH)_3$ together with a member such as cellulose acetate having a high ohmic resistance to the flow of elec. current applied to such member and a metallic hydroxide such as $Fe(OH)_3$ which reacts chemically with the evolved gas to produce a material of good elec. conducting character.

Photoelectric cathodes. Leslie E. Flory (to Radio Corp. of America). U. S. 2,175,888, Oct. 10. A light-transmitting support such as glass or mica carries on one side a light-transmitting film of metal such as Pt, Al, Ni or Cr with an overlying layer of minute photosensitive globules of material such as Ag. Cf. *C. A.* **33**, 2049[7].

Cathode for electric discharge devices. Georg Galdies, Hermann Krefft and Hermann Kummer (to General Elec. Co.). U. S. 2,175,345, Oct. 10. A method of producing a thermionic cathode involves sintering a mixt. of an alk. earth metal compd. such as BaO or SrO and W powder, forming a paste of the sintered material with alc., and placing the paste within a helix of W wire to fill completely the space within the helix, and again sintering the material in a nonoxidizing atm.

Mosaic electrodes for television tubes. Albert Rose (to Radio Corp. of America). U. S. 2,175,701, Oct. 10. Electrodes are prepd. by coating the exposed surface of a wire-mesh screen which may be formed of Ni with an elec. insulating substance such as an enamel and filling the interstices of the screen with a mixt. of paraffin and powd. material such as Ag or Ag oxide which when fired sinters and becomes electrically conducting while maintaining the screen at a temp. approx. the m. p. of the paraffin to form individual sepd. plugs in the interstices of the screen, cooling the screen to solidify the paraffin, applying a quantity of the powd. material to each side of the prepd. screen, mechanically working the powd. material into the plugs to remove the excess of the binder from the exposed surface of the insulated screen, and firing to volatilize the binder and sinter the powd. material.

Television transmitting tube. Harley A. Iams (to Radio Corp. of America). U. S. 2,175,691, Oct. 10. A target electrode positioned to be scanned by an electron beam comprises a Cu foundation plate carrying an integral layer of Cu_2O and an overlying discontinuous mosaic of translucent particles of sputtered metal such as Cs. U. S. 2,175,692 also relates to details of television transmitting tubes.

Electron emitters. Ernest A. Lederer (to Radio Corp. of America). U. S. 2,175,696, Oct. 10. A core of metal such as Ni is coated with MgO and Ba azide and is heated in a nonoxidizing environment to solidify the MgO and cause it to adhere to the core and to decompose the azide to metallic Ba and disperse the latter through the oxide.

Electron-discharge devices suitable for transmitter tubes. Peter Knepen (to General Elec. Co.). U. S. 2,175,695, Oct. 10. An electrode is used formed of Ni, Ta or Mo carrying a layer of C and an overlying layer of a metal such as Zr having a high m. p. and good heat-radiating and gettering properties.

Electric discharge devices rendered luminescent by discharge through them. John T. Randall (to General Elec. Co.). U. S. 2,174,449, Sept. 26. A source of light comprises in combination a high-pressure Hg vapor elec. discharge lamp having a quartz envelope, and luminescens material assocd. therewith and exposed to the radiation from the lamp, the luminescent material contg. three different components, one component comprising a fluorescent Zn Cd sulfide contg. 20–40% of CdS activated by copper, another of the components comprising a fluorescent Cd silicate or Zn Be silicate activated by Mn, and a third component which emits blue luminescent light upon excitation by radiations from the lamp in the range of 4000–2200 A.

Composite bodies such as vacuum tubes. Hans Pulfrich (to General Elec. Co.). U. S. 2,174,390, Sept. 26. As a material for bonding with W, Mo or the like, use is made of a low-dielec. loss ceramic material such as is formed by firing at an elevated temp. a mixt. which may be formed of Be oxide 10–40, hydrous Mg silicate 15–36 and hydrous Al silicate 36–67.5 parts, such ceramic material having a coeff. of linear expansion not substantially exceeding 50.10^{-7} per degree.

Ignitron apparatus such as that containing neon or argon and mercury. Joseph Slepian (to Westinghouse Elec. & Mfg. Co.). U. S. 2,175,924–5, Oct. 10. Various structural, elec. and operative details of app. suitable for low potential operation.

Iron phosphate from ferro-phosphorus. Lewis H. D. Fraser. U. S. 2,173,103, Sept. 19. Ferro-P is used as anode in an electrolyte consisting essentially of an aq. soln. of an alkali metal salt of a strong inorg. acid (such as one of Na sulfate and H_2SO_4), and a chemically inert conductor, such as Pb or C, is used as a cathode, employing a d. c. at an anode c. d. of not more than 100 amps. per sq. ft. between the anode and cathode, to produce insol. Fe phosphate.

5—PHOTOGRAPHY

E. R. BULLOCK

A new color cinematographic process (Agfacolor Negativ-Positiv process). J. Eggert. *Phot. Ind.* **37**, 702 (1939).—Complementarily dyed negatives are produced by color development, and from these prints are made. Diffusion-fast constituents for the color development have been incorporated in the manuf. of the taking and reproducing films. E. R. B.

Influence of pressure and development on the solarized latent photographic image. Anna Joyce Reardon. *J. Optical Soc. Am.* **29**, 427–31 (1939); cf. *C. A.* **32**, 8966[2].—Using Eastman P. M. C. Bromide No. 1 paper and Eastman Portrait (nitrate) Films, R. detd. the effect of pressures up to 387 kg. per sq. cm. and of up to 1356 kg. per sq. cm., resp., applied during exposure, on the ds. after development by 2 or all of 4 methods. These are: chem. development with restrained hydroquinone, and phys. development (1 prefixation and 2 postfixation methods) according to Odell (*C. A.* **27**, 4182). The result obtained,

in all cases, was a decrease in the d., this effect increasing with increasing pressure, without removal of the solarization when solarization was shown in the control expts.
E. R. Bullock

Role of the oxidation products in development. H. Staude. *Phot. Ind.* **37**, 701 2(1939); cf. *C. A.* **32**, 6564⁴. —From the results of expts. with different developer solns., each of which had been carefully freed from the oxidation product of the particular developing agent, it appeared probable that such an oxidation product is essential for the initiation of development. S. considers that the oxidation product favors adsorption of the developing agent onto the exposure nuclei and so causes the reducing agent to be a photographic developer.
E. R. B.

Standardization of photographic sensitometry based on the addition law. A. van Kreveld. *J. Optical Soc. Am* **29**, 327–36(1939).—From the abs. spectral sensitivities, measured in connection with a recent investigation on darkroom illumination, of 26 well-known films and plates, various practical sensitometric magnitudes have been computed by means of the addn. law (*Brit. J. Phot.* **82**, 388(1935)). Conclusions: (1) The total sensitivity of panchromatic emulsions does not greatly exceed that of orthochromatic and noncolor-sensitive emulsions. (2) For all (even the panchromatic) emulsions, the sensitivity to W incandescent light is lower than to daylight. (3) Color sensitivity of all the emulsions is far less than is desirable. (4) Color sensitivity (contrary to common opinion) does not vary significantly with the kind of illumination. (5) Five sensitometric nos. which satisfy all practical requirements are: the total sensitivity to daylight, the total sensitivity to W light and the color sensitivities, compared with blue, to green, yellow and red, resp.
E. R. Bullock

Mordanting bath for dye-toning transparencies. P. Hanneke. *Phot. Chronik* **45**, 368(1938). A mordanting bath suggested is: H_2O 1 l., $CuSO_4.5H_2O$ 40 g., KCNS 20 g., K citrate 60 g. and AcOH 30 cc. After the transparencies are mordanted and washed, it is recommended to dye them in a soln. of rhodamine B, thoflavine T or methylene blue 2 g. or less, with AcOH 2 cc. or less, per l.
L. E. Muehler

Sulfonated long-chain secondary alcohols as wetting agents. R. Bredeau. *Rev. prod. chim.* **41**, 289–91; *Science ind. phot.* **9**, 271(1938). The Tergitols, which are the Na sulfonates of secondary aliphatic alcohols contg. 8–20 C atoms, are recommended as wetting agents for photographic use. The even flow of developer over sensitive materials is ensured by the addn. of 0.5–1.0% of Tergitol 7; an alk. soln. contg. Tergitol 4 is used for washing bottles, and Tergitol 08 can be added to acid fluxes used for soldering.

Photographic fixing compositions. Robert B. Barnes (to American Cyanamid Co.). U. S. 2,174,494, Sept. 26. An amidine salt such as guanidine thiosulfate is used in thiosulfate fixing compns. for use with Ag halides, to increase the fixing speed.

Sensitized coating for photographic and printing purposes. Anton F. Greiner. U. S. 2,174,629, Oct. 3. A polymerized vinyl alc. is used with a catalyst such as $(NH_4)_2Cr_2O_7$ reactive with the polymerized vinyl alc. in the presence of actinic rays to render it less sol.

Modification system for correcting a set of yellow, red and blue separation photographic negatives. Wm. J. Wilkinson (50% to Michle Printing Press and Mfg. Co.). U. S. 2,174,812, Oct. 3. Numerous details of procedure are described.

Color-sensitive photographic plates. Joseph S. Friedman and Arthur Bruck (to Color Processes, Inc.). U. S. 2,175,836, Oct. 10. A method of producing multicolor-sensitive stratification of the light-sensitive emulsion on a photographic plate having a transparent carrier which is to be placed toward the source of light on exposure, and to produce the image in one color value adjacent the carrier and in another color value away from the carrier, involves providing a plate composed of the transparent carrier coated with a blue-sensitive gelatin emulsion of an insol. Ag halide, immersing the plate in a substantially nonaq. org. solvent soln. such as an iso-PrOH soln. of a color-sensitizing dye which will sensitize the emulsion to one of the primary colors other than blue, such as pinacyanol, without swelling or penetrating the emulsion (penetration being prevented by a sufficient concn. of the org. solvent used), removing the plate and drying to form a substantially nonpenetrating surface coating of the sensitizing dye upon the emulsion without substantial sensitization of the emulsion, and then treating the dried plate with an aq. soln. of an org. solvent such as an aq. iso-PrOH soln. contg. auramine to cause a slight swelling and to cause a limited diffusion of the deposited surface coating of the sensitizing dye into the outer portion of the emulsion without penetrating the portions of the emulsion adjacent the carrier, whereby upon exposure of the plate with the carrier facing the source of light the portion of the emulsion adjacent the carrier will reproduce the image in blue values while the portion of the emulsion away from the carrier will reproduce the image in values corresponding to the sensitization obtained by the sensitizing dye.

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

Action of chlorine on calcium oxide. Marcel Lemarchands and Ernesto Matiz Umana. *Compt. rend.* **209**, 757–9(1939).—Anhydrous Cl scarcely acts on anhydrous CaO. The results obtained when Cl reacts on CaO which is hydrated to a varying degree (**X** = 5.8–85%) indicate: (*a*) The percentage of H_2O replaced by Cl is independent of the amt. of hydration if **X** is less than 45%; (*b*) the case of chlorination is increased if **X** is greater than 50%, but the amt. of H_2O of hydration replaced by Cl decreased with increasing **X**. The explanation given was that when **X** is small a larger proportion of CaO is present to reabsorb the H_2O expelled by the Cl, thus rendering the H_2O available again for exchange with the Cl.
C. A. Silberrad

Solubility of the double fluorides of aluminum and of the basic metals. J. Tananaev and Sh. Talipov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1155–7(1939). —An exptl. method is given for the prepn. of Na_3AlF_6, K_3AlF_6 and $(NH_4)_3AlF_6$ whose compns. correspond exactly to their formulas. The expts. were performed in a thermostat at 25° in vessels having Hg seals. Twelve hrs. was required for the satn. After the equil. had been reached a definite vol. was dried and weighed. The analysis of the dry residue corresponded to the formula M_3AlF_6. Expts. were also performed for the detn. of the soly. of Na_3AlF_6 and of K_3AlF_6 at different temps. At 0, 25, 50, 75 and 100° the soly. of Na_3AlF_6 in g./1000 g. of the soln. was 0.3480, 0.4175, 0.7932, 0.9302 and 1.3500 and that of K_3AlF_6 in 1000 g. of the soln. 0.8604, 1.4288, 2.6125, 3.4511 and 4.5828, resp. The soly. of $(NH_4)_3AlF_6$ at 0, 25, 50, 55, 60, 65, 75 and 100° was 4.3128, 7.6585, 12.3622, 12.1217, 11.7034, 11.2510, 11.0132, 7.4190, resp. In contrast to the soly. of Na_3AlF_6 and K_3AlF_6 the soly. of $(NH_4)_3AlF_6$ does not rise steadily, but it has a max. at about 50°, after which it decreases sharply. At 10° and 25° the values for the soly. are the same. The unusual behavior of $(NH_4)_3AlF_6$ is evidently due to a change in its cryst. structure. A supposition that the salt dissolves incongruently was not verified, since the compn. of the dry residue was close to $(NH_4)_3AlF_6$. The difference in the solubilities of the 3 investigated salts led to an attempt to use a soln. of $(NH_4)_3AlF_6$ for the pptn. of the ions of Na and K. Preliminary expts. showed that both ions (used singly or together) were quantitatively pptd. as Na_3AlF_6 and K_3AlF_6. Since the soly. of each ppt. was very small,

attempts were made to det. the amt. of Na and K by microchem. means. Three graphs, 3 tables and 3 references are given. W. R. Henn

The nature of the precipitates obtained by adding sodium silicate to magnesium sulfate. R. Roseman, M. B. Levin and H. Eisenberg. *Am. J. Pharm.* **111**, 400–6 (1939).—The prepn. of a group of Mg silicates by the interaction of Na silicate and Mg sulfate (mols. $Na_2O.3.27SiO_2$/mols. $MgSO_4.7H_2O$ = 0.51–2.03) is described. Careful analyses of the products (mol. ratios, $MgO:SiO_2$ = 1:3.08–1:4.31) have furnished the data needed for plotting curves, useful in detg. the proportions of reactants required to produce any silicate in the range studied. A synthetic Mg silicate, in which the mol. ratio $MgO:SiO_2$ is the same as the mol. ratio $Na_2O.SiO_2$ in the Na silicate used in its prepn. (1:3.27), results from the interaction of equal numbers of mols. of the Na silicate and the Mg sulfate. The pptd. Mg silicates can be washed free of Na (and sulfate), even where a considerable excess of Na silicate has been employed as precipitant. W. G. Gaessler

Investigations in the domain of the chemistry of "inert" gases II. The hydrates of argon and neon. B. A. Nikitin. *J. Gen. Chem.* (U. S. S. R.) **9**, 1167–75(1939); cf. Khlopin and Gerling, *C. A.* **31**, 3339[3].—The coppttn. with isomorphic substances is the new method for the prepn. and investigation of the dissocg. compds. During the formation of the hydrate of SO_2 from the gas and ice an isomorphic absorption of A takes place which is distributed between the gaseous phase and the crystals according to Berthelot-Nernst law. In the expts. with A and Ne about 1 ml. of these gases and a large excess of SO_2 were taken. The app. for the prepn. of the hydrates of A and Ne consisted of a U-shaped tube (approx. 50 ml) of which one end was drawn into a capillary, and both ends were provided with stopcocks. About 30 g. of finely divided ice was added to the tube, and the vol. of the unfilled space detd. Into the evacuated tube a definite amt. of SO_2 was introduced. The hydrate was formed after 1–2 mm. when a definite amt. of the inert gas was added. The reaction tube was left at this temp. for several days. The fine crystals of the hydrate of SO_2 rapidly recrystd. (through the gaseous phase). After a definite time the reaction tube was washed with a mixt. of CO_2 and SO_2 in which the partial pressure of SO_2 was equal to the dissocn. pressure of the hydrate of SO_2. This prevented dissocn. of the hydrate during washing. The washed gases entered first the capillary of the reaction tube where they were cooled. Specially conducted control expts. showed that in the absence of SO_2 all A is washed away and it is not absorbed by ice. The inert gases were analyzed in the app. of Khlopin and Gerling (cf. *C. A.* **31**, 3339[3]). The mean distribution const. D at −10.5° was 0.0078. Ne was also absorbed by the crystals of the SO_2 hydrates, but only 1.5–3.5% of Ne can be transferred to the residue. For Ne the distribution const. at −8.5° was of the order of 4×10^{-5}. No Ne was observed in the residue under the same conditions. This points to the existence of a formerly unknown hydrate $Ne.6H_2O$. The inert gases have many analogs in the formation of mol. chem. compds. This analogy is expressed not only in the same compn. and structure of the crystallohydrates of the inert gases as have the other mol. crystallohydrates, but they form mixed crystals with the other hydrates. Five tables and 12 references are given. **III. Separation of the "inert" gases from each other by chemical means.** *Ibid.* 1176–81 (1939).—By isomorphic coppttn. with the hydrate of SO_2 it was possible to convert Rn quantitatively to a hydrate while He, Ne and A remained in the gaseous phase. It was also possible under other conditions of the expt. to ppt. A practically quantitatively and to sep. it from He and Ne which remained in the gaseous phase. Such a method for the sepn. of the "inert" gases should be called a chem. method since it is based on the different stabilities of the hydrates of the "inert" gases. According to its chem. properties A is closer to Rn than to Ne. It is easier to sep. A from Ne by the hydrate method than from Rn. Seven tables and 3 references are given. W. R. Henn

Complexes formed by molybdic acid in aqueous solution. Mme. Hugues Frey (Zina Soubarew). *Compt. rend.* **209**, 759–60(1939); cf. *C. A.* **33**, 37[2], 5765[8].—Crystd. addn. compds. of the type $2MoO_3.X.n\,H_2O$ [X = glycine, hexamethylenetetramine, antipyrine, imidazole, or *d*-arabotetrahydroxybutyl-4 (or 5)-imidazole (I)] were prepd. (N = 1–3, usually being 2). I was found to be similar to ammoniomannitodimolybdic acid (cf. *C. A.* **33**, 5765[8]), forming a well-crystd. and very sol. NH_4 salt $[Mo_2O_7H.C_7H_{12}N_2O_4]NH_4$. The other complexes are less stable. The conductimetric method shows that the imidazole compd. has an active H, which is replaced by Na.

C. A. Silberrad

7—ANALYTICAL CHEMISTRY

W. T. HALL

Qualitative and quantitative chemical analysis by line emission spectra. Ralph A. Sawyer. *Applied Phys.* 10, 741–50(1939).—A review with 38 references. E. H.

Fractional centrifugation as a means of separation in the analysis of a mixture. A. Gourevitch. *Ann. chim. anal. chim. appl.* **21**, 291–7(1939).—Without using any chem. reaction, it ought to be possible to sep. compds. in a mixt. by means of evapg. the aq. soln. to dryness in such a way that very small crystals are obtained, adding a liquid in which the crystals are insol., triturating to form a paste, adding another liquid in which the first liquid is sol. but which does not dissolve any salt and subjecting the mixt. to centrifugation. The procedure was tested with $K_2Cr_2O_7$, d. 1.99 and KCl d. 2.69. The aq. soln. was evapd. to dryness, triturated with 9 times its wt. of thymol and some glass, and after 3–4 days some of the mixt. was mixed with a relatively large quantity of $CHBr_3$ + C_9H_{20} which was mixed so that its d. was a little greater than that of KCl and less than that of the $K_2Cr_2O_7$. Gentle centrifugation brought the KCl to the surface, where it could be skimmed off, and the $K_2Cr_2O_7$ formed a mass at the bottom of the tube. W. T. H.

Necessity of reducing analytical weights to normal temperature and pressure. C. J. van Nieuwenburg. *Atti X° congr. intern. chim.* **3**, 451–4(1939) (in French).—If it is desired to know the exact weight, which is rarely the case, of 10 g. to within 0.001 mg., it is necessary to take into account the fact that the buoyancy of the wts. and sample in air varies appreciably with changes in temp. and atm. pressure. A simple app. is shown which makes it easy to apply the correction so that the weight corresponds to the wt. at 0° and 760 mm. of Hg pressure. W. T. H.

The preparation of an analytical standard for chromite. A. V. Shein and M. V. Mil'kovskaya. *Trudy Ural. Nauch.-Issledovatel. Inst. Geol. Razved. i Issled. Mineral. Syr'ya* **1938**, No. 3, 335–54; *Khim. Referat. Zhur.* **2**, No. 1, 67(1939). The methods used for analyzing chromite are described. W. R. Henn

Adsorption indicators for the determination of halides. A. M. Hal'perin. *Farmatsiya* **1938**, No. 3, 7–12; *Khim. Referat. Zhur.* **2**, No. 2, 82(1939).—For the detn. of the chlorides, bromides and iodides in dil. solns. by titration in the presence of adsorption indicators, the superiority of the method of Fajans over the method of Mohr is shown. Besides fluorescein good results in the titration of the chlorides were obtained with azolitmin, metanil yellow and diphenylamine blue. The protective colloids (dextrin and gelatin) prevented coagulation at the equiv. point, but did not affect the accuracy of the titration. Bromothymol blue, aniline red and Congo red were satisfactory for the detn. of bromide. Eosin and fluorescein were also suitable for dil. solns. All indicators used for the detn. of the bromides could also be used for titration of 0.05–0.1 N iodide solns. For 0.01 N solns. only Congo red

could be used, and for 0.0005 *N* solns. none of the indicators mentioned was suitable. Three comparative tables from which the magnitude of deviations from the gravimetric results can be seen, and a table for the changes of color are given. W. R. Henn

Quinaldinic acid as a reagent for the separation and determination of copper and cadmium. Anil Kumar Majumdar. *Analyst* **64**, 874 6(1939).- Shennan, *C. A.* **33**, 1621[2], has claimed that the quinaldinic acid method of Ray and Bose, *C. A.* **28**, 1625[2], is excellent for detg. Cu and Cd when only one of these elements is present but he found the sepn. of Cu from Cd unsatisfactory. It is now shown that this conclusion is wrong. The sepn. of Cu from Cd by means of quinaldinic acid is excellent at pH 1.22-2.01. W. T. H.

Colorimetric determination of aluminum. A. A. Rode. *Problemy Sovet. Pochvovedeniya* **1938**, No. 6, 53 60; *Khim. Referat. Zhur.* **2**, No. 2, 73(1939). -R. modified the oxine method of the colorimetric detn. of Al for the investigation of *soil solns.* and of their Al content. The difficulties arising from the presence of Fe were overcome by changing Fe^{+++} to $Fe(CNS)_3$ and removing it by shaking with a mixt. of ether with Am alc. Take 3–7 cc. of the soln. contg. 50–400 γ of Al_2O_3, acidify with 2–3 drops of coned. HCl, add 1 cc. of a 10% soln. of NH_4CNS and 6 cc. of a mixt. of ether with Am alc. (2:5). Shake well for 1 min., allow to stand for 2–3 min. and remove the colored liquid with a pipet. Repeat the extn. with the mixt. of ether with Am alc. until a colorless liquid is obtained (usually 3–4 extns. are sufficient). Decomp. the excess NH_4CNS and org. substances by heating with 2 cc. of coned. HNO_3. Proceed as in the pptn. of Al by the oxine method. Dissolve the Al hydroxy quinolate in a mixt. of ether with HCl and color the soln. by treating it with 1 cc. of a soln. of sulfanilic acid, 1 cc. of a $NaNO_2$ soln. and 10 cc. of a 4 *N* NaOH soln. Compare the colored soln. immediately with the standard. W. R. Henn

Rapid determination of chromium and manganese in steel. K. Dietrich. *Metallwirtschaft* **18**, 811–13(1939).— Treat 0.5 g. of metal with 5 ml. of coned. HNO_3 + 5 ml. coned. HCl. To the resulting soln. add 15 ml. of $HClO_4$ and evap. till fumes of this acid are evolved. After 3 min. of fuming, cool, add a little water and transfer to a 200-ml. measuring flask. Add an aq. soln. of 1 g. NaF, dil. to the mark, mix and measure the chromic acid color in a "Leifo" polarization photometer. Beer's law holds for samples contg. not more than 1% Cr but for larger quantities an aliquot part of the soln. must be taken for the colorimetric measurement. For the Mn detn. take 0.1 g. of sample, treat with a mixt. of 4 pts. coned. HNO_3, 1 pt. coned. H_2SO_4 and 5 pts. water, add 10 ml. of 28% H_3PO_4, 10 ml. of 0.5% $AgNO_3$ soln. and 10 ml. of 20% $(NH_4)_2S_2O_8$ soln. and allow the mixt. to stand a short time until all foaming ceases from decompn. of the persulfate excess. Dil. to exactly 100 ml. and det. the extinction coeff. of the soln. Excellent results were obtained for both Cr and Mn in the analysis of 12 samples for Cr and 11 samples for Mn. W. T. H.

Determination of copper in cast iron and in steel with quinaldic acid. A. M. Zan'ko and G. O. Butenko. *Ber. Inst. physik. Chem., Akad. Wiss. Ukr. S. S. R.* **9**, 99–107 (1938); *Khim. Referat. Zhur.* **2**, No. 3, 73-4(1939) — The method is based on the relative unstability of the tartaric complex of Cu at a definite acidity of the soln. and on the fact that the quinaldate of Cu is less sol. than are the corresponding compds. of the other elements in steel and cast iron. For the analysis dissolve 1 g. of the metal in 15–20 cc. of 6 *N* HCl, acidify with 2–3 cc. of coned. HNO_3, boil for some time, evap. the soln. to dryness in a porcelain dish and sep. the SiO_2 by the usual method. Filter off the residue, roast it, treat it in a Pt crucible with HF + H_2SO_4 (until white fumes appear), ext. with water and add the soln. to the original filtrate. Add to the mixt. 6 g. of tartaric acid, neutralize to nitrazine yellow paper with NH_4OH, add 15 cc. of 4 *N* H_2SO_4, heat to boiling and ppt. (by stirring) with an excess of a 2% soln. of Na quinaldate. Let the mixt. stand (total vol. 100–120 cc.) for 18 hrs., filter through a glass crucible No. 3 or 4, wash the residue with hot water, dry at 125° and weigh. One g. of ppt. = 0.1494 g. of Cu. If the amt. of Cu in the sample is less than 0.05–0.06% take twice as much sample and twice the quantities of tartaric acid and of 4 *N* H_2SO_4. The Cu values obtained are accurate within 0.02% of the wt. of sample. W. R. Henn

A new method for the determination of copper in stereotype and linotype alloys. N. V. Fedorova. *Poligraficheskoe Proizvodstvo* **1938**, No. 8-9, 41-3; *Khim. Referat. Zhur.* **2**, No. 3, 71(1939).—F. recommends the colorimetric method of T. Carnelly (*Chem. News* **32**, 308 (1875)) for the detn. of Cu with $K_4Fe(CN)_6$ in the presence of NH_4Cl. W. R. Henn

New method for the gravimetric determination of tin in bronzes and brasses. A. G. Dunbar-Poole. *Analyst* **64**, 870, 3(1939).—The principle involved in the proposed method is based on the discovery that when Sn contg. P or As is ignited in the air in the presence of Cu, the P and As are taken up by the Cu to form phosphate and arsenate of Cu without the formation of any stannate A subsequent digestion with HNO_3 dissolves out the Cu, As and P and leaves purified SnO_2. For the analysis of bronze a 0.5-g. sample is usually sufficient but with brass about 2 g. is better. Digest the weighed drillings with a mixt. of 15 ml. 6 *N* HNO_3 and 5 ml. of 6 *N* HCl. After the metal has dissolved, dil. with water and add NH_3 soln. until a deep-blue color persists after stirring. Neutralize with 9 *N* H_2SO_4 and add 2 ml. in excess. Dil. with hot water to 300 ml. and, while boiling the soln., add 4 g. of $Na_2S_2O_3$ dissolved in 50 ml. of water. Boil gently for 15 min. The ppt. will contain all the Sn and Sb as hydrated oxides together with some adsorbed Cu. Filter, wash with very dil. $(NH_4)_2SO_4$ soln. and ignite. Transfer the ignited ppt. to a small beaker, cover with 25 ml. of coned. HNO_3 and digest until all Cu has dissolved. Dil. to 100 ml. and allow the ppt. to settle while the soln. is kept hot. Filter, wash with hot, dil. HNO_3, ignite and weigh as SnO_2. If the residue is white, no Sb is present. The presence of Sb causes the residue to assume a bluish tint and, if necessary, it can be fused with NaOH in a Ag crucible and a sepn. of Sb from Sn made. The results in the analysis of 4 alloys appear to be unusually good and the ignited oxides of SnO_2 + Sb_2O_4 in samples contg. Sb were apparently pure and contained all the Sb and all the Sn. W. T. H.

Determination of nitrogen as ammonia in monosubstituted ureas, urethans, allophanates and semicarbazones. Santiago Rovira. *Compt. rend.* **209**, 754 7(1939); cf. *C. A.* **34**, 345[9].—The use of a benzyl alc. soln. of KOH for detg. N of amides and nitriles requires in some cases an excessive period of heating, e. g., 4 hrs. for a semicarbazone. The use of a higher-boiling solvent, e. g., glycerol is therefore advantageous. The time necessary is thus reduced by more than half with no reduction in accuracy. Results with 24 substances were within 3% of the truth. C. A. Silberrad

Method for the accurate estimation of elementary sulfur dissolved in organic liquids. B. S. Rao and M. R. Aswathanarayano Rao. *Atti X° congr. intern. chim.* **3**, 462–5(1939)(in English).—The liquid is shaken with Hg under suitable conditions and then, out of contact with air, the HgS is treated with aq. HCl soln. contg. KI + H_3PO_2. This results in evolution of H_2S which is swept away, absorbed in an aq. suspension of $Zn(OH)_2$ and the resulting ZnS detd. iodometrically or, if the S content is very low, by the methylene blue colorimetric method. W. T. H.

Determination of ferrous oxide in liquid chromium-molybdenum steel. V. T. Braga. *Teoriya Prakt. Met.* **9**, No. 7–8, 55–7(1938); *Khim. Referat. Zhur.* **2**, No. 3, 75(1939).—A rapid gas method for the detn. of FeO in steel consists in the removal of the gases from the liquid sample by suction under a vacuum. These gases are analyzed for their content of CO and of other gases (CO_2 which is formed from 2CO = C + CO_2). The amt. of CO sepd. according to the reaction FeO + C → CO + Fe (1) multiplied by $^{72}/_{28}$ gives the amt. of FeO. This method (Hare, Peterson and Soler, *C. A.* **31**, 7816[1]) was tested on Cr-Mo steels fused in acid elec. furnaces. A

comparison of the results with those obtained by the method of Herty (reduction of FeO with metallic Al with the formation of Al_2O_3 followed by its detn.) proved the dependability of the method. The main requirement of the method is as complete as possible reduction of the metal. The sample should be completely liquid during its analysis. The time required for the sample taking is about a min. W. R. Henn

A simplified method for the calculation of the carbon dioxide content in air. L. I. Figlin. *Higiena i Sanitariya* **1938**, No. 2, 23–32; *Khim. Referat. Zhur.* **2**, No. 1, 70 (1939).—It is proposed to use nomograms. The necessary calcns. are described and several auxiliary tables are given. W. R. Henn

Determination of water in ether. R. Gaspart and G. Serrure. *Bull. soc. chim. Belg.* **48**, 283–92(1939); cf. *C. A.* **33**, 3296[1].—The infrared absorption spectra between 3400 and 3700 cm.$^{-1}$ are given for anhyd. ether fractionally distd. from Na through a 110-cm. Crismer column (all-glass app.) and for ether contg. 0.55, 1.45, 3.66, 5.00, 11.70 and 27.80 × 10^{-4} mols. of H_2O per l. (prepd. by dilg. 3 concd. solns. in carefully dried app.). The 1st 2 solns. show a single band at 3598 cm.$^{-1}$, the others a 2nd band at 3525 cm.$^{-1}$. The bands are attributed to H_2O-Et_2O addn. compds. The concn. of H_2O can be interpolated from a standard curve constructed with χ (extinction coeff.) plotted against concn. in mol. per l. The concn. of H_2O in colloidal Au solns. is detd. by this method with the formula $T = e^{-\chi d}$ where T is the value of the transmission at the min. 3598 cm.$^{-1}$. Janet E. Austin

The interferometer in the analysis of dilute solutions of strong electrolytes. A. M. Zan'ko and I. L. Kukhtevich. *Trudy Dnepropetrov. Khim.-Tekhnol. Inst.* **1938**, 33–59; *Khim. Referat. Zhur.* **2**, No. 2, 70(1939).—The possibility of using the interferometer for detg. the concn. of substances in aq. solns. is shown by a study of solns. of HCl, NaOH and Na_2CO_3 which were 0.001–0.160 *N*. The method can be used only for measurements of pure substances in soln. but is then more accurate than the usual methods of analysis. Details for carrying out the work are given. W. R. Henn

Identification of propionic acid in the presence of acetic and butyric acids. Louis Musicant and Frank J. Kaszuba. *J. Am. Chem. Soc.* **61**, 2974–6(1939).—Propionates can be identified in the presence of acetates and butyrates by prepg. photomicrographs of the mercurous salt; the salt is pptd. on a microscope slide from the Na salt and Hg$(NO_3)_2$; as little as 0.15 mg. can be positively identified. Formates should be destroyed before the test. C. J. West

Angular constants of microcrystalline profiles and silhouettes in the conclusive identification of substances. IV. R. C. Shank, M. D. Grimes and A. C. Shead. *Proc. Okla. Acad. Sci.* **19**, 127–9(1939); cf. *C. A.* **32**, 737.—Angular values are listed for 11 addnl. compds. W. F. Bradley

Dithizone colorimetric micromethod for the determination of lead. G. A. Evlanov. *Nauch. Zapiski Inst. Narodnogo Khozyaĭstva im. Plekhanova* **1938**, No. 1, 131–5; *Khim. Referat. Zhur.* **2**, No. 3, 71–2(1939).—The following colorimetric micromethod for the detn. of Pb is based on the method of Hellmut Fischer and Grete Leopoli (*C. A.* **28**, 2295[8]). To a soln. contg. Pb^{++} and Rochelle salt add NH_4OH in excess, and ext. in a separatory funnel several times with a soln. of dithizone in CCl_4. Treat the CCl_4 exts. with aq. KCN soln. to get the excess dithizone into the aq. phase. Wash the soln. of the pure dithizone compd., destroy the Pb complex with HCl (1:1) and after dilg. with more CCl_4, examine the green soln. in a Dubosc colorimeter. From the quantity of dithizone found the amt. of Pb combined with it is detd. The method can be used in the presence of the alkali and the alk. earth metals which do not give complexes with dithizone. The heavy metals (Zn, Ni, Fe, Cu, Hg, Bi, Sn, Ag) are converted into complex cyanides prior to the treatment on the dithizone. By this method 200 to 10 γ of Pb can be detd. which makes it suitable for *examn.* of *food products*. W. R. Henn

The semimicrodetermination of sulfur in organic materials. Antonio Angeletti. *Ann. chim. applicata* **29**, 356–9(1939).—The method is based on Sanchez method (*C. A.* **32**, 6577[1]) for the semimicrodetn. of halogens in org. compds. The S is oxidized in a sealed tube with $KMnO_4$, the sulfate formed is pptd. with $BaCl_2$ in slight excess, and this excess pptd., in turn, with K_2CrO_4 in slight excess. The excess K_2CrO_4, finally, is titrated iodometrically. A blank detn. on K_2SO_4 should be carried out as a check. A. W. Contieri

Semimicroanalytical method for the determination of methoxyl groups in organic compounds. E. B. Lisle *Analyst* **64**, 876–7(1939).—Satisfactory results can be obtained quickly by an adaptation of the Zeisel method for detg. CH_3O groups in org. compds. The group is removed as volatile CH_3I by the action of HI at 130° and the vapor is passed over test paper which has been steeped in a soln. of $PdCl_2$ and pyridine. A brown color results if CH_3O is present. Dissolve 0.5 g. of sample in a little decahydronaphthalene and dil. to 50 ml. Take a convenient aliquot and transfer to a 50-ml. flask fitted with a side tube and ground-glass neck. A glass tube, 18 cm. long of 0.7 cm. bore, fits into the neck of the flask and the top of this tube ends in a disk-like flange with ground surface. A similar glass flange rests on this surface and is attached to a glass tube 3 cm. long. The 2 flanges are held together by 2 steel clips. Place a strip of filter paper satd. with $PdCl_2$ and pyridine between the flanges. Conduct a slow stream of CO_2 through the app. Dry the CO_2 by passing it through glycerol and heating it to 35° by passage through a tube kept in hot water. Heat the contents of the reaction flask in an oil bath which is kept at 130°. Shake frequently. After 30 min. remove the test paper, allow to dry and compare with standards prepd. from known quantities of vanillin. The method was tested with anisole, eugenol and guaiacol and the values 28.0, 18.5 and 24.3% were obtained in place of the theoretical values 28.7, 18.9 and 25.0. W. T. H.

The application of micromethods to the analysis of zein. II. Tauno Laine. *Suomen Kemistilehti* **12B**, 23(1939)(in English); cf. *C. A.* **33**, 6359[8].—The results of microchemical analyses indicate that the N of zein is present as amino acids of which alanine alone constitutes 9.75%, alanine + valine + leucine + phenylalanine + methionine = 32.3%, aspartic acid = 2.22%, tyrosine = 2.61%, glutamic acid = 18.4% and cystine = 0.60%. The corresponding values obtained by macromethods are 9.56, 32.8, 1.18, 2.83, 18.5 and 0.66%. For the analyses the methods of Virtanen and L. (*C. A.* **33**, 505[9]), Arhimo and modified by Pucher (*C. A.* **33**, 6198[6]), Arhimo and L. (*C. A.* **33**, 6198[8]) and Brdicka (*C. A.* **29**, 82[4]) were used. S. A. Karjala

Biochemical study on lead. I. Quantitative analysis of very small amounts of lead in organic substances. Susumu Yosida. *Oriental J. Diseases Infants* **23**, 15–16(1938)(in English).—The Pb is sepd. electrolytically as PbO_2 in the presence of strong HNO_3 contg. Cu and analyzed polarographically. Other ions from org. substances, such as liver and bone, do not interfere. **II. The adsorption of lead ions by activated charcoal.** *Ibid.* **24**, 9. The extent to which Pb ions are adsorbed by charcoal is shown to vary considerably with different kinds of charcoal. Ruth Berggren

A rapid analysis of crude and of enriched anthracene. I. Ya. Postovskiĭ and V. I. Khmelevskiĭ. *Trudy Ural. Ind. Inst. im. S. M. Kirova* **1938**, No. 6, 64–9; *Khim. Referat. Zhur.* **2**, No. 2, 85(1939).—The method is based on the addn. of maleic anhydride to anthracene. The compd. formed can be detd. either directly by the gravimetric method or indirectly by the volumetric titration of uncombined maleic anhydride. To 1 g. of the crude anthracene add 0.5 g. of maleic anhydride and 5 cc. of xylene, boil for 25 min., add 80 cc. of water, remove the xylene with steam, cool the maleic acid (formed at the expense of the emulsification of the excess anhydride), and titrate with a 0.5 *N* soln. of KOH in the presence of phenolphthalein. The method was tested with artificial mixts. of anthracene with carbazole, phenanthrene, fluorene, ace-

naphthene and β-methylanthracene. Of these substances only β-methylanthracene reacts with maleic anhydride. Therefore, in case β-methylanthracene is present a parallel detn. by the method of Sielisch should be made. The analysis takes 1–1.5 hrs., and its accuracy is ± 0.5%.
W. R. Henn

A new method for the determination of carbazole and anthracene in crude and in concentrated anthracenes by the bromometric method. B. I. Ardashev. *Trudy Ural. Ind. Inst. im. S. M. Kirova* **1938**, No. 6, 70–9; *Khim. Referat. Zhur.* **2**, No. 3, 83(1939); cf. *C. A.* **32**, 1612⁸. — The method is based on the bromination of carbazole to form the dibromide. Anthracene, which is usually present in the crude product, is also brominated, but its content can be detd. in parallel detns. by the method of Postovskiĭ and Khmelevskiĭ (in the form of the condensation product with the maleic anhydride). From the other substances present together with carbazole only acenaphthene can be brominated, but it is rarely present in appreciable quantities. In checking the method on artificial mixts. of anthracene, phenanthrene and carbazole the percentage error in some cases reached 5%. With a parallel detn. of N according to the method of Kjeldahl the content of other N compds. can be estd. The time required for the analysis of samples contg. only anthracene and carbazole is 1 hr. The procedure is as follows: Dissolve 0.5 g. of the sample in 15–20 cc. of a hot 80–90% soln. of AcOH, add 1–1.5 cc. of 12 *N* HCl, cool to 35° and add at this temp. an accurately measured vol. of a standardized soln. contg. 16.72 g. of $KBrO_3$ and 59.5 g. of KBr in 1 l. Add the bromide-bromate soln. until the reaction to a I-starch paper persists for 10 min. After this add a soln. of 0.5 g. of KI in 25 cc. of water and titrate the sepd. I with $S_2O_3^{--}$ to dct. the excess $KBrO_3$.
W. R. Henn

Determination of paraldehyde. D. J. T. Bagnall, A. Smith and A. R. Tankard. *Analyst* **64**, 857–61(1939). The following procedure is recommended in cases of suspected poisoning after the administration of paraldehyde. Place 50 g. of minced material in a l. flask and add 100 ml. of 50% EtOH + 1 2 ml. of concd. H_2SO_4. Adjust a fractionating tower to the flask and connect it with a good condenser dipping into a 4% soln. of neutralized NH_2OH.·HCl in 50% alc. About 10 ml. of this soln. is required for 0.2 g. of paraldehyde. Heat the mixt. in the flask gently at first and distil slowly with steam. After at least 100 ml. of distillate has been obtained, titrate with NaOH to a green end point with bromophenol blue indicator. Then distil some more into the titrated soln. and consider the reaction complete if no change in color takes place after 50 ml. more of distillate has been obtained. One ml. of 0.1 *N* NaOH = 4.4 mg. of paraldehyde. Carry out a blank test in the same way. Stomach contents, viscera, etc., usually contain small quantities of volatile acids and these must be allowed for by a sep. distn. in the presence of H_2SO_4.
W. T. H.

Creatinine determination with *m*-dinitrobenzoic acid. Ernst Komm and Heinz Pinder. *Z. Untersuch. Lebensm.* **78**, 113–23(1939).—The utility of *m*-dinitrobenzoic acid as a reagent for the detn. of creatinine was confirmed. Tests on the stability of the reagent, effect of impurities, amts. of reagent and means of decolorizing samples were made for the development of the following procedure: Free a 5% meat soup soln. or a 0.5% meat ext. soln. from fat. Add 20 cc. *N* HCl to 50 cc. of sample in an evapg. dish and evap. to dryness on a steam bath. Take up the residue with water and dil. to 50 cc. in a volumetric flask. Filter with suction through a column of $Al(OH)_3$, 3 cm. diam. and 10–15 cm. high (cf. Remy, *C. A.* **32**, 1213⁶). To 20 cc. of the filtrate add 5 cc. *N* HCl and dil. to 50 cc. with distd. water. Treat 2.00 cc. of the soln. with 4 cc. of 2% *m*-dinitrobenzoic acid in abs. alc. and 1 cc. of a 5% soln. of NaOH in water. Treat similarly a 0.01% standard creatinine soln. in 0.1 *N* HCl with the reagent and NaOH soln. Measure the percentage absorption in a photoelec. colorimeter or compare the 2 solns. in a Dubosq colorimeter.
M. M. Piskur

Phthalization in hot pyridine. Sébastien Sabetay. *Ann. chim. anal. chim. appl.* **21**, 289–90(1939); cf. *C. A.* **31**, 2550⁶.—In the previous paper, a method for detg. primary alcs. was proposed which consists in heating with phthalic anhydride at the b. p. of the alc. for 2 hrs. under reflux condensation after which a definite vol. of water is added and some pyridine. After this the mixt. is titrated with NaOH. Under the prescribed conditions good results can be obtained. Some chemists have encountered difficulties arising from a partial sapon. of the acid phthalate ester that is formed in the procedure. Incorrect results are obtained if the heating is continued for 20 min. instead of the prescribed 10 or if 20 ml. is the vol. of the soln. during the pyridine treatment instead of the prescribed 50 ml. The hydrolysis of the excess phthalic acid is accomplished within 1 min.
W. T. H.

Qual. org. analysis—identification of alkyl halides, aromatic nitroso compds., aromatic hydrocarbons and cyclopentadiene compds. (Levy, Campbell) **10**. Detn. of S in solid fuel and in pyrite (Seuthe) **21**. Behavior of the SCH_3 group in methoxyl detns. (Arndt, *et al.*) **10**.

Determination of constituents such as hydrogen sulfide in gaseous atmospheres. John B. Littlefield (to Mine Safety Appliances Co.). U. S. 2,174,349, Sept. 26. A method of detg. the concn. of a constituent of a gaseous atm. comprises causing a predetd. volume of the atm. to be tested to flow through an elongated bed of granular material carrying a salt reagent which upon contact with the constituent changes color over a length which is dependent upon the concn. of the constituent in the atm., the color change being substantially independent of the concn. of the constituent and measuring the length. Ag cyanide is used in detg. the concn. of H_2S.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Germanium in some sulfide ores in U. S. S. R. S. A. Borovik and N. M. Prokopenko. *Bull. acad. sci. U. R. S. S., Sér. géol.* **1938**, No. 2, 341–6; *Khim. Referat. Zhur.* **2**, No. 1, 29(1939); cf. *C. A.* **33**, 4549⁸.—Ninety-three samples of sulfide minerals from Middle Asia (mostly), Baĭkal region, Ural, Caucasus, Ukraine, and the northern part of the European U. S. S. R. were analyzed spectrographically. Of 58 sphalerites, 19 contained Ge in small amts. Zn blende contg. Ge is as a rule light-colored and is characterized by a very small amt. or total absence of In. Sphalerites contg. Ge are mostly found with low-temp. meso- and epi-thermal deposits. The Middle Asia sulfide deposits contain little Ge. In zones of oxidation no Ge was found. Ge was found in small amts. in Zn blende from Caucasus, Ural and the Northern regions. Other investigators found Ge in sphalerites from Medvezh'iĭ, Azerbaĭdzhan and Ridder, as well as in some chalcopyrites from Caucasus, Ural and the Minusin region.
W. R. Henn

Iron oxide monohydrate (goethite). Hans Himmel. *Zentr. Mineral., Geol.* **1939A**, 281–6.—Crystallographic. It is suggested that goethite and lepidocrocite, α-FeOOH and γ-FeOOH, resp., be called α-goethite and γ-goethite.
Michael Fleischer

Alteration of ilmenite. E. S. Moore. *Econ. Geol.* **34**, 931(1939); cf. Koenigsberger, *C. A.* **34**, 58⁴.—M. agrees with K. that leucoxene is derived from ilmenite in most cases by hydrothermal action, not by weathering. However, leucoxene is not always titanite, but may consist of several Ti minerals.
Michael Fleischer

Microstructure and origin of the Wittekind horizon. G. Berg. *Z. prakt. Geol.* **47**, 175–80(1939).—Sixteen drill

cores in an oölitic ironstone horizon in the Upper Dogger near Hüverstädt were studied. The material was originally a marl with oölites of an Fe silicate near chamosite. Bicarbonate solns. changed the silicate almost completely to siderite. Michael Fleischer

The rare earth content of wiikite. Th. G. Sahama and Veikko Vähätalo. *Bull. comm. géol. Finlande* No. 125, 97–109(1939)(in English); cf. Lokka, *C. A.* **22**, 4416; Ant-Wuorinen, *C. A.* **31**, 1732[9].—Spectrographic detns. are given of the content of 16 rare earth elements in 6 wiikites. Y predominates, and the ratio Y earths:Ce earths is high, usually 6 to 10. Samples of *allanite* and *monazite* were also examd.; Ce earths predominate in these. Michael Fleischer

Arseniosiderite from Hüttenberg, Carinthia. Heinz Meixner. *Zentr. Mineral., Geol.* **1939A**, 287–9.—Arseniosiderite occurs as a brown "mountain leather" with symplesite and scorodite, all formed by the oxidation of löllingite. Michael Fleischer

Use of explosives in synthesis of deep rock minerals. Albert Michel-Lévy. *Compt. rend. soc. géol. France* **1939**, 194–6; cf. *C. A.* **34**, 576.—A connected account of later results already briefly reported (cf. *C. A.* **33**, 7699[1]) showing that at temp. of 500–600° and pressures of 3000–4000 kg./sq. cm. in presence of H_2O and alkali—conditions which occur at depths of 10,000–20,000 m.—the principal minerals of granite are formed; also that under these circumstances circulating fluids of this nature produce changes in actual rocks similar to actually observed metamorphism. C. A. Silberrad

Gases in mineral salts. Yu. V. Morachevskii. *Byull. Inst. Halurgii* **1938**, No. 5, 1–14; *Khim. Referat. Zhur.* **2**, No. 3, 25(1939). By measuring the evolved gases (present as microdispersed inclusions in different layers of salts composing the Solikamsk formations) it has been shown that the many-colored sylvite is the richest in gas content (50–100 cc. per kg.), followed by the striped and the red sylvites. Carnallite usually contains about 10 cc. of the microincluded gas per kg. of the salt, and very little gas was contained in the halite. Large variations in the gas content were observed in the different samples of the same layer. The gases differ in compn.; they can be classified into 4 types depending on their relative contents of H_2, CH_4, N_2 and heavy hydrocarbons (from 1 to 6%). The formation of the combustible components in the included gases (CH_4 and H_2) is attributed mainly to processes of a biochem. character. W. R. Henn

Gold in Alsace-Lorraine. E. Kohl. *Z. prakt. Geol.* **47**, 180–4(1939).—A review with 15 references. Prospects of finding any appreciable amt. of Au are considered poor. Michael Fleischer

Minerals of Kivu (Belgian Congo.) René van Aubel. *Compt. rend. soc. géol. France* **1939**, 186–8; cf. *C. A.* **31**, 3428.—Three polished sections and 2 powd. samples of auriferous quartz from Kivu were examd. The sections showed about 10% tourmaline; the other principal components in order of abundance are quartz, mispickel (I), pyrite (II) and hypogene Au, with subordinate amts. of magnetite (III), pyrrhotite (IV), chalcopyrite (V), hematite and marcasite (VI) but no telluride. The order of formation appears to be III, IV, I, II, V and VI, thus differing from Schwarz's rule (*C. A.* **31**, 2556[6]). The powd. samples are also minutely described. They indicate formation at a high temp., and probably at considerable depth (cf. Buddington, *C. A.* **30**, 3747[7]). C. A. S.

The pyrite deposit of Hevoskumpu in Tuupovaara. Erkki Aurola and Veikko Vähätalo. *Bull. comm. géol. Finlande* No. 125, 87–95(1939)(in English).—The ore body of pyrite and pyrrhotite is bordered by a zone of epidote-quartzite on one side, and by a zone of sericite-quartzite on the other. These were probably formed by the metasomatic action of the ore-bearing solns., rich in carbonates and sulfides, on the country rock, an amphibolite. The deposit is very similar to that at Otravaara nearby (cf. Saxén, *C. A.* **18**, 1634). Michael Fleischer

Magnetite and hematite veins in Triassic lavas of Nova Scotia. A. P. Hornor, Jr. *Econ. Geol.* **34**, 921–30(1939).—The veins, occurring in basaltic lavas, were probably formed by the filling of fissures by emanations from the cooling lavas. The order of crystn. was hematite and magnetite with some apatite, calcite, zeolites and quartz. A complete analysis of the magnetite shows 6.42% MgO; hence it is intermediate between magnetite and magnesioferrite. Michael Fleischer

Some iron ores in the Jussaari region, S. W. Finland. Martti Saksela. *Bull. comm. géol. Finlande* No. 125, 9–38 (1939)(in German).—The banded Fe ores, found on several small islands and also extending under water between them, contain magnetite with quartz, amphibole and garnet. In places, magnetite and garnet have crystd. simultaneously. Late pegmatitic solns. rich in Fe appear to have migmatitized schists and simultaneously deposited magnetite. A brief history of mining operations, now abandoned, is given, with several ore analyses. Most of the ore carried 30–35% Fe. Michael Fleischer

An occurrence of tinstone in the Pre-Cambrian of western Ontario. E. M. Burwash. *J. Geol.* **47**, 767–8(1939). Cassiterite has been found in narrow greisen dikes near Eagle Lake. Similar occurrences have been noted in eastern Manitoba, and a tin-bearing area of some size is indicated. Michael Fleischer

Coal veins in Malaya. Sir Lewis L. Fermor. *Geol. Mag.* **76**, 465–72(1939); cf. *C. A.* **24**, 1488; **25**, 578.—F.'s views on the colloidal nature of coal and its formation are recapitulated, and strongly supported by recent observations in Malaya of a vertical vein of vitrain about 4½" thick of which analyses of the outer, intermediate and central portions are given as also the values of k in F.'s formula, ash content = $100(d - k)$, (d being density). These show increases in k and moisture, and decreases in volatile matter and fixed C from the center outward. Conclusion: Org. matter, derived from wood (occurring as such elsewhere in the surrounding alluvium), passed into colloidal soln. whence it was deposited in the vein by gelation. C. A. Silberrad

Geology of western Quruq Tagh, eastern Tien-Shan. Erik Norin. *Rept. Sci. Exped. to N. W. China* **1937**, 195 pp.; *Neues Jahrb. Mineral. Geol.*, Ref. II, **1939**, 522.—Detailed petrographical descriptions of the rocks found are given. C. A. Silberrad

The crystallization of the Kangasniemi orbicular granite. D. S. Belyankin and V. P. Petrov. *J. Geol.* **47**, 769–71(1939).—Discussion of Eskola's conclusions (*C. A.* **32**, 6195[7]). Michael Fleischer

Petrology of the alkaline intrusive at Blue Mountain, Ontario. M. L. Keith. *Bull. Geol. Soc. Am.* **50**, 1795–1826(1939).—A large stock of alk. rocks, previously described as nephelite syenite, is more accurately a litchfieldite, the mean of 112 Rosiwal analyses giving albite 54, microcline 20, nephelite 22, muscovite 2 and mafic minerals 2%. The mineralogical variations are shown on contoured distribution plans. Age detns. based on radioactivity measurements give 850 ± 400 million yrs. for the litchfieldite, 150–200 ± 75 million yrs. for the surrounding syenodiorite. This precludes the possibility of a genetic relationship between them, and with the lack of field evidence of desilication by limestone, renders the theory of limestone assimilation untenable for this intrusive and probably for the Bancroft area. Field evidence indicates that the litchfieldite crystd. from an alk. magma with a compn. close to that of the av. of the intrusive, the relations approximating those in synthetic melts (cf. Bowen, *C. A.* **31**, 1734[6]). Five rock analyses and analyses of albite, nephelite and microcline are given. M. Fleischer

Geochemical properties of the Maarianvaara granite. Th. G. Sahama and Kalervo Rankama. *Bull. comm. géol. Finlande* No. 125, 5–8(1939)(in English).—A preliminary note. It is hoped that the spectrographic detn. of minor constituents will make possible the classification of the Finnish Archaean granites into provinces showing similarities in their content of the rarer elements. Qual. data indicate that the rare earths, Sr, Ba, Cr and V may be suitable index elements. Michael Fleischer

The rock ground of the coast of Labrador and the connection between the Pre-Cambrian of Greenland and

North America. E. H. Kranck. *Bull. comm. géol. Finlande* No. 125, 65–86(1939)(in English).—Rock types of the Labrador coast are described and tentatively correlated with those of Greenland. New analyses are given of nordmarkite, odinite, and *aillikite*, the last being an alnoite-like dike rock, high in olivine, biotite and calcite.
Michael Fleischer

Metasomatism associated with Tertiary mineralization in New Guinea. N. H. Fisher. *Econ. Geol.* **34**, 890–904 (1939).—Porphyries and phyllites of the Wau-Edie Creek area have been metasomatized over a considerable area to soft, easily eroded rocks such as chloritoid schist. This has led to considerable placer enrichment in Au.
Michael Fleischer

Formation and age of the Syrian green rocks. Lois Dubertret. *Compt. rend.* **209**, 763–4(1939); cf. *C. A.* **31**, 6153⁷.—These rocks are further described; the peridotite-pyroxenite extends practically uniformly for a depth of some 1800 m. In places it passes with no distinct boundary into masses of microdiorite, which become more and more fine-grained upward and finally vitreous with pillow lavas and volcanic tuffs and breccias. In places large blocks of much altered sedimentary rocks (Trias to Cretaceous) are included. The formation appears to have resulted from a combination of igneous intrusions at great and moderate depths with actual volcanism. C. A. Silberrad

Rock formations of Middle Asia. I. M. Evfimenko. *Razvedka Nedr* **1938**, No. 8–9, 12–16; *Khim. Referat. Zhur.* **2**, No. 1, 28(1939).—The following geochem. classification of rocks is given: magnetite rocks (Tan-Shan type), pyrrhotite rocks (Alaĭ type), and rocks without pyrrhotite and magnetite (Nur-Atin type). The magnetite rocks often contain hematite and industrial amts. of chalcopyrite. Other sulfides may be present as well as cobaltite and erythrite. Scheelite is absent. The pyrrhotite Alaĭ type contains much arsenopyrite. Little magnetite is present. Scheelite, cassiterite, molybdenite and minerals of Co and Bi are present. These rocks are characterized by 2 stages of mineral formation: the contact stage (formation of the garnet-pyroxene rocks) and the pneumatolitic stage (addn. of W, Sn, Mo and other elements). The Nur-Atin type (contg. no Fe) is related to the garnet-pyroxene types. Scheelite and molybdenite are present. This type contains much WO_3. W. R. H.

Limestones of Ardgour (Argyllshire). H. I. Drever. *Geol. Mag.* **76**, 501–18(1939); cf. *C. A.* **30**, 8102⁴.—These limestones have been much altered by high-grade metamorphism—dynamic or thermal or both—owing to epidioritic intrusions and metasomatic action of solns. of uncertain origin. They are classified according as they are assocd. with granulites and quartzites, diorite gneiss or serpentine. Much wollastonite, also prehnite and scapolite have been formed, also several zeolites and other minerals. Contact effects have also been produced in the intrusive rocks owing to contamination by the limestone, but to a smaller extent. The petrology of the occurrences and the probable metamorphic processes are minutely described with several photomicrographs and 33 references.
C. A. Silberrad

Electromagnetic separator for mineral powders (Evans 1.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Sixty years of development in ore dressing with special attention to the last ten years. C. S. Parsons. *Can. Mining J.* **60**, 693–711(1939). W. H. Boynton

The content of dispersed rare earth elements thallium, indium, gallium and germanium in the intermediate and the waste products of the nonferrous metallurgy of Ural. V. S. Syrokomskiĭ and A. K. Sharova. *Tsvetnye Metal.* **1938**, No. 11, 23–7; *Khim. Referat. Zhur.* **2**, No. 3, 93–4 (1939).—There were found in the intermediate and the waste products of the nonferrous metallurgy of Ural, in most cases, increased amts. of Tl, Ga and Ge. This is explained by the fact that they are contained in the ores of the nonferrous metals in the form of isomorphous admixts. and that a natural concn. of these elements takes place during the process of the technological treatment of the ore. W. R. Henn

Rare metals in the Bashkir republic. I. E. Leshchuk. *Zolotaya Prom.* **11**, No. 7, 18–19(1939).—A short description of the distribution of Se, Te, Bi, Sb, Cd, In, Co, V, As, Sn, Pt, Os, Ir, W, Ce, Th, Zr and Hg in the Bashkir republic of the Soviet Union. B. Z. Kamich

The composition and the properties of cyanide slimes. A. I. Gaev, T. S. Dolzhenko, E. V. Serebrova and P. V. Trutnev. *Tsvetnye Metal.* **1938**, No. 11, 76–80; *Khim. Referat. Zhur.* **2**, No. 3, 94(1939).—The chem. compn. of cyanide slimes from different plants varied greatly. Hygroscopicity was one of their characteristic properties. The presence of sol. sulfates and of CaO increased the hygroscopicity and the velocity of water absorption. The effect of SiO_2 on the hygroscopicity depended on the temp. of drying and roasting. A more thorough washing is necessary in order to lower the hygroscopicity. Results of the chem. and the sieve analyses are given as well as tables and graphs which characterize the hygroscopicity of different slimes. W. R. Henn

Concentration of Artemovsk pyrrhotites. A. G. Bayula. *Zolotaya Prom.* **11**, No. 4–5, 38–40(1939).—Flotation of Artemovsk pyrrhotites yielded concentrates contg. 93–95% of the Au content of the ore. Conditions of flotation were: CaO 0.5–1.0 or soda 2 kg., sol. glass 0.5 kg., xanthate 0.05 kg. and pine oil 0.016 kg./ton. Duration of agitation with reagents ~12 min., flotation ~15 min., liquid/solid ratio 4:1. The flotation products consist chiefly of sulfides contg. small amts. of Cu, Co, Zn and As. Na_2SO_3 did not act as a selective depressor of pyrrhotite. With lime the extn. of Au was 93% and with soda 97%.
B. Z. Kamich

The Stuerzelberg process. H. Hofmeister. *Mining J.* (London) **206**, 757–8(1939).—This process was developed to handle low-grade ores in Germany, especially those contg. PbO, ZnO and other impurities unsuited to usual blast-furnace operation. It can operate with low-grade solid fuel when high-quality coke is unavailable although it cannot compete with large blast-furnace operations except where unusual conditions exist. Starting with calcined pyrites contg. Fe 44, SiO_2 10.2, S 5.0, Zn 8.2, Pb 0.4, Mn 0.2, P 0.02, As 0.02 and Cu 0.02%, a pig iron of the following analysis can be made: C 4.4–4.8, Si 0.015, Mn 0.2–0.4, P 0.01–0.03 and S below 0.01%. By means of a waste heat exchanger, the mixt. of ore, coal and lime is preheated and then charged into a rotary furnace where it is heated to 1500° to form a pasty ferrous silicate slag and spongy iron. The typical slag contains SiO_2 27, Al_2O_3 5, CaO 57, MgO 3–5 and Fe 2–4%. A. George Stern

Thirty years of zinc-blende roasting. Aladár Pór. *Mining J.* (London) **206**, 777–8, 795–6(1939).—A review.
A. George Stern

Pig-iron manufacture in a rotary cement kiln. Hisayuki Ohara. *Tetsu-to-Hagane* **25**, 831–42(1939).—In an exptl. process with purple ore there was obtained in the rotary cement kiln a pig iron contg. C 4.42, Si 0.09, Mn 0.11, P 0.069, S 0.009 and N 0.0023%. M. Ishida

Sulfide inclusions from clay packing. Geo. K. Manning. *Metal Progress* **36**, 747–8(1939).—A description of sulfide inclusions which formed in carburized parts from Al sulfate in packing clay. W. A. Mudge

Failure of press tools under fatigue and impact. C. E. Bretney. *Metal Progress* **36**, 751–4(1939).—The importance of design and the proper selection of materials are discussed. W. A. Mudge

Metallographic identification of ferromagnetic phases. H. S. Avery, V. O. Homerberg and Earnshaw Cook.

Metals & Alloys **10**, 353–5(1939).—If the polished surface of a metallographic specimen is covered with a thin colloidal suspension of magnetic particles, application of a magnetic field will cause a visible concn. of the colloid over the magnetic areas, and a characteristic mosaic pattern frequently results. This technique has proved especially useful for the detn. of ferrite in austenitic Ni-Cr-Fe alloys, and examples showing typical results for 3 different alloys are described. 8 references. I. Hartmann

Selection of greases for cold-rolling metals and alloys. I. M. Pavlov and Ya. S. Gallaĭ. *Kachestvennaya Stal* **6**, No. 2, 34–42(1938).—A discussion of the important requirements of greases for use in rolling metals and alloys. Results are given of lab. tests with various greases. The most satisfactory greases are those made of mineral and vegetable oil and also oil emulsions. The general requirements of such greases are sufficient viscosity and adhesiveness, no corrosion, stability, safety, ease of application and economy. The most effective oils are castor oil, vegetable oils, mineral oils, emulsions and kerosene in decreasing order. Effectiveness of greases is improved by the addn. of free fatty acids. B. Z. Kamich

Controlled atmospheres for heat-treatment of copper. Ralph D. Hawkins. *Gas* **15**, No. 12, 35–6(1939).—Flue gases are used as the furnace atm., sufficient vol. being circulated to prevent air infiltration. Flue products, cooled and dried, are also used in the cooling chamber. Cl is used for pickling Cu wire prior to tinning. R. W. Ryan

Stepwise heat-treatment of chromansil. I. M. Gryaznov and M. I. Yudkevich. *Aviapromyshlennost* **1939**, No. 6, 50–2.—Usual chromansil steel specimens were subjected to ordinary quenching in oil followed by tempering and to stepwise quenching and tempering. The mech. properties of the heat-treated specimens were then detd. and on the basis of these tests the following method is suggested: heating to normal temp., hardening in a mixt. of salts at 160–180°, and subsequent tempering to the required hardness. B. Z. Kamich

Industrial gears for large transmissions. Edward J. Wellauer. *Metal Progress* **36**, 725–30(1939).—The requirements for large, industrial gears, especially high-speed gears for transmitting large amts. of power, such as rolling mill drives or reduction units between steam turbines, are given. The relative merits of plain and alloy steels in forgings and castings are included. W. A. M.

Tempering of cast iron. Otto Glaser. *Giesserei* **26**, 466–7(1939).—Piston rods made from elec. furnace gray iron, chilled castings (3.1–3.3 C, 1.8–2.4 Si, 0.5 Mn, 0.6–0.8 P and 0.1 S) showed a 2–3-mm. white rim, consisting of fine-grained graphite, finely laminated pearlite, ferrite and phosphide eutectic. After annealing and machining, the castings were quenched from 850° in oil. Hardening increased the Brinell hardness from approx. 180 to 420. During heating for tempering, some of the graphite enters soln., forming γ mixed crystals; on quenching it becomes a martensite or martensitic-troostite. The martensite is fine acicular grained; the troostite forms dark spots, owing to the phosphide eutectic. The increased hardness is accompanied by an increase in wear resistance. Uniform dispersion of the phosphide eutectic gives reduced wear. F. W. Fink

Mechanical properties and creep resistance of steels for use in equipment for ammonia synthesis. N. A. Minkevich and A. M. Borzdyka. *Kachestvennaya Stal* **6**, No. 1, 8–18(1938).—Data are given for metallographic characteristics, mech. properties at normal and high temps., creep resistance, and heat resistance of 5 steels for use in equipment for ammonia synthesis. The steels were 2.5% Cr-Mo, 5% Cr-Mo, 5% Cr-Mo-V, 1.5% Cr-Cu and 2.5% Cr-Ti. The steels were prepd. in an acid induction furnace. Grain sizes (A. S. T. M.) were 4, 5, 8, 3 and 5, resp. The creep tests lasted up to 48 hrs. The highest creep resistance was shown by the Cr-Ti steel. It also had the greatest resistance to scale formation at temps. up to 1000°. But its impact toughness was rather low at normal temps. The 3 Cr-Mo steels had rather high and nearly the same creep resistance (stress of 17.4–19 kg./sq. mm. at 400° and 11–11.5 kg./sq. mm. at 500° corresponding to tangential creep of 10^{-6} mm./mm. per hr. in the interval of 24–48 hrs.). At 600° the oxidation of all steels was negligible and not over 0.05 mg./sq. cm. per hr., at 700° it was 0.2 mg./sq. cm. per hr., at 800° it was 0.9 mg./sq. cm. for all 3 Cr steels, 0.74 mg./sq. cm. for Cr-Cu steel, 0.54 mg./sq. cm. for the Cr-Ti steel, and at 900° the oxidation proceeded intensively. B. Z. K.

Transformation of austenite in fast-cutting steels. I. P. Lipilin and A. Usov. *Kachestvennaya Stal* **6**, No. 2, 14–18(1938).—A study was made of the effects on the transformation of supercooled austenite by various factors such as original structure, temp. of initial heating, speed of cooling from initial temp. to temp. of isothermic transformation, and plastic deformation above Ac_1. The following steels were tested: (1) C 0.70, Cr 4.34, W 18.50 and V 0.50%, and (2) C 0.35, Cr 2.55, W 7.70 and V 0.37%. In forged and rolled steel the transformation of supercooled austenite is more rapid than in cast steel owing to the presence of many finely dispersed carbides. By increasing the temp. of initial heating the stability of the supercooled austenite increases sharply owing to the soln. of carbides as well as to the increase in austenite grain size. A gradual cooling from the temp. of initial heating to the temp. of transformation decreases the stability of the supercooled austenite. Plastic deformation of the austenite before the transformation in the subcritical temp. region decreases the stability of the austenite. B. Z. K.

Effect of grain size of steel on the depth and hardness of the nitrided layer. L. I. Dmitriev and V. A. Lobacheva. *Aviapromyshlennost* **1939**, No. 4, 34–6.—Steels having A. S. T. M. grain sizes of 3, 4, 5 and 7 and contg. C 0.30–0.38, Cr 1.35–1.47, Mo 0.42–0.60, and 0.98–1.37% Al were nitrided at 520° (15 hrs.) + 580° (10 hrs.) in the presence of a catalyst after they were quenched at 940° in water and tempered at 630°. The depth of the nitrided layer decreased with increasing grain size while the hardness increased. For grain sizes of 3 to 7 the hardness varied from 76 to 85 Rockwell units (P-30) and the depth of the layer from 0.43 to 0.80 mm. for the same heat-treatment. B. Z. Kamich

Effect of phosphorus and arsenic on dynamo and transformer steel. V. S. Mes'kin and Yu. M. Margolin. *Kachestvennaya Stal* **6**, No. 3, 23–30(1938).—P shows a prolonged pos. effect on magnetic properties of dynamo steel contg. 0.8–1% Si with a rapid drop in the coercive force being observed for 0.2–0.25% P. For this P concn. the mech. properties of the steel are still good. P has no effect on magnetic properties of transformer steel. It raises the brittleness in proportion to the Si content. Arsenic does not compensate for the effect of P on brittleness. B. Z. Kamich

Effect of aging on the properties of Bessemer rail steel. I. Daĭkhes. *Novosti Tekhniki* **1938**, No. 24, 11–12.—Bessemer rail steel contg. C 0.43–0.45, Mn 0.75–0.95, S 0.04–0.059 and P 0.070–0.080% was subjected to artificial aging and the mech. properties were detd. The mech. properties as shown by rupture tests were not affected noticeably. The impact toughness was found to depend upon the temp. and duration of tempering. B. Z. K.

Tool steels. H. B. Chambers. *Can. Metals Met. Inds.* **2**, 270–3(1939).—All tool steels are classified into 12 groups with these arranged according to the combination of wear resistance and toughness, together with the conditions which they are required to meet. The properties of the steels in each group are indicated graphically for toughness, wear resistance at room temp., wear resistance at red hardness and movement in hardening. W. H. B.

Steel for aviation valves. M. V. Pridantsev and E. A. Klausting. *Kachestvennaya Stal* **6**, No. 1, 18–24(1938).—A study was made of the properties and heat-treatment of steel contg. C 0.45, Cr 17.36, Ni 6.5, Si 0.4 and Mn 0.4% and having unstable austenite. The optimum heat-treatment is: (1) temp. interval of hot mech. treatment—1050–800°, (2) heat-treatment of valves—tempering at 800°. Such steel gave $\gamma \rightleftarrows \alpha$ transformation, $\gamma \rightarrow \alpha$ starting at 150° and $\alpha \rightarrow \gamma$ taking place at 650–720°. The steel had a high hardness (350–400 Brinell units) and high

resistance to dynamic crumpling in the interval 20-900°. The coeff. of expansion of the steel was 12×10^{-6} against 16×10^{-6} for austenite steels. The steel is suggested for use as aviation valves. B. Z. Kamich

Low-carbon steels of high strength. K. Antipov. *Novosti Tekhniki* **1939**, No. 8 9, 21-2.—A study was made of the mech. properties of rolled, forged and simple heat-treated specimens of low-C steels contg. C 0.09-0.29, Si 0.06-1.03, Mn 0.35-1.32, Cr 0-1.12, Cu up to 0.61, Ni up to 0.10, P 0.014-0.169 and S 0.012-0.026%. Cu had very little effect on the mech. properties. With a low Si content the yield point and ultimate rupture strength drop considerably. By increasing the Mn content of P steels to 0.7-1.0% and over the steel becomes brittle. P steels should have over 0.15% C when the P content is 0.12-0.14%. Steels which satisfy these compn. requirements will have high mech. properties only if they contain also Si and Cr in amts. of 0.8-1.1%. B. Z. Kamich

Creep of some chromium-molybdenum steels. H. D. Newell. *Metals & Alloys* **10**, 342-5(1939).—The high-temp. creep properties of 5% Cr steels contg. 1 to 1.5% Mo were investigated to det. whether the increased Mo content provides any improvement over the common approx. 0.5% Mo alloy. Si was increased somewhat also, to increase the oxidation resistance. The results indicate that while the higher percentage Mo steels have slightly better resistance to creep throughout the temp range studied (538 to 649°), there is not sufficient difference in stress values to justify the increased cost of the addn. over the usual 0.5% Mo addn. I. Hartmann

Aluminum-iron alloys for bearings. P. S. Banas. *Aviapromyshlennost* **1939**, No. 3, 34 9.—Al-Fe alloy contg. 6% Fe and 0.5% Mg and possessing properties suitable for bearings in aero engines are best prepd. by centrifugal casting at 810-840°. After pouring, the metal should be cooled intensively to obtain a fine grain and to eliminate liquation of the Fe compds. The Fe should be introduced into the alloy directly or in the form of an Al-Fe alloy contg. 15-20% Fe. The alloy should be forged or pressed to improve its structure. Forging should be done at 500-550°. The material was suitable for bearings in aero engines and in Diesel engines. B. Z. Kamich

Casting and pressure treatment of aluminum-iron alloys. O. E. Kestner. *Aviapromyshlennost* **1939**, No. 6, 38-49.—The most suitable temp. for casting Al alloy contg. 6% Fe was found to be 860-880° followed by heating of the chill at 100° and then cooling with water. In order to remove the slag from the metal before casting 0.1-0.2% $ZnCl_2$ by weight of the charge is added. Addn. of Ti changes the macrostructure and facilitates working under pressure while Mg improves the strength. The optimum addn. of Mg is 0.3-0.5%. Best temp. for forging is 530-570° and for pressing it is 400-450°. B. Z. Kamich

Rolling magnesium-aluminum alloy sheets. S. M. Voronov and L. Ya. Shpolyanskiĭ. *Aviapromyshlennost* **1939**, No. 3, 11-22. Expts. are described on the rolling of Mg-Al sheets of the Altmag type (5-10% Mg, 0.4-0.8%, 0.1-0.2% Ti, rest Al). Alloys contg. 5-6% Mg were not satisfactorily hot-rolled in the cast state and must be deformed preliminarily. Subsequent hot-rolling proceeds without difficulty as does cold-rolling. The alloy was heat-treated at 425-450° and followed by quenching in water or in moving air. Alloys contg. up to 9% Mg showed in the hardened condition a tensile strength of 35-36 kg./sq. mm. and a relative elongation of 20-25%. The mech. properties of the alloys can be improved by slight hardening. In the semihardened state the alloy contg. up to 9% Mg had a tensile strength of 42-44 kg./sq. mm. and a relative elongation of 10-12%. Both the hardened and semihardened alloys are easily cold-stamped. B. Z. Kamich

Alloys of magnesium and intermetallic compounds. K. V. Peredel'skiĭ. *Aviapromyshlennost* **1939**, No. 3, 40-1.—Mech. and casting properties of alloys of Mg with intermetallic compds. of Sb_2Ni_5, Cu_4Sn, Cu_3Sb and $MgZn_5$ in amts. up to 10% were investigated. Alloys contg. 3% $MgZn_5$ gave the highest tensile strength of 18.9 kg./sq. mm. and an elongation of 10.7% which were higher than for all the other compds. B. Z. Kamich

Magnesium alloys containing intermetallic compounds. K. V. Peredel'skiĭ. *Vestnik Inzhenerov i Tekh.* **1939**, No. 8, 356-8.—The casting and mech. properties of Mg alloys contg. intermetallic compds. CuMg, Al_6Mg_4Cu, Cu_2Mg and SbSn in amts. up to 20.0% were studied. The alloys were prepd. in an elec. furnace under a flux of F and Cl salts. The alloys were satisfactorily cast in metal and earth forms. Addn. of CuMg raises the tensile strength and it reaches a max. of 17.2 kg./sq. mm. for 5.0% CuMg and also a max. Brinell hardness of 50 after which they begin to drop. The elongation remains practically const. at about 8% up to 3% CuMg and then falls off. For 3% Al_6Mg_4Cu the max. tensile strength was 17.8 kg./sq. mm. The hardness rises continually while the elongation reaches a max. of 9.5% for 3% Al_6Mg_4Cu and then falls off. Addn. of Cu_2Mg up to 10% gives a max. tensile strength of 19.0 kg./sq. mm. The elongation decreases while the hardness increases with the addn. of Cu_2Mg. SbSn raises sharply the tensile strength and it reaches a max. of 21.5 kg./sq. mm. for 0.5% SbSn but any further increase in SbSn lowers the tensile strength and it becomes const. for 15% SbSn. For 0.5-1.0% SbSn the elongation rises to 10-11% and then falls off. The hardness reached max. values at 0.5% and 15.0% SbSn. B. Z. Kamich

Effect of the quenching medium upon the mechanical properties of magnesium alloys. I. G. Shul'gin. *Aviapromyshlennost* **1939**, No. 7-8, 60-3.—Mg alloys contg. about 3.4% Al, 4.0% Zn, 0.13% Mn, 0.1% Fe and traces of Si were quenched at 420° (held for 6 hrs.) in cold water, hot water (100°), oil (20°), and in air and also quenched and tempered at 175° (held for 6, 12 and 24 hrs.) in the same media. The results show that quenching in all these media gives about the same mech. properties. The most thorough quenching with subsequent tempering was obtained by cooling the material in water and the least thorough by cooling in air. Quenching in water at 100°, especially after extended tempering at 175°, is close to quenching in water while quenching in air is next in effect. B. Z. Kamich

A note on yttrium-aluminum alloys. W. Kroll. *Metals & Alloys* **10**, 332-3(1939).—The effect of Y and other rare earths on the high-temp. strength or hot-hardness of Al piston alloys was studied. While Y addns. somewhat increased the hardness of certain alloys and maintained a slightly higher level of hardness over the temp. range to 300°, the effect is not impressive, especially in view of the present high cost of Y. 9 references. I. Hartmann

Refinement of grain of worked aluminum bronze. Hideo Nishimura. *Nippon Kinzoku Gakkai-Si* **3**, 321-4(1939).—Effects of Cr, Co, Fe or Ti were examd. upon the grain size of worked Al bronzes contg. 6 or 8% of Al. The specimens were cold-rolled to about 60% reduction and annealed at 700° or 800°. The grain sizes of the recrystd. metals were measured. Conclusion: The grain-refinement was effective by addns. of element in the order of Cr, Ti, Co, and Fe as the contents increase. H. N

Copper-zirconium-cadmium bronze. F. R. Hensel, E. I. Larsen and A. S. Doty. *Metals & Alloys* **10**, 372-80(1939).—An investigation of the melting procedures of the alloy, the effect of various deoxidizers on the age-hardening characteristics, the effect of combining cold working and aging, phys. properties, the effect of quenching temp. on the microstructure, the effect of Zr on alloys other than Cd, etc. The investigation produced a new (Cu-Zr-Cd) high-strength, high-cond. alloy; it constitutes a very substantial improvement in hardness and strength over the present Cu-Cd bronzes. The alloy is being used for elec. conducting members, welding electrodes and heat-conducting members. 3 references. I. Hartmann

Substitutes for tin bronzes in airplane engines. V. S. Rzheznikov and B. L. Slinko. *Aviapromyshlennost* **1939**, No. 7-8, 43-60.—On the basis of numerous tests recommendations are made for the use of substitutes for Sn bronzes in airplane engines. For conditions of high impact loads and small speeds of slipping Al bronzes are suitable,

especially the bronze contg. Al 8–10, Fe 3–4% and the rest Cu. For high speeds of slipping and for medium and high loads (up to 60–80 kg./sq. cm.) the bronze contg. Sn 4–6, Pb 23–26%, and the rest Cu is suggested. For especially high speeds of slipping the bronze contg. 9.5–11.5% Al, 3.5–4.5% Fe, 3.5–4.5% Ni, and the rest Cu is suggested. B. Z. Kamich

Plating Duralumin alloy 24S with aluminum-magnesium alloys. V. N. Rzhevtsev. *Aviapromyshlennost* **1939**, No. 3, 26–34.— Duralumin 24S (4% Cu, 1.5% Mg, 0.5% Mn) was plated with Al-Mg alloys contg. 2–9% Mg. By increasing the Mg to 4–5% in the plating layer the tensile stiength and the yield point are increased approx. by 1–1.5 kg./sq. mm. and the plastic properties of the metal are thereby changed very little. The plated alloys were tested against corrosion in a soln. of 3% NaCl and 0.1% H_2O_2. By maintaining a homogeneous structure the plating contg. 4% Mg was just as resistant to corrosion as pure Al while that with 5% Mg was only slightly less resistant. The presence of Mg in the plating layer impedes the diffusion of Cu. For alloys with different amts. of Mg in the plated layer the same heat-treatment produced more dispersed Cu particles and a less deep penetration into the plated layer in accordance as the Mg in the latter increased. B. Z. Kamich

Protection of magnesium alloys against corrosion. A. T. Bundin. *Aviapromyshlennost* **1939**, No. 9, 49–59.— At the present time the aviation industry in the Soviet Union uses the following methods of protecting mechanically treated Mg alloy objects against corrosion: (1) degreasing with org. solvent, degreasing with phosphate soln., washing in cold water, washing in hot water, oxidation, washing in cold water, drying and painting, and (2) degreasing with org. compds., treatment with a 20% CrO_3 soln., washing in hot water and drying. The effects on Mg of the compn. of the oxidizing bath, concn., duration of oxidation and contact with other metals were studied. One-min. treatment in 20% CrO_3 gave the best protective film 0.02–5 0.035 mm thick. In joining Mg parts to Mg or to brass, steel and Duralumin the Mg should be oxidized with H_2SO_4. B. Z. Kamich

Preventing corrosion of oil-well compressor tubes. B. Sheinin. *Novosti Tekhniki* **1939**, No. 22, 29–30.— Corrosion of compressor tubes in oil wells which are kept flowing with the aid of air-gas lift was reduced by coating the end tubes with 3 layers of Bakelite to which kaolin and a plastifier were added. After the application of each coating the tube is dried for 2 hrs. and then subjected to the following heat-treatment: 2 hrs. at 80° and 90°, 1 hr. at 100° and 110°, and 2 hrs. at 120°, 140°, and 160°. Tests with tubes treated in this manner were satisfactory. B. Z. Kamich

Dropping tests for measuring the thickness of zinc and cadmium coatings on steel. Abner Brenner. *J. Research Natl. Bur. Standards* **23**, 387–407 (1939) (Research Paper No. 1240).—A corrosive soln. drops onto a Zn or Cd coating. The penetration time is proportional to the thickness. B. finds a soln. contg. 200 g./l. CrO_3 + 50 g./l. H_2SO_4 is preferable to Hull and Strausser's (cf. *C. A.* **30**, 8037) acidified NH_4NO_3 solns., especially for Zn + Hg coatings, and for Cd on cast Fe. A stripping soln. contg. 20 g. $SbCl_3$ per l. coned. HCl is often preferable as an umpire test to the microscopic method. F. W. F.

Corrosion of metals as an electrochemical problem. A. Til. *Sbornik Elektrokhim. Teoriya Korrozii* **1938**, 30–52; *Khim. Referat. Zhur.* **2**, No. 1, 130–1 (1939).—Theoretics of the mechanism of corrosion are reviewed. The theory of local elements is of most importance. That absolutely pure metals do not corrode was verified on a sample of specially purified Zn. A slight corrosion of Zn in 0.5 *N* HCl took place only at breaking points, or scratches. Corrosion of ordinary Zn was different in different samples, and it even changed on polishing over the same sample. In all cases (after an initial period) the soln. velocity was const. When Zn was connected to an electrode of a different metal contained in the same soln. the corrosion velocity increased while the amt. of H (evolved on Zn decreased (difference effect). The value of the difference effect was proportional to the current flowing in the element. This is explained by the increase of the concn. of Zn in the contact layer of the soln., which was caused by increased soln. of Zn, and which was connected with the change of the potential of Zn. In strong currents passivity of the electrode is possible. The increasing action depends on the nature of the metal of the auxiliary electrode (increases with a decrease of the overvoltage of H). For Al (sol. in alkali) the difference effect is larger than for Zn. When dissolved in HCl the difference effect of Al is opposite in sign (the reason remains undetd.). The accelerating action of graphite on the soln. of Zn cannot be explained by low overvoltage of H on graphite, since this is of the same order of magnitude as that of Pb. W. R. Henn

Corrosion of heat-resistant steels in high-sulfur furnace gases. F. F. Khimushin, G. I. Zharov and P. D. Arlievskiĭ. *Kachestvennaya Stal* **6**, No. 3, 14–23 (1938).—The corrosion of Cr-Ni, Cr, Cr-Mn heat-resistant steels was tested in furnace gases contg. 0.5–3% SO_2 at high temps. up to 1100°. The tests lasted up to 200 hrs. Most of the Cr-Mn steels had an insufficient corrosion resistance and high brittleness at temps. of 500–900° and prolonged heating periods. Sulfide corrosion of Cr-Ni steels does not as a rule spread over the whole area, especially when the temp. is 900° but it penetrates into the metal. Cr-Ni steels showed no sulfide corrosion at temps. below 900° and after tests of 300 hrs. B. Z. Kamich

Corrosion of valves in pumps used for deep-well pumping. B. Sheinin. *Novosti Tekhniki* **1939**, No. 17–18, 37.—The corrosion of valves in pumps used for deep-well pumping was considerably reduced by employing a stainless steel valve seat and Cr-plated valve balls. The Cr plating is carried out in the following bath: CrO_3 250 g./l. and H_2SO_4 2.5 g./l. Duration of plating is 1 hr. at a. c. d. of 20 amps./sq. dm. and 63°; this gives a Cr layer of 0.01 mm. To decrease the brittleness the balls are kept in oil at 200° for 2–3 hrs. B. Z. Kamich

Protective greases for airplane engines. V. A. Yakhlakov. *Aviapromyshlennost* **1939**, No. 7–8, 9–24.—The corrosion of inside surfaces of airplane engines and the characteristics of various protective greases are discussed. Results are reported on tests conducted with the following 2 greases for protecting inside and outside airplane engine surfaces, resp.: (1) butanol 10, Al stearate 10, triethanolamine 6.5 and lard 73.5% and (2) oil 98, triethanolamine oleate 1.5 and triethanolamine 0.5%. The tests were conducted with various metals and on the basis of these tests it is claimed that these greases are equal to those of the Ethyl Gasoline Corp. B. Z. Kamich

Fabricated stainless steel (Vollrath) **25**. Use of city and natural gas for metal cutting (Wierum) **21**. Cement from Kerch Iron and Steel Works blast-furnace slags (Tevfikov) **20**. Introduction of semiacid refractories in reheating furnaces of the Stalin New Kramatorsk Machine Works (Popov) **19**. Lubricating composition for metal-working operations (U. S. pat. 2,174,907) **22**. Elec. device for burning in furnace linings of metal furnaces (U. S. pat. 2,174,927) **4**.

Ore concentration by froth flotation. Anderson W. Ralston and Wm. O. Pool (to Armour and Co.). U. S. 2,175,093, Oct. 3. Flotation agents are used comprising sebaconitrile or other aliphatic dinitrile of the general formula $NC(CH_2)_xCN$ in which x is at least 4.

Ore treatments such as in froth flotation or cyaniding. Harry V. Wallace and Leland H. Logue (to Mining Process and Patent Co.). U. S. 2,174,540, Oct. 3. Various details of app. and operation.

Apparatus for preferential grinding and scrubbing of ores and minerals with air treatment. Holbert E. Dunn (to Vanadium Corp. of America). U. S. 2,175,457, Oct. 10. Various structural and operative details.

Dry concentration of carnotite ores. Charles P. Rees, Holbert E. Dunn and Archibald A. Sproul (to Vanadium Corp. of America). U. S. 2,175,484, Oct. 10. A process of concg. the V and U content of carnotite ores comprises crushing the ore to a size only slightly coarser than its single

grain size, subjecting the crushed ore to air classification to an extent sufficient to provide a free-flowing feed adapted to electromagnetic sepn., subjecting the ore to electromagnetic sepn., subjecting the nonresponsive discard from the electromagnetic sepn. to pneumatic scrubbing to remove encrusting V and U minerals, and sepg. the valuable fines from the coarse tailings by air classification.

Recovery of metals such as gold, silver or copper from solutions. Albert B. Doran. U. S. 2,174,570, Oct. 3. For the recovery of a metal from soln., the soln. is treated with an insol. permanganite salt of a metal more electropositive than the desired metal, the amt. of the permanganite being at least slightly in excess of that chem. equiv. to the metal which it is desired to recover, whereby an insol. permanganite salt of the desired metal and a spent soln. substantially exhausted in the metal are formed.

Hydraulic apparatus for saving fine gold. Geo. B. McKeever. U. S. 2,174,925, Oct. 3. Various structural, mech. and operative details.

Tilting crucible furnace suitable for melting and refining metals. Isaiah Hall. U. S. 2,175,462, Oct. 10. Various structural, mech. and operative details.

Roller-hearth conveyer-type furnace suitable for heat-treatment of metal sheets, etc. Edward S. Fatkin (to Westinghouse Elec. & Mfg. Co.). U. S. 2,175,834, Oct. 10. Various structural, mech. and operative details.

Roller-hearth furnace for heat-treating copper tubes, steel strips, etc. Arthur H. Vaughan (to Elec. Furnace Co.). U. S. 2,175,233, Oct. 10 Various structural and mech. details.

Vaporizing furnace for metals such as zinc. Geo. Anderson and Rangwald S. Olsen (to International Smelting & Refining Co.). U. S. 2,174,559, Oct. 3. A metal-supporting floor for a vaporizing chamber comprises a series of trays each independently supported in the chamber so as to carry only its own load of molten Zn.

Utilizing fuel oils in the operation of iron blast furnaces. Marvin W. Ditto (to Emulsions Process Corp.). U. S. 2,175,517, Oct. 10. App. is described, and a process for the production of pig iron in a blast furnace which involves introducing a water-in-fuel oil emulsion into the tuyère zone of the furnace, the oil in the emulsion being sufficient upon combustion to generate at least the amount of heat required to decompose the water vapor derived from the water to form CO and H in the presence of the C produced by the hydrocarbons of the fuel oil, whereby a gas of high calorific value and relatively low in total N is produced.

Ladle for use in casting copper wire-bars. Adolphe Busche and John H. Jago (to American Smelting and Refining Co.). U. S. 2,175,375, Oct. 10. Various structural details of a ladle adapted for preventing formation of substantial amts. of Cu oxide during pouring of the metal.

Blowpipe nozzle for cutting metals. Theodor Zobel and Ulrich Noetzlin (to Linde Air Products Co.). U. S. 2,175,160, Oct. 3. Various structural details.

Apparatus for heat-treatment of metals, as in annealing or normalizing. Howard Scott (to Westinghouse Elec. & Mfg. Co.). U. S. 2,175,922, Oct. 10. Various structural and operative details.

Fusible salt bath for case-hardening steels. Ernest A. Walen (to Heatbath Corp.). U. S. 2,175,417, Oct. 10. A mixt. suitable for carburizing steels of relatively low C content contains NaCN 40, $SrCl_2$ 20, Na_2CO_3 10, NaCl 20.45, KCl 5 and NaF 4.55%.

Apparatus for annealing steel wire or strip, etc. Carl J. Toll (to American Steel and Wire Co. of N. J.). U. S. 2,174,642, Oct. 3. Various structural and operative details.

Cast iron. Max Kuniansky. U. S. 2,174,519, Oct. 3. An arrangement of app. is described, and a method of making cast iron involving melting a mixt. of cast iron and malleable cast iron in a cupola furnace where C is picked up by the molten mass, casting this melt into ingots, remelting the ingots in a second cupola where addnl. C is picked up by the molten mass, and adding a graphitizing agent. Use of various alloys is described. U. S. 2,174,520 describes an arrangement of app., and a method of making cast iron contg. over 3% of C, which involves subjecting scrap predominantly of steel to a melting operation in a cupola furnace in contact with C, to add C to the molten material, casting this melt into ingots, and remelting the ingots in contact with C, to add further C up to a total above 3%.

Cyanide neutralizing pickled iron and steel sheets. Russell R. Smith, Hillard E. Miller and Ralph H. Gelder (to American Rolling Mill Co.). U. S. 2,175,620, Oct. 10. In a process of cyanide neutralizing pickled iron and steel sheets to be subsequently coated with Zn, Ni, Cd or enamel, etc., the cyanide soln. is maintained at a temp. of 60–82°, at a concn. of 0.12–0.15 oz. per gal. and with a treatment time of 4–40 sec.

Steel. Marvin W. Ditto (to Emulsions Process Corp.). U. S. 2,175,181, Oct. 10. App. including an open-hearth furnace is described, and a process which involves introducing lime and ferric scrap metal into the furnace, melting the scrap metal and then introducing cold iron, melting the cold iron, then injecting a water-in-oil emulsion into the pool of metal for a time sufficient, in conjunction with the lime boil, to oxidize the C, and maintaining the pool in molten condition during the injection of the emulsion by burning fuel in proximity to the point at which the emulsion is brought in contact with the pool. U. S. 2,175,182 describes app. and a process for the production of steel in an open-hearth furnace which involves impinging a jet of water-in-fuel oil emulsion traveling at high velocity and in atomized condition on the upper surface of a molten iron charge covered with slag, in an area constituting a portion only of the entire area of the surface, and thereby causing material turbulence at the upper portion of the charge and in the slag, simultaneously impinging a jet of water-in-fuel oil emulsion at high velocity and in atomized condition onto the upper surface of the charge in the first-mentioned area, from a point arranged laterally beyond the upper surface of the molten charge and thereby causing further turbulence at the upper portion of the charge and in the slag, and preventing undue chilling of the charge during such injection by burning fuel in proximity to the place of impingement.

Steel powder. Raymond L. Patterson and Claus G. Goetzel (to Hardy Metallurgical Co.). U. S. 2,175,850, Oct. 10. A process for making steel powder involves subjecting finely divided Fe oxide to the action of a reducing agent such as H under pressure at an elevated temp. to produce hot Fe powder, subjecting the Fe powder particles while maintaining them at an elevated temp. to the action of a carburizing agent such as a hydrocarbon gas until combined C has formed to a substantial depth below the surface of the particles, and partially decarburizing the resulting steel-powder particles while maintaining them at an elevated temp. by the action of a decarburizing agent such as H until a substantial proportion of C-free Fe has been restored in the portions of the particles adjacent their surface. The resulting product is suitable for molding under pressure with heat-treatment or for alloying.

Case-hardening steel. Arthur E. Bellis. U. S. 2,174,867, Oct. 3. A steel article is case hardened by dipping it in a fused salt bath contg. a eutectic mixt. of KCl and $MgCl_2$ together with about 0.5–3% of a mixt. of B nitride and Mg carbide (the bath being maintained in fused condition and at heat-treating temp. by passing an a. c. through it).

Controlling the strain sensitivity of steel. Herbert W. Graham and Samuel L. Case (to Jones & Laughlin Steel Corp.). U. S. 2,174,740, Oct. 3. Molten steel of desired compn. has nitrides of Fe and Al incorporated in it (suitably in proportions of about 1.5–3 lb. Al per ton) to give the metal product a desired strain sensitivity.

Alloy steels suitable for tools and dies. James P. Gill (to Vanadium-Alloys Steel Co.). U. S. 2,174,281, Sept. 26. A forgeable, machinable and hardenable alloy steel contains Fe together with C about 1.25–3.5, Mo about 3.5–10, Cr about 0.25–5 and V about 3–11%, the ratio of the V to the C being in excess of about 2:1 and less than about 4:1. U. S. 2,174,282 relates to alloys of generally similar compn. except that they do not contain Cr or Mo.

2,174,283 relates to generally like hardenable alloys . Mo but not Cr. U. S. 2,174,284 relates to forge- and machinable alloy steels contg. Fe together with C t 1.25–3.5, W 1–12 and V 3–10%, the ratio of the V being in excess of about 2:1 but less than about 4:1. 2,174,285 relates to otherwise generally similar alloys s. also Cr about 5.5% or less. U. S. 2,174,286 re- to tools or dies of such alloy steels contg. Fe together C 1.25–3.5, W 1–12, Mo 1–10, Cr 0.25–5 and V 3–

ist alloy steel engine parts such as valve seat rings and ider sleeve linings. George Charlton (to Eaton Mfg. . U. S. 2,175,683, Oct. 10. An alloy is used which m. it 1100–1300° and which contains Fe together with C -2.0, Cr 5–15, Si 0.25–2.0, Ni 20–40, B 0.25–3.0, P 5–2.0 and S 0.005–2.0%. Such alloys have good wear stance at high temps.

endering stainless steels resistant to acids. Henry Giles (to American Sheet and Tin Plate Co.). U. S. 75,771, Oct. 10. A method of immunizing stainless el against the corrosive attack of acids such as washing ior of nitrocellulose manuf. involves heating it to above crit. temp. to change the grain growth of the steel, the ip. and time of the heat-treatment being such as to ovide the outer surfaces of the steel with an unstrained l unstriated substantially rounded grain structure which isible under microscopic examination, cooling the heat- ated steel to about room temp. without changing such in structure and to a temp. which will permit the re- oval of oxide scale, and the metal is then exposed with surfaces cleaned to an oxidizing medium while the steel heated to a temp. which is materially above normal atm. np. but below its lower crit. point to provide the surface th an invisible corrosion-resistant oxide film.

Use of stainless steels in contact with chlorine. Hans . Kauffmann and Robert L. McEwen (to Buffalo Elec- o-Chemical Co.). U. S. 2,174,516, Oct. 3. A stainless eel is rendered resistant to active Cl by preliminary eatment with a persulfate such as that of K (suitably in l. aq. soln. at room temp. or a higher temp. for 6–48 rs.).

Facing steel with corrosion-resisting metal. Thomas B. hace (to Clad Metals Industries, Inc.). U. S. 2,174,733, ct. 3. A method of facing a steel backing with a corro- ion-resisting metal substantially free of Fe comprises onding to the face of the steel backing a thin intermediate ayer of a Ni-Cu alloy of such thickness as substantially o prevent migration of Fe into the corrosion-resisting metal from the steel backing when the corrosion-resisting metal is bonded to the intermediate layer and then bonding o the face of the layer of Ni-Cu alloy a facing of Cu-Si lloy. Cf. *C. A.* **33**, 5801[6].

Alloying the surface of metal bodies such as steel slabs with other metals such as chromium. Robert E. Kinkead. U. S. 2,175,606–7, Oct. 10. Various details of app and operation.

Alloys having artificial radioactivity. Oleg Yadoff. U. S. 2,175,236, Oct. 10. A method of prepg. an alloy having artificial radioactivity involves placing on the bottom of a furnace, in the cold state, Hg 0.5–1, adding Sn 4–6.5 and Pb 2.4–5, adding Cu 5–12 and Al 68–74%, melting these metals, introducing Mn 1.89–2% into the molten bath, heating to melt the materials together, evapg. Hg, adding Mg 4.2–8.4%, stirring, and subjecting the molten mixt. to an elec. field of high intensity corresponding to a tension of at least 100 v. per cm. of thickness of the molten alloy thus formed.

Treating aluminum alloys to effect better resistance to corrosion. Harry H. Wetzel (to Douglas Aircraft Co.). U. S. 2,174,645, Oct. 3. App. is described, and a method of treating a strong Al alloy such as "17S" alloy involving subjecting the alloy to a soln. heat-treatment, and cooling the alloy by introducing it at substantially the temp. of the soln. heat-treatment into a quenching atm. of fog-like character formed by atomizing a liquid such as water in a gas such as air.

Heat-resisting alloys suitable for resistance wires. Wm. M. Kay. U. S. 2,174,919, Oct. 3. Ni is alloyed with Cr 10–30, Th 0.01–2, Si 0.25–3 and Ce 0.01–2%. Ca, Mg and Zr also may be used.

Removing magnesium from aluminum alloys. Georg Messner (to I. G. Farbenind. A.-G.). U. S. 2,174,926, Oct. 3. Al alloys contg. Mg are treated with Cl at temps. above the m. p. of $MgCl_2$ but not substantially above 1000°, and the $MgCl_2$ formed is sepd. from the metal.

Treating iron-aluminum alloys. Franz Noll and Paul Wolf (to "Fides" Ges. fur die Verwaltung und Verwertung von gewerblichen Schutzrechten m. b. H.). U. S. 2,174,368, Sept. 26. A method of treating Fe-Al alloys contg. from about 1.5% up to 8% of Al to impart thereto a high initial permeability and improve the constancy thereof when subjected to weak magnetizing forces involves subjecting the alloy to cold work in an amt. ranging from 25 to 85%, annealing the cold-worked alloy at a temp. between 900° and 1100° in the presence of O, and slowly cooling the annealed alloy.

Copper-boron-silicon alloys. Horace F. Silliman (to American Brass Co.). U. S. 2,175,223, Oct. 10. Alloys which are of fine grain and resistant to corrosion contain Cu together with Si 0.1–5.0 and B 0.005–4.5%.

Lead-bismuth-lithium cable sheath alloy. Hans Osborg (to Maywood Chemical Works). U. S. 2,175,279, Oct. 10. An extrudable and workable Pb alloy contg. Bi and Li is prepd. by establishing a melt of Pb contg. about 0.03–0.09% of Bi, maintaining the melt at a temp. of at least about 425°, adding about 0.005–0.025% of Li and stirring to effect practically complete incorporation of any wet dross, and then casting. Cf. *C. A.* **33**, 2478[1].

Galvanizing articles such as sheets of steel. Thomas C. Scott (to Continental Steel Corp.). U. S. 2,175,706, Oct. 10. Articles to be galvanized are passed through a molten bath comprising a relatively deep supporting layer of Pb and a relatively thin layer of Zn, and immediately on emergence of the article from the bath the Zn coating on it, while still hot, is subjected to the action of a fluxing agent such as NH_4Cl in the presence of oxalic acid, in order to reduce Pb oxide formation.

Apparatus for rust-proofing galvanized sheets by treatment with phosphoric acid, etc. Benjamin P. Finkbone, Geo. R. Hoover and Harvey F. Miller (to American Rolling Mill Co.). U. S. 2,175,599, Oct. 10. Various structural, mech. and operative details.

Welding electrodes and contacts. James M. Kelly (to Westinghouse Elec. & Mfg. Co.). U. S. 2,175,899, Oct. 10. A major proportion of a refractory metal powder such as W, Mo or Ta is mixed with a minor proportion of a highly conductive metal powder such as Cu or Ag and the mixt. is placed in a mold of refractory material such as graphite and over this mixt. there is placed a layer of a mixt. of a major proportion of a highly conductive metal powder and a minor proportion of a refractory metal powder and the materials are heated in the mold under pressure to produce a dense composite electrode having a contact tip of refractory metal and a shank of highly conductive metal (the heating being in a protective atm. such as H or N at a temp. above the m. p. of the highly conductive metal so that it serves as a bonding agent).

Flux compositions for use in soldering, welding, etc. Lionel Cinamon and Samuel Sklarew (to Special Chemicals Corp.). U. S. 2,174,551, Oct. 3. A high proportion of boric acid is used with other ingredients such as KHF_2, KBF_4 or K_2SiF_6.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

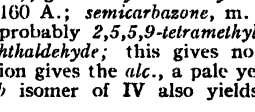
Properties of long-chain compounds as functions of chain length. Maurice L. Huggins. *J. Phys. Chem.* **43**, 1083–98(1939).—From theoretical considerations, largely qual. in nature, certain conclusions have been reached regarding the variation with chain length of heat content, entropy, heat of fusion, heat of vaporization and vapor pressure of long-chain compds. at const. temp. Variation of b. p. with chain length has also been briefly discussed. Conclusions were tested, where possible, with expt. data for *n*-paraffin hydrocarbons. Oden E. Sheppard

Stability of polymorphous forms of long-chain hydrocarbons and their derivatives. Theodor Schoon. *Ber.* **72B**, 1821–7(1939).—S.'s system for deriving the possible cryst. forms of substances built up of long chains from a basic rhombic form by simple translation of the chain axis (*C. A.* **32**, 6523[9]) is briefly reviewed. Hitherto it was an entirely open question which of these possible forms are thermodynamically stable. Müller (*C. A.* **23**, 30), from considerations of symmetry, believed that paraffins with an even no. of C atoms have a monoclinic structure. Kohlhaas and Soremba (*C. A.* **33**, 2388[1]) raised the question whether in the case of $C_{30}H_{62}$ the rhombic α-form might not be the more stable modification and hence not obey the Muller rule. To clear up this point the relative stabilities of the 2 forms (α and γ_1) were studied by means of Müller spectrograms of their intraconversion. Their transformation temps. and m. ps., resp., were found to be: α, 60°, 67°; γ_1, 60°, 66°. Their spectrograms at 20°, 61° and after cooling to 20°, which are reproduced, show that the rhombic α-form is in fact the more stable modification. Whether the γ_1-form is totally unstable or becomes stable at much lower temps. cannot be detd. experimentally. From simple considerations it is concluded that the monoclinic high-temp. ϵ_2-form of stearic acid is very probably totally stable, as in this cryst. form the structural units must be in a state of abs. min. of free energy. C. A. R.

Oxidation to aliphatic acids of olefins prepared from paraffin. Henning Scheller. *Ber.* **72B**, 1917–26(1939). Air oxidation of paraffins to aliphatic acids has the disadvantage of giving no homogeneous product, with or without a catalyst, under normal or increased pressure, at high or low temps. The object of the present work was to obtain light on the course of the reaction by a method in which the oxidation of the paraffin proceeded under the simplest possible conditions. For this purpose it was desirable to produce in the chain of a normal paraffin a sensitive position which offered a preferential point of attack. It was sought to attain this object by chlorinating paraffin, converting it into an olefin by elimination of HCl, and subjecting it to oxidation either (1) at the double bond (with O_3, $KMnO_4$, HOCl, etc.) or (2) at the C atom adjacent to the double bond while preserving the double bond (with O, SeO_2, CrO_3, etc.). For the prepn. of relatively large amts. of olefins recourse was had, in part, to the process of Schaarschmidt and Thiele (*C. A.* **15**, 1309). A purified com. hard paraffin, m. 68–70°, av. mol. wt. 420 (Rast), chlorinated slightly above its m. p. until it had absorbed 0.5 mol. Cl, yielded a product of salve-like consistency, m. 58–62°, which at 300° rapidly and quantitatively split off the Cl as HCl. The resulting dark oil underwent extensive cracking when distd. under atm. pressure and was therefore distd. under 3 mm.; the olefin so obtained was white, with a faint yellowish shimmer, m. 47–50°, av. mol. wt. 410, I no. 58. Homogeneous triacontane, m. 66.8° (obtained by electrolysis of the Na salt of pure palmitic acid, m. 62°), was then chlorinated under the same conditions, because com. paraffin yields a large no. of products; heating the product under atm. pressure at 300° and then distg. it *in vacuo* gave a pure white cryst. olefin, m. 58–60°, I no. 50, showing no evidence of the presence of conjugated double bonds (neg. results in diene no. detns. with maleic anhydride). To obtain light on the positions of the double bonds the olefin was subjected to ozonolysis and subsequent oxidation of the aldehydes to the acids. It was ozonized in CCl_4 at 0° and the ozonide was cleaved by boiling with water in the presence of a little H_2O_2. The neutral portion (about 30%) remaining after sepg. the CO_2H acids had the very low I no. 6, showing that the product used for the ozonization had contained about 70% olefin and the ozonization had been practically quant. The neutral portion was a white solid, m. 64°, consisting mostly of unchanged triacontane. The light yellow acids, sepd. through the Na salts, were mainly satd. aliphatic acids (I no. 10). In the water used for boiling out, the only sol. acid present was formic; the next higher homologs (acetic, propionic, butyric, valeric) could not, at any rate, be detected, nor could oxalic acid. Hence the chlorination must have attacked principally the end α- or β-C atoms. Detns. of the HCO_2H showed 23% of the theoretically possible amt. of acid. As no AcOH was found it is probable that all of the Cl in the chlorinated product was on the α-Cl atom. The acids were converted into the Me esters and fractionated; below are given, resp., the b. ps. (pressures in parentheses), wts., phys. state, color, MeO content, mol. wt. calcd. for $C_nH_{2n+1}CO_2Me$ from the MeO content, and mol. wt. found in freezing benzene, for the various fractions: 90–150° (8 mm.), 1.70 g., liquid, colorless, 15.86%, 195, 188; 90–135° (0.08 mm.), 2.20 g., liquid, colorless, 13.86%, 236, 249; 135–70° (0.08 mm.), 2.20 g., solid, yellow, 10.55%, 291, 302; 150–70° (0.005 mm.), 2.40 g., solid, yellow, 9.09%, 311, 359; 170–80° (0.005 mm.), 2.20 g., solid, brown-yellow, 8.33%, 372, 383; 250–5° (0.005 mm.), 1.32 g., solid, brown, 6.95%, 446, 459; residue, 1.20 g., black solid. The good agreement between the calcd. and found mol. wts. indicates these fractions were indeed esters of aliphatic monocarboxylic acids with 10–29 C atoms. Oxidation of the olefin with air (about 5 l. per hr. per 70 g. olefin) for 48 hrs. at about 105° gave a light-yellow product of acid no. 80, I no. 63, yielding about 35% light-yellow acids of I no. 50. The yellow unsaponifiable part had an I no. of 82. Pure O under the same conditions gave in 24 hrs. a light-yellow product of acid no. 126, I no. 65, yielding about 50% of yellow acids with sapon. no. 182, I no. 54; I no. of unsaponifiable part, 90. In both cases the unsaponifiable part was no longer a pure olefin. Its av. mol. wt., 615, and its O content indicated it consisted of polymerization products and also contained oxidation products. The acids contained small amts. of HO acids insol. in petr. ether. The I nos. of the acids were about the same as that of the original olefin. The oxidation must therefore have occurred according to (2) above. After ozonization at 0° and boiling of the ozonide with water contg. a little HNO_3, the water contained, along with traces of HCO_2H, oxalic and succinic acids but no malonic acid. Hence the oxidation with air or O had occurred principally at the C atoms adjacent to the double bond. The Me esters of the acids obtained with air or O gave fractions with the following properties (b. p., wt., phys. state, color, MeO content, calcd. mol. wt., found mol. wt., I no., resp.): 95–135° (8 mm.), 0.90 g., liquid, colorless, 17.06%, 182, 175, 15; 90–140° (0.01 mm.), 1.90 g., liquid, colorless, 12.11%, 256, 262, 24; 140–70° (0.01 mm.), 1.30 g., solid, yellowish, 10.41%, 297, 300, 47; 170–95° (0.01 mm.), 1.90 g., solid, yellow, 8.39%, 370, 379, 63; 195–215° (0.01 mm.), 1.55 g., solid, brown-yellow, 7.76%, 400, 410, 74; 215–40° (0.01 mm.), 1.80 g., solid, brown, 6.89%, 450, 465, 86; residue, 0.65 g., brown-black solid. The acids therefore had about the same mol. wts. as those obtained with O_3 but were unsatd. and not pure carboxylic acids; analysis showed they contained more O than corresponded to that in the CO_2H group. The olefin obtained from the com. paraffin was subjected to similar oxidations, in part in the presence of 0.1% of various catalysts (Ba, Ca, Mn and Al stearates, cobaltous-cobaltic oxide, hopcalite). With air there were obtained more or less colored products with acid nos. 67–78. After 48 hrs. oxidation the I no. was in no case

higher than 62. In most cases the catalysts did not appreciably affect the results but with hopcalite the I nos. of the oxidation product, the aliphatic acid mixt. and the unsaponifiable portion were appreciably lower. The neutralization nos. and m. ps. of all the acid mixts. were approx. the same. The av. yield of acids was 30% and their I nos. (except of that obtained with hopcalite) not much lower than that of the starting material. Ozonization in CCl_4 and cleavage of the ozonides gave oxalic and succinic acids. The unsaponifiable portions had an av. mol. wt. of 585 and contained O. The aliphatic acids all had approx. the same consts., contained HO acids and yielded soaps which foamed well. The Me esters showed the following properties (given in the same order as above): 75–109° (0.05 mm.), 6.68 g., liquid, colorless, 17.23%, 180, 207, 19; 100 35° (0.05 mm.), 7.60 g., liquid, colorless, 10.49%, 296, 301, 53; 135–90° (0.05 mm.), 7.62 g., solid, yellow, 8.96%, 346, 360, 60; 190–230° (0.05 mm.), 5.89 g., solid, brown-yellow, 7.00%, 413, 446, 76; residue, 4.20 g., black solid. Pure O instead of air gave, in half as long a time, a light-yellow product with acid no. 126, and 40% of acids with the same consts. as those obtained with air. Hard paraffin treated with air under the same conditions (48 hrs. at 105°) was unchanged. C. A. R.

Polyene series. I. E. Barraclough, J. W. Batty, I. M. Heilbron and W. E. Jones. *J. Chem. Soc.* **1939**, 1549–54. It has been shown (*C. A.* **31**, 5369[3]) that citral (I) condenses with crotonaldehyde (II) with a neutral piperidine-AcOH catalyst to give 3 isomeric aldehydes. With an excess of AcOH, the results are very similar, although the reaction period is greatly reduced; the addn. of a small proportion of silica gel to either the neutral or the acid catalyst results in a considerable increase in the total yield of condensation products with a marked reduction in the quantity of undistillable resin. Citrylidenecrotonaldehyde *a* (III) (from the semicarbazone, m. 160°, $\lambda_{max.}$ 3255 A.) is reduced by (iso-$PrO)_3Al$ in iso-PrOH to *7,11-dimethyl-2,4,6,10-dodecatetraen-1-ol*, b_{30} 200–10°, pale-yellow oil, $\lambda_{max.}$ 2680 A. ($\epsilon_{max.}$ 42,000), which contains 4 double bonds. The *b* isomer (IV) of III (semicarbazone, m. 206°, $\lambda_{max.}$ 3255 A.) is acyclic and contains 4 double bonds. Condensation of I and II in dry Et_2O with $NaNH_2$ as catalyst gives III and a new *semicarbazone* (V), $C_{16}H_{23}ON_3$, m. 186°. I and AcH with $NaNH_2$ in Et_2O give citrylideneacetaldehyde (semicarbazone, m. 170°) and small quantity of V, III could not be detected. I and β-methylcrotonaldehyde with $NaNH_2$ in Et_2O give a mixt. of *ψ-ionylideneacetaldehyde a* (VI), $C_{18}H_{22}O$, and *b* (VII), whose *semicarbazones*, m. 178–9° and 112°, resp., are sepd. by crystn. from 80% MeOH. VI and VII are pale-yellow oils with $\lambda_{max.}$ at 3150 A. Reduction of IV, VI and VII gives the corresponding alcs. as readily autoxidizable oils with $\lambda_{max.}$ 2650, 2650 and 2660 A. The action of O_3 on III and VI gives 77 and 70% of the theory of Me_2CO but no AcH. PhCH:CHCHO and AcH with $AcNH_2$ give cinnamylideneacetaldehyde, $\lambda_{max.}$ 3390 A., $\epsilon_{max.}$ 52,460. III and Me_2CO give *2-keto-10,14-dimethyl-3,5,7,9,13-pentadecapentaene*, b_1 140–5°, λ_{max} 3580 A. (*semicarbazone*, m. 171°, λ_{max} 3500 A.). VI gives the *6,10,14-trimethyl* deriv., $b_{0.4}$ 161° (semicarbazone, m. 161°, $\lambda_{max.}$ 3500 A.). II. I. M. Heilbron, W. E. Jones and A. Spinks. *Ibid.* 1554–6. *ψ*-Ionone semicarbazone (20 g.) with 200 cc. H_3PO_4 at room temp. gives 14 g. of an ionone, almost exclusively the β-isomer. Citrylideneacetaldehyde semicarbazone gives a yellow oil, which is probably *β-cyclocitrylideneacetaldehyde* (I), λ_{max} 2930 A., $\epsilon_{max.}$ 8000, whose *semicarbazone*, pale yellow, m. 186–7°, $\lambda_{max.}$ 2950 A., $\epsilon_{max.}$ 27,400. O_3 and I give geronic acid. I condenses with Me_2CO to give the ketone $CMe:C(CH:CHCH:CHAc)\cdot CMe_2.CH_2.CH_2.CH_3$, $b_{0.17}$ 140–5° m. 186°, $\lambda_{max.}$ 3160 A., ϵ_{max} 38,000. III. J. W. Batty, I. M. Heilbron and W. F. Jones. *Ibid.* 1656–60.—Citrylidenecrotonaldehyde *a* (I) semicarbazone (m. 160°), added to 100 cc. H_3PO_4 (d. 1.75) with stirring at room temp. during 1 hr. and distn. with steam in the presence of 25 g. $C_6H_4(CO)_2O$ in N stream, gives 5.1 g. of *5,5,9-trimethyl-5,6,7,8,9,10-hexahydro-1-naphthaldehyde* (II), m. 60–1°, $\lambda_{max.}$ 3210 A.; *semicarbazone*, with 1 mole MeOH, m. 114°, from Et_2O-light petr., m. 169–71°; *2,4-dinitrophenylhydrazone*, red, m. 186°. Reduction of 3 g. II with (iso-$PrO)_3Al$ in iso-PrOH at 110–20° gives 2 g. of the *alc.*, $C_{14}H_{22}O$, pale yellow viscous oil; $SbCl_3$-$CHCl_3$ gives a blue-violet color; absorption bands 6410, 5800, 5030 A.; the H absorption corresponds to 3 double bonds but results in the formation of the hydrocarbon. With O_3 II gives a diketodicarboxylic acid, $C_{12}H_{18}O_3$ (*semicarbazone*, m. 163°); no Me_2CO was found. The semicarbazone of the *b* isomer of I gives an *aldehyde*, possibly III (R = H), m. 56.5–60°; *semicarbazone*, m. 221–2°; *2,4-dinitrophenylhydrazone*, red, m. 253–4°. Reduction gives the *alc.*, pale yellow, showing no selective absorption in the ultraviolet; further reduction gives a hydrocarbon. *ψ*-Ionylideneacetaldehyde *a* semicarbazone (IV), gives a *cyclic aldehyde* (V), pale yellow oil, $\lambda_{max.}$ 3160 A.; *semicarbazone*, m. 188–9°, $\lambda_{max.}$ 3250 A.; V is probably *2,5,5,9-tetramethyl-5,6,7,8,9,10-hexahydro-1-naphthaldehyde;* this gives no geronic acid with O_3; reduction gives the *alc.*, a pale yellow oil, λ_m 2720 A. The *b* isomer of IV also yields an *aldehyde*



(III, R = Me), a pale yellow oil (*semicarbazone*, m. 214–15°). The results indicate that I is derived from the trans form of citral (i. e., citral *a* or geranial), whereas the *b* isomer is related to the cis isomer (citral *b* or neral). IV. I. M. Heilbron, A. E. Johnson and W. E. Jones. *Ibid.* 1560–3.—Oxidation of vitamin A (I) with (iso-$PrO)_3Al$ in the presence of Me_2CO gives the same C_{23} ketone (axerophthylideneacetone (II)) as is obtained by using (*tert*-$BuO)_3Al$ (*C. A.* **32**, 3346[3]). Reduction of II by (iso-$PrO)_3Al$ in iso-PrOH gives a secondary alc. (III), viscous orange oil, λ_{max} 3545 A., $E^{1\%}_{1cm.}$ 1250; $SbCl_3$ in $CHCl_3$ gives an intense greenish blue color with a strong band at 7120 A. Oxidation of II or III with O_3 gives geronic acid, thus confirming the presence of the β-ionone ring; neg. results were obtained with the product formed by oxidation of I in Et_2CO or the corresponding alc. PhCH:$CHCH_2OH$ and (iso-$Pr)_2CO$ in C_6H_6 with (*tert*-$BuO)_3Al$ give 5% of PhCH:CHCHO; with Et_2CO there results *α-cinnamylidenediethyl ketone*, PhCH:CHCH:CMeCOEt, pale yellow, m. 63°, $\lambda_{max.}$ 3220 A., $\epsilon_{max.}$ 33,400 (*2,4-dinitrophenylhydrazone*, reddish violet, m. 232°). $PhCH_2OH$ and Et_2CO give *α*-benzylidenediethyl ketone and furfuryl alc. yields α-furfurylidenediethyl ketone, b_{21} 135–40°; *semicarbazone*, m. 181°, λ_{max} 3160 A., $\epsilon_{max.}$ 74,000; *2,4-dinitrophenylhydrazone*, reddish violet, m. 188°. Geraniol gives mainly high-boiling products. C. J. West

Chlorine derivatives of the aliphatic series. XV. Chlorination of isobutylene. I. D'yakonov and D. Tishchenko. *J. Gen. Chem.* (U. S. S. R.) **9**, 1258–64 (1939); cf. *C. A.* **33**, 4190[1,6].—Isobutylene with approx. an equal vol. of Cl gave, after fractional distn., 90 g. Me_2CCl (I), b. 52 4°, 88 g. isobutenyl chloride (II), b. 71–4°, 61 g. 1,2-dichloroisobutane, b. 107–10°, 231 g. of a mixt. contg. approx. 40% (dctd. by hydrolysis) 1-chloro-2-chloromethyl-2-propene (III) and 60% 1,3-dichloro-2-methyl-1-propene (IV), b. 131–4°, and a mixt. of trichloroisobutanes, not investigated further. I was identified by hydrolysis to Me_2COH, m. 25°, b. 80–2°. III and IV were identified by oxidation of the mixt. of III and IV with O_3 to give $ClCH_2COMe$ (semicarbazone, m. 142–3°), and $(ClCH_2)_2CO$. The chlorination of II at 0° in the presence of $NaHCO_3$ also gave a mixt. of III and IV, in addn. to other products. Based on the exptl. data the chlorination of isobutylene is an anomalous reaction, similar to that previously observed for other ethylene hydrocarbons with a tertiary C atom at the double bond.

John Livak

The relations of "oxygen and peroxide effect," and of hypochlorous acid addition, to the structures of unsatu-

rated organic compounds. Arthur Michael. *J. Org. Chem.* 4, 519–30(1939).—Based on the results of his own expts. and those of Kharasch and coworkers (30 references) on the addn. of hydrogen halides and hypohalous acids to unsatd. compds. and on the relationship of "O and peroxide effect" upon these reactions, M. gives some theoretical interpretations to explain the structures of the halohydrins formed from aliphatic α,β-unsatd. compds. and the quant. relations between them. He explains the accelerated velocity of these addns. over those of the H halides and formulates the direct connection between the abnormal addns. and the chem. structure of the unsatd. compds. These interpretations also explain how mol. O and peroxides act catalytically in abnormal HBr addns.: they connect changes in the mode of addn. with relative reaction facility. Further exptl. development of the phenomena is suggested. In the Winstein and Lucas interpretation (*C. A.* **32**, 4861[1]) there is no connection between the adherence of normal addn. and the magnitude of the oxidant effect or with the structures of the unsatd. org. compds. It is based upon a series of speculations, which are wholly without exptl. support and which are opposed not only to the fundamental law on addn. in org. reactions, but to the affinity relations between C and O.
F. E. Brauns

Solvent and peroxide effect in the addition of hydrogen bromide to trimethylethylene. Arthur Michael and Nathan Weiner. *J. Org. Chem.* **4**, 531–42(1939).—According to Kharasch (*C. A.* **27**, 3444) abnormal addn. through peroxide influence occurs only in alkenes with terminal unsatn. Trimethylethylene (I), b_{789} 38.8°, n_D^{25} 1.3869, therefore should not exhibit additive abnormality nor should it be susceptible directly to solvent influence. From the theoretical viewpoint (cf. preceding abstr.) I may not only manifest a direct peroxide but also a direct solvent effect. I is therefore used to exam. experimentally these theoretical interpretations. HBr is added to I under various conditions with the following results: Ascaridole (II) causes the formation of the abnormal secondary isopentyl bromide (III). The extent of this effect increases with the concn. of II. Contrary to K., therefore, the abnormal addn. is not limited to 1-alkenes. In CS_2, C_5H_{12} and AcOEt at −78°, HBr and I give the normal Me_2CBrEt (IV). In Et_2O at −78°, I and HBr yield III in a considerable proportion which increases with rising temp. It is reduced only slightly by the presence of "antioxidant" Ph_2NH (V) but to a large extent by p-$C_6H_4(OH)_2$ (VI). Under the same conditions I and HCl or HI yield only the tertiary amyl halides. AcOH induces the formation of a small proportion of III. The abnt., not affected by the presence of II, is reduced slightly by V and completely by VI. In Me_2CO soln. the addn. yields only IV, as it does also in the presence of II. MeOH and EtOH effect a small percentage of the abnormal addn. at −78° which decreases with rising temp. In these solvents II causes a large proportion of the abnormal addn. at −78° but its effect falls off with rising temp. and at 20° it has no measurable influence on the normal course of the reaction. The chem. mechanism of the peroxide effect, as advanced by K., is not applicable to explain the above results of certain solvents in causing the abnormal addn. or to interpret the specific combined effect of solvent and peroxide. This interpretation has been discussed. It has been shown that in the abnormal addn. to I, the relations between solvent effect and peroxide effect vary decidedly when used separately and together. The abnormal effect of solvents on the addn. of HBr to I is specific, depending upon their chem. character. In certain solvents II exercises a marked effect upon the course of the addn. while in other solvents it remains inert. The influence of V as "antioxidant" depends upon the nature of the solvent and may be practically ineffective in reducing the abnormal addn. which is usually suppressed by VI. In some solvents, however, this effect is only partial and depends upon the temp. These relations differ to a considerable extent from those observed in the corresponding reaction with 1-alkenes. An explanation of the abnormal addn. of HBr to I by solvent influence is advanced, based upon the primary formation of double mols. of HBr and solvent. These then unite, in accordance with the partition principle, with the relatively more pos. unsatd. C in the alkene and the reversal occurs when the formed unsatd. C-solvent-HBr grouping functions as relatively neg. to the terminal, formerly relatively neg., unsatd. C. A corresponding chem. change is believed to take place in the addn. reversal by peroxide effect.
F. E. Brauns

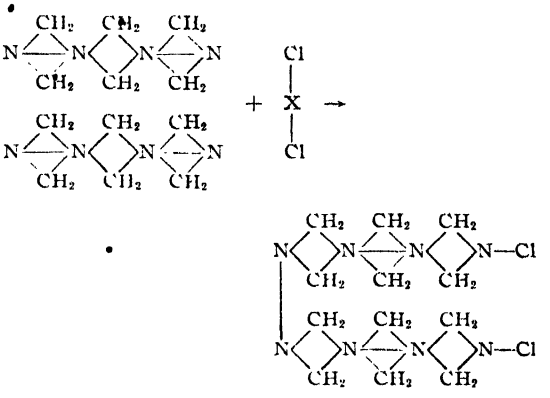
A new method for the separation of organic oxygen compounds from hydrocarbons. A. S. Osokin. *J. Gen. Chem.* (U. S. S. R.) **9**, 1315–25(1939).—The method, based on the reaction of O-contg. compds. with $MgCl_2$ to form complexes of the oxonium type, is suitable for the quant. sepn. of neutral O-contg. compds. (alcs., aldehydes, ketones, esters, lactones, anhydrides, etc.) from hydrocarbon mixts. Phenol ethers, and furan and pyran compds. which do not contain OH, CO_2H or carbonyl groups fail to form complexes. The following mixts. in petr. ether (30–70°) were refluxed with $MgCl_2$ and the corresponding complexes (cf. *C. A.* **33**, 1263[7]) isolated and analyzed. The values in parenthesis denote the amts. in % of O-contg. compds. removed from soln. AmOH(I)-Me_2CO (II) (99.49), I-AcOAm (III) (98.72), I-furfural (IV) (99.12), I-Ac_2O (V) (99.52), I-II-III (93.69), I-III-V (98.99), I-II-V (94.10), II-III-V (99.30), I-III-IV (98.88) and I-II-IV-V (97.52).
John Livak

Alkyl peroxides. XII. Ethylidene diperoxide. Alfred Rieche and Richard Meister. *Ber.* **72B**, 1933 8(1939); cf. *C. A.* **29**, 6877[4]. Previous work has shown that almost all aldehyde analogs of peroxides can be prepd.; only monomeric aldehyde or ketone peroxides of the general structure $RHC\langle^{O}_{O}\rangle$ and $RR'C\langle^{O}_{O}\rangle$ are unknown and, the authors believe, are incapable of existence; all the "monomeric" aldehyde peroxides which are described in the literature have been erroneously assigned such a structure. If they are actually formed transiently in any reaction it is to be expected that they will immediately dimerize or change into polymeric cyclic peroxides or carboxylic acids (cf. R., *Die Bedeutung der organischen Peroxyde fur die chemische Wissenschaft und Technik*, p. 16; *C. A.* **31**, 700[1]). Aldehydes with 1 mol. H_2O_2 form hydroxyalkyl hydroperoxides which yield alkylidene peroxides with dehydrating agents. A polymeric ethylidene peroxide (I) was prepd. in this way from MeCH(OH)OOH (II) and P_2O_5 in ether (*C. A.* **26**, 82). Wieland and Wingler (*C. A.* **17**, 2558) by heating bis(α-hydroxyethyl) peroxide or letting it stand a long time obtained a highly explosive resin which they considered to be dimeric I but which R. and M. regard as a polymer. However, they believe both this and their own product contained certain amts. of the dimer, which they undertook to prep. in a pure and nondangerous form. They tried to eliminate water from II in Me_2O at a considerably lower temp. than that which results in the formation of the polymeric I but the reaction proceeded in an entirely different direction; 2 mols. of the II esterified each other to form *bis(hydroperoxyethyl) ether*, $[MeCH(OOH)]_2O$. An unexpected result was obtained in connection with the prepn. of monoperparaldehyde (III) from the so-called "synthetic dimeric butylene ozonide" (*C. A.* **26**, 5906). When the latter substance is cautiously heated *in vacuo* it undergoes cleavage (which was considered to be a "cracking" of the labile 10-membered ring) and III distils over. In one such "cracking" operation, after the III had distd. over under 14 mm. at a bath temp. of 60–70° there formed, at about 80°, in the condenser and receiver a white cryst. mass which, unlike III, was extremely explosive. A minute crystal readily penetrated through a clay plate, with a flash of fire, when pressed with a metal spatula. The felted needles, dissolved out with ether, cautiously evapd., filtered and washed with ether, yielded pure *dimeric* I. The substance has a penetrating, AcH-like odor; a small sample on a watch glass evaps. in about 10 min. Its prepn. is always reproducible but violent detonations frequently occur so that only small amts. of materials must be employed and only with the greatest possible precautions. It is cer-

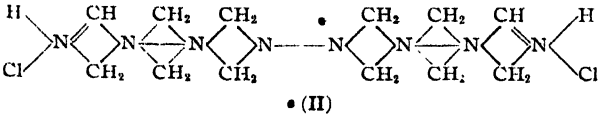
tainly possible to convert the oil remaining after distn. of the III, which consists chiefly of polymeric I, for the most part into the dimer, for more and more of the latter passes over as the heating is continued, but the residual oil becomes increasingly sensitive so that even a slight jar may cause it to detonate. The largest amt. of the dimer which has been prepd. at any one time was 500 mg. M. m. 63° without decompn., mol. wt. 117 (boiling benzene), 123–7 (dioxane); C and H detns. by the Pregl micro method and C detns. by the Lieb and Krainich wet combustion method gave values agreeing with the formula $(C_2H_4O_2)_x$. The dimer is relatively stable toward hydrolytic agents; it is not appreciably decompd. by long heating with water and even with 25% H_3PO_4 it can be heated for hrs. on the water bath without change. It is insol. in water but sol. in most org. solvents. Its oxidative power is remarkably small. Iodometric titration in alc. gave only 2.7% active O instead of the calcd. 26.7%, and even titration in ether with aq. $TiCl_3$ gave only 1%. **XIII. Tripropylidene triperoxide.** *Ibid.* 1938–40.—$[EtCH(OH)]_3O_2$ (I) had been found (R., *Alkylperoxyde und Ozonide*, p. 57; *C. A.* **25**, 1258) to undergo a change whereby it becomes explosive and richer in active O; the change was accelerated by allowing an ether soln. to stand over P_2O_5 and evacuating the residue for a long time. It was believed that tripropylidene triperoxide (II) was formed through an intermediate mononeric or dimeric propylene ozonide which split off EtCHO, the resulting propylidene peroxide then trimerizing. The process would thus be entirely analogous to the formation of dimeric and polymeric ethylidene peroxide (Part XII above). It had not been possible, however, to repeat the prepn. of pure II by the above method; I with P_2O_5 in ether gave oils whose compn. corresponded approx. to that of propylene ozonide and which on heating *in vacuo* gave off EtCHO and underwent further change, but the products were not homogeneous. The method used for ethylidene peroxide was not successful in this case. II was obtained without difficulty, however, by elimination of water from EtCH(OH)OOH. When equimol. amts. of H_2O_2 and EtCHO were allowed to stand some days in ether and the soln. was treated a long time with P_2O_5 at 0 5°, evapn. of the ether and heating the residue *in vacuo* gave an oil somewhat more mobile than glycerol, with a penetrating odor similar to that of ethylidene peroxide, and which was exceedingly explosive, although not so brisant as the dimeric ethylidene peroxide. It was also very sensitive to friction; the slightest pressure on a drop on a clay plate produced detonation. II is insol. in water but easily sol. in most org. solvents, has the compn. $(C_3H_6O_2)_x$ (Pregl), d_{20} 1.089, n_D^{20} 1.43903, mol. refr. 53.612, exaltation 2.195 (0.73 per peroxide group), mol. wt. in dioxane 215, surface tension at 20° 32.94 dynes/cm., parachor 438.8 (calcd. 487.8; the increment for peroxide O has been found to be 21.3). According to Mumford and Williams a ring const. of −4 in the parachor value corresponds to about a 7-membered ring; in view of the inexactness of the method, the value found can equally well indicate a 9-membered ring. The ring in II is less resistant to hydrolysis than the 6-membered ring of dimeric ethylidene peroxide, but complete hydrolysis with acids to EtCHO and H_2O_2 is not possible. By the iodometric method, only about half the calcd. amt. of H_2O_2 is found. With alkalies the greater part (about 75%) goes over into $EtCO_2H$.

C. A. R.

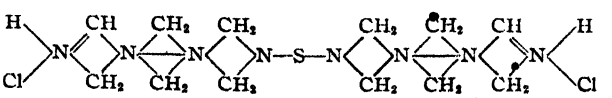
The structure of hexamethylenetetramine. The action of chlorides of sulfur upon formine. Preliminary communication. Mieczysław Dominikiewicz. *Arch. Chem. Farm.* **4**, 1–7 (in French, 7) (1939).—The reactions between formine (hexamethylenetetramine) and SCl_2, S_2Cl_2, as well as $SOCl_2$ and SO_2Cl_2, were studied. These reactions take place very easily, similarly to the reaction of formine with $COCl_2$ (cf. *C. A.* **32**, 4522[4]). The S compds. in $CHCl_3$ are run into formine in cold $CHCl_3$; white, cryst. products of the reactions ppt. almost quantitatively. They are purified by crystn. from MeOH. With all the above-mentioned chlorides of S, formine gives the same Cl compd., characterized by a m. p. of 193–4°. This compd. has the chem. formula $(CH_2)_6N_4Cl$ (I) and its properties are identical with those of the product of the reaction between $COCl_2$ and formine; its aq. soln. is acid and it can be titrated; the same holds for the alc. soln. The soln. ppts. AgCl from an $AgNO_3$ soln. The aq. and alc. solns. conduct electricity. The reactions between formine and the S compds. in question can be expressed by the scheme:



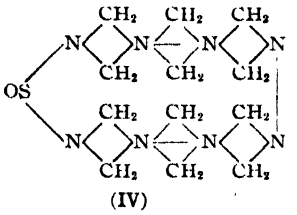
where X = -S-, -S-S-, -SO- or $-SO_2-$. The chem. constitution of I can be represented by a tautomeric formula (II), which explains the ionization of $(CH_2)_6N_4Cl$ in solns. According to this formula, being in accord with the formula of formine adopted by D. (cf. *C. A.* **30**, 1029[8]), the compd. formed by interaction of formine and the Cl compds. of S is chlorodiformine (II). With SCl_2, besides II, another compd. was also sepd.; its analysis seems to prove that it is thiochlorodiformine (III). This compd. is sol. in water and gradually sets free its S. In the reaction between $SOCl_2$ and formine, besides II a 2nd compd. was also sepd. Its analysis permits the assumption that it is thionyl diformine (IV). By the action of SO_2 upon formine in $CHCl_3$, an addn. product of formine and SO_2 was obtained; it has the formula $(CH_2)_6N_4.SO_2$. It is a cryst., snow-white compd., very highly hygroscopic and very easily sol. in MeOH and EtOH; exposed to the air, it becomes moist and liberates SO_2; its aq. solns. are acid; on heating they emit CH_2O. It is possible that this compd. is also formed besides II in the action of SO_2Cl_2 upon formine. It could not be sepd., however, by crystn. from MeOH, as it is too sol. and it decomps. on contact with moisture. Further investigations are being carried on.



(II)



(III)



(IV)

Edward A. Ackermann

Hydrogenation of acetone. Bruno Foresti. *Atti XXVII riunione, Bologna, Soc. ital. progresso sci.* 5, 346–52 (1939).—Hydrogenation of acetone in aq. soln. contg. Na_2SO_4 and at ordinary temp. and pressure results in the formation of propane and iso-PrOH (in the presence of Pt black) if the soln. is acidic and the alc. alone, with traces of diacetone glycol, if the soln. is alk. In no case does pinacol form. Under these conditions pinacol and iso-PrOH cannot be hydrogenated. It is suggested that the mechanism differs from that of the electrolytic reduction of acetone. H. A. Iredale

The dissociation constants of monocarboxylic acids; their measurement and their significance in theoretical organic chemistry. John F. J. Dippy. *Chem. Rev.* 25, 151–211(1939). The methods used in measuring the strengths of org. acids are reviewed and the effect of constitution on dissocn. consts. is discussed. Many references are given. The appendix contains all of the dissocn.-const. data for monobasic org. acids (also phenols and bases) that have been derived by the modern, more reliable methods. Louise Kelley

Synthesis of diallylacetic (heptadiene-4-carboxylic) acid. M. Dominikiewicz and M. Krjewska. *Arch. Chem. Farm.* 4, 41–4(in French, 44)(1939). The Na deriv. of acetoacetic ester gives with allyl bromide the monoallyl deriv. of the ester. In the latter the 2nd H atom is substituted with Na, and it is made to react with a 2nd mol. of allyl bromide; diallylacetoacetic ester is formed. On sapon. this yields the free acid, $(CH_2{:}CHCH_2)_2CHCO_2H$ (I); at the same time, however, a certain quantity of diallylacetone (II) is formed. Hitherto, in this sapon. almost equal quantities of I and II were obtained. The authors describe in detail how to conduct this sapon. so as to obtain I in 75% yield. 7 references. Edward A. Ackermann

The synthesis of α-amino alcohols from the light oil fraction obtained in the pyrolysis of gas oil and determination of some of the hydrocarbons entering into its composition. L. S. Dedusenko. *J. Gen. Chem.* (U. S. S. R.) 9, 1294–1302(1939). The light oil, b. 27–50°, d^{15} 0.7464, shown to contain 3.5–3.7% cyclopentadiene, was treated with HOCl and the aq. soln. of chlorohydrins distd. over KOH to give 28.6–30.6% of mixed oxides, which was increased to 37.9–41% when NaOH was used. The mixt., b. 60–140°, contg. approx. 50% amylene oxides, with 10 vols. 25% NH_4OH in sealed tubes at 100° for 6–7 hrs. gave 63.8% (based on amylene oxide, 19% based on amylene) of crude amino alcs., from which was isolated $Me_2C(OH)$-$CH(NH_2)Me$ (I), b. 156–8°, as the *picrate*, m. 133.5–4.5°; *acid oxalate*, m. 119° (turbid), 121–2° (decompn.); *oxalate*, m. 210.0–10.5° (decompn.). The other amino alcs. in the mixt. could not be identified since their acid oxalates were chiefly oils while the neutral oxalates were cryst. but could not be sepd. Ether extn. of the alk. residues from the distn. of the oxides gave a mixt. of glycols from which were sepd. by distn. $Me_2C(OH)CH(OH)Me$ (II), $MeCH(OH)CH(OH)Et$ (III) and *cis*-cyclopentadiol (IV). II and III were identified by dehydration to Me(iso-Pr)CO (semicarbazone, m. 111–12°), and Et_2CO (semicarbazone, m. 135°), resp. IV with PhNCO (V) gave the urethan $C_{19}H_{20}N_2O_4$, m. 211–12°. Treatment of the mixt. of glycols with V led to the formation of PhNCO polymers, probably because of the presence of halogen-contg. impurities. II, b. 176–9°, prepd. from the oxide, gave with 2.04 moles V the urethan $C_{19}H_{22}N_2O_4$, m. 134.5–5.5°, and with 0.625 moles V gave the partial urethan $C_{12}H_{17}NO_3$, m. 125.5°. Conclusion: $Me_2C{:}CHMe$, $MeCH{:}CHEt$ and cyclopentene are present in the light oil fraction analyzed. John Livak

The reagents of Girard and Sandulesco. Applications to the separation of ketonic fractions. A. Petit and Suzanne Tallard. *Rev. chim. ind.* (Paris) 48, 226–31(1939). —The 2 quaternary salts, $Me_3NClCH_2CONHNH_2$ (I) and $C_5H_5NClCH_2CONHNH_2$ (II), are used for the isolation of ketonic substances such as hormones, vitamins and perfumes because of their property of forming with these ketonic compds. combinations which are water-sol. and are not sol. in nonhydroxylic org. solvents. To 984 g. of $ClCH_2CO_2Et$ (III) in 1000 cc. of abs. EtOH is added 280 g. of NMe_3 (previously cooled to −5°). The reaction starts immediately and the temp. rises to about 60°. After 24 hrs. at room temp. 400 g. of 100% $N_2H_4.H_2O$ is added. An exothermic reaction sets in and after 45 min. of agitation the soln. is cooled and the product is crystd. and dried in a desiccator over H_2SO_4. Yield, 1100 g. of I (90% of theory). I is very hygroscopic and develops a disagreeable odor if it becomes moist. Pyridine (632 g.), 2000 cc. abs. EtOH and 984 g. of III are refluxed 2–3 hrs. until the odor of III disappears. A sample should dissolve completely in dil. H_2SO_4. After cooling, 400 g. of $N_2H_4.H_2O$ in 500 cc. of abs. EtOH is added. An exothermic reaction occurs. The crystals are filtered from the alc. and dried in air. Yield, 90% of theory of II. II is not hygroscopic. For extn. of ketone bodies, 5–10% of I or II is mixed with the ketones (in alc.) and 10% AcOH is added. After refluxing for 0.5–1 hr., the soln. is cooled and the AcOH is partially (90%) neutralized to a definite pH. The resulting mixt. is cooled and the nonketonic compds. are extd. with Et_2O or $(iso\text{-}Pr)_2O$. The remaining aq. soln. of the ketones combined with I or II is then hydrolyzed with HCl or H_2SO_4 and the ketone extd. Some difficulty may be encountered in sepg. the complex of the ketone and I or II from the nonketonic compds. because of the emulsifying tendencies of I and II. The utilization of I and II for the extn. of folliculin (estrone), the corticoadrenal hormone, isomenthone, methylheptenone, vitamin E and other ketones is cited. R. F. D

Synthesis of choline esters. Dimorphism of the higher terms. Maurice Loury. *Compt. rend.* 209, 682–4 (1939).— A convenient method of prepg. fatty acid esters of halogen salts of choline is by the action of MeX (X = Cl, Br or I) on the $Me_2NCH_2CH_2$ ester of the fatty acid: $RCO_2CH_2CH_2NMe_2$ (I) + MeX = $RCO_2CH_2CH_2NMe_3X$ (II), (R = $Me(CH_2)_n$). I is obtained by the action of the acid chloride on one or two mols. of aminoethanol, and in the former case treatment of the halogen salt with alc. KOH or AgOH: RCOX + $NMe_2CH_2CH_2OH$ = RCO_2-$CH_2CH_2NMe_2.HX$ (1) or RCOX + $2NMe_2CH_2CH_2OH$ = $RCO_2CH_2CH_2NMe_2$ + $CH_2(OH)CH_2NMe_2.HX$ (2) I with n = 10 or 14 are colorless oils, b_3 155° and 187°, resp., with n = 16 a white fat, m. 25°, b_3 205°. II usually form pearly greasy leaflets with no definite cryst. outlines; but by careful arrangements the palmitic-iodine deriv. (n = 14, X = I) is obtainable in either lozenge-shaped leaflets or transparent rectangular tables, but more frequently both forms are obtained together. The derivs. with n = 10 or 16 give only one or other form, as also do those with X = Br. The dimorphism thus resembles the polymorphism of other long-chain compds. C. A. S.

New syntheses of basic amino acids and glycine. Donald W. Adamson. *J. Chem. Soc.* 1939, 1564–8.— When α-aminodicarboxylic acids are submitted to the Schmidt N_3H reaction, the CO_2H group remote from the α-NH_2 group is replaced by an NH_2 group. Addn. of N_3H (4.8 g.) in 48 cc. $CHCl_3$ during 6 hrs. to 14.7 g. *d*-glutamic acid, 25 cc. concd. H_2SO_4 and 10 cc. $CHCl_3$ at 43–6° with stirring, which is continued for an addnl. 4 hrs., decompn. of the product with ice and pptn. with phosphotungstic acid gives 41% of *d*-α,γ-diaminobutyric acid (as the oxalate); NaN_3 gives 33% of the acid; *dipicrate*, yellow, m. 180–1°; *di-HCl salt*, m. 195–6° (decompn.), α_D^{19} 14.6° (H_2O, *c* 3.67). α-Aminopimelic acid (I) gives 66% of *dl*-lysine (as the monopicrate); NaN_3 gives a 55% yield; *dipicrate* (II), yellow, m. 188–90°. Passing a slow stream of dry HCl through Et cyclohexanone-2-carboxylate (III)

in C_6H_6 contg. 1.4 moles N_3H in an ice bath for 3 hrs., adding concd HCl and boiling the dild. aq. layer for 3 hrs. gives 8% of I and 18% of II; at 3–5° in $CHCl_3$ there results 25% of II; the use of 2 moles N_3H gives 60% of II. III and N_3H in concd. H_2SO_4 give only a trace of II. α-Aminoadipic acid and N_3H in $CHCl_3$ and H_2SO_4 give 75% of *dl*-ornithine (as sulfate); Et cyclopentanone-2-carboxylate gives 40% of the acid. Adding 2.4 g. N_3H in 35 cc. $CHCl_3$ during 2 hrs. to 5.2 g. $CH_2(CO_2H)_2$ in 15 cc. H_2SO_4 at 40° gives 29% of glycine; at 50° the yield is 46%. A convenient method for the isolation of basic amino acids is through the use of the dipicrates. The above reaction appears to be a general method for the synthesis of such acids. Cf. Brit. pat. 307,798, *C. A.* **24**, 127; Fr. pat. 671,388, *C. A.* **24**, 2140; Ger. pat. 544,890, *C. A.* **26**, 3515. C. J. West

Behavior of the SCH$_3$ group in methoxyl determinations. Fritz Arndt, Lotte Loewe and Mehke Ozansoy *Ber.* **72B**, 1860–3(1939).—Baernstein's method for the detn. of MeS in methionine (*C. A.* **30**, 7136[1]) is essentially the same as the Vieböck and Schwappach method for detg. MeO as modified by Clark (*C. A.* **26**, 2395). With pure methionine the present authors by the usual Vieböck semimicro method obtained the calcd Me value after 3 hrs. heating (the customary 1.5 hrs. heating gave only 4/5 of the calcd. value). The MeS group in methionine and its derivs. is therefore hydrolyzable like almost all MeO groups, although with somewhat greater difficulty. But this is not true of all MeS groups. *p*-MeC_6H_4SMe even after 8 hrs. gave only about 1/3 of the calcd. Me value. On a preparative scale, no free MeC_6H_4SH could be detected in the reaction mixt. after 7 hrs. boiling with azeotropic HI; unsolar as slow hydrolysis occurs, there is a further decompn. of the free mercaptan. With AcSMe and *S*-methylthiuronea sulfate, still lower results are obtained. On the other hand, the MeS group in thiomazole Me ether and its 5 Ph deriv. behave entirely like MeO, giving the calcd Me values after 1–1.5 hrs. and smoothly yielding the free mercaptans in preparative expts. Dithiourazole di-Me ether gives values corresponding to 1.5 and 2 Me groups after 1.5 and 5 hrs., resp., whereas the structurally closely related aminothiobiazolethiol Me ether gives only 1/3 and 1/2 of the calcd. values after 4 and 6 hrs., resp. There is as yet no clear relationship between structure and behavior of MeS groups toward HI, and if it is desired to det. MeO groups in a compd. also contg. MeS groups a blank will have to be made on the mother substance (contg. the MeS groups only). C. A. R.

Methionine IV. A color reaction of methionine. Joseph J. Kolb and Gerrit Toennies. *J. Biol. Chem.* **131**, 401–7(1939); cf. *C. A.* **33**, 7833[7].—Methionine and certain closely related substances form a compd. with a deep orange-brown color with solns. of $CuCl_2$ in concd. HCl. The compd. is stable in concd. HCl and is a combination of 1 mol. each of methionine-HCl and $CuCl_2$. Methionine is the only commonly known amino acid which gives this reaction. A. P. Lothrop

Hydroxy aldehydes. III Preparation of δ-methoxyvaleraldehyde. Rudolf Pummerer and Matthäus Schönamsgruber. *Ber.* **72B**, 1834–43(1939); cf. *C. A.* **29**, 3653[4].—It was shown in the earlier papers that in the formation of levulinic acid from hexoses with boiling acids there occurs a remarkable inner dismutation of δ-hydroxylevulinaldehyde and that the δ-MeO aldehyde, as also $MeOCH_2CH(OH)CH_2CH_2CHO$, undergo the same dismutation. For comparison with these aldehydes, simpler HO and MeO aldehydes, e. g., the as-yet unknown *δ-methoxyvaleraldehyde* (I), were of interest. The present paper describes the prepn. of I. Two methods were used. (1) From 300 g. $CH_2(CH_2OH)_2$ and 28 g. Na with 175 g. MeI on the water bath was obtained 98 g. $MeOCH_2CH_2CH_2OH$, b_{738} 150–0.5°, b_{18} 76–68° (so given in the original; crude product, b_{14} 58–61°), d_4^{20} (vac.) 0.9455, n_D^{20} 1.41292; *anthraquinone-β-carboxylate*, from the ether cautiously heated over a small flame with the calcd. amt. of β-$C_6H_4(CO)_2C_6H_3COCl$ until the evolution of HCl ceased, m. 132° (m. ps. cor.). The ether (240 g.) in 42 g. pyridine treated in the course of 4 hrs. with 322 g. PBr_3 gave 135 g. $MeO-CH_2CH_2CH_2Br$ (II), b_{18} 29–30°, b_{736} 129.5–31°, d_4^{20} (vac.) 1.3592, n_D^{20} 1.44667. Attempts to obtain the phthalimide from $C_6H_4(CO)_2NK$ and the calcd. amt. of II at 190° gave only *trimethylene diphthalimide*, m. 202°. With somewhat more than 1 equiv. of titrated $CH_2{:}CHCH_2MgBr$ soln., II gave *6-methoxy-1-hexene* (56 g. crude product from 120 g. II), freed from unchanged II by refluxing in pyridine at 120 30°, decanting from the viscous deposit, distg., pouring the distillate into enough aq. H_2SO_4 (1 5) so that the pyridine odor disappeared, sepg. the upper layer, shaking it out with a little ether, drying with Na_2SO_4 and fractionating. The pure III (45 g.) b_{742} 124°, d_4^{20} (vac.) 0.7916, n_D^{20} 1.41173. From 20 g. III ozonized in AcOH and, after dilu. with ether, treated with Zn dust was obtained 15.5 g. I, $b_{14.5}$ 59°, d_4^{20} (vac.) 0.9198, n_D^{20} 1.41625, mobile oil of penetrating ether-like odor and very burning astringent taste, sol. in about 3 parts water, shows all the typical reactions of free aldehydes (immediate reduction of cold NH_3-$AgNO_3$, strong reduction of hot Fehling soln., strong reddening of fuchsin-SO_2 in a few sec.), gives a cryst. ppt. with 2,4-$(O_2N)_2C_6H_3NHNH_2$, is easily volatile with steam, dissolves with strong evolution of heat in $NaHSO_3$ and in MeOH, dissolves clear in concd. HCl and with brown color and green fluorescence in concd. H_2SO_4, gives with phloroglucinol in concd. HCl a lake-colored amorphous ppt. becoming white on dilu. with water, and with resorcinol in concd. HCl a white amorphous ppt. In the liberation of I from its $NaHSO_3$ compd. with concd. alkali aldol condensation occurs; there is obtained a product b_{14} 152° (decompn.). Probably there is a partial elimination of water to form *2-(ω-methoxypentenyl)-5-methoxy-1-pentanal*, for the difficultly water-sol. oil of pleasant ethereal odor immediately decolorizes Br and gives all the above aldehyde reactions and a yellow ppt. with phloroglucinol-HCl. *Di-Me acetal* of I, b_{16} 81.5°, d_4^{20} (vac.) 0.9247, n_D^{20} 1.41456, reduces hot Fehling soln. only after short boiling with acids, reddens fuchsin-SO_2 after some min. and reduces NH_3-$AgNO_3$ slowly at room temp. I showed quite normal stability and preliminary attempts to dismutate it to valeric acid by the same means as convert δ-methoxylevulinaldehyde into levulinic acid have thus far given no conclusively pos. results. (2) After the properties of I had been learned, its prepn. was effected by a simpler method from com. 1,5-pentanediol (IV). Oxidation of IV with hot acid $KMnO_4$ to det. the position of the HO groups resulted in the formation of HCHO, about 9% succinic acid and, as chief product, a yellow oil, b_{22} 130° (possibly valerolactone), but with 2% alk. $KMnO_4$ at room temp. was obtained more than 80% of almost pure glutaric acid, m. 95°. Furthermore, IV with PCl_5 in CCl_4 gave $Cl(CH_2)_5Cl$, b_{21} 76–8°, which with NaCN in MeOH yielded, through the dinitrile, pimelic acid, m. 104°. Diurethan of IV, m. 176°. *Bis(anthraquinone-β-carboxylate)*, pale yellow, m. 218.5°. *Mono-Me ether* (V) (70% from IV, Na and MeI), b_{17} 95°; the urethan and acid phthalate did not crystallize and decompd. on distn., but the *anthraquinone-β-carboxylate* formed greenish yellow rodlets, m. 88° (cor.). V (10 g.) with $K_2Cr_2O_7$ and H_2SO_4 gave 4 g. unchanged V, 0.6 g. I, b_{15} 60°, and 2 g. high-boiling aldol. C. A. R.

Synthesis of uronic acids. M. Stacey. *J. Chem. Soc.* **1939**, 1529–31.—Oxidation in AcOH with $KMnO_4$ converts 1,2,3,4-tetraacetyl-β-*d*-glucose to 1,2,3,4-tetraacetyl-*d*-glucuronic acid; the latter need not be isolated since by the action of $Ba(OH)_2$ in aq. soln. deacetylation with simultaneous formation of Ba glucuronate takes place readily; removal of the Ba and crystn. from EtOH gives 20% of the acid (based on the glucose used as starting material). Similarly *d*-galacturonic acid can be prepd. in approx. 20% yield from *d*-galactose. C. J. West

Mercury salts as catalysts in the synthesis of aspartic acid from fumaric acid and ammonia. Terje Enkvist and Laura Laasonen. *Ber.* **72B**, 1927–32(1939).—The catalytic influence of simple inorg. substances on the formation of aspartic acid (I) by the addn. of NH_3 to fumaric acid (II) has been studied as a preliminary step in the investigation of org. catalysts with aspartase action (*C. A.* **32**, 2816[7]). The catalytic action of various substances,

especially metal salts, was detd. by measuring either the increase of amino N by the Van Slyke nitrite method, after removal of the ammonia N by evapn. with $Ca(OH)_2$, or the decrease in $KMnO_4$ consumption in H_2SO_4 at about 55°. Little or at most very little catalytic activity was shown by Cl, Br, I, $FeSO_4$, PbO; $KCr(SO_4)_2$ and $FeCl_3$ with Seignette salt (III) (amino-N method); $CoSO_4$, $Ni(NO_3)_2$, $[Co(NH_3)_4CO_3]_2SO_4$, $CuSO_4$, $CdCl_2$, $PdCl_2$, H_2PtCl_6, $Pb(NO_3)_2$, $MnCl_2$ and $KHCO_3$ without III ($KMnO_4$ method). On the other hand, mercuric oxide, chloride and sulfate materially accelerated the reaction ($KMnO_4$ method); $HgCl_2$ also gave a pos. result by the amino-N method. A weaker but still distinct effect was shown by $AgNO_3$. The action of $HgCl_2$ was not increased by piperidine, $NHEt_2$, pyridine and $NCCH_2CONH_2$ ($KMnO_4$ method). Substitution of $(NH_4)_2CO_3$ soln. for NH_4OH gave poor yields of amino N. In the main expts. the I was isolated as the Cu salt. The favorable action of mercuric compds. and $AgNO_3$ was confirmed; mercuric chloride, oxide and sulfate were approx. equally active per equiv. One mol. of $HgCl_2$ can increase the yield of I by about 3 mols. The effect is about proportional to the amt. of catalyst. With moderate amts. of catalyst the II has for the greater part disappeared after 9 hrs. at 100° and practically completely after 33 hrs. Judging from the behavior of the nitrate, mercurous salts accelerate the reaction only insofar as they are converted into mercuric salts; 2 mols. have about the same effect as 1 mol. of mercuric salt. NaOH, both in the presence and in the absence of mercuric salts, has an inhibiting action on the formation of I, as does CuCl. The influence of $HgCl_2$ on the addn. of NH_3 to maleic acid (IV), which without a catalyst adds NH_3 more rapidly than II, was also tested; the result was neg. Neg. results were also obtained in preliminary expts. on IV (amino-N method) with $MnCl_2$ in the presence and with I in the absence of ascorbic acid. The fact that mercuric compds. form isolatable addn. products with IV but not with II would seem to indicate that the catalysis is due to an activation of the II, not the NH_3, by the formation of a labile complex; with IV, the formation of an unreactive, too stable adduct inhibits the catalysis. The catalytic effect of the Ag ion, which, like the mercuric ion, forms a complex with NH_3, suggests, to be sure, that the power of the metal ion to combine with NH_3, may play a role in the catalysis. Possibly the fumarate ion, metal ion and NH_3 form an unstable complex which then decomps. into aspartate ion and an NH_3-free or NH_3-poor metal ion. In the expts. with $HgCl_2$, I was obtained through the Cu salt in good yields (3.9 g. completely crystd., almost colorless product and 0.7 g. yellowish but still solid product from 10 g. II); after 2 crystns. from hot water it m. 227–8° (decompn.) in sealed tubes. In another expt. the I from 10 g. II was esterified with EtOH-HCl, giving 3.4 g. di-Et ester, b_{12} 125.5–7.5°, d_4^{20} 1.0815, n_D^{20} 1.4378. C. A. R.

The chemistry of aminoguanidine and related substances. Eugene Lieber and G. B. L. Smith. *Chem. Rev.* **25**, 213–71(1939).—A review with many references.
Louise Kelley

Syntheses according to Friedel-Crafts with tricarballylyl chloride and α-phenyltricarballylyl chloride. Walther Borsche and Helmut Schmidt. *Ber.* **72B**, 1827–33(1939). —Succinyl chloride in the Friedel-Crafts reaction reacts chiefly in the unsym. form, $O.CO.CH_2.CH_2.CCl_2$, giving mainly γ,γ-diaryl-γ-butyrolactones, along with a little of the 1,4-diketones (*C. A.* **31**, 387[8]). A study has been made of tricarballylyl chloride (I) to det. whether it behaves in the same way. With benzene, 23.1 g. I gave 2 compds. of formula $C_{24}H_{20}O_3$: 23 g. *α-phenacyl-γ,γ-diphenyl-γ-butyrolactone* (II), yellowish needles, m. 137–8°, sol. in aq. alc. KOH or K_2CO_3 only on long boiling and repptd. unchanged by HCl (*oxime*, m. 203–5°; *2,4-dinitrophenylhydrazone*, orange-yellow, m. 219–21°; *Br deriv.*, from II and Br in AcOH at 100–10°, m. 141–2°; *4-(ω-diphenyl-ω-hydroxyethyl)-6-phenyl-3-oxo-2,3,4,5-tetrahydropyridazine*, $CO.NH.N:CPh.CH_2.CHCH_2CPh_2OH$, from II and N_2H_4.-H_2O boiled 12 hrs. in MeOH, m. 195–6[5]), and about 3 g. of the *β-phenacyl isomer*, m. 108–10° (*2,4-dinitrophenylhydrazone*, m. 159–61°). II had already been prepd. by Emery (*Ber.* **24**, 601(1891)) who, however, described it as $BzCH(CH_2Bz)_2$. With toluene the reaction was more complex; in different expts. under as nearly identical conditions as possible the results were not always the same. In 2 runs the chief product from 23.1 g. I was a keto lactone (11–12 g.), presumably *α-tolacyl-γ,γ-ditolyl-γ-butyrolactone* (III), m. 133–4° (*2,4-dinitrophenylhydrazone*, yellow, m. 187–8°; *tetrahydropyridazine*, m. 201–2°), with 1.6 g. of an acid, $C_{20}H_{20}O_4$, (IV) which was not wholly freed from the keto lactone and was analyzed only as the *bis(2,4-dinitrophenylhydrazone)*, $C_{28}H_{28}O_{10}N_8$, orange-red, m. 208–10°. IV was most probably *ditolacylacetic acid*. In 2 other runs there were obtained, resp., instead of IV, 2 isomers: 7 g. *γ,γ-ditolyl-γ-butyrolactone-α-acetic acid* (V), m. 190–2°, and 6.5 g. of the *β-acetic acid* (VI), m. 116–17°. V was accompanied by 11–12 g. III, VI by 1.9 g. *dimethylanthracene*, m. 220° (the crude product gave with 2,4-$(O_2N)_2C_6H_3NHNH_2$ an orange-red product, m. 165–7°, with 9.76% N, possibly the *dinitrophenylhydrazone* of the *β-tolacyl* isomer of III). With *m*-xylene only 1 cryst. product could be obtained, presumably a *xylacyldixylylbutyrolactone* (15 g. from 23.1 g. I), m. 174–6°, sol. in dil. alc. KOH on long boiling. Some orienting expts. were also made with α-phenyltricarballylyl chloride. The tri-Et ester (20–5 g. from 17.2 g. di-Et maleate, 16.5 g. $PhCH_2CO_2Et$ and NaOEt on the water bath), b_{12} 212°, was sapond. in MeOH with aq. KOH to the acid (12 g. from 16.8 g. ester), m. (sealed capillary) 110–15°, resolidifies and again m. 195°. The acid (5 g.) was heated with an equiv. wt. of $SOCl_2$ and, without further purification, was treated with $AlCl_3$ in benzene, yielding 2.3 g. of an acid $C_{24}H_{20}O_4$, m. 230–3°, which formed no dinitrophenylhydrazone and was presumably one of the possible lactonic acids. C. A. R.

Zinc citrates. F. S. Shpilev. *J. Gen. Chem.* (U. S. S. R.) **9**, 1286–93(1939).—The formation and compn. of Zn citrates obtained by reaction of $ZnSO_4.7H_2O$ (I) with Na citrate (II) depend on the pH of the medium and on the amt. of II. I (14.38 g.) with an equimol. amt. of II (8.7 g.) in concd. H_2O soln. gives $Zn_3(C_6H_5O_7)_2$ (III). By heating the soln. prior to pptn. with alc., ZnO (IV) is also obtained. In alk. soln. both the OH and CO_2H groups react and the product is $Na_2Zn(C_6H_4O_7$ (V). In weakly alk. soln. the product is a mixt. of III, IV and V. In the presence of an excess of II the reaction proceeds in a different manner. I (14.38 g.) with 17.4 g. II gives, depending on the pH of the medium, $ZnNa_3H(C_6H_5O_7)_2$, $ZnNa_4(C_6H_5O_7)_2$ and $Zn(Na_3C_6H_4O_7)_2$, resp. The mechanism for the formation of the complexes is discussed.
John Livak

The constitution of the tetrameride of hydrogen cyanide. (A reply to the work of Hinkel, Richards and Thomas: "Studies on hydrogen cyanide. X. The tetrapolymer."). E. Gryszkiewicz-Trochimowski. *Arch. Chem. Farm.* **4**, 45–57(in English)(in Polish, 57)(1939); cf. *C. A.* **33**, 1383.—The expts. of G. and those of H., R. and T. (cf. *C. A.* **31**, 7848[9]) indicate irrefutably that the tetrapolymer of HCN possesses an aptitude for chem. conversions inducing the formation of heterocyclic rings. All those conversions can be easily explained by adopting for the tetrameride the structure of diaminomaleonitrile, $\begin{matrix} NH_2—C—CN \\ \| \\ NH_2—C—CN \end{matrix}$, proposed by G. some years ago. On the other hand, the formula of H., R. and T., who consider the tetrameride as an aminoiminosuccinonitrile, $\begin{matrix} NH_2—CH—CN \\ \| \\ HN{=}C—CN \end{matrix}$, is not only devoid of any convincing exptl. data, but moreover it possesses this weak side, that it does not explain the reaction of the tetrameride with HNO_2, glyoxal, etc. If one assumes, however, as H., R. and T are obliged to do, that in these latter reactions isomerization takes place, inducing the migration of an H atom and the rearrangement of the double bond, then it would be more proper to

assume that the grouping $\begin{matrix}-C-CN\\ \|\\ -C-CN\end{matrix}$ exists already in the tetrameride mol.; in consequence one arrives at the formula proposed by G. When comparing both formulas, one can easily notice that they may be considered as desmotropic varieties. However, the existence of the form corresponding to the formula of H., R. and T. is not sufficiently founded. 12 references. Cf. G., *C. A.* **22**, 4475.
E. A. Ackermann

Qualitative organic analysis. II. Identification of alkyl halides, aromatic nitroso compounds, aromatic hydrocarbons and cyclopentadiene compounds. Winifred J. Levy and Neil Campbell. *J. Chem. Soc.* **1939**, 1442–6; cf. *C. A.* **32**, 5009.—Brown and C. (part I) showed that alkyl bromides and iodides can be satisfactorily identified as alkylisothiourea picrates; the method has been extended to include chlorides and tertiary compds. Thiourea (1 g.) and 1 g. of the halide in 100 cc. EtOH are refluxed for various periods, picric acid added and the mixt. heated until a clear soln. results; H_2O may be added to facilitate pptn. of the picrate. *tert*-Bu and isovaleryl halides give the Et deriv. because of interaction with the solvent; $ClCO_2Et$ and $ClCO_2Me$ give the Et and Me derivs., resp. In the following the halide, the time of heating and the m. p. of the picrate are given: MeI 5 min., m. 224°; EtI 5 min., 188°; $C_2H_4Br_2$ 15 min., 260°; PrBr 5 min., 177°; PrCl 5 hrs., 176°; iso-PrBr 3 hrs., 196°; propylene dibromide 40 min., 232°; BuBr 5 min., 177°; BuCl 2 hrs., 177°; iso-BuI 10 min., 167°; *sec*-BuI 10 min., 166°; *tert*-BuI 3 hrs., 188°; isobutylene dibromide 1 hr., 223°; AmBr 20 min., 154°; AmCl 2 hrs., 154°; iso-AmBr 20 min., 173°; iso-AmCl 2 hrs., 173°; *sec*-AmBr 40 min., 157°; hexyl bromide 20 min., 157°; heptyl bromide 20 min., 112°; octyl bromide 20 min., 134°; cetyl iodide 3 hrs., 137°; allyl chloride 5 min., 155°; $(CH_2)_3Br_2$ 5 min., 229°; $McPhCHCH_2Br$ 5 min., 167°; $PhCH_2CH_2Br$ 5 min., 139°; *o*- and *m*-$BrC_6H_4CH_2Br$ 5 min., 222° and 205°; *p*-$BrC_6H_4CH_2Cl$ 5 min., 219°; *o*-, *m*- and *p*-$ClC_6H_4CH_2Br$ 5 min., 213°, 200° and 194°. The CH_2 group in 2,7-dibromofluorene condenses readily with C-NO compds. but the products are difficult to purify, probably owing to formation of both anils and nitrones. 2-Phenylindole forms anils suitable for identification of PhNO and *m*- and *p*-derivs. The azo compds. formed from NO compds. and *p*-$BrC_6H_4NH_2$ are the most suitable derivs. for identification. *3-Arylimino-2-phenylindolenines* (m. p. of NO deriv. given): Ph 154°; *m*- and *p*-ClC_6H_4 148° and 157°; *m*- and *p*-BrC_6H_4 169°, 154°; *m*- and *p*-MeC_6H_4 136° and 146°; these are all orange except the Ph deriv., which is vermilion. Substituted *p-bromoazobenzenes* (m. p. of NO deriv. given): Ph 88°; *o*-, *m*- and *p*-ClC_6H_4 110°, 119° and 190°; *o*-, *m*- and *p*-BrC_6H_4 104°, 126° and 205°; *o*-, *m*- and *p*-MeC_6H_4 82° and 152°; 0.1 g. of NO compd. can easily be identified by this method. 2,4,5-$(O_2N)_3C_6H_2Me$ is a valuable reagent for alkyl but not for aromatic amines; *4,6-dinitro-N-aryl-m-toluidines:* $PhNH_2$ 145°, *m*-$MeC_6H_4NH_2$ 150°, *m*-xylidine 186°, *p*-$MeOC_6H_4NH_2$ 139°. 2,3,5-Trinitro-*p*-xylene reacts with the replacement of the 2-NO_2 group; *3,5-dinitro-N-methyl-p-xylidine;* this reagent does not react readily with many aliphatic amines. The colors obtained by the addn. of H_2SO_4 or of H_2SO_4 and $PhCHCl_2$ to aromatic hydrocarbons were given when the latter were highly purified and these tests, together with the fluorescence in C_6H_6 soln., are valuable aids for detection and identification; colors are given for a large no. of hydrocarbons. Vanscheidt's reagent (*C. A.* **29**, 2160[3]) with *p*-$C_6H_4(NO_2)_2$ gives characteristic green or blue colors with cyclopentadiene in Me_2CO or C_5H_5N; the mere presence of a CH_2 group is insufficient to give the test. C. J. W.

Emulsin. XL. Glucoside of isethionic acid and its ethyl ester. B. Helferich and H. Lutzmann. *Ann.* **541**, 1–16(1939); cf. *C. A.* **34**, 782[3].—$HOCH_2CH_2SO_3H$ (26 g.) in 50 cc. H_2O, shaken with 28.5 g. Ag_2CO_3, gives 46.7 g. of the *Ag salt* (I); for purification 90 g. was rubbed with a little EtOH, dissolved in 1.25 l. EtOH and 50 cc. H_2O, clarified with C, cooled to 40° and treated with 0.5 l. Me_2CO and, after filtration, with an addnl. 3 l. Me_2CO, giving 78 g. I, m. 110° (all m. ps. cor.). Addn. of 10 g. I (rubbed under abs. C_6H_6) during 20 min. to 17.6 g. acetobromoglucose in 75 cc. abs. C_6H_6 at 50° gives an acid reaction to Congo in 10 min.; after cooling to room temp. 17.8 g. Ag_2CO_3 are added and the mixt. is shaken for 20 min. in the dark; addn. of 400 cc. abs. Et_2O ppts. the Ag salt of tetraacetyl-β-*d*-glucosidoisethionic acid; this is extd. with Me_2CO and treated with 2 moles of EtI, giving 58% of *Et tetraacetyl-β-d-glucosidoisethionate* (II), pptd. from 40 parts of Me_2CO or 2–3 parts abs. EtOH by 100 parts of H_2O, m. 125°, $[\alpha]_D^{19}$ −15.4° ($CHCl_3$); it is unstable and unexpectedly reduces hot Fehling soln. In Me_2CO an excess of aq. KOH at room temp. during 15 min. removes the Ac groups and saponifies the ester group. *Et β-d-glucosidoisethionate* (III), m. 89°, $[\alpha]_D^{19}$ −24.1° (H_2O); it is unstable and is decompd. slowly by H_2O in the cold and quickly on heating; the resulting soln. reduced Fehling soln. only after hydrolysis with AcOH. β-Glucosidoisethionic acid (IIIA) could not be isolated; the aq. soln. results from the ester after standing several weeks at room temp., during which the pH is reduced from 5.1 to 1.7 (29 days) and α from −0.25° to −0.66°; no free glucose is formed; IIIA results from the ester on heating on a water bath for 20 min.; Fehling soln. is not reduced until after acid hydrolysis; decompn. results on evapn. of the soln. The *Na salt* (IV) of IIIA is obtained by neutralization of IIIA and pptd. from MeOH by Me_2CO and Et_2O as an amorphous ppt. and which may be obtained cryst. by seeding. Hydrolysis of the tetra-Ac deriv. (*C. A.* **32**, 4953[7]) by titration with MeONa in $CHCl_3$ at −18°, neutralization with *N* H_2SO_4, washing the $CHCl_3$ layer with H_2O and neutralization with $NaHCO_3$, evapn. to dryness, extn. with MeOH and crystn. from 22 parts of AcOEt give 90% of *β-glucosidoethylene chlorohydrin* (IVA), m. 67–8°, $[\alpha]_D^{19}$ −29.2° (H_2O), which has a bitter-sweet taste and reduces Fehling soln. only after hydrolysis. *Tetraacetyl-β-d-glucosidoethylene bromohydrin* (V), m. 118°, $[\alpha]_D^{19}$ −12.3° ($CHCl_3$); *β-d-glucosidoethylene bromohydrin* (VI), m. 74–5°, $[\alpha]_D^{19}$ −26.1° (H_2O), 90% yield, bitter-sweet taste. The *iodohydrin* corresponding to V m. 100–1°, $[\alpha]_D^{19}$ −11.9° ($CHCl_3$), 90%; *iodohydrin* (VII) corresponding to VI, m. 120–1°, $[\alpha]_D^{19}$ −25.3° (H_2O), bitter taste. VII and 1 mole Na_2SO_3 in 60–70 cc. H_2O, heated 6 hrs. at 60°, give IV, with 1 mole H_2O, m. 130–1°, $[\alpha]_D^{19}$ −32.9° (H_2O). IV has a sweet taste which then becomes salty; the tetra-Ac deriv., which could not be crystd., was transformed into the free acid, which gives II with $MeCHN_2$ and with MeONa in $CHCl_3$-MeOH II gives III. III (0.6422 g.) with 39 cc. 0.01 *N* NaOH at 20° (α −0.70°) shows no rotation after 5 hrs.; the pH fell from 11.2 to 10 during this time and much quicker after this time; 50% of glucose was split off, after which the alkali was neutralized. With 0.5 *N* NaOH at 19° 100% of glucose is split off at 7 hrs. The activity and percentage of splitting with sweet almond emulsin are: IV 0.0009, 28%; III 0.32, 25%; IV 0.44, 25%; VI 0.58, 27%; VII 0.94, 28%.
C. J. West

Emulsin. XLII. The cleavability of *d*-xylosides, *l*-xylosides and *dl*-xylosides by sweet-almond emulsin. Burckhardt Helferich, Erich Günther and Wm. W. Pigman. *Ber.* **72B**, 1953–9(1939); cf. *C. A.* **34**, 782[4].—The question of the enzymic cleavability of glucosides of enantiomorphic sugars has seldom been studied because suitable materials (substrate as well as enzyme) are only rarely available. Sweet-almond emulsin (I) cleaves β-*d*-xylosides, even if but slowly (the designation *d*-xylose is used for the xylose, closely related configurationally to glucose, which occurs in nature), and the authors have undertaken a comparative study of the cleavability of β-*d*- and β-*l*-xylosides by I. Phenol β-*l*-xyloside (II), which can be synthesized just like the *d*-antipode (*C. A.* **27**, 2080), is cleaved only very slightly, if at all, by I, even in high concns. and after long-continued action. On bringing together satd. solns. of *d*- and *l*-II there rapidly seps., in good yield, the cryst. *dl-compd.*, m. 187° (cor.); in the aq. soln. of the racemate the presence of the *l*-form retards slightly the cleavage of the *d*-form by I.

This affords a new method, probably hitherto never before used, for the preparative resolution of *dl*-sugars into their active components. The 3-*β*-*d*- and -*l*-xylosides (III) of protocatechualdehyde 4-*β*-*d*-glucoside (IV) were also tested. The *d*-form, in which both sugar components belong to the *d*-series, was cleaved by I to about the same extent as other known diglucosides of the aldehyde, whereas in the *l*-form the *β*-*d*-glucosidic union was cleaved to a much smaller extent (about 0.01 as much). With a I of high activity, the glucose in *l*-III was completely split off; from the end rotation, $[\alpha]_D$ for protocatechualdehyde *β*-*l*-xyloside is calcd. to be 82°. Below are the values (*Wertigkeiten*) of the different glucosides toward I of glucosidase value 1.1: *d*-II, 0.0058; *l*-II, 0.000005; *dl*-II (calcd. for the *d*-form only), 0.0051; *d*-III, about 0.1; *l*-III, about 0.001. *Tetraacetyl-β-d-xylopyranose* (V) (173 g. from 150 g. *l*-xylose and 150 g. NaOAc in 900 cc. Ac_2O dissolved in about 10 min. by heating on the water bath and heated 2 hrs. longer), m. 123–5°, $[\alpha]_D^{20}$ 25.3° ($CHCl_3$). *Triacetylphenol-β-l-xylopyranoside* (8.4 g. from 20 g. V), m. 143–5°, $[\alpha]_D^{20}$ 50.7° ($CHCl_3$); *l*-II (5 g. from 10 g. of the tri-Ac compd.), m. 178–80°, reduces Fehling soln. on long boiling, $[\alpha]_D^{20}$ 49.5° (water). Acetobromo-*l*-xylose (8.3 g. from 10 g. tetraacetyl-*l*-xylose), m. 95–7°; 8.3 g. added to 15.2 g. of the tetra-Ac deriv. of IV and 1 g. NaOH in aq. acetone and allowed to stand 15 hrs. gave 4.9 g. of the *hepta-Ac deriv.* (VI), m. 148–50°, $[\alpha]_D^{20}$ 9.4° ($CHCl_3$), of *l*-III, which with NaOMe in boiling MeOH yielded 2.8 g. *l*-III, m. 235–7°, $[\alpha]_D^{20}$ −32.7° (water). *d-Form* of VI (5.2 g. from 10 g. acetobromo-*d*-xylose), crystals with 0.5 mol. EtOH, sinters about 72°, m. (alc.-free) 128–30°, $[\alpha]_D^{20}$ −89.8° (water). C. A. R.

Fructose anhydrides. XXII. Secalin. Hans H. Schlubach and Christa Bandmann. *Ann.* **540**, 285–97 (1939); cf. *C. A.* **32**, 5067.—Unripe rye (about 14 days after flowering) was extd. for 20 min. with boiling 96% EtOH and then for 20 min. with boiling 50% EtOH; the concd. ext. was freed from chlorophyll by basic Pb acetate at 60°, the Pb removed with H_2S, the soln. evapd. to a sirup and the carbohydrate pptd. from a little H_2O by EtOH and Et_2O; the yield of sirup is 3.2% with α_D −8° to −20.5°. Fractional pptn. from H_2O with EtOH gives after 100 pptns. a ppt. contg. 34% ash and with $[\alpha]_D$ −37.6°. Acetylation in 90% C_5H_5N gives 84.5% of crude Ac deriv.; reacetylation and 80 pptns. from boiling C_6H_6 with petr. ether give the *Ac deriv.* (I), $[\alpha]_D$ 3° ($CHCl_3$, *c* 1); 290 g. crude I gives 115 g. of pure I. Hydrolysis by MeONa in MeOH gives a pure *secalin* (II), $[\alpha]_D$ −37.5°; with 0.1 *N* H_2SO_4 II is 50% hydrolyzed in 226 min.; the reduction value (Bertrand) is 0; the rotation change on acid hydrolysis is from 37.9° to 86.3° during 2733 min. (75% hydrolysis). The mol. wt. is 667 (817 for N before acetylation). I in Me_2CO at 50° with Me_2SO_4 and 30% NaOH gives the *Me deriv.* (III), $[\alpha]_D$ −45° ($CHCl_3$, *c* 0.37), 45% MeO. Hydrolysis by boiling 20 g. III in 1050 cc. 96% EtOH with 15 g. $(CO_2H)_2$ in 188 cc. H_2O for 12 hrs. and reaction of the sirup with *β*-$C_{10}H_7COCl$ give 3.1 g. of the 1,3,4,6-tetramethylmethylfructoside, and 9.4 g. of trimethylnaphthoylmethylfructoside, $b_{0.1}$ 80°, m. 75°, n_D 1.4652, $[\alpha]_D$ −8.3° (MeOH, *c* 0.24) changing to −2.6°, 11.7° ($CHCl_3$, *c* 1) changing to 18.7°, which is probably the 1,3,4-tri-Me deriv. The distn. residue (6.7 g.) is a brown sirup, with $[\alpha]_D$ −7.6° ($CHCl_3$, *c* 0.79), −14.6° (MeOH, *c* 0.76) changing to −21.2°; this is probably the 1,3-di-Me deriv., identical with that from triticin (*C. A.* **32**, 6620[1]). The ratio of the 3 hydrolysis products is 1.2:1. II is therefore a tetrafructose anhydride and is quite different in its structure from graminin. C. J. West

Partially methylated disaccharides. II. Experiments on maltose. Kurt Hess and Wolfgang Gramberg. *Ber.* **72B**, 1898–905(1939); cf. *C. A.* **31**, 4959[8].—While there are numerous possible methods of selectively substituting the HO groups of monosaccharides, similar substitutions in disaccharides have been effected only in relatively few cases. In part I was described the prepn. of 2,3,6,8,9-pentamethyl-*β*-benzylmaltoside (I) and cellobioside wherein, in view of the known selective methylation of *α*- and *β*-Me glucosides at the 2- and 3-positions, condensation with BzH was selected to protect the 10- and 12-HO groups in the disaccharides. From the smooth further selective methylation, in Me glucosides, of the primary alc. group by the series of reactions tritylation (C6) → tosylation (C4) → detritylation → methylation (C6), I should be methylated at position 12 to give the 2,3,6,8,9,12-hexa-Me compd. (II), of importance for further syntheses. Actually, the reactions followed, in part, a different course. The prepn. of pure I was materially improved. Benzylidene-*β*-methylmaltoside was heated 24 hrs. at 40° in smaller portions (1 g. instead of 5 g.) with a larger excess of Ag_2O (30 g., added in 2 portions, instead of 21 g.) and 30 (instead of 55) cc. MeI, the product from several runs was worked up as before, and the product remaining in the mother liquors was repeatedly methylated under the same conditions until the yield of the benzylidene deriv., m. 140° (formerly given as 132–3°), of I was practically quant. The yield of I from the benzylidene deriv. was somewhat increased (to 66%) by boiling the latter with much more dil. HCl-MeOH (0.004 instead of 0.1 *N*). I m. 109.5–10.5° (previously given as 103–4°), $[\alpha]_D^{20}$ 35.3° (MeOH), 49.9° ($CHCl_3$), 10.2° (acetone). *10,12-Diacetate* (75% from I and Ac_2O pyridine at 20°), m. 85–6°, $[\alpha]_D^{20}$ 29.5° (MeOH), 40.9° ($CHCl_3$), 11.5° (benzene). *10,12-Dibenzoate* (90% from I and BzCl in pyridine at 115°), m. 146.5°, $[\alpha]_D^{20}$ 51.7° (benzene), 68.8° ($CHCl_3$), 48.5° (acetone). With Ph_3CCl in pyridine at 20°, I yielded 61% of the *12-trityl ether* (III) (completely sepd. from the accompanying Ph_3COH only by sublimation under 0.0001 mm., the Ph_3COH passing over at 60–120°, III at about 215°). The sublimate, whose cryst. character could be readily seen under the microscope, m. 70–80°, $[\alpha]_D^{20}$ 39.2° (MeOH), 35.3° ($CHCl_3$), 33.6° (benzene). It could not be cryst'd. from solvents; from the ordinary solvents it was obtained only as an oil or sirup and from hot hexane it sepd. on long standing in voluminous flocks which, after filtration, formed a loose, non-cryst. powder. On detritylation with 1.2 mols. HCl in AcOH it regenerated I. Toward tosyl chloride in pyridine, III behaved unlike the monosaccharides; even at 180° no esterification occurred. On the other hand it readily formed a *10-benzoate* (IV) (best prepd. directly after the tritylation in the same reaction mixt. with 1.5 mols. BzCl at 125°; yield, 24%), m. 70–80°, $[\alpha]_D^{20}$ 42.7° (MeOH), 52.3° ($CHCl_3$), 31.9° (benzene). With 1.1 mols. $PhCH_2COCl$ at 70° was similarly obtained a *phenylacetate*, sublimes at 220° under 0.0002 mm. With boiling *N*/7 NaOMe in MeOH IV regenerated I. When IV was allowed to stand 15 min. at 0° with 1.5 mols. HCl in AcOH, filtered from the Ph_3CCl, taken up in $CHCl_3$, shaken out repeatedly with water to convert the remaining Ph_3CCl into Ph_3COH, evapd., freed from the Ph_3COH by heating in a high vacuum at 130°, and the whole process was repeated 3 times more, there was finally obtained a product, consisting chiefly of a monobenzoate of I, which, however, on methylation with Ag_2O and boiling MeI gave, instead of the desired 2,3,6,8,9,12-hexamethyl-10-benzoyl-*β*-benzylmaltoside, the isomeric *2,3,6,8,9,10-hexamethyl-12-benzoyl compd.* (V), viscous oil, $[\alpha]_D^{20}$ 31.8° (MeOH), 39.5° ($CHCl_3$), 22.2° (benzene), for on debenzoylation with *N*/7 MeONa-MeOH and cautious hydrolysis of the resulting hexa-Me ether with 5% HCl on the water bath it gave 2,3,6-trimethyl-*β*-benzylglucoside and the non-cryst'g. 2,3,4-trimethylglucose, $[\alpha]_D^{20}$ 59.7° (MeOH), 62.4° (water). Hence a migration of the Bz group had occurred, very probably during the detritylation with acid. For preparative purposes V can be made directly (420 mg. yield) from 1500 mg. I heated 2 hrs. at 100° with 990 mg. Ph_3CCl and 5 cc. pyridine, then 2 hrs. at 120° with 0.5 cc. BzCl, freed from the pyridine by distn., treated 15 min. at 0° with 1.3 mols. HCl in 5 cc. AcOH, dild. with much $CHCl_3$, shaken with $NaHCO_3$, washed with water, evapd., freed from the Ph_3COH by sublimation (bath temp. up to 160°) in a high vacuum, and taken up in 5 cc. EtOH, whereupon the 10,12-dibenzoate (450 mg.) soon seps. completely. The residue from the alc. mother liquors is subjected anew to the HCl-AcOH treatment and the

subsequent operations, and the residue (1050 mg.) remaining after the sublimation of the Ph_3COH is then boiled 15 hrs. with 25 g. MeI and 5 g. Ag_2O added in 2 portions. **III. Experiments on cellobiose.** Kurt Hess and Hsin-Lu Hwang. *Ibid.* 1906–8.—Pentamethyl-β-benzylcellobioside (I) behaves like the maltose analog (part II above). Its *12-trityl ether* (70% from I with Ph_3CCl in pyridine at room temp.), sublimes at 170–220° under 0.0004 mm., $[\alpha]_D^{20}$ −17.74° (acetone), −36.21° (benzene), −25.99° (CHCl₃), −16.74° (MeOH), cannot be tosylated. It yields, however, with BzCl in pyridine at 100° 64.3% of the *10-benzoate*, sublimes at 190–220° under 0.005 mm., $[\alpha]_D^{20}$ −18.3° (acetone), −19.9° (benzene), −13.2° (CHCl₃), −17.4° (MeOH), which is converted by 1.5 mols. of 5.5% HCl in AcOH at 10° into *2,3,6,8,9-pentamethyl-12-benzoyl-β-benzylcellobioside*, $[\alpha]_D^{20}$ −28.9° (acetone), −41.1° (benzene), −35.2° (CHCl₃), −32.4° (MeOH); this with Ag_2O and MeI at 60° yields the sirupy *2,3,6,8,9,-10-hexa-Me compd.*, $[\alpha]_D^{20}$ −39° (acetone), −42° (benzene), −30.2° (CHCl₃), −33.8° (MeOH), which on cautious hydrolysis gives 2,3,6-trimethylbenzylglucoside and 2,3,4-trimethylglucose. *10,12-Dibenzoate* of I (85% from I and 2.5 mols. BzCl in pyridine at 115°), sirup, $[\alpha]_D^{20}$ −27.7° (acetone), −47.7° (benzene), −31.5° (CHCl₃), −34.2° (MeOH). C. A. R.

Polysaccharides. XXXII. The molecular constitution of rice starch. E. L. Hirst and G. T. Young. *J. Chem. Soc.* **1939**, 1471–82; cf. *C. A.* **33**, 6807⁴.—Rice starch (I), in common with all other starches hitherto examd., contains a repeating unit composed of a straight chain of 24–30 glucose residues. Independently of the mode of prepn. of the Me deriv. whether the starch grain is methylated directly in air or N or whether the Me deriv. is prepd. via the acetate—and irrespective of the mol. wt. of the methylated starch, the percentage of end group (tetramethylglucose) obtained on hydrolysis remains unchanged. The observed proportion of end group cannot therefore be explained by random hydrolysis of long main chains of similarly united residues and it is concluded that viscous methyl starches are composed of a large no. of repeating units joined together laterally, forming side chains. In support of this view, a viscous methyl starch contg. some 80 repeating units (mol. wt. approx. 500,000) has been disaggregated by controlled hydrolysis into a non-viscous, essentially homogeneous Me deriv., which, on further methylation to etherify the HO groups liberated during the disaggregation process, gives the fully methylated deriv. Osmotic pressure and ultracentrifuge measurements show that the latter has a mol. wt. corresponding to about 3 repeating units (90 glucose residues) and on hydrolysis the methylated disaggregated deriv. gives precisely the same amt. of tetramethylglucose as do the viscous derivs. but the yield of dimethylglucose is now very small. Consideration of the conditions of the disaggregation process leads to the conclusion that in the starch mol., the repeating units, each consisting of a chain of 30 glucose residues, are linked to a non-terminal glucose residue of another unit by primary valencies of the glucosidic type. The relationship between viscosity data and mol. wt. in the methyl starch series is considered and an empirical method is suggested for the utilization of viscosity results in the detn. of approx. mol. sizes. The I used had [illegible] 152° (*N* NaOH, *c* 0.4). Acetylation of I in AcOH contg. a little Cl with Ac_2O-SO_2 gives 85% of an *acetate* (II), $[\alpha]_D^{20}$ 174°, η^{20} 0.494 in *m*-cresol (*c* 0.4), corresponding to an apparent mol. wt. of 380,000; Ac_2O in C_5H_5N at 70° gives 92% of an *acetate* (III), $[\alpha]_D^{20}$ 171° (CHCl₃, *c* 0.55%), η^{20} 0.93 in *m*-cresol (*c* 0.4) and an apparent mol. wt. of 720,000. I was methylated under various conditions. Pptd. I with Me_2SO_4 and 30% NaOH at 20° in air gives 60–70% of a Me deriv., fractionally pptd. from $CHCl_3$ by petr. ether into 3 fractions (8, 12 and 7.4 g.) showing apparent mol. wts. of 520,000, 385,000 and 250,000. "Prepared" I with Me_2SO_4 and 30% NaOH in air at 55° (finally at 100° for 30 min.) gives a Me deriv., sepd. into 4 fractions (3.7, 5.9, 4.1 and 5.7 g.) with apparent mol. wts. of 190,000, 250,000, 205,000 and 95,000. Methylation in a N atm. at 20° gives 75% of a product with 45.4% MeO (8 treatments); this Me deriv. was sepd. into 4 fractions (0.6, 34, 8.2 and 3.5 g.) with apparent mol. wts. of 560,000, 525,000, 400,000 and 175,000. Deacetylation and methylation of II give a Me deriv. (44% MeO), sepd. into 2 fractions (4.5 and 7.9 g.) with apparent mol. wts. of 600,000 and 510,000; III gives 89% of a Me deriv. with an apparent mol. wt. of 670,000. All these derivs. showed $[\alpha]_D^{20}$ from 205° to 212° (CHCl₃). Hydrolysis of the Me derivs. gives values of 2,3,4,6-tetramethylglucose corresponding to 29–34 glucose residues for the repeating unit or mol. wts. from 5900 to 6900. On heating in *m*-cresol (0.4% concn.) at 150° the apparent mol. wt. changes from 205,000 to 13,000 in 29 hrs.; on boiling in a soln. of 1 g. of $(CO_2H)_2$ in 75 cc. MeOH and 25 cc. H_2O (concn. 2.5%) the change is from 520,000 to 23,000 in 142 hrs.; $[\alpha]_D^{20}$ varied only from 211 to 207°. An examn. of the methylated disaggregated starch in the ultracentrifuge is reported by J. St. L. Philpot and E. Dodwell. C. J. West

Constitution of the mucilage from the bark of Ulmus fulva (slippery elm mucilage). I. The aldobionic acid obtained by hydrolysis of the mucilage. R. E. Gill, E. L. Hirst and J. K. N. Jones. *J. Chem. Soc.* **1939**, 1469–71.—Extn. of slippery elm bark with hot H_2O for 24 hrs. and the filtered soln. poured into 3 vols. of MeOH acidified with HCl gives the polysaccharide (I), $[\alpha]_D^{20}$ 12° (H_2O, *c* 1); the very viscous aq. soln. of I is acid in reaction. Boiling an aq. soln. of I causes partial hydrolysis with the sepn. of about 10% of dark material which contains C, H, N and S. The filtrate on pouring into EtOH gives a polysaccharide (II) with $[\alpha]_D^{20}$ 68° (H_2O, *c* 1), equiv. wt. by titration 468, uronic anhydride 36.6%, furfural and methylfurfural 18% (the latter approx. 12%). Hydrolysis of 20 g. of II with *N* H_2SO_4 at 90° for 9 hrs. and the pptd. Ba salt purified by pptn. from H_2O by EtOH gives 14 g. of the *Ba salt*, $(C_{12}H_{19}O_{11})_2Ba$; removal of the Ba as $BaSO_4$ and evapn. of the soln. at 40°/12 mm. (addn. of *N* TlOH), followed by boiling with MeI give a sirup which, on further methylation with Purdie reagents, removal of methylated monosaccharides by distn. at 120°/0.01 mm. and remethylation 3 times, gives the *Me ester* of *2-(2,3,4-trimethyl-d-galacturonido)-3,4-dimethylmethyl-l-rhamnopyranoside* (III), $b_{0.01}$ 170° (bath temp.), n_D^{19} 1.4722, $[\alpha]_D$ 76° (H_2O, *c* 3.2). Hydrolysis of 0.79 g. III with 2 *N* HCl at 95°, removal of the HCl with Ag, of the Ag with H_2S and neutralization with $BaCO_3$ gives a product, from which Et_2O gives 0.20 g. of a sirup, 3,4-dimethylrhamnose, n_D^{19} 1.4730, $[\alpha]_D^{19}$ 20° (H_2O, *c* 2), which is oxidized by Br to 3,4-dimethyl-*l*-rhamnonolactone. Oxidation of the residual Ba salt with Br and boiling with 3% MeOH-HCl give Me 2,3,4-trimethyl-*d*-galacturonic acid. Thus the aldobionic acid is *2-d-galacturonido-l-rhamnose* and is identical with an aldobionic acid isolated from flax seed mucilage by Tipson, Christman and Levene (*C. A.* **33**, 7278⁸). C. J. West

Constitution of damson gum. II. Hydrolysis products from methylated degraded (arabinose-free) damson gum. E. L. Hirst and J. K. N. Jones. *J. Chem. Soc.* **1939**, 1482–90; cf. *C. A.* **32**, 8374⁸.—It was shown previously that graded hydrolysis of damson gum gave a polysaccharide (I) which contained 1 part of *d*-glycuronic acid, 1 of *d*-mannose, approx. 3 of *d*-galactose and about 3% of *d*-xylose. I (40 g.) has now been methylated with MeI and TlOH, giving 38 g. of the Me deriv. (II) (38.9% MeO). Fractionation by addn. of petr. ether to a $CHCl_3$ soln. failed to give portions differing essentially from 1 another. Hydrolysis of 9.55 g. of II with 100 cc. *N* HCl contg. 20 cc. AcOH for 6 hrs., removal of the Cl with Ag_2CO_3, neutralization of the soln. with $BaCO_3$ and extn. with C_6H_6, followed by methylation, give 3.2 g. of Me glucosides; the aq. soln. on concn., extn. with Me_2CO, esterification and hydrolysis with $Ba(OH)_2$ yields an addnl. 4.05 g. of glucosides; the Ba salts give 2.78 g. of glucuronic acids. The glucosides were sepd. into 7 fractions, from which were isolated 2,3,4-trimethyl-*d*-xylose (0.25 g.), identified as such and as the corresponding lactone; 2,3,4,6-tetramethyl-*d*-galactose (1.15 g., 1 part), identified as the anilide, m. 197°: 2,3,4-trimethyl-*d*-galactose (III) (1.43 g., 1 part) and the 2,4,6-isomer (IV) (1.26 g., 1 part), identified as the anilides (*that* of IV m. 179°, $[\alpha]_D^{19}$ −92°

(Me_2CO, *c* 1.1), changing to 38° in 22 hrs.; a partial sepn. of III and IV can be effected by fractional distn. of the mixed Me galactosides, that of IV being obtained cryst.); 4,6-dimethyl-α-*d*-galactose (V) (1.29 g., 1 part), which was sepd. as *4,6-dimethyl-α-β-methyl-d-galactoside*, m. 163°. V seps. from Me_2CO as the hydrate, m. 105°, $[\alpha]_D^{25}$ 123° (H_2O, *c* 3.7), which falls to 82°. The *anilide* of V m. 207°, $[\alpha]_D^{25}$ −174° (C_5H_5N, *c* 0.35). There is no downward change in the rotation of V with cold 1% MeOH-HCl, indicating the absence of a HO group on C_4; oxidation with Br-H_2O for 24 hrs. gives *4,6-dimethyl-d-galactonolactone*, $[\alpha]_D^{25}$ 78° (MeOH, *c* 2.4), 91° (H_2O, *c* 1.2), changing to 45° in 60 hrs.; liquid NH_3 yields *4,6-dimethyl-d-galactonamide hydrate*, m. 164°, $[\alpha]_D^{25}$ 54° (H_2O, *c* 2), which gives a pos. Weerman reaction with NaOCl, indicating a free HO group at C_2. 2,3-Dimethyl- and 2,3,4-trimethyl-*d*-glucuronic acids (1 part each) were isolated from the acid fraction. Full details are given of the various methods used for the identification of each of the above products. All the sugars must be present in I as pyranose residues. It has not been possible to identify the mannose residue which is present partly among the distd. Me glycosides and partly as incompletely hydrolyzed material in the undistillable residue of the uronic acid portion. The meaning of these results in connection with the mode of linkage of the sugar residues present in the damson gum mole is briefly discussed. C. J. West

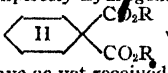
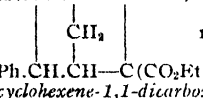
Isomerization of polymethylene hydrocarbons under the influence of aluminum chloride. III. Isomerization of ethylcyclopentane and of methylcyclohexane. M. B. Turova-Pollak and Z. Makaeva. *J. Gen. Chem.* (U. S. S. R.) **9**, 1279–82(1939); cf. *C. A.* **33**, 9293¹.—When 50 g. ethylcyclopentane (I), b_{760} 103.0–3.2°, d_4^{20} 0.7672, n_D 1.4198, is heated with 23 g. $AlCl_3$ at 110–115° for 20 hrs. an equil. mixt. contg. 97% methylcyclohexane (II) and 3% I is formed. II, b_{760} 99–100°, d_4^{20} 0.7687, n_D^{20} 1.4240, with $AlCl_3$ under the same conditions gives a mixt. contg. 6.3% I and 93.7% II. John Livak

Tetrahydrocitrylidene- and citronellylideneacetic acids. Syntheses of *sec*-isoöctylcyclopentane derivatives. H. N. Rydon. *J. Chem. Soc.* **1939**, 1544–9.—This work had as its object the synthesis of 2-methyl-3-*sec*-isoöctylcyclopentanone, the necessary starting material for the synthesis of cholesterol by the Mannich base method (*C. A.* **31**, 2202⁷; **32**, 7444⁸). Tetrahydrocitral (I) (41 g.), 39 g. $(HOCH_2CH_2)_3N$ and 28 g. $CH_2(CO_2H)_2$ (II), heated on the water bath for 21 hrs., acidified with 50% H_2SO_4 and extd. with Et_2O, give 15 g. (29%) of *tetrahydrocitrylideneacetic acid* (III), b_{15} 164–6°, n_D^{18} 1.4459, which contains 66% of the Δ³-isomer. II (285 g.), added to 250 g. I and 500 cc. C_5H_5N, kept at room temp. for 6 hrs. and heated on the water bath overnight, gives 75% III contg. 25% of the Δ³-isomer. III (1 g.-mole) with 100 cc. *N* EtOH-HCl and 230 cc. abs. EtOH, kept at room temp. overnight and poured into excess 10% Na_2CO_3, gives *Et 5,9-dimethyl-3-decenoate* (IV), b_{15} 134–5°; acidification of the residual Na_2CO_3 soln. gives *5,9-dimethyl-2-decenoic acid* (V), b_7 158–60°, n_D^{18} 1.4580 (*p-bromophenacyl ester*, m. 47°). Hydrolysis of IV gives *5,9-dimethyl-3-decenoic acid* (VI), b_{13} 162°, n_D^{18} 1.4540 (*p-bromophenacyl ester*, m. 39°). V (118 g.) with 50 g. NaOH in 100 cc. EtOH and 100 cc. H_2O, heated on a water bath for 24 hrs., is converted into VI; the equilibrated acid contains 53% of V. VI with $KMnO_4$ gives 2,6-dimethylheptanoic acid; mixing 92 g. VI with 92 g. concd. H_2SO_4, with cooling, gives 57% of *γ-sec-isoöctyl-γ-butyrolactone* (VII), b_{13} 158–62°, n_D^{18} 1.4619. With HBr at 0° VII gives 65% *Et 4(?)-bromo-5,9-dimethyldecanoate* (VIII), $b_{1.5}$ 145–50°. VI (52 g.) and HBr at room temp. with 50% HBr-AcOH yields 30 g. VIII. VIII gave no useful condensation product with $NCCHNaCO_2Et$. Citronellylideneacetic acid on partial esterification gives 28% of the *Et ester*, b_{13} 139–41°, of *5,9-dimethyl-3,8-decadienoate* (IX), b_1 163–8°, and the residual Na_2CO_3 soln. gives 60% of the Δ²,⁸-isomer, b_{13} 173–5°. The equil. acids contain 75% of IX. The K deriv. of Et cyclopentanone-2-carboxylic acid and *sec*-isoöctyl iodide (X) in xylene, refluxed 33 hrs. at 140–50°, give 59% of *Et 2-sec-isoöctylcyclopentanone-2-carboxylate*, b_{14} 165–75°, n_D^{18} 1.4588; refluxing with aq. $Ba(OH)_2$ for 72 hrs. gives 13% of XI and also *α-sec-isoöctyladipic acid* (XI), m. 54°; distn. of XI with $Ba(OH)_2$ at 350–60° gives 52% of *2-sec-isoöctylcyclopentanone* (XII), b_{17} 135–7°, n_D^{18} 1.4548 (*2,4-dinitrophenylhydrazone*, yellow, m. 86–7°). XII reacts with MeMgI to yield 60% of *1-methyl-2-sec-isooctyl-1(2)-cyclopentene*, b_{18} 112–15°, n_D^{18} 1.4572; this reacts with SeO_2 in BuOH to give a complex mixt. which has not been investigated fully. The Grignard reagent from X does not react with cyclopentanone. Cyclopentyl bromide and $AcCHNaCO_2Et$ in EtOH, refluxed 4 days, give 63% of *Et cyclopentylacetoacetate* (XIII), b_{18} 125–30°, n_D^{18} 1.4527; $PhNHNH_2$ gives *1-phenyl-3-methyl-4-cyclopentyl-5-pyrazolone*, pale yellow, m. 133–4°. XIII, MeI and MeONa give 66% of *Et cyclopentylmethylacetoacetate*, b_{13} 128–31°, n_D^{18} 1.4607°; refluxing with aq. KOH for 18 hrs. gives 69% of *α-methyl-α-cyclopentylacetone* (XIV), b_{17} 76–9°, n_D^{20} 1.4470; *semicarbazone*, m. 98°. The condensation product of XIV and iso-PrCHO is a complex mixt. C. J. West

Anionotropic and prototropic changes in cyclic systems. VII. The structure of the chlorodiphenylcyclopentenone obtained by the action of hydrogen chloride on anhydroacetonebenzil. Harold Burton and Charles W. Shoppee. *J. Chem. Soc.* **1939**, 1408–15; cf. *C. A.* **33**, 5368⁴.—In part III (*C. A.* **28**, 2685⁶) it was suggested that the chloride, m. 129°, obtained from CPh CH CO.CH_2.CPhOH (Japp and Burton, *J. Chem. Soc.* **51**, 428(1887)) and Et-OH-HCl had the structure PhC:CCl.CO.CH_2.CHPh (I); Allen and Spanagel (*C. A.* **27**, 80) assigned the structure PhCH.CHCl.CO.CH:CPh (II) to this chloride and I to the product (III), m. 142°, from the reaction of $POCl_3$ and PhC:C(OH).CO.CH.CHPh (IV). B. and S. believe that III is PhCH.CO.CCl:CH.CHPh (V) and that it is obtained from the isomer of IV, i. e., PhCH.CO.C(OH) CH.CHPh (VI). IV (5 g.) and $POCl_3$ at 110° for 10 min. give 2.2 g. of V, m. 140°; this also results from 2,3-diphenylcyclopentenone (VII) and SO_2Cl_2 in C_6H_6; 2,4-dinitrophenylhydrazone, m. 215° and depressed the m. p. of I to 200°. V dissolves in piperidine (VIII) at 40° with immediate pptn. of VIII.HCl. V is not affected by Ag_2CO_3 or $BaCO_3$ in boiling MeOH but Na_2CO_3 (refluxing 0.5 hr.) gives the mono-MeO dimer (mol. wt. 1000). V does not yield an oxime, the product being a Cl-free *oxime*, $C_{31}H_{26}O_2N_2$, pale buff, m. 258–9° (decompn.). When treated with MeOH-HCl in piperonal at 0° for 24 hrs. or with glacial AcOH-HCl, V gives a compd. m. 188–9°, decomps. 210–15°. Reduction of V with HI and P (refluxing 2 hrs.) gives VII, isolated as the oxime. Catalytic reduction of V in EtOH-AcONa gives *trans*-2,3-diphenylcyclopentanone. I yields an *oxime*, m. 172°; *piperonylidene deriv.* of I, bright yellow, m. 165°. I does not react with NOCl in C_6H_6 in 48 hrs. Reduction of I with HI and P gives 3,4-diphenyl-Δ³-cyclopentenone (IX); catalytic reduction with PtO_2 in EtOH gives *cis-3,4-dicyclohexylcyclopentanol*, m. 91°; in EtOH-AcONa there results *cis*-3,4-diphenylcyclopentanone. Oxidation of V with O_3 gives only BzOH, although Allen and Rudoff (*C. A.* **32**, 1244) claim to have isolated desylacetic acid; $KMnO_4$ in 90% Me_2CO at −15° and CrO_3 in 90% AcOH at 43° also give only BzOH. Reduction of the oxime of I with PtO_2 in AcOH gives *trans-3,4-diphenylcyclopentylamine* (X), m. 119–20°; it absorbs CO_2 rapidly from the air; *picrate*, yellow, m. 232° (decompn.); *Ac deriv.* (XI), m. 119°. The oxime of *trans*-3,4-diphenylcyclopentanone on reduction with Na and EtOH gives X. The *cis*-ketoxime on reduction and acetylation gives the *cis-isomer* of XI, m. 133–4° (less sol.) and 128°. IX forms an *oxime*, m. 179°; reduction gives X. Reduction of *trans*-2,3-diphenylcyclopentanone oxime and acetylation give isomeric *1-acetamino-2,3-diphenylcyclopentanes*, m. 187° (less sol. in C_6H_6) and 170–1°. The oxime of VII gives the same isomers. γ,δ-Diphenyl-Δ^α-pentenoic acid

yields an *anilide*, m. 129–30°; reduction gives γ,δ-diphenylvaleric acid, whose *anilide* m. 111–12°; *Me ester*, b_{18} 206–8°; the ester with Na in C_6H_6 gives semisolid materials, which yield a semicarbazone(?), m. 237° (decompn.). C. J. West

Mobility of the saturated six- and seven-ring and the configuration of the 1,2-cycloheptanediols. J. Böeseken. *Proc. Acad. Sci. Amsterdam* **42**, 573–80(1939); cf. *C. A.* **33**, 8578[7]. C. R. Addinall

The diene synthesis. XIV. Preparation of alicyclic malonic, cyanoacetic and acetoacetic esters. Kurt Alder and Hans F. Rickert. *Ber.* **72B**, 1983–92(1939); cf. *C. A.* **33**, 1299[1].—Partially and completely hydrogenated alicyclic malonic esters of the type  with 2 CO groups on the same C atom have as yet received but scant study, and A. and R. therefore sought a simple method of prepg. them by the diene synthesis. As the olefin components for such syntheses were considered the methylenemalonic esters and their homologs and derivs., $RR'C:C(CO_2R)_2$, which are readily obtained by condensation of aldehydes and ketones with $CH_2(CO_2R)_2$. The simplest of these, $CH_2:C(CO_2Et)_2$, has such a great tendency to polymerize, however, that the more stable MeCH:$C(CO_2Et)_2$ (I) was selected. At elevated temps. it adds surprisingly smoothly, and for the most part with excellent yields, the most varied dienes. That the reactions are true diene syntheses (formation of 6-membered ring compds.) can be shown in various ways. Thus, the adduct with butadiene (II) smoothly adds 1 mol. H on catalytic hydrogenation and the product, b_{11} 131–3°, is hydrolyzed to 2-methylcyclohexane-1,1-dicarboxylic acid, m. 155–6°. Again, the adduct with cyclopentadiene (III) adds PhN_3 with the greatest ease to form the *hydrotriazole*  m. 158–9°. The following *di-Et* *3-cyclohexene-1,1-dicarboxylates* obtained in this way are described: *6-Me* (39 g. from 56 g. I and 50 g. II heated 14 hrs. at 170–80° in an autoclave), b_{11} 125–35°; *3,4,6-tri-Me* (230 g. from 200 g. I and 95 g. $(CMe:CH_2)_2$ (IV)), b_{11} 147–9°; *2,5-endomethylene-6-methyl* (210 g. from 220 g. I and 78 g. III), b_{11} 138–9°; *3,4-dimethyl-6-phenyl*, from 38 g. $PhCH:C(CO_2Et)_2$ and 14 g. IV, $b_{0.1}$ 156–8°, m. 52° (free *acid*, m. 190°, is decarboxylated at 210° to a mixt. of *trans*-3,4-dimethyl-6-phenyl-Δ^3-tetrahydrobenzoic acid, m. 157–8°, and the *cis-isomer*, m. 151°); *3,4-dimethyl-6-isopropyl*, b_{11} 155–7°, from 100 g. IV and 150 g. *di-Et isobutylidenemalonate*, b_{12} 115–16°, which is obtained in 90-g. yield from 54 g. iso-PrCHO. 120 g. $CH_2(CO_2Et)_2$ and 120 g. Ac_2O heated 24 hrs. at 125–30°; *3,4-dimethyl-6-ethyl* (from $EtCH:C(CO_2Et)_2$ and IV), b_{11} 149–50°; *6-methyl-2,5-endoethylene*, from 1,3-cyclohexadiene and I, b_{16} 155–6°. α,β-Unsatd. derivs. of $NCCH_2CO_2Et$, $CH_2(CN)_2$ and especially $AcCH_2CO_2Et$ proved to be equally well adapted to these diene syntheses. Thus, 29 g. MeCH:C(CN)CO_2Et and 24 g. IV gave 32 g. *Et 3,4,6-trimethyl-1-cyano-3-cyclohexene-1-carboxylate*, b_{11} 146–9°. *3,4-Dimethyl-6-phenyl-1,1-dicyano-3-cyclohexene* (42 g. from 30 g. $PhCH:C(CN)_2$ and 18 g. IV), b_2 155–6°, m. 81–2°. *Et 6-methyl-1-acetyl-3-cyclohexene-1-carboxylate* (70 g. from 60 g. MeCH:$CAcCO_2Et$ (V) and 70 cc. II), b_{11} 126–8°, hydrogenated to the cyclohexane ester, b_{11} 127–9°; *3,4,6-tri-Me homolog* (76 g. from 60 g. V and 40 g. IV), b_{12} 139–41°; *3,4-dimethyl-4-ethoxy analog* (55 g. from 62 g. EtOCH:$CAcCO_2Et$ and 40 g. IV), b_{12} 153–5°, slowly solidifies on standing to a cryst. mass. Even the completely substituted olefin $(EtO_2C)_2C:C(CO_2Et)_2$ (VI) adds dienes to form 6-membered rings. Heated 6 hrs. at 170–80° with 20 g. IV, 57 g. VI gave 65 g. *tetra-Et 4,5-dimethyl-4-cyclohexene-1,1,2,2-tetracarboxylate*, $b_{0.1}$ 151–3°. *Tetra-Et 4-cyclohexene-1,1,2,2-tetracarboxylate* (35 g. from 40 g. VI and 40 cc. II heated 8 hrs. at 170–80°), $b_{0.1}$ 149–51°, is smoothly hydrogenated to the *cyclohexane ester*, b_{11} 190–2°, which on hydrolysis loses 2 mols. CO_2, giving with alkalies *cis*-hexahydro-*o*-phthalic acid, m. 190–1°, and with acids the trans isomer, m. 222°. C. A. R.

Catalytic oxidation of cycloheptylamine. V. S. Smirnov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1283–5(1939); cf. *C. A.* **33**, 4966[2].—The work on the catalytic oxidation of alicyclic amines was continued and 10% cycloheptylamine (I) in water was oxidized in the presence of Naturkupfer C in an O current, forming 36–64% suberone (II), whose semicarbazone m. 163°, hydrazone m. 48–9°, and dibenzal deriv., yellow, m. 106°. I, b. 165–9°, was prepd. in 22% yield from the oxime of II by reduction with metallic Na in alc. (cf. Markovnikov, *J. Russ. Phys. Chem. Soc.* **25**, 365(1893)). John Livak

Mechanism of the aromatization (of hydrocarbon oils). II. Thermal isomerization of the xylenes. A. F. Dobryanskiĭ and F. Ya. Saprykin. *J. Gen. Chem.* (U. S. S. R.) **9**, 1313–14(1939); cf. *C. A.* **33**, 4968[2].—The pyrolysis of pure *o*-xylene (I), *m*-xylene (II) and *p*-xylene (III) at 700°, 730°, 750° and 770° gave in all cases a xylene fraction, PhMe, condensation products which were not investigated further, and a gas fraction. At all of the temps. investigated II proved to be most stable and I least stable. Oxidation of the xylene fractions to the corresponding phthalic acids revealed that during pyrolysis I underwent partial isomerization to II and some III, III underwent slight isomerization to II, while II remained unchanged, again indicating its greater stability. J. L.

Method of preparation and physical data of monoalkylbenzenes. Albert W. Schmidt, Gerhard Hopp and Viktor Schoeller. *Ber.* **72B**, 1893–7(1939).—In the present paper are given the method of prepn. and phys. data of the monoalkylbenzenes used in the work on the chem. constitution and viscosity of benzene hydrocarbons with long side chains reported in *C. A.* **33**, 7747[8]. The values obtained for the phys. consts. differ more or less widely from those given in the literature. The *n* and d. values plotted against the no. of C atoms in the side chain fall on a curve while the points corresponding to the literature values are quite scattered. In the prepn. of the hydrocarbons by the Friedel-Crafts method, acid chlorides, which yield the easily purified ketones as primary products, were chosen rather than alkyl chlorides. Reduction of the ketones is the most difficult part of the prepn. The Clemmensen method gave unsatisfactory results; there were formed unsatd. compds. and oils, probably styrenes and their condensation products. Slight impurities in the Zn and HCl seemed to play a part in this. The Kishner-Wolff method, however, proved satisfactory. The ketones were heated with NaOEt and $N_2H_4.H_2O$ in autoclaves 12 hrs. at 180° and the resulting hydrocarbons, after distn., were treated a long time with Na, filtered through fullers' earth and carefully purified by repeated distn. In many cases it was found preferable to add the $N_2H_4.H_2O$ to the ketone first and then heat the resulting hydrazone with NaOEt. Below are given, resp., the b. p. (pressure in parentheses), n_D^{20}, d_4^{20} and the viscosity (centistokes) at 10° and 70° (the original gives the viscosities at 10, 20, 30, 40, 50, 60, 70 and 80°), of the *alkylbenzenes:* Et, — 1.4951, 0.8681, 0.863, 0.472; Pr, 47–9° (11 mm.), 1.4922, 0.8617, 1.140, 0.629 (at 60°); Bu, 66–8° (12 mm.), 1.4899, 0.8613, 1.395, 0.666; Am, 87° (12 mm.), 1.4887, 0.8600, 1.85, 0.811; hexyl, 97.5–101° (12 mm.), 1.4868, 0.8592, 2.31, 0.955; heptyl, 116–18° (12 mm.), 1.4860, 0.8590, 2.968, 1.126; octyl, 131–4° (12 mm.), 1.4851, 0.8582, 3.72, 1.316; dodecyl, 183–5° (12 mm.), 1.4822, 0.8564, 8.507, 2.287; tetradecyl, 153° (0.5 mm.), 1.4813, 0.8559, 12.33, 2.97; hexadecyl, 171° (0.1 mm.), 1.4814, 0.8558, 8.98 (at 30°), 3.71. C. A. R.

Alkylation and the action of aluminum halides on alkylbenzenes. Dorothy V. Nightingale. *Chem. Rev.* **25**, 329–76(1939).—The following generalizations may be made relative to the mechanism of alkylations by means of $AlCl_3$: (1) $AlCl_3$ probably forms a nonconducting, unstable complex with the reacting aromatic hydrocarbon. (2) With the alkyl halide $AlCl_3$ forms a complex, not isolated, of the type $R:X:AlCl_3$. This complex can ionize, yielding a pos. carbonium ion (R^+) and $(X:AlCl_3)^-$,

(3) Alkylation may then proceed in 2 ways: (*a*) the R^+ may coördinate with a pair of electrons from a double bond in the benzene ring, followed by the loss of a proton (Price, *C. A.* **33**, 5654) or (*b*) the compd. R:X:$AlCl_3$ may form a ternary complex with the reacting aromatic hydrocarbon, in which alkylation takes place with the loss of HX (Wertyporoch, *et al.*, *C. A.* **27**, 887, 2139; **28**, 10267). (4) The formation of a 1,3,5-hydrocarbon from a 1,2,4-hydrocarbon is explainable on the basis of Price's theory. According to this view, the alkyl radicals in the 2- and 4-positions direct the entering H to the 1-position, replacing the dissocd. alkyl radical. The carbonium ion may then either (*a*) re-alkylate the benzene ring from which it came to form a 1,3,5-hydrocarbon, or (*b*) alkylate another mol. of the 1,2,4- or a 1,3,5-hydrocarbon or (*c*) be hydrogenated to form an aliphatic hydrocarbon. There are much conflicting data in the literature and no one theory seems adequate to explain these data. L. K.

Isomerization of the β-substituted oxides of styrene. Influence of the saturated or unsaturated character of the substituent radical. Marc Tiffeneau and P. K Kuriaki. *Compt. rend.* **209**, 465–8(1939).— Expts. were carried out to show that the state of satn. of the substituent radical dets. the following reactions brought about by Mg etherates: PhCH.O.CHC·CH.CH_2.CH_2.CH_2.CH_2 by hydrobenzoin rearrangement to give CHOCHPhC CH.CH_2.CH_2.CH_2.CH_2; and PhCH.O.CHCH.CH_2.CH_2.CH_2.CH_2.CH_2 without rearrangement to give $PhCH_2CO$-CH.CH_2.CH_2.CH_2.CH_2.CH *sym* - Phenylcyclohexenylethylene (I) was converted into the epoxide (II) as follows. Phenacetyl chloride acting on I in the presence of $SnCl_4$ gave phenacetylhexene (III), m. 54°, b_{25} 192 4°; semicarbazone, m. 167°; oxime, m. 118°. Treatment of III with (iso-PrO)$_3$Al gave the corresponding alc. (IV), b_7 149 51°; *p*-nitrobenzoate, m. 79°. On distn. *in vacuo* over H_2SO_4 IV gave I, b_5 137°. I was chlorinated in HOAc and the resulting chlorohydrin distd. over KOH to give II, b_7 147–50°. II heated with the etherate of $MgBr_2$ gave a product (V), b_{10} 150 2°; semicarbazone, m. 203°; oxime, m. 156°. On oxidation V gave an acid, m. 150°, identical with phenylcyclohexylacetic acid. 1-Phenyl-2-cyclohexylethanol, b_{17} 156–7°, obtained from the action of $IMgCH_2C_6H_{11}$ on BzH when subjected to perphthalic oxidation gave the epoxide of *sym*-phenylcyclohexylethylene (VI), b_{16} 158 60°, d_4^{18} 1.003, n_D^{18} 1.003. VI heated with $MgBr_2$ etherate gave a ketone, b_{15} 163–5°, m. 26°; semicarbazone, m. 142°. This ketone was identical with cyclohexyl benzyl ketone. Rachel Brown

Allenes. I. The preparation of 1-phenyl-1,2-butadiene. Fred Acree, Jr., and F. B. LaForge. *J. Org. Chem.* **4**, 569–74(1939).—According to Staudinger and Ruzicka (*C. A.* **18**, 1819) pyrethrolone (I) has an open side chain contg. a cumulated system of double bonds but later R. (*C. A.* **28**, 3061[1]) preferred a conjugated system. Recently LaForge and Haller (*C. A.* **32**, 7438[8]) found that I gives with Br in EtOH a mono-Br substituted product from which by reduction with Zn I is recovered. Since such behavior is not in agreement with the known behavior of either cumulated or conjugated double bonds, the action of halogens on allenes, especially substituted 1,2-butadienes, is studied, for a terminal Me group may be present in the side chain of I. *1-Phenyl-1,2-butadiene* (II) is prepd. by 2 different methods. In the first the OH in PhCH(OH)CCl CHMe is replaced by Cl and the 1-phenyldichlorobutene is dehalogenated; in the second, PhCH(OH)CCl_2CHClMe is treated with Zn dust in EtOH. In contact with air, II soon turns yellow and after standing for some time it becomes a viscous mass, probably because of oxidation and polymerization. Mineral acid causes rapid polymerization or decompn. II does not react with maleic anhydride or with α-naphthoquinone. On catalytic hydrogenation II gives PhBu and on oxidation with $KMnO_4$, $PhCO_2H$ and AcOH are formed. To a Grignard reagent prepd. from 6 g. Mg and 37 g. PhBr in 200 cc. Et_2O, 23 g. α-chlorocroton aldehyde in 200 cc. Et_2O is slowly added with stirring and cooling with ice. After keeping the mixt. overnight in the cold, it is decompd. by addn. of 20 g. NH_4Cl in 300 cc. ice H_2O. The Et_2O soln., after washing with H_2O and dild. $NaHCO_3$ soln., is dried and evapd. Distn. of the residue gives 21.8 g. *1-phenyl-1-hydroxy-2-chloro-2-butene* (III), $b_{0.6-1}$ 122–4°, m. 50–1°, n_D^{25} 1.5545, n_D^{30} 1.5502. III is also formed when 10 g. 1-phenyl-2,2,3-trichloro-1-butanol in 25 cc. EtOH is dropped into a stirred suspension of 10 g. Zn dust in 25 cc. boiling EtOH. After refluxing the mixt. for 30 min. it is cooled, filtered and dild. with H_2O and extd. with Et_2O. The yield is 7.2 g. When into 4 g. III in 30 cc. cold C_6H_6, 1 g. dry HCl is passed, the excess of HCl removed by washing with H_2O and $NaHCO_3$ and the C_6H_6 removed *in vacuo*, distn. of the residue gives 3.5 g. *1-phenyldichlorobutene* (IV), either PhCH:CClCHClMe or PhCHCl-CCl:CHMe, $b_{0.7}$ 100°, n_D^{25} 1.5712, n_D^{30} 1.5666. When the chlorination is carried out with SO_2Cl_2 *1-phenyl-2,3-dichloro-1-butene* is the main product formed, $b_{0.5-1}$ 82 7°, n_D^{25} 1.5727. Dehalogenation of IV is carried out by addn. of 12 g. Zn dust in small portions to 12 g. IV in 100 cc. hot EtOH. After refluxing the mixt. for several min. it is filtered, freed from the EtOH *in vacuo*, dild. with H_2O and extd. with Et_2O. After washing and drying, the Et_2O is distd. off and the residue fractionated, with a 15-cm reflux column. I is obtained in 4.5-g. yield, $b_{0.5-1}$ 44 7°, n_D^{25} 1.5754, $n_F^{25} - n_C^{25}$ 0.025, n_D^{30} 1.5698, $d_4^{26.5}$ 0.9240. *1-Phenyl-2,2,3-trichlorobutanol* (V), $b_{0.5}$ 140–5°, m. 53°, $n_D^{25.7}$ 1.5627, is prepd. according to Helferich and Besler (*C. A.* **19**, 241). When 50 g. V is treated with 50 g. PCl_5, the cooled mixt. warmed for a few min., ice added and the product extd. with Et_2O, the latter washed with H_2O and $NaHCO_3$ soln., dried and distd., 48 g. *1-phenyl-1,2,2,3-tetrachlorobutane* (VI), $b_{0.5-1}$ 122–5°, n_D^{30} 1.5625, is obtained. VI (10 g.) when treated with Zn dust in EtOH yields 3.7 g. I, b_{10} 76–7°, n_D^{21} 1.5716. F. E. Brauns

Electronic interpretation of the halogenation of toluene. A. P. Kreshkov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1251–7 (1939).—Review and discussion with 30 references. John Livak

The separation of the isomeric dinitro-1,4-dibromobenzenes and their reactions with *p*-phenylenediamine. C. J. Sunde, Gestur Johnson and C. F. Kade. *J. Org. Chem.* **4**, 548–54(1939).—Nitration of *p*-$C_6H_4Br_2$ (I) gives a mixt. of isomeric dinitro derivs. from which Austen (*Ber.* **8**, 1182 (1875); **9**, 621, 918 (1876)) isolated *1,4-dibromo-2,6-dinitrobenzene* (II), Calhane and Wheeler (*Am. Chem. J.* **22**, 449 (1899)) *1,4-dibromo-2,3-dinitrobenzene* (III) and Jackson and Calhane (*Am. Chem. J.* **28**, 451 (1902)) *1,4-dibromo-2,5-dinitrobenzene* (IV). Since II is obtained according to A. only with difficulty, the method of sepn. is improved. I (200 g.) is nitrated according to J. and C. The crude mixt. (250 g.) is dissolved in 425 cc. hot AcOH and allowed to stand in a cool place overnight. The crystals formed are filtered and 100 cc. AcOH is distd. off from the filtrate. On standing overnight a 2nd crop is obtained, another 100 cc. AcOH is distd. off from the filtrate and a 3rd crop is formed. The total yield of III is 35 g., m. 159–60° after 2 crystns. from AcOH. To the filtrate 800 cc. H_2O is added whereupon an oil seps. which solidifies on cooling. It is filtered and thoroughly washed with H_2O. The dried material (200–15 g.) is dissolved in 500 cc. hot dioxane. After standing overnight the crystals formed are filtered off, 160 cc. of the filtrate is distd. off under reduced pressure and a 2nd crop is obtained. Another 150 cc. dioxane is then removed by distn. and a 3rd crop is formed, giving a total yield of 66 g. crude IV. On purification by 2 crystns. from EtOH, 30–5 g. pure IV, m. 126–7°, is obtained. The mother liquor of IV is then concd. by distg. off 100 cc. dioxane and on standing 30 g. crude II, m. 70–80°, is obtained which after 5 crystns. from EtOH gives 16 g. pure II, m. 119–20°. From the mother liquor another 5.5–8 g. II is isolated. When 0.5 g. II is heated with 8 cc. EtOH, 0.5 g. KNO_2 and 4 cc. H_2O on a water bath, and the mixt. after standing overnight is acidified with 12 *N* HCl, *4-bromo-2,6-dinitrophenol*, m. 74–5°, is formed in

98% yield. III (1 g.) when refluxed with 1 mol. (0.330 g.) *p*-$C_6H_4(NH_2)_2$ (V) in EtOH in the presence of 0.44 g. K_2CO_3, 0.1 g. KI and 0.05 g. Cu bronze in 40 cc. MeOH according to Goldberg (*C. A.* **2**, 535) gives *3,6-dibromo-2-nitroanisole* (VI), m. 82.5–3°, in 5% yield. VI is also formed in the absence of V and by the action of MeONa on III. When a mixt. of 1 g. III, 3 g. (excess) V, 0.44 g. K_2CO_3, 0.1 g. KI and 0.05 g. Cu bronze is refluxed for 5–6 min., and the hot filtered mixt. is dild. with 100 cc. H_2O, *3,6-dibromo-2-nitro-4'-aminodiphenylamine*, m. 146–7° after crystn. from MeOH, is formed. IV (1 g.) when refluxed for 1 hr. with 0.330 g. V in 40 cc. EtOH in the presence of 0.1 g. AcONa loses 1 Br and gives 0.3 g. *4-bromo-2,5-dinitro-4'-aminodiphenylamine* (VII) as dark-blue crystals, m. 180–1° after 2 crystns. from dil. EtOH and once from $CHCl_3$. Its *Ac deriv.* (VIII), dark-red crystals, m. 227–8°. It is impossible to replace the 2nd Br. With an excess of V, IV gives a dark-red ppt., m. 235–7°, which after acetylation gives the *tetra-Ac deriv.* of the *Bandrowski base*, m. 293–4°. VIII (0.3 g.) when refluxed for 1 hr. with 3 g. V in 50 cc. EtOH forms a condensation product by replacing a NO_2 group as a dark-red cryst. product, m. 245–6°. When 1 g. II is refluxed with 0.6 g. V and 0.3 g. AcONa in 40 cc. EtOH for 15 min. *4-bromo-2,6-dinitro-4'-aminodiphenylamine* (IX), m. 193–4°, is obtained in 98% yield. Its *Ac deriv.* (X) m. 271–2°. X does not further react with V. When, however, 2 mols. II and 1 mol. V are refluxed in EtOH, *N,N'-bis(2,6-dinitro-4-bromophenyl)-p-phenylenediamine* (XI), m. 276–7°, is formed. XI is also obtained when 0.2 g. IX and 0.4 g. II are refluxed with 0.2 g. AcONa in 25 cc. EtOH for 2 hrs. In both condensation products the Br between the 2 NO_2 groups in the *o*-positions is replaced. IX is also obtained when 1 g. 1-chloro-4-bromo-2,6-dinitrobenzene (XII), 0.68 g. V and 0.5 g. AcONa in 30 cc. EtOH are refluxed for 15 min. XI is further formed when 0.2 g. IX, 0.4 g. XII and 0.2 g. AcONa in 25 cc. EtOH, or when 0.5 g. XII, 0.095 g. V and 0.3 g. AcONa in 25 cc. EtOH are refluxed for 25 min. F. E. Brauns

The structure of diazoamino salts. F. P. Dwyer. *Australian Chem. Inst. J. & Proc.* **6**, 348–61(1939).—The malenoid-fumaroid color theory of diazoamino salts proposed by Mangini and Dejudicibus (*C. A.* **28**, 1672[9]; **29**, 6580[9]) has been found to be untenable on the grounds that the colored forms described by them arise either by the use of impure diazoamino compds. or by the formation of impurities during the prepn. of the salts. The *Hg* and *K salts* of *PhN₂NHPh*, the *Hg salt* of *diazoaminoazobenzene*, the *Ag salt* of *3-nitrodiazoaminobenzene* and *3-nitrobenzenediazoaminoazobenzene*, the *Hg* and *Ag salts* of *4-nitrodiazoaminobenzene*, the *Ag salt* of *4-nitrobenzenediazoaminoazobenzene*, the *Ag* and *K salts* of *2,2'-dinitrodiazoaminobenzene* and the *Ag* (I) and *K salts* of *3,3'-dinitrodiazoaminobenzene* are prepd. It is found that I exists only in the yellow triazene form and that purified diazoamino compds., whether unsubstituted or with 1 or more Me groups, give no color with alc. alkali and yield only yellow salts. Pure nitrodiazoamino compds., however, with at least 1 NO_2 group in an *o*- or *p*-position give intensive colors with alc. alkali and the intensity of the color increases with 2 NO_2 groups in these positions. With 1 or 2 NO_2 groups in the *m*-position, an orange color is produced with alc. alkali. Diazoamino compds. with NO_2 groups in the *o*- or *p*-position are absorbed strongly on $Mg(OH)_2$ and give brilliantly colored lakes, while *m*-nitro derivs. are absorbed only feebly. PhN_2NHPh itself and its Me-substituted derivs. do not show any absorption or color formation. Methylation of the labile H in the NH group causes loss of salt-forming properties and the derivs. give no color with alc. alkali nor are they absorbed on $Mg(OH)_2$. The normal forms of 2,2'- and 4,4'-dinitrodiazoaminobenzene are yellow, the aci forms are red and purple, resp. The purple and the yellow forms of the Ag and Cu salts of 4,4'-dinitro compds. correspond to the aci and normal forms of the diazoamino compd. On the basis of these results, a theory of the structure of diazoamino salts is put forward. The colored salts which can be obtained only from *o*- and *p*-nitro compds. have the metal joined electrovalently with the O of the NO_2 group and coordinated with the triazene N. The color is caused by the *o*- or *p*-quinoid structure. Among *m*-nitro compds. and PhN_2NHPh itself and the Me derivs., the triazene structure, in which the metal is joined electrovalently to the triazene N in the "1" position and is coördinated with the N in the "3" position, is the only one possible. These salts are yellow or orange. Of the *m*-nitro compds. a 2nd type of structure is possible when the metal is strongly electropos., in which case the metal is coördinated with the O of the NO_2 group. **The isomerism of diazoamino salts.** *Ibid.* 362–8.—In the above paper it was found to be impossible to sep. the isomeric Ag salts $PhN.N:NC_6H_4NO_2(p)$ and $PhN:N.NC_6H_4NO_2(p)$. A possible solution of the question was, however, to fix 1 of the isomerides as the pyridine-coördinated isonitro acid salt $PhN:N.N:C_6H_4(:O).O$, then to revert it to the triazene form by loss of the stabilizing pyridine group and to det. the position of the Ag atom by methylation. This attempt was unsuccessful with the 4-nitro compd. but with the *3,4'-dinitrodiazoaminobenzene* (II) (cf. Meldola and Streatfeild, *J. Chem. Soc.* **51**, 102 (1887); **53**, 668 (1888)) it was found possible to settle the question by this method. The Ag salt of II exists in 2 forms, *m*-$NO_2C_6H_4N.N:NC_6H_4NO_2(p)$ (III) and *m*-$NO_2C_6H_4N:N.N:NC_6H_4NO_2(p)$ (IV) but only IV gives a *pyridine-coördinated salt* (V) of the isonitro acid and on heating at 100° or warming with Me_2CO, V should revert into IV if the isomerism is stable. Methylation of IV with MeI should give *N*-methyl-4,3'-dinitrodiazoaminobenzene (VI) which may also be obtained by coupling diazotized *m*-$NO_2C_6H_4NH_2$ with *p*-$NO_2C_6H_4NHMe$. If, however, the isomerism is dynamic, V should be converted into a mixt. of III and IV and on methylation yield a mixt. of *N*-methyl-3,4'-dinitrodiazoaminobenzene, also obtainable from diazotized *p*-$NO_2C_6H_4NH_2$ and *m*-$NO_2C_6H_4NHMe$, and of VI. When the purplish red V, isolated from pyridine at °, is warmed it loses pyridine and is reverted to the yellow triazene form which on methylation gives a mixt. of 2 *N*-Me derivs. m. 153–7°, indicating that the isomerism is actually dynamic. Similarly *4-nitrodiazoaminobenzene* gives a red isonitro acid salt which on losing pyridine is reverted into the yellow triazene form and gives on methylation a *N*-Me deriv. (VII), m. 94–5°. Hydrolysis of VII with HCl and CuCl gives a mixt. of *p*-$NO_2C_6H_4NHMe$, PhNHMe, PhCl and *p*-$NO_2C_6H_4Cl$, indicating that VII is a mixt. of 2 isomeric forms. This shows that the isomeric Ag salts of unsym. triazene 4-nitrodiazoaminobenzene are in a dynamic state. F. E. Brauns

Reactivity of the aromatic nucleus. I. Karrer's theory of coupling. W. J. Hickinbottom and E. W. Lambert. *J. Chem. Soc.* **1939**, 1383–6(1939).—Karrer (*C. A.* **9**, 3239) has reported that $(iso\text{-}Bu)_2NPh$ (I) or $(iso\text{-}Am)_2NPh$ (II) reacts in aq. AcOH with *p*-$HO_3SC_6H_4N_2X$ (III) to form *p*-$HO_3SC_6H_4N_2C_6H_4NHR$ (R = iso-Am or iso-Bu) with the elimination of an alkyl group. It has not been possible to repeat these results, the amines reacting normally with III. II (1.5 g.) in 5 cc. AcOH, cooled and stirred while III from 1.5 g. of the acid was added gradually, followed by AcOK, gives on addn. of KOH the *K salt* of 4-diisoamylaminoazobenzene-4'-sulfonic acid, yellow-orange, glistening plates. Reduction with $Na_2S_2O_4$ in alk. soln. gives *p*-aminodiisoamylaniline (IV), whose *HCl salt* is formed in Et_2O; an aq. soln. gives a brilliant-red color with $FeCl_3$, quickly fading to yellow. The *Bz deriv.* of IV m. 101°. II and *p*-$O_2NC_6H_4N_2Cl$ (V) gives *4'-nitro-4-diisoamylaminoazobenzene*, crimson, m. 120°. III and (iso-Am)NHPh (VI) in AcOH give the *K salt* of 4'-isoamylaminoazobenzene-4-sulfonic acid, golden-orange plates; reduction gives *p*-aminoisoamylaniline, whose

di-HCl salt forms plates; $FeCl_3$ gives a green color. V and VI give *4'-nitro-N-isoamyldiazoaminobenzene*, yellow, m. 72–3°; the corresponding aminoazo compd. could not be isolated. I and III give the *K salt* of 4-diisobutylaminoazobenzene-4-sulfonic acid, orange-brown crystals; reduction yields *p-aminodiisobutylaniline* (VII), the *HCl salt* of which m. 223–4°; $FeCl_3$ gives an intense-red color, rapidly fading to yellow; *Bz deriv.* of VII, m. 111°. I (2.1 g.) in 1:2 HCl, cooled and treated with 1.6 cc. 48% aq. $NaNO_2$, gives the *HCl salt*, yellow-brown needles, of *p-nitrosodiisobutylaniline*, green, m. 62–3°; reduction with Zn and dil. HCl gives VII. V and I give *4'-nitro-4'-diisobutylaminoazobenzene*, crimson, m. 122–3°. V and methyl-*tert*-butylaniline in aq. Na_2CO_3 give *4'-nitro-4-methyl-tert-butylaminoazobenzene*, crimson, m. 133–4°; *tert*-BuNHPh similarly give *4'-nitro-N-tert-butyldiazoaminobenzene*, yellow, m. 142–3°. Dioctylaniline and V give *4'-nitro-4-dioctylaminoazobenzene*, crimson, m. 66–7°; octylaniline yields *4'-nitro-N-octylaminodiazoaminobenzene*, yellow, m. 61–2°. Cetylaniline gives *4-nitro-N-cetyldiazoaminobenzene*, pale yellow, m. 77°; V and dicetylaniline give *4'-nitro-4-dicetylaminoazobenzene*, bright red, m. 70–1°. *N*-Dialkylanilines may be purified by crystn. of the picrates; the method fails if the alkyl group is too large. $PhNH_2$ (25 g.) and 50 g. iso-AmBr, refluxed 2 hrs. at 120° and 1 hr. at 140°, the liberated amines distd. and the fraction b. above 190° (43.9 g.) heated again with 25 g. iso-AmBr for 3 hrs. at 100° and 5 hrs. at 140° and the operation repeated by heating 7 hrs. at 150° and the fractions b. above 260° converted into picrates and crystd. from EtOH, give the pure *picrate*, yellow, m. 146°; the yield of II is 21.5 g. I gives a *picrate*, yellow, m. 141°; *that* of dimethyl-*p*-xylidene, yellow, m. 159–60°, and *that* of 2-dimethylamino-*m*-xylene, yellow, m. 154–5°; *that* of *o*-$ClC_6H_4NH_2$ m. 133–4°. C. J. West

Hydrolysis of substituted benzenesulfonanilides. IV. Solubility of sulfonanilides in water and hydrochloric acid. R. L. Shriner, J. D. Oppenlander and R. S. Schreiber. *J. Org. Chem.* 4, 588–92(1939); cf. *C. A.* 28, 5052[3].—Since *N*-alkylbenzenesulfonanilide is hydrolyzed in about 1/3 the time required for the hydrolysis of an unsubstituted benzenesulfonanilide (cf. *C. A.* 28, 1674[4]) it was thought that the soly. might play an important role. The detn. of the soly. of *benzenesulfonanilide*, its *N-Me*, *N-Et*, m. 37–8°, *N-Pr* and *N-Bu derivs.*, b. 182–4°, m. 33°, *p-toluenesulfonanilide* (II), its *N-Me*, *N-Et*, *N-Pr* and *N-Bu derivs.* in H_2O and const.-boiling HCl, shows that the soly. of each series in either solvent decreases as the size of the alkyl group increases, and the ratio of the soly. in HCl to that in H_2O is not only greater than 1.0 but rises to a max. value and then decreases. The increase in soly. of the *N*-alkylarylsulfonanilides in HCl may be one of the reasons why they are hydrolyzed by acids more rapidly than their unsubstituted derivs. F. E. Brauns

The action of nitrous acid on certain halogenated substitution products of 2,5-, 3,4- and 3,5-dimethylphenols. L. Chas. Raiford and Donald W. Kaiser. *J. Org. Chem.* 4, 555–68(1939).—Earlier expts. on the action of HNO_2 on brominated phenol and cresol (cf. Zincke, *J. prakt. Chem* [2], 61, 561 (1900), R. and Miller, *C. A.* 27, 2943, and R. and Scott, *C. A.* 32, 924[1]) showed that Br in a favorable position to the OH group can be replaced by a NO_2 group. It was desired to prep. for comparison 2-nitro-4,6-dibromo-*m*-xylenol and to exam. the behavior of tri-Br substitution products of other xylenols. *2,5-Dimethyl-3,4,6-tribromophenol* (I), prepd. according to Auwers and Erckientz (*Ann.* 302, 114, (1898)), (250 g.) is dissolved in a mixt. of 3 l. AcOH and 200 cc. dioxane, cooled to 7–10° and 12 g. $NaNO_2$ is added within 2 hrs. After keeping the mixt. overnight it is poured with rapid stirring into 18 l. H_2O and the *2,5-dimethyl-3,6-dibromo-4-nitrophenol* (II) is filtered. The yield is 81%. II m. 152–3° (decompn.) after crystn. from ligroin. The Br at C atom 4 (OH = 1) is therefore replaced by a NO_2 group. Methylation of II with Me_2SO_4 and KOH gives *2,5-dimethyl-3,6-dibromo-4-nitrophenyl Me ether*, m. 85–6°, in 58% yield. The *Ac deriv.* of II m. 114–15°. Oxidation of II by slow addn. of 10 g. to 50 cc. fuming HNO_3 at 0°, warming the mixt. to room temp., followed by heating for 5 min. on a water bath and pouring the mixt. into ice H_2O gives *3,6-dibromo-p-xyloquinone*, m. 185–6°, in 58% yield. Reduction of II with $SnCl_2$ according to R. and Colbert (*C. A.* 19, 1858) gives *2,5-dimethyl-3,6-dibromo-4-aminophenol-HCl* (III) in 72% yield. III decomps. at about 225°. The *free base* (IV) of III is isolated with $(NH_4)_2CO_3$ and m. 187–8° (decompn.). To prove that II is a 4-nitrophenol, the following acyl derivs. of IV are prepd: *N,O-di-Ac*, in 77% yield, m. 237–8°; *acetylaminophenol*, 89% yield, m. 230–1° (decompn.); *N,O-di-Bz*, 86% yield, m. about 275°; *benzoylaminophenol*, 92% yield, m. 221–2°; *N-benzoyl-O-acetyl*, 73% yield, m. 224–5°; and *N-acetyl-O-benzoyl* 72% yield, m. 250–1°. 3,4-Dimethylphenol is nitrated by addn. of a mixt. of 15 cc. concd. HNO_3 and 50 cc. AcOH to a soln. of 10 g. in 100 cc. AcOH and pouring the mixt. after 1 min. into 5 vols. ice H_2O. On fractional crystn. *3,4-dimethyl-6-nitrophenol* (V), m. 86–7°, is obtained in 19% yield in addn. to the *2,6-dinitro deriv.*, m. 126–7°. By steam distn. of the crude nitration product, V is obtained in 38% yield. To decide whether the NH_2 group is in the 2- or 6-position, V is brominated by addn. of 21 g. Br in 10 cc. AcOH to 10 g. V in 40 cc. AcOH in the presence of 0.5 g. Fe powder. *2-Bromo-3,4-dimethyl-6-nitrophenol* (VI), m. 74–5°, is so obtained in 82% yield. On reduction with $SnCl_2$ *2-bromo-3,4-dimethyl-6-aminophenol-HCl* (VII) is formed in 74% yield. VII decomps. at about 260°; *free base* (VIII), m. 103–4°; *Ac deriv.*, m. 199–200°. Attempts to introduce a 2nd Br atom into VII failed. 3,4-Dimethylphenol on bromination with Br gives *2,5,6-tribromo-3,4-dimethylphenol* (IX), m. 173–4°. Nitration of IX with $NaNO_2$ in AcOH gives *2,5-dibromo-3,4-dimethyl-6-nitrophenol* (X), m. 168–9° (decompn.), in 61% yield. Its *Me ether*, prepd. with Me_2SO_4 in 67% yield, m. 100–1°. Reduction of X with $SnCl_2$ yields *2,5-dibromo-3,4-dimethyl-6-aminophenol-HCl* (XI) in 87% yield. XI decomps. about 230° without melting. The *free base* (XII) m. 130–1°. XII is further characterized by the following acyl derivs: *N,O-di-Ac*, 82% yield, m. 117–18°; *acetylaminophenol*, 90% yield, m. 181–2°; *N,O-di-Bz*, 85% yield, m. 207–8°; *benzylaminophenol*, 90% yield, m. 227–8°; and *N-benzoyl-O-acetyl*, 62% yield, m. 209–10°. Only 1 mixed Ac-Bz deriv. is obtained independent of the order of introduction of acyl groups, the heavier radical being attached to N (cf. *C. A.* 20, 1073). Since on nitration of *sym*-tribromo-*m*-xylenol a 4-NO_2 compd. is formed, the isomeric 2-NO_2 deriv. is prepd. by bromination of 20 g. 2-nitro-3,5-dimethylphenol in 100 cc. AcOH at 100° with 13 cc. Br. *2-Nitro-3,5-dimethyl-4,6-dibromophenol* (XIII), obtained in 90% yield, m. 160–1° (decompn.), its *Me ether* m. 99–100°. Reduction of XIII gives *2-amino-3,5-dimethyl-4,6-dibromophenol-HCl* (XIV) in 89% yield which decomps. at about 241°; *the free base* (XV) m. 141–2°. Only 1 Ac-Bz deriv. is obtained from XV. The following acyl derivs. are prepd: *N,O-di-Ac*, 78% yield, m. 244–5° (decompn.); *acetylaminophenol*, 91% yield, m. 190–1°; *N,O-di-Bz*, 87% yield, m. 178–9°; *benzoylaminophenol*, 93% yield, m. 224–5° (decompn.); and *N-benzoyl-O-acetyl*, 64% yield, m. 175–6°. Since Cl is not replaced by NO_2 when the Zincke method is used, the behavior of *2,4,6-trichloro-3,5-dimethylphenol* (XVI) toward HNO_3 is examd. XVI is prepd. in 87% yield by passing Cl into 122 g. 3,5-dimethylphenol in 1.5 l. hot CCl_4, XVI m. 177–8°. Treatment of XVI with fuming HNO_3 according to Kohn and Rabinowitsch (*C. A.* 21, 3606) gives no NO_2 deriv. but *2,6-dichloro-m-xyloquinone* (XVII) in 87% yield, m. 177–8°. With H_2NOH in alc. XVII yields *2,6-dichloro-m-xyloquinhydrone* (XVIII), m. 177–8°. Reduction of XVII by treating it with 2 mols. H_2NOH or with $SnCl_2$ gives *2,6-dichloro-m-xylohydroquinone* (XIX) in 86% yield, m. 225–6°. When to 100 g. XVI in 1.8 l. AcOH, 50 g. $NaNO_2$ is added in small portions within 1 hr. at room temp. and the mixt. allowed to stand overnight, a *mol. compd.* consisting of 1 mol. XVII and 2 mols. XVI is formed in 48% yield. It turns yellow at 118–19° without melting and m. between 133 and 164° to a yellow liquid. F. E. Brauns

Action of alcoholic monomethylamine on derivatives of

benzoquinone and toluquinone. I. The methoxy- and hydroxymethoxy derivatives. W. K. Anslow and H. Raistrick. *J. Chem. Soc.* **1939**, 1446–57.—The following work grew out of an attempt to synthesize 3,6-dihydroxy-4-methoxy-2,5-toluquinone (I) (spinulosin, *C. A.* **32**, 7955[9]) by the interaction of alc. $MeNH_2$ and 4-methoxytoluquinone and hydrolysis of the resulting methylamino deriv. Instead of the expected 3,6-bis(methylamino)-4-methoxytoluquinone, however, *2,5-bis(methylamino)-1,4-benzoquinone* (II), cerise, m. 284–6° (decompn.), was formed, which gives 2,5-dihydroxy-1,4-benzoquinone on hydrolysis. Benzoquinone, its MeO and its 2,5-di-MeO derivs. likewise give II. 2,6- and 2,3-Dimethoxy-1,4-benzoquinone and 4,6-dimethoxytoluquinone give with $MeNH_2$ *2,5-bis(dimethylamino)-3-methoxy-1,4-benzoquinone* (III), steel-gray, m. 234°. Toluquinone, the 3- and 6-MeO and the 3,6-di-MeO derivs. give 3,6-bis(methylamino)-2,5-toluquinone (IV), purple-brown, m. 231°. 3,4-Dimethoxytoluquinone and the 3,4,6-tri-MeO deriv. give the *4-MeO deriv.* of IV, purple-gray, m. 231° (partial sublimation); it gives a deep-purple color in $CHCl_3$. Hydrolysis of III and acetylation give *2,5-diacetoxy-3-methoxy-1,4-benzoquinone*, lemon-yellow, m. 77°. I and CH_2N_2 in Et_2O or Me_2SO_4 and K_2CO_3 in Me_2CO give *3,4,6-trimethoxy-2,5-toluquinone*, reddish orange, m. 80°, which gives a deep-blue color with concd. H_2SO_4; reduction with $Na_2S_2O_4$ gives a nearly quant. yield of *2,5-dihydroxy-3,4,6-trimethoxytoluene*, m. 82–3°; cold concd. H_2SO_4 gives a bright-yellow color, changing to a dark olive-green in 30 min.; $FeCl_3$ gives a golden-yellow color. $1,2,4,5\text{-}(AcO)_4C_6H_2OMe$, boiled with MeOH-$H_2SO_4$ for 0.75 hr. in a N atm. and the quinol oxidized with air at pH 8 for 10 min., gives *2-hydroxy-5-methoxy-1,4-benzoquinone* (V), orange-brown, m. 179° (decompn.); it sublimes at 100° in a high vacuum; concd. H_2SO_4 gives a dull-red color and EtOH-$FeCl_3$ a deep reddish brown color; Ac_2O-H_2SO_4 gives the *2-Ac deriv.*, lemon-yellow, m. 124°; V and $MeNH_2$ give *4,5-bis(dimethylamino)-1,2-benzoquinone* (?), dark-purple, does not m. 360°. $1,4,5,2,3\text{-}(AcO)_3C_6H(OMe)_2$ with MeOH-H_2SO_4, followed by oxidation with air at pH 8 for 30 min., gives *5-hydroxy-2,3-dimethoxybenzoquinone* (VI), reddish orange, m. 125–6°; cold concd. H_2SO_4 gives an intense blue color and $FeCl_3$ an intense reddish brown color. VI with $MeNH_2$ gives the *$MeNH_2$ salt*, dark-purple, m. 228–30° (decompn.), of *2-methylamino-5-hydroxy-3-methoxybenzoquinone*, purple-black, m. 179° (decompn.), which gives a purple soln. in $CHCl_3$ and 0.1 *N* NaOH and an olive-brown color with $FeCl_3$. Reduction of VI with $Na_2S_2O_4$ gives *1,4,5-trihydroxy-2,3-dimethoxybenzene*, m. 157–8°; H_2SO_4 gives a canary-yellow color, quickly changing through yellow-green to emerald-green; $FeCl_3$ gives an intense reddish brown (I) color. 2,5-Dihydroxy-3-methoxy-1,4-benzoquinone (VII) and $MeNH_2$ give the *di-$MeNH_2$ salt* of VII, violet, m. 214° (decompn.). 3-Hydroxy-4-methoxy-2,5-toluquinone (Fumigatin) and $MeNH_2$ give the *6 $MeNH_2$ deriv.*, coppery-purple, m. 213–14°; $CHCl_3$ gives a deep-purple soln.; $FeCl_3$ gives an intense olive-green color; hydrolysis gives I. 6-Hydroxy-4-methoxy-2,5-toluquinone and $MeNH_2$ probably give *5,6-bis(methylamino)-4-methoxy-2,3-toluquinone*, olive-green, m. 228°; hydrolysis yields I. H_2SO_4 gives a deep blue-violet soln. 3-Methoxy-2,5-toluquinone with Ac_2O and H_2SO_4 gives *2,5,6-triacetoxy-3-methoxytoluene*, m. 155°; hydrolysis and air oxidation yield *6-hydroxy-3-methoxytoluquinone* (VIII), golden-yellow, m. 155–6°; concd. H_2SO_4 gives a reddish violet color and $FeCl_3$ a purple color. $MeNH_2$ gives *3-methylamino-6-hydroxy-2,5-toluquinone*, dark purple-red, m. 252–4°; H_2SO_4 gives a crimson soln. and $FeCl_3$ an intense purple-brown color. Reduction of VIII yields *2,5,6-trihydroxy-3-methoxytoluene*, m. 102–3°, which acquires a purple color in the air; concd. H_2SO_4 gives an orange-yellow color, changing through apple-green to emerald-green; $FeCl_3$ gives an olive-brown, changing to a purple color. *6-Ac deriv.* of VIII, yellow, m. 109°. A cryst. product could not be obtained from 4-hydroxy-6-methoxy-2,5-toluquinone and $MeNH_2$. 3,6-Dihydroxy-4-methoxy-2,5-toluquinone yields the *bis-$MeNH_2$ salt* of I, violet, m. 173°; cold 2 *N* H_2SO_4 gives I. 3,4-Dimethoxytoluquinone gives an oily acetylation product; hydrolysis and oxidation yield *6-hydroxy-3,4-dimethoxy-2,5-toluquinone* (IX), tomato-red, m. 105°; concd. H_2SO_4 gives a blue-green color and $FeCl_3$ a brownish purple color; $MeNH_2$ yields *3-methylamino-6-hydroxy-4-methoxy-2,5-toluquinone*, purple-black, m. 212–13°; $CHCl_3$ gives a purple ($KMnO_4$) soln. and 0.1 *N* NaOH a deep-violet soln.; $FeCl_3$ gives an intense olive-green color. Reduction of IX yields *2,5,6-trihydroxy-3,4-dimethoxytoluene*, m. 110–11°; concd. H_2SO_4 gives a golden-yellow, changing to a deep emerald-green color; $FeCl_3$ gives a brownish purple color. In those cases above where 2 MeO groups are replaced by 2 $MeNH_2$ groups, the yields approximate 100%; where only 1 MeO group is replaced, the yield is 50%; with benzo- and toluquinones the yields were 33%. The mechanism of the reactions is discussed.
C. J. West

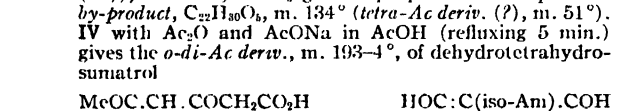
Nitrosation of phenols. XVI. *m*-Fluorophenol. A new red indophenol. Herbert H. Hodgson and Donald E. Nicholson. *J. Chem. Soc.* **1939**, 1405–8; cf. *C. A.* **27**, 4225.—*m*-FC_6H_4OH (I) behaves exceptionally toward HNO_2 in H_2O in that reaction occurs in the 6-position instead of the normal 4-position, as with the other *m*-halogen derivs. Probably 5,2-$F(ON)C_6H_3OH$ is first formed but this immediately condenses with unchanged I to form a *m,m'-difluoro-o-indophenol* (II), red-brown, very stable to acids. In 30% aq. AcOH at room temp. pptn. of II occurs continuously over several days until an almost quant. yield is obtained; at 100° the reaction is immediate and it is also more rapid when carried out in H_2SO_4. In all cases a small quantity of 5,2-$F(O_2N)C_6H_3OH$ is formed by a simultaneous reaction. The structure of II is established by a comprehensive series of color reactions. II on reduction with Zn and AcOH gives a leuco compd., which is oxidized by air to a blue soln., giving a red color with $FeCl_3$. The reaction of I is compared with that of *m*-$MeOC_6H_4OH$ and both are explicable on electronic grounds.
C. J. West

Aromatic amines and 3-nitro-6-bromonitrostyrene. David E. Worrall and Jack Finkel. *J. Am. Chem. Soc.* **61**, 2969–70(1939).—Following the work on 2-chloronitrostyrene (*C. A.* **33**, 1284[9]), the behavior of the Br deriv. has been studied; the 2 compds. have almost identical chem. properties. Reaction of BrC_6H_4CHO, Et_3N and $MeNO_2$ at 25–30° gives 60% of *α-nitro-β-(2-bromophenyl)ethylene* (I), yellow, m. 84°; fuming HNO_3 gives the *6-bromo-3-nitrophenyl analog* (II), pale yellow, m. 114.5° (oxidation gives 6,3-$Br(O_2N)C_6H_3CO_2H$); Br gives the *α-Br deriv.* (III) of II, yellow, m. 146–7°; *α-Cl deriv.*, yellow, m. 140–1°. I in hot EtOH with 0.5 equiv. of *p*-$C_6H_4(NH_2)_2$ gives *N,N'-[α,α'-di(2-bromophenyl)-β,β'-dinitrodiethyl]-p-phenylenediamine*, yellow, m. 146–7°; III but not II forms an addn. product with *p*-$MeC_6H_4NH_2$, yellow, m. 103–4°. The following *β-derivs.* of *α-nitro-β-(6-bromo-3-nitrophenyl)ethane* were prepd.: *o-*, *m-* and *p-toluidino*, yellow, m. 108–9°, 103–4° and 132–3°; *o-*, *m-* and *p-anisidino*, yellow, m. 139–40°, 159–60° and 105–6°; *p-phenetidino*, yellow, m. 134–5°; *p-dimethylaminoanilino*, yellow, m. 140–1°; *phenylhydrazino*, yellow, m. 147–8°. *Bis(α-(6-bromo-3-nitrophenyl)-β-nitroethyl)amine*, $C_{16}H_{13}Br_2N_5O_8$, m. 146–7°; the *N,N'-bis[α-(6-bromo-3-nitrophenyl)-β-nitroethyl]-p-phenylenediamine* and *-benzidine compds.*, orange, have indefinite m. ps.
C. J. West

Phototropy of anils and a note on the phototropy of solutions of the leucocyanides of malachite and brilliant greens. V. De Gaouck and R. J. W. Le Fèvre. *J. Chem. Soc.* **1939**, 1457–65.—Of 300 known anils only 25 have been reported to show phototropy and of these 18 are derivs. of *o*-HOC_6H_4CHO and 3 of *p*-HOC_6H_4CHO. A study of various anils, such as salicylidene-*m*-toluidine in soln., spectrophotometrically and dielectrically, shows that phototropism of anils is a reaction which occurs *only* in the solid state; in soln. no such change of color or other properties can be produced by illumination. X-ray studies and photomicrographs show that the phototropic mechanism must consist in a mutual interaction of moles in the lattice and not in some rearrangement undergone by them. In

compds. of the type 4,2-X(OH)$C_6H_3CH{:}NC_6H_2Y_3$, it is shown that if X is any other group than H, phototropism does not occur; the elec. specification of X seems to be irrelevant—it may be either $+I$ or $\pm I \pm T$; the influence of Y upon the phototropic process is very marked, for although salicylidene-*m*-toluidine, -aniline and -*p*-bromoaniline give θ values in the ratios 1·2 3, yet the *o*- and *p*-toluidines and *p*-chloroaniline underwent no apparent color changes. The light used has some effect; salicylideneaniline (I) shows little color development in sunlight, but if the light is first passed through a blue filter a strong color change—from light yellow to reddish brown—is induced in the anil which is thus evidently very sensitive to the reversing action of the longer waves. Absorption spectra are given for salicylidene-*o*-, -*m*- and -*p*-toluidines, -*p*-bromo and -*p*-chloroanilines, the *o*-MeO, 5-Br, 5-NO_2 and 5-Me derivs. of I and 5-chlorosalicylidene-*m*-toluidine. An app. is described and illustrated for the dielec. examn. of phototropic changes in soln. The phototropic changes described in the literature for the leucocyanides of malachite green (II) and brilliant green (III) have been confirmed when EtOH is the solvent; however, no effect was observed in C_6H_6. The dipole moment of II, III and the leuco base of malachite green, obtained from solns. in C_6H_6, are 1.1$_3$, 1.7$_2$ and 1.5$_7$, resp. These values illustrate the facilitation of mesomerism by the R_2N group. C. J. West

Sumatrol. II. The synthesis of dehydrotetrahydrosumatrol. Thomas S. Kenny, Alexander Robertson and Stephen W. George. *J. Chem. Soc.* **1939**, 1601–4; cf. *C. A.* **31**, 4318[9].—1,3,5-$C_6H_3(OH)_3$ (I) (16 g.) and 20 g. $AlCl_3$ in 200 cc. $PhNO_2$, treated with 13 g. of iso-BuCOCl at 0°, give 8–10 g. *phloroisovalerophenone* (II), m. 145° (*2,4-dinitrophenylhydrazone*, dark-red, m. 196°). I and iso-BuCN with HCl and $ZnCl_2$ in Et_2O give a mixt. which gives II on heating *in vacuo* at 110–15°. Clemmensen reduction of II gives *isoamylphloroglucinol* (III), m. 126°, which gives a faint-blue color with aq. $FeCl_3$. Condensation of III and 2,4,5-$NCCH_2(MeO)_2C_6H_2OCH_2CO_2Me$ with HCl and $ZnCl_2$ in Et_2O and hydrolysis of the ketimine and the resulting ester gives *4,5-dimethoxyphenoxyacetic acid-2-isoamylphloroacetophenone* (*tetrahydrosumatrolic acid* (IV)), m. 206°; $FeCl_3$ gives a purple color. A *phenolic by-product*, $C_{22}H_{30}O_6$, m. 134° (*tetra-Ac deriv.* (?), m. 51°). IV with Ac_2O and AcONa in AcOH (refluxing 5 min.) gives the *o-di-Ac deriv.*, m. 193–4°, of dehydrotetrahydrosumatrol



(V), m. 218° (cf. part I). The structure V is preferred through analogy with toxicarol; this implies that sumatrol contains the isopropylenedihydrofuran system present in rotenone. C. J. West

Alleged geometrical isomerism in certain anils and the dipole moment of phenanthridine. V. De Gaouck and R. J. W. Le Fèvre. *J. Chem. Soc.* **1939**, 1392–4.—It was shown in *C. A.* **32**, 5798[8] that the 2 crystallographically distinct varieties of salicylideneaniline are identical in C_6H_6 soln. The same is true of I and II. *p*-Homosalicylideneaniline (I), crystd. rapidly with cooling, gives a yellow form, whereas slow cooling above 32° gives an orange-red form; the yellow may be irreversibly transformed into the red modification by application of heat. Et salicylidene-*p*-aminobenzoate (II) is obtained as a yellow form by mixing concd. EtOH solns. of the components and quickly crystg. the product; slow crystn. from a dil. soln. gives a red form. The yellow form is 6-sided tables, m. 87.5°, and the red is long prisms, m. 83° (followed by immediate solidification and reversion to the yellow form). Ebullioscopically and cryoscopically both forms are unimol. in C_6H_6. The 2 forms of I have the dipole moments 2.95 and 2.91, and for II the values are 2.69 and 2.69; values for d_4^{25} and n_D^{25} are given for 4 concns. of these compds. Thus the alleged isomerism is due to dimorphism. The assumption of a trans structure for benzylideneaniline (III) depends upon the identity of moment found for it and its *p,p'*-Cl_2 deriv. The dipole moment of phenanthridine (IV) has been detd., since this should be of the order to be expected for the unknown cis modification (V) of III. The values for the dipole moment are: III 1.5$_7$ (calcd. 1.9), V 1.6 (calcd.) and IV 1.5$_0$ (calcd. 1.6); they thus differ in the sense forecast. The value of the dipole moment for benzophenoneanil is 2.0$_3$. C. J. West

A group of organo-mercury compounds, derivatives of allyl. M. Dominikiewicz and M. Kijewska. *Arch. Chem. Farm.* **4**, 8–21(in French, 21–2)(1939).—In a previous paper (cf. *C. A.* **32**, 9298[3]) it was shown that the org. component with which a radical of allylamine, substituted with Hg, is combined in diuretics, plays no part in the specific action of such compds. The diuretic effect of such compds. seems to depend only upon the substituted radical: $RNHCH_2CH(OMe)CH_2HgOH$, or $RNHCH_2CH(HgOH)CH_2OMe$. A problem arises, however, whether the carbonyl group, by means of which the allylamine radical is combined with the org. component in all the above-mentioned compds. (as, e. g., in Diluvite, *o*-$NaO_2CC_6H_4CONHCH_2CH(OMe)CH_2HgOH$ (I) or salyrgan, *p*-$NaO_2CCH_2OC_6H_4CONHCH_2CH(OMe)CH_2HgOH$ (II), has any effect upon the action of compds. having a constitution similar to that of I or II, but deprived of the linking CO group. The aminobenzoic acids (*o*- and *p*-) answer these conditions, and they were used as starting material for the syntheses described below. By heating anthranilic acid and also *p*-aminobenzoic acid with allyl bromide in alc., with addn. of K_2CO_3, the corresponding *o*- and *p*-allylaminobenzoic acids (III, IV) were obtained. III, yellowish needles from MeOH, m. 118.5–19.5°; alc. solns. of this acid show a bluish fluorescence. IV, colorless prisms from C_6H_6, m. 128–9° (for the same acid, obtained according to U. S. pat. 1,550,350 (*C. A.* **20**, 480) the m. p. 144–6° is given; the authors consider this to be an error). Besides these 2 main products, 2 others are also formed during the above reactions, viz., the allyl esters (V, VI) of III and IV. At room temp. both these compds. are oily liquids, slightly yellow and orange, resp., almost odorless, insol. in water. Solns. of V in EtOH and Et_2O show a bluish fluorescence. Both acids, III and IV, yield with $Hg(OAc)_2$ in MeOH the corresponding acetomercuri compds., $HO_2CC_6H_4NHCH_2CH(OMe)CH_2HgOAc$ (VII, VIII). VII, white powder, m. around 215° (decompn.); VIII, white powder, insol. in water. VII and VIII are sol. in alkalies with a yellow color and a bluish fluorescence; from these solns. upon satn. with CO_2 white hydroxymercuri derivs. (IX) are pptd. (the Ac group is split off and replaced by H). The *o*-aminobenzoic deriv. changes into the anhydride form, $O.CO.C_6H_4.NH.CH_2.CH(OMe).CH_2.Hg$ (X) From the above it is evident that there is a great similarity between the diuretics of the type I or II, which are derivs. of acid amides, and the derivs. of aromatic amines. In spite of this, however, the difference between both types of compds. can have as a consequence a difference in their pharmacol. and pharmacotherapeutical action. It seems to be incontestable that prepns. of type II owe their properties to the radical of allylamine substituted with Hg. Because of this it would be interesting to establish whether and to what extent their action is caused by the allylamine radical itself, and to what degree by the allyl radical as such. Syntheses of compds. derived from diallylacetic acid would help to solve this problem. Compds. of this type were prepd. by condensation of diallylacetyl chloride with *o*- and *p*-aminobenzoic acids. By direct action of the chloride upon the acids, *o*- and *p*-diallylacetylaminobenzoic acids, $HO_2CC_6H_4NHCOCH(CH_2CH{=}CH_2)_2$ (XI, XII) were obtained. XI, colorless prisms from C_6H_6, m. 108–9°, sol. in the majority of org. solvents, insol. in water. XII, white prisms from EtOH, m. 215.5–16°. In MeOH these 2 compds. yield with $Hg(OAc)_2$ the acetomercuri compds. $HO_2CC_6H_4NHCOCH[CH_2CH(OMe)CH_2HgOAc]_2$, (XIII, XIV). Both XIII and XIV are sol. in alkalies and in alk. carbonates, whereby the Ac radicals are split off and replaced by H. In that way the proper corresponding hydroxymercuri compds. (XV) are formed; they ppt.

from the solns. satd. with CO_2, in form of white powders, insol. in water. The authors also tried to synthesize a deriv. of diallylacetic acid in which the radical of this acid would be connected with the aromatic nucleus not by means of an NH_2 group, as in the above described compds., but indirectly, through a carboxylic group. Thus the problem was to obtain a substituted acid amide. For this purpose diallylacetyl chloride acid was condensed with K phthalimide. Although the reaction took place with great difficulty, a small quantity of phthaldiallylacetylimide (XVI) was obtained, crystals from ligroin, m. 52°. This imide could not be transformed into a deriv. of phthalamic acid because, during its hydrolysis by heating with NaOH, it decompd. into phthalic acid, NH_3 and diallylacetic acid. This seems to prove the impossibility (already mentioned in the literature) of obtaining derivs. of a bilateral acid amide, i. e., substituted by a 2nd acid group with an open chain. The desired result was reached in a different way: XVI was substituted with Hg in MeOH by means of $Hg(OAc)_2$, and the corresponding acetomercuri deriv. $C_6H_4(CO)_2NCOCH[CH_2CH(OMe)CH_2HgOAc]_2$ (XVII) was obtained, as a snow-white powder from MeOH, softens at 138° and m. 148° (decompn.). XVII is insol. in water and in cold alkalies; on heating, however, it dissolves slowly and gives clear solns. without sepn. of Hg. That is the result of hydrolysis of the imide to the corresponding deriv. of phthalamic acid; during this hydrolysis a sol. alkali salt of the hydroxymercuri deriv. (XVIII) is formed; this compd. can be sepd. as a snow-white powder by satg. the alk. soln. with CO_2. XVII contains 47.2% Hg, and XVIII 51.17% Hg. The latter, representing a compd. of a very high Hg content, may have very interesting pharmacotherapeutical properties. E. A. Ackermann

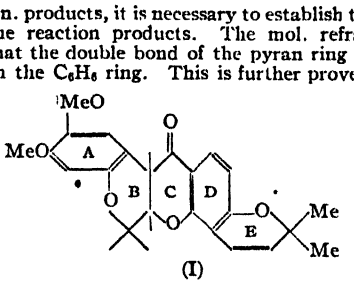
The action of sulfur monochloride on phenylacetonitrile. V. V. Korshak and A. F. Liscenko. *J. Gen. Chem.* (U. S. S. R.) **9**, 1329-31(1939). $PhCH_2CN$ (I) (10 g.) with 93 g. S_2Cl_2 (II), allowed to stand at room temp. for 15 days, with occasional stirring, gave a mixt. of I, $PhCHClCN$, $PhCCl_2CN$ (III) and diphenylmaleonitrile (IV), m. 159-60°. By extending the time of reaction to 3 months or by heating a mixt. of 10 g. I, 10 g. III and 18 g. II on the water bath for 20 hrs. complete conversion to IV was obtained. IV sapond. with alc. KOH gave diphenylmaleic anhydride (V), yellow, m. 153°. I (58 g.) with 135 g. II refluxed on the water bath for 40 hrs. gave 30 g. *diphenyldichlorosuccinonitrile* (VI), m. 189-90°, and a small amt. of IV. VI sapond. with 10% alc. KOH gave V and with KI in Me_2CO gave IV in quant. yield. An attempt to add Br and Cl to IV proved unsuccessful.

John Livak

The preparation and properties of 3,5-diiodo-*l*-tyrosine. A. Ya. Savitskiĭ. *J. Gen. Chem.* (U. S. S. R.) **9**, 1342-4 (1939).—3,5-Diiodo-*l*-tyrosine (I) is obtained in 88% yield by treating 90.5 g. air-dried tyrosine in 1340 cc. 25% NH_4OH and 1510 cc. H_2O at 6-8° with 2025 cc. 1 *N* I soln in KI for 3 hrs. and neutralizing the reaction soln. with 670 cc. concd. HCl and SO_2 gas, and is best purified by dissolving in 2 *N* HCl, treating with norite and pptg. with concd. NH_4OH. I from aq. solns. gives the dihydrate, m. 202° (decompn.). 3,5-Diiodo-*dl*-tyrosine under the same conditions crystallizes as the monohydrate, which indicates that it is the *dl*-compd. and not a mixt. of the *d*- and *l*-forms. John Livak

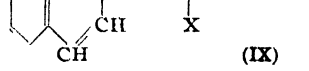
New synthetical methods in coumarin chemistry. R. C. Shah. *Proc. Natl. Inst. Sci. India* **5**, 243-8(1939).—A general survey. C. J. West

The action of alkylmagnesium halides on coumarin and related compounds. Synthesis of 2,2-dialkyl-1,2-benzopyrans. R. L. Shriner and A. G. Sharp. *J Org. Chem.* **4**, 575-82(1939).—Insecticides such as deguelin (I) are characterized by the presence of a dihydrobenzopyran ring system (AB) and a dimethylbenzopyran system (DE). To study whether portions of this mol. would possess insecticidal activity, a series of 2,2-dialkyl-1,2-benzopyrans (II) is prepd. by the method of Houben (*Ber.* **37**, 489(1904)) by treating coumarin (III) with an excess of alkylmagnesium halide. Since the Grignard reagent may react with the conjugated system in III to give either 1,2- or 1,4-addn. products, it is necessary to establish the structure of the reaction products. The mol. refractivities indicate that the double bond of the pyran ring is conjugated with the C_6H_6 ring. This is further proved by the



(I)

formation of *o*-HOC_6H_4CHO (IV) on ozonolysis and of *2,2-dimethylchroman* (V) on catalytic reduction. According to H., in the reaction the lactone ring of III is opened and closed again. If this is correct, addn. of MeMgI either to III or to *o-hydroxybenzalacetone* (VI) should give the same product. Decompn. of the addn. compd. of VI gives *4-(o-hydroxyphenyl)-2-pentanone* (VII) which, when heated to its m. p., loses H_2O and by ring closure forms *2,4-dimethyl-1,2-benzopyran* (VIII). Ozonolysis of VIII gives *o*-hydroxyacetophenone. This indicates that the reaction mechanism as proposed by H. is incorrect. Heilbron and Hill (*C. A.* **21**, 3613) also assumed a rupture of the ring in III which would lead to a 1,4- addn. When an excess of Grignard reagent is added to III an oxonium type of intermediate is formed as a very transitory yellow ppt. (cf. Decker and Fellenberg, *C. A.* **2**, 98) while when a mol. amt. is added a yellowish pasty ppt. is formed which on hydrolysis with NH_4Cl regenerates III. It is suggested that the formation of II probably involves an intermediate coordination compd. (IX) in which the alkyl group undergoes an α,γ-shift. Subsequent reaction with a 2nd mol. of



(IX)

Grignard reagent gives II. Since III is a lactone of *cis-o*-$HOC_6H_4CH{:}CHCO_2H$ it was of interest to study the behavior of the trans deriv. toward MeMgI. In this reaction VI is formed which is identical with the compd. obtained on condensation of IV with Me_2CO. VI is therefore the trans form. Stereochem. considerations therefore play a rôle in detg. the mode of action of the Grignard reagent on conjugated systems. In general, II are prepd. by addn. of 0.125 mol. III in 200 cc. Et_2O to a Grignard soln. prepd. from 0.41 mol. Mg and 0.4 mol. alkyl halide in 150-175 cc. Et_2O over a period of 2-4 hrs. The mixt. is decompd. with 200 cc. of a 22% NH_4Cl soln. contg. 2-5 cc. concd. HCl. The Et_2O soln. is dried with $CaCl_2$, evapd. and the residue distd. The following II are prepd.: *Me deriv.* (X), $b_{2.5}$ 79-80°, n_D^{25} 1.5490, d_4^{20} 1.0163; *Et deriv.*, $b_{2.8}$ 99-100°, n_D^{25} 1.5428, d_4^{20} 1.0049; *Pr deriv.*, $b_{2.8}$ 118-20°, n_D^{25} 1.5320, d_4^{20} 0.9773; *Bu deriv.*, $b_{2.8}$ 138-40°, n_D^{25} 1.5257, d_4^{20} 0.9656; *Am deriv.*, b_8 156-8°, n_D^{25} 1.5184, d_4^{20} 0.948; C_6H_{13} *deriv.*, b_8 174-6°, n_D^{25} 1.5136, d_4^{20} 0.9351; C_7H_{15} *deriv.*, b_8 192-3°, n_D^{25} 1.5095, d_4^{20} 0.9233. A soln. of X turns reddish on standing; it reduces $KMnO_4$ and decolorizes Br. It is stable toward boiling alc. alkali (cf. Heyes and Robertson, *C. A.* **29**, 5111[2]). X dissolves in concd. H_2SO_4 with a deep-red color. Boiling with AcOH causes no isomerization (cf. Löwenbein, *C. A.* **19**, 286). Hydrogenation of 12 g. X in 100 cc. EtOH with PtO_2 yields V, b_2 67.5-8°, n_D^{25} 1.5264, d_4^{20} 1.0237, in 92% yield. Ozonization of 5 g. X in 30 cc. CCl_4, decompn. with 50 cc. H_2O, 1 g. Zn, 1 cc. AcOH and 0.2 g. *p*-$C_6H_4(OH)_2$ gives IV, identified as the *2,4-dinitrophenylhydrazone*, m. 250.5-1°. No other decompn. product can be isolated. VI (0.046 mol.), prepd. according to Harries (*Ber.* **24**, 3180(1891)), when treated with 0.1 mol. MeMgI and the addn. compd. decompd., gives VII, m. 127-9° with dehydration. Its *semicarbazone* m. 155-5.5°. When

VII is heated for 10 min. at its m. p. VIII, b_3 79–80°, n_D^{25} 1.5428, d_{20}^{20} 1.0196, is formed. Ozonization of VIII gives *o-hydroxyacetophenone*, b. 215–20°; its *semicarbazone* m. 205–7° (cf. Pauly and Lockemann, *C. A.* **9**, 1052). When 0.06 mol. *trans-o*-hydroxycinnamic acid prepd. according to Dodge (*C. A.* **10**, 764) is treated with 0.36 mol. MeMgI and the addn. compd. decompd. with NH_4Cl soln. VI, m. 136–8°, is obtained in 15% yield. X causes paralysis of a goldfish in 3 min. whereas VIII requires 15 min. The higher II have no effect. F. E. Brauns

Constitutents of some Indian essential oils. XXVI. The structures of *l*-α- and -β-curcumenes. F. D. Carter, F. C. Copp, B. Sanjiva Rao, J. L. Simmonsen and K. S. Subramaniam. *J. Chem. Soc.* **1939**, 1504–9; cf. *C. A.* **23**, 149.—*l*-α-Curcumene (I) (*loc. cit.*), present in the essential oil from the rhizomes of *Curcuma aromatica*, regenerated from the HCl salt (II), b_{17} 137°, d_{20}^{20} 0.8821, n_D^{20} 1.4989, α_{5461} −34.3°; titration with perphthalic acid in $CHCl_3$ indicates 1 double bond, as does catalytic reduction with Pd-norite in EtOH. Heating I with Se at 250° for 6 hrs. and at 280–310° for a further 8 hrs. gives a deep-blue oil, b_6 150–70°, which yields a black picrate, m. 120°, identical with that from the azulene (III) from the original oil; under similar conditions II gives III and cadalene (picrate, m. 115°). The *nitrosate* of I m. 101°, $[\alpha]_{5461}$ −20.3° ($CHCl_3$, *c* 6.005). *l*-Dihydro-α-curcumenylamine, b_{14} 153–4°; *Ac derv.*, m. 109°; $NaNO_2$ in dil. AcOH gives I. Oxidation of I with MnO_2 gives *p*-toluic, terephthalic and trimellitic acids, sepd. by fractionation of the Me esters. I with O_3 in HCO_2Me gives a mixt. of HCHO, Me_2CO, *l-Me* γ-*p-tolylpentyl ketone* (IV), b_{15} 154°, d_{20}^{20} 0.9451, n_D^{20} 1.5016, α_{5461} −30.8° (*semicarbazone*, m. 138–9°), γ-*p-tolylvaleraldehyde* (V), isolated as the *2,4-dinitrophenylhydrazone*, golden, m. 94–5°, and *l*-γ-*p-tolylvaleric acid* (VI), b_{17} 180°, $[\alpha]_{5461}$ −13.82° (EtOH, *c* 13.243) (*p-phenylphenacyl ester*, m. 73–4°); oxidation of VI with alk. $KMnO_4$ gives *p*-MeC_6H_4Ac. Details are given of the sepn. of these products. Me_2CO, V and VI result from *l*-ζ-*p*-tolyl-β-methyl-Δβ-heptene (VII). *p*-MeC_6H_4CH-$MeCH_2CH_2CH.CMe_2$, HCHO and IV result from *l*-ζ-*p*-tolyl-β-methyl-Δα-heptene, *p*-$MeC_6H_4CHMeCH_2CH_2$-$CH_2CMe{:}CH_2$ (VIII). Comparative expts. on the ozonolysis of I regenerated from II and of the original mixt. of hydrocarbons as isolated by distn. indicate that, whereas the former consists of approx. equal quantities of VII and VIII, in the natural hydrocarbon VII predominated. The acidic fraction on esterification, followed by sapon. of the fraction b_{23} 100–45° and oxidation of the acid with NaOBr yields α-methylglutaric acid and some succinic acid. *l*-β-Curcumene (IX), regenerated from the tri-HCl salt, b_{19} 142°, d_{25}^{25} 0.8670, n_D^{25} 1.491, α_{5461} −48.2°; on catalytic reduction 2 double bonds react rapidly (2 hrs.), whereas the 3rd requires 15 hrs.; IX with CrO_3 yields terephthalic acid. The action of O_3 showed that IX was not homogeneous, the products being HCHO, Me_2CO, a *diketone*, $AcCHMeCH_2CH_2CH_2Ac$ (whose *2,4-dinitrophenylhydrazone*, orange, m. 178–80°), some Me levulinate, and the degradation products of I. I is not attacked by SeO_2 in EtOH at 40–50°; IX gives a mixt. of X and *l*-β-*curcumenol*, b_{17} 175°, d_{20}^{20} 0.9563, n_D^{20} 1.5164, α_D 39°, isolated as the liquid H phthalate; the *p-xenylurethan* m. 79–80°; oxidation gives X. *l*-β-Curcumenal (X), b_{17} 175°, d_{20}^{20} 0.9644, n_D^{20} 1.5331, α_{5461} −74.1°, was isolated as the *semicarbazone* (XI), m. 199°, $[\alpha]_D$ −77.8° ($CHCl_3$, *c* 4.5); 3.9 g. of XI gives only 8 g. X. X is somewhat unstable and after digestion with H_2O no longer gives cryst. derivs.; the *2,4-dinitrophenylhydrazone*, orange, m. 139°, $[\alpha]_D$ −145.4° ($CHCl_3$, *c* 3.4); *nitroguanylhydrazine*, m. 151°, $[\alpha]_D$ −86.1° ($CHCl_3$, *c* 3.1); *oxime* (XII), b_4 170–5°, d_{20}^{20} 0.9851, n_D^{20} 1.5324, α_D −67°. Heating XII with Ac_2O or AcONa for 2 hrs. on the water bath gives *β-curcumenonitrile*, b_{17} 178–82°. EtOH and KOH (48 hrs.) give β-curcumenylic acid, whose *Me ester* b_{16} 180–2°; *anilide*, m. 87°. IX is believed to be $CH_2.CR.CH.CH_2.$-$CMe{:}CH$, where R is $CHMeCH_2CH_2CH_2CMe{:}CH_2$ or $CHMeCH_2CH_2CH_2{:}CMe_2$. C. J. West

Phellandrene nitrosites. II. The α- and the β-nitrosite of *d*-α-phellandrene. P. A. Berry, A. Killen Macbeth and T. B. Swanson. *J. Chem. Soc.* **1939**, 1418–21; cf. *C. A.* **33**, 4222⁸.—*d*-α-Phellandrene (I), b_{11} 53°, n_D^{20} 1.4729, d_{20}^{20} 0.8475, α_D 72.5°, $[\alpha]_D^{20}$ 85.5°, was used in this study. I was transformed into the nitrosite (II) as in part I. After 1 hr. it was filtered, washed with EtOH and H_2O, pressed and stirred with CS_2 to a thin cream, boiled and filtered. Crude β-II was recovered from the filtrate by diln. with MeOH. The residue was stirred into boiling $CHCl_3$ and after addn. of MeOH was allowed to stand in the refrigerator for a few hrs. (ppt. A). The filtrate gives β-II, m. 100°, $[\alpha]_D^{20}$ 198.3° ($CHCl_3$, *c* 1.5). Repeated soln. of ppt. A in $CHCl_3$ and diln. with MeOH gives α-II, m. 117°, $[\alpha]_D^{20}$ −133.8° ($CHCl_3$, *c* 1.265), −168.4° (Me_2CO, *c* 1.253), −217° (C_6H_6, *c* 1.255). Refluxing β-II in Me_2CO for 5 min. gives α-II. The mutarotation of α- and β-II in C_6H_6, Me_2CO, $CHCl_3$ and 0.1 *N* piperidine in $CHCl_3$ is reported, some curves being given. C. J. West

Synthetic investigations in bicyclic terpenes. P. C. Guha. *Proc. Natl. Inst. Sci. India* **5**, 217–33(1939).—A review of syntheses in the pinane (ketonopinone), pinocamphone, pinic acid, pinonic acid, nopinone), thujane, carane and camphane groups. C. J. West

The stereochemistry of pinane and its derivatives. K. Ganapati. *J. Indian Inst. Sci.* **22A**, 155–69(1939).—A discussion of the isomerism of pinane and related compds. in the light of the Sachse-Mohr theory, and of the bearing of this isomerism and of ring strain upon the chem. properties. G. R. Yohe

The action of acetic acid on camphene in the presence of boroacetic acid anhydride or acetic anhydride and boric trioxide. Minoru Imoto. *J. Soc. Chem. Ind., Japan* **42**, Suppl. Binding 267–8(1939); cf. *C. A.* **33**, 8593⁸.—Equil. at 110–20° for camphene + acetic acid ⇌ isoborneol acetate occurs when approx. 67–69% of ester is present, the equil. concns. being approached from each side, with $B(OAc)_3$ or Ac_2O and B_2O_3 as catalyst. From camphene with $[\alpha]_D^{15}$ 5.47° in alc., the ester was obtained with $[\alpha]_D^{15}$ varying from −1.87° to −9.60°, from which, on sapon., isoborneol was obtained with $[\alpha]_D^{15}$ varying from ± 0° to −0.59° (in alc.). Addn. of H_2SO_4 to the reaction system at 50–60° increases the yield of ester. Thus 136 g. camphene, 120 g. of 99% HOAc, 20 g. Ac_2O and 1.9 g. B_2O_3 at 110–20° for 14 hrs. gave 63% ester; further addn. of 12 g. of 80% H_2SO_4 to the reaction mixt. at 50–60° for 3 hrs. resulted in a 95.2% total yield of ester. George Ayers

Thujone series. III. Chemistry of sabina ketone. Andrew G. Short and John Read. *J. Chem. Soc.* **1939**, 1415–18; cf. *C. A.* **33**, 6817².—Oil of savin (150 g.) gives 45 g. *d*-sabinene (I); oxidation of 25 g. I with alk. $KMnO_4$ gives 40 g. Na sabinenate; further oxidation with acid $KMnO_4$ gives 65% of sabina ketone (II); pure *l*-II from the oxidation of III, b_{11} 97.5°, n_D^{25} 1.4672, d_4^{25} 0.9195, $\alpha_D^{15.6}$ −19.8°, $[\alpha]_D^{15}$ −34.2° (EtOH, *c* 2), $[R_L]_D$ 40.38 (calcd. 39.51); *semicarbazone*, amorphous, m. 135–7°, $[\alpha]_D^{15}$ 137.5° (MeOH, *c* 1); *2,4-dinitrophenylhydrazone*, orange, m. 124.5°, $[\alpha]_D^{15}$ 135.2° ($CHCl_3$, *c* 1). The rotatory power of II is not appreciably affected by EtOH-EtONa; hot aq.-alc. H_2SO_4 gives 4-isopropyl-2-cyclohexen-1-one. II is incompletely reduced by (iso-PrO)$_3$Al in iso-PrOH; Na in EtOH gives a mixt. of *sabina ketols* (III); crystn. of the *p*-nitrobenzoate from MeOH gives the pure *ester*, m. 89.5°, α_D^{15} 94.5° ($CHCl_3$, *c* 1), of *d*-α-III, b_{16} 100°, d_4^{25} 0.9397, n_D^{25} 1.4670, α_D^{15} 80.84°, $[\alpha]_D^{15}$ 90.6° (EtOH, *c* 1.2), $[R_L]_D$ 41.36 (calcd. 40.85); *3,5-dinitrobenzoate*, m. 70.5°, $[\alpha]_D^{20}$ 81.5° ($CHCl_3$, *c* 6). Catalytic reduction of II gives a product with more of β-III but it could not be isolated pure. Heating II with HCO_2NH_4 at 200° for 3 hrs. gives a mixt. of α- and β-*sabinaketylamines*, $b_{19.5}$ 63–4°, n_D^{20} 1.4705, α_D^{15} 43.8°; crystn. from MeOH gives a *p-nitrobenzoate*, m. 141°, α_D^{15} 84° ($CHCl_3$, *c* 1); *HCl salt*, m. 225° (decompn.), $[\alpha]_D^{15}$ 36.1° (H_2O, *c* 0.8); the portion nonvolatile with steam may be disabinaketylamine, $b_{9.6}$ 166–7°, $n_D^{15.6}$ 1.4987, $[\alpha]_D^{15}$ 60.6° ($CHCl_3$, *c* 1.2). II may be regarded

as a link between 2 important natural groups of substances, of which the thujones and the phellandrenes, severally, are representatives. C. J. West

Reactions of α,β-unsaturated cyclic aldehydes and ketones. V. *dl*-Cryptone and *cis*- and *trans-dl*-cryptol. D. T. C. Gillespie and A. Killen Macbeth. *J. Chem. Soc.* **1939**, 1531–4; cf. *C. A.* **33**, 3360².—*l*-Cryptone (200 g.), α_D −61°, 200 cc. Et_2O and 10 g. concd. HCl, heated for 1.5 hrs. and the HCl removed by 1% Na_2CO_3, give 87% of *dl*-cryptone (I), $b_{2.8}$ 78°, n_D^{25} 1.4810, d_{20}^{20} 0.9393; *semicarbazone*, m. 188°; *p-nitrophenylhydrazone*, yellow, m. 169–1°; *2,4-dinitrophenylhydrazone*, deep orange-red, m. 130–1°. Reduction of I with $(iso\text{-}PrO)_3Al$ in iso-PrOH gives 88% of crude *trans-dl*-cryptol (II), purified through the *p-nitrobenzoate* (III), pale yellow, m. 76.5°, II b_4 90°, n_D^{25} 1.4761, d_{20}^{20} 0.9247; the configuration of II follows from its reduction to the dihydro deriv. (α-naphthylurethan, m. 157.8°). II yields an *α-naphthylurethan*, m. 136°, and a *phenylurethan*, m. 108°. The *H phthalate* m. 97–7.5° and the *3,5-dinitrobenzoate* m. 106° (*α-naphthylamine salt*, orange, m. 140°). The mother liquor from III contains *cis-dl*-cryptol (IV), which was isolated in small yield by the tedious fractionation of the α-$C_{10}H_7NH_2$ salt of the 3,5-dinitrobenzoate. IV b_6 86°, n_D^{25} 1.4752, d_{20}^{20} 0.9282; *3,5-dinitrobenzoate*, m. 96.5° (*α-naphthylamine salt*, deep orange-red, m. 102–4°); reduction gives the dihydro deriv. (α-naphthylurethan, m. 112–13°). IV yields an *α-naphthylurethan*, m. 105.5°; the *p-nitrobenzoate* m. 34.5–5.5°. Iso-PrOH for Pondorf reduction is kept over quicklime and before use it is refluxed with Ca for 2 hrs., distd. into a flask contg. some $(iso\text{-}PrO)_3Al$ and then into a perfectly dry receiver. This iso-PrOH dissolves Al foil (dusted with a little $HgCl_2$) on refluxing for 20–30 min. C. J. West

Constituents of Herba gratiola officinalis (hedge hyssop). I. Kurt Maurer, Karl Meier and Georg Reiff.* *Ber.* **72B**, 1870–3(1939); cf. Retzlaff, *Arch. Pharm.* **240**, 561(1902).—Retzlaff's gratiolone (I) has been prepd. in pure form and the glucoside, gratiolin, has been isolated and its glucosidic nature confirmed. Extn. of 2 kg. of the powd. drug gave 14 g. ext. which, after exhaustive extn. with petr. ether and repeated crystn. of the residue from MeOH with animal charcoal, yielded 5 g. I, $C_{30}H_{48}O_3$, m. 311–12°, sublimes at 240–60° under 15 mm., mol. wt. 454–6 (Rast), 452–7 (titration in MeOH with alc. KOH), $[\alpha]_D^{25}$ 5.7° (pyridine). Two of its O atoms are in a CO_2H group; the alkali salts have a great tendency to gelatinize and their solns. accordingly foam strongly. The 3rd O atom is in an alc. grouping; I can be acetylated under the most varied conditions, forming a cryst. *acetate*, m. 268°, $[\alpha]_D^{25}$ 20.4° ($CHCl_3$). *Me ester*, prepd. with CH_2N_2 in ether, m. 220°, $[\alpha]_D^{25}$ 5.0° ($CHCl_3$), forms an *acetate*, m. 197°. I is therefore a *hydroxycarboxylic acid*, $C_{29}H_{46}(OH)$-CO_2H, apparently of the triterpene group. With $C(NO_2)_4$ in $CHCl_3$ it gives an intense-yellow color and on titration with BzO_2H it uses up exactly 1 atom O. In CCl_4 it absorbs 1 mol. Br with liberation of HBr; the cryst. *product*, $C_{30}H_{47}O_3Br$, m. 257°, is a bromo lactone; it no longer shows acid properties, regenerates I with Zn dust in boiling acetone and no longer gives a color with $C(NO_2)_4$ but still contains the HO grouping, for it forms an *acetate*, m. 186°, $[\alpha]_D^{25}$ 12.5° ($CHCl_3$); alc. KOH hydrolyzes it to a Br-free *compd.*, m. 239° (decompn.), and CrO_3-AcOH oxidizes it to the *ketone*, m. 232°, characterized as the *oxime*, C_{30}-$H_{46}O_3NBr$, m. 188°, $[\alpha]_D^{25}$ −5.5° ($CHCl_3$). C. A. R.

Question of intramolecular asymmetric induction. Alex. McKenzie and Alex. D. Wood. *J. Chem. Soc.* **1939**, 1536–44.—Kuhn and Albrecht (*C. A.* **21**, 2892) found that the quinine salt of 4,4′-dinitrodiphenic acid (I) results in 80% yield and that it is strongly *d*-rotatory, giving $[\alpha]_{5893}$ 108° in $CHCl_3$, whereas quinine itself has $[\alpha]_{5893}$ −177°; the salt was regarded as a homogeneous salt of the activated acid and when the quinine was eliminated from the salt, racemization was supposed to take place owing to the removal of groups which acted as obstacles to the free rotation of the C_6H_6 nuclei. From the following study it is seen that the esters were all *l*-rotatory in the solvents chosen and that there was no evidence that intramol. asym. induction of I had occurred under the directing influence of the optically active menthyl and bornyl groups. The conclusion is drawn that Kuhn's suggestion of "asym. rearrangement of the 1st order" with I under the influence of quinine must remain an open question in the meantime. I (10 g.) and (−)-menthol, heated at 130° for 13 hrs., HCl being passed in at intervals, give 4 g. of the (−)-*monomenthyl ester* (II), amorphous, m. 166–7°, and a small quantity of the (−)-dimenthyl ester (III), amorphous, m. 61–2°. On heating 27 hrs., 11 g. I gives 5.7 g. of II and 3.1 g. of III; III also results from the chloride of I or II and (−)-menthol. Values are given for $[\alpha]_D^{25}$ and $[\alpha]_{5461}^{20}$: I −55.8°, −63° (EtOH, *c* 1.04); −58.4°, −64.3° ($CHCl_3$, *c* 0.6768); −59.4°, −65.2° (C_6H_6, *c* 0.598). II —, −89.8° (EtOH, *c* 0.8964); −74°, —(EtOH, *c* 0.5676); −78.3°, −95.4° ($CHCl_3$, *c* 0.734); −83.6°, −96.3° (C_6H_6, *c* 0.8868). (−)-Menthyl *m*-nitrobenzoate, −81.3°, −95.2° (EtOH, *c* 1.4024); −83.7°, −99.2° ($CHCl_3$, *c* 1.5224); −86.7°, −101.4° (C_6H_6, *c* 2.0815). (−)-Dimenthyl phthalate, −96.9°, −119.0° (EtOH, *c* 0.5212); −95.4°, −113.8° ($CHCl_3$, *c* 1.6032); −95.9°, −(C_6H_6, *c* 1.9815). I (16 g.) and (−)-borneol, heated 18 hrs. at 165–75°, give 10.9 g. of (−)-*dibornyl ester* (IV), m. 201–2°, −40°, −48.1° (Me_2CO, *c* 1.434); −46.9°, −56.3° (EtOH, *c* 0.2132); −41.5°, −48° ($CHCl_3$, *c* 1); −32.8°, −41.3° (C_6H_6, 0.533). Partial sapon. of IV with KOH in aq. EtOH gives (−)-*monobornyl ester* (V), amorphous, m. 178–9°, −28.9°, −33.8° ($CHCl_3$, *c* 2.1292); −25°, −29.6° (C_6H_6, *c* 1.62). (−)-*Bornyl m-nitrobenzoate*, m. 76–7°, −36.1°, −43.2° (EtOH, *c* 0.7284); −36.9°, −42.5° ($CHCl_3$, *c* 1.2475); −32.7°, −(C_6H_6, *c* 2.0045). (−)-Dibornyl phthalate, m. 104–5°, −82.9°, −97.1° (EtOH, *c* 0.4582); −67.8°, −80.8° ($CHCl_3$, *c* 2); −64.5°, −(C_6H_6, *c* 2.1695). I and cinchonine in EtOH, heated 1 hr., give the cinchonidine salt, m. 220–1°, $[\alpha]_{5461}^{20}$ −185.6° ($CHCl_3$, *c* 4.025). The quinidine salt of I has $[\alpha]_D^{25.5}$ −87° ($CHCl_3$, *c* 2.1325). The acid quinine salt of I m. 195–6°, $[\alpha]_D^{25.7}$ 46.6°, $[\alpha]_{5461}^{20}$ 55.5° (EtOH-$CHCl_3$, *c* 1.0185); there is no evidence of mutarotation in 10 days. I (8 g.) and 18.4 g. of quinine in 360 cc. EtOH give 21.6 g. of a salt, m. 229–31° (decompn.), $[\alpha]_D^{25}$ 102.4°, $[\alpha]_{5461}^{21}$ 119.6° ($CHCl_3$, *c* 1.998); crystn. 3 times from C_6H_6 gives $[\alpha]_D^{25}$ 85.2° ($CHCl_3$, *c* 2.001); the mother liquor gives 1.5 g. of a salt m. 226–7°, (decompn.), $[\alpha]_D^{25}$ 108.5°, $[\alpha]_{5461}^{20}$ 128.5° ($CHCl_3$, *c* 2.0084); on recrystn. from C_6H_6-$CHCl_3$ the salt seps. with 2 moles of C_6H_6; the rotation of the dried salt is $[\alpha]_D^{25}$ 101° ($CHCl_3$, *c* 3.02). V with $SOCl_2$ gives the *acid chloride*, m. 48–9°; with (+)-borneol there results (+)-*bornyl*(−)-*bornyl 4,4′-dinitrodiphenate*, m. 212–13°; the *dl*-dibornyl ester of I m. 200–1°. C. J. West

Certain therapeutically important triphenylmethane dyestuffs. Mieczysław Dominikiewicz. *Arch. Chem. Farm.* **4**, 58–68(in German, 68)(1939).—Syntheses of several triphenylmethane dyestuffs from guaiacol and vanillin, guetol (Et analog of guaiacol) and bourbonal (Et analog of vanillin), guaiacol and bourbonal, as well as guetol and vanillin, are described. By condensation of the above-named constituents the corresponding triphenylmethanes or fuchsones (dyestuffs) are formed. By reduction of the dyestuffs, triphenylmethanes are formed, and vice versa, by oxidation of the latter the dyestuffs are obtained. From guaiacol and vanillin the following compds. were synthesized: triguaiacylmethane, [4,3-HO(MeO)C_6H_3]$_3$CH (I), brick-red or orange amorphous ppt., m. 88–90°, sol. in alkalies as well as in EtOH and in EtOAc, almost insol. in Et_2O; triguaiacylmethyl chloride (II), a water-sol. compd. of brown-red color, with a metallic luster, m. 198–201° (decompn.); and triguaiacylcarbinol (III), brown-red crystals from EtOAc, m. about 235°, which on soln. in NaOH forms the dyestuff (fuchsone) proper, [HO(MeO)C_6H_3]$_2$C·C_6H_3(OMe):O (IV). IV has been introduced recently (under the trade name Rubofrene) as a remedy for skin and bone tuberculosis; it is used in the form of the dyestuff proper or in the form of its additive compd. (V) with Na_2SO_3, which also was synthesized. V is perfectly sol. in water with a slightly

orange color, which gradually changes to red. In a series of syntheses and transformations, similar to those above mentioned, the following compds. were obtained: from bourbonal and guetol, triguetylmethane, [4,3-HO(EtO)-$C_6H_3]_3CH$ (VI), and the corresponding carbinol; from guaiacol and bourbonal, diguaiacylguetylmethane, [HO-(MeO)$C_6H_3]_2CHC_6H_3$(OEt)OH, (VII) and the corresponding carbinol; from guetol and vanillin, diguetylguaiacylmethane (VIII) and the corresponding carbinol. All these compds. have very similar properties and their therapeutic effects are probably also very similar. E. A. A.

Thio compounds derived from *o*-aroylbenzoic acids. John O'Brochta and Alexander Lowy. *J. Am. Chem. Soc.* **61**, 2765-8(1939).—*o*-$BzC_6H_4CO_2H$ (I) (20 g.) and 20 g. P_2S_5 in 700 cc. C_6H_6, refluxed 25 hrs., give 11 g. of *3,3'-diphenyldiphthalidyl sulfide* (II), m. 241°; II also results in 5-g. yield by heating 10 g. I and 10 g. P_2S_5 at 115° for 1 hr. and in 60-g. yield from the chloride from 100 g. I in 400 cc. C_6H_6 by passing H_2S through the boiling soln. until evolution of HCl ceases. NaOH fission of II gives a pos. test for S^{++}; refluxing with 5% EtOH-KOH gives I, the S being eliminated as H_2S. H_2SO_4 gives anthraquinone. Oxidation with CrO_3 or HNO_3 gives I and 30% H_2O_2 gives I and phenylphthalide (III); boiling with $Pb(OAc)_4$ gives PbS and I; reactions with $PhNH_2$, PhOH and $PhNHNH_2$ yield compds. obtained from I and these reagents. Refluxing II and Cu dust in cymene for 3 hrs. gives 3,3'-diphenylbiphthalidyl. With $AlCl_3$ in C_6H_6 II gives *thiodiphenylphthalide*, m. 162°, III being recovered from the mother liquors. P_2S_5 gives dithiodi(phenylphthalide). Addn. of 50 g. P_2S_5 to 50 g. I in boiling xylene and refluxing 4 hrs. gives, after a complex purification, 7 g. of *2-phenyl-3,4-benzothiophene* (IV), reddish brown, m. 236–7°, which is not hydrolyzed by EtOH-NaOH and is unchanged by heating with Cu in Ph_2 or by Na or HgO in xylene. *o*-(*p*-$MeC_6H_4CO)C_6H_4CO_2H$ gives 30% of *3,3'-di(p-tolyl)diphthalidyl sulfide*, m. 212°; the acid chloride and H_2S give 60%; *(p-chlorophenyl)analog*, m. 232°, 40% with P_2S_5 or 68% with the acid chloride and H_2S. *p-Tolyl analog* of IV, m. 217°, 28%; *p-chlorophenyl analog*, m. 241–2°, 12%. *p-Chlorophenylphthalide*, m. 124°, 50% yield. C. J. West

Reactive methylene groups and nitroso compounds. Abnormal action of acids on 1,2,3-triketones. Alexander Schönberg and Raymond C. Azzam. *J. Chem. Soc.* **1939**, 1428-30; cf. *C. A.* **31**, 4286[6].—Further examples of the formation of anil oxides by the action of PhNO and its derivs. on methylene ketones are reported. The substance hitherto known as $PhC(:NC_6H_4NMe_2)Bz$ is in fact the corresponding *anil oxide* (I). Desoxybenzoin (4 g.) and *p*-$ONC_6H_4NMe_2$ (II) in abs. EtOH and piperidine, heated 3 hrs. on the steam bath and kept 24 hrs. at 0°, give 3.6 g. of I, red, m. 165–6°, and *benzil-p-dimethylaminoanil* (III), orange-red, m. 137–8°. Hydrolysis of I or III with H_2SO_4 in AcOH gives benzil (IV). CH_2Br_2 (V) (3.4 g.) and PhNO in abs. EtOH, heated 20–30 min. on the steam bath, give 2.2 g. of *diphenyl triketone β-anil oxide*, yellow, m. 144–5° (decompn.); hydrolysis with H_2SO_4 gives IV. V and II give the *β-p-dimethylaminoanil oxide*, dark red, m. 183–5° (decompn.). *p*-$MeC_6H_4CO-CH_2Bz$ and PhNO give *1'h p-tolyl triketone β-anil oxide*, light yellow, m. 141–3° (from C_6H_6), or canary-yellow needles, m. 132–4° (from petr. ether). $COBr_2$ and H_3PO_4 in AcOH give benzoin (VI); H_2SO_4 gives IV; VI with H_2SO_4 is oxidized to IV. Bz_2CO and $AlCl_3$, heated 1 hr. at 100°, also give IV. Triketohydrindene hydrate(ninhydrin) and concd. H_2SO_4 give bisindandione. C. J. West

Evidence for a skew structure of benzil. C. C. Caldwell and R. J. W. Le Fèvre. *J. Chem. Soc.* **1939**, 1614–22; cf. *C. A.* **33**, 5248[1].—The suggestion is made that the stable configuration of benzil (I) in nonpolar solvents is 1 in which the ketonic groups, with their appropriate bonds, are effectively situated in, or make rotational oscillations of low amplitude about, 2 planes which are roughly mutually perpendicular. The evidence consists in the value of the dipole moment of I, the fact that this shows no greater dependence upon solvent than does the corresponding value for phenanthraquinone (II) and the observations that the moment is const. throughout a temp. range of 65° in decalin or 25° in C_6H_6 or CCl_4. Other explanations of these data are discussed and rejected. Such a *skew* structure could arise if the dominant forces setting the shape of the mole were superimposed dipolar repulsions between the C.O moments and steric repulsions between the Ph groups and O atoms (tending to a trans-cis structure). Compatibly with such a view Ac_2 (in which dipolar repulsions should be much the same as, but the van der Waals attractions weaker than, in I) appears to be either much more flexible or more trans in type. The following values are given: for I, hexane 3.4_9, decalin 3.3_3, dioxane 3.7_8, CCl_4 3.6_0, C_6H_6 3.7_8, CS_2 3.4_4, $CHCl_3$ 3.2_1; for II, dioxane 5.66, C_6H_6 5.5_7, CS_2 5.5_0, $CHCl_3$ 4.7_1; for acenaphthaquinone in C_6H_6 6.0_8. Values for I in decalin: 25° 3.33, 50° 3.31, 70° 3.34, 90° 3.3_4; in C_6H_6 at 25° 3.76, 50° 3.6_8. Ac_2 in C_6H_6 1.84. C. J. West

1,5-Dimethylnaphthalene in coal tar. Otto Kruber and Alfred Marx. *Ber.* **72B**, 1970–1(1939).—There had thus far been isolated from the 260–70° fraction of coal-tar heavy oil 1,6-, 2,6-, 2,7-, 2,3-, 1,2- and 1,7-dimethylnaphthalenes (*C. A.* **30**, 6535[5], and earlier papers). A 7th of the 10 possible isomers, viz., the 1,5-di-Me compd. (I), has now been obtained. It always accompanies the 2,3-isomer (II), which it greatly resembles. II is obtained by chilling appropriate fractions of the heavy oil. Some of these well-chilled, entirely liquid fractions were fractionally sulfonated. From the first and middle sulfonation fractions considerable amts. of the 1,6- and 1,7-isomers of I were obtained. The last sulfone acids, which could no longer be made to crystallize, were salted out with KCl and the K salts, after crystn. from water, were decompd. with superheated steam. In this way I was obtained as needles from alc., m. 82°, b_{761} 265–5.5° (picrate, golden yellow, m. 140°); yield, 25 g. from 7 kg. of a heavy-oil neutral fraction, b. 265 8°, which had to a great extent been freed from II by repeated fractionation and chilling and was then washed with 1 kg. of 92% H_2SO_4 to remove the acenaphthene and fractionally sulfonated with 1-kg. portions of $H_2SO_4.H_2O$ at 45°. The oil which remained unsulfonated (about 4%) was stable even toward oleum (15% SO_3). It had a pronounced paraffin odor and a markedly higher b. p. (281–7°) than the original material and showed d_{15} 0.836, n_D^{25} 1.46702, C 86.15%, H 13.93%. C. A. R.

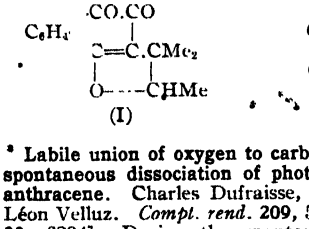
The trimethylnaphthalenes in coal tar. Otto Kruber. *Ber.* **72B**, 1972–7(1939).- The 280-90° fraction of coal-tar heavy oil on cooling to room temp. deposits considerable amts. of "mixed crystals" consisting chiefly of acenaphthene, diphenylene oxide and fluorene (*C. A.* **26**, 5936). Further fractionation and chilling of the oily portion gives more mixed crystals until finally there remains 1/4 or 1/6 of the original material as a "true oil," b. 280–90°. In this oil there has been found a class of compds. entirely new in coal tar, viz., trimethylnaphthalenes, consisting of a mixt. of solids and liquids which, when together, remain liquid when chilled. Of the 14 possible isomers, 2 have been identified and isolated in pure form: the 2,3,6- (I) and the 1,3,7-isomer (II). The total trimethylnaphthalenes constitute hardly more than 0.1% of the coal tar but in spite of this they are, in their boiling range, of extraordinary importance from a tech. standpoint as liquefiers of solids, i. e. as new formers of tar oil. The starting material was 3.4 tons of a partially cryst. heavy-oil fraction (representing 1.6% of the total tar), b. 275–95°, contg. 4% acid and 6% basic components. Washing with dil. alkali and acid, centrifugation of the mixed crystals and fractionation of the liquid portion *in vacuo* through a long Raschig column gave 800 kg. of a fraction b. 283–8°, again permeated with crystals, from which, on repeating the process, was obtained 320 kg. of a fraction (III) remaining liquid. The chief impurity which accompanied I and remained in it in considerable amts. even after repeated chilling was diphenylene oxide (IV). To remove it III was heated 3–4 hrs. with an equal wt. of KOH at 270–5°, leaving 260 kg. oil (V) consisting chiefly of trimethylnaphthalenes. V on refractionation gave

about 100 kg. of a fraction, b. 285–91°, which, on standing 12–15 hrs. at −15°, deposited 13.5 kg. crystals; recrystn. from 6 parts alc. yielded 7 kg. I, m. 102°, b_{762} 286°; picrate, m. 130°. Oxidation of I with CrO_3 gave a mixt. of 2,3,6-trimethyl-1,4- and -5,8-naphthoquinones, m. 103° and 72–3°, sepd. by crystn., which with $KMnO_4$ yielded, resp., trimellitic acid, m. 221–3°, and an acid, m. 202–4° (foaming), having the compn., $C_{11}H_{10}O_5$, of *1,2-dimethyl-4,5-phthalonic acid* (from the aq. mother liquor of the latter was isolated pyromellitic acid, m. (anhyd.) 273°). The purification of II was much more difficult. The sulfonic acids of the trimethylnaphthalenes crystallize much more difficultly than those of the di-Me compds. After repeated repptns. of solid deposits from individual sulfonation fractions there were obtained cryst. fractions of quite homogeneous appearance but decompn. with steam almost always gave mixts. of oily isomers with solid I, IV or homologous biphenyls. A 281–5° fraction (6.6 kg.) was sulfonated 9 successive times 4–5 hrs. with stirring at 45° with 750 g. of 92% H_2SO_4 dropped in slowly. The 3rd–9th runs, after standing several days in the cold, deposited solid acids whose Na salts, recrystd. 3 times, gave with superheated steam in the presence of 70% H_2SO_4 335 g. hydrocarbon, from which, through the orange picrate, m. 144°, was obtained 110 g. II, b_{764} 280°, b_{15} 148–50°, d_4^{20} 1.007, n_D^{20} 1.57589, solidifies 13.5°. The Na salt of the sulfonic acid was not reduced by Na-Hg on the water bath; fused with 5 parts KOH and 1 part water, it yielded *1,3,7-trimethyl-6-naphthol*, m. 95–6°, which coupled with PhN_2Cl to a cherry-red *o-hydroxyazo dye*, insol. in cold dil. alkali, and sepg. from AcOEt in dark-red needles, m. 142°. This was reduced in AcOH with $SnCl_2$-HCl to the yellowish white aminonaphthol-HCl which with CrO_3-H_2SO_4 yielded the brownish *1,3,7-trimethyl-5,6-naphthoquinone*, m. 154–5°, oxidized by $KMnO_4$ to 3,5-dimethylphthalic acid, m. 181°. Oxidation of II with CrO_3-AcOH, on the other hand, gave, in small yield (0.2 g. from 2 g. II), the *5,8-quinone*, light yellow needles of penetrating odor, m. 136–7°. All attempts to increase the yield were unsuccessful; the chief product was always a resinous residue (1 g.) remaining after the steam distn. of the ether ext. and sepg. from AcOH in yellowish prisms, m. 183°, mol. wt. 320 (Rast), having the compn. (C 91.86, H 7.63%) of a *hexamethylbinaphthyl*. C. A. R.

The constitution and synthesis of vitamin K_1. E. W. MacCorquodale, L. C. Cheney, S. B. Binkley, W. F. Holcomb, R. W. McKee, Sidney A. Thayer and Edward A. Doisy. *J. Biol. Chem.* **131**, 357-70(1939); cf. *C. A.* **33**, 8602[6], 8718[4].—The constitution of vitamin K_1 as 2-methyl-3-phytyl-1,4-naphthoquinone has been proved by a study of its reactions and degradation products and confirmed by synthesis. Phytyl bromide was condensed with the mono-Na salt of 2-methyl-1,4-naphthoquinone and the vitamin was isolated in the pure condition as the diacetyldihydro deriv. The synthetic compd. gave the same degradation products as the natural vitamin by the same methods. A. P. Lothrop

The isolation of vitamin K_2. R. W. McKee, S. B. Binkley, Sidney A. Thayer, D. W. MacCorquodale and Edward A. Doisy. *J. Biol. Chem.* **131**, 327–44(1939); cf. *C. A.* **33**, 5461[3].—Vitamin K_2 has been isolated in pure form from putrefied com. sardine meal by the use of Decalso and Permutit and by recrystn. from various solvents. Its activity is approx. 600 units per mg. Reductive acetylation converts it to the diacetate of dihydrovitamin K_2 which has a potency 1/2 that of the vitamin. While it is not yet possible to decide definitely upon a formula for the vitamin, the evidence indicates that it is a 2,3-disubstituted 1,4-naphthoquinone with 6 double bonds in the side chains. *Vitamin K_2* m. 53.5–54.5°; *diacetate* of *dihydrovitamin K_2*, m. 59.5–60°. A detailed account of the process of isolation is presented to give other workers sufficient information for prepg. the cryst. vitamin. **The ultraviolet absorption of vitamins K_1, K_2 and some related compounds.** D. T. Ewing, J. M. Vandenbelt and Oliver Kamm. *Ibid.* 345–56.—Ultraviolet absorption studies indicate that vitamins K_1 and K_2 are derivs. of 2,3-dimethylnaphthaquinone and that the side chains do not contain conjugated double bonds. A. P. Lothrop

Dunnione. I. J. R. Price and Robert Robinson. *J. Chem. Soc.* **1939**, 1522–9.—The orange-red deposits on the leaves, stems and flowers of *Streptocarpus dunnii* Mast. yield an orange pigment termed *dunnione* (I). I is extd. with H_2O at room temp. (5–10 times, each for 24–48 hrs.) and removed from the aq. soln. by C_6H_6; the residue is dissolved in EtOH, added to half-satd. $NaHSO_3$, filtered, pptd. with Na_2CO_3, extd. with C_6H_6 and crystd. from petr. ether; 1 leaf yields 0.5–2 g. I. I, $C_{15}H_{14}O_3$, orange-red, m. 98–9°, $[\alpha]_D^{18}$ 310° ($CHCl_3$, *c* 4.163). I is recovered unchanged after heating with concd. H_2SO_4 at 100° for 1 hr. *Semicarbazone*, yellow, m. 232–3°; *2,4-dinitrophenylhydrazone*, orange-red, m. 266–8°. Reduction gives a colorless soln., the color returning on shaking in air; reductive acetylation yields *diacetyldihydrodunnione*, m. 143–4°, $[\alpha]_D^{15}$ 16.7° ($CHCl_3$, *c* 3.236). These reactions suggest an *o*-quinone structure, which is confirmed by the reaction with *o*-$C_6H_4(NH_2)_2$; the *phenazine*, $C_{21}H_{18}ON_2$, yellow, m. 140–1°; the yellow EtOH or Me_2CO soln. has a strong green fluorescence; mineral acid solns. are deep red. I dissolves slowly in cold alkali to a red soln. similar in color to that of lapachol (II) or hydroxyhydrolapachol; the behavior on extn. with org. solvents is the same as that of II; acidification regenerates I. Heating I in lots of 0.2–0.5 g. in 10% NaOH until the red color disappears gives *allodunnione* (III), yellow, m. 161–2°; it is insol. in cold aq. $NaHSO_3$, does not condense with *o*-$C_6H_4(NH_2)_2$ and cannot be acetylated; *2,4-dinitrophenylhydrazone*, yellow-orange, m. 315° (decompn.). On keeping I with 5% NaOH at room temp. for 2 days, a part forms a red soln. and a part changes to a yellow solid; shaking with C_6H_6, washing with 1% HCl and crystn. from petr. ether yields *α-dunnione* (IV), yellow, m. 121–2°; the alk. liquor contains III. IV also results by heating I with 20% HCl for 2 hrs.; I is unchanged on heating with HBr (d. 1.49) for 1 hr. at 70°. IV gives a brilliant-red soln. in concd. H_2SO_4 and is recovered unchanged after 2 hrs. at room temp. Boiling 5% NaOH gives III; addn. of the NaOH to IV in EtOH gives I. *2,4-Dinitrophenylhydrazone* of IV, reddish orange, m. 278 80°. Heating III at 100° with concd. H_2SO_4 for 0.5 hr. gives *β-isodunnione* (V), orange-red, m. 129–31°; it is sol. in aq. $NaHSO_3$, is sensitive to sunlight (turns brown in a few min.) and gives in aq. NaOH a red color which remains after boiling for 5 min. Heating V with 20% HCl for 0.5 hr. gives *α-isodunnione*, yellow, m. 118–19°. *α-Lapachone 2,4-dinitrophenylhydrazone*, brownish orange, m. 277–8°; *β-isomer*, orange, m. 282–5°. Oxidation of I with acid $KMnO_4$ gives $C_6H_3(CO_2H)_3$ (VI); III and H_2O_2 in AcOH also give VI. I and H_2O_2 in dil. NaOH give AcH, VI and an *acid* (VII), $C_{12}H_{12}O_4$, m. 205–6°; III gives AcH and VII. CrO_3 oxidation of I or III gives about 1.3 moles of AcOH, suggesting the presence of 1 side-Me group. The behavior on acidification of an alk. soln. of III indicates the presence in the mol. of a ring system which is opened by alkalies and closed by acids. Tentative formulas for I and III are:



(I) (III)

C. J. West

Labile union of oxygen to carbon: special study of the spontaneous dissociation of photoöxydiphenyldimethoxyanthracene. Charles Dufraisse, Léon Velluz and Mme. Léon Velluz. *Compt. rend.* **209**, 516–18(1939); cf. *C. A.* **33**, 6294[7].—During the spontaneous decompn. of the photoöxide of 9,10-diphenyl-1,4-dimethoxyanthracene the O is emitted in an active state which is not understood. Rachel Brown

Anomalous halides. V. Anomalous halides of anthanthrene and attempts to prepare monohalides of *peri*-naphthindenone. Kurt Brass and Erich Clar. *Ber.* **72B**, 1882–4(1939); cf. *C. A.* **33**, 4983[8].—As shown in the ear-

lier papers, perylene and benzanthrone form with Br and I deeply colored compds. which in their simplest compn. are unpaired (monomol.), but the fact that the compd. of benzanthrone with 1 atom of Br is diamagnetic would seem to indicate that the formula of this and possibly the other analogous compds. should be doubled. This complicates the question of their structure, for the unpaired formulation would more satisfactorily explain their high reactivity and deep color. They are provisionally designated "anomalous" halides to differentiate them from the normal halogen addn. products, to which group they certainly do not belong. The prepn. of further such anomalous halides seemed to be the best means of clearing up their structure. Anthanthrene (I) and *peri*-naphthindenone (II) have been found to behave like perylene and benzanthrone, resp., in their behavior toward Br and I. I, m. 262°, with I in boiling thiophene-free benzene gives 92% of a *triiodide*, gleaming, almost black needles, begins to sinter (evacuated tubes) at 150° and slowly melts up to 250°, when gas is evolved. In finally powd. state it slowly loses I in the air with regeneration of I. Titration in benzene suspension with aq. $Na_2S_2O_3$, a few drops of KI, I and starch paste gave 2.957–2.971 atoms I per mol. of I, and the titrated soln., after removal of the benzene with steam, yielded pure I. With 3 parts Br in benzene at 30°, I gives a deep-brown ppt. which decomps. in a few mm., becoming orange-yellow. Attempts to analyze the primary product were unsuccessful; its orange-yellow transformation product, whose Br content (Carius) was 17.72% (calcd. for a mono-Br deriv., 22.51%), contained no Br titratable with $Na_2S_2O_3$; treatment with Br in benzene no longer gave a dark ppt. The faintly yellow, rather concd. soln. of II (m. 153°) in benzene yielded with Br an orange-yellow cryst. product which, however, lost Br on filtration and washing with benzene so that titration showed only about 0.6 atom of active Br. The I compd. behaved similarly. The results so far obtained indicate that a compact arrangement of the benzene nuclei is necessary for the formation of these anomalous halides; hydrocarbons contg. hexagons with only 1 side in common do not form such compds. Compact structure alone is not sufficient, however; pyrene behaves normally while its highly condensed deriv. pyranthrone has a tendency to form an almost black addn. product with Br. C. A. R.

Condensation products of phenols and ketones. IV. *o*-Cresol with acetone. Wilson Baker and D. M. Besly. *J. Chem. Soc.* **1939**, 1421–4; cf. *C. A.* **33**, 2520[2].—Refluxing a mixt. of 100 g. *o*-MeC_6H_4OH, 250 cc. AcOH, 75 cc. Me_2CO and 190 cc. concd. HCl for 60 hrs. and purifying through the di-Ac deriv. give 22 g. *6,6'-dihydroxy-3,3,5,3',3',5'-hexamethylbis-1,1'-spirohydrindene* (I), $C_{23}H_{28}O_2$, m. 245–6° (Niederl, *C. A.* **22**, 3629; **23**, 2431, gives 245°; he termed the product di-*o*-cresylphorone and gave the formula $C_{23}H_{30}O_3$); I also results from [3,4-Me(HO)C_6H_3]$_2CMe_2$ and concd. HCl in AcOH, *o*-MeC_6H_4OH being liberated. Di-Ac deriv. of I, m. 266–7° (Sükösd, *C. A.* **27**, 1873, gives 263–4° and the formula $C_{27}H_{32}O_4$). The *di-Bz* deriv. exists as an *α-form*, transparent rhombs, m. 170–1°, or a *β-form*, opaque prisms, m. 201°; *di-p-nitrobenzoate*, pale yellow, m. 247–8°; *di-Me ether*, m. 158–9°; the last exists as prismatic needles which, when recrystd., give thick tablets. 7,7'-Di-Br deriv., m. 224° (N. gives 220°). Oxidation of I with $KMnO_4$ in AcOH gives a small quantity of phoronic anhydride. HNO_3 and I in AcOH, heated on the water bath for 1 hr., give 2 NO_2 derivs., yellow, m. 233–4° and 225° (both with decompn.), which are probably degradation products. C. J. West

The synthesis of 9,10-dialkylanthracenes. W. E. Bachmann and J. M. Chemerda. *J. Org. Chem.* **4**, 583–7 (1939); cf. *C. A.* **33**, 8604[4].—A synthesis of 9,10-dialkylanthracenes has been developed. *9,10-Dimethylanthracene* (I) is prepd. from anthrone (II) according to Barnett and Matthews (*C. A.* **20**, 2677, 3003) from 9-methylanthrone (cf. Meyer and Schlosser, *C. A.* **14**, 2925) in 15–20% yield. By the same method *9,10-dibenzylanthracene*, m. 243–5°, is obtained in 17% yield (cf. Barnett and Cooke, *C. A.* **22**, 1972). A much more satisfactory method for prepg. I is developed based on the procedure of prepn. of 9,10-dimethyl-1,2-benzanthracene (cf. *C. A.* **32**, 4978[3]). As a general procedure 10.4 g. anthraquinone (III) is placed in a Soxhlet thimble and a Grignard soln. is prepd. from 10 cc. MeI in 100 cc. Et_2O in the extn. flask. III is added to the Grignard soln. by refluxing the Et_2O on a water bath. After 2.5 days most of the III is dissolved. The Et_2O suspension of the addn. compd. is hydrolyzed, the Et_2O evapd. and the insol. product filtered and dried. It is dissolved in hot NaOH, a small amt. of III is removed by filtration and the hot MeOH soln. is treated with a soln. of NaOH and $Na_2S_2O_4$ and much H_2O. *9,10-Dimethyl-9,10-dihydroxy-9,10-dihydroanthracene* (IV) (8.5 g.) is filtered and washed with H_2O. After recrystn. from MeOH, IV m. 185–95°. When 5 g. IV in 25 cc. C_6H_6 and 25 cc. MeOH contg. 5 drops H_2SO_4 are kept at room temp. for 0.5 hr., then much H_2O is added and the benzene soln. is treated with dil. NH_4OH, 5.36 g. *9,10-dimethyl-9,10-dimethoxy-9,10-dihydroanthracene* (V), m. 197° (cf. Guyot and Stæchling, *Bull. soc. chim.* [3], **33**, 1144 (1905)), is isolated. On treating 5.36 g. V with 0.82 g. powd. Na in 30 cc. Et_2O and 30 cc. C_6H_6 by shaking the mixt. for 4 days, 2.54 g. I is obtained. From the Et_2O-C_6H_6 filtrate after treating with HCl, an addnl. 1.25 g. I is obtained. In the same way as IV, *9,10-diethyl-9,10-dihydroxy-9,10-dihydroanthracene* (VI), m. 169–71° (Clarke and Carlton, *C. A.* **6**, 611, found 175°), is prepd. Treatment of VI with MeOH and H_2SO_4 yields *9,10-diethyl-9,10-dimethoxy-9,10-dihydroanthracene* (VII), m. 179–80.5°. When VII is shaken with powd. Na in a mixt. of Et_2O and C_6H_6, *9,10-diethylanthracene*, m. 146–7°, in 95% yield, is obtained. Its *picrate* m. 128–9°. *2,9,10-Trimethyl-9,10-dihydroxy-9,10-dihydroanthracene* (VIII) is prepd. in the same way from β-methylanthraquinone. VIII m. 112 30°. It retains solvent of crystn. quite tenaciously. Methylation of VIII with MeOH and H_2SO_4 yields *2,9,10-trimethyl-9,10-dimethoxy-9,10-dihydroanthracene* (IX) m. 181.5–2.5°. When treated with powd. Na, IX gives *2,9,10-trimethylanthracene* in 85% yield. When sublimed and allowed to crystallize slowly from EtOH it m. 100–1°; when recrystd. rapidly it m. 95 6°. Its *picrate* m. 162–2.5°. F. E. Brauns

Influence of substituents in the benzanthrone nucleus on its destructive oxidation. G. Charrier. *Atti X° congr. intern° chim.* **3**, 58–64 (1939); cf. *C. A.* **33**, 2133[8].—A summary of the influence of substituents on the course of oxidation of benzanthrone and its derivs. with different oxidizing agents (e. g., $KMnO_4$, CrO_3, O, O_3). 34 references. J. C. Lo Cicero

Photoreactions. IV. Photoreaction between phenanthraquinone and aromatic aldehydes. A new passage from phenanthraquinone to fluorenone. Alexander Schönberg and Radwan Mostbacher. *J. Chem. Soc.* **1939**, 1430–2; cf. *C. A.* **30**, 2850[1].—Phenanthraquinone (I) (5 g.) and 10 g. BzH in a sealed quartz tube, kept in sunlight for 4 days, give 6.5 g. of the *phenylhydroxymethylene oxide* (II) of 9,10-dihydroxyphenanthrene (III), m. 177–8° (cf. Klinger, *Ann.* **249**, 137 (1888), who believed it to be the *O*-Bz deriv. of III); heating 0.25 hr. at 90° with HNO_3 (d. 1.30) gives I; CH_2N_2 gives the *phenylmethoxymethylene ether* of III, m. 80°. I (2 g.) and *p*-ClC_6H_4CHO give 3 g. of the *p-chlorophenylhydroxymethylene ether* (IV) of III, m. 222° (decompn.); *Me ether* (V), m. 170°. Hydrolysis of V with 20% NaOH at 40° for 0.5 hr. gives I and *p*-$ClC_6H_4CO_2Me$. Thermal decompn. of IV gives fluorenone, I, BzOH and BzH. α-Stilbenediol diacetate heated at 165° gives benzil. C. J. West

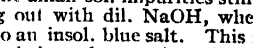
The synthesis of 2-methylphenanthrene from *l*-menthone. Ruby Murray Orcutt and Marston T. Bogert. *J. Org. Chem.* **4**, 543–7 (1939).—When methyl-1-phenethylcyclohexanols are cyclodehydrated, a Me group in position 3 on the cyclohexane nucleus causes the cyclization to occur on C atom 6 of the same nucleus (cf. *C. A.* **31**, 1296[6]; **32**, 921[2]; Kon, *C. A.* **27**, 5336). The cyclization takes place even when an iso-Pr group is attached to C atom 6. This fact is taken advantage of for the synthesis of *2-methylphenanthrene* (I) from *l*-menthone (II). II (15.4 g.) in 20 cc. dry Et_2O is added to a well-cooled

soln. of $Ph(CH_2)_2MgBr$, prepd. from 23.4 g. $Ph(CH_2)_2Br$, in 75 cc. Et_2O, stirred for 2 hrs. and kept overnight at room temp. After decompn. of the mixt. with acidified H_2O, the mixt. is extd. with Et_2O, and Et_2O soln. evapd. and the residue distd. at 2 mm. Repeated fractionation gives *1-phenethyl-3-methyl-6-isopropylcyclohexanol* (III), b_2 167-9°, in 50% yield. When 3 g. III is allowed to react with PhNCO with exclusion of moisture, carbanilide slowly seps. The residual liquid is removed with petr. ether, the soln. washed with H_2O and allowed to stand with H_2O overnight. It is then filtered, the filtrate is dried, concd. and distd. over Na. *1-Phenethyl-2-isopropyl-5-methylcyclohexene* (IV) (2.7 g.), b_4 145°, is obtained. IV is highly unsatd. and is not cyclized when it is shaken in petr. ether 3 times with cold 90% H_2SO_4. With concd. H_2SO_4, IV is rearranged and *2-methyl-12-isopropyl-1,2,3,-4,9,10,11,12-octahydrophenanthrene* (V) is formed in nearly quant. yield. Distd over Na, V b_2 123–7°. Dehydrogenation of V by successive addn. of 15 g. Se to 7 g. V at 345 65° for a total of 50 hrs. gives on extn. with EtOH and treating the ext. with Norit, a soln. from which, on standing, a dark oil seps. This is sepd. into 2 fractions, one (VI), 3 g., b_3 185–55°, the other (VII) b_3 155–60°. From VII, 2 g. I, m. 56°, crystallizes (cf. Haworth, *C. A.* 26, 3503; Sengupta, *C. A.* 33, 3370[3]). VI when retreated with Se gives another 0.8 g. I. The picrate of I m. 117.5–18.5° (cor.). Oxidation of 2 g. V in 20 cc. AcOH with 10 g. Cr_2O_3 in 10 cc. AcOH and 10 cc. H_2O added in 5 successive portions yields about 1 g. *2-methyl-12-isopropyl-1,2,3,4,11,12-hexahydrophenanthraquinone* (VIII), m. 151°, as yellow needles which are immediately decolorized by $Na_2S_2O_4$. With cold concd. H_2SO_4, VIII gives a deep amber soln. Its *quinoxaline* m. 121° (cor.). When VIII is shaken with a cold NaOH soln. and the alk soln. is acidified, *2-methyl-9-hydroxy-11-isopropyl-1,2,3,4,10,11-hexahydrofluorene-9-carboxylic acid* (IX) is formed, which when heated rapidly in a sealed tube m. 215–22° (cor.) to a viscous mass insol. in cold alkali. In 1 expt. IX is obtained directly with alk. treatment, indicating that VIII may undergo rearrangement even in the absence of alkali When 1 g. VIII in 20 cc. AcOH is refluxed for 8 hrs. with 10 cc. H_2O_2, the AcOH is distd. off, the residue dissolved in *N* NaOH, and the filtered soln. is acidified, an oily product seps. which is extd. with Et_2O and the Et_2O soln. is dried and evapd. The residue after crystn. from dil. AcOH and twice from dil. EtOH gives about 1 g. *1-isopropyl-4-methyl-1,2,3,4,5,6-hexahydrobiphenyl-2,2'-dicarboxylic acid*, m. 194–8° (cor.), with the formation of a yellow anhydride. F. E. Brauns

Aromatic hydrocarbons. XXIV. Hexacene, a green simple hydrocarbon. E. Clar. *Ber.* **72B**, 1817-21(1939); cf. *C. A.* **34**, 947.—According to Bentley, *et al.* (*C. A.* 2, 540) 1,5-$C_{10}H_6(OH)_2$ (I) undergoes 2-fold condensation with $C_6H_4(CO)_2O$ (II) by the H_3BO_3 method to give a dicarboxylic acid, 2,6,1,5-(*o*-$HO_2CC_6H_4CO)_2C_{10}H_4(OH)_2$, but on attempted ring closure a phthalic acid residue is apparently split off and instead of the expected linear 6-ring *7,15-dihydroxyhexacene-5,16,8,13-diquinone* (III) there is obtained a naphthacene deriv. In the present paper is described the prepn. of III in 1 operation in 45-8 g. yield by gradually adding 16 g. I and 40 g. II to a fused mixt. of 120 g. $AlCl_3$ and 24 g. NaCl at 200°, heating 0.5 hr. at 210°, cooling to 110°, pouring into dil. HCl, at once heating to boiling, filtering and washing with much hot water. The alkali-sol. impurities still present are removed by boiling out with dil. NaOH, whereby the III is converted into an insol. blue salt. This is further purified by converting it into the vat dye with alk. $Na_2S_2O_4$, passing in air and decompg. the salt in boiling water suspension with HCl. The red-brown III crystallizes from $PhNO_2$ or sublimes *in vacuo* in CO_2 in red-brown needles with green surface luster, slowly becomes fluorescent (blue) above 300° in evacuated tubes, forms a brown vat with alk. Na_2SO_4 and dissolves in concd. H_2SO_4 with blue color. It is also obtained, frequently in better but also in greatly varying yields, by adding powd. $AlCl_3$ to a suspension of I and II in $(CHCl_2)_2$, heating 1 hr. at 130° with stirring, decompg. with ice and dil. HCl, removing the $(CHCl_2)_2$ with steam and extg. the residue with dil. Na_2CO_3. Heated with 1 part NaCl, 6 parts $ZnCl_2$ and 1 part Zn dust at 210° and then, in the course of a few min., to 280°, it gives *5,16-* or *6,15-dihydrohexacene* (IV), subliming *in vacuo* in CO_2 at 300° in orange-red leaflets whose strongly orange-yellow soln. in xylene lightens considerably on boiling and then deposits lighter crystals, m. 357-8° (evacuated tubes) (Marschalk, *C. A.* **33**, 7294[9], gives 369–70° (cor. (?)). IV sublimed with Cu powder *in vacuo* in CO_2 at 300–20° gives the linear 6-ring *hexacene* (V) in deep-green crystals (large crystals appear almost black with steel-blue luster), decomps. at elevated temps. without melting, slowly dissolves in concd. H_2SO_4 with green color, very difficultly in org. solvents. The green solns. are extremely sensitive to light and air and are immediately decolorized by maleic anhydride. Because of the sensitivity of V it is very difficult to obtain its absorption spectrum; a very cursory observation gave about 6900 A. for the position of the 1st band, giving for *K* in the equation $\sqrt{R_p/\nu} = \sqrt{R_p}\cdot\lambda - K$ (*C. A.* **30**, 8205[9]) the value 10.87 (calcd. 11) and leaving no doubt as to the linear structure of V.

C. A. R.

Oxidation products of pyrrolic amines. III. Tommaso Ajello. *Gazz. chim. ital.* **69**, 453-9(1939); cf. *C. A.* **33**, 3786[1].—To ascertain whether the properties of triphenylpyrroleninehydroxylamine are common to other members of the same series, the attempt was made to prep. other pyrrolic hydroxylamines by the same procedures as before, viz., reduction of the isonitrosopyrroles (cf. *C. A.* **31**, 3476[6], 3480[1]), and oxidation of the corresponding amines (cf. *C. A.* **33**, 3786[1]). Reduction of isonitrosomethylphenylpyrrole by various methods did not give definite results in any case, because of its great sensitivity to both reducing agents and acids. Zn + AcOH, Fe + AcOH, and Cu + AcOH give reddish amorphous substances with basic properties (ppts. with picric acid and with alkaloid reagents). No definite products could be isolated with Zn + NH_4Cl, Al-Hg, Al-K, Zn-K, $(NH_4)_2S$, etc. With salts such as $FeSO_4$ and CuCl, the only definite product was methylbenzoylisoxazole (cf. *C. A.* **32**, 4557[7]). Reduction of isonitrosodiphenylpyrrole (I) by Zn, Fe and Cu in hot AcOH and Al-K, Al-$HgCl_2$ and $(NH_4)_2S$ in alk. medium gives aminodiphenylpyrrole (II). With ferrous salts and cuprous salts in acid medium hydrolysis occurs and the product is phenylbenzoylisoxazole (cf. *loc. cit.*). A suspension of I (4 g.) in glacial AcOH (80 cc.) and powd. Cu (4 g.), allowed to stand (with agitation) for 2–3 days (during which time 4 g. more of Cu are added and Cu-$(OAc)_2$, which impedes the reaction, is removed), the green liquid decanted into water (600 cc.), $(NH_4)_2SO_4$ added, filtered, the soln. (yellow with violet fluorescence) made alk., the yellow ppt. (III) withheld, the filtrate extd. with Et_2O, III in EtOH or Me_2CO added to the Et_2O ext., clarified, extd. with water (to remove EtOH or Me_2CO), the Et_2O layer dried by Na_2SO_4, concd. and the ppt. purified by soln. in Me_2CO, diln. with Et_2O, clarification, washing with water, etc., yield *asoxydiphenylpyrrole*,



(IV), yellow, m. 170-2°, basic properties, sol. in mineral acids (reppld. by alkalies). These acid solns. are stable when cold but decomp. when boiled (change from yellow to orange to red) with sepn. of an amorphous red substance from which no definite compds. could be sepd. During the cryoscopic detn. of the mol. wt. of IV in AcOH, alternate freezing and thawing lowered the m. p. progressively, indicating decompn. even at low temps. IV in dil. AcOH and excess picric acid pptd. the *picrate*, $C_{32}H_{24}ON_4.C_6H_2(NO_2)_3OH$, m. 180° (decompn.). II in glacial AcOH and perhydrol, allowed to stand for 2 days, dild. with water, filtered, made alk. with NH_4OH and the product isolated as in the reduction of I by Cu, give a low yield of IV. Also II in AcOH and CrO_3 heated at 100° for 30 min., dild. with water, made alk. with NH_4OH and isolated as before, gives a low yield of IV. Alc. II and aq. $FeCl_3$, refluxed for 1 hr., dild. with water, filtered, made alk. with NH_4OH and extd. with Et_2O, give a very low yield of IV. IV is reduced

to II by all ordinary reducing agents, both acid and alk. In the formation of IV by reduction of I or by oxidation of II, intermediate compds., such as NH_2OH and azo and hydrazo derivs., are probably formed, and it should be possible to find conditions under which they can be isolated. C. C. Davis

Oxidation of *d*(+)-proline by *d*-amino acid oxidase. Hans A. Krebs. *Enzymologia* **7**, 53–7(1939)(in English).—*d*-Amino acid oxidase (previously known as *d*-amino acid deaminase) oxidizes *d*(+)-proline to form α-keto-δ-aminovaleric acid (I). I reacts with 2,4-dinitrophenylhydrazine to form *α-keto-δ-aminovaleric acid 2,4-dinitrophenylhydrazone* (II), m. 223° (not cor.). II forms a *HCl salt* (III) and a H_2SO_4 *salt*. III m. 233 42° (decompn.) (not cor.). (−)-Ornithine also yields I when oxidized by *d*-amino acid oxidase. Felix Saunders

Active principles of leguminous fish-poison plants. III. The structure of elliptone. Stanley H. Harper. *J. Chem. Soc.* **1939**, 1424–7; cf. *C. A.* **33**, 7792⁹.—In the prepn. of dehydroelliptone (I) from *l*-elliptone (II) by 1-AcONa there also results *O-acetylelliptolone* (III), m. 175.5°; heating III above its m. p. gives I_2, AcOH being evolved. I also results in a quant. yield by refluxing III with 5% EtOH-H_2SO_4 for 8 hrs. Refluxing III with 0.5 *N* EtOH-KOH for 2 hrs. gives *elliptolone*, $C_{20}H_{16}O_7$, m. 228°; 5% EtOH-KOH gives I. I (2 g.), 8 g. Zn and 20 cc. 15% KOH in 60 cc. EtOH, refluxed 2 hrs., give 1.68 g. of *elliptic acid*, $C_{20}H_{18}O_8$, m. 190°, which gives a blue-green color with $FeCl_3$; *Me ester*, m. 143°; alk. H_2O_2 at 60° gives derric acid. Refluxing 5 g. II in 5% EtOH-KOH for 2 hrs. gives 120 mg. of *4-hydroxycoumarone-5-carboxylic acid*, m. 221°, which gives a deep-blue color with $FeCl_3$; *Me ester*, m. 105°; the acid was synthesized by passing CO_2 through 4-hydroxycoumarone and MeONa in MeOH at 180°. These results establish the formula for I proposed in part II. *Rotenone* α- and β-*oximes*, m. 237° and 249°; the α-form, seeded with the β-form, deposits the pure β-oxime but the α-form with the α-oxime gives only the β-form; thus, this is a case of dimorphism. This is also true of the oximes of *l*- and *dl*-II.

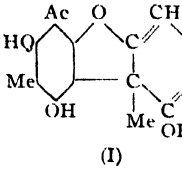
C. J. West

Thiophene series. XLIX. Constitution of indophenins. Wilhelm Steinkopf and Werner Hanske. *Ann.* **541**, 238–60(1939); cf. *C. A.* **33**, 8196¹.—The Grignard reagent (I) from 53 g. 2-iodothiophene (II) and 6 g. I in 100 cc. C_6H_6, added to 14.8 g. of isatin in 500 cc. C_6H_6 during 30 min., heated 15 min. and treated with 500 cc. 10% NaOH, gives 14.3 g. of *3-(2-thienyl)dioxindole* (III), m. 208–8.5°; heating with NaOH 0.5 hr. gives the Na salt of 2-thienyl-*o*-aminomandelic acid, the diazo compd. of which gives a red dye with β-$C_{10}H_7OH$. III yields a *di-Bz deriv.*, m. 159°. Heating 3.5 g. of III with $ZnCl_2$ at 180° for 15 min. gives 40 mg. of isatin(thiophen)indophenin, which may be recrystd. from BzOEt or C_5H_5N; this is identical with the product prepd. by S. and Heimpel (*C. A.* **26**, 3793). I from 4.6 g. II and Et 5-bromoisatin-1-acetate in Et_2O give 5.9 g. of *Et 3-(2-thienyl)-5-bromodioxindole-1-acetate*, m. 124–5°; warming 3.7 g. in 150 cc. AcOH with 120 cc. concd. H_2SO_4 and 40 cc. AcOH at 55–60° gives 0.15 g. of Et 5-bromoisatin(thiophen)-1-acetate, blue (S. and H.). The I from 5.3 g. of II in 20 cc. C_6H_6 and 3 g. of 1-methylisatin in 100 cc. C_6H_6 give 1.5 g. of *1-methyl-3-(2-thienyl)dioxindole*, m. 127.5–9°, which gives the indophenin with AcOH-H_2SO_4. *5-Bromo-3-(2-thienyl)dioxindole*, m. 214.5° (decompn.); AcOH-H_2SO_4 gives the indophenin. The I from 10.6 g. of II and 8.8 g. of Et mesoxalate in Et_2O give mesoxophenin (di-Et mesoxalate(thiophen)indophenin) (IV); hydrolysis with KOH in dioxane-MeOH gives the yellow-red K salt of glyoxylic acid(thiophen)indophenin. IV and Zn in AcOH give *di-Et 2,2'-dithienyl-5,5'-bis(malonate)*, pale yellow, m. 111.5–12.5°; hydrolysis with KOH in EtOH (30 min.) and acidification with 50% AcOH give *2,2'-dithienyl-5,5'-bisacetic acid*, m. 217°; *Me ester*, yellow, m. 75.5–7°; decarboxylation gives 5,5'-dimethyl-2,2'-bithienyl (VI), m. 65.5–6.5°. The I from 5.3 g. of II and $PhCOCO_2$-Et (VIA) give 2 g. of *Et α-(2-thienyl)mandelate* (VII), $b_{0.3}$ 136°, m. 59.5–60.5°; 0.8 g. of the ester with 20 cc. concd. H_2SO_4, shaken for 5 min., gives 10 mg. of *Et phenylglyoxylate(thiophen)indophenin* (VIII), red-violet, m. 208°, which has a green metallic luster on rubbing; this also results on melting VII with $ZnCl_2$ and in 0.9-g. yield from 4.2 g. of VIA and 3 g. thiophene in 320 cc. petr. ether at 0° with 55 cc. ice-cold H_2SO_4; the free *acid* (IX) m. 208–10° (decompn.); the *K salt* forms red needles. VIII with Zn in boiling AcOH gives the *Et ester*, pale yellow, m. 95–6.5°, of *2,2'-bithienyl-5,5'-bis(α-phenylacetic acid)*, yellow, m. 70–85° (decompn.); decarboxylation gives VI. 2,2'-Bithienyl (3.4 g.) and 9 g. of BzCl in C_6H_6 with 7 g. $TiCl_4$ give 1.2 g. *5,5'-dibenzoyl-2,2'-bithienyl* (X), orange, m. 250–2°; this also results from IX in NH_3 conc'd. H_2SO_4 gives an intense green-yellow fluorescence; Zn in AcOH gives a blue-red color. X yields a *3,3'-di-Br deriv.*, pale reddish yellow, m. 195–7°. The I from 10.5 g. II and 10.5 g. of benzil give a yellow-white ppt. which with CH_2N_2 yields the *Me ether* of *ms-(2-thienyl)desoxybenzoin* (XI), m. 71–2°. XI (80 g.) in 500 cc. AcOH and 500 cc. concd. H_2SO_4 in 900 cc. AcOH at 45–50° for 20 min. give *benzil(thiophen)indophenin* (XII), golden green, becoming blue on rubbing, m. 223°. Benzil and thiophene in $ClHCl_2$, shaken with concd. H_2SO_4 give *ms-bis(2-thienyl)desoxybenzoin*, m. 103.5–4°. XII and Zn in AcOH give *5,5'-bis(phenylbenzoylmethyl)-2,2'-bithienyl*, m. 219.5–20.5°, which with EtONa gives *5,5'-dibenzoyl-2,2'-bithienyl* (XIII), m. 96.5–7.5°. This proves the presence of a 2,2'-bithienyl nucleus in indophenins. Thiophene (30 g.) and 30 g. $PhCH_2OH$ with 30 g. $ZnCl_2$, gently boiled 0.5 hr., give (from 100 g. thiophene in 3 lots) 42 g. of recovered thiophene, 51 g. of *2-benzylthiophene*, b_1 257–62°, and 23 g. of *2,5-dibenzylthiophene*, b_{12} 220–2°. 5-Chloromercuri-2-benzylthiophene with 1-KI at 50° gives *5-iodo-2-benzylthiophene*, m. 55–7°; with Natum-kupfer C at 185–90° and then at 190–210° there results 14% of XIII. I and Ac_2 in Et_2O give *ms-(2-thienyl)acetone*, pale yellow, b_1 82°. Cumaran-2,3-dione (15 g.) and 8.4 g. thiophene with concd. H_2SO_4 in AcOH (0.5 hr. at 55°) give 90 mg. of *cumaran-2,3-dione(thiophen)indophenin*, green-gold, does not m. 300°. The Grignard reagent from 9.8 g. of 5-iodo-2-thiotolene and 9.2 g. of benzil give 5.7 g. of *ms-(2-methyl-5-thienyl)benzoin*, m. 78–9°; AcOH-H_2SO_4 gives a blue color, which quickly turns to a dirty red-brown; heating with BzOH at 180° gives a blue powder. The Grignard reagent from 2,5-dibromothiophene gives *ms-(2-bromo-5-thienyl)benzoin*, m. 99–100.5°; cold concd. H_2SO_4 gives only a yellow halochromy; on warming the yellow color changes to blue but H_2O ppts. only brown flakes. The action of CO_2 upon the Grignard reagent from 2,5-diiodo-3-thiotolene gives *2-iodo-3-thiotolene-5-carboxylic acid*, m. 172–3°. Structures proposed for indophenins are discussed in the light of the above expts. L.

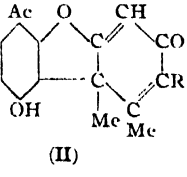
Derivatives of 3,4-dibromothiophene-2,5-dialdehyde and macrocyclic compounds. Wilhelm Steinkopf, Reinhard Leitsmann, A. Herbert Müller and Helmut Wilhelm. *Ibid*, 260–82.—3,4-Dibromothiophene-2,5-dialdehyde (I) with Ac_2O-AcONa, heated at 170–5° for 1.5 hrs., gives 50% of *3,4-dibromothiophene-2,5-diacrylic acid*, light yellow, does not m. 350°, sublimes in a high vacuum at 220°; *acid chloride*, yellow, m. 172° (decompn.). I and $PhNH_2$ in AcOH at 95° give the *dianil*, light yellow, m. 245° (rapid heating); *di(o-hydroxyanil)*, orange, m. 214° (decompn.); I and quinaldine (II) in Ac_2O give 76% of *3,4-dibromo-2,5-bis(β-quinolyl-2-ethylene)thiophene*, brownish yellow, m. 247–8°; the *di-HCl salt* is fiery red. Isophthalaldehyde (III) and II in Ac_2O give *m-bis(β-quinolyl-2-ethylene)benzene*, nearly colorless, m. 180°; mineral acids form yellow addn. products; *p-isomer*, light greenish yellow, m. 243°; mineral acids give orange salts. Terephthalaldehyde (IV) gives an ivory-colored *dianil*, m. 159°; the *bis(o-hydroxyanil)* is yellow and m. 215°. 5,5'-Dimethyl-2,2'-bithienyl (V) (4.3 g.) and 15.5 g. Br in CS_2 give 93% of the *3,4,3',4'-tetra-Br deriv.* (VI), Ag-gray, m. 255°; 4 g. VI and 4 cc. Br at 70°, illuminated for 2 hrs., give 11–15% of the *5,5'-di(bromomethyl) deriv.*, pale yellow, m. 210°. Passing Cl into a warm soln. of V in AcOH gives 55% of the *3,4,3',4'-tetra-Cl deriv.* (VII), m. 201°; treating VII in boiling CS_2 with Cl for 3 hrs. (sun-

light) gives 55 g. of the *5,5'-bis(dichloromethyl) deriv.* (VIII), m. 119-20°. Boiling 0.5 g. VIII with 50 cc. aq. $Ca(OH)_2$ and 0.3 g. $CaCO_3$ for 4–5 hrs. and subliming the product at 170–200° give 50% of *3,4,3',4'-tetrachloro-2,2'-bithienyl-5,5'-dialdehyde* (IX), golden yellow, m. 179°; $N_2H_4.H_2O$ in AcOH gives the *diazine*, dark red, shows no m. p.; II and IX in AcOH give *3,4,3',4'-tetrachloro-5,5'-bis(β-quinolyl-2-ethylene)-2,2'-bithienyl*, deep orange, m. 284°. I and $C_2H_4(NH_2)_2$ in dioxane-H_2O give *bis(3,4-dibromo-2,5-thioxal)ethylenediamine*, pale-brown amorphous compd., which gives an orange color with concd. H_2SO_4 or red with concd. HCl; IV gives *bis(p-xylal)ethylenediamine*, yellow; with *o*-$C_6H_4(NH_2)_2$ IV gives *1,4-bis(2-benzimidazolyl)benzene*, pale yellow, unchanged at 300°, shows a blue fluorescence in alk. soln. under the quartz Hg lamp. I (2 g.) and 3 g. *o*-C_6H_4-$(NH_2)_2$ in AcOH, heated on the water bath for 0.25 hr., give a ppt. (0.24 g.) of *bis(3,4-dibromo-2,5-thioxal)-o-phenylenediamine* (X), chocolate-brown, decomps. 262°, and from the filtrate 1.3 g. of *3,4-dibromo-2,5-bis(2-benzimidazolyl)thiophene*, yellow, m. 385°; the AcOH soln. shows a pale bluish green fluorescence. I and *m*-C_6H_4-$(NH_2)_2$ give the *m-phenylenediamine* isomer of X, olive-brown. I and $(2\text{-}H_2NC_6H_4)_2$ in boiling AcOH give *bis(3,4-dibromo-2,5-thioxal)-2,2'-diaminobiphenyl*, yellow, m. about 230°; concd. H_2SO_4 and HCl give red solns. III and diaminodurene in hot EtOH give *bis(m-xylal)diaminodurene*, yellow, amorphous; IV gives the *p-isomer*, brown-yellow. I and benzidine give a poor yield of *3,4-dibromo-2,5-thioxalbisbenzidine*, brown-golden, does not m. 450°; reaction in BzOEt with I in AcOH gives *bis(3,4-dibromo-2,5-thioxal)benzidine*, brown and giving a violet-blue soln. in H_2SO_4. III gives *bis(m-xylal)benzidine*, light-olive, sol. in concd. H_2SO_4 with a yellow, in concd. HCl with a brown-orange, color. I and $(p\text{-}H_2NC_6H_4)_2CH_2$ in hot AcOH give *bis(3,4-dibromo-2,5-thioxal)-4,4'-diaminodiphenylmethane*, fiery yellow. *Bis(p-xylal)-4,4'-diaminodiphenylmethane*, pale yellow, gives a red color with H_2SO_4 and a black-red color with HCl. I and (*p*-AcNHC$_6$H$_4$)$_2$ in AcOH give *3,4-dibromothiophene-2,5-dialdehyde bis(p-acetaminoanil)*, yellow, decomps. above 300°; *terephthalaldehyde bis(p-acetaminoanil)*, light yellow, m. 320-2°. I (3 g.) and 15 g. $PhNMe_2$ with 8 g. $ZnCl_2$, heated 3 hrs. at 110-20°, and purification by pptn. with NH_4OH from a HCl soln., give 6 g. of *3,4-dibromo-2,5-di[bis(p-dimethylaminophenyl)methyl]thiophene* (leuco base of XI), m. 246°; with MnO_2 in dil. H_2SO_4 there results the *carbinol base*, $C_{38}H_{42}O_2N_4Br_2S$, amorphous, pale-brown powder, m. 180-5°; EtOH gives a green color; this base with H_2SO_4 in EtOH, warmed on the water bath, gives *3,4-dibromothiophene blue* (as the *acid sulfate*) (XI), violet-brown, which gives a blue-violet color; the C_5H_5N soln. is decolorized on standing, the EtOH and AmOH solns. are colored green. Similarly IV gives *1,4-di[bis(p-dimethylaminophenyl)methyl]benzene*, (XIA) m. 244-5° (decompn.); the *carbinol base* (*1,4-di[bis(p-dimethylaminophenyl)hydroxymethyl]benzene*) (XII), pale gray, m. 160-5°; the *color base* (as the *acid sulfate*) (XIII) is a violet powder with a brown surface luster and gives a blue-green soln. III gives the *1,3-isomer* of XIA, m. 147–9°; *1,3-isomer* of XII, gray, amorphous, m. 135-40°; of XIII, a_0 violet powder. 3,4,5-Tribromothiophen-2-aldehyde with $PhNMe_2$ and $ZnCl_2$ gives *bis(p-dimethylaminophenyl)[2-(3,4,5-tribromothienyl)]methane* (*leuco base* of XIV), m. 159-60°; oxidation gives *tribromothiophene green* (XIV), (as the *acid sulfate*), green. Colors of solns. of I, III and IV in C_6H_6, PhOH, PhOMe, $PhNH_2$ and $PhNMe_2$ are given. C. J. West

Usnic acid. VII. Analogs of usnolic acid. Reginald T. Foster, Alexander Robertson and Thomas V. Healy. *J. Chem. Soc.* **1939**, 1594-1601; cf. *C. A.* **32**, 4560[8].—A brief review of the structures recently proposed for usnic acid (I) leads to the adoption of that first suggested in part V (*C. A.* **31**, 6219[6]) and supported by the work of Schöpf and Ross (*C. A.* **33**, 2505[1]). A new structure (II, R = CO_2H) for usnolic acid (III), based on the formula (II, R = H) which was advanced for decarbousnol in part V, is deduced and its formation from I is discussed. *m*-Me-OC_6H_4OH (15 g.), 14.5 g. $ClCH_2Ac$ and 45 g. K_2CO_3 in 250 cc. boiling Me_2CO (4 hrs.) give 10.2 g. of 3-methoxyphenoxyacetone, b_{20} 150–3° (*2,4-dinitrophenylhydrazone*, pale yellow, m. 146°); concd. H_2SO_4 at 0° for 5 min. gives 6-methoxy-3-methylcoumarone (IV), $b_{0.4}$ 79-82°; reaction of 10 g. IV with HCN and HCl in Et_2O and hydrolysis with H_2O gives 10 g. of *6-methoxy-2-formyl-3-methylcoumarone* (V), m. 105° (*2,4-dinitrophenylhydrazone*, red, m. 262°; semicarbazone, m. 248°); oxidation with $KMnO_4$ gives the corresponding acid, m. 190° (decompn.). Condensation of V with hippuric acid by Ac_2O-AcONa gives the *azlactone*, orange-red, m. 194°; hydrolysis by boiling 10% aq. NaOH gives *6-methoxy-3-methylcoumarone-2-pyruvic acid*, pale yellow, m. 196° (*oxime*, m. 166°); warming with 30% H_2O_2 in 5% aq. NaOH gives *6-methoxy-3-methylcoumarone-2-acetic acid*, m. 145°; H_2SO_4 gives a brown, red and finally purple color; PCl_5 gives a chloride (VI), which yields an *amide*, m. 162°. Reaction of VI with $AcCHNaCO_2Et$ in Et_2O at room temp. for 18 hrs. gives the keto ester which could not be purified; concd. H_2SO_4 at 60° for 1.75 hrs. gives a mixt. of the *Et*



(I)



(II)

ester, m. 122°, and *6'-methoxy-3',3-dihydrobenzofurano-(2',3',5,4)-Δ^{2,5}-cyclohexadienone-2-carboxylic acid* (VII), which seps. as the *hydrate*, yellow, m. 147°; *Me ester*, m. 101°. VII gives an intense bright-blue color in Ehrlich's reaction, identical with that of III. In order to exclude the possibility that the cyclization of the ketone ester to the anhydro compd. might have involved the interaction of the δ-CO group of the side chain with the C atom in the 7-position of the coumarone residue, the homolog in which the 7-position is blocked by a Me group was studied. 3,2,4-Me(HO)(MeO)C_6H_2Ac (20 g.) and $BrCH_2CO_2Et$ with K_2CO_3 in Me_2CO (refluxing 18 hrs.) give 20 g. of the *Et ester*, b_{15} 180-5° (*2,4-dinitrophenylhydrazone*, bright orange, m. 167°), of *3-methoxy-6-acetyl-2-methylphenoxyacetic acid*, m. 133°; refluxing with EtONa for 1 hr. gives the *Et ester*, m. 75°, of *6-methoxy-3,7-dimethylcoumarone-2-carboxylic acid*, m. 225° (decompn.); refluxing with Ac_2O and AcONa gives *6-methoxy-3,7-dimethylcoumarone*, b_{11} 92-3° (*picrate*, bright red, m. 92°); H_2SO_4 gives a pale-yellow and then a blue color; HCN and HCl give *6-methoxy-2-formyl-3,7-dimethylcoumarone*, m. 102° (*2,4-dinitrophenylhydrazone*, red, m. 284°); hippuric acid gives the *azlactone*, crimson, m. 218°; hydrolysis yields *6-methoxy-3,7-dimethylcoumarone-2-pyruvic acid* (VIII), pale yellow, m. 228° (*oxime*, m. 162° (decompn.)); a by-product is *6-methoxy-2,3,7-trimethylcoumarone*, m. 41°, which gives an olive-green and then a blue color with H_2SO_4; *picrate*, deep crimson, m. 103°; hydrogenation yields *6-methoxy-2,3,7-trimethylcoumaran*, a mobile oil. Oxidation of VIII with 30% H_2O_2 in 5% aq. NaOH gives *6-methoxy-3,7-dimethylcoumarone-2-acetic acid*, m. 158°; *amide*, m. 179°; the chloride and $AcCHNaCO_2Et$ give a keto acid, cyclized by concd. H_2SO_4 at 60° (1.75 hrs.) to *6'-methoxy-3',7',3-trimethyl-2',3-dihydrobenzofurano-(2',3',5,4)-Δ^{2,5}-cyclohexadienone-2-carboxylic acid*, pale straw, m. 150°; *Et ester*, m. 115°; the acid gives an intense bright-blue color with Ehrlich's reagent. A detailed comparison of these acids with III clearly indicates that the latter compd. and its synthetical analogs are similarly constituted, thus affording independent evidence in support of the formula II (R = CO_2H). C. J. West

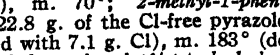
Action of nitric acid on polycyclic indole derivatives. XIII. Indeno(2',3',2,3)indole. N. M. Beyts and S. G. P. Plant. *J. Chem. Soc.* **1939**, 1534-6; cf. *C. A.* **32**, 8412[8].—Indeno(2',3',2,3)indole (3 g.) in Me_2CO contg. 3 g. of 66% KOH, treated gradually with AcCl, gives the *1-Ac deriv.* (I), m. 131°; the *1-Bz deriv.* (II), brown, m.

169–70°. I (2 g.) in 13 cc. AcOH at 50°, treated with 0.7 g. of HNO_3 (d. 1.5) in 2.5 g. AcOH, gives 0.5 g. of a *6(?)-NO_2 deriv.* (III), orange, m. 275° (decompn.); the filtrate gives 1.2 g. of *3-nitro-2-acetoxy-1-acetyl-2,3-dihydroindeno(2',3',2,3)indole*, m. 177–80° (decompn.); this is an addn. compd. formed by the attachment of NO_2 and OAc; I thereby exhibits reactivity which is abnormal in an indole of this degree of complexity. II did not show a similar behavior. β-Hydrindone (IV) and *p*-$O_2NC_6H_4NHNH_2$ in EtOH give the hydrazone, yellow, m. 232° (decompn.); refluxing with AcOH-HCl gives *5-nitroindeno(2',3',2,3)-indole*, crimson, m. 255°; *1-Ac* deriv., yellow, m. 247°, which is not the same as III. IV yields a *β-naphthylhydrazone*, yellow, m. 176° (decompn.); boiling with AcOH for 5 min. gives *indeno(2',3',2,1)-β-naphthindole*, yellow, m. 208–9°; *3-Ac deriv.*, m. 185°; HNO_3 in AcOH does not give an addn. compd. but the *?-NO_2 deriv.*, yellow, m. 265° (decompn.); the results indicate that the ability to form addn. compds. is diminished by the presence of the addnl. benzene nucleus. C. J. West

Mechanism of indoxyl formation in vivo from certain *o*-nitrophenyl derivatives. F. Böhm. *Z. physiol. Chem.* **261**, 35–42(1939); cf. *C. A.* **33**, 7898⁴.—Feeding *o*-$NO_2C_6H_4C{:}CCO_2H$ (I) to rabbits results in the excretion of small amts. of *o*-$NO_2C_6H_4CO_2H$ (II) and with large toxic doses *o*-$NO_2C_6H_4CH_2CH(OH)CO_2H$ in addn. to the previously recognized indican formation. The Et ester of I gives II besides indican. The mechanism proposed by Crowdle and Sherwin (*C. A.* **17**, 2443) for the formation of indoxyl from I *in vivo* is probably incorrect because the proposed intermediates, *o*-$NH_2C_6H_4CH{:}CHCO_2H$ and indole-α-carboxylic acid, do not produce an increase in indican excretion nor does *o*-$NH_2C_6H_4C{:}CCO_2H$. The last yields *o*-$NH_2C_6H_4CO_2H$ in the urine. A new mechanism is proposed as follows: I → *o*-$NO_2C_6H_4C(OH)CHCO_2H$ (III) → *o*-$NO_2C_6H_4COCH_2CO_2H$ (IV) → II or *o*-$HONHC_6H_4COCH_2$-CO_2H which then loses H_2O between NHOH and CH and CO_2 to give indoxyl. While the intermediates III and IV were not available, it is shown that *o*-$NO_2C_6H_4COCH_2$-$COCH_2CO_2Et$ does form small amts. of indican when fed. M. L.

***cis*-Indigo. II.** Gustav Heller. *Ber.* **72B**, 1858–60 (1939); cf. *C. A.* **30**, 4495⁴.—As had already been pointed out, the only known form of indigo is the trans modification, but from the behavior of dyed fibers it can be concluded that the cis form is primarily deposited on the fiber and converted into the trans form in the subsequent operations. The cis modification should be formed, if at all, by shaking the vat with air at room temp. A product (I) so obtained was, in paste form, dark blue with violet tinge, considerably deeper in color than the product (II) obtained on the water bath. Soly. expts. showed the cis form (I) is extraordinarily unstable but in some solvents there can be observed, now and then, a momentarily stronger color which, corresponding to the soly. of the trans form, immediately becomes weaker. The primary color is distinctly and reliably reproducible in dioxane, in which it is stable for some time. I behaves in the same way in CCl_3CO_2H, but not so distinctly and is not so stable; the color is stronger than in AcOH. A difference between I and II is also noted in a mixt. of 87.5 parts AcOH and 12.5 parts H_2SO_4, which gives a blue color, not the green of H_2SO_4 solns. (sulfonation). On shaking I and II with this mixt. I apparently dissolves while II hardly gives any color; the difference persists about 0.5 hr. and then gradually disappears as the I changes into II. The instability of I is further shown by the fact that the above differences are no longer observed 24 hrs. after the pastes of I and II have been dried. That in reactions, such as the formation of oxalylindigo from indigo, the reverse change of the trans into the cis form occurs has by no means been proved as yet. From the statement of Thiele and Pickard (*Ber.* **31**, 1252(1898)) that indigo oxime cannot be prepd. from indigo powder and NaOH with NH_2OH but only from the dye in a very fine state of subdivision, as obtained from the vat, it might be concluded that this is a reaction of the cis compd., but their statement is erroneous. The oxime is best obtained by covering indigo powder or paste with dil. NaOH and NH_2OH salt solns., filling the flask almost full, covering it with a watch glass, heating 0.5 hr. on the water bath and filtering into dil. HCl. If somewhat stronger alkali is used it may happen that at first nothing is pptd.; apparently this is due to the formation of a difficultly sol. Na salt, and on washing the substance on the filter dissolves. C. A. R.

Cyclotetramethylenepyrazolone. II. Hans Ruhkopf. *Ber.* **72B**, 1978–82(1939); cf. *C. A.* **31**, 4978⁸.—In part I was reported the prepn. of new derivs. of 3,4-cyclotetramethylene-5-pyrazolone (I) which are exceptionally well adapted to therapeutical application. It was found that condensation of Et cyclohexanone-2-carboxylate (II) with $PhNHNH_2$ in the cold does not result directly in closure of the ring but stops at the phenylhydrazone stage, and further reaction, with elimination of alc., occurs only on heating. To obtain light on the conditions under which simple hydrazone formation or pyrazolone ring closure occurs, a study was made first of the influence of substituents in position 1. When II was allowed to stand 12 hrs. with the hydrazine in cold dioxane the pyrazolone was formed directly in all cases where the phenylhydrazine had 1 substituent on the ring. With the 2,4-dinitro compd. condensation, even with heat, stops at the *hydrazone* (60% yield), yellow, m. 156°, which does not form the pyrazolone when fused. With β-$C_{10}H_7NHNH_2$ (which may be regarded as a 3,4-disubstituted $PhNHNH_2$) ring closure again occurs directly with elimination of water and alc. With α-$C_{10}H_7NHNH_2$ (2,3-disubstituted $PhNHNH_2$) the results are still doubtful. There is apparently first formed a relatively stable hydrazone which, on recrystn., undergoes ring closure. These results allow as yet of no definite conclusions on the tendency to ring closure; possibly a 2nd substituent, in addn. to one in the 2-position, makes ring closure more difficult. Halogens with derivs. of I form dihalides which, however, are just as unstable as those of monocyclic pyrazolones. Under the influence of water they readily form monosubstitution products with elimination of halogen acid. As the halogen adds at the double bond, tautomerism allows of various possible positions for the halogens. With the 1-Ph compd. these positions have been established. If Br added at the 2,3-positions elimination of 1 mol. HBr would give a 2-Br deriv., with no adjacent H atom permitting elimination of a 2nd mol. of HBr, and since even very weak bases, like $NHEt_2$, actually do eliminate a 2nd mol. of HBr to give a halogen-free product (III) the addn. of Br must have occurred at the 3,4-positions and the mono-Br compd. (IV) is the 4-Br deriv. As easy, however, as it is to split out 2 mols. HBr, it is just as difficult to obtain the III in pure form. When 5 g. IV is boiled in 100 cc. MeOH with 5 cc. of 10% NH_4OH (or the corresponding amt. of $NHEt_2$) it yields 20–5% of a cryst. *compd.*, $C_{26}H_{26}O_2N_4$, m. 174° (decompn.), mol. wt. in camphor 426, together with a viscous, Br-contg. sirup which resists all further treatment. The Et cyclohexen-6-one-1-carboxylate, b_{760} 220°, obtained in 30% yield by bromination of II (Kötz, *C. A.* **2**, 1276), gives with $PhNHNH_2$ in alc. the same sirup, from which up to 20% of the above cryst. compd. can also be isolated. The other monohalogen derivs. of I, unsubstituted or completely substituted at positions 1 and 2, also very probably have the halogen at position 4, although position 3 is not excluded. Only 1 dihalogen deriv. has thus far been obtained. The halogen derivs. no longer have the power to form mol. compds. with substituted barbituric acids. Their antipyretic action is materially higher than that of the halogen-free compds., their toxicity is greater and they are all highly irritating to the mucous membranes. *Derivs.* of I: *1-o-tolyl* (80% from 12.2 g. *o*-tolylhydrazine in 100 cc. dioxane and 15.4 g. II allowed to stand 12 hrs.), yellowish white, m. 184°; *1-m-tolyl* (80%), ivory-colored, m. 149.5°; *1-p-tolyl* (80%) m. 203°; *1-(4-nitrophenyl)* (90%), yellow, m. 236°; *1-β-naphthyl* (80%), light brown, m. 180°; *4-Br* (75% from 13.6 g. I in 50 cc. AcOH treated with stirring with 16 g. Br in 50 cc. AcOH and after 1 hr. poured into 300 cc. ice water), m. 133°; *1-phenyl-4-bromo* (95% from the 1-Ph deriv.), light yellow, m. 85°; *1-p-tolyl-4-bromo* (80%),

deep yellow, m. 94°; *4-Cl* (60%), m. 112°; *1-phenyl-4-chloro* (90%), m. 70°; *2-methyl-1-phenyl-3,4-dichloro* (60% from 22.8 g. of the Cl-free pyrazolone in 100 cc. $CHCl_3$ treated with 7.1 g. Cl), m. 183° (decompn.). *4-Bromo-2-methyl-1-phenyl-Δ6′-tetrahydrobenzo(1′,2′,3,4)-pyrazol-5-one*,  (90% from the Br-free pyrazolone with Br in AcOH), m. 138° 1

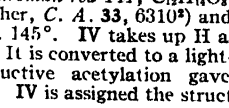
C. A. R. 2

Benzisoxazoles. III. Walther Borsche and Wilhelm Scriba. *Ann.* **541**, 283-92(1939); cf. *C. A.* **33**, 8197⁶.—Meyer (Cathcart and M., *Ber.* **25**, 3291(1892)) was of the opinion that benzisoxazoles could not be prepd. from oximes of *o*-acylated halo- or nitrobenzenes unless the radical $XC_6H_4C(:NOH)$ is bound with a neg. group. It is now shown that this is not true. *o*-BrC_6H_4CN and MeMgI give 85% of 2-BrC_6H_4Ac, b_{16} 118-20°; *oxime* (I), m. 129°. 2-$BrC_6H_4CO_2Me$ and MeMgI give some *dimethyl-2-bromophenylcarbinol*, b_{16} 128-30°; BrC_6H_4Ac was not formed. Heating I with KOH in 50% MeOH gives 80% of 3-methylbenzisoxazole, b_{15} 104-8°. *o*-BrC_6H_4CN and EtMgBr give 90% of 2-bromopropiophenone, yellowish oil, b_{16} 135-40°; *2,4-dinitrophenylhydrazone*, orange-yellow, m. 115-16°; *oxime*, b_{16} 164-72°; with KOH in 50% MeOH (9 hrs. at 120°) there results a mixt. of unchanged oxime and ethylindoxazene. *o*-BrC_6H_4CN (18.2 g.) and $PhCH_2MgCl$ give about 12 g. of 2-bromophenyl benzyl ketone, b_{15} 206-8° (*2,4-dinitrophenylhydrazone*, orange, m. 149°; *oxime*, m. 116°); KOH in 50% MeOH (8 hrs. at 110-15°) gives 85% of *3-benzylbenzisoxazole*, m. 87°. 4,3-$Br(H_2N)C_6H_3Me$ gives about 70% of *3-cyano-4-bromotoluene*, m. 65°; MeMgI gives *3-acetyl-4-bromotoluene*, b_{15} 132-6°; *2,4-dinitrophenylhydrazone*, orange, m. 170°; *oxime*, m. 131-2° (cf. Claus, *J. prakt. Chem.* **46**, 26(1892), who states that it could not be converted to II); KOH in 50% MeOH (9 hrs. at 150°) gives 3,5-dimethylbenzisoxazole (II), b_{14} 116-18° (NO_2 deriv., m. 72°). 2,4-$Cl_2C_6H_3CN$ (6.4 g.) gives 4 g. 2-ClC_6H_4Ac; *2,4-dinitrophenylhydrazone*, dark yellow, m. 206°; semicarbazone, m. 178-9°. 2-BrC_6H_4Ac, B_2H and 10% NaOH in MeOH give *2-cinnamoylbromobenzene*, b_{14} 234-8°, as a yellow, viscous oil; *2,4-dinitrophenylhydrazone*, red, m. 236-7°; an oxime could not be prepd. 6,3-Br $(O_2N)C_6H_3Ac$ (4.88 g.) and 4 g. $PhNHNH_2.HCl$ in MeOH, heated 18 hrs. at 150°, give 3.1 g. of *3-methyl-1-phenyl-5-nitroisoindazole*, yellow, m. 131-2°; catalytic reduction gives the *5-NH₂ deriv.*, m. 127-8° (*Bz deriv.*, m. 160-1°); a by-product, yellow, m. 336°, is probably the corresponding *azoxy compd.* Removal of the NH_2 group gives *3-methyl-1-phenylisoindazole*, m. 73-4°. 3

C. J. West

Antisterility factors (vitamin E). VII. Red oxidation products of tocopherol. W. John and W. Emte. *Z. physiol. Chem.* **261**, 24-34(1939); cf. *C. A.* **33**, 2896². Oxidation of α-tocopherol with $AgNO_3$ in boiling EtOH gives *α-tocopherol red* (I) $C_{58}H_{92}O_6$, oily, max. ultraviolet absorption at 270 mμ, in max. yield after 100-120 min I is a quinone, reducible by H, and on reductive acetylation gives an oily *diacetate*, $C_{32}H_{52}O_5$. β-Tocopherol similarly yields *β-tocopherol red* (II). Both I and II are bimol. 4

nplds. Analogous oxidation of tetramethylhydroxychroman gave a *chroman red 141*, $C_{12}H_{14}O_3$ (IV in Karrer, Fritzsche and Escher, *C. A.* **33**, 6310²) and a 2nd product, $C_{11}H_{10}O_4$ (III), m. 145°. IV takes up H and the product is autoxidizable. It is converted to a light-yellow compd. by NaOH. Reductive acetylation gave IV *diacetate*, $C_{16}H_{20}O_5$, m. 82°. IV is assigned the structure 5



and probably exists as a dimer. Reductive acetylation of chroman red 109, obtained by oxidation of pentamethylhydroxychroman, gave a *diacetate*, m. 91°. In III, the Me group at 7 has been replaced by OH. Similar oxidation at 8 should yield a diquinone. Reductive acetylation of III yields a *diacetate*, $C_{15}H_{18}O_6$, m. 116°, instead of the expected triacetate. The structures of I and II are probably analogous to that of IV. Over-oxidation of IV by HNO_3 until the color is completely yellow gives a *product*, m. 129°, which is isomeric with IV. 6

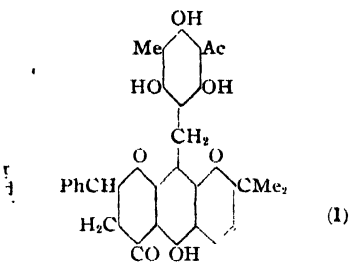
Milton Levy

Rottlerin. II. Hans Brockmann and Karl Maier. *Ann.* **541**, 53-75(1939); cf. *C. A.* **32**, 8419⁷.—Isorottlerin (I) (960 mg.) in 5 cc. Me_2CO and 1 g. K_2CO_3, warmed 0.5 hr. on the water bath, give 790 mg. of *pseudorottlerin* (II), m. 193-4°; 2 *N* NaOH gives BzH; $FeCl_3$ gives a green-brown, and H_2SO_4 a reddish brown, color; boiling 230 mg. of II with 6 cc. AcOH for 70 min. gives 175 mg. I. II (420 mg.) and Ac_2O in C_5H_5N give 500 mg. of the *pentaacetate* (IIA), yellow, m. 176-7.5°; reduction gives an oily product. The dihydro deriv. (III) of I, warmed 1 hr. with K_2CO_3 in Me_2CO, gives *dihydropseudorottlerin* (IV), yellow, m. 206-7°; in 1 expt. a product m. 215-16° was obtained; boiling AcOH (1 hr.) gives III. The *pentaacetate* (IVA) of IV, pale yellow, m. 181-2.5°. Catalytic reduction of II, III or IV in Me_2CO with Pd black or of I in Me_2CO contg. K_2CO_3 gives *tetrahydropseudorottlerin* (V), m. 225-6°; $FeCl_3$ gives a gray-green, H_2SO_4 a yellow, color; the reduction of I without K_2CO_3 usually gives IV; in 2 expts. the principal product was V. I (800 mg.), 3 cc. Me_2SO_4, 6 g. K_2CO_3 and 30 cc. Me_2CO give 530 mg. of the *penta-Me ether* (VI) of II, pale yellow, m. 135-6°; this is not hydrolyzed by refluxing with EtOH-H_2SO_4. III, Me_2SO_4, K_2CO_3 and Me_2CO give a *penta-Me ether* (VII) of IV, pale yellow, m. 134°. Catalytic reduction of VI in Me_2CO contg. a trace of C_5H_5N with Pd black gives a *penta-Me ether* (VIII) of IV, m. 123-4°. Rottlerin penta-Me ether gives a *dihydro deriv.* (IX), m. 86-7°. V yields a *tetra-Me deriv.*, m. 154-6°, and from the MeOH-Me_2CO mother liquor a *penta-Me deriv.* (X), m. 98°; the latter also results from the reduction of VI, VII or VIII. The action of O_3 upon II, IV, VI or VII gives BzH but IX gives no volatile fraction. II and PhN·NHPh in Me_2CO give the same azo dye, $C_{30}H_{27}O_6N_2Ph$, m. 201-4°, as rottlerin; IV and V give the same dye as does tetrahydrorottlerin (XI). V and 2 *N* NaOH warmed to 65°, give *tetrahydropseudorottlerone* (XII), $C_{20}H_{22}O_4$ or $C_{21}H_{24}O_4$, m. 179°; B_2O_3 in Ac_2O gives an intense citron-yellow color; *di-Me ether*, m. 87-9°. Absorption spectra are given for II, IIA, III, IV, V, VI, VII, VIII, X, XI, XII and rottlerin penta-Me ether. Structural formulas are suggested for I, II, III, IV and V. 7

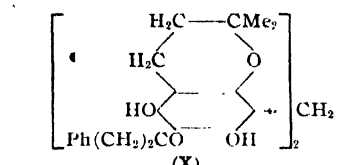
C. J. West

Rottlerin. IV. Alexander McGookin, Alexander Robertson and Eric Tittensor. *J. Chem. Soc.* **1939**, 1579-87; cf. *C. A.* **34**, 104⁴.—The fact that neither 5,7-dihydroxy-6- nor 5,7-dihydroxy-8-β-phenylpropionylchroman (I) is identical with octahydrorottlerone (II) (part III), referred to in parts I and II (*C. A.* **31**, 5359²; **32**, 4555⁴) as tetrahydrorottlerone (III), led to a reinvestigation of this substance. While fission of II with hot concd. alkali gives results identical with those previously recorded (part II), the use of more dil. alkali has now been found to yield I. This behavior, and the absence of *C*-methylphloroglucinol derivs. in the hydrolyzate, together with the conversion of II into *2,4,6,2′,4′,6′-hexahydroxy-5,5′-diacetyl-3,3′-dimethyldiphenylmethane* (IV) and II, suggested that the latter had the structure type of *7′-tetrahydroxy-8,8′-diacetyl-2,2,2′,2′-tetramethyl-6,6′-dichromanylmethane* (V), which is in good agreement with the analytical results of the substance and its derivs. This conclusion is confirmed by the synthesis of II from the 2,2-di-Me deriv. of I and HCHO. The structure of IV, which was arrived at by analysis and degradation, was also confirmed by its synthesis. Reinvestigation of a considerable no. of rottlerin (VI) derivs. did not serve to distinguish between the empirical formulas $C_{30}H_{28}O_8$ and $C_{31}H_{30}O_8$ for VI but the results of mol.-wt. detns. appear to exclude formulas based on C_{60} or C_{62}, which might be expected on the basis of the simultaneous formation of IV and V from III. The isolation of 2,4,6-trihydroxy-5-acetyl-3-methylazobenzene (VII) from the latter by Bochm's reaction confirms the presence of the *C*-methylphloroacetophenone (VIIA) residue in VI. The residue is joined to the rest of the mol. by a CH_2 group. Consideration of all 8 9

the available evidence disproves the view that VI contains a lactone group. **VI** m. 212° (unchanged after 4 years); penta-Ac deriv., m. 213°; **VI** and Me_2SO_4 with K_2CO_3 in boiling Me_2CO give the *O*-penta-Me deriv. (**VIII**), m. 142°; CH_2N_2 gives the di-Me deriv. (**IX**), m. 254°. Tetrahydrorottlerin (**X**) m. 215° and yields a penta-Me deriv., m. 109°, which also results in a quant. yield by catalytic reduction of **VIIII**; CH_2N_2 gives the *O*-di-Me deriv., pale greenish yellow, m. 192° (also prepd. by reduction of **IX**), and what appears to be the *tri-Me deriv.*, bright yellow, m. 153°. **X** and PhN·NNHPh in boiling EtOH give **VII**, red plates, m. 202°; this also results from **VI**. Rottlerone and Me_2SO_4 give the *tetra-Me ether*, pale yellow, m. 136°. **II**, $C_{31}H_{44}O_8$, m. 173°; tetra-Ac deriv., m. 215°; tetra-Me ether, m. 102° (dioxime, m. 204.5°). **X** (2 g.) in 90 cc. AcOH and 10 cc. H_2O, refluxed 12 hrs., gives 0.47 g. **IV**, light yellow, m. 291° (decompn.), which yields a red-brown color with EtOH-$FeCl_3$; the mother liquor yields 0.83 g. of **II**. **IV** and Me_2SO_4 give the *hexa-Me ether*, m. 103°; **IV** and PhN·NNHPh give **VII**. **II** and 20% aq. NaOH in EtOH, with or without Zn in N (heated 3 hrs.), give **I**, $PhCH_2CH_2$-CO_2H and 5,7-dihydroxy-2,2-dimethylchroman (**XI**), m. 162°. **XI** and PhN·NNHPh yield a bis(phenylazo) deriv., bright red, m. 256° (decompn.). 5,7-Dihydroxy-8-acetyl-2,2-dimethylchroman and 40% aq. HCHO with H_2SO_4 in EtOH give **V**, yellow, m. 240°; $FeCl_3$ gives an intense rich-purple color. The 2,2-di-Me deriv. of **I** and 40% HCHO with H_2SO_4 in EtOH give **II**. **VIIA** and HCHO give **IV**. In the prepn. of perhydrorottlerin Me_2CO, AcOH or AcOEt as solvents gave unsatisfactory results; with EtOH the variety m. 188° occurs much less frequently than that m. 182°; with PhN·NNHPh both forms give **VII** and they give the same perhydrorottlerone, m. 147°; from EtOH or AcOEt a labile form, m. 159–60°, may be occasionally obtained **V** **Tetrahydroallorottlerin**. *Ibid.* 1587–93. Isorottlerin (**I**), $C_{30}H_{28}O_8$, catalytically reduced by Pd-C in AcOH or AcOEt at 10 lb./sq. in. during 2 hrs., gives the *dihydro deriv.* (**II**), light yellow, m. 213°; reduction with Pd-C in EtOH, Me_2CO or AcOEt at 5 lb./sq. in. during 2 hrs. gives *tetrahydroallorottlerin* (**III**), bright yellow, m. 241°, which gives a brown $FeCl_3$ reaction in EtOH; **III** also results from **II** under the same conditions. At atm. pressure there results a mixt. of **II** and **III**, sepd. in part by crystn. from Me_2CO. **I** and Me_2SO_4 with K_2CO_3 in Me_2CO give the *O-penta-Me ether*, pale greenish yellow, m. 136°; catalytic reduction with Pd-C in abs. EtOH at 20 lb./sq. in. gives *O-pentamethyltetrahydroallorottlerin* (**V**), m. 101°; this also results from **III** and Me_2SO_4. **II** and Me_2SO_4 with K_2CO_3 in Me_2CO give a mixt. of a *tetra-Me ether* (**VI**), m. 149°, and a *penta-Me ether* (**VII**), pale greenish yellow, m. 135°. **VI** is not further reduced but **VII** gives **V**. **III** and PhN·NNHPh in EtOH give a mixt. of 2,4,6-trihydroxy-5-acetyl-3-methylazobenzene, m. 202°, and *8-phenylazo-5,7-dihydroxy-6-β-phenylpropionyl-2,2-dimethylchroman* (**VIII**), orange-red, m. 162°; the last was also prepd. from 5,7-dihydroxy-6-β-phenylpropionyl-2,2-dimethylchroman (**IX**) and PhN·NNHPh. The 8-β-phenylpropionyl isomer of **IX** and PhN·NNHPh give the *6-phenylazo isomer* of **VIII**, dark red, m. 181°. 5,7-Dihydroxy-8-acetyl-2,2-dimethylchroman gives a *6-phenylazo deriv.*, deep red, m. 232°. **III** (1.8 g.) in 75 cc. of 4% aq. NaOH in N, heated to 55° for 5 min. and rapidly cooled, gives 0.6 g. of *octahydroallorottlerone* (**X**), pale yellow, m. 175–5.5°; *tetra-Ac deriv.*, m. 163°. **X** and PhN·NNHPh in EtOH-dioxane, heated on the steam bath for 0.5 hr., give **VIII**. **III** in AcOH (boiled 12 hrs.) gives 2,4,6,2′,4′,6′-hexahydroxy-5,5′-diacetyl-3,3′-dimethyldiphenylmethane, m. 291°, and **X**. 5,7-Dihydroxy-6-β-phenylpropionyl-2,2-dimethylchroman and 40% HCHO with H_2SO_4 in EtOH give **X**. 5,7-Dihydroxy-6-acetyl-2,2-dimethylchroman gives 5,7,5′,7′-tetrahydroxy-6,6′-diacetyl-2,2′,2′-tetramethyl-8,8′-dichromanylmethane, greenish yellow, m. 209°, which gives a dark purple-brown $FeCl_3$ reaction. The conversion of rottlerin into **III** by way of **I** is explained and the structure which has been deduced for the latter compd. is supported by its behavior on hydrogenation and methylation. The relationship of the ethers obtained from **I** and its hydrogenation products has been detd. and their orientation established.



(1)



(X)

C. J. West

Yellow pigment of Papaver nudicaule. I. I. R. Price, Robert Robinson and R. Scott-Monerieu (mrs. Meares). *J. Chem. Soc.* **1939**, 1465–8(1939).—Details are given of the isolation of *nudicaulin chloride* (**I**), $C_{30}H_{35}O_{15}NCl \cdot 4H_2O$, from the flowers of *Papaver nudicaule*. **I** is a yellow to orange-yellow, amorphous powder, contg. 0.3 MeO group. It forms an orange-yellow Pb salt and a bright-red Hg salt. Hydrolysis affords about 40% of glucose (calcd. for a diglucoside, 52.8%); the other product is a reddish brown solid, which is in part a condensation product; the ratio of N:Cl is 1:0.75, as in **I**. Methylation and oxidation give anisic acid and thus **I** contains a *p*-HOC_6H_4 grouping. KOH fusion and methylation of the acid fraction also yield this acid. The behavior with HNO_2 indicates the presence of a NH_2 group. An aliphatic aldehyde appears to be formed on oxidation with H_2O_2. **I** is not extd. from an aq. soln. by BuOH or iso-AmOH even in the presence of NaCl but if the liquid is neutralized there is partial extn. of the colorless ψ-base, which is the chief reason for suspecting the presence of a flavylium salt structure but this is not decisive. The buds of yellow Iceland poppies, which are red, contain a pelargonidin diglucoside or bioside; this disappears as the flower develops.

C. J. West

Synthetical experiments in the flavone and isoflavone groups. R. Venkataraman. *Proc. Natl. Inst. Sci. India* **5**, 253–60(1939).—A general survey. C. J. West

Synthesis of some naturally occurring flavones from chalcones. T. S. Wheeler. *Proc. Natl. Inst. Sci. India* **5**, 267–74(1939).—A general survey. C. J. West

Vitexin. Ervin Péteri. *J. Chem. Soc.* **1939**, 1635–7.—Vitexin (**I**) was isolated by Perkin (*J. Chem. Soc.* **73**, 1019 (1898); **77**, 416(1900)) from New Zealand dyewood (*Vitex littoralis*) and by Barger (*J. Chem. Soc.* **89**, 1210 (1906)) from *Saponaria officinalis*. P. assigned the formula $C_{16}H_{14}O_7$ or $C_{17}H_{16}O_8$ to **I**. **I** isolated by P.'s method has the formula $C_{16}H_{14}O_7$ and m. 263°; it yields a *penta-Ac deriv.*, m. 251–6°. Attempts to convert **I** to apigenin ($C_{15}H_{10}O_5$) by dehydrating agents failed. Oxidation with H_2O_2 gives *p*-$HOC_6H_4CO_2H$ (**II**) and a minute quantity of quinol; Fehling soln. gives 1,3,5-$C_6H_3(OH)_3$, *p*-HOC_6H_4Ac and an amorphous acid; $K_3Fe(CN)_6$ gives **II**. **I** reduces a large amt. of $AgNO_3$-NH_4OH but the oxidation product could not be isolated; it does not react with $Pb(OAc)_4$ in AcOH, possibly owing to its insoly. **I** does not yield cryst. compds. with the usual methylating agents. Nitration of **I** and crystn. from dioxane gives the tetra-NO_2 deriv., yellow, m. 257°, which does not depress the m. p. of tetranitroapigenin. Sublimation of **I** with Zn dust at 350–60° gives a compd. $C_{18}H_{12}O_6$, the Ac deriv. of which does not depress that of triacetylapigenin (m. 181–2°).

C. J. West

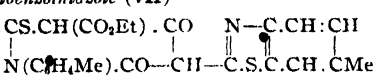
Demethylation of wogonin. Sizuo Hattori. *Ber.* **72B**, 1914–17(1939).—Although H. had always obtained 5,7,8-trihydroxyflavone (I) by demethylation of wogonin (5,7-dihydroxy-8-methoxyflavone) (II), Shah, Mehta and Wheeler (*C. A.* **33**, 601[8]) report the formation, from 7-hydroxy-5,8-dimethoxyflavone, of the 5,6,8-tri-HO compd. (baicalein) (III) with HI, and normal demethylation (formation of II or I, depending on the amt. of reagent), on heating with anhyd. $AlCl_3$. They conclude that in the treatment with HI the γ-pyrone ring is opened and subsequently reclosed in the opposite direction. Other cases where hydroxymethoxylflavones of the 5,7,8-type undergo the one or the other kind of demethylation are reported in the literature. It was suspected that differences in the exptl. conditions might be responsible for the apparent discrepancies and H. accordingly undertook a study of the conditions under which rearrangement will or will not occur. When II is very gently boiled a short time (5 min. at most) or heated 30 min. at 130–5° with 15–20 parts of HI of d. 1.7 (either freshly prepd. and colorless or brown from liberated I), it gives chiefly I, also obtained with the S., M. and W. mixt. of equal parts HI (d. 1.7) and Ac_2O on short gentle boiling as above. When, however, II is heated in this mixt. in an oil bath preheated to 145–50° or 150–5°, the product is III; in 1 expt. in which the temp. did not rise above 140°, some I was also obtained. Similar results were obtained with HI alone. Attempts to rearrange I into III by vigorous boiling with HI with or without Ac_2O were unsuccessful. The conclusion which might be drawn from the observations of S., M. and W. that demethylation of these hydroxyflavone Me ethers with HI is always accompanied by opening of the ring and its reclosing in the opposite direction must be qualified. I, deep yellow, m. 250–1° (previously reported as 227–8°), gives with alc. $FeCl_3$ a brown color and, after standing overnight, deposits a deep-brown cryst. ppt. When moistened with 5% NaOH, it transiently becomes brownish red and then dissolves with a light red-brown color. III, m. 263°, on the other hand gives with alc. $FeCl_3$ a dark olive-black color and on standing deposits a ppt. of the same color. In 5% NaOH it dissolves at once with brown-red color quickly changing to dark olive-blue with formation of a fine, dark-blue ppt.; in more dil. NaOH it dissolves with grass-green color, quite rapidly changing through light green to yellow. Mixed m. p. with I, about 235°. Cf. *C. A.* 25, 1595. C. A. R.

Cleavage of heterocyclic compounds of coal tar. (Correction of the communication under the same title by R. Weissgerber and Chr. Seidler.) O. Kruber. *Ber.* **72B**, 1878 (1939). The statement of W. and S. (*C. A.* 22, 416) that diphenylene oxide (I) is stable toward alkali at 300° and higher is erroneous, for as W. had himself already shown with Kramer (*Ber.* **34**, 1662[1901]); Ger. pat. 130,679) I at about 250° is cleaved to $(o\text{-}HOC_6H_4)_2$, and the cleavage of homologs of I and its 2,3-benzo deriv. has been effected (K., *C. A.* **31**, 6655[9]). This correction is made because it is being sought to utilize the erroneous statement in patent litigation. C. A. R.

Condensation of arsenic halides with pyridine and quinoline hydrohalides. P. P. Popov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1265–73(1939).—The complexes formed may be divided into 5 types: $5RHX.2MX_3$, $2RHX.MX_3$, $3RHX.2MX_3$, $RHX.MX_3$ and $RHX.2MX_3$ (R = C_5H_5N or C_9H_7N, X = Cl, Br or I and M = As). $AsCl_3$ (I) (10.82 g.) in 100 cc. $CHCl_3$ (II) with 5.90 g. $C_5H_5N.HCl$ in 75 cc. II gave $2C_5H_5NHCl.AsCl_3.CHCl_3$. $AsBr_3$ (III) (8.00 g.) with 3.80 g. C_5H_5NHBr (IV) in II gave **IV.III**, which recrystd. from hot II gave **3IV.2III.II** (V), needles, and this on standing gave **2IV.III.II** (VI), yellow, also obtained directly from 6.80 g. IV and 6.60 g. III. VI dried in a vacuum at 60–5° gave **2IV.III**, pale yellow. V under the same conditions underwent only partial loss of II. VI in boiling benzene for 20 min. gave **5IV.2III** (VII), also obtained from 6.58 g. IV and 2.14 g. III in II by refluxing the mixt. for 10 min. VII heated with a large excess of II for 10 min. and allowed to stand several days gave VI. $C_5H_5N.HI$ (VIII) (0.288 g.) with 2.416 g. AsI_3 (IX) in II gave **VIII.IX** (**XI**), bright orange. Both **X** and **XI** are less hygroscopic than the extremely hygroscopic Cl- and Br-contg. complexes. I (5.5 g.) with 4.9 g. $C_9H_7N.HCl$ (**XII**) in II gave **XII.I**, extremely hygroscopic, m. 122–3°. III (4.6 g.) with 3.0 g. $C_9H_7N.HBr$ (**XIII**) gave **XIII.III**, yellow-green, hygroscopic, m. 147–8°. **IX** (1.20 g.) with 0.34 g. $C_9H_7N.HI$ (**XIV**) in II at 40–50° gave **XIV.2IX**, bright orange, decomps. with darkening when heated, which, refluxed with II for 30 min., gave **XIV.IX**, golden yellow. All of the complexes undergo decompn. when dissolved in water. John Livak

Nicotinic amide and nicotinic acid. V. Helweg Mikkelsen. *Arch. Pharm. Chem.* **46**, 479–97(1939)(German summary).—Methods of prepn. and purification are discussed and results compared. Otto Johnson

Action of *p*-tolyl isothiocyanate on ethyl acetonedicarboxylate. David E. Worrall. *J. Am. Chem. Soc.* **61**, 2966–9(1939).—Addn. of 1 equiv. of $CO(CH_2CO_2Et)_2$ (I) to 0.25 g.-mole of Na in Et_2O, followed by 1 equiv. of *p*-MeC_6H_4NCS (II) and decompn. of the product with cold dil. HCl gives *1-p-tolyl-2,4-dioxo-5-carbethoxy-6-thiopiperidine* (III), $OC.CH_2.CO.CH(CO_2Et).CS.NC_6H_4Me$, m. 174–5° (decompn.); the aq. Na_2CO_3 soln. of III is pptd. by HCl but not by AcOH; the alk. soln. neutralized with AcOH gives a blue-green ppt. with $FeCl_3$. III is gradually decompd. by heating with AcOH, slowly evolving H_2S (speeded up by the presence of $PhNHNH_2$) and giving amorphous products. Refluxing III with coned. EtOH-KOH gives *1-p-tolyl-2,4-dioxo-6-thiopiperidine*, gray powder, m. 158–9° (decompn.). III and excess MeI in warm MeOH give a ppt. of the *6-methylmercapto deriv.* (IV), m. above 250° (decompn.); no H_2S is evolved on heating with AcOH; it forms a sparingly sol. salt with NaOH. With Br in AcOH (heating on the water bath) III yields the *3-Br deriv.*, pale yellow, m. 238–9° (decompn.); the *3-Br deriv.* of IV m. 165.5–6.5° and appears to sep. with EtOH of crystn. Shaking III in NaOH with Me_2SO_4 gives *1-p-tolyl-2-oxo-4-methoxy-5-carbethoxy-6-methylmercaptopiperidine*, m. 166°, which is insol. in both Na_2CO_3 and NaOH and does not react with Br. I reacts slowly and incompletely with the 2nd equiv. of Na, even when heated; the decanted soln. reacts with 2 equivs. of II to give *1-p-tolyl-2,4-dioxo-5-carbethoxy-6-thiopiperidine-3-thioformo-p-toluidide* (V), $MeC_6H_4N.CS.CH(CO_2Et).CO.CH(CSNHC_6H_4Me).CO$, yellow, m. 182–4° (decompn.); NH_4OH gives an *NII₄ salt;* H_2S is evolved on long heating with AcOH. The cold coned. H_2SO_4 soln. develops a blue fluorescence on warming. Heating V with EtOH-KOH for 1 hr. gives *1-p-tolyl-2,4-dioxo-6-thiopiperidine-3-thioformo-p-toluidide*, pale yellow, m. 205–8° (decompn.). Refluxing V with MeI in MeOH gives the *6-methylmercapto deriv.* (VI), bright yellow, m. 151–2°; it is pptd. from Na_2CO_3 soln. by AcOH or HCl but does not evolve H_2S on heating with AcOH. Refluxing VI with coned. EtOH-KOH for 1 hr gives *1-p-tolyl-2,4-dioxo-3-carboxy-6-methylmercaptopiperidine-3-thioformo-p-toluidide*, yellow, m. 232–3° (decompn.). The Na deriv. of V (prepd. with dil. NaOH and the salt crystd. from H_2O) and MeI, heated at 100° for 2 hrs., give *1-p-tolyl-2-oxo-4-methoxy-6-methylmercaptopiperidine-3-thioformo-p-toluidide*, m. 153°. V and Me_2SO_4 in warm dil. NaOH give *1-p-tolyl-2-oxo-4-methoxy-6-methylmercaptopiperidine-3,5-dicarboxylate*, m. 177–8°; *p*-MeC_6H_4NHMe is also formed. Reaction of V with Br in warm AcOH proceeds with evolution of HBr and formation of *1-(1-p-tolyl-2,4-dioxo-5-carbethoxy-6-thiopiperidyl)-5-methylbenzothiazole* (VII)



m. above 300°; it is sol. in NH_4OH or coned. H_2SO_4, in the latter with a bluish fluorescence; heating with AcOH and $PhNHNH_2$ liberates H_2S. Soln. of VII in cold NH_4OH and pptn. with HCl gives the free *acid*, m. 260–1° (de-

compn.). With MeI in EtOH-NH_4OH VII gives the *6-methylmercapto deriv.*, pale yellow, m. 282–3° (decompn.); this does not react with Br or $PhNHNH_2$. C. J. West

Alkaloids of Datura alba Nees. Cheoa Sakul Pradisth and Alfredo C. Santos. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 1-4(1939); cf. *C. A.* **33**, 5593⁸.—The seeds of *D. alba*, grown in the Philippines, contain chiefly hyoscine and very little hyoscyamine, whereas the pericarps, leaves and stems yield only the former. The plant is more similar to the *D. alba* cultivated in Germany than to that grown in Japan. C. R. Addinall

The bases of Stemona tuberosa Loureiro. VII, VIII. Tuberostemonine of the root of Stemona tuberosa Loureiro. 2. Heisaburo Kondo, Kohei Suzuki and Masakiti Satomi. *J. Pharm. Soc. Japan* **59**, 443-50(in German, 177-84)(1939); cf. *C. A.* **31**, 106².—Tuberostemonine perchlorate, $C_{22}H_{33}O_4N.HClO_4$, in 5% aq. NH_3 when shaken with ether gave tuberostemonine (I), $C_{22}H_{33}O_4N$, with 1 mol MeOH, $C_{22}H_{33}O_4N.MeOH$, m. 86–8°. The formula, $C_{19}H_{29}O_4N$, as given in the previous paper is now corrected as above. I contains 1 lactone linkage and is inactive toward $HONH_2$ and *p*-nitrophenylhydrazine. I does not contain MeO, NMe or methylenedioxy radicals. Of the 4 O atoms, 2 form a lactone linkage, but the nature of the other 2 is not known. I does not contain OH groups as reported in the previous paper. I and MeI gives a methiodide, $C_{23}H_{33}O_4N.MeI.H_2O$, m. 236–8°. The nature of N linkage is tertiary instead of secondary as reported previously. In general I resembles a compd., $C_{22}H_{33}O_4N$, obtained from *Stemona sessilifolia* by Schild (*C. A.* **30**, 2973⁵). He reported, however, the existence of a double linkage detected by hydrogenation, but the authors failed to show the existence of an unsatd. linkage. **Stemonidine. 4 (Supplement).** K. Suzuki. *Ibid.* 450–7(in German, 184–6).—The proposed structure of stemonidine (II) is as follows: $C_{19}H_{31}O_5N = C_{17}H_{28}O_2(:N)(OMe)(-CO.O-)$. II and alc. MeI gave a methiodide, decompg. 263°, while II and MeI gave a compd., $C_{19}H_{31}O_5N.MeI$, decompg. 248°. Oxidation of II with alk. $KMnO_4$, followed by treatment with MeI, gave a methiodide, $C_{19}H_{29}O_5N.MeI$, decompg. 235°. Oxidation of stemonidine-MeOH (prepd. from the above methiodide) with alk. $KMnO_4$ gave a compd. as the chloroaurate, $C_{19}H_{29}O_5NMeAuCl_4$, m. 158°. Oxidation of II with $KMnO_4$ in H_2SO_4 gave a compd., $C_{16}H_{24}O_5N$ (III), m. 208°, sol. in benzene, and $C_{11}H_{17}O_4N$ (IV), m. 202°, insol. in benzene. III does not contain a =CO radical. IV contains 1 MeO radical and forms a semicarbazone, m. 258°, but it cannot be acetylated. Dehydrogenation of II with Pd and asbestos gave a dehydro base, $C_{17}H_{23}O_4N$, contg. 1 each =N, lactone, —OMe, and perhaps =CO group. F. I. N.

Ether extract of the bark of Cajuput tree. Minoru Ishi and Yasuyosi Osima. *J. Agr. Chem. Soc. Japan* **15**, 841-2(1939).—The bark of *Melaleuca leucadendron* Linn. was extd. with ether. The yield of the ext. was 20%. When the unsaponifiable matter was extd. with petr. ether, cryst. scales, m. 79°, were isolated. The formula $C_{30}H_{50}O$ is given. The petr. ether-insol. part was again extd. with ether. Long needles, m. 215°, were obtained from the ext. From the residue a large amt. of needles, m. 304°, crystd. out after a day. They were insol. in petr. ether, difficultly sol. in alc. or ether, and sol. in hot alc. and showed the Liebermann reaction strikingly. They are given the formula $C_{28}H_{15}O_3$(?) and the name *melaleucin*. Mono-Ac deriv., m. 280°. Melaleucin is a new resinol. Y. Kihara

Chemical studies on the roots of Platycodon grandiflorum. VIII. Isolation, purification and properties of platycodigenin, a sapogenin. Magosaburo Tuzimoto and Ryoiti Senzyu. *J. Agr. Chem. Soc. Japan* **15**, 857-61 (1939); cf. *C. A.* **33**, 6448¹·³; **34**, 137⁵.—Platycodin, a saponin, (10 g.) in 500 cc. of abs. alc. was hydrolyzed by heating with 188 cc. of 20% HCl for 20 hrs., neutralized with NaOH, decolorized and evapd. Platycodigenin (I) sepd. as a yellowish brown mass. When it was dissolved in a little abs. alc. and 50% KOH was added, K platycodigenin crystd. out as colorless plates. I was isolated in a pure state from the K salt. It was also purified by the chromotographic method. It formed colorless needles or prisms, m. 242–3°, sol. in MeOH, EtOH, AcOH, Ac_2O and acetone, difficultly sol. in $CHCl_3$, insol. in H_2O, ether, C_6H_6 and petr. ether, $[\alpha]_D^{17}$ 59.45°. It is an unsatd. monobasic acid giving Liebermann's sterol reaction. It did not reduce Fehling soln. No MeO group in the mol. was proved. **IX. Determination of the molecular weight of platycodigenin.** *Ibid.* 862–4.—The mol. wt. of platycodigenin was detd. by the titration method, Barger's method and the elementary analysis of the K salt. The mean value was 527. The formula $C_{30}H_{48}O_7$ is given for platycodigenin. Also in *Bull. Agr. Chem. Soc. Japan* **15**, 132–3(1939)(in English). Y. K.

Chlorophyll. LXXXIX. Vinyl-, hydroxyethyl- and oxophylloporphyrins. Hans Fischer and Stewart Ferguson MacDonald. *Ann.* **540**, 211–23(1939); cf. *C. A.* **33**, 6336⁹.—Chlorine e_6 (I) (4 g.) in 25 cc. quinoline, heated 5 min. in a N atm. and poured into Et_2O, gives after extn. with 2–6% HCl, 600–700 mg. of phyllochlorine (II), extd. by 8% HCl; the Me ester m. 181°; the 2% HCl soln. contains 160 mg. of vinylphylloporphyrin (III), m. 238°, and the 0.5% HCl soln. from III contains phylloporphyrin (IV), whose ester m. 226°. I (1 g.) heated with 10% HCO_2H gives 30–40 mg. of III, whose ester m. 137°. Decarboxylation of 1 g. of I with Ph_2 (5 min.) gives about 0.5 g. of II and 100 mg. of III. Catalytic reduction of 50 mg. of III gives 7 mg. of IV; HI reduction gives a very poor yield of IV. The ester of II (2 g.) in 2 l. AcOH, treated with 25 cc. HI (d. 2; it is not necessary to decolorize the HI) and with a stream of air for 2–3 weeks, gives after methylation 370 mg. of the *Me ester* of *oxophylloporphyrin* (V), $C_{33}H_{36}N_4O_5$, m. 257°, acid no. 1.8; *Cu complex*, m. 278° (cor.); *oxime*, m. 290° (decompn., cor.). Hydrolysis of 165 mg. of V with 13.5 g. KOH in 22.5 cc. abs. EtOH (refluxing 5 hrs.) gives after methylation the *Me ester* of *2-desethyl-2-(α-hydroxyethyl)phylloporphyrin* (VI), m. 209–10°, acid no. 0.3; the Ac group is thus reduced to CH(OH)Me; VI also results in 18-mg. yield from 65 mg. of the ester of III in 7 cc. AcOH and HBr on standing 1 week; with HI in AcOH (3 weeks) III gives V; VI with HI in AcOH gives V in 1 week and in 24 hrs. with $KMnO_4$ in C_5H_5N. VI in $AcOH_{\text{v}}$ evapd. to dryness and heated on the water bath for 12 hrs., gives III; heating crystals of VI or smears from $CHCl_3$, Et_2O, Me_2CO or C_5H_5N causes no change. **XC. 2-α-Hydroxymesoisochlorine e_4 dimethyl ester and vinylisochloroporphyrin e_4.** Hans Fischer and Juan M. Ortiz-Velez. *Ibid.* 224–32.—The *hemin*, $C_{35}H_{38}N_4O_4FeCl$, from the di-Me ester (I) of isochlorine e_4 and $Fe(OAc)_2$ and NaCl in AcOH, does not yield satisfactory anal. results. The *hemin*, $C_{35}H_{40}N_4O_4FeCl$, from the di-Me ester (II) of mesoisochlorine e_4, m. 223°; the anal. results are satisfactory. II with $Cu(OAc)_2$ in $CHCl_3$-MeOH, heated 1 hr., gives the *Cu salt*, $C_{35}H_{40}N_4O_4Cu$, m. 125°. I (1 g.), shaken 1.5 hrs. with 50 g. HBr-AcOH, the AcOH removed at 45° and the residue hydrolyzed with 350 cc. 15% HCl at room temp. for 48 hrs., gives 790 mg. of the *di-Me ester* of *2-α-hydroxymesoisochlorine e_4* (III), brown, m. 170°; heating for 10 min. at 180° in a high vacuum gives I. Shaking 0.5 g. III in 40 cc. C_5H_5N with 2 g. $KMnO_4$ for 48 hrs. and esterification gives the *di-Me ester* of *2-acetylisochlorine e_4*, $C_{35}H_{40}N_4O_5$, orange, m. 243°. Isochlorine e_4 (200 mg.), 2 g. P_2O_5 and 10 g. sand, heated on the water bath, give pyropheophorbide a. II (200 mg.) in 50 cc. $CHCl_3$ and 10 cc. Br-AcOH, allowed to stand 24 hrs. and the perbromide decompd. with Me_2CO, gives the *di-Br deriv.*, m. 171° (*Cu complex*, green, m. 133°). I (100 mg.) in 20 cc. 80% HCO_2H, heated nearly to boiling, powd. Fe added and the mixt. warmed 2 min. on the water bath, gives 35 mg. of the *di-Me ester* of *vinylisochloroporphyrin e_4*, m. 224°; *Cu complex*, m. 221°; the *hemin*, orange, m. 278°. **XCI. Isopurpurins and neopurpurins.** Hans Fischer and Martin Strell. *Ibid.* 232–49.—The di-Me ether of neopurpurin 4 (I) gives a *Cu complex*, $C_{35}H_{34}O_4N_4Cu$, m. 245°. Dihydroxychlorine e_6 in C_5H_5N, refluxed 6 hrs. while O is passed through, gives after methylation the *di-Me ester* of dihydroxypurpurin 5 (II), removed by 13% HCl, which could not be crystd.; 14% HCl exts. dihy-

droxy-γ-hydroxymethylrhodochlorine lactone, m. 180°. II yields an oxime, which was not isolated. II in Et_2O contg. a little C_5H_5N, shaken 5 min. with 20% KOH-PrOH and esterified, gives the *Me ester* of *dihydroxyneopurpurin 4*, $C_{35}H_{36}O_6N_4$, m. 191°. Catalytic reduction of I in dioxane with Pd gives *mesoneopurpurin 4* (III), m. 200°. Shaking the di-Me ester of mesopurpurin 5 in EtOH contg. a little C_5H_5N with 25% KOH-PrOH for 5 min. also gives III. The di-Me ester of purpurin 5 (IV) in C_5H_5N, shaken with satd. MeOH-$Ba(OH)_2$, gives *"unstable" chlorine 5* (V), $C_{33}H_{34}O_6N_4$, m. above 300°; CH_2N_2 gives IV; V does not give the neopurpurin reaction; HI in AcOH gives chloroporphyrin e_5 lactone (VI). Shaking 600 mg. of IV in a little C_5H_5N with 300 cc. 5% MeOH-KOH for 1 min. gives 550 mg. of the *di-Me ester* of *isopurpurin 5* (VII), m. 210°; heating above the m. p. causes some decompn. but no other change; further action of 5% MeOH-KOH gives I and V; VII is unchanged by passing O through a boiling C_5H_5N soln. for 12 hrs.; with HI in AcOH VII yields VI. VII (50 mg.) in a little C_5H_5N, heated with 10 cc. 20% MeOH-KOH for 1–2 min. at 100°, gives the *mono-Me ester* of *2-vinylchloroporphyrin* e_5, m. above 300°; HI in HOH gives 2-ethylchloroporphyrin e_5. Catalytic reduction of VII in dioxane gives the *di-Me ester* of *mesoisopurpurin 5*, m. 183°. Hydrolysis of the ester gives *dihydroxypurpurin 5*, m. 175°. The tri-Me ester of purpurin 7 (200 mg.) with 4% MeOH-KOH (shaken 2 min.) gives 140 mg. of the *tri-Me ester* of *isopurpurin 7*, m. 270°; HI in AcOH gives pheoporphyrin a_7 di-Me ester. 10-Acetoxymethylpheophorbide a with CH_2N_2-MeOH gives a mixt. contg. chlorine e_7 lactone; MeOH-Na_2CO_3 (refluxed 2 hrs.) gives the ester of rhodochlorine, m. 208°.

XCII. Synthesis of rhodoporphyrin-γ-carboxylic anhydride and synthetic rhodines and verdins. Hans Fischer and Carl Gottfried Schröder. *Ibid.* **541**, 196–202.— Mesoverdin II ester in Me_2CO and powd. $KMnO_4$, shaken 1 hr. at 0°, give rhodoporphyrin-γ-carboxylic anhydride, m. 250°. Mesoporphyrin XIII (1,4-diethyl-2,3,5,8-tetramethylporphine-6,7-dipropionic acid) in the rhodine reaction gives *mesorhodine XIII*, $C_{36}H_{38}N_4O_3$, m. 275°; $H_2NNHCONH_2$.HCl gives *mesoverdin XIII*, $C_{35}H_{36}N_4O_3$, m. 241°. Mesoporphyrin II (di-Me 1,3,5,7-tetramethyl-4,8-diethylporphine-2,6-dipropionate) gives *mesorhodine II ester*, m. 240°, and *mesoverdin II ester*, m. 222–3°. Synthetic mesoporphyrin IX gives a mesorhodine and a mesoverdin identical with those previously prepd.; thus this compd. as isolated from the blood pigments must be considered homogeneous. C. J. West

The isolation and chemical constitution of bonelline, the green pigment of Bonellia viridis. Edgar Lederer. *Compt. rend.* **209**, 528–30(1939).—Pure bonelline (I) was obtained from cold alc. exts. of the gephyrean worm *Bonellia viridis* as follows. I was extd. with Et_2O from the residue after evapn. and extn. with petr. ether. From the Et_2O ext. I was extd. with 1% NH_4OH and then re-extd. with Et_2O after neutralization of the green alk. soln. I was then extd. with 6% HCl in which it gave a blue soln. After neutralization and reëxtn. by Et_2O the Et_2O soln. was passed through a column of $CaCO_3$, giving a wide green zone with some weak blue zones. I was eluted from the principal zone by soln. in dil. HCl and extd. with Et_2O. On evapn. a dark-green cryst. residue was left. I crystd. from Et_2O or toluene in fine needles which did not m. below 300° nor show fluorescence. Concd. solns. showed an intense red-green dichroism. I reacted with CH_2N_2 to form an ether salt which no longer had any acid characteristics. It formed complex salts with Cu, Fe and Zn. Only the Zn salt showed red fluorescence. The absorption and fluorescence spectra of I were strikingly similar to those of mesopyrrochlorine. The elementary analysis of I, C 69.76%, H 6.92% and N 10.4%, corresponded to the formula $C_{34}H_{36}N_4O_4 = H_2$. Rachel Brown

Constitution of the purine nucleosides. VIII. Uric acid riboside. Roderick Falconer and J. Masson Gulland. *J. Chem. Soc.* **1939**, 1369–71; cf. *C. A.* **32**, 5792[5].—Uric acid 9-*d*-riboside (I), isolated from red corpuscles of beef blood by Newton, *et al.* (*C. A.* **17**, 811), is also found in liver. Liver at pH 5 is allowed to autolyze for 4 hrs., coagulated by rapidly heating to 85° and filtered; the filtrate is concd. to 0.1 its vol. under reduced pressure at 50°, cooled, satd. with $(NH_4)_2SO_4$ and the resulting ppt. discarded; on standing for several days crude I seps., which is again purified from H_2O; the aq. soln. at pH 5 is then pptd. with $Hg(OAc)_2$ and the filtrate treated with AcONa (to make a 10% soln.); Hg is removed from the ppt. and the soln. concd. at 50° until crystn. begins. I seps. as needles or squares or rectangular plates, $[\alpha]_D^{20}$ −40.8° (0.1 *N* NaOH, *c* 1.25) for the I from blood or −40.6° (*c* 1.13) for the I from liver. The ultraviolet absorption spectra of I in H_2O, acid and alkali very closely resemble those of 9-methyluric acid and are quite unlike those of 1-, 3- and 7-methyluric acids in the same solvents, thus establishing the position of the ribose group. The sugar occupies the same position as in other purine nucleosides.

C. J. West

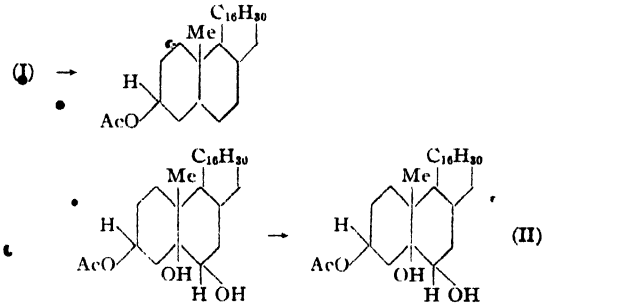
Synthesis of substances related to the sterols. XXVII. The synthesis of x-norestrone. Robert Robinson and H. N. Rydon. *J. Chem. Soc.* **1939**, 1394–405; cf. *C. A.* **33**, 7746[8].—Details are given of the prepn. of 6,2-$MeOC_{10}H_6$-Ac (I) in 120-g. yield from 192 g. 2-$C_{10}H_7OMe$. The *oxime* (II) of I m. 169–70°. Rearrangement of II with PCl_5 in Et_2O gives *6-acetamido-2-methoxynaphthalene*, m. 162–3°. Hydrolysis with HCl, transformation of the NH_2 group into the HO group and methylation with Me_2SO_4 give 2,6-$C_{10}H_6(OMe)_2$, thus establishing the structure of I. 3-(6′-Methoxy-β-naphthyl)-Δ^2-cyclopentenone-2-acetic acid and AcOH, refluxed 30 min., give 74% of 4-acetoxy-7-methoxy-3′-keto-1,2-cyclopentenophenanthrene (*C. A.* **33**, 1744[7]) (III), m. 241–2° (sufficiently pure for preparative purposes); the 4-HO deriv. (IV) gives an *oxime*, m. 268°; hydrolysis of III and methylation without isolation of IV give the 4,7-di-MeO deriv. (V). IV and V were not suitable for hydrogenation but 6.4 g. III in AcOH, reduced with Adams catalyst at 70° for 26 hrs. (4 moles H_2) and the product crystd. from AcOH and then AcOEt, gives 0.2 g. *4,3′-dihydroxy-7-methoxy-1,2-cyclopentenophenanthrene* (VI), m. 139–40°; in another expt. the product was triturated with petr. ether and crystd. from MeOH, giving the *4-Ac deriv.* of VI, m. 145°. In a 3rd expt. the product was hydrolyzed with KOH in MeOH-H_2O (5 hrs.) and distd., giving 2 fractions, $b_{0.2}$ 175–95° and $b_{0.3}$ 200–20°. The latter fraction was pptd. with digitonin, giving *4-hydroxy-7-methoxy-1,2,3,4-tetrahydro-1,2-cyclopentenophenanthrene*, m. 141–2° (*p-nitrobenzoate*, m. 214–16°); it is very resistant to oxidation. The 1st fraction on redistn. and dehydrogenation gives a mixt. of 80% of 1,2-cyclopentenophenanthrene and a MeO deriv., the latter being sepd. as the 1,3,5-$C_6H_3(NO_2)_3$ complex and the former as the picrate. These results may be regarded as exptl. evidence for preferential deoxygenation at the 4-position in the hydrogenation of 4,7-dihydroxyphenanthrene derivs. This work also indicated that in order to obtain the desired 3′-keto complex it would be necessary to open the 5-membered ring before proceeding with the hydrogenation. V (2.9 g.) and iso-$AmNO_2$ with *tert*-BuOK give 3 g. of the *2′-isonitroso deriv.*, m. 248–9° (decompn.); concd. H_2SO_4 gives a brilliant indigo-blue color; it was intended to convert this into an acid but the work was discontinued in light of the shorter route given below. V in C_5H_5N, treated successively with HCO_2Et and EtONa, gives 97% (crude yield) of the *2′-formyl deriv.* (VII), pale yellow, decomps. 195°; it gives a deep olive-green color with EtOH-$FeCl_3$; attempted condensation of V with HCO_2Et or iso-AmO_2CH in C_6H_6, Et_2O or dioxane with Na or in Et_2O with EtONa were fruitless; iso-AmO_2CH and *tert*-BuOK in a N atm. give a *condensation product*, $C_{39}H_{30}O_6$, orange, m. 301–2°; concd. H_2SO_4 gives a purple color; AcOH contg. a little HCl gives a plum color with a bright-red fluorescence. VII and NH_2OH.HCl in AcOH give a cyano ketone which is hydrolyzed by KOH in dil. EtOH (3 days on steam bath) to *4,7-dimethoxyphenanthrene-1-β-propionic-2-carboxylic acid* (VIIA), m. 285° (decompn.); *di-Me ester* (VIII), m. 115°. Reduction of VIII in AcOH with the Adams catalyst (10% by wt.) at 70° is complete in 12–48 hrs., according to the activity of the catalyst. Hydrolysis with KOH in dil.

MeOH and fractionation from C_6H_6 and then from dil. AcOH gives 3 acids: *4,7-dimethoxy-9,10-dihydrophenanthrene-1-β-propionic-2-carboxylic acid* (**IX**), m. 208–9° (10%), sparingly sol. in C_6H_6; *4,7-dimethoxy-1,2,3,4-tetrahydrophenanthrene-1-β-propionic-2-carboxylic acid* (**X**), m. 138–40°, which is more sol. in C_6H_6 than **IX**; *7-methoxy-1,2,3,4,9,10,11,12-octahydrophenanthrene-1-β-propionic-2-carboxylic acid* (**XI**), m. 233°, 25% yield; these structures are not definitely proven and the analogies on which they are based are given. Pyrolysis of the Pb salt of **XI** over a free flame at 0.25 mm. gives *7-methoxy-3'-keto-1,2,3,4,9,10,11,12-octahydro-1,2-cyclopentenophenanthrene* (*x-norestrone Me ether*), m. 142–3°; concd. H_2SO_4 gives a yellow color, becoming orange on warming; HI in AcOH gives *x-norestrone*, m. 222°, which gives a yellow color with H_2SO_4 unchanged on heating; *acetate*, m. 145–6°. Pyrolysis of the Pb salt of **IX** gives *4,7-dimethoxy-3'-keto-9,10-dihydro-1,2-cyclopentenophenanthrene*, concd. H_2SO_4 gives a bright-yellow color, with a brilliant-green fluorescence on warming; *2,4-dinitrophenylhydrazone*, deep red, m. 242 3°. The reaction failed with **X**, probably owing to partial elimination of MeOH during the pyrolysis. **IV** and Et_2SO_4 with NaOH in EtOH give 100% of the *4-EtO deriv.* (**XII**), m. 191°; the formyl deriv. from 5.2 g. of **XII** yields a cyano ketone which is hydrolyzed to 3.2 g. of the *7-methoxy-4-ethoxy analog* of **VIIA**, m. 268 9°; *di-Me ester* (**XIII**), m. 118°; this is best purified by percolation through Al_2O_3. Reduction of **XIII** gives as the only isolatable product the *7-methoxy-4-ethoxy analog* of **X**, m. 160°; **XI** or any other deoxygenated product could not be found. 7-(β-6'-Methoxynaphthyl)-4,7-diketoheptoic acid with concd. HCl-AcOH (refluxing 3 hrs.) gives 84% of *7-(β-6'-hydroxynaphthyl)-4,7-diketoheptanoic acid*, m. 171–2°; heating with dil. KOH on the water bath for 1 hr. gives 100% of *3-(6'-hydroxy-β-naphthyl)-Δ²-cyclopentenone-2-acetic* acid, yellow, m. 221 2°, which is converted by refluxing with Ac_2O for 30 min. into 64% of *4,7-diacetoxy-3'-keto-1,2-cyclopentenophenanthrene* (**XIV**), m. 196 7°; NaOH gives the *4,7-di-HO deriv.* (**XV**), m. 338° (decompn.). Expts. on the hydrogenation of **XIV** gave no useful results. Methylation of **XV** yields *V*. γ-*m*-Methoxyphenylpropyl iodide (from the chloride and NaI in 91% yield), b_{11} 155 60°, n_D^{25} 1.5773; refluxing with Et cyclopentanone-2-carboxylate and K in C_6H_6 gives 57% of *Et 2-(γ-m-methoxyphenylpropyl)cyclopentanone-2-carboxylate*, $b_{0.5}$ 187 90°, n_D^{25} 1.5167; *semicarbazone*, with 2 moles EtOH; hydrolysis and distn. with Ac_2O yield *2-(γ-m-methoxyphenylpropyl)cyclopentanone*, $b_{0.5}$ 173 7°, n_D^{25} 1.5280; *semicarbazone*, with 1 mole EtOH, m. 180°; *2,4-dinitrophenylhydrazone*, orange, m. 103–4°. The prefix "x" is used above to indicate indeterminate stereochem. configuration. C. J. West

Steroids. II. The isolation of a new androstan-3(β)-olone and of allopregnan-3(β)-ol-20-one from the urine of pregnant mares. R. D. H. Heard and A. F. McKay. *J. Biol. Chem.* **131**, 371–9(1939); cf. *C. A.* **32**, 2537⁷.—A new satd. HO ketone, $C_{19}H_{30}O_2$, has been isolated from the neutral ext. of the urine of pregnant mares remaining after the removal of the phenolic estrogens. The compd. is an androstan-3(β)-olone, $C_{19}H_{30}O_2$, and evidence is adduced that the CO group is most probably located at C_6, C_7 or C_{12}. It m. 187–187.5°, $[\alpha]_D^{24}$ −160°; *oxime*, m. 194 5°; *benzoate*, m. 206–8°. It yields on oxidation by CrO_3 in the cold a diketone, m. 157–8°, which is not identical with androstane-3,17-dione. The presence of allopregnan-3(β)-ol-20-one was confirmed. A. P. Lothrop

A 5,16-pregnadiene-3,20-diol. Adolf Butenandt and Josef Schmidt-Thomé. *Ber.* **72B**, 1960 (1939).—From 400 mg. 5-pregnene-3,17,20-triol 3,20-diacetate (*C. A.* **33**, 5862⁸), boiled 4 hrs. in 20 cc. pyridine and 1 cc. $POCl_3$, is obtained 160 mg. of *5,16-pregnadiene-3,20-diol diacetate*, m. 121°, 150 mg. of which, boiled 0.5 hr. in 10 cc. MeOH with 0.1 g. NaOH in 1 cc. water, gives 84 mg. of the *diol* (**I**), m. 168–70°, and regenerating the diacetate with Ac_2O in pyridine at room temp. I (86 mg.) with prehydrogenated Pt oxide in AcOH takes up 2 mols. H to give 45 mg. allopregnane-3(β),20(β)-diol, m. 193° (diacetate, m. 138°), which is oxidized by CrO_3-AcOH to allopregnane-3,20-dione, m. 196°. **I** shows no androgenic activity even when applied directly, in oil, to the cock's comb in 5 × 100 γ dose. C. A. R.

The chemical constitution of cholesterol. XVI. Oxidation with peracetic acid. Francesco Pirrone and Rosilde Vannucchi. *Gazz. chim. ital.* **69**, 470–8(1939); cf. *C. A.* **34**, 444⁹.—Since Pickard and Yates (*C. A.* **3**, 2679) obtained a cholestanetriol from cholesterol (**I**) in AcOH, Minovici and Vladhutza (*C. A.* **6**, 2743) a triolcarboxylic acid from **I** in AcOH-H_2SO_4 with excess perhydrol and M. and V. (*Biochem. Z.* **38**, 46(1912)) a compd., $C_{27}H_{47}OCl$, from **I** in HCl-AcOH with perhydrol, it was of interest to ascertain the effect of dil. H_2O_2 on **I** in AcOH. The oxidation was carried out in AcOH: (1) at room temp. in sunlight; (2) on a boiling water bath, and (3) at the b. p. of the reaction mixt. **I** (4 g.) and 3.6% aq. H_2O_2 (200 cc.), allowed to stand for 3 months in sunlight, water (1000 cc.) added, and the ppt. purified by EtOH, yield 0.90 g. of *diacetylcholestanetriol* (**II**), lustrous, m. 164–5°, gives the same colors in the Rosenheim, Salkowski and Liebermann-Burchard reactions as does **I**, gives a red-yellow color in concd. H_2SO_4, is insol. in aq. alkalies and acids, gives no color in hot EtOH with iodized starch, does not decolorize 10% Br in AcOH or 0.01 *N* $KMnO_4$, cannot be acetylated, and does not give an oxime. In hot alc. KOH, **II** forms the free *cholestanetriol*, $C_{27}H_{48}O_3$ (**III**), lustrous, m. 217–18°; when cold it gives no color in the Rosenheim test but when hot it gives a violet-red color, which turns red, with strong green fluorescence. In the Salkowski test, an orange-yellow color, with green fluorescence, appears slowly. In the Liebermann test an immediate violet-brown color appears, but changes to grass-green, then to brown. A $CHCl_3$ soln. of **III** does not turn the plane of polarized light. It is insol. in aq. alkalies and in dil. mineral acids; it gives no color in hot EtOH with iodized starch; it does not decolorize 0.01 *N* $KMnO_4$ nor a 10% soln. of Br in AcOH. **III** and Ac_2O, refluxed for 2 hrs. and poured into water, yield **II**. **III** and Ac_2O contg. H_2SO_4, refluxed for 1 hr. and poured into water, yield a *compd.*, $C_{31}H_{50}O_4$, m. 124–5°. The reactions indicate that perhaps 2 O atoms are present as secondary alc. OH groups and therefore that a hydroxycholestanediol is involved. To establish the character of the 3rd O atom, the work of Dunn, *et al.* (*C. A.* **29**, 807⁴) on cholestenetriol was repeated; by boiling with Ac_2O and concd. H_2SO_4 the product is a diacetylcholestenediol, m. 123 6°, obtained by Dunn (*loc. cit.*) and Westphalen (*C. A.* **9**, 2535). Accordingly the formation of **II** from **I** by AcO_2H (**IV**) in light involves simultaneous oxidation and esterification, probably as follows:



When 50 cc. 3.6% H_2O_2 is added during 3 hrs. to 3.86 g. **I** in 100 cc. glacial AcOH on a boiling water bath, the mixt. heated 3 hrs. longer, and the cold soln. filtered, there is obtained a small residue of a *compd.*, m. 63–5°; the filtrate, neutralized with NH_4OH and dild., ppts. a *compd.* $C_{24}H_{40}O_4$ (**IV**), m. 121–2°. Neither was identified. **IV** is insol. in dil. acids and alkalies, does not color hot alc. iodized starch, does not decolorize 0.01 *N* $KMnO_4$ nor 10% Br in AcOH; when cold, the Rosenheim test gives no color, but when hot an intense color with green fluorescence. The Salkowski test gives a red-yellow with green

fluorescence. The Liebermann reaction is first violet, then grass-green and finally brown. It is possible that oxidation of I takes place first at the secondary alc. groups, with formation of a ketone, and then on the lateral chain; in this case IV might be a ketonetriol. I (4 g.), 100 cc. glacial AcOH and 50 cc. 3.6% H_2O_2, refluxed for 3 hrs., filtered hot, and cooled, ppt. 300 mg. of a substance which, purified many times by EtOH-AcOH, gives III. The mother liquor from the sepn. of III, neutralized with NH_4OH and dild., yields IV. The expts. leave no doubt that under the conditions employed, oxidation of I gives a triol having 2 secondary and 1 tertiary alc. groups. The difference between the m. p. of III and that of the cholestanetriol prepd. by Mauthner and Suida (*Monatsh.* **19**, 579(1896)), Pickard (*C. A.* **3**, 2679), Westphalen (*loc. cit.*) and Windhaus (*C. A.* **1**, 1001) is not surprising, since theoretically various stereoisomers of 3,5,6-trihydroxycholesterol can exist. C.C. Davis

Experimental correlation of the plant cardiac poisons with the estrone group. Adolf Butenandt and Thomas F. Gallagher. *Ber.* **72B**, 1866–9(1939).—The widely distributed strophanthidin (I) has an aldehyde group in the place of the angular 10-Me group characteristic of most of the steroids and therefore seemed a promising material for the exptl. correlation of a cardiac poison with the follicle hormones of the estrone group, which are partially aromatized derivs. of steroids which no longer have a substituent on C atom 10. From I there has been obtained a monounsatd. ketocarboxylic acid, $C_{19}H_{26}O_5$ (II), considered to be *3-oxo-4-estrene-17-carboxylic acid*. Its prepn. is described in the present paper. I in acetone at 0–5° is oxidized with powd. $KMnO_4$ to strophanthidinic acid, m. 276°, which, allowed to stand 1 hr. at 25° in 10 vols. of 4% aq. NaOH, then dild. with water to 100 vols. and oxidized with 5% $KMnO_4$ soln., gives the ketolactonecarboxylic acid, $C_{21}H_{28}O_7$ (III), m. 260° (Elderfield, *C. A.* **30**, 4173[6]); free *trans*-ketodicarboxylic acid, from III boiled with 2% NaOH, m. 178°. III oxidized with H_2O_2 according to Elderfield gives the trihydroxydicarboxylic acid, $C_{20}H_{30}O_7$ (IV), m. 285° (di-Me ester, m. 203°). When 1.28 g. IV was dissolved in 120 cc. of 0.1 *N* alc. HCl, concd. under atm. pressure to about 10 cc., dild. with a little water and gently warmed under a current of N to incipient crystn., there was obtained 59% of the $\Delta^{14,15}$-unsatd. *anhydrodicarboxylic acid*, $C_{20}H_{28}O_6$ (V), leaflets from dil. MeOH, sinters 250°, becoming brown, and decomps. 260° (the m. p. depends on the rate of heating), $[\alpha]_D^{25}$ 122° (abs. alc.); *di-Me ester*, m. 150°, obtained from V and CH_2N_2 or by dehydration of the di-Me ester of IV. In alc. or AcOH with the Adams-Shriner Pt oxide catalyst, V is hydrogenated to the satd. *acid*, decomps. 255–6°, $[\alpha]_D^{16}$ 35° (abs. alc.) (*di-Me ester*, m. 104–5° (foaming)). 230 mg. of which, treated in 10 cc. AcOH with 66 mg. CrO_3 in 6 cc. AcOH and allowed to stand 15 hrs. at 4°, gives in varying yields (av., 32 mg.) the *hydroxyketocarboxylic acid*, $C_{21}H_{28}O_6$, m. 193–4° (foaming). This acid (68 mg.) refluxed 12 min. in 3 cc. MeOH and 0.1 cc. of 0.1 *N* alc. HCl gives II, m. 186°, sublimes without decompn., even in the presence of Cu bronze, at 110–30° under 0.001 mm., $[\alpha]_D^{25}$ 83° (abs. alc.), absorption max. 240 mμ (ε 17,200 in alc.). It shows no estrogenic activity in the castrated mouse in 4 × 750 γ doses. C. A. R.

Biochemical dehydrogenations in the cr
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pure bacterial strain which dehydrogenates secondary steroid alcs. to the corresponding ketones. All the properties of this strain correspond to those described in the literature for *Corynebacterium helvolum* (Lehmann and Neumann) but as no culture of the latter was available

helvolum. As a member of the cortin group to be tested for its behavior toward the bacterium they selected 21-acetoxy-5-pregnen-3-ol-20-one (I), a by-product in the synthesis of desoxycorticosterone (II) (Steiger and Reichstein, *C. A.* **32**, 581[3]). I undergoes the expected dehydrogenation of the secondary alc. grouping on C atom 3, with shifting of the double bond to position 4, but at the same time the 21-AcO group is sapond. and there is obtained after shaking 6 days under O at 36–7° 34% free II, m. 139–40°; 25% of the I is recovered unchanged. The alc. group formed by sapon. of the 21-AcO group is apparently not attacked by the pure bacterium; this is confirmed by the fact that Serini and Logemann's 4-pregnene-17,20,21-triol-3-one (*C. A.* **32**, 7475[8]) remains unchanged under the same conditions. C. A. R.

Preparation of substituted cyclopentanones. Hans A. Weidlich and Margot Meyer-Delius. *Ber.* **72B**, 1941–9 (1939); cf. *C. A.* **33**, 8576[8].—Equilenin, having a naphthalene ring system in the 1st two rings of the sterol skeleton and only 2 asym. C atoms between the 3rd and 4th rings, is the simplest natural steroid and hence numerous attempts to effect its total synthesis have been made. The authors have undertaken to synthesize it by the following series of reactions, the first 5 of which they describe in this paper: Conversion of Me nerolyl ketone, 6,2-MeO-$C_{10}H_6Ac$ (I), into *5-bromo-6-methoxy-2-bromoacetylnaphthalene* (II), condensation of II with $EtCOCHNaCO_2Et$ to the diketo ester, $Br(MeO)C_{10}H_5COCH_2CH(CO_2Et)$-COEt (III), treatment of III with hot alkali to give *1-methyl-2-(5-bromo-6-methoxy-2-naphthyl)cyclopenten-5-one* (IV), and hydrogenation, with simultaneous debromination, of IV to the stereoisomeric *1-methyl-2-(6-methoxy-2-naphthyl)-5-cyclopentanones* (V). The further steps in the proposed synthesis are bromination of V to 5,6,2-Br-(MeO)$C_{10}H_5CH.CMeBr.CO.CH_2.CH_2$, condensation of this with $CHNa(CO_2Et)_2$, sapon. and decarboxylation of the product, cyclization of the resulting monocarboxylic acid to the diketone and partial hydrogenation, debromination and hydrolysis of the latter to equilenin or its stereoisomers. I (20 g.) in 500 cc. CCl_4 in ice-salt treated in the course of 1 hr., with thorough stirring, with 40 g. Br (somewhat more than 2 mols.) in 50 cc. CCl_4 gave quantitatively an orange addn. product which, on decompn. with 20 g. $NaHCO_3$, filtration from the inorg. salts, evapn. of the $CHCl_3$ and crystn. from $CHCl_3$-petr. ether, yielded II, m. 132–5° (*pyridinium compd.*, Br-(MeO)$C_{10}H_5COCH_2N(C_5H_5)Br$, faintly yellowish, decomps. 243°). Attempts to prep. $MeOC_{10}H_6COCH_2Br$ by using only 1 mol. Br resulted in the formation of mixts. from which the desired product could not be obtained. Treatment with 2 mols. Br also at first gave only mixts. In the different runs were isolated the following products, which give an insight into the course of the bromination. The 1st product was *5-bromo-6-methoxy-2-acetylnaphthalene*, m. 126–7°, mol. wt. in camphor 287; further bromination gave II and the isomeric *5,7-di-Br deriv.* of I, m. 143–6° (which was unchanged by pyridine in alc. or by long heating in pyridine alone); and finally there was obtained *5-bromo-6-methoxy-2-dibromoacetylnaphthalene*, pale greenish, m. 164–5°, which was unchanged by pyridine in boiling alc. but on long heating in pyridine gave the methylene-bis (pyridinium bromide), m. 255–8°. *Et α-propionyl-β-(5-bromo-6-methoxy-2-naphthoyl)propionate* (III), m. 100–1°; in 1 expt. was obtained a product which, when crystd. from $CHCl_3$-petr. ether, m. 187–8° and had the compn. of *Et α-propionyl-β,β'-bis(5-bromo-6-methoxy-2-naphthoyl)-isobutyrate*, mol. wt. in camphor 696. In working up III there was always obtained a very small amt. of a *compd.* $C_{36}H_{39}O_9Br_3$ or $C_{45}H_{37}O_9Br_3$, insol. in ether and acetone, m. 208–10°, mol. wt. in camphor 1051. IV, from 10 g. III in 1 l. of 2% aq. NaOH in a long-necked flask heated 2 hrs. on the water bath and finally 1 hr. to boiling over a free flame, yellowish, m. 175–7°; in 1 case was isolated a small amt. of the *carbinol*, Br(MeO)$C_{10}H_5C(OH).CH_2.CH_2.CO.CHMe$, m. 150–1°. When the cyclization product still contains unchanged III, it forms on distn. the *Et furancarboxylate*, $Br(MeO)C_{10}H_5C:CH.C(CO_2Et):CEt.O$, m. 108–10° (*free acid*, m. 249°). On hydrogenation of 2

g. IV in 200 cc. alc. with PdO-$CaCO_3$ and 0.5 g. KOH 1 mol. H was taken up in a few min. with formation of *1-methyl-2-(6-methoxy-2-naphthyl)cyclopenten-5-one* (VI), m. 113–16°; the *semicarbazone*, m. 269° (decompn.), became intensely yellow in the light and was so difficultly sol. that it could not be recrystd. When more than 1 mol. H was taken up, there was formed, in addn. to VI, the *trans-form* of V, m. 81–3°; *semicarbazone*, m. 236–7° (decompn.). With PdO in 200 cc. alc. and 70 cc. AcOEt, 2 g. IV, after absorbing 2 mols. H, gave about $^2/_3$ *cis*-V, m. 119–21° (*semicarbazone*, m. 239–40° (decompn.)), and $^1/_3$ of the corresponding *cyclopentane* (VII), m. 70° (*picrate*, red, m. 89°). VI (2 g.) in 100 cc. alc. with PdO took up 1 mol. H in 1.5 hrs. and yielded about equal parts of *cis*- and *trans*-V; in the presence of 0.2 g. KOH the hydrogenation stopped after 5 hrs. with absorption of 1 mol. H and quant. formation of *trans*-V, which, on Clemmensen reduction, gave *trans*-VII, m. 52–4° (*picrate*, red, m. 112°). C. A. R.

Study of break-down products of lignin (Bobrov, Kolotova) **23**. Hardening of phenol-CH_2O resins (Hanus, *et al.*) **13**. Dipole moment of the aminobenzoic acids in dioxane (Van Blaricom, Gilbert) **2**. Lignin (Richtzenhain, v. Hofe) **23**. Electrolysis of mixts. of pivalic acid salts with nitrates (Fichter, Gunst) **4**. Nitrates and chlorinated org. compds. (U. S. pat. 2,174,574) **18**.

Fractionating mixtures of gaseous hydrocarbons such as propane mixtures. Paul D. Barton (to Sun Oil Co.). U. S. 2,175,590, Oct. 10. An arrangement of app. is described, and a process for sepg. normally gaseous hydrocarbon mixts. which comprises subjecting the mixt. to reflux fractionation, subjecting the sepd. overhead gaseous light fractional product of the fractionation to cooling and partial condensation under a substantial super-atm. pressure, sepg. the condensate from the uncondensed gas, releasing the pressure on such uncondensed gas further to cool it, utilizing such cooled uncondensed gas as a cooling medium in the specified cooling and partial condensing step, and utilizing the sepd. condensate as reflux in the fractionation operation.

Olefins from saturated hydrocarbons. Hans Klein, Ferdinand Haubach and Wilhelm Hofeditz (to I. G. Farbenind. A.-G.). U. S. 2,174,288, Sept. 26. App. is described, and a process for the production of olefins from gaseous satd. hydrocarbons other than CH_4 which involves preheating the hydrocarbons, such as C_2H_6 or C_3H_8, to about 700° and supplying O to them while diluting it at once so as to prevent formation of strata and streaks of gas when it meets the preheated hydrocarbons, thereby producing a reaction temp. above 700° but below about 1000°, the temp. at which substantial amounts of acetylene are formed under the conditions obtaining while avoiding the formation of a flame or local overheating. Cf. *C. A.* **33**, 2903[5].

Esterification of olefins. Wilbur A. Lazier (to E. I. du Pont de Nemours & Co.). U. S. 2,174,985, Oct. 3. For producing an ester such as EtOAc, an olefin such as C_2H_4 and a satd. aliphatic monocarboxylic acid such as HOAc in the vapor phase are brought into contact with a heteropoly acid catalyst such as phosphotungstic acid on silica gel at a temp. of 150–350° and under a pressure of 10–500 atm.

Alkyl and aralkyl cyanoacetic esters. Arthur C. Cope, Walter H. Hartung and Frank S. Crossley (to Sharp & Dohme, Inc. (1929)). U. S. 2,176,018, Oct. 10. In producing isopropyl cyanoacetate or other monoalkyl or aralkyl cyanoacetic ester, isopropylidene cyanoacetic ester or other alkylidene or aralkylidene cyanoacetic ester is subjected to the action of H in the presence of an active catalyst such as Pt or Pd.

Purification of ethers. Norman D. Scott (to E. I. du Pont de Nemours & Co.). U. S. 2,174,293, Sept. 26. A nuclear addn. compd. of a polycyclic aromatic compd. and an alkali metal such as one of naphthalene and Na is used as a purification agent for ethers such as diethyl ether.

Hydroxyalkylamine ethers. Ernst M. Schwarz. Friedrich O. Zschimmer, Gotthold E. Zschimmer, Georg M. W. Schwarz and Friedrich W. R. Schwarz (trading as Zschimmer & Schwarz Chemische Fabrik Dolau). Brit. 508,525, July 3, 1939. The etherification of hydroxyalkylamines is effected in 2 or more stages, each stage comprising treatment with alkali metal and then with alkyl halide in less than the theoretical quantities required. In examples, (1) Na is added in small portions to triethanolamine (I) at 105° under reflux, the product is cooled to 75° and BuCl is added with heating to 105°, then more Na is added, followed by BuCl as before, and (2) the cetyl ether of I is prepd. similarly.

Alkyl derivatives of isobutane. Vladimir N. Ipatieff and Herman Pines (to Universal Oil Products Co.). U. S. 2,174,883, Oct. 3. Isobutane is alkylated with C_2H_4 at an alkylating temp. below 40° and in the presence of $AlCl_3$ and HCl, maintaining present during the reaction a mol. excess of isobutane over C_2H_4 and activating the reaction by the presence of a relatively small amt. of an olefin of greater reactivity than C_2H_4, such as C_4H_8.

$\Delta^{4,5}$-Unsaturated steroid ketones. Soc. pour l'ind. chim. à Bâle. Brit. 508,452, June 30, 1939. These are prepd. by subjecting to thermal decompn. a condensation product of an org. base with a steroid 2-halo-3-ketone contg. no halogen in rings A and B other than that in 2-position. In examples, (1) monobromocholestanone and pyridine are refluxed to give a cryst. condensation product, which decomp. when heated to about 300° in a vacuum; the distillate is extd. with H_2O and from the insol. portion $\Delta^{4,5}$-3-cholestenone is formed, and (2) bromoandrostan 3,17-dione is converted into its pyridine addn. compd. as in (1) and this is then decompd. under reduced pressure to give $\Delta^{4,5}$-androstene-3,17-dione.

Aliphatic-araliphatic amines. Theodor H. Temmler (trading as Temmler-Werke Vereinigte Chemische Fabriken Hermann Temmler). Brit. 508,756, July 5, 1939. Amines are prepd. by reducing aliphatic-araliphatic ketones with activated Al and H_2O in the presence of NH_3 or a primary or secondary amine. The reaction may be effected in an atm. of H under pressure. Examples are given in which (1) phenylacetone (I) and NH_2Me yield β-phenyl-*N*-methylisopropylamine, (2) I and allylamine yield β-phenyl-*N*-allylisopropylamine, and (3) I and benzylamine yield β-phenyl-*N*-benzylisopropylamine.

Hexahydro-*p*-phenylenediamine. Caryl Sly (to E. I. du Pont de Nemours & Co.). U. S. 2,175,003, Oct. 3. *p*-Phenylenediamine is catalytically hydrogenated in the liquid phase, at a temp. of 120–200° and under a pressure of 5–300 atm. in the presence of a Ni or Co catalyst.

Ketenes. Donald J. Loder (to E. I. du Pont de Nemours & Co.). U. S. 2,175,811, Oct. 10. A process for the prepn. of a ketene such as methyl ketene involves thermally decompg., in the vapor phase, a lower alkyl ester of a lower aliphatic monocarboxylic acid such as methyl propionate at a temp. between about 500° and about 1000° (suitably with use of silica gel as a catalyst.).

Production and recovery of organic oxy compounds such as amyl acetate. Theodore Evans (to Shell Development Co.). U. S. 2,175,080, Oct. 3. An arrangement of app. is described, and a process for the production of an oxy compd. such as AmOAc as by the reaction of C_5H_{10} with HOAc in which the reacted mixt. comprises a substantially water-immiscible phase and an aq. inorg. acid phase with a water-sol. org. oxy compd. distributed between the 2 phases, involving the method of removing the water-sol. org. oxy compd. from the water-immiscible phase by sepg. the 2 phases and extg. the water-sol. org. oxy-compd. from the water-immiscible phase by intimately bringing this phase into contact with a minor part of the sepd. aq. catalyst phase at a temp. substantially below that at which the initial phase sepn. was effected.

Hydrogenation of nitroparaffins. Kenneth Johnson (to Purdue Research Foundation). U. S. 2,174,498, Sept. 26. In a catalytic process for the direct hydrogenation of satd. nonbenzenoid nitrohydrocarbons such as nitrobutane or nitropropane for producing the corresponding amines, H and the liquid nitrohydrocarbon are brought

into contact with a catalyst such as a Ni catalyst at a temp. below 165° (suitably 15–150° under pressure).

Hydrogenating unsaturated materials such as rosin, abietyl alcohol, and methyl abietate. Rollin J. Byrkit, Jr. (to Hercules Powder Co.). U. S. 2,174,651, Oct. 3. An arrangement of app. is described, and a method for the continuous hydrogenation of an unsatd. material which contains the hydrocarbon nucleus of a rosin acid, that includes continuously flowing the unsatd. material in contact with H successively through a plurality of stationary hydrogenation catalyst beds while under superatm. pressure in excess of about 100 lb. per sq. in. and at a temp. within the range of about 70° to about 300° until the activity of the catalyst in the beds has dropped materially, replacing the first of the catalyst beds with a fresh catalyst bed and continuously flowing the unsatd. material in contact with H through the plurality of catalyst beds in such order that the fresh catalyst bed is the last through which the unsatd. material flows. Cf. *C. A.* **33**, 5414[1].

Catalytic dehydration of compounds such as diacetone alcohol for the production of mesityl oxide. Sumner H. McAllister and Edwin F. Bullard (to Shell Development Co.). U. S. 2,174,830, Oct. 3. A distn. process for the catalytic dehydration of a carbinol-contg. carbonylic compd to an unsatd. carbonylic compd., which forms an azeotrope with water, which contains a higher ratio of water to unsatd. carbonylic compd. than the stoichiometric ratio, involves distg. a reaction mixt. contg. a preponderance of the carbinol-contg. carbonylic compd. in the presence of a dehydrating catalyst, passing the distillate into a column and adding sufficient water to the distillate in the column to make the compn. of the top product substantially correspond with that of the azeotrope.

Reducing nitroaryl compounds. Harold G. Bowlus and Walter V. Wirth (to E. I. du Pont de Nemours & Co.). U. S. 2,175,244, Oct. 10. In effecting reactions such as the production of hydrazobenzene from $PhNO_2$, the reaction mass, formed with use of comminuted Fe and aq. alkali, is subjected to continuous attrition in a ball mill during the reaction.

Compounds of the cyclopentanopolyhydrophenanthrene series. Schering A.-G. Brit. 508,576, June 29, 1939; Fr. 838,704, Mar. 14, 1939. Such compds. contg. an aromatic ring A are prepd. from compds. of the said series in which ring A is not aromatic but which contain 1 or more double bonds in ring A and a keto or an alc. OH group or a functional deriv. of the OH group in 3-position, or derivs. thereof that contain on the C atoms 1, 2, 4 and (or) 5 a group capable of being split off with the formation of a double bond, by a thermal and (or) a mineral-acid treatment. The treatment effects the removal of the 10-methyl group or its displacement to a C atom not at a point of junction of the rings and then follows the aromatization of ring A. The starting materials may be (1) 3-ketones of steroids doubly satd. in ring A, or their enol derivs., (2) 3-ketones of steroids singly unsatd. in ring A, or their enol derivs., that in addn. possess in ring A a group capable of being split off with formation of a further double bond, (3) 3-ketones of steroids singly unsatd. in ring A between C atoms 1 and 2, and their enol derivs., (4) 3-hydroxy compds. of steroids doubly unsatd. in ring A and their derivs., (5) 3-hydroxy compds. of steroids singly unsatd. in ring A, or their derivs., that in addn. possess in ring A a group capable of being split off with formation of a further double bond, (6) 2,3- or 3,4-diketones of steroids or their enol derivs., (7) satd. 3-ketones of steroids that possess on the 2-C atom a group capable of being split off with the formation of a double bond. The term enol derivs. denotes enol esters or ethers. Instead of the free ketones, their reaction products with the customary ketone reagents, e. g., semicarbazide, phenylhydrazine, may be used. Among examples, (1) the isovalerate of hydroxycholesten-3-one obtained according to Brit. 500,353 (*C. A.* **33**, 5872[9]) is heated in a stream of CO_2 for 1 hr. at 330–340°, the product is taken up with Et_2O, washed with alkali and distd. under reduced pressure to give a light oil that is an aromatic product, (2) the 4-benzoate of $\Delta^{1,3}$-cholesten-3-one-4-ol is heated in a stream of CO_2 to 310–320° and worked up as in example (1) to give an aromatic product, and (3) 2-bromocholestan-3-one is treated with BzOK in toluene-BuOH soln., the benzoate of 2-hydroxycholestan-3-one thus obtained is purified by crystn. and sapond. and the free hydroxy compd. thus obtained is treated according to Brit. 486,596 (*C. A.* **33**, 8706[3]) by heating with agents that split off H_2O, e. g., H_3PO_4, P_2O_5, $KHSO_4$, $ZnCl_2$, to give an unsatd. compd. by the splitting off of the secondary OH group; this material is rendered aromatic and the product worked up as described in example (2).

Alkyl halides. Ober C. Slotterbeck and Raphael Rosen (to Standard Oil Development Co.). U. S. 2,174,278, Sept. 26. For producing an alkyl halide such as EtCl, an olefin such as C_2H_4 and a H halide such as HCl are passed over a catalyst contg. a halide of a metal of the 5th group, such as Bi chloride while maintaining between 2.5% and 20% of moisture in the feed gases.

Alkanesulfonyl chlorides. Cortes F. Reed (to Charles L. Horn). U. S. 2,174,492, Sept. 26. For the production of a product such as ethanesulfonyl chloride, a normally gaseous alkane such as C_2H_6 is treated with a gaseous mixt. of SO_2 and Cl. Several examples are given.

Sulfonyl halides. Treat B. Johnson (to Röhm & Haas Co.). U. S. 2,174,856, Oct. 3. A sulfonyl halide such as methane sulfonyl chloride is produced by subjecting an org. thiocyanate in which the nucleus of a C compd. is linked through a C atom to the S of the thiocyanate radical, such as methyl thiocyanate, to the action of a halogen such as Cl in the presence of water (suitably at a temp. of 5° or lower). Numerous examples are given.

Alkyl phosphites. Thomas H. Rogers, Clarence M. Loane and Bernard H. Shoemaker (to Standard Oil Co. of Ind.). U. S. 2,175,509, Oct. 10. An arrangement of app. is described, and a method of prepg. alkyl phosphites involving mixing a satd. aliphatic alc. such as BuOH with a tertiary amine such as dimethylaniline, adding a liquefied volatile hydrocarbon solvent such as butane to the mixt. and effecting reaction with PCl_3 at a temp. not higher than 10°.

Carbon sulfoselenide. Winfield Scott (to Wingfoot Corp.). U. S. 2,175,816, Oct. 10. Reaction is effected between H_2Se and phenyl isothiocyanate or other aryl isothiocyanate or aryl thiourea (suitably at room temp.) and the C sulfoselenide is recovered (suitably by distn.).

Stabilizing organic nitriles. Ralph A. Jacobson (to E. I. du Pont de Nemours & Co.). U. S. 2,175,805, Oct. 10. Distn. of glycolonitrile is effected from an aq. medium at a pH of less than 7 (suitably contg. H_3PO_4 to give a pH of less than 6).

Unsaturated nitriles. Donald J. Loder (to E. I. du Pont de Nemours & Co.). U. S. 2,175,810, Oct. 10. A process for the prepn. of unsatd. derivs. of isobutyronitrile such as methacrylonitrile involves dehydrohalogenating an α-halogenated isobutyronitrile such as α-chloroisobutyronitrile with use of $FeCl_3$ as a catalyst (suitably with refluxing)

Unsaturated aliphatic or cycloaliphatic carboxylic acid nitriles. Kurt Pieroh (to I. G. Farbenind. A.-G.). U. S. 2,174,756, Oct. 3. A process for the production of a nitrile such as methacrylonitrile comprises heating a halogen-contg. satd. aliphatic carboxylic acid nitrile such as isobutyronitrile at a temp. above 250° (suitably 400–550°) in the presence of a substance such as TiO_2 which is capable of splitting off H halide.

Concentrating aqueous solutions of acetic acid. Charles J. L. Coutor (to Établissements Lambiotte frères). U. S. 2,175,879, Oct. 10. An arrangement of app. is described, and a process which involves distg. one portion of the acid soln. azeotropically with an entraining liquid such as BuOAc to dehydrate the soln., subjecting another portion of the acid soln. to an extn. treatment in the liquid phase with a solvent for HOAc such as EtOAc to remove the acid from the soln., and evapg. the extn. solvent from the extd. acid at least partially by the heat evolved in the condensation of the vapor of the azeotropic distn., the

extn. solvent used having a b. p. low enough that it can be vaporized by such heat and also forming an azeotropic mixt. with water.

Maleic anhydride. Harold B. Foster and Joyce H. Crowell (to National Aniline & Chemical Co., Inc.). Brit. 508,489, June 30, 1939. Solid maleic acid, or a soln. thereof (preferably of 25-75% concn.), is brought into contact with a surface heated to about 160-400° so as to vaporize the acid quickly and produce a vapor of about 150° or more. The pressure may be 100-250 mm. or an inert gas may be used to assist rapid evapn. The reaction vapors may be treated with an inert org. liquid to absorb the anhydride or may be cooled fractionally to sep. first a small quantity of fumaric acid and then the maleic anhydride, H_2O being left in the vapor state.

1,1,3-Trichloroethane. Gerald H. Coleman and Garnett V. Moore (to Dow Chemical Co.). U. S. 2,174,737, Oct. 3. A method of prepg. 1,1,2-trichloroethane comprises simultaneously passing ethylene chloride and gaseous Cl, in the ratio of between about 0.2 and about 1.0 mol of Cl per mol of ethylene chloride, into a liquid reaction bath contg. above 50% of ethylene chloride, and 1,1,2-trichloroethane, while maintaining the bath at a temp. above 50°, in the presence of actinic light.

2-Ethylcrotonaldehyde. Henry L. Cox (to Carbide & Carbon Chemicals Corp.). U. S. 2,175,556, Oct. 10. A process for making 2-ethylcrotonaldehyde for subsequent hydrogenation to 2-ethylbutyraldehyde involves condensing a mixt. of butyraldehyde and acetaldehyde in molar proportions, resp., of at least 1:2 in the presence of a weak alk. soln., and dehydrating the aldol mixt. so formed by gradual addn. to a boiling soln. of not higher than 5% H_2SO_4.

Furfurylamines. Homer Adkins and Charles F. Winans. U. S. 2,175,585, Oct. 10. A process for prepg. furfuryl secondary and tertiary amines such as *N*-furfurylbutylamine involves hydrogenating under superatm. pressure, at a superatm. temp. not above about 110°, in the liquid phase and in the presence of a base metal catalyst such as a Ni catalyst, a reaction product of furfural and an amine such as butylamine which contains the group RN(R')H in which at least one of the R groups is a hydrocarbon radical. *N*-Furfuryl-*N*-(*p*-hydroxyphenyl)amine, etc., may be similarly produced.

Optically active phenylisopropylamines. Theodor H. Temmler (trading as Temmler-Werke Vereinigte Chemische Fabriken Hermann Temmler). Brit. 508,757, July 5, 1939. Racemic β-phenylisopropylamine or a *N*-homolog thereof is resolved into its optical components by means of an optically active acid. In an example, the *d*-tartrate of racemic *N*-methyl-β-phenylisopropylamine is produced and extd. with hot EtOH, in which the *d*-tartrate of *d*-*N*-methylphenylisopropylamine is readily sol. while the *d*-tartrate of the *l*-amine is sparingly sol.

Tetrahydrofurans. I. G. Farbenindustrie A.-G. Brit. 508,548, July 30, 1939. These are prepd. by heating 1,4-butylene glycol or its *C*-alkyl, -aralkyl, -cycloalkyl or -aryl substitution products in the liquid state with 1 or more solid dehydration catalysts, i. e., oxides of Al, Zr or Th, sulfates of Al and Cu, K Al sulfate, K pyrosulfate, phosphates of Al, Fe, Ce and Ag having a neutral reaction, chlorides of Mg, Ca, Zn and Al, silica gel, bleaching earths, org. acids, e. g., $(COOH)_2$, *p*-toluenesulfonic acid, acid anhydrides. The products may be obtained by fractional distn. with or without previous drying. Cf. *C. A.* **33**, 9328[2,3].

α-Picoline from divinylacetylene and ammonia. Albert S. Carter (to E. I. du Pont de Nemours & Co.). U. S. 2,175,339, Oct. 10. By a process involving passing divinylacetylene vapor and NH_3 over a catalyst which may comprise freshly reduced Pb and Cd on a carrier of alumina, etc., α-picoline is obtained with a relatively small admixt. of other products. Various related reactions and details of operation are described.

Androstenedione. Walter Schoeller, Arthur Serini and Willy Logemann (to Schering A.-G.). U. S. 2,175,220, Oct. 10. A method for producing an androstenedione of the general formula $C_{19}H_{26}O_2$ involves oxidizing an androstenolone of the general formula $C_{19}H_{28}O_2$ with an agent, such as chromic acid anhydride in coned. HOAc soln., capable of converting a secondary alc. group into a keto group. Br may be used to form a dibromide as an intermediate. Various examples with details are given.

Styrene. Consortium für elektrochemische Industrie G. m. b. H. Brit. 508,666, July 4, 1939. Styrene is prepd. by heating a mixt. of C_6H_6 vapor and C_2H_4 under reduced pressure, e. g., at about 800-1000°.

Butadiene. Victor E. Wellman (to B. F. Goodrich Co.). U. S. 2,174,280, Sept. 26. A process for producing butadiene comprises catalytically dehydrating 1,3-butanediol, sepg. the dehydration products into a low boiling fraction consisting principally of butadiene and a high-boiling fraction contg. substantially all the remaining products of the dehydration, subjecting the high-boiling fraction to fractional distn. and thereby sepg. a const.-boiling mixt. of water and 1-buten-4-ol distg. at 90-92°, chiefly at 91°, at atm. pressure, admixing a quantity of the const.-b. mixt. with 1,3-butanediol and subjecting the resulting soln. to catalytic dehydration.

Butadiene. I. G. Farbenindustrie A.-G. Brit. 508,764, July 5, 1939. Butadiene (I) is prepd. by catalytic dehydrogenation of butane to butylene (II), isolation of this from the reaction mixt. and further dehydrogenation to I. Conversion of C_4H_{10} to II may be effected at 500-600° with Al_2O_3 activated by oxides of Cr, V, W or Mo so that only up to about 35% conversion is obtained. The II is washed out with solns. or suspensions of salts that absorb olefins, e. g., $AgNO_3$, $Cu(NO_3)_2$ or $HgNO_3$ solns., and is recovered by heating or evacuating. Unconverted C_4H_{10} is recycled, and the II, after further purification if necessary, is dehydrogenated in the presence or absence of catalysts, preferably only up to about 30% conversion to I, which is removed by solns. of salts of the heavy metals of groups 1 or 2, e. g., CuCl contg. NH_4Cl or alkali chloride.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W. DOX

The darkening of pigments by ultraviolet light of long wave lengths. G. Miescher and H. Minder. *Strahlentherapie* **66**, 6-23(1939).—The 3 pigment phenomena, direct tanning of pigmented skin in living persons by ultraviolet rays of long wave lengths, darkening of pigmented portions of skin by irradiation with a quartz lamp (Lignac's phenomenon, *C. A.* **17**, 1662), and darkening of pigmented portions of skin by warming to 56° (Meirowsky's phenomenon, *Frankf. Z. Path.* **2**, 438-48(1909); *C. A.* **3**, 2313) depend upon the darkening of the pigment through uptake of O. Melanin exists in an O-poorer form, which reduces Ag, and an O-richer form, which does not. Under the exptl. conditions, and probably also in nature, the reversibility of the 2 forms is not complete, since melanin tends to be stabilized in an O-richer form. The reduction potential of the cells effects a gradual conversion of the melanin, formed through the action of the dopa oxidase, into an O-poorer form. The darkening phenomenon depends upon the conversion of the light, O-poorer form into the dark, O-richer form through O uptake. Ruth Berggren

The prevention of Röntgen-ray leucopenia. C. Carrié and O. Schnettler. *Strahlentherapie* **66**, 149-54(1939).—Large doses of vitamin C produced a leucocytosis in rabbits. The administration of vitamin C immediately before irradiation has the most favorable effect on x-ray leucopenia. Ruth Berggren

A direct oxidase present in Pyrethrum cinerariaefolium. Mario Covello. *Ann. chim. applicata* **29**, 333–9(1939).—An active oxidase consisting of the enzymic system: peroxidase + peroxide was extd. from pyrethrum by means of 30% EtOH. Its activity is greatest at pH 4.33–4.93 at 35°. It becomes inactive on heating above 75°. A. W. Contieri

The effect of sodium oleate on liver, pancreas and serum lipase. T. I. Meerzon and T. Ya. Volpyans'ka. *Med. exptl* (Ukraine) **1938**, No. 1, 37–46.—Pancreatic lipase was activated by the addn. of Na oleate, but an increase in the ratio of the latter to the lipase (above a certain optimum) inhibited the activity of the latter. Na oleate always inhibited the activity of the liver and serum lipase irrespective of the ratio between it and the enzyme, human serum lipase being somewhat less sensitive to Na oleate than rabbit serum lipase. Addn. of inactivated exts. of the liver to pancreas lipase and *vice versa* had no effect on the Na oleate-lipase interaction. S. A. Corson

Structure of protein films. E. G. Cockbain and J. H. Schulman. *Trans. Faraday Soc.* **35**, 1266–76(1939).—The force *vs.* area and surface potential *vs.* area characteristics of pure gliadin films have been studied on buffered solns. from pH 2 to 10 at temps. from 17 to 22°. It is suggested from stereochemical considerations that a sepn. of polar from nonpolar chains of a protein at an air/water interface takes place by means of a looping of the polypeptide chains. Fully extended polypeptide chains of the β-keratin type or of any such regular pattern are not possible. The interaction between gliadin films and tannic acid is strongly dependent on pH, the nature and concn. of the anions in the underlying soln. and on the surface pressure of the film. Victor R. Deitz

Two degradation products of hemocyanin. Marcel Florkin and Charles Toussaint. *Compt. rend. soc. biol.* **132**, 15–7(1939).—The supposed prosthetic group of hemocyanin as prepd. by the method of Conant, *et al.* (*C. A.* **29**, 2189[6]) gives a green color with the orcinol-in-HCl reagent used as a test for pentoses; the compd. of Schmitz (*C. A.* **25**, 1847) does not. L. E. Gilson

Phenolase activity of different vertebrate tissues and the mechanism of the formation of adrenoxine. Ghislaine Duchateau Bosson and Marcel Florkin. *Compt. rend. soc. biol.* **132**, 47–50(1939).—Expts. by the authors indicate that the supposed phenolase activity of vertebrate tissues is not due to true phenolases but to other oxidizing systems. L. E. Gilson

A polarographic study of insulin. Oscar Kanner and G. J. Reed. *Proc. Soc. Exptl. Biol. Med.* **42**, 387–91(1939).—The height of polarographic steps of an insulin soln. is a function of the concn. of –SS– or –SH groups and independent of the intrinsic physiol. activity. Polarographic analysis permits the detn. of the concn. of insulin solns., for any given brand, after proper calibration. L. E. Gilson

Cholinesterase and esters of thiamine. David Glick and Wm. Antopol. *Proc. Soc. Exptl. Biol. Med.* **42**, 396–9(1939); cf. *C. A.* **33**, 4608[6].—Thiamine chloride acetic ester (I) was a poorer inhibitor of cholinesterase than free thiamine, and the pyrophosphoric ester (II) had even less inhibitory action. The affinity of I for the enzyme was calcd. to be 5.3, and that of II, 1.7, times that of acetylcholine. I was hydrolyzed slowly by horse serum, the magnitude of the enzymic splitting being approx. equal to the OH^- scission at the same pH (7.4). L. E. Gilson

Macromolecular [protein] components of untreated and of formolized normal chick embryo tissue. D. G. Sharp, A. R. Taylor, Harold Finkelstein and J. W. Beard. *Proc. Soc. Exptl. Biol. Med.* **42**, 459–61(1939).—Preliminary. L. E. Gilson

Lysozymes. Z. V. Ermol'eva. *Uspekhi Sovremennoĭ Biol* **9**, No. 4, 68–80(1938); *Khim. Referat. Zhur.* **2**, No. 3, 61(1939).—The utilization of the bacteriol. lysozyme, contained in tissues and secretions, in industry (conservation of caviar) and in medicine is described. Data on the sensitivity of lysozyme to bases, acids, temp., adsorption tendency, inactivation by salts of the heavy metals, are presented and its fermenting properties are noted. Lysozyme is detd. as a polypeptide contg. N 15.0, O 48.65, H 6.4, P 0.25 and S 0.64%. W. R. Henn

Effect of fluorides on salivary amylase. F. J. McClure. *U. S. Pub. Health Repts.* **54**, 2165–71(1939).—NaF, KF, NH_4F and Na_2SiF_6 have no effect on the activity of salivary amylase in concns. varying from 1.7 to 8550 p. p. m. of F present in 1 to 10 dilns. of salivas which stood for 1 hr. in the cold prior to testing amylolytic property. The same fluorides, when present in the enzyme-substrate mixt. during the digestion period, in concns. varying from 0.76 to 760 p. p. m. of F in the substrate, had no final effect on enzyme activity. The salivas of school children whose drinking water contained an av. of 1.8 p. p. m. of F showed no differences in amylolytic action from a similar group of salivas obtained under similar conditions from school children whose drinking water was free from fluoride. Eighteen references. J. A. Kennedy

Emulsin. XXXIX. The hydrolysis of methyl glycosides of some synthetic sugars by sweet almond emulsin. H. Helferich, W. W. Pigman and H. S. Isbell. *Z. physiol. Chem.* **261**, 55–60(1939); cf. *C. A.* **33**, 7826[8].—The emulsin of sweet almonds does not measurably hydrolyze the α- or β-methyl glycosides of the following synthetic sugars: *d*-lyxose, *d*-gulose, *d*-α-glucoheptose and *d*-α-galaheptose. (Nomenclature according to Isbell and Pigman, [*C. A.* **31**, 3012[4]].) **XLI. The hydrolyzability of lactobionic acid by sweet almond emulsin.** *Ibid.* 189–92; cf. *C. A.* **34**, 721[9].—A standard sweet almond emulsin prepn. hydrolyzes lactose at 30 times the rate of hydrolysis of lactobionic acid. The latter is hydrolyzed somewhat more slowly than its lactone. Milton Levy

Hydrolysis of polysaccharides with phosphorylation in muscle and sarcoma. Hans v. Euler and Erwin Bauer. *Z. physiol. Chem.* **261**, 125–36(1939); cf. *C. A.* **33**, 2106[6].—The enzyme which phosphorylates starch is adsorbed from muscle exts. by alumina Cγ (I) and to a lesser extent by kaolin but not by animal charcoal (II) or Al_2O_3. Adsorption by I is most complete at pH 5 and at 8.5 and minimal at pH 7. The enzyme is elutable with phosphate buffers at pH 7. Adenylic acid, Mn^{++} and Mg^{++} are necessary for the enzyme. Amylopectin is more readily phosphorylated than amyloamylase. Amylopectin was sepd. into 2 fractions by bringing its soln. in H_2O to 44% EtOH by vol. Both the sol. and insol. fractions were then further fractionated by $Ba(OH)_2$, each yielding 2 fractions. The rates at which the fractions are phosphorylated are not related to the P contents of the fractions. Dialyzed Jensen sarcoma exts. also contain the enzyme. M. L.

Arginase action. S. Utzino and M. Kaiju. *Z. physiol. Chem.* **261**, 137–40(1939).—A series of Ac derivs. of arginine peptides was subjected to the action of an arginase prepn. from cattle liver which had been freed from acylase and peptidase. Only slight hydrolysis occurred even with addn. of Mn^{++} and even after long times. Pancreas maceration juice hydrolyzes acetyl-*l*-leucyl-*d*-arginine and diacetyl-*l*-tyrosyl-*d*-arginine. Milton Levy

Preparation and purification of "old" yellow enzyme from yeast and a new method for reversible splitting. Friedrich Weygand and Leonhard Birkofer. *Z. physiol. Chem.* **261**, 172–82(1939); cf. *C. A.* **31**, 6264[2].—To prep. "old" yellow enzyme, yeast is air dried, macerated and the ext. treated with 3/8 vol. of Me_2CO at 0°. The filtrate is carried through the following steps 5 times: (1) adsorption on $Al(OH)_3$ at pH 5.2, (2) elution with $(NH_4)_2SO_4$ soln at pH 8.2, (3) pptn. from the eluate at pH 6 by 70% satn. with $(NH_4)_2SO_4$ and (4) soln. in H_2O. The final soln. is dialyzed. The yield is 0.4 g. per kg. of yeast. The mol. wt. from flavine estn. is 68,500–74,000. Chromatographic adsorption can be used especially on frankonite. The prosthetic group and carrier can be sepd. from yellow enzyme by adsorption from acid soln. by suitable adsorbents. Examples of the process are given. M. L.

The question of the presence of methionine in insulin. Vincent du Vigneaud, Gail L. Miller and Clement J. Rodden. *J. Biol. Chem.* **131**, 631–40(1939); cf. *C. A.* **31**, 3948[1].—When digested with HI according to the Baernstein procedure, cryst. insulin was found to liberate 0.6–0.7% volatile iodide calcd. as methionine, thus con-

firming the data of Kassell and Brand (*Proc. Soc. Exptl. Biol. Med.* **35**, 444–5(1936)) with respect to the volatile iodide. The HI digests, however, gave practically neg. tests for homocysteine thiolactone, indicating that the volatile iodide did not represent methionine but originated from some other source in the insulin mol. Preliminary hydrolysis of insulin with HCl brought about a ⅔ decrease in the volatile iodide liberated by the insulin on digestion with HI. Since there is no analogy for a decompn. of methionine with HCl under such conditions, this result is interpreted as further evidence that the volatile iodide does not have its origin in methionine. Finally it was shown that only a small portion, if any, of the volatile iodide liberated is MeI. Conclusion: methionine is absent in cryst. insulin. A. F. Lothrop

The activity of maltase from wheat and rye flour. Alfred Rotsch. *Biochem. Z.* **301**, 418–28(1939).—In an aq. suspension of wheat or rye flour there is a synthesis of glucose by maltase in addn. to the diastatic hydrolysis of the starch. The flour suspensions were made very thick (3 parts flour to 5 parts H_2O) to demonstrate this synthesis. In suspensions of rye flour a considerably higher glucose concn. was found. S. Morgulis

The use of radioactive forms of the common elements in physiology. A. Barnett. *Phys. Rev.* **56**, 963(1939).—Artificially radioactive elements are used as "tracers" in physiol. expts.: conclusions are usually drawn on the assumption that the ordinary and the radioactive element behave alike. The charge on the cell membrane and the polar properties of the lipoid mols. in this membrane would be modified by the radiations. Proteins near the cell wall might be denatured, grossly modifying surface conditions. The validity of conclusions drawn from such exptl. work is questioned. G. M. Petty

Specific magnetization of methemoglobin. Paulette Berthier. *Compt. rend.* **209**, 774–6(1939); cf. *C. A.* **33**, 4607⁴.—The coeff. of sp. magnetization of methemoglobin was detd. at 10.5° in soln. with suitable addns. of HCl or NaOH. Immediately on prepn. of the soln. k_0 for pH 1.1, 3.2, 7.2, 8.2 and 14.0 was +0.46, +0.04, +0.15, −0.18 and −0.21, resp. With time k increases in acid sols, and decreases (in neg. value, ultimately becoming pos.) in alk. sols; in H_2O it remains const. But the sols show signs of gradual decompn. C. A. Silberrad

Constitution of the purine nucleosides (Falconer, Gulland) **10**. Emulsin (Helferich, *et al.*) **10**. Biochem. dehydrogenations in the cortin group (Mamoli) **10**.

Enzymic manufacture of nucleotides. Pawel Ostern (to Dr. Georg Henning, chemische pharmazeutische Werk G. m. b. H.). U. S. 2,174,475, Sept. 26. Adenosine-5-monophosphoric acid is obtained by a process which involves adjusting a phosphate buffer soln. to a pH of 6.0–7.5, introducing adenosine into the soln., adding beer yeast to the soln. and agitating the resulting mixt. at a temp. of 10–50°. Various details of procedure are described.

B—METHODS AND APPARATUS

GLENN E. CULLEN

The estimation of aneurin by thiochrome reaction with Pulfrich photometer. A. Mukherji. *J. Indian Chem. Soc.* **16**, 273–80(1939); cf. *C. A.* **31**, 1443⁶.—Jansen's method (cf. *C. A.* **33**, 3834³,⁴) for the estn. of aneurin was modified by (1) carrying out the oxidation of aneurin in the presence of CO_2, (2) estg. the thiochrome formed by comparison of the ultraviolet fluorescence (a Pulfrich photometer is used instead of a Cohen fluorometer) and (3) decreasing the quantity of isobutanol used from 13 cc. to 3–4 cc., thus increasing the fluorescence of the test soln. Results from the use of the modified method on urine, polished rice, carrot, bread and com. vitamin B complex are included. George Ayers

A standardized Wohlgemuth procedure for α-amylase activity. R. M. Sandstedt, Eric Kneen and M. J. Blish. *Cereal Chem.* **16**, 712–23(1939).—Wohlgemuth values are commonly indicative of combined activity of α- and β-amylase. Increasing the ratio of β-amylase to α-amylase in the starch-enzyme mixt. increased the rate of dextrinization up to a point beyond which further increments of β-amylase have essentially no effect. The quant. measurement of α-amylase, therefore, involves the addn. of sufficient supplementary β-amylase to eliminate the variable effect of β-amylase already present in the malt ext. The prepn. and use of an easily reproducible red-brown dextrin-I soln. as a standard end point are described. The linear relationship between α-amylase content and dextrinization time permits calcn. of α-amylase units as the no. of g. of sol. starch which, under the influence of an excess of β-amylase, are dextrinized by one g. of malt in 1 hr. at 30°. The application of the method to barley malts and the lack of parallelism between α-amylase activity and either saccharogenic or dextrinogenic activity of malts is discussed. L. H. Bailey

A modification of the Wohlgemuth method for the determination of alpha-amylase and a comparison of this method with r viscosity method. Lawrence E. Ehrnst, Geo. J. Yakish and Wm. Olson. *Cereal Chem.* **16**, 724–9 (1939).—Full details of method are given. L. H. B.

Investigations on the separation of some enzymes of emulsin by means of chromatography. Géza Tóth. *Magyar Chem. Folyóirat* **45**, 103–8(1939).—A 4% aq. soln. of emulsin (Merck) was led through a 5-cm. layer of bauxite. This layer retained 79% of β-glucosidase. The filtrate contained 3% of β-glucosidase, 70% of α-galactosidase and 90% of chitinase. A second, 3.5-cm. layer of bauxite was used for chromatography to retain 75% of α-galactosidase. The filtrate contained practically no β-glucosidase nor β-galactosidase and consisted chiefly of chitinase. The adsorbed enzymes could always be easily dissolved by dild. ammonia. The bauxite used was commercial ore finely powd. and mixed with 30% quartz sand to increase its permeability. S. S. de Finály

Determination of pregnandiolglucuronic acid in urine. Roger Crismer. *Compt. rend. soc. biol.* **132**, 50–2(1939).—An improved method of defecating the urine and extg. with BuOH is described. L. E. Gilson

A crystal form which precedes the formation of Teichmann crystals in the test for hemoglobin. M. Goulliart. *Compt. rend. soc. biol.* **132**, 108–11(1939).—The dried blood or hemoglobin is mixed on a slide with glacial AcOH or a 1% soln. of HCl in AcOH. Rusty-appearing shuttle-shaped crystals slowly form. If glacial AcOH contg. a little KI is used as the reagent all hemoglobins and chlorocruorins form, in about 30 min., dichroic boat-shaped crystals of protoiodoheme which change gradually into square tabular Teichmann crystals. The reaction is hastened by warming. L. E. Gilson

The precipitation reaction of erythrocytes in test tubes. V. A. Shangin. *Lab. Prakt.* (U. S. S. R.) **1939**, No. 7, 30.—It is recommended to replace the watch glass with short test tubes (1.5–2 cm. diam., 2–2.5 cm. long) when the velocity of the pptn. of erythrocytes is detd. Advantages are easier mixing and complete removal of the liquid. W. R. Henn

The determination of iodine in thyroid glands. F. Reimers. *Dansk Tids. Farm.* **13**, 237–51(1939) (German summary).—Hunter's method (*J. Biol. Chem.* **7**, 321 (1909)), U. S. P. XI, was modified by the addn. of 10 ml. of 30% NaOH before titration. This gave a pH of 2.2. In the acetic acid method the only change was the use of H_2SO_4, evapn. to 175 ml., neutralization by NaOH and the addn. of glacial acetic acid before titration. Citric acid, giving a pH of 2.2, was also used in place of the glacial acetic acid. When these modifications were used the results of the methods were in better agreement than with the methods given in the U. S. P. Otto Johnson

The determination of thiocyanate in serum after the administration of its salts. Emanuel Ginsburg and Norbert Benotti. *J. Biol. Chem.* **131**, 503–17(1939).—The detn. of thiocyanate is carried out directly upon serum by addn. of acid $FeCl_3$ without preliminary pptn. of protein, thus shortening and greatly simplifying the procedure. The color is read in a microphotoelec. colorimeter. Recovery from normal serum is within ±2% and from serum with a concn. of bilirubin as high as 7.4 mg. %, 96–99%

recovery is possible. The method affords a working limit of 7.5 mg. % in which range the Lambert-Beer law holds accurately. By diln. of the original serum, the upper limit may be extended to 15 mg.% with negligible error. A. P. Lothrop

A combination simple manometer and constant-volume differential manometer for studies in metabolism. Wm. H. Summerson. *J. Biol. Chem.* **131**, 579–95(1939).—The app. described is a combination manometer offering in a single app. the possibilities of either direct or differential manometric measurements. For direct measurements it is the equiv. of 2 single manometers of the conventional Barcroft-Warburg type in which one limb is open to atm. pressure. As a differential manometer it operates at const. vol. with the attendant simplification of differential measurements made possible by use of const.-vol. vessel consts. The differential readings are equally significant at high or low vessel pressures and a sensitive manometer fluid may be used since only pressure differences are allowed to influence the manometer. It is adaptable for use with a variety of vessel types and has proved equally suitable for the study of metabolism in Ringer-phosphate soln. or in those solns. which must be maintained under physiol. conditions of gas tension such as Ringer-bicarbonate soln., blood serum and other physiol. fluids. The application of the app. to the differential measurement of the O_2 consumption, respiratory CO_2 output and aerobic glycolysis of tissues is illustrated. A. P. Lothrop

Note on hemoglobin estimation. John McGrath. *Irish J. Med. Sci.* [6], No. **166**, 740–2(1939).—A short review. G. H. W. Lucas

C—MICROBIOLOGY

LAWRENCE H. JAMES

Influence of purification of brewers' yeast by the pharmacopeial method upon its biological value. Z. Markuze and St. Biniecki. *Arch. Chem. Farm.* **4**, 37–40 (in English, 40)(1939).—The effect of the purification of brewers' yeast according to the method specified in the Polish Pharm. (2nd edition) was studied with regard to the N, P and vitamin B contents of the product. It was found that the total N and P content of the purified yeast is slightly lower, and that of purine N is slightly higher than in the initial product. Lipides, glycogen and other carbohydrates are unaffected. Purified yeast contains slightly more vitamin B_1 (50 I. U. per g., as compared with 45 I. U. for the unwashed yeast); the content of vitamin B_2 is 10 and 5–10 Akroyd-Roscoe units, resp. So the pharmacopeial method of washing yeast does not involve removal of active constituents of yeast, and it even slightly raises its vitamin B content. E. A. Ackermann

Denitrification and hydrogen-ion concentration. Astrid Karlsen. *Bergens Museums Årbok* **1938**, No. 2, 38 pp.—Expts. on the influence of the H-ion concn. on denitrification in a strain of *Pseudomonas aeruginosa* (Schroet.) Migula are described. In nutrient solns., contg. KNO_3, the min. lies at about pH 5.8 to 6.0, the max. at about 9.0 to 9.2. The optimum varies with the nitrate concn. In NO_3 nutrient solns. both the min. and the optimum varies with the NO_2 concn. At all concns. the max. point lies at about 9.2 to 9.4. It is suggested that the explanation of the varying places of the optimum point in the expts. with 27.4 mg. nitrate N may be the varying NO_2 accumulation, which interferes more or less with the denitrification process in the crit. range near the point of neutrality. Fe in measurable quantities is necessary for the denitrification process. With $FeCl_3$ 0.07 to 0.1 mg. Fe per 100 ml. soln. seems to be the optimal concn.; 0.2 mg. Fe has a deleterious effect. Fe citrate furthers the denitrification process in concns. of 0.1 and 0.2 mg. Fe per 100 ml., and 0.2 mg. Fe has a greater effect than 0.1 mg. Fe citrate in a concn. of 0.2 mg. Fe per 100 ml. accelerates the nitrate decompn. both in the min. range pH 5.5 to 7.0 and in the max. range 8.6 to 9.2. The addn. of Fe, especially citrate Fe, favors particularly the NO_2 decompn., not the reduction of nitrate to NO_2. Low temps., 1.5° to 5.0° have no influence on the course of the pH curve of denitrification. The expts. described were made with growing bacteria. The denitrification, considered as a purely enzymic process, may have other cardinal pH points than those found in the expts. V. Aschehoug

Thiamine and symbiosis. Wm. J. Robbins. *Bull. Torrey Botan. Club* **66**, 569–72(1939); cf. *C. A.* **33**, 5890².—Symbiosis may occur between fungi that are heterotropic and those that are autotropic for thiamine. Thus *Penicillium* may supply thiamine to *Phycomyces*. R. C. Burrell

Preparation of antigens Vi and O [of typhoid bacillus]; their serological reactions. Ivan Malek. *Compt. rend. soc. biol.* **132**, 15–18(1939).—Discussion. **Antigenic properties of antigens Vi and O.** *Ibid.* 18–20.—The two protein-free antigens are almost identical in their antigenic properties. **Influence of the glucide-lipide antigens on cultures of Eberthella typhi.** *Ibid.* 24–5.—Addn. of either antigen to a broth culture stabilizes the organisms against flocculation by Na salts or acids. L. E. Gilson

Metabolism of the tubercle bacillus in Long's synthetic medium. Theodore E. Friedemann and Florence B. Seibert. *Proc. Soc. Exptl. Biol. Med.* **42**, 41–3(1939).—In Long's medium (*C. A.* **20**, 2535) growth was rapid and was directly related to the consumption of glycerol and other org. components of the medium. Rapid autolysis occurred after exhaustion of the nutrients. No lactic acid was formed. L. E. Gilson

Effect of chlorophyll derivatives and related compounds on the growth of Mycobacterium tuberculosis. Sylvester Daly, Geo. Heller and Erich Schneider. *Proc. Soc. Exptl. Biol. Med.* **42**, 74–8(1939).—Chlorin-e and chlorophyllin in concns. of 0.025 and 0.05% in glycerol broth and in Sauton's medium inhibited the growth of H37 and avian tubercle bacilli. In similar concns. Cu chlorin-e, deuteroporphyrin, Cu deuteroporphyrin and the Na salt of pyrroporphyrinsulfonic acid did not retard growth. The pellicles were colored by the compd. used. The absorption spectra indicate that Cu chlorin-e unites chemically with the bacillary protein to form a complex. L. E. Gilson

Toxicity of "Q" substance from Eberthella typhosa. E. W. Dennis. *Proc. Soc. Exptl. Biol. Med.* **42**, 89–92 (1939).—The "Q" substance (cf. White, *C. A.* **26**, 2238; **29**, 488⁹) prepd. from typhoid bacilli is lethal to mice and rabbits when given in sufficient doses. Its toxicity is attributed to its necrotizing action, which appears to be due to a toxic compd. formed from the "Q" substance and serum protein. L. E. Gilson

Anticatalase activity of sulfanilamide and related compounds. IV. Peroxide accumulation and growth inhibition in pneumococcus. Edna R. Main, Lawrance E. Shinn and R. R. Mellon. *Proc. Soc. Exptl. Biol. Med.* **42**, 115–18(1939); cf. *C. A.* **33**, 8231⁷, 8296⁸.—The effect of sulfanilamide, and 11 related complex compds. capable of inhibiting catalase, upon growth and accumulation of H_2O_2 in broth cultures of pneumococcus was detd. The concn. of H_2O_2 per unit of growth was 2–10 times greater in the presence of compds. which caused bacteriostasis than in control cultures. *p*-Aminobenzamide, the carboxylic acid deriv. corresponding to sulfanilamide, showed no bacteriostatic activity. *p*-Nitrobenzamide was markedly bacteriostatic. L. E. Gilson

Fluorescence and absorption spectra of a flavin isolated from a toxic culture filtrate of Corynebacterium diphtheriae. M. O'L. Crowe. *Proc. Soc. Exptl. Biol. Med.* **42**, 212–15(1939).—Preliminary report. L. E. Gilson

Bacteriostatic effect of sulfapyridine, sulfanilamide and prontosil rubrum in vitro on mycobacteria. Konrad E. Birkhaug. *Proc. Soc. Exptl. Biol. Med.* **42**, 275–7(1939). —Human, bovine and avian tubercle bacilli were used, also *Myc. johnei*, *Myc. piscium* and *Myc. paratuberculum*. Both sulfapyridine and prontosil rubrum produced significant inhibition of growth of the cultures in 10 mg.% concn. and sometimes complete inhibition in 50–90 mg.% concn. Sulfanilamide in 50 and 90 mg.% concn. was less effective than sulfapyridine in 10 mg. % concn. L. E. Gilson

Filterability of bacteria. S. P. Kramer. *Proc. Soc.*

Exptl. Biol. Med. **42**, 448–51(1939).—If one filters a 1: 30,000 soln. of night blue, a colloidal basic dye, through a siliceous filter, Berkefeld N, the filtrate is colorless. If a wetting agent (blood serum, bile, Na taurocholate, glycocolic acid, Turkey-red oil, common soap, castor-oil soap, lecithin, Na lauryl sulfate, etc.) is added to the dye soln. the dye passes through the filter. In like manner the addn. of one of the above wetting agents to the culture suspension enables *B. subtilis*, *Streptococcus hemolyticus* and typhoid and other bacilli to pass through the Berkefeld N filter. In some cases the meat broth used as a culture medium may contain enough soap or other active substance to produce the effect. L. E. Gilson

Substance "B" in lactic fermentation according to the scheme of Van Laer. Hervasio Guimarães de Carvalho. *Rev. brasil. chim.* **8**, 122–7(1939).—Discussion. L. E. Gilson

The bacteriostatic and antitoxic actions of sulfanilamide. Joseph T. King, Austin F. Henschel and Beryl S. Green. *J. Am. Med. Assoc.* **113**, 1704–9(1939).—Tissue-culture studies of the bacteriostatic properties of sulfanilamide indicate that it is effective against β-streptococci. Reduction in hemolysis accompanied bacteriostasis. The drug modifies the normal mode of division and reduces the ability of the organism to invade the clot. F. P. G.

Forssman antigen in tubercle bacilli. Cesare Perondi. *Boll. soc. ital. biol. sper.* **14**, 500–2(1939).— No Forssman antigen was found. Helen Lee Gruehl

Forssman antigen in ox organs. V. Cavina. *Boll. soc. ital. biol. sper.* **14**, 503–6(1939).—No Forssman antigen was demonstrable in ox liver, spleen, kidney, lungs, blood or brain. Helen Lee Gruehl

Action of methyl *p*-hydroxybenzoate on tubercle bacilli. M. Adorni Braccesi. *Boll. soc. ital. biol. sper.* **14**, 508–10 (1939).—Concns. of 0.05% to 0.15% proved effective in inhibiting the growth of various strains. H. L. Gruehl

Bacterial symbiosis with legumes and nonlegumes. H. Schanderl. *Gartenbauwiss.* **13**, 406–40(1939).—*B. radicicola* was detected in plants of the Papilionacea and isolated under aseptic conditions not only from root nodules but from the roots, sprouts, leaves and seeds as well. Bacteria, apparently of the same type, were also isolated under similar conditions from various organs of nonleguminous plants, including those belonging to the Compositae, Cruciferae, Graminae and Caryophyllaceae. Bean ext. media proved more successful than agar media for the isolation of the bacteria. Symbiosis between *Diplotaxis tenuifolia* and N-fixing bacteria was demonstrated in a pot expt. on kaolin sand (contg. 0.007% N) with N-free nutrient soln. This plant and several others were found growing on a kaolin sand hill from a kaolin mine. The lack of energy material in this substrate indicated the improbability of the presence of nonsymbiotic N-fixing bacteria. The evidence for the source of the symbiotic N-fixation residing solely in the root nodules is discussed. Conclusion: The evidence is more favorable for the hypothesis that N assimilation takes place in the leaf or other aerial portion of the plant. 35 references. C. K. Horner

The occurrence of Colletotrichum lindemuthianum (Sacc. & Magn.) Bri. & Cav. in broad bean seeds. T. F. Yu. *Bull. Chinese Botan. Soc.* **3**, No. 1, 1–19(1937).— In an aq. medium contg. 1% dextrose and 1% peptone and at a temp. of 28°, no growth of the fungus occurred at pH 3.1 and only slight growth at pH 4.4. Max. growth was made at pH 7.3–8.4 and some growth took place at pH 11.6. Two strains of the fungus showed practically identical behavior with respect to pH. In a soln. composed of $MgSO_4$ 0.8, KCl 1.0 and $NaNO_3$ 2.0%, the *Vicia* and *Phaseolus* strains showed little difference in the amt. of growth in the presence of a no. of carbohydrates, but in raffinose soln. the mycelial growth of the latter was 3 times that of the first. K. D. Jacob

The effect of chaulmoogra oil and related substances upon the growth of Mycobacterium avium in vitro. Robert Graham, L. E. Boley and Norman D. Levine. *Cornell Vet.* **29**, 357–9(1939).—Chaulmoogra oil in a concn. of 1:100 apparently inhibited the growth of but did not kill *M. avium*. Concns. lower than 1:500 had no effect. The Na salts of the total acids of *Hydnocarpus wightiana* in concns. of 1:100–1000 also inhibited growth but were not toxic. Na diheptyl acetate gave similar results. K. D. Jacob

The mold Byssochlamys fulva. II. T. G. Gillespy. *Univ. Bristol, Fruit Vegetable Preservation Research Sta., Campden, Ann. Rept.* 1938, 68–78; cf. *C. A.* **33**, 2605⁸.— The asci of *B. fulva* are most resistant to heat at pH 5.0 and the resistance at a given temp. and pH increases with the concn. of sucrose in the medium. All ascospores were destroyed when the medium was subjected to initial and final heatings for 10 min. each at 77° with an intermediate heating for 30 min. at 46°. A 38% survival of the ascospores occurred when the medium was heated continuously for 20 min. at 77°. K. D. Jacob

Biochemistry of Endoconidiophora fimbriata (E. et H.) Dav. I. Kenzi Miyazi. *J. Agr. Chem. Soc. Japan* **15**, 831–5(1939).—The sweet potato or the potato ext. contg. 3% of sucrose was most suitable for the culture soln. of *Endoconidiophora fimbriata*. The black pigment was produced in the soln. It showed the properties of caramelan. It may come from the sugars but not from the starch. Alc., fusel oil, aldehyde, acetone, AcOH, fumaric acid, malic acid, kojic acid and glycerol were detected as the fermentation products. Y. Kihara

Study of a new acetone-resistant stock of acetone-ethyl alcohol bacteria with special reference to the possibility of increasing the concentration of industrial mashes. M. D. Chumak. *Bull. acad. sci. U. R. S. S., Sér. biol.* 1939, 145–54.—An acetone-resistant strain of *B. acetoethylicum*, grown on sterile potato cultures, was found to be suitable for the fermentation of concd. (25–60%) potato mashes. For concns. exceeding 60% fermentation was limited only by the viscosity of the mash. For 5–10% corn mashes fermentation by *B. acetoethylicum* was very slow owing to a lack of N in suitable form. Addn. to such mashes of inorg. N ($(NH_4)_2SO_4$) or of the aq. ext. from potatoes accelerated fermentation. John Livak

Biochemical reactions of Leishmania tropica. H. A. Senekji. *Am. J. Trop. Med.* **19**, 601–4(1939).—Seven locally isolated strains of *Leishmania tropica* were uniform in biochem. reaction in that they produced no indole or liquefaction of gelatin and no acid or gas from carbohydrates. The methyl red reaction and the Voges-Prauskauer reaction were neg. They produced rapid peptonization of milk and were bile sol. G. H. W. Lucas

The effect of various substances used as energy supply of microbe growth when introduced separately in culture media. Auguste Sartory, Jacques Meyer and André Netter. *Bull. acad. méd.* **121**, 815–19(1939).—The substances studied were Bios II prepd. from egg yolk by Kögl's method (cf. *C. A.* **29**, 2563¹), vitamin B_1, thiazole, pyrimidine, nicotinic acid, inositol and heteroauxin, tested on staphylococcus. Bios represents the only true energetic factor in these expts. The other substances, as far as necessary for growth, give no further benefit once the min. requirement has been supplied. A. E. Meyer

The mechanism of the pathogenic action of anthrax bacilli. H. Peter. *Zentr. Bakt., Parasitenk.*, I Abt., Orig. **144**, 463–71(1939).—Prior treatment with monohalogen acids, especially monochloroacetic, lengthens the life of a mouse injected with anthrax. This is probably due to inhibition of proteolytic enzymes. 13 references. John T. Myers

A rapid simple and reproducible method for the determination of bacterial sugar fermentations. J. G. Davis. *Zentr. Bakt., Parasitenk.*, II Abt. **101**, 97–101(1939).—A freshly grown mass culture on agar or in a suitable liquid medium is washed with tap water, taken up with about 30 cc. of tap water, 6 cc. of phosphate buffer pH 6.8 (equal vols. of 0.1 *M* Na_2HPO_4 and 0.1 *M* KH_2PO_4), 3 cc. of 0.01% bromocresol purple and 21 cc. of tap water. Approx. 5-cc. amts. are distributed in clean but not sterile test tubes. To each tube is added 10–20 mg. of the test sugar with a sterile Pt spatula. The tubes are closed with rubber stoppers, incubated at 37° and examd. after 3, 16

and 24 hrs. A clear yellow indicates a pos. result. Controls of each constituent should be run. J. T. Myers

An experimental study of the relation between concentration of disinfectants and time required for disinfection. F. W. Tilley. *J. Bact.* **38**, 499–510(1939).—The bactericidal efficiencies of phenol, *o*-cresol, *p*-cresol, *p*-butylphenol, resorcinol, propylresorcinol, EtOH and BuOH against *Staphylococcus aureus* and *E. typhosa* were detd. by a modified Rideal-Walker technique. From the resulting data values for the concn. exponent, n, were calcd. by the formula: $n = (\log t_2 - \log t_1)/(\log C_1 - \log C_2)$. The value of n thus obtained was then substituted in the formula $n \log C + \log t = \log A$ (A const.). Values of n and $\log A$ thus derived could be employed in this same equation to calc. either time or concn. when only one of these factors was known. The values of n seem to be characteristic for each disinfectant with each organism. John T. Myers

Studies on the hemolytic streptococcus. III. Polysaccharide and protein fractions encountered in the precipitation of erythrogenic toxin from culture filtrates. Aaron H. Stock. *J. Bact.* **38**, 511–24(1939).—The following extraneous products were encountered in preliminary expts. aimed at isolation of erythrogenic toxin from streptococcic culture filtrates: a peptone polysaccharide, a uronic acid polysaccharide, a yellow "oil," sirupy protein products from medium and an acid-precipitable protein. The polysaccharide from peptone can support streptococcic growth but it is not an essential growth factor. The uronic acid polysaccharide differed from the above by giving a strong uronic acid test (naphthoresorcinol), a neg. direct Morgan and Elson test for *N*-acetylglucosamine and a pos. test for hexosamine after acid hydrolysis. The oil gave a pos. Molisch and a pos. biuret. One cc. of oil in 9 cc. of water rotated polarized light +0.05°. Toxin was isolated from the filtrates only when some of these substances were present to act as adsorbent agents during pptn. with alc. 22 references. John T. Myers

Studies with the agar cup-plate method. I. A standardized agar cup-plate technique. S. Brandt Rose and Ruth E. Miller. *J. Bact.* **38**, 525–37(1939).—The following technique is suggested for testing antiseptics by this method. Use a standard organism; if it is *Staphylococcus aureus* use the F. D. A. strain or one of equal resistance to phenol. Grow the organisms in broth for 18 to 24 hrs. and standardize the suspension to 1 billion per cc. Ext. agar, pH 6.8, may be used. If necessary for some organisms use infusion agar, pH 7.4. Always designate the medium. The final agar concn. should be 1.5%. A 3% agar can be dild. with saline, protein (serum, blood) or protein saline mixts. Seed the medium with 0.1 cc. of standard suspension per 30 cc. Place 30 cc. of seeded medium in a Petri dish. Remove a disk of agar 1.5 cm. in diam. Use 0.2 cc. of a given dilu. of the antiseptic in each cup. The plates should be ready for incubation within 1 hr. after seeding. Incubate the plates for 24 hrs. at 37° and measure the zone of inhibition. This technique yields consistent results with phenol, $HgCl_2$ and crystal violet.

III. The influence of agar on mercury antiseptics. Ruth E. Miller and S. Brandt Rose. *Ibid.* 539–47.—Metaphen, merthiolate, $HgCl_2$ and mercurochrome were tested at various dilns. in broth and agar in the presence of varying amts. of blood. The test organism was *Staph. aureus* of standard resistance (F. D. A.). Agar exerts little or no effect on the antiseptic properties of Hg compds. The effectiveness of Hg compds. varies with the dilu. of the antiseptic and the blood content of the medium according to the general formula $y = Kx^n$, where y is antiseptic dilu., x is the blood concn. at which dilu. y is bactericidal, K and n are consts. for each organism. At certain crit. blood and antiseptic levels the compds. studied have no antiseptic properties. The antiseptic potency is not directly related to the Hg content of the compd. J. T. Myers

Studies on immunizing substances in pneumococci. X. The relationship between the acetyl group and Type I pneumococcus polysaccharide antigenicity. Lloyd D. Felton and Benjamin Prescott. *J. Bact.* **38**, 579–93 (1939); cf. *C. A.* **33**, 7873[7].—A study of the effect on antigenicity for white mice of both alk. and acid treatments of the polysaccharide of Type I pneumococcus prepd. by both Heidelberger (cf. *C. A.* **30**, 8296[9]) and Ca phosphate methods yielded the following results: NH_4OH (sp. gr. 0.89) at room temp. caused little alteration in N content, glucose no., precipitin titer, immune precipitible N, or optical rotation. Acid hydrolysis reduced the distillable acid, but the distillate did not give a test for HOAc. Antigenicity remained unchanged no matter by which method the polysaccharide was prepd. Treatment at room temp. with $N/1$ NaOH produced no change in the immunizing power of either sample, but the Heidelberger sample no longer gave a pos. test for HOAc in the vacuum distillate. Acid hydrolysis at 100° with either 5% phosphoric or *p*-toluenesulfonic acid destroyed the acetyl groups present in the Heidelberger sample yet produced no change in antigenicity. Also this treatment did not change the antigenicity of the Ca phosphate sample. Hence the presence of the acetyl group has no relationship to antigenicity. 19 references. John T. Myers

Evaluation of the tubercle bacillus concentration methods of Petroff, Pottenger and chemical flocculation. A. H. Nagy. *J. Lab. Clin. Med.* **25**, 67–71(1939).—Pottenger's (*Am. Rev. Tuberc.* **24**, 583(1931)) diln.-flotation method gives an av. of 33 times as many bacilli as can be obtained in direct smears of choice particles in routine work. The efficiency of this method is twice that of chem. flocculation and 4 times that of Petroff's (*Tuberculosis, Bacteriology, Pathology, and Lab. Diagnosis* 1927) NaOH method. Howard W. Robinson

Observations on MacConkey's and desoxycholate-citrate agars for the isolation of dysentery bacilli. J. V. Irons, S. W. Bohls, Thelma DeShazo and L. L. Hewlett. *J. Lab. Clin. Med.* **25**, 81–5(1939).—Desoxycholate-citrate medium is superior to MacConkey's agar for the isolation of Flexner dysentery bacilli. The former medium should be used along with a less restrictive medium in the bacteriol. investigation of acute diarrheal disorders. Where typhoid and paratyphoid bacilli are sought a medium more suitable for the purpose should be used. Howard W. Robinson

Anaerobic degradation of cysteine by B. coli. III. Optical specificity of cysteinase. Pierre Desnuelle. *Enzymologia* **6**, 387–91(1939)(in French); cf. *C. A.* **33**, 8677[8].—Under the action of *B. coli* cells which have been adapted to synthesize cysteinase, a given amt. of *l*-cysteine gives rise to twice as much H_2S as can be obtained from the same amt. of *dl*-cystine. The amts. of H_2S obtained from *l*-, *dl*- and *meso*cystine in the presence of glucose correspond exactly to the amts. of *l*-cysteine capable of being formed during the course of reduction by the bacteria of the different optical isomers. If *dl*-cystine is submitted to the action of *B. coli* in the presence of glucose it is possible, when all the *l*-cystine has disappeared, to isolate pure *d*(+) cystine $[\alpha]_D^{25}$ 211°. Felix Saunders

Sugar assimilation by living yeast. Changes taking place in the first few minutes. A. Mirski and E. Wertheimer. *Enzymologia* **7**, 58–71(1939)(in German).—Immediately after the addn. of glucose to living yeast cells at 30° there is a decrease in the amt. of acid-sol. phosphate in the cell. After a few min. a decrease of 40–50% is observed. The phosphate decrease persists throughout the entire period of sugar breakdown. After the period of glucose utilization, the phosphate curve gradually returns to normal. Addn. of phosphate to the fermentation mixt. has no effect on the phosphate curve. Interruption of the sugar breakdown by washing out the sugar present, or addn. of iodoacetate at the lowest point of the phosphate decrease lead to an immediate increase in the acid-sol. phosphate. Fluoride prevents this increase, and even makes the phosphate decrease still greater. If the acid-sol. phosphorylated product formed during the first 15–30 sec. of fermentation is heated 3 hrs. with N HCl it is completely hydrolyzed. If the incubation period is increased beyond 15–30 sec. the acid-sol. product is not completely hydrolyzed by heating 3 hrs. The longer period of incubation also leads to the formation of an acid-insol. compd. Corresponding with the decrease in acid-sol. phosphate

there is a decrease in pH. By working at low temps. (5–8°) it can be shown that the decrease in acid-sol. phosphate precedes the breakdown of the sugar. No glycogen formation can be demonstrated. A brief cooling of resting cells decreases the amt. of acid-sol. phosphate but in the presence of KCN or an atm. of N this decrease does not take place. At const. temp. KCN or N increases the acid-sol. phosphate. Felix Saunders

Total luminescence of bacterial suspensions in relation to the reactions concerned in luminescence. Frank H. Johnson. *Enzymologia* 7, 72–81(1939)(in English).—Detns. of luminescence intensity confirm the observations that the decrease in luminescence with time, when washed cells of luminous bacteria are aerated in phosphate buffer plus glucose, results neither from an exhaustion of the glucose nor from a possible accumulation of toxic metabolites. When glucose is added to portions of a washed cell suspension after successively longer periods of aeration, the resulting increase in luminescence takes place more slowly and the max. intensity attained is less. The total luminescence over a period of some hrs., however, is approx. the same. The characteristics of the time decrease in luminescence intensity are influenced by relatively small amts. of K and Cl. With Cl and no K, luminescence intensity is highest, after glucose addn., and decreases logarithmically with time. The data are discussed in relation to the hypothesis that an irreversible luminescent oxidation of luciferin by luciferase in bacteria follows a reduction of an oxidized form of luciferin (different from that resulting from luminescent oxidation) by dehydrogenase activity. The general form of all the curves for luminescence intensity in relation to time after adding glucose may be described by differential equations on the basis of these 2 reactions. Felix Saunders

Vitamin B_1 and acetate oxidation by bacteria. J. H. Quastel and D. M. Webley. *Nature* 144, 633–4(1939).—The oxidation of AcOH by suspensions of propionic acid bacteria grown on a vitamin B_1-deficient medium is greatly accelerated by the addn. of small amts. of the vitamin. Expts. indicate that the catalytic agent is cocarboxylase (vitamin B_1 pyrophosphate) rather than vitamin B_1 itself. E. D. Walter

Conversion of starch to crystalline dextrins by the action of a new type of amylase separated from cultures of Aerobacillus macerans. E. B. Tilden and C. S. Hudson. *J. Am. Chem. Soc.* 61, 2900–2(1939).—When *Aerobacillus macerans* is grown for several weeks upon a potato medium and the culture fluid is filtered through a Berkefeld N filter to remove the microörganisms, the filtrate contains an enzyme which converts gelatinized starch to a high rotating ($[\alpha]_D$ 203°) mixt. of nonreducing dextrins, of which the cryst. α- and β-dextrins of Schardinger are components, without the production of maltose, glucose or other reducing sugars. The culture filtrate (0.5 ml.) will convert 30 mg. of starch in a total vol. of 1.5 ml. in 30 min. at 40°; at 30° the time is twice this period and at 20° 4 times; at 50°, however, the time is more than half that required at 40°, indicating that some inactivation occurs at the higher temp. The enzyme is active over a pH range of 5.6–6.4. It is pptd. by 37.5% Me_2CO in the cold and can be extd. from this ppt. with 0.1 the original vol. of H_2O. The activity of the enzyme is unimpaired in this purification. From the above results it is inferred that the α- and β-dextrins are not products of the synthetic metabolism of the organism but are either the true components of starch or are closely related to such true components.
C. J. West

The antigenic structure of hemolytic streptococci of Lancefield group A. IV. Nucleoprotein components: Some chemical and serological properties, and changes in both caused by certain enzymes. Charles A. Zittle. *J. Immunol.* 37, 1–16(1939).—The type-specific *M* substance extd. from undried whole streptococci with 0.05 *N* HCl at 56° and isolated by pptn. at pH 3.5 was characterized as a nucleoprotein on the basis of P and purine-N content and chem. behavior; the protein was deficient in tyrosine and tryptophan on the basis of neg. Millon and Hopkins-Cole reactions. The nucleic acid, on the basis of color tests and the action of ribonuclease, was of the ribose-type. Ribonuclease caused detectable chem., but not serological, changes in prepns. of *M*. *M* was serologically inactivated by trypsin in less than 5 min. after which *M* could not be pptd. with acid. Protein fragments and nucleic acid were recovered from the tryptic digest of *M*. *M* was also inactivated by Cl-H_2O which formed a ppt. in acidic solns. The nucleoprotein *NPA*, obtained after sonic disintegration of the organisms, differed from *M* in giving pos. Millon and Hopkins-Cole reactions and contained both ribose- and desoxyribose-type nucleic acids. V. **The lack of interference of blood-group A substance in culture media with chemical and serological studied on streptococcus hemolyticus.** Werner Henle and Gertrude Henle. *Ibid.* 149–57.—Serological tests show that the presence of blood-group *A* substance in culture media contributed by the peptone usually does not interfere with the chem. fractionation of organisms from such media. The small amts. present with the organisms can be removed by careful washing 3 times. An interference in serological work seems to be excluded also. Charles A. Zittle

The isolation and properties of the specific polysaccharide of type B Hemophilus influenzae. John H. Dingle and Leroy D. Fothergill. *J. Immunol.* 37, 53–63(1939).—A simplified, peptone-free, liquid medium was used for the growth of *H. influenzae*. After the removal of the organisms the medium was concd. to 0.1 vol., pptd. with 1.5 vol. of EtOH. The ppt. was purified by repeated soln., in the presence of Na acetate made acid to litmus with glacial AcOH, and pptn. with EtOH and subsequent treatment with chloroform and BuOH. The yield from 10 l. of culture media was 0.228 g. The product was characterized by pos. Molisch test, pos. naphthoresorcinol test for glucuronic acid, neg. biuret test. Analytical data: N 0.3, C 30.7, H 5.4, ash 27.4, P 8.54 and reducing sugar (as glucose) 27%. Less than 1% of the total P was in the form of inorg. phosphate; after 5 hrs.' hydrolysis 92% was detd. as inorg. phosphate. Specific pptn. occurred in a diln. of 1:35,000,000 with immune horse serums and 1:12,000,000 with immune rabbit serums. Pptn. with various rabbit serums was specific but certain horse serums exhibited cross reactions which immunologically did not appear to be due to contamination. C. A. Z.

The disintegration of bacteria by mechanical means. I. Description and capabilities of a new type of ball mill. Paul H. Langner, Jr., and James S. Forrester. *J. Immunol.* 37, 133–6(1939).—A ball mill is described which in grinding dry hemolytic streptococci at low temp. (CO_2 ice) in 2 hrs. rendered 40% of the total bacterial N sol., in 3 hrs. 55%. Similar results were obtained with other organisms. Grinding at room temp. compared favorably with grinding at low temp. Also grinding a packed, wet mass of whole organism at room temp. was successful. II. **Comparative efficiency of the low temperature ball mill and the sonic oscillator.** *Ibid.* 136–40.—A comparison is made of the new type of ball mill with the sonic oscillator (Chambers and Flosdorf, *C. A.* 30, 6408[7]) and another type of ball mill (Mudd, *et al.*, *C. A.* 31, 6271[8]).
Charles A. Zittle

A new Schick toxin. E. M. Taylor and P. J. Moloney. *J. Immunol.* 37, 223–32(1939).—A historical review of the development of the Schick test is presented dealing chiefly with efforts to stabilize and standardize the toxin. On the basis of their work the authors conclude it is advantageous to have Schick toxin of higher toxicity than the present standard of the League of Nations and it is preferable to use for its prepn. "fresh" rather than "matured" toxin. A comparison of such a Schick toxin with the present standard is given; out of 205 tests 178 interpretable readings were obtained for the former, 166 for the latter. The conditions for maintaining the stability of the new toxin are described. 18 references. Charles A. Zittle

Pneumococcal capsular polysaccharide in urine; detection by precipitation and centrifugation. Paul F. De Gara, Samuel C. Bukantz and Jesse G. M. Bullowa. *J. Immunol.* 37, 305–20(1939).—**The minimal amt. of spe-**

cific polysaccharide detectable after its addn. to normal urine and the optimal amt. of rabbit antibody required for detection was investigated for various types of pneumococci. The minimal concn. detectable for types 1, 3, 4 and 14 was 1:200,000 and for 2, 5, 7 and 8, 1:400,000. Pooled rabbit serums were successfully used to facilitate the testing. Concn. of urine contg. polysaccharide yielded roughly equal increases in the concn. of polysaccharide found. Centrifugation at 2000 r. p. m. for 30 min., immediately after mixing of urine and antiserum, gave reactions more evident than the usual procedure of incubation at 37° for 2 hrs. and refrigeration overnight. The reaction has been used to identify the infecting type of pneumococcus in patients whose sputums yielded several types. Charles A. Zittle

The effect of temperature upon combination and aggregation and upon equilibrium in the reaction between antigen and antibody. Edna M. Follensby and Sanford B. Hooker. *J. Immunol.* 37, 367–82(1939).—A decrease in temp. from 40° to 5° has little influence upon the speed of combination between diphtheria toxin and antitoxin, but has a marked influence upon the flocculation time; the equil. attained in optimal mixts. of diphtheric toxin and antitoxin was independent of temp. Diphtheric toxin and antitoxin will combine in the presence of an amt. of salt insufficient for flocculation. Pptd. antiovalbumin will combine with ovalbumin, and temp. has little if any effect upon the equil. attained in the mixt. Charles A. Zittle

Chemical and immunological studies of the pneumococcus. V. The soluble specific substances of types 1–32. Rachel Brown. *J. Immunol.* 37, 445–55(1939); cf. *C. A.* 27, 3748; 31, 7923[9].—By the use of ultrafiltration and repeated fractional alc. pptns. in the cold in the presence of Na acetate, highly purified prepns. of the type-specific substances were obtained from broth-culture filtrates of pneumococci of types 1 through 32. The method appears to be simpler and possibly less drastic than those previously used; comparative data are given for types 1, 2, 3, 4, 8 and 14. Data in tabular form, for the 32 types, are given for Kjeldahl N, amino N, P, Ac group, ash, specific rotation, relative viscosity and precipitin titer. In some cases data are given for different prepns. of the same strain and type and also for different strains of the same type. Ten types probably represent N-free carbohydrates; 5 others (types 1, 4, 5, 12 and 25) contained a max. of 4–5% of N; the remainder contained $^1/_4$–$^3/_4$ of this amt. The type-1 substance contained 2% amino N; the others contained none or very small amts. (the detn. was made only if the total N was above 3%). The P content of 9 of the types was less than 0.5%; in 13 it was 3% or higher; type 32 contained 6.38%. Evidence is given that this is neither inorg. phosphate nor due to contaminating "C" substance. The percentage of acetyl ranged from 0.32 for type 3 to 16.33 for type 11; the high values cannot be due to the presence of Na acetate as there is no correlation between the amt. of ash and of acetyl groups. All of the prepns. showed optical activity except type 23; 2 prepns. of this type showed $[\alpha]_D$ of −0.8 and −0.4°. Type 1 was the most active with $[\alpha]_D$ of +253.2 and +255.6° for 2 prepns. Twenty-five of the prepns. were *d*-rotatory; 7 were *l*-rotatory. The relative viscosities of 0.1% solns., in 0.9% NaCl at 20°, ranged from 1.06 for type 5 to 2.79 for type 3. Qual. chem. tests of 1% solns. gave neg. biuret and ninhydrin, neg. I test for glycogen; picric and trichloroacetic acid tests were neg. The Molisch test was pos. in all cases. Before hydrolysis only types 5, 21 and 32 reduced Fehling soln.; after hydrolysis reduction was marked in every case. The naphthoresorcinol test for uronic acids was pos. in 9 cases (types 1, 2, 3, 8, 9, 12, 22, 25, and 27). The dimethylaminobenzaldehyde test for amino sugars was neg. before hydrolysis; after acid hydrolysis the test was strongly pos. in 17 types, weakly so in 3. The pptg. action of 11 acids and salts, with 1% solns. of the type substances, were investigated; of these $(NH_4)_2SO_4$ and basic lead acetate gave the most general pptn. All of the prepns. pptd. homologous immune serums in dilns. as high as 1:4,000,000 or 1:8,000,000.
Charles A. Zittle

D—BOTANY

THOMAS G. PHILLIPS

Chemical composition of diploid and tetraploid Lolium perenne L. J. T. Sullivan and W. M. Myers. *J. Am. Soc. Agron.* 31, 869–71(1939).—Percentages of dry matter, total alc.-sol. matter, crude fiber, sugars, insol. N, alc.-sol. N and total N in diploid and tetraploid plants of *Lolium perenne* are tabulated. The tetraploid plants are higher than the diploid in reducing sugars, sucrose, total sugars and in the proportion of dry matter that is sol. in 80% alc. J. R. Adams

Studies in tropical fruits. VI. A preliminary consideration of the solubility of gases in relation to respiration. E. R. Leonard. *Ann. Botany* [N. S.], 3, 825–43(1939); cf. *C. A.* 33, 4289[9].—The vols. of the gases chiefly involved in respiration, and dissolving in H_2O at the partial pressures, total pressures and temps. most frequently encountered under biol. conditions, are given in the form of tables and graphs. Data are also given of the soly. of other gases in H_2O, of N_2, O_2 and CO_2 in solvents other than H_2O and of the effect of solutes on the soly. of these gases. Tables and graphs are provided showing the percentage of the total vol. of gas in soln. occupied by each constituent gas and the vols. of these gases liberated from such solns. with rise in temp. An example is given of the application of these tables based on values of gas concns. observed in respiration studies of the papaw. **VII. Notes on banana fruits in relation to studies in metabolism.** C. W. Wardlaw, E. R. Leonard and H. R. Barnell. *Ibid.* 845–60.—For the Gros Michel banana data are given of wts. of individual "fingers" and of the proportion of pulp to skin during development up to the final senescence and collapse of the individual plant. R. C. Burrell

Further studies on transport in the cotton plant. VII. Simultaneous changes in the production and distribution of dry matter under varying potassium supply. E. Phillis and T. G. Mason. *Ann. Botany* [N. S.], 3, 889–99 (1939); cf. *C. A.* 31, 732[4].—It was found that dry wt. and its distribution (rest of plant: leaf lamina) are highly correlated under varying K supply. This correlation holds both under conditions of low as well as high K supply. No such correlation was observed for N, while the results for P were inconclusive. It is suggested that K controls the rate of photosynthesis by altering the rate at which CO_2 diffuses to the chloroplasts and that it controls equally the rate of sugar export from the chloroplast to the phloem of the leaf by altering the rate at which sugar diffuses through the protoplasm of the parenchyma. R. C. B.

Excretion of nitrogenous substances from root nodules: observations on various leguminous plants. G. Bond and J. Boyes. *Ann. Botany* [N. S.], 3, 901–14(1939).—Consistently neg. results were obtained from sand culture expts., confirming that excretion is not a const. factor of the healthy growth of leguminous plants. These results are at variance with those of Virtanen (*C. A.* 32, 5140[2]). It is just possible that differences in illumination (Glasgow and Helsinki) might have been responsible for the different results. R. C. Burrell

Light, transpiration, salt absorption and leaf structure. A contribution to the problem of sun and shade leaves. R. Bötticher and L. Behling. *Flora* 34, 1–44(1939).—The most important and characteristic part of the structure of sun leaves is conditioned by an increased salt intake which is controlled by the transpiration and the light. K seems to be more firmly bound in strongly lighted plants than in controls kept in the dark. The latter may lose K to the medium through their roots and absorb it again when placed in light, even when the transpiration rate is unchanged. R. C. Burrell

Effect of type and period of storage on cottonseed after treatment with organic mercury dusts. L. E. Miles. *Phytopathology* 29, 986–91(1939).—There was a beneficial effect not only on control of seed-borne diseases but also on germination. Seed could be safely treated any time between harvest and subsequent planting date. Under the conditions of the test the types of storage had no significant effect on results. R. C. Burrell

Role of auxin in the growth and growth movements of the higher plants. P. Boysen-Jensen. *Scientia* **66**, 233–40 (1939).—General discussion. L. E. Gilson

The influence of size on the dry matter, mineral and nitrogen content of hyacinth bulbs. J. Hargrave and F. C. Thompson. *J. Pomology Hort. Sci.* **17**, 185–94(1939). —Dry matter, sol. ash, K_2O, P_2O_5, CaO and N contents were compared on 6 different sizes of hyacinth bulbs, namely, 6, 8, 10, 12, 14 and 16 cm. in circumference. The 6-, 8- and 10-cm. sizes were all significantly higher in dry matter than the larger bulbs. The K_2O, P_2O_5 and N contents decreased between 6 and 8 cm. (not significant for N) and then increased with increasing size to a max. in the 16-cm. bulbs. This increase of all 3 constituents may be connected with the increased capacity of the bulb for flower formation, root development and foliage production. CaO content decreased with increasing size up to 10 cm. and suddenly rose in the 12-cm. size with a decline thereafter. Sol. ash content reflected the rise and fall in the P_2O_5 and K_2O contents. The size of bulbs seemed to have a definite influence on the chem. compn. Thirteen references. John O. Hardesty

Seasonal variations of starch content in the genus Rosa, and their relation to propagation by stem cuttings. Dorothy Brandon. *J. Pomology Hort. Sci.* **17**, 233–53 (1939).—A series of expts. was carried out to ascertain the rooting capacities of various species and varieties of the genus *Rosa*, with variations in the time of insertion and in treatment prior to insertion. Hardwood cuttings were taken at intervals throughout the winter. The highest rooting percentage was obtained during the period Oct.–Dec. With softwood cuttings inserted in the summer, June was the best time for rooting. After prepn., the cuttings were subjected to various chem. treatments. Ethylene chlorohydrin, thiourea, $NaNO_3$, glucose and β-indoleacetic acid were used in suitable concns. β-indoleacetic acid (1:10,000 to 1:50,000) and glucose (1%) increased the rooting percentage while ethylene chlorohydrin and thiourea depressed it slightly. No treatment gave pronounced increase or acceleration in rooting. pH of the solns. had very little effect on the subsequent rooting. Different species and varieties of the genus *Rosa* may be divided into groups comprising those in which the starch remains throughout the winter, and those in which it disappears. Botanically related species and varieties fall in the same groups, indicating that starch variation is a genetically related phenomenon among species of the genus *Rosa*. Starch accumulation in the spring was delayed by pruning. Starch content of the cuttings had no relation to facility of rooting. Eighteen references.

John O. Hardesty

Biochemistry of lucerne (Medicago sativa L). R. B. Gelchinskaya. *Biokhim. Kul'turnykh Rastenii* **2**, 236–59(1938); *Khim. Referat. Zhur.* **2**, No. 2, 59(1939).—A monograph devoted to the chem. compn. of lucerne and to the influence of external conditions on its growth and its properties. The biochem. utilization of lucerne and the dynamics of substances in the process of the development of the plant are given special attention. W. R. H.

The biochemistry of the cacao bean; present state of knowledge. H. F. Birch and E. C. Humphries. *Ann. Rept. Cacao Research* **8**, 40–2(1938)(Pub. 1939).—A review, with 37 references. K. D. Jacob

The effect of sex- and posterior pituitary hormones on plant growth. Tadahumi Mabuti. *J. Oriental Med.* **31**, 211–28(German abstr. 21)(1939).—Ova hormone 500–2000 international units) accelerates the growth of the seedling of "hakusai" (a sort of cabbage), but when heated shows no action. Praehormone (anterior pituitary prepn. 300–600 rat units) inhibits the growth, while the heated prepn. does not. Neogeburtin (posterior pituitary prepn. 30–60 international units) accelerates the growth, and when heated still retains this power. S. T.

"Gormands" (abnormal suckers) in the sugar cane. F. Martin. *Bull. assoc. chim.* **56**, 619–24(1939).—Certain cane varieties, especially P. O. J. 2878, have a tendency to produce abnormal suckers during dry weather in fertile soils; these are low in sucrose and salts, and high in reducing sugars. Their formation can be avoided by irrigation during the dry season. F. W. Zerban

Vegetable growing in nutrient salt solutions. Alexis Michailoff. *Bull. assoc. chim.* **56**, 625–30(1939).—The significance of this new method is discussed. It may be applicable to the growing of sugar beets. Bibliography of 43 titles. F. W. Zerban

Yellow pigment of *Papaver nudicaule* (Price, *et al.*) **10**. Report of the agricultural chemist [on seasonal fluctuations of HCN in several varieties of Queensland plants] (Gurney) **15**.

E—NUTRITION

PHILIP B. HAWK

New information on the relation between liver function and vitamin B_1. Yosiho Hirata. *Oriental J. Diseases Infants* **23**, 23–31(1938)(in German).—Vitamin B_1 produced a marked increase in the liver glycogen of healthy rabbits. In rabbits with liver dysfunction caused by injections of $CHCl_3$ the administration of vitamin B_1 completely removed the pronounced decrease in liver glycogen as well as the pathol. disturbance, revealed by the sugar-tolerance test, and produced a distinct improvement in the degeneration of the liver. Vitamin B_1 restores liver function, especially the detoxicating action of the liver.

Ruth Berggren

Biological activity of synthetic *dl*-α-tocopherol (vitamin E) on male rats. Preliminary note. H. W. Julius and Chr. Engel. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 196(1939).—Doses of 2–8 mg. of synthetic *dl*-α-tocopherol and of wheat-germ oil were not able to restore the fertility of male rats in a curative test. Tocopherol and wheat-germ oil + 5–40 units of gestyl or pregnyl or both were also ineffective. In the prophylactic test on male rats tocopherol and wheat-germ oil were equally effective. E. Curzon

Interdependence of vitamin B_1 and manganese. II. Manganese, copper and iron metabolism in B_1-deficient rats. Marta Sandberg, David Perla and Olive M. Holly. *Proc. Soc. Exptl. Biol. Med.* **42**, 368–71(1939); cf. *C. A.* **33**, 8712[3].—The depletion period of rats on a vitamin B_1-deficient diet was shortened 7–10 days if the rats received 1 mg. Mn daily. The rise in blood pyruvic acid from the initial value of 3.74 mg. % to a peak of 7.28 occurred a week earlier in rats receiving Mn than in rats on a Mn-free diet, both groups being deprived of vitamin B_1. Rats deprived of B_1 stored more Mn than those given B_1. Changes in Cu and Mn metabolism in the absence of vitamin B_1 were not significant. **III. Manganese, copper and iron metabolism in normal rats.** David Perla, Marta Sandberg and Olive M. Holly. *Ibid.* 371–4.—When rats were given a normal diet supplying about 100 γ Mn daily they stored no Mn. When the Mn intake was increased some Mn was stored, and the amt. stored was markedly increased when an addnl. 400 γ vitamin B_1 was given daily. Some dietary Cu was retained at all times, the amt. decreasing when the Mn was increased but increasing again when Mn and B_1 were given together. Vitamin B_1 did not influence Cu metabolism when the Mn intake was only 100 γ per day. Changes in Fe metabolism were not significant. L. E. Gilson

Effect of a high-fat diet on carbon dioxide-combining power of blood plasma. Helen L. Wikoff and Joseph F. Vincent. *Proc. Soc. Exptl. Biol. Med.* **42**, 382–6(1939).—A high-fat diet had no characteristic effect on the CO_2-combining power of human blood plasma. When on identical diets the CO_2-combining power of the plasma was slightly greater in men than in women. L. E. Gilson

Factors in the recurrence of renal calculi. Charles C. Higgins. *J. Am. Med. Assoc.* **113**, 1460–5(1939).—Review with clinical observations. Proper control of the pH of the urine by diet is important in preventing recurrent formation of calculi. F. P. Griffiths

Riboflavin requirements of ducklings. James C. Fritz, Wallace Archer and Donald Barker. *Poultry Sci.* **18**, 449–54(1939).—The riboflavin requirement for optimum growth of White Pekin ducklings, at least during the 1st

few weeks, is about the same as that for chicks and is not less than 800 γ per 100 g. feed. Results obtained with purified diets indicated that ducklings require a factor or factors not needed by chicks. A leg deformity that occurred when the birds were raised on semipurified diets contg. more than 60 p. p. m. of Mn, the lack of which is responsible for perosis in chicks, seemed to be of nutritional origin. K. D. Jacob

The effect of different cereals on the composition of the edible portions of cockerels. H. M. Harshaw. *Poultry Sci.* **18**, 486–91(1939).—Corn-fed birds were the highest in the fat content of the edible portions, followed in order by those reared on wheat, control, barley and oat diets. The percentage of protein, ash and water in the edible portions of the birds reared on the 5 diets varied inversely with the fat content, but the edible portions of the wheat-fed birds were consistently lower in protein than were the same portions of the birds of the other groups. The cereals used showed no tendency to cause any difference in the distribution of fat between the edible portions. K. D. Jacob

The photographing of the line test in vitamin D determinations. P. Fønss Bech. *Dansk Tids. Farm.* **13**, 253–7(1939).—An improved technique for obtaining photographs of the line is described. Otto Johnson

Studies on some possible causative factors of the spontaneous adenomatous lesion of the stomach in mice of strain I. H. B. Andervont. *U. S. Pub. Health Repts.* **54**, 2085–93(1939).—The stomach lesion is not communicable and is not, apparently, caused by an infectious agent. The lesion is not the result of *vitamin A* deficiency. It is suggested that the phys. state of the diet may exert some influence upon the development of the lesion. It is also suggested that mice may be of some use in the study of vitamins. Six references. J. A. Kennedy

Riboflavin deficiency in man (ariboflavinosis). W. H. Sebrell and R. E. Butler. *U. S. Pub. Health Repts.* **54**, 2121–31(1939); cf. *C. A.* **33**, 2187⁶.—Lesions on the lips and seborrheic accumulations on the face similar in appearance to the condition formerly described as pellagra occurred in women on a diet low in riboflavin and were alleviated and prevented by the administration of synthetic riboflavin but were not benefited by nicotinic acid. These lesions are a manifestation of riboflavin deficiency. Sixteen references. J. A. Kennedy

Growth of young rats and the formation of vital-staining erythrocytes. Hans v. Euler and Maj Malmberg. *Z. physiol. Chem.* **261**, 103–9(1939).—The reticulocyte count falls in rats on diets deficient in vitamin A. It is restored to normal when the deficiency is repaired. Similar relations hold when the diet is deficient in the whole vitamin B complex. Nicotinic acid amide in such rats does not restore the reticulocytes but dried brewers' yeast does. Milton Levy

Filtrate growth factor, B_w. Hans Kringstad and Gulbrand Lunde. *Z. physiol. Chem.* **261**, 110–24(1939); cf. *C. A.* **32**, 7084⁶.—Cane sugar is a better constituent for basal diets in the study of the vitamin B complex than is starch which contains some of the factors. For a B_6-free diet the protein source should be casein which has been purified by soln. and repptn. several times. Fish proteins contain B_6 and can be used to study the other factors. Fuller's earth adsorptions are not suitable for complete sepn. of the B factors in yeast, B_6 always remaining in the filtrate at pH 5–6. At pH 1, other B factors are adsorbed. At strongly acid reactions, substances can be adsorbed which are toxic to the avitaminotic rats. Phosphotungstic acid quantitatively ppts. B_6. Mercuric acetate ppts. neither B_6 nor B_w (filtrate factor necessary for rat growth). Factor B_w is not extd. by ether from acid soln. It is therefore not identical with the chick antidermatitis factor (Jukes, *C. A.* **33**, 3849⁵). Estns. of the amt. of B_w in various marine products are given based on a rat unit which is the amt. necessary to bring about a wt. increase of 7 g. per week during 4 weeks when added to a diet contg. 18% fish meal, 68% sucrose, 8% peanut oil, 2% cod liver oil, 4% salt mixt., 10 mg. vitamin B_1 and 20 mg. vitamin B_2 per 100 g. Milton Levy

The protective action of vitamin C on visceral lesions produced by chronic intoxication with phenylquinoline-carboxylic acid. Pietro Tagariello. *Sperimentale* **93**, 429–54(1939).—Daily injections of 200 mg. vitamin C for 3 days effected in the dog a certain degree of protection against parenchymal lesions by cinchophen. The formation of gastric ulcers was not prevented. A. E. Meyer

Studies in experimental dehydration. Dorothy W. Asher and Horace L. Hodes. *Am. J. Med. Tech.* **5**, 216–34(1939).—Albino rats at weaning were put on either a basal or a high-protein diet for 3 weeks, and then dehydrated by either diminishing the water intake or by withdrawing water entirely. In both treatments, those animals on the basal diet survived longer than those on the high-protein diet. When water was withdrawn completely, the serum proteins showed a definite rise. Rats were killed at various intervals on diminishing water intake, and their bodies analyzed for water, fat, ash, N, Cl, Na, K and P. The percentage of these elements in the whole body remained the same in the exptl. animals as in the controls. These results indicate that loss of body water is accompanied by a parallel loss of salts and N when dehydration is complicated by starvation. D. A. M.

Vitamins in theory and practice. Howard B. Lewis. *Ann. Internal Med.* **13**, 749–54(1939).—A review. John T. Myers

Occurrence of vitamin B_2 (lactoflavin). IV. The absorption of lactoflavin by proteins. Josef Schormüller. *Z. Untersuch. Lebensm.* **78**, 124–38(1939); cf. *C. A.* **33**, 7356⁸.—In the preceding report of this series, it was revealed that proteins absorb vitamin B_2. This has now been confirmed with horse and goose muscle. It appears also that in addn. to an absorption a solution process plays a role. The processes are reversible because the flavin can be eluted from the flavin-satd. muscle fibers. Considerable amts. of flavin appear in the ppt. when proteins are flocculated with tungstates, zinc sulfate or trichloroacetic acid. The importance of this unspecific binding phenomenon to transport and exchange of lactoflavin in organisms, to vitamin B_2 content of foods and vitamin-free diets, to reliability of biol. action of proteins and to analytical investigations for flavin are discussed. M. M. Piskur

Effect of vitamin C and related substances upon glycogen metabolism. Kiyosi Terada. *Tohoku J. Exptl. Med.* **36**, 180–210(1939).—*l*-Ascorbic acid, *d*-araboascorbic acid, and plant materials such as lemons, mandarins, apples, green tea, strawberries, tomatoes, watermelon, acted directly to increase the glycogen production in the liver of rabbits. Most of the plants contained substances (flavones) which further stimulated ascorbic acid to produce glycogen. This is considered an indirect effect and is named factor II. Some plants such as bitter oranges and green tea exerted a neg. action on factor II. The pos. action of plants does not depend on their vitamin C content alone. This was demonstrated by expts. in which 1 cc. of lemon juice (which contains only about 5 mg. vitamin C) added to sugar infusions produced more liver glycogen than was produced by 50 mg. *l*-ascorbic acid. T. gives the name vitamin C_2 to this glycogenic substance which is regarded as including 2 factors, one acting directly, the other indirectly on the glycogen depot of the liver. Twenty-six references. Maurice M. Rath

Application of the quantitative indicator method to the determination of the time of passage of food through the intestinal canal. Lauri Paloheimo, Milka Pirilä, A. Koskinen and T. Puokka. *Biedermanns Zentr. B. Tierernähr.* **11**, 370–88(1939).—Cr_2O_3 was used as an indicator to det. the distribution of food in the intestinal canal of rats and cattle at definite periods after eating. Felix Saunders

The importance of vitamin B_6 and factor W in the nutrition of dogs. J. M. McKibbin, R. J. Madden, Simon Black and C. A. Elvehjem. *Am. J. Physiol.* **128**, 102–10 (1939); cf. *C. A.* **33**, 981⁶.—Dogs may be raised successfully on a highly purified or synthetic vitamin B complex free ration when properly supplemented. In addn. to thiamin, riboflavin and nicotinic acid the dog also requires

vitamin B_6 and a filtrate factor which may be identical with factor W. Preliminary evidence indicates that the chick antidermatitis factor may also be needed by the dog. E. D. Walter

Antisterility factors (vitamin E) (John, Emte) 10. Isolation of vitamin K_2 (McKee, *et al.*) 10. Constitution and synthesis of vitamin K_1 (MacCorquodale, *et al.*) 10.

F—PHYSIOLOGY

HOMER W. SMITH

Effect of female sex hormones on the guinea-pig nipple. (a) Quantitative evaluation of the local nipple test. F. Fierz. *Helv. Chim. Acta* 22, 989–98(1939).—A detailed procedure for carrying out measurements of the linear growth of the nipple of the male guinea pig by optical measurement of shadow photographs is given and the results, causes of error and advantages of the technique are discussed. The expts. recorded show that the method is suitable for the estn. of compds. contg. estrone. **(b) Hyperpigmentation after local application of female sex hormones.** *Ibid.* 999–1004.—Dropwise treatment of the nipple of male guinea pig with solns. contg. 1 γ of estrone or stilbestrol per cc. causes strong pigmentation of the nipple and the areola. The untreated nipple is not pigmented. This finding is of interest since nowadays the female sex hormones are often applied to the skin and it shows that the pigmentation may result directly without the intermediary action of the pituitary, symphysis or adrenals. It was not previously apparent that substances with female sex hormone action, unrelated chemically to estrone, could cause hyperpigmentation of the nipple and arecla. Histological examn. of nipple treated with estrone percutaneously shows, besides increase of the epithelial cells, a pronounced thickening of the epidermis with formation of numerous pigment-forming cells. C. R. Addinall

Circulation—review. R. Schoen. *Jahreskurse ärtzl. Fortbild.* 29, No. 2, 14–28(1938).—A review of recent work including the part played by sympathol, veritol, suprifen, ephetonine, benzedrine(elastonon), adrenaline, histamine, acetylcholine, insulin and various other hormones, and the adenylic acid group and some unknown substances in the circulation, as well as the behavior of the circulation and O utilization at high altitudes, and the effect of industrial poisons, as CO, benzine and benzene, of chronic Pb poisoning, and of other poisons, as alc., caffeine and nicotine, on the circulation. Ruth Berggren

The biological reaction of milk. I. The biological reaction of the milk of mothers of healthy children. Mataiti Yamamoto. *Oriental J. Diseases Infants* 23, 7(1938)(in English).—The following anaphylactic reactions occur in the isolated organs of guinea pigs which have been sensitized with 1.0 cc. milk from mothers of healthy children (MM-HC). A strip of the uterus suspended in Locke's soln. contracts when MM-HC is added to the soln. (Schultz-Dale reaction). If the heart is irrigated with Locke's soln. contg. 1% MM-HC, temporary acceleration, followed by retardation, takes place; vascular contraction appears in the coronal vascular system. If an isolated vascular prepn. of the sensitized guinea pig (Friedberger and Seidenberg, *Z. Immunitätsforsch.* 51, 276–348(1927)) is irrigated with Locke's soln. contg. 1% MM-HC, the dropping no. decreases, i. e., vascular contraction occurs. **II. The biological reaction of the milk of mothers of children with exudative diathesis.** *Ibid.* 8–9.—The anaphylactic reactions described above were more intense if carried out with the milk of mothers whose children had an exudative diathesis (MM-CED). Such differences between MM-HC and MM-CED may be important in the development of allergic manifestations in infants fed with MM-CED. **III. The biological reaction of each fraction of milk protein.** *Ibid.* 10.—Guinea pigs were sensitized with 0.02 g. casein, albumin or globulin, which had been sepd. from MM-HC and MM-CED and dried. The Schultz-Dale reaction in a strip of the isolated uterus was estd. after the incubation period. The biol. reactions of the caseins from MM-HC and MM-CED were identical. The differences in the biol. reactions of the albumins from the 2 types of milk were hardly perceptible. The globulins, especially that of MM-CED, caused the most intense reactions of the proteins studied. The difference in biol. reaction between MM-HC and MM-CED is due to differences in the globulin fraction. **IV. The qualitative and quantitative relations of globulin in the biological reaction of milk.** *Ibid.* 24, 1–2.—Guinea pigs were sensitized with 4.0 cc. of whey from various kinds of milk. The anaphylactic reaction in the isolated intestinal strip was tested 2 weeks after sensitization. The whey of MM-CED produced a weaker anaphylactic reaction than the wheys of goat mik or human colostrum but a stronger reaction than those of cow milk or MM-HC. The biol. reaction was also tested with mixts. of 1.0 cc. whey and 0.01 g. casein as the antigen; the mixt., MM-CED whey + MM-HC casein, produced a stronger anaphylactic reaction than the mixt., MM-HC whey + MM-CED casein. The differences in the biol. reaction of MM-HC and MM-CED are due to quant. and qual. differences in the globulin fraction. Ruth Berggren

Homoplastic transplantation of endocrine glands. I. Transplantation of preserved adrenal and testis. M. G. Rudits'kiĭ. *Méd. exptl.* (Ukraine) 1938, No. 1, 21–30.—Description of morphological changes following subcutaneous transplantation into patients of glands removed from fresh cadavers. S. A. Corson

The iron content of normal and trained muscles of the rabbit, chicken and the pigeon. V. G. Klimenko and P. M. Zubenko. *Méd. exptl.* (Ukraine) 1938, No. 1, 31–6.—The pectoral muscle of the chicken and pigeon and the vastus lateralis muscle of the rabbit were stimulated by Faradic shocks on one side of the animal, the muscles of the other side serving as controls. Bivalent, trivalent and org. Fe were detd. according to the Pincussen-Roman method (cf. *C. A.* 25, 2751). Normal pectoral muscles of the pigeon contained 4.3 mg. % of total Fe, those of the chicken contained 0.1 mg. %, while the m. vastus lateralis contained 1.8 mg. %. Training in the rabbit and chicken led to an increase in all the Fe fractions, while in the pigeon training increased only the org. Fe. S. A. Corson

Changes in cholesterol content and phosphate fractions of blood serum of growing rabbits. V. S. Sidorenko. *Méd. exptl.* (Ukraine) 1938, No. 1, 47–54.—Cholesterol content and the phosphate fractions (total, lipoidal and inorg.) decreased progressively during growth, the cholesterol decrease being especially marked. These changes were noted particularly during the first 2 months of postembryonic life. S. A. Corson

Muscle hemoglobin. G. A. Millikan. *Physiol. Rev.* 19, 503–23(1939).—A review article concluding that muscle hemoglobin is found in those muscles requiring vigorous repetitive activity. Its concn. increases with age. It can be crystd., is a true hemoglobin, but differs slightly from blood hemoglobin. There is no evidence for catalytic action, but it does act as a short-time O store. H. R. Getz

Fat transport in the animal body. W. R. Bloor. *Physiol. Rev.* 19, 557–77(1939).—A review article on the transport of fat from the food into the body. The transfer across placental and egg membranes is included. 104 references. H. R. Getz

Androgenic action of progesterone. L. Desclin. *Compt. rend. soc. biol.* 132, 43–5(1939).—D. was unable to detect any androgenic effects after repeated injections of progesterone in castrated male rats of various ages. L. E. Gilson

Action of sex hormones on the parathyroids of the female rat. P. Bastenie and S. Zylberszac. *Compt. rend. soc. biol.* 132, 93–4(1939); cf. *C. A.* 32, 4639[2].—Injection of folliculin caused a decrease and ovariectomy an increase in the no. of cell mitoses in the parathyroids. The successive administration of folliculin and progesterol caused a marked stimulation of the parathyroids in castrated but not in normal females. **Influence of irradiated tachysterol on the parathyroids of the female rat.** *Ibid.* 95–6.—No stimulation was detected. L. E. Gilson

Action of thyrotropic hormone on the basal metabolism of normal rabbits and rabbits which had previously ex-

hibited a period of inversion of the action of the hormone. Jacques Mahaux. *Compt. rend. soc. biol.* **132**, 97–9 (1939); cf. *C. A.* **34**, 489[7].—Thyrotropic hormone produced the same increase in metabolism in normal rabbits and the group (cf. *C. A.* **33**, 705[8]) which had shown an inverted response 4–6 months previously. **Action of serum, from rabbits with metabolism decreased by prolonged treatment with thyrotropic hormone, on the basal metabolism of normal rabbits.** *Ibid.* 99–102.—In some cases there was no apparent action; in others metabolism was slightly decreased suggesting the presence of an antibody.
L. E. Gilson

Extreme limits of the gonadotropic hormone content of human serum during normal and pathological pregnancy. Louis Gernez. *Compt. rend. soc. biol.* **132**, 111–12(1939).—In general the findings of G. confirm those of Brindeau and Hinglais (cf. *C. A.* **33**, 7808[8]). L. E. Gilson

Iron contents of various organs of dogs after intravenous injections of hemoglobin. E. Aubertin, A. Lacoste and R. Castagnou. *Compt. rend. soc. biol.* **132**, 139–41(1939).—The Fe of the liver, spleen, lungs, kidneys and pancreas increased appreciably. Little or no increase occurred in the skeletal muscles, heart, brain, stomach or intestine. L. E. Gilson

Comparative study of blood gases in dogs made acutely anemic by bleeding and subsequently treated or not by intrainjection of dog blood, solutions of dog or horse hemoglobin, or saline solution. E. Aubertin, A. Lacoste and R. Castagnou. *Compt. rend. soc. biol.* **132**, 141–4 (1939).—When hemoglobin is injected in the anemic dog it transports O satisfactorily for the first few hrs., although a considerable part of it remains in the reduced form and some is converted to methemoglobin. During the next few days it gradually disappears from the plasma.
L. E. Gilson

Dehydration and basal insulin requirement. D. B. Tyler, P. O. Greeley and D. R. Drury. *Proc. Soc. Exptl. Biol. Med.* **42**, 393–6(1939).—Depancreatized dogs on a standard diet were dehydrated by producing glucosuria along with restricted water intake. In this state the basal insulin requirement increased to more than double that of the same animals without dehydration. When they were given enough water to prevent dehydration from the glucosuria no increase in basal insulin requirement resulted.
L. E. Gilson

Effect of certain endocrines on the excretion of an antidiuretic substance. Stevens J. Martin and Herman C. Herrlich. *Proc. Soc. Exptl. Biol. Med.* **42**, 451–4(1939); cf. *C. A.* **33**, 7873[8].—Prolonged injections of large doses of theelin, progesterone, testosterone propionate and antuitrin S do not alter the ability of dehydrated rats to excrete an antidiuretic substance. L. E. Gilson

Effects of a digested hypophysis extract on reproductive tract of hypophysectomized adult male rats. R. O. Greep. *Proc. Soc. Exptl. Biol. Med.* **42**, 454–7(1939).—Tryptic digestion of anterior hypophysis ext. under suitable conditions destroys interstitial cell-stimulating activity, leaving a pure gametogenic effect in adult hypophysectomized male rats. It appears that interstitial cell stimulation and luteinization (cf. *C. A.* **33**, 7862[7]) are caused by the same substance, which is largely destroyed by such digestion.
L. E. Gilson

Mechanism of pituitary gonadotropic antagonism. Sibylle Tolksdorf and H. Jensen. *Proc. Soc. Exptl. Biol. Med.* **42**, 466–9(1939); cf. *C. A.* **33**, 6931[9], 9411[1]. The thyroid secretion exerts an antagonistic effect on the ovarian response to the pituitary interstitial cell-stimulating (luteinizing) hormone and follicle-stimulating hormone in young rats. Further expts. indicate that the pituitary thyrotropic hormone may be identical with the interstitial cell-stimulating hormone. L. E. G.

Gonadotropic activity of anterior pituitary of the finback whale. H. Jensen, E. M. K. Geiling and Sibylle Tolksdorf. *Proc. Soc. Exptl. Biol. Med.* **42**, 470–2(1939).—Three samples of Me_2CO dried whale anterior pituitary and 40% EtOH exts. thereof were assayed in normal and hypophysectomized female rats. Only follicle-stimulating hormone (FSH) was found in sample I. Samples II and III contained FSH and interstitial cell-stimulating hormone (ICSH), concurrently with luteinizing (LH), antagonistic and thyrotropic activity. Sample II had adrenotropic activity; the others were not tested for this. The alc. exts. of II and III had about the same gonadotropic activity as similar prepns. from sheep and pig pituitaries. The ICSH, LH and thyrotropic principles are believed to be identical.
L. E. Gilson

Effect of season (temperature) on blood lipides. O. B. Houchin and C. W. Turner. *Proc. Soc. Exptl. Biol. Med.* **42**, 477–9(1939).—Rabbits were kept outdoors in unprotected cages. In very hot summer weather the blood lipides ranged from 200 to 800 mg. %. In winter weather, below freezing, the range was 22–70 mg. %. Indoors in a room kept at 75–80°F. the range was 190–285 mg. %. Animals to be used for assay of the fat metabolism hormone should be kept in a temp.-regulated room.
L. E. Gilson

Lactogen content of pituitary of [illegible] and lactating rabbits and guinea pigs. Skat Holst and C. W. Turner. *Proc. Soc. Exptl. Biol. Med.* **42**, 479–82(1939); cf. *C. A.* **32**, 1310[1]; **33**, 8259[7].—In rabbits and guinea pigs the lactogen content of the anterior pituitary does not increase during early pregnancy and increases very little in the late stages of pregnancy. A distinct increase occurs after parturition. Nursing decreases and absence of nursing increases the lactogen content in both species.
L. E. Gilson

Effect of testosterone propionate on genital tract of adrenalectomized and ovariectomized immature female rats. Ira T. Nathanson and Rulon W. Rawson. *Proc. Soc. Exptl. Biol. Med.* **42**, 482–4(1939); cf. *C. A.* **33**, 8255[5].—Testosterone acts directly on the uterus and vagina and indirectly, by way of the hypophysis, on the ovaries in operatively adrenal-insufficient immature female rats. L. E. Gilson

Relation of the thyroid to creatine and creatinine excretion in the rat. J. B. Allison, C. Glaser and S. L. Leonard. *Proc. Soc. Exptl. Biol. Med.* **42**, 491–3(1939).—Thyroidectomy decreases creatine excretion and usually increases creatinine excretion; injection of thyroxine into the thyroidectomized rat has the opposite effect.
L. E. Gilson

The digestion and resorption of carbohydrates in the colon of the ruminant. A. Trautmann and Th. Asher. *Z. Tierernähr. Futtermittelk.* **3**, 45–52(1939).—In expts. with goats it was shown that starch and cellulose, brought into the cecum by means of an inserted canal, passed through the colon tract without essential change. One g. dextrose was not completely resorbed when a soln. of the sugar was introduced in the same manner. Likewise, sucrose, maltose and lactose were detected in the feces 1 hr. after introduction into the cecum. Large quantities of these sugars caused diarrhea. Liquids did not immediately pass through the colon. Introduction of large amts. of H_2O caused hematuria. High intravenous injections of dextrose led to excretion of reduced sugar through the colon. The functional peculiarity of the digestion tract of ruminants does not necessarily apply to other herbivorous species, e. g., the horse. J. O. H.

The role of cell membranes in the process of digestion of plant food products. E. L. Rozenfel'd. *J. Physiol.* (U. S. S. R.) **25**, 550–5(1938); *Khim. Referat. Zhur* **2**, No. 2, 58(1939).—The action of the amylase of saliva and of a prepn. of trypsin on ground and on whole boiled string beans was investigated. Microscopic investigation showed that the boiling process did not destroy, but only sepd. the cells and caused no pasting of starch. Approx. half of the cells were destroyed by grinding. The cell membranes were permeable to enzymes and did not suppress, but only slowed down the velocity of their activity.
W. R. Henn

The role of unilateral permeability in the intestinal absorption. D. L. Rubinshtein and V. V. L'vova. *J. Physiol.* (U. S. S. R.) **24**, 957–63(1938); *Khim. Referat. Zhur.* **2**, No. 2, 56(1939).—The intestinal tract and its blood vessels were washed simultaneously according to the method of Mond. Diffusing substances were added

to the different liquids used. The expts. proved a unilateral movement through the intestinal wall (the same for the acid as for the basic dyes) from the blood vessels into the intestinal tract, but in a direction different from the direction of the physiol. absorption. Glucose (which is actively absorbed by the intestinal wall of mammals) showed no unilateral absorption through the intestines of frogs. In the physiol. processes of intestinal absorption the unilateral permeability plays no role. The unilateral passing of the dyes in Mond's expts. is attributed to the absorption of the dye (diffused through the intestinal wall) by the endothelium of the blood vessels. W. R. Henn

The salt of synovia of cattle. S. N. Malorov. *J. Physiol.* (U. S. S. R.) **24**, 1145–9 (in German, 1149) (1938); *Khim. Referat. Zhur.* **2**, No. 2, 58–9 (1939).—The pH of synovia of cattle is < 6.90. The variations in the content of the elements, especially of Cl', are considerable. The elec. cond. is fairly const. with an av. of 93.81×10^{-3}. The f.-p. depression is expressed by the index 0.68. The values of the elec. cond. and of the f.-p. depression are higher than those for blood; therefore, the osmotic pressure in synovia must be higher. The n (av. 1.3380) and the d. (1.008) are fairly const. The η of synovia varies considerably, from 3.7 to 83.7; this is attributed to the difference in the content of mucin-like substances. W. R. Henn

Presence of histamine in the platelets of the rabbit. Leo Zon, E. T. Ceder and Catherine W. Crigler. *U. S. Pub. Health Repts.* **54**, 1978–86 (1939).—The white cells of the rabbit may be markedly depressed without significant change in blood histamine. Administration of antiplatelet serum caused a significant drop in blood histamine along with a drop in platelets. Fractional centrifugation of platelet-contg. plasma removes histamine nearly in proportion to the platelets removed. Twenty-one references. J. A. Kennedy

The fate of cholic acid in the guinea pig. Chai Heung Kim. *Z. physiol. Chem.* **261**, 97–102 (1939).—Guinea-pig bile normally contains only chenodesoxycholic acid and 3-hydroxy-7-ketocholanic acid (Imai, *C. A.* **31**, 6709[6]). After intraperitoneal injection of 18.8 g. of cholic acid (I) to 118 guinea pigs there was isolated from the combined urines 0.015 g. of desoxycholic acid (II) and 0.087 g. of I, and from the bile 0.2 g. of II. It is suggested that I is first oxidized to 3-hydroxy-7,12-diketocholanic acid, that this is then reduced to 3-hydroxy-12-ketocholanic acid and the latter reduced to II. Milton Levy

The distribution of body water and electrolytes in the intact and partially nephrectomized rat after dehydration and hydration. Alfred Chanutin, Stephan Ludewig and Geo. R. Minor. *J. Biol. Chem.* **131**, 519–38 (1939); cf. *C. A.* **32**, 9198[1].—The extracellular phase and the Cl concn. of the muscle are greater in intact rats than in those partially nephrectomized. Fasting for 24, 48 and 72 hrs. brings about an increased percentage of extracellular phase and an increased concn. of cellular H_2O in the muscle of the partially nephrectomized animals. Marked dehydration, produced by depriving the partially nephrectomized rat of food and H_2O for 24 hrs., is followed by a decrease in the cellular H_2O and a concn. of electrolytes in the extracellular phase. Intact animals show no difference in electrolyte and H_2O distribution after such treatment. Voluntary ingestion of 0.9% NaCl for 24 and 48 hrs. causes a marked subcutaneous edema and ascites in the nephrectomized animals and the intermuscular fascia of the muscle is also markedly edematous. The blood serum is hydrated and the concn. of electrolytes increased. Intact animals show comparatively small changes under similar conditions. There is also visible edema in a small percentage of the exptl. animals after voluntary ingestion of 0.4% NaCl for 72 hrs. and appreciable hydremia in all animals. Intact and partially nephrectomized rats were dehydrated by injection of isotonic glucose soln. into the peritoneal cavity. In the intact animal there was a marked shift of fluid into the muscle cells, particularly after the 5th and 6th hr. after injection. In the partially nephrectomized rats there was definite hemoconcn. and a decrease in NaCl concn. but the absolute changes in the distribution of H_2O were small and variable and in no way comparable to those noted in the intact animals. A slight decrease in the vols. of the extra- and intracellular phases during the 1st 6 hrs. followed the injection of 1.8% NaCl into the peritoneal cavity of the intact rat but under similar conditions there was an increase in the extracellular phase and a relatively marked decrease in the intracellular vol. of the partially nephrectomized animal. The results of these expts. indicate that renal insufficiency exerts an effect on the distribution of fluid in muscles. Two factors concerned are (*a*) the inability to retain or excrete H_2O and salts due to the kidney damage and (*b*) an alteration in the osmotic relationship between the muscle cells and the extracellular fluid. A. P. Lothrop

Lipoid-thiocyanate in serum. Jack D. Rosenbaum and Paul H. Lavietes. *J. Biol. Chem.* **131**, 663–74 (1939); cf. *C. A.* **30**, 7166[6].—In a series of 54 ultrafiltrations and 2 dialyses of human serum there was in every case a higher concn. of thiocyanate in the serum than in ultrafiltrate or dialyzate. Bound thiocyanate is in equil. with ionized thiocyanate of the serum. The amt. bound increased as the amt. of thiocyanate added was increased with a smaller fraction of the total bound at higher than at lower concns Increases in temp. diminished thiocyanate binding by the serum. Increases in H-ion concn. increased thiocyanate binding. The combination is loose enough to be destroyed by pptn. of the lipoids with the proteins of the serum by CCl_3CO_2H since following such pptn. recovery of SCN from the filtrate is complete. Thiocyanate is present in the petr. ether exts. of serum contg. thiocyanate although the Na salt is completely insol. in this solvent. The amt. of lipoid-SCN extd. from a given serum sample agreed well with the bound SCN detd. by ultrafiltration. Lipoid-SCN and bound SCN are also similarly influenced by temp. changes and by variations in pH. These findings furnish suggestive evidence that the chemically similar halides may exist in the same form. A. P. Lothrop

Biochemical changes associated with onset of secretory activity in the metanephros of the fetal pig. The cytochrome oxidase–cytochrome system and oxidation–reduction potentials. Louis B. Flexner. *J. Biol. Chem.* **131**, 703–11 (1939); cf. *C. A.* **33**, 1002[2].—The onset of secretory activity in the metanephros of the fetal pig is accompanied by the following changes: (1) in the presecretory structures of the metanephros, cytochrome-cytochrome oxidase activity as detd. by dimethyl-*p*-phenylenediamine and α-naphthol is feeble and is equal in epithelium and stroma. In secretory structures activity increases markedly in the epithelium and is absent from the stroma. In the presecretory structures there is no measurable oxidation-reduction potential difference between epithelium and stroma but with onset of secretion a potential difference of the order of 0.20 v. develops between them. The oxidase activity is absent or almost so in Bowman's capsule and is low in the epithelium of the collecting ducts. No potential difference was observed between the epithelium of the collecting ducts and the stroma. A. P. L.

Changes in the chloride distribution between red blood cells and plasma during the course of the general adaptation syndrome. S. Karády, H. Selye and J. S. L. Browne. *J. Biol. Chem.* **131**, 717–31 (1939); cf. *C. A.* **30**, 6444[2]; **32**, 7103[2].—It has been previously shown that if an organism is exposed to any of a variety of damaging agents, it shows certain morphological and physiol. reactions which form essentially the same syndrome irrespective of the particular agent which produces the damage. This reaction to damage has been termed "the general adaptation syndrome" and a detailed study has been made of the plasma and whole blood chlorides, hematocrit reading, hemoglobin concn. and plasma vol. to obtain accurate information regarding changes in blood chlorides during this adaption syndrome. A decrease in the concn. of chlorides in the red cells occurs immediately after cessation of treatment in rats exposed to cold or treated with subcutaneous injections of HCHO for 24 hrs. accompanied by hemoconcn. If treatment with these agents is continued for 12 days, so that the animals become adapted to them the direction of these deviations is reversed. There is an

increase in the plasma vol. and in Cl concn. in the red cells and the hematocrit and hemoglobin values are below normal. After forced muscular exercise the chlorides of the cells are above normal immediately after the cessation of the stimulus, the plasma vol. is slightly decreased and the hematocrit and hemoglobin values are slightly increased. If a 2-hr. rest period follows 24 hrs. of exposure to cold, the deviations of the 1st exposure reverse so that the cell chlorides and plasma vol. are above normal and the hemoglobin below. This reversal has not occurred 3 hrs. after the last injection of HCHO but is present after a rest period of 24 hrs. and the plasma Cl at this time is normal. If the animals are exposed to mild cold or to small doses of HCHO, the cell chlorides are increased immediately after the cessation of the treatment and show the same picture as is seen immediately after muscular exercise. If the treatment is discontinued for 24 hrs. after 12 days when the animals have become adapted to the stimulus, there is no significant change in the Cl concn., the cell chlorides remaining above the normal level. If the rats are exposed to sublethal or lethal doses of the damaging agents to which they have been adapted, the cell Cl concn. remains high in most cases although the plasma vol. may be markedly diminished and the hematocrit increased. Under the conditions of these expts. the plasma chlorides are not a good index of the changes in Cl metabolism. The red cell chlorides and the ratio between red cell and plasma Cl are more satisfactory. Marked shifts of Cl concn. in red cells may therefore occur and whole blood Cl detns. are not always merely a reflection of the proportion of cells to plasma. Special emphasis may be laid on the inverse response seen immediately after exposure to mild damage, during recovery from more severe damage and after adaptation has occurred. It appears to be the exact opposite to the 1st changes which occur after damage in these expts. and also in what is usually termed "shock." This inverse type of response has received little attention up to the present time, although it is usually connected with an increased resistance of the organism and probably reflects the establishment by the body of a compensatory mechanism against damage.
A. P. Lothrop

Content of ascorbic acid in tonsils. Mělka-Měkvá. *Acta Oto-Laryngol.* **27**, 95–6(1939)(in French).—Amygdaloid tissue is rich in ascorbic acid, especially in young individuals. Some tissue can synthesize ascorbic acid on addn. of maltose, glucose, sucrose and lactose.
J. McAfee

The action of pregneninolon on the human endometrium; by oral application. J. A. Salaber and E. B. del Castillo. *Semana méd.* (Buenos Aires) **1939, II**, 769–73.—Pregneninolon or anhydrooxyprogesterone given orally in amenorrhea of long standing produced uterine bleeding from an endometrium showing characteristic proliferation. In another case, treatment was preceded with oral doses of ethinylestradiol: the endometrium showed accentuated secretion at induced menstruation. An intercyclic menstruation in a normal woman could not be induced.
A. E. Meyer

Blood protein formation in the bone marrow. Enrico Poli. *Sperimentale* **93**, 455–62(1939).—The plasma in the marrow has a higher protein content with prevalence of the less disperse constituents. The bone marrow is considered as a place of formation of plasma proteins.
A. E. Meyer

Precipitins in antigonadotropic serums. M. Van den Ende. *J. Endocrinology* **1**, 156–71(1939).—Antiserums to an active gonadotropic ext. of pregnancy urine contain precipitins demonstrable with a variety of urinary exts. independently of their hormone activity. The amts. of precipitins present could be detd. by optimum proportions. Precipitin content and antigonadotropic power showed no const. relation to each other. Pregnancy urine exts. contain multiple antigens. Absorption of precipitins by an ext. of male urine removed all precipitins for urinary gonadotropic exts., but only partly reduced the biol. inhibitory power. Absorption of precipitins for human serum only slightly reduced the precipitins for urinary exts., and left the biol. inhibitory power completely unimpaired.
Felix Saunders

What becomes of respired free oxygen? The hydrogenotropy of oxygen. T. Thunberg. *Kgl. Fysiograf. Sällskap. Lund, Förh.* **7**, 186–98(1987)(Pub. 1938)(in German); cf. *C. A.* **32**, 7060⁶.—Various theories on biol. oxidations are discussed. In general, when atm. O_2 is inhaled it serves to oxidize the H of org. compds. in the body. The expired CO_2 arises from O already combined into compds.
W. C. Tobie

The part played by carotid body reflexes in the respiratory response of the dog to small changes in the carbon dioxide tension in the arterial blood. Carl F. Schmidt, Paul R. Dumke and Robert D. Dripps, Jr. *Am. J. Physiol.* **128**, 1–9(1939).
E. D. Walter

The effect of hypophyseal stalk transection on the gonadotropic functions of the rabbit hypophysis. Chandler McCuskey Brooks and E. F. Lambert. *Am. J. Physiol.* **128**, 57–69(1939).—Transection of the hypophyseal stalk did not interfere with reproductive activities in 6 of the 14 male rabbits operated upon. Assays of the follicle-stimulating hormone and luteinizing hormone content of the anterior lobes of male and female rabbits several weeks or months after stalk transection showed that the concn. of these hormones was comparable with that of the glands of normal control rabbits.
E. D. Walter

The response of jejunum and ileum to food and enterocrinin. M. J. Schiffrin and E. S. Nasset. *Am. J. Physiol.* **128**, 70–80(1939).—Feeding causes a decrease of both enzyme concn. and total enzyme secretion of 1st-stage jejunal and ileal segments. This inhibition is overcome in the jejunum 6 or 7 hrs. *post cibum*, but persists in the ileum for at least 8 hrs. Denervation results in an increase in enzyme concn. as well as total secretion after food which indicates that the 1st-stage inhibition was nervous in nature. The amt. of enzymes produced per unit time is greater in the jejunum than in the ileum. A reciprocal relationship exists between the Cl and total CO_2 content of succus entericus in different sections of the gut. Enterocrinin increases the concn. and amt. of enzyme secretion but does not affect the pH, Cl or total CO_2. Feeding or denervation augments the response to enterocrinin. It is effective subcutaneously when given in 10 times the amt. required for intravenous administration.
E. D. W.

The effect of occlusion of the carotids and the injection of ephedrine on the blood pressure of cats in adrenal insufficiency. R. A. Cleghorn. *Am. J. Physiol.* **128**, 133–8(1939).—Occlusion of the carotid arteries causes a marked rise in blood pressure in adrenalectomized cats even at a time when adrenal insufficiency is severe and splanchnic nerve stimulation elicits but little increase. When the circulation has become so poor that spinal reflexes become impaired, carotid occlusion fails to cause a substantial pressor effect. The effect of ephedrine on the blood pressure of the cat in adrenal insufficiency roughly parallels the degree of response obtained on splanchnic nerve stimulation.
E. D. Walter

The effect of blood flow on potassium liberation from muscle. W. O. Fenn, W. S. Wilde, Ruth A. Boak and R. H. Koenemann. *Am. J. Physiol.* **128**, 139–46(1939).—Partial or intermittent occlusion of the arterial blood supply of a muscle results in an increase in the concn. of K in the venous plasma or may cause the muscle to give out K to the blood. Excessive slowing of the circulation or complete stagnation does not increase the K more than a moderate slowing. The K which enters the blood does not cause a corresponding increase in alky. and therefore enters in exchange for some other cation or accompanied by some nonvolatile acid. Usually H_2O is taken up by the blood when the flow is diminished.
E. D. Walter

Relative cholinergic effects of selected estrogens. Samuel R. M. Reynolds and Frances I. Foster. *Am. J. Physiol.* **128**, 147–53(1939); cf. *C. A.* **32**, 6716⁷.—The effect of selected estrogens on the concn. of acetylcholine in the uterus of the ovariectomized rabbit was detd. Those used were amniotin, estradiol, estradiol benzoate and estradiol dipropionate. The artificial estrogens used were triphenylethylene and stilbestrol. Each of

these estrogens (except stilbestrol) increases within an hr. the acetylcholine content of the uterus. By the 12th hr. after injection the amt. in the uterus is distinctly less. A 2nd injection of estrogen made at the 12th hr. after the 1st injection raises again the acetylcholine content of the uterus. Esterification does not affect the capacity of the estrogen to increase the concn. of acetylcholine in the uterus within 1 hr. after injection. Triphenylethylene is as potent as any of the natural or synthetic estrogens used in its cholinergic effect on the uterus. E. D. Walter

The pH of the digestive tract in the living albino rat as determined by the capillary glass electrode. Gordon B. Ball. *Am. J. Physiol.* **128**, 175–8(1939).—The pH of the wall of the digestive tract of the living albino rat was detd. by means of the capillary glass electrode. The wall of the duodenum is rather consistently acid and the ileal and cecal walls are usually alk., while that of the colon approaches neutrality. E. D. Walter

Increased intracranial pressure and its effects during anoxia and hypoglucemia. L. Yesinick and E. Gellhorn. *Am. J. Physiol.* **128**, 185–94(1939). E. D. Walter

5,16-Pregnadiene-3,20-diol (Butenandt, Schmidt-Thomé) **10**. Exptl. correlation of the plant cardiac poisons with the estrone group (Butenandt, Gallagher) **10**.

G—PATHOLOGY

The effect of vitamins B_1 and C on anaphylactic shock. Mataiti Yamamoto. *Oriental J. Diseases Infants* **23**, 11–12(1938)(in English).—The injection of 0.25 mg. vitamin B_1 into guinea pigs before sensitization during the incubation period or several hrs. to 1 day before the shock test, checked markedly the anaphylactic shock, as estd. by the Schultz-Dale reaction of strips of the isolated uterus or intestine. The effect of vitamin B_1 may be due to its beneficial action on the liver function, preventing the formation of antibodies and removing the disturbance of the body during the sensitization period. Shock was also prevented by the injection of 100 mg. vitamin C before sensitization or several hrs. before the shock test, but it was more severe if the vitamin C was injected during the sensitization period. Vitamin C acts on the antigen *in vivo*, preventing its invasion into the tissues and hastening its removal; but, if the antigen has already invaded the body sufficiently, vitamin C intensifies the shock. Combined treatment with vitamins B_1 and C before sensitization or the shock test or during the incubation period prevents the shock. This combined treatment is beneficial to allergic patients. Ruth Berggren

Experimental studies on the function of the reticulo-endothelial system. IV. The relation between the scarlet fever toxin (Streptococcus haemolyticus) and the function of the reticulo-endothelial system. Takamaro Kitahara. *Oriental J. Diseases Infants* **24**, 5(1938)(in English).—The toxin of *Streptococcus haemolyticus* from scarlet fever patients was injected into rabbits and its effect on the reticulo-endothelial system (r. e. s.) was estd. by the Adler-Reimann method (*C. A.* **20**, 1664). Slight functional disturbances of the r. e. s. appeared which were less evident in adult than in young rabbits. Injection of the toxin into rabbits which had been immunized with anatoxin of *Streptococcus haemolyticus* produced practically no functional disturbances in the r. e. s. of either young or adult rabbits. **V. The relation between the dysentery toxin and the function of the reticulo-endothelial system.** *Ibid.* 6.—Max. disturbance of the function of the r. e. s. of rabbits appeared 6–12 hrs. after the injection of a small dose of the toxin of the Shiga bacilli and 12–24 hrs. after the injection of a large dose. In the former case the function became normal again after 3 days, in the latter after about 1 week. In the young rabbits the disturbance in the function appeared earlier and was more intense and the power of recovery was somewhat greater than in the adult rabbits. Injection of the toxin into both young and adult rabbits which had previously been immunized with the koktigen of the Shiga dysentery bacilli caused a rather marked disturbance in the function after about 6 hrs., followed by an immediate turn toward recovery. The toxin of the atypical dysentery bacilli (Y type), in general, produced the same disturbance in function as that of the Shiga type. **VI. The influence of the pneumonia bacilli on the function of the reticulo-endothelial system.** *Ibid.* 7.—Injection of the toxin of type I pneumonia bacilli into the ear vein of adult rabbits produced a max. disturbance in the function of the r. e. s. after 24 hrs., regardless of the size of the dose; a slight acceleration of the function appeared later. The max. disturbance in the function of young rabbits appeared 12 hrs. after the injection of a large dose and 6 hrs. after the injection of a small dose, followed by a marked acceleration of the function. The disturbance was greater in the adult than in the young rabbits. If type II pneumonia bacilli were used, the disturbance in the function of adult rabbits was slight and the acceleration quite marked. In the young rabbits an intense disturbance appeared 24 hrs. after a large dose and earlier after a small dose; later acceleration of the function appeared. In the case of the type II pneumonia bacilli the disturbance was smaller in the adult than in the young rabbits. **VII. The influence of the bacilli of epidemic cerebrospinal meningitis on the function of the reticulo-endothelial system.** *Ibid.* 8.—The toxin from these bacilli produced a max. disturbance in the function of the r. e. s. 6 hrs. after injection. Gradual recovery, even a slight functional acceleration, was observed after 24 hrs. The normal condition was restored in about 1 week. In the early period the disturbance in the function was marked in the young rabbits and somewhat smaller in the adult rabbits. The toxin, which was injected into rabbits, after they had been immunized with immune serum, was completely neutralized; in the young rabbits a slight acceleration in the function of the r. e. s. occurred. Ruth Berggren

The architecture of viruses. W. M. Stanley. *Physiol. Rev.* **19**, 524–56(1939).—A review article with especial attention to the measurement of virus activity, the correlation of activity with chem. and phys. properties, compn. of the viruses, crystallinity, shape and size, and the nature and mode of action of the viruses. 103 references. H. R. Getz

Provoked hyperlipemia test in diabetic patients. P. Mauriac, L. Servantie and A. Baron. *Compt. rend. soc. biol.* **132**, 145–7(1939).—In 10 diabetic patients blood lipides were detd. at intervals for 8 hrs. after ingestion of 100 cc. olive oil (no other food and no insulin given). In mild cases the changes were slight and not significant. In severe cases where the blood lipides were already high there was a slow rise for several hrs., indicating decreased tolerance. L. E. Gilson

Difference in behavior of reagins and hemolysins with respect to certain globulins. H. Bierry, M. Andrac and B. Gouzon. *Compt. rend. soc. biol.* **132**, 153–5(1939).—In human syphilitic serum the syphilitic reagins are largely found in the globulin fraction pptd. by CO_2 while the hemolysins remain in soln. with the other proteins. L. E. G.

Pancreatic secretion of patients with gastric and duodenal ulcer. P. Augier, J. Diesnis and M. Raybaut. *Compt. rend. soc. biol.* **132**, 160–2(1939).—Duodenal ulcer is frequently assocd. with a decrease in the lipase activity of the pancreatic juice. L. E. Gilson

Lack of carcinogenic potency of sulfanilamide and prontosil soluble in mice. Paul C. Zamecnik and Simon Koletsky. *Proc. Soc. Exptl. Biol. Med.* **42**, 391–2(1939).—Repeated subcutaneous injections of sulfanilamide and prontosil sol. in mice over a period of 1 yr. failed to produce any tumors. L. E. Gilson

Effect of induced hypercholesterolemia on antibody response in rabbits. Maurice R. Chassin and Maurice Bruger. *Proc. Soc. Exptl. Biol. Med.* **42**, 457–9(1939).—Hypercholesterolemia resulted in a higher agglutinin titer after treatment with typhoid vaccine. L. E. Gilson

Macromolecular components of chick embryo tissue diseased with the virus of equine encephalomyelitis. A. R. Taylor, D. G. Sharp, Harold Finkelstein and J. W. Beard. *Proc. Soc. Exptl. Biol. Med.* **42**, 462–4(1939).—Preliminary. L. E. Gilson

No platelet-destroying action in extracts of the spleen

and urine of patients with chronic thrombopenic purpura. L. M. Tocantins. *Proc. Soc. Exptl. Biol. Med.* 42, 485–6 (1939). L. E. Gilson

Blood histamine in the rabbit during anaphylactic shock. Bram Rose and Paul Weil. *Proc. Soc. Exptl. Biol. Med.* 42, 494–6(1939).—During acute anaphylactic shock in rabbits a marked decrease in total blood histamine occurs. No increase in plasma histamine is observed. L. E. G.

Effect of local applications on development of ultraviolet tumors. Harold P. Rusch, Carl A. Baumann and Bernerd E. Kline. *Proc. Soc. Exptl. Biol. Med.* 42, 508–12 (1939).—Tumors were produced in mice by ultraviolet irradiation, and during the induction period, various substances were painted on the ears where the tumors were developing. Mineral oil accelerated tumor development most rapidly, olive, cottonseed and wheat-germ oils caused slight acceleration, and linseed oil retarded tumor formation. Cholesterol in oil caused marked acceleration. H_2O_2, Bz peroxide and 1,2,5,6-dibenzanthracene were without effect. L. E. Gilson

Active immunity to pneumococci in rabbits protected by sulfapyridine. Milton Levine, W. P. Larson and Raymond N. Bieter. *Proc. Soc. Exptl. Biol. Med.* 42, 515–18 (1939); cf. *C. A.* **33**, 7892[8], 8300[7].—Rabbits were inoculated with a very virulent type II pneumococcus and saved by oral administration of sulfapyridine. After 90 days they were still immune to the type II organism and also to some other types tried. L. E. Gilson

Irradiation of cancer following injection of colchicine. M. F. Guyer and P. E. Claus. *Proc. Soc. Exptl. Biol. Med.* 42, 565–8(1939).—X-rays were markedly more lethal to bits of carcinoma from colchicine-treated rats than to similar pieces of carcinoma from untreated animals, as shown by the infrequency of "takes" when implanted. By giving colchicine to rats bearing actively growing carcinoma 15–18 hrs. before irradiation the effectiveness of the x-rays in completely destroying or retarding the growth of the cancer was increased. L. E. Gilson

Relation of skim milk feeding to cataract production. C. F. Krewson, E. J. Schantz and C. A. Elvehjem. *Proc. Soc. Exptl. Biol. Med.* 42, 573–6(1939).—Development of cataract in rats depends on the amt. of galactose consumed in the diet. Skim milk alone was not sufficiently high in lactose to cause cataract formation in the particular strain of rats used. L. E. Gilson

Effect of methylcholanthrene on latent period of breast tumors in dilute brown mice. G. Burroughs Mider and John J. Morton. *Proc. Soc. Exptl. Biol. Med.* 42, 583–4 (1939).—Painting the mice with methylcholanthrene soln. shortened the latent period of spontaneous mammary cancer. L. E. Gilson

Effects of selective salivary gland extirpation on experimental dental caries in the rat. Virgil D. Cheyne. *Proc. Soc. Exptl. Biol. Med.* 42, 587–90(1939).—Preliminary. L. E. Gilson

Gas gangrene toxin production. G. B. Reed, J. H. Orr and Mary C. Baker. *Proc. Soc. Exptl. Biol. Med.* 42, 620–1(1939).—Preliminary. L. E. Gilson

Indoluria and its relation to sulfur deficiency. Daniel H. Basinski and Geo. T. Lewis. *Proc. Soc. Exptl. Biol. Med.* 42, 628–31(1939).—Free indole was found in 22 of 275 urine samples from hospital patients. Fingernail clippings from the patients with indoluria had a normal cystine content, hence it is improbable that indoluria is due to failure of conjugation (to form indican) because of lack of available S. L. E. Gilson

The production of persistent arterial hypertension by cellophane perinephritis. Irvine H. Page. *J. Am. Med. Assoc.* 113, 2046–8(1939).—Severe persistent arterial hypertension was produced in animals by means of perinephritis induced by cellophane and silk. F. P. G.

The adrenaline content of the suprarenal glands in diphtheria intoxication. C. A. Ashford. *Brit. J. Exptl. Path.* 20, 385–9(1939).—The adrenaline content of the suprarenal glands of a series of guinea pigs rendered deeply toxemic by injection of diphtheria toxin was assayed biologically, and the results were compared with estns. on a series of normal guinea pigs. The figures were subjected to statistical analysis. The difference between the infected and noninfected animals is small, and the existence of a real difference between the 2 series is not established with a high degree of probability. The possibility of a reduction in infected animals is indicated, but in no case does this approach exhaustion of the adrenaline load. Reduction of lipoid tissue in the guinea-pig adrenal is a const. effect of diphtheria toxin, and it may be that this effect on the cortex is responsible for the depression of sympathetic action. Harriet F. Holmes

Neutralization of "purified" tumor agent suspensions by antifowl serum. R. Knox. *Brit. J. Exptl. Path.* 20, 391–6(1939).—Tumor agent suspensions apparently freed from fowl protein by differential centrifugation are neutralized by antifowl serums prepd. in goats. Neutralization occurs only in the presence of complement. The validity of a serological reaction as a test for fowl protein in "purified" suspensions depends upon the titer of the serum used. Harriet F. Holmes

A polypeptide responsible for some of the phenomena of acute inflammation. E. S. Duthie and E. Chain. *Brit. J. Exptl. Path.* 20, 417–29(1939).—A polypeptide which produces an increased permeability of the blood vessels and a leucocyte infiltration in the skin of the rabbit and guinea pig has been isolated from peptic hydrolyzates of blood fibrin. The polypeptide showed strong chemotactic effects on leucocytes *in vitro*. Polypeptide with similar properties were present in peptic hydrolyzates of a no. of proteins examd., but were not present in hydrolyzates of gelatin. The polypeptide had no demonstrable effect on smooth muscle and was nontoxic to guinea pigs. Since the polypeptide isolated had no marked vasodilator effect, it is unlikely that polypeptides are responsible for the vascular changes assocd. with tissue injury, particularly in the early stages of inflammation but must be largely responsible for the permanent increase in capillary permeability which always occurs in the later stages of inflammation after proteolysis has begun. While the biol. properties of the purified polypeptides resemble closely those of Menkin's leucotaxine (*C. A.* **33**, 717[8]), it is difficult to arrive at any definite conclusions about their chem. relationship, the field of polypeptide biochemistry being still obscure. Harriet F. Holmes

The chemical composition of the active agent of the Rous sarcoma No. 1 and of some related products. A. Pollard. *Brit. J. Exptl. Path.* 20, 429–38(1939).—The tumor-producing agent of the Rous sarcoma No. 1 can be purified by fractional centrifugation and tryptic digestion. The material contains lipoid material which has a stabilizing influence on the suspensions and protein which is considered to be essential for the activity of the prepns. Treatment with formaldehyde reduces both the activity of the prepns. and the detectable amino N, but the regeneration of the amino N has not been accompanied by an increase in the tumor-producing activity. Products derived by centrifugation from nonfilterable tumors were found to be similar in general compn. to the Rous agent although they possessed no infectivity. Materials rich in pentose nucleotides have been found to be present in high concn. in rapidly dividing cells of both plant and animal origin. The relation between the occurrence of such nuclear material and the malignant change is, however, by no means clear. It is considered that the Rous agent although consisting mainly of nucleoprotein may be more complex in character than is bacteriophage which has been found to consist almost entirely of nucleoprotein. Harriet F. Holmes

Variations in acid-base equilibrium in cancer. M. N. Pasternak. *J. méd., Ukraine* 9, 147–60(in French, 160) (1939).—The blood of patients at various stages of cancer development is alk., the pH being about 7.45, while advanced stages show a pH of 7.53. The development of intestinal polyps results in alkalosis but gastric ulcers show no abnormal variation in the acid-base equil. Similar results were observed in rabbits. S. A. Karjala

The plasma and red blood cell lipides in persistent (diabetic) lipemia and in transient (alimentary) lipemia. S. H. Rubin. *J. Biol. Chem.* 131, 691–702(1939).—In

persistent human diabetic lipemia the total plasma lipides decreased from an initial value of 23% to about 1.2% after 137 days. A linear relation was noted between the plasma carotene and phospholipide concns. In dogs with transient alimentary lipemia, there were moderate increases in plasma phospholipides and triglycerides but no change in free or total cholesterol. Both in the diabetic patient and in the dogs, the corpuscular lipides remained unchanged and within normal limits from which it is concluded that the red cells are inert in both persistent and in transient lipemia and do not participate in the transport or metabolism of fat. A. P. Lothrop

Further investigations on manic-depressive psychosis. I. Spectrographic estimation of blood electrolytes. Helgi Tómasson. *Acta Psychiat. Neurol.* **13**, 517–26(1938).—Abnormal variability occurs in manic-depressive patients, Ca values tending to be high, Na low. When possible, correction of blood electrolyte and autonomic nervous conditions by appropriate drugs disperses the psychosis and permits earlier discharge from hospital. J. McAfee

The elimination of creatine and creatinine in psoriasis. Bernhard Zorn. *Dermatol. Wochschr.* **109**, 1223–30(1939).—Creatine does not appear in the urine. A. E. Meyer

Pneumothorax gases. C. B. Weld. *Proc. Novia Scotian Inst. Sci.* **20**, 1–12(1938–39)(Pub. 1939).—Analyses of the mixts. from 15 pneumothoraxes in dogs and from 62 human patients reveal a striking difference between the human and dog results. The gas mixt. rapidly reaches an equil. and its compn. depends on the individual. In most dogs it is about 6% CO_2 and 10% O_2, while the figures in human cases vary widely; in the majority it is less than 5% O_2 and in many less than 1% O_2, with more than 7% CO_2. Possible reasons for this divergence are investigated. The duration of the pneumothorax is not a factor. A large pneumothorax may result in a slight change in the analysis in this direction, as may depression of respiration by morphine, but these are not the chief factors. Results in dogs approximating human analyses are obtained when pleural irritation and inflammation are induced by 1-cc. injections of Monsel's soln. or of 5% I_2 in 10% KI. The typical compn. of the human pneumothorax—a low O_2 and a high CO_2 concn.—is therefore apparently due to a concomitant pleural inflammation. Dorothy A. Meyer

Simmond's disease due to postpartum necrosis of the anterior pituitary. H. S. Sheehan. *Quart. J. Med.* 8, 277–309(1939).—Anterior pituitary necrosis may occur at delivery if it is complicated by collapse and severe hemorrhage. The symptoms produced by lack of anterior pituitary secretion ensue. Replacement therapy is not yet satisfactory, but if a subsequent pregnancy occurs the symptoms are permanently cured, probably because of hypertrophy of pituitary remnants. Fifty-one cases are reviewed. 81 references. John T. Myers

Experimental leucocytosis in man. N. G. Nordenson. *Quart. J. Med.* **8**, 311–21(1939).—The effects of Na nucleinate, pentose nucleotide, and in a few instances, of adenine sulfate were studied including 59 expts. on 43 patients. Both Na nucleate and pentose nucleotide induce a continuing peripheral neutrophilic leucocytosis with hastened maturation of the granular cells of the bone marrow, but only if the bone marrow was previously undamaged. No abnormal mitosis in the bone marrow was observed. If the bone marrow had been previously injured by infection or pernicious anemia these changes did not occur. 105 references. John T. Myers

A study of some serum electrolytes in hypertension. O. L. V. S. De Wesselow and W. A. R. Thomson. *Quart. J. Med.* **8**, 361–74(1939).—The serum of patients with essential, and even more markedly with malignant, hypertension tends to show a lower level of K than that of patients with a normal blood pressure, when on the same diet. Low serum Na is not infrequent in malignant hypertension. Administration of Na salts raises the blood pressure of hypertensive subjects, while K salts have the opposite effect. These alterations are slight and the amts. of salts required to produce them are not apt to be taken in a freely chosen diet. Attempts at depletion of the body Na are without effect on the blood pressure. 30 references. John T. Myers

Cholesterolysis in the blood plasma of individuals with mental disorders. Purcell G. Schube, Naomi Raskin and Eleanor Campbell. *J. Lab. Clin. Med.* **25**, 142–9(1939).—The rate of change of the total cholesterol concn. of the blood plasma of 26 male patients who were normal physically but mentally ill was studied over a period of 24 hrs. at room and ice-box temps. The results were similar to those obtained on normal individuals (*C. A.* **33**, 1378[9]) but on a lower plane. The rate at which cholesterol aggregates are able to free themselves from the meshes of protein mols. is discussed as an important factor in cholesterolysis. Howard W. Robinson

The Eagle complement-fixation test for syphilis. A note on the amboceptor titration. Allen Gold. *J. Lab. Clin. Med.* **25**, 194–5(1939).—The Eagle test (*C. A.* **31**, 2282[2]) was found inferior in sensitivity when run in parallel with an 18-hr. fixation and both Kahn and Eagle flocculation tests. When the test was modified so that the proper relationships between amboceptor and complement were assured, a high degree of sensitivity, with a specificity in excess of the requirement of the U. S. Pub. Health Service, was obtained. Howard W. Robinson

Virus problem with foot-and-mouth disease as an example. L. W. Janssen. *Chem. Weekblad* **36**, 684–8(1939)(English summary). **Cultivation of ultrafilterable viruses.** H. S. Frenkel. *Ibid.* 688–91. **Pathological botanical aspect of the virus question.** H. M. Quanjer. *Ibid.* 691. **Purification of the tobacco mosaic virus.** Ij. van Koot. *Ibid.* 691–2. **The place of virus tumors in tumor investigation.** N. Waterman. *Ibid.* 692–3.—A symposium. Felix Saunders

Glucose-tolerance tests. B. A. Watson. *Endocrinology* **25**, 845–52(1939).—The incidence of glucosuria in routine examn. of college students was 1.14%. About 15.5% of patients with glucosuria showed definitely disturbed carbohydrate metabolism. Felix Saunders

Action of dimethylaminoazobenzene on tissue culture. Syuzo Morigami. *Gann* **33**, 281–5(1939).—By adding dimethylaminoazobenzene to a culture medium in proportion of 1:10,000 a change of healthy fibroblasts into morphologically malignant cells took place. After two passages the morphological divergency begins to appear. Inoculation of these suspicious cultures into the pectoral muscle of normal hens failed to develop sarcoma. K. S.

Ketonemia in pregnant ewes and its possible relation to pregnancy disease. A. H. H. Fraser, W. Godden, L. C. Snook and W. Thomson. *J. Physiol.* **97**, 120–7(1939); cf. *C. A.* **33**, 2190[5].—Further evidence is presented of an inverse correlation between a caloric deficiency of the diet and the incidence of ketonemia in pregnant sheep. The possible significance of exptl. results to a clearer understanding of the diseases of pregnant sheep in the field is discussed. E. D. Walter

Density distribution and energy spectrum of B electrons—excitation process in cancerous cells (Schmidt) **3**.

H—PHARMACOLOGY

CARL F. SCHMIDT

The cerebellar form of lead encephalopathy. A. Biemond and S. van Creveld. *Acta Paediat.* **27**, 51–62(1939)(in English).—This form of Pb poisoning, observed in a 2-year-old girl, was caused by drinking water contaminated with Pb. Ruth Berggren

The relation of nicotinamide to porphyrin metabolism and to the action of light. Wolfram W. Kühnau. *Strahlentherapie* **66**, 24–39(1939).—Studies on 8 patients and 250 mice failed to reveal any clear relation between nicotinamide and porphyrin metabolism. From certain differences in the behavior of mice, treated with hematoporphyrin and nicotinamide, on irradiation it is probable that nicotinamide possesses a light-protective action as yet unexplained. Ruth Berggren

Treatment of heart worms in dogs with Stibsol—a new drug. Harold P. Brown and James A. Austin. *J. Am. Vet. Med. Assoc.* **95**, 566–9(1939).—Stibsol, sodium anti-

monial-3-catechol-thiosalicylate is effective in the treatment of heart-worm infestation in dogs if a certain unspecified concn. is present in the blood stream. R. Brown

Hemoglobin, reticulocytes and blood sedimentation rate in cases of therapeutic malaria and the effects of treatment of them. E. D. W. Greig and Alexander Neil. *J. Trop. Med. Hyg.* **42**, 277–81(1939). R. Brown

Inhibition of peptic digestion by coffee and sodium chloride. Th. Sabalitschka and E. Pilger. *Scientia Pharm.* **10**, 128–31(1939).—An undild. drink of coffee prepd. in the usual manner strongly inhibits peptic digestion *in vitro* and the same effect is produced by a considerably dild. coffee, coffee beans, Kaffee-Hag and Idee-Coffee; Kathreiner-malt coffee shows no such action. The effect is due both to the ingredients of the coffee and to the change of pH of the digestive liquid as a result of adsorption of gastric acid to the constituents of the coffee prepn. Caffeine in the drink is not responsible for the inhibition. NaCl in concn. of 0.25% has a noticeable inhibitory action *in vitro;* in 1% soln. a very strong one. The inhibitory action in each case is not assocd. with an irreversible change in the albumin making it permanently indigestible for pepsin-HCl mixt. 16 references. H. M. Burlage

The relation of the liver to adrenaline. G. E. Batrak and L. I. Timofeeva. *Méd. exptl.* (Ukraine) **1938**, No. 1, 55–62.—Expts. were performed on isolated livers from normal and P-poisoned rabbits. Adrenaline activity was detd. by perfusing the blood vessels of the rabbit ear (Kravkov-Pisemskiĭ technique). Both the normal and the P-poisoned livers showed no ability to destroy adrenaline. In fact, the vasoconstricting effects of adrenaline solns. which were prepd. in Ringer-Locke soln. previously perfused through the liver were markedly stronger than those prepd. in ordinary Ringer-Locke soln. Moreover, the former type of adrenaline soln. retained its activity for much longer periods than the adrenaline soln. prepd. in ordinary Ringer-Locke soln. S. A. Corson

Changes in intermediary metabolism during ether narcosis. F. N. Shterenson-Genes. *Méd. exptl.* (Ukraine) 1938, No. 1, 63–72.—Seventy-five dogs were kept under ether narcosis for 30-150 min. In all cases the blood of the narcotized dogs showed an increase in glucose, lactic acid and acetone, and a decrease in the alk. reserve and pH. These changes were apparent after 10 min. of etherization, reached a max. at the end of administration of ether, and returned to normal 4–24 hrs. after ether was discontinued. They can probably be ascribed to the accompanying anoxemia. S. A. Corson

The influence of surgical operations on the acid-base equilibrium of the blood. R. B. Kremerman. *Méd. exptl.* (Ukraine) **1938**, No. 1, 73–80.—The alkali reserve (Van Slyke method) was detd. before and 3–48 hrs. after operations on 19 patients under general anesthesia and 53 patients under local anesthesia. In all cases there was a decrease in the alk. reserve during the postoperative period, this decrease being more marked in patients who exhibited some acidosis before the operation. Preoperative alkali administration is therefore recommended. S. A. Corson

Pharmacology of zinc, mercury and lead compounds of the DAB 6. Hans Braun. *Süddeut. Apoth.-Ztg.* **79**, 761–5(1939).—Seventeen references. W. O. E.

Pharmacology of boron, carbon and silicon. Hans Braun. *Süddeut. Apoth.-Ztg.* **79**, 786–7(1939). W. O. E.

The effect of toxemia on metabolism. Eric Holmes. *Physiol. Rev.* **19**, 439–71(1939).—A review of the literature on the effect of toxemia on metabolism with especial consideration of carbohydrate metabolism. 113 references. H. R. Getz

The present status of the barbiturate problems. A. L. Tatum. *Physiol. Rev.* **19**, 472–502(1939).—A review article presenting the more recent knowledge of the pharmacology of the barbituric acid derivs. 187 references. H. R. Getz

Influence of diethylaminoethoxydiphenyl (F 1262) and corynanthine on adrenaline-benzene cardiac fibrillation. T. C. R. Shen. *Compt. rend. soc. biol.* **132**, 52–4(1939); cf. *C. A.* **32**, 9260⁴.—In dogs corynanthine exerts a prolonged protective action against the fibrillation. The protective action of F 1262 is weak and very transient. L. E. Gilson

Characteristic changes in the electroencephalogram produced by narcosis. Z. Drohocki and J. Drohocka. *Compt. rend. soc. biol.* **132**, 64–9(1939); cf. *C. A.* **33**, 2212¹.—Effects of evipan, dial and Et_2O on the frequencies of the waves are described. L. E. Gilson

Mydriatic action of adrenoxine. P. Heirman and M. Goffart. *Compt. rend. soc. biol.* **132**, 84–5(1939).—The mydriatic activity of adrenoxine is about 10,000 times that of adrenaline. A 1:100,000 soln. produces a market effect in the eye of the frog, guinea pig, dog or man. L. E. Gilson

Action of sodium glucuronate in the prophylaxis of benzopyrene cancer. J. Maisin, Y. Pourbaix and C. Van de Voorde. *Compt. rend. soc. biol.* **132**, 86–7(1939).—Oral or parenteral administration of small repeated doses of Na glucuronate seemed to have an appreciable inhibiting action on the development of cancer after the application of benzopyrene to the skin of mice. L. E. Gilson

Pharmacodynamic study of phenyltyramine. A. Lespagnol and G. Bizard. *Compt. rend. soc. biol.* **132**, 103–6 (1939).—In dogs the intravenous injection of 10 mg./kg. of α-phenyltyramine-HCl, $HOC_6H_4CH_2CH(Ph)NH_2.HCl$, causes a transient decrease in arterial pressure equiv. to 20–30 mm. Hg, a decrease in kidney vol. and a short period of apnea. A $^1/_{15,000-30,000}$ soln. decreases both the tone of isolated rabbit intestine and the amplitude of its contractions. L. E. Gilson

Action of carbaminoylcholine, geneserine and acetylcholine-geneserine mixture on the thyroid gland. G. Carrière, J. Morel and P. J. Gineste. *Compt. rend. soc. biol.* **132**, 113–14(1939).—In young rabbits the repeated injection of large doses of any of the above mixt. produced marked hypertrophy of the thyroid. L. E. Gilson

Attempted isolation of the toxic substance present in extract of Ascaris megalocephala. Some properties of the toxin. M. A. Macheboeuf and R. Mandoul. *Compt. rend. soc. biol.* **132**, 124–6(1939); cf. *C. A.* **33**, 5503⁴.—The substance was not isolated. It is sol. in 50% EtOH. It is inactivated by boiling a few min. or by storing the slightly acid soln. in the refrigerator a week. **Biological properties of the toxin of Ascaris megalocephala.** R. Mandoul. *Ibid.* 126–8.—The toxin extd. by CCl_3CO_2H soln. has no antigenic properties. L. E. Gilson

Toxicity of the fluke, Fasciola hepatica. R. Mandoul. *Compt. rend. soc. biol.* **132**, 128(1939).—Ext. of the sheep liver fluke is not toxic to guinea pigs. L. E. Gilson

Toxic action of hemoglobin injected intravenously in dogs. E. Aubertin, A. Lacoste and R. Castagnou. *Compt. rend. soc. biol.* **132**, 129–31(1939).—The injection of 3.5% solns. of dog or horse hemoglobin produced no significant symptoms but solns. 7% or stronger often produced nephritis, sometimes severe enough to cause death. **Experimental production of nephritis by hemoglobin.** *Ibid.* 132–4. **Renal elimination of injected hemoglobin.** A. Lacoste, E. Aubertin and R. Castagnou. *Ibid.* 135–6. **Fate of eliminated hemoglobin products fixed in the kidneys and the histopathological reactions provoked by this fixation.** *Ibid.* 137–8.—After intravenous injection of hemoglobin granules of a heme pigment become fixed in the kidney tissues and cause degeneration of the epithelial cells. L. E. Gilson

Effect of analeptic drugs on hibernation in the thirteen-lined ground squirrel (Citellus tridecemlineatus). Carl Pfeiffer, Mark A. Foster and David Slight. *J. Pharmacol.* **67**, 307–12(1939).—The sympathicomimetic amines are the most potent analeptics against the hibernating state. During hibernation clonic convulsions are well tolerated and may not awaken the animal; spinal convulsions are poorly tolerated and sensitivity to spinal convulsants is greatly increased. Metrazole, picrotoxin and cocaine have high analeptic indexes in hibernation. Caffeine sensitizes the hibernator so that handling produces a tetanic convulsion which may be immediately fatal. Coramine is twice as toxic in hibernation and produces a sen-

sitization lasting several days during which the animal, if touched, goes into clonic convulsions which may continue 2–3 days ("marathon convulsions") and kill the animal by exhaustion, but which can be stopped by ephedrine which awakens the animal. Strychnine is 10 times as toxic in the hibernating as in the awake animal. The hibernating animal is a good test animal for the study of acidosis and the effects of vasoconstricting and metabolism-stimulating drugs. L. E. Gilson

Effects of sedatives, narcotics and anesthetics on changes in the body water of frogs produced by pituitrin. Eldon M. Boyd, K. J. Clark and Austin E. Smith. *J. Pharmacol.* **67**, 313–20(1939).—Et_2O, $CHCl_3$ and anesthetic doses of Na phenobarbital depressed pituitrin water uptake in frogs. Similar results were obtained with all other sedative and narcotic drugs tried. L. E. Gilson

Electrical studies on the pharmacology of autonomic synapses. III. Action of ephedrine analyzed by a study of its sympathetic central and ganglionic effects. Amedeo S. Marrazzi. *J. Pharmacol.* **67**, 321–9(1939); cf. *C. A.* **33**, 4674⁴.—Increased preganglionic potentials show that ephedrine activates sympathetic cells within the central nervous system, while decreased postganglionic potentials show that it blocks sympathetic ganglia and annuls the effect of central sympathetic stimulation. The possible mechanism of the action is discussed. L. E. Gilson

Hypoglucemic activity of globin insulin. L. Reiner, D. S. Searle and E. H. Lang. *J. Pharmacol.* **67**, 330–40 (1939); cf. *C. A.* **33**, 7487⁴.—The prepn. contained about 3.8 mg. beef globin and 0.3 mg. Zn per 100 units insulin. It was completely sol. at pH 4 but pptd. at pH 5–8 with max. flocculation at pH 6.1. The soly. was modified by the presence of various salts. The hypoglucemia produced lasted more than twice as long as that produced by an equiv. amt. of ordinary insulin. Decreasing the Zn or globin content shortened the duration of action. The antigenic action was extremely slight. Exptl. prepns. made with rabbit and human globin gave about the same results as beef globin insulin. L. E. Gilson

Calcium ions necessary to synaptic transmission in parasympathetic, not in sympathetic, ganglia. Geo. D. Shafer. *J. Pharmacol.* **67**, 341–52(1939).—The parasympathetic paths to the sphincter pupillae of the cat are temporarily paralyzed by proper injections of Na citrate, but the sympathetic pathways to the constrictor musculature of the visceral blood vessels, to the chromaffin cells of the adrenal medulla, to the dilator pupillae, or to the retractor smooth muscle of the nictitating membrane are not. Perhaps the synapses in cholinergic ganglia are of 2 classes, Ca-cholinergic and K-cholinergic. L. E. G.

Distribution and rate of elimination of picrotoxin. Dorotha M. Duff and James M. Dille. *J. Pharmacol.* **67**, 353–7(1939); cf. *C. A.* **33**, 742⁸.—In rabbits and dogs, after injection of 5 mg./kg. doses of picrotoxin there is an immediate rapid fall in blood picrotoxin which levels off after about 20 min. Analyses of liver and muscle show that much of the drug is taken up by the tissues and eliminated later. Two hrs. after the injection the concn. of picrotoxin in the blood is biologically negligible (less than 0.02 mg. %). This means that when it is used in treatment of barbiturate poisoning frequent administration is necessary to maintain effective concns. L. E. G.

Retention and excretion of selenium after the administration of sodium selenite to white rats. Ross A. Gortner, Jr., and Howard B. Lewis. *J. Pharmacol.* **67**, 358–64(1939).—Young rats were fed synthetic diets contg. Na_2SeO_3 at levels of 25, 35 and 50 p. p. m. of Se. Their growth was stunted. The Se content of the combined liver, kidneys and spleen of individual rats so fed for long periods ranged from 0.03 to 0.17 mg. or from 0.4 to 2.48% of the Se ingested. There was no correlation between the Se concn. of the diet and that of the organs. Ingested Se in the form of Na_2SeO_3 is rapidly eliminated by rats. From 20 to 50% of that ingested was found in the feces. L. E. Gilson

Procaine base dissolved by means of carbon dioxide and its mode of action. R. Beutner. *Proc. Soc. Exptl. Biol. Med.* **42**, 380–2(1939).—Procaine base was suspended in water heated to the m. p. of the base, 59°, and CO_2 passed in until the base dissolved. This soln. was only slightly more convulsant than an equiv. soln. of procaine-HCl but was much more anesthetic on topical application. L. E. Gilson

Influence of hypochloremia on convulsive reactivity. E. Spiegel and H. Wycis. *Proc. Soc. Exptl. Biol. Med.* **42**, 400–3(1939).—In rabbits and cats hypochloremia increased the convulsive reactivity to elec. stimulation through the eyeballs. L. E. Gilson

Negative effects of cysteine hydrochloride on regression of carcinoma in line A albino mice. E. Elizabeth Jones. *Proc. Soc. Exptl. Biol. Med.* **42**, 403–5(1939).—Cysteine-HCl injected directly into spontaneous and inoculated carcinoma caused necrosis and extrusion of necrotic material but produced permanent regression in only one of 20 mice treated. Partial regression of any one tumor was without effect on the growth of other untreated tumors on the same mouse. L. E. Gilson

Some effects of anesthetic mixtures dissolved in oil on motor nerves in the cat. Donald Duncan. *Proc. Soc. Exptl. Biol. Med.* **42**, 405–7(1939).—Local anesthetic mixts. were dissolved in vegetable oil and injected into the subcutaneous tissues of the face in cats. Paralysis of the orbicularis oculi muscle lasting 1–21 days was produced by solns. contg. procaine base or nupercaine-HCl (with benzyl alc. and other ingredients). Degeneration of the facial nerve fibers occurred in every case. The oil alone caused no damage. L. E. Gilson

Effect of sulfapyridine in pneumococcus type I infection in rabbits. W. P. Havens, L. P. Hansen and Cecelia G. Kramer. *Proc. Soc. Exptl. Biol. Med.* **42**, 408–10(1939).—A blood level of 7–10 mg. % total (free plus conjugated) sulfapyridine was effective in curing ⅔ of the treated rabbits. The temps. of the treated rabbits were 1–2° lower than those of untreated infected controls. L. E. Gilson

Toxicity of sulfathiazole and sulfapyridine. H. B. van Dyke, R. O. Greep, Geoffrey Rake and C. M. McKee. *Proc. Soc. Exptl. Biol. Med.* **42**, 410–16(1939).—The toxicity (LD 50) of Na sulfathiazole (2-*p*-aminobenzenesulfonamidothiazole) (I) is about 65% of that of Na sulfapyridine (II). Repeated administration of the drugs in the food of mice shows that I is more toxic than II at high dose level but not at the therapeutic dose level. In monkeys and growing rats, given either drug for 14–17 days, II is clearly more toxic. The principal pathol. changes are kidney damage. I is more rapidly excreted and undergoes much less conjugation than II. L. E. G.

Therapeutic effect of sulfathiazole and sulfapyridine. C. M. McKee, Geoffrey Rake, R. O. Greep and H. B. van Dyke. *Proc. Soc. Exptl. Biol. Med.* **42**, 417–21 (1939).—When administered as 1% of the diet the therapeutic action of sulfathiazole (2-*p*-aminobenzenesulfonamidothiazole) is equal to that of sulfapyridine, in mice infected with pneumococcus or meningococcus. Both gave complete protection from hemolytic streptococcus and both had an appreciable therapeutic action against the agent of venereal lymphogranuloma. Neither showed any activity against swine influenza virus or herpes simplex. L. E. Gilson

Chemotherapeutic evaluation of sulfanilamide derivatives of heterocyclic amines. Frank B. Cooper, Paul Gross and Marion Lewis. *Proc. Soc. Exptl. Biol. Med.* **42**, 421–5(1939).—In mice inoculated with 1000–10,000 fatal doses of streptococcus, 2,6-diamino-3-*p*-sulfonamidophenylazopyridine (I) saved only 20% while 2-*N*-4-acetylsulfanilamido-6-aminopyridine (II), 2-sulfanilamido-6-aminopyridine, 2-sulfanilamidothiazole, 2-sulfanilamido-4-methylthiazole, sulfanilamide and sulfapyridine saved 60–90%, the effectiveness increasing in the order named. In type II pneumococcus infection of mice I and II were of no value while the other compds. saved 40–60%. L. E. Gilson

Effect of repeated injections of cobra venom and morphine on behavior of rats in a maze. Moses B. Macht. *Proc. Soc. Exptl. Biol. Med.* **42**, 433–6(1939). Behavior

of rats in a maze in relation to analgesic effects of cobra venom and morphine. *Ibid.* 436–8.—Preliminary notes. L. E. Gilson

Sugar alcohols. XIX. Relationship between chemical constitution and speed of hemolysis. Anne Mary Kunkel, C. Jelleff Carr and John C. Krantz, Jr. *Proc. Soc. Exptl. Biol. Med.* 42, 438–40(1939); cf. *C. A.* 33, 7385[9].—Unbuffered solns. of the compds. isoösmotic with blood were used. The pH ranged from 6.9 to 7.2. Ethylene glycol, ethylene oxide, glycerol and epihydrin alc. rapidly hemolyzed dog corpuscles. With erythritol hemolysis was slow, but that produced by its anhydride, erythritan, was rapid. Sugar alcs. contg. 5 and 6 C atoms and their monoanhydrides (pentaerythritol, arabitol, mannitol, mannitan, styracitol, sorbitol, sorbitan, polygalitol, dulcitol, inositol and pinitol) hemolyzed the corpuscles very slowly (75–240 min.) but the double anhydrides isomannide and isosorbide hemolyzed them in a few seconds. All the hemolytic phenomena were osmotic in character and not erythrolytic. L. E. Gilson

Effect of parenteral liver extract on the fission rate of Paramecium caudatum. Austin R. Middleton and George E. Wakerlin. *Proc. Soc. Exptl. Biol. Med.* 42, 442–4(1939).—Low concns. had no effect and higher concns. retarded fission. The method has no value as a bioassay for the antipernicious anemia principle. L. E. Gilson

Amino acid nitrogen in urine of children with the nephrotic syndrome following intravenous amino acids. Lee E. Farr and Douglas A. MacFadyen. *Proc. Soc. Exptl. Biol. Med.* 42, 444–6(1939).—There was no significant immediate increase in the urinary excretion of nonprotein N, urea plus ammonia N, nor amino acid N, by 4 nephrotic children aged 5–7 yrs. who had received intravenously 5 g. of an amino acid mixt. from casein hydrolyzed by enzymes; therefore it seems probable that the amino acids were utilized for nutritional needs. L. E. Gilson

Effect of pyocyanine on cerebral metabolism. J. F. Fazekas, Harriet Colyer, Sarah Nesin and H. E. Himwich. *Proc. Soc. Exptl. Biol. Med.* 42, 446–8(1939).—Preliminary. L. E. Gilson

Glucuronic acid produced by surviving slices of liver from animals poisoned with phosphorus or chloroform. Ernest Bueding and Peter Ladewig. *Proc. Soc. Exptl. Biol. Med.* 42, 464–5(1939); cf. *C. A.* 33, 1801[4], 8748[2].—P poisoning impaired the ability to form glucuronic acid, $CHCl_3$ poisoning did not. L. E. Gilson

Alkyl nitrites. V. Pharmacology of alkyl nitrites of high molecular weight. John C. Krantz, Jr., C. Jelleff Carr and Sylvan E. Forman. *Proc. Soc. Exptl. Biol. Med.* 42, 472–4(1939); cf. *C. A.* 33, 741[9].—Inhalation of the vapors of hexyl, heptyl, octyl and (2-ethyl)hexyl nitrites produced a marked fall in blood pressure in dogs. The effects of nonyl and decyl nitrites were much less marked. Dodecyl, (5-ethyl)nonyl, (7-ethyl-2-methyl)-undecyl, tetradecyl, hexadecyl and octadecyl nitrites, because of their low vapor pressures, produced little or no effect when inhaled, but when dissolved in a hydroalc. solvent and injected intravenously they elicited full depressor responses. The min. effective vapor pressure for the series, 0.5 mm. at 28°, is exhibited by decyl nitrite. The optimum vapor pressure is between 3 and 4 mm. (heptyl nitrite); higher vapor pressures give rise to compds. which produce an unnecessary amt. of methemoglobin in the blood, and, owing to low oil soly., produce a transient response. L. E. Gilson

Comparison of the influence of anoxia and asphyxia on blood sugar. E. Gellhorn and A. C. Packer. *Proc. Soc. Exptl. Biol. Med.* 42, 475–7(1939).—In unanesthetized rabbits the inhalation of 5.4% CO_2 has practically no effect on blood sugar when used alone but greatly increases the production of hyperglucemia in inhalation of 7% O_2. L. E. Gilson

Effect of cyanide on cerebral metabolism. J. F. Fazekas, Harriet Colyer and H. E. Himwich. *Proc. Soc. Exptl. Biol. Med.* 42, 496–8(1939).—In dogs the intravenous or intracarotid injection of KCN causes a decrease in cerebral O consumption proportional to the KCN concn. Concns. which inhibit cerebral respiration cause no significant decrease in the O consumption of skeletal muscles. Discussion. L. E. Gilson

Do alkalies used in the treatment of peptic ulcer cause kidney stones? Herman L. Kretschmer and Ralph C. Brown. *J. Am. Med. Assoc.* 113, 1471–5(1939).—The difference of 1.8% in the incidence of stone formation between individuals who were given alkalies in the treatment of peptic ulcer and those who were not is not significant. F. P. Griffiths

The treatment of pneumococcic meningitis with sulfapyridine. Horace L. Hodes, Harry S. Gimbel and Geo. W. Burnett. *J. Am. Med. Assoc.* 113, 1614–19(1939).—Intravenous use of a 5% soln. of the Na salt of sulfapyridine permits better control of the concn. in the blood. An initial dose of 0.1 g. per kg. body wt. followed every 6 hrs. by 0.03 g. per kg. is combined with oral administration of 1 to 12 g. per day. A spinal fluid concn. of between 10 and 15 mg. of sulfapyridine per 100 ml. should be maintained. F. P. Griffiths

Experimental chemotherapy with sulfanilamide and related compounds. Sanford M. Rosenthal. *J. Am. Med. Assoc.* 113, 1710–14(1939); cf. *C. A.* 33, 2994[8].—Review of relation of chem. structure to therapeutic action. Numerous references. F. P. Griffiths

Desoxycorticosterone esters. Certain effects in the treatment of Addison's disease. Joseph W. Ferrebee, Charles Ragan, Dana W. Atchley and Robert F. Loeb. *J. Am. Med. Assoc.* 113, 1725–31(1939).—Administration of desoxycorticosterone esters caused retention of Na and water and marked improvement in patient's condition. No effect on carbohydrate metabolism was noted. F. P. Griffiths

A new method of treatment of subacute bacterial endocarditis. Saul R. Kelson and Paul D. White. *J. Am. Med. Assoc.* 113, 1700–2(1939).—Patients were given 4 to 6 g. sulfapyridine daily and after 4 to 7 days treatment 15 to 25 drops per min. of heparin soln. contg. 20 units per ml. was given by uninterrupted intravenous drip. Venous clotting time was maintained at approx. 1 hr. (normally about 20 min.). Heparin treatment continued for 14 days and sulfapyridine for 4 weeks. Patients were kept well satd. with ascorbic acid. Three of 7 patients showed striking improvement and freedom from recurrence of the disease. F. P. Griffiths

Significance of the excretion of lead in the urine. Lawrence T. Fairhall. *U. S. Pub. Health Repts.* 54, 2016–19 (1939).—Presence of Pb in the urine indicates Pb absorption only and in the absence of other signs and symptoms is of itself insufficient diagnostic evidence of Pb poisoning. Eleven references. J. A. Kennedy

Studies in chemotherapy. XI. Antibacterial action of phosphorus compounds. Preliminary report. Hugo Bauer and Sanford M. Rosenthal. *U. S. Pub. Health Repts.* 54, 2093–5(1939); cf. *C. A.* 34, 163[1].—The Na salt of 4-dimethylaminophenylphosphonous acid (I) and of tris(4-dimethylaminophenyl)phosphine (III) were inactive. The secondary compd. bis(4-dimethylaminophenyl)phosphinous acid (II) administered by mouth or subcutaneously was active against streptococcal infections in mice. The activity was equal to that of sulfanilamide. The effect upon pneumococcus (Type I) infections in mice, as with sulfanilamide, was much less pronounced. The max. tolerated dose of II was 2 g. per kg orally or subcutaneously. For I orally it was greater than 8 g. per kg, and for III greater than 4 g. per kg. No evidence of delayed toxic effects has been seen. J. A. Kennedy

Effect of adrenaline on convulsions. E. Gellhorn, C. W. Darrow and L. Yesinick. *Arch. Neurol. Psychiat.* 42, 826–36(1939).—Adrenaline in doses of 0.004 to 0.015 mg. per kg. body wt. injected intravenously in rabbits temporarily inhibited insulin and metrazole convulsions, blood sugar remaining unchanged. In cats under chloralose anesthesia, hyperreflexia due to the narcotic was abolished. Adrenaline in small doses induced sleep in rabbits awakened from Na barbital sleep by metrazole, but larger doses increased metrazole convulsions. The

anticonvulsant action is linked with the carotid sinus and depressor reflexes. G. H. W. Lucas 1

Acute toxic nephritis due to inhalation of carbon tetrachloride fumes. M. A. Simon. *Can. Med. Assoc. J.* **41**, 580–3(1939).—The inhalation of concd. CCl_4 vapors produced an acute toxic degenerative nephritis. Liver damage appeared to be less than when the poison is swallowed. G. H. W. Lucas

The poisonous action of various benzenearsonic acids. Tyuiti Tomita. *Folia Pharmacol. Japon.* **27**, 205–15 (Breviaria 25–6)(1939).—Six derivs. were studied in mice; they were administered subcutaneously, intravenously and by stomach tube. The 3-nitro-4-hydroxy deriv. by stomach was more poisonous than all others given thus, but the 3-benzylamino-4-hydroxy compd. by injection was even more toxic. The toxic symptoms were usually shaking of the head, running backwards, dragging themselves in circles, loss of appetite and wt. and loss of eyesight. **The poisonous action of sodium *o*- and *p*-hydroxybenzenearsonate.** *Ibid.* 216–20(Breviaria 26).—These 2 derivs. gave symptoms similar to those described above. The *o*-deriv. was the more toxic of the 2. G. H. W. L. 2 3

The actions of some new nonalkaloidal antispasmodics on the plain and leech muscles, described and compared with those of atropine and papaverine. II. The action on the excised rabbit uterus, ox bronchial and the leech muscle. Tadamitu Yosida. *Folia Pharmacol. Japon.* **27**, 221–34(Breviaria 26–7)(1939); cf. *C. A.* **33**, 8808[8].—In descending order the following drugs were effective in decreasing acetylcholine spasm in excised rabbit uterus and ox bronchial muscle: atropine, papaverine, trasentin, 2-methyl-6-benzylaminoheptene-HCl (B-O), dibenzylacetic acid, benzylmethylaminoethyl ester-HCl (B-Tr) and octinum. In decreasing Ba spasm the order was papaverine, trasentin, B-Tr, B-O, atropine and octinum. In relaxing nicotine spasm in leech muscle the order was atropine, morphine, papaverine, trasentin, B-Tr, B-O and octinum. G. H. W. Lucas 4 5

The toxicity changes in various arsphenamine preparations through oxidation and the increased toxicity following exposure of such solutions to air. I. Spectrographic changes and the relationship between the quantity of oxygen absorbed by the solution of arsphenamine base during oxidation and the quantity of phenylarsenic oxide formed thereby. Koeki Kondo. *Folia Pharmacol. Japon.* **27**, 235–49(Breviaria 27–9)(1939).—Aq. solns. of arsphenamine base on standing show a ppt. and the absorption band in the spectroscope shows a shorter wave length. The amt. of phenylarsenic oxide formed at first is almost proportional to the O_2 absorbed, but on long standing the amt. of O_2 absorbed is much greater than the theoretical, suggesting the formation of other compds., as well as phenylarsenic oxide. G. H. W. Lucas 6 7

Pharmacologic studies on the movement of the stomach in situ. I. Action of acetylcholine. Eniti Yamao. *Folia Pharmacol. Japon.* **27**, 250–9(Breviaria 29–30)(1939).—The motor activity of the stomach in cats and rabbits was studied by placing a balloon in the stomach *in situ* and connecting it to a tambour which recorded on a kymograph. Acetylcholine produced increased activity, then almost complete cessation of movement; a delayed increase in activity was also noted. Injection of atropine in rabbits followed by an injection of acetylcholine caused only a slight relaxation. After section of the splanchnics, acetylcholine produced normal inhibitory effects, but after removal of the adrenals only stimulant effects were observed. G. H. W. Lucas 8

Experimental investigation on the action of certain Formosan snake poisons on carbohydrate metabolism. V. The influence of antiserum on the blood sugar in rabbits poisoned with snake poisons. Togaku Ri. *Folia Pharmacol. Japon.* **27**, 260–9(Breviaria 30–2)(1939); cf. *C. A.* **33**, 8808[1]. **VI. The altered influence on blood sugar of certain crotalus snake poisons after the production of habituation to these poisons.** *Ibid.* 280–91(Breviaria 33–4).—**An extensive study on the effects of snake poisons in rabbits.** G. H. W. Lucas 9

Studies in the insulin treatment of dementia precox. Charles F. Read, Gert Heilbrunn and Erich Liebert. *J. Nervous Mental Disease* **90**, 747–56(1939).—A review. G. H. W. Lucas

The chrono-inotropic action of the glucosides of Digitalis lanata on the human myocardium in myocardial insufficiency. Pietro Occhioni. *Arch. sci. med.* **68**, 245–80 (1939).—The inotropic effects are superior to those obtained with the glucosides of *Digitalis purpurea* (I) and in intensity, if not in rapidity, comparable to those of K strophanthin (II). The direct or indirect chronotropic effect is superior to that of II and slightly inferior to I. In intensive medication as well as in maintenance treatment an optimum relationship of chronotropic and inotropic effects is obtained. The neg. bathmotropic effects as observed with I (extrasystoles) are extremely rare with *D. lanata*. The neg. dromotropic effect on the bundle of His, clinically valuable in auricular fibrillation, is slightly inferior to that of I but better than II. *Digitalis lanata* is the preferred medication in insufficiency of the right as well as of the left heart. II has only a preference for temporary medication when quick action is imperative. The lanata glucosides are well tolerated and a cumulative effect is unlikely. They can be given intravenously, intramuscularly (painless) and *per os*, without upsetting the stomach. A. E. Meyer

A case of nephrosis caused by trypaflavine. Antonio Malaguti. *Arch. sci. med.* **68**, 305–38(1939).—Report of the case of a girl 14 yrs. old treated for endocarditis with intravenous injections of a 0.5% soln. A total of 0.1125 g. was given in 5 days. Albuminuria (1.4%) oliguria and moderate N retention were present. Cessation of treatment was followed by complete recovery within 40 days. A. E. Meyer

The action of oligodynamic waters and of some preparations of colloidal metals on experimental infection with Castellanella brucei. S. Biozzi. *Riv. parassitologia* **2**, No. 2(1938); *Rev. sud-americana endocrinol. inmunol. quimioterap.* **22**, 631.—Of 14 guinea pigs infected with *Castellanella brucei* and treated with H_2O kept in contact with metals (Cu, Zn, Pt) only one survived. Certain colloidal metal prepns. (zymocuprol, cupridol) seemed to have some curative effect. A. E. Meyer

Rhodium salts and syphilis. E. Paravanati. *Giorn. ital. dermatol. syphilol.* **79**, No. 4(1938); *Rev. sud-americana endocrinol. inmunol. quimioterap.* **22**, 633–4.—The Cl salts of Rh and Rh with Li, K and Na were tested for their usefulness in syphilis treatment. While *in vitro* no effect on spirochetes was observed a good therapeutic effect was obtained in rabbits infected with syphilis. The drugs were well tolerated. A few human cases treated gave favorable responses, but the no. was too small to be convincing. A. E. Meyer

Anatomical lesions following injections of dinitrophenylmethylglyoxalidine in large dosage. Enrique F. Cantilo. *Semana méd.* (Buenos Aires) **1939**, II, 773–80.—A 1% soln. was injected into rabbits. A single dose exceeding 0.05 to 0.07 cc. per kg. caused death within a few hrs. with asphyxia, convulsions and hyperthermia. If smaller doses were given repeatedly, the animals showed at autopsy congestion and degeneration of the liver, damage to kidneys and myocardium and pulmonary congestion. If the treated animals were not killed they survived without apparent detrimental aftereffects. A. E. Meyer

Action of drugs on the nasal mucosa. Arthur W. Proetz. *Arch. Otolaryngol.* **30**, 509–15(1939).—The actions of various drugs were noted on ciliary activity in the nasal mucosa, both *in vivo* and excised. Benzedrine inhalers, both with and without oil of lavender, caused no change in the amplitude or speed of the beat of the cilia. Direct application of benzedrine sulfate, however, in 1%, 2% or 3% soln., stopped ciliary motion for a few min. Alc., either 18% or 20%, stopped the ciliary beat immediately. Wetting agents, such as 0.01% decylbenzene Na sulfonate and 0.01% monobutyl diphenyl Na monosulfonate, cause slowing of the ciliary beat. These drugs in a 0.1% soln. disintegrate the cilia. Ether and chloroform vapor have no effect on the cilia, but if applied in

liquid form, stop ciliary beat. N_2O has no effect on the cilia of the nasal mucosa. Dorothy A. Meyer

An attempt to condition gastric secretion to histamine. S. Katzenelbogen, Roger B. Loucks and W. Horsley Gantt. *Am. J. Physiol.* **128**, 10–12(1939); cf. *C. A.* **31**, 8702[7].—Conditioning cannot take place if the unconditioned stimuli which provoke the phenomenon to be conditioned exercise their specific actions through the peripheral and not through the central nervous system. E. D. Walter

New results on the absorption of insulin from the alimentary tract. L. E. Young, W. A. Phillips and J. R. Murlin. *Am. J. Physiol.* **128**, 81–91(1939); cf. *C. A.* **32**, 9974.—Nearly 300 expts. on 10 dogs. have confirmed the favoring effect of hexylresorcinol in alk. soln. on the absorption of insulin from the alimentary tract. The heptyl and octyl resorcinols also have this property. The optimum pH range of the mixt. for max. effect on intragastric administration is from 9.9 to 10.5. Insulin protected by hexylresorcinol survives incubation for one-half hr. with trypsin Unless the soln. is boiled before injection, however, the trypsin will destroy insulin afterward. A method was devised for testing the relative efficacy of many solns. on a single day in the dog anesthetized with amytal. Such expts. with solns. introduced into a segment of the intestine prove that there is very rapid buffering of high or low pH. Both dogs and men exhibit great variability of response to this method of administering insulin. E. D. Walter

A comparative study of the effect of alkylresorcinols and related compounds upon the absorption of insulin from isolated intestinal loops of anesthetized dogs. Robert R. Sealock, John R. Murlin and Robert L. Driver. *Am. J. Physiol.* **128**, 92–6(1939); cf. preceding abstr.—The effect of the alkylresorcinols, ethyl-, propyl-, butyl-, pentyl-, hexyl-, heptyl-, and octyl-, on the absorption of insulin from isolated loops of the small intestine of anesthetized dogs has been compared. Of these compds. hexylresorcinol causes the greatest absorption of insulin as detd. by analysis of blood glucose. Evidence is presented to indicate that the hydrophylic-hydrophobic nature of hexylresorcinol is not the only factor involved in promoting insulin absorption. Other compds. of similar chem. nature were tested and found to be without effect under the conditions of the expt. E. D. Walter

Effects of an anterior pituitary growth preparation on metabolism in phlorizin diabetes. O. H. Gaebler and Walter J. Zimmerman. *Am. J. Physiol.* **128**, 111–20 (1939).—Bitches were given large injections of a growth prepn. on the 4th day of phlorizin administration. The calorigenic effect of the prepn. was superimposed on the high metabolism of phlorizin diabetes. In spite of this the wt. increased and the N output was less than in expts. with phlorizin alone. The effect of the prepn. on N output was increased by thyroidectomy. In meat-fed phlorizinized animals glucose and N output were diminished proportionately, leaving the D/N ratio unchanged; in thyroidectomized-depancreatized animals receiving a const. amt. of insulin the same doses of this pituitary prepn. were severely diabetogenic. The injected prepn. did not diminish N output by increasing the oxidation of fat, or of carbohydrate when latter was available. E. D. W.

Response of Brunner's glands to secretin. S. J. Fogelson and W. H. Bachrach. *Am. J. Physiol.* **128**, 121–3 (1939).—Intravenous injection of secretin is followed by the secretion of a viscid juice from the Brunner gland area of the duodenum, but proof is still lacking that secretion is entirely independent of the increased duodenal motility accompanying the secretion. E. D. Walter

Influence of massive doses of insulin on peripheral blood flow in man. David I. Abramson, Norman Schklowen, Meyer N. Margolis and I. Arthur Mirsky. *Am. J. Physiol.* **128**, 124–32(1939).—A study of the peripheral vascular responses to injections of massive doses of insulin in a series of patients with schizophrenia by means of the plethysmographic method. E. D. Walter

Certain therapeutically important triphenylmethane dyestuffs (Dominikiewicz) **10**. Group of organo-Hg compds., derivs. of allyl [pharmacotherapeutical properties] (Dominikiewicz, Kijewska) **10**. Cyclotetramethylenepyrazolone [therapeutical application] (Ruhkopf) **10**.

1—ZOÖLOGY

R. A. GORTNER

Respiration of fishes. I. Respiration of the Hungarian dogfish (Umbra lacustris Grossinger). Fritz Geyer and Hans Mann. *Zool. Anz.* **127**, 234–45(1939).—The O consumption of a normal dogfish was 18.5 g. O_2/kg. body wt./24 hrs. when the temp. of the water was 14–16°, but, if removal of the gases in the swimming bladder was prevented by keeping the fish under water in a closed tube for 24 hrs., the O consumption increased to 27.36 g.; immediately after the fish had swallowed air it was 19.2 g. If the swimming bladder was punctured or evacuated by reduction of the external pressure, the O consumption increased from 16.39 to an av. of 25.1 g. and from 19.2 to an av. of 33.55 g., resp. The O consumption of 4 fish kept in a closed tube for 26 hrs. was 3.89 g. O_2/kg. body wt./24 hrs.; after air-swallowing it fell to 3.09 g. The difference in O consumption calcd. per body wt. and for 24 hrs. between individual fish and a group of fish was due to a "group effect." The above figures are valid only for expts. with flowing water. The same ratio (2:1) of the O uptake of the gills (and skin) to that of the swimming bladder was also found in fish larvae of the same age. The swimming bladder in *U. lacustris* is, therefore, an accessory respiratory organ, the lack of which does not affect the ability of the fish to live. The gills, which normally take care of the greater part of the O requirement, are capable of meeting the total requirement. With a sufficiently high O content of the water the swimming bladder respiration is of minor importance. **II. Further contribution to the respiration of the Hungarian dogfish (Umbra lacustris Grossinger).** *Ibid.* 305–12.—The air respiration, water respiration and total respiration of this fish in g. O_2/kg. body wt./24 hrs. under different conditions were: in stagnant water, 16–18°, during the day, 33.40, 2.78, 36.18; in stagnant water during the night, 13.30, 3.89, 17.19; in O-poor stagnant water (O content of the water reduced from 9.57 mg. O_2/l. to 4.25 mg. O_2/l.), 35.70, 1.69, 37.39; in stagnant water with no possibility of air respiration, —, 4.54, —; in stagnant water with exclusion of the swimming bladder (evacuation), —, 27.45, 27.45 (?); in flowing water with the possibility of air respiration, — (not measurable in the exptl. period), 15.12, —, resp. These results confirm the earlier view that *U. lacustris*, by virtue of its swimming bladder which functions solely as an accessory respiratory organ, can live in waters with low O content, i. e., under unfavorable conditions. Ruth Berggren

The formation of dihydroxycholenic acid from apocholic acid in the toad. Tai Sihk Sihn. *Z. physiol. Chem.* **261**, 93–6(1939).—Feeding 22 g. of apocholic acid (I) to toads in doses of 0.2–0.3 g. daily caused the appearance of 0.065 g. of dihydroxycholenic acid (II) in their urine and 0.33 g. in their bile (142 animals). The double bond of I between 8 and 14 can be shifted to the 7-8 position in II in the organism as well as by ultraviolet light (*C. A.* **33** 2901[7]). Milton Levy

12—FOODS

H. A. LEPPER

Determination of tin in food products. A. G. Bosin and S. E. Spektor. *Voprosy Pitaniya* **7**, No. 2, 87–94(1938); *Khim. Referat. Zhur.* **2**, No. 1, 70(1939).—The method of Owe (cf. *C. A.* **17**, 3145) for the detn. of Sn in food prod-

ucts contains a no. of defects. In the process of mineralization (which requires a considerable length of time) a partial loss of Sn takes place. A dry method of ashing the sample is proposed, by which smaller samples can be used. The ash is treated with a 25% soln. of HCl, the Sn is reduced with Al, KI is added to the soln., and the soln. is titrated with $K_2Cr_2O_7$ in the presence of starch. The accuracy of the method reaches 95% of the theoretical. Another method for the detn. of Sn is also proposed which is based on the fact that the sulfide is treated with a standard I soln., excess of which is titrated with $Na_2S_2O_3$.
W. R. Henn

The use of nitric acid in ashing wheat, etc. B. S. Dmitriev. *Trudy Odesskogo Inst. Tekhnol. Zerna i Muki im. I. V. Stalina* **1938**, 89–93; *Khim. Referat. Zhur.* **2**, No. 2, 78(1939).—Detns. of nitrate and nitrite in ash showed that no appreciable error is caused by acceleration of the ashing by means of HNO_3. W. R. Henn

The influence of discharge rate of flours upon the concentration of the fatty materials of rice and its by-products. Roger F. Auriol and G. Huet. *Bull. mat. grasses inst. colonial Marseille* **23**, 209–13(1939).—With increase of the discharge rate (above 3.62%) of rice into flour, the percentage of fatty materials in the flour gradually decreases, as does also the percentage of fatty materials in the recovered pieces of rice grains. At a discharge rate of 9.5% and above, the percentage of fatty materials in the recovered pieces of rice grains remains approx. const. For discharge rates below 3.62% the flours had lower contents of fatty matter than were present at the figure mentioned, probably because of incomplete rupture of the aleuronic cells which are rich in fatty matter. George Ayers

Determination of corn meal in wheat flour. H. Radeloff. *Z. Untersuch. Lebensm.* **78**, 145–9(1939).—Stir a 5-g. flour sample with 10 cc. of chloral hydrate-HCl soln. (cf. Bredemann, *C. A.* **6**, 1325) until lump-free and boil (1½–2 min.) until clear. Add 10 cc. of chloral hydrate, which should dissolve the last traces of starch. Pipet 0.1-cc. portions of this to 4 slides (70 × 35 mm. with 40 × 24 mm. covers) from a pipet with a wide opening. The count is made on 5 cross strips on each slide. Work on known samples yielded a factor 7.6 which is the amt. of corn tissue protein networks per count per percentage of corn meal in the flour. The evaluation of unknown samples was based on data obtained on prepd. mixts. M. M. P.

Purification of wash waters in flour mills. V. Ya. Girshson. *Trudy Odesskogo Inst. Tekhnol. Zerna i Muki im. I. V. Stalina* **1938**, 119–30; *Khim. Referat. Zhur.* **2**, No. 2, 110(1939).—The wash waters can be successfully settled and purified in the first settling tank and filter. Since the wash waters have an alk. reaction, addn. of minute amts. of $CaOCl_2$ has an excellent chem.-bacteriol. disinfectant action. W. R. Henn

Determination of α- and β-amylases in flour. I. Glazunov. *Biokhimiya Khlebopecheniya* **1938**, No. 1, 51–9; *Khim. Referat. Zhur.* **2**, No. 3, 86(1939).—The method depends on the different thermolabilities of α- and β-amylases. The α-amylase is inactivated by heating for 15 min. on a water bath at 70°. Detn. of β-amylase by its dextrinizing power is less accurate than detn. by its sugar-forming properties. The activity of β-amylase depends to a great extent on the condition of starch. Starch with finer grains or with damaged grains forms sugar much faster than does the starch with coarse grains. A starch paste forms sugar 500–1000 times faster than the unprepd. starch. W. R. Henn

The role of α- and β-amylases in bread baking. E. G. Onishchenko. *Biokhimiya Khlebopecheniya* **1938**, No. 1, 39–50; *Khim. Referat. Zhur.* **2**, No. 3, 61(1939).—The action on the starch paste of α-amylase caused 23.1%, and of β-amylase 43.2%, sugar formation. From the action on dextrins of α-amylase were obtained 278 mg. and of β-amylase 370 mg. of maltose, and from the action on natural starch (not paste) 264 mg. and 42 mg. of maltose, resp. Addn. of α-amylase to the dough in the course of mixing caused an increased formation of dextrins and lowered the quality of the bread. The action of α-amylase can be inhibited by increase of the acidity of the medium. The action of β-amylase was mainly on the dextrins and it caused only a very slow formation of sugars from the unchanged starch grains. The addn. of this enzyme improved the quality of bread. W. R. Henn

The flavor of milk as affected by season, age and level of feeding dairy cows. J. C. Hening and A. C. Dahlberg. *J. Dairy Sci.* **22**, 883–8(1939).—The flavor of fresh milk and its keeping qualities as indicated by the percentage occurrence of oxidized flavor and the numerical score in aged milk were not influenced by the level of feeding under the conditions of the expt. The occurrence of oxidized flavor was considerably less in summer months but there was not a definite correlation between the exact period of feeding green cut legumes and the occurrence of oxidized flavors. The milk from first-calf heifers showed a higher incidence of oxidized flavors than milk from older cows, but the data were not considered sufficient to draw definite conclusions even for the one herd in which all the data for this study were obtained. A. H. Johnson

The effect of increased iodine feeding upon the iodine content of cow milk. Norman L. Mathews, Geo. M. Curtis and J. H. Meyer. *J. Dairy Research* **10**, 395–402(1939).—The milk and blood I of a herd of 30 Guernsey and 30 Holstein cows were detd. previous to and during the prolonged increased feeding of I to one-half of the herd. The increased amt. of I was fed as KI which was mixed uniformly with the grain feed. The blood I of the iodized cows was greatly and uniformly increased. The milk was increased, this increase being principally dependent on the amt. of I which was fed. During the late spring, the milk I from both the iodized and control cows was unusually low. During early autumn the milk I from the iodized cows was low. The milk from the iodized cows contained 7 to 26 times as much I as that from the control cows. An av. milk I of 80 γ % was obtained from the iodized cows through the mid-year period of 5 months. The data indicate that the I content of milk can be readily increased by increasing feeding of I. A. H. Johnson

Biochemical sugar determination. IV. F. Th. van Voorst. *Chem. Weekblad* **36**, 699–702(1939); cf. *C. A.* **33**, 6376².—By means of previously described methods directions are given for the detn. of the sugar content of milk powder, milk chocolate, cane-sugar sirup, cooking sirup, and household sirup and jam. V. *Ibid.* 715–16.—Directions are given for the detn. of sucrose, lactose, molasses or crude sugar in chocolate paste. F. S.

Bacterial growth in milk as a possible source of error in the phosphatase test. Harold W. Leahy, Leslie A. Sandholzer and Marian R. Woodside. *J. Bact.* **38**, 683(1939).—False pos. reactions may result from the hydrolysis of the bacterial nucleic acids. Tests should not be made on milks with microscopic counts above 8,000,000 per cc. or standard plate counts above 2,000,000 or interpreted with caution. John T. Myers

Skimmed condensed milk. K. E. Langwill. *Mfg. Confectioner* **19**, No. 12, 18–19(1939); cf. *Ibid.* No. 11, 24–5.—A discussion of the analyses of 3 com. samples with respect to candy manuf. George Ayers

Improvement in the viscosity of pasteurized cream through subsequent heat-treatment. Hilda F. Wiese, J. H. Nair and R. S. Fleming. *J. Dairy Sci.* **22**, 875–81(1939).—The process of increasing the viscosity of cream involving immediately warming the pasteurized cream to 86°F. in 20 to 25 min., vat cooling from 86°F. to 45°F. in 12 to 15 min., followed by surface cooling to 45°F. is termed the rebodying process. The fat phase of normal cream plays the most important role in the cream rebodying process. The fat membrane material of normal milk globules was found to be the most effective butterfat stabilizer for artificial cream and always resulted in a cream which would respond to the rebodying process. Stabilization of the butterfat with all or part of the constituents of normal skim milk did not yield artificial creams which would respond to rebodying. None of the emulsions prepd. from other than the normal fat globule membrane material responded to the rebodying expts. The constituents of the aq. phase of normal cream exert a beneficial effect on the rebodying process but this effect is not noted

except when the butterfat is stabilized by its normal membrane. The compn. of the butterfat appears to be a factor in the stability of cream subjected to the rebodying process. A. H. Johnson

Weight loss of stored margarine. A. Schloemer. *Z. Untersuch. Lebensm.* **78**, 138–41(1939).—Loss of 2% in wt. by evapn. of moisture occurred in 1 to 15 weeks in 1/4-kg. packaged com. margarines during storage. The wt. loss of the 1/2-kg. packages was slower. M. M. Piskur

Determination of insoluble substances in fruits and in berries. M. Kotlyarenko and A. Popel. *Spirto-Vodochnaya Prom.* **1938**, No. 10, 23–5; *Khim. Referat. Zhur.* 2, No. 2, 89–90(1939).—An extn. cylinder of glass, provided with a stopcock, is described. It is heated in a thermostat at 70–80°. Place a 25-g. sample in the cylinder in a preliminarily dried and weighed paper case, cover it with hot water. After every 20–30 min. change the water in the cylinder until the wash water gives no reaction for sugar with Fehling soln. Wash the cylinder 2–3 times with 96% alc., filling it for 20–30 min. Dry the paper case with the sample at 105° to const. wt. The detn. requires 15 hrs. W. R. Henn

Apple preservation with the aid of certain oils. Ia. Scupin. *Obst- u. Gemüseb.* **35**, 48–9(1939); *Rev. Applied Mycol.* **18**, 533.—Apples treated with 3 different oils at harvesting showed less incidence of *Gloeosporium album* after storage for 3, 4, 5 and 6 months in the case of 2 oils than controls but more in the case of the third oil. The third oil (No. 2243) caused injury to the fruit. O. E. S.

Factory and field application of maturity test for peas. S. L. Jodidi. *Canning Trade* **61**, 7–12(1939); cf. *C. A.* **34**, 186⁹.—J.'s maturity test which is based on the sp. gr. of peas and shows that peas of lower or higher sp. gr. indicate a better or poorer quality, resp., is characterized by the following properties: The test is accurate up to a few hundredths of one %, which is of special importance in sweet varieties of peas whose grades differ but very little. The test is rapid, requiring but 5 min. or less. It is free from waste, because the samples tested remain perfectly clean and can be added to the bulk of peas for canning or other processing. The whole app. costs only $25–50. S. L. Jodidi

Food value of artificially dried sweet lupine. W. Kirsch and H. Jantzon. *Biedermanns Zentr. B. Tierernähr.* **11**, 273–5 (1939).—Sweet lupine artificially dried in a rotary drier contains 11.82% digestible crude protein and 10.93% digestible pure protein. The digestibility of the protein is reduced by artificial drying. Felix Saunders

The chemist in the carbonated beverage industry. H. A. Showalter. *Can. Chem. Proc. Inds.* **24**, 621–2, 624 (1939).—The chemist is interested primarily in this industry in: (1) the cleaning of the bottles, (2) the control of the water supply and (3) the production of suitable carbonation. Control of these and tests on finished goods are discussed briefly. W. H. Boynton

Extermination of warehouse ticks. M. F. Ermolaev and A. E. Krivul'tsova. *Len i Konoplya* **1938**, No. 1, 23–7; *Khim. Referat. Zhur.* 2, No. 2, 100(1939).—Naphthalene, chalk, ordinary and the double superphosphates and talcum were tested for a rapid extermination of grain ticks. Naphthalene is recommended for wide use. The most effective dose was 500–1000 g. of naphthalene for each ton of the grain. W. R. Henn

Staff reports. Southern division. N. A. R. Pollock. *Queensland Dept. Agr. and Stock, Ann. Rept.* **1937–38**, 47–53.—Analyses are given of Sudan grass (young growth and in flower), chick pea (*Cicer arietinum*) (plant, seed and husk), several varieties of fodder grasses and 5 varieties of grain sorghums (plants and grain). Data on the digestible nutrients in the grain sorghums are also given. K. D. Jacob

Storing of carbohydrates by forage grasses. A. S. Morozov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 407–9(1939)(in English).—Investigations of *Bromus inermis* Leyss., *Lolium perenne*, *Festuca pratense*, and some other forage grasses, cleaned, killed, dried, and ground, gave the following results (figures given in tables): (1) Carbohydrates accumulate chiefly in roots, stems, shortened internodes and leaves. The carbohydrates stored are chiefly inulin-like substances and hemicellulose. (2) Sucrose always predominates over monosaccharides, its increase being attended by an increase in the total content of carbohydrates. (3) The carbohydrate content increases with the growth of the plant, attaining a max. at flowering. 4 references. A. H. Krappe

Roughage quality and quantity in the dairy ration, a review. C. F. Huffman. *J. Dairy Sci.* **22**, 889–980(1939). A. H. Johnson

Production of concentrated fodder and the cultivation of alfalfa. A. Demolon. *Compt. rend. acad. agr. France* **25**, 885–94(1939).—Alfalfa requires a high-Ca soil which assures a forage of high alkalescence. This is particularly valuable for dairies. Repeated addns. of large doses of $Ca(NO_3)_2$ for alfalfa cultivation on a loam soil result in a significant decrease in the N content of the crop. A general discussion of the raising of alfalfa is given. J. R. A.

The drying of sugar beets, leaves, and tops as well as albuminous green fodder. H. Claassen. *Centr. Zuckerind.* **47**, 801–2(1939).—After drum drying the crude protein content of sugar-beet chips was 10–11%; of agriculture waste, 16.5–19.8%; alfalfa, 19.9–21.3%; red clover, 18.8–19.5%; vetch mixt., 24.1–24.8% and pure vetch, 29.1%. High digestibility was claimed for sugar-beet fodder. W. W. Binkley

Food value of artificially dried beet tops as fodder for milk cows and work horses. Robert Ehinger. *Biedermanns Zentr. B. Tierernähr.* **11**, 389–427(1939).—The coeff. of digestibility of dried beet leaves was lower than that for the fresh leaves. Both dairy cattle and work horses eat dried beet leaves readily up to 6 kg. The fodder has no harmful effects on either animals. Felix Saunders

Feeding whole oats to work horses. Gerhard Winkler. *Biedermanns Zentr. B. Tierernähr.* **11**, 428–34(1939).—Work horses use whole and rolled oats equally well. Felix Saunders

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Variations in the cooking quality of potatoes as influenced by fertilizers (Blood, Haddock) **15**. Report of the agricultural chemist [on pasture grasses, roughage, etc.] (Gurney) **15**. Extruded tubing of nitrocellulose compn. [for sausage casings] (U. S. pat. 2,175,313) **23**.

Bleaching flour and the like. Souren Z. Avedikian. U. S. 2,175,172, Oct. 10. Bleaching is effected by use of an addn. compd. of SO_2 with a nitrite such as that of Na, Li, K or Ca in very small proportion, which also improves the water-absorption value of the flour and the texture of bread made from it.

Inhibiting oxidative deterioration of compositions containing glyceride oils and fats, etc. Sidney Musher (to Musher Foundation Inc.). U. S. 2,176,022, Oct. 10. Food emulsions contg. oils and fats, etc., are stabilized against oxidative deterioration by adding to them a small proportion of an unbleached cereal flour such as that of oats, degerminated maize or barley. U. S. 2,176,023 relates to stabilizing products such as cream, butter and ice cream by adding less than 2% of a similar material. U. S. 2,176,024 relates to the similar use of a finely divided deoiled seed residue such as deoiled soybean flour.

Stabilizing foods, etc., against oxidative deterioration. Sidney Musher (to Musher Foundation Inc.). U. S. 2,176,026, Oct. 10. An aq. or alc. ext. such as one of unbleached oat or corn flour is added in small proportion to products such as mayonnaise, liquid egg white, biscuits or coffee. U. S. 2,176,027, relates to the similar stabilization of water-contg. food compns. such as cream, concd. orange juice, cream cheese, ice cream or salad dressings. U. S. 2,176,028 relates to similar stabilization of meat and fishery products. U. S. 2,176,029 relates to stabilization of foods with an alc. extract of a cereal flour which before extn. contains less than 5% total phospholipins. U. S. 2,176,030 relates to stabilization of glyceride oils and foods contg. them by use of an alc. extract such as one of deoiled peanut press cake or deoiled soybean flour. U. S.

2,176,031 relates to a like use of a finely divided defatted cacao residue or its alc. ext.

Stabilizing water-containing foods such as milk and cream against oxidative deterioration. Sidney Musher (to Musher Foundation Inc.). U. S. 2,176,033, Oct. 10. A small proportion of crude cane sugar or crude beet sugar is added as a stabilizing agent. U. S. 2,176,034 relates to the conjoint use of a sugar and water-sol. antioxygens such as those extd. from unbleached corn. U. S. 2,176,035 relates to the use together of a sugar and water-sol. antioxygens such as those of deoiled soybean flour. U. S. 2,176,036 relates to the use together of salt and antioxygens such as those extd. from corn. U. S. 2,176,037 relates to the use together of cereal or seed materials such as oat flour and an aq. or alc. ext. such as that of unbleached whole oat flour, for stabilizing various foods.

Apparatus for measuring the curd tension of milk. Laurence Batchelder (to Submarine Signal Co.). U. S. 2,175,173, Oct. 10. App. used includes a curd-penetrating knife, a supporting frame for the knife, a container for holding Hg on which the frame may float, and a scale and indicator for indicating the surface level of Hg with respect to the float. Various other structural and operative details are described.

Centrifugal separator suitable for separation of cream from milk. Hans O. Lindgren (to De Laval Separator Co.). U. S. 2,174,272, Sept. 26. Various details of structure and operation for discharge regulation.

Stabilizing desiccated milk products. Faw Y. Chuck. U. S. 2,174,734, Oct. 3. A process for producing a dry stable milk product from a source material contg. sufficient α- and β-lactose anhydrides as to render the material markedly hygroscopic involves dehydrating the source material to remove therefrom all but about 10% of the water therein and so the partially dehydrated material is powdery, agitating the partially dehydrated material at a temp. below 93.5° for a time sufficient to hydrate any hygroscopic components in the material and to stabilize the partially dehydrated material, and finally removing substantially any moisture in excess of that present as water of hydration of constituents of the stabilized material.

Frozen foods such as fish. Robert H. Bedford. U. S. 2,175,680, Oct. 10. Foods such as fish are provided with a transparent noncracking ice glaze formed from an aq. soln. of a polyhydric alc., ketonic alc. or aldehydic alc. such as glycerol, ethylene glycol, arabinose, glucose, mannose, galactose, fructose, sucrose or maltose, preferably brought to a pH of about 5.5, as by use of HCl.

Hydrogenated vegetable-oil shortening. Truman M. Godfrey and Victor Serbell (to Lever Bros. Co.). U. S. 2,174,364, Sept. 26. App. is described, and a method of finishing substantially dry hydrogenated vegetable-oil plastic shortening in which the oleaginous material comprising the same in a liquid state is converted into a semi-solid plastic condition, involving simultaneously agitating and chilling the material uniformly and rapidly to crystallize at least a portion of it; terminating the agitating and chilling operation and withdrawing the oleaginous material in a crystd. creamy viscous condition such as would be capable of retaining air and when the resultant latent heat of crystn. available is such as to impart to the oleaginous material a temp. approx. 25° to 30°, and agitating the material in creamy viscous condition while it acquires the tempering temp. before packaging when the resultant latent heat of crystn. available is at least sufficient to impart to the oleaginous material a temp. approximating a predetd. tempering temp.; withdrawing the oleaginous material in a crystd. creamy viscous condition capable of retaining air; and permitting the material to acquire such predetd. tempering temp.

Blended shortenings. Arne Gudheim (to Lever Bros. Co). U. S. 2,174,365, Sept. 26. A plastic shortening which may carry an inert gas or air, of uniform appearance and texture, comprises a base of partially hydrogenated vegetable oil that is semisolid but somewhat softer than desired at room temp., with which is mixed 0.5 to 5% of a hard fat having a titer of not less than 65°, the hard fat being prepd. by hydrogenating a vegetable oil which, when completely hydrogenated, has a titer of not less than 65°, whereby the mixt. has a plasticity at room temp. suiting it for culinary operations, and retains its plasticity over a wide temp. range. Various examples with details are given.

Cooking salt mixture. Frederick C. E. Harry and Henry H. York (to Chemtex Ltd.). U. S. 2,175,955, Oct. 10. See Brit. 507,904 (*C. A.* **34**, 542[8]).

Apparatus for expressing and separating juices and rind oils from citrus fruits. Frederick L. McCulloch. U. S. 2,174,909, Oct. 3. Various structural, mech. and operative details.

Retarding deterioration of hides, fish, meat, fruits, vegetables, etc. Sidney Musher (to Musher Foundation Inc.). U. S. 2,176,025, Oct. 10. The materials are treated with a saline soln. and with a cereal flour such as that of maize, oats, wheat, rye or barley. Various examples with details are given.

Containers such as metal cans for holding foods or beverages. William C. Rainer (to Crown Cork & Seal Co.). U. S. 2,175,972, Oct. 10. A metal container is provided with a relatively thin layer of shellac on its inner surface with a thicker layer of wax such as paraffin wax on the shellac coating, the shellac being in sufficient amount to overcome the surface tension differential and congealing force of the wax and to enhance its elasticity during solidification and thereby avoid fractures of the wax coating at the seam and mouth portions of the container.

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

The technical industries of Rhode Island. Willard L. Morgan. *Trans. Am. Inst. Chem. Engrs.* **35**, 779–87 (1939).—The industries of R. I. produce mainly consumer goods and are characterized by wide variety and by the use of highly skilled labor. They originate from the capital derived during the early sailing days and from the application of machinery and water power in the development of the cotton industry which was started in the U. S. in this section. Textile industries are today the dominant activity, with jewelry and machinery following. Chemicals have been subordinant to these industries. The only heavy chem. industry is the Rumford Chemical Co. The manuf. of alkalies in the U. S. was largely brought about by R. I. interests. A review of the labor shows it to be essentially native whites. C. L. Mantell

A new development for promoting the physical-chemical control of technical operations. P. Wulff. *Chem. Fabrik* **1939**, 494–5; cf. *C. A.* **33**, 7621[7].—An outline of the duties and aims of the "Research and Consulting Office for phys.-chem. factory control and laboratory technic." J. H. Moore

The poisonous war gases. Johs. C. Bock. *Arch. Pharm. Chem.* **46**, 567–88(1939). Otto Johnson

Radium poisoning: A review of present knowledge in relation to war risks. J. Read. *Brit. J. Radiol.* **12**, 632–7(1939).—The possibility is considered of a bomb destroying a Ra container and scattering the element, and of persons subsequently ingesting or inhaling lethal doses. The literature on Ra poisoning and on inhalation of dust is reviewed; no new material is presented. Bibliography. E. H. Quimby

Physicochemical properties of poisonous substances used in warfare. G. Gavrilov. *Khimiya i Oborona* **1938**, No. 6, 11–13; *Khim. Referat. Zhur.* **2**, No. 1, 113(1939).—

The following phys. properties of the poisonous substances are described: vapor pressure, volatility, d. of vapors, adsorption by activated charcoal, color, odor, soly., and b. p., together with their significance for war use and for defense from poisonous substances. Chem. stability under storage conditions and in use, ease and velocity of hydrolysis, oxidation by O of the air, reactivity with the usual degasifiers, and the detection and the distinguishing of the poisonous are discussed. W. R. Henn

Chronic exposure to benzene. I. The industrial aspects. Manfred Bowditch and Hervey B. Elkins. *J. Ind. Hyg. Toxicol.* **21**, 321-30 (1939).—The commonly accepted max. allowable concn. for benzene vapor is 100 p. p. m. Also 50% is proposed as the limiting safe urine/sulfate ratio. Based on plant studies, these 2 standards are not correlative. Benzene vapor concn. of 75 p. p. m. is proposed as the max. **II. The clinical effects.** Francis T. Hunter. *J. Ind. Hyg. Toxicol.* **21**, 331-54 (1939).—Eighty-nine individuals exposed to benzene fumes were observed and studied. Ten cases were fatal. Benzene poisoning may produce polycythemia or anemia; leucocytosis or leucopenia; leucemia; eosinophilia, megalocytosis or microcytosis; the presence of immature marrow elements in an otherwise normal blood. Complete blood pictures should be used in the diagnosis of benzene poisoning. Acclimatization to C_6H_6 fumes does not occur. **III. The pathologic results.** Tracy B. Mallory, Edward A. Gall and Wm. J. Brickley. *J. Ind. Hyg. Toxicol.* **21**, 355-94 (1939).—Histologic material from 19 patients (14 autopsies and 5 biopsies) is described. Not merely bone marrow but the entire hematopoietic system characteristically shows changes. Hyperplastic reactions are more common in the male, hypoplastic in the female. A. L. Elder

The hematological effects of benzene poisoning. Lowell A. Erf and C. P. Rhoads. *J. Ind. Hyg. Toxicol.* **21**, 421-34 (1939).—Hematological findings on 9 patients with C_6H_6 poisoning are reported. The increased rate of destruction of erythrocytes may be one cause of anemia of benzene poisoning. A. L. Elder

Benzene poisoning in the rotogravure printing industry in New York City. Leonard Greenburg, May R. Mayers, Leonard Goldwater and Adelaide R. Smith. *J. Ind. Hyg. Toxicol.* **21**, 395-420 (1939).—Benzene poisoning in 3 fast-press rotogravure printing plants in New York City is reported. Concns. of C_6H_6 vapor varied from 11 to 1060 p. p. m. Several cases of poisoning occurred where the concn. was less than 100 p. p. m. The use of C_6H_6 was discontinued in these plants. All men originally exposed are being examd. periodically. Blood studies and urine sulfate detns. are reported. A. L. Elder

The acute and subacute toxicity of morpholine. Thomas F. Shea, Jr. *J. Ind. Hyg. Toxicol.* **21**, 236-45 (1939).—Morpholine is used with fatty acids as an emulsifying agent for polishes, etc. When fed undild., it is a deadly poison. The m. l. d. of dild. morpholine for albino rats is 1.6 g. per kg. Application to the skin damages the secreting tubules of the kidneys. Lung damage is similar to that of ammonia. A concn. of 12,000 p. p. m. in the air is barely tolerable to human subjects. Neutralized morpholine when absorbed through the skin causes no toxic symptoms. Numerous animal expts. are reported. A. L. Elder

Tissue reaction to some carbon arc dusts. E. L. MacQuiddy, J. Perry Tollman, Leroy W. La Towsky and Stanley Schonberger. *J. Ind. Hyg. Toxicol.* **21**, 498-513 (1939).—Some high-intensity carbon arc ashes appear to cause mildly proliferative reactions when injected intraperitoneally in the albino rat. Arc dusts administered by intratracheal and subcutaneous routes in rabbits are relatively inert. The rare earth metal salts, some of the carbon arc ashes, $Ca_3(PO_4)_2$, CuO and CaF_2 appear to be essentially inert. A. L. Elder

Acute poisoning in animals after intraperitoneal and intratracheal administration of dusts. J. Perry Tollman, E. L. MacQuiddy and Leroy W. La Towsky. *J. Ind. Hyg. Toxicol.* **21**, 514-16 (1939).—Injection of certain dusts caused acute death which was due to sol. cupric ion. Intraperitoneal injection of 2.5 mg. of $CuSO_4$ into rats caused death in 1-3 hrs. A. L. Elder

Volatilization of lead below 800°. Paul F. Rezin and Philip Drinker. *J. Ind. Hyg. Toxicol.* **21**, 461-3 (1939).—Significant amts. of Pb are carried off from molten baths. A. L. Elder

Removal of chloropicrin from railroad cars after disinfection. V. I. Efimenko. *Higiena i Sanitariya* **1938**, No. 2, 77-9; *Khim. Referat. Zhur.* **2**, No. 1, 114 (1939).—The method is based on the ability of chloropicrin in alc. to give with sulfates salts of nitromethanedisulfonic acid. It is recommended to burn S (1.5-2 kg./car) and to atomize after 1.5 hrs. denaturated alc. (3-3.5 l./car). The entire treatment takes 36-48 hrs. W. R. Henn

Synthetic resin cements. A. Foulon. *Nitrocellulose* **10**, 205-6 (1939).—A review. E. M. Symmes

The hardening of phenol-formaldehyde resins. II. Franz Hanus, Erich Fuchs and Erich Ziegler. *J. prakt. Chem.* **153**, 327-36 (1939); cf. *C. A.* **33**, 5378[8].—Further evidence establishes the formation of ether bridges as a primary reaction in the resinification of dimethylolphenols. The following were prepd. from CH_2O, NaOH and the corresponding *p*-substituted phenol: *4-ethyl-2,6-dimethylolphenol* (I), m. 85.8-86.6°, *2,6-dimethylol-4-propylphenol*, m. 85.4-85.8°, *4-butyl-2,6-dimethylolphenol* (II), m. 67.0-67.4°, *4-tert-butyl-2,6-dimethylolphenol dialcohol* (III), m. 74-5°. On heating all these lose about 1 mol. H_2O and 0.37-0.5 mol. CH_2O at 100-200°. The temp. at which CH_2O evolution begins is higher the greater the size of the substituent, and is also higher for II than III. The *p-ClH$_3$C$_6$H$_3$SO$_3$H ester* of I m. 130-1° and loses 1 mol. H_2O at 150-90° but practically no CH_2O; the corresponding ester of 4-cyclohexyl-2,6-dimethylolphenol behaves similarly. The *p-ClH$_3$C$_6$H$_3$SO$_3$H ester* of III (impure) m. 140°. A 35% yield of *1-hydroxy-2,6-bis(bromomethyl)-4-cyclohexyl-benzene* (IV), m. 81.8°, is obtained from HBr and the resin formed by the loss of 1 mol. H_2O from 4-cyclohexyl-2,6-dimethylolphenol at 140°; IV is also formed directly from HBr and the dialcohol. The *dibromide* of *2,6-bis(bromomethyl)-p-tolyl p-toluenesulfonate*, m. 122.3-122.5, is obtained either from *p*-cresol dialcohol *p*-toluenesulfonate or from its resinification product formed by loss of 1 mol. H_2O at 204°, by treatment with HBr. A. F. S.

Study of the electric insulating properties of paper boards by the method of rapid aging. Yu. V. Koritskiĭ, A. A. Volkova and B. V. Kossovich. *Bumashnaya Prom.* **17**, No. 8, 27-33 (1939).—Paper boards and condenser paper were subjected to rapid aging in Russian transformer oil and in imported acid-refined mineral oil at 150°. The η and mech. properties were detd. after aging and the results are given in tables and graphs. The boards aged more intensively in oil than in air. The sulfate specimens were most resistant against heat in the oil. B. Z. Kamich

Preparation of adhesives from raw materials obtained in U. S. S. R. V. N. Tsvetkov. *Legkaya Prom.* **1938**, No. 5, 99-109; *Khim. Referat. Zhur.* **2**, No. 1, 105 (1939).—A no. of formulas for new adhesives and for their utilization are given. Addn. to synthetic rubber of 75-200% (of the dry residue) of rosin gives best results. Gas black and MgO give best results as active fillers. Benzene was used as solvent for adhesives from synthetic rubber. Formulas for adhesives prepd. from gutta-percha with rosin are given. Butyl and ethyl acetates were used as solvents instead of the toxic benzene and dichloroethane. W. R. Henn

Importance of chemistry in pest control. R. C. Roark. *Pests* **7**, No. 11, 14-17 (1939).—A review discussing the chemistry of pyrethrum, derris, cube, timbo, F compds., borax, As compds., $TlSO_4$, P compds., tartar emetic, petroleum oils and fumigants. Henry H. Richardson

Unusual pest problems. J. J. Davis. *Pests* **7**, No. 12, 15 (1939).—$Ca(CN)_2$ dust is recommended to eradicate *bees*, *hornets* and *wasps* around and in buildings or carp grounds. Henry H. Richardson

Interesting household pest control problems. P. N. Annand. *Pests* **7**, No. 12, 6-7 (1939).—The problems involved with fumigants, termite-control chemicals and

chemicals used to control insects attacking fabrics, foods and man are discussed. Henry H. Richardson

Test methods for recording moribund kill (given by household sprays). H. E. Whitmire. *Soap* (*Sanitary Products Sect.*) **15**, No. 11, 99, 101, 103, 123 (1939).—The addn. of rotenone and related compds. to household sprays increased the no. of moribund flies present 24 hrs. after spraying because of the slower toxic action of these compds. (*C. A.* **28**, 2837[9]). W. suggests that after flies have been sprayed by the Peet Grady method (*C. A.* 22, 4734) they be placed in an open-top screen cage placed inside another large cage so that dead, moribund and active flies can be more easily sepd. H. H. Richardson

Construction and use of an olfactometer for muscoid flies, and a discussion of interpreting results. Craig Eagleson. *Soap* (*Sanitary Products Sect.*) **15**, No. 12, 123, 125, 127 (1939).—A U-shaped metal tube 15 cm. in diam. is used in testing the attractant or repellant qualities of different chemicals to the house fly *Musca domestica*, stable fly *Stomoxys calcitrans* and screw worm fly *Cochliomyia americana*. The flies are placed in the tube one arm of which is perfused with the vapor of the chemical tested. At regular intervals counts are made of the no. of flies located on the screen at the end of the arms of the U. A formula is given for calcg. the efficiency of the different chemicals. Two references. Henry H. Richardson

The control of rats and mice. Donald A. Spencer. *Pests* **7**, No. 12, 8–9 (1939).—A substitute is needed for Tl because of its high cost and low supply. As_2O_3 ground to particles of 3–5 microns was about 5 times as toxic as standard-size As_2O_3 (passing 100-mesh sieve). Finer grinding of Zn_3P_2 also increases efficiency. High temps. generated in grinding *red squill* will detoxify the powder. Many so-called attractant chemicals used in com. baits are ineffective. Moist baits and fresh foods are usually more effective than dry baits and preserved foods. Henry H. Richardson

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Canister for gas masks. Augustin M. Prentiss. U. S. 2,174,528, Oct. 3. Various structural details.

Oxygen distributor for use with face masks. Frank G. Manson. U. S. 2,174,523, Oct. 3. Various details of an app. with baffles for deflecting O as desired.

Forming articles such as cups, jars or bottles from organic plastic material such as cellulose derivative and synthetic resin compositions. Enoch T. Ferngren (to Plax Corp.). U. S. 2,175,053, Oct. 3. Various details of app. and operation. U. S. 2,175,054 (Enoch T. Ferngren and Wm. H. Kopitke, joint inventors; to same assignee) relates to an app. suitable for forming hollowware from org. plastic material.

Thermoplastic molding powder. Robert V. Townend and Weaver R. Clayton (to Wm. Zinsser & Co.). U. S. 2,175,232, Oct. 10. A molding powder is formed of shellac, ZnO and CaO, MgO or Pb oxide.

Molding thermoplastic materials. Hans Gastrow (to Franz Braun A.-G.). U. S. 2,174,311, Sept. 26. App. is described, and a method suitable for the manuf. of molded articles from materials such as cellulose acetate or polyvinyl compds. which comprises introducing the thermoplastic material to be molded in granular form into a preheating chamber, preheating the material at a temp. lower than that required to produce fusion thereof, the while agitating the same and discharging the granular preheated material into a molding cylinder.

Polyvinyl halide compositions suitable for hot molding. Claude H. Alexander (to B. F. Goodrich Co.). U. S. 2,174,545, Oct. 3. For stabilizing gamma polyvinyl chloride, water glass is incorporated with it on a hot mill, followed by milling until the water has evapd.

Synthetic resins. Israel Rosenblum. U. S. 2,175,215, Oct. 10. An oil-sol. resin suitable for use in coating compns. is produced by treating materials such as amyl phenol about 100 with phenol 100, 100% formaldehyde 94 and the monoglyceride of a drying oil such as that of linseed oil 200 parts (suitably with heating to 150° until an oil-sol. condensate is obtained).

Phenolic-formaldehyde resins. Winfrid Hentrich and Fritz Schlegel (to Henkel & Cie. G. m. b. H.). U. S. 2,175,393, Oct. 10. Condensation products which are suitable for coatings or for molding are produced by condensing a phenol, an olefin such as α-butylene and CH_2O or its polymers, with use of perchloric acid (suitably at 80°).

Resinous products from lactic acid. Paul D. Watson (to the people for free use). U. S. 2,174,491, Sept. 26. A resinous product suitable for use in coating wood, metals, etc., is obtained by a process which involves heating aq. lactic acid in contact with a high-boiling petroleum fraction ranging from 155° to 216°, while distg. off the free and combined water; continuously returning the distd. entraining liquid to the mixt.; sepg. the resulting product from the entraining liquid; adding furfural, glycerol and ethyl alc. thereto, and subjecting the resulting product in substantially thin layers to temps. ranging from 150° to 170° for a period of 2–6 weeks.

Urea-formaldehyde reaction product suitable for casting and molding. Leonard Smidth. U. S. 2,174,535, Oct. 3. A process of producing urea-CH_2O condensation products suitable for casting and molding comprises mixing CH_2O and urea in a molar ratio of 2 to 1.1–1.33, causing the mixt. to react under conditions of a pH value above about 5 which form a cloudy soln., continuing the reaction until the viscosity of the reacting soln. has increased to an extent indicated by an increase in the time of flow of a few sec. from a described standard pipet which period in any case is insufficient to form a clear soln. having hydrophobic properties, then evapg. off the water present under acidity, temp. and time conditions which do not appreciably advance the reaction, until a sample of the material will form a ball in cold water.

Phenolic condensation products. Ludwig Cserny (to Resinous Products & Chemical Co.). U. S. 2,175,793, Oct. 10. A process of producing glass-clear, transparent, light-resistant condenstion products involves condensing a phenol with 1–3 mol. equivs. of CH_2O in the presence of an alkali, acidifying with lactic acid, adding a reactive urea-CH_2O condensation product, and heating to harden completely the mixt.

Stable solutions of urea-formaldehyde condensation products. Oskar R. Ludwig (to Resinous Products & Chemical Co.). U. S. 2,175,475, Oct. 10. A process of prepg. a stable aq. soln. of a urea-CH_2O intermediate condensation product involves heating a neutral aq. soln. of urea and CH_2O in the presence of an amt. of an alk. earth metal chloride chemically equiv. to 3–25% of $CaCl_2$ based on the wt. of urea, until amorphous products of relatively low mol. wt. are formed, and then cooling the mixt. to stop the reaction.

Heat insulation. Wm. S. Wilson (to Monsanto Chemical Co.). U. S. 2,174,770, Oct. 3. Finely divided Si or ferro-Si is used with materials such as silica aerogel.

Electrical insulating compositions suitable for use in transformers, etc. Arthur A. Levine and Oliver W. Cass (to E. I. du Pont de Nemours & Co.). U. S. 2,174,289, Sept. 26. A nuclear chlorinated ethylbenzene contg. 3 to 5 Cl atoms per mol. is used with a nuclear chlorinated isopropylbenzene contg. 4.0 to 4.5 atoms of Cl per mol., which serves as a freeze-point depressant. Cf. *C. A.* **33**, 2254[1].

Composite insulating slabs. Paul S. Denning (to F. E. Schundler & Co.). U. S. 2,175,715, Oct. 10. App. is described, and a method of making an insulating slab from granules of exfoliated vermiculite fiber, and cement wherein the quantity of vermiculite is substantially greater than the quantity of cement, which method is characterized by suspending granules of exfoliated vermiculite together with thin plates or laminae of vermiculite in a cementitious slurry in which the vermiculite is buoyant, the slurry contg. a small percentage of fiber, placing the mixt. in a mold having a perforated bottom, applying suction to draw out the liquid constituent of the slurry, the fiber holding the vermiculite in slightly sepd. condition to facilitate withdrawal of the liquid, the liquid being withdrawn without substantially compressing the vermiculite so as to leave the latter free to arrange its particles with their flat faces generally parallel to the bottom.

Insulating fluids such as oil in pipes around insulated electric cables. Charles E. Bennett (to Okonite-Callender Cable Co.). U. S. 2,174,961, Oct. 3. Various details of app. for automatic pressure regulation.

Apparatus for testing the insulating properties of assembled spark plugs with porcelain insulation. Cleveland C. Soper (to Firestone Tire & Rubber Co.). U. S. 2,175,038, Oct. 3. Various structural, elec. and operative details.

Coating rubber-insulated wires or the like. Charles W. Abbott. U. S. 2,175,099, Oct. 3. App. is described, and a method for continuously applying to a rubber element, like the rubber covering of a conductor, a viscous coating material having volatile constituent and effecting an intimate bond therebetween which involves continuously extruding vulcanizable rubber compn. onto a longitudinally moving conductor, feeding the conductor with the compn. thereon throughout a continuous vulcanizer chamber provided with a suitable heating medium substantially to vulcanize the rubber compn. and to impart to the conductor and its covering a heat content at substantially the temp. of vulcanization, applying to the surface of the rubber covering as it continues to move and while still in heated condition a coating material the volatile constituent of which is substantially instantaneously volatilized by the heat content of the rubber element, withdrawing heat from the rubber covering and conductor prior to applying the coating material to suit the heat content of the rubber covering and conductor to the evapn. characteristic of the volatile constituent of the coating material and thereby detg. the rate of setting of the coating material, and reeling up the rubber-covered conductor with the set coating on the rubber.

Copper wire coated with vinyl resin. Raymond H. Thielking (to Schenectady Varnish Co.). U. S. 2,174,912, Oct. 3. A Cu wire suitable for elec. coils, etc., is provided with a smooth, continuous, flexible, adherent coating comprising the conjoint polymerization product of vinyl chloride and vinyl acetate polymerization to a mol. wt. above 10,000.

Polymerized nitriles. Anderson W. Ralston (to Armour and Co.). U. S. 2,175,092, Oct. 3. See Can. 382,579 (*C. A.* **33**, 8627[7]).

γ-Polyvinyl chloride. Claude H. Alexander (to B. F. Goodrich Co.). U. S. 2,175,049, Oct. 3. A mixt. of this compd., suitable for use as a *dielectric*, is prepd. by incorporating it with PbO and a thianthrene such as 2,6-dimethylthianthrene.

Dielectric benzotrifluoride compositions suitable for use in transformers, etc. Lee C. Holt and Herbert W. Daudt (to Kinetic Chemicals, Inc.). U. S. 2,174,512, Oct. 3. Use is made, alone or in mixts., of compds., such as tetrachlorobenzotrifluoride (which may be made by chlorinating benzotrifluoride and which b. about 247–9°, freezes at about 10°, and has a viscosity of about 35 sec. at 37.8° and a dielec. const. at 25° of about 4.5). U. S. 2,174,513 relates to products obtained by chlorinating benzotrifluoride, with production of a dichlorobenzotrifluoride b 178–180° alone or mixed with related compds. and having dielec. properties. Several examples with details are given.

Waterproof adhesives suitable for general use. Edwin O. Groskopf (to Patent and Licensing Corp.). U. S. 2,175,797, Oct. 10. A substantially odorless, uniformly sprayable and brushable adhesive comprises an aq. emulsion contg. approx. 40–45% of an adhesive thermoplastic material, approx. 0.8 to 1.2% of soap as the emulsifying agent for the thermoplastic material, approx. 1.3% of clay whereby to inhibit flow under heat of a dried film deposited from the compn. without impairing the rapid setting properties of the wet film, and approx. 6 to 9% of rubber in dispersed form whereby to impart elasticity and increased bonding strength to the dried film of the compn., said thermoplastic material consisting of approx. equal parts by wt. of asphalt not readily miscible with rubber and a material selected from the group consisting of cumar resin, albino asphalt and asphalts low in asphaltenes whereby to render the first-named asphalt component of the thermoplastic material miscible with said rubber.

Adhesives and sizings from seed meals such as peanut or soy bean meal. John F. Corwin and Henry V. Dunham. U. S. 2,174,438, Sept. 26. A readily dispersible adhesive base is prepd. by dissolving matter from a seed meal in an alk. soln. such as one of NH_3 or borax, sepg. insol. matter from the soln., and evapg. the soln. to substantial dryness.

Thermoadhesive compositions suitable for use on paper tapes, etc. Ernest L. Kallander (to Dennison Mfg. Co.). U. S. 2,174,885, Oct. 3. Thermoadhesive compns. comprise a polyvinyl resin having a softening point of about 65°, shellac having a softening point of about 70° and a fluxing resin having a softening point falling within a range of about 32–54°, the polyvinyl resin, shellac, and fluxing resin all being compatible and being present in the compn. in approx. the proportions of 60, 20, and 20, resp., to impart to the compn. a softening point of about 57°, and the fluxing resin being prepd. by condensing derivs. of the terpene series with polycarboxylic acid and esterifying with polyhydric alc. Cf. *C. A.* **33**, 3926[1].

Sound-deadening adhesive suitable for use with pads of vehicle bodies. Joseph A. Torri (to J. W. Mortell Co.). U. S. 2,175,767, Oct. 10. A noninflammable, sound-deadening adhesive, adapted to secure pads to sheet metal, contains Na silicate approx. 60, emulsified asphalt 12 and an inert filler such as clay 28 parts.

Solid solution of acetates of sugars. Victor Walthausen and Lylla R. Metry. U. S. 2,174,541, Oct. 3. By acetylating a partially dried invert sugar sirup, an *adhesive* is produced comprising a solid soln. contg. sucrose octa-acetate 20–80 and invert sugar penta-acetates 80–20 parts. Such an adhesive does not readily discolor and is relatively nonbrittle.

Wetting agents, etc. Alfred W. Baldwin, Henry A. Piggott, Francis S. Statham and Imperial Chemical Industries Ltd. Brit. 508,477, June 28, 1939. Sulfonated derivs. of amidomethyl compds. having the formula $RCONHCH_2R'OR''$, where R is an aliphatic radical having at least 8 C atoms, R′ is a radical of the C_6H_3 or $C_{10}H_3$ series and R″ is H or a radical of the aliphatic, aliphatic-aromatic or aromatic series, are prepd. by (1) direct sulfonation of the parent amidomethyl compd., (2) reaction of a sulfonated phenol or phenol ether with CH_2O and an amide of formula $RCONH_2$ or with the methylol deriv. of such an amide, or (3) reaction of a phenol or phenol ether, simultaneously with a sulfonating agent and a methylol compd. of an amide of formula $RCONH_2$ or a mixt. of such an amide with CH_2O. Among examples, (1) stearohydroxybenzylamide, prepd. by condensing stearohydroxymethylamide (I) with PhOH by means of $ZnCl_2$, is sulfonated with $H_2SO_4.H_2O$, (2) laurohydroxymethylamide is condensed with Na 2-naphthol-3,6-disulfonate by means of $ZnCl_2$ in glacial AcOH, and (3) I is condensed and sulfonated with anisole.

Menthane derivatives. Joseph L. Richmond (to E. I. du Pont de Nemours & Co.). U. S. 2,174,505, Sept. 26. By treatment of menthane with a gaseous mixt. of SO_2 and Cl (suitably at 30–80° with exposure to actinic light), compds. are obtained such as menthanedisulfonyl chloride, *useful as wetting agents* and for other purposes.

Treating liquid alkanes with sulfur dioxide and chlorine. John M. Tinker and Arthur L. Fox (to E. I. du Pont de Nemours & Co.). U. S. 2,174,507, Sept. 26. A liquid alkane contg. 5 to 12 C atoms (such as C_6H_{14} or C_7H_{16} for the production of *mercerizing assistants*) is treated with admixed gaseous SO_2 and Cl at a temp. below the decompn. point of the formed hydrocarbon sulfonyl chlorides. U. S. 2,174,508 (Arthur L. Fox, sole inventor; to same assignee) relates to treating a normally nongaseous branched chain satd. aliphatic hydrocarbon (such as isooctane for the production of a *mercerizing assistant*) with a gaseous mixt. of SO_2 and Cl (suitably at 40°). U. S. 2,174,509 relates to reactions such as that for the production of a disulfonyl chloride from cyclohexane by treatment with admixed SO_2 and Cl. Numerous uses of the products of these patents and their derivs. are specified, as *wetting*,

emulsifying, weed-killing, fungicidal, lubricating or *tanning agents.*

Reaction of alicyclic hydrocarbons with chlorine and sulfur dioxide. Arthur L. Fox (to E. I. du Pont de Nemours & Co.). U. S. 2,174,506, Sept. 26. For effecting reactions such as the production of sulfonyl chloride derivs., etc., an alicyclic compd. such as dodecylcyclohexane is treated with a gaseous mixt. of SO_2 and Cl. Numerous examples for producing *wetting agents*, etc., are given.

Condensation products suitable for textile treatments, etc., and derived from carboxylic acids. Hermann Schuette and Max Wittwer (to I. G. Farbenind. A.-G.). U. S. 2,174,760, Oct. 3. By the reaction of stearic acid or various other carboxylic acids under pressure successively with reagents such as ethylene oxide and propylene oxide (suitably at 130–140°), products are obtained suitable for use as *wetting, washing, dispersing, leveling,* or *softening agents* or the like in the textile, paper, lacquer, leather, rubber or other industries or in cosmetics or pharmaceutical prepns. U. S. 2,174,761 relates to condensation products which may be produced by heating hydroxy compds. such as cetyl alc. or dodecyl alc. successively with ethylene oxide and propylene oxide, with or without subsequent treatment with a sulfonating reagent. U. S. 2,174,762 relates to the production of condensation products, for various like uses, by treating an amine such as dodecylamine or cetyl amine, successively, with reagents such as epichlorohydrin and propylene oxide or with propylene oxide and ethylene oxide. Numerous uses of the products are mentioned.

Sodium silicate detergents. Walter S. Riggs and Clarence W. Burkhart (to Pennsylvania Salt Mfg. Co.). U. S. 2,175,781, Oct. 10. A process of making a Na silicate-contg. product capable of use as a detergent comprising a reaction product whose mol. ratio of Na_2O to acidic oxide is from approx. 1:1 to 2:1 comprises mixing together, in the absence of sufficient water to dissolve a substantial portion of the reactants, a Na sub-silicate contg. a higher mol. ratio of Na_2O to acidic oxide than 1:1 and higher than that of the product desired, and a Na compd. selected from the group consisting of water glass, $NaHCO_3$, NaH_2PO_4, Na_2HPO_4, a Na borate having a mol. ratio of B_2O_3 to Na oxide greater than 1:1, the reactants being present in such mol. proportions that the ratio of Na_2O to acidic oxide of the reactants in the reaction mixture is approx. from 1:1 to 2:1, and treating while stirring the mixt.

Polyamides suitable for use in coatings, etc. Wallace H. Carothers (to E. I. du Pont de Nemours & Co.). U. S. 2,174,619, Oct. 3. From initial materials such as fumaric acid and decamethylenediamine and the like there are obtained (suitably by heating with phenol at 150–160° and vacuum distn. of the phenol) polymeric reaction products of compds. consisting substantially solely of equimol. proportions of bifunctional polyamide-forming reactants the sum of whose radical lengths is at least 9, the amide-forming groups in the reactants being attached to aliphatic C atoms, at least one of the reactants contg. an unsatd. C—C linkage of the nonbenzenoid type in the chain sepg. the amide-forming group. Numerous examples are given.

Bonded carbon articles. Edwin F. Kiefer (to National Carbon Co.). U. S. 2,174,886, Oct. 3. Molded carbon members are bonded with a cement contg. essentially a resinified deriv. of furfuryl or furfural alc. or their mixts. U. S. 2,174,887 relates to baked carbon articles such as parts of chem. app. the pores of which are substantially filled by a similar resinified product.

Saturated gaskets of paper or the like. Leon E. Hoogstoel (to Behr-Manning Corp.). U. S. 2,175,773, Oct. 10. App. is described, and a method of making gaskets of predetd. size and shape from paper-like webs including cellulose fibers in an amt. to cause the webs to change dimensions upon satn. with a binder soln. which swells cellulose, comprising satg. the web. with a binder soln. contg. a flexibilizing agent, and a material selected from the classes consisting of bone glues, hide glues and casein, drying the satd. web to produce a satd. web at least the cross dimension of which differs substantially from the same dimension of the untreated web, cutting gaskets of definite predetd. size and shape therefrom and subsequently tanning the binder within the gaskets so cut to produce gaskets of the same size and shape as the gaskets cut from the untanned web whereby the satg. materials in the waste remain untanned and may be recovered for reuse and whereby the scrap paper may be reprocessed. Glycerol or sorbitol may be used as the flexibilizing agent. Cf. *C. A.* 33, 2252[5].

Saturated paper gaskets. Elmer C. Schacht and Nicholas E. Oglesby (to Behr-Manning Corp.). U. S. 2,175,774, Oct. 10. App. is described, and a process of making satd. paper gaskets of definite size and shape from paper contg. cellulose fibers in an amt. which will cause the paper to change dimensions upon satn. comprises swelling the paper to a degree controlled in accordance with the characteristics of the paper and the binder used for satn. thereof, cutting a blank from the paper in such a swollen condition and subsequently satg. the blank with a binder contg. an agent which swells cellulose whereby the final dried satd. article has substantially the same shape and the same dimensions in the plane of the paper as the pre-cut blank. The binder used may comprise a soln. contg. glue and sorbitol. Cf. *C. A.* 33, 2252[5].

Friction facing suitable for clutches. Morton F. Judd (to Raybestos-Manhattan, Inc.). U. S. 2,175,399, Oct. 10. App. is described, and a method of forming a friction element suitable for a clutch facing, which comprises, convolutely winding a composite strip comprising a thickness of nonwoven fibrous material and a thickness of woven textile fabric, the strip being impregnated with a thermoplastic heat-hardenable binder compn., shaped to provide longitudinally extending recessed and projecting portions on the opposite sides of the strip; and wound coils of interesting relationship to form an annular body while maintaining the textile fabric thereof in outward formation and subjecting the body to heat and pressure to consolidate it and harden the binder thereof.

Molded friction materials suitable for brake and clutch facings, etc. Wm. Nanfeldt (to World Bestos Corp.). U. S. 2,175,480, Oct. 10. Asbestos fiber, PbO, albumin and friction materials such as PbO are used together.

Stabilizing glue, casein and other protein materials. Sidney Musher (to Musher Foundation Inc.). U. S. 2,176,038, Oct. 10. To inhibit decompn., the materials (such as sizing for paper, etc.) are mixed with an unbleached cereal flour such as oat flour or an ext. contg. water- or alc.-sol. antioxygens.

Preserving oxidizable substances. United States Rubber Products, Inc. Brit. 508,442, June 30, 1939. *Rubber, unsatd. fatty oils, essential oils, petroleum oils* and *their derivs.* such as *gasolines, soaps, aldehydes* and *synthetic resins* are preserved by incorporation therein of a small proportion, e. g., 0.1–5%, of a compd. of formula RNHR′-NHY, where R is an aryl group, R′ an arylene group and Y a COOH radical the H atom of which is replaced by an alkyl, aryl or aralkyl group, which may be substituted or unsubstituted. The compds. may be formed by the interaction of a primary-amino-substituted diarylamine and a chlorocarbonic ester. In an example, *p*-aminophenyl-*p*-tolylamine in alc. soln. is treated with Et chlorocarbonate in the presence of AcONa to yield *p*-(*p*-tolylamino)phenylurethan.

Chloromethyl compounds of sulfonamides. I. G. Farbenindustrie A.-G. Brit. 508,794, July 4, 1939. A sulfonamide that has at least 1 exchangeable H atom at the amide N and also contains a hydrocarbon radical having at least 4 C atoms, which may contain substituents and (or) may be interrupted by at least 1 O, S or N atom, is caused to react with CH_2O or a polymer thereof and HCl at ordinary or raised temp., or HCl is caused to react with a methylol compd. obtained by the reaction of CH_2O or a polymer thereof with a sulfonamide as defined above. The products may be used for the *treatment of textiles, leather, paper, plastic masses,* etc. Among examples, (1) octadecylsulfonamide (obtainable by the action of liquid NH_3 on octadecylsulfonyl chloride) is dissolved in methylene chloride, paraformaldehyde (I) is added and HCl intro-

ed into the cold soln., (2) p isododecylcyclohe oil is
lensed with Na chloroeth ulfonate, the product
eated with PCl_5 and then with liquid NH_3, and the
lting sulfonamide is caused to react with I and HCl in
), and (3) octadecylsulfonomethylolamide is treated
HCl in methylene chloride.

luminum sound records. Junius D. Edwards (to
ninum Co. of America). U. S. 2,174,720, Oct. 3.
und-recording blank comprises an Al disk coated with a
y acid having lubricating properties such as ricinoleic
(which may be mixed with mineral oil).

Removing enamel from enameled articles. Max Zimmermann and Werner Funke (to I. G. Farbenind. A.-G.). U. S. 2,174,454, Sept. 26. For removal of the enamel, enameled articles are subjected to the action of an aq. soln. of HCl and H_2SO_4 in about equal amts. (suitably about 20% each) at a temp. of about 20–30°.

Smoke-screen materials. James F. Booker and Roger L. Annis (to Intermetal Corp.). U. S. 2,175,790, Oct. 10. $TiCl_4$ or $SnCl_4$ is used in chem. combination with a S chloride and with a substantial excess of one of the chlorides.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

ifty years of water-works advance. M. N. Baker. . *News-Record* **123**, 617–18(1939).—Conditions are pared in regard to the no. of water-works systems, no. of water- and sewage-treatment plants and the noid death rate. R. E. Thompson

iltered water for Chicago. Loran D. Gayton. *Eng. s-Record* **123**, 682–5(1939).—In the 320-million gallon day filter plant now under construction, there will be filters and the sedimentation tanks will be 32.5 ft. , with intermediate settling floors at half the depth. mixing period will be 45 min. and the settling period s. If acid-treated Na silicate is employed to strengthen floc, av. filtration rates of 2.5 gal. per sq. ft. per min. inter and 3 gal. in summer, with max. of 3 and 4 gal., ., may be employed: otherwise, the av. and max. s should not exceed 2 and 2.5 gal., resp. The water l for continuous sludge removal and for filter washing be reclaimed. A surface-washing system will be pro- d. R. E. Thompson

hanghai (China) Waterworks Co., Ltd., Annual Re-, 1938. W. P. Rial. 53 pp.(1939).—The av. daily sumption was 46.36 million gallons. The turbidity of Whangpoo River water was reduced from an av. of to 20 p. p. m. with an av. dose of 0.91 grain per gallon lum. All the water applied to the rapid sand filters prechlorinated, the av. dosage being 1.01 p. p. m. he total output, 29% was from the slow sand plant and 6 from the rapid sand plant. The av. rates of filtration e 1.71 and 100 gallons per sq. ft. per hr., resp. The no. of days between the cleaning of the slow sand units 16.56 and the water used for washing the rapid sand rs averaged 2.59%. Larvae of *Diptera chironomus* in appeared in the effluent of some of the rapid sand rs (cf. *C. A.* **32**, 7621[6]) and their presence was corred with an increase in the effective size of the sand. Reing the effective size by adding fresh sand corrected the ible. In addn. to prechlorination, 0.35 p. p. m. Cl applied to the rapid sand filter effluent and 0.24 p. p. at the main engines. Consumers' complaints regarding er quality numbered 27, 7 of which referred to palata- y. Of 1509 samples of water from the distribution em examd. for *B. coli*, 95% were neg. in 100 cc., 3.8% in 100 cc., 0.7% in 10 cc., 0.4 in 1 cc., and 0.1 in 0.1 The cost of steam per 1000 lb. was $1.6653 and B. t. u. sumed per lb. of steam produced averaged 1828. The cost per million B. t. u. was $0.73. R. E. T.

lkaline ground water of slight hardness at Bucharest. is Stanisavlievici. *Gas- u. Wasserfach* **82**, 697–700 39).—The analyses of waters contg. Na_2CO_3 which oc- in London, East Prussia and Westphalia are given and trasted with that of a deep artesian well at Bucharest. latter water was well adapted for drinking, process boiler feed water. Wells sunk within city limits re- e strict supervision to ensure satisfactory bacteriol. lity, but are very desirable in case of air raids. R. W. Ryan

olloidal substances in natural waters. M. A. Kulakov. *l. acad. sci. U. R. S. S., Sér. géograph. géophys.* **1938**, 1, 73–91; *Khim. Referat. Zhur.* **2**, No. 2, 26(1939).—content of the colloidal substances in water was detd. the method of ultrafiltration. In Lake Baikal and its tributaries the colloid content varied from 8×10^{-5} to 136×10^{-5}%, and in the Leningrad lakes from 5×10^{-5} to 103×10^{-5}%. Usually the natural waters contain more org. colloids (humic substances) than inorg. colloids. The soln. of electrolytes is the dispersion medium, and such compds. as SiO_2, $Fe(OH)_3$ and $Al(OH)_3$, and the humic substances are the dispersed phase. The sources of colloids in the hydrosphere (weathering, the action of tides, the breaking up of rock formations in the channel, formation of colloidal $Fe(OH)_3$ by the hydrolysis of the Fe salts, etc.) and the significance of the colloidal-chem. properties of natural waters in chem., phys. and hydrological investigations are discussed. W. R. Henn

Expression of the results of chemical analyses of well waters and a method of analysis. V. I. Malyshev. *Azerbaĭdzhanskoe Neftyanoe Khoz.* **1938**, No. 7–8, 15–17; *Khim. Referat. Zhur.* **2**, No. 3, 79(1939).—The alky. of water should be expressed in 4 components: bicarbonates, carbonates, org. acids and the borate compds. Only the gravimetric method can be used for the detn. of sulfates. All results of analyses must be converted to percentage by wt. W. R. Henn

Electrometric determinations of the oxidation-reduction potential in water wells. T. I. Nekhotenova. *Microbiology* (U. S. S. R.) **7**, No. 2, 186–97(1938); *Khim. Referat. Zhur.* **2**, No. 2, 68–9(1939).—The usual methods used for the detn. of the O content (Winkler), of the oxidation ability and of the biol. requirements for O are not sufficient for the characteristics of the oxidation-reduction conditions of the medium which contributes to the development of bacteria. Simple electrometric cells are proposed which are lowered directly into the well for the measurement of the p. d. on a Pt electrode (immersed in the water under investigation) relative to the calomel electrode. The app. was tested on tap water, well water and on a room aquarium. A const. p. d. value in waters with an established O equil. (aquarium) is obtained almost instantly, and in 1–4 hrs. in samples of fresh water. The values of E_h obtained in different river waters at different depths and at different points varied from 0.1356 to 0.5307. Parallel detns. of pH, O_2 (according to Winkler), O consumption and H_2S were made. The proposed method gives a new empirical means of detn. of the biol. conditions existing in a given well. W. R. Henn

The physical-chemical state of the hot springs at Monfalcone. Bartolomeo Doro. *Ann. chim. applicata* **29**, 374–80(1939); cf. *C. A.* **33**, 8863[8].—The observed f.-p. lowering, 0.777°, of these waters does not agree very well with the value calcd. by applying the theory of Debye and Hückel, 0.674°, based on the coeff. of activity of the waters. A. W. Contieri

Manganese in a thermal spring in West-Central Utah. Eugene Callaghan and H. E. Thomas. *Econ. Geol.* **34**, 905–20(1939).—The Abraham Hot Spring has a total discharge of over 1200 gallons a min. at temps. as high as 182°F. Five complete analyses of these alk. waters show about 3900 p. p. m. dissolved solids, high in Na, Ca, Cl and sulfate. The dome built by the spring contains seams about a ft. thick, from which 715 tons of ore averaging 20% Mn was mined. The seams consist chiefly of pyrolusite, psilomelane, limonite and calcite. The present Mn

content of the waters is 0.3 to 1.2 p. p. m. and the Mn deposition must have constituted a distinct episode in the history of the spring. The source of the Mn is unknown. An analysis of the ore is given; the high BaO content (4.3%) is noteworthy. Michael Fleischer

Routing nightmares of water conditioning. R. E. Hall, E. P. Partridge and T. H. Daugherty. *Mech. Engr.* **61**, 715–21 (1939).—Suggestions for the prevention of cracking in upper tube ends of boiler water tubes are, maintenance of the sulfate:alky. ratio above 3, maintenance of an equally important Cl:alky. ratio (value not given), feeding of lignin or certain of the tannins, or sulfite waste liquors if obtainable. The design and construction of the boiler should be checked to make certain that no portions of drum or tubes are supported by other than intended means. The formation of steam line and turbine deposits may be caused by fog carryover resulting from too great velocity of steam and water as it is discharged from the steam cross-over tubes into the steam take-off drum. Installation of addnl. cross-over tubes reduces this steam velocity. New boilers can be effectively and rapidly cleaned from grease, etc., by use of 3 lb. of Calgonite (40% $NaPO_3$, 15% $Na_3PO_4.H_2O$, 40% Na metasilicate pentahydrate, and 5% NaOH), 0.6 lb. of NaOH, and 0.1 lb. of dispersive tannin per 1000 lb. water. The use of 2 lb. of Na hexametaphosphate per million lb. of raw water is effective in prevention of scale in condensers. Na Al silicate scale formation can be prevented by removal of the Al portion from the feed water. Treatment with CO_2 to lower the pH value to 7, at which the alumina will ppt. out, is recommended. This ppt. can then be filtered from the water. Desuperheating should be carried out by addn. of only so much water that it will not be entirely evapd. and thereby prevent scale or ppt. formation at the point of evapn. H. E. Messmore

Comparison of MacConkey's broth and standard lactose broth as media for detection of coliform organisms in water. M. H. McCrady. *Am. J. Pub. Health* 29, 1250–7 (1939).—The MacConkey presumptive (presence of gas within 48 hrs.) did not prove to be, in general, a satisfactory indication of the presence of coliform organisms. False presumptives (or at least presumptives from which such organisms were not isolated by means of the usual complete confirmation procedure) constituted 2, 20, 39, and 40% of all MacConkey presumptives encountered by the Maryland, Quebec, Toronto and New York labs., resp. Complete confirmation of MacConkey presumptives yielded about as many coliform isolations as did like confirmation of the larger no. of lactose broth presumptives, or of brilliant green bile confirmatory gas pos. The economy in no. of presumptives to be confirmed obtained through the use of MacConkey broth, however, did not appear to surpass that which was secured in a previous study, through the use of a fuchsin broth (cf. *C. A.* **32**, 1370[8]). The effect of inhibiting agents employed in these 2 media upon coliform organisms that may be contained in finished waters has yet to be detd. On the whole, the procedure employing lactose broth and confirmation (gas only) in secondary brilliant green bile appeared to yield more satisfactory results than the other procedures. In the Toronto lab., a no. of false positives were encountered in brilliant green bile as well as in MacConkey broth; but there also the procedure employing brilliant green bile, whether or not followed by complete confirmation, proved to be as satisfactory or more so than that in which MacConkey broth was used. Eight references. J. A. K.

A sewage-works laboratory facilitates operation. Norman J. Howard. *Eng. Contract Record* **52**, No. 42, 18–19, 30 (1939).—A general discussion. R. E. T.

Gas hazards in sewerage systems. A. T. Byram. *Eng. Contract Record* **52**, No. 42, 26–8 (1939).—Means of avoiding explosions and gas hazards in sewers and sewage-disposal plants are discussed. R. E. Thompson

Methane from sewage. The Croyden plant. J. P. Lawrie. *Chem. Products* **2**, 155–6 (1939); cf. *C. A.* **33**, 8869[9].—At the Beddington Sewage Works and Farm of the County Borough of Croyden serving a population of 330,000 the total dry-weather flow of sewage is approx. 11½ million gals. daily and the total wet sludge treated amounts to about 300 tons per day. This is utilized on farm land, at the av. rate of 2 lb. of wet sludge per sq. yard per day. This dries in 2 weeks during favorable weather and is then ploughed in. The cost of disposing of the digested sludge on land amounts to 2.008 pence per ton. The sewage-treatment plant includes sedimentation tanks, 3 processes of biol. type, percolating filters and a battery of 6 cork-insulated digestion tanks with a gross capacity of nearly 4,000,000 gals., giving a digestion period of 8 weeks. One heater is arranged to each pair of tanks and the sludge is circulated and heated to 79–85°F. There is a sep. gas holder of sufficient capacity to cover the periods of min. gas evolution. The gas produced contains CH_4 69%, CO_2 30%, B. t. u. 690 gross. The quantity of CH_4 produced is 300,000 cu. ft. daily. Leopold Scheflan

Power from sludge gas at Albuquerque. W. W. Wheeler. *Eng. News-Record* **123**, 842–3 (1939).—The new 5-million gal. per day sewage-treatment plant consists of revolving screens of the comminutor type, machines for feeding lime and chlorinated copperas or other coagulants, a flocculating basin equipped with revolving paddles, a clarifier with sludge-removing and scum-skimming mechanisms, 3 trickling filters contg. 6 ft. of crushed gravel, primary and secondary sludge-digestion tanks and drying beds. The sludge gas is used in a gas engine connected to an elec. generator, in the lab., and for heating purposes. The jacket water from the engine is circulated through the primary digestion tank and the flocculation basin. The cost of the plant was $233,500. R. E. Thompson

The problem of (sewage) sludge disposal. Wm. Raisch. *Eng. Contract Record* **52**, No. 42, 34 (1939).—A brief discussion, with particular reference to incineration. R. E. Thompson

Relation of industrial wastes to sewerage problems. Darwin W. Townsend. *Eng. Contract Record* **52**, No. 42, 36, 38 (1939).—A discussion of the effects of industrial wastes on sewers, sewage works and treatment processes, their admission to or exclusion from sewer systems and pretreatment of specific types of wastes prior to admission to sewers. R. E. Thompson

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Purification of wash waters in flour mills (Girshson) **12**. Softening of water in the production of rayon (Burlakov) **23**. Manuf. of alum, ferric sulfate and Na aluminate (Abbiati) **18**. Problem of org. manuring—possibilities of town refuse (Tripp) **15**. Detection of sugar in feed water (Trœje-Brieg) **28**.

Proportioning device (suitable for use in treating boiler feed water with scale-reducing substances, etc.). Emil J. Formhals (to Formhals Engineering Co.). U. S. 2,174,784, Oct. 3. Various structural and operative details of a device for proportioned measuring and pumping.

Thickening sewage sludge. John R. Downes and Thomas R. Komline. U. S. 2,174,873, Oct. 3. An arrangement of app. is described, and a method of thickening sewage sludge which involves freezing it, thawing the frozen sludge and draining off water released by the freezing and thawing.

Marine type pressure separator for separating oil from oil-polluted water. Edward W. Green and Geo. R. Unthank. U. S. 2,175,563, Oct. 10. Various structural details.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

The humification reactions occurring in composting straw. L. Schulte. *Bodenkunde u. Pflanzenernahr.* **14**, 297–322(1939).—In practical scale expts., soaked cut straw with 0.7 or 1.4% dry wt. N as $CaCN_2$ or $CO(NH_2)_2$ + CaO was packed solidly or loosely for initial heating to 60–70° and then compacted in tight pits of 8.8 cu. m. capacity. After a total storage period of 8–9 months, examn. of the material indicated: Total loss in wt. was about 10% greater with the initial hot fermentation, and slightly less with the larger than with the smaller addn. of N. AcBr-insol. humus formation was apparently a little greater with the single addn. of N and hot fermentation, but when corrected for abs. values immediate compaction resulted in the greatest net formation of humus. Some slight differences in humus combinations with the 2 Ca carriers were apparent, but colorimetric studies indicated that in all cases only the brown humic acid type was present. The expt. was inconclusive in other respects, but in general the indications from similar work (cf. *C. A.* **32**, 9375[1]), that heating is undesirable and losses are smaller but less humus is formed with the greater addn. of N, are substantiated. Seventeen references. C. J. S.

Evaporation of moisture from soil in large lysimeter pots. P. L. Gow. *Hawaiian Planters' Record* **43**, 287–90 (1939). K. D. Jacob

Report of the chemistry section. R. E. R. Grimmett. *New Zealand Dept. Agr., Ann. Rept.* **1938-39**, 67-71; cf. *C. A.* **33**, 3051[7].—*Co investigations.* Samples of New Zealand ultrabasic magnesian rocks contained 67–115 p. p. m Co. Certain North Auckland soils assocd. with Co-deficient pastures contained up to 10 p. p. m. total Co, but the Co present was relatively insol., even in strong acid. Typical limestones contained 0.2–5.1 p. p. m. Co. The av. Co content of the livers of bush-sick sheep was about 0.04 p. p. m. or less, but for healthy animals more than 0.1 p. p. m. A similar difference was observed for cattle. There was no evidence of Cu deficiency assocd. with bush sickness in the North Island. *Arsenic in the Reporoa district.*—Representative samples of soil to 9-in. depth in pasture lands contained 0.0008–0.525% As. Mud deposits contained 0.0068–1.9% As, either as sulfides or in combination with Fe in impure limonite. In 39 samples of water from springs, streams and surface depressions the As_2O_3 content ranged from a trace to 2.6 grains/gal. *Chem. control of ragwort.*—$NaClO_3$, either as a spray or as lime-chlorate dust, was more effective in killing the roots of ragwort when it was applied in wet weather than in dry periods and winter applications seemed to be more effective than those made at other seasons. The treatment did not prevent the germination of seeds that were already on the ground. Applications of 300 lb. or more per acre caused a reduction in the clover and an increase in the Yorkshire fog on the plots. Injections of chlorate into the soil or applications on the soil surrounding the plants were not as effective as those applied to the foliage in the usual way. K. D. Jacob

[Report on] chemistry. N. Craig. *Mauritius Dept. Agr., Ann. Rept. Sugar-Cane Research Sta.* **8**, 33–46 (1937)(Pub., 1938); cf. *C. A.* **32**, 1031[7], 1032[1].—In tests on a series of normal *Mauritius soils*, negligible differences in pH values were obtained by the collodion bag and the Kuhn colorimetric methods. With the Volk-Truog method (cf. *C. A.* **28**, 5570[1]), 2 successive 5-min. extns. using 225 cc. *N* NH_4OAc for each extn. to each 30 g. soil extd. 98% of the total exchangeable K, whereas a 5-min. treatment with double the quantity of NH_4OAc extd. only 82%. The Truog method (cf. *C. A.* **31**, 6795[1]) gave low results for available P in highly laterized, immature soils that were rich in org. matter, because of failure of the method to dissolve org. P compds.; Dyer's citric acid method and Hance's (cf. *C. A.* **31**, 7161[2]) rapid chem. method gave higher results on such soils and Hance's method was preferable because it was easier and quicker in operation. The immature, sugar-cane soils of Lallmatie and Bon Accueil are deficient in available P, very low in exchangeable K and exceptionally high in org. matter (16.2–20.5%). In preliminary expts., chem. analysis of the leaves of the growing plants gave promise as a method for the detn. of the *fertilizer requirements of sugar-cane soils.* K. D. Jacob

Report of the agricultural chemist. E. H. Gurney. *Queensland Dept. Agr. and Stock, Ann. Rept.* **1936–37**, 94–109; cf. *C. A.* **31**, 5419[4].—Mech. and chem. analyses and properties of numerous samples of *Queensland soils* are tabulated, as well as chem. analyses of numerous samples of *Queensland pasture grasses, roughage, herbage, sorghum seed and shrubs. Ibid.* **1937-38**, 130–44.—Analyses of soils, pasture grasses, roughage, herbage, shrubs and *grains* are given. Figures on the *seasonal fluctuations of HCN in several varieties of Queensland plants* are tabulated. K. D. Jacob

The effect of lime and of drilling superphosphate on soils on which subterranean clover does not thrive. E. F. Fricke. *Tasmanian J. Agr.* **10**, 110–19(1939).—Pot cultures with soils on which subterranean clover did not thrive showed that the majority of these soils responded to treatment with com. lime and to superphosphate close to the seeds as in drilling. Lack of response to lime in the first yr. may be followed by a large response in the second or subsequent yrs. J. R. Adams

A lysimeter study of losses of applied potash by leaching from an acid soil. P. L. Gow. *Hawaiian Planters' Record* **43**, 263–76(1939).—In ratoon sugar-cane pots, K applied as either neutral salt or carbonate was not leached to any serious extent. When K was applied to cane pots at the same time as $(NH_4)_2SO_4$, the leaching of K was not significantly greater than that which occurred when the application of K was delayed until after nitrification of the $(NH_4)_2SO_4$ had taken place. Somewhat lower losses of K were indicated in uncropped pots which did not receive K until after nitrification had occurred. No important conservation of K was gained by the use of K_2CO_3 in cane pots, but lower losses of K were indicated by the use of K_2CO_3 in uncropped pots. Retention of applied K by an acid soil in the absence of vegetation was poor, but in the presence of cane was very good, indicating highly efficient uptake of K by ratoon cane. Seriously increased loss of K by leaching as a result of long-continued use of acid-forming fertilizers appears unlikely to occur in soils cropped to cane. K. D. Jacob

Soluble phosphoric acid in soils fertilized with phosphates and treated with steam. P. N. Koshel'kov. *Trudy N. I. U. I. F., Sbornik "Fosfor. Udobr. i ikh Kachestva"* No. **141**, 261–77(1938); *Khim. Referat. Zhur.* **2**, No. 2, 98(1939).—The changes in the water-sol. P_2O_5 taking place when the soil is fertilized with different phosphates (superphosphate, phosphorite, phosphate of Fe) and when it is treated with steam were investigated. The soly. curves of P_2O_5 and the method of the hot dialysis and electrodialysis at different ratios of soil to water were used. Besides P_2O_5 the amt. of Ca in the soln., the elec. cond. and the dry residue were detd. The decrease of the P_2O_5 content is connected with the increase of the dispersion ability of the soil when treated with steam. The mol.-dispersed form of P_2O_5, which passes into the ultrafiltrate (through the collodian sack), and the colloidal peptized form of P_2O_5 (not passing through the sack) are differentiated by different assimilation. W. R. Henn

Availability to plants of phosphoric acid of the difficultly soluble phosphates in saline soils. E. I. Ratner. *Trudy N. I. U. I. F., Sbornik "Fosfor. Udobr. i ikh Kachestva"* No. **141**, 239–55(1938); *Khim. Referat. Zhur.* **2**, No. 3, 64–5(1939).—The mobility of P_2O_5 of $FePO_4$ and of $AlPO_4$ increases considerably with the increase of the percentage content of exchangeable Na. The mobility of P_2O_5 of the phosphorites changes very little on increase of Na in the soil. The effect of exchangeable Na on the mobility of P_2O_5 of the phosphorite in chernozem is consider-

ably greater than in saline soils. With a high content of exchangeable Na in chernozem the mobility of P_2O_5 of apatite increases, but the satn. with Na decreases the quality of the soil as a medium for the growth of plants. On poor humus horizons of saline soils a noticeable increase of the soly. of P_2O_5 of phosphorite takes place only after substitution of 40% of the total exchangeable bases by Na. In saline soils the P_2O_5 in the phosphates of the sesquioxides is sufficiently mobile and is available to plants. The greater the content of the exchangeable Na in the soil the greater the mobility of P_2O_5 of these phosphates. Addn. of gypsum to the saline soils causes a sharp decrease of the availability to plants of P_2O_5. A large amt. of org. substances increases the effect of exchangeable Na on the soly. of P_2O_5 of the difficultly sol. phosphates. The effect of exchangeable Na on the availability of P_2O_5 in chernozem is very small in comparison with the effect of an equiv. amt. of exchangeable H. W. R. Henn

Methods for the investigation of phosphorus fertilizers. A. V. Sokolov. *Trudy N. I. U. I. F., Sbornik "Fosfor. Udobr. i ikh Kachestva"* No. **141**, 87–96(1938); *Khim. Referat. Zhur.* **2**, No. 2, 98(1939).—The comparative effectiveness of the P_2O_5 unit in fertilizers cannot be connected directly with the crop increase obtained. A no. of suggestions are given for the planning of expts. in which the different forms of P fertilizers are compared. W. R. Henn

Importance [to plants] of elements occurring in traces only. C. Krügel and H. Heinrich. *Superphosphate* **12**, 141–5, 161–4(1939).—A review and discussion. K. D. Jacob

Urea as a source of nitrogen for potatoes in the Hastings, Florida, area. B. W. Hundertmark and R. V. Allison. *Am. Potato J.* **16**, 322–9(1939).— In expts. on Bladen fine sandy loam and Portsmouth fine sand soils, 50% of the N in a mixed fertilizer for potatoes was derived from urea instead of natural org. sources, with the other half supplied as $NaNO_3$ 15 and $(NH_4)_2SO_4$ 35%, without appreciably affecting the yield. The use of 20% of the N in the form of natural org. compds., when the balance was supplied by a mixt. of equal parts of urea and $(NH_4)_2SO_4$, did not affect the yield of tubers as compared with either the check treatment or all-urea mixts., though it did favorably influence the phys. condition and the drillability of the mixt. No stimulation in growth of vine or consistent increase in yields of tubers could be attributed to the use of a mineral supplement of Mn, Zn and B. K. D. Jacob

Variations in the cooking quality of potatoes as influenced by fertilizers. P. T. Blood and J. L. Haddock. *Am. Potato J.* **16**, 329–35(1939).—As compared to the results obtained with a 4:8:7 fertilizer mixt., the av. relative yield was increased but the cooking quality of the tubers was decreased by the use of a 4:8:14 mixt. in a 6-yr. expt., whereas with a 4:16 7 mixt. the yield and cooking quality were both increased. Potatoes that received no fertilizer showed the highest cooking quality but produced the lowest yields. A small amt. of B in the fertilizer seemed to improve the general external appearance of the tubers but did not increase the cooking quality. K. D. Jacob

[Report on] research botany. The early fertilizer requirements of sugar cane. H. Evans. *Mauritius Dept. Agr., Ann. Rept. Sugar-Cane Research Sta.* **8**, 58–9(1937) (Pub. 1938).—Cores were removed from the middle internodes of cane cuttings by means of a cork-borer, the holes filled with a mixt. of equal parts of urea and K_2HPO_4 and sealed with cork stoppers and the cuttings grown in moist sawdust for 3 months. As compared to the controls, the treated cuttings produced more shoots and showed much better growth of shoots and roots. Also, the leaves and stems of shoots from the treated cuttings showed higher percentages of N, P and K in the dry matter than did those from the controls. In field expts., internally treated cuttings gave better results than did either the controls or the cuttings that received the same quantity of fertilizer mixt. placed in the ground outside the cutting. NH_4 salts had a marked toxic effect when they were placed in the cutting. K. D. Jacob

1 **The prob[illegible] organic manuring—possibilities of town refuse.** E. [illegible] Rupp. *Fertiliser, Feeding Stuffs, Farm Supplies J.* **24**, 607–8(1939).—An org. fertilizer is prepd. from the household refuse of the Royal Borough of Kensington by removing the glass, metals, paper and rags, crushing, spraying with a culture soln. of bacteria and fungi and then fermenting for 16 days in large chambers made of brick and coated with bitumen. The product is a 2 nearly odorless brown powder contg. org. matter 30, insol. inorg. matter 40 and moisture 30%. In 1-yr. expts. the N in the product was usually equal to, in some cases significantly superior to, that in farmyard manure in increasing the yields of kale and sugar beets, and appeared to be about 25–50% as effective as the N in $(NH_4)_2SO_4$. K. D. Jacob

The value of the characteristics conferred on the grape vine by fertilizing. E. Vinet. *Compt. rend. acad. agr. France* **25**, 894–902(1939).—Final results of this work are 3 not given but the use of K_2O fertilizers markedly increased the K_2O content of the woody portion of the vine and the saccharine production. K_2SO_4 gave greater increases than KCl. J. R. Adams

Phosphorite flour. I. S. Pospelov. *Sel'khozgiz.* **1938**, 18 pp.; *Khim. Referat. Zhur.* **2**, No. 2, 96–7(1939).—A description of the production of phosphorite flour and of 4 soils where it is used (meadows, pastures, virgin soils). The use of phosphorite flour together with other fertilizers (manure, lime and peat), methods for their use and of the chlorinated phosphorite flour are given. W. R. Henn

The different kinds of potassium fertilizers. D. V. Druzhinin. *Sotsialist. Rekonstruktsiya Sel'skogo Khozyaĭstva* **1938**, No. 9, 127–34; *Khim. Referat. Zhur.* **2**., No. 2, 100(1939).—Sylvinite is the best form of K fertilizer for all kinds of beets in soils poor in Na. K_2SO_4 is best for potatoes, citrus fruits, grapes and tobacco. KNO_3 is the best form of K-N fertilizers for flax, tobacco and in some 5 cases for potatoes. W. R. Henn

Pineapple investigations. H. K. Lewcock. *Queensland Dept. Agr. and Stock, Ann. Rept.* **1936–37**, 85–9.—Applications of K *fertilizers* markedly increased the yield of pineapples. While no distinguishable difference in the rate of growth during the 1st 12 months was noted be- 6 tween plants receiving KCl and K_2SO_4 in the fertilizing mixts, the yield from the sulfate plots was appreciably greater than that from the chloride plots. The fertilizing value of the N and P in inorg. fertilizers was markedly superior to that of these elements in org. fertilizers. A very pronounced increase in the vigor of growth of pineapples on manganiferous soils was obtained by spraying the plants with Fe sulfate at intervals of 3–4 weeks, particularly during the winter months. Plants grown in 7 paper mulch did not exhibit the same symptoms of Fe deficiency during the winter as did those set out in exposed soil. Semiannual applications of Fe filings to the hearts of young pineapple plants corrected the Fe-deficiency symptoms, but the plants were markedly retarded in growth compared with adjoining plants that had been treated with Fe sulfate spray. There were indications that Fe present in a soil with a low buffer capacity can be 8 made available to pineapple plants by suitably adjusting its reaction, whereas it cannot be so released in a highly buffered soil. **Report of the plant physiology section.** *Ibid.* **1937–38**, 40–4.—Incidence of the *"crookneck" disease of pineapples* was markedly reduced by spraying the young plants with a soln. of H_3BO_3 at monthly intervals. K. D. Jacob

Chemical delintering and budding of cottonseeds. N. Chebotaev. *Sovet. Khlopok* **1938**, No. 5, 117–18; *Khim. Referat. Zhur.* **2**, No. 1, 60(1939).—Delintering by means 9 of 175 g. of concd. H_2SO_4 per kg. of cottonseed, for 20–30 min. at 20°, increased the crop by 1 cental/hectare. Budding the seeds after delintering increased the crop by 1.8 centals/hectare. Delintering budded seeds caused a sharp thinning of the plants and a sharp decrease of the crop. W. R. Henn

Disease control and stimulation of cane cuttings by the hot-water treatment. J. P. Martin and R. K. Conant.

Hawaiian Planters' Record **43**, 277–85(1939).—Germination was hastened, growth of the sprouts was stimulated and control of the chlorotic streak disease was favored by soaking sugar-cane cuttings in hot water (50–52°) for 20 25 min. The treatment killed all insects, either within or on the cuttings, and produced much more rapid germination and growth of shoots than did dipping the freshly cut ends of the seed pieces in 1% Ceresan soln. K. D. J.

Asparagus rust control with copper-containing sprays. H. Hülsenberg. *Nachr. Schädl Bekampf.* (Leverkusen) **14**, 65 72(1939); *Rev. Applied Mycol.* **18**, 649.—Conflicting results in the control of asparagus rust (*Puccinia asparagi*) with Cu-contg. sprays were investigated. It is concluded that effective control can be secured by the treatment of young plantings a fortnight before the expected appearance of the acidia with 2 subsequent applications; by treatment 10 days after thinning out and 1 or 2 further sprays at 3 weekly intervals; and by 3 treatments for plantings 3 years old. Oden E. Sheppard

The use of chloropicrin as a seed treatment for black rot of kale. T. J. Nugent and H. T. Cook. *Larvicide Log* **1**, 114–19(1938); *Rev. Applied Mycol.* **18**, 565.—With 0.88 ml. per l. of chloropicrin kale seeds were subjected to the gas for 24 hrs. and caused an increase of sterile seeds from 2.9 (untreated) to 79.3% and reduced the incidence of fungal and bacterial contamination from 77 to 1.6 and from 43 to 16%, resp. Germination percentages for seeds treated with chloropicrin, $HgCl_2$ and hot water were 64, 72 and 61, resp., compared with 75% for the controls. Up to 40° at a moisture content of 6.5% even 3.52 ml. chloropicrin per l. did little injury to the seeds but at 14.5% moisture practically all the seeds were killed. Oden E. Sheppard

The long-winged thrips (Scirtothrips longipennis Bagn.) and its control in greenhouses. H. Andison. *Proc. Entomol. Soc. Brit. Columbia* No. **34**, 13 17(1938). Control of the insect on begonia and cyclamen plants was best obtained by spraying at 7–10-day intervals with 1 mixt. contg. 3 oz. of a kerosene-linseed oil soap emulsion to 1 gal. water with 1–2 teaspoons of nicotine sulfate per gal. of spray soln. The stock emulsion is prepd. by dissolving 1 oz. linseed oil soap in 5 oz. hot water, adding 10 oz. kerosene and agitating until emulsification is complete. Volck oil, Paris green and molasses-nicotine sprays caused slight to severe burning of the foliage which increased as the successive applications were made. Naphthalene and nicotine dusts were ineffective. K. D. Jacob

Control of canary fly. P. H. Thomas. *Tasmanian J. Agr.* **10**, 152 3(1939).—The substitution of a lime sulfur spraying for the first of 2 nicotine sulfate sprayings is not as efficient in the control of canary fly as the double spraying with nicotine. J. R. Adams

The pomegranate fruit butterfly (Virachola livia Klug)—morphology, life history and control. A. D. Hanna. *Ministry Agr. Egypt, Tech. Sci. Service, Bull.* **186**, 54 pp. (1939).—From the standpoint of economy and efficiency, the insect was best controlled by spraying the pomegranate bushes with a mixt. of Na_2SiF_6 125, lime about 140, casein 12, flour 25, Quena mud 380–500 g. and water 4 gal., applied at the rate of 2 gal./tree for the 1st spraying, 1 gal. for the 2nd, 3rd and 4th sprayings, resp., and 0.5 gal. each for the 5th and 6th sprayings. K. D. Jacob

Biology and control of the oak leaf roller (Tortrix viridana L.) in Westphalia. E. Erler. *Anz. Schädlingskunde* **15**, 85–93, 105–8(1939).—This moth larva, becoming increasingly important as a pest of oak, is effectively controlled only by chem. methods. Expts. were made with 3 com. dusts. Forestit, a contact poison (cf. Marcus, *C. A.* **27**, 5875[1]), gave 60–70% control. Detal, a dinitrocresol prepn., after 4 days, showed that 100% of the larvae were killed, and the residue was quite apparent despite a heavy shower on the 2nd day after dusting. Forstesturmit, a Ca arsenate poison contg. about 10% active component, gave 50% max. kill. Thus Detal is the only poison of the 3 tested giving satisfactory and economical control. Edwin J. Seiferle

Oil emulsions for the destruction of winter pupae of the eudemis, a European vine moth. F. Stellwaag. *Anz. Schädlingskunde* **15**, 97–105(1939).—The eudemis, *Polychrosis botrana*, a most important pest of *grape*, overwinters as the pupa in a cocoon, so the problem involved in winter control is to penetrate the cocoon and wet the pupa. Com. contact poisons alone do not do this. A com. lubricating oil soap added to the soln. at 0.5% assisted in wetting the cocoon but its use is uneconomical and it sometimes injures the foliage. Another com. prepn., 2002 N, at 0.1%, concn. wetted the pupae, but when used at 0.2% with 5 different contact poisons produced no kill because of rapid drying. Quick breaking mineral oil emulsions possessed all desirable properties. In lab. expts. 100% kill was attained by 2% oil emulsion (I) + 0.2% com. nicotine (II), I + 0.3% crude nicotine (III), I + 2% com. pyrethrum (IV) (pyrethrin content unknown), I + 0.5% rotenone, 3% oil emulsion (V) + 0.2% III, and V + 1% IV. The sepd. emulsion is inactive; thorough stirring is therefore necessary to prevent demulsification. Field expts. were made by spraying the vines and placing over them wire screen cages 9 or 18 m. by 2 m. to prevent loss of adult moths. Oil emulsion + 0.15% II sprayed on 44 vines gave 100% kill, for on 182 first buds no larvae were found. On untreated vines 201 larvae were found on 174 buds. Oil emulsion + 2% IV on 88 vines also gave 100% control. I + II at 0.2 and 0.3% concn. sprayed in large-scale field expts. produced a considerable reduction in no. of moths, but did not reach the desired 95% control. Greenhouse expts. with oil emulsion and special field expts with 2, 4 and 6% oil emulsions + 0.2% II showed no injury to the plants. I + 0.15% nicotine rapidly killed the moth larva, *Oenophthira pilleriana*, and oil emulsions were effective against the mites, *Epitrimerus vitis* and *Eriophyes vitis*, all grape pests. Edwin J. Seiferle

The control of mole crickets with barium fluosilicate. A. Kassab. *Ministry Agr. Egypt, Tech. Sci. Service, Bull.* **193**, 13 pp.(1939).—A bait composed of $BaSiF_6$ 5 and water 25 parts per 100 parts of grain is as effective as a similar bait contg. 5 parts Zn_3P_2 in controlling the mole cricket (*Gryllotalpa* sp.). The $BaSiF_6$ bait is not as rapid as the Zn_3P_2 bait in its lethal action but both baits have the same ultimate effect. It has the advantage over the phosphide bait in that it is insol. in water, odorless, easily handled and harmless to the leaves of plants. The $BaSiF_6$ bait loses its effectiveness in 9 10 days after its prepn. A dose of 100 mg. $BaSiF_6$ was lethal to hens weighing approx. 1.5 kg., whereas the fatal dose for pigeons was 170 mg. K. D. Jacob

Apple black spot (Venturia inaequalis) investigations. J. O. Henrick. *Tasmanian J. Agr.* **10**, 150–1(1939).—In efforts to eradicate apple black spot, infected leaves were sprayed with solns. of $CO(NH_2)_2$, $(NH_4)_2SO_4$, NH_4Cl, $(NH_4)_2CO_3$, K_2SO_4, KCl and com. lime sulfur. The ammonia compds. increased the rate of leaf decompn. Under the dry conditions prevailing all the leaf treatments appeared to have an inhibiting effect on ascospore formation both in the field and lab.-field trials. J. R. A.

Report of the veterinary laboratory, Wallaceville. C. S. M. Hopkirk. *New Zealand Dept. Agr., Ann. Rept.* **1938 39**, 23–33.—*Arsenic poisoning of cattle.*—Administration of 4 grains As (as Na arsenite) daily for 3 days caused no increase in the As content of the milk and urine of a heifer. This was followed after 10 days by 3 successive daily administrations of 16 grains As and the death of the animal occurred 3 days later. Mud, contg. approx. 3.5 grains As_2O_3 per oz. (partly in the form of the sulfide), from farms in the Reporoa district on which mortalities, supposedly due to As poisoning, had occurred, was fed to a steer at the rate of 20 oz. daily for approx. 11 weeks without the development of serious symptoms. *Cu poisoning of sheep.*—Four fully grown crossbred sheep were each administered 100 cc. of a 1% $CuSO_4$ soln. daily. The livers of the animals, which died in 33–77 days, contained 1950–4030 p. p. m. of Cu on the dry basis. There was no relation between the Cu content of the livers and the rapidity of death, but there was a marked similarity between the figures and those for Cu in the livers of animals that died from natural cases of *enzootic icterus*. *Effect of Zn on pigs.*

—Milk contg. 0.125–0.25 g. Zn lactate per gal. was fed to pigs at the rate of approx. 3 gal./day for about 3 months without any adverse symptoms. K. D. Jacob

[Experiments on] lime sulfur. F. B. Coleman. *Queensland Dept. Agr. and Stock, Ann. Rept.* **1936-37**, 128; **1937-38**, 127-8.—High-grade lime S (19.4–21.1% polysulfide S) showed little or no deterioration when it was stored for 7 months in tightly closed 45-gal. drums, whether the drums were full or only ⅓ full or whether they were stored in the shade or exposed to the sun. Deterioration was somewhat greater in low-grade lime S (14.2 14.7% polysulfide S), particularly when the drums were only ⅓ full. K. D. Jacob

Some common facts about pyrethrum products as insecticides. Cady S. Corl. *Soap* (*Sanitary Products Sect.*) **15**, No. 12, 115, 117, 119, 121(1939).—The present rating of pyrethrum flowers is (1) Kenya flowers 1.3–1.5% pyrethrins, (2) Japanese 0.9–1.0% and (3) Dalmatian 0.6–0.7%, and Brazilian 0.6–0.7%. Exts. of pyrethrum should be kept out of contact with Pb, Zn, brass, galvanized metal as well as glass. Other factors are reviewed. Henry H. Richardson

Leaching of sodium pyroarsenate through soil. Geo. L. Hockenyos. *Pests* **7**, No. 12, 16–17(1939).—Leaching of $Na_4As_2O_7$ was less in clay and soil with org. matter than in sandy soil. H. believes that many of the unusual results with $Na_4As_2O_7$ as a termite poison can be explained by the differences in soils. Henry H. Richardson

Action of alkylmagnesium halides on coumarin and related compds.—synthesis of 2,2-dialkyl-1,2-benzopyrans [insecticidal activity] (Shriner, Sharp) **10**. Production of coned. fodder and the cultivation of alfalfa (Demolon) **12**. Colorimetric silicomolybdic acid method for detg. nicotine [in soil] (Sutherland, *et al.*) **17**. Importance of chemistry in pest control (Roark) **13**. Treating liquid alkanes with SO_2 and Cl [to produce weed-killing and fungicidal products] (U. S. pats. 2,174,507-9) **13**. Colorimetric detn. of Al [in soil] (Rode) **7**.

Seed-germinating wafer. Albert C. Fischer. U. S. 2,175,113, Oct. 3. A wafer suitable for use with seeds such as those being tested for germinating properties comprises a float such as a cork disk carrying a contacting film of germinating soil suitable for the seed.

Apparatus (with a rotating drum) for aerating fertilizing materials, etc. Augustus J. Sackett. U. S. 2,174,896, Oct. 3. Various structural, mech. and operative details. U. S. 2,174,897 also relates to app. for treatment, as in drying and cooling, and grinding, fertilizer materials, crab shells, fish, tankage, etc.

Emulsifiable oil suitable for plant sprays, etc. Marcellus T. Flaxman (to Union Oil Co. of Calif.). U. S. 2,175,988, Oct. 10. A small proportion (suitably 0.5–5%) of undecylenic acid is used as an emulsifying, wetting and spreading agent with a mineral spray oil.

Insecticides containing 9-chlorofluorene. Houston V. Claborn and Lloyd E. Smith (to the people of the U. S. A. for free use). U. S. 2,175,109, Oct. 3. 9-Chlorofluorene is used in dusting powders or sprays.

Stable nicotine compounds suitable for insecticidal or fungicidal use. Grover D. Turnbow. U. S. 2,175,980, Oct. 10. A substantially stable compn. contains nicotine and Cu hydroxide combined with casein or albumin and CH_2O (the degree of stability being detd. by the CH_2O content).

Fungicidal oils. Edward F. English and Alexis Voorhies, Jr. (to Standard Oil Development Co.). U. S. 2,174,258, Sept. 26. A fungicidal oil suitable for impregnating wood such as cross-ties may be prepd. by destructive hydrogenation of a distillate oil and is composed substantially of aromatic, naphthenic and unsatd. hydrocarbons, has an aniline point of about −7° to −62° and a gravity of 8° to 20° A. P. I.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Hydrolysis of plant waste materials and the manufacture of alcohol from the hydrolysis products. N. Gutgerts. *Spirto-Vodochnaya Prom.* **1938**, No. 6, 4–8; *Khim. Referat. Zhur.* **2**, No. 1, 118(1939).—In the Dnepropetrovskii exptl. plant the product of the one-phase hydrolysis at 90–2° is treated at 85° with a mixt. of lime and $CaCO_3$ suspension (70 30) 20°Bé. to pH = 4.8–5.2. The duration of the process is 90 min. During the reaction aldehydes and a part of the volatile acids are blown out with air. The product is filtered-pressed, cooled to 30°, and the turbid filtrate again filtered through peat. The clear filtrate is fermented with pure-culture yeast for 36–48 hrs. The concn. of the reducing substances is 2.5–3%. Twenty-five kg. of $(NH_4)_2SO_4$ and 17 kg. of superphosphate per 100 cu. m. are added. Attempts to ferment the neutral solns. by the continuous method under lab. conditions were successful, but the method is not adaptable to plant conditions owing to the high sterility of the work required. The crude alc. is distd. off from the mash, and is stored. The residue is utilized in the yeast production department. An av. of 100–110 l. of 100% alc. is obtained from 1 ton of straw. This yield can be increased to 116–120 l. by more efficient methods. W. R. Henn

Sorbose from sorbitol. Semiplant-scale production by Acetobacter suboxydans. P. A. Wells, L. B. Lockwood, J. J. Stubbs, E. T. Roe, N. Porges and E. A. Gastrock. *Ind. Eng. Chem.* **31**, 1518–21(1939).—Studies on *l*-sorbose production from *d*-sorbitol by submerged growths of *A. suboxydans* revealed that coned. corn steep liquor was a satisfactory nutrient substitute for dried yeast ext., but necessitated the use of octadecyl alc. as an antifoam agent. In the presence of a slight excess of $CaCO_3$ which afforded satisfactory pH control, *d*-sorbitol, in concns. up to 30%, was rapidly oxidized to *l*-sorbose. Pilotplant-scale results showed no essential differences from those obtained on a lab. scale. When 20% sorbitol solns. were used under the most favorable conditions, the yields of sorbose, obtained in fermentation periods of 25 hrs. on both pilotplant- and lab. scale, were in excess of 90%. Recovery yields of cryst. sorbose approximated 70%. J. C. Jurrjens

Standardized Wohlgemuth procedure for α-amylase activity (Sandstedt, *et al.*) **11B**. Study of a new Me_2CO-resistant stock of Me_2CO-EtOH bacteria with special reference to the possibility of increasing the concn. of industrial mashes (Chumak) **11C**. Containers for holding beverages (U. S. pat. 2,175,972) **12**.

Alcohol recovery from fermented grape pomace. Enrico Prati. U. S. 2,174,707, Oct. 3. For recovery of alc. values from fermented grape pomace by distn., pomace including only about 5–20% of the fruit seeds is run through a mill with added water and the liquefied mass is passed through a continuous still in which alc. is removed.

Incorporating vitamin D with malted or fermented liquors. Jacques W. D. Chesney (to New Discoveries, Inc.). U. S. 2,175,340, Oct. 10. A coned. oil-free alc. soln. contg. vitamin D in stable form is added to a product such as beer contg. at least 0.25% alc. and also contg. dissolved CO_2, just prior to its transfer to the commercial containers in which it is to be sold.

Increasing yeast production and activity. Roger J. Williams (to Standard Brands Inc.). U. S. 2,174,543, Oct. 3. A small proportion of ethanolamine is used in yeast production to increase the rate of propagation and total yield obtainable, or in the use of yeast as for alc. production or in leavening bread to stimulate the activity of the yeast for the purpose desired. One part of ethanolamine in 12,000 parts of a culture medium gives good results.

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Pharmacognostical study on Strophanthus cumingii A DC. from the Philippines. Jose K. Santos. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 103–22(1939).—The bark, wood and pericarp of immature fruits and seeds of *S. cumingii* contain traces of strophanthin similarly to those of the seeds of *S. kombe*, Oliver and *S. hispidus*, DC. C. R. Addinall

An apparatus for the technical preparation of salves and emulsions containing emanation, perfume, or pharmaceuticals. B. Rajewsky and E. Burkhardt. *Kolloid-Z.* **89**, 320–4(1939).—A detailed description of an app. designed primarily for rapid prepn. of solns. of Ra emanation (I) in petrolatum. Heated petrolatum is forced through a nozzle into an aq. soln. of I, forming an emulsion. The I quickly distributes itself between the phases, mostly passing into the petrolatum; the emulsion is then cooled and seps., and the desired petrolatum soln. of I forced into a tube. Also described is a nozzle contg. an electrically charged pin for making charged fogs and suspensions. A. O. A.

Analysis of juniper berries. P. Casparis and W. Freund. *Pharm. Acta Helv.* **13**, 307–315(1938).—The following substances have been isolated: resin 8% (mainly resin acids; phenols and esters absent), essential oil, "juniperin" 0.36% (probably a mixt. of a tannin with a sugar or sugars; reactions given), a mixed *glyceride* of α-isostearic acid (?) and 15-hydroxypentadecoic acid, m. 84° (*Ac* deriv., m. 59°), *l*-malic acid, invert sugar and K salts. B. C. P. A.

New hydrocarbon from juniper oil. P. Casparis and W. Freund. *Pharm. Acta Helv.* **14**, 1 8(1939).—Oil from juniper berries collected in the Tyrol and from Italian fruits gave by fractional distn. 0.17–0.345% of *junene* (I), $C_{10}H_{16}$, b_{760} 164 6°, b_8 53–5°, α_D^{20} (1 dm.) +19.6° to +20.1°, possessing strong diuretic properties; a soln. in Ac_2O gave a red coloration with H_2SO_4. Reduction (H_2, Pd-$BaSO_4$, AcOH) of I gave *dihydrojunene*, $C_{10}H_{18}$, b_{760} 170°, b_8 58–61°, α_D^{20} (5 cm.) −6.5°. With HCl in AcOH I gave an additive product, b_8 76 86°, α_D^{20} −0.3°, and no cryst. products with Br, NOCl or HI, and did not react with BzO_2H. It is probably a cyclopentene deriv. similar to but not identical with the chamene of Kafuku, *et al.* (*C. A.* **25**, 2424). The juniper oils contained α-pinene, camphene and cadinene and, from the consts. of the terpene fraction, 5–15% of I. B. C. P. A.

Stabilization of hydrogen peroxide. Karl Höll. *Deut. Apoth.-Ztg.* **54**, 946(1939).—Expts. are reported which show the keeping qualities of 7.5% H_2O_2 with and without the addn. of stabilizers like BzOH, acetanilide and nipagin over a period of 2 yrs. With addn. of 0.1% of nipagin to 7.3% H_2O_2, e. g., there was a diminution in activity of only 0.2% during the 2-yr. period. W. O. E.

Production of stable solutions of calcium gluconate. J. Pfirschke and G. Peukert. *Deut. Apoth.-Ztg.* **54**, 992 (1939).—The production of such solns. in highly concd. supersatd. form is readily effected by addn. of min. amts. of Ca *d*-glucoheptonate. W. O. E.

Synthetic fat acids, in the place of oleic acid, for the preparation of Vasolimentum Erg. B. 5. Richard Holdermann. *Deut. Apoth.-Ztg.* **54**, 1091–2(1939). W. O. E.

Pharmaceutical coloring agents—substitute for Bordeaux B. C. L. M. Brown. *Quart. J. Pharm. Pharmacol.* **12**, 332–46(1939).—Sixteen dyestuffs were examd. for their suitability for coloring pharmaceuticals, and the effects of acid, alkali, salt concn., heavy metals and alkaloids were studied. Six dyestuffs were selected and the effects of oxidizing and reducing systems detd. Also their characteristic color reactions with concd. H_2SO_4 and their relative tinctorial values were detd. Their suitability for use in those prepns. of the National Health Insurance Formulary and the Brit. Pharmaceutical Codex which are artificially colored were examd., and suggestions offered. The keeping properties of Liquor Azorubri were investigated and an alternative formula was suggested. It has been shown that the dyes can be extd. from acid aq. solns. (and from acidified pharmaceuticals) by AmOH, and a scheme of analysis, by means of which the dyestuff can be identified, has been prepd. No satisfactory method was found for the estn. of dyestuffs in pharmaceuticals. W. O. E.

Absorption spectrophotometry in pharmaceutical analysis. I. Estrogenic preparations. W. F. Elvidge. *Quart. J. Pharm. Pharmacol.* **12**, 347–60(1939).—Preliminary results are presented on attempts to use spectrometric absorption methods in the routine control of tablets and ampoules of certain estrogenic compds. The results are promising, particularly in those cases where the hormone can be sepd. from the diluent, and it is intended to pursue this subject further, and to obtain more data. Curves are given for diethylstilbestrol (I), and its dipropionate, hexestrol(dihydro-I), estradiol monobenzoate and progesterone, together with the numerical values of their extinction coeffs. Tentative values have been assumed, which may be modified when more samples are examd. W. O. E.

Natural and artificial soft paraffins. Harry Brindle. *Quart. J. Pharm. Pharmacol.* **12**, 361–79(1939).—A simple test is proposed to distinguish between "natural" and "artificial" soft paraffins. The test consists in detg. the deposition temp., or soln. temp., of a soln. of the soft paraffin in a mixt. of glacial AcOH and CCl_4. The vols. of cryst. deposit, if any, and of the upper oily layer which seps., are also detd. Freedom from adulteration with liquid paraffin and hard paraffin is indicated by: (1) a high soln. temp., (2) a low vol. of cryst. deposit and (3) a considerable vol. of sepd. upper oily layer. W. O. E.

Nonstaining iodine ointment. J. C. Penman. *Quart. J. Pharm. Pharmacol.* **12**, 380–91(1939).— Large variations in results are obtained in the assay of com. samples of nonstaining I ointment. It is suggested that the Brit. Pharmaceutical Codex adopt a standard for total I content of not less than 4%. During the action of I alone on fatty oils, partial hydrolysis of the glycerides occurs. In the presence of I the glycerides of the unsatd. acids form pungent-smelling substances. A resin-like sticky sludge occurs when undissolved I is kept in contact with the fatty oils and with oleic acid. Iodine dissolved in fatty oils does not deposit a resin-like sludge. Alternative methods for the prepn. of nonstaining I ointment are given. It is indicated that the effect of heat upon the compounded ointment is to produce resin-like deposits. Fourteen references. W. O. E.

Stability of solutions of adrenaline hydrochloride. H. R. Rowlinson and S. W. F. Underhill. *Quart. J. Pharm. Pharmacol.* **12**, 392–8(1939).—Liquor adrenalinae hydrochloridi Brit. Pharm. retains its full potency for 16 months when stored under CO_2 at lab. temp. At 37.5° about half the potency was lost in 8 months. The addn of 0.5% Na metabisulfite or the substitution of HCl by SO_2 in the prepn. has little influence on the maintenance or loss of potency under these conditions of storage, but preserves the color of the soln. for a longer period. The color of a soln. of adrenaline-HCl is not an indication of its potency. Clear, colorless solns. lost 50% of their potency, while colored solns. may retain their full activity. The addn. of 0.1% of Na metabisulfite improves the keeping qualities of Liquor adrenalinae hydrochloridi Brit. Pharm. Eight references. W. O. E.

Rapid colorimetric assay of belladonna and stramonium, including their preparations. Noel L. Allport and Ewart S. Wilson. *Quart. J. Pharm. Pharmacol.* **12**, 399–408 (1939).—Morin's adaptation of Vitali's color test for solanaceous alkaloids has been modified in order to make it quant., and it is shown that, provided the alkaloid is first dissolved in dil. AcOH, the intensity of the color produced by the test is a function of the quantity of alkaloid present. By use of the Lovibond tintometer the color test was utilized for the development of a rapid alkaloidal assay of belladonna leaf, belladonna root, stramonium leaf

and their galenical prepns. Essentially, the method consists in the $CHCl_3$ extn. of a small quantity of the drug (or the prepn. previously absorbed on sawdust), agitation of the percolate with dil. AcOH soln. and detn. of the alkaloidal concn. in the sepd. acid aq. layer by means of the color test. An alkaloidal assay can be completed within an hr., or less, and the results compare favorably with those obtained by the official methods. W. O. E.

Occurrence of free vitamin A alcohol in fish livers. Thomas H. Mead. *Quart. J. Pharm. Pharmacol.* **12**, 409-12(1939).—It would appear that a small proportion of free vitamin A is present in the oil extd. from the fresh livers in spite of the attempt to reduce hydrolysis after the death of the fish. Seven references. W. O. E. 2

Assay of some mercurial ointments. G. J. W. Ferrey. *Quart. J. Pharm. Pharmacol.* **12**, 413-19(1939); cf. *C. A.* **33**, 1092[1].—Methods are developed for the assay of 4 mercurial ointments; the principles of reduction of the Hg compd. present to metal, and amalgamation with Zn dust or filings are used. The value of ethylene glycol monoethyl ether as a menstruum for sapon. in the assay of mercurial ointments contg. paraffins is shown. Six references. W. O. E. 3

Extraction process for the assay of phenol ointment. R. Maxwell Savage. *Quart. J. Pharm. Pharmacol.* **12**, 420-2(1939).—The extn. by dil. acid of phenol from its soln. in light petroleum was studied. A method of assay for phenol ointment is described. W. O. E. 4

Tannic acid gauze. R. Maxwell Savage and W. P. Chambers. *Quart. J. Pharm. Pharmacol.* **12**, 423-37(1939).—Methods of analyzing tannic acid solns. are discussed and certain suggestions offered. Tannic acid gauzes are found to be stable materials over 27 months' storage, no definite deterioration having been noted. Adsorption of tannic acid occurs, but is about equal to that which occurs with plain gauze soaked in fresh tannic acid soln. The conditions in compresses were studied. Apparent increases in gallic acid are traced mainly to differential adsorption and not to hydrolysis. Methods of detg. the total amt. of tannic acid in gauze are developed. Nine references. W. O. E. 5

Alkaloidal assay of lobelia and its preparations. H. A. Caulkin. *Quart. J. Pharm. Pharmacol.* **12**, 438-45(1939).—In the case of tinctures, acidify 50 ml. with 1 ml. dil. AcOH, add 25 ml. distd. H_2O and evap. in a porcelain basin to about 20 ml. Filter through a small funnel plugged with cotton wool into a separator, wash the residue in the basin with successive small quantities of H_2O acidulated with AcOH until all the alkaloids are removed. Render the liquid alk. with dil. NH_4OH and ext. with successive quantities of $CHCl_3$ until free from alkaloids, washing each quantity of $CHCl_3$ with the same 5 ml. of distd. H_2O. Ext. the $CHCl_3$ soln. of the alkaloids with 2% H_2SO_4 until the acid liquid ceases to give any reaction with Mayer's reagent, wash the mixed acid liquid once with 5 ml. of $CHCl_3$ and the $CHCl_3$ with 5 ml. of 0.1 *N* H_2SO_4 which is added to the main acid soln. Make the acid liquids alk. with dil. NH_4OH and ext. with successive quantities of $CHCl_3$, each portion of $CHCl_3$ being washed with the same 5 ml. of H_2O. Distil off the $CHCl_3$ until about 2 ml. remains, add 5 ml. abs. EtOH and evap. to dryness at a low temp. Make 2 further addns. each of 2 ml. abs. EtOH and evap. to dryness after each addn. Dry finally at 80°. Det. the amt. of alkaloid in the residue (1) by addn. of an excess of 0.02 *N* H_2SO_4 and titrating the excess acid with 0.02 *N* NaOH; (2) by converting the alkaloids into their HCl salts and detg. their Cl content by the addn. of 0.1 *N* $AgNO_3$ in excess and titrating with 0.1 *N* NH_4CNS; (3) by dissolving the alkaloids in dil. HCl and pptg. with silicotungstic acid. Results obtained by this procedure are reported. Eight references. W. O. E. 6

Stabilization of hydrogen peroxide solutions for pharmaceutical purposes. S. M. Tritton. *Quart. J. Pharm. Pharmacol.* **12**, 446-50(1939).—It is shown that the addn. of certain substances like acetanilide, phenazone, BzOH, thiourea, urea and hexamine tends to inhibit the decompn. of H_2O_2 by catalase. W. O. E. 7

Chemical assay of powdered ergot. Cyril Daglish and Frank Wokes. *Quart. J. Pharm. Pharmacol.* **12**, 451-67 (1939).—The Pharmacopeia Lab. method (employing a single 5-hr. extn.) does not remove all the alkaloid, even if the amt. of NH_3 is increased or dil. NH_3 is used, although this factor certainly does influence the results. The Brit. Pharmacopeia, 1932, method (shaking for $^1/_2$ hr. at room temp.) also failed to remove all the alkaloid from any of 6 samples examd. No clear evidence was obtained that the efficiency of the Brit. Pharmacopeia, 1932, method depended on the alkaloidal content of the ergot. The efficiency of Hampshire and Page's method (cf. *C. A.* **32**, 6002[6]), on the other hand, was definitely higher with low-potency ergots, in which it exceeded the efficiency of the Pharmacopeial method. A new method is described of assaying powd. ergot by shaking at room temp. with Ac-Me and NH_3 for half an hr.; it shows an av. efficiency of 93%. Seven references. W. O. E. 8

Review of analyses of drugs taken under the adulteration acts. J. F. Liverseege. *Quart. J. Pharm. Pharmacol.* **12**, 468-77(1939).—12 references. W. O. E. 9

Preparation of tablet triturates for use in hypodermic injections. G. W. G. Smithers. *Quart. J. Pharm. Pharmacol.* **12**, 478-88(1939).—Details of the prepn. of certain types of tablet triturates commonly in demand are described, together with the variations observed in the properties of such triturates when proportion and strength of alc., temp. of drying and quantity and nature of the active medicament vary. Four references. W. O. E.

Disintegration of tablets. C. L. M. Brown. *Quart. J. Pharm. Pharmacol.* **12**, 489-500(1939).—The present position respecting the standardization of tablets and the methods used by various workers to det. the disintegration of tablets was outlined. A new form of app. for testing tablets was described and details were given of expts. performed with it: the effects of compression and of 3 different ingredients (potato starch, gelonide and MgO_2) were shown, the results of an examn. of a no. of com. tablets were given and the effect upon disintegration of medicaments exhibited in "granular" form was shown. Three new terms applied to tablets—dry breaking wt., wet breaking wt., and disintegration ratio—were introduced and fully described. Purely as a guide to other workers tentative values were assigned to each of the 3 terms. Ten references. W. O. E.

Preparation of compressed tablets. I. Measurement of the rate of disintegration of compressed tablets. H. Berry. *Quart. J. Pharm. Pharmacol.* **12**, 501-10(1939). A method of measuring the rate of disintegration of compressed tablets has been suggested. The factors affecting the rate of the disintegration of compressed tablets have been investigated. W. O. E.

Estimation of small quantities of arsanilic acid in tryparsamide. C. A. MacDonald and J. G. Reynolds. *Quart. J. Pharm. Pharmacol* **12**, 534-40(1939).—A method is given for the estn. of small quantities of arsanilic acid in tryparsamide. The Pharmacopeial limit test for arsanilic acid in tryparsamide is satisfactory provided the sample contains mere traces of arsanilic acid. When a sample of tryparsamide contains more than traces of arsanilic acid, it is not possible by the Pharmacopeial test alone, to det. whether the sample may be said to satisfy the requirements of the Pharmacopeia or to be very much over the limit. W. O. E.

Riboflavin in liver extract. G. E. Shaw. *Quart. J. Pharm. Pharmacol.* **12**, 541-9(1939).—By careful heat-treatment an aq. liver ext. can be prepd. which, although it contains riboflavin, is nonfluorescent. A plain aq. ext. of liver at about pH 5.6 when boiled for about 30 sec. forms a ppt., and the clear yellow fluorescent filtrate, when extd. under certain conditions with benzyl alc., yield fluorescent material. It would not be expected that boiling for 30 sec. at pH 5.6 would split off phosphate from a nucleotide, but a polynucleotide might be broken down into simpler nucleotides. Where the riboflavin is in the form of a polynucleotide, especially when one of the constituent nucleotides is adenine, it is insol. in benzyl alc. Similarly, when the complex is conjugated with a protein, it is still insol. When the vitamin is in the form of a

nucleotide, or as its mononucleotide it is sol. in benzyl alc. A method has been described for the estn. of riboflavin in com. liver exts. The instability of riboflavin to HNO_3 has been shown. The form in which riboflavin exists in com. liver exts. has been discussed. Twenty-one references. W. O. E.

Preparation of solutions of gum acacia for intravenous injection. H. Gartside. *Quart. J. Pharm. Pharmacol.* 12, 550-62(1939).—Attention is directed to the quality of gum acacia used for the prepn. of a soln. for intravenous injection. A satisfactory method is described for the prepn. of a 4-fold concd. soln. and a 6% soln. of acacia-saline, together with a note on acacia-saline with dextrose. It is shown that the natural acidity of the soln. can be neutralized to an optimum pH, but neutralization beyond this point results only in the discoloration of the soln. When tested physiologically, on rabbits or mice, the solns. were satisfactory. W. O. E.

Easton's sirup—examination of the changes occurring during storage. W. T. Wing. *Quart. J. Pharm. Pharmacol.* 12, 563-72(1939).—The following formula is suggested as an improvement over the older prepn.: Fe 8.6 g., H_3PO_4 35.0 ml., strychnine-HCl 0.3 g., quinine-HCl 13.3 g., dil. HCl 50.0 ml., sirup 660.0 ml., glycerol 140.0 ml. and distd. H_2O to 1000.0 mls. The mode of compounding is given in detail. Ten references. W. O. E.

Preservation of pharmacopeial paraldehyde. James S. Toal. *Quart. J. Pharm. Pharmacol.* 12, 573-9(1939).—Expts. were carried out to show that freshly prepd. paraldehyde decomps. on storage. It has been demonstrated that the addn. of small amts. of phenolic compds. retards decompn. W. O. E.

Heart poisons. K. Brunner. *Pharm. Zentralhalle* 80, 605-13, 619-21, 630-3(1939).—An enumeration of the more important members of this group. 31 references. W. O. E.

Detection of codeine in papaverine hydrochloride. A. Iermstad and B. Fretheim. *Pharm. Zentralhalle* 80, 629-30(1939).—Dissolve 0.05 g. of the sample and 0.02 g. sulfanilic acid in 1 cc. 0.1 *N*-HCl and 0.5 cc. 1% $NaNO_2$ soln. After 1 min. add 2 cc. 4.0 *N* NaOH soln. Heat the mixt. 5 min. in the water bath in a test tube covered with a watch glass; no reddening of the liquid should result. W. O. E.

The more recent investigational results on ergot alkaloids and their relations to pharmaceutical practice. Benno Schwenke. *Pharm. Zentralhalle* 80, 641-6, 653-8 (1939). W. O. E.

Quirinus oil from Tegern Sea. Heinrich Huber. *Süddeut. Apoth.-Ztg.* 79, 749-50(1939).—A brief account is given of the natural oil emanating from about the Tegern Sea and said to possess curative properties. W. O. E.

Application of active alumina in pharmacy and cosmetics. Walter Meyer. *Süddeut. Apoth.-Ztg.* 79, 773-6, 781-8 (1939). W. O. E.

Assay of a sample of opium ninety years old. With some remarks on the history of morphinometric assay. Horatio C. Wood and Arthur Osol. *Am. J. Pharm.* 111, 380-4(1939).—From the review of the early literature on opium assay the authors conclude that the method of Guillermond (*J. Pharmacie*, 14, 463 (1828,) was employed when the sample of opium was assayed originally. As this process gives too high results it seems probable that the original morphine content (supposedly 10%) was not materially lower than the 9.72% which the authors obtained 90 years later. Results therefore seem to indicate that the morphine content of opium does not alter greatly under ordinary methods of storage. W. G. G.

Preservatives for nasal jellies and ophthalmic solutions. Louis Gershenfeld and David Tomkin. *Am. J. Pharm.* 111, 385-99(1939).—Nasal jellies: The following preservatives displayed either bacteriostatic or bactericidal properties, did not attack the collapsible tubes, and did not possess an objectionable color, odor, or appearance after a period of 4½ months: 0.05% ethyl hydroxybenzoate of sodium, 0.03% propyl hydroxybenzoate of sodium (not bactericidal), 0.1% hydroxyquinoline sulfate, 0.2% HCHO, 1:3000 hexylresorcinol, 0.01% azochloramid, 0.01% 2-naphthol, 0.01% merthiolate, 0.02% butoben not bactericidal, 0.002% phenylmercuric acetate, 0.002% phenylmercuric nitrate, 0.5% chlorobutanol. Ophthalmic solns.: chlorobutanol (0.5%), chlorothymol (0.01%), merthiolate (0.01%), phenylmercuric acetate (0.002%), and phenylmercuric nitrate (0.002%) displayed bactericidal power after 6 days. The following displayed bactericidal properties after 20 days: 0.05% ethyl hydroxybenzoate of sodium, 0.05% propyl hydroxybenzoate of sodium, 0.5% sodium benzoate, 0.02% butoben, 0.05% hydroxyquinoline sulfate, 0.01% mercurophen (ppts.) and 0.1% collargolum. Methyl hydroxybenzoate of sodium (0.15%), sodium benzoate (0.1%), acriflavine (0.01%), synthetic camphor (0.1%), phenyl hydroxy mercuric chloride (satd. soln.), and Cu sulfate (0.01%) were bactericidal after 35 days. W. G. Gaessler

Colorimetric silicomolybdic acid method for determining small quantities of nicotine. G. L. Sutherland, R. P. Daroga and A. G. Pollard. *J. Soc. Chem. Ind.* 58, 284-8 (1939); cf. Hofmann, *C. A.* 27, 3288.—The following Hoffman reagents were used: (1) silicomolybdic acid: 14.4 g. of MoO_3 is dissolved in *N* NaOH by warming. A soln. of Na_2SiO_3 contg. 0.7 g. SiO_2 is added, followed by 10% HCl which is stirred in, in small portions, until the soln. becomes green (about 200 ml.). The soln. is dild. to 900 ml. with H_2O and placed on a boiling water bath for 3 hrs. After standing for 24 hrs. at room temp., excess SiO_2 is filtered off and the filtrate is dild. to 1 l. (2) Wash liquid: 10% NaCl in 0.5% HCl. (3) Reducing soln.: 1 g. of glycine is dissolved in 15 ml. of 20% aq. Na_2S soln.; 5 ml. of NH_4OH (sp. gr. 0.880) is added in small portions while stirring, and the soln. is dild. to 100 ml. The detn. is conducted as follows: Add 2 ml. of reagent (1) to a 100-ml. beaker contg. the nicotine in 15 ml. of 1% HCl. Warm and shake the beaker until the ppt. dissolves or is obtained in a dense compact form if there is too much to dissolve readily. If the ppt. appears to be large, add 1 ml. more of reagent. After standing at least 2 hrs. at room temp., collect the ppt. on a disk of No. 42 Whatman paper in a small (No. 00) Gooch crucible. Wash the beaker and ppt. with successive quantities of 1.0, 0.5 and 0.5 ml. of the wash liquid. Empty and wash the filter flask. Pipet 2-3 ml. of the reducing soln. into the beaker and dissolve any residual ppt. present. Pour this soln. carefully into the Gooch crucible and stir the contents of the crucible with a glass rod. Then suck the soln. into the filter flask, followed by the washings of the beaker and filter. Transfer the liquid and washings to a 50-ml. graduated flask and dil. to the mark. Place the flask in a water bath at 45° for 25 min. and then match the color against permanent glass standards in a Tintometer or against special glass standards in the disk of a B. D. H. Lovibond nesslerizer. Colors of low intensity (less than 0.5 mg. of nicotine) were fully developed in 20 min., while deeper colors (greater than 1 mg. of nicotine) required 30 min. at 45°. Det. nicotine in *soil* in the following manner: Add 3 g. of CaO and 20 g. of NaCl to a suspension of soil contg. 1.5 mg. of nicotine in 200 ml. of water. Pass a current of steam through the heated suspension and collect 250 ml. of distillate in a receiver contg. 10 ml. of 1% HCl (a special app. for the steam distn. is described by Higgins, *et al.*, *C. A.* 33, 9200[4]). Evap. the distillate to 5–10 ml. and make up to approx. 15 ml. with 1% HCl. Ppt. the nicotine with the silicomolybdic acid reagent and proceed as directed above. The amt. of nicotine recovered from the soil was ± 2% of the quantity added. L. W. G.

South African fish products. I. Liver oils from the stockfish or hake (Merluccius capensis, Cast), and from the kingklip or cape ling (Genypterus capensis, Smith). C. J. Molteno and W. S. Rapson. *J. Soc. Chem. Ind.* 58, 297-8(1939); cf. *C. A.* 33, 8114[9].—The liver oils from the stockfish (I) are light yellow in color and have acid nos. less than 0.4. About 5% of stearin seps. from the oil on chilling. Seasonal variations in quality of the oil are very small although there is a marked increase in yield from the livers during the summer months, with a corresponding increase in I no. and a decrease in vitamin A potency. The following data are given for fish of

different sizes: av. wt. 12–16, 8–14, 1–2 lb.; av. wt. of livers 430, 286, 9.5 g.; oil in livers 36, 42, 11%; I no. of oil (Wijs) 126, 131, —; vitamin A in oil 1.1, 0.31, 0.30%, resp. Kingklip liver oils (II) are similar in color to I but contain relatively little stearin. Seasonal variations in yield and quality resemble those shown by I. During spring and summer, however, there is a much greater decrease in liver-oil content in the case of II but the vitamin A content of the oil is not affected. The oils from the larger kingklip are of considerable com. value since they are remarkably free from any fishy or unpleasant odors, contain very little stearin and compare favorably with halibut-liver oils in vitamin A potency. L. Wilson Greene

Chemical microscopy of essential oils. III. L. Wilson Greene. *Perfumery Essent. Oil Record* **30**, 309–16(1939); cf. *C. A.* **33**, 3068⁹.—The chemical principles and methods of essential oil microscopy are discussed. Crystn. reaction products, useful for characterizing these products, were obtained with the following oils and reagents: bergamot oil with satd. solns. of NaOH in EtOH and BuOH; bitter almond oil and benzaldehyde with phenylhydrazine (I), $NaHSO_3$ soln. (II), alk. $KMnO_4$ soln. and semicarbazide hydrochloride soln.; caraway oil and carvone with I; cassia oil and cinnamon bark oil with I, II and a 60% aq. Na phenate soln. (III); catnip oil with I; cumin oil with I and III; fennel oil and dog-fennel oil with I; and wintergreen oil, sweet birch oil and Me salicylate with III and with satd. solns. of KOH in MeOH and PrOH. A list of 131 different oils giving neg. results with I is presented. Crystn. reaction products are illustrated by 13 sketches. 11 references. L. Wilson Greene

Analysis of pills containing plasmocid and atebrin. N. S. Goryunova. *Farmatsiya* **1938**, No. 1–2, 4–9; *Khim. Referat. Zhur.* 2, No. 2, 85–6(1939).—The detn. is based on the ability of the insol. plasmocid and the sol. atebrin, when decompd. with alkali, to yield bases which are easily sol. in org. solvents. In addn., atebrin is sepd. from the aq. soln. with KI as a double salt. In the detn. of plasmocid its base is sepd., dissolved in an org. solvent (ether) and titrated with acid (1 cc. of 0.1 *N* HCl corresponds to 0.0287 g. of the plasmocid base). Atebrin can be titrated directly with a base in the presence of phenolphthalein (1 cc. of 0.1 *N* HCl corresponds to 0.01995 g. of the atebrin base). The sepn. of the substances from the mixt. of both compds. is performed after the sepn. and the extn. of the bases (the presence of the pill mass complicates the filtration considerably). The bases are transformed into HCl salts and the atebrin is sepd. with KI in the form of the double salt.

W. R. Henn

Evaluation of peppermint water from its surface tension. N. A. Izmaĭlov and A. G. Shvartsman. *Farmatsiya* **1938**, No. 1–2, 17; *Khim. Referat. Zhur.* 2, No. 3, 83 (1939).—The existing methods for the evaluation of aromatic waters give no indication if peppermint water prepns. comply with the pharmaceutical standards. The dependence of the surface tension of aq. peppermint solns. on the concn. of oil (calcd. to the total menthol) was detd. Addn. of NaCl increased the accuracy in the limits of the application of the detn. The error did not exceed ±3%. The vessel and the salt must be checked for the absence of admixts. of surface-active substances.

W. R. Henn

A drop-chromatographic method of analysis and its utilization in pharmacy. I. N. A. Izmaĭlov and M. S. Shraĭber. *Farmatsiya* **1938**, No. 3, 1–7; *Khim. Referat. Zhur.* 2, No. 2, 90(1939).—A drop-chromatographic method is proposed which permits observing the distribution of the substance in different zones in a drop of the substance placed on a flat layer of an adsorbent (CaO, MgO, Al_2O_3, etc.) 2 mm. thick on an object glass. The ultrachromatogram consists of concentric circular zones which are visible (owing to fluorescence) in the light of a Hg quartz lamp. The ultrachromatogram is developed with several drops of the solvent. Comparative investigations of 2 methods (performed on infusions of belladonna and of digitalin) gave full agreements of the chromatograms and the ultrachromatograms. This confirms the suitability of the drop-chromatographic method for a preliminary testing of the properties of the adsorbent and of the method of developing. The method can also be used for qual. evaluation and identification of the galenical preparations. In the last case some difficulties are caused by the indefinite color. A detn. of an exact color nomenclature of the colored zones for the drop-chromatographic analysis is contemplated. W. R. Henn

The determination of the quality of belladonna. N. V. Kuznetsov. *Farmatsiya i Farmakol.* **1938**, No. 3, 21; *Khim. Referat. Zhur.* 2, No. 3, 84(1939).—From a bush of a 2-year-old belladonna plant take 2 furcate leaves, air-dry them, take off a part of the middle vein between the 2nd and 3rd primary nerves, sep. the removed part from the parenchyma, treat it on a watch glass with 0.2 cc. of a 0.62 *N* H_2SO_4 soln. from a microburet, cover with a second watch glass and infuse for 50 min. Add a drop of Maier's reagent. The formation of a ppt. or of a turbidity shows a high quality of the leaves. A turbidity corresponds to 0.9–1% of alkaloids and a ppt. corresponds to a higher content. W. R. Henn

Microchemical reactions of barbital. E. E. Rozhdestvenskaya. *Farmatsiya* **1938**, No. 4, 1–6; *Khim. Referat. Zhur.* 2, No. 3, 83–4(1939).—All methods of analysis are confined to the extn. with ethyl acetate. Barbital is identified by microsublimation and microscopic investigation of the sublimate. Ammoniacal soln. of $AgNO_3$ is the most sensitive and the most characteristic reagent. Its sensitivity was 0.003 mg. in a drop. Salicylic and benzoic acids give ppts. of another kind. Phenobarbital, phenacetin and caffeine give no cryst. ppts. Reactions in basic solns. with an ammoniacal soln. of $CuSO_4$ also is characteristic, but the sensitivity is 0.06 mg. in a drop. Reaction with a 3% $CuSO_4$ soln. in the presence of pyridine (Zwikker's reagent) has a sensitivity of 0.02 mg. in a drop.

W. R. Henn

Determination of essential oil in alcoholic solutions. S. I. Spiridonova. *Novosti Nauki i Tekh. Efirno-Maslichnoĭ Prom.* **1938**, No. 3–4, 61–5; *Khim. Referat. Zhur.* 2, No. 3, 86(1939).—Prep. several dilns. of the alc. soln. and titrate 1 cc. of each with water from a 2-cc. microburet until the first permanent slight turbidity appears. Take the mean of the results of 3 titrations as the true value. Plot the vol. of water for the titration of 1 cc. of each soln. against the ratio of the vol. of alc. used for the diln. to the vol. of the initial soln. for each concn.

W. R. Henn

Some impressions of Finland and Finnish pharmacy. O. Ströh Andersen. *Arch. Pharm. Chem.* **46**, 630–49 (1939). Otto Johnson

Newer methods in galenic pharmacy. J. Büchi. *Dansk Tids. Farm.* **13**, 205–31(1939).—A lecture given before the Danish Pharmaceutical Soc. Otto Johnson

Coloration in codeine solutions. Kai Rørbye. *Dansk Tidsk. Farm.* **13**, 261–72(1939)(German summary).—For the prepn. of solutio codeini spirituosa and syrupus codeicus that will remain colorless for an appreciable period it is recommended that the original codeine soln. be free of color and that the sugar sirup used contain only small amts. of invert sugar. Otto Johnson

Pharmacognostic study of the leaves of Hammamelis virginiana L. Yutake Yosida. *J. Pharm. Soc. Japan* **59**, 582–605(in German, 174–7)(1939). F. I. Nakamura

Content of free eugenol in oil of Parma violet flowers. Sébastien Sabetay and Lucien Trabaud. *Compt. rend.* **209**, 843–5(1939).—Examn. of oil of Parma violet flowers of the highest quality shows it to contain approx. 21% eugenol. A similar examn. of oil from mixed leaves of Parma and Victoria violets showed the presence of mere traces of eugenol. This difference is the chief cause of the difference in scents of the oils from the leaves and flowers (cf. Ruzicka, *C. A.* **32**, 6805⁶). C. A. Silberrad

Constituents of some Indian essential oils (Carter, *et al.*) **10.** Preserving oxidizable substances [essential oils] (Brit. pat. 508,442) **13.** Fat acids and glycerides of neem oil [medicinal properties] (Hilditch, Murti) **27.**

Substance for lowering the blood pressure. Ernst Wollheim. U. S. 2,175,334, Oct. 10. See Ger. 663,994 (*C. A.* **33**, 321[4]).

Crystallizing insulin. Melville Sahyun (to Frederick Stearns & Co.). U. S. 2,174,862, Oct. 3. A process of crystg. insulin involves prepg. an aq. soln. of insulin contg. a phosphate buffer, an org. solvent such as iso-PrOH, and $ZnCl_2$ or other sol. salt of Zn, Co, Ni or Cd, and contg. about 20–100 units of insulin per cc. of the soln., adjusting the pH of the soln. to about 6.8, heating to about 60°, sepg. the ppt. from mother liquor, gradually increasing the acidity of the mother liquor to about pH 6.0 and gradually lowering its temp. to about 4°, sepg. insulin crystals formed, increasing the acidity of the mother liquor to about pH 5.2, removing the ppt. thus formed and dissolving it in dil. H_2SO_4, adjusting the acidity of the last-named soln. to about pH 3.5, and removing the resulting ppt. Cf. *C. A.* **33**, 1446[9].

Alkylethylamines. Schering A.-G. Brit. 508,726, July 5, 1939. β- Di- and -tri-alkylethylamines contg. 11–18 C atoms are prepd. by reducing the corresponding nitriles or acid amides. The starting materials may be prepd. according to the processes of Brit. 393,055, 394,087 (*C. A.* **27**, 5755), and 469,921 (*C. A.* **32**, 729[6]). The products *possess therapeutic properties*. Among examples, (1) β,β,β-tributylethylamine is obtained by the hydrogenation of tributylacetonitrile in an autoclave with use of a Ni-kieselguhr catalyst, or by similar treatment of tributylacetamide in the presence of a Ni catalyst prepd. by reduction of pptd. basic Ni carbonate, and (2) dihexylacetonitrile is shaken with H in the presence of a Raney Ni catalyst prepd. by the process of U. S. 1,915,473 (*C. A.* **27**, 4361) to give β,β-dihexylethylamine.

Composition for treatment and prevention of mycotic and similar skin infections. Douglas T. Prehn. U. S. 2,175,780, Oct. 10. Salicylic acid 2–12, menthol 2–15, and camphor 3–15% are used with a vehicle such as alc.

Procaine butyrates as local anesthetics. Gerald F. Rorer (to Wm. H. Rorer, Inc.). U. S. 2,175,782, Oct. 10. A procaine butyrate is used in various mixts. suitable for swabing or injection, as in dental work.

Concentrates of vitamin G. Lela E. Booher and Lincoln T. Work. U. S. 2,175,014, Oct. 3. A process for the prepn. of a concentrate of vitamin G from aq. solns. thereof comprises adding an amt. of silicious adsorbent material whereby the greater part of the vitamin is adsorbed from the soln.; sepg. the silicious adsorbent from the body of the soln.; treating the silicious adsorbent with water, alc. or dil. HOAc at an elevated temp.; sepg. the solvent from the adsorbent at a temp. above that at which adsorption had taken place; prepg. an aq. soln. from the eluate by removing any nonaq. solvent which may be present; adding an amt. of adsorbent C to the soln. whereby the greater part of the vitamin is removed from the soln.; sepg. the C from the soln.; eluting vitamin G from the C with benzene-alc. and sepg. the benzene-alc. from the C at an elevated temp.; and evapg. the benzene-alc. from the so-produced soln.

Preparing purified testosterone. Ernst Laqueur, Karoly G. David, Elizabeth Dingemanse and Janos Freud (to Ciba Pharmaceutical Products, Inc.). U. S. 2,175,963, Oct. 10. A soln. contg. testosterone in an org. solvent (preferably acetone of 60% concn.) which is inert to H_2SO_4 is extd. with 55–75% H_2SO_4, and the H_2SO_4 layer formed is dild. with water to a concn. not higher than 40% H_2SO_4, the soln. is extd. with a solvent immiscible with water, such as ether, the org. solvent is removed by evapn., and the residue is subjected to distn. in a high vacuum and the distillate is collected. Various details and modifications of procedure are given, and a cryst. product is obtained, m. 154–154.5° after several recrystns. from dil. acetone.

Separation of phenols from solvents such as those of germinal gland hormone solutions. Erwin Schwenk and Bradley Whitman (to Schering Corp.). U. S. 2,174,532, Oct. 3. Impure solns. such as those of hormones are treated under substantially anhyd. conditions with an excess of an inorg. alk. compd. reacting with phenolic hydroxyls to effect pptn. of the phenols, and pptd. phenolate material is sepd.

Purifying antibody compositions. Ivan A. Parfentjev (to Lederle Laboratories, Inc.). U. S. 2,175,090, Oct. 3. A method of purifying a soln. contg. antibodies assocd. with proteins involves adding a proteolytic enzyme such as pepsin, active in acid media, to the soln., adjusting the pH to about 3.0–3.2 and digesting the proteins without substantial destruction of the antibodies for about 2–6 hrs. after adding the enzyme, filtering and treating the filtrate with finely divided tri-Ca phosphate.

Germicidal alkylated halophenols. Lindley E. Mills (to Dow Chemical Co.). U. S. 2,176,010, Oct. 10. By the direct action of Cl or Br on alkyl phenols (heated to above the m. p. or in a solvent) or by other reactions such as: (1) the condensation of a halogenated phenol with an alkyl halide in the presence of a catalyst such as $ZnCl_2$ or $AlCl_3$; or, (2) hydrolysis of a di- or tri-halogenated alkyl-substituted benzene in the presence of a suitable catalyst, *e. g.*, Cu or Cu_2O; or, (3) diazotization of a halo-alkyl aniline and decompn. of the resulting product, germicidal compds. are produced such as: 2-chloro-4-*tert*-butylphenol, b_{3-4} about 85–6°; 2-bromo-4-*tert*-amylphenol, b_{6-7} 119–20°; 2,6-dibromo-4-*tert*-octylphenol, b_{3-6} 158–163°; 2-chloro-4-hexylphenol, b_{8-10} 143–6°; 2,6-dichloro-4-hexylphenol, b_8 154°; 2-bromo-4-octylphenol, b_{11} 172–3°; and 2,4-dibromo-6-octylphenol, m. 28° and b_7 190–2°. Details of the production of these compds. are given; and general mention is made of the similar production of other compds. such as 2-bromo-4-*sec*-butylphenol, 2,6-dichloro-6-isobutylphenol, 2,6-dibromo-4-*sec*-amylphenol, 2-chloro-4-*sec*-heptylphenol, 4-bromo-3-*sec*-butylphenol, and 2-chloro-6-*sec*-amylphenol. The products have a high germicidal action against *Staphylococcus aureus*, *E. typhi* and *B. typhosus*.

Bactericidal product. Meyer S. Glauser. U. S. 2,174,976, Oct. 3. A bactericidal product suitable for use on the skin is produced by heating equal amts. of *m*-dihydroxybenzene and gum camphor to the b. p. and continuing boiling for 5 min.

Cosmetic for preventing or reducing sunburn. Charles L. Parsons (50% to Henry C. Parker). U. S. 2,175,213, Oct. 10. A substantially flesh-colored, flaked, light-wt. metal powder such as dyed or pigmented Al is dispersed in a vehicle such as petrolatum, etc.

Detergents suitable for toilet use. Robert A. Duncan (to Procter & Gamble Co.). U. S. 2,175,285, Oct. 10. A detergent in bar form substantially free from soap contains predominantly a mixt. consisting of 5–60% of a satd. superglycerinated fat having at least 12 C atoms in the fat acid radical and not less than about 40% of a substantially solid water-sol. salt such as the Na salt of a compd. from the group consisting of the following, in all of which the alkyl radical contains more than 8 C atoms: sulfonated aliphatic alcs., sulfated aliphatic alcs., sulfonated aliphatic hydrocarbons, sulfated aliphatic hydrocarbons, fatty acid esters of hydroxyethane sulfonic acid, fatty acid amides of methylaminoethane sulfonic acid, fatty acid esters of dihydroxypropane sulfonic acid and alkyl ethers of dihydroxypropane sulfonic acid.

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

E. M. SYMMES

Automatic control and regulation in the production of sulfuric acid. K. F. Pavlov, E. G. Golubev and B. I. Arkhangel'skiĭ. *Avtomatika i Telemekhanika* **1938**, No. 1, 107–22; *Khim. Referat. Zhur.* **2**, No. 3, 88(1939).—By means of several examples, problems are illustrated which are encountered in the introduction of automatic control

and regulation of H_2SO_4 production. An automatic regulator for the dilu. of fuming H_2SO_4 to 98.5% is operated by measurement of the concn. of the acid by elec. resistance. W. R. Henn

Intensification of the tower sulfuric acid process. V. N. Shul'ts. *Wiss. Werke moskau. mendelejeff. chem.-tech. Inst.* **1938**, No. 3-4, 5-10; *Khim. Referat. Zhur.* **2**, No. 1, 74(1939); cf. *C. A.* **32**, 2295[3]; **33**, 1887[4].—The tower system consisted of 7 towers, 5 of which were formerly used as towers of the Glover and Gay-Lussac system. A yield of 77.5 kg./cu. m. was obtained, with an expenditure of HNO_3 of approx. 15 kg./ton of H_2SO_4. The process of H_2SO_4 formation was practically completed in the first 3 towers, which comprised 45% of the total vol. of the system. The first 2 towers served as denitrators at the same time, and absorption of the N oxides took place in the 3rd tower. This points to the possibility of combining (in definite limits) the production and the absorption parts of the tower system. W. R. Henn

Problems of the magnesium salts. N. S. Spiro. *Byull. Inst. Halurgii* **1938**, No. 1, 28-46; *Khim. Referat. Zhur.* **2**, No. 3, 98(1939).—Salt lakes are the purest, cheapest and most abundant sources of Mg. The solns. of Mg salts were electrolyzed, with diffusion diaphragms; a good yield was obtained, especially with a cathode, c. d. of 0.004-0.03 amp./sq. cm. A yield of 90-95% was obtained from the electrolysis of solns. contg. NaCl and $MgSO_4$. The ppt. contained fairly pure $Mg(OH)_2$, with admixts. of Mg(OH)Cl. A cycle was developed for the pptn. of Mg from solns. by means of NaOH, which was prepd. by electrolysis of NaCl and Na_2SO_4 from the solns. after the pptn. of Mg. In electrolysis of astrakanite contg. 150 g./l. of H_2SO_4, about 3.5-4.5 kw.-hrs. per kg. of $Mg(OH)_2$ was used. The method of extn. of $Mg(OH)_2$ from sea water according to (Ba, Ca)S + $MgCl_2$ + $2H_2O$ = (Ba, Ca)Cl_2 + $Mg(OH)_2$ + H_2S was investigated, and the method for obtaining MgO by liming was studied. Pptn. and filtration are facilitated by addn. of fine, unslaked lime, or by coagulation. The tanning exts. are good coagulants. W. R. Henn

Alkaline decomposition of kaolin for the recovery of alumina. W. D. Treadwell and H. Schneeberger. *Helv. Chim. Acta* **22**, 1048-58(1939).—A constitutional formula for kaolinite is given and discussed. Equations showing the assumed decompn. reactions are developed when mixts. of soda, $CaCO_3$ and kaolinite are heated. The decompn. of kaolinite depends upon temp. and time. The amt. of CO_2 evolved shows the extent of the reaction. Detns. were made of the proportion of immobilized alkali in the decompd. melt, and the quantities of SiO_2 going into soln. during the hydrolytic decompn. Most of the immobilized alkali in the melt can be recovered by hydrothermal decompn. The insol. residue had the compn. of a portland cement. A. W. King

Manufacture of alum, ferric sulfate and sodium aluminate. F. A. Abbiati. *J. New Engl. Water Works Assoc.* **53**, 247-54(1939).—Kalinite, alunite, pyrites schist, clay, kaolin and bauxite are basic materials for the manuf. of alum or Na aluminate, and the procedure is very similar save that H_2SO_4 is the dissolving medium with alum and an alk. soln. is used for Na aluminate. Ferrisul is the only ferric coagulant mentioned. D. K. French

Recent progress in the production of ammonium nitrate. Dino Maveri. *Chimica e industria* (Italy) **21**, 572-7(1939).—A description of the latest improvements made in the Fauser process (cf. Fauser, *C. A.* **25**, 3132; Pastonesi, *C. A.* **31**, 1963[6]). A. W. Contieri

The preparation of magnesium chloride flakes. G. S. Klebanov, V. M. Bukshtein and I. O. Evert. *Byull. Inst. Halurgii* **1938**, No. 7, 24-31; *Khim. Referat. Zhur.* **2**, No. 3, 98-9(1939).—In a lab. app., a boiler-iron cylinder of 0.5 sq. m. surface, cooled internally with water, revolves in a trough contg. fused $MgCl_2$. The crust of $MgCl_2$ is removed from the cylinder by a scraper. The optimum conditions for the prepn. of $MgCl_2$ flakes were: temp. of the melt in the trough 160-140°, velocity of cylinder 14 revolutions/min. The output was 0.3 ton/hr./sq. m. of cylinder surface and thickness of the flakes up to 1 mm. W. R. Henn

Natural soda in Siberia. A. S. Eliseev. *Byull. Inst. Halurgii* **1938**, No. 3, 42-59; *Khim. Referat. Zhur.* **2**, No. 3, 27(1939).—The soda-contg. lakes found in different parts of Siberia, which are of com. interest, are enumerated. Comparative characteristics and the tech., economic problems for their exploitation are discussed. W. R. Henn

Hydrolysis of titanium sulfate. B. A. Tsarev and Velikoslavinskiĭ. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 6-7, 39-48; *Khim. Referat. Zhur.* **2**, No. 2, 107(1939).—As a result of preliminary expts. for the prepn. of TiO_2 by hydrolysis of dil. solns. of $Ti(SO_4)_2$ (about 120 g./l.), products of satisfactory filtering properties and color were obtained. Three methods were used: (1) a preliminary hydrolysis of 10-20% of the total vol. of soln. at a concn. of $Ti(SO_4)_2$ of 250 g./l. followed by addn. of dil. $Ti(SO_4)_2$ with a ratio (*R*) of active acid to TiO_2 of 2.45 or 2.58; (2) a preliminary hydrolysis of the $Ti(SO_4)_2$ soln. (*R* = 2.65) equal to 10-20% of the total vol., followed by the addn. of basic or neutral sulfate; (3) hydrolysis of the weak $Ti(SO_4)_2$ solns. with *R* = 2.44 in the presence of ZnO. The ZnO increased considerably the velocity of hydrolysis during the first hr., after which the velocity dropped sharply. Tests of direct hydrolysis of dil. basic or neutral solns. gave products of poor filtering properties. W. R. Henn

Helium, its sources, production and use. A. W. Trusty. *Refiner Natural Gasoline Mfr.* **18**, 325-6(1939). W. L. Benedict

Changes in the concentration of bromine in the saline waters of the lakes of the Kulundinskiĭ steppe. V. M. Bukshteĭn and N. I. Visyagin. *Byull. Inst. Halurgii* **1938**, No. 8, 48-54; *Khim. Referat. Zhur.* **2**, No. 3, 26-7(1939).—Lake Kulundinskoe contains 0.0052-0.0085%, Lake Kuchuk 0.026-0.0317%, Lake Bol'shoe Yarovoe 0.0263-0.0267%, Lake Burlinskoe 0.0547-0.0814% of Br. These values are slightly higher than values found by other investigators in 1932 and in 1935; this is attributed to evapn. of water from the lakes. Tabulated results show the change in Br concn. throughout the year for the main lakes of the Kulundinskiĭ steppe. W. R. Henn

A complete utilization of sea salt. N. S. Spiro. *Byull. Inst. Halurgii* **1938**, No. 3, 21-30; *Khim. Referat. Zhur.* **2**, No. 3, 96(1939).—The climatic conditions, transportation facilities and proximity of the Azov Sea are factors which permit a complete utilization of the strong salt solns. of waters found in Sivash for the production of NaCl, Br, MgO and its derivs. (carbonates, Sorel cement, etc.), $MgSO_4$ and Na_2SO_4. The technological scheme for the pptn. of Mg with lime is described. W. R. Henn

Industrial utilization of the Kulundinskiĭ salt deposits. V. M. Bukshteĭn. *Byull. Inst. Halurgii* **1938**, No. 7, 40-50; *Khim. Referat. Zhur.* **2**, No. 3, 26(1939).—Lake Kuchuk (160 sq. km.) is a reservoir of sulfates. About 600 million tons is contained in its saline waters and in its strata. Lake Bol'shoe Kulundinskoe (750 sq. km.) is less mineralized (7% of salts) and has no bottom deposits. The saline waters of Lake Kuchuk can be regarded as a (Na^+, Mg^{++}) $(Cl^-, SO_4^{--})H_2O$ system. Other ions are contained in very small amts. In winter, 380-640 thousand tons of mirabilite (150-60 kg./sq. m. of the saline water) is deposited. With increase of the temp. of the H_2O, the mirabilite dissolves. The d. of the saline water and its sulfate content increased steadily from 1930 to 1936 (the concn. of sulfate from 1.74 to 4%). The water remains satd. with NaCl; this might offer difficulties in the utilization of the Lake Kuchuk as a source of sulfates. Its water should be dild. with the water from the less mineralized Lake Bol'shoe Kulundinskoe. Soda, sulfates, Na_2S and a no. of other salts could be produced from it on a com. scale. Methods for the production of mirabilite are proposed. W. R. Henn

A technological scheme for the complete utilization of the Sivash saline water. R. A. Mandel. *Byull. Inst. Halurgii* **1938**, No. 5, 23-8; *Khim. Referat. Zhur.* **2**, No. 3, 96(1939).—Two different technological treatments of

the Sivash saline water are proposed consisting of a preliminary concn. (I) and of the diln. of the saline water (II). According to I, the saline water of western Sivash, of 6°Bé., contg. about 0.5% of $MgCl_2$ is evapd. in reservoirs to 13% $MgCl_2$ (a ppt. of NaCl is formed). After the sepn. of Br by blowing, the saline water is treated with a $CaCl_2$ soln. for the sepn. of SO_4^{--}. The gypsum residue is used for the manuf. of alabaster. The $MgCl_2$ soln. is partly passed into the reservoir for further evapn. and partly treated with slaked lime for the production of different grades of MgO or of $MgCO_3$. The $CaCl_2$ soln. (which remains after the pptn. of $Mg(OH)_2$) is evapd. and the sulfate pptd. from it. The part of the $MgCl_2$ soln. which was evapd. in the reservoir is used for the production of Sorel cement or of gypsum-Mg cement. In II the saline water of the southern reservoir of Sivash, of 12°Bé., is mixed with water from the Azov Sea in the ratio 1:3.43 to prevent the sepn. of gypsum in the following treatment. The dild. saline water is decarbonized with milk of lime and after sepn. of the carbonate and of Br, a ppt. of $Mg(OH)_2$ is obtained. W. R. Henn

Foam formation in natural salt solutions and its prevention. L. M. Zarudskiĭ and T. V. Korobochkina. *Byull. Inst. Halurgii* **1938**, No. 3, 13–20; *Khim. Referat. Zhur.* **2**, No. 3, 97–8(1939).—The formation of foam is caused by the simultaneous presence of carbonates, org. substances and mech. admixts. Their removal from solns. decreases considerably or overcomes completely formation of foam and increases simultaneously the surface tension. To remove foam-forming substances, chlorinated $Fe_2(SO_4)_3$ was added to the soln. until its presence could be detected in the filtrate by means of $K_4Fe(CN)_6$. A scheme for the lab. expts. is given. W. R. Henn

The concentration of hydrogen ions and the surface tension of natural salt solutions. L. M. Zarudskiĭ and T. V. Korobochkina. *Byull. Inst. Halurgii* **1938**, No. 6, 1–16; *Khim. Referat. Zhur.* **2**, No. 3, 7(1939).—A no. of curves are given of potentiometric titrations (with quinhydrone electrode) of the natural salt solns. (well water, Chusovskn and Beyuk-Shorskiĭ saline waters, etc.). All solns. investigated possessed considerable buffer properties, which were caused by the presence of salts of weak org. acids. The accuracy of the detns. was very low. Curves of parallel detns. varied greatly; this may be explained by the inconstancy of the compn. of the solns. The surface tensions in a no. of cases were greatly lowered (in spite of a large concn. of the salts) by the presence of org. compds. The characteristics of waters, of different depths and concns., depending on their chem. compn. and origin, are shown. Causes detg. their pH values (hydrolysis, equil. between CO_2 and the carbonates, etc.) are discussed. W. R. Henn

Problems and investigations of the Crimean salt-bearing lakes. V. E. Grushvitskiĭ. *Byull. Inst. Halurgii* **1938**, No. 2, 68–89; *Khim. Referat. Zhur.* **2**, No. 3, 96–7 (1939).—The Crimean lakes contain considerable amts. of Br. A method for the prepn. of fine NaCl was developed by salting out with a concd. salt soln. having a high content of $MgCl_2$. Up to 45% of the $MgSO_4$ content was obtained at 5° from the mother liquor (after the sepn. of NaCl). Conditions for the enriching and sepn. of $MgCl_2$ from the solns. and of its bleaching were investigated. Refining of crude Br, increase of its concn. and the technological production were studied. Conditions for sepn. of Na_2SO_4 (thenardite) were investigated; the contents of K in solns. and of Cl in $FeBr_3$ were detd. On the basis of the exptl. results obtained a project for the construction of the Perekop Br-producing plant was developed. W. R. Henn

Salt-bearing formations of the western slope of the Ural mountains as a base for the salt-working industry. P. I. Preobrazhenskiĭ. *Byull. Inst. Halurgii* **1938**, No. 1, 47–60; *Khim. Referat. Zhur.* **2**, No. 3, 25(1939).—The complex exploitation of the salt-bearing formations bounded by the western slope of the Ural mountains and the Kama and Volga rivers in the east is discussed. The presence of rich deposits of NaCl, sylvinite, carnallite (in Solikams, Berezniki, Usol'e and the Dedyukhin's mines), halite and salts richer in K_2SO_4, the content of Br in brines (up to 1500 mg./l. in Ust-Borovskiĭ) and of I (up to 120 mg./l. in Chusovskie Gorodki), and the presence of H_2S (up to 1000 mg./l.), and of borates, make possible the development of chem. industry in this region. The presence of petroleum (in Chusovskie Gorodki and in Ishimbaevo) and of natural gas, in conjunction with the water resources of the Kama and Volga rivers as a source of hydroelec. power, create exceptional conditions for the development of this region. W. R. Henn

Possible ways for the utilization of astrakanite. V. E. Grushvitskiĭ. *Byull. Inst. Halurgii* **1938**, No. 7, 9–23; *Khim. Referat. Zhur.* **2**, No. 3, 97(1939).—Astrakanite is found in considerable amts. in lakes near the Aral Sea. Essentially the same products (Na_2S and MgO) were obtained by the reduction of astrakanite with different gases (H_2, CH_4, CO) or with coal at high temp. Na_2S can be sepd. from MgO by lixiviating the melt with water. At optimum conditions (900–1000°) the duration of the process was 1–2 hrs. The amt. of reducing agent used was 0.1–0.7 tons per ton of astrakanite. A practically complete reduction of astrakanite was obtained when suitable reducing agents were used. A ppt. of Glauber's salt was obtained by freezing out the astrakanite transferred into soln. at −5, 0 and +5°. From a more concd. soln. a ppt. of $MgSO_4$ was formed, besides the Glauber's salt. The max. yield of Glauber's salt was 20–5% of the wt. of the soln. By isothermal evapn. of the mother liquor at 25° (after freezing out the Na_2SO_4) crystals of pure epsomite ($MgSO_4.7H_2O$) were obtained, at a $MgSO_4$ yield up to 65%. The disadvantage of this process is that Na_2SO_4 is sepd. in the form of Glauber's salt, from which the combined water must be removed. Pure Na_2SO_4 can be obtained only by salting it out with NaCl. By mixing astrakanite with NaCl in definite proportions, and keeping the mixt. in a thermostat at 55° until equil. is reached, a pure cryst. Na_2SO_4 was obtained, at a yield of SO_4^{--} up to 53% of its content in the soln. The velocity of soln., sp. gr. and mineralogical compn. of astrakanite were detd. W. R. Henn

Bleaching clays find increasing use. G. Austin Schroter. *Eng. Mining J.* **140**, 35–8, 40(Nov., 1939).—Improved demand has brought about some innovations in prospecting, mining and prepn. A discussion, including a classification of the bleaching clays, uses, geology, mining, prospecting, prepn. and milling. W. H. Boynton

Continuous activation of refining clays. M. L. Blagodarov. *Rabochiĭ Neftyanik* **1938**, No. 2, 21(1938); *Khim. Referat. Zhur.* **2**, No. 1, 91(1939); cf. *C. A.* **33**, 7500².—In lab. expts., 35% of H_2SO_4 (15–20% concn.) is passed together with finely ground clay to the top of a column. The temp. is maintained at 90°. The clay settles gradually and is removed from the bottom. H_2SO_4 is pressed out and 500% of water (on the wt. of clay) is used to wash the clay free from the acid and salts. Expts. on a semiproduction scale are contemplated. W. R. Henn

Revivifying bone char. A new method and apparatus. Edgar W. Rice. *Ind. Eng. Chem.* **31**, 1516–18(1939).—The app. comprises a rotating drum 4 ft. in diam. and 30 ft. long, with a firebrick combustion chamber at the lower end. Temp. is controlled by a thermocouple in the stream of outgoing material. The upper end is enclosed by a brick chamber with a flue to the stack and a duct to a recirculating fan. A mixt. of air and combustion gases cools the reactivated char and elevates it to the settling chamber. From this chamber the gases are led back to the combustion chamber. Oil is used as fuel; by the recirculation of gases, lower treating temp. is required. E. M. Symmes

Mech. properties and creep resistance of steels for use in equipment for NH_3 synthesis (Minkevich, Borzdyka) 9.

Sulfuric acid. Peter S. Gilchrist and James M. Rumple (to Chemical Construction Corp.). U. S. 2,174,739, Oct. 3. An arrangement of app. is described, and a method of simultaneously producing concd. H_2SO_4 from H_2S and concd. separated sludge acid which comprises burning

H_2S to form a moisture laden SO_2 gas, drying the SO_2 gas by a circulation of H_2SO_4, oxidizing the dried SO_2 to SO_3 in a contact H_2SO_4 process, introducing a portion of the dild. acid from the drying circuit together with sepd. sludge acid into a concentrator and subjecting the acid mixt. in the concentrator to heat produced as a result of the combustion of H_2S partially to conc. the acid mixt., introducing a portion of the partially concd. acid into the drying-acid circuit, absorbing the SO_3 produced by the contact process in an absorber circuit and introducing the remaining portion of the partially concd. acid from the concentrator into the absorption circuit to transform it into strong H_2SO_4.

Sulfur dioxide for producing sulfuric acid and ferric sulfate. Harmon E. Keyes. U. S. reissue 21,215, Sept. 26. A reissue of original patent No. 2,055,082 (*C. A.* **30**, 7793[4]).

Alkaline earth salts of alkyl sulfates. Anton J. Tulleners (to Shell Development Co.). U. S. 2,176,005, Oct. 10. At a temp. between 60° and 120°, a H_2SO_4-contg. alkyl acid sulfate of at least 7 C atoms is treated with a basic alk. earth metal compd. such as $Ca(OH)_2$ in the presence of sufficient acetone to cause pptn. of cryst. alk. earth metal sulfate. 3

Nitrates and chlorinated organic compounds. Mayor P. Fogler (to Solvay Process Co.). U. S. 2,174,574, Oct. 3. An arrangement of app. is described, and a process for the production of a nitrate such as $NaNO_3$ and a chlorinated org. compd. such as PhCl which involves: (1) causing HNO_3 to react with a metal chloride such as NaCl to form a nitrate and a gas contg. NOCl and Cl; (2) causing the NOCl to react with an org. compd. such as C_6H_6 to form a chlorinated compd. such as PhCl and a gas contg. N oxide and HCl; (3) passing the gas just mentioned in contact with an aq. liquor to absorb and sep. the HCl; (4) treating the N oxide with water and O to form HNO_3; and (5) utilizing the HNO_3 from step "4" to form addnl. metal nitrate. 4

Recovery of aluminum compounds from coal. Lucien Freling and Jules Dorten. U. S. 2,174,825, Oct. 3. A process for the recovery of Al compds. from coal, and the combustible waste materials obtained from the washing and screening of coal, involves mixing the raw material with milk of lime in a porportion of about 2.5% calcd. on the ash content of the raw material, burning the mixt. at temps. commonly attained in boiler furnaces, and treating the resulting ash with HCl at boiling temp. under atm. pressure. 6

Ammonium nitrate. Giacomo Fauser (to Montecatini, Società generale per l'industria mineraria ed agricola). U. S. reissue 21,217, Sept. 26. A reissue of original patent No. 1,987,552 (*C. A.* **29**, 1593[6]). 7

Calcium carbide. Frederick T. Snyder. U. S. 2,174,900, Oct. 3. An arrangement of app. is described, and a process for producing CaC_2, which, when carried out in an app. comprising an upright kiln communicating with an elec. furnace directly below, involves charging the kiln with mixed lime-producing material such as limestone or oyster shells and oil-contg. carbonaceous fuel such as wood or coal, and distg. the oil vapors from the fuel and converting the charge into lime and carbon by passing hot gases upwardly through the fuel, withdrawing the gases and vapors from the upper portion of the kiln, consuming a portion of the C content of the fuel in the kiln to effect distn. of the oil vapors by introducing O-contg. gases to the fuel bed at the lower portion of the kiln, discharging the lime and the remaining C direct to the elec. furnace without substantial heat loss, and heating the charge in the elec. furnace in a reducing atm. at a temp. sufficient to convert it into CaC_2, the process involving also stripping the oil vapors from the gases withdrawn from the kiln and cooling the residual gases, and controlling the temp. and partial pressure on the oil vapors in the distn. zone of the kiln by returning a portion, at least, of the cooled residual gases to the kiln at a point intermediate the zone at which the O-contg. gases are introduced to the kiln and the zone at which the oil-laden gases are withdrawn from the kiln. 1 2

Basic copper sulfate. Marcel Serciron. U. S. 2,175,132, Oct. 3. See Ger. 667,792 (*C. A.* **33**, 2662[1]).

Sodium tripolyphosphate. Ferdinand Bornemann and Hans Huber. U. S. 2,174,614, Oct. 3. A process for the prepn. of Na tripolyphosphate corresponding to the formula $Na_5P_3O_{10}$ from a Na phosphate melt having a stoichiometric $Na_2O:P_2O_5$ ratio of 1.667 comprises cooling the melt to bring it to the solidification point, and then further cooling it at an extremely slow rate below the softening temp. but above 300°, until substantially complete conversion to tripolyphosphate form is achieved.

Coherent zirconium silicates. Charles J. Kinzie (to Titanium Alloy Mfg. Co.). U. S. reissue 21,224, Oct. 3. A reissue of original patent No. 2,101,947 (*C. A.* **32**, 1067[3]).

Removing hydrogen sulfide from air. John C. Goshorn and Paul O. Rockwell. U. S. 2,175,190, Oct. 10. An adsorbent is used comprising activated charcoal impregnated with an inorg. compd. of an O acid of As such as Na arsenate.

Rectifying apparatus with bubble cap trays suitable for separating oxygen, nitrogen, argon and neon. Peter Peff. U. S. 2,175,360, Oct. 10. Various structural details.

Purifying native rock salt and other soluble materials. Thomas P. Campbell and Wm. B. Jacobsen. U. S. 2,175,178, Oct. 10. For purifying native rock salt, native borax or by-product chloride of lime, contg. a minor proportion of insol. earthy constituents as impurities, the finely divided material is introduced into an aq. soln., satd. with the compn., to form a pulp, and insol. impurities are collected in a froth-flotation treatment without material change in temp. by the action of a fatty acid compn. such as Na oleate and oleic acid, in a proportion of about 8 oz. per ton or less, while flotation of the solid but sol. constituents of the compn. is retarded, as by the use of lime or Na silicate. 5

Treating rock or evaporated salt. Marnell Segura (to Jefferson Island Salt Mining Co.). U. S. 2,174,450, Sept. 26. For maintaining it in soft, moist condition, rock or evapd. salt is mixed with an aq. soln. contg. $CaCl_2$ and water, each in an amount 0.1–5% the wt. of the salt.

Obtaining soluble products from alunite. Frank K. Cameron, Ernest O. Huffman and Joseph A. Taylor. U. S. 2,174,684, Oct. 3. Alunite is heated with an alkali metal sulfide (or with components forming such a sulfide, such as coal and K_2SO_4) supplying alkali metal more than sufficient to combine with the alumina of the alunite, to effect reaction with formation of sol. alkali metal aluminate; the resulting product is leached and the leach liquor is treated with a reagent such as a gas contg. CO_2 for pptg. alumina from the alkali metal aluminate formed and forming sol. salts of the alkali metal. 8

Activating clay. James W. Weir (one-third to Henry S. Montgomery). U. S. 2,174,610, Oct. 3. An activated clay suitable for use in treating oils, sugar solns., etc., is prepd. by bringing comminuted clay, suspended in water, into contact with SO_2 and Cl, and sepg. the activated clay from sol. products of reaction.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

The present position of the glass industry in Poland. H. Freytag. *Glastech. Ber.* **17**, 290–2(1939). J. F. H.

Artistic colors for glass. V. Ya. Lokshin and M. S. Fedorova. *Steklo'naya Prom.* **1938**, No. 7, 31–2; *Khim. Referat. Zhur.* **2**, No. 1, 85(1939); cf. *C. A.* **33**, 1894[9].—The best red Cd-Se pigments contain 10–20% of Se. Pigments contg. less than 10% of Se have an orange tint, while the shade of a pigment contg. more than 20% of Se

approaches brown. A mixt. contg. 78.6% of $CdCO_3$, 13.4% of S, and 8.0% of Se was investigated in detail. It was roasted at 540–50° for 10 min. X-ray investigation showed that the product was a solid soln. of α-CdS.-CdSe. The rich Pb fluxes were found unsuitable for the Se pigment; they were replaced by low-melting Pb-free fluxes. Best results were obtained from a color which was prepd. by the addn. of 10% of the analyzed pigment to the flux. W. R. Henn

The coloring substance in the so-called carbon yellow glasses. II. The coloring by polysulfides of glasses free from heavy metals. C. Neumann and A. Dietzel. *Glastech. Ber.* **17**, 286–90(1939); cf. *C. A.* **33**, 2296[8].—In Part I of this work it was shown that the so-called carbon yellow glasses owe their color not to carbon but to sulfides formed as a result of reducing conditions. By working with a base glass of the compn. 74% SiO_2 (synthetic with 0.0002% Fe_2O_3), 20% Na_2O, 6% CaO with $^1/_4$–$^1/_2$ of the Na_2O added as Na_2SO_4, and adding 2–3 equivs. of carbon, yellow to orange-red glasses result. Reducing conditions are used in melting. The colors are due to polysulfides, not to base metals such as iron. The presence of iron results in dull brownish colors. The yellow colors are due to lower polysulfides, while the orange-red and red colors are due to higher polysulfides. Aq. polysulfide solns. were studied for comparison with the glasses. There is close similarity in behavior of the absorption spectra. In dild. aq. solns. of Na_2S lower polysulfides are formed first, while in concd. Na_2S higer polysulfides are formed directly even with relatively small amts. of added S apparently involving only the ionized Na_2S. The present glass (high concn. of Na_2O) corresponds in behavior to a concd. soln. of Na_2S in which lower polysulfides are not stable. The color depth attainable in lower alkali glasses is less owing to greater volatility as well as to the tendency to form lower polysulfides. J. F. Hyde

Gases in glass. S. E. Nekrasov. *Stekol'naya Prom.* 1938, No. 7, 21–6; *Khim. Referat. Zhur.* 2, No. 1, 84 (1939). The changes of the amts. and the compn. of gases during melting were investigated. In a series of samples taken 11, 13 and 23 hrs. after the mixing, and in the second series after 3, 5, and 7 hrs., the total gas content was not materially changed. The compn. of the gas mixt undergoes considerable changes during the process of digesting. CO was found in the gases even when no carbonates were added to the mixt. It is concluded that the gases appear in glass as a result of the interaction of glass with the furnace atm. The gas content in glass produced in a high-frequency lab. oven was $^1/_{10}$ to $^1/_{12}$ of that in glass produced on an industrial scale. The production of gas in glass is very complex, is not the same for all grades of glass, and is caused by phys. soln. of the gas, satn. and supersatn., and by thermal decompns. connected with very complex mol. rearrangements of the different glass forming substances. W. R. Henn

A combination furnace for glass manufacture. M. G. Stepanenko, L. K. Kovalev and B. M. Polik. *Keram. i Steklo* 1938, No. 3, 31-9; *Khim. Referat. Zhur.* 2, No. 1, 122(1939).—Expts. on a semi-plant scale are described. The combination system combines the work of the shaft furnace and the bath furnace. In the shaft furnace fusion and glass formation take place; in the bath furnace degasification and homogenization occur. The usual reservoir of the glass-producing furnace is connected by means of a sloping duct to a shaft. Production is increased by this combination arrangement. W. R. Henn

The use of the dynamic viscometer in the glass tank furnace. M. S. Kazanskiĭ. *Stekol'naya Prom.* 1938, No. 10, 27–9; *Khim. Referat. Zhur.* 2, No. 3, 99(1939).—The dynamic viscometer of K. G. Kumanin was tested in the tank furnace of the Gor'kiĭ glass plant. A ball of heat-resisting steel, suspended on a steel wire, was immersed in the glass mass. The whole system was rotated by means of an elec. motor. The app. was found to react well to the changes of the η of the glass mass. The app. is graduated and gives the η in poises. W. R. Henn

Brick with a light filler. P. Solov'ev. *Keramika* 1939, No. 2, 16–17.—Clay brick can be made with an addn. of a considerable amt. of crushed pumice. E. E. S.

Determination of the moisture content of ceramic masses. S. Makarin. *Stroitel. Materialy* 1938, No. 3, 21–3; *Khim. Referat. Zhur.* 2, No. 2, 69(1939); cf. *C. A.* **33**, 5141[6].—A dielec. method for the detn. of the moisture content, and an app. for its measurement are described. The accuracy is ±1%. This app. can be utilized for the detn. of the moisture in ceramic masses. W. R. Henn

Separators (used in the ceramic industry). N. P. Vaganov. *Ogneupory* 1938, No. 1, 955–61; *Khim. Referat. Zhur.* 2, No. 1, 123–4(1939). W. R. Henn

Introduction of semiacid refractories in reheating furnaces of the Stalin New Kramatorsk Machine Works. K. I. Popov. *Ogneupory* 7, 141-3(1939).—Semiacid quartz-clay brick (sand:clay = 1:1) showed satisfactory service in a reheating furnace during 4 months in one case and over 6 months (still working) in another case and is preferred to grog brick. E. E. Stefanowsky

Acid- and alkali-resistance of some vitreous enamel ware. Amando Clemente and Loreto Alzate. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 51–7(1939).—The resistances of com. samples of Swedish, American and Japanese enamel ware to dil. solns. of citric acid, AcOH and NaOH were detd. George Ayers

Installation of a large gas-fired continuous vitreous enameling furnace (Michael) **21**. Elec. device for burning in furnace linings of glass-melting furnaces (U. S. pat. 2,174,927) **4**.

Glass. Frederick L. Koethen and Ignatius J. Wernert (to E. I. du Pont de Nemours & Co.). U. S. 2,174,517, Oct. 3. In order to make a carbon amber glass, there is introduced into a glass melt about 1–5% of NaCN or other metal cyanide, cyanate or cyanamide.

Tank for melting materials such as glass. Henry H. Blau and Kenneth K. Knaell (to Carborundum Co.). U. S. 2,174,458, Sept. 26. In melting-tank construction, there are used a plurality of cast refractory blocks forming a wall and having seams between the blocks extending away from the material contacting surfaces of the blocks, the faces of the blocks at the seams being formed with complemental grooves, the grooves on opposed faces of each block being opposed but with the grooves on adjacent faces of the blocks being offset from each other, conduits positioned in the complementary grooves, and header pipes connected to the ends of the conduits and adapted to pass cooling fluid through the conduits, the conduits serving to hold the blocks in position and to cool the seam around each block whereby molten material attempting to escape through the seam is solidified.

Apparatus for feeding mold charges of molten glass. Karl E. Peiler (to Hartford-Empire Co.). U. S. 2,175,-407, Oct. 10. Various structural and operative details.

Apparatus for feeding and severing mold charges of molten glass. Frank L. O. Wadsworth (to Ball Bros. Co.). U. S. 2,174,905, Oct. 3. Various structural, mech. and operative details.

Ruby glass. Frank J. Dobrovolny, John M. Youel and Harold E. Klein (to E. I. du Pont de Nemours & Co.). U. S. 2,174,554, Oct. 3. A glass melt is used which contains a Cu compd. such as Cu cyanide or Cu_2O and a metal cyanide, cyanate or cyanamide such as NaCN.

Apparatus for forming hollow glass articles such as lamp bulbs. Leonard D. Soubier (to Owens-Ill. Glass Co.). U. S. 2,174,930, Oct. 3. Various structural, mech. and operative details.

Treating the interior of glass containers such as jars or bottles to effect neutralization of alkali. Oscar G. Burch (to Owens-Ill. Glass Co.). U. S. 2,175,076, Oct. 3. App. is described, and a method which involves annealing the containers, depositing in each container a quantity of a solid such as S in pellet form, which when fired creates an acidic gas, and subjecting the containers with the solid in them to an atm. of heat to fire the solid and create the acidic gas in the container.

Ornamental glass. Al Selsky. U. S. 2,174,899, Oct. 3. A method of prepg. an ornamental glass involves molding a glass plate with one surface having a desired design in bas-relief, silvering this surface, brushing the high spots of the bas-relief design to remove the Ag and produce a design in transparent glass, then applying Cu plate to the silvered surface, applying shellac to cover this side of the glass, and applying a rubber paint entirely covering the back.

Glass wool. Games Slayter (to Owens-Corning Fiberglas Corp.). U. S. 2,175,225, Oct. 10. App. is described, and a method of producing filamentous glass consisting of causing a stream of glass to flow continuously from a molten pool, reducing the temp. of the molten stream of glass to a point where it assumes a semisolid state, and subjecting a portion of the semisolid mass to a high-temp. blast within a confined area by which the reheated portion is progressively remelted and blown from the main body of the mass to form elongated fibers. Cf. *C. A.* **33**, 8287.

Apparatus for supporting glass sheets during case hardening. Lloyd V. Black (to Pittsburgh Plate Glass Co.). U. S. 2,174,254, Sept. 26. Various structural, mech., elec. and operative details.

Extrusion press for producing foils or plates of materials such as polymerization products for use with glass. Adolf Kampfer. U. S. 2,175,961, Oct. 10. Various structural, mech. and operative details.

Sealing glass to metals. Thomas A. Elder (to General Elec. Co.). U. S. 2,174,381, Sept. 26. A metal container such as that of an elec. discharge device with a metallic tubular projection passing through its wall has an elec. conductor such as a metal rod passing through the tubular projection and sepd. from its walls by glass fused vacuum-tight to the projection and conductor, the surface of the projection to which the fusion is made being of an alloy of Ni 28, Co 18 and Fe 54%. U. S. 2,174,382 (Thomas A. Elder and Albert C. Gable, joint inventors (to same assignee)) also relates to similar devices.

Glass seals for metal pieces such as those of metal vacuum tubes. Donald V. Edwards (to Electrons, Inc. of Del.). U. S. 2,175,019, Oct. 3. For sealing, a glass is used of the approx. compn.: Na_2O 20, SiO_2 60 and FeO 20%, which is highly elastic and tough so that after being melted to form the seal it does not rupture upon cooling.

Composite bulbs or lamps of metal, glass and ceramic material. Hans Pulfrich (to General Elec. Co.). U. S. 2,175,916, Oct. 10. A metal part has bonded to it a glass contg. approx.: SiO_2 56, Na_2O and K_2O 12, PbO 32 and Al_2O_3 1 part, and to the glass there is fusion welded a joint of ceramic material fired at an elevated temp. which may contain MgO 65–80, Be oxide 35–20 and TiO_2 0.5–2 parts. Such a product is readily made gas tight.

Joints for metal and ceramic materials such as those of spark plugs. Charles M. Carington (to K. L. G. Sparking Plugs Ltd.). U. S. 2,174,913, Oct. 3. A metal part such as a sleeve or collar and a ceramic part such as an insulator are joined by 2 or more intervening layers of foil of soft metal such as Al.

Use of styrene in sealing ceramic and metallic parts such as those of electric fittings. Thomas R. Scott and Leonard A. C. Pooley (to International Standard Elec. Corp.). U. S. 2,175,672, Oct. 10. A method of sealing the metallic part of an electrical fitting to a ceramic part thereof involves providing a filling of a cementing material mainly of styrene between the metal and ceramic parts of the fitting, providing a gasket contg. a small amt. only of sytrene at an exposed surface of the cementing material and then hardening the cementing material and the gasket by polymerization of the styrene *in situ* to bond to the walls of the electrical fitting parts and to the gasket.

Tiles suitable for use on wall surfaces. David Broadwin. U. S. 2,175,660, Oct. 10. Tiles are formed with a corrugated rear surface which is coated with paint and with an overlying layer of sand the granules of which project beyond the outer surface of the coating of paint.

Ceramic spacer material for electron-discharge devices. Lawrence R. Shardlow (to Radio Corp. of America). U. S. 2,175,707, Oct. 10. An electrode holding and insulating material of porous ceramic character is used comprising MgO 6.5–11.5, SiO_2 26–44.5 and Al_2O_3 46–66%.

Bonding abrasive grains with synthetic resins. Emil E. Novotny (to Durite Plastics, Inc.). U. S. 2,174,755, Oct. 3. For the production of articles such as slabs, abrasive grains are mixed with a resinous coating liquid such as "Durite No. S-1719" and a pulverized potentially reactive resin such as "A" stage "Durite No. KV-1000-B" in proportions to produce an initial wet mixt. which upon standing "converts itself" to a dry moldable mixt. which is formed into the desired article and hardened, as by heating.

Waterproof abrasive articles such as disks. Herbert R. Stratford (to The Stratmore Co.). U. S. 2,174,902, Oct. 3. A relatively rigid disk formed of a phenol condensation product and uniformly distributed abrasive particles has its outer portion thicker than the central portion, and has a working surface of substantial area in a plane normal to the axis of the disk.

Abrasive disks. John O. Amstuz (to Behr-Manning Corp.). U. S. 2,175,073, Oct. 3. A single layer of abrasive grains is attached to one side of a perforated thin sheet of metal such as steel by a flexible nonporous bonding material such as glue or a synthetic resin extending through the perforations of the metal to anchor the grains to the latter

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Survey in seventeen cement plants of atmospheric dusts and their effects upon the lungs of twenty-two hundred employees. Leroy U. Gardner, Thomas M. Durkan, Daniel M. Brumfiel and Homer L. Sampson. *J. Ind. Hyg. Toxicol.* **21**, 279–318(1939).—Very few workmen in this industry are exposed to high-silica dusts. Although dust counts are frequently high the incidence of lung infections is less than that in the general population. 2378 workmen were exaind. and only 8 showed evidence of nodular fibrosis and in 6 of these previous employment was presumably responsible. A. L. Elder

Cement from Kerch Iron and Steel Works blast-furnace slags. A. G. Tevfikov. *Tsement* **6**, No. 4/5, 57–9(1939). E. E. Stefanowsky

Fungicidal oils [for impregnating wood] (U. S. pat. 2,174,258) **15.**

Fixing pervious or loose subsoil layers. Jan van Hulst (to Patent and Licensing Corp.). U. S. 2,175,804, Oct. 10. A process for making impervious, tightening or fixing pervious or loose subsoil layers such as sand soils or other porous masses comprises first introducing an aq. dispersion of bitumen into the mass to form a partially impermeable partition, and subsequently introducing an impermeabilizing agent to form an impervious screen against the partially impermeabilized partition.

Mixture for coloring gravel, sand or shale particles, etc. Ernest G. Hewish (50% to Carl Buchholz). U. S. 2,174,632, Oct. 3. A mixt. is used contg. a color base such as chrome green or toluidine red 8–20, $CaSO_4$ 25–50, boiled linseed oil 5–10, resin varnish 15–30, pilchard oil 10–20 and Co drier 1–4%.

Shingles covered with a mat of glass fibers. Games Slayter (to Owens-Corning Fiberglas Corp.). U. S. 2,175,226, Oct. 10. Shingles such as those of tarred paper have their upper surface covered with a mat of glass fibers with open air-filled interstices.

Artificial building blocks etc. Karl E. Haustein. **U. S. 2,175,568, Oct. 10. Fibrous material such as rye**

straw is digested by an alk. chem. treatment, as with a 3° Bé. "lime-sodium lye" and the digested material is rinsed, then treated with a substance such as clay, adapted to lower its water-absorbing quality, then mixed with a pulp of cement and water, and molded and dried under pressure.

Floor- and wall-covering material. Hugo Strauch (to I. G. Farbenind. A.-G.). U. S. 2,175,096, Oct. 3. An inorg. filler such as stone flour is used with about 15–30% its quantity of an org. filler such as wood meal incorporated with an aq. emulsion of stand oil, a drying oil, an alkyd resin of soft consistency comprising a radical of a fatty acid derived from a drying oil or an oil lacquer, and an emulsifying agent (the filler and emulsion being proportioned to form a product which is moist like wet earth but not sticky). Various examples are given.

Wood preservative and stain. Percy L. Gardner. U. S. 2,175,115, Oct. 3. A highly penetrative compn. suitable for treating various woods contains crude pine gum 5, dehydrated pine oil free tar 7, and low-temp. distd. pine oil 9 parts as a penetrating solvent for the tar and gum.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

Evaluation of certain normal alkylated benzenes as Diesel fuels. Gann Shen, C. E. Wood and F. H. Garner. *J. Inst. Petroleum* **25**, 695–703(1939).—The prepn. and phys. properties of Am benzene, hexylbenzene, heptylbenzene and nonylbenzene are given. The cetane no. of Am benzene is 8, hexylbenzene 26, heptylbenzene 35 and nonylbenzene 50. The lines representing the cetane no. of blends of a high reference fuel and of the pure hydrocarbons are curved in all cases; the curvature becomes greater the lower the mol. wt. of the hydrocarbon. Am benzene shows the poor ignition quality found in aromatic hydrocarbons. The aniline pt. has no significance in the evaluation of these hydrocarbons. Joseph H. Wells

Diesel-fuel characteristics influencing engine output. V. J. Blackwood and G. H. Cloud. *J. Inst. Petroleum* **25**, 684–94(1939).—Diesel fuels were tested in a 6-cylinder $5^1/_4 \times 4^1/_2$, antichamber engine capable of running up to 2000 r. p. m. for those fuel factors influencing power and fuel economy. For const. cetane no., the volumetric fuel economy improves with increasing mid-b. p. For either const. gravity or cetane no., an increase in mid-b. p. of a fuel is accompanied by an increase in heating value per gallon. Under low-speed conditions, the best consumption is obtained on the fuel of highest heating value whereas at high speeds, the fuel of superior ignition quality gives greater fuel economies. The low-viscosity fuels show somewhat higher consumption than might be expected from heating values. Joseph H. Wells

Experiments with doped fuels for high-speed Diesel engines. J. J. Broeze and J. O. Hinze. *J. Inst. Petroleum* **25**, 657–77(1939).—The effect of adding acetone peroxide as a dope to straight-run gas oils expressed either as an increase in the cetene no., or as a decrease of the ignition delay, decreases as the amt. of dope increases. The effect of the dope will be greater the greater the "chem." part of the ignition delay and does nothing to shorten the "phys. delay." The effect of a dope expressed in delay time is lower in a high-speed engine than in a low-speed engine. The addn. of dope to a fuel has little influence on the combustion process as a whole apart from its effect on the ignition quality. The amt. of incrustations and piston ring wear is slightly higher with a doped fuel than with an undoped fuel. Storage of pure $EtNO_3$ for several years has no influence on its effectiveness as a dope. Fuel doped with acetone peroxide is stable during storage. Acetone peroxide as a dope has no effect on the flash point. $EtNO_3$ decreases the flash point of the fuel. Joseph H. Wells

The application of graphical and statistical methods of hydrocarbon analysis to Diesel fuels. J. C. Vlugter, H. J. Waterman and H. A. van Westen. *J. Inst. Petroleum* **25**, 678–83(1939).—Cetene values of Diesel fuels as calcd. by Kreulen's formula (*C. A.* **31**, 5141[4]) do not agree with the detd. values. The differences are smaller if the same formula is used for calcg. the cetane values. J. H. W.

Motor fuel from butane cracking and catalytic polymerization. G. Egloff and J. C. Morrell. *Atti X° congr. intern. chim.* **3**, 734–41(1939)(in English).—The conversion of natural gas into motor fuel by a combination of gas cracking and catalytic polymerization as carried out on com. scale at the Shamrock Oil and Gas Corporation, Amarillo, Texas is described. Joseph H. Wells

Effect of carburetor adjustment, spark advance, richness and admission temperature of fuel on fuel consumption. G. Simon. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 582–94(1937)(in French).—Tests carried out to det. the savings possible by making various adjustments of carburetor, spark advance, fuel inlet temps., etc., in a single engine and at const. speed confirm the previously obtained results, although these tests are considered to be incomplete. E. J. Mahler

Influence of fuel richness and compression ratio on cylinder-head temperatures. Puisais. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 578–81(1937)(in French). The effect of motor-fuel mixts. of varying richness and at different compression ratios on cylinder-head temps. was studied in the CFR-ASTM test engine. The temp. was recorded at the spark-plug joint, in the plug itself and on the bouncing pin either at the joint or at the cylinder wall. An unequal distribution of fuel in the carbureted mixt. at the different points of the cylinder head was observed. Turbulence had a decided effect on local rises of temp. as a function of the compression. The relation between temp. and detonation varied with the fuel and with the test conditions. Addn. of tetraethyl lead had no appreciable effect on the working temp. at the same compression ratio. E. J. Mahler

Principal combustion features in explosion motors and devices for detecting and recording them. Max Serruys. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 560–5(1937)(in French).—S. defines and discusses the following features of combustion: detonation proper, pseudo-detonation, self-ignition, pre-ignition, knock and post-combustion. The merits and disadvantages of devices for recording and detecting these phenomena are pointed out. The "Detonindex," an invention of S. and used by him for 5 years, is an app. consisting of a membrane rigidly spread with a calibrated spring held in contact with the membrane at one point where a bead is held attached. Slight vibrations are not recorded. Vibrations equiv. to detonations are recorded by the breaking of an elec. contact causing a neon tube to light as a result of each detonation. Connection with a galvanometer permits the intensity of the detonation to be recorded. In this way weak but frequent detonations, and the more violent but less frequent detonations can be recorded. E. J. Mahler

Incomplete combustion products in explosion motors. A. Maillard. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 557–9(1937)(in French).—Exhaust gases were collected in a special app. and analyzed. From the oily and water layers M. isolated products of a widely differing nature, e. g., acidic compds., neutral cracked compds., and other substances probably of an aldehydic nature which resinify at low temps. forming substances analogous to those causing ring-sticking. E. J. Mahler

Gum formation on pistons in internal-combustion engines. C. A. Bouman. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 524–8(1937)(in French).—For gasoline and direct-injection Diesel engines the piston temp. is the most important factor. The higher the temp. the more pronounced is the amt. of gum. Gumming at low temps. is almost negligible. Detonation in gasoline engines and sooty combustion in Diesel engines increase piston temps.

and hence the amt. of gum formed. Although the basic properties of the lubricating oils in the motor may be responsible for gum formation to a certain extent, the extreme operating conditions of the engine have a greater bearing on gum, and C deposits. Exptl. results are reported. E. J. Mahler

The determination of sulfur in solid fuel and in pyrite by combustion in oxygen. A. Seuthe. *Glückauf* **75**, 409–11 (1939).—S in solid fuels can be readily detd. by means of a small combustion furnace and a special absorbing bulb. A 1-g. sample is placed in a porcelain boat and introduced into the furnace at 1200–1250°. A rapid stream of O_2 is passed over the sample for 8 min. and the SO_2 or SO_3 produced is absorbed in a 1% soln. of H_2O_2. The H_2O_2 is then titrated with 0.05 *N* NaOH with methyl red as an indicator. One cc. of 0.05 *N* NaOH is equiv. to 0.08% S. The same method is used to det. S in pyrite except that a higher furnace temp. about 1450° is required and a larger vol. of H_2O_2 for absorption with stronger NaOH used in titrating. The higher temp. is necessary completely to burn the ash. L. P. Rockenbach

Briquetting, with special reference to the agglomeration of substances by pressure without the use of a binder. Hans Maul. *Chem. Fabrik* **1939**, 483–6.—With reference to earlier work (*C. A.* **14**, 886; **16**, 4122) the briquetting in tablet form of 150 constitutionally well-defined org. and inorg. compds. was investigated in regard to stability, compression strength, flexibility, Brinell hardness, flow under pressure, the effect of compression temp. and tablet form, aging and fatigue. The substances were prepd. for briquetting as in *C. A.* **31**, 7200⁴. Results are tabulated. J. H. Moore

Coal preparation in 1937. A. Götte. *Glückauf* **74**, 1065–79, 1093–1101, 1117–24(1938); cf. *C. A.* **32**, 8108⁴.—Progress in various countries is reviewed. Numerous illustrations are given of screening and washing plants, slurry-treatment systems, etc. B. C. P. A.

Practical determination of probable distribution of density characterizing coal-washing. André Terra. *Rev. ind. minérale* No. **446**, 409–13(1939); cf. *C. A.* **33**, 1470⁶.—The definition of the probable distribution of density resulting from, and measuring the efficiency of, coal washing, is amplified; and a simple method of detg. it (with examples) is described. C. A. S.

Coal gasification in suspension. Wilhelm Gumz. *Feuerungstech.* **27**, 257–9(1939); cf. *C. A.* **33**, 8956⁴. George Ayers

Use of city and natural gas for metal cutting. Carl Wierum. *Gas* **15**, No. 12, 29–30(1939).—When city gas is used at a pressure of about 12 lb. per sq. in., O requirements and speed of cutting metal are approx. the same as for C_2H_2. Some experimentation may be required to secure the best flame adjustment as the appearance of the flame is different from that of the C_2H_2–O flame. Precautions must be taken to avoid any back flow of O and to minimize any flashback. R. W. Ryan

The installation of a large gas-fired continuous vitreous enameling furnace. A. F. Michael. *Gas* **15**, No. 12, 34–5 (1939).—A continuous vitreous enameling furnace 82 ft. long is fired with natural gas by means of premix burners. The max. capacity of this furnace is 3000 sq. ft. of coated surface per hr.; gas requirements are about 6500 cu. ft. per hr.; this varies little with throughput. The furnace is never cooled below 1300°F. which requires 2500 to 3000 cu. ft. of natural gas during nonworking hrs. Details of the furnace and the (external) conveyor system are given. R. W. Ryan

Butane-air does standby service at Colusa, California. Harry F. Smith and John K. Heller. *Gas* **15**, No. 12, 42–4(1939).—App. is provided for making a 1300-B. t. u. butane-air gas (58% air) for emergency use in place of the normal 1015 B. t. u. natural gas. This gas will be distributed at 21 in. (water column) pressure as against 10 in. for the natural gas. Equipment is illustrated and described. R. W. Ryan

Gas-purification masses. W. Mantel and F. Backenköhler. *Glückauf* **74**, 661–9(1938).—A method for detg. the activity and capacity curves of bog Fe ore-Luxmasse mixts. is described. The reaction of fresh and spent masses after heating to high temp. with gases contg. H_2S is discussed. The activity appears to depend on the ability of the mass to absorb H_2O, and the capacity of the H_2O content and pH value. B. C. P. A.

Corrosion prevention by high purification of fuel (illuminating) gas. Horst Brückner. *Chem. Fabrik* **1939**, 489–93.—Moisture is the most fundamental cause of corrosion in gas as commonly delivered to pipe lines, both on account of its action on Fe and of its tendency to dissolve traces of other impurities. The advantages of thorough drying and the removal of oxides of N, org. S compds. and other org. compds. are discussed and methods for their removal outlined. 26 references. J. H. Moore

Hydrogen sulfide removed by tripotassium phosphate. H. N. LaCroix and L. J. Coulthurst. *Natl. Petroleum News* **31**, R-326, 27, 29, 30, 32; *Refiner Natural Gasoline Mfr.* **18**, 334–8(1939); cf. *C. A.* **33**, 9604⁸.—Cracked gas is treated with K_3PO_4 to remove H_2S. When used to purify gas for polymerization processes the operating temp. is up to 200°F. with a 31.8% soln. The soln. at equil. will contain 3000 times as much H_2S as a liquid C_3–C_4 mixt. The soln. is regenerated by heating with steam at 225–240°F. H_2S is removed from the H_2O in a stripper operating at a top temp. of 90°F. The regenerated soln. is recirculated. Countercurrent scrubbing is used. The H_2S content is reduced from as much as 3000 grains/100 cu. ft. to as little as 15 grains/100 cu. ft. W. L. B.

Increasing the content of phenols in tars. U. B. Lobkov. *Coke and Chem.* (U. S. S. R.) **1938**, No. 8–9, 42; *Khim. Referat. Zhur.* **2**, No. 1, 87(1939).—In order to obtain the light-medium fraction with the standard amts. of phenols it was necessary to lower the yield of this fraction. To obtain products of standard quality it is proposed to increase the content of phenols in the tar by improving the regime of the coke furnaces. W. R. H.

High-pressure hydrogenation of low-temperature tar. XIV. Re-processing of fractions of hydrogenated oil. Singo Andō. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 268–71(1939); cf. *C. A.* **33**, 9596⁹.—Two products, one from mild and the other from severe hydrogenating conditions, were obtained from Hōkoku coal hydrogenation at approx. 480° and 200 atm. pressure with a type of Mo catalyst. The first product was sepd. by distn. into gasoline (b. up to 200°), middle oil (b. 200–300°) and heavy oil (b. over 300°), while the second product was sepd. by Hempel distn. into gasoline (b. up to 190°) and middle oil (b. over 190°). The 5 fractions (250–350-g. samples) were resp. subjected to hydrogenation at 463–470° in the presence of NH_4 thiomolybdate-asbestos or MoO_3 (25–45 g. catalyst) under an initial H_2 pressure of 90–100 atm. (0°) for 60–120 min. The middle-oil fractions gave high yields of gasoline, but the heavy-oil fraction was more difficult to break down. Both gasoline and middle-oil fractions increased in aromatic hydrocarbon content, while the former also increased in naphthene content. G. A.

The behavior of the so-called organic coke sulfur in coke at temperatures over 1000°. Iv. Trifonov. *Atti X° congr. intern. chim.* **3**, 659–65(1939)(in German).—A sample of metallurgical coke and coal-tar pitch coke prepd. at 1000° was extd. with acid to remove inorg. S compds. By distn. of the cokes in a N or H atm. at temps. of 1100° to 1500° there is only slight volatilization of S. At temps. above 1500°, the S volatilization curve is linear and reaches 100% at 2000°. H slightly increases the rate of volatilization of S. Joseph H. Wells

Coal veins in Malaya (Fermor) **8**. Cleavage of heterocyclic compds. of coal tar (Kruber) **10**. 1,5-Dimethylnaphthalene in coal tar (Kruber, Marx) **10**. Trimethylnaphthalenes in coal tar (Kruber) **10**. Treating [gas] wells penetrating calcareous earth formations (U. S. pat. 2,175,079) **22**. Treating gas wells with HCl to increase production (U. S. pat. 2,175,095) **22**. Use of acid in gas wells to increase production (U. S. pat. 2,175,081) **22**. Recovering liquefiable hydrocarbons from strata penetrated by [gas] wells (U. S. pat. 2,174,336) **22**.

Diesel fuel. Darwin E. Badertscher and Geo. S. Crandall (to Socony-Vacuum Oil Co.). U. S. 2,174,680, Oct. 3. A fuel oil for use in Diesel engines is prepd. by a process which involves dissolving Ac_2O in a hydrocarbon oil suitable for use as a Diesel fuel and oxidizing the Ac_2O *in situ* (suitably by use of BaO_2) to diacetyl peroxide, which serves as an ignition accelerator.

"Hydrofining" carbonaceous vapors such as those of motor-fuel distillates. Marion H. Gwynn. U. S. 2,174,510, Oct. 3. An arrangement of app. is described, and a method of continuously "hydrofining" vapors which comprises continuously bringing the vapor and an excess of H in a series of time stages into contact with a solid S-sensitive catalytic surface contg. a catalytic metal, such as Ni or Cu, the pptd. sulfide of which is black, at a plurality of temps. above about 75° but below the temp. at which substantial pyrolysis occurs with the vapor, and adjusting the temp. and H excess of each of the time stages so that relatively equal amts. of hydrofining occur in each of the stages, the plurality of temps. consisting substantially of an ascending time gradient of temp., the rise of temp. occurring as the catalytic surface becomes progressively spent, the difference between the extremes of the gradient being between about 20° and 200°, while the pressure of each stage is maintained between about 1 and 100 atm.

Apparatus for making briquets such as those of coal. John F. Crawford (to J. I. Case Co.). U. S. 2,175,342, Oct. 10. Various structural, mech. and operative details.

Continuous gasification of solid fuels such as coal or coke. Willy Linder (to Koppers Co.). U. S. 2,175,610, Oct. 10. App. is described, and a method of continuous gasification of solid fuels by reaction thereof with a mixt. of preheated air and steam comprising, maintaining a bed of continuously descending fuel; charging the fuel at the top of the bed and withdrawing the made gas continuously from the upper part of the bed; subjecting the fuel in the lower part of the bed to continuous mech. rotative agitation and ash-crushing action and continuously discharging the ash thereof in solid form from the bottom of the bed; introducing a mixt of very highly preheated air and steam into the fuel bed through the circumference thereof at a zone somewhat above the region of mech. agitation and causing the same to flow upwardly through the bed for reaction therewith and withdrawal at the upper part thereof; and concurrently with the introduction of the very highly preheated air and steam separately introducing steam and relatively cooler air into the lower portion of the bed through the mech. agitation medium to cool the same and diffusing the steam and relatively cooler air from the mech. medium into the portion of the fuel bed between the mech. medium and the region of entrance of the very highly preheated air and steam for combustion of combustible residues of the ash and causing the gas thereof to flow upwardly through the fuel bed for off-flow therefrom together with the very highly preheated air and steam introduced to the fuel bed circumferentially thereof somewhat above the mech. medium.

Water gas. Max Radtke (to Koppers Co.). U. S. 2,175,613, Oct. 10. An arrangement of app. is described, and a process for the continuous production, from distillable bituminous fuel, of water gas practically free from hydrocarbons for subsequent synthesis to hydrocarbons for motor fuel, which involves circulating a gaseous heat carrier comprising a highly heated water gas and steam mixt. in cycle through a gasification step, in which the distillable fuel is both distd. by the heat of the gaseous heat carrier to liberate hydrocarbons from the fuel and is also caused to react with the steam in the heat carrier to form water gas, and thence from the gasification step to and through a reheating step for the carrier, in which the liberated hydrocarbons in the carrier from the gasification step are caused to react to water gas and the carrier also reheated for return to the gasification step; the process further involves causing water gas newly generated in each cycle of flow of the carrier to flow through the gasification step also along to the reheating step together with the heat carrier and with the hydrocarbons distd. off in the gasification step during their return to the reheating step for conversion of the hydrocarbons to water gas and reheating of the carrier, and withdrawing the final end product water gas from the process from the reheated carrier after it has been reheated in the reheating step and before the reheated heat carrier reënters the gasification step. Cf. *C. A.* **33**, 4001[6].

Apparatus for introducing odorous vapors into gas lines. Robert M. Hutchison and Frank Y. Hutchison. U. S. 2,175,526, Oct. 10. Various structural and operative details of an app. suitable for introducing vapors such as those of "Calodorant" into natural gas lines, etc.

Determining combustible matter in waste gases from gas-fired furnaces. Dominick Labino (to Owens-Ill. Glass Co.). U. S. 2,174,923, Oct. 3. The combustibles in the gas are ignited and simultaneously the elec. cond. change in the gas is registered. Various details of app. are described.

Coke ovens with internally heated movable heating walls. Franz Puening. U. S. 2,174,832-3, Oct. 3. Various structural and operative details.

Coke-oven retort. Gustaf E. Salkvist (to Koppers Co.). U. S. 2,175,217, Oct. 10. Various structural details of door fastening, etc.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STUART S KURTZ, JR.

Preparation of bright pyrolyzed resins from pyrolyzed petroleum products. I. E. Bespolov. *Azerbaĭdzhanskoe Neftyanoe Khoz.* **1938**, No. 11, 25–30.—The best (lightest) pyro-resins are obtained by using 3% of a 98% H_2SO_4, lighter fractions yielding a better product. Thus, by applying 8–10% of H_2SO_4 there can be obtained pyro-resins which can be used in the prepn. of oilcloth after the introduction of oil driers. Co oleate was found to improve the quality of the pyro-resins to such an extent as to produce absolutely white films. Oil drier "No. 12" also gives good results, although the color of the resins is not as satisfactory. Four % of it is added at a temp. not in excess of 50°. A mixt. of pyro-resins contg. 4% of oil drier "No. 12" and not less than 20% pyro-resins may replace pure oilcloth oil drier in the prepn. of light oilcloths. The ratio of pyro-resins may be increased when plasticizers (castor oil) are introduced. The expts. are described.

A. A. Boehtlingk

Hydrogen sulfide in Ishimbaevo crude oil. V. G. Plyusnin, E. A. Nikonova and S. S. Spasskiĭ. *Neftyanoe Khoz.* **1939**, No. 2, 46–9.—Ishimbaevo and the upper horizon Krasnokama crude oils contain dissolved H_2S; other oils such as those of Chusovskie Gorodki, Samarskaya Luka, the lower Krasnokama horizon do not contain H_2S. Krasnokama oil from the lower horizon forms pyrogenetic H_2S at about 300°. Ishimbaevo oil seps. pyrogenetic H_2S on straight distn. in the amts. of 7 kg. per ton of oil at 300° in one hr. The source of pyrogenetic H_2S at 350° is elementary S and compds. having a S grouping similar to that of the disulfides. In Ishimbaevo crude oil up to 68% of the pyrogenetic H_2S is from S compds. of the asphalt-resinous part of the crude oil and only 32% from the S compds. of the kerosene-lubricating oil fractions.

A. A. Boehtlingk

Modern instrumentation for topping, cracking and polymerization plants. Donald J. Bergman. *Refiner Natural Gasoline Mfr.* **18**, 304–11(1939); cf. *C. A.* **33**, 9605[9].

W. L. Benedict

Economics of catalytic polymerization of natural butanes. F. B. Mack. *Refiner Natural Gasoline Mfr.* **18**, 330–4(1939); cf. *C. A.* **33**, 7991[9]. W. L. Benedict

Coöperative catalytic polymerization plant operates at

1100–1200 pounds. M. G. Van Voorhis. *Natl. Petroleum News* **31**, R270, 71, 73(1939). W. L. Benedict

Color density and acid vapor indicate oil performance. W. F. Weiland. *Natl. Petroleum News* **31**, R334, 36, 38 (1939).—The oxidation tendencies of lubricating oils are measured by visible changes in color density, and corrosion and sludging tendencies are measured by the temp. at which acid vapors form. These relationships are shown graphically. W. L. Benedict

The action of aqueous solutions of acids on the liquid-phase pressure distillate. V. Butyrya and V. Bulnitskaya. *Azerbaidzhanskoe Neftyanoe Khoz.* **1938**, No. 5, 47-50; *Khim. Referat. Zhur.* **2**, No. 1, 89–90(1939).—The removal of the unstable substances from cracked gasoline by means of aq. solns. (5%, 15% and 30%) of H_2SO_4, HNO_3, H_3PO_4 and HCl as well as 10% and 15% aq. solns. of AcOH and $(COOH)_2$. The individual fractions as well as gasoline as a whole were treated with the acids. The treatment with HNO_3 gave a definite picture of the nitration process. The treatment of gasoline with aq. solns. of $(COOH)_2$ and of AcOH under pressure decreased sharply the induction period of the distn. W. R. Henn

Hydrogenation of Dubroval vapor-phase cracked gasoline. V. Getling, A. Sosnina and L. Stepantsev. *Novosti Tekhniki* **1939**, No. 19, 31–3.—Data are given on the hydrogenation of gasoline obtained in the Dubroval vapor-phase cracking. The gasoline was hydrogenated in the presence of MoS_2 at 25-100 atm. and 400°. The ratios of gasoline vapors to H were 1:2, and 1:4. The most thorough hydrogenation was obtained at 100 atm. regardless of the gasoline/H ratio. A reduction in the pressure decreased the speed of hydrogenation. A drop in the temp. to 340° also reduced the speed of hydrogenation. The hydrogenated gasoline had a high stability, an octane no. of 71-72, and a good susceptibility to tetraethyl lead. B. Z. Kamich

Desulfurization of gasoline with pyrite dross. M. Blagodarov. *Novosti Tekhniki* **1939**, No. 16, 33 4. -In the desulfurization of gasoline by the Frasch method the gasoline vapors passed through a column of pyrite dross consisting chiefly of Fe and Cu oxides. The spent packing can be partially regenerated by blowing with superheated steam at 400°. For complete regeneration the packing is removed from the column and calcined to convert the S compds. into oxides. B. Z. Kamich

The chemical composition and the antiknock properties of fuels. I. A. Rogozin. *Tekhnika Vozdushnogo Flota* **1938**, No. 8, 26–33; *Khim. Referat. Zhur.* **2**, No. 2, 112-13 (1939).- A general discussion of the causes for knocking. The primary process of oxidation and its intensity are influenced by the period of the gasoline mixt. in the zone of high temp. and by the stability of the components of the fuel (hydrocarbons) in relation to the oxidation process. The antiknock properties of different hydrocarbons are compared with some of their phys. consts. and with the relative contents of different hydrocarbons in gasolines of different origin. W. R. Henn

Lowering the solidification point of transformer oils. L. A. Aleksandriiskaya. *Novosti Tekhniki* **1938**, No. 11-12, 46-7.—By adding 0.1-0.3% paraflow to Emba transformer oils it was possible to lower the solidification points to the specified values. Elec. properties were not affected by the addn. of as much as 0.5% paraflow. The solidification points of Emba oils which had been refined with selective reagents were lowered by 9-14° depending on the amt. of paraflow added. Addn. of 0.2–1.5% paraflow to mineral oils of paraffinic base reduced the solidification point by 20–25°. Baku oil having a solidification point not lower than −45° is not affected by the addn. of paraflow. B. Z. Kamich

Laboratory method for evaluating the influence of lubricating oils on carbon deposition in internal-combustion engines. H. A. Everett and G. H. Keller. *Penna. State Coll. Bull., Eng. Expt. Sta. Ser., Bull.* No. **48**, 35 pp.(1939).—A simplified and inexpensive lab. test for predicting the C-forming characteristics of lubricating oils utilizes a battery of small, single-cylinder engines. Mechanical devices for measuring C formation were not very successful. When the oil was overheated without actual contact with flame or the incandescent products of combustion, no appreciable C was deposited (though lacquer was), but when the oil was similarly treated in contact with flame or incandescent products of combustion, C was deposited. In tests with com. engines, after thorough cleaning of the engine with gasoline, the cylinder heads were weighed to 0.001 g. Each test was conducted for five 8-hr. periods and the heads were weighed at the end of each period. The pistons were weighed only at the end of the test. After each test of an oil a 40-hr. test was made with a reference oil consisting of a blend 180 Penna. neutral oil and Penna. overhead bright stock. The data were plotted against time, to give a curve of the av. cylinder-head C formation for each oil. It is doubtful if the accuracy of individual results is closer than about ±10%. Although this method does not give a final answer on any one oil it should select oils that are good or bad as to C formation. Further tests on full-scale engines could then be carried out. A bibliography (with brief abstracts) is included. Saverio Zuffanti

Effect of fatty acid derivatives on lubricants. IV. Lubricating properties of aliphatic esters. A. W. Ralston, E. J. Hoffman and E. W. Segebrecht. *Natl. Petroleum News* **31**, R320, 322(1939); cf. *C. A.* **33**, 8975⁸.—The effect of added esters and thioesters of fatty acids was detd. by measuring the increase in temp. (°F.) due to friction on a bearing surface of the untreated oil and oil contg. 0.5% of addn. agent. The original oil was 96.4°F., Et palmitate 79.0°F., Pr laurate 81.8°F., Pr myristate 83.1°F., Bu myristate 78.6°F., Bu palmitate 79.6°F., Am palmitate 74.3°F., Et oleate 88.0°F., Et esters of unsatd. fish oil acids 92.5°F., Pr esters of unsatd. fish oil acids 90.2°F., Me thiollaurate 86.5°F., Me thiolmyristate 85.8°F., Me thiolpalmitate 83.7°F., Me thiolstearate 84.3°F., Et thiollaurate 84.1°F., Et thiolmyristate 81.0°F., Et thiolpalmitate 86.5°F., Et thiolstearate 82.7°F., Pr thiollaurate 83.3°F., Pr thiolmyristate 87.9°F., Pr thiolpalmitate 85.6°F., Pr thiolstearate 81.0°F., Pr thiololeate 83.2°F., Bu thiollaurate 87.2°F., Bu thiolmyristate 82.4°F., Bu thiolpalmitate 85.0°F., and Bu thiolstearate 81.8°F. The esters of satd. acids were more effective than the corresponding unsatd. esters. The thiol esters were less effective than the corresponding O_2 esters. W. L. B.

Automobile manufacturer's selection of lubricants. K. Brozyna: *J. Inst. Petroleum* **25**, 629–48(1939).—There are discussed for *engine oils* (*a*) the fallacy of working to specifications only, (*b*) the importance of new methods of refinery and addn. agents, (*c*) oil filters, (*d*) selection of oils, (*e*) running tests, (*f*) effect of oils on the engine, and (*g*) cold-room tests; characteristics of suitable *gear-box oil lubricants;* for *rear-axle lubricants* (*a*) extreme-pressure lubricants, (*b*) attempts to correlate the results of lab. scoring tests with those under road conditions, (*c*) torsion loaded gear-testing fixture, and (*d*) selection of worm gear lubricants; selection of *semisolid lubricants* for *chassis lubrication.* Saverio Zuffanti

Service tests with lubricants for high-speed oil engines. A. T. Wilford. *J. Inst. Petroleum* **25**, 607–22(1939); cf. *C. A.* **33**, 3644.—A discussion of lubricating-oil tests conducted by the London Passenger Transport Board covering a period of intensive development in the application of oil engines to passenger vehicles. Steps leading to the drafting of a first specification for lubricating oils for this type of engine are described, and data given pointing to a close relationship between hard asphalt produced in an oil during use and that produced in an oxidation test of the Air Board Type. The discussion also includes investigations involving detn. of the optimum periodicity of oil changes, the efficiency of a flushing oil for cleaning engine-bases, and the useful life of engine-oil by-pass filters. Results of tests with solvent-refined oils are summarized. Compared with the lubricant originally standardized in 1932, oils complying with the specifications quoted in an included appendix increased engine mileage by 11%, reduced oil consumption by nearly 7%, reduced cylinder wear by 13.5%, and decreased engine failures due to seiz-

ures and bearings by 60%. The oil has been adopted despite its much higher cost. It is estd. that a net yearly saving of a few thousand pounds will result. Experience to date proves that engines are cleaner internally than before, and in spite of some "lacquering" no trouble has been encountered. Saverio Zuffanti

Manufacture of lubricating greases and high-pressure lubricants. W. Maass. *Seifensieder-Ztg.* **66**, 172–4, 196–7, 256–7, 278–9, 298–9, 318–19, 338–9, 358–9, 377–8, 397, 417–18, 437–8, 457–8, 477–8, 497–8, 517, 557–8, 577–8, 597–8, 637–8, 657–9, 690–1, 713–14, 731–2, 745–6, 775, 785, 795, 805, 815, 825(1939).—The review presents the uses, underlying theory, raw materials and methods of manuf. of lubricants, including 101 formulas. Brief specifications for lubricants for machinery, engines, cranes, weapons, cordage, heavy rolls (graphite greases), automobiles, extreme pressure (transmission) cutting oils are included with methods of testing, chiefly those in use in U. S. A. Conversion tables for viscosities, temps. and weights are presented. A. Guillaudeu

Melting point of solid greases. D. S. Velikovskiĭ, I. P. Lukashevich and F. L. Borshchevskaya. *Refiner Natural Gasoline Mfr.* **18**, 312-17(1939).—See *C. A.* **33**, 3126⁹. W. L. Benedict

Experimental studies on nonfluid lubrication. II. High-temperature reactions of addition agents. Acid effects and the mechanism of seizure. S. Kyropoulos. *Refiner Natural Gasoline Mfr.* **18**, 320-4(1939); cf. *C. A.* **33**, 8973⁷. W. L. Benedict

Function of colloidal graphite in special-purpose lubricating oils. Raymond Szymanowitz. *Natl. Petroleum News* **31**, R310, 42, 43(1939). W. L. Benedict

Dry distillation of wood, moss and similar materials. Hilding Bergstrom and K. G. Trobeck. *Tek. Tid.* **69**, Uppl. A-C, *Kemi* 49 52, 57–63, 67–71(1939)(English summary).—Tables are given showing the compn. of residues of various kinds of wood distd. with varying amts. of NaOH, NaOH + $Ca(OH)_2$, $Ca(OH)_2$ and $Ba(OH)_2$. The yield and compn. of the oils and water-sol. products were detd. Beechwood plus an equal weight of NaOH heated to 210° at ordinary pressures yields a water-sol. residue consisting chiefly of Na carbonate and the Na salts of org. acids. An addn. of 20 to 50% of NaOH increases considerably the yield of oil in dry distn. Addn. of lime to NaOH-treated wood increases the amt. of water-sol. products in the distillate. Otto Johnson

Continuous activation of refining clays (Blagodarov) **18**. High-pressure hydrogenation of low-temp. tar [re-processing of fractions of hydrogenated oil (Andō) **21**. Preventing corrosion of oil-well compressor tubes (Sheĭnin) **9**. Selection of greases for cold-rolling metals and alloys (Pavlov, Gallaĭ) **9**. Corrosion of valves in pumps used for deep-well pumping (Sheĭnin) **9**. Container for pouring out measured portions of lubricating oil (U. S. pat. 2,175,933) **1**. Preserving oxidizable substances [petroleum oils and their derivs.] (Brit. pat. 508,442) **13**. Treating liquid alkanes with SO_2 and Cl [for producing lubricating agents] (U. S. pats. 2,174,507-8-9) **13**. Extinguishing flames of gasoline (U. S. pat. 2,174,606) **24**.

Treating light petroleum distillates. Arthur Lazar and Thomas F. McCormick (to Tide Water Associated Oil Co.). U. S. 2,175,437, Oct. 10. A process employed involves treating a petroleum oil contg. aromatic hydrocarbons with sep. dosages of an aq. alk. soln. to remove org. compds. and of H_2SO_4 having a concn. less than 90% H_2SO_4 to remove nitrogenous bases, extg. the thus purified oil with a selective solvent whereby an ext. rich in aromatic hydrocarbons is obtained, sulfonating the ext. with H_2SO_4 of a concn. greater than 90% H_2SO_4, and recovering the sulfonated products.

Apparatus utilizing hot combustion gases for heating petroleum oils to effect cracking, etc. Arthur E. Nash and Franklin E. Shelly (to Alcorn Combustion Co.). U. S. 2,175,211, Oct. 10. Various structural and operative details.

Separating water-in-oil petroleum emulsions. Jesse V. Stevens. U. S. 2,174,849, Oct. 3. App. is described, and a method of sepg. a petroleum emulsion of water in oil comprising moving the emulsion against adjacent parallel oppositely rotating rolls whose surfaces are preferentially wettable by oil, squeezing the water from the emulsion by the adhesive action of the rolls on the oil, passing the oil by cohesion and adhesion through the rolls in a film on same and away from the water, and separately collecting the oil and water.

Breaking mineral-oil emulsions. Daniel Stryker (to The Texas Co.). U. S. 2,175,818, Oct. 10. Emulsions of the water-in-oil type are broken by use of an alkali metal salt of a sulfonated mineral oil and an alkali metal hexametaphosphate.

Demulsifying crude mineral-oils. Max Powell. U. S. 2,175,699, Oct. 10. Monoglycerol ricinoleate in a small proportion is used to effect demulsification.

Refining mineral oils with organic oxides. Ernst Teres, Josef Moos and Erich Saegebarth (to Edeleanu G. m. b. H.). U. S. 2,174,765, Oct. 3. A process of refining mineral oil contg. both high viscosity index hydrocarbons and low viscosity index hydrocarbons involves extg. the oil with a selective solvent of the class consisting of cyclic org. oxides contg. one O atom and less than 4 C atoms per mol., to form a raffinate layer contg. the high viscosity index hydrocarbons, and an ext. layer contg. the low viscosity index hydrocarbons of the mineral oil dissolved in the selective solvent, sepg. the layers from each other and recovering the solvent therefrom. Ethylene oxide or propylene oxide may be used as the selective solvent.

Dyes for mineral oils. I. G. Farbenindustrie A.-G. Brit. 508,483, June 30, 1939. Oil-sol. substances are obtained by heating $C_{10}H_8$, anthracene, phenanthrene, acenaphthene or mixts. thereof, in presence of an aromatic solvent, e. g., C_6H_6, toluene, xylenes, Ph_2, PhCl, cyclohexane, with anhyd. Al halides and leading air or O through the reaction mixt. The products dissolve in mineral oils with a red color and green fluorescence.

Noncracking distillation of mineral oils such as crude oils. Cecil F. Slawson (to Texas Co.). U. S. 2,175,817, Oct. 10. Various details of a 2-stage atm.-vacuum distn. app. are described, and of a method which comprises heating the oil in a continuously flowing stream and flashing without any substantial cracking thereof into a primary fractionating zone of substantial fractionating capacity, refluxing the vapors therein, removing lighter vapors overhead to suitable condensers, withdrawing an intermediate distillate cut which is fractionated to a narrow cut, such as a kerosene fraction, as a side stream to a stripping fractionating zone of lesser fractionating capacity into which no cut lighter than the intermediate distillate cut is introduced, withdrawing bottoms from the stripping fractionating zone, passing withdrawn bottoms in a continuously flowing stream through a heating zone, returning the heated bottoms to the stripping fractionating zone to supply heat thereto to redistil the side stream therein and sep. it from entrained heavy oil and impurities, fractionating the vaporized side stream and condensing the same within the stripping fractionating zone as a close distillate cut to sep. it from retained lighter constituents, removing the distillate cut as a side stream from an intermediate point of the stripping fractionating zone, and returning uncondensed vaporized lighter constituents from the stripping zone to the main fractionating zone.

Refining hydrocarbons such as crude benzene. Gerhard Rühl (to Koppers Co.). U. S. 2,175,619, Oct. 10. An arrangement of app. is described, and a process for refining crude benzene comprises evapg. the crude benzene and sepg. the vapors distg. over below about 80° and between about 125° and about 170° from those distg. over between about 80° and about 125°, subjecting only the sepd. vapors distd. off below about 80° and those above about 125° to the influence of a high-voltage electrostatic field in the presence of O and thereby converting the unstable unsatd. to more stable compds.; condensing the thus treated and the untreated vapors, and combining the con-

densed treated vapors with the condensed untreated vapors still untreated to convert unstable unsatd. to more stable compds.

Cracking hydrocarbon oils. Lyman C. Huff (to Universal Oil Products Co.). U. S. 2,175,397, Oct. 10. An arrangement of app. is described, and a process whch comprises charging crude oil through incondensable gases previously removed from the system, passing the oil, together with condensed portions removed from the gases, to a fractionator to combine reflux condensate therewith and to revaporize the condensed portions therefrom, passing the resultant mixt. to a heating zone wherein conversion conditions of temp. and pressure are maintained, discharging the resultant heated products into a reaction zone where liquids and vapors sep., subjecting the vapors to reconversion in a secondary heating zone, passing the reconverted products to a zone of reduced pressure, withdrawing the heavier, insufficiently converted components from the zone of reduced pressure, cooling the same, combining the cooled, insufficiently converted components from the zone of reduced pressure with heavier portions withdrawn from the reaction zone, commingling the resultant mixt. with the reconverted products withdrawn from the secondary heating zone prior to their introduction into the zone of reduced pressure, supplying vapors from the zone of reduced pressure to the fractionator for fractionation therein, finally condensing the fractionated vapors and sepg. resultant distillate from incondensable gases, and scrubbing the latter with the crude oil as aforesaid.

Cracking hydrocarbon oils such as crude or reduced crude oils. Helge C. Dieserud (to Texas Co.). U. S. 2,175,180, Oct. 10. An arrangement of app. is described, and a method of converting relatively high-boiling hydrocarbon oils into lower-boiling oils of the gasoline type which comprises heating in a coil a flowing stream of charging oil to dstn. temp. and discharging the heated charging oil into a sepg. zone wherein the oil seps. into vaporous and nonvaporous portions, withdrawing the vapors from the zone and subjecting them to vapor-phase cracking, discharging the cracked vaporous products from the vapor-phase cracking operation to an enlarged coking still, withdrawing nonvaporous portions from the sepg. zone and subjecting them in a coil to liquid-phase cracking, discharging the resulting cracked products directly into an independent distg. and fractionating zone, withdrawing vaporous products from the coking still and introducing them into the independent distg. and fractionating zone, withdrawing unvaporized residual liquid products from the independent distg. and fractionating zone and discharging them directly into the coking still wherein they are converted to coke by the contained heat of the vaporous cracked products passed thereto from the vapor-phase cracking operation, withdrawing reflux condensate from the independent distg. and fractionating zone and passing the condensate to the first-named coil for treatment in the system.

Cracking hydrocarbon oils such as reduced crude oils. Percival C. Keith, Jr. (to Gasoline Products Co.). U. S. 2,174,858, Oct. 3. An arrangement of app. is described, and a process for converting higher-boiling hydrocarbons into lower-boiling hydrocarbons which comprises sepg. cracked products produced as hereinafter specified into vapors and residue in a sepg. zone and passing resultant sepd. vapors to primary, secondary and tertiary fractionating zones in succession, maintaining superatm. pressure in the sepg. and fractionating zones, introducing heavy charging stock into the secondary fractionating zone whereby a portion of the vapors therein is condensed and a portion of the charging stock is vaporized, collecting resultant reflux condensate and unvaporized charging stock and passing the same to a cracking zone wherein the oil is subjected to cracking temp. to effect cracking and produce viscosity-breaking of the heavy constituents thereof, delivering resultant cracked and viscosity-broken products into the primary fractionating zone wherein sepn. of vapors from cracked residue occurs and resultant sepd. vapors are added to the vapors flowing to the succeeding fractionating zones, subjecting vapors in the tert. fractionating zone to fractionation to form a desired distillate product and reflux condensate, passing reflux condensate from the tert. fractionating zone to a second cracking zone wherein the condensate is subjected to cracking temp. under superatm. pressure to effect conversion into lower-boiling hydrocarbons, delivering resultant cracked products into the sepg. zone as the cracked products mentioned, passing resultant residue comprising residual constituents of cracking from the sepg. zone into a lower-pressure flash zone wherein sepn. of vapors from liquid residue takes place, passing cracked residue from the primary fractionating zone to a sep. lower pressure flash zone in which sepn. of vapors from liquid residue takes place, and combining vapors evolved in the first flash zone with vapors evolved in the second flash zone and subjecting the combined vapors to dephlegmation and condensation to form condensate.

Cracking hydrocarbon oils such as gas oil. Joseph K. Roberts, Jay H. Forrester and Roy J. Diwoky (to Standard Oil Co. of Ind.). U. S. 2,175,362, Oct. 10. An arrangement of app. is described, and a process of converting heavy hydrocarbon oils into gasoline and an intermediate-boiling furnace-oil fraction wherein the heavy hydrocarbon oil is subjected to cracking in a cracking zone and the products are sepd. from tar in an evapg. zone and thereafter fractionated under pressure in a fractionating zone from which gasoline vapor is withdrawn at the top, incompletely cracked hydrocarbons are condensed and withdrawn at the bottom whence they are recycled to the cracking zone, and an intermediate-boiling furnace-oil condensate contg. dissolved gasoline is withdrawn from an intermediate point of the fractionating zone. The process also comprises conducting the furnace-oil condensate to a second fractionating zone at lower pressure where dissolved gasoline is sepd. from the furnace-oil fraction, withdrawing and condensing gasoline vapors from the fractionating zone first mentioned and sepg. uncondensable gases therefrom, conducting the gasoline condensate to a third fractionating zone and sepg. substantially all the propane therefrom together with some butane and higher hydrocarbons, condensing the sepd. propane fraction and combining it with the gasoline fraction removed from the furnace-oil distillate sepd. in the second fractionating zone, conducting the combined gasoline and propane fraction to a fourth fractionating zone maintained at higher pressure than the second and third fractionating zones, and sepg. substantially all propane and lighter hydrocarbons from butane and heavier hydrocarbons in the fourth fractionating zone.

Cracking oils such as gas oil. Eugene C. Herthel (to Sinclair Refining Co.). U. S. 2,175,663, Oct. 10. An arrangement of app. is described, and a process which involves heating a stream of higher-boiling petroleum oil to a moderate cracking temp. under a substantial superatm. pressure and subjecting the higher-boiling oil to the moderate cracking temp. for a time sufficient to effect moderate cracking of the higher-boiling oil, sepg. the composite hot oil products of this heating operation into a vapor stream and a liquid stream and separately heating each of the sepd. streams to high-cracking temps. under maintained superatm. pressure, reducing the pressure on the composite hot oil products of each of these heating operations and simultaneously cooling them to temps. at which substantial cracking ceases, sepg. the expanded and cooled products into tar fractions and vapor fractions and recovering gasoline fractions from these vapor fractions.

Sweetening hydrocarbon oils. Geo. H. Von Fuchs and Lawson E. Border (to Shell Development Co.). U. S. 2,174,810, Oct. 3. Liquid hydrocarbon material such as a "sour gasoline" contg. mercaptans is treated at a temp. below 93° with metallic Cu in the presence of an effective proportion of added H halide gas such as HCl.

Superheating oil (such as that for producing motor fuel) in the vapor phase. Frank H. Praeger and Thomas B. Leech (to Alcorn Combustion Co.). U. S. 2,174,893, Oct. 3. Various details of app. and operation.

Refining hydrocarbon distillates such as cracked gasolines. Waldo C. Ault and Carroll A. Hochwalt (to Mon-

santo Chemical Co.). U. S. 2,174,908, Oct. 3. A catalytic method of treating liquid hydrocarbons of gasoline motor fuel boiling range which are rich in gum-forming constituents, to obtain a motor fuel of good quality and substantially free from gum, involves heating the liquid below cracking temp. while the liquid phase is maintained in the presence of an acid of P such as H_3PO_4 which is substantially nonvolatile at the temp. of the treatment, the heating being continued until the gum-forming constituents are converted to relatively high-boiling products which can be sepd. by distn., sepg. the liquid hydrocarbons from the acid of P, and subsequently effecting sepn. of lower-boiling from high-boiling hydrocarbons by fractional distn.

High antiknock motor fuel. Ernest A. Ocon. U. S. 2,175,359, Oct. 10. A method for producing isoaliphatic hydrocarbons suitable as high antiknock motor fuel comprises treating oxygenated derivs. of straight-chain aliphatic hydrocarbons including alcs. and fatty acid in about the gasoline boiling range with an alkali compd. capable of saponifying fatty acids among such derivs., causing the thus treated mixt. to react with a reducing gas composed of H and CO in the presence of a catalyst with relatively high hydrogenating and low dehydrating activity at a temp. of about 315–480° at super-atm. pressure and with a space velocity of about 75 to 200 cu. ft. per hr. per cu. ft. of catalyst, fractionating vapors from this catalytic reaction to obtain an overhead of motor-fuel ingredients, and condensing such motor-fuel ingredients.

Pump and associated devices for delivery of liquids, such as Diesel engine fuel oil, under high pressure. Ernest V. Parker. U. S. 2,174,526, Oct. 3. Various structural and operative details.

Recovering liquefiable hydrocarbons from strata penetrated by wells. Jay P. Walker and Edwin V. Foran (to Eureka Process Co.). U. S. 2,174,336, Sept. 26. App. is described, and a method of recovering liquefiable hydrocarbon constituents from a gaseous reservoir in which they are in soln. with natural gas and are under high pressure within the retrograde condensation range which includes, flowing the gas from the well under high pressure within the retrograde condensation range, cooling the gas while the pressure is maintained substantially within the retrograde condensation range to condense liquefiable hydrocarbon constituents, sepg. the gas from the liquids at a high pressure substantially within the retrograde condensation range, raising the pressure of the high-pressure degraded gas only sufficiently to return it to a high-pressure gaseous reservoir, and returning the repressured gas to a gaseous reservoir through an input well and employing the returned gas to displace the gaseous products in the reservoir en masse toward the output well for prolonging high-reservoir pressures.

Treating wells penetrating calcareous earth formations. Willard H. Dow (to Dow Chemical Co.). U. S. 2,175,079, Oct. 3. A method of treating a well such as an oil or gas well penetrating a calcareous earth formation to facilitate production involves introducing into the well a charge of an aq. soln. of a weak acid such as chloroacetic acid, having an ionization const. between 8.59×10^{-5} and 1.55×10^{-3} and applying pressure to the charge to force it into the formation.

Treating wells such as oil, gas or brine wells with hydrochloric acid to increase production. Sylvia M. Stoesser (to Dow Chemical Co.). U. S. 2,175,095, Oct. 3. For preventing pptn. of gelatinous Fe and Al hydroxides in the spent acid soln., there is introduced into the well an aq. HCl soln. contg. about 0.5–10% of glycine or lactic, citric or glycolic acid, and pressure is applied to force the soln. into the formation under treatment.

Use of acid in wells such as oil, gas or brine wells to increase production. John J. Grebe (to Dow Chemical Co.). U. S. 2,175,081, Oct. 3. A strong inorg. acid such as HCl soln. contg. SO_2 is introduced into the well.

Intercepting oil-well-casing gases during welding operations. Earl G. Summers. U. S. 2,175,137, Oct. 3. A method of intercepting gas in the casing of an oil or gas well while the proximate terminals of the inner casing pipes are welded involves internally sealing the inner casing of the well and sealing the space between the inner and outer casings, both seals being below the zone of the welding operation.

Paraffin scraper suitable for use in oil-well tubing. Sidney V. Dodson. U. S. 2,175,770, Oct. 10. Various structural details.

Dewaxing oils such as mineral lubricating oil fractions. Lyle Dillon and Claude E. Swift (to Union Oil Co. of Calif.). U. S. 2,174,938, Oct. 3. An arrangement of app. is described, and a process which comprises shock chilling the oil to ppt. wax, subjecting the chilled oil contg. pptd. wax to the influence of an elec. field between electrode surfaces immersed in the oil to render the wax readily separable, and sepg. the wax from the chilled mixt. by electrodeposition upon an immersed electrode surface. Cf. *C. A.* **33**, 5174[7].

Lubricating composition for use in metal-working operations such as cold rolling or drawing. Stanley P. Waugh (75% to Tide Water Associated Oil Co.). U. S. 2,174,907, Oct. 3. A mineral oil and the sapond. product derived, as by the action of triethanolamine, from the fatty acid mixt. obtainable from a palm oil are used together in a substantially neutral aq. emulsion.

Lubricating and dielectric oil compositions. Frank M. Clark (to General Elec. Co.). U. S. 2,175,877, Oct. 10. A mineral oil or a vegetable oil such as a castor-oil mixt. or a chlorinated biphenyl mixt. is used contg. 25–50% of an alkyl phosphate ester the alkyl radical of which contains not more than 4 C atoms, such as triethyl or tributyl phosphate, which gives a lowered viscosity which is relatively uniform at various low temps.

"Beneficiating" lubricating oils. John M. Musselman and Herman P. Lankelma (to Standard Oil Co. of Ohio). U. S. 2,175,548, Oct. 10. About 0.001% or more of diphenyl carbazide or diphenyl semicarbazide is added to a lubricating oil such as one for internal-combustion engines in order to inhibit degradation in use at high temps.

Apparatus for reclaiming used lubricating oil (such as that from automobile engines) by heating and filtration under pressure. Carl E. Holt. U. S. 2,174,265, Sept. 26. Various structural and operative details.

Oil filter with a transparent casing for inspection of the oil. Lyall B. White. U. S. 2,174,769, Oct. 3. Various structural details of a device suitable for use with lubricating systems of the pressure type.

Device (with intermeshed gears) for demonstrating the viscosity characteristics of lubricants. Frederick G. Rau. U. S. 2,175,638, Oct. 10. Various structural and operative details.

Increasing the melting point of petroleum asphalt, etc. James E. Gambrill (to Atlantic Refining Co.). U. S. 2,175,189, Oct. 10. The material is mixed with NaOH 0.5–10% and the mixt. is heated to about 315–370° (suitably for 15 min. to 8 hrs.).

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Microscopic analysis of swelled cellulose. B. G. Milov. *Bumashnaya Prom.* **17**, No. 9, 7–14(1939).—Shake a cellulose sample contg. 0.17 g. abs. dry fibers with 7 cc. water in a stoppered vessel until the lumps disappear, add 7.15 cc. Cu-NH_4 soln. contg. 14 g. Cu and 195–210 g. NH_3/l., mix the contents, shake for 10 min., and withdraw a 2-mg. portion with a pipet and use 1–2 drops thereof for microscopic study. B. Z. Kamich

Lignin. XXVI. A stilbene derivative from the sulfite waste liquor. Hermann Richtzenhain and Christian v.

Hofe. *Ber.* **72B**, 1890–2(1939); cf. *C. A.* **33**, 9290⁹.—In repeating the work of Hibbert and coworkers (*C. A.* **32**, 3314⁷, and earlier papers) who, by heating the waste sulfite liquor from spruce wood with alkali, obtained about 7% vanillin (based on the lignin in the liquor), the authors obtained a further product (I) which gave vanillin on cautious oxidation and proved to be 3,3′-dimethoxy-4,4′-dihydroxystilbene. For unknown reasons the yield varied widely; in the most favorable cases it was about 1% of the lignin but in others it amounted only to traces or none at all. As I is not present before the boiling with alkali it is probably formed during the operation from some constituent of the waste liquor. This is apparently not the vanillin formed simultaneously, for vanillin alone yields no stilbene with sulfite and alkali under these conditions. The yield seems to be best when on treatment of the liquor with alkali appreciable amts. of free S appear. The liquor was heated with alkali under pressure (U. S. pat. 2,069,185, *C. A.* **31**, 1828²), then acidified with H_2SO_4, the liberated SO_2 boiled off, the filtered soln. extd. with ether, the vanillin removed from the ext. in the usual way, the soln. evapd., the residue extd. with acetone, the acetone evapd. and the product crystd. from alc. I m. 212–13°; *4,4′-di-Me ether*, prepd. with alk. Me_2SO_4, faintly yellow, m. 153°; *4,4′-diacetate*, m. 226°, is hydrogenated in AcOH with Pd-$BaSO_4$ to *3,3′-dimethoxy-4,4′-diacetoxybibenzyl*, m. 140–1°, which is sapond. by 10% NaOH to the *4,4′-di-HO compd.*, m. 158. I was synthesized for comparison by distg. trithiovanillin with Cu powder, and its di-Me ether by distg. thioveratraldehyde with Fe powder. This ether with $KMnO_4$ in acetone gave veratric acid, m. 181°. C. A. R.

Study of break-down products of lignin. P. A. Bobrov and L. I. Kolotova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 49–51(1939)(in English).—The present paper reports further work on the oxidation products of lignin (cf. *C. A.* **32**, 3955⁶). The Ba salts of the hydroxy acids were evapd. and recrystd. giving a product of const. compn. contg. 53.43% Ba. This amt. corresponds to that in tartronic acid salt (53.8% Ba) and leads to the conclusion that lignin is of carbohydrate nature. Four g. of Ba salts was caused to react at 170–180° for 4 hrs. in sealed tubes with 30 ml. HI (sp. gr. 1.19) and 1.4 g. red P. The mixt. was dild. with 3 vols. of H_2O and extd. with Et_2O. The residue left after distg. off the Et_2O was treated with 25% H_2SO_4 and Zn dust in the cold and filtered. The filtrate was treated with $PbCO_3$ and Ag_2O. It was then acidified and extd. wth Et_2O. The residue had a characteristic odor of fatty acids. It was distd. into 4 fractions: (1) below 125°; (2) 125–165°; (3) 165–185° and (4) 185°. The Na salts of each of the fractions were converted into their *p*-bromophenacyl esters and recrystd. Fraction (1) was thus identified as AcOH, (2) and (3) were identified as butyric acid and (4) was identified as caproic acid. Glycolic acid was identified among the nonvolatile products of reduction. Lignin was also oxidized with 20% H_2O_2 at room temp. in the presence of 2 *N* NaOH. On acidification of the aq. soln. a voluminous white flaky ppt. was obtained in a yield of 54–60% of the oxidized lignin. The H_2O-sol. acids were similar to those obtained by the oxidation in neutral medium. The white ppt. gradually turned black on standing and lost its soly. in hot H_2O, MeOH, EtOH, AcOH, Me_2CO, and similar solvents. It could finally be dissolved only in aq. NaOH but regained the initial soly. characteristics on pptn. from its alk. soln. The substance was purified by repeated pptn. It melted with decompn. and gave a reaction for furane when heated. Na and Ba salts were obtained. The Br deriv., prepd. by bromination in glacial AcOH soln. or of its Na salt in aq. soln., was sol. in MeOH, EtOH and in EtOAc. The substance had the following ultimate analyses: C 57.39, H 5.16 and OCH_3 9.71%. The empirical formula is $C_8H_8O_4$. Mark Plunguian

Softening of water in the production of rayon. V. S. Burlakov. *Legkaya Prom.* **1938**, No. 2, 106–17; *Khim. Referat. Zhur.* **2**, No. 1, 110(1939).—A combination scheme can be used for softening water: permutite treatment with a preliminary liming. This arrangement gives light, clear water contg. a min. amt. of impurities, and having a hardness of 0.1–0.2°. W. R. Henn

Manufacture of pulp from bagasse. I. Bagasse pulp by soda process. Syosuke Tanaka and Muneo Koriyama. *J. Agr. Chem. Soc. Japan* **14**, 724–32(1938); cf. *C. A.* **34**, 261⁸.—Bagasse pulp was prepd. by the soda process; fresh and 1.5-year-old bagasse was used. New bagasse gave about 17% more pulp than old. Lignin can be removed very easily by the soda process. α-Cellulose in the old bagasse increased up to 85% when both the alkali content and pressure were increased; with new bagasse there was a max. yield of 73%. The pentosan content for the new-bagasse pulp was 26–31%, while it was only 7–10% for the old-bagasse pulp. There was about a 2–6.5% reduction in pulp during the process of bleaching. The optimum conditions for the manuf. of pulp for the new bagasse are: alkali 24%, steam pessure 2.5 atm.; for the old bagasse, alkali 24% and steam pressure 6 atm. F. I. Nakamura

Mechanism of pulp bleaching. F. P. Komarov. *Bumazhnaya Prom.* **17**, No. 8, 3–9(1939).—A review of the literature. It is concluded that in the preliminary bleaching with gaseous Cl_2 the process of chlorination prevails while in using hypochlorite the oxidation reaction predominates. Seventeen references. B. Z. Kamich

Rapid methods for determining the viscosity of pulp. F. P. Komarov. *Bumazhnaya Prom.* **17**, No. 9, 3–7 (1939).—Various methods for the rapid detn. of the η of pulp are discussed. The need for a single satisfactory method is emphasized. B. Z. Kamich

Strong acid liquor for sulfite pulping. N. N. Nepenin. *Bumazhnaya Prom.* **17**, No. 6, 3–5(1939).—Polemic on Giller's paper (*C. A.* **33**, 857⁷). B. Z. Kamich

Regeneration of sulfur dioxide at the Balakhnin sulfite cellulose plant. I. A. Nagrodskii. *Bumazhnaya Prom.* **17**, No. 7, 10–14(1939).—It is proposed to recover the SO_2 at the Balakhnin sulfite cellulose mill by a combined hot cold method in which the SO_2 is absorbed in cold acid followed by heating of the acid in a tank. The system includes 2 500-cu. m. tanks of high and medium pressure which operate successively. Before the tanks the discharge gas passes through eductors which operate on the principle of injectors. Acid enters the upper section of the eductor at a pressure of about 10 atm. while the discharge gas enters through a side pipe. The gas is well absorbed in the eductor. Flowsheet is given. B. Z. Kamich

Biological experiments with sulfite pulp waste liquor. A. O. Winter. *Finnish Paper Timber J.* **21**, 636–7(in English)(in Finnish, 646–52)(1939).—The formation of H_2S from sulfite waste liquor occurs only if the contaminated water is in the anaerobic state, and contains no SO_2 or other S compds. or sugar. Neutralization of the SO_2 with $CaCO_3$ gives rise to H_2S if the temp. is above +10°, the concn. of the waste liquor is 1.40–1.800 and the pH is between 4.6 and 7.2. Microörganisms may reduce inorg. sulfate, thiosulfate, sulfite and lignosulfonic acid to H_2S by using the biol. decompn. products of glucose, arabinose and xylose as sources of energy. Preservation of the aerobic state of the water course by lowering the O demand or pumping in addnl. water contg. O is not always satisfactory for preventing H_2S formation. Fermentation of the liquor for EtOH manuf. is ineffective since only glucose is removed. Moreover, the SO_2 is neutralized and yeast is added, resulting in strong H_2S formation. Removal of 75% of the S compds. with $Ca(OH)_2$ and reduction of the O demand by 70–80% (G. Howard, *Paper Mill* **59**, No. 31, 11(1936)) has no effect on the availability of the sugars to the microörganisms since this waste liquor readily forms H_2S. The purification of the waste liquor by preliminary biol. formation of H_2S to remove hexoses, pentoses and S compds. is impractical since the fermentation requires 3–4 weeks, and a dilu. of the liquor of 1:50. S. A. Karjala

Hydrogenation of waste sulfite liquors. P. A. Bobrov and L. I. Kolotova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 46–8(1939)(in English).—Sulfite waste liquor acidified with H_2SO_4 was steam treated at 100° and then evapd. to dryness. This served to remove half of the fixed S as SO_2. This preliminary treatment led to a considerable saving of

H. The yield of the initial material was 70.5% of the wt. of dry residue obtained by direct evapn. The initial material was suspended in heavy hydrogenation oil in a proportion of 2.1. Consumption of H is first observed at the temp. range 140–170°. During further heating to 300°, the consumption of H_2 is inappreciable but appears again at temps. over 300°. High yields of heavy oils in almost complete absence of light fractions were obtained at temps. not over 340-350°, while a sharp increase in light fractions, b. below 150°, was obtained by raising the temp. above 400°. By heating for 6 hrs. at 350–450° a total yield of 55% oils was obtained. The yield of light fractions was 10% of the total amt. of oil. At temps. below 350° the yield of light fraction was not more than 8% of the oil. There was 18% of solid carbonaceous residue left after hydrogenation with an ash content of 50%. It is argued that wood, lignin, cellulose, wood-distn. tars and other products break down at temps. of 270-280°. Thermal decompn. is accompanied by a considerable evolution of H_2O, CO_2, CO, etc. The loss of fixed O lessens the consumption of H. Destructive hydrogenation must be preceded by thermal decompn. while controlled hydrogenation, such as reduction of OH acids into fatty acids, must be carried out at temps. below those of thermal decompn.

Mark Plunguian

Viscosity of paper as a criterion of pulp quality. E. V. Lipshits. *Bumazhnaya Prom.* **17**, No. 8, 10–17(1939).— Tabulated and graphical data are given on the relation of viscosity to (1) aging of paper, and (2) mech. properties and ease of grind of sulfite and sulfate pulps during various stages of bleaching with Cl_2. The η varied inversely with the duration of bleaching, the Cu nos. increased almost linearly, the content of α-cellulose decreased and reached a min. after 4 hrs., resistance against break decreased sharply at first but after 3 hrs. it reached an almost min. value, and the tensile strength increased during the first hr., then it dropped to nearly the original value in 3 hrs. and after that it changed very little. Conclusion: Bleaching produces parallel decrease in η, difficulty in grind and resistance to break. B. Z. Kamich

Calculating the dirt particles in paper. Kh. A. Frukhtbein. *Bumazhnaya Prom.* **17**, No. 7, 15–19(1939).— Various methods for calcg. the dirt particles in paper are briefly reviewed. The method of Clark is considered more accurate than the present Russian method. B. Z. K.

Chloromethyl compds. of sulfonamides [for treatment of paper] (Brit. pat. 508,794) **13.**

Cellulose. Henry Dreyfus. U. S. 2,175,257, Oct. 10. A material such as chips of poplar or spruce is subjected to the action of an alk. soln. of alky. equiv. to that of a 2.5–10% NaOH soln. at a temp. which is initially at least 120° and which rises as the treatment proceeds by 3–7° per hr. to between 155° and 180°.

Acetylating cellulose. Pierre Koetschet (to Soc. des usines chimiques Rhône-Poulenc). U. S. 2,175,842, Oct. 10. In the manuf. of fibrous acetylated cellulose, cellulose such as bleached linters is pretreated with HOAc and is then treated with an acetylating mixt. contg. Ac_2O, HOAc, a substance such as benzene which prevents the cellulose acetate from going into soln., and a catalyst free from metallic salt and which consists of a mixt. of perchloric acid with 2-20% its wt. of H_2SO_4.

Cellulose ethers. I. G. Farbenindustrie A.-G. Brit. 508,517, June 30, 1939. Materials sol. or capable of swelling in H_2O but insol. in org. solvents are produced by etherifying pretreated wood with monohaloacetic acids or their salts, e. g., monochloroacetic acid or its Na salt. The wood is pretreated with NaOH soln. at normal or increased pressure so that the lignin, pentosan and resin constituents are not substantially removed.

Cellulose esters. Ernst Berl. U. S. 2,175,103, Oct. 3. For producing a partially esterified product, wood pulp is treated with formic acid and the resulting product is further treated with a lower aliphatic acid (such as for acetylation) with use of an acid catalyst and of an anhydride to form a tri-substituted cellulose ester and the latter is dissolved by heating it with a concd. lower aliphatic acid such as formic acid in the presence of a salt of a weak acid such as borax capable of reacting with the residual acid catalyst. Various examples with details are given.

Mixed cellulose esters such as cellulose acetate methacrylate. Robert W. Maxwell (to E. I. du Pont de Nemours & Co.). U. S. 2,175,357, Oct. 10. A cellulose deriv. such as acetone-sol. cellulose acetate which is sol. in org. solvents and contains esterifiable hydroxyl groups is dissolved in a solvent such as acetone which is substantially inert to the esterifying agent, and then treated with an esterifying agent such as methacrylic anhydride with use of a catalyst such as NaOAc or other alkali or alk. earth metal carbonate, phosphate, acetate, butyrate or borate in at least sufficient proportion to react with the acid set free in the esterification.

Cellulose derivatives. The Dow Chemical Co. Brit 508,766, July 5, 1939. Alkali cellulosate is obtained by causing anhyd. cellulose to react with an alkali metal amide in liquid NH_3 at below 25° under the vapor pressure of the NH_3 at the temp. employed, the reaction being conducted in the absence of H_2O. Mono-, di- or tri-alkali cellulosate is obtained according to the proportion of alkali amide present. During the subsequent etherification of the alkali cellulosate, an org. solvent, e. g., C_6H_6, toluene, xylene, may be present. In an example, Na and $Fe(NO_3)_3$ are added to liquid NH_3 in a closed vessel and the mixt. is stirred until the blue color disappears, finely divided anhyd. cellulose is added and the mixt. is stirred for several hrs. while NH_3 is allowed to distil off slowly until at the end of the reaction only enough liquid remains to wet the mass, the mixt. is then cooled below −33° and EtBr and toluene are added, the mixt. is allowed to stand for several hrs., the temp. rising gradually to 25°, the mixt. is then poured into hot H_2O and the ethylcellulose is sepd. from the aq. suspension by extn. with a solvent.

Crimped yarns of cellulose derivatives such as cellulose acetate. Donald Finlayson (to Celanese Corp. of America). U. S. 2,174,573, Oct. 3. Yarns such as those having a basis of cellulose acetate are subjected to the operations of twisting, setting the twist, and untwisting, and subsequent treatment in a bath of hot aq. liquid to impart a higher degree of crimp.

Crinkled decorative material such as that of regenerated cellulose films. Eleanor R. Cohoe. U. S. 2,176,019, Oct. 10. A film of material such as one of regenerated cellulose or a cellulose ester or ether or gelatin is subjected to the action of a softening agent, twisted into a substantially cylindrical compact mass, subjected to such tension as to produce plastic deformation resulting in the formation of a multiplicity of permanent, fine and irregular wrinkles in the material, and is then untwisted.

Soda treatment and conversion of cellulose-fiber sheets. George A. Richter and Kenneth E. Glidden (to Brown Co.). U. S. 2,174,894, Oct. 3. A dry cellulose-fiber sheet such as one of bleached sulfite pulp is dipped in water until satd., then dipped in NaOH soln. of about 18% strength at about room temp. to effect replacement of the water by the NaOH soln., pressed to a predetd. NaOH content, and treated, as by shredding and xanthation, to convert the soda-cellulose of the sheet into another cellulose deriv.

Extruded tubing of nitrocellulose composition. Frank H. Reichel and Augustus E. Craver (to Sylvania Industrial Corp.). U. S. 2,175,313, Oct. 10. Tubing suitable for sausage casings is formed by extruding a cellulose nitrate compn. contg. about 6–11% of water, with coagulation in an aq. bath.

Treating artificial filaments, films, sheets, etc., with liquids. Atlas Powder Co. Brit. 508,682, June 30, 1939. Regenerated cellulose material is plasticized, softened and conditioned by treating with a soln. of sorbitol sirup contg. a relatively large proportion of sorbitol (I) and, in addn., substantial proportions of each of saccharitols, i. e., alcs. corresponding to saccharinic acids, Na salts of hydroxycarboxylic acids contg. 4–6 C atoms, tetrahydric alcs. and monoanhydrohexitols, and allowing the material to dry.

The treatment may be conducted during or subsequently to the production of the regenerated cellulose material. The sirup may also contain small amts. of unreduced sugar, mannitol, and Na_2SO_4. The Na salt of a hydroxycarboxylic acid may be a lactate or saccharinate. Brit. 508,519, June 30, 1939, divided on 508,682, claims a *softening* or *conditioning agent* or *compn.* comprising I, saccharitols, Na salts of hyroxycarboxylic acids, tetrahydric alcs. and monoanhydrohexitols. The several ingredients of the compn. may be brought together by mixing, or the mixt. may be obtained by reduction of glucose and treatment of the reduced liquor so as to recover therefrom a viscous aq. sirup contg. the desired ingredients. The compn. is insol. in hydrophile solvents with but few exceptions among which are AcOH, pyridine, PhOH and $AcNH_2$.

Rayon staple. Henry C. Forrest. U. S. 2,174,576, Oct. 3. App. is described and a method of making a spinnable rayon staple, which comprises extruding a cupro-ammonium cellulose soln. into a pptg. bath to produce a wet cupro-ammonium regenerated cellulose filament, subjecting the filament to treatment with liquids while setting up irregular strains in the filament by stretching and then relaxing the strains to deform the filament and drying the filament in slack condition permitting free shrinkage to retain the deformation, and so feeding and guiding the filament during such treatment that it is free from folding.

Rayon, etc. Aktiengesellschaft für Vermögensverwertung. Brit. 508,781, June 26, 1939. Rayon, spun fibers and horsehair and also bands, films, etc., are prepd. from alk. solns. of phosphoproteins or conjugated proteins to which have been added satd. or olefinic unsubstituted aliphatic carboxylic acids having 3-9 C atoms, or their derivs. such as esters or amides, with or without aliphatic amines or amino acids. Acids specified are propionic, heptylic, caprylic and caproic, and amines are $PrNH_2$, allylamine and $BuNH_2$. A small quantity of CS_2 may be added. In an example, potash lye is added slowly to a paste of acid casein and CS_2, propionic acid and $PrNH_2$ are added, the soln. is then spun into a pptg. bath and the thread is dried under tension and hardened in a formalin bath.

Drying reel for rayon thread. Louis E. Lovett (to Industrial Rayon Corp.). U. S. 2,175,205, Oct. 10. Various structural, mech. and operative details.

V-type bedplate for paper-pulp beaters. Archer L. Bolton (to John W. Bolton & Sons, Inc.). U. S. 2,174,774, Oct. 3. Various structural details.

Treating fibrous material as in the production of sulfite pulp from wood chips. Albert D. Merrill (to Chemipulp Process Inc.). U. S. 2,175,154, Oct. 3. An arrangement of app. is described, and a method of treating fibrous material which comprises soaking the material in a recirculating mass of hot alk. liquor; then draining the excess liquor and soaking the material in a recirculating mass of acid liquor maintained at elevated but below reaction temps. and then raising the temp. and cooking the material in the acid liquor.

Apparatus for pressing moving webs in papermaking machines. Harold S. Hill. U. S. 2,174,744, Oct. 3. Various structural and operative details of an app. in which water or air under pressure exerts pressure on an impervious belt which may be formed of rubber, impregnated canvas or thin steel and which serves to confine a paper web as it passes over a roll.

24—EXPLOSIVES AND EXPLOSIONS

C. G. STORM

Dynamite in an automobile plant. A method of blasting drill bits from crankshaft oil holes. O. J. Otto. *Explosives Engr.* **17**, 376(1939).—When an oil-hole drill breaks off in the crankshaft, $^1/_8$–$^1/_2$ a thimbleful of 40% ammonia gelatin dynamite is pushed down the hole and a cap and fuse are placed on the dynamite. The charge is fired, and the drill piece will then fall out on tapping with a hammer. Caliper measurements have failed to show any enlargement of the hole and exhaustive tests have shown no damage to the grain structure or other specifications of the crankshaft steel. E. M. Symmes

Explosives suitable for detonation. Willard de C. Crater (to Hercules Powder Co.). U. S. 2,174,914, Oct. 3. Ingredients used together may comprise charcoal 8, S 7, and nitrated balsa wood contg. about 9-11.5% N 10, impregnated with NH_4NO_3 10 and $NaNO_3$ 65 parts. Various similar mixts. are described.

Explosives such as ammunition priming mixtures. Willi Brün (to Remington Arms Co.). U. S. 2,175,826, Oct. 10. An explosive compn. is prepd. by moistening (without completely dissolving) a mixt. of a nitrate of Pb or Ca with a hypophosphite of K, Na, Ca, Sr, NH_4, Ba or Mn.

Treating deteriorated nitrocellulose for smokeless powder manufacture. Fredrich Olsen, Gordon C. Tibbitts and Edward B. W. Kerone (to Western Cartridge Co.). U. S. 2,175,212, Oct. 10. Deteriorated nitrocellulose contg. regions of acid concn. is softened with a solvent such as EtOAc which is immiscible with water, and the material is washed in a bath of water.

Electric blasting initiator of the delay type. Lawton A. Burrows and Wm. F. Filbert (to E. I. du Pont de Nemours & Co.). U. S. 2,175,249, Oct. 10. An ignition charge, in the form of a bead surrounding the bridge wire, comprises a complex salt of Pb nitrate with a Pb salt of a nitrophenol such as a bis basic Pb picrate.

Extinguishing flames of gasoline, etc. Xavier B. Tansill. U. S. 2,174,606, Oct. 3. A method of extinguishing the flames on the surface of a body of burning oil, gasoline, benzine, naphtha, kerosene, etc., comprises submerging a plurality of bodies of solid CO_2 in the body of burning liquid fuel so that CO_2 gas resulting from sublimation bubbles to the surface of the burning fluid and forms an atmospheric excluding blanket on the surface.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

A theory of the color of dyes. Linus Pauling. *Proc. Natl. Acad. Sci. U. S.* **25**, 577-82(1939).—The long-wave absorption band of a dye is assocd. with the resonance of a pos. charge from atom to atom about the mol. The source of the resonating pos. charge may be the CO group



as in benzaurin and indigo, or the —N:O, O—N:O and —N:N— groups for nitroso, nitro and azo dyes. In some cases the resonating charge results from external ionization as in Dobner's Violet. The band of longest wave length, representing the transition from the normal state with nodelesswave function to the excited state with a single nodal plane is predicted to be the most intense band for many dyes. The agreement between predicted and observed values is good. Detailed accounts are to be published. Janet E. Austin

Soluble chromium derivatives of dyestuffs. James L. Boyle. *Am. Dyestuff Reptr.* **28**, No. 24, *Proc. Am. Assoc. Textile Chem. Colorists* P746-51(1939).—The development, from a chem. standpoint, of sol. metallic derivs. of mordant dyestuffs which makes possible a substantive dyeing process requiring no mordant complexes of azo

dyestuffs is reviewed and the behavior of metallic complexes in dyeing outlined. The class of dyes most used from the production of sol. metallic derivs. is the *o*-substituted azo mordant dyes. W. H. Boynton

The management and operation of a hosiery dye house. A. G. Alexander and Clarence Wille. *Am. Dyestuff Reptr.* 28, No. 25, *Proc. Am. Assoc. Textile Chem. Colorists* P716-21(1939).—The arrangement, the dyeing equipment, the method of dyeing silk hosiery, methods for mercerizing hosiery, methods for wool hosiery, types of goods, water-supply materials and purchases, steam and power supply and controlling and recording app. are discussed. W. H. Boynton

Organizing a dyeing and finishing plant for synthetic piece goods. P. J. Wood. *Am. Dyestuff Reptr.* 28, No. 26, *Proc. Am. Assoc. Textile Chem. Colorists* P746-51 (1939). W. H. Boynton

Technical dyeing methods. II. C. L. Wall. *Textile Mfr.* 65, 454(1939); cf. *Ibid.* 411.—Limitations in adsorption methods of dyeing and the possibilities of continuous impregnation processes are discussed, and some requirements are given. Agents which assoc. with ionic groups of dyestuffs, thus preventing adsorption, are a means of improving the application of existing dyestuffs by simple impregnation. Pyridine, etc., can be used to advantage in the application of anionic dyestuffs (if the fumes are disposed of properly). Halsey E. Silliman

Protective coatings for the wooden parts of dyeing equipment. L. K. Tyumenev. *Shelk* **1938**, No. 5, 41–2; *Khim. Referat. Zhur.* 2, No. 2, 134(1939).—Bakelite lacquers can be used for protection of the wooden parts. The lacquer is applied to the wood heated to 85–90°, dried and second coat applied. Good results were obtained with the acidic ("novolak") as well as with the basic lacquers ("rezol"), although the acidic lacquer has a somewhat unpleasant odor and is less stable to bases. W. R. Henn

Textiles of tomorrow. Kenneth H. Barnard. *Am. Dyestuff Reptr.* 28, 737–41(1939).—An address. W. H. Boynton

The new artificial textiles. G. Martin. *Bull. soc. ind. Rouen* 66, 319–36(1938).—An address. C. R. P.

Refractive indexes of textile fibers: double variation method for their determination. Kenneth R. Fox. *Textile Research* 10, 79–93(1939).—The method and app. employed to secure a more precise and convenient method of measuring the refractive indexes of individual textile fibers are outlined. Refractive indexes of standard immersion fluids are shown, also curves giving temp. increase vs. heater scale reading, the effect of temp. on refractive indexes, the effect of wave length on them, and a sample of the data taken in test detns. and a measure of the dispersion in each table. Eight references. W. H. B.

The hydrophobing of artificial fibers and fabrics. Richard Flint. *Silk and Rayon* 13, 808, 834(1939).—A discussion of the nature of the chem. process of hydrophobing and of methods for hydrophobing pieces of cloth. Milton Harris

Properties and utilization of "Teca" staple fiber. Harold DeWitt Smith. *Rayon Textile Monthly* 20, 637–8, 639(1939).—See *C. A.* 33, 9628[4]. *Ibid.* 699–701. Drawing machines, slubbers, intermediates, speeders and spinning frames handle Teca satisfactorily. The conversion of Teca yarns into fabrics is outlined, also the dyeing and finishing. W. H. Boynton

The chemistry of ramie fibers; a method of degumming and analysis of the raw and degummed materials. Lilly Gomez and Isabel Concepcion. *Univ. Philippines Nat. and Applied Sci. Bull.* 7, 33–7(1939).—Uhi Hakucho ramie fibers from Davao, Mindanao, were heated under 15 lb. pressure for 1½ hrs. with a soln. composed of 2% soap and 0.2% palm oil, then bleached with 0.5% NaOCl soln. The white fibrous material obtained was treated under 10 lb. pressure for ½ hr. with a 1% soln. of $Na_2S.9H_2O$, then bleached again with 0.1% NaOCl soln. The degummed fiber, obtained in 80% yield, was soft, lustrous, strong, contained no lignin, was composed mostly of α-cellulose, and had greater dyeing capacity than cotton. Analyses of the raw and degummed materials are included. George Ayers

The use of sodium hexametaphosphate in the silk industry. K. M. Markuze and M. N. Vasil'eva. *Shelk* **1938**, No. 5, 28–32; *Khim. Referat. Zhur.* 2, No. 2, 116(1939).—Exptl. washings of silk in the presence of $(NaPO_3)_6$ showed that the fat content of the fibers was decreased, the time of washing reduced and the formation of Ca soap prevented. The use of $(NaPO_3)_6$ in indanthrene dyeing is of some practical interest. W. R. Henn

New knowledge of the physics and microscopic structure of wool. Werner Von Bergen. *Textile Research* 10, 63–9(1939).—A review. W. H. Boynton

The processing of linen piece goods in the United States. O. W. Clark. *Am. Dyestuff Reptr.* 28, 709–14, 727–9 (1939).—Const. and meticulous supervision must be employed in the processing of linen fabrics. Each quality of linen fabric requires its own set of dyeing formulas. Detailed formulas and step-by-step procedures are given for the processing of various types of linen fabrics. W. H. B.

Bleaching of linen with peroxide. O. E. Itina. *L'nopen'ko-dzhutovaya Prom.* **1938**, No. 4, 35–44; *Khim. Referat. Zhur.* 2, No. 1, 97(1939); cf. *C. A.* 33, 9002[5].—A soln. of Na_2O_2 in water was neutralized by the addn. of H_2SO_4. The optimum concn. of the peroxide for bleaching linen was 1.5–2% of O on the wt. of the cloth. Best results were obtained from bleaching at 80–5° for not less than 3 hrs., or for 1 hr. at 80° and 1 hr. at 100°. A stabilizer (Na silicate) must be added to the peroxide soln. The optimum alky. was obtained with a ratio in the bleaching soln. of SiO_2 (in the silicate) to Na_2O (total alky. of the soln.) close to 1:1. Some NaOH (2–3 g./l.) should be added to the soln. Presence of Na_2CO_3 is undesirable, and addn. of soap increases the whiteness of the cloth, but decreases slightly its capillarity. More economical than use of peroxide alone is boiling in an alk. bath, bleaching with hypochlorite, finishing with Na_2O_2 with the addn. of acid. W. R. Henn

The bleaching of cellulose, with special reference to bast fibers. E. Butterworth. *J. Soc. Dyers Colourists* 55, 589–96(1939).—The problem is not the degradation of the cellulose but the bleaching of the color under conditions which will preclude attack on the cellulose when in the presence of the colored impurities. W. H. Boynton

Modern methods of bleaching rayon and cotton mixed fabrics. H. Joubert. *Bull. soc. ind. Rouen* 66, 348–66 (1938).—The effect of boiling with alkalies under pressure, and of Cl and H_2O_2 bleaching treatments upon cotton and rayon fabrics was followed by measuring the breaking strength, elongation, loss in weight, change in viscosity in cuprammonium soln., and the titration with $KMnO_4$ of the material extractable with boiling NaOH soln. Elaborate conclusions and recommendations are given for different cases. In general, J. prefers H_2O bleaching for rayon fabrics. Charles R. Phillips

The finishing of modern spun rayon fabrics. B. S. Hillman. *Rayon Textile Monthly* 20, 649–50(1939); cf. *C. A.* 33, 4030[9].—The scouring and dyeing of Cisalfa with various types of colors are outlined. *Ibid.* 708–9.—The dyeing of this fiber with developed dyes, with acid dyes and with chrome colors is discussed. The av. Cisalfa spun-rayon fabrics require little or no finishing materials to obtain a full desirable "woolly" feel and handle. Casein fabrics should be framed with a great deal of steam. W. H. Boynton

Technical evaluation of textile-finishing treatments. Lelia J. Winn and Edward R. Schwarz. *Rayon Textile Monthly* 20, 652–3, 710–12(1939).—See *C. A.* 34, 269[7]. W. H. Boynton

The emulsification of batching oils. Alexander King. *Textile Mfr.* 65, 439(1939).—Bentonite and inert Al hydroxide emulsions of great stability are produced. In solid stabilized emulsions, it is often possible to see under the microscope the solid particle μ adsorbed at the oil-water interface. In emulsions where there is a creaming tendency, homogenization will generally correct this. One lb. of kerosene emulsified in uniform particle diam. size of 1 μ has a surface area of 31,500 sq. ft. The vis-

cosity of an emulsion is essentially controlled by the percentage of the internal phase, the viscosity of the latter being of little importance. Emulsions of less than 40% internal phase are relatively mobile. Between 40% and 50% the viscosity increases rapidly, and over that becomes paste-like masses. An advantage of emulsification over the unemulsified oil technique for use with jute is that viscous oils of high lubricating value can be used.
Halsey E. Silliman

The rotproofing of textiles. S. G. Barker. *Proc. Food Group, Soc. Chem. Ind.* **1**, 102–8(1938); *Rev. Applied Mycol.* **18**, 527; cf. *C. A.* **33**, 1952[8].—Shirlan paste and powder gave excellent results in the preservation of fine fibers from attack by microörganisms and with coarser textiles a high lignin content confers strong resistance. A rotproofing material must not impair the intrinsic characteristics of each fiber and therefore each fiber is a sep. problem. The Thaysen acetylation process renders a cotton surface unsuitable as a nutrient. The iron-chromt proofer, chromium-clutch method (which gives good results if Cr content is maintained between 2 and 2.5%) and the use of creosote are also considered. O. E. S.

Recovering tin from waste phosphate liquors. C. C. Downie. *Silk and Rayon* **13**, 962(1939). Waste phosphate liquors are passed through a filter charged with active Al_2O_3. The ppt. is washed with Na_2S contg. free S forming SnS_2. The soln. of SnS_2 in excess Na_2S is acidified with HCl and the pptd. SnS_2 converted to SnO_2 by "steam-roasting."
Milton Harris

Fabricated stainless steel in the rayon and textile industries. H. B. Vollrath. *Rayon Textile Monthly* **20**, 713–15 (1939).—The corrosion resistance of so-called stainless steels is emphasized and the "Shotweld" process of welding is described. A unique rayon-spinning machine used in the Furness process of making cuprammonium yarn and employing stainless steel in its construction is described.
W. H. Boynton

Spot testing in textile analysis. Erwin J. Saxl. *Am. Dyestuff Reptr.* **28**, 757–8(1939).—Economy of time, minute amts. of material required, small lab. space and low initial and running expense of an outfit to carry on the tests feature spot tests. A spot paper test for Cu, using a 0.5% alc. soln. of rubeanic acid, is sensitive in a concn. of 1 250,000. A test for phenols consists of taking a drop of a soln. of the compd. in distd. water or alc. on a filter paper or spot plate, adding a 2% aq. soln. of phosphomolybdic acid and then a drop of concd. NH_4OH. A rich-blue color indicates the presence of phenolic compds.
W. H. Boynton

Methods of removing special stains in the power laundry. Polly Bell Kessinger, J. Fred Oesterling, Mae Yoder Moore and Pauline Beery Mack. *Starchroom Laundry J.* **46**, No. 8, 32, 35–6; No. 9, 92, 94–6; No. 11, 38, 40, 42 (1939).—Standard stain strips contg. 18 common stains were prepd. Data are given showing the reaction of these stains to 94 different laundry procedures done in the lab. A multiple suds and bleaching treatment removed all the stains, except nonwashable fountain-pen ink, India ink, dark-colored salve and iron rust. The first 3 of these can be removed by a boiling-out treatment with built soap and the iron rust can be removed by the addn. of an acid in one of the rinses. The standard stain strips were sent to 101 com. laundries and the results summarized. The recommendation is made that the bleach concn. should not be increased to obtain better stain removal, but that other parts of the washing formula be changed.
Charles R. Phillips

The background of filter powder; the nature and use of diatomaceous silica in the cleaning plant. F. L. Horine. *Natl. Cleaner Dyer* **30**, No. 10, 40, 78–9(1939).—A discussion of the use of diatomaceous silica as a filtering agent in purifying dry-cleaning solvent. C. R. Phillips

Dry clarification; its application to dry-cleaning solvents. H. E. Bierce. *Natl. Cleaner Dyer* **30**, No. 12, 38, 40, 59(1939).—The use of dry adsorbent powders or clays to remove dissolved impurities from dry-cleaning solvent is discussed. Charles R. Phillips

Filtering dry-cleaning solvent. Noel L. Cooperider. *Natl. Cleaner Dyer* **30**, No. 11, 32, 34, 63–5(1939).—Changes in filter design and problems met with in keeping the solvent free from impurities are described.
Charles R. Phillips

cis-Indigo (Heller) **10.** Chloromethyl compds. of sulfonamides [for treatment of textiles] (Brit. pat. 508,794) **13.** Treating liquid alkanes with SO_2 and Cl [for mercerizing assistants] (U. S. pats. 2,174,507–8–9) **13.**

Monoazo dyes. Frithjof Zwilgmeyer (to E. I. du Pont de Nemours & Co.). U. S. 2,175,370, Oct. 10. From components such as acetoacetyl-3-chloro-4-ethoxyaniline and the diazoimino compd. obtained from diazotized 2,5-diethoxyaniline and diethanolamine, etc., dyes are produced which dye cotton and regenerated cellulose bright fast yellow when used according to any processes for the application of ice colors. Several examples with details are given.

Producing azo dyes on the fiber. Karl Jellinek (to General Aniline Works). process of producing water-insol. azo dyes on the fiber according to the ice-color method involves developing the vegetable fiber impregnated with a coupling component adapted for the production of ice-colors in a soln. of a diazonium salt contg. a water-sol. chromic salt as alkali binding agent.

Chromable dyes of the triarylmethane series. Wilhelm Eckert and Karl Schilling (to General Aniline Works). U. S. 2,175,168, Oct. 10. Dyes dyeing animal fibers in an acid bath yellowish and bluish red and brown tints and of good fastness when after-chromed are produced by condensing hydroxytrimellitic acid or its anhydride with an equimol. proportion of an N-substituted *m*-aminophenol to form a benzoylbenzoic acid, and condensing the latter with a *m*-dihydroxy compd. having a reactive H atom of a sulfonic acid group in *p*-position to the hydroxy group. Several examples are given, and the dyes formed are suitable for chrome printing on cotton, rayon, etc., and may be chromed in substance and used for dyeing in an acid soln. Cf. *C. A.* **33**, 5199[4].

Vat dyes. Walter Kern (to Soc. pour l'ind. chim. à Bâle). U. S. 2,175,122, Oct. 3. Vat dyes, generally dyeing and printing cotton fast yellow or yellow-brown shades, are produced by treating fluoranthene, in the presence of a condensing agent such as $AlCl_3$ or $FeCl_3$ and at a temp. of 120–160°, with about 2.5 or more mol. proportions of phthalic anhydride, naphthalene-2,3-dicarboxylic acid anhydride, anthraquinone-dicarboxylic acid anhydride or their halogen- or alkyl-substitution derivs. Several examples with details are given.

Vat dyes in finely divided form. Wilfred M. Murch and Le Roy G. Kline (to Dow Chemical Co.). U. S. 2,176,011, Oct. 10. Ciba Blue 2BD or other vat dye is dissolved in concd. H_2SO_4 and the resulting soln. is brought into contact with water to ppt. the dye in finely divided form by atomizing the acid dye soln. and bringing the spray into contact with water.

Sodium salt of Lithol Red. Henry H. Reich (to Calco Chemical Co.). U. S. 2,174,501, Sept. 26. A Na salt of Lithol Red of strong bright color is produced by coupling a diazotized mixt. of Tobias acid and 2-chloro-5-aminotoluene-4-sulfonic acid on β-naphthol, the proportion of the chloroaminotoluenesulfonic acid being 5–10% the amt. of the Tobias acid.

Anthraquinone derivatives. I. G. Farbenindustrie A.-G. Brit. 508,503, June 30, 1939. These are made by subjecting the products obtained according to Brit. 487,877 (*C. A.* **33**, 402[6]) to the action of agents capable of transforming carboxylic acids into their chlorides, e. g., PCl_5, preferably in the presence of a high-boiling indifferent solvent, e. g., $PhNO_2$, 1,3,5-trichlorobenzene (I), and causing the chlorides obtained to react with an amine contg. at least 1 H attached to the N, preferably in the presence of a high-boiling indifferent solvent, e. g., *p*-chlorotoluene, I. The anthraquinone residue may contain further groups capable of reacting, which can be used for

further reactions. The products are *vat dyes* and may also be used as starting materials for other dyes.

Anthraquinone derivatives. I. G. Farbenindustrie A.-G. Brit. 508,708, July 5, 1939. 1,2-Pyridino- and 1,2-pyridono-anthraquinones and anthraquinoneacridines are made by causing aminoanthraquinone-*o*-aldehydes to react in H_2SO_4 or H_3PO_4 with ketones contg. a CH_2 group adjacent to the CO group, with free or esterified malonic or cyanoacetic acid or with resorcinol, phloroglucinol, α- or β-naphthol, 2,6- or 2,7-dihydroxynaphthalene, aminohydroxynaphthalenes, hydroxynaphthalene-carboxylic acids or -sulfonic acids, hydroxyanthracenes, hydroxyphenanthrenes, hydroxyazaphenanthrenes or hydroxythionaphthenes. Ketones specified are Me_2CO, MeEtCO, acetylacetone, acetophenone and its derivs. substituted in the aryl radical, methyl naphthyl ketones, desoxybenzoin, acetylanthracenes, acetylphenanthrenes, cyclohexanone, barbituric acid, 2,5-diketopiperazines, hydantoins, naphthindandiones and naphthalenediindandiones. The products may be *dyes* or *dye intermediates*. Among examples, (1) 1-aminoanthraquinone-2-aldehyde (I) is caused to react with β-naphthol in concd. H_2SO_4 to give anthraquinone-1(*N*),2,2′(*N*),1′-naphthacridine, which may be oxidized with CrO_3 to give a substance that dyes cotton red shades, (2) I is caused to react with *peri*-naphthindandione or naphthalene-1,8,4,5-diindandione, and (3) I is caused to react with barbituric acid to give anthraquinone-1(*N*),-2,2′(*N*),1′,3′,5′-diaza-4′,6′-dihydroxybenzacridine, which may be converted to a dichloro deriv. by reaction with PCl_5.

Hydroxymethylphenol derivatives. Reginald J. W. Reynolds, Eric E. Walker and Imperial Chemical Industries Ltd. Brit. 508,523, July 3, 1939. H_2O-sol. compds. are obtained by heating together a phenol substituted by 1 or more hydroxymethyl groups in the *o*- or *p*-positions and a salt of an inorg. acid anhydride addn. compd. of a hetero cyclic tertiary amine. The products may be used as *assistants in dyeing cellulose fibers*. The phenols used may also contain, as substituents in the nucleus or side chain, halogen atoms, acylamido, acylamidomethyl, alkyl, aralkyl or hydroxyaralkyl groups; the hydroxyaralkyl groups may be substituted by further hydroxymethyl groups.

***m*-Halo-*p*-ethoxyacetoacetanilides.** Frithjof Zwilgmeyer (to E. I. du Pont de Nemours & Co.). U. S. 2,175,371, Oct. 10. Products such as 3-chloro-4-ethoxyacetoacetanilide, m. 111°, and suitable for use as *intermediates in the production of azo dyes* are produced by treating a 3-halo-4-ethoxyaniline and an alkyl acyl acetate such as ethyl acetoacetate in a nonaq. medium such as xylene (suitably at a temp. of 148–150°).

4,5-Dichlorophthalonitrile. John S. H. Davies and William O. Jones (to Imperial Chemical Industries Ltd.). U. S. 2,174,568, Oct. 3. This compd. is produced by dehydrating 4,5-dichlorophthalamide with phosgene in a tertiary org. base such as dimethylaniline or the like and is a *dye intermediate*.

Dyeing materials such as mercerized yarn with vat dyes. Cornelis W. Zahn (to J. A. Carp's Garenfabrieken N. V.). U. S. 2,174,372, Sept. 26. Material to be dyed is immersed in an alk. soln. of the leuco base of a dye such as Indanthrene Brilliant Violet R. R. contg. a water-sol. org. substance such as MeOH acting as a solvent for the salts of the leuco base in a proportion of at least 20% of the dyeing bath, and the dye is formed on the fibers by oxidation. Numerous examples are given.

Printing textiles. I. G. Farbenindustrie A.-G. Brit. 508,554, June 30, 1939. Textile fabrics are printed with a compn. contg. a vat dye, a reducing agent, a thickening agent sol. or capable of swelling in H_2O, a H_2O-sol. salt of an acid H_3PO_4 ester contg. at least 1 aliphatic or cycloaliphatic hydrocarbon radical having at least 6 C atoms and, if desired, addnl. ingredients known in vat dye printing pastes. The compns. may also contain an aliphatic or cycloaliphatic alc. or ketone, which may be halogenated, e. g., the by-products obtained in the synthetic manuf. of MeOH, or cyclohexanol, BuOH, chloropropanol or chlorobutanol. Among examples, the Na salt of the reaction product of P_2O_5 and a mixt. of hexyl and heptyl alcs. is mixed with BuOH, H_2O and 2,1,2′,1′-naphthathioindigo and the product mixed with a printing thickening of wheat starch, tragacanth, British gum, glycerol, KOH, Na formaldehydesulfoxylate and H_2O; cotton and rayon fabrics may be printed with the resulting paste.

Printing textiles. Société Nobel française. Brit. 508,717, July 5, 1939. Fabrics are printed with prepns. contg. in admixt. (a) 1 or more phenol-CH_2O resins that are sol. in drying oils, (b) 1 or more drying oils, and (c) an org. solvent. A diluent, e. g., xylene, and a drier, e. g., a linoleate of Co, Mn, Pb or Ca, may be added. In an example, a resin is prepd. by mixing together xylenol, ester gum, $(CH_2O)_3$ and NaOH soln., boiling the mixt. for 15 min., adding HCl soln., boiling for 1 hr., washing with H_2O until neutral, adding more ester gum, cooking the mixt. for 2 hrs. at 210–220° and allowing to cool, and this resin is mixed with china-wood oil, the mixt. is heated to 270°, so maintained for 10 min. in a stream of CO_2 to prevent yellowing, allowed to cool and, when 90° is reached, ethyleneglycol monoethyl ether and its acetate are added. Dyes or pigments may be added and the prepns. may be used to produce resist effects with over-dyeing.

Textile printing pastes containing penetrating agents. Ivan F. Chambers and Arthur L. Fox (to E. I. du Pont de Nemours & Co.). U. S. 2,174,486, Sept. 26. Vat dye printing compns. are used which contain an alkali metal salt of allylthioglycolic acid, the Na salt of α,α-dimethylbenzylthioglycolic acid or various compds. of the general formula RXA where R is a hydrocarbon or benzothiazole radical joined to X through an acyclic C atom, X is —O— or —S—, and A is an org. or inorg. acidyl radical and when A is inorg. R must be aralkyl, and further characterized in that R or A may contain a substituent halogen, hydroxyl, alkoxy, aliphatic acyl or hydrocarbon radical. Numerous examples with details are given.

Apparatus for dyeing or bleaching textile materials such as skeins of yarn. Robert E. Oberholtzer (to James Lees & Sons, Inc.). U. S. 2,174,474, Sept. 26. Various structural and operative details.

Staple fiber yarns of materials such as cellulose acetate. Wm. I. Taylor (to Celanese Corp. of America). U. S. 2,174,607, Oct. 3. A process for the production of improved staple fiber yarns comprises twisting continuous filament yarns which have a basis of org. derivs. of cellulose, and which contain a high proportion of filaments of flat cross section setting the twist therein and untwisting such yarns, converting the yarns into staple fiber yarns by a direct conversion process, and thereafter subjecting the yarns to treatment with a bath of hot aq. liquid maintained at about its b. p.

Composite yarns. Vernal R. Hardy (to E. I. du Pont de Nemours & Co.). U. S. 2,174,878, Oct. 3. Composite yarns of wool-like character comprise a crimped thread of material such as a polyamide product and a spontaneously crimpable thread such as one also of polyamide material.

Pile yarn for carpets and rugs. Henry C. Forrest. U. S. 2,174,575, Oct. 3. Cuproammonium fibers are used, of an individual size of 25–30 deniers, sufficiently strong and pliable to be bent sharply without cracking.

Treating textiles. Heberlein & Co. A.-G. Brit. 508,665, July 4, 1939. Addn. to 494,663 (*C. A.* **33**, 2738[2]). A noncurling fabric stiffened and transparentized by treatment with a parchmentizing agent has at least 1 of its selvedges woven entirely or in part from pre-shrunk yarns. In an example, the selvedge yarn is boiled in Na_2CO_3 soln. and Turkey-red oil and allowed to shrink 10–12% by treatment while moist with 30°Bé. NaOH, the yarn is washed, acidified and dried.

Treating cotton textiles. Walter R. Cooke. Brit. 508,476, June 28, 1939. Cotton interlock fabric is subjected to an immersion in a hot aq. bath of a degreasing solvent for such a brief period as not to cause the surface of the fabric to rough up, the solvent being such as to remove sufficient of the contained oil, fat or wax to render the fabric absorbent to such a degree than when globules of H_2O are spilled on the surface thereof they do not stand

or run about thereon but are immediately absorbed. The fabric may be treated simultaneously with sufficient dye to cause it to retain its natural color. In an example, the fabric is passed through a hot aq. soln. of soap and "solvol" that may also contain Indian Yellow R or other monoazo dye so that the period of immersion is about 20 sec., cooled by a H_2O-spray, hydroextd., dried and calendered.

Improving the resistance of textile materials to creasing. Henry Dreyfus, Donald Finlayson and Richard G. Perry (to Celanese Corp. of America). U. S. 2,175,183, Oct. 10. Materials such as viscose or acetate rayon fabrics have incorporated in them an aldehyde such as CH_2O or an aldehyde-yielding substance and a Me, Et, Pr, Bu or Am ester of lauric, myristic, oleic, palmitic, stearic or ricinoleic acid and are heated (suitably to about 140°) to form a crease-resisting substance in the material.

Elastic fabric. Fernand F. Schwartz and Marc A. Chavannes (to American Ecla Corp.). U. S. 2,175,733, Oct. 10. A process for the manuf. of an elastic fabric consisting of textile materials such as wool and cotton and rubber involves weaving or knitting a fabric from textile threads some of which (such as those of wool) can be dissolved in a solvent such as hot dil. NaOH soln. without dissolving the others, applying rubber latex in a fine spray in insufficient amount to enclose the threads completely, and then treating the coated fabric with a solvent to dissolve the sol. threads and leave the insol. threads intact.

Parchmentizing cellulose material such as cotton fabrics. Joseph H. Shipp (to E. I. du Pont de Nemours & Co.). U. S. 2,174,534, Oct. 3. A material such as an unfinished cotton voile fabric is treated with a parchmentizing reagent comprising H_2SO_4 of at least 80% concn. together with 5–35% of a cellulose degradation inhibitor comprising a low mol. wt. amide, such as urea, of suitable soly. in the acid.

Apparatus for washing or other liquid treatments of multiple filament high denier rayon rovings. John P. Tarbox (to New Process Rayon, Inc.). U. S. 2,174,863, Oct. 3. Various structural, mech. and operative details.

Dry cleaning acid-soiled garments. Thomas M. Langan and Guy H. Condit (to Riverside Mfg. Co.). U. S. 2,174,793, Oct. 3. An arrangement of app. is described, and a process involving application to soiled garments, etc., of a nonaq. solvent and a soap, and reconditioning of the used soap soln. by adding an alkali to compensate for the acid soil extd. from the materials cleaned.

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

War-time paints. E. Melling. *Paint Manuf.* **9**, 323 (1939).—Camouflage, black-out and road-line paints are discussed. W. H. Boynton

Methods of straining and clarifying paints. Milton M. Loeserman. *Am. Paint J.* **24**, 61-2(Nov. 27, 1939). W. H. Boynton

The influence of hot drying on the covering properties of paints. B. F. Tyurin. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 5, 39–41; *Khim. Referat. Zhur.* **2**, No. 2, 120 (1939).—Paints prepd. from linseed oil with the usual drier and with different pigments (Pb-ZnO, lithopone, Pb-$PbCrO_4$ and ocher) were dried at 20, 40, 80, 100 and 120° for 2, 4, 6 and 8 hrs. The pigments have a considerable influence on the properties of the films. The Pb-$PbCrO_4$ paints are most elastic. In general the elasticity of the films changes differently with temp. and with duration of drying depending on the pigment. The water resistance increases with the increase of the temp. of drying (except for ocher). The temp. of drying optimum for water resistance is for $PbCrO_4$ between 60 and 80°, for ZnO about 80°, for ocher and lithopone about 100°. The optimum duration of heating is 2-4 hrs. Paints contg. lithopone and ocher should not be dried at high temp. W. R. Henn

White lead content of a good house paint. L. A. Thompson. *Am. Paint J.* **24**, 10, 12(Dec. 4, 1939).—Under normal conditions a most satisfactory pigment for house paint will contain 100% white lead. In areas with high humidity it should contain 50–75% white lead with the balance ZnO. In combination with ZnS pigments the white lead should be 25–50%. In combination with a co-fumed leaded zinc the white lead content should be 50–60%. In atms. contg. H_2S no white lead should be used in house paints. W. H. Boynton

Experiments with emulsion paints. S. P. Zel'din. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 4, 35–6; *Khim. Referat. Zhur.* **2**, No. 1, 100-1(1939).—Paints prepd. with lithopone on a water-castor oil emulsion preserve their white shade much better than those prepd. with linseed oil. Green paints and carbon-black paints dry much faster when prepd. with a water-castor oil emulsion than with linseed oil. The emulsion black has a greater luster. Painting of the wooden platforms of trucks with the emulsion paints (on casein base as well as without it) gave satisfactory results. W. R. Henn

Exterior house-paint primers. E. Peterson. *Am. Paint J.* **24**, 64, 66(Nov. 27, 1939). W. H. Boynton

The painting of nonferrous metals. H. Eastwood. *Am. Paint J.* **24**, 47–8(Dec. 4, 1939). Essentials for good results are: (1) thorough cleaning, a chem. surface treatment and the proper selection of a primer. The most satisfactory types are alkyd enamels or aluminized synthetic spars, either alkyd or phenolic. W. H. Boynton

The development of paint systems for painting iron and steel. G. H. P. Lichthardt. *Am. Paint J.* **24**, 7-9(Dec. 4, 1939). W. H. Boynton

Pacific Coast fish oils in paint and varnish. Fred S. Dexter. *Am. Paint J.* **24**, 9–10(Dec. 4, 1939).—Pilchard, menhaden and sardine oils are widely used. W. H. B.

Nonpenetrating flatwall finishes. E. C. Alford. *Am. Paint J.* **24**, Convention Daily, 8(Nov. 3, 1939).—In the development of nonpenetrating flats the following vehicles were employed: (1) linseed-oil vehicles with CaO to produce soaps in the vehicle, (2) blown or polymerized oils, (3) sulfurized oils produced by dissolving S in oil during the kettling with or without the subsequent addn. of polymerized oils, (4) S_2Cl_2-treated oils (vulcanized oils), (5) castor-oil gels (blown castor oil) dissolved in oil or other vehicle, (6) a highly polymerized perilla oil completely lime-neutralized and thinned to a comparatively low nonvolatile content (about 38%). This is completely limeproof and when properly pigmented will carry large pigment vols. and produces a uniform flat, free from shiners, covers water stains and patches nicely with one coat, levels well and shows no sags or laps; its good penetration prevents peeling. W. H. Boynton

Increase of the drying properties of oils and fats. N. A. Suvorovskaya and Simova. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 4, 42–5; *Khim. Referat. Zhur.* **2**, No. 2, 128(1939).—"Ryzhik" mushroom, tobacco, corn, sunflower and seal oils were oxidized with air at 150° and dehydrated at 280° in the presence of 3% of Zn and 1.5% of Al_2O_3. In all cases a hardening of the films was observed (as compared with the polymerized or with the only oxidized oils) as well as an increase of the I no. Extn. of the oxidized and dehydrated oils with acetone yielded a fraction similar to linseed oil. The possibility of completely replacing linseed oil with the semidrying oils has not been proved, but in some cases the semidrying oils can be used with success. W. R. Henn

Fish oils in the production of drying oils. Kulikov. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 6–7, 64–72; *Khim. Referat. Zhur.* **2**, No. 2, 118(1939).—Thick pastes were prepd. from lithopone, Fe_2O_3, ocher, carbon black and ZnO with drying oils consisting of mixts. of prepd. seal oil (oxidized or polymerized either in the presence or in the absence of catalysts) with linseed oil or with poly-

merized castor oil and semidrying oils. The pigments were dild. with drying oil (mostly with natural oils) until a paint consistency was obtained and the drying properties of the paints and the hardness of the films obtained were detd. Part of the paints were tested for elasticity, spreading properties, ability to dissolve and resistance to water and weather. The combination drying oils dry slowly and sticky for over 10 days. The 3-component oils are superior to the 2-component oils in hardness. The viscosity of the oxidized oil must not be below 4 min. 30 sec. on the NILK funnel at 20°. Paints prepd. with synthetic oils without the addn. of natural oils are sticky and do not harden well. Four months' exposure on sheet iron showed satisfactory results. The thick paste prepd. from ZnO did not thicken for 1 month. Paints prepd. from ocher, from ZnO and from Fe_2O_3 were water-resistant, but those prepd. with lithopone and with carbon black were not water-resistant. W. R. Henn

Review of domestic tung-oil industry. W. E. MacKee. *Am. Paint J.* 24, 21–2, 24 (Nov. 27, 1939). W. H. B.

Acid number, viscosity and livering characteristics of boiled linseed oil. Lawrence Gussman. *Am. Paint J.* 24, Convention Daily 16, 18, 20 (Nov. 1, 1939).—The acid no. *vs.* logarithm viscosity plot for any one kettle bodying condition is a straight line, the slopes differing with temp. and the acid no. and viscosity of a blend of 2 oils on any one line falls on that line. Cross blending of oils bodied at 2 different temps. yields acid nos. and viscosity characteristics of oils bodied at intermediate temps. The study was confined to acid no., viscosity and temps. Conclusions: (1) A new livering line which has practical significance to both the ink and paint industry is defined through the use of specially prepd. oils to give points that lie in the crit. livering region. This shows (*a*) any oil, the viscosity and acid no. of which will be above this line, will liver and (*b*) below this line, there will be no livering. (2) The equation for the livering line is $A = 145 - 0.086\ u$ where A = acid no. and u = viscosity. (3) Viscosity varies semilogarithmically when 2 different oils that have been bodied at the same temp. are blended. (4) Blends of oils of different viscosities bodied at the same temp. fall on the acid no. *vs.* viscosity plot of the bodying curve. (5) Blends of oils of different viscosities bodied at different temps. yield oils that have similar acid no. and viscosity characteristics to those of oils bodied at an intermediate temp. W. H. Boynton

The production of polymerized castor oil. S. I. Karasik and G. M. Sokolova. *Byull. Lako-Krasochnoĭ Prom.* 1938, No. 4, 32–5; *Khim. Referat. Zhur.* 2, No. 1, 115 (1939).—A method of polymerization has been developed in the "Krasnyĭ Malyar" plant in which the temp. of the oil is raised to 280° during approximately 12 hrs., after which the temp. is kept const. for about the same length of time. The η of the oil during the first 18–20 hrs. (4–6 min. in the NIIKL funnel) rises slowly and then sharply. By working with refined castor oil the time of polymerization can be reduced. W. R. Henn

Water-castor oil emulsions for water-oil colors. S. P. Zel'din, N. G. Kiselev and Samarin. *Byull. Lako-Krasochnoĭ Prom.* 1938, No. 4, 36–41; *Khim. Referat. Zhur.* 2, No. 1, 100 (1939).—Ethanolamine and triethanolamine in the free state as well as in the form of oleic soaps are excellent emulsifiers for the system castor oil-water (1:1). At small concns. of emulsifier (0.25–6% of the ethanolamine soap or 0.1% of ethanolamine) water-oil emulsions are obtained, while at large concns. of the emulsifier (10% and 1%, resp.) oil-water emulsions are obtained. At medium concns. the emulsions are not clearly defined. Emulsions of the type water-oil have a dense viscous consistency, and their stability decreases with the increase of the concn. of the emulsifier. The oil-water emulsions are thin and their stability increases with the increase of the concn. of the emulsifier. W. R. Henn

Scientific methods of varnish manufacture. VIII. Oils used in varnishes and synthetic resins. Ralph H. Huff. *Am. Paint J.* 23, 56, 58, 60, 62–3 (Sept. 18, 1939); *Ibid.* 50, 52, 54, 56, 58 (Oct. 2, 1939); cf. *C. A.* 33, 9016⁴.—A historical review of varnish oil history. The chemistry of vegetable oils and other oils used in varnishes is briefly considered. *Ibid.* 24, 65–8, 70 (Oct. 16, 1939).—A consideration of the glycerol mol. and the types of compds. formed when chem. combination takes place between glycerol and a fatty acid, methods of treatment of varnish and paint oils after expression of the oils are included. *Ibid.* 54, 56–7, 58, 60, 62 (Oct. 30, 1939).—The Twitchell process of fat-splitting and oil-refining methods are outlined. *Ibid.* 48, 50, 52, 54, 56 (Nov. 13, 1939).—The prepn. of varnish makers' linseed oil (alkali-refined oil), acid-refined linseed oil, oil of low acid value, oil of high acid value are included. *Ibid.* 54, 56, 58, 60 (Nov. 27, 1939).—Bleached raw oil, the air blowing of oils (oxidized oils) and boiled oils are considered. *Ibid.* 54, 56, 58, 60 (Dec. 11, 1939).—Boiled oils including fire boiled linseed oil, bleached or extra-pale boiled oil, "bung hole" boiled oils (produced by adding liquid driers to ordinary raw linseed oil in quantity intended to be sufficient to make the oil dry at a rate similar to that of genuine boiled oils and "boiled paint oils" are included. Eighteen references. W. H. Boynton

Investigation of copals found in the U. S. S. R. deposits, and their adaptation for varnishes. V. P. Tsybasov. *Byull. Lako-Krasochnoĭ Prom.* 1938, No. 11–12, 59–61; *Khim. Referat. Zhur.* 2, No. 1, 99 (1939).—Geological expeditions in 1937 discovered deposits of copals in the Caucasus and in the Far Eastern region. The Caucasus copals m. 210–30°, and the Far Eastern copals m. 250–80°. The copals, when fused at 280–320° (like the foreign copals), acquire the ability to combine with oil. Oil-tar varnishes, when prepd. from these copals, were satisfactory as to transparency, drying qualities, diffusion, absence of dirt, warming qualities, hardness, elasticity and waterproofness. The varnishes were too dark in color, especially those prepd. from the Far Eastern copals. The results of the lab. expts. were substantiated by plant expts. W. R. Henn

Nitrocellulose lacquers for special purposes. A. Kraus. *Nitrocellulose* 10, 203–5 (1939); cf. *C. A.* 33, 9019⁴.—A review. E. M. Symmes

The addition of driers to lacquers prepared with synthetic copals. A. Gamazov. *Byull. Lako-Krasochnoĭ Prom.* 1938, No. 5, 28–32; *Khim. Referat. Zhur.* 2, No. 2, 120 (1939).—Expts. with lacquers prepd. from synthetic copals (44 and 50 B) and with albertols 209 α and 111 α showed that all lacquers prepd. with resinous driers give no ppt. while those prepd. with the linoleate driers form a ppt. Lacquers prepd. from linseed oil with resinate driers dry up "from dust" faster than the lacquers with linoleate driers. The films of the lacquers with linoleate driers are harder than those prepd. with resinate driers. Addn. of resinate driers lowers to a certain extent the water resistance of the lacquers. Lacquers from synthetic copals should be prepd. with resinate driers. W. R. Henn

Combining Pechory asphalt with linseed oil. S. A. Uranov and E. N. Orlova. *Byull. Lako-Krasochnoĭ Prom.* 1938, No. 4, 21–6; *Khim. Referat. Zhur.* 2, No. 1, 102 (1939).—The enriched Pechory asphaltite (asphaltenes 54.24%, carbenes, 2.26%, carboids 0.98% and ash 0.20%) was fused with oil in the ratios of asphaltite to oil 1:1, 1:2 and 2:1. By dilg. the lacquers with 200–500 cc. of lacquer kerosene a part of the highly carbonized components (25–36% of the wt. of asphaltite) was pptd. A min. pptn. was obtained with the ratio asphalt:oil = 1:2. The amt. of the assimilated highly carbonized components decreased with diln. This dependence is observed least with asphalt:oil = 1:2. Lacquer kerosene is not suitable for the detn. of the combining ability of the asphalts. Turpentine is suitable. It is proposed to call the "true combining ability" of asphalt with oil expressed in percentage the ratio of the assimilated (not sepd. with turpentine), highly carbonized components to the total asphalt content. W. R. Henn

Investigation of the Sadkin asphaltite. S. A. Uranov and N. B. Riskina. *Byull. Lako-Krasochnoĭ Prom.* 1938, No. 5, 24–8; *Khim. Referat. Zhur.* 2, No. 2, 120 (1939).—Samples taken from a depth of from 17 to 35 m. showed that the Sadkin asphaltite is nearly pure bitumen contg.

only 0.8% of ash. The content of the asphaltogenic acids varies from 0.77 to 2.3%. The combining power of asphaltite with linseed oil is smallest at the ratio of 1:2. At 2 1 asphaltite combines with the oil practically completely. W. R. Henn

Egg tempera prepared from dry yolk. K. A. Gorbatov and M. L. Solovova. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 4, 51-8; *Khim. Referat. Zhur.* **2**, No. 1, 101 (1939).—Expts. on the prepn. of emulsions from water, linseed oil and dry yolk (4-5% of moisture) showed that the emulsifying ability of dry egg yolk is considerably higher than that of the normal egg yolk. Viscosity of the emulsion of dry egg yolk is greater than that of the emulsion of normal egg yolk. When 1-4% of AcOH is introduced into the emulsion as peptizer the emulsions can be easily mixed with pigments (sienna, etc.) producing plastic pastes. The liquid capacity of these pastes is much lower than that of those prepd. without the addn. of AcOH in spite of the high viscosity of the emulsion. An increase of the concn. of the acid increases the viscosity of the initial emulsions, and it also increases the velocity of the transformation of the paint into the irreversible state. An antiseptic in the paste is necessary to prevent molding. Pastes prepd. with AcOH are entirely satisfactory for artists' paints. W. R. Henn

Prepn. of bright pyrolyzed resins from pyrolyzed petroleum products (Bespolov) **22**.

Water-insoluble metal soaps suitable for use in paints, printing inks, etc. Frederick A. Stresen-Reuter and Charles Rimpila (to Frederick A. Stresen-Reuter, Inc.) U. S. 2,175,489, Oct. 10. A product suitable for use in paints, varnishes, printing inks, etc., comprises a water-insol. Cu soap derived from a pine-wood product such as "Spefa" contg. a major proportion of unsatd. acids, a minor proportion of rosin acids and a small proportion of unsaponifiable material calcd. as a sterol. U. S. 2,175,490 relates to alk. earth metal soaps of similar material; and U. S. 2,175,191 relates to Pb, Co, Mn and other soaps of such material.

Azo pigments. Vincent C. Vesce (to Harmon Color Works, Inc.). U. S. 2,174,954, Oct. 3. In producing azo pigments from aq. suspensions of solid insol. phenolic coupling components by coupling with a diazo soln., the solid component is subjected to wet milling to produce a suspension of fine particles with worked and amorphized surfaces and is then coupled with a diazotized amine in aq. soln.

Phthalocyanine pigments. Interchemical Corp. Brit. 508,583, July 4, 1939. See U. S. 2,138,384 (*C. A.* **33**, 1973[7]).

Pigment containing titanium oxide. Max H. Kliefoth (to Sherwin-Williams Co.). U. S. 2,174,920, Oct. 3. A pigment which has good hiding power comprises a mech. blend of 10-60% pigment TiO_2 and an alk. earth metal sulfate such as $BaSO_4$, the pigment TiO_2 consisting of a cryst. TiO_2 produced by the calcining of a hydrate formed by the pptn. of a Ti tetrafluoride compd. in aq. soln. by use of NH_3, fritting materials being substantially absent in the reaction mass after pptn. of the hydrate is effected and the alk. earth metal sulfate being produced by pptn. in aq. soln., the sizes of substantially all the individual particles of both the pigment TiO_2 and alk. earth metal sulfate being less than 0.5 micron.

Zinc sulfide pigment. Albert T. Mertes (to E. I. du Pont de Nemours & Co.). U. S. 2,175,273, Oct. 10. An oxidic Zn material such as crude Zn oxide is treated with an ammoniacal soln. of NH_4 sulfite, undissolved residue is sepd. after the soln. has reached the desired concn., impurities are removed from the Zn liquor, as by use of metastannic acid, and the purified liquor is treated with a sol. sulfide to form ZnS.

Synthetic resin coating compositions. Charles Bogin (to Commercial Solvents Corp.). U. S. 2,174,495, Sept. 26. A coating compn. possessing decreased gelling tendencies comprises a tough and strong artificial resin resulting from the conjoint polymerization of a vinyl halide with a vinyl ester of a lower aliphatic acid, the resin being dissolved in a sufficient quantity of a volatile solvent having a low rate of evapn. to decrease the gelling tendency of the resulting compn. comprising an alkyl diacetone ether, to make a readily flowable compn. adapted to produce resistant, adhesive and stable protective or ornamental surface coatings.

Synthetic resin coating compositions. Wm. H. Butler (to Bakelite Corp.). U. S. 2,174,819, Oct. 3. A method of improving the properties of resinous condensation products of phenols and CH_2O for the production of oil resin coating compns. comprises heating the condensation product in the absence of added substances other than inert gaseous substances such as steam at a temp. of above 175° whereby the soly. of the condensation production in vegetable oils is substantially improved

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Examination of fatty material taken from an Egyptian tomb at Armant. T. P. Hilditch. *Analyst* **64**, 867-70 (1939). The specimen was found to contain 35% of neutral fatty matter of mainly satd. character, about 25% of free satd. fatty acids and about 40% of material insol. in light petroleum. The substance probably contained originally at least 80% of fat. The other material consisted probably of triolein which, as a result of prolonged atm. action, broke down into nonanoic (pelargonic) and azelaic acids or even simpler products of water-sol. character. W. T. H.

The properties and recovery of wool fat. Hans J. Henk. *Seifensieder-Ztg.* **66**, 820-1(1939). A. Guillaudeu

Fatty acids and glycerides of the body fat of she-goats. D. R. Dhingra and M. Haneef. *J. Soc. Chem. Ind.* **58**, 292-3(1939).—The tallow was obtained from the back tissues of Punjab she-goats. The characteristics of the tallow were: (fat) sapon. no. 287.5, I no. (Wijs) 32.8, acid no. 4.8, unsaponifiable matter 1.5%, setting point 45.8°, n^{40}_{D} 1.4600; (fatty acids) sapon. no. 275.7, I no. 34.2, titer 46.7°, solid fatty acids 58.2% and isooleic acids 7.8%. The component fatty acids, as detd. by ester fractionation, were: lauric 2.5, myristic 2.8, palmitic 27.5, stearic 26.0, arachidic 2.2, oleic 34.8 and linoleic 2.3%. The unsaponifiable matter present was 1.9%. The fat was oxidized with $KMnO_4$ and the fully satd. glycerides (30.3%) were sapond. The acids obtained were methylated and the resulting esters were fractionated to det. the acids of the component glycerides. These acids comprise: myristic 2.4, palmitic 41.7, stearic 51.8 and arachidic 4.1%. From the above data, and from data obtained from fractional crystn. of the fully satd. glycerides, the approx. compn. of the latter is probably: tristearin 2, distearoarachidin 3, palmitodistearin 3-4, tripalmitin and dipalmitostearin 5% each; the remaining 11-12% comprise the glycerides of myristic, palmitic and stearic acids. The nonfully satd. glycerides consisted of 6-8% triolein and about 7% of simple trisatd. glycerides. The similarity of this fat to he-goat tallow (cf. Dhingra and Sharma, *C. A.* **33**, 1527[6]), mutton tallow and beef tallows is discussed. 9 references. L. W. G.

Some notes on the determination of moisture and volatile matter in fats and oils. N. T. Joyner and S. J. Rini. *Oil & Soap* **16**, 233-6(1939).—The method of moisture detn. introduced by Parsons and Holmberg (*C. A.* **31**, 7547[6]), in which H_2O is evolved from the sample and absorbed on $CaCl_2$, is abs. and is applicable to all types of oils and fats, except those contg. residual solvent. Of the methods recommended by the A. O. C. S. for the detn. of H_2O and volatile in oils and fats, the vacuum oven was

found the most accurate except on high-fat acid coconut oil. The hot-plate method gave the highest moisture results when the test was conducted according to the procedure given in the A. O. C. S. methods. When first traces of smoking were observed under a strong beam of concd. light, resulting moistures approached those of the vacuum oven. Moisture results obtained by the air oven, if corrected for peroxide absorption, approach those of the vacuum oven. The percentage of residual solvent in extd. soybean oil, independent of moisture, can be detd. by adsorption of solvent vapor on activated charcoal. E. S.

Fat acids and glycerides of neem (margosa) oil. T. P. Hilditch and K. S. Murti. *J. Soc. Chem. Ind.* **58**, 310–12(1939).—A sample of Cawnpore neem oil had the following compn.: palmitic 14.9, stearic 14.4, arachidic 1.3, oleic 61.9 and linoleic acid 7.5%. It contained about 0.6% fully satd. glycerides and 22% of tri-unsatd. glycerides, the other components being stearodi-olein (34%), palmitodi-olein (26%) with oleo-palmitostearin (12%) and oleo-dipalmitin (5%). The presence of characteristic nonfatty compds. which confer on neem oil certain *medicinal properties* and an unpleasant odor led to difficulties in one stage of the analysis. The component glycerides follow the usual rules of glyceride structure in seed fats. If the tri-unsatd. glycerides should consist of linodiolems, neem oil is a marked instance of the application of the "rule of even distribution." E. Scherubel

Rancidity prevention. Paul I. Smith. *Soap* **15**, No. 12, 21-3(1939).—Antioxidants used in the soap industry are discussed. Recently some of the lesser known antioxidants used in the rubber industry have come in for attention as fat antioxidants, especially the phenylnaphthylamines. The condensation products of acetone with aminodiphenyl, and the nonstaining rubber antioxidants such as the condensation products of dimethylphenol and formaldehyde and a secondary amine and the condensation products of styrene with phenols have interesting potentialities. Recently also attention has been given to the claims of the esters of glycerol with phosphoric and higher fatty acids. E. Scherubel

A rapid method for the determination of iodine number. H. D. Hoffman and C. E. Green. *Oil & Soap* **16**, 236–8 (1939).—Expts. were conducted with the method of Scott in which mercuric acetate is used as an accelerator in conjunction with a soln. of I in pure benzene. It is suggested that accurate I nos. can be rapidly detd. by modifying the standard method, adding 10 cc. of a 2.5% soln. of mercuric acetate dissolved in glacial AcOH to the sample directly after adding the Wijs soln. Allow 3 min. absorption time and proceed with the detn. as in the standard method. E. Scherubel

Relation between the iodine number and refractive index of crude soybean oil. K. R. Majors and R. T. Milner *Oil & Soap* **16**, 228–31(1939).—The I no. of soybean oil can be detd. by calcn. from the measurement of n with an accuracy comparable to any chem. method, provided that the instrument used is sufficiently accurate, the measurements are carefully made, and, for any given crop year, a correlation curve is established. Of 400 samples of soybeans, embracing 185 varieties, so far examd. only 3 have given oil whose I no. and n did not conform satisfactorily. E. Scherubel

Preparation of castor oil. D. Yu. Gamburg. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 5, 32-3; *Khim. Referat. Zhur.* **2**, No. 2, 121(1939).—Heating castor oil without blowing for 24 hrs. had almost no effect. Heating the oil for 16–20 hrs. at 250° in a current of air at a velocity of 6 l./min. caused the oil to darken. The oil becomes sticky and dissolves in basic solns. with difficulty. Heating in the presence of such catalysts as rosin, captax, flowers of S and $AlCl_3$ as well as *in vacuo* caused little change in the qualities of castor oil. W. R Henn

Molecular distillation of soybean and corn oils. Herbert W. Rawlings. *Oil & Soap* **16**, 231-2(1939).—A batch of 1000 gals. of soybean and a batch of 700 gals. of corn oil were molecularly distd. at an av. abs. pressure of 0.002 mm. of Hg and at a rate of 7 to 8 gals. per hr. Four and 5 fractions were, resp., obtained and analyzed. The results are tabulated. Although no great fractionation of the glyceride constituents occurred, the unsaponifiable portion of the oil was almost completely present in the first 2 fractions. It is possible by mol. distn. to remove the unsaponifiable from these oils without resorting to sapon. and extn. The coloring matter and odorous constituents volatilize readily and sep. almost entirely from the oil, so that the later fractions consist of fairly pure glycerides and are as bland as bleached and steam-deodorized oils. E. S.

Density and viscosity of glycerol solutions at low temperatures. Edmund Green and John P. Parke. *J. Soc. Chem. Ind.* **58**, 319–20(1939).—The densities and viscosities of aq. glycerol solns. contg. 30 to 80% of glycerol were detd. at temps. between −5° and −40°. The viscosities obtained were found to be higher than published figures which were derived from data at temps. above 0°, by extrapolation along straight lines plotted on logarithmic viscosity temp. scales. Tables and curves are given. E. Scherubel

A distillation method for water in soaps. Ralf B. Trusler. *Oil & Soap* **16**, 239-41(1939).—It is proposed to modify the present distn. method for moisture in soaps by converting the water-sol. soaps into insol. soaps by adding 10 g. anhyd. powd. $BaCl_2$ to a 10-g. sample of soap in 250 ml. of toluene in a 500-ml. distn. flask. The use of $BaCl_2$ as an antifoaming agent is superior to Na acetate in respect to speed, ease of handling and also in leaving more easily cleaned app. It offers another advantage in that anhyd. $BaCl_2$ is more easily prepd. than anhyd. Na acetate. E. Scherubel

Liquid shampoos. C. A. Tyler *Soap* **15**, No. 11, 21-3, 69(1939).—This is a discussion of raw materials and formulas. E. Scherubel

Industrial soaps. John Glenn. *Soap* **15**, No. 11, 27-30, 69-70(1939).—The compn., uses and development trends of non-household soap products in the English market are discussed. E. Scherubel

Soap manufacture under war conditions in England. Paul I. Smith. *Soap* **15**, No. 11, 31, 41(1939). E. S.

Abrasives. Richard J. Roley. *Soap* **15**, No. 12, 24-6, 70(1939).—The occurrence and characteristics and use of abrasives in soaps and scouring powders are discussed. E. Scherubel

South African fish products—liver oils (Molteno, Rapson) **17**. Occurrence of free vitamin A alc. in fish livers (Mead) **17**. Preserving oxidizable substances [unsatd. fatty oils, soaps] (Brit. pat. 508,442) **13**.

28—SUGAR, STARCH AND GUMS

J. K.

Thermophils in sugar. T. G. Gillespy. *Univ. Bristol, Fruit Vegetable Preservation Research Sta., Campden, Ann. Rept.* **1938**, 45–59.—Many samples of sugar refined in Britain were examd. for thermophilic spoilage bacteria and a considerable portion was found to be unsuitable for canning purposes. Canning expts. with processed peas showed that when unsuitable sugars were used sterility was not attained by normal processing. Data are given on the content of spores of thermophilic bacteria in the products obtained in the various stages of the manuf. of raw beet sugar and in the refining of raw beet and cane sugars. Eighteen references. K. D. Jacob

Physicochemical phenomena of sulfurization of sugar-beet juices. O. Spengler. *Centr. Zuckerind.* **47**, 782–4 (1939).—Sulfurization of juices poisons the catalyst of discoloration, viz., iron, and is thought to keep many colored materials in a colorless leuco state. The change in pH caused by H_2SO_3 may aid the coagulation of colloidal par-

ticles. The viscosity of the juices is reduced by the conversion of dissolved $CaCO_3$ to $CaSO_3$ during sulfurization. W. W. Binkley

Lime salts in beet-sugar juices. J. Dědek. *Facts About Sugar* **34**, No. 11, 42–4; No. 12, 38–9, 41(1939).—A summary of articles previously published by D. and collaborators, stressing application of the results to sugar-factory control. F. W. Zerban

Detection of sugar in feed water with the aid of conductivity measurements. E. Troje-Brieg. *Centr. Zuckerind.* **47**, 758–9(1939).—The cond. of untreated feed waters of an av. cane-sugar refinery varies between 2500 and 4700 ohms. The av. fluctuation is between 2800 and 3800 ohms. An increase of 0.1% of sugar causes an increase of 1500–2000 ohms. Traces of sugar are more easily detected in refinery waters with lower conds. Refinery waters treated with Na_3PO_4 behave normally. The presence of α-naphthol facilitates the detection of sugar by conduction; the derivs of α-naphthol are even more effective. W. W. Binkley

Use of the collactivit method in the sugar-refining operation and its results. K. Lanksch. *Centr. Zuckerind.* **47**, 818–21(1939).—Collactivit decolorized and clarified dark sirups better than diatomaceous earths and boneblack. The collactivit is prepd. by the action of concd. H_2SO_4 on sawdust. The sawdust must be dry and made from coniferous trees. The reaction proceeds rapidly at 110°. After completion, the products are washed thoroughly, and the pH of an aq. suspension of collactivit (500 g./l.) is adjusted to 8.4 with lime to inhibit the formation of invert sugar. The concn. of invert sugar is 0.7% at pH = 7.4; 0.3 to 0.4% at pH = 8.4. W. W. Binkley

Borsig mammoth beet pump in the sugar industry. Friedrick Pickert. *Centr. Zuckerind* **47**, 706–8(1939). W. W. Binkley

Sirup from sweet-potato starch. A pilot-plant investigation. Lawrence E. Stout and Carl G. Ryberg, Jr. *Ind. Eng. Chem.* **31**, 1451–4(1939).—A sweet sirup was prepd. from sweet-potato starch and the method of prepn. including app. used given in detail. The effects of pressure and acid concn. on the rate of hydrolysis were studied and compared with those of cornstarch. The iso elec. point of the undesirable humus, and the amt. of activated C and length of time necessary to decolorize the sirup were detd., and the clarity, color, flavor and aftertaste of the resulting sirup observed. The conditions required for the production of sweet-potato sirup do not differ greatly from those of cornstarch. 19 references. J. C. Jurrjens

Research botany – early fertilizer requirements of sugar cane (Evans) **15**. Disease control and stimulation of cane cuttings by the hot-water treatment (Martin, Conant) **15**. Manufacture of pulp from bagasse (Tanaka, Koriyama) **23**. Lysimeter study of losses of applied potash by leaching from an acid soil [effect on sugar cane] (Gow) **15**. Inulin and its mol. wt. (Bezzi) **2** Report on chemistry [fertilizer requirements of sugar-cane soils] (Craig) **15**.

Refining cane sugar. Geo. E. Stevens (to Western States Machine Co.) U. S. 2,175,998, Oct. 10. An arrangement of app. is described, and a process which involves removing relatively impure adherent substantially dry sirup from grain sugar by mixing the sugar with an affination sirup having a dry substance not substantially below 80 in proportions such as to produce a thick, viscid mass unadapted for introduction into and purging in centrifugal machines, stirring the mass and adding dry heat thereto to raise its temp. to above 70° at which a magma of a fluidity sufficient to loosen the adherent dry sirup on the sugar grains and to be centrifuged effectively has formed, and then centrifuging the hot magma.

White sugar refining. Eugene Roberts (to Western States Machine Co.). U. S. 2,175,996, Oct. 10. An arrangement of app. is described, and a process for white sugar refining which comprises boiling sirup in a vacuum pan at a temp. between 80° and 90° to produce white massecuite of greater than 91% dry substance, dropping the massecuite into a mixer and there maintaining its temp. and fluidity uniform and substantially the same as in the vacuum pan, introducing successive charges of the hot massecuite into a centrifugal during acceleration corresponding to the acceleration of a 40″ centrifugal between about 300 and 700 r. p. m., sepg. more than 90% of the mother liquor in less than one min. by revolving the centrifugal to produce forces corresponding to those produced by accelerating a 40″ centrifugal to a speed in excess of 1250 r. p. m. within 40 sec. from the introduction of the hot charge, thereafter further cleaning the remaining sugar and maintaining it at a high temp. by spraying with a washing medium in liquid form at a temp. above 80° while the centrifugal is revolving at high speed, and discharging from the centrifugal substantially pure sugar at a temp. in excess of 70° and having a moisture content of less than 1.2%.

Centrifugal separation of sugar crystals from liquids. Eugene Roberts (to Western States Machine Co.). U. S. 2,175,995, Oct. 10. Improved sepn. is effected by accelerating the speed of a centrifugal used to over 1250 r. p. m. within less than 40 sec. after a charge is introduced.

Moisture trap for use with evaporators and vacuum pans of sugar factories, etc. Roy L. Lay. U. S. 2,174,794, Oct. 3. Various structural details.

Dextrose production from corn starch or other materials. Roscoe C. Wagner and Paul L. Stern (to Clinton Co.) U. S. 2,175,369, Oct. 10. An arrangement of app. is described, and a method for the production of a cryst. hydrate dextrose from an impure dextrose-contg. soln. which involves seeding in a water-jacketed crystg. tank a body of the soln. having a d. of 40°Bé. and a temp. of about 50°, the seed employed being a magma left in the crystallizer from a preceding batch and in the amt. of about 3 to 5% of the capacity of the crystallizer and maintaining the soln. temp. above 43° for about the first 3 days while circulating warm water at about 43° through the jacket slowly to withdraw the residual heat and exothermic heat of crystn. as the crystals develop until the supersatn. of the soln. is diminished enough to permit lowering of the temp. below 43° without promoting any substantial addnl. growth of new crystal nuclei.

Starch modification and conversion products. Philip A. Singer. U. S. 2,175,486, Oct. 10. A process for the prepn. of products for use as adhesives, sizings or in the prepn. of foods and beverages, etc., involves heating to about 60–70° a mixt. of starch and water contg. about 25–50% dry starch solids, then adding the min. quantity of diastase necessary to make the soln. mobile after further heating, gradually increasing the temp. over a period of about 10 min. to about 80° when the mixt. becomes very thin, rapidly raising the temp. to the b. p. of the mixt., heating to gelatinize thoroughly the starch, cooling to about 80°, adding a cold water infusion of malt having a diastatic strength of 75° Lintner, maintaining at the specified temp. for about 25–30 min. and then rapidly raising the temp. to the b. p. to arrest further reaction. Several examples with similar details of procedure are given and numerous uses of the product are mentioned.

29—LEATHER AND GLUE

HENRY B. MERRILL

Notes upon the analyses of leathers. II. Liboslav Masner. *Tech. Hlídka Koželužská* **15**, 59–61(1939); cf. *C. A.* **33**, 6639⁸. In 5 tables the chem. and phys. properties of sole leather, box calf, cow box, dull box prepd. in Czechoslovakia are given. The tables are to serve as standards. Frank Maresh

New methods for the two-bath chrome-tanning method. E. Bělavský. *Tech. Hlídka Koželužská* **15**, 62–3, 67–8, 75 7(1939)(German summary); cf. *C. A.* **34**, 2843.—B. shows the incorrectness of present chem. reactions which indicate the course of events occurring in chrome tanning. From stoichiometric computations it is evident that present reactions do not consider (*a*) the losses of chrome in the 1st bath, (*b*) the loss of thiosulfate in the 2nd bath and (*c*) the correct valence and basicity of the Cr salts deposited upon fibers. B. presents 20 sequential corrected stoichiometric equations. In a comparison of the Czechoslovakian and American 2-bath tanning processes B. finds the Czechoslovakian process the more economical in chemicals, giving a lower elasticity, a firm surface, and a correct S content, and yielding better hygienic conditions (removal of SO_2, protection against Cr ulcers). F. M.

Retarding deterioration of hides (U. S. pat. 2,176,025) **12.** Treating liquid alkanes with SO_2 and Cl [to produce tanning agents] (U. S. pats. 2,174,507–8–9) **13.** Chloromethyl compds. of sulfonamides [for treatment of leather] (Brit. pat. 508,794) **13.**

Tanning agents. Friedrich-Wilhelm Guthke (to I. G. Farbenind. A.-G.). U. S. 2,174,287, Sept. 26. A condensation product obtainable by causing a dihydroxydiphenylsulfone to react with a water-sol. salt of sulfurous acid and a formaldehyde substance is combined with a substance obtainable by the reaction of a condensation product of a phenol such as β,β-di-(4-hydroxyphenyl)-propane and a ketone with a salt of sulfurous acid and a formaldehyde substance. 2

30—RUBBER AND ALLIED SUBSTANCES

C. C.

Concentration of latex by means of a centrifuge. O. B. Schrieke. *Algemeen Proefsta. A. V. R. O. S.*, Circ. No. 150, 9 pp.(1939).—S. describes the "Westfalia"-centrifuge for the continuous sepn. of rubber from crude latex. It has a high efficiency (92–8% rubber recovered from latex compared with 80–92% of other types). A disadvantage is that the rotor has to be changed and cleaned frequently as the pores close after 1.75 hrs.' use. About 200 kg. can be coned. in 1 hr. The content of the rotor is about 11 l. Latex samples that are hard to sep. can be coned. easily. Robert Simha 4

History of the statistic-kinetic theory of rubber-like elasticity. Typographical error in support of a priority claim. Edgar Wohlisch. *Z. physik. Chem.* **A184**, 416 18 (1939).—The statistic-kinetic theory of rubber-like elasticity was first developed by Wohlisch in 1926 and not, as given by Hawk and Neumann (cf. *C. A.* **33**, 1537[2]), in 1936. Meyer and Ferri first took up the theory in 1932 (cf. *C. A.* **29**, 4622[8]). Victor R. Deitz 5

Prepn. of adhesives [from synthetic rubber] obtained in U. S. S. R. (Tsvetkov) **13.** Preserving oxidizable substances [rubber] (Brit. pat. 508,442) **13.** Coating rubber-insulated wires (U. S. pat. 2,175,099) **13.** Elastic fabric [contg. rubber latex] (U. S. pat. 2,175,733) **25.** 6

Pigmented rubber hydrohalides. James B. Holden (to Wingfoot Corp.). U. S. 2,175,801, Oct. 10. Increased resistance to aging is imparted to products such as rubber-HCl films by mixing C black with them. U. S. 2,175,802 relates to a like use of Prussian blue. Cf. *C. A.* **33**, 1540[2]. 7

Porous rubber suitable for filter sheets or battery separators. Ernst A. Hauser (to Dewey and Almy Chemical Co.). U. S. 2,175,798, Oct. 10. A porous product is formed by a process which involves milling a mass comprising rubber, curing substances such as S, ZnO and mercaptobenzothiazole, and a proteinous volume-loading substance such as Ca caseinate and forming an article such as a filter sheet from the mass, curing the article, and subjecting the volume-loading substance to the action of a proteolytic enzyme, and leaching out the decompn. products. Starch and diastase also may be used. 8

Rubber hydrochloride dispersions suitable for making laminating films, etc. Herbert A. Winkelmann (to Marbon Corp.). U. S. 2,174,673, Oct. 3. A method of making dispersions of rubber-HCl in benzene, toluene, xylene, ethylene dichloride, etc., comprises fluxing rubber with a resin which is sol. in one of the solvents, until an intimate mixt. of rubber and resin is obtained, calendering the mixt. into thin sheets, treating the sheets with HCl in the absence of solvents for the resin and the rubber, whereby there is obtained an intimate mixt. of rubber-HCl and resin, and agitating the mixture of rubber-HCl and resin in a solvent for the resin selected from benzene, its homologs and ethylene dichloride. U. S. 2,174,674 relates to a compn. adapted to be vulcanized and molded or otherwise shaped by heat and pressure in articles of manuf., the compn. comprising a rubber-HCl, vulcanizing and HCl neutralizing ingredients, and a plasticizer for the rubber-HCl selected from phthalyl glycolates and glycol phthalates, the plasticizer being present in amts. of from about 10% to 100% by wt. of the rubber-HCl. 9

Making rubber soles, etc. Charles R. Keiser and Theodore R. Rike (to Rainbow Rubber Co.). U. S. 2,174,943, Oct. 3. A method of forming a composite rubber sole or the like involves diffusing a coherent layer of liquid latex in nonvulcanizable condition onto the surface of a transfer member or plate, drying it on the transfer member, applying the latter to a blank of vulcanizable rubber with the dried latex layer in contact with a surface of the blank, and uniting the materials by vulcanizing under heat and pressure so as to permit subsequent removal of the transfer member.

Rubber balls such as golf balls. Ernest O. Dieterich (to B. F. Goodrich Co.). U. S. 2,175,685, Oct. 10. Solid balls are formed mainly of unvulcanized rubber with an imperforate surface layer of vulcanized rubber.

Synthetic rubber-like material. Harro Hagen, Ingofroh Dennstedt and Wilhelm Becker (to I. G. Farbenind. A.-G.). U. S. 2,175,082, Oct. 3. A 1,3-butadiene polymerizate and a sulfide of an alkylated phenol such as a di-(*tert*-amylphenol)disulfide are used together, the sulfide serving as a stabilizing agent.

Rubber vulcanization. Albert M. Clifford (to Wingfoot Corp.). U. S. 2,175,792, Oct. 10. An *N,N'*-bis(1-thiothiazyl)quinonediimine is used as an accelerator.

Rubber vulcanization. Joy G. Lichty (to Wingfoot Corp.). U. S. 2,175,809, Oct. 10. As a vulcanization accelerator, use is made of carboxymethyl bis(dimethyldithiocarbamate) or other compd. of the general formula $(DS)_2CHCOOX$ in which D is an aliphatic thiocarbamyl radical and X is an org. amine radical.

Rubber-tire tread. John P. Tarbox (to Edward G. Budd Mfg. Co.). U. S. 2,171,438, Aug. 29. A bonding material in liquid form such as molten brass or latex is applied to granular material such as a sand or slag and the bonding material is then rendered less liquid, or solidified, and the grains encased in the bonding material are subsequently incorporated in rubber for the tire-tread manuf.

Rubber articles such as jar rings. Arthur F. Thenet (to Cupples Co.). U. S. 2,170,919, Aug. 29. A method is employed which comprises forming a vulcanized rubber article more than 10% harder than the predetd. hardness of the finished article, and more than 5% smaller than the predetd. dimensions of the finished article, thereafter enlarging and at the same time reducing the hardness of the vulcanized rubber article, the simultaneous operations being performed by subjecting the relatively small vulcanized article to a drastic treatment in oil for a period longer than 15 min., until it attains the predetd. hardness and dimensions of the finished article.

Covering tennis balls. Samuel G. Ball (to Dunlop Tire

and Rubber Corp.). U. S. 2,171,118, Aug. 29. Sections of a partly fulled cloth are applied to a rubber ball to cover it, and fulling of the cloth is subsequently completed.

Salts of 2-mercaptobenzothiazole. Ira Williams (to E. I. du Pont de Nemours & Co.). U. S. 2,170,670, Aug. 22. Compns. suitable for use in rubber comprise water-insol. heavy metal salts, such as the Zn or Pb salts, of 2-mercaptobenzothiazole, in finely divided form, the particles of which are coated with neutral inert water-insol. oily or waxy hydrocarbons such as paraffin (the coated salts being substantially dry materials tending to form soft lumps).

Vulcanization accelerators. Wingfoot Corp. Brit. 506,296, May 25, 1939. Rubber is vulcanized in the presence of the reaction product of a 2-mercaptoarylthiazole with a halo-dioxane or S analog thereof. Suitable compds. are those prepd. by the interaction of 2-mercaptoarylthiazole, preferably in the form of an alkali metal salt, with 2,3-dichloro- or 2-chloro-1,4-dioxane, 2-chloro-1,3-dioxane, 2,3-dichlorothioxane and 2-chloro- or 2,3-dichloro-1,4-dithiane.

Rubber vulcanization. Marion W. Harman (to Monsanto Chemical Co.). U. S. 2,171,305, Aug. 29. As a vulcanization accelerator, use is made of a reaction product of equimol. proportions of monochloracetamide and the Na salt of mercaptobenzothiazole.

Vulcanizing rubber. Harry L. Fisher (to United States Rubber Products Inc.). U. S. 2,170,191, Aug. 22. Vulcanization is effected by means of a quinoncimine compd. such as *p*-quinonedioxime and an oxidizing agent such as PbO_2 or MnO_2 incorporated in the rubber prior to complete vulcanization. Numerous examples are given.

Vulcanizing rubber. Norman R. Wilson and Arthur J. Lang (to Rare Metal Products Co.). U. S. 2,171,901, Sept. 5. Scorching during vulcanization in the presence of an accelerator is inhibited by the use of a compd. such as a hypochlorite or *N,N'*-dichloroazodicarboxamidine.

Preserving rubber. Albert M. Clifford (to Wingfoot Corp.). U. S. 2,173,711, Sept. 19. Rubber is mixed with a small proportion of a *sec*-tetrahydrofurfuryl aryl amine such as tetrahydrofurfuryl naphthylamine or tolylamine.

Articles such as rubber gloves. Albert E. Sidnell (to Seiberling Latex Products Co.). U. S. 2,173,734, Sept. 19. A method for making rubber gloves or the like comprises forming a smooth body portion for the glove including thumb and fingers by depositing one or more layers of liquid latex on a form, and forming over a portion of the gloves, including surfaces of the fingers and thumb, roughened surfaces or gripping surfaces, by depositing a layer of liquid latex contg. a granular material distributed therein in homogeneous mixt. over the portion of the gloves, the last-named layer being deposited by dipping the forms with fingers extending downwardly whereby the latex will flow uniformly about and between the fingers and vulcanizing the gloves.

Rubber-coated tie bands for use around packages, etc. John L. Lane (to Ralph H. Wilbur). U. S. 2,173,972, Sept. 26. A band of flexible material such as paper carries thin flexible rubber coatings comprising dried and coalesced rubber latex particles only on opposite faces of opposite marginal portions, such coatings presenting exposed rubber surfaces and being firmly cohesive under pressure but practically nonadhesive with the uncoated surface of the band (various structural and mfg. details being described).

Rubberized tie band suitable for binding packages. Ralph H. Wilbur. U. S. 2,173,989, Sept. 26. A band of flexible material such as paper carries thin flexible rubber coatings of dried and coalesced rubber latex particles only on opposite faces of opposite marginal portions, the coatings presenting exposed rubber surfaces and being firmly cohesive under pressure but practically nonadhesive with the uncoated surface of the band and the band is waxed on at least its faces immediately in back of those carrying the coatings, whereby when the band is placed in a stack with other similar bands, the coatings of one band will come into contact with the waxed faces of an adjacent band in the stack.

Paper carrier sheet for tacky rubber. Geo. W. Coggeshall (to S. D. Warren Co.). U. S. 2,173,097, Sept. 19. A strong tough paper web is deeply impregnated with a fluid compn. consisting essentially of a water-sol. org. adhesive such as a modified starch or casein and a plasticizer such as glycerol, and is provided with a surface coating of a flexibilized starch compn., and at least one surface of the web is subjected to friction-calendering to give it a glossy nonadhering character. Various compns. which may be used are described.

Apparatus for spinning hollow rubber filaments for coating wires. Heinrich Ziegner. Ger. 678,042-3, June 7, 1939 (Cl. 39*a*. 10.03). Addn. to 654,864 (C. *A.* **32**, 3666[8]).

Coating surfaces. Charles F. Lumb. Brit. 507,057, June 5, 1939. Surfaces are coated by prepg. rubber or a rubber compd. in powder form, with or without the addn. of a powd. filler, and spraying it upon the surface by means of a pistol, in which compressed air or gas is used to eject the powder, in a stream that passes through or adjacent to a flame of sufficient temp. to melt the material or render it plastic. The powd. rubber may be mixed with powd. bitumen or bituminous compd., or with a molding powder, e. g., PhOH-CH_2O. Specified fillers are $CaCO_3$, CaO, ZnO, powd. C, coke, SiO_2, Zn dust, cement and ciment fondu. Cu, $CuSO_4$, As or arsenious compds. may be added to produce an antifouling coating. A vulcanizing agent, e. g., S, with or without an accelerator, may be present in the mixt., or the mixt. may be ejected by means of a gas contg. S. Alternatively, the sprayed coating may be cold vulcanized after application.

Vulcanizer for retreading tires. James C. Heintz. U. S. 2,174,189, Sept. 26. Various structural, mech. and operative details.

Rubber vulcanization. Winfield Scott (to Wingfoot Corp.). U. S. 2,173,731, Sept. 19. A vulcanization accelerator is used which is obtainable by reaction, under water-eliminating conditions (such as by heating to 140–145°), of approx. equimol. proportions of mercaptobenzothiazole and the equimol. addn. product of CH_2O and diphenylguanidine or the like.

CHEMICAL ABSTRACTS

Vol. 34 FEBRUARY 20, 1940 No. 4

1—APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

New distillation apparatus for laboratory use. Lennart Smith. *Kgl. Fysiograf. Sallskap. Lund, Handl.* **47**, No. 5, 1-24(1936)(in Swedish, German summary 23-4).—A lab. distg. column is described in which internal cooling (reflux) is obtained by passing liquid or gas into a condenser-tube extending downward through nearly the whole length of the column. Heated gas or liquid is drawn off from the bottom of the internal condenser through a small concentric exhaust tube. Surface is increased on the vapor side by means of fins or disks projecting from the tube walls. Two forms of app. are shown, one requiring glass-blowing, the other being readily constructed from ordinarily available materials. Comparative distn. curves are given for the binary mixts. ether-acetone, water-alc., benzene-CCl_4, chlorobenzene-bromobenzene, and Me benzoate-nitrobenzene. The curves indicate a much sharper sepn. of the 2 components than was obtained with a Hempel, Vigreux or Widmer column. 11 references. W. C. T.

A substitute for the laboratory food grinder. W. B. Davis. *Ind. Eng. Chem., News Ed.* **17**, 752(1939).—A "hopcher" (Waring Corporation, 1697 Broadway, New York, N. Y.) is described in which knives, rotating at high speed in a liquid, rapidly reduce the sample to a fine state of subdivision. W. C. Ebaugh

Small centrifuge tube filter. Theodore Perrine and Wm. Kump. *Ind. Eng. Chem., Anal. Ed.* **11**, 658(1939). A filter plate made from Pyrex tubing is ground to fit the shoulder of a small conical centrifuge tube. A length of tubing left connected to the plate serves as a handle and as a means of causing the liquid centrifugate to react. The app. is readily used at low temp. by introducing powd. CO_2 into the centrifuge. W. F. Bruce

Mechanically operated continuous liquid-extraction apparatus. Geo. W. Pucher and Hubert B. Vickery. *Ind. Eng. Chem., Anal. Ed.* **11**, 656-7(1939).—A modified Widmark extn. app. (*C. A.* **20**, 3602) is made by connecting 2 Erlenmeyer flasks by a wide base tube sealed into the sloping sides. The app. is filled on one side with material to be extd. and on the other with $NaHCO_3$ for collecting acids or an acid soln. for bases. The app. is rocked through 15°, about an axis below the connection, at about 2.5 cycles per min. Of 5 solvents EtOAc was the most effective for extg. citric acid and other acids extd. with difficulty. HNO_3 was extd. quantitatively in 24 hrs. when the soln. is at pH 1.0. C_6H_6 was shown suitable for extg. neotine. W. F. Bruce

Investigation of analytic balances and microbalances manufactured in U. S. S. R. V. A. Muller. *Trav. inst. métrol.* (U. S. S. R.) No. **19**(**35**), 4-12(1939).—The domestic industry supplies the demand for most of the precision scales of the more common types. Present practice is to build short-beam balances with consequent economy of material, smaller effect of temp. coeff. and shorter period of vibration. The beam is 14 cm. for a balance of 200-g. capacity. Cold-rolled alloys, low-zinc bronze and duralumin are satisfactory beam materials. Aluminum, widely used, is inferior. A number of balances and microbalances were investigated for beam mass inertia, location of basic points, center of gravity, distance from the knife edges, sensitivity, inequality of arms and period of vibration. In their indication constancy, accuracy of detail and assembly, Soviet scales are inferior to the foreign. B. Gutoff

Investigations in the field of precision balances. S. D. Gidaspov. *Trav. inst. métrol.* (U. S. S. R.) No. **19**(**35**), 12-23(1939).—A theoretical discussion of const.-sensitivity balances, isochronous balances, and control of scale sensitivity by observing the vibration period. B. G.

Investigation in the field of precision weighing. S. D. Gidaspov. *Trav. inst. métrol.* (U. S. S. R.) No. **19**(**35**), 23-8(1939).—In a modification of Gauss' method for detn., of the mass of a set of wts., they are placed on one pan, the standard is placed on the other, the balance is brought to equil. L_0 with an addnl. wt. (usually the rider, which does not have to be considered any more), the entire set of weights is then interchanged, one by one, and the mean balance point noted after each change. The difference between the means of two subsequent vibrations $L_n - L_{n-1}$ caused by the interchange of 2 weights P_n and Q_n will indicate the difference of these wts. The sensitivity is detd. at the beginning and the end of the weighing. The mass of the wt. P_n is detd. from $P_n = Q_n + {}^1/_2 R_n g + {}^1/_2 q_n$, where Q_n is the wt. of the standard, R_n is the difference between two positions of pointer $L_n - L_0$, g, scale sensitivity, q_n the added wt. The proposed system has the accuracy of Gauss' method, with the advantage of Mendeleev's, permitting the checking of the entire set in one operation. B. Gutoff

Investigation of standard hydrometers, sp. gr. 0.650 2.000. I. I. Kuznetsov. *Trav. inst. métrol.* (U. S. S. R.) No. **19**(**35**), 46-56(1939).—The Glass Blowing Corporation VIMS prepd., in 1930, three identical hydrometer sets, 19 each, covering the entire scale. The scale corresponds to a difference of 0.70, and has 140 unequal divisions, the smallest corresponding to 0.0005 unit d. The method of calibration is described. Tables show that the deviation is less than half of the smallest division, or 0.00025 g. B. Gutoff

Pycnometric method of calibration of standard hydrometers. M. D. Ippits. *Trav. inst. métrol.* (U. S. S. R.) No. **19**(**35**), 56-60(1939).—Because of the volatility of petr. ether, two pycnometers were used to check hydrometer readings. One, a cylinder-shaped bottle of 50 cc., had a 4-mm. capillary neck with bulb and ground-glass stopper. The second was 100 cc., spherical, with 4-mm. neck and wide mouth, with a ground-glass stopper. Details of the procedure are described. A table of results shows that the hydrometer corrections for the two pycnometers were identical. Boris Gutoff

A high-pressure differential manometer with magnetic transmission. G. E. Aristov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 45-8(1939). H. M. Leicester

[The Chandler Medal award to Thomas H. Chilton.] Anon. *Ind. Eng. Chem.* **32**, 23(1940).—Engineering in the service of chemistry. Thomas H. Chilton. *Ibid.* 23-31.—Chandler lecture. E. H.

Automatic effusiometer for determination of specific gravity of gases. Geo. V. Feskov. *Ind. Eng. Chem., Anal. Ed.* **11**, 653-4(1939); cf. Edwards, *C. A.* **11**, 2554.—Addn. of an automatic timer consisting of an elec. stop clock with Pt contact points in a Hg reservoir outside the effusion chamber improves the accuracy of the method and the ease with which detns. are carried out. The app. is not recommended for gases contg. H_2S. W. F. Bruce

A precision determination of the viscosity of air. J. A. Bearden. *Phys. Rev.* **56**, 1023-40(1939).—An instrument with a rotating inner cylinder gave the viscosity of air at 20° as (1819.20 ± 0.06)10^{-7} poises. A method is

described for prepg. torsion wires with const. characteristics. S. Bradford Stone

Metering liquids which are viscous or solid at ordinary temperature. B. Mironov. *Masloboino Zhirovoe Delo* **15**, No. 3, 38(1939).—Illustrated description of an electrically operated flowmeter. Julian F. Smith

A practical continuous liquid extractor. Fritz Reuter. *Australian Chem. Inst. J. & Proc.* **6**, 384–6(1939).—An app. is described for the continuous extn. of a wide range of liquid vol. (25 500 ml. and more). The same set-up can also be conveniently used for the evapn. of low-boiling solvents such as ether. For the extn. of larger vols. the use of longer and wider bottles with distributors to match is proposed. Robert Simha

Separation of liquid mixtures in the Clusius separation tube. H. Korsching and K. Wirtz. *Z. Elektrochem.* **45**, 662–3(1939); cf. *C. A.* **33**, 7643[1]. L. E. Steiner

Vacuum service in the chemical industry. A. E. Williams. *Engineering* **148**, 607–9(1939).—A review. E. H.

Rapid circulating dialyzer. A. R. Taylor, A. K. Parpart and R. Ballentine. *Ind. Eng. Chem., Anal. Ed.* **11**, 659(1939).—A double continuous-flow app. is described. A gas lift is used for circulating the soln. to be dialyzed. A bulb receiver is connected to a long dialyzing chamber designed to give a thin layer in contact with the membrane. Pressure from osmosis is impossible. The app. can readily be operated in a refrigerator. Protein solns. (25–150 cc.) were freed of 98% of salt in 9 hrs. with a min. of denaturation (cf. Aitken, *C. A.* **25**, 619). W. F. Bruce

Determining the diameters of openings in screen plates of rectifying columns. A. A. Grigor'ev. *Khim. Mashinostroenie* 8, No. 7, 8–10(1939).—In detg. the proper diam. of openings in screen plates of rectifying columns a sheet of material having the same compn. and thickness as that from which the screen is to be made is perforated with many holes of regularly varying diams., the sheet is then wetted with the liquid which is kept close to its b. p., and the largest hole which remains filled with the liquid is selected as the proper size. Owing to inaccuracies in constructing screen plates on a large scale the diam. selected should be about 10–20% less than that chosen in the above lab. expt. B. Z. Kamich

Operation and use of a centrifugal acid pump without a packing gland. W. Meinecke. *Chem. App.* **26**, 294–6; *Zellwolle u. deut. Kunstseiden-Ztg.* **5**, 244–5(1939).—The details of operation and construction of a packingless centrifugal pump are described. During rotation the shaft is hydraulically sealed; when not in motion, sealing is accomplished by metal-to-metal contact between a ring on the shaft and a ground seat in the casing. G. W. Stroebe

The preparation of compressed oxygen from liquid oxygen. A. Orlieck. *Chem. App.* **26**, 321–4(1939).—Methods and types of app. for the vaporization of liquid O are described. Storage and transportation problems are discussed. G. W. Stroebe

Capillary flowmeter with variable orifices. Johannes H. Bruun. *Ind. Eng. Chem., Anal. Ed.* **11**, 655(1939).—In place of interchangeable capillaries, a single large-bore capillary can be used in conjunction with different gage wires, which are inserted in the whole length of the capillary. With a capillary 60 × 1.1 mm. the range of gas flow from 0.2 to 7 l. per min. was covered, wires from 20 to 30 gage were used. Ease of cleaning the capillary is an important advantage. W. F. Bruce

Fluid flow through porous carbon. M. R. Hatfield. *Ind. Eng. Chem.* **31**, 1419–24(1939).—Flow rates were detd. through porous C over a superficial velocity range of nearly 600,000-fold, d. 1140-fold, viscosity 31,000-fold, pore diam. 40-fold and thickness 5-fold—nearly 2000 detns.; air, water, corn sirup soln., paraffin oil and glycerol were used. A "friction factor," $Dg\Delta P/2\rho LV_m^2 = f$, is plotted logarithmically against $DV_m\rho/\mu = Re$, where D is pore diam., g is gravity, ΔP is pressure drop, ρ is fluid d., L is thickness, μ is fluid viscosity, and V_m is estd. mean velocity through the pores. The units are ft., lb., and sec., but f and Re are dimensionless. When $8 \times 10^{-6} < Re < 4$, $f = 0.29/Re$, indicating streamline (viscous) flow (Darcy's law). Between the points $Re = 10$, $f = 0.035$, and $Re = 160$, $f = 0.0075$, the line is straight, the slope indicating turbulent flow. When $4 < Re < 10$, the line is curved, indicating gradual dissemination of turbulent flow throughout the varying sized pores. The max. deviation is about 40%. D is detd. by the method of Ruoss and others (cf. *C. A.* **30**, 6620[9]; E. W. Washburn, *Proc. Natl. Acad. Sci.* **1**, 115(1921)), measuring streamline flow of viscous liquids and computing D by a formula related to Poiseuille's law and involving void space. V_m is estd. by dividing the superficial velocity by the porosity (cf. *C. A.* **27**, 4660), which varies from 36% to 48%. Flow through porous media in general is briefly discussed. Twenty-five references. R. W. Higbie

Flow of liquids through beds of granular solids. Wm. H. Ward. *Engineering* **148**, 435–8(1939).—Data on the flow of water through 8 sands and gravels are correlated in a single plot; a friction factor and Reynolds no. are used and corrections are made for porosity by the method of Bakhmeteff and Feodoroff (*J. Applied Mechanics*, Sept. (1937), June (1938)). Reynolds no. varies from 1.2 to 5000, including streamline and turbulent flow. It is based on the diam. of a sphere of mean particle weight, which varies from 0.08 to 0.626 cm. Porosity varies from 0.356 to 0.462. R. W. Higbie

Flotation. H. Madel. *Chem. App.* **26**, 305–8, 324–6 (1939).—A review. G. W. Stroebe

Apparatus for luminescence analysis and its use for the examination of silicates. B. S. Shvetsov, M. A. Matveev and Ju. P. Simanov. *Keramika* **1939**, No. 8, 5–12.—An a.-c. Hg vapor-quartz lamp of 380–400 w. is equipped with a filter that transmits ultraviolet rays and with a device for microscopical observation. The app. can be used for detg. in slags to be used as rubble the stability against silicate decompn. due to the transition of β-2 $CaO.SiO_2$ to γ-2$CaO.SiO_2$. Stable slags give a homogeneous dark-violet or dark-brown (more rarely bright-violet) luminescence. Older slags show sometimes isolated gold-yellow or silver-white pads or efflorescences due to weathering. Unstable slags show a light breakage surface, multiple iridescent white-yellow and bright-yellow points on a bright-violet ground, sometimes also rust-brown pads with light-brown points. The method can be used also for detn. of the extent of mullitization of fused mullite ware, refractories, porcelain and other ceramic ware. E. E. Stefanowsky

Color testing. Tryggve Johansson. *Svensk Papperstidn* **42**, 529–34(1939).—App. used in testing colors by illumination is described. Wilhelm Segerblom

What diameter? What pressure? How many pounds of steam? W. F. Schaphorst. *Ind. Eng. Chem., News Ed.* **17**, 764(1939).—A nomographic chart of 3 scales answering the above questions when there is at least a 60% drop through the opening. Applications to typical problems are cited. W. C. Ebaugh

Arrangements and economic practice in continuous crushing and grinding. E. H. Fraser and A. N. Hambly. *Soc. Chem. Ind. Victoria, Proc.* **39**, 199–202(1939). E. H.

A newly developed spray drier for chemical industries. J. F. Kesper. *Chem. App.* **26**, 353–4(1939).—A spray drier in which the soln. is dispersed in the center of the drying chamber by 2 converging hot-air streams. The main drying air stream is introduced tangentially. Temps. up to 400° can be used. The soln. can be preheated and partially evapd. by contact with the outgoing air. G. W. Stroebe

The theoretical basis for the practice of drying technique, removal of fogs and humidification. P. Beckers. *Spinner u. Weber* **57**, No. 36, 2–6, 8, 10, 12(1939). L. S.

Lead-sodium alloy as a drying agent. Harold Soroos. *Ind. Eng. Chem., Anal. Ed.* **11**, 657–8(1939).—An alloy of 90 parts Pb and 10.5 parts Na is brittle and readily powdered, as well as safe to handle. It is as effective a drying agent as Na wire, but acts more slowly. Unused alloy can safely be decompd. with H_2O. W. F. Bruce

Heat exchange of gases at high pressures. A. B. Nefedov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 21–4(1939).—Data are reported for the heat exchange of 3:1 H_2-N_2

mixts. at 1–276 atm. and av. temp. 50–60° flowing through metal pipes. The usual laws are obeyed. H. M. L.

Using hot blast gases to blow out hydrogenation apparatus. A. Panyshev. *Maslobоino Zhirovoe Delo* **15**, No. 2, 19-20(1939).—Trial runs show that hot blast gases from a water-gas producer or other gas generator can be used for blowing out hydrogenation app. Gas connections for the purpose are described and illustrated. With a fuel bed 1 m. thick the full blast does not give excess air and the resulting gas contains no free O_2. Conditions for blowing out the app. with hot blast gases depend on the manner in which the gas was formed and may be governed according to the gas compn. as shown by analysis. J. F. Smith

Measurement of metal temps. of cracking-still tubes (Kaasa) **22**. Sediment indicator for testing liquids (U. S. pat. 2,177,060) **12**. Device for aerating liquids (U. S. pat. 2,176,558) **16**.

Achema-Jahrbuch, 1938/39. Berlin: Verlag Chemie g. m. b. H. Edited by **Herbert Bretschneider**. 387 pp.

Valve system suitable for reducing the pressure of various materials for chemical reactions, etc. Curt Räth (to Chemische Fabrik von Heyden A.-G.). U. S. 2,177,205, Oct. 24. Various structural, mech. and operative details.

Applying films such as paraffin to pouring rims of bottles to render them nondripping. Robert E. Ford (to Luther Ford & Co.). U. S. 2,177,625, Oct. 24. Various details of app. and operation.

Apparatus for dew-point determinations. Joseph C. Parkinson (to Pittsburgh Plate Glass Co.). U. S. 2,177,402, Oct. 24. There are used, in combination in app. for detg. the dew point of a fixed volume of gas contained in a double glazed window construction, a vessel provided with a thin metal face, which is designed to fit in intimate contact with one plate of the window construction, having a surface area materially less than that of the glass plate, a layer of insulating material substantially surrounding the vessel, an inlet tube connecting the central portion of the vessel with the atm., a freezing mixt., the temp. of which may be varied, contained in the vessel and indicating means for registering the temp. of the freezing mixt.

Vacuum rectifying column. Kenneth C. D. Hickman (to Distillation Products, Inc.). U. S. 2,176,498, Oct. 17. Various structural and operative details.

Solution suitable for removing oxygen from gases as in gas analysis. Dorothy Quiggle. U. S. 2,170,596, Aug. 22. An O-absorbing soln. is used of alk. reaction and contg. an alkali metal sulfide and an aromatic compd. such as pyrogallol, α-naphthoquinone, β-(chloromercuri)-anthraquinone, 1-chloro-2-anthraquinonecarboxylic acid, 1-mercapto-2-anthraquinonecarboxylic acid, the sulfide present in much greater amt. than the aromatic compd.

Separating gases such as carbon dioxide from mixtures. Leo Horvitz (to E. E. Rosaire). U. S. 2,177,139, Oct. 24. A component of a gaseous mixt. to be sepd., such as CO_2, is reduced to a solid phase of low vapor pressure which is collected; the reducing and collecting steps are repeated, and between the repeated steps such solid is revaporized as has failed to be collected in the preceding step. App. is described.

Centrifugal separators. John F. Tholl (to American Tool & Machine Co.). U. S. 2,176,440, Oct. 17. Various structural, mech. and operative details.

Steam separator and drier. Albert P. Pinto (to Novo Patents, Inc.). U. S. 2,176,098, Oct. 17. Various structural and operative details.

Separating fragmentary materials of different specific gravities. Victor Rakowsky, Ray W. Arms and Charles B. Hebbard (to Minerals Beneficiation, Inc.). U. S. 2,176,189, Oct. 17. An app. is used comprising a tank contg. a gravity-sepg. liquid medium of constantly increasing sp. gr. from the top downward and composed of a liquid and comminuted solids and wherein the lighter material floats and the heavier material sinks, means within the tank continuously removing in a current of the medium the heavier material together with some of the medium from a lower level in the tank, means sepg. the removed material with a small amt. of the solids of the medium clinging thereto from the thus removed medium, and means within the tank continuously vertically adjustable during operation for returning the thus sepd. medium otherwise unaltered to the tank.

Apparatus for air purification by spraying and reversal of flow to effect separation of impurities. Newton C. Schellenger (to Chicago Telephone Supply Co.). U. S. 2,177,289, Oct. 24. Various structural and operative details.

Apparatus for dispensing liquefied gases such as liquefied petroleum gas. Loyd J. White (to Southern Steel Co.). U. S. 2,177,620, Oct. 24. Various details of an app. with an underground storage tank.

Apparatus for storage and dispensing of liquefied gases such as liquefied butane and propane mixtures. Loyd J. White (to Southern Steel Co.). U. S. 2,176,829, Oct. 17. Various structural and operative details.

Apparatus for controlling the level of liquids, such as oil in a still. Paul E. Kuhl (to Standard Oil Development Co.). U. S. 2,176,741, Oct. 17. Various structural and operative details.

Bringing immiscible liquids such as oil distillates and alkali solutions into contact. Albert G. Schuessler and Robert W. Leslie (to Skelly Oil Co.). U. S. 2,176,806, Oct. 17. App. is described, and a method of treating a liquid with a heavier immiscible treating soln. which consists in maintaining a substantially const. body of treating soln. in a vessel, introducing a stream of the liquid into and below the upper level of the body of soln., passing the liquid through a packed zone, a portion of which extends into the body, whereby portions of the soln. are carried concurrently with the liquid through the packed zone to bring the two into intimate contact, sepg. the mixt. into its components in an unpacked zone, withdrawing the treated liquid, and returning the sepd. soln. to the body out of contact with the liquid being treated.

Apparatus for gas calorimetry. James G. Stewart. U. S. 2,177,267, Oct. 24. There are used together: means for supplying to the calorimeter app. the gas that is to be tested and the liquid medium employed for detg. the calorific value, comprising a first piston pump for producing a particular rate of supply of the liquid medium, a second piston pump for producing a rate of supply of the gas, which rate normally bears a fixed relation to the rate of liquid medium supply, and means effective upon one of the pumps for varying the output flow therefrom to compensate for local changes in atm. temp. and pressure.

Pyrometer tube. Benjamin J. Sweo. U. S. 2,177,046, Oct. 24. A unitary pyrometer tube comprises concentric tubular layers of semivitreous porcelain resistant to high temps., and an intermediate layer therebetween composed of vitreous porcelain which is impervious to gases so that it constitutes a seal for the pores in the semivitreous porcelain (all the layers being bonded by firing them together as a unit).

Forced-circulation evaporator. Philip B. Sadtler (to Goslin-Birmingham Mfg. Co.). U. S. 2,176,152, Oct. 17. Various structural and operative details.

Furnace-heated apparatus for drying wet granular materials such as sand. Wm. H. Golden. U. S. 2,177,404, Oct. 24. Various structural and operative details of a continuous drier.

Open-work tray for use in heat-treating furnaces. Henry H. Harris. U. S. 2,176,072, Oct. 17. Structural details of a bent-bar tray. U. S. 2,176,073 also relates to structural details of a tray for like use.

Apparatus for testing the tensile or compression strength of materials. John P. Sanner (to Tinius Olsen Testing Machine Co.). U. S. 2,176,722, Oct. 17. Various structural, mech. and operative details.

Shell and tube surface condenser. Ulrich A. Taddiken (to Westinghouse Elec. & Mfg. Co.). U. S. 2,176,475, Oct. 17. Various structural details.

Atomizing device suitable for use with cleansing liquids, etc. Rome C. Seyforth (to Shelby Metal Products Co.). U. S. 2,176,642, Oct. 17. Various structural and operative details.

Concentrating apparatus for air-conditioning solutions, etc. Harry F. Smith (to General Motors Corp.). U. S. 2,176,645, Oct. 17. App. suitable for treating solns. of glycerol, $CaCl_2$, etc., includes a heater for the circulating liquid, a motor and blower and a switch responsive to the d. of the liquid treated for controlling the operation of the motor and blower. Various structural and operative details are described.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Frank Orville Clements. T. A. Boyd. *Ind. Eng. Chem., News Ed.* **17**, 777–8(1939).—A brief biography with portrait. E. J. C.

J. Willard Gibbs, the hundredth anniversary of his birth. P. A. Rebinder. *Uspekhi Fiz. Nauk* **21**, 377–81 (1939).—Biography. F. H. Rathmann

Vladimir Vasil'evich Markovnikov. 1839-1904. I. A. Kablukov. *Uspekhi Khim.* **8**, 300–20(1939).—Biography and discussion of M.'s scientific and pedagogical work in memory of the centenary of his birth. F. H. Rathmann

Waldemar Lindgren. Paul Ramdohr. *Z. prakt. Geol.* **47**, 187(1939).—Obituary. Michael Fleischer

Prof. A. A. J. de 'Sigmond. Béla Grenczer. *Magyar Mérnök Épitészegylet Kozlonye* **73**, 305–7(1939).—Obituary. S. S. de Finály

The Haber Memorial Lecture. J. E. Coates. *J. Chem. Soc.* **1939**, 1642–72.—Biography and account of the work of Fritz Haber, with portraits. E. H.

Organic matter in water of certain seas. V. G. Datsko. *Compt. rend. acad. sci. U. R. S. S.* **24**, 294–7(1939)(in English).—Analyses of water samples showed that the C and N contents of the Sea of Azov and the Caspian are higher than those of other seas investigated. The water of the Caspian is much more abundantly stored with org. C than the Sea of Azov but is poorer in N. The hydrographic reasons are briefly discussed. The water of the White Sea is richer in both org. C and N than are the ocean waters, and its C/N quotient is somewhat lower. The protein and carbohydrate contents are given in a table:

Sea	Protein mg./l.	Carbohydrates mg./l.	Total of carbohydrates + protein mg./l.
Caspian	3.1	11.0	14.1
Sea of Azov	3.9	6.0	9.9
White Sea	1.9	4.0	5.9
Black Sea	1.6	4.0	5.6
Greenland Sea	1.4	3.5	4.9

6 references. A. H. Krappe

Relation between the chlorinity and the density of Caspian sea water. A. V. Trofimov. *Compt. rend. acad. sci. U. R. S. S.* **23**, 929–32(1939)(in English).—Expts. were made with a view to increasing the accuracy of calcg. the d. of Caspian sea water by means of its Cl no. The d. was detd. by the wt. pycnometer method at 0° and 25°. The Cl content was detd. by wt. titration of weighed samples of H_2O. The relation of chlorinity and d. is expressed by an equation of the 2nd order: $\sigma_0 = 0.036 + 2.090\ Cl - 0.0063\ Cl^2$, modified in the case of southern Caspian water artificially dild. with twice distd. H_2O as follows: $\sigma_0 = -0.132 + 2.101\ Cl - 0.0025\ Cl^2$. The relation between σ_0 and σ_{25} is: $\sigma_{25} = -2.808 + 0.933\ \sigma_0 + 0.0013\ \sigma_0^2$. Salinity is calcd. from the Cl no. by the equation $S = 0.14 + 2.36\ Cl$. 7 references. A. H. Krappe

Oxidizing activity and pH of brown sediments of the Barentz Sea. A. V. Trofimov. *Compt. rend. acad. sci. U. R. S. S.* **23**, 925–8(1939)(in English).—The upper layer (1–3 cm.) of stratum *A* was compared with the lower layer *C* (15–30 cm.) at 21 stations. The upper layer of stratum *A* oxidized quinhydrone in all cases but one (Δ varying from −5 to 54 mv.) (Δ = the difference between the potential of a quinhydrone electrode dipping into the buffered mud and its value in the pure buffer). The lower stratum reduced quinhydrone in all cases (Δ varying from −45 to −78, mean Δ being −65). Between the upper stratum of the lower reduced layer a difference in the values of Δ was observed in all cases, equal to 90–100 mv. The mean pH value for the upper stratum is 8.20, for the lower stratum 8.25. The presence of an acid streak in the profile of the brown mud is due to an active process of oxidation caused by the dissolved O_2 of org. matter or manganous and ferrous carbonates present at the sea bottom. 5 references. A. H. Krappe

Physical chemistry and chemical technique. Ludwig Holleck. *Z. ges. Naturw.* **5**, 148–51(1939). —A discussion of the important role that phys. chemistry plays as a binding link between physics and mathematics on one side and inorg. and org. chem. and biology on the other side. The recent developments of chem. technique offer in an increasing degree a definite goal for research and offer a basis for the development of new branches of science. W. R. Henn

Investigations on the conductivity of solid gelatin-dye phosphors. Lajos Gombay. *Math. naturw. Anz. ungar. Akad. Wiss.* **58**, 338–54(1939).—At room temp. the cond. increases with the concn. of the dye. Const. temps. (either high or low) had the same effects: the dye-phosphor loses its cond. within a short time. At higher temps. this effect is irreversible; at low temp. it is reversible. With a continuous and regular increase of temp. the cond. at first increases to a max., then diminishes and finally increases again owing to a new inner positive e. m. f. The increase of cond. increases with velocity of temp. increase, and the extreme values of cond.-temp. curves are at higher points with rapid temp. increase. Once heated dye-phosphor plates showed on reheating to 50° no cond. at all, from 50° to 100° low, and above 100° rapidly increasing conductivities. S. S. de Finály

Fluctuations, thermodynamic equilibrium and entropy. Edwin C. Kemble. *Phys. Rev.* **56**, 1013–23(1939).—Because of the large fluctuations found when the laws of thermodynamics are applied to microscopic systems, K. suggests replacing all statements that thermodynamics makes about individual systems with corresponding statements regarding ensembles of identically constructed independent systems similarly prepd. or subject to the same expt. L. E. Steiner

The assignment of uncertainties to the data of chemistry and physics, with specific recommendations for thermochemistry. Frederick D. Rossini and W. Edwards Deming. *J. Wash. Acad. Sci.* **29**, 416–41(1939).—For the comparison and appraisal of measurements made in different labs., for the purpose of estg. the uncertainty in the value of a phys. or chem. const., there should be adopted a uniform procedure for expressing the consistency of data. From a consideration of the definitions of precision and accuracy, and on the basis of the theory of probability, the procedures for ascertaining this are discussed. The examn. of one or more sets of observations, tests for functional concordance in measurements involving several magnitudes, and the propagation and combination of errors are considered for data known to be in statistical control. This is applicable to abs. or comparative measurements in general, and the example of thermochem. measurements is discussed in detail. J. W. Knowlton

A rule of coördination valency. Richard F. Robey. *J. Chem. Education* **16**, 514–16(1939).—The approx. coördination no. is half the difference between the effective at. no. of the simple cation and the at. no. of the following inert gas. The rule does not hold for certain alkali and

alk. earth metals, where space relations limit the coördination no. to 6 or less. Wm. E. Trout, Jr.

A simplified nomenclature for the proton-transfer concept of acids. Hubert N. Alyea, *et al.* *J. Chem. Education* **16**, 535–8(1939).—Tentative recommendations of the Comm. on Nomenclature of Acids, Bases and Salts, of the Division of Chem. Education of the Am. Chem. Soc. Approved terminology and superfluous or incorrect usage listed. Sixty definitions and a selected bibliography are included. Wm. E. Trout, Jr.

Remarks on the calculation of bond strengths. Milton Burton. *J. Chem. Phys.* **7**, 1072–5(1939); cf. *C. A.* **33**, 8094[1].—The hypothesis that predissocn. may be used to establish bond strength is shown to lead to incorrect conclusions. Values are derived from various C—C and C—H bond strengths. Bonds in free Ac and formyl radicals are weaker than in the stable compds. G. M. P.

New aspects on the cohesion of simple compounds. III. J. M. Stevels. *Rec. trav. chim.* **58**, 931–40(1939) (in English); cf. *C. A.* **33**, 4483[7,8].—The b. ps. of halogenated methane, ethane and ethene derivs. are calcd. as the sum of 3 effects; the London, Keesom and Debye effects. These effects are estd. to a higher approximation than formerly. The previous formula for the L. effect is generally satisfactory, a slight correction being made in a few cases. The formula for the K. effect is correct, whereas that for the D. effect is altered. With these alterations it is possible to predict trends in the b. p. of isomers of the same type. Agreement is found in all known cases. John E. Vance

Antiferromagnetism in some manganous compounds. Charles F. Squire. *Phys. Rev.* **56**, 922–5(1939).—The temp. dependence (300°K. to 40°K.) of the magnetic susceptibility of the following Mn^{++} salts was measured: MnO, MnS, MnSe, MnTe. A λ-point transition at low temps. makes the susceptibility break away from a Weiss-Curie law and decrease with lowering temps. Each salt has its characteristic transition temp., increasing with increasing mol. wt. Evidence for field dependence of the susceptibility and for magnetic hysteresis was found. An exchange force may be the cause of the transition from paramagnetism to antiferromagnetism. Bernard Lewis

Electrical conductivity as a function of temperature of some manganous compounds. Charles F. Squire. *Phys. Rev.* **56**, 960(1939); cf. preceding abstr.—When log resistance is plotted against temp. for MnSe, MnS and MnO a series of straight lines is obtained. MnTe has a rounded max. at 290°K. G. M. Petty

Internal rotation and dipole moment in succinonitrile. Geo L. Lewis and Charles P. Smyth. *J. Chem. Phys.* **7**, 1085–93(1939).—A new heterodyne-beat app. was used to det. the dipole moments of MeCN and of $NC.C_2H_4.CN$ in soln. Dielec. consts., ds. and polarizations are tabulated for solns. of MeCN in C_6H_6 at 25° (c_1 = 0–0.20), MeCN in PhMe at −60 to +60° (c_1 = 0.013–0.071); $(CH_2CN)_2$ in PhMe at −90 to +90° (c_1 = 0–0.044). The height of the potential barrier which restricts rotation about the C—C bond in $(CH_2CN)_2$ is calcd. to be 1.2 ± 5 kg.-cal. G. M. Petty

Determination of the velocity of sound in a gas; application to analysis of mixtures of helium, oxygen and nitrogen. Wm B. Dublin, Walter M. Boothby and Marvin M. D. Williams. *Science* **90**, 399–400(1939).—An app. for detg. the velocity of sound in a gas was constructed which is particularly suited for mixts. of He, N and O. It is possible to det. the percentages of He and N in the whole mixt. with an accuracy of approx. ±1.0%. A. B. G.

Tension of lithium vapor between 462° and 642°. Marguerite Maucherat. *J. phys. radium* **10**, 441–4(1939). —See *C. A.* **33**, 3225[4]. H. Game

The coefficient of thermal diffusion of methane. Alfred O. Nier. *Phys. Rev.* **56**, 1009–13(1939).—The coeff. of thermal diffusion of CH_4 was calcd. from the observed sepn. of the isotopic gases, $C^{12}H_4$ and $C^{13}H_4$, under a temp. gradient. L. E. Steiner

The van der Waals potential in helium. H. Margenau. *Phys. Rev.* **56**, 1000–8(1939).—Theoretical. The van der Waals potential in He is calcd. from its at. structure. L. E. Steiner

The limiting volumes of oxygen and hydrogen. G. P. Luchinskiĭ. *J. Gen. Chem.* (U. S. S. R.) **9**, 1310–12 (1939).—The limiting vols. of O and H are calcd. by means of the limiting vols. of their compds. As initial values for the calcn. of the limiting vol. of O were taken the limiting vols. of SO_2, SO_3, $SOCl_2$, SO_2Cl_2, $S_2O_5Cl_2$, $S_3O_7Cl_4$, $COCl_2$ and $POCl_3$ whose values of ω were 0.5065, 0.5147, 0.5329, 0.5114, 0.5267, 0.5231, 0.5606 and 0.5352, resp. If for the compd. Q_xO_y the mol. limiting vol. is ωM (if the additivity rule holds true) the atomic limiting vol. of O $\omega_0 A_0$ can be calcd. for $\omega_0 A_0 = (1/y)(\omega M - x\omega_q A_q)$, where A is the at. wt. The results of the calcn. of the at. limiting vol. of O checked sufficiently well with one another. The limiting vol. of O was also calcd. from the crit. vol. of elementary O. The mean deviation of the $\omega_0 A_0$ values obtained from the 8 different substances was +9.31% and it was equal to 8.67 from which the limiting vol. of O ω_0 was found to be 0.5419. The limiting vol. of water was used for the calcn. of the limiting vol. of H. The fluidity of water obeys the rule of Bachinskiĭ only in the region of sp. gr. from 1.03 and higher. The mol. limiting vol. of water was calcd. to be 17.47 from which the at. limiting vol. $\omega_H A_H$ was 4.40 and the limiting vol. of H ω_H = 4.365. One curve, 2 tables and 6 references. W. R. Henn

Phenomenological thermodynamics of moving matter. D. van Dantzig. *Physica* **6**, 673–704(1939)(in English). —Thermodynamics and hydrodynamics of moving matter are presented in relativistically invariant form, with special reference to perfectly perfect fluids. If a flowing imperfectly perfect fluid such as liquid He is subjected to a temp. gradient, a relativistic effect gives rise to internal friction. The effect is too small to be detected. G. M. Murphy

Viscosity of liquid ammonia. C. J. Plank and Herschel Hunt. *J. Am. Chem. Soc.* **61**, 3590–1(1939).—By use of a closed system (app. illustrated) the d. (g./cc.) and viscosity of liquid NH_3 (av. g./cm. sec.) are detd. to be at 5° 0.63197, 0.001618; at 15° 0.61821, 0.001457; at 25° 0.60427, 0.001350. The app. was calibrated with CS_2 and CCl_4 for which d. and viscosity are given for 5, 15 and 25°. C. J. West

The surface-tension isotherms of binary liquid systems. N. A. Trifonov. *Trudy Saratov. Avtomob.-Dorozhn. Inst. im. Molotova* **1938**, No. 4, 381–401; *Khim. Referat. Zhur.* **2**, No. 4, 26(1939).—By considering a system to be normal if its components do not change their mol. conditions on mixing and by adding to this definition the requirements (specific for surface tension) of the proximity of the dipole moments of the components, T. concludes that the surface-tension isotherm of such a system can be best expressed by the formula of Stakhorskiĭ $\sigma = \sigma_1\sigma_2/[\sigma_1(1 - X) + C_2X]$. This formula was verified on a no. of systems. According to the formula the isotherm is expressed by a curve that is curved downward, toward the axis of the components. The surface-tension isotherms of a system contg. a decompg. assocd. component lie below the isotherm of the normal system. Singular curves were obtained for rational systems from the isotherms of the first two types. These curves are always branched out toward the abscissa axis. The singular point forms either a max., a min. or a nodal point, depending on the relation between the values of the surface tension of the compd. and the components. The isotherms of the irrational systems correspond to the same types as the rational isotherms, but their extremes or their transition points are rounded, and they do not correspond to the rational compn. of the components. A no. of examples of systems are presented that illustrate the types of isotherms described. W. R. Henn

The structure of liquids. Joseph O. Hirschfelder. *J. Chem. Education* **16**, 540–4(1939).—The Eyring theory (*C. A.* **30**, 3304[8]) of liquids, based on the space in which a mol. is free to move when its neighbors are fixed, is developed in terms of elementary thermodynamics and a simple picture. An equation of state is derived, $(p + a(T)/V^2)(v - 0.7816b^{1/3}V^{2/3}) = NkT$, where v is the free

vol. and the remaining symbols have their usual significance. This is a limiting form of van der Waals' equation corrected for close packing. The Hildebrand (cf. *Solubility of Non-Electrolytes*, *C. A.* **30**, 2478[8]) and Trouton rules for vapor pressure and entropy change on melting, and the temp. coeff. of viscosity are explained.
Wm. E. Trout, Jr.

The nature of the anomalous physical properties of thin silver films. A. T. Ashcheulov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 122–5(1939) (in English).—Ag was evapd. *in vacuo* onto glass, fused quartz, KCl and NaCl in layers of varying thickness. The absorption of transmitted light by these films was then detd. as a function of the wave length. When the Ag was deposited on a base kept at room temp. the max. absorption for thin films (1 mμ) was at a wave length of 430–440 mμ; with increase in the thickness of the layer the max. absorption shifts toward longer wave lengths. When the base was heated to 300–350° during the deposition, Ag layers 10–15 mμ thick were required to give max. absorption at a wave length of approx. 440 mμ. Such films on standing gradually revert to the condition of the cold-deposited ones; vapors of I or Br accelerate this change, without forming AgI or AgBr in appreciable amts. The results prove that both types of films have a colloidal rather than an amorphous structure.
T. H. Dunkelberger

Cathode-ray investigation of thin layers formed on some single crystals. II. Molybdenum oxide deposited on molybdenite by sublimation of MoO_3 in vacuum. Ryozi Ueda. *Proc. Phys.-Math. Soc. Japan* **21**, 517–23(1939) (in English); cf. *C. A.* **33**, 4476. Thin films of MoO_3 were formed on cleavage faces of molybdenite or polished surfaces of Au, Ni or Cu, held at a temp. t, by sublimation in a vacuum, and the structure of the films was ascertained by electron-diffraction patterns obtained at grazing incidence. At t = 20–100°, diffuse rings are obtained. On molybdenite at 100–350° an oxide probably between MoO_3 and MoO_2 is found, and shows a fiber-like structure; at 350–490°, cryst. MoO_2 forms, extra spots showing the presence of a superlattice. On the metals, ring patterns only are obtained showing lack of orientation; on Au and Ni, the intermediate oxide is indicated at t = 100–350°, MoO_2 being found at 350–490°; on Cu, MoO_2 is formed over the whole range 100–490°.
A. O. Allen

The electrical breakdown strength of ionic crystals as a function of temperature. R. C. Buchl and A. Von Hippel. *Phys. Rev.* **56**, 941–7(1939).—It is shown that, at least in ionic crystals like KBr, a very steep increase of breakdown strength with temp. occurs in the lower temp. range, in contrast to the general belief that the breakdown strength of an insulator is const. in the lower temp. range and decreases rapidly at high temps., indicating thermal breakdown. This new phenomenon is apparently analogous to the temp. coeff. of the resistance in metals and it allows a decision between the different theories of breakdown proposed.
Bernard Lewis

Penetration of the ions of metals into transparent crystals of basic halides. S. A. Artsybyshev. *Trudy Fizicheskogo Inst.* **1**, 5–70(1938); *Khim. Referat. Zhur.* **2**, No. 2, 2–3(1939).—The penetration of the ions of Au, Ag, Cu, Ni, etc., into NaCl and KCl crystals was investigated. Cases were found from ions that were immobile in the crystals to ions possessing as great a mobility as those in aq. solns. Pt is an example of an ion that cannot move in the cryst. lattice. In some compds. the metal ion cannot move in the crystal, but the Cl sepg. at the anode reacts with the metal of the anode forming a Cl compd. This compd. gives an easily fusible mixt. with rock salt, the crystal is fused, and the metal of the anode flows into the cavity formed. Some metals can penetrate the crystals of the basic halides, causing a local destruction of the lattice with the formation of the corresponding Cl salts. The ions of some metals (Bi and Fe) penetrate the crystal and are sepd. in the form of mech. admixts. The cryst. lattice is destroyed in this place, and the metallic ions coagulate, forming a particle of the fused metal. At high temp., Au ions penetrate easily the crystal in which they are mobile, but the system is unstable on cooling. At a comparatively low temp. the ions of the metal can also penetrate the crystal forming a system that is stable at all temps. The theories of the mechanism of the movement of the ions in the cryst. lattice are discussed.
W. R. Henn

The crystal structure of cesium fluorochromate. J. A. A. Ketelaar and E. Wegerif. *Rec. trav. chim.* **58**, 948 (1939) (in German); cf. *C. A.* **33**, 1567[7].—The dimensions of the unit cell of $CsCrO_3F$ are a = 5.71[5] ± 0.005 A., c = 14.5 ± 0.1 A. The unit cell contains 4 mols. The structure is isomorphous with the K salt.
John E. Vance

Crystal structure of acid compounds of graphite. W. Rudorff. *Z. physik. Chem.* **B45**, 42–68(1939); cf. *C. A.* **32**, 8232[8].—X-ray study was made of the crystal structure of the compds. of graphite with H_2SO_4, H_2SeO_4, HNO_3 and $HClO_4$.
G. M. Murphy

X-ray study of polymetatelluric esters. Marcel Mathieu and Cécile Stora. *Compt. rend.* **209**, 834–6(1939).—The amorphous polymetatellurates (cf. Patry, *C. A.* **30**, 5521[9]) of Me, Et, Pr, Bu, Am and iso-Pr, iso-Bu and iso-Am were examd. by x-rays by Guinier's method (*C. A.* **31**, 4200[3]). Their amorphous structure is confirmed and the progressive changes tightening of the concentric rings—with increasing length of the hydrocarbon chain are described.
C. A. Silberrad

The adsorption of hydrogen by copper dispersed in calcium oxide. John R. Lewis, Lawrence J. E. Hofer and Howard Whitehead. *J. Am. Chem. Soc.* **61**, 3580–3 (1939).—The adsorption was measured at 650 mm. and over a temp. range of 273–707° A. The data indicate that Cu, dispersed in CaO, is a better adsorbent for H than is pure Cu. In general the activated adsorption of H on CaO and on Cu dispersed on CaO resembles the adsorption of H on MgO and on Cu dispersed in MgO. Cf. *C. A.* **32**, 4032[2].
A. B. Garrett

The structure of the adsorption layer and the adhesion of microscopic particles. A. v. Buzágh. *J. Phys. Chem.* **43**, 1003–14(1939). See *C. A.* **33**, 2013[8].
W. B. K.

Theory of nondissolving volume. II. B. V. Deryagin. *Colloid J.* (U. S. S. R.) **5**, 605–11(1939); cf. *C. A.* **33**, 8468[1]. With Bakker's theory of the structure of surface layers and the Gibbs adsorption theorem as a basis a relation is derived between the "nondissolving" vol. and the concn. of the substance the neg. adsorption of which is measured. The expts. used for checking the theory give a curve of a predicted shape but an impossible value for the const. involved (vol. of the solute in the soln.).
J. J. Bikerman

Adsorption of the ions of barium, sodium and lithium by glauconite in relation to the pH of the equilibrium solution and the concentration of the ion. E. A. Materova. *J. Gen. Chem.* (U. S. S. R.) **9**, 1274–8(1939). The exchange of Ba^{++}, Li^+ and Na^+ ions on glauconite was investigated by potentiometric titration. Titration curves were obtained electrometrically in the presence and in the absence of glauconite under identical conditions. In general for all cases an increase of the pH of the soln. increased greatly the exchange ability. At pH 7–11 the dependence was nearly linear. The exchange of Li^+, Na^+ and Ba^{++} justifies the supposition of the electromotive activity of H^+ toward glauconite. The adsorption of H^+ is of a "chem." character whereas the adsorption of the metallic cations is of an electrostatic adsorption nature. The effect of the concn. of the ion on the adsorption curve agreed with Frumkin's theory of the electromotive-active ion. The effect on the nature of the ion on the adsorption agreed with the lyotropic series. One diagram, 6 tables and 8 references.
W. R. Henn

Interaction of casein with aqueous solutions of aniline and pyridine. A. Ya. Korolev and V. A. Vilenskiĭ. *Compt. rend. acad. sci. U. R. S. S.* **24**, 266–9(1939) (in German).—Casein sol was brought into contact with aq. solns. of aniline and pyridine, resp., through a collodion membrane (denitrated with alc. $(NH_4)_2S$ soln.) until equil. was reached. From the change in concn. of aniline and pyridine, resp., detd. by the interferometer, the amts. taken up by the casein were calcd. Casein takes up aniline and pyridine by (1) salt formation and (2) sorption.

When K caseinate was brought into contact with pyridine solns. through the membrane, salt formation with the pyridine was suppressed and values for sorption alone were obtained. Results from casein sol and aq. pyridine solns. show that both water and pyridine are taken up by the casein, the ratio of sorbed water to sorbed pyridine increasing rapidly with increase in pyridine concn. in the soln. Casein swells in water or pyridine, but dissolves in aq. pyridine soln. George Ayers

Aging and formation of precipitates. XXX. The determination of the specific surface of silver bromide by the radioactive and dye methods. I. M. Kolthoff and A. S. O'Brien. *J. Am. Chem. Soc.* **61**, 3409–14(1939); cf. *C. A.* **33**, 5722[7].—Radioactive bromide is rapidly incorporated into well-aged AgBr when a soln. of the former is shaken with the solid. Adsorbed wool violet and methylene blue limit the exchange between soln. and solid to the surface layer only, and are suitable for the detn. of the sp. surface of AgBr. The amt. of dye adsorbed from a soln. contg. an excess of Ag is twice as great as that from a soln. contg. an excess of bromide. **XXXI. The aging of silver bromide.** *Ibid.* 3414–19.—The aging was followed by the wool violet and the radioactive methods. The speed of aging increased with increasing soly. of the ppt., but when the soly. reached a certain min. value, further decrease of the soly. did not affect the still fairly large speed of aging. Evidence is presented to indicate that this relatively rapid aging is due to a thermal aging of AgBr which also occurs in the dry state even at room temp. A. B. Garrett

Oriented coagulation in aerosols. III. Physical strength of aerosol sediments. D. Beischer. *Kolloid-Z.* 89, 214–19(1939); cf. *C. A.* **32**, 2402[8].—A method is given for the exptl. detn. of the breaking strength of thread-like aggregates of colloidal particles in a gaseous medium. The results obtained are compared with values calcd. by the method of Hamaker (*C. A.* **32**, 3219[1]) assuming exclusive action of the London-van der Waals forces between two spherical particles. In several cases these theoretical values agree fairly closely with the exptl. results and in these cases the breaking strength can be ascribed primarily to the London-van der Waals forces. In other cases in which the measured values are considerably greater than those calcd. according to Hamaker, either a cementing of the sep. particles by surface diffusion or the effect of addnl. elec. forces between polar particles must be assumed, according to the system being investigated. 13 references. A. L. Kibler

The use of ultrasonic energy for dispersion processes. Preparation of aqueous emulsions without the use of a stabilizer. A. A. Morozov. *Byull. Ivanovo Nauch. Issledovatel. Inst.* **1938**, No. 4–5, 105; *Khim. Referat. Zhur.* 2, No. 4, 19(1939).—Paraffin emulsions were prepd. without addn. of stabilizers in an ultrasonic field. With increasing quantities of paraffin, the concn. of the emulsion reached a max. at a proportion of 1.1 by wt. of the components of the mixt. The concn. of emulsion reached 0.4% on irradiation for 40 min. The degree of dispersion (1–5 μ, with a predominant diam. of the particles of 1.5 μ) increased simultaneously. The concn. increased nearly twofold with an increase of the intensity of the ultrasound, produced by increasing the tension on the quartz plate from 1.6 to 2.2 kv. Increased concns. of emulsions were obtained in the following order: 2% Na acetate < 7% C_2H_5OH < 0.5 *N* Na citrate < 4% formalin < distd. water < 10% glycerol < 10% acetone < 10% C_3H_5OH. W. R. Henn

The protective action of gelatin toward the hydrosols of metallic silver and of silver sulfide. A. A. Titov. *Kino-Foto-Khim. Prom.* **1938**, No. 9, 44–50; *Khim. Referat. Zhur.* 2, No. 3, 129(1939).—Very small concns. of gelatin increase the velocity of coagulation, whereas large concns. decrease the velocity of coagulation of Ag and Ag_2S sols. The protective action on the sols of Ag_2S depends to a considerable extent on the grade of gelatin, whereas all grades of gelatin exert practically the same effect on the sols of Ag. The protective action depends not so much on the gelatin substance as on impurities which possess the ability of "elective" protection in regard to Ag sols. The protective action gradually decreases with decreasing pH; at values of pH below the isoelec. point, gelatin exerts on both sols a sensitizing rather than a protective action. Up to values of pH = 4.35 gelatin coagulates Ag_2S sols. At pH > 4.7 the effect of H-ion concn. is much smaller for Ag sols than for Ag_2S sols. This fact points to an effect of adsorption in the phenomenon of protection. W. R. Henn

The theory of electrokinetic phenomena. Wm. Horwitz. *J. Chem. Education* **16**, 519–35(1939).—A review with 45 references. Wm. E. Trout, Jr.

Experimental investigations on laminar systems. Electrophoresis of thin films of metal sulfides and metal hydrates on the surface of water and solutions. S. G. Mokrushin and Z. G. Sheina. *Colloid J.* (U. S. S. R.) **5**, 707–15(1939).—Islets of thin films of CuS, As_2S_3, Sb_2S_3, Bi_2S_3, PbS, ZnS, Ag_2S, $Al(OH)_3$, $Fe(OH)_3$, $Zn(OH)_2$, or $Cu(OH)_2$, particles of paraffin wax, stearic acid, S, Al, or Mg, or droplets of petroleum jelly were placed on a water surface inside a paraffin wax ring, and Pt electrodes inserted outside the ring. The particles moved to one of the electrodes but neither the direction nor the rate of movement was const. No allowance for the movement of water was made. J. J. Bikerman

Thermostatics and dynamics of drying of disperse systems. A. K. Skryabin. *Colloid J.* (U. S. S. R.) **5**, 673–82(1939).—From equations given in S.'s book (Study of the Drying of Peat, 1936) the equation $dW/dt = -m(P_\infty - P_c)\tanh K(W - W_c)$ is deduced, in which t is time, W the amt. of liquid in the body, P_∞ the vapor pressure of the free liquid, P_c the pressure of the vapor in equil. with a unimol. layer of liquid on the particles of the disperse body (P_c is also supposed to be the vapor pressure in the air used for drying), W_c the amt. of liquid in the air-dry body, and m and K are consts. The equation agrees with exptl. results obtained in the course of drying peat. J. J. Bikerman

Surface solubility of clay particles. V. S. Sharov. *Colloid J.* (U. S. S. R.) **5**, 571–83(1939).—Surface soly explains the chem. and colloidal behavior of clays better than exchange adsorption. It also accounts for the plasticity of clay moistened with H_2O while mixts. of clay with apolar liquids are not plastic. J. J. Bikerman

Effect of the pH of the solution on the sedimentation of clays. A. S. Korzhuev and Z. L. Borisova. *Colloid J.* (U. S. S. R.) **5**, 475–82(1939).—One part of clay was shaken with 5 parts of H_2O, and the sedimentation of the suspension obtained was observed. Some clays sediment at once, while others produce a gradually increasing deposit. The effect of the pH is not uniform although strong acids usually accelerate, and strong alkalies retard, the sedimentation. J. J. Bikerman

Dependence of the swelling of clays upon the pH of the solution. A. S. Korzhuev and Z. L. Borisova. *Colloid J.* (U. S. S. R.) **5**, 667–72(1939); cf. preceding abstr.—The swelling of clays increases with the amt. of small particles (below 10^{-4} cm.) in them. In NaOH or HCl it is little affected by the pH between 3 and 11, and in AcOH-NaOH buffers between 5 and 9; in strongly acid or strongly alk. soln. it is larger than in neutral ones. J. J. B.

Dispersion of indanthrene pigments in the supersonic field. S. S. Tumanskii and Ch. Maksimova. *Colloid J.* (U. S. S. R.) **5**, 517–24(1939); cf. *C. A.* **33**, 6116[6].—Sedimentation curves of pigments dispersed in H_2O by the app. described (cf. *C. A.* **33**, 8470[4]) are given. In supersonic field a higher dispersity is achieved than in a colloid mill. There is no difference between tech. and pure specimens of indanthrene yellow *gk* and yellow *g*. The dispersity of chloroindanthrene is increased by sulfonated fatty acids. J. J. Bikerman

General chemistry of colloid-colloid reactions. VIII. Mechanism of protection by some higher carbohydrates. Wo. Pauli, J. Szper and St. Szper. *Trans. Faraday Soc.* **35**, 1316–27(1939); cf. *C. A.* **34**, 6674.—Gold, Congo blue, dextrin, starch, gum arabic and Night Blue sols were highly purified by electrodecantation. Gold sols, both spark-dispersed and those obtained by reduction with

alc., were distinctly protected by means of dextrin, but not completely, against KCl, $BaCl_2$ and $La(NO_3)_3$, least against the KCl. The highly purified gum arabic sol has a pronounced protective effect on Au sols against electrolytes and freezing; when present in a final concn. of 0.001% it completely protects the reduction Au sols against KCl, $BaCl_2$ and $La(NO_3)_3$. The spark-dispersed sols were protected by 0.01% of gum arabic final concn. No protective effect of electroneg. Congo blue sols by dextrin, gum arabic or sol. starch sols was obtained. However, Congo blue sols can be protected with gum arabic if the latter has previously been allowed to take up multivalent ions such as Ba, Mg or La. The role played by the surface groups of the particles in colloid-colloid reactions is emphasized and mechanisms for the protective effects are discussed. Victor R. Deitz

Dispersoid and high-molecular systems. A. V. Dumanskiĭ. *Colloid J.* (U. S. S. R.) **5**, 585–604 (1939).—The difference between sols and solns. of high-mol. substances is pointed out. Some methods of detg. the degree of dispersity, the shape, and the solvation of high-mol. substances are discussed; neither the viscosity nor the osmotic pressure gives the correct value for solvation. J. J. B

The density, thermal expansion, vapor pressure and refractive index of styrene, and the density and thermal expansion of polystyrene. Winton Patnode and W. J. Scheiber. *J. Am. Chem. Soc.* **61**, 3449–51 (1939).—The d. *vs.* temp. graphs for resinous polystyrene consist of 2 straight lines that intersect, which indicates that at the temp. corresponding to this point there is apparently a fundamental change in the structure of the polymer. The bilinear thermal expansion of polystyrene, the sharp transition temp., and the closely accompanying sharp "high elasticity temp." all point to the conclusion that polystyrene is a body of fairly definite compn. and structure. The d., thermal expansion, vapor pressure and n of carefully purified styrene are given. A. B. Garrett

Structure and solvation of cellulose nitrate particles. G. V. Lipatova and S. M. Lipatov. *Colloid J.* (U. S. S. R.) **5**, 647–54 (1939).—Cellulose nitrate was sepd. into 4 fractions by a gradual pptn. with H_2O. Fractions showing high viscosity in $PhNO_2$ solns. have a high temp. coeff. of viscosity, while the η of $PhNO_2$ solns. of other fractions is less affected by temp. As the temp. coeff. of solvation ought to be const. for various fractions it follows that the η is not connected with solvation and presumably depends on disaggregation of micelles. The ratio of viscosities of 2 fractions in various solvents ($PhNO_2$, $COMe_2$, and MeOH) is also different. J. J. Bikerman

Swelling of xerogels and powdered disperse substances in the course of sorption of water vapors. M. V. Chapek and P. V. Zhuravel. *Colloid J.* (U. S. S. R.) **5**, 541–53 (1939).—See *C. A.* **33**, 8083[6]. J. J. Bikerman

The nature of solutions of lyophilic colloids. S. M. Lipatov. *Colloid J.* (U. S. S. R.) **5**, 613–38 (1939).—The theory (cf. Staudinger, *C. A.* **32**, 3236[6]; Deryagin and Kusakov, *C. A.* **32**, 3235[2]) ascribing to lyophilic colloids a high degree of solvation disagrees with the fact that the activation energy of swelling is neg. whereas the energy of solvation is pos.; the swelling is not due to, and is no proof of, solvation. The lyophilic sols are not solns. of macromols.; they show the change typical for colloids from sol to sol possessing a structure, to gel, and then a syneresis. In contrast to mols. the particles of a lyophilic sol can adsorb mols. from solns.; thus large micelles of gelatin adsorb and are peptized by highly dispersed gelatin; the viscosity of mixed gelatin solns. is not additive (contrary to Staudinger's rule). A substance forms lyophilic sols if a part of its surface has a higher, and the rest a lower, affinity for solvent than for the substance itself; therefore the dispersity of a substance in its sols depends on the solvent. J. J. Bikerman

Stabilization of suspensions by fractions of gelatin and agar. P. M. Lapin and S. M. Lipatov. *Colloid J.* (U. S. S. R.) **5**, 683–90 (1939); cf. preceding abstr.—Less sol. fractions of gelatin and agar-agar stabilize ZnO suspensions better and are adsorbed by ZnO powder to a greater extent than more sol. fractions. The stabilizing effect of gelatin increases in the course of its aging or after a heating at 100°. Aging of agar has no effect. The heat of adsorption of gelatin by ZnO is greater for less sol. or for preheated gelatin than for untreated gelatin. These results agree with L.'s conception of a competition between the affinities of colloid particles for solvent and for adsorbent; when the first affinity is small the adsorption is favored. J. J. Bikerman

Composition of the colloids of the diffusion sap of beetroot. E. F. Simonova. *Colloid J.* (U. S. S. R.) **5**, 723–31 (1939); cf. Kharin, *et al.*, *C. A.* **33**, 9698[8].—The ppt. obtained at mixing diffusion sap with EtOH contains 24% of pectic substances (detd. as furfuraldehyde), 24% of proteins (from a detn. of N), and 25% of ash; the rest are org. acids, phytosterin, lecithin, saponin(?), etc. A part of the ash constituents is bound to the pectic substances and therefore belongs to colloids, and a part is bound to org. acids and is truly dissolved in the sap. The ash content is unaffected by the pH of the sap and by the ratio EtOH: sap. J. J. Bikerman

Structure and physicochemical properties of surface layers of highly polymerized compounds. II. Surface properties of agar and starch gels. V. A. Pchelin. *Colloid J.* (U. S. S. R.) **5**, 717–22 (1939); cf. *C. A.* **33**, 7645[8].—Drops of H_2O in air or C_6H_6 and of C_6H_6 in H_2O were placed on the surface of dry or swollen gels of agar and starch. The contact angles are slightly affected when water and benzene exchange their position and almost unaffected when the gels are kept in benzene for several days. An explanation based on the mol. structure of starch is advanced. J. J. Bikerman

Electrovoluminal effects in gels and sols of agar. M. S. Shul'man and A. M. Karel'shtadt. *Colloid J.* (U. S. S. R.) **5**, 741–8 (1939).—The viscosity of 0.5% soln. of agar is lowered by $BaCl_2$ more than by KCl; the effect is stronger in dialyzed than in electrodialyzed solns. It is concluded that electroviscous effect takes place and that the ions of the double layer are removed by electrodialysis. The swelling of agar is also inhibited by $BaCl_2$ more than by KCl. Similar results were obtained with agar fractions prepd. by extn. of an agar gel with water of various temps. J. J. Bikerman

Effect of sugars, alcohols, anions of organic acids, and of pH on the rigidity of agar gels. P. S. Zhelezkov. *Colloid J.* (U. S. S. R.) **5**, 733–40 (1939); cf. *C. A.* **33**, 6121[6].—The rigidity of 0.75% agar gels increases on addn. of p% of EtOH, glycerol, glucose or sucrose by $2p$%, $1.3p$%, $1.1p$% and $0.9p$%, resp. These substances also lower the reduction of the rigidity produced by heating agar to 75°. Acids increase the rigidity in the order Na citrate > Na tartrate > Na malate > Na acetate. In presence of citric acid the highest rigidity is observed at pH = 3.6; in these expts. the acid must be added immediately before gelation. J. J. Bikerman

Dielectric constant of the fractions of lyophilic colloids. I. Dielectric constant of the fractions of gelatin. S. M. Lipatov and M. S. Shul'man. *Colloid J.* (U. S. S. R.) **5**, 555–66 (1939).—The dielec. const. of "highly assocd." and of "thermolyzed" gelatin is the same and reaches in 3% gelatin soln. the value of 89 at 21–22°. Aging lowers the dielec. const. of the "assocd." but does not affect that of the "thermolyzed" gelatin. J. J. Bikerman

Effect of salts on the surface tensions of gelatin solutions. J. W. Belton. *Trans. Faraday Soc.* **35**, 1312–16 (1939).—The bubble-pressure method was used to det. the surface tensions at 25° of aq. solns. of gelatin to which NaCl, KCl, LiCl, KI or $BaCl_2$ was added at varying concns. of 1, 2, 3 or 4 *N*. A plot of surface tension *vs.* salt concn. shows a max. for NaCl, is almost horizontal for KCl, and increases almost linearly for both LiCl and KI. The surface tension of the stock soln. of gelatin remained const. over a period of several days and then began to fall gradually. These surface tensions were less than that of water, indicating pos. adsorption of gelatin at the surface. Victor R. Deitz

Determination of the coefficient of diffusion of electrolytes into gels using electrical conductivity. N. F. Ermolenko and S. A. Levina. *Colloid J.* (U. S. S. R.) **5**, 483–

91(1939).—The diffusion vessel used contained in its lower part 5 pairs of electrodes; the lower part was filled with gelatin, and the upper one with a KCl soln. The diffusion was calcd. from the increase of the cond. The coeff. of diffusion D is independent of the concn. of KCl between 0.1 and 1 N; it is 30% less than D in H_2O if the gel contains 5% of gelatin; in 20% gelatin it is 0.5 of the D in H_2O. J. J. Bikerman

Effect of hydrolysis of gelatin on periodic reactions. S. S. Kharamonenko. *Colloid J.* (U. S. S. R.) **5**, 755–9 (1939).—Periodical pptn. of $Ag_2Cr_2O_7$ (from $AgNO_3$ and $K_2Cr_2O_7$) was observed in gelatin boiled for 1, 2, 3, etc., hrs. The const. of periodicity and the size of $Ag_2Cr_2O_7$ crystals increase with the time of boiling. J. J. B.

Methods of obtaining periodic structures and determining periodicity constants. F. M. Shemyakin and P. F. Mikhalev. *Colloid J.* (U. S. S. R.) **5**, 655–8(1939).—Criticism of the technique used by Nikiforov and Runtso (*C. A.* **32**, 6928⁸). J. J. Bikerman

Anomalous dispersion as a method of studying colloidal solutions. A. V. Dumanskiĭ and M. S. Barvinok. *Colloid J.* (U. S. S. R.) **5**, 639–45(1939).—From published data on the abnormal dispersion of the dielec. const. of protein solns. the radii of protein mols. are calcd. by use of the dipole theory of Debye. It is found that the particle size of zein increases with rising temp., and that of egg albumin with dilu. J. J. Bikerman

Physical chemistry of the heat denaturation of proteins. I Interaction of denaturated and of native egg albumin with hydrogen and hydroxyl ions. A. P. Salchinkin. *Colloid J.* (U. S. S. R.) **5**, 467–73(1939).—The effect of albumin on the potential of a H electrode in HCl (0.008–0.1 N) and in dil. NaOH was observed. One g. of native albumin binds 0.0013, and 1 g. of albumin coagulated at 60° binds 0.0017 g. of H ions This difference indicates a chem. change in the course of denaturation.
J. J. Bikerman

Solubility of gases. I. The inert gases in water. D. D. Eley. *Trans. Faraday Soc.* **35**, 1281–93(1939).—To dissolve a gas mol. a cavity has first to be made in the solvent; second, the gas mol. is placed in this cavity liberating energy. This simple picture is found to hold for He, Ne, A, Kr and Xe dissolved in water. The neg. temp. coeff involved and its rapid increase to zero as the temp. is raised to 80° is explained mainly by the energy and entropy assocd. with the formation of the hole. These factors are calcd. thermodynamically and found to be zero at 0°, but increase strongly with increase in temp. The main factors for the inert gases are the loss of translational movement and entropy assocd. with cavity formation. Pos. temp. coeff. observed for some gases, N_2 and H_2, in water above 100° is explained by the large energy required to form a cavity at these temps., which outweighs the solute-solvent attraction. Victor R. Deitz

Solubility of barium iodate monohydrate in solutions of uni univalent electrolytes at 25°, and the calculation of the dissociation constant of iodic acid from solubility data. Solomon Naidich and John E. Ricci. *J. Am. Chem. Soc.* **61**, 3268–73(1939).—The solubilities were detd. in aq. solns. of KCl, HCl, KNO_3 and HNO_3. The data are used to calc. the ionization const. of iodic acid on the assumption of a const. mean activity coeff. for $Ba(IO_3)_2$ in either the acid or the K salt soln. of the same anion at the same total ionic strength. Corrections for the effect of undissocd. $BaIO_3^+$ were found to be negligible. The value of the thermodynamic const. K_a for iodic acid is found to be 0.163, in agreement with the best value (0.1686) derived from cond. data. A. B. Garrett

Solubilities of salts in dioxane-water solvents. T. W. Davis, J. E. Ricci and C. G. Souter. *J. Am. Chem. Soc.* **61**, 3274–84(1939).—The solubilities of Ag acetate, Ag sulfate and Ba iodate were detd. at 25° in a series of dioxane-water solns. extending from 0 to 100% dioxane. The solvent effect of KNO_3, $Ba(NO_3)_2$, $MgCl_2$ and $KBrO_3$ solns. on $Ba(IO_3)_2$ in water was detd. The solvent effects of KNO_3, $NaNO_3$, and $KClO_3$ on Ag acetate in 10% dioxane solns. and of $KClO_3$ on Ag acetate in 20% dioxane solns. were detd. The corresponding Debye-Hückel parameters are calcd. The Born equation fails to account for the course of the solubilities as the percentage of dioxane increases, predicting in each case lower solubilities than those observed. Modifications of the Born equation to agree with these observations are discussed.
A. B. Garrett

Solubilities of sodium and potassium salts of nitrophenols and related acids. O. C. Dermer and V. H. Dermer. *J. Am. Chem. Soc.* **61**, 3302–3(1939).—These soly. data, at 30°, were detd. in a search for a better precipitant for K. The data indicate that the most sensitive reagents of this group for K are dipicrylamine and dilituric acid. A. B. Garrett

The critical solution temperatures in aniline of the aromatic hydrocarbons and of paraffins of normal structures. M. D. Tilicheev. *Khim. Tverdogo Topliva* **9**, No. 2, 181–6 (1938); *Khim. Referat. Zhur.* **2**, No. 4, 47(1939).—The crit. soln. temp. in aniline of the high-mol. monoalkylbenzenes fits into one curve and permits interpolating the crit. temp. for the intermediate homologs of benzene. The crit. temp. for the dialkylbenzenes (diamyl- and diheptyl-benzene) are higher than for the monoalkylbenzenes of the same mol. wt. The normal-structure homologs of benzene have a slightly lower crit. temp. than the secondary alkylbenzenes. The critical temps. of the monoalkylnaphthalenes (heptylnaphthalene) are about 25° lower than those of the monoalkylbenzenes with the same no. of C atoms. For the normal-structure paraffin hydrocarbons from C_5H_{12} to $C_{32}H_{66}$ a regular increase in the crit. temp. of soln. in aniline is observed. These crit. soln. temps. fit into one curve, which permits a graphic interpolation of the points for the intermediate members of the series. The exptl. part of the article describes the synthesis and gives the consts. for diamyl- and diheptyl-benzene as well as for heptylnaphthalene. W. R. Henn

The solubility of a solid substance in a binary mixed solvent. I. E. I. Akhumov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1207–19(1939).—A theoretical discussion of the ternary system S–L_1–L_2 and the deduction of the formula $Y = Y_1(1 - X)^{n_1} + Y_2X^{n_2}$ for the isothermic soly. of a solid substance S (under ordinary conditions) in a binary mixed solvent $L_1 + L_2$ in which Y_1 and Y_2 are the sep. solubilities of S in the binary systems S–L_1 and S–L_2, X is the no. of mols. of L_2 in the binary solvent. The exponents n_1 and n_2 det. the processes of solvation between the components of the mixed solvent L_1 and L_2 in the presence of the 3rd component S in the soln. With an increase of the temp. n_1 and n_2 decrease. The conditions for the mutual solvation of the components of the mixed solvent is more favorable in the regions of the pure solvents. An equation $K = [(Y_1 - Y)/Y_1 X] - 1$ is deduced which can be utilized for the calcn. of the no. of mols. of water that hydrate the alc. in water-alc. solns. If there are common ions between the S and L_1 or S and L_2, the partial soly. of the solid in the mixt. ($L_1 + L_2$) is expressed by $Y_1 = Y' + Y''$, where Y' is the decrease of the soly. caused by the mutual solvation of L' and L_2, and Y'' by ionic equil. Seven refereuces are given. **II.** *Ibid.* 1220–36(1939).—Examples illustrate the above deductions. The systems investigated were $C_{12}H_{22}O_{11}$–C_2H_5OH–H_2O, KCl–C_2H_5OH–H_2O, NaCl–C_2H_5OH–H_2O, Na_2SO_4–C_2H_5OH–H_2O, KCl–NH_3–H_2O, Na_2CO_3–NH_3–H_2O and $NaNO_3$–NH_3–H_2O. The equations given agree with the exptl. material on the soly. in ternary systems, and good agreement was found between $Y_{calc.}$ and Y_{exptl} The relation between the soly. of a solid substance in a binary solvent is true to the first approximation for n = const., and is exact for $n \neq$ const. The conceptions of partial soly. in a binary solvent are very important from a theoretical point of view. However, the question of the exptl. detn. of Y_1 and Y_2 when $Y_1 = 0$ and $Y_2 = 0$ is still not clear. Eight tables, 13 diagrams and 12 references. W. R. Henn

The solubility of high-molecular substances. VII. The thermodynamics of high-molecular solutions. G. V. Schulz. *Z. Elektrochem.* **45**, 652–8(1939); cf. *C. A.* **33**, 5265⁶.—At low concns. (c less than 0.1%) the solns. of high-mol. substances (mol. wt. from 50,000 to 443,000)

in acetone or toluene act as ideal dil. solns. With increasing concns. deviation from ideality results from the energy exchange between the 2 components of the soln. In the concn. range where osmotic measurements can be made the solns. are "regular." At higher concns. (about 1 1) the entropy term, $T\Delta S_i$, becomes negligible compared with the partial heat term. At still higher concns. the systems lose the properties of solns. and assumed those of compds. between the 2 components. L. E. Steiner

Capillary properties of α-amino acids. J. W. Belton. *Trans. Faraday Soc.* **35**, 1293 8(1939).—Surface tension of aq. solns. of glycine, alanine, α-aminobutyric acid and valine was detd. at 25°; also for these solns. with addn. of NaCl in varying amts. (1 to 4.4 moles per 1000 g. of water). The max. bubble pressure method was used (cf. *C. A.* **30**, 669[9]). The slope of the surface tension-concn curve varies with the length of the hydrocarbon chain, which situation becomes more marked in the presence of the NaCl. It is shown that with alanine the presence of salt changes the sign of the acid adsorption in the surface from neg. to pos. Victor R. Deitz

Change in the drop of potential at the air/solution interface as related to the age of the latter. A. I. Pankratov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 149 51(1939)(in English).—A study of the time variation of the potential drop at the interface air/soln., with a view to detg. the causes of the phenomenon, with application of the method of Guyot-Franklin, led to the following conclusions: In the absence of an accumulation of surface-active materials at the soln surface no change in the potential drop is noted. Otherwise the potential drop changes to more pos. values, the active surface materials penetrating to the surface mainly from the soln. and partly as a result of dust settling from the air. The effect of both factors produced, in 135 min., a change of 210 mv. in the potential drop of a *N* KBr soln. The effect of the 2nd factor alone produced a change of 35 mv. For a 0.01 *N* KCl soln. the change was 20 mv. The greater value for KBr is due to the more effective spreading of monolayers over the surface. 5 references. A. H. Krappe

The viscosities of solutions of sulfur dioxide in organic liquids. S. B. Cupp and H. E. Rogers. *J. Am. Chem Soc.* **61**, 3353-4(1939).—The viscosities and ds. of many solns. of SO_2 in Pr bromide, iso-Pr bromide, and Bu bromide were measured at 25°. An expansion in vol., on mixing, was found in each case. The results support the fact that when liquids show an expansion on mixing, the fluidity of the soln. is greater than the fluidity calcd. from the fluidities of the pure liquids. A. B. Garrett

The diffusion of hydrogen through iron at room temperature. J. H. de Boer and J. D. Fast. *Rec. trav. chim.* **58**, 984 93(1939)(in German).—Diffusion of H from buffer solns. will take place through Fe only when the pH of the buffer is less than 7 and the Fe is attacked with evolution of H gas The conclusion is that only H atoms diffuse and not H ions. It was also found that H atoms formed in H gas by an incandescent coil diffuse through Fe, whereas the mols. do not. This diffusion takes place against an atm. of H at any pressure. John E. Vance

A study of the diffusion processes by electrolysis with microelectrodes. H. A. Laitinen and I. M. Kolthoff. *J. Am. Chem. Soc.* **61**, 3344 9(1939); cf. *C. A.* **34**, 3085 —Current-time curves with various shapes of electrodes and diffusion fields in the electro-oxidation of ferrocyanide ions were detd. and the conditions under which theoretical diffusion conditions can be obtained are discussed. The temp. coeff. of the quantity $i\sqrt{t}$ was found to agree with the calcd. value and was const. to ±0.5% over a period of 20 min. when diffusion was linear and in such a direction as to produce a d. gradient in the downward direction. A. B. Garrett

Calculation of the properties of mixed solutions. A. B. Zdanovskiĭ. *Byull. Inst. Halurgii* **1938**, No. 4, 1-21; *Khim. Referat. Zhur.* **2**, No. 4, 30(1939).—A method of calcn. is proposed which is based on the additive properties of salt solns. obtained by mixing the isotonic soln. of the individual salts. It is necessary to know the p or the $\Delta p/p$ curves of the soln. contg. one salt. The necessary concns. x_1, x_2, x_3, x_4 of the isotonic soln. are found which satisfy the equation $(a_1/x_1) + (a_2/x_2) + (a_3/x_3) + (a_4/x_4) = 1$ where a_1, a_2, a_3 and a_4 are the concns. of the salts in the mixed soln. Formulas are given for the calcn. of the vapor pressure, sp. gr., coeff. of expansion, heat capacity, b. p., f. p. and η. The method of graphic calcn. is described. This method can be used for solving many theoretical as well as production problems and for the detn. of the accuracy of the exptl. data. The method was used for the detn. of the satn. point of the system Na_2SO_4 $Na_2SO_4.10H_2O$ astrakanite. W. R. Herzn

Application of the cage theory of liquids to the problem of ionic mobilities. J. J. Hermans. *Rec. trav. chim.* **58**, 917 27(1939)(in English); cf. Polissar, *C. A.* **33**, 1198[4].—The size of the cage is smaller for ions than for the solvent mols. because of the hydration layer. This size is such that classical and quantum mechanics are equally unsatisfactory. An expression independent of the cage size is therefore proposed for the frequency of oscillation of the ion in the cage. This expression is justified by the close agreement between calcd. and observed values of the temp. coeff. of ionic mobilities. The high mobility of the H ion is explained by its small size compared with the dimensions of the smallest possible cage. It is estd. that the potential barrier at the cage walls is such that any tunneling is negligible. John E. Vance

Transference numbers of ions in the system aluminum chloride-sodium chloride. Yu. V. Baĭmakov and V. I. Shelomov. *Trans. Leningrad Ind. Inst.* **1938**, No. 1, Sect. Met. No. 1, 36-48(in English, 49).—A review of the physicochem. properties of the system $AlCl_3$ NaCl is followed by a description of expts. on the detn. of the transference nos. in the system. For the range of 53–57 mol. % $AlCl_3$ and 47–43 mol. % NaCl the current is carried by the Na ions. During the transfer of current by the Na ions there is also some solvation of NaCl which is carried off to the cathode. Both Al and Cl are in a complex and, because of the small mobility, they do not act as carriers. B. Z. Kamich

An experiment for the determination of transference numbers by electromotive-force methods. Charles M Mason and Edward F. Mellon. *J. Chem. Education* **16**, 512-13(1939).—Two Ostwald H electrode assemblies and 2 Ag-AgCl electrodes are used to det. transference nos. with an error of about 0.48%. Wm. E. Trout, Jr.

Dependence of conductance on field strength. Darwin J. Mead and Raymond M. Fuoss. *J. Am. Chem. Soc.* **61**, 3589-90(1939); cf. *C. A.* **33**, 8087[4].—A correction is reported that brings the exptl. result in exact agreement with the theoretical value for the cond. of tetrabutylammonium picrate in Ph_2O at 50°. C. J. West

Properties of electrolytic solutions. XXI. The conductance of tributylammonium picrate in ethylene chloride at 25°. Darwin J. Mead with Raymond M. Fuoss and Charles A. Kraus. *J. Am. Chem. Soc.* **61**, 3257-9(1939), cf. *C. A.* **31**, 8320[6].—The concn. range covered was 1.8×10^{-4} *N* to 0.5 *N*. The equil. const. for the formation of triple ions is 0.045. The dissocn. const. of $NHBu_3$ picrate is 2.10×10^{-3} which gives a value of a (effective ion size) of 2.4 A. A. B. Garrett

Hydrolysis of stannous ion in stannous perchlorate solutions. Mel. Gorman. *J. Am. Chem. Soc.* **61**, 3342-4 (1939).—The extent of hydrolysis was detd. by the potentiometric measurements of the mean ion activity of total free $HClO_4$ with the aid of a H electrode and a normal calomel electrode. The data indicate that the hydrolysis follows the equation $Sn^{++} + H_2O = Sn(OH)^+ + H^+$. The value of the equil. const. for this reaction at 25° is 0.02. A. B. Garrett

The effect of certain salts on the lowest temperature at which a reaction between methane and oxygen is observed. W. P. Jorissen and H. O. Lebbink. *Rec. trav. chim.* **58**, 959-63(1939)(in English).—Explosive and nonexplosive mixts. of mine gas (70.0% methane) and O were passed through a heated tube coated with various salts. Formation of CO_2 was taken as an indication of reaction. The lowest temp. at which a reaction occurred

was 170° with a coating of LiF and the highest temp. was 540° with KI, while the uncoated tube gave a reaction at 250°. The temp. of observable reaction rose in the order Li, Na, K, Rb and similarly in the order F, Cl, Br, I.
John E. Vance

Change in the rate of solution of copper during anodic and cathodic polarizations—difference effect—protective effect. N. D. Tomashov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 152–5(1939)(in English).—A study of the kinetics of the soln. of Cu in 1 *N* and 0.1 *N* solns. of $NH_4S_2O_8$ and in 0.8 *N* soln. of $CuCl_2$ at room temp. of 18 20° by means of a gravimetric method led to the following conclusions: The rate of soln. increases with an increase in anodic polarization and decreases with an increase in cathodic polarization. The rate of soln. of Cu changes with the character of the current charge imposed. For Cu in solns. of 1 *N* and 0.1 *N* $NH_4S_2O_8$ the rate of soln. is decreased when anodic polarization and when cathodic polarization are imposed. For Cu in 0.8 *N* soln. of $CuCl_2$ the rate of soln. increases with anodic polarization and with cathodic polarization. The potential change of the Cu electrode as a result of cathodic polarization is much greater than during anodic polarization. 5 references. A. H. K.

Velocity of solution of sodium chloride and potassium chloride crystals at different temperatures. A. B. Zdanovskiĭ *Bull. Inst. Hidurgii* **1938**, No. 6, 22–31; *Khim. Referat. Zhur.* **2**, No. 4, 30(1939).—The velocity of soln. of NaCl and KCl at different temps. was studied. A method was developed for a running solvent with a freely suspended state of the crystals. The method increased the accuracy of the detns. 5–10 times. The calcn. of the velocity const. was made from the formula of Noyes which was modified to the following form $K = A(\sqrt[3]{M_0} - \sqrt[3]{M})/t(C_s - C)$ after the changes of the size of the crystal surfaces during soln. were taken into consideration. In this equation M_0 and M are the wts. of the crystals at the beginning and at the end of the expt., C is the vol. concn. of the satn. soln., C_s the concn. at the moment T, $A = d/2$ and d is the d. of the crystals. The values obtained were several times greater than those given in the literature. The temp. dependence of the velocity consts. is expressed by curves that are slightly curved toward the temp. axis. Calcns. were made from the formulas $K = A\sqrt{T}e^{-Q/RT}$, $K = Ae^{-Q/RT}$ and $K(C - C_s) = 173.7$ $(C = 211.5/T$ was obtained from the exptl. $K_{275°K.}$ and $K_{360°K.})$. The smallest deviation (10%) from the exptl. values was found at $K_{325°K.}$ by using the formula $K(C - C_s)_0 = 175.7$.
W. R. Henn

The hydrolysis of bromine. The hydration of the halogens. The mechanism of certain halogen reactions. Herman A. Liebhafsky. *J. Am. Chem. Soc.* **61**, 3513–19 (1939). Corrections are made in earlier work (cf. *C. A.* **28**, 5318[2]) on the hydrolysis of Br. These corrections strengthen the case for the hypothesis that the anomalous temp. coeffs. assocd. with aq. halogen solns. result from shifts in the hydration equilibria. The heats of hydration for the halogens are calcd. from these equilibria data and are found to compare favorably with those calcd. from kinetic data which involve the specific rates at which H_2O_2 is oxidized by each of the 3 halogens. This problem is also approached by data on the reaction of H_3AsO_3 with I_2 and by spectrophotometric measurements of solns. of I_2 in CCl_4 (in which there are no definite hydrates) and solns. of I in water. The latter differ from the CCl_4-I_2 solns. in 3 spectrophotometrically measurable ways which are suggested to be due to the formation of definite I-solvent compds.
A. B. Garrett

Hydrolysis of benzoic and related esters in varying media. R. A. Harman. *Trans. Faraday Soc.* **35**, 1336–43 (1939).—The alk. (NaOH) hydrolysis of esters of the types $XC_6H_4CH_2COOEt$ and $XC_6H_4CH{=}CHCOOEt$ was studied from −20° to 40°; X was H, *p*-NO_2 or *p*-NH_2. The reactions were followed by adding excess acid to a measured sample and back-titrating with cresol red as indicator. The consts. of the Arrhenius equation, $k = PZe^{-E/RT}$, were detd. The solvent effects on benzoic and on *m*-nitrobenzoic ester hydrolysis were also studied in acetone-water mixts. As the solvent compn. was altered, the correlation of log PZ with E, previously reported by Timm (cf. *C. A.* **32**, 7331[6]), was found. The effect on E produced by the substituent varied with solvent compn.
Victor R. Deitz

Kinetic studies on iodine derivatives. I. The thermal decomposition of acetyl iodide. J. Leslie Jones. *J. Am. Chem. Soc.* **61**, 3284–8(1939).—The main products of the reaction, in the temp. range 290–340° were identified as CO, CH_4, I_2 and polymerized ketene. The decompn. is unimol. with respect to Ac iodide and the rate consts. depend upon the initial pressure of iodide. The data indicate a chain mechanism which is broken by the walls of the vessel. The value of the activation energy, E, is 43,100 cals./mole. The data indicate that the radical CH_3COI may be an intermediate rather than the radical CH_3CO.
A. B. Garrett

The critical increment of ionic reactions. IV. The influence of dielectric constant and ionic strength. Louis Rampino and W. J. Svirbely. *J. Am. Chem. Soc.* **61**, 3534–7(1939); cf. *C. A.* **32**, 6932[8].—The rate of conversion of NH_4 cyanate to urea was studied over the temp. range 30 to 60° in isodielec. mixts. of iso-PrOH with water over the dielec. range of 63.5 to 20. The effect of ionic strength on the observed crit. increments at zero ionic strength agrees well with equations previously derived (cf. *C. A.* **32**, 6932[8]). The crit. increment is apparently independent of the dielec. const. in isodielec. mixts. over the major portion of the range investigated. The value of the collision factor Z in the Arrhenius theory varies with dielec. const. The collision theory is in satisfactory agreement with the thermodynamic treatment at the higher dielectrics used. **V. The influence of dielectric constant and ionic strength.** W. J. Svirbely and James Lander. *Ibid.* 3538–42.—The rate of conversion of NH_4 cyanate to urea was studied over the temp. range 30 to 60° in isodielec. mixts. of dioxane with water over a dielec. range 63.5 to 5. The effect of ionic strength upon the observed crit. increments at zero ionic strength agrees well with the theory. The effect of the dielec. const. on the rate consts. is in reasonably good agreement with the Scatchard-Christiansen theory (cf. *C. A.* **24**, 2365) at the higher dielec. consts.
A. B. Garrett

Decomposition of acetaldehyde and deuterioacetaldehyde. R. E. Smith. *Trans. Faraday Soc.* **35**, 1328–36 (1939).—The reactions of acetaldehyde and the completely substituted deuterioacetaldehyde (99.5%) were compared. The gas was caused to react in a silica bulb of about 200 cc. contained in an elec. furnace between 500 and 570°; the reactions were followed manometrically. The pressures ranged from 25 mm. to 450 mm. In all cases the light and heavy compds. gave similar results; the pressure increased to a max. of 97% over the initial pressure. The effects of the addn. of (1) ethylene, (2) ethane or (3) CO_2 were studied. (1) and (2) had no effect within the error of the expts.; (3) gave a slight increase in the velocity of the decompn. The effects of the products on the reaction velocity were small. Activation energies for both aldehydes are given.
Victor R. Deitz

Kinetics of polyesterification: A study of the effects of molecular weight and viscosity on reaction rate. Paul J. Flory. *J. Am. Chem. Soc.* **61**, 3334–40(1939).—The kinetics of 2 polyesterifications, diethylene glycol-adipic acid and decamethylene glycol-adipic acid, are compared with several nonpolymer-forming esterifications, diethylene glycol-caproic acid, lauryl alc.-adipic acid, and lauryl alc.-lauric acid. Preliminary exptl. data on the reaction of diethylene glycol with adipic acid catalyzed by *p*-toluenesulfonic acid are presented. In the absence of a catalyst the course of the reaction corresponds to a continuous increase in kinetic order, becoming approx. 3rd order at large extents of reaction. The fact that polyesterification and esterification follow similar courses indicates that the reaction rate is not affected by either increase in mol. wt. or the concurrent increase in viscosity. This conclusion agrees with theory (*C. A.* **30**, 7941[8]).
A. B. Garrett

Rates of the thermal reduction of dichromic acid by quinine, hydroquinine and cinchonine in dilute sulfuric

acid at 0° to 60°. Lawrence J. Heidt. *J. Am. Chem. Soc.* **61**, 3455-8(1939).—The thermal rates of oxidation of quinine, hydroquinine and cinchonine by dichromic acid in 1.55 *M* H_2SO_4 are the same within 5%. The reactions are autocatalytic. The initial rates are given by the equations: $-\Delta(K_2Cr_2O_7)/\Delta t = k(K_2Cr_2O_7)$ (alkaloid)$^{1/2}$ and $\log_{10}k = 4.05 - 2000/T$. Light absorbed by the alkaloids initiates a different reaction which is affected very little by thermal energy. A. B. Garrett 1

Catalyzed polymerization of butadiene at a liquid-gas interface. G. Gee, C. B. Davies and H. W. Melville. *Trans. Faraday Soc.* **35**, 1298-1312(1939).- An app. was devised in which a const. pressure of butadiene up to several atms. could be maintained above a water surface, the surface tension of which (detd. at intervals by the ring method) served to follow the course of the polymerization. The reaction rate was detd. as a function of the concn. and stability of the H_2O_2 catalyst, the pressure of the butadiene and the temp. (50° to 80°). The stability of the H_2O_2 soln. was varied by adjusting the concn. of the added H_2SO_4 from 0 to 10^{-2} *N*, the percentage of H_2O_2 decompd. in 18 hrs. dropping from 100 to 21.9. Hence the lifetime of the active polymer is shorter than that of the time of the reaction. From a study of the kinetics it is shown that the mechanism of the reaction consists in the reaction of a mol. of H_2O_2 with 1 monomeric mol. This complex polymerizes and is terminated by some deactivating collision of the monomer of a kind different from that for its propagation. Victor R. Deitz 2 3 4

Study of the isomerization of butanes and their equilibrium ratios. B. L. Moldavskiĭ and T. V. Nizovkina. *Compt. rend. acad. sci. U. R. S. S.* **23**, 919-20(1939)(in English).—The catalytic isomerization of butane to isobutane and *vice versa* by $AlCl_3$ was studied and the equil. compn. of the mixt. butane-isobutane was detd. in the temp. range 70 to 180°. The expts. were made at 70° in the liquid phase (by shaking the butanes with $AlCl_3$ + $CuSO_4.2HCl$ in a sealed ampoule in a water thermostat) and at 110-180° in the vapor phase (by passing the butane vapors together with HCl over $AlCl_3$). The amts. of isobutane in the equil. mixts. were found at 70°, 110°, 130°, 150° and 180° to be 79%, 72%, 67%, 63% and 58%, resp., the results obtained at 70° (liquid phase) being calcd. for the vapor phase according to Raoult's law. The relation between the equil. const. K_p and the temp. is expressed by the equation: $\log K_p = 611/T - 1.204$. The data of previous investigators on butane isomerization are discussed. Dora Stern 5 6

The equilibrium and kinetics of the thermal isomerization of dichloroethylene catalyzed by iodine. Reuben E. Wood and Roscoe G. Dickinson. *J. Am. Chem. Soc.* **61**, 3259-63(1939).- Equilibria between the cis and trans isomers of dichloroethylene were established and measured in the pure liquids and in their solns. of benzene, cyclohexane and decahydronaphthalene with I as a catalyst. A method of analysis based on dielec. const. measurement was employed to det. the extent of isomerization. Neither the activation energies nor the actual rates vary much from one medium to another. The activation energy is in the order of 30,000 cals. The kinetics are compatible with an I-atom catalysis. Evidence against an ionic catalysis is presented. A. B. Garrett 7 8

Catalytic oxidation of ammonia at low pressures on platinum and on alloys of platinum with rhodium and ruthenium. Walther Krauss and Hans Schuleit. *Z. physik. Chem.* **B45**, 1-18(1939); cf. *C. A.* **32**, 4865[4].—Mixts. of NH_3 and O_2 (1:1) were passed over the catalysts at 1250° at a rate of 1.545 micromol. per hr. and a pressure of 0.03 mm. The catalysts were Pt contg. 1, 5 or 10% Rh (I) and Pt contg. 1% Rh and 2% Ru (II) and pure Pt (III). The reaction $NH_2OH + O_2 = HNO_3 + H_2O$ takes place on the catalysts. The source of N_2 is the reaction $HNO_2 + NH_3 = N_2 + 2H_2O$. For II and III an induction period was found, during which the yield of NH_2OH and HNO_3 depends on the time of contact with the catalyst. The direction of the curve is opposite for the 2 catalysts. No induction period was detected for I. G. M. Murphy 9

The catalytic interaction of acetylene and hydrogen on platinum. A. Farkas and L. Farkas. *J. Am. Chem. Soc.* **61**, 3396-3401(1939); cf. *C. A.* **33**, 6128[3].—The catalytic hydrogenation of C_2H_2 was investigated at pressures of 70-150 mm. in the temp. range of 20-140° on a Pt catalyst. The rate of hydrogenation increases with increasing H_2 pressure but is strongly reduced with increased C_2H_2 pressure. The presence of C_2H_2 retards the rate of ortho-para conversion of H_2. The ratio of the rate of hydrogenation by H_2 to that of D_2 is 1.5 at 20°. The hydrogenation of C_2H_2 proceeds in 2 distinct stages: first, all the C_2H_2 is reduced to C_2H_4 then the C_2H_4 is hydrogenated to C_2H_6. The start of this second step is indicated by a sudden increase in the rate of hydrogenation. The results indicate that C_2H_2 is strongly adsorbed on the surface of the catalyst and that C_2H_2 can displace both H_2 and C_2H_4 in the adsorption layer. The mechanisms of hydrogenation and exchange reactions are discussed. A. B. Garrett

The change in heat of activation of the mixed phase, Au-Cu, at the transition order ⇌ disorder. Armin Schneider. *Z. Elektrochem.* **45**, 727-31(1939).—The change in the heat of activation of the decompn. of HCOOH vapor by a Au-Cu alloy, contg. 50 at. % of Au as catalyst was used to study the different states of the alloy. When the quenched solid soln. alloy was annealed at temps. between 200 and 500° it passed through 2 metastable characteristic intermediate states, one at 250-300° during transition to the ordered state at 350°, and the other at 385-415° on passing to the unordered lattice at the higher temps. These intermediate states showed about 8 and 5 kg.-cal. higher activation energies, resp., than did the stable ordered or unordered states. L. E. Steiner

The freezing point of rhodium. C. R. Barber and F. H. Schofield. *Proc. Roy. Soc.* (London) **A173**, 117-25(1939). - The f. p. of Rh, 1966 ± 3°, was detd. in a vacuum by measuring the ratio of brightness for a black body held at the f. ps. of Rh and Au. The method of measurements Natl. Bureau of Standards) is described. A total of 95 melts on 2 ingots was observed. 4 references. J. N. L.

Dilatometric study of the system iron-nitrogen. V. I. Prosvirin and G. I. Alekseeva. *Vestnik Metalloprom.* **11**, No. 1, 72-7(1939).—The investigation was conducted with a Shevenar dilatometer and was limited to Fe specimens contg. 1, 1.3, and 3.06% N. The N was introduced into the specimens by nitriding in a quartz tube. On the basis of the dilatometric curves the changes in the coeff. of expansion were plotted. B. Z. Kamich

The α solubility limit and the first intermediary phase in the copper-silicon system. A. G. H. Andersen. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. **1126**, 17 pp.(1939).—An investigation of the binary Cu-Si system below 7% Si is reported. Both x-ray methods and microscopic technique were employed. *An appendix* to the paper, giving chem. and spectrographic analyses, tables and description of app., can be obtained, from *Am. Doc. Inst., Doc.* 1256 (Microfilm 50¢, photoprint $3.20). C. L. Mantell

The transition-point diagram of the zirconium-titanium system. J. D. Fast. *Rec. trav. chim.* **58**, 973-83(1939)(in English).—Ti and Zr are isomorphous at nearly all temps. in both their hexagonal and body-centered cubic (high temp.) forms. By means of resistance measurements it was found that the solid solns. have a transition-point min. at 545° when the at. ratio is 1:1. The transition temp. of pure Ti was redetd. as 885° ± 10°. The m.-p. diagram of the system also shows a min. at about 1575° with an at. ratio Ti:Zr = 2:1. John E. Vance

Determination of the composition diagram for the liquid-gas system methane nitrogen hydrogen. F. A. Shtekkel and N. M. Tsin. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 24-8(1939).—Data are presented and diagrams given for the systems N_2-H_2, CH_4-H_2 and N_2-H_2-CH_4 at 107.7°K. at 10-100 atm. The results can be used in calcns. for the *fractionation of coke gas.* H. M. Leicester

Equilibria in systems with salting out. R. V. Mertslin. *J. Gen. Chem.* (U. S. S. R.) **9**, 1303-9(1939).—Different variants of diagrams with salting out were studied theoretically with the principle of prevalence used as a basis for

the investigation. They are different cases of the crystn. of ternary systems with one binary sepn. into layers. Neither the inorg. nor the org. salts can be regarded as specific substances responsible for a given phenomenon. Salting out takes place in systems in which the prevalent role belongs to the binary system which is formed by a solid component (the salting-out substance) with one of the components of the salting-out system. Ten diagrams and 4 references are given. W. R. Henn

The reciprocal system $Ba(SH)_2 + 2NaCl = BaCl_2 + 2NaSH$. D. V. Bezuglyĭ and F. M. Kutsakov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 37–40(1939).—NaHS is best prepd. by passing H_2S into NaOH soln. until phenolphthalein gives no color, then evapg. the soln. in a vacuum at 60–80° and allowing it to stand for 2–3 days at room temp. for crystn. The NaHS is very hygroscopic. Its soly. at 20° is 42%. $Ba(SH)_2$ is obtained by salting out from its soln. with NaHS, or, in smaller yield, by pptg. with EtOH. At 20° the equil. system NaHS–NaCl–H_2O contains 35.8% NaHS and 2.06% NaCl; the system NaHS–$Ba(HS)_2$–H_2O contains 40.85% NaHS and 0.15% $Ba(HS)_2$ and the system $Ba(SH)_2$–$BaCl_2$–H_2O contains 22.3% $Ba(SH)_2$ and 14.0% $BaCl_2$. The phase-rule diagram at 20° for the reciprocal system of all the salts is constructed and used to derive conditions for pptg. $BaCl_2$ from the mixt. To get max. pptn. of $BaCl_2$ the initial soln. must contain 35% $Ba(SH)_2$. This concn. can be obtained only by satg. a soln. contg. 17.9% $Ba(SH)_2$ and 11% BaS with H_2S. H_2S can be obtained by treating $NaHCO_3$ with NaSH, and the Na_2CO_3 also formed in this reaction can be used to ppt. $BaCO_3$ from the $BaCl_2$ mother liquors. The process gives 340 kg. $BaCl_2$ and 360 kg. $BaCO_3$ per ton of barytes used. H. M. Leicester

Simplified formulas for calculating the coefficients of heat transfer and Reynolds number. I. A. Gorlovskiĭ. *Trudy Moskovskogo Mashinostroenie* **8**, No. 6, 21–5(1939).—Simplified formulas are derived for calcg. the coeffs. of heat transfer and Reynolds no. for heating of liquids under laminar flow. The application of the formulas is illustrated for 13 compds. including EtOH, MeOH, acetone, H_2O, C_6H_6, and heptane. B. Z. Kamich

Measurement of specific heats of gases at high temperatures. Aurel D. Potop. *Pub. sci. tech. ministère air* (France), No. **148**, 54 pp.(1939); cf. *C. A.* **32**, 1173[8]; **33**, 9111[1].—Means of circumventing the exptl. difficulties in the method of Blackett, *et al.* (*C. A.* **24**, 2369) are described. This method may be extended to studies in the natural convection of air, and to measure the thermal conduction of metals. John W. Knowlton

Temp		0	5	10	15	20	25
MeOH	*d*	30.91		55.43	74.45		
	s	30.06	40.73	55.03	73.37	96.33	125.21
PrOH	*s*	3.41	5.09	7.41	10.38	14.72	20.88; 28.58 (30°)
CCl_4	*d*	33.44	43.44	56.64	71.43	91.38	
	s	33.39	44.03	56.76	72.66	91.31	114.84
$CHCl_3$	*s*	60.17	77.47	99.46	125.75	157.64	172.13 (22°)
C_6H_6	*s*	26.32		45.35	58.23	75.47	94 38
Acetone	*d*	67.28	88.39	115.4			
	s	69.06	89.41	115.02	145.17	181.72	
MeOAc	*s*	63.08	82.40	107.47	137.85	174.56	217.60
PrOAc	*s*	7.16	9.95	13.81	18.68	25.12	32.63
HCOOEt	*s*	72.08	93.64	120.05	154.37	193.82	
Cyclohexanone	*s*	0.74	1.61	2.30	2.92	3.93	5.17
C_2H_5COOEt	*s*	8.39	11.43	15.70	21.21	27.96	36.69
MeCOEt	*s*	24.17	32.11	42.61	55.46	71.52	90.69
Et *o* formate	*s*	0.52	1.00	1.40	2.29	3.36	4.78
$C_2H_3Cl_3$	*s*	2.04	2.65	3.22	4.02	5.03	6.18
$C_2H_4Cl_2$	*s*	20.48	27.94	36.66	46.96	61.18	78.54
$CHBr_3$	*s*	1.99	2.91	3.25	3.93	5.51	6.83
$C_2H_4Br_2$	*d*	2.03		4.59	6.30		
	s	1.99	2.96	4.39	6.06	8.19	

The specific heat of gases at high temperatures. R. W. Fenning and A. C. Whiffin. *Trans. Roy. Soc.* (London) **A238**, 149–212(1939).—The explosion method was employed in the measurements; an app. that is fully described was used. Direct measurement of the heat loss to the vessel walls was avoided. The explosion vessel consists of a hollow steel sphere made up in halves that are clamped together by means of a flanged joint. A manometer is connected to the lower half, and a gunmetal casing surrounds the vessel. The intervening space is supplied with steam. The calibration of the manometer, detn. of mixt. compn. and technique for the addn. of H_2O vapor to certain gas mixts. are described in detail. The investigation covered CO, N_2, CO_2, H_2 and H_2O. Values for the molal heat capacities are represented graphically and by equations. The results are in fairly close agreement with the values deduced from spectroscopic data. **The experimental determination of the compressibility of gases.** *Ibid.* 213–28(supplement).—In the above investigation, compressibility data were required on gas mixts. at medium pressures. The method is fully described. A known vol. is charged with the gas or mixt. This is then expanded to atm. pressure, and the vol. measured. The method is capable of high precision provided there are available sensitive measurements of temp. and pressure. J. W. K.

Thermal measurements on very pure sulfur dioxide. L. Riedel. *Bull. Intern. Inst. Refrig.* **20**, No. 4, Annex No. **5**, B1-10(1939).—The vapor pressure from −60° to 15°, equation of state of the gas, heat of vaporization from −20° to 15°, and sp. heat of the liquid from −40° to 0° were detd. The sp. heat in the vapor state was calcd. The vapor pressure is representable by the relation $\log p(\text{mm. Hg}) = 43.885_{22} - 2378.72/T - 14.11350 \log T + 0.0083319T$. The P-V-T relation of the gas was detd. from 5° to 50°, and the deviation from ideality (B in $V = RT/(p - B)$) was evaluated as $123.5/(T/100)^{2.7}$ cc./g. John W. Knowlton

The specific heat of a monatomic liquid. Wm. J. Archibald. *Phys. Rev.* **56**, 926–32(1939).—The partition function for an atom in a monatomic liquid is evaluated by assuming that the atom is constrained by its nearest neighbors to move in a spherical region, and that the potential energy of the atom at any point within this region can be found if the law of force between the 2 atoms is known. On the basis of this partition function an expression for C_v is derived, and the theory is checked by a comparison of the exptl. and theoretical values of C_v for liquid A. Bernard Lewis

Vapor-pressure measurements from new dynamic and static methods. The applicability of the reaction isochore to the measurement of the latent heat of vaporization. Dan Rădulescu and Maria Alexa. *Bul. Soc. Chim. Romania* **20A**, 89–113(1938)(in German).—The following vapor pressures (in mm. Hg) were measured with dynamic, *d*, and static, *s*, methods.

Additional values for $CHBr_3$ are 0.29, 0.41, 0.55, 0.65, 0.75, 0.90, 1.13, 1.34, 1 44, 1.54, 1.60, 1.73, 1.81 and 1.89 mm., resp., for the temps. −14, −13 .... to −1°. Addnl. values for benzene are 28.42, 32.40 and 36.35 for the temps., 2, 4 and 6°, 50.24 and 55.11 for the temps., 12 and 14°, 68.35, 82.65 and 90.99 for the temps., 18, 22

and 24°, resp. With $CHBr_3$ and $C_2H_4Br_2$ a glycerol manometer was required because these substances react slowly with Hg to give high apparent pressures. L. E. S.

The specific heats of tantalum in the normal and in the superconducting state. W. H. Keesom and M. Désirant. *Proc. Acad. Sci. Amsterdam* **42**, 536-7(1939).—In the absence of a magnetic field, the sample of Ta investigated showed a discontinuity in the sp. heat at 4.075°K. At this temp., the difference in sp. heat between the superconducting state and the normal condition is 0.00881 cal./degree mol. Measurements made in a magnetic field gave much lower values than those calcd. It was observed that the *H-T* curve which indicates the temp. at which the induction penetrates into the metal is different from the curve indicating the temp. at which elec. resistance reappears. It is not evident that the former curve is that which characterizes the difference between the superconducting and the normal condition. John W. Knowlton

The specific heat of some ethylene halides. Wilford E. Railing. *J. Am. Chem. Soc.* **61**, 3349-53(1939).—The heat capacities of 1,2-dibromoethane, 1,2-dichloroethane, and 1,2-bromochloroethane were measured over the range 90-320°K. The heats of fusion and transition were measured also. The questions of restricted intramol. rotation and cis-trans equilibria are discussed with reference to their effect upon the specific heat of these compds. A. B. Garrett

The heats of formation and the states of order in the system gold-copper. Friedrich Weibke and Udo Freiherr Quadt *Z. Elektrochem* 45, 715-27(1939).—The e. m.f. of Au-Cu alloys against a Cu electrode at temps. between 320 and 550° were obtained in evacuated cells with a eutectic mixt. of LiCl-KCl or of LiCl-RbCl, and small amts. of pure CuCl, as electrolyte. At temps. above about 425° the Au and Cu atoms are distributed statistically in the crystal lattice. At lower temps. the existence of the phase, Au_2Cu_3, is established in addn. to the phases, AuCu and $AuCu_3$. From the Gibbs-Helmholtz relation the heats of formation of the solid solns. from the solid metals at 500° are calcd. and are found to have a max. value of 1.25 kg.-cal. per g. atom of alloy at about 55 at. % Cu. The heats of transition from the unordered solid soln. to the ordered phases, AuCu, Au_2Cu_3 and $AuCu_3$ are, resp., 0.38, 0.14 and 0.37 kg.-cal. per g. atom of alloy. L. E. Steiner

The high-temperature calorimetry of alloys. O. Kubaschewski and Alexander Walter. *Z. Elektrochem.* **45**, 732-40(1939); cf. *C. A.* **31**, 8478[9]; **32**, 6600[5]; **34**, 3[9].—The heats of formation, at temps. from 600 to 650°, over wide concn. ranges were obtained for the systems, Ca-Bi, Ca-Sb, Ca-Tl, Ca-Pb, Mg-Sb and Mg-Sn. L. E. S.

Thermal data on organic compounds. XIX. Modern combustion data for some nonvolatile compounds containing carbon, hydrogen and oxygen. J. Wilfred Richardson and Geo. S. Parks. *J. Am. Chem. Soc.* **61**, 3543-6(1939).—The heats of combustion were detd. for the following substances at 25° and const. vol.: β-methylnaphthalene, phthalic anhydride, phthalic acid, anthracene, phenanthrene, stilbene, pyrene, hexadecane, cetyl alc., triphenylbenzene and polyisobutylene. From these data the corresponding heats of combustion and heats of formation at const. pressure are calcd. A. B. Garrett

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

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The propagation surfaces of scalar waves in lattice-like media. E. Fues. *Ann. Physik* **36**, 209-26(1939).—Math. treatment of electron waves. S. L. Gerhard

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Modern quantum mechanics and the benzene problem. IV. G. Elsen. *Chem. Weekblad* **36**, 763-73(1939); cf. *C. A.* **31**, 3375[5].—A review of recent developments. H. S. v. Klooster

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Self-consistent field with exchange for carbon. A. Jucys. *Proc. Roy. Soc.* (London) **A173**, 59-67(1939); cf. *C. A.* **29**, 33[9]; **32**, 4073[7].—Calcns. were made for the normal states of C^{++}, C^{4+} and for the ^3P, ^1D and ^1S states of neutral C. For the latter, energies were also

obtained for the $2s^22p^3$ shell both with and without inclusion of the excited $2p^4$ configuration superimposed on the normal state. G. M. Murphy

The action of helium on polonium under the influence of electric discharge. Rafael Mendez. *Anales asoc. quím. argentina* **27**, 130–9(1939).—Helium, at a pressure of 3.8 mm. and under the influence of elec. discharge, combines with Po, forming an ionizing compd. Rise of temp. favors the reaction. Even at 100°, the Po begins to vaporize at low pressures and the activated He acts upon such vapors. E. M. Symmes

Diffusion of ions in a discharge and the initial rate of gas deionization. I. V. L. Granovskiĭ. *Compt. rend. acad. sci. U. R. S. S.* **23**, 883–7(1939)(in English); cf. *C. A.* **33**, 6703[3].—The diffusion theory is used to calc. the ambipolar diffusion coeff. D_a and μ, the root of the equation $nw/n_0 = J_0(\mu)$, where nw/n_0 is the ratio of the ion concn. at the wall to that at the axis and J_0 is Bessel's function of zero order. D_a is calcd. for 2 limiting cases (1) direct ionization and (2) cumulative ionization. The theoretical and exptl. values of μ obtained from probe measurements in a Hg vapor discharge tube are found to agree. II. *Ibid.* 888–90.—The deionization (time const.) can be calcd. from the relation $\tau = R^2/D_a\mu^2$. On the assumption D_a at the start of deionization has the steady discharge value, the initial value (τ_0) can be calcd. These calcns. are compared with those detd. by probe measurements with a cathode oscillograph. The results are (1) for pR less than 0.2 mm. Hg the calcd. values are in agreement with expt., (2) with tubes of large diam. the best agreement occurs when D_a is calcd. on the basis of accumulative ionization, (3) for smaller tubes the value of τ_0 is intermediate between those calcd. from the 2 assumptions on D_a and (4) in case of pR more than 0.25 cm. Hg, the initial disintegration rate is greater than the calcd. value with either of the assumptions. Earl A. Gulbransen

A preliminary report on the polarization of electrons. Kozi Kikuti. *Proc. Phys.-Math. Soc. Japan* **21**, 524–7(1939)(in English).—The asymmetry of the distribution of fast electrons after double right-angle scattering from Au foils was found to be in good agreement with the predictions of Mott (*C. A.* **26**, 4750). A. O. Allen

Origin of the spotted regions of electron-diffraction patterns of etched crystals. G. Menzer. *Ann. Physik* **36**, 239–48(1939).—These regions are due only to the mosaic structure of the diffracting crystal layers, as shown by results obtained with a Cu crystal. S. L. Gerhard

Intensities of electron-diffraction rings. M. Blackman. *Proc. Roy. Soc.* (London) **A173**, 68–82(1939).—The dynamical theory of Bethe (*C. A.* **23**, 332) is applied to electron diffraction from thin films. A criterion is presented for detn. of the conditions under which the kinematical theory of Laue is applicable. With the thin films and fast electrons commonly used experimentally, the latter theory is not usable. An approx. intensity formula is derived and is applied to exptl. data on Cu and Ag films; good agreement is obtained with a reasonable assumption for the av. crystal size. G. M. Murphy

Internal absorption of γ-rays in radium-beryllium neutron sources. Leon F. Curtiss. *J. Research Natl. Bur. Standards* **23**, 617–19(1939)(Research Paper No. 1257).—The internal absorption of γ-rays in Ra-Be neutron sources has been detd. for a source contained in a brass cylinder of 8 mm. internal diam. and 24.5 mm. internal length with walls 1 mm. thick. The cylinder contained a mixt. of 1.237 mg. of finely powd. Be and Ra sulfate contg. 139.7 mg. of Ra element. From measurements made in the usual way with a γ-ray electroscope with 1 cm. of lead filtering, the absorption correction was found to be 5.1%. These results can be used to det. the actual Ra content for such sources within the usual limits of error, that is, ±0.5%. Robert M. Simha

Energy of conversion electrons arising in the transformation of bromine isomers. L. I. Rusinov and A. A. Yuzefovich. *Compt. rend. acad. sci. U. R. S. S.* **24**, 129–30(1939)(in English).—The energy of the conversion electrons produced in the transformation of isomeric Br nuclei was detd. by means of a magnetic spectrograph (diagram included). The energies of conversion on the *K* and *L* levels are 33.5 ± 2 and 46.5 ± 3 e. kv., resp. T. H. Dunkelberger

β-spectra of iodine. G. F. Tape. *Phys. Rev.* **56**, 965–71(1939).—Bombardment of Te and I with deuterons and neutrons resulted in radioactive I. The momentum distributions of the β-particles were examd. in a cloud chamber placed in a uniform magnetic field and filled with H. Energies of the γ-radiation were detd. from the electrons ejected from Pb within the cloud chamber. The probable isotopes, half-lives and energies of β- and γ-radiation, resp., are: I^{126}, 13.0 ± 0.3 days, 1.20 ± 0.03 m. e. v., γ-radiation detected but could not be measured; I^{128}, 25 ± 1 min., 2.40 ± 0.07 m. e. v., as for I^{126}; I^{130}, 12.5 ± 0.5 hrs., 0.83 ± 0.03 m. e. v., 0.59 m. e. v.; I^{131}, 8.2 ± 0.3 days, 0.687 ± 0.010 m. e. v., 0.27 and 0.46 m. e. v. G. M. Murphy

β-spectrum of actinium K. M. Perey and M. Lecoin. *J. phys. radium* **10**, 439–40(1939).—See *C. A.* **33**, 9128[9]. H. Game

Disintegration of uranium by neutrons. N. A. Perfilov. *Compt. rend. acad. sci. U. R. S. S.* **23**, 896–8(1939)(in French).—Cloud-chamber expts. are performed on the disintegration of U_3O_8 by neutrons (Rn + Re) of 1000 millicuries intensity. A preliminary analysis of 1000 stereophotographs indicates (1) the U nucleus is disintegrated into heavy particles, (2) some of the heavy particles have 6 times the ionization power of an α-particle and (3) the max. path for the nuclei of recoil is 3 cm. (air). Earl A. Gulbransen

Determination of radium in powerfully emanating preparations by measuring the emanation "in statu nascendi." Alexander Janitzky. *Kolloid-Z.* **89**, 316–19(1939).—A stream of air is bubbled at a const. rate through or over the Ra-contg. prepn. into an evacuated ionization chamber. After about 25 min., a steady state is reached in which emanation is carried over as fast as formed, and from a measurement of the amt. of emanation carried in a given time, the amt. of Ra present is readily calcd. The method is less time-consuming and nearly as accurate as the older methods. A. O. Allen

The radioactive determination of protactinium in siliceous terrestrial and meteoritic material. Walter C. Schumb, Robley D. Evans and Jane L. Hastings. *J. Am. Chem. Soc.* **61**, 3451–5(1939).—Conclusion: Within the limits of error the age of the U atoms in the specimen of the Pultusk meteorite is the same as for the terrestrial U. A. B. Garrett

The Scherrer formula for x-ray particle-size determination. A. L. Patterson. *Phys. Rev.* **56**, 978–82(1939).—It is suggested that the calcn. for the ellipsoidal particle based on the tangent plane approximation will provide a satisfactory basis for future work. S. L. Gerhard

The influence of temperature on x-ray interference in monatomic hexagonal crystals. Max Kohler. *Ann. Physik* **36**, 227–38(1939).—The temp. factor depends on the angle between the normal to the reflecting plane and the hexagonal axis. S. L. Gerhard

Indirect excitation in x-ray interference. Ernst Lamla. *Ann. Physik* **36**, 194–208(1939).—Math. S. L. G.

The diffraction of x-rays by small crystalline particles. A. L. Patterson. *Phys. Rev.* **56**, 972–7(1939).—The approx. shape of a particle can be obtained from accurate x-ray measurements. S. L. Gerhard

Isotope shift in the boron spectrum. W. Opechowski and D. A. de Vries. *Physica* **6**, 913–17(1939)(in English).—The calcd. sp. isotope shift is −0.33 cm.$^{-1}$ (cf. *C. A.* **24**, 5620) for the $3\ ^2S_{1/2} - 2\ ^2P_{1/2, 3/2}$ transition in neutral B at 2497–8 A. The exptl. value is −0.37 cm.$^{-1}$ (cf. *C. A.* **33**, 6715[8]). G. M. Murphy

Compilations of spectroscopic data. George R. Harrison. *J. Applied Phys.* **10**, 760–7(1939).—References and brief abstracts are given for 26 abbreviated tables for spectrochem. analysis; for 5 tables of standard wave lengths; and for 7 charts and atlases of spectra. The limitation of present wave-length data is discussed. L. W. Strock

Astronomical spectra—modern observation and inter-

pretation. Otto Struve. *J. Applied Phys.* **10**, 800–16 (1939).—A general paper describing the use of temp. and pressure parameters as obtained by an analysis of stellar spectra in classifying stars. Characteristic features of normal and anomalous stellar spectra are described, such as the simultaneous occurrence of the absorption lines of normal stars and emission lines of H and ions of other elements in spectra of the same star. The astronomical interpretation of the width of emission lines of various types of stars, and the advances in observational technique at the principal observatories of the world are described. L. W. Strock

Atmospheric absorption. Arlette Vassy and E. Vassy. *J. phys. radium* **10**, 403 12(1939).—The absorption of light for both the total atm. and the lower atm. was measured over the range 3000–8300 A.; it follows accurately the Rayleigh-Cabannes scattering law, with superimposed bands due to the various atm. constituents. Unknown bands at 4400, 3850 and 3600 A. varied in intensity from night to night and are attributed to H_2O. A. O. Allen

The arc spectrum of nitrogen. (N I) II-A. Extreme ultraviolet region. Masahide Kamiyama. *Sci Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 375-81(1939).—The N I spectrum is photographed in the extreme ultraviolet with a 1-m. grating spectrograph of Siegbahn type giving a dispersion of 6 A./mm. in the first order. A He pressure of about 18 mm. Hg and a partial pressure of N ranging from 0.05 to 0.1 mm. were found to be the best condition for developing the arc spectrum of N. About 120 of the 237 lines measured between 1836.70 and 855.70 A. are new. A majority of the lines are classified but a discussion of this classification is reserved for Part III. W. F. Meggers

The Stark effect of Hg I. Yosio Isida and Sigeru Hiyama. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 390–416(1939).—A discharge tube of simple Lo-Surdo form is used to study the Stark effect of Hg lines in elec. fields up to 560,000 v./cm. In the elec. field the relative intensities of most lines are similar to those of the arc spectrum but lines violating both Δl and Δj selection rules become stronger. Results for more than 100 Hg I lines involving singlet and triplet terms are presented in tables and diagrams. W. F. Meggers

The Stark effect of C I. Yosio Isida, Tadasi Tamura and Masaiti Hukusima. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 417–18(1939). Since no data on the Stark effect in the C I spectrum have ever been published, results are given here for a dozen lines (4110 to 5052) investigated in elec. fields of 125,000 to 421,000 v./cm. W. F. Meggers

Molecular emission spectra. G. H. Dieke. *J. Applied Phys.* **10**, 780–99(1939). A comprehensive paper covering the following aspects of the emission spectra of diat. mols.: (1) energy levels of diat. mols., (2) structures of band spectra and (3) application. The application of the band-spectrum data in detg. isotopes, heat of dissocn. and nuclear spin is reviewed. References to 8 general papers and books are given. L. W. Strock

Infrared spectra—observation and uses. H. M. Randall. *J. Applied Phys.* **10**, 768–79(1939).—A general paper with 19 references. L. W. Strock

A push-pull photoelectric photodensitometer for determining fine structure in ultraviolet absorption spectra. John R. Loofbourow. *J. Optical Soc. Am.* **29**, 535–7 (1939). E. H.

Far infrared absorption spectrum and the rotational structure of the heavy water vapor molecule. Nelson Fuson, H. M. Randall and D. M. Dennison. *Phys. Rev.* **56**, 982–1000(1939); cf. *C. A.* **31**, 7755[4].—The absorption spectrum of D_2O vapor was studied between 23 and 135 μ; measurements were made of wave length and relative intensity of 210 pure rotation lines. The energy levels of a zero-order approximation to the D_2O asym. rotator were calcd. through $J = 11$ and corrected for zero-point vibration and centrifugal stretching in the ground state. The observed spectrum was then used to obtain more exact energy levels, the correctness of the assignments being assured by series regularities and combination relations. The resulting 111 energy levels were then used to compute a theoretical spectrum, which is compared with the exptl. one. G. M. Murphy

Infrared absorption spectra of some monosubstituted naphthalenes. Jean Lecomte. *J. phys. radium* **10**, 423–7 (1939).—See *C. A.* **33**, 5741[9]. H. Game

Rotation-vibration energies of tetrahedrally symmetric pentatomic molecules. II. Wave H. Shaffer, Harald H. Nielsen and L. H. Thomas. *Phys. Rev.* **56**, 1051–9 (1939); cf. *C. A.* **33**, 5280[4]; **34**, 675[9].—A general Hamiltonian, including all terms through the second order, is applied to the states $2\nu_3$, $2\nu_4$ and $\nu_3 + \nu_4$ of the mol. XY_4 (ν_3 and ν_4 are the triply degenerate vibrations belonging to the representation, T_2 of the symmetry group Td). Wave functions, selection rules and matrix elements, have been obtained. G. M. Murphy

Infrared absorption studies. IX. Bonding of hydrogen in nitrogen compounds. A. M. Buswell, J. R. Downing and W. H. Rodebush. *J. Am. Chem. Soc.* **61**, 3252–6 (1939); cf. *C. A.* **32**, 8932[9]; **33**, 9141[3].—The absorption due to the N-H group is distinctly weaker than for the O-H group and there is a much greater variability in the characteristic frequency. Infrared absorption is a less-reliable criterion for bonding of H attached to N than for H attached to O. There is no pos. proof of assocn. involving the formation of N-H → N bonds but there is a strong tendency toward assocn. if the H is somewhat acidic. The characteristic absorption produced by assocn. of mols. contg. the peptide linkage may be due to an enolized H. A. B. Garrett

Infrared studies of the porphyrin molecule. C. S. Vestling and J. R. Downing. *J. Am. Chem. Soc.* **61**, 3511-13(1939).—The infrared absorption of 2 dipyrrylmethenes, the Cu complex of one of them, etioporphyrin I, and etiohemin I chloride has been measured. Replacement of the acidic hydrogens with metal atoms eliminated N-H absorption in the dipyrrylmethenes and in etioporphyrin I. The data do not give conclusive evidence that N-H-N bonding exists in these mols. but it is concluded that absorption peaks occur at frequencies which might be expected if N-H-N bonding were existent in the porphin and dipyrrylmethene nuclei. A. B. Garrett

Absorption of inorganic colored salt solutions in the near infrared. Th. Dreisch and O. Kallscheuer. *Z. physik. Chem.* **B45**, 19–41(1939).—Aq. solns. of the following salts gave absorption max. at the wave lengths noted (in A.): $TiCl_3$, $TiBr_3$, 7440; $VOCl_2$, $VOSO_4$, VCl_2, VSO_4, 8400; $V_2(SO_4)_3$, VCl_3, 6100; $CrCl_2$, $CrBr_2$, 7920; $FeCl_2$, $FeBr_2$, $FeSO_4$, $FeSO_4.(NH_4)_2SO_4$, 9700; $FeBr_3$, $FeCl_3$, 7740; $MnCl_2$, no absorption between 6000 and 16,000; UO_2SO_4, UO_2Cl_2, UO_2Br_2, $U(SO_4)_2$, UCl_4, UBr_4, absorption with fine structure between 7000 and 9000 and between 13,000 and 18,000, with no fine structure between 10,000 and 12,000. Many of the other bands also showed some fine structure. G. M. Murphy

Raman spectra of acetylenes. II. Displacements and depolarization factors for phenylacetylene and derivatives of the type $C_6H_5C{\equiv}CR$. M. J. Murray and Forrest F. Cleveland. *J. Am. Chem. Soc.* **61**, 3546–9(1939); cf. *C. A.* **33**, 1596[3].—The R group in these compds. was H, Cl, CH_3, C_2H_5, CH_2OH, CH_2Cl, CH_2Br, CH_2CH_2OH, CH_2CH_2Cl, $CH(OH)CH_3$, $CH_2C_6H_5$ and $CH_2CH_2CH_2Cl$. The 2 lines near 2200 cm.$^{-1}$ were found to have the same depolarization factors; this indicates that one frequency cannot correspond to a sym., and the other to an asym. vibration as Glocker and Davis (cf. *C. A.* **28**, 7159[9]) have stated to be the case for dimethylacetylene. A. B. G.

Raman spectra. CVII. Methylene derivatives. J. Wagner. *Z. physik. Chem.* **B45**, 69–91(1939); cf. *C. A.* **32**, 8937[9]; **33**, 8117[5,6,7,9].—Raman spectra and depolarization measurements were obtained for YCH_2X where Y, X = Cl, Cl; Br, Br; I, I; Cl, Br; Cl, I; Br, I; Me, Cl; Me, Br; Me, I. Selection principles were detd. for the symmetry C_{2v} and C_s and the frequencies were assocd. with normal vibrations. The mol. consts. were detd. for H_2CCl_2, H_2CBr_2 and H_2CI_2. Simple valence forces are applied to the mol. H_2CX_2. G. M. Murphy

The nature of the low-frequency Raman spectrum and

the spectrum of the hexamethylbenzene crystal. E. F. Gross and A. I. Raskin. *Compt. rend. acad. sci. U. R. S. S.* 24, 126–8(1939)(in English).—In the Raman spectrum of a single crystal of C_6Me_6 2 bands were found at frequencies of 53 and 95 cm.$^{-1}$. The existence of these bands supports the conclusion of Gross and Vuks (*C. A.* 30, 5128[1]) that the low-frequency Raman spectrum results from intermol. oscillations of the crystal lattice.
T. H. Dunkelberger

Low-frequency scattering spectra in *p*-, *m*- and *o*-diiodobenzenes. E. F. Gross and A. V. Korshunov. *Compt. rend. acad. sci. U. R. S. S.* 24, 328–31(1939)(in English).—The new type of scattering spectrum observed in crystals of org. substances is probably due to the intermol. vibrations, translational and angular, within the cryst. lattice. A true test of the theory seems possible only by the comparison of the spectra of substances having the same structure but contg. different isotopes but an approach to the solution of the problem is made with *p*- (I), *m*- (II) and *o*- (III) $C_6H_4I_2$, which have the same mass but different structures and consequently different moments of inertia. The cryst. lattices of I and II are known to be closely related, that of III, less completely known, is similar. The low-frequency Raman lines in cm.$^{-1}$, obtained with monocrystals at room temp. with the ultraviolet portion of the spectrum absorbed by 10% $NaNO_2$ in H_2O are: I 15, 25, 115; II 24, 79, 101; III 23, 46, 74, 89, 100, 127. The agreement in the frequencies for the 3 compds. is explained as due to the fact that all 3 have the same mass, i. e., they are the translational vibrations of the whole mols. in the crystal lattice. The noncoincidence of the other lines should then possibly be put down to the angular vibrations of the whole mols.
Janet E. Austin

The molecular structures of sulfuryl fluoride and thiophosphoryl fluoride. D. P. Stevenson and Horace Russell, Jr. *J. Am. Chem. Soc.* 61, 3264–8(1939).—Electron-diffraction investigation of these compds. gave the following interat. distances and bond angles: for sulfuryl fluoride, S – F = 1.56 ± 0.02 A., S – O = 1.43 ± 0.02 A., ∠F – S – O = 105 ± 2°, and ∠F – S – F = 100 ± 10°; and for thiophosphoryl fluoride, P – F = 1.51 ± 0.02 A., P – S = 1.85 ± 0.02 A., ∠F – P – F = 9.95 ± 2°, and F – P – S = 118 ± 2°. The relationship between the structures found and the resonating valence bond structures is briefly discussed.
A. B. Garrett

Present status of radiography by photographing the fluorescent screen image. H. Franke. *Phot. Ind.* 36, 1291(1938).
E. R. B.

The influence of temperature on the ultraviolet luminescence spectrum of sodium chloride and potassium chloride crystals. M. N. Podashevskiĭ and A. M. Polonskiĭ. *Compt. rend. acad. sci. U. R. S. S.* 24, 332–3(1939)(in German); cf. *C. A.* 33, 4522[6].—The ultraviolet luminescence spectra of tempered rock salt crystals and synthetic KCl crystals, colored by light from a condensed Al spark or by x-rays, were detd. in a high-vacuum chamber in a Dewar flask fitted with thin quartz and fluorite windows. The luminescence band is broadened at the higher temps. and the max shifted toward the long wave lengths. The max. of NaCl and of KCl, resp., are: −180°: 244, 270; 15°: 249, 280; 100° 252, 286 mμ. The curves are given.
Janet E. Austin

The potential-energy relationships in normal and excited acetaldehyde. Thomas W. Davis and Milton Burton. *J. Chem. Phys.* 7, 1075–80(1939); cf. *C. A.* 33, 5743[4].—Math. The following effects are explained: (1) the dependence on temp. and wave length of the probabilities of free radical and ultimate mol. production in the primary photochem. act; (2) the disappearance of fluorescence at shorter wave lengths or at higher temps.; (3) the sep. maxima for bond and continuous absorption; (4) the high quantum yield at 3340 A.
G. M. Petty

Thermal and photochemical exchange reactions of bromine. J. Norton Wilson and Roscoe G. Dickinson. *J. Am. Chem. Soc.* 61, 3519–20(1939).—Investigation of the exchange of Br between radioactive Br and various Br compds. has led to the following results: a rapid exchange occurs with $AsBr_3$ and $SnBr_4$ at room temp. in CCl_4 soln.; in the same solvent no exchange, beyond the limits of exptl. uncertainty, was observed to occur with either ethylene bromide or trichlorobromomethane in the dark at 100°; a rapid exchange with trichlorobromomethane is induced by green light at 76°. A method is described for the prepn. of dil. and highly radioactive solns. of Br_2 in CCl_4.
A. B. Garrett

The photochemical decomposition of solid hydrogen compounds at low temperatures. L. Farkas, Y. Hirshberg and L. Sandler. *J. Am. Chem. Soc.* 61, 3393–6(1939).—Para-hydrogen is formed when solid HI is irradiated at low temps. An explanation for this is that the hydrogen primarily formed can be converted by the paramagnetic action of free I atoms, or the heat formed in the reaction $H + HI_{solid} = H_2 + I$, is dissipated in the solid. In the photolysis of HCHO and CH_3OH, under the same conditions, normal hydrogen is formed. This suggests that the 2 hydrogen atoms forming a mol. come from the same mol. of HCHO or CH_3OH.
A. B. Garrett

The photochemical formation of trichlorobromomethane from chloroform and bromine. V. Braunwarth and H. J. Schumacher. *Kolloid-Z.* 89, 184–94(1939).—The reaction of $CHCl_3$ and Br to give HBr and CCl_3Br was induced by 5460-A. light and the reaction kinetics were studied at 110° and 130° and pressures of 40–400 mm., the compn. of the reacting mixt. being varied and HBr, CCl_3Br and N added in varying amts. Quantum yields were around 19. The reaction rate is given above 200 mm. total pressure by $k[I_{abs.}]^{1/2}[CHCl_3]/P^{1/2}\{1 + (k'[HBr]/[Br_2])\}$ and below 90 mm. by $k[I_{abs.}][CHCl_3]P/\{1 + (k'[HBr]/[Br_2])\}$ where P is the sum of the pressures of reactants and products plus half the pressure of N. In going from 110° to 130°, k approx. doubles, but k' remains const. A slight inhibition by added CCl_3Br is also found in the later stages of the reaction. All the data are very neatly explained by a reaction mechanism similar to those found for the photochem. formation of CCl_4 from $CHCl_3$ and Cl, and of HBr from H and Br (cf. *C. A.* 30, 7041[2]).
A. O. Allen

A photocalorimeter. The quantum efficiency of photosynthesis in algae. John L. Magee, Thomas W. DeWitt, Elizabeth Coolidge Smith and Farrington Daniels. *J. Am. Chem. Soc.* 61, 3529–33(1939).—A small calorimeter is described capable of measuring a rate of heat change as small as a millionth of a caloric per second. It is designed to admit light and thus give a measurement of heat changes accompanying photochem. reactions. It consists of a small thin-walled quartz cell mounted in a cylindrical Al container. The heat evolved or absorbed in a chem. reaction taking place in the calorimeter can be obtained by comparing the galvanometer-time curve with the curve for a chemically inert material under similar conditions. The calorimeter has been used to measure the thermal efficiency of photosynthesis by green algae. About four fifths of the red light absorbed in living algae is converted into heat, with a quantum yield of about 0.08 mol. per quantum absorbed.
A. B. Garrett

Poisoning by radioactive substances (Balázs) **11H.** Investigations on cond. of solid gelatin-dye phosphors (Gombay) **2.** Sensitization and desensitization of sensitive layers for high-energy rays (Schopper) **5.** Light absorption and structure of Schiff bases (Varga) **10.** Absorption spectra of some substituted nitrosobenzenes (Hodgson) **10.** Treating ores contg. U and Ra (U. S. pat. 2,176,609) **9.** Working ores contg. U (U. S. pat. 2,176,610) **9.**

Radley, J. A., and Grant, J. Fluorescence Analysis in Ultra-Violet Light. Vol. II. 3rd ed., revised and enlarged. Edited by E. Howard Tripp. London: Chapman & Hall. 424 pp. 22s. 6d.

Fluorescent material suitable for coatings. Carl Pfanstiehl (to Pfanstiehl Chemical Co.). U. S. 2,176,090, Oct. 17. A fluorescent material such as Zn silicate is prepd. in the form of individual unground crystals substantially all of which are of the order of one micron in size.

U. S. 2,176,100 relates to a fluorescent powder which may comprise Zn Be silicate in the form of unground crystals substantially all less than 2 microns in size and activators including a rare earth metal such as La, Sm or Nd and MnO_2.

Fluorescent screen. Gorton R. Fonda (to General Elec. Co.). U. S. 2,177,701, Oct. 31. A light-modifying screen adapted to improve the spectrum of impinging radiations deficient in red comprises a base carrying a coating in layers of a material contg. a substantial quantity of rhodamine alternating with layers formed mainly of cellulose acetate.

Luminescent bodies for excitation. Wilfried Meyer (to General Elec. Co.). U. S. 2,177,735, Oct. 31. A luminescent body capable of light emission under excitation of ultraviolet rays includes a conductive carrier of ZnO with a surface contg. Zn, SiO_2, Mn and O, which is luminescent.

4—ELECTROCHEMISTRY

COLIN G. FINK

Basic problems in electrochemistry. A. N. Frumkin and V. A. Pleskov. *Sbornik "Matem. i Estestvozn. v S. S. S. R."* **1938**, 401–15; *Khim. Referat. Zhur.* **2**, No. 4, 3 13–14(1939).—A review of the most important electrochem. investigations in U. S. S. R. for the last 20 years. Considerable progress was made in the electrochemistry of nonaq. solns. (relation between elec. cond. and the formation of complexes); properties of liquid-NH_3 solns.; theory of aq. electrolytes; nature of electrodeposition; mechanism of reactions in the elec. discharge through gases; potential drops at different phase boundaries; problems of surface phenomena; theory of electrode proc- 4 esses; measurements of dipole moments and problems of applied chemistry (development of different types of storage batteries, methods of electrolysis of fused salts, electrosyntheses, etc.). W. R. Henn

Top-charge rapid-type furnaces in the manufacture of plain carbon steels. H. H. Watson. *Can. Metals Met Inds.* **2**, 308–10(1939).—The top-charge type of elec. furnace shows substantial savings in power, electrode and re- 5 fractory costs. Cost of refractories for the fixed-roof furnace was 30% greater than for the top charge furnace and electrode consumption was 14% lower for the top-charge furnace. W. H. Boynton

Electric drying ovens for lacquers liable to detonate. K.-A. Lohausen and G. Schumann. *Elektrowärme* **9**, 231–8(1939).—Elec. ovens are particularly suitable for drying lacquers giving off vapors which can form explosive 6 mixts. with air. The heating units can be so designed that their temp. can be safely kept below the ignition temp. of the vapors. Suitable ovens are described. M. H.

Determination of the electromotive force of the electrolytic cell aluminum ‖ carbon in fluorides and chlorides. Yu. V. Baĭmakov and N. R. Ishmaev. *Trans. Leningrad Ind. Inst.* **1938**, No. 1, Sect. Met. No. 1, 81–96.—The e. m. f.s of the following electrolytic cells were detd.: (1) Al ‖ C in cryolite + Al_2O_3 melts in atm. of H and A at 890–1100°; (2) Al ‖ C in chlorides at 680–900°. The thermal 7 data calcd. are close to the heat of formation of Al_4C_3 as obtained by other authors. The measurements in A corresponded to those in H. B. Z. Kamich

Stability of iron oxide and copper oxide anodes in the electrolysis of cryolite-alumina melts. Yu. V. Baĭmakov, K. P. Batashev, L. M. Evlannikov and A. I. Bukhbinder. *Trans. Leningrad Ind. Inst.* **1938**, No. 1, Sect. Met. No. 1, 57–80.—Anodes were tested for stability in the electrolysis 8 of cryolite alone or cryolite with 5% Al_2O_3 or with 10% NaF. The chem. soln. of the Fe_2O_3 anodes did not exceed 0.24%; Cu oxide anodes, 0.15–0.20%. The soly. of the anodes during electrolysis was then detd. and they were found to be unstable. B. Z. Kamich

Electrolytic production of lead-barium alloys. K. P. Batashev and M. A. Vinogradova. *Trans. Leningrad Ind. Inst.* **1938**, No. 1, Sect. Met. No. 1, 50–6.—Pb-Ba alloys of high purity were obtained by electrolyzing a 9 melt of 20–70% $BaCl_2$ and 80–30% KCl by wt. in Fe cells lined with burnt clay or talc-schist. The cathode c. d. was 0.3–0.5 amp./sq. cm., spacing between electrodes, 15 to 100 mm., best temp. 700–750°. The molten Pb cathode can be satd. with Ba up to 15% without affecting the electrolysis provided stirring of the Pb is resorted to from time to time. The anode was graphite. B. Z. K.

Anode slime formation during the refining of copper. A. Glazunov. *Chem. Listy* **33**, 352–4(1939).—G. analyzes the anode slimes, explains the process of slime formation, and divides the products into primary and secondary phases. In the primary phase are the insol. compds.: Cu_2O, Cu_2S, Cu_2Te. To the secondary phase belong (*a*) the noble metals Ag, Au, Pt and other metals of the Pt group which have a potential more noble than that of Cu; (*b*) products of the reaction of sulfate that are insol. ($PbSO_4$); (*c*) other products of anodic oxidation; (*d*) products formed by the hydrolysis of elements as Bi hydrate or Sb-HCl and (*e*) metallic powders formed from ions of multivalence: $2Cu^+ \rightleftharpoons Cu^{++} + Cu$ or more rarely $3Au^+ \rightleftharpoons Au^{+++} + 2Au$. Frank Maresh

A modern electroplating plant. Fauvelot. *Electricité* **23**, 310–12(1939).—F. describes a modern plant for mass production of small articles Ni, Cr and Cd plated. J. M. Noy

Chromium-plating baths containing fluoride ions. Yu. V. Baĭmakov, K. P. Batashev and D. M. Telenkov. *Trans. Leningrad Ind. Inst.* **1938**, No. 1, Sect. Met. No. 1, 27–35.—The baths contained 250 g./l. of CrO_3, 0.5–10 g./l. of NaF and less than 1 g./l. of sulfate. Temps. were 15–45° and c. d. 1–5 amp./sq. dm. Best deposits were obtained in baths contg. 2–5 g./l. of NaF and at a c. d. of 1–5 amps./sq. dm., while in some cases bright deposits were obtained with c. d. of 0.5 amps./sq. dm. Deposits obtained at 18–30° were bright. Max. thickness of these deposits was 6–8 microns. The throwing power of the bath contg. CrO_3 250 g. and NaF 5 g./l. was detd. at 21–22° and at a c. d. of 3 amp./sq. dm. With increasing temp. the throwing power dropped and at 35° it was 16%. Pb anodes deteriorated rapidly; Pt and magnetite (treated in a Cr bath for 48 hrs.) anodes were good for long periods. B. Z. Kamich

Improvement in the acid sulfate and fluoborate cadmium baths so that they may replace the cyanide bath. V. I. Lainer, S. I. Orlova and A. M. Faĭgel'shteĭn. *Korroziya* **4**, No. 2, 96–114(1938); *Khim. Referat. Zhur.* **2**, No. 2, 138 (1939).—Coarse cryst. deposits are formed in the acid Cd bath (addn. agents being absent) owing to insufficient cathodic polarization. In order to increase the cathodic polarization and to obtain a fine-grain Cd deposit, the addn. of colloids (peptone, glue, creosol) to the acid Cd bath was investigated at different pH values and c. ds. The Fe cathodes were pickled in concd. HCl, degreased with Vienna lime and carefully washed. Anodes were rolled Cd plates with a surface 1.5–2 times as large as the cathode surfaces. The structure of the ppt. was studied under a microscope (× 100) and in each case compared with the structure of the ppt. obtained from a $Cd(CN)_2$ bath connected in series with the acid bath. The following compns. of the bath were used, in g./l.: $CdSO_4 \cdot {}^8/_3H_2O$ 64, $(NH_4)_2SO_4$ 33 and $Al_2(SO_4)_3 \cdot 18H_2O$ 28. Bath temp. 18–20°. In all cases the Cd plate was 0.01 mm. thick. The cathode efficiency was 96–98%. From the peptone-contg. bath the finest-grain structure and dense deposits were obtained at a concn. of 0.5 g./l. of peptone with a c. d. of 0.5–1 amp./sq. dm. and pH 2–3.2. The optimum conditions for creosol were a concn. of 8 g./l. of creosol, pH 1.5–3.3, c. d. 0.5–0.8 amp./sq. dm. The densest and finest deposits from a H_2SO_4 bath were with glue. For best results the concn. of glue is 0.5 g./l., c. d. 0.5–1.0 amp./sq. dm., pH 3.0–5.5, temp. 18–20°. The

Cd + HBF_2 bath was operated at 20° and at 50°, c. d. up to 10 amp./sq. dm. with an addn. of 1 g./l. glue. Finest-grain deposits were obtained from $Cd(BF_4)_4$ 143 g./l., HBF_2 35, glue 1, c. d. 9–10 amp./sq. dm. temp. 50°. The current efficiency was 96–98%. The HBF_2 bath is superior to the others because it permits use of a high c. d. The throwing power of the acid Cd bath is considerably smaller than that of the CN bath. The Cd plates from an acid bath have a fine-grain structure and give the same protection of the steel against corrosion as the plates from a CN bath. W. R. Henn

High-speed copper plating. Details of the development of a process for cyanide solutions. F. F. Oplinger. *Metal Ind.* (London) **55**, 335–8, 375–7(1939).—See *C. A.* **33**, 4134⁹. H. Game

Cleaning of plating solutions. A discussion of purification and filtration methods. Chester W. Smith. *Metal Ind.* (London) **55**, 415–17(1939); cf. *C. A.* **33**, 9149⁷.— A review. E. H.

Protection of silver by the electrodeposition of beryllia. I. E. Price and G. J. Thomas. *Engineering* **148**, 675–6 (1939).—See *C. A.* **33**, 9151⁸. H. Game

The polarization of quinhydrone electrodes. V. Čupr and A. Čížek. *Chem. Listy* **33**, 321-5(1939)(French summary).—From continuously and automatically-recorded voltage *vs.* time graphs Č. concludes that the voltage, π, in the cells (quinhydrone nonpolarized: quinhydrone polarized) is not a log function of the time. The exptl. results and graphs did not substantiate any other relations which could be derived from the fundamental Fick law for diffusion processes. Further analyses revealed that this discrepancy does not lie in the Fick law but in the fact that during the polarization of the quinhydrone electrode, local galvanic cells are formed which modify the value of π. Whenever the quinhydrone electrode became polarized cathodically, H as well as hydroquinone formed in the electrode which acquired some of the characteristics of a H electrode. Even with a polarized quinhydrone electrode the potential of the H electrode was present; for this reason it was not possible to substantiate the Fick law. The change in π with time depends not only upon the diffusion of the hydroquinone but also upon the intensity of the local cells. Frank Maresh

Kinetics of the oxidation-reduction potentials. I. A. Rotinyan. *J. Gen. Chem.* (U. S. S. R.) **9**, 1182-7 (1939).—The potentials of mixts. of H_3AsO_4 and H_3AsO_3 in basic and in acid mediums were measured by Raps compensator with a precision of 0.0001 v. in a water thermostat at 25 ± 0.05°. The reference electrode was Hg | Hg_2SO_4, 0.1 *N* H_2SO_4; unplatinized Pt electrodes of the Wink- type were used as inert electrodes. Attempts to obtain equil. potentials for the H_3AsO_4 and H_3AsO_3 mixts. during 24 hrs. in a basic soln. were not successful. No reproducible potentials were obtained in the presence of the ions of I. In acid solns. under suitable conditions it was possible to obtain equil. potentials; this is in agreement with F. Forster and Pressprich (*C. A.* **21**, 2596). In the presence of KI the electrode potential did not depend on the concn. of KI. In acid solns. in the presence of KI equil. potentials are obtained. Four tables, 1 graph and 19 references are given. II. *Ibid.* 1188–97.—The kinetics of the equil. oxidation-reduction potentials of H_3AsO_4 and H_3AsO_3 at polarized cathodes were investigated by potential-time curves. It was verified that the velocity of the establishment of equil. potentials increases with an increase of the acidity of the soln. and with the concn. of the ions of I which transfer the potential. For the first time it was found that the velocity increases with increase in ratio of the concn. of H_3AsO_4 to the concn. of H_3AsO_3. The equil. potentials at the electrodes consisting of a thin layer of Pt on glass were reached very rapidly. The effect of poisoned electrodes on the equil. oxidation-reduction potentials was developed. Wagner's hypothesis of surface reactions (as a time-detg. factor of the process) contradicts the expts. of Zhukov as well as those of R. If the potential As^{+++++}/As^{+++} is considered as a H potential in the supposition that the process of the diffusion of H to the surface is the time-detg. process, the relation between the time necessary for the establishment of equil. and the ratio of H_3AsO_4 concn. to H_3AsO_3 concn. can be deduced theoretically. Four tables, 5 diagrams and 11 references are given. III. *Ibid.* 1198–1206.—The velocity of the establishment of equil. potentials increases with an increase of the ratio of H_3AsO_4 concn. to H_3AsO_3 concn. The values of the equil. potentials and the curves of potential *vs.* time do not depend on the method of oxidation of the electrode (by immersion in HNO_3 or by cathodic polarization). The time necessary for the establishment of the equil. potentials on the oxidized electrode is proportional to the logarithm of time necessary for the establishment of the equil. potential on the polarized cathode. Nine diagrams, 4 tables and 4 references are given. W. R. Henn

Electrochemical purification of water for storage batteries. M. M. Likhachev. *Elektrichestvo* **60**, No. 3, 26–30(1939).—In various electrochem. methods of treating water the cations Na, Ca and Mg are removed in order of increasing difficulty; for anions the order is Cl, SO_4, CO_3 and SiO_2. Colloidal SiO_2 is not removed by electrochem. means, while org. compds. are removed only incompletely. If present in large amts. org. compds. should first be coagulated. Various app. are illustrated (cf. Jean Billiter). B. Z. Kamich

Resistors and condensers in mass production. Herbert Chase. *Electronics* **12**, No. 9, 28–31(1939).—Description of the Erie Resistor Corp. process. Two forms of resistors are made, in a variety of sizes and resistance values, but all having as the essential resistor a cylindrical bar (3-mm. diam.) of C. The ends of the bars are Cu coated, by the spray method, to ensure good contact with the wire terminals. Finely powd. C is mixed with inert materials in various proportions to procure the desired ohmic resistance. A binder is added and the bars are formed in a tableting machine. The bars are then baked, and next automatically sorted according to their resistance. Then follows the painting of body, tip and dot, as required by the marking code. The final step is the sealing of the C bar into a ceramic shell. The fixed condensers are of 2 types: one with Ag plates in intimate contact with a ceramic dielectric, and the other with Ag plates and mica as dielectric. Those with the ceramic dielectric have a definite linear and reproducible temp. coeff. and are widely used in tuned oscillator circuits to compensate for changes in frequency due to temp. variations. One type has a pos temp. coeff. of 0.00012 per 1°; another type with a TiO_2 dielectric has a neg. temp. coeff. of 0.00068 per 1°. Others have coeffs. lying between these 2 limiting values. TiO_2 has a high dielec. const. (85), and accordingly fairly large capacities are obtainable in a rather small unit. The Ag is applied to the ceramic surface by coating the surface with a Ag soln., drying and heating to high temp. in a reducing atm., converting the Ag salt into Ag metal. Every condenser is carefully tested and calibrated. C. G. F.

Recovery of slag with high content of V in basic Bessemer and its use in elec.-arc furnace (Harr) **9**. Organic acids [by elec. process] (U. S. pat. 2,176,343) **10**.

Storage-battery plates. Willis A. Gibbons and Eardley Hazell (to United States Rubber Products Inc.). U. S. 2,177,062, Oct. 24. Finely divided highly microporous hard rubber is used as a porosity agent in a paste of finely divided active material.

Storage-battery retainers. Wm. E. Kershaw (to Elec. Storage Battery Co.). U. S. 2,176,427, Oct. 17. A perforated storage-battery retainer the thickness and perforation dimensions of which remain const. is made of a vinyl resin which in contact with PbO_2 resists disintegration under the electrolytic action to which it is exposed in a storage battery. U. S. 2,176,428 relates to tubular retainers made of fabric consisting of threads of a synthetic vinyl resin.

Electrolytic condenser. Anthonius F. P. J. Claassen and Cornelis de Lange (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,177,018, Oct. 24. Various structural

details of a condenser with a liquid electrolyte such as a glycerol soln. of NH_4 borate and electrodes which may be formed of Al. Cf. *C. A.* **33**, 2421[7].

Electrical condensers. Paul Schupp and Fritz Wilke (to Siemens & Halske A.-G.). U. S. 2,177,266, Oct. 24. Alternating layers of foil electrode material such as Al foil and a polymeric dielectric such as polystyrene are wound upon themselves with the dielec. material in expanded condition, and the wound roll is subjected to heat treatment sufficient to transform the dielec. material to a lesser degree of expansion with elimination of air enclosures

Electrodes for electrolytic condensers, etc. Joseph S. Williams (to P. R. Mallory & Co.). U. S. 2,177,086, Oct. 24. A predetd. section of an electrode metal surface such as one of Al foil is immunized to etching action, as by coating with paraffin, and the metal surface is exposed to an etching medium so as to etch the portions of the surface which have not been immunized, and an electrode terminal is formed out of the unetched portions

Electroplating apparatus. Arthur J. Donald. U. S. 2,177,453, Oct. 24. Various structural details.

Electroplating with silver. Birger Egeberg and Nathan Promisel (to International Silver Co.). U. S. 2,176,668, Oct. 17. In a Ag cyanide plating bath, a brightening agent is used such as urea or other compd. of the general formula $X\text{-}CO\text{-}NH_2$ in which X represents NH_2 or a substituted NH_2 group contg. Me, Et, Ac or NH_2 as substituents.

Chromium-plating. John R. Mardick. U. S. 2,177,392, Oct. 24. A method of Cr-plating articles involves connecting the articles as cathode in an aq. electrolyte contg., per l., chromic acid 60–300 g., $Na_2Cr_2O_7$ 100–350 g. and some sulfate present as impurities and within the range of 0.5 g. to 12 g. per l., operating the bath at a c. d. of 15–140 amp. per sq. ft. and at a temp. of 20–45°, periodically adding chromic acid and $Na_2Cr_2O_7$ to compensate for their depletion, and continuing the plating while allowing the sulfate content to increase to not over about 12 g. per l.

Coating ferrous metals with tin. Elgin C. Domm (to National-Standard Co.). U. S. 2,176,066, Oct. 17. An article to be protected against corrosion, such as a sheet or wire, is immersed in a molten metallic bath predominantly composed of Pb and Sb, and then electroplated with Sn of a thickness of about 0.0001–0.0002 in

Electrolytic cell assembly suitable for the manufacture of persulfuric acid and its salts. Josef Müller (to Oesterreichische chemische Werke G. m. b. H.). U. S. 2,177,626, Oct. 24. Various details of an app. with cells one above another in a "filter-press-like" arrangement.

Electric apparatus for controlling the concentration of solutions. Edward H. Pyle and Thomas E. Ross (to Calif. Packing Corp.). U. S. 2,176,471, Oct. 17. Various elec. and operative details of an app. suitable for automatic control of the strength of salt and lye solns. employed in fruit peeling app., etc.

Multi-cell electrochemical generator with single electrolyte. Gunnar A. F. Winckler (to Winckler Engineering Laboratories Inc.). U. S. 2,177,235, Oct. 25. Various structural details.

Treating ores, such as hematite, with high-frequency electric currents. Hideyuki Kikuti (to Nippon Koshuha Jukogyo K. K.). U. S. 2,177,070, Oct. 24. A method of reducing ores such as those of Fe, Mo, Pb, Ti, etc., involves mixing the granulated electrically nonconductive ores with an amt. of granulated at least partly electroconductive reducing agents at least equal to that theoretically necessary to reduce the charge and in a proportion to the latter to produce a powderous mixt. having discontinuous electroconductive properties, and subjecting the mixt. in an electrode furnace to the action of a high-frequency current having a voltage above 1000 v and a frequency of at least 100,000, whereby numerous minute local discharge sparks are generated in the mixt. Reducing agents such as graphite or coke may be used.

Alloys containing beryllium. Bengt R. F. Kjellgren and Charles B. Sawyer (to Brush Beryllium Co.). U. S. 2,176,906, Oct. 24. A method of forming alloys contg. Be and a heavy metal such as Cu, Ni, Cr or Fe capable of alloying with Be at a temp. at which Be oxide is reducible with C involves maintaining in a suitable chamber an elec. arc adjacent to the surface of a molten bath of alloy such as it is desired to form, progressively introducing into the zone immediately surrounding the arc a loose mixt. contg. finely divided C and Be oxide of such a degree of purity that its apparent d. after being heated to 1000° for the first time does not exceed 0.4, for production of Be with evolution of CO; and meanwhile progressively introducing into the top of the molten bath small pieces of the heavy metal. App. is described.

Calcium carbide. Ernst Winter, Franz Lückerath and Paul Windelband (to Akt.-Ges. für Stickstoffdünger). U. S. 2,177,621, Oct. 24. See Ger. 677,461 (*C. A.* **33**, 6732[2]).

Television transmitting tube. Harold Miller (to Electric & Musical Industries Ltd.). U. S. 2,177,736, Oct. 31. A target electrode for a cathode-ray television transmitting tube comprises a conductive signal plate having on its surface a layer of photoelectrically conductive material such as Cu oxide which is nonphoto-emissive, and a coating on this layer of a borate of an alkali metal.

Electric switch contacts. Newton C. Schellenger (to Chicago Telephone Supply Co.). U. S. 2,177,288, Oct. 24. Contacts are formed of conductive metal such as a Cu alloy provided with a plating of Ag and an overlying plating of Sn which is thin and adapted to be worn away quickly in use of the contact, but which previously serves to facilitate soldering.

Electric discharge device. Gilles Holst (to General Elec. Co.). U. S. 2,176,134, Oct. 17. A device suitable for operation at high temps. comprises a sealed envelope contg. electrodes, a gaseous atm. within the envelope consisting of Ne with an admixt. of a small proportion of A, and a sealed jacket about the envelope contg. N mixed with a small proportion of Ne so that the Ne concn. within the sealed envelope is maintained substantially const. despite long-continued maintenance of the envelope at a temp above that at which Ne will diffuse through it.

Electric discharge devices. Walther Dawihl, Otto Fritze and Alfred Rüttenauer (to General Elec. Co.) U. S. 2,177,691, Oct. 31. The wall of an elec. discharge device of luminescent character is formed of colored and transparent material such as glass and is provided with an internal coating consisting of the product of reaction between the container material and a soln. of an acid of an element of the fifth group of the periodic system such as H_3PO_4 and with a luminous material such as Zn silicate on the coating, the device being provided with electrodes and a filling of gas.

Gaseous electric discharge device suitable for supplying ultraviolet rays. Hermann Krefft, Kurt Larche and Max Thomas (to General Elec. Co.). U. S. 2,177,728, Oct. 31. A gaseous elec. discharge device comprises a container, electrodes sealed therein, a gaseous atm. therein, and a quantity of vaporizable material therein which emits visible and ultraviolet light when excited to luminescence by an elec. discharge between the electrodes, the container consisting of two glass layers fused to each other, the inner layer being thinner than the outer layer and consisting of an aluminate, hard glass inert to the vaporizable material having a softening temp. of about 700° and which transmits ultraviolet rays at a wave length of 280 millimicrons and longer and which is opaque to ultraviolet rays of shorter wave length, the outer layer consisting of a borosilicate glass having a softening temp. of about 550° and which transmits ultraviolet rays at a wave length of 280 mμ and longer and ultraviolet rays of shorter wave length and which is deleteriously affected by the rays of shorter wave length.

Electric gaseous discharge devices suitable for use as a light source. Willem Elenbaas (to General Elec. Co.) U. S. 2,177,694, Oct. 31. An elec. gaseous discharge device comprises a sealed tubular envelope having a pair of main operating electrodes sealed into its opposite ends, an auxiliary electrode sealed into the envelope adjacent one of the main electrodes, Hg within the envelope in an amt. sufficient to produce a pressure of about one atm. when

wholly vaporized, and a gaseous filling of Ne mixed with 0.2% of A at a pressure of about 3 mm.

Electric discharge device suitable for use as a light source. Ernst Friederich (to General Elec. Co.). U. S. 2,177,705, Oct. 31. A sealed vitreous envelope contains an anode, a source of electrons such as BaO, and a material which emits light under bombardment by the electrons emitted, one surface of the anode consisting of an electrically conductive oxide which may be ZnO or Cb_2O_5, and the light-emitting material, which may be Ca tungstate, being interposed between the electron source and the oxide.

Gaseous electric discharge arc lamp. Willem Elenbaas (to General Elec. Co.). U. S. 2,177,695, Oct. 31. Within a hermetically sealed envelope are placed a gaseous elec. discharge lamp device and a series ballast means for the device consisting of an incandescent filament, and a resistance having a high negative temp. coeff. of elec. resistance, connected in series with the lamp device and filament in the envelope, to maintain the temp. of the filament substantially const. during the starting and operation of the lamp device.

Gaseous electric discharge lamp device suitable for use as a light source. Hans Ewest (to General Elec. Co.). U. S. 2,177,696, Oct. 31. A gaseous elec. discharge lamp device of the high-pressure type comprises a container which may be formed of quartz or glass together with thermionic electrodes sealed in the container, a gaseous atm. such as one of A and Hg in the container, and a refractory metal body such as a sphere of W or Ta carbide mounted in heat-receiving relation to the arc-discharge path between the electrodes, means to supply elec. energy to the refractory metal body, and means to control the temp. and the light output of such body.

Electric lamp. Alfred Rüttenauer (to General Elec. Co.). U. S. 2,176,151, Oct. 17. A lamp is described which comprises an elec. gaseous discharge device contg. Hg and having a coating of luminescent material exposed to the radiations therefrom, the material comprising a mixt. of substantially equal amts. of Cd silicate activated with 0.8% Mn and Zn Be silicate activated with 0.5 to 1.5% Mn in which the Zn and Be are present in equal mol. proportions, whereby the light produced by the lamp is a warm white having substantially the same high luminous efficiency as that of the Zn Be silicate alone.

High-pressure metal-vapor electric discharge lamp. Victor J. Francis. U. S. 2,177,702, Oct. 31. Spaced, flexible electrodes which may be formed of W, etc., are used with a gaseous filling such as Hg vapor, etc. (various structural details being described). U. S. 2,177,703 relates to a thermionic cathode adapted for use within an elec. gaseous discharge device, and comprising a porous body of metal such as W wire helixes the pores or interstices of which are filled with thermionically active material, the porous body being surrounded by a helix of refractory metal, with a lead extending from one end of the helix through the porous body in good thermal contact with it (the helix being spaced from the porous metal body). U. S. 2,177,704 relates to various structural, elec. and operative details of a high-pressure metal-vapor discharge device. Cf. *C. A.* **34**, 3342.

5—PHOTOGRAPHY

E. R. BULLOCK

A physicochemical tone-separation process for photography. Hans Zickendraht, Jr. *Helv. Chim. Acta* **22**, 1001-22(1939); cf. *C. A.* **32**, 48915.—Based on the two known facts, that (*a*) the emulsion of a light-sensitive paper is capable of being impressed by brightness values of a range which is considerably greater than can be reproduced when the paper is viewed by reflected light, and that (*b*) bleach baths exist which dissolve Ag but do not attack Ag_2S, a new chem. tone-sepn. process has been developed. In this process, under continuous visual inspection, the gradation curve of a prepd. photographic image can be altered, as desired, within wide limits. The mode of action of the various bleach and toning baths which are needed for the process has been investigated, and explained and classified in a new theory. It is shown by examples how the artistic claims of a picture can be realized through appropriate variations of the process. Finally, the theory and the explanation of the process have been established by photomicrographs, and a new microsensitometric method is given for investigation of the grain distribution in depth in the emulsion layer. Author

Silver in the photographic process. Karl Schaum. *Kolloid-Z.* **89**, 211-14(1939).—A discussion. A. O. A.

Bromoil. René Lamarre. *Rev. franç. phot. cinémat.* 19, 79-81(1938); *Phot. Abstracts* **19**, 49.—Expts. are described to det. the optimal conditions of development, bleaching and inking in the bromoil process. Formulas and working instructions are given.

Change in gradation by nucleus denudation. Lüppo-Cramer. *Phot. Ind.* **37**, 130-1(1939); cf. *C. A.* **33**, 5137.—The effects of bathing exposed high-speed plates in a 0.01% hypo soln. before developing with $K_3Fe(C_2O_4)_2$, or in a 0.01% KI soln. before developing with heavily bromided hydroquinone, are illustrated by spectrograms. In the former expt. the virtual speed is increased and the gradation softened, with a little fog, while in the latter there is merely an acceleration of the early stages of development. L.-C. calls attention to the appreciable difference in meaning which he intends to convey by the expressions "nucleus denudation" and "nucleus isolation"; the latter refers to the nuclei in the interior of the grains.
E. R. Bullock

Spontaneous alteration of the latent photographic image. F. Urbach and A. Wolinski. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse*, Abt. IIa, **147**, 29-36(1938).—Some emulsions give a higher d. if development does not follow exposure immediately; this suggests a change in the latent image with time. In the present paper, U. and W. consider and use, as a method of indicating very small changes of the latent image, the intermediate Herschel effect (*C. A.* **23**, 2112), which they had encountered in their own expts.: a difference of d. resulting from 2 ways of applying red light—either simultaneously with, or after, the white exposure. They present a simple calcn. showing that the d. should be higher in the former case—based on the assumption that the differential decrease in d. is proportional to the duration of the red exposure and independent of the time, relative to the white exposure, at which it is applied. The expt. evidence, however, does not support this assumption, since the d. is definitely higher in the case of succeeding exposure. This indicates a change of stability with time of the latent image, and subsequent expts. show that the stability is increasing rapidly at first, and still slowly increasing after 22 hrs.; the decrease in d. by red exposure is shown to be proportional to the logarithm of the time elapsed after the white exposure. U. and W. were not able to find any connection between the change in stability of the latent image and the change of the latent image mentioned at the beginning, for this phenomenon was practically absent in the emulsions used in this investigation. G. Kornfeld

Image tones by development. Bertrand L. Twinn. *Photo Art Monthly* **7**, 321-7(1939).—A review of methods of direct and indirect toning. E. R. B.

Print toning by dye-coupling. Robert Ballentine. *Photo Art Monthly* **6**, 369-70, 375(1938).—A review, and description of a particular method. E. R. B.

Mechanism of development. II. Development by hydroquinone. T. H. James. *J. Phys. Chem.* **44**, 42-57 (1940); cf. *C. A.* **33**, 61792.—The rate of development by hydroquinone in the absence of Na_2SO_3 and O_2 varies as the sq. root of the hydroquinone concn. and the 1st power of the OH^- concn. in the pH range 8.0-8.9. The rates measured approximate the av. rates of development of the

individual AgBr grains. The addn. of quinone to the developer results in an increase in the development rate, which is due to an effect, presumably of a decompn. product of the quinone, upon the double-layer elec. barrier. The quinone likewise attacks the development centers, resulting in a decrease in the no. of developed grains for a given exposure. The bivalent ion is the active developing agent. Reduction occurs heterogeneously at the Ag-Ag halide interface. Comparative rates are given for the development reaction, autoxidation, and the Ag-catalyzed reaction of Ag ion with a series of substituted hydroquinones. Author

The action of corpuscular rays on the photographic emulsion. H. Wambacher. *Z. wiss. Phot.* **38**, 38–68(1939); cf. *C. A.* **33**, 2798⁴.—A review and bibliography (of about 70 references) are given of the photographic action of corpuscular rays, i. e., electrons, ions, protons, deuterons, etc. C. H. Evans

Direct traces of corpuscular rays in the photographic layer as a method of measurement in nuclear physics. I. General survey. E. Schopper. *Z. angew. Phot.* **1**, 21–8 (1939); cf. *C. A.* **33**, 3680¹. - The general phys. requirements for photographic registration of corpuscular rays are treated, and the possibilities of this method are shown by several examples. Special plates obtained from Agfa proved to be valuable in the application of this method, since, without pretreatment, they were microscopically free from fog. C. H. Evans

The direct photochemical bleaching of photoiodides. Luppo-Cramer. *Phot. Korr.* **75**, 129–32(1939); cf. *C. A.* **34**, 335¹.—Plates coated with a gelatino-iodide emulsion prepd. with a slight excess of KI, and soaked in a 2% $K_2S_2O_8$ soln. for 2 min. and dried, are first exposed uniformly to bright daylight until the emulsion acquires a gray-violet coloration, when they are washed in running H_2O for 1 hr. and dried, and then reëxposed to daylight behind an Eder-Hecht tablet. In a given time, bleaching of the print-out effect is seen to be appreciably more extensive than with a correspondingly prepd. and treated bromide emulsion. The gray-violet Ag photoiodide reassumes, in the more heavily exposed area, the pure yellowish white color of AgI and, on fixing, is glass-clear while the margin is brown-orange. There is appreciable yellow and red sensitivity, and the deposit under these particular tablet strips is, when fixed, not gray but reddish. These, and related, facts (such as the bleach-sensitizing and color effects of bathing the insolated iodide plates, after washing, in a 2% KBr soln. before exposing behind the tablet), and their possible explanation, are discussed. E. R. B.

A peculiar sensitization. Luppo-Cramer. *Phot. Korr.* **75**, 132–4(1939); cf. *C. A.* **30**, 4415² and preceding abstr.—An insolated AgI gelatin emulsion plate, after being "desilvered" with CrO_3 mixt., shows appreciably higher threshold speed (18° E.-H.) and greater contrast, on development in alk. amidol, than does a similar but uninsolated AgI plate, either treated with CrO_3 or not so treated. That this can be attributed to the sensitizing action of (persistently) adsorbed Ag ions is supported by the observation that a $AgNO_3$ treatment consisting of bathing the iodide plates in a 1% soln. for 3 min. is as effective as insolation. E. R. Bullock

Sensitization and desensitization of sensitive layers for high-energy rays. E. Schopper. *Phot. Ind.* **36**, 845 (1938); cf. *C. A.* **32**, 39²; **33**, 2829¹.—Optical sensitizers act very inefficiently or not at all for high-energy quanta such as x-rays, γ-rays or for corpuscular rays such as α-rays, protons or electrons. A new sensitizing action of pinakryptol yellow is described. Plates treated with this dye and exposed to β-rays *in vacuo* show a higher d. of developed grains along the tracks of these particles in the sensitive layer. W. F. Berg

Desensitization. R. Namias. *Progresso fot.* **45**, 331–5 (1938); *Phot. Abstracts* **19**, 39(1939).—Plates desensitized with pinakryptol green (I), but not with safranine (II), give an objectionable fog in caustic developers. A mixt. of a smaller amt. of I and more of II gives satisfactory results.

Mechanical properties of films. P. V. Kozlov. *Kino-Foto-Khim. Prom.* **1938**, No. 9, 28–32; *Khim. Referat. Zhur.* **2**, No. 3, 130; cf. *C. A.* **33**, 8513⁹.—There are 3 different regions on the stretching curve of films prepd. from cellulose ethers. The region of elastic deformation is most important for the motion-picture industry. This region of the stretching curve depends on the magnitude of the intermol. adherence of the cellulose ether complexes and, consequently, on the distance between the single chains or their regions, and on the nature of the cellulose ether. The region of plastic deformation (i. e., the sliding of the single chains in the film or their regions in relation to each other) is greater the greater the contact surface and the distance between them. The longer the chain, the greater is the possible contact surface and the greater is the work done in sliding of one chain in relation to another. The region of elastic deformation of the films with the oriented cellulose ether complexes (in the process of plastic stretching) is of secondary importance and is characterized as a "reserve" of durability. For best results the films must possess max. elastic and plastic deformability. W. R. Henn

Changes in the physicochemical properties of cinematographic films on prolonged standing. S. M. Solov'ev and Va. A. Shnaĭdman. *Kino-Foto.-Khim. Prom.* **1938**, No. 6, 54–6; *Khim. Referat. Zhur.* **2**, No. 3, 129–30; cf. *C. A.* **32**, 2855⁷.—There was but slight difference in the physicochem properties of emulsion-coated (unprocessed) and non-coated films which were stored outdoors for 6–7 years from those not exposed to the weather. Strength decreases with increased duration of storing. Aging under thermostatic conditions had the same effect on the dynamic properties as had natural aging. A splitting of the films into layers was observed in natural aging under unfavorable atm. conditions. W. R. Henn

Medium-speed single-layer films and exposure latitude. H. Starke. *Fot. Rundschau* **76**, 312(1939).—It has been found that a certain com. single-layer film of 17/10° DIN possesses sufficient latitude to give acceptable prints of a subject of normal lighting range, exposed from 0.004 to 4 sec. R. W. Henn

Photographic plates used in astronomy. M. G. Fracastoro. *Osservazioni e mem. R. osservatorio astrofisico Arcetri Univ. Firenze* No. **57**, 57–67(1939).—Data are presented of a new panchromatic emulsion (Ferrania Suiperpavero antihalo 20/10° DIN), which is being produced in Italy and which is highly sensitized for astronomical use. Microdensitometer curves of d. plotted against wave length show a smoother curve for the new emulsion as compared with the commonly used Agfa Isopan ISS, which has more pronounced peaks and depressions, especially in the red region of the spectrum. These peaks and depressions are further analyzed by curves comparing the new emulsion with the older types under different conditions of exposure at the various wave lengths at which the maxima and minima occur. C. R. Amadeo

Evaluation of motion-picture films by semimicro testing. J. E. Gibson and C. G. Weber. *J. Soc. Motion Picture Engrs.* **32**, 105–9(1939); cf. *C. A.* **33**, 4145³.—The article shows how the approx. quality and condition of film stored as permanent records can be detd. by tests for acidity, viscosity and residual $Na_2S_2O_3$; specimens weighing only 7 mg. each were used. These tests are recommended to archivists and librarians for detg. the condition of films in their custody, so that the necessity for making duplicates can be detd. before damage by deterioration is serious enough to be visible. J. G. Streiffert

Preparation of "magic photographs." Felix Formstecher. *Phot. Ind.* **36**, 1014–15(1938); *Phot. Abstracts* **19**, 78.—A review of the methods used for the prepn. of "magic photographs," i. e., bleached images on paper made visible by the action of some chemical or of light.

Methods of producing patterns on cloth (Freytag) **25.** Methods for prepn. of starting substances for sensitizers of quinoline series—isocyanines (Alekseeva) **10.**

Color photography. Lothar Jakob and Bruno Wendt

(to Agfa Ansco Corp.). U. S. 2,177,257, Oct. 24. A process of producing colored photographic pictures comprises exposing to light a photographic material provided with at least one emulsion layer contg. a light-sensitive Ag halide, transforming the latent image into a Ag halide image, converting the Ag halide image by an amine capable of being diazotized or an antidiazotate thereof, the compd. contg. a mercapto group, an ethinyl group or an imino group, the H atom of the group being capable of being exchanged for a metal, into an image of the corresponding org. Ag compd. and transforming the image into an azo-dye picture.

Color photography. Edwin B. Hesser and Eva L. V. Hesser (to Photocolor Corp. of America). U. S. 2,177,342, Oct. 24. A method of producing a multicolor photographic record involves exposing from the same side 2 regions of photographic film having 2 sensitive layers arranged in superposition, the first layer nearest the lens being sensitive to blue and green but not to red, the second layer being effectively sensitive to red only, one region only being exposed through a yellow filter for recording a portion of the spectrum in the first layer and another portion of the spectrum in the second layer, and the other region being exposed without any filter for recording another portion of the spectrum in the second layer of such other region.

Color photography. Ernst Bauer (to Agfa Ansco Corp.). U. S. 2,177,632, Oct. 31. Color photographs are produced by a process which involves exposing to light controlled by an object to be reproduced, a 3-layer photographic element, two layers of the element comprising a color-forming development component fast to diffusion for the blue and the red picture, resp., and one layer comprising a substantive azo dye component; developing the element with an aromatic amino developer, thereby forming a Ag and a color picture in the two first-named layers in a single development step, and a Ag picture in the second-named layer, removing the undeveloped Ag salt, converting the residual Ag picture into a Ag antidiazotate picture and causing the substantive azo-dye component to couple with the silver-antidiazotate.

Color photography. Veracol Film Syndicate Ltd. and Humphrey Desmond Murray. Brit. 507,611, June 19, 1939. A light-sensitive Ag salt emulsion is developed by means of an aromatic amino developing agent and contains as a color-former a compd. of formula $X.CH_2.CH(CH_2COCH_2CONRR')_2$, wherein X is an O or a S atom, R is H or an alkyl, e. g., Me, Et, Pr or higher alkyl, aralkyl e. g., benzyl, alicyclic, e. g., cyclohexyl, aryl, e. g., Ph, or azole, e. g., benzothiazole, group and R′ is also a H atom or 1 of the above groups. R and R′ may be substituted with halogen atoms or OH, alkoxy, NO_2, NH_2, substituted NH_2, Bz or phenylazo groups. Color-formers specified are furoylacetamide and the *N*-furoylacetyl derivs. of the following: monoamines and their halo and NO_2 derivs., e. g., $PhNH_2$, *p*-nitroaniline, *p*-chloroaniline, 2,5-dichloroaniline, *C*-alkylanilines and their halo and NO_2 derivs., e. g., *m*- and *p*-toluidine, 2,5-dimethylaniline, 2,3,5,6-tetramethylaniline, *C*-alkoxy and *C*-aryloxyanilines and their halo and NO_2 derivs., e. g., anisidines, phenetidines, [illegible]-phenoxyaniline, di- and poly-[illegible]diamine, benzidine and bi-anisidine, α- and β-naphthylamine, *p*-aminophenylmorpholine, 2-amino-6-methylbenzothiazole and *p*-amino-*p*′-hydroxyazobenzene. Similar thiophene derivs. may be used. Developing agents specified are alkylphenylenediamines, e. g., dimethyl- and diethyl-*p*-phenylenediamines, and their derivs., alkyltolylenediamines and alkylnaphthylenediamines.

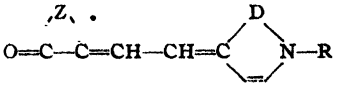
Photomechanical color process. John A. C. Yule (to Eastman Kodak Co.). U. S. 2,176,518, Oct. 17. In a photomech. process employing 3 subtractive-color coloring materials for the reproduction of a multicolored original, a method of making a color printer comprises exposing a sensitive photographic layer to one of the primary colors from the original and to a different color from the original, developing the layer, prepg. a positive image corresponding to a color from the original effectively the same as the different color, making a negative comprising the developed layer masked by the positive and printing a positive printer therefrom. Cf. *C. A.* **33**, 7226[1].

Coloring photographic images. Wm. H. Evans. U. S. 2,176,585, Oct. 17. A process of coloring a photographic image involves developing a light-exposed Ag halide type photographic emulsion, treating it without fixing in a bath which simultaneously removes the reduced Ag image and forms a latent non-Ag image capable of becoming a color image when treated with acid dyes of the type which are nondyeing to gelatin in the presence of an alkali, in the presence of an activator for the dyes such as NaOAc, removing the Ag salts in a fixing bath, and then staining the latent image with a soln. contg. NaOAc and an acid dye of the type mentioned.

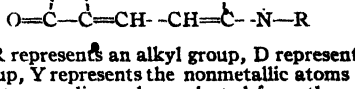
Color correction of negatives and printing plates. Wm. J. Wilkinson (50% to Miehle Printing Press and Mfg. Co.). U. S. 2,177,195, Oct. 24. A process is employed which involves making: (*a*) yellow, red and blue color-sepn. photographic negatives of a multicolor subject, (*b*) a positive photographic transparency through the yellow-sepn. negative, (*c*) a corrective photographic overlay-transparency for the yellow-sepn. negative comprising making a photographic transparency through the positive transparency and the red-sepn. negative while the two are in superposed registered relation, (*d*) correction of the yellow-sepn. negative by applying the overlay thereto and in register therewith, (*e*) a second positive photographic transparency through the red-sepn. negative, (*f*) a corrective photographic overlay-transparency for the red-sepn. negative through the second positive transparency and the blue-sepn. negative while the two are in superposed registered relation, (*g*) correction of the red-sepn. negative by applying its corrective overlay thereto and in register therewith, and (*h*) corresponding printing plates from the corrected yellow-sepn. and red-sepn. negatives and the blue-sepn. negative.

Specially sensitized photographic emulsions. Burt H. Carroll and Edward P. Davey (to Eastman Kodak Co.). U. S. 2,177,635, Oct. 31. See Can. 380,343 (*C. A.* **33**, 5308[2]).

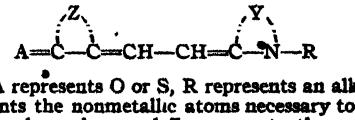
Photographic sensitizing dyes. Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 2,170,803, Aug. 29. Numerous examples are given of the production of merocyanine dyes of the general formulas



and



wherein R represents an alkyl group, D represents a phenylene group, Y represents the nonmetallic atoms necessary to complete a cyclic nucleus selected from the group consisting of 5- or 6-membered heterocyclic nucleus and Z represents the nonmetallic atoms necessary to complete a rhodanine nucleus. E. g., 5-(1-ethyl-2-quinolylidene)-3-phenylrhodanine is produced by refluxing 3-phenylrhodanine with 2-iodoquinoline ethiodide and triethylamine and abs. EtOH. U. S. 2,170,804 relates to the production of 5-(2-ethyl-1-benzoxazolylideneethylidene)rhodanine, 3-ethyl-5-(2-ethyl-1-benzoxazolylideneethylidene) rhodanine and various dyes of the general formula



wherein A represents O or S, R represents an alkyl group, Y represents the nonmetallic atoms necessary to complete a benzoxazole nucleus and Z represents the nonmetallic atoms necessary to complete a five-membered heterocyclic nucleus containing a nuclear N and a nuclear S atom, by a

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Desensitization. R. Namias. *Progresso fot.* **45**, 331-5 (1938); *Phot. Abstracts* **19**, 39(1939).—Plates desensitized with pinakryptol green (I), but not with safranine (II), give an objectionable fog in caustic developers. A mixt. of a smaller amt. of I and more of II gives satisfactory results.

Mechanical properties of films. P. V. Kozlov. *Kino-Foto-Khim. Prom.* **1938**, No. 9, 28-32; *Khim. Referat. Zhur.* 2, No. 3, 130; cf. *C. A.* **33**, 8513[9].—There are 3 different regions on the stretching curve of films prepd. from cellulose ethers. The region of elastic deformation is most important for the motion-picture industry. This region of the stretching curve depends on the magnitude of the intermol. adherence of the cellulose ether complexes and, consequently, on the distance between the single chains or their regions, and on the nature of the cellulose ether. The region of plastic deformation (i. e., the sliding of the single chains in the film or their regions in relation to each other) is greater the greater the contact surface and the distance between them. The longer the chain, the greater is the possible contact surface and the greater is the work done in sliding of one chain in relation to another. The region of elastic deformation of the films with the oriented cellulose ether complexes (in the process of plastic stretching) is of secondary importance and is characterized as a "reserve" of durability. For best results the films must possess max. elastic and plastic deformability. W. R. Henn

Changes in the physicochemical properties of cinematographic films on prolonged standing. S. M. Solov'ev and Va. A. Shnaidman. *Kino-Foto.-Khim. Prom.* **1938**, No. 6, 51-6; *Khim. Referat. Zhur.* 2, No. 3, 129-30; cf. *C. A.* **32**, 2855[7].—There was but slight difference in the physicochem. properties of emulsion-coated (unprocessed) and non-coated films which were stored outdoors for 6-7 years from those not exposed to the weather. Strength decreases with increased duration of storing. Aging under thermostatic conditions had the same effect on the dynamic properties as has natural aging. A splitting of the films into layers was observed in natural aging under unfavorable atm. conditions. W. R. Henn

Medium-speed single-layer films and exposure latitude. H. Starke. *Fot. Rundschau* **76**, 312(1939).—It has been found that a certain com. single-layer film of 17/10° DIN possesses sufficient latitude to give acceptable prints of a subject of normal lighting range, exposed from 0.001 to 4 sec. R. W. Henn

Photographic plates used in astronomy. M. G. Fracastoro. *Osservazioni e mem. R. osservatorio astrofisico Arcetri Univ. Firenze* No. **57**, 57-67(1939).—Data are presented of a new panchromatic emulsion (Ferrania Suiperpavero antihalo 20/10° DIN), which is being produced in Italy and which is highly sensitized for astronomical use. Microdensitometer curves of d. plotted against wave length show a smoother curve for the new emulsion as compared with the commonly used Agfa Isopan ISS, which has more pronounced peaks and depressions, especially in the red region of the spectrum. These peaks and depressions are further analyzed by curves comparing the new emulsion with the older types under different conditions of exposure at the various wave lengths at which the maxima and minima occur. C. R. Amadeo

Evaluation of motion-picture films by semimicro testing. J. E. Gibson and C. G. Weber. *J. Soc. Motion Picture Engrs.* **32**, 105-9(1939); cf. *C. A.* **33**, 4145[3].—The article shows how the approx. quality and condition of film stored as permanent records can be detd. by tests for acidity, viscosity and residual $Na_2S_2O_3$; specimens weighing only 7 mg. each were used. These tests are recommended to archivists and librarians for detg. the condition of films in their custody, so that the necessity for making duplicates can be detd. before damage by deterioration is serious enough to be visible. J. G. Streiffert

Preparation of "magic photographs." Felix Formstecher. *Phot. Ind.* **36**, 1014-15(1938); *Phot. Abstracts* **19**, 78.—A review of the methods used for the prepn. of "magic photographs," i. e., bleached images on paper made visible by the action of some chemical or of light.

Methods of producing patterns on cloth (Freytag) **25**. Methods for prepn. of starting substances for sensitizers of quinoline series—isocyanines (Alekseeva) **10**.

Color photography. Lothar Jakob and Bruno Wendt

to Agfa Ansco Corp.). U. S. 2,177,257, Oct. 24. A process of producing colored photographic pictures comprises exposing to light a photographic material provided with at least one emulsion layer contg. a light-sensitive Ag halide, transforming the latent image into a Ag halide image, converting the Ag halide image by an amine capable of being diazotized or an antidiazotate thereof, the compd. contg. a mercapto group, an ethinyl group or an imino group, the H atom of the group being capable of being exchanged for a metal, into an image of the corresponding org. Ag compd. and transforming the image into an azo-dye picture.

Color photography. Edwin B. Hesser and Eva L. V. Hesser (to Photocolor Corp. of America). U. S. 2,177,342, Oct. 24. A method of producing a multicolor photographic record involves exposing from the same side 2 regions of photographic film having 2 sensitive layers arranged in superposition, the first layer nearest the lens being sensitive to blue and green but not to red, the second layer being effectively sensitive to red only, one region only being exposed through a yellow filter for recording a portion of the spectrum in the first layer and another portion of the spectrum in the second layer, and the other region being exposed without any filter for recording another portion of the spectrum in the second layer of such other region.

Color photography. Ernst Bauer (to Agfa Ansco Corp.). U. S. 2,177,632, Oct. 31. Color photographs are produced by a process which involves exposing to light controlled by an object to be reproduced, a 3-layer photographic element, two layers of the element comprising a color-forming development component fast to diffusion for the blue and the red picture, resp., and one layer comprising a substantive azo dye component; developing the element with an aromatic amino developer, thereby forming a Ag and a color picture in the two first-named layers in a single development step, and a Ag picture in the second-named layer, removing the undeveloped Ag salt, converting the residual Ag picture into a Ag antidiazotate picture and causing the substantive azo-dye component to couple with the silver-antidiazotate.

Color photography. Veracol Film Syndicate Ltd. and Humphrey Desmond Murray. Brit. 507,611, June 19, 1939. A light-sensitive Ag salt emulsion is developed by means of an aromatic amino developing agent and contains as a color-former a compd. of formula $X.CH{:}CH.-CH{:}CHCOCH_2CONRR'$, wherein X is an O or a S atom, R is H or an alkyl, e. g., Me, Et, Pr or higher alkyl, aralkyl e. g., benzyl, alicyclic, e. g., cyclohexyl, aryl, e. g., Ph, or azole, e. g., benzothiazole, group and R′ is also a H atom or 1 of the above groups. R and R′ may be substituted with halogen atoms or OH, alkoxy, NO_2, NH_2, substituted NH_2, Bz or phenylazo groups. Color-formers specified are furoylacetamide and the *N*-furoylacetyl derivs. of the following: monoamines and their halo and NO_2 derivs., e. g., $PhNH_2$, *p*-nitroaniline, *p*-chloroaniline, 2,5-dichloroaniline, *C*-alkylanilines and their halo and NO_2 derivs., e. g., *m*- and *p*-toluidine, 2,5-dimethylaniline, 2,3,5,6-tetramethylaniline, *C*-alkoxy and *C*-aryloxyanilines and their halo and NO_2 derivs., e. g., anisidines, phenetidines, 2,5-diethoxyaniline, *o*-phenoxyaniline, di- and polyamines, e. g., *p*-phenylenediamine, benzidine and bianisidine, α- and β-naphthylamine, *p*-aminophenylmorpholine, 2-amino-6-methylbenzothiazole and *p*-amino-*p*′-hydroxyazobenzene. Similar thiophene derivs. may be used. Developing agents specified are alkylphenylenediamines, e. g., dimethyl- and diethyl-*p*-phenylenediamines, and their derivs., alkyltolylenediamines and alkylnaphthylenediamines.

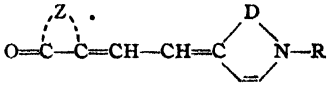
Photomechanical color process. John A. C. Yule (to Eastman Kodak Co.). U. S. 2,176,518, Oct. 17. In a photomech. process employing 3 subtractive-color coloring materials for the reproduction of a multicolored original, a method of making a color printer comprises exposing a sensitive photographic layer to one of the primary colors from the original and to a different color from the original, developing the layer, prepg. a positive image corresponding to a color from the original effectively the same as the different color, making a negative comprising the developed layer masked by the positive and printing a positive printer therefrom. Cf. *C. A.* **33**, 7226[1].

Coloring photographic images. Wm. H. Evans. U. S. 2,176,585, Oct. 17. A process of coloring a photographic image involves developing a light-exposed Ag halide type photographic emulsion, treating it without fixing in a bath which simultaneously removes the reduced Ag image and forms a latent non-Ag image capable of becoming a color image when treated with acid dyes of the type which are nondyeing to gelatin in the presence of an alkali, in the presence of an activator for the dyes such as NaOAc, removing the Ag salts in a fixing bath, and then staining the latent image with a soln. contg. NaOAc and an acid dye of the type mentioned.

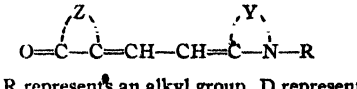
Color correction of negatives and printing plates. Wm. J. Wilkinson (50% to Miehle Printing Press and Mfg. Co.). U. S. 2,177,195, Oct. 24. A process is employed which involves making: (*a*) yellow, red and blue color-sepn. photographic negatives of a multicolor subject, (*b*) a positive photographic transparency through the yellow-sepn. negative, (*c*) a corrective photographic overlay-transparency for the yellow-sepn. negative comprising making a photographic transparency through the positive transparency and the red-sepn. negative while the two are in superposed registered relation, (*d*) correction of the yellow-sepn. negative by applying the overlay thereto and in register therewith, (*e*) a second positive photographic transparency through the red-sepn. negative, (*f*) a corrective photographic overlay-transparency for the red-sepn. negative through the second positive transparency and the blue-sepn. negative while the two are in superposed registered relation, (*g*) correction of the red-sepn. negative by applying its corrective overlay thereto and in register therewith, and (*h*) corresponding printing plates from the corrected yellow-sepn. and red-sepn. negatives and the blue-sepn. negative.

Specially sensitized photographic emulsions. Burt H. Carroll and Edward P. Davey (to Eastman Kodak Co.). U. S. 2,177,635, Oct. 31. See Can. 380,343 (*C. A.* **33**, 5308[2]).

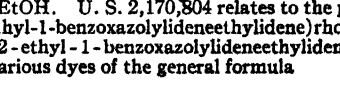
Photographic sensitizing dyes. Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 2,170,803, Aug. 29. Numerous examples are given of the production of merocyanine dyes of the general formulas



and

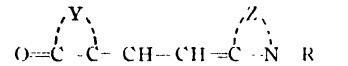


wherein R represents an alkyl group, D represents a phenylene group, Y represents the nonmetallic atoms necessary to complete a cyclic nucleus selected from the group consisting of 5- or 6-membered heterocyclic nucleus and Z represents the nonmetallic atoms necessary to complete a rhodanine nucleus. E. g., 5-(1-ethyl-2-quinolylidene)-3-phenylrhodanine is produced by refluxing 3-phenylrhodanine with 2-iodoquinoline ethiodide and triethylamine and abs. EtOH. U. S. 2,170,804 relates to the production of 5-(2-ethyl-1-benzoxazolylideneethylidene)rhodanine, 3-ethyl-5-(2-ethyl-1-benzoxazolylideneethylidene) rhodanine and various dyes of the general formula



wherein A represents O or S, R represents an alkyl group, Y represents the nonmetallic atoms necessary to complete a benzoxazole nucleus and Z represents the nonmetallic atoms necessary to complete a five-membered heterocyclic nucleus containing a nuclear N and a nuclear S atom, by a

process which may comprise treating, in the presence of a trialkylamine condensing agent, a 1-(β-anilinovinyl)benzoxazole alkyl quaternary salt with a five-membered heterocyclic compd. contg. a reactive nuclear methylene group adjacent to a nuclear carbonyl group or a six-membered heterocyclic compd. contg. a reactive nuclear methylene group adjacent to a nuclear carbonyl group. U. S. 2,170,805 relates to photographic gelatino-Ag halide emulsions sensitized with such dyes. U. S. 2,170,806 relates to the production of 1-(2-ethyl-1-benzoxazolylideneethylidene)-2(1)-thianaphthenone, 1-(3-methyl-2-thiazolinylideneethylidene)-2(1)-thionaphthenone, and various dyes of the general formulas



and



wherein D represents a vinylene or phenylene group, R represents an alkyl group, Y represents the non-metallic atoms necessary to complete a 2(1)-thianaphthenone nucleus and Z represents the nonmetallic atoms necessary to complete a 5- or 6-membered heterocyclic nucleus. U. S. 2,170,807 relates to the production of 5-(2-ethyl-1-benzothiazolylideneethylidene)-2,4,6-triketohexahydropyrimidine and various merocarbocyanine dyes derived from barbituric acids.

2-Alkylhexahydrobenzo-thiazoles and -selenazoles. Walter Zeh (to Agfa Ansco Corp.). U. S. 2,173,491, Sept. 19. See Can. 377,534 (*C. A.* **33**, 2148[7]).

Photographic sound track on colored film. Charles F. Jones (25% each to J. D. Grant and C. W. Durbrow). U. S. 2,176,303, Oct. 17. A method of reproducing a photographic sound track on a film comprising a plurality of superposed differently sensitized emulsion strata involves: printing the sound track to the film using a printing light to which but one of the strata is sensitive; completely exposing the sound track areas in the other of the strata to light to which they are sensitive; developing the images thereby obtained; bleaching the images; exposing the film to light; redeveloping the film; and coloring the resulting sound track image in the first stratum.

Polarizing layers suitable for use in photography. Gustav Wilmanns and Wilhelm Schneider (to Agfa Ansco Corp.). U. S. 2,176,516, Oct. 17. A polarizing body comprises a solid suspending medium such as a cellulose ester compn. and particles which are addn. compds. constituted of a heterocyclic N compd. contg. in its mol. only one heterocyclic N nucleus which has either 5 or 6 ring members, such as 2,5-diphenyloxazole, and a metal salt, such as $FeCl_3$ or $CuCl_2$, or Br or I, these particles being embedded in the suspending medium with their polarizing axes substantially parallel.

Photographic printing on lenticular films. John Eggert and Gerd Heymer (to I. G. Farbenind. A.-G.). U. S. 2,177,417, Oct. 24. Various optical and operative details.

Blue-print paper and cloth. John Holden (to Keuffel & Esser Co.). U. S. reissue 21,240, Oct. 17. A reissue of original patent No. 2,158,422 (*C. A.* **33**, 6712[9]).

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

Lead suboxide. L. Leighton Bircumshaw and Ivan Harris. *J. Chem. Soc.* **1939**, 1637-9. The decompn. of PbC_2O_4 at 0.01 mm. at temps. of 310° to 470° is expressed by $3PbC_2O_4 = Pb + 2PbO + 4CO_2 + 2CO$, as detd. by analysis of the gases evolved. The residue of the decompn. is a mixt. of Pb and red tetragonal PbO rather than the suboxide, Pb_2O. This was confirmed by x-ray diffraction patterns and by elec. cond., which for the decompn. residue was 10,000 times the value for PbO. A. F.

Some new observations on hydrazine. C. H. Bamford. *Trans. Faraday Soc.* **35**, 1239-46(1939).—Pure hydrazine vapor when sparked at 100° explodes and a yellow flame accompanies the decompn. The products are NH_3, H_2 and N_2, the NH_3 and H_2 being approx. equiv. The explosion has the usual lower and upper pressure limits. The heterogeneous decompn. at a quartz surface in the presence of NO was also studied and as a result it is suggested that the primary step in the decompn. is the dissocn. into 2 NH_2. Victor R. Deitz

Evidence for existence of a selenium iodide. James D. McCullough. *J. Am. Chem. Soc.* **61**, 3401-2(1939).—Absorption spectra give strong evidence in favor of compd. formation between selenium and iodine in CS_2. Soly. data give quant. measurements of the equil. between Se and I in CCl_4. These data indicate the presence of a compd. having the formula Se_nI_2 with n undetd. A. B. Garrett

The preparation of sulfamic acid by the hydroxylamine-sulfur dioxide reaction. H. H. Sisler and L. F. Audrieth. *J. Am. Chem. Soc.* **61**, 3389-91(1939).—The yield of sulfamic acid from the reaction of hydroxylamine salts with SO_2 is greatly increased and the time required for the reaction decreased by operating under pressure. This is also true of the acetoxime reaction. The reaction is inhibited by excessive concns of hydronium ions. A mechanism for the reaction is proposed involving coördination between the hydroxylamine mol. and SO_2 with subsequent rearrangement to sulfamic acid. A. B. Garrett

The action of liquid ammonia upon sulfur trioxide addition compounds. H. H. Sisler and L. F. Audrieth. *J. Am. Chem. Soc.* **61**, 3392-3(1939). The reactions of NH_3 with $ClSO_3H$ and $ClSO_3Na$ are ammonolytic in character, involving replacement of a negative constituent by the NH_2 group and leading to the formation of the sulfamate. The same mechanism also characterizes the reaction of NH_3 on addn. compds. of SO_3 with pyridine, dimethylaniline and dioxane. A. B. Garrett

Acetometallates. II. Acetozincate. Alexander Lehrman and Philip Skell. *J. Am. Chem. Soc.* **61**, 3340-2 (1939).—The liquidus curve of the binary system zinc acetate–sodium acetate was detd. and the compd. $2NaC_2H_3O_2.Zn(C_2H_3O_2)_2$ or $Na_2Zn(C_2H_3O_2)_4$ shown to exist. The analogy between this compd. and $Na_2Zn(OH)_4$ is discussed. A. B. Garrett

Kinetics of complex formation in nonaqueous solutions in connection with electrical conductivity. II. E. Ya. Gorenbein. *J. Gen. Chem.* (U. S. S. R.) **9**, 1369-72 (1939).—See *C. A.* **33**, 5267[8]. E. J. C.

Ephraim, Fritz. Inorganic Chemistry. 3rd English ed. by P. C. L. Thorne and A. M. Ward. London: Gurney and Jackson. 877 pp. 28s.

Partington, J. R. College Course of Inorganic Chemistry. London: Macmillan & Co., Ltd. 658 pp. 8s. 6d. Reviewed in *Chemistry & Industry* **1939**, 974.

Gmelins Handbuch der anorganischen Chemie, System-Nr. 59, Eisen. Teil. C, Lieferung 2. Prufung der Kerbschlagzähigkeit. Sup. Roy. 288 pp. RM. 33. Teil F2 Lieferung 2: Nachweis und Bestimmung von Fremdelementen in Eisen und Stahl. Sup. Roy. 224 pp. RM. 27. Berlin: Verlag Chemie G. m. b. H. Cf. *C. A.* **33**, 4544[8].

Gmelins Handbuch der anorganischen Chemie. 1 Ergänzungband, Teil 1. Aluminum Legierungen Patentsammlung. by **G. Apel.** Edited by **E. Pietsch.** Berlin: Verlag Chemie G. m. b. H. 880 pp. RM. 72.

7—ANALYTICAL CHEMISTRY

W. T. HALL

X-ray diffraction applied to chemical analysis. Wheeler P. Davey. *J. Applied Phys.* **10**, 820-30(1939).—A review. E. H.

Qualitative spectrographic analysis in the arc with graphite electrodes. W. C. Pierce, O. Ramirez Torres and W. W. Marshall. *Ind. Eng. Chem., Anal. Ed.* **12**, 41 5(1940); cf. *C. A.* **33**, 4153⁸.—The methods and app. for qual. spectrographic analysis with a d. c. arc are described and from comparative studies the conclusion is drawn that anode excitation is generally preferable. The factors affecting the sensitivity are discussed and sensitivity data are given for typical analyses in which traces of elements in materials such as dolomite, silicon, pig iron and com. Pb are detected. W. T. H.

Direct chemical rapid analysis with the mercury dropping electrode. J. Bocke and H. van Suchtelen. *Z. Elektrochem.* **45**, 753-6(1939).— The methods used for working with the moving Hg electrode are described and compared with respect to the time requirements. Considerable time can be saved if the current is registered for the indication of the half-wave potential. Two methods of arriving at these values are outlined. W. T. H.

A vapor pressure method for the estimation of volatile solvents. Charles E. Couchman and Wilmer H. Schulze. *J. Ind. Hyg. Toxicol.* **21**, 256 63(1939).— The vapor-laden air is drawn through a trap immersed in a dry-ice and acetone mixt., which freezes out the vapor. The trap is then evacuated while in the freezing mixt. and the pressure of the compd in the vaporous stage is measured at room temp. Diagrams of app. are given. A. L. Elder

A vapor pressure method for determination of the concentration of some organic solvents in air. Kingsley Kay, Geo. M. Reece and Philip Drinker. *J. Ind. Hyg. Toxicol.* 21, 264 9(1939). Org. solvents in air were frozen out in a 9-ft. glass coil. The partial pressure of the solvent can be accurately estd. Water is kept in the coil and its vapor pressure subtracted from the readings. Accuracy of ±5% is claimed. A. L. Elder

A new vapor pressure instrument for determining organic solvents in air. Leslie Silverman, Geo. M. Reece and Philip Drinker. *J. Ind. Hyg. Toxicol.* **21**, 270 8 (1939).— The instrument consists of 2 identical 65-cc brass cells partially filled with bronze balls and provided with inlet and outlet valves. The contaminated atm. is drawn through one cell and frozen out. All valves are then closed, the instrument is warmed in a water bath, connected to a manometer and the pressure read. Diagrams of app. are shown. A. L. Elder

Quantitative absorption spectrophotometry—an internal control method. J. S. Owens. *Ind. Eng. Chem., Anal. Ed.* **11**, 643 6(1939). Absorption spectra of a comparison material and of some material whose concn. is to be detd. by the amt. of its absorption at a given wave length are photographed on the same photographic plate. The intensity ratio of wave lengths, preferably in the peak of the absorption band, of the comparison and second substance is detd., from which extinction coeffs. (k) are calcd. These coeffs. are converted to concn. by an empirical analytical curve. The method was applied for detg. the monomer content (bands at 2910 A. and 2830 A.) in partially polymerized styrene. The accuracy in detg. k in the range 0.08 to 0.12 from a single spectrum was $k \pm 0.006$ for monostyrene. The method was used for the range from 0.58 to 100% monomer content. L. W. S.

Computing titration blanks. Francis W. Glaze. *Ind. Eng. Chem., Anal. Ed.* **12**, 14 15(1940).—In making precise detns. by titration it is customary to allow for the quantity of reagent which would be required to give the end point when none of the substance titrated is really present. This is commonly done by carrying out a "blank" detn. in exactly the same way that the analysis is made. Park, *C. A.* **30**, 1322⁷, has recommended the computation of the value of the blank from a series of detns. with varying quantities of the substance in question from which a plot can be made with the quantities of reagent used as ordinates and the actual content of the solns. tested as abscissas. From this plotted line the value at O concn. can be detd. by extrapolation. This method is good if the results of the expts. fall in a straight line, which is seldom the case. It seems preferable, therefore, to calc. the slope of the line from a series of expts. by the method of least squares. This procedure is explained in connection with the titration of Zn^{++} by ferrocyanide and of B_2O_3 with $Ba(OH)_2$. W. T. H.

Photelometric study of the lead-dithizone system at 610 millimicrons. Charles L. Guettel. *Ind. Eng. Chem., Anal. Ed.* **11**, 639-40(1939).— The results of expts. show that 15 ml. of soln. contg. 12 mg. dithizone per l. is appropriate for detg. 15-50 γ of Pb. For lower Pb concns. it is better to use 15 ml. of dithizone soln. contg. 4 mg. per l. The standard Pb solns. were prepd. as outlined by the Assoc. Official Agr. Chemists but the procedure for making the test was modified somewhat. W. T. H.

Calibration and use of the gas interferometer. F. A. Patty. *J. Ind. Hyg. Toxicol.* **21**, 469-74(1939).—A portable gas interferometer is recommended for the analysis of gas contg. org. vapors. Unit refractivity changes for 40 solvents are given. A. L. Elder

Use of interferometer for two-component mixtures. C. C. Harrold and L. E. Gordon. *J. Ind. Hyg. Toxicol.* **21**, 191-7(1939). CO_2 and moisture-free air are used in the reference standard. Aviation gasoline, CCl_4 and mixts. were studied. A. L. Elder

Mercaptobenzimidazole as an analytical reagent. M. Kuraš. *Collection Czech. Chem. Commun.* **11**, 321–4 (1939).— See *C. A.* **33**, 7233³. H. Game

Indicators. A. Voigt. *Oberflachentech.* **16**, 215–16 (1939).— A review with 8 references. M. Hartenheim

Mercury iodocyanide as acid indicator for organic compounds, particularly for ring nitro compounds. Langhans. *Nitrocellulose* **10**, 163 5, 184–5, 207 8(1939). A soln. of 12.6 g. $Hg(CN)_2$ in 200 cc. H_2O and 6.3 g. I in 12.6 g. KI in 200 cc. H_2O gives immediate sepn. of HgI_2 with the slightest trace of acid. Acidity tests with hundreds of substances are shown. E. M. Symmes

Amperometric (polarometric) titrations. I. The amperometric titration of lead with dichromate or chromate. I. M. Kolthoff and Yu-Djai Pan. *J. Am. Chem. Soc.* **61**, 3402 9(1939). Amperometric titrations are those in which the current which passes between 2 suitable electrodes at a const. e. m. f. is measured. Only one or both of the electrodes may be placed in the titration medium. The end point is found as the point of intersection of 2 lines giving the change of the current before and after the equivalence point. The principle underlying this type of titration is discussed as well as the application to the titration of Pb^{++}. Even 0.001 *M* Pb solns. can be titrated with a high degree of accuracy. Pb can be titrated amperometrically in the presence of large amts. of Ba when the soln. is slightly acid with $HClO_4$. A. B. Garrett

Test for magnesium with *p*-nitrobenzeneazoresorcinol. Effect of diverse ions. J. P. Mehlig and K. R. Johnson. *Ind. Eng. Chem., Anal. Ed.* **12**, 30-1(1940).—Suitsu and Okuna (*C. A.* **20**, 300) showed that 0.002 mg. of Mg can be detected by the formation of a sky-blue lake with *p*-nitrobenzeneazoresorcinol. This has been called the S. and O. reagent. Other chemists have testified concerning the sensitivity of the test and shown that quite a no. of ions interfere. The purpose of the present work was to make a further study of interference. The effect of 44 other ions was studied. Although many of the cations of the first 3 groups in the usual qual. scheme interfere, they are easily removed by conventional methods. Al, Ba, Ca and Sr, which cause so much trouble when the attempt is made to detect Mg^{++} by forming $MgNH_4PO_4.6H_2O$, do not interfere at all. Very few anions cause trouble (As-

O_4^{---}, CrO_4^{--}, MnO_4^{-}) and although the test is not specific, it is satisfactory, efficient and very useful. W. T. H.

Manganese and chromium in steel. Modified persulfate-arsenite method. R. P. Forsyth and W. F. Barfoot. *Ind. Eng. Chem., Anal. Ed.* **11**, 625(1939).— The persulfate method for detg. Mn consists in treating the acid soln. with excess persulfate in the presence of Ag^+, the excess persulfate is destroyed by boiling, a measured vol. of standard arsenite is added and the excess titrated with $KMnO_4$. In this last reaction the As is oxidized completely to the quinquevalent state but the MnO_4^- is reduced somewhat indefinitely so that the soln. has to be standardized empirically. If 3 drops of 0.01 *M* OsO_4 is added to the soln., however, the MnO_4^- is reduced completely to Mn^{++} and the $KMnO_4$ can be standardized against $Na_2C_2O_4$. It is important that all excess persulfate be destroyed, which requires boiling for about 4 min. If Cr is present it is detd. with the Mn, then after the $KMnO_4$ titration, the Cr and Mn can be oxidized again, the resulting MnO_4 reduced, the Ag^+ pptd. with HCl and then the Cr detd. by itself. W. T. H.

Separation and colorimetric determination of rhenium and molybdenum. James I. Hoffman and G. E. F. Lundell. *J. Research Natl. Bur. Standards* **23**, 497–508 (1939).—For detg. either Re or Mo when only one of these elements is present, use can be made of the fact that a colored soln. is formed by the addn. of CNS^- + $SnCl_2$ but the reddish colors are so similar that the colorimetric detn. fails when both Re and Mo are present. If a soln. contg. perrhenate and molybdate in 6 *N* HCl is shaken with ether, most of the Mo can be made to pass into the ethereal layer by repeated treatments and nearly all of the Re will remain in the aq. layer. This serves to effect a fairly good sepn. but allowance must be made for the small quantities of both Re and Mo which go the wrong way. The ether sepn. seems to go better in the presence of a little $FeCl_3$. Then, if the aq. ext. is dild. to make the soln. 0.17 *N* in HCl a double extn. with KCNS + Hg + ether serves to remove the last traces of Mo in the ether where it is detd. colorimetrically and the quantity of Mo found should be added to that found in the original ether ext. The ethereal soln. now obtained contains the Re probably as $ReO(CNS)_4$ and the content of this red compd. can be detd. by colorimetric comparison with standards. After the removal of the ether from the original ether ext., which contains most of the Mo and very little Re, treatment with KCNS + Hg + ether in 2.5 *N* HCl serves to ext. the Mo as complex thiocyanate which has a blood-red color and is suitable for colorimetric comparison. Some authorities think that the Mo is not entirely in the trivalent state. The aq. layer will now contain a little Re which is detd. colorimetrically after reduction with KCNS + $SnCl_2$ + ether. The procedure can be shortened in many cases It is intended for the analysis of solns. contg. not more than 10 mg. of either element. Cr, Pt, Rh, V and W interfere somewhat and Cu, Au, Pd, Se and Te contaminate the Hg used so that it must be purified before it is used again. W. T. H.

The thiocyanate reaction of molybdenum. Yasumitu Uzumasa and Ken-iti Doi. *Bull. Chem. Soc. Japan* **14**, 337–43(1939).—By means of photoelec. studies, the conclusion is drawn that in the thiocyanate test, the Mo is reduced from molybdate to the quinquevalent state, possibly to $K_3[MoO(SCN)_5]$. To obtain the max. red color, the acid content should lie between 5 and 6% and it is best to add the KCNS reagent before the $SnCl_2$. If these conditions are not maintained, there is danger of colored Mo compds. being formed of other valence. W. T. H.

Determination of molybdenum in cast iron and steel. Calvin Sterling and W. P. Spuhr. *Ind. Eng. Chem., Anal. Ed.* **12**, 33–4(1940).—The proposed method consists in pptg. the Mo with α-benzoinoxime (cf. Knowles, *C. A.* **26**, 5273), dissolving the filtered and washed ppt. in aq. NH_3, filtering and pptg. the Mo as $PbMoO_4$ which is heated and weighed. The results of 14 analyses with samples contg. 0.2–0.70% Mo were excellent. W. T. H.

Determination of active oxygen in alkaline peroxides. I. Mario Sartori. *Ann. chim. applicata* **29**, 381–6 (1939).—Owing to the importance of the detn. of active O in alk. peroxides in the regeneration of air, various known methods were evaluated. The volumetric methods of Rupp (*Arch. Pharm.* **240**, 437(1902)) and of Bosshard and Furrer (*C. A.* **18**, 2658) were found to give low results, owing to some escape of O_2. The methods of Archbutt (*Analyst* **20**, 3(1895)) and of Desgrez and Labat (*C. A.* **16**, 541) were found satisfactory. II. **Determination of the activity of alkaline peroxides in the regeneration of air** *Ibid.* 386–91.— An app. has been developed which measures the O_2 evolved from a given amt. of peroxide when a given vol. of a mixt. of gases which closely approximates exhaled air is passed through the sample. A. W. C.

Some measuring methods for detecting O_2 in molten steel. Mituzaburō Umezawa. *Tetsu-to-Hagane* **25**, 842–50(1939).—(1) The change of O_2 in molten steel of acid open-hearth melt can be estd. by the change of CaO content in the slag. (2) The change of O_2 in molten steel can be calcd. by the change of deoxidizing elements, such as C, Si and Mn. (3) The change of O_2 in molten steel can be estd. from an accurate computation for the boundary conditions such as O_2 before deoxidation, oxidation by flame and bed, amt. of O_2 in solidified steels, etc. M. I.

Bromoiodometric determinations. XI. Is the fluorescein reaction of Hahn specific for bromine? J. H. van der Meulen. *Chem. Weekblad* **36**, 702–5(1939); cf. *C. A.* **33**, 6750⁴.—The method of Hahn (*C. A.* **29**, 5381³) for the detn. of small amts. of Br is not specific for Br since I will also give a fluorescent compd. with fluorescein. The red color which is developed with Br is unstable to direct sunlight or bright daylight. A method is described by means of which it is possible to distinguish between Br and I. Felix Saunders

The color reactions of sulfur chloride, S_2Cl_2, and sulfur dichloride, SCl_2, with *o*-tolidine and their analytical applications. Gustaf Holst. *Ber.* **72B**, 1909–13(1939).—A soln. of 0.010 *M* S_2Cl_2 in pure CCl_4 gives with 5 times as much of 0.010 *M* *o*-tolidine in a mixt. of equal vols. CCl_4 and EtOH an intense red color which is fairly stable in the dark. An excess of the *o*-tolidine soln. is necessary to prevent pptn. Neither $SOCl_2$ nor SO_2Cl_2 gives any color with *o*-tolidine and the color produced with SCl_2 is much less intense. This reaction can be used for detg. small quantities of S_2Cl_2 and, when a suitable filter is used, also for the analysis of mixts. of S_2Cl_2 and SCl_2. W. T. H.

Possible errors in determining cassiterite by reduction with a zinc plate. E. V. Kopchenova. *Zolotaya Prom* **11**, No. 6, 30–3(1939).—The detn. of cassiterite by reducing it to Sn with HCl on a Zn plate may give inaccurate results because other compds. such as oxides, carbonates, and sulfates of Pb, Bi and Cu also form coatings on the surface. To avoid errors the coating is removed, dissolved in a few drops of concd. HCl on a watch glass, a drop of the acid soln. is placed on a filter paper and tested for Sn with a drop of an aq. soln. of cacotheline. A violet coloration indicates Sn. B. Z. Kamich

New method of analyzing cyanide slimes. E. A. Marenkov. *Zolotaya Prom.* **11**, No. 7, 30–1(1939).— Heat a 1-g. sample of cyanide slimes with 50–80 ml. concd. HNO_3 on a sand bath for 15–20 min., dil. with hot water to 150–200 ml., filter, wash the residue with water contg. 1–2 drops of HNO_3 and det. the Ag in the filtrate as AgCl. Heat the residue with 50–60 ml. of aqua regia on a sand bath, evap. with HCl until all HNO_3 is expelled (not to dryness), dil. with hot water to 150–180 ml., filter, heat and ppt. the Au with a hot satd. soln. of hydrazine-HCl. B. Z. Kamich

Microdetermination of iron with the silver reductor. Sylvan M. Edmonds and Nathan Birnbaum. *Ind. Eng. Chem., Anal. Ed.* **12**, 60–1(1940).—The micromethod described is a direct adaptation of the macroprocedure of Walden, Hammett and Edmonds (*C. A.* **28**, 1953⁷) with the scale of app. reduced in proportion to the abs. amt. of Fe present. Resultsa ccurate to 6 γ were obtained with samples of material ranging from 0.69 to 2.75 mg. W. T. H.

Effects and distribution of mercury. XXIX. Film

phenomena and the microchemical determination of mercury. Alfred Stock. *Ber.* **72B**, 1844–57(1939); cf. *C. A.* **32**, 3816[8], 4099[9].—Neutral aq. solns. contg. about 1 γ of Hg in 10 ml. of soln. lose almost all of the Hg when the total vol. of soln. is reduced from 10 ml. to 5 ml. at room temp. The expts. here described can be explained best by assuming that a thin, unimol. film is formed on the surface of the liquid solvent. The addn. of acid- or water-sol. salt prevents the loss of Hg by evapn. Probably the relatively fast evapn. of metallic Hg through layers of water, benzene, etc., can be explained similarly. Dil. solns. of Hg salt in Pt also appear to form on the surface of the Pt a film which is not easily removed by washing with water. Such films do not appear to form on glass or quartz surfaces but parts of the living organism (heart, kidney etc.) behave like Pt; some of the adsorbed Hg salt can be removed by washing with HCl. Dil. solns. of Hg salt kept in glass or quartz containers lose appreciable quantities of Hg on standing but the cause of the adsorption of the Hg by the glass does not appear to be of nonchem. nature. The error is greater if the surface of the glass has been scratched or etched. This effect may be the cause of serious error in microchem. work. Acids may cause the removal of a part of this Hg salt and in some cases too much Hg may be found. In the analysis of expired air from mouths contg. amalgam fillings, practically all the Hg was condensed together with the moisture when the expired air was cooled to 0°. It is suggested that it is likely that the expired air may contain a little HCl which dissolves in the water vapor and a similar explanation may account for the Hg content of rain through air which contains only minute traces of Hg vapor. W. T. H. 1 2 3 4

Rapid microdetermination of nitrogen in mixtures with rare gases. J. A. M. van Liempt and W. van Wijk. *Rec. trav. chim.* **58**, 964–72(1939)(in German); cf. *C. A.* **31**, 7457[3,4]. With the app. described the N content of a mixt. of N_2 and rare gases can be detd. in 10 min. The N is absorbed by liquid Li; the accuracy of the detn. is ±0.2% N. The smallest sample which can be analyzed is 1 ml. at 1 atm. John E. Vance 5

Organo-microanalysis. VIII. Determination of carbon and hydrogen. Syusaku Sakamoto. *J. Pharm. Soc. Japan* **59**, 623–31(1939); cf. *C. A.* **33**, 1993[4].—A review. **IX Volumetric analysis of sulfur.** *Ibid.* 631–4.—A review. F. I. Nakamura 6

Accuracy and precision of microanalytical determination of carbon and hydrogen. A statistical study. Francis W. Power. *Ind. Eng. Chem., Anal. Ed.* **11**, 660–73(1939).—A study of 349 microanalyses of approx. 200 pure compds. by 23 experienced analysts shows an over-all precision of 2.9 parts per 1000 of C and 22 parts per 1000 of H. Both elements are detd. slightly too high, the error in C being probably significant and that in H probably not. The outside tolerances for H agree well with those commonly accepted; those for C are somewhat wider. A description of the statistical methods used is included, as well as some recommendations, based on the statistical findings, for improving the reliability of C-H analyses. T. H. D. 7

Analysis of organic materials for traces of metallic impurities. T. M. Hess, J. S. Owens and L. G. Reinhardt. *Ind. Eng. Chem., Anal. Ed.* **11**, 646–9(1939).—The spectroanalytical detection of traces of Al, Ca, Cu, Fe, Pb, Mg, Mn, Ni, Sr, Sn and Zn in cellulose derivs., synthetic resins, pharmaceuticals, dyes and biol. tissues or fluids is described at considerable length. The org. material was first oxidized in spectroscopically pure HNO_3, H_2SO_4 and $HClO_4$. The internal control method of analysis was used and photometric measurements were made of the relative intensities of the test elements and of the control elements which were introduced into each sample to a known extent. Considerable time is saved and results are obtained with little difficulty in detg. small contents of material which would be hard to det. accurately by the usual chem. methods of analysis. W. T. H. 8 9

Qualitative test for oxygen in organic compounds. David Davidson. *Ind. Eng. Chem., Anal. Ed.* **12**, 40–1 (1940).—Solid $Fe(CNS)_3$ is insol. in liquid hydrocarbons and their halogen derivs. but is sol. in the widest variety of compds. contg. O. To carry out a test for O, take 1 g. of $FeCl_3$ and 1 g. of KCNS in sep. containers. Dissolve each salt in 10 ml. of MeOH, mix and filter off the KCl ppt. Drench filter paper with the filtrate and dry in the air. More than 1 dipping may be required to get a greenish reflex like that of fuchsine crystals. Moisten a square of this paper with a few drops of the liquid to be tested. A pos. test is indicated by the formation of a deep wine-colored soln. Test solids by dissolving them first in hydrocarbon or hydrocarbon deriv. W. T. H. 10

Determination of sulfur in organic compounds. New microchemical method. E. W. D. Huffman. *Ind. Eng. Chem., Anal. Ed.* **12**, 53–8(1940).—When compds. contg. no other elements than C, H, O and S are burned in a combustion tube contg. Ag, good results for C and H are obtained and all S is retained as Ag_2SO_4. If the Ag, more or less covered with sulfate, is placed in a soln. contg. dil. isopropyl alc. and a little $MgSO_4$, then the passage of an elec. current through the hot soln. will cause deposition of Ag on the cathode and the deposited Ag is equivalent to the S. Care must be taken in carrying out the analysis to avoid oxidation but the results of about 55 analyses show that excellent results can be obtained. W. T. H. 11

The volumetric determination of ethyl alcohol. Radim Sigmund. *Chem. Listy* **33**, 325–8(1939)(German summary).—Into a special flask consisting of 2 100-cc. vessels connected with a narrow graduated cylinder, place 100 cc. of the unknown EtOH-gasoline mixt., overlay this with 100 cc. of a satd. NaCl aq. soln., shake the mixt. for 3 min., and after the liquids have sepd., read the new vol. of the NaCl soln. on the graduated cylinder. Because the total vol. of the EtOH-NaCl soln. is smaller than the vols. of the sep. EtOH and NaCl fractions, the usual detns. were too low. After the NaCl soln. is mixed with the EtOH-gasoline mixt., the total vol. of both solns. is also diminished. With the equation of Šťastný (*C. A.* **28**, 4831[6]) prep. a table which corrects the vols. of EtOH for their shrinkage in the NaCl soln. and gives correct values for prepd. mixts. Frank Maresh 12

Titrimetric procedure for the estimation of resin acid in addition to fatty acid. B. Stempel. *Pharm. Zentralhalle* **80**, 617–19(1939).—Dissolve 2–4 g. of the sample in 50–100 cc. xylene, add 0.25–0.5 cc. HCl (1.19) in app. for H_2O estn. and distil with a small flame and open cock. Increase heat gradually until HCl drops reach the upper end of the riser, close the cock and drive the HCl over with a larger flame till no more acid flows from the tube. After cooling and adding neutral alc. titrate with 0.5 *N* KOH (phenolphthalein or alkali blue 6B). W. O. E. 13

Method for determining glutamine in plant tissues. Geo. W. Pucher and Hubert B. Vickery. *Ind. Eng. Chem., Anal. Ed.* **12**, 27–9(1940).—The usual method for detg. glutamine is based upon the complete hydrolysis of this rather unstable amide by heating for 2 hrs. at 100° and pH 6 to 7. The NH_3 thus formed is a measure of the amido N present but, unfortunately, there are other plant components which will liberate NH_3 under the same conditions. When glutamine is hydrolyzed nearly 90% of it is converted into pyrrolidonecarboxylic acid which is a relatively strong imino acid which can be extd. completely by EtOAc from aq. solns. buffered in the range pH 2 to 3. Moreover, it is easily hydrolyzed to glutamic acid when heated for a short time with dil. mineral acid. The increase in amino N after this acid hydrolysis is equiv. to the amide N of the glutamine from which the pyrrolidone carboxylic acid was derived. From these facts a satisfactory scheme of analysis is proposed which is not, to be sure, meant to be a substitute for the convenient and accurate amide hydrolysis method. It is, however, a more sp. means of estg. glutamine and will be found useful for the detn. of small quantities or in unfavorable conditions such as in the presence of aspargine or other substances that might interfere with the simpler hydrolytic method. W. T. H. 14

Harmlessness of const.-boiling 72% $HClO_4$ (Dietz) 24.

Decompn. of cassiterite by fusion with borax and some details of its complete chemical analysis (Borneman-Starynkevich) 8.

Feigl, Fritz. Qualitative Analysis by Spot Tests. 2nd English ed. from 3rd German ed. New York-Nordemann Publishing Co. 462 pp. $7.00.

Middleton, Arthur R., and Willard, John W. Semi-micro Qualitative Analysis. New York: Prentice-Hall, Inc. 446 pp. $3.50.

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Determining hydrocyanic acid in gas mixtures such as air. Robert W. McAllister (to Mine Safety Appliances Co.). U. S. 2,176,462, Oct. 17. A method of detg. HCN involves passing a volume of the gas mixt. through a uniform column of a granular adsorptive material such as alumina gel impregnated with a color-forming substance such as a benzidine acetate-cupric acetate soln. which is sensitive to HCN and noting the length of travel of coloration in the column, which is proportional to the content of HCN in the gas mixt.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Part taken by close packing of crystals in the diffusion of helium. E. K. Gerling. *Compt. rend. acad. sci. U. R. S. S.* **24**, 274-7(1939)(in English).—Helium losses of minerals are explained by the loose structures of feldspars, nephelites, mica, most amphiboles and pyroxenes, etc. The closeness of the packing being a detg. factor in He loss, it must be taken into consideration in age calcns. by the He method. 6 references. A. H. Krappe

Crystallographic investigation of artificial mullite. D. P. Grigor'ev and I. I. Shafranovskiĭ. *Compt. rend. acad. sci. U. R. S. S.* **23**, 933-4(1939)(in English).—A specimen of mullite obtained by the method of Ginzberg (cf. *C. A.* **32**, 8719[9]) was subjected to goniometric and optical crystal analysis. n_g = 1.657, n_p = 1.644; the small deviations from the results of Bowen and Greig (cf. *C. A.* **18**, 2587) are probably due to the presence of impurities. A goniometric study gave the following values for the angles: (1)(110).(110) = 90°52′; (2)(110) (110) = 89°08′, as compared with 90°47′ and 89°13′ found by Bowen and Greig. 3 references. A. H. Krappe

Crystallography of aramayoite. Harry Berman and C. W. Wolfe. *Mineralog. Mag.* **25**, 466-73(1939); cf. Spencer, *C. A.* **21**, 2241, and Yardley, *Ibid* Measurements of recently discovered better developed crystals of aramayoite from the type locality give $a : b : c$ = 0.8753 : 1 : 0.9406, and a = 7.76, b = 8.79, c = 8.34 A., α 100°22′, β 90°00′, γ 103°54′, with $6Ag(Sb,Bi)S_2$ in the unit cell, which is therefore 3 times as large as the cell detd. by Yardley. C. A. Silberrad

Decomposition of cassiterite by fusion with borax and some details of its complete chemical analysis. I. D. Borneman-Starynkevich. *Compt. rend. acad. sci. U. R. S. S.* **24**, 353-6(1939)(in English).—Fusion of cassiterite with borax led to a series of reactions the last of which is expressed by the formula $NaBF_4 + H_2SO_4 = BF_3 + HF + NaHSO_4$. The remaining fused Na pyrosulfate contains all the components of cassiterite; it dissolves when treated with tartaric acid. A *spectroscopic analysis* shows the presence of Sn, Si, Ti, Zr, Cb, Ta, Fe and Mn. Detn. of Sn and the other components is described in detail. 6 references. A. H. Krappe

Mineralogy of the Tikhvin bauxites. E. P. Levando and N. A. Adamova. *Mém. soc. russe minéral.* **67**, No. 1, 74-80(1938); *Khim. Referat. Zhur.* **2**, No. 4, 37(1939).—By mech. and chem. treatment of the bauxite samples of the Tikhvin region, there were obtained fine, opaque, white, isotropic grains with n = 1.647 ± 0.002. The sepd. substance is $Al_2O_3.H_2O$ with small admixts. of SiO_2, Ti and Fe and with a somewhat larger amt. of water than called for by the formula. On the basis of the chem. and optical studies, as well as from a comparison with the French bauxites, the mineral can be regarded as a non-cryst. hydrated Al_2O_3 of the böhmite type which is formed as a result of aging of the gel-like substance. W. R. H.

Tektites and silica glass. L. J. Spencer. *Mineralog. Mag.* **25**, 425-40(1939).—All available analyses of tektites and similar occurrences with d. and n (36 in all) are tabulated and compared, d. and n being plotted against SiO_2 content (68-80%). The nature and manner of occurrence of the silica glass found in the Libyan desert are then discussed. Two closely agreeing analyses average SiO_2 98.20, TiO_2 0.23, Al_2O_3 0.70, Fe_2O_3 0.53, FeO 0.24, NiO 0.02, MgO 0.01, CaO 0.30, Na_2O 0.33, K_2O 0.02, H_2O+ 0.03, H_2O- 0.03. Including traces revealed by spectroscopic analysis 22 elements have been detected in the glass, but no clue as to the origin has been found. 49 references. C. A. Silberrad

Classification of some magnesium silicates and their alumino analogs. N. E. Efremov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 287-9(1939)(in English).—On the basis of observations on clay deposits in Russia the following classification is proposed: (1) α montmorillonite, α sepiolite, (2) β montmorillonite, β sepiolite, (3) γ montmorillonite, γ sepiolite, (4) δ montmorillonite, δ sepiolite, (5) ϵ montmorillonite and ϵ sepiolite. 11 references. A. H. Krappe

Investigation of the serpentine region of Northern Caucasus. N. E. Efremov. *Bull. acad. sci. U. R. S. S., Sér. géol.* **1938**, No. 1, 107-29; *Khim. Referat. Zhur.* **2**, No. 4, 39(1939).—The serpentine minerals of Northern Caucasus originated mainly from saxonites; the age of these ultrafundamental intrusions is Permocarboniferous Many have a compn. which differs greatly from the commonly accepted formula by excessive amts. of MgO and H_2O. Two branches can be noted among the serpentine minerals: one in which are observed an increasing role of SiO_2 toward MgO and changes from serpentine through picrolite to talc with a change of the MgO SiO_2 ratio from 1.5 to 0.75, and a 2nd, in which this ratio increases from 1.5 to 2.00. Variations of the content of the main oxides in serpentines indicate that the chem. constitution changes from talc through picrolite, chrysotile to nemalite-brucite. The serpentines must be regarded as a mixt. of the two end members, talc and brucite. This conception coincides with the results obtained from the x-ray investigations of Schiebold, who gives the following equation: $[Si_8O_{20}]\text{-}Mg_6(OH)_4$ (talc) + $6[Mg(OH)_2]$(brucite) ⇄ $[Si_8O_{20}]\text{-}(OH)_{10}Mg_{12} = 2\{Mg_6(OH)_8[Si_4O_{10}]\}$ (serpentine), as well as with the results obtained from dissolving serpentine in NH_4Cl with a max. yield of Mg from serpentine of 66% which amt. corresponds to the amt. of Mg which is combined with the hydroxides in the mineral. W. R. H.

Hibschite in Georgia. D. S. Belyankin and V. P. Petrov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 349-52 (1939)(in English).—A mineralogical characterization and optical consts. of Caucasian hibschite are followed by an analysis of the mineral. A. H. Krappe

The identity of molengraaffite with lamprophyllite. C. E. Tilley. *Trans. Geol. Soc. S. Africa* **41**, 109-11(1938); *Am. Mineral.* **24**, 728(1939).—A new partial analysis of molengraaffite from Pilansberg gave: CaO 1.9, SrO 14.4 and BaO 1.8. The original analysis, therefore, appears to be in error, SrO and BaO being included in the CaO. This identity is confirmed by a comparison of optical properties. C. H. Hale

Relation of chamosite and daphnite to the chlorite group. A. F. Hallimond, C. O. Harvey and F. A. Bannister. *Mineralog. Mag.* **25**, 441-65(1939).—Existing

information on chamosite, daphnite, bavalite, leptochlorite, orthochlorite, thuringite, amesite, corundophillite, prochlorite, clinochlore, pennine and cronstedtite is discussed, and the 79 most reliable analyses are plotted with the ratios $2OOR_2O_3/SiO_2$ and $2OORO/SiO_2$ as coördinates; analyses of the first 5 are also plotted with the ratios FeO/(FeO + MgO) and $2OORO/SiO_2$ as coördinates, bringing out certain relationships. X-ray diagrams of chamosite, daphnite and some other chlorites are given and new analyses of chamosite from Cornwall (Tolgus mine) and of daphnite from Lincolnshire (Frodingham). These show chamosite to be approx. $2SiO_2.Al_2O_3.3FeO,nH_2O$ with a special structure of the chlorite type, while that of daphnite is of normal chlorite type resembling that of clinochlore. 26 references. C. A. Silberrad

Isodimorphism between metavariscite, variscite, phosphosiderite and strengite. H. Strunz and K. v. Sztrókay. *Zentr. Mineral., Geol.* **1939A**, 272–8.—The results of McConnell (*C. A.* **33**, 9208[2]) are confirmed. Phosphosiderite, $FePO_4.2H_2O$, is monoclinic and probably isomorphous with metavariscite, $AlPO_4.2H_2O$. Variscite, $AlPO_4.2H_2O$, is orthorhombic, isomorphous with strengite, $FePO_4.2H_2O$, and scorodite, $FeAsO_4.2H_2O$. The existence of a monoclinic "clinoscorodite" is probable. Michael Fleischer

Datolite from the volcanic group of the Karadag in the Crimea. M. N. Shkabara and E. A. Shturm. *Compt. rend. acad. sci. U. R. S. S.* **24**, 166–70(1939)(in English). A description of (1) violet, (2) watery and (3) barrel-like datolite crystals including crystallographic features is followed by a chem. analysis of each type. 7 references. A. H. Krappe

Datolite from the Soganlug talus in the neighborhood of the town of Tbilissi. G. V. Gvakhariya. *Compt. rend. acad. sci. U. R. S. S.* **24**, 162–5(1939)(in English). An interpretation of the interrelation of the crystal forms of datolite from the Soganlug talus (Caucasus) includes a brief geol. survey of the region, a description of 4 types of datolite crystals, with Goldschmidt and Dana (cf. D. and Ford, *Text-Book of Mineralogy*, *C. A.* **16**, 2100; G., *C. A.* **18**, 1233) indexes (table), an enumeration of the phys. properties and a chem. analysis. A. H. Krappe

Analysis of the paragenesis observed in the Inder deposits of borates. M. N. Godlevskiĭ. *Mém. soc. russe minéral.* **67**, No. 1, 18–29(1938); *Khim. Referat. Zhur.* **2**, No. 4, 44(1939); cf. *C. A.* **33**, 2850[2].—The following borates are found in the Inder region: ulexite, inyoite, colemanite, pandermite, inderite, β-ascharite, hydroboracite and kaliborite. The first 6 are found in the gypsum zone and the rest in the transition zone and in the salt mass. Kaliborite is found only in the salt mass. The paragenesis can be conditionally divided into (1) the "equil." (no replacement of one mineral with another is observed) and (2) the "non-equil." (a definite replacement is observed). The ulexite + β-ascharite, the inyoite + β-ascharite, etc., belong to "equil." type, while the hydroboracite (inyoite + β-ascharite), colemanite + pandermite and a no. of others to the "non-equil." Being unstable at atm. pressures and at the surface temp., hydroboracite undergoes a no. of transformations from the intruding surface water:

hydroboracite → ulexite → inyoite; hydroboracite → β-ascharite ↙ (colemanite) → pander-

mite + carbonates. The colloidal character of most borates was proved. In spite of this the phase rule can be applied to the investigation of the systems of these deposits. By applying the conception of the active and the inert components during metasomatosis (formulated by Korzhinskiĭ), G. was able to study in more detail the systems $(CaO–B_2O_3)$, $(MgO–CaO\ B_2O_3)$, to det. the fields of stability of the single minerals and to det. a no. of conditions of the formation of the Inder borate deposits. W. R. H.

Conversion of astrakhanite. I. G. Druzhinin. *Compt. rend. acad. sci. U. R. S. S.* **23**, 921–4(1939)(in English).—Expts. were made to det. the properties of $Na_2SO_4.MgSO_4.4H_2O$ and the conditions required for the conversion of the mineral into Na_2SO_4 used in the glass and chem. industries. The conversion temps. are given in a table and the heat curves added. On being heated, astrakhanite undergoes 3 conversions: (1) at 105° 2 mols. of H_2O is lost and astrakhanite passes over into loweite $(Na_2SO_4.MgSO_4.2H_2O)$; (2) at 215° anhyd. astrakhanite is formed; (3) at 625° a polymorphous conversion of $Na_2SO_4MgSO_4$ takes place. For anhyd. astrakhanite the refractive indexes are, *ng* 1.650; *np* 1.450. 7 references. A. H. Krappe

The mineralogic composition of acid blast-furnace slags. Dieter Hoenes. *Zentr. Mineral., Geol.* **1939A**, 257–71.—Five slags contained anorthite 41–63, clinopyroxene 5–22 and melilite plus leucite (usually as intergrowths) 23–54. An unidentified mineral, possibly pseudowollastonite, was present in several slags, in considerable amt. in one. The mineralogic compn. and order of crystn. are compared to those of basic hearth slags, coal slags, etc. (cf. Koch, *C. A.* **27**, 4756; **28**, 6400[2]). Two analyses of acid blast-furnace slags are given. Michael Fleischer

The reciprocal action of feldspar, "pyroxene" and sulfide melts. D. P. Grigor'ev. *Mém. soc. russe minéral.* **67**, No. 1, 7–17(1938); *Chem. Zentr.* **1939, II**, 1654.—Mixts. of 58% diopside and 42% anorthite, or 62% diopside and 38% plagioclase were melted with FeS to 1300°. The melts sepd. into a lower sulfide layer where 8–10% silicate is dissolved, and an upper silicate layer in which very little sulfide is dissolved. M. V. Condoide

Dolomitization and anhydritization of limestones of the Ishimbaev petroleum-bearing region. E. P. Aleksandrova. *Trudy Neft. Geol.-Razved. Inst.*, Ser. A, No. **101**, *Materialy k Poznaniyu Ishimbaevskogo Mestorozhdeniya Nefti* 13–26(1938); *Khim. Referat. Zhur.* **2**, No. 4, 40 (1939).—The dolomitized rocks are distributed very unevenly in the midst of the reef limestones. The intensity of dolomitization is very different. Dolomite is formed by a secondary course replacing limestone. The sepn. of anhydrite among the reef limestones is also of a secondary nature. Dolomite and anhydrite replace the skeletons of organisms and the cement between them. The dolomitized rocks are porous; this can be explained by a decrease of the vol. during the change from limestones to dolomites and by the partial soln. of anhydrite and calcite. Intensive petroleum activity is observed in dolomitized varieties of limestones. The formation of dolomite and anhydrite is explained by the reaction of a $MgSO_4$ soln. on limestone, which takes place in a lagoon-type reservoir with an increased concn. of salts. W. R. Henn

Study of the kaolinized Tirschenreuth granite, which has been referred to in ceramic work as "pegmatite." J. H. Hellmers and P. Pfeffer. *Z. prakt. Geol.* **47**, 192–6 (1939).—Microscopic study and analyses of samples from 4 depths show that the kaolinization is a surface phenomenon and decreases rapidly with depth. M. F.

Contact metamorphism of phosphorites. P. L. Bezrukov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 282–4 (1939)(in English).—Intense metamorphism of the lower Paleozoic phosphate beds in contact with Caledonian granite, observed at Kara-Tau, So. Kazakhstan, led to a close study of the phenomenon, involving a detailed geol. description of the prevailing conditions and of the metamorphism of the phosphorites into apatite beds. There are reasons to believe that thermal metamorphism was accompanied by an admixt. of volatile components carried in by the intrusion. The metamorphism involves complete destruction of the phosphorite crystals. The P_2O_5 content of the apatite layer amounts to 21.3% and in some cases to as much as 32%. 2 references. A. H. Krappe

Gold deposits in the Bashkir republic. I. E. Leshchuk. *Zolotaya Prom.* **11**, No. 4–5, 18–22(1939).—Descriptive. B. Z. Kamich

Gold and silver in the ores of Kounrad. M. A. Shibakov. *Mineral. Syr'e* **1938**, No. 2, 59–62; *Khim. Referat. Zhur.* **2**, No. 4, 43(1939).—A universal and fairly const. distribution of Au and Ag is noted in the ores of Kounrad. The Ag and the Au minerals are absent in the primary ores. Au is found in the form of 0.005–0.05-mm. grains only in the zone of the oxidized ores, mostly assocd. with limonite. Pyrite and chalcopyrite are considered to be the primary Au-contg. minerals. Ag, apparently, is one of the components of weathered ores of the freibergite type (Cu-Ag-Sb ore which probably contains

As). The weathered ores are evenly distributed in the form of very fine grains. The content of Ag is slightly increased in the surface processes of the oxidized zone of the deposits. The extn. of these metals together with Cu is discussed. W. R. Henn

The geology and development of Mill Close Mine, Derbyshire. J. G. Traill. *Econ. Geol.* **34**, 851–89 (1939).—Galena and sphalerite, with calcite, pyrite, fluorite and barite, occur in metasomatic replacement veins in limestone. The galena carries only 1 to 1½ oz. Ag per ton. The sphalerite is exceptionally pure, averaging 65% Zn and 1% Cd. Structural factors such as jointing and faulting, the presence of favorable limestone beds, and especially the presence of impermeable lava flows under which the ore is concd., largely controlled the paths followed by the ore-bringing solns. The deposit is very similar to the manto deposits of Mexico (cf. Prescott, *C. A.* **20**, 3669). From 1929 to 1938, over 222,000 tons of Pb concentrates and 21,500 tons of Zn concentrates were produced, but the production of Zn now exceeds that of Pb. Seven analyses of limestones are included. M. F.

Genesis of the Novo-Troytsky iron ore deposit of the Khalilov type. G. I. Teodorovich. *Compt. rend. acad. sci. U. R. S. S.* **24**, 270–3(1939)(in English).—A geol. description of the ore bed is given with views on the genesis of the various constituents including secondary changes. The Fe ores originated in the littoral region of a system of lakes with a prevailing pH that did not permit pptn. of $CaCO_3$. Part of the ferric Fe was reduced to ferrous by org. substances in the silt. A warm climate must have prevailed, and the process is likely to have taken place in the Jurassic period. 4 references. A. H. Krappe

The tin-containing pegmatites. M. F. Strelkin. *Bull. acad. sci. U. R. S. S., Sér. géol.* **1938**, No. 3, 465–86; *Khim. Referat. Zhur.* **2**, No. 4, 41(1939).—A theory of the formation of cassiterite as a result of the hydrolysis of the alkali stannate, $Na_2SnO_3 + H_2O \rightarrow SnO_2 + 2NaOH$, is based on the lowered content of F in minerals contg. F or OH, on the paragenic interrelationship of the minerals of the deposits, and on the strongly developed process of albitization of K feldspar by the NaOH solns. which are formed during the hydrolysis of stannates. The Sn-contg. pegmatites of the Turkestan ridge are connected with the granite intrusion which breaks through the Middle Paleozoic sedimentary formations. The pegmatic veins are represented by (1) schorlo-biotites, (2) schorlo-muscovites, and (3) albites which are Sn-bearing and which are subdivided into cleavelandite-spodumenes and into greisenized veins. W. R. Henn

Geochemistry of titanium, vanadium and chromium in the titano-magnetites of the Ural mountains. P. G. Panteleev. *Bull. acad. sci. U. R. S. S., Sér. géol.* **1938**, No. 3, 449–62; *Khim. Referat. Zhur.* **2**, No. 4, 42(1939).—P. divides all the titano-magnetite deposits into the Kusin-Kapan type (14–15% of TiO_2) and the Pervoural'sko-Kochkanar type (3–6% of TiO_2). The ratio Ti Fe for the first type is 0.14–0.18 and 0.03–0.06 for the second type. These ratios as well as a no. of genetic and geol. differences are explained by the different geol. ages of the formations of these 2 types: the Pre-Cambrian for the first and the Devonian for the second. The contents of Cr and Fe in the ores increase in the direction from west to east and the ratio of Ti to Fe decreases in the same direction. The amt. of V is increased in the central deposits, but the ratio V:Fe remains more or less const. W. R. Henn

Technical agate in U. S. S. R. and problems for the investigation of its deposits. S. S. Vanyushin. *Mém. soc. russe minéral.* **67**, No. 1, 141–53(1938); *Khim. Referat. Zhur.* **2**, No. 4, 37–8(1939).—The tech. agate deposits in Georgia, Armenia and Azerbaïdzhan are described. Of the agates of the Caucasus regions, those occurring as nuggets in porphyrites and andesites are of the highest quality. Agates found in veins in the same deposits are of poorer quality. Tube-shaped agates (in the Pomach and Akhaltsykh deposits) are usually 0.5–50 cm. in diam. Some tubes are completely filled with agate while others are hollow with a smooth inner surface or a surface covered with quartz crystals. Agates in the form of specks are very numerous. Agate in sedimentary deposits gives no suitable tech. raw material. The microstructure of the tech. agates is described very briefly. W. R. Henn

A new bauxite-bearing region in Siberia. L. A. Rogozin. *Razvedka Nedr* **1938**, No. 10, 18–23; *Khim. Referat. Zhur.* **2**, No. 4, 40(1939).—Sharp-angled 30 × 20 × 15-cm. bauxite fragments were found 1.5 km. above the Ust-Sertinskaya village on the right bank of the Kiya River in the northern part of Kuznetskiĭ Alatan. The bauxites have an oölite texture with a brown-colored main mass which consists of limonite and goethite. The chem. analysis of the bauxite gave Al_2O_3 27.70, Fe_2O_3 23.74 and SiO_2 28.65%. In their petrographic properties and chem. compn. the Ust-Sertinskaya bauxites are like the Salair and the Eniseĭ bauxites. Their age is conditionally taken as Jurassic. The bauxites were formed in ancient river valleys by the deposition of materials rich in clay. W. R. Henn

Ribbon clays in the vicinity of Leningrad. N. A. Uspenskiĭ. *Mém. soc. russe minéral.* **67**, No. 1, 87–101 (1938); *Khim. Referat. Zhur.* **2**, No. 4, 37(1939).—Microscopic investigation of polished specimens of clays from along the Izhora River between Kolpino and Ust-Izhora showed the presence of brown mica, thin-scaled sericite-like mineral, carbonate, glauconite, quartz, feldspar, muscovite, biotite, chlorite, amphibole, garnet, epidote and tourmaline. U. emphasizes the little dependability of the detns. of the mineral compn. of clays which are based on the data of chem. analyses only. The investigation of the mineralogic compn. by means of polished specimens is more dependable than the method with immersion liquids because of the destruction of the soft minerals. W. R. Henn

Copals and their utilization. V. A. Oskolkov. *Razvedka Nedr* **1938**, No. 8–9, 6–11; *Khim. Referat. Zhur.* **2**, No. 4, 46(1939).—The known copal deposits in U. S. S. R. are represented by 2 types: (1) the true copal deposits in which they are found as monominerals in the sand-clay formations (Zakavkaz'e, Kazakhstan and probably Turkmen), (2) inclusions among the younger coal deposits in the Far Eastern region. The Verkhne-Agdzhekend deposit contains 20–300 mg. (with an av. of 200 mg.) of copal/cu. m. of the formation. The copal-contg. soft-coal deposits of the Far Eastern region are the Artem, Shkotov and Khungarin shafts. The Artem shaft contains an av. of 0.0025% of copal which is distributed irregularly among the coal in the form of fine and coarse milky-white and orange grains. The copal deposits sometimes contain interlayers of copals. Other copal deposits are described and the results given of the technological studies for the enrichment of the copal ore and for the utilization of the deposits. W. R. Henn

C. Wiman's "Psilophyton-like fossil from Lapland." Oskar Kulling. *Geol. Foren. Förh.* **61**, 412–15(1939).—Analyses for CaO and MgO ignition loss and for part insol. in dil. HCl, of (1) the *Psilophyton*-contg. rock, (2) dolomite from Kalv Mountain and (3) gray dolomite quartz veins from Kalv Mountain are given in an attempt to det. the origin of the fossil. Wilhelm Segerblom

Cone-in-cone [structures] from Lufubu [River], Manema, Belgian Congo. Marcel E. Denaeyer. *Ann. soc. géol. Belg., Bull.* **62**, 493–511(1938–39).—Macroscopic and microscopic descriptions of 2 specimens of calcareous cone-in-cone structures. The principal constituent is calcite with 2.34% SrO. The origin of these growths and a possible relation with neighboring, nonstrontianiferous, thermal, saline springs previously described (Cornet, *Ann. soc. géol. Belg.* **38**, 16(1910–11); Mathieu, *Ibid.* **40**, 103–25 (1912–13)) are discussed. D. W. Pearce

Siberian petroleum—crystalline shales of Main Caucasus Divide and their origin (Senyukov, Shmelev) **22**.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Metal-working industries in Canada. W. H. Losee and H. McLeod. *Can. Metals Met. Inds.* **2**, 286, 288, 311–12, 314, 316(1939).—A summary of production value and tonnage for 1938 and the previous decade. W. H. B.

The flotation of the blue schist of Recsk. József Finkey. *Math. naturw. Anz. ung. Akad. Wiss.* **58**, 608–17(1939).— This blue schist consists probably of decayed, kaolinic andesite tuff, and contains an av. of 15% pyrite and 5–15 g. Au per ton. Use of a sulfuric acid-contg. bath and the addn. of protective colloids did not give successful flotation of this ore. The schist contains a large amt. of water-... ulfates, especially Al sulfate. The Al ions prevent the coagulation of the ore foam. This disturbing effect can be removed by the use of a soda-contg. flotation bath. Practical expts. showed that the following reagents are required for each metric ton of flotation bath: 20 kg. cryst. sodium carbonate, 160 g. K ethylxanthate, 100 g. pine-needle oil and 300 g. water glass (to prevent coagulation of the kaolin). The pyrite yield was in this case 78% and the product contained 40% S. S. S. de Finály

Kinetics and adhesion of mineral particles to air bubbles in flotation suspensions. M. A. Elgeles. *Compt. rend. ad. sci. U. R. S. S.* **24**, 340–4(1939)(in English).—From a study of the adhesion to an air bubble of mineral particles of the type commonly used in flotation (fluorite, barite, calcite) by means of an elec. contact app. (described), conclusions are drawn as to role of the accumulator, which increases the attraction between the particles and the bubble and provides the required adhesion kinetics. 6 references. A. H. Krappe

Flotation problems in treatment of gold ores. P. Blewett. *Mining J.* (Phoenix, Ariz.) **23**, No. 9, 6(1939).—A discussion of flotation alone and of a combination of flotation and cyanidation or amalgamation; the flow sheet depends on the characteristics and chem. analysis of the particular ore to be treated. Leopold Scheflan

Synthetic flotation oils from turpentines. D. I. El'kin. *Lesokhim. Prom.* **6**, No. 2, 32–3(1938); *Khim. Referat. Zhur.* **2**, No. 3, 125–6(1939).—Yields of flotation oils were 43% from natural turpentines, 47.6% from the steam resin-soap industry and 37.2% from the resin-extn. industry. The flotation oils obtained are 45–55% cheaper than those obtained from dry-distn. turpentines. W. R. Henn

Mineral production of the South. George C. Branner. *Mins Record* **108**, No. 11, 18–27(1939).—A detailed illustrated survey of the metal mining industry in the southern states of the U. S. Leopold Scheflan

Assaying rich telluride-gold ores. H. F. Silva. *Chem. Eng. Mining Rev.* **32**, 59–66(1939).—The most suitable flux for assaying telluride Au ores contains 8 parts PbO, 8 parts soda ash and 1 part NaCl. Cupellation losses are discussed and means outlined of minimizing these losses; they include low temp. and a 10–1 Ag:Au ratio in the button weighing not less than 30.0 g. Cement cupels are shown to be satisfactory if precautions are taken. The standard fire assaying method is described. W. H. B.

Present milling practice at the Porcupine gold mines. Henry Hanson. *Can. Mining J.* **60**, 804–9(1939).—A description together with a complete flowsheet for the Hollinger mill. W. H. Boynton

Sintering iron ores in suspension. A. M. Parfenov. *Sovet. Met.* **1938**, No. 2, 11–20; *Khim. Referat. Zhur.* **2**, No. 4, 92(1939).—The rich Magnitnaya Gora ore contg. about 63% of Fe was used for the expts. in 2 fractions: 0–1 mm. and 0–3 mm., and the Kerch concentrate contg. about 44% of Fe in 3 fractions: 0–1 mm., 0–3 mm. and 0–5 mm. The ore was blown into the upper part of a cylindrical 0.6-cu. m. shaft by means of air heated in a recuperator. A special cast-iron directing cone was constructed along the whole cross-section of the shaft in the upper part of the furnace for an even distribution of the falling ore. Two petroleum sprays were attached tangentially to the walls in the lower part of the furnace. The combustion products of petroleum were led through the upper part of the furnace into the recuperator and then released into the atm. The optimum temp. was 900–1100°. The agglomerate formed in part a finely porous mass and in part a fused mass or an oxidized agglomerate with large pores which crumbled easily. The orienting expts. showed a productivity of the furnace of about 600 kg./hr./cu. m. W. R. Henn

Agglomerates obtained from Magnitogorsk ores and blast-furnace dust. E. T. Kaminskaya-Dul'skaya. *Sovet. Met.* **1938**, No. 2, 3–10; *Khim. Referat. Zhur.* **2**, No. 4, 92–3(1939).—Fine ore 25, limonite 20 and blast-furnace dust 25% roasted for 24 hrs. yielded a fine-grained agglomerate contg. 7.8% of FeO. The yield of fines was 49.5%. The roasting was performed without any addn. of fuel, at the expense of the 9% combustible substances in the blast-furnace dust. Roasting 35% of fine ore, 40% of blast-furnace dust and 25% of the returned agglomerate with addn. of 5.6% of fuel gave a better product; fines 29.5%. In the agglomeration process the martite is first reduced to magnetite, which is oxidized to hematite. The nonore minerals are mostly unfused. Two samples with 55 and 45% of fine ore, 20 and 30% of blast-furnace dust and 25% of returned ore when roasted with 7.8 and 6.85% of fuel yielded 16.2 and 19.5%, resp., of fine ore and a fused easily crumbling agglomerate. The process is mostly one of reduction (martite to magnetite). The contents of FeO were 30.5 and 40%. Roasting of fine ore yielded an agglomerate of cryst. structure with fused ore minerals (magnetite) and with nonore minerals (glass, fayalite), and 23% of fines. Roasting 70% of blast-furnace dust with 5% of fine ore gave an agglomerate with a weakly developed globular structure and lower strength, and a 17.8% yield of fines. The content of FeO was 22.5%. At 110–100° the drying and the loss of water of hydration take place; at 500–600° the kaolin nucleus is formed (a considerable absorption of heat by the clay components); at 1100–1300° the feldspars and garnet are fused; at 1400° magnetite is fused. A min. amt. of garnet is necessary to obtain a fused agglomerate. The production of cryst. agglomerate is not profitable, owing to the large amt. of fuel necessary. Photographs of the microstructures and the compns. of the mixts. and of the agglomerate are given. W. R. Henn

Secondary metals. C. L. Smith. *Mines Mag.* (Colo. School of Mines) **29**, 510–12(1939).—A description of the industry dealing with the recovery of secondary and scrap metal. Leopold Scheflan

Recovery of slag with high content of vanadium in the basic Bessemer and its use in the electric-arc furnace. A. Harr. *Stahl u. Eisen* **59**, 1145–54, 1174–81(1939).— The need of Germany for V has been increasing and more thoroughgoing attempts have been made to recover V from basic Bessemer slag. Basic Bessemer pig iron in Germany contains an average of 0.12% V and 80% of this goes into the converter slag. In a series of tests converter dust which settles on the roofs of the Bessemer mill and contains as much as 1% V was smelted in a blast furnace. This pig iron was then blown in a converter and the resulting slag contg. over 10% V was charged into elec. furnaces for making alloy steel contg. up to 0.4% V. In this way about 60% of all the original V was recovered. Recovery of V in the basic Bessemer converter slag is aided by the admixt. of roll scale. S. Epstein

Method of heating and operation of ore-preparation equipment. K. Guthmann. *Stahl u. Eisen* **59**, 1125–33 (1939).—Practical. A discussion of modern sintering technique. 24 references. S. Epstein

Firing of the Martin furnace with cold coke gas. I. G. Kazantsev. *Teoriyai Prakt. Met.* **1938**, No. 9, 27–32; *Khim. Referat. Zhur.* **2**, No. 4, 95(1939).—Cold coke gas purified from S is the most economical fuel for the Martin furnace. A part of the excess heat (0.3×10^6 cal./ton of metallurgical coke) can be used for other purposes. The

use of cold coke gas lowers considerably the expense of the construction of different parts of the equipment and simplifies the automatic regulation of the furnace. It also intensifies the process and increases the stability of the lower part of the furnace. The high content of H_2S (20 g./cu. m.), which is a hindrance to a wider use of the cold coke gas, can be removed. The technology of the purification of the gas has been developed in detail for gases used in the synthesis of NH_3. W. R. Henn

Metallurgical studies of oxygenated blast in basic Bessemer practice. W. Eilender and W. Roeser. *Stahl u. Eisen* **59**, 1057-66(1939).—O_2-enriched air may give the following advantages: shorter time of blow, lower Mn losses, means of using more scrap, somewhat lower and at least no higher oxidation of the bath, lower S and N_2 content of the bath. About the best O_2 enrichment was to 28% O_2 in the blow. The fact that oxidation of the bath was not increased was considered to result from the more rapid heating of the charge and hence the faster melting of the lime, and a generally more favorable temp. cycle. The faster melting of the lime likewise resulted in better desulfurization; more of the S was also given off as SO_2 because of the higher O_2 content of the blow. The N_2 content of the bath was lowered from about 0.016 to about 0.013% N_2. The increase in output with 28% O_2 in the blow amounted to about 16%. Relatively low-P pig iron with 1.19 to 1.35% P could be used when the blow was enriched to 31% O_2. It is stated that with present O_2 costs with the Linde process, the use of O_2-enriched blow for the basic Bessemer process in Germany is economical. 22 references. S. Epstein

Blowing coke gases into the blast furnace. M. A. Shapovalov. *Teoriya i Prakt. Met.* **1938**, No. 11, 24-6; *Khim. Referat. Zhur.* **2**, No. 4, 94(1939).—A blast-furnace gas suitable for the *synthesis of* NH_3 (with a simultaneous production of cast iron in the blast furnace) can be obtained by blowing coke gas into the furnace together with O. This permits obtaining a ratio $(CO + H)/N = 3.2$ in the blast-furnace gas with a content of O in the blown air of less than 60%. The use of hot blowing replaces in the heat balance of the furnace a part of the expensive coke heat. More than 2 cu. m. of coke gas can be blown in for each kg. of C. The O content in the blast should be 43-5%. By preliminary sepn. of H from the coke gas (by cooling) and adding it to the blast-furnace gas, the amt. of the blast gas will be reduced to approx. one-half. A no. of curves and tech. data are given. W. R. Henn

The present status of the Krupp-Renn reduction process. F. Johannsen. *Stahl u. Eisen* **59**, 1041-6(1939).—See *C. A.* **33**, 9220⁴. S. Epstein

Foundry facings. J. Ridderhof. *Can. Metals Met. Inds.* **2**, 299-303(1939)—A review of the types of facings used, from an analytical as well as a practical viewpoint. The properties and application of sea coal, core washes, plumbago and parting are discussed. Characteristics desired in sea coal are volatile matter 33-36%, S not above 1%, ash 6-7% and moisture not over 1.5%. Core wash may be applied to dry sand or baked cores, by dipping or spraying. The Baumé of a core wash soln. must be controlled. Water base core wash solns. are alone considered here. Ten points to be considered in making a core wash are listed. The types of graphite employed in facing and their specific properties are noted. Parting is the material shaken through a cloth bag on to sand joints or on to loose patterns or pattern plates to ensure a clean lift of the pattern or a clean sepn. of the core from the drag. Materials used are listed. W. H. Bovnton

Beryllium and its alloys. Recent developments in fields of application. Louis L. Stott. *Metal Ind.* (London) **55**, 470-2(1939). E. H.

Corrosion of light metals and of their alloys by metallic mercury. V. S Zotin. *Korroziya* **4**, No. 2, 142-7(1938); *Khim. Referat. Zhur.* **2**, No. 2, 137(1939).—The corroding action of metallic Hg was investigated on Al with small admixt. of impurities, on duralumin, on Mg (99.98%), on Mg (tech.), on the AZ "elektron" and on the Z3 "elektron." The rolled metals (except Mg, which was cast) were tested. Drops of Hg were added to the metals and the corrosion processes were investigated. The largest amt. of corrosion was observed on the metal alloys (especially on the tech. Mg and on the "elektrons"), while pure Mg was almost immune to corrosion. The velocity and the degree of corrosion increased with the increase of the humidity of the atm. and they did not depend on its compn. (the expts. were also performed in H, O, A and CO_2). The protective films on the metals preserved the metals, but did not ensure abs. protection from Hg corrosion. W. R. Henn

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Acid-resistant steel in textile-refining industry (Hougardy) **25**. α-Soly. limit and first intermediary phase in Cu-Si system (Andersen) **2**. Increase of yields of flotation oil in rosin-extn. plant Vakhtan (Gordon) **22**. Traces of Cu and Fe in alc. (Knop, Malcher) **16**. Properties of hydraulic blast-furnace slags (Mussgnug) **20**. Protection of Mg and its alloys (Barboni) **26**. Progress in paints for exposure in Cuba (Roland) **26**. Synthetic resin paints in corrosion prevention (Koken) **26**. Corrosion and destruction of refractory materials in Martin furnaces (Ruban) **19**. Preventing internal corrosion of boilers by protective coatings and films (Ingham) **14**. Checkerwork for regenerators [of open-hearth furnaces] (U. S. pat. 2,176,157) **19**. Metallurgical coke from petroleum coke (U. S. pat. 2,177,226) **22**. Gear-wheel-spinning pump [of steel alloy] (U. S. pat. 2,176,388) **23**. Reaction products of pyrophosphoric acid with acyl derivs. of aliphatic polyhydroxy substances [for ore-sepg. agents) **13**.

Buell, Wm. C., Jr. The Open-Hearth Furnace. Vol. II. Cleveland: Penton Publishing Co. 260 pp. $4.00. Reviewed in *Foundry* **66**, No. 1, 79(1938) Vol. III. 308 pp. $4.00. Reviewed in *Metals & Alloys* **10**, 733 (1939).

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Williams, R. S., and Homerberg, V. O. Principles of Metallography. 4th ed. New York: McGraw-Hill Book Co.; London: McGraw-Hill Publishing Co., Ltd. 439 pages. $3.50 (23s.). Reviewed in *Metals & Alloys* **10**, 733(1939).

Ore briquets. Otto Seidl (to Hungaria Kunstdünger, Schwefelsaure und chemische Industrie). U. S. 2,177,228, Oct. 24. To prepare briquets suitable for smelting operations, ore material such as copper pyrites is mixed with about 2% or less of sugar material such as sugar and briquets formed of the mixt. are hardened by heating at about 200-300°.

Treating manganese ores. Andrew T. Sweet and John D. MacCarthy (to General Manganese Corp.). U. S. 2,176,774, Oct. 17. A method of extg. Mn compds. from complex carbonate ores contg. Mn and Fe comprises calcining the ore to eliminate the carbonates, sulfatizing the calcined product, roasting the sulfatized product in the presence of air at a temp. of approx. 650° until the iron is oxidized into a condition relatively insol. in water, leaching with water, sepg. sol. Mn sulfate from the insol. residue, pptg. a Mn compd. from the soln. and heating the ppt. to a temp. forming a Mn oxide sinter. U. S. 2,176,775 relates to a process of recovering Mn compds. from ores contg. appreciable amts. of Mn oxides which involves roasting the ores with an NH_4 salt such as the sulfate, ca-

pable of forming a sol. Mn compd. with evolution of NH_3 gases, sepg. the sol. Mn salt from the insol. residue, pptg. insol. Mn hydroxide with NH_4OH derived from the NH_3 gases, thereby reforming the NH_4 salt in soln., and sepg. and evapg. the soln. to recover the NH_4 salt for further use in the cycle. U. S. 2,176,776 relates to a generally similar process with use of NH_4Cl instead of the sulfate.

Working ores of vanadium and uranium. Charles J. Stamberg (to North Shore Coke & Chemical Co.). U. S. 2,176,610, Oct. 17. A process for the recovery of V and U values from ores contg. them in assocn. with compds. of Fe and Al comprises sulfatizing such an ore to solubilize V and U values, leaching solubilized values from the sulfatized ore, subjecting the resultant acid leach soln. to heat and the action of a suitable oxidizing agent to hydrolyze and ppt. V values therefrom, while adjusting and maintaining the degree of acidity of the acid leach soln. within desired limits with the aid, as a neutralizing agent, of a basic Fe-contg. ppt. obtained at a later stage of the process, sepg. the resultant V ppt., subjecting the residual soln. to a purifying treatment which includes removal of Fe and Al as a basic Fe-contg. ppt., utilizing such ppt. in cycle as a neutralizing agent in adjusting and maintaining the degree of acidity of a further quantity of the acid leach soln and recovering U values from the residual purified soln.

Treating ores containing vanadium, uranium and radium. Harry McCormack (to North Shore Coke & Chemical Co.). U. S. 2,176,609, Oct. 17. A process of treating siliceous ores contg. V, U and Ra values involves mixing with the ore in comminuted condition a quantity of $(NH_4)_2SO_4$ sufficient for reaction with the sulfate-forming components thereof, subjecting the mixt. in dry condition to regulated moderate heating, with access of air, at reacting temp. not exceeding about 475° until adequate sulfatization of the V and U values is effected, leaching the resultant product with water to ext. the solubilized values, sepg. the resultant leach soln. together with suspended Ra-slimes from the undissolved residue, sepg. the slimes from the leach soln., and subjecting the clarified soln. to appropriate treatment for recovery therefrom of its contained V and U values.

Ore car adapted for use in roasting furnaces. Zachriah T. Parker. U. S. 2,177,741, Oct. 31. Details are given of a car with slots in its sides for egress of volatilized ore gases, suitable for use in roasting various ores.

Ore-roasting and smelting reverberatory furnace. Hans W. Jaeger (50% to Fred B. Dawley). U. S. 2,177,654, Oct. 31. Various structural, mech. and operative details of a furnace having a roasting chamber directly above a smelting chamber.

Open-hearth furnace. Wm. A. Morton (to Amco, Inc.). U. S. 2,176,270, Oct. 17. Various structural and operative details.

Regenerative metallurgical furnaces such as open-hearth steel furnaces. Lewis B. Lindemuth. U. S. 2,176,674, Oct. 17. A metallurgical furnace is associated with a regenerative chamber, a tunnel under the furnace from the chamber, checkerwork providing smooth-walled vertical passages through the chamber to a height above its base (the base being free from transverse obstructions and the tunnel being of sufficient height and width to permit of cleaning the entire base of the chamber from the tunnel).

Sweating furnace suitable for treating scrap metals. Leo Mejselman and Rawson E. Stark (to American Smelting and Refining Co.). U. S. 2,176,267, Oct. 17. A sweating furnace comprises 2 telescoping drums inclined from the horizontal and with a space between their walls and bands of slots in their walls permitting flow of fused metal from the interior of the drum of smaller diam. into the space and thence out of the furnace.

Cupola furnace suitable for treating pig iron, etc. Laurence A. Grotewohl (to Campbell, Wyant & Cannon Foundry Co.). U. S. 2,176,336, Oct. 17. A furnace is described having an outer metal shell and an inner lining of fire-resisting material, an annular metal member of substantially channel-shaped cross section secured at the inner side of the shell at a zone of the furnace where the heat is severe, a similar annular channel-shaped metal member secured around the outer side of the shell, opposite the first channel member, whereby two continuous annular chambers are made, the shell between the chambers having openings, and means for continuously circulating water through the chambers.

Reducing metal compounds. Norman D. Scott and Joseph F. Walker (to E. I. du Pont de Nemours & Co.). U. S. 2,177,412, Oct. 24. Metal compds. (other than alkali metal compds.) such as a Pb salt or a Hg salt are treated with a soln. of the alkali metal addn. compd. of an org. compd., e. g., a Na-naphthalene addn. compd., to effect production of products such as a Pb-Na or Hg-Na alloy.

Grading sheets of magnetic material such as tin plate according to weight. James J. Bowden. U. S. 2,176,784, Oct. 17. App. is described, and a process of grading according to wt. sheets of material of substantially uniform magnetic susceptibility comprising subjecting such sheets first to a magnetic field capable of lifting the same, and then conveying the sheets thus lifted within the influence of a magnetic field of such strength as to release such of the sheets as are above a predetd. wt.

Grinding or polishing sheet metal such as that of the stainless type. Henry H. Giles and Carl M. Nystrom (to American Sheet and Tin Plate Co.). U. S. 2,177,316, Oct. 24. In the use of a roll or belt coated with abrasive grains, these grains are flushed with palm oil during a grinding or polishing operation so as to remove loosened grains from between those remaining on the roll or belt and to prevent the formation of dust from the loosened grains.

Pickling coils of metal such as strip steel. Agnes J. R. Greer. U. S. 2,176,900, Oct. 24. Various details of app. and operation by which pickling liquid is pumped through convolutions of the metal by alternate compression and expansion of the convolutions on opposite sides of the coil.

Pickling ferrous metals. Robert L. Brandt (to Colgate-Palmolive-Peet Co.). U. S. 2,176,389, Oct. 17. For pickling, use is made of an aq. soln. of an acid consisting of the reaction product of a material obtained from a mineral oil by solvent extn., as with liquid SO_2, and a sulfonating agent, the product being made in soln. in liquid SO_2 (suitably by use of oleum).

Treating strip metal as in tempering, etc. Carl E. Moore. U. S. 2,176,094, Oct. 17. An arrangement of app. is described, and a method of treating strip metal which includes cold-reducing the metal to approx. the desired gage, annealing the cold-reduced strip metal, temper-rolling the annealed metal in a cold-rolling mill whereby the strip metal is characterized by a wavy surface which is produced by longitudinally extending metallic fibers of unequal length, withdrawing the temper-rolled material from the cold-rolling mill by passing between a plurality of power-driven spaced-apart rolls which are constructed and arranged to tension the temper-rolled strip metal sufficiently to stretch the shorter of the longitudinally extending fibers of the metal without elongating it over its entire width, and delivering the strip metal from the power-driven spaced-apart rolls in a substantially untensioned state.

Metal heat-treatments, as in case hardening. Crandall Z. Rosecrans (to Leeds & Northrup Co.). U. S. 2,176,473, Oct. 17. A heat-treatment app. suitable for forming a diffusion alloy case comprises a furnace including a chamber for metal objects, means providing a passage for discharge into the chamber of a treating liquid, unmixed with gas, which by pyrolytic breakdown forms the atm. in which the objects are treated, the feeding means for the liquid comprising a positive displacement pump for exerting upon the liquid a pulsating pressure which increases upon increase of resistance to flow of the liquid through the passage to ensure feed of a const. metered amt. of the liquid per unit of time irrespective of greater or lesser obstruction of the passage as by the breakdown products of the liquid, which may be atomized fusel oil or carbitol, etc.

Photoelectric control of metal heat-treatments such as those effected by an oxyacetylene flame. James H. Bucknam (to Linde Air Products Co.). U. S. 2,177,276, Oct. 24. An arrangement of app. is described, and a process of heating, welding, desurfacing or cutting a ferrous metal article along a predetd. line which comprises locally heating the metal article at the starting point of the line; initiating relative movement between the metal article and the source of heat photoelectrically in response to a predetd. intensity of radiant energy emitted by the heated area at the starting point, progressively to heat successive portions of the article along the line; and stopping the relative movement at any point along the line photoelectrically in response to a decrease to below such predetd. intensity of emitted radiant energy.

Heat-treatment of articles as in bright annealing tubes, etc. Thomas G. Tanner. U. S. 2,177,031, Oct. 24. An arrangement of app. is described, and a method of heat-treatment in the heat-treatment chamber of a continuous furnace of articles contaminated with oil or grease, comprising preheating the articles in an inlet chamber, maintaining the temp. in the inlet chamber at a substantially const. temp. between the volatilization and cracking temps. of the oil or grease, entraining the vapors produced by the volatilization of the oil or grease in a stream of a protective gas outflowing from the treatment chamber, and cooling the protective gas between the treatment chamber and the inlet chamber to reduce its temp. below the cracking temp. of the vapors.

Apparatus for annealing rapidly moving electrically heated wire. John Cook (to Cornish Wire Co.). U. S. 2,176,582-3, Oct. 17. App. used may include means for passing an elec. current through a portion of the wire to heat it to the annealing temp., a water bath for quenching the heated wire after annealing, an open-ended electrically and heat-insulated tube closely surrounding the highly heated portion of the wire, the lower end of the tube extending below the surface of the water bath a sufficient distance as to cause a local heating of the water confined in the tube to the b. p. to effect flash production of steam to envelop the heated wire with a nonoxidizing atm. before it passes into the water bath and thus prevent discoloration of the wire.

Apparatus for producing desulfurized pig iron. Russell P. Heuer. U. S. 2,177,716, Oct. 31. App. used comprises a desulfurizing vessel having a C lining in the portion which is to hold a charge, a basic desulfurizing slag within the lining of the desulfurizing vessel, means for sealing the interior of the desulfurizing vessel from the outside atm. and means for producing and maintaining a pressure substantially below atm. pressure in the interior of the desulfurizing vessel.

Alloy steels containing chromium. Marvin J. Udy. U. S. 2,176,686, Oct. 17. A compn. for use in making alloy steels contg. Cr comprises an intimate mixt. of Fe oxide, ferrochrome silicon low in C and contg. sufficient Si to reduce all the Fe oxide to metal and lime sufficient to flux the silica formed in the reduction (the compn. being capable of conversion by internal exothermic reactions into a ferrous Cr alloy and a basic Ca silicate slag). U. S. 2,176,687 relates to a material made from chromite ore comprising oxidized ferro-Cr substantially free of C in finely divided admixt. with low-C ferrochrome-Si of a Si content sufficient to reduce the metal oxides of the oxidized ferro-Cr. U. S. 2,176,688 relates to a method of producing a compositie reagent suitable for use in the production of Cr alloys which comprises oxidizing C-bearing ferro-Cr and forming an oxidized product low in C and contg. Fe and Cr in oxidized forms, and mixing the oxidized product in the solid state with a solid noncarbonaceous reducing agent such as ferro-Si capable of reducing the oxidized forms of Fe and Cr to metallic form. U. S. 2,176,689 relates to a process of making ferrochrome silicon of controlled Si and C contents by reduction of chrome Fe ore with C which involves smelting the ore in a submerged arc elec. furnace in the presence of lime and with SiO_2 present in excess of the amt. required to form with the lime present in the charge a slag having a ratio of CaO to SiO_2 of about 1.7-2.2.1, resp., reducing the Fe and Cr of the ore and the Si of the excess SiO_2, and withdrawing from the furnace molten ferrochrome silicon and molten slag contg. CaO and SiO_2 in the stated ratio.

Alloy steel for internal-combustion engine valves, etc. Harry L. Frevert and Francis B. Foley (to Midvale Co.). U. S. 2,177,454, Oct. 24. An alloy of good strength at high temps. and resistant to scaling contains Fe together with C 0.1-1.0, Cr 10-20, Mn and Ni 5-13 (the Mn being 3-10.25 and the Ni 1.75-3.5%), with the percentage of Mn substantially exceeding the percentage of Ni) and Si and Al 2.5-4.5% (the Si being over 1.25%). Cf. *C. A.* **33**, 2875[9].

Hard metal alloy products. Johan Romp (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,176,802, Oct. 17. See Brit. 499,097 (*C. A.* **33**, 4955[1]).

Apparatus for galvanizing metal sheets. Daniel O. Fisher, Kristian Kronborg and Ernest G. Schlup (to American Rolling Mill Co.). U. S. 2,176,761, Oct. 17. Various structural, mech. and operative details of an app. with a cooling wheel and conveyor.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Analysis of hydrocarbons. II. Diene number of hydrocarbons. H. Grosse-Oetringhaus. *Petroleum Z.* **35**, 567-73(1939); cf. *C. A.* **33**, 9609[8].—The diene-maleic anhydride reaction was studied to det. the effect of temp., reaction time, concn. of reagent and solvent on the diene no. of a hydrocarbon mixt., especially a mixt. of cracked products. To prevent polymerization and the possibility of reaction between ethylenic hydrocarbons and maleic anhydride it is essential that the reaction temp. be kept below 100°. Inconsistent results were obtained with reaction times varying from 5 to 30 hrs. but in general the diene no. increased with increasing time. Maleic anhydride is used preferably in a concn. of 0.2 *M*. The best solvent appears to be xylene. Unreliable results are reported with toluene. 11 tables and 15 references.

E. J. Mahler

Halogenation of hydrocarbons. Chlorination of olefins and olefin-paraffin mixtures at moderate temperatures; induced substitution. H. P. A. Groll, G. Hearne, F. F. Rust and W. E. Vaughan. *Ind. Eng. Chem.* **31**, 1239-44 (1939).—Flow studies on the chlorination of olefins have revealed that analyses for free halogen in olefin-Cl mixts. are susceptible to error because of the possibility that catalyzed reactions may occur in the absorption vessel. It has been proved that olefins react with Cl only slowly, if at all, in the gas phase at moderate temps. (below 150°). In the presence of a liquid phase, however, the reactions are exceedingly rapid. Under this condition the substitution of Cl into the satd. addn. product or into a concurrently present paraffin is inhibited by O, the paraffin reaction being the more strongly influenced. These substitution processes come under the classification of "induced" reactions. The distribution of products from several such chlorination reactions has been detd. Catalytic vapor-phase chlorination of olefins and of olefin-paraffin mixts. occurs at moderate temps. in the absence of liquid. The concurrent substitution reactions are not inhibited by O and are a consequence of purely thermal and catalytic conditions rather than induction. William E. Vaughan

Halogenation of hydrocarbons. Substitution of chlorine and bromine into straight-chain olefins. H. P. A. Groll and G. Hearne. *Ind. Eng. Chem.* **31**, 1530-7(1939); cf. preceding abstr.—The reaction of halogens with olefins contg. a double bond in an unbranched C chain is

changed from addn. to substitution by operating at elevated temps. This substitution, unlike so-called "induced substitution," occurs exclusively into the olefin with the formation of allyl-type unsatd. monohalides. The optimum temp. ranges from 300 to 600°, depending on the nature of the olefin and halogen. Operating conditions have been examd. in some detail so that the work can serve as a basis which will make this class of products easily available. E. g., chlorination of propylene at 500° resulted in 74% of unsatd. monohalide, principally allyl chloride. Bromination yields allyl bromide. Other hydrocarbons were also studied. William E. Vaughan

Hydrogenation of 1-heptene and heptane under hydrogen pressure. A. F. Nikolaeva and P. V. Puchkov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 345-6(1939)(in English).—Heptane (I), b_{745} 96-8°, n_D^{20} 1.3880, d_{20} 0.6844, $PhNH_2$ point 70.0°, from the dehydration of heptyl alc. to give 1-heptene (II) and subsequent hydrogenation at room temp. by Skita's method, reacts with HNO_3 in a sealed tube at 120° to give 2-nitroheptane, n_D^{23} 1.4240, 98% sol. in KOH soln. on heating. I (40.6 g.), heated 2 hrs. at 400° under 140 atms. H in the presence of 4.0 g. MoS_2 and the product distd., gave fraction *a*, b. 78-95.5° (11.0 g.), n_D^{20} 1.3860, d_{20} 0.6798, $PhNH_2$ point 70.6°; fraction *b*, b. 95.5-8.2° (17.3 g.), n_D^{20} 1.3880, d_{20} 0.6845, $PhNH_2$ point 70.6; residue n_D^{20} 1.4038. Fraction *a* heated 24 hrs. in a sealed tube at 120° with HNO_3 gave a product, n_D^{20} 1.4262, 60% sol. in KOH soln. The undissolved nitro compds., n_D^{20} 1.4276, reduced with Sn and HCl gave an oil with an ammoniacal odor, proving that I had isomerized to give isoheptanes. II (37.5 g.), b. 94-8°, n_D^{20} 1.4051, d_{20} 0.7029, heated 40 min. at 400° under 90 atms. of H in the presence of 3.7 g. MoS_2, is completely hydrogenated (value 0.7). On distn. the product gave fraction *a*, 80-94° (5.6 g.), n_D^{20} 1.3848, d_{20} 0.6790, $PhNH_2$ point 71.4°; fraction *b*, b. 94-8° (19.9 g.), n_D^{20} 1.3880, d_{20} 0.6893, $PhNH_2$ point 71°; residue, n_D^{20} 1.4119. The mol. wt. of fraction *a* is 101, i. e., no polymerization and no splitting of the mols. have occurred but the phys. consts. show that isoheptanes are formed in this case also.
Janet E. Austin

Action of elementary fluorine on organic compounds. VI. The vapor phase reaction between ethane and fluorine in progressively varying proportions. John D. Calfee, Nobukazu Fukuhara and Lucius A. Bigelow. *Jr. Am. Chem. Soc.* **61**, 3552-4(1939); cf. *C. A.* **32**, 2519[1].—The app. for the fluorination and the low-temp. distn. is described and illustrated. The vapor-phase fluorination of C_2H_6 (IV) over a Cu-gauze catalyst gives CF_4 (I), azeotropes A (II) and B (III), IV, C_2F_6 (V) and a residue b. above −78° (VI). III b. −92°, mol. wt. 62; this consists of approx. 2:1 IV and V. II b. −104°, mol. wt. 54, and consists of approx. 6:1:1 of IV, V and SiF_4. The liquid vol. % of products using 1:1, 2.3:1, 4:1 and 6:1 ratios, resp., of F and IV are: I, 5, 12, 21, 12; II, 11, 17, 21, 18, III, 31, 52, 14, 0; IV, 42, 0, 0, 0; V, 0, 6, 32, 41; VI, 12, 17, 14, 29. As the proportion of F in the reaction mixt. increases the quantities of I and V increase, while the amt. of IV recovered decreases. III was formed in max. quantity under conditions when both of its components would be expected to be present in considerable proportions at the same time. Direct fluorination is more similar to chlorination than has been supposed hitherto.
C. J. West

Chlorinations with sulfuryl chloride. II. The peroxide-catalyzed reaction of sulfuryl chloride with ethylenic compounds. M. S. Kharasch and Herbert C. Brown. *J. Am. Chem. Soc.* **61**, 3432-4(1939); cf. *C. A.* **33** 7728[8]. —SO_2Cl_2 reacts with ethylenic compds. to form the corresponding dichlorides; the reaction is catalyzed by org. peroxides; it is suggested that the reaction proceeds through a chain mechanism involving atoms and free radicals. Cyclohexene and SO_2Cl_2 in CCl_4 give about 90% of dichlorocyclohexane; allyl chloride gives 80-90% of 1,2,3-trichloropropane; ClCH:CHCl gives 85% of $Cl_2CHCHCl_2$ in the presence of Bz_2O_2; stilbene gives 45% of the α,α′-dichloride and 33% of the β,β′-isomer; Cl_2C:CCl_2 gives 15% of Cl_3CCCl_3 in 5 hrs.; Ph_2C:CPh gives the dichloride (the reaction is very slow in the absence of the peroxide).
C. J. West

Hydrogen bonds involving the C—H link. VIII. The solubilities of completely halogenated methanes in organic solvents. M. J. Copley, G. F. Zellhoefer and C. S. Marvel. *J. Am. Chem. Soc.* **61**, 3550-2(1939); cf. *C. A.* **34**, 396[6].—Soly. data are given for CCl_2F_2 and CCl_3F at 32.2° at pressures equal to their vapor pressure at 4.5° in hexyl alc., cyclohexanol, PhOH, $(CH_2OH)_2$, $CH_3(CH_2OH)_2$, cyclohexyl Me ether, PhOMe, $MeO(CH_2CH_2O)_4Me$, AcOH, $EtCO_2H$, Et laurate, Et caprylate, heptaldehyde, cyclohexanone, Ac_2CH_2, $(AcCH_2)_2$, cyclohexylamine, $PhNH_2$, dimethylcyclohexylamine, $PhNMe_2$, quinoline, $AcNH_2$, AcNHMe, $AcNMe_2$, BuCN, PhCN, EtMeC.NOH, decane, mesitylene, PhBr and hexyl bromide. In practically every case the soly. was lower than that calcd. from Raoult's law. These observations support the earlier postulation that intermol. assocn. through H bonding is an important factor in producing soly. of H-contg. halogenated methanes. C. J. West

Mechanism of the hydrolysis of α,γ-dimethylallyl chloride. C. L. Arcus and J. W. Smith. *J. Chem. Soc.* **1939**, 1748-9.—The hydrolysis of α,γ-dimethylallyl chloride (I) in aq. Me_2CO (75% by vol.) has been followed by a conductometric method and shown to follow a unimol. law, in accord with the mechanism deduced from stereochem. observations. The apparent incompleteness (93%) of the reaction in the cond. cell employed is attributed to adsorption of the I on the Pt-blacked electrodes.
C. J. West

Structure of vinyl polymers. VI. Polyvinyl halides. C. S. Marvel, J. H. Sample and Max F. Roy. *J. Am. Chem. Soc.* **61**, 3241-4(1939); cf. *C. A.* **34**, 3748.—Heating a satd. soln. of polyvinyl chloride (I) in dioxane with Zn gives an insol. product still contg. most of the Cl. When a very dil. soln. of I in dioxane was used the cross-linking reaction which produced the insol. material was avoided and a smooth dehalogenation reaction occurred; under the most favorable conditions the dehalogenated product (II) contained 13 to 16% Cl (i. e., I had lost 84-87% Cl); under similar conditions the bromide polymer (III) lost 85.9% Br; Flory (*C. A.* **33**, 6236[3]) has shown that random removal of pairs of halogens in a polymeric 1,3-dihalide should take out 86.47% of the halogen and leave 13.53% isolated from reactive neighbors and non-removable except by cross-linking of the C chains. II is sol. in dioxane, does not decolorize alk. $KMnO_4$ and in CCl_4O_3 shows no evidence of ozonolysis; HNO_3 does not give cryst. oxidation products. With Cl both addn. and substitution occur. Neither I nor III liberates I from a peroxide-free dioxane soln. of KI. Treatment of a Cellosolve soln. of I with KOH removes halogen acid and leads to the formation of an insol. shiny reddish brown polymer. The ultraviolet absorption spectrum of I is very similar to that of 2,4-dichloropentane and somewhat different from that of the 2,3-isomer. All these facts support the view that I has the 1,3-dihalide structure. **VII. Polyacrylyl chloride.** C. S. Marvel and Charles L. Levesque. *Ibid.* 3244-6.—Acrylyl chloride, prepd. from Na acrylate and $POCl_3$, may be polymerized either by peroxides or ultraviolet light; when $SOCl_2$ is substituted for $POCl_3$ the product obtained is polymerizable only by ultraviolet light (the chloride may be contaminated with a little $SOCl_2$ which inactivates the peroxide catalyst). The polymers (I) obtained are brittle, pale-yellow solids, sol. in $POCl_3$ and dioxane but insol. in other common solvents. Photopolymerized I with Br gives a Br compd. contg. 1 atom Br for every 3.4 I units; transformed into the Me ester and heated with KI in Me_2CO it gives free I equiv. to 46% of the Br in the polymer; this reaction is characteristic of 1,2-di-Br compds., especially those in which the Br atoms are adjacent to a neg. group. The production of 1,2-di-Br units is most logically explained by assuming a "head-to-head, tail-to-tail" structure for this polymer. Since only a third of the H atoms in the α-positions of I were replaced by Br, the possibility of the presence of some "head-to-tail" units is not excluded. No bromination occurs with polymethacrylyl chloride, in which the α-positions are not

available for substitution. These facts indicate that at least a part of the units of I are arranged in a "head-to-head, tail-to-tail" structure, [—$CH_2CH(COCl)CH(COCl)CH_2CH_2CH(COCl)CH(COCl)CH_2$—]$_n$. C. J. W.

Polarizations and related data of optically active and racemic β-octanols. J. B. M. Coppock and F. R. Goss. *J. Chem. Soc.* **1939**, 1789–92.—Detns. of the d., dielec. const., mol. polarization and partial polarization in C_6H_6 of *d*-, *l*- and *dl*-β-octanol reveal no difference between the active and the *dl*-forms. These results are in agreement with the view that the *dl*-compd. is simply a racemic mixt. It is shown that the hygroscopic nature of the carbinol leads to anomalous results for the moist material and the need for the careful exclusion of H_2O in the measurements described is emphasized. The apparent dipole moment of β-octanol in C_6H_6 is 1.66 D. The *d*-alc. has [α] 9.91°, 10.38°, 11.64° and 19.2° at 5893, 5780, 5461 and 4358 A.; the values for the *l*-alc. are −9.72°, −10.09°, −11.48° and −19.2°; d_4^{20} is 0.8202 and 0.8201 for the *d*- and *l*-alcs.; all 3 isomers have n_D^{20} 1.4264. The ε value for *dl*-alc. immediately after distn. is 8.173; addn. of 0.2% H_2O gives 7.982; after standing 1 month, 8.120; after 6 months, 7.785. C. J. West

Optical activity of α-bromopropionitrile. Kenneth L. Berry and Julian M. Sturtevant. *J. Am. Chem. Soc.* **61**, 3583–4(1939). In connection with recent theories of optical rotatory power, *l*-MeCHBrCN (I) has been prepd. by asym. conversion from *l*-MeCHBrCO$_2$H (II). The rotation of II indicated it to be 67.1% *l*- and 32.9% *d*-acid; the I, prepd. by dehydration of the amide with P_2O_5, had $[\alpha]_D^{25}$ −5.25°; on the assumption that no racemization occurred during the synthesis the calcd. $[\alpha]_D^{25}$ for I is −15.33°. Efforts will be made to prep. a purer I. C. J. West

Preparation of primary amines. Alexander Galat and Gertrude Elion. *J. Am. Chem. Soc.* **61**, 3585 6(1939).—One mole of hexamethylenetetramine in 8 10 times its wt. of hot 95% EtOH and slightly more than 1 mole of NaI, treated with 1 mole alkyl chloride or bromide, gives the amine on standing (varying from a few min. to several weeks); the longer the C chain the longer is the time required for pptn. The amine is pptd. by satn. of the mixt. with HCl gas and liberated by distn. with excess of NaOH. $MeNH_2$, 1 week, 72%; $EtNH_2$, 8 days, 82.5%; $PhCH_2NH_2$, 2 hrs., 82.5%; *p*-$O_2NC_6H_4CH_2NH_2$, 1 day, 61%; $PhCH_2CH_2NH_2$, 3 weeks, 54%. C. J. West

Preparation of certain amines. Edward J. Schwoegler and Homer Adkins. *J. Am. Chem. Soc.* **61**, 3499 502 (1939).—Conditions have been detd. for the max. yields of secondary and tertiary amines from alcs. and amines. Equimol. quantities (usually 0.2 mole) of amine and alc. and 4 g. Cu chromite were used except in (*i*) where 3–4 g. Raney Ni and in (*f*) and (*j*) where 8 g. Cu chromite were used; 80 ml. of dioxane was the solvent for 0.2 mole amine except in (*c*) where an excess of alc. and (*a*) and (*g*) where Et_2O was the reaction medium. All reactions were carried out under 125 atm. of H at the temps. and for the times indicated: (*a*) and (*e*) 12 hrs. at 180°; (*b*) and (*c*) 3.5 hrs. at 200°; (*i*) 12 hrs. at 250°; (*d*) and (*f*) 3.5 hrs. at 250°; (*g*), (*h*) and (*j*) 12 hrs. at 200°. The alc. and methods used and yields (%) of amines are given. $AmNH_2$: EtOH, (*a*) 39; PrOH, (*a*) 15; iso-PrOH, (*a*) 43; BuOH, (*a*) 6; cyclohexyl alc. (I), (*e*) 57; dodecyl alc. (II), (*a*) 0. Piperidine (III): EtOH, (*c*) 82; EtOH, (*d*) 31; PrOH, (*d*) 63; iso-PrOH, (*d*) 46; BuOH, (*g*) 70; BuOH, (*f*) 83; hexyl alc., (*d*) 84; I, (*d*) 59; 2-ethylhexyl alc., (*i*) 29; II, (*c*) 69; (*d*) 78. Phenethylamine: EtOH, (*b*) 67; PrOH, (*b*) 26; iso-PrOH, (*b*) 67; BuOH, (*b*) 60; I, (*b*) 58; II, (*b*) 14. *2-Methyl-4-aminopentane* (IV): EtOH, (*g*) 53; PrOH, (*a*) 61; iso-PrOH, (*a*) 50; BuOH, (*j*) 48; I, (*h*) 37; II, (*h*) 47. The high yields with III are due to the higher temps. used; their use, as contrasted with primary amines, is possible because the latter may form secondary amines through dehydrogenation. Representative ketones and aldehydes have been converted in good yields to the corresponding primary amines by soln. in a mixt. of MeOH and liquid NH_3 and hydrogenating over Raney Ni; the reaction mixt. in most cases consisted of 0.5 mole CO compd., 0.7 mole of NH_3, 50 ml. of MeOH and 3–4 g. of Raney Ni under 150 atm. of H; except for BzH (125°) and furfural (125–40°) the reaction temp. was 150°; the time was usually about 1 hr., though with furfural the reaction was complete after 10 min., whereas Ph_2CO was heated for 3.5 hrs. before the absorption of H ceased. Among the compds. which have given good results are heptaldehyde, BzH, PhAc, pinacolone and several dialkyl ketones. The yields (%) of various amines were as follows: IV 65, α-phenethylamine 64, benzohydrylamine 19, *2,2-dimethyl-3-aminobutane* (V) 51, 5-aminononane 72, *2,4-dimethyl-3-aminopentane* (VI) 48, $PhCH_2NH_2$ 48, heptylamine 59, furfurylamine 60. Acetonylacetone under the same conditions gives *2,5-dimethylpyrrolidine* (VII) 28 and 2,5-dimethylpyrrole 59; Ac_2CH_2 gives a quant. yield of $AcNH_2$. Hydrogenation of BuCN and hexyl cyanide in the presence of NH_3 at 125° over Raney Ni gives less than 5% of secondary amine and 90–5% of primary amines. *N-2-Ethylhexylpiperidine*, b_{42} 141°, *n* 1.4520 (all values at 20° for n_D) (*HCl salt*, m. 162–3°); *N-propyl-β-phenethylamine*, b_{16} 102°, *n* 1.4998 (*HCl salt*, m. 218°); *N-iso-Pr isomer*, b_{21} 112°, *n* 1.4990 (*HCl salt*, m. 163–4°); *N-ethylamylamine*, b. 136°, *n* 1.4111 (HCl salt, m. 195°); *N-propylamylamine*, b. 155°, *n* 1.4161 (*HCl salt*, m. 247° (decompn.)); *N-isopropylamylamine*, b. 146°, *n* 1.4113 (*HCl salt*, m. 167–7.5°); *N-cyclohexylamylamine*, b_{30} 118°, *n* 1.4500; *N-ethyl-2-methyl-4-aminopentane*, b. 136°, *n* 1.4105 (*HCl salt*, m. 144–5°); *N-propyl-2-methyl-4-aminopentane*, b. 162°, *n* 1.4148 (*HCl salt*, m. 139°); *N-Bu analog*, b. 179°, *n* 1.4192 (*HCl salt*, m. 149–50°); *N-dodecyl analog*, b_{12} 170–2°, *n* 1.4410 (*HCl salt*, m. 124.5 5°); *N-cyclohexyl analog*, b_{21} 106°, *n* 1.4530 (*HCl salt*, m. 198–9°); *PhNCO derv.*, m. 110°); *N-iso-Pr analog*, b. 146°, *n* 1.4098 (*HCl salt*, m. 158.5°); IV, b. 108 9°, *n* 1.4063 (*HCl salt*, m. 139.5°); *N-ethyl-β-phenethylamine*, b_8 85° (*HCl salt*, m. 183.5–4°); *N-butyl-β-phenethylamine*, b_6 113.5°; V, b. 102° (*HCl salt*, m. 296–7° (sublimation)); VI, b. 129° (*HCl salt*, m. 196°); VII, b. 113–18° (*HCl salt*, m. 201–2°); *isopropylpiperidine picrate*, m. 153°. C. J. West

Action of diazomethane on zinc chloride. G. Caronna and B. Sansone. *Atti X° congr. intern. chim.* **3**, 77–81 (1939).—One mol. $ZnCl_2$ (I) in 2 mols. abs. ether (II) was added dropwise to 1.0 g. CH_2N_2 (III) in II until the III was no longer discolored. The gas evolved (832 cc. at 0°, 760 mm.) was collected. From the vol. of gas evolved and from the fact that $(CH_2OH)_2$ was detected on treating the residual soln. with Ag_2O, the reaction is believed to proceed according to the equation $Et_2O + ZnCl_2 + 2CH_2N_2 = ZnO + C_4H_{10} + C_2H_4Cl_2 + 2N_2$. The complex Zn alkyl, $Zn(CH_2Cl)_2$ is believed to be an unstable intermediate product which then reacts with II to give the final products. J. C. Lo Cicero

Preparation of Grignard reagents from magnesium amalgams. Eugene G. Rochow. *J. Am. Chem. Soc.* **61**, 3591(1939). The yield of RMgX from Mg-Hg increases with the concn. of Mg in the amalgam and with the increasing possibility of free Mg in the mixt.; 0.1, 0.5 and 1% Mg in the amalgam give 0, 4.1 and 25.3% RMgX. It may be concluded that $MgHg_2$ does not participate in the Grignard reaction as readily as Mg and that Hg therefore has an inhibiting effect on the reaction. C. J. W.

Redistribution reaction. IV. Interchange between triethyllead chloride and radioactive tetraethyllead. Geo. Calingaert, Harold A. Beatty and Lewis Hess. *J. Am. Chem. Soc.* **61**, 3300–1(1939); cf. *C. A.* **34**, 373⁹.—With Ra D as an indicator, it is shown that an interchange of Cl atoms and Et radicals between $PbEt_4$ and $PbEt_3Cl$ takes place and reaches equil. in less than 1 day at room temp. C. J. West

Oxidation of aldehydes. I. The combustion zones of butaldehyde, isobutaldehyde, propaldehyde, acetaldehyde, glyoxal and acraldehyde. D. M. Newitt, L. M. Baxt and V. V. Kelkar. *J. Chem. Soc.* **1939**, 1703–10; cf. *C. A.* **32**, 1167⁹, 1168⁴,⁶.—The combustion zones of a series of satd. and unsatd. aldehydes have been mapped out over a wide range of temps. and pressures. A compari-

son of the combustion diagrams indicates that the order of reactivity of the satd. aldehydes with respect to O depends upon the compn. of the reacting medium and upon its temp. and pressure. The effect of a side chain is to increase the resistance of the aldehyde to O attack and the presence of a double bond alters the character of the combustion in such a way as to suggest that the processes occurring at low temps. result in a slower building up of the critical concn. of the particular species responsible for cool-flame inflammation. Mixts. contg. 9–20% of aldehyde and 91–80% of (2N + O) are suitable, the proportions being varied according to the no. of C atoms in the aldehyde. Combustion diagrams are given for EtCHO, PrCHO, iso-PrCHO, AcH, $(CHO)_2$ and CH_2:CHCHO. The existence of 3 pressure limits of normal ignition are observed in the case of the satd. aldehydes. The original should be consulted because the diagrams cannot be described adequately in an abstract. **II. The products of their combustion.** D. M. Newitt and L. M. Baxt. *Ibid.* 1711–20.—The oxidation products of a series of satd. and unsatd. aldehydes have been studied over a wide range of conditions from slow combustion to normal ignition. During the oxidation of EtCHO and AcH the initial product consists of a relatively stable peroxide (I), isomeric with the corresponding per acid. This substance, which is found at all stages prior to cool-flame inflammation or normal ignition, decomps. to give a 2nd peroxide (II) and an ale., in aq. soln. it changes into a per acid. The incidence of cool flames and normal ignition are shown to be conditioned by its presence in critical concns. There is no evidence that per acids or acids are formed in an excess aldehyde-O medium during reaction, except at low temps. At higher temps. some step-wise oxidation of aldehydes takes place to give lower members of the series. Data are given for C_4H_6, AcH, EtCHO, $(CHO)_2$ and CH_2:CHCHO. C. J. West

Aldehydic odoriferous substances. II. Synthesis of pelargonaldehyde. Seiiti Isikawa and Akira Miyata. *Science Repts. Tokyo Bunrika Daigaku* **A3**, 257–63(1939) (in German), cf. *C. A.* **31**, 7851[4]. Pelargonaldehyde, $Me(CH_2)_7CHO$ (I), is obtained in 20% yield by passing ozonized air into a suspension of oleic acid, $Me(CH_2)_7CH$:$CH(CH_2)_7CO_2H$, in aq. $NaHSO_3$ to which a small amt. of decalin has been added. Under other conditions (cf. Kobata, *C. A.* **29**, 7279[2]) the yield of I is even smaller. Pelargonic acid and azelaic semialdehyde, $CHO(CH_2)_7CO_2H$ (II), are formed in addn. to I. Better yields (50%) of I and 53% of the Me ester of II are obtained by adding 10 g. mixt. to 40 g. Me 9,10-dihydroxystearate, $Me(CH_2)_7CH(OH)CH(OH)(CH_2)_7CO_2Me$ (III), (from castor oil) in 400 cc. glacial AcOH and 10 cc. Ac_2O. Small amts. of I are also formed (beside a substance m. 42–3°) by heating III in the presence of sea sand in a CO_2 atm. to 650°. I b_{22} 91.2°, d_{16} 0.8280, n_D^{18} 1.4274; 2,4-dinitrophenylhydrazone, m. 106–7°. The Me ester of II b_{18} 135–9°, d_{20} 0.9542, n_D^{18} 1.43705; 2,4-dinitrophenylhydrazone, m. 67.8°. Dora Stern

Chloralides. Condensation of butylchloral with α-hydroxy carboxylic acids. N. M. Shah. *J. Indian Chem. Soc* **16**, 285–6(1939).—A mixt. of 25 g. citric acid, 25 g. butylchloral hydrate (I) and 50 cc. concd. H_2SO_4 was shaken together and after 24 hrs. poured onto ice. The brown residual mass was dissolved in AcOH, treated with concd. HCl and recrystd. from Et_2O and petr. ether yielding 8 g. of *citric acid butylchloralide*, $C_{10}H_{11}Cl_3O_7$, m. 187–8°. Similarly were prepd. the *malic* and *tartaric acid butylchloralides*, $C_8H_9Cl_3O_6$ and $C_{12}H_{12}Cl_6O_6$, m. 139 and 156°, resp. The yields (2 g.) were uniformly poor and no monocondensation product with tartaric acid was formed. Attempts to form butylchloralides from mandelic and benzilic acids were unsuccessful. No product was obtained by reduction of the butylchloralides with Zn dust and AcOH. C. R. Addinall

Crotonaldehyde condensation. Reaction of crotonaldehyde with formamide. Hans L. du Mont and Werner Schmidt. *Ber.* **72B**, 2029–35(1939).—This paper deals with the resins obtained in the condensation of crotonaldehyde (I) with amides, such as $HCONH_2$ (II), to form pyridine (*C. A.* **33**, 8171[6]). The question was by what conditions of temp., pressure, concn. and catalyst the reaction is influenced and what is the nature of the products formed in addn. to pyridine. The N content of these products, obtained often under very different conditions, varies within narrow limits (5.5–6.5%). Many of the air-dried resins contain about 4% moisture which can be removed *in vacuo* over P_2O_5. The removal of inorg. constituents is more difficult and often cannot be effected quantitatively so that the results of analysis have to be recalcd. on the basis of the ash-free org. substance. The empirical formulas so obtained ($C_8H_{13}ON$ or $C_8H_{12}ON$, $C_{10}H_{15}ON_6$, $C_{10}H_{16}ONCl$, $C_{12}H_{17}ON$, $C_{14}H_{17}O_3N$, $C_{14}H_{24}O_2N_2Br_2$, $C_{15}H_{26}O_8N_2Cl_2$, $C_{20}H_{28}O_2N_8$, $C_{20}H_{30}O_2N_2$, $C_{20}H_{32}O_2N_2Cl_2$, $C_{28}H_{48}O_4N_4Br_4$, $C_{38}H_{45}O_6N$) almost all contain an even no. of C atoms although an odd no. of C atoms would have been expected in condensation products of I and II. This suggests that these resins are formed for the most part from I and NH_3 resulting from decompn. of the II; this would explain the C_8-, C_{12}- and C_{20}- compds.; the mol. wts. of the C_{10}- and C_{14}- compds. are either to be doubled or these compds. are to be considered as condensation products of I with AcH resulting from decompn. of the I. In the condensations the temp. was varied between 20° and 180°, the pressure between 1 and 40 atm., the reaction time between 1 hr. and 2 weeks, the ratio of I to II between 2:1 and 1:2. As solvents were employed water, MeOH, dioxane and benzene, or no solvent was used. As dehydrating agents and catalysts were used K_2CO_3 and U oxide, $ZnCl_2$, $AlCl_3$ or $CdCl_2$.$ZnCl_2$ exerted a catalytic action only when used in large amts., but its use resulted in a lower and a more vigorous and complete reaction. The condensation does not proceed like the autocondensation of I catalyzed by piperidine, which takes place suddenly and rapidly and, even in the presence of II, yields only N-free products as resins. Details of the prepn. and the analytical results on the compds. listed above are given. C. A. R.

Catalytic action of vanadium compounds in the conversion of acetylene and water vapor to acetone. D. Cozzi. *Atti X° congr. intern. chim.* **3**, 89–94(1939).—The use of a mixt. of $Zn_3(VO_4)_2$ (I) and $Mn_3(V_3O_8)_2$ in the ratio of 1:1 gives a yield in excess of 90% of Me_2CO from C_2H_2 and H_2O and the temp. required is 50° lower than that necessary if the simple oxides were used as catalyst. The H_3VO_4 apparently acts as an activator for the ZnO in converting the HOAc (an intermediate product in the reaction) to Me_2CO. J. C. Lo Cicero

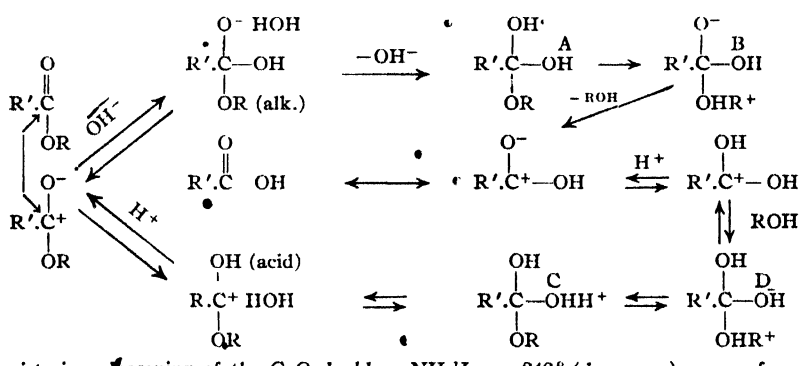
The melting-point curve of esters of dihydroxystearic acid from castor oil. Seiiti Isikawa and Eiiti Kuroda. *Science Repts. Tokyo Bunrika Daigaku* **A3**, 265–71(1939) (in German).—The esters of dihydroxystearic acid from castor oil with 14 normal primary alcs. are synthesized, using $PhSO_2Cl$ or H_2SO_4 as condensing agent. With regard to their m. ps. the esters of alcs. with an even, and those with an uneven no. of C atoms form 2 different series, the m. ps. of the 1st series being lower than those of the second. The hexyl ester has the lowest m. p. The differences between the m. ps. of 2 subsequent esters decrease with increasing C atoms. The esters up to the dodecyl ester are cryst., the tetradecyl, hexadecyl and octadecyl esters are waxy amorphous substances, insol. in water and ether, difficultly sol. in alc. and benzene and easily sol. in CCl_4. The m. ps. of the esters, detd. according to Berl (cf. *C. A.* **21**, 3285), are the following: *Me* 110°, *Et* 100°, *Pr* 100.6°, *Bu* 93°, *Am* 93.7°, *hexyl* 92.2°, *heptyl* 94.3°, *octyl* 93.4°, *nonyl* 95.4°, *decyl* 94.9°, *dodecyl* 95.6°, *tetradecyl* 96.6°, *hexadecyl* 97.4°, *octadecyl* 98.2°. The heptyl alc. employed, prepd. by reducing enanthal, b. 175–6°, d_4^{20} 0.8239, n_D^{20} 1.4356. The decyl alc., obtained by hydrogenizing coconut oil under high pressure and fractionating, b_9 113–15°, d_4^{20} 0.8275. Dora Stern

Pseudoeleostearic acid. J. P. Kass and G. O. Burr. *J. Am. Chem. Soc.* **61**, 3292–4(1939).—The linseed oil fatty acids from which the solid acids were removed by 2 crystns. from ligroin at −18° (625 g.) are refluxed under N for 2 hrs. with an equal wt. of KOH in 2.5 l. anhyd. $(CH_2OH)_2$ (or BuOH); the mixt. is cooled, several hun-

dred cc. of H_2O added and the mixt. again refluxed to saponify the esters; the soln. is esterified, the acids extd. with 1.5 l. ligroin and washed with H_2O; at −18° 25 g. pseudoeleostearic acid (I) seps. (cf. Moore, *C. A.* **31**, 4517[8]). I seps. from 85% EtOH as feathery crystals and from hexane as glistening scales; at 0° 1 g. I requires 175 cc. petr. ether (30–5°) for soln. I m. 77–9° and is remarkably susceptible to oxidation, quickly acquiring an acridly rancid odor and even its ligroin soln. becomes opalescent on boiling. The I no. gives values intermediate between 2 and 3 double bonds, rising with time. Catalytic reduction of I gives stearic acid. The Me ester (II) of I m. 41°. Oxidation of II with $KMnO_4$ in Me_2CO (boiling 3 hrs.) gives sebacic acid, $(CO_2H)_2$ and $PrCO_2H$, establishing its structure as *10,12,14-octadecatrienoic acid*. I (1.5 g.) in 250 cc. petr. ether at 0°, treated with Br until a distinct orange color results, gives after 3 hrs. about 0.1 g. of a *tetrabromide*, $C_{18}H_{30}O_2Br_4$, m. 104–4.5°; addn. of Br to the filtrate and exposure to direct sunlight at room temp. for 24 hrs. give 90 mg. of a *hexabromide* (III), m. 152–2.5°; the only other products are liquid bromides; III is apparently the only solid product obtained on bromination in ultraviolet light; this light induces no isomerization of the I. The maleic anhydride addn. product is not homogeneous and could not be sepd. into clearly defined individual components; this points to the geometric configuration of the parent acid as the trans-trans-trans or trans-cis-trans isomer, either 1 of which may form more than 1 condensation product. C. J. West

New method for the cleavage of unsaturated aliphatic acids. Chi-Yi Hsing and Kou-Jen Chang. *J. Am. Chem. Soc.* **61**, 3589(1939).—Shaking 0.6740 g. of 9,10-dihydroxyoctadecanoic acid (from oleic acid) and 0.95 g. $Pb(OAc)_4$ in 10 cc. AcOH for 24 hrs. gives 90% of azelaic semialdehyde (I) and 82% of pelargonic aldehyde (isolated as the semicarbazones). In C_6H_6 9,10,12-trihydroxyoctadecanoic acid (from ricinoleic acid) is oxidized in 4 hrs., giving about 90% of I and a semicarbazone, m. 112–13°, which may be β-hydroxypelargonic aldehyde semicarbazone. C. J. West

Mechanism of ester saponification and ester formation. Otto Mumm. *Ber.* **72B**, 1874–8(1939).—The scheme given by Hinshelwood and co-workers (*C. A.* **33**, 1199[6], and earlier papers) to represent the mechanism of ester sapon. does not sufficiently take in the individual stages of the reaction and M. accordingly suggests the following scheme:



The 1st step consists in a loosening of the C:O double bond, i. e., a shifting of the mesomerism in the direction of the zwitter-ion form. Then, in alk. sapon., the now pos. charged C atom adds a HO ion, while in acid sapon. the neg. O atom binds a proton. At the same time the remaining charge, of opposite sign, of the loosened ester mol. attracts a water mol. because of its polar character and binds it, at the pos. C atom in acid sapon. and at the neg. O atom in alk. sapon., in the latter case repelling a HO ion. This process probably dets. the velocity of the reaction. The assumed migration of a proton from the one to the other O atom with formation of an oxonium ion (A → B) or with mutual interconversion of 2 oxonium ions (C → D) probably occurs intramol. through an intermediate stage with a "H bond." If this mechanism is correct, it should be possible to detect one or other of the intermediate stages by trapping it by means of a suitable reaction. This, because of their reactivity, should be especially true of the carbenium cations formed in the course of the acid sapon. and also of the zwitter-ion formed in the next to the last stage of both acid and alk. sapon. The life of this zwitter-ion is very short, to be sure, but in its stabilization to the acid there also occurs a change in the positions of the atoms toward each other which must require a certain length of time, sufficient, even if but extraordinarily short, for the detection of the zwitter-ion. Support for this is afforded by the recent observations of the change in alk. medium of pyridone methides into a peculiar bicyclic system (*C. A.* **32**, 9085[7]) and of the surprising migration of the C_5H_9 group in 3,2-Me(CH₂:CHCHEtO)$C_6H_3CO_2Me$ to the *p*(5)-position on alk. sapon. (*C. A.* **33**, 8185[9]). C. A. R.

Optical activity dependent on the planar arrangement of the valencies of the 4-coördinated palladous atom. Alan G. Lidstone and Wm. H. Mills. *J. Chem. Soc.* **1939**, 1754–9.—The method employed by Mills and Quibell (*C. A.* **29**, 5764[1]) for the examn. of the valency configuration of the 4-covalent Pt atom has been applied to Pd. The planar configuration of the valencies of Pd (4-covalent Pd atom) has been inferred from 2 kinds of evidence—the occurrence of isomerism in various Pd compds. in which a planar arrangement of the valencies would require the existence of geom. isomerism and the x-ray analysis of the crystal structure of various Pd compds. The following work furnishes a 3rd line of evidence. A 13% aq. soln. of isobutylenediamine (2 moles, 210 cc.) is dild. with 500 cc. H_2O, heated to 80–90° and 1 mole (500 cc.) of 10% aq. K_2PdCl_4 added during 10 min. and the mixt. heated until clear; 50 cc. coned. HCl were added and the soln. heated 10 min.; on cooling 85–90% of *isobutylenediaminodichloropalladium* (I), $H_2N.CMe_2.CH_2.NH_2.PdCl_2$, seps. as orange prisms, decompg. about 300°

I (25 g.) is boiled with 500 cc. H_2O and a satd. EtOH soln. of 20 g. mesostilbenediamine (IA) gradually added; 32.5 g. KI are then added and the soln. cooled to 0°; 90% of *dl-isobutylenediaminomesostilbenediaminopalladous iodide* (II), $[H_2N.CMe_2.CH_2.NH_2.Pd.NH_2.CHPh.CHPh.NH_2]I_2$, m. 242° (decompn.) seps.; from a dil. aq. soln. a *hydrate* (1 H_2O) seps. II (25 g.), shaken with the Ag_2CO_3 from 18 g. $AgNO_3$ for 1 hr., the filtrate treated with 8.15 g. *d*(−)-diacetyltartaric anhydride, the soln. evapd below 50° and the residue pptd. from a small quantity of H_2O by abs. EtOH gives a mixt. of the *d*- and *l*-salts, hygroscopic needles with 2 moles of H_2O; digestion of 75 g. with 60 cc. cold H_2O and 200 cc. abs. EtOH, filtration, addn. of 500 cc. abs. EtOH to the filtrate and repetition of the operation give 18 g. of *l*-II *d*(−)-*diacetyltartrate* (III) as the *dihydrate*; the anhyd. III shows $[M]^{15}_{5461}$ −120.5°, −117°, −113°, −111°, −110° with *c* 9.97, 6.33, 4.22,

1.944, 1.25. III with KI in H_2O gives the *iodide*, which with $AgNO_3$ gives the *nitrate* (IV), needles, $[M]^{15}_{5461}$ −50.4° (*c* 1.607 in H_2O). At room temp. no appreciable racemization of IV was observed in aq. or dil. MeOH soln. during 24 hrs. but at 56° a 2% aq. soln. lost 30% of its optical activity in 20 hrs. and when boiled it lost 10% in about 8 min. Although the iodide yields an optically active IV, its soln. in MeOH is optically inactive, presumably on account of optical racemization; however, when a small quantity of KI is added to IV in H_2O or dil. MeOH no detectable racemization occurs in 2 days at 15°. The mother liquor from III was converted into *d*-II *l-diacetyltartrate dihydrate*, $[M]^{15}_{5461}$ 110° (H_2O *c* 1.941); *d*-II *nitrate*, $[M]^{15}_{5461}$ 50.5° (H_2O, *c* 1.605). Decompn. of 0.96 g. II in 100 cc. H_2O with 2 cc. concd. HCl at 50° (1 hr.) gives IA, m. 119°; this is regarded as evidence that the IA in III and IV is indeed the meso base, since it is hardly possible that the meso base suffers a change of configuration into the *dl*- form on coördination and is then changed back quant. into the meso form under the conditions of decompn. *dl*-Stilbenediamine (V) yields a *diacetate monohydrate*, m. 131–2°. V was resolved through the H *d*-tartrate; *l*-V is stable on heating at 100° for 16 hrs. I and *l*-V give *isobutylenediamino-l-stilbenediaminopalladous iodide hydrate*, pale-yellow needles; the *nitrate*, needles, is less sol. in H_2O than is *d*-II nitrate; $[M]^{15}_{5461}$ −497°, $[M]^{15}_{5461}$ −624° (H_2O, *c* 1.0028); decompn. of the iodide with dil. HCl gives *l*-V. In these salts the 2 Ph groups are in the cis relationship and the possibility of their resolution shows that in this cation the 4 valencies of the Pd atom cannot have the regular tetrahedral arrangement and hence presumably lie in 1 plane.
C. J. West

Organic syntheses with sulfuryl chloride. W. W. Binkley and Ed. F. Degering. *J. Am. Chem. Soc.* **61**, 3250–1(1939).—Addn. of 1/3 mole of amine to 0.5 mole of SO_2Cl_2 with cooling, followed by gentle refluxing for 24 hrs., gives *dialkylaminesulfuryl chlorides: di-Me*, b_{10} 66°, d^{25}_4 1.337, n^{20} 1.4526 (these temps. for d. and *n* for other compds.); *di-Et* (I), b_6 69°, d. 1.221, *n* 1.4564; *di-Pr*, b_4 83.5°, d. 1.195, *n* 1.4615; *di-Bu*, b_3 95–6°, d. 1.142, *n* 1.4648; these compds. have an irritating effect on the skin and the di-Me deriv. is also a lachrymator. Esters of *N,N*-dialkylaminesulfonic acids are obtained from the metathesis of I and the proper Na alkoxide and in small yields from Et_2NH and the appropriate ester of $ClSO_3H$; *diethylaminesulfonates:* Et, b_5 86°, d. 1.076, *n* 1.4307; *Pr*, b_3 80.5°, d. 1.068, *n* 1.4331; *Bu*, $b_{2.25}$ 73.5°, d. 1.046, *n* 1.4352; these are pleasant-smelling liquids. The Me esters of the *N,N*-dialkylaminesulfonic acids were prepd. by the action of $ClSO_3Me$ on $R_2NH.HCl$ or by the alcoholysis of the chlorides with MeOH; *Me N,N-diethylaminesulfonate*, m. 80°; *Pr analog*, m. 135°; *Bu analog*, m. 117°.
C. J. West

Method for the preparation of α,β-diglycerides of fatty acids. B. F. Daubert and C. G. King. *J. Am. Chem. Soc.* **61**, 3328–30(1939).—3-Mono-Na glyceroxide (Fairbourne and Toms, *C. A.* **15**, 3079) in dry C_6H_6 and $PhCH_2OCOCl$, allowed to stand 24 hrs. at room temp. and then heated gently, give 83% of *3-carbobenzyloxyglycerol* (I), pale-yellow oil. I in C_6H_6-quinoline and palmitoyl chloride, shaken for 2 hrs. and then allowed to stand at room temp. for 4 days, give 80% of *3-carbobenzyloxy-1,2-dipalmitin*, m. 71°; catalytic reduction (Pd black) in abs. EtOH is complete in about 2 hrs. at room temp. and 2 atm. pressure and gives 76% of *1,2-dipalmitin* (II), m. 64°; the same II resulted by catalytic reduction of the α′-tritYl deriv. at 45–50° under 3 atm. pressure. *3-Carbobenzyloxy-1,2-dimyristin*, m. 67–8°; *1,2-dimyristin*, m. 80° (59%). *3-Carbobenzyloxy-1,2-glycerol dibenzoate*, on reduction, gives 70% of glyceryl 1,2-dibenzoate (III), m. 58°; *1-p-bromobenzoyl deriv.*, m. 107°. When II is allowed to stand 24 hrs. in soln. in 0.1, 0.05 and 0.025 *N* EtOH-HCl or EtOH-NH_3 there is a marked drop in m. p. in the recovered product but there is no change in that of III. Soly. in EtOH (g. per 100 ml.) at 25°: α- and β-monopalmitin 4.09, 4.61; β-*p*-bromobenzoyl-α,α′-benzylideneglycerol in EtOH and Et_2O at 26° 0.50, 1.15; β-palmitoyl-α,α′-benzylideneglycerol in EtOH and Et_2O at 26° 1.75, 17.40.
C. J. West

Preparation of tricaprylin. E. B. Hershberg. *J. Am. Chem. Soc.* **61**, 3587–8(1939).—Details are given of the prepn. of tricaprylin (b_1 233–3.5° (cor.), m. 9.8–10.1°) in 89% (based on I) or 84% yield (based on II) by the reaction of 73.5 g. of $C_3H_5(OH)_3$ (I) in 25–50 cc. H_2O, 410 g. octanoyl chloride (II) and 181 g. of 85% KOH in 375 cc. H_2O (simultaneous addn. during 1 hr.) at −5 to 0°, with 3 hrs. addnl. stirring at −10 to −5°; the product is extd. with Et_2O and distd.
C. J. West

Pyrolysis of diglycolic anhydride. Charles D. Hurd and Howard G. Glass. *J. Am. Chem. Soc.* **61**, 3490–1 (1939).—Diglycolic anhydride (I) undergoes pyrolysis at 450–500° into maleic anhydride (II); the yield varies from 44 to 71%; this reaction involves lengthening of the C chain. Concurrently, a small yield of ketene is obtained. The sepn. of I and II is accomplished by the selective solvent action of C_6H_6; both are sol. in hot C_6H_6 whereas I seps. on cooling the soln. to 6°; after concg. the filtrate and cooling till crystals of I no longer appear, furan is added, pptg. II; the recovery of I is almost quant., that of II is 89–95%.
C. J. West

Ricinus communis. I. Oxidation of ricinoleic acid. St. Elmo Brady. *J. Am. Chem. Soc.* **61**, 3464–7(1939).—The prepn. and purification of ricinoleic acid (I), its Et ester (II), b_{1-2} 193–4°, n^{25}_D 1.4595, d^{20}_0 0.9182, and the acetate of II, b_{2-3} 196°, n^{25}_D 1.452, are described. Oxidation of 50 g. II in 350 cc. Me_2CO with 200 g. $KMnO_4$ (added during 1 hr. with gentle refluxing of the soln.) gives 7.1 g. of neutral products and 40.7 g. of acidic products; the 17.1 g. of liquid acids consist of caproic, heptylic and caprylic acids; the 22 g. of solid acids consist of azelaic, suberic and β-hydroxypelargonic acids, with an acid, m. 96°, which was not identified. Oxidation of 5 g. of I with alk. $KMnO_4$ at 0° gives 1.8 g. of the trihydroxystearic acid m. 141° (III) and 1.7 g. of the acid m. 110° (IV), with 1.5 g. of an oily product. Ricinelaidic acid gives IV with only a small quantity of III. Oxidation of both III and IV with HIO_4 gives β-hydroxypelargonic aldehyde and aldehydoazelaic acid. Aldehydoöctanoic acid with acid $KMnO_4$ gives azelaic acid.
C. J. West

Carbamates and α-amino acid esters and their polycondensation. Max Frankel, Otto Neufeld and Ephraim Katchalski. *Nature* **144**, 832–3(1939); cf. *C. A.* **33**, 9285².—The Et carbamates of glycine (I), alanine (II) and phenylglycine have been prepd. by the passage of CO_2 through the corresponding α-amino acid ester or its soln. At room temp. the compds. decomp. readily, giving off CO_2. This class of compds. is invaluable for carrying out polycondensations. On standing for several weeks I yields a glycine peptide of high chain length and II yields a product giving the biuret reaction.
Rachel Brown

Hydrogenation of 1,3-diketones to ketols. Paul S. Stutsman and Homer Adkins. *J. Am. Chem. Soc.* **61**, 3303–6(1939).—Sprague and A. (*C. A.* **29**, 734⁸) obtained the ketol $Me_3CCOCH_2CH(OH)Me$ in 68% yield by hydrogenation of Me_3CCOCH_2Ac. A study is now reported of conditions under which other ketols, less resistant to hydrogenation, could be obtained by the partial hydrogenation of the corresponding 1,3-diketones. Hydrogenation at 100° over Raney Ni of the diketones in MeOH gave in general the highest yields of ketols ($RCOCH_2CH(OH)Me$); these yields (%) were (R given): Me 35, Et 51, Pr 58, iso-Pr 50, Bu 66, iso-Bu 49, *sec*-Bu 64. Other solvents gave in several cases lower yields, though the differences between solvents was in general negligible; for R = *tert*-Bu the yields in MeOH, Et_2O and EtOH were 66, 68 and 70%. In order to obtain the above yields the shaking of the reaction vessel was stopped after 0.9–1 mole of H per mole of diketone had been adsorbed. The following method gives better results: 1 mole of H per mole of diketone was added to the diketone, MeOH and catalyst in the reaction vessel contg. N at a pressure of about 100 atm.; the mixt. was shaken at 100° until the pressure was const.; the method requires about 110 min. due to the low pressure of H as compared with about 20

min. under 125 atm. H; in the case of R = Me, iso-Bu and *sec*-Bu the yields were raised by 4, 20 and 17%, resp. H did not react at the CO next to R until the CO next to the Me group had been hydrogenated. The hydrogenation of 1,3-diketones may be continued beyond the ketol stage to give good yields of glycols, $RCH(OH)CH_2CH(OH)Me$; the yields of R = Me, Pr, Bu and *sec*-Bu are 92, 94, 94 and 80%, resp.; these hydrogenations were made at 100–25° in 1.5–3 hrs. at 100 atm. H with 4 g. Raney Ni. Evidence is presented that the cleavage of diketones previously reported is really a hydrogenolysis and not a disproportionation of a ketol subsequent to hydrogenation; heating *tert*-$BuCOCH_2CH(OH)Me$ in Et_2O with Raney Ni at 60° for 12 hrs. causes no change; hydrogenation of BzCHEt-Ac caused 27% cleavage. *Hexan-3-on-5-ol*, b_{12} 75 8°, *n* 1.4280, d. 0.950 (n_D^{25} and d_4^{25} throughout); pentan-2-on-4-ol, b_{43} 93–5°, *n* 1.4238; *heptan-4-on-2-ol*, b_{24} 101° *n* 1.4300, d. 0.930; *2-methylhexan-3-on-5-ol*, b_9 72–3°, *n* 1.4278, d. 0.929; *octan-4-on-2-ol*, b_8 91°, *n* 1.4333, d_4 0.920; *6-methylheptan-4-on-2-ol*, b_9 86°, *n* 1.4294, d. 0.914 (*phenylhydrazone*, m. 111–13°); 2,2-dimethylhexan-3-on-5-ol, b_{10} 72–4°, *n* 1.4243; *5-methylheptan-4-on-2-ol*, b_{36} 113–14°, *n* 1.4318, d. 0.921; 4-hexen-3-one, b_{740} 136–9°, *n* 1.4345, d. 0.851 (*2,4-dinitrophenylhydrazone*, red, m. 164–5°); *2-methyl-4-hexen-3-one*, b_{739} 117–8.5°, *n* 1.4345, d. 0.843 (*2,4-dinitrophenylhydrazone*, orange, m. 140–1°); 2-hepten-4-one, b_{740} 156–62°, *n* 1.4383, d. 0.852 (*2,4-dinitrophenylhydrazone*, red, m. 112 3°); *2-octen-4-one*, b_{740} 178°, *n* 1.4393, d. 0.852 (*2,4-nitrophenylhydrazone*, orange, m. 108–9°); *6-methyl-2-hepten-4-one*, b_{711} 168 70°, *n* 1.4388, d. 0.841 (*2,4-dinitrophenylhydrazone*, red, m. 101–1.5°); *5-methyl-2-hepten-4-one*, b_{710} 170°, *n* 1.4400, d. 0.848; *3-methylheptan-4-one*, b_{740} 152–4°, *n* 1.4103, d. 0.817 (*semicarbazone*, m. 106 7°); 2,2-dimethyl-4-hexen-3-one, b_{740} 152 3°, *n* 1.4380, d. 0.843 (*2,4-dinitrophenylhydrazone*, yellow, m. 135 5.5°); *heptane-2,4-diol*, b_8 107–8°, *n* 1.4386, d. 0.926 (*bisphenylurethan*, m. 101–1.5°); *octane-2,4-diol*, b_8 117–18°, *n* 1.4422, d. 0.918 (*bisphenylurethan*, m. 126 7°); *5-methylheptane-2,4-diol*, b_8 111–12°, *n* 1.4449, d. 0.928 (*bisphenylurethan*, m. 129–30°); 5-methylhexane-2,4-diol bisphenylurethan, m 134–5°; *6-methylheptane-2,4-diol bisphenylurethan*, m. 143–3.5°. C. J. West

The molecular structures of glyoxal and dimethylglyoxal by the electron diffraction method. James E. LuValle and Verner Schomaker. *J. Am. Chem. Soc.* **61**, 3520–5 (1939).—The configurations are given by the following parameters: Glyoxal: C—H = 1.09 A. (assumed, C···O = 1.20 ± 0.01 A., C—C = 1.47 ± 0.02 A., angle C—C···O = 123° ± 2°. Dimethylglyoxal: C—H = 1.09 A. (assumed), C=O = 1.20 ± 0.02 A., C_2···C_3 = 1.17 ± 0.02 A., C_1···C_2 = 1.54 ± 0.02 A., angle CO···C=O = 1.23° ± 2°, angle CH_3—C=O = 122.5° ± 1°. The electron diffraction data and the dipole moment data, as well as chem. information, indicate uniformly that both mols. are coplanar with the trans configuration and that rotation around the C—C bond connecting the adjacent carbonyl groups is restricted. A. B. Garrett

Action of diazonium salts on ascorbic acid; a general reaction of dienols. Rudolf Weidenhagen, Hans Wegner, K. H. Lung and L. Nordström. *Ber.* **72B**, 2010–20 (1939).—A characteristic property of ascorbic acid (I) is its strong reducing action by virtue of the conversion of the dienol to a diketo grouping, with formation of dehydroascorbic acid (II). In a study of the action of diazonium salts on I a different course of the reaction was found. When, e. g., 10% aq. solns. of $(MeC_6H_4N_2)_2SO_4$ and I are mixed in equimol. proportions there seps. in a few min. a cryst. substance (III) which soon fills the whole soln. III is *l-threonolactone p-tolylhydrazidooxalate*, CO.O·CH_2.CH(OH).CHOCOCONHNHC$_6$H$_4$Me. Its formation is explained as follows: I is oxidized as usual to II and the diazonium salt is reduced to $MeC_6H_4N{:}NH$. The free CO groups of II add water; the $MeC_6H_4N{:}NH$ is reactive enough to abstract H from the resulting dihydrate, the dehydrogenation being accompanied by rupture of the 2,3-union to give the oxalate, $HO_2CCO_2CH(CO_2H)CH(OH)CH_2OH$ (IV), of *l*-threonic acid (V) and reduction of the diimine to the hydrazine which with IV gives the hydrazide; the latter is at the same time lactonized to III. III, obtained nearly quantitatively, can be recrystd. unchanged from AcOEt-petr. ether, AcOH and abs. alc., but on short boiling with water it is hydrolyzed to V and *oxalic mono-p-tolylhydrazide*, $HO_2CCONHC_6H_4Me$ (VI), m. 153° (foaming); on longer boiling, $HO_2CCO_2H{\cdot}NH_2C_6H_4Me$ is formed. The cleavage of III can also be effected in alc. with $PhNHNH_2$, which gives the mixed *hydrazide*, $PhNHNHCOCONHNHC_6H_4Me$, m. 252–3° (foaming). Erlbach (*C. A.* **29**, 3652[4]) obtained the corresponding products from PhN_2Cl and isoascorbic acid but gave an entirely different interpretation of the reaction. The reaction is distinctly diphasic: (1) very rapid disappearance of the diazonium compd. and I; (2) cleavage of the II, a pronounced time reaction depending on the reactivity of the diazonium compd. This characteristic reaction with diazonium compds. is applicable to all compds. of dienol character, such as 3,4-dihydroxytetrone (VII) (Micheel, *et al.*, *C. A.* **32**, 113[5]), reductic acid (VIII), and the open-chain reductone (IX). The open-chain dihydroxymaleic acid with $(2,5\text{-}Cl_2C_6H_3N_2)_2SO_4$ gave, with dehydrogenation and cleavage of 1 mol. CO_2, a C_3-compd. which reacted further with the arylhydrazine simultaneously formed, but because of the instability of the intermediate diketotartaric acid, the reaction was not entirely homogeneous and its interpretation is reserved for a later report. This is also true of pyrocatechol. III (77% yield), m. 175–6° (foaming) (these unstable compds. give a correct m. p. only when placed in a bath preheated to a temp about 10° below the m. p.), $[\alpha]_D^{25}$ 59.1° (*c* 0.533, alc.) V, obtained, mixed with the lactone, as a brownish sirup, was identified as the phenylhydrazide, m. 158°, $[\alpha]_D^{25}$ 57.2° (*c* 0.533, alc.), and the *dibenzoyl lactone*, m. 114°, $[\alpha]_D^{25}$ 171.4° (*c* 0.533, alc.). *Ph homolog* of III (91.7% from I and PhN_2Cl), faintly yellowish, m. 155–7° (foaming), $[\alpha]_D^{25}$ 63.8° (*c* 0.533, alc.). *2,5-Dichlorophenyl analog* (86%), yellowish, m. 110° (foaming), $[\alpha]_D^{25}$ 84.8° (*c* 0.533, alc.). *d-Erythrono isomer* of I (38.1% from isoascorbic acid), druses of leaflets, m. 175° (foaming), from AcOEt-petr. ether, leaflets, m. 177° (foaming), from abs. alc., $[\alpha]_D^{25}$ −73.2° (*c* 0.533, alc.), gives on hydrolysis VI and *d*-erythronolactone, m. 104–5°, $[\alpha]_D^{25}$ −73.2° (*c* 0.533, water). *p-Tolylhydrazidooxalylglycolic acid* (100% yield from VII), m. 184 5° (foaming). *2-Ketoglutaric mono-p-tolylhydrazide*, $HO_2CCH_2CH_2COCONHNHC_6H_4Me$ (40% from VIII), faintly yellowish, m. 157° (decompn.), titrates as a monobasic acid and forms a *semicarbazone*, faintly yellowish, m. 207° (decompn.). IX with diazotized 2,4-$Cl_2C_6H_3NH_2$ gives HCO_2H and *glyoxylic 2,5-dichlorophenylhydrazide hydrate*, $(HO)_2CHCONHNHC_6H_3Cl_2$, m. 125–6°, which shows the characteristic reactions of glyoxal derivs. and forms a *phenylhydrazone*, faintly yellowish, m. 223° (gas evolution). C. A. R.

Condensation brought about by bases. VII. The acylation of ethyl isobutyrylisobutyrate and the cyclization of a 3,5-diketo ester by means of sodium triphenylmethyl. Boyd E. Hudson, Jr., and Charles R. Hauser. *J. Am. Chem. Soc.* **61**, 3567–70(1939); cf. *C. A.* **33**, 4220[1].—Et isobutyrylisobutyrate (I) (prepn. from the enolate of Et isobutyrate (II) and isobutyryl chloride (III) (55%) and from Et α-bromoisobutyrate and Mg (72%) given) with Ph_3CNa is converted into its Na enolate, which reacts with III to give 46% of *Et 2,2,4,4,6-pentamethyl-3,5-diketoheptanoate* (IV), $Me_2CHCOCMe_2COCMe_2CO_2Et$, b_{15} 137–8°. With Ph_3CNa in Et_2O IV is cyclized in 3 days to hexamethylphloroglucinol, m. 79–80° (30% yield). II and Ph_3CNa in Et_2O, allowed to stand 24 hrs. and poured into III in Et_2O, give 42% of IV; since I does not condense with III this result shows that I produced by the self-condensation of II by Ph_3CNa is in the form of its Na enolate. Cleavage of IV with EtONa gives 74% of II. The enolate of I and AcCl give 52% of *Et 2,2,4,4-tetramethyl-3,5-diketohexanoate*, b_{15} 122–4°; this could not

be cyclized with EtONa or Ph_3CNa, an alkali-insol. oil resulting in each case. C. J. West

Isotopic exchange reaction between deuterium oxide and *cis*- and *trans*-glutaconic acids. E. M. Evans, H. N. Rydon and H. V. A. Briscoe. *J. Chem. Soc.* **1939**, 1673–9.—The exchange reactions between *cis*- and *trans*-glutaconic acids and D_2O in the presence of an excess of alkali have been studied. The results clearly show that 3 H atoms are concerned, a result in accordance with modern views on tautomerism. In the exchange reactions between the trans ion and 10% D_2O, using 5 mols.-% excess of NaOH in *N* soln. at 20°, by plotting percentage interchange against time, the data represent a pseudo-unimol. reaction with a velocity const. of 22.5×10^{-4} min.$^{-1}$; after the NaOH soln. had stood in a glass container for several months, the const. had fallen to 12.4. The time of half-interchange is 5 hrs. Comparison of this value with the results of other workers shows that the glutaconate ion is an acid, in the Brönsted sense, of the same order of strength as Me_2CO and with a mobility greater than that of most tautomeric systems which have been investigated under like conditions. The high mobility leaves no doubt that the tautomerism exhibited by glutaconic acid is of the "bimol." class, i. e., the proton and the anion have free independent existence. The results with the cis acid shows that, at equil., the interchange was identical with that found for the trans acid; the same 3 H thus take part in the exchange. In 1 hr. at 20° the exchange with the cis acid was 4 times that for the trans acid under the same conditions; this confirms the real difference between the 2 isomers. This greater mobility with the cis acid is no doubt due to the instability and higher energy content of the cis ion; steric inversion to the trans ion will bring about exchange of 1 H. The results show that this inversion must be a faster process than the isomerization process; this seems to be unlikely if the mechanism of steric inversion involves the mesomeric ion. It is suggested that ionization of H of the CH_2 group is responsible and that this occurs through the agency of H-bond formation which is sterically possible only in the case of the cis acid. The exchange reaction with glutaric acid was also studied in order to establish that CH_2 groups exchanged only slowly even when present in a mole contg. 2 activating groups such as CO_2H. C. J. West

Constitution of arabic acid. II. Degraded arabic acid. F. Smith. *J. Chem. Soc.* **1939**, 1724–38; cf. *C. A.* **33**, 6253[1].—The Ba salt of degraded arabic acid prepd. from the acid by hydrolysis with 0.01 *N* H_2SO_4 is identical with that obtained by autohydrolysis; it has $[\alpha]_D$ −9° (H_2O, *c* 1), equiv. 670 (from Ba content); the free acid (I) has $[\alpha]_D^{15}$ −9° (H_2O, *c* 1), equiv. 660 (titration), I no. about 10; fractional pptn. of I or the Ba salt shows that they are essentially homogeneous. Since I contains only galactose (II) and glucuronic acid (IIA) residues, the equiv. figures indicate the presence of a repeating unit composed of 1 IIA and 3 II units. Both I and the Ba salt reduce Fehling soln. and it would seem that this portion of the arabic acid mole is of finite size and relatively small in comparison with the parent acid and with highly complex saccharides, such as starch and cellulose. Methylation of I with Me_2SO_4 and NaOH gives a product with a free CO_2H group which, on esterification and further treatment with Purdie's reagents, gives a fully methylated I, pale yellow, $[\alpha]_D^{15}$ −54° ($CHCl_3$, *c* 1); fractional pptn. failed to disclose the presence of degraded material. Hydrolysis of the Me ester with 6.5% MeOH-HCl (boiling 10 hrs.) gives a nonreducing sirup which was heated with 0.15 *N* $Ba(OH)_2$ for 2 hrs. at 55°, giving a sirup and a Ba salt; from the values of *n* of various fractions it is calcd. that the sirup contains 1.84 g. (1 mole) of 2,3,4,6-tetramethylmethylgalactoside (III), 8.63 g. of the 2,3,4-tri-Me deriv. (IV) (5 moles) and 4.8 g. of the 2,4-di-Me deriv. (V) (3 moles), and the Ba salt (7.5 g.) is that of 2,3,4-trimethylmethylglucuronoside (VI) (3 moles); the amt. of III is 8.4% of the sirup. VI has $[\alpha]_D^{15}$ 80° (H_2O, *c* 0.9), and does not reduce Fehling soln.; there is no increase in MeO content when the Ba salt is remethylated. The free acid from VI boiled for 8 hrs. with 3% MeOH-HCl gives the Me ester of 2,3,4-trimethylmethylglucuronoside, $b_{0.02}$ 120° (bath temp.), n_D^{15} 1.4470, $[\alpha]_D^{15}$ 87° (H_2O, *c* 1); MeOH-NH_3 gives the *amide*, m. 183°, $[\alpha]_D^{15}$ 137.5° (H_2O, *c* 0.7). Methylation of glucuronolactone and esterification with 3% MeOH-HCl gives 2,3,4-trimethyl-α-methylglucuronoside (VII), $b_{0.2}$ 125°, n_D^{15} 1.4467, $[\alpha]_D^{15}$ 81° (H_2O, *c* 0.8); amide, m. 183°, $[\alpha]_D^{15}$ 138° (H_2O, *c* 0.6); these are identical with those from VI. The β-isomer of VII, esterified with CH_2N_2 gives an *amide*, m. 193°, $[\alpha]_D^{15}$ −47° (H_2O, *c* 1.2). The free acid from VI on oxidation with Br gives 2,3,4-trimethylsaccharolactone, whose *Me ester* (VIII) m. 107°, $[\alpha]_D^{15}$ 32° (equil. value in H_2O), $[\alpha]_D^{15}$ 102° (initial in MeOH, *c* 1) changing to 52° (equil. value). Oxidation of VIII with HNO_3 (1.5 hrs. at 50° and 3 hrs. at 95°) gives *dl*-xylotrimethoxyglutaric acid (IX) and *l*(+)-threodimethoxysuccinic acid (X), characterized as the amides. β-1,6-Anhydroglucopyranose, methylated and oxidized with HNO_3, gives VIII, IX and X. III is identified by converting it into the corresponding reducing sugar and its anilide, m. 192°. IV was transformed into 2,3,4-trimethylgalactose (XI), which gives a monohydrate, m. 80°, $[\alpha]_D^{15}$ 152° (H_2O, *c* 1) changing to 114°, and an *anilide*, m. 167° (cf. McCreath and Smith, *C. A.* **33**, 4202[2]). Oxidation of XI gives 2,3,4-trimethyl-δ-galactonolactone, $b_{0.09}$ 140–50°, n_D^{15} 1.4757, $[\alpha]_D^{15}$ 134° (after 10 min.) changing to 24° (after 9 hrs., H_2O, *c* 1); $PhNHNH_2$ gives the phenylhydrazide of 2,3,4-trimethylgalactonic acid, m. 175–6°; the *anilide* of the acid m. 165°, $[\alpha]_D^{15}$ 32° (H_2O, *c* 2.1). Oxidation of IV with HNO_3 (1 hr. at 50° and 2 hrs. at 80°) gives 2,3,4-trimethylmucic acid (Me ester, m. 102–3°; *diamide*, m. 273° (decompn.); *1-monoamide*, m. 156°, $[\alpha]_D^{15}$ 34° (H_2O, *c* 3); *bismethylamide*, m. 205°, $[\alpha]_D^{15}$ 7.5° (H_2O, *c* 1.3)); thus the Me groups in IV are in positions 2, 3 and 4. IV was synthesized as follows: α-methylgalactopyranoside and Ph_3CCl in C_5H_5N give the *6-trityl deriv.*, pale yellow, glassy residue, $[\alpha]_D^{15}$ 30° (Me_2CO, *c* 2); Me_2SO_4 and NaOH give the *2,3,4-tri-Me deriv.*, $[\alpha]_D^{15}$ 44° ($CHCl_3$, *c* 2); the 6-trityl group was removed by satg. an Et_2O soln. with HCl at 10°, giving IV. V exists in 2 forms. 2,4-Dimethyl-β-methylgalactoside, m. 165–6°, which is non-reducing; methylation gives the 2,3,4,6-tetra-Me deriv., m. 48°; *2,4-dimethylgalactose* (XII), as the monohydrate, m. 103°, $[\alpha]_D^{15}$ 122° (10 min.) changing to 85.6° (equil. value in H_2O, *c* 1.7). The α-isomer m. 105°, $[\alpha]_D^{15}$ 142° (H_2O, *c* 1.1); hydrolysis gives XII. XII forms an *anilide*, m. 216°. XII and $PhNHNH_2$, heated in dil. AcOH for 3 hrs. at 80°, give *4-methylgalactose phenylosazone*, m. 150°; in 3 years the m. p. falls to 130°; on crystn. from aq. MeOH a product, m. 158° (decompn.), results which is probably *4-methylanhydrogalactose phenylosazone*. XII and Br in H_2O at 20° (2 days) give a sirupy 2,4-dimethylgalactonolactone, $[\alpha]_D^{15}$ 100° (initial, in H_2O, *c* 1.2) changing to 62° in 18 hrs.; *phenylhydrazide*, m. 183°; heating the latter with 0.1 *N* H_2SO_4 gives *2,4-dimethyl-δ-galactonolactone*, m. 113°, $[\alpha]_D^{15}$ 162.2° (H_2O, *c* 0.54) changing to 52.6° in 20 hrs.; *2,4-dimethylgalactonamide*, m. 167°, $[\alpha]_D^{15}$ 59° (H_2O, *c* 0.8). Heating XII with HNO_3 for 24 hrs. at 50–5° and esterification give *Me 2,4-dimethyl mucic 3,6-lactone* (XIII), $b_{0.12}$ 190° (bath temp.), m. 111°, $[\alpha]_D^{15}$ 120° (H_2O, *c* 1), changing to 83.5° in 14 days (mutarotation still incomplete); *2,4-dimethylmucic diamide*, m. 229° (decompn.), $[\alpha]_D$ 30° (H_2O, *c* 1); *bismethylamide*, m. 214°, $[\alpha]_D^{15}$ 27° (H_2O, *c* 1.5). Methylation of XIII with Purdie's reagents and crystn. from Et_2O give Me 2,3,4,5-tetramethylmucate and from the mother liquor on addn. of petr. ether the *Me ester lactone* of *2,4,5-trimethylmucic acid*, m. 63–4°, $[\alpha]_D^{15}$ 85° (H_2O, *c* 1.2); *2,4,5-trimethylmucic diamide*, m. 225° (decompn.); *bismethylamide*, m. 232° (decompn.), $[\alpha]_D^{15}$ 23° (H_2O, *c* 1.3). A structure composed of the 12 units mentioned above joined by glucosidic links and having a single free reducing group protected with a Me residue would have a mol. wt. of 2494 and an equiv. of 831 (found by titration, 830) and a Me ester would have a MeO content of 46.4% (found, 45.2). The unmethylated degraded arabic acid calcd. on this basis would have a mol. wt. of 2003 (found by I no., 2000) and an equiv. wt. of 663 (found by direct titration, 660, and

from Ba content, 670). The degraded arabic acid reduces Fehling soln. and on the above data the mol. of min. size would consist of 12 units, 9 being *d*-galactose and 3 *d*-glucuronic acid. The mode of attachment of these units is indicated by the isolation of their various methylated derivs. The isolation of 1 mol. proportion of III and 3 of VI shows clearly that there must be 4 "ends" in the structure of the repeating unit of 12 sugar residues. The constitution can therefore be represented by a terminated chain of galactose residues to which are attached 3 side chains, each terminated by a glucuronic acid unit; the side chains may be attached to any but the terminal galactose units which furnish the III, the point of linking being indicated by the isolation of V. The view is supported by the isolation of equal amts. of VI and V. The evidence suggests that the galactose residues in the main chains are mutually joined by 1,6-glucosidic links or by 1,3-links or even by 1,6- and 1,3-links. The side chains each contg. a terminal glucuronic acid residue may be attached by 1,3-links or by 1,6-links and at this stage the possibility that they are joined by 1,3- and 1,6-links cannot be excluded. Structural formulas illustrating these possibilities are given. C. J. West

2-Alkylthiosemicarbazides. Eugène Cattelain. *Compt. rend.* **209**, 799–801(1939). As 2-alkylsemicarbazides, $NH_2CONRNH_2$, are obtained by the action of KCNO on an alkylhydrazine (I), so the corresponding 2-alkylthiosemicarbazides, $NH_2CSNRNH_2$, (II), are obtained by treating I in a similar fashion with KCNS, the first product being the thiocyanate, $NHRNH_2.SCNH$ (III), which on heating to a temp. varying with R isomerizes to II, which is purified by recrystn. from hot H_2O in which it is much more sol. than in cold. With aldehydes or ketones it readily forms 2-alkylthiosemicarbazones. The following were prepd.; II, R = Me, m. 183–4°, R = benzyl, m. 155°; III, R = Me and Et, both liquids, isomerizing to II at 165° and 140°, resp.; also 2-methyl- and 2-benzylthiosemicarbazones from benzaldehyde, m. 174° and 214.5°, resp., from anisaldehyde, m. 192° and 175°, and from *p*-methoxyhydratropaldehyde, m. 100° and 195°.
C. A. Silberrad

5-(*α-sec*-Butoxy)ethyl-5-alkylhydantoins. Robert J. Speer and Henry R. Henze. *J. Am. Chem. Soc.* **61**, 3376–7(1939).—One part of *α-sec*-butoxyethyl alkyl ketone (*C. A.* **33**, 5360⁹) is mixed with a suspension of 1.25 parts of KCN and 3 parts of $(NH_4)_2CO_3$ in 7–8 vols. of 50% EtOH and warmed at 55–60° for 5–6 hrs., giving *5-(α-sec-butoxy)ethyl-5-alkylhydantoins;* they are purified by crystn. from 50–60% EtOH or from C_6H_6-petr. ether; *Me* m. 203–4°, 36%; *Et* m. 190°, 41%; *Pr* m. 205–6°, 24%; *iso-Pr* m. 196–7°, 22%; *Bu* m. 204 5°, 36%; *iso-Bu* m. 192°, 44%; *sec-Bu* m. 189–90°, 30%; *Am* m. 178°, 31%; *iso-Am* m. 177°, 40%. These compds. are potentially important as *soporifics* or *anticonvulsants*.
C. J. West

Constitution of purine nucleosides. IX. Crotonoside. Roderick Falconer, J. Masson Gulland and Leonard F. Story. *J. Chem. Soc.* **1939**, 1784–7; cf. *C. A.* **34**, 769⁹.—Crotonoside (I), m. 243–5° (decompn.), is isolated in 0.53-g. yield from 500 g. ground, unshelled croton seeds by extn. with hot H_2O at 80° (Cherbuliez and Bernhard, *C. A.* **26**, 2967, 5077). Deamination of I with $NaNO_2$ and dil. AcOH gives xanthosine (?) (II), $[\alpha]_D^{19}$ −51.2° (0.1 *N* NaOH, *c* 1.029). 2,6-Dichloro-9-methylpurine and 40 parts dry EtOH-NH_3, heated 3 hrs. at 85–90°, give *2-chloro-6-amino-9-methylpurine*, needles; heating with EtONa for 3 hrs. at 130° gives *6-amino-2-ethoxy-9-methylpurine*, microcryst.; PH_4I in HI (d. 1.95) at 30–40° and then heated to boiling gives 9-methylisoguanine (III). The 7-isomer of III could not be prepd. from 2,6-dichloro-7-methylpurine, 7-methylguanine resulting through an isomeric change. Comparisons of the ultraviolet absorption spectra of I, III and guanosine (IV) confirm that I is a 9-substituted deriv., that it is not identical with IV and that its aglucone is isoguanine. The spectrum of II is identical with that of authentic xanthosine. I is a 9-*d*-ribose deriv. of isoguanine. C. J. West

Oxidation of glycosides by means of lead tetraacetate in aqueous solution. J. M. Grosheintz. *J. Am. Chem. Soc.* **61**, 3379–81(1939); cf. *C. A.* **34**, 377⁸.—The oxidative cleavage of *α-* and *β*-Me-*l*-arabinopyranosides can be carried out quant. in aq. soln. with $Pb(OAc)_4$. Three moles of the oxidizing agent, instead of 2, are required to complete the reaction; the reason for this excess consumption of reagent is that in aq. soln. the 1 mole of HCO_2H formed during the 1st reaction is oxidized by 1 mole of $Pb(OAc)_4$ to 1 mole of CO_2. C. J. West

A method of preparing *β*-glucose. Willy Rasmussen. *Dansk Tids. Farm.* **13**, 273–9(1939)(English summary).—Ca bicarbonate is prepd. by suspending 0.7 g. $CaCO_3$ in a l. of distd. water and passing CO_2 until dissolved. To this soln. 100 g. of *α*-glucose is added and the soln. left for 24 hrs. at room temp. to permit mutarotation. The soln. is then filtered and heated to 40°, the excess CO_2 being forced out by agitation until a blue color is obtained with bromothymol (pH 7.4). A soln. of AcOH-free acetone is prepd. by shaking with $CaCO_3$, allowing to stand and filtering just before using. Equal vols. of the sugar soln. and the acetone are mixed and placed in a thermostat at 40°. In 5–10 min. 3 ml. of 0.2 *N* H_2SO_4 is added and the mixt. allowed to stand for 2 hrs. at 40°. At the end of this time active charcoal is added, the soln. is filtered and evapd. on a water bath or under a vacuum to a sirup which turns to a solid under frequent stirring. The solid is pulverized, dried at a temp. not above 60° or in a vacuum over H_2SO_4. The resulting product is claimed to be chiefly *β*-glucose. Otto Johnson

Synthesis of 5,6-dimethylglucose. M. R. Salmon and Garfield Powell. *J. Am. Chem. Soc.* **61**, 3507–10(1939) 1,2-Diacetoneglucose (I) and Na in Et_2O, allowed to react 2 days at room temp. and then treated with $PhCH_2OCH_2Cl$, give 55% of *3-benzyloxymethyldiacetoneglucose* (II), $b_{0.2}$ 163–77°; it forms a yellow, slightly viscous oil which did not crystallize. Reduction with Na in EtOH gives I. II also results in 4.5-g. yield from 10 g. 3-acetyldiacetoneglucose and 21 g. $PhCH_2OCH_2Cl$ in Et_2O with 85 g. powd. KOH (added during 1 hr. and refluxed 1.5 hrs.). II (96 g.) in 300 cc. glacial AcOH and 30 cc. H_2O, allowed to stand 14 hrs. at room temp., the solvent removed *in vacuo*, the residue taken up in 300 cc. AcOH and 50 cc. H_2O, allowed to stand 9 hrs. at room temp., the solvent removed *in vacuo*, the aq. soln. neutralized with Na_2CO_3 and extd. with $CHCl_3$, gives 1.23 g. of *3-benzyloxymethylacetoneglucose* (III), an oil; PhNCO gives the *5,6-dicarbanilyl deriv.*, m. 148–8.5°; this also results from II and PhNCO. Reduction of III with Na and EtOH gives 68% of acetoneglucose. III (86 g.) and Me_2SO_4 with NaOH, followed by 2 methylations with MeI and Ag_2O, give 49 g. of *5,6-dimethyl-3-benzyloxymethylacetoneglucose* (IV), $b_{0.12}$ 155–63°. Reduction of IV with Na in EtOH gives 71% of *5,6-dimethylacetoneglucose* (V), $b_{0.15}$ 105–10°, m. 56–6.5°, $[\alpha]_D^{19}$ −12.8° (H_2O, *c* 4.18); PhNCO in C_6H_6 at 85° (3 hrs.) gives the *3-carbanilyl deriv.*, m. 88–9°, $[\alpha]_D^{19}$ −62.3° (EtOH, *c* 3.25); with C_5H_5N as catalyst there results a compd. m. 241–2°, corresponding to the *N,N'-diphenylallophanate* of V; decompn. of the carbanilyl compd. with MeONa gives V, the crystals of which were used for seeding the main fraction of V. V with *N* HCl at 80° for 30 min. gives *5,6-dimethylglucose* (VI), colorless or greenish yellow oil, which could not be crystd. VI reduces Fehling soln. and aq. $KMnO_4$ at room temp. and reddens fuchsin-SO_2 but the color does not develop as rapidly nor is it as deep as is typical of a true aldehyde. VI has $[\alpha]_D^{19}$ 4 ± 0.3° (H_2O, *c* 2.4) and does not show mutarotation. The osazone is an oil; *p-bromophenylosazone*, yellow, m. 155.5–6° (decompn.). Degradation of VI with HIO_4 gives dimethylglyceric acid (*p-phenylphenacyl ester*, m. 62.5–3°; *p-bromophenacyl ester*, m. 66.5–7.5°).
C. J. West

The oxidation of aldoses by hypoiodite. IV, V. Karl Myrbäck. *Svensk Kem. Tid.* **51**, 179–92, 206–17(1939) (in German); cf. *C. A.* **32**, 4472⁴; **33**, 3720⁴, 5773⁵, 8176⁵.—The study of the oxidation of aldoses by hypoiodite in various alk. solns. is continued to include maltose, cellobiose, lactose, melibiose, mannose, xylose, arabinose, ribose, lyxose, fucose and rhamnose. Aldoses are oxi-

dized to the corresponding acids. This may require a very long time and be incomplete. The alkali does not destroy the sugar. When conditions are right the reaction will be quant. For quant. detns. the sugar should not exceed 100 mg. and there should be a third more hypoiodite than calcd. After this add the alkali with a buret slowly over a period of 10 min. There should be 1.5 equivs. NaOH for each equiv. I. Let it stand for 15 min. and titrate with 0.1 *N* $Na_2S_2O_3$. A. R. Rose

Reaction of benzene with methylcyclobutene and methylenecyclobutane in the presence of sulfuric acid. V. N. Ipatieff and Herman Pines. *J. Am. Chem. Soc.* **61**, 3374–6(1939).—A mixt. of methylenecyclobutane and methylcyclobutene, b_{736} 40–2.5°, results in 65% yield by the action of Zn upon pentaerythrityl bromide. Addn. of 25 g. of this mixt. in 35 g. C_6H_6 to 30 g. 96% H_2SO_4 and 15 cc. C_6H_6 at 4° during 1 hr. gives 31.3 g. of acid layer and 93.5 g. of hydrocarbon layer; distn. showed that the latter contained 50 moles monomethylcyclobutylbenzene, 45 moles of the di-deriv. and 5 moles of the tri-deriv. *1-Methyl-1-phenylcyclobutane* (I), b_8 69°, b_{760} 208.6°, *dt/dp* (760–740 mm.) 0.05°/mm., $d^{20}_{vac.}$ 0.9192, $-dD/dp$ 0.00074, n^{19}_D 1.5132; *4-acetamino deriv.*, m. 144°; *2,4-diacetamino deriv.*, m. 202°. *1,4-Di(1'-methylcyclobutyl)benzene*, b_6 123–5°, m. 34°, $d^{20}_{vac.}$ 0.9344, n^{19}_D 1.5203; oxidation with HNO_3 gives terephthalic acid. Hydrogenation of I in pentane at 65° (Ni-kieselguhr catalyst) gives *1-methyl-1-ohexylcyclobutane*, b_9 72–3°, b_{760} 201–5°, *dt/dp* (752–739 mm.) 0.08°/mm., d^{20}_4 0.8595, n^{19}_D 1.4662; dehydrogenation over Pt-Al_2O_3 at 250° gives *tert*-AmPh and 2-phenylpentane. The cyclobutyl ring becomes very stable toward H_2SO_4 or nitrating mixt. when a Ph group is attached to it. C. J. West

Substituted ring compounds. I. Synthesis of α,α,γ-trimethylcyclopentanone. Muhammad Qudrat-i-Khuda and Subash Kumar Ghosh. *J. Indian Chem. Soc.* **16**, 287–95(1939).—Synthesis of α,α,γ-trimethylcyclopentanone (I) was effected from α,α,γ-trimethyladipic acid (II), prepd. by 2 independent processes from mesitonic ester III (*J. Chem. Soc.* **85**, 1219 (1904)). Mesityl oxide (98 g.) in boiling alc. was shaken with 131 g. KCN in 270 cc. H_2O and the cooled reaction mixt. was treated with 93 g. $FeSO_4$ in 180 cc. H_2O. Acidification of the reaction product with concd. HCl gave 55 g. of a mixt. of mesitonic acid and mesitylic acid. Esterification and fractional distn. gave 30 g. of III, b_{30} 115–6°, $d^{12.8}_4$ 0.96095, $n^{23.8}_D$ 1.41576, M. R. 44.9 (calcd. 45.3), and 18 g. of Et mesitylate, b_{35} 140–50°. Treatment of 25.8 g. III in 80 cc. of dry benzene with 4.3 g. Mg turnings and 25.1 g. $BrCH_2CO_2Et$ and decompn. of the product with dil. H_2SO_4 yielded 17 g. of *Et α,α,γ-trimethylbutyrolactone-γ-acetate* (IV), $C_{11}H_{18}O_4$, b_7 148–50°, $d^{21.2}_4$ 1.0471, $n^{23.2}_D$ 1.44355, M. R. 54.2 (calcd. 54.11), and 2 g. of viscous liquid, b_5 170–5°. IV (12 g.) was heated on the steam bath for 3 hrs. with 26 g. PCl_5 and the cooled clear soln. was poured into 75 cc. abs. alc. The mixt. was dild. with H_2O and extd. with Et_2O, giving 78% of *Et α,α,γ-trimethyl-γ-chloroadipate* (V), $C_{13}H_{23}ClO_4$, b_5 113–5°, $d^{21.5}_4$ 1.0381, $n^{23.8}_D$ 1.43913, M. R. 70.6 (calcd. 70.4). Reduction of 20 g. V by refluxing with 40 g. Zn dust in 290 cc. AcOH gave 8 g. of *Et α,α,γ-trimethyladipate* (VI), $C_{13}H_{24}O_4$, b_{16} 145–6°, d^{22}_4 0.99383, n^{23}_D 1.44335, M. R. 65.3 (calcd. 65.6), hydrolyzed by refluxing with 15% HCl for 12 hrs. to II, $C_9H_{16}O_4$, m. 80°. Condensation of 114.6 g. III with 75.4 g. $NCCH_2CO_2Et$ in the presence of 6 cc. piperidine and anhyd. Na_2SO_4 yielded 98 g. of *Et α-cyano-β,δ,δ-trimethylbutene-α,δ-dicarboxylate*, $C_{14}H_{21}NO_4$, b_4 162°, $d^{23.8}_4$ 1.0431, $n^{23.8}_D$ 1.45717, M. R. 69.68 (calcd. 69.4), reduced by Al-Hg in moist Et_2O to the corresponding *satd. compd.*, $C_{14}H_{23}NO_4$, b_8 155–6°, d^{22}_4 1.0230, n^{23}_D 1.44033, M. R. 69.4 (calcd. 69.6), hydrolyzed by refluxing with concd. HCl for 35 hrs. to II. A mixt. of 21.5 g. VI and 2.3 g. Na in 100 cc. alc. was refluxed for 6 hrs., cooled, decompd. with dil. HCl and extd. with ether, yielding 48.7% (8.5 g.) of *Et α,α,γ-trimethylcyclopentane-δ-carboxylate* (VII), $C_{11}H_{18}O_2$, b_5 88–90, $d^{21.8}_4$ 0.98559, $n^{23.8}_D$ 1.43882, M. R. 52.85 (calcd. 52.5). Refluxing with dil. HCl for 2 hrs., neutralizing with Na_2CO_3 and extg. with Et_2O gave 45.5% of the required ketone (I), $C_9H_{14}O$, b_{18} 65–6°, $d^{22.6}_4$ 0.87660, $n^{23.6}_D$ 1.42426, M. R. 36.68 (calcd. 36.9); *semicarbazone*, m. 173°; *monobenzylidene compd.*, m. 125–6°. Dibromodihydroisophorone (VIII) (25 g.) was shaken with 17 g. KOH in 667 cc. H_2O for 6 hrs. and the mixt. was acidified with HCl. Steam distn. gave a diketone (IX), m. 168–9° (89–90° according to Wallach, *C. A.* **13**, 427[1]), converted into trimethylhydroxycyclopentanecarboxylic acid, m. 90°, on heating in a sealed tube with 50 cc. KOH (1:2) at 140° for 4 hrs. Treatment of VIII with PbO_2 yielded I. The structures of I, VIII and IX are established and differ from those suggested by Wallach. C. R. A.

Some derivatives of cyclopentane. Robert B. Rothstein and Mario Rothstein. *Compt. rend.* **209**, 761–2 (1939); cf. *C. A.* **29**, 3308[1]; **30**, 1742[6].—Cyclopentene (I) is obtained practically pure and in theoretical yield by passing cyclopentanol in vapor form over a Fourneau porous catalyzer (*C. A.* **16**, 2495). 2-Chlorocyclopentanol (II) is thence prepd. in 60–70% yield by shaking in a closed vessel 90 g. chlorourea (in 12% soln.), 37.5 g. AcOH and 78 g. I until the amt. of HOCl in the residual H_2O is const. The product is extd. with Et_2O, washed and dried over Na_2SO_4. On fractionating *trans*-2-chlorocyclopentanol is obtained, the cis isomer distg. over with the dichlorocyclopentane formed at the same time. II b_{15} 81–2°, $d^{22.5}_4$ 1.1686, $n^{22.5}_D$ 1.4782. Epoxycyclopentane (III) is prepd. by agitating for some hrs. 77 g. II and 150 g. aq. NaOH (d. 1.332), H_2O is added to dissolve the NaCl, and III extd. with Et_2O, washed, dried and fractionated, III distg. over at 100–1°. It has d^{23}_4 0.9670, n^{19}_D 1.4321; yield 80–5%. From III there were prepd. in similar fashion as before the lactones $CH_2(CH_2)_3CHR$ / $CH_2.CH_2.CH.O.CO$ R = Et, b_{14} 128, $n^{19.5}_D$ 1.4672, $d^{19.5}_4$ 1.0504; Pr, b_{14} 141°, n^{23}_D 1.4660, d^{23}_4 1.0287; Bu, b_{16} 154°, $n^{18.5}_D$ 1.4682, $d^{18.5}_4$ 1.0119; iso-Bu, b_{15} 148°, n^{21}_D 1.4685, d^{21}_4 1.0098; iso-Am, b_{15} 163°, $n^{23.5}_D$ 1.4688, $d^{22.5}_4$ 0.9972. C. A. S.

Synthesis of some monosubstituted homologs of cyclopentane having a normal side chain. A. F. Platé. *Compt. rend. acad. sci. U. R. S. S.* **24**, 257–62(1939) (in English). The following *1-alkylcyclopentanols* were prepd. from cyclopentanone and the appropriate alkyl-MgBr: Am, b_7 85–7°, n^{20}_D 1.4530, d^{20}_4 0.8957, yield 42.5%; hexyl, b_4 85–6°, n^{20}_D 1.4600, d^{20}_4 0.8921, yield 21–50%; heptyl, b_3 91–2°, n^{20}_D 1.4604, d^{20}_4 0.8817. Dehydration of these alcs. with 20% aq. $H_2C_2O_4$ or I (latter case) gave the following *1-alkylcyclopentenes:* Am, b_{743} 177–9°, n^{20}_D 1.4513, d^{20}_4 0.8128 (also given as 0.8108), yield 70–80%; hexyl, b_{743} 202–4.5°, n^{20}_D 1.4540, d^{20}_4 0.8158, yield 72% (dodecane probably accompanied this compd., thus explaining lower *n* and d. values of Zelinskiĭ, Mikhlina and Eventova (*C. A.* **27**, 5725)); heptyl, b_{762} 218–20°, n^{20}_D 1.4555, d^{20}_4 0.8176. Reduction of these olefins with Pd black gave the following *alkylcyclopentanes:* Am, b_{762} 178–9°, n^{20}_D 1.4356, d^{20}_4 0.7898; hexyl, b_{742} 201.1–2.2°, n^{20}_D 1.4394, d^{20}_4 0.7957; heptyl, b_{741} 222.1–4.0°, n^{20}_D 1.4430, d^{20}_4 0.8002. Cyclopentenyl chloride (85% yield from addn. of HCl to cyclopentadiene) and alkyl-MgBr react readily, giving the following *3-alkylcyclopentenes:* Am, b_{747} 173.5–5.2°, n^{19}_D 1.4455, d^{20}_4 0.8022, yield 43%; hexyl, b_{761} 196.8–8.8°, n^{19}_D 1.4480, d^{20}_4 0.8067, yield 38%. Hydrogenation of these latter compds. gave the following alkylcyclopentanes (see above): Am, b_{748} 178.4–9.6°, n^{20}_D 1.4359, d^{20}_4 0.7893; hexyl, b_{748} 200.8–2.0°, n^{19}_D 1.4392, d^{20}_4 0.7956. G. A.

Preparation and pyrolysis of cyclohexanone. Charles D. Hurd, Harry Greengard and Arthur S. Roe. *J. Am. Chem. Soc.* **61**, 3359–60(1939).—Passing the vapors of 150 g. cyclohexanol over pumice coated with the Adkins Cu chromite catalyst at 290–310° gives 12 g. cyclohexene, 91 g. (60%) of cyclohexanone (I) and 30 g. of residue. Refluxing 24 g. I for 115 hrs. gives 20 g. I and 2.5 g. of cyclohexylidenecyclohexanone, b_{20} 158–62°. Pyrolysis of I at 700–25° gives no ketene; some cyclohexadiene was identified. Decompn. of I in the ketene lamp (*C. A.* **30**, 5182[6]) during 1 hr. also gave no ketene. C. J. West

Hydrogenation of acetophenone to cyclohexylmethyl-

carbinol in the presence of solvent. V. N. Ipatieff and B. B. Corson. *J. Am. Chem. Soc.* **61**, 3292(1939).—A 3350-cc. bomb was charged with 200 cc. PhAc, 400 cc. isopentane, 40 g. Ni catalyst and 100 kg./sq. cm. H and rotated 6 hrs. at 100°; the products consisted of 20% (by vol.) of PhEt, 7% of an intermediate fraction (b. 137-89°) and 70% of cyclohexylmethylcarbinol (I), b_{761} 189.4-9.8°, n_D^{20} 1.4677, d_4^{20} 0.925. At 75° the product contained 8% PhEt and a 50/50 mixt. of I and PhMeCHOH; at 50° the product was largely unchanged PhAc. In the absence of solvent and using reduced Cu as catalyst at 225° the product was 75% PhEt. Using cyclohexane as solvent at 100° the product was a mixt. of PhEt, the 2 alcs. and PhAc. C. J. West

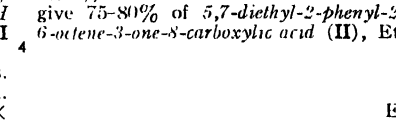
Addition of compounds to dicyclohexylamine. Charles F. Winans. *J. Am. Chem. Soc.* **61**, 3591-2(1939). -Dicyclohexylamine (I) and cyclohexanol (II) in petr. ether give an *addn. compd.*, m. 47-8°; other *addn. compds.* of I were prepd. as follows: *2-methylcyclohexanol*, m. 59-60°; *1,2-cyclohexanediol*, m. 64-6°; *1,3-isomer* (III), m. 64-6°; *1,4-isomer*, m. 90-1°; *o-cyclohexylcyclohexanol*, m. 43-5°; *p-tert-butylcyclohexanol*, m. 75-6°; those with *p-phenethyl alc.*, *1,3-butanediol* and *PhCH₂OH* m. below room temp. but the existence of compds. was shown by the analysis of the melts. The compds. of $(PhCH_2)_2NH$ with II, *piperidine* with III and *cyclohexylamine* with II also m. below room temp. C. J. West

Absorption spectra of some substituted nitrosobenzenes. Evidence for the mesomeric effect. Herbert H. Hodgson. *J. Chem. Soc.* **1939**, 1807.—Absorption spectra in 4×20^{-4} *M* EtOH (values for peak of band (A) and extinction coeff. (ε) are given): PhNO 3160, 1750; *o*-EtO deriv. 3800, 1875; *o*-I deriv. 2930, 2187; *o*-Br deriv. 2900, 3125; *o*-Cl deriv. 2880, 3281. Relative to PhNO the shifts of the *o*-derivs. are in the order of the neg. inductive (−*I*) effects, I < Br < Cl. The relatively small displacement difference would appear to indicate in each case the existence of pos. mesomeric (+*M*) effects of the order Cl > Br > I which, while opposed to the (−*I*) effects, do not exceed them. In the case of the EtO deriv. the feeble (−*I*) effect of the group is completely exceeded by a powerful pos. effect which must be ascribed to the pos. (mesomeric) polarization produced by the EtO groups. C. J. W.

Light absorption and structure of Schiff bases. Éva Varga. *Magyar Chem. Folyóirat* **45**, 83-99(1939). —Absorption spectra between 200-460 mμ have been detd. in a soln. of abs. alc. by means of a Zeiss spectrograph, between 400-500 mμ by means of a quartz prism of the same app. and above 460 mμ by means of a Konig-Martens photometer. The values of mol. extinction were calcd. on the basis of the law of Beer-Lambert. The results proved that azomethines alone have no specific selective light absorption. In case of the Schiff bases the aldimine-anamine tautomery is present at any time when a quinoid transformation of the mol. takes place. Thus a new band appears at 440 mμ. In case of 3-hydroxybenzalamines this new band could not be observed. The transformation $RCH{:}NCH_2R' \rightleftarrows RCH_2N{:}CHR'$ did not take place even in the case when this translocation would form a conjugated system (e. g., quinonimine structure). The characteristic band of 2- and 4-hydroxybenzalamines seems to be due neither to a "H bridge" nor to a hetero chain. It possibly may result from the formation of a quinoid ring structure. The possibility of a hetero ring seems improbable. S. S. de Finály

Reactions of anils. II. Addition of methyl ketones to benzalaniline in the presence of boron fluoride. H. R. Snyder, H. A. Kornberg and J. R. Romig. *J. Am. Chem. Soc.* **61**, 3556-8(1939); cf. *C. A.* **32**, 8390⁸.—PhCH:NPh (I) and $BF_3.Et_2O$ (II) in Et_2O give the *complex* $I.BF_3$ (III), yellow, m. 135-45°. III (1.5 g.) in 25 cc. Me_2CO gives 0.5 g. of 1-anilino-1-phenyl-3-butanone (IV), m. 88-9°; MeEtCO gives the pentane analog (V), m. 120-1°; I in MeEtCO (without BF_3) is recovered unchanged. It is not necessary to isolate III and the reaction is effected conveniently by adding II to a soln. of I in excess of the ketone in an ice bath; after 5 min. the compd. is pptd. by H_2O; II is not a true catalyst, for with mole ratios of BF_3 to I of 0.1, 0.32, 0.5 and 0.75 the yields of IV were 0, 20, 38 and 67%, resp. Using this method IV results in 67% and V in 66% yields; other *amino ketones*, $RCOCH_2CHPhNHPh$, were prepd. from the following: *iso-BuAc*, m. 80-1°, 60%; *AmAc*, m. 78-9°, 38%; *4-methyl-2-hexanone*, m. 72-3°, 38%; $PhCH_2CH_2Ac$, m. 98-8.5°, 26%; *pinacolone*, m. 148-9°, 71%; *cyclopentanone*, m. 163-4°, 42%; PhAc, m. 166-7°, 62%; $CH_2(CO_2Et)_2$, m. 98-9°, 6%. Neg. results or impure products were obtained with Et_2CO, Bu_2CO, dinonyl ketone, PhCN, PhC:CH, AcOEt, $MeNO_2$, acetomesitylene, mesityl oxide, $PhCH_2Ac$, cyclohexanone, α-tetralone and $AcCH_2CO_2Et$. Methone and $NCCH_2CO_2Et$ gave the benzal derivs.; however, this does not involve hydrolysis of the anil, since AcCH CHPh and $PhNH_2$ do not react. The addn. of Me ketones to III is not a reversible process.

III. A new type of Diels-Alder reaction. H. R. Snyder, R. B. Hasbrouck and J. F. Richardson. *Ibid.* 3558-60.—2-Ethyl-2-hexanal and $PhNH_2$, heated 1 min. on the sand bath and allowed to stand 15 min. at room temp., give 75% of *2-ethyl-2-hexenalaniline* (I), $PrCH{\cdot}CEtCH\ NPh$, b_2 127-8°, d_{20}^{20} 0.9379, n_D^{20} 1.5596. Equimol. quantities of maleic anhydride and I in C_6H_6 (1300 cc. per mole anhydride), allowed to stand 2 hrs. and refluxed for 3 hrs., give 75-80% of *5,7-diethyl-2-phenyl-2-azabicyclo[2.3.1]-6-octene-3-one-8-carboxylic acid* (II),



m. 145-6°. Catalytic reduction of II with PtO_2 and H (3 atm. pressure) gives 90% of the *dihydro deriv.* (III), m. 177° (monohydrate, decomps. 120-30°); the *amide*, prepd. through the chloride, m. 187-8°. II or III could not be hydrolyzed by boiling with acid or alkali (recovered unchanged after boiling 10 days with 10% KOH); fusion of 20 g. II with 20 g. KOH in 20 cc. H_2O gives 2.5 g. of 3,5-$Et_2C_6H_3CO_2H$ (IV), m. 133°. The reaction occurs through tautomerization of the anil and addn. of the anhydride to the diene system of the resulting enеamine. The mechanism of the formation of IV is also outlined. The work of Bergmann (*C. A.* **33**, 5914) with cinnamalaniline is confirmed, except that under highly anhyd. conditions the yield of maleanilic acid is negligible; the failure of this compd. to undergo condensation with maleic anhydride supports the formulation given for the reaction of I; because the ε-C atom is part of the C_6H_6 ring, cinnamalaniline is unable to undergo the initial tautomerization

IV. The reactions of benzalaniline and cinnamalaniline with methyl acetylenedicarboxylate. H. R. Snyder, Harry Cohen and Wm. J. Tapp. *Ibid.* 3560-1.—Benzalaniline (I) (14 g.) and $(CCO_2Me)_2$ (II) (8 g.) in 50 cc. abs. Et_2O and 2 cc. H_2O, allowed to stand 2 days at room temp., give 3.8 g. of *Me α-benzal-α'-phenyliminosuccinate*, m. 192-3°; the same product is obtained from I and Me oxalacetate (III) or from BzH, $PhNH_2$ and III or II. That the yield is improved by the addn. of a small quantity of H_2O suggests that the reaction involves hydrolysis of the anil. Cinnamalaniline (IV) and II in petr. ether, refluxed 2 days, give 23% of the *compd.* $C_{27}H_{25}O_8N$, yellow, m. 166-7°; this corresponds to 1 mole of anil to 2 of II. If a mixt. of 1.4 g. of II and 2. g. of IV is kept at 0° for 4 hrs. and at room temp. for 2 weeks, washed with petr. ether and crystd. from 15 cc. PhMe, there is obtained 0.05-0.1 g. of an *isomer*, m. 309-10°; addn. of petr. ether to the PhMe gives 20% of the isomer m. 166-7°. In the absence of solvent the reaction is highly exothermic. C. J. W.

Nickel as a catalyst for the hydrogenation of aromatic halogen compounds. Charles F. Winans. *J. Am. Chem. Soc.* **61**, 3564-5(1939).—The following typical conditions are used for the reductions: 300 g. *p*-$ClC_6H_4NO_2$, 400 ml. EtOH and 15 g. Raney Ni in an autoclave at 100 atm. H pressure were slowly heated to about 50°; when the pressure had fallen to 20 atm. more H was admitted; after 23 min. the reduction was complete; the yield of *p*-$ClC_6H_4NH_2$ was 97%; even at 150° the yield was nearly quant. Other compds. are not as stable. In many cases the catalyst may be reused as many as 6 times; catalysts no

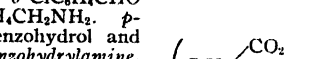
longer sufficiently active for more difficult hydrogenations served well in simpler conversions. *m*- and *p*-$ClC_6H_4NO_2$ give 90.3 and 97% of *m*- and *p*-$ClC_6H_4NH_2$; *p*-$BrC_6H_4NO_2$ gives 83% of *p*-$BrC_6H_4NH_2$; *o*-$IC_6H_4NO_2$ gives 23% of *o*-$IC_6H_4NH_2$, the main reaction product being $PhNH_2$; 2,5-$Cl_2C_6H_3NO_2$ gives 97% of 2,5-$Cl_2C_6H_3NH_2$ but 2,4-$(O_2N)_2C_6H_3Cl$ gives 91% of *m*-$C_6H_4(NH_2)_2$; *o*-chlorobenzaldazine gives 81% and *o*-chlorobenzalaniline gives 65.5% of *o*-$ClC_6H_4CH_2NH_2$. Benzal-2,5-dichloroanil yields 91% of *benzyl-2,5-dichloroaniline*, m. 44–5°. *o*-ClC_6H_4CHO and excess NH_3 give 87.5% of *o*-$ClC_6H_4CH_2NH_2$. *p*-BrC_6H_4Bz (I) gives 72% of *p*-bromobenzohydrol and the oxime of I yields 88.5% of *p-bromobenzohydrylamine*, m. 126°. *p*-ClC_6H_4CN gives 64% of *p*-$ClC_6H_4CH_2NH_2$ and 21% of (*p*-$ClC_6H_4CH_2)_2NH$. PhCl does not give chlorocyclohexane, small quantities of C_6H_6 being formed. $PhCH_2Cl$ gave some diphenylethane. C. J. West

Chemistry of *p*-hydroxyphenylisopropylmethylamine or veritol. Rosa C. D'Alessio de Carnevale Borsino. *Semana méd.* (Buenos Aires) **1939, II**, 1314–23.—For quant. detn. dissolve 0.1 g. of veritol (I) in 10 cc. H_2O and 15 cc. EtOH and titrate with 0.1 *N* NaOH, using phenolphthalein; add rosolic acid and titrate with 0.1 *N* H_2SO_4 to yellow. Both titrations must be identical if the substance is pure. The factor per cc. is 0.0128. Differentiation from hordenine (II), tyramine (III) and tyrosine (IV) was tried, making use of 22 different reagents; but most gave identical reactions. The following color reactions may be used: Cl water and NH_3 give with I red, with II light yellow, with III yellow with green fluorescence, with IV red. HIO_3 gives with I and III red, with II and IV neg. H_2O_2 with I and III red, with II and IV neg. Tyrosinase gives with I, III and IV red, with II neg. Colorimetric estns. of veritol may be effected with the diazo reaction, using either sulfanilic acid or *p*-nitroaniline, or with Wavelet's reagent, which gives a blue color in the presence of NH_3. A. E. Meyer

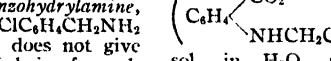
New color reaction for diarylamines. E. Marshall Meade. *J. Chem. Soc.* **1939**, 1808. Addn. of MeMgI to an amine in PhOMe, followed by BzCl, gives a red color if a diarylamine was originally present; it will det. 1% of Ph_2NH in Ph_2NMe. Pos. results were obtained with Ph_2NH, 4-$MeOC_6H_4NHC_6H_4Me$-4, (4-$MeOC_6H_4)_2NH$, Ph-(α-$C_{10}H_7$)NH and (*o*- and *p*-$MeOC_6H_4$)(β-$C_{10}H_7$)NH. C. J. West

Identification of organic acids by the use of *p*-chlorobenzylpseudothiuronium chloride. Bartlett T. Dewey and Robert B. Sperry. *J. Am. Chem. Soc.* **61**, 3251–2 (1939). *p-Chlorobenzylpseudothiuronium chloride* (I) results on refluxing 161 g. *p*-$ClC_6H_4CH_2Cl$ and 76 g. $CS(NH_2)_2$ in 200 cc. EtOH for 30 min., and recrystg. from a mixt. of equal parts of concd. HCl and H_2O; I m. 197°. The following salts were prepd. from a 10% EtOH soln. of I and an aq. soln. of the Na or K salt of the acid; they may be recrystd. from dioxane. There is not sufficient diversity in m. p. to make these salts satisfactory derivs. of general application. The m. ps. are cor. *Acetate* 140°, *butyrate* 139°, *caproate* 143°, *formate* 148°, *chloroacetate* 158°, *oleate* 131°, *oxalate* 194°, *palmitate* 146°, *propionate* 143°, *succinate* 167°, *trichloroacetate* 148°, *valerate* 142°, *benzenesulfonate* 184°, *benzoate* 155°, *o*-, *m*- and *p*-*bromobenzoates* 165, 161 and 172°, *o*-, *m*- and *p*-*chlorobenzoates* 159, 157 and 173°, *cinnamate* 167°, *o*-, *m*- and *p*-*iodobenzoates* 162, 154 and 177°, *phthalate* 166°, *salicylate* 162°, *sulfosalicylate* 181°, *o*-, *m*- and *p*-*toluate* 150, 151, 161°, *p-toluenesulfonate* 193°. C. J. West

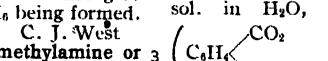
The reactions and salts formed by phenylglycine, nitrosophenylglycine, phenylglycine-*o*-carboxylic acid and 1-aminoacridine-4-carboxylic acid. J. V. Dubský, E. Tesařík, Št. Rusňák, A. Okáč and V. Šindelář. *Chem. Listy* **33**, 346–52(1939).—Phenylglycine formed the salts RAg (R = $PhNHCH_2CO_2$), $R_2Pb.7H_2O$, white plates, m. 108° and decompg. 174°, $R_2Cu.H_2O$, pale-blue crystals decompg. at 174°, R_2Cu, dark-green crystals decompg. 182°, $R_2Cu.2NH_3$, R_3Fe, $R_4Cr_3(OH)_2.10H_2O$, stable at 320°, $R_4CO_2(OH)_2$, solid at 320°, $R_2Zn.2H_2O$, and $R_3Ca_2OH.7H_2O$. Nitrosophenylglycine, m. 100°, sol. in EtOH and warm H_2O, formed pale-yellow needles, reacted with Hg^+ to form $C_8H_7O_3N_2Hg$ and did not react with any other cations. Phenylglycine-*o*-carboxylic acid formed $Hg(C_9H_7NO_4).5H_2O$, $HgC_9H_7NO_4$, $AgC_9H_8O_4N$, $Ag_2C_9H_7O_4N$, $Pb(AcO)_2.PbC_9H_7NO_4.9H_2O$,

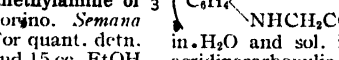


$C_9H_7NO_4.10H_2O$,

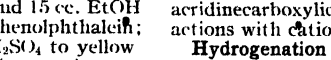


$C_9H_7NO_4.5H_2O$,





$FeOH.4H_2O$, decomps. 305°, insol. in H_2O, sol. in EtOH with difficulty, and



$Fe_2.4.5H_2O$, a blue powder insol. in H_2O and sol. in EtOH with difficulty. 1-Amino-4-acridinecarboxylic acid did not enter into any typical reactions with cations. Frank Maresh

Hydrogenation of aldehydes in the presence of ammonia. Charles F. Winans. *J. Am. Chem. Soc.* **61**, 3566–7(1939).—The hydrogenation of aldehydes, such as BzH, contg. no reactive H on the α-C atom, in EtOH-NH_3 soln. may be accomplished at temps. below 75°. By suitable control of the ratio of aldehyde to NH_3, the product may be predominantly primary (I) or secondary amine (II). Using 3 g.-mole of BzH to 51 g. (3 moles) in 300 ml. cooled alc. and 10 g. Raney catalyst in a hydrogenation autoclave with an initial H pressure of 90 atm., absorption starts at 40° and in 0.5 hr. is complete at a final temp. of 70°; distn. gives 89.4% $PhCH_2NH_2$ (III) and 7.1% of $(PhCH_2)_2NH$ (IV); with 0.5 and 0.66 equiv. NH_3 the yields are 11.8 and 80.8 and 30.5 and 62.6%, resp. Using 0.5, 0.66 and 1 equiv. NH_3 *o*-MeC_6H_4ClIO gives 11.2, 30.8 and 82.6% I and 81.7, 63.1 and 15.5% II; *o*-ClC_6H_4CHO gives 3.6, — and 87.5% I and 84.6, — and 7.6% II; furfuraldehyde gives 12.2, 30.3 and 79% I and 65.5, 66.5 and 6% II. Hydrobenzamide (V) gives 30.7% III and 60.9% IV; V with excess NH_3 gives 81% III and 8% IV; 0.37 mole each of V and BzH give 11.7% III and 67% IV. Hydrofuramide (VI) gives 29.4% furfurylamine (VII) and 62.8% of difurfurylamine (VIII); VI and excess of NH_3 give 62.5% VII and 12.4% VIII; VI and furfural (0.75 mole each) give 16.4% VII and 60.5% VIII. The results show that the proportions of products depend on the ratio of the reactants and not on the method of addn. The use of aliphatic aldehydes should presumably lead to similar results but the formation of tarry by-products through the aldol reaction or other condensation largely masks the production of amines. C. J. West

Diazo chemistry. Herbert H. Hodgson. *Rec. trav. chim.* **58**, 928–30(1939)(in English); cf. *C. A.* **33**, 4211⁴. —A further reply by H. to the claims of priority by Schoutissen. C. J. West

Decomposition reactions of the aromatic diazo compounds. VII. Some reactions of diazonium chlorides with esters and nitriles. W. E. Hanby and Wm. A. Waters. *J. Chem. Soc.* **1939**, 1792–5; cf. *C. A.* **33**, 6263⁸.—Solid *p*-$ClC_6H_4N_2Cl$ (from 20 g. *p*-$ClC_6H_4NH_2$) in AcOMe gives 2.8 g. of PhCl and 0.1 g. *p*-$C_6H_4Cl_2$; in AcOEt the yields were 1.1 and 0.5 g.; in AcOPr 0.5 and 1.2 g.; in AcOAm there were no simple reaction products; in all cases the chief product is a complex black tar. The decompn. of PhN_2Cl in AcOAm, Pr propionate and BzOMe did not commence until the mixt. had been heated to nearly 100° and then tended to become uncontrollable; the same is true in Bu_2O or Am_2O. PhN_2Cl under AcOMe reacts vigorously with both Sb and Zn, giving metallic chlorides and with Sb (*p*-$ClC_6H_4)_3SbCl_2$ but there was no reaction under AcOAm; under BzOMe, PhN_2Cl reacts with Zn and under AcOEt it reacts slowly with Te but gives no appreciable quantity of org. tellurides. If the diazo compd. is washed with Et_2O and this is not completely removed, AcH is formed, probably due to the dehydrogenation of Et_2O by a free radical. On decompn. in

MeCN the ArN_2Cl also yields small quantities of ArNHAc and traces of ArAc may also be formed. PhN_2Cl (from 22 g. $PhNH_2$.HCl) gives 3 g. PhNHAc, 0.1 g. Ph_2 and a trace of PhAc. Zn and Sb bring about the reaction at room temp. Rapid heating, even in the absence of metals, decreases the yield of PhNHAc. Yields are given for various other diazonium chlorides. These reactions seem to indicate that addn. to the CN group can occur. All of these reactions are consistent with the view that a certain amt. of decompn. of the diazonium chloride to neutral radicals can occur in these solvents. VIII. **The diazocyanides.** Oliver Stephenson and Wm. A. Waters. *Ibid.* 1796–804.—The reactions of diazocyanides in nonaq. solvents have been studied in order to discover to what extent the theories postulated for the mechanisms of decompn. of diazoacetates, diazohydroxides and diazonium chlorides can be generalized. The following new *diazocyanides* are reported: *o-chlorobenzene-syn* (I), orange, m. 49°; *antiisomer*, bright red, m. 78°; *4-chloro-o-toluene-syn* (II), orange-yellow, m. 49°; *antiisomer*, red, m. 68°; *5-chloro-o-toluene-syn* (III), orange, m. 60°; *antiisomer*, red, m. 75°. Dry specimens of the syn compds. could be kept for some days in the dark but damp specimens gave off HCN and formed tarry products contg. only a little of the anti isomer. Freshly prepd. EtOH solns. of the syn compds. reacted immediately with EtOH-$AgNO_3$, pptg. AgCN and leaving practically colorless diazonium nitrate solns. which would couple with alk. β-$C_{10}H_7OH$; after a short time the EtOH solns. turned reddish brown and then would not couple; acidified solns. did not change color on keeping. EtOH solns. of the anti compds. gave no immediate ppt. but on exposure to light AgCN was gradually formed and the soln. became paler. Solns. of the anti compds. in EtOH or Me_2CO when kept for several days in daylight darken considerably and gradually evolve N_2, showing that a slow decompn. occurs; those kept protected from light show little change; the final photochem. decompn. products of the anti compds. are identical with the thermal decompn. products of the syn compds. Metallic Cu undoubtedly influences the course of the decompn. of the syn compds. but it has no obvious direct action upon the anti compds. On warming I in 100% EtOH there results 20% of PhCl and a trace of the anti compd.; Cu gives 20% PhCl and a trace of *o*-ClC_6H_4CN; III gives 15% of *m*-MeC_6H_4Cl and with Cu 25% *m*-MeC_6H_4Cl and 1% of 5-chloro-*o*-tolunitrile; Hg, Sb and Zn did not affect the decompn. In Me_2CO the syn compds. yielded HCN, tar and some anti compd.; AcOMe solns. behaved similarly; in the presence of Cu there was no free HCN but nitriles were formed; I gave 4% PhCl and 10% *o*-ClC_6H_4CN and II 6% *p*-ClC_6H_4Me and 9% of 4-chloro-*o*-tolunitrile. In CCl_4 all syn compds. isomerized to the pure anti compds., and this method was used for their prepn.; with Cu, N and HCN are evolved on gentle warming and CuCl and $CuCl_2$ are formed; the Cu is attacked even in the presence of $CaCO_3$; Ag, Hg, Fe, Pb or Zn does not cause decompn. The syn compd. (IV) from *p*-$ClC_6H_4NH_2$ gives 9% *p*-$C_6H_4Cl_2$; I gives 14% *o*-$C_6H_4Cl_2$; that (V) from *p*-$BrC_6H_4NH_2$ yields 10% *p*-ClC_6H_4Br; II gives a little nitrile and 15% 2,4-$Cl_2C_6H_3Me$ and III gives 20% of 2,5-$Cl_2C_6H_3Me$. In dry C_6H_6 Cu causes the evolution of N and HCN but the Cu is not attacked; IV gives 1.5% of 4-ClC_6H_4Ph; I gives 7% of *o*-ClC_6H_4CN and 3% of crude 2-ClC_6H_4Ph; V gives 5% of *p*-BrC_6H_4CN and 1% of 4-BrC_6H_4Ph; II and III gave only traces of nitriles. There was no reaction with Ag or Zn; Fe causes a slight evolution of N and a trace of 4-ClC_6H_4Ph was isolated from IV. Reaction in dry Et_2O was difficult to control; the solns. tend to decomp. violently upon evapn. to dryness; AcH was always formed and so was HCN; I gives 6% PhCl and 3% *o*-ClC_6H_4CN; V gives 6% PhBr and 3% of the nitrile; II gives 8% of *p*-ClC_6H_4Me and 4% of nitrile; III yields 10% of *m*-ClC_6H_4Me and 2% of nitrile. A table gives the percentage of N evolved and of tar formed from the 5 syn compds. in the various solvents (with and without Cu). The following conclusions are drawn: anti compds., though thermally stable, may be converted photochemically into the isomeric, reactive syn compds. 1 The syn compds. exist in EtOH soln. in tautomeric equil. with diazonium cyanides; neutral solns. easily give self-coupling products consequent upon a hydrolysis in which free HCN is liberated; solns. in non-ionizing solvents isomerize to the anti compds. even in the absence of light. Cu appears to be the only metal which catalyzes the decompn. of the syn compds. In non-ionizing solvents (CCl_4, C_6H_6, Et_2O) syn compds. yield free radicals upon warming with Cu, the respective final products being RC_6H_4Cl, RC_6H_4Ph and RPh plus AcH, together with, in each case, HCN; only in CCl_4 does the Cu appear to be attacked. The main reaction product is always a black tar which is not a polyazo compd. Hantzsch's theory (H. and Schultze, *Ber.* **28**, 666(1895)) that the syn compds. decomp. to give vicinal radicals which promptly unite does not accord with the exptl. facts. It appears that the radicals formed by the decompn. of the syn 3 compds. react with neighboring solvent mols. and therefore must have an independent free existence. **IX. Note on oxidation mechanism.** Wm. A. Waters. *Ibid.* 1805–7.—Benzenediazoacetate (I) is insol. in cyclohexene (II) but, when stirred under II, I gradually decomps., giving chiefly tar. The II layer yields a small quantity of 2-cyclohexenyl acetate (III) and traces of other unsatd. substances of high b. p. III also results by the decompn. of aq. PhN_2Cl in a mixt. of II and Me_2CO contg. an excess 4 of AcONa, whereas decompn. of the solid in the same 2 solvents in the presence of $CaCO_3$ affords 2-cyclohexenyl chloride. These reactions are evidently substitutions of the reactive CH_2 group of II by the AcO and Cl radicals derived from the decompg. diazo compds. Analogous to these reactions are the oxidation of II by $Pb(OAc)_4$ and by O_2 in the presence of Os. It is suggested that all these reactions have a common mechanism in which neutral 5 radicals are involved. C. J. West

Transformations of dulcin. C. Alberti. *Atti X° congr. intern. chim.* **3**, 21–6(1939); cf. *C. A.* **33**, 7283².—In order to obtain *chloroacetyl-* (I) or *bis(chloroacetyl)dulcin* (II) and further to det. the effect on the sweet taste that a hydantoin nucleus would have, A. treated $ClCH_2COCl$ (III) with the Mg bromide deriv. (IV) of dulcin (V). IV (from 2.4 g. Mg, 11 g. EtBr and 9 g. V) and 6 g. freshly distd. III were boiled 9 hrs. The Mg complex was de- 6 compd. with ice and the soln. alkalized with $NaHCO_3$. I, m. 181–2° from Me_2CO, insol. in H_2O or Et_2O, pptd. The ether soln. was dried over anhyd. Na_2SO_4 (VI) and treated several times with 5% Na_2CO_3 and finally washed with H_2O. Dried over VI and concd. the soln. (in a H_2SO_4 desiccator) finally yielded 0.5 g. *N-p-phenetylhydantoin* (VII), m. 201–2°. VII is insol. in H_2O, very slightly sol. in petroleum solvents, slightly sol. in Et_2O and C_6H_6, sol 7 in MeOH and EtOH and very sol. in Me_2CO, insol. in acids, sol. in 20% NaOH. Boiling VII with 5% $Ba(OH)_2$ in alc. gave *N-dulcinylacetic acid* (VIII) ($EtOC_6H_4N(CONH_2)CH_2CO_2H$), m. 179–80°, almost insol. in C_6H_6, Et_2O and petr. solvents, sol. in EtOH, MeOH, Me_2CO, NH_3 and dil. alkalies. VIII (0.0736 g.) is equiv. to 2.92 cc. 0.1 *N* KOH with methyl red. The NH_4 salt of VIII with Ag, Pb, Hg and Cu gives the corresponding salts. I was also prepd. from the mono-Mg bromide deriv. of 8 V. Complete hydrolysis of I was accomplished by boiling with 0.5 *N* alkali or acids and the final products were V, HCl and $CH_2(OH)CO_2H$, the latter identified by the method of Denigès (cf. *Bull. soc. chim.* [4], **5**, 648(1874)). It was impossible to obtain II irrespective of the proportions of the reactants used and the length of heating. The products resulting always were I and VII. None of the new derivs. showed any sweet taste as might have been expected from the sweetness of their constituent radicals. J. C. Lo Cicero

Synthesis of organobismuth compounds. Henry Gilman and Alexis C. Svigoon. *J. Am. Chem. Soc.* **61**, 3586(1939).—*p*-$MeC_6H_4N_2Cl$ (from 10.7 g. *p*-$MeC_6H_4NH_2$) and 0.1 mole $BiCl_3$ in 16 cc. concd. HCl, pptd. with an ice-cold mixt. of MeOH-EtOH, give the Bi complex, $C_{21}H_{21}N_6BiCl_6$; this is pptd. by MeOH or EtOH and more effectively with the mixt. of the 2. The complex (32.5 g.) in 100 cc. cold Me_2CO, treated with 52.8 g. Cu powder

and after 0.5 hr. with an equal vol. of 25% NH_4OH and dild. to 450 cc. H_2O, gives 3.07 g. of $(p\text{-}MeC_6H_4)_3Br$. C. J. West

Intramolecular substitution as a means of comparing activating and deactivating effects. Jessie D. C. Mole and E. E. Turner. *J. Chem. Soc.* **1939**, 1720–4.—The effect of substitution on the reactivity of the aromatic nucleus can be studied not only by nitration expts. but also by ring closures. The conversion of a no. of substituted *o*-phenoxyphenyldichloroarsines into 10-chlorophenoxarsines has been investigated and the rate of cyclization correlated with the nature and position of the

2',4'-di-Me isomer, pale yellow, m. 61–2° (78%); *2-nitro-4'-methoxydiphenyl ether*, pale yellow, m. 75–6.5°. The NO_2 compds. were reduced at 100° with excess of Fe tilings and H_2O in presence of a little AcOH; *2-Amino-2',5'-dimethyldiphenyl ether*, m. 56–7° (77%); *2',5'-isomer*, b_{14} 213–14° (83%) (*HCl salt*, m. 178–9°); *2',4'-isomer*, m. 64–5° (80%); *2-amino-4'-methoxydiphenyl ether*, b_{21} 212–13° (*HCl salt*, m. 169–70°). Arsonic acids were prepd. by the method of Roberts and Turner (*C. A.* **20**, 175); the yield obtained varied from compd. to compd. and with the temp. of mixing (the optimum temp. is given); *2-o-tolylbenzenearsonic acid*, 50–60°, m. 184–5°, 30–35% yield; *m-isomer*, 50–60°, m. 193–4°, 30–40%; *2-(2',5'-dimethylphenoxy)benzenearsonic acid*, 90°, m. 178–9°, 12%; *2',5'-di-Me isomer*, 50–60°, m. 177.5–8°, 13%; *2',4'-di-Me isomer*, 90°, m. 184–5°, 12–16%; *2-p-anisyloxybenzenearsonic acid* (VI), 50°, m. 188–9°, 11%. *2-p-bromophenoxybenzenearsonic acid*, 55–60°, m. 183–4°, 20%. The dichloroarsines were also prepd. by the method of R. and T. and were purified through the oxides, which were warmed with fuming HCl; liquid products were extd. with $CHCl_3$. *2-o-Tolyloxyphenyldichloroarsine* (I), m. 73–4°; *m-isomer* (II), oily; *p-isomer* III), m. 73°; *2-(3',5'-dimethylphenoxy)phenyldichloroarsine* (IV), m. 71.5–3°; *2',5'-isomer* (V), m. 70–71.5°; *2',4'-isomer* (VI), m. 52.5–4°; *2-p-anisyloxyphenyldichloroarsine* (VII), m. 63–4°; *2-p-Br analog* (VIII), m. 76–7°. Ring closure was followed at different temps., the HCl produced during definite intervals of time being detd.; the 1st-order reaction equation gives reasonably trustworthy values for velocity consts., although with some of the slower reactions there was a brief period of induction and rate consts. in these cases only have a semi-quant. significance. The following figures are the reaction temp. and $k \times 10^4$ ($min.^{-1}$). 150°: I 6, III 12, IV 100, V 48. 160°: *o*-$PhOC_6H_4AsCl_2$ (IX) 13, I 18, II 100, III 30, IV 170, V 70, VI 24. 175°: I 40, II 160, III 74. 180°: IX 40, I 47, II 230, III 110, IV 600, V 140, VI 66, VII 61. 190°: VII 83, *p*-$ClC_6H_4OC_6H_4AsCl_2$-*o* (X) 9.5, VIII 10. 200°: IX 97, I 120, III 270, VI 165, VII 110, X 17, VIII 19. 210°: IX 140, X 33, VIII 45. *10-Chloro-4-methylphenoxarsine*, m. 90–1°; *3-Me isomer* (XI), m. 140–1°; *1,3-di-Me deriv.*, m. 138–9°; *1,4-di-Me deriv.*, m. 146–7°; *2,4-di-Me deriv.*, m. 130–1°; *2-MeO deriv.*, m. 108–9°; *2-Br deriv.*, m. 172–3°. The structure of XI follows from the following synthesis: 3,4-$Cl(O_2N)C_6H_3Me$ gives 50% of 2-nitro-5-methyldiphenyl ether; $SnCl_2$ reduction gives 77% of *2-amino-5-methyldiphenyl ether*, yellow, b_{15} 213–14°; the Hg diazonium salt was decompd. at −70° over a period of 20 hrs. and the product heated with $AsCl_3$; the resulting oil was then heated for 6 hrs. at 200° in a stream of CO_2, giving XI. In explaining the mechanism of ring closure, it is probable that the As—Cl bond becomes polarized, the cyclization process then resolving itself into

$$\overset{\delta+}{\text{As}}\text{—}\overset{\delta-}{\text{Cl}}$$

the attack of the electrophilic reagent, $-AsCl_2$, on the opposed aromatic nucleus. The results show that this "internal" electrophilic reagent places activated and deactivated centers in aromatic systems in the same order as that given by an external reagent such as HNO_3. All mono-Me compds. (I-III) are more easily cyclized than IX; moreover, II is much more readily cyclized than III and the latter is much more readily cyclized than I, which, in turn, is more rapidly cyclized than IX in spite of the decreased no. of possible fruitful collisions. That this factor does influence rates of ring closure is clear from a comparison of I and III, in which the activation by Me of the reacting position or positions is approx. equal, I, however, having only half as many collisions as III between the reacting atoms. The great reactivity of IV is to be expected; the greater speed of cyclization of V than of VI is interesting in comparison with the sulfonation of *p*- and *m*-xylenes. The inability of a mesomeric effect to activate the *m*-position should mean a comparatively slight difference between the rate of cyclization of IX and VII; actually, the latter is slightly the more reactive. The results for X and VIII clearly show the deactivating effect of Cl and Br. C. J. West

Action of nitrous acid on dimethylaniline-*p*-sulfonic acid in sulfuric acid. A. M. McKessar Davidson and Thomas H. Reade. *J. Chem. Soc.* **1939**, 1701–3; cf. Michler and Walder, *Ber.* **14**, 2176(1881).—*p*-$Me_2NC_6H_4SO_3H$ (I) (1 mole) in 4 *N* H_2SO_4 (cooled in ice), slowly treated with stirring with 4 moles of aq. $NaNO_2$, allowed to react 17–18 hrs. and the yellow ppt. extd. with petr. ether, gives as the sol. portion a mixt. of 4-$O_2NC_6H_4NMe_2$ (II) and 4-$O_2NC_6H_4NMeNO$ (III) (sepd. by washing with 5 *N* HCl) and as the insol. portion *3-nitro-4-dimethylaminobenzenesulfonic acid* (IV), pale-yellow needles; this was synthesized by heating 4,3-$Cl(O_2N)C_6H_3SO_3H$ and 33% aq. Me_2NH with Cu powder for 3–4 hrs.; the *anilide* of IV, m. 182°. Soly. of IV in H_2SO_4 at 14°: 0.5 *N* 0.5710 g., *N* 0.5660 g., 2 *N* 0.547 g., 3 *N* 0.5217 g., 4 *N* 0.4823 g., 5 *N* 0.4100 g. The yield of IV from I increases from 0.319 g.-mole to 0.380 g.-mole on increasing the concn. of the H_2SO_4 from 0.5 to 5 *N*; that of III increases from 0.0037 to 0.0547 g.-mole; that of II decreases from 0.052 to 0.005 (at 3 *N*). C. J. West

The transition of carbohydrates to carbocyclic compounds. I. The transformation of glucose into phenol. P. P. Shorygin and N. N. Makarova-Zemlyanskaya. *Compt. rend. acad. sci. U. R. S. S.* **23**, 915–18(1939)(in German).—Phenol is obtained in 0.55-g. yield by adding 2.7 g. Na to 3.86 g. 2,3,4-trimethyllevoglucosan, $O.CH_2.$-$CH.CH(OMe).CH(OMe).CH(OMe).CH.O$, in 45 cc. dry liquid NH_3, sealing the tube the following day, leaving it at room temp. for about 18 days, distg. off the NH_3, treating the reaction product with aq. Et_2O and with water, acidifying the soln., extg. it with Et_2O and fractionating the Et_2O residue under normal pressure. An explanation of the reaction mechanism may be found in previous investigations about the decompn. of ethers by Na and Na metalloörg. compds. (cf. *C. A.* **19**, 496) and in expts. not yet published concerning the formation of double bonds by the splitting off of NaOH. Styrene is, indeed, obtained in 75% yield by heating 1 mol. $PhCH_2CH_2OH$ with 0.5 g.-atom Na. Dora Stern

Catalytic synthesis of anisole and *p*-cresol methyl ether. Seiiti Isikawa and Masakatu Matuhasi. *Science Repts. Tokyo Bunrika Daigaku* **A3**, 249–55(1939)(in German).—The formation of anisole by conducting a soln. of phenol in MeOH over heated ThO_2 (formed from $Th(NO_3)_4$) has been investigated. It makes no difference whether the catalyst is deposited on cotton cloth or on asbestos, nor does an admixt. of CeO_2 influence the catalytic action. The highest yield (48% anisole) is obtained at 400° with 80 g. $Th(NO_3)_4$ per 94 g. phenol. At higher temps. (500°) increasing amts. of Ph_2O and xanthene (m. 99.2°, cor. Berl) are formed. The latter is also obtained by passing phenol or Ph_2O with HCHO over the catalyst. HNO_3 oxidizes it to xanthone, m. 173.1° (cor. Berl). The reaction between *p*-cresol and MeOH in the presence of heated ThO_2 yields *p*-cresol Me ether, *p*-tolyl ether, m. 50°, and 2,7-dimethylxanthene, m. 168.2° (cor. Berl). HNO_3 oxidizes the latter to 2,7-dimethylxanthone. Dora Stern

4,6-Dibromoresorcinol dimethyl ether. G. Lock. *Monatsh.* **72**, 373–7; *Sitzber. Akad. Wiss. Wien. Math.-naturw. Klasse*, Abt. IIb, **148**, 71–5(1939).—Hodgson and Dyson (*C. A.* **29**, 6585[9]) report a 4,6-dibromoresorcinol

di-Me ether (I) as m. 65°, whereas L. and Nottes (*C. A.* **30**, 5954[6]) found 140–1°. The action of Me_2SO_4 on 4,6-dibromoresorcinol (m. 116.5°) gives a I m. 141.5°. The Me ether of 2-nitroresorcinol (m. 130°) with Br without a solvent gives 60% of the di-Br deriv.; reduction with $SnCl_2$ in HCl-EtOH gives 92% of *2-amino-4,6-dibromoresorcinol di-Me ether*, m. 95°; removal of the NH_2 group by boiling the diazo compd. with EtOH gives a I m. 141.5°. The observation of H. and D. must be in error.

C. J. West

Improved methods for the nitrosation of *m*-halophenols and their conversion into benzoquinone monoximes Herbert H. Hodgson and Donald E. Nicholson. *J. Chem. Soc.* **1939**, 1808; cf. *C. A.* **34**, 7383. *m*-Halophenols (2 g.) in 25 cc. 50% AcOH, treated gradually below 20° with 4 g. $NaNO_2$ in 10 cc. H_2O give 80% of the 6-NO deriv. with the *m*-Cl and *m*-I derivs.; the *m*-Br deriv. gives a lower yield than in dil. H_2SO_4. The velocity of pptn. is greatest for the I and least for the Br deriv. Some of the NO_2 deriv. is also formed. *m*-Halophenols (2 g.) in 20 cc. AcOH and 2 g. $NaNO_2$ in 10 cc. concd. H_2SO_4 (heated previously to 70°), mixed at 20° and kept at 0° for 10 min.; the yield of the 3-halobenzoquinone 4-oximes is nearly quant.

C. J. West

***d*- and *l*-α-Phenylallyl alcohols and some of their reactions.** D. I. Duveen and J. Kenyon. *J. Chem. Soc.* **1939**, 1697–1701.—K., Partridge and Phillips (*C. A.* **31**, 3025[5]) showed that (−)-α-phenyl-γ-methylallyl H phthalate (I) is readily rearranged into (+)-γ-phenyl-α-methylallyl H phthalate with a large retention of optical activity and that (−)-α-phenyl-γ-methylallyl alc. and its esters readily undergo replacement reactions during which a similar rearrangement occurs although the retention of optical activity is of a lower order. It was concluded that a γ-Me group contributes an inductive effect favorable to liberation of an anion in these compds. In order to obtain comparative evidence of the influence exerted by the Me group in I, the optically active forms of α-phenylallyl alc. (II) have been prepd. and the behavior of II and some of its derivs. examd. II and $C_6H_4(CO)_2O$ in C_5H_5N at 50° for 3 hrs. give a *H phthalate* (III), m. 73–4°. Quinidine (484 g.) and 422 g. III in 1600 cc. Me_2CO give a ppt. which, crystd. 3 times from AcOMe, gives about 300 g. of the *l*-III *quinidine salt* (IV), m. 124° (decompn.), $[\alpha]_{5893}$ 128.9°, $[\alpha]_{5461}$ 155.8°, $[\alpha]_{4358}$ 279.5° ($CHCl_3$, *c* 5.010); the mother liquor from IV deposits the *d*-III *salt* (V) which, recrystd. from Me_2CO, m. 161–3° (decompn.), $[\alpha]_{5894}$ 106.8°, $[\alpha]_{5461}$ 127.9°, $[\alpha]_{4358}$ 235° ($CHCl_3$, *c* 5.101). IV, covered with Me_2CO and decompd. with a slight excess of cold dil. HCl, gives *l*-III, an oil, $[\alpha]_{6438}$ 33.6°, $[\alpha]_{5893}$ 12.6°, $[\alpha]_{5461}$ 51.4°, $[\alpha]_{4358}$ 93° (CS_2, *c* 5.376); data are also given for solns. in C_5H_5N, C_6H_6, AcOH, $CHCl_3$, MeOH and EtOH; in the homogeneous soln., α^{20}_{5893} 6.39°, α^{20}_{5461} 7.64°, α^{20}_{4358} 11.9° (*l* 0.25); the *d*-III from V is also an oil, $[\alpha]_{5893}$ −42.3°, $[\alpha]_{5461}$ −51.3°, $[\alpha]_{4358}$ −92.6° (CS_2, *c* 4.947). *l*-III on standing 4 months deposits the γ-isomer. Hydrolysis of *l*-III with a slight excess of aq. 5 *N* alc. KOH gives *l*-II, b_{16} 106°, n^{19}_D 1.5398, α_{5893} −20.08°, α_{5780} −21.55°, α_{5461} −26.01°, α_{4358} −60° (18°); the influence of temp. is shown by data for 10 temps. from 21° to 67° for α_{5893}, α_{5461}, α_{4358}. *d*-II b_{16} 107°, $n^{19.5}_D$ 1.5391, α_{5893} 20°, α_{5461} 25.7° at 19°; α_{6438} 3.1°, α_{5893} 3.3°, α_{5780} 3.4°, α_{5461} 3.4° ($CHCl_3$, *c* 5.170); data are given for CS_2, C_6H_6 and EtOH, all at room temp. Catalytic reduction of *l*-II gives (+)-phenylethylcarbinol. *l*-II and Ac_2O in C_5H_5N, kept overnight and then warmed to 40° for 1 hr., give *l*-α-*phenylallyl acetate*, b_{16} 111°, α_{6438} 27.2°, α_{5461} 39.93°, α_{5780} 33.39°, α_{4358} 70.5° at 18°, n^{20}_D 1.5092; the *dl*-isomer b_{19} 114°, n^{20}_D 1.5085; heating II and Ac_2O on the steam bath for 3 hrs. gives the same product, showing that no conversion into the isomeric γ-deriv. had taken place. The K deriv. of II and MeI give the *dl-Me ether* (VI), b_{16} 85°, n^{20}_D 1.5105; the isomeric γ-deriv. b_{16} 116°. Slow distn. of III in abs. MeOH for 2 hrs. gives VI; *l*-III gives $C_6H_4(CO_2H)_2$ and VI. *d*-III (11 g.) in 10 cc. MeOH, kept in a closed vessel for 3 weeks at summer room temp., gives 10 g. *d*-III of almost unchanged rotatory power and VI. *l*-III (1 g.) in 20 cc. abs. EtOH showed no alteration in rotatory power after 3 weeks but after 18 months this had decreased 25% and after 33 months to 6% of its original value; the resulting soln. gave 0.3 g. $C_6H_4(CO_2H)_2$ and 0.3 g. of the Et ether of II. Anhyd. HCO_2H and 10 g. of *d*-III react in 2 hrs. to give 5 g. $C_6H_4(CO_2H)_2$, 1.3 g. of partially racemized III and 3 g. γ-phenylallyl formate. In AcOH a 5% soln. of *l*-III changed from α_{5461} 1.96° to 1.34° in 16 days at room temp.; *l*-III (3.2 g.) in glacial AcOH, heated on a steam bath for several hrs., gives 0.6 g. $C_6H_4(CO_2H)_2$, 0.7 cc. cinnamyl acetate and 1.5 g. *l*-III having $[\alpha]_{5461}$ −5.4° (CS_2). A comparison of the reactivities of II with those of I shows that the latter undergo anionotropic changes far more readily than the former. This enhanced reactivity must be ascribed to the influence of the γ-Me group.

C. J. West

Nitrones. V Bellavita. *Atti X° congr. intern. chim.* **3**, 33–8(1939). Extending the reaction of KCN (I) reported in previous papers to *carboxamide derivs.* (II) of aldoniitrones formed by treating aromatic aldehydes with hydroxyurea, B. obtained a new series of ureide derivs., RCH·NCONH$_2$ (III), along with KCNO. Obviously II have an oxidizing action on I. Both the Dumas and Kjeldahl methods for N, however, gave lower results than the calcd. Combustion of III over CuO showed that a certain amt. of HCN was formed, thus explaining the discrepancy in the results. III forms mono- and di-Ac as well as Bz derivs., RCH·NCONHAc, RCH·NCONAc$_2$, RCH·NCONHBz. The benzalureas do not react with $PhCHCl_2$ or $PhCCl_3$ but with $COCl_2$ give compds. of the structure RCH·NCONHCONHCON·CHR. The new compds. reported include PhCH·NCONH$_2$ (liquid); *o*-NO$_2$C$_6$H$_4$CH·NCONH$_2$, m. 103°; *m*-NO$_2$C$_6$H$_4$CH·NCONH$_2$, m. 123.5°; PhCH:CHCH·NCONH$_2$, m. 68–70°; *o*-HOC$_6$H$_4$CH·NCONH$_2$ (liquid); *p*-MeOC$_6$H$_4$CH·NCONH$_2$, m. 67°; H_2C  C_6H_3CH·NCONH$_2$, m. 113.5°. The same compds. may also be obtained by treating the aldehydes with a mixt. of HCNS and NH_2OH. Cf. *C. A.*, **30**, 3119[6].

J. C. Lo Cicero

Ketene in the Friedel-Crafts reaction. I. Direct acetylation of aromatic hydrocarbons with ketene. Jonathan W. Williams and James M. Osborn. *J. Am. Chem Soc.* **61**, 3138–9(1939).—The yield of PhAc from ketene (I) and C_6H_6 may be increased above previously reported values by the following means: use of considerable excess of I; use of I which contains min. amts. of C_2H_4 and CO, operation at 0°; addn. of $AlCl_3$ in small portions with rapid stirring; use of at least 1.5 moles of $AlCl_3$ per mole of C_6H_6; use of an inert diluent, as CS_2. I was passed into a well-stirred mixt. of 100 ml. of C_6H_6 and 300 ml. of CS_2 at 0°; at 15-min. intervals approx. 10-g. portions of $AlCl_3$ were added until 200 g. had been used (5 hrs.); I addn. and stirring were continued for a total of 10 hrs.; the addn. complex was decompd. by pouring onto 1 kg. of cracked ice and 30 ml. of concd. HCl; the yield of PhAc is 32.7%. $C_{10}H_8$ gives 34.8% of Me α-naphthyl ketone (*2,4-dinitrophenylhydrazone*, m. 259°); a small amt. of the β-ketone is formed. Tetralin gives 21.1% of Me β-tetrahydronaphthyl ketone (*2,4-dinitrophenylhydrazone*, m. 236°). Ph_2 gives 23.4% of *p*-PhC$_6$H$_4$Ac.

C. J. West

Splitting of the methyl radical from *o*-methoxyacetophenone and the action of potassium bicarbonate on resacetophenone and its derivatives. Kanzo Okazaki. *J. Pharm. Soc. Japan* **59**, 547–52(in German, 190–3)(1939).—3-Methyl-6-methoxy-7-acetoxycoumarilic acid (0.2 g., prepd. according to Limaye and Sathe, *C. A.* **31**, 2212[2]), and 0.2 g. $PhNH_2$.HI in 1 cc. aniline when heated on the water bath for 7 hrs. at 95° gave 70 mg. 6-hydroxy-7-acetyl-3-methylcoumarone, $C_{21}H_{10}O_3$, m. 112°. Acetylation of 10 g. 4-hydroxybenzyl cyanide (prepd. according to Pschorr, *Ber.* **33**, 170(1900)) gave 4-acetoxybenzyl cyanide (I), $C_{10}H_9O_2N$, m. 49–50°. I (10 g.) and 15 g. $AlCl_3$ were heated at 100–10° for 10 min., cooled, and treated with HCl-ice mix. The ether ext. gave acetyl-4-hydroxyphenylacetonitrile (II), $C_{10}H_9O_2N$, m. 106°, in 75% yield; semicarbazone, decomp. 218–19°. Methylation of II gave 3-acetyl-4-methoxyphenylacetonitrile (III), $C_{11}H_{11}O_2N$, m.

85–6°. **III** (0.5 g.) and 0.57 g. $PhNH_2.HI$ in 1 cc. aniline when heated as described above gave **II**. Methylation of *o*-gallacetophenone (prepd. according to Nencki, *J. prakt. Chem.* [2], **23**, 151(1881)) gave *o*-gallacetophenone tri-Me ether (**IV**), b_5 131°; semicarbazone, decomp. 170°. Splitting of the Me radical from IV as previously described gave a compd. m. 83°, which did not depress the m. p. of the 3,4-di-Me ether of *o*-gallacetophenone. Me *p*-orsellinate di-Me ether (6 g.) in 20 cc. $PhNO_2$, 3 g. AcCl and 7.8 g. $AlCl_3$ when heated for 2 hrs. at 70–90°, gave 2 g. Me 6-methylresacetophenone-3-carboxylate 4-Me ether, $C_{12}H_{14}O_5$, m. 123°, which on methylation gave the di-Me ether (**V**), $C_{18}H_{16}O_5$, m. 92°; semicarbazone, decomp. 215°. An attempt to split off a Me radical from V gave a trace of a compd. which gave a purple-red color with $FeCl_3$. Methylation of 3,6-dimethylresacetophenone (prepd. from β-orcinol) gave 3,6-dimethylresacetophenone di-Me ether (**VI**), b_8 115–18°; semicarbazone, decomp. 206.5°. An attempt to split off a Me radical from VI gave a compd., which gave a purple-red color with $FeCl_3$. Orcinol diacetate gave by the Fries rearrangement 2,6-diacetylorcinol (**VII**), $C_{11}H_{12}O_4$, m. 97°, and a small amt. of isoörcacetophenone (**VIII**). Both VII and VIII gave when treated with $KHCO_3$ *p*-orsellinic acid, $C_8H_8O_5$, decomp. 180°. Resacetophenone (10 g.) and 15 g. $KHCO_3$ when heated in a sealed tube at 190–200° for 5 hrs. gave 5 g. 6-hydroxy-9-methylfluorone, $C_{14}H_{10}O_3$, decomp. 238°. F. I. Nakamura

Chalcones. I. Chalcones derived from resacetophenone and its dimethyl ether. Jagraj Behari Lal. *J. Indian Chem. Soc.* **16**, 296–300(1939).— A mixt. of resacetophenone di-Me ether (**I**) (3.2 g.), 2.5 g. of isovanillin, 10 cc. MeOH (freed from traces of HCHO by distn. over $AgNO_3$) and 10 cc. of 30% KOH in MeOH was heated to boiling and kept at 50–60° for 24 hrs. After diln. with H_2O, the MeOH was boiled off and the reaction mixt. was extd. with Et_2O. The ppt. obtained on acidification with AcOH was washed with H_2O and crystd. from hot alc. to yield 73.6% (3.9 g.) of lemon-yellow prismatic needles of *2,4-dimethoxyphenyl 3-hydroxy-4-methoxystyryl ketone*, $C_{18}H_{18}O_5$, m. 115°. Similar condensations of I with *o*-vanillin (**II**), 5- and 6-methoxysalicylaldehyde and of resacetophenone with II yielded 79.6, 82.2, 82.3 and 63.8% of *ones*: *2,4-dimethoxyphenyl 2-hydroxy-3-methoxystyryl*, 117°; *2,4-dimethoxyphenyl 2-hydroxy-5-methoxystyryl* 129°; *2,4-dimethoxyphenyl 2-hydroxy-6-methoxystyryl*, 116.5°; and *2,4-dihydroxyphenyl 2-hydroxy-3-methoxystyryl*, m. 211°. Attempts were made to det. the optimum conditions for these condensations. C. R. Addinall

Preparation of aminobenzoic acid esters of substituted monoalkylamino alcohols. Samuel D. Goldberg, Wm. F. Ringk and Paul E. Spoerri. *J. Am. Chem. Soc.* **61**, 3562–4(1939); cf. *C. A.* **32**, 5256. —Results of pharmacol. work on previously described compds. suggested the investigation of the properties of a series of esters in which the side chain was limited to 2 C atoms, 1 of which carried 2 alkyl substituents, such as $HOCMe_2CH_2NHR$. A 33% aq. $EtNH_2$ soln. (0.23 mole) and 100 cc. H_2O, treated with 0.18 mole $ClCH_2CMe_2OH$ and shaken in a pressure bottle 24 hrs., gave 58% of *β-ethylamino-α,α-dimethylethanol*, 152.3°, d_4^{19} 0.8777, n_D^{20} 1.4344 (*picrate*, m. 132–3°); *Me analog*, prepd. similarly, b. 142–3°, d_4^{23} 0.8875, n_D^{20} 1.4338 (*picrate*, m. 137–8°); the other analogs were prepd. in 95% EtOH as solvent, refluxing 3–24 hrs.; *Pr*, b. 169–71°, d_4^{19} 0.8646, n_D^{20} 1.4335 (*picrate*, m. 128–9°); *iso-Pr*, b. 158–60°, d_4^{19} 0.8528, n_D^{20} 1.4288 (*picrate*, m. 166–7°); *Bu*, b. 186.7°, d_4^{20} 0.8586, n_D^{20} 1.4362 (*picrate*, m. 121.5–2.5°); *iso-Bu*, b. 180–1°, d_4^{20} 0.8490, n_D^{20} 1.4309 (*picrate*, m. 138.9°); *Am*, b. 205–8°, d_4^{20} 0.8543, n_D^{20} 1.4388 (*picrate*, m. 109–10°); *iso-Am*, b. 202–4°, d_4^{19} 0.8580, n_D^{20} 1.4380 (*picrate*, m. 145–6°). *β-Butylamino-α,α-diethylethanol*, b. 216–20°, d_4^{26} 0.8629, n_D^{20} 1.4433 (*picrate*, m. 127.8°); *iso-Bu analog*, b. 214–16°, d_4^{26} 0.8621, n_D^{20} 1.4410 (*picrate*, m. 130.5–1.5°). These alcs. were reacted with *p*-$O_2NC_6H_4COCl$ in dil. NaOH at a temp. not above 40°; *β-alkylamino-α-dimethylethyl p-nitrobenzoates: Pr* m. 108–9°, *Bu* m. 87–8°, *iso-Bu* m. 130–1°, *Am* m. 107–9°, *iso-Am* m. 112–13°. *β-Isobutylamino-α-diethylethyl p-aminobenzoate*, m. 122–3°, by reduction of the NO_2 ester with Sn and HCl (*sulfate*, m. 131–3°). *β-Alkylamino-α-dimethylethyl p-aminobenzoates: Pr* m. 123–4° (*sulfate*, m. 138–40°, 150–3°); *Bu* m. 116–19° (*sulfate*); *iso-Bu* m. 83.5–4.5° (*sulfate*, m. 142–3°, 158.5–9.5°); *Am* m. 93–5° (*sulfate* (I), m. 163–6°); *iso-Am*, an oil (*sulfate*, m. 131–3°). Subcutaneous toxicity of I (1% concn.): white mice M. L. D. 45 mg./kg., guinea pigs 35–40; intravenous toxicity of I for white mice (1% concn.): 10–15 mg./kg., dogs, 20 mg./kg. I has interesting anesthetic properties, some of which are discussed. The other aminobenzoates were too toxic for injection purposes. C. J. West

Preparation and asymmetric reduction of β-methylcinnamic acid. David Lipkin and T. D. Stewart. *J. Am. Chem. Soc.* **61**, 3295–6(1939).—Complete details are given for a procedure for the Reformatsky condensation of aromatic ketones and $BrCH_2CO_2Et$ leading to max. yields and applicable to any scale of operation and applied to the prepn. of β-methyl-(I) and β-(α-naphthyl)cinnamic acids (**II**). Catalytic reduction of the hydrocinchonine salt of I in abs. EtOH gives a β-phenylbutyric acid with $[\alpha]^{20}_{5461}$ 4.5°, corresponding to about 8–9% of asym. synthesis; the PtO_2 catalyst was 48 days old and the H pressure 3 atm.; in another prepn. with a catalyst 24 days old and a H pressure of 1 atm. the acid had $[\alpha]^{20}_{5461}$ 0.64°. Reduction of the salt of II in EtOH gives an acid with $[\alpha]^{20}_{5461}$ −0.5° ($CHCl_3$). The results indicate that adsorption of these polar substances has not prevented the mol. inductions responsible for the specificity. C. J. West

Asymmetric reduction of β-methylcinnamic acid by *d*-glucose in the presence of Raney nickel. T. D. Stewart and David Lipkin. *J. Am. Chem. Soc.* **61**, 3297–300 (1939).—The reduction of the β-methylcinnamate ion by *d*-glucose in alk. soln., catalyzed by Raney Ni, has been studied with variations in amt. of catalyst, temp., order of mixing, method of prepn. of catalyst and relative concn. of solutes. The optical activity in C_6H_6 of the resulting β-phenylbutyric acid varied from $[\alpha]_{5461}$ 0.31 to −0.42°, corresponding to about 0.5% asym. synthesis. The specificity changed with each variable and a tentative explanation of all of the variations has been presented based upon a simple hypothesis of relative rates of adsorption. Attention is called to the analogous behavior of enzyme-catalyzed reactions. C. J. West

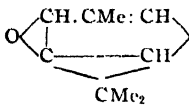
Constituents of Nephromopsis stracheyi f. ectocarpisma Hue. III. Mitizo Asano and Masami Taniguti. *J. Pharm. Soc. Japan* **59**, 607–9(in German, 216)(1939); cf. *C. A.* **33**, 8593⁴.—A mixt. of nephromopsinic and *l*-lichesterinic acid (cf. *C. A.* **29**, 5072⁸) (2 g.) when treated chromatographically gave *l*-protolichesterinic acid, $C_{19}H_{32}O_4$, m. 103–6°, $[\alpha]_D^{19}$ − 12.4° (in $CHCl_3$), which did not depress the m. p. of the *l*-protolichesterinic acid (m. 103–5.5°) of *Cetraria tenuifolia*. The pyrazoline deriv., $C_{21}H_{36}O_4N_2$, m. 60–1°, $[\alpha]_D^{15}$ −288.2°. F. I. N.

The constituents of Catalpa ovata G. Don. Minoru Hiramoto and Kazue Watanabe. *J. Pharm. Soc. Japan* **59**, 261–4(1939)(in English).—The authors have isolated from the bark of the root of *Catalpa ovata* isoferulic acid (I) and sitosterol (II), from the leaves *p*-coumaric acid (III), and from the bark of the trunk *p*-coumaric and ferulic acids (IV). A phenolic coloring matter present in the bark of the root which gave a red soln. with NaOH appeared to be a substance belonging to the anthraquinone series, but it has not been crystd. *Exptl.*: *Isolation of* I.—About 5.7 g. of the bark of the root was boiled to destroy the enzymes and filtered to obtain the aq. ext. The residue was extd. with MeOH. The ext. was evapd. and the residue was combined with the aq. ext. and extd. with ether. The aq. layer was used for the extn. of the glucoside. The ether soln. was shaken with 5% Na_2CO_3 and 1% KOH soln. The Na_2CO_3 ext. (*A*) and KOH ext. (*B*) were separately acidified and extd. with ether. The ether ext. of the Na_2CO_3 ext. (*A*) was evapd. and the residue was recrystd. from hot H_2O; colorless needles m. 228° (decompn.); yield 0.1 g. This was identified as I by mixed m. p. with the synthetic compd. and by elementary analysis. The synthesis of I was accomplished by heating protocatechualdehyde, malonic acid and glacial AcOH or by

heating caffeic acid and MeI in the presence of KOH in sealed tube. The KOH ext. (*B*) on being made acidic with HCl gave a yellow ppt., but it has not been obtained in cryst. form. *Isolation of* **II.**—The ether soln. after extn. with Na_2CO_3 and KOH gave a residue on evapn. This was extd. with petr. ether and then with 95% alc. From the alc. soln. crystals, m. 137°, were obtained. The Liebermann reaction was pos. and the alc. soln. gave a ppt. with digitonin. Acetate, m. 114°. *Isolation of* **III.**—About 0.8 g. of the leaves was extd. with boiling $NaHCO_3$ soln. The ext. was made acidic with 10% HCl and then extd. with ether. After evapg. off the solvent the residue was recrystd. from hot water; needles, m. 202–3°; yield 0.15 g. This was found to be **III** by mixed m. p. and elementary analysis. About 3 kg. of the bark of the trunk was extd. with MeOH. The ext. was evapd. and the residual fluid was extd. with ether. The ether ext. was treated in the same manner as in the case of the leaves to isolate the compd. **III.** Yield 0.1 g. The aq. layer remaining after the extn. with ether was heated with 10% HCl, extd. with ether. The ether soln. was shaken with $NaHCO_3$ soln. and the ether soln. was again made acidic. After evapg. the solvent the residue was recrystd. from hot water. Colorless needles, m. 171°, which were found to be identical with synthetic **IV.**

Nao Uyei

***l*-Δ³-Carene 5,6-epoxide, a constituent of the oil from Zieria smithii.** A. R. Penfold, G. R. Ramage and J. L. Simonsen. *J. Chem. Soc.* **1939**, 1496–504.—In study of the constituents of the essential oil from *Zieria smithii*, the fraction b_{17} 88–90° is shown to contain *l*-Δ³-*carene 5,6-epoxide*



(**I**), b_{14} 83–5°, d_{25}^{25} 0.9454, n_D^{25} 1.4729, $[\alpha]_{5461}$ −88°, $[R_L]_D$ 44.63 (calcd. 43.63). The oil also contains a very small quantity of linalool (*xenylurethan*, m. 83–5°) and of an *alc.*, $C_{10}H_{14}O$, whose *3,5-dinitrobenzoate* m. 119°. I and O_3 in AcOMe at 0° give small quantities of HCHO and Me_2CO and, after oxidation with $KMnO_4$ at 0°, *cis*-homocaronic acid (**II**), m. 135 6° (*di-p-phenylphenacyl ester*, m. 147 9°; 5 cc. of I give 5.5 g. of the Me ester of **II**); some *cis*-caronic acid is also probably formed. Digestion of I with aq. KOH (2.8 g. KOH in 100 cc. H_2O) for 24 hrs. or heating I with H_2O at 150° for 3 hrs. gives geranic acid; I with EtOH-KOH at 24° for 14 days gives a small yield of cyclogeranic acid. I in AcOH, satd. with HCl at 0°, gives *dl-1,8-dichloro-p-menthan-3-one*, decomps. 72° and on keeping; the *di-Br analog* (**III**) decomps. 74° and is extremely unstable. Hydrogenation with Pd-norite in EtOH at 60° is complete in 10 hrs., giving *dl*-menthone (*2,4-diphenylhydrazone*, yellow leaflets or needles, m. 141–2°). Heating **III** in AcOH with AcONa at 140° for 2 hrs. gives Δ¹·⁴⁽⁸⁾-*p-menthadien-3-one* (**IV**), CH:CMe.CH_2.CH_2.C(:CMe_2).CO, b_4 120 2°, d_{25}^{25} 0.9683, n_D^{25} 1.5190, $[\alpha]_{5461}$ −0.1°, $[R_L]_D$ 46.66 (calcd. 45.26); *2,4-dinitrophenylhydrazone*, red needles, m. 187° (from AcOEt-EtOH), or red leaflets, m. 125–7° (from MeOH, the more sol. form). With HBr **IV** gives **III.** **IV** with O_3 in AcOMe gives Me_2CO, levulinic acid (**VA**), an oil yielding a *semicarbazone*, $C_9H_9O_3N$, decomps. 232–3°, and *2-methyl-1-butene-1,4-dicarboxylic acid* (**V**), HO_2CCH:CMe-$CH_2CH_2CO_2H$, m. 121–2°; **V** is unstable to alk. $KMnO_4$, is reduced by Na in EtOH to β-methyladipic acid (**VB**) and with O_3 gives **VA.** **V** is possibly a mixt. of cis and trans isomers, for evapn. of an aq. soln. of the NH_4 salt gives a salt sparingly sol. in EtOH, the acid of which m. 140–1° and may be the Δ²-isomer, for it is reduced to **VB** (*di-p-phenylphenacyl ester*, m. 124–5°). The acid from the sol. NH_4 salt is an oil, catalytic reduction of which gives 60% of the lactone of β-hydroxy-β-methylbutane-α,δ-dicarboxylic acid (?). Heating 3 g. of I at 160–5° for 10 min. gives 3 g. of an oil, b_{13} 95–140°; this is yellow and becomes sage-green on exposure to the air; with Brady's reagent it gives a deep-red solid, m. 203°; the *2,4-dinitrophenylhydrazone*, $C_{16}H_{18}O_4N_4$, purple, m. 218–20°; the *semicarbazone*, $C_{11}H_{17}ON_3$, decomps. 221–2°, and the β-*isomer* decomps. 183–5°; these are sepd. by crystn. from MeOH and EtOH; the yields are small; most of the product could not be sepd. and m. 150–70° and turns reddish brown in the air; all fractions are phototropic. I and aq 2,4-$(O_2N)_2C_6H_3NHNH_2.H_2SO_4$, kept in the cold for 5 days, give a *2,4-dinitrophenylhydrazone* (**VI**), light yellow, m. 145–7°; with an EtOH soln. (8 days) there results 3 *2,4-dinitrophenylhydrazones* (**VII**), garnet, m. 192–3°, and orange (**VIII**), m. 165–6°, as well as **VI.** I and $H_2NNHCONH_2$.AcOH in MeOH (5 days) give a *semicarbazone*, $C_{11}H_{17}ON_3$ (**IX**), m. 192·4°, $[\alpha]_{5461}$ −70° (C_5H_5N, *c* 3.46), and a fraction m. 199°; reduction gives a mixt. from which a *semicarbazone*, $C_{11}H_{21}ON_3$, m. 212°, was isolated. **IX** and 2,4-$(O_2N)_2C_6H_3NHNH_2$ in EtOH-H_2SO_4 for 10 days give a mixt. of **VII** and **VIII.** Hydrolysis of the mixed semicarbazones with $C_6H_4(CO)_2O$ gives a poor yield of a mixt. of ketones; 1 *ketone*, $C_7H_{10}O$, b_{15} 87°, d_{25}^{25} 0.9385, n_D^{25} 1.4712, $[\alpha]_{5461}$ 26.3° (*2,4-dinitrophenylhydrazone*, brick-red, m. 176·7°); the 2nd *ketone*, b_{13} 127–30°, d_{25}^{25} 0.9851, n_D^{25} 1.5029, $[\alpha]_{5461}$ 6.52°, contains some **IV.** C. J. West

A new method of resolving a racemic compound. Geo. M. Henderson and H. Gordon Rule. *J. Chem. Soc.* **1939**, 1568–73.—Complete resolution of *dl-p*-phenylenebis-(iminocamphor) was effected by an adsorption method. A dil. soln. in light petroleum with 12 or 25% C_6H_6 is passed through an adsorption tube packed with *d*-glucose till the pale yellow adsorbed layer occupies ¼ of the tube, then the solvent is passed through the column to expand to the full column. The *d*-form is adsorbed more strongly than the *l*-form so that the upper adsorbate of the tube is the *d*-, the lower adsorbate the *l*-form. Washing the glucose with $CHCl_3$, followed by careful drying, increases its adsorption capacity. The adsorbed *d*- and *l*-forms are recovered by extn. with warm $CHCl_3$. A. Fleischer

ω-Camphor series. I. Synthesis of 2-ketoapocamphane-1-acetic acid. Torsten Hasselstrom and Burt L. Hampton. *J. Am. Chem. Soc.* **61**, 3445–8(1939). —ω-Benzoylborneol oxime (35 g.) in 300 cc. Et_2O, treated with 77 g. PCl_5 during 1 hr. at 20–30°, the product washed with H_2O and distd. with steam, gives 0.5 g. PhCN; the residue from the steam distn., crystd. from EtOH, gives 28.2% of *2-hydroxyapocamphane-1-acetanilide* (**I**), m. 176.5 7.5° (m. ps. cor.), and 17 g. of an oily residue; refluxing this with 10% EtOH-KOH for 3 hrs., pouring into ice water, extn. with Et_2O and crystn. from hexane give 10.1% of *camphenecarboxanilide* (**II**), m. 154.5–5.5°; the aq. alk. soln. gives 1.2 g. of **III.** Refluxing 4.5 g. of **I** with 160 cc of 20% EtOH-KOH for 6 hrs. gives 60% of the *2-hydroxyapocamphane-1-acetic lactone* (**III**), m. 201.5 2.5°. Oxidation of **III** with alk. $KMnO_4$ (refluxing 15 min.) yields 84.4% of *2-keto-1-apocamphane-1-acetic acid*, m. 92–3°; *semicarbazone* (**IV**), m. 199 200°. Wolff-Kishner reduction of **IV** gives 83.2% of *apocamphene-1-acetic acid*, m. 77–8°. **II** is a secondary product apparently formed by way of the Meerwein-Wagner retropinacolone rearrangement from the intermediate 2-chloroapocamphane-1-acetanilide; treating 1 g. **I** in 200 cc. Et_2O with 1.6 g. PCl_5 gives 66% of **II.** Hydrolysis of **II** with EtOH-KOH gives 23% of camphenecarboxylic acid (**V**), m. 126. Alk. $KMnO_4$ oxidizes **II** or **V** to camphenilone. C. J. W.

Preparation of camphor by the interaction of pinene hydrochloride with hexamethylenetetramine. P. P. Shorygin, V. N. Belov and S. G. Gurevich. *Wiss. Werke moskau. mendelejeff. chem.-tech. Inst.* **1938**, No. 3–4, 121–3, *Khim. Referat. Zhur.* 2, No. 1, 95(1939).—No camphor was formed in an aq.-alc. medium from the interaction either under atm. pressures or under high pressures. Neg. results were also obtained when EtOH was replaced with iso-AmOH. On heating the hydrochloride of pinene with hexamethylenetetramine in iso-AmOH under pressure some camphor was obtained (together with the other products of the reaction) in amts. of 2% of the theoretical yield.

W. R. Henn

Bitolyl series. VIII. A. Angeletti. *Atti X° congr. intern. chim.* 3, 26–31(1939); cf. *C. A.* **34**, 4068.—*2-*

Chloro-2'-amino-6,6'-bitolyl (I) was prepd. according to directions given previously (cf. *C. A.* **26**, 4809). I (10 g.) in 500 cc. 6% HCl was diazotized at 0–4° with 3.2 g. $NaNO_2$ (II) in 30 cc. H_2O. The soln. was filtered and the ppt. washed with H_2O and the filtrate heated to 90°. The product obtained was dissolved in ether and washed thoroughly with dil. NaOH. After drying the ether soln. with solid NaOH and removing the ether, the oil was steam-distd., giving *2,2'-dichloro-6,6'-bitolyl* (III), m. 119°. III was also prepd. from I by the Sandmeyer reaction, from which its identity was confirmed. Similarly *2,2'-dibromo-6,6'-bitolyl* (IV), m. 109–10°, was prepd. from *2-bromo-2'-amino-6,6'-bitolyl*. The yields of both III and IV were quite high. To 10 g. I in 50 cc. H_2O was added 50 cc. H_2SO_4 (1:2) and then 100 cc. H_2O. The soln. was diazotized as usual with 3.2 g. II in 30 cc. H_2O, filtered and warmed to 80°. The product was dissolved with dil. NaOH, then repptd. with HCl, steam-distd. and finally recrystd from 70-proof EtOH. *2-Chloro-2'-hydroxy-6,6'-bitolyl* (4.5 g.), m. 65–6°, was thus obtained. The corresponding Br and I compds., m. 91–2° and 58°, resp., were similarly obtained. J. C. Lo Cicero

Rearrangement in zinc dust distillation. Arthur Lüttringhaus and Grete v. Saäf. *Ber.* **72B**, 2026–8(1939).—In a study of the action of PhNa on aromatic ethers (*Ann.* in press) there was obtained *2,6-diphenylphenol* (I) from *o*-PhC_6H_4OPh (II) and also, in smaller yield, from Ph_2O. In the latter case the reaction was found to proceed through II. The structure of I was proved by the synthesis of I from 2,6,4-$Ph_2(O_2N)C_6H_2OH$ through the amino and diazonium compds. It was also shown that I is produced by intramol. rearrangement from the Na deriv. of 6,2-$NaPhC_6H_3OPh$ (III), of II, and that in the exchange of Na between II and PhNa the Na compd. *o*-(*o*-PhC_6H_4O)-C_6H_4Na (IV), isomeric with III, is formed. By an intramol. rearrangement analogous to that mentioned above, IV should give *o*-(*o*-PhC_6H_4)C_6H_4OH (V), but only 1 product of the compn. $C_{18}H_{14}O$ was obtained. It had been attempted to decide between structures I and V for this product by reducing it to the hydrocarbon by distn. with Zn dust. This, however, gave neither *m*- nor *o*-$C_6H_4Ph_2$ but a cryst. compd. (VI), m. 207°, since shown to be *p*-$C_6H_4Ph_2$ (*p,p'*-dintro deriv., m. 273°). Application to I of the Clar "Zn dust fusion" method (*C. A.* **34**, 947) with $ZnCl_2$ contg. varying (small) amts. of water, at various temps. (280–340°), with different kinds of Zn dust, likewise gave VI. There can be no doubt, therefore, that I undergoes rearrangement on distn. with Zn dust, and hence caution must be used in applying the results of such distns to the detn. of structure. C. A. R.

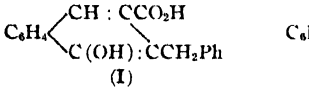
Degradation of 1,8-diphenyloctatetraene to 7-phenylheptatrien-1-al. P. Karrer and H. Obst. *Helv. Chim. Acta* **22**, 1191–2(1939).—1,8-Diphenyloctatetraene in 100-mg. portions in 40 cc. $CHCl_3$ was shaken in a stoppered bottle for 1.5 hr. with 50 cc. $KMnO_4$ soln. (5 g. $KMnO_4$ in 1000 cc. 0.5 *N* H_2SO_4) till a total of 6 g. (60 portions) was worked up. After filtering off the MnO_2, the $CHCl_3$ was concd., giving a dark red-brown oil which upon extg. 4 times with petr. ether and 5 times with ligroin, concg. each ext. and distg. under reduced pressure gave, resp., BzH and 340 mg. 7-phenylheptatrienal as a yellow sublimate, m. 112.5–13°, and yellow crystals upon 2 crystns. from ligroin (270 mg.); *oxime*, dark yellow lustrous flakes, m. 186–7°. The previously reported prepns. (m. 96°, Engelberg, *Diss. Berlin* **1914**; liquid, Vorländer, *C. A.* **23**, 3687; m. 94°, Kuhn and Winterstein, *C. A.* **22**, 1767) were either not uniform or stereoisomers of the present form. John F. Lontz

1,2-Diacylethylene glycols. Reynold C. Fuson, C. H. McBurney and W. E. Holland. *J. Am. Chem. Soc.* **61**, 3246–9(1939); cf. *C. A.* **28**, 2674⁴.—Previously it was shown that mesitylglyoxal reacts with Mg and MgI_2 to give 1,2-dimesitoylethylene glycol (I). It is now shown that *tert*-butyl-, phenyl- (**IA**), 2,4,6-triethylphenylglyoxal (II), *3,5-dibromomesityl-* (**III**) and *isodurylglyoxal* (IV) behave in the same manner. Refluxing 14.5 g. of 3,5-dibromoacetomesitylene with 5.1 g. of SeO_2 in 100 cc. wet dioxane for 4 hrs. gives 41.5% of **III**, b_4 157°; *hydrate*, m. 100–2°; *semicarbazone*, m. 238–41°; *phenylhydrazone*, m. 183–4.5°. Heating II with 10% NaOH gives *3,5-dibromomesityleneglycolic acid*, m. 184.5°. IV, b_3 123–7°, results in 72% yield from acetoisodurene; *hydrate*, m. 86–7°; *semicarbazone*, m. 207–8°; *phenylhydrazone*, m. 118–19°; isodurylglycolic acid, m. 171.5–2° (Claus and Foecking, *Ber.* **20**, 3097(1887) give 156°). II (8.8 g.), added to 7 g. I and 2.5 Mg in C_6H_6-Et_2O, gives 42% of *1,2-di(2,4,6-triethylbenzoyl)ethylene glycol*, m. 104–5° (cor.); *3,5-dibromomesitoyl analog*, m. 229–32° (27%); *2,3,4,6-tetramethylbenzoyl analog*, m. 160–1° (37%). **IA** gives 2 forms of *1,2-dibenzoylethylene glycol* (V); from 19 g. of the reaction mixt. Et_2O exts. all but 3 g. which, crystd. from EtOH, m. 126–7.5° (cor.) (*diacetate*, m. 168–9° (cor.)); the Et_2O mother liquor gives 2 g. of an *isomer*, m. 118–19° (cor.). The yield of V depends on the time of reaction and on the Et_2O-C_6H_6 ratio of the solvent; with Et_2O:C_6H_6 in 1:2 ratio, the yield is only 2%; with a ratio of 2:3 the yield is 55%. Mesityl Ph diketone gives 2,4,6-trimethylbenzoin. I is dehydrated by $(CO_2H)_2$ or H_2SO_4, giving 1,4-dimesityl-1,3,4-butanetrione enol (VI) (*C. A.* **32**, 3370⁴); I, H_2SO_4, $MgSO_4$ and Me_2CO give the *acetone complex* of I, m. 117–18° (cor.). Oxidation of I with $CuSO_4$ in C_5H_5N gives dimesityl diketone; SeO_2 gives dimesityl triketone. $PhNHNH_2$ and I give a *compd.*, $C_{28}H_{28}O_2N_2$, pale yellow, m. 128–9°. Refluxing I with BzCl for 6 hrs. gives the benzoate of VI. Treatment of I with 4 moles EtMgBr, followed by 4 moles of AcCl, gives 1,2-dimesitoylformoin. I with Ac_2O and AcONa gives an intractable oil. C. J. West

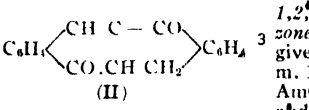
Reaction between 2,3-dimethyl-1,4-naphthoquinone and phenylmagnesium bromide. II. H. Marjorie Crawford. *J. Am. Chem. Soc.* **61**, 3310–14(1939); cf. *C. A.* **29**, 7970³.—Further details are given of the prepn. of the 2 diaddn. compds., 1,4-dihydroxy-2,3-dimethyl-1,4-diphenyldihydronaphthalene (I), m. 203–4°, and 1-oxo-2,3-dimethyl-2,4-diphenyldihydronaphthalene (II), m. 124°; II is obtained in a quant. yield by dehydration of I. Oxidation of I gives *o*-$C_6H_3Bz_2$ and II gives PhAc and *o*-$BzC_6H_4CO_2H$; II and PhMgBr give *1-hydroxy-2,3-dimethyl-1,2,4-triphenyldihydronaphthalene* (III), m. 164–74°. *3-Methyl-2-methylene-1,1,4-triphenyldihydronaphthalene* (IV), m. 189–90°, results by dehydration of III or IX (e. g., with $ZnCl_2$ and HCl in C_6H_6); addn. of MeMgI to V and decompn. of the reaction mixt. with HCl gives 76% of IV; a practically quant. yield of IV results by addn. of PhMgBr to VIII and decompn. after 1 hr. with HCl. IV decolorizes Br in CCl_4 rapidly but not $KMnO_4$ in Me_2CO at room temp.; $K_2Cr_2O_7$ in AcOH gives a little BzOH and a neutral oil; O_3 gives V and sometimes also VI. *2-Oxo-3-methyl-1,1,4-triphenyldihydronaphthalene* (V), m. 228°, results by the action of O_3 upon IV or IX; it is unchanged by fusion with KOH or boiling with $K_2Cr_2O_7$ in AcOH for 3 hrs. and does not form a semicarbazone; 1 g. with O_3 in CCl_4 gives 0.6 g. diphenyl(*o*-benzoylphenyl)acetic acid (VI), decomps. 218°; *Me ester*, m. 192–3°. 1,4-Dihydroxy-2,3-dimethyl-1,2-diphenyldihydronaphthalene (VII), m. 208–9° (cf. part I), contains 2 active H atoms; the most interesting reaction of VII is the loss of a mol. of H_2O to give *4-oxo-2,3-dimethyl-1,1-diphenyldihydronaphthalene* (VIII), m. 183°, which occurs on heating at 100° with PBr_3 in $CHBr_3$, heating in C_6H_6 with $ZnCl_2$ and HCl or with I in AcOH; VIII is very inert; reduction with Zn and AcOH (boiling 4 hrs.) appears to give a dihydro deriv., $C_{24}H_{22}O$, m. 142–3°, and a hydrocarbon, m. 176–7°. VIII with PhLi or PhMgBr gives IV; if the Grignard compd. is carefully decompd. after 20 min. with NH_4Cl and H_2O there results 90% of *4-hydroxy-2,3-dimethyl-1,1,4-triphenyldihydronaphthalene* (IX), m. 154°. Oxidation of IV gives small amts. of the hydrocarbon $C_{30}H_{24}$, m. 235°; heating IV with AcOH or I in AcOH did not give the higher-melting isomer. C. J. West

Cyclization of benzylidenebenzylsuccinic acid. E. Bergmann and A. Weizmann. *Compt. rend.* **209**, 539–40 (1939).—By distn. under atm. pressure of the crude condensation product, $C_{18}H_{16}O_4$ (I), from Me benzylsuccinate and BzH, a substance believed to be 2-benzyl-1-hydroxy-3-naphthalenecarboxylic acid, $C_{18}H_{14}O_3$, or an isomer was

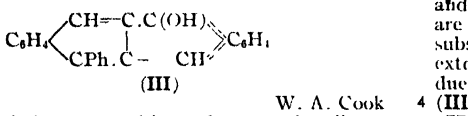
isolated; it $b_{0.02}$ 184–8°, colorless prisms, m. 65–8° (from a C_6H_6-petr. ether mixt.). Apparently the distn. is accompanied by an unilateral cyclization. Treatment of I with glacial AcOH yields pure benzylidenebenzylsuccinic acid which, when heated with concd. H_2SO_4 at 70° for 1 hr. (1 g. I and 100 g. H_2SO_4) undergoes a bilateral cyclization. Dilu. of the reaction mixt. with ice water yields a compd., $C_{18}H_{12}O_2$ (II), crystg. from xylene in deep-red needles, m. 265°. II and 10 mols. of PhLi react through addn. of 1 mol. PhLi and loss of 1 mol. H_2O, with the formation of $C_{34}H_{16}O$ (III), m. 255°, citron-yellow prisms from AcOBu and deep red in the liquid state. Its properties are in accord with its suggested formula. Evidently the PhLi reacts on the satd. ketonic group, enolizing the other ketone group simultaneously and creating an entirely aromatic molecule.



(I)



(II)



(III)

W. A. Cook

Reaction of bromine with anthracene in dioxane. Charles C. Price and Clay Weaver. *J. Am. Chem. Soc.* **61**, 3360-1(1939).—Unless moisture is excluded rigorously the reaction of Br with anthracene in dioxane leads to the formation of 9-bromoanthrone and anthraquinone, as well as the normal product, 9,10-dibromoanthracene. This behavior eliminates the evidence for the ionic mechanism suggested by Price and Thorpe (*C. A.* **33**, 1273[7]) for the cis-trans isomerization of di-Et maleate in the presence of Br and anthracene and the alternate atomic-free radical mechanism is therefore to be preferred. C. J. West

Conjugation of amino acids with isocyanates of the anthracene and 1,2-benzanthracene series. Louis F. Fieser and Hugh J. Creech. *J. Am. Chem. Soc.* **61**, 3502-6 (1939).— β-Aminoanthracene and $COCl_2$ in PhMe-C_6H_6 give a ppt. of the amine-HCl; refluxing 0.5 hr. gives 70% of *β-anthryl isocyanate* (I), pale yellow, m. 207.5–8° (m. ps. below 275° cor.). Refluxing I in MeOH gives *Me β-anthrylcarbamate*, pale yellow, m. 231–1.5°; *Et ester*, light yellow, m. 216–16.5°. I and $NH_2CH_2CH_2OH$ in $CHCl_3$ give *β-anthrylcarbamidoethanol*, bright yellow, m. about 350°. I and concd. NH_4OH in dioxane give *β-anthrylurea*, yellow, does not m. at 360°; β-anthramine gives *N,N'-di-β-anthrylurea*, amorphous, does not m. at 340°. Addn. of $NH_2CH_2CO_2H$ at a pH of 8.5 to I in dioxane gives *β-anthrylcarbamidoacetic acid*, yellow, m. about 310° (decompn.); purification is tedious; the analogous *ε-caproic acid*, dull yellow, m. 285–6°. All of the above derivs. result in a nearly quant. (crude) yield. Reduction of 10-nitro-1,2-benzanthracene with $PhNHNH_2$ gives 20% of the 1-NH_2 deriv. (II), but $SnCl_2$ in concd. HCl-AcOH yields 77% of II, which gives 78% of *1,2-benz-10-anthryl isocyanate* (III), m. 144–4.5°; compds. prepd. from III showed marked tendency to sep. in a gelatinous condition. *Me 1,2-benz-10-anthrylcarbamate*, by refluxing III with MeOH for 15 min., m. 227–7.5°; *Et ester*, m. 204–4.5°; $H_2NCH_2CH_2OH$ gives *1,2-benz-10-anthrylcarbamidoethanol*, m. 247–8°; NH_4OH in dioxane gives *1,2-benz-10-anthrylurea*, m. 334–6° (decompn.); the *N,N'-di(1,2-benz-10-anthryl)urea* is amorphous and unmelted at 330°. III in C_5H_5N at room temp. gives a yellow soln. from which a *polymer* quickly seps. as a yellow powder, m. 305–7° (decompn.). *1,2-Benz-10-anthrylcarbamidoacetic acid*, amorphous, light brown, m. 270–5° (decompn.); *Et ester*, from glycine ester, m. 245–5.5° (it could not be hydrolyzed to the acid); *ε-(1,2-benz-10-anthrylcarbamido)caproic acid*, amorphous, m. 265–7°. *1,2,5,6-Dibenz-9-anthrylurea*, m. 260–3° (decompn.); the 9-carbamidoacetic acid, yellow, m. about 300° (decompn.); *ε-(1,2,5,6-dibenz-9-anthrylcarbamido)caproic acid*, m. about 305°. The 9-isocyanate and the 9-amine in C_6H_6 did not form a urea; reaction occurred with $PhNH_2$ but a satisfactory product was not isolated. *N,N'-Di-(9-anthryl)urea*, m. above 360°. *1,2-Benz-3-anthryl isocyanate*, light yellow, m. 163–3.5°; C_5H_5N at 25° gives an amorphous, high-melting polymer. *Me 1,2-benz-3-anthrylcarbamate*, m. 203.5–4°; *Et ester*, m. 211.5–12°. *1,2-Benz-3-anthrylcarbamidoethanol*, m. 343–5°. *1,2-Benz-3-anthrylurea*, m. above 350°; *N,N'-disubstituted urea*, light brown powder, m. above 350°. *1,2-Benz-3-anthrylcarbamidoacetic acid*, pale yellow, m. about 310° (decompn.); the analogous *caproic acid* m. 295–7°.

C. J. West

Reduction of 4-keto-7-hydroxy-1,2,3,4-tetrahydrophenanthrene with sodium and amyl alcohol. Munemaro Miyasaka. *J. Pharm. Soc. Japan* **59**, 648–55(in English, 278–82)(1939).—Boiling of γ-(2-methoxy-6-naphthyl)-butyric acid with P_2O_5 in C_6H_6 gives *4-keto-7-methoxy-1,2,3,4-tetrahydrophenanthrene* (I), m. 56°. *Semicarbazone*, m. 235°. Boiling of I in C_6H_6 with $AlBr_3$ or $AlCl_3$ gives *4-keto-7-hydroxy-1,2,3,4-tetrahydrophenanthrene* (II), m. 117°; *acetate*, m. 105°. II is reduced with Na and iso-AmOH. After addn. of H_2O to the reduction products and removal of iso-AmOH by steam, the neutral substances are extd. with ether. Evapn of the solvent gives an oily substance in small amt. The alk. aq. soln. is acidified and extd. with ether. On evapn. of the ether, a phenolic residue is obtained. Recrystn. from AcOEt gives platelets (III), m. 189°. From the mother liquor crystals (IV), m. 177°, are obtained. Both III and IV gave the empirical formula $C_{14}H_{18}O_2$. Monobenzoate of IV, m. 110°. The mixed m. p. of equal parts of III and IV is 150°, showing the 2 are different substances. M. considers that these are stereoisomeric *4,7-dihydroxy-1,2,3,4,9,10,11,12-octahydrophenanthrenes*, the isomerism being due to the OH group at C atom 1. III should be the trans form, because of its higher m. p., and IV the cis form. It is of interest to note that reduction of II takes place at the B nucleus, giving the aromatic compd. in much greater yield than the alicyclic. Reduction of II in AcOH by H in presence of PtO_2 gives *2-hydroxy-1,2,3,4,5,6,7,8-octahydrophenanthrene*.

Nao Uyei

Synthesis of substances related to the sterols. XXVIII. Robert Robinson and J. M. C. Thompson. *J. Chem. Soc.* **1939**, 1739–42; cf. *C. A.* **34**, 7703. γ-1-Naphthylbutyryl chloride (I) (from 20 g. acid) in 60 cc. Et_2O, slowly added to the Na deriv. from 20 g. Et acetylsuccinate in Et_2O cooled in a freezing mixt., allowed to reach room temp. during 2 hrs., kept overnight and then refluxed 10 hrs., the product (35.5 g.) shaken with KOH in EtOH, the neutral material extd. with Et_2O and the acidic product hydrolyzed by heating with 2 *N* NaOH on the steam bath for 2 hrs., gives after esterifying with CH_2N_2 8.3 g. of *Me ester* (II), $b_{0.4}$ 193–8°, n_D^{15} 1.5685, of *4-keto-7-α-naphthylheptanoic acid*, m. 123–4° (*semicarbazone*, m. about 170° (decompn.)). The action of EtONa on II gives no pseudo-acidic product and dil. mineral acid pptd. sirupy material which could not be crystd.; this is believed to be an indication of failure to obtain the cyclopentane-2,5-dione. The cyclodehydration of this crude material with P_2O_5 in moist C_6H_6 gives 3'-keto-3,4-dihydro-1,2-cyclopentenophenanthrene (*C. A.* **31**, 1420[8]). I and the Na deriv. of Et α-acetylglutarate give *5-keto-8-α-naphthyloctanoic acid*, m. 66–7°; *Me ester* (III), $b_{0.4}$ 200–5°, n_D^{20} 1.5625; *semicarbazone*, m. about 118°; the ester and EtONa, kept at room temp. for 24 hrs. and refluxed 30 min., give *β-1'-naphthylethylcyclohexane-2,6-dione*, m. 199–200°; P_2O_5 in moist C_6H_6 gives 16% of *3-keto-1,2,3,4,5,6-hexahydrochrysene* (IV), m. 154–6°; this also results from III and P_2O_5 in moist C_6H_6; *2,4-dinitrophenylhydrazone*, dark red, m. 284° (decompn.). Details are given of the prepn. of the 9-MeO deriv. of IV (*2,4-dinitrophenylhydrazone*, crimson, m. 284° (decompn.)), previously reported by Chuang, Tien and Huang (*C. A.* **31**, 4674[1]); reduction with Na in EtOH gives *3-hydroxy-10-methoxy*(or *ethoxy*)*-1,2,3,4,5,6,-15,16-octahydrochrysene*, isolated as the *p-nitrobenzoate*, yellow, m. 218–19°; the MeO group may be replaced by EtO in the reaction.

C. J. West

Azetidine derivatives. I. 2,4-Diketo-3-hydroxy-3-arylazetidines. J. L. Riebsomer, Howard Burkett,

Thomas Hodgson and Fred Senour. *J. Am. Chem. Soc.* 61, 3491–3(1939).—$Ph(OH)C(CO_2Et)_2$ (25 g.) and 7.5 g. Na in 80 cc. abs. EtOH, heated to 115–20° and treated with 10 g. $CO(NH_2)_2$, stirred at 115–20° for 5 hrs., 10 g. $CO(NH_2)_2$ again added and the stirring and heating continued for about 11 hrs., the soln. evapd. to dryness, the product dissolved in 100 cc. H_2O, 50 g. ice and 10% HCl added until the soln. is acid, and the soln. extd. with Et_2O, give 17% of *2,4-diketo-3-hydroxy-3-phenylazetidine*, $PhC(OH).CO.NH.CO$, m. 107.5–8°; NH_3 may be bubbled into the mixt. instead of the addn. of $CO(NH_2)_2$, the yield being about 3%. Similarly prepd. were the *p-tolyl deriv.*, m. 131° (9%); the *p-ethylphenyl deriv.*, m. 105–6° (24%); the *2,5-dimethylphenyl deriv.*, m. 135–6° (37%); the *mesityl deriv.*, m. 151–2° (6%); the *p-sec-butylphenyl deriv.*, m. 80–90° (38%). The structure of these compds. follows from their hydrolysis with NaOH to $PhCH(OH)CO_2H$ and its derivs., $Ph(HO)C(CO_2Na)_2$ being assumed as an intermediate. These compds. are inactive as hypnotics when given to rabbits and are toxic in relatively small doses.

C. J. West

β-Phenylfurylethylamine and analogous derivatives of thiophene and pyrrole. Robert Robinson and W. M. Todd *J. Chem. Soc.* **1939**, 1743–7.—On account of the remarkable physiol. effects of histamine it was considered desirable to prep. compds. possessing the ethaneamine chain linked to heterocyclic rings other than iminazole. β-2-(5-Phenylpyrryl)propionic acid (Kehrer and Igler, *Ber.* 35, 2009(1902)) is obtained in 87% yield by heating an intimate mixt. of diketophenylheptanoic acid and $AcONH_4$; refluxing 10 g. of the acid with 4 g. concd. H_2SO_4 in 100 cc. EtOH for 4 hrs. gives 82% of the *Et ester*, pale pink, m. 103°; an excess of $N_2H_4.H_2O$ (refluxing 1 hr.) gives 80% of the *hydrazide* (I), m. 137°. I (7 g.) and 4 g. $NaNO_2$ in 10 cc. H_2O, covered with Et_2O and treated with 30 cc. 2 *N* HCl with stirring and ice cooling, give an Et_2O soln. of the azide; MeOH (removing the Et_2O and refluxing 2 hrs.) gives the methylurethan which, refluxed with satd. $Ba(OH)_2$-MeOH for 36 hrs., gives an unsatisfactory yield of *β-2-(5-phenylpyrryl)ethylamine-HCl*, pale pink, m. 225°. Refluxing 20 g. 4,7-diketo-7-phenylheptanoic acid (II), 15 g. P_2O_5 and 300 cc. C_6H_6 for 2 hrs. gives 88% of *β-2-(5-phenylfuryl)propionic acid*, m. 116°; *Et ester*, b_{2-3} 105–7°, m. 20–1°, n_D^{18} 1.5508; in another expt. a small amt. of the *Et ester* of II is formed, m. 23–5°. *β-2-(5-Phenylfuryl)propionhydrazide*, m. 110°, quant. yield; *Me β-2-(5-phenylfuryl)ethylcarbamate*, m. 59–60°; refluxing with $Ba(OH)_2$-MeOH for 24 hrs. gives 50–60% of *β-2-(5-phenylfuryl)ethylamine-HCl* (IIA), m. 205–6°; *picrate*, orange-yellow, m. 200°; *Bz deriv.*, m. 121°; *Ac deriv.*, m. 72°. *Me 4,7-diketo-7-phenylheptanoate*, b_2 197°, m. 41°, n_D^{18} 1.5180, 88% yield with CH_2N_2; P_2S_5 at 98° (1 hr.) gives about 50% of the *Me ester*, m. 75° (with 0.5 mole H_2O), of *β-2-(5-phenylthienyl)propionic acid*, with 0.5 mole H_2O, m. 148°; the *hydrazide* m. 151° (quant. yield); *Me β-2-(5-phenylthienyl)ethylcarbamate*, m. 100°; hydrolysis with concd. HCl or better with MeOH-$Ba(OH)_2$ gives 50–60% of *β-2-(5-phenylthienyl)ethylamine-HCl*, m. 206°; *picrate*, scarlet, m. 217°; *Bz deriv.*, m. 141°; *Ac deriv.*, m. 128°. Furfuraldehyde and *p*-$MeOC_6H_4Ac$, added to 1% MeOH-MeONa with shaking and cooling and kept at room temp. for 2–3 hrs., give 80–90% of *furfurylidene-p-methoxyacetophenone*, straw-yellow, m. 79°; hot EtOH-HCl gives 50–5% of *4,7-diketo-7-p-methoxyphenylheptanoic acid* (III), m. 119°; *β-2-(5-p-methoxyphenylpyrryl)propionic acid*, m. 170–1°; *Et ester*, m. 103°; *hydrazide*, m. 169°; this could not be converted into the azide because of profound decompn. Refluxing III with P_2O_5 in C_6H_6 for 2 hrs. gives 70–5% of *β-2-(5-p-methoxyphenylfuryl)propionic acid*, m. 141°; *Et ester*, b_2 189–95°, m. 52°; *hydrazide*, m. 136°; *Me β-2-(5-p-methoxyphenylfuryl)ethylcarbamate*, m. 89°; refluxing with MeOH-$Ba(OH)_2$ for 24 hrs. gives an unsatisfactory yield of *β-2-(5-p-methoxyphenylfuryl)ethylamine-HCl*, m. 240°. III and CH_2N_2 give 90% of the *Me ester*, b_3 248°, m. 48°; heating with P_2S_5 at 90–100° for about 1 hr. gives 50–60% of the *Me ester*, m. 94°, of *β-2-(5-p-methoxyphenylthienyl)-propionic acid*, m. 178°; *hydrazide*, m. 165°; *Me β-2-(5-p-methoxyphenylthienyl)ethylcarbamate*, light yellow, m. 112°, 80%; hydrolysis with concd. HCl or better with MeOH-$Ba(OH)_2$ gives 60% of *β-2-(5-p-methoxyphenylthienyl)ethylamine-HCl*, m. 283°; *Ac deriv.*, m. 145°. 4,7-Diketoöctanoic acid (IV) and P_2O_5 in C_6H_6, refluxed 2 hrs., give 50% of *β-2-(5-methylfuryl)propionic acid* (V), m. 54–5°; esterification with EtOH and concd. H_2SO_4 gives 2 fractions b_{2-3} 97°, n_D^{15} 1.457, and b_{2-3} 136°, n_D^{15} 1.445 (75%); the lower fraction is an impure sample of the desired ester but the esterification causes the furyl ring to open, yielding the diketo ester; esterification with 5% EtOH-H_2SO_4 converts IV into a mixt. of its ester and the furyl ester, that of IV predominating. V (10 g.) and CH_2N_2 give 7.8 g. of the *Me ester*, b_{2-3} 83°, n_D^{15} 1.465; the *Me ester* of IV b_4 140°, n_D^{15} 1.4458. Catalytic reduction of IIA with Pd-charcoal in EtOH gives *β-2-(5-phenyltetrahydrofuryl)ethylamine-HCl*, m. 122°. The physiol. properties of these bases are being studied. C. J. W.

Isonitrosopyrroles. IX. Products of the transformation of isonitrosopyrrole. T. Ajello. *Atti X° congr. intern. chim.* 3, 7–14(1939); cf. *C. A.* 32, 4557[7].—In addn. to the black compd. $(C_4H_3N_2O)_x$ (I) reported by Angeli and Cusmano (cf. *C. A.* 12, 1291) there are obtained by the action of acid on isonitrosopyrrole (II) 2 other black compds., $(C_4H_3NO)_x$ (III) and $(C_4H_3NO_2)_x$ (IV), and a white compd. $C_4H_4N_2O_2$ (V), m. 210° (decompn.). IV and V can both be obtained together from I by treating it with mineral acid. V is obtained by extn. with ether while IV comes out as a ppt. Salts of NH_3 are formed simultaneously. III was obtained from II by partially satg. it with CO_2. I does not ppt. out when II is treated directly with H_2SO_4, but IV and V are gradually formed. V can be purified from concd. aq. or alc. solns., is slightly sol in benzene, $CHCl_3$, ether and insol. in petr. ether and ligroin. It becomes brown at 180°, softens at 206–8° and m. 210–12° (decompn.), changing to a slimy carbonaceous mass. In the pure state it does not react with $FeCl_3$, but does give a reddish violet color when impure. It gives no reaction to litmus although acidic in nature, forms an explosive white salt of Ag, does not reduce Fehling soln., is not reduced by Zn and HOAc, does not react with HNO_2, gives a mono-Bz deriv., $(C_4H_3N_2O)$-OBz, m. 245°, and a mono-Me deriv. $(C_4H_3N_2O)OMe$, m. 170°. Oxidized with alk. $KMnO_4$ it gives $H_2C_2O_4$ and CO_2. Dil. and alc. KOH with V yield some NH_3 and a volatile fatty acid. Concd. KOH gives an equiv. amt. of NH_3 and a white unidentified material. Warm, somewhat concd. solns. of mineral acids give the soln. a high reducing power attributed to NH_2OH by Angeli (cf. *Ber.* 29, 1884(1896)), and a compd. m. 287°, corresponding to fumaric acid from mixed m. p., neutralization equiv., reduction to succinic acid by 3% Na-Hg and oxidation to tartaric acid. The structure CH.CH.O.N:CCH:NOH is attributed to V. X. *Ibid.* 15–21.—Isonitrosopyrrole (I) was treated with $NH_2OH.HCl$ (II) and with $NH_2NHCONH_2.HCl$ (III) in order to obtain more information on the structure of the compd. $C_4H_3N_2O_2$ (IV), m. 210°, reported in part IX above. With II a white compd., $C_4H_3N_3O_2$ (V), m. 256°, was obtained. It was of weakly acid nature, giving a Ag salt and a Bz deriv., did not react with $FeCl_3$. It was stable to HOAc and HNO_2 and was not reduced by Zn and acid. A possible structure for V is HON.CHCH$_2$C.N.O.N:CH. It was not possible, however, to obtain the corresponding aldehyde but strong hydrolytic action resulted in the complete destruction of the compd., giving NH_2OH, fumaric acid and NH_3. It was also impossible to obtain V from IV by treating it with II. Following the procedure used in older researches (cf. *C. A.* 31, 6652[2]), A. obtained 2 compds. from the action of III on I: $C_4H_3NO:NNHCONH_2$, m. 230°, and $C_4H_4N_2O$: $NNHCONH_2$ (VII), m. 295°, sepd. by fractional crystn. VII with II gave V as did VI. V with III gave VII. In no case was IV obtained. IV with III gave a mixt. of VI and VII. The above facts apparently exclude the isoxazole structure for IV which was advanced in part IX and seem

to support the views of Cusmano according to which IV would be *maleinimide dioxime*, VI *maleinimide monosemicarbazone* and VII the *semicarbazone* of *maleinimide monoxime*. J. C. Lo Cicero

Isonitrosopyrroles. XII. Transformation of the pyrrole nucleus into the pyrimidinic nucleus. Tommaso Ajello. *Gazz. chim. ital.* **69**, 460–70(1939); cf. preceding abstr. and *C. A.* **34**, 99[1].—In a general discussion it is shown that there is an analogy between the reaction whereby pyrrole (I) is transformed into C_5H_5N derivs. or into its aldehyde and pyrroles are transformed into their corresponding isonitroso derivs. It is further shown that, in view of this analogy, it should be possible to pass from these isonitroso compds. to derivs. of pyridizine and pyrimidine. As a start in this problem, the effects of heat, of HCl and of PCl_5 on α,α',β'-triphenyl-β-isonitrosopyrrole (II) and on α,α'-diphenyl-β-isonitrosopyrrole (III) were studied. When heated above their m. ps., II and III do not decomp. according to the reaction foreseen, but much more profoundly, with formation of NH_3, HCN, BzH, BzOH and brown or red-brown resins when air is present and the same products, except BzOH, in the absence of air. Treatment of suspensions of II and III in $CHCl_3$ form only the corresponding HCl salts. If water is present, II and III are partially transformed into diphenylbenzoylisoxazole and phenylbenzoylisoxazole, resp., the yields of these latter varying directly with the proportion of water. Evidently in this case hydrolysis of the I nucleus takes place, as in earlier expts. (cf. *C. A.* **32**, 4557[7]). Progressive addn. of PCl_5 (10 g.) to an ice-cold suspension of II (5 g.) in $CHCl_3$ (50 cc.) gives a dark red soln., which, allowed to stand closed for 12 hrs., ppts. a mixt. of PCl_5 and a yellow substance which could not be extd. with any anhyd. solvent tried. The reaction mixt. was therefore dild. with Et_2O, chilled, ice and then dil. NH_4OH were added, the Et_2O layer was dried with Na_2SO_4, clarified, evapd. and the residue purified by EtOH or AcOH; this yielded triphenoxypyrimidine (IV), m. 340° (cf. Atkinson, Ingham and Thorpe, *C. A.* **1**, 2128). More IV can be recovered from the aq. layer. In the purification of IV there is sometimes obtained another *compd.* (V), m. 228°, which does not contain Cl and which, boiled with glacial AcOH for 12 hrs., yields IV. The most favorable conditions for the formation of V could not be ascertained. Under the same conditions as with II and PCl_5, III and PCl_5 form diphenoxypyrimidine, m. 286° (cf. 281° of Pinner, *Ber.* **22**, 1626(1889)). The expts. show that there is an analogy between the reaction whereby I forms C_5H_5N derivs. and the transformation of the I nucleus through isonitroso compds. to pyrimidine compds. However, the oximinic structure attributed to isonitrosopyrroles (cf. Angeli and collaborators, *Rend. accad. Lincei* **1899** to **1912**) suggests that the reaction may represent a Beckmann transposition. On the other hand, the variations in the course of the reaction and the fact that at times a product, viz., V, which can be converted into a pyrimidine, is formed suggests that the reaction progresses through the formation of intermediate products, analogous to those in the passage of I to C_5H_5N. C. C. Davis

β-Diazo-α-phenylindole. S. Capuano. *Atti X° congr. intern. chim.* **3**, 73–7(1939); cf. *C. A.* **33**, 3375[1].—To 2 g. *β-diazo-α-phenylindole* (I) in 40 cc. 95-proof EtOH is added a concd. aq. soln. of 4 g. NH_4Cl and the soln. is warmed in a water bath. After the gas has ceased to be evolved, heating is continued for a while, whereupon the soln. is cooled and filtered. By repeated treatment with benzene the hydrazo (II) and azo (III) derivs. are sepd. (II being insol.). II, decompg. 271°, could be converted to III, decompg. 263°, with AmONO. To 4 g. I in 80 cc. alc. are added 40 cc. of 10% KOH, the soln. is warmed, concd. and cooled, ppts. *α-phenylindole* identified from its isonitroso deriv. In both treatments AcH is formed, indicating the oxidizing character of I. J. C. Lo Cicero

The condensation of isatin with phenols. II. Isatin and 8-hydroxyquinoline. Yu. O. Gabel and V. M. Zubarovskii. *Trudy Khar'kov. Gosudarst. Univ.* **3**, 67–71 (1938); *Khim. Referat. Zhur.* **2**, No. 1, 55–6(1939).—For the prepn. of 2-oxo-3,3-bis(8-quinolyloxy)indoline, $C_{26}H_{17}N_3O_3$ (I), 10 g. of isatin and 20 g. of 8-hydroxyquinoline were fused with 3 cc. of $POCl_3$. The product was pulverized and treated with dil. AcOH. The yield was 16 g. of I. It is insol. in water and in ordinary org. solvents, is insol. in bases, sol. in H_2SO_4 and HCl (not too dil.). The structural formula of (I) is $C_6H_4.NH.CO.C(OC_9H_6N)_2$; with Ac_2O it forms an almost colorless product, $C_{28}H_{19}O_4N_3$, [*N*-Ac deriv.] which decomps. above 150°, is sol. in acetone, $CHCl_3$ and acids. W. R. Henn

Synthesis of diphenylene dioxide derivatives. XV. Synthesis of α-oxo(or hydroxy)-β(or γ)-morpholylalkyldiphenylene dioxides. Masao Tomita. *J. Pharm. Soc. Japan* **59**, 538–42(in German, 205–6)(1939); cf. *C. A.* **32**, 7464[1]; **33**, 2898[3].—2,6-Di(β-chloroacetyl)diphenylene dioxide (1 g.) and 5 cc. morpholine when heated on the water bath at 80° gave 0.8 g. 2,6-di(α-oxo-β-morpholylethyl)-diphenylene dioxide (I), $C_{24}H_{28}N_2O_8$, m. 195°; HCl salt, m. above 300°. I (0.5 g.) in 10 cc. alc., 1 cc. water and 20 g. 5% Na-Hg when heated on the water bath for 5 hrs. gave 0.2–0.3 g. 2,6-di(α-hydroxy-β-morpholylethyl)diphenylene dioxide, $C_{24}H_{30}N_2O_8$, m. 202°. 2,6-Di(α-chloropropionyl)diphenylene dioxide (1 g.) and morpholine when treated as before gave 1.2 g. 2,6-di(α-oxo-γ-morpholylpropyl)diphenylene dioxide (II), $C_{26}H_{30}N_2O_8$, m. 176°; HCl salt, m. above 280°. Reduction of II with Na-Hg as before gave 2,6-di(α-hydroxy-γ-morpholylpropyl)diphenylene dioxide, $C_{26}H_{34}N_2O_8$, m. 199°. 2,6-Di(β-chloroacetyl)-3,7-dimethyldiphenylene dioxide (1 g.) and morpholine when treated as before gave 1.2 g. 2,6-di(α-oxo-β-morpholylethyl)-3,7-dimethyldiphenylene dioxide, $C_{26}H_{30}N_2O_8$, m. 171°; HCl salt, m. above 280°. Reduction of the above compd. with Na-Hg gave 2,6-di(α-hydroxy-β-morpholylethyl)-3,7-dimethyldiphenylene dioxide, $C_{26}H_{34}N_2O_8$, m. 242°. In like manner 1 g. 2,6-di(β-bromopropionyl)diphenylene dioxide and 5 cc. morpholine gave 2,6-di(α-oxo-β-morpholylpropyl)diphenylene dioxide, $C_{26}H_{30}N_2O_8$, m. 184°; HCl salt, m. above 280°. Reduction of the above oxo compd. with Na-Hg gave 2,6-di(α-hydroxy-β-morpholylpropyl)diphenylene dioxide, m. 220–32°. F. I. Nakamura

2-(*p*-Aminobenzenesulfonamino)thiazole: a new chemotherapeutic agent. W. A. Lott and Frank H. Bergeim. *J. Am. Chem. Soc.* **61**, 3592–4(1939); cf. Fosbinder and Walter, *C. A.* **33**, 7795[1].—2-(*p*-Aminobenzenesulfonamino)thiazole (I) (F. and W.), m. 202–2.5° (cor.); soly. in EtOH at 26°, 525 mg. per 100 cc.; in H_2O at 26°, 60 mg. per 100 cc., giving pH 6.03 (about twice the soly. of sulfapyridine (II)). The *Na salt* of I m. 264.5–5° (cor.); a 2% soln. has pH 9.57. The *HCl salt* of I m. 193–7°; the soly. in H_2O is less than 2% with pH 1.28; it loses HCl on standing. The potentiometric titration curves for the acidification of 2% soln. of the Na salts of I and II show that I is more strongly acidic than II. The *4-Me deriv.* of I m. 237–8°; the *4-Et deriv.* m. 149.5–50.5° With $CuSO_4$ the Na salt of I gives a purple ppt. and II gives an apple-green ppt.; this is a test to distinguish the 2 drugs. C. J. West

Chromones of the naphthalene series. I. Transformation of *o*-aroyloxyacetoarones into *o*-hydroxydiaroylmethanes. V. V. Virkar and T. S. Wheeler. *J. Chem. Soc* **1939**, 1679–81.—1,2-$HOC_{10}H_6Ac$, α-$C_{10}H_7COCl$ and C_5H_5N, heated 1 hr. at 100°, give *1,1'-naphthoyloxy-2-acetonaphthone* (I), m. 135°; the 2'-isomer (II) m. 113–14°, and *1,3'-methoxy-2'-naphthoyloxy-2-acetonaphthone* (III) m. 119°. Heating 5 g. I and 0.4 g. Na in 35 cc. PhMe for 3 hrs. gives *1-hydroxy-2,1'-dinaphthoylmethane* (IV), yellow, m. 142°; 1 g. IV with 5 cc. Ac_2O and 5 cc. HI (d. 1.7), kept at room temp. for 2 hrs., gives 0.5 g. of *2,1'-naphthyl-7,8-benzochromone* (V), m. 205°. II with Na in PhMe gives *1-hydroxy-di-2-naphthoylmethane*, yellow, m. 164°; HBr in AcOH gives the *2'-isomer* of V, m. 190–1°. III yields *1-hydroxy-3'-methoxy-2,2'-dinaphthoylmethane*, orange, m. 163°; HBr in AcOH yields *2-(3'-methoxy-2'-naphthyl)-7,8-benzochromone*, m. 204–5°; refluxing the latter with HI in Ac_2O for 24 hrs. gives the *3'-HO deriv.*, greenish yellow, m. above 300° (*Ac deriv.*, yellow, m. 180–

1°). *o*-$BzOC_6H_4Ac$ with Na in Et_2O, kept overnight and then shaken 5 hrs., gives *o*-$HOC_6H_4COCH_2Bz$ which with HBr in AcOH gives flavone. 1-Acetoxy-2-acetonaphthone and Na in PhMe, refluxed 3 hrs., give 1-hydroxy-2-naphthoylacetone, yellow, m. 117–18°; HI in AcOH gives 2-methyl-7,8-benzochromone, m. 178–9°. **II. Synthesis of linear naphthoflavone (6,7-benzoflavone).** *Ibid.* 1681-3.—PhAc and 2,3-$MeOC_{10}H_6CO_2Me$ with Na in Et_2O, shaken 3 hrs. and kept overnight, give *benzoyl-2-methoxy-3-naphthoylmethane* (I), yellow, m. 98°. *o*-$MeOC_6H_4Ac$ gives the *o-anisoyl analog* (II) of I, yellow, m. 120–2°. *3-Methoxydi-2-naphthoylmethane*, yellow, m. 160°; *di(1-methoxy-2-naphthoyl)methane*, yellow, m. 122°; *2,3'-dimethoxy-1,2'-dinaphthoylmethane* (IIA), yellow, m. 163°. II and Br in $CHCl_3$ give a *Br deriv.*, m. 152°; the Br could not be replaced by Ac with AcONa in AcOH. Heating 0.5 g. I in 5 cc. Ac_2O and HI for 1 hr. gives 0.25 g. of *6,7-benzoflavone* (III), m. 171–2°; HBr in AcOH also gives III. Heating III with EtONa-EtOH under a reflux for 4 hrs. gives 2-hydroxy-3-acetonaphthone (*C. A.* **31**, 9064) and 2,3-$HOC_{10}H_6CO_2H$. II gives the *2'-MeO deriv.* of III, m. 165°; *2'-HO deriv.* of III, greenish yellow, m. 256–7°; *2'-AcO deriv.*, m. 136–8°; EtONa-EtOH decomps the MeO deriv. into the same products as III. *2,2'-Naphthyl-6,7-benzochromone*, yellow, m. 193°. *2-(1'-Methoxy-2'-naphthyl)-7,8-benzochromone*, m. 151–2°; the *1'-HO deriv.*, greenish yellow, m. above 280° (*Ac deriv.*, m. 171°). IIA and III in Ac_2O at 100° for 15 min. or HBr in AcOH for 12 hrs. at room temp. give *2-(3'-methoxy-2'-naphthyl)-5,6-benzochromone* or *2-(2'-methoxy-1'-naphthyl)-6,7-benzochromone* (the latter is preferred), m. 94°, the *HO deriv.*, greenish yellow, m. 283–5° (*Ac deriv.*, m. 148–50°). C. J. West

Catalytic reduction of chromone and coumarone derivatives. F. Pribinger and H. Schmid. *Monatsh.* **72**, 427–31. *Sitzber. Akad. Wiss. Wien. Math.-naturw. Klasse, Abt IIb*, **148**, 125–9(1939).—3-Methyl-6-hydroxycoumarone (I), m. 106°, is catalytically reduced in 3 hrs. to 3-methyl-6-hydroxycoumaran, $b_{0.6}$ 80–90° (bath temp.), m. 60° (Karrer and Widmer, *C. A.* **14**, 1299, gives 96°). I and PhCN give 3-methyl-5-benzoyl-6-hydroxycoumarone, m. 171.5° (K. and W. give 159° for a compd. they believed to be the coumaran); I could not be reduced by Na and EtOH as stated by K. and W. 7-Methoxychromone (II) is reduced by Pd and H to 7-methoxychroman (III), an oil; the *7-HO deriv.* m. 70–2°. Reduction of the 2-Ph deriv. of II gives the corresponding *chroman*, an oil; the *p*-methoxyphenyl deriv. of II gives the *chromaan*, m. 85–88°. Demethylation of III with EtMgI gives *7-hydroxychroman*, m. 90°. C. J. West

3-Substituted resorcinol. IV. 5,6-Dihydroxyflavone. Kenji Nakazawa. *J. Pharm. Soc. Japan* **59**, 521–4(in German, 196 8)(1939); cf. *C. A.* **34**, 1064.—6-Hydroxy-5-methoxyflavone (0.5 g.) in 5 cc. $PhNO_2$ and 0.2 g. $AlCl_3$ when heated on the oil bath at 100° for 1 hr. gave 0.35 g. 5,6-dihydroxyflavone, $C_{15}H_{10}O_4$, m. 190°; diacetate, m. 167°; monobenzoate, m. 175°; dibenzoate, m. 195°. 5,6-Dimethoxyflavone (0.28 g.) when treated as above gave 0.15 g. 5-hydroxy-6-methoxyflavone, m. 129.5°. **V. Synthesis of primetin (5,8-dihydroxyflavone).** *Ibid.* 524–30(in German, 199–202).—2,6-$HO(MeO)C_6H_2Ac$ (8.3 g.) by the Gattermann reaction gave 3.5 g. 2-hydroxy-4-methoxy-3-acetylbenzaldehyde, m. 89.5°, which gave 2,3-dihydroxy-6-methoxyacetophenone (I), m. 147°; dibenzoate, m. 132°. I (2.4 g.), 12 g. BzOH and 3 g. BzONa when heated at 180–90° for 5 hrs. gave 1.6 g. 8-benzoyloxy-5-methoxyflavone (II), m. 216°. II (1.4 g.) when treated with H_2SO_4 gave 0.7 g. 8-hydroxy-5-methoxyflavone (primetin 5-Me ether) (III), m. 236°. Methylation of 0.38 g. III in acetone with MeI gave 0.22 g. 5,8-dimethoxyflavone (primetin di-Me ether) (IV), $C_{17}H_{14}O_4$, m. 146°. III gave by the $AlCl_3$ reaction 5,8-dihydroxyflavone (primetin), $C_{15}H_{10}O_4$, m. 230–1°; diacetate, m. 190–1°; dibenzoate, m. 219°. IV gave 5-hydroxy-8-methoxyflavone (primetin 8-Me ether), $C_{16}H_{12}O_4$, m. 210–11°. Demethylation of III with HI gave dihydroxyflavone, m. 189°, which did not depress the m. p. of 5,6-dihydroxyflavone. F. I. Nakamura

New research on the flavone derivatives from hydroxyphloroglucinol. G. Bargellini. *Atti X° congr. intern. chim.* **3**, 32(1939).—By treating AcCl with 1,2,3,5-$C_6H_2(OMe)_4$ in the presence of $AlCl_3$ there is obtained among the products *2-hydroxy-3,4,6-trimethoxyacetophenone* (I), m. 112–13°. By condensing I with anisaldehyde there is obtained *2-hydroxy-3,4,6,4'-tetramethoxychalcone* (II) which on heating with dil. HCl in alc. gives *5,7,8,4'-tetramethoxyflavanone* (III). By heating II with SeO_2 in AmOH there is obtained the corresponding *5,7,8,4'-tetramethoxyflavone*, m. 207–8°, identical with *isoscutellarein tetra-Me ether*. By treating II wth H_2O_2 in NaOH according to Algar and Flynn (cf. *C. A.* **29**, 161[8]) there is obtained *5,7,8,4'-tetramethoxyflavonol* which by demethylation with boiling HI gives *5,7,8,4'-tetrahydroxyflavonol* or herbacetin, recently synthesized by Goldsworthy and Robinson (cf. *C. A.* **32**, 2120[9]). J. C. Lo Cicero

Derivatives of pyridine and quinoline. XLIII. The formation of 2,3,4,6-tetrabromopyridine during the bromination of 2,6-dibromopyridine at about 500°. J. P. Wibaut and A. F. Bickel. *Rec. trav. chim.* **58**, 994–7(1939); cf. *C. A.* **33**, 8615[3].—The bromination of 2,6-dibromopyridine in the gaseous phase and in the presence of pumice as a contact substance has been reinvestigated in the temp. range of 500–80° (most suitable 510–20°); besides the 2,4,6-tri-Br deriv., which is the main product of the reaction (den Hertog and W., *C. A.* **27**, 508), *2,3,4,6-tetrabromopyridine*, m. 105.3–6°, and a very small amt. of the penta-Br deriv. (m. 209.5–10°) are formed. The previous yield of the tri-Br deriv. could not be duplicated. C. J. West

Synthesis of pyridinium ethanols. III. Further observations in the synthesis. Physiological action of the pyridinium ethanols. Fritz Krohnke and Alfred Schulze. *Ber.* **72B**, 2000–9(1939); cf. *C. A.* **29**, 6892[2].—As shown in the earlier papers, the methylene group in pyridinium salts of the general type $RCH_2N(C_5H_5)Br$ undergoes an aldol-like condensation with aldehydes, R'CHO, to form pyridinium ethanols, $R'CH(OH)CHRN(C_5H_5)Br$. The salts with R = acyl react with aromatic, heterocyclic and aliphatic aldehydes and the acyl group is then split off secondarily, while the salts with R = alkyl react only with aromatic aldehydes and, in part (R = benzyl, allyl), with furfural. As it has thus far not been possible to effect the condensation in an acid medium, the mechanism of the reaction with the acyl derivs. is represented by the scheme

$$RCOCH_2\overset{+}{N}(C_5H_5)Br \rightarrow R.C(\bar{O}).CH.\overset{+}{N}C_5H_5 \ (+R'CHO)$$

$$\rightarrow R.C(\bar{O})C[CH(\bar{O}H)R'].\overset{+}{N}C_5H_5 \ (I) \ (+HBr) \rightarrow R'-CH(OH)CH_2N(C_5H_5)Br + RCO_2H.$$

Attempts to isolate the intermediate I have not as yet been successful. On the other hand, *mol. compds.* (1:2) of *phenacylpyridinium chloride* and *bromide* with *m-nitrobenzaldehyde*, does not m. clear 130° and m. 135°, resp., have been obtained in alc. From the fact that they are formed in alc. and decomp. in water, it may be that in the ethanol condensation solvent forces also have a decisive influence. Unfortunately it has been possible to make but little use, for the synthesis of pyridinium ethanols, of the numerous investigations which have been carried out on aldehyde condensations, for they cannot be applied (or only in part) to the above condensation. Nevertheless, some progress has been made, in many cases by the addn. of NaBr. The role of the alkali in the reaction is that of a catalyst. The use of org. bases as the catalyst has been only partially successful; by this means it has been possible to effect, to some extent, further transformations of aromatic HO aldehydes. $NHEt_2$ has proved to be the most effective, piperidine less so, pyridine not at all. MeANOH is about as effective as alkalies. Of benzaldehydes the most reactive is the *m*-nitro compd., followed by others with electroneg. substituents, then by BzH itself; the Me, MeO and *p*-PhO derivs. react more slowly and with poorer yields, the HO derivs. even less satisfactorily, the amino and Me_2N compds. not at all. *m*-Substituted benzaldehydes, on the whole, are more reactive than the *o*- and *p*-isomers. In general, the aldehydes react with the greater

difficulty the less autoxidizable they are. Furfural behaves like an aromatic aldehyde. In the condensation to pyridinium ethanols there is noted a more or less strong red-brown color, indicating the occurrence of side reactions. If pyridine is used instead of alc. as solvent, the dye formation appears to be the chief reaction. Perhaps this is not the only side reaction; with enol betaines from RCO-CH_2NMe_2PhBr (II) there has been found another type of reaction with aldehydes whereby oxido compds. are formed: II + R'CHO → RCOCH[CH(OH)R']NMe_2-$PhBr$ → RCOCH.CHR'.O + NMe_2Ph + HBr. In the salts $RCH_2N(C_5H_5)Br$ where R = acyl the reactivity of 1 methylene H atom is decreased when the other is substituted and only 1 mol. aldehyde reacts with the salt. Only 1 exception has thus far been found. $PhCH_2CHO$ reacts normally with $PhCOCH_2N(C_5H_5)Br$ to give $PhCH_2CH$-$(OH)CH_2N(C_5H_5)Br$ (III) but there are also formed 2 other compds. (IV, V) whose compn. shows that they have been formed from 2 mols. aldehyde and 1 mol. salt. They may be either diastereomers of the structure $[PhCH_2CH$-$(OH)]_2CHN(C_5H_5)Br$, or the other methylene H atom may have been replaced by the 2nd mol. of aldehyde; in this case 4 pairs of diastereomers would be expected. The in general more difficult formation of ethanols with the grouping $-CH(OH).CHR.N\equiv$ corresponds to their lesser stability. Because of their sensitiveness to heat it had previously been possible to purify them only by repptn. from alc.-ether; it has since been found that they can be satisfactorily recrystd. from glacial AcOH. The pyridinium ethanols prepd. in the course of these investigations have been tested for their physiol. activity on the uterus, blood pressure and intestine. Many show on the rabbit, guinea pig and sheep uterus an action qualitatively similar to that of the ergot alkaloids. CCl_3CH-$(OH)CH_2N(C_5H_5)Br$ (10 mg. intravenously) lowers the blood pressure of the rabbit under urethan 40 mm. (*β*-Hydroxy-*β*-(*o*-chlorophenyl)-*α*-phenylethyl)isoquinolinium bromide is 20 times more powerful than papaverine in its action on the intestine. The following *derivs.* of (*β-hydroxyethyl*)*pyridinium bromide* (substituents on the Et group) are described: *α-phenyl-β-(α-furyl)* (75% from 3 g. $PhCH_2N(C_5H_5)Br$, 2 cc. furfural and 0.3 cc. of 10 *N* NaOH in 25 cc. alc. after 4 hrs. at 0°), m. 201–3° (decompn.), loses 4–6% in wt. at 90–110° in 30 hrs. (*picrate*, m. 108 9°, loses 6.3% at 70°); *β-(α-furyl)* (55% from 5 g. $PhCOCH_2N(C_5H_5)Br$ in 55 cc. 90% alc., 2.25 g. furfural and 3 cc. 10 *N* NaOH allowed to stand 3 days), m. 183–215°, depending on the rate of heating (perchlorate, m. 151 2°); *β-(m-nitrophenyl)*, obtained in 33% yield from the components refluxed 2.5 hrs. with $NHEt_2$; *β-(m-hydroxyphenyl)* (47% from 3 g. $PhCOCH_2N(C_5H_5)Br$, 2.4 g. HOC_6H_4CHO and 3 g. NaBr in 50 cc. of 90% alc. treated at 0° with 1.2 cc. of 10 *N* NaOH and an addnl. 1.2 and 0.75 cc. after 1 hr. and after another 15 min., resp.; without NaBr the yield is 10%), m. 268° (decompn.); *α-vinyl-β-phenyl* (45.5 g. from 25 g. allyl bromide in 50 cc. alc., 17 cc. pyridine, 25 cc. BzH and 2 cc. of 10 *N* NaOH at 0°), m. 215° (perchlorate, m. 153°; *Ac deriv.*, prepd. with boiling Ac_2O-AcOH, m. 157–8°, loses 2% at 80°); *α-vinyl-β-(m-hydroxyphenyl)* (almost quant. with $NHEt_2$), rhombohedrons from 80% AcOH, m. about 195°, octa- and polyhedrons from 8.8 *N* HBr, m. 236° (decompn.) (*perchlorate*, m. 170°); *o-HO isomer* (28%), m. 159 60°; *α-vinyl-β-(m-nitrophenyl)* (96%), m. 163 5°; *p-nitro isomer* (62% from 1 g. allylpyridinium bromide, 1 g. $O_2NC_6H_4CHO$ and 0.07 cc. of 10 *N* NaOH in 15 cc. alc. allowed to stand 6 hrs. at 0°), m. 203° (decompn.); *α-vinyl-β-(m-chlorophenyl)* (98% with $NHEt_2$), m. 200–1°; *α-phenyl-β-(o-chlorophenyl)* (55%), m. 242°; *α-methyl-β-(m-nitrophenyl)* (17%), m. 212–14°, *β-(p-phenoxyphenyl)* (43% from 5 g. $PhCOCH_2N(C_5H_5)$-Br, 5 cc. $PhOC_6H_4CHO$ and 1.8 cc. of 10 *N* NaOH in 55 cc. alc. after 3 days at 0°), m. 98 100°, loses about 3%; *β-(m-bromophenyl)* (76%), m. 232–3°; *α,β*-diphenyl (*acetate*, leaflets with 3 H_2O, m. (dried), 225°). [*α-(m-Nitrophenyl)-β-(o-nitrophenyl)ethyl*]*pyridinium chloride* (90% with $NHEt_2$), m. 212°. *Picrate* of **III**, golden yellow, m. 162°; of **IV**, needles with 1 H_2O, m. 108–13° (*perchlorate*, leaflets with 2 H_2O, m. 81–2°); of **V**, needles with 1 H_2O, m. 173.5°. (*β-Hydroxy-β-benzylethyl*)*pyridinium chloride*, from $PhCH_2CH(OH)CH_2Cl$ refluxed 2.5 hrs. with 2 vols. pyridine and pptd. with ether, m. 142–3°; the picrate is identical with that of III. *N-(γ,γ,γ-Trichloro-β-hydroxypropyl)-3-bromopyridinium bromide* (40% from $PhCOCH_2N(C_5H_4Br)Br$ and CCl_3-$CHO.H_2O$), m. 215° (decompn.); *N-(β-hydroxy-β-nitrophenylethyl) analog* (40%), m. 261° (decompn.); *N-(β-hydroxy-β-phenylethyl) compd.* (28%), m. 206–8°. *α,β*-Oxido-*α*-phenyl-*β*-(*m*-nitrobenzoyl)ethane (40 mg. from 600 mg. *m*-nitrophenacyldimethylphenylammonium enol betaine and 0.2 cc. BzH in alc.), m. 199°; *α-(m-nitrophenyl)-β-(m-nitrobenzoyl)* analog (56%), m. 185°; *α-(m-nitrophenyl)-β-(p-bromobenzoyl)* compd. (72%), m. 134°. C. A. R.

Electron-sharing ability of organic radicals. X. α-Substituted tetrahydroquinolines. Wilbur Oldham and I. B. Johns. *J. Am. Chem. Soc.* **61**, 3289–91(1939); cf. *C. A.* **29**, 7717⁴. *α*-Substituted quinolines were prepd. from quinoline and RMgX or RM_2; the Bu deriv. was prepd. by the reaction of $NaNH_2$ on quinaldine, followed by PrBr; reduction to the tetrahydro derivs. was accomplished by Na in boiling EtOH. *α*-Methyltetrahydroquinoline (I), b_{17} 125°, results in 70% yields; *α*-Et deriv. (II), b_5 110–13° (62%) (picrate, m. 119–20°); *Bu deriv.* (III), b_6 138° (55%) (*p-bromobenzenesulfonamide*, m. 160–60.5°); Ph deriv. (IV), b_8 196° (73%) (picrate, m. 129°; *p-bromobenzenesulfonamide*, m. 201 2°); *α-p-tolyl deriv.* (V), b_{14} 210° (73%) (*picrate*, m. 134–4.5°). *α-o-Tolylquinoline*, b_4 197°, m. 76 6.2°, results in 90% yield by the use of *o*-MeC_6H_4Li, followed by dehydrogenation with $PhNO_2$; *picrate*, m. 176°; *tetrahydro deriv* (VI), b_8 200 2°, m. 69.5° (*p-bromobenzenesulfonamide*, m. 193–3.5°). *α 2-Mesitylquinoline*, b_1 200°, m. 69 9.5°, *picrate*, m. 216.5°; *tetrahydro deriv.* (VII), b_6 218° (*picrate*, m. 164.5 5°). Ionization consts. were measured by the method of Goodhue and Hixson (*C. A.* **28**, 4378⁵); values for $pK_{BH,OH}$ are: VII 12.92, VI 12 18, IV 12.18, V 11.94, I 10.90, II 10.87, III 11.08, unsubstituted 10.90. These consts., plotted against electron-sharing ability functions, give a curve similar to that for a series of *α*-substituted pyrrolidines (G. and H.). C. J. West

Synthesis of alkyl-substituted substances of the quinoline series. E. S. Vasserman. *Trudy Dnepropetrov Khim.-Tekhnol. Inst. im. F. E. Dzerzhinskogo, Kafedra Org. Khim.* **1938**, 68–72; *Khim. Referat. Zhur.* **2**, No. 4, 56 (1939). The object of the expts. was the application of Komb's method for the prepn. of 2,4-dimethylquinolines to different aromatic amines and to their derivs. When used with aniline the scheme of the reaction is as follows: $PhNH_2$ + $MeCOCH_2COMe$ → PhN $CMeCH_2COMe$ + H_2SO_4 → $C_6H_4.N$ $CMe.CH$ CMe. From *p*-toluidine and CH_2Ac_2 was obtained 2,1,6-trimethylquinoline, m. 43–5°. From *α*- and *β*-naphthylamines and CH_2Ac_2 were obtained 2,4-dimethyl-*α*-, m. 44°, and *β*-naphthoquinoline, m. 66–7°. Aniline with $BzCH_2Ac$ gives similarly 2-methyl-4-phenylquinoline, m. 100°. *p*-Toluidine with $BzCH_2Ac$ gives 2,6-dimethyl-4-phenylquinoline, m. 78°. The Komb reaction does not take place when aromatic amines with halogen and with nitro groups in the *o*- and the *p*-positions are used. W. R. Henn

Methods for the preparation of the starting substances for sensitizers of the quinoline series—isocyanines. V. A. Alekseeva. *Trudy Dnepropetrov. Khim. Tekhnol. Inst. im. F. E. Dzerzhinskogo, Kafedra Org. Khim.* **1938**, 73–83; *Khim. Referat. Zhur.* **2**, No. 4, 56(1939); cf. *C. A.* **32**, 2449.— The object of the expts. was the prepn. of different derivs. of quinoline which can be used as starting materials for the synthesis of isocyanines. According to Konrad-Limpach [*Ber.* **20**, 944, 980, 1397(1887)] the reaction proceeds according to the following scheme: *p*-$MeC_6H_4NH_2$ + $MeCOCH_2CO_2Et$(−H_2O) → MeC_6H_4N:$CMeCH_2CO_2$-Et(−EtOH) → $MeC_6H_3.N.CMe.CH_2.CO$ → $MeC_6H_3.N$:

$CMe.CH:COH$. The condensation reaction with $AcCH_2$- CO_2Et and the further ring formation were performed completely with *p*-toluidine and α- and β-naphthylamine. Besides this, condensation products (anils) were obtained with $AcCH_2CO_2Et$ and xylidine (1:3:4), *o*- and *p*-$C_6H_4(NH_2)_2$ and benzidine. The ring formation with the anils was obtained by a rapid heating to 240° in a kerosene medium with the use of a mixer. The yield of the corresponding hydroxyquinaldine was greatly increased (to 87.6%). W. R. Henn 1

Preparation of some *py*-aminoquinolines and their derivatives. R. R. Renshaw and H. L. Friedman. *J. Am. Chem. Soc.* **61**, 3320–2(1939).—Reduction of 3-nitroquinoline gives 3-aminoquinoline (I) in small over-all yields; 3-bromoquinoline, heated with concd. NH_4OH and $CuSO_4$ 12 hrs. at 160°, gives 73% I. The Ac deriv. of I and HNO_3 in AcOH give the *nitrate*, m. 195.5° (decompn.); fuming HNO_3 in concd. H_2SO_4 gives the *Ac deriv.*, golden yellow, m. 205–6°, of *3-amino-4(?)-nitroquinoline* (II), red, m. 189–9.5°, which could not be reduced in HCl with $SnCl_2$ or other reagents. The diazo soln. from 200 mg. II, poured into EtOH and boiled, gives 40 mg. of *3-ethoxy-4(?)-nitroquinoline*, tan, m. 113–14°. Decarboxylation of quinoline-2,4-dicarboxylic acid (III) in boiling $PhNO_2$ for 10 min. gives 90% of cinchoninic acid; through the acid chloride, Me ester and amide 4-aminoquinoline results in an over-all yield of 68%. III through the acid chloride (IV) yields the *di-Me ester* (V), m. 130–1°, and the *di-Et ester* (VI), m. 74–5.5°; IV and $PhNH_2$ give *quinoline-2,4-dicarboxanilide*, bluish white, m. 285–6°. Heating V with MeOH-NH_3 at 80° for 20 hrs. gives 2,4-dicarbamylquinoline, m. 277.5–9.5°; KOH and Br give 85% (over-all yield 59%) of *2,4-diaminoquinoline*, m. 197–8.5° (*picrate*, m. 283° (*decompn.*)). Heating VI with MeOH-NH_3 at 50° gives 86% of *2-carbomethylethyl cinchoninate*, m. 226–7.5°; KOH and Br give 2-aminocinchoninic acid, tan, m. 362° (decompn.) All m. ps. are cor. C. J. West 2

4-Phenyl-4-aminoquinoline derivatives. U. P. Basu and P. K. Das-Gupta. *J. Indian Chem. Soc.* **16**, 301–4 (1939). 2 - Phenyl - 4 - (4' - aminobenzenesulfonyl)-aminoquinolines may have some therapeutic importance since the monosubstitution of the H_2NSO_2 group of $H_2NSO_2C_6H_4NH_2$ (I) often widens the scope of activity of the drug. A mixt. of 4.4 g. of 2-phenyl-4-aminoquinoline (II) (*C. A.* **20**, 3010[8]), 4 g. $Et_2NCH_2CH_2Br$, 2 g. anhyd. K_2CO_3 and a trace of Cu powder in xylene was refluxed for 12 hrs. The ext. with dil. HCl was neutralized with K_2CO_3 and extd. with Et_2O. Treatment with excess K_2CO_3 and extn. of the oil with Et_2O gave viscous yellow liquid *2-phenyl-4-(β-diethylaminoethyl)aminoquinoline*, $C_{21}H_{25}N_3$, b_6 272–6°, n_D^{33} 1.6510; *picrate*, m. 238–9°. Similarly were produced the corresponding compds.: *γ-diethylaminopropyl*, b_6 265–70° (*picrate*, m. 234°) and its *6-MeO deriv.*, m. 159°; *δ-diethylaminobutyl* (*picrate*, m. 203°) and its *6-MeO deriv.* (*picrate*, m. 192°); and *δ-diethylamino-α-methylbutyl* (*picrate*, m. 162°). Condensation of 2-phenyl-4-chloroquinoline with I in the presence of Cu powder gave *2-phenyl-4-(4'-sulfonamidophenyl)-aminoquinoline*, $C_{21}H_{17}N_3O_2S$, m. 250°. The corresponding *diethylsulfonamido compd.*, $C_{25}H_{25}N_3O_2S$, m. 144°, was similarly prepd. Condensation of II with *p*-$AcNHC_6H_4SO_2Cl$ in benzene and hydrolysis of the product with HCl (d. 1.16) gave *2-phenyl-4-(4'-aminobenzenesulfonyl)aminoquinoline*, $C_{21}H_{17}N_3O_2S$, m. 293°; *Ac deriv.*, m. 297°. Similarly was produced the corresponding *6-MeO compd.*, $C_{22}H_{19}N_3O_3S$, m. 268°; *Ac deriv.*, $C_{24}H_{21}N_3O_4S$, m. 268°. The yield of these condensation products was invariably poor. No therapeutic activity data are reported. C. R. Addinall 3

Quinovic acid from Zygophyllum coccineum L. Gabra Soliman. *J. Chem. Soc.* **1939**, 1760–1.—The annual shrub *Zygophyllum coccineum* L. (gasshul, rotreyt or kemmun quaramany of Egypt), on extn. of 3 kg. with petr. ether and then with Et_2O or EtOH, gives after a lengthy purification 19 g. of quinovic acid, m. 297° (decompn.), identical with that which occurs in cinchona bark. *O-Ac deriv.*, m. 282–4° (decompn.); Me ester, m. 175° (*O*-Ac deriv., m. 218°). C. J. West 4

Pyrimidines. The molecular rearrangement of 4-methyl - 5 - propyl - 2,6 - dimethoxypyrimidine. Youh-Fong Chi, Shao-Seng Wei and Mei-Seng Liang. *J. Am. Chem. Soc.* **61**, 3377–9(1939).—4-Methyl-5-propyluracil (I) and $POCl_3$, refluxed 12 hrs., give 80% of *4-methyl-5-propyl-2,6-dichloropyrimidine*, $b_{19.5}$ 145–6°, b_{35} 163°, m. 31–3°; MeONa gives the *2,6-di-MeO deriv.* (II), $b_{19.5}$ 135–40°, and EtONa gives the *2,6-di-EtO deriv.*, b_{18} 145–8°. Heating II at 260–80° for 3 hrs. gives 90% of *1,3,4-trimethyl-5-propyluracil* (III), m. 74–5°. II and excess MeI, heated at 50–60° for 8 hrs., give *2-hydroxy-3,4-dimethyl-5-propyl-6-methoxypyrimidine* (IV), $b_{4.5}$ 180–2°; hydrolysis of IV with dil. HCl gives *3,4-dimethyl-5-propyluracil*, m. 148–50°. Methylation of I with Me_2SO_4 and NaOH or MeONa gives *1,4-dimethyl-5-propyluracil*, m. 193.5–4°. Heating IV at 330–50° for 6–8 hrs. gives III. C. J. West 5

α,ω-Amino alcohols. I. *N*-Phenyl-*N'*-(ω-hydroxyalkyl)piperazines from α,ω-chlorohydrins. Derivatives of piperazine. 17. Geo. W. Anderson and C. B. Pollard. *J. Am. Chem. Soc.* **61**, 3439–40(1939).—The general procedure consisted in heating 0.2 g. of the chlorohydrin with 0.4 mole of *N*-phenylpiperazine for 5 hrs. on the water bath, heating the solid with 40 cc. 5 *M* K_2CO_3 and recrystg. the solidified orange-colored layer from 60% EtOH. In all but the 1st compd. the yield of crude product was practically quant. Cor. m. ps. are given for the *N-phenyl-N'-(ω-hydroxyalkyl) piperazines*, $PhNC_4H_8N(CH_2)_nOH$ (*alkyl* given) and their *phenylurethans: butyl*, 59–60°, 91.2°; *amyl*, 74–5°, 100–1.5°; *hexyl*, 65.5–7°, 91.5–3°; *heptyl*, 75.5–6.5°, 96.5–7.5°; *octyl*, 57–8.5° (*hydrate*, m. 80–2°), 99.5–100.5°; *nonyl*, 80–80.5°, 94–5°; *decyl*, 67–8°, 95–6°. *α-Naphthylurethan* of *hexamethylene-α,ω-chlorohydrin*, m. 49–50°; *decamethylene analog*, m. 63–4°. **II. Morpholino alcohols. Derivatives of morpholine.** 2 *Ibid.* 3440–1.—Heating approx. 0.5 mole of morpholine and α,ω-glycol in 300 cc. dioxane with Cu-Cr oxide catalyst at 235–70° for 6 hrs. at 100 atm. gives a mixt. of morpholinoalkanol, $O(CH_2CH_2)_2N(CH_2)_nOH$ (I), and dimorpholinoalkane, $[O(CH_2CH_2)_2N]_2(CH_2)_n$ (II); yields of I and II are (*alkane* given): *butane*, 36, 22; *pentene*, 31, 28; *hexane*, 21, 18; *heptane*, 19, 28; *octane* 26, 41; *nonane*, 38, 28; *decane*, 21, 13. Properties of I (*alkane* given): *butane*, b_6 116.5–7°, n_D^{25} 1.4745, d_4^{25} 1.018 (*phenylurethan*, m. 86–7° (m. ps. of derivs. cor.)); *pentane*, b_6 133–3.5°, n_D^{25} 1.4755, d_4^{25} 1.005 (*phenylurethan*, m. 55.5–7°); *hexane*, b_6 146–7°, n_D^{25} 1.4750, d_4^{25} 0.9884 (*α-naphthylurethan*, m. 71–2°); *heptane*, b_6 155.5–8°, n_D^{25} 1.4747, d_4^{25} 0.9783 (*phenylurethan*, m. 71–2°); *octane*, b_6 164–4.2°, n_D^{25} 1.4735, d_4^{25} 0.9675 (*α-naphthylurethan*, m. 73–4°); *nonane*, b_6 173–3.5°, m. 31° (*α-naphthylurethan*, m. 54–6°); *decane*, b_2 164–5°, m. 39.5–40° (*α-naphthylurethan*, m. 66.5–7.5°). Properties of II: *butane*, b_6 147.5–8.5°, m. 51.5–2.5°; *pentane*, b_6 161–2°, n_D^{25} 1.4804, d_4^{25} 0.9980; *hexane*, b_6 169.5–71°, m. 35.5–8.5°; *heptane*, b_6 183–4°, n_D^{25} 1.4796, d_4^{25} 0.9789; *octane*, b_6 191.5–3.5°, m. 46.5–7.5°, 48° (double m. ps., not complete resolidification after 1st melting but distinct crystal formation); *nonane*, b_6 203.5–4°, n_D^{25} 1.4789, d_4^{25} 0.9639; *decane*, b_2 187–9°, m. 49–9°, 50.5–1.5°. C. J. West 6 7 8

Constitution and synthesis of the alkaloid anonaine. G. Barger and G. Weitnauer. *Helv. Chim. Acta* **22**, 1036–47(1939).—Percolation of the bark of *Anona reticulata* with 95% alc. gave 0.12% of anonaine (I), $C_{17}H_{15}NO_2$, m. 122–3°, $[\alpha]_D^{19}$ −52°; *HCl salt*, m. 277.5° (decompn.); *nitroso deriv.*, m. 229–30°; *Ac deriv.*, m. 229–30°; *N-Me deriv.* (II) (*HI salt*, m. 246–7° (decompn.)). I is a secondary, non-phenolic base, contg. 1 active H atom and a CH_2O_2 group but giving neg. tests for NMe, MeO, CO_2H, CO and indole groupings. Oxidation with $KMnO_4$ yielded a small amt. of o-$C_6H_4(CO_2H)_2$ and the structure of I was assumed to be of the aporphine type. Proof of this assumption was advanced by the results of Hofmann degradation expts. The *quaternary ammonium iodide*, $C_{19}H_{20}INO_2$, m. 217°, was boiled for several hrs. with alc. KOH and yielded 91% of a *methine*, m. 87–90°; MeI deriv., m. 9

270.5° (decompn.), converted by refluxing with 5% KOH in MeOH to a substituted *vinylphenanthrene*, $C_{17}H_{12}O_2$, m. 87°. Oxidation with $KMnO_4$ in acetone produced an acid, $C_{16}H_{10}O_4$, m. 240° (decompn.), which was decarboxylated according to Reichstein (*C. A.* **27**, 1333) with Cu chromite and quinoline to a *methylenedioxyphenanthrene*, $C_{15}H_{10}O_2$; picrate, m. 168° (decompn.). All known aporphine alkaloids with 1 exception have the CH_2O_2 group in the 5,6-position and accordingly this was assumed to apply to I. Proof of the assumption was sought in a synthesis of I according to a scheme commonly used for aporphine alkaloids. A mixt. of 18.1 g. of o-$O_2NC_6H_4CH_2CO_2H$ and 60 cc. $SOCl_2$ in 100 cc. $CHCl_3$ was kept at 40° for 30 min. After distn. at reduced pressure the resulting acid chloride was taken up in 30 cc. of benzene and the soln. was added dropwise to a cool soln. of 31 g. of homopiperonylamine in 40 cc. benzene. The crude product was extd. with boiling dil. AcOH and recrystd. from MeOH, yielding 85% of *3-3,4-methylenedioxyphenyl)ethyl-o-nitrophenylacetamide* (III), $C_{17}H_{16}N_2O_5$, m. 119°. Treatment of 5 g. III in 20 cc. $CHCl_3$ with 15 cc. $POCl_3$ for 5 days at room temp. gave 79% of *2'-nitro-6,7-methylenedioxy-1-benzyl-3,4-dihydroisoquinoline* (IV), $C_{17}H_{14}N_2O_4$, m. 165°, reduced by Zn dust in HCl to crude oily *2'-amino-6,7-methylenedioxy-1-benzyltetrahydroisoquinoline* (V); *di-HCl salt*, m. 257°. V (6.68 g.) in 180 cc. of 2 *N* H_2SO_4 was diazotized with 0.5 *N* $NaNO_2$ and heated on the steam bath for 30 min. The mixt. was treated with 3 g. Zn dust and 8 cc. concd. HCl, heated for 30 min., filtered, cooled, shaken out with Et_2O and made strongly alk. The pptd. base was taken up in Et_2O and recrystd. from HCl in Et_2O, yielding 22% of white needles of the *HCl salt* of I, m. 255° (decompn.); *Ac deriv.* of I, m. 217°. The Hofmann degradation of synthetic I gave an identical series of products as the natural base. Synthetic I gave the same color reactions as the natural product. A mixt. of 3.6 g. IV and 10 cc. MeI was heated for 30 min. in a sealed tube at 100°, producing 93% of yellow platelets of the *MeI deriv.*, $C_{18}H_{17}IN_2O_4$, m. 243° (decompn.), reduced by Zn in HCl to *2'-amino 6,7-methylenedioxy-1-benzyl-2-methyltetrahydroisoquinoline* (VI); *di-HCl salt*, m. 259-60° (decompn.). Diazotization of VI in H_2SO_4, heating on the steam bath for 30 min., reduction, filtration, extn. with Et_2O and addn. of excess alkali gave a base. Extn. with 2 *N* HCl and treatment with KI yielded prisms of *dl-N-methylanonaine-III*, $C_{18}H_{17}NO_2$.HI, m. 244° (decompn.); *MeI deriv.*, m. 210-11°, identical with the corresponding product prepd. from synthetic I. N-Methylanonaine is probably identical with the alkaloid roemerine recently isolated from *Roemeria refracta* (*C. A.* **33**, 6325[1]). C. R. Addinall

Alkaloids of Menispermaceae. L. Alkaloids of Stephania sasakii, Hayata. 1. Hisaburo Kondo and Masao Tomita. *J. Pharm. Soc. Japan* **59**, 542-6(in German, 207-8)(1939).—From the alc. ext. of *Stephania sasakii*, Hayata, T. obtained a base as the Bz deriv. (I), m. 103°, which corresponds to cepharanthine, m. 103°, isolated from *Stephania cepharantha*, Hayata. I gave 3 free bases: (1) $C_{37}H_{38}N_2O_6$; $[\alpha]_D^{15}$ 296.6° (in $CHCl_3$); α-methine base m. 98-100°, and β-methine base m. 183°. (2) $C_{38}H_{40}N_2O_7$, m. 115-17°, $[\alpha]_D^{20}$ −57.1° (in $CHCl_3$); HCl salt, m. 222.5°; methiodide, $C_{38}H_{40}N_2O_7.2MeI.H_2O$, m. 220°; methine base, $C_{40}H_{44}N_2O_7.H_2O$, m. 110-14°. (3) $C_{36}H_{36}N_2O_7$, m. 210°, $[\alpha]_D^{20}$ −36.7 (in $CHCl_3$), is phenolic in character; HCl salt, m. 264°. The free base contains 2 OMe groups, but on methylation with CH_2N_2 forms a compd., m. 160-5°, with 4 OMe groups. F. I. Nakamura

The *N*-alkyl- and the *N*-arylmorpholones (2-ketotetrahydro-1,4-oxazines). A. I. Kiprianov, A. P. Tisel'skii and I. K. Ushenko. *Trudy Khar'kov. Gosudarst. Univ.* **3**, 45-52(1938); *Khim. Referat. Zhur.* **2**, No. 4, 54-5(1939). —By boiling the alkyl- and the arylaminoethanols with $ClCH_2CO_2Na$ were obtained Me, Et, Pr, iso-Pr, iso-Am, $PhCH_2$, Ph and *o*- and *p*-MeC_6H_4 derivs. of morpholone. In case of the aryl derivs. morpholones are formed directly:

$$ArNHCH_2CH_2OH + ClCH_2CO_2Na \rightarrow CH_2.CH_2.NAr\text{-}CH_2.CO.O + NaCl + H_2O \text{ (I)}.$$

In case of the alkylaminoethanols the hydroxyalkylamino acids are formed first and are dehydrated to the corresponding alkylmorpholones by distn. *in vacuo*. The alkylmorpholones are easily hydrolyzed. By the action of concd. NH_3 on the arylmorpholones the amino acids, *N*-aryl-*N*-β-hydroxyethylaminoacetic acids, were obtained. The product of the condensation of *N*-phenylmorpholone with Michler's ketone was obtained in the form of an amorphous iodide.

Its probable structure is $Me_2NC_6H_4CR\ C_6H_4{:}\overset{+}{N}Me_2 + I$ (R = *p*-$CH_2.CH_2.O.CO.CH_2.NC_6H_4$-) (II). For the prepn. of *N*-methylmorpholine 17 g. of $ClCH_2CO_2H$ in 35 cc. of water are neutralized with concd. NaOH, boiled for 7 hrs. with 13.5 g. of $MeNHCH_2CH_2OH$, evapd. on a water bath and the residue distd. *in vacuo*. The yield was 8.4 g., colorless liquid, b_{10} 100-2°, b. 233°. [Knorr, *Ann.* **307**, 199 (1899).] A yield of 14 g. of *N*-ethylmorpholone (14 g. from 15.6 g. of $EtNHCH_2CH_2OH$ [Knorr and Schmidt, *Ber.* **31**, 1073(1898)], colorless mobile liquid, b_7 97-9.5°. By hydrolysis was obtained *N*-ethyl-*N*-β-hydroxyethylaminoacetic acid, colorless crystals. A yield of 8 g. of *N*-propylmorpholone was obtained from 17 g. of propylethanolamine, b_{20} 130-6°, as a dense colorless liquid. *N*-Propyl-*N*-β-hydroxyethylaminoacetic acid is a non-crystg. syrup. The Cu salt $(C_{11}H_{23}O_6NCu.3H_2O)$ forms dark blue needles. A yield of 2.5 g. of *N*-isopropylmorpholone was obtained from 7 g. of isopropylaminoethanol, b_8 78-80°. A yield of 5 g. of *N*-isoamylmorpholone was obtained from 11 g. of isoamylaminoethanol, b_{20} 150-5°. A yield of 11 g. of *N*-benzylmorpholone was obtained from 12 g. of benzylaminoethanol (boiling for 15 hrs.) b_8 158-61°. *N*-Phenyl-*N*-β-hydroxyethylaminoacetic acid was obtained from *N*-phenylmorpholone (III) [Kiprianov, *C. A.* **24**, 1081] with concd. NH. The methyl ether of *N*-phenyl-*N*-β-hydroxyethylaminoacetic acid yields III during the distn. *in vacuo*. From the reaction of 10.5 g. of *o*-toluidine and 14.7 g. of ethylene oxide in a sealed tube at 100° for 8 hrs. was obtained *N*-β-hydroxyethyl-*o*-toluidine (IV) in the form of a yellow oil, b_8 168-74°. By boiling 32.2 g. of IV for 8 hrs. *N*-*o*-tolylmorpholone, b_7 186-7°, was obtained. *N*-β-Hydroxyethyl-*N*-*o*-tolylaminoacetic acid was obtained in the form of colorless needles, m. 113-14°. From *p*-toluidine and ethylene oxide was obtained *N*-(β-hydroxyethyl)-*p*-toluidine (V), b_{20} 183-92° and m. 39°. From V white crystals of *N*-*p*-tolylmorpholone were obtained, m. 71-8° (sealed tube). White crystals of *N*-*p*-tolyl *N*-β-hydroxyethylaminoacetic acid were obtained from alc., m. 170-2°. W. R. Henn

Lupine studies. XIV. The isolation of anagyrine from Lupinus laxiflorus var. silvivola C. P. Smith. James F. Couch. *J. Am. Chem. Soc.* **61**, 3327-8(1939); cf. *C. A.* **33**, 6320[8]. The dried plant of *Lupinus laxiflorus* var. *silvicola* C. P. Smith (western U. S.) gives 0.7-0.97% of anagyrine (I); cytisine, methylcytisine and sparteine were not found. I b_{12} 260-70°, $[\alpha]_D^{25}$ −168° (1% in OH, *c* 1.0596); the HCl salt seps. with 3 moles H_2O, m. 235-6°, and also with 0.5 mole H_2O, m. 284.5-5.5°; $[\alpha]_D^{25}$ −124.2° (H_2O, *c* 1.7316); perchlorate, long needles, decompg. without melting; *chloroaurate*, golden needles, m. 167-8°; picrate, m. 169.5°; *methiodide*, m. 262-3°. I on filter paper, exposed to Br vapor, gives an orange-yellow color, which develops a pale-blue color with NH_3 and on heating it changes to brown instead of scarlet as in the case of sparteine (modified Grant test). C. J. West

β-Elemonic acid. M. Mladenović and I. Berkeš. *Monatsh.* **72**, 417-26; *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse*, Abt. IIb, **148**, 115-24(1939).—Previous work (*C. A.* **30**, 2979[4]) had shown that β-elemonic acid (I) is probably identical with Ruzicka's δ-elemic acid (*C. A.* **27**, 1339) and is present as such in the native resin acid mixt. Treatment of this mixt. with $NH_2OH.HCl$ and AcONa and fractionation of the oximes yield the oxime of I, from which I can be regenerated by acids. The use of the oxime also furnishes a convenient method for isolating I from the mixt. of products from the oxidation of the elemic acid. Catalytic reduction (PtO_2 in EtOH) of I gives a

dihydro deriv. (II), $C_{30}H_{48}O_3$, m. 248° and gives no characteristic color reactions. II and HBr in $CHCl_3$ give a *monohydro deriv.* (III), $C_{30}H_{47}O_3Br$, m. 245° (decompn.); KOH in MeOH (boiled 15 min.) regenerates I; catalytic reduction (Pd in EtOH) gives II. I and Br in $CHCl_3$ (cooling with ice) give the *di-Br deriv.*, m. 223° (decompn.); KOH-MeOH gives a *Br deriv.*, $C_{30}H_{45}O_3Br$, m. 273°. I and O_3 in $CHCl_3$ (2 hrs.) give a *diozonide*, m. 80° (decompn.); further action of O_3 (4 hrs. in all) gives a *triozonide*. III yields a *mono-* and a *diozonide*, and II gives a *monoozonide*, m. 243° (decompn.), and a *diozonide*. The Me ester of I m. 119°; of II, m. 115°. The oxime of I could not be reduced to an amine; the oxime could not be degraded by PCl_5. The behavior of I and its derivs. with O_3 indicates the presence of 3 double bonds, although hydrogenation indicates only 1 and values for the enol reaction indicate 2. The difficulties of applying the latter method to compds. such as I are discussed. One double bond is considered active and the other 2 as inactive. C. J. West

Pachymic acid, a new constituent of bukuryo (Poria cocus, Wolf). I. Sokiti Nakamisi, Mitiko Yamanoto and Hukuko Ikeda. *J. Pharm. Soc. Japan* **59**, 725–9, *Abstracts* (in English) 273–6(1939).—"Bukuryo" is one of the important oriental drugs. Extn. with MeOH or AmOH of the ether ext. of the drug gave a cryst. substance (I) and a gelatinous mass. Recrystn. of I from MeOH or Me_2CO gave a compd. $C_{30}H_{44}O_6$, needles, m. 300°; Liebermann reaction pos. It is a monobasic acid, having 1 lactone, and 1 OH group and 1 double bond. It is named *pachymic acid* (II), from *Pachyma hoelen*. *Acetate*, m. 225°. II and CH_2N_2 gave a Me ester, needles, m. 175°, $[\alpha]_D^{19}$ 29.69°. *Me ester of the acetate*, m. 155°, prisms $[\alpha]_D^{23}$ 8.18°. Nao Uyei

Constituents of Lentinus tuber-regium, Fr. Sokiti Nakamsi, Mitiko Yamanoto and Tie Nakamura. *J. Pharm. Soc. Japan* **59**, 730–1(in English, 276–7)(1939).—*Lentinus tuber-regium* (I) is imported into Japan from the Micronesia and East Indies as a substitute for bukuryo. But the two drugs are different in appearance and the chem. reactions of their sclerotium. From the ether ext. of I, a sterol, $C_{27}H_{46}O_4$, needles, m. 112°, and a wax, m. 80°, were isolated. Nao Uyei

A phytochemical study of Asclepias syrica L. Alfred E. Rheineck. *Pharm. Arch.* **10**, 93–6(1939); cf. *C. A.* **33**, 9361⁴.—Amyrin acetate, propionate (m. 178°), trichloroacetate (m. 168–70°, 204°), benzoate and stearate (m. 75°) are prepd. and described. The hydrocarbon also occurring in the follicle walls was found to contain H 13.08% and C 96.43%. H. M. Burlage

Calycanthine. IV. Structural formula. Richard H. F. Manske and Léo Marion. *Can. J. Research* **17, B**, 295–301(1939); cf. *C. A.* **33**, 3798⁸.—Anhyd. calycanthine (I) (2 g.) was heated with Se (2 g.) at 300° for 30 min. in a N atm. The distillates and melts from 5 batches were worked up separately and yielded skatole (II), β-ethylindole (III), lepidine (IV), norharman (V) and a base, calycanthine (VI), $C_{21}H_{13-15}N_3$, m. 210° (all m. ps. cor.). A mixt. of 2 g. I with 2 g. Pd-charcoal catalyst was heated to 200° and at 200–10° for 5 hrs. in a stream of N passing into dil. HCl. NH_3 was liberated. Benzoylation of I and subsequent oxidation with $KMnO_4$ in acetone yielded benzoyl-*N*-tryptamine, BzOH and an amorphous *acid* (VII), $C_{18}H_{18-20}N_2O_{3-4}$, m. 170–4°, giving a pos. reaction with Ehrlich's reagent on boiling. Heating VII with Se produced quinoline. Boiling benzoylated I for several hrs. with alc. KOH gave a *base*, $C_{36}H_{34}N_4O_2$, m. 235°, for which a structure is proposed. A structural formula for I, based on the above transformations, is suggested which accounts for the dehydrogenation of VII to quinoline. The source of II, III and V is attributed to the carboline half of the mol. of I and the isolation of IV makes it possible to link the Me group of IV to the indole N of the carboline half. The ready formation of NH_3 is accounted for by the assumption of a reduced pyrrole ring contg. the 4th N atom of I. The constitution of I and VI proposed by Barger, *et al.* (*C. A.* **33**, 5405⁸) is discussed. C. R. Addinall

Newest developments in the chemistry of the glucosides. M. Bergol'ts. *Farmatsiya* **1938**, No. 1–2, 10–17; *Khim. Referat. Zhur.* **2**, No. 3, 53(1939).—A short history of the study of the glucosides of digitalis. The investigated substances are enumerated. Their structures are given in connection with the structures of sterols, bile acids and hormones which are based on the cyclopentaphenanthrene ring. The compn. of some glucosides and of their aglucone parts are given. W. R. Henn

The synthesis of isoprimeverose, of α-1-*d*-xylosido-6-*d*-glucose, and of an α-isomer and derivatives of primeverose. Géza Zemplén. *Math. naturw. Anz. ung. Akad. Wiss.* **58**, 356–78(1939); cf. *C. A.* **33**, 4965⁶.—A new optically active (*d*-rotatory), cryst. α-acetochloro deriv. could be sepd. from the mother lyes obtained in the synthetic production of primeverose derivs. (cf. *C. A.* **33**, 2110⁶). The compd., α-acetochloro-α-1-*d*-xylosido-6)-*d*-glucose, has been named α-acetochloroisoprimeverose. This gave in anhyd. AcOH with AgOAc a mixt. of α- and β-heptaacetylisoprimeverose (with the β-form as dominant part) which, further, was transformed with Ag_2CO_3 in MeOH to β-1-Me hexaacetylisoprimeveroside. The hepta-Ac deriv. is easily sapond. and yields free isoprimeverose. The detailed data of the compds. are: primeverose, m. 208–10°, $[\alpha]_{20}^{D}$ 24.1° → −3.3° (in water); isoprimeverose, m. 200–1°, $[\alpha]_{20}^{D}$ 151.3 → 121.3° (water); β-heptaacetylprimeverose, m. 216°, $[\alpha]_{20}^{D}$ −23.5° ($CHCl_3$); β-heptaacetylisoprimeverose, m. 107–10°, $[\alpha]_{20}^{D}$ 82.3° ($CHCl_3$); β-1-Me hexaacetylprimeveroside, m. 219–20°, $[\alpha]_{20}^{D}$ −37.0° ($CHCl_3$); β-1-Me hexaacetylisoprimeveroside, m. 123–4°, $[\alpha]_{20}^{D}$ 66.0 ($CHCl_3$); α-acetoprimeverose, m. 201–3°, $[\alpha]_{20}^{D}$ 72.3° ($CHCl_3$); α-acetochloroisoprimeverose, m. 158–60°, $[\alpha]_{20}^{D}$ 185.8° ($CHCl_3$); α-acetobromoprimeverose, m. 176–8°, $[\alpha]_{20}^{D}$ 96.5° ($CHCl_3$); and α-acetobromoisoprimeverose, m. 155.5–7.5°, $[\alpha]_{20}^{D}$ 186.3° ($CHCl_3$). The reductive capacity of free isoprimeverose lies between that of maltose and lactose, being nearer to the latter; 1 cc. 0.1 *N* $KMnO_4$ equals, according to Bertrand, 5.1 mg. of isoprimeverose. S. S. de Finály

Isomerization of xanthophylls (addendum). L. Zechmeister, L. v. Cholnoky and A. Polgár. *Ber.* **72B**, 2039–40(1939); cf. *C. A.* **33**, 9308¹.—Strain's monograph, *Leaf Xanthophylls* (*C. A.* **33**, 3123³), has only now become available to the authors. Some of his observations are very similar to those of the authors and in part were made at an earlier date. But whereas the authors in their work laid the greatest stress on the complete reversibility of the transformations and on the study of catalytic influences and the theory of the isomerization, Strain sought principally (and successfully, on the basis of his extensive exptl. data) to prove the complexity of the leaf xanthophyll. C. A. R.

Desoxycholamine. Wm. T. Caldwell. *J. Am. Chem. Soc.* **61**, 3584–5(1939).—Desoxycholyl hydrazide (22 g.) in 67 cc. *N* HCl, and 400 cc. H_2O, treated with 400 g. ice and 4.2 g. $NaNO_2$ in 50 cc. and the pressed wet cake of azide gently heated with 210 cc. glacial AcOH to 45–60°, the product made alk. with KOH, the ppt. dissolved in EtOH-KOH, pptd. with H_2O and crystd. from MeOH, give 3 g. of *desoxycholamine*, with 1 mole of MeOH, m. above 70°; without MeOH, m. 158–9°; *HCl salt*, m. 306° Vanghelovici (private communication) reports a similar compd m. 118° (HCl salt, m. 247°). The 2 compds. are probably stereoisomers; epimerization may occur during the alk. hydrolysis used in the Curtius degradation. C. J. West

Sterols. XIX. Sterol of Semen coicis. Satoru Kuwada and S. Yosiki. *J. Pharm. Soc. Japan.* **59**, 560–6(in German, 203–4)(1939); cf. *C. A.* **33**, 8209².—The ether ext. of *Semen coicis* gave after hydrolysis a non-saponifiable compd., m. 90–110°; 3,5-dinitrobenzoate (I), $C_{36}H_{52}N_2O_6$, m. 215–16° (cor.), $[\alpha]_D^{18}$ −7.3° (in $CHCl_3$). Hydrolysis of I gave sitosterol (II), $C_{29}H_{50}O$, m. 138.5° (cor.), $[\alpha]_D^{19}$ −19.5°. II forms the following derivs.: acetate, $C_{31}H_{52}O_2$, m. 124–5° (cor.), $[\alpha]_D^{19}$ −37.2°; benzoate, $C_{36}H_{54}O_2$, m. 147–9°, $[\alpha]_D^{23}$ −14.7°. Catalytic reduction of II with Pt oxide gave sitosterol, $C_{29}H_{52}O.0.5H_2O$, m. 140.5–2.5° (cor.), $[\alpha]_D^{23}$ 23.5°. 3,5-Dinitrobenzoate of phytosterol (Schuchardt), $C_{36}H_{52}N_2O_6$, m.

211–12° (cor.), $[\alpha]_D^{25}$ −14.0°, did not depress the m. p. of I. Phytosteryl *m*-dinitrobenzoate gave after hydrolysis a compd., m. 140.5° (cor.), $[\alpha]_D^{25}$ −35.6°. 3,5-Dinitrobenzoate of phytosterol (Merck), $C_{36}H_{52}N_2O_6$, m. 209–10° (cor.), $[\alpha]_D^{25}$ −13.2°, did not depress the m. p. of I.

F. I. Nakamura

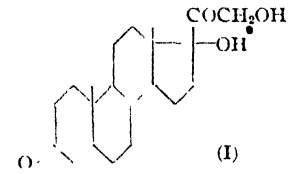
Sterols. LXXVI. Oxidation and reduction products of equilenin. Russell E. Marker and Ewald Rohrmann. *J. Am. Chem. Soc.* **61**, 3314–17(1939); cf. *C. A.* **34**, 4423.—Reduction of equilenin (I) with the Adams catalyst in Et_2O-EtOH at 3 atm. H pressure and 25° for 15 hrs. gives α-dihydroequilenin (II), m. 245–7°; reduction of II in acidified EtOH gives 5,7,9-estratrien-17(α)-ol (III), m. 144–6° (cf. Ruzicka, Muller and Morgeli, *C. A.* **33**, 1337[2]); this indicates that the HO group at C-17 is of the α-configuration. III and CrO_3 in AcOH, on standing 1 hr. at 25°, give *5,7,9-estratrien-17-one*, m. 107–9°; *oxime*, m. 203–5° (decompn.). The diketone $C_{18}H_{16}O_2$ (*C. A.* **33**, 8621[6]) is believed to be *3-desoxy-11-ketoequilenin* (IV); reduction in acidified EtOH of 250 mg IV gives 150 mg. of III; III *acetate*, m. 102–3°; catalytic reduction of IV in Et_2O-EtOH gives the *compd.* $C_{18}H_{20}O_2$, m. 209–12° (the 2 CO groups appear to be reduced to HO groups); Clemmensen reduction with Zn gives the *compd.* $C_{18}H_{18}O$, m. 156–8° (monoketo compd.), whereas amalgamated Zn gives desoxyequilenin, $C_{18}H_{20}$, m. 73–5°. The CO group at C-11 is probably introduced during the CrO_3 oxidation, inasmuch as I acetate with CrO_3 in AcOH at 25° for 5 hrs. yields a product which appears to be *11-ketoequilenin acetate*, $C_{20}H_{18}O_4$, m. 195–7°; *monosemicarbazone*, m. 238–41° (decompn.); thus IV may be formed by the oxidation of 3-desoxydihydroequilenin and therefore this may be present in mares' pregnancy urine. I reacts readily with $ClCH_2CO_2Et$ and EtONa in EtOH to give *equilenin-3-oxyacetic acid*, m. 233–6°; *Et ester*, m. 141.5–3°; *Me ester*, m. 180–2°; catalytic reduction gives III. **LXXVII. The oxidation of pregnane-3,4,20(α)-triol and of coprostane-3,4-diol.** Russell E. Marker, Eugene L. Wittle, Louis Plambeck, Jr., Ewald Rohrmann, John Krueger and Paul R. Ulshafer. *Ibid.* 3317–20.—4,20-Diacetoxypregnan-3-one (I) (1.7 g.) on catalytic reduction in Et_2O-EtOH gives 1.4 g. 4,20-diacetoxypregnan-3-ol (II), unsharp m. p. and gives only a slight ppt. with digitonin (III); CrO_3 gives a quant. yield of I; hydrolysis with EtOH-KOH gives *pregnan-3,4,20(α)-triol* (IV), m. 184°, gives no ppt. with IV; *triacetate*, m. 181°. Reduction of I with (iso-PrO)$_3$Al also gives IV, characterized as its acetate. Oxidation of IV with CrO_3 in AcOH gives *pregnan-20-one-3,4-dicarboxylic acid* (V), m. 216° (*oxime*, m. 238°); V gives a m. p. lowering of 20° with the 2,3-diacid of allopregnan-20-one (*C. A.* **31**, 7870[9]) and m. 180–220° with the 2,3-diacid of pregnan-20-one (m. 281°) (VI); di-Me ester of VI, m. 87°. IV and $Pb(OAc)_4$ in AcOH (room temp. for 24 hrs.) give *pregnan-20(α)-ol-3,4-dicarboxylic acid*, m. 231°; CrO_3 oxidation gives V. 4-Bromocoprostanone and AcOK in AcOH, refluxed 2 hrs., give *4-acetoxycoprostanone*, m. 149°; catalytic reduction and hydrolysis give *coprostane-3,4-diol*, m. 185–8°; CrO_3 oxidation gives *coprostane-3,4-diacid*, m. 217°; *di-Me ester*, m. 74°; this is different from the dicarboxylic acid obtained by direct oxidation of coprostanone. Thus, the point of cleavage of ring A of the sterols on oxidation is highly dependent on the nature of the group attached to C-17, even though this group is far removed from the point of oxidative attack. The greater part of the oxidative fission of 3-substituted derivs. of the coprostane configuration (except those of the bile acid series) takes place at the 2,3-bond rather than at the 3,4-bond as has been generally assumed. **LXXVIII. Sterols from sow pregnancy urine.** Russell E. Marker and Ewald Rohrmann. *Ibid.* 3476–7.—Sow pregnancy urine differs from other pregnancy urines studied in that the pregnanediols appear to be absent. Pregnan-3(α)-ol-20-one (I), allopregnan-3(β)-ol-20-one, cholesterol and the urinary hydrocarbon ($C_{28}H_{58}$) were isolated. The epi-ketone fraction remaining after the removal of I yields an oxime which appears to be identical with androsterone. This lends further support to the theory that these products are derived from the adrenal compds. There appear to be other 3(β)-sterols present in the sow pregnancy urine but these could not be isolated from the quantity of urine studied. No apparent differences were observed in urine collected during the 2nd month and during the last month of pregnancy. **LXXIX. Oxidation products of dihydrosarsasapogenin.** *Ibid.* 3477–9.—Dihydrosarsasapogenin was refluxed with Ac_2O for 30 min., the excess Ac_2O removed, the residue taken up in AcOH and the soln. heated at 90–5° and treated with CrO_3 in AcOH during 2 hrs., the soln. concd. to 100 cc. and pptd. with H_2O; the ppt. was taken up in Et_2O and washed with 3% NaOH; the Et_2O soln. was concd. and the product hydrolyzed with EtOH-KOH: this yields a neutral sirup and some HO lactone or sarsasapogenin, m. 200–1.5°; the NaOH washings yield the C_{22} keto acid, m. 285–7° (*C. A.* **33**, 5407[8]) and the C_{19} dibasic acid, m. 220–2° (*C. A.* **34**, 1412[2]); the *acetate anhydride* of the latter m. 202–3.5°. The Me ester of anhydrotetrahydrosarsasapogenoic acid was refluxed with Ac_2O and oxidized with CrO_3 as above, except that the reaction mixt. was heated 4 hrs. at 55–60° and 1 hr. at 80°; the residue from the Et_2O soln. (after washing with 3% NaOH) on hydrolysis gives anhydrosarsasapogenoic acid; the acid fraction gives the C_{22} keto acid and 3-hydroxyetiobilianic acid. This indicates that the Me ester acetate of sarsasapogenoic acid was formed in the oxidation and was in turn converted to the anhydro acid by the alkali treatment; in this reaction sarsasapogenoic acid could only have arisen from the oxidative opening of the oxide ring to yield a diketo compd., thus supporting the proposed formula for the acid (*C. A.* **33**, 7807[2]). **LXXX. Reactions of chlorogenin.** *Ibid.* 3479–82; cf. *C. A.* **33**, 4263[4].—Chlorogenin (I) resembles tigogenin more closely than it does sarsasapogenin in its various reactions involving the side chain. I shows little tendency to undergo isomerization with HCl in EtOH. Attempts to reduce I by the Clemmensen reaction were unsuccessful. Catalytic reduction of 7 g. of I in AcOH at 70° for 16 hrs. gives 5 g. of *dihydrochlorogenin* (II), m. 233–5°; II gives a ppt. with a 2% EtOH soln. of digitonin but does not react with Br or SeO_2; *tris-3,5-dinitrobenzoate*, m. 210–12°. Oxidation of II with CrO_3 in 80% AcOH gives *3,6-dehydroanhydrotetrahydrochlorogenoic acid*, m. 202–4°; *disemicarbazone*, m. 240° (decompn.); *Me ester*, m. 156.5–8°. I diacetate (III) yields a *Br compd.*, m. 200° (decompn.); reduction with Na and EtOH gives I. Catalytic reduction of desoxychlorogenin gives a dihydro deriv., m. 92.5–3.5°, identical with dihydrodesoxytigogenin. Oxidation of III with CrO_3 in AcOH at 90–5° gives the *lactone* of I, m. 250–51.5° (*diacetate*, m. 247–50°; *dibenzoate*, m. 278–80°), which is oxidized with CrO_3 at 25° to a *diketo lactone*, m. 213–5°; there also results a small amt. of an *acid* $C_{22}H_{34}O_5$, m. 221–6°. **LXXXI. Conversion of sarsasapogenin to pregnane-3(α),20(α)-diol.** *Ibid.* 3602–3.—Heating sarsasapogenin and Ac_2O at 200° gives *pseudosarsasapogenin*, $C_{27}H_{44}O_3$, m. 171–3°; mild oxidation with CrO_3 in AcOH gives a good yield of an *unsatd. diketone*, $C_{21}H_{30}O_2$, m. 201–3°; reduction with Na and EtOH gives pregnane-3(α),20(α)-diol, m. 236–9°.

C. J. West

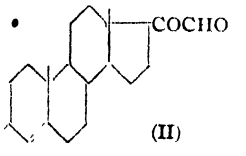
Hydrolysis of dicholesteryl ether by acid clay. Tikataro Kawasaki. *J. Pharm. Soc. Japan* **59**, 418–23(in English, 268–70)(1939).—Bills (B. and McDonald, *C. A.* **20**, 2522) found that when cholesterol (I) was heated with floridin in CCl_4 soln. it was converted into dicholesteryl ether (II), which on further heating polymerized into a resinous product having antirachitic properties. Yoder (*C. A.* **31**, 1033[6]) assumed that the antirachitic substance prepd. by B. was cholesterilenesulfonic acid (III), which had been formed from I by the dehydrating and sulfonating action of SO_3 adsorbed at the surface of floridin. He obtained I and II by floridin treatment and concluded that II would be decompd. into I and cholesterilene, then the latter sulfonated. Hattori and K. (*C. A.* **31**, 6247[6]; **33**, 8622[1]) have shown that I in C_6H_6 soln. heated with activated Japanese acid clay was easily dehydrated into II and on prolonged heating an antirachitic substance was produced. The formation of II from I is so rapid that only a few min. boiling with acid clay is sufficient. But a com-

plete conversion of I to II does not take place, and a small portion of I remains unchanged even after many hrs. of boiling. The presence of unchanged I can be easily demonstrated by means of the chromatograph. The C_6H_6 soln. of I is refluxed with acid clay until the clay has become a darker purplish red color. The soln. after filtering off the clay is passed through an activated Al_2O_3 layer. On evapg. the filtrate, II is sepd. When the Al_2O_3 layer is extd. with MeOH, pure I is obtained. The above expt. shows that the dehydrating action of acid clay is not strong and an equil. is established between I and II. Inversely, it can be shown that II can be decompd. into I by acid clay. The C_6H_6 soln. of II (1.5 g.) is passed through an Al_2O_3 layer to remove I. Then the filtrate is boiled 10 min. with acid clay. After filtering off the acid clay, the filtrate is passed through the Al_2O_3 layer. On washing the latter with C_6H_6 or CCl_4, II is recovered unchanged. On extg. the Al_2O_3 layer with MeOH, 0.12 g. I is obtained, which gives a ppt. with digitonin and no depression of m. p. when mixed with a pure specimen of I. The above results show Y.'s statement is erroneous. I, isolated by Y., must have been formed by hydrolysis of II. The assumption that the antirachitic substance produced by floridin activation is cholesterilenesulfonic acid is deemed untenable as shown by Windaus from another angle. Nao Uyei

Constituents of the adrenal cortex and related compounds. XXVI. Proof for the membership of substance S in the 17(β)-series. T. Reichstein, C. Meystre and J. v. Euw. *Helv. Chim. Acta* **22**, 1107–13(1939); cf. *C. A.* 33, 6870[1].—Proof is given that the formula proposed for substance S (I) is correct. The mother liquor of I (18 mg.)



in 3 cc. MeOH was treated with 35 mg. HIO_4 in 3 cc. H_2O for 16 hrs. at room temp. The residue on evapn. was taken out with ether and the washed ext. was extd. with Na_2CO_3. Acidification with HCl and extn. with ether gave 10 mg. of crude acid which, on recrystn. from ether, yielded 2 mg. of *acid* (II), $C_{20}H_{28}O_4$, m. 232–40° (all m. ps. cor.). Methylation with CH_2N_2 in ether at 0°, filtration over Al_2O_3, elution with benzene-ether (1:1) and recrystn. from ether-pentane gave colorless needles of Me 3-keto-17(β)-hydroxy-4-etiocholenate (III), $C_{21}H_{30}O_4$, m. 216–18°, identical with the ester prepd. by oxidizing 10 mg. of Me 3(β),17(β)-dihydroxy 5-etiocholenate (*C. A.* **33**, 6870[1]), m. 232–6°, by refluxing for 24 hrs. in 0.8 cc. acetone and 2 cc. benzene with 100 mg. of freshly sublimed $Al(OCMe_3)_3$. The formation of II is in accordance with the presence of a dihydroxyacetone grouping in the side-chain. The alternative dihydroxyaldehyde grouping would give rise to 4-androstene-3,17-dione. Oxidation of 50 mg. of Me 3(β),17(α)-dihydroxy-5-etiocholenate (IV) (*C. A.* **32**, 2126[2]) according to Oppenauer (*C. A.* **31**, 3061[3]) by refluxing with acetone and $Al(OCMe_3)_3$ in benzene gave an oxidation mixt. partially purified by Girard's reagent T to give a keto ester (V), m. 182–5°, contg. 30–5% of the starting ester but distinct from III. Bromination of IV prior to oxidation with CrO_3 in AcOH and debromination with Zn also gave impure V. I has the assigned formula and accordingly belongs to the 17(β)-series. **XXVII. 3-Keto-4-androstenyl-17-glyoxal and related compounds.** H. Reichand T. Reichstein. *Ibid.* 1124–38.—Of the 5 known physiol. active pregnane derivs. isolated from the adrenal cortex, desoxycorticosterone (I) and its esters have shown the strongest activity. Substance S may also be active. The non-cryst. residues are more active than any identified cryst. constituent and, since this active constituent is difficult to isolate, attempts have been made to synthesize more active principles by modifying the side chain. The prepn. of 3-keto-4-androstenyl-17-glyoxal (II) from 21-chloro-5-pregnen-3-ol-20-one (III) (*C. A.* **32**, 581[3]), by the use of the excellently suitable method of Kröhnke and Börner (*C. A.* **30**, 6714[7]) in 2 distinct procedures, is described. A suspension of 9 g. 21-diazopregnenolone (*C. A.* **32**, 581[3]) in 100 cc. ether was treated with 15 g. dry HCl in 200 cc. ether and the washed and dried reaction mixt. was concd. The crude cryst. product was washed



with ether and the mother liquor was purified by chromatographic adsorption, giving a total yield of 7 g. III. Similar treatment of 0.9 g. 21-diazopregnenolone with 2 g. HBr in ether gave 600 mg. of pure *21-bromopregnenolone* (IV), m. 159.0–9.5°(all m. ps. cor.). Heating 2 g. III for 1 hr. on the steam bath with 14 cc. abs. pyridine gave 2 g. of *21-pyridinium-5-pregnen-3-ol-20-one chloride* (V), $C_{26}H_{36}ClNO_2$, m. 289–90°. Analogous procedures converted IV into the corresponding *bromide*, m. about 300° (decompn.). A chilled mixt. of 429.5 mg. V in 13.4 cc. alc. and 150 mg. *p*-$ONC_6H_4NMe_2$ was shaken with 1 cc. of *N* NaOH. The red soln. was dild. and the ppt. was recrystd. from dil. alc., yielding fine orange-yellow needles of hydrated *3-hydroxy-5-etiocholenoyl-N-(p-dimethylaminophenyl)-nitrone* (VI), $C_{29}H_{40}N_2O_3.H_2O$, m. 133–4°. A suspension of 430 mg. VI in ether was shaken out with 2 *N* HCl. Concn. of the washed and dried Et_2O layer gave hydrated crystals of *5-pregnen-3-ol-20-on-21-al* (VII), $C_{21}H_{30}O_3.H_2O$, m. 135–6°. Concn. of the mother liquor gave a high-melting form (VIII), m. 170°, probably a polymeric form of VII. Both VII and VIII gave the same *di-Me acetal* (IX), $C_{23}H_{36}O_4$, m. 109–11° (after sublimation at 0.01 mm. and 165°, followed by recrystn. from ether-pentane), m. 112–13° (after chromatography), $[\alpha]_D^{23}$ 39.1 ± 1°, $[\alpha]_{5461}^{23}$ 52.2 ± 1° (*c* 2.202 in MeOH). Both VII and VIII reduce NH_3-$AgNO_3$ and were further characterized by the formation of a *dioxime*, $C_{21}H_{32}N_2O_3$, m. 285–90°; *quinoxaline*, $C_{27}H_{34}N_2O$, m. 229–31°; and *dianil*, $C_{33}H_{40}N_2O$, m. 85–90°. Oxidation of 190 mg. IX by refluxing for 24 hrs. with 5 cc. acetone, 15 cc. abs. benzene and 415 gm. of freshly sublimed $Al(OCMe_3)_3$ and careful purification of the reaction products by chromatography and high vacuum sublimation gave 50 mg. of cryst. *4-pregnene-3,20-dion-21-al di-Me acetal* (X), $C_{23}H_{34}O_4$, m. 84–6°, $[\alpha]_D^{23}$ 170.3 ± 2°, $[\alpha]_{5461}^{23}$ 207.9 ± 3° (*c* 1.116 in acetone), ultraviolet absorption max. 244 mμ (in alc.). Hydrolysis of 100 mg. X at room temp. with 1 cc. AcOH and 1 cc. of 2 *N* HCl for 5 days, neutralization, sublimation in high vacuum at 150°, and recrystn. from ether yielded a small amt. of cryst. II, m. 230–40°. A mixt. of 5 g. III, 150 cc. of freshly distd. acetone, 450 cc. abs. benzene and 12.5 g. of freshly sublimed $Al(OCMe_3)_3$ was refluxed for 24 hrs., evapd. *in vacuo* and extd. with ether. The ext. was washed with dil. HCl, H_2O, Na_2CO_3 and H_2O. Acidification of the alk. ext. gave 0.5 g. of an impure *acid*, m. 297–9°, methylated by CH_2N_2 to *Me 3-keto-4-etiocholenate*, $C_{21}H_{30}O_3$, m. 170–4°, absorption max. 244 mμ, isomeric with a known ester (*C. A.* **32**, 947[3]). The dried neutral ext. was concd. and the recrystd. product was chromatographed and recrystd. from benzene-ether, yielding *21-chloroprogesterone* (XI), $C_{21}H_{29}ClO_2$, m. 203–5°, $[\alpha]_D^{24}$ 209.5 ± 6°, $[\alpha]_{5461}^{24}$ 255.2 ± 7° (*c* 1.007 in $CHCl_3$), converted by refluxing for 1 hr. with fused AcONa in AcOH to desoxycorticosterone acetate, m. 159–60°. Details for the prepn. of XI by stirring a mixt. of 200 mg. I and 200 mg. $CaCO_3$ in 4 cc. $CHCl_3$ with 200 mg. powd. PCl_5 at 0° are given. Oxidation of IV according to Oppenauer's procedure gave *21-bromoprogesterone*, $C_{21}H_{29}BrO_2$, m. 190–1°. Heating 1 g. XI for 1 hr. with 10 cc. abs. pyridine at 100° yielded 1.042 g. of colorless crystals of *21-pyridinium-4-pregnene-3,20-dione chloride* (XII), $C_{26}H_{34}ClNO_2$, m. 274–5° (decompn.). The corresponding *Br deriv.*, m.

265–8° (decompn.), was similarly prepd. A mixt. of 214 mg. **XII** and 75 mg. of *p*-$ONC_6H_4NMe_2$ in 6.7 cc. alc. was cooled to −10°, treated with 0.5 cc. of *N* NaOH and, after recooling for 5 min., with 4 cc. H_2O. The resulting orange-yellow *nitrone* was shaken with Et_2O and dil. HCl and the washed and dried Et_2O layer was concd. A good yield of difficultly crystallizable material was obtained which gave a poor yield of **II**, m. 103–6°, converted by HCl in MeOH to **X**. Physiol. tests of amorphous **II** according to the Everse de Fremery method gave a very pos. result with 2.5 mg. per day per rat from which it would seem that **II** is less active than corticosterone.

C. R. Addinall

Chemical studies on the poisonous substance of the toad. X. Chemical constitution of cinobufagin Kenji Kuwada. *J. Chem. Soc. Japan* **60**, 45–8(1939); cf. *C. A.* **32**, 9092⁸; **33**, 5861⁶.—Dissolve 0.9 g. cinobufagone, m. 234–bath for 1.5 hrs., then pour the contents in water and acidify with H_2SO_4 in order to obtain a ppt. Take this ppt. up in ether and dry with anhyd. Na_2SO_4, then remove the ether. Treat the residue with acetone-ether in order to obtain crystals of desacetylisocinobufagonic acid (**I**), m. 217° (yield 0.2 g.). Recrystn. from EtOH gives columns, m. 218–21°. **I** is sol. in dil. alkali and aq. $NaHCO_3$; **I** gives no color with alc. $FeCl_3$ and does not reduce Fehling soln. or Tollen's reagent. Dissolve 10 g. cinobufagin, m. 212–13° in 100 cc. 95% EtOH by heating, and heat to boiling in a mixt. of 100 cc. concd. HCl (d. 1.19) and 300 cc. 95% EtOH and boil for 5 min. Pour into a large amt. of water and take up the ppt. formed with $CHCl_3$ and dehydrate with Na_2SO_4. Yield of desacetylanhydrocinobufagin (**II**) 2.0 g., m. 226–8°. Recrystn. from EtOH gives light yellow plates, m. 227–9°; Ac deriv., colorless needles, m. 201–5°. Dissolve 2.0 g. **II** in 50 cc. glacial AcOH, reduce with H and Pd black at the rate of absorption of 630 cc. H in 2 hrs., remove the Pd by filtration, pour the filtrate into water and take the ppt. up in $CHCl_3$. Wash the $CHCl_3$ layer with water until it is no longer acid in reaction, shake with 2% aq. $NaHCO_3$, then dry with Na_2SO_4. Conc. the $CHCl_3$ to obtain octahydrodesacetylanhydrocinobufagin (**III**), m. 203–6° (yield 0.35 g.); recrystd. from MeOH, it m. 207.5–8.5°. Wash the aq. $NaHCO_3$ layer with $CHCl_3$ and acidify with H_2SO_4, then ext. with $CHCl_3$, wash the $CHCl_3$ layer with water and dehydrate with Na_2SO_4, then remove the $CHCl_3$. Recrystn. from MeOH gives 0.05 g. leaflets of dihydroxycholanic acid (**IV**), m. 144–7°. Dissolve 0.2 g. **IV** in 15 cc. glacial AcOH and add, while cooling with ice, 2.5 cc. of a soln. of 1.5 g. CrO_3 in 20 cc. water and 2.5 cc. concd. H_2SO_4, and let stand for 20 min. at room temp. Pour into water, take ppt. up with $CHCl_3$, wash the $CHCl_3$ layer with water, dehydrate it with Na_2SO_4, remove the $CHCl_3$ and obtain diketocholanic acid by addg. EtOH; columns, m. 191–5°, lowers the m. p. of 3,12-diketocholanic acid. Heat 0.07 g. **III** in a mixt. of 2 cc. anhyd. AcOH and 0.3 g. anhyd. AcONa for 2 hrs. on the water bath, pour into water and take the crystals up with ether. Wash the ether layer with water, then dry it with Na_2SO_4. Remove the ether and recrystallize the residue from MeOH to obtain the mono-Ac deriv. of **III**, needles, m. 207–9°.

K. Kitsuta

Infrared studies of porphyrin mol. (Vestling, Downing) **3**. Thermal data on org. compds. (Richardson, Parks) **2**. Isomerization of C_4H_{10} and their equil. ratios (Moldavskii, Nizovkina) **2**.

Oxygenated organic compounds. Nicholas A. Milas (to Research Corp.). Brit. 508,526, July 3, 1939. Compds comprising phenols, glycols, aldehydes, ketones, quinones and carboxylic acids are produced by treating unsatd. org. compds., which may be aromatic hydrocarbons, unsatd. hydroaromatic compds., unsatd. terpenes, other compds. contg. an ethylene linkage and compds. contg. an acetylenic linkage, with a soln. of H_2O_2 in a nonaq. solvent, e. g., *tert*-BuOH, *tert*-AmOH, nitrites, ethers, in the presence of a catalyst consisting of an oxide of a metal other than Os that assumes various valencies, e. g., Ru, V, Cr, Mo. Reactions of the following types may be effected: (1) a monosubstituted ethylene $RCH.CH_2$ yields a glycol $RCH(OH)CH_2OH$, which by further oxidation yields an aldehyde RCHO and CH_2O; further oxidation to an acid RCOOH and HCOOH may follow, (2) a disubstituted ethylene $RR'C:CH_2$ yields a glycol $RR'C(OH)CH_2OH$ from which, by further oxidation, a ketone RR'CO and CH_2O are obtained; further oxidation of CH_2O to HCOOH may follow, (3) a trisubstituted ethylene RR'C:CHR'' yields a glycol RR'C(OH)CHR''OH, from which, by further oxidation, a ketone RR'CO and an aldehyde R''CHO are obtained; oxidation of the aldehyde to an acid R''COOH may follow, (4) a tetrasubstituted ethylene RR'C:CR''R''' yields a glycol RR'C(OH)CR''R''', which, by further oxidation, yields ketones RR'CO and R''R'''CO, (5) C_2H_4 yields ethylene glycol from which CH_2O and HCOOH may be obtained by further oxidation, (6) a monosubstituted acetylene RC:CH may yield (a) a hydroxy aldehyde RCH(OH)CHO, produced by isomerization of the glycol RC(OH)CHOH, or (b) a keto aldehyde RCOCHO, produced by dehydration of the glycol $RC(OH)_2CH(OH)_2$; further oxidation of the aldehydes may yield the corresponding hydroxy and ketonic acids RCH(OH)COOH and RCOCOOH, (7) a disubstituted acetylene RC:CR' may yield (a) a hydroxy ketone RCH(OH)COR', produced by isomerization of the glycol RC(OH)CR'OH, or (b) a diketone RCOCOR', produced by dehydration of the glycol $RC(OH)_2CR'(OH)_2$, (8) C_2H_2 yields, by isomerization or dehydration of intermediately formed glycols, glyoxal and glycolaldehyde, from which, by further oxidation, glycolic acid and $(COOH)_2$ may be obtained, (9) cyclohexane yields 1,2-cyclohexanediol, which yields adipaldehyde and adipic acid on further oxidation, and (10) C_6H_6 yields PhOH, toluene yields *o*- and *p*-cresol, $C_{10}H_8$ yields 1,2- and 1,4-naphthoquinone, α-naphthol and phthalic acid, anthracene yields anthraquinone and phenanthrene yields phenanthraquinone.

Production of olefin oxides. Ray M. Carter (to U. S. Industrial Alc. Co.). U. S. 2,177,361, Oct. 24. An arrangement of app. is described, and a method for causing an olefin such as C_2H_4 and an O-contg. gas to react in the presence of an active Ag catalyst which involves sepg. the olefin oxide from the gases after contact with the catalyst by selective absorption with an aq. soln. under conditions which will cause moisture to be added to the gases from which the olefin oxide is sepd., recycling at least a part of the effluent gas from the sepn. and mixing it with make-up O-contg. gas, and removing moisture from the resultant gaseous mixt. before it comes into contact with the catalyst until the moisture content of the gaseous mixt. is less than that indicated by a dew point below −10°. Cf. *C. A.* **33**, 7312⁸.

3-Hydroxybiphenylene oxides. Karl Zahn and Kurt Schimmelschmidt (to General Aniline Works). U. S. 2,172,572, Sept. 12. A process of prepg. 3-hydroxybiphenylene oxides comprises heating compds. of the general formula 1,4-$(HO)_2$-2-(2-Cl-3-X_1-4-X_2-5-X_3-6-X_4C_6)C_6H_1, where X_1 and X_4 stand for H or Cl, X_2 stands for H, methyl, Cl, methoxy or amino, and X_3 stands for H, methyl, Cl or methoxy, at least three X's being H, the fourth X being other than H, with an agent having an alk. action selected from the group consisting of alkali metal hydroxides and alkali metal carbonates to a temp. of about 170–270°. Cf. *C. A.* **34**, 636³.

Olefin glycols. I. G. Farbenindustrie A.-G. Brit. 508,543, June 29, 1939. Addn. to 501,015 (*C. A.* **33**, 5870⁴). These, of formula $R^1R^2C(OH)CH:CHC(OH)R^3R^3$, in which R, R^1, R^2 and R^3 are H or identical or different alkyl, cycloalkyl, aralkyl or aryl groups, are prepd. by treating in aq. alk. soln. with Zn the corresponding acetylene glycols, which may be obtained by the process of Brit. 508,062 (*C. A.* **34**, 447⁴). Examples are given of the prepn. of *cis*- and *trans*-butene-1,4-diol from butyne-1,4-diol with use of NaOH and electrolytic Zn dust. N bases may also be used as the alk. agent as described in Brit. 504,957 (*C. A.* **33**, 7815⁴). Org. solvents,

e g., aliphatic alcs., ketones or dioxane, may be added to the reaction mixt.

Peroxidic products (germicides, fungicides, bleaching agents, and intermediates for organic syntheses). Nicholas A. Milas (to Mass. Institute of Tech.). U. S. 2,176,407, Oct. 17. Various alcs. are treated with H_2O_2 in highly concd. aq. soln. (suitably a 30% soln. with conjoint use of a water-abstracting salt such as anhyd. Na_2SO_4 or $CaSO_4$), details being given of the treatment of *tert*-Bu alc., the methyl ether of diethylene glycol, *tert*-Am alc., EtOH, *sec*-butanol, monoethyl ether of ethylene glycol, monomethyl ether of ethylene glycol, diethylene glycol, ethylene glycol, iso-PrOH, benzyl alc., cineol, cyclohexanol, 4-methylcyclohexanol, and tetrahydrofurfuryl alc.

Recovering allyl alcohol from wood-spirits residue. Edgar C. Britton and Gerald H. Coleman (to Dow Chemical Co.). U. S. 2,176,055, Oct. 17. Wood-spirits residue is treated with HCl at a temp. below 75° (suitably 55–65°) whereby the allyl alc. present in the residue is preferentially reacted upon, forming allyl chloride as substantially the only aliphatic chloride present, and the allyl chloride is sepd. by distn. and heated with an aq. alkali soln. to form allyl alc.

Hydroxy aliphatic esters. Benjamin T. Brooks (to Standard Alc. Co.). U. S. 2,176,201, Oct. 17. For producing isomeric hydroxypropionic esters or other esters of org. acids contg. a hydroxyl group, reaction is effected between Me formate or other ester of a hydroxy lower mol. wt. satd. fatty acid and an aliphatic alc. contg. not more than 5 C atoms (suitably MeOH, at 100–140° under pressure).

Alcoholysis of glycerides. Virgil L. Hansley (to E. I. du Pont de Nemours & Co.). U. S. 2,177,407, Oct. 24. For the production of an ester, reaction is effected between a fatty acid glyceride such as palm oil or coconut oil and a monohydric aliphatic alc. such as MeOH or EtOH at a temp. of not less than 175° (suitably about 200° and under a corresponding pressure).

Dehydrogenating secondary hydroxy compounds, as in producing ketostearyl acetate from 1,12-octadecanediol and acetic anhydride. Benjamin W. Howk and Wilbur A. Lazier (to E. I. du Pont de Nemours & Co.). U. S. 2,173,114, Sept. 19. A dehydrogenation process for the conversion of secondary carbinol groups to ketonic groups comprises contacting a compd. of the general formula, $RCH(OH)(CHY)_xCH_2OR'$ in which R is a simple or substituted alkyl or aryl radical, R′ is H or an alkyl, aryl or acyl radical, and x is a number from 0 to 20, inclusive, and Y is H, a hydroxyl radical, an alkyl radical, or an aryl radical, in the liquid phase at a temp. between 50° and 400° with a metal of the eighth group of the periodic table, such as Ni, on kieselguhr. Various reactions are described.

Polyamides. Ralph A. Jacobson (to E. I. du Pont de Nemours & Co.). U. S. 2,176,074, Oct. 17. Polyamides which may be used in coating, molding or fiber-forming compns. are obtained (suitably by heating in alc. under pressure) from substantially solely bifunctional polyamide-forming reactants (such as phoronic acid and decaethylenediamine) at least one of which contains a lateral substituent in the chain of atoms sepg. the amide-forming groups, the amide-forming groups being attached to aliphatic C atoms and the lateral substituent being an ether or thioether group. Several examples are given. Cf. *C. A.* **34**, 7788.

Acetylenic carbinols. Thomas H. Vaughn (to Union Carbide and Carbon Research Laboratories, Inc.). U. S. 2,175,581, Oct. 10. For producing an acetylenic carbinol such as 3-methyl-1-butyn-3-ol, an acetylenic glycol such as 2-butyne-1,4-diol is pyrolyzed (as by distg. in the presence of K_2CO_3) and the acetylenic carbinol produced is recovered. Cf. *C. A.* **33**, 7815.

Mercapto aryl thiazoles. Wm. E. Messer (to U. S. Rubber Products, Inc.). U. S. 2,176,593, Oct. 17. A method of production is employed which may involve treating in alc. soln. at least 2 moles of an alkali salt of trithiocarbonic acid with at least one mole of *o,o*′-diaminodiphenyl disulfide, to form an alkali salt of mercaptobenzothiazole, evapg. the alc., removing free S after pptn. of the same from an aq. soln. of the salt, and subsequently recovering the mercaptobenzothiazole after pptn. of the same on acidification of the aq. soln. of the salt.

Imidazolines. Georg Kranzlein, Herbert Bestian and Walther Schnurr (to I. G. Farbenind. A.-G.). U. S. 2,176,843, Oct. 17. See Brit. 492,812 (*C. A.* **33**, 1761).

Epichlorohydrins. Wm. Engs and Alasdair W. Fairbairn (to Shell Development Co.). U. S. 2,177,419, Oct. 24. A process for the production of an epichlorohydrin involves bringing a dichlorohydrin into contact with an excess of a basic metal hydroxide such as $Ca(OH)_2$ in the presence of water at a temp. not above about 60° for a time sufficient to effect substantially complete conversion of the dichlorohydrin to the corresponding epichlorohydrin and recovering the latter by flash distn. with live steam at a pressure at least equal to atm. pressure so as to avoid any substantial loss due to hydration and hydrolysis reactions.

Isobutylene polymers of high molecular weight. Lewis A. Bannon (to Standard Oil Development Co.). U. S. 2,176,194, Oct. 17. An arrangement of app. is described, and a method for the production of a high mol. wt. polymer by polymerizing isobutylene by the action of B fluoride in the presence of an inert volatile diluent, such as C_2H_4 and iso-C_4H_8, and low polymers of the type of dimer and trimer, which involves sepg. the diluent from the high mol. wt. polymer, and recycling the diluent to the reaction chamber after removing the low mol. wt. polymers from it.

1-Amino-2,4-dibromoanthraquinone compounds. Henry R. Lee and David X. Klein (to E. I. du Pont de Nemours & Co.). U. S. 2,169,196, Aug. 8. 1-Amino-2,4-dibromoanthraquinone is prepd. by treating 1-amino-2-anthraquinonesulfonic acid with Br in an aq. soln. and is obtained in readily filterable form by heating the treated materials to 70–80° for 1 hr. Various similar dibromination reactions are also described or mentioned, as for the production of a 1-amino-2,4-dibromoanthraquinone carrying in one of the positions 5 and 6 a radical of the class consisting of —OR, —OR′OH and OR′OR′OH, where R stands for an alkyl radical contg. not more than 2 C atoms and where R′ in each case stands for an alkylene radical contg. not more than 2 C atoms.

Alkylolaminomethylene compounds. Jean G. Kern (to National Aniline and Chemical Co.). U. S. 2,169,736, Aug. 15. Compds. of the general formula $(HOR_1N(R_2)C(R_3)(R_4)OSO_2)_xAm$, where R_1 represents an alkylene, cycloalkylene, hydroxyalkylene or polyhydroxyalkylene radical; R_2 represents a member of the group consisting of hydrogen, alkyl and cycloalkyl radicals, and the radical $HO\text{-}R_1$; R_3 represents H or an alkyl radical; R_4 represents H or an alkyl radical or, only when R_4 represents H, aryl radicals; Am represents H or a metal atom; x is an integer which equals the valence of Am; and z is an integer less than 3, may be prepd. from primary or secondary alkylolamines by reaction with a hydroxymethylene sulfite or sulfoxylate derived from an aldehyde or a ketone. Details are given of the production of: Na monoethanolaminomethylene sulfite; Na diethanolaminomethylene sulfite; monoethanolaminoethylidene K sulfite; Na *N*-methylethanolaminomethylene sulfite; monoethanolaminoisopropylidene Na sulfite; diethanolaminoisopropylidene Na sulfite; monopropanediolaminobenzal Na sulfite, and related compds. These compds. are suitable for use as *intermediates in making other compds.* and as *dye assistants*. U. S. 2,169,737 relates to *insecticides* and *dye intermediates* of the general formula $(ArN{:}NN(R_1OH)C(R_2)(R_3)OSO_2)_xAm$ wherein Ar represents the aromatic residue of a diazotizable aromatic amine; R_1 is the same as given above; R_2 represents H or an alkyl group; R_3 represents H or an alkyl group or, when R_2 represents H, an aryl group; Am represents H or a metal atom; and x is an integer equal to the valence of Am, which may be obtained from compds. such as those described in U. S. 2,169,736 by reaction with diazonium salts such as those derived from aromatic amines of the benzene, naphthalene, anthraquinone, and carbazole series, for instance, the diazonium salts of *m*-chloroaniline, 2-methyl-5-chloroaniline, 2,5-dichloroaniline, 2,5-dichloro-4-methylaniline, 2-methoxy-5-chloro-

aniline, 2-methyl-4-nitroaniline, 3-nitro-4-methylaniline, 2-amino-4-methoxy-5-benzoylamino-1-chlorobenzene, 4-chloro-4'-amino-2',5'-diethoxyazobenzene, bianisidine, benzidine, 2,5-dimethoxy-4-(4'-methylbenzene-1'-sulfonylamino)aniline, 4,4'-diaminodiphenylamine, 4-amino-4'-methoxydiphenylamine, 4-amino-3-methoxydiphenylamine, 2-methoxy-5-chloro-4-benzoylaminoaniline, 2-methyl-5-methoxy-4-benzoylaminoaniline, 2,5-dimethoxy-4-benzoylaminoaniline, 2-chloro-5-methoxy-4-benzoylaminoaniline. The diazoamino compds. produced are valuable *dye intermediates*, especially in compns. contg. alkali metal salts of coupling components, since they exhibit an increased stability over the simpler forms of the diazo compds. as for example the nitrosamines, from which they are produced.

Compounds of the ceranthrene and cerbianthrene series. Heinrich Hopff and Karl Heymann (to General Aniline Works). U. S. 2,176,421, Oct. 17. Compds. of the ceranthrene or cerbianthrene series are produced by the reaction on compds. of the ceroxonols or ceroxenols with nascent H produced in an alk. medium until compds. practically insol. in alkali are obtained.

Oxo compds. of the polyhydrocyclopentanophenanthrene series. Schering A.-G. Brit. 508,072, June 22, 1939. These are prepd. by oxidizing compds. of the formula $R(HO)X\,CR'R''$, where X is a polyhydrocyclopentanophenanthrene residue, R is H or a hydrocarbon residue and R' and R'' are H and (or) hydrocarbon residues, e. g., alkyl, aryl, aralkyl or cycloalkyl. Nuclear double bonds are protected during the oxidation by the addn. of halogen or H halide. Starting materials may be obtained by the action of unsatd. metal org. compds. according to Brit. 467,790 (*C. A.* **31**, 8835[8]) on compds. of the polyhydrocyclopentanophenanthrene series contg. keto groups. If R in the above formula is H, aldehydes are formed by mild oxidation and carboxylic acids by more vigorous oxidation. Alternatively, the aldehydes first produced may be further oxidized to carboxylic acids. The OH present on the ring C atom to which the unsatd. side chain is attached may be split off in the form of H_2O, e. g., by heating with acid anhydrides or by vacuum distn., to form a C to C double bond which, in turn, may be satd. by hydrogenation. In examples, (1) cholestanone is treated in Et_2O soln. with bromostyrene (I) in the presence of Li and the product is treated with O_3 to give a product with a strong aldehyde reaction; this is treated further with CrO_3 to give the corresponding hydroxy carboxylic acid, and (2) estrone acetate is treated with I in Et_2O soln. in the presence of Mg and the 17-styryl-3,17-estradiol so produced is ozonized in $CHCl_3$ soln. to give 3,17-estradiol-17-carboxylic acid.

Solid diazonium double salts containing cobaltous chloride. Ferdinand Keller (to General Aniline Works). U. S. 2,175,807, Oct. 10. Solid salts of the general formula $\{R[N(:N)Cl]_n\}_m.CoCl_2$, where n and m stand for one of the numbers 1 and 2, the sum of $n + m$ being always 3, and R stands for a radical of the benzene, naphthalene, diphenyl or anthraquinone series, being generally green cryst substances which are very stable and have a good soly., are produced by treating solns. of diazonium salts with $CoCl_2$ or other Co salt in the presence of Cl ions. Numerous examples with details are given.

Methallyl phosphates. Edgar C. Britton and Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,176,416, Oct. 17. Colorless mobile liquids useful as solvents for various materials and as modifying agents in the polymerization of styrene, etc., are produced by reacting Na methallylate with P oxyhalides. Details are given of the production of: trimethallyl phosphate, dimethallyl ethyl phosphate, monomethallyl diphenyl phosphate, and dimethallyl mono-*o*-diphenyl phosphate, and mention is made of the possible similar production of monomethallyl dibutyl phosphate, dimethallyl crotyl phosphate, monomethallyl dinaphthyl phosphate, dimethallyl monobenzyl phosphate, etc.

Diphenyl *o*-chlorophenyl phosphite. Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,170,833, Aug. 29. This compd., a colorless mobile liquid b_8 about 238–46° and having a sp. gr. of 1.159 is suitable for plasticizing cellulose derivs. and is made by heating *o*-chlorophenyl phosphorous acid dichloride with phenol and adding Na_2CO_3.

Nitriles. Otto Nicodemus and Otto Wulff (to I. G. Farbenind. A.-G.). U. S. 2,177,619, Oct. 24. For producing a nitrile such as oleic acid nitrile, a fatty acid free from hydroxy groups and contg. at least 8 C atoms per mol., such as oleic acid, or a volatilizable ester such as the methyl ester of such an acid, is passed, in the vapor phase together with NH_3, over a dehydrating catalyst such as Al oxide or silica gel at a temp. of 320–420°. Several examples with details are given.

Aromatic mercury salts of organic acids. Carl N. Andersen (to Lever Bros. Co.). U. S. 2,177,049, Oct. 24. A method of prepg. aromatic Hg salts, in which an aromatic Hg group is linked with an org. acid radical by replacement of the acidic H of the org. acid, involves treating, in an inert liquid such as water or alc., an org. acid the acidic H of which is linked through O, with an aromatic Hg sol. salt of a sol. acid in which the Hg is directly connected to a nuclear C of an aromatic structure in which none of the C atoms has direct linkage with any element other than H, C or Hg, the reacting aromatic Hg salt being of an acid weaker than the reacting org. acid and the latter forming an aromatic Hg salt that is less sol. under the reaction conditions than the reacting aromatic Hg salt and the reacting org. acid. Details are given of the production of: bis(phenylmercury) adipate, m. 202°; bis(phenylmercury) malate, m. 202°; phenylmercury salicylate, m. 158°; phenylmercury ethanesulfonate, which becomes of moist appearance at 182° and puffs up at 186°; phenylmercury gluconate, m. 162–4°; phenylmercury quininate, m. 207° (decompn.); phenylmercury 2-phenylquinoline-4-carboxylate, m. 204–8°; phenylmercury *o*-sulfamylbenzoate, m. 142–3°; phenylmercury α-naphthoate, m. about 109°; phenylmercury carboxylate of tyrosine, darkening at 150° and decompg. at 240°; and phenylmercury chlorobenzoate, m. 108–110°. Cf. *C. A.* **33**, 7493[9], 9555[6].

Organic acids from oxidation of coal, coke, etc. Henry C. Howard (to Carnegie Institute of Technology). U. S. 2,176,343, Oct. 17. A process for the sepn. and purification of the aromatic org. acids formed by the oxidation of coal, coke and carbonaceous substances, which contain at least one six-membered C ring with other C atoms attached thereto, consists in placing a soln. of an alkali metal salt of the acid in the middle compartment of a three-compartment diaphragm cell, placing distd. water in the end compartments and passing a current of electricity through the cell whereby the acid radical and the metal radical are caused to move in opposite directions to the end cells, and collecting the metal radical and the acid radical in the separate end compartments. A similar process may be used for the recovery of mellitic acid from NH_4 mellitate. App. is described.

Polyene carboxylic acids and esters. Richard Kuhn and Christoph Grundmann (to Winthrop Chemical Co.). U. S. 2,175,843, Oct. 10. An acyl deriv. of an oxalo compd. of an unsatd. carboxylic acid ester in which the oxalo radical is connected with a C atom having at least one H atom and standing in α-position to a doubly bound C atom, such as the acetyl deriv. of oxalo-1,3-hexadiene-1-carboxylic acid ethyl ester, is transformed, by the action of a mild reducing agent such as Al amalgam, into the corresponding dihydrogenated compd. and a further double bond is caused to form by splitting off of the acyl radical in the form of acid by heating, followed by sapon. of the ester obtained (suitably by use of aq.-alc. KOH soln. and HCl for the production of 2-methylhexatriene-1,6-dicarboxylic acid, m. 245–7°). Various similar reactions are described.

Apparatus for continuous solvent extraction of acetic or propionic acid, etc., from dilute aqueous solutions. Jack J. Gordon and John H. Zeigler (to Eastman Kodak Co.). U. S. 2,176,899, Oct. 24. Various structural and operative details.

Concentrating aqueous aliphatic acid solutions such as those of acetic acid. Campbell C. Hyatt, Jr. (to Eastman Kodak Co.). U. S. 2,176,500, Oct. 17. An arrangement of app. is described, and a process for concg. aq. materials

contg. at least one of the lower aliphatic acids by azeotropic distn. which comprises feeding the aq. solns., at least partially in a vaporous condition, to a distn. unit contg. withdrawing agent of 50–90% AmOAc and 10–50% AmOH, supplying and maintaining the quantity of AmOAc and AmOH in the unit insufficient to appear below the aq. feed, subjecting the materials in the unit to a distn. treatment whereby a distillate contg. AmOAc, AmOH and water is removed from the unit, recovering AmOAc and AmOH from the distillate and returning it to the upper part of the unit.

Glutamic acid. Geza Braun (to Standard Brands Inc.) U. S. 2,176,785, Oct. 17. See Brit. 501,542 (C. I. **33**, 6348[8]).

Mellitic acid. Bernard Juettner (to Carnegie Institute of Technology). U. S. 2,176,348, Oct. 17. Coal, coke, charcoal, graphite, a C black or pitch is treated with HNO_3 and vanadic acid (suitably refluxing) for 14 days followed by treatment with an alkali metal permanganate in an alk. soln. (suitably with further heating for 7 days). Various details of procedure are described.

Aliphatic acid anhydrides. Josef Losch, Felix Walter, Heinrich Behringer and Otto Schlöttig (to Akt.-Ges. fur Stickstoffdunger). U. S. 2,177,494, Oct. 24. For the production of an anhydride such as Ac_2O, an aldehyde such as AcH is treated with O or ozone (suitably under pressure at 12°) and the anhydride formed is isolated. Various catalysts may be used and numerous details are given.

Endothermic reactions such as acetic anhydride and ketene production from acetic acid. Henry Dreyfus. U. S. 2,176,419, Oct. 17. A current of gaseous or vaporous starting material such as HOAc vapor is preheated and the pressure on it is reduced to a substantial subatm. pressure by passage through a constriction under the action of a suction pump, and the pressure on the material in a reaction zone is maintained not substantially over 300 mm Hg. Under such conditions, formation of undesired by-products is restricted.

Ethylene from oil such as gas oil. John J. Grebe (to Theodor Nagel). U. S. 2,176,962, Oct. 24. A process of producing C_2H_4 from oil involves preheating the oil under superatm. pressure while maintaining it at a temp. slightly below its vaporizing temp. under the prevailing pressure, injecting all of the preheated liquid oil into a flowing superheated condensable vapor such as superheated steam which contains sufficient heat to flash-heat the preheated oil to about 700–870°, at which temp. all of the hydrocarbons of the oil are instantly decompd. to C_2H_4 and hydrocarbons of not more than 4 C atoms, and then immediately shock-cooling the resulting gaseous mixt. to below 540° to prevent polymerizing reactions forming gasoline hydrocarbons and to retain the hydrocarbons as C_2H_4 and other hydrocarbons of not more than 4 C atoms. An arrangement of app. is described.

Selective absorption of ethylene from gas mixtures. Rudolph L. Hasche (to Eastman Kodak Co.). U. S. 2,176,496, Oct. 17. App. is described, and a continuous process for absorbing C_2H_4 from a mixt. also contg. C_2H_2 with use of a H_2SO_4 absorbent which involves continuously passing the mixt. through a series of H_2SO_4 absorbents in a state of activity less than max. and then passing off the C_2H_4 and C_2H_2 materials through H_2SO_4 absorbent having a content of $EtHSO_4$ in the range of from about 30–65 mols. of C_2H_4 per mol. of H_2SO_4. Other olefins may be similarly absorbed.

Vinyl acetate, ethylidene diacetate, and homologous esters. Henry Dreyfus. U. S. 2,176,958, Oct. 24. For the production of at least one vinyl ester or ethylidene diester, such as vinyl acetate or ethylidene diacetate, an aliphatic acid such as HOAc is treated with C_2H_2 (suitably at about 200°) in the presence of a catalyst for the reaction such as $Zn(OAc)_2$ which has hydrating properties and in the presence also of a metal salt such as $K_2Cr_2O_7$ which is an oxidizing agent, the quantity of the metal salt being at least 2% of the wt. of the catalyst used. This salt serves to promote the desired reaction.

Pentachlorophenol. Edgar C. Britton and Francis N. Alquist (to Dow Chemical Co.). U. S. 2,176,417, Oct. 17. Hexachlorophenol is reduced with gaseous SO_2 in the presence of a lower aliphatic alc. as an inert solvent for the reactants (suitably in EtOH at 80° for 8 hrs.).

Epicholesterol and intermediates. Russell E. Marker (to Parke, Davis & Co.). U. S. 2,177,355, Oct. 24. A process for the prepn. of epicholesterol involves oxidizing a cholesterol halide such as the chloride to 7-ketocholesteryl halide with a strong oxidizing agent such as chromic acid, converting the halide into the corresponding 3-hydroxy compd. by hydrolysis with KOH after acetylation with fused KOAc, treating the 7-ketoepicholesterol produced with a hydrazine deriv. such as semicarbazide and causing the product to react with alkali alcoholate to obtain epicholesterol. Various details of procedure are described.

Preparing $\Delta^{5,6}$-3-chloroetiocholen-17-one. John Weijlard (to Merck & Co. Inc.). U. S. 2,176,113, Oct. 17. A process for the production of the chloro ketone $\Delta^{5,6}$-3-chloroetiocholen-17-one comprises reacting dibromocholesteryl chloride with chromium trioxide in glacial HOAc at a temp. of about 65° for about 4 hrs., raising the temp. to about 90° until the dibromocholesteryl chloride is completely dissolved, lowering the temp. to about 60–65° for about 4 hrs., and subsequently debrominating the oxidation product with Zn in glacial HOAc.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W. DOX

Adenine derivatives and their biological functions. Cecilia Lutwak-Mann. *Biol. Rev. Cambridge Phil. Soc.* 14, 399–419(1939).—A review of the distribution, isolation and properties of biologically interesting adenine derivs. and their position in relation to certain biochem. processes is given. 155 references. David E. Adelson

Cataphoretic measurements on solutions of visual purple and indicator yellow. E. E. Broda, C. F. Goodeve, R. J. Lythgoe and E. Victor. *Nature* **144**, 709(1939); cf. *C. A.* 33, 1772[7].—Quartz particles (2–5 μ) were suspended in a soln. of visual purple from Hungarian frogs, 0.01 *N* acetate buffer was added and the cataphoretic velocity was measured in a microcataphoretic cell first with ruby light and then white light. The isoelec. point of the visual purple was 4.47 pH units, that of the indicator yellow, 4.57. Other prepns. of visual purple gave the same shift on bleaching, the isoelec. points agreeing with the above by ±0.1 pH. The bleaching process of visual purple probably results in an increase in the no. of alk. groups (as NH_2) available for ionization. Ruth Berggren

A mechanism for the concentrating of potassium by cells, with experimental verification for muscle. E. J. Conway and P. J. Boyle. *Nature* **144**, 709–10(1939).—From the requirements of the osmotic, elec. and Donnan equil. equations are derived which describe the conditions inside and outside a special membrane permeable to ions such as K, chloride, bicarbonate, phosphate, etc., but not to ions such as Na, hexose esters, phosphocreatine, etc. Such a membrane in contact with ionic media, as blood plasma, will result in a high internal K concn. in equil. with a low external K concn. Certain relationships are deduced which are shown experimentally to apply to excised muscle. The original entrance of K into the cells and the relation of K interchanges to carbohydrate metabolism are briefly discussed. Ruth Berggren

Colloidochemical hydrolysis of proteins. III. S. I. D'yachkovskiĭ, G. V. Tumanovskaya and I. B. Rabinovich. *Colloid J.* (U. S. S. R.) **5**, 501–15(1939); cf. *C. A.* **29**, 4033[1].—An aq. soln. of egg albumin was re-

peatedly shaken with Et_2O and the emulsion sepd.; the "ether fraction" contained 40% of the albumin taken. In an analogous way a "benzene fraction" contg. 7% of the initial protein was obtained. The same treatment was also applied to casein. Different fractions gave different color reactions. Conductometric titration showed that both exts. bound 2.2 times as much HCl as the native albumin. The loss of wt. on heating is different for the native albumin and the exts. J. J. Bikerman

The effect of acids in the general meaning of the term on the activity of invertase. Walter A. Wisansky. *J. Am. Chem. Soc.* **61**, 3330-4(1939).—The data indicate that acids, in the general meaning of the term "acid," can retard the enzymic activity of invertase under conditions which purport to hold the degree of ionization of the enzyme const. (i. e., conditions such as const. ionic strength and const. pH). It is suggested that oxonium ion and acids in general may alter the activity of an enzyme by causing the rupture of intramol. H bonds in the enzyme protein. Such bond breaking may give modified forms of the enzyme with more internal degrees of freedom, possessing less catalytic activity. A. B. G.

Application of radioactive isotopes to the study of biochemical exchanges and transformations. J. K. Parnas. *Bull. soc. chim. biol.* **21**, 1059-93(1939).—A review in the form of an address. Bibliography appended. L. E. G.

Chemical reactions between electrolytes and proteins in the form of sols or gels. IV. Reactions with salts of the bivalent alkali earth cations, calcium and magnesium. Methods. E. J. Bigwood. *Bull. soc. chim. biol.* **21**, 1102-4(1939); cf. *C. A.* **34**, 3056. **V. Experimental results with calcium and magnesium cations.** *Ibid* 1105-16. Solns. of blood albumin or globulin in collodion bags and lumps of gelatin gel were immersed in solns. of $CaCl_2$, $MgCl_2$ or $MgSO_4$. If the protein mixt. was on the acid side of the isoelec. point the Donnan equil. rule was applicable in a qual. but not in a quant. sense. At the isoelec. point or on the alk. side the rule did not apply, too much of both cation and anion passing into the protein mixt. L. E. Gilson

Use of radioactive phosphorus in the study of glucolysis and fermentation. O. Meyerhof. *Bull. soc. chim. biol.* **21**, 1094-1101(1939); cf. *C. A.* **33**, 6555. L. E. Gilson

Intake and loss of radioactive cations by certain marine eggs. S. C. Brooks. *Proc. Soc. Exptl Biol. Med.* **42**, 557-8(1939).—Preliminary. L. E. Gilson

Effect of certain radioactive elements on the metabolism of cells. Matilda Moldenhauer Brooks. *Proc. Soc. Exptl. Biol. Med.* **42**, 558-9(1939).—Radioactive Na and K (as chlorides) had no effect on the O consumption of *Nitella*, *Elodea* or red blood cells *in vitro*. L. E. Gilson

Influence of light rays on coagulation of plasma and fibrinogen. Ludwig Pincussen. *Proc. Soc. Exptl. Biol. Med.* **42**, 614-17(1939). Both visible and ultraviolet irradiation retarded coagulation of plasma. On fibrinogen the effects were irregular. Graphs are shown. L. E. Gilson

Optical activity of biological material—a review. I, II. G. F. Gauze. *Biodynamica*, No. **52**, 1-10, 11-26(1939). E. H.

Enzymes defensive against the proteins of the endocrine glands in the serum of old animals. N. B. Medvedeva. *J. méd., Ukraine* **9**, 7-25(in French, 24-5)(1939).—The interferometric index of the serum changes only slightly when youths pass adolescence, but on passing to old age a definite increase is observed. The serum of adult animals contains no enzymes against endocrine gland proteins, but these enzymes were found in the serums of old animals in approx. 50% of the cases. The enzymes decomp. the proteins of the various endocrine glands in the following order of decreasing activity: testicular and ovarian, thymus, pancreatic, cortical suprarenal, medullary suprarenal, hypophyseal and thyroid. S. A. Karjala

Enzymic decomposition of polymeric carbohydrates. II. Some enzymes of the house fungus (Merulius lacrimans). Theodor Ploetz. *Z. physiol. Chem.* **261**, 183-8(1939); cf. *C. A.* **33**, 6361[1].—Press juice from *Merulius lacrimans* cultures after dialysis shows lichenase, β-glucosidase, maltase and cellulase. The latter was not demonstrable in month-old cultures but was present after 2 and 4 months. If EtOH and Et_2O are added to the exts. the β-glucosidase is pptd. at a lower concn. of added solvents than is lichenase. Cellulase requires the highest concn. for pptn. This behavior is exactly the reverse of the behavior of the same enzymes in *Aspergillus* exts. and *Helix pomatia* exts. Milton Levy

The estimation and distribution of cytochrome oxidase and cytochrome C in rat tissues. Elmer Stotz. *J. Biol. Chem.* **131**, 555-65(1939); cf. *C. A.* **32**, 7933[9], 7934[4].—In the detn. of cytochrome oxidase the enzyme is dialyzed from ground tissue and the rate of hydroquinone oxidation in the presence of an excess of pure cytochrome C is measured manometrically. Cytochrome C is partially isolated by quant. procedures and is detd. by manometric measurement of hydroquinone oxidation in the presence of a beef heart oxidase prepn. As little as 30 γ of cytochrome or 0.1 γ of cytochrome-Fe gives sufficient velocities for estn. and the reaction is uninfluenced by other colored substances since a specific enzymic reaction is employed. The distribution of these substances in normal tissues was detd. by these methods and their amts. in the various tissues run remarkedly parallel. Since an increase in either constituent could increase the efficiency of the cytochrome system kinetically, this may indicate a common pathway for their synthesis or perhaps a basically similar chem. structure. The significance of the cytochrome system to cellular respiration is briefly discussed. A. P. L.

Ultraviolet absorption spectra of cocarboxylase, thiamine and their reduction products. Joseph L. Melnick. *J. Biol. Chem.* **131**, 615-20(1939).—The absorption spectra maxima for thiamine and cocarboxylase are very similar at the same pH. Upon reduction of either there is at pH 4 a lowering of the extinction at the max. at 235 to 237 mμ, while the max. at 265-6 mμ is lowered only slightly but is shifted to 280 mμ; at pH 2.3 the band at 243 mμ is still present but it is lowered and not so sharp. A. P. L.

Oxidation-reduction potentials of the methemoglobin-hemoglobin system. John F. Taylor and A. Baird Hastings. *J. Biol. Chem.* **131**, 649-62(1939).—The oxidation-reduction titration curve of the methemoglobin-hemoglobin system at const. pH is not symmetrical, the slope of the curve indicating that the no. of electrons involved apparently varies from 1 toward 2 as the oxidation progresses. The variation of the midpoint potential with pH indicates that upon the oxidation of hemoglobin to methemoglobin, for each electron transferred there appears a univalent cation corresponding to an apparent dissocn. const. (K) of 2.2×10^{-7} (pK = 6.65). At pH 7, the potential of an equimolar mixt. of horse methemoglobin and hemoglobin is +0.139 v. at 30°. The use of a small amt. of an electromotively active dye system as mediator permitted the rapid attainment of equil. at the Pt electrode, the dyes used being selected on the basis of close correspondence between their E'_0 and that of the hemoglobin system at the pH of the expt. No theory of the oxidation of hemoglobin has been devised which accounts satisfactorily for the exptl. results obtained. Thirty-two references. A. P. Lothrop

The mechanism of cocarboxylase action. Kurt G. Stern and Joseph L. Melnick. *J. Biol. Chem.* **131**, 597-613(1939).—Thiamine is not a typical primary amine since it reacts with ketene to yield an *O*-acetyl rather than an *N*-acetyl deriv. and it does not readily give up its N when treated with HNO_2. It would seem, therefore, that pyruvic acid cannot be decarboxylated via the "Langenbeck-cycle" (*C. A.* **33**, 4984[6]), i. e., by combination with cocarboxylase to form a catalytically active substituted imino acid. Dihydrothiamine is completely devoid of any antineuritic activity in pigeons while dihydrococarboxylase, on the other hand, is just as active as the oxidized form both in the polyneuritic pigeon and in the yeast test system. These differences emphasize the importance of the

pyrophosphate group which probably serves as the link between the active group and the protein bearer to which it must be attached before it can undergo reversible oxidation-reduction which it apparently does in the course of its physiol. action. Neither dihydrothiamine nor dihydrococarboxylase is autoxidizable. Thirty-eight references.
A. P. Lothrop

Equilibria between calcium and purified globulins. Nancy Drinker, Arda Alden Green and A. Baird Hastings. *J. Biol. Chem.* **131**, 641–7(1939); cf. *C. A.* **29**, 1127[4]; **30**, 6026[2].—The combination between Ca and 4 purified globulin fractions prepd. from horse serum has been studied by use of the frog heart technique for the estn. of the Ca-ion concn. The law of mass action is applicable to the ionization of these Ca protein salts. The $pK_{Ca/Prot}$ values for the various globulins of serum examd. are as follows: pseudoglobulin 2.96, euglobulin P_I 2.70, euglobulin P_{II} 2.90, euglobulin P_{III} 3.13. The estd. amt. of Ca combined per g. of each protein, when the Ca-ion concn. equals 1.0 mM per l., for the 4 globulins are as follows, resp.: 0.021, 0.037, 0.005 and 0.086 mM. Changes in the proportions of different globulin fractions would lead to the binding of different amts. of Ca by the globulin fraction of serum as a whole and might assume special significance in hyperglobulinemia.
A. P. Lothrop

Action of hexokinase. Sadaya Iri. *J. Biochem.* Japan) **30**, 217–24(1939).—The production of lactic acid from glucose by muscle ext. in the presence of hexokinase might be a series of changes beginning with the synthesis of glycogen from glucose. Hexokinase alone cannot react with glucose. Monoiodoacetic acid inhibits the glycogen synthesis from glucose, which suggests the possible participation of oxidation-reduction reactions in the process.
S. Morgulis

Relation between oxidoreduction and tryptic and ereptic activities. Zyunzi Nagai. *J. Biochem.* (Japan) **30**, 225–31(1939).—The attempt was made to induce synthetic action by such extracellular proteolytic enzymes as trypsinkinase and erepsin but with no success. It was found, however, that the oxidation-reduction state of the protein mol. had a direct relation to the proteolytic activity. Mild oxidation with H_2O_2 of casein or lens protein increased its resistance to trypsin, while reduction with Na_2SO_4 or with a succinic acid-succinodehydrogenase system accelerated its digestion. The SH-group is regarded as of special importance and it is pointed out that heat-denatured protein with a stronger SH reaction is also more easily digested than the native protein. A further indication of a change in the protein mol. is the fact that its optical rotation is increased by oxidation and decreased by reduction. Hydrolysis of dipeptides by erepsin under different reduction-oxidation conditions was also tested, and the enzyme activity was increased by reduction and retarded by oxidation. The intestinal flora which keeps the digestive enzymes in a reduced state thus assumes physiol. significance.
S. Morgulis

Liver arginase. II. Arginase action during liver autolysis. Masaru Kaizyu. *J. Biochem.* (Japan) **30**, 265–9(1939); cf. *C. A.* **33**, 2583[2].—The arginase activity in autolyzing liver ceases at pH 5 and cannot be reactivated with $MnSO_4$. This is attributed to the probable destruction of its protein moiety by trypsin or pepsin. During autolysis at pH 7 or 7.6 the arginase activity, in the presence or absence of activator, is decreased either because of the cathepsin or peptonase and peptidase action. The arginase is practically unaffected when liver paste is kept in the refrigerator. If, however, the pH is adjusted to 5, the activity is definitely lowered but can be restored by means of $MnSO_4$. **III. Arginase action on acetyl-*l*-phenylalanyl-*d*-arginine.** *Ibid.* 271–5.—The acetylpeptide is markedly hydrolyzed by macerated pancreas. It is also definitely hydrolyzed by liver paste as detd. both by the increase in formol titratable acidity and urea formation. But purified arginase prepd. from beef liver hydrolyzes acetyl-*l*-phenylalanyl-*d*-arginine only slightly.
S. Morgulis

Effects of oxidation-reduction on yeast sucrase action. Ryozi Ito and Huzio Obo. *J. Biochem.* (Japan) **30**, 277–82(1939).—Changing the reduction-oxidation potential of the reaction system by means of oxidizing (H_2O_2, I_2) and reducing ($Na_2S_2O_4$, H_2S) agents retards or slightly accelerates the yeast sucrase action but certainly not at all in relation to the extensive changes in potential. The inhibition of sucrase activity by amines is not fully removed by reduction.
S. Morgulis

Studies on lipase. VI. Effects of oxidation-reduction on the hydrolysis by serum lipase and milk esterase. Riozi Ito, Sinkiti Kayasima and Kinsei Huzimi. *J. Biochem.* (Japan) **30**, 283–9(1939).—The reaction mixt. consisted of 0.5 cc. tributyrin, 3 cc. 0.5% gelatin, 2 cc. *M*/15 phosphate buffer pH 7.0 (for esterase) or 7.7 (for lipase), 1 cc. of the oxidation or reduction agent and 1 cc. enzyme prepn. The latter consisted of dild. (1:1) human serum (lipase) and of human milk (esterase). The control mixt. contained everything except the tributyrin. After incubation for 6 hrs., 0.5 cc. tributyrin was added to the control, and 25 cc. abs. alc. to each and well shaken. Of the clear filtrate 20.0 cc. was titrated with alc. 0.05 *N* KOH. Both the lipase and esterase activity were increased by reduction and retarded by oxidation. Lipase inhibited by atoxyl or quinine was somewhat activated by reduction. Milk esterase, which splits only simplest esters, is present in human milk but not in cow or goat milk.

VII. Alkali titration method for the determination of tissue esterase activity and results obtained by this method. Riozi Ito and Sinkiti Kayasima. *Ibid.* 291–5.—The enzyme prepn. is made by grinding 2 g minced tissue with 8 cc. water, using pure sand, and filtering through muslin. The rest of the detn. is carried out as related in preceding abstr. The lipolytic activity of the tissues depends upon the natural content of reducing substances (glutathione, ascorbic acid). The activity of ox or hog gastric lipase is relatively weak but rabbit or human gastric lipase is very strong and is present chiefly in the mucosa. Blood lipase may be mainly in the erythrocytes (ox) or in the serum (rabbit). Advanced cancer patients have a lower blood lipase activity than healthy persons. The esterase activity of various portions of the brain is practically the same.
S. Morgulis

The position of quantum physics in practical biological problems. Review. P. Jordan. *Arch. ges. Virusforsch.* **1**, 1–20(1939).—37 references.
J. Pinchack

Enzyme investigations during the drying of green tobacco. L. Bartá. *Z. Untersuch. Lebensm.* **78**, 322–7(1939).—Tests were made on the activity of catalase, peroxidase and phenolase during the drying of green tobacco leaves at room as well as at higher (to 70°) temps. In the green tobacco leaves catalase is almost entirely in the water-insol. form, peroxidase being the reverse. The catalase activity is highest at the tip and at the edges; the peroxidase activity is highest in the venous system of the leaves. The catalase activity decreases quickly during drying. The peroxidase activity first increases and then slowly decreases on drying, except when drying at high temps. in which case the activity quickly decreases. Phenolase is not detected in green leaves. In drying at room temp. a max. phenolase activity develops in 100 hrs. and remains unchanged to the end of the drying period; at high temps., however, the phenolase quickly decreases toward the end of the drying period
M. M. Piskur

Progress of the Biochemical Research Foundation of the Franklin Institute. Ellice McDonald. *J. Franklin Inst.* **228**, 695–717(1939).—A progress report covering the chem., phys., bacteriol. and other work being done.
Edward B. Sanigar

Recent advances in the physiology of reproduction and heredity. A symposium. Investigations of reproduction in primates. Edgar Allen. *Growth*, **3**, 221–40(1939). **Growth and reproduction as problems in the synthesis of protein molecules.** Addison Gulick. *Ibid.* 241–60. **Reproductive cycles in animals with special reference to the bat.** Mary J. Guthrie. *Ibid.* 261–75. **Applications of reproduction physiology to livestock breeding.** Fred F. McKenzie. *Ibid.* 277–93. **Physiological factors in re-**

production of plants. A. E. Murneek. *Ibid.* 295–315. **Nutritive factors in plant reproduction.** Wm. J. Robbins. *Ibid.* 317–20. **Experimental alteration of heredity.** L. J. Stadler. *Ibid.* 321–2. **Hormonic interrelations between reproduction, mammary gland growth and lactation.** Charles W. Turner. *Ibid.* 323–36. Felix Saunders

The influence of temperature on the spreading of mitogenic rays in a liquid yeast culture. S. Ya. Zalkind. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 406–10(1937)(in German); cf. *C. A.* **31**, 2238[2,4]. Walter H. Seegers

Gastric carbonic anhydrase. Horace W. Davenport. *J. Physiol.* **97**, 32–43(1939).—Carbonic anhydrase is present in the parietal cells of the gastric mucosa of cats and rats. In cats the concn. of carbonic anhydrase in the parietal cells is 5 to 6 times higher than in the red blood cells; in rats it is about 3 times higher. It is present in the cells of the surface epithelium of the gastric mucosa. In cats its concn. in the surface cells is about $^1/_{10}$ of that in the parietal cells. There is no carbonic anhydrase in the chief cells of cats or rats. A small amt. is present in an unidentified type of cell in the pyloric antrum of the rat. E. D. Walter

Cell-free enzymic model of *l*-amino acid dehydrogenase (*l*-deaminase). A. E. Braunshtein and S. M. Bychkov. *Nature* **144**, 751–2(1939).—A cell-free enzymic system was found which deaminizes *l*-alanine at a fairly high rate under aerobic conditions with pyocyanine as autoxidizable H carrier. E. D. Walter

Mechanism of decomposition of hydrogen peroxide by catalase. D. Keilin and E. F. Hartree. *Nature* **144**, 787–8(1939); cf. *C. A.* **32**, 2550[1].—The decompn. of H_2O_2 by catalase is brought about by the successive reduction of the catalase Fe by the H_2O_2 and its reoxidation by mol. O. This is in contradiction to the view of Johnson and Schouwenburg (*C. A.* **34**, 4607), which was based on qual. tests with luminous bacteria. *Ibid.* 1091. E. D. Walter

Studies on proteins in liquid ammonia. V. Reaction of sodium in liquid ammonia with peptones and related substances. Clemmy O. Miller and Richard G. Roberts. *J. Am. Chem. Soc.* **61**, 3551–6(1939); cf. *C. A.* **32**, 7492[4]. -- Peptones are acidic in liquid NH_3 and liberate H when Na is added to them; they are more acidic than diketopiperazine but less acidic than proteins or amino acids. Silk peptones prepd. by digesting silk fibroin for 10 days pass through a min. acidity on the 2nd and 3rd days Peptones are more closely related to diketopiperazines than are proteins in their acid reactions in liquid NH_3; they react as if they contained relatively more diketopiperazines than do proteins. C. J. West

Ultracentrifugal analysis and stability in protein systems. Harold P. Lundgren and J. W. Williams. *J. Phys. Chem.* **43**, 989–1002(1939).—The sedimentation const., *S*, the diffusion const., *D*, and the Svedberg dissymmetry factor, f/f_0, of phycocyan and of hemoglobin and their dissocn. products were detd. Upon dissocn. of phycocyan a pronounced decrease in *S* is accompanied by little change in *D* and an increase in the ratio of major to minor axis from 4:1 to 8:1. When hemoglobin dissocs. a decrease in *S* accompanies an increase in *D* and f/f_0 remains const. Native thyroglobulin (I) in salt soln. sediments as a single well-defined protein. In salt-free solns. of protein concn. greater than 1.0% there is an equil. between I and a single well-defined slower sedimenting component (II). The equil. $I \rightleftarrows II$ is attained rapidly in alk. soln., but very slowly at pH = 7. The addn. of 0.02 *M* electrolyte to II rapidly transforms it to I. At protein concns. under 0.1% equil. is established between II and a third slower sedimenting protein. Denatured protein appears to arise from II. The transformation of I into II probably involves an unfolding of the protein mol. Analogous equil. are observed with thymus nucleohistone and antitoxic diphtheria pseudoglobulin. W. B. Keighton

Oppenheimer, Carl. Die Fermente und ihre Wirkungen. Supplement, Lieferung 11, and Bibliographie (1924–1938). Den Haag, Holland: W. Junk Verlag. 156 + 128 pp. Fl. 10 + 10. Cf. *C. A.* **33**, 6642.

B—METHODS AND APPARATUS

GLENN E. CULLEN

Stable isotopes as indicators in biology. W. E. Van Heyningen. *Biol. Rev. Cambridge Phil. Soc.* **14**, 420–50 (1939).—A review of the biol. application of the stable isotopes of H, N and O. 92 references. D. E. Adelson

Phenolphthalein as a test for gastrointestinal ulceration in the experimental animal. Ben Slutzky and Chas. M. Wilhelmj. *Am. J. Digestive Diseases Nutrition* **6**, 449–50 (1939).—In the attempt to evaluate the Woldman test (cf. *C. A.* **32**, 9127[9]) for gastrointestinal ulceration 37 detns. were made on normal dogs and on dogs known to have ulceration. There was no uniformity of results. Dogs with jaundice gave false pos. reactions. In 5 cases of acute surgical ulcers no phenolphthalein was found in the urine of 3 of the 5 dogs. Edward Eagle

Intravenous modification of the hippuric acid test for liver function. Armand J. Quick. *Am. J. Digestive Diseases Nutrition* **6**, 716–17(1939). Edward Eagle

Spectroscopic analysis of biological fluids for heavy metals. D. W. Armstrong and F. S. Brackett. *J. Ind. Hyg. Toxicol.* **21**, 448–60(1939).—Spectroscopic analysis for Pb, Mn and Hg in the body fluids, urine and blood are outlined. Lower limits for lead are ±0.03 mg./l. Evaluations should be based on 5 or more detns. A. L. Elder

A new procedure in adsorption and elution and its application to the isolation of urinary imidazoles. André Riegert. *Compt. rend. soc. biol.* **132**, 115–17(1939).—A filter tube is prepd. with a column of medicinal charcoal 4 cm. deep. A small amt. of 0.033 *M* phosphate buffer, pH 6.9, is filtered through the column, then the urine previously mixed with an equal vol. of the buffer soln., then more buffer soln. Uric acid, arginine, tyrosine, xanthine, guanine, creatinine, phenols and imidazoles are quantitatively adsorbed by the C; urea and mineral salts are not adsorbed. From the C a 2% aq. soln. of pyridine removes exclusively and quantitatively the imidazoles, i. e., histidine, histamine, imidazole and imidazolelactic acid. L. E. Gilson

Preparation of stable fibrinogen for study of streptococcal fibrinolysin. L. R. Christensen and L. R. Jones. *Proc. Soc. Exptl. Biol. Med.* **42**, 569–71(1939).—Method. L. E. Gilson

Preparation and assay of inhibitor of gastric secretion and motility from normal human urine. H. Necheles, Martin E. Hanke and Erich Fantl. *Proc. Soc. Exptl. Biol. Med.* **42**, 618–19(1939).—Preliminary report on methods. L. E. Gilson

Polarographic studies: quantitative separation of sodium and potassium. W. Kemula and M. Michalski. *Atti X° congr. intern. chim.* **3**, 419–27(1939)(in French).—For physiol. studies the time and technique required by known methods to carry out a quant. sepn. of Na from K are decidedly objectionable. Previous polarographic studies have encountered difficulties arising from the similar oxidation potentials of Na and K. The method is described for the examn. of urine. Here the pH and the presence of Mg^{++}, Ca^{++}, PO_4^{---} and colloidal org. matter presented difficulties and the first polarographic curves were unsatisfactory. Neutralization with $(CH_3)_4NOH$ improved the conditions but the accurate detn. of Na and K in urine contg. 10–30 mg. Na and 20–60 mg. of K was accomplished only after adopting the following procedure. (1) Take 10 ml. of urine in a 100-ml. vessel, add 10 ml. of water, heat to boiling and titrate the hot soln. with 0.1 *N* $Ba(OH)_2$ using phenolphthalein. This causes the pptn. of Mg^{++}, Ca^{++}, PO_4^{---} and SO_4^{--}. (2) Add 2 ml. of satd. $(NH_4)_2C_2O_4$ soln. and introduce CO_2 for 20 min. to ppt. all Ba^{++} and Ca^{++}, heat on the water bath for 30 min. to coagulate the ppt., filter and wash with hot water. (3) Evap. the filtrate to dryness, moisten the residue with HCl, heat to 300° to remove NH_4 salts and finally raise the temp. to about 550° in an elec. furnace. (4) Digest the residue with hot water, filter and make up to exactly 100 ml. (5) Det. the Cl^- content on 20 ml. by Mohr's method. This gives the total equivalents of Na + K. (6) Dil. an aliquot part of the soln. to 0.1 *N* Cl^- and add

0.5 ml. of 10% $(CH_3)_4NOH$ to 20 ml. dild. soln. Test this soln. polarographically under optimum conditions of capillary tube diam., temp. and sensitivity of the galvanometer. W. T. H.

Determination of ascorbic acid in different substances (according to the method of Devyatin and Iosikova). V. M. Iosikova. *Lab. Prakt.* (U. S. S. R.) **14**, No. 8, 13–18 (1939).—To det. ascorbic acid in plant substances, grind the chopped sample with 5–10 g. of a fine roasted sand or glass powder and with 10–20 cc. of 5% AcOH, wash the mortar with 10–40 cc. of the same acid, centrifuge the mass or filter rapidly through gauze, to 10 cc. of the ext. add 0.4 g. of dry finely ground $CaCO_3$, shake, add 5 cc. of 5% $Pb(CH_3COO)_2$, shake and centrifuge rapidly (or filter). Titrate 10 cc. of the filtrate plus 5 cc. of 80% AcOH with a 0.001 *N* soln. of 2,6-dichlorophenolindophenol until a clear pink color is obtained which persists for 1–2 min. The wt. of the sample to be used varies with the content of vitamin C, the consistency, vol. etc. The amt. of AcOH can also vary from 20 to 60 cc., but to insure accurate results the amt. must be carefully calcd. The whole process should not take more than 15–20 min. because the reducing properties of the exts. are lowered on prolonged standing. Colored exts. may be dild. with distd. water (from 1:1 to 1:20) before titration, or the filtrate may be treated with H_2S after the pptn. with $Pb(CH_3COO)_2$. The method for the calcn. of the ascorbic acid content and a no. of specific examples are given. Detn. of the oxidized form of ascorbic acid (overripe tomatoes) is described. W. R. Henn

A new modification of the method of Cajal for the impregnation of peripheral nerves with silver nitrate. A. G. Chernyakhovskiĭ. *J. méd., Ukraine* **9**, 93–8(in French, 98)(1939).—The tissue is treated successively for 24-hr periods with a soln. of 60 parts of EtOH and 10 parts each of Et_2O, C_5H_5N and $CHCl_3$, followed by EtOH, C_5H_5N, running H_2O, 20% chloral hydrate contg. 2–5% HNO_3, running H_2O and finally a soln. of 1 drop of concd. NH_4OH in 10 cc. of EtOH. It is then placed in 2% $AgNO_3$ at 37° for 10–15 days. Reduction is carried out in pyrogallol soln. with HCHO, after which the procedure is the same as for the Cajal method (*Trabeau d. Labor. d. r. b. de Madrid*, **23**(1925)). S. A. Karjala

The determination of aromatic substances in human bile. A. P. Shtraikher. *Klin. Med.* (U. S. S. R.) **16**, 526–8 (1938).—The concn. of aromatic substances in human bile parallels that in the urine and blood and can be used for diagnostic purposes in pathol. cases. S. A. Karjala

The photometric determination of tryptophan, tyrosine, diiodotyrosine and thyroxine. Erwin Brand and Beatrice Kassell. *J. Biol. Chem.* **131**, 489–502(1939).—The photometric detn. of tryptophan, tyrosine, diiodotyrosine and thyroxine described is based on the procedure developed by Lugg (*C. A.* **32**, 7948[7]) from the Folin and Ciocalteu method (*C. A.* **21**, 3210). Hydrolysis with alkali or with alk. stannite is followed by the sepn. of tyrosine and tryptophan as Hg compds. and their detn. by the Millon reaction with a Pulfrich photometer. Diiodotyrosine and thyroxine give no Millon reaction before or after hydrolysis with alkali but during hydrolysis with alk. stannite both are converted into reactive phenols, the former quantitatively to tyrosine and the latter probably to diiodothyronine or thyronine. Hydrolysis of a thyroid prepn. with alk. stannite therefore yields a higher tyrosine value than with alkali alone, the difference being a measure of the amt. of the iodoamino acids present. The tyrosine equivs. of the 2 iodoamino acids are so different that it is possible to ascertain the content of diiodotyrosine and thyroxine in thyroid prepns. from a consideration of the extra tyrosine together with the total (org.) I content. The results of analyses of normal thyroid prepns. by the new method indicate a thyroxine content somewhat higher than that found by the method of Leland and Foster (*C. A.* **26**, 2759) but lower than that found by the Harington and Randall method (*C. A.* **24**, 2237). The application of the new method to the evaluation of com. thyroid prepns. is feasible and recommended. Small quantities of material are required and the analysis is comparatively easy. Representative results are given for cryst. egg albumin, cattle fibrin and several thyroid prepns. A. P. Lothrop

Biochemical studies on carbohydrates. LII. Estimation of free amino sugar in normal and diabetic urines. Masato Ysbitake. *J. Biochem.* (Japan) **30**, 199–203 (1939); cf. *C. A.* **34**, 1066[9].—Adjust the urinary reaction to pH 6.8 with 30% AcOH. Add 4 cc. 37.9% (neutral) $Pb(AcO)_2$ to 20 cc. urine, centrifuge and delead with H_2S. Drive off excess H_2S by aeration and filter through an ultrafiltration membrane. (This membrane is made by impregnating a hardened paper with 4% collodion and drying in air for 5 min. After the treatment is repeated the membranes are preserved under distd. water.) Pass a current of ether through the filtrate for 90 min., drive off the ether, and autoclave 6 cc. with 4 cc. 2 *N* HCl at 150° for 10 min. Cool, neutralize the contents with Na_2CO_3 (anhyd.) to pH 6.8, transfer to a 25-cc. vol. flask and proceed with the detn. according to Masamune and Nogazumi (*C. A.* **32**, 1734[4]) with acetylacetone. S. Morgulis

Determination of galactose in blood. P. A. Larsson and S. L. Sveinsson. *Skand. Arch. Physiol.* **83**, 58–67 (1939).—Measure 0.3 cc. blood into a test tube contg. 2 cc. 0.1 *N* NaOH and 9.7 cc. 0.45% $ZnSO_4$, boil in a water bath 4 min., cool and centrifuge sharply. Pour about 10 cc. of the centrifugate into a tube contg. previously washed bakers' yeast and centrifuge after standing 15 min. at room temp. Measure 4 cc. of the clear fluid (= 0.1 cc. of the original blood), det. sugar by the Hagedorn-Jensen procedure (cf. *C. A.* **24**, 5324), and read the mg. % galactose off a calibration diagram or from the table of empirical values. To det. the fermentable sugar on the same sample run a sugar analysis both before and after the fermentation. S. Morgulis

Determination of crystalline androsterone with the Evelyn photoelectric colorimeter. Harry B. Friedgood and Helen L. Whidden. *Endocrinology* **25**, 919–24(1939); cf. *C. A.* **33**, 9401[6].—A modification of the Zimmermann procedure for color development (cf. *C. A.* **31**, 2626[4]) was applied to the assay of cryst. androsterone, and the Evelyn photoelec. colorimeter (cf. *C. A.* **31**, 1836[8]) was calibrated for the technique in terms of androsterone. The data indicate a high degree of reliability and reproducibility of results in the assay of cryst. androsterone. Felix Saunders

Modification of the Zondek alcohol method for determining both luteinizing and follicle-stimulating principles in the urine. Robert T. Frank. *Endocrinology* **25**, 996–7 (1939).—A modification of the Zondek alc. method (*Klin. Wochschr.* **9**, 964(1930)) is described for concg. both the follicle-stimulating and luteinizing factors. F. Saunders

Modern methods for the determination of sulfur and cystine in sheep wool and other proteins. Alfons Schöberl and Paul Rambacher. *Klepzig's Textil-Z.* **42**, 369–71 (1939).—A detailed discussion with 24 references. Leopold Scheflan

A simple electrode for rapid pH determination in living tissues, and certain data on functional shifts of pH in organs. A. O. Voynar. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 411–14(1937)(in English).—A pinch of quinhydrone is placed on the organ and the electrode thrust in. The connecting tube filled with agar-KCl only touches the surface. Organs of living animals always were found to be more alk. than the same organs immediately after death. When the pancreas secretes changes in pH are biphasic. At the beginning of secretion it was alk. and later acid. Slight changes were detected in the brain after physiol. excitation. Walter H. Secgers

Method for the microdetermination of histidine. Zenya Kurihara. *J. Biochem.* (Japan) **30**, 205–16(1939).—Measure 20 cc. urine into a cylinder and make slightly alk. to phenolphthalein (1 drop of 1%) with an alk. phosphate soln. (mixt. of equal parts 10% NaOH and 10% Na_2HPO_4). Dil. to 25 cc., shake with about 0.1 g. activated C and filter. Measure 20 cc. of the colorless filtrate into a centrifuge tube, add 1 g. NaCl and 2 cc. $HgCl_2$ reagent (dissolve 70 g. cryst. AcONa and 10 g. NaCl in

150 cc. satd. $HgCl_2$), make slightly alk. with satd. borax soln. and centrifuge off the ppt. Transfer the ppt. to a small graduated centrifuge tube and again centrifuge and fill up to the 4-cc. mark with 4% CCl_3COOH. Drop in a tiny particle of Na_2S, whereupon a ppt. is produced. Filter directly through a dry paper into a separatory funnel. Brominate 4 cc. filtrate with 1 cc. of a mixt. of 95 cc. $CHCl_3$ + 5 cc. Br_2 by shaking vigorously and drawing off the $CHCl_3$ layer after 10 min. Decolorize the aq. layer with 2 cc. 8% CCl_3COOH in $CHCl_3$, and filter through a dry paper. Carry out the color development on 1 cc. filtrate pipetted into a 10-cc. cylinder. Add 4 cc. of an acetate buffer of pH 4.6 (100 cc. 16% $AcONH_4$ + 57 cc. 30% AcOH) and dil. to 5 cc. with 0.6% KCN, mix and leave 25-30 min. Dil. to 7 cc. with glycerol (2 1), make up to 10 cc. with 20% KOH and mix. For the standard, treat 2 cc. *M*/80 histidine monochloride (1 cc. = 1.84 mg. histidine) with 2 cc. CCl_3COOH, brominate and proceed as with the unknown sample, and compare the colors.
S. Morgulis

Analysis of [biol. tissues or fluids] for traces of metallic impurities (Owens, Reinhardt) 7.

C—MICROBIOLOGY

LAWRENCE H. JAMES

The influence of vitamin C (*l*-ascorbic acid) on the whooping cough bacillus and its toxin. Tosio Otani. *Oriental J. Diseases Infants* **25**, 1-2(1939)(in English).—Vitamin C *in vitro* had a greater effect on the whooping cough bacillus than on any of the other bacilli tested, repressing its growth, inducing a degenerative metamorphosis and reducing its toxicity. The whooping cough bacillus which has undergone this degenerative metamorphosis produces in the test animal a neutral polynuclear leucocytosis rather than the lymphocytosis produced by the original whooping cough bacillus; it has about the same degree of reaction (agglutination and complement-binding reaction) and capacity of forming antitoxin as the original bacillus. The toxin of the whooping cough bacillus is neutralized and detoxified *in vitro* by vitamin C. Ruth Berggren

The growth-promoting substance of brewers' yeast as a growth-inhibiting factor for yeast, and its effect upon the economic coefficients. Vagn Hartelius. *Compt. rend. trav. lab. Carlsberg, Sér. physiol.* **22**, 387-404(1939).—See *C. A.* **33**, 7343[6]. H. Game

Electrophoresis of glucide-lipide antigens O and Vi extracted from typhoid bacilli. Cornelia Combiesco and Eugenia Soru. *Compt. rend. soc. biol.* **132**, 172-4(1939).—Alone, the virulence antigen Vi, at pH 2-9, has an elec. charge 4-5 times greater than that of the somatic antigen O. But when both antigens are present in the same soln. they are transported with approx. equal velocities.
L. E. Gilson

Forssman antigens in human erythrocytes type A_1. H. Brocks. *Compt. rend. soc. biol.* **132**, 230-3(1939).
L. E. Gilson

Production of pyrogen in serums by bacteria. F. W. Co Tui and M. H. Schrift. *Proc. Soc. Exptl. Biol. Med.* **42**, 549-52(1939).—Preliminary. L. E. Gilson

Ultraviolet absorption spectra of active and inactive yeast. Ernest W. Landen and Fred M. Uber. *Proc. Soc. Exptl. Biol. Med.* **42**, 559-63(1939).—The ultraviolet absorption spectrum of *Saccharomyces ellipsoideus* shows a max. at 265 mμ. The extinction coeff. for the max. decreases for inactive cells revealing a secondary max. at 280 mμ. Agreement with the theory of Caspersson (*C. A.* **30**, 8267[6]) on nucleic acid metabolism as a division function of division rate is obtained. Methods are described.
L. E. Gilson

Action of sulfanilamide on hemolytic enterococcus (Streptococcus fecalis hemolyticus). Erwin Neter. *Proc. Soc. Exptl. Biol. Med.* **42**, 668-72(1939).—The bacteriostatic action was slight and varied with the compn. of the culture medium. L. E. Gilson

Dry culture media. R. V. Litvak. *Lab. Prakt.* (U. S. R.) **14**, No. 8, 2-4(1939).—Directions are given for the prepn. of agar-agar and of bouillon No. 2 TsIEM prepd. from fish-waste products as well as the dry medium prepd. from meat waste products. The dry media are as suitable as the ordinary culture media, and in some of their properties are superior. W. R. Henn

The nutrition of Corynebacterium diphtheriae. Pantothenic acid as an essential growth factor for certain strains of C. diphtheriae gravis: the synthesis of some physiologically active compounds by C. diphtheriae cultures in synthetic media. W. C. Evans, W. R. C. Handley and F. C. Happold. *Brit. J. Exptl. Path.* **20**, 396-408(1939); cf. *C. A.* **33**, 5443[8].—The factor present in tissue exts., required by certain exacting strains of *C. diphtheriae gravis* for growth in synthetic medium, has similar properties to and can be replaced by pantothenic acid. *Mitis* and some *gravis* strains grown in a synthetic medium consisting of amino acids, lactate and salts, together with the 3 growth factors of Mueller—nicotinic acid, pimelic acid and β-alanine—can synthesize pantothenic acid. Sterile filtrates of these strains grown in this medium support the growth of exacting *gravis* strains. *C. diphtheriae* strains (both *mitis* and *gravis*) grown in synthetic medium also synthesize substances with physiol. activities similar to aneurin, coenzyme I or II and riboflavin. Harriet F. Holmes

The bios requirements of various strains of Saccharomyces cerevisiae. C. Rainbow. *J. Inst. Brewing* **45**, 533-45(1939).—The present chaotic state of the bios literature is due to variations in (1) requirements of the particular strain used, (2) the compn. of the synthetic medium, (3) subculture methods, which may induce acclimatization, (4) seeding rates, growth period, temp., agitation and growth criteria. With "full wort growth" as the ultimate standard for complete stimulation 7 strains were classified into 3 groups: class A, no effect with inositol (I) or bios II B (III) and only slight effect with bios II A (II); class B, no effect with II and slight effect with I or III; class C, no effect with any single component, but large stimulation with I plus II. All classes gave excellent growth with all 3 components. β-Alanine replaces II with only 3 of the strains; vitamin B_1 stimulates only one. Twenty-two references. Quick Landis

The concentration and examination of the bios required by English brewery top fermentation yeast. C. Rainbow and L. R. Bishop. *J. Inst. Brewing* **45**, 593-605(1939); cf. preceding abstr.—With the Institute of Brewing yeast (class A) as a control test object II and III were fractionated from egg yolk to a concn. of 10^6 times the original. A rapid and a lengthy procedure is diagrammed. Since the final concentrates gave full wort growth at a concn. of about 10^{-7} g./cc. of synthetic medium they were deemed nearly pure and a combustion gave $C_7H_{11}NO_4$ for II and $C_7H_{12}N_2O_3$ for III. The mol. wts. (cryoscopic) were 173 and 180, resp. Other tests indicate that II is probably β-alanine linked with an unidentified hydroxy acid. Five components of "bios" exclusive of "Z factors" are recognized; I, II, III, vitamins B_1 and B_6, not all of which are required by all yeasts. Twenty-four references. Q. L.

Bacteriological dissimilation of carbohydrates. C. H. Werkman. *Bacteriol. Revs.* **3**, 187-225(1939).—A detailed review with 127 references. John T. Myers

The endogenous respiration of Bacillus cereus. I. Changes in the rate of respiration with the passage of time. M. Ingram. *J. Bact.* **38**, 599-612(1939).—When cells of *B. cereus*, grown on nutrient agar at 25° for less than 24 hrs., are washed and suspended in distd. water or buffer soln. cell division continues and gives rise to an unusually high rate of respiration. If the cells are 24 or more hrs. old, no cell division occurs and the endogenous respiration passes through 3 phases. The first phase usually lasts less than 2 hrs. Its duration is greater with older cells, but is not much affected by temp. The large uptake of O is attributed to the satisfaction of an O debt arising from asphyxia during washing. The second phase lasts about 5 hrs. at 25°, and during this time the rate of respiration remains const. During the third phase the rate of respiration declines exponentially with time, but this is not due to decrease in food supply. During endogenous respira-

tion, the cells diminish in size and lose their fatty materials and their Gram-pos. reaction. The low R.Q. (0.7) indicates that the fat is probably destroyed by respiration which leads to the loss of the outer Gram-pos. sheath of the cells. The addn. of NaCl does not destroy the 3 phases. 20 references. **II. The effect of salts on the rate of absorption of oxygen.** *Ibid.* 613-29.—The important factor in the detn. of rate of respiration is the concn. of salt present. All salts increase the rate of respiration when present in low concn. and decrease it at higher concns., unless special specific toxic properties of certain ions intervene. This is not due to osmotic changes. The increased respiration by unbuffered dil. saline suspensions is brought about by the cation of the salt; the salts of uni-, bi- and trivalent cations are equally effective at concns. roughly in the ratio of 1000; 100; 1. When buffered at pH 6 this stimulating action is slightly increased, probably because of the greater acidity. The inhibitory effect of high salt concns. is probably due to the cations. There is no antagonistic effect between the ions of Na and K, and a slight interaction between Na and Ca in dil. solns. only. 20 references. John T. Myers

Nutrient requirements of butyric acid-butyl alcohol bacteria. R. W. Brown, H. G. Wood and C. H. Werkman. *J. Bact.* **38**, 631-40(1939).—An ether-sol. ext. of "Difco" yeast ext. and of Speakman's salts are essential growth factors in media contg. $(NH_4)_2SO_4$ as a source of N. Neither the Speakman salts minus the phosphates nor phosphates without the other inorg. salts are sufficient for growth in successive transfers. The ether-sol. yeast ext. is not altered by prolonged heating in N H_2SO_4. Numerous substances known to be growth factors for organisms did not replace yeast ext. for growth of butyric acid-butyl alc. anaerobes (thiamine, riboflavin, tryptophan, cystine, asparagine, nicotinic, pimelic and pantothenic acids, alanine and uracil. These substances do not stimulate utilization of glucose when added to media contg. an amino acid mixt. In the presence of purified hydrolyzed casein as a source of N and glucose as a source of C, phosphates alone were essential for growth, other inorg. salts being included in the casein. An ether-sol. stimulant could not be demonstrated in the hydrolyzed casein, its stimulating effect being due to the amino acids. Glucose is dissimilated with the formation of normal products in media contg. $(NH_4)_2SO_4$ or casein hydrolyzate as a source of N when the other essential nutrients were present. 15 references. John T. Myers

The nature of the catalase reaction in the residue of Staphylococcus aureus lysed by bacteriophage. F. Lyle Wynd and J. Bronfenbrenner. *J. Bact.* **38**, 659-75 (1939).—Cultures of *Staphylococcus aureus* lysed by bacteriophage exhibit no utilization of O. Lysis does not alter the catalase activity of the organism. The catalase present in the filtrate of lysed cells is in a very labile condition and it appears to destroy H_2O_2 by an irreversible stoichiometrical reaction. This catalase reaction is inhibited by cyanide. The destruction of H_2O_2 follows the equation for the unimol. reaction and the reaction const. is that of the rate of inactivation of the enzyme and not that of disappearance of the substrate. When catalase is more or less freed from intimate assocn. with cellular structures it is unable to enter reversibly into the catalyzed reaction. 16 references. John T. Myers

The use of the quinhydrone electrode for correlating final hydrogen-ion concentration and pigmentation of actinomycetes growing on agar. Jean E. Conn. *J. Bact.* **38**, 679(1939).—The pigments of these cultures act as indicators changing, resp., from blue to red, violet to red bright red to pink and black to light brown as the acidity of the medium increases. John T. Myers

Alcohol- and acid-resistant bacteria. J. Guilherme Lacorte. *O Hospital* **16**, 511-22(1939).—A review on germs resistant to the action of dil. acids and alc., especially *Mycobacterium tuberculosis* and *M. leprae*. G. N.

A simplified apparatus for the preservation of bacterial cultures in the dried state. Merlin L. Cooper and Frank J. Grabill. *J. Lab. Clin. Med.* **25**, 184-8(1939).—A simple inexpensive low-vacuum app. is described that employs the method developed by Flosdorf and Mudd (*C. A.* **30**, 4189[1]; *J. Immunol.* **34**, 469(1938)). H. W. R.

A physicochemical study of neurotropic viruses and their relation to the components of the nervous tissue. L. S. Ratner. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 426-8(1937) (in English).—Virulent brain tissue can be dried without destroying equine encephalomyelitis. Lipoid solvents do not ext. the virus. Likewise, proteins obtained by extg. dry or wet brains with 10% NH_4Cl or $(NH_4)_2SO_4$ were found inactive. Walter H. Seegers

Biotin as a growth factor for the butyl alcohol-producing anaerobes. Esmond E. Snell and Roger J. Williams. *J. Am. Chem. Soc.* **61**, 3594(1939).—Biotin proved to be approx. 500 times as active as "liver concentrate" (McDaniel, Woolley and Peterson, *C. A.* **33**, 4285[8]) and is evidently the only substance required in addn. to the ordinary nutrients for the BuOH-producing clostridia. Hydrolyzed casein evidently contains small amts. of some substance which is in this case physiologically equiv. to biotin. C. J. West

D—BOTANY

THOMAS G. PHILLIPS

Legume nodule metabolism and nitrogen fixation. Franklin E. Allison, C. A. Ludwig, Sam R. Hoover and Francis W. Minor. *Nature* **144**, 711-12(1939); cf. *C. A.* **29**, 5145[5]; **33**, 3055[2].—Variations in behavior between samples of nodules of 12 different species of legumes were not much greater than between samples of the same species; this was also true for their root tissues. The relative rates of respiration and R.Qs. of nodules and roots in different partial pressures of O showed that the inner tissues of most nodules in air and of large nodules in O were partially anaerobic. Small roots apparently contained less available carbohydrates than nodules. Under anaerobic or partially anaerobic conditions both nodule and root tissues formed C_2H_5OH; under aerobic conditions the C_2H_5OH was completely oxidized to CO_2 and H_2O. A considerable portion of the N in the nodules is either in storage, translocatory or other biologically inactive compds. Attempts to obtain N fixation by detached nodules were, in general, unsuccessful. Most of the carbohydrate supply which dets. largely the magnitude of N fixation is used by the host in its growth processes. Ruth Berggren

Color phenomena of chlorophyll. H. Lauth. *Deut. Apoth.-Ztg.* **54**, 1078-9, 1100-1(1939).—23 references. W. O. Emery

Quantum efficiency of photosynthesis in Chlorella. II. H. G. Petering, B. M. Duggar and Farrington Daniels. *J. Am. Chem. Soc.* **61**, 3525-9(1939).—The quantum yields in photosynthesis by algae have been measured under a variety of conditions; the dropping mercury electrode was used for the rapid measurement of dissolved O. The results show that at 25°, 0.04 to 0.1 mol. of O is evolved in photosynthesis by *Chlorella* per quantum of red light absorbed. These data agree with those reported earlier (cf. *C. A.* **32**, 2982[9]), but are in definite disagreement with those of Warburg and Negelein (cf. *C. A.* **18**, 1316) who reported an efficiency of 0.25. The discrepancy between the results can be explained in part by the different methods of measurements. A. B. Garrett

The chemical composition of wood bark. V. I. Sharkov, Z. A. Tyagunova and V. N. Kolpina. *Lesokhim. Prom.* **6**, No. 2, 9-10(1938); *Khim. Referat. Zhur.* **2**, No. 3, 123 (1939); cf. *C. A.* **33**, 5651[1].—By extn. of the bast of pine with boiling water and with 96% alc. followed by an extn. of the residue with $(NH_4)_2C_2O_4$ soln. it was possible to sep. pectin hydrate, from which the pectin insol. in 70% alc. was sepd. An analysis of the pectin gave 57.5% of polyuronides, 12.6% of pentosans, 2.0% of methoxides, 4.2% of lignin, 1.6% of ash and about 3% of volatile acids. The nature of the remaining 20% of substances is not yet detd. The polyuronic acids contain galacturonic acid. In the pectin obtained from the bast of birch were found up to 71% of uronic acids. In its methoxide content (3.4%) it resembles the pectin obtained from the bast of pine.

The pectins of bark possess no jellying properties, probably owing to the low content of the methoxides. W. R. Henn

The constancy of chemical properties of the tung tree. E. N. Taran. *Sovet. Subtropiki* **1938**, No. 3, 61-3; *Khim. Referat. Zhur.* 2, No. 3, 60(1939).—Seeds of a tung tree contained oil 63.29, ash 2.57 and crude protein 17.87%. Seeds of a graft of this tree contained, resp., 64.07, 2.73 and 16.46%. The physicochem. consts. of oils obtained from the original trees and from the grafts varied only in limits of exptl. errors. The activities of the catalases of the original tree and of the graft were practically the same. W. R. Henn

The absorption of nutritive substances by plants. F. Gessner. *Z. ges. Naturw.* 5, 187-96(1939).—The addn. of Hoagland soln. (LiCl 0.5 g., $CuSO_4$ 1.0 g., $ZnSO_4$ 1.0 g., TiO_2 1.0 g., H_3BO_3 11.0 g., $Al_2(SO_4)_3$ 1.0 g., $SnCl_2$ 0.5 g., KI 0.5 g., $MnCl_2$ 7.0 g., $NiSO_4$ 1.0 g., $Co(NO_3)_2$ 1.0 g. and KBr 0.5 g.) increased the wt. of peas 69%, of sugar cane 200-300%, of tobacco 100-180% and of scarlet beans 64%. The absorption of nutritive substances by plants is regulated not by the roots alone, but by the plant as a whole. The transformation of the substances in the plant is an important factor in the absorption of nutritive substances. The optimum temp. is 15-30°. W. R. H.

The injection of growth substance into plants. K. Weissenbock and A. Stern. *Botan. Arch.* 39, 315-31 (1939).—Sprouts of *Sedum praealtum* when injected with a satd. heteroauxin soln. were caused to curve about 45° in 1 hr. Many curvatures ultimately reached an angle of 180°. The plants bend away from the injected side. The reaction was especially strong with 14-day-old seedlings of *Phaseolus multiflorus*, which after 2-3 hrs. had reached the extent of curvature requiring 2-3 days when the growth substance was applied in the form of paste. The floral stems of *Galanthus* and *Hyacinthus* were accelerated in growth, increased in length and had the death of stock delayed by the injection of heteroauxin. The injection method of applying the growth substance appears to have considerable advantage over other methods of application; the concn. is better controlled and the material is more certainly introduced into plants which are difficult to affect by external application. 28 references. C. K. Horner

The uptake of carbonic acid by the roots of green plants. Ortrud Overkott. *Botan. Arch.* 39, 389-443(1939); cf. *C. A.* 33, 687³.—The assimilation of CO_2 by the roots of various plants was demonstrated from solns. of $KHCO_3$ in distd. H_2O (pH around 8.3), from H_2O contg. CO_2 (pH 4.5-7) and from modified Knop's nutrient soln. contg. various concns. of $KHCO_3$. If the concn. of $KHCO_3$ or CO_2 was around 30 mg. CO_2 per 100 cc., the uptake was about equal to the CO_2 liberated in the respiration of the roots. This equil. point varied with the exptl. series and type of plant. Analyses of several soils showed that the concn. of CO_2 in the soil soln. varies between 40 and 80 mg. in 100 cc. Calcns. indicate that the CO_2 absorbed by the roots in the transpiration stream under natural conditions could amount to 5-20% of the av. assimilation by the leaves and may even be as much as 50%. Direct expts. with the aerial portion of plants in a CO_2-free atm. and the roots in substrates contg. CO_2 showed that the assimilation of CO_2 by the roots alone was not sufficient for the total C economy of the plant. 57 references. C. K. Horner

Chromosome doubling in potatoes induced by colchicine treatment. Francis E. Johnstone, Jr. *Am. Potato J.* 16, 288-304(1939).—By treating the seed with 0.25-1.0% aq. solns. of colchicine, chromosome doubling was induced in a no. of cultivated and wild species of *Solanum*. The most satisfactory method was to germinate the seed in an approx. 0.5% soln. of colchicine at a temp. that insured rapid and even germination. Observations on colchicine-treated plants that gave rise to polyploids indicated that it it necessary to approach the lethal dosage in order to get doubling of an entire growing point. K. D. Jacob

Effect of temperature on the reversible activity of invertase in forage grasses as dependent on their cold and heat resistance. A. S. Morozov. *Compt. rend. acad. sci. U. R. S. S.* 23, 949-51(1939)(in English).—Expts. with hibernating leaves of *Bromus inermis* and *Lolium perenne* taken from under the snow and (with the second plant) also grown in a greenhouse, with reference to the synthesizing and hydrolyzing activity of invertase at temps. ranging from −5 to +50° yielded results pointing to important deviations of the enzymic activity in meadow grasses connected with the effect of high and low temps. Enzymes and biochem. processes in plant tissues play a most important part in the drying of plants subjected to high and low temps. A. H. Krappe

The influence of aneurin and biotin on the growth of some mycorrhizal fungi. Preliminary note. E. Melin and G. Lindeberg. *Bot Notiser* **1939**, 241-5; *Rev. Applied Mycol.* 18, 542.—By means of Fries's technique (cf. *C. A.* 33, 9359²) the influence of aneurin, yeast filtrate, biotin and inositol on the development of 7 mycorrhizal fungi was tested. Biotin and inositol alone or jointly failed to improve the growth of any fungi but in combination with aneurin both exerted a beneficial effect. Aneurin and yeast filtrate showed substantial beneficial effects on growth of fungi over the controls, the yeast filtrate causing generally the greater increase in growth. Oden E. Sheppard

Spruce mycorrhiza in the light of modern growth-substance research. B. Lindquist. *Bot. Notiser* **1939**, 314-55; *Rev. Applied Mycol.* 18, 608-9.—The effects of exts. from pure cultures of mycorrhiza-forming and other soil fungi on spruce seedlings grown in Erlenmeyer flasks on sand with the addn. of a synthetic soln. were studied. Only the secretions of the unnamed hyaline mycelium 82c, that of mycelium *Radicis nigrotrigosum* and that of mycelium 19f showed a stimulus to development of the spruce seedlings. Secretions from some had no effect at all while that from others caused retardation in growth. The paper critically discusses the theories to explain these effects including the N and mineral salt theory of Frank and the growth-substance interaction theory. O. E. S.

The influence of twelve elements on the growth of the potato. D. A. van Schreven. *Mededeel. Inst. Phytopath. Wageningen* 84, 1-166(1939); *Rev. Applied Mycol.* 18, 515; cf. *C. A.* 33, 9525⁵.—The effects of Fe, Zn, Na and Cl in various concns. on the growth of several potato varieties are shown. Plants suffering from P, Zn or B deficiency simulate primary leaf-roll symptoms. True leaf roll, however, can be differentiated from nutritional disorders by phloem necrosis, in which the dead sieve tubes react to phloroglucin and HCl by a red coloration absent from the disorganized tissues of plants affected, for instance by lack of B. In several cases of B deficiency, moreover, the damage is not restricted to the phloem, as it invariably is with leaf roll. Medullary necrosis, due to Ca deficiency, is stated to occur sporadically in Holland. O. E. S.

Plant viruses. I. Serological, chemical and physicochemical properties. F. C. Bawden and N. W. Pirie. *Tijdschr. biol. den Haag* 16, 355-71(1938); *Rev. Applied Mycol.* 18, 540.—Tables are presented showing the properties of plant viruses in crude infective sap, their serological reactions, activity of purified virus prepns., approx. weight of virus in 1 l. sap, analytical compn., pptn. and isoelec. points, inactivation by acid and alkali (pH stability ranges), effect of enzymes, shape of virus particles, sedimentation consts., viscosity, specific vol. and specific gravity, and ultraviolet absorption spectra of solns. of purified plant viruses. Oden E. Sheppard

Experiments with plant-growth substances for the rooting of cuttings. C. R. Metcalfe and W. G. Templeman. *Bull. Misc. Inform., Kew* No. 8(1939).—Expts. with 3 growth substances, β-indolylacetic acid, β-indolylbutyric acid and α-naphthaleneacetic acid, on the rooting of cuttings of a large no. of trees, shrubs and herbaceous plants are described. Acceleration of root production was obtained in about 50% of the large no. of expts., with one or another of the growth substances used. L. G. G. Warne

Wound hormones of plants. IV. Structure and synthesis of a traumatin. James English, Jr., James Bonner and A. J. Haagen-Smit. *J. Am. Chem. Soc.* 61, 3434-6 (1939); cf. *C. A.* 33, 7347⁹.—The cryst. substance iso-

lated from string bean pods and capable of inducing renewed cell division and cell extension activity in the parenchymatous cells of the bean pod mesocarp is shown to be 1-decene-1,10-dicarboxylic acid (I), m. 165–6°, since catalytic reduction gives decan-1,10-dicarboxylic acid (II), m. 171° and oxidation of the Me ether with $KMnO_4$ gives sebacic acid. Me undecylenate with O_3 gives 40% of the half aldehyde of Me sebacate; refluxing with $CH_2(CO_2H)_2$ and C_5H_5N for 4 hrs. (evolution of CO_2) and hydrolysis with dil. HCl give I; *S-benzyl thiuronium salt.* I is termed *traumatic acid.* I is capable of inducing wound periderm formation in washed disks of potato tuber and to function thus as a wound hormone of the potato; it is also capable of partially replacing the juice of the tomato fruit in reversibly inhibiting the germination of tomato seeds. II has an activity about half that of I; the satd. dibasic acids possessing 7 or fewer C atoms were without significant activity. Suberic and azelaic acids possess slight activity and sebacic acid is approx. half as active as I; succinic acid is completely inactive but maleic acid evokes a small but definite response in the bean test. Two CO_2H groups appear to be essential for wound hormone activity. C. J. West

Method for detg. glutamine in plant tissues (Pucher, Vickery) 7. Photocalorimeter—quantum efficiency of photosynthesis in algae (Magee, *et al.*) 3. Action of local anesthetics on plant cell (Régnier, Quevauviller) 17.

E—NUTRITION

PHILIP B. HAWK

The value of the sweet potato in human nutrition. Wm. H. Adolph and Hsi-Chen Liu. *Chinese Med. J.* 55, 337–42(1939).—Three adults were fed sweet potato only for periods of 5 to 8 weeks. N balance was maintained with a daily intake of 2 kg. of sweet potato per day. W. H. A.

Chinese dietary standards and some dietary problems among refugees. Hsiang-Chuan Hou. *Natl. Med. J. China* 25, 129–43(1939). Wm. H. Adolph

Studies on röntgenographic changes in bones as an early sign of scurvy in infants. P. W. Braestrup and Sv. A. Chrom. *Acta Paediat.* 27, 63 6(1939)(in English).—The ascorbic acid content of the plasma, detd. by the method of Farmer and Abt (*C. A.* 30, 8273[8]), varied from 0.00 to 0.28 mg. % in 25 sick infants, 2–23 months of age. The av. normal values of bottle-fed and breast-fed infants in Copenhagen were approx. 0.24 and 1 mg. % (lower limit 0.5 mg. %), resp. None of the sick infants showed the röntgenographic changes described by Park, *et al.* (*Arch. Disease Childhood* 10, 265-94(1935)). Ruth Berggren

Vitamin C and opsonic power of the blood. Cesare Ardy. *Pathologica* 31, 384–8(1939).—Vitamin C injected in guinea pigs increases the opsonic power of the blood, which in scorbutic animals is almost zero. A modification of the detn. of the opsonic power by the method of Wright (cf. Brocq-Rousseau and Roussel, *Sérum normal—Propriétés physiologiques, C. A.* 33, 4306[2], p. 174) is proposed. G. A. Bravo

The nutritional availability of iron in molasses. Robt S. Harris, L. Malcolm Mosher and John W. M. Bunker. *Am. J. Digestive Diseases Nutrition* 6, 459–62(1939).—The availability of the Fe of 3 grades of molasses (1st, 2nd and 3rd) was detd. by chem. (Hill's dipyridyl method) and biol. (hemoglobin studies on anemic rats on a low-Fe diet) procedures. From chem. studies the availability of Fe was found to be, resp., 97, 85 and 54%. From biol. studies the availability was, resp., 90, 80 and 50%. Molasses is a rich and inexpensive source of Fe. E. E.

The effects of vitamin deficiency on the gastrointestinal tract. Dwight L. Wilbur. *Am. J. Digestive Diseases Nutrition* 6, 610–17(1939).—A review with 64 references. Edward Eagle

Bone diseases caused by disturbances in the mineral metabolism. József Marek. *Math. naturw. Anz. ung. Akad. Wiss.* 58, 429–45(1939).—The etiology, pathogenesis and biochemistry of rickets, osteomalacia, fibrous osteodystrophia and osteoporosis are discussed. In rickets, mineral abnormalities of the diet can be detd. by investigating the Ca and P contents of the blood serum. On an alkaligenic diet, a Ca content below the lowest normal values prevents the hormonal action of the parathyroid. The inorg. P content increases with both an acidogenic P-rich diet and a low Ca intake. Vitamin D has very little effect when the Ca and P ratio is normal, but has a regulating effect when the diet is abnormal. Hormones seem to play some role, but a purely hormonal rickets is not confirmed yet. The deposition of Ca salts in the bone substance is connected with the presence of a phosphatase formed by the organism and with a basophil chemical compn. of blood serum. Abnormal chemical compn. of the serum may cause the Ca to be dissolved out of the bone deposits. The etiology of osteomalacia is very similar to that of rickets. Osteodystrophia fibrosa seems to occur on one-sided P-rich diets contg. $CaO:P_2O_5$ in a ratio of less than 1:2. The epidemic osteofibrosis of horses diminishes the Ca level of serum below the lowest normal values and increases the inorg. P content. Human osteodystrophia fibrosa generalis is connected with an increased activity of parathyroids. The Ca level of blood serum increases from 9–11 to 17–23 mg. % and the inorg P content is below the normal. S. S. de Finály

Curing of rickets by a single dose of vitamin D. Pál Mödlinger. *Orvosi Hetilap* 83, 970–1(1939).—Clinical expts. proved that a single large dose of vitamin D injections contg. in 1 cc. 15 mg. vitamin D cured rachitic symptoms and prevented the appearance of rickets for 2.5 months on the average. S. S. de Finály

Effect of vitamin B_1 on morphine-abstinence symptoms. O. Garth Fitzhugh. *J. Pharmacol.* 67, 423–8(1939).—The irritability of albino rats addicted to ascending doses of morphine is significantly decreased by heavy doses of vitamin B_1. The vitamin also prevents the usual increase in irritability that follows morphine withdrawal. The effect is not due to any toxic action of the large doses of B_1 used. L. E. Gilson

Effect of dihydrotachysterol on various types of experimental rickets in rats. Alfred T. Shohl, Ch'uan H. Fan and Sidney Farber. *Proc. Soc. Exptl. Biol. Med.* 42, 529–34(1939).—Rickets caused by high-Ca low-P diets was not prevented by nontoxic doses of dihydrotachysterol (Holtz A. T. 10) which protected rats fed low-Ca high-P diets. L. E. Gilson

Further studies on relation of fat to utilization of lactose in milk. E. J. Schantz and C. F. Krewson. *Proc. Soc. Exptl. Biol. Med.* 42, 577–9(1939); cf. *C. A.* 32, 2576[2].—Natural fats and oils and even numbered chain fat acids contg. 12 or more C atoms when fed with skim milk to the extent of 3–4% were effective in preventing the loss of galactose in the urine while caproic, caprylic and capric acids and their glycerides were ineffective. The odd-chain fat acid, pentadecylic, was ineffective. Feeding glucose at levels of 8–10% in skim milk did not prevent loss of galactose. The excretion of galactose was increased as much as 20% by feeding 2% of NaCl or Na_2HPO_4 in the skim milk. KCl was not as effective in increasing galactose excretion. The above salts caused some excretion of galactose on whole-milk diets. L. E. Gilson

Occurrence of the pellagra-like syndrome in range chicks. Herman C. Mason. *Proc. Soc. Exptl. Biol. Med.* 42, 609–11(1939); cf. *C. A.* 33, 8712[4].—Lack of an unknown dietary factor seems to be responsible. L. E. Gilson

Natural vitamin K and synthetic vitamin K_1. S. Ansbacher, Erhard Fernholz and H. B. MacPhillamy. *Proc. Soc. Exptl. Biol. Med.* 42, 655–8(1939); cf. *C. A.* 33, 6922[9].—In blood-clotting expts. with chicks synthetic 2-methyl-3-phytyl-1,4-naphthoquinone (vitamin K_1), its "isophytyl" isomer, and 2-methyl-3-dihydrophytyl-1,4-naphthoquinone were considerably less potent than 2-methyl-1,4-naphthoquinone, 2-methyl-1,4-naphthohydroquinone diacetate and certain alfalfa concentrates. L. E. Gilson

Nitrogen retention on casein digests. Warren M. Cox, Jr., and Arthur J. Mueller. *Proc. Soc. Exptl. Biol. Med.* 42, 658–63(1939).—Whole casein and casein hydrolyzed

by trypsin gave a pos. N balance in rats. Acid-hydrolyzed casein gave a slightly neg. balance, but after addn. of 0.2% tryptophan a pos. balance. L. E. Gilson

Quantitative biological assay of vitamin K and its application to several quinone compounds. Flemintine P. Dann. *Proc. Soc. Exptl. Biol. Med.* **42**, 663–8(1939).—A 3-day curative technique using chicks is described. The vitamin K activity of a compd. varies significantly with the solvent and the method of administration. The vitamin K activity of 2-methyl-1,4-naphthoquinone and of 2-methyl-1,4-naphthoquinhydrone is approx. the same as that of natural vitamin K_1, on a molar basis. L. E. Gilson

Control of prothrombin deficiency in obstructive jaundice by use of vitamin K. John D. Stewart and G. M. Rourke. *J. Am. Med. Assoc.* **113**, 2223–6(1939).—Administration of a vitamin K-cholic acid mixt. contg. 0.45 g. Na glycocholate, 0.45 g. of Na taurocholate and 0.1 g. of ext. from 200 g. of fresh spinach tended to keep the prothrombin level in the blood above the danger level of 40%. F. P. Griffiths

Studies in lead mobilization. S. L. Tompsett and J. N. W. Chalmers. *Brit. J. Exptl. Path.* **20**, 408–17(1939).—In human cases of Pb poisoning and increased Pb absorption a study has been made of the effect of high-Ca diet and of low-Ca diet with and without NH_4Cl, which is an active mobilizer of Pb. High-Ca diets produced a fall in blood Pb, while low-Ca diets with and without NH_4Cl produced a rise in blood Pb. There was no parallelism between blood Pb level and Pb excretion in the 2 cases exaind. In mice fed with abnormal amts. of Pb, on a low-Ca diet Pb predominates in the soft tissues, although considerable amts. were found in the skeleton. On high-Ca diet Pb predominated in the skeleton but the amts. of Pb in the soft tissues was not negligible and was probably capable of producing change. Harriet F. Holmes

Oxidation-reduction and tissue changes during an insufficient-protein regime. M. M. Mir-Salimov. *J. méd. Ukraine* **9**, 39–48(in French, 47–8)(1939).—Rabbits on an insufficient-protein diet develop hypochromic anemia and leucocytosis, and lose wt. more rapidly than those on a protein-free diet. The total and reduced glutathione (I) of the blood and liver decreases, of skeletal and heart muscles increases, and of the spleen, kidney and adrenals remains within normal limits. The amt. of oxidized I in all the organs and blood increases while the glycogen reserve and anaerobic glucolysis in the liver and muscles decrease sharply. Liver respiration decreases, while muscle and kidney respiration increases. S. A. Karjala

The diagnosis of C hypovitaminosis by the method of saturation (new modification). I. I. Matusis. *Klin. Med.* (U. S. S. R.) **16**, 50–4(1938).—The daily elimination of vitamin C (I) in the urine of normal persons is 5–7 mg. %. The elimination of I in the urine reaches a max. of 14–15 mg. % 4–7 hrs. after ingestion of 300 mg. of I and falls to its original level in 24 hrs. When this max. is used as the criterion it is not necessary to take samples of urine through the entire 24-hr. period. Hypovitaminosis is diagnosed by ingestion of I and analysis of the eliminated I in the urine in 4–7 hrs. If this analysis shows less than 14–15 mg. % of I the patient is "unsaturated" with respect to I. S. A. Karjala

The elimination of quinine in urine under the influence of acidic or basic dietary regimes. L. Gnilosyrova-Gur'eva. *Klin. Med.* (U. S. S. R.) **16**, 386–7(1938).—An alk. dietary regime results in a retardation in the beginning and completion of quinine elimination in the urine and is recommended for malaria patients. S. A. Karjala

Carbohydrate metabolism under normal and pathological conditions. I. M. I. Barbas and L. S. Shvarts. *Klin. Med.* (U. S. S. R.) **16**, 509–13(1938).—The administration of 100 g. of sucrose to human subjects causes a sharp rise in blood sugar (I) in 30 min. followed by a decrease to normal in 60 min. in both venous and arterial blood. Glycogen (II) shows no increase in 30 min. in arterial blood but shows a sharp increase in 60 min., while venous blood shows an increase in 30 min. with a slight decrease from the max. in 60 min. The mg. % of II in arterial and venous blood before sucrose administration, after 30 min. and after 60 min., are 35 and 27, 37 and 48, and 67 and 40, resp. The injection of 20 units of insulin (III) results in a greater decrease in II in venous than in arterial blood. The mg. % of I in arterial and venous blood before, 30 min. and 60 min. after sucrose administration are 84 and 98, 134 and 124, and 103 and 90, resp. The same values after injection of III are 96 and 103, 101 and 99, and 79 and 77 mg. %, resp. II. L. S. Shvarts and M. I. Barbas. *Ibid.* 665–70.—In some cases of diabetes the arterial-minus-venous blood-sugar difference (I) is neg. but increases to a high pos. value 30–60 min. after sucrose administration, while the arterial-minus-venous blood glycogen difference (II) goes from 0 to a high pos. value in 30 min. In other cases I develops a higher neg. value in 30–60 min., while II, which has a high pos. value before sucrose administration, falls to 0 or a low neg. value in 30–60 min. These differences in reaction are explained by the suggestion that the 1st type of case still has relatively active insulin (III) secretion, which lowers the sugar content of venous blood, while the 2nd type of case is no longer capable of secreting III, with the result that the venous blood is higher in sugar than is the arterial blood. S. A. K.

The local and general action of aqueous solutions of carotene. V. M. Kushko and A. A. Mamontova. *Klin. Med.* (U. S. S. R.) **16**, 562–3(1938).—The parenteral injection of aq. colloidal solns. of carotene has the same effect as peroral administration in oil, provided the aq. soln. is freshly prepd. and is still yellow. The solns. decolorize on exposure to air for some time, and are no longer effective. S. A. Karjala

Blood, urine and gastric juice chloride in experimental scurvy. G. K. Kasasev. *Klin. Med.* (U. S. S. R.) **16**, 1750–6(1938).—No differences in total acidity were observed in the gastric juice of healthy and scorbutic guinea pigs, but the latter had considerably less free HCl in the juice. Blood Cl falls 9% and urine Cl increases 29% on the av. S. A. Karjala

Attempt to analyze the symptoms of polyneuritis in vitamin B_1 deficiency in the light of the chemical theory of the nervous process. Kh. S. Koshtoyants. *Compt. rend. acad. sci. U. R. S. S.* **24**, 357–9(1939)(in English).—Expts. made on the skeletal muscles of normal and vitamin B_1-deficient pigeons throw light on the processes underlying the disturbance of the neuroreflectory processes resulting from vitamin B_1 deficiency. Lack of vitamin B_1 (cocarboxylase) leads to a disturbance in the decompn. of carbohydrates, arresting it at the stage of pyruvic acid, which in turn disturbs the normal level of syntheses of the chem. factors involved in the nervous process, especially acetylcholine. 5 references. A. H. Krappe

The influence of total B avitaminosis and of alimentary carbohydrate disequilibrium on oxidation-reduction factors as glutathione and ascorbic acid in the pigeon. Raoul Lecoq and Élhane Flender. *Bull. sci. pharmacol.* **46**, 387–94(1939); cf. *C. A.* **33**, 8245[9], 8703[8].—Diet lacking in vitamin B or contg. 66% of glucose or galactose produces an increased glutathione content in the spleen, atrophy of the latter and increased elimination of bile pigments. A drop in muscle glutathione occurs every time when a grain diet is substituted by an artificial diet. The latter leads to a loss in ascorbic acid in liver, kidneys and spleen regardless of the presence of this factor in the diet. A. E. M.

Biochemical studies on B_1-avitaminosis in animals and man. Birger Carlström, Karl Myrbäck, Nils Holmin and Alvar Larsson. *Acta Med. Scand.* **102**, 175–213; *Biedermanns Zentr. B. Tierernahr.* **11**, 322–56(1939).—Numerous cases (human and animal) are discussed which are considered to represent vitamin B_1 deficiency according to the pathol. findings and the effect of administered thiamine. Pyruvic, lactic and (occasionally) α-glutaric acid, β-hydroxybutyric acid, total acetone and bisulfite-binding substances in the blood were detd. The study was made on a fox with deficiency disease, acetonemic cattle, horses with paralytic myoglobinuria, polymyositis and with encephalitis, and on human subjects with muscular insufficiency, chronic polyarthritis, chronic muscular rheu-

matism, hyperemesis gravidarum, pregnancy toxemia, etc. There was always an increase in the blood pyruvic and frequently an increase in lactic acid. The acetone bodies were greatly increased but in some cases there was no increase at all. In cattle acetonemia the α-ketoglutaric acid content was sometimes increased. Since treatment with thiamine caused a disappearance of the clinical symptoms and a return of the blood to a normal condition, these cases are regarded as B_1 deficiencies. S. Morgulis

Vitamin A and lung infection. Martin Uddströmer. *Acta Med. Scand.* **102**, 214–42(1939).—The designation of vitamin A as the "anti-infection" vitamin is without justification. Although a certain lowering of resistance of the respiratory passages to infection may be present, it is not at all certain that such a condition results from a mild deficiency of vitamin A, and the consumption of large amts. of A does not give any advantage. S. Morgulis

The influence of variations in nutrition on formation of acetaldehyde in the liver. I. Formation of acetaldehyde in the liver of dogs nourished on a normal mixed diet. Kokusyo Ri. *J. Biochem.* (Japan) **30**, 251–63(1939).—Adult dogs were on a diet consisting of beef, lard and boiled rice. They were killed by bleeding and the fresh liver was perfused with the same (defibrinated) blood. Acetaldehyde is formed in the liver; it differs with each individual, but the formation bears no relation to the concn. of Na_2SO_4 used. An increase in the formation of acetaldehyde was found when glucose or fructose was added but not glycogen or lactose. The addn. of insulin does not seem to affect the formation of acetaldehyde. S. Morgulis

Alimentary exudative diathesis and its relation to vitamin E. Henrik Dam and Johannes Glavind. *Skand. Arch. Physiol.* **82**, 299–316(1939).—See *C. A.* **33**, 5460[9]. S. Morgulis

Iron metabolism in the rat. Sam. Nordfeldt. *Skand. Arch. Physiol.* **83**, 7–38(1939).—Mature female rats on a low milk diet were in neg. Fe balance, the av. daily loss being 27–31 γ per day. Adding Ca lactate to the diet for a period of 5–7 weeks caused a very considerable increase in the daily Fe loss. The Fe balance was apparently not affected either by Cu or Co or by the addn. of Cu + Co. The daily feeding of 1000 γ Cu + 500 γ Co increased the hemoglobin and red-cell count. Even with rats, whose liver Fe store was 4–5 times as large, the results were essentially the same, though the loss of Fe in the feces was larger. S. Morgulis

The ability of hedgehogs to utilize carotene and vitamin A. Paavo Suomalainen. *Skand. Arch. Physiol.* **83**, 104–12(1939).—Hedgehogs were fed for 2 months a diet free from carotene and vitamin A. The carotene content of the liver and especially of the serum decreased. The vitamin A content of the serum decreased also but that of the liver remained unchanged. Feeding vitamin A to these animals causes a slight rise in the serum but a very substantial rise in the vitamin A content of the liver about half of the amt. fed being deposited there. Feeding carotene causes the carotene content of both serum and liver to increase several times. About 3% of the carotene fed is deposited in the liver. Although the vitamin A content of the liver on feeding carotene is likewise increased, it is not anywhere as great as when vitamin A is fed. Whether this is due to poor absorption of carotene or to an inefficient utilization of carotene in the formation of vitamin A has not been established. S. Morgulis

Geographical distribution of megacolon. Eduardo Etzel. *O Hospital* **16**, 445–55(1939).—A study of the geographical distribution of 626 cases of megacolon in Brazil from 1920 to 1938 established that the disease attacks especially zones of an ancient and poor civilization where there is a great possibility for an alimentary deficiency in vitamin B_1 (northeastern zone of the State of São Paulo bordering the State of Minas Gerais). No case was reported from the Atlantic coast, where fish rich in vitamin B_1 are abundant in the diet. G. Nachod

Megacolon and the present state of the theory of B_1 avitaminosis. Eduardo Etzel. *O Hospital* **16**, 611–17(1939).—Statistics of 626 cases, nearly all of them Brazilian farmers, confirm the theory that megacolon is caused by chronic B_1 avitaminosis. The disease is most common in puberty and below 40 years. G. Nachod

Metabolism of vitamin C in the human organism. A survey of the problem. Vicente Baptista. *O Hospital* **16**, 771–91(1939).—A summary. George Nachod

Hypovitaminosis B_1 and cardiopathies. I. The role of vitamin B_1 deficiency in the pathogeny of cardiovascular disorders in chronic alcoholics. Georges Bickel. *Arch. maladies coeur vaisseaux* **32**, 657–68(1939).—Early administration of vitamin B_1 in chronic alcoholics has the same beneficial effect on the cardiac disorders present as on the polyneuritic symptoms. A review with 45 references is included. **II. The role of vitamin B_1 deficiency in the pathology of cardiac disorders of pregnancy.** *Ibid.* 769–79.—Parenteral administration of vitamin B_1 is recommended in certain cardiovascular disorders of pregnancy. One case is described and 38 references are appended. J. Pinchack

The concentration of vitamin C in the blood during and after pregnancy. A. Sadovsky, D. Weber and E. Wertheimer. *J. Lab. Clin. Med.* **25**, 120–31(1939).—For percentage concn. of vitamin C in the blood of women (pregnant, post partum and nonpregnant) see *C. A.* **33**, 211[5] (information repeated in *J. Lab. Clin. Med.* paper). The blood of pregnant women with healthy teeth contained on the av. a slightly higher concn. of vitamin C than that of those with poor teeth. In this group the concn. of the blood Ca and P was found to be independent of the dental condition. The concn. of the vitamin was found to be low in the blood of severe cases of hyperemesis gravidarum, to be normal in the blood of pregnant women suffering from gingivitis, and slightly below normal when the gingivitis was complicated by caries. The concn. of vitamin C in human milk was found to be low immediately after parturition and continuously increases from the first day, the quantity excreted in the milk per day on the second day was calcd. to be 2.4 mg. and on the eighth day 27 mg. The vitamin C concns. of the milk and blood were not found to be definitely correlated and are not influenced by the age of the mother, the no. of children previously born or the wt. of the newborn infant. The importance of the estn. of vitamin C level in the blood for the exact diagnosis of a real vitamin deficiency is emphasized. Results, showing the effect of pH and KCN on the stability of vitamin C, the inhibition of the oxidation by serum protein, the failure of the addn. of oxalate to tested plasma samples to inhibit oxidation, and the loss of practically all reducing power in serum toward Tillmans reagent after ascorbic acid was removed by oxidase, are given. Howard W. Robinson

Vitamin A deficiency: Its prevalence and importance as shown by a new test. L. Bradley Pett. *J. Lab. Clin. Med.* **25**, 149–60(1939); cf. *C. A.* **33**, 2567[6].—Details of a rapid visual test depending on the recovery time after looking at a bright light are given. The test is shown to be related to vitamin A by experimentally induced vitamin deficiency, prolonged recovery time observed in patients with liver disease or on special diets, recovery on treatment of 200 cases classed as deficient and subjective improvement in many. Sex, age, color of eyes, myopia, hyperopia, astigmatism, wearing of spectacles and fatigue have no effect on the test. The influences of size of pupil, disparity of vision of the two eyes and disease are discussed. In a group of 1600 people, 52% were deficient in vitamin A, the incidence was higher in the unemployed. Adults tend to become more deficient in February than they were in October. Howard W. Robinson

Protein requirements of work horses at rest and during gradually increased work. II. Herbert Nitsche. *Biedermanns Zentr. B. Tierernahr.* **11**, 245–72(1939).—The need for protein does not increase in proportion to the increase in work. At 500,000 m.-kg. 80 g. of pure protein is needed but at 1,200,000 m.-kg. only 50 g. is needed. Felix Saunders

Long-time feeding of rats with yeast grown on the sulfite waste from cellulose manufacture. E. Mangold, A. Columbus and H. Hock. *Biedermanns Zentr. B. Tierer-*

nähr. **11**, 357–69 (1939).—Three generations of rats were fed with yeast grown on sulfite waste. The yeast contained 18% protein. In spite of the rather large amts. of Pb, Cu and As that the yeast contains neither the parent rats nor the 2 succeeding generations showed any signs of injury. Felix Saunders

Clinical and chemical observations on adrenalectomized dogs maintained by a diet high in sodium salts and low in potassium. R. A. Cleghorn, C. W. J. Armstrong and D. C. Austen. *Endocrinology* **25**, 888–98(1939).—The results of efforts to maintain 10 adrenalectomized dogs on a high-NaCl, low-K diet are reported. The difference in the development and in the signs of ordinary adrenal insufficiency and the crisis of salt-maintained dogs is emphasized. The clinical signs of the latter are correlated with the blood chemistry and pathol. findings. An expt. is reported in which K administration led to a crisis without the occurrence of a diuresis. The serum K increase in this and other expts. is often less than that to be expected from the blood water loss. Felix Saunders

Anorexia nervosa. Helen P. Davis. *Endocrinology* **25**, 991–5(1939).—The extent to which the activity of all organs of the body is reduced when faced with chronic undernutrition is clearly demonstrated. Thyroid ext. and pituitary gonadotropic ext. do not appear to have a beneficial effect in this condition. Felix Saunders

Renal rickets. A. Loeschke. *Monatsschr. Kinderheilk.* **78**, 298–328(1939).—A clinical, pathol. and chem. study was made in a girl 6 years old with the pyuria-type of renal dwarfism with severe rickets. Nonprotein N of the blood was 100–170 mg. %, serum NaCl 643–732 mg. %, serum Ca 8.7–5.7 mg. %, serum P 3.8–9.1 mg. %, CO_2-combining power of the plasma 38% by vol., blood sugar 103 mg. % and hemoglobin 52–23%. The Ca balance was ±0; the P balance, however, was strongly positive (+14% of the intake). The Ca was almost all eliminated through the stool, whereas the P output was equally divided between the urine and stool, a diversion to the stools which is characteristic also of simple florid rickets. When 0.5 g. Na_2HPO_4 per kg. of body weight was given by mouth the urinary and stool excretion of P was increased by about 130% in 2 normal control children and by 26.9% in the child with renal rickets; there was retention of P in the tissues. Post-mortem tissue analyses are given. Dysmineralization occurred in addn. to demineralization Since P retention, renal acidosis, hypocalcemia, and parathyroid hyperplasia do not, per se, lead to the development of true rickets, it is concluded that renal rickets is a genuine D-avitaminotic rickets modified only in certain aspects by the presence of chronic kidney disease (the dwarfism being not caused by, but coördinated to the congenital anomaly of the renal tract). H. P. G. Seckel

The role of nutritional factors in embryology. II. Is the role of the hypophysis identical during starvation and during avitaminosis B? S. I. Teresa. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 354–6(1937)(in German); cf. *C. A.* **32**, 7080⁹.—A group of mature rats was starved and another fed a vitamin B-deficient diet. Their hypophyses were then implanted in young female rats. The tissues from vitamin B-deficient rats showed no gonadotropic effect while the others did. Walter H. Seegers

Diet and the insulin content of pancreas. C. H. Best, R. E. Haist and Jessie H. Ridout. *J. Physiol.* **97**, 107–19 (1939).—Fasting or the feeding of diets rich in fat produces a very definite decrease in the insulin content of the pancreas. The insulin content of the pancreas, depleted by fasting, is restored within 6 days to a normal value by feeding a well-balanced diet. Carbohydrate alone effects a partial restoration but fat produces no rise in insulin content. Short periods of anesthesia and vitamin B_1 deficiency do not appear to affect the insulin content of the pancreas in a specific manner. The possible relationship between the low insulin content of the pancreas and the altered carbohydrate metabolism of animals which have been fasted or fed diets rich in fat is discussed.

E. D. Walter

Reduction of the *d*-amino acid oxidase content of rat tissues in riboflavin deficiency. A. E. Axelrod, H. A. Sober and C. A. Elvehjem. *Nature* **144**, 670–1(1939).—Rats fed on a diet low in both riboflavin and factor W show a decrease in the *d*-amino acid oxidase content in the liver. When the basal ration was supplemented with riboflavin alone or a factor W concentrate alone, there was some increase in the oxidase content of the liver, but the value returned to normal only when both riboflavin and the factor W concentrate were given. E. D. Walter

Flavin-adenine-dinucleotide in tissues of rats on diet deficient in flavin. S. Ochoa and R. J. Rossiter. *Nature* **144**, 787(1939).—A decrease of the flavin-adenine-dinucleotide of Warburg and Christian (*C. A.* **33**, 1882)' was found in the heart and liver of rats fed on a diet deficient in flavin. This is evidence of a further instance of a deficiency in the vitamin B complex affecting biol. oxidation systems. E. D. Walter

Effect of dietary protein on the course of nephrotoxic nephritis in rats. Lee E. Farr and Joseph E. Smadel. *J. Exptl. Med.* **70**, 615–27(1939).—Acute nephritis of medium severity, affecting both glomeruli and tubules, was produced in rats by injection of rat-kidney antiserum, given on 3 consecutive days. The course of the nephritis was markedly influenced by the type of diet which was fed. Rats tended to recover promptly from the induced nephritis when a low-protein, high-carbohydrate diet was given. On the other hand, in nephritic rats maintained on a medium-protein diet the nephritis almost invariably became chronic and half of the animals died of renal insufficiency during the 10.5 months of observation. Finally none of the rats which received a high-protein, low-carbohydrate diet recovered from the acute renal injury; all developed chronic progressive nephritis and the majority died of renal failure after some months. C. J. West

McLester, James S. Nutrition and Diet in Health and Disease. 3rd ed. Philadelphia & London: W. B. Saunders Co. 838 pp. $8.00.

Purcell, F. M. Diet and Ill-Health in the Forest Country of the Gold Coast. London: H. K. Lewis and Co., Ltd. 77 pp. 7s. 6d. Reviewed in *Nutrition Abstracts & Revs.* **9**, 509(1939).

F—PHYSIOLOGY

HOMER W. SMITH

New research on the variations in the inorganic constituents of the liver of the rabbit. I. Total variations in the inorganic constituents. S. Lazard-Koloduy. *Ann. physiol. physicochim. biol.* **15**, 392–402(1939); cf. *C. A.* **32**, 7522⁸, 9206⁶; Chevillard and Mayer, **33**, 8734⁹, 8735². —In rabbits of the same breed, living under uniform conditions and on the same diet the quantity of inorg. constituents in the liver can differ from one individual to another but their concn. varies very little. This phenomenon is true if the quantity of ash is related to the mass of the liver or to the mass of H_2O in the liver. The variations in the inorg. constituents are not produced separately but follow those of the other constituents of the liver. This stability of the concn. persists during changes in the diet, upon the infliction of wounds, during existence under conditions of varied caloric loss or upon the injection of various substances, as saline, glucose, oxalic acid, citric acid, adrenaline and acetylcholine. The concn. of inorg. constituents in the liver of the rabbit varies little during the 1st 24 hrs. of fasting, but increases slightly if the fasting is prolonged. **II. Variations in potassium, sodium and calcium.** *Ibid.* 403–10.—In normal rabbits of the same breed, age and wt. rather large individual variations exist in the contents of K, Na and Ca in the liver. The Ca content is smallest and shows the greatest fluctuations. Like the concn. of the ash, the concns. of K and Na (and probably Ca) vary little from the av. During fasting or overfeeding K and Na vary in the same sense as the ash. The concns. of K and Na with respect to the liver tissue vary little when the mass of the latter changes. Variations in the mass of the liver depend on the movements of H_2O, inorg. and org. constituents; K, Na and Ca appear to follow these movements. Ruth Berggren

Animal experiments on oxygen lack and asphyxia. I. The circulation and respiration during oxygen lack. W. Mertens. *Arch. Kreislaufforsch.* **2**, 192–209(1938).—The significance of the presso-receptor and vagus regulations during O lack was studied in morphinized and urethanized dogs by means of a rebreathing app. After exclusion of the presso-receptors and vagi only a smaller degree of O lack is obtained. The O consumption is greater, while the respiration remains unchanged. The blood pressure falls. The O_2 content of the arterial blood decreases and the CO_2 content increases. If the presso-receptors and vagi are intact, 3 conditions (no change, primary rise or precritical fall in blood pressure) are discernible in Phase I (a decrease in tonus in the region of the sympathetic and parasympathetic nerves). Upon exclusion of the vagi with retention of the presso-receptors the primary rise in blood pressure is absent. The increase in respiration occurs mainly through an increase in amplitude. The O_2 and CO_2 contents of the arterial blood decrease. The degree of O lack is as high as when the vagi are retained. Upon exclusion of the presso-receptors with retention of the vagi the vagus stimulation appears very early. The respiration shows only a small increase in frequency. The CO_2 content of the arterial blood increases slightly. In the case where the vagi are retained, the cessation in respiration always occurs simultaneously with the max. stimulation of the vagus at the end of Phase II (a chemically produced condition of stimulation of the vegetative nerve centers). After exclusion of the vagi, however, the cessation of respiration appears simultaneously with the final fall of blood pressure in Phase III (a central paralysis, initially reversible). **II. Circulation and respiration during asphyxia.** H. Rebensburg. *Ibid.* **5**, 123–34 (1939).—The effect of the presso-receptor and chemo-receptor nerves and of the vagi during gradual asphyxiation was estd. on narcotized dogs with the aid of a rebreathing app. without CO_2 absorption. After exclusion of all these nerves the av. arterial blood pressure decreases progressively during asphyxiation; the heartbeat rate remains unchanged until the heart action is arrested; at first the respiration increases solely through increase in amplitude, the frequency remaining unchanged, but later the respiration ceases at about the same time as the heart action. If all the nerves are retained, the blood pressure and heartbeat rate, as a result of reflex counter-regulations, remain unchanged until the inspired air contains about 5% CO_2 and 12.5% O_2; then both increase and reach a peak at about 9.5% CO_2 and 4.5% O_2, after which they fall off rapidly. The blood-pressure peak is connected with the presence of the chemoreceptors and is lower when the presso-receptors are also retained. The respiratory min. vol. increases considerably as a result of the increase in amplitude and frequency; its peak is attained only at a higher CO_2 content of the blood than when the nerves are excluded. If only the vagi are excluded, the blood pressure still reaches an asphyctic peak; the frequency of the respiration remains unchanged, while the amplitude increases. If only the CO_2 is increased in the inspired air, while the O_2 is kept above 20%, neither the blood pressure nor the heartbeat rate increases; they increase immediately, if the O_2 supply is discontinued.
Ruth Berggren

Clinical and experimental studies on the water metabolism. V. The bound and free water of the serum of rabbits during water deficiency. Tokikane Okamoto. *Oriental J. Diseases Infants* **23**, 4(1938)(in English).—The bound and free H_2O of the serum of adult male rabbits were detd. before and after starvation or feeding a dried, powd. diet. During H_2O deficiency the total H_2O content as well as the percentage of free H_2O in the blood is lower, while the percentage of bound H_2O is higher, than normal. During dehydration the living organism loses free H_2O more readily than bound H_2O. **VI. Changes in the bound and free water in rabbits with active serum anaphylaxis.** *Ibid.* 1–3.—In the serum and pressed fluids of the muscles and livers of rabbits sensitized with horse serum the percentage of bound H_2O increases and that of the free H_2O decreases as the incubation period advances; in the liver the percentage of free H_2O increases and that of the bound H_2O gradually decreases. These changes reach a max. during the 2nd week of incubation and then return to normal, although normal values are not reached at the end of the 3rd week. If shock is produced by again injecting horse serum after the 3rd week of sensitization, the percentage of bound H_2O in the serum and liver fluid increases markedly and that of the free H_2O decreases, while in the muscle fluid the reverse is true. The total H_2O content of the serum, muscle and liver during sensitization does not change markedly. But on the appearance of shock the total H_2O content of the blood decreases and that of the muscle and liver increases; on the 1st day after the shock the values become approx. normal and then approach those during the incubation period. The changes in the H_2O metabolism during shock are attributed to the increase in permeability of the blood vessels. The colloid-chem. change in the body during incubation and shock is accompanied by the change in the H_2O metabolism.
Ruth Berggren

Physical chemistry of the blood during hypnotic conditions. A. Naerebout and Berthold Stokvis. *Nederland. Tijdschr. Geneeskunde* **83**, IV, 5532–40(1939).—The authors det. in the blood: Cl, Ca, urea, glucose, red blood cells, leucocytes and sedimentation, all before and after sedative medication. No effect of this medication was found.
R. Beutner

Necessity of magnesium in the pyruvate oxidation system of brain. S. Ochoa. *Nature* **144**, 834(1939).—Pigeon brain prepns. treated with $Na_4P_2O_7$ and dialyzed for 8 hrs. give with pyruvate 1/2 of the O uptake which can be obtained by the addn. of Mg. Mn also has a striking effect.
Rachel Brown

The biological activity of crystalline cortin-like substances. L. Waterman, M. Danby, J. H. Gaarenstroom, R. W. Spanhoff and I. E. Uyldert. *Acta Brevia Neerland. Physiol. Pharmacol. Microbiol.* **9**, 75–8(1939).—The activity of 10 cortin-like substances was detd. by (1) the dog test (I) (U., *C. A.* **34**, 1081[8]), (2) the swimming test on adrenalectomized rats (II) (*C. A.* **31**, 2664[8]) and (or) the muscle test of Everse and Fremery (III) (*Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* 2, 152 (1932)). In I pos. results were obtained with 1 1/2 mg. of the partially hydrolyzed ketone fraction C17A2 (Reichstein) (IV), 0.6 mg. corticosterone (V), 2 mg. corticosterone acetate, 2 mg. corticosterone butyrate (VI), 2 1/2 mg. 21-hydroxypregnenolone (VII), 5 mg. substance E (Reichstein) (VIII), 1 1/4 mg. substance M (Reichstein) (IX) and 1/8 mg. (usually) with desoxycorticosterone acetate (X). Neg. results were given in I by 6 mg. corticosterone benzoate (XI), 1 mg. VII, 3 mg. VIII, 1/16 mg. X and 12 mg. progesterone. In II uncertain results were obtained with IV, pos. results with 1/2 mg. V, 2 mg. XI, 1 mg. VI, 3 mg. IX, 1/2 mg. X; neg. results were obtained with 1/4 mg. V, 3 mg. VII, 2 mg. VIII, 2 mg. IX and 3/4 mg. X. In III 1.2 mg. V gave pos. results, and 600 γ gave neg. results. With IX 2 mg. was pos. and 1 mg. neg.; with X 80 γ was pos. and 40 γ neg.
E. Curzon

The physiological control of the normal human gastric secretory curve. Chas. M. Wilhelmj and Adolph Sachs. *Am. J. Digestive Diseases Nutrition* **6**, 467–74(1939).—Acid inhibition and duodenal regurgitation play important roles in the regulation of the gastric secretory curve in the normal human subject.
Edward Eagle

The calcium content of gastric juice. Jos. B. Kirsner and J. Edmond Bryant. *Am. J. Digestive Diseases Nutrition* **6**, 704–6(1939).—The av. Ca content of gastric juice at pH 1.49 to 1.91 was 2.06 mg. %; gastric juice with a pH between 2.0 and 2.94 averaged 2.12 mg. %; the av. Ca content of gastric juice with pH 3.05 to 8.38 was 4.54 mg. %. Thus, the higher the pH value of the gastric juice, the higher the amt. of Ca. Ewald test meal and fasting gastric juice contain more Ca than histamine-stimulated secretion.
Edward Eagle

Changes in the lipide-albumin and lipide-globulin complexes during aging of blood serum. M. Mousseron and H. Huc. *Compt. rend. soc. biol.* **132**, 151–2(1939).—When

serum is allowed to stand a week at 0–17° the amt. of lipide fixed to the albumin fraction remains const. but that fixed to the globulins increases slightly. L. E. Gilson

Ascorbic acid content of eyes of various species of [domestic] animals. R. Vladesco and H. Stefanesco. *Compt. rend. soc. biol.* **132**, 169–71(1939).—The results agree with those of other investigators. L. E. Gilson

Influence of age on blood potassium. G. Benetato and P. Ciurdariu. *Compt. rend. soc. biol.* **132**, 175–7 (1939).—Serum samples were taken 3 hrs. after the blood had clotted. Serum of rats 8–9 months oil contained an av. of 31.5 and that of rats 2 yrs. old 39.2 mg. % K. Serum of men and women 19–22 yrs. old contained 21.4 and serum of men past 70 yrs. 32.4 mg. % K. **Influence of age on tissue potassium.** *Ibid.* 177–8.—Brains of young rats contained an av. of 0.4 and brains of old rats 0.32% K. Muscles of young rats contained 0.4 and those of old rats 0.36% K. L. E. Gilson

Total chloride and sodium chloride of renal tissue after extirpation of the adrenals [in rats]. Mares Cahane. *Compt. rend. soc. biol.* **132**, 178–80(1939).—After adrenalectomy total Cl increased slightly, NaCl decreased slightly. L. E. Gilson

Integration of the vasomotor responses in the liver with those in other systemic vessels. L. N. Katz and S Rodbard. *J. Pharmacol.* **67**, 407–22(1939).—The dynamic interrelationships between the blood flow in the thoracic inferior vena cava and the portal vein and the arterial, venous and portal pressures were studied in the intact anesthetized dog and the effects of adrenaline, histamine, pitressin, amyl nitrite, acetylcholine, mecholyl, atropine, saline soln. and vagus section on the flow in the hepatoportal and systemic circuits detd. L. E. G.

Effect of desoxycorticosterone acetate on blood sugar and electrolytes of adrenalectomized rats. Harold E. Harrison and Helen Coplan Harrison. *Proc. Soc. Exptl. Biol. Med.* **42**, 506–8(1939).—The injection of adequate amts. of desoxycorticosterone acetate into fasted adrenalectomized rats prevents the drop in blood sugar which occurs in untreated adrenalectomized rats but the amt. required to maintain the blood sugar is greater than that necessary to maintain normal concns. of serum electrolytes and nonprotein N. L. E. Gilson

Factors influencing ovarian response of normal and hypophysectomized rats to pregnant mare serum. Richard I. Pencharz. *Proc. Soc. Exptl. Biol. Med.* **42**, 525–9 (1939).—With small doses intraperitoneal injection was twice as effective as subcutaneous in all the rats. In the normal rats pregnant mare serum was twice as effective as in the hypophysectomized rats, in producing increase in the wt. of the ovaries. The uterine response was not significantly affected by the mode of injection in normal rats, but in the hypophysectomized rats intraperitoneal injection was 4 times as effective as subcutaneous.
L. E. Gilson

Maintenance of gestation in the castrate pregnant rat with androgens. R. R. Greene and M. W. Burrill. *Proc. Soc. Exptl. Biol. Med.* **42**, 585–7(1939).—Testosterone, testosterone propionate and androstenedione maintained pregnancy with resulting living fetuses in rats castrated during the latter half of pregnancy. In rats castrated before the 11th day all the fetuses were resorbed.
L. E. Gilson

Responses of hypophysectomized immature female rats to mare serum hormone. J. H. Leathem. *Proc. Soc. Exptl. Biol. Med.* **42**, 590–2(1939).—Small doses of mare serum hormone ("Gonadin") produced increase in ovarian wt. and marked theeal luteinization. Larger doses caused the development of large vesicular follicles and the largest doses used (50 rat units) caused the formation of corpora lutea, many of which were atretic, follicles with thickened granulosa and some large normal vesicular follicles. Large amts. of castrate urine ext. also produced corpora lutea, but produced only follicle stimulation in the absence of theeal luteinization in ovaries weighing as much as 80 mg. Thus a definite difference in the gonadotropic activity of mare serum hormone and castrate urine is seen under identical exptl. conditions. L. E. Gilson

Prothrombin, thromboplastin and thrombin; quantitative interrelationships. Edwin T. Mertz, Walter H. Seegers and H. P. Smith. *Proc. Soc. Exptl. Biol. Med.* **42**, 604–9(1939); cf. *C. A.* **32**, 8464[8]; **33**, 8633[6].—Methods are described. Thromboplastin is consumed when it reacts with prothrombin in the presence of ionic Ca; hence it is not an enzyme capable of converting an unlimited quantity of prothrombin into thrombin. The quantity of thrombin produced from an excess of prothrombin is proportional to the quantity of thromboplastin added. If thromboplastin is present in excess the amt. of thrombin formed is proportional to the amt. of prothrombin added.
L. E. Gilson

Assay of progesterone by intrauterine application in the rabbit. Arthur L. Haskins, Jr. *Proc. Soc. Exptl. Biol. Med.* **42**, 624–8(1939).—The findings of McGinty, *et al.* (*C. A.* **33**, 6930[3]), were confirmed. L. E. Gilson

Correlation between movements of gravid uterus and formation of histamine. H. Handovsky. *Proc. Soc. Exptl. Biol. Med.* **42**, 643–5(1939).—Expts. with cats suggest that inside the pregnant uterus (in the placenta) a rhythmic production of histamine occurs, which provokes the contractions of the uterus, and that some of this histamine escapes destruction, passes into the general circulation, and causes the short but distinct falls of blood pressure observed at intervals of about 2 min.
L. E. Gilson

Effect of simultaneous administration of growth complex and estradiol on mammary glands of hypophysectomized rats. Ira T. Nathanson, Darrel T. Shaw and Clifford C. Franseen. *Proc. Soc. Exptl. Biol. Med.* **42**, 652–5(1939).—The effects were irregular and of uncertain significance. L. E. Gilson

The inclusion of adrenaline and of sympathins in the biochemical dynamics of the cells. A. M. Utevs'kiĭ. *Uspekhi Sovremennoĭ Biol.* **9**, No. 2, 203–29(1938); *Khim. Referat. Zhur.* **2**, No. 3, 55(1939); cf. *C. A.* **33**, 3427[7].—A no. of physicochem. changes produced in the cells by adrenaline bring about the transformation of glycogen. Oxidation of adrenaline in the cell to its *o*-quinone and adrenochrome is described; these products are biocatalysts in oxidation processes in the cell. W. R. Henn

Influence of androgens on the growth and metastasis of the Brown-Pearce epithelioma. J. R. Murlin, C. D. Kochakian, C. L. Spurr and R. A Harvey. *Arch. Path.* **28**, 777–98(1939); cf. *C. A.* **33**, 8783[6].—Rabbits inoculated in one testis with a fragment of Brown-Pearce epithelioma were treated with injections of the following androgens: urinary androgenic exts., androsterone, dehydroandrosterone, testosterone, testosterone propionate; also estradiol monobenzoate. The urinary androgenic exts., especially in the smaller doses, caused increased regression of the primary tumors. The same effect, however, could not be produced with androsterone or dehydroandrosterone, the known androgens of the urinary exts. It is suggested that this result may be due to some other steroid (or steroids) or a combination of substances in the ext. In the expts. continued after cessation of injections the urinary exts. and testosterone propionate decreased, testosterone increased and estradiol monobenzoate, sesame oil and olive oil left unaffected, the amt. of metastasis. In the short-period expts., however, androsterone, dehydroandrosterone and also testosterone propionate showed no or very slight effect. The greatest differences were noted when injections were begun prior to inoculation of the tumor. A hypothesis proposed to account for the opposite carcinogenic effects of androgens and estrogens is that estrogens owe their carcinogenic activity to the necessity for their oxidation, i. e., they tend to rob cells of O_2 and leave them dependent on anaerobic glucolysis. This action is prevented by androgens, which provide H acceptors, thereby adequately titrating the H which estrogens have to spare and thus defeating the attack on normal cell life. Harriet F. Holmes

A study of the pH values of the ingesta of the bovine rumen. C. F. Monroe and A. E. Perkins. *J. Dairy Sci.* **22**, 983–91(1939).—The pH values of the contents of the

bovine rumen obtained from animals having a rumen fistula were detd. The pH values of the ingesta averaged between 6.83 and 7.01 when such roughages as corn or A. I. V. silage and alfalfa hay in fair amts. were fed. On pasture, both blue grass and alfalfa, the ingesta were slightly more acid. Samples taken at 2-hr. intervals throughout the day showed the ingesta to be most alk. just prior to feeding in the morning. After feeding, there was a drop until about 9 A. M. and then a gradual trend toward alky. reaching a peak at 3 P. M. immediately preceding the evening feeding. After feeding there was again a drop in pH. These results were obtained for cows on winter rations. Those on pasture did not show these fluctuations. The pH values were not the same in all parts of the rumen. The largest variations were found after feeding. At 1 P. M. these variations fell within 0.2 pH. Samples of the rumen contents of animals slaughtered 12 to 18 hrs. after the last feeding had an av. pH value of 7.34 These values were uniformly more alk. than av. values of the rumen contents taken from living animals but were quite similar to those obtained at the 5 A. M. sampling in the 2-hr. collection study. A. H. J.

The differentiation of organ lipases in the blood. T. I. Meerzon. *Klin. Med.* (U. S. S. R.) **16**, 62–4(1938).—The addn. of an inactivated lipase or ext. of the liver to normal serum increases its stability to quinine (I) but not to atoxyl (II). The addn. of an inactivated ext. of the pancreas to normal serum does not affect its stability to I but increases its stability to II. S. A. Karjala

The normal ascorbic acid content of the blood. V. M. Ioskova. *Klin. Med.* (U. S. S. R.) **16**, 1582–4(1938).—The normal ascorbic acid content of the blood is 0.9–1.0 mg. % in the fall and 0.4–0.5 mg. % in the winter and spring. S. A. Karjala

Further investigations on the mechanism of the formation and destruction of the chemical factors of nervous stimulation. Kh. S. Koshtoyants and R. L. Mitropolitanskaya. *Compt. rend. acad. sci. U. R. S. S.* **23**, 955–7 (1939)(in English); cf. *C. A.* **33**, 5492[1].—Investigations on the transmission of stimuli from the nerve of the cardiac muscle under conditions of carbohydrate metabolism, inhibited by the effect of glyceraldehyde on the heart of a frog, showed that after treatment of the heart with glyceraldehyde (0.02 *M* soln.) the typical response (stopping) to the excitation of n. vagus is absent. This is explained by the assumption that the disturbance of the normal course of carbohydrate metabolism due to the action of glyceraldehyde led to the disturbance of the normal process of formation of acetylcholine-like substances. 4 references. A. H. Krappe

The role of diphosphoglyceric acid in the electrolyte equilibrium of blood cells: studies of pyloric obstruction in dogs. S. Rapoport and Geo. M. Guest. *J. Biol. Chem.* **131**, 675–89(1939); cf. *C. A.* **26**, 5141; **33**, 7868[1].—In studies of intestinal obstruction in dogs previously reported it was suggested that unidentified "ester P" compds. probably played an important role in maintaining the acid-base equil. of the blood. With a suitable method available for the detn. of diphosphoglyceric acid, these expts. have been repeated and the changes in concn. of org. acid-sol. P in the blood cells have been identified as occurring almost entirely in the diphosphoglyceric fraction. The most important factor compensating for the decreased concn. of Cl in the cells after pyloric obstruction was an increased concn. of diphosphoglycerate. In both normal dogs and those with obstruction good agreement was found between the cations (detd. as total base) and the sum of the anions Cl, HCO_3, hemoglobin, inorg. phosphate, diphosphoglycerate and other org. acid-sol. phosphate (mainly adenosinetriphosphate). The agreement between the distribution ratios calcd. from the data on the nondiffusible anions and the observed ratios of the diffusible H, Cl and HCO_3 ions indicates that the distribution of the diffusible ions between cells and serum depends mainly upon the concn. and anion equivalency of hemoglobin and diphosphoglycerate, the 2 most important nondiffusible constituents of the cells. This agreement also supports the validity of the Donnan theory as applied to dog blood under the conditions described. Thirty-seven references. A. P. Lothrop

The artificial activation of the testicles of some bird species in the fall by irradiation and anterior pituitary hormone. H. Schildmacher. *Biol. Zentr.* **59**, 653–7 (1939).—*Phoeniculus ph. phoenicurus*, *Sylvia a. atricapilla* and *Erithacus r. rubecula* were brought to complete or partial testicular activity by exposure to addnl. light in November, but not in the first half of October. Pregnant mare serum was only moderately successful, but in combination with the anterior pituitary synergistic hormone full activity was obtained. Since the hormone is successful also in October, it is concluded that the failure of light is not caused by lack of response in the testicle but to some other organ, probably the pituitary. A. E. Meyer

Blood in experimental asphyxia. (A cystine-cysteine study.) II. Asphyxia caused by breathing air containing an excess of carbon dioxide. Ryosuke Murata. *Japan. J. Med. Sci. III. Biophys.* **6**, 9–28(1939); cf. *C. A.* **32**, 9210[6].—A CO_2 content in the inhaled air exceeding 3.35% in the dog and 3.82% in the rabbit causes a marked increase of ventilation. The max. stimulation obtains at about 6%. The cystine-cysteine content in the blood decreases after about 30 min. but on prolongation of the expt. a considerable increase is observed. With increase of ventilation there is an increase of H-ion concn. and the CO_2-combining power of the blood increases at an av. Later, when the respiratory movement returns to normal, the pH shows no appreciable changes while the CO_2-binding power considerably increases. The change in respiration is stronger than that in asphyxia caused by lack of O_2. In the final stage, the respiration becomes weak and concomitantly the CO_2-binding power decreases again and the pH is augmented. The normal dissocn. curve of dog blood is lower than that in rabbit blood because the former has a lower alkali reserve. A. E. M.

A hormone of intestinal motility produced by the action of hydrochloric acid on the intestinal mucosa. T. Hukuhara and S. Kinose. *Japan. J. Med. Sci. III. Biophys* **6**, 73–5(1939)(in German).—While HCl introduced into the duodenum causes abundant secretion of pancreatic juice, the motility of the intestine is only stimulated by local irritation. A hormone similar to secretion does not exist. A. E. Meyer

The tonus of the vagus in affective psychosis investigated with neutral red. A. Amicarelli. *Neopsichiatria* **2**, (1936); *Rev. sudamericana endocrinolinmunol. quimioterap.* **22**, 731.—The secreting activity of the stomach was measured as an index of vagal tonus. After intramuscular injections of neutral red, the dye appears in the gastric juice within 12 min. in normal persons, at 8 min. in hyperacidity and after 25 min. in hypoacidity. Hypotony of the vagus exists in melancholia and in manic-depressive states; hypertony was found in anxiety states. A. E. Meyer

Oxygen consumption in vitro of different skeletal muscles. Nils Alwall. *Acta Med. Scand.* **102**, 258–74(1939).—The detns. were made in the Warburg app. with either strips of muscle or finely chopped muscle. The latter were in a phosphate buffer to which was added succinic or lactic acid, or boiled muscle juice. Under these conditions it was found that the O_2 consumption of the masseter muscle approaches that of the heart muscle which *in vitro* is ordinarily about 10 times as great as that of skeletal muscles. The O_2 consumption of other cranial muscles (tongue, eye), though less than that of the masseter, is still many times larger than the O_2 consumption of such muscles as the sartorius. S. Morgulis

Increase in citrate metabolism in vitro through salicylic acid. Nils Alwall. *Acta Med. Scand.* **102**, 390–6(1939).—The O_2 consumption of liver or kidney slices in the presence of citrate is increased by salicylic acid. This observation seems to offer an explanation of the lowering of serum citrate by medication with salicylates. S. Morgulis

Biochemical studies on carbohydrates. XLIX. Submaxillary mucin and mucoid. Yasuhisa Tanabe. *J. Biochem.* (Japan) **30**, 181–4(1939); cf. *C. A.* **33**, 9404[8],

1046[1].—The mucin and mucoid from the submaxillary are practically identical with material prepd. from the sublingual. L. **Prosthetic group of cornea mucoid.** Masami Suzuki. *Ibid.* 185–91.—The ratios of N:S (sulfate) for cornea mucoid were 2.76–3.42, resembling those found for mucoitinsulfuric acid. The carbohydrate complex apparently consists of more than one ordinary sugar. LI. **Carbohydrate grouping of the mucin from the vitreous humor.** *Ibid.* 193–8(1939).—Reducing power, glucosamine, glucuronic acid and acetyl were the same in vitreous humor mucin as in funis mucin. It contains practically no sulfate S or ordinary sugar. S. M.

Hibernation of the hedgehog. Carotene and vitamin A metabolism. Paavo Suomalainen. *Skand. Arch. Physiol* **83**, 94–103(1939).- The carotene and vitamin A content of the liver and serum were detd. in hedgehogs in the late summer while the animals are active, in the late fall when the animals become somnolent, in mid-winter when the animals are in deep sleep, and later when they commence to wake up, and again in early spring shortly after they have awakened from their hibernation. The liver vitamin A content diminishes in the course of hibernation, the decrease extending into the summer months. In spite of feeding the liver, vitamin A content actually attains its min. value during the late summer months, but as hibernation sets in there is a very great accumulation of vitamin A. In the serum, the vitamin A content reaches a min. just at the commencement of hibernation and a max. at the time of awakening. The carotene content of the serum is higher in the summer than during the hibernation. The vitamin A/carotene ratio, both in liver and serum, is much greater in the winter than in the summer. S. M.

The excitation mechanism of the chemoreceptors of the carotid body. U. S. von Euler, G. Liljestrand and Y. Zotterman. *Skand. Arch. Physiol.* **83**, 132–52(1939); cf. *C. A.* **33**, 8277[1].—The chemoreceptors of the carotid body (cat), judged by its action potentials, responds to O_2 want when the hemoglobin satn. falls below 96%, the response being practically in linear relationship to the arterial satn. CO_2 evokes a response when the alveolar tension is below 30 mm. Hg and increases regularly with rising tension. The centers are thus stimulated reflexly both by O_2 and CO_2 through the carotid body. Intravenous injection of very weak CN stimulates the chemoreceptors, and this effect can be quickly abolished by a small dose of NH_4OH or by raising the arterial O_2 satn. The stimulating action of nicotine or lobeline cannot be abolished by NH_4OH, which leads to the conclusion that these alkaloids must act on the chemoreceptors at a different point than O_2 lack or CO_2. S Morgulis

The chemical excitation of nerve cells. D. W. Bronk, Frank Brink and M. G. Larrabee. *Trans. Am. Neurol. Assoc.* **1939**, 46–9. J. Pinchack

Assay of cortical hormone. I. E. Uyldert. *Endocrinology* **25**, 871–6(1939).- -The assay of cortin in dogs based upon clinical symptoms, principally appetite and body temp., is described. The symptoms of insufficiency are sharply defined. The largest dose of ext. that can possibly be assumed to be pos. is tested first, then the dose is diminished until the dog becomes insufficient. The choice of assay period is arbitrary. A period of 4 days is sufficient for 1 dose of ext. It is necessary to det. the limiting dose in a large no. of dogs and to check this dose with the limiting dose of a known standard ext. Water-balance expts. are of little value for the assay, but from large nos. of estns. it is concluded that in insufficiency fluid excretion is increased in relation to fluid intake. F. Saunders

Repression and resorption of the corpora lutea of early pregnancy following injections of testosterone propionate. H. O. Burdick and Basil Emerson. *Endocrinology* **25**, 913–18(1939).—In mice, daily injections of 5 mg. testosterone propionate begun the day of mating cause the corpora lutea to become corpora albicans and hasten their resorption. The ovaries decrease in size. Similar treatment with 0.25 mg. for the same length of time results in larger ovaries but in small and degenerated corpora lutea. Temporary sterility is established with either amt.
Felix Saunders

Effect of large doses of testosterone propionate (oreton) on the female genital tract of the very young rat. Production of ovarian cysts. Harry Shay, J. Gershon-Cohen, Karl E. Paschkis and Samuel S. Fels. *Endocrinology* **25**, 933–43(1939).—Administration of large doses of testosterone propionate, beginning at the age of 1 day, produced ovarian tumors. The estrous cycle was not completely suppressed. It is thought that the testosterone has a direct effect on the female gonad. F. Saunders

Action of small quantities of progesterone. Oluf Thomsen, Kaj Pedersen-Bjergaard and Ib Anderson. *Endocrinology* **25**, 944–52(1939). --The appearance of the contracted type of uterus in rats that are used for gonadotropic hormone assays is dependent on whether developed corpora lutea are found in the ovaries. Dilated uteri are found in all animals when they are autopsied after 48, 60 and 72 hrs. After 96 hrs. all of the uteri are of the contracted type. The contracted uterus appears in a definite zone of varying quantities of progesterone, the dilated type of uterus being found not only over but also under the zone. The zone of action was found to be between 0.3 and 0.13 rabbit units. Felix Saunders

Relation of the melanophore hormone of the pituitary gland to oxygen consumption of the rat. R. S. Teague. *Endocrinology* **25**, 953–61(1939).—Prepns. of the pituitary gland rich in melanophore hormone, obtained from various sources and prepd. by different methods, vary considerably in their effect on O consumption in rats. A pituitary ext. of Collip and a melanophore hormone ext. prepd. from whale anterior lobe, although having a similar melanophore hormone content, showed marked differences in their action on O consumption in rats. Collip's ext. in large doses stimulated metabolism but the whale prepn. was inactive. When the melanophore hormone in pit-melanin was destroyed by HCl or by tryptic digestion, the product produced even more consistent metabolic stimulation than the original ext. The melanophore hormone of the pituitary gland is not identical with a substance in pituitary exts. which increases the basal metabolic rate.
Felix Saunders

Biological assay of the melanophore hormone of the pituitary gland. R. S. Teague. *Endocrinology* **25**, 962–4(1939).—A method for the biol. assay of the melanophore hormone of the pituitary is described. The hypophysectomized frog is used as the test object and alkali-treated U. S. P. posterior pituitary powder as the reference standard. A unit of melanophore hormone is defined as the activity of 1 γ of the alkali-treated standard, when injected into a 30-g. hypophysectomized frog. F. S.

Effects of hypophysectomy upon the blood picture of the rat. Erwin P. Vollmer, Albert S. Gordon, Irving Levenstein and Harry A. Charipper. *Endocrinology* **25**, 970–7(1939).--Complete hypophysectomy in the rat is invariably followed by a decline in red cell count and hemoglobin, which attain 60–70% of their normal values in approx. 2 months. Felix Saunders

Separation of follicle-stimulating fraction from pituitary gonadotropin. H. Rinderknecht and P. C. Williams. *J. Endocrinology* **1**, 117–27(1939).—Attempts to sep. a pure follicle-stimulating fraction from horse pituitary exts. by the methods of Evans, *et al.* (cf. *C. A.* **31**, 3120[2]) and of Fevold (cf. *C. A.* **33**, 5430[6]) were unsuccessful By modifications of these procedures a relatively pure follicle-stimulating fraction was obtained. Removal of inert material from the crude pituitary gland exts. improved the results. The inert materials in crude exts. may seriously interfere with the sepn. of LH and FSH.
Felix Saunders

Effects of continuous oral administration of aqueous diethylstilbestrol solutions to rats. R. L. Noble. *J. Endocrinology* **1**, 128–41(1939).—By substituting aq. solns. of different concns. of stilbestrol for rats' drinking water it is possible to administer this substance at various dose levels for prolonged periods of time. In adult male animals a daily dose of 2–3 γ caused a slight but definite inhibition of body growth, whereas atrophy of the gonads was not produced until a daily dose of approx. 7 γ was given. Lactation was reduced by a daily dose of 2–3 γ.

Larger doses of stilbestrol were followed by enlargement of the adrenals and pituitary gland, marked atrophy of the gonads and extreme alterations in body growth and lactation. A reduction in fluid intake occurred in adult rats after the oral administration of aq. solns. of stilbestrol, after implantation of crystals or after hypophysectomy. Felix Saunders

Duration of action of certain natural and synthetic estrogens when administered orally or by injection. C. W. Emmens. *J. Endrocinology* **1**, 142–55(1939).—Large doses of estrone injected daily during the post-ovulation phase of the menstrual cycle of the pig-tailed monkey lead to swelling of the sexual skin. The swelling is due to the accumulation of water in the skin. The fact that swelling does not occur during this phase of the normal cycle shows that the progesterone produced by the corpus luteum is unable to retain in the sexual skin the water deposited there as a result of estrogenic stimulation during the pre-ovulation phase. Testosterone and cortin injected into spayed monkeys do not lead to the retention in the sexual skin of water that has accumulated there as a result of previous injections of estrone. The injection of vasopressin at short intervals delays the resorption of sexual skin swelling. Neither cortin nor vasopressin is able to inhibit post-estrogen bleeding in monkeys. Felix Saunders

Rate of appearance of antiluteinizing activity in the serum of rabbits injected with extract of ox pituitary gland. I. W. Rowlands. *J. Endocrinology* **1**, 172–6(1939).—The serum of rabbits injected daily with a gonadotropic ext. of ox pituitary gland inhibits selectively, in immature rats, the luteinizing activity of a gonadotropic ext. of gelding pituitary gland. The amt. of antiluteinizing activity present in the serum increases up to about 7 weeks after the commencement of immunization, is const. during the next 2 weeks, and then falls somewhat. Felix Saunders

Progonadotropic and antithyrotropic activity of antiserums to extracts of the anterior pituitary gland. I. W. Rowlands. *J. Endocrinology* **1**, 177–83(1939).—The serum of a dog injected daily for many weeks with an ext. of ox pituitary gland augmented the gonadotropic activity of exts. of ox and pig pituitary gland when tested on the ovaries of immature rats. The serum neither augments nor inhibits the thyrotropic activity of the ext. used for immunization. The serum of a goat injected with an ext. of pig pituitary contg. thyrotropic and gonadotropic activity augmented the response produced by this ext. in the ovaries of the immature rat. The progonadotropic activity of the serum was at a max. after 6 weeks of injections, at a time when antithyrotropic activity first appears. At 10 weeks the serum has a strong antithyrotropic activity, but a decreased augmentatory activity on the ovarian response. Felix Saunders

Direct gynecogenic and indirect estrogenic action of testosterone propionate in female rats. R. L. Noble. *J. Endocrinology* **1**, 184–200(1939).—Testosterone propionate in daily doses of 2 mg. for 3–4 weeks produces a stimulation of the mammary glands, a diestrus condition of the vaginal smears and mummification of the vaginal epithelium in ovariectomized adult female rats. Progesterone did not produce any consistent effect in hypophysectomized adult or immature rats, and its administration simultaneously with testosterone propionate did not modify qualitatively the effect of the latter in immature hypophysectomized animals. Felix Saunders

Recovery of injected estrogenic substances from rabbit urine. S. W. Stroud. *J. Endocrinology* **1**, 201–7(1939). —A technique for the extn. of synthetic estrogens from rabbit urine is described. The recoveries found were: for 4,4′-dihydroxy-γ,δ-diphenylhexane 21.3%, for 4,4′-dihydroxy-γ,δ-diphenyl-β,δ-hexadiene 7.2%, for 4,4′-dihydroxy-α,β-diethylstilbene 25.2 and 16.8% and for estrone 1.5%. A nonketonic phenolic metabolic product of estrone, probably β-estradiol, was isolated from the urine of rabbits receiving large injections of estrone. Felix Saunders

Effects of synthetic estrogens and carcinogens when administered to rats by subcutaneous implantation of crystals or tablets. R. L. Noble. *J. Endocrinology* **1**, 216–29(1939).—Changes are observed only after the implantation of substances which possess estrogenic activity, and are characterized in adult animals by an atrophy of the gonads with assocd. secondary effects, a reduction or cessation of body growth, and an increase in wt. of the adrenals and pituitary gland. The injection of pregnancy urine ext. into female rats treated 3 weeks by estrogen crystals caused an ovarian response similar to that seen in the intact immature rat. The rate of absorption of triphenylethylene, 4,4′-dihydroxy-β,δ-diphenyl-β,δ-hexadiene and 4,4′-dihydroxy-α,β-diethylstilbene from implanted tablets was detd. Felix Saunders

The role of hemoglobin in intermediary heat exchange. Ernst Simonson. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 323–5(1937)(in German). Walter H. Seegers

Regulatory function of the lung in intermediary metabolism. E. Simonson, E. L. Libkind, A. Ph. Naiman and A. V. Sokolov. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 326–8(1937)(in German). Walter H. Seegers

Morphology of liver function. III. So-called round cell filtration in Glisson's capsules. Syozo Oda. *J. Chosen Med. Assoc.* **29**, 1966–87(German abstr. 127–8)(1939); cf. *C. A.* **34**, 5037.—Morphological examn. of 130 human livers. S. Tashiro

The effect of noxious agents on creatine, creatinine, chloride and water excretion. J. S. L. Browne, S. Karady and H. Selye. *J. Physiol.* **97**, 1–7(1939); cf. *C. A.* **32**, 7163².—The nonadapted animal, just as the animal completely exhausted by continuous exposure, responds to damaging agents such as cold, excessive muscular exercise or toxic doses of formaldehyde with a decrease in the excretion of H_2O and Cl in the urine and with a marked increase in the urinary elimination of creatine. The animal optimally adapted to these stimuli on the other hand shows a rise in the excretion of H_2O and Cl toward or slightly above the normal level and a decrease of creatine and creatinine elimination below this level. The expts. confirm the conception that during adaptation the organism responds in a characteristic manner, and that the symptoms and signs of this response are detd. mainly by the intensity of the stimulus and the degree of adaptation which the organism has acquired to this stimulus. E. D. Walter

The occurrence of ovulation in the rabbit as a result of stimulation of the central nervous system by drugs. F. H. A. Marshall, E. B. Verney and Marthe Vogt. *J. Physiol.* **97**, 128–32(1939).—Picrotoxin in a dose of 0.9–1.1 mg./kg. was injected intravenously into rabbits in heat. Follicle growth, development of batches of cystic and hemorrhagic follicles, or ovulation ensued in a large no. of animals so treated. No ovarian responses were obtained to the injection of a series of other substances, most of which were stimulants of the central nervous system. E. D. Walter

Myosin and adenosinetriphosphatase. V. A. Engel'hardt and M. N. Lyubimova. *Nature* **144**, 668–9(1939). —The primary energy-yielding reaction in muscle, the hydrolysis of adenosine triphosphate, seems to be assocd. with the protein forming the anisotropic contractile part of muscle fiber. E. D. Walter

Acetylphosphate and pyruvate oxidation. S. Ochoa, R. A. Peters and L. A. Stocken. *Nature* **144**, 750–1 (1939); cf. *C. A.* **33**, 7370⁶.—Acetylcholine is neither an intermediate in the oxidation of pyruvic acid by brain nor does it act significantly as a donator of phosphate to adenylic acid in muscle ext. E. D. Walter

Oxidation of methyl esters of monocarboxylic fatty acids by normal and neoplastic tissue. E. Ciaranfi. *Nature* **144**, 751(1939).—Esters of fat acids increase the O consumption of normal tissue slices much more than the fatty acids themselves. Only the fat acid component of the esters is consumed. Neoplastic tissues do not oxidize the free fat acids but actively oxidize their esters. E. D. Walter

Localization of electrolytes in muscle. E. J. Conway, F. Kane, P. Boyle and H. O Reilly. *Nature* **144**, 752–3 (1939). E. D. Walter

Sex and Internal Secretions. 2nd ed. Edited by **Edgar Allen, Charles H. Danforth and Edward A. Doisy.** London: Bailliere, Tindall & Cox. 1346 pp. 54s. net.

G —PATHOLOGY

The investigation of "falling disease" of cattle in the southwest. H. W. Bennetts and H. T. B. Hall. *J. Dept. Agr. W. Australia* **16**, 156–60(1939).—Preliminary results indicate that stock in the "falling disease" area are affected with a deficiency of Cu and other minerals and this may in some ways be assocd. with the disease. J. R. Adams

Blood plasma bromide levels in bromoderma. Lester W. Kimberly. *J. Investigative Dermatol.* **2**, 331–42(1939).—There is no direct correlation between the blood plasma bromide level and the occurrence of bromoderma. The value of giving NaCl to patients with bromism is clearly shown. The tendency of bromide to replace chloride in the plasma or vice versa is confirmed. P. D. Adams

Modifications of the respiratory function of the blood during experimental pulmonary edema. I. Variations in the oxygen-saturation curve and in the progress of oxygenation and reduction of the arterial blood. D. Cordier and J. Français. *Ann. physiol. physiochim. biol.* **15**, 339–52(1939); cf. *C. A.* **33**, 1809[5], 5178[8].—The O_2-satn. curve of the blood of an animal succumbing to pulmonary edema caused by $COCl_2$ is much lower than that of normal blood. The O_2-satn. curve of an animal dying of pulmonary edema is always lower than that of normal blood to which has been added the same amt. of ether-sol. acids. The blood in $COCl_2$ poisoning has a lower affinity for O_2 than that of an animal dead from progressive anoxia. In pulmonary edema the blood is oxygenated more slowly and reduced more rapidly than normal blood. The acidification of the blood by the fixed acids in pulmonary edema cannot explain entirely the modifications of the respiratory function of the blood. The pulmonary edema caused by $COCl_2$ creates in the organism an anoxia, 3 forms of which are now evident: anoxic anoxia from lesions of the respiratory app., stagnant anoxia due to slowing of the circulation and anemic anoxia caused by the diminution of the affinity of the red cells for O_2. Ruth Berggren

The effect of vitamin C on the production of antibodies. Yosihiko Muturo. *Oriental J. Diseases Infants* **25**, 32(1939)(in English). Successive intravenous injections of typhoid vaccine and vitamin C into rabbits produced a rapid, marked and prolonged increase in the agglutination value, hemolysin value and precipitin content. In adult rabbits the normal agglutination value, hemolysin value and opsonin index increased after one intravenous injection of 40–100 mg. vitamin C/kg. body wt. but decreased after an injection of 150 mg. In normal immature rabbits the hemolysin value increased after a dose of 20 mg. vitamin C but decreased after one of 50 mg. One injection of vitamin C into a mouse increased its resistance to infection with living typhoid bacilli and prolonged its life, but injection of a large amt. (amt. not stated) seemed to decrease its resistance Ruth Berggren

Production of tumors of the spleen in rabbits by means of injections of thorotrast. C. J. van Merveemee and P. A. ten Thije. *Nederland. Tijdschr. Geneeskunde* **83**, IV, 5622–31(1939).—The injection of 3 to 4 cc. of thorotrast per kg. kills rabbits in 8 to 10 hrs. After the injection of repeated smaller doses the authors observed a development of tumors of the spleen with metastases. R. Beutner

Experimental actinomycosis. Syuzi Hassegawa, Tameziro Nakamoto, Yosio Miyasaki, Tomoyuki Arimiti and Masatoyo Akiyosi. *Japan J. Med. Sci. V. Path.* **3**, 27–83(1938).—Human actinomycosis is produced by aerobic and anaerobic varieties, infections from the latter being most usual. All species of this fungus are feebly pathogenic for dogs and other exptl animals. The course of the lesion is usually altered by mixed infection, its degree depending on the grade of mixed infection and the types of organism involved. Lucien Y. Dyrenforth

The significance of the presence of calcium bilirubin pigment and cholesterol crystals in the feces. Fred Boerner, Thos. A. Johnson and Marion Gianniny. *Am. J. Digestive Diseases Nutrition* **6**, 466–7(1939).—Of 2003 stools examd. 67 contained Ca bilirubinate, cholesterol crystals or both. The relation between Ca bilirubin pigment in the stool and cholelithiasis is discussed. E. E.

The comparative value of serial hippuric acid excretion, total cholesterol, cholesterol ester and phospholipide tests in diseases of the liver. I. Results of the tests. Franklin W. White, Emmanuel Deutsch and Stephen Maddock. *Am. J. Digestive Diseases Nutrition* **6**, 603–10(1939).—Studies on 64 cases are recorded. Edward Eagle

The effect of pregnancy and of antuitrin-S on cinchophen ulcers in dogs. A. A. Farbman, David J. Sandweiss and Harry C. Saltzstein. *Am. J. Digestive Diseases Nutrition* **6**, 702–3(1939).—Pregnancy and injections of antuitrin-S had only slight effect on cinchophen ulcers in dogs. Edward Eagle

New knowledge of fluorine in relation to dental caries. Gerald J. Cox. *J. Am. Water Works Assoc.* **31**, 1926–30(1939).—Investigations have shown that F in water supplies causes endemic mottled enamel, and also recently it has been demonstrated that the element most responsible for increased caries-resistance is F. It has also been noted that mottled enamel does not increase caries. D. K. F.

Variations in the polypeptide contents of blood and spinal fluid of typhoid and anthrax patients. A. Slatineanu, I. Balteanu, I. Potop and M. Franche. *Compt. rend. soc. biol.* **132**, 287–90(1939); cf. *C. A.* **33**, 1384[6], 1791[2].—Small increases occurred. L. E. Gilson

Failure of wheat-germ oil to produce neoplasms. R. Auchincloss and C. D. Haagensen. *Proc. Soc. Exptl. Biol. Med.* **42**, 703–5(1939). L. E. Gilson

Histology of the thyroid in exophthalmic goiters and hyperthyroidism. C. A. Hellwig. *Arch. Path.* **28**, 870–903(1939).—A general review with 107 references. Harriet F. Holmes

Hyperinsulinism and surgery. E. Åkerberg. *Acta Chir. Scand.* **83**, 104–22(1939).—A patient is described with persistent and very severe hypoglucemia. On operation an islet adenoma was removed, whereupon the blood sugar rapidly increased without the administration of glucose or of adrenaline. S. Morgulis

Further observations on the value of heated elementary body suspensions in immunization against experimental influenza. R. W. Fairbrother and A. E. Martin. *Arch. ges. Virusforsch.* **1**, 114–19(1939)(in English); cf. *C. A.* **32**, 2609[9].—Further evidence has been obtained that elementary body suspensions heated at 57° for 30 min. and treated with 0.5% phenol effect satisfactory immunization against exptl. influenza in mice, lasting more than 8 weeks. These suspensions are noninfective, bacteriologically sterile, and stable for at least 6 months at 0–4°. They are therefore suitable for experimentation on human subjects. J. Pinchack

The metabolism of acetone bodies in acute pancreatic disturbance. I. Acetone bodies in the blood and urine in acute pancreatic disturbance of rabbits. Akira Sirakura. *Japan. J. Gastroenterol.* **11**, 49–57(1939).—Ligation of the pancreatic ducts of rabbits results in a low concn. of total acetone bodies in the blood while that in the urine was slightly higher. The abs. amt. of acetone bodies excreted in the urine in 24 hrs. was diminished. These changes disappeared on the 2nd–4th days after the operation. Introduction of olive oil or pancreatin into the pancreatic duct gives the same results as l[illegible]
The changes disappeared on the 4th–10th days after the
[illegible] forming acetone
c duct. *Ibid.* 58–
[illegible] butyrate were injected into rabbits with ligated pancreatic duct and the managing function and the forming function for acetone bodies studied. The function managing acetone bodies was slightly decreased 1 day after the operation, nearly recovered after 3 days, promoted after 5–7 days, and came back to normal again. The function producing acetone bodies was lowered 1 day after the operation with promotion on the reverse after 5 days and normal after 10 days.

III. **Function of disposing and forming acetone bodies in rabbits with acute pancreatic necrosis.** *Ibid.* 64–8.—Results of this paper are similar to those of paper II. Benjamin Prescott

Cerebral metabolism during fever. Harold E. Himwich, Karl M. Bowman, W. Goldfarb and Joseph F. Fazekas. *Science* **90**, 398(1939).—The brain metabolism of patients with general paresis was studied before and during fever produced by injections of typhoid vaccine or inductotherm therapy. Samples of arterial blood and of the return flow of the brain obtained from the internal jugular vein were analyzed for O, CO_2, glucose and lactic acid. In every instance an increase of cerebral metabolism during fever was indicated. Felix Saunders

Investigations in atypical toxicoses of pregnancy. H. Albers. *Arch. Gynäkol.* **168**, 754–74(1939).—Seven cases were reported, 4 of which, on the basis of chem. analysis, were proved to be toxicoses of pregnancy. In the first case, a fatal uremia developed during childbed with the nonprotein N rising from 30 mg. % before delivery to 122 mg. % shortly before death and the serum NaCl correspondingly dropping from 715 to 430 mg. %. In the absence of glomerular damage at autopsy, the hypochloremia was interpreted as secondary to an increased protein catabolism, possibly overproduction of guanidine. In case 2, a severe hyperemesis gravidarum was assocd. with a primary hypochloremia (about 400 mg. % serum NaCl) and corresponding rise in nonprotein N to 120 mg. %. Serum chemistry in cases of chorea gravidarum and eclamptic apoplexy is presented in a table, together with av. figures of normal standards. H. P. G. Seckel

Blood iodine content of childhood. W. Schwenk. *Monatsschr. Kinderheilk.* **79**, 349–61(1939).—In 50 normal children av. figures of blood I were according to age groups: up to 1 year 10.25, 2 to 6 years 11.23, 7 to 9 years 12.59, 10 to 11 years 12.64, 12 to 14 years 11.58 γ % (mean 11.67 γ %). The following figures were found in various morbid conditions:

Condition	No of cases	Age in years	Average blood I, γ, %	Effect of I treatment
Congenital struma	2	newborn	9.3	Increased
Nontoxic struma	1	7	7.3	Increased
Nontoxic struma	9	11–15	9.5	Increased
Myxedema	3	10; 6; 7	6.0	None
Cretinism	3	7, 2, 4	6.4	None
Mongolism	2	1, 7	6.9	None
Obesity (girls)	3	12–14	10.4	Increased
Rickets	7	½–2	10.3	Not given

With the findings in rickets, earlier observations to the contrary by Nitschke (cf. *C. A.* **28**, 2037[4]) were disproved for the third time. H. P. G. Seckel

The role of histamine in allergy reactions. I. I. Schimanko. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 381–4(1937) (in German). Walter H. Seegers

Influence of specific treatment on the state of the hemato-encephalic barrier from the viewpoint of its permeability to bromine in infants afflicted with congenital syphilis. M. Silberstein and E. Birguer. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 385–8(1937)(in French).—Blood and cerebrospinal fluid were drawn simultaneously. The quantity of Br in the serum of infants with congenital syphilis is less than that of healthy infants. With specific treatment serum Br increases considerably. In general, the ratio of Br in the cerebrospinal fluid to Br in serum is near 63 in diseased individuals and drops to about 32 under treatment. Walter H. Seegers

Release of autonomic humoral substances in hypoglucemic cats and monkeys. M. B. Bender and S. Siegal. *Am. J. Physiol.* **128**, 324–31(1940).—Adrenergic and cholinergic humoral effects take place in response to hypoglucemia, the adrenergic phenomena predominating in the cat. Much slighter autonomic effects are demonstrable in the monkey. This may be explicable on the basis of relative insensitivity of the indicators rather than as significant of a fundamental difference in autonomic responses. E. D. Walter

Trans-amination of *l*- and *d*-amino acids in normal muscle and in malignant tumors. A. E. Braunshtein and R. M. Azarkh. *Nature* **144**, 669–70(1939); cf. *C. A.* **33**, 5015[2].—Expts. show that trans-amination of *d*- and *l*-amino acids is either not effected at all by minced tissue from various malignant tissues or at a much lower degree than it is by normal tissues. E. D. Walter

The partition of serum calcium in domestic animals—some pathological cases. J. Duckworth and W. Godden *Vet. J.* **95**, 380–92(1939).—Ca^{++}, ultrafiltrable Ca (in phosphate-bicarbonate complex), nonultrafiltrable Ca (in an unknown complex form), protein-bound Ca and total Ca were detd. in the blood of 13 farm animals including cows with hoven, retained placenta, stomach staggers and acetonemia, calves with convulsions, a horse with grass sickness, a sheep with dropsy, 2 sheep with tetany and 3 sheep with rickets. The tetany cases showed low values for Ca^{++} and extremely low values for protein-bound Ca. Rapid reduction of nonultrafiltrable Ca complex at time of greatest severity of the symptoms was characteristic of the cases of rickets. C. W. Whittaker

Food poisoning due to staphylococci with special reference to staphylococcus agglutination by normal horse serum (Slocum, Linden) **12**.

H—PHARMACOLOGY

CARL F. SCHMIDT

Histaminase in the treatment of urticaria and atopic dermatitis. Carl W. Laymon and Harry Cumming. *J. Investigative Dermatol.* **2**, 301–12(1939).—A preliminary report. Philip D. Adams

Influence of salyrgan upon the blood volume. E. Lopez Cardozo. *Nederland. Tijdschr. Geneeskunde* **83**, IV, 5528–32(1939).—In decompensation, the administration of salyrgan causes a 20 to 30% diminution of the blood vol., which is far above the normal level in that condition. This diminution results from a decrease of both the plasma and the red blood cell vol. The plasma becomes concd. during diuresis; the red cells somehow disappear. R. Beutner

Anesthesia. The conquest of pain. Edward Podolsky. *Am. Professional Pharmacist* **5**, 629–31, 638, 695–7(1939). A historical discussion of general anesthetics and procedures. H. M. Burlage

The irritant action of the chloroximes. Mario Milone. *Ann. chim. applicata* **29**, 360–6(1939).—The reactions of chloroisonitrosoacetone (I) and of chloroisonitrosoacetophenone (II) on the skin were investigated in rats. The oximes of I and II were also prepd. I and its oxime have an irritant action, while II and its oxime have not. It is known that I reacts much more readily with proteins and lipides than II, which accounts for this difference in irritant action on the skin. A. W. Contieri

Some recent applications of caryoclastic poisons. A. P. Dustin. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 227–30(1939). E. Curzon

Effect of diphenols on the small intestine. S. Zylbersztac. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 240(1939). E. Curzon

Action of colchicine on nervous cicatrization. R. Delcourt. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 241(1939). E. Curzon

Intubation studies of the human small intestine. XVII. The effect of atropine and belladonna on the motor activity of the small intestine and colon. Kendall A. Elsom and J. L. Drossner. *Am. J. Digestive Diseases Nutrition* **6**, 589–93(1939).—The effects of atropine sulfate and tincture of belladonna (administered to normal subjects and patients with gastrointestinal disease) on the small intestine and colon were studied by means of intestinal intubation combined with fluoroscopy. Therapeutic doses produced a marked decrease in tone and in peristaltic activity and a less striking effect on rhythmical contractions. **XVIII. The effect of pitressin and of amphetamine (benzedrine) sulfate on the motor activity of the small intestine and colon.** Kendall A. Elsom, Paul M. Glenn and J. L. Drossner. *Ibid.* 593–7.—Pitressin produced an increase in motor activity of the intestinal tract,

usually with increased tone and peristaltic activity. The effects of pitressin were more intense in the more distal portions of the tract. Benzedrine sulfate exerted a sympathomimetic effect on the small bowel and colon, with decreased tone and peristaltic activity. Edward Eagle

The oral administration of citrated blood in man. I. The effects on the blood urea nitrogen. Leon Schiff, Richard J. Stevens, Sander Goodman, Ellen Garber and Anna Lublin. *Am. J. Digestive Diseases Nutrition* **6**, 597-601(1939).—Intragastric or intrajejunal administration of citrated human blood in single doses of 250 to 1000 cc. is followed by a significant rise in the blood urea N, this rise being proportional to the amt. of blood administered, and dependent on the portion of the intestinal tract into which the blood is placed. The rise usually returns to normal within 48 hrs. and is apparently dependent on the digestion and absorption of the blood. Edward Eagle 2

The effect upon gastric secretion of introducing dilute hydrochloric acid into the duodenum. R. E. Stevens, H. L. Segal and W. J. Merle Scott. *Am. J. Digestive Diseases Nutrition* **6**, 706-11(1939).—HCl in 0.4% soln., when introduced into the duodenum of normal subjects or of duodenal ulcer patients, had no const., significant effect on gastric secretory curve. Edward Eagle 3

The use of homatropine-benzedrine cycloplegia. Lyle S. Powell. *Am. J. Ophthalmol.* **22**, 956-9(1939).—Two one-drop instillations in the conjunctival sac of 2% aq. homatropine-HBr soln. followed in 5 min. by 2 instillations of 1% benzedrine sulfate ophthalmic soln. produced complete practical cycloplegia in 60 min. in patients 16 to 31 yrs. old. Beginning recovery occurred in 4 hrs. Eserine salicylate (1 or 0.5% soln. buffered to be isotonic with tears) overcomes homatropine-benzedrine cycloplegia promptly and restores the power of accommodation within $\frac{1}{2}$ hr. Edward Eagle 4

Prophylactic foreign protein therapy in cataract extraction. C. A. Noe. *Am. J. Ophthalmol.* **22**, 1014-17(1939).—Prophylactic intravenous administration of typhoid-H antigen lessens the inflammatory reaction after cataract extn. and gives rise to both "O" and "H" antibodies in the blood. There is no definite relationship between blood-antibody titer and postoperative reaction. Edward Eagle 5

A study of the fate in the organism of some chlorinated hydrocarbons. H. M. Barrett, J. G. Cunningham and J. H. Johnston. *J. Ind. Hyg. Toxicol.* **21**, 479-90(1939).—Between 5 and 8% of the trichloroethylene absorbed by dogs after inhalation anesthesia is excreted in the urine as trichloroacetic acid. No such conversion was noted after the administration of CCl_4, 1,1,2-trichloroethane and $CHCl_3$. *S*-tetrachloroethane is one of the most toxic of the chlorinated hydrocarbons. A. L. Elder 6

Pharmacognosy of Chelidonium majus L. IV. Heinrich Cappenberg and Heinz Harms. *Deut. Apoth.-Ztg.* **54**, 40(1939).—This study is based essentially on the alkaloidal salts. Thirty-four references. W. O. E. 7

Poisoning by radioactive substances. Gyula Balázs. *Orvosi Hetilap* **83**, 893-7(1939).—Cases described in the literature are summarized. Small doses of radioactive substances seem to have a curative power; larger amts. usually cause severe injury within the cells. S. S. de F. 8

Production of anemia in white mice by sulfanilamide, sulfapyridine and diaminodiphenylsulfone. Arthur P. Richardson. *J. Pharmacol.* **67**, 429-36(1939).—An anemia assocd. with reticulocytosis was produced by feeding mice diets contg. the drugs. On the basis of minimal effective blood concn. which is necessary to produce a significant effect on the red cells, sulfapyridine is about half as toxic as sulfanilamide and diaminodiphenylsulfone about twice as toxic as sulfanilamide. L. E. Gilson 9

Mechanism of insulin convulsions. III. Effects of varying partial pressures of atmospheric gases after adrenalectomy. Irvine McQuarrie, M. R. Ziegler, W. E. Stone, O. H. Wangensteen and C. Dennis. *Proc. Soc. Exptl. Biol. Med.* **42**, 513-14(1939); cf. *C. A.* **33**, 7385[6].—Breathing a mixt. of 5% O_2 and 95% N_2 causes hypoglucemia in adrenalectomized dogs without insulin, and hypercemia in normal dogs. Insulin convulsions are prevented by anoxia of this degree even when the blood sugar falls to 9-14 mg.%. Breathing a mixt. of 15% CO_2, 20% O_2 and 65% N_2 also tends to prevent insulin convulsions. L. E. Gilson 10

Effect of sulfapyridine on immune responses to pneumococcal infection. Joseph C. Edwards, Theodor E. Kircher, Jr., and Lawrence D. Thompson. *Proc. Soc. Exptl. Biol. Med.* **42**, 539-41(1939).—The immune responses that occur naturally in man in untreated pneumonia, studied by detg. type-specific and species-specific agglutinins and by the dermal reactivity to type-specific polysaccharides, are apparently unaltered by treatment with sulfapyridine. There seems to be no relation of the heterophile-antibody titer to the clinical course of pneumococcal pneumonia or its immune responses following sulfapyridine therapy. L. E. Gilson 11

Toxicity of the *o*-, *m*- and *p*-isomers of sulfanilamide. Edwin P. Laug and Herman J. Morris. *Proc. Soc. Exptl. Biol. Med.* **42**, 541-3(1939).—When given orally to mice the median lethal doses of the isomers are: *o*- 3.84, *m*- 12.45 and *p*- 4.61 g./kg. There is no correlation between soly. and toxicity or between toxicity and therapeutic efficiency as reported by others. L. E. Gilson 12

The local anticonvulsive action of calcium salts. R. Beutner. *Proc. Soc. Exptl. Biol. Med.* **42**, 547-9(1939).—In guinea pigs the intramuscular injection of 100-200 mg./kg. of procaine-HCl caused clonic and tonic convulsions. Mixing $CaCl_2$ with the procaine-HCl greatly decreased the incidence of convulsions. Other Ca salts acted like $CaCl_2$, except Ca gluconate which does not ionize. $MgCl_2$ counteracts the action of $CaCl_2$, probably by altering membrane permeability, and in the absence of Ca increases the convulsive action of procaine. L. E. Gilson 13

Toxicity of acid-soluble typhoid toxin for laboratory animals. E. W. Dennis. *Proc. Soc. Exptl. Biol. Med.* **42**, 553-4(1939).—The fraction contg. the somatic antigen complex of the typhoid bacillus is highly toxic. The macroscopic changes produced are those attributed to the endotoxin. The effect is primarily on the blood vessels, resulting in degenerative changes in the tissues supplied. A monocytic response is not a component of the tissue response to the toxin. L. E. Gilson 14

Effect of sulfapyridine on Brucella abortus in vitro and in vivo. E. E. Hamann and I. F. Huddleson. *Proc. Soc. Exptl. Biol. Med.* **42**, 555-6(1939).—A 1:10,000 concn. of sulfapyridine has some bacteriostatic action on *Brucella abortus in vitro*, but oral administration in large doses to infected guinea pigs has little or no effect on the course of the infection. L. E. Gilson 15

Action of tincture of iodine when injected into the pericardial sac. J. A. Bone and J. W. Elam. *Proc. Soc. Exptl. Biol. Med.* **42**, 563-4(1939).—Preliminary. L. E. Gilson 16

Inhibition by cortin of the blood-sugar changes caused by adrenaline and insulin. Hans Selye and Christiane Dosne. *Proc. Soc. Exptl. Biol. Med.* **42**, 580-3(1939); cf. *C. A.* **33**, 7331[3].—In fasted adult male rats both the hypoglucemia caused by insulin and the hyperglucemia provoked by adrenaline can be largely, but not completely, suppressed by cortin. It appears that cortin exerts a stabilizing effect on blood sugar much like that obtained with certain hypophysis exts. by Neufeld and Collip (*C. A.* **33**, 1795[9]). L. E. Gilson 17

Rate of elimination of nicotine by the rabbit. J. H. Weatherby. *Proc. Soc. Exptl. Biol. Med.* **42**, 593-6(1939).—When repeatedly injected in small doses the rate of elimination is proportional, within certain limits, to the rate of administration. When the optimum rate of injection is passed the rate of elimination decreases to less than the max., i. e., the elimination curve bends downward. L. E. Gilson 18

Effect of thiamine chloride on Eimeria nieschulzi infection of the rat. Elery R. Becker. *Proc. Soc. Exptl. Biol. Med.* **42**, 597-8(1939); cf. *C. A.* **32**, 5037[6], 7079[8].—Large doses of thiamine chloride retarded the development of the coccidium in its rat host. L. E. Gilson 19

Diabetes in rats and its alleviation with sodium chloride. James M. Orten and Henry B. Devlin. *Proc. Soc. Exptl.*

Biol. Med. **42**, 632–4(1939).—About 50% of adult rats of the "Yale" strain show a diabetic tendency (low glucose tolerance). The injection of NaCl with the glucose results in a normal tolerance to glucose, both in intact rats with the diabetic trait and in partially pancreatectomized rats. L. E. Gilson

Further observations of phenothiazine in experimental trichinosis. James B. McNaught, Rodney R. Beard and Floyd DeEds. *Proc. Soc. Exptl. Biol. Med.* **42**, 645 8 (1939); cf. *C. A.* **33**, 8300².—Contrary to the previous report phenothiazine is of no value in the treatment of trichinosis infection. L. E. Gilson

The prevention of carotene absorption by liquid petrolatum. Arthur C. Curtis and Robert S. Ballmer. *J. Am. Med. Assoc.* **113**, 1785–8(1939).—Liquid petrolatum interfered with absorption of carotene from food. Petrolatum satd. with carotene at 37° (0.28%) did not influence carotene absorption. F. P. Griffiths

Nonsurgical aspects of the kidney stone problem. Fuller Albright, Hirsh W. Sulkowitch and Richard Chute. *J. Am. Med. Assoc.* **113**, 2049–53(1939).—A soln. of Na citrate-citric acid at pH 4.0 is effective in dissolving $Ca_3(PO_4)_2$ stones *in vitro* and *in vivo*. The soln. combines the effect of acids on phosphates with a complex ion effect to reduce the Ca-ion concn. Na hexametaphosphate, $Na_3(NaPO_3)_6$, solns. have been suggested as being more effective than citrate-citric acid. F. P. Griffiths

The reaction of the coronary vessels to drugs and other substances. Louis N. Katz and Erna Lindner. *J. Am. Med. Assoc.* **113**, 2116–19(1939). The actions of a variety of drugs, salts and bloods of foreign species on the tone of the coronary vessels of the dogs are reported. Coronary vasodilator substances are adrenaline, acetylcholine derivs., $CaCl_2$, NaCl, $NaNO_2$, nitroglycerin, histamine, caffeine, aminophylline and other xanthines and diffusible substances liberated in myocardial ischemia. Vasoconstrictor substances are ergotamine, piperidinomethylbenzodioxane, pitressin, atropine sulfate and substance in defibrinated foreign species blood. KCl acts as a vasoconstrictor when greater than 1.5 normal blood concn. and as a vasodilator when less than that concn. F. P. G.

Respiratory alkalosis during anesthesia. An experimental study in man. M. H. Seevers, R. T. Stormont, H. K. Hathaway and R. M. Waters. *J. Am. Med. Assoc.* 113, 2131–6(1939).—Eleven patients were manually hyperventilated for periods of 11 to 21 min. during anesthesia with different agents. A marked respiratory alkalosis developed, the av. being 0.31 pH unit above anesthesia level and 0.25 unit above normal plasma pH. The CO_2 level in the blood was reduced 21 mm. below the mean anesthesia level and 31 mm. below the mean normal level. Systolic and diastolic arterial pressures were reduced from the elevated levels of anesthesia 25 and 10 mm., resp. The initial arterial pressures were reëstablished rapidly when hyperventilation was discontinued and no adverse effects on the circulation or general condition of the patients followed hyperventilation. Arterial hypotension due to rapid removal of CO_2 is not surgical shock since the hypotension is not progressive, recovery of arterial pressure occurs even during continued ventilation, and recovery is immediate when hyperventilation is discontinued. F. P. Griffiths

Pharmacology of strontium. V. Direct action on bulbar and cortical centers. A. Boriani. *Arch. farmacol. sper.* **68**, 105–22(1939); cf. *C. A.* **33**, 8301⁸; **34**, 168².
Helen Lee Gruehl

Effect of potassium iodide on bone and cartilage in thyroidectomized immature guinea pigs. M. Silberberg and R. Silberberg. *Arch. Path.* **28**, 846–50(1939); cf. *C. A.* **33**, 6424⁷·⁸.—In immature male guinea pigs in which the thyroid glands were completely or almost completely removed KI caused proliferation of the euhyaline cartilage as it does in nonthyroidectomized animals. In this respect KI acts on the growth of the cartilage without the mediation of the thyroid gland. However, the increase in the no. of hypertrophic cartilage cells, the decrease of ossification, and the stimulation of resorption of bone which occurred when the thyroid gland was intact were lacking when the thyroid gland had been removed previous to the administration of KI. These processes, which under the influence of KI are seen only in guinea pigs with intact thyroid glands, are held to depend on certain functions of the thyroid gland. Harriet F. Holmes

The protein fractions in blood and spinal fluid after poisoning of the nervous system with carbon monoxide. V. A. Bakhtiyarov. *Klin. Med.* (U. S. S. R.) **16**, 726–9 (1938).—Chronic CO poisoning decreases blood and spinal fluid albumin, increases blood and spinal fluid globulin, and decreases the permeability of the hematoencephalic barrier. S. A. Karjala

Influence of sodium fluoride, sodium maleinate, glutamic acid and glyceraldehyde on muscular activity. A. M. Ryabinovskaya. *Compt. rend. acad. sci. U. R. S. S.* **23**, 958 61(1939)(in English).—A survey of the existing literature is followed by expts. with a nerve-prepn. muscle (sciatic-gastrocnemius) and sartorius muscle of a frog, with Ringer soln. for control. NaF in concn. of 0.02 *M* for 1 hr. produces a reduction of the amplitude and a rise of the excitability to direct stimulation; indirect excitability (via nerve) is lacking. Na maleinate (0.0025 *M*) in the presence of phosphate buffer (pH = 7.2–7.3) produces a lowering of direct excitability in both muscles and of indirect excitability in m. gastrocnemius. Na glutaminate (0.01 *M*) eliminates indirect excitability and lowers direct excitability, though to a lesser degree than NaF. Glyceraldehyde (0.02 *M*) leads to a decrease of both direct and indirect excitability. 16 references. A. H. Krappe

Alcohol and sedatives. Helmut Peter. *Deut. Z. ges. gerichtl. Med.* **31**, 113–53(1939).—Impairment of attentiveness and concn. power paralleled the limits of motor performance and blood alc. level. Phenobarbital, 0.3 g., had the same effects as alc., 1 g./kg. body wt. when the subject was tested objectively. Sedormid impaired the motor ability of one case slightly. Cibalgin was effective only after exercise. Subjective tests showed that the effects of phenobarbital and alc. can be differentiated. Together with alc. even the relatively ineffective cibalgin produced a real narcosis; pyramidone produced a sense of well-being with no improvement in motor performance. Frances Krasnow

A fatal case of accidental poisoning by chlorate of potassium, with a review of the literature. W. J. Cochrane and R. P. Smith. *Can. Med. Assoc. J.* **42**, 23–6 (1940).—A discussion of the symptoms and postmortem findings in a case of accidental poisoning from taking 30–35 g. of $KClO_3$. G. H. W. Lucas

Anuria caused by sulfapyridine therapy. E. Smith, K. A. Evelyn and J. F. Nolan. *Can. Med. Assoc. J.* **42**, 27–9(1940).—The formation of acetylsulfapyridine crystals caused a complete bilateral ureteral blockage after the administration of 42 g. sulfapyridine and 9 g. neosulfanilamide in 4 weeks. G. H. W. Lucas

The toxic effects of sulfanilamide and related compounds. E. H. Bensley. *Can. Med. Assoc. J.* **42**, 30–3 (1940).—A review. G. H. W. Lucas

Pharmacodynamics of some saponins, particularly of the saponin of Dumoria heckeli (Sapotaceae). P. Dodel, G. Dastugue and Mlle. Villedieu. *Bull. sci. pharmacol.* **46**, 401–7(1939).—Five mg. *Dumoria* saponin (I) per 100 g. animal dissolved in physiol. NaCl soln. and injected intraperitoneally in guinea pigs causes death within 2 hrs.; 7.5 mg. *Saponaria* saponin (II) causes death in 4 hrs. and 60 mg. guaiac saponin (III) in 24 hrs. The min. lethal dose by intravenous application in the rabbit is 8 mg. per kg. of I; 17 mg. of II or 150 mg. of III does not cause death. A drop in blood pressure, amounting to 30 mm. Hg in the rabbit in urethan narcosis, is produced by 0.5 mg. per kg. of I, 5 mg. of II and 150 mg. of III. The hypotensive action of I is attenuated by double vagotomy; eserine sulfate has no appreciable effect on it. The hypotensive effect is not due to acetylcholine. The imbibition observed in frog gastrocnemicus muscle when immersed in H_2O or Ringer soln. is considerably diminished and, at higher concn., reversed by the addn. of II or III. The muscle of the leech is not sensitized by I to the action of acetylcholine either in the presence or in absence of eserine.

I at a concn. of 1:10,000 causes an increase of tonus and decrease of amplitude of the beat of the heart of *Helix pomatia*. The same effect is obtained by II at 5 10,000 but not by III at 1·1000. The actions of I on the rabbit intestine are: at concn. 0.3·10,000 drop in tonus and decrease of contractions, at 1.5 10,000 increase of tonus and decrease of contractions, effects prevented by atropine. The action of II is similar; that of III is variable.
A. E. Meyer

The special contraction of partially veratrinized muscle. Kiyotune Inoue. *Japan. J. Med. Sci. III. Biophys.* **6**, 29–53(1939).—In order to obtain 2 typical veratrine contractions by 2 succeeding stimuli an interval of 4 min. is necessary to prevent a modification of the second contraction. A muscle fixed in the center and veratrinized on one side only always gives a veratrine response no matter which parts of the muscle is stimulated. This is not due to a veratrine leakage. The veratrine-effect curve was studied in various modifications of the expt. A. E. M.

Pneumonia in adults and children treated with 2-(*p*-aminobenzenesulfonamido)pyridine. A. Eldahl. *Acta Med. Scand.* **102**, 324–39(1939).—Of the 38 adults and 16 children suffering from pneumonia (types 1, 3, 4, 6 and 7, in the order of diminishing frequency) treated with 2-(*p*-aminobenzenesulfonamido)pyridine only 1.9% mortality was directly attributable to the pneumonia, 3 other patients having died from complications. The substance was administered in 0.5–1.0 g. doses every 4 hrs., adults receiving 28 and children 10 g. The children seem to have tolerated it much better than the adults. S. Morgulis

Pneumonia in adults and children treated with 2-(*p*-acetylaminobenzenesulfonamido)pyridine. A. Eldahl. *Acta Med. Scand.* **102**, 340–56(1939). Fifty-five patients both adults and children (types 1, 6, 7, 3, 19, in the order of diminishing frequency) were treated with a total of 40 and 25 g., resp., of 2-(*p*-acetylaminobenzenesulfonamido)-pyridine. The mortality was 3.6%. In two-thirds of the patients the temp. fell to normal within 48 hrs. The toxic symptoms, especially vomiting, were less common with this substance. S. Morgulis

Creatinuria in thyrotoxicosis. Knud Brøchner-Mortensen and Eggert Møller. *Acta Med. Scand.* **102**, 417–31(1939).—No proportionality was found in a large no. of patients with thyrotoxicosis between the basal metabolic rate and the creatine-creatinine excretion. Prior to I treatment an increased creatine excretion (more than 200 mg. in 24 hrs.) was found in about two-thirds of the cases, while after the treatment the creatinuria decreased in 10% of the cases. X-ray treatment had no effect on the creatinuria. Similarly, immediately after a subtotal thyroidectomy the creatinuria remained unchanged.
S. Morgulis

The action of some phenyl-substituted aliphatic amines on the perfused surviving heart. V. Larsen. *Skand. Arch. Physiol.* **82**, 288–98(1939).—Hydroxyphenylamines increase the min. vol. and frequency of the surviving heart even in dil. soln., but amines with ordinary Ph groups have practically no stimulating effect. In solns. more concd. than 1 200,000 they inhibit the min. vol. due to a change in pulse vol., the inhibition increasing with the concn.
S. Morgulis

The action of some indifferent narcotics on the acetylcholine sensitivity of the rectus muscle of the frog. Nils Emmelin. *Skand. Arch. Physiol.* **83**, 69–76(1939).—Various alcs. (Me, Et, Pr, Bu, Am) increase the action of acetylcholine on the frog rectus muscle proportionally to their no. of C atoms. Expts. with 3 isomeric Bu alcs. show that the tertiary alc. has a weak action while normal primary BuOH and isobutyl alc. have a strong action. Neither glycerol nor ethylene glycol has any effect. The sensitiveness toward acetylcholine is also increased by Me, Et, Pr esters of carbamic acid, methylurethan having the weakest and propylurethan the strongest action. Certain narcotics increase the sensitivity to acetylcholine and their effect persists even after the complete paralysis of the choline esterase by physostigmine. S. Morgulis

Citric acid metabolism in the kidneys after administration of malic acid. Johan Mårtensson. *Skand. Arch. Physiol.* **83**, 113–20(1939); cf. *C. A.* **33**, 7138.—By far the largest part of citric acid supplied to the kidney is converted, only a small portion being excreted in the urine. On the administration of malic acid, citric acid is not formed in the kidneys. *l*-Malic acid arrests or suppresses the normal breakdown of citric acid in the kidneys and at the same time brings about a large increase in the urinary excretion of citric acid. S. Morgulis

Utilization of glucose and phosphate metabolism in hind-limb preparations of cats poisoned with phlorizin. Å. Liljestrand and E. Lundsgaard. *Skand. Arch. Physiol.* **83**, 121–31(1939).—The utilization of glucose in the musculature of phlorizin-poisoned animals proceeds normally, as does also the phosphorylation process. This does not contradict the demonstrable *in vitro* inhibition of phosphorylation by phlorizin since here the concn. required is much greater than is possible in ordinary phlorizin poisoning in the living animal. A starving phlorizin-poisoned animal has a low carbohydrate tolerance owing to severe carbohydrate lack which is responsible for the diabetic glucose-tolerance curve. The authors found that the perfused liver, from well-fed phlorizin-poisoned cats, which is fat-infiltrated and practically free from glycogen, cannot form glycogen from fructose as the normal cat liver does. This is also attributed to carbohydrate lack. Phlorizin attacks selectively the kidneys interfering with reabsorption of glucose possibly through inhibition of phosphorylation. The poison tends to accumulate in the renal tubules which accounts for the toxic effect, but no such concn. is found in other tissues. The resulting diabetic condition is not due to decreased glucide combustion but is, especially in the starved animal, the result of extreme carbohydrate lack. The latter, of course, may be responsible for a diminished insulin output. Under similar conditions the glucose tolerance will be of increasing severity in the following order: rabbit, cat, dog. The tolerance will be decreased most seriously by a fat diet or by inanition, whereas with ample protein or carbohydrate there may be no reduction in tolerance. S. Morgulis

Cardiometric study of the cardiotonic properties of several sympathomimetic amines. Robert Charlier. *Arch. maladies coeur vaisseaux* **32**, 690–710(1939).—The circulatory analeptics (*p*-hydroxyphenyl)(methylamino)-ethanol (sympathol) (I), (*m*-hydroxyphenyl)(methylamino)ethanol(neosynephrine) (II), epinephrine (levorenine) (III), α-methylphenethylamine (benzedrine) (IV), α,*N*-dimethyltyramine (veritol) (V), *p*-hydroxyephedrine (suprifen) (VI), ephedrine (VII), a 1 4 mixt. of hydroxyephedrine and a lobeline-like compd. (ieoral) (VIII), and a mixt. of III and a compd. related to *N*,*N*-diethylnicotinamide (cardiovasculare) (IX), have been tested for their effect on myocardial contraction in anesthetized, vagotomized dogs. I, II and III are good analeptics because they have a vascular and myocardial effect, but II and III produce too sudden a hypertension for some myocardial conditions; I and II have a more prolonged effect than III. IV and V have a comparable cardiovascular action, but their hypertensive and cardiotonic actions are less pronounced than those of the ethanol derivs. Furthermore, these actions are reversed with repetition of injections. VI, VII and IX seem to be valuable cardiotonics since their increase of myocardial contraction appears to be independent of the simultaneous increase in arterial pressure. Small doses of VIII have a favorable effect on the myocardium, but doses which raise the pressure are toxic. The results are compared with those reported in the literature. 117 references.
J. Pinchack

Neuro-histopathology of metrazole and insulin shock therapy. Experimental study in the cat. N. W. Winkelman and Matthew T. Moore. *Trans. Am. Neurol. Assoc.* 1939, 214–16.—Insulin (I) caused severe damage of the neurones, while metrazole (II) produced practically no morphologically demonstrable change in the central nervous system of the cat. These results may indicate the need for greater caution in the use of I in human subjects; II may be considered the safer drug. J. Pinchack

The toxicity of various iodine solutions. A. L. Berman and A. C. Ivy. *J. Lab. Clin. Med.* **25**, 113–20(1939).—

The relative toxicity of various solns. used clinically in the treatment of thyrotoxicosis was investigated by these procedures: (1) the depression of the blood pressure observed in ether-anesthetized dogs when various I solns. equiv. in I content were injected intravenously during a period of 10 to 15 sec.; (2) the least amt. of Amend's and Lugol's soln. that would induce vomiting when injected intravenously in unanesthetized dogs who had been given a meal; (3) the blood I curves of 8 normal human subjects and 4 dogs were detd. after ingestion of I equiv. amts. of these 2 solns.; (4) the rate of absorption was detd. by the time of occurrence of the peaks in the blood I curves of human subjects and by the time of appearance of I in the saliva after 50 mg. of I in solns. had been given by Rehfuss' stomach tube; (5) the uptake of I by the thyroid in dogs anesthetized with nembutal following injection of I solns.; and (6) the toleration by I-sensitive subjects of the various solns. The degree of toxicity is related to the presences of the Na or K cation in the soln., to the presence of a buffering agent such as protein to neutralize free I if the latter is present and possibly to the amt. of protein iodide formed during absorption of orally administered I. Amend's soln. and NaI are less toxic when given intravenously, are less irritating to the stomach when taken orally, and are better tolerated than Lugol's soln. in I equiv. doses. Amend's soln. should be as effective as Lugol's soln. in the treatment of hyperthyroidism when given in I equiv. doses as the I in both solns. were utilized to approx. the same extent by thyroid tissue. The irritating effects of Lugol's soln. are greatly reduced if this soln. is administered in milk. Howard W. Robinson

The relationship of the insulin hypoglucemic reaction to shock. Warren C. Corwin. *J. Lab. Clin. Med.* 25, 769–74(1939).—Hypoglucemic manifestations ("insulin shock") were produced in dogs and rabbits by the injections of fatal and nonfatal doses of insulin. Detns. of the hemoglobin content and the no. and vol. of erythrocytes in the blood indicate that hemoconcn. does not occur incident to such hypoglucemic reactions. Visceral evidences of capillovenous congestion and increased capillary permeability were not seen in the animals after death. The mechanism of death in "insulin shock" is not the same as that of shock (Moon, *Arch. Path.* 24, 642, 794(1937)). Howard W. Robinson

Examination of the blood of normal and adrenalectomized dogs in relation to cortin treatment. I. I. E. Uyldert, J. Thomassen and L. Waterman. *Endocrinology* 25, 877–84(1939).—No change in the Na or K content of the blood plasma or the nonprotein N or glucose of whole blood was found after the removal of 1 adrenal. A significant difference in these substances was found between normal dogs or dogs with 1 adrenal left intact and bilaterally adrenalectomized dogs. A significant difference in 2-stage adrenalectomized dogs between a good condition and a slight insufficiency was found only in the plasma K. A significant difference exists between slightly insufficient and insufficient dogs only in the nonprotein N. The sharp difference between various degrees of insufficiency, which can be observed from the clinical symptoms of appetite and body temp. cannot be deduced from changes in compn. of blood. II. L. Waterman, I. E. Uyldert, J. Thomassen and F. Oestreicher. *Ibid.* 885–7.—Adrenalectomy produces no significant changes in either the red or white cell picture. Felix Saunders

Effect of a single injection of thyroxine on carbohydrates, protein and growth in the rat liver. Richard Sternheimer. *Endocrinology* 25, 899–908(1939).—The changes in chem. compn. and histological structure of the rat liver vary according to the time elapsed after the injection of thyroxine. The chem. changes consist in a loss of glycogen in the liver and the entire animal, followed, beginning 48 hrs. after injection, by an increase above normal of these values. There is a marked rise in liver protein in the 1st period and, later, a decrease of liver protein to values still above normal in linear proportion to the increase in liver glycogen. Liver sugar, blood sugar and lactic acid content of the liver remain unchanged during the 1st period but rise later, simultaneously with the glycogen. Fresh wt. and dry wt. of the liver increase. The loss in liver glycogen, increase in liver protein and liver size begin before O consumption rises, i. e., during the latent period. The variations in carbohydrates observed in the liver present a close analogy to changes described in growing tissues and it is concluded that liver growth takes place under the conditions of these expts. Felix Saunders

The effects of adrenaline and of nerve stimulation on the mechanical and electric responses of uterine muscle. Robert S. Morison. *Am. J. Physiol.* 128, 372–81(1940). E. D. Walter

The effect of choline on the fatty liver of carbon tetrachloride poisoning. H. M. Barrett, C. H. Best, D. L. MacLean and Jessie H. Ridout. *J. Physiol.* 97, 103–6(1939); cf. *C. A.* 29, 6651⁴.—Rats maintained on a diet low in lipotropic factors with an amt. of added choline sufficient partially to prevent the increase in liver fat due to a low-choline diet develop very fatty livers during the 20-day period after the administration of CCl_4. Animals poisoned with CCl_4 and fed the same diet, with the addn. of excess choline, have almost normal livers at the end of the same period. The results suggest that choline or other lipotropic factors are essential for the removal of the excess fat which accumulates in the livers of rats as a result of CCl_4 poisoning. E. D. Walter

Blood plasma proteins as influenced by intravenous injection of gum acacia. II. Production of chronic hypoproteinemia. Charles L. Yuile and Ralph E. Knutti. *J. Exptl. Med.* 70, 605–13(1939); cf. *C. A.* 33, 2590⁹.—By repeated weekly intravenous injections of gum acacia solns. in dogs over periods of 4–5 months, it has been possible to maintain plasma protein concn., and total circulating protein at very low levels. If sufficient nos. of such injections are given and then discontinued, plasma protein concn. will remain below the normal limits for several more months; acacia remains in the blood during this time. Reduction of fibrinogen concn. in such animals is out of proportion to and more marked than the changes in plasma protein concn.; this would indicate interference with liver function. Globulins are reduced to a greater extent than albumin after a single injection of gum acacia, although both diminish; this cannot be accounted for by a decrease in fibrinogen alone; after 14–16 weekly injections, both albumin and globulin are more profoundly reduced. During injection periods in such animals, it has not been possible to control quantitatively the dietary intake, a complication which has made it difficult to ascertain the effect of various protein diets upon the protein-acacia balance. The changes described, however, have taken place regardless of various types of animal protein diets. C. J. West

Control of wastage of citrus fruit by impregnated wrappers on com. scale [toxicity of biphenyl] (Farkas) 12. Mineral waters of Boario [medicinal value] (Bragagnolo) 14. 5-(α-*sec*-Butoxy)ethyl-5-alkylhydantoins [soporifics or anticonvulsants] (Speer, Henze) 10. Synthesis of pyridinium ethanols [and their physiol. action] (Krohnke, Schulze) 10. Prepn. of aminobenzoic acid esters of substituted monoalkylamino alcs. [anesthetic properties] (Goldberg, *et al.*) 10.

I—ZOÖLOGY

R. A. GORTNER

Attempt to isolate the virus of grasserie of the silkworm by ultracentrifugation. A. Paillot and A. Gratia. *Arch. ges. Virusforsch.* 1, 120–9(1939)(in French).—Particles of the virus causing grasserie in silkworms were allegedly isolated from the blood and infected tissues by centrifugation and fractional ultracentrifugation. The virus is about 100 mμ in size, i. e., between tobacco-mosaic virus and vaccine virus. In 0.5% NaOH soln., it presents a cubic system of agglomerations of rhombic dodecahedrons under the ultramicroscope. Crystals differing from those of the virus were isolated from the normal tissue fluids of the silkworm. J. Pinchack

Vitamin C and the histophysiology of the hypophysis of

the Selachii. Gregorio Castigli. *Pub. staz. zool. Napoli* 17, 183-92(1939).—Vitamin C was best detd. in the hypophyses of *Scyllium stellare*, *S. canicula* and *Mustelus laevis* histochemically by a $AgNO_3$ method slightly modified from that of Giroud and Leblond (*C. A.* 28, 6181[8]; 29, 6937[2]; 30, 7611[5]). The $AuCl_3$ reduction method of Tonutti (*C. A.* 32, 2268) was less satisfactory. In the anterior lobe the vitamin C reaction is very weak in young animals especially in the chromophobic cells, but increases with maturity and sexual activity until it is strong in both chromophobic and chromophilic cells. The amt. of vitamin C is apparently proportional to the amt. of hormone produced. Within individual cells, the reaction is localized in the zone of Golgi. The intermediate lo be generally has a weaker reaction than the anterior lobe. The echinochrome of *Arbacia* eggs also gives a pos. reaction for vitamin C. 23 references. W. C. Tobie

Effect of halogenated hydrocarbons on eggs of *Toxocara canis* (Lucker) 15.

Krogh, August. Osmotic Regulation in Aquatic Animals. Cambridge: Univ. Press. 242 pp. 15s. net

12—FOODS

H. A. LEPPER

Variations and reasons for the variations of the iodine content of the air in Central Europe and their importance for the iodine content of foodstuffs. H. Cauer. *Beiheft Z. Ver. deut. Chem.* No. 34, *Angew. Chem.* 52, 625-8 (1939).—A comprehensive treatise and evaluation of available statistical material developed by C. and other investigators covering the period of about 1923 to 1938. General findings are that a considerable reduction in I content occurred in the last decade. References.

Karl Kammermeyer

Over two thousand estimations of the pH of representative foods. Milton A. Bridges and Marjorie R. Mattice. *Am. J. Digestive Diseases Nutrition* 6, 140-9(1939).—In tabulated form 2100 detns. of the pH of over 400 representative foods are presented. Edward Eagle

Micro-Kjeldahl determinations on foods. Oskar Steiner. *Z. Untersuch. Lebensm.* 78, 300-4(1939). Data on 17 foods are tabulated. The advantages of the method are discussed. M. M. Piskur

Electrochemical determination of small amounts of copper and of lead in food products. M. S. Zakhar'evskiĭ. *Voprosy Pitaniya* 7, No. 4/5, 180-8(1938); *Khim. Referat. Zhur.* 2, No. 4, 84(1939).—The method is based on the measurement of the amt. of electricity which is passing through the circuit Pb-soln.-metal during the soln. of the metal under investigation. Pt wires, having a surface of 0.35 sq. cm. and sealed into glass tubes, are used as electrodes. The Cu in the sample is deposited on an electrode, which is then immersed in a glass contg. a 0.1 *N* soln. of $CuSO_4$ in a 0.2 *N* soln. of CH_3COOH. An auxiliary Pt electrode is placed in the same glass. Both electrodes are connected to a milliammeter. By measuring the current strength and the time, the amt. of electricity passed through the circuit during the soln. of the metal is detd. As little as 0.02 mg. of Cu can be detd. The error is about 10% at a Cu content of 0.01 mg. The Pb is sepd. by electrolysis as PbO_2. A mixt. of equal vols. of normal CH_3COOH, of water and of satd. solns. of CH_3COONa and KNO_3 was used as solvent. Pb can be detd. in the amt. of 0.01 mg. with an error of about 10%. W. R. Henn

Electrometric determination of the titrated acidity in dark-colored liquids. V. A. Rush and S. S. Aksarina. *Voprosy Pitaniya* 1938, No. 4/5, 164-72; *Khim. Referat. Zhur.* 2, No. 4, 84-5(1939).—The electrometric method of titration (with quinhydrone) is recommended for detn. of the acidity of food products. Results of expts. for the detn. of the titrated acidity of sauces, tomatoes, jams and berry preserves are given. W. R. Henn

Food poisoning due to staphylococci with special reference to staphylococcus agglutination by normal horse serum. Glenn G. Slocum and B. A. Linden. *Am. J. Pub. Health* 29, 1326-30(1939). J. A. Kennedy

Simplifying the determination of the moisture content of grain by a preliminary drying. P. Chatskiĭ. *Spirto-Vodochnaya Prom.* 1938, No. 9, 40-1; *Khim. Referat. Zhur.* 2, No. 2, 131(1939).—Instead of the formula for the detn. of the moisture content of grain $W = [1 - (bd/ac)]\ 100\%$, the use of a special table is recommended. For const. wts. of the sample (15 g. for the preliminary and 3 g. for the second drying) a value for the total moisture content is found in the table directly. The results can be made more accurate by interpolation.

W. R. Henn

Protection of cereal seed from the granary weevil by disinfecting agents. E. Reinmuth and H. A. Kirchner. *Anz. Schadlingskunde* 15, 115-17(1939).—The com. organomercury seed disinfectants tested were Abavit Neu (I), Germisan (II) (cf. Saillard, *C. A.* 29, 4888[8]), and Ceresan UT 1875a (III) (cf. Brentzel, *C. A.* 33, 9522[6]), used dry at the rate of 200 g./100 kg. wheat, and as 0.1% solns., the grain being soaked 30 min. and then dried. To 400 g. of grain, after treatment with the resp. disinfectants, 100 adult weevils [*Calandra granaria*] were added, and the infested portions were placed at 19-20° for 143 days, one complete series being left undisturbed and another agitated twice weekly. Solns. of II and III proved valueless, for the increase in weevils was in no case less than that in the untreated control. The soln. of I was more satisfactory, allowing an increase of but 52-125% in no. of weevils. The dry disinfectants were much more effective: III allowed an increase of 37-65% in no. of weevils, and I and II allowed no reproduction and killed all. After 70 days more the germination of the treated and untreated infested wheat was compared with that of weevil-free untreated wheat which germinated about 95%. Germination of the infested, untreated wheat had decreased about 10%, that treated with III showed no change, that with II a decrease of about 5% with 8% showing injury to the coleoptile, and that with I no change. Thus treatment with dry I is most satisfactory from all standpoints. Agitation of the grain produced no appreciable deviation in results. Edwin J. Seiferle

The determination of the flour yield from the starch content in grain. B. S. Dmitriev and P. I. Demkovskiĭ. *Trudy Odesskogo Inst. Tekhnol. Zerna i Muki im. I. V. Stalina* 1938, 69-80; *Khim. Referat. Zhur.* 2, No. 2, 131 (1939).—The content of starch in grain decreases fairly uniformly from the center to the periphery. Therefore, the detn. of starch can characterize the purity of the grinding. Starch in the flour was detd. by the polarimetric method of Evers. The yield of flour cannot be accurately detd. from the starch content in the grain for the tech. chem. production control, because of the necessity for the detn. of corrections for the optical active carbohydrates in the different grades of grain. W. R. Henn

The pigments of grain and a method for the determination of the quality of flour from the color of its alkaline extracts. N. I. Ozolin. *Trudy Odesskogo Inst. Tekhnol. Zerna i Muki im. I. V. Stalina* 1938, 56-68.—In wheat there were found a yellow and a red pigment, which were extd. from flour by an alc. soln. of a base. Curves of the "basic no." were obtained from the colorimetric study of these exts. These curves were the higher the lower the quality of the flour. By the method of the "basic no." the quality of flour in baked bread can be detd. **A colorimetric method for determination of corn flour in mixture with wheat flour.** *Ibid.* 81-8.—The method is based on the different contents of tryptophan in the protein complexes of wheat and corn. The flour is treated with fuming HCl to which alc. has been added and the amt. of corn flour in the HCl soln. (which acquires a characteristic red-

violet color) is detd. colorimetrically. Through *Khim. Referat. Zhur.* 2, No. 2, 131 (1939). W. R. Henn

Conditioning of hard wheat. P. G. Demidov. *Trudy Odesskogo Inst. Tekhnol. Zerna i Muki im. I. V. Stalina* 1938, 21–38; *Khim. Referat. Zhur.* 2, No. 2, 131(1939).—The cold and the hot methods of conditioning cause a no. of phys. and chem. changes in the grain (softening of the endosperm, increase of the water-absorption properties, activation of the enzymes and increase of the quality of gluten) which improve the milling properties of the grain. The baking properties of flour are damaged by the hot method and improved by the cold method of conditioning. W. R. Henn

Saccharification in wheat flour. A. Ostrovskiĭ. *Biokhimiya Khlebopecheniya* 1, 23–38(1938); *Khim. Referat. Zhur.* 2, No. 3, 134(1939).—Starch maltose is the chief source of gas formation in dough. The amt. of sucrose + reducing sugars is insufficient to produce the necessary amt. of gases. The increase of the diastatic activity of flour (according to Ramsey) increases the quality of bread only if this increase of the diastatic activity is not caused by the presence of α-amylase in flour. In some cases it is necessary to det. separately the activities of α- and of β-amylases. W. R. Henn

The thermal treatment and the drying of flour. N. I. Ogolin. *Trudy Odesskogo Inst. Tekhnol. Zerna i Muki im. I. V. Stalina* 1938, 3–20; *Khim. Referat. Zhur.* 2, No. 2, 132(1939).—Heating of some grades of flour to 60° for 1 hr. improves the bread-baking properties, owing to a change of the colloidal properties of gluten. W. R. Henn

Effect of various conditions of storage on baking quality of flour. A. G. McCalla, J. D. McCaig and A. D. Paul. *Can. J. Research* 17, C, 452–9(1939); cf. *C. A.* 31, 5047⁵.—Flour stored in sealed containers in a refrigerator at 2° did not change in quality for 22 months after milling. Similar flours stored in sealed containers at room temp. deteriorated significantly within 3 months, while a third lot stored in small bags at room temp. showed first a definite improvement and then rapid deterioration. At the end of 22 months flours stored in sacks were much the poorest. Acidity of all flours increased with storage, but this detn. was of little value in estg. flour quality. J. W. Shipley

A rapid method for the determination of moisture in bakery products. A. G. M. Kul'man, *et al. Vsesoyuz. Nauch.-Issledovatel. Inst. Khlebopekarnoĭ Prom. S. S. S. R.* 1938, 36 pp.—It is proposed to heat the sample with a nonvolatile liquid which remains const. in wt. during the detn. of water (sunflower-seed oil, cottonseed oil, paraffin). The oil is heated for 1–2 hrs. at 200° until no more foam is formed, and then kept in well-sealed glass jars. The sample is heated with the oil in an open Fe crucible in an elec. drying oven or on a sand bath at 185–65°. The moisture is detd. from the loss of wt. A 0.2–0.3% agreement of results in parallel detns. was obtained, and results on 90 samples of flour, dough and bread agreed with those obtained by drying at 105°. The detns. (including all operations) take about 20–5 min. W. R. Henn

Biennial reviews of the progress of dairy science. Section E. Bacteriology and mycology applied to dairying. A. T. R. Mattick, E. R. Hiscox and J. G. Davis. *J. Dairy Research* 10, 514–49(1939).—The following phases of the subject are discussed: milk control in relation to technique; coli-aerogenes group and spore-forming bacteria in milk and milk products; bacterial metabolism, protein and fat metabolism, nutrition, respiration, fermentation and N metabolism of the lactic acid-producing organisms; starters; cheese ripening; cheese faults; butter; pasteurization; canned and dried milk products; and ice cream. A. H. Johnson

Kay and Graham's phosphatase test. A. Modifications in technique. B. Effect of bacterial growth. F. K. Neave. *J. Dairy Research* 10, 475–84(1939).—By the use of Na hexametaphosphate it was possible to eliminate the final filtration in the phosphatase test and thus appreciably to shorten the time required for the test. It was necessary to avoid direct sunlight during that part of the test in which Folin's reagent is in use. Other minor precautions are also mentioned. The pH of the milk samples tested varied naturally before pasteurization from pH 6.5 to pH 6.9 without affecting the validity of the test. The test was also unaffected by the presence in milk of bacteria which produce reducing substances or which hydrolyze the substrate (Na phenyl phosphate) unless the organisms are present in very large nos. The addn. of mercuric chloride, one part in 10,000 parts of milk, could be used without any significant effect on milk phosphatase and increased the keeping time of the milk from 1 to 8 days. Concn. of 1 to 5000 or greater had a destruction or retarding action on the phosphatase. A. H. Johnson

A rapid phosphatase test. A. Adaptation of Scharer's modification to pasteurizing conditions in Great Britain. B. A study of factors influencing the reliability of the test. R. Aschaffenburg and F. K. Neave. *J. Dairy Research* 10, 485–97(1939).—By adapting Scharer's "10 minute field test" to British conditions of pasteurization, an accurate phosphatase test has been evolved requiring less than 1.5 hrs. for completion. The method is described in detail. A small percentage of anomalies was detected when the new method was applied to the examn. of pasteurized samples bulked from small quantities of milk (less than 100 gal.). This led to a study of several factors thought to be the likely cause of such anomalous results. No correlation was found between the phosphatase surviving heat-treatment and the stage of lactation when milk from individual cows and from small groups of animals was tested, with the possible exception of the early stages of lactation when the enzyme concn. before and after heating was frequently found to be too low. Pasteurized milk from animals suffering from mastitis tended to give abnormally high results for the phosphatase test. The amt. of residual phosphatase was subject to considerable fluctuation. A. H. Johnson

A slide rule especially constructed for the rapid determination of the simplified real molecular constant of milk. P. Gallot. *Bull. soc. ind. Rouen* 66, 346–7(1938).—Description of a slide rule especially constructed by G. for the detn. of the simplified real mol. const. of milk, representing the lb. of lactose isotonically equiv. to the sum of the milk crystalloids. J. C. Jurrjens

The lipides of milk. II. The fat acids of the sphingomyelincerebroside fraction. Floyd E. Kurtz and Geo. E. Holm. *J. Dairy Sci.* 22, 1011–15(1939); cf. *C. A.* 28, 6861⁹.—The acetone-insol., ether-insol. lipides of milk were isolated and found to consist of approx. equal parts of sphingomyelin and cerebrosides. Their amt. was approx. 15% of that of the ether-sol. lecithin-cephalin material. The fat acid constituents were analyzed and found to consist chiefly of lignoceric acid (approx. 80%) which was isolated and identified. The other 20% of acids was found to be a very complex mixt. of satd., unsatd., hydroxy satd., and presumably hydroxy unsatd. acids; with the exception of myristic acid none was present in sufficiently great concn. to make isolation possible with the limited supply of available material. It is indicated that myristic acid is present in a concn. of less than 1%. The presence of lignoceric acid in high concn. and the indicated nature of the other acids are in harmony with the nature of the acids of sphingomyelin and cerebrosides obtained from other sources. A. H. Johnson

The effect of light on the vitamin C of milk in different containers. J. Houston, S. K. Kon and S. Y. Thompson. *J. Dairy Research* 10, 471–4(1939).—Brown glass bottles allowed little destruction, green glass bottles considerably more, and wax-impregnated cartons still more. In clear glass bottles only half as much vitamin C remained as in the wax-impregnated cartons. A. H. Johnson

Cooked and oxidized flavors of milk as affected by ferrous iron. I. A. Gould. *J. Dairy Sci.* 22, 1017–23(1939).—The heating of milk momentarily to 80–82° or above prevents the development of an oxidized flavor as induced by 2.8 p. p. m. of ferrous Fe. This occurs irrespective as to whether the Fe is added before or after the heat-treatment. The appearance of a strong cooked flavor at these temps. is correlated with the failure of the oxidized flavor to

develop. The liberation of sulfides is related to the cooked flavor and prevents the development of the oxidized flavor. The "critical" temp. is different for milk contg. added ferrous Fe than for that contg. added Cu, owing to differences in their abilities to form complexes with the substance supplying the heat-labile S or due to differences in their oxidizing properties. A. H. Johnson

Proteins in whey. Margrethe Sørensen and S. P. L. Sørensen. *Compt. rend. trav. lab Carlsberg*, Sér. chim. **23**, 55-99(1939).—Pptn. of the casein with 100 cc. *N* AcOH removes 4500 mg. of N and 230 mg. of P from skim milk of av. N content of 5500 mg. and av. P content of 250 mg. per l., leaving 1000 mg. of N and 20 mg. of P in the whey. Pptn. of casein with $(NH_4)_2SO_4$ (I) removes as much N and P as does AcOH when 32.8 g. and 33.5 g., resp., per 100 cc. of milk are added. N and P are removed at a much slower rate per g. of salt added than prevails up to the addn. of the 32.8- and 33.5-g. amts. In this range a slimy fraction, formerly designated lactoglobulin, first appears. This fraction produced "*lactomucin*" (II) of green color and a red substance (III). Removal of this uncrystallizable mixt. and the addn. of more I permitted the sepn. of 2 crystallizable fractions, (1) Palmer's cryst. globulin-like substance (*C. A.* **28**, 3091[6]) (IV), obtained in both a cryst. and gelatinous form, and (2) an "insol. substance" (V). The major part of the whey proteins begins to ppt. when a concn. of 60 g. of I per 100 cc. is reached and is complete on adding 80 g. One-step addn. of I to skim milk of either pH 6.7 or 5.4 left equal amts of N in the whey. Fractional pptn. (fractional addn. of I alternated with filtrations) leaves more N in the whey than one-step addns. of the same amt. of I, indicating co-pptn. in the former method. "Lactomucin" was obtained from whey by bringing the concn. of I to 65%, the ppt. washed with 65% I, dissolved and filtered, the soln. of pH 5.8 contg. 1/4 of the N of the whey; addn. of I to this soln. to 45% yielded a green ppt. The filtrate, brought to 48% I, yielded a greenish fraction, and the second filtrate brought to 51.4% I yielded a second greenish ppt. These 3 ppts. were combined and H_2O was added, leaving II, a green, thick, oily mass, slowly sol. and when pptd. with I at 40% and washed with 40% I was found to have 0.04 mg. P, 0.618 mg. carbohydrate, 0.138 mg. glucosamine and 0.019 mg. tryptophan per mg. of protein N. The portion sol. in 40% I was pptd. by increasing I to 70%, repptd. to free it from lactose; it was found to have P 0.015 mg., carbohydrate 0.325 mg., glucosamine 0.281 mg. and tryptophan 0.220 mg. per g. of protein N. The green color of these fractions is removed on adding NH_4 but reappears on adding acid. Increase of I to 57.3%, 58.3%, 62% and 68.5% in the filtrate from the first green ppt. yielded successive red fractions, which were combined and repptd. to yield finally III, having P 0.017 mg., carbohydrate 0.153, glucosamine 0.102 mg. and tryptophan 0.653 mg. per g. of protein N. The red fractions account for about 80% and the green fractions for about 20% of the protein N of this part of the whey proteins. II is difficultly sol. in H_2O and in neutral salt soln.; III is sol. in H_2O. IV, contg. 0.2–0.3 mg. tryptophan per mg. of protein N and no P or carbohydrate, is obtained, after removal of II and III, by pptg. all of the remaining protein (lactalbumin proper) with I, repptg. to remove lactose and finally dissolving in H_2O, dialyzing and crystg. at room temp. IV is insol. in H_2O but sol. in weak salt soln., accounts for 50% of the lactalbumin N, and crystallizes after seeding to long needles or prismatic crystals. A gelatinous fraction is obtained from the soln. of lactalbumin proper by acidifying with H_2SO_4 to pH 4.6 and adding I to 45%, filtering and allowing the filtrate to stand until it jells. This fraction reverts to IV by adding I at pH 6. Crude IV contains V which has somewhat more tryptophan and accounts for about 10% of the lactalbumin fraction proper. In another series of expts. to obtain the cryst. fractions of lactalbumin (probably IV and V), estd. to total one-fifth of the lactalbumin fraction, the authors had to resort to fractional dissolving of the protein in gradually decreasing concns. of I to free the cryst. portions from amorphous material. The protein soln. is first half satd. with I and filtered. Seeding of the filtrate and gradual increase of I to 60% produced a mixt. of amorphous and cryst. material which is washed and stirred with gradually decreasing concns. of I, until a concn. of 50% is reached. On seeding, these solns. yield on long standing and gradual increase of I to 65%, 2 well-defined, P-free and carbohydrate-free, cryst. substances (needles), contg. 0.4 mg. tryptophan per mg. of protein N. No crystn. could be induced without this fractional treatment. Photographs of the crystals are shown. Detns. of protein N, P, carbohydrate and glucosamine (by methods published earlier by one of the authors) and the detn. of tryptophan by the Komm and Bohringer method (*C. A.* **17**, 2125), in the examn. of the fractions, were applied after sepn. of the proteins by tannic acid since it was found that tannic acid, in contrast to heat or CCl_3CO_2H, ppts. these fractions completely over a wide range of concn. H. K. Salzberg

Factors affecting the solubility of milk powders. IV. The influence of speed and duration of stirring on solubility with a description of a rapid method for solubility determinations. G. R. Howat, J. A. B. Smith, R. Waite and N. C. Wright. *J. Dairy Research* **10**, 198-514(1939); cf. *C. A.* **29**, 3053[4].—The effects of alterations in the duration and speed of stirring on the apparent soly. of milk powders were investigated. It was concluded that shaking of the powder reconstituted in a 10% mixt. for 30 sec. was sufficient to dissolve the truly sol. portion of the dried milk, but that the protein that had become denatured during the drying process tended to pass into soln. with increasing speed, and duration of stirring. A rapid method for estg. the soly. of milk powders on a total solid basis involving only 1-min. shaking is described and discussed. The sediment method frequently used in industry as a guide to the soly. of dried milks is compared with the rapid method. At higher solubilities the sediment vol. may serve as a guide to small changes in soly., but in the lower soly. ranges its usefulness was limited. The washing of the sediment with one or more changes of water merely introduced addnl. errors into this method of soly detn. The detn. of soly. by detg. protein in the centrifuged reconstituted milk was not as good an index of soly. as detg. the total solids in the soln. The soly. of the proteins in roller powder was 20 to 30% higher at 50° than at 20° under the same conditions of reconstitution. A. H. Johnson

Butter in cold storage. Studies on the keeping quality and oxidation. O. R. Overman, O. F. Garrett and H. A. Ruehe. *Ice and Cold Storage* **42**, No. 498, 141-2(1939).—The length of time that elapsed from initial exposure of fat to O until the beginning of apparent vol. absorption varied greatly for different butters and even for samples of the same butter after different periods of storage. No consistent relation between the initial quality of the butter or the time in storage and the induction time could be observed. For some butters the induction period was shorter after many months of storage, for some butters it was not shorter and for some butters it was longer after storage. Butter to which 0.25% of $CuSO_4$ had been added showed a much shorter induction period than did other samples. The I absorption no. showed no correlation with keeping quality. Butters made during the months of May to September gave I absorption nos. ranging from 36.0 to 41.8 while butters made in December gave values ranging from 30.24 to 33.16. A. H. Johnson

Judging the weight decrease of printed butter and margarine. A. Schloemer. *Z. Untersuch. Lebensm.* **78**, 298-300(1939); cf. *C. A.* **34**, 825[1].—General discussion. M. M. Piskur

Margarine production in Buenos Aires. Abel Sánchez Díaz. *Rev. soc. bras. quím.* **8**, 95-106(1939). E. S. G. Barron

Applying fat characteristics for distinguishing between sheep and cow milk cheese. Alfons Schloemer and Erich Langmann. *Z. Untersuch. Lebensm.* **78**, 293-8(1939).—Means of distinguishing Roquefort cheese and blue cheese or other substitutes of the former were investigated. The butyric acid and the isoöleic acid value of fat of sheep and cow milk are practically the same. The fat from sheep milk cheese had an appreciably greater

"total value" and residue value than the fat from cow milk cheese. These characteristics can be used to differentiate the fats. About 38 references. M. M. Piskur

Investigation on fruit products. XV. Experiments on the production of unfermented apple juice. 1938. Vernon L. S. Charley and V. E. Sills. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 188–203(Pub., 1939); cf. *C. A.* **33**, 765[4,7,8].—Apple juice produced from culinary (75%) and cider (25%) fruits was processed in 26 different ways into bottles of varying degrees of sterility. Satisfactory sterility was obtained in 98% of bottles filled by the cold sterilization process, 100% of bottles in which the juice had been pasteurized in the container and in varying percentages of the flash pasteurized juices. Pasteurization at 185°F. for 30 sec. followed by immediate cooling and filling at 160°F. into hot steamed bottles gave a satisfactory product, but the sterility of the other products was affected to a considerable extent by the flash 3 pasteurization and filling temps. and by the sterility of the bottles into which the juice was filled. The flavors of juices pasteurized at the highest temps. were preferred by a flavor panel both to those of juices pasteurized at lower temps. or in bottle, and also to the cold-pressed juice. The best sterilization of washed and rinsed bottles was obtained by finally rinsing with a 2% SO_2 soln. K. D. J.

Ice crystals in frozen fruits. J. G. Woodroof. *Ice and Cold Storage* **42**, No. 498, 139–40(1939).—The solidity, rigidity or firmness of tissues usually frozen appears to be due to the distribution and state of the liquid in the cell, possibly in the form of surface films between granules, microsomes or droplets of various kinds as well as to the presence of vascular bundles, thickened walls or cuticle. The removal of a part of this water by freezing at moderately low temp. and later restoring on thawing is partly reversible and to that extent is not injurious; while the complete removal at very low temp. seems to ppt. the colloids and is irreversible. However, the cell walls of some fruits and vegetables are easily broken by ice crystals on freezing. Cell-wall rupture is much more frequent in some tissues than in others and is assocd. with the nature of the material frozen, the time and the rate of freezing and the size, shape and location of the ice crystals. The cells of rhubarb are much more inclined to push apart than cells of other plants of this group. The cells of stringbean pods sometimes sep. rather than rupture, but those of spinach, asparagus and broccoli rupture badly. Ripe strawberries, raspberries, dewberries, peaches, figs and cherries are difficult to freeze because of the ease with which their colloidal complex is changed. A short interval between formation of the first ice crystals and the complete hardening of the product is essential for the preservation of texture, palatability and satisfactory superficial appearance of fruits and vegetables. A. H. Johnson

Control of wastage of citrus fruit by impregnated wrappers on a commercial scale. A. Farkas. *Hadar* **12**, 227–31(1939); cf. *C. A.* **33**, 1827[6].—The *toxicity of biphenyl* was studied by feeding it to a rat and a monkey at rates corresponding to 7 and 2.5 g. per week for a man weighing 70 kg. No ill effects on the animals were observed. A man consumed 435 mg. in 13 weeks without effect. Biphenyl dust in the air can be tolerated for several days 8 without harm except a transient smarting of the eyes. It is concluded that biphenyl is harmless and that quantities likely to be encountered in making or using impregnated wraps can do no harm. Marketability of fruit is unimpaired by use of these wrappers. Fruit in wrappers impregnated with biphenyl shows much less spoilage and can be stored longer. Shipping and storage expts. are described. Colin W. Whittaker

Effect of storage temperature on peaches. M. H. Haller and P. L. Harding. *U. S. Dept. Agr., Tech. Bull.* 680, 32 pp.(1939).—Peaches cannot be held in storage 9 for more than 2–4 weeks, depending on the variety and growing conditions, without serious loss of dessert quality or the development of breakdown. There is generally a marked loss in the flavor of peaches ripened at 50°F. as compared with those ripened at higher temps. Internal breakdown or low-temp. injury develops earlier at 36° and 40°F. than at lower or higher temp. A temp. of 32°F. is recommended for the storage of peaches. W. H. R.

The Long Ashton contribution to the development of pure fruit products. B. T. P. Barker. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 213–19 (Pub., 1939).—A discussion of developments in the prepn. of cider and apple juice and the utilization of cull apples. K. D. Jacob

World developments in fruit-juice production and the present English industry. Roger C. Morel. *Ann. Rept. Agr. Hort. Research Sta., Long. Ashton, Bristol* **1938**, 220–5(Pub., 1939). K. D. Jacob

Silver determination in catadynized acids and fruit-juice lemonades. O. Noetzel. *Z. Untersuch. Lebensm.* **78**, 315–21(1939).—The application of the Feigl reaction (*C. A.* **22**, 4080) for colorimetrically detg. Ag in acids and lemonades was investigated. Ashing followed by fusion with $NaNO_3$ is suitable for destruction of the org. material. M. M. Piskur

Impressions of the German apple-juice industry. Vernon L. S. Charley. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 204–12(Pub., 1939).—See *C. A.* **33**, 7914[3]. K. D. Jacob

Fruit pectins—their chemical behavior and jellying properties. C. L. Hinton. *Dept. Sci. Ind. Research* (Brit.), *Food Invest., Special Rept.* No. **48**, 96 pp.(1939). —Pectin in a food ext. can be detd. by pptn. in 50% acetone. The ppt. is dissolved in warm H_2O and repptd. in acetone with NaCl to assist pptn. A more exact detn. is made by dissolving the first acetone ppt. and repptg. it as Ca pectate. The soln. is treated with 0.5 *N* NaOH overnight, then with *N* acetic acid 5 min., and then with *M* $CaCl_2$. It is boiled with water to remove Cl and dried first in a steam oven and then at 100–110°. Jellying power of the pectins is detd. by the strength of the jelly formed at a pH of 2. The term pectin includes many compds. with minor variations in mol. compn. Their free acidity, pH and alk. ash content vary with the extent to which metallic bases, united with the acidic groups, were removed in the prepn. Detn. of total acidic groups showed that the galacturonic acid units make up 75–95% of the mol. All pectins have a slight reducing action on alk. I solns. indicating a chain structure for the mol. This is the only chem. property that can be correlated with jellying power. Long boiling reduced jellying power and increased I reducing power, but an 80° temp. had less effect. Small amts. of acid had little effect. Pectase action was harmful because the deesterified pectin formed insol. Ca salts. The loss of CH_3OH affects the pH at which jellying power is best. Addn. of alkali or salts affects the action of pectin with metallic salts. The jelly- 7 ing power varies with the type of fruit, the heat to which it has been subjected, pH conditions, and pectase action. The methoxyl content is 11–12%. Amy LeVesconte

Unification of methods of analysis of tomato conserves. Franco Emanuele. *Ind. ital. conserve* **14**, 83–8(1939).— Standards and analytical methods are discussed. O. W. Willcox

The calcium and phosphorus contents of vegetables cooked in fat. Hsi Hsuan Yü and Margaret L. Fincke. *J. Home Econ.* **31**, 711–13(1939).—Asparagus and peas lost no Ca or P and celery cabbage lost no Ca when cooked by the Chinese method of sautéing. Amy LeVesconte

The vitamin C content of honey. Jenö Becker and R. F. Kardos. *Z. Untersuch. Lebensm.* **78**, 305–8(1939).—On the basis of animal tests (biol. test) it was demonstrated that the reducing component of honey is not vitamin C. Fifteen references. M. M. Piskur

Volumetric estimation of lac on glazed candies. Nicholas M. Molnar and Joseph Grumer. *Ind. Eng. Chem., Anal. Ed.* **11**, 673–4(1939).—The lac is dissolved in alc. An equal quantity of water is added and the boiling mixt. is titrated with Na_2CO_3. Phenol red is the indicator. Org. acids interfere but these can be detd. in the aq. ext. Fatty acids can be removed with CCl_4. A. LeVesconte

Determination of color components of paprika spice. L. v. Cholnoky. *Z. Untersuch. Lebensm.* **78**, 157–61

(1939).—A proximate method for detg. the various carotenoids, i. e., carotenes, kryptoxanthin, capsanthin and capsorubin of paprika is a combination of Tswett's chromatographic analysis based on selective adsorption on $CaCO_3$ and $Ca(OH)_2$, with the Kuhn and Brockmann's (*C. A.* **26**, 3533) and other comparative methods of colorimetrically evaluating the amt. of each eluted from sections of the adsorbate. Data on products of various geographical sources, com. products, and the effect of storage on the coloring constituents are tabulated. There was a 5–13% loss of pigment in the ground product after 6 months' storage. M. M. Piskur

Determining the cacao hull contents of cacao powder. A. Müller. *Z. Untersuch. Lebensm.* **78**, 150–6(1939).—The crude fiber of 10 com. cacao products was 0.55–0.92%. A 5.01–9.88% increase in crude fiber occurred per 1% addn. of hull; cacao hulls from different geographical sources contribute different amts. of fiber in the test. M. M. Piskur

The maximum water content of pressed cacao butter. Heinrich Fincke. *Z. Untersuch. Lebensm.* **78**, 314–15 (1939); cf. *C. A.* **33**, 6979[6,3,5].—The moisture content of cacao butter is below 0.03%. M. M. Piskur

Urea as a possible substitute for peanut cake for wintering young stock. C. A. Murray and A. E. Romyn. *Rhodesia Agr. J.* **36**, 554–9(1939).—Feeding expts. indicated that urea can be utilized, at least in part, as a substitute for peanut cake. Nine references. C. W. W.

Comparative value of Napier and Sudan grass when used as soiling crops for dairy cows. L. A. Henke and G. W. H. Goo. *J. Dairy Sci.* **22**, 1007–10(1939).—In expts. comparing green Sudan with green Napier grass as a soiling crop fed to dairy cows, the former proved superior in each test on the basis of quantity of milk produced. Milk production averaged 8.7% higher and roughage consumption 7.2% higher when Sudan grass was fed. The higher production in Sudan grass resulted from a greater intake because of greater palatability and higher nutritive value. Butterfat tests were slightly higher when Napier grass was fed. Analysis of grasses show that Sudan grass was higher in protein, N-free ext. and total nutrients than Napier grass. Sudan and Napier grasses are among the chief grasses grown in Hawaii. A. H. Johnson

The souring of raw disintegrated sugar beets in combination with potatoes for feeding swine. Hans-Joachim Neumann. *Kuhn-Arch.* **52**, 193–205(1939).—Silage prepd. with steamed potatoes and chopped or mashed sugar beets in a ratio of 1:1 or 2.1 makes a suitable feed for swine. These mixts. were free from butyric acid and nitrate N. Very low concns. of ammonia N showed that there was practically no decompn. of protein during the prepn. The ratio of lactic acid to acetic acid was 2.132:1 in the 1:1 mixt. and 2.594:1 in the 2:1 mixt. Potato silage alone had an acid ratio of 1.548:1. The addn. of the sugar beets to the potato silage lowers the pH from 4.10 to 3.74–3.75. C. K. Horner

Poisonous properties of some plants of Western Siberia. G. I. Yavel'berg. *Sovet. Veterinariya* **1938**, No. 3, 75–6; *Khim. Referat. Zhur.* 2, No. 3, 59–60(1939).—Some fodder plants of Western Siberia were exaind. for alkaloids; most of them contained no alkaloids in significant quantities, although some (not formerly classified as alkaloid-contg.) were found to be harmful, e. g., thermopsis. Methods for the detn. of alkaloids and results are given. Content of alkaloids found were *Delphinium laxiflorum* 0.19–0.21; *Veratrum album* 0.13–0.17; *Aconitum barbatum* 0.80–1.00; *Thermopsis lanceolata* 0.52–0.62%. W. R. Henn

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Arsenical soils of Waiotapu Valley. Evidence of stock poisoning at Reporoa (Grimmett) **15**. Hydrogenation of mixed oils (de Leon, Agdeppa) **27**. Substitute for lab. food grinder (Davis) **1**. Extg. grape seed [residue used in stock feed] (Gavrilenko) **27**. Application of H_2O_2 for preservation or refining of beverages (Matui, Yamada) **16**.

1 Paper containers for food products (U. S. pat. 2,176,370) **13**.

Wrapping material for foods, etc. John Eggert and Bruno Wendt (to I. G. Farbenind. A.-G.). U. S. 2,171,427, Aug. 29. Sheets of wrapping material are used such as those of gelatin, paper or regenerated cellulose contg. a 1,3,5-triazine deriv. at most but slightly colored, such as 2 the Na salt of 1,4-bis(2-hydroxy-4-phenylamino-1,3,5-triazin-6-ylamino)benzenedisulfonic acid. Numerous 1,3,5-triazine derivs. are listed which may be used for protecting wrapped materials from the action of ultraviolet light.

Concentrated emergency ration. Paul P. Logan. U. S. 2,176,086, Oct. 17. A concd. food adapted to withstand temps. up to about 55° is formed of ingredients such as bitter chocolate (contg. 54% cacao fat) 160, sucrose 160, 3 skimmed milk powder 70, raw oat flour 30, added cacao fat 30 parts and a flavoring of vanillin crystals concentrate.

Ingredient for bakery cakes. Morris B. Katzman (to The Emulsol Corp.). U. S. 2,176,077, Oct. 10. A reaction product of tetraphosphoric acid with an alc. contg. at least 4 C atoms, such as octadecyl or lauryl alc. or coconut oil mixed fatty alcs., is used to give cakes improved texture and grain.

Device suitable for taking samples of milk from tanks, etc. Allan T. Dahlstrom. U. S. 2,177,477, Oct. 24. 4 Various structural and operative details.

Sediment indicator for testing liquids such as milk. John Drew. U. S. 2,177,060, Oct. 24. App. for testing liquids for sediment includes means for trapping a sample of the liquid to be tested, means for holding filtering material in position to pass the liquid sample therethrough, comprising opposed conduits relatively movable into and 5 out of filtering material clamping relation to each other, one of said conduits being connected to said sample trapping means, pneumatically operable means for effecting the relative clamping movement of said conduits, means for connecting said pneumatic means and also said sample trapping means to a source of compressed air, said means including valves for controlling the admission of the compressed air into said connections.

Curing meat. Meyer Moskowitz and Harry Meisel (to Corn Products Refining Co.). U. S. 2,176,144, Oct. 6 17. Fresh meat, such as pork bellies, is treated with a curing compn. contg. salt and dextrose, then subjected to a washing operation, and then treated with H_2O_2 to prevent darkening when fried.

Preserving the natural color of fresh meat. James J. Doyle. U. S. 2,177,519, Oct. 24. Meats such as ground meats are treated with an alkali metal salt of a weak acid 7 such as Na aluminate to give the meat a pH of 7.0–7.4, and may also be treated with a reducing sugar such as dextrose, an alkali metal salt of a sugar acid, a natural metabolic product of a sugar or a substance such as Na benzoate, for inhibiting bacterial and enzymic action.

Tubing (such as sausage casings) from cellulose derivatives. Frank H. Reichel and Augustus E. Craver (to Sylvania Industrial Corp.). U. S. 2,176,925, Oct. 24. App. is described, and a process of producing seamless 8 tubing comprising extruding in the shape of a tubing a coagulable cellulose nitrate dispersed in a solvent comprising alc. and ether into a coagulating and conditioning bath comprising alc. and water, the concn. of alc. in the bath being such that substantially all of the ether in the cellulose nitrate during coagulation is displaced by alc. and water so that the cellulose nitrate is maintained in an uncontracted but completely coagulated condition, applying internal pressure to the completely coagulated and 9 conditioned cellulose nitrate tubing to stretch the same, and converting the cellulose nitrate in the state caused by stretching substantially to cellulose hydrate. Similar procedure may also be used in producing tubing from solns. of other cellulose derivs. such as viscose. Cf. *C. A.* **34**, 886[8].

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

Some new products of 1939. A few of the year's achievements in industrial and medical chemistry. H. E. Howe. *Barron's* **19**, No. 49, 18(Dec. 4, 1939). A. M. P.

Civilian gas masks in other lands. Ed. Smolczyk. *Z. ges. Schiess- u. Sprengstoffw.* **34**, 273–5(1939).—This article contains descriptions and photographs of civilian gas masks of various nations insofar as these have been published. A. L. Kibler

Medical experience of the Americans with chemical warfare gases in the World War. Max Gerchik. *Protar* **5**, 173–9, 199–202(1939).—The object of this article was to discuss the American records of gas casualties with special reference to therapy and aftereffects. Data are given for phosgene, chlorine and mustard gas. The aftereffects of these gases are discussed in considerable detail. A. L. Kibler

Carbon monoxide. Fritz Gehrmann. *Gasmaske* **11**, 97–101(1939).—This is primarily a historical treatment of the toxic effects of CO. It also contains brief directions for treatment of poisoned persons and a brief description of the Auer CO detector. This app. is based on the reaction of CO with a mixt. of I_2O_5 and fuming H_2SO_4, liberating I, which colors the liquid. A comparison of the color with a color card gives the concn. of CO. A. L. Kibler

Accident and sickness prevention in chemical industries. Karl Schildt. *Chem. App.* **26**, 249–52, 269–72, 289–94, 308–10(1939); cf. *C. A.* **33**, 7921[8].—A discussion of accident-prevention measures in German chem. industries. G. W. Stroebe

Dust prevention by use of carbonate minerals. H. Charlton Dod. *Chem. Eng. Mining Rev.* **32**, 57(1939).—Since certain mineral carbonates and oxides carry elec. charges the opposite of those carried by siliceous particles, they may be used as tamping in drill holes. Prepd. cylinders of damp tamping could be supplied. In using carbonate minerals for tamping it is necessary to ensure that the atm. be charged with water vapor. The air of the mine chamber should be filled with water spray before "firing out." The mixed dust of limestone and magnesite is efficacious in the settling of siliceous dust around ore bins, chutes, "crackers," etc., so the use of water is not compulsory. W. H. Boynton

Organic chemistry and the chemical industry (in U. S. S. R.). N. D. Zelinskiĭ. *Shornik "Matem. i Estestv. v S. S. S. R."* **1938**, 465–73; *Khim. Referat. Zhur.* **2**, No. 3, 28(1939).—A review of developments in the last 20 years 7 of the destructive hydrogenation of petroleum products, synthesis of artificial rubber, aromatization of the naphthenes and paraffins, desulfurization of petroleum and shale oils, development of the production of stable dyes, synthesis of chem.-pharmaceutic prepns. production of alkaloids from domestic raw materials, and the synthesis of liquid fuel. W. R. Henn

Film-forming plastics. Effects of solvents, diluents and plasticizers. Frank W. Reinhart and Gordon M. 8 Kline. *Ind. Eng. Chem.* **31**, 1522–9(1939).—Compatibility, flexibility and film shrinkage are given in extensive tables for cellulose triacetate (I), cellulose nitrate, cellulose acetobutyrate, cellulose acetopropionate, hydrolyzed I, ethylcellulose (II), Me acrylate resin, chlorinated rubber, benzylcellulose and isobutyl methacrylate resin, with 39 plasticizers and a wide variety of solvent mixts. The shrinkage of the plastics decreased in the order in which 9 they are given above, being negligible for the last 4. II had the greatest range of soly.; I, least. Shrinkage was increased by the use of certain diluents which have a swelling action on the plastic but the resulting films tended to be brittle. Arnold M. Collins

Preparation of plastic masses on a basis of partially hydrolyzed sawdust. L. V. Gordon, L. N. Kozlovskaya and L. L. Korshun. *Lesokhim. Prom.* **6**, No. 1, 10–12 (1938); *Khim. Referat. Zhur.* **2**, No. 3, 122(1939).—Birch sawdust was treated with an equal wt. of 1.3–1.5% H_2SO_4 soln., dried for 5 hrs. at 110–20°, and mixed with an 2 aq. alk. soln. of resol tar (with a NaOH catalyst, the condensation did not reach the stage of sepn. into layers). The impregnating soln. contained 1.5–2% NaOH soln. in an amt. equiv. to, or slightly exceeding, the amt. required for the neutralization of the acid in the sawdust. The impregnated mass was dried to 4–5% moisture content and pressed at 140–5° under 400 kg./sq. cm. Rolling at 90° for 1.5–2 min. increased the rate of the polymerization and increased the fluidity of the press-powder. The product 3 had av. impact hardness of 5–8 kg.-cm./sq. cm., temporary resistance to bending 450–700 kg./sq. cm., water resistance (wt. added in 24 hrs.) 0.1–0.3%, sp. surface elec. resistance 5×10^{11} ohms, sp. vol. elec. resistance 2×10^{11} ohms, elec. breakdown strength 10.7 kv./mm. The plastic mass can be easily polished and drilled. W. R. Henn

Preparation of plastic masses on a basis of wood fibers. G. A. Kan. *Lesokhim. Prom.* **6**, No. 2, 12–14(1938); 4 *Khim. Referat. Zhur.* **2**, No. 3, 122(1939).—The object of the expts. was to prep. from wood fibers a material of uniform strength in all directions and of greater strength than the original wood material. Pine chips were boiled for 2 hrs. in a 1% alk. soln. at 140°, and ground to small fragments. The fiber mass (yield about 85% of the wood material) was shaped into bricks and air-dried. The bricks were compressed at different temps. and pressures. They possessed satisfactory strength, but were not water-resistant. In order to impart water resistance the mass was impregnated with resol phenol-formaldehyde resin in the form of an emulsion obtained by diln. of an alc. soln. of resin with water or with an alk. soln. of resin followed by treatment with acid. The impregnated samples absorbed water to the extent of 2–15% in 3 days, depending on the thoroughness of the mixture of the fiber with the resin. Pressure of 600 kg./sq. cm. at 160° for 15 min. gave best results. W. R. Henn

Laminated plastics with plywood base. S. P. Krasovskiĭ. *Lesokhim. Prom.* **6**, No. 1, 13–15(1938); *Khim. Referat. Zhur.* **2**, No. 3, 122–3(1939).—Laminated plastics (lignofol) are prepd. by soaking plywood with a soln. of resin in denaturated alc., drying and subjecting to high pressures; a considerable compression of the wood takes place and the resin is converted to an infusible and insol. state. Penetration of the wood decreases with increasing 7 concn. of resin, and increases slightly with duration of soaking (5–20 hrs.) and with decreasing thickness of the plywood (2–0.5 mm.). The optimum temp. of compression is below the optimum for the formation of the *C* stage (170–80°). The optimum pressure is not lower than 300 kg./sq. cm. The optimum time of compression is 4 min. for 30-mm. samples and 5 min. for 50-mm. samples. Lignofol of an equal vol. wt. with "tekstolit" had a lower resistance to compression, and a higher resistance to 8 stretching, to static bending and to bending by blows. Lignofol is satisfactory in regard to water absorption, hardness and elec. resistance. W. R. Henn

The action of heat in the plasticization of wood materials. V. G. Matveev and N. M. Chetverikov. *Lesokhim. Prom.* **6**, No. 2, 19–25(1938); *Khim. Referat. Zhur.* **2**, No. 3, 121–2(1939).—Wood material is heated preliminarily to 60–80° (before pressing), then for 2 hrs. at 130°. The object of the preliminary heating is to obtain 9 the max. increase of the plasticity of the wood material. During the following heating the elastic forces (which were formed during the deformation) are dampened and a physicochem. transformation of the wood material takes place. Bricks of plasticized wood kept their shapes satisfactorily at a relative humidity of 60%. Pressed bricks, which had not been subjected to the second heating, were deformed at 60% relative humidity. Bricks which were heated to

100–10° swelled considerably at a humidity of above 60%. It is concluded that the 2nd heating decreases the hygroscopicity of the wood material. The wood material was darkened and its water resistance increased by a prolonged treatment at 120–40° after compression. W. R. Henn

Preparation of bakelitized wood material stable to acetic acid. E. N. Rassadina. *Lesokhim. Prom.* **6**, No. 2, 15-17(1938); *Khim. Referat. Zhur.* **2**, No. 3, 123 (1939).—Bakelitization of wood gave a product of good mech. and elec.-insulating properties and of high chem. stability. Four types of phenol-formaldehyde resins were investigated for the bakelitization. Best results were obtained from (1) basic soln. of resol resins (with NaOH as catalyst; the condensation did not reach the stage of sepn. into layers), (2) resinite prepd. from 6 parts of phenol, 7 parts of a 40% formalin soln. and 1% Na_2CO_3 soln. (by heating on a water bath at 80°; the water layer did not sep.). Birch wood material impregnated with these resins was boiled 30 hrs. in 15%, 60% and 80% AcOH soln., in black acid, in crude AcOH, in Et_2O and in MeOH. Changes in size and mech. properties of the samples and in color of the acid were noted. W. R. Henn

Formation of phenol-formaldehyde resin. I. Condensation of guaiacol with formaldehyde. Hans v. Euler, Erich Adler and Dagmar Friedmann. *Arkiv Kemi, Mineral. Geol.* **13B**, No. 12, 7 pp.(1939).—Guaiacol (I) (2.2 mol., 74.4 g.) was heated 10 min. on a water bath with 40% CH_2O soln. (1 mol.) and 0.024 mol. HCl. Distn. gave 30 g. of unchanged I, 9.75 g. of an oil, $b_{0.5}$ 210–12°, and higher fractions. The oil crystd. and was sepd. by crystn. from C_6H_{14} into *4,4'-dihydroxy-3,3'-dimethoxydiphenylmethane* (II), needles, m. 107–8° and *2,4'-dihydroxy-3,3'-dimethoxydiphenylmethane* (III), plates, m. 119–20°. I (1 mol.) with 40% CH_2O (2 mols.) and 10% NaOH (1 mol.) after 2 days at room temp. gave, when acidified and shaken with Et_2O, a cryst. ppt., probably a mixt. of vanillyl alc. and *1,5-di(hydroxymethyl)-2-hydroxy-3-methoxybenzene*. On standing, *3,3'-dimethoxy-4,4'-dihydroxy-5,5'-di(hydroxymethyl)diphenylmethane* (or an isomer) m. 148–9°, sepd. This was also formed from II (1 mol.), 2 mols. CH_2O, and 2 mols. NaOH in H_2O soln. by heating 1 day at 40–50°. III gave no cryst. product when similarly treated. Conclusion: The mechanism of the formation and hardening of I-CH_2O resins, involving the formation of $-CH_2-$ bridges, is similar to that for Ph-OH-CH_2O resins. Arnold M. Collins

High-grade coumarone (and indene) resins. W. Obst. *Tar & Bitumen* **37**, No. 13, 151–2(1939); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 377(1939).—A review. George Ayers

Microscopy in the resin industry. T. G. Rochow. *Ind. Eng. Chem., Anal. Ed.* **11**, 629–34(1939).—Use of the microscope in the detn. of *n*, sp. gr. and hardness and for the study of stresses, weathering of films, dispersion of pigments and reagents, and identification of fillers (by observation of polished cross sections). A. M. Collins

Resin bonding without hot presses. Thomas D. Perry. *Hardwood Record*, Special issue **1939**, 12, 16.—A discussion of the use of cold-setting resins for bonding operations. Leopold Scheflan

Furfural-phenol compounds. E. E. Novotny. *Modern Plastics* **16**, 32, 154–8(1938); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 377(1939).—The properties of furfural as a plasticizer and of furfural resins as hardening agents and components of synthetic resins are discussed. George Ayers

Note on the elastic properties of vinyl sheeting. S. Bateson. *J. Applied Phys.* 10, 887–9(1939).—Strips cut in the direction of extrusion were tested at 20, 30, 40 and 50°, at loads up to about 2.5 kg./sq. cm. Plastic flow apparently occurred at temps. above 40°. Creep is pronounced during both extension and recovery, obeying an empirical law of the form $S = S_0 + a_1 t^{1/3} + a_2 t$. Elongation and birefringence are not strictly proportional but exhibit considerable lag. Elasticity, creep and birefringence depend upon temp., amt. of plasticizer and viscosity of polymer. S. L. Gerhard

The physics of heat insulation. Alpheus W. Smith. *Verre et silicates ind.* **10**, 340–5(1939); cf. *C. A.* **33**, 4698³. Herbert S. Willson

New insulating material. L. Zubkova. *Legkaya Prom.* **17**, No. 4, 106–8(1938).—A new insulating material, Viamiz, is prepd. by foaming water solns. of tech. gelatin (6–10%), adding formalin and an antiseptic, pouring into wooden forms, and drying at 20–30°. The material burns but does not support combustion. It is hygroscopic and is insol. in alc. and benzene. Its use for soundproofing is suggested. B. Z. Kamich

The triple alliance in electrical insulation. Leo J. Berberich. *Elec. Eng.* **59**, 23–36(1940).—A review of progress in elec. insulation achieved by the combined efforts of physicists, chemists and elec. engineers. 30 references. C. G. F.

The thermal insulation of carbide shaft ovens. N. N. Znamenskiĭ. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 56–7 (1939).—When vermiculite, a hydrated Mg Al silicate contg. Fe, Na and sometimes K, is heated to 500° it loses H_2O and swells to 15–20 times its original vol., forming zonolite. The latter is an excellent insulating material. H. M. Leicester

New noninflammable insulating liquid for transformers. K. A. Andrianov and A. K. Vardenburg. *Vestnik Elektroprom.* **10**, No. 5, 14–17(1939).—A new noninflammable insulating liquid for transformers includes trichlorobenzene and Sovol (chiefly pentachlorobiphenyl) and has the following properties: colorless, $d_4^{20} = 1.506$–1.550, at 65° not over 10 centipoises, at 90° about 4 centipoises, b. p. 310–320°, coeff. of expansion 0.0006, heat capacity 0.25 cal./kg.°C., heat cond. about 0.2 cal./m.°C. hr., solidifying point 29–30°, acid no. 0.01–0.05, dielec. permeability 4.5 at 20° and 3.8 at 90°, tangent of angle of dielec. losses was 0.001–0.002 at 20° and 0.01–0.05 at 90°. The elec. resistance of the liquid was decreased after being heated at 110° for 31 days with various materials, such as magnesia cement, bakelite, enameled iron, which are used in transformer construction. B. Z. Kamich

Insulation finishes. E. E. Halls. *Paint Manuf.* **9**, 299–305, 309(1939).—Practical information is condensed and actual results are given. Finishes may be considered under the following headings: (1) media for coil treatments, (2) finishes for synthetic plastics, both laminated and molded, (3) ebonite lacquers, (4) insulating finishes on metalwork, (5) finishes on ceramic components and (6) application of shellac. The 1st 3 headings are discussed. *Ibid.* 359–60.—The latter 3 headings are discussed. Resistors having porcelain or ceramic spools or cores, and slate panels are detd. by the working temps., etc. For resistors which operate at 100° low-bake black enamels having phenol-aldehyde oil-sol. resin base are employed. Lab. characteristics of such enamels are given. Shellac-base media are used for brushing over enamel wire windings of coils. W. H. Boynton

Method for preparing rubber (without the use of gasoline) applied to the preparation of artificial leather. A. S. Aizenshtein. *Kozhevenno-Obuvnaya Prom. U. S. S. R.* **18**, No. 2, 39–40(1939); *Chem. Zentr.* **1939, II**, 3229–30.—Rubber is rolled alone at a spacing of the rollers of 1.5 mm. and then with the admixt. of S and half of the required amt. of softeners (rubberax, rosin, pine oil, coal-tar oil and cumarone oil, divinol) with half of the required amt. of leather tissue and carbon black; the procedure is repeated in the same order with the remaining admixtures. Each individual operation lasts 3 min. and the initial temp. must not exceed 25–30°, while the rolling temp. may be raised to 45° after the introduction of the ingredients. The mixt. is cooled after the introduction of ZnO and is rolled for 2–3 min. with a roller spacing of 4 mm.; then the accelerators (captax, thiuram), are added, and the mass is cooled, formed on plates to a thickness of 7.5 mm. and pressed to a thickness of 5.5 mm., subjected to a pressure of 45 kg. per sq. cm. and finally vulcanized. The following proportions of ingredients are recommended: 32–3% rubber, 13–17% divinol and 27–30% softeners (preferably coal-tar oil or cumarone oil). A. A. Boehtlingk

Nonmetallic acid-resisting materials. K. A. Polyakov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 29-32(1939). H. M. Leicester

Adhesion in plywood. E. C. M. Ernest and C. B. Pettifor. *Wood* **4**, 65-6(1939).—The animal glue, casein glue and blood-albumin glue tested are unsuitable for use in plywood exposed to warm humid conditions, the first two because of their lack of resistance to moisture as such, and the third because of weakening brought about by the action of microörganisms, for the growth of which such conditions are ideal. Synthetic-resin glue is resistant to both moisture and microörganisms. Certain com. grades of glues of the nonsynthetic types may contain special ingredients that render them immune from the harmful effect mentioned. Leopold Scheflan

Fumigation with hydrocyanic acid gas. M. C. Mossop. *Rhodesia Agr. J.* **36**, 220-35, 317-29(1939).—A review with detailed instructions for producing and using HCN gas. Colin W. Whittaker

Control of dermestids and clothes moths. N. L. Fremed. *Pests* **7**, No. 12, 13-14(1939).—Approx. a dozen cases of larder- and hide-beetle infestations were reported out of 4000 establishments in New York City during the last year. The increasing use of hair felt and other susceptible materials for sound proofing and insulation is responsible for increasing trouble with clothes moths and carpet beetles. In New York City where HCN fumigation is prohibited in most cases, F. used ethylene dichloride-CCl_4 mixts. as a fumigant for insulating materials infested with clothes moth and in addn. he sprayed with pyrethrum ext. and aliphatic SCN compds. in soln. in a petroleum distillate. Details of a com. control case are given. Henry H. Richardson

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Analysis of [synthetic resins] for traces of metallic impurities (Hess) **7**. Peroxidic products (bleaching agents) (U. S. pat. 2,176,407) **10**.

Sartori, Mario. The War Gases, Chemistry and Analysis. New York: D. Van Nostrand Co., Inc. 360 pp. $7.50. Reviewed in *J. Franklin Inst.* **228**, 670(1939).

Snell, Foster D., and Snell, Cornelia T. Chemicals of Commerce. New York: D. Van Nostrand Co., Inc. 542 pp. $5.00. Reviewed in *Textile Colorist* **61**, 705 (1939).

Chemical Engineering Catalog, 1939. 24th annual ed. New York: Reinhold Publishing Corporation. 1026 pp. $3.00.

Plasticized compositions containing γ-polyvinyl chloride and suitable for pipe linings, etc. Claude H. Alexander (to B. F. Goodrich Co.). U. S. 2,175,048, Oct. 3. Gamma polyvinyl chloride is used with bisethyl-*o*-phenylene disulfide or other compd. of the general formula $SA_1(R_1).S.A_2R_2$, wherein R_1 and R_2 represent a member of the class consisting of aliphatic and alicyclic hydrocarbon groups contg. 2-6 C atoms, and A_1 and A_2 represent aromatic hydrocarbon nuclei with the sulfur linkage in the ortho position.

Polycarboxylic acid esters. Russell McGill (to E. I. du Pont de Nemours & Co.). U. S. 2,172,803, Sept. 12. *Solvents, plasticizers, resin intermediates, alc. denaturants* and *"pesticidal" esters* such as 3-methyl-3-hydroxy-2-butanone adipate, m. 58-9°, are prepd. by treating, in the presence of a Hg salt of a carboxylic acid such as $Hg(OAc)_2$, an acid having an ionization constant of less than 0.0007 with an alkynylcarbinol wherein the carbinol group is joined to an acetylenic C, as by treating adipic, succinic, glutaric, hexahydrophthalic, suberic, sebacic, mucic, malic, or tricarballylic acid with dimethylethynylcarbinol, propargyl alc., methylpropargyl alc., ethylpropargyl alc., hexylpropargyl alc., methylethynylcarbinol, ethylethynylcarbinol, ethylhexynylcarbinol, isopropylethynylcarbinol, hexylethynylcarbinol, vinylethynylcarbinol, chloromethylethynylcarbinol, methylethylethynylcarbinol, methylpropylethynylcarbinol, diethylethynylcarbinol, methylisobutylethynylcarbinol, methylamylethynylcarbinol, diisopropylethynylcarbinol, 1-ethynylcyclohexanol, methylphenylethynylcarbinol, isopropylphenylethynylcarbinol, diethylphenylethynylcarbinol, dimethylpropynylcarbinol, methylpropylbutynylcarbinol or butylamylethynylcarbinol.

Methallyl ethers of phenylphenols. Gerald H. Coleman and Garnett V. Moore (to Dow Chemical Co.). U. S. 2,170,990, Aug. 29. By treating 2-methallyl chloride with a phenylphenol in the presence of an alkali (suitably in acetone at its reflux temp.), products are obtained such as the 2-methallyl ether of 2-phenylphenol, b_3 140-2°, the 2-methallyl ether of 3-phenylphenol, b_4 160-1°, the 2-methallyl ether of 4-phenylphenol, m. 75.5-6.0°, the 2-methallyl ether of 4-chloro-2-phenylphenol, b_5 138-40°, the 2-methallyl ether of 4-*tert*-butyl-2-phenylphenol, b_3 152-3°, and 2-methallyl ethers of 2,4-dichloro-6-phenylphenol, 4-bromo-2-phenylphenol, 2-chloro-4-*tert*-butyl-6-phenylphenol, 4-iodo-2-phenylphenol, 2'-chloro-4-phenylphenol, 2',2,6-trichloro-4-phenylphenol, 4'-bromo-2-methyl-4-phenylphenol, 4'-isopropyl-4-phenylphenol, 4-*sec*-butyl-2-phenylphenol, 4-cyclohexyl-2-phenylphenol, 2,6-dimethyl-3-phenylphenol. These ethers may be used as *plasticizers* and modifying agents in polymerized vinylidene chloride compns.

Alkylhalodiphenyl oxides. Gerald H. Coleman and Robert R. Dreisbach (to Dow Chemical Co.). U. S. 2,170,989, Aug. 29. Alkylhalodiphenyl oxides which vary from oily liquids to resinous solids at room temp. and are suitable *for use as dielectrics in condensers, transformers*, etc., and as *plasticizers in resin* and *varnish compns.*, etc. are prepd. by halogenating and alkylating diphenyl oxide. Details are given of the production of: ethylchlorodiphenyl oxide, b_6 155-64°; diethylchlorodiphenyl oxide, b_6 170-4°; a mixt. of polyethylchlorodiphenyl oxides, b_6 200-210°; a mixt. of ethylchloro- and ethyldichloro-diphenyl oxides, b_5 140-65°; ethyltrichlorodiphenyl oxide, b_5 165°; a mixt. of ethyltetrachloro- and ethylpentachlorodiphenyl oxides, b_3 190-210°; isopropylchlorodiphenyl oxide, b_6 156-69°; diisopropylchlorodiphenyl oxide, b_6 181-4°; *tert*-butylchlorodiphenyl oxide, b_6 173-6°; di-*tert*-butylchlorodiphenyl oxide, b_5 192-5°; an isomeric di-*tert*-butylchlorodiphenyl oxide, b_6 198-201°; *sec*-butyldichlorodiphenyl oxide, b_6 175-80°; di-*sec*-butyldichlorodiphenyl oxide, b_5 205-8°; isopropyltetrachlorodiphenyl oxide, b_2 199-202°; and an isomeric isopropyltetrachlorodiphenyl oxide, b_2 202-207°.

Ethylene glycol aryloxyacetates. Ernest F. Grether, William R. Shawver and Russell B. Du Vall (to Dow Chemical Co.). U. S. 2,170,995, Aug. 29. Ethylene glycol aryloxyacetates of the general formula $XOCH_2CH_2OOCCH_2OR$, where R represents an aryl group and X represents H or an aryloxyacetyl radical, are prepd. by heating a mixt. of an aryloxyacetic acid and ethylene glycol, at a pressure not greatly above atm. pressure, to a reacting temp. (suitably up to about 140-175°), and recovering the product as by fractional distn., crystn., etc. A catalyst may be used such as $NaHSO_4$, H_2SO_4 or benzenesulfonic acid. The products may be used as *plasticizers for cellulose ethers or esters* and *synthetic resins*. Details are given of the production of the following esters of ethylene glycol: bis(phenoxyacetate), m. 92°; bis(2-chlorophenoxyacetate), m. 107°; bis(2-phenylphenoxyacetate), a viscous liquid; bis(4-*tert*-butylphenoxyacetate), m. 77°; a mixed ester of 2-chlorophenoxyacetic acid and phenoxyacetic acid, $b_{0.5}$ 265-75°; mono(phenoxyacetate), b_{10} about 175°; and mono(phenoxyacetate) mono(2-naphthoxyacetate), m. 115°. U. S. 2,170,996 gives details of the production of the following esters of ethylene glycol: bis(2-methylphenoxyacetate), m. 57°; bis(3-methylphenoxyacetate), m. approx. 74°; bis(4-methylphenoxyacetate), m. 56°; bis(2-chloro-4-methylphenoxyacetate), m. 74°; bis(2-phenylphenoxyacetate), a viscous liquid; and bis(4-*tert*-butylphenoxyacetate), m. approx. 77°; and general mention is made of the like production of various similar compds. Cf. *C. A.* **33**, 3024⁸.

Extruded or molded articles of polyvinyl alcohol com-

positions. Ernst Schnabel (to Resistoflex Corp.). U. S. 2,177,612, Oct. 24. App. is described, and a process of producing an intermediate product for use in charging an extruder or mold in forming articles which have a basis of polyvinyl alc. contg. a predetd. amt. of solvent such as water, which involves uniformly distributing throughout a mass of finely divided dry polyvinyl alc. such an amt. of volatile solvent for the alc. as will be absorbed into the particles without substantially affecting their aggregate state but in excess of that desired in the final product and sufficient to result in cohesion of the particles during the rolling step, and thereafter pressing the moistened material between closely set rolls in one or more single passes therethrough at a solvent-expelling temp. below 100° to form a thin coherent strip and to remove excess solvent before extrusion or molding.

Water-soluble condensation products such as those from phenols and formaldehyde. Hermann Noerr and Gustav Mauthe (to I. G. Farbenind. A.-G.). U. S. 2,177,420, Oct. 24. A process for prepg. water-sol. condensation products comprises sulfonating a fusible condensation product derived from a phenol and an agent capable of linking aromatic nuclei selected from the class consisting of acetaldehyde, chloroacetone, dichloro ether, CH_2O and substances yielding CH_2O, while introducing at the most, one sulfonic acid group into the condensation product per every two aromatic nuclei contained therein, and without rendering the condensation product completely water-sol. thereby, and then treating the sulfonated product with a further quantity of the agent until it is completely water-sol.

Synthetic resins. Clarence Bremer (to Atlas Powder Co.). U. S. 2,176,415, Oct. 17. A process of making an odorless, tasteless resinous material suitable for coating food wrappers, etc., involves heating a mixt. consisting essentially of an inner ether derivable from a straight chain hexahydric alc., such as sorbitol or mannitol with abietic acid or a rosin from grades WG to X, and a hydroxyl-free, aliphatic dibasic acid in which the carboxyl groups are sepd. by at least 2 C atoms, such as maleic, adipic or succinic acid at temps. (suitably to 295°) to effect desired reaction with caramelization of the product while substantially excluding air and removing volatile odor- and taste-producing reaction products from the reaction mixt., the total no. of acid equivs. in the reaction mixt. being about 2.8 to 4.5 per mol. of inner ether, and the dibasic acid mol. fraction of the total acid present being substantially from 0.05 to 0.35.

Polyvinyl resins. Geo. O. Morrison and Aubrey F. Price (to Shawinigan Chemicals Ltd.). U. S. 2,176,859, Oct. 17. A method of making a polyvinyl resin involves treating a hydrolysis product of a polyvinyl ester other than polyvinyl formate, such as polyvinyl acetate, with a material (such as formaldehyde) contg. an active carbonyl group capable of combining with the hydroxyl groups of the hydrolysis product, in the presence of a catalyst such as H_2SO_4 and a lower satd. aliphatic acid such as HOAc in which the hydrolysis product is initially dissolved. The resulting product may be used in making lacquers or molded products. Various examples are given.

Phenol-butyraldehyde resin. Wm. J. Bannister (to Resinox Corp.). U. S. 2,176,951, Oct. 24. A product which is suitable for use in coatings, etc., is produced by treating, in the presence of an alk. catalyst such as NaOH (and suitably by refluxing in N), a mixt. of butyraldehyde and a phenol, until there is formed a resinous condensation product lighter in color than one similarly produced in the presence of an acid catalyst.

Noncrystallizing resin suitable for use in adhesives, core oils, soaps, sizings, etc. Samuel Palkin and Wiley C. Smith (to the people for free use). U. S. 2,176,660, Oct. 17. A noncrystg. resin is produced by a method which involves permitting normal pine oleoresin to undergo substantially max. crystn., then filtering out the crystals, recovering the filtrate, and removing volatile oils from it, as by steam distn.

Sulfonates of polyaryl polyethers (wetting, emulsifying, cleansing and introfying agents for textile treatments). Herman A. Bruson (to Röhm & Haas Co.). U. S. 2,171,498, Aug. 29. Numerous details and examples are given of the production of sulfonates of the general formula ROAOR′ in which R and R′ are each aromatic groups at least one of which contains a nuclear substituent of the group consisting of hydrocarbon and acyl groups of more than 3 C atoms and A is an alkylene group or polyalkylene ether group in which at least 2 C atoms sep. successive ether atoms. Among the compds. obtained are: a disulfonate of bis-β-(*p*-α,α,γ,γ-tetramethylbutylphenoxy)-ethyl ether, a water-sol. sulfonate of β-laurylphenoxyethyl β′-phenoxyethoxyethyl ether, and a water-sol. sulfonate of β-*p*-*tert*-butylphenoxyethoxyethyl β′-*p*-*tert*-butylphenoxyethyl ether.

Amines and derived quaternary ammonium bases and salts. Herman A. Bruson (to Röhm & Haas Co.). U. S. 2,170,111, Aug. 22. Amines, various water-sol. bases and salts of which may be used as *wetting, emulsifying, dispersing* and *cleaning agents* and which have the general formula R—O—A—(O—A)$_n$—O—A—N-≡ in which R is a hydrocarbon radical contg. an aromatic nucleus at its point of attachment to the ether O atom, A is an alkylene radical having more than one C atom, *n* is one or zero, and N is the N atom derived from NH_3, a primary or secondary aliphatic, cycloaliphatic, aryl aliphatic or hydroxy aliphatic amine or secondary heterocyclic amine, are prepd. by condensing one mol. each of a monohydric phenol and a polyalkylene ether, having a halogen substituent on each of its terminal C atoms, in the presence of an alk. condensing agent, treating the product thus obtained with NH_3, a primary or a secondary amine and treating the resulting amine hydrohalide with an alkali or alk. earth hydroxide. Numerous examples are given, including the production of: [*p*-(α,α,γ,γ - tetramethylbutyl)phenoxyethoxyethyl]diethanolamine, b_5 255–260°; [*N*-*p*-(α,α,γ,γ-tetramethylbutyl)-phenoxyethoxyethyl]morpholine, b_4 203–8°; [*p*-(α,α,γ,γ-tetramethylbutyl)phenoxyethoxyethyl] - *N* - benzylpiperidinium chloride (suitable for use as a spreader for insecticides); (*p*-*tert*-butylphenoxyethoxyethyl)diethanolamine, b_{10} 265°; (*p*-*tert*-amylphenoxyethoxyethyl)diethanolamine, b_4 240–5°; (*p*-*tert*-amylphenoxyethoxyethyl)bis(hydroxyethyl)ethylammonium ethylsulfate (a pale-yellow oil suitable for wetting-out cotton yarn); (*p*-*tert*-amylphenoxyethoxyethyl)dimethylamine; *tert*-octylphenoxyisopropoxyisopropyl chloride, b_5 190–5°; (thymoxyethoxyethyl)diethanolamine, b_5 233–6°; β-(*tert*-octylphenoxyethoxy)ethyl β′-chloroethyl ether, b_3 199–207°; (β-naphthoxyethoxyethyl)diethanolamine, b_7 275–80°; (*o*-benzylphenoxyethoxyethyl)diethanolamine, b_6 280 85°; (*o*-cyclohexylphenoxyethoxyethyl)diethanolamine, b_6 262°; (*p*-cyclohexylphenoxyethoxyethyl)diethanolamine, b_8 280–85°; (*o*-phenylphenoxyethoxyethyl)diethanolamine, b_{10} 275–80°; (*p*-phenylphenoxyethoxyethyl)diethanolamine (a resinous mass); and (*p*-*tert*-octylphenoxyethoxyethyl)-*N*-dibenzylamine (waxy crystals), and some related products.

Reaction products of pyrophosphoric acid with acyl derivatives of aliphatic polyhydroxy substances (wetting, penetrating, detergent, emulsifying and ore-separating agents, etc.). Benjamin R. Harris. U. S. 2,177,650, Oct. 31. Numerous examples are given such as the production of reaction products of pyrophosphoric acid with polyhydroxy substances, where at least one hydroxyl group of the polyhydroxy substance has its H substituted by a lipophile group. The lipophile group may include any org. acid group, particularly fatty acid groups having preferably at least 4 C atoms; or the lipophile group may be an alkyl radical derived from an alc. Specific examples of polyhydroxy substances, the residues of which may serve as linkages between the lipophile groups and the hydrophile pyrophosphoric acid groups, include: mucic acid, tartaric acid, saccharic acid, gluconic acid, glucuronic acid, gulonic acid, mannonic acid, trihydroxyglutaric acid, glyceric acid, carboxylic oxidation products of polyglycerols and sugars, and sugar alcs. The polyglycerols and their oxidation products are produced by polymerizing glycerol, preferably by heating with about 1% of alkali at 250–60° for about 3 hrs. in the presence of an inert gas (forming a mixt. of

various polyglycerols which may then be oxidized with mild oxidizing agents to convert at least one of the primary hydroxy groups to a carboxylic group).

Capillary-active compounds. I. G. Farbenindustrie A.-G. Brit. 508,066, June 21, 1939. These are made by causing CH_2O or a polymer thereof to act in the presence of a tertiary base and an anhydride of an org. dicarboxylic acid upon a compd. that contains a hydrocarbon radical having at least 10 C atoms and at least once 1 of the groupings —CON< or —CSN< in which at least 1 exchangeable H atom is present at the N atom. In a modification, the Me compd. obtained by causing CH_2O or a polymer thereof to react with a compd. contg. these groupings is caused to react with a tertiary base and an org. carboxylic acid anhydride. The products may be used, in conjunction or not with soaps, Turkey-red oil, H_2SO_4 esters of alcs. of high mol. wt., the condensation products of fatty acids with amino carboxylic or amino sulfonic acids, glue, gums and org. solvents, as *wetting, emulsifying* and *washing agents;* and by impregnation therewith at 80–100° natural or artificial textile fibers of vegetable or animal origin may be *rendered H_2O-repellent* or *waterproof.* Among examples, the following compds. are heated with paraformaldehyde (I) at 80–100° for 0.5–6 hrs.: (1) stearamide (II), phthalic anhydride (III) and pyridine (IV), (2) octadecylurea, diglycolic anhyride V and β-dimethylaminoethyl methyl ether, (3) Et octadecylcarbamate, IV and V. Among further examples a worsted yarn fabric is treated with an aq. soln. contg. the product of reaction of I, II, *N*-tetramethylmethylenediamine and III, centrifuged, dried at 50° and then heated at 100–110° for 1 hr.

Esters of **sulfo dicarboxylic acids.** Alphons O. Jaeger (to American Cyanamid & Chemical Corp.). U. S. 2,176,123, Oct. 17. *Wetting, detergent* and *emulsifying agents* comprise esters of the general formula $R(CO_2X)(CO_2E)$, in which R is an aliphatic carbon chain substituted by a sulfonic acid group and another substituent selected from the group consisting of hydrocarbon, alkoxy, hydroxyl, halogen and nitro groups directly linked thereto, X is a positive ester-forming radical contg. at least 5 C atoms and E is a member of a group consisting of hydrogen, a salt-forming radical, and a positive, ester-forming radical. Numerous uses of such products are given, with details of the production of: an alkali metal salt of dimethyl sulfomaleate; diamyl sulfosuccinate; the Na salt of dioctyl sulfosuccinate; the Na salt of dilauryl sulfosuccinate, dicapryl Na sulfosuccinate; difenchyl Na sulfosuccinate; Na diethoxyethyl sulfopyrotartrate; the Na salt of dibutoxydiethylene glycol sulfosuccinate; the cyclohexyl ester of sulfoglutaric acid; the Na salt of dibenzyl sulfoadipate; Na diphenyl sulfopyrotartrate; the Na salt of the ditetrahydrofurfuryl ester of sulfosuccinic acid; the diester of Na sulfosuberic acid with methylisobutylcarbinol; dibutyl Na sulfosebacate; the Na salt of distearyl sulfosuccinate; the Na salt of dioleyl sulfosuccinate; the Na salt of ethyl stearyl sulfosuccinate; the Na salt of glycol sulfosuccinate; the di-Na salt of octyl sulfosuccinate; the Na salt of glycerol sulfosuccinate; the Na salt of diglycol sulfosuccinate; the Na salt of the glycerol ester of sulfosuccinic and acetic acids; a glycerol ester of sulfosuccinic acid and acid amyl phthalate; a glyceryl phthalate sulfosuccinate; mono-Na sulfobutylsuccinic acid; the Na salt of dihexyl sulfobutylsuccinate; diamyl Na sulfobromosuccinate; bis(ethylbutyl) Na sulfobenzylsuccinate; the di-Na salt of disulfosuccinic acid ethyl ester; and some related compds.

Carboxylic acid esters of aromatic sulfo carboxylic acids with hydroxyalkylamides. Otto Albrecht (to Soc. pour l'Ind chim. à Bâle). U. S. 2,169,515, Aug. 15. Carboxylic acid esters of aromatic sulfo carboxylic acids of the benzene series are produced by treating an aromatic sulfo carboxylic acid or an ester, anhydride, salt or halide of such an acid with a hydroxyalkylamide of carboxylic acids contg. at least 8 C atoms and difficultly sol. in water, the products being suitable for use as *wetting, cleansing, dispersing, equalizing, softening or foaming agents.* As parent materials, there may be used for example sulfoacetic acid, sulfobutyric acid; sulfosuccinic acid, sulfonaphthenic acids, sulfobenzoic acid, sulfosalicylic acid, the sulfonic acids of phthalic acid, isophthalic acid or naphthalic acid or their anhydrides, phthalic acid disulfonic acid, sulfoterephthalic acid and sulfo-4-chlorophthalic acid. The *N*-hydroxyalkylamides used for esterifying one of the carboxyl groups may be derived from aliphatic monohydroxyamines or polyhydroxyamines, such as ethanolamine, diethanolamine or glucamine which are acylated with aliphatic or cycloaliphatic carboxylic acids, for example naphthenic acids, and still contain at least one free hydroxyl group. Such products are, for example, *N*-hydroxyethylundecylenamide, *N*-hydroxyethyllauramide, *N*-hydroxyethylpalmitamide, stearic acid glucamide, *N,N*-dihydroxydiethyllauramide and *N*-dihydroxypropyllauramide. For neutralizing the second carboxyl group of sulfodicarboxylic acid monoesters there may be used an oxide, hydroxide or carbonate of a univalent or a multivalent metal, especially of an alkali metal, or an org. base such as cyclohexylamine or triethanolamine. The sulfonic acid group linked to a hydrocarbon residue which in some cases may be substituted may be present in the form of a salt of a uni- or a multivalent metal. It may also be neutralized with ammonia or with an amine before or after the conversion of one or both carboxyl groups.

Aminoaryl sulfones. J. R. Geigy A.-G. Brit. 508,148, June 27, 1939. These are prepd. by causing sulfones with halogen in the *o*- or *p*-position to the SO_2 group and of formula halogen—$C_6H_4SO_2CHRR'$, where R is H or a satd. or an unsatd., substituted or unsubstituted aliphatic or alicyclic residue, which may be interrupted by hetero atoms and R′ is H, alkyl or -COX, where X is alkyl, aryl, OH, alkoxy, NH_2 or mono- or di-alkylamino, and where at least 1 of R and R′ contains a residue of at least 8 C atoms, to react, preferably in the presence of Cu as a catalyst, with NH_3, primary aliphatic, araliphatic and hydroaromatic amines or secondary aliphatic, aliphatic-araliphatic, aliphatic-hydroaromatic or heterocyclic amines, e. g., NH_2Me, NH_2Bu, benzylamine, cyclohexylamine, $NHMe_2$, $NHBu_2$, $NHAm_2$, methylbenzylamine, methylcyclohexylamine, piperidine. The products may be further alkylated or may be converted into salts of org. or inorg. acids. For examples see *C. A.* **33**, 8859[4], 9675[1].

Polymerizing iso and normal butenes. Edwin F. Nelson (to Universal Oil Products Co.). U. S. 2,176,354, Oct. 17. App. is described, and a process for the mixed polymerization of iso and normal butenes which comprises subjecting a mixt. contg. iso and normal butenes to the action of a solid phosphoric acid catalyst at a polymerizing temp. above 135° under conditions of time and super-atm. pressure sufficient to effect substantial interpolymerization of the iso and normal butenes, and controlling the polymerizing temp. to prevent it from increasing to a point above 163° as a result of the exothermicity of the reaction by regulating the butene content of the mixt. to approx. 10–20%.

Cleaning mica and similar materials. Francis C. Atwood (to Atlantic Research Associates, Inc.). U. S. 2,177,358, Oct. 24. App. is described, and a method of treating mica and similar laminated material to remove dirt and other foreign impurities by passing the material between relatively smooth pins or the like moving relative to each other at such a speed and so spaced as to engage the laminae at spaced points and produce essentially a snapping and flexing of the laminae accompanied by a grinding of the larger particles of the impurities from the laminae.

Wax compositions suitable for floor polishes, etc. Homer C. Brumbaugh (to Universal Chemical Corp.). U. S. 2,177,240, Oct. 24. An aq. emulsion of a wax such as yellow carnauba wax is formed, by using, as an emulsifying agent, a morpholine compd. with a fat acid of high mol. wt. such as oleic acid, holding the wax dispersed in such small particle size that it will dry bright or with substantial luster when merely applied to a surface and exposed to the atm. without rubbing (the emulsifying agent being decomposable by drying of the compn. so that the compn. loses its ability to re-emulsify with water).

Polystyrene compositions suitable for coatings. Sylvia M. Stoesser and Arnold R. Gabel (to Dow Chemical Co.).

U. S. 2,174,538, Oct. 3. Polystyrene is plasticized with the salicylate of diethylene glycol monoethyl ether or with other salicylate of the general formula $o\text{-}R'OC_6H_4COO(C_nH_{2n})_mYOR''$, where R' is H or an alkyl radical, R'' is a radical selected from the group consisting of an alkyl or alkoxyalkyl radical, Y is a carbonyl or methylene radical, and *m* and *n* are integers, to decrease the permeability and increase the adhesiveness. Cf. *C. A.* **33**, 8862[2]. 1

Adhesive sheeting suitable for sealing wrappers of lustrous cellulose, etc. Richard G. Drew (to Minnesota Mining & Mfg. Co.). U. S. 2,177,627, Oct. 31. A transparent flexible nonfibrous cellulose film backing is used with a nonoffsetting, normally tacky and pressure-sensitive water-insol. adhesive coating such as one of a rubber-resin mixt. contg. a reinforcing and coloring pigment such as ZnO, firmly united to and visible through the backing, the back surface of the backing being lustrous and inactive to the adhesive coating so as to permit winding, unwinding and rewinding of the material without substantial offsetting of adhesive. 2 3

Moistureproof coated sheets of material such as wrapping tissue. Robert B. Flint and James A. Mitchell (to E. I. du Pont de Nemours & Co.). U. S. 2,177,645, Oct. 31. A thin, flexible, slippery, nonfibrous, transparent sheet such as one with a base of regenerated cellulose is provided with a moisture-proofing coating contg. a film-forming ingredient such as a cellulose ester or ether, a moistureproofing agent such as paraffin wax, and, as a "slip agent" in a phase sep. from the main body of the coating, Zn acetylacetone or other solvent-sol. beta-diketone of the formula Q-CO-CH_2-CO-R, in which Q and R represent alkyl or alkoxy groups and which has a metal substituted for enolic H, such compd. having a soly. of at least 1% in toluene at a temp. of 25° and 0.5 g. of the compd. being at least partially insol. in 25 cc. acetone at 25° (the compd. being present in insufficient quantity substantially to impair the transparency of the sheet). Various examples are given. 4

Forming sheeting of thermoplastic material such as cellulose esters and ethers. Ernest C. Blackard (to Eastman Kodak Co.). U. S. 2,177,633, Oct. 31. Various structural and operative details are described of an app. in which material is forced through a die to form an extruded sheet which is supported, adjacent to the die orifice, by jets of compressed gas such as air. 5

Forming sheets of thermoplastic material such as plasticized gamma polyvinyl chloride. Waldo L. Semon (to B. F. Goodrich Co.). U. S. 2,176,153, Oct. 17. To produce a sheet substantially free from grain, a thermoplastic material is calendered and is floated across the surface of a liquid such as Hg which does not have a destructive effect on the material and which is heated to a temp. at which the material is plastic, suitably about 150°. 6 7

Extrusion of thermoplastic materials such as cellulose acetate, as in the manufacture of sheets. John S. Kimble and Ernest C. Blackard (to Eastman Kodak Co.). U. S. 2,177,658, Oct. 31. App. is described, and a method of extruding a continuous attenuated article of uniform d. and dimensions from an extrusion die which involves regularly injecting predetd. uniform amts. of a suitable volatile-solvent-free cellulose deriv. compn. from a pressure cylinder into a screw conveyor at least a portion of the input end of which is cooled, conveying the compn. from the cooled conveyor to a heated screw conveyor in which the compn. becomes plastic, and forcing the plastic compn. through a suitable die attached to the heated conveyor. 8

Sheeting such as that of cellulose acetate compositions. John S. Kimble, Ernest C. Blackard and John S. McLellan (to Eastman Kodak Co.). U. S. 2,177,660, Oct. 31. App. is described, and a process which involves producing a low-shrinking thermoplastic sheet by forcing a material such as a cellulose acetate compn. through an extrusion die at a const. rate and pressure, supporting the sheet near the die by a gas such as air or N, and passing the sheet through a heater while supporting and conveying it in a manner and at a rate not imposing any substantial tension upon the sheet, so that residual strains are substantially removed. U. S. 2,177,661 (John S. Kimble, sole inventor; to same assignee) relates to app. and to a continuous method of improving the phys. characteristics of thermoplastic sheeting which comprises heating the sheet, to an extent which will permit residual strains therein to equalize, in a heated conditioning chamber while supporting the sheet without substantial tension thereon, then reducing the thickness of the sheet by passing it through a calender, further heating the sheet, further reducing the thickness of the sheet by a final calendering operation, then conducting the sheet through a final heated conditioning chamber maintained at a temp. of 50–75° while supporting the sheet without substantial tension thereon whereby strains in the sheet normally releasable at room temps. are released, and cooling the sheet while under substantially no tension.

Removing paint and varnish films. Gilbert F. Hoffmann (to Pittsburgh Plate Glass Co.). U. S. 2,176,995, Oct. 24. A soln. of AcCl in Me Et ketone is applied to the coated surface and the AcCl is subsequently neutralized with a soda soln.

Products such as bristles, from synthetic polyamides. Donald D. Coffman (to E. I. du Pont de Nemours & Co.). U. S. 2,177,637, Oct. 31. For improving the resiliency and stability of articles such as fibers or films made from fiber-forming synthetic polyamides such as polyhexamethylene adipamide, the articles are treated (suitably in a dil. aq. soln. also contg. NH_4Cl) with CH_2O or a CH_2O-liberating material. Various details and modifications of treatment are described.

Extruded articles such as lead cable sheaths. Harvey A. Anderson (to Western Elec. Co.). U. S. 2,177,681, Oct. 31. Various details of app. and operation.

Forming tubes comprising cement and asbestos. John Ferla and Levi H. Blouch. U. S. 2,177,643, Oct. 31 Various details of app. and operation for applying superposed layers of material on a mandrel.

Treated paper containers for food products, etc. Melvin Wagner (to Liquid Carbonic Corp.). U. S. 2,176,370, Oct. 17. A method of forming a container, substantially impervious to gases and liquids, involves: (*a*) coating a sheet of paper with a solvent-contg. impervious varnish; (*b*) applying thereon a preformed thermoplastic medium in its cold state; (*c*) folding the sheet into container form with the thermoplastic medium adjacent to the edges of the sheet in engagement with one another; and (*d*) applying heat and pressure to the sheet to cause the thermoplastic media to adhere to one another to seal the container. Rubber hydrochlorides such as "Pliofilm" or a vinyl resin may be used as the thermoplastic material.

Rodent poisons. Paul Herzig and Hans Kükenthal (to Winthrop Chemical Co.). U. S. 2,177,598, Oct. 24. A water-sol. cellulose deriv. such as methylcellulose or a hydroxyethylated cellulose is used as a carrier for poisons to be eaten by rodents.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

The division of water, sewage and sanitation chemistry. Edward Bartow. *Ind. Eng. Chem., News Ed.* **17**, 776 (1939).—Historical and descriptive. E. J. C.

The mineral waters of Boario (Brescia). Giuseppe Bragagnolo. *Ann. chim. applicata* **29**, 402–13 (1939).—These waters are of medium mineral content, consisting essentially of alk. earth sulfates. These waters have definite diuretic, digestive, antiuric acid and anticatarrhal *medicinal value;* they are of value in diseases due to low metabolic rate. These waters have been famous from

early times under the names: Igea, Eximia and Silia waters. A. W. Contieri

Purification of the waters from peat-gas generators. V. T. Ruff and O. I. Martynova. *Vodosnabzhenie i Sanit. Tekh.* **1938**, No. 10, 74–84; *Khim. Referat. Zhur.* **2**, No. 3, 102–3(1939).—In order to purify the waste waters of the peat-gas plants several schemes are proposed for the utilization of the most valuable admixts., i. e., fatty acids (up to 60 kg./cu. m.), phenols (up to 6 kg./cu. m.) and NH_3 (up to 18 kg./cu. m.). The water (which is purified from tar) is limed and evapd. to recover fatty acids as their Ca salts. The condensed vapor of the stills is passed through a layer of activated charcoal, then into an NH_3 column, where a concd. NH_3 soln. is obtained by blowing with steam. The purified water is clear (over 30 cm.), pH = 7.0–7.5; it contains phenol 1 mg./l., fatty acids traces; NH_3 up to 20 mg./l., O consumption 10 mg./l. The activated charcoal is regenerated with hot C_6H_6 followed by blowing with superheated steam. W. R. Henn

Purification of phenol waste waters by activated carbon and the regeneration of the carbon with dichloroethane. A. I. Kozko. *Vodosnabzhenie i Sanit. Tekh.* **1938**, No. 11, 86–92; *Khim. Referat. Zhur.* **2**, No. 3, 103(1939).—The tarry water was settled, passed through König and coke filters, made alk., passed into dephenolizing adsorbers at normal temp. at a velocity of 2.0–3.5 m./hr. through a layer of C not less than 1.0 m. thick, chlorinated, neutralized with chalk and lime and filtered. The water thus treated conformed to all sanitary requirements. Dichloroethane is superior in all respects to C_6H_6 and gasoline as an extg. agent. The activated C and the impure dichloroethane are regenerated very simply and completely. W. R. H.

Fundamentals of water pretreatment. Frank Bachmann. *J. Am. Water Works Assoc.* **31**, 1691–1702(1939). The values of "presettling" prior to coagulation are stated. Flocculation results in grouping finely divided suspended solids into small lumps with good settling properties. Collision of the particles is necessary, brought about by mol. energy or mech. motion. Various factors such as addn. of electrolytes, addn. of solid material and flash mixing are discussed. The benefits and savings in the ensuing treatment are described. D. K. French

Coagulation of natural waters with aluminum sulfate at low temperatures. B. A. Skopintsev and M. T. Golubeva. *Vodosnabzhenie i Sanit. Tekh.* **1938**, No. 10, 48–54; *Khim. Referat Zhur.* **2**, No. 3, 102(1939); cf. *C. A.* **33**, 7487. In expts. with Moscow River water at temps. of 2–4° and of 17–19°, the effects of the dose of the coagulant, alky. of water, mixing of water, presence of turbidity, addn. of lime and addn. of Muttovskiĭ alumina were investigated. Hydrolysis of the added $Al_2(SO_4)_3$ also was investigated. The most effective methods for the formation of flakes at low temp., which at the same time sufficiently purify the water, are mixing, addn. of an artificial suspension in the form of clay turbidity or of milk of lime, and the addn. of Muttovskiĭ alumina. During the introduction of the suspension it is necessary to add exact amts. of the substance since an excess of the clay turbidity causes a considerable lowering of the clearness of the coagulated water, while an excess of CaO causes an increased pH of the water and an accumulation of Al. W. R. Henn

Coagulation of soft waters with iron salts. Geo. E. Willcomb. *J. Am. Water Works Assoc.* **31**, 1703–22 (1939).—Experiences at Albany, N. Y., are described. The water has temporary hardness under 50, color, Mn and Fe. Ferric sulfate was finally used successfully. Lime was used, and when the pH was 9.0 to 9.5 Mn was removed as well. With Ferrisul costs were lower than with alum. Colloidal org. matter interferes, and floc formation is prevented. Complete soln. of the coagulant is most important for efficient results. D. K. French

Performance of upward-flow basins at St. Petersburg. Robert W. Sawyer. *J. Am. Water Works Assoc.* **31**, 1755–62(1939).—In a plant, over 4 years old, lime-treated water is carried to the bottom of the treating tank and then rises through, and is filtered by previously pptd. sludge. Results have been good and operating and maintenance costs are low. D. K. French

The aging of reservoir waters. Lee T. Purcell. *J. Am. Water Works Assoc.* **31**, 1775–1806(1939).—During storage, changes, both phys. and chem., occur which affect the quality of the stored water. Mostly these changes are good. Harmful changes usually occur in the first years of the reservoir's use. Based on observations made on different reservoirs, the nature of these "aging" changes is outlined. When the water ceases to improve the reservoir can be considered "aged." Changes in color, Fe, Mn, CO_2, dissolved O, H_2S and microörganisms, which can mostly be detd., are the guides to this aging. D. K. F.

Determination of sulfates in natural waters by nephelometric titration. Ts. I. Krasnovskaya. *Lab. Prakt.* (U. S. S. R.) **14**, No. 8, 19–20(1939).—Sulfate is pptd. with $BaCl_2$ and the ppt. compared nephelometrically with a ppt. from a known amt. of a standard soln. of $(NH_4)_2SO_4$. The detn. should be performed so that the times of the reaction in the 2 cylinders of the nephelometer are as nearly the same as possible. The method is especially suited to detns. in the field. Analyses of natural waters by the nephelometric and the gravimetric method, resp., gave in mg. SO_3/l.: 84.0, 83.98; 47.0, 47.99; 18.0, 18.92; 19.0, 18.37; 16.0, 14.26; 68.0, 68.83; 44.0, 42.37; 18.0, 17.82; 18.0, 17.55; 28.0, 27.70. W. R. Henn

Determination of the alkalinity of river water by means of a galvanometer. G. M. Vainshtein. *Vodosnabzhenie i Sanit. Tekh.* **1938**, No. 8–9, 57–60; *Khim. Referat. Zhur.* **2**, No. 3, 87(1939).—An app. for the visual detn. of the elec. cond. of water is based on the measurement of the inner resistance of a Daniel galvanic element. For the half elements, electrodes are immersed in 2 wide test tubes: the Cu electrode in the test tube with a $CuSO_4$ soln., and the Zn electrode in the test tube with a $ZnSO_4$ soln. The water under investigation circulates through a straight glass tube and closes the inner chain of the galvanic element. The wires of the electrodes are connected to a galvanometer whose signals are directly proportional to the elec. cond. of the soln. and, consequently, to the alky. of the water. A formula is given by means of which the alky. in mg. equiv./l. can be calcd. The described "continuous control" of the quality of river water can be registered by lights of an automatic registering app. W. R. Henn

The use of sodium azide in the Winkler method for the determination of dissolved oxygen. G. R. Barnett. *Sewage Works J.* **11**, 781–7(1939).—The addn. of 2% Na azide to the alk. KI reagent of the Winkler method for dissolved O is recommended to eliminate the interference of nitrites. E. Hurwitz. *Ibid.*—Satisfactory results were obtained with a 1% soln. of the azide and 1.5 ml. of acid in the acidification technique. It is applicable to all plant effluents and river samples. W. D. Hatfield

Removal of dissolved oxygen from water by chemical means. D. Ya Kagan. *Teplo i Sila* **24**, No. 2, 29–34 (1939); *Khim. Referat. Zhur.* **2**, No. 3, 101–2.—The object of the expts. was the removal of O from water to prevent corrosion of boilers. The method is based on the oxidation of Na_2SO_3 to Na_2SO_4. The exptl. equipment and the methods of the expts. are described. With an equiv. amt. of Na_2SO_3 the velocity of the reaction depends on the temp. (at 40–60° it is 6–7 min., at 80–100° 1–2 min.). Increase of the amt. of Na_2SO_3 increases the velocity of the reaction (with a 70% excess the reaction is complete in 2 min. at all temps.). The amt. of the dry residue of water (up to 100 mg./l.) has no effect on the process, but is injurious to straight-run boilers. To avoid a large excess of Na_2SO_3 (which increases the amt. of the dry residue), part of the O is removed by heating before treatment with Na_2SO_3. Admixts. of org. substances decrease the velocity of the reaction (up to 80°) and a larger excess of Na_2SO_3 is required. Inorg. salts (1% of Fe salts or 0.0001% of Cu salts) act as catalysts. Therefore, it is advisable to use tech. Na_2SO_3 (OST 3511). Na_2SO_3 is added directly to the vessel or to the water. At a high temp. the process is complete in a short time without excess of Na_2SO_3. Curves show the dependence of the reaction velocity on temp. and on concn. of Na_2SO_3. W. R. Henn

Molybdenum in mineral, mine and surface waters. I. P. Novokhatskiĭ and S. K. Kalinin. *Compt. rend. acad.*

sci. U. R. S. S. **24**, 278–9(1939)(in English).—Mo has been found in the thermal waters of Russia in quantities amounting to as much as 0.27 g. per l. In mine waters it amounts to 0.3 to 0.7 g. per l. It is absent from the waters of the salt lakes of Kazakhstan and from oil waters. The presence of Mo in certain horizons of mine waters and not in others is evidently connected with H-ion concn. 2 references. A. H. Krappe

A new method for the determination of suspensions (in water). B. M. Yasnov. *Vodosnabzhenie i Sanit. Tekh.* **1938**, No. 2, 48–55; *Khim. Referat. Zhur.* **2**, No. 3, 79 (1939).—An app. was devised in which suspensions in water contained in a cylinder settle into a dish connected with a float. The amt. of deposit is detd. (by the depth of the immersion of the float) directly on a scale after 1, 2 and 3 min. and then after 5, 10 and 20 and more min. Curves of the deposition of suspensions were obtained for the unchanged and for the alkalinized Moscow River water and for the slime formed from the softening of waters of different degrees of hardness by the soda-lime method with a coagulation at 60–80°. Increase of the temp. of water to 40° increased the deposition velocity. The limiting velocity, with which a definite percentage of the suspensions is deposited, is called the percentage velocity of the deposition and it is the basic element in the no. of values which are necessary for the layout of the settling tank. W. R. Henn

The correlation between the carbon dioxide and mineral content of water and its corrosivity. Willem Rudolfs and T. T. Wong. *J. Am. Water Works Assoc.* **31**, 1909–25 (1939).—Oxygen seems to be necessary for initial corrosion; thereafter corrosion seems to increase with increasing CO_2 with or without bicarbonate. Natural and distd. waters contg. CO_2 corroded readily. Above 4 p. p. m. CO_2 in distd., and above 8 p. p. m. in natural waters, the rate was retarded, probably owing to the formation of protective coatings. In the presence of sulfates, corrosion is const., regardless of concn. of sulfate, but very little iron goes into soln. In discussing the mechanism of corrosion many new factors must be considered, which the authors describe as primary, secondary and tertiary, and which include chemicals and chem. equilibria and surface or protective films. D. K. French

The permissible quantity of lead in drinking water, the daily resorption of lead in a normal man and the question of chronic lead intoxication. J. F. Reith and L. W. van Esveld. *Nederland. Tijdschr. Geneeskunde* **83**, IV, 5632–9 (1939).—The authors consider 0.3 mg. of lead per l. as permissible after the water has been kept in the pipes for about 8 hrs. Recently laid lead pipes may contain 2 to 3 times as much. R. Beutner

Deacidifying of drinking water by means of magnesite. R. Strohecker. *Z. Untersuch. Lebensm.* **78**, 184–6(1939). —The water is passed through an app. in which part of it filters through magnesite and part through $CaCO_3$ (marble). The mixed filtrate has a pH between 7.5 and 8.4. M. M. Piskur

Chemical processes of deacidifying drinking water by means of Magno. Karl Holl. *Z. Untersuch. Lebensm.* **78**, 186–7(1939).—Polemic (cf. Plücker, *C. A.* **33**, 3937⁴). H. pointed out that fresh Magno contained 15% MgO and 5% $MgCO_3$, after use there remained about . MgO which may be blocked out of the reaction by the $CaCO_3$. He claimed that the treated water gained Mg while the Ca content remained the same as that of the untreated water. The $CaCO_3$ therefore acted only as ballast. M. M. P.

A method for the neutralization of acid mine waters. A. I. Veselov. *Tsvetnye Metal.* **1938**, No. 8, 26–8; *Khim. Referat. Zhur.* **2**, No. 3, 102(1939).—In order to overcome the premature wear of the water-pumping app., of cables and of air pipes, and the pollution of water reservoirs with mine water contg. free H_2SO_4, a mechanized method for the purification of mine water is proposed. The water is treated with milk of lime which is added directly into the absorption pipe of the pump. W. R. Henn

Bactericidal action of chlorine in short contact (with water) when introduced in front of the pump. N. G. Belyaeva. *Vodosnabzhenie i Sanit. Tekh.* **13**, No. 5, 62–7 (1938); *Khim. Referat. Zhur.* **2**, No. 1, 86(1939).—An excess of 0.8 mg./l. Cl was added instead of the usual 0.5 mg./l. directly in front of the pump so as to make the time of contact 4–5 min. Although the bacteriol. analyses showed pos. results the results were unreliable because 1–3 hrs. had elapsed until the samples were analyzed. During this time the residual Cl could have completed the sterilization. Therefore, addnl. parallel analyses with planting of bacteria colonies were performed 7 min. after the chlorination. In some cases the excess Cl has been preliminarily neutralized with $Na_2S_2O_3$. No differences in results were found. The following conclusions can be made: chlorination of clear spring water with a dose of 0.8 mg./l. by passing the water with Cl through a centrifugal pump causes a satisfactory bactericidal action in 5 min., and under these conditions the bacterial colonies planted after 1–3 hrs. can serve as a definite proof of the effectiveness of chlorination. W. R. Henn

Reaction of heavy doses of chlorine in various waters. A. E. Griffin. *J. Am. Water Works Assoc.* **31**, 2121–9 (1939).—The effect of increasing doses of Cl over the quantity necessary for sterilization is described. As more Cl is added, the residuals first increase, then decrease, sometimes disappearing, and then increase in proportion to the dose. Tastes and odors decrease and disappear with the dropping of the residual. Tastes and odors appearing afterward usually disappear with dechlorination. Records from several plants are given. D. K. French

A definition of "available chlorine." L. L. Hedgepeth and A. M. Buswell. *J. Am. Water Works Assoc.* **31**, 2135–6(1939).—Available Cl is the weight of Cl given by reaction of a given weight of sample (Cl- carrying material) under ideal conditions, with an excess of HCl, the results to be expressed in %. Several equations and supplementary definitions are included. D. K. French

Superchlorination for taste and odor control. J. M. Lloyd. *J. Am. Water Works Assoc.* **31**, 2130–4(1939).—Superchlorination at Tyler, Tex. eliminated tastes and odors, partly oxidized Mn, and killed bacteria. The filter load was reduced and filter runs were lengthened. 6.2 p. p. m. Cl was used. D. K. French

Iodide technique for colorimetric determination of chlorine in water. F. W. Gilcreas and F. J. Hallinan. *J. Am. Water Works Assoc.* **31**, 1723–33(1939).—A colorimetric test, based on the liberation of I from KI by Cl, for the detn. of free Cl in water. Technique and reagents are described. As the procedure is complicated, the method will probably not be used where nitrates or Mn interferes. D. K. French

Removal of fluorine from potable waters. P. K. van der Merwe. *Nature* **144**, 668(1939). -A simple and inexpensive method for removal of F from natural waters by the addn. of superphosphate and pptg. $Ca_3(PO_4)_2$ by the addn. of lime is described. E. D. Walter

A uniform basis for activated carbon comparison. W. A. Helbig. *J. Am. Water Works Assoc.* **31**, 1931–44 (1939).—The efforts to find a basis of C comparison whereby adsorption tests on one type of odor can be correlated with tests on another type are described. The phenol value and threshold odor tests are used with many substances. A formula is suggested ($G/T.O. = Gp$) in which G is the gravimetric concn. of the odor-causing substance, $T.O.$ the odor at this concn. and Gp (a const.) the gravimetric concn. at the threshold of odor perceptibility. Results are not very consistent. Suggestions as to future work are made. D. K. French

Illinois's experiences in lime softening with short-time upward-flow clarification. H. A. Spafford and C. W. Klassen. *J. Am. Water Works Assoc.* **31**, 1734–54(1939). —The basic principles of the "precipitator" and the "accelator" involve first the bringing of the chemically treated water into intimate contact with freshly pptd. sludge and, second, using this sludge as a filtering medium, the water passing upward and the newly formed particles being trapped in, adsorbed or pptd. on the larger and heavier sludge particles. Clarification is rapid. Split treatment is often used with waters high in Mg, one portion of water

being overtreated in one basin and then in a second basin being mixed with a second portion of untreated water. D. K. French

Permutite or sodium hexametaphosphate for water softening. N. Meshcherskiĭ. *Legkaya Prom.* **17**, No. 11, 103–8(1938).—Cost data on construction and operation of water-softening installations having capacities of 2000 cu. m./day show that permutite is more economical than Na hexametaphosphate. B. Z. Kamich

Preventing internal corrosion of boilers by protective coatings and films. Edward Ingham. *Brit. Clayworker* **48**, 272–3(1939).—A small amt. of Ca scale will prevent corrosion. If the feed H_2O does not contain scale-forming materials, a coating may be formed by adding lime to the feed supply. The lime must be first slaked and it may then be added directly to the boiler. Only a very light coating should be formed so that the efficiency of the heat transmission will not be appreciably reduced. As an alternative to introducing lime into the boiler, the internal surfaces may be lime-washed at cleaning time. A cement wash may be applied. Expts. show this to be good practice as the cement is easily applied and its adhesiveness enables it to resist strongly the tendency for its removal, caused by repeated changes of temp. and pressure. Satisfactory results have been obtained with distd. gas tar and graphite. A coating of 0.02 in. is effective and such coatings will adhere firmly to the boiler surfaces. A red lead coating has sometimes been employed for protection but it soon peels off under the action of boiling H_2O. E. C. P.

Service lives of water mains. Reeves Newsom and F. H. Aldrich. *J. Am. Water Works Assoc.* **31**, 1625–54 (1939).—The Springfield, Mass., Water Works have records going back 75 years. As the transmission and distribution mains represent rarely less than 50% and often approach 80% of the total value of the complete system, data as to the life of such systems are needed. In 1864 wrought iron, cement-lined and coated pipe began to replace the original wood pipe, and the records begin. Wrought iron, cement, cast iron, steel and transite pipe are used. Cast iron pipe was rarely replaced owing to depreciation. The original cement pipe has been practically all replaced. Its av. life was 25.67 years for 2, 3 and 4″, and 31.1 years for 6, 8 and 10″. Life increases with diam. of pipe. Cast iron pipe life seems longest. D. K. French

Water and sewage works in Chili. Leonardo Lira. *J. Am. Water Works Assoc.* **31**, 1949–56(1939).—No town in Chili with over 5000 population is without its public water supply, and no city of over 10,000 lacks a sewerage system. Methods of management and control are summarized. Results are unusually good. D. K. French

Trends in sewage treatment. Wm. A. Hardenbergh. *Sewage Works J.* **11**, 803–10(1939). W. D. Hatfield

Chemical coagulation of sewage. XI. Effect of soluble matter on coagulation. Harry W. Gehm. *Sewage Works J.* **11**, 738–51(1939); cf. *C. A.* **33**, 3044[6].—Coagulation expts. with different types of sewages and groups of substances present in sewage, together with addns. of pure chemicals representing possible sewage constituents, have shown that the amt. of dispersed matter removed by a given coagulant varies in the same sewage when samples are taken at different times of the day. Org. rather than inorg. matter is responsible for the coagulant demand. However, no correlation between the gross amt. of org. matter in the Scitz filtrate and the coagulant demand is evident. A close correlation of the ammonia N content of sewage and the coagulant demand exists. Although ammonia itself plays no part it appears to be an index of the quantity of urine present. Urea, uric acid, creatinine, hippuric acid and other org. substances found in sewage have no effect on the demand. This is possibly due to transition products present in decompg. urine or formed by combination. W. D. Hatfield

Colloids in sewage and sewage treatment. I. Occurrence and role. Willem Rudolfs and Harry W. Gehm. *Sewage Works J.* **11**, 727–37(1939).—A crit. review of the literature on colloids in sewage and sewage treatment indicates that various methods of measurement produce widely varying results. 31 references. W. D. H.

The true oxygen consumption of sewage and a method for its determination. A. M. Dzyadzio. *Vodosnabzhenie i Sanit. Tekh.* **1938**, No. 8–9, 117–25; *Khim. Referat. Zhur.* **2**, No. 3, 80(1939).—The different methods of Kubel, of Schulze and of Tyurin for the detn. of the O consumption of sewage and of org. substances were verified. The new method is: Pour into a flask equipped with a reflux condenser a 5% soln. of KIO_3, add some concd. H_2SO_4 soln. and 5 cc. of the liquid under investigation and 2–3 beads or a capillary. The concn. of H_2SO_4 should be 65–80% by vol. Heat gradually to 200°. The oxidation of the org. substance begins with an evolution of I vapors and can be considered completed when the evolution ceases. Cool the flask, add 40–50 cc. of H_2O, transfer the contents of both the exptl. and the control flask into larger flasks, dil. with water to 300–400 cc., add 1 cc. of a 10% soln. of KI, stopper, place for 10–15 min. in a dark place and titrate with a 0.1 *N* $Na_2S_2O_3$ soln. By this method 14 org. prepns. were investigated. The error did not exceed 2–3%. By far the most org. substances were oxidized to 100% in limits of exptl. errors. The method is superior not only to the methods of Kubel and of Schulze for the detn. of the O consumption but also to the method employing $K_2Cr_2O_7$. W. R. Henn

The use of high-rate trickling filters. C. M. Stanley and H. S. Smith. *Bull. Assoc. State Eng. Soc.* **14**, No. 4, 69–76(1939); cf. *C. A.* **33**, 3043[5].—The authors describe the high-rate filter and its loading and deal with its performance, costs, advantages and disadvantages. The patent situation is briefly discussed. J. M. Noy

Carbon and nitrogen transformations in the purification of sewage by the activated sludge process. II. Morphological and biochemical studies of zoögleal organisms. H. Heukelekian and M. L. Littman. *Sewage Works J.* **11**, 752–63(1939); cf. *C. A.* **33**, 7450[9].—A study of the morphological and cultural characteristics of 14 cultures of zoögleal bacteria isolated from activated sludges proved that they were indistinguishable from *Zooglea ramigera* described by Butterfield (cf. *C. A.* **29**, 5559[2]). Pure cultures of *Zooglea ramigera* decomp. simple and complex carbohydrates, proteins and soaps of fatty acids similar to natural sludges. The av. pure culture sludge-index was 54 under conditions which would produce extreme bulking of natural activated sludges. Pure culture sludges were stable and could not be made bulky. The chem. compn. of the pure culture sludges was 44.9% C and 9.9% N_2. W. D. Hatfield

Continuous digestion of mixtures of sludges from domestic sewage and packing-house wastes. O. J. Knechtges, Francis M. Dawson and M. Starr Nichols. *Sewage Works J.* **11**, 819–27(1939).—Twenty-five digestion expts. were run in 20-l. bottles with domestic and packing-house sludges. The sludges were fed in daily addns. of 2–18%. The digestion period was 100 days. The results show a distinct advantage obtained in the rate of digestion when packing-house sludge and domestic sludges are mixed. Comparison of results of batch and continuous digestion shows conclusively that the prediction or rates of sludge fermentation is most reliable when based on expts. in continuous digestion. W. D. Hatfield

Filtration tests with elutriated and unelutriated digested solids. Paul D. McNamee. *Sewage Works J.* **11**, 764–73(1939).—Digested sludge elutriated by countercurrent washing with 2.5 vols. of water can be coagulated with 1/3 the amt. of $FeCl_3$ usually needed. The alky. test is a convenient measure of the degree of elutriation. The HCO_3 ion and not the NH_4 ion is thought to be the cause of the $FeCl_3$ demand of nonelutriated sludge. W. D. H.

Digestion studies on paper pulp. Milton T. Hill. *Sewage Works J.* **11**, 864–76(1939).—Mixts. of paper pulp and fresh sewage sludge, when added to well-seeded sludge, digested satisfactorily in ratios of 2:13. No noticeable deleterious effects upon digestion were noticed with C to N_2 ratios from 20 to 52.6. The volatile solids in paper pulp produced more gas than sewage solids. The CO_2 content of the gas was greater than normal. W. D. H.

A unique and effective determination of the extent and degree of pollution by sewage of the west and north shores

of the city and county of San Francisco. J. C. Geiger, C. G. Hyde and A. B. Crowley. *Sewage Works J.* **11**, 811–18(1939).—Bacteriol. examn. of the water was made by collecting weekly samples from 18 carefully selected sampling stations. The presence of coli-aerogenes organisms was the criterion used to est. the degree of pollution in dilns. of 10, 1, 0.1, 0.01 ml. Samples were taken for a period of 52 weeks. Serious contamination was demonstrated at all stations. The data constituted the basis for quarantine against bathing at the beaches in question. W. D. Hatfield

Aspects of governmental policy on stream-pollution abatement. Herman G. Baity. *Am. J. Pub. Health* **29**, 1297–307(1939). J. A. Kennedy

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F in relation to caries (Cox) **11G**. Pptn. of textile wastes and studies of pH control (Porges, *et al.*) **25**. Expts. on manurial value of sewage sludge from septic tanks (Cranfield) **15**. Corrosion of cements under action of gases of waste waters (Makhaev, Kaverin) **20**. Flow of liquids through beds of granular solids (Ward) **1**. Ca soaps [water softening] (Rière) **25**.

Preventing rust formation in water-storage equipment. Geo. J. Thomson (to Rusta Restor Corp.). U. S. 2,176,514, Oct. 17. A method of preventing rust formation in water-storage equipment comprising a metallic water tank having a metallic tubular casing of relatively small diam. depending centrally from it and a water-supply pipe extending through the casing and into the lower portion of the tank involves providing a source of d. c., connecting the pos. side of the current to an electrode immersed in the water in the tank adjacent the upper end of the tank, and connecting the neg. side of the current to the exterior of the casing adjacent its lower end.

Apparatus for softening water by percolation through materials such as baked fire clay. Samuel Smith. U. S. 2,176,549, Oct. 17. Various structural and operative details of an app. into the upper portion of which the water is atomized.

Clarifying sewage. Henry P. L. Bendel. U. S. 2,177,167, Oct. 24. App. is described, and a process for mechanically clarifying sewage contg. liquid matter and suspended solid matter which tends to rise in the liquid matter; it involves conducting unclarified sewage to a clarification chamber at a relatively high velocity, feeding the sewage into the lower part of the chamber so as to allow suspended solid matter to rise, intercepting the rising matter in a part of the chamber below the surface of sewage in the chamber, withdrawing intercepted matter from the part of the chamber and withdrawing clarified sewage from the chamber.

Electrical control system for sewage pumping and ejection apparatus. Robert E. Sykes and John M. Gray (to Yeomans Bros. Co.). U. S. 2,177,083, Oct. 24. Various structural, elec. and operative details.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

The loess soils of the Beersheba region of Palestine. A. Reifenberg. *Empire J. Exptl. Agr.* **7**, 305–10(1939).—The loess territory owes its origin mainly to the dust storms of the desert. The loess is yellow and consists mainly of grains of fine quartz intermixed with chalky particles. Chem. analyses show that these soils are rich in Ca, comparatively rich in mineral nutrients, deficient in org. matter and N and poor in Fe and Al. They are easily permeable to water and air and of a texture most suitable for cultivation. The aspects of irrigation with saline water are given as well as the salt-resistance of various plants. Irrigation with water contg. 1500 mg. of Cl per l. cannot be recommended since the salts tend to accumulate in the soil, and owing to the scanty rainfall they are not leached out in the rainy season. J. R. Adams

The soils of the 3500 Farms Scheme area, Western Australia. L. J. H. Teakle. *J. Dept. Agr. W. Australia* **16**, 202–30(1939); cf. *C. A.* **33**, 8873[5].—A brief description of the general geological, vegetation, climatic and soil factors is given for that portion of the 3500 Farms Scheme area which lies south of Southern Cross and between Newdegate and Salmon Gums. The woodland and mallee soils of this area are of the solonetz type; $CaCO_3$ accumulation in the subsoil is characteristic; and, the surface horizon is typically noncalcareous except in 1 group assocd. with morrel timber. High concn. of H_2O-sol. salts in the subsoils is apparent. The soils of the woodland and mallee areas fall into 8 main groups and each of these groups is described in some detail. The virgin soils of 7 of these groups are characteristically more or less saline and the heavy-textured types of groups are generally excessively saline. The soil salinity problem is largely confined to heavy-textured soils. The incidence of soil salinity in this area is related to the permeability of the soil to moisture. J. R. Adams

A soil survey of the Denmark Agricultural Research Station, Denmark, Western Australia. G. H. Burvill. *J. Dept. Agr. W. Australia* **16**, 243–57(1939).—Fourteen soil types have been mapped principally on the basis of soil profile features. Of these, 9 are types recognized in a larger district survey (cf. Hosking and Burvill, *C. A.* **32**, 5556[2]) while the remaining 5 are new types. These soils fall into 3 groups. Group I. These soils are gray, yellow and light-brown sands more or less gravelly, with yellow to white clay subsoils. The pH of the surface soil is 5.5–6.0. Group II. These are well podzolized gray sands, with "coffee rock" or ferruginous hardpans or coffee-stained layers in the subsoil; the surface pH is 4.4–4.8. Group III. These are chocolate, dark-gray and brown loams with clay subsoils formed over basic rocks with a surface pH of 6.0. Detailed descriptions of the different types are given. In general, both total salts and chlorides occur in small quantities only. J. R. Adams

Arsenical soils of the Waiotapu Valley. Evidence of stock poisoning at Reporoa. R. E. R. Grimmett. *New Zealand J. Agr.* **58**, 383–91(1939).—Much of the soil of the district is composed of Fe and Al hydroxides and ferruginous springs occur. Detns. of As by the Reinsch test showed that arsenical soils and springs extended over 2000 acres of farming land besides an undetd. area in the Waiotapu thermal and forestry reserves. Several of the mud volcanoes gave strong tests for As and Champagne Pool contained 0.86 grains of As_2O_3 per gal. Analyses of 65 muds and soils showed that the former contained 0.0069 to 1.9% As while representative samples of soil to a depth of 9 in. in pasture lands varied from 0.0008 to 0.525% As. The As content of 39 samples of water from springs, streams and surface depressions varied from a trace to 26 grains per gal. Fresh mud deposited on farm lands by the Waiotapu River during flood contained As. Both hot and cold springs contained As in soln. which was deposited as an arsenical limonite or as sulfide in different places. In one extinct hot-spring area masses of deposited silica contain pockets of As_2S_3 and an orange-yellow crust under the surface mud of an adjacent water hole consisted of silica with 5% of orpiment and realgar. The As in farm lands is present in the water-sol., acid-insol. and acid-sol forms. The urine of cattle grazing in As-contaminated areas contained 0.34 to 5.8 mg. of As_2O_3 per 100 cc. while the milk contained 0.01 to 0.20 mg. per 100 cc. The As_2O_3 content of the urine of a cow fed H_2O-sol. As rose to 5.9 mg. per 100 cc. before death occurred but very little As passed into the milk which contained up to 0.050 mg. per 100 cc. when the animal showed evidences of As poisoning. The liver and kidney of the animal contained 15 and 29 mg. As_2O_3 per 1000 g. of wet wt., resp. The As in Fe oxide mud is readily assimilated but when fed in sublethal amts. to steers was excreted as rapidly in the urine as it was

taken in. Feeding As sulfide mud to steers caused no increase in the As content of the urine indicating that this form of As is nontoxic. In 9 cases of As poisoning the As content of the liver varied from 2.7 to 32.0 mg. and that of the kidney from 1.6 to 33.5 mg. As_2O_3 per kg. of wet wt. The As content of the urine of cattle feeding in arsenical areas was highest in Aug. and Sept. when feed was scarce and there was much surface water. No close agreement between the level of As in the urine and the condition of the animals was found. The Co content of autumn and spring pastures in As areas varied from 0.030 to 0.108 p. p. m. of dry matter, most samples being above 0.05 p. p. m. which is sufficient for cattle but below the requirement for sheep. *Ranunculus rivularis*, which grows to slight extent in the As area, was fatal when fed to sheep but is not thought to be the cause of the cattle sickness. Ten samples of pasture contained 0.6 to 23 mg. As_2O_3 per kg. of air-dry material with most samples contg 3–9 mg. per kg. Oat straw and grain from arsenical soil contained 4 and 3 mg. As_2O_3 per kg., resp., and were thus safe for stock. Poisonous diethylarsine can be produced by the action of molds on org. matter contg. As. It is concluded that As is responsible for only a small mortality, the greatest danger being to cattle having access to arsenical mud or water. Clean, growing pasture on arsenical soils is usually harmless. Colin W. Whittaker

Soil characteristics, topography and lesser vegetation in relation to site quality of second-growth oak stands in Connecticut. Herbert A. Lunt. *J. Agr. Research* **59**, 407–28(1939).—The soil samples collected in this study were analyzed for total N, loss on ignition, pH, exchangeable H, total base capacity, percentage satn., cond., moisture equiv., total colloids and sol. nutrients by Morgan's quick test method. The native fertility of the soil is an important detg. factor in stand compn., but this is a controlling factor in site quality only in those situations where other environmental influences are of minor significance. W. H. Ross

Investigation of the soil of young oak growth in the Liebenstein district of the royal domain of the house of Wurtemberg. K. Rehling. *Allgem. Forst- u. Jagd-Ztg.* **115**, 273–91(1939).—Relation of pH, phosphoric acid content, M, total protein N and phys. measurements of fine soil to growth is shown. J. McAfee

Considerations on the Bennett-Allison classification of Cuban soils. G. A. Regato. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* **1938**, 63–70; cf. *Soils of Cuba*, *C. A.* **22**, 2804.—The advantages of the system are pointed out O. W. Willcox

Cation-exchange properties of certain forest soils in the Adirondack section. R. F. Chandler, Jr. *J. Agr. Research* **59**, 491–505(1939).—On soils of similar geol. origin, the sugar maple-beach-yellow birch forest type produced a soil type which, in the surface layers, was less podzolized, had a higher pH value, and a larger percentage base satn. than soil profiles beneath stands of the red spruce-sugar maple-beech type, or the red spruce type. The differences between the latter 2 types were small. Evidence is submitted to indicate that the cause of these differences was assocd. with the Ca content of the foliage of the trees. A high correlation existed between total exchange capacity and percentage loss on ignition. Percentage base satn. and pH value were highly correlated when soils of similar org. matter content were compared. The apparent pK values of the various horizons indicated that the soil org. matter had a lower apparent pK value than that of the mineral soil. The values were somewhat higher for the hardwood profiles, indicating that weaker acids were involved. The lower apparent pK value of org. matter and hence the higher percentage base satn. at a given pH concn. explain why it is possible to have a lower pH value in the B_1 horizon than in the A_2 horizon of a humus podzol profile. W. H. Ross

Mineral content of pastures. Cobalt investigations at the Cawthron Institute, period 1938–39. Theodore Rigg. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* **13**, 60–3 (1938–39); cf. *C. A.* **33**, 2640⁶.—In Ashburton County, the loess soils of the Plains and the recent soils of the Ashburton and Rangitata Rivers produced pastures having a satisfactory Co status (av. 0.17 and 0.23 p. p. m. Co, resp.). In Southland, pastures located on recent alluvial soils had a satisfactory Co status, whereas those assocd. with the loess soils of the Invercargill district tended to be low in Co (0.04–0.06 p. p. m.). In the Nelson-Collingwood districts, certain soils derived from granite contained approx. 1 p. p. m. Co, but the pastures assocd. therewith contained only 0.04 p. p. m. Soils derived from limestone, basic rocks and Ordivician slates were much higher in Co, but the pastures assocd. therewith were not correspondingly high in Co. Pastures located on conglomerates, sandstones and dune sands contained 0.03–0.06 p. p. m. Co. On the West Coast, the av. Co content of pastures assocd. with recent alluvial soils exceeded 0.2 p. p. m., whereas pastures located on pakihi soils, dune and recent blown sands, leached gravel terraces and limestone-country soils were low in Co. The Co content of pastures was increased from 0.04 p. p. m. on the control plots to 0.08, 0.16 and 0.37 p. p. m. on those receiving 0.25, 0.5 and 2 lb. Co chloride per acre, resp. CoO was successfully used in the manuf. of *cobaltized superphosphate* contg. 0.1% Co 90% sol. in water. Samples of early spring pasture tended to be higher in Co than those of autumn pasture. Ground limestone contg. 5 p. p. m. Co and applied at the rate of 3 tons per acre caused a marked increase in the Co content of the pasture. K. D. Jacob

The biological synthesis of ammonia in soil and water. Serge Winogradsky. *Compt. rend.* **209**, 616–20(1939); cf. *C. A.* **24**, 3072, **29**, 8203⁴.—NH_3 can be found in the distillate from a culture of *Azotobacter vinelandii* (green strain) or *A. agilis* (*Azomonas*) grown on ethanol or Na butyrate, with Ca and Mg carbonates. The sum of NH_3 liberated and fixed N of the culture exceeds the initial fixed N. Excess nutritive element decreases NH_3 evolution. J. McAfee

Effects of varying amounts of ammonium sulfate on moisture content of Lipa clay loam at wilting of rice plants. Felipe R. Lopez. *Philippine Agr.* **28**, 321–37(1939).—A study was made of the moisture contents of Lipa clay loam at the time of wilting of leaves of rice, variety Inintiw, when supplied with varying amts. of $(NH_4)_2SO_4$. There seems to be no definite relation between the amt. of $(NH_4)_2SO_4$ applied and the moisture content of the soil at time of wilting of seedling rice plants. In the vegetative and flowering stages the H_2O in the soil at time of permanent wilting seemed to increase with the amt. of $(NH_4)_2SO_4$ applied. Increasing amts. of H_2O remained in the soil of both fertilized and unfertilized pots at wilting time as the plants became older. With applications of $(NH_4)_2SO_4$ varying from 0 to 1.75 tons per hectare rice plants in the seedling stage were permanently wilted at 14.35 to 14.40% H_2O in the soil, plants in the vegetative stage at 15.73 to 16.97% and plants in the flowering stage at 17.93 to 19.54%. Colin W. Whittaker

Investigations on sugar cane on saline soils (solonchaks). Takeo Nagata and Sanziro Sasaki. *J. Sci. Soil Manure, Japan* **13**, 597–607(1939).—The facts that the alkali spots were always of lower elevation than the surrounding land and that the surface soil of the alkali spots was rich in clay fraction indicate that these spots were generally due to seepage water. The greater the distance from the alkali spot the more nearly normal was the growth of sugar cane. Juice of plants damaged by alkali was lower in Brix, sucrose content and apparent purity, and higher in reducing sugar. In the stalks total N, total ash, CaO, MgO, K_2O, Na_2O, SO_3 and Cl were high; CaO MgO: K_2O Na_2O was 2.28:4.74:54.50.38.48 and SO_3.Cl, 57.22.42.78; the ratios were independent of the degree of damage. These facts indicate that the damage was due to the high concn. of absorbed salt and of surrounding soil soln., not to the ratios of absorbed substances. Y. Kamoshita

Recent experiments with "minor" elements in Western Australia. I. A brief review of the "minor" element question in Western Australia. L. J. H. Teakle. *J. Dept. Agr. W. Australia* **16**, 116–19(1939); cf. *C. A.* **33**, 9515¹.—**II. Experiments with "minor" elements on the growth of potatoes, vegetables and pastures.** L. J. H.

Teakle and E. T. Morgan. *Ibid.* 119-28.—On the marly peat soils of the coastal swamps in the Albany district $MnSO_4$ is likely to benefit a variety of crops. Cu, in addn. to Mn, may be beneficial with some. A no. of crops are benefited by the addn. of Cu to a no. of acidic soils types, including swamp soils, soils of bottle brush flats and brown sandy soils of karri hills of the Albany district. No response is observed to the use of "minor" elements on the agricultural soils of the western coastal plain of Perth. Rates of application of 15 lb. per acre are sufficient for Cu sulfate or $MnSO_4$ and lower rates may be adequate. The residual effect of "minor" elements in the soil is observed in the growth of the crop grown the following yr. III. **Response of wheat to copper on light lands at Wagin.** A. M. Stewart and L. J. H. Teakle. *Ibid.* 135-43.—The use of Cu sulfate is beneficial to the growth of wheat on some light lands in the Wagin district. On the poorest soil type wheat fails to mature grain with superphosphate and K_2SO_4 but produces a good crop when Cu sulfate is used as an addnl. fertilizer. Cu sulfate improves the apparent health and vigor of the wheat throughout the growing period. Other "minor" elements fail to produce substantial increases in yield on any soil types. Borax and Zn sulfate interfere somewhat with germination. It can be expected that benefits from Cu will be shown in improved quality of pasture and in the health of animals grazing on the poorer gravelly sand soils. IV. **The effect of "minor" elements on the growth of wheat in other parts of the state.** L. J. H. Teakle and I. Thomas. *Ibid.* 143-7.—The use of "minor" elements for the growth of wheat on soil types at Cleary, Salmon Gums and Wongan Hills fails to improve the yield. Significant depression in yields results from the use of Zn sulfate, borax and various mixts. of "minor" elements on the acidic sandy soils of Wongan Hills. Zn sulfate is especially injurious. At Cleary, a "minor" element mixt. interferes with germination and yield of wheat but in the early growth stages causes the development of a deeper green color than in the controls. J. R. Adams

Minor elements in fertilizer practice. P. Menchikowsky. *Hadar* **12**, 47-50(1939).—A review with 15 references. Colin W. Whittaker

The effect of boron on the growth of wheat. Matuo Tokuoka and Syusm Zyo. *J. Sci. Soil Manure, Japan* **13**, 613-21(1939).—In sandy shale soils of Tertiary formation in Formosa, pH 6.7, seeds from plots to which more than 66.67 p. p. m. B was applied were not capable of germination. The growth of plants in plots treated with less than 3.33 p. p. m. B was poorer than that of the control in the beginning but was better later; more grain was produced. Slight toxic action of B was observed with 6.67 p. p. m.; notable toxic action at 20 p. p. m. Y. K.

The infiltration of potassium and phosphoric acid in the moor soils. Br. Tacke. *Ernahr. Pflanze* **35**, 307-8 (1939).—The absorption of K by high-moor soils was in agreement with that found previously (A. Konig, *Landw. Jahrb.* **11**, 1(1882)). The fixation of P in the fertilized upper layer of soil was considerably more than that of K, and the amt. of P reaching the lower layer (15-30 cm.) was proportionately smaller. The loss of K from the upper layer of tilled soils was greater than that from grass lands. John O. Hardesty

Retention of some phosphorus compounds by soils as shown by subsequent plant growth. John P. Conrad. *J. Agr. Research* **59**, 507-18(1939); cf. *C. A.* **33**, 1853⁹.—A soln. of each of a series of P compds. was allowed to percolate through a column of 3 pots contg. dry soil deficient in P. The growth of the subsequent crop of milo, whether increased or reduced according as the compd. used was beneficial or toxic, was taken as evidence of P retention. Yolo subsoil and Aiken loam soil were used in the tests. The former showed little retention of hypophosphites but somewhat more of phosphites, The P of HPO_3 reached the 2nd pot but that of the pyro- and orthophosphates was held in the top pots. Aiken soil held each inorg. compd. more strongly than did the Yolo soil. The Yolo soil retained the P of phytin in the top pot but held back the glycerophosphates only slightly. The Aiken soil retained the P of nearly all these compds. in the top pots. The phosphites and hypophosphites were toxic to milo while the meta-, pyro- and orthophosphates, if not too concd., and the glycerophosphates were beneficial when used in both soils. Phytin was beneficial on the Yolo soil and Na nucleate on the Aiken soil. The possible mechanisms by which the various compds. were retained are discussed. W. H. Ross

The solution of phosphorus and potassium in the soil. Kálmán Pallaghy. *Mezőgazdasági Kutatások* **12**, 196-9 (1939).—The contents of the same soils in P_2O_5 and K_2O were detd. by the Neubauer method in August 1936, March and July, 1937. The values are somewhat higher in the spring than in the summer. Since the deviations of parallel detns. are relatively high in Neubauer expts. the difference in the nutrient content of the soils in the various seasons may be of a considerable range. S. S. de Finály

The importance of an abundant supply of potash to German soils and plants, a contribution to the problem of "harmony of nutrients." L. Schmitt. *Ernahr. Pflanze* **35**, 301-6(1939); cf. *C. A.* **33**, 7971.—Pot expts. were carried out with spinach, tobacco and ray grass receiving N, P and K in various combinations. Symptoms of K deficiency occurred in plants receiving no K. Increasing applications of K in conjunction with increasing N showed that the K was more responsible for increased yields. Amts. of vitamin C, both in oxidized and reduced forms, and of carotene in the spinach and ray grass are tabulated for different fertilizer applications. Results with spinach are graphically represented showing the relationship between the dry matter and K contents of the plant and the dehydrogenation of the ascorbic acid. The ascorbic acid in spinach was more stable with high applications of K. With ray grass a high carotene content usually corresponded to a low residual value for ascorbic acid. John O. Hardesty

Some experiments on potassium fertilization. A. Rothenberg. *Hadar* **12**, 211(1939).—One-hundred barley plants grown 18 days in an unfertilized mixt. of kaolin and sand irrigated with well water contg. 35 mg. Cl per l. contained 30 mg. less K and 3 mg. less HPO_4^{--} than did the original seed, but contained 0.9 mg. more Na, 7 mg. more Ca and 7 mg. more Cl. When 0.1246 g. KH_2PO_4 and 0.277 g. KNO_3 were added the plants contained 39 mg. K, 0.8 mg. Na, 7 mg. Ca, 37 mg. HPO_4^{--} and 5 mg. Cl more than the original seed. In the unfertilized soil K was actually lost, but 37% of the K added as fertilizer was taken up in 18 days. A red sandy loam of the coastal belt contained SiO_2 93.68, Al_2O_3 3.23, Fe_2O_3 1.36, H_2O 0.89% and a trace of CaO. The exchangeable cations were Ca 2.5, Mg 0.9, K 0.3 and Na 2.6 mg. equivs. in 100 g. Available K and P were lacking and the soil contained only a trace of N. K fertilization of maize grown on this soil was very effective. Colin W. Whittaker

The effect of calcium arsenate upon the productivity of several important soils of the cotton belt. Clarence Dorman, Frederick H. Tucker and Russell Coleman. *J. Am. Soc. Agron.* **31**, 1020-8(1939).—Neither germination nor seedlings were injured on any of the 7 soil types tested until 400 lb. per acre or more of $Ca_3(AsO_4)_2$ was applied. The greatest injury from the heavier applications occurred in the seedling stage and the extent of this injury depended upon the nature of the soil type. Crop yields from oats, Austrian peas and hairy vetch planted immediately after the As was applied and 1 yr. later showed that yields were not affected except by heavy treatments and much of their toxicity was lost during 1 yr.'s time. Oats seemed more sensitive to As than Austrian peas and hairy vetch, but all crops grown on Norfolk, Ruston and Cahaba sandy loams were injured more than those grown on heavier soils. Large amts. of H_2O-sol. As did not accumulate in any soil until 400 lb. of $Ca_3(AsO_4)_2$ was added, and then only in the sandy soils. Those soils which were most sensitive to arsenates contained the smallest amts. of clay, Fe, Al, Ca and Mg. Houston clay loam, the soil least affected by $Ca_3(AsO_4)_2$, contained the largest quantities of these constituents. From these data it appears that the av. application of $Ca_3(AsO_4)_2$ for insect control will probably never

cause enough accumulation to injure crops usually grown on the soils used in this study. J. R. Adams

The consumption of inorganic nitrogen by the root-nodule bacteria of leguminous plants. II. Syuzi Isizawa. *J. Sci. Soil Manure, Japan* **13**, 560–8(1939); cf. *C. A.* **33**, 1628⁷.—Ammonia and nitrate N were readily utilized by broad-bean bacteria; nitrite was utilized less readily. Y. Kamoshita

Studies on control of mineral damage to plants. I. Sulfide. II. Lime and organic fertilizer. Goro Matuki and Siniti Katutani. *J. Sci. Soil Manure, Japan* **13**, 639–52(1939).—In protecting plants such as paddy rice and barley from damage by inorg. agents, Na_2S and CaS are suitable to ppt. sol. Cu, Pb and As salts. Na_2S is less suitable than CaS for protection of paddy rice, but more suitable for barley. This is attributed to differences in H-ion concn. produced by the 2 sulfides. Duration of the protecting power differs according to the kind of injurious substance and to the soil condition. CuS is easily oxidized to sulfate in the presence of air and moisture and is rather unstable, especially in water-logged soil. PbS and As_2S_3 are more stable than CuS. The soils contg. inorg. substance harmful to plants are inclined always to be acidic. Addn. of lime is considered the most suitable means of protecting the plant. For paddy rice the amount of lime must not be sufficient to produce an alk. reaction, as this hinders the plant growth. Organic fertilizer is not a suitable protecting agent, especially when Na_2S is added. Y. Kamoshita

Fertilizer requirements of sugar cane in Egypt. IV. Further phosphate experiments. Arthur H. Rosenfeld. *Ministry Agr., Egypt, Tech. Sci. Service, Bull.* No. 210, 23 pp.(1939); cf. *C. A.* **31**, 2729², 8792⁵.—$Ca(NO_3)_2$ was considerably more effective than superphosphate in increasing the yield of cane. There was no indication whatsoever of the supposed ripening effect of phosphate fertilizer on sugar cane. The trend was rather consistently toward a slight decrease in cane quality as a result of phosphate application. **V. Time and number of nitrogenous fertilizer applications.** *Ibid.* No. 213, 16 pp. K. D. Jacob

Summary of results of fertilizer experiments on black currants, raspberries and strawberries at Long Ashton, 1924 1937. T. Wallace. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 17–39(Pub., 1939).—See *C. A.* **33**, 7947⁷. K. D. Jacob

The fertilizing of cricket-bat willow trees. H. P. Hutchinson *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 249–53(Pub., 1939).—See *C. A.* **33**, 7947⁵. K. D. Jacob

The spreading ability of fertilizers and laboratory methods for determining it. N. E. Pestov and A. N. Mironova. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 33–6(1939). An app. is described for detg. the amt. of fertilizer which flows through a slit in the bottom of a jar. Comparison of the case with which a no. of fertilizers flow from this app. and from a funnel permits construction of a scale by which various fertilizers can be graded as to ease of spreading. The moisture content of the fertilizer is an important factor. H. M. Leicester

Studies on the fertilizing value of Mayon Volcano ash. II. Beneficial effects of adding ammonium sulfate. Rafael B. Espino. *Philippine Agr.* **28**, 260–70(1939); cf. *C. A.* **34**, 210¹.—Liberal addns. of Mayon Volcano ash to Lupa clay loam gave good results on radishes and tomatoes when supplemented with the correct amts. of $(NH_4)_2SO_4$. Mayon Volcano ash is not toxic to plants. It contains mineral nutritents valuable to plants when applied to a soil rich in N or to an unfertile soil if accompanied by $(NH_4)_2SO_4$. Colin W. Whittaker

Composition of superphosphate (super) and Nauru phosphate. R. A. Taylor. *Queensland Agr. J.* **52**, 549–53(1939).—A typical analysis of Nauru Island phosphate rock is total P_2O_5 39.8, $Fe_2O_3 + Al_2O_3$ 0.7, F 0.5, total CaO 50.4, loss on ignition 3.0 and free water 1.5%. A typical analysis of the superphosphate produced from this rock is H_2O-sol. P_2O_5 20.5, citrate-sol. P_2O_5 0.5, citrate-insol. P_2O_5 1.0, F 0.3, $Fe_2O_3 + Al_2O_3$ 1.0, insol. material 2.2, CaO 29.5, SO_3 28.4, free water 7.6 and combined water 4.0%. K. D. Jacob

Compost. S. D. Timson. *Rhodesia Agr. J.* **36**, 194–219, 285–316(1939).—An extension and revision of a previous paper (*C. A.* **32**, 4706²). Colin W. Whittaker

Experiments on the manurial value of sewage sludge from septic tanks. H. T. Cranfield. *Empire J. Expll. Agr.* **7**, 319–29(1939).—The great bulk of ordinary sewage sludge as produced in septic tanks and drained in lagoons has a compn. falling within the following limits: moisture 50–80, org. matter 10–30, total N 0.5–1.0, P_2O_5 0.1–0.5, K_2O 0.03–0.3 and ether-sol. matter 1–9%. Such sewage sludge has considerable value as an org. fertilizer. To obtain good results with sewage sludge adequate dressings of inorg. fertilizers must be applied. The decompn. of fresh sewage sludge may be slow during dry periods, particularly on light land, since adequate moisture is necessary for fairly rapid decompn. The heaping of sludge for a yr. or 2, or even composting with soil, materially improves the utilization of this manure by producing a more friable material which can be distributed more evenly, and in which the decompn. is rendered more rapid. On certain soils an appreciable residual fertilizing value may accrue in favor of the second yr.'s crop. J. R. Adams

The highest temperatures which occur in stored calcium cyanamide on contact with water. H. H. Franck and Carl Freitag. *Angew. Chem.* **52**, 623–5(1939).—The highest temps. observed on slow addn. of H_2O at 100° to white (19.9% N) and black (23.7% N) $CaCN_2$ and to CaO were 120–5°, 150–60° and 370–400°, resp. If highly combustible materials, such as nitrates, are not present, there is no danger of ignition. Thermodynamic calcns. of max. temps. are presented. 6 references. K. Kammermeyer

Experiments on the control of pests of apple nursery stock by means of dipping. Woolly aphid and red spider. Progress report No. I. H. G. H. Kearns and E. Umpleby. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 72–7(Pub., 1939).—The roots of lifted nursery trees were freed as completely as possible from soil and were completely immersed in an emulsion contg. grade A tar oil 3, grade A petroleum oil 3 and 40% sulfite lye 1.5%. The treatment gave high but incomplete controls of woolly aphid (*Eriosoma lanigerum* Hausm.) and red spider (*Oligonychus ulmi*). K. D. Jacob

Biology and control of Pseudococcus comstocki Kuwana on citrus in Palestine. E. Rivnay. *Hadar* **12**, 197–201 (1939).—Spraying with oil emulsions and tank mixt. (oil mechanically mixed with H_2O plus blood albumin as a spreader) did not give satisfactory results. Oil emulsions failed to pentrate the layer of wax and fumagine on the leaf. Green or yellow soft soap, dild. to a concn. of 1–1½%, softened the fumagine and in spray tests killed 85–90% but dried quickly and its effects did not last long. Thiocyanate in a sol. oil used at concns. of 0.33, 0.50 and 1% penetrated the fumagine and wax and killed over 95%. Residual oil from oil sprays leave a lasting film that is effective against the young crawlers. A S wash was entirely ineffective but gave a mortality of 70% when mixed with a sol. oil. Pyrethrum ext. in vegetable oil contg. an emulsifier gave a 60% kill when dild. to 0.33%. A combination of derris and pyrethrum was unsatisfactory as was also a product contg. derris alone when used at the rate of 1:500. Nicotine with a spreader gave a mortality of 70–80%. Colin W. Whittaker

Further experiments on control of vine moths with the help of sex scents. Bruno Götz. *Anz. Schädlingskunde* **15**, 109–14(1939); cf. *C. A.* **34**, 178⁸.—Expts. were made by which the attractant power of unfertilized females of the vine moths, *Polychrosis botrana* and *Clysia ambiguella*, was used for trapping the males. Such females were imprisoned in cages placed in the center of traps consisting of vertical surfaces covered with white paper coated with glue. The males, which usually appear earlier, are thus captured before they have fertilized the females. For comparison, glass traps baited with the best artificial attractant known, wine made from the marc of grapes with the addn. of 2% vinegar and 1% sugar, were used. The results showed that (for the resp. species) 25 and 23 times

as many moths were trapped in the male traps as by the bait, and, considering males alone, 38 and 52 times as many. The no. of moths captured depends on the weather, the direction of the wind, and the no. and age of the females. The attractiveness of the secretion is greater on the 2nd day than on the 1st, and continues throughout the adult life. This method of control will be practical only when the synthetic scents are available. E. J. S.

Tartar emetic as a control for the gladiolus thrips. W. G. Matthewman and A. G. Dustan. *Ann. Rept. Entomol. Soc. Ontario* **69**, 114(1938).—A spray composed of tartar emetic 2, brown sugar 8 oz. and water 2.5 gal. was slightly more effective than Paris green spray in controlling the thrips and caused no noticeable spotting of the foliage. The 1st application of the tartar emetic spray was made when the foliage was 6 in. tall and the treatment was repeated at weekly intervals for 6 weeks; enough spray was applied to cover the foliage with fine droplets, but not enough to wet the leaves completely. K. D. Jacob

Recent developments in cabbage-worm control on Long Island. H. C. Huckett. *Ann. Rept. Entomol. Soc. Ontario* **69**, 93-6(1938).—Pyrethrum dusts are generally more effective than derris and other rotenone-contg. dusts in controlling the insect pests of cabbage. K. D. Jacob

Control of the house cricket [Gryllus domesticus L.] L. Caesar and G. G. Dustan. *Ann. Rept. Entomol. Soc. Ontario* **69**, 101-5(1938).—In lab. tests pyrethrum powder, NaF and Na_2SiF_6 were highly effective against the house cricket. A bait composed of bran 25, NaF 1 lb., molasses 2 qt. and water 2.5 gal. is recommended for the control of crickets breeding in refuse dumps. The bait should be applied 3 times at weekly intervals, in the late evening to all infested parts of the dump. Crickets in houses can be controlled by placing a mixt. of equal parts of fresh pyrethrum powder and NaF in a ring 1 in. wide, enclosing an area about 6 in. in diam. in the center of a newspaper, and placing a small handful of dry oatmeal, as a bait, in the center of the ring. The dust ring should be heavy enough to cover the paper which is allowed to remain in a corner of the room until all crickets have disappeared. K. D. Jacob

Effective spacing of soil fumigants for field application A. L. Taylor. *Proc. Helminthol. Soc. Wash., D. C.* **6**, 62-6(1939). If k is the max. distance from the point of application of a soil fumigant to the point where it produces the desired results, the most efficient utilization of the fumigant is obtained when the application points are located in straight parallel rows 1.5 k apart and the points are 1.732 k apart in the rows. The 1st application point in the 1st and other odd-numbered rows is located on a line perpendicular to the rows and the 1st application point in the 2nd and other even-numbered rows is made at a distance of 0.866 k from this line. K. D. Jacob

A rapid method for determining k values of nematocides B. G. Chitwood. *Proc. Helminthol. Soc. Wash., D. C.* **6**, 66-70(1939); cf. preceding abstr. and *C. A.* **33**, 4683[1].—The I-type test, devised by Newton, Hastings and Bosher (cf. *C. A.* **31**, 5089[6]), is considered of value in selecting chemicals and detg. dosage rates but not for the detn. of row and hole spacing in plot or field. After a few promising dosage rates are selected, the X- or Y-type tests (described by C.) should be performed. Information so obtained should be applied only under conditions similar to those of the test. **Frames for spacing injections of soil nematocides.** *Ibid.* 70-3. K. D. Jacob

Some factors governing the success of chemical treatment of soil for nematode control. Gerald Thorne. *Proc. Helminthol. Soc. Wash., D. C.* **6**, 60-2(1939).—Granular $Ca(CN)_2$ was applied to a beet-field soil by means of a special applicator attached to the plow beam which dropped the chemical into the furrow just ahead of the plow. The plow depth was 10–12 in. and most of the $Ca(CN)_2$ was applied at that depth. After plowing, the field was harrowed down to a fine mulch and leveled. Applications of $Ca(CN)_2$ at rates as high as 800 lb./acre failed to control *Heterodera schachtii*, apparently because of failure of the HCN to penetrate into the hard subsoil where an important portion of the nematode population was present. Later applications of $Ca(CN)_2$ at a depth of 14-16 in. were also ineffective. K. D. Jacob

The effect of some halogenated hydrocarbons on the eggs of Toxocara canis (Nematoda). John T. Lucker. *Proc. Helminthol. Soc. Wash., D. C.* **6**, 51-7(1939).—Some eggs of *T. canis* became embryonated in cultures initially consisting of 1 part Chlorosol (a com. mixt. of ethylene dichloride 3 and CCl_4 1 part by vol.) or dichloropentane (a com. mixt. of isomers) and 14 parts water. Chlorosol delayed the development of the eggs. Dichloropentane prevented the larvae in embryonated eggs from reaching a normal structure to a greater extent than did Chlorosol. Practically all eggs placed on moist soil in small dishes and exposed to small amts. of Chlorosol or ethylene dichloride, under conditions minimizing loss of vapors from the containers in an initial period of 48–96 hrs., failed to become embryonated or undergo appreciable development and were evidently killed. Practically all embryonated eggs similarly exposed to Chlorosol for 96 hrs. were also killed. Under the same conditions, dichloropentane and CCl_4 were ineffective in preventing embryonation of the eggs, but development was delayed by CCl_4. Dichloropentane was not effective against embryonated eggs under similar conditions. A practical method of confining the vapors closely to the soil must be developed before Chlorosol and ethylene dichloride can be used effectively for killing ascarid eggs on runways of dog and fox kennels. K. D. J.

Progress report on vegetable diseases. X. L. Ogilvie, H. E. Croxall and C. J. Hickman. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 91-7(Pub. 1939); cf. *C. A.* **33**, 7991.—$CuCN_2$, applied to the soil at the rate of 5 cwt./acre, seemed to exert some degree of control of *asparagus rust* caused by *Puccinia asparagi*. Promising results in the control of *celery blight*, caused by *Septoria apii*, were obtained by dusting the seed with either Me Hg phosphate or proprietary prepns. contg Ph Hg acetate or Et Hg chloride. The stand of plants and yield of peas were greatly increased by treating the seed with Cu_2O or with certain org. Hg compds. Increases in germination also resulted from the Cu_2O treatment of seeds of sugar beet, tomato, cucumber and sweet pea. Germination of cabbage, turnip, radish and lettuce was increased by treating the seed with ZnO. K. D. J.

Chemical control of rust of cultivated plants K. Hasselbraluk. *Angew. Botan.* **20**, 366-73(1938), cf. *C. A.* **32**, 5572[8].—Cu sprays were only fairly effective in controlling rust of asparagus, but Bordeaux (Wacker) was fairly effective against rust of snapdragon. α-Naphthol seemed to be a promising dust in the control of rust. Materials added to the soil to render plants resistant to rust were: picric acid (I) and *p*-toluenesulfonamide (II). I and II were tested on cereal. II was tested on mint, mallow and snapdragon; the results regarding control of rust on these plants were either neg. or not conclusive. K. Longrée

Control of kernel smut of sorghum. A. F. El-Helaly *Ministry Agr., Egypt, Tech. Sci. Service, Bull.* No. 233, 22 pp.(1939).—The disease was controlled by mixing the seed thoroughly with Agrosan G at the rate of 2.5–5.0 g./kg. or by treating the seed with 1-2% soln. of Uspulun or Germisan for 15 min. Semesan used at the rate of 5–10 g./kg. of seed also gave good results. The treatments protected the seed against attack by weevils during storage and had no adverse effect on the subsequent germination of the seed and growth of the plants. Susceptibility to the disease was definitely increased by treating the seed with solns. of Cu_2Cl_2 or Cu_2I_2. $HgCl_2$ and Cu_2I_2 treatments had an adverse effect on seed germination and plant growth. Treatments with either CH_2O, $CuSO_4$, Cu nitrate, Cu chloride or Cu acetate did not protect the seed against attack by weevils. In lab. tests the toxicity of S and Cu carbonate toward spores of the causal organism was increased enormously by using soil filtrate instead of distd. water as the germination medium. Spore germination in soil filtrate alone was about half that in distd. water alone. K. D. Jacob

Systematic and automatic warm-water steeping to control loose smut of wheat. G. Howard Jones. *Ministry Agr., Egypt, Tech. Sci. Service, Bull.* No. 220, 12 pp.

(1939).—Nearly complete control of the smut, without injury to seed germination, was obtained by steeping the wheat in water at either 40° for 6–8 hrs. or 43° for 4–6 hrs. Steeping at 41.5° for 6 hrs. is most suitable for practice. An automatic machine for carrying out the warm-water treatment is described and figured. K. D. Jacob

The control of fire blight (Phytophthora infestans) of potatoes. J. K. Thompson. *Kirton Agr. J.* No. 3, 7, 9–11, 13, 15–28(1939).—Regardless of the degree of fineness, dry-mixed $CuSO_4$-$CaCO_3$ dusts contg. 10% or less of Cu did not give satisfactory control of blight. The best, though not complete, control given by dry-mixed dusts was obtained with those contg. 24% Cu. Results obtained with Cu lime dusts prepd. by different methods were inconclusive. K. D. Jacob

The control of damping-off fungi by means of chemicals applied to the soil, with special reference to weak formaldehyde solutions. L. Ogilvie, C. J. Hickman and H. E. Croxall. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 98–114(Pub., 1939).—Of the large no. of chemicals tested, CH_2O was the most effective against the fungi causing damping-off. When it was used at dilns. of 1 200 600 for watering seed boxes after the seed had been sown, it controlled the fungi to a marked extent. CH_2O was used successfully with seeds of peas, tomatoes, cucumbers and sweet peas, but it caused injury to seeds of stocks and certain other ornamentals. Twenty-six references. K. D. Jacob

Experiments with oil spray for the control of the mussel scale (Lepidosaphes pinnaeformis Bché). Y. Ben-Amotz. *Hadar* **12**, 203–6(1939).—Good control was obtained by spraying with 1½ and 2% white oil emulsions. Colin W. Whittaker

An outline of the life history of the hop-vine borer, Gortyna immanis Guenee, with notes on its control. H. A. Gilbert. *Ann. Rept. Entomol. Soc. Ontario* **69**, 107–14 (1938).—*p*-Dichlorobenzene, applied to the soil as a fumigant for control of the borer, was highly injurious to hop plants. K. D. Jacob

Treatment of lemon seeds to prevent molds. M. Zubov. *Sovet. Subtropiki* **1938**, No. 5, 120; *Khim. Referat. Zhur.* **1**, No. 11–12, 72–3(1938).—To prevent growth of *Penicillium* (green and blue mold), the following substances were investigated: borax, Solbar, aqua Laurocerasi, formalin, 40% nitrophenylboric acid, and Granosan. In wet treatment best results were obtained with 5% borax and 5% Solbar. In dry treatment best results were obtained with Granosan and 40% nitrophenylboric acid in the amt. of 5 g./kg. of the seeds. Germination of the seeds was decreased by 10–15% after the wet treatment. No decrease was observed after the dry treatment. W. R. H.

White grubs and pasture deterioration on the Atherton Tableland. D. O. Atherton. *Queensland Agr. J.* **52**, 484–522(1939).—Soils from a grub-infested area had pH values of 4.5–6.0 and patches showing poor growth of crops were assocd. with low pH values (4.4–4.6) and deficiencies of Ca, P, K and Mg. *Analyses of silage crops* (maize, soybean, rice bean, velvet bean and Groit cowpea) grown on the Tableland soils are given. K. D. Jacob

A method for determining deguelin in derris and cubé. Lyle D. Goodhue and H. L. Haller. *Ind. Eng. Chem., Anal. Ed.* **11**, 640–2(1939).—After the rotenone and aq. alkali-sol. material are removed from derris and cubé, the remaining resin is treated with dil. methanolic alkali. The resulting racemic deguelin is crystd. from CCl_4 and weighed as a 1 to 1 solvate. The purity of the solvate is detd. by the Goodhue red color test (cf. *C. A.* **30**, 2690⁹). The deguelin content, as detd. by this method, of 7 samples of derris, 5 of cubé and 1 of timbo varied from 0.25 to 3.92%. The high toxicity to insects of the noncryst. portion of derris and cubé exts., coupled with a generally low deguelin content, suggests the presence of other unidentified compds. that contribute to the toxicity. J. R. A.

Combined washes. Progress report. V. H. G. H. Kearns and H. Martin. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 66–71(Pub., 1939); cf. *C. A.* **33**, 801⁶.—Petroleum oil sprays contg. either dinitro-*o*-cresol (I) or Bu carbitol thiocyanate failed to control aphids that had just hatched from the eggs, but sprays contg. 3% or more of petroleum oil gave an appreciable control of fruit tree red spider (*Oligonychus ulmi*) eggs. When applied to plums before egg hatch, the sprays gave a high control of plum aphis (*A. padi*) and could be applied with safety just before bud burst. Sprays contg. I could not be applied to apples later than the very early green-flower stage without risk of serious injury. Black currants and gooseberries with the flower buds exposed suffered complete loss of crop, but red currants were more tolerant. Grade A tar-oil emulsions (3%) gave complete control of plum aphis and could be applied just before bud burst without causing flower injury. K. D. Jacob

Accident prevention in the use of poisonous spray materials. Hubert Martin. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 145–53(Pub., 1939).—The various methods of accident prevention are reviewed and the precautions legally enforced or voluntarily observed in different countries are compared. K. D. J.

Spray-injury studies. Progress report I. Some observations on the probable causes of lime-sulfur injury. W. E. Berry. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 124–44(Pub., 1939).—Symptoms of lime-S injury are described and the relative susceptibilities of some varieties of common fruit plants are indicated. The penetration of spray materials into the leaf is discussed with particular reference to cuticle permeability and the effect of nutritional and climatic factors. Exptl. results indicated that foliage injury from lime S may be correlated with temp., humidity and sunshine. Max. injury occurred when temp. was high, humidity low and sunshine continuous. Inasmuch as concd. sprays of sucrose and $CaCl_2$ produced little damage compared with lime S, loss of water due to the purely osmotic effect of spray deposits is not alone responsible for spray injury. Detached leaves of Lane's Prince Albert and Laxton's Superb apples exhibited rapid increases in respiration when sprayed with 2% lime S and showed symptoms similar to those observed in the field. Necrotic patches are believed to result from local penetration of spray fluid, but the increase in respiration seems to be due to a more general physiol. effect on the whole leaf. Injury from lime S of the type resulting in leaf abscission may be caused by a gaseous or volatile compd. such as H_2S. Twenty-nine references. K. D. Jacob

The anthelmintic efficiency of "Lentin" against the more important internal parasites of sheep. Grahame Edgar. *Australian Vet. J.* **15**, 172–6(1939).—"Lentin," a stable deriv. of choline, seems to possess a pharmacol. action similar to that of physostigmine. Lentin showed no anthelmintic efficiency on *Haemonchus contortus* and *Trichostronglus colubriformis*, had very little effect on *Oesophagostomum columblanum* and was toxic to sheep in poor condition. Colin W. Whittaker

The efficiency of copper sulfate and carbon tetrachloride against Haemonchus contortus in adult sheep. Hugh McL. Gordon. *Australian Vet. J.* **15**, 118–20(1939); cf. *C. A.* **34**, 159⁹.—One fluid oz. of 4% Cu sulfate soln. is not an effective dose against *H. contortus* in adult sheep but 2 oz. is very effective. Two ml. of CCl_4 in 3 ml. of liquid paraffin is very effective. Colin W. Whittaker

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Compns. for use as insecticides (U. S. pat. 2,177,197) **26**. Alkylolaminomethylene compds. [for insecticides] (U. S. pat. 2,169,737) **10**.

Use of phenothiazone as a fungicide. Marion C. Goldsworthy (to the people for free use). U. S. 2,177,198, Oct. 24. Phenothiazone may be used with lime, bentonite, water, etc.

Insecticides. Donald L. Vivian (to the Secretary of Agriculture of the U. S. A.). U. S. 2,173,386, Sept. 19. In insecticides such as those for fruits or vegetables, use is made of hydrazobenzene or other compds. of the general formula $PhNHNHC_6H_4R$ where R represents H, methyl, ethoxy or halogen.

Insecticidal oil emulsions. Paul R. Jones (to Shell

Development Co.). U. S. 2,177,434, Oct. 24. A plant spray mineral oil is emulsified with water by use of a petroleum sulfonate and cottonseed oil from which the free fatty acids have been removed by treatment with a caustic alkali.

Insecticidal compositions. Benjamin Collie, Wm. H. Davies, Wilfred A. Sexton and Imperial Chemical Industries Ltd. Brit. 507,221, June 12, 1939. The compns. comprise as an active ingredient a *N*-alkylbenzothiazolethione. These compds., e. g., *N*-ethylbenzothiazolethione, may be prepd. by heating the corresponding 2-benzothiazyl alkyl sulfide alone or with Br, I or an alkyl bromide. The active ingredient is mixed with an inert pulverulent carrier to which a H_2O-absorbent or dust-binding agent may be added, or may be suspended or emulsified in H_2O or in H_2O and an org. liquid to which spreading, emulsifying and other agents may be added. Other insecticidal substances may also be added.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Yeasts in the production of alcohol from wood. I. A. Mazilkin. *Microbiology* (U. S. S. R.) **7**, No. 5, 611–81 (1938); *Khim. Referat. Zhur.* **2**, No. 4, 66(1939).—Yeast (the plant mash cultured 4 v) which is added to the hydrolyzate of the wood very soon shows signs of poisoning and is replaced by smaller forms of yeast by means of which the hydrolyzate is fermented. The fine yeast is a sep. form belonging to *Saccharomyces exignus*. If several races of the yeast sepd., No. 2 was the predominant kind. It ferments the hydrolyzate rapidly and multiplies rapidly, but is not sufficiently stable. The yeast 4 v belongs to *Saccharomyces cerevisiae*, it resembles the race *XII*, but its fermenting power is small. It is unsuitable for the production of alc. from wood material. The yeast of the race *L* was sepd. from the vats of continuous fermentation in which mineral salts are added to the hydrolyzate. It resembles *Saccharomyces chevalieri Guill.* In contrast to the yeast No. 2 it yields an insignificant percentage of dead cells during prolonged cultivation in the hydrolyzate. It is intermediate in rate of fermentation. W. R. H.

The traces of copper and iron in alcohol. J. Knop and J. Malcher. *Chem. Obzor* **14**, 209–12(1939).—A spectrum of the residues from raw alcs. showed the elements Al, Ca, Cu, Fe, K, Na, Mg, Mn and Si. The Fe lines exceeded those of Cu in intensity. For the Cu detns. neutralize 25 cc. of raw alc. with NaOH, mix with 25 cc. H_2O, add 5 cc. of a diphenylcarbazide reagent (0.1 g. of diphenylcarbazide in 50 cc. EtOH and 50 cc. C_6H_6), dil. to 100 cc. with C_6H_6, shake and allow the mixt. to stand quietly for several hrs. Remove the colored C_6H_6 layer and compare it to a $Cu(NO_3)_2$ in EtOH soln. contg. 0.00145 0.00029 mg. Cu per cc. In 9 specimens of raw alc. prepd. in Czechoslovakia the Cu content ranged from 0.2 to 5.2 mg. per l. Refined alc. contained 0.001 mg. Cu per l. For the Fe detns. take 25 cc. of neutralized raw alc., add 0.25 cc. of concd. HCl, 0.25 cc. of concd. HNO_3 and 5 cc. of a 10% KCNS, dil. to 100 cc. with water, and allow to stand for 1 hr. Compare the colored soln. with a standard $FeCl_3$ soln. contg. 0.002 mg. Fe per cc. In 8 specimens of raw alc. prepd. in Czechoslovakia the Fe content ranged from 0.7 to 42.9 mg. per l. Refined alc. contained 0.02 mg. Fe per l. The presence of Fe in the ratio Fe:Cu::5:1 did not interfere with the Cu detns. Elec. cond. detns. confirmed the analyses. In the residues from 9 different distilleries the Cu content ranged from 7 to 21 mg. per l. and the Fe content ranged from 3 to 12 mg. per l., the Cu content exceeding that of Fe in all residues. The method enables a study of the *corrosion of stills* and an evaluation of the *keeping qualities of motor fuel*, i. e., catalytic effect of Fe and Cu upon the formation of resins and unsatd. hydrocarbons. Frank Maresh

Formation of fusel oil during alcoholic fermentation. II. M. I. Zalesskaya. *Microbiology* (U. S. S. R.) **7**, No. 5, 546–64(1938); *Khim. Referat. Zhur.* **2**, No. 4, 66–7 (1939); cf. *C. A.* **33**, 5980[2].—The use of tech. leucine lowered the yield of fusel oil to 0.12%; with pure leucine the yield was 0.14%. The most energetic formation of fusel oil coincides with the beginning of the main fermentation of sugar, when the multiplication of yeast and the deamination of leucine are nearly concluded, in the period of from 24 to 48 hrs. The greater the amt. of the fermented sugar the greater the yield of fusel oil. On lowering the amts. of added yeast (3 million cells/cc.) the formation of fusel oil takes place slowly and continues uniformly until the fermentation is concluded, but the yield is greater (0.23%). With a larger amt. of yeast (30 million cells/cc.) the formation of fusel oil stops rapidly (in 36 hrs.) simultaneously with the main fermentation of sugar and the yield of fusel oil is smaller (0.19%). The splitting of leucine by yeast takes place very rapidly; within 12 to 24 hrs. up to 70% of the leucine is consumed.
W. R. Henn

The fermentation of cassava and molasses for the production of acetone and normal butyl alcohol. Marcos A. Tubangui, Victoria A. Masilungan and Dolores Hipplito. *Philippine J. Sci.* **70**, 123–31(1939). E. H.

Cider-making trials for the season 1937–1938. P. T. H. Pickford. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 154–70(Pub. 1939); cf. *C. A.* **33**, 7663.—Data are given on d., rate of fermentation and malic acid and tannin contents of apple and pear ciders.
K. D. Jacob

Fermentation control of ciders by the centrifuge method. Relationship between changes in nitrogen content in juices and ciders and the subsequent rates of fermentation. Vernon L. S. Charley. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 174–87(Pub. 1939).—See *C. A.* **33**, 7951[9], 7952[4]. K. D. Jacob

Chemical control of distilleries. Jose Martinez Dalman. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* **1938**, 214–26.—Elementary. O. W. Willcox

Applications of capillary analysis. I. Detection of artificial coloring matter in red wines. Carlo Ferrari. *Ann. chim. applicata* **29**, 367–73(1939).—The method of K. Fajans depending on the adsorbing power of Ag halides is used. Twenty-five cc. of wine is acidified with 5 cc. of dil. HNO_3 (1 3), 10 cc. of 0.1 *N* $AgNO_3$ is added, and then 3–4 cc. of 0.1 *N* KI, drop by drop. If the color is natural, the AgI is yellow, whereas, if an acid dye has been used the ppt. is violet-colored. If the reaction is carried out on a filter paper, a semimicrotest can be made. A. W. C.

Application of hydrogen peroxide to brewing. I. Destruction of the odor of putrefied sake by hydrogen peroxide. Masakazu Yamada. *J. Agr. Chem. Soc. Japan* **15**, 699–700(1939); cf. *C. A.* **33**, 4368[8].—When 0.001 part of 35% H_2O_2 was added to 1 part of putrefied sake and it was kept at ordinary temp. for 4–5 days, the smell was completely removed. **II. The action of catalase at various stages in sake brewing.** *Ibid.* 700–2.—The action of catalase was strongest in the aq. ext. of koji. It decreased gradually with the progress of brewing. It declined suddenly after the pasteurization of sake. It decreased more or less by putrefaction. **III. Influence of alcohol and temperature upon the catalase of sake.** Masakazu Yamada and Syōzō Masui. *Ibid.* 702–4.—The catalase in sake could not be completely destroyed by pasteurization, while the diastase lost its activity by heating at 45–60°. The catalase in the koji ext. was destroyed by heating at 80°, while that in sake at 70°. It may be due to the presence of alc. in sake. **IV. Destruction of catalase in sake by hydrogen peroxide.** Hisao Matui and Masakazu Yamada. *Ibid.* 704–8.—Sake was prevented from putrefaction in the presence of a small amt. of H_2O_2. The catalase in sake should be first destroyed by the addn. of H_2O_2, and then the excess of H_2O_2 was available for sterilization. One thousandth part of 35% H_2O_2 was decompd. by the

catalase in sake within 24 hrs. When sake was heated at 50° and 0.001 part of 35% H_2O_2 was added, the catalase in sake was inactivated. V. **The action of hydrogen peroxide on biacetyl, acetoin and butylene glycol.** *Ibid.* 708–10.—When H_2O_2 was added to remove the smell of putrefied sake, acetoin or 2,3-butylene glycol in the putrefied sake could not be destroyed, while biacetyl was oxidized to AcOH. VI. **Effect of hydrogen peroxide on the growth or multiplication of microörganisms.** *Ibid.* 819–20.—The multiplication of sake yeast and distillery yeast was retarded in the koji ext. contg., resp., 0.028% and 0.024% of H_2O_2, while *Aspergillus oryzae* was resistant even to 0.1% of H_2O_2. VII. **Complete prevention of putrefaction of sake by hydrogen peroxide.** Masakazu Yamada, Hisao Matui and Tokuitiro Ohasi. *Ibid.* 820–5.—The catalase in sake was destroyed by heating at 55° and H_2O_2 was added. Four mg. of H_2O_2 remaining in 100 cc. of sake was sufficient to prevent the putrefaction, even when sake was dild. with H_2O. An excess of H_2O_2 spoiled the taste of sake. VIII. **Application of hydrogen peroxide to the preservation or the refining of beverages or brewages.** Hisao Matui and Masakazu Yamada. *Ibid.* 826–30.—When H_2O_2 was added to soy for preservation, it was decolorized giving a bad smell. It may be due to the oxidation of amino acids into aldehydes. H_2O_2 was gradually decompd. by catalase in the soy. Hence it was quite inadequate to use H_2O_2 as the rectifying agent or antiseptic for the soy. When H_2O_2 was added to vinegar, the smell of bacteria or biacetyl was removed. The addn. of 0.001–0.004 part of 35% H_2O_2 to "calpis," tomato catsup, syrup of coffee, soap, evapd. milk, bean curd or vermicelli was successful. Also in *Bull. Agr. Chem. Soc. Japan* **14**, 58–60(1938); **15**, 115–17(1939)(in English). Y. K.

Absorption of bromine by mash as a measure of quality. K. Sotomn. *Spirto-Vodochnaya Prom.* **1938**, No. 6, 35–6; *Khim. Referat. Zhur.* 2, No. 2, 130(1939).—Br absorption is a much more accurate measure of quality in mash than is I absorption. The two methods are described, with comparative results. W. R. Henn

Determination of reducing sugars in wort and in mash by means of photoelements A. Egorov. *Spirto-Vodochnaya Prom.* **1938**, No. 9, 38–40; *Khim. Referat. Zhur.* 2, No. 4, 82–3(1939).—In the detn. of reducing sugars, Cu^{++} is detd. photocolorimetrically before and after the reduction, by means of a Cuprox element and a yellow-orange light filter. W. R. Henn

The determination of the electrical conductivity of yeast from the viewpoint of the manufacturer. V. Jonáš, R. Briess and M. Kninek. *Chem. Obzor* **14**, 169–77, English summary(1939).—Elec. cond. detns. of yeast suspensions made in the yeast plant in the manner of Šandera (*C. A.* 33, 7326[4]) show that freshly prepd. com. yeast suspensions have a relative cond. of 12 which remains const. for 3–6 days at 18–25°, that the elec. cond. of fresh com. yeasts from other factories in Czechoslovakia ranged from 14 to 28, that water used in the prepn. and for the washing of yeasts had a relative cond. of 9, that water from the presses and water from between yeast cells had a relative cond. of 12. For 1st generation yeast cells used for cultures, the relative cond. ranged from 24 to 45. Yeasts stored in packages which dried at the terminal period showed the following relative cond. on the resp. days (1) 16, (3) 18, (6) 20, (15) 28, (24) 46 and (30) 58; for yeast which liquched during storage the relative cond. during the following days of storage was (1) 17, (3) 18, (6) 20, (15) 40, (20) 68 and (22) 161. From factory experience a low cond. value indicated a good preservation in storage, a relative cond. of 70 meant the beginning of autolysis, a value in the range 110–140 was accompanied by a smeariness, and at 160 liquefaction began. At 35° the relative cond. reached a value of 100 in 24 hrs. and ranged from 180 to 240 at the beginning of liquefaction. Yeasts with a low elec. cond. had the highest fermenting powers and produced the best doughs. A low ash content in yeast cells correlated with a low cond.; the total N content of yeast cell bore no relation to the elec. cond. At 35° during autolysis the ratio of relative cond. to the percentage of dead yeast cells was on the following days (1) 17:2, (2) 30:9, (3) 67:14, (4) 88:14, (6) 105:20, (8) 200:25, (10) 412:48 and (13) 1135:78. All electrolytes were released by boiling yeast cells for 30 min.; further boiling did not increase the cond. above the range 150–190. The elec. cond. of a sucrose soln. fermented by yeast rose from 10 to 12 during the fermentation. Yeasts with a good appearance had a low cond.; yeasts with a dark color had a high cond. For abs. units the relative cond. values should be maltiplied by 1.58×10^{-5} ohm^{-1} cm.$^{-1}$.

Frank Maresh

Concn. and examn. of bios required by English brewery top fermentation yeast (Rainbow, Bishop) **11C.**

Denaturing alcohol. Leo M. Christensen (to Chemical Foundation, Inc.). U. S. 2,176,208, Oct. 17. An arrangement of app. is described, and a method of producing a denatured EtOH to produce a power alc. fuel which involves treating a primary amine such as monoamylamine with $CHCl_3$ and with NaOH in the presence of the EtOH which is to be denatured, co-distg. and co-condensing the volatile and condensable reaction products together with the excess alc. and blending the condensate thus produced with additional quantities of alc.

Denatured alcohol. Louis J. Figg, Jr. (to Eastman Kodak Co.). U. S. 2,176,489, Oct. 17. Diphenyl ether 0.5–5% is used as a denaturant, alone or together with other denaturants. U. S. 2,176,491 relates to the use of about 0.5–5% of formamide as a denaturant. U. S. 2,176,490 (Louis J. Figg, Jr. and James W. Rhea, joint inventors; to same assignee) relates to the use of about 0.5–5% of dichloromethyl ether or dichloroethyl ether for denaturing alc. U. S. 2,176,492 relates to the use of a mixt. of $NaNO_2$ and butyl stearate for inhibiting corrosion, in alc. antifreeze compns.

Device for aerating liquids, as in yeast manufacture. James Lockey (to Standard Brands Inc.). U. S. 2,176,558, Oct. 17. Use is made of a device which may comprise a pipe having suitably disposed escape passages, and a tightly fitting enveloping pipe having a spirally running slit therein forming escape passages communicating with the first named pipe, the enveloping pipe having a coefficient of expansion differing from that of the enveloped pipe and adapted to control the discharge from the escape passages of the first named pipe as well as the discharge from the spirally running slit of the enveloping pipe, and a layer of wire wound to form a pipe about the enveloping pipe, the spirally running slit and the spacings between the windings of the wire being of a width insufficient to permit the entry of particles to the escape passages. Cf. *C. A.* 33, 4738[3].

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Nails and nail changes. I. Investigation of nail lacquers and their components. Henry Silver and Bernard Chiego. *J. Investigative Dermatol.* 2, 361–74(1939).—A study of the compn. of fingernail lacquers with toxicol. and sensitization tests on guinea pigs and patch tests on human subjects. Philip D. Adams

Preparation of ampoules of calcium levulinate. Lorenzo Bracaloni. *Boll. chim. farm.* **78**, 457–9(1939); cf. *C. A.* 33, 7481[8].—Ca levulinate hydrated (I) and anhyd. contains 13.00–13.10% and 14.10–14.20% Ca and this Ca content is superior to that found in the corresponding gluconates and camphorsulfonates. A 5% soln. of I in doubly distd. H_2O has a cryoscopic p. −0.78° and pH 7.6. The addn. of 5 cc. *N* HCl to 1 l. of soln. shifts the pH to

6.2–6.6. A detailed procedure for the prepn. of 10 l. of 5% **I** as a brilliant limpid soln. suitable for hypodermic and intravenous injection is given. Sterilization of the ampouled soln. in neutral glass at 100° for 1 hr. caused no perceptible change in the properties of the soln. which gave no local or general reactions on intravenous injection in animals and in human subjects. C. R. Addinall

Italian ephedras. Carlo Alberti. *Boll. chim. farm.* **78**, 477-81(1939).—A study of the ephedras of Sardinia and Sicily showed that *E. vulgaris*, *fragilis*, *altissima* and *procera* have low alkaloidal content (0.36, 0.03, —, 0.12%) and that they contain predominantly the pharmacologically inactive pseudoephedrine. The problem of using *E. vulgaris* as a national source of ephedrine resolves itself into devising methods for the economical extn. of the alkaloid and its conversion to ephedrine. C. R. A.

Preparation of aqueous solutions of folliculin for hypodermic use. Antonio Mossini. *Boll. chim. farm.* **78**, 482 3 (1939).—A mixt. of 0.05 g. folliculin, 1 g. $N(CH_2CH_2OH)_3$ and 95 cc. of $HOCH_2CH_2OAc$ is heated with stirring to complete soln. and cooled. Diln. with doubly distd. H_2O gives a limpid soln., unstable to light and air, which is suitable for ampouling in colored ampoules under an inert gas. Such ampoules can be sterilized at 100° without loss of activity and provide solns. suitable for intravenous use. C. R. Addinall

Vitamin A and D potencies of liver and intestinal oils of halibut (Hippoglossus hippoglossus). L. I. Pugsley. *J. Fisheries Research Board Can.* **4**, 396–404(1939).—In northern British Columbia halibut, size seems to be the most important factor detg. the vitamin A content. Vitamin A varies inversely with the percentage of oil in the liver, whereas the vitamin D content appears to be unrelated to the size of the fish or to the vitamin A content. Oil from the heads and trimmings is low in both vitamins. 5 Halibut with 5.03% viscera contain 1.21% liver and 2.15% intestines, which yield 17.1% and 3.6% of oil, resp. Liver, liver oil, intestines and intestinal oil contain 4100, 35,000, 2300 and 80,000 blue units of vitamin A per g., resp. Seasonal variations of these various yields, their vitamin A and D potencies and the I no. of the oils are tabulated. C. R. Addinall

Vitamin A and D potencies of liver and intestinal oils of gray cod (Gadus macrocephalus). L. I. Pugsley. *J. Fisheries Research Board Can.* **4**, 405 8(1939); cf. *C. A* **33**, 2357[4].—A year-round study of the seasonal variations of the liver and intestinal content of *G. macrocephalus*, a species of true cod present in the coastal waters of British Columbia and Alaska, showed a definite increase in the liver content (4% in August) during the fall and winter months (prespawning period) accompanied by a rise of the liver-oil content (12.8% in October) and a decrease in the vitamin A content (1100 blue units per g. in October). A similar fall in the vitamin D content (125 international units in November) was noted. The vitamin A and D contents (6500 and 365) and the unsaponifiable matter of the liver oil were above the av. for gadids. The intestines (2.4%) yielded less oil than the liver (31.2%) but the oil was relatively high in vitamin A (16,000 blue units per g.) and low in D (35 international units per g.). Summaries of these seasonal variations are tabulated. C. R. A.

Review of Chinese materia medica during the last decade. Bernard E. Read. *Natl. Med. J. China* **25**, 3–14(1939). Wm. H. Adolph

Chemical properties of some Chinese herbs. Heng-Pi Chu. *Natl. Med. J. China* **25**, 15–54(1939).—A review of 24 important herbs used in medicine. W. H. Adolph

The preparation, toxicity and bactericidal activity of methenamine mandelate. Glenn L. Jenkins, Laurine Jack and Charles H. Drake. *Pharm. Arch.* **10**, 81-5 9 (1939).—The prepn. of the compd. is given. The compd., $C_{14}H_{20}O_3N_4$, m. 129.2–129.5°, is readily sol. in H_2O, slightly sol. in EtOH, practically odorless and has a sweetish taste, pH (10% aq. soln.) 4.5. It is toxic to rats on intraperitoneal injection and nontoxic on oral administration to rabbits and it is bactericidal in urine *in vitro* at pH levels of 5.5, 6.0 and 6.5. H. M. Burlage

Adaptation of assay methods for some N. F. preparations. IV. Ointment of mild mercurous chloride. Robert Tzucker and Wm. B. Baker. *Pharm. Arch.* **10**, 85–7 (1939); cf. *C. A.* **33**, 9542[1].—The following adaptation of the U. S. P. XI method for the assay of HgCl is offered: Place about 2.5 g. of the ointment in a 250-cc. tared, glass-stoppered flask and weigh accurately. Add 100 cc. $CHCl_3$, stopper, and shake gently until the ointment base is dissolved. Filter the mixt. and wash the residue with small portions of $CHCl_3$. Place the filter paper and contents in the glass-stoppered flask, add about 25 cc. H_2O and mix well. Add 50 cc. 0.1 *N* I_2 and 5 g. KI dissolved in 10 cc. H_2O. Stopper the flask, allow the mixt. to stand with occasional shaking until complete soln. has taken place, and then titrate the residual I_2 with 0.1 *N* $Na_2S_2O_3$, using starch test soln. as an indicator. Each cc. 0.1 *N* I_2 = 0.02361 g. HgCl. The following standard for the N. F. ointment is recommended: It contains not less than 29% and not more than 31% HgCl. H. M. Burlage

Capsicum from Italian Somaliland. (Capsicum frutescens L.) Carlo Alberti. *Ann. chim. applicata* **29**, 392-402(1939).—Two types of capsicum are generally recognized: the annual, *Capsicum annuum* L., and the perennial, *Capsicum frutescens* L. Somaliland furnishes the perennial. Its therapeutic properties are equal to those of imported varieties. A. W. Contieri

Evaluation and proper storage of some of the principal pharmaceutical preparations (tinctures, fluidextracts) János Ragettli. *Magyar Gyógyszerésztud. Társaság Értesitője* **15**, 521-67(1939).—Digitalis tincture can be stored for years without any considerable changes in the dark and cold, provided it is kept in small, dark-colored glass bottles, completely filled, and sealed with paraffin. A criterion of proper storage is const. pH. The degree of decompn. of glucosides is shown by the fluorescence of digitoxose. Infusions can be stored in a similar manner for a long time. S. S. de Finály

Evaluation of digitalis by means of Rana esculenta. Aranka Stasiak. *Magyar Gyógyszerésztud. Társaság Értesitője* **15**, 568-79(1939). —*Rana esculenta* gave values identical with those obtained on *Rana temporaria* or *pipiens*, and the curves were similar to the curves shown by English and Danish investigators. The evaluation of digitalis powders may be calcd. either on basis of the relative sensitivity test curves or by detg. the LD_{50} value according to Møller (*C. A.* **30**, 5364[4]) on basis of single investigations Parallel detns. made during the period 1937–39 showed deviations not greater than 10% in the values obtained by the 2 methods. S. S. de Finály

Aromatic Portuguese plants. II. Lavandula pedunculata Cav. Aloisio Fernandes Costa. *Noticias farm.* (Portugal) **5**, 438-56(1939). - The plant grows wild in Portugal 7 The fresh flower heads yield 0.21% of essential oil, d_4^{15} 0.9354, $[\alpha]_D^{15}$ 19°57′, n_D^{15} 1.46913. It contains ketones 59.5%, free alcs. calcd. as borneol 11.63% and esters calcd. as bornyl acetate 3.28%. Pinene, camphene, camphor and cineole are also present; thujone and linalool absent. The oil resembles oil of *Lavandula stoechas* L. L. E. Gilson

Preservation of insulin in solution and in substance and modifications during this period. Raffaele De Blasi and Umberto Gueli. *Arch. farmacol. sper.* **68**, 123-33(1939) —Various com. prepns. of insulin were kept for 6–7 yrs. and were apparently little affected during this period. Helen Lee Gruehl

Chemical evaluation of the preparations from the valerian root. S. E. Babich. *Farmatsiya* **1938**, No. 4, 7-11 *Khim. Referat. Zhur.* **2**, No. 4, 81(1939).—The quality of valerian root was detd. from the amt. of acids present To 10 g. of sample add 50 cc. of distd. water and distil with steam for 1.5 2 hrs. Titrate the distillate. For the detn. of the combined acids, after the titration add 20 cc. of a 0.1 *N* alkali, evap. to 20–30 cc., transfer to a flask, add 20–30 cc. of 70° alc., heat on a sand bath for 1 hr and titrate excess alkali. To prepare a concd. infusion, add 50 cc. to 100 g. of the finely cut root, let stand for 1–2 hrs., transfer to a percolator and percolate (according to the pharmocopeia) with an amt. of water sufficient to give

400 cc. of percolate. **Distil the residue with steam to a** 100 cc. vol. of the distillate. Add the distillate to the previously obtained 400 cc., filter through cotton and sterilize. The amt. of the acids in the concd. infusion is 2.5-2.7%. W. R. Henn

Microchemical reactions of cocaine. M. D. Shvalkova. *Farmatsiya* **1938**, No. 5, 9–12; *Khim. Referat. Zhur.* 2, No. 4, 81(1939).—Reactions of cocaine with a 5% soln. of $K_2Cr_2O_7$ acidified with HCl, with chlorauric acid, with chloroplatinic acid and with $KPbI_3$ are little sensitive or too little specific and are much inferior to the reaction for cocaine with $KMnO_4$. W. R. Henn

Determination of sulfur and chlorine in albichthol. E. I. Chukhina. *Farmatsiya* **1938**, No. 6, 21–3; *Khim. Referat. Zhur.* 2, No. 4, 81(1939).—Albichthol (cf. *C. A.* **28**, 6243[6]) has several advantages over ichthyol, in place of which it is used. It is transparent, almost colorless, has a specific odor, is easily sol. in alc., lanolin, petrolatum, and vegetable and mineral oils, and forms a fine emulsion with water. Its therapeutic action is greater than that of ichthyol. During refining it is treated with chlorinated lime and, therefore, contains about 2–3% of Cl. The content of S is 9–15%. S and Cl are detd. according to the method of Wirth and Stross (*C. A.* **27**, 2288). W. R. Henn

Essential oil in leaves of camphor basil. M. V. Tsarev. *Farmatsiya* (*Vsesoyuz. Inst. Lekarstvennykh Rastenii, Sekt. Khim.*) **1938**, No. 3, 27–33; *Khim. Referat. Zhur.* 2, No. 4, 61(1939).—Essential oil was detd. by the method of Ginzberg (cf. *C. A.* **27**, 372), in leaves cut every 2 hrs. The surface area of the leaves was 17,800 sq. m. per hectare. All essential oil can be obtained in 5–6 days. The loss of essential oil per hectare of the plantation can reach 13 kg./day, depending on the meteorological conditions. The plants do not use the essential oil for their growth. Light is not directly involved in the formation of the essential oil, but serves as a source of energy for the formation of the primary products of photosynthesis; oil formation is a secondary process. W. R. Henn

The essential oil of Trachyspermum copticum L. N. I. Ibragov. *Farmatsiya i Farmakol.* **1938**, No. 4, 33–6; *Khim. Referat. Zhur.* 2, No. 3, 133(1939).—A sample of the essential oil of *Trachyspermum copticum* L. contained approx. cymene 50%, dipentene and α-terpinene 25% thymol 24% and carvacrol 1%. Thus the oil is of high quality because the thymol contains very little carvacrol and cymene can be transformed into thymol by oxidation. W. R. Henn

Advances in thiamine research. Aaron Arnold and F. D. Baird. *Am. J. Pub. Health* **29**, 1344–9(1939).—Forty-nine references. J. A. Kennedy

Dete mination of iodine in thyroid and its preparations by cerate oxidimetry. Wayne W. Hilty and Dale T. Wilson. *Ind. Eng. Chem., Anal. Ed.* **11**, 637–9(1939).—NaI formed from thyroid gland or tablets by fusing with Na carbonate can, after filtering off carbonaceous residue, be titrated in 2 *M* HCl with 0.005 *N* ceric sulfate (*o*-phenanthroline ferrous sulfate indicator). Percentage deviation from theory of this method applied to a KI-lactose mixt. was 0.1 that of U. S. P. XI. J. McAfee

The assay of officinal diastase; the influence of various factors. The amylolytic titration. J. Langlois and Ch. Morin. *Bull. sci. pharmacol.* **46**, 353–64, 415–36(1939).—The general properties of diastase and the various methods of assay are discussed. The method of the French pharmacopea was used. When NaOAc buffer was added it was found that the optimum of activity lies between pH 5 and 6. The temp. optimum is 55°. The percentage of 10 g. starch split within 1 hr. by 40 mg. diastase is for wheat starch 42.3, corn 45, common potato starch 47.5 and pure potato starch 49.5. The time of boiling the starch may vary from 1 to 60 min. without influencing the results. Excess of starch does not modify materially the quantity hydrolyzed, but very large excess prevents liquefaction and makes the detn. impossible. The hydrolysis proceeds to about 50% at a linear rate. Hydrolyzing for 1 hr. is not excessive. **Activation by glycine or glutathione could not be observed: Cu has a strongly inhibiting action which** is noticeable at 25.4 γ, reduces the hydrolysis to ½ at 170 γ and increases in linear proportion to 250 γ; Ni must be added in quantities from 5.5 to 500 mg. to produce similar inhibition; Zn up to 50 mg. and Ca from 407 mg. to 3.82 g. Glutathione and cysteine (100 mg.) abolish the effect of Cu; glycine is not quite as efficacious. Ascorbic acid seems rather to increase the effect of Cu. The method of the French pharmacopea used with due regard to the results of these expts. gives reliable results. The ratio (starch transformed into maltose)/(diastase used) should be at least 100, a limit easily exceeded by most diastase prepns. The procedure of assay is described in detail. A. E. Meyer

The action of local anesthetics on the plant cell. II. The quantitative action of *p*-aminobenzoyldiethylaminoethanol on the cell content of Ascoidea rubescens (Brefeld). The effect of the acid. Jean Régnier and André Quevauviller. *Bull. sci. pharmacol.* **46**, 365–6(1939); cf. *C. A.* **33**, 8241[5]. A high concn. of OH ions is favorable to the action. The phenylpropionate is generally more active than the citrate, but at pH 7.4 both salts and the HCl salts have almost the same activity. A. E. Meyer

The preparation of morphine from dried poppy capsules. André Goris. *Bull. sci. pharmacol.* **46**, 376–87(1939).—A review on newer publications. A. E. Meyer

Importance of impurities in diethyl ether used for narcosis. I. Acetaldehyde. Lennart Gisselsson and Gunnar Lindgren. *Acta Chir. Scand.* **83**, 45–73(1939).—Expts. made on mice with ether to which 0.5% AcH was added revealed no effect on the time of onset of anesthesia but 1% caused a significant delay. Expts. on guinea pigs likewise showed no change in the time of onset of anesthesia when 0.1–0.5% AcH was added to the ether. Expts. with rabbits revealed no effect of admixt. of AcH to the ether, judged by the time required for the disappearance of corneal and pupillary reflexes or for the cessation of breathing. With 1% AcH the time required was prolonged. Detn. of ether in the blood 15 min. after the onset of anesthesia showed the same concn. whether pure ether or ether-AcH mixt. was used. In rabbits the rate of respiration was somewhat greater where a 0.5% AcH-ether mixt. was used, but in deep anesthesia the respiration rate was the same. With a 1% mixt. the respiration rate was somewhat lower than with pure ether. The vol. of expired air during 15 min. of narcosis was 3905 ± 318 cc. per kg. for the 1% mixt. and 4570 ± 477 cc. per kg. for the 0.5% mixt. as compared with 4450 ± 409 cc. per kg. with pure ether. No disturbances or irregularities in respiration could be observed when the AcH did not exceed 0.5%. No effect was found on the heart nor on arterial or venous pressure with mixts. up to 1%. S. Morgulis

Pharmacognostic study of the leaves of Hamamelis species II. Yutaka Yosida. *J. Pharm. Soc. Japan* **59**, 656–9(in German, 246–7)(1939); cf. *C. A.* **34**, 856[8].—The tannic acid content of the leaves of *Hamamelis* species ranged from 2.27 to 9.47%. F. I. Nakamura

The role of Burow's solution in dermatology. Frank C. Combes. *N. Y. State J. Med.* **40**, 37–41(1940).—Liquor Burowi, an N. F. prepn. of $Pb(C_2H_3O_2)_2$, $Al_2(SO_4)_3$ and water, is recommended for its beneficial buffer, astringent, antiphlogistic and antiseptic action on the inflamed integument. A revision of the N. F. VI method of prepg. this soln. is suggested, i. e., the inclusion of excess $Al_2(SO_4)_3$ to ensure pptn. of all the Pb. J. Pinchack

Tobacco products. II. Constantin Pyriki. *Z. Untersuch. Lebensm.* **78**, 162–79(1939); cf. *C. A.* **30**, 1177[3].—Results are given on content of nicotine, nicotine N, protein, ammonia, ammonia N, residue N, total N, ash, reducing substances before and after hydrolysis, polyphenols before and after hydrolysis, and resins and waxes. These materials were divided into favorable and unfavorable materials and the ratio between the 2 groups was used as a measure of quality. In general, the quality rose with the price of the product. The pH and Schmuck coeff. of the tobaccos are also tabulated. M. M. Piskur

Tobacco investigations. II. Difference between vital and nonvital harvested tobacco leaves after drying. Adolf Wenusch. *Z. Untersuch. Lebensm.* **78**, 179–84(1939);

cf. *C. A.* **33**, 7491[7].—The extn. of fine powd. tobacco with ether, alc., water, dil HCl and dil. lye yields an insight to the biol. growth state of the leaves. The amt. of aq. ext. depends upon the condition under which the tobacco is grown. Hunger-grown (Oriental) tobacco yields small aq. exts. Vital leaves contain more protein and more degradation products of proteins and less cellulose than those that have lost their vitality. M. M. Piskur

Potency of certain commercial hormone preparations. II. Fred E. D'Amour. *Endocrinology* **26**, 88–92(1940); cf. *C. A.* **32**, 5158[7].—Estrogens in oil, for parenteral use, are uniformly potent. Aq. estrogens deteriorate and do not contain the labelled potency. Estrogens for oral use should be assayed orally. Progestin prepns. in oil are uniformly potent, aq. prepns. are not. Growth hormones deteriorate on standing. Most cortin prepns. are potent and contain the expected activity. Felix Saunders

Biological potency of International Standard Chorionic Gonadotropin. Fred E. D'Amour and Marie C. D'Amour. *Endocrinology* **26**, 93–6(1940).—International Standard Chorionic Gonadotropin was assayed by 5 methods. The biol. potency of the international unit, 100 γ of this prepn., was detd. The combination of uterine wt. and vaginal cornification methods, the absence of estrin having been assured, represents the most desirable method for the use of this material in the assay of gonadotropic substance originating from human pregnancy urine. Felix Saunders

The evaluation of crude drugs. V. Microscopical examinations. T. C. Denston. *Chem. Products* **2**, 161–3, 146(1939); cf. *C. A.* **33**, 8919[8].—The use of glycerol, chloral hydrate soln., phloroglucinol soln. and HCl, Sudan red or tincture of alkanet, alk. soln. of corallin and ruthenium red soln., resp., for the examn. of a powd. drug is discussed and the general diagnostic microscopical characters are given of powd. drugs belonging to different groups. Leopold Scheflan

Analysis of chaulmoogra oils. IV. Hydnocarpus anthelmintica oil. V. Taraktogenos kurzii (chaulmoogra) oil. Howard I. Cole and Humberto T. Cardoso. *J. Am. Chem. Soc.* **61**, 3442–5(1939); cf. *C. A.* **33**, 8921[6].—By use of previously described methods the following percentage compn. of the fat acids of *Hydnocarpus anthelmintica* (I) and *Taraktogenos kurzii* (II) oils were detd.. hydnocarpic acid 67.8, 34.9; chaulmoogric acid 8.7, 22.5; gorlic acid 1.4, 22.6; oleic acid 12.3, 14.6; palmitic acid 7.5, 4.0; lower homologs of hydnocarpic acid 0.1, 0.4; loss 2.2, 1.0. The oils (I and II) showed the following characteristics: d_{25}^{25} 0.952, 0.952; free fat acid (as percentage of oleic) 2.9, 1.3; sapon. no. 203.3, 200.6; I no. (Hanus) 89.2, 101.5; α_D^{25} 49.7, 49.8; n_D^{25} 1.4772, 1.4790; unsaponifiable matter, % 0.50, 0.29. C. J. West

Analysis [of pharmaceuticals] for traces of metallic impurities (Hess, *et al.*) **7**. Enzyme investigations during drying of green tobacco (Bartá) **11A**. New products of 1939—in medical chemistry (Howe) **13**. Peroxidic products (germicides, fungicides) (U. S. pat. 2,176,407) **10**.

Therapeutic gold compounds of acylalkylglucamide disulfides. Max Bockmühl and Gustav Ehrhart (to Winthrop Chemical Co.). U. S. 2,174,412, Sept. 26. See Can. 382,217 (*C. A.* **33**, 7962[3]).

***N*-Lower-dialkyl-coumarin-3-carboxamides.** Otto Dalmer and Fritz von Werder (to Merck & Co., Inc.). U. S. 2,170,127, Aug. 22. Sedative compds. of but slight toxicity are produced by various reactions, preferably by treating coumarin-3-carbonyl chloride with a lower dialkylamine. Coumarin-3-carboxdimethylamide m. about 144–5°; the diethylamide m. about 77°; the methylethylamide m. about 108–9°; the methylpropylamide, etc., may be similarly formed.

Hydroxy halogenated benzene derivatives. Lucas P. Kyrides (to Monsanto Chemical Co.). U. S. 2,171,494, Aug. 29. Compds. are produced of high germicidal power and which have the general formula of a halogenated dihydric phenol substituted by an alkyl or acyl group, which groups have more than 4 and not more than 12 C atoms. Details are given of the production of chlorohexylresorcinol, chlorooctylresorcinol and heptylchloropyrocatechol, and general mention is made of the similar production of other Cl and Br derivs. U. S. 2,171,495 relates to monoalkyl ethers of halogenated resorcinols in which the alkyl group contains more than 3 C atoms, which have high germicidal properties. The hexyl ether of 4-chlororesorcinol is an oil, b_2 152–62°, and general mention is made of other ethers which may be similarly produced.

Bismuth carboxylates. Eli Lilly and Co., Horace A. Shonle and John H. Waldo. Brit. 506,593, June 1, 1939. Oil-sol. basic Bi salts of acids of formula $R'COCHRCO_2H$, where R is a univalent primary aliphatic radical having at least 5 C atoms and R' is an alkoxy group having not more than 4 C atoms, are obtained by causing the acid or an alkali metal salt thereof to react with a freshly prepd. Bi compd. that is sol. in an aq. soln. of glycol, e. g., the hydroxide or subnitrate. R is a noncyclic radical in which the attaching C atom is joined to only 1 other C atom of the radical, e. g., the isoamyl, 2-ethylbutyl, 2-methylamyl, 2,4-dimethylamyl, 2-ethylhexyl, decyl, dodecyl, octadecyl or 9,10-octadecenyl radical, and R' is preferably Et though it may be Me, Pr or Bu. Solns. in oil of the basic Bi salts are effective *spirocheticidal agents* and may be injected intramuscularly. Cf. *C. A.* **33**, 3077[7].

Alkyl thio-substituted benzoic acid alkamine ester salts and intermediates. John J. Donleavy (to Pitman-Moore Co.). U. S. 2,173,827, Sept. 26. Products, various of which are of relatively high effectiveness and low toxicity when used as *local anesthetics*, as when used in the form of their citrates, comprise esters (various properties and details of prepn. of which are given) such as *o*-ethylthiobenzoates: diethylaminoethyl, diethylaminopropyl, piperidinoethyl, dibutylaminoethyl; *o*-propylthiobenzoates: diethylaminoethyl, diethylaminopropyl, piperidinoethyl, dibutylaminoethyl; *o*-butylthiobenzoates: diethylaminoethyl, diethylaminopropyl, piperidinoethyl, dibutylaminoethyl; *m*-methylthiobenzoates: diethylaminoethyl, diethylaminopropyl; *m*-ethylthiobenzoates: diethylaminoethyl, diethylaminopropyl, piperidinoethyl; *m*-propylthiobenzoates: diethylaminoethyl, diethylaminopropyl, piperidinoethyl; *m*-butylthiobenzoates: diethylaminoethyl, diethylaminopropyl, piperidinoethyl; and *p*-ethylthiobenzoates: diethylaminoethyl, diethylaminopropyl.

Benzyloxyaryl aromatic sulfonates. Courtland L. Butler and Leonard H. Cretcher (to Mellon Institute of Industrial Research). U. S. 2,172,606, Sept. 12. By effecting reaction between the monobenzyl ethers of various glycols and aromatic sulfonyl chlorides, in the presence of an alk. condensing agent such as pyridine, intermediate products are obtained such as benzyloxyethyl benzenesulfonate, benzyloxyethyl *p*-toluenesulfonate, 3-benzyloxypropyl *p*-toluenesulfonate, 1-benzyloxy-2-propyl *p*-toluenesulfonate, and from these substances other products such as benzyloxyethyl phenyl ether, benzyloxyethyl (*p*-dibenzyloxyethylaminophenyl) ether and phenylmorpholine *p*-hydroxyethyl ether, benzyloxyethyl 8-quinolyl ether, hydroxyethyl 8-quinolyl ether, benzyloxyethylapocupreine, benzyloxyethylhydrocupreine, 3-benzyloxypropylapocupreine, benzyloxyisopropylapocupreine, hydroxyethylapocupreine, hydroxyethylhydrocupreine, 3-hydroxypropylapocupreine, and (1-hydroxy-2-propyl)apocupreine are obtained by reactions some details of which are given. U. S. 2,172,607–8 (Courtland L. Butler, Leonard H. Cretcher and Alice G. Renfrew, joint inventors; to same assignee) also relate to the prepn. of various of the compds. just listed, which have a highly *antipneumococcic effect*.

Organo-arsenic compounds. I. G. Farbenindustrie A.-G. Brit. 507,186, June 12, 1939. *sym*-Bis(dihydroxyalkyl)aminoarsenobenzenes are prepd. by reducing the corresponding arsonic acids. The *products possess therapeutic properties*. Among examples, 3,3'-bis[bis(dihydroxypropyl)amino]-4,4'-dihydroxyarsenobenzene is prepd. by reducing 3-[bis(dihydroxypropyl)amino]-4-hydroxybenzenearsonic acid with H_3PO_2, the arsonic acid

being used as its hydrochloride and the free base being obtained from the resulting arsenobenzene-di-HCl by neutralization with Na_2CO_3 and pptn. with EtOH.

Precipitating tannins from the air, as for hay-fever prevention. Robert R. Means and Harry E. Lederer. U. S. 2,176,592, Oct. 17. A compn. suitable for application to the nasal mucous membrane is formed of ingredients such as $Ca(OH)_2$ 0.5 grain, gelatin 1 grain and water 1 oz.

Carbonic acid derivatives of androstanolones. Karl Miescher and Hans Kaegi (to Soc. pour l'ind. chim. à Bâle). U. S. 2,173,423, Sept. 19. *Therapeutic compds.* are produced by reaction of satd. and unsatd. hydroxy ketones of the type of the androstanolones with phosgene, halogen carbonic esters, urea halides or isocyanates. Details are given of the production of the chlorocarbonic ester of Δ^4-androsten-3-on-17-ol, m. (decompn.) 139–40°; the chlorocarbonic ester of Δ^5-androsten-17-on-3-ol, m. 126–7°; the Δ^4-androsten-3-on-17-ol M_g carbonate, m. about 142°; the hydrochloride of Δ^4-androsten-3-on-17-ol β-diethylaminoethyl carbonate, m. 178–80°; Δ^4-androsten-3-on-17-ol carbamate, m. 160–1°; Δ^4-androsten-3-on-17-ol ethylcarbonate, m. 142°; and general mention is made of the possible similar production of other compds. such as Δ^4-androsten-3-on-17-ol ethyl carbonate, m. 142°; Δ^4-androsten-3-on-17-ol propyl carbonate, m. 87–8°; Δ^4-androsten-3-on-17-ol phenyl carbonate, m. 144–5°; Δ^4-androsten-3-on-17-ol benzyl carbonate, m. 156–7°; Δ^4-androsten-3-on-17-ol propylcarbamate, m. 190–1.5°, from Δ^4-androsten-3-on-17-ol chlorocarbonate and propylamine; and the Δ^5-androsten-17-on-3-ol carbamate, m. 207–8°, from Δ^5-androsten-17-on-3-ol chlorocarbonate and ammonia. In similar manner there are also obtained testosterone 17-diethylaminoethylcarbamate, Δ^5-androsten-17-on-3-ol methyl carbonate, m. 194–6°; Δ^5-androsten-17-on-3-ol phenyl carbonate, m. 170–2°; Δ^5-androsten-17-on-3-ol benzyl carbonate, m. 159–60.5°; and corresponding derivs. of the androstan-3-on-17-ol and androstan-17-on-3-ol.

Compounds of the androstane and pregnane series. Adolf Butenandt and Willy Logemann (to Schering A.-G.) U. S. 2,170,124, Aug. 22. Therapeutic or intermediate compds. are produced by treatment of unsatd. compds. of the androstane and pregnane series, which possess in a position adjacent to the C-to-C double bond a methylene group, with oxidizing agents such as CrO_3, for converting the methylene group into a carbonyl group without protection of the double bond; and reduction products of derivs. richer in O of the androstane and pregnane series are produced by a process in which reducible compds. of these series contg. at least 3 O atoms directly connected to the C atoms of the androstane or pregnane system are subjected to the action of reducing agents such as Al isopropylate (suitably in the presence of a noble metal catalyst). Details are given of the production of various compds., including: 7-oxy-Δ^5-3,17-androstenediol diacetate, m. 219–20°; 7-oxo-Δ^5-3,17-androstenediol, m. 201°; 6-oxotestosterone acetate; 6-oxotestosterone; 3,6-androstanedione-5,17-diol 17-monoacetate; androstenetrione, m. 216–17°; 3,6,17-androstanetrion-5-ol; 7-hydroxyandrostenediol diacetate, m. 241–2°; 7-oxo-androstanediol diacetate, m. 193–4°; 7-hydroxyandrostanediol diacetate; Δ^5-androstene-3,7,17-triol tribenzoate, m. 250–1°; and $\Delta^{5,8}$-androstadien-17-ol-7-one, m. 171–2°.

Therapeutic bactericidal sulfonamides of 2-aminopyridines. Carl Naegeli (to Cilag, Chemisches Industrielles Laboratorium A.-G.). U. S. 2,170,209, Aug. 22. Details are given of the production of the following compds., various of which, or their salts, are suitable for subcutaneous, intramuscular or intravenous injection: 2-aminopyridine-5-sulfonamide, m. 175–6°; 2-ethylaminopyridine-5-sulfonamide, m. 189–91°; 2-butylaminopyridine-5-sulfonamide, m. 121–2°; 2-allylaminopyridine-5-sulfonamide, m. 195–201°; 2-phenylaminopyridine-5-sulfonamide, m. 181–3°; 2-benzylaminopyridine-5-sulfonamide, m. 197–201°; 2-diethylaminopyridine-5-sulfonamide, m. 116–17°; 2-chloropyridine-5-sulfonanilide, m. 149–51°; 2-aminopyridine-5-sulfonanilide, m. 177–8.5°; 2-ethylaminopyridine-5-ethylsulfonamide, m. 139–141°; 2-benzoylaminopyridine-5-sulfonylbenzoylamide, m. 221–3°; and a mixt. of 2-(2′-amino-6′-pyridyl)-aminopyridine-5-sulfonamide and 2′,6′-bis(2-amino-5-pyridylsulfonylamino)pyridine.

Sulfonic acid amide compounds (suitable for combating streptococci infection). Robert Behnisch, Josef Klarer and Fritz Mietzsch (to Winthrop Chemical Co.). U. S. 2,169,971, Aug. 15. By treating an aromatic amino group of benzenesulfonamides which either contain a sulfonamide group in *p*-position to the amino group attached to the nucleus or several sulfonamide groups in the nucleus and which may also contain further substituents in the nucleus, with acylating agents of 5 or more C atoms, such as acid halides, esters, anhydrides or azides, products are obtained such as: 4-oleoylaminobenzenesulfonamide, m. 197°; 4-caproylaminobenzenesulfonamide, m. 201°; 4-caprylylaminobenzenesulfonamide, m. 189°; 4-caprylaminobenzenesulfonamide, m. 198°; 4-lauroylaminobenzenesulfonamide, m. 198°; 4-myristoylaminobenzenesulfonamide, m. 203°; 4-palmitoylaminobenzenesulfonamide, m. 202°; 4-stearoylaminobenzenesulfonamide, m. 201°; 4-undecylenoylaminobenzenesulfonamide, m. 199°; 4-erucoylaminobenzenesulfonamide, m. 177°; 4-behenoylaminobenzenesulfonamide, m. 171°; 4-phenylacetylaminobenzenesulfonamide, m. 201°; lauroylaminobenzene-3,5-di(sulfondimethylamide), m. 96°; 4-lauroylaminobenzenesulfonbenzylamide, m. 134°; 4-lauroylaminobenzenesulfonbutylamide, m. 113°; 4-lauroylaminobenzenesulfonic acid piperidide, m. 103°; 4-cinnamoylaminobenzenesulfonamide, m. 265°; 4-cinnamoylaminobenzenesulfondiethylamide, m. 157°; 4-oleoylamino-3,6-dimethoxybenzenesulfonamide, m. 145°; 4-oleoylamino-3,6-dimethylbenzenesulfonamide, m. 207°; 4-oleoylamino-3-methylbenzenesulfonamide, m. 138–40°; 4-oleoylamino-2-methylbenzenesulfonamide, m. 150°; 4-oleoylamino-3-methoxy-6-methylbenzenesulfonamide, m. 148°; 4-isovalerylamino-3-methoxy-6-methylbenzenesulfonamide, m. 187°; 4-isovalerylamino-benzenesulfonamide, m. 213°; and 4-isovalerylamino-benzenesulfoncyclohexylamide, m. 197°. Details are given of the production of various of these compds.

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

E. M. SYMMES

Experiments on reducing the loss of lead in the sulfuric acid tower and chamber process. Hans Lohfert. *Chem. Fabrik* **1939**, 499–502.—The expts. consisted in coating Pb with $PbSO_4$ by pickling in acid of 9.1–65.5°Bé. before subjecting it to the action of chamber acid. It was found that the behavior of the coatings depends on their phys. properties more than on the thickness; that the weaker the acid and the longer the time of pickling the better the results, but that pickling above room temp. did not shorten the time, and that the purity of the pickle acid did not seem to be important. Considerable savings were indicated. Detailed results are tabulated. J. H. M.

Sources of natural sulfates in U. S. S. R. B. V. Yasnopol'skiĭ. *Byull. Inst. Halurgii* **1938**, No. 8, 1–26; *Khim. Referat. Zhur.* **2**, No. 4, 45(1939).—The sulfate lakes near the Aral Sea in the region of Dzhaksa-Klych lake are very important supply bases for sulfates. A preliminary estn. of the supplies of mirabilite is 3.9 million tons. When calcd. as dry substance the sulfate contains Na_2SO_4 88–96, $CaSO_4$ 4–1 and NaCl 1–1.7%. In 1938, 50,000 tons of the anhydrous sulfate were obtained. Tenardite is produced continuously, while the natural dehydration of mirabilite takes place only during the summer. Lake Chumym-Kul, which lies below sea level, is a natural reservoir in

which sea water can be evapd. naturally during the hot summer days. **New deposits of sulfates in the Aral Sea region.** S. E. Maksimov, A. A. Unkovskiĭ and M. A. Kuksova. *Ibid.* 27–31.—In the Sadir-Baĭ region to the south of the main sulfate deposits of Dzhaksy-Klych, there are 20 sulfate lakes, 3 tenardite lakes and 2 astrakanite lakes. W. R. Henn 1

The production of calcium nitrate and elementary sulfur from gypsum. S. N. Ganz. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 40–2 (1939).—$CaSO_4$ is heated with C at 900° to give CaS and SO_2. The CaS is treated under pressure with CO_2 and H_2O to give $CaCO_3$ and H_2S, which reacts with SO_2 to give S. The $CaCO_3$ is dissolved in HNO_3 and the CO_2 formed is used in treating the CaS. H. M. L. 2

The formation of gypsum incrustations in the distiller in ammonia-soda production. V. R. Terashkevich, S. S. Urazovskiĭ, R. E. Shtok and E. M. Eĭdel'man. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 12–16 (1939). SO_4 in the soln. causes pptn. of $CaSO_4$ when $Ca(OH)_2$ is added in the distiller. Above 95°, flakey $CaSO_4.0.5H_2O$ is formed; below 95°, the harder $CaSO_4$ ppts. as an incrustation. At sulfate concns. below 0.35 g. equiv. per l., no $CaSO_4$ ppts. Temps. between 85 and 105° have little effect on the amt. of pptn. The presence of $CaCl_2$ decreases the soly. of $CaSO_4$. H. M. Leicester 3

The composition of the precipitate deposited in soda-production apparatus and measures for avoiding it. II. V. E. Voronchikhin. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 17–21 (1939); cf. *C. A.* **31**, 2364[8]. The deposit in various parts of the app. consists of varying proportions of $CaCO_3$ and $MgCO_3$, mixed with NaCl and Na_2CO_3 or $NaHCO_3$. Fine crystals of $CaCO_3$ do not tend to accumulate, but may collect around dust particles to form thick incrustations. Therefore, the liquid should be covered at all times. Mg compds. cause incrustation most actively, and Mg should be removed as completely as possible. Pptd. $Mg(OH)_2$ is as bad as sol. Mg salts if it is allowed to circulate with the brine, since it redissolves and ppts. as $MgCO_3$. H. M. Leicester 4

Rationalization of the process for obtaining sodium sulfide. F. A. Romaslovskiĭ. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 51–4 (1939).—Modifications are suggested in the app. for burning Na_2SO_4 with C. H. M. L. 5

The Kerch boron problem. L. M. Zarudskiĭ and B. Ya. Rozen. *Byull. Inst. Halurgii* **1938**, No. 6, 42–53; *Khim. Referat. Zhur.* **2**, No. 4, 45 (1939).—Before the discovery of the Inder borate deposits (ascharite and hydroboracite) the Kerch deposits were the only com. source of B in U. S. S. R. The av. content of B_2O_3 is only 0.3–0.4%. The Inder deposits of borates contain 25–7% of B_2O_3. In spite of the relatively poor content of the borates in the Kerch deposits they still can be utilized under certain conditions. W. R. Henn 6

Boron in the salt lakes of the Mangyshlak Peninsula. N. B. Feĭgel'son and A. A. Kozhevnikova. *Byull. Inst. Halurgii* **1938**, No. 7, 1–7; *Khim. Referat. Zhur.* **2**, No. 4, 44 (1939).—The B content in the salt lakes of the Mangyshlak Peninsula varies from 0.202% to 0.045% (calcd. as H_3BO_3). In the Karabogaz Gulf the H_3BO_3 content is 0.25% of the total salt content, and in the Caspian Sea 0.28%; the H_3BO_3 content in sea water is only 0.005% of the total salt. The H_3BO_3 salts dissolve in pure water to a much smaller degree than $MgCl_2$ and $MgSO_4$. Therefore, it would be expected that under the conditions of the salt lakes the H_3BO_3 salts will be deposited before NaCl. This was not the case, except in the lake Krasnoe, where traces of H_3BO_3 were found in layers of NaCl. It is concluded that $MgSO_4$ may increase the soly. of the borates and that H_3BO_3 is concd. in the mother liquor during the evapn. of the solns. W. R. Henn 7

Utilization of lake brines for the production of mirabilite and magnesium compounds. V. I. Nikolaev, E. V. Gritsevich and L. S. Dynkina. *Compt. rend. acad. sci. U. R. S. S.* **24**, 338–9 (1939) (in English).—The pptn. of Na_2SO_4, $MgSO_4$ and $MgCl_2$ from the Karabogaz brines (Kalmuck Soviet Socialist Republic) is plotted in graphs on the basis of lab. expts. Cooling (in winter) to −8° of brine collected in July and August ppts. Na_2SO_4. The method of drying by the sun should be replaced by the use of Na metasilicate. After deposition of Na_2SO_4, the brines can be evapd. further to produce $MgCl_2$. A. H. Krappe 8

The probable composition of the saline water of Lake Kuchuk. O. D. Kashkarov. *Byull. Inst. Halurgii* **1938**, No. 3, 33–41; *Khim. Referat. Zhur.* **2**, No. 4, 45 (1939).—In a desire to find the probable compn. of the saline water of the Kuchuk lake at the beginning of the fall deposition of mirabilite, there were analyzed statistically the results of the 10-year investigations of the chem. compn. of the water. The results show that after 68 years the saline water will contain less than 12% Cl, which is the only factor which guarantees a fair purity of mirabilite. The ratio SO_4:Cl increases for the summer period simultaneously with an increase of the Cl content; this can be connected with the gradual soln. of the mirabilite which has been deposited during the winter. The depth and the dimensions of the lake det. the velocity of the process of soln. and at the same time limit the max. concn. of SO_4^{--} which can be reached during the summer period. W. R. Henn 9

Salts of Inder Lake. A. N. Volkov. *Byull. Inst. Halurgii* **1938**, No. 2, 20–67; *Khim. Referat. Zhur.* **2**, No. 4, 46 (1939); cf. *C. A.* **32**, 6983[7].—The main mineral component of the salt waters which feed Inder Lake is NaCl; there are smaller amts. of K salts, $MgCl_2$ and $MgSO_4$. The compn. of the water of Inder Lake is NaCl 19.6–23.9, KCl 0.10–2.1, $MgCl_2$ 1.74–4.57, $MgSO_4$ 0.35–0.49, $CaSO_4$ 0.04–0.3 and $Ca(HCO_3)_2$ 0.05–0.13%. In a crevice in the center of the lake, NaCl (varying from 88 to 99%) is the main component of the salt mass to a depth of 33 m. There are also present 0.03–0.23% of KCl, 0.002–0.04% of KBr and 0.007–0.009% of B_2O_3. The total supply of salt is estimated at 1500 million cu. m. W. R. Henn 10

Laws of solar evaporation of salt solutions from observations in the Kulundin steppe. O. D. Kashkarov. *Byull. Inst. Halurgii* **1938**, No. 6, 31–40; *Khim. Referat. Zhur.* **2** No. 4, 31 (1939).—The adaptability of the equations of Meier, Parshal and Karkentner for the evapn. of water from large reservoirs was verified by calcg. the evapn. of a no. of fresh-water American reservoirs. Most suitable for the calcn. is the Meier equation, $E = 0.707(n/2)(H-h)(1 + 0.224\ V)$, where E is the amt. of the evapd. water in kg./sq. m., n the no. of days of evapn., H the vapor pressure of water, h the abs. humidity and V the velocity of the wind in m./sec. at a height of 4.5 m. Expts. were made on the evapn. of the saline water of Lake Kuchuk from 2 reservoirs (surface 500–600 sq. m.) and from crystallizers (surface 250–300 sq. cm.). The vapor pressure of the saline water was at the exptly. detd. b. p. *in vacuo*, and the amt. of the evapd. water was calcd. from the change of the compn. of the saline water and from the detn. of the amt. of salts and ppts. of the saline water. A satisfactory accuracy (8–9%) was obtained for these reservoirs by calcn. from $E = 0.372(H-h)(1 + 0.224\ V)n$. W. R. H. 11

Annual changes in the hydrochemical conditions in the Yashalta lakes. V. I. Nikolaev and B. I. Stepanov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 334–7 (1939) (in English).—Chem. analysis of the brines of the Yashalta lakes (Kalmuck Soviet Socialist Republic) at different seasons (figures in tables) disclosed that at the beginning and end of the year the brines are dild. and unsatd. From the middle of March to the middle of May the coeff. of metamorphism becomes so high that $MgCl_2$ disappears and the ratio $MgSO_4/MgCl_2$ is replaced by the ratio $Na_2SO_4/MgSO_4$, which is explained by the inflow of spring waters. On about May 20th intense evapn. sets in (temp. 30° and more); the coeff. of metamorphism settles at about 1.4–1.5. At the end of July or in August NaCl begins to ppt. The total of salts in August 1938 amounted to 29.10%. A. H. Krappe 12

The composition of water of the Karabogaz gulf in connection with the drop of the Caspian Sea level. N. A. Shreders. *Byull. Inst. Halurgii* **1938**, No. 6, 54–68; *Khim. Referat. Zhur.* **2**, No. 4, 47 (1939).—The water level of the Caspian Sea dropped in 1937 by 103 cm., as compared with the 1929 level, which was the av. level of

the preceding 100 years. This caused a decrease of the water flowing into the Karabogaz gulf from 19.5 to 9.52 cu. km. Previously the saline water of the Karabogaz gulf became satd. with respect to Glauber's salt at 5.5 6°, when it was deposited and became of com. importance. The new concn. of salts in the water causes the pptn. not only of $Na_2SO_4.10H_2O$, but also of NaCl. New ways for preserving the purity of the Glauber's salt deposits must be found. W. R. Henn

Apparatus for keeping and transporting large amounts of liquid oxygen. S. M. Rips. *J. Chem. Ind.* (U. S. S. R.) 16, No 8, 43–4 (1939).—Equations are derived for calcg. the conditions for use of a spherical container for liquid O. H. M. Leicester

The velocity of adsorption on carbon. E. Angelescu and E. Soloviu. *Bul. Soc. Chim. Romania* **20A**, 197–223 (1938) (in French).—The adsorption of the acids (oxalic, acetic, propionic and butyric) and of mixts. of oxalic acid with these acids and with H_2SO_4 on the active carbons, *Norit* and *Pick*, was measured at definite time intervals. The observed velocities of adsorption cannot be expressed by any of the proposed simple formulas. L. E. Steiner

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Blowing coke gases into blast furnace [blast-furnace gas for NH_3 synthesis] (Shapovalov) 9.

Aluminates. Hans Zirngibl (to I. G. Farbenind. A.-G.). U. S. 2,176,444, Oct. 17. See Fr. 839,961 (*C. A.* 33, 7969[2]).

Condensing materials such as antimony trioxide into particles of desired and substantially uniform size. Melville F. Perkins and Albert J. Phillips (to American Smelting and Refining Co.). U. S. 2,177,551, Oct. 24. App. is described, and a process for treating fluid streams carrying various sublimable materials in vapor phase, which involves introducing a fluid stream carrying such materials into the lower portion of a quenching fluid stream, such as air of substantially greater d. and at substantially lower temp. than the first-mentioned stream, so as to cause the latter to rise through the quenching stream, and maintaining the conditions of relative volumes of the streams, velocity, concn. and temp. such as to produce substantially instantaneously at the point of mixing a condensation of the materials directly into solid particles of high concn. of a predetd., closely controlled and standardized particle size and fixed crystal form.

Cadmium selenide. Neil E. Gordon and Edgar C. Pitzer (to Chemical Foundation, Inc.). U. S. 2,176,495, Oct. 17. For producing substantially pure CdSe, $CdSO_4$ is treated in an aq. medium with a substantial excess of alkali selenosulfate, the Cd selenosulfate formed is hydrolyzed to CdSe in the presence of the selenosulfate (as at a temp. of 60–100°), the ppt. is sepd. by filtration, and the filtrate is re-employed with addnl $CdSO_4$ for producing an addnl. quantity of CdSe.

Lime production from carbonate sludge. Dudley Baird (to Nichols Engineering & Research Corp.). U. S. 2,176,239, Oct. 17. See Can. 382,612 (*C. A.* 33, 7971[2]).

Ferric oxide. Urban E. Bowes. U. S. 2,176,242, Oct. 17. App. is described, and a method of obtaining Fe_2O_3 from a compn. in which it is contained, such as an ore, which involves flowing HCl through a mass of the compn. at a temp. above the temp. at which $FeCl_3$ volatilizes, to produce a gaseous mixt. of $FeCl_3$ and steam, sepg. the gaseous mixt. from the compn., lowering the temp. of the mixt. to reverse the original reaction a substantial degree and produce HCl and Fe_2O_3, and so limiting the amt. of HCl in proportion to the gaseous $FeCl_3$ formed 1 that after sepg. the gaseous $FeCl_3$ and steam from the mass a substantial degree of reversal of the original reaction is effected on the lowering of the temp. of the mixt. of $FeCl_3$ and steam.

Sodium chromate, etc. Marvin J. Udy. U. S. 2,176,685, Oct. 17. In a process involving oxidation of ferro-Cr in finely divided form at an elevated temp. below its m. p. and in the presence of CaO and Na_2CO_3, the Na_2CO_3 is employed in the amt. required to form Na chromate with 2 about half of the Cr of the ferro-Cr and the CaO is employed in an amt. in excess of that required to form Ca chromate with the remainder of the Cr of the ferro-Cr, so that an oxidized product is formed contg. about equimol. proportions of Na and Ca chromates. This product may be treated with H_2SO_4 to ppt. $CaSO_4$ and produce $Na_2Cr_2O_7$.

Removing fluorine compounds from acid bone liquors. Milton H. Merchant (to American Agricultural Chemical Co.). U. S. 2,176,464, Oct. 17. In a process of purifying, an acid bone liquor, such as that obtained by treating 3 bones with a dil. acid, such as HCl, which gives only sol. Ca salts, which liquor contains Ca, the PO_4 radical and a dissolved F compd. and in which the Ca·PO_4 ratio is not less than in tri-Ca phosphate, also contg. a sol. Ca salt other than acid Ca phosphate, and in which Ca and PO_4 are maintained in soln. by excess acid, the liquor, contg. not more than about 11% total solids, is treated with an 4 alk. Na compd., such as NaOH, and a sol. Al compd., such as $AlCl_3$, proportioned to give the liquor a pH of about 4.0–4.3 and to ppt. substantially all the dissolved F, with agitation and removal of the F-contg. ppt. to leave a liquor substantially free from sol. F compds.

Sulfur from sulfur dioxide. Gant Gaither. U. S. 2,177,707, Oct. 31. An arrangement of app. is described, and a cyclic process for prepg. S from SO_2 which involves 5 the steps of absorbing SO_2 in an alkali carbonate soln., whereby CO_2 gas and an acid alkali sulfite soln. are formed, neutralizing the soln. with alkali carbonate to form CO_2 gas and a neutral soln. of alkali sulfite, evapg. this neutral soln. and mixing it with C and subjecting the mixt. to heat to reduce the alkali sulfite to sulfide, dissolving the sulfide and recycling the sulfide soln. to react with CO_2 evolved in the process, thus forming H_2S and alkali carbonate soln., recycling the carbonate soln. thus 6 formed to the steps of absorbing SO_2 and neutralizing acid alkali sulfite soln., and treating the H_2S with SO_2 to produce elemental S and water. Cf. *C. A.* 33, 7972[4].

Use of carbon for adsorption of solvents such as ethyl acetate. Gilbert W. Brant (to E. I. du Pont de Nemours & Co.). U. S. 2,177,473, Oct. 24. A process is employed which involves submerging carbon of vegetable origin, adapted for adsorption of solvents, in water contg. sufficient HOAc to neutralize the alky. of the C, allowing the mixt. 7 to stand until the desired neutralization has taken place, removing the wash liquid and the materials dissolved therein, washing the C with about 50 times its wt. of tap water acidified in the pH range 5–6 with HOAc over a period of about 6 hrs., and thereafter passing a solvent-laden atm. over the C to recover the solvent.

Adsorbent material suitable for drying gases or treating vegetable oils, etc. Pearl H. Brewer and Henry R. Kraybill (to Purdue Research Foundation). U. S. 2,176,851, Oct. 17. A process of making an acid-reacting adsorbent agent involves passing CO_2 into an aq. soln. of Na 8 silicate sufficiently concd. to produce a gel contg. a Na carbonate, treating the gel so formed with a slight excess of acid, such as HCl, which reacts with the carbonate to liberate CO_2 and cause the gel to expand into a solid foam, washing the solid foam with water, and drying it.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Glasses, organic and inorganic. Harry Moore. *Chemistry & Industry* **1939**, 1027–37.—A review. E. H.

Role of physics in the glass industry. I. I. Kitaigorodskii. *Uspekhi Fiz. Nauk* **21**, 338–41 (1939).—K. discusses the various types of modern glasses produced in the U. S. S. R. Cf. Sullivan, *J. Applied Phys.* 8, 122 (1937). F. H. Rathmann

A new MgF_2-SiO_2 glass. Choong Shin-Piaw. *Compt.*

rend. 209, 884–5(1939).— Though usually a fused mixt. of MgF_2 and SiO_2 forms a white opaque enamel, under "favorable circumstances" (not further specified) a transparent solid is obtained. In that case there is a marked increase in density (2.73–2.82, usually 2.81, as against 2.47 and 2.20 the d. of MgF_2 and SiO_2, resp.), and the glass has no definite m. p., but gradually softens at about 1460°, or some 60° and 150° below the m. ps. of its constituents. The limit of transparency may extend to λ2620, but is less as d. decreases. C. A. Silberrad

A rapid method of analysis of aluminum-magnesium glass. O. V. Krasnovskiĭ. *Shornik "Sovremennye Metody Kontr. Proizvodstva v Stekol'noĭ Prom."* **1938**, 9 13.— In one sample of glass SiO_2 and R_2O_3 are detd. In a second sample Mg and Na are detd. The glass is decompd. with a mixt. of H_2SO_4 and HF. The excess H_2SO_4 is removed and the dry residue heated to transform $Fe_2(SO_4)_3$ and $Al_2(SO_4)_3$ into their oxides. The residue is treated with water, and Fe and Al are pptd. from soln. with NH_4OH in the presence of CH_3COONH_4. From the same soln. Ca is pptd. with an $(NH_4)_2CO_3$ soln., the soln. filtered, the filtrate is evapd. and the residue heated at 550°. The calcined residue, contg. $MgSO_4$ and Na_2SO_4, is dissolved in water, Mg is pptd. with an alc. soln. of $(NH_4)_2CO_3$, the filtrate evapd., and Na detd. as Na_2SO_4. In a third sample Ca is detd. The glass is decompd. with a mixt. of HF with $H_2C_2O_4$, the fluorides are converted to oxalates by heating them with $H_2C_2O_4$, the sol. oxalates are extd. from the dry residue with water and dil. CH_3COOH. The CaC_2O_4 residue is converted to oxide and Ca is detd. as $CaSO_4$. **A rapid semimicrochemical method of the determination of silica acid and of the sesquioxides in glass** O. V. Krasnovskiĭ. *Ibid.* **1938**, 13–16.—SiO_2 can be sepd. quantitatively from the glass melt with NaOH by treating the melt once with concd. HNO_3. R_2O_3 is detd. in the filtrate from SiO_2 by the usual method. The air bath and the water bath used for the semimicrochem. method are illustrated. Through *Khim. Referat. Zhur.* 2, No. 2, 81–2(1939). W. R. Henn

Accelerated method of analysis of lime-soda-magnesia glass. E. V. Knipovich and B. F. Ivanushkin. *Stekolnaya Prom.* **14**, No. 6, 32–3(1939).—Detn. of silica: 0.7 to 0.8 g. of powd. glass is melted with 5 g. soda in a Pt crucible. The melt is cooled and transferred to a porcelain cup. It is dissolved in a HCl soln. and heated to dryness. The silica sediment is treated with HCl soln., some distd. water is added and stirred, then a gelatin soln. is added and given a 2- or 3-min. rest. It is then filtered and washed with hot water. The filtrate is carefully heated to redness. It is weighed and the percentage content of SiO_2 detd. Detn. of alkalies: To 0.5 g. powd. glass 1.0 to 1.5 g. of strong H_2SO_4 and 5 ml. HF are added; it is heated; the glass dissolves, the surplus HF evaps. first then the H_2SO_4. The dry sediment is calcined and cooled. Some hot water is added. The soln. is boiled and a soln. of hydrate of Ba oxide is added. The soln. is boiled, filtered and washed with hot water. An ammonia soln. is added. Then it is filtered. The sediment is washed and evapd. to dryness; then heated to eliminate NH_4 salts. Two or 3 drops of methyl orange are added and then titrated. Alkalies can be obtained by weighing as chlorides or sulfates. The oxides of Al, Fe, Ca and Mg are detd. in the usual way with the usual reagents. M. V. Condoide

Reply to the remarks of W. Biltz and Fr. Weibke (on my work) on the molar refraction of glasses. Ernst Kordes. *Z. anorg. allgem. Chem.* **241**, 418–20(1939); cf. *C. A.* **33**, 5139[7].—Recently taken refraction curves of simple binary glass systems (with one exception) are definitely bent and therefore do not agree with the simple summation formula of B. and W. (cf. *C. A.* **33**, 5140[3]). Their contention that K. required 4 equations for the calcn. of the molar refraction of binary glass series is based on a misunderstanding. **Reply.** Wilhelm Biltz and Friedrich Weibke. *Ibid* 421–3.—The 4 equations used by K. in his calcns. are restated; they may be contracted if desired. The contribution of K. makes use of the authors' principle and meaning and is supplementary to them. M. McM.

Factors influencing the formation of bubbles and seeds in aluminomagnesia glass melted in a sulfate soda batch. G. Yu. Zhukovskiĭ, V. V. Pollyak and M. P. Orlova. *Stekolnaya Prom.* **14**, No. 6, 26–30(1939); cf. *C. A.* **33**, 1894[7].—The results of expts. show that (1) The addn. of sulfate to the batch of an aluminomagnesia glass (corresponding to 0.5% Na_2O in the glass) improves purification. (2) The addn. of sulfate and coal at first affects purification but later improves it. (3) The increase of the concn. of SO_3 in the furnace atm. hampers purification. (4) Severe cooling lowers the no. of bubbles. (5) Repeated heating of sulfate glass after cooling produces "secondary" bubbles whose quantity is proportional to the sulfate content in the glass batch. (6) The increase of the concn. of SO_3 in the furnace atm. increases the amt. of the sulfate dissolved in the glass. M. V. Condoide

Effect of alumina on the quality of bottles worked on semiautomatic machines. V. Sh. V. E. Leonov. *Stekolnaya Prom.* **14**, No. 5, 13–14(1939).—Chem. compn. of the glass has a great effect on its working in semiautomatic machines, producing various defects in the bottles. The reduction of the alumina content of the glass from 5% to 3% eliminated the majority of defects. M. V. C.

Chemical heterogeneity of lead glasses. M. M. Skornyakov. *Optiko-Mekhan. Prom.* **9**, No. 6-7, 11–13 (1939).—Expts. showed that no liquation takes place in lead glasses. The chem. heterogeneity of glasses is accounted for by the evapn. from the surface of the glass of individual components, and the differentiation in sp. gr. of raw materials forming glass during their melting. Chem. heterogeneity of glass can be prevented by energetic stirring with a specially shaped device which prevents air bubbles from mixing with the melt. M. V. Condoide

Colloidal graphite, excellent coating for molds. Ernst Grüter. *Glashütte* **69**, 713–14(1939). The disadvantages of coatings such as oil, soap or beeswax, which have been used heretofore for lubricating molds in the production of cast glass are discussed. The use of colloidal graphite as a protection against corrosion, and methods of applying aq. colloidal graphite suspensions are explained. Its advantages are summarized as follows: Molds and machines remain cleaner; the thinness of the coating keeps the shape of the glass more accurately and improves luster; wear on molds from cleaning is minimized; the refractoriness of colloidal graphite coatings protects the metal surface of the molds and prolongs their life. M. V. C.

Classification of sand used for grinding plate glass. P. Torlin. *Stekolnaya Prom.* **14**, No. 6, 16–21(1939).— Tables give the granulometric compn. of sands used for grinding plate glass. M. V. Condoide

Window glass with a lowered alkali content. I. I. Kitaigorodskiĭ, V. I. Bokunyaeva and T. N. Keshishyan. *Stekolnaya Prom.* **14**, No. 5, 29–34(1939).—From expts on 1000 different glasses it is concluded that glasses contg. 14% Na_2O melted well when they contained RO equal to 9, 10, 11, 12, 13 and 14% Glasses contg. 16, 18, 20% RO melted well only when the ratio of CaO to MgO was 4 :1. Glasses contg. 13% Na_2O melted badly when RO was 13 or 14% and Al_2O_3 was 5%; other glasses melted well. Glasses contg. 12% Na_2O had a strong tendency to crystallize when RO was 12–18%. Glasses having RO over 18% melted satisfactorily. Glasses contg. 10% Na_2O melted satisfactorily only when RO was 16%. The best results in regard to crystn. were obtained with glasses contg. 1.5% Al_2O_3, and with RO 12, 13, 14, 16%; in glasses with RO 12 and 13%, the best were those with a ratio CaO:MgO of 4 :1; while with RO 14 and 16%, the best results were obtained with a ratio of CaO to MgO 3:1. Lower SiO_2 content gives lower viscosity at 1200° and 1100°; at 1000° and 900° glasses contg. less SiO_2 were more viscous. A table gives the recommended compn. of window glasses manufactured by the Fourcault method. M. V. C.

Milky flash glass on an apatite base. L. M. Blyumen *Stekolnaya Prom.* **15**, No. 6, 21(1939).—Attempts to use Murman apatite contg. about 40% P_2O_5 and only 1% Fe_2O_3 for opacification are discussed. The chem. compns. of glasses produced are given in a table. M. V. C.

Effect of some factors on the silvering of glass. V. M. Vinokurov and B. N. Moskvin. *Optiko-Mekhan. Prom.*

9, No. 6–7, 17–19(1939); cf. *C. A.* **33**, 8371.—(1) Expts. showed a marked difference in the behavior of reducers obtained through inversion of sugar with HNO_3, H_2SO_4 and AcOH. The concn. of the acid is of great importance for the inversion of sugar with HNO_3. With a greater concn. of acid in sugar solns., compds. are formed which accelerate the process of sugar reduction; this leads to the formation of such layers and to a lowered coeff. of utilization of the silvering soln. When sugar is inverted with H_2SO_4 or AcOH, the concn. of the latter and that of the sugar in the soln. do not affect the reducing properties, and the reducers obtained are identical with regard to their properties. The reason for the specific effect of HNO_3 is based on its oxidizing properties. Therefore, the inversion of sugar with HNO_3 is undesirable. (2) The presence of some compds. and ions in the silvering solns. and their effect on the silvering process were studied. Hydrate of Ca oxide has a retarding effect on the reducing process in the soln. and thickens the silver layer; however, this does not lower the coeff. of refraction of the silvered surface which is probably due to the structure of the layer. Na silicate also lengthens (to a definite concn. of the silicate) the silvering process and promotes a more complete deposition of silver as a metallic silver layer. However, this increase in the thickness of the layer lowers the coeff. of refraction of the silver layer which is apparently due to the formation of a coarser cryst. deposit. Because of this, Na and K silicates should be considered harmful and should not be added. The introduction of small amts. of Ca oxide into silvering solns. may be recommended. (3) The presence of ions of Al^{+++} and Ba^{++} in the silvering soln. has no effect on the silvering process. The increase in the concn. of nitrate ions lengthens the silvering process. The presence of sulfate ions has no effect. (4) The presence of up to 25% potash in the KOH soln. has no marked effect on silvering. If a greater quantity of it is present, reduction is retarded. M. V. Condoide

Classification of ceramic facing materials. I. A. Kovelman. *Keramika* **1939**, No. 6, 56–67.—A new classification based on the nature of the body and of the decoration is suggested. E. E. Stefanowsky

Causes and elimination of efflorescences on ceramic ware. P. N. Grigor'ev. *Keramika* **1939**, No. 4, 1–6.—The following corrective measures are suggested: weathering of the clay; sedumentation with very pure weakly mineralized water; substitution of weakly mineralized water for hard water, substitution of fuel lower in S; increasing the time of drying; drying with pure air, especially with hot air from Hoffmann kiln chambers; firing at higher temps. and for longer times, beginning if possible with reducing and ending with oxidizing conditions; addn. of org. materials; chem. addns., especially $BaCO_3$; washing the ware with water (art ware only). E. E. Stefanowsky

Krivoi Rog Pre-Cambrian metamorphous quartzites and vein quartzes as a raw material for silica brick. M. I. Ozhegova, S. V. Potapenko and I. S. Soloninko. *Ogneupory* **7**, 415–26(1939). E. E. Stefanowsky

Effect of steam on silica brick for coke ovens. S. L. Herman. *Ukrain. Nauch.-Issledovatel. Inst. Ogneuporov i Kislotouporov* No. **45**, 120–2(1939).—Expts. showed that steam had little or no effect at 700–1150°. M. V. C.

Occurrence of wax-like substances in peaty fire clay. V. L. Bosazza. *Nature* **144**, 835–6(1939).—Waxy substances have been extd. with Ac_2O, EtOH and C_5H_5N in 0.03 to 0.72% yield from fire clays. The substance oxidizes readily and m. about 90–100°. Attempts to ext. the pigmenting material from the clay have failed. Rachel Brown

Plasticity. I. F. Ponomarev. *Keramika* **1939**, No. 7, 1–7.—A new theory of plasticity is suggested based on the following: The ceramic mass should be considered as a heterogeneous system. Under the influence of an applied stress the plastic mass flows. The plasticity of a heterogeneous system is characterized by the mass in g. flowing in a unit of time over 1 sq. cm. of cross section of the stream. The plasticity of a heterogeneous system is affected by applied stress, temp., compn. and properties of the solid and liquid phases, and the gas phase. E. E. Stefanowsky

Experience in the production of hollow sand-lime brick. A. S. Razorenov and V. F. Abashkina. *Keramika* **1939**, No. 6, 40–4.—An ordinary sand-lime batch with 6–8% active lime can be used. Lime must be finely ground (1–2% retained on a screen, 144 meshes per sq. cm.). The moisture content of the batch must be 4–5.5%. The batch fed to a special mixer must be moistened beforehand. E. E. Stefanowsky

Rational construction of mouthpieces for molding siphon brick and tubes. I. Sh. Shvartsman. *Ogneupory* **7**, 435–7 (1939). E. E. Stefanowsky

A rapid method of determination of working properties of casting slurry. E. A. Ulatov. *Keramika* **1939**, No. 7, 41–3.—An areometer is introduced for 3 min. into a cylinder contg. the slurry, whose sp. gr. has previously been detd. by pycnometer. The difference characterizes the inner friction of the slurry ($Q = \gamma - \gamma_1$). The addn. of electrolytes decreases the friction and improves the property of giving off water, which is best when Q approximates zero. E. E. Stefanowsky

Improving saggers. P. F. Romodan. *Keramika* **1939**, No. 8, 20–7.—Durability can be improved by adding talcum or gypsum. The latter decreases shrinkage, but increases water absorption. E. E. Stefanowsky

Some defects of underglaze colors and majolica glazes for whiteware. A. Z. Barabanova and O. V. Tyzhnova. *Keramika* **1939**, No. 7, 33–6. E. E. Stefanowsky

Causes of shrinkage of decalcomania after burning and ways to correct it. P. F. Romodan. *Keramika* **1939**, No. 7, 31–3. E. E. Stefanowsky

An instant-hardening refractory cement for patching coke ovens during operation. I. L. Movshevich. *Vestnik Inzhenerov i Tekh.* **1939**, No. 1, 53; *Chem. Zentr.* **1939, II**, 2140.—The setting requirements in a hot oven, of a satisfactory cement composed of 75% "marshalite," 20% quartzite (grain size under 0.7 mm.), and 5% clay with 1–1.5% graphite and 1.25% Na_2O (in the form of water glass) are discussed. This mixt. has a porosity of 25%, a vol. shrinkage of 3.9% and a refractoriness of 1630° (beginning of deformation at 1130° under a load of 2 kg. per sq. cm.). M. V. Condoide

Refractory cement containing barium aluminate. R. Matveev. *Novosti Tekhniki* **1939**, No. 23/24, 33–4.—Three methods are suggested for prepg. refractory cements contg. $BaAl_2O_4$: (1) Bauxite, or other material contg. Al_2O_3, is fired with a mixt. of Ba salts which decomp. upon being heated or with a mixt. of Ba salts and coal. (2) Soln. of $NaAlO_2$ and Ba salt, such as BaS, is treated with CO_2; the ppt. is washed, dehydrated, fired, and ground. (3) Bauxite is fired with barite, $BaAl_2O_4$ is extd. or the mixt. is treated in an autoclave with BaS. The $BaAl_2O_4$ is treated with CO_2, dehydrated, fired and ground. The Ba cement is mixed with 20–30% of water for use. B. Z. Kamich

Sintering process of highly refractory materials. I. G. V. Kukolev and E. I. Dudavskiĭ. *Ukrain. Nauch.-Issledovatel. Inst. Ogneuporov i Kislotouprov* No. **45**, 1–37 (1939).—(1) A method of sintering highly refractory materials (contg. silicates of Ca and Mg) at lower temps., for a shorter time, and with a smaller flux content (3.5–4% R_2O_3) in the mixes, was developed. It was called "method of active components." The method was used in 3 ways: (*a*) introduction into the mix of a dispersing material consisting chiefly of γ-$2CaO.SiO_2$; (*b*) introduction of natural silicates of Mg; (*c*) introduction of double silicates of Ca and Mg. Five types of highly refractory materials were produced: (*a*) calcareous refractory (consisting chiefly of $3CaO.SiO_2$) based on CaO and sand as raw materials and dispersing product γ-$2CaO.SiO_2$; (*b*) lime-dolomite refractory (consisting chiefly of $3CaO.SiO_2$ and MgO) based on CaO, sand and dolomite and the same dispersing product; (*c*) a refractory composed chiefly of $3CaO.SiO_2$ and MgO produced from a raw material called "zmeevik" (a silicate of Mg) and dolomite; (*d*) a refractory composed chiefly of $2CaO.SiO_2$ and MgO based on dolomite and sand

and synthetic diopside as an active component, contg. Fe in solid soln.; (*e*) a refractory composed of $3CaO.SiO_2$ and MgO on the base of dolomites and sand and the same active component. The refractories obtained possess a high d. and high indexes of incipient and final softening. Especially high indexes were shown by the "zmeevik"-dolomite refractories (incipient softening under load at 1620°, 4% shrinkage at 1700° and 14% shrinkage at 1750°). M. V. Condoide

Corrosion and destruction of refractory materials in Martin furnaces. A. M. Ruban. *Sovet. Met.* **10**, No. 1, 38-44(1938); *Chem. Zentr.* **1939, II**, 1737-8.—During the first 20 melts in Martin furnaces a crystn. and further tridymite formation occurs; this contributes to the phys. and chem. stability of the lining. The destruction of the blocks by the formation of porous spots is divided into 2 stages: (1) the impregnation of the gray zone by particles of coal dust and (2) a washing out of the tridymite by fluxes. These occur simultaneously and are intensified by high temp. The assumption that a temp. of 1470° exists in the boundary between the gray and black zones was not confirmed by R. Blocks with a gray zone measuring 160-180 mm. are employed at the Kirov Works and with the smallest temp. gradation of only 3° for 1 mm. block length, a temp. of 1950° must prevail on the side of the crown next to the fire, which is not likely. The mech. destruction of Dinas and magnesite blocks can be greatly reduced by the use of suitable heat insulators. Moreover, heat insulation permits a more complete crystn. of tridymite and also a widening of the black and brown zones. The corrosion and zone structure are similar in Dinas and magnesite blocks. The structure and extent of the diffusion of the fluxes (e. g., CaO and SiO_2) are explained not only by the temp. conditions which exist in the different zones, but also by the chem. behavior of the refractory toward one or more of the diffusing oxides. While the strongly basic CaO reaches the greatest concn. in the 3rd zone of refractory Dinas material, the acid flux (SiO_2) diffuses most deeply into magnesite blocks and also reaches its greatest concn. in the 3rd zone. It is assumed that physicochem. processes which also include reactions in a solid state take place during the formation of the zones in magnesite and Dinas materials. M. V. Condoide

Slag movements in refractory bricks. Th. Schauer. *Sprechsaal* **72**, 553-4(1939).—Expts. are described to define the movement of slag into magnesite bricks and especially the Fe pickup by the refractory. A blast-furnace slag high in SiO_2 and CaO ("half acid") was allowed to react for 1 hr. at 1450° with electro-magnesite. Three zones resulted with the $CaO.SiO_2$ penetrating rather deep and causing a middle zone between the original material and the Fe-rich surface. Magnesite and fire brick in contact resulted in corrosion of the fire brick with $2MgO \cdot 2Al_2O_3.5SiO_2$ penetrating deep into the brick and an Fe-rich surface forming next to the hole caused by the corrosion. Cases are mentioned where the decrease of porosity due to solidifying slag made the brick more resistant against continued attack by slag. J. M. Noy

Spinel refractories. A. S. Berezhnoĭ and E. Z. Slonimskaya. *Ukrain. Nauch. Issledovatel. Inst. Ogneuporov i Kislotouporov* No. **45**, 78-119(1939).—Fused spinel made under lab. conditions from Al_2O_3 and $Mg(OH)_2$ has valuable properties, such as high temp. of deformation (above 1800°) under load (2kg./sq. cm.). The production process has been developed. Deformation under load begins at 1600-1650°; destruction occurs at 1660° or over. Refractoriness is over 1920. Thermal stability (air quenching) is about 30-40. The resistance to slag is not as high as mentioned in the literature. It is affected, although little, by SiO_2, CaO, Martin slag and some other materials at 1600°. The introduction of some admixts., especially of chromite, accelerates the formation of spinel. Spinel refractories can be used in contact with magnesite and even highly aluminous and chromite refractories, but contact with olivine, and especially with grog and SiO_2 refractories should be voided. Tests of spinel refractories in the crown and arch of elec. steel melting furnace XT3 showed resistance far superior to that of SiO_2 refractories. It was found possible to replace Al_2O_3 by bauxites for spinel refractories where a [illegible] ruation temp. of 1500-1550° and a refractoriness of 1825° is satisfactory. M. V. Condoide

Manufacture of chromite refractories. A. S. Berezhnoĭ and K. N. Repenko. *Ukrain. Nauch.-Issledovatel. Inst. Ogneuporov i Kislotouporov* No. **45**, 38-57(1939).—A review. Tables and diagrams are given. M. V. C.

Selection of refractory materials for the bottom of furnaces. A. I. Kramarenko and L. A. Tseitlin. *Ukrain. Nauch.-Issledovatel. Inst. Ogneuporov i Kislotouporov* No. **45**, 73-7(1939).—Russian metallurgical plants use SiO_2 semiacid grog, magnesite, talc and chromite refractories as the linings of furnace bottoms; they are unsatisfactory. In attempts to develop suitable refractories it was found that: (1) Chromite mix is not affected by slag and does not soften, but it does not sinter and slag penetrates the porous structure and soon destroys it. (2) Chrome magnesite mix does not soften and is not affected by slag. Its surface sinters and is resistant to shock and wear. There is little reaction between chrome-magnesite and slag M. V. Condoide

Glass-tank refractories. W. J. Rees. *Brit. Clayworker* **48**, 291-2(1939). E. C. Petrie

Pouring pit refractories. Everett C. Hite and Gilbert Soler. *Brick & Clay Record* **95**, No. 5, 54-6; No. 6, 52-4(1939). E. C. Petrie

Tests on the viscosity of slips. Pierre Brémond. *Rec. commun. congr. tech. ind. céram.* Apr., **1938**, 155-65; *Chem. Zentr.* **1939, II**, 1739.—Tests were made on the viscosity of suspensions of pure clay, 50% clay and 50% finely powd. quartz, 33% clay and 67% quartz, and pure quartz; and on its dependence upon the quantity of dry substance, particle form, pH of the liquid and temp. The results are given in graphs and tables. M. V. C.

Modern ground enamels. L. Vielhaber. *Emailwaren-Ind.* **16**, 241-2(1939).—Batch compns. for ground enamels with min. borax content are given M. V. Condoide

Mat enamels. L. Vielhaber. *Emailwaren-Ind.* **16**, 228-9(1939).—When mat enamel is desired, as for blackboards in schools, the mat effect can be obtained on glossy enamels by sand blasting, salt treatment, etching with HF, stamping with a printing color or burning. A batch for a mat enamel in which the borax content is almost entirely replaced by ZnO and Na_2O and which retains practically the same expansion and fusibility is: feldspar 29, quartz 16, cryolite 10, soda 12.5, saltpeter 4, fluorspar 4, Sb_2O_5 5, ZnO 9.5, with 5% clay added to the mill. M. V. C.

Manufacture of acid-stable enamels. L. Vielhaber. *Emailwaren-Ind.* **16**, 221-2(1939).—Acidproof enamel batches are given (Andrews) which were defective when fired on metal. Conclusion: Tests for acid stability are important only for enamels whose value for enameling work has already been established. M. V. Condoide

Determining the physical properties of enamels. L. Vielhaber. *Emailwaren-Ind.* **16**, 205-6(1939).—When enamel is fused to metal it assumes an entirely different structure. The enamel layer is permeated with small bubbles which change many properties, such as the thermal cond., which varies with the size and no. of bubbles, which in turn are dependent chiefly upon the grinding fineness of the enamel. The expansion due to heat of iron which has been enameled is less than that of iron alone before enameling, but greater than that of the enamel alone; this is also explained by the presence of the small bubbles. It is therefore obvious that tests on heat expansion, elasticity, resistance to pressure, etc., of enamels must be made on enameled ware instead of on the enamel alone. Other factors, such as the duration of firing, may influence the formation of bubbles. The control of the size of bubbles is possible by microscopic study. M. V. Condoide

State of the enamel melt. R. Aldinger. *Glashütte* **69**, 749-51(1939).—The type and method of fusing are very important for subsequent treatment. It is here that the expression "state of the melt" of enamels arose. Fusing various types of enamel is discussed. M. V. Condoide

Spraying equipment. L. Vielhaber. *Emaillieren-Ind.* 16, 207–8(1939). M. V. Condoide

Cast iron, pottery, and sanitary wet enamels past and present. H. Kerstan. *Glashütte* 69, 714–15(1939).—The compn. and chem. analysis of wet ground enamels for pottery and sanitary ware are given. In batches used in the past the low B_2O_3, high Al_2O_3 and relatively high expansion coeff. are notable. Cryolite was first used in 1890. Manuf. of enamel in past times is described. M. V. Condoide

Enameling defects and their origin. R. Aldinger. *Glashütte* 69, 589–92(1939); cf. *C. A.* 33, 6013⁴.—Two types of defects are discussed, the bursting off of enamel at edges and dark points in enamel. M. V. Condoide

Fine cracks in enamel. R. Aldinger. *Glashütte* 69, 738–9(1939). M. V. Condoide

App. for luminescence analysis and its use for examn. of silicates (Shvetsov, *et al.*) 1.

Searle, A. B.: Refractories. London: Crosby Lockwood. 102 pp. 3s. 6d. Reviewed in *Blast Furnace Steel Plant* 28, 104 (1940).

Glass vessels such as baking dishes. Wm. W. Shaver and Harold K. Martin (to Corning Glass Works). U. S. 2,177,336, Oct. 24. Vessels are formed with surface layers under compression and an inner tension zone the max. degree of tension of which per sq. mm. does not exceed 2.6 kg. Such vessels are not subject to "explosive fracture." 4

Apparatus for feeding articles such as bottles or other glassware to lehrs for annealing. Norman R. Beck (to Carr-Lowrey Glass Co.). U. S. 2,176,241, Oct. 17. Various structural, mech. and operative details.

Bending glass sheets. Robert A. Miller (to Pittsburgh Plate Glass Co.). U. S. 2,176,999, Oct. 24. App. is described, and a method of bending a glass sheet which involves supporting it at opposite extremities in a horizontal position with the intermediate portion unsupported, heating the entire sheet to a high temp., but below the softening temp. of the glass, applying radiant heat to each face the intermediate sheet portion along a narrow band only extending across the sheet to heat such band to a bending temp. so that the sheet bends by gravity, and limiting the bending movement to produce a predetd. contour. 6

Coated glass sheets. Arthur D. Nash (to Pittsburgh Plate Glass Co.). U. S. 2,177,000, Oct. 24. App. is described, and a method of making a glass sheet which involves withdrawing a sheet continuously from a molten bath of clear glass in such manner that the surface glass in the bath moves forwardly relative to the body of the bath as the sheet is formed, and applying continuously to such surface a layer of unfused vitreous glazing material which is fused on the surface of the bath and remains thereon and forms the surface layer of one side of the sheet. 7

Apparatus for producing ground and polished glass strip. Frederic B. Waldron and Frank Slocombe (to Pilkington Bros. Ltd.). U. S. 2,176,480-1, Oct. 17. Various structural, mech. and operative details.

Tempered glass articles such as sheet glass for windshields. Bernard Long (to American Securit Co.). U. S. 2,177,324, Oct. 24. In order to divide a tempered glass article such as a sheet into several pieces, there is produced along the periphery of each piece to be obtained a band in which the glass is untempered and the fragmentation of the glass is effected in the zones of tempered glass outside these pieces.

Composite interlayer for cementing together plates of laminated safety glass. Herman R. Marini (to Pittsburgh Plate Glass Co.). U. S. 2,176,997, Oct. 24. A layer such as a plasticized polyvinyl acetal resin of tacky character is used between layers of unplasticized nontacky synthetic resin of normally nonadherent character but which can be bonded with plates of glass by heat and pressure. 3

Improving the properties of sheeting such as that of a cellulose acetate composition for use in laminating glass. John S. Kimble and John S. McLellan (to Eastman Kodak Co.). U. S. 2,177,659, Oct. 31. App. is described, and a continuous method of improving the phys. characteristics of a thermoplastic sheeting of cellulose org. deriv. which comprises heating the sheet in a heating chamber while supporting the sheet without substantial tension being exerted thereon, reducing the thickness of the sheet in a series of calenders, heating the sheet between the calenders to facilitate calendering, and cooling the sheet while it is under substantially no tension.

Laminated glass. Carleton Ellis (to Ellis-Foster Co.). U. S. 2,176,837, Oct. 17. At least 2 panes of light-transmitting glass are bonded together by a composite light-transmitting mixt. such as glass fiber and a resinous compn. such as a synthetic resin having substantially the same n as the glass. Cellulose esters also may be used with glass fiber. 5

Hermetic, electrically conductive seals suitable for use with tungsten and quartz. Cornelis Bol, Gottfried B. Jonas and Hendricus J. Lemmens (to General Elec. Co.) U. S. 2,177,685, Oct. 31. For sealing, a glass is used substantially free from alkali and having a coeff. of expansion less than that of W, such as one contg. SiO_2 88.3, B_2O_3 8.4, Al_2O_3 2.9 and CaO 0.4%.

Checkerwork for regenerators such as those of open hearth or glass-tank furnaces. Henry Tanner (to Chicago Retort and Fire Brick Co.). U. S. 2,176,157, Oct. 17. Various structural details.

Abrasive sheets and disks, etc. Lawrence V. Redman (to Behr-Manning Corp.). U. S. 2,176,942, Oct. [illegible]. A flexible base such as paper or cloth carries abrasive grains held by a binder including a phenol-oil resin reaction product such as may be formed from tung oil, phenol and $(CH_2)_6N_4$, etc.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Development of portland cement. E. M. Schroder. *Soc. Chem. Ind. Victoria, Proc.* 39, 202–16(1939). E. H.

Calcium diborate hexahydrate from a mortar of portland cement and colemanite. M. A. Peacock and V. A. Vigfusson. *Univ. Toronto Studies, Geol. Ser.* No. 42, 113–21 (1939).—Portland cement briquets made from 1 part cement and 4 parts colemanite ($Ca_2B_6O_{11}.5H_2O$) were prepd. in the usual manner. After 14 months large clear and transparent crystals were attached to the briquet surfaces. The compn. of these crystals is $CaB_2O_4.6H_2O$ and their formation may be expressed in the reaction: colemanite + $Ca(OH)_2$ + H_2O = $CaB_2O_4.6H_2O$. Two g. of this latter compd. dissolves in 1 l. water at 10° and gives an alk. soln. It is stable toward atm. CO_2 but rapidly loses its hydration at 80°. The crystals are colorless, sp. gr. 1.881, are biaxial, neg., with low refringence and moderate birefringence. X-ray measurements gave the lattice parameters a_0 = 7.97, b_0 = 6.614, c_0 = 7.977 A and β = 104°25′. The unit cell consists of $Ca_2B_4O_8.12H_2O$. H. E. Messmore

Increasing the activity of Roman cement. G. Aristov. *Keramika* 1939, No. 6, 54–6.—The activity of Roman cement can be increased by adding about 2% by wt. of slaked lime. The mechanical strength of activated cement is higher. E. E. Stefanowsky

Hydrotechnical cements. V. N. Yung. *Tsement* 6, No. 6, 20–33(1939).—As a most appropriate cement for hydrotechnical construction is suggested a three-component sand-pozzuolanic cement consisting of 50% of clinker

and 50% of addns. Its silica content amounts to 55–60%. E. E. Stefanowsky

Corrosion of cements under the action of gases of waste waters. V. P. Makhaev and P. S. Kaverin. *Vodosnabzhenie i Sanit. Tekh.* **1938**, No. 11, 81–6; *Khim. Referat. Zhur.* **2**, No. 3, 101(1939).—The stability of different cements to CO_2 and H_2S was investigated. The smallest gas permeability was shown by samples (from 1·3 solns.) prepd. with portland cement and the max. permeability by samples prepd. with the acid-resisting KTsV cement. CO_2 had a greater effect on the compressive strength than did H_2S. The samples prepd. with the acid-resisting cement were destroyed by the action of CO_2. Most of the other samples, after 28 days increased in strength under the action of CO_2. W. R. Henn

Cast blocks from aluminous slag for lining cement kilns. A. I. Zhilin and L. P. Ignat'eva. *Tsement* **6**, No. 6, 41–5(1939).—Blocks from aluminous blast-furnace slags contg. not over 39% of CaO are resistant to the effect of clinker, but have low spalling resistance. E. E. S.

Chromite-alumina [cement-kiln] lining. N. I. Levin and E. G. Kanovich. *Tsement* **6**, No. 8, 10–14(1939).—The use of chromite-alumina linings is effective at plants with average burning conditions. E. E. Stefanowsky

Properties of hydraulic blast-furnace slags. G. Mussgnug. *Arch. Eisenhuttenw.* **13**, 193–200(1939).—Because wide variations have been obtained in tests of slags that are almost identical physically and chemically, the more recent testing methods are reviewed and a modified method was developed. Setting-accelerators were investigated. Hydrated lime is the most important economically. KCl as accelerator gives the highest compression strength and KOH the highest bending strength in water; KCl increases shrinking considerably. Ability to set is greater, the higher the temp. at which the slag was blown. With increasing ratio of SiO_2 to Al_2O_3 the waterproofness increases, airproofness is unchanged, and shrinking decreases. A decreasing ratio favors setting of the slags in water and in air. A higher Mn content decreases setting power of the blast-furnace slags. The ratio $CaO:SiO_2$ has no practical effect on the mech. properties. A higher Al_2O_3 content favors in general the reactivity of a slag. Acid slags set less readily than do basic slags. M. H.

Lime paste from calcium carbide waste. I. Yu. Belyavskiĭ. *Keramika* **1939**, No. 4, 45.—Waste from acetylene generators, contg. up to 76% of CaO, gives in 28 days a strength exceeding that of usual lime-sand mortar (1:3 ratio). It contains no acetylene or H_2S NH_3 and very small amounts of PH_3 are present. E. E. Stefanowsky

The preparation of mortar from activated kaolin. Rudolf Barta. *Chem. Obzor* **14**, 212–13(1939).—Kaolin heated at 600–700° released a reactive form of SiO_2 which had the capacity of combining with the free lime in cements and improving their quality. The behavior of this kaolin is used to explain why flours prepd. from bricks—especially from bricks fired at low temps.—added to mortars gave such lasting qualities to Roman cements. The relation of this activated kaolin to the mortar "Ladco Bondo" of Cartersville, Ga., is discussed. F. Maresh

Method for estimating mixing water in the determination of mortar strength of sands. Horace A. Pratt. *Maine Tech. Expt. Sta., Univ. Maine*, Paper No. 26, 15 pp.(1939).—The proper amt. of water required for mixing mortars made with com. sands for the Maine State Highway Commission was at first obtained by trial and error within the approx. range of 10 to 14%. Multiple correlation studies showed that the amt. of mixing water was a function of the proportion of granitic grains present, the surface area of the grains, the percentage retained on the 28-mesh sieve and the fineness modulus. With the 3 regression equations developed, it is possible to est. with a considerable degree of accuracy the amt. of mixing water required for any Maine sand to produce a mortar of the required consistency. A. W. King

Laboratory tests of concretes and mortars exposed to weak acids. Dalton G. Miller, Philip W. Manson and Charles F. Rogers. *Agr. Eng.* **20**, 427–30(1939).—See *C. A.* **33**, 7069⁸. J. R. Adams

Testing the efficiency of concrete-curing methods. Henry D. Dewell. *Western Construction News* **14**, 403–5 (1939). George Ayers

Gas concretes from Moscow district coal ash. L. A. Kislyakov and N. N. Gureeva. *Keramika* **1939**, No. 4, 41–4.—Gas concretes were made by autoclaving, with an addn. of 0.1–0.2%, of aluminium powder, (*a*) lime, cement and ash and (*b*) lime and ash. The first was fairly strong and air-stable, the second less so. Floor blocks can be prepared from cementless gas concrete containing 3% of $CaCl_2$ as filler. The frost resistance is low. E. E. Stefanowsky

Portable apparatus for determining the relative wear resistance of concrete floors. Louis Schuman and John Tucker, Jr. *J. Research Natl. Bur. Standards* **23**, 549–70(1939)(Research Paper No. 1252).—The paper describes a portable abrasion machine and an optical gage for measuring the depths of wear. Abrasion tests were made on 138 slabs of portland cement mortars and concretes ranging from 1:2 to 1:3.6 mixts. with cement-water ratios from 1.33 to 2.50. The effects of other factors such as aggregate types, grading, finishing procedures, dust coats, liquid surface treatments, metallic hardeners, cement dust coats, delayed trowelling and increased wear resistance were also studied. Dry mixes, coarsely graded aggregates and adequate wet curing helped increase wear resistance. High early-strength cement mixts. required much shorter periods of damp curing without decreasing the wear resistance. A. W. King

The evaluation of fillers for tar and other bituminous surfacings. J. G. Mitchell and A. R. Lee. *J. Soc. Chem Ind.* **58**, 299–306(1939). Data are given showing that the bulk d. of a filler which has been allowed to settle in C_6H_6 gives a quant. measure for proportioning it as a constituent of a bituminous surfacing. For fillers which are not sol. in bituminous binders, the addn. of equal bulk vols. of different fillers to the same quantity of bituminous binder gives products having the same viscosity, irrespective of the nature of the filler. M. and L. also give data showing that adsorption between filler and binder causes removal of the resinous constituents from the binder and tends to reduce the viscosity of the product. Results from mech tests and early observations on full-scale road expts. also show that the bulk d. of a filler is its significant property in relation to bituminous road-surfacing materials, and that failure may easily occur through neglect to adjust the filler-binder ratio on this basis. M. and L. advocate the inclusion of a clause defining the relation between the bulk d. of the filler and the binder content in existing specifications for bituminous surfacings. H. Mare

Gypsum of the Porkhovo deposits. A local source of raw material for the building industry of Leningrad. I. G. Sandomirskiĭ. *Keramika* **1939**, No. 8, 33–6. E. E. S.

Gypsum and anhydrites of Bashkiria. S. P. Zorin. *Keramika* **1939**, No. 8, 37–41.—Characteristics are given of several kinds of gypsum and anhydrite and of anhydrite cement and slag blocks made from it. E. E. S.

Cellular gypsum from alabaster. A. B. Getselev. *Keramika* **1939**, No. 6, 45–50.—The process is similar to the production of froth concrete from portland cement. E. E. Stefanowsky

The methods of testing antiseptics in the control of house fungi. B. P. Karakourtin. *Sovet. Botan.* **2**, 57–65 (1939); *Rev. Applied Mycol.* **18**, 720.—The growth of *Merulius lacrymans* and *Coniophora cerebella* on wood was completely arrested by doses of anthracene oil of between 1 and 2% of the wt. of the wood, while 5% carbolineum (the largest concn. used) only retarded it slightly. Oden E. Sheppard

Minimizing shrinkage and swelling of timber. H. E. Desch. *Wood* **4**, 19–21(1939).—Impregnation of wood with chemicals reduces shrinkage and swelling in special circumstances, but the cost is too high for general application. For many uses, sufficient protection is obtained by protective coatings that merely offer mech. resistance to moisture movement. Leopold Scheflan

A new preservative. J. Bryan. *Wood* **4**, 161–2(1939).—In lab. tests, with 2 parts of $K_2Cr_2O_7$ to 1 part of $HgCl_2$

the chloride was fixed in the wood to the extent of 99%. The fixative action of the dichromate does not adversely affect the toxicity of $HgCl_2$. The soln. contg. 2% $K_2Cr_2O_7$ and 1% $HgCl_2$ while not so corrosive as $HgCl_2$ soln. alone is still too corrosive for use in ordinary metal containers. This corrosive action can be reduced by the addn. of reducing salts. Best results were obtained with $NaNO_2$. By the addn. of 5% of $NaNO_2$ the corrosion of Fe and steel was kept within normal limits experienced with water-sol. preservatives so that steel equipment can be used; however, Cu and brass vessels are attacked. The reduction of the dichromate by the nitrite is prevented by the addn. of 0.5% NaOH; excess base will cause pptn. The max. concn. suitable for industrial operation is $NaNO_2$ 1.25, $K_2Cr_2O_7$ 0.5, $HgCl_2$ 0.25, NaOH 0.125, H_2O 97.875 lbs. To prepg. this mixt. the alk. $NaNO_2$ soln. should be added slowly to a soln. of $HgCl_2$ and $K_2Cr_2O_7$. The same effect can be achieved by eliminating NaOH and using K_2CrO_4 in place of $K_2Cr_2O_7$. To obtain permanent protection from the use of this new preservative it is necessary to impregnate the timber under pressure. L. Scheflan

Fluorine compounds as wood preservative. D. Steinberg. *Can. Chem. Process Inds.* **23**, 601(1939).—A review of methods of application. NaF and some of the natural fluosilicates are the most important F compds. used as wood preservatives. Solns. of F compds. are generally applied in closed containers in which wood is treated with the soln. under pressure. W. H. Boynton

Pentachlorophenol for wood preservation. T. S. Carswell and Ira Hatfield. *Ind. Eng. Chem.* **31**, 1431–5 (1939); cf. C. *A.* **32**, 5531[2].—Lab. tests show that small amounts of pentachlorophenol in nutrient agar kill transplants of 21 different wood-destroying fungi while wood blocks treated with a 0.5% soln. of the chemical are resistant to 3 test organisms used. Its low soly. in water (8 parts per million at 50°F.) and its low vapor pressure (0.0017 mm. Hg at 20°) promise a high degree of permanence. Service tests have so far yielded favorable results. Its soly. in 26 org. solvents is given as well as a discussion of suitable methods of application. R. H. B.

Testing of timber preservation by laboratory methods. K. Rubanus. *Angew. Botan.* **19**, 579–86(1937).—The effectiveness of Basilit N extra, Basilit U and Basilit U A as wood-preserving materials was tested. In Basilit N the fungicidal ingredients are NaF and dinitrophenol. In Basilit U a Cr compd. is added, while Basilit U A contains, in addn., an As compd. The theory is that with Basilit U the Cr compd. is reduced in the wood and together with the fluoride will form new, complex salts not easily sol. in water; with Basilit U A, Cr-As compds. will form which are still more resistant to the dissolving action of water. The 3 materials were tested in the lab. In addition, these materials were tested out of doors, under every day conditions. Basilit U and Basilit U A proved superior to the older prepn. Basilit N extra. K. L.

Bleeding from creosoted sleepers treated by the Rueping process. A. D. Dhall. *Indian Forester* **65**, 349–55 (1939).—Deodar, fir and chir treated by the Rueping process lost on the first day an av. of 28, 20 and 4%, resp., of the material originally injected; 4, 3.5 and 0%, resp., on the 2nd day; 2, 0.7 and 0% on the 3rd day; 1, 0.7 and 0% on the 4th day; and 0.5, 0 and 0% on the 5th day. In summer deodar, fir and chir lost by bleeding as high as 15, 35 and 6%, resp., while in the winter as little as 25, 10 and 1% were lost, resp. The mechanism of bleeding and possible means of reducing it are discussed.

Colin W. Whittaker

App. for luminescence analysis and its use for examn. of silicates (Shvetsov, *et al.*) **1**.

Cement mixture. Henry H. Morcton. U. S. 2,176,862, Oct. 17. A mixt. of Portland cement, ground silica sand, pumicite, and a natural silicate product native to the Mojave Desert (which is a gel-forming colloidal material contg. approx. 14% of magnesia, of high water absorptiveness, and of an inherent alumina content of about 0.8% which is so low that the quantities of any aluminates or alumina-silicates which may be formed within the mixt. will be negligible) is suitable for making a cement of relatively low shrinkage and high strength.

Solidifying permeable rock and concrete layers, etc. Tore G. Malmberg. U. S. 2,176,266, Oct. 17. A process for tightening and consolidating rock formations, sand and gravel layers, porous concrete, dam structures, shafts and drill holes, etc., involves the step of prepg. an aq. mixt. of an alkali silicate and a water sol. acid salt of a weak acid, injecting the mixt. into the material to be treated prior to any appreciable coagulating reaction having taken place in the mixt., and letting the reaction between the alkali silicate and the acid salt proceed with a formation of silica gels in the injected material. Salts such as $NaHCO_3$ or borax, etc., may be used, also $NaHSO_3$, etc.

Bituminous paving material. James M. Johnson. U. S. 2,177,568, Oct. 24. A method of prepg. a bituminous paving material comprises segregating a mass of paving aggregate, adding thereto a mixt. of Al oleate, free oleic acid and light lubricating oil, in sufficient amt. thoroughly to coat the particles of aggregate therewith, while maintaining the mass in agitation, and, when the soap mixt. is uniformly distributed, adding the amt. of bituminous material required for the pavement and continuing the agitation until the bituminous material is evenly distributed over and around the particles of aggregate.

Aging calcined gypsum. Frank L. Marsh and Dudley C. Chads (to National Gypsum Co.). U. S. 2,177,668, Oct. 31. Calcined gypsum is agitated, exposed to a moisture-carrying gas such as air having a predetd. relative humidity, and this treatment is continued until rehydration to the hemihydrate is effected.

Saturating web materials as in treating roofing material with asphalt. Donald A. Cumler (to United States Gypsum Co.). U. S. 2,176,835, Oct. 17. App. is described, and a method for effecting optimum satn. which involves periodically exerting oppositely directed forces transversely of and substantially parallel to the broad surface of a web to cause alternately loosening and compacting of the fibers of the web while it is passing through a satg. medium.

Colored granular material suitable for use on asphalt roofing. Carl E. Hillers and Horatio L. Small (to Blue Ridge Slate Corp.). U. S. 2,177,389, Oct. 24. Granules such as those of slate are coated with Ba fluosilicate, an aq. dispersion of alkali metal silicate and a coloring material, and are heated (suitably to about 140–150°), soaked in water, rinsed and dried.

Flooring and roofing material, etc. James P. Burke (to Vermiculite Corp. of America). U. S. 2,177,092, Oct. 24. A fabric base such as burlap is provided with a layer of a substantially densified compn. of exfoliated vermiculite and a varnish binder applied to the base and having an exposed surface. U. S. 2,177,093 describes app. and the manuf. of a roof covering comprising a metallic base, a layer of exfoliated vermiculite and a varnish having a relatively high percentage of voids therein and a superposed layer of waterproof material such as an asphaltic compn.

Tiling suitable for flooring. Herbert A. Winkelmann (to Marbon Corp.). U. S. 2,177,413, Oct. 24. Tiles of substantial thickness are formed with fillers and a binder including a rubber-HCl and a soap such as Ca stearate, etc.

Wall plaster. Walter A. Troy. U. S. 2,176,938, Oct. 24. A plastered wall highly resistant to cracking when subjected to stresses of compression or tension and by freedom from spalling under impact or when nails are driven into or withdrawn from it comprises a tough, resilient, nail penetrable plaster compn. composed essentially of a hydraulic cement, sand and a fibrous material and having the outer surface portion impregnated with a solidified re-enforcing agent comprising Chinawood oil.

Light weight calcium sulfate plaster. Winfield W. Heckert (to E. I. du Pont de Nemours & Co.). U. S. 2,177,254, Oct. 24. Crushed gypsum rock calcined to a state of

hydration not higher than the hemihydrate, is mixed, in the presence of an acidic agent adapted for decompg. reaction with impurities in the gypsum, with a considerable excess of water over that required to rehydrate the hemihydrate and sufficient to form a slurry with the sulfate, the wet mixt. is agitated until the calcined material has crystd. in a finer particle size and in the dihydrate form, and the material is recalcined to an anhyd. dead burned form. Various crystal growth restraining agents may be used.

Floor-covering material. John J. Bradley, Jr., and Arthur R. Cripps (to Bird & Son, Inc.). U. S. 2,177,634, Oct. 31. A hard-surfaced floor covering is produced by a method which involves first forming an aq. mixt. including finely powd. wood, an aq. gel-forming emulsifying agent such as clay, soap or casein, and a substantial quantity of water, the gel-forming agent being present in sufficient quantity to hold practically all of the water, the mixt. having lubricating character, then applying to a flexible base such as asphalt-satd. felt a layer of the mixt. of substantial thickness, drying off the water from the layer to provide a smooth-surfaced though porous firm and adherent layer consisting mainly of the powd. wood and emulsifying agent on the base, and then applying coloring and binding material such as a lacquer compn. to fill the pores through at least the major portion of the depth of the layer.

Bleaching wood veneer. Russell Fortune. U. S. 2,176,763, Oct. 17. Wood veneer such as that of American maple is treated with an aq. alk. soln. contg. Cl, to remove natural pigment color without disturbing the fiber organization of the wood.

Treating veneers prior to gluing. Frank V. Tischer (to Anna M. Tischer). U. S. 2,177,160, Oct. 24. For rendering contained hygroscopic matter nonhygroscopic, both sides of a veneer are coated with a compn. including a neutralized oxidizing agent such as $K_2Cr_2O_7$ with Na_2CO_3, NaCl and glue, the coated veneer is dried, and then separately subjected to heat and pressure to cause the oxidizing agent to penetrate the veneer and act upon the hygroscopic matter.

Colored fiberboard. Joseph W. Gill (to United States Gypsum Co.). U. S. 2,176,854, Oct. 17. A colored fiberboard which is suitable for building purposes is formed of ingredients such as vegetable fibers, *e. g.*, those of cottonwood 1000 lb., size 5–15 lb., Brilliant Paper Yellow dye 6.5–8 oz., Brilliant Crocein dye 5–5.5 oz., nigrosine 2.5–4 oz., red oxide of Fe 4–15 lb., carbon black 3–3.5 lb. and alum 20–40 lb.

Wood-preservative composition. Howard B. Carpenter (to Penola, Inc.). U. S. 2,177,448, Oct. 24. See Brit 498,336 (*C. A.* **33**, 4402[8]).

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE SIERN

Spectral analysis of fuels. A. S. Elinger. *Tekhnika Vozdushnogo Flota* **1938**, No. 12, 71–5; *Khim. Referat. Zhur.* **2**, No. 4, 81(1939).—A short description of the general principles of the methods used for the detn. of hydrocarbons by means of infrared and of combination spectra. These methods developed by E. Cotton, Ober, Lecompte, Andant, Barshevits and Freiman are especially suitable for the analysis of gasolines. They make possible the detn. of all isomers of the individual hydrocarbons. Definite references to the chem. literature are not given.
W. R. Henn

Use of gas as a fuel for motor vehicles. J. S. Clarke. *Gas J.* **228**, 614, 617–18, 623(1939).—The compressor is 6
the essential mechanism in the compressed gas system. Up to 5000 lb. per sq. in. a 4- or 6-stage compressor may be used. The 4-stage is cheaper in cost, but absorbs about 35% more power. Tests on a single-cylinder Tangye engine with a direct injection combustion chamber have shown that a high brake mean effective pressure can be maintained with accompanying high thermal efficiency with a min. quantity of oil, the remaining part of the charge being town gas, without unduly high max. pressures being 7
developed. P. J. Wilson, Jr.

High octane aviation fuel by the sulfuric acid alkylation process. S. H. McAllister. *Refiner Natural Gasoline Mfr.* **18**, 494–503(1939); *Natl. Petroleum News* **31**, R-512–16 (1939).—Olefins from C_3 to C_5 inclusive and isobutane or isopentane are mixed with H_2SO_4 and thoroughly agitated. The important variables are the isoparaffin-olefin ratio, 8
contact time, acid strength, temp., acid-hydrocarbon ratio, olefin concn. of the feed, and agitation. Standard com. equipment may be used. The acid loses titratable acidity by the absorption of hydrocarbons, but may be recouped by conventional methods. The products are of a completely isoparaffinic nature and have a high octane no. (82 to 93), high lead susceptibility, very low S content and high calorific value. The product boils in the gasoline range and is good blending stock for 100-octane no. aviation fuel. The process produces 2½ to 5 times as 9
much 87-octane no. aviation fuel as do the polymerization processes when operating on a C_4 fraction from cracking. 5 references. C. H. Brooks

Thermal alkylation and neohexane. G. G. Oberfell and Fred E. Frey. *Refiner Natural Gasoline Mfr.* **18**, 486–93, 503(1939); *Natl. Petroleum News* **31**, R-502–9(1939).—With much the same charging stock, alkylation produces a more volatile material than does polymerization. Thermal alkylation is less selective as regards charging stock than is acid alkylation. In the manuf. of neohexane, an ethane-propane mixt. is cracked at low pressure and 1425°F. to give the max. amt. of ethylene. The ethylene is absorbed in liquid isobutane and distributed to 10 points along a pipe coil, through which more isobutane is pumped. A temp. of 950°F. and a pressure of 3000 to 5000 lb. per sq. in. are maintained in the reaction zone. The liquid products are sepd. by conventional fractionation. The lead susceptibility of neohexane is better than that of synthetic isooctane. Data are included on volatility and lead susceptibility of neohexane, and blends of isooctane-heptane, neohexane-isooctane, and isopentane-isooctane, as well as data on aviation-fuel blend. 18 references. C. H. Brooks

Engine combustion and pressure development. Effects of mixture ratio, spark position and throttle opening on flame pictures and pressure cards. Gerald M. Rassweiler, Lloyd Withrow and Walter Cornelius. *S. A. E. Journal* **46**, 25–48T(1940); cf. *C. A.* **30**, 5774[8]; **32**, 6033[3].—Values of either vol. or mass fraction of charge inflamed at any time as calcd. from the pressure record are in close agreement with the same values calcd. from analysis of 38 different high-speed motion pictures of the flames. A 900-r. p. m. single-cylinder L-head engine with unheated intake was used, with 3 spark locations, 2 spark advances and full or part throttle opening, at 4.6–4.8 compression ratio and 13–19 air/fuel ratio, and with gasoline or isooctane as the fuel; no knock was observed. The effects of these variables on the combustion process and pressure development are pointed out. Even under the engine conditions used, there appears to be no marked stratification of the charge, and it is likely that the method of calcn. can be applied to automobile engines. H. A. Beatty

Dangerous swelling pressures in carbonization practice G. E. Foxwell. *Gas World* **111**, No. 2887 Coking Sect., 141–2(1939); cf. *C. A.* **34**, 239[9]. P. J. Wilson, Jr.

Problems which deserve consideration. W. H. Bristow. *Gas J.* **228**, 288–90(1939).—The production of some *coal products* which are important to the fuel and heavy industries are briefly reviewed. P. J. Wilson, Jr.

Chemical research and coal. Jessie V. Sullivan. *Mfrs. Record* **108**, No. 10, 30, 52(1939).—A survey. L. S.

The coal production of Hungary. István Vitális. *Math. naturw. Anz. ung. Akad. Wiss.* **58**, 619–35(1939); cf. *C. A.* **33**, 4764[8].—The output of coal was 159,604 metric tons in 1851, 737,140 in 1867, 4,894,353 tons in

1896, 10,274,052 tons in 1913 and 9,359,704 tons in 1938. The total output from 1841 to 1938 amounts to 386 million tons, 18% of which was black coal and 82% brown coal. The proportion of black coal decreased in 1938 to 11.1%. S. S. de Finály

The thermal behavior of coal. I. The behavior of coals in heating to incipient softening. Horst Brückner. *Angew. Chem.* **52**, 671–6(1939).—A comprehensive summary with data, diagrams and 50 references. K. K.

Hydrogenation of typical North American splint coals. Abner Eisner, Geo. C. Sprunk, Loyal Clarke, C. H. Fisher and H. H. Storch. *Ind. Eng. Chem.* **32**, 73–8(1940), cf. *C. A.* **33**, 9587⁸.—American splint coals are similar to European splint coals in being less suitable for hydrogenation than bright coals. The liquefaction yields of 12 splint samples were found to be inversely proportional to both the C and opaque matter contents. The hydrogenation residues were opaque, which indicates that spores, resins and other translucent constituents had been liquefied. Joseph H. Wells

The ash constituents of Hungarian coals. Elemér Vadasz *Bányász. Kohász. Lapok* **72**, 387–90(1939).—The ash components of coal are detd., not by the ash of the plant from which the coal was formed, but by the components of the sedimentary rocks and the neighboring substances, and are thus independent of the geological age of the coal. Numerous analyses of Hungarian coal ash are given. S. S. de Finály

The determination of the fusibility of coal ash. G. E. Hall *Gas World* **111**, No. 2887 Coking Sect., 134–9, 1939). H. discusses methods of detn. and evaluates factors affecting the results. Conclusions: A direct test is the only means available for detn. of the fusion point or softening interval of the ash; analysis gives no indication of the probable values. Most authorities consider a cone method to be the most satisfactory. The control of atm. in the test furnace is of paramount importance. A mildly reducing atm. in which the ratio of the vols. of oxidizing to reducing gases falls between the limits 20 80 and 80 20 is generally considered most satisfactory. P. J. W., Jr.

Cracking tars and distillates from coal. Gustav Egloff, Jacque C. Morrell, G. B. Zimmerman and W. E. Lemen. *Ind. Eng. Chem.* **32**, 39–47(1940).—Coal tars, creosote oils, lignite tar fractions and distillates from the low-temp. carbonization of coal-oil mixts. are cracked under conditions to produce gasoline, gas and coke or fuel-oil residues. The boiling phenols are produced from higher-boiling tar acids. Com. products include finished gasoline, cresylic acid, fuel oil, domestic coke, electrode C and polymer gasoline. In comparison with petroleum cracking, greater corrosion is encountered and lower plant capacities are obtained. The finished gasoline has a greater heating value per unit vol. with good antiknock value. The gas is lower in mol. wt. and heating value than that from petroleum cracking. Joseph H. Wells

Oil dehydration of North American lignites. E. P. Schoch *Ind. Eng. Chem.* **31**, 1489–96(1939); cf. *C. A.* **33**, 7990⁸.—The lignite was dehydrated by covering with naphtha (b. 160°), heating to 210° in a closed vessel and allowing the liberated H_2O to escape slowly. The oil was then removed by drainage followed by a brief reduction of the pressure to 15 mm. This treatment did not disintegrate the original lumps. The product (4% moisture) had a heating power of 11,000 B. t. u. A. M. Collins

Gasoline from peat tar. N. S. Semenov and M. K. Kompanets. *Motor* **16**, No. 4, 24–8(1938).—A graphical comparison is given of the behavior of gasolines from oil and peat tar in an automobile engine. The octane no. of the petroleum gasoline was 63 while those of the peat-tar gasolines were 70.5 and 63.0 while their initial b. ps. were 90° and 120°. At 1000 r. p. m. the first peat gasoline developed 0.2–0.3 more h. p. than the oil gasoline while the second gasoline developed a lower h. p. It is necessary to add about 10–12% of ordinary gasoline to the peat gasolines to bring their starting properties up to satisfactory standards. B. Z. Kamich

Dry purification of gas. M. G. Kazhdan and V. G. Bocharov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 8, 54–6(1939).—When coke gas is passed through finely divided coke at 18–33°, the H_2S and tar droplets in it are removed. H. M. Leicester

Purification of [fuel] gases. Kenzi Nakamura. *J. Fuel Soc. Japan* **18**, 843–52(1939).—A general discussion. F. I. Nakamura

Wood gas. G. H. Donald. *Wood* **4**, 80–2(1939).—An illustrated discussion of the production of producer gas from wood and its application in the driving of automobiles. Leopold Scheflan

Yield of chemical substances during the gasification of wood in a Siemens gas generator. N. V. Chalov. *Lesokhim. Prom.* **6**, No. 2, 26–8(1938); *Khim. Referat. Zhur.* **2**, No. 3, 124(1939); cf. *C. A.* **32**, 5187⁴.—At the gas-generating station of the Bytoshev glass plant (hardwood logs are used for fuel) samples of the steam-gas mixts. were analyzed for tars, HCOOH, CH_3COOH, C_2H_5COOH, aldehydes, CH_3OH, ketones, esters and unsatd. alcs. The yield of all products (excepting the tar) was only one-half of that usually obtained during dry distn. The insides of the logs burn before they are decompd. In the gasification of chips in the generator AVG the yield of the products was much higher. W. R. Henn

Induced pyrolysis of methane. W. J. Hessels, D. W. van Krevelen and H. I. Waterman. *J. Soc. Chem. Ind.* **58**, 323–7(1939); cf. Fischer *C. A.* **27**, 2016; Peters and Meyer, *C. A.* **24**, 484; Tropsch and Egloff, *C. A.* **29**, 7355⁷.—The pyrolysis of CH_4 in the presence of foreign substances, such as halogens, aliphatic hydrocarbons (I) and halogen, S or O compd. of I as inductor, is studied. The primary reaction in the pyrolysis is the formation of radicals which react with each other and with undecompd. CH_4. The same radicals are also formed by the action of halogens on CH_4 or by the thermal decompn. of I which are less stable than CH_4 itself. I, such as C_3H_8 or C_4H_{10}, can be used for the production of the radicals necessary to demonstrate the induction effect on the CH_4 pyrolysis. By applying the inductor effect of foreign substances CH_4 is transformed into unsatd. hydrocarbons such as C_2H_4, C_2H_2, C_6H_6 and naphthalene under conditions where CH_4 alone passes the heating zone unchanged. The ratio of CH_4 to inductor is important and the effect is more marked if the concn. of the inductor is low in comparison with the CH_4 concn. Aromatic compds. such as C_6H_6 and naphthalene have very little or no induction effect. When the gases are passed through the furnace several times, high yields of conversion products are obtained and unsatd. I formed in the first passage through the heated tube act as inductor in the next passage. The induced pyrolysis can be applied to CH_4 present in natural gases which usually contain substances capable of acting as inductors. It has been shown that by the decompn. of the higher I in natural gas, CH_4 can be partially involved in the decompn. under conditions in which pure CH_4 undergoes no decompn. F. E. Brauns

Dry quenching of coke. A. Furman. *Novosti Tekhniki* **1939**, No. 23/24, 50–1.—In the first expts. on dry quenching of coke in the Soviet Union the porosity, true and apparent sp. gr., and elec. cond. of the dry-quenched coke were the same as those of wet-quenched coke. The dry-quenched coke had a greater content of large fractions, more moisture, less S, and less volatile compds. than wet-quenched coke. B. Z. Kamich

Optimum dimensions of the newest-design coke ovens. A. S. Vodyanoi. *Coke and Chem.* (U. S. S. R.) **1938**, No. 7, 43–5; *Khim. Referat. Zhur.* **2**, No. 2, 133–4(1939).—The construction and the dimensions of coke ovens in different countries are compared and discussed. In the new project of coke ovens of the "Giprokoks" system the thickness of the brick wall along the whole height is 110 mm.; this can be reduced to 100 mm. W. R. Henn

Hot repair of coke ovens. V. A. Bron. *Ukrain. Nauch.-Issledovatel. Inst. Ogneuporov i Kislotouporov* No. **45**, 58–72(1939).—Attempts to produce suitable mixes for hot repair of coke ovens are discussed. The most suitable mix was found to be that composed of natural dust-like quartz rock (called marshalite), as a basic component and

addns. of 20% finely ground quartz and 5% Chassov Yar clay, and 1.0% to 1.5% graphite and 1.25% sol. glass. M. V. Condoide

Siberian petroleum--brown coals of Krivorog District (Naida) **22**. Detn. of compn. diagram for liquid-gas system CH_4 N H [calcns. for fractionation of coke gas] (Shtekkel, Tain) **2**. Traces of Cu and Fe in alc. [keeping qualities of motor fuel] (Knop, Mahler) **16**. Effect of steam on silica brick for coke ovens (Herman) **19**. Purification of phenol waste waters by activated C (Kozko) **14**. Purification of waters from peat-gas generators (Ruff, Martynova) **14**. Organic acids from oxidation of coal, coke, etc. (U. S. pat. 2,176,343) **10**. Removing gyp scale from gas wells (U. S. pat. 2,177,345) **22**. Removing volatiles from coal (U. S. pat. 2,177,665) **22**.

Motor fuel mixtures. Helmuth G. Schneider and Wm. H. Smyers (to Standard Oil Development Co.). U. S. 2,176,717, Oct. 17. A motor fuel of high octane no. contains about 75% of a light hydrocarbon liquid such as petroleum naphtha and about 25% of methyl propyl ketone or other ketone having not more than 10 C atoms, and a small amt. of a tetraalkyl or tetraaryl Pb compd. serving as an antiknock constituent. Cf. *C. A.* **33**, 5644[9]. 3

Motor fuel from normally gaseous hydrocarbons. Wm. M. Stratford (to Texas Co.). U. S. 2,177,421, Oct. 24. An arrangement of app. is described, and a process which involves preheating a hydrocarbon gas predominating in paraffinic hydrocarbons to a temp. short of active conversion thereof while at an elevated superatm. pressure, substantially instantaneously heating the preheated gases to a sufficiently elevated temp. while under elevated superatm. pressure rapidly to convert paraffinic hydrocarbons to olefinic hydrocarbons, cooling the resultant gaseous products, polymerizing olefinic hydrocarbons thus produced and cooled while under elevated superatm. pressure to liquid hydrocarbons contg. motor fuel, and sepg. and recovering motor fuel from the products of polymerization. 4

Diesel fuel. Wm. H. James, Robert C. Moran and Edwin M. Nygaard (to Socony-Vacuum Oil Co.). U. S. 2,177,719, Oct. 31. A hydrocarbon fuel oil is mixed with about 1 5% of bis (diamylamine) disulfide to decrease the ignition delay period of the fuel. 5

Diesel engine fuel. Frederick H. MacLaren (to Standard Oil Co. of Ind.). U. S. 2,177,732, Oct. 31. A method of increasing the pour point susceptibility of a narrow-cut high-speed Diesel engine fuel oil having an initial b. p. of about 200–260°, an end point of about 315–270°, and characterized by a difference in temp. between the 50% distn. point and the 90% distn. point of less than about 30°, the pour point of which is normally not materially reduced by the addition of a pour-point depressor, involves adding to such fuel oil about 0.2–2% of a pour-point depressor such as a condensation product from naphthalene and chlorinated paraffin wax and about 0.2–0.8% of an amorphous waxy material such as petrolatum or wax tailings, by which the pour point is materially reduced. 7

Diesel engine fuel production by cracking petroleum residues. Jacque C. Morrell (to Universal Oil Products Co.). U. S. 2,176,353, Oct. 17. An arrangement of app. is described, and a process for producing Diesel engine fuel and fuel for spark ignition engines from paraffinic and mixed base residues heavier than gas oil, which comprises subjecting such residue to a temp. of from about 510° to 590° for a cracking time of the order of less than 5 sec., sepg. resultant vapors from unvaporized oil, fractionally condensing the vapors to form a condensate of hydrocarbons heavier than gasoline and removing this condensate from the process, subjecting the unvaporized oil to a temp. of about 455–510° for about 10 to 40 sec. to convert a substantial portion thereof into gasoline, fractionating the vapors formed by the last-named cracking treatment to condense fractions thereof heavier than gasoline, and finally condensing and collecting the fractionated vapors. 8

Apparatus for gasifying liquid or plastic fuels such as hydrocarbon fuels. Chester A. Killmeyer and Geo. L. Reichhelm (to Frank A. Kane). U. S. 2,176,305, Oct. 17. Various structural and operative details. 9

Fuel-conditioning and -burning apparatus for conjoint use of pulverized and liquid fuels. Webster I. Salley. U. S. 2,176,824, Oct. 17. Various details of app. suitable for conjoint use of pulverized, liquid and gaseous fuels.

Tunnel furnace for distillation, coking and drying purposes. Peter Scheloumow (to Eesti Patendi Aktsiaselts). U. S. 2,176,825, Oct. 17. Various structural and operative details of a furnace suitable for distg. bituminous materials.

Coating solid fuels such as coal with petrolatum, etc. Harvey R. Fife. U. S. 2,176,128, Oct. 17. App. is described, and a method of protectively coating solid fuel susceptible to dusting and degradation which comprises forming a mixture of petrolatum and water, applying an extraneous mech. pressure to the mixt. of petrolatum and water, heating the mixt. while it is subjected to such pressure to a temp. adequate to liquefy the petrolatum and above the b. p. of the water for conversion of the water to steam upon release of the pressure, and passing the mixt. through a spraying nozzle under the combined extraneous mech. pressure and the vapor pressure of the heated liquid, while the hot spray is directed on the coal. U. S. 2,176,12[9] relates to a method of protectively treating coal with oily petroleum material which comprises atomizing an oily petroleum material into a fine mist by subjecting it to extraneous mech. pressure at a spray nozzle, and while the coal to be treated is passed through a treating zone of the finely atomized mist, steam is added independently at low velocity and low temp. to the finely atomized mist, to supply to the coal independently of the mist heat for flowing the oily petroleum material of the mist over the coal and to apply moisture at the surface of the coal.

Coating coal with oil, etc. Harvey R. Fife. U. S. 2,176,127, Oct. 17. A petroleum blend for dust-proofing and otherwise protectively treating coal and coal-derived particulate fuel consists substantially of petroleum oil, having in application to the fuel a fluidity corresponding to that of a Pennsylvania petroleum-derived oil within the approx. viscosity range of 50 Saybolt sec. at 38° and 15[0] Saybolt sec. at 38°, charged with a substantial content of amorphous petroleum wax, the petroleum oil constituting not less than 75% of the blend, and the blend having a viscosity below 38 Ford cup sec. at 58°.

Apparatus for separating crude coal, slate, etc., by water currents. Frank E. Smith (to E. I. du Pont de Nemours & Co.). U. S. 2,176,107, Oct. 17. Various structural and operative details.

Removing gaseous weak acids such as H_2S and CO from gases such as coal hydrogenation waste gases. Heinrich Ulrich, Reinhold Fick, Hans Baehr and Wilhelm Wenzel (to I. G. Farbenind. A.-G.). U. S. 2,176,111, Oct. 17. The gas is scrubbed with a soln. of Na diethylenetriamino-diacetate or other salt of an alkali, alk. earth or strong org. base with an aminocarboxylic acid contg. at least 2 N atoms and derived from ethylenediamine or a polymer (the salt used having an alk. reaction).

Gas from finely divided fuels such as oil or pulverized coal. Claude C. Van Nuys (to Air Reduction Co.). U. S. 2,177,379, Oct. 24. App. is described, and a method of producing gas of high calorific value from finely divided fuels which involves projecting the fuel and O in opposed co-axial jets, the fuel being in excess of the amt. which will react with the O supplied, maintaining combustion at the zone where the opposing jets collide and exclude steam, and simultaneously introducing steam in the region surrounding the jets for reaction with highly heated surplus fuel which is not burned with O.

Removing moisture and acid gases from natural gas, etc. Arthur J. L. Hutchinson (50% each to The Fluor Corp., Ltd. and Lone Star Gas Co.). U. S. 2,177,06[8], Oct. 24. An arrangement of app. is described, and a process of purifying a gas contg. water vapor and H_2S or CO_2 as impurities, that includes bringing the gas into contact with an absorbent composed of a liquid polyhydric alc., an aliphatic amine, and water, the amt. of polyhydric

ale. being substantially in excess of the amt. of aliphatic amine, and regenerating the fouled absorbent by heating it sufficiently to sep. the absorbed water vapor and acidic gases therefrom.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

Siberian petroleum. V. M. Senyukov and A. A. Shmelev. *Soviet Geol.* **9**, No. 8, 83-4(1939). **Petroleum content of the Upper Paleozoic deposits of the Eastern European Platform.** M. M. Tolstikhina. *Ibid.* 85-6. **Brown coals of the Krivorog District.** M. I. Naida. *Ibid.* 86-90. **Crystalline shales of the Main Caucasus Divide and their origin.** S. P. Solov'ev. *Ibid.* 90-1.
F. H. Rathmann

Desulfurization of Kalin petroleum. Sh. B. Aliev. *Izvest. Azerbaĭdzhan. Filiala Akad. Nauk S. S. S. R.* **1938**, No. 2, 75-9; *Khim. Referat. Zhur.* **2**, No. 3, 108(1939).—The treatment of the Kalin petroleum (0.31-0.39% of S, 7% of water) with pyrite slags for 24 hrs. on a water bath did not give pos. results. The S content was lowered by 33% in the preliminarily dried petroleum which was treated with roasted slags for 8 hrs. at 160-70°. It was not possible to obtain a complete desulfurization of the Kalin petroleum. W. R. Henn

A solid naphthenic acid from Iranian petroleum. Thomas Kennedy. *Nature* **144**, 832(1939).—From the caustic washing liquors used in removing traces of acid from a kerosene SO_2 ext. derived from Iranian petroleum, there was obtained a cryst. naphthenic acid. After repeated crystns. the acid m. 82°, 70.9% C, 10.74% H (calcd. for $C_{10}H_{18}O_2$, 70.52% C, 10.66% H), mol. wt. by titration 173. A polymethylcyclopentyl structure such as

$CH_2.CMe_2.CHMe.CH_2.CMeCO_2H$

is suggested for the acid. It was obtained in 3.3% yield of the original acid mixt. from the caustic washing liquors. Rachel Brown

Synthetic fats from petroleum suitable for grease making. A. W. Burwell and J. A. Camelford. *Natl. Petroleum News* **31**, R-424-7(1939).—Saponifiable materials, ranging from C_6 to C_{24}, were prepd. by the controlled oxidation of petroleum distillates and waxes. They consist of a mixt. of acids, esters, lactones, alc. ketones, and primary, secondary and tertiary alcs. The soaps of Na, Ca, Al, Pb, K, Mg and Ba and the corresponding greases, were prepd., following the conventional outline, with only minor exceptions. C. H. Brooks

Condensers containing mineral oil and chlorinated aromatic compounds. M. G. Gertsenshtein and S. L. Sokolova. *Elektrichestvo* **60**, No. 3, 35-9(1939).—Data are given on the performance of condensers contg. mineral oil and Sovol (chiefly pentachlorodiphenyl). With rising temp. the tangent of the angle of dielec. losses in condensers contg. Sovol decreased and reached a min. of about 0.1 at 30-35° and then increased to 0.35 at 90°. For mineral oil the tangent was also at a min. at 30-35° but slightly higher (0.15) and at 70° it was 0.2. At 15-20° both condensers showed nearly the same tangent. The elec. properties of Sovol were reduced by the presence of rubber. After 8 months' use the Sovol condensers showed no change in the curves of tangent of angle of losses to voltage whereas for mineral oils the curves were U-shaped with the min. corresponding to the operating voltages. B. Z. Kamich

Improved equipment reduces water requirements at refineries. James M. Augustus and David S. Frank. *Natl. Petroleum News* **31**, R-454-6(1939).—The use of cooling towers or spray ponds may reduce the water requirement for a refinery to 25-30% of that formerly needed. All the water should be treated for use as a cooling medium. The quantities needed for special purposes, such as steam generation, can be drawn from the general system and treated. Examples, with analyses, of typical waters and their treatment are given. C. H. Brooks

Measurement of metal temperatures of cracking still tubes. O. G. Kaasa. *Natl. Petroleum News* **31**, R-478-80(1939).—A No. 8 constantin wire is peened into the surface of the fire side of the heater tube. A 1/2 in. calorized steel protecting tube, with the end shaped for welding to the heater tube, is insulated from the wire with asbestos cord covered with high-temp. shellac. The advantages are the ability to use standard iron-constantin calibrated instruments, the self-supporting nature of the installation, and complete protection from flue gas. The life of the installation is a year or more. C. H. Brooks

Catalytic reforming for the production of aviation gasoline. A. G. Peterkin, John R. Bates and H. P. Broom. *Refiner Natural Gasoline Mfr.* **18**, 501-8(1939); *Natl. Petroleum News* **31**, R-517-19(1939).—Gasolines or naphthas boiling up to 500°F. may be catalytically reformed to give aviation naphthas. The equipment and operation are similar to those of the Houdry catalytic cracking process (cf. *C. A.* **33**, 4005[1]). Installation costs are given. The operating costs compare favorably with those for thermal reforming. The product has a high octane no., good lead susceptibility, and stable antiknock properties under severe engine conditions. The same equipment can be used to produce aviation or motor fuels from naphthas, and aviation or motor fuels from gas oils. The yields are, resp., 30 to 60%, 83 to 94%, 35 to 40% and 50 to 56%. C. H. Brooks

Production of motor fuel from Udino shale oil. Domenico Costa. *Chimica e industria* (Italy) **21**, 609-12 (1939).—These shales contain high amts. of S, making it impractical to produce motor fuels by simple distn. However, on hydrogenation, the light fractions yield oils of low I_2 no., almost free of S; they give promise as motor fuels. A. W. Contieri

Combustion in the gasoline engine. T. A. Boyd, Lloyd Withrow and Gerald M. Rassweiler. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 566-77(1937)(in English).—In a summary of the phases of research conducted on combustion in gasoline engines, the app. and methods used in obtaining data on motor-fuel combustion within the engine are briefly described. A more detailed explanation is given of velocity of flame propagation, detonation, effect of antiknock agents, etc. 19 references. E. J. Mahler

Stoichiometric calculations of exhaust gas. G. W. Gleeson and F. W. Woodfield, Jr. *Natl. Petroleum News* **31**, R-461-4(1939); cf. *C. A.* **30**, 3204[6].—Equations are developed for calcg. the compn. of the exhaust gas from a motor. These include the equil. consts. for the water-gas reaction and the dissocn. of H_2O vapor, the air-fuel ratio, and the C, H and O in the fuel, as variables. Calcd. and exptl. results with pure octane and a blend of 20% EtOH and 80% isoöctane agree within about 20%. 10 references. C. H. Brooks

Ten-year trial shows success of inert-gas system. M. G. VanVoorhis. *Natl. Petroleum News* **31**, R-441-7 (1939).—The use of flue gas is superior to other methods of preventing the formation of explosive mixts. in refinery equipment and tank ships. Illustrations of some equipment are given. C. H. Brooks

Cylinder lubricating oils for locomotives operating under high heat conditions. Guillermart, P. Woog, J. Givaudon, Chmelevsky and Schmitt. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 536-56(1937)(in French).—Fourteen cylinder lubricating oils for locomotives operating under superheat conditions were tested in the lab. for stability. Locomotive tests were also run on those lubricating oils ranking high, and those ranking low in stability. High lab. stability was no indication of stability in practice. The I no. of lubricating oils is a good index of the lubricating quality, an oil with a low I no. being emulsified quickly on the hot cylinders without being previously satd. with water, and remaining stable. Tabulated results are given.
E. J. Mahler

The significance of vegetable oils as lubricants. István Thamm. *Anyagvizsgálók Közlönye* **17**, 57-77(1939).—High cohesion of vegetable oils diminishes friction and retards wear. This explains why the addn. of small amounts had good effects in practical lubricating expts. Vegetable oils are much less stable than mineral oils. The oxidation of lubricants contg. vegetable oil was investigated by a special Thamm-Freund app. The increase of viscosity at the end of the expts. was 7–12% in mineral oils, 26% in rape oil and 41% in castor oil which had been previously treated by chemical agents to make it sol. in mineral oils. Motors cannot be operated for more than 40–60 hrs. with lubricants contg. 30% vegetable oil. Addn. of suitable chemical inhibitors preventing rapid oxidation increases this period somewhat. S. S. de Finály

Influence of lubricants on the starting of motors. K. Schwaiger. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 529–35(1937)(in German).—The factors detd. by the lubricating oil were first established by motor research and the values obtained were compared with those resulting from cold viscometer tests. The tests show good agreement. It was shown that change in viscosity of many lubricants in the temp. range below 10° does not correspond to the accepted formulas. Graphs, illustrations and a diagrammatic representation of the cold viscometer are given. E. J. Mahler

Electroconvective vortexes in insulating liquids. Douchan Avsec. *Compt. rend.* **209**, 750–2(1939); cf. *Ibid.* **204**, 757(1937) and Hofmann, *C. A.* **29**, 2038⁶.—The electroconvective vortexes that appear momentarily in a film of lubricating oil (e. g., Shell B. 14), 2–35 mm. thick and spread over the glass bottom of a vessel 18 cm. diam., the sides of which are of paraffin, when subjected to a strong elec. field, are figured and described. C. A. S.

New method of purifying lubricating oils. Douchan Avsec. *Compt. rend.* **209**, 830–2(1939); cf. preceding abstr.—The production of instantaneous electroconvective vortexes in a film of lubricating oil (e. g., Shell B. 14, which is black, viscous and contains many particles) spread on glass and not confined by paraffin boundaries, on application of a strong elec. field by means of a pointed electrode charged at 50,000 v., and situated above the film causes the film to spread. At the same time the suspended particles are given to the periphery of the film leaving the oil in the center clear and transparent. On removing the field the particles diffuse back as they were. If the film rests on an earthed metal plate the vortices continue while the field is applied but interposition of a nonconducting substance between the charged point and the film causes the vortexes to cease over the shaded portion the extent of which is exactly as though the point were a source of light, while the particles accumulate, at the edge of the shadow next the "illuminated" portion, which remains free of particles. C. A. Silberrad

Insulating oils of high stability and low dielectric losses. R. M. Sitskaya, L. N. Aleksandriĭskaya, Yu. V. Koritskiĭ and V. V. Skipetrov. *Elektrichestvo* **59**, No. 12, 34–6(1938).—The Sligh nos. of Baku and Emba insulating oils which were refined with 9% H_2SO_4 and brought into contact with Zikeev earth at 90–95° were reduced to 13.6 and 14.0, resp. For Baku oil the lowest value of the tangent of the angle of dielec. losses (tg δ) was obtained after an acid wash with 14% H_2SO_4, the tangent changed very little at 20–80° and at 80° it was not over 0.0003, for the Emba oil the min. value of the angle of losses was obtained with 9% H_2SO_4. Some of the original oils were refined with selective solvents and brought into contact with Zikeev earth at 95°. For Baku oil, treatment with 200% furfural gave a Sligh no. of 7.7, acid no. of 0.005 and tg δ at 80° of 0.0009 while for Emba oil the resp. values were 12.0, 0.017 and 0.0007. Nitrobenzene gave better results when used in amts. of 300%, giving a tg δ of 0.0002 and a Sligh no. of zero for Emba oil. B. Z. Kanich

The flow properties of asphalts and their measurement by the penetrometer. Charles Mack. *J. Soc. Chem. Ind.* **58**, 306–10(1939).—After discussing the flow properties of asphaltic bitumens and their influence on the penetration detn., M. gives an equation, based on exptl. data, which presents depth of penetration as a function of time: $P = At^c$, where P is the depth of penetration in decimillimeters under a given load, A a const. representing the penetration at $t = 1$ sec., and c is another const. which is said to express numerically the flow properties of asphaltic bitumens as well as to evaluate viscous and plastic flow, thixotropy and elasticity. Further data show that c remains const. at all normal temps. for viscous asphalts, but varies for plastic asphalts. If the consistencies of asphaltic bitumens are expressed in terms of sec. for a given penetration with the aid of the above equation, they refer to the same shearing stress, and the consistencies of bituimens of various flow properties are comparable. H. M.

The utilization of cracked gases for deasphaltization. A. V. Druzhinina, T. F. Margolina and E. E. Pisarevskaya. *Neftyanoe Khoz.* **1938**, No. 11, 27–9; *Khim. Referat. Zhur.* **2**, No. 3, 110(1939).—Expts. with the deasphaltization of the Koschugal concentrate with the C_3H_8 and the C_3H_8-C_3H_6 fractions gave best results with C_3H_8. For C_3H_8 the optimum temp. was 25° with a 1:4 dilu. An increased temp. lowers the yield of oil, increases the yield of asphalt and sharply increases its penetration. A vapor was obtained whose yield and quality were better than when refined with H_2SO_4. To obtain the C_3H_8-C_3H_6 fraction the gases were led away from the upper plate of the stabilizing column. The gases (b. 17–27°) contained 87% of C_3H_8-C_3H_6 and 13% of C_4H_{10}-C_4H_8. This fraction gives vapors with standard properties in a yield higher than 70%. The optimum temp. was 40°, the dilu 1.6:1 with a 1 hr's. settling. The products of deasphaltization possessed a pungent odor. W. R. H.

Asphalt lute for tube joints. A. Gladkov. *Novosti Tekhniki* **1938**, No. 3, 27.—An asphalt waterproofing lute for tube joints is prepd. by heating a mixt. of natural or petroleum bitumens and finely ground asphalt at 180° until the mass is uniform and completely dehydrated. Total amt. of bitumens in the mixt. is 25–27%. The compn. should have a sp. gr. of 1.7 at 20°, tensile strength not less than 10 kg./sq. cm., elongation of the briquet not less than 15 mm., a temp. of softening at 95–105°, mobility at 130–140° and no moisture. The extd. bitumen should have a penetration of 20–40, ductility not less than 3 cm., no moisture and a softening temp. of 65–75°. B. Z. K.

Acid-resisting materials for the wood-chemical industry. K. V. Kudinov. *Lesokhim. Prom.* **6**, No. 1, 16–17(1938), *Khim. Referat. Zhur.* **2**, No. 3, 140(1939).—The metallic and the nonmetallic acid-resistant materials which can be utilized in the wood-chem. industry are reviewed. Expts. are being conducted for the utilization of acid-resistant enamel coating on app. made of Fe. The enamel is very stable not only to AcOH, but also to boiling concd. HCl. W. R. Henn

The maximum concentration of acetic acid obtained by extraction according to the method of Brüster. A. N. Brik and V. P. Sumarokov. *Lesokhim. Prom.* **6**, No. 1, 7–10(1938); *Khim. Referat. Zhur.* **2**, No. 3, 124–5(1939).—In fractional extn. with ether of AcOH from the tar-contg. liquid the first ext. (with a small amt. of solvent) contains most of the impurities (phenols, aldehydes, ketones and the higher homologues of AcOH). A comparatively pure acid is obtained in the second extn. By this method in the Ashin plant was obtained an 84% acid. The diagram H_2O–AcOH–Et_2O indicates a max. concn. of 68% the acid in the ether soln. in the presence of water. The observed higher concn. can be explained by the formation of the azeotropic mixt. ether-water. The azeotropic action increases with the decrease of the concn. of the acid in the ext. Increase the velocity of the liquids in the extractor decreases the concn. of AcOH because of the formation of ether-water emulsions and of the diln. of the acid. The use of hydrophobic solvent (pentane) is not recommended because, although it produces glacial AcOH, too large an amt. of the solvent is necessary. It is recommended to use a solvent which, according to its hydrophobic properties, is intermediate between ether and pentane. Since the coeff. of distribution of the acid between such a solvent and water is smaller (as compared with ether and water) the amt. of the solvent must be in-

creased. From the weak exts. obtained (low in water) it is possible to obtain 98-100% AcOH by distg. off the solvent. W. R. Henn

The concentration of acetic acid by means of triethylamine. P. P. Leonov. *Lesokhim. Prom.* 6, No. 2, 33 4 (1938); *Khim. Referat. Zhur.* 2, No. 3, 126(1939).—During the rectification of black acid a considerable amt. of 10-20% AcOH is obtained. The acid is mixed with triethylamine, most of the water is distd. off *in vacuo*, the unstable salt is decompd. by increasing the temp., and the acid (which has a strength of about 60%) is distd. off. The regenerated amine can be again utilized. The yield of the acid reaches 96%. Triethylamine can also be used to ext. tar water contg. 7.5% acetic acid. The yield of the 60% acid in this case is about 88%. W. R. H.

Increase of the yields of flotation oil in the rosin-extraction plant Vakhtan. S. A. Gordon. *Lesokhim. Prom.* 6, No. 1, 23(1938); *Khim. Referat. Zhur.* 2, No. 3, 125 3 (1939).—In distn. of flotation oil from rosin oil, the distn. is discontinued before all valuable terpene alcs. enter the distillate. If the distn. is permitted to continue the acids begin to go over and flotation oils are obtained which do not comply with the specifications. Since the residue is transformed into drying oils the residual alcs. are not usually utilized. It is proposed to distil still residues further and pass the vapors through a trap contg. alkali. Lab expts. showed that from 1 ton of residues it is possible 4 to obtain an addnl. 0.25 ton of the 50% flotation oil.

W. R. Henn

Production of 2-furaldehyde from hardwood. S. O. Skvortsov, G. A. Kan and D. I. El'kin. *Lesokhim. Prom.* 6, No. 1, 18 20(1938); *Khim. Referat. Zhur.* 2, No. 3, 126. Finely divided wood, e. g., sawdust, is autoclaved with 10% H_2SO_4 soln. in an amt. equal to 30–50% of the wt. of the dry substance at 4 5 atm. For each ton of the 2-furaldehyde there are obtained as by-products 0.8 ton of acetate powder, 0.1 ton of volatile substances (CH_3OH, CH_3OCH_3) and 40 tons of the hydrolyzed residue contg. 75% moisture, which can be utilized as a fuel. The cost of the furaldehyde is less than that from waste products of agriculture. W. R. Henn

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Spectral analysis of fuels [gasolines, etc.] (Eliner) **21.** Cracking tars and distillates from coal (Egloff, *et al.*) **21.** App. for controlling the level of oil in a still (U. S. pat. 2,176,741) **1.** Bringing immiscible liquids such as oil distillates and alkali solns. into contact (U. S. pat. 2,176,806) **1.** C_2H_4 from gas oil (U. S. pat. 2,176,962) **10.** Diesel engine oil by cracking petroleum residues (U. S. pat. 2,176,-453) **21.** App. for dispensing liquefied petroleum gas (U. S. pat. 2,177,620) **1.** Analysis of hydrocarbons (Grosse-Oetringhaus) **10.**

Petroleum Facts and Figures. 6th ed. New York: Am. Petroleum Institute. 192 pp. $1.00. Reviewed in *Chem. & Met. Eng.* **46**, 643(1939).

Refining petroleum oil in propane solution. Claude P. McNeil (to Standard Oil Co. of Ind.). U. S. 2,177,734, Oct. 31. An arrangement of app. is described, and a 8 method of refining petroleum oil in propane soln. which involves treating the soln. with H_2SO_4 and sepg sludge, neutralizing the acid-treated oil with aq. caustic alkali soln. and sepg. the caustic wash, recovering propane mixed with acidic gases from the acid sludge and scrubbing the propane and acidic gases with the caustic wash in a closed system whereby any propane entrained in the caustic wash may be combined with the propane recovered from the sludge and whereby the unspent alky. of the caustic alkali 9 in the wash may be utilized to neutralize the acidic gases admixed with the propane.

Petrolatum mixture. Clarence M. Loane (to Standard Oil Co. of Ind.). U. S. 2,177,729, Oct. 31. A petrolatum characterized by a lower m. p. for a given penetration comprises a petrolatum characterized by relatively high m. p. for a given penetration and 1 to 10% of an isobutylene polymer resin having a mol. wt. of about 1500 to 8000.

Breaking natural petroleum emulsions. Charles M. Blair, Jr. (to Petrolite Corp., Ltd.). U. S. 2,171,328, Aug. 29. A process for breaking oil-field emulsions of the water-in-oil type involves subjecting the emulsion to the action of a demulsifying agent, such as may be formed from castor oil, glycerol, maleic anhydride and methylethanolamine or the like, comprising a sol. polymeric subresinous product having a mol. wt. of less than 100,000. Cf. *C. A.* **33**, 8978[2].

Resolving petroleum emulsions of the water-in-oil type such as "roily oil." Melvin DeGroote, Bernhard Keiser and Charles M. Blair, Jr. (to Petrolite Corp., Ltd.). U. S. 2,176,702, Oct. 17. A demulsifying agent is used derived by reaction, under substantially anhyd. conditions between a blown oil and a nonaryl hydroxyamine having at least one amino H atom, within the molal ratio of 1:1 and 1:3, at a temp. above the b. p. of water and below the point of decompn., the reaction being conducted in a manner to yield a substantial quantity of basic material in which the blown oil fatty acid radical is attached to the basic N atom through a C chain, with the added proviso that the ratio of the acid radical to amino N atom shall be at least 1.1 and not more than 2:1; the basic material being further characterized by absence of amide and polyamino radicals. E. g., blown castor oil may be treated with diethanolamine or ethanolamine. U. S. 2,176,703 relates to the like use of a demulsifying agent derived by an esterification reaction between phthalic anhydride or maleic acid or other polybasic carboxy acid and the hydroxylated product derived by reaction, under substantially anhyd. conditions, between a blown oil and triethanolamine or other nonaryl tertiary hydroxy amine, within the mol. ratio of 1:1 and 1:3 at a temp. above the b. p. of water and below the point of decompn.; 5 the last mentioned reaction being conducted in a manner to yield a substantial quantity of basic material in which the blown oil fatty acid radical is attached to the basic N atom chain; the first mentioned esterification reaction involving a polybasic carboxy acid and being conducted so as to react with the blown oil fatty acid radical which is a part of the same mol. contg. the basic N atom. U. S. 2,176,704 relates to the like use of a demulsifying agent comprising the products derived by esterification reaction 6 between (*a*) a polybasic carboxy acid, and (*b*) the hydroxylated product derived by reaction between a blown oil and a nonaryl hydroxylamine having at least one amino H atom, within the molal ratio of 1.1 and 1.3, at a temp. above the b. p. of water and below the point of decompn.; the last mentioned reaction being conducted in a manner to yield a substantial quantity of basic material in which the blown oil fatty acid radical is attached to the basic N atom chain; the first mentioned esterification reaction involving a polybasic carboxy acid and being conducted so 7 as to react with the blown oil fatty acid radical which is a part of the same mol. contg. the basic N atom. Cf. *C. A.* **33**, 8979[3].

Recovery of solvents such as cresylic acid or phenol used in solvent treatment of petroleum. Wheaton W. Kraft and Merle A. Zimmerman (to Lummus Co.). U. S. 2,177,183, Oct. 24. An arrangement of app. is described, and a method of recovering a solvent from a soln. of an org. material therein, the solvent being of a character to form with water an azeotropic mixt. condensable in a water layer contg. a small proportion of solvent and a solvent layer contg. a small proportion of water, which involves circulating the material of the water layer in a closed cycle by vaporizing the material and utilizing it as a stripping medium to strip solvent from the original soln., fractionating the stripped vapors of solvent and water substantially between dry solvent as residue and the azeotropic mixt. as distillate, and condensing and cooling the distillate vapors to form the solvent layer and water layer and to complete the closed cycle of the water layer. Cf. *C. A.* **33**, 8978[1], 9617[7].

Scrubbing petroleum distillation vapors for purification. Clayton M. Beamer and John Hooton (to Standard Alc. Co.). U. S. 2,176,196, Oct. 17. An arrangement of app. is described, and a process for the treatment of petroleum

hydrocarbon vapors from crude oil sources contg. S compds and used in the manuf. of products involving a hydrocarbon H_2SO_4 reaction, which involves initially scrubbing the petroleum hydrocarbon vapors contg. S compds. with an alk. soln. (such as a NaOH soln.) forming an alk. S compd. soln. and a substantially S-free petroleum hydrocarbon vapor, then treating the vapor with H_2SO_4 under conditions involving the formation of SO_2 in the vapors, scrubbing the SO_2-contg. vapors with the alk. S compd. soln. from the initial scrubbing operation and completely removing the SO_2 from the unreacted petroleum hydrocarbon vapors and forming H_2S and an alk. S compd. soln without the pptn. of free S.

Distilling and cracking petroleum oils. Charles H. Angell (to Universal Oil Products Co.). U. S. 2,176,320, Oct. 17. An arrangement of app. is described, and a conversion process which comprises topping crude petroleum to form topped crude oil and a distillate contg. the low antiknock straight-run gasoline components of the crude oil, subjecting the distillate in a heating coil to cracking conditions adequate to enhance the antiknock value of the gasoline components, introducing the resultant products into a reduced-pressure vaporizer, passing the major portion at least of the topped crude oil, without prior cracking thereof, directly from the topping step into the reduced-pressure vaporizer and therein vaporizing a substantial portion thereof, sepg. vapors from residue in the vaporizer and fractionating the vapors to sep. relatively heavy and light reflux condensates therefrom, subjecting such heavier reflux condensate, unadmixed with residual portions of the crude oil, in a second heating coil to independently controlled cracking conditions of temp. and pressure and subsequently discharging the same into the reduced-pressure vaporizer, supplying lighter reflux condensate formed by the fractionation to the first-mentioned coil for retreatment therein together with the straight-run distillate, and finally condensing the fractionated vapors.

Cracking hydrocarbon oils. Wm. B. D. Penniman (to Ellis-Foster Co.). U. S. 2,176,655, Oct. 17. An arrangement of app. is described, and a process which involves feeding liquid hydrocarbon material such as crude oil, gas oil or fuel oil and air to a passage heated to about 200-400°, refluxing vaporous products, then removing the vapors and condensing them, and treating the resultant condensate with alkali to remove a portion of its constituents such as phenols, etc.

Cracking hydrocarbon oils such as topped crude oils, etc. Joseph G. Alther (to Universal Oil Products Co.). U. S. 2,176,318, Oct. 17. An arrangement of app. is described, and a conversion process which comprises heating hydrocarbon oil in a heating coil to cracking temp. under sufficient pressure to maintain a substantial portion thereof in liquid phase and discharging the resultant vaporous and liquid product into a reaction chamber, also introducing charging oil for the process to the chamber, sepg. vapors from unvaporized oil in the chamber and separately removing the same therefrom, subjecting such withdrawn unvaporized oil, including liquid products discharged from the coil into the reaction chamber, to further vaporization in a second chamber, heating hydrocarbons removed as vapor from the reaction chamber to higher cracking temp. than the oil in the coil and introducing resultant heated products into contact with the unvaporized oil in the second chamber to assist in further vaporization, and fractionating and condensing the vapors from the second chamber. Cf. *C. A.* **34**, 2533.

Cracking hydrocarbon oils such as gas oils. Peter J. Wiezevich (name changed to Peter J. Gaylor) (to Standard Oil Development Co.). U. S. 2,176,234, Oct. 17. An arrangement of app. is described, and a method which comprises passing a stream of oil through a cracking zone and subjecting it to cracking therein, thereafter sepg. the cracked products into vapors contg. unsatd. gases and residue, fractionating the vapors in a fractionating zone to condense insufficiently-cracked constituents as reflux condensate, bringing the vapors in the fractionating zone into contact with a catalyst capable of causing the unsatd. gases to react to form higher-boiling hydrocarbons, removing vapors remaining uncondensed in the fractionating zone, further cooling the vapors to sep. the same into a desired distillate fraction and a normally gaseous fraction contg. satd. and unsatd. constituents, sepg. the gaseous fraction into a satd. component and an unsatd. component and passing the unsatd. component to the fractionating zone.

Polymerization and cracking of hydrocarbon gas-mineral oil solutions. Percy A. Maschwitz (to Pure Oil Co.) U. S. 2,177,146, Oct. 24. An arrangement of app. is described, and a method for cracking a hydrocarbon oil and for converting gaseous hydrocarbons into products of higher b. p. which involves heating the oil and gas in the same stream to a temp. sufficient to cause cracking and conversion under pressure in excess of 500 lb. per sq. in., subjecting the oil and gases to the conditions of temp. and pressure for a sufficient time to bring about the desired amt. of cracking, sepg. the reaction products into liquids and gases at substantially reaction pressure, subjecting the resulting gases in a sep. zone to suitable temp., without material reduction in pressure, for converting further quantities thereof to higher-boiling hydrocarbons, mixing the products from the last mentioned conversion with the liquids, and sepg. the normally gaseous from the liquid hydrocarbons resulting from the process. The mixed products may be treated to produce a finished gasoline.

Refining mineral oils with selective solvents. Merrell R. Fenske and Wilbert B. McCluer (to Pennsylvania Petroleum Research Corp.). U. S. 2,176,396, Oct. 17. The oil is extd. with a solvent for the more naphthenic portion, with resultant formation of a raffinate phase and an ext. phase, each of which contains selective solvent; the phases are sepd. and contact is effected between the ext. phase and an org. wash solvent substantially completely miscible with the selective solvent and at such temp. and in such amt. that there separates from the ext. phase a layer predominantly oil which is of different compn. from the oil in the ext. phase being treated, and this layer is sepd. App. and various operative details are described.

Removing sulfur from mineral-oil distillates. Everett C. Hughes (to Standard Oil Co. of Ohio). U. S. 2,177,343, Oct. 24. The liquid distillate is brought into contact with MgO in nascent form (suitably as produced from $MgCO_3$) at a temp. below the vaporizing point of the liquid but above 150° (suitably about 315° under pressure) and then washed with NaOH soln.

Treatment of hydrocarbon oils with solvents such as furfural. Wynkoop Kiersted, Jr. (to Texas Co.). U. S. 2,176,429, Oct. 17. App. is described, and a countercurrent treatment of hydrocarbon oil with a solvent to ext. from the oil undesired constituents, the method comprising passing the oil through a vertical tower provided with a plurality of sections of packing spaced vertically apart, one above the other, and contg. collecting means between succeeding sections for separately collecting ext. and raffinate phase liquids, moving a solvent through the tower countercurrently to the oil, withdrawing ext. and raffinate phase liquids accumulating in the spaced portions between succeeding sections of packing, mixing the liquids in proportions such that the ratio of extn. solvent to oil is substantially greater than that existing between the fresh solvent and oil entering the terminals of the tower, adjusting the temps. thereof, and returning the thus conditioned mixt. to the same spaced portion of the tower from which withdrawn.

Hydrocarbon oil conversion. Lincoln Clark, Jr. (to Lincoln Clark). U. S. 2,176,453, Oct. 17. An oil-conversion app. is used comprising walls of refractory material forming an elongated gas chamber and an elongated mixing passage having an inlet leading from the chamber at one end thereof, the passage extending in a direction transversely of the axis of the chamber, the length of the passage being a plurality of times its transverse mean cross sectional dimension, an enlarged reaction chamber communicating with passage, means for generating hot combustion gases within the chamber toward the end thereof opposite the first mentioned end, and means for projecting a high-velocity stream of hydrocarbon vapors through an

opening substantially smaller than the mixing passage inlet and thence in a straight path through an open portion of the chamber occupied by the combustion gases directly into the inlet, so that the projected vapor stream draws combustion gases from the gas chamber into the mixing passage and maintains a relatively low differential between the pressures in the gas chamber and reaction chamber.

Apparatus for heating hydrocarbon oils to effect conversion and distillation. Clive M. Alexander. U. S. 2,177,296, Oct. 24. Various structural details of an app. in which oil in tubes may be heated by oil or gas burners.

Solvent extraction of nonparaffinic fractions from hydrocarbon oils such as naphthas. Oldrich S. Pokorny and Geo. W. Gurd (to Standard Oil Development Co.). U. S. 2,176,746, Oct. 17. Nonparaffinic constituents are dissolved with a selective solvent such as a mixt. contg. β-phenoxyethyl alc. and triethylene glycol.

Removing volatiles from oil shale, coal, etc. Carl T. Loughrey. U. S. 2,177,665, Oct. 31. An arrangement of app. is described, and a method which involves confining a mass of the material in granular form and causing a hot fluid such as combustion gas to pass through the mass without pulsation to remove volatiles from the solids, and causing the fluid, with entrained vapors, to enter a body of liquid by creating vortices within the liquid and directing the fluid and vapors into the folds of the vortices so that they become temporarily occluded in the liquid and at least a portion of the vapors are condensed in the liquid which, initially, may be oil or water).

High-boiling oils from asphaltic materials. Mathias Pier, Walter Simon and August Eisenhut (to Standard I G Co.). U. S. 2,177,376, Oct. 24. An arrangement of app. is described, and a process for the production of high-boiling oils from materials, such as those of a German crude oil, by catalytic destructive hydrogenation with hydrogenating gases under pressure, which involves carrying out the hydrogenation under such mild conditions that no considerable formation of gasoline takes place and in the presence of a halogen or a H halide or substance splitting off H halide under the reaction conditions, the asphaltic substances subjected to the hydrogenation having been sepd. from hydrocarbon oils contg. them by treatment of the oils with aliphatic hydrocarbons of low b. p. such as liquefied C_3H_8.

Apparatus for pumping emulsions of oil and water such as those from oil wells. Antum E. Cuthrell. U. S. 2,177,517, Oct. 24. An app. used includes a reservoir for the emulsion, a chamber carrying a float arranged below the reservoir, a conduit connecting the bottom of the reservoir with said chamber, a heater in the conduit, a source of high pressure gas connected to the upper end of the chamber, a valve controlled by the float adapted to control the feed of gas to the chamber in such a way as to admit gas into the chamber when the liquid therein reaches a predetd height and to shut off the supply of gas when the liquid in the chamber drops to a predetd. level, a conduit for returning fluid from the chamber to the reservoir and an outlet for oil arranged adjacent the top of the reservoir.

Recovering liquefiable hydrocarbon constituents from distillate type wells. Jay P. Walker and Edwin V. Foran (to Eureka Process Co.). U. S. reissue 21,239, Oct. 17. A reissue of original patent No. 2,080,351 (*C. A.* **31**, 3151).

Rotary drum and screening apparatus suitable for separating shale from muds from well drilling, etc. Frederick L. Coogan and Earl O. Houx. U. S. 2,177,560, Oct. 24. Various structural, mech. and operative details.

Removing gyp scale from oil and gas wells. Albert G. Looms, Harold T. Byck and James F. Fidiam, Jr. U. S. 2,177,345, Oct. 24. A mixt. of HCl 55–65 and acetone 45–35% is introduced.

Apparatus for separating emulsified gas such as air from fuel oil or other liquids. Ralph B. Pressler (to S. F. Bowser & Co.). U. S. 2,177,330, Oct. 24. Various structural, mech. and operative details.

Catalytic condensation of normally gaseous hydrocarbons to form gasolinic liquids. Roderick D. Pinkerton and Wm. Mendius (to Sinclair Refining Co.). U. S. 2,177,579, Oct. 24. A process for the catalytic condensation of normally gaseous hydrocarbons including saturates and unsaturates to produce normally liquid hydrocarbons of gasoline boiling range, involves passing a mixt. of such hydrocarbons consisting predominantly of C_4-hydrocarbons contg. not less than about 40 mol % of ethane, propane and butanes and a substantial proportion but not more than about 25 mol % of normal butylene and isobutylene on its total content of C_4- hydrocarbons in contact with a phosphoric acid catalyst at a temp. of about 95–225° under a pressure upward of about 500 lb. per sq. in., whereby substantial alkylation is effected.

Metallurgical coke from petroleum coke. Earl W. Rice and Walter J. Buchele (two-thirds to Courtney W. Kimler, Sr., and Harry Hall). U. S. 2,177,226, Oct. 24. Petroleum coke breeze or fines are mixed with pitch derived from the by-product coke or coal industry 5–50% in a fine state and the mixt. is heated to a coking temp. in a vertical by-product coke oven until coking is completed, producing a metallurgical coke of the approx. analysis: 99.19% F. C., 0.37% ash, 0.44% volatile and 0.65% S.

Dewaxing mineral oils. Merrell R. Fenske (to Pennsylvania Petroleum Research Corp.). U. S. 2,176,623, Oct. 17. A process for the removal of normally solid wax components from liquid soln. in a mineral oil, the normally solid wax components being of a character such that the total vol. occupied by wax and oil when the wax is in soln. in the oil is greater than when the wax and oil exist as sep. phases, involves subjecting the solution of wax and oil to a sufficiently high pressure to cause the normally solid wax components to sep. as a sep. solid phase from soln. in the oil due to the high compressive stresses set up throughout the wax and oil by the applied pressure, removing at least a part of the latent heat of fusion which is liberated as the result of the solidification under these conditions of the normally solid wax components, and removing the sepd. solid wax components from the oil.

Dewaxing mineral lubricating oils. Robert E. Manley (to Texas Co.). U. S. 2,176,432, Oct. 17. An arrangement of app. is described, and a method of dewaxing wax-bearing mineral lubricating oil by continuous centrifugal sepn. wherein the wax is sepd. as a heavier phase and the oil as a lighter phase, comprising dilg. the oil, chilling the dilute mixt. to ppt. wax, passing the chilled mixt. to a centrifuge, centrifugally sepg. the charge into an oil phase and a wax phase heavier than the oil phase within the bowl of the centrifuge, disposing a film of hot furfural over the interior wall of the centrifuge bowl thereby providing a carrier liquid for the sepd. wax phase, moving the sepd. wax phase by flotation upon said film of carrier liquid to the point of discharge from the bowl, separately withdrawing the phases from the bowl, and discharging the sepd. wax from the centrifuge bowl in the presence of a further quantity of hot furfural.

Mineral lubricating oils treated to avoid corrosion. Frederick W. Sullivan, Jr. (to Standard Oil Co. of Ind.). U. S. 2,174,019, Sept. 26. A mineral lubricating oil such as one for automobile engines is used in mixt. with diethyl isoamyl thiophosphinite or other org. P compd. of one of the general formulas $R'_aP(XR'')_b$, $R'_aP(:Z)(XR'')_b$, $R'_aP(:Z)(XR'')_b(XH)_c$ and $R'_aP(XR'')_b(XH)_c$ in which R' and R'' represent alkyl, aryl, aralkyl, alkaryl or halogen-substituted alkyl, aryl and aralkyl groups; Z is O, S or Se; X also is O, S or Se; a and b are 1 or 2; c is 0 or 1; and in which $a + b + c$ is always equal to 3, said org. P compd. being added in small quantities to inhibit corrosion by said mineral lubricating oil (suitably about 10% or less of the amount of the oil). Numerous substances are listed which may be used.

Stabilizing mineral lubricating oils against decomposition by heat. Louis A. Mikeska and Eugene Lieber (to Standard Oil Development Co.). U. S. 2,174,248, Sept. 26. Stabilization is effected by the addn. of about 1% or less of diamyldiphenol disulfide or other alkyl phenol polysulfide of the general formula $4R\text{-}2OH\text{-}C_6H_3S_nC_6H_3\text{-}2OH\text{-}4R'$ in which R and R' are alkyl groups having at least 2 C atoms each and n is 2, 3 or 4.

Lubricating compositions. Paul L. Magill (to E. I. du

Pont de Nemours & Co.). U. S. 2,176,632, Oct. 17. A lubricating oil such as a "cutting oil" or high-pressure oil is given greater load capacity by admixt. with a reaction product of a dihydronaphthalene dimer and S. U. S. 2,176,633 relates to the use of a lubricating oil with a homogeneous, mono-phase liquid reaction product of dihydronaphthalene and S.

Hydrocarbon lubricating oils. John G. Butz and Leonard N. Leum (to Atlantic Refining Co.). U. S. 2,176,884, Oct. 24. In order to improve film strength, etc., a hydrocarbon oil contg. lubricating components is treated with a reagent comprising $PSCl_3$ at a temp. of from atm. temp. up to about 200°, and any resulting insol. reaction products are sepd.

Solvent extraction of hydrocarbon lubricating oils. Geo. Thayer (to Sinclair Refining Co.). U. S. 2,176,982 3, Oct. 24. A centrifugal countercurrent contacting app. is described, and a process which involves introducing a selective solvent such as phenol into the central portion of a centrifuge, introducing an addnl. selective solvent such as a light naphtha into the outer portion of the centrifuge, introducing the oil to be treated into the centrifuge at a point intermediate the points of introduction of the 2 selective solvents, subjecting the oil and solvents to the action of centrifugal force to produce an ext. and a raffinate phase, and separately withdrawing these phases.

Lubricating alloy bearings. Elmer W. Cook (to Tide Water Associated Oil Co.). U. S. 2,177,561, Oct. 24. Bearings such as those of internal-combustion engines, and which have substantially the corrosion susceptibility of Cd-Ag, Cd-Ni and Cu-Pb alloys, are lubricated with a mineral oil normally tending to corrode the bearing surfaces but which has its corrosive action inhibited by the incorporation of (suitably about 0.2% of) triphenylstibine.

Apparatus (with a motor, shaft and bearings) for testing the load-carrying ability of lubricating oils. Barrett E. Sibley (to Continental Oil Co.). U. S. 2,177,293, Oct. 24. Various structural, mech. and operative details.

Insulating oils. Leo J. Berberich (to Socony-Vacuum Oil Co.). U. S. 2,176,952, Oct. 24. A mineral oil suitable for impregnating cable and capacitor materials, etc., has a low tendency to loss of dielec. stability, given to it by the addn. of about 1 5% its wt. of diphenyl, dibenzyldisulfide, benzophenone or the like.

Solid and semisolid lubricants. Geo. L. Neely, Frank W. Kavanagh and Bruce B. Farrington (to Standard Oil Co. of Calif.). U. S. 2,176,509, Oct. 17. Lubricants which are suitable for use under high loads are formed of a hydrocarbon material such as an oil and tallow mixt. with an admixt. of about 2% or more of a solid, water-sol., oil-insol. carbohydrate such as sucrose, dextrose or dextrin dispersed in solid form.

Lubricants for use under high pressure. Gus Kaufman and Samuel R. Philson (to Texas Co.). U. S. 2,176,426, Oct. 17. A process for the prepn. of lubricants for use under high-pressure conditions involves forming a sulfurized lubricating oil by heating an oil such as a heavy mineral lubricating oil with S to about 175–190° for a sufficient time (suitably about 3 hrs.) to combine the S with the oil in a loosely bound form, and then incorporating Pb naphthenate in the sulfurized oil at a temp. of about 105–120°.

Electric indicating and recording apparatus suitable for use in pressure tests on greases. Paul McJunkin (to Texas Co.). U. S. 2,176,433, Oct. 17. Various elec. and operative details.

Graphite dispersion suitable for use with fuel for internal-combustion engines, etc. Floyd E. Bartell (to Acheson Colloids Corp.). U. S. 2,176,879, Oct. 24. A dispersion of colloidal graphite in nonflocculated form in an organophilic and substantially nonpolar water-insol. org. liquid such as a gasoline or kerosene is prepd. contg. a stabilizing agent such as lecithin or a mineral oil sulfonate which is strongly adsorbed to the graphite and remains adsorbed when in contact with the org. liquid and prevents flocculation of the graphite by lowering the interfacial tension between the graphite and the org. liquid.

Distillation of materials such as wood chips, peat or peat moss. Hilding O. V. Bergstrom and Karl N. Cederquist. U. S. 2,177,557, Oct. 24. An arrangement of app. is described, and a method of transforming woody material into alcohols, ketones, oils and salts of org. acids comprising heating the woody material together with sufficient added water (to prevent carbonization) and $Ca(OH)_2$ under a pressure higher than that of satd. steam in an autoclave to 220 360° by means of steam introduced into the same, so as to decompose substantially all of the woody material, the amount of $Ca(OH)_2$ being sufficient to react with the products formed by the pressure heating of the woody material to form Ca salts, withdrawing volatile substances from the autoclave and condensing the same, sepg. oily products from the aq. soln. of the condensate thereby obtained, recovering ales. from the soln., exposing the solid residue consisting principally of Ca salts from the autoclave in a sep. operation to dry destructive distn. at such a temp to form ketones from the Ca salts, condensing the escaping distn. gases and sepg. the oily products from the aq. soln., recovering ketones from the soln. and recovering from the distn. residue metallic oxides to be used for the treatment of fresh raw materials.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Physicochemical studies of the distribution of the degrees of polymerization in cellulose. I. The method of fractional solution of cellulose. Hans Dolmetsch and Friedrich Reinecke. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 219 27(1939).—The various methods of fractionation are described in detail with exptl. results and diagrams. Staple rayons from refined textiles are extremely low in low-mol. celluloses or sol. noncelluloses; normal viscose cellulose manufd. from ordinary raw materials, high in constituents of poor textile quality, contains much low-mol. cellulose. The chain length of the nitrocellulose fractions is detd. viscometrically. The chain-length diagrams give a good picture of the distribution of the cellulose mols. of various sizes in the fiber exaind. The degrees of polymerization of the fractions extd. with the same solvent from different celluloses are not the same, although the soly. of cellulose is a function of the chain length. Therefore, for an unknown cellulose it is necessary to det. for each diagram the degree of polymerization of the individual fractions. **II. The investigation of the distribution of the degree of polymerization of some natural and commercial celluloses.** *Ibid.* 299-307.—The degree of polymerization of crude cotton is 3000-4000, of ramie treated with NaOH 2000, of ramie treated and bleached 1000, of refined cellulose contg. over 96% α-cellulose 1200–1600, of paper cellulose contg. 85 92 α-cellulose 800–1300, of rayon fabrics contg. 85 92% α-cellulose 800–1300, of cuprammonium staple rayons 500–600, of special viscose staple rayons (Schwarza-Lanusa process) 450–800, of normal viscose staple rayons (W and B types) 250 350, of viscose foils 250 350, of nitro rayon 200 350, and of acetate rayon 250-300. Degradation below 200 results in a decompn. of the cellulose fiber. Soln. and chain-length diagrams showed that untreated cotton cellulose is composed of mols. of various sizes and that it does not contain low polymer constituents. The nitration takes place without degradation, but in soln. in ammoniacal copper soln. degradation can hardly be avoided. Alkali treatment and bleaching of cotton linters does not produce low-polymer constituents. The best raw materials for artificial textile fibers are cotton linters and wood cellulose. Chem. purity and uniformity of ordinary celluloses is not sufficient for acetylation (rayon), and nitration (gun cotton), or the manuf. of cuprammonium spinning soln.;

it is necessary to use refined cellulose for these processes. This refinement is carried out with alk. baths which dissolve to a large extent the low-polymer constituents of cellulose and the contaminants. After the extn. of the low-polymer constituents the chain-length diagram of a refined cellulose becomes similar to the characteristic diagram of cotton linters. The soln. diagram of linters differs from that of refined celluloses, in the region of high degree of polymerization, owing to a higher packing density of the cotton. The chem. changes that occur during alkali refinement are demonstrated by soln. and chain-length diagrams. The degree of polymerization of the first fraction is higher for the refined celluloses than for the original products. The soln. of cellulose by NaOH is accompanied by an expansion of the crystal lattice, which increases the reactivity and effects due to mol. size of the cellulose. This is due not merely to the effect of the base but also to an oxidizing cleavage by air, which cannot be excluded in large scale com. operations. The change in the soln. diagram and the chain-length distribution which occurs in 1 hr. in a com. alkalization is illustrated. In a process of wet alkalization with chem. ripening, cellulose is mixed with NaOH to a thick fluid pulp and the viscosity is lowered very rapidly by the addn. of oxidizing agents. When the proper degree of ripeness is reached the base is removed and alkali cellulose suitable for xanthation is immediately isolated. In this process the long mols. are decompd. and the low-mol. constituents are extd.; thus the product is more uniform in compn. The observation that the decompn. of cellulose in the viscose process takes place primarily before the xanthation and that the xanthate is highly stable against oxidative cleavage was confirmed by chain-length diagrams for normally ripened alkali cellulose, viscose staple rayon made therefrom, and special staple rayon Schwarza. The distribution of the chain length is shown to be due chiefly to the preripening and not to the afterripening or the spinning process. After the removal of the alkali the degree of polymerization of the first fraction is nearly const. during the viscose process. An alk. process was developed which yields a product of α-cellulose content 98.8%, Cu viscosity 175, mean degree of polymerization of 850 (as nitrate) and pentosan content of about 3%. It is more like linters than is ordinary wood cellulose. Soln. diagrams of the nitrates of fiber grades of staple rayon show great variations of the mean degree of polymerization and alkali soly. at initial stages but parallel behavior at the end of the curve; however, the chain length distribution curves differ greatly from the corresponding soln. curves, owing to differences in the degree of crystn. or packing density. Cellulose products of variable tear resistance, nearly identical titer and equal mean degree of polymerization yielded practically identical soln. and chain-length diagrams and alkali soly. There was a remarkable agreement between wet resistance and the orientation angle detd. by x-ray methods; hence the resistance to tearing of a fiber spun from normal viscose is related to the parallel structure of the crystallites in the fiber. The special staple rayon Lanusa (manufd. from linters) has a mean degree of polymerization of 700 (detd. as nitrate), high wet resistance and low alkali soly. Leopold Scheflan

Enzymic decomposition of polymeric carbohydrates. III Behavior of linden wood toward ethylene diamine-copper oxide solution and the enzymic degradation of the main fractions. Theodor Ploetz. *Ber.* **72B**, 1885-9 (1939); cf. *C. A.* **34**, 1039⁹.—Treatment of the finely ground wood (C 49.59, H 6.37, MeO 6.51%) of *Tilia tomentosa*, after exhaustion with benzene-alc., with the Hilpert reagent (I) (*C. A.* **33**, 5178⁹) left 61% undissolved, and from the soln. acids pptd. 12.7%. The insol. residue (C 49.62, H 6.55, MeO 7.20%) hardly differed in compn., except in MeO content, from the original wood, but a better idea of the change it had undergone was given by the detn. of its chief constituents: Cross-Bevan cellulose (pentose-free) 60.5, pentoses 8.67, lignin (detd. as Klason lignin) 20.55%, as against 45.5, 26.1 and 18.0% resp., for the original wood. Hence 18.9% of the cellulose, 79.7% of the pentoses and 30.5% of the lignin had dissolved in I. The soln. of 30% of the lignin is to be considered as a fractionation, for the lignin (C 61.32, H 6.04, MeO 20.91%) obtained from the residue insol. in I differs from that (C 64.60, H 5.50, MeO 19.86%) obtained from the original wood. The fraction pptd. from the soln. in I by acids was a yellowish powder with C 45.98, H 5.91, MeO 7.23, pentoses 49.6, lignin 26.14% (the lignin contained C 61.40, H 5.25, MeO 15.64%). This fraction therefore consists of lignin and an MeO-contg. substance which does not go over into Klason lignin. Neither the fraction insol. in I nor that pptd. by acids contains N. The enzymic degradations were effected with various purified prepns. from the digestive juice of the Weinberg snail (*Helix pomatia*), which contain cellulase, lichenase and cellobiase. The original wood is quite resistant to enzymic attack. A not very active enzymic prepn. which degraded cuprophan only 23% in 6 days dissolved only 3.8% of the wood in the same length of time, and the most active prepns., which completely dissolved cuprophan in 2-3 days, degraded the wood only 14% in 8 days. Of the sugar going into soln., 35% consisted of pentoses. This proportion remained quite const. on repeated treatment with different enzyme prepns., indicating that both classes of carbohydrates, pentoses and hexoses, from the beginning dissolve in about the same proportions in which they are present in the wood. The residue insol. in I showed no increased sensitivity to enzymic attack. Even after long treatment and with repeated renewal of the enzyme, only 18.6% could be brought into soln. The sugar detns. and the loss in wt. gave entirely concordant results on the extent of degradation; 42.5% of the sugar consisted of pentoses. On the other hand, the fraction pptd. from I by acids was relatively easily degraded, 51.4% in 2 stages; 70% of the dissolved sugar consisted of pentoses. The degraded solns still contained MeO. The residue now had C 51.77, H 6.36, MeO 9.07%. At this stage the hitherto smooth degradation suddenly became very halting with even the most active enzymic prepns., but after 13 days a further 9.8% degradation was obtained; the dissolved sugar contained 92% pentoses. Although these degradations, which in the last stage are very time-consuming, have not been completed they justify the hope that it may be possible, under the mild conditions of enzymic degradation (pH 4-7 at 37°), to isolate lignin-like substances from the native material. The increase in C content of the residue after 51.4% degradation points distinctly to the presence of lignin-like components of high C content C. A. R.

Unesterified primary hydroxyls in acetone-soluble cellulose acetate. F. B. Cramer and C. B. Purves. *J. Am. Chem. Soc.* **61**, 3458-62 (1939).—*p*-$MeC_6H_4SO_2Cl$ in C_5H_5N at 20° rapidly esterified about 1/3 of the free HO groups in com., Me_2CO-sol. cellulose acetate (I); the remainder reacted much more slowly. No removal, and probably no wandering, of Ac groups occurred. NaI in Me_2CO at 100°, or HCl in C_5H_5N at 85°, smoothly substituted I or Cl atoms for *p*-$MeC_6H_4SO_2$ residues derived from primary, as opposed to secondary, HO groups. Analyses of the halogenated mixed cellulose esters indicated that at least 1/3 of the free HO groups in I were in the primary (sixth) positions of the anhydroglucose units. The esterification was interrupted at the end of the initial, rapid reaction and the groups introduced were replaceable to the extent of 85-90% by I; *p*-$MeC_6H_4SO_2Cl$ had therefore reacted 10 or 12 times as rapidly with the free primary as with the free secondary HO groups (2nd and 3rd positions). All the above reactions proceeded almost quantitatively and without appreciable degradation of the cellulose as measured by viscosity methods. The position of I in a 6-iodocellulose acetate was confirmed by the reduction to a degraded 1-free desoxy acetate. This gave methylfurfural on distn. with mineral acid and glucomethylose (isorhamnose) after complete hydrolysis. C. J. W.

Unesterified secondary hydroxyls in acetone-soluble cellulose acetate. F. B. Cramer, R. C. Hockett and C. B. Purves. *J. Am. Chem. Soc.* **61**, 3463-4 (1939).—A com. Me_2CO-sol. cellulose acetate had an av. of 0.35-0.45 mole of unesterified HO distributed between the 2nd and 3rd

positions of the anhydroglucose units. The unsubstituted —CHOH.CHOH— or glycol groupings it contained were estd., by means of $Pb(OAc)_4$, to occur not more frequently than once in 100 glucose residues. A significantly greater frequency of 1 in 20–30 was calcd. by assuming a purely random distribution of HO between the 2 positions. C. J. West

Ethers and esters of cellulose and their commercial applications with particular reference to the textile industry. H. Rath. *Klepzig's Textil-Z.* **42**, 491–4(1939).—A discussion of the constitution soly., prepn. and application of cellulose esters and ethers. Leopold Scheflan

A simple and rapid method for the quantitative separation of artificial fibers [prepared] from hydrated cellulose and fibers from natural cellulose. Karl Schwertassek. *Angew. Chem.* **52**, 700–1; *Kunstseide u. Zellwolle* **21**, 422–6(1939).— The method consists in treating the fibers with cold 10% NaOH soln. contg. some wetting agent. The soaked fiber gels are pressed by rollers on a fine screen where the artificial fibers break down and pass through owing to their lower mech. resistance and the natural fibers remain as their resistance even in the soaked condition is fairly high. Acetylcellulose fibers must be removed prior to the test by soln. in acetone. Wool loses considerable wt. and the method is not applicable to it in the present state. Karl Kammermeyer

Machines for the production of staple rayon and rayon in the laboratory. Herbert Fischer. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 309–10(1939).— An illustrated discussion. Leopold Scheflan

Industrialization of [Cuban] bamboo. Carlos Rodriguez Casals. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* **1938**, 236–9.— The cellulose of this plant can be used for making rayon and a general line of high-quality papers. O. W. Willcox

Rapid determination of moisture in wood pulp. L. M. Perelygin. *Lesnaya Industriya* **1939**, No. 5, 62–4.—Moisture in wood pulp can be detd. rapidly by drying in an air stream at temps. up to 200°. The error in most cases does not exceed 0.5% for air-dry pulp and 1.5% for moist pulp and the times required for the detns. were 15 and 20 min., resp. B. Z. Kamich

Sweden's first fan drying machine for ground pulp. Sven Wellmar. *Svensk Papperstidn.* **42**, 539–40(1939).— App. is described. Fan drying uses only 40% as much steam as the old method. Personnel and financial savings are given in detail. Wilhelm Segerblom

Technical evolution of wood-grinder construction. Robert Stehr. *Zellstoff u. Papier* **19**, 605–8(1939).—Various recent types of mech. pulp-grinding equipment are described. S. I. Aronovsky

Degree of efficiency of sulfite acid towers. Hugo Nihlén. *Svensk Papperstidn.* **42**, 491(1939); cf. *C. A.* **33**, 8988⁸.— N. points out that Sylwan's efficiency formula is correct only when no SO_3 is formed in the tower. Wilhelm Segerblom

Investigations of black liquor. Hilding Bergström and Kari G. Trobeck. *Svensk Papperstidn.* **42**, 554–7(1939).— New methods are reported for the detn. of H_2S, mercaptans and sulfides in the vapors and gases from black liquor and for the detn. of its sulfide content. The gases from the evapd. black liquor are cooled and then passed successively through a 10% $CdCl_2$ soln. contg. 1% HCl to absorb the H_2S, through a 5% $Hg(CN)_2$ soln. to absorb the mercaptans, and lastly through a 5% $HgCl_2$ soln. to absorb the org. sulfides. From the ppts. formed the amts. of the impurities are detd. Diagram of app. and details of procedure are given. To det. the sulfide content of black liquor, the liquor is treated with 10% NH_4Cl soln., and the mixt. boiled in an oxygen-free atm. of N, the gases being detd. as before. The change in the sulfide content in black liquor has been shown to be due to oxidation, and that it increases with rising temp. The sulfide S is oxidized first. Details are given. W. S.

Macromolecular compounds. No. 221. The degree of polymerization of various types of cellulose. H. Staudinger and F. Reinecke. *Holz Roh u. Werkstoff* **2**, 321–323 (1939); cf. *C. A.* **33**, 7095³.—The tearing and bursting strength increase with degree of polymerization, becoming nearly const. at about 1000. The viscosity of a 1% soln. in Schweitzer's reagent continues to increase beyond 1700. Data are given on the degree of polymerization and viscosity of pulps from different sources and by different processes, as well as of different artificial textile fibers. Cellulose is the one important constituent of wood to be converted to textiles, as other constituents tend to dissolve in the alk. treatment. R. H. Baechler

Paper and color. Archim Skjöldebrand. *Svensk Papperstidn.* **42**, 462–7(1939).—The properties required for satisfactory newsprint paper are described in detail with special reference to its handling and use. W. S.

Wool, felts and paper drying. F. W. Holl. *Zellstoff u. Papier* **19**, 612–15(1939).—The chem., mech. and temp. effects of paper drying on wet and drier felts are discussed in detail. Wool is the best material so far available for the production of these felts. S. I. Aronovsky

Felt drying. Johannes Bartsch. *Zellstoff u. Papier* **19**, 616–18(1939).—The drying of paper machine felts, both on the machine and after removal from the machine and washing, is described, and the effects of these procedures on felt life are discussed. S. I. Aronovsky

Beating parchment and parchment substitutes with regard to the rapid development of the required paper properties. R. Muller. *Zellstoff u. Papier* **19**, 609–12(1939).— The development of the "turnstile" mill for pulp beating furnishes another unit for the proper prepn. of paper stock. This large-surface beating machine is very acceptable to the industry at present owing to its high output at lower power consumption and with less fiber destruction, as well as to lowering the blistering point and increasing the strength of the strongly beaten pulp. S. I. Aronovsky

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Analysis of [cellulose derivs.] for traces of metallic impurities (Owens, Reinhardt) **7**. [Sewage] digestion studies on paper pulp (Hill) **14**. Tubing from cellulose derivs. (U. S. pat. 2,176,925) **12**.

Cellulose organic acid esters. Carl J. Malm (to Eastman Kodak Co.). U. S. 2,176,088, Oct. 17. A process of making high viscosity esters of cellulose involves presoaking cellulose such as cotton linters in about 5 times its quantity of a lower fatty acid bath (such as mixed HOAc and propionic acid) contg. HOAc at a temp. of about 13° and subsequently esterifying the presoaked cellulose by adding a refrigerated esterifying liquid contg. a lower fatty acid anhydride such as Ac_2O about 3.36 parts for each part of cellulose treated together with an esterification catalyst such as H_2SO_4 (this liquid having a temp. of between −18° and about 0° and the temp. of the esterification mass being kept below 32°). Cf. *C. A.* **34**, 623¹.

Rendering cellulose ethers quickly soluble. Hermann Neuroth (to Kalle & Co. A.-G.). U. S. 2,176,678, Oct. 17. A fibrous sol. cellulose ether such as cellulose methyl ether is rendered quickly sol. by introducing the fibers between parallel plates spaced a short distance apart and having corrugated inner surfaces, and rotating the plates relative to each other until the fibers are arranged into twisted bundles.

Use of cellulose ethers and viscose in forming films or threads, etc. Leon Lilienfeld. U. S. 2,176,085, Oct. 17. A material suitable for films, etc., is prepd. by a process in which an alkali-sol. cellulose ether and viscose are brought together in such proportions that the CS_2 in the viscose is less than 20% of the sum of the wt. of the cellulose contained in the viscose plus the wt. of the cellulose ether used. Such a mixt. gives products of good strength.

Esters such as cellulose acetate. Carl J. Malm (to Eastman Kodak Co.). U. S. 2,177,667, Oct. 31. In the production of an ester, as by acylating cellulose followed by partial hydrolysis, pptn., washing with water, and drying, uniform viscosity of the product is maintained by maintaining the effective hardness of the water employed for washing uniform over an extended series of batches.

Cellulose acetate from wood. Lionel E. Goff (to Cellulose Research Corp.). U. S. 2,176,850, Oct. 17. An ar-

rangement of app. is described, and a process of producing cellulose acetate from wood by treating wood with a sulfite delignifying soln. to produce pulp, washing the pulp with water at elevated temp., defibering and screening the pulp to remove neps and fiber bundles and to provide a max. exposed surface of ligneous material, chlorinating the pulp with an amt. of Cl expressed in lb. equal to 16–18% of its bleach value, removing the chlorinated compds. by treatment with a dil. soln. of NaOH at a temp. in excess of 60°, bleaching the chlorinated pulp with a hypochlorite soln. of from 1–6% concn., with a pH above 8, at 25°–35°, treating the bleached pulp in a nonmercerizing soln. of NaOH at a temp. in excess of 60°, repeating the bleaching treatment with hypochlorite, mercerizing the bleached pulp in a 12–15% soln. of NaOH at 25°–35°, washing the mercerized pulp in less than 30 min. with water until neutral, treating the mercerized pulp with HOAc at a temp. in the range from 50° to boiling, displacing the treating acid with glacial HOAc, thereafter treating the cellulose with Ac_2O in the presence of a H_2SO_4 catalyst.

Nonfibrous films such as those of cellulose acetate or polyvinyl alcohol. Emmette F. Izard (to E. I. du Pont de Nemours & Co.). U. S. 2,176,903, Oct. 24. In casting films, the stripping character of the film produced, when cast upon a surface such as a casting wheel, is improved by including in the casting soln. about 2% or less of stearylamine, octadecylamine or other normally solid primary alkyl amine of a high mol. wt. hydrocarbon or a salt of such an amine, which, in the quantity used, does not materially affect the transparency of the resultant film.

Products such as threads from cellulose xanthate. Josef Lilienfeld. U. S. 2,176,799, Oct. 17. Products which have good luster, strength and extensibility are formed by adding to a xanthate of a cellulose material an alkyl ester of an O-contg. inorg. acid such as Et_2SO_4 and treating a soln. of the resulting product, shaped as desired, e. g., in the form of threads, with a coagulating agent, and plasticizing the freshly coagulated product. Several examples with details are given.

Cellulose films suitable for use as wrapping tissue. Henry S. Rothrock (to E. I. du Pont de Nemours & Co.). U. S. 2,170,839, Aug. 29. A water-sensitive film suitable for use as a wrapping tissue is formed from an aq. alk. cellulose soln. and contains, as a deformation-restricting agent, a softening agent comprising bis(ethoxyethyl) succinate or other org. ester having a hygroscopicity of from 1 to 80, a b. p. of at least 135° at a pressure of 12 mm. Hg, and a soly. of at least 1% in water at 20°, the ester being present in sufficient amt. to restrict the deformation of the film to a max. of 3.0. U. S. 2,170,840 relates to the like use of propylene glycol dilevulinate or other ester of a keto acid having similar properties and effect.

Fiber-forming polyamides. Wesley R. Peterson (to E. I. du Pont de Nemours & Co.). U. S. 2,174,527, Oct. 3. A process for making fiber-forming substantially viscosity stable polyamides comprises heating a mixt. of polyamide-forming reactants consisting essentially of a diamine of the formula $H_2NCH_2RCH_2NH_2$ and a compd. of the class consisting of dicarboxylic acids of the formula $HOOCCH_2R'CH_2COOH$ and amide-forming derivs. of such acids in the presence of a viscosity stabilizing agent of the class consisting of monofunctional amide-forming compds. and their derivs. capable of functioning as such under the condition of the reaction, said monofunctional compds. being selected from monofunctional carboxylic acids or monofunctional nitrogenous bases, R and R′ in said formulas being bivalent hydrocarbon radicals free from aliphatic unsaturation and R having a chain length of at least 2 C atoms. The monofunctional compds. may be monobasic org. acids and monofunctional nitrogenous bases which contain at least one H atom attached to the N atom. The nitrogenous bases include ammonia, monoamines and compds. capable of yielding NH_3 or monoamines under the conditions of the reaction. The term polyamide-forming reactant is used to designate a bifunctional compd. which yields a polyamide when heated alone or in admixt. with a complementary polyamide-forming reactant. It includes polymerizable amino acids or amide-forming derivs. thereof (i. e., an ester, acid halide, amide, or anhydride), diamines, dicarboxylic acids, and amide-forming derivs. of dibasic carboxylic acids. In contrast to the polyamide-forming reactants, the monofunctional amide-forming reactants are not capable of yielding polymers. Various examples with details of procedure are given.

Spinning funnel for rayon. Cornelis G. Jansen (to American Enka Corp.). U. S. 2,177,322, Oct. 24. A spinning funnel is used having a hard thread-guiding surface of material such as glass etched (as by HF) adjacent its outlet end to provide a myriad of minute depressed portions capable of effecting the entrapment of globules of liquid to form an antifriction surface for the thread during operation of the app.

Gear-wheel spinning pump. Otto Bochmann (to Barmer Maschinenfabrik A.-G.). U. S. 2,176,388, Oct. 17. A pump suitable for use in rayon manuf. comprises a casing and rotatable gear wheels of a steel alloy contg. 0.7–1.1% C and 12–16% Cr and having a hardness of at least 60 Rockwell C.

Treating colored rayon to improve fastness of color. James G. McNally and Joseph B. Dickey (to Eastman Kodak Co.). U. S. 2,176,506, Oct. 17. Colored materials such as those of cellulose acetate colored with various dyes are treated with an aq. soln. of melamine, which serves to give improved fastness of color.

Loose-belt drive for papermaking machines. Bernard A. Malkin (to Dominion Engineering Works Ltd.). U. S. 2,176,431, Oct. 17. Various structural, mech. and operative details.

Coating paper. Laurence W. Porter (to S. D. Warren Co.). U. S. 2,177,580, Oct. 24. App. is described, and a method of coating paper, which comprises applying to a surface of a moving web of paper an excess of an aq. coating compn. comprising carbohydrate adhesive and pigment, and removing excess coating compn., the viscosity and solids content of the coating compn. being balanced against the absorptivity of the paper and the wt. of coating so that the coating assumes a plastic and wet but nonflowing condition; then superimposing upon the wet and plastic but nonflowing coating a second coating layer of aq. coating compn. comprising protein adhesive and pigment, the second coating layer not freely mingling with the first coating but the two layers bonding together at a more or less plane interface; smoothing the resulting composite coating; and drying the resulting coated product. Pigments such as blanc fixe and satin white may be used with adhesives such as clay and casein.

24—EXPLOSIVES AND EXPLOSIONS

C. G. STORM

The ammonium explosives. P. Radevich. *Tekhnika i Vooruzhenie* **1938**, No. 7, 86–94; *Khim. Referat. Zhur.* **2**, No. 2, 127 (1939).—Ammonites are the main types of explosives used in the industrial practice in U. S. S. R. They are mech. mixts. of NH_4NO_3 with nitro derivs. (dinitronaphthalene, etc.) or with combustible materials, such as coal or sawdust. The production technology of the ammonites consists in drying and grinding followed by mech. mixing of the components. In comparison with other explosives the storage of the ammonites is simple, owing to the low sensitivity to shocks, friction and climatic conditions. Hygroscopicity and deterioration are the main disadvantages. Methods for combating these disadvantages are given. Properties of the most commonly used ammonites are described. W. R. Henn

The harmlessness of constant-boiling 72% perchloric

acid. Walter Dietz. *Angew. Chem.* **52**, 616–18(1939).— Expts. are described which show that 72% $HClO_4$ (const.-boiling) is entirely harmless in the absence of combustible substances. Expts. with mixts. of $HClO_4$ vapor and H resulted in explosions at 400 5°. The presence of steel turnings in the vapor space lowered the temp. of explosion to 215°. The explosions experienced when $HClO_4$ is used in steel analysis (detn. of Cr) are apparently due to the formation of mixts. of $HClO_4$ vapor and H which are exploded by the catalytic action of undetd compd. steel particles. The formation of the explosive gas mixts. can be prevented by the addn. of a little water during the soln. of the steel. All steels dissolve easily in aq. $HClO_4$ when boiling temps. of 150 60° are reached and dangerous amts. of $HClO_4$ vapor are not evolved at this temp. 11 references. Karl Kammermeyer

Cold flames. II. J. M. Stevels. *Chem. Weekblad* **36**, 654–7(1939); cf. *C. A.* **33**, 9647[1].—A review of recent developments in cold-flame technique. 18 references. **III.** *Ibid.* 657–63.—A review of the importance of cold-flame theories in the investigation of chem. union. 32 references. O. W. Willcox

Modern detonators. Wilfrid Taylor. *Chemistry & Industry* **1939**, 1065–9. E. H.

Explosives suitable for priming. Edward B. W. Kerone and Clayton C. Carroll (to Western Cartridge Co.). U. S. 2,177,657, Oct. 31. A salt of a nitrosoresorcinol, such as a basic Pb nitrosoresorcinate, is used (suitably with Hg fulminate or Pb azide, $Ba(N_3)_2$, etc.).

Track torpedo containing a detonable explosive. Louie A. Sherman (to Safetee Torpedo Corp.). U. S. 2,176,362, Oct. 17. Various structural details.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The semiquinone radicals of methylene blue and related dyestuffs. S. Granick, L. Michaelis and M. P. Schubert. *Science* **90**, 422–3(1939).— It has been shown that thionine (Lauth's violet) when reduced in strongly acid soln. contains the semiquinone (free radical) which is yellow and exhibits a series of distinct absorption bands in the blue part of the spectrum similar to the bands of the triphenylmethyl radical. This is presented as further proof of the theory of compulsory univalent oxidation (M. and Smythe, *C. A.* **33**, 3831[2]) which has never been shown to apply for thiazine or oxazine dyes. Methylene blue acts similarly to thionine in a slightly higher acid concn and shows a similar absorption spectrum for the semiquinone radical. These dyestuffs are considered to fit very well into this theory since any bivalent oxidation-reduction system must be capable of forming a semiquinone radical to some extent in order to behave as a reversible system. It is further stated that any org. dyestuff can act as a catalyst for slow oxidation when this radical is formed. Recently, it was shown (*C. A.* **33**, 7750[1]) that the first oxidation product of diaminodurene (1,4-diamino-2,3,5,6-tetramethylbenzene) was a free radical while the *N*-methylated compd. did not form this radical. The diaminodurene increases respiration of erythrocytes to about the same extent as methylene blue where the *N*-methylated compd. has no catalytic effect. R. F. D.

The preparation of printing dyes. B. V. Ponomarenko. *Legkaya Prom.* **1938**, No. 7–8, 94–108; *Khim. Referat. Zhur.* **2**, No. 3, 116–17(1939).—The production of printing dyes was investigated in the lab. and on production scale from the *hygienic standpoint*. The prepn. of pastes not with oil and with acetol, and the prepn. of $Al(NO_3)_3$ are harmless. Some processes are harmful owing to the gases and vapors evolved. The harmful gases which should be removed are SO_2, Cl_2, NO_2, vapors of AcOH, CH_2O, PhOH and HCOOH. The heating of the indanthrene printing dyes is injurious because of the evolution of HCOOH. The diazo solns. produce injurious oxides of N. W. R. Henn

The migration of substantive dyes in artificial textile fibers in comparison to the behavior of dye solutions and the gel structure of textile fibers. W. Weltzien and H. Froitzheim. *Monatsh. Seide Kunstseide Zellwolle* **44**, 185–90, 238, 240, 242, 244–5, 269–75, 314–18, 320, 322(1939).—From expts. described in detail are drawn the following conclusions: (1) The diffusion of substantive dyes in soln. and their penetration in the fiber differ fundamentally. In soln. the addn. of electrolyte causes a lowering of the diffusion while in the fiber it hastens the penetration of the dye. The larger, more aggregated dye particles penetrate faster into the fiber than the smaller particles; this is explained by an increase of the adsorption velocity at the inner surface of the fiber with increased electrolyte addn. In the pretreatment of the fiber with alkalies similar processes take place. (2) The alk. treatment shrinks the fiber, causing a disorientation of the micellar arrangement, and dissolves small amts. of the fiber, rendering the inner surface generally more accessible. (3) As the treatment with alkalies increases greatly the absorption velocity of the dye, the particular properties characteristic for Brilliant Benzo Blue 6B do not appear in case of viscose rayon. The pretreatment with NaOH increases the dye-absorption power of different rayons to various degrees; however, the final result after complete pretreatment is approx. the same. (4) The influence of various textile assistants, with the exception of Peregal O, is explained by a difference in the penetration of the dye. This is in partial agreement with the strong capillary activity of these substances. The diffusion velocity is decreased slightly. Therefore, the stabilizing effect of the textile assistant cannot be explained by any essential influence on the degree of dispersion. (5) From the results obtained conclusions are drawn concerning the gel structure of Cu rayon and other textiles. 67 pictures and 26 references. Leopold Scheflan

New experiences with acetate rayon dyes. Erich Herrmann. *Monatsh. Seide Kunstseide Zellwolle* **44**, 231–6(1939).—A discussion of dyeing at high temp., production of fastness to light in delustered dyed acetate rayon, resistance of celliton and celliton fast dyes against various aftertreatments following the dyeing of mixed fabrics contg. viscose rayon, the dyeing of mixed fabrics contg wool and acetate rayon and the advantages of the use of the water-sol. developer ONL for cellitazol dyeings over the older developer ON. Numerous dyes suitable for the various treatments and sp. dyeing directions are given. Leopold Scheflan

The application of naphthol dyes to cotton and other textiles. II. Joseph Lindsay, Jr. *Cotton* (Atlanta) **103**, 67–8, 112(Dec., 1939); *C. A.* **34**, 629[7].—This instalment covers the chem. constitution of the naphthols, fast color salts, the pH of the developing bath, substantivity of naphthols, printing with naphthols, etc. W. H. Boynton

Fast Indanthrene Red for the dyeing of clothing. Richard Alt. *Deut. Färber-Ztg.* **75**, 345–6(1939).—Practical directions are given for dyeing clothing by means of dyes of the Naphthol AS type as well as other dyes. L. S.

How dyes are broken down. E. Dutoit. *Teintex* **4**, 608–11(1939).—A discussion of methods used to remove the dye from dyed fabrics so that they can be redyed in some other shade. Certain direct dyes, basic dyes and acid dyes come off in a slightly alk. bath (ammonia, soap, Na_2CO_3 for vegetable fibers, and ammonia, Na_2SO_4, for animal fibers) when they are warmed slightly and agitated in these solns. After a rinsing in a slightly alk. bath the material is ready for redyeing. Saverio Zuffanti

Reserve and two-color effects on artificial textile fiber crepe fabrics. Veseley. *Monatsh. Seide Kunstseide Zellwolle* **44**, 265–9(1939).—A discussion of proper dyeing

operations. In a textile mixt. viscose can be dyed readily without dyeing acetate rayon; however, all wooden vats must be freed completely from acetate dyes and mistakes in the pretreatment of the acetate fiber during bleaching and delustering may cause the acetate fiber to absorb substantive dyes. Dirty acetate rayon can be cleaned by soaping at 30–40°, by the hyposulfite soln. or by a dil. soln. of AcOH. Spots of special acetate dyes are best removed with activated charcoal. Leopold Scheflan

Light-fast, commercially used color tones from Sirius and Sirius Light dyes. H. Hansen. *Klepzig's Textil-Z.* **42**, 520–22, 524(1939); cf. *C. A.* **33**, 7115⁵.—A detailed description of the production of various color tones. Dyes are listed suitable for dyeing of fabrics contg. acetate rayon, mixed yarns of cotton and viscose rayon, viscose rayons of different affinities, and delustered rayons. Cl-resistant dyes and Sirius and Sirius Light dyes of good leveling properties are tabulated. Leopold Scheflan

Uniform dyeings. R. Hünlich. *Spinner u. Weber* **57**, No. 34, 96–8(1939).—A discussion of flake dyeing, piece-goods dyeing, washing of wool, water softening, sizing, carbonization, decatizing, weaving and dyeing. L. S.

The machine dyeing with Naphthol AS dyes. Heinrich Muller. *Klepzig's Textil-Z.* **42**, 533–4(1939).—The historical development of the use of Naphthol dyes is sketched briefly and new applications are discussed. L. Scheflan

Dyeing with direct dyes. William Davidson. *Can. Textile J.* **56**, No. 20, 34, 36(1939).—A discussion of the dyeing theory, applications, use of textile assistants, aftertreatments, topping and the dyeing of wool, silk and union materials. Leopold Scheflan

The oxygen of the air as a harmful factor in fast-dyeing operations. Schickl. *Spinner u. Weber* **75**, No. 30, 60; No. 34, 98(1939).—Descriptive. Leopold Scheflan

The need of more care in handling acids. IX. Additions to dyeing baths. X. Rinsing acidified textiles. XI. Neutralization aftertreatments. Carl-Heinz Fischer. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 310–14(1939); cf. *C. A.* **33**, 9002⁸. Various cases of textile processing are discussed with numerical data. Leopold Scheflan

Improving unsuccessful dyeings. Willi Festerling. *Deut. Farber-Ztg.* **75**, 371–2(1939).—A discussion of com. industrial practices. Leopold Scheflan

The practical application of dyes for mixed fabrics in the dyeing of clothing. G. Krüger. *Klepzig's Textil-Z.* 42, 439–41(1939). The goods should be tested for the presence of acetate rayon. Procedures for using direct semiwool dyes, single-bath diazotization, semiwool metachrome processes and black dyeing with Autazolchrome Black R are discussed. Leopold Scheflan

Dyeing brown uniforms gray. Hermann Zill. *Deut. Farber-Ztg.* **75**, 489(1939).—The brown color should be removed with soln. of Dekrolin and HCOOH with Modinal or a similar textile assistant as protecting agent. In the case of certain vat dyeings a yellow color remains after this treatment; this color is then changed into gray-green by using an indigo MLB paste. Only wooden vessels should be used for these treatments as well as for rinsing. All Dekrolin must be removed thoroughly to ensure the complete destruction of the brown color. The first rinsing bath should contain H_2O_2 or other O-forming compd., and the second bath should be made alk. with NH_3. The residual H_2S of the Dekrolin is thus oxidized to H_2SO_4 and the color tone becomes clearer. The redyeing is best done with fast alizarin or anthralan dyes in the presence of Glauber's salt and AcOH (no HCOOH should be used). The leveling is facilitated by the use of $AcONH_4$. The addn. of Modinal to the dyeing bath renders the goods softer and ensures thorough dyeing of the thick seams. L. S.

Dyeing cellulose fibers with acid wool dyes in the presence of synthetic resins. Theodor Crebert. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 146–58, 182–7, 227–31(1939).—Rayon textiles contg. artificial resins bearing NH_2 groups can, like wool, absorb acid dyes. The condensation of glutamic acid with glycerol produces very viscous brown oils which, by the catalytic action of HCl, can be further condensed, with chain formation. The products are brown resins which, because of soly. in water, are useless for dyeing purposes. An insol. product was formed by incorporation of glutamic acid in the phthalic acid glycerol complex, but its ease of sapon. renders it not very suitable as an addn. product to viscose. Bakelite obtained by alk. condensation contains alc. OH groups which can be esterified with dicarboxylic acids and particularly with glutamic acid. The esterification never takes place on both COOH groups and, therefore, it is possible to esterify the Bakelite dicarboxylic acid semiester further. Resins thus produced are neutral, light in color and alkali-sol.; they are most useful for treating the textile fiber so that it will absorb acid wool dyes. Dicarboxylic acids can be introduced into an acid-condensed Bakelite which contains no alc. OH groups by using the acid anhydrides, e. g., phthalic anhydride. In the product thus obtained, one COOH group can be esterified further with glycerol and condensed with free OH groups of the glycerol-glutamic acid compd. Such resins do not exhibit the desirable properties shown by the product from alkali-condensed Bakelite. The alc. OH groups of alkali-condensed Bakelite can be easily made to react with one NH_2 group of a diamino compd. without binding the second NH_2 group. These condensation products are very efficient and upon addn. to viscose increase greatly the dye-absorbing power. The no. and type of linkage of the free NH_2 groups increases or decreases the dye-absorption power of the fiber. If ethylenediamine is made a constituent of the resin a product is obtained which increases the dye-absorption power toward acid wool dyes exceptionally well. Leopold Scheflan

Spun-rayon dyeing and finishing. I. Staple and yarn dyeing. T. R. Brockleman. *Textile Bull.* **57**, No. 3, 8, 10(1939).—Dyeing operations for the cut staple and spun rayon yarns are discussed in detail and typical direct color formulas are given. Leopold Scheflan

The dyeing and finishing of lining fabric. Erich Ebbinghaus. *Deut. Wollen-Gewerbe* **71**, 850–5(1939).—A discussion of suitable chem. treatments. L. Scheflan

The dyeing of feathers. Franz Misera. *Klepzig's Textil-Z.* **42**, 542–3(1939).—The feathers are washed with soap suds, bleached with H_2O_2, and dyed in a hot acid bath. Various details are given for the dyeing of feathers from different birds. Leopold Scheflan

Mixed fabrics and the necessity for the use of a microscope in dyeing operations. H. Bedarff. *Deut. Färber-Ztg.* **75**, 305–6(1939).—The difficulty of dyeing modern textile mixts. is pointed out and directions are given for prepg. textile threads for microscopic examns. The characteristic properties of various textile fibers are demonstrated with photomicrographs. Leopold Scheflan

Stencil printing [of textiles]. Albert Franken. *Spinner u. Weber* **57**, No. 26, 30–3; *Deut. Textilwirt.* **6**, No. 12, 7–13(1939).—A review. Leopold Scheflan

Stencil or cylinder printing. Fr. Streng. *Deut. Färber-Ztg.* **75**, 277–8(1939).—A discussion of the advantages and disadvantages of the use of stencil printing as compared to cylinder printing. Leopold Scheflan

The printing of yarn. W. Kura. *Deut. Wollen-Gewerbe* **71**, 943–6(1939).—Descriptive. Leopold Scheflan

Technique of wool printing. P. Merey. *Teintex* **4**, 611–18(1939).—Because of the downy nature of the wool, on printing it is difficult to get as sharp an outline as on cotton or rayon. Wool is less absorbent and more elastic than cotton or silk and cannot be printed on machines used for these fabrics. Wool can be printed best on wooden rolls having the design in relief made of wood, Cu or stereo-metal. M. discusses methods of bleaching, degreasing, singeing and other steps necessary for prepg. the wool for printing. Considerable detail is included on screen, plate and roll printing of wool. S. Zuffanti

Modern fabric printing. Albert Franken. *Monatschr. Textil-Ind.* **54**, 195–7(1939).—A discussion of com. treatments. Leopold Scheflan

Printed cloth. E. Justin-Mueller. *Teintex* **4**, 525–30 (1939).—A historical discussion. Saverio Zuffanti

Comparative examination of some tannins as mordants. Teresa Sola. *Atti ufficiali assoc. ital. chim. tec. conciaria* **2**, 248–50(1939).—Exts. from Chinese galls (I), Aleppo galls (II), Istrian galls (III), divi-divi (IV) and *Acacia*

arabica (V), all at 27°Bé., contained, resp., tannin (filter 1
method) 40.00, 39.62, 39.38, 31.01, 30.75%; nontannin 3.92, 3.90, 3.65, 13.25, 13.91%; insol. matter 0.30, 0.41, 0.20, 0.71, 1.35%; and had pH 3.8, 3.6, 3.7, 3.6, 4.4 and Lovibond tintometer readings (yellow) 0.6, 1.3, 6.4, 1.6, 10.1; (red) 0.2, 0.3, 1.8, 0.4, 3.1. Dyeing expts. with methylene blue on wool mordanted with K antimonyl tartrate gave a dyeing intensity progressively decreasing as follows: I, sumac ext., II, III, IV, V. G. A. Bravo

Discussion of the article "The use of [German] raw materials in place of non-rusting steels for the construction of vessels for dyeing and bleaching plants." Karl Strehle. *Klepzig's Textil-Z.* **42**, 449–50(1939); cf. *C. A.* **33**, 7574[9]. —A crit. discussion. Leopold Scheflan

German flax—German linen. Erich Schindler. *Klepzig's Textil-Z.* **42**, 287–8, 319–21, 417–18, 457–8(1939).—A survey of the industry. Leopold Scheflan

Comparative studies on the determination of the quality of fibers in the flax stem. Herbert Ulbricht. *Klepzig's Textil-Z.* **42**, 447(1939).—The detn. of the quality by various methods used in several labs. showed good agreement of the results. By Tobler's micro method it is possible to exam. very small amts. for quality of the textile; it can also be used to test large amts. if care is taken to obtain an av. sample. Leopold Scheflan

Review of artificial German textiles. P. A. Koch. *Klepzig's Textil-Z.* **42**, 229–36, 307–10, 361–8, 464(1939). —An alphabetically arranged survey of artificial textile fabrics manufd. in Germany. Leopold Scheflan

The trend of progress in the cellulose textile industry. H. A. Thomas. *Silk and Rayon* **13**, 864, 866; *Rayon Textile Monthly* **20**, 639–40(1939); cf. *C. A.* **33**, 7117[3].—A review of recent developments in the production, dyeing, finishing and testing of cellulose fibers. II. *Silk and Rayon* **13**, 942–4; *Rayon Textile Monthly* **20**, 694–6(1939).— 5
The affinity of viscose rayon for wool dyestuffs has been increased by (1) mordanting the fiber with quaternary ammonium compds., (2) incorporation of proteins, such as casein, in the viscose spinning mass and (3) treatment of viscose filaments with reagents designed to combine with the cellulose to introduce basic groups or to form a basic resin in or with the fiber. Modifications of the fibers by (2) and (3) have resulted in new fibers of practical value. Viscose rayon is satisfactorily processed in the cake form. 6
This eliminates reeling into skeins and decreases the no. of knots. Modifications in the acetylation process for producing cellulose acetate are described. Mixed esters such as cellulose butyroacetate possess different properties from normal acetate fibers By stretch spinning, rayon of high tenacity is produced. Milton Harris

Progress of the refining of textiles. A. Foulon. *Monatschr. Textil-Ind.* **54**, 197–9(1939).—See *C. A.* **33**, 4042[6]. 7
Leopold Scheflan

The removal of fogs in textile-refining plants. Harry Opitz. *Spinner u. Weber* **57**, No. 35, 11–12(1939).—An illustrated discussion of com. operations. L. S.

Textile chemical analysis. Bernhard Kneer. *Klepzig's Textil-Z.* **42**, 484–5(1939).—Methods are described for the detection of active O in peroxide bleaches and the detn. of fats in textiles by extn. with acetone. Ca soaps are not extd. by acetone; they are detd. by extn. with C_6H_6 or CCl_4. 8
Leopold Scheflan

The article "Textile chemical analysis." Klenk. *Klepzig's Textil-Z.* **42**, 519(1939); cf. preceding abstract. —The Ti reaction is an unequivocal test for the detection of H_2O_2 and all true peroxides (e. g., Na_2O_2, BaO_2); it distinguishes between persulfates and H_2O_2, peroxides and H_2O_2 addn. compds. Leopold Scheflan

The modern finishing of knitted and woven textile fabrics. Carl Aberle. *Deut. Wirker-Ztg.* **59**, No. 34, 38, 9
50, 52, 66(1939).—An illustrated discussion of industrial operations. Leopold Scheflan

New methods for the improvement of fine woven textiles. A. Foulon. *Deut. Wirker-Ztg.* **59**, No. 34, 29–30 (1939).—A survey of new treatments including the dyeing of silk and rayon stockings and the dyeing, washing and wet-treating of other textiles. Several German patents in this field are discussed. Leopold Scheflan

Yarns and fabrics from sheep and Tiolan wool. R. Hünlich. *Spinner u. Weber* **57**, No. 38, 6–7(1939); cf. *C. A.* **33**, 7578[3].—A discussion of manufg., dyeing with various types of dyes and of drying. Leopold Scheflan

Contribution to the histology and pathology of the woolen fiber. Horst Reumuth. *Klepzig's Textil-Z.* **42**, 352–60, 495–510, 538–41(1939).—The structure of wool and the damage to wool caused by acids, alkalies, H_2O_2, Cl and other chemicals, and by fungi and bacteria are reviewed. 2
The Pauly reaction is suitable for damages that are not too large; it is unsuitable for damages in which all of the epidermis and subcutis have been destroyed. The following new method of prepg. pure stable diazobenzenesulfonic acid is given: To 50 g. of sulfanilic acid and approx. 25 g. KOH in 250 cc. soln., cooled thoroughly, add 200 cc. of cold 10% $NaNO_2$ soln., and drop by drop an ice-cooled soln. contg. 80 cc. concd. HCl and 40 cc. of water. 55 references and 48 figures. Leopold Scheflan

The pH value in the refinement of wool. Paul Müller *Deut. Wollen-Gewerbe* **71**, 915–17(1939).—A discussion of the importance of H-ion concn., methods of its detn., applications in fermentation sizing, alk. soap washing of textiles, fulling operations, bleaching with H_2O_2 and acid dyeing. Leopold Scheflan

Increasing the stability of silk to light by protective treatments. M. I. Babynichev and K. M. Markuze. *Shelk* **1938**, No. 10, 24–7; *Khim. Rejerat. Zhur.* **2**, No. 3, 128(1939).—The effect on light-stability of silk of treatment with tannin, hydroquinone, NH_4CNS, hydroxylamine, HCOONa, Na_2SO_3 and thiourea was investigated 4
Best results were obtained by treatment with thiourea; this was effective for 20-day insolation in summer under glass. The stability of silk to light is increased by increasing the alky. of the impregnating soln. However, silk dyed with Indanthrene Yellow 5 GK was less fast to light with increasing alky., owing to the catalytic action of the indigo dye with an increase of pH, which facilitates the intermediate formation of the leuco compd. W. R. H.

The roughening of cotton fabrics. Herberger. *Deut Wollen-Gewerbe* **71**, 1036(1939).—A discussion of suitable treatments. Leopold Scheflan

Theory of the viscometric method of determination of the wear-resistance of cellulose materials. A. A. Morozov. *Colloid J.* (U. S. S. R.) **5**, 525–40(1939).—A cotton fabric was repeatedly washed with a boiling soln. of 1% Na_2CO_3 and 1.5% soap, washed samples were dissolved in Cu NH_4 sulfate and the viscosity of the solns. was measured; η decreased almost linearly with the no. of washings. Detn. of η in a capillary viscometer at various pressures in a H_2 atm. showed that it was abnormal in 0.5 and 1% solns. Washings of the cotton fabric lowered the abnormal viscosity of its solns. to the same extent as the total viscosity, e. g., by 70% after 20 washings. A temp. increase from 20° to 30° lowered the η when its abnormal part was large, otherwise there was only a small change. J. J. B.

Viscosity of products of fractioning of cotton cellulose A. A. Morozov. *Colloid J.* (U. S. S. R.) **5**, 691–706 (1939); cf. preceding abstr.—Cotton (10 g.) was warmed with 1% NaOH and then kept for 20 hrs. in 1 l. of a soln. (I) contg. 1.35% of Cu, 15.5% of NH_3, and 0.2% of sucrose, or in 1 l. of this soln. dild. with $^2/_3$, 1, $1^1/_2$, or 2 vols. of H_2O. The resulting mixts. were injected into dil. AcOH soln. through a Cu gauze; the part remaining on the gauze was termed "insol. fraction" and that pptd. outside the gauze, "sol. fraction." Solns. of "sol. fractions" in I had higher viscosities than those of "insol. fractions" but the difference (and the values of both viscosities) decreased with the vol. of H_2O added to I. The structural part and the temp. coeff. of η also increased with dilu. of the initial Cu NH_4 soln., while the I no. of "insol. fractions" decreased. J. J. Bikerman

The chemical modification of cellulose, with some observations on the more recent developments in textile-finishing processes. J. Craik and W. R. Davis. *J. Soc. Dyers Colourists* **55**, 597–606(1939).—A consideration of: (*a*) the general trend in the development of cellulose derivs. and (*b*) some of the newer finishing processes and an outline of some older and better known products.

Among the latter are cellulose nitrate and acetate, viscose, ethyl- and benzylcellulose and methyl- and hydroxyethylcellulose. Under (*a*) cellulose esters and ethers are briefly discussed. There appears little prospect of important new cellulose ethers, sol. in org. solvents, coming to the fore. Cellulose mixed ether esters have shown no characteristics likely to justify their manuf. on a large scale. In the hydroxyethyl (glycol) cellulose, made by the action of ethylene oxide or ethylene chlorohydrin on soda cellulose, it is possible to prep. 3 classes of ethers. In the line of permanent finishes, the most promising materials are the hydroxyethylcelluloses and methylcelluloses. The corresponding cellulose glycolic acid can also be used, though the free — COOH group makes it much less permanent a finish when washed with soap. An ether made by the action of a half-mol. proportion of etherifying agent per $C_6H_{10}O_5$ unit of cellulose and completely and readily sol. at ordinary temps. in NaOH gives finishes not nearly as permanent as those from products made by the actions of, e. g., one-quarter mol. proportion of etherifying agent. The methods of application of these cellulose ethers are outlined. A proprietary softening agent resistant to laundering may be applied either before, after or with the cellulose ether. New and useful finishes on fabrics have been obtained by the use of waxes or resins as polyvinyl acetate, polyacrylic acid esters, certain glyptals and resin dispersed on the alkali solns. of the cellulose ethers. Means of prepg. these dispersions are outlined. The properties imparted to fabrics by the various permanent finishes are discussed from the points of: washing fastness, tensile strength, wearing properties and storage properties. Water-sol. cellulose ethers are used to some extent in the finishing of leather and textiles. They are neutral and extremely resistant to the action of light, alkalies and atm. oxidation but are not fast to washing. They are capable of holding very much larger proportions of inert fillers than starch. Water-sol. Na cellulose glycolate has a greater holding power for pigments than products of the methylcellulose type. The water-sol. cellulose ethers act as powerful protective colloids and are good emulsifiers for oils, waxes and fats, and may serve as adhesives and binding agents for clays and graphites. Recently aq. emulsions of certain cellulose derivs. have been introduced for the finishing of textiles. W. H. Boynton

The German rayons and staple fibers in photomicrographs. II. Staple fibers. B. Hauptmann. *Kunstseide u. Zellwolle* **21**, 447–50(1939); cf. *C. A.* **33**, 6057[2].—Photomicrographs of longitudinal and cross sections of 4 com. cellulosic fibers are reproduced. Mark Plunguian

Research in the German staple-rayon industry. Ludwig Gesser. *Klepzig's Textil-Z.* **42** No. 30, 1–2; No. 32, 1–2 (1939).—A survey. Leopold Scheflan

The technological behavior of staple rayons. Robert Schwab. *Klepzig's Textil-Z* **42**, 387–9, 397–8(1939).—A discussion of felting. Leopold Scheflan

Methods of examining staple rayons and their relationship to the requirements of the industry. W. Weltzien. *Monatsh. Seide Kunstseide Zellwolle* **44**, 324, 326, 328, 330, 350 6(1939); cf. *C. A.* **33**, 8021[4].—Fifty-six addnl. references are discussed and numerous illustrations and curves are shown. Leopold Scheflan

Staple rayon and fabrics containing staple rayon. A. Boulon. *Monatschr. Textil-Ind.* **54**, Fachheft 2, 65–6 (1939).—A discussion of chem. and mech. treatments. Leopold Scheflan

Vistra staple rayon 1919–1938. H. van Beek. *Monatschr. Textil-Ind.* **54**, Fachheft 2, 47–9(1939).—See *C. A.* **33**, 2332[2]. Leopold Scheflan

Physical and chemical methods of testing staple rayon. Walther Schieber. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 266–74(1939).—Comparison of phys. properties of eleven grades of staple rayons with those of cotton and wool shows the superiority of the natural over the artificial textiles. A nitrate soln. diagram makes it possible to judge to a certain extent the packing density in a vegetable fiber material and its relation to the degree of polymerization and sp. wt. For the staple rayons examd. the packing density varied from 43–62%. The higher packing density indicates higher resistance against soln. and correspondingly better wet strength. Chain-length diagrams and soln. diagrams for eleven types of staple rayon are shown and discussed. The alkali soly. is inversely proportional to the mean degree of polymerization, in case of nearly uniform titer. The data indicate that (1) staple rayons of low mean degree of polymerization always have a greater soly. than those of higher degree of polymerization and (2) depending on the method of spinning used, special staple rayons show distinct differences, the cuprammonium process yielding the least favorable results. The detn. of the accurate compn. of staple rayons with regard to their mol. length was studied by (1) detg. the soly. of staple rayon in NaOH of const. concn. and different temps. and (2) nitrating staple rayon and subsequent fractional soln. of the fibers by means of mixts. contg. a solvent and a nonsolvent, e. g., Et acetate and alc. in different proportions. Reproducible results can be obtained with these methods only if they are carried out under const. conditions. Results obtained with them are shown in alkali soln. diagrams and nitrate soln. diagrams for Schwarza staple rayon. At different temps staple rayons of higher degree of polymerization were found to have a lower soly. than those with low and mean degree of polymerization. Another diagram illustrates the distribution of cellulose mols. of a fresh and a repeatedly washed and bleached fabric according to chain length; it indicates that the repeated washing and bleaching operations brings about a progressive alteration of the compn. in favor of smaller mol. lengths. Soln. diagrams obtained by the nitrate methods of two staple rayons of widely differing degrees of polymerization which had been manufd. under the same spinning conditions show that the low-polymer staple rayon contains consistently more constituents of easily sol. material. The results of all chem. and phys. tests show that there are relationships among soly., degree of polymerization, cleavage tendencies and frictional properties which make it possible to deduce the usefulness of a fabric and that high degree of polymerization of the fiber shows high quality and usefulness. 5 tables and 27 figures. Leopold Scheflan

New methods of evaluating staple fiber. Otto Eisenhut. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 261–5(1939).—The chem. methods of testing include the measurement of the mean degree of polymerization, fractional washing with NaOH of definite concn. at various temps., and the nitration of staple rayon and subsequent fractionation of the nitrates. It is recommended that the degree of polymerization be checked in all cases where a chem. disintegration of staple rayon may occur. The fractionation of the nitrates from staple rayons of different degrees of disintegration yields constituents with mols. of a degree of polymerization of 250. Staple rayons which are disintegrated to a smaller extent contain 40% of mols. of a degree of polymerization of 1000 while the highly degraded staple rayons contain only 10% of these mols. Similar results were obtained by washing these staple rayons with NaOH at different temps. Other examples of applications are discussed. Conclusions: The mech. and chem. properties of staple rayons differ from those of cotton owing to a difference in their phys. structure. The study of staple rayon and its control in industrial practice should be governed by more thorough methods of testing based on (1) accurate measurements of the strength-elongation properties and observations of the elastic and plastic properties of staple rayon, (2) measurement of the degree of polymerization and observation of staple rayon according to its compn. from different mols. of varying size during its manuf. and chem. alteration during processing, and (3) study of the splitting-up effect and its cause. 4 tables and 10 figures. Leopold Scheflan

Survey of the refinement of modern rayons and staple rayons. Max Peter. *Klepzig's Textil-Z.* **42**, 223–8, 393–4, 402–5, 410–12, 420–1, 450–2, 469–71, 478–80, 486–8, 524, 526, 534–5(1939).—226 references. L. Scheflan

Highly waterproof staple rayon. J. Harms. *Klepzig's Textil-Z.* **42**, 421; *Deut. Wollen-Gewerbe* **71**, 879–80 (1939).—Permanent waterproofing of staple rayon has

not yet been realized by hydrophobing or addns. to the spinning soln. Better results have been obtained by the use of very pure cellulose, careful treatment of cellulose during manufg. operations, better soln. of the xanthate and various changes in pptn. and aftertreatment baths. Leopold Scheflan

The oiling of staple rayons. B. Axhausen. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 242–4(1939).—An illustrated discussion of various com. installations and processes. Leopold Scheflan

Practical experiences in the sizing of staple rayon and rayon. Karl Walter. *Deut. Wollen-Gewerbe* **71**, 1093–6, 1121–4(1939).—The desirable properties of a good size are enumerated, an appropriate sizing process is described, the advantages of the use of dryer sizing machine are discussed, and special sizing formulas are given. L. S.

Testing knitted rayon fabrics. C. Eugene Coke. *Can. Textile J.* **56**, No. 21, 33–4(1939).—A discussion of results of laundering tests, the loss of strength during wear, instructions for washing rayon and the dry cleaning of dress goods. Leopold Scheflan

Production and equipment machinery for the manufacture of staple fiber and rayon goods. E. A. Anke. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 188–90(1939). L. S.

The sizing of rayon and staple rayon Herbert Brandenburger. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 240–1; *Spinner u. Weber* **57**, No. 31, 93–4, 96(1939).—A discussion of appropriate chem. and mech. treatments. Leopold Scheflan

Donegal. Kurt Hentschel. *Klepzig's Textil-Z.* **42**, 511–18(1939).—An illustrated description of chem. and mech. methods of manufg. Donegal textile fabrics in northwest Ireland. Leopold Scheflan

The manufacture and finishing of women's velour fabrics containing German shoddy. Erich Sellenk. *Deut. Wollen-Gewerbe* **71**, 890–1(1939).—A discussion of suitable chem. and mech. treatments. Leopold Scheflan

Felt and velvet. An alphabetical review of the common trade terms, names and designations for felts and velvets. Otto Pennenkemp *Spinner u. Weber* **57**, No. 26, 25–30 (1939) Leopold Scheflan

Methods of producing patterns on cloth. Hans Freytag. *Gebrauchsfotografie* **45**, 69–70(1938); *Phot. Ind.* **36**, 611. —The methods described are: (*a*) pictures produced on the cloth by the Fe gallate process, by Prussian blue or by Ag compds. are transformed into other metal compds. onto which basic dyes can be mordanted; (*b*) the cloth is made sensitive to light by means of diazo compds.; (*c*) cloth is sensitized to light by leuco dyes; and (*d*) colorless or colored org. substances make the cloth sensitive to light. A method of producing patterns on cloth belonging to the 1th group is described, in which grayish brown or brownish violet half-tones are produced by a 6-stage process. W. F. Berg

The nature of the shrinking [of textiles] and the problems of sanforizing finishing treatments. H. Rath. *Monatsh. Seide Kunstseide Zellwolle* **44**, 347–9(1939).—An address. Leopold Scheflan

New suggestions for the preparation of washproof and waterproof textiles involving the use of protein and protein compounds. Karl Erler. *Wollen- & Leinen-Ind.* **59**, 267–8(1939); *Chem. Zentr.* **1939, II**, 2865.—A discussion of the theory of porous, waterproof impregnations, the behavior of colloids, and double-bath methods for protein impregnations. A 20% soln. of egg albumin in cold water is reduced with 5% NaCl soln. to 1% albumin. The pH is adjusted to 4.5 by the addn. of AcONa and the textile is treated with this soln. in a suitable machine. Aftertreatments involve evapn., soaping and boiling at a pH of 7–7.5. Impregnations insol. in hot soap solns. are obtainable only with albumin which can be coagulated at the isoelec. point and which has been subjected to the double-bath treatment. Leopold Scheflan

Preservatives. Carl-Heinz Fischer. *Deut. Wollen-Gewerbe* **71**, 704–6(1939).—A crit. discussion of the simple, older preservatives used in the textile industry contg. derivs. of HClIO, phenol, salicylic acid, $ZnCl_2$, etc., as well as of modern products as Amicrol, Betol, chlorocresol, Preventol, Raschit, Salol and Shirlan. The new products are more effective and less harmful than the old. Leopold Scheflan

The textile chemical uses of sulfamic acid. J. Wakelin. *Am. Dyestuff Reptr.* **28**, 729–31(1939).—A recently discovered method for the relatively cheap production of sulfamic acid makes its use for a variety of textile uses more important. The addn. of Na or NH_4 sulfamate to solns. of soap or sulfated fatty alc. detergents for textiles is advantageous and improves the speed of dissolving and their ultimate soly. Sulfamates dissolve or disperse heavy metal salts. Alkali sulfamates prevent concd. solns. of soap from forming a gel when they cool. The amino H atoms of sulfamic acid are capable of being substituted by other radicals. W. H. Boynton

The cause, nature and significance of the Allwörden reaction. Curt Müller. *Klepzig's Textil-Z.* **42**, 329–33 (1939).—A crit. discussion of the value of the Allwörden reaction (*C. A.* **10**, 1436). The bubbles of the Allworden reaction are caused by the cells of the scales. The character of the bubbles is described as well as the behavior toward alkalies, acids and mech. factors and the formation of the bubbles by osmotic forces, whereby the wall of the bubble acts as a true membrane with selective permeability. The Allwörden reaction is not a generally applicable testing method. 13 references and 6 photomicrographs Leopold Scheflan

Undesirable electrolytic phenomena in the textile industry. H. Rammensee. *Klepzig's Textil-Z.* **42**, 481–2 (1939).—Several examples of unwanted electrolysis, corrosion, etc., in com. textile operations are discussed Leopold Scheflan

Can air be the cause of defects in textiles? Rudolf Schwarz. *Deut. Textilwirt.* **6**, No. 14, 20–3(1939).—Damages caused by the atm. are described and suitable air conditioning installations are discussed and shown. Leopold Scheflan

Calcium soaps: Defects caused by their formation Remedies. Joseph Rière. *Teinter* **4**, 514–19(1939).—The use of hard waters, in textile treating, causes the formation of undesirable Ca soaps R. points out the unevenness of dyeing and lack of fastness of dyes whenever these soaps are pptd. on or in the fibers. The common methods of *water softening* are discussed, such as heating, $Ca(OH)_2$, Na_2CO_3, Na_3PO_4, Permutite, AcOH, NaH_2PO_4, $Na_2H_2P_2O_7$, and protective colloids such as sulfonated fatty alcs. and their derivs. Saverio Zuffanti

The automatic production and control of low temperatures. Otto Th. Koritnig *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 307–8(1939).—An illustrated discussion of industrial installations for the textile industry. L. S

Progress in the technique of air conditioning. Conr. J. Centmaier. *Spinner u. Weber* **75**, No. 34, 35–7(1939) A survey of applications in the textile industry. L. S

Electrical air-conditioning installations [in the textile industry]. G. Firle. *Spinner u. Weber* **57**, No. 25, 8 (1939) Leopold Scheflan

Air-conditioning installations, the last stage in the development of the modern textile plant. Emil Gluckheh. *Deut. Wollen-Gewerbe* **71**, 838–44(1939).—Descriptive. Leopold Scheflan

Air-conditioning installations in the production and utilization of staple rayon and rayon. E. G. Schmidt. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 190–2, 236–40(1939) —A survey of com. installations and processes. L. S

Air conditioning plants for the production and processing of staple fiber and rayon. E. G. Schmidt. *Zellwolle u. Deut. Kunstseiden-Ztg.* **6**, 190–2, 236–8(1939).—An illustrated discussion. Leopold Scheflan

The impregnation with rubber of raincoat fabrics Kurialt. *Deut. Färber-Ztg.* **75**, 403(1939).—A discussion of chem. and mech. treatments. Leopold Scheflan

Slide fasteners from modern synthetic materials and their behavior toward the solvents used in chemical dry cleaning. Kuno Rickert. *Deut. Färber-Ztg.* **75**, 325–6 (1939).—Of a large no. of dry-cleaning and spotting solvents and solvent mixts. which were tested on slide fasteners manufd. from two German synthetic raw materials

only light petroleum and EtOH were entirely inert to both. Slide fasteners made from one of these two raw materials were resistant to more solvents than those made from the other raw material. The method of testing is described. Leopold Scheflan

Acid-resistant steel in the textile-refining industry. Hans Hougardy. *Spinner u. Weber* **75**, No. 30, 49–50, 53–6, 58(1939).—A survey. Leopold Scheflan

The application of rustproof and acid-resisting steels in the textile-refining industry. Werner Anhegger. *Spinner u. Weber* **57**, No. 34, 89–90, 93(1939).—An illustrated review with views of various types of machinery used. Leopold Scheflan

Modern dust-removal installations for the textile industry. H. Opitz. *Monatschr. Textil-Ind.* **54**, Fachheft 2, 1–2(1939).—Descriptive. Leopold Scheflan

Chemical precipitation of textile wastes and studies of pH control. Ralph Porges, Robert K. Horton, and Herman G. Baity. *Sewage Works J.* **11**, 828–63(1939).—The optimum pptn. of Sulfur Black waste appears dependent on mixing, flocculation and addn. of chemicals. Addn. of iron salts prior to acids reduces odors and favors better color removal owing to the formation of insol. Fe sulfide. By the addn. of inert materials such as coal, dust or sand more complete settling is obtained. For the treatment of kier liquors alum alone or alum and acid produce the best results. Cu and lime yield fair results. Carbonation by CO_2 and coagulation with $CaCl_2$ produces a poor effluent but offers possibilities as a cheap method for partial treatment. The best color removal for indigo waste liquor is obtained with lime, second best with alum and third best with $CaCl_2$. The most economical treatment is a combination of lime and copperas followed by flocculation. The resulting sludge dewaters rapidly. The most satisfactory treatments of vat dye waste were $FeCl_3$, alum, copperas in combination with lime and $Fe_2(SO_4)_3$. In the treatment of developed color waste the best and most economical results were obtained from copperas and lime. *Naphthol color dye waste* was successfully treated with H_2SO_4, $Fe_2(SO_4)_3$, alum and $FeCl_3$. Aniline black wash water was treated successfully with lime and alum. In general, results show that each coagulant appears to have a pH zone for optimum pptn., this zone being independent of the individual waste being treated. W. D. Hatfield

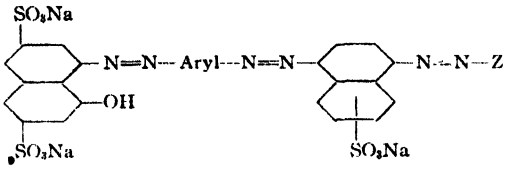
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Analysis [of dyes] for traces of metallic impurities (Hess, *et al.*) 7. Modern methods for detn. of S and cystine in sheep wool (Schoberl, Rambacher) **11B**. Control of dermestids and clothes moths (Fremed) **13**. Alkylolaminomethylene compds. [dye intermediates] (U. S. pat. 2,169,736-7) **10**. Capillary-active compds. [for waterproofing fibers] (Brit. pat. 508,066) **13**. Aminoaryl sulfones [improving fastness of direct dyeings] (Brit. pat. 508,148) **13**.

Azo dyes. Pierre Petitcolas (to Compagnie nationale de matières colorantes et manufactures de produits chimiques du Nord réunies, etablissements Kuhlmann). U. S. 2,169,162, Aug. 8. From components such as 2-diethylsulfonamido-5-methylphenylsulfonamidoaminobenzene and diacetoacetyl-*o*-tolidine and the like, azo dyes are produced which dye cotton yellow or orange shades and which have the general formula $1\text{-}(R_3R_4NSO_2)\text{-}4\text{-}(R_1R_2NSO_2)\text{-}2\text{-}(AN.N)C_6H_3$, in which R_1, R_2, R_3, R_4 are H or alkyl, aralkyl, aryl or cycloalkyl groups and A is the residue of a coupling component of the group consisting of the arylides of *o*-hydroxy carboxylic acids and of acylacetic acids.

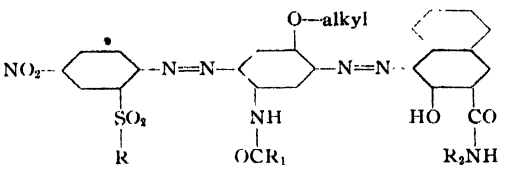
Azo dyes. James G. McNally, Joseph B. Dickey and Werner H. Zugschwerdt (to Eastman Kodak Co.). U. S. 2,171,159, Aug. 29. From components such as 4-aminophenyl furyl ketone and barbituric acid and the like, dyes are obtained which dye cellulose acetate yellow to red or orange shades and which have the general formula RCO-R_2N NR_1 wherein R represents a furan, a thiophene or a pyrrole radical, R_1 represents a benzene nucleus, a naphthalene nucleus, a heterocyclic nucleus or a hydroaromatic nucleus and wherein the benzene nucleus designated R_2 may contain an alkyl group, an alkoxy group, a halogen atom or a nitro group. Numerous examples are given.

Azo dyes. Chester W. Hannum and Swanie S. Rossander (to E. I. du Pont de Nemours & Co.). U. S. 2,171,364, Aug. 29. From components such as H acid, α-naphthylamine, 1,6-Cleve's acid and cresidine, and the like, dyes are obtained which dye cellulose blue shades and which have the general formula



in which Aryl is a radical having a single benzene or naphthalene nucleus and Z is a radical having a single benzene nucleus and an amino group substituted thereon.

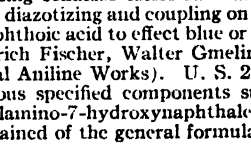
Azo dyes. Gerald Bonhote and Hans Johner (to Soc. pour l'ind. chim. à Bâle). U. S. 2,171,824, Sept. 5. From components such as 4-amino-5-methoxy-2-acetylamino-2′-methylsulfonyl-4′-nitroazobenzene and 3-hydroxy-2-naphthanilide and the like, dyes are formed which dye blue tints of good fastness and which have the general formula



in which R stands for an alkyl, aralkyl or an aryl radical of the benzene series, R_1 stands for alkyl, O-alkyl, aralkyl or an aryl radical of the benzene series, and R_2 stands for an aromatic nucleus of the benzene and naphthalene series.

Azo dyes. Donovan E. Kvalnes (to E. I. du Pont de Nemours & Co.). U. S. 2,172,752, Sept. 12. From components such as 4′-amino-4-(ethylhydroxyethylamino)-azobenzene and 3-hydroxy-2-naphthoic acid and the like, dyes are obtained of the general formula $(H_2N)(X)C_6H_3N.NC_6H_3(Y)N(alkyl)(hydroxyalkyl)$ in which X and Y are each at least one of a group consisting of hydrogen, alkyl, alkoxy and halogen, and hydroxyalkyl contains at least 2 C atoms. These dyes are suitable for coloring acetate rayon, etc. U. S. 2,172,753 relates to the use of such dyes in dyeing cellulose esters such as cellulose acetate with further diazotizing and coupling on the fibers with 3-hydroxy-2-naphthoic acid to effect blue or black dyeings.

Azo dyes. Erich Fischer, Walter Gmelin and Richard Huss (to General Aniline Works). U. S. 2,175,794, Oct. 10. From various specified components such as aniline and 1-sulfoethylamino-7-hydroxynaphthalene, water-sol. azo dyes are obtained of the general formula

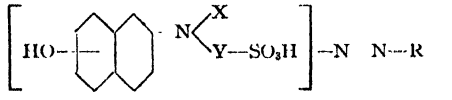


wherein R stands for a radical of the benzene series, X for H or the sulfonic acid group and Y for methyl or ethyl, being dark powders which penetrate deeply into *leather* and yield shades from violet to blue to black.

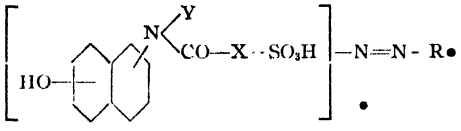
Azo dyes. Wilhelm Huber (to Soc. pour l'ind. chim. à Bâle). U. S. 2,178,417, Sept. 19. From components such as 2-cyano-4-nitro-1-aminobenzene and (ethylmethoxyethylamino)benzene and the like, dyes are ob-

tained which dye acetate rayon blue to violet shades and which have the general formula 2-($R_1R_2NAN{:}N$)-3-X-5-$NO_2C_6H_2CN$ wherein X represents H or NO_2, A represents an aromatic nucleus of the benzene and naphthalene series, and R_1 and R_2 represent H or alkyl, the amino group $—NR_1R_2$ standing in 4-position to the —N=N— group when A is a nucleus of the naphthalene series. Numerous examples are given.

Azo dyes. Erich Fischer and Walter Gmelin (to General Aniline Works). U. S. 2,175,795, Oct. 10. Monoazo dyes are produced of the general formula



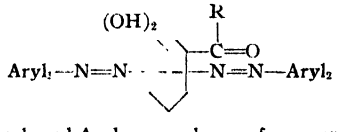
wherein R means a radical of the benzene series not contg. a group lending solubility, X stands for H, methyl or ethyl, and Y for methane, ethane or propane residues, being brown powders which dye wool from an acid bath below boiling temp., at 60° to 90°, yellow-brown, brown-red to Bordeaux-red even shades. U. S. 2,175,796 relates to the production of water-sol. dyes of the general formula



wherein R means a radical of the benzene series not contg. a group lending solubility, Y stands for H, methyl or ethyl, and X for methane or ethane residues, being yellow-red to dark-red powders which dye wool in an acid bath below boiling temp., at 60° to 90°, orange-yellow, red to blue-red even shades.

Azo dyes. I. G. Farbenindustrie A.-G. Brit. 507,274, June 13, 1939. Water-insol. dyes are made in substance or on a substratum by coupling a diazo compd. of an amine of formula 2-Cl-4-$H_2NC_6H_3SO_2$-alkyl with 1-(2′,3′-hydroxynaphthoylamino)-4-ethoxybenzene. They yield orange shades fast to light and weather and may be used in the manuf. of lakes. In examples describing the prepn. of a dye in substance and on cotton yarn, the methyl sulfone is used as the diazo component.

Azo dyes from ring acylated phenols. Swanie S. Rossander and Harold E. Woodward (to E. I. du Pont de Nemours & Co.). U. S. 2,174,998, Oct. 3. From components such as diazotized *o*-aminophenolsulfonic acid and a dihydroxyphenone and the like, dyes are obtained which dye fast colors and which have the general formula



in which $Aryl_1$ and $Aryl_2$ are each one of a group consisting of the residues after diazotization of primary aryl amines, and R is the radical of one of a group consisting of straight- and branched-chain aliphatic hydrocarbons having at least 6 C atoms, aryl and aralkyl.

Chromiferous azo dyes. Walter Hanhart and Peter Pieth (to Soc. pour l'ind. chim. à Bâle). U. S. 2,171,828, Sept. 5. Cr-contg. azo dyes which dye wool and silk fast violet shades, etc., are produced by a process which involves heating azo dyes of the general formula of a 4-amino-1,5-naphthalenedisulfonic acid substituted in the 3-position by HORN:N— wherein R represents the radical of a diazo component the hydroxyl group of which stands in *o*-position to the azo group, with a trivalent Cr salt of HCl, HF or H_2SO_4 until on the one hand the complex Cr compd. of the azo dye has been formed, and, on the other hand, the NH_2 group of the naphthalene nucleus standing in *o*-position to the azo group has been exchanged for a hydroxyl group.

Azo compounds; dyeing and printing. Hans Z. Lecher (to The Calco Chemical Co., Inc.). Brit. 507,260, June 13, 1939. A diazotized aromatic or heterocyclic amine, not contg. a SO_3H or COOH group, is coupled with biguanide or a deriv. thereof that contains at least 1 H atom linked to a biguanide N atom but does not contain an aromatic or heterocyclic radical carrying a OH or amino group. Among examples, (1) diazotized 2-methyl-5-chloroaniline is added to a soln. of biguanide acid sulfate in NaOH soln., the azo compd. formed is filtered off and excess of biguanide is recovered from the filtrate by addn. of ammoniacal $CuSO_4$ soln., whereby a ppt. of Cu biguanide sulfate is obtained that may be decompd. with H_2S or Na_2S, and (2) diazotized 2-methoxy-4-nitroaniline or 2-methyl-4-nitroaniline is coupled with 1-phenylbiguanide. The azobiguanide compds. are generally stable to alkalies but easily decompd. by acids. They may be used in producing azo dyes on the fiber and for this purpose an alk. compn. contg. an azobiguanide compd. and an enolic or phenolic coupling component may be printed on the fibers and the dye then developed by treatment with an acid bath or with steam contg. an acid vapor. For use in such compns. the azobiguanide compds. may be treated with a deflocculating agent and a protective colloid with or without a wetting agent and a hydrotropic substance. Among examples, an aq. mixt. of 2-methyl-5-chlorobenzeneazobiguanide, 3-hydroxy-2-naphthoic acid *o*-phenetide, the Na salt of disulfodinaphthylmethane, Na_3PO_4 and dextrin is prepd. and dried, a printing paste is then prepd. by dispersing the product in aq. NaOH soln. and adding glycol monoethyl ether and starch-tragacanth thickener; printing is effected in the usual manner and the dye developed with steam contg. AcOH vapor, a scarlet print being obtained.

Monoazo compound. James G. McNally and Joseph B. Dickey (to Eastman Kodak Co.). U. S. 2,176,505, Oct. 17. From diazotized 1-amino-2,6-dimethoxybenzene and 1-phenyl-3-methyl-5-pyrazolone a monoazo deriv. is obtained which dyes cellulose acetate rayon yellow. Various similar yellow, red and brown dyes are described.

Monoazo dyes. Arthur H. Knight and Imperial Chemical Industries Ltd. Brit. 508,314, June 28, 1939. Dyes are made by coupling a diazotized *p*-nitroamine of the C_6H_6 series devoid of SO_3H and COOH groups with (a) an amine of the C_6H_6 series of formula *m*-AC_6H_4NXY, where X is alkyl, hydroxyalkyl, aryl, aralkyl or cycloalkyl, Y is an esterified hydroxyalkyl group, the ester residue being that of a dicarboxylic acid 1 COOH group of which is unesterified, which acid is either maleic acid or an aliphatic acid of formula $C_nH_{2n}(COOH)_2$, where C_nH_{2n} is a straight- or branched-chain hydrocarbon radical contg. 2–4 C atoms, and A is H, alkyl or halogen, or (b) a monoester of a 3-hydroxy-1,2,3,4-tetrahydroquinoline deriv. substituted in the 1-position by alkyl or aralkyl and in the 7-position by H, alkyl or halogen, and a dicarboxylic acid as above defined. Alternatively, the corresponding hydroxyalkyl dyes are monoesterified by reaction with anhydrides of the above dicarboxylic acids. The salts of the dyes are H_2O-sol. and are used for dyeing and printing acetate rayon. Among examples, (1) acetate rayon is printed with a paste contg. the azo dye 2-chloro-4-nitroaniline → the succinic ester of *N*-ethyl-*N*-β-hydroxyethylaniline, *N*,*N*-dibenzylsulfanilic acid, glycerol and an ammoniacal thickener, dried and steamed (bluish red), and (2) the dye *p*-nitroaniline → *N*-ethyl-*N*-β-hydroxyethylaniline is treated with maleic anhydride in dry tetrachloroethane.

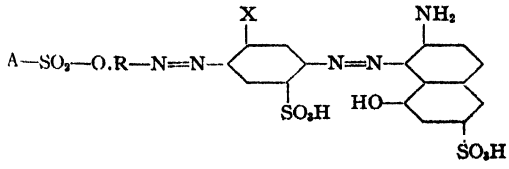
Monoazo dyes for cellulose esters and ethers. Emmet F. Hitch (to E. I. du Pont de Nemours & Co.). U. S. 2,173,054, Sept. 12. Dyeing is effected by applying to cellulose esters or ethers such as cellulose acetate rayon an aq. soln. of a dye such as may be formed from *N*-(*p*-aminobenzoyl)-*N*-methylglucamine or the like and which is represented by the general formula $Aryl_1—N=N—Aryl_2$ in which $Aryl_1$ and $Aryl_2$ are each one of a group consisting of benzene and naphthalene nuclei which are devoid of

sulfonic acid and carboxy groups, at least one of said aryl nuclei being substituted by a group $—(Z)_{n-1}NR_1R_2$ wherein Z is the radical —CO—, $—CH_2—$ or $—SO_2—$, n is 1 or 2, R_1 is a polyhydroxyalkyl radical having 4–6 C atoms and one fewer hydroxy group than C atoms, and R_2 is H, alkyl, hydroxyalkyl, dihydroxyalkyl or chlorohydroxyalkyl; and when $Aryl_1$ is substituted by a group $(Z)_{n-1}—NR_1R_2$ then $Aryl_2$ is substituted by one of a group consisting of hydroxy and said group $—(Z)_{n-1}NR_1R_2$; said application being carried out at a temp. of approx. 70° to 95° and until the fibers are dyed; and then washing the fibers. Such dyes dye orange and various other shades and numerous examples are given.

Monoazo dyes for cellulose esters and ethers. Emmet F. Hitch and Donovan E. Kvalnes (to E. I. du Pont de Nemours & Co.). U. S. 2,173,055, Sept. 12. Dyes giving red or other colored dyeings on cellulose esters and ethers such as cellulose acetate are formed from components such as *p*-nitroaniline and *N*-sorbityl-α-naphthylamine and the like and have the general formula of a naphthalene deriv. Aryl—N=N)-4-RHN-8-X-$C_{10}H_4Y$ in which aryl is a radical of the group consisting of primary amines of the benzene and naphthalene series which are devoid of carboxyl and sulfonic acid groups, X is H or hydroxy, Y is at least one of the group consisting of H, hydroxy, alkyl, alkoxy, halogen, amino, acetylamino, benzoylamino, NH-alkyl, —NH-hydroxyalkyl, dialkylamine and dihydroxyalkylamine, wherein the alkyl groups have one to three carbons, and R is a polyhydroxyalkyl group having 4 to C atoms and one fewer hydroxy than C atoms. U. S. 2,173,056 (Hitch, Kvalnes and Swanie S. Rossander, joint inventors; to same assignee) relates to dyes dyeing cellulose acetate or other cellulose esters and ethers orange or other shades, which may be formed from components such as β-naphthol and (*p*-aminobenzoyl)-*N*-methylglucamine and the like and have the general formula $R_1R_2N/_n(C_6H_3(X)(N{:}NE)$ in which R_1 is a polyhydroxyalkyl radical having 4–6 C atoms and one fewer hydroxy than C atoms; R_2 is H, alkyl, hydroxyalkyl, or halogen-substituted alkyl and hydroxy alkyl; Z is one of the radicals CO, $—CH_2—$ or $—SO_2—$; n is 1 or 2; X is at least one of a group consisting of H, alkyl, alkoxy and halogen; and E is an azo dye coupling component having no sulfonic or carboxyl groups and which may be of the hydroxybenzenes, anilines, naphthylamines, enols, phenylalkylpyrazolones or hydroxyquinolines, the azo bridge being connected to the benzene nucleus in one of the positions meta or para to Z. Numerous examples are given. Cf. *C. A.* **34**, 6341.

Disazo dyes. Wolfgang Alt and Hans Krzikalla (to General Aniline Works). U. S. 2,169,970, Aug. 15. Dyes of blue and other colors are obtained by coupling a diazo compd. of 4-amino-3-methoxydiphenylamine or 4-amino-4′-methoxydiphenylamine or the like with an *o*-hydroxyaryl carboxylic arylide contg. in the arylide portion at least one sulfonic acid group and corresponding to the general formula *o*-HO—Ar—CO—NH—B_1—NH—B_2—NH—B_3—NH—CO—Ar—OH—*o*, where Ar stands for arylene radicals and where B_1, B_2 and B_3 stand for phenylene radicals.

Disazo dyes. J. R. Geigy A.-G. Brit. 507,967, June 23, 1939. Dyes of formula



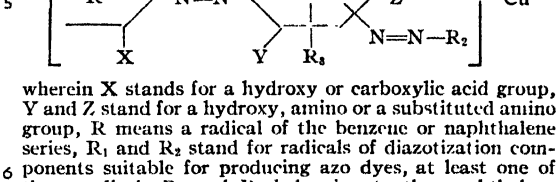
where X is H, alkyl or alkoxy, R is the residue of a phenol coupled in *p*-position and A is aryl, are made by coupling the diazo compd. of an amino monoazo dye corresponding to the above compd. with a phenol capable of coupling in *p*-position, and treating the disazo dye with an arylsulfonylchloride, or by coupling the diazo compd. of a monoazo dye of formula 2-H_2N-4-X-5-(HORN:N)$C_6H_3SO_3H$ with 2,8,6-acid in acid soln. and treating the disazo dye with an arylsulfonyl chloride. In examples, (1) the dye 4-nitro- or -acetylamino-1-aminobenzene-6-sulfonic acid → 2,8,6-acid is reduced or sapond., diazotized, coupled with phenol and the product treated with *p*-toluenesulfonyl chloride (I) (violet on wool), and (2) the dye 4-amino-4′-hydroxyazobenzene-3-sulfonic acid (from 4-nitro- or -oxalylamino-1-aminobenzene-3-sulfonic acid → PhOH and reduction or sapon., or by heating the dye 4-chloro-1-aminobenzene-3-sulfonic acid → PhOH with NH_3 under pressure) is diazotized and coupled with 2,8,6-acid in acid soln. and the product treated with I. Cf. *C. A.* **33**, 7585[1].

Diazoamino compounds. Albert Schmelzer and Eberhard Stein (to General Aniline Works). U. S. 2,173,324, Sept. 19. From initial materials such as diazotized 4-chloro-2-toluidine and 3-tetramethylene sulfone-glycine and the like, generally colorless to yellowish to brown cryst. compds. are obtained which have the general formula

$$[CH_2.SO_2.CH_2.CH_2.CHN(N—\text{alkylene}—X) : N—]_n—R$$

wherein R stands for an aromatic radical, free from carboxylic and sulfonic groups, X stands for an acid salt-forming group and n for 1 or 2, which can be used in the *prepn. of azo dyes* according to U. S. patents 1,882,560–1 (*C. A.* **27**, 849 and 852). Several examples with details are given.

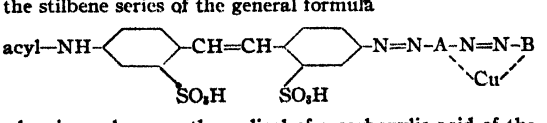
Copper-containing azo dyes. Ernst Fellmer (to General Aniline Works, Inc.). U. S. 2,175,187, Oct. 10. Several examples are given of the production of brown dyes contg. Cu in complex form of the general formula



wherein X stands for a hydroxy or carboxylic acid group, Y and Z stand for a hydroxy, amino or a substituted amino group, R means a radical of the benzene or naphthalene series, R_1 and R_2 stand for radicals of diazotization components suitable for producing azo dyes, at least one of these radicals R_1 and R_2 belonging to the naphthalene series, and R_3 stands for a member of the group consisting or hydrogen, hydroxyl, alkyl, halogen, —COOH and $—SO_3H$, being in form of their alkali metal salts generally dark, water-sol. powders, dyeing *leather* generally even shades fast to light.

Dyes containing metals such as chromium and copper. Mordecai Mendoza (to Imperial Chemical Industries Ltd.). U. S. 2,174,591, Oct. 3. A process for the manuf. of metal-contg. dyes comprises treating with agents yielding metals having an atomic wt. between 50 and 64, those unsymmetrical azo dyes obtainable by coupling meta diamines of the benzene series having two free coupling positions with one mol. proportion of diazotized 3-amino-5-sulfosalicylic acid and one mol. proportion of a diazotized primary aryl amine other than the residue of ortho-coupled 5-sulfosalicylic acid; said primary aryl amine being one of a group consisting of aniline, monoaminonaphthalene, naphthylaminemonosulfonic acids, benzeneazonaphthylaminemonosulfonic acids and aminobenzenes substituted by at least one of the group consisting of nitro, hydroxy, alkyl, sulfonic acid, carboxyl, azobenzene, azobenzenesulfonic acid and $HO_3SC_6H_4NH—$.

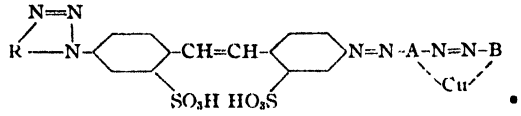
Copper complex compounds of disazo dyes of the stilbene series. Hans Schindhelm (to General Aniline Works). U. S. 2,175,815, Oct. 10. Details are given of the production of Cu complex compds. of disazo dyes of the stilbene series of the general formula



wherein acyl means the radical of a carboxylic acid of the

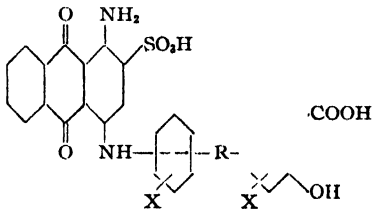
aliphatic or the benzene series and A and B stand for sulfonated radicals of the naphthalene series which contain in *o*-position to the azo group a group capable of being metallized, which Cu complex compds. dye vegetable fibers green to greenish gray shades of excellent fastness to light.

Copper complex compounds of polyazo dyes of the stilbene series. Hans Schindhelm and Carl T. Schultis (to General Aniline Works). U. S. 2,175,652, Oct. 10. Various examples with details are given of the production of Cu complex compds. of polyazo dyes of the stilbene series of the general formula



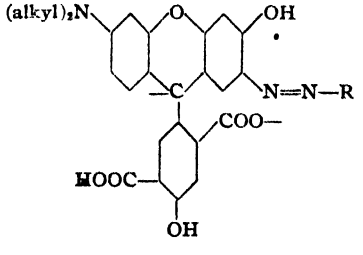
wherein R stands for a sulfonated radical of the naphthalene series and A and B stand for sulfonated radicals of the naphthalene series contg. in *o*-position to the diazo group a group capable of being metallized, which dyes dye vegetable fibers green shades of good fastness, especially to light. Cf. *C. A.* **33**, 5197[4].

Chromium-containing dyes. Erich Fischer (to General Aniline Works). U. S. 2,174,823, Oct. 3. Dyes which dye wool violet, blue, gray or green are produced by the action of Cr-yielding agents such as Cr acetate or formate on anthraquinone compds. of the general formula



wherein X represents H, CH_3, Cl, methoxy or sulfonic acid, and R represents $—CH_2SO_2—$, —CONH—, $—CH_2—$ or —CO—.

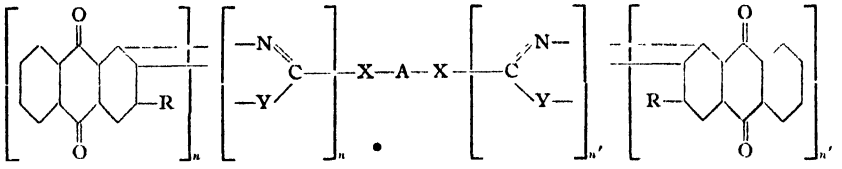
Chromable dyes of the triarylmethane series. Wilhelm Eckert and Karl Schilling (to General Aniline Works). U. S. 2,175,716, Oct. 10. Various examples are given of the production of fast chromable dyes, dyeing various colors and of the general formula



where R means the residue of a diazotizable arylamine of the benzene or naphthalene series and alkyl means methyl or ethyl. Cf. *C. A.* **34**, 892[4].

Vat dyes. I. G. Farbenindustrie A.-G. Brit. 508,393, June 30, 1939. Dyes of formula $RNHCOC_6H_4N:NC_6H_4$-CONHR, where R is the radical of a vattable ring system, or the corresponding imidazole, oxazole or thiazole derivs., are made by converting such *N*-aroyl derivs. of amines of vattable ring systems, or their imidazole, oxazole or thiazole derivs., as contain in the aroyl radical an amino or NO_2 group, by an oxidation or reduction process, resp., into the corresponding azo compds. Among examples, (1) 1-(3'-nitrobenzoylamino)anthraquinone is reduced by means of Zn dust and NH_4OH in dioxane soln.; the product dyes cotton from a red vat lemon-yellow shades, and (2) μ-(4'-aminophenyl)-2,1(*N*)-oxazoloanthraquinone is oxidized by means of NaClO in aq. Na_2CO_3 soln.

Vat dyes of the anthraquinone series. Ernst Honold and Max Schubert (to General Aniline Works). U. S. 2,175,803, Oct. 10. Dyes which dye vegetable fibers from the vat yellowish shades of good fastness to Cl and boiling soap soln. and, in many instances, to light, have the general formula



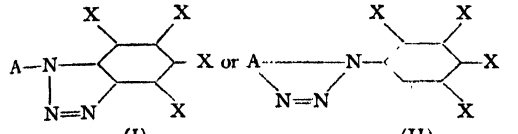
wherein R stands for H or halogen, *n* and *n'* stand for one of the numbers 1 and 2, Y for a member of the group consisting of —S— —O— and —N=, X for a member of the group consisting of the phenylene, halogenated phenylene, alkoxyphenylene, the naphthalene, the biphenylene radical, the radical of biphenylene oxide, fluorene, carbazole and diphenyl sulfide, and an *ar*-aliphatic radical (*ar* meaning the phenyl radical), A stands for a member of the group consisting of —N N—, —N(:O) N—, —N NX_1N.N— and —N(:O) NX_1N.N(:O)—, X_1 meaning a member of the group consisting of the biphenylene, azobenzene and benzophenone radical, the pairs of X, Y, *n* and n_1 having identical value, and are obtainable by condensing such amines of the anthraquinone series as contain in ortho position to the amino group a further amino group or a hydroxy or mercapto group, which amines are able to form an imidazole or oxazole or thiazole ring during the condensation reaction, with carboxylic acids of the general formula: $(HOOC)_n—X—A—X—(COOH)n'$, wherein *n*, *n'*, X, A and X have the above said signification, or their functional derivs. Advantageously the condensation reaction is performed in org. solvents. By acting with the carboxylic acid chlorides of the said azo or azoxy compounds on the amines condensation occurs in some cases at room temp. The condensation reaction is finished at elevated temps. whereby simultaneously the formation of the azole ring is performed.

Vat dyes of the dipyrazoleanthrone series. Werner Zerweck and Eduard Gofferje (to General Aniline Works) U. S. 2,176,443, Oct. 17. By reactions such as cyclohexylating and alkylating dipyrazoleanthrone, *N*-cyclohexyl-*N'*-alkyldipyrazoleanthrones are obtained which form leuco compds. of good soly. and give bright yellowish red fast dyeings on cotton.

Dyes of the anthraquinone series. Chemische Fabrik vorm. Sandoz. Brit. 508,742, July 5, 1939. Compds. of the formula of a 1-(benzanthronylamino)anthraquinone substituted in the 4-, 5- and 8-positions by H or an amino, alkylamino, alkylolamino or arylamino radical and in which the arylamino, anthraquinone and benzanthrone radicals may be substituted but must not contain aroylamino groups, are treated with sulfonating agents. Substituents specified are halogen, CN, OH, alkoxy, phenoxy and alkyl. The products are H_2O-sol. and dye wool gray, reddish brown or yellow shades. Among substances treated in the examples are (1) 1-(*Bz*-1-benzanthronylamino)anthraquinone and its substitution products contg. in 4-position of the anthraquinone nucleus the radicals

(a) anilino, (b) *o*- or *p*-toluino, (c) *p*-acetamidoanilino, (d) *o*- or *p*-chloroanilino, (e) 2,5-dichloroanilino, (f) *p*-aminoanilino, (g) *p*-phenylanilino, (h) ethanolamino, etc., (2) 1,4-anilino-*Bz*-1-(6-bromo- or 2-methyl-benzanthronylamino)anthraquinone.

Vat dyes of the phthaloylcarbazole series containing trifluoromethyl groups. Hans Schlichenmaier, Hans Hoyer and Ludwig W. Berlin (to General Aniline Works). U. S. 2,174,182, Sept. 26. Vat dyes which are given improved fastness or color by the presence of trifluoromethyl groups are obtained by transforming into carbazoles according to known processes compds. of the formulas

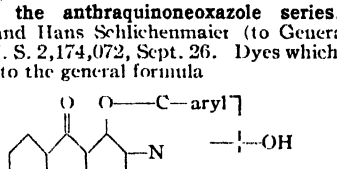


(I) (II)

wherein A is the radical of an anthraquinone compd., at least one X stands for a trifluoromethyl radical and the other X's are H or any substituents, two adjacent ones of which may also be members of a further ring system; or similar anthraquinone compds. contg. the azimide radical twice. Several examples with details are given.

Anthraquinone acid wool dyes. Henry R. Lee and David X. Klein (to E. I. du Pont de Nemours & Co.). U. S. 2,170,385, Aug. 22. Acid wool dyes which dye wool blue shades have the general formula of a 1-amino-5-nitro 2-anthraquinonesulfonic acid or its alkali metal salt substituted in the 4-position by an arylamino radical of the benzene series such as that of aniline or *p*-aminomethylacetanilide.

Dyes of the anthraquinoneoxazole series. Georg Kranzlein and Hans Schlichenmaier (to General Aniline Works). U. S. 2,174,072, Sept. 26. Dyes which probably correspond to the general formula



wherein aryl comprises radicals of the group consisting of phenyl and phenyl substituted by noncyclic univalent substituents and the position of the hydroxyl and sulfo groups in the molecule is not known, and the alkali metal salts thereof, which may be after-chromed to obtain fast greenish blue dyeings, are obtained by causing H_2SO_4 contg. free SO_3 to act upon 4-aminoanthraquinone-1,2-(N)-aryloxazoles (suitably at a temp. of 60–160°). Several examples with details are given.

Dyes and intermediates. I. G. Farbenindustrie A.-G. Brit. 508,029, June 23, 1939. Benzanthrone derivs. are made by causing a *Bz*-1-alkoxybenzanthrone, or a *Bz*-2-carboxylic acid or ester thereof, to react with a primary aromatic amine, which may be a vattable compd., in the presence of a caustic alkali, the ester group when present being sapond. during the reaction. The reaction is preferably conducted in the presence of an indifferent solvent. Depending on conditions, *Bz*-1-arylaminobenzanthrones or the benzanthronehydroacridines resulting therefrom from ring closure thereof are formed, the former being capable of transformation into the latter by fusion with caustic alkali. The products are dyes or intermediates thereof. Among examples (1) *Bz*-1-methoxybenzanthrone (I) is heated with $PhNH_2$ in the presence of KOH and pyridine to yield *Bz*-1-anilinobenzanthrone, (2) I is heated with *Bz*-2-aminobenzanthrone in the presence of KOH and pyridine to produce *Bz*-1,*Bz*'-2-dibenzanthronylamine; by fusion of this with KOH and alc. the corresponding hydroacridine, which dyes cotton violet shades from a bluish red vat, is produced and (3) Me I-*Bz*-2-carboxylate is heated with 2,4-dichloroaniline in the presence of KOH and pyridine to produce *Bz*-1-(2',4'-dichloroanilino)benzanthrone-*Bz*-2-carboxylic acid.

Dyes and intermediates of the anthraquinone series. Artur Krause and Robert Zell (to General Aniline Works). U. S. 2,174,245, Sept. 26. Intermediates or dyes giving clear fast red to violet dyeings on cellulose acetate, etc., are produced by reaction of compds. such as 1-amino-2,3-dihydroxypropane, glucamine, alkylglucamines and similar amines of the sugar series with anthraquinone derivs. such as 1-nitroanthraquinone-2-carbonyl chloride, 1-chloroanthraquinone-2-carbonyl chloride, 1-aminoanthraquinone-2-carbonyl chloride, 1-amino-4-nitroanthraquinone-2-carbonyl chloride, 1-amino-4-(*p*-toluenesulfamido)anthraquinone-2-carbonyl chloride, 1,4-dichloroanthraquinone-6-carbonyl chloride, 1,4-bis(*p*-toluenesulfamido)anthraquinone-6-carbonyl chloride, 1-iodoanthraquinone-2-sulfonyl chloride, 1,4-dichloroanthraquinone-2-sulfonyl chloride, 1,4-dichloroanthraquinone-6-sulfonyl chloride and 1,5-diaminoanthraquinone-2,6-dicarbonyl chloride The reaction is preferably carried out in the presence of water, an alc., pyridine or a diluent.

1,3-Diazaanthraquinones. Fritz Baumann and Heinz W. Schwechten (to General Aniline Works). U. S. 2,176,413, Oct. 17. *Intermediates for the production of vat dyes, acid wool dyes* or *pigment dyes* are produced by subjecting a 6,7-benzoquinazoline to oxidizing agents such as an excess of chromic acid in the presence of H_2SO_4. Details are given of the production of: 1,3-diaza-2-hydroxy-4-phenylanthraquinone from 2-hydroxy-4-phenyl-6,7-benzoquinazoline; 1,3-diaza-2,4-dihydroxyanthraquinone from 2,4-dihydroxy-6,7-benzoquinazoline; 2-phenyl-4-hydroxy-1,3-diazaanthraquinone from 2-phenyl-4-hydroxy-6,7-benzoquinazoline; and a corresponding oxidation product from 2-(1'-nitro-2'-anthraquinonyl)-4-hydroxy-6,7-benzoquinazoline.

Halodialkoxyisodibenzanthrone compounds. Edward T. Howell (to E. I. du Pont de Nemours & Co.). U. S. 2,170,381, Aug. 22. Blue *dyes* and *intermediates* are obtained by introducing Cl or Br into *Bz*-2,*Bz*-2'-dialkoxyisodibenzanthrone compds., either by direct halogenation or by halogenation of intermediates with subsequent oxidation and alkylation. Details are given of the production of 6-chloro-*Bz*-2,*Bz*-2'-dimethoxyisodibenzanthrone, a brominated dihydroxyisodibenzanthrone, a dibromodihydroxyisodibenzanthrone, a tetrabromodihydroxyisodibenzanthrone, a dibromodimethoxyisodibenzanthrone, a monobromodimethoxyisodibenzanthrone, a brominated dimethoxyisodibenzanthrone contg. somewhat in excess of 2 atoms of Br and a dibromo-*Bz*-2,*Bz*-2'-diethoxyisodibenzanthrone. Bromination may be effected in H_2SO_4 or $ClSO_3H$, or the halogenation may be carried out in an org. solvent such as $PhNO_2$ or in aq. suspension, and I or other halogenation catalyst may be used.

***peri*-Naphthindenones.** Karl Koeberle, Werner Rohland and Christian Steigerwald (to General Aniline Works). U. S. 2,174,751, Oct. 3. *peri*-Naphthindenones contg. one or two of the groups $-NR_1R_2$, where R_1 and R_2 stand for H or alkyl, aryl acyl or heterocyclic groups, are obtained by condensing halogenated naphthindenones with arylsulfonic acid amides and saponification of the arylsulfonamidonaphthindenones thus formed, or by causing alkylamines, arylamines or heterocyclic amines, or amides of org. carboxylic acids to react with halogenated naphthindenones or by acylation or alkylation or arylation of aminonaphthindenones. Details are given of the production of compds. such as 2-aminonaphthindenone, m. 127–8°, 2-benzoylnaphthindenone (dyeing artificial silk yellow), dinaphthindenonylaminoanthraquinone (dyeing cotton red-yellow shades from a violet vat), 2-dimethylaminonaphthindenone (dyeing artificial silk reddish yellow shades), 2-dodecylaminonaphthindenone (a red powder), 2-anilinonaphthindenone, 1-(naphthindenon-2-ylamino)-2-carboxylic acid, m. 248–9°(decompn.), 2-(1-anthraquinonylamino)naphthindenone (giving a red vat), 2-naphthindenonylamino-1,9-anthrapyrimidine (giving a red vat), 6-(1-anthraquinonylamino)-2-chloronaphthindenone (giving a yellow-red vat) and

2-(1-anthraquinonylamino)-6-pyrazoloanthronylnaphthindenone, and mention is made of the production of various other similar compds. by like reactions. As initial materials for the said reactions, there may be used, e. g., 2-chloronaphthindenone, 2-bromonaphthindenone, 2,6-dibromonaphthindenone, 2-chloro-6-bromonaphthindenone, 2-aminonaphthindenone and 2-amino-6-bromonaphthindenone, and the like. The reactions are preferably carried out in the presence of org. diluents, such as isobutanol, AmOH, nitrobenzene, mono-, di- or trichlorobenzene or naphthalene and of agents capable of combining with acids such as alkali carbonates, $CaCO_3$, $MgCO_3$ and alkali acetates and substances favoring the reaction, such as Cu compds. In many cases it is preferable to carry out the reaction under superatm. pressure.

Dyeing. I. G. Farbenindustrie A.-G. Brit. 507,528, June 16, 1939. Azo dyes are made on the fiber by applying to cotton or regenerated cellulose compds. that possess affinity for cellulose fibers, contain at least 1 SO_3H group and contain diazotizable amino groups, diazotizing and developing by treatment with enolizable hydroaromatic carbocyclic β-diketones. The substances possessing affinity are substantive dyes or substantive compds. that are not dyes. Greenish yellow shades are obtained. In examples, cotton is treated with bis(*p*-aminobenzoyl)-1,4-diaminobenzene-2-sulfonic acid or bis(*p*″-aminobenzoyl-*p*′-aminobenzoyl)-4,4′-diaminostilbene-2,2′-disulfonic acid, diazotized and developed with 5,6-dimethyl-1,3-cyclohexanedione, 5-phenyl-1,3-cyclohexanedione, 4-isobutyl-1,3-cyclohexanedione or 1,3-diketodecahydronaphthalene.

Dyeing regenerated rayon in tightly wound packages. Theodoor Koch (to American Enka Corp.). U. S. 2,176,403, Oct. 17. The package is impregnated with an alk. dye soln. contg. a water-sol. aliphatic alc. such as MeOH or iso-PrOH to prevent swelling of the threads so that even passage of the dye soln. through the package is effected.

Preparing fibers from plant materials such as pineapple leaves, flax, hemp and jute. Frederick P. Gardner. U. S. 2,177,646-7, Oct. 31. Various details of app. and operation.

Preparing cloth for fulling. Roland E. Derby (to M. T. Stevens & Sons Co.). U. S. 2,176,706, Oct. 17. App. is described, and a method of continuously and progressively prepg. for fulling cloth contg. animal fiber, as it comes from the loom, which comprises simultaneously performing in sequence upon a continuous web of the cloth the following steps, first, continuously, progressively and successively (*a*) passing the cloth through a bath of a liquid solvent for oleaginous foreign substances contained in the cloth, (*b*) extg. by suction the principal part of the solvent and solvent-retained foreign substances remaining in the cloth, (*c*) heating the cloth sufficiently to vaporize the solvent remaining therein and (*d*) sepg. the cloth from the solvent vapor; second, continuously, progressively and successively (*a*) moistening the cloth, (*b*) passing the moistened cloth through an acid bath and (*c*) expressing the acid from the cloth; third, (*a*) continuously and progressively stretching the cloth to a predetd. width and while maintained thus stretched continuously and progressively drying the cloth and (*b*) then continuously and progressively baking the cloth to carbonize foreign vegetable material therein; and, fourth, continuously and progressively subjecting the cloth to a plurality of crushing operations to free the carbonized material therefrom.

Sizing and impregnation of textile materials. Stanley L. Kirkendall (to Owens-Corning Fiberglas Corp.). U. S. 2,177,323, Oct. 24. App. is described, and a method of controlling the sizing and impregnation of textile materials by passing the material through a soln. of the sizing material and impinging jets of gaseous fluid such as air under pressure against the material at an acute angle to it and contra to its direction of motion to remove excess sizing material and to force the retained sizing material into the textile.

Sizing textile fabrics such as cotton broadcloth. Wyly M. Billing (to Hercules Powder Co.). U. S. 2,176,053, Oct. 17. **A sized fabric of stiff and starch-like finish in the absence of starch and pliable and pervious to moisture and to air has its individual threads discontinuously impregnated with about 5–40% of a compn. comprising a solid thermoplastic material such as a compn. of chlorinated rubber, ethyl cellulose or cellulose acetobutyrate substantially resistant to the action of aq. alk. solus., and has directly adjacent threads bonded together by the thermoplastic material, which however does not fill the interstices.**

Softening textile materials. Otto Albrecht (to Soc. pour l'ind. chim. à Bâle). U. S. 2,175,101, Oct. 3. Softening of materials such as viscose rayon is effected by treatment with an aq. soln. of the NH_4 salt of hexahydrophthalic acid oleyl alc. monoester or other product of the general formula MOC(:O)AYZ in which M stands for an alkali metal or NH_4, A for an unsulfonated aryl radical of the benzene series, Y for a —C(:O)O— group which is attached to the aryl radical A by means of the C atom and Z for an aliphatic radical having at least 8 C atoms in a straight chain.

Use of solvents for removing oleaginous and foreign substances from webs of fibrous material, as in removing tar from wool cloth. Roland E. Derby (to M. T. Stevens & Sons Co.). U. S. 2,176,705, Oct. 17. Various details of app. and operation for the treatment of continuous webs passed through a solvent bath.

Conditioning acetate rayon yarn, etc., with diethyl octyl phosphamate and related compounds. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.). U. S. 2,172,241, Sept. 5. A process of conditioning yarn to render it more amenable to textile operations including knitting, weaving, spinning, etc., comprises applying a lubricating and softening compn. contg. as its essential lubricating and softening component a P compd. having the general formula: $BB_1P(:X)OR$ where X is O or S, R is alkyl or aryl; B is —O—R or B_1; B_1 is —NR^1R^2 and R^1 and R^2 are H, alkyl or alkaryl. Cf. *C. A.* 33, 8123[9].

Compositions suitable for lubricating yarns of cellulose acetate, etc. Edwin A. Robinson (to Eastman Kodak Co.). U. S. 2,176,510, Oct. 17. A water-insol. oil such as a white mineral oil is dispersed in an aq. vehicle by use of a sulfonated wax such as sulfonated spermaceti wax.

Lubricating composition for treating rayon. Theodoor Koch (to American Enka Corp.). U. S. 2,176,402, Oct. 17. A lubricating compn. suitable for treating rayon comprises a soln. formed of a mixt. of mineral oil, Bu stearate, a substituted hexylamine such as diethylcyclohexylamine and a solvent such as oleic acid.

Waterproofing textiles. I. G. Farbenindustrie A.-G. Brit. 507,628, June 15, 1939. Fibrous materials, e. g., cotton, wool, silk, viscose, are rendered water-repellent by impregnation with an isothiourea salt contg. the group —CH_2XR or —$CH_2X'R'$, wherein R is an aliphatic, aliphatic-cycloaliphatic or aliphatic-aromatic radical contg. at least 11 C atoms, which may contain substituents and (or) may contain an O, S or N atom as a hetero atom in an aliphatic C chain or as a bridge directly linking an aliphatic portion of the radical to a cycloaliphatic or aromatic nucleus, R′ is an alkyl radical, X is O, S or phenoxy or the group —CO.N(R″)—, —O.CO.N(R″)— or —NH.CO.N(R″)—, wherein R″ is H or alkyl, and X′ is —CO.N(R)— or —O.CO.N(R)—, and subjection of the impregnated material to heat treatment at about 80–150°. Typical compds. are *S*-octadecyloxymethylisothiourea-HCl, *S*-stearoylaminomethylisothiourea-HCl, the reaction product of 4-dodecyl-2-chloromethylphenol and thiourea, *S*-stearoylaminomethyl-*N*-dodecyloxymethylisothiourea-HCl (prepd. from stearic acid chloromethylamide and dodecyloxymethylthiourea, the latter being prepd. from dodecyloxymethyl isothiocyanate and NH_3) and the reaction product of thiourea or a compd. thereof with a halomethyl compd. prepd. by the action of CH_2O or a polymer thereof on stearonitrile. The compds. may be used in the presence of buffering substances and may be applied in soln. in an org. solvent or in aq. solns. or dispersions at 0–100°. The impregnated material may be

preliminarily dried at up to 80° prior to the heat treatment. The compds. may be applied in admixt. with other water-proofing agents and the treatment may be combined with softening, delustering, etc., processes.

Mothproofing solution. Wm. H. Engels and John Weijlard (to Merck & Co. Inc.). U. S. 2,176,894, Oct. 24. A stable soln. suitable for treating various fabrics contains triethanolamine fluosilicate, $Al_2(SO_4)_3$ and a sol. wetting agent such as lauryl sulfate and is substantially free from uncombined silicic acid. Cf. *C. A.* **33**, 5678[9].

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

Progress in paints for exposure in Cuba. Wm. D. Roland. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* 1938, 163-70.—The chief difficulties to be met are slow drying, blackening from mildew, rapid bleaching of color, and poor durability; these are counteracted by choice of drying agent and mildly toxic pigments. With special reference to sugar factories, the corrosion-inhibiting properties of Pb and Zn chromates make them superior to red lead; they are recommended as primers for outdoor painting. It is definitely established that even the highest grades of bituminous paints are inferior to oil paints. Synthetic-resin varnishes are recommended for resistance to chem. attack, and black asphaltum coatings for resistance to cold or hot sirups. O. W. Willcox

Accelerated weathering of paints. Ontario Research Foundation. *Bull. Ontario Research Foundation*, Reprint, 3
P. No. **339**, 3-7; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 397(1939).—A report of tests using the Weather-Ometer. George Ayers

Economizing oil in paints with special consideration of weather resistance. M. Hess. *Oil Colour Trades J.* **96**, 1284-4, 1288(1939).—The oil requirement depends to a much greater extent on the degree of fineness and the shape of the particles than on the chem. characteristics of the pigment. Stand oil is more weatherproof than boiled oil. H. considers the use of stand oil of a suitable viscosity, the addn. of pure phenolic resins to the drying oils, combination of refined fish oils with film-forming oils, use of synthetic wood oils, air-blown linseed oils, perhaps with an addn. of pure phenolic resins or use of alkyd resins contg. at least 50% of oil, cellulose products, and greater use of products based on chlorinated rubber, asphalt, bitumen and pitch. W. H. Boynton

Traffic paint. Leroy Shuger. *Drugs, Oils & Paints* **54**, 111-16, 118(1939); cf *C. A.* **34**, 2753.—Essential requirements of a traffic-paint method of test are noted. Properties covered are flexibility and abrasion resistance. Lab. tests are outlined. A wear-testing machine is described and illustrated. W. H. Boynton

Moisture peeling of house paints. Mechanism of moisture peeling. J. W. Iliff and R. B. Davis. *Ind. Eng. Chem.* **31**, 1446-50(1939); cf. *C. A.* **34**, 6435.—The mechanism discussed is essentially confirmatory of the conclusions of prior investigators (cf. Browne, *C. A.* **27**, 4940, and Teesdale, *C. A.* **34**, 6437). F. L. B.

The advance of synthetic-resin paints in corrosion prevention. G. Koken. *Chem. Fabrik* **1939**, 502-4.—Historical, with comments on the type of paint best suited to purposes. J. H. Moore

Covering power" determination. A. Davidsohn. 8
Paint Manuf. **9**, 340(1939); cf. *C. A.* **33**, 8039[6].—Glass slides 25 sq. cm. in area are cut accurately to permit insertion in another accurately cut glass sheet. The small slides may be inserted in the corresponding empty space of the large glass sheet and then brushed in the usual manner with an ordinary brush. The small glass slide is then withdrawn and the wt. increase detd. both in the fresh condition and after 48 hrs. This permits measurement of the consumption of pigment-paint (*a*), the wt. of the coat (*b*) and, if the sp. gr. of the paint is known (*s*), also of the film thickness (*c*). *a* and *b* can be directly weighed in respect to the 25 sq. cm. surface, while *c* (in cm.) is calcd. from the equation $c = b/s.25$. Once the single or double coating of paint is dry, the slides are fitted into the window lattice and the light-transparency examd. preferably in comparison with a suitable standard. Photographs of the tests can be made. The method does not possess the accuracy of photocell methods but is suitable for routine examn. of light transparency of paints. W. H. Boynton

Wall paintings in the Bagh caves—investigation into their methods. S. Paramasivan. *Proc. Indian Acad. Sci.* **10A**, 85-95(1939).—See *C. A.* **34**, 6432. H. G.

Titanium pigments. J. A. Lutz. *Am. Paint J.* **24**, 3
50, 52-7(Dec. 18, 1939).—A general discussion of the pigment properties of the Ti pigments. The paints are discussed under the headings of: (1) exterior house paints, (2) interior finishes and (3) industrial paints. Several formulas are included. W. H. Boynton

A practical hiding power comparison of lithopone and titanium-calcium pigments in commercial flat-wall paints. J. C. Thompson, Jr. *Drugs, Oils & Paints* **54**, 408, 410, 412, 414(1939).—A study of the dry hiding power and the effects of such factors as: (1) volatile in the vehicle, (2) wetting power of the vehicle, (3) ratio of pigment vol. to nonvolatile vol. (PFV), (4) flocculation of the pigment, (5) oil absorption of the pigment and the inert and (6) influence of the pigment-inert ratio. No fixed hiding power can be detd. for any pigment, lithopone and Ti-Ca pigment varying in hiding power per lb. from a min. value of about 23.5-58.5 sq. ft. for lithopone and from 30.5 to about 67 sq. ft. for Ti-Ca. The relative "dollar hiding value" comparison of the 2 pigments shows an edge for lithopone. The comparison was made on 95 com. paints obtained in all parts of the U. S. and significant results are shown in graph and table form. W. H. Boynton

Iron blues in synthetic vehicles. W. Krumbhaar. *Bay Gum* (Detroit) **9**, No. 6, 8-10(1939); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 338(1939).—The modifications in manufg. methods required to produce the different com. grades of Prussian blues are described. George Ayers

Ink. E. St. John. *Inland Printer* Aug., **1939**, 49; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 360(1939).—A discussion of (1) the effect of foodstuffs, soaps, spices, etc., on inks, and (2) the use of synthetic resins and cellulose derivs. in photogravure inks. George Ayers

News inks. F. L. Watson. *Brit. Printer* **52**, No. 307, 44(1939); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 360(1939).—A review. George Ayers

The printing ink patents of the United States. International Association of Printing House Craftsmen. *Craftsmen's Research Bur.*, Tech. Paper No. **10**; *Rev. Current Lit. Paint, Colour, Varnish & Applied Ind.* **12**, 360(1939). —A review. George Ayers

Hardening of printed ink on the press. International 8
Association of Printing House Craftsmen. *Share Your Knowledge Rev.* June, **1939**, 15; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 360(1939).—A survey of U. S. patents. George Ayers

Causes of set-off. E. Coussement. *Chronique graphique* **14**, 4428(1939); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 359(1939).—Causes of set-off, such as highly glazed paper, inferior ink, faulty reduction of inks, faulty roller setting, and low temp. are discussed. George Ayers

An unusual type of set-off. Printing & Allied Trades Research Association. *Patra J.* **2**, No. 5, 225-8(1939); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 360(1939).—A stain often appearing on the back of printed work and not produced by ordinary set-off or strike-through occurs with all drying-oil-contg. inks and is probably due to evolution of volatile matter from the oil. George Ayers

Drying oils and resins. Insolubilization of maleic glycol polyesters by additive polymerization. E. L. Kropa and T. F. Bradley. *Ind. Eng. Chem.* **31**, 1512–16(1939); cf. *C. A.* **32**, 6080[8].— Maleic glycol polyester (I), $(-CO-CH=CH-CO\cdot O\cdot CH_2\cdot CH_2\cdot O-)_x$, heated at 90° with 1/3 its wt. of vinyl acetate (II) formed an insol. gel in which the chains of I are believed to be linked at the double bonds through mols. of II in the same way as rubber is linked by S in vulcanization. The reaction is accelerated by the Hg arc, + Bz_2O_2. Me methacrylate reacted similarly, with development of various colors (Christiansen effect). Styrene (III) did not dissolve I but reacted with 10% of a mixed triethylene glycol polyester (IV) of maleic acid (V) and "Petrex" (the addn. product of terpene and V) in 13 days at 62° to form a hard, clear resin insol. in PhH. IV and $(CH_2=CH)_2C_6H_4$ thus act similarly upon III since both are polyfunctional (contain 2 or more active double bonds). Arnold M. Collins

Utilization of synthetic rubber in the production of drying oils. Kulikov. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 8, 43–53; *Khim. Referat. Zhur.* 2, No. 3, 118(1939).— Drying oils contained 5.7–8.4% of synthetic rubber, "siccative 630" and semidrying oils, cod-liver oil or linseed oil and 53.5–71.1% of white spirit. The thick pastes prepd. from these drying oils with ZnO, ocher, Fe_2O_3 and carbon black were dild. to paint consistency with "sunflower" drying oil (mixt. of sunflower-seed oil, prepd. castor oil and white spirit), or with synthetic or natural drying oil. The paints were tested for covering, drying properties, elasticity and hardness. The content of the film-forming substances in the paints with synthetic rubber was lower than in ordinary oil paints (6–30%). The paints prepd. with drying oils contg. synthetic rubber without natural drying oils or the sunflower-seed oil had a dull finish when dry. Paints with ZnO and most paints with ocher had good water-resistance. Less water-resistant were the Fe_2O_3 paints, and still less the carbon-black paints. On standing, the pastes prepd. with drying oils contg. synthetic rubber formed a rubberized layer on the surface. W. R. Henn

Tung-oil substitution. E. Melling. *Paint Manuf.* **9**, 347–50(1939). There are 3 main types of substitution, either partly or wholly as follows: (1) by resin or resin mixts., (2) by other oils, (3) by other materials, as chlorinated rubber. The type of substitute is dependent upon the outstanding property required of the finished product. In retaining drying speed resin substitute is suitable, but at the expense of flexibility, outside life and like characteristics. Combinations such as 100% phenolic resins and linseed oil, alkyd resin plus linseed oil-copal ester varnishes, the substitution of perilla, oiticica, dehydrated castor and fish oils for tung oil are discussed. None of these completely fulfills the properties of tung oil. It is necessary to formulate the medium for the particular job, note the primary characteristics wanted and formulate accordingly using mixts. of oils and resins till the most satisfactory product is found. Chlorinated rubber may replace the tung oil - 100% phenolic combination for producing an alkaliproof paint. W. H. Boynton

Ideal matt varnish. H. Courtney Bryson. *Paint Manuf.* **9**, 351–2(1939).- Fifteen properties in the order of their importance for an ideal matt varnish are listed. Matt finishes can be produced by the utilization of waxes, the use of certain org. compds. of Al, and by the incorporation of pigments with a refractive index roughly equal to that of the dry film. Particle size is important in the latter case. Advantages and disadvantages are given for each means of producing the matt finish. W. H. B.

Electrical heat for the modern varnish kettle. W. R. Beach. *Am. Ink Maker* **17**, No. 12, 20–1(1939). E. H.

The stability of the alkyd lacquers. A. A. Bolotin and M. N. Nasilova. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 5, 44–8; *Khim. Referat. Zhur.* 2, No. 2, 119(1939).—The lacquers consisted of 33% of phthalic anhydride, 17% of glycerol and 50% of linseed oil. As solvents there were used (singly and in mixts.) white spirit, solvent naphtha, turpentine and xylene; as driers, Pb-Mn and Pb-Mn-Co. Lacquers prepd. from phthalic anhydride, gycerol and linseed oil with different combinations of solvents and used in different proportions were tested for viscosity the day of prepn. and after 10, 20, 40 and 60 days. White spirit alone is unsatisfactory as solvent. Optimum results were obtained with solvent naphtha, with turpentine and with a mixt. of white spirit and solvent naphtha. Best thickening results were obtained from lacquers prepd. with Pb-Mn driers. Lacquers which did not contain driers did not change in viscosity for 2 months. W. R. Henn

Testing of polygraphic lacquers. B. I. Berezin. *Poligraf. Proizvodstvo* **1938**, No. 11, 33–4; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 359(1939).— Methods for the detn. of consistency, drying rate, impurities, gloss, hardness and elasticity of the film, penetration into the paper, etc., are included. George Ayers

Water absorbency of the alkyd air-dried and baked lacquers. A. A. Bolotin and M. N. Nasilova. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 5, 49–54; *Khim. Referat. Zhur.* 2, No. 2, 119(1939).—Lacquers (with or without driers) were spread on 2 glass plates one of which was dried at room temp. and the other at 100°. The films of the air-dried lacquers rapidly turned white in water and soon peeled off (except of the lacquers prepd. without driers). Only the baked lacquers were water-resistant. The character of the solvents and of the driers did not affect the water-resistance of either the baked or the air-dried lacquers. The most water-resistant lacquers were prepd with the fat acids of cottonseed oil. The optimum ratio of glycerol phthalate to the oil was 1·1. W. R. Henn

Fibrous lac. R. Bhattacharya and G. D. Heath *London Shellac Research Bur.*, Tech. Paper No. **18**, 14 pp. (1939).—B. and H. describe a process which produces a resin possessing a characteristic fibrous form. This consists of gelation of ammoniacal soln. of lac by HCHO. The gel, on washing with hot H_2O, gives an insol. and a sol. fraction, which are similar to hard and soft lac resins. The insol. resin has rapid "heat curing" property and gives solns. having higher viscosity than those obtained from ordinary lac or hard lac resins of corresponding concns. Data show that the best results are obtained by using a 20% soln. of lac in NH_4OH, approx. 3.2% by vol. of 40% HCHO soln. at 20° and a gelling time of 2 hrs. The films from fibrous lac are quick-drying and have good H_2O-resistance with a tendency to craze under severe conditions. This deficiency can be overcome by the use of suitable plasticizers. H. Marc

Nonwax floor finishes. I. Charles S. Glickman. *Soap* (Sanitary Products Sect.) **15**, No. 11, 90–2, 109(1939) —Nonwax floor finishes are characterized by high gloss, high water resistance, low slipperiness, high wearability and fairly low cost. Other qualities are discussed and comparisons made with water emulsion, paste and liquid polishes. II. *Ibid.* No. 12, 109, 111, 113, 127.—Nonwax floor finishes consist of natural resins or gums dissolved in hydrocarbon solvents. G. discusses spirit varnishes which are quick drying and of simple compn. Fifteen resins with their phys. characteristics, costs and solubilities are specified and general directions for manuf. are given. Four references. Henry H. Richardson

Studies on the constitution of the shellac complex. I. Interaction of tolyl iodochloride with shellac. M. Venugopalan, H. K. Sen and S. C. De. *Indian Lac Research Inst., Bull. No.* **33**, 14 pp.(1939).—Simultaneous substitution and oxidation reactions complicate the detn. of unsatn. in shellac by various halogen addn. reagents. A new reagent, formed by dissolving 0.05 mol. *p*-tolyl iodochloride (yellow crystals from passing Cl into *p*-iodotoluene dissolved in 5 parts of $CHCl_3$, filtering, washing with cold $CHCl_3$ and Et_2O, resp., and drying) in 250 cc. of $CHCl_3$ and then making up to 1 l. with glacial AcOH, gives results approx. similar to those obtained by the Wijs method. With shellac still closer correlation of the 2 methods is obtained after subtracting 10% (corresponding to about 1.4 in I value) from the results by the new method. The new reagent, upon standing, deteriorates somewhat more rapidly than does Wijs reagent. For detn. of I value by the new method, 25 cc. of HOAc and 5 cc. of $CHCl_3$ are added to 0.2 g. (or 10 cc. of a soln. of 4 g. made up to 200 cc. with $CHCl_3$-HOAc or HOAc) of substance

such as shellac, followed by 20 cc. of the *p*-tolyl iodochloride reagent. After standing for 1 hr. at 22 ± 1° in the dark, 10 cc. of 10% KI soln. is added and the excess I titrated with standard $Na_2S_2O_3$ soln. Iodine values of oleic acid, various shellac samples, linseed oil, Norwegian cod-liver oil, castor oil, olive oil, sesame oil, almond oil and rosin were detd. by both Wijs and *p*-tolyl iodochloride methods. Based on work with shellac, the I value increases with (1) time of absorption, (2) amt. of reagent used and (3) increase of temp., but decreases with increase in the amt. of sample used. Addn. of I in AcOH to the *p*-tolyl iodochloride reagent diminishes the time necessary for the detn. of I value. George Ayers

Protection of magnesium and its alloys. E. Barboni. *Journée ind.* (Paris) **1939**; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 401(1939).—No paint will adhere to the metal unless the latter is first treated chemically (immersion in KNO_3 or $K_2Cr_2O_7$ soln.) or electrolytically. The second and third coats must not be of cellulose materials. George Ayers

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Extg. grape seed [drying oil] (Gavrilenko) **27**. Constancy of chem. properties of tung tree (Taran) **11D**. Elec drying oven for lacquers liable to detonate (Lohausen, Schumann) **4**.

Norme italiane per il controllo degli olii per Vernici. 1st ed. Milan: R. Stazione Sperimentale per l'Industria degli Olii e dei grassi. 257 pp. No price stated. Reviewed in *Chem. Trade J.* **105**, 334(1939).

Use of copper paint on surfaces such as those of metal. Harry A. Sweeney and Leo D. Pangborn (to National Copper Paint Co.). U. S. 2,176,597, Oct. 17. A process employed involves applying to the surface to be coated a primer which includes in its compn. Si which has been treated in an oven at a temp. of about 2040°, a flatting agent such as celite adapted to give bulk so that the Si will settle over the surface and a varnish having a high absorptive factor for H and adapted to absorb excess H from the Si, together with light naphtha as a solvent and a small quantity of an anticoagulant such as "Dipentine" and then causing the primer to dry with microscopic projections, and then applying a paint contg. amorphous Cu in a varnish together with Ca linoleate as a suspension agent, and a drier including Co, Pb and a hydrocarbon solvent such as naphtha.

Calcimine. Herman A. Scholz and Alexander Adams (to United States Gypsum Co.). U. S. 2,177,154, Oct. 24. A dry calcimine or distemper paint compn. contains as its main pigment powd. gypsum, a water-sol. adhesive such as glue, and only sufficient of an alk.-reacting material, such as NaOAc, to overcome the acidity of the compn. so that when it is gaged with water a compn. is formed having a pH of 7.0–8.5, the gypsum having a high opacity and hiding power.

Blended pigment. Marion L. Hanahan and Rodolphe V. Gagnon (to E. I. du Pont de Nemours & Co.). U. S. 2,177,250, Oct. 24. $CaSO_4$ contg. less combined water than the dihydrate is subjected to hydration in the presence of an aq. suspension of a Ti pigment such as TiO_2 and the mixt. is concurrently subjected to a mech. shearing action, and the product thus obtained is dehydrated within about 30 min. from the completion of the hydration and sharing treatment. U. S. 2,177,251 relates to a similar process in which an aq. suspension of ZnS is used instead of the Ti pigment.

Composite pigments. Hugh V. Alessandroni (to National Lead Co.). U. S. 2,176,875, Oct. 24. Separately dispersed suspensions of pigments such as TiO_2 and $BaSO_4$ are prepd. by means of dispersing agents which are not antipathetic to each other, such as Na silicate, and the suspensions are mixed together and the dispersed pigments are coflocculated by a coagulating agent such as $MgSO_4$. Various examples are given. U. S. 2,176,876 relates to the manuf. of a composite pigment formed of ZnS and another pigment such as $BaSO_4$ by a generally similar method.

U. S. 2,176,877 relates to a similar process except that antipathetic dispersing agents such as Na silicate and Pb chloride are used in the initially prepd. sep. pigment dispersions so that coflocculation takes place when they are mixed. Cf. *C. A.* **34**, 2764.

Pigment dispersions. Paul E. Marling and Charles A. Thomas (to Monsanto Chemical Co.). U. S. 2,176,219, Oct. 17. A dispersion in concd. paste form suitable for use in prepg. paints or varnishes consists of a pigment such as ZnO or white lead or TiO_2 intimately mixed with a soln. in a volatile solvent, such as petroleum naphtha, of the unsatd. petroleum-naphtha-sol. hydrocarbon resin obtained by polymerizing a cracked petroleum distillate fraction rich in diolefins under the influence of a Friedel-Crafts catalyst.

Molybdenum orange. Arthur Linz and Lynn W. Coffer (to Climax Molybdenum Co.). U. S. 2,176,819, Oct. 17. A process for the production of molybdenum orange involves mixing a soln. of a sol. chromic acid salt such as $Na_2Cr_2O_7$ and a sol. molybdic acid salt such as Na_2MoO_4 with a soln. of a sol. Pb salt such as $Pb(NO_3)_2$ to form a ppt. at pH 3.0–5.0 and reducing the pH of the mixt. contg. the ppt. to 2.5–3.0 for the development of the color in the ppt.

Stabilizing pigment sulfates and carbonates of alkaline earth metals. Roy W. Sullivan (to E. I. du Pont de Nemours & Co.). U. S. 2,177,269, Oct. 24. Compds. such as anhydrite are stabilized against increase in particle size by admixt. with 10% or less (suitably about 0.1–1%) of a water-sol. glycolate such as an alkali metal starch glycolate.

Compositions suitable for use as pigments, insecticides, etc. Arthur B. Cummins (to Johns-Manville Corp.). U. S. 2,177,197, Oct. 24. An intimate mixt. of finely divided diatomaceous earth and an oxide (or compd. such as $Pb(NO_3)_2$ reactive at the calcination temp.) of Pb, Zn, Bi, Cd, Cr, As, Sb, Mo, Ti, V, Ag or Hg in an amt. 1–40% that of the diatomaceous earth is heated to about 815–1040° to form a complex product contg. a sufficient amt. of unreacted diatomaceous earth to serve as an extender together with a reaction product of the heavy metal compd. and silica of the diatomaceous earth, without eliminating the characteristic structure of the diatomaceous earth.

Polymerizing China wood oil. Solomon Caplan (to Harvel Research Corp.). U. S. 2,176,058, Oct. 17. Diethyl sulfate (suitably in a proportion of about 5–10%) is dissolved in China wood oil then heated to about 105° to effect desired polymerization, as *for use in varnishes*, molded products, etc. (the diethyl sulfate serving to promote polymerization).

Polymerizing cashew nutshell liquid. Solomon Caplan (to Harvel Corp.). U. S. 2,176,059, Oct. 17. About 2% or more of diethyl sulfate or other mono- or di-alkyl sulfate which may contain H_2SO_4 is dissolved in cashew nutshell liquid, the soln. is heated (suitably to about 160°) to effect reaction of the soln. with the metals naturally present in the cashew nutshell liquid and ppt. salts of the metals, and the ppt. is removed. A polymerized product may be obtained which is suitable for use in making varnishes, etc.

Treating hydrocarbons from rosin, etc., to produce products for use in paints, etc. Edwin R. Littmann (to Hercules Powder Co.). U. S. 2,177,530, Oct. 24. A method of treating a hydrocarbon derived by decarboxylation of rosin, partially hydrogenated rosin, rosin acids or partially hydrogenated rosin acids involves bringing the hydrocarbon in the liquid phase into contact with an active hydrogenation catalyst under conditions of reaction adapted to produce an intra- and inter-mol. rearrangement of H atoms in the hydrocarbon and in the absence of added substances capable of reducing the unsatn. of the hydrocarbon. Various examples with details are given.

Nitrocellulose and other coating compositions. Carleton Ellis (to Ellis-Foster Co.). U. S. 2,177,418, Oct. 24. A nitrocellulose of low viscosity is used with fatty oil-acid phthalic glyceride resins, to form compns. which are suitable for coating metals, etc.

Coating materials containing phenolic condensation

products. Siegfried Kohn (to Resinous Products & Chemical Co.). U. S. 2,169,361, Aug. 15. Products suitable for use as varnishes are formed contg. an oil-sol. condensation product obtainable by condensing less than 0.75 mol. of HCHO and one mol. of a complex cryst. phenol, such as dihydroxydiphenyl dimethylmethane, obtainable by the condensation of a phenol and a ketone, and these products may also be used in admixt. with a natural resin, etc.

Liquid coating compositions containing soaps. Theodore F. Bradley (to American Cyanamid Co.). U. S. 2,169,577, Aug. 15. An air-drying, coherent film-forming coating compn. suitable for use on textiles, paper, etc. comprises a soln. including a fusible, hydrocarbon-sol., unoxidized and O-convertible soap contg. in chem. combination a metal such as Al or Fe that can exist in a state of multivalency of at least 3 and a soap-forming fatty acid, such as linseed fatty acids, contg. at least 2 C-to-C double bonds in the mol., a hydrocarbon solvent for the soap such as turpentine, and a catalytic oxidation promoter, the soap being present as the major film-forming constituent, and films formed from the soln. being convertible to substantially insol., substantially infusible varnish-like films through exposure to air.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The thermostability of some fats. E. Glimm, H. Wittmeyer and W. Jahn-Held. *Z. Untersuch. Lebensm.* **78**, 285-93(1939). - Data on hydrolysis of beef tallow, lard, coconut oil, palm-kernel oil, sesame oil, peanut oil, olive oil and trioleins at temps. between 60 and 120° for time intervals of 7 days are presented graphically. The degree of splitting by warming was independent of the original content of free fat acids but rose with increases in temp. and time of heating. No appreciable splitting occurred in beef tallow or lard at temps. up to 60°. With vegetable oils it was found that each showed a crit. temp. at and above which an appreciable increase in splitting occurred in 3 days. These crit. temps. were: coconut oil 100°, palm-kernel oil 90°, olive oil 90°, peanut oil 80°, soybean oil 80° and sesame oil 75°. M. M. Piskur

Hydrogenation of mixed oils. Antonio I. de Leon and Felipe T. Agdeppa. *Philippine Agr.* **28**, 225-42(1939).—Coconut, pilinut (*Canarium ovatum* Engl.), peanut (*Arachis hypogaea* Linn.) and kapok-seed (*Ceiba pentandra* Linn.) oils were hydrogenated, after treatment with kieselguhr and Na_2SO_4, at 180-90° by use of the Raney Catalyst Powder previously activated with NaOH. This catalyst contained 52.63% Ni. I no. and m. ps. were detd. every 2 hrs. during each hydrogenation. Hydrogenation of coconut oil for 20 hrs. with 3% of Ni reduced the I value from 6.07 to 3.83, when 1% of Ni was used a final I value of 2.90 and a m. p. of 29-35° were obtained. Similar hydrogenation of pilinut oil for 20 hrs. with 1, 2 and 3% of Ni reduced the I value from 60.04 to 19.84, 14.76 and 3.13, resp., with m. ps. of 50-56, 53-60.5 and 60-69.5°, resp. Similar hydrogenation of peanut oil for 20 hrs. reduced the I value from 95.46 to 35.89, 26.33 and 16.40, resp., with m. ps. of 37-42, 46-53 and 55-62°, resp. Similar hydrogenation of kapok-seed oil for 20 hrs. reduced the I value from 93.20 to 49.14, 45.26 and 25.31, resp., with m. ps. below room temp., 31-39 and 49-57°, resp. Similar hydrogenation of a 1:1 mixt. of pilinut and coconut oils for 20 hrs. reduced the I value from 33.15 to 12.80, 9.80 and 6.70, resp., with m. ps. of 42-50, 46-54 and 50-57°, resp. In a 1:2 mixt. the initial I value of 24.06 was reduced to 10.66, 8.08 and 5.74, resp., with m. ps. of about room temp., 38-44 and 42-48°, resp. In a 1:3 mixt. the initial I value of 19.14 was reduced to 7.39 when 2% of Ni was used, and 5.26 with 3% with m. ps. below room temp. and 33-39°, resp. In a 1:4 mixt. with 3% Ni the initial I value of 16.84 was reduced to 5.13 and a product 40% solid was obtained. Hydrogenation of a 1:1 mixt. of peanut and coconut oil with 1, 2 and 3% of Ni reduced the I value from 50.60 to 20.82, 15.56 and 10.12, resp., with m. ps. below room temp., 41-50, and 47-54°, resp. In a 1:2 mixt. the I value was reduced from 33.20 to 11.99 with 2% of Ni and to 8.03 with 3% with m. ps. below room temp. and 40-47°, resp. In a 1:3 mixt. the I value was reduced from 27.12 to 6.97 and a soft solid obtained with 3% of Ni. Hydrogenation of a 1:1 mixt. of kapok and coconut oils for 20 hrs. with 3 and 4% of Ni reduced the I value from 49.13 to 21.04 and 14.11, resp., and gave a soft solid product and one having a m. p. of 43-50°. In a 1:2 mixt. with 4% Ni the I value was reduced in 20 hrs. from 32.14 to 10.23 and a m. p. of 35-42° obtained. Increasing the amt. of catalyst results in a decrease in I value and an increase in m. p. of the product. Raney Catalyst Powder is simpler to use and gives about the same results as Ni catalyst from Ni carbonate. Mixts. of equal parts of pilinut and coconut oils gave good products on hydrogenation for 6 hrs. with 3% Ni, for 8 hrs. with 2% of Ni or for 12 hrs. with 1% of Ni. Mixts. contg. 1 part of pilinut to 2 parts of coconut oil gave good products after 10 hrs. with 3% of Ni or after 18 hrs. with 2% of Ni. Suitable products were obtained from 1:1 mixts. of peanut and coconut oils after 6 hrs. with 3% of Ni or 16 hrs. with 2% of Ni; 1:2 mixts. required 14 hrs. with 3% of Ni. Mixts. of kapok and coconut oils required 10 hrs. with 4% of Ni. Products suitable for the *margarine industry* can be prepd. by adding coconut oil to the hydrogenated mixt. 9 references. Colin W. Whittaker

Drying bottles for processed vegetable oils. I. Berg. *Masloboino Zhirovoe Delo* **15**, No. 3, 28-9(1939).—Illustrated description of the construction and operation of an improved drying cabinet, with mech. conveyor, for drying bottles before filling them with oil. Previous driers were inefficient, either leaving liquid water in the bottles or permitting condensation after drying and cooling, so that the oil was contaminated with water when bottled. Julian F. Smith

Continuous oil-refining process. I. Tovbin. *Masloboino Zhirovoe Delo* **15**, No. 3, 5-7(1939).—The Sharples supercentrifuge system for neutralizing oils, the Foster-Wheeler steam deodorizer (with Dowtherm as heat carrier) and a continuous-vacuum filtration system have been combined into a cycle of operations whereby an oil or fat can be continuously neutralized, deodorized and clarified. The output is considerably greater than in batch operation. Julian F. Smith

Anderson expeller RB. K. Leont'evskii and I. Morozov. *Masloboino Zhirovoe Delo* **15**, No. 2, 34-5(1939).—The Anderson RB type expeller has been applied to the processing of copra, palm kernels and cottonseed. The machine is illustrated and its operation for these purposes is described. Julian F. Smith

Achieving a lower content of hulls in oil-seed cake. V. Sadomskii and L. Rodina. *Masloboino Zhirovoe Delo* **15**, No. 2, 3-5(1939).—In a study of methods for obtaining sunflower-seed cake with min. hull content the customary procedure for prepg. and processing seed pulp was compared with 2 modifications; in one the seed pulp was steamed under 10 atm. pressure before the final heating, in the other it was steamed at 5 atm. in admixt. with condensate. Some modifications in mech. huller operation are also described and illustrated. Tabulated data show the moisture content and oil content of the seed cake produced by the customary and modified procedures. Julian F. Smith

The Kudryavtsev-Vasil'ev mill for processing sunflower seed. N. Kudryavtsev. *Masloboino Zhirovoe Delo* **15**, No. 2, 38-40(1939).—Illustrated description of construction and operation. Julian F. Smith

Pressing sunflower-seed pulp without a cloth. S. Kucherov. *Masloboino Zhirovoe Delo* **15**, No. 2, 9-12(1939).—Pressing sunflower-seed pulp without a press

cloth lowers press efficiency by 5–10% but gives a better appearing cake, clean and free from shreds of wool. A procedure in which the pressure was raised to the first stage in 3 min., then to the final stage in 3 min., proved to be too rapid. More time is needed for attaining the final pressure (300 atm.). Iron and wood frames for pressing without a press cloth are described and illustrated.
Julian F. Smith

Extracting grape seed. I. Gavrilenko. *Masloboino Zhirovoe Delo* **15**, No. 3, 3-5(1939).—Grape seed can be successfully extd. with gasoline in a battery of extractors. For best quality and yield of oil the seed must be clean (it can be freed from skins and dirt in a Saturnia machine) and should be dried to 8–9% moisture while fresh, before mold growth can set in. The yield of oil from 100 tons grape seed was 10.87 tons; unavoidable loss of oil, 0.12 ton. The I no. of the oil was 132.8, indicating the possibility of use as a *drying oil* in paint manuf. The extn. residue may be used in *stock feed* or in making *coffee substitutes*.
Julian F. Smith

Commercial value of Asclepias syriaca. G. P. Stepanov. *Caoutchouc and Rubber* (U. S. S. R.) **1939**, No. 9, 10-3.—The seeds of *Asclepias syriaca* contain 17% oil having an acid no. of 94.75 (after storage) and 0.7% unsaponifiable matter. The oil has 37.49% protein and 8.88% ash. The oil may be used in the manuf. of liquid soap, lipid siccatives, and solid fats by hydrogenation.
B. Z. Kamich

The development of sulfonated oils and fatty alcohols. Alfred Wende. *Soc. Chem. Ind. Victoria, Proc.* **39**, 189-98(1939).
E. H.

Determining hydrocarbons in unsaponifiable. J. Grossfeld. *Z. Untersuch. Lebensm.* **78**, 273-85(1939).—It had been observed (cf. *C. A.* **33**, 3012[1]) that petr. ether quickly extr. the hydrocarbons from alc. soap solns., while the sterols are extd. less easily. This led to the development of new characteristics for the unsaponifiable matter of fats. The weighed unsaponifiable matter of a fat, 5 g. of a fat acid, 20 cc. 96% alc., and 3 cc. KOH (sp. gr. 1.5) are refluxed 5 min., cooled, 50 cc. petr. ether (b. 60–70°) and 1 cc. of H_2O are added, and the charge is stoppered and vigorously shaken. The residue from 25 cc. of solvent is dried. If palmitic acid was the fat acid used the characteristic is called "palmitate hydrocarbon value" (I) which equals 100 (50/25) (wt. of residue/wt. of unsaponifiable). With use of oleic acid in the detn. the characteristic is called "oleate hydrocarbon value" (II). Results on detg. I and II, resp., on some compds. were: paraffin 109, 107, sterols 26, 27, cetyl alc. 39, 43 and "Boeson trennwax" 7.7, 7.9. The values for paraffin and paraffin oil as well as those for cholesterol and phytosterol were practically alike. The relative amts. of sterols and hydrocarbons in mixtures can be calcd. with the use of this characteristic and the above data.
M. M. Piskur

Oleosols of soaps. I. Solution of soaps in hydrocarbons. G. E. Levant and E. L. Al'perovich. *Colloid J.* (U. S. S. R.) **5**, 493-500(1939).—Metal stearates were prepd. from K stearate and a convenient metal salt, and were not analyzed. They were shaken for 2 hrs. with a paraffin oil, and the amt. dissolved was detd. It increased with rising temp. (25-140°). Stearates of Ca, Sr, Ba, Cd, Al, Bi, Mn, Fe, Co, Ni and Cu were used.
J. J. Bikerman

Synthetic fats from petroleum suitable for grease making (Burwell, Camelford) **22**. Adsorbent material for treating vegetable oils (U. S. pat. 2,176,851) **18**.

Distillation of fat acids, oils, etc. Alan P. Lee U. S. 2,177,664, Oct. 31. App. is described, and a process for distn. with avoidance of decompn. which involves atomizing the material at atm. or higher pressure with not less than about 5 times its own vol. of inert gas to form an atomized mist consisting of a continuous phase of inert gas contg. and surrounding a discontinuous phase of liquid, heating the atomized mist as such in a continuous tubular structure to a temp. below the initial vaporization temp. of the liquid at the pressure of the heating, but which temp. is higher than the initial vaporization temp. of the liquid at a subsequent subatm. distg. pressure and is within the normal temp. range of incipient decompn. of the liquid if subjected to flow as a liquid stream through a heated tube, expanding the heated atomized mist through suitable control means into a distg. zone of subatm. pressure and passing inert gas into the distd. zone to promote vaporization of liquid from the atomized mist.

Soap. Helen M. Cranor. U. S. 2,177,055, Oct. 24. A toilet soap in cake form, of smooth texture, good lathering properties and deodorant action contains $NaHCO_3$ 10-30% (less than would cause crumbling of the compn.) and an approx. neutral soap 90-70%.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Fertilizer requirements of sugar cane in Egypt (Rosenfeld) 15. Paints [for sugar factories] for exposure in Cuba Poland) **26**. Compn. of colloids of diffusion sap of beet (Smonova) **2**. Investigations on sugar cane on saline soils (Nagata, Sasaki) **15**.

Swelling starch nonlumping with cold water. Helmut Schorn and Carl V. Daumas (to N.-V. "Agratherm"). U. S. 2,177,378, Oct. 24. App. is described, and a method which involves moistening starch, comminuting and sieving it, subjecting the resulting starch particles to a plurality of jets of superheated steam having a temp. of 200–500° for a short time to diminish the sp. wt. of some of the starch particles and to sep. by the force of the jets those particles the sp. wt. of which has been diminished.

29—LEATHER AND GLUE

HENRY B. MERRILL

Unhairing with the fruits of Solanum campylacanthum Hochst of the Italian East Africa. Preliminary note. Rino Airoldi. *Atti ufficiale assoc. ital. chim. tec. conciaria* **2**, 251-65(1939).—Fruits of *S. campylacanthum* Hochst contain seeds 9-11.6, H_2O 78-80, dry matter 8.4-13%, pH of the juice 5.4, fat from the seeds (extn. with Et_2O) 15.1, tannins (filter method; pyrocatechuic) 2.48, ash (calcd. on dry matter without seeds) 4.66, reducing sugars 4.85, total sugars 13.61, N-contg. matter (N 6.25) 12.89, crude cellulose (König method) 19.10%. The acidity of the fruits is due principally to malic acid. Unhairing expts. were made on sheep skins simultaneously with a paste of *S. campylacanthum* (15% of dry matter) and with CaO and Na_2S normal unhairing mixt., and the unhaired samples were tanned with sumac. The leathers obtained were nearly identical in their characters, but the wool sepd. from the skins treated with the fruits was slightly brown. The unhairing action is attributed to the proteases contained in the fruits; rH was 15.2 (at pH 5.56 and 25°); these proteases do not sensibly deteriorate collagen and wool proteins.
G. A. Bravo

Preparation of analytical solutions of tanning extracts from large quantities of the solid extract. V. A. Zotov and S. S. Martynova. *Kozhevenno-Obuvnaya Prom. U. S. S. R.* **12**, No. 4, 55(1939); *Chem. Zentr.* **1939**, II, 2604.—In dissolving 100–200 g. of tanning ext. and diln.

to 0.5 to 1 l., the soln. becomes turbid owing to the pptn. of phlobaphenes. It is recommended to dissolve 80 g. of the ext. in 5 vols. of hot water and to boil the mixt. on a water bath for 15 min. to complete solution, to transfer to a 2-l. measuring flask cooling on the water bath to 20°, to fill to the mark with cold water, to mix thoroughly, to transfer 400 cc. to a second flask and to dil. with boiling water to 2 l. The turbidity is thus eliminated. A. A. Boehtlingk 1

The tanning value as a function of the concentration of tanning extract and of the water content of the pelt. Emilio Durio. *Atti ufficiali assoc. ital. chim. tec. conciaria* **2**, 201-7; *Cuir tech.* **28**, 214-15(1939).—Expts. were made with hide powder and chestnut, quebracho and mimosa exts. The max. combination of tannin occurred in the solns. contg. 20% of ext., about 5°Bé., and with pelts of an initial moisture content of 75% or greater. The highest degree of tannage was given by freshly prepd. chestnut ext. Old exts. partially lose their tanning power owing to acid fermentation. G. A. Bravo 2 3

Further development of the production of synthetic tannins. Ya. P. Berkman. *Kozhevenno-Obuvnaya Prom.* **1938**, No. 7, 26-7; *Khim. Referat. Zhur.* **2**, No. 2, 129-30 (1939); cf. *C. A.* **33**, 6640[9], 6641[3].—A complete assortment of synthetic tannins of the light type can be obtained only by the use of phenols. Phenols in combination with hydrocarbons are especially valuable. The sulfite cellulose exts. can be used as starting raw materials for the heavy synthetic tannins. The tannins obtained from the products of condensation of the polyphenols with aldehydes are very similar to the plant tannins, but their high cost hinders their development as synthetic tannins of the heavy type. W. R. Henn 4

Soluble and insoluble matters in tanning sole leather. Cesare Schiaparelli. *Atti ufficiali assoc. ital. chim. tec. conciaria* **2**, 193-200(1939).—The less-sol. tannins and the insol. matter contained in the tanning exts. deposit at lower temps. and clog the pores of the skins; the absorption of this sparingly sol. matter occurs only at 28-30°. The insol. matter in the tanning exts. can be detd. by a sedimentation method (e. g., Kubelka method); the official (filter-candle) method gives high results. In the preliminary tanning process the exts. used should give little sediment. G. A. Bravo 5 6

A new type of silica tannage. Alexander Rose. *Can. J. Research* **17**, B, 385-9(1939).—Silica tannage, usually in combination with other methods, has been extensively investigated, but no process in which Si compds. were the principal agent has reached the com. stage. Et and Me orthosilicate possess a marked tanning action when hydrolyzed in dehydrated or pretanned pelt. Details of the prepn. of silica-tanned leather, analyses and hydrothermal behavior of the resulting material, and significance of the new method of tannage are discussed. J. W. Shipley 7

Pigments for leather. Michele Fiorenza. *Atti ufficiali assoc. ital. chim. tec. conciaria* **2**, 229-35(1939).—Insol. coloring matters for the prepn. of leather pigments may contain: (1) support, (2) solvent, (3) plasticizer, (4) coloring matter. Modern pigments for leather are: (white) TiO_2, ZnO, lithopone, Sb whites; (yellow and orange) Pb and Zn chromates, CdS; (brown) Fe oxides; (red) CdS, Fe oxides and insol. Ca and Ba derivs. of azo dyes; (blue) anthraquinone or indigo compds. and Cu derivs. of phthalocyanines. G. A. Bravo

Rapid determination of fat in leather. N. P. Kostin, B. N. Rybakov and P. K. Isaev. *Kozhevenno-Obuvnaya Prom. S. S. S. R.* **12**, No. 4, 56(1939); *Chem. Zentr.* **1939, II**, 2604.—The method proposed by Wislicenus in 1920 (cf. *C. A.* **15**, 380) for the analysis of coal, wood, etc., is recommended for the detn. of fat in leather. The sample is placed in a flask equipped with a reflux condenser through which a thread is passed only at the beginning of the boiling of the ether. The thread is removed after the end of the boiling and is rinsed with the condensate passing through the condenser. The "boiling" time is limited to 10 min. and the "rinsing" time to 15 min. The results agree satisfactorily with those of the Soxhlet method. A. A. Boehtlingk

Analyses of sole leather. IV. Bohemian and Danish. Vittorio Casaburi. *Boll. staz. sper. ind. pelli mat. concianti Napoli* **17**, 139-44(1939); cf. *C. A.* **33**, 6086[1].—By the method already described, 2 Bohemian leathers (obtained from salted hides, with pine-bark ext. tanning) and 1 Danish (from refrigerated hides, tanned by the ordinary quebracho process) were examd. The values obtained in the analyses are normal, but the middle layers of Danish leather appear to be more thoroughly tanned than the grain. G. A. Bravo

Waterproofing of fur skins. Use, detection and determination of formaldehyde in fur, hair and wool. Urbain J. Thuau and David Lisser. *Cuir tech.* **28**, 212-13 (1939).—Furs or hairs, e. g., wool of sheep skins, are waterproofed with CH_2O, acrolein or a compd. that produces CH_2O on heating, such as trioxymethylene, formaldehyde bisulfite or hexamethylenetetramine. The impregnated skins after some hrs. are hot-pressed or ironed at temps. above 100°. Hairs of calf, cow or rabbit skins are previously partially hydrolyzed. To det. CH_2O, 1-2 g. of the shaved hairs are boiled in a flask with 100 cc. 15% HCl with replacement of drop by drop by fresh acid of the liquid distd. off until the vol. of the distillate amounts to about 200 cc.; then the distn. is continued nearly to dryness. CH_2O can be detected by phenylhydrazine and $K_4Fe(CN)_6$. For the detn. there are added to the distillate 25 cc. 0.1 *N* iodine and concd. NaOH until the color of the liquid becomes light yellow. After cooling the excess I is titrated with a 0.1 *N* $Na_2S_2O_3$ after acidulation with HCl. George Nachod 8

Lubricating skins and leather. Joseph G. Niedercorn (to American Cyanamid Co.). U. S. 2,176,434, Oct. 17. The material is impregnated with a lubricant contg. jojoba seed oil or sulfonated jojoba seed oil.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Technical application of Buna in the chemical industry. II. Vulcanized rubber from Buna. H. Roelig. *Chem. Fabrik* **1939**, 481-2; cf. *C. A.* **32**, 6905[4].—The phys. properties of hard rubber made from Buna-S and Zahlenbuna with that made from natural rubber are practically alike. But when protective coatings are applied, certain extra precautions are necessary with Buna rubber, which are outlined. Buna is as resistant as natural rubber to H_2SO_4 (up to 50%), to all concns. of HCl, to NaOH and KOH solns. and to AcOH and salt solns., but less resistant to Cl gas and solns. and to HNO_3. Buna is superior with C_6H_6, CCl_4, etc., and in heat aging. J. H. Moore 9

The state of aggregation of rubber and of substances with rubber-like extensibility. Kurt H. Meyer. *Chem. Rev.* **25**, 137-49(1939).—A review. Louise Kelley

Chromatography of rubber solutions. Giorgio R. Levi and Gian P. Cajelli. *Rev. brasil. chim.* (São Paulo) **8**, 119-21, 161-7(1939).—See *C. A.* **33**, 9043[6]. L. E. G.

Utilization of synthetic rubber in production of drying oils (Kulikov) **26**. Method for prepg. rubber (without use of gasoline applied to prepn. of artificial leather (Aizenshtein) **13**. Impregnation with rubber of raincoat fabrics (Kurialt) **25**.

Apparatus for molding gas-expanded rubber products. Dudley Roberts (to Rubatex Products, Inc.). U. S. 2,176,945, Oct. 24. Various structural, mech. and operative details.

CHEMICAL ABSTRACTS

Vol. 34 MARCH 10, 1940 No. 5

1—APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

Vapor-proof laboratory stirrer. Geo. Calingaert. *Ind. Eng. Chem., Anal. Ed.* **12**, 51(1940).—A flask stirrer is described using oilless bearings as guides and seals. H. G. Bowlus

Simple holding devices for laboratory glassware. A. H. Waychoff. *Products Finishing* **4**, No. 3, 54–5(1939).—A device for holding flasks, beakers, retorts, etc., can be made by splitting a hollow rubber ball in half and fastening each half to a table or shelf by means of a small nail or tack. By using balls of various sizes different pieces of glassware can be protected against tipping, spilling and breaking. A device for holding and protecting thermometers, hydrometers, pipets, etc., against breakage can be made from rubber hose. One end of the hose is cut in four segments of $1^1/_2$" length. These segments are spread apart and nailed to a table or board. A rubber stopper is placed on the bottom at the center so as to cushion the piece of glassware when it is dropped into the holder. Leopold Scheflan

Simple valve for use in laboratory apparatus. G. P. Gibson. *J. Soc. Chem. Ind.* **58**, 317–19(1939).—A glass needle valve having grooves in the stem and seat is used to regulate vapor flow or liquid take-off in distn. heads. H. G. Bowlus

Repair and construction of laboratory glassware. Joseph J. Sullivan. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 22–6(1939).—Certain fundamental operations in glass working are described and literature references are given. Leopold Scheflan

An improved test tube rack. Robert F. Ervin. *J. Lab. Clin. Med.* **25**, 320–2(1939).—A zigzag bar is supported at each end by uprights from a flat base and P bronze coil springs, securely fastened at each end, run down each side through holes in the apex of each V in the zigzag bar. The advantages are simplicity of design, ease of use, sturdiness of construction, and economy of space. Test tubes are held so firmly that the entire rack can be shaken without rattle or danger of slipping, and contents of all tubes are visible at the same time without removal from rack. Howard W. Robinson

Best pipe bending practice for the chemical plant. W. F. Schaphorst. *News Ed. (Am Chem. Soc.)* **18**, 48 (1940).—Filling pipes with sand, resin, pitch, rosin, paraffin wax, lead, Babbitt, etc. and then bending at a suitable temp. is described; the use of mech. devices for pipe bending is recommended. W. C. Ebaugh

Fundamental relationships in the design of cooling towers. G. Russell Nance. *Trans. Am. Soc. Mech. Engrs.* **61**, 721–5(1939).—Math. George Ayers

Progress in the field of technical plant heavy apparatus. VI. **Evaporators.** Bruno Waeser. *Chem. Fabrik* **1939**, 509–12; cf. *C. A.* **33**, 7149[3].—A chronological review of 245 papers and patents between 1933 and May 15, 1939, with over 270 references. J. H. Moore

An opacimeter used in chemical analysis. Ralph M. Evans and Geo. P. Silberstein. *J. Soc. Motion Picture Engrs.* **32**, 321–4(1939).—The opacimeter is an optical instrument designed to measure the light transmission of a colored or turbid soln. A Loewenthal Photronic type light-sensitive cell connected to a microammeter is used to measure the intensity of the light transmitted by the soln. under test. The light intensity falling on the sensitive cell is kept within a fixed range by varying the distance of the cell from the light source. The instrument is arranged so that a 30-cc. test tube or a 300-cc. Kohle flask may contain the reaction mixt. The results of analyses are detd. from calibration curves prepd. from known solns. Authors

New apparatus for qualitative semimicroanalysis. H. H. Barber. *Ind. Eng. Chem., Anal. Ed.* **12**, 58–60 (1940).—Test tubes, funnel, pressure filter tube, filter stick, vacuum-pressure bulb, and hot water bath are described and their use is illustrated by a method for the qual. semimicroanalysis of Group II. H. G. B.

A new device for determining carbon dioxide in the air. Seizi Miyamoto. *Japan. J. Exptl. Med.* **17**, 407–12(1939)(in English).—A modified app. is described which ensures greater accuracy in the vol. of air introduced. Diagrams and tables accompany the article. C. J.

Cleaning of air and gas by thermal repulsion. Samuel C. Blacktin. *J. Soc. Chem. Ind.* **58**, 334–8(1939).—The effect of heated solid bodies of rod form in producing at normal pressure a dust-free region around them is termed a radiometer action. C. conducted expts. testing various sources of heat and different types of dust-repelling app. Elec. heating (by conduction) and hot-water heating gave comparable results. A peripheral hot-wire repulsor was developed and served well as a dust repellor. In an electrically heated app., with air originally contg. at 18.4° 90,880 dust particles per cc., the contents were at 38.5° 52,000, at 55.0° 25,760, at 74° 17,080 and at 85.3° 3200 particles. An app. using hot-liquid heating gave with air originally contg. at 14° 56,000 particles per cc., at 29° 17,100, at 44° 4300, at 55° 3100 and at 81° "nil" particles per cc. H. E. Messmore

A portable self-powered suction apparatus for collecting air samples. Harold W. Ruf and Wm. Z. Fluck. *Wis. State Board Health Bull.* **6**, No. 8, 19–21(1937); *U. S. Pub. Health Eng. Abstracts* **18**, AC, 4 (Oct. 22, 1938).—An app. is described. C. R. Fellers

Theory of gas compression and circulation. D. M. Newitt. *Trans. Inst. Chem. Engrs.* (London) Advance copy, Dec. 12, **1939**, 16 pp.—A review. For medium and high pressures, N. shows how to arrange interstage pressures and temps. to divide the work of compression fairly evenly between stages, with small differences in max. interstage temps., using the temp.-entropy diagram. Fourteen figures and 52 equations. R. W. Higbie

Mechanical calculations for high-pressure apparatus. V. I. Sokolov. *Khim. Mashinostroenie* **1938**, No. 2, 14–18; *Khim. Referat. Zhur.* **2**, No. 1, 122–3(1939).—A formula is derived for the calcn. of app. under pressure $R = r/\sqrt{(\sigma_g - 1.73p)/\sigma_g}$, where σ_g is the safe working stress, p the pressure, R and r are the external and internal radii of the cylinder. For pressures close to $\sigma_g/1.73$ the formula does not apply, since R then approaches ∞. The expression in a more convenient form is $R = r(2.31\ \sigma_g + p)/(2.31\sigma_g - p)$. A general form which can be used under any pressure is $R = (r/\omega)(e^m)$, where m is related to the pressure p and to the limit of plastic flow σ_0 through the equation $m = [(p\sqrt{3})/2\sigma_0] - 0.5 + \omega^2/2$, and ω depends on the margin of strength n and is expressed by $\omega = \sqrt{(1 + 1/n)(0.5)} - \sqrt{(1 + 1/n)^2(0.25) - 1/n}$. At high temp. the use of Bailey's formula $R = re(0.217p/\tau)$ is recommended where τ is the tangent tension for the outer surface of the cylinder. At high pressures the outer layers of the cylinder are destroyed first. The inner layers can

withstand pressures much higher than the limit of elasticity which should cause a plastic deformation. The plastic flow and the destruction begin only when the critical pressure reaches the outer radius. W. R. Henn

Improved counting rate meter. Robley D. Evans and Robert L. Alder. *Rev. Sci. Instruments* **10**, 332–6(1939). E. H.

A direct-reading counting rate ratio meter. Robley D. Evans and Ralph E. Meagher. *Rev. Sci. Instruments* **10**, 339–44(1939). E. H.

An automatic Pirani vacuum gage. E. J. Scott. *Rev. Sci. Instruments* **10**, 349–50(1939). E. H.

An improved agar bridge for pH measurements. A. van Kreveld. *Chem. Weekblad* **36**, 786–7(1939).—The improved agar bridge permits accurate pH measurements with an ordinary galvanometer. It is a combination of the usual KCl bridge and an agar bridge. With the latter it shares a low elec. resistance (500 ohms), with the former a regulated renewal of the boundary surfaces. The results of the measurements of some buffers with Pt quinhydrone electrodes at 20° are given. A. H. Krappe

Cloud chamber control circuit. I. A. Getting. *Rev. Sci. Instruments* **10**, 323–4(1939). E. H.

Exhaust valve for pneumatic cloud chambers. Lewis Fussell, Jr. *Rev. Sci. Instruments* **10**, 321–2(1939). E. H.

A useful expansion chart. W. F. Schaphorst. *Ind. Eng. Chem., News Ed.* **17**, 790(1939).—A nomographic chart with scales showing temp. differences in degrees F., total expansion in inches, and length of pipe in ft.; the expansion in piping, rods, tubes, etc., can be found directly and simply. W. C. Ebaugh

How many gallons in any vertical cylindrical tank? W. F. Schaphorst. *News Ed. (Am. Chem. Soc.)* **18**, 14 (1940).—A nomographic chart answering the above question for tanks of any height from 2 to 600 in., and for any diam. from 3 to 1000 in. (max. capacity of chart = 2,000,000 gal.). W. C. Ebaugh

Unit processes—background and objects. R. Norris Shreve. *Ind. Eng. Chem.* **32**, 145–6(1940).—An address. G. G.

Separation processes. The principle of minimum dilution in design of new or unusual processes. Merle Randall and Bruce Longtin. *Ind. Eng. Chem.* **32**, 125–9 (1940); cf. *C. A.* **32**, 8217[9], 8840[2]; **33**, 2[2], 1570[1], 2831[8], 3244[1], 9053[5,6,7].—To obtain the highest thermodynamic efficiency in a sepn. process, the streams mixed should be potentially as near at equil. as possible. Examples of violations of this principle in binary fractional distn. are given, and the resulting inefficiencies are traced. Such faulty operating methods can be recognized graphically, as shown in distn. by use of either the McCabe-Thiele (*x-y*) or the Ponchon-Savarit (*H-N*) diagram. Other applications are suggested. R. W. Higbie

Means of measuring turbidity and fluorescence using the Lovibond tintometer fitted with Rothamsted device. G. S. Fawcett and J. Hewitt. *J. Soc. Chem. Ind.* **58**, 342–4(1939).—The Lovibond-Schofield app. is a modification of the Lovibond tintometer and consists of a white light cabinet contg. 2 standard light sources, 2 $MgCO_3$ blocks, or 1 block and a sample. The $MgCO_3$ block and sample are illuminated at 45° and these are viewed through an eyepiece which brings the 2 fields into juxtaposition. With this modification of the app. and when fuller's earth is used in a 5¼ in. cell, readings indicating turbidities greater than 10 particles per hundred thousand are accurate. By inserting a nephelometer cell, turbidities from 0 to 10 per hundred thousand can be accurately measured. H. E. Messmore

The precision conductivity-bridge assembly. W. F. Luder. *J. Am. Chem. Soc.* **62**, 89–95(1940).—The use of recent developments of communication engineering in the cond.-bridge assembly was studied. This study shows that simplification, ease of construction, and lowered cost can be obtained with no loss in precision and with some gain in convenience in the operation of the bridge. Several different forms of the oscillator and its power supply, of the bridge network, and of the amplifier were constructed and tested. An adaption of a new and simple low-distortion oscillator to cond.-bridge use is described. Sep. detector terminal balance to ground is suggested. A two-stage untuned amplifier with gain sufficient to permit balancing the bridge to 1 or 2 parts per million when oscillator harmonics, a. c. hum, and stray pickup have been practically eliminated is suggested for ordinary use of the bridge. A three-stage tuned amplifier is described. A. B. Garrett

Analytical study of drying. P. Arribat. *Mém. poudres* **29**, 12–48(1939).—Math. A. J. Phillips

Typical dryer calculations. O. A. Hougen. *Chem. & Met. Eng.* **47**, 15–17(1940). E. H.

Improved magnesite crucible. Welton J. Crook, John R. Cunningham and James R. Cady. *Ind. Eng. Chem., Anal. Ed.* **12**, 48–51(1940).—Crucibles formed from magnesite brick, contg. iron oxide and silica, and fired at 2000° in an induction furnace are more impervious to fused slags than the com. variety. H. G. Bowlus

Continual observation of changes in weight at oven temperatures. A. C. Beckel and A. G. Sharp. *Ind. Eng. Chem., Anal. Ed.* **12**, 45–7(1940).—A Jolly spring balance suspended above a controlled atm. oven is used to measure rates of drying and oxidation of oils. H. G. Bowlus

Method for assembling thermocouples. H. M. Trimble. *Ind. Eng. Chem., Anal. Ed.* **12**, 52(1940).—Braided Fiberglas sleeving is used to cover a thermocouple wire bundle. H. G. Bowlus

An accurate gas thermostat. L. Levenbook. *Microscope Entomol. Monthly* **3**, 265–6(1939).—An inexpensive Hg app. for maintaining the temp. of molten paraffin embedding baths is described and illustrated. L. Wilson Greene

Acid-base catalysis in depolymerization of dimeric glycolaldehyde [microdilatometer] (Bell, Hirst) **2**.

McPherson, William, Henderson, William Edwards, and Fowler, George Winegar: Laboratory Units in Chemistry. New York: Ginn & Co. 329 pp. $.80. Reviewed in *J. Chem. Education* **16**, 598–9(1939).

Countercurrent contact apparatus. Donald S. McKittrick (to Shell Development Co.). Can. 385,775, Dec. 19, 1939. Structural details are described of an app. for countercurrent contact treatment of a liquid with fluid of a lower sp. gr. than the liquid and at least partially immiscible therewith.

Flotation cell. Wm. J. McKenna (to International Smelting and Refining Co.). U. S. 2,178,239, Oct. 31. Various structural and operative details of a cell provided with an impeller.

Apparatus suitable for measuring and recording elongation and compression of specimens of materials under test. Jens Sivertsen (to Tinius Olsen Testing Machine Co.). U. S. 2,176,016, Oct. 10. Various structural, elec., mech. and operative details.

Flushing equipment for scrubbers and other gas-washing apparatus. N. S. Lazarev. Russ. 51,749, Sept. 30, 1937. Construction details.

Use of filter paper. Alfred E. Squire. U. S. 2,171,484, Aug. 29. A filtering device for use in funnels is prepd. by taking a sheet of filter paper of substantially semicircular shape with a flange projecting along its diametrical line, folding the sheet about a radial line perpendicular to the diametrical line so as to form two quadrants of a circle, securing together the superimposed parts of the projecting flange portion, folding the secured flange portions about the diametrical line and then opening the two quadrants to form a conical structure.

Air filter. Games Slayter (to Owens-Corning Fiberglas Corp.). U. S. 2,178,614, Nov. 7. Fibrous material such as glass wool is used with a viscous coating of an oil and a Zn soap mixed with the oil. Cf. *C. A.* **33**, 6661[8].

Air filter for wet duct humidifier systems. Agnew H.

Bahnson (to The Bahnson Co.). U. S. 2,178,463, Oct. 31. Various structural, mech. and operative details.

Apparatus for cleaning and filtering air. Theodore W. Hallerberg (to United Specialties Co.). U. S. 2,179,229, Nov. 7. Various structural details.

Filter press. Alonzo L. Bausman. U. S. 2,178,416, Oct. 31. Various structural, mech. and operative details.

Medium suitable for use in filtering cleaners' naphtha, etc. Wm. H. Alton (to R. T. Vanderbilt Co.). U. S. 2,179,028, Nov. 7. Finely divided pyrophyllite is used with an admixt. of fibrous talc 5–50%.

Apparatus for extracting hops, ginger roots, etc., by aqueous liquids, etc. Charles G. Kummerlander. U. S. 2,178,207, Oct. 31. Various structural and operative details of an app. including a retort and superposed condenser, etc.

Separating device (for connection in pipe lines) for removing condensate from steam or other vapors or gases. Pasquale Pascale (to Novo Patents, Inc.). U. S. 2,178,240, Oct. 31. Various structural details.

Device for separation of minute liquid particles from swiftly moving gas. Charles G. Hawley (to Centrifix Corp.). Can. 384,786, Oct. 24, 1939.

Apparatus for magnetic separation of dry materials such as ore constituents. Augustin L. J. Quenau. U. S. 2,177,809, Oct. 31. Various structural and operative details.

Separation of powdered materials. Nikolai Ahlmann (to F. L. Smidth & Co.). Can. 384,465, Oct. 3, 1939. Operative and structural details.

Fractionating finely divided solid particles such as those of crude clays. Sanford C. Lyons (to Bird Machine Co.). U. S. 2,179,154, Nov. 7. An arrangement of app. is described, and a process of fractionating finely divided solid material of widely varying particle size, including a fraction of such fine particle size as tends to interfere materially with selective gravitational settling of coarser particles from an aq. suspension of such material, which comprises centrifuging an aq. suspension of such material to deposit centrifugally substantially all but the very finest particle fraction, resuspending the centrifugally deposited fraction in water, and gravitationally settling from the resulting suspension the coarsest particle fraction while maintaining above and removing from the gravitationally settled fraction an aq. suspension of the intermediate-size particle fraction.

Apparatus for producing gas and dry residue. Charles Ness and Hugo V. Kojola (to Dominion Oxygen Co., Ltd.). Can. 385,463, Dec. 5, 1939. A gas and a substantially dry residue, e. g., C_2H_2 and $Ca(OH)_2$, are produced by reaction of a solid and liquid in amts. proportioned to complete the reaction. After the reaction is complete the solid residue is withdrawn from the reaction zone, and the gas is sepd. from the solid.

Gas-pressure governor. Frederick O. Horstmann and Percival F. Horstmann. U. S. 2,173,416, Sept. 19. Various details.

Regulating the penetration of liquids such as those used for cleaning air filters. Ralph D. Petre. U. S. 2,178,701, Nov. 7. Various details of app. and operation in which centrifugal action is utilized to counteract and limit penetration of applied liquid.

Device (with an adjustable overflow) for dipping and measuring liquids. Herman Siemund (to Joe Lowe Corp.). U. S. 2,178,524, Oct. 31. Various structural and operative details.

Classification system for pulverized materials. Harlowe Hardinge (to Hardinge Co., Inc.). Can. 385,343, Nov. 28, 1939. Structural details.

Crushing, grinding and classifying mill. William W. Gibson. Can. 385,405, Dec. 5, 1939. Structural details.

Spray coating device. David A. Wallace (to Chrysler Corp.). U. S. 2,177,851, Oct. 31. Various details of a device suitable for spraying coating materials with compressed air.

Apparatus for continuous mixing, homogenizing or drying of various solid and liquid materials. Pieter Smit (to N. V. Octrooien Maatschappij "Activit"). U. S. 2,177,910, Oct. 31. A mixing and homogenizing app. suitable for use in the manuf. of activated carbonaceous materials, etc., comprises a longitudinal trough, a conveying screw disposed above and parallel with the trough, inlet means above and at one end of the screw for admitting material thereto, at least one shaft rotatably mounted in the trough and parallel with the screw, the shaft being provided with agitating elements and a partition disposed at the end of the trough opposed to the inlet means for permitting discharge of the material only by the conveyor screw, whereby the material carried by the conveyor screw falls by gravity from the screw into the trough and is thrown up again to the screw by the agitating elements thereby effecting the conveying of the material separately from mixing.

Centrifugal drier suitable for treating sand, coal, gravel, etc. Claude M. Garland. U. S. 2,178,750, Nov. 7. Various structural, mech. and operative details.

Regenerative apparatus (with a cylindrical wire screen) for heating and cooling gases such as air and combustion gases. Erik T. Linderoth. U. S. 2,178,481, Oct. 31. Various structural details.

Thermometer mounting for side walls of tanks. Geo. J. Oestreicher. U. S. 2,178,697, Nov. 7. Various structural details.

Temperature-compensated indicating instruments. Hans Loen (to Bendix Aviation Corp.). U. S. 2,178,799, Nov. 7. Various structural and operative details.

Electrical system for automatic control of temperature conditions, etc. Albert Callender and Allan B. Stevenson (to Imperial Chemical Industries Ltd.). U. S. 2,175,985, Oct. 10. Various structural, elec. and operative details of app. for automatic control of a steam supply, etc.

Thermostatic control suitable for use with laboratory ovens. Hugo Romander (to Federal Telegraph Co.). U. S. 2,170,664, Aug. 22. Various structural and operative details.

Heat-exchange apparatus (of the header and parallel tube type) suitable for cooling water, etc. Harry P. Bowser (to H. P. Bowser Mfg. Co.). U. S. 2,178,095, Oct. 31. Various structural details.

Soaking pits for heat treatments. Levi S. Longenecker. U. S. 2,178,668, Nov. 7. Various details of cover mounting and construction.

Regulating the humidity of air with use of a hygroscopic solution such as one of calcium chloride. Robert B. P. Crawford. U. S. 2,177,869, Oct. 31. App. and various operative details are described.

Absorption refrigerating system suitable for use with ammonia, etc. Rudolph S. Nelson (to Hoover Co.). U. S. 2,178,603, Nov. 7. Various details of app. and operation.

Absorption refrigerating systems, suitable for operation with ammonia, etc. Curtis C. Coons (to Hoover Co.). U. S. 2,178,560–1, Nov. 7. Various details of app. and operation.

Absorption refrigerating systems such as those utilizing ammonia and inert gas. Curtis C. Coons (to Hoover Co.). U. S. 2,178,869–70, Nov. 7. Various details of app. and operation.

Acetylene from other hydrocarbons. Floyd J. Metzger (to Air Reduction Co.). U. S. 2,179,378, Nov. 7. App. is described, and a process involving introducing into a large combustion and reaction chamber a large number of sep. high-velocity jets of a hydrocarbon such as C_3H_8, etc., and of O directed to cause commingling and combustion in a localized and regulated manner and blending of the jets and combustion products. U. S. 2,179,379 describes an app. and a process of producing acetylene from hydrocarbons such as those of petroleum by combustion with O insufficient for complete combustion and in the presence of steam (various operative details being described).

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Ivan Evgrafovich Adadurov. Anon. *Trudy Khar'kov. Khim.-Tekhnol. Inst. S. M. Kirova* **1**, 5–11(1939).—A brief account of the accomplishments of I. E. Adadurov including a list of his works. B. Z. Kamich

Pietro Spica. Efisio Mameli. *Gazz. chim. ital.* **69**, 479–98(1939).—An obituary, with a bibliography of 222 publications by S. and his collaborators. C. C. Davis 2

The atomic hypothesis of William Higgins. Edward R. Atkinson. *J. Chem. Education* **17**, 3–11(1940). E. H.

Perkin medal award to C. M. A. Stine. Anon. *Ind. Eng. Chem.* **32**, 137(1940). **Rise of the organic chemical industry in the United States.** C. M. A. Stine. *Ibid.* 137–44. G. G.

The historical and industrial discovery of the elements. 3 I. J. Newton Friend. *Chemistry & Industry* **1939**, 1104–7. II. *Ibid.* **1940**, 24–6. E. H.

Chemistry in public junior colleges. A comparison of 1938 with 1928–29. Maurice R. Amsden and Stanley W. Morse. *J. Chem. Education* **17**, 31–5(1940). E. H.

Does high-school chemistry function in college? Vernon K. Krieble. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 27–8(1939).—Accrediting authorities are too lenient with respect to chemistry. Leopold Scheflan 4

Does high-school chemistry function in college? Harold A. Iddles. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 74–8(1939).—The secondary school contribution is extremely important and does function materially in college work. Leopold Scheflan

A high-school course in chemistry which does not lead to repetition in college. P. M. Glasoe. *J. Chem. Education* **17**, 11–15(1940). E. H.

Teachers and textbooks. George W. Fowler. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 28–32(1939).—An address on the teaching of chemistry in high schools. 5 Leopold Scheflan

Lecture demonstrations. Grover C. Greenwood. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 32–3(1939).—Demonstrations are described on fires, the extinguishing of a fire and on spontaneous combustion. L. S.

Teaching problems in presenting the law of chemical equilibrium to students in analytical chemistry. C. S. Adams. *J. Chem. Education* **17**, 22–9(1940). E. H. 6

Approximate solutions to problems involving the ideal gas law. Alexander Calandra. *J. Chem. Education* **17**, 15–17(1940). E. H.

Recent advances in physics. Thomas H. Osgood and Ralph B. Bowersox. *News Ed. (Am. Chem. Soc.)* **18**, 30–1, 34(1940). E. J. C.

The charcoal-iron industry. The attempts to discover a substitute for charcoal, mainly in the eighteenth century and with particular reference to the Royal Society of Arts MSS. H. Gwynn Jones. *J. Roy. Soc. Arts* **88**, 41–57 (1939); *Foundry Trade J.* **61**, 353–4. E. H. 7

Further experiments on the decomposition and regeneration of nitrogenous organic matter in sea water. Theodor v. Brand, Norris W. Rakestraw and Charles E. Renn. *Biol. Bull.* **77**, 285–96(1939); cf. *C. A.* **31**, 4545[2]; **33**, 3642[5].—Successive cycles of decompn. and regeneration of nitrogenous org. and inorg. compds. can be effected aerobically by innoculation with living diatoms (*Nitzschia closterium*) at any stage of the N cycle. At the expense of particulate N, NH_3 increases for 1 month in the first cycle, less rapidly in the second. Nitrite begins to appear after 1–2 months as NH_3 starts to disappear, nitrate as nitrite lessens. Anaerobically (in H_2) H_2S appears; particulate N diminishes less slowly than aerobically. J. McA. 8

Hydrographic features of the waters of Saint John Harbor. H. R. Hachey. *J. Fisheries Research Board Can.* **4**, 424–40(1939).—The temp. of the surface waters of St. John Harbor seldom exceeds 15.0°, while bottom waters probably never reach 15.0°. During the colder months of the year, water temps. are seldom lower than 0.0°. Salinities based on 1 year's observations indicate that the mean monthly salinity of surface waters ranges from 5.1% to 23.3%. The salinity distribution of the harbor waters varies greatly with the phase of the tide. After a dry summer, with comparatively small discharge from the river, the salinity at any phase of the tide did not fall below 22.0%. Salinities greater than 32.0% penetrated the harbor at the greatest depths. At the times of the spring freshets, the harbor was thoroughly bathed, at certain phases of the tide, with waters of a salinity less than 5.0%, and at other phases, with a salinity greater than 30.0%. A well-marked gradation in salinity was noted proceeding seaward from the reversing falls. Formulas are derived to express the annual variation of water temps., and the relation between harbor salinities and river discharge. Dorothy A. Meyer 9

Measurements of atmospheric ozone at Bombay. M. W. Chiplonkar. *Proc. Indian Acad. Sci.* **10A**, 105–20 (1939).—Daily measurements during 2 yrs. yield averages and show seasonal variations that agree with those of Dobson's world-wide survey (O_3 equiv. to a thickness of 0.213 cm.). The annual curve, however, shows an unusual depression during the monsoon months (July and Aug.) and a peak during Sept. and Oct. There is practically no correlation between the daily value of O_3 and the pressure at ground level. Wm. E. Trout, Jr.

Attempt to solve some problems of nomenclature. G. A. Butkevich. *Uspekhi Khim.* **8**, 593–603(1939).—Some suggestions are made as a basis for discussion on changes in Russian chem. nomenclature. F. H. Rathmann

Nomographic methods of calculation in physical chemistry. G. V. Vinogradov. *Uspekhi Khim.* **8**, 378–438 (1939).—Examples for electrode potentials, radius of colloid particles, rate of sedimentation of aerosols, relative nos. of gas mols. the energies of which exceed a given value, dissocn. consts., mean free path, Planck-Einstein function, Debye-Hückel activity coeffs., vol. of satd. vapors, activity coeffs., adsorption coeffs., vapor pressure are given in 16 nomograms. 152 references. F. H. Rathmann

The intermolecular potential of mercury. J. H. Hildebrand, H. R. R. Wakeham and R. N. Boyd. *J. Chem. Phys.* **7**, 1094–6(1939).—The distribution function for Hg (−35 to +250°) (*C. A.* **33**, 9082[7]) and the Hildebrand-Wood equation (*C. A.* **28**, 955[2]) are used to calc. the intermol. potential. This potential is $\epsilon = (j/r^n) - (k/r^6)$ (where $j = 5.49 \times 10^{-9}$, $k = 3.52 \times 10^{-10}$, ϵ is in dynes, r in A.). The value of k checks well with the value 3.35×10^{-10} calcd. from the London formula (*C. A.* **31**, 2882[9]) for dispersion potential. Several other independent checks agree with this potential function within the apparent limits of error of each. G. M. Petty 10

Free hydroxyl. V. N. Kondrat'ev. *Uspekhi Khim.* **8**, 195–240(1939).—Theoretical and review. K. discusses spectroscopic data on the OH mol., the thermal dissocn. of H_2O, O_2, H_2 and OH, production of OH during elec. discharge through H_2O and H_2O_2 vapors, and in a hydrogen flame. OH is present in a non-equil. state and plays an important role in the mechanism of combustion of H_2, NH_3, PH_3, H_2S, H_2CO_3 and of hydrocarbons. F. H. Rathmann 11

Diamagnetism of gases and vapors. Ya. Shur. *Uspekhi Fiz. Nauk* **20**, 410–46(1938).—In a theoretical and math. review, Shur discusses the classical and quantum theories of diamagnetism, and the methods of calcn. of the magnetic susceptibility. He then discusses various exptl. data for N_2, H_2, CO_2, He, Ne, A, Kr, Xe, CH_4, C_2H_6, C_2H_2, CS_2, C_6H_6, $(H_2O)n$, Br_2 and Hg. Using a method of his own (cf. *C. A.* **31**, 4862[3]) and also Yanus and Shur, (*Compt. rend.* (U. R. S. S.) **2**, 465(1934)). Shur obtained the following values for $-\chi \times 10^6$; CS_2 gas 0.53, C_6H_6 gas 0.75, liquid CS_2 0.56–0.59, liquid C_6H_6 0.71–0.73, Br_2 gas 0.46, liquid or solid Br_2 0.40, Hg gas 0.39, Hg ion 0.20. The exptl. values agree best with the values calcd. by Slater's method. F. H. Rathmann

Dependence of ferromagnetic anisotropy on the field

strength. L. P. Tarasov. *Phys. Rev.* **56**, 1224–30(1939). —In evaluating the anisotropy consts. of ferromagnetic materials a common method is to measure the torque exerted on a specimen of circular section by a uniform magnetic field, to det. the max. torque by extrapolation to infinite field strength, and to multiply this by an appropriate no. The law of approach of the torque T_H to its limiting value T_∞ is $T_H = T_\infty (1 - H_0/H_a)$ for disks and ellipsoids of single crystals of Fe-Si alloys contg. up to 7.4% Si, and for polycryst. disks of Fe and of Si steel. H_a is the strength of the applied field uncorrected for demagnetizing field and H_0 is a const. which depends mostly on the dimension ratio of the disk. This law is discussed in relation to a similar law proposed by H. Schlechtweg (*C. A.* **31**, 1668[3]), and to the familiar law of approach of magnetization to satn. For disks the approach to satn. of the torque peaks is connected with the lack of magnetic satn. at their edges. G. M. Petty

Ferromagnetic anisotropy of iron and iron-rich silicon alloys. L. P. Tarasov. *Phys. Rev.* **56**, 1231–40(1939); cf. *C. A.* **33**, 2091[5].—The ferromagnetic anisotropy const. K_1 was measured by the magnetic torque method for Fe alloys contg. up to 13.7 at. % Si. For $A < 9.86$, $K_1 \times 10^{-5} = 5.20–0.279A$. For $A < 9.86$, $K_1 \times 10^{-5} = 4.43–0.1915A$. K_1 is expressed in ergs/cc.; A is the at. percentage of Si. Akulov's value for Fe (*C. A.* **24**, 536) is unreliable, as it is an av. of discordant results. The present theory of ferromagnetic anisotropy is in need of revision, possibly in connection with the higher order terms in the magnetic energy equation. The change in slope in the K_1-A curve occurs at nearly the same concn. as the similar change in slope found by Jette and Greiner for the lattice parameter a_0 (*C. A.* **27**, 2922). An attempt is made to explain the occurrence of these breaks in terms of a change from a hypothetical superlattice with a Si concn. of $^3/_{32}$ to a partially formed Fe_3Si superlattice. G. M. Petty

Ferromagnetic anisotropy of low-nickel alloys of iron. L. P. Tarasov. *Phys. Rev.* **56**, 1245–6(1939); cf. preceding abstr.—The anisotropy of low-Ni (0–17 at. %) alloys of Fe decreases linearly from 5.29×10^5 ergs/cc. for Fe to $\sim 1.3 \times 10^5$ ergs/cc. for 17 at. % Ni. G. M. P.

Volume determination by dielectric measurement. H. Ulich and H. van den Berge. *Chem. Fabrik* **1939**, 512–13.—The method was developed to measure the concn. and d. of solns. of C_2H_2 in Me_2CO with respect to temp. and pressure, but may be used for other purposes. It depends on the fact that the capacity of an elec. condenser partly submerged in the soln. depends on both the dielec. const. of the soln. and the depth of submergence. A cut of the app. is shown, the method is described and math. formulas are given. J. H. Moore

The dielectric behavior of colloid systems. H. Schaefer and Stachowiak. *Kolloid-Z.* **89**, 311–16(1939).—A modified app. for detg. the dielec. const. of colloidal substances (in this case animal liver tissue) is described. The effect of colloidal structure on the dielec. const. is discussed. The dielec. const. depends on the frequency (wave length) and temp., and is affected by the structure of the particle, especially in the case of biol. materials such as proteins. S. I. Aronovsky

Dipole moment of 1-chloroanthraquinone. Ernst Bergmann and Anna Weizmann. *J. Am. Chem. Soc.* **61**, 3583(1939); cf. *C. A.* **32**, 7445[5].—Repetition of previous work shows that the dipole moment of 1-chloroanthraquinone in C_6H_6 and dioxane is 1.8, and 1.9D., resp.; Fischer and Rogowski (*C. A.* **33**, 7633[3]) give 1.53 (C_6H_6) and 1.55 (dioxane). C. J. West

Dipole moment and alkyl chain length. H. O. Jenkins. *Nature* **144**, 667–8(1939).—When the dipole moment μ is plotted against $1/r^2$, where r is the distance between the C° of the ring and the terminal C atom in the side chain (H in the case of C_6H_6), a straight line is obtained for C_6H_6, PhMe, PhEt and PhPr. The limiting value of μ is 0.69D. G. M. Petty

The heat capacity of cyanogen gas. E. J. Burcik and Don M. Yost. *J. Chem. Phys.* **7**, 1114–15(1939); cf. following abstr.—The observed values of $C_p°$ (in cal./deg.) at infinite diln. are: 273.16° abs., 13.14 ± 0.02; 296.36° abs., 13.46 ± 0.02; 326.91° abs., 13.96 ± 0.02. These are compared with calcd. values. G. M. Petty

The heat capacity of cyanogen gas. F. Stitt. *J. Chem. Phys.* **7**, 1115(1939); cf. preceding abstr.—The observed values of $C_v°$ at 0.01 mm. pressure lie in the range 9.59–9.61 at 185.2°K., 12.04–12.05 at 294.1°K., 12.29–12.42 at 320.4°K. These are compared with calcd. values. G. M. Petty

The flow of gases through metal capillaries at low pressures. Hirosi Adzumi. *Bull. Chem. Soc. Japan* **14**, 343–7(1939).—A graph of the rate of flow of H per unit pressure *vs.* pressure goes through a min. This effect which was observed in Ag, Al, Cu and Fe capillaries can be explained in terms of adsorption on the capillary walls. S. B. S.

Kinetic processes in an expansion cylinder. Walther Meissner and Gertrud Meissner. *Ann. Physik* **36**, 303–18(1939).—A kinetic treatment of a gas expanding adiabatically against a piston moving with const. velocity shows that the pressure exerted on the piston agrees to within a negligible amt. with the pressure for very small piston velocity. More general cases of expansion are handled qualitatively. Henry C. Thomas

Equation of state for gas mixtures. I. R. Krichevskiĭ and Ya. S. Kazarnovskiĭ. *J. Phys. Chem.* (U. S. S. R.) **13**, 378–96(1939); cf. *C. A.* **33**, 6104[4]. F. H. R.

On the *p-v-T* relations and an equation of state for unsaturated vapors of methyl alcohol. L. Lashakov. *Acta Physicochim. U. R. S. S.* **11**, 107–16(1939)(in English).—Exptl. data obtained over the range 170–290° and 10–95 atms. yield pv values about 4% lower than those obtained by Ramsay and Young. By use of the Beattie and Bridgeman equation (*C. A.* **21**, 3146) the av. difference between exptl. and calcd. values is 0.21%. F. H. R.

Extinction limits of flames. W. P. Jorissen. *Chem. Weekblad* **36**, 815–20(1939).—A survey of research on the extinction limits of flames from the 18th century (Priestley) to the present day is given, with figures for the more common gas mixts. in a table. 41 references. A. H. K.

A definition of real fluids. Walter S. Hill. *Anales asoc. quím. farm. Uruguay* **41**, 64–71(1938)(Pub. 1939).—The following general definition of a fluid is proposed: A real fluid is a continuous material system capable of perfect mobility (i. e., with zero work) under all infinitesimal deformations that leave the elemental vol. and the areas that limit the different portions of the system unchanged. It is shown mathematically that this definition leads to the classical expressions for internal equil., for Laplace's law of superficial equil. and for the condition of equil. with the surroundings. Iver Igelsrud

The nature of the liquid state. Wm. Band. *J. Chem. Phys.* **7**, 1114(1939); cf. *C. A.* **33**, 5249[3].—A general discussion. G. M. Petty

High-pressure vapor-liquid equilibrium for the systems propylene–isobutane and propane–hydrogen sulfide. E. R. Gilliland and H. W. Scheeline. *Ind. Eng. Chem.* **32**, 48–54(1940); cf. *C. A.* **33**, 9071[1].—*P-T-x-y* data were obtained for the propylene-isobutane and H_2S-propane systems. A comparison between exptl. values and those calcd. from the K charts indicate that the latter are in considerable error in the critical region. A general empirical correlation is presented for predicting phase equil. data for two-component hydrocarbon systems in the critical region. Joseph H. Wells

Thermodynamic properties of the hexyl alcohols. III. 2-Methyl-3-pentanol and 3-methyl-3-pentanol. Frank Hovorka, Herman P. Lankelma and Abraham E. Axelrod. *J. Am. Chem. Soc.* **62**, 187–9(1940); cf. *C. A.* **32**, 4400[6].—The surface tension, d., viscosity and vapor pressure were detd. for 2-methylpentanol-3 and 3-methylpentanol-3 over the temp. range from 5° to the b. p. The n was detd. from 15 to 45°. The av. heat of vaporization, the consts. for Rankine's Eötvös relation, total surface energy, and the crit. consts. were calcd. The heats of vaporization are 10,624 and 10,057 cals., the b. ps. 126.68 ± 0.02° and 120.91 ± 0.02° and Trouton's const. 26.6 and 25.5 for the two alcs., resp. The high values of Trouton's const. indicate varying degrees of assocn. This conclusion is also

indicated by the values of the Eötvös const., parachor, and total surface energy. A. B. Garrett

Interfacial activity of short-chain isomers. C. C. Addison. *Nature* **144**, 783(1939); cf. *C. A.* **32**, 1161[8], 2805[7].—Interfacial tensions (dynes per cm.) were detd. between pure water and (1) C_6H_6, 35.41; (2) 1% *trans*-$Cl_2Pt(SEt_2)_2$ in C_6H_6, 35.30; (3) 1% *cis*-$Cl_2Pt(SEt_2)_2$ in C_6H_6, 28.62; between C_6H_6 and 1% aq. solns. of maleic, fumaric and *trans*-mesaconic acid, 35.41; *cis*-citraconic acid, 28.51. Similar differences are reported between *cis*- and *trans*-benzaldoxime, and between structural isomers such as the toluic acids, cresols, phthalic acids and butyl alcs. G. M. Petty

A modified method of using Poiseuille's apparatus. J. Bhimasenachar. *Proc. Indian Acad. Sci.* **10A**, 141–4 (1939).—Viscous liquids, e. g., glycerol, are forced by pressure of dry air through a horizontal glass capillary of cross section 0.0008005 sq. cm. and length 30.5 cm. A bulb at one end facilitates filling. The motion of a small pellet of Hg, trapped in the capillary, between marks 16.58 cm. distant indicates the rate of flow of the liquid, from which the viscosity can be obtained. For glycerol, the viscosity $\eta_T = Ae^{B/T}$, where $A = 7.23 \times 10^{-9}$ and $B = 6125$. Wm. E. Trout, Jr.

The viscous force between almost-coaxial cylinders. D. R. Inglis. *Phys. Rev.* **56**, 1041–4(1939).—The math. theory of the flow between a rotating and a stationary cylinder, which are not perfectly coaxial, and the theory of the torque on the stationary cylinder are discussed. S. Bradford Stone

The viscosity of liquid hydrogen. H. E. Johns. *Can. J. Research* **17A**, 221–6(1939).—The viscosity of liquid hydrogen was measured by observing its flow through a variety of capillary tubes. The resulting viscosities are about 10% higher than those obtained by Keesom and Macwood (*C. A.* **32**, 8229[4]) using an oscillating disk. J. W. Shipley

The change in electrical resistance of alkali metals on melting. Akira Harasima. *Proc. Phys.-Math. Soc. Japan* **21**, 679–86(1939).—Math. The $R_{liq.}/R_{solid}$ ratio is derived from theoretical considerations and found to agree with exptly. observed values. The temp. coeff. of the resistance of a liquid was derived and was found to give results of the right order of magnitude. The authors criticized their theory from the point of view of the theory of Wigner and Seitz. Frank Gonet

The adiabatic piezo-optic coefficients of water and the alcohols. K. S. Venkataraman. *Proc. Indian Acad. Sci.* **10A**, 121–40(1939).—The following adiabatic piezo-optic coeffs. ($(\partial n/\partial p)_\phi \times 10^6$) were obtained by the method of Raman and Venkataraman (*Proc. Roy. Soc.* (London) **A171**, 137(1939)): 34.52 for MeOH at 24.4°, 36.12 for EtOH at 24.0°, 33.54 for *n*-PrOH at 24.1°, 37.30 for *i*-PrOH at 25.5°, 32.95 for *n*-BuOH at 24.5°, 36.07 for *i*-BuOH at 25.5°, 34.15 for *n*-AmOH at 26.1°, and 14.66 for H_2O at 23.1°. The temp. coeffs. of the refractive indexes, $(\partial n/\partial T)_p \times 10^6$, were, resp., −37.5, −39.8, −40.5, −43.5, −41.1, −41.8, −41.1. The elasto-optic coeffs. calcd. for pressure changes at const. temp. and at const. entropy were always higher than the theoretical value given by the Lorentz formula. The difference between the value at const. temp. and the theoretical value, resulting from the anisotropy of the polarization field, is considerably smaller in the alcs. than in CS_2 or benzene. The elasto-optic coeff. calcd. for temp. changes approaches the values given by the Lorentz formula for the higher alcs. The pure temp. coeff. of *n* is pos. in MeOH and EtOH and neg. from *n*-PrOH on. Wm. E. Trout, Jr.

The interpretation of atomic distribution curves for liquids. C. A. Coulson and G. S. Rushbrooke. *Phys. Rev.* **56**, 1216–23(1939).—Math.-theoretical. The theory, applied to liquid Na, gives a latent heat of melting in fair agreement with expt. There is a change of structure on melting. If the parameters in a partition function developed in this way are chosen to agree with any one phys. property, it is incorrect to add terms representing "communal entropy." G. M. Petty

The extraction of ferric iron from hydrochloric acid solutions by dichloroethyl ether and the formula of the iron compound in the ether. Joseph Axelrod and Ernest H. Swift. *J. Am. Chem. Soc.* **62**, 33–6(1940).—The mutual soly. of dichloroethyl ether with HCl solns. is so small that extns. are practical with even quite concd. acid solns., and so little acid passes into the ether phase that conditions are favorable for studying the assocn. of HCl with the iron. The distribution data of $FeCl_3$ between HCl solns. and β,β-dichloroethyl ether indicate that this ether can be used for the quant. extn. of $FeCl_3$ from solns. greater than 7 *N* in HCl. Chem. analyses of the ether soln. have shown that 1 mol. of HCl and 4–5 mols. of water are present for each mol. of iron present in the ether layer. If polymerization and the possible presence of ether in the mol. are disregarded, the empirical formula can be written as $HFeCl_4 \cdot 4\text{–}5H_2O$. A. B. Garrett

Evaporation coefficient of polar crystals. Kurt Neumann and Virgil Costeanu. *Z. physik. Chem.* **A185**, 65–80(1939).—The vapor pressure of $KReO_4$ was detd. by the Knudsen effusion method between 780 and 853°K.; the pressures are between 0.26×10^{-3} and 9.55×10^{-3} mm. Hg, resp. $\log p(\text{solid}) = 22.045 + 16092/T$; $\log p(\text{liquid}) = 15.586 + 11666/T$; $\Delta H(\text{solid}) = 73.28$ kg.-cal./mol.; $\Delta H(\text{liquid}) = 53.12$ kg.-cal./mol.; $\Delta H(\text{fusion}) = 20.16$ kg.-cal./mol. From the evapn. velocity of a small crystal of $KReO_4$ into a high vacuum, the evapn. coeff., α, is calcd. to be 0.8. $v_{evapn.} = v_{condensation} = \alpha[N/\sqrt{2\pi MRT}]p$, where v = velocity, N = Avagadro's no., M = mol. wt., p = pressure. Theoretical considerations are given as to the elementary process of evapn. on the surface, edges and corners of the crystal in order to account for the high value of $\alpha = 0.8$. Victor R. Deitz

Photopotential of an element composed of metal-semiconductor-metal. V. Experiments with polycrystalline cuprous oxide specimens at low temperatures. G. Mönch *Ann. Physik* **36**, 1–8(1939); cf. *C. A.* **33**, 4101[1].—Considerable exptl. detail is given. William E. Vaughan

The electric conductivity of the alkali metals in a magnetic field. E. Justi and M. Kohler. *Ann. Physik* **36**, 349–56(1939).—A discussion of exptl. results to appear in *Physik. Z.* The temp. dependence to 14° abs. for zero magnetic field is given by the Grüneisen formula with characteristic temp. $\theta = 199.5°$. A theoretical solution is given of the problem of the change of resistance of the alkali metals for the case of a very strong perpendicular magnetic field with isotropic binding and anisotropic collision frequency. The satn. value of the relative increase in resistance found by expt. is reproduced to order of magnitude by the theory. Henry C. Thomas

Large anisotropy of the electrical conductivity of graphite. K. S. Krishnan and N. Ganguli. *Nature* **144**, 667(1939).—The sp. resistance in the basal plane of graphite is of the order of 10^{-4} ohms per cm.; along the normal to the plane, 2–3 ohms per cm. G. M. Petty

Diffusion of oxygen in copper. C. E. Ransley. *J. Inst. Metals* **65**, Advance copy No. 855, 25 pp.(1939).—The desorption of O from Cu *in vacuo* is controlled by the rate of evapn. from the surface of the metal. CO does not diffuse in solid Cu. When Cu contg. O is heated in CO, the O is removed by a surface reaction. This reaction follows the equation $W^2 = tk$. W is the weight of O removed, t is time, and k is the diffusion const. Log k is a straight-line function with respect to abs. temp. The embrittlement of Cu in reducing atms. is due to the penetration of H. 24 references. J. N. Lynn

Structure and physical properties of thin metallic layers. A. T. Ashcheulov. *Uspekhi Fiz. Nauk* **20**, 481–512(1938).—Review. A. discusses the methods of prepn. and structure detn., elec. cond. and optical properties of thin metallic layers. 208 references. F. H. Rathmann

Growth phenomena in cadmium single crystals and their importance for the investigation of the forces active between lattice atoms. I. N. Stranski. *Ber.* **72A**, 141–8 (1939).—A review. G. G.

Mathematical treatment of structure analyses according to the Debye-Scherrer method. III. The rhombohedral system. P. Adolf Herrlin. *Kgl. Fysiograf. Säll-*

skap. Lund, Handl. **47**, No. 3, 1–10(1936)(in English). IV. **The tetragonal system.** *Ibid.* 11–16.—Math. W. C. Tobie

Atomic parameters of γ-silver-cadmium. Harald Perlitz and Rolf Aavakivi. *Nature* **144**, 708–9(1939).—There is a regular distribution, with Ag in the positions of *B* and *C* atoms and Cd in the position of *A* and *D* atoms; a = 0.105, b = 0.175, c = 0.358, d = 0.310 and e = 0.038. G. M. Petty

Structure and thermal properties associated with some hydrogen bonds in crystals. III. Further examples of the isotope effect. A. R. Ubbelohde. *Proc. Roy. Soc.* (London) **A173**, 417–27(1939); cf. *C. A.* **33**, 4486[4,6].—The effect on the lattice spacings of substituting deuterium for H was investigated for pentaerythritol; $CuSO_4.5H_2O$; $SrCl_2.6H_2O$; fumaric acid; KH_2PO_4; $NaHSO_4$; urea; and KHF_2. U. concludes that when the crystal structure contains hydroxyl bonds the isotope effect is small, and when it contains H bonds there is a marked expansion, which disturbs the lattice sufficiently to lead to sepn. in a new crystal structure (K phosphate). The effect obtained for KHF_2 does not suggest a short H bond in this compd. Short H bonds are believed to require special resonance forces for their explanation. Frank Gonet

Fiber structure in alkali metal wires. Carlo Goria. *Kolloid-Z.* **89**, 325–8(1939); cf. *C. A.* **33**, 8072[9].—X-ray examn. of metals and alloys (Debye-Scherrer method, cf. *C. A.* 12,786) discloses the orientation, as well as the form and size of the cryst. units present; also whether fibers or platlets are formed in the transition stages which are affected by thermal, mech. and crystallographic factors. Quickly cooled wire specimens showed random structure of standard space-centered cubic lattices, where a is 4.27 A. for Na, 5.32 A. for K, and 5.42 A. for a solid soln. of 55% K, 45% Rb. Slow cooling developed a fiber structure, the fiber axis being parallel to the direction [001]. In solid soln. fiber formation is perfect, being undisturbed by changes in vol. Deformation of the wires and pressure developed fibers parallel to the direction [111]; simple tension developed fibers in the direction [110], which is that of greatest lattice density. These results should apply to all alkali metals, which have the same lattice, and the same phys. and mech. properties. The results also indicate the utility of this x-ray method in clearing up obscure points in the constitutional diagrams of binary alloys; they show that the alkali metals have the same lattice at ordinary as at very low temps., and give an insight into fiber structure in metallic wires which accords with our knowledge of the relation between fiber structure and crystal lattice. The work is being continued. Jerome Alexander

Investigation of spiropentane by electron diffraction. Fritz Rogowski. *Ber.* **72B**, 2021–6(1939).—Electron-diffraction patterns of C_5H_8 as prepd. from Zn and tetra-bromopentaerythritol are consistent with the spiropentane configuration. Two cyclopropane rings lie in mutually ⊥ planes with the central C common. Apex angles for each ring are 60° and C-C distances = 1.54A. Two H atoms are assocd. with each outer C atom at distances of 1.08A. The C-H bonds make normal tetrahedral angles. W. F. Bradley

Transformation of organic compounds in the solid state. II. *n*-Tricosanoic acid. Rudolf Kohlhaas and Camill Stuber. *Ber.* **72B**, 1962–9(1939).—Tricosanoic acid (prepd. as in *C. A.* **33**, 3332[4]) crystallizes from acetone as a mixt. of 2 modifications, α- and β-. Both are tabular with rhombic profiles but the profile angles differ. X-ray powder diffraction diagrams, and rotation diagrams from nearly "single crystal" aggregates yield the following unit-cell measurements:

	a	b	$cx \sin \beta$	β
α-form	5.13A.	7.43A.	57.20A.	73.95°
β-form	5.64A.	7.49A.	53.23A.	61.57°

The α-form solidifies from melts, and is derived from irreversible transformation from the β-form at 69.3°. The α-form is consistent with observations by Schoon on other long-chain aliphatic compds. (*C. A.* **32**, 6523[9]). W. F. Bradley

Dynamics of the sorption process. A. A. Zhukhovitskiĭ, Ya. L. Zabezhinskiĭ and D. S. Sominskiĭ. *J. Phys. Chem.* (U. S. S. R.) **13**, 303–10(1939).—The theory of Mecklenburg (*C. A.* 20, 531) is criticized as erroneous and misleading. F. H. Rathmann

Surface compounds. III. Sorption of oxygen by active carbon determined by magnetic measurements. Robert Juza and Robert Langheim. *Z. Elektrochem.* **45**, 689–98 (1939); cf. *C. A.* **32**, 6524[4].—The formation of surface oxide on active carbon was studied in relation to time, quantity of sorbed O and in the temp. range 18 to 200°. App. was designed for measurement of *magnetic susceptibility* at low temps. in any desired gas. The magnetic susceptibility of O adsorbed on carbon at −183° depends upon the d. of the layer of O in the carbon surface. H. Stoertz

Investigation of the structure of gel surfaces. I. Heat of wetting of a silicic acid gel. G. Rykhlikov and B. Bruns. *J. Phys. Chem.* (U. S. S. R.) **13**, 502–7(1939).—The heats of wetting of 3 gels, I—com., II—from HCl, and III—from NH_4Cl, are shown. For I, some heats of adsorption for the given amts. of H_2O adsorbed are: 0%, 17.2 cal./g; 4.08, 12.22; 14.5, 7.02; 25.2, 3.8; for II: 0, 28.2; 5.2, 16.1; 15.2, 9.7; 28.7, 0.59; for III: 0, 24.2; 9.5, 8.9; 16.4, 3.30; 17.2–20.1, 0.0. For I, the adsorption isotherm consists of 2 lines, for II, capillary condensation is indicated, while III obeys the Freundlich isotherm. Since the differential heats of adsorption show 2 max., it is concluded that the surface of the gel consists of several distinct types. F. H. Rathmann

Sorption of water vapor by vermiculite and its silica. L. A. Hansen, W. S. Samuel, Jr., and P. A. Forni. *Ind. Eng. Chem.* **32**, 116–18(1940).—Exfoliated vermiculite, activated at 115° for 48 hrs., has a low capacity for H_2O vapor from air (100% relative humidity) at 25°. The silica (d. about 0.1) obtained from exfoliated vermiculite by acid treatment has high sorptive capacity for H_2O vapor; when activated at 250° the capacity (100 × g. H_2O sorbed per g. silica) is about 13.4 at 100% efficiency at 25° with air satd. with H_2O vapor. There is a slight loss in capacity upon reactivation. Silica prepd. from unexfoliated vermiculite is slightly inferior in sorptive capacity to that obtained from exfoliated mineral. The silica has much less capacity for EtOH than for H_2O; for C_6H_6 the capacity is very small. George Ayers

A theory of the activated adsorption of gases by heteropolar crystals. F. C. Tompkins. *J. S. African Chem. Inst.* **22**, 37–43(1939); cf. *C. A.* **33**, 2012[1].—The theory is an extension of Ward's theory (cf. *C. A.* **26**, 894, 3977) that slow absorption of H_2 by copper is due to the penetration of the gas into Smekal cracks (cf. *C. A.* **22**, 1271) which are known to be present at the surfaces of cryst. solids, by a process of diffusion. The new feature of this theory is that the controlling factor of the rate of absorption is the acquirement of the necessary heat of activation, not by the mols. which enter the Smekal cracks, but by the adsorbed sentinel mols. which line the edge of the crack. This heat of activation is calcd. to be in the order of 6000 cal., which is in agreement with the exptl. values. A. B. Garrett

The adsorption of nonpolar gases on alkali halide crystals. Wm. J. C. Orr. *Proc. Roy. Soc.* (London) **A173**, 349–67(1939); cf. *C. A.* **34**, 666[8].—An exptl. technique sufficiently sensitive to measure accurately the very small amts. of nonpolar gas absorbed on alkali halide crystals (from 0.20 to 0.30 cu. mm./g. salt) and an automatic temp.-control working in the range from 65 to 90°K. are described. Isotherms for A, O and N on KCl and CsI are described and heats of adsorption for A, O and N were found to be 8.3, 8.4, 7.2 × 10^3 g. mol. on KCl and 4.5, 4.0, and 4.0 × 10^3 g. mol. on CsI. The position at which the first monolayer is completed was found to be given by a max. when ΔH is plotted as a function of the amt. absorbed. Good agreement was obtained between the exptl. values and theoretical calcns., where the divergence of the curves at low values of θ can be ascribed to adsorp-

tion taking place in cracks and other irregularities. In the region between the completion of the monolayer and the bulk condensation of a gas an amt. equal to 3 to 4 times that in the first layer is adsorbed; the mols. are arranged in layers rather than in localized aggregates. Frank Gonet

Adsorption of cations on platinized charcoal in a hydrogen atmosphere. S. Petrov, R. Burstein and P. Kisseleva. *Acta Physicochim. U. R. S. S.* **11**, 59–66(1939)(in English).—In a H_2 atm. the adsorption of uni- and multivalent ions on slightly activated platinized charcoal is in the order $Li < Na < K < Cs$ and $K^+ > Ba^{++} > La^{+++}$. On highly activated charcoal the reverse order holds for increasing ionic charge. The practically unchanged adsorption of K^+ and the strongly increased adsorption of the multivalent ions on increasing activation are ascribed to parallel increases in the pore diams. Values for the adsorption calcd. on the basis of Stern's theory agree well with the exptl. data. F. H. Rathmann

Lyotropic series and adsorption. A. R. Docking. *Australian Chem. Inst. J. & Proc.* **6**, 400–6(1939); cf. *C. A.* **33**, 4493⁴.—The adsorption of ions on methylcellulose is given by the following series (order of decreasing adsorption): CNS, I, Br = $C_2H_3O_2$, NO_3 = Cl, SO_4. The effect of salts on the soly. of methylcellulose is in the order KCNS, KI, H_2O, KCl, K_2SO_4, K_2SO_4 decreasing and KCNS increasing the amt. dissolved. From these measurements and those previously made with gelatin as adsorbent it can be concluded that generally those ions that are weakly hydrated are strongly adsorbed by the colloid. Robert Simha

The nature of foam. Tunetaka Sasaki. *Chem. Products* **2**, 143–6(1939); cf. *C. A.* **33**, 9087².—The stability of foam is discussed as well as qual. tests for detg. the effect of alc. and ether on foaming solns., the measurement of the stability of stable and unstable foam (as, e. g., the foam produced in aq. fatty acid or alc. soln.), liquid ternary systems and types of systems. Foams of an aq. soln. of AcOH are decompd. on the addn. of C_6H_6 or hexane (nonpolar liquid) in moderate excess. Foam is produced if water is shaken with relatively small amts. of a hydrocarbon such as hexane obtained by the usual method of repeated distn. from com. products. No foam is produced, however, in the mixt. of hexane and water from which traces of impurities are carefully removed by shaking it a long time with fuming H_2SO_4 and distg. This is a simple but effective method of detg. impurities in aliphatic hydrocarbons. There are certain heterogeneous systems (e. g., 0.4 cc. AcOH, 4.52 cc. C_6H_6, 5.00 cc. water) which are both foamy and nonfoamy, according to the different modes of shaking. This is due to the difference in the type of emulsion produced. 8 references. L. S.

The electric double layer and the stability of emulsions. E. J. W. Verwey. *Chem. Weekblad* **36**, 800–3(1939).—Elec. conditions in a colloidally dispersed solid and in an emulsion are contrasted. On a solid, the elec. double layer, potential of which depends on definite ions, forms a surface charge, all the potential drop occurring in the dispersing liquid. In an emulsion, the potential drop is distributed in a definite manner in both liquid phases. The function of the emulsifying agent is to produce in the double layer at the interface of the 2 liquids a condition resembling that of a double layer on the surface of a solid. A. H. Krappe

Electrophoresis in theory and practice. Arne Tiselius. *J. Franklin Inst.* **228**, 797–810(1939).—App. and technique for electrophoresis (scale and "schlieren" methods) are described, with a summary of results obtained by T. and others. Illustrated. Edward B. Sanigar

The different modes of retention of multimolecular films of stearic acid (Langmuir films). Line Denard. *J. chim. phys.* **36**, 216–17(1939).—*X* and *Y* films of stearic acid on polished Cr were obtained without varying the compn. of the aq. support but simply by modifying the superficial film pressure. The different forms of stearic acid characteristic of the cryst. state are found in 2 dimensions. Henry C. Thomas

Evaporation of built-up molecular films. S. J. Gregg and E. E. Widdowson. *Nature* **144**, 666–7(1939); cf. *C. A.* **33**, 8057⁹.—The condensation coeffs. for stearic and for arachidic acids detd. by evapn. in a high vacuum are both 0.01 ± 0.004. Mixed films of Ba stearate and stearic acid were analyzed by this method. The pH of the substrate and the Ba stearate contents of the film were, resp.: 3, 0%; 4, 5%; 5, 28%; 6, 76%; 7, 90%; 8, 100%. The compn. of the deposited film differs somewhat from that on the trough surface. G. M. P.

The viscosity of unimolecular surface films. Maurice Joly. *Kolloid-Z.* **89**, 26–35(1939).—A review. The app. is described and the theory outlined for the detn. of the viscosities of surface films by the rate of flow through a channel and by the rate of damping of the oscillations of a ring floating in the film. In addn. to the general features of surface films, the effect on viscosity of changes in the concn. of the films is discussed with reference to liquid, gaseous, mesomorphic and protein films. 42 references. W. B. Keighton, Jr.

Shapes of crystals formed in thin colloidal films. G. E. Viñar. *Anales asoc. quim. farm. Uruguay* **41**, 72–83 (1938)(Pub. 1939).—The arboreal form of the crystals formed in colloidal solns. is so common that certain authors have even suggested that all crystn. in such systems take this form or one very similar to it. That this is not generally true in thin colloidal films is shown experimentally. E. g., on mixing 2 solns. contg. 50% $(NH_4)_2SO_4$ and 10% Senegal gum, resp., short rod-like crystals were produced and on mixing 2 contg. 15% $Ba(NO_3)_2$ and 10% gelatin, resp., a lacework of row upon row of slender needle-like crystals interwoven at right angles with slender thread-like crystals was formed. The crystals from these solns. showed no tendency toward tree formation. Results with 20% NH_4Cl solns. alone and mixed with 10% gelatin or Senegal gum solns. showed that the nature of the crystalloid detd. the crystal form. Expts. with KCl, K_2SO_4, $KH(COO)_2$ and $K_4Fe(CN)_6$ in 10% gelatin solns. showed that increasing the complexity of the crystalloid increased the complexity of the crystals obtained. Varying the nature of the colloid (Senegal gum, gum arabic and agar-agar) in Al sulfate solns. resulted chiefly in changing the crystn. velocities with resulting larger or smaller crystals of the same form. The thickness of the colloidal film markedly changed the appearance of $Sr(NO_3)_2$ crystals in films formed after mixing 30% $Sr(NO_3)_2$ solns. with 10% gelatin solns. Impurities in the prepn. also changed the appearance. Iver Igelsrud

Studies in gelation and film formation. II. Studies in clay films. E. A. Hauser and D. S. Le Beau. *J. Phys. Chem.* **43**, 1037–48(1939); cf. *C. A.* **33**, 9141.—The formation of self-supporting coherent films of clay (Alsifilm) results from the lining up of the particles in the clay gel to give fibrillar interweaving cryst. aggregates. This structure accounts for the fact that films made up originally of small particles retain their water much more tenaciously than films made under identical conditions from fractions of coarse particle size; decreasing original particle size increases the capillary interstices in the film structure. Films dehydrated once at different temps. up to 550° take up from air (40% moisture content) the same amt. of water, irrespective of the original particle size. Films of H bentonite take up nearly twice as much water from moist air as films of natural bentonite. Clay films in the presence of electrolytes exhibit base exchange to a marked degree, the exchange being greater the smaller the size of the particles from which the film was made. Exchange of Na for K or Pb followed by heating the film to 110° decreases greatly the capacity for taking up water. This water resistance following base exchange results only with cations that form extremely sol. salts and whose apparent diams. are of the same order of magnitude as the spacing between opposite O atoms in the hexagonal Si-O sheets of the clay lattice. The cation of suitable dimensions serves to bind unit layer parcels in a way similar to that in mica. The structure of the films is discussed on the basis of x-ray analytical studies. Harry B. Weiser

A property of radiocolloids. Catherine Chamié and

Branca Edmée Marques. *Compt. rend.* **209**, 877–9 (1939); cf. *C. A.* **33**, 4868⁴.—Expts. are described in which solns. of Po in HNO_3 of varying concn. poured on paraffin were examd. photographically, showing that the percentage of Po deposited as colloidal aggregates on the paraffin from a strongly acid soln. thereof is a function of the content of Po in the soln., the percentage decreasing as the content increases. C. A. Silberrad

Active oxides and reactions of solid substances. CXVI. The transition of γ-aluminum oxide into α-aluminum oxide, and the effect of the presence of foreign gases on this transition. Gustav F. Hüttig and Georg Markus. *Kolloid-Z.* **88**, 274–88(1939); cf. *C. A.* **33**, 3973⁹.—The investigations described deal mainly with the solubilities and with the decompn. of prepns. belonging to the transition series $\gamma\text{-}Al_2O_3 \rightarrow \alpha\text{-}Al_2O_3$. The conditions detg. the soly. were systematically varied. As starting material Al oxyhydrate ($\gamma\text{-}Al_2O_3.xH_2O$) prepd. in a definite way was used and the temp. (t_1) and the duration (τ_1) of the preliminary heating of this material were varied. Thus 7 series of prepns. originated; their solubilities and decompn. were examd. In the detn. of soly., the quantities of the prepn. (a) and of the solvent (b), as well as the concn. of the solvent (c), also the temp. (t_2) and the duration (τ_2) of the soln. process were varied. HCl and $K_2S_2O_7$ were chosen as solvent and decompg. agent, resp. The effect exerted upon the course of the transition $\gamma\text{-}Al_2O_3 \rightarrow \alpha\text{-}Al_2O_3$ by foreign gases, characterized by solubilities, was studied on series of prepns. which were heated beforehand to a temp. t_1, not in the air but in the various streams of the dry gases. Under the conditions maintained during the detn. of the soly., the quantity dissolved is at least approx. proportional to the quantity (a) used for the soly. test. There also exists only a slight susceptibility of the quantity dissolved to variations in concn., temp (t_2) and the quantity (b) of the solvent used (HCl). The soly. decreases with the duration of the preliminary heating (τ_1), and it does so the quicker, the higher the temp. (t_1) of this heating. The decompn. tests, performed with the use of fused $K_2S_2O_7$, showed that at a const. quantity of $K_2S_2O_7$ and const. duration of the test, the quantities decompd. were approx. proportional to the weighed portion of the prepn. With increasing temp. of the preliminary heating, the decomposability sinks; this decline is particularly great when the temp. of the preliminary heating is raised from 950 to 1000°. However, there are also regions in which the increase in the temp. of the preliminary heating causes an increase of decomposability. As far as the properties of the prepns. made in the various gas streams are concerned, these foreign gases can be divided into 3 groups. Gases belonging to the 1st group (NO_2, CO_2, air, N_2 and SO_2) can be characterized as rather ineffective (only a slight affinity to Al_2O_3 can be attributed to all these gases). The prepns. show solubilities approx. equal those which characterize them when they are prepd. in an inert atm. of N. In contrast to this, the presence of the 3rd group of foreign gases (H_2O, HBr, SO_3 + air, HCl) causes a strong lowering of the solubilities. This group of gases consists of those that have a great affinity for Al_2O_3, an affinity which, under different conditions, would suffice for the formation of compds. (AlOOH, $AlBr_3$, $Al_2(SO_4)_3$, $AlCl_3$). The foreign gases of a 2nd group (NH_3, NO_2 + air, Cl_2) occupy a middle position between the gases of the 1st and the 3rd group, with regard to their catalytic effect upon the Al_2O_3 transitions as well as their affinity to Al_2O_3. 26 references. E. A. Ackermann

pH and the stability of (colloidal) powders. I. Essential notions of pH. J. Rouvillois. *Mém. artillerie franç.* **17**, 773–98(1938).—The pH detn. is widely used in a variety of chem. work, including research. It is more convenient and more precise than titration or colorimetric methods, and the range of units (0 to 14) expressing the results is small and readily interpreted. A physicochem. theory of pH is given. Subsequent articles will give results of applying pH methods to stability measurements on powders, comparing this method with titration and colorimetric methods. B. E. Anderson

The function and significance of rheology. S. Erk. *Kolloid-Z.* **89**, 208–11(1939).—The broad realm of rheology, which deals with the flow behavior of substances is outlined briefly. The fundamental distinction between the state (phase doctrine) or the flow behavior (rheology) of substances is illustrated by several examples. The significance of rheology lies for the most part in a rationalization of research. S. I. Aronovsky

Viscometric and osmometric measurements on nitrocelluloses. Kurt H. Meyer and E. Wolff. *Kolloid-Z.* **89**, 194–201(1939).—Viscometric and osmometric measurements were made on acetone and cyclohexanone solns. of nitrocellulose. The relation between relative viscosity and concn. in the system nitrocellulose–acetone is shown by the Fikentscher equation (*C. A.* **26**, 5414). The const., ("sp. viscosity"), of this equation, therefore, is suitable for the viscometric characterization of nitrocelluloses. The limiting viscosity, $\lim_{c=0}\left[\frac{\eta\ \text{spec.}}{c}\right]$, was also detd. The results of the viscosity and osmotic measurements of the nitrocellulose solns. are discussed in regard to Staudinger's "degree of polymerization." A graph showing the relation between sp. viscosity, limiting viscosity and relative viscosity is given. S. I. Aronovsky

Behavior of colloidal suspensions with electrolytes. E. A. Hauser and S. Hirshon. *J. Phys. Chem.* **43**, 1015–36(1939).—The effects of electrolytes on colloidal suspensions are discussed theoretically. Various samples contg. different percentages of a mixt. of carefully fractionated and dialyzed Fe_2O_3 and bentonite sols were prepd., and their viscosity behavior was studied with a rotating-cylinder viscometer. When the Fe_2O_3 sol is added to the bentonite sol the final equil. viscosity of the system goes through a first max. and decreases through a min., whence it goes through a second max. The first max. may be considered as the greatest gelation effect induced in the bentonite sol by the addn. of the Fe_2O_3 particles, and the second max., as the greatest gelation effect in the Fe_2O_3 sol as induced by the addn. of the bentonite particles. The explanation offered for these phenomena appears to correlate well with a great variety of existing exptl. data. The proposed theory may offer a new means of predicting the behavior of electrocratic (lyophobic) sols and a better understanding of the gelation and coagulation of electrocratic colloidal dispersions in general. S. I. Aronovsky

Stability of silver iodide sols in the presence of gelatin. I. R. Protas. *J. Phys. Chem.* (U. S. S. R.) **13**, 446–50 (1939).—The stability of *M*/400 to *M*/8000 AgI sols in the presence of 0.005% gelatin and at pH values of 3.5 to 9.7 (AcOH and NaOH) was detd. by means of the intensity of the light dispersed from the sols. The effects of the addns. of K, Ba, Th and NO_3 ions are shown graphically. The protective action of the gelatin with respect to AgI sols is detd. by both the charge of the lyophobic AgI sol and that of the gelatin, in analogy with the effects of adsorbed inorg. electrolytes. F. H. R.

A new method for the quantitative measurement of coagulation. H. A. Wannow. *Kolloid-Beihefte* **50**, 367–474(1939).—An optical kinetic method for the detn. of coagulation is described with a photocell sensitive to infrared light waves. The direct and indirect methods of measuring the coagulation point are discussed. The change in the transmission of light by the addn. of electrolytes in the coagulation range depends on the molarity and activity coeff. of the dominant ion, and results in S-curves. The point of inflection of such an S-curve presents a better-defined coagulation value than is obtained from the fixed value of permeability to light. The ultramicroscope particle counts and the curves for the transmission of light agree well. Methods for detg. the dependence of the coagulation value on the sol concn. of As_2S_3 and TiO_2 sols over a large concn. range gave results for As_2S_3 in good agreement with the Burton rule (B. and MacInnes, *C. A.* **16**, 1037): the coagulation value for univalent dominant ions decreases, that for multivalent ions increases, and the value for bivalent dominant ions assumes an intermediate position as the sol concn. is increased. At very low sol concns. the valency of the

coagulating ion has but little effect. The positively charged TiO_2 sol deviates from the Burton rule. The effects of various coagulating electrolytes on As_2S_3, MnO_2, mastic, humic acid, and $Fe(OH)_3$ sols showed no relation between coagulation value and the Büchner lyotropic nos. The coagulation of mastic and clay sols by the reversing electrolytes, $AlCl_3$ and $ThCl_4$, was investigated with this new method, and it was found that the H ion and colloidal $Th(OH)_4$, obtained by hydrolysis of the $ThCl_4$, tended partially to stabilize the mastic sol. In the coagulation of As_2S_3 sol by binary mixts. of electrolytes a typical antagonism was observed with the KCl-$MgCl_2$ and the KCl-$BaCl_2$ mixts., whereas a sensitization was established with the KCl-$LaCl_3$ and the $MgCl_2$-$LaCl_3$ mixts. The soln. of the As_2S_3 sols could also be followed by light-permeability measurements. An alkali such as NaOH affects an As_2S_3 sol in only one direction, colloid → mol., whereas Na_2CO_3 can affect both soln. and coagulation of the sol. This new method can be used to measure the change of state in milk and protein solns. The *coagulation of whole milk*, *skim milk*, and *Ca caseinate* by HCl, and the changes in the *fermentation of whole milk* were followed by this optical kinetic method. S. I. Aronovsky

Freezing of iron oxide hydrosols as affected by their constitution and mode of freezing. A. Lottermoser and G. Schmole. *Kolloid-Z.* **89**, 328–40(1939).—The sols were prepd. by the method of Graham, and their behavior on freezing is strongly influenced by their electrolyte content. If a sol, which is reversible on thawing, is dialyzed, it tends to become irreversible, though the irreversibility disappears on prolonged aging. In confirmation of observations of Lottermoser and Büchholz great reduction of electrolyte content tends to make sols irreversible on thawing, the degree of irreversibility being dependent not merely upon reduction in total Cl, but on the relation total Cl/ultra Cl, which changes on aging. As Langenscheidt (*C. A.* **26**, 3166) found, addn. of HCl reëstablishes reversibility, evidently by replenishing ultra Cl. Irreversible sols cloud even before freezing, and flocculation on freezing must be due to concn. changes in sol structure and not to changes induced by freezing. In irreversibly frozen sols part of the ultra Cl migrates inwardly, a reversal of the known relative increase of ultra Cl upon diln. with water. Evidently an equil. exists between the Cl (apart from that included in the colloid ions) which appears in the form of ultra and of compensating Cl. This equil. is disturbed by changes in amt. of hydrate water in the colloid ions; these changes occur swiftly. Another equil. exists between the total external or "free" Cl and that included in the colloid ions, which changes slowly and explains the slow irreversible/reversible effect above mentioned. In the light of present knowledge the behavior of a sol upon freezing depends upon the amt. of "free" Cl which can quickly shift in its ratio to compensating Cl. It is still unsettled why dialyzed sols when concd. by sepn. of ice tend to aggregate and flock, whereas nondialyzed sols like those here used do not. The degree of dialysis necessary to evoke irreversibility is also unsettled. Jerome Alexander

The action of supersonic waves on colloid phenomena. V. Influence on thixotropy. 2. Thixotropic systems of iron hydroxide. Naoyasu Sata and Nobuzo Naruse. *Kolloid-Z.* **89**, 341–4(1939); cf. *C. A.* **33**, 7172⁴.—Fe_2O_3 sols prepd. by Graham's method were used, and supersonic agitation exerted a marked effect on the setting time. The nature of the effect varied with the salt concn., there being a delay with smaller concns. and an acceleration with higher salt concns. The delay is due to destruction of a hydration layer of strongly hydrated particles; the acceleration is due to orientation of weakly hydrated nonspherical particles. Most thixotropic systems contain nonspherical particles which introduce particle form as a factor in addn. to aggregation and hydration. Jerome Alexander

Time of set of silica gels. IV. The effect of aldehydes and sugars over a pH range. L. A. Munro and J. A. Pearce. *Can. J. Research* **17B**, 404–8(1939); cf. *C. A.* **33**, 9090⁹.—The effects of a series of sugars, aldehydes and other substances on the time of set of silica gels were investigated over a pH range. Diacetone alc., propionaldehyde, rhamnose hydrate and xylose give curves similar to those previously obtained with the alcs. having a const. and equal effect at pH 7. The hexoses behave as a group whereas the disaccharides show divergent effects. Propionaldehyde and acetone give very similar curves. The implications of the results are discussed. J. W. S.

Highly polymerized compounds. CCXXXV. Polymer homogeneity, polydispersivity and polymolecularity. H. Staudinger. *Melliand Textilber.* **20**, 781–3(1939).—A review of recent work on macromol. compds. shows that the term polymer homogeneity should be applied to high-mol. compds. consisting of mols. of varying wt. built up in the same way from the same units. Such compds. of high mol. wt. are also polymolecular and yield polydisperse solns. Since compds. whose mols. are identical with respect to structure and mol. wt., e. g., a soap, may form in soln. colloidal particles of varying size, polydispersivity is a condition or state whereas polymer homogeneity and polymolecularity are properties of mols. J. W. Perry

Rupture of macromolecules with ultrasound. Gerhard Schmid and Otto Rommel. *Z. physik. Chem.* **A185**, 97–139(1939); cf. *C. A.* **34**, 3036.—Dil. solns. of polystyrene in benzene and toluene, polyvinyl acetate in Bu acetate, polyacrylic acid esters in Et acetate, nitrocellulose in acetone, Et-, Pr-, Bu-, iso-amyl, iso-Bu acetates and Et benzoate, and rubber were placed for definite time intervals (up to 240 min.) in a strong ultrasonic field of 284 kHz. and kept at a temp. detd. by the b. p. of the soln. This app. was described previously (cf. *C. A.* 32, 2800⁴). The viscosity of these solns. was markedly diminished, generally irreversably. This is interpreted as a depolymerization of the dissolved substance. It is shown that the ultrasonic vibrations directly affect the rupture of C–C bonds in the long-chain mols. The decompn. is more effective the longer the mol. chain. It is less at higher concns.; pastes or swollen gels are in general no longer affected. Also increasing pressure (15 atm.) in an O_2 atm. slackens the depolymerization of polystyrene in toluene and benzene, also of guncotton dissolved in Bu acetate. Theoretical considerations are presented as to the effect of sound vibrations on the stability of long polymerized chains. Victor R. Deitz

Micellar types of aqueous soap solutions. Joachim Stauff. *Kolloid-Z.* **89**, 224–33(1939); cf. *C. A.* 33, 6682⁷.—Photometric x-ray absorption curves were obtained on aq. solns. of Na tetradecyl sulfate and Na laurate, in various concns., at 20° and 75°. The absorption of x-rays by the soap solns. indicates the occurrence of large colloidal particles in 0.1 *N* solns. of Na tetradecyl sulfate and 0.2–0.25 *N* solns. of Na laurate. These particles are termed large micelles, to distinguish them from the smaller colloidal aggregates present in the solns. The structure of these large micelles was detd. to be *cryst. fluid*, indicating that they consist of one system, soap-water. According to the x-ray data, the water is located between the polar groups of the soap mol. These results reconcile the contradictions between the work and theories of Hartley (*C. A.* **31**, 1288⁷), on one hand, and the work of McBain (*C. A.* **25**, 1139) and Thiessen (*C. A.* 26, 896, 1498, 2908) on the other. Based on the magnitude or state of elec. charge on the particles, only one type of micelle exists, according to Hartley, whereas the size, form and space requirement of the particles indicate the existence of 2 different types of micelles. The structure of the large micelles is indicated by cond. min. as well as by the osmotic behavior of the soap solns. Forty-two references. S. I. Aronovsky

Colloid chemistry of the systems: soaps–cresol–water. IV. Viscosity of cresolated sodium stearate solutions in the presence of free fatty acids. E. Angelescu and V. Ciortan. *Kolloid-Z.* **89**, 47–54(1939); cf. *C. A.* 32, 4046⁶.—The viscosity of various concns. of Na stearate was detd. in the presence of excess amts. of stearic, palmitic and oleic acids and of *o*-, *m*-, and *p*-cresols, at 50° and 60°. In the absence of cresols, an excess of free acid

has no appreciable effect on the viscosity of the stearate soln. The 3 acids gave similar effects, the viscosity of the mixts. being equiv. to that of a stearate soln. of a concn. equal to the sum of the acid and salt present. The nature of the acid and temp. affect the viscosity of the stearate solns. only at sufficiently high concns. With stearate solns. above 0.2 *N* the acids increase the viscosity of the mixt. in the order: oleic < palmitic < stearic. The addn. of cresols leads to a sharp differentiation between the effects of the different acids and gives viscosity curves with marked max. Stearic acid caused a strong increase, and palmitic acid a smaller increase, in the viscosity max. of a Na stearate soln., whereas oleic acid lowers the viscosity max. of the soln. This difference in properties of the 3 acids is explained partly by the difference in length of their C chains. The different behaviors of these acids are apparent only in the region of maxt viscosity. In the horizontal portion of the curve these acids (in the presence of 5% cresol) have about the same effect on viscosity as an equal no. of Na stearate mols. Cresols tend to change the strongly lyophobic soap-acid complex to a lyophilic complex, and this tendency increases in the order: ortho < meta < para. S. I. Aronovsky

Discussion and interpretation of the thermodynamic properties, conductivity and diffusion of a typical colloidal electrolyte—laurylsulfonic acid in aqueous solution. Pierre Van Rysselberghe. *J. Phys. Chem.* **43**, 1049–61 (1939). —Data on f. p. and cond. of aq. solns. of laurylsulfonic acid were interpreted on the basis of an "av. micellar micelle." The size and elec. charge of the av. micelle vary with concn. in terms of which the soln. is considered as ideal, on the assumption that the sole constituents of the soln. at all concns. are free H ion and this "av. micelle." The Nernst formula for the diffusion coeff. of an unsym. electrolyte was applied to this av. micelle, and the main features of the exptl. diffusion were thereby reproduced. Some predictions were made regarding the variation of transport nos. of the H ion and the simple laurylsulfonate radical with concn. The possibility of decompg. the av. micelle into ionic and neutral micelles is discussed. S. I. Aronovsky

Organic substances that cause swelling. J. R. Katz and J. Seiberlich. *Rayon Textile Monthly* **21**, 82–3 (1940); cf. *C. A.* **33**, 2314,5.—Aq. solns. of thiocyanate, thiourea, chloral hydrate, etc., exert a more intensive swelling effect than pure water. The results are indicated of a research on the swelling action on mixts. of equal parts of potato starch, collagen, gelatin, cellulose, etc. It is concluded that only in a few special cases is the swelling action of one lyotropic substance improved by the addn. of another compd. of the same type. In most cases the swelling phenomenon produced by a lyotropic substance will be considerably reduced by the addn. of another lyotropic substance that has a different ion. W. H. Boynton

Elastic reactions of gels. Félix Michaud. *J. chim. phys.* **36**, 201–9(1939).—In a theoretical study of momentary equilibria in gels the effects of an external mech. or osmotic constraint are investigated. The results lead to a theory of cellular membranes. Henry C. Thomas

"Runge" figures and Liesegang rings on filter paper. Eugen Deiss. *Kolloid-Z.* **89**, 146–61(1939).—"Runge" figures (*C. A.* **29**, 2035[5]) were formed from a no. of salts on filter paper by displacement or by pptn. In one case it was found that, instead of the characteristic displacement or pptn. figures of Runge, rhythmic sepn. of the reaction products in the form of concentric rings was obtained. This occurred when a soln. of a manganous salt (with or without the addn. of K_2SO_4) was allowed to drop on filter paper which had been impregnated with K_2CrO_4 soln. and dried. The expt. was conducted at a relative humidity of 50%. On partial or complete substitution of the K_2CrO_4 by Na_2CrO_4 no rhythmic rings were formed. An increase in the atm. moisture above 50% relative humidity also hindered the ring formation. This case demonstrates "inner" rhythm of Liesegang rings and not the "outer" rhythm of Runge figures. The rhythmic ring formation was not obtained when a soln. of K_2CrO_4 was added to filter paper impregnated with a manganous salt. S. I. Aronovsky

Solubility of carbon dioxide in benzene at elevated pressure. Shen-Wu Wan and Barnett F. Dodge. *Ind. Eng. Chem.* **32**, 95–8(1940).—Values for mol. % of CO_2 in C_6H_6 (both liquid and gas phases) are shown graphically for pressures up to 95 atm. and for temps. of 30°, 40°, 50° and 60°, resp. Values of k in the equation $yP = kx$ (where y and x are the mol. fractions of CO_2 in gas and liquid phases, resp., and P is the total pressure in lb. per sq. in. abs.) are (for 0.1, 0.2, 0.3, 0.4, 0.5, 0.6 and 0.7 mol. fractions of CO_2 in the liquid, resp., for each temp. noted): 30°, 1240, 1230, 1208, 1190, 1169, 1102, 1045; 40°, 1420, 1430, 1440, 1395, 1360, 1303, 1255; 50°, 1670, 1650, 1605, 1605, 1588, 1535, 1492; 60°, 1860, 1918, 1940, 1935, 1910, 1840, 1742. Av. values of k are also given for approx. calcns. The present results differ considerably from those of Sander (*C. A.* **6**, 954). George Ayers

Solubility in liquids of gases from mixtures under pressure. Ya. D. Zel'venskiĭ. *J. Phys. Chem.* (U. S. S. R.) **13**, 514–27(1939).—Exptl. data on the soly. in H_2O of the components of the systems N_2–CO_2 and H_2–CO_2, at 25° and under pressures of 25 to 300 atm. are given. The presence of CO_2 decreases the soly. of N_2 and H_2 up to 21%; H_2 and N_2 decrease the soly. of CO_2 up to 4%. The energy of interaction of the gases in soln. is not over 110–125 cal. F. H. Rathmann

Thermodynamic relations between the dissociation pressure and the solubility of strong complex electrolytes. I. G. Ryss. *J. Phys. Chem.* (U. S. S. R.) **13**, 547–50 (1939).—Theoretical discussion of systems of the type Na_2SiF_6–$2NaF + SiF_4$. F. H. Rathmann

Investigation of the exchange between a metal and ions in solution by using radioactive indicators. B. V. Rollin. *J. Am. Chem. Soc.* **62**, 86–7(1940).—Expts. using radioactive silver show that exchange takes place between a soln. of Ag^+ ions and a surface of metallic Ag. In 2 hrs. an exchange of silver corresponding to 10 at. layers was found. The exchange was increased by a factor of 10 if the surface was pretreated with $NaNO_3$ soln.; these results are unexplained. The isotope was Ag^{108} having an 8-day half-life and was obtained by bombarding Pd with 8 m. e. v. deuterons. A. B. Garrett

Determination of transference numbers of ions in fused salts. Yu. V. Baĭmakov and S. P. Samusenko. *Trans. Leningrad Ind. Inst.* **1938**, No. 1, Sect. Met. No. 1, 3–26.—The literature is reviewed. Use of anode cells with an insol. anode is not recommended. The best app. is that which has 3 compartments connected with tubes not less than 2–3 mm. in diam. The selection of the diam. depends on current strength and sp. elec. cond. of the electrolyte. The study was limited to the system KCl–$PbCl_2$. B. Z. Kamich

Anomalous diffusion of quinone in salt solutions. Herbert Freundlich and Deodata Krüger. *J. Phys. Chem.* **43**, 981–8(1939).—When KCl or K_2SO_4 diffuses in an aq. soln. of quinone or succinic acid, there is a peculiar change in concn. known as "diffusion retrograde." The second solute increases in concn. on the salt side of the borderline, and decreases on the solute side. In cases like this, it is found that the soly. of the second solute is decreased by the presence of the salt (e. g., quinone by KCl). On the other hand, when the soly. of the second solute is increased by the presence of the salt (e. g., quinone by KNO_3), the concn. changes are in the opposite directions. J. H. Reedy

Surface-tension measurements to determine double salts in solution. Georges Arcay and Marcel Marcot. *Compt. rend.* **209**, 881–2(1939).—Measurements of the surface tension of mixed 0.2 *N* solns. of 2 salts forming a double salt (care being taken that the mixing is done drop by drop so that the proportion of the salts remains const., e. g., for a 2:1 mixture alternately 2 drops of one and 1 of the other should be added) show with KCl and $HgCl_2$ distinct min. for the double salts, i. e., for KCl.$2HgCl_2$, KCl.$HgCl_2$ and 2KCl.$HgCl_2$; and similarly for

NaCl and $HgCl_2$, though here the min. are less marked. C. A. Silberrad

Molecular interactions in solutions: effects on rotation of dipoles in an alternating field. Pierre Girard and Paul Abadie. *Compt. rend.* **209**, 874–7(1939).—Dispersion and absorption curves $((\epsilon' - \epsilon'')/(\epsilon_1 - \epsilon_0)$ and $\epsilon''/(\epsilon_1 - \epsilon_0)$ against λ) are plotted for radio frequencies (λ = 3–300 cm.) for PrOH with 40% of C_6H_6 and C_6H_{14} and compared with similar curves for pure PrOH. The differences in the curves for the mixed liquids and those for the pure PrOH are characteristic of the mixts. C. A. Silberrad

Water in nonaqueous solutions. W. J. V. Osterhout and J. W. Murray. *Science* **90**, 397–8(1939).—If increasing amts. of Cl_3CCO_2H are added to a 2-phase guaiacol-water system in equil. at 25° the concn. of water in the guaiacol phase steadily increases, whereas its activity in this phase decreases. Since the acid can attract both water and guaiacol it is able, when added in sufficient quantity, to make the 2 phases fuse into 1. These findings may be significant in *biol. systems*. Felix Saunders

Viscosity of the system ketones–organic acids. I. V. V. Udovendo. *J. Gen. Chem.* (U. S. S. R.) **9**, 1162–6(1939).—The viscosity and d. were detd. for binary systems contg. acetone and CCl_3CO_2H (at 35, 45, 55°), CH_2ClCO_2H (at 25, 35, 50°), HCO_2H (at 25, 35, 45°), AcOH (at 20, 30, 40°), $C_3H_7CO_2H$ (at 25, 35, 45°), resp. A chem. reaction occurs between acetone and the acids studied. Gertrude Berend

Modern conception of acids and bases. S. S. Israelstam. *J. S. African Chem. Inst.* **22**, 44–56(1939).—A survey of the modern theory of acids and bases in aq. solns. and in nonaq. solvents. A. B. Garrett

Magnetooptic study of neutralization. Fernand Gallais and Daniel Voigt. *Compt. rend.* **209**, 872–4(1939).—The magnetic rotation (ρ) of a mixt. of normal HCl and NaOH when plotted against compn. shows a decreasing value as neutralization is approached and a sharp min. at neutralization. This is more marked when instead of ρ the difference (Δ) between the actual ρ and that calcd. by the additivity law is similarly plotted. Δ increases with the concn. of the 2 solns. With H_2SO_4 there is very little effect on neutralization of the first H. In general, Δ is greater the stronger the acid. But HNO_3 and HCNS give anomalous results, owing probably, in the case of HNO_3, to change in structure and consequent diminution in the amt. of $(NO_3)^-$ ion, and in that of HCNS to a partial transformation of thiocyanic into isothiocyanic acid (cf. Gallais, *C. A.* **33**, 7231[1]). C. A. Silberrad

Error of a glass electrode in alkaline solutions as a function of temperature. V. A. Pchelin. *J. Phys. Chem.* (U. S. S. R.) **13**, 490–4(1939).—Exptl. data for the values of $\Delta\epsilon/\Delta$ pH are given for the H_2 and glass electrodes at temps. from 0 to 80° over pH values 1 to 12.7. Up to pH = 9.5 at 0–30°, 8 at 48.6°, and 6 at 59°, the error of the glass relative to the H_2 electrode is small and then increases rapidly with increasing pH. F. H. R.

pH measurements with new glass electrodes of highly conductive glass. K. Schwabe and O. Herdey, Jr. *Zellstoff u. Papier* **19**, 530–3, 567–70(1939).—The suitability of glass electrodes, made from the new highly conductive glass (*C. A.* **33**, 2371[3]), for pH measurements was studied. The shift in potential with changes in H-ion concn. does not follow the Nernst equation as closely in the new glass as it does with electrodes of the usual glass compn. (72% SiO_2, 6% CaO, 22% Na_2O). The pH displacement with the new glass electrodes is toward the alk. side, owing to the emission of alkali ions from the highly conductive glass. Temporary, inconst. variations in potential are obtained with this new electrode. S. I. Aronovsky

Equilibrium between valine and ammonium dimethyl pyruvate. R. Wurmser and S. Filitti-Wurmser. *Enzymologia* **7**, 161–4(1939)(in French).—The potential of the system, valine $\rightleftarrows$ dimethylpyruvate + NH_4 ion at pH 7 and 37° is $E_0 = -0.115 \pm 0.015$ v. when the ratio of the constituents is 1, provided that there is no appreciable amt. of the imino acid. Felix Saunders

Osmotic pressure, reduction-oxidation-potential, affinity. G. L. de Haas-Lorentz. *Chem. Weekblad* **36**, 782–5(1939).—An examn. of the equil. of 2 isolated systems in contact with one another, under application of the laws of thermodynamics leads to the establishment of series of differential equations and the expression of intensity parameters in the form of differential quotients. From these it is also possible to derive expressions for osmotic pressure, the reduction-oxidation-potential, and affinity. A. H. Krappe

Electrocapillary curves in nonaqueous solutions. I. Capillary-active organic cations in methanol. A. Murtazaev and M. Abramov. *J. Phys. Chem.* (U. S. S. R.) **13**, 350–2(1939).—Exptl. data are given for the electrocapillary curves of Hg in the presence of NH_4NO_3, $N(CH_3)_4I$, $N(C_2H_5)_4I$ and $N(CH_3)_3HCl$. The nature of the effect of the capillary-active substances is the same in MeOH as in H_2O; the activity of $N(C_2H_5)_4I$ is greater in MeOH than in H_2O. Although in aq. soln. the curves for these substances approach that for NH_4NO_3 far from the max., this is not true for MeOH solns. F. H. R.

Solutions of metallic cadmium in molten chlorides. S. Karpachev and A. Stromberg. *J. Phys. Chem.* (U. S. S. R.) **13**, 397–405(1939).—The potential of a C electrode with respect to solns. of metallic Cd in molten NaCl, KCl and $CdCl_2$ and their mixts. at temps. near 700° obeys the equation $E = a - \frac{2.3RT}{2F} \log C$. The soly. of at. Cd increases linearly from 0.042 wt. % in pure KCl to 2.05 in a 50 mol. % $CdCl_2$–KCl soln. F. H. Rathmann

Internal friction in molten salts as a function of concentration. A. G. Stromberg. *J. Phys. Chem.* (U. S. S. R.) **13**, 436–45(1939).—S. describes an app. more stable and simple than that of Harris (*C. A.* **28**, 3942[4]) and Hunter (*C. A.* **28**, 4553[4]) for detg. the rate of fall of a sphere in a volatile, colored, molten salt at high temps. From 270 to 450°, the coeff. of internal friction of 0.05 to 0.70 *N* solns. of AgI in HgI_2 is a linear function of the concn. The slopes or ratios η/η_0 for a 0.7 *N* soln. with respect to pure HgI_2 are 1.61 at 275°; 1.50, 300°; 1.32, 350°; 1.22, 400°; 1.20, 425°. For KCl in $SbCl_3$ soln. at 100°, η is linear from 0.009 to 0.5 *N*; the ratio $(\eta_{0.5}/\eta_0)$ is (0.0246/0.0171) = 1.41. Above 0.5 *N*, up to 1.91 *N*, η increases somewhat more rapidly. While the Falkenhagen electrostatic theory is applicable only up to KCl concns. of 1.6×10^{-5} *N* in $SbCl_3$ and 10^{-4} *N* in CH_3OH, the Einstein colloid soln. theory is applicable throughout most of the range of concns. studied. F. H. R.

Concluding remarks of the discussion with E. Janecke. Heterogeneous equilibrium in binary mixtures with vapor pressure maxima. R. Vogel. *Z. physik. Chem.* **A185**, 152(1939); cf. Janecke, *C. A.* **33**, 9106[1]. V. R. D.

Diffusion of hydrogen through iron at high pressures. P. S. Perminov and B. F. V'yunov. *Korroziya* **4**, No 3, 229–38(1938); *Khim. Referat. Zhur.* **2**, No. 3, 138 (1939).—Diffusion of H through Armco Fe depends on the size of the grains, the temp. (260–360°) and the pressure (300–1700 atm.). As a rule the velocity of diffusion is proportional to the square root of the pressure. Diffusion takes place through the grains of ferrite as well as along the surfaces of the grains. The velocity of diffusion through the intercryst. substance of the Armco Fe is greater than through the crystals. With an increase in the size of the grains the velocity of diffusion decreases, but with an increase of the pressure the effect of the size of the grains is decreased. W. R. Henn

Theory of crystal growth and the formation of crystal nuclei. I. N. Stranski and R. Kaishev. *Uspekhi Fiz. Nauk* **21**, 408–63(1939); cf. *C. A.* **33**, 3227[9].—The authors discuss, from both the thermodynamic and the statistical viewpoints, equilibria between two or three-dimensional nuclei and the gas or molten phase, simple homopolar and heteropolar crystals, kinetics and rate of liquid or crystal nuclei formation from supersatd. vapors or of a

gas from a superheated liquid, and the rate of polymorphic transformaion or recrystn. F. H. Rathmann

Kinetics of phase change. I. General theory. Melvin Avrami. *J. Chem. Phys.* **7**, 1103–12(1939).—The theory of the kinetics of phase change is developed with the experimentally supported assumptions that the new phase is nucleated by germ nuclei which already exist in the old phase, and whose no. can be altered by previous treatment. The d. of germ nuclei diminishes through activation of some of them to become growth nuclei for grains of the new phase, and ingestion of others by these growing grains The quant. relations between the d. of germ nuclei, growth nuclei, and transformed vol. are derived and expressed in terms of a characteristic time scale for any given substance and process. The geometry and kinetics of a crystal aggregate are studied from this point of view, and it is shown that there is strong evidence of the existence, for any given substance, of an isokinetic range of temps. and concns. in which the characteristic kinetics of phase change remains the same. The detn. of phase reaction kinetics is shown to depend upon the solution of a functional equation of a certain type. Some of the general properties of temp.-time and transformation-time curves, resp., are described and explained. G. M. Petty

The viscosity effect of the rate of solution of calcium carbonate in hydrochloric acid. Hitosi Tominaga, Hirosi Adzumi and Taro Isobe. *Bull. Chem. Soc. Japan* 14, 348–52(1939).—The reciprocal of the first-order rate const. is a linear function of the viscosity, and also of the reciprocal of the rotational velocity of the $CaCO_3$ disk: The change of viscosity with temp. must be considered in calcg. the energy of activation. S. B. Stone

Oxidation of solutions of ferrous chloride in alcohols. James R. Pound. *J. Phys. Chem.* **43**, 969–80(1939).—Alc. solns. of $FeCl_2$ are oxidized by air much more rapidly than aq. solns. The action is bimol. with respect to the Fe^{++} concn., and the rate of oxidation increases with the mol. wt. of the alc. Water and acids decrease the speed of oxidation. The O consumed in oxidizing alc. solns is greater than expected, probably because of the oxidation of the alcs. to aldehydes. The rate of oxidation is also influenced by the presence of light, H_2O, Hg and acid. Elec. conds. increase during oxidation. J. H. Reedy

Velocity of oxidation of CoO to Co_3O_4. Germaine Chauvenet. *Compt. rend.* **209**, 886–7(1939); cf. *C. A.* 32, 8322[4].—In similar fashion the oxidation at 500–750° to Co_3O_4 of polished pieces of CoO formed by preliminary heating in O_2 of disks of Co 2 × 5 mm. was examd. Results confirm the parabolic law as with metals and give the energy of activation as 23,950 cal., and the wt. of O_2 fixed at temp T, and pressure 760 mm. in time t by s sq. cm. CoO as $571se^{-11975/T}\sqrt{t}$. C. A. S.

Mechanism of oxidation of organic compounds by means of selenious anhydride. V. Kinetics in the oxidation of aldehydes. N. N. Mel'nikov and M. S. Rokitskaya. *J. Gen. Chem.* (U. S. S. R.) **9**, 1158–61(1939); cf. *C. A.* 33, 4194[2].—The oxidation of CH_3CHO, C_2H_5CHO, C_3H_7CHO, $C_6H_{13}CHO$, $(CH_3)_2CHCHO$ and $(CH_3)_2CH$-CH_2CHO by means of H_2SeO_3 in 75% AcOH was studied and the velocity of this reaction detd. The results show that the oxidation velocity decreases with increasing mol. wt. with the exception of CH_3CHO where the reaction const. is considerably smaller than that of C_2H_5CHO. This is explained by the easy polymerization of CH_3CHO in acid medium. The reaction const. is decreased also in the iso compds. as compared with the normal compds. Thus the reaction const. of C_3H_7CHO is 7.96×10^{-5}, and of $(CH_3)_2CHCHO$ 1.22×10^{-5}. G. Berend

The reaction of hydrogen and deuterium atoms with propane. E. W. R. Steacie and N. A. D. Parlee. *Can. J. Research* **17B**, 371–84(1939); cf. *C. A.* **30**, 6648[5].—The reaction of H atoms with C_3H_8 was investigated over the temp. range 30° to 250° by the Wood-Bonhoeffer method. The products are solely CH_4 at low temps., and CH_4, C_2H_6 and C_2H_4 at higher temps. It is concluded that the results can be explained only by the assumption that the reaction $H + C_2H_8 \rightarrow 2CH_3$ is of importance. The bearing of this on the Rice-Herzfeld mechanism (*C. A.* **33**, 8090[4]) is discussed. The activation energy of the reaction is 10 ± 2 kg.-cal. The main steps in the postulated mechanism are: Primary reaction $H + C_3H_8 \rightarrow C_3H_7 + H_2$. Secondary reactions at low temps. $H + C_3H_7 \rightarrow CH_3 + C_2H_5$; $H + C_2H_5 \rightarrow 2CH_3$; $CH_3 + H \rightarrow CH_4$. Addnl. secondary reactions at high temps. $C_3H_7 \rightarrow C_2H_4 + CH_3$; $2CH_3 \rightarrow C_2H_6$; $H + C_2H_4 \rightarrow C_2H_5$; $H + C_2H_5 \rightarrow C_2H_6$; $H_2 + C_2H_5 \rightarrow C_2H_6 + H$. The reaction of deuterium atoms with C_2H_8 was also investigated. It was found that the CH_4 and C_2H_5 produced were highly deuterized, while the C_3H_8 was not appreciably exchanged. J. W. Shipley

Kinetics of bimolecular reactions in solutions. V. A. Hol'tsshmidt and N. K. Vorob'ev. *J. Phys. Chem.* (U. S. S. R.) **13**, 473–82(1939).—The values of the bimol. reaction consts. $K \times 10^4$/min. were found to be: *m*-chlorodimethylaniline + allyl bromide in MeOH at 30°, 25.3; at 38°, 50.8; in EtOH at 30°, 28.9; at 40°, 65.4; *p*-bromodimethylaniline + allyl bromide in benzyl alc. at 16°, 50.5; at 23°, 87.2; pyridine + benzyl chloride in nitrobenzene at 30°, 2.20; at 38°, 2.22; dimethylaniline + benzyl chloride in MeOH at 29°, 21.3; at 38°, 43.7. From these and other exptl. data H. and V. calc. the values of K 30°, log B and E in the Arrhenius equation $K = Be^{-E/RT}$ for various reactions and solvents. From these data it is concluded that the values of K for various substituted anilines in the same solvent increase in the order Br < Cl < H < CH_3; for the quinolines, quinoline < *m*-toluquinoline < *p*-toluquinoline; and for the various halides in the order: benzyl chloride < allyl bromide < benzyl bromide. For the solvents, the values of K increase with increasing values of the dipolar moments; $K_{acetone} < K_{acetophenone} < K_{nitrobenzene}$; $K_{EtOH} < K_{MeOH} < K_{benzyl\ alc.}$ A theory is developed for the part played by the solvent, and an equation is derived for the pre-exponential factor (cf. Wynne-Jones and Eyring, *C. A.* **29**, 6491[2]). F. H. Rathmann

Velocity of formation of *m*-nitroaniline hydrochloride. Dora Markowska. *Compt. rend.* **209**, 879–81(1939).—In a fashion similar to that of *C. A.* **33**, 5732[2,3], the rate of formation of *m*-nitroaniline-HCl (d. 1.468) by the action of gaseous HCl on powdered *m*-nitroaniline was detd. The amt. m transformed in time t is $F(m) \equiv 5.3215 - (1-m)^{2/3} - 4.3215(1 + 0.2314m)^{2/3} = Kt/e_0^2$, where K is a const. dependent on the phys. conditions, and e_0 is the av. thickness of the grains of the *m*-nitroaniline. C. A. Silberrad

Liquid-phase reactions at high pressures. V. The polymerization of cyclopentadiene and α-dicyclopentadiene. B. Raistrick, R. H. Sapiro and D. M. Newitt. *J. Chem. Soc.* **1939**, 1761–9; cf. *C. A.* **32**, 8376[2].—The polymerization of pure liquid cyclopentadiene under pressure, up to 5000 atm., at temps. from 0° to 40°, proceeds in 3 stages: (*a*) dimerization to α-dicyclopentadiene, (*b*) production of higher polymers, and (*c*) an explosive disruptive reaction, occurring within definite pressure limits at each temp., accompanied by the formation of a carbonaceous residue and much gas. The specific reaction rates (k), at various temps., and the energies of activation (E) for the bimol. reaction (*b*) were detd. at a no. of pressures; both the A and E terms of the rate equation $k = Ae^{-E/RT}$ increase with increasing pressure, E varying with log A in a linear manner. The substances formed in (*b*), and those obtained by subjecting α-dicyclopentadiene to pressure at 130°, are related to those resulting from heat polymerization. **VI. The explosive decomposition of cyclopentadiene.** *Ibid.* 1770–3.—The effect of temp., diam. and material of the reaction tube and of the presence of a diluent on the explosive decompn. of cyclopentadiene (cf. above) was studied. The lower crit. pressure necessary for the reaction to occur decreases with increasing temp. (between 13° and 40°) and with increasing diam. of the tube. This pressure is greater in a stainless steel tube than in one of glass, but pieces of glass produce no catalytic effect in the steel tube. The addn.

of n-C_7H_{16}, AcOEt or AcOH as diluent increases the lower crit. pressure, the effect increasing in the order given. The gaseous product of the reaction is a mixt. of 92% CH_4 and 8% H_2. The carbonaceous solid has an x-ray structure similar to low-temp. coke obtained at 550–600°. The existence of an induction period and of crit. pressure limits dependent on the surface/vol. ratio of the reaction vessel suggests a chain mechanism, the chains being broken at the walls. The different results obtained in steel and glass tubes are attributed to the higher heat cond. of the former, with consequent reduction in the self-heating of the system. S. Glasstone

Velocities of the hydrolysis of ethers. Roman Skrabal. *Z. physik. Chem.* **A185**, 81–96(1939).—The effect of the following different alkyl ethers on their velocities of hydrolysis was investigated: vinylethyl, vinylisopropyl, vinylallyl, diallyl, ethylallyl and isopropylallyl ethers. The reacting solns. at 15°, 25° or 35° all contained 0.0909 *M* AcOH and 0.00909 *M* Na acetate per l., i. e. $(H^+) = 1.85 \times 10^{-4}$. The results are discussed from the viewpoint of the reaction mechanism, 2 factors being emphasized: a factor, μ, corresponding to a displacement of the equil., another factor which takes into account the change of the decompn. velocity of the reaction complexes. Victor R. Deitz

Relations between electrostatic potentials and reaction velocities. H. O. Jenkins. *J. Chem. Soc.* **1939**, 1780–4; cf. *C. A.* **33**, 8478⁴.—The energy of activation in the hydrolysis of a series of benzoic esters, in the benzoylation of amines and in the formation of quaternary ammonium salts is a linear function of the electrostatic potential produced by a substituent in the benzene ring at the C-atom to which the reacting group is attached. The slope of the line is approx. equal to Ne, where N is the Avogadro no. and e is the electronic charge; this suggests that the change in the activation energy is due to the work done in bringing up a reacting ion against the dipole field of the mol. being attacked. In the acid hydrolysis of halogen-substituted benzoic acids and benzyl chlorides, and in the reaction of the latter with KI, a linear relation exists between the potential produced by the substituent and the specific rate const. The fact that *m*-compds. are exceptional is interpreted as indicating that the inductive and mesomeric effects of the halogens are proportional. S. Glasstone

Chain length and chain-ending processes in acetaldehyde decomposition. Milton Burton, H. Austin Taylor and Thomas W. Davis. *J. Chem. Phys.* **7**, 1080–5(1939); cf. *C. A.* **33**, 1217⁵, 5743⁴.—The C-C bond strength in AcH is probably less than a previously postulated value of 93 kg.-cal. and may be as low as the 75 kg.-cal. value calcd. by Grahame. The chain-ending processes in the pyrolysis, in the MeN:NMe-induced decompn., and in the photolysis of AcH are all bimol. but it is clear that the processes in the second and the third decompns. cannot be identical. The uncertainty of the process in the pyrolysis introduces an uncertainty into Grahame's calcn. In any event, the process is not the combination of Me radicals in the gas phase to yield C_2H_6. In the photolysis (and perhaps in the pyrolysis) HCO seems to be involved in the chain-ending reaction. In the induced decompn. MeCO seems to be concerned. The recombination of Me radicals as a wall reaction may occur in packed vessels. Activation energies of the various reactions are discussed. G. M. Petty

Kinetics of the Cannizzaro reaction. A. Eitel and G. Lock. *Monatsh.* **72**, 392–409; *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse*, Abt. IIb, **148**, 90–107(1939).—For detg. the reaction velocity consts. of the Cannizzaro reaction for aromatic aldehydes, a new method was developed, with 50% aq. dioxane as the solvent. The decrease in the alkali concn. is detd. by titration, the aldehyde concn. by weighing as the 2,4-dinitrophenylhydrazone. The reaction with BzH is established as trimol. The investigation was made with BzH and the 3 Cl derivs. The Cl atom increases the reaction velocity in all positions. The consts. for BzH and the *o*-, *m*- and *p*-Cl derivs. are: 60° 7.15×10^{-3}, 2.93×10^{-3}, 2.60×10^{-1}, 6.03×10^{-2}; 80° 1.75×10^{-2}, 6.05×10^{-2}, 4.95×10^{-1}, 1.18×10^{-1}; 100° 3.70×10^{-2}, 1.14×10^{-1}, 8.45×10^{-1}, 2.14×10^{-1}. C. J. West

Theory of the Cannizzaro reaction. A. Eitel and G. Lock. *Monatsh.* **72**, 410–16; *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse*, Abt. IIb, **148**, 108–14(1939).—The possible reactions are discussed. C. J. West

An easily arranged periodic action. E. E. Wark and I. W. Wark. *Nature* **144**, 833(1939).—A lecture expt. A Pb sheet is amalgamated with Hg. While still fluid a drop of concd. HNO_3 is placed on it. After about 1 min., gas evolution occurs for a fraction of a sec., followed by quiescence, with a cycle of about 1 sec. This continues for some min., until $Pb(NO_3)_2$ crystallizes out. Impure lead causes shorter cycles; weak acid causes longer cycles. Pb dissolves, liberating oxides of N. G. M. Petty

Acid catalysis in nonaqueous solvents. VIII. The rearrangement of *n*-chloroacetanilide in chlorobenzene solution at 100°. R. P. Bell and P. V. Danckwerts. *J. Chem. Soc.* **1939**, 1774–6; cf. *C. A.* **33**, 8482⁶.—The catalytic effect of chloroacetic, dichloroacetic, phenylacetic, and *o*- and *m*-nitrobenzoic acids on the rearrangement of *n*-chloroacetanilide into *o*- and *p*-chloroacetanilide in PhCl soln. at 100° shows that under these conditions the reaction is subject to general acid catalysis. The Brønsted relation $k = GK^x$, where k is the specific reaction rate, K the dissocn. const. of the catalyzing acid, and G and x are consts., is approx. obeyed. The reactions are strongly autocatalytic, and this effect is attributed to the formation of the powerful catalyst HCl by a side reaction between the reactant and the product. S. Glasstone

Acid-base catalysis in the depolymerization of dimeric glycolaldehyde. R. P. Bell and J. P. H. Hirst. *J. Chem. Soc.* **1939**, 1777–80.—The depolymerization of dimeric glycolaldehyde is catalyzed by both acids and bases in aq. soln. The reaction bears a general resemblance to the corresponding depolymerization of dihydroxyacetone (cf. Bell and Baughan, *C. A.* **32**, 4059³). The Brønsted equation, relating the specific reaction rate to the dissocn. const. of the catalyzing acid or base, is applicable. A new form of *micro-dilatometer*, which requires about 1 cc. of liquid, is used for the measurement of reaction velocity. S. Glasstone

Mechanism in the acid-catalyzed dimerization of anethole. Weldon G. Brown and Alex H. Widiger. *J. Am. Chem. Soc.* **62**, 115–16(1940).—The dimerization of anethole in a partly deuterated medium of CH_3OH and HCl is accompanied by a slow H exchange reaction of the monomer. The dimer contains no more deuterium than can be accounted for as a result of this exchange. It is difficult to find any support in these data for the Whitmore mechanism (cf. *C. A.* **28**, 1327⁹) involving an intermediate carbonium ion (or addn. compd.) in which the equivalence of the newly acquired H atom with H atoms previously present on the same C is to be assumed. A. B. Garrett

Oxidation of solutions of ferrous salts. James R. Pound. *J. Phys. Chem.* **43**, 955–67(1939).—The oxidation of solns. of $FeSO_4$ by air or O is accelerated by the presence of H_3PO_4 and HCl, but H_2SO_4 has little effect. The action of H_3PO_4 seems to be mainly catalytic. Low concns. of HNO_3 have little effect, but above 0.5 *M* the action becomes rapid. Mixed HNO_3 and HCl have no effect, if dil. Oxides of N accelerate the action. Neutral solns. are oxidized more rapidly than acid solns., and salts of weak acids more rapidly than strong acids. However, the addn. of neutral salts to acid solns. makes little difference in the speed. The formation of a ppt. of basic salt is accompanied by high rate of oxidation. In general, the rate of oxidation varies as the square of the concn. of the Fe^{++} salt. Oxidation of $Fe_3(PO_4)_2$ is very rapid, but is repressed by addn. of free H_3PO_4. Addn. of dil. solns. of H_2SO_4, HCl and HNO_3 also repress oxidation to a considerable degree. H_3BO_3 and $C_2H_4(COOH)_2$ also decrease oxidation slightly. Fe^{+++} salts are reduced by citric and oxalic acids in the presence of light, the amt. of reduction varying with the concns. of the acids.

H_2SO_4 inhibits this reduction, and H_3PO_4 accelerates it. In the dark, oxalic and citric acids reduce Fe^{+++} solns. slightly, if at all. In general, oxidation is least in the presence of low concns. of strong oxidizing acids, such as H_2SO_4 and HCl. No explanation is given for these effects. J. H. Reedy

Effect of gaseous additions on the disintegration of carbon monoxide. W. Baukloh and E. Spetzler. *Arch. Eisenhüttenw.* **13**, 223–6(1939).—The disintegration of C according to $2CO \rightleftharpoons C + CO_2$ is under ordinary conditions only very slight if no catalysts are present but even with metallic catalysts, as metallic Fe, Ni and oxides, it is not of much practical importance, e. g., for the destruction of Fe ores. The investigation of the effect of CO_2, N, H and water vapor in CO showed that disintegration takes place only in presence of metallic Fe. Presence of H produces at higher temps. a strong acceleration of the disintegration and is due mainly to chem. reaction at the surface of the substance. Water vapor suppresses C sepn., as it hinders the reduction of the Fe oxide. The better effect of H is ascribed to the ability of H to form a catalytically effective Fe lattice. For the operation of a blast furnace it is found that the range of 400–650° is particularly harmful, as in it C is pptd. instead of leaving as CO in the gas. M. Hartenheim

The relative effect of inhibitants on adsorption and on catalytic activity. II. Edward B. Maxted and Herbert C. Evans. *J. Chem. Soc.* **1939**, 1750–4; cf. *C. A.* **33**, 2101⁴.—The effect of H_2S on the poisoning of Pt black for the catalytic hydrogenation of crotonic acid runs parallel to the decrease in the rate of adsorption of H_2 by the same catalyst. A sharp change in the slope of the plot of the poison content of the Pt against the adsorption velocity or catalytic activity suggests that there are 2 types of adsorption on the Pt surface. S. Glasstone

Active substances. XLI. Characteristics of the change from amorphous ferric hydroxide to α-ferric oxide by adsorption and catalytic measurements. R. Fricke and H. Wiedmann. *Kolloid-Z.* **89**, 178–84(1939); cf. *C. A.* **34**, 1⁹⁶. The active α-Fe_2O_3 obtained by dehydration of amorphous $Fe(OH)_3$ at various temps. was investigated. Measurements were made on CO_2 adsorption, heat of adsorption of the CO_2, H_2O catalysis with change in concn. and temp. (values were based on apparent reaction order, heats of activation and reaction consts.), and the hygroscopic nature of the material. W. George Parks

Vapor pressures of some salts at high temperatures. I. I. Naryshkin. *J. Phys. Chem.* (U. S. S. R.) **13**, 528–33(1939).—From the exptl. data on the vapor pressures at temps. from 750 to 1000°, the values of A and B in the August equation, $\log p = -(A/T) + B$, are: 8810.6, 7.982 for NaCl; 8133.0, 7.580 for KCl; 9756.0, 8.463 for KF; 11387.7, 8.654 for NaF; and 5000, 4.35 for AlF_3. The heats of evapn. and the extrapolated b. ps. are: NaCl, 40.2 Cal., 1454°; KCl, 37.2, 1457; KF, 44.6, 1473; NaF, 51.9, 1702; AlF_3, 59.0, (sublimes). These values are fairly close to the av. values of other workers. F. H. Rathmann

Distribution of radium D between crystals and solutions of $Ba(IO_3)_2$. A. Polesitskii. *Acta Physicochim. U. R. S. S.* **8**, 864–8(1938); cf. *C. A.* **33**, 3654⁴.—Measurements of the distribution in the presence and absence of $Ca(NO_3)_2$ in the solns. are in agreement with Ratner's thermodynamic theory (*C. A.* **28**, 700²), as found previously for Ra. B. C. P. A.

The system isopropyl ether–isopropanol. Vapor-liquid equilibrium. H. C. Miller and Harding Bliss. *Ind. Eng. Chem.* **32**, 123–5(1940).—The vapor-liquid equil. curve is given. Joseph H. Wells

Phase equilibria in hydrocarbon systems. The propane n-butane system in the critical region. C. N. Nysewander, B. H. Sage and W. N. Lacey. *Ind. Eng. Chem.* **32**, 118–23(1940).—The volumetric and phase behavior of 6 mixts. of propane and n-butane were investigated throughout the two-phase region at temps. above 160°F. From these data the sp. vols. and the compns. of coexisting phases of the system were calcd. Joseph H. Wells

Existence of hydrates of a definite chemical composition in the liquid phase. I. The systems $Na_2S_2O_3$–H_2O and $Ca(NO_3)_2$–H_2O. B. V. Bak. *J. Phys. Chem.* (U. S. S. R.) **13**, 534–40(1939).—From exptl. data on the viscosities and elec. conds. of $Na_2S_2O_3$ and $Ca(NO_3)_2$ solns. contg. 0–77% of salt, at temps. from 20 to 80°, minima are found in the isotherms for the sp. conds., max. in their temp. coeffs., and max. in the temp. coeffs. of the viscosities corresponding to the hydrates $Na_2S_2O_3.5H_2O$ and $Ca(NO_3)_2.3H_2O$. Below approx. 50° $Ca(NO_3)_2.4H_2O$ is also stable. F. H. Rathmann

Electroconductivity of the molten potassium chloride–magnesium chloride system in the region of the possible existence of the compound $(KCl)_3.MgCl_2$. A. A. Shcherbakov and B. F. Markov. *J. Phys. Chem.* (U. S. S. R.) **13**, 353–5(1939).—Between 27 and 37 mole % $MgCl_2$ and 600–800°, the cond. isotherms show a discontinuity and the temp. coeffs. a max. at 33–34% $MgCl_2$. F. H. R.

Polytherm of the three-component system KCl–KH_2PO_4–H_2O at temperatures from −10.8 to +35°. V. A. Polosin and M. I. Shakhparonov. *J. Phys. Chem.* (U. S. S. R) **13**, 541–6(1939).—Data on the system over 5° intervals are given. The polytherm of the binary system KCl–H_2O shows a break at +22.2° for 26.2% KCl. On addn. of KH_2PO_4, the temp. of the polymorphic transformation of KCl decreases from 22.2 to 12.5°. The triple eutectic point lies at −10.8°, 18.84% KCl, 2.31% KH_2PO_4, a triple point at 22.6% KCl and 3.8% KH_2PO_4. KCl has a strong salting-out effect on KH_2PO_4. The system KCl–KH_2PO_4–H_2O forms no double compds. in the range studied but solid solns. of KH_2PO_4 in KCl are not excluded. F. H. Rathmann

The partial vapor pressures of water and ammonia from the system water–phosphoric acid–ammonia. Clayton S. Huey and H. V. Tartar. *J. Am. Chem. Soc.* **62**, 26–32(1940).—The partial pressures of NH_3 and H_2O were measured at 25° from solns. of H_3PO_4 contg. various amts. of NH_3 and from solns. of $(NH_4)_2HPO_4$ of varying molality. The hydrolysis const. of $(NH_4)_2HPO_4$ was found to be 8.87×10^{-3}. The dissocn. pressures of NH_3 and H_2O for the reaction $(NH_4)_2PO_4.3H_2O_{(s)} \rightleftharpoons (NH_4)_2HPO_{4(s)} + 3H_2O_{(g)} + NH_{3(g)}$ were measured over the temp. range from 25 to 50°. From these data K_p, $\Delta F°$, ΔS and ΔH were computed. A. B. Garrett

Intersection of the tie-lines in diagrams of three-component systems. D. Tarasenkov and I. Paulsen. *Acta Physicochim. U. R. S. S.* **11**, 75–86(1939)(in English).—Ternary diagrams are given for the systems EtOH–benzene–H_2O, EtOH–toluene–H_2O, EtOH–cyclohexane–H_2O, AcOH–benzene–H_2O, AcOH–$CHCl_3$–H_2O, at 20 and 25°. All the extensions of the tie-lines of any given system intersect in a single point. The tie-lines are given by equations of the type, $X(Y_1 - Y_2) + X_1(Y_2 - Y) + X_2(Y - Y_1) = 0$, where X_1 and Y_1, X_2 and Y_2 are the coördinates of the conjugate solns. F. H. Rathmann

Tie lines in two-liquid-phase systems. A. V. Brancker, T. G. Hunter and A. W. Nash. *Ind. Eng. Chem., Anal. Ed.* **12**, 35–7(1940).—A method is proposed for obtaining complete tie-line data for ternary systems having one pair of nonconsolute components forming 2 liquid phases. For the system toluene–acetic acid–water the wt. percentage of toluene in one liquid phase is plotted against the wt. percentage of water in the other liquid phase. By using a variable ordinate the tie-line curve is made to plot as a straight line. Thirty other ternary systems plot straight tie-line curves when this coördinate system is used. To obtain the tie-line curve for any other similar ternary system it is only necessary experimentally to det. 2 tie-lines. **Tie lines in ternary liquid systems.** Irvin Bachman. *Ibid.*, 38–9.—A plot of the ratio of the wt. percentage of nonconsolute A in the A-rich layer to wt. percentage of nonconsolute B in the B-rich layer is a straight line. Therefore from 2 experimentally detd. tie-lines and the equil. curve one may derive the compns. of any pair of conjugate solns. W. B. Keighton, Jr.

Defect lattices in some ternary alloys. H. Lipson and A. Taylor. *Proc. Roy. Soc.* (London) **A173**, 232–7 (1939).—In the Ni-Al system the soln. of Al in β-NiAl

structure is accompanied by omission of some Ni atoms from some points of the lattice. In the Cu–Ni–Al system the omission of atoms begins at a line of const. ratio of valency electrons to atoms. These results are accounted for by electrons in the Brillouin zone. If electrons fill the zone to a given energy level, the no. of electrons per unit cell should be const. This latter is true for the Ni–Al system. In the Cu–Ni–Al system the no. of electrons in the zone increases as Cu is added. 7 references. J. N. Lynn

System butyl magnesium bromide–magnesium bromide–ethyl ether. W. E. Doering and C. R. Noller. *J. Am. Chem. Soc.* **61**, 3436–7(1939).—A study of the system BuMgBr–$MgBr_2$–Et_2O shows that BuMgBr.$2Et_2O$ greatly modifies the soly. of $MgBr_2.2Et_2O$ in Et_2O and that the mutual soly. of the 2 dietherates is greater than their soly. in Et_2O. Whereas $MgBr_2.2Et_2O$ and Et_2O form homogeneous solns. at 25° only when the concn. of the dietherate is greater than 73% or less than 5.5%, if the total concn. of BuMgBr.$2Et_2O$ is greater than approx. 23% the ratio of the $MgBr_2.2Et_2O$ to the Et_2O may be any value without the sepn. into 2 phases; when sepn. into 2 phases does occur, the concn. of the BuMgBr.$2Et_2O$ is always greater in the lower layer than in the upper layer These 2 results indicate that the mutual soly. of the 2 dietherates is greater than their soly. in Et_2O. C. J. West

System of alkali oxides–CaO–Al_2O_3–SiO_2–CO_2. IX. The reaction behavior of different SiO_2 modifications. Carl Kröger and Werner Graeser. *Z. anorg. allgem. Chem.* **242**, 393–405(1939); cf. *C. A.* **33**, 6696[8].—With Li_2CO_3, cristobalite, like quartz, forms Li_2SiO_3. No $CaSiO_3$ or $CaSiO_4$ forms (as in the case of quartz) on the heating of $CaCO_3$ with cristobalite but only a soln. of CaO in SiO_2. $Na_2Ca(CO_3)_2$, formed by heating a mixt. of Na_2CO_3 and $CaCO_3$ in a Pt crucible in a stream of CO_2 at 820°, reacts with cristobalite according to the equation $3[Na_2Ca(CO_3)_2] + 6(SiO_2)_{cryst} = [Na_2O.2CaO.3SiO_2] + [2Na_2O.CaO.3SiO_2] + 6CO_2$. Vapor pressure-temp. curves for these systems as well as for the systems K_2CO_3 with cristobalite, tridymite and pptd. SiO_2 are presented. H. A. Frediani

The heat capacity of nickel oxide from 68 to 298°K. and the thermodynamic properties of the oxide. Harry Seltz, Bernard J. DeWitt and Hugh J. McDonald. *J. Am. Chem. Soc.* **62**, 88–9(1940).—The heat capacity of NiO was measured from 68 to 298°K. and the entropy and free energy of formation of the oxide calcd. The entropy of the oxide is 8.36 e. u. ± 0.1 e. u. The contribution of the Debye function to the entropy is 0.648 e. u. at 68°K., whereas the contribution of the Einstein function is less than the exptl. error. The value of $\Delta F°_{298.1}$ was calcd. with the aid of Bichowsky and Rossini's value of $\Delta H_{298.1}$ = 58,400 cal. This value and the entropy of formation, $\Delta S_{298.1} = -18.00$, gives $\Delta F°_{298.1} = -53{,}034$ cal. A. B. Garrett

The heat of dissociation of carnallite melts. W. D. Treadwell and A. Cohen. *Helv. Chim. Acta* **22**, 1341–8 (1939); cf. *C. A.* **33**, 6696[1].—The e. m. f. of chlorine-magnesium cells was measured in the temp. range 550–750° with pure $MgCl_2$ and carnallite as electrolytes. Satisfying agreement was found with the values calcd. from the equil. measurements. From the relatively great variation of the values of the e. m. f. by addn. of KCl the existence of chlorine-magnesium complexes could be concluded. Robert Simha

Heat of formation of AgF_2. H. v. Wartenberg. *Z. anorg. allgem. Chem.* **242**, 406–12(1939).—By direct synthesis in a calorimeter the heat of reaction for the reaction $Ag + F_2 = AgF_2$ was found to be 84.5 ± 1.2 kg.-cal. The m. p. of AgF_2 is about 690° and its dissocn. pressure at 700° is less than 0.1 atm. H. A. Frediani

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Chapman, Sydney, and Cowling, T. G.: The Mathematical Theory of Non-Uniform Gases. An Account of the Kinetic Theory of Viscosity, Thermal Conduction and Diffusion in Gases. Cambridge: University Press. 404 pp. 30s. Reviewed in *Nature* **144**, 993 5(1939).

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Williams, S., and Bond, G.: Practical Botany. A First Year Course for University and Intermediate Science Students. London: Edward Arnold and Co. 96 pp 5s. 6d. Reviewed in *Nature* **144**, 739(1939).

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F. DUNCAN

Physical methods in the chemical laboratory. XLI. The critical selection of colorimetric, spectrophotometric and spectrographic methods for the measurement of absorption. G. Kortüm and M. Seiler. *Angew. Chem.* **52**, 687–93(1939); cf. *C. A.* **33**, 5741[6].—The following subjects are discussed: principles of absorption measurements, limits of the validity of the Lambert-Beer law, the various measuring methods and reproducibility of results, and accuracy of measurements. 21 references. K. K.

Transition probabilities in double β-disintegration. W. H. Furry. *Phys. Rev.* **56**, 1184–93(1939).—Math. This probability is calcd. for both Majorana's sym. theory of the neutrino and for the original Dirac-Fermi theory. G. M. Petty

Spin-orbit coupling in the α-model of light nuclei. D. R. Inglis. *Phys. Rev.* **56**, 1175–80(1939). G. M. P.

Inversion of the partition function to determine the density of energy states. S. H. Bauer. *J. Chem. Phys.* **7**, 1097–1102(1939).—Math. G. M. Petty

A new model of the point-charge electron and of other elementary particles. E. C. G. Stueckelberg. *Nature* **144**, 118(1939).—Math. A point-charge electron is described which conserves a no. of properties of the Lorentz electron and which can be taken over into the quantum theory without any difficulties. G. M. Petty

Classical dynamics of the meson. D. Ivanenko. *Nature* **144**, 77–8(1939).—Math. A classical theory of the mesonic field is useful for the construction of various potentials or for the discussion of the nature of heavy mass. G. M. Petty

Exchange force between the heavy particles due to the meson exchange field. L. Jánossy. *Proc. Cambridge Phil. Soc.* **35**, 616–21(1939).—Theoretical. E. O. W.

Origin of the *E* layer of the ionosphere. S. K. Mitra. *Nature* **142**, 914–15(1938).—Recent work on ionization of the upper atm. is discussed. The region around 100 km in which rapid transition of O_2 to O occurs is the region of max. ionization of O_2, and the ionized layer formed near this level is to be identified with the *E* layer. The origin of this layer is due to strong absorption resulting in photo-ionization of O_2 commencing at 744 A. B. C. P. A.

Lower limit to energy evolution in stellar matter. D. S. Kothari. *Nature* **142**, 916(1938).—The min. energy evolved at different [H] by the combination of 2 protons to form a deuteron is obtained by averaging the probability of reaction for a velocity distribution corresponding with that of a completely degenerate proton gas. B. C. P. A.

A table of induced radioactivities. J. J. Livingood and G. T. Seaborg. *Rev. Modern Phys.* **12**, 30–46(1940). E. H.

Nuclear fission. Louis A. Turner. *Rev. Modern Phys.* **12**, 1–29(1940). E. H.

The hydrogen isotope of mass 3. V. I. Chernyaev. *Uspekhi Fiz. Nauk* **21**, 466–77(1939).—A review. F. H. Rathmann

Phase-shift calculations for proton-proton scattering at high energies. H. M. Thaxton and L. E. Hoisington. *Phys. Rev.* **56**, 1194–8(1939).—The theoretical *s* wave shift for the square well and the Gauss error well, which

is fitted to expt. from 0.7 to 2.6 m. e. v., is calcd. up to energies of 10 m. e. v. Coulomb functions needed for this purpose are tabulated and the phase shift, as well as the ratio of theoretical scattering to that expected according to Mott's formula, is represented graphically as a function of the energy. Both the Gauss error well and the square well give similar extrapolations of the exptl. phase shifts to high energies. G. M. Petty 1

Critical conditions in neutron multiplication. R. Peierls. *Proc. Cambridge Phil. Soc.* **35**, 610–15(1939).—Theoretical. E. O. Wiig 2

The lengths of the links of unsaturated hydrocarbon molecules. C. A. Coulson. *J. Chem. Phys.* **7**, 1069–71 (1939); cf. *C. A.* **33**, 3690[6], 9279[1].—The lengths of the links in the series ethylene, butadiene, hexatriene, octatetraene and in C_6H_6, naphthalene and Ph_2 are calcd. on the assumption that there is a simple interaction energy between all contiguous C-C bonds. The lengths agree well with those calcd. from quantum-mech. ideas of resonance. G. M. Petty 3

Partial and total emissive power of various substances. III. Generalized Wien's law. A. Carrelli. *Atti accad. Lincei, Classe sci. fis. mat. nat.* **29**, 435–41(1939); cf. *C. A.* **34**, 21[5].—A formula is derived from Planck's law of emission from a black body, on the assumption that the emissivity is independent of temp The emissive power of Pt is 0.248 and graphite 0.212, compared with a value of 0.294 for a black body. A. W. Contieri 4

The effect of ionization and dissociation on the specific heat. F. Moglich, K. H. Riewe and R. Rompe. *Ann. Physik* **35**, 735–60(1939).—The sp. heat of gases undergoing dissocn. or ionization is calcd. by Planck's summation state method, translational, interval, and dissocn. or ionization energies are taken into account. At low pressures in the case of hydrogen the max. sp. heat occurs at 0.57 dissocn. or ionization; this max. is several hundred times the classical translational value. The calcn. is also applied to Hg for the first 4 ionization steps and briefly to semiconductors. E. O. Wiig 5

Ionization in the positive column. B. N. Klyarfel'd. *Compt. rend. acad. sci. U. R. S. S.* **24**, 251–3(1939) (in English).—Theoretical. The results of a previous paper (*C. A.* **33**, 4865[9]) are modified by introducing a new method for evaluating the efficiency of noncumulative ionization processes in low-pressure discharges. The calcd. values now agree to within 10–15% with the exptl. results of Nottingham (*C. A.* **33**, 2795[7]). T. H. Dunkelberger 6

The atom-physical interpretation of Lichtenberg figures and their application to the study of gas-discharge phenomena. F. H. Merrill and A. Von Hippel. *J. Applied Phys.* **10**, 873–87(1939). Discharges in N_2 between 5 mm. and 30 atm. pressure progress in 3 stages—the primary figure, spark development and the discharge of neg. surface charges. Admixts. of CCl_4 or Freon up to 6 atm. show the influence of electroneg. components on the development of the phenomena and reveal the reason why these gases are effective in suppressing corona discharges. Deviations from Pascen's law can be interpreted in terms of the photographic evidence obtained. S. L. G. 7

New data on secondary emission. N. S. Khlebnikov. *Uspekhi Fiz. Nauk* **21**, 301–37(1939).—Data are given on the secondary emission as a function of the voltage from clean, oxidized or partially or thoroughly degassed Cs, Cs-Ag, Be (in H_2 atm.), W, Ni, Ag, Sb-Cs and KCl emitters at various temps. F. H. Rathmann 8

Ionization by collisions of the second kind in a gas discharge. A. A. Zaĭtsev and E. M. Reĭkhrudel. *Uspekhi Fiz. Nauk* **20**, 447–68(1938).—From exptl. data on He, Ne and A, Z. and R. conclude that collisions of the second kind play an important and at times a predominant role in detg. the spectral and elec. characteristics of a discharge. F. H. Rathmann 9

The Townsend ionization coefficients for nickel and aluminum cathodes in an atmosphere of hydrogen. Donald H. Hale. *Phys. Rev.* **56**, 1199–1202(1939); cf. *C. A.* **33**, 6138[8].—Values of the α- and γ-coeffs. are compared with those for a Pt surface in H. Values of α/p (in H) plotted against X/p decrease for X/p from 900 to 1400. Values of γ plotted against X/p show a photoemission peak at $X/p = 131$, and a gradual rise at higher values of X/p. Sparking potential curves are calcd. from the γ-values and are compared with experimentally detd. curves. G. M. Petty 10

The absorption of high-energy electrons. IV. M. M. Slawsky and H. R. Crane. *Phys. Rev.* **56**, 1203–10 (1939); cf. *C. A.* **31**, 6546[9], 8351[2]; **32**, 4422[2].—The scattering of electrons in Pb and Al was studied, chiefly under conditions used previously for the study of energy loss. The primary object was to det. the extent to which existing energy-loss data (up to 13.5 m. e. v.) are affected by multiple scattering. Measurements made in Pb with electrons below 9 m. e. v. are so much affected by multiple scattering in the absorbing material that they are useless as a direct check on the theory for energy loss. From 9 to 13.5 m. e. v. the scattering losses are about 40% above theoretical; here a comparison with theoretical values is possible. Measurements were made on the multiple scattering of 0.9-m. e. v. electrons in thin sheets of Al. The most probable angle of scattering and the av. angle of scattering were in good agreement with theoretical predictions. G. M. Petty 11

A portable apparatus for recording bursts of cosmic-ray ionization. C. G. Montgomery and D. D. Montgomery. *Rev. Sci. Instruments* **10**, 350–2(1939). E. H. 12

A discussion of theoretical formulas and curves relating to γ-rays. T. Kahan. *J. phys. radium* **10**, 430–4(1939). —Math. and theoretical. Various expressions concerning the photoelec. effect, Compton effect, and the formation of positron-negatron pairs are discussed and their limits of validity are defined. The behavior of the 3 effects as a function of the at. no. and of the energy of the incident photon is detd. Curves are presented showing the relative importance of the 3 effects in the electron bombardment of Al, Cu and Pb specifically, as well as for the general case. T. H. Dunkelberger 13

Intensity of mesotrons in the upper atmosphere. E. G. Dymond. *Nature* **144**, 782(1939); cf. Carmichael and D., *Proc. Roy. Soc.* (London) **A171**, 321(1939).—The intensity of vertically directed mesotrons rises to a max. of 9 times the ground value at a pressure of 80 mm. Hg (16 km. height). The theoretical work of Euler and Heisenberg (*C. A.* **33**, 4634) is brought into agreement with these data by assuming that the min. energy of production of mesotrons is 8×10^8 e. v. G. M. Petty 14

Lifetime of the mesotron. Ira M. Freeman. *Nature* **144**, 667(1939); cf. *C. A.* **32**, 4869[4].—On the assumption that a heavy electron is a quasi-stable state of an ordinary electron, the life of the mesotron is calcd. to be 2.48×10^{-6} sec. G. M. Petty 15

The production of yukons (mesotrons). Guiseppe Cocconi. *Nuovo cimento* **16**, 78–85(1939).—The curve of Bowen, Millikan and Neber (*C. A.* **32**, 5695[4]) is modified to give a spectrum for electrons forming primary cosmic rays which is in better agreement with measurements at high altitude. Assuming that yukons are the least penetrating part of cosmic rays, C. calcs. from the latitude effect the probability of production of yukons by primary electrons. J. B. Austin 16

Absorption of slow mesotrons in matter. Hideki Yukawa and Taisuke Okayama. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 385–9(1939).—Math. E. O. Wiig 17

A thallous sulfide photovoltaic cell. Foster C. Nix and Arnold W. Treptow. *J. Optical Soc. Am.* **29**, 457–62 (1939).—A photo-e. m. f. cell effect is observed in Tl_2S produced by partial sulfurization of a Tl disk or of an evapd. Tl layer. The photosensitivity is observed to be as high as 6000×10^{-6} amp./lumen. Both open-circuit voltage and short-circuit current are observed in some cells to be directly proportional to the incident-light intensity at all temps. In other cells, especially those displaying high photoresponse, both tend to sat. at high light intensities. The spectral photosensitivity curve possesses a max. at 9800 A. ± 200 A. with long-wave and short-wave thresholds at 15,000 and 6500 A., resp. The short-circuit cur- 18

rent increases with decreasing temp. down to about −45° and then decreases continuously down to −180°. The photoelec. output when measured as a function of frequency of interruption of the incident light displays a recession of 75% at 20,000 cycles. M. Farnsworth 1

Photovoltaic cells: The spectral sensitivities of copper, silver and gold electrodes in solutions of electrolytes. Paul E. Clark and A. B. Garrett. *J. Am. Chem. Soc.* **61**, 1805–10(1939).—The sensitivity is detd. over the range 3650 to 6908 A. The photovoltaic threshold for different conditions is detd. The sensitivity of coated and some metal electrodes at 5461 A. is ascribed to the coating. A vacuum-tube circuit for measuring photopotentials is described. J. B. Austin 2

The optical translucence of selenium as connected with its photoelectric conductivity. G. Mönch. *Physik. Z.* **40**, 487–8(1939).—The position of the diffuse absorption edge is detd. spectrographically in the range −200° to +50°. It is concluded that the photoelec. properties of gray Se are due to the presence of traces of red Se. J. B. Austin 3

A photoelectric meter with a photocathode of CuI, filled with ethyl alcohol vapor. D. Ilkovič. *J. chim. phys.* **36**, 140–6(1939).—The elec. and optical properties of the meter are described in detail. The app. has an abs. sensitivity near 2350 A. of 2–6 photons/sec./sq. cm. G. M. Petty 4

Electron interference for light molecules by the sector method. P. Debye. *Physik. Z.* **40**, 404–6(1939).—An extension of *C. A.* **33**, 3678², giving more details and recent improvements. Illustrations are given for CCl_4, C_2H_2 and NH_3. J. B. Austin 5

The resonance capture of slow neutrons and emission of γ-rays. Itaru Nonaka. *Proc. Phys.-Math. Soc. Japan* **21**, 594–608; *Nature* **144**, 831–2(1939).—Neutron resonance energies were detd. for some elements which are not made radioactive by neutron capture. The intensity of γ-rays emitted from Fe, Cd, Hg and Bi by slow-neutron capture was measured as a function of the thickness (0–12 cm.) of a paraffin layer interposed between a D + D neutron source and a detector. From an analysis of the γ-ray intensity curves and from measurements of energy by B absorption, a resonance of 10 e. v. was found in Hg, a resonance group of 5–7 e. v. in Bi, and several resonances from a few to several tens of e. v. in Cd. No distinct resonance groups were found in Fe. The mean energy of the Cd groups plus the residual energy of the first group (Er^3 = 0.17 e. v.) not absorbed by 0.43 g./sq. cm. Cd is about 2 e. v. The app. and technique are described. G. M. Petty 6

A simple apparatus for producing neutrons. Carl-friedrich Weiss and Hans Westmeyer. *Physik. Z.* **40**, 461–6(1939).—The app. uses the reaction ${}_1D^2 + {}_1D^2 \rightarrow {}_2He^3 + {}_0n^1$. The source of ions is a low-tension arc with a hot cathode. The app. costs 2000 marks and gives a max. yield equiv. to 1 g. (Rn + Be). J. B. Austin 7

Energy of high-velocity neutrons by the photographic method. C. F. Powell and G. E. F. Fertel. *Nature* **144**, 115–16(1939).—The B + D proton spectrum and the B + D and Be + D neutron spectra were studied by the counter method, the expansion-chamber method, and a direct photographic method in which the protons or neutrons passed tangentially into an Ilford "half-tone" plate. The resolving powers of the methods for protons (25–100-cm. range in air) are comparable. With neutrons, the photographic method (*a*) is equiv. to a continuously sensitive, high-pressure expansion chamber, (*b*) involves a min. of material (and equipment) and does not give rise to disturbing scattered neutrons, and (*c*) uses a small plate placed very near the neutron source, with a corresponding gain in intensity. G. M. Petty 8

Angular distribution of the fast neutrons scattered by atoms. II. Tetuo Wakatuki and Seisi Kikuti. *Proc. Phys.-Math. Soc. Japan* **21**, 656–60(1939).—Continuation of former research (*C. A.* **33**, 6141⁸, 8491⁶) and extending the scattering angles up to 152°. In the small-angle region the agreement with the old value was found quite satisfactory, and the authors believe it to be predominantly elastic scattering. For angles larger than 55° σ was found to be nearly const. ($\sigma(\theta)$ is, the differential scattering cross section), while for smaller angles it increased regularly with decreasing angles. Fast Li + D neutrons were found to act quite similarly to D + D neutrons. Frank Gonet 9

The scattering of α-particles by nitrogen. Gordon Brubaker. *Phys. Rev.* **56**, 1181–3(1939).—α-Particles are scattered by N into 4 angular ranges of mean angles 53°, 66°, 88° and 104°. Anomalies in the scattering are observed for energies as low as 3.5 m. e. v. Curves showing the ratio of observed to Coulomb scattering as a function of energy show several maxima and minima. Forms of the curves vary greatly with the scattering angle. G. M. Petty 10

Transformations of atomic nuclei produced by collisions with material particles. N. Bohr and F. Kul'kar. *Uspekhi Fiz. Nauk* **20**, 319–40(1938).—Theoretical review. Distribution of energy levels, emission of radiant energy by nuclei, emission of neutrons and charged particles, and effects of collisions with slow neutrons and with charged particles are discussed. F. H. Rathmann 11

Artificial disintegration of heavy nuclei. E. V. Shpol-skiĭ. *Uspekhi Fiz. Nauk* **21**, 253–60(1939).—A review, chiefly of the work of Hahn and his coworkers, on the explosive disintegration of uranium under the action of neutron bombardment. F. H. Rathmann 12

The cyclotron of the Biochemical Research Foundation. A. J. Allen, M. B. Sampson and R. G. Franklin. *J. Franklin Inst.* **228**, 543–61(1939).—This cyclotron, with its improved ion source using tungsten ribbon filaments, delivers a current of 30 microamperes of deuterons at 11 m. e. v. on an external target. Various improved features of the app., e. g., design of the magnetic circuit, and construction of the vacuum tank and deflector, of dee supports with a convenient arrangement for adjustment of the dees, and of a high-frequency system for supplying voltage to the dees, are given in detail (with drawings and photographs) together with the results of a survey of the magnetic field with and without "shimming." E. B. S. 13

The preparation of polonium-beryllium neutron sources. Ch. Haenny and M. Haïssinsky. *J. chim. phys.* **36**, 218–20(1939).—A neutron source prepd. by chem. pptn. of Po in a Be tube and subsequent filling with Be chips gave a neutron yield twice that of a similar amt. of Po on Ag strips similarly surrounded by Be. H. C. T. 14

Coincidence experiments on the nuclear transformation of boron when bombarded by protons. Kurt Fink. *Ann. Physik* **34**, 717–39(1939).—A study of the reaction $B^{11} + H = He^4 + Be^8$ leads to the conclusion that Be^8 is not stable but breaks up immediately into 2 α-particles. The α-particles have a range of 44 mm. The no. of observed coincidences is considerably smaller than one would expect on the basis of spacially symmetrical decompn. of the Be^8 atoms. P. H. Emmett 15

Experiments on the transmutation of fluorine by deuterons. J. C. Bower and W. E. Burcham. *Proc. Roy. Soc.* (London) **A173**, 379–91(1939).—The emission of protons from F bombarded by deuterons of 0.8-m. e. v. energy was studied in an expansion chamber. Five groups of protons of ranges of 13.0, 18.8, 21.0, 24.2 and 31.0 cm. were found, and from their energy values the authors conclude that in the radioactive F^{20} nucleus there exist excitation levels at 0.7, 1.0, 1.35 and 1.9 m. e. v. above the ground state. A mass of 20.0063 is deduced from the energy of the 31-cm. group, which gives an energy release of 7.0 m. e. v. in the β-decay of F^{20} to Ne^{20}. The disagreement between this value and the observed β-ray end-point of 5.2 m. e. v. is partially reconciled by the observation that a γ-ray emission of 2.2 m. e. v. accompanies the β-emission. The authors discuss the origin of this γ-radiation in terms of the level system of Ne^{20}. The exptl. results were found not to support the original theory of Bethe, *et al.* (*C. A.* **34**, 3678⁷) on the complexity of the β-ray spectrum of F^{20}. A new transmutation of the C^{13}-isotope by deuterons is also reported. F. G. 16

Concentration of radiophosphorus ${}_{15}P^{32}$ by means of an electric field. J. Govaerts. *J. chim. phys.* **36**, 130–9 (1939).—Radio-P is deposited on Cu electrodes in an elec. 17

field of 165 v./cm. When CS_2 is irradiated with Ra + Be neutrons, all the radio-P is deposited on the electrodes. When CCl_4 is irradiated, the radio-P is not completely pptd. on the electrodes. When Al electrodes are used, only part of the radio-P is deposited from irradiated CS_2. The black deposit which forms on Cu electrodes arises from the decompn. of CS_2 by the penetrating rays from Ra. The radio-P is readily recovered from the electrodes on treating them with HNO_3. G. M. Petty 1

Radioactive arsenic isotopes. R. Sagane, S. Kozima, G. Miyamoto and M. Ikawa. *Proc. Phys.-Math. Soc. Japan* **21**, 660–71(1939).—Decay periods of six radioactive arsenic isotopes were investigated by bombarding Br, Se, As and Ge with either deuterons or fast and slow neutrons from the Berkeley (5.5–7.6 m. e. v.) and the Tokyo (3 m. e. v.) cyclotrons. The following results were obtained: (1) As^{78}: When Br^{81} was bombarded with neutrons the As^{78} obtained [$Br^{81}(n,\alpha)As^{78}$] was found to have an activity (e^-) of 65 min. and an upper limit of 1.4 m. e. v. This isotope was also believed to be produced by fast neutron bombardment of Se^{78} [Se^{78} (n,p) As^{78}]. (2) As^{77}: When Ge^{76} was bombarded with deuterons the As^{77} obtained [$Ge^{76}(d,n)$ As^{77}] gave an activity (e^-) of 90 ± 10 days, and an upper limit of about 0.12 m. e. v. The (e^-) emitted was very soft. (3) As^{76}: The As isotope produced by the following reactions, [$Br^{79}(n,\alpha)$ As^{76}; $Se^{76}(n,p)$ As^{76}; $As^{75}(n,\gamma)As^{76}$; and $As^{75}(d,p)As^{76}$] gave a strong activity (e^-) of 26 hrs. The β-rays were studied in a cloud chamber and 2 components were found, the upper limits of which were 1.31 m. e. v. and 2.75 m. e. v. At least two γ-ray lines were observed (0.5 and 1.5 m. e. v. and a half-value thickness of 3 and 10 mm. Pb, resp.). The prepn. of As^{76} was chemically checked. (4) As^{74} produced by bombarding Ge with deuterons [$Ge^{73}(d,n)$-As^{74} and $As^{75}(n,2n)As^{74}$] gave a strong 16-day period. Cloud-chamber studies showed the emission of e^- and e^+, the upper limits of which were estd. to be 0.9 and 1.3 m. e. v., resp. The expt. was repeated with Li + D neutrons and a 16 ± 1 day period was also obtained and the upper limits of the β-ray spectrum was found to coincide with the Ge + D results. (5) As^{73} and As^{71} (?) were believed to be produced when Ge was bombarded with deuterons [$Ge^{72}(d,n)As^{73}$ and $Ge^{70}(d,n)As^{71}$] as 2 positron activities of 88 min. and 50 hrs. were found. This result was not obtained when Ge was bombarded with neutrons. The authors suppose that the 88-min. period is due to As^{73} and the 50-hr. period to As^{71}. No chem. tests have been carried out as yet, for the Tokyo cyclotron is still too weak to produce sufficient exptl. material. The chem. method of sepn. is given. Frank Gonet 2

A method for preparing neutron sources of long-time action. A. Polesitskiĭ and A. Ratner. *Compt. rend. acad. sci. U. R. S. S.* **24**, 250(1939) (in English).—A soln. of a Ra or Rd-Th salt is mixed with a neutral soln. of 0.8 g. $BeCl_2$ in 200 ml. H_2O and also with approx. 2 g. of metallic Be. A soln. of NH_4OH (contg. some Na_2SO_4 in the case of the Ra salt) is added with vigorous stirring. After 15 min. the ppt. is filtered off, dried at 110° and then ignited at 300°. The resulting powder of Be + BeO is placed in a gilded metallic tube and carefully soldered shut to avoid any diffusion of Rn or thoron. Compared with the usual Rn + Be source, the Ra prepn. has an intensity of 0.8; that of the Rd-Th prepn. is 1.2. T. H. D. 3

Experiments on the transmutation of sodium by deuterons. E. B. M. Murrell and C. L. Smith. *Proc. Roy. Soc.* (London) **A173**, 410–17(1939).—The transmutation of Na bombarded by deuterons of 0.85-m. e. v. energy was investigated. The two groups of α-particles emitted, with ranges 5.0 ± 0.1 and 3.4 ± 0.1 cm. are attributed to the process: $Na^{23} + H^2 \rightarrow Ne^{21} + He^4$; where the former gave a value of 22.9961 ± 0.0003 for the mass of Na^{23} and the latter indicates an excitation level of 1.6 m. e. v. above the ground state in the Ne^{21} nucleus. Four groups of protons were also found with ranges of 7.5, 24.0, 33.4 and 37.8 cm. The energy of the longest group gave a value of 23.9976 ± 0.0003 for the mass of the Na^{24} atom, and the other groups gave excitation levels at 0.38, 1.26 and 3.38 m. e. v. above the ground state in the Na^{24} nucleus. Using these values, the authors obtained a value of 23.9913 ± 0.0003 for the mass of Mg^{24}. Frank Gonet 4

The peculiar nuclear properties of samarium and its structural isomerism. W. Wefelmeier. *Ann. Physik* **36**, 373–80(1939).—On the assumption that changes between isobars have taken place at lower temps. than those required for conversions with a change in mass, the anomalous distribution of the abundance of Sm isotopes is in part explained. The remainder of the anomaly is clarified by considerations of isomerism. Henry C. Thomas 5

The application of artificial radioelements to the clearing up of a question of complex chemistry. A. A. Grinberg and F. M. Filinov. *Compt. rend. acad. sci. U. R. S. S.* **23**, 912–14(1939) (in German); cf. Roginskiĭ and Gopshtein, *C. A.* **29**, 6834[9].—By neutron irradiation of $C_2H_4Br_2$ and shaking of the product with a dil. KBr soln. radioactive Br was obtained and used to det. the exchangeability of the 4 Br atoms in K_2PtBr_4 and the 6 Br atoms in K_2PtBr_6 for Br of KBr. All the Br atoms in each were found exchangeable for Br of KBr. This probably means that the three coördinate positions in the octahedron of $PtBr_6$ are equiv. Oden E. Sheppard 6

A completely portable radioactivity meter requiring no high-voltage battery. Herman F. Kaiser. *Rev. Sci. Instruments* **10**, 218–19(1939).—A simple vacuum-tube oscillator circuit is used for generating the high potential necessary for operating a Geiger-Müller tube. The app. has a simplified counting rate meter, compactness, flexibility and complete portability. G. M. P. 7

Radium exposure meter. Leon F. Curtiss. *J. Research Natl. Bur. Standards* **23**, 479–84(1939) (Research Paper No. 1246).—The meter is a modification of a portable Geiger-Müller counter unit with a sensitivity range that is suitable for indicating when the tolerance dosage for γ-ray exposure has been exceeded. A wiring diagram and directions for building the meter are given. M. Farnsworth 8

Some peculiarities of the atoms from the nuclear fission of uranium and thorium. Otto Hahn. *Ann. Physik* **36**, 368–72(1939).—A discussion. Henry C. Thomas 9

Delayed neutron emission accompanying uranium fission. K. J. Bostrøm, J. Koch and T. Lauritsen. *Nature* **144**, 830–1(1939).—It has been shown that the fission of U is followed by β-ray periods of 45, 10, 3–4 and 0.3–0.9 sec. Neutron emissions connected with the 2 longer periods have been reported; neutron periods of 3 sec. and 0.1–0.3 sec. were found. The total cross section for periods down to 0.1 sec. is less than 2×10^{-25} sq. cm. The theoretical analysis of Bohr and Wheeler (*C. A.* **33**, 9115[5]) gives a simple explanation of these results. G. M. Petty 10

Fission of uranium under deuteron bombardment. D. H. T. Gant. *Nature* **144**, 707(1939).—When U is bombarded with high-energy deuterons, recoil radioactive nuclei are projected about 2 cm., owing to a fission of U. The threshold energy is about 8 m. e. v.; the cross section increases rapidly from 8 to 9 m. e. v. G. M. Petty 11

Splitting of the uranium and thorium nuclei into two complex nuclei. I. N. Golovin. *Uspekhi Khim.* **8**, 529–36(1939). **The splitting of the uranium and thorium nuclei. Experimental evidence for the explosive disintegration of uranium and thorium nuclei under neutron bombardment.** Frederick Joliot. *Ibid.* 537–9; cf. *C. A.* **33**, 4509[1]. **Radioelements formed in uranium and thorium irradiated by neutrons.** I. Joliot Curie and P. Savich. *Ibid.* 540–2; cf. *C. A.* **33**, 2408[8]. **Physical basis for the division of heavy nuclei under neutron bombardment.** S. Frish. *Ibid.* 542–4. **Disintegration of heavy nuclei.** Niels Bohr. *Ibid.* 544–5; cf. *C. A.* **33**, 3685[2]. F. H. Rathmann 12

Element 87, actinium K, derived from actinium. M. Perey. *J. phys. radium* **10**, 435–8(1939); cf. *C. A.* **33**, 2030[8].—Chem. sepn. of the products resulting from the disintegration of Act showed the appearance of a radioactive alkali metal with a half-life period of 21 min. This element is produced by α-disintegration of Act; about 1% of Act disintegrates in this way instead of by loss of a β-particle. Act K is a β-emitter. T. H. Dunkelberger 13

The β-radiations of uranium X_1 and uranium X_2. J. S. Marshall. *Proc. Roy. Soc.* (London) **A173**, 391–410 (1939).—The distribution with momentum of the β-rays of U X was investigated by a cloud chamber for values below $H\rho$ 2000 (280 e. kv.) and a magnetic spectrometer (for higher values). The β-rays of U X_1 were found to extend at least to $H\rho$ 1950 (265 e. kv.). The spectrometer values give a β-ray line at $H\rho$ 3600 (686 e. kv.), intensity 0.0036 ± 0.0004 per disintegration, indicating the presence of an 802-e. kv. γ-ray. The continuous distribution for the U X_2 β-rays (above $H\rho$ 3000) is interpreted as formed of 2 partial Fermi-type spectra, one contg. 95% of the intensity and extending to $H\rho$ 9300 (2.32 m. e. v.) and the other with about 5% of the total intensity and extending to $H\rho$ 6550 (1.52 m. e. v.). An internal conversion coeff. for the γ-ray of about 0.07 is found from the γ-ray intensity and the strength of the β-ray line. The energy of the γ-ray agrees with the energy values of the γ-rays of U Z (Feather and Bretscher, *C. A.* **32**, 6146[9]), and constitutes added evidence for the isomerism of the nuclei U X_2 and U Z. Frank Gonet

Concentration of the heavy oxygen isotope by redistillation of water, and the isotopic analysis of water. A. I. Brodskiĭ and O. K. Skarre. *J. Phys. Chem.* (U. S. S. R.) **13**, 451–63(1939).—See *C. A.* **33**, 7662[8]. F. H. R.

The spin of carbon thirteen. C. H. Townes and W. R. Smythe. *Phys. Rev.* **56**, 1210–13(1939).—C^{13} of methane was concd. in a Hertz diffusion system; enough 35% C^{13} was obtained for a measurement of the nuclear spin. The C^{13} nucleus obeys the Fermi-Dirac statistics; it has a spin of 3/2. This is the value predicted by the α-particle model; the Hartree nuclear model predicted 1/2. G. M. Petty

The photography of interatomic distance vectors and of crystal patterns. M. J. Buerger. *Proc. Natl. Acad. Sci.* **25**, 383–8(1939).—Extension of the Bragg method of obtaining the 2-dimensional Fourier summation optically to cases for crystals having a projected center of symmetry, for detg. interat. distance vectors and for application of purely photographic processes is outlined. Use is made of an appropriate set of polaroid strips. Preliminary operations for summation of the equations involved using photographic processes are described which produce a diffraction picture as a direct photograph of the crystal itself. Plane gratings for the Patterson-Harker syntheses are prepd. photographically. Various procedures for accomplishing the technique are clearly described. Raymond H. Lambert

Construction of a 10-kw. rotating-anode Röntgen tube and investigation of the structure of salt solutions. Jürgen Beck. *Physik. Z.* **40**, 474–83(1939).—The construction of the tube is described. The scattering of Cu *K* radiation was detd. in solns. of LiCl, LiBr and RbBr at concns. up to 13.3, 12.3 and 5.16 mol. per l. resp. At high concn. the scattering of H_2O is repressed. The data are incompatible with the assumption of a random distribution of ions in the soln. They indicate that H_2O has a distorted lattice structure in which the ions are located. At high concn. the whole structure becomes similar to that of a solid salt contg. H_2O. J. B. Austin

Note on the integration of the equation of the formation of absorption lines. H. R. Hulme. *Monthly Notices Roy. Astron. Soc.* **99**, 730–2(1939).—The equation of the formation of absorption lines is integrated for the case in which $(1 + \eta)^{-1} = \alpha + \beta\tau + \gamma\tau^2$ in which τ is the optical depth, η is the ratio of the line absorption to the continuous absorption, and α, β, γ are consts. C. C. Kiess

Problems of solar eclipses. V. G. Fesenkov. *Astron. J. Soviet Union* **16**, No. 2, 1–16(1939).—F. discusses the spectrophotometric data obtainable, in particular as regards the amts. of H, He, Ca and Na present. F. H. Rathmann

Revised spectrophotometric temperature of nova Herculis 1934. B. Voroutsov-Vel'yaminov. *Astron. J. Soviet Union* **16**, No. 2, 17–29(1939).—The max. temp. was 12,000°, the effective (Pannekoek) temp. 7300 ± 500°. Ultraviolet radiation in excess of that for black-body radiation is ascribed partly to continuous H emission and partly to extended atms. Bands due to CN appear at the time of max. brightness. F. H. Rathmann

Methods of meteoric astronomy in the study of the stratosphere. I. S. Astapovich. *Astron. J. Soviet Union* **16**, No. 1, 28–41(1939).—A list of 50 spectral lines of Fe, Ni, Ca, Mg, Mn, Al, Cr, Na and Si observed in meteor spectra is given. No conclusions as to the compn. of the upper atm. can be drawn from meteor spectra. F. H. Rathmann

The ultraviolet spectra of A and B stars. Otto Struve. *Astrophys. J.* **90**, 699–726(1939).—Approx. 350 absorption lines have been measured in the ultraviolet region (3227 to 3957 A.) of the spectra of some stars of class *A*. These have been identified with known lines of H, Fe I, Fe II, Cr II, V II, Sc II, Ti II, Y II, etc. Approx. 200 lines measured in the same region of some class *O* and *B* stars have been identified with known lines of He I, Ne II, O II, O III, N II, N III, S III, Ca III, Fe III, etc. C. C. Kiess

The ultraviolet spectra of 17 Leporis and P Cygni. O. Struve and F. E. Roach. *Astrophys. J.* **90**, 727–53(1939).—In 17 Leporis the lines of Ti II, Sc II and Mn II are strong; those of Si II abnormally weak. In P Cygni the Balmer series of H is measured up to $n = 23$; 6 series of He I are present, the $2^3P - n^3D$ series being measured up to $n = 21$, and the $2^1P - n^1D$ series up to $n = 14$. Other P Cygni lines are identified with Fe III, Si III, Fe II, N II, Ti II, etc. C. C. Kiess

The spectrum of the night sky and of the zodiacal light observed at the astronomical station at Windhuk, Southwest Africa. C. Hoffmeister. *Z. Astrophys.* **19**, 116–31 (1939).—Wave lengths of 19 emission lines that appear in the light of the night sky are communicated. The spectra of the zodiacal light and of the Gegenschein appear to be that of reflected sunlight on which is superimposed the weakened night-sky spectrum. The bright line at 3914 A. appears strengthened in the zodiacal light. C. C. Kiess

The transparency of the atmosphere in the ultraviolet and a possible means of extending the solar spectrum in the region 2200–2000 A. K. R. Ramanathan and L. A. Ramdas. *Proc. Indian Acad. Sci., Symposium on Molecular Structure*, Aug. **1934**, 103–12; also in *Proc. Indian Acad. Sci.*, **A 1**, 308–14(1934).—Between the short-wave limit of the absorption band of atm. O_3 at 2200 A. and the beginning of the O_2 band at 2000 A. there is a window through which sunlight should be transmitted. Since none is received at the earth's surface there must be some absorbing agent in the atm. near its lowest level; probably another continuum of O_2 beyond the convergence limit at 2400 A. of the weak bands described by Herzberg (*C. A.* **26**, 5495). It is pointed out that if a spectrograph can be exposed at levels higher than 16 km. above the earth's surface in the tropics there is great likelihood of recording the sun's spectrum in the interval 2200–2000 A C. C. Kiess

Hyperfine structure of the spark spectrum of iodine. S. Tolansky. *Nature* **144**, 754–5(1939); cf. *C. A.* **33**, 4517[6].—Reply to Schmidt (*C. A.* **34**, 25[6]). The data of Murakawa (*C. A.* **33**, 6716[3]) agree with those of Tolansky G. M. Petty

Anomalous dispersion in lead vapors. K. I. Zhemchtsova. *J. Exptl. Theoret. Phys.* (U. S. S. R.) **9**, 566–9 (1939).—Using the method of Rozhdestvenskiĭ (cf. *C. A.* **7**, 446), Zh. found that in Pb vapors at 800–920°, the ratio f_1/f_2 for the lines 2170 and 2833 A. is 1.85 ± 0.06 or $(f6^2P_0 - 7S^3P_1)/(f6^3P_0 - 6d^3D_1) = 0.540$. Comparison with other data on Na and Tl vapors indicates that the ratio of the dispersion centers of the head lines of the sharp and the diffuse series increases with increasing at. wt. F. H. Rathmann

The Stark effect of the Balmer lines after passage of the atoms through a very strong electric field. Rudolf Ritschl. *Physik. Z.* **40**, 413–15(1939).—When H canal rays are passed through an elec. field so strong that the component displaced toward the red vanishes through ionization, then on decreasing the field only the component displaced to the violet is observed. If now, after passing through the

ionizing field, the atoms enter a second field, reversed with respect to the first, only the violet component appears but in increased intensity. J. B. Austin

Evidence of a nuclear chain reaction inside a uraniferous mass. H. von Halban, Jr., F. Joliot, L. Kowarski and F. Perrin. *J. phys. radium* **10**, 428–9(1939); cf. *C. A.* **33**, 6146⁷.—A Cu sphere 50 cm. in diam. has a source of photoneutrons (1 g. Ra + 160 g. Be) at the center. The neutron d. inside and around the sphere is measured with a Dy detector when the sphere is filled with water, with dry U_3O_8, and with U_3O_8 plus various proportions of water. A consideration of the no. of neutrons detected at various distances form the source, in the light of the av. life of *thermal* neutrons, leads to the conclusion that in the presence of U some of the neutrons are of secondary, tertiary or higher origin. This indicates the presence of a converging chain reaction in such nuclear processes. At least 8 nonprimary neutrons are produced by each primary process. T. H. Dunkelberger

Line absorption and total absorption of copper resonance lines, and determination of the radiation temperature in the gas column of the copper arc light. Herman Schnautz. *Spectrochim. Acta* **1**, 173–96(1939).—An arc light entirely free from self-reversal is described. The light is taken from the axis of the arc through an axial hole in the anode. By comparing the intensity in the center of the Cu line 3248 A. with that from the pos. crater of a C arc at temp. 3703°K. a mean value of 5473°K. is obtained for the temp. of the gas column of a Cu arc at atm. pressure. With the reversal-free light source, the course of line absorption with concn. is measured by detg. the intensity ratio of 2 lines of known statistical weight as a function of the intensity of 1 of the 2 lines. Thus the intensity ratio of the Cu resonance lines 3248 and 3274 A. is found to be 2 for very small concns., 1.4 for the greatest observed concns., and it sinks to 1.05 between these extremes. W. F. Meggers

The intensity of the resonance lines of an element in arc light in relation to its concentration. R. Mannkopff. *Spectrochim. Acta* **1**, 197–206(1939).—The nonlinear concn. sensitivity of spectral lines, especially at high concn. is caused not by self-reversal in the arc envelope but by self-absorption of the lines in the emitting layer, as is shown by a comparison of ordinary with stabilized reversalfree arcs (cf. preceding abstr.). With Cu this phenomenon can be explained by temp. ionization and migration of ions causing the arc interior to be depleted of atoms. This interpretation is supported by measurements of the intensity-concn. curve for the Be doublet 3130/3131 A. Since its degree of ionization is very small Be does not migrate out of the arc axis, and in this case the total intensity as a function of concn. is that expected for spectral lines whose width is detd. by Doppler effect and damping. W. F. Meggers

Investigation of a tube of molecular hydrogen. D. L. Astavin-Razumin. *Astron. J. Soviet Union* **16**, No. 2, 49–55(1939).—The intensity of radiation increases 20% for a 5% increase in voltage, is practically independent of the temp. from 0 to 20°, but increases by 60% at 60°, and increases as the gas disappears with aging. The use of a H tube for spectrophotometric comparison purposes is discussed. F. H. Rathmann

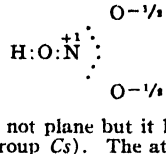
The molecular binding energy between atomic hydrogen and aluminum atoms in aluminum. H. Schüler, H. Gollnow and E. Fechner. *Ann. Physik* **36**, 328–34(1939).—From spectroscopic observations in a hollow cathode it is found that AlH mols. exist in metallic Al. The unusual intensity of AlH bands is due more to the evapn. of AlH from the metal than to its formation in the gas space. The binding energy between H and Al in Al detd. from the bands of the $^1\Pi - {}^1\Sigma$ transition at the lowest discharge pressure is 0.228 ± 0.004 e. v. Henry C. Thomas

Absorption spectra and chemical linkage. R. Samuel. *Proc. Indian Acad. Sci., Symposium on Molecular Spectra*, Aug. **1934**, 1–90.—A theory of linkage that explains the chem. behavior of all the elements is the one that regards electrovalency as the limiting case of covalency. According to this theory a covalent linkage is due to the bonding of electron pairs and the energy required to dissoc. the mol. decreases according to the no. of bonds that are weakened when the electrons are excited. If, however, an odd electron not participating in the linkage is excited the energy of dissocn. increases. Covalent linkage occurs in mols. in which the electrons from 2 different atoms join with counterbalanced spins to form the bonds. If an atom with more than half the max. no. of p electrons can receive from the combining atoms addnl. electrons beyond its nuclear charge until the max. is attained then the electrovalent linkage results. The expt̄l. facts that support these views are furnished by the absorption spectra of various mol. systems. The spectra of I_2, CO, halides of Ag, etc., are cited to illustrate systems in which dissocn. energy decreases with excitation; whereas the spectra of mols. with free valences, such as –NO or –Be O, illustrate the systems in which the dissocn. energy increases by excitation. Also from the absorption spectra of polyatomic mols. in the vapor state, of mols. in soln. and in the liquid and solid states, criteria are found to det. whether the linkages are covalent or electrovalent. C. C. Kiess

Application to the molecules concerned of the new analysis of molecular spectra. Simple relation between the frequencies of the same molecule in the gaseous and liquid states. Henri Deslandres. *Compt. rend.* **209**, 865–9(1939); cf. *C. A.* **34**, 2698.—The relation depends on such facts as that the infrared frequencies of gaseous and liquid SiH_4 are expressible as 5/17 of 175 and 5/17 of $174d_1$, resp., where d_1 is D.'s universal const. 1062.5 and 17 the no. of activated electrons. C. A. Silberrad

Inertial effects in the skeletal vibrations of tetramethylmethane and tetramethylsilicon. Samuel Silver. *J. Chem. Phys.* **7**, 1113(1939).—Wall and Eddy (*C. A.* **32**, 2402²) calcd. the vibrational frequencies of Me_4C and Me_4Si; their X-Y force const. was small. This was due to their failure to consider the motions of the H atoms relative to the C atom. G. M. Petty

The structure of nitric acid and of methyl nitrate. Jean Chédin. *J. phys. radium* **10**, 445–54(1939).—A comparison of expt̄l. Raman frequencies with those calcd. from various mol. models indicates that undissocd. HNO_3 possesses plane symmetry (C_{2v}) and probably has the electronic structure



The $MeNO_3$ mol. is not plane but it has a plane of symmetry (symmetry group Cs). The atoms O—NO_2 are in one plane and the C atom is in a plane perpendicular to this; the latter plane is the plane of symmetry of the mol. The angle C—O—N is approx. 116°. The NO_2 group has the same structure as in HNO_3. The nitrate ion belongs to symmetry group D_{3h} and has interat. forces $f = 4.4 \times 10^5$ and $f' = 2 \times 10^5$ dynes/cm.; f corresponds to a simple N·O bond and f' corresponds to a single-electron O.O⁻ bond. Also in *Mém. poudres* **29**, 111–33(1939). T. H. Dunkelberger

The absorption spectra of nitrates and nitrites in relation to their photodissociation. K. S. Krishnan and A. C. Guha. *Proc. Indian Acad. Sci., Symposium on Molecular Spectra*, Aug. **1934**, 91–102.—See *C. A.* **28**, 6370⁸. C. C. Kiess

Absorption spectrum of hypericin. N. Pace and G. Mackinney. *J. Am. Chem. Soc.* **61**, 3594–5(1939).—Absorption spectra for hypericin (I) are given for 90% aq. Me_2CO, 100% Me_2CO, 33% Me_2CO + 67% Et_2O, 25% Me_2CO + 75% Et_2O, 100% Et_2O, Et_2O and a trace of C_5H_5N, Et_2O and about 20% C_5H_5N and 100% C_5H_5N. Of particular interest is the coexistence of 2 distinct spectral types in homogeneous solns. of mixts. of Me_2CO and Et_2O. The data suggest the existence of a different mol. species of I in Et_2O, possibly an addn. compd., because the pigment is hydroxylated. This is capable of coexistence with a 2nd type (A_2) in anhyd. EtOH- or Me_2CO-Et_2O

mixts. In the presence of H_2O or C_5H_5N it disappears, leaving a spectrum of type A_1. C. J. West

The ultraviolet absorption spectra of some derivatives of 1,2-benzanthracene. R. Norman Jones. *J. Am. Chem. Soc.* **62**, 148–52(1940).—The ultraviolet absorption spectra of 1,2-benzanthracene and of 10 mono- and dimethyl derivs. were examd. and found to be closely similar in shape and intensity. Considerable variation is observed in the bathochromic shift of the position of the max. of the most intense band and this appears to show some correlation with the variation in the carcinogenic activity of the hydrocarbons. The spectrum of 1′,9-methylene-1,2-benzanthracene differs markedly from that of the other derivs. This variation may possibly be attributed to steric strain in the mol. A. B. Garrett

Light absorption by some derivatives of the bacteriochlorophylls. A. Stern and F. Pruckner. *Z. physik. Chem.* **A185**, 140–51(1939).—The visible and ultraviolet (680 to 230 mμ) absorption spectra are reported for the following derivs. of bacteriochlorophylls in dioxane soln. and compared with the spectra of the corresponding deriv. of chlorophyll: methylpheophorbide a, 2-acetylmethylpheophorbide a, bacteriomethylpheophorbide, 2-acetylchlorin e_6 trimethyl ester, bacteriochlorin e_6 trimethyl ester, chlorin e_6 trimethyl ester, bacteriopheopurpurin 7 trimethyl ester, bacteriochlorin e_6 trimethyl ester, pyrroporphyrin methyl ester and mesopyrrochlorin methyl ester. In the ultraviolet both classes of compds. show similar spectra, while in the visible large differences are to be detected. Victor R. Deitz

Absorption of polymolecular films in the infrared. G. B. B. M. Sutherland and W. T. Tutte. *Nature* **144**, 707 (1939).—Appreciable absorption at 3.3 μ due to CH groups was detected; a single reflection through a film of Me stearate 200 mols. thick was used. With a film 700 mols. thick, other bands between 6 μ and 10 μ were observed. The infrared absorption coeff. of a mol. seems to increase when it is in a surface film. G. M. Petty

Influence of temperature and coupling on the intensity of infrared vibrations. Frank Matossi. *Physik. Z.* **40**, 323–31(1939).—An application of dispersion theory for anharmonic linear coupled oscillations to *silicate* spectra. The intensity of vibrations depends on the degree of coupling and when there is an atom common to both oscillations, as in silicates, there is anomalous weakening of the octave. The 2 components of the octave have different intensities. The anharmonic binding const. as calcd. from the shift in the max. absorption coeff. with temp. agrees with observation. J. B. Austin

The Raman effect in organic chemistry. M. Burgel and M. Pio. *Uspekhi Khim.* **8**, 271–99(1939).—Review. F. H. Rathmann

Absorption of dipole liquids and electrolytes in the region of short electric waves. Karl Schmalc. *Ann. Physik* **35**, 671–89(1939).—Cond. measurements at high frequency for the dipole liquids water, glycol, acetone, $PhNO_2$ and PhCl show results in agreement with the Debye theory and the Malsch hypothesis of a relaxation time for the structure of the mols. (*C. A.* **33**, 3221[6]). Aq. solns. of cetylpyridinium chloride contg. 30% sugar show a selective absorption at wave lengths between 10 and 20 m. Hausser, *et al.* (*C. A.* **30**, 934[1]), Schmacks (*C. A.* **31**, 587[5]) and Linhart (*C. A.* **32**, 858[8]) have observed a similar effect. These results may be regarded as resonance effects or explained by the Malsch hypothesis. E. O. Wiig

The magnetic rotation of praseodymium, samarium and europium chlorides in aqueous solution at 25°. Charles M. Mason, Joseph W. Hickey and Wilfred K. Wilson. *J. Am. Chem. Soc.* **62**, 95–9(1940); cf. *C. A.* **30**, 7931[7].—The rotations were measured for the wave lengths λ = 4810.5, 5085.8, 5460.7, 5893, 6362.4, and 6438.47 A. except in those cases where absorption interfered. The *n*s of these aq. solns. were detd. at 25°. The Verdet consts. were calcd. The consts. for Sm and Eu solns. are pos. and those for Pr solns. are neg. when referred to water. The specific and mol. rotations were calcd. The values of the specific rotation for solns. of Pr are const. within limits of error but those Sm and Eu chlorides show a definite trend to decrease in the more concd. solns. An anomaly is observed in the comparison of the Verdet consts. with the known magnetic moments of these ions. The Bohr magneton nos. of Pr, Eu, Ce and Sm are 3.6, 3.4, 2.5 and 1.5, resp., but the magnetic optical rotatory powers of Eu are of the order of magnitude of those of Sm rather than those of Pr or Ce. A. B. Garrett

Spectrum of the torch discharge. Yosihiro Asami and Takeo Hori. *Nature* **144**, 981–2(1939).—The torch spectrum, which is obtained at a single electrode in an ultra high-frequency (10^7–10^8) undamped oscillation circuit, is essentially the same as that of the high-tension d.-c. arc. Bands due to O_2 (Runge), NO (γ) and OH in the flame, and N_2 and N_2^+ near the electrode, were observed. There is a continuous band from 6000 A. to the red end. The *Q* branch of the 3360 band of NH appears at higher c. d. G. M. Petty

Absorption spectra of heteropolar crystals and the crystal lattice energy. L. M. Shamovskiĭ. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) No. **130**, 5–50(in English 51)(1938).—A critical review of the modern conception of the relation between optical and thermal properties of heteropolar crystals. Sixty-seven references. A. A. Podgorny

Cathodo-luminescence of luminescent magnesium silicates and some related magnesium minerals. Eiti Iwase. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 426–36(1939)(in English); cf. *C. A.* **32**, 8272[7], 6946[9].—The luminescence, as a result of cathode-ray bombardment, of synthetic Mg silicates to which were added, before calcination, small amts. of salts of Ag, Al, Au, Bi, Ca, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Sb, Sm, Sn, Th, Tl, U and Zn were observed visually and in part spectroscopically. In particular added Mn gives an intense red luminescence. A no. of native minerals were also examd. On passing from magnesite through dolomite to calcite there is a shift in the max. of the luminescent bands paralleling the change in chem. compn. The luminescence from a powd. carbonate mineral from Korea indicated the presence of Mg, which was borne out by chem. analysis. E. O. Wiig

Cleavage luminescence in mica. V. Ben Meen. *Univ. Toronto Studies, Geol. Ser.* No. **41**, 33–4(1938); *Mineralog. Abstracts* **7**, 404–5.—Pale-brown mica ($n_\beta = n_\gamma = 1.575$) from the magnesite mine at Kilmar (Quebec) shows a bluish white luminescence when split. The assocd. magnesite and dolomite are triboluminescent, resp. yellow and reddish orange, when struck. A pale-brown phlogopite from Buckingham (Quebec) also shows cleavage luminescence. C. A. Silberrad

Optical sensitization of silver halides. VII. Spectral sensitivity and absorption spectrum of sensitized layers of silver bromide. S. Natanson. *Acta Physicochim. U. R. S. S.* **11**, 67–74(1939)(in English); cf. *C. A.* **33**, 3707[9].—Graphical data for the effects of erythrosin, phloxine and rhodamine B are given in 3 figures. Conclusion: The shift of the sensitivity max. is due to the change of the absorption spectrum resulting from adsorption of the dye on the Ag halide. F. H. Rathmann

Photodissociation of ICN and BrCN molecules and the transfer of rotational energy on collision of the CN radical with foreign molecules. A. V. Yakovleva. *Acta Physicochim. U. R. S. S.* **9**, 665–80(1938)(in English); *J. Expll. Theoret. Phys.* (U. S. S. R.) **9**, 10–16(1939); cf. *C. A.* **33**, 8112[2].—The fluorescence of CN in ICN consists of bands at 3883 and 4216 A. and is accompanied by fluorescence of I_2 mols. In the region 3900–3800 A., the I_2 mol. shows 3 bands with max. at 3925, 3870 and 3800 A. The photodissocn. of ICN is accompanied by the formation of CN radicals in the electronic state $^2\Sigma^+$ and in the vibrational states $v' = 0, 1, 2$. The rotational energy of the CN radical for $v' = 0$ corresponds with 1140°K. With BrCN, CN fluorescence shows the same groups as with ICN. The magnitude of the effect of foreign gases in increasing the rotational temp. of the CN radical decreases in the order $A > N_2 = CO_2 > H_2$. B. C. P. A.

Some investigations on the photochemical methods for the measurement of ultraviolet radiation. T. Imai.

Hokuetsu Igk. Z. **52**, 952–66(1937); *Rev. Phys. Chem. Japan* **12**, 62(1938).—Among the various photochem. methods for the measurement of ultraviolet radiation, the oxalic acid method (Anderson and Robinson, cf. *C. A.* **19**, 2453) and the NH_4 molybdate method (Hanzawa, cf. *C. A.* **25**, 2643) were examd. The principal results of these expts. are: (1) The decompn. of oxalic acid is almost proportional to the amt. of the radiation, while the reaction of the NH_4 molybdate becomes slower with prolonged exposure. This may be due to the fact that the transmission index of radiation in the oxalic acid soln. does not change throughout the process, while in the NH_4 molybdate soln. it is decreased gradually with exposure. (2) For a const. exposed area the reaction value in a large quantity of soln. is greater, but the reaction value of unit vol. in a large quantity of soln. is smaller because of the transmission index. In the oxalic acid method the ratio of the equiv. value for unit vol. to the other is almost const. while in the NH_4 molybdate method it approaches 1 with prolonged exposure. (3) The reaction is influenced slightly by the reflection factor of the substance under the soln. In the oxalic acid method the influence is almost const., while in the NH_4 molybdate method it is reduced with the process of reaction. (4) Temp. has a slight influence on the reaction to almost the same extent in both methods. (5) Visible rays somewhat influence the reaction in both methods, to a greater extent in the oxalic acid method. E. H. 1 2 3 4

Studies on the reactions of the leucocyanides of the triphenylmethane dyes. I. The mechanism of the dark reaction following the photolysis of malachite green leucocyanide. Frank E. E. Germann and Charles LeRoy Gibson. *J. Am. Chem. Soc.* **62**, 110–12('1940).—Absorption studies of photolyzed and subsequently faded solns. of malachite green leucocyanide in alc. contg. some water have shown that the dark reaction does not regenerate the leucocyanide as an end product; nor is it leucocarbinol. The final product of the dark reaction is a colorless, light-sensitive substance with a peak in its absorption curve in the neighborhood of 3500 A. This end product is decompd. by dil. HCl to form a green soln. similar to that of malachite-green salts. A. B. Garrett 5

Photosensitized production of reducing sugars from starch. Lawrence J. Heidt. *J. Am. Chem. Soc.* **61**, 3588 9(1939); cf. *C. A.* **34**, 3255.—Substances which reduce the Shaffer-Hartmann-Somogyi reagent are produced when light is absorbed by aq. solns. contg. uranyl sulfate and starch. Quinine and fluorescein had little effect on starch. The quantum yield is smaller and falls more rapidly than for the photosensitized decompn. of sucrose at the same concn. of O bridges, if there is 1 bridge per sucrose mol. and 1 per glucose unit in starch. C. J. W. 6

Detn., causes and significance of ion content of air in mines (Funder) **21. Conversion of sulfanilamide into *p*-hydroxyaminobenzenesulfonamide by ultraviolet irradiation** (Shinn, *et al.*) **10. Property of radiocolloids** (Chamié, Marques) **2. Exchange between metal and ions in soln. by using radioactive indicators** (Rollin) **2. X-rays in mineralogy. Design of serviceable app.** (Peacock) **8. Mineral spring at Bad Karlsbrunn** [radioactivity] (Holluta, Herrmann) **14. Hot medicinal springs of Budapest** [radioactive] (Papp) **14. Ultraviolet absorption spectra of synthetic mineral oils** (Vellinger, Thomas) **22.**

Slater, J. C.: Introduction to Chemical Physics. New York and London: McGraw-Hill Book Co. $5.00.

Luminescent material. Humboldt W. Leverenz (to Radio Corp. of America). Can. 385,361, Nov. 28, 1939. A luminescent material consists of Mn-activated Be Zn salt of an ortho acid of an element in the second subgroup of the 4th group of the periodic system, e. g., Mn-activated Be Zn orthosilicate. Cf. *C. A.* **33**, 8130[1].

Luminescent tubes. Lloyd T. Jones. U. S. 2,177,891, Oct. 31. In producing a luminescent tube having a longitudinally striated discharge, an electrode of the tube is coated with an oily substance and the glass of the tube and its electrodes are heated to deprive them of occluded gases, the tube is evacuated, and is filled with an inert gas such as A and Hg at reduced pressure.

Luminous and radioactive compositions suitable for luminous paints. Raymond W. Gear. U. S. 2,178,961, Nov. 7. A method of making a luminous compn. involves adding concd. NH_3 soln. to a mixt. formed from S and KNO_3 for pptn. of a "nitrosulfate," adding to the latter, by pptn., activated sulfides obtained by pptn. with alc. from a mixt. formed from Th and Na nitrates and S, and thoroughly mixing the resulting composite mixt. with added luminous Ca sulfide.

Fluorescent-screen material. Russell H. Varian (to Farnsworth Television Inc.). Can. 384,697, Oct. 17, 1939. In a cathode-ray tube a fluorescent screen material consists of Zn tungstate contg. not more than 10^{-6} deactivating impurities.

Fluorescent-screen material. Russell H. Varian (to Farnsworth Television Inc.). Can. 384,698, Oct. 17, 1939. A Mn salt is heated with Zn borate, and the reaction product is mixed with pure ZnS at a temp. insufficient to cause combination of the Mn and ZnS.

Screen for cathode-ray tube. Philo T. Farnsworth and Harry S. Bamford (to Farnsworth Television Inc.). Can. 384,703, Oct. 17, 1939. A fabric of fine refractory W wire is knitted and mounted by its edges, and the diam. of the wire is decreased by etching in hot $NaNO_3$.

4—ELECTROCHEMISTRY

COLIN G. FINK

Review of the world development of the electrothermic and electrochemical industries. E. Houbart. *Bull. soc. belge electriciens* **55**, 418–50(1939).—A comparatively exhaustive review covering all important producing countries. As a whole, the world's electrochem. industry has more than tripled during the past 10 years. C. G F. 7

Process studies of the manufacture of calcium cyanamide. Karl Heilmann. *Z. Ver. deut. Ing., Beiheft Folge* **1939**, No. 4, 103–15.—Time-temp. relationships were detd. in a nitriding furnace of 0.8 m. diam. and 2.9 m. height. The charge was ground to approx. 8% on the 4900 mesh screen (corresponds to about 170 mesh Tyler Standard Screen Scale) and the compn. averaged CaC_2 79.5, $CaCN_2$ 20 and CaF_2 0.5%. Processing gave a vol. shrinkage of 10% of the initial vol. and a wt. increase of 22–23%. Time-temp. diagrams for longitudinal and cross sections are presented in 2 and 3 dimensions (isotherms). If the N_2 supply is sufficient, the reaction proceeds rapidly and uniformly. If the N_2 supply is limited by lack of sufficient supply channels, the reaction slows down and becomes irregular resulting in the formation of cold wall zones with incomplete conversion. Temp.-pressure relationships show that the vacuum created by the reaction increases with increasing reaction temp. The differential equation for the heat of reaction is derived from a heat balance and the quantity calcd. as 330 kg.-cal./kg. Many figures, graphs and data are given. 8

Karl Kaminermeyer

Rapid methods for heavy nickel plating. Louis Weisberg. *Monthly Rev. Am. Electroplaters' Soc.* **26**, 929–36 (1939).—For rapid nickel plating a Watts-type bath may be used: 32–48 oz./gal. of $NiSO_4.7H_2O$; 6 of $NiCl_2$; and 4 of boric acid. The operating conditions are: c. d. up to 150 amp./sq. ft. with agitation, or 60 amp./sq. ft. without agitation; temp. up to 180°F. Soft deposits (Brinell, 150) are obtained at a pH of 2 and medium hard deposits at a pH of about 5. Harder deposits may be obtained by adding not over 1 oz. of $(NH_4)_2SO_4$ per gal. of bath and maintaining the pH at 5.2. A modified Ni bath is recommended, which is made by adding Ni for- 9

mate, 6 oz./gal. and formaldehyde, 0.3 oz./gal., to the above Watts-type bath. With this bath, hard deposits can be obtained at a lower pH, and the hard deposits are more ductile than those from the Watts-type bath contg. added NH_4 salts. Pitting seldom if ever occurs in the formate bath. To overcome stress and buckling in deposits, certain naphthalenesulfonic acids may be added to the bath. A. Brenner

Bright nickel deposits—their structure and properties. A. W. Hothersall and G. E. Gardam. *Metal Ind.* (London) **55**, 455-8, 493-6(1939). L. H. Seabright

A suggested basis for specifications of electroplated coatings of nickel and chromium. A. W. Hothersall. *J. Electrodepositors' Tech. Soc.* **15**, 195-204(1939); cf. *C. A.* **33**, 2418[7].—The British Non-ferrous Metals Research Assoc. (BNF) has suggested specifications to assist their members in framing their own detailed specifications. These specifications cover the requirements for decorative or protective electrodeposited coatings of Ni and Cr on steel or on Cu alloys contg. more than 50% Cu. The coatings must be free from imperfections such as blisters, pits, cracks, etc. Three qualities of Ni plating are specified and they differ with respect to the min. thickness of coating on a significant surface.

Quality	Service conditions	Minimum thickness of undercoating (inch): On Brass (Nickel)	On Steel (Ni or Ni-Cu-Ni or Bronze-Ni)
A	Mild	0.0002	0.0004
AA	General	0.0004	0.0008
AAA	Severe	0.0006	0.0008

The average thickness of coating would usually be 2 or more times the minimum thickness. The porosity of AAA quality plating, as detd. by the ferricyanide test, should be less than 6 pores/sq. ft. Cr should always be applied over a Ni undercoating and should have an av. thickness of 0.00002 in. for qualities A and AA and a thickness of 0.00004 in. for the AAA quality. It is suggested that significant surfaces be defined as surfaces which can be touched by a ball 0.75 in. in diam. The BNF jet test is suggested as a min. thickness test for Ni coatings. A sample fails if the coating falls below the required min. thickness at 2 points more than 0.5 in. apart. The thickness test for Cr consists in measuring the time required for a reagent (20 g. of Sb_2O_3 in 1 l. of HCl of sp. gr. 1.16) to dissolve the Cr coating. A. Brenner

Simple methods for plating-solution analysis. Paul A. Oldam. *Monthly Rev. Am. Electroplaters' Soc.* **26**, 851-9(1939).- A review. A. Brenner

Polarization during the electrodeposition of tin from acid solutions of its simple salts. M. Loshkarev, O. A. Esin and V. Sotnikova. *J. Gen. Chem.* (U. S. S. R.) **9**, 1412-22(1939).—Measurements were made of the polarization during cathodic deposition and of anodic soln. of Sn in acid solns. of $SnCl_2$ and $SnSO_4$ by use of the direct compensation method with a mirror galvanometer. The deviations of the polarization values in parallel expts. were 0.2-0.3 mv. for solns. without any addns. and 0.3-0.5 mv. for solns. with addns. for small c. d. At high c. d. in com. baths the deviations were greater, but did not exceed 10 mv. For moving Hg cathodes the reproducibility was 2-3 mv. for pure Hg and 1 mv. for the Sn amalgam. The observed small polarization in $SnCl_2$ and $SnSO_4$ solns. can be almost completely overcome by agitating the electrolyte. This polarization is a result of the slow diffusion of Sn^{++} in the electrolyte. Volts *vs.* c.-d. curves are given for the deposition of Sn from acid solns. ($SnSO_4$, H_2SO_4, glue, cresolsulfonic acid, H_2O). A high polarization voltage is observed in the presence of cresolsulfonic acid. The first part of the voltage *vs.* c.-d. curve (up to the "limiting" c. d.) can be expressed by the equation for the concn. polarization if a sufficient amt. of the cresolsulfonic acid is present. The second part of the curve (beyond the "limiting" c. d.) can be satisfactorily expressed by the equation $\eta = a - b \log (i - i_n)$ where η is the polarization, i is the total c. d. and i_n is the "limiting" c. d. Analogous expts. with moving Hg cathodes were performed. Results supported the previous conclusions. Ten references.
W. R. Henn

Influences affecting the use of spray rinsing facilities. J. D. Tierney. *Monthly Rev. Am. Electroplaters' Soc.* **26**, 937-46(1939).—A discussion of the advantages of the spray-rinse method over the still rinse tank. A. B.

Anodic treatment of aluminum. Henry A. Smith. *Monthly Rev. Am. Electroplaters' Soc.* **26**, 843-50(1939).—A review. A. Brenner

The platinum electrode. VII, VIII. The effect of poisoning on the capacity of the platinum electrode. A. Slygin and B. Ershler. *Acta Physicochim. U. R. S. S.* **11**, 45-58(1939)(in English); cf. *C. A.* **32**, 3271[6].—S. and E. detd. the amts. of H_2 adsorbed on variously poisoned platinized and smooth Pt electrodes. The exptl. data are shown graphically in 11 figs. Small amts. of Hg and As are adsorbed on the most active spots. With further addn. of poison, KCN lowers the adsorption potential of H_2 (similar to the effect of reversibly adsorbed Br ions), $HgCl_2$ leaves the shape of the isotherm unchanged, As increases the binding energy. At low concns. the relative poisoning effects are: As = 4, KCN = 10, Hg = 40 atoms of H per mol. of poison. Poisoning effects of Hg and As on smooth and on platinized Pt show almost quant. agreement. The decrease of adsorption of H_2 after poisoning is due to a certain specific effect of interaction and not to mere blocking of the surface. F. H. Rathmann

Hydrogen overvoltage on nickel. P. Lukovtsev, S. Levina and A. Frumkin. *Acta Physicochim. U. R. S. S.* **11**, 21-44(1939)(in English).—The H overvoltage on Ni in HCl solns. from 0.0006 to 0.15 *N* and for c. d. from 10^{-5} to 10^{-4} amp./sq. cm. obeys Tafel's equation $\eta = a + b \log i$ with $b = 0.100$. In NaOH, concns. from 0.001 to 8.8 *N*, $b = 0.108$-0.115 at 20°. In acid solns. the overvoltage increases on addn. of neutral salts (NaCl, $LaCl_3$); in alkalies, it decreases. A satn. current similar to that predicted by Horiuti and Okamoto (*C. A.* **32**, 4861[9]) was observed only at much higher c. ds., and can be more satisfactorily explained as due to concn. polarization of H and to the oxidation of Ni and not by the velocity of H adsorption. The exptl. results can be explained by assuming that the slow process is ionic and influenced by the elec. field of the double layer. F. H. Rathmann

Activation process and the nature of the active centers in electrocatalytic hydrogenation. V. V. Monblanova, N. I. Kobozev and P. S. Filippovich. *J. Phys. Chem.* (U. S. S. R.) **13**, 326-40(1939).—Data are given for the electrocatalytic hydrogenation of cinnamic acid at electrodes with large (Cu, Ag, Hg, Pb, Sn) and small (Pt, Fe) H overvoltages; and in the presence of catalyst poisons such as K_3AsO_4 and $HgCl_2$. The "poisons" poison the first group of metals and activate the second up to a certain max. concn., 1×10^{-5} mols./l. in alkali, 6×10^{-4} in acid for $HgCl_2$ on a Pt cathode and 1×10^{-4} mols./l. for K_3AsO_4 on an Fe cathode, from which the Kobosev (cf. *C. A.* **33**, 7654[3]) "active ensemble" could be calcd.: 2.1-2.4 for Pt, 2.0 for Fe. In this case the active centers have a lowered adsorption potential due to the effect of the "poison." On a clean Pt cathode the energy of activation between 0° and 51° is 5.95 cal., on a Hg film 1.5 mol. thick 2.32, and on an amalgamated Pt cathode 1.21 cal./mol. Comparison of the effects of poisoning of polarized surfaces of smooth and of platinized platinum indicates that they are essentially the same. On Ag and Cu cathodes no reduction takes place with or without the presence of a "poison." Exptl. data are tabulated in 10 tables and 7 figs. The Erdey-Gruz-Volmer and the Bowden-Rideal conceptions of electrode processes are not applicable to electrocatalytic reduction. F. H. R.

Overvoltage of silver. A. T. Vagramyan. *J. Phys. Chem.* (U. S. S. R.) **13**, 311-17(1939); cf. *C. A.* **33**, 6169[1].—Data are given for the Ag-$AgNO_3$ electrode in a N_2 atm. On closing the circuit, the cathode polarization is high, then decreases to a nearly const. value, the less the greater the concn. of the electrolyte, and varying also with the purity of the soln. Above 6 *N* $AgNO_3$ (3 cryst. deposit

nuclei), especially if impure, the value of the stable cathode polarization varies by only 0.5 mv. on changing the current from 10^{-5} to 10^{-6} amp.; below 0.1 *N* $AgNO_3$ (70 nuclei), esp. in pure solns., it increases considerably. Temporarily the polarization increases considerably on increasing the current, and vice versa, but then slowly, and in 20–40 min. reaches a stable value. These facts cannot be explained by the present Erdey-Gruz and Volmer theory. F. H. Rathmann 1

Overvoltage of hydrogen on lead. B. Kabanov, S. Filippov, L. Vanyukova, Z. Iofa and A. Prokof'eva. *J. Phys. Chem.* (U. S. S. R.) 13, 341–9(1939).—See *C. A.* 33, 2044. F. H. Rathmann 2

Electrochemical potential and Volta effect. I. O. Scarpa. *Atti accad. Lincei, Classe sci. fis., mat. nat.* 29, 141–51(1939).—The Volta effect (potential difference between 2 metals in contact) cannot always be ignored when measuring metal electrode potentials. A list of such potentials for the more common metals is given. A. W. Contieri 3

Role of electrons in producing the electromotive force at the metal-electrolyte contact. N. Vasilesco-Karpen. *Compt. rend.* 209, 474–6(1939).—In voltaic cells metal and electrolyte are regarded as immiscible liquids of different dielec. consts. and contg. metal cations of concns. M and M' in metal and electrolyte, resp., and free electrons of concns. E and E'. The valence of the metal is n. The energy θ_m of an equiv. of cation in the interior of the metal is less than that, θ_e, in the electrolyte, the difference $\theta = \theta_e - \theta_m$ being the work required to remove the cation from metal to electrolyte; similarly to remove an electron the necessary energy is $\tau = \tau_e - \tau_m$. The p. d. produced by exchange of cation between metal and electrolyte is $V_1 = \theta - (RT/n) \log (M/M')$, and similarly for the electron $V_2 = -\tau + RT \log (E/E')$. V_1 should equal V_2, but usually does not do so. If, e. g., V_1 is greater than V_2, electrons and cations will pass between metal and soln., reducing the concn. in the metal to $M - x$ and $E - nx$ until the potential becomes $V = \theta - (RT/n) \log [(M - x)/(M' + x)] = -\tau + RT \log [(E - nx)/(E' + nx)]$. In the soln. the electrons and cations recombine to metal. *Ibid.* 509–11. V.-K.'s views are applied to the Daniell cell in which x is small compared with M, E and M'. C. A. Silberrad 4

Electron concentration cells and measurement of pH. N. Vasilesco-Karpen. *Compt. rend.* 209, 790–2(1939); cf. preceding abstr.—The case is considered of cells composed of identical electrodes of nonattackable metal in 2 electrolytes touching each other and contg. no cations of the metal; which according to the author's theory are electron-concn. cells. C. A. Silberrad 5

Electrolytic preparation of iron and steel microspecimens. G. E. Pellissier, Jr., Harold Markus and Robert F. Mehl. *Metal Progress* 37, 55–6(1940).—Steel specimens finished with 000 emery were polished electrolytically in an aq. electrolyte contg. acetic acid and perchloric acid. Modified electrolytes and elec. conditions are given for Sn, Cu, Co, Al, Zn, Pb, brass and bronze. Illustrating photomicrographs at 100 to 2500 magnification are included. W. A. Mudge 6

Galvanic action, particularly in corrosion. W. P. Jorissen. *Chem. Weekblad* 36, 832–4(1939).—A review covering the period from the 18th century (Galvani, Volta) to the present. 36 references. A. H. Krappe 7

Backing and steel-facing zinc plates. A. G. Arend. *Process Engraver's Monthly* 45, 369–70(1938); *Phot. Abstracts* 19, 50.—Zn plates are "steel-faced" by depositing first a thin film of Cu and then a coating of Fe. Successful facing depends upon a high Fe^{++} concn. at the cathode, low acidity, high temp., the presence of chlorides and freedom from org. matter. H_2 is absorbed by charcoal suspended in the bath. An acid-resisting backing can be applied by depositing a steel similar in compn. to "Staybrite." The same Fe bath can be used with the addn. of Ni and Cr. 8

An apparatus for electrodialyses and preparation of organic sols and gels. Olle Dahl. *Svensk Kem. Tid.* 51, 219–25(1939)(in English).—A glass cylinder of about 800 cc. capacity is placed between 2 electrode compartments made of wooden blocks. The wood compartments are separated from the glass cylinder by a cellophane membrane at the anode end of the cylinder and by parchment at the cathode end. Electrodes are made of stainless steel wire gauze disks. Ag wire cannot be used. Glass tubes pass into the wooden compartments so as to have water circulate through them, also to remove accumulating gases. The glass cylinder has a feed tube through which the material to be electrodialyzed is introduced. The wooden parts are impregnated with paraffin. A 220 v. current is applied at the beginning of the electrodialysis giving about 40 milliamp. which gradually drops to 4 and remains constant; 440 v. may then be applied. A. R. Rose 9

Piezodynamic proof of the Gladstone-Tribe theory of the mechanism of the lead storage battery. Ernst Cohen and G. W. R. Overdijkink. *Proc. Acad. Sci. Amsterdam* 42, 834–48(1939).—Within exptl. error the mechanism of the Pb battery is described by the Gladstone-Tribe sulfate theory, $2PbSO_4 + 2H_2O \rightleftharpoons Pb + PbO_2 + 2H_2SO_4$. The vol. change due to the supply of current and with the passage of 2 faradays was detd. The mol. vol. of the solid substances was detd. by means of x-rays. The pressure coeff. of the e. m. f. at 0° = -3.07×10^{-6} = 0.038×10^{-6} v./atm. W. George Parks 10

Lamps: electric, incandescent, large, tungsten-filament. *Federal Specification* W-L-101d, May 2, 1939. **Batteries, storage: ignition, lighting, and starting.** *Ibid.* W-B-131b, Apr. 4, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office, 5¢ each. L. W. Greene 11

Electroconvective vortexes in smoke-laden air. Douchan Avsec. *Compt. rend.* 209, 869–71(1939); cf. *C. A.* 34, 1159⁴.—A layer of tobacco smoke 2–5 mm. thick was arranged along the bottom of a glass chamber 110 cm. long and of cross section 45 × 2 to 6 cm. thick. The vortexes formed on applying an electrostatic field of at least 1000 v./cm. are described. C. A. Silberrad 12

Cleaning of air and gas by thermal repulsion [elec. heating in] (Blacktin) **1**. Elec. method for end-point detns. in jet test for thickness of metal plating (Lindsey, Terrett) **9**. Applications of high-frequency currents in rubber industry (Leduc) **30**. Factory production of special glasses for discharge lamps (Staton) **19**. Glass manuf. for elec. lamps—development of special glasses for Hg discharge lamps (Stanworth) **19**. Electroplating with Pb and Cr of metallic parts used in coking industry (Kupchin) **21**. Enamel coatings on the interior of glass tubes [by elec. heating] (U. S. pat. 2,178,419) **19**. Lead alloy [for battery grid] (Can. pat. 384,675) **9**. Heat-treatment of metal filaments [for incandescent lamps] (U. S. pat. 2,179,367) **9**. Elec. heating of flowing molten glass [use of elec. resistor] (U. S. pat. 2,179,224) **19**.

Storage-battery paste. Robert A. Daily (to General Motors Corp.). U. S. 2,178,680, Nov. 7. A Ni salt of sulfonated lignin is used as an expander.

Storage-battery venting device. Stewart C. Aikenhead (to Willard Storage Battery Co.). Can. 385,264, Nov. 21, 1939. Structural details

Dry cell. Paul A. Marsal (to Canadian National Carbon Co., Ltd.). Can. 385,324, Nov. 28, 1939. Operative and structural details.

Dry electrolytic condenser. James M. Booe and Charles M. Blackburn (to P. R. Mallory & Co.). U. S. 2,177,819, Oct. 31. A flexible sheet electrode for dry electrolytic condensers comprises a cloth base and finely divided film-forming metal such as Al deposited on the base the metal particles cohering to provide a conducting path along the electrode layer and the electrode being sufficiently open-mesh and porous to permit light to pass through the electrode layer at a multiplicity of distributed points throughout its area. Such electrodes give relatively high capacity.

Vent for electrical condensers. Alexander M. Georgiev and Paul F. Koehly (to General Motors Corp.). U. S. 2,178,686, Nov. 7. Various structural details, including

a vent with a wall member having an aperture therethrough ending in a countersink, and a celluloid soln. residue sealing the aperture against free flow around a closure which is provided.

Venting cap for electrolytic devices such as condensers. Joseph L. Collins (to Sprague Specialties Co.). U. S. 2,174,437, Sept. 26. Structural details.

Oxide film on aluminum used for electric condensers. V. I. Likhov. Russ. 51,902, Oct. 31, 1937. The oxide film is obtained by anodic oxidation at elevated temp. and under pressure.

Dry electrolytic capacitors. Samuel Ruben. U. S. 2,178,970, Nov. 7. Between elements such as electrode foils, a spacer is used comprising a layer of fibrous material such as paper sized with a plasticized, conductive, flexible, nonviscous methyl cellulose compn. comprising a membrane in the fibrous layer.

Potential producing cell. Samuel Ruben. U. S. 2,178,969, Nov. 7. A neg. electrode such as a Zn or Cd disk and a pos. electrode such as a V_2O_5 disk are used with a contacting electrolyte such as one formed of ethylene glycol, boric acid and NH_3 soln. all of which are sealed together in a shell of molded resin such as a synthetic resin.

Electroplating with stainless iron. Miklós Kalocsay. Hung. 122,063, Nov. 15, 1939. Anodes of a stainless Fe alloy or steel are used in a bath contg. the components of this metal as cations; other metals or ions, especially citric acid, may be present. Potential of 4 v. and c. d. of 3.5 amp. per sq. dm. are used.

Gold-plating grids for electric discharge tubes. Egyesült Izzólámpa és Villamossági R. T. Hung. 121,761, Oct. 16, 1939. Gold is electrodeposited in several layers, and the grid ignited in a neutral-gas atm. after each layer is deposited.

Barrel electroplating apparatus. Albert H. Hannon. U. S. 2,177,982, Oct. 31. Various structural, mech. and operative details.

Calcium silicide. M. A. Varzanov, A. S. Negovskiĭ and Ya. I. Izrailovich. Russ. 51,983, Oct. 31, 1937. To prep. $CaSi_2$, a mixt. of SiC, CaC_2 and quartz is fused in the elec. furnace.

Apparatus suitable for etching printing plates in an electrolytic bath. Harry G. Pfaffmann (to Burger-Baird Engraving Co.). U. S. 2,177,877, Oct. 31. Various structural, mech., elec. and operative details.

Electrostatic heating system suitable for heating nonconducting molding materials. Arthur C. Meller (to Bell Telephone Laboratories, Inc.). U. S. 2,179,261, Nov. 7. Various structural, elec. and operative details.

Electrode clamp suitable for use with electric furnace electrodes. Robert R. Jones (to Ohio Ferro-Alloys Corp.). U. S. 2,179,153, Nov. 7. Various structural details.

Oxide cathodes. Egyesült Izzólámpa és Villamossági R. T. Hung. 122,130, Nov. 15, 1939. A metal wire (e. g., tungsten) is led through an aq. suspension of the substance that is to be applied to its surface. Various org. substances (e. g., sucrose or glucose) are dissolved in this suspension so that on ignition not more than 0.1% carbon should be formed on the metallic surface. This first coating is dried at 200–450°, the wire is treated with a soln. of the same substances in nitrocellulose and the procedure is repeated. Cf. *C. A.* **33**, 2824[6].

Thermionic cathode. Victor O. Allen (to Radio Corp. of America). Can. 384,608, Oct. 10, 1939. A thermionic cathode for use in an electron-discharge device consists essentially of W contg. Th electrolytically coated with Cr.

Cooled contact rectifier. Carl C. Hein (to Westinghouse Elec. & Mfg. Co.). U. S. 2,179,293, Nov. 7. Various structural details of a rectifier having a plate contact member such as one of Cu with an adjoining metal member carrying a layer of electronically conductive compd.

Grids for rectifier tubes. Egyesült Izzólámpa és Villamossági R. T. Hung. 121,762, Oct. 16, 1939. The base metal of the grid is coated with a metal or an alloy that will form an alloy with Au (e. g., Ni or Ni alloys), and then a Au plate is applied. The grid is finally heated to alloy the Au with the intermediate layer.

Electric resistors. Knox C. Black and Royer R. Blair (to Bell Telephone Laboratories, Inc.). U. S. 2,178,548, Nov. 7. A method of making a resistor involves welding terminal conductors to the ends of a length of fine Ag wire, heating the wire in S vapor to sulfidize it, drawing the wire and terminal conductors into a capillary glass tube, placing a heating coil about the exterior of the tube and mounting the unit thus formed in an evacuated envelope such as a glass tube.

Electric resistor unit. Charles J. Ganci (to Ward Leonard Elec. Co.). U. S. 2,179,212, Nov. 7. A ceramic base carries a resistive conductor such as wound Ni-Cr-Fe alloy wire over which is placed an enamel coating having a coeff. of expansion lower than that of the ceramic base, the latter having a coeff. of expansion of 50–75% that of the resistive conductor.

Photoelectric exposure meter. Joseph M. Bing. U. S. 2,178,197, Oct. 31. Various structural details.

Gas treatment. Harry A. Wintermute (to International Precipitation Co.). Can. 384,289, Sept. 26, 1939. A gas is passed through a high tension elec. field maintained between opposed complimentary electrodes and an extended stream of liquid particles is projected into the gas without coming into contact with the electrodes. The process is used for cleaning gases, for removing water from a tar emulsion by means of hot gases or aerating sewage. An app. is described.

Grid for screening-off scattered x-rays. Gustav A. Lindstedt and Ernst H. Öhrn (to Aktiebolaget Linham). U. S. 2,178,798, Nov. 7. A thin sheet of Pb is coated with a layer of fibrous material such as paper and the composite sheet thus formed is cut into narrow strips which are assembled side by side to form the grid.

Electrodes for television tubes. John L. Gallup (to Radio Corp. of America). U. S. 2,175,689, Oct. 10. A mosaic electrode includes an enameled perforated base of material such as Ni and a vitrified enamel coating completely covering the base to provide apertures having enameled walls, the enamel consisting of an alkali lime glass base contg. 8–15% B_2O_3, m. about 900° and having an elec. resistivity of about 1×10^{13} ohm cm., and metallic plugs contg. Ag fitted into the apertures.

Insulating films for picture-transmitting tubes. Emanuel R. Piore (to Radio Corp. of America). U. S. 2,178,081, Oct. 31. In a tube having a mosaic structure and means for producing an electron beam and for directing it toward the mosaic structure, the latter is formed with an electrically conducting surface having on it an insulating film of a material comprising B_2O_3, which supports a multitude of electron-emissive elements or globules supported on the film and insulated from each other.

Electric discharge devices. Walter Hanlein, Wilhelm Hagen and Hermann Krefft (to Canadian General Electric Co., Ltd.). Can. 385,194, Nov. 21, 1939. The device contains a gaseous atm. and sealed electrodes, and is formed of a glass consisting of SiO_2 about 82.5%, Al_2O_3 10, CaO 3.75 and BaO 3.75%.

Vapor electric device suitable for arc discharge. Adolph H. Toepfer (to Westinghouse Elec. & Mfg. Co.). U. S. 2,179,310, Nov. 7. Various structural details of a device having a container of quartz tubing or the like contg. loose particles of high-resistance material such as B carbide portions some of which protrude from a slitted opening in a lower portion of the container into contact with a conductor such as Hg.

Cathode for electron-discharge devices. Emil G. Widell (to Radio Corp. of America). U. S. 2,179,110, Nov. 7. In a device such as an amplifier, a cathode of substantially pure Ni contg. 0.02–0.05% of C is used with a coating of alk. earth oxides (the Ni being free of impurities which would reduce the oxides).

Gaseous electric discharge device for emitting ultraviolet radiations. Alfred Rüttenauer (to General Elec. Co.). U. S. 2,178,436, Oct. 31. On the interior surface of the container of a Hg-vapor lamp or the like, a coating is used consisting of Mn-activated Cd silicate and Sm-

activated Ca tungstate and which avoids loss of luminosity such as occurs when ZnO is used.

Electric discharge device suitable for making visible the paths of electrons. Ernest A. Massa and Geo. A. Morton (to Radio Corp. of America). U. S. 2,178,238, Oct. 31. Various details are described of a device having a fluorescent screen comprising an insulating supporting surface such as mica or glass having on it Ag globules sensitized with an alkali metal and having only a portion of the globules covered with minute particles of fluorescent material such as willemite substantially uniformly distributed over the screen surface.

Luminescent mixture suitable for use with electric discharge tubes. Marcel Servigne (to Société pour l'étude & l'exploitation des materiès luminescentes). U. S. 2,179,134, Nov. 7. Tri-Ca orthophosphate 75, Pb molybdate 5, Ca molybdate 20 parts and Li_2O 0.25 part or the like are used together.

Coating the interior surface of luminescent glass tubes with materials such as fluorescent compositions. Theodore W. Frech (to General Elec. Co.). U. S. 2,179,288, Nov. 7. Various details of app. and operation.

Removing gases from enclosures such as electric discharge tubes. Jean Lecorguillier (to Soc. anon. pour les applications de l'électricité et des gaz rares, établissements Claude-Paz & Silva). U. S. 2,178,326, Oct. 31. A process for removing gases evolved from electrodes of a gaseous elec. discharge tube during its manuf. involves circulating Hg unidirectionally in a closed circuit including the discharge tube, successively converting the Hg from liquid to vapor state in a sep. vaporizing receptacle, passing it through substantially the whole longitudinal section of the discharge tube in the vapor state, condensing it by passing downward through a cooled condensing chamber and returning it as liquid to the vaporizing receptacle, while causing the gases to flow in the same direction as the condensed liquid, and sucking them from the closed circuit at a point between the condensing chamber and the vaporizing receptacle.

Electric discharge lamp. Willem Uyterhoeven (to General Elec. Co.). U. S. 2,177,755, Oct. 31. An elec. lamp comprises in combination a gaseous elec. discharge lamp device of the type operating with an elevated container temp., a heat conservator in which the lamp device is mounted and which has a heat dissipating part, a coating of heat-sensitive, luminescent material such as ZnS in the conservator in light-receiving relation to the lamp device and remote from the heat-dissipating conservator part, and a gaseous filling such as N in the conservator at a pressure such that the heat emitted by the lamp device during its operation causes convection currents in the gas to transfer the heat from the lamp to the heat-dissipating part of the conservator to increase the useful life of the luminescent material.

Flash lamp. Richard S. Mackie (to General Elec. Co.). U. S. 2,178,430, Oct. 31. A flash lamp with a sealed container contg. combustible material such as Al foil is provided with an igniter comprising a bead of highly sensitive fulminating substance (such as Zr, PbO_2 and a lacquer binder) coated with a synthetic-resin mixt. or the like. Cf. *C. A.* **33**, 2826[7].

Electric incandescent lamp. Arthur R. Socolofsky U. S. 2,179,437, Nov. 7. A W filament is used with inert gas such as A or N and active gases such as WCl_6 which set free W atoms operating to compensate evapn. of the filament.

5—PHOTOGRAPHY

E. R. BULLOCK

Hundredth anniversary of the discovery of photography. A. Rabinovich. *Uspekhi Fiz. Nauk* **21**, 478–80 (1939).—A brief historical review. F. H. Rathmann

Recent developments in color photography. D. A. Spencer. *J. Roy. Soc. Arts* **88**, 163–75(1939). E. H.

The photographic reciprocity law at low temperature. C. H. Evans and E. Hirschlaff. *J. Optical Soc. Am.* **29**, 164–7(1939); cf. *C. A.* **32**, 7837[6].—The results of measurements of reciprocity law failure at 20° and at −186° are given for 2 different high-speed panchromatic emulsions, 1 low-speed unsensitized emulsion and 1 high-speed orthochromatic emulsion. These measurements, covering the range in exposure time from 1/16 sec. to 1024 sec., show that in each case the reciprocity law failure, at both high and low intensity, is normal at 20°, but has disappeared entirely at −186°. These results are in complete agreement with those recently published by Berg and Mendelssohn (*C. A.* **33**, 1608[9]). Authors

Chemical analysis of an M.-Q. developer. Ralph M. Evans and Wesley T. Hanson, Jr. *J. Soc. Motion Picture Engrs.* **32**, 307–20(1939); cf. *C. A.* **33**, 1228[6].—The maintenance of developer activity over a long period of time is among the most important problems of a motion-picture lab. The developer is oxidized by the Ag halide in the emulsion and by air. When known amts. of these 2 oxidizing materials react with the developer, simple calcns., which were presented in a previous paper (*C. A.* **33**, 4536[5]), are sufficient to det. the equil. condition of the developer as well as the replenisher formula to give a chosen equil. Under ordinary conditions, there are large variations in the amt. of developer oxidation. A chem. analysis immediately detects any deviation from the correct equil. and permits readjustment of the replenisher formula. Chem. analyses are presented which require a min. of equipment and time. In most cases, ease of manipulation and speed have been considered as more important factors than a high degree of accuracy but in all cases the methods are capable of giving results to an accuracy of 5% or better. Whenever possible, the analyses are colorimetric in nature, the measurements being made on an instrument called an opacimeter (cf. *C. A.* **34**, 1209[9]). One operator can make a complete analysis in about 30 min. Analysis for any one constituent may be made in a much shorter time. It is emphasized that no one control variable is significant for specifying the activity of a developer. Sensitometric curves are included demonstrating the time lag in pH equil. but not in photographic equil. when hydroxide is added to or released in the developer. The aim of chem. control is to insure a const. condition of the developer and thus const. photographic quality, rather than to det. the degree of development. Authors

Use of color-coupling developers for toning processes. K. Famulener. *J. Soc. Motion Picture Engrs.* **32**, 412–18 (1939).—Some expts. on the toning of motion-picture pos. film by the methods of direct dye-coupling color development, which have heretofore been applied principally to natural color processes, are described. Methods of obtaining a wide range of colors and of controlling contrast are also discussed. Author

Making duplicates from miniature negatives. I, II. Heinrich Stoeckler. *Miniature Camera Mag.* **3**, 129–30, 228–30(1939); cf. *C. A.* **33**, 8512[9].—Two articles deal with the production of duplicate negatives on special duplicating films, such as are marketed by Agfa, Kodak and Perutz. Procedures and formulas are given. M. D. G.

Color printing by photogravure. H. Mills Cartwright. *Phot. J.* **79**, 436–8, 449(1939); cf. *C. A.* **33**, 5759[1].—The photogravure process is described with special reference to the methods employed for color printing. Color correction, types of original and proofing are discussed. R. F. W. Selman

Ozaphane sound film. A. Narath. *Kinotech.* **20**, 232–7 (1938); *Phot. Abstracts* **19**, 66.—The Ozaphane film using cellophane base gives direct positives after development with NH_3 gas. The grainless image is warm black; a d. of 2.42, measured visually, has a d. of only 0.45 to a Cs photocell densitometer. The sensitive layer is thicker (47 or 65 μ) than that of a normal Ag halide emulsion (10–15

μ), and as a result sound tracks show losses at high frequencies. With variable-width methods a slight loss in amplitude occurs. Satisfactory copies can be obtained with the Ozaphane film, the nonlinear distortions caused by diffusion in the sensitive layer being not more important than those produced in Ag halide emulsions.

Klein, Adrian Bernard: Colour Cinematography. 2nd ed. Revised. London: Chapman and Hall, Ltd. 463 pp. 30s.

Mack, Julian Ellis, and Martin, Miles J.: The Photographic Process. New York: McGraw-Hill Co. 586 pp. $5.00. Reviewed in *J. Applied Phys.* 11, 71-2 (1940).

Color photography. John Eggert, Alfred Fröhlich and Bruno Wendt (to Agfa Ansco Corp.). U. S. 2,179,228, Nov. 7. A light-sensitive material for color photography comprises a support such as a film carrying a Ag halide gelatin emulsion contg. an org. colorless dye component such as 2,3-hydroxynaphthoic acid dianisidide capable of reacting with a further component such as *p*-diphenylaminediazonium sulfate to produce a dye image, the first component being of a chem. character imparting to it substantive properties with respect to the gelatin. Several examples are given.

Color photography. Gustav Wilmanns, Wilhelm Schneider and Ernst Bauer (to Agfa Ansco Corp.). U. S. 2,179,238, Nov. 7. A light-sensitive material for color photography comprises a Ag halide emulsion contg. a dye component for color-forming development, such as an acetoacetic ester having attached to it a group which gives the component substantive character with respect to the binding agent of the Ag halide emulsion and also contg. a compd. such as diphenylguanidine having a pptg. action on the dye component. U. S. 2,179,239 relates to a photographic emulsion layer having incorporated in it a color-forming development component, such as one contg. the benzothiazole grouping, which has linked to an atom of its mol. a substantive grouping of so large a number of C atoms that the mol. size of the component is materially increased, the grouping rendering the component fast to diffusion.

Color photography. Wilhelm Schneider and Alfred Fröhlich (to Agfa Ansco Corp.). U. S. 2,179,244, Nov. 7. Use is made of a Ag halide gelatin emulsion contg. a dye component such as an α-hydroxynaphthoic acid reaction product which is fast to diffusion and capable of forming a dye of the group of quinoneimine-, azomethine- or azo dyes, and which is a polypeptide of a color former.

Color photography. Gustav Wilmanns and Wilhelm Schneider (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,229, Sept. 26, 1939. Multilayer photographic material having several superposed Ag halide emulsion layers contg. dyestuff components fast to diffusion is exposed, the formed latent image developed with a black-and-white developer, fixed, the formed Ag reconverted to a Ag salt capable of being developed and the Ag salt redeveloped successively with several color-forming developers that react with different speeds with the dyestuff components contained in the layers.

Color photography. Gustav Wilmanns and Wilhelm Schneider (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,384, Oct. 3, 1939. A colored transparency to be viewed in reflected light comprises a support, several Ag halide emulsion layers for a multicolor picture on one side of the support, and a panchromatic layer for a black-and-white picture on the other side. The black-and-white picture faces the camera objective and is developed as a dyestuff picture or directly as a Ag picture.

Color photography. Wilhelm Schneider (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,668, Oct. 17, 1939. A light-sensitive element consists of a support and several differently sensitized Ag halide emulsion layers consisting of a blue-sensitive layer having a sensitive range of about 400–80 mμ with a max. of about 430–60 mμ, a green-sensitive layer of sensitive range about 460–610 mμ with a max. at 540–55 mμ, and a red-sensitive layer of sensitive range about 500–670 mμ with a max. at about 500–630 mμ.

Color photography. Wilhelm Schneider (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,669, Oct. 17, 1939. In producing colored prints from subtractive master pictures, a multilayer, color-photographic, light-sensitive element sensitized with dyes corresponding substantially with the absorption maxima of the picture dyes of a master picture is illuminated through the master picture and a series of filters which absorb the wave lengths of the light corresponding to the overlapping regions of the picture dyes of the master picture.

Color-photographic material. Gustav Wilmanns (to Agfa Ansco Corp. (a Delware corp.)). Can. 384,383, Oct. 3, 1939. A color-photographic material to be viewed in reflected light comprises an opaque support, several differently sensitized emulsion layers with dye components fast to diffusion, and an antihalation layer contg. finely divided pyrolusite as an absorbing medium arranged between the support and layers.

Bi-pack for color photography. Bruno Wendt (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,667, Oct. 17, 1939. One support bears two superposed, differently sensitized Ag halide emulsion layers and another bears a single Ag halide emulsion layer, the layers being in contact with one another, and the two superposed layers contain a dyestuff fast to diffusion.

Emulsion for color photography. Wilhelm Schneider and Alfred Fröhlich (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,382, Oct. 3, 1939. The emulsion contains a dye component fast to diffusion with respect to the gelatin. The dye component contains a carboxylic acid radical linked to the amine group of a polypeptide and is capable of forming a quinoneimine, an azomethine or an azo dye *in situ* with a Ag picture on contact with a color-forming developer.

Photographic emulsion. Walter Zeh (to Agfa Ansco Corp.). Can. 384,086, Sept. 19, 1939. A Ag halide emulsion contains a dyestuff consisting of at least 2 nitrogenous heterocyclic nuclei, the nuclei joined by at least one methine group, with at least one of the nuclei being a 2-alkyltetrahydrobenzothiazole or a 2-alkyltetrahydrobenzoselenazole. Many examples are described for the prepn. of the dyestuffs.

Photographic emulsion. Frank L. White and Grafton H. Keyes (to Canadian Kodak Co., Ltd.). Can. 384,241, Sept. 26, 1939. Many examples are described of hemicyanine dyes for incorporation in Ag halide emulsions. Novel sensitivity is produced and the concn. of the dyes in the emulsions is about 5–100 mg./l. of flowable emulsion.

Photographic emulsions on textiles. P. N. Engelblik. Dutch 46,703, Sept. 15, 1939. Melted light-sensitive emulsions are applied to fabrics and rubbed in; the tissue may be pretreated successively with a $KMnO_4$ soln. (1%) and a K metabisulfite soln. (10%). The emulsion can be: 65 g. gelatin, 50 g. KBr, 0.5 g. KI, 1.5 l. distd. H_2O and 65 g. $AgNO_3$ heated to 55° for 1 hr., then 0.5 l. H_2O added and 90 g. gelatin, heating continued for 1/4 hr. After solidification the mass is broken up, washed for 1 hr., melted at 30° and 1/8 l. formaldehyde soln. added. A metol-hydroquinone developer and acid fixing bath are advocated.

Photographic silver halide gelatin emulsions containing dye components. Wilhelm Schneider and Max Hagedorn (to Agfa Ansco Corp.). U. S. 2,178,612, Nov. 7. With a Ag halide gelatin emulsion, there is used a dye component fast to diffusion with respect to the gelatin and which may be an amide of a color former with a highly polymeric carboxylic acid capable of forming a dye at the places of the Ag image upon being brought into contact with a color-forming developer such as *p*-aminodimethylaniline.

Light-sensitive layers. Roelof J. H. Alink and Jan H. de Boer (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,178,771, Nov. 7. In mfg., from a diazonium compd. component, a coloring component, and an alk.-reacting substance, a light-sensitive layer capable of image development after exposure merely by the action of moisture and without the addn. or removal of any coem. substance, at least the last-applied of the components is applied in a

powdery state to a dry carrier such as paper to which is also applied an alk.-reacting powder such as Ca silicate and a powder, such as CaO, which yields upon development a hydroxide of low soly. Various examples are given.

Dyeing photographic images. Béla Gáspár. U. S. 2,178,167, Oct. 31. A process of dyeing a photographic image by an azo dye involves incorporating in the light-sensitive Ag halide emulsion used for the production of the image an aromatic nitro or nitroso compd., such as di-(nitrobenzoylamino)-stilbenedisulfonic acid, exposing the layer to light to form a latent image in it, developing to form a Ag image, reducing the N compd. within the layer to an amino compd., as by a 2% Na hyposulfite soln., and synthesizing an azo dye within the layer from the amino compd., as by use of an alk. soln. of β-naphthol.

Photographic fixing and hardening composition. Garnet P. Ham (to American Cyanamid Co.). U. S. 2,179,242, Nov. 7. A product suitable for dissolving in water is formed into solid masses with a core of a hardening component such as alum surrounded by a layer of a fixing component such as Na thiosulfate.

Gelatin printing reliefs. Walter Frankenburger and Georg Rössler (to Agfa Ansco Corp.). U. S. 2,178,338, Oct. 31. A process for the production of a gelatin relief by the H_2O_2 etching method involves exposing a Ag halide gelatin emulsion layer through the support of the layer, developing the latent image, hardening the gelatin proportionally to the developed silver, exposing the layer to diffused light, treating the layer with a developer incapable of affecting the gelatin, and transforming the layer to a relief.

Photographic film. Alfred Miller (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,385, Oct. 3, 1939. On the front of a support are 2 differently sensitized Ag halide emulsion layers and on the rear is a third layer. Each layer contains a dye component fast to diffusion, capable of forming a dye at the places of the Ag image on contact with a color-forming developer. A layer contg. a matting agent is cast on top of the third layer.

Multicolor sound films. Wilhelm Schneider (to Agfa Ansco Corp.). U. S. 2,178,882, Nov. 7. A process of producing multicolor sound films comprises producing a multilayer film having incorporated in the several Ag halide gelatin emulsion layers dye components which, though sol. in aq. liquids, are fast to diffusion and capable of forming dyes with a developer adapted for color development, the several layers being sensitive to different colors, exposing the multilayer film to a color-picture image while protecting a marginal portion of the film for the sound record, developing all the layers in a single process in a developer capable of forming dyes with the dye components, bleaching the produced metallic Ag, printing a sound negative on the marginal portion of the film while protecting the picture portion of the film from further exposure, developing the sound track in a black-and-white developer, and removing all the undeveloped Ag halide still contained in the layers.

Developing photographic films and plates. Alphons O. Jaeger and Joseph E. Jewett (to American Cyanamid & Chemical Corp.). U. S. 2,178,450, Oct. 31. A Ag halide emulsion contg. a latent image is subjected to the action of a chem. developer soln. together with an effective amt., not substantially exceeding 0.25%, of a salt of an ester of an aliphatic sulfo carboxylic acid such as Na dioctyl sulfosuccinate which serves to facilitate uniform distribution of the developer soln.

Photographic sound-track image. Ralph M. Evans and Wesley T. Hanson, Jr. (to Canadian Kodak Co., Ltd.). Can. 385,872, Dec. 26, 1939. A natural-color image and a sound-track image are formed in a multilayer film having three differently sensitized layers on one side of a transparent support by forming a natural-color picture in the film and a sound-track image in at least one layer of the film by development with a *p*-benzylphenol and a *p*-phenylenediamine developing compd.

Sound and picture photographic records. Judd O. Baker (to Radio Corp. of America). U. S. 2,178,217, Oct. 31. A method of sound motion picture production involves recording the sound and picture on a photographic record having a fog d. of the range of 0.38 and a γ of the range of 0.55, printing the sound track into a second record having high-contrast pos. emulsion, a fog d. of the range of 0.02 and a γ of the range of 4, printing the sound from the high-contrast record to a release print, and printing the picture from the photographic record to the release print.

Making photographs. Geo. N. Pifer (to Speedtype, Inc.). U. S. 2,178,896, Nov. 7. App. is described, and a process of producing a photograph which involves applying a developing soln. to the exposed sensitized surface, then applying an acid bleaching soln. and partially removing the bleaching soln., then applying a "hypo" soln., and then, without an intervening washing of the surface and while it is in an acid condition and without exposure to light, applying a developing soln. in the presence of the "hypo" soln. which mixes with the developing soln. and acts as an accelerator for it.

Multicolor photographs. Wilhelm Schneider (to Agfa Ansco Corp.). U. S. 2,179,234, Nov. 7. A process of producing multicolor photographs comprises producing a multilayer film having incorporated in the several gelatin Ag halide emulsion layers a dye component capable of forming a dye with a developer adapted for color development, the dye components although sol. in aq. photographic developing solns. being of such molecular constitution that they are incapable in such dissolved form of diffusing in gelatin in any photographic treating bath, exposing the multilayer film to a colored object, developing the exposed film in a developer not capable of forming a color with the dye components, exposing the multilayer film a second time, simultaneously developing all the layers of the exposed film in a developer capable of forming dyes with the dye components and removing the developed Ag from the film.

Printing multicolor pictures. Wilhelm Schneider (to Agfa Ansco Corp. (a Delaware corp.)). Can. 384,386, Oct. 3, 1939. In printing from a multicolor master picture obtained by color-forming development onto a printing material adapted for color-forming development, a multicolor filter contg. images identical in structure with those of the master film is interposed in the path of the light rays.

Color correction of photomechanical images. Robert L. Klein. U. S. 2,179,014, Nov. 7. A method of controlled color correction of photomech. images involves applying, over those mass tones that are correct, a permanent transparent waterproof and acid-resisting staging compd., etching unstaged tone masses of the image with etching soln. until masses requiring the least etching are corrected, then staging the masses thus corrected with a staging compd. as previously used, and repeating the etching and staging operations as required to correct and protect all tone masses of the image, then photographically copying through the corrected image without removing any of the previously applied staging compd. Various compns. used are described.

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

The properties of liquid amalgams. V. D. Ponomarev and S. M. Gubel'bank. *J. Gen. Chem.* (U. S. S. R.) 9, 1365-8(1939).—0.1 *N* $HgCl_2$ shaken with Zn amalgam for 10–15 sec. was reduced to Hg. $PbSO_4$ was reduced to Pb by Zn amalgam in HCl soln. These results show that liquid amalgams can be used for the decompn. of weakly dissocg., or of slightly sol. compds. which contain an ion whose oxidation-reduction potential

is higher than the potential of the corresponding amalgam. AgCl, AgBr and AgI were completely reduced by Zn amalgam. A decrease of the acidity during the reduction process increased slightly the time of the decompn. of the ppts. The decompn. velocity decreased in the direction from AgCl to AgI. These reactions can be utilized for the detn. of Cl^-, Br^- and I^-. Unsatisfactory results were obtained for the quant. decompn. of AgNCS because the Zn amalgam reduces not only Ag^+, but also NCS^-. $Ag_4Fe(CN)_6$ is only slightly reduced. $Ag_3Fe(CN)_6$ is reduced to $Ag_4Fe(CN)_6$ by reaction with the amalgam. For CuCl and CuI the reduction proceeded quantitatively and in CuNCS, NCS^- was reduced to H_2S. $HgCl_2$ and HgI_2 were reduced in several sec. with the Zn amalgam. Hg_2SO_4 was decompd. with difficulty, but quantitatively, while HgCl was only slightly decompd. K_2HgI_4 was reduced. Unsatisfactory results were obtained for CuS, while Ag_2S and HgS gave a quant reduction of the metals. Quant. decompn. of the sulfides of Pb, Cd, Bi, Sn and Sb was obtained. At temps. of 60–70° all the decompns. proceed more easily and rapidly. Five references. W. R. H. 1

The structures of boron hydrides. II. L. E. Agronomov. *J. Gen. Chem.* (U. S. S. R.) 9, 1389–93(1939); cf. *C. A.* 33, 6189[8].—The new exptl. results obtained by Schlesinger and Burg (*C. A.* 32, 2859[9]) for $B_2H_6.2NH_3$ (in their investigation of the reaction with Na in liquid ammonia) can be explained if the compd. is taken to be of the form $BH_3.NH_3$. The more complex formula (proposed by Schlesinger and Burg) $NH_4.[BH_3.NH_2.BH_3]^-$ is not based on exptl. results. The article gives also a possible scheme of the reaction for the formation of the compd. B_2H_7N that agrees with the formula $BH_3.NH_3$ for the ammoniate prepd. from diborane. Ten references. W. R. Henn 2

Recent developments in the chemistry of the boron hydrides. II. Some new reactions of diborane and its derivatives. A. J. E. Welch. *Chemistry & Industry* 1939, 937–40; cf. *C. A.* 34, 39[3]. R. F. D. 3

Some new halides of silicon. IV. A silicon chloride of formula SiCl. Robert Schwarz and Ulrich Gregor. *Z. anorg. allgem. Chem.* 241, 395–415(1939); cf. *C. A.* 32, 3716[6], 6169[8].—The method of formation, chem. behavior and constitution of SiCl were investigated; hydrolysis and ammonolysis gave new unsatd. Si compds. The thermal decompn. of $Si_{10}Cl_{20}H_2$ at normal pressure in inert atm. at 300° gave a solid, yellow SiCl or $(SiCl)_x$ of laminated, amorphous structure. Color change from yellow to orange-red is reversible between 180 and 200°, probably owing to the unsatd., highly polymeric character of the compd. SiCl is reduced in ammoniacal $AgNO_3$; Br_2 decomposes it into Si and unsatd. Si-Cl-Br compds. A very unstable compd. is formed with concd. HNO_3, which is explosively decomposed by contact or heating. SiCl does not react with dry O_2 in the cold; at 98° it burns briskly to fine SiO_2. Ammonolysis at room temp. gave $Si_6(NH_2)_6(NH)_3$ and $Si_8(NH_2)_8(NH)_2$. At temps. below 0° products of the same chain length were obtained. The results of ammonolysis of SiCl were confirmed by partial hydrolysis. Hydrolysis proceeds in three steps; at the second step chain members with 4-Si atoms appear. Results indicate that $(SiCl)_x$ is highly polymeric. M. McM. 4

Magnetochemical investigations. IV. Magnetochemistry of complex antimony compounds of various degrees of oxidation. R. W. Asmussen. *Z. Elektrochem.* 45, 698–703(1939).—Magnetic measurements were made in the systems $SbCl_3$–$SbCl_5$ and $SbCl_3$–Rb_2SbCl_6. One would expect Sb^{IV} to be *paramagnetic* and Sb^{III} and Sb^V to be *diamagnetic*. All the compds. in the systems studied were found to be diamagnetic. It is assumed that Sb has a valence which oscillates between 3 and 5, although this is in apparent disagreement with x-ray structure, which indicates that Sb is quadrivalent. H. Stoertz 5

The chemistry and morphology of the basic salts of bivalent metals. VII. Basic nickel chlorides. W. Feitknecht and A. Collet. *Helv. Chim. Acta* 22, 1428–44 (1939).—The chemistry of the solid solns. of Ni salts is discussed. In the pptn. of $NiCl_2$ with NaOH a basic dispersed chloride is obtained that gradually changes into the hydroxide. During this aging the pH decreases by about one unit. The soly. product is 1.1×10^{-16}. Expts. on the aging reaction at various concns. and temps. led to 5 basic chlorides of different structures. The following "ideal" formulas are suggested: (*a*) $1\,NiCl_2.Ni(OH)_2$; (*b*) $NiCl_2.3\,Ni(OH)_2$; (*c*) $NiCl_2.2Ni(OH)_2$; (*d*) $NiCl_2.3$–$4\,Ni(OH)_2.xH_2O$; (*e*) $NiCl_2.6$–$7Ni(OH)_2.xH_2O$. Their equil. conditions could not be investigated because reaction rates were too low. However, the greater part of them seem to be metastable. The respective crystallographic structures are discussed. **VIII. Basic nickel bromides.** *Ibid.* 1444–55.—Concd. solns. of $NiBr_2$ can contain much $Ni(OH)_2$. Six different basic Ni salts were obtained at varying temp. and concn. ranges. The following formulas are suggested: (*a*) $NiBr_2.3Ni(OH)_2$; (*b*) $NiBr_2.2Ni(OH)_2.4H_2O$; (*c*) $NiBr_2.7Ni(OH)_2.8H_2O$; (*d*) $NiBr_2.5Ni(OH)_2.8H_2O$; (*e*) $NiBr_2.5Ni(OH)_2.7H_2O$; (*f*) $NiBr_2.6$–$7Ni(OH)_2.xH_2O$. The compds. seem to be solid solns. No complex ions were found in the lattices. The lattice types are discussed. Robert Simha 6

Hydrothermal reactions. II. Magnesium hydrosilicate. 2. Wilhelm Jander and Reinhold Fett. *Z. anorg. allgem. Chem.* 242, 145–60(1939); cf. *C. A.* 32, 4898[8].—The synthesis of talc and serpentine was investigated at 600° and at 300°. A very simple phase diagram was derived. Between 100 and 60% MgO, $Mg(OH)_2$ + serpentine exists; between 60 and 42% MgO, serpentine + talc; with less MgO, talc + SiO_2. Anthophyllite and meerschaum were not found under exptl. conditions used. Fluorine seems to play an important role in the synthesis of chondrodite and humite. At least 6% F is necessary for the formation of chondrodite by hydrothermal reactions. At lower steam pressure the Mg orthosilicate, forsterite, is formed instead of serpentine. Temp.-pressure dependence of the formation of orthosilicate or serpentine is according to the equil.: $2(3MgO.2SiO_2.2H_2O) \rightleftarrows 3Mg_2SiO_4 + SiO_2 + 4H_2O$. This dependence is of great significance in the formation in nature. Corresponding equil. ratios were not observed with talc. They probably lie beyond the temp.-pressure region investigated. M. McMahon 7

Aluminum fluosilicate. Adrien A. Sanfourche and Alexandre Krapivine. *Bull. soc. chim.* 6, 1689–96(1939). —See *C. A.* 33, 6743[1]. J. F. D. 8

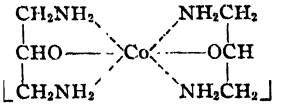
Mechanism of the formation of polythionic acids. II. Formation of polythionic acids with the aid of thiosulfurous acid. Hellmuth Stamm and Margot Goehring. *Z. anorg. allgem. Chem.* 242, 413–26(1939); cf. *C. A.* 33, 9178[8].—The following mechanism is proposed for the formation of polythionic acids in Wackenroder's soln. The starting point is the reaction between H_2S and SO_2 to form $H_2S_2O_2$, which reacts with more H_2S to form S and H_2O. $H_2S_2O_2$ then reacts with $2H_2SO_3$ to form $H_2S_4O_6 + 2H_2O$ and from these primary products all the other polythionic acids can be obtained as follows: $H_2S_4O_6 + H_2SO_3 \rightarrow H_2S_3O_6 + H_2S_2O_3$; $S + H_2SO_3 \rightleftarrows H_2S_2O_3$; $H_2S_4O_6 + H_2S \rightarrow S + 2H_2S_2O_3$; $H_2S_2O_2 + 2H_2S_2O_3 \rightarrow H_2S_6O_6 + 2H_2O$; $H_2S_6O_6 \rightarrow H_2S_5O_6 + S$. H. Stoertz 9

The hydrates of cobalt, nickel and copper sulfates. A. Simon and H. Knauer. *Z. anorg. allgem. Chem.* 242, 375–92(1939).—Dehydration of $CoSO_4.7H_2O$ in a desiccator over H_2SO_4 leads to a continuous loss of H_2O until the monohydrate is reached. Dehydration at a const. tension of 11 mm. indicates the existence of the hydrate $CoSO_4.6.5H_2O$, which is formed at 18°, after which the temp. steadily rises to 29.5° at which the hexahydrate, $CoSO_4.6H_2O$ is formed. $NiSO_4.7H_2O$ can be converted into tetragonal $NiSO_4.6H_2O$ by dehydration over H_2SO_4 in a desiccator. Crystd. from a concd. neutral soln., monoclinic hexahydrate is obtained. Treatment of the hexahydrates of Ni and Co and the pentahydrate of Cu with anhyd. liquid NH_3 indicates that 1 mol. of H_2O is bound in a manner different from the others. Ni and Co form the hexammine monohydrate and Cu the tetrammine monohydrate. Tensimetric decompn. of $NiSO_4.7H_2O$ at 11 mm. shows steps to correspond with $NiSO_4.6H_2O$ and $NiSO_4.4H_2O$. In dehydration of $CuSO_4.5H_2O$, if this is crystd. from H_2SO_4, a trihydrate is formed, which breaks down to monohydrate, but if the pentahydrate is obtained 10

from alc. soln. it goes directly to monohydrate. The results indicate the structure $[M(H_2O)_4][SO_4H_2O]$ for the Ni and Co salts and $[Cu(H_2O)_4][SO_4.H_2O]$ for the Cu salt. H. Stoertz

Active iron. XII. Magnetic character of a few complex iron salts. A Simon and H. Knauer. *Z. Elektrochem.* **45**, 678–85(1939).—In the salts (in which bip represents bipyridyl and phen represents phenanthroline) $[Fe(bip)_3]_2[PtCl_6]_3.0.7H_2O$, $[Fe(bip)_3]_2[PtCl_6]_3.3H_2O$, $[Fe(phen)_3]_2[PtCl_6]_3.1.4H_2O$, $[Fe(phen)_3]_3[PtCl_6]_3.1H_2O$, $[Fe(phen)]Cl_3$, magnetic susceptibility down to temps. of −190° follows Weiss's law rather closely. H. Stoertz

Coördination compounds of 1,3-diaminoisopropanol. J. G. Breckenridge and J. W. R. Hodgins. *Can. J. Research* **17, B**, 331–5(1939).—1,3-Diaminoisopropanol combines with cobaltous salts to give a series of *cobaltic coördination compds.* of the general formula $[(C_3H_9N_2O)_2Co]X$. The chloride, bromide, iodide, thiocyanate, nitrate, *d*-camphor-10-sulfonate, and *d*-α-bromocamphor-11-sulfonate were prepd. The last 2 were prepd. from the iodide by interaction with the Ag salt of the camphorsulfonic acid. These compds. were previously prepd. by the use of roseocobaltic salts. The complex cation is assigned the following structure



The base also gives cryst. coördination compds. with Cu^{++}, Ag and Zn salts. With Cu, the salts have the general formula $CuX_2.(C_3H_{10}N_2O)_2$, with $AgNO_3$ the salt $C_3H_{10}N_2O.AgNO_3.0.5H_2O$ was obtained, and with $ZnCl_2$ the cryst. product obtained did not correspond to any simple formula. H. Stoertz

The stereochemistry of complex inorganic compounds. VI. A study of the stereoisomers of the dichloro-diammino-ethylenediamine cobaltic ion. John C. Bailar, Jr., and Donald F. Peppard. *J. Am. Chem. Soc.* **62**, 105–9 (1940); cf. *C. A.* **34**, 3428.—The three isomeric forms of the dichloro-diammino-ethylenedianine cobaltic ion were prepd. The *cis*-dichloro-*cis*-diammino-ethylenediamine cobaltic ion is asymmetric and has not been resolved. It is most readily obtained through the reaction of *trans*-dichloro-*cis*-diammino-ethylenediamine cobaltic ion with Ag_2CO_3 to give carbonato-*cis*-diammino salt, which reacts with alc. HCl to give the *cis*-dichloro-*cis*-diammino isomer. The second step gives a mixt. of the cis and trans forms, owing to the rearrangement of the *cis*-dichloro form. The configurations of the two *cis*-dichloro forms were assigned through a study of the corresponding carbonato complexes. Improved methods are described for the prepn. of NH_4 *cis*-disulfito-tetrammino cobaltiate, NH_4 *cis*-disulfito-*trans*-diammino-ethylenediamine cobaltiate, cis and trans isomers of dichloro-*cis*-diammino-ethylenediamine cobaltic chloride, *trans*-dibromo-*cis*-diammino-ethylenediamine cobaltic bromide, and isomers of carbonato-*cis*-diammino-ethylenediamine cobaltic carbonate. A. B. Garrett

Constitution of complex metallic salts. X. Further evidence for the structure of bridged dipalladium derivatives. Joseph Ghatt and Frederick G. Mann. *J. Chem. Soc.* 1939, 1622–34; cf. *C. A.* **33**, 2434[3].—Previous conclusions of Mann and Purdie (*C. A.* **30**, 6668[8]) on the existence of the unsymmetric form in complex metallic salts are not supported by attempts to prep. a bridged compd. which could have only this structure. Two phosphine or arsine mols. were replaced by a suitable chelated mol. having two atoms united by coördinated links in the cis position to one Pd atom. Several unbridged Pd compds. contg. such chelated mols. were prepd., but none reacted further with $PdCl_2$ to give the required bridged derivs. The apparent nonexistence of such a bridged compd. is evidence against the existence of stable unsymmetric compds. The high value of the dipole moments of the bridged tetrachlorides and the dichloroöxalate cited by Mann and Purdie must be due primarily to the presence of a tautomeric mixt. of the cis and the trans symmetric forms alone. The yellow cryst. compd. $[C_2H_4(AsPhBu)_2PdCl_2]$, which contains two similar, asymmetric 4-covalent As atoms, was obtained in two forms, α m. 172–4°, β 185–6°; one of these forms must be the meso and the other the externally compensated isomer. This is the first recorded example of such isomerism in coördinated metallic derivatives. M. McMahon

Application of artificial radioelements to clearing up of a question of complex chemistry (Grinberg, Filinov) 3.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Chromatographic methods in inorganic chemistry. H. Erlenmeyer and H. Dahn. *Helv. Chim. Acta* **22**, 1369–71 (1939).—Schwab and his coworkers (cf. *C. A.* **31**, 8437[2], 3811[7], 6993[3]) have shown that chromatographic methods can be applied to the analysis of inorg. cations and anions. They used, for the most part, Al_2O_3 prepns. as adsorption agent and, when necessary, developed the colors of the different layers by the addn. of various reagents. Here, the use of 8-hydroxyquinoline(oxine) as adsorption agent in a tube 5–8 cm. long and 0.3 cm. in diam. is described. Schwab showed in his studies that the adsorption was probably due to the replacement of Na and the formation of metal aluminates. With oxine, hydroxyquinolates are formed. The order in which the adsorption takes place and the color of the layer formed are as follows: VO_3^- grayish black, WO_4^{--} yellow, Cu^{++} green, Bi^{+++} yellow, Ni^{++} green, Co^{++} pink, Zn^{++} yellow with intense green fluorescence, Fe^{+++} black, UO_2^{++} reddish orange. The order appears to correspond pretty well with the varying solubilities of the hydroxyquinolates but it also depends upon the pH of the liquid. Thus the order of Zn and Fe is reversed in AcOH solns. The sensitivity of the tests varies with the color formed. As little as 2 γ of Fe can be detected by the black zone formed. The method should find use in qual. or semiquant. tests. W. T. H.

Inorganic chromatography. IV. Chromatography as an auxiliary method in qualitative analysis. G. M. Schwab and A. N. Ghosh. *Angew. Chem.* **52**, 666–8 (1939); cf. *C. A.* **33**, 941[4].—The combination of the usual qual. analytical procedure and chromatography results in considerable improvements in the use of the latter, especially with the HCl, H_2S and $(NH_4)_2S$ groups. Karl Kammermeyer

Analytical results obtained by the explosion of gases. V. Beneš. *Chem. Obzor* **14**, 219–23(1939).—B. describes an app. in which gases are exploded completely or fractionally and analyzed for CO, H, CH_4, N, CO_2 and O. Results obtained in the analysis of generator gas are compared with those obtained by the usual combustion method. Frank Maresh

Spectral determination of elements in the spark by direct photoelectric measurement of line intensities. G. Thanheiser and J. Heyes. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* **21**, 327–34(1939).—The efforts to det. spectral lines in the spark instead of in the flame because of greater intensity of the lines in the spark and better possibility of detn. in the ultraviolet range are described and the shortcomings discussed. A direct photoelec. detn. is described in which the light emanating from the spark is divided in two parts by a prism system and each part examd. spectrally. One line of each part spectrum is prepd. by a monochromator and the intensity of this line caused to act on a photocell and the photocurrents are measured by the charging of two electrometers. The

quotients of the two charges in a given time are proportional to the ratio of the line intensities and permit detn. of the element if the relation between line intensity and concn. of the element is known. App. and procedure are described in full. The av. error of the measurement is 1.49%. An example of the detn. of Mn and Mg in Al illustrates the method which proved to have the same accuracy as detn. with the photographic plate.
M. Hartenheim

Organic reagents in inorganic analysis. J. Albert Southern. *Furman Bull.* **22**, 14–23(1940).—A review with 61 references. W. T. H.

Use of base-exchanging substances in analytical chemistry. II. Olof Samuelson. *Svensk. Kem. Tid.* **51**, 195–206(1939)(in German); cf. *C. A.* **33**, 5767[1].—Burrell, *C. A.* **32**, 4700[8], has proposed the name *organolite* for org. substances which behave like permutite and other zeolites for removing cations from aq. solns. In the expts. here described the organolite used was a sulfonic acid. With the aid of 3.2 g. of the organolite it was possible to remove all Al^{+++} from a soln. contg. a little more than 2 milliequiv. of $Al_2(SO_4)_3$ and H^+ ions replaced the Al^{+++} in the soln. The H^+ equiv. to the SO_4^{--} could then be titrated with NaOH to a methyl red end point. In 30 expts. most of the values were excellent although there was nearly 1% error in a few cases. The organolite could be regenerated by washing with 200 ml. of 2 *N* HCl followed by pure water. The analysis required much less time than the usual methods. With about 5 g. of organolite which was satd. with NH_4^+ ions it was possible completely to remove a little over 2 milliequiv. of K^+ and the anions were left in the filtrate. Then, by washing with HCl, all the absorbed alkali cations could be removed and, after evapn. to dryness and careful ignition, the Cl^- equiv. to the K^+ could be titrated with $AgNO_3$. Such a method of analysis is particularly advantageous when a nonvolatile anion such as VO_3^- is present. Much less time is required than when the VO_3^- is removed by means of the insol. Pb salt and the results appear to be better. Bibliography of 15 titles.
W. T. H.

Determination of arsenic by the distillation method. D. R. Jackson. *J. S. African Chem. Inst.* **22**, 68–70 (1939).—Loss of $AsCl_3$ on mixing the H_2SO_4 soln. with HCl can be avoided by pptg. the As as As_2S_3 and using this ppt. in the distn. with HCl. A. B. Garrett

The microestimation of arsenic. P. Kamerman. *J. S. African Chem. Inst.* **22**, 63–7(1939).—To carry out the Gutzeit test, it is recommended to bubble the AsH_3 through $AgNO_3$ soln. contg. gum arabic to protect the Ag sol formed and to measure the color in a Lovibond Tintometer. The method is suitable for detg. 2–20 γ of As.
A. B. Garrett

Determination of extremely small quantities of iron in aluminum by means of photoelectric colorimetry. M. Kofler and H. v. Halban. *Helv. Chim. Acta* **22**, 1395–1403(1939).—The Fe content can be detd. within 10% of the truth when 0.05–2.0% of Fe is present provided there are available test electrodes of accurately known compn. The photoelec. method is capable of detecting very much less than 0.0001% of Fe in metallic Al. Contents of 0.0001–0.01% were studied and results obtained which were within 10% of the truth after 10 g. of metal was dissolved in HCl and the soln. dild. to one l. Particular attention was paid to the Fe content of the acid used. W. T. H.

Rapid method of estimating small amounts of iron and manganese in copper-nickel-zinc alloys. Harendra Nath Roy. *J. Indian Chem. Soc.* **16**, 419–20(1939).—The alloy is dissolved in dil. HNO_3 and the Fe + Mn are pptd. as $Fe(OH)_3$ and H_2MnO_2 by means of NH_4OH and Br_2. The well-washed ppt. is dissolved in H_2SO_4 + $NaHSO_3$ and is oxidized by persulfate. After boiling to decomp. the excess persulfate, the acid soln. is reduced in a Jones' reductor and the Fe^{++} titrated with 0.02 *N* $KMnO_4$. After this the Mn is detd. by the persulfate method.
W. T. H.

Estimation of lithium as lithium potassium ferric periodate. O. Pročke and A. Šlouf. *Collection Czech Chem. Commun.* **11**, 273–94(1939).—P. and Uzel, *C. A.* **32**, 5329[9], showed that Li can be pptd. as $LiKFeIO_6$. In this paper the best conditions for carrying out the quant. pptn. were detd. and the best way to det. Li in the presence of Na. To carry out the analysis, evap. the soln. contg. the chlorides or sulfates of Na and Li to about 1 ml. In the tests, the Li content varied from 0.07 to 3.5 mg. To remove the Na, treat the soln. with EtOH which has been satd. with HCl. Remove the NaCl and wash the ppt. 3 times with 2-ml. portions of the alc. soln. of HCl. Evap. the filtrate contg. the Li to about 1 ml. and make about 1.0 *N* in KOH. While stirring and heating to 90° slowly add the reagent. It is prepd. from 2.3 g. of KIO_4, 10 ml. of 2 *N* KOH, 2 ml. of *N* $FeCl_3$ soln., 40 ml. of 2 *N* KOH and water to make 100 ml. When all the Li has been pptd. and the supernatant liquid is clear, filter and wash the ppt. of $LiKFeIO_6$ with 0.25 *N* KOH soln. Dissolve the washed ppt. in dil. H_2SO_4, add KOH till neutral and then just enough acid to clear the soln. Add an excess of KI and after some time add $NaHCO_3$ and titrate the liberated I_2 with standard arsenite or thiosulfate soln. Seven equivs. of I_2 correspond to 1 atom of Li.
W. T. H.

Colorimetric determination of manganese in the presence of organic substances and of Cu, Al, Zn, Ca, Mg, Fe and P, with special reference to drug preparations. Elemér Schulek and Pál Menyhárth. *Magyar Gyógyszerésztud. Társaság Értesítője* **15**, 513–20(1939).—Take sufficient sample to furnish 0.1–1.0 mg. of Mn. Digest it with concd. H_2SO_4, fuming and cautiously adding small portions of H_2O_2 until all org. matter is destroyed. Cool, dil. and oxidize the Mn to MnO_4^- by persulfate in the presence of Ag^+. Det. the color photometrically. Full details are given for carrying out the analysis. If much Fe is present, the addn. of H_3PO_4 is advisable and in some cases filtration is necessary before adding the presulfate.
S. S. de Finály

Method for determining very small quantities of molybdenum, applicable to biological material. Didier Bertrand. *Bull. soc. chim.* **6**, 1676–89(1939).—ter Meulen (*C. A.* **25**, 3882) studied the detn. of Mo in vegetable products but used samples weighing 3–5 kg. His method of basing the detn. upon the color of colloidal MoS_3 can serve to detect in 5 ml. of soln. as little as 0.2 mg. Mo per l. Sb, Sn and Sn cause interference. A procedure is given here for starting with 100 g. of material and detg. as little as 2 γ of Mo. With 14–15 g. of ash as little as 1–2 γ of Mo can be detd. Special pains should be taken during the calcination of the sample. Then, on treating the ash with HCl and removing the Si, it is necessary to remember that some Mo is contained in the insol. residue and it can be recovered by fusion with $NaHCO_3$. The sulfide test does not work well if much salt is present and it is convenient to conc. the Mo by forming a complex with cupferron and extg. it with $CHCl_3$. To remove the Sn, careful neutralization with NH_4OH succeeds provided a little Fe^{+++} is present. Cu is removed by pptn. with Na_2S. The final detn. of Mo is made with the aid of a photoelec. cell in a vol. of less than 9 ml. Full details are given for carrying out the entire procedure. W. T. H.

Amperometric titrations. II. The titration of nickel with dimethylglyoxime using the dropping-mercury electrode as indicator electrode. I. M. Kolthoff and A. Langer. *J. Am. Chem. Soc.* **62**, 211–18(1940); cf. *C. A.* **34**, 958[6].—This method yields accurate and precise results for very dil. Ni solns., good results being obtained in a concn. range between 0.01 and 0.0001 *M*. The interference by other metal ions is discussed. Procedures are described for the detn. of Ni after removal of large amts. of Co and of Fe. The procedure given for the detn. of Ni in Ni steel yields good results. A. B. Garrett

Determination of tantalum and columbium in ferrotantalum, ferrocolumbium and ferrotantalocolumbium. K. Brüning, K. Meier and H. Wirtz. *Metall u. Erz* **36**, 551–4(1939).—To det. the sum of the oxides Ta_2O_5 + Cb_2O_5, place 1 to 2 g. of alloy in H_2O in a covered Pt dish, add 3 to 4 ml. HNO_3 and if necessary small amts. of HF until soln. is complete. Add 10 ml. of 12 *N* H_2SO_4 and heat the mixt. to fumes. Fuse the salts so obtained with KH-

SO_4 until the melt is bright red in color. Ext. it with H_2O, dil. to about 800 ml., and digest for 0.5 hr. with SO_2, which completely separates Ta and Cb. Filter the ppt. and wash with H_2O contg. SO_2; all the Ta and Cb, nearly all the Sn, most of the Ti and a small amt. of Fe remain on the filter. Carefully wash the ppt. into an 800-ml. beaker with hot H_2O, and add 100 ml. of 6 *N* HCl and 25 ml. of perhydrol. Heat the soln. until clear, dil. to 500 ml. and digest for 20 min. Filter the ppt., wash with hot H_2O, redissolve as above and reppt. The ppt. is now free of impurities, but some of the Ta and Cb are in soln. To recover these, evap. the filtrates to about 500 ml., and add NH_4OH until the soln. will contain only about 30 to 40 ml. of 6 *N* HCl. Heat to 90° and allow to stand 12 hrs. If a ppt. forms, filter, and wash the ppt. with H_2O contg. HCl. Heat the filtrate to 40 to 50°, and sat. with H_2S, after which filter the ppt. and wash with H_2O contg. NH_4NO_3. This ppt. is free of Ta and Cb. In the H_2S-contg. filtrate, which is boiled, ppt. Ta, Cb and Ti with NH_4OH, filter, ash in a porcelain crucible and fuse with $KHSO_4$. Take up the melt with H_2O, add 30 ml. of 12 *N* HCl, dil. to 300 ml. with H_2O and neutralize with NH_4OH. Again add 30 ml. of 12 *N* HCl, dil. the soln. to 500 ml. and digest for 20 min. The remainder of the Ta and Cb sep., leaving Ti in soln. Filter the ppt. and wash with H_2O contg. HCl. Combine the 3 ppts. and ash in a porcelain crucible to Ta_2O_5 and Cb_2O_5. Sep. the Ta and Cb by a crystn. method based on the work of Marignac. H. Stoertz

Rapid method for determining halogen in gaseous mixtures containing chlorine and fluorine substitution products of hydrocarbons. W. D. Treadwell and M. Zürcher. *Helv. Chim. Acta* **22**, 1371–80(1939).—The use of CF_2Cl_2 has become quite common in refrigeration. The tech. testing is usually based upon the detn. of the d. and the halogen content of a given vol. of gas. The method here proposed consists in mixing a known quantity of sample with a large excess of H_2 and a little air, burning the mixt. from a narrow Pt capillary, condensing the water and analyzing the condensate for HF and HCl. The mixt. suitable for analysis can be obtained by passing H_2 through the liquid. For condensing all the HF and HCl with the H_2O it was found necessary to introduce a little excess water vapor. Sufficient air is provided so that the products of the combustion are CO_2, H_2O, HF and HCl together with a very little Cl_2. From 25 ml. of the sample, about 25 ml. of aq. soln. was obtained which was approx. 0.1 *N* in HCl and 0.1 *N* in HF. The Cl^- can be titrated in an aliquot part of the condensate with $AgNO_3$ and in another part of the condensate the F^- can be titrated with $FeCl_3$ if the aq. soln. is satd. with NaCl and the titration done in an atm. of CO_2. Both end points can be detd. electrometrically. Known wts. of CF_2Cl_2, $CHCl_3$, C_6H_5Cl and CCl_4 were analyzed. From samples contg. 1.5, 26.0 and 106.4 mg. of Cl, the values 1.2, 25.4 and 104.9 mg. Cl were obtained and from samples contg. 13.7 and 14.8 mg. F the values 13.2 and 14.6 mg. F were obtained. Three different methods for carrying out the condensation are described. In one case the H_2 mixt. is burned in a cake of ice obtained from about 1 kg. of distd. water. In the second case a water-cooled condenser is used and in the third case, the combustion takes place in a glass vessel kept at const. temp.; the gases formed are removed by suction and the condensation of the HCl and HF is effected in an efficient wash bottle contg. dil. alkali hydroxide. W. T. H.

A method for a rapid and accurate determination of small concentrations of chlorine in air. A. N. Mal'chevskiĭ. *Hig. i Sanitariya* **1938**, No. 11–12, 37–43; *Khim. Referat. Zhur.* **2**, No. 4, 74–5(1939).—A construction of an absorbing app. is proposed and a method for the detn. of Cl in air is given. The air under investigation is drawn through a soln. contg. KI, starch and a standardized soln. of As_2O_3 or $Na_2S_2O_3$. The amt. of Cl is detd. from the vol. of air which it is necessary to pass through the absorber to give a blue color to the starch. The absorber consists of a test tube 17 cm. long and 1.8 cm. in diam. A glass rod is sealed to the enlarged upper part of the test tube for the passing of gas. The surface of the test tube has deformities for better mixing of air. The absorber is closed with a stopper through which a sealed tube for air is passed almost to the bottom. The end of this tube has a 0.1–0.2-mm. opening. The vol. of the absorbing soln. is 15–17 cc. At a Cl concn. of 5–50 mg. per cu. mm. the air is passed with a velocity of 0.5–0.7 l./min. The error is about 5%. The time of one detn. is 4–6 min. W. R. Henn

Phosphorus determination in vanadium slags. E. Stengel. *Arch. Eisenhüttenw.* **13**, 205–7(1939).—See *C. A.* **33**, 9192⁴. Max Hartenheim

Scattered elements in salt deposits. Yu. V. Morachevskiĭ and T. V. Polenova. *Byull. Inst. Halurgii* **1938**, No. 3, 1–12; *Khim. Referat. Zhur.* **2**, No. 4, 76(1939).—For very small amts. of admixts. in salts methods of prepn. of analytical concentrate and the direct detn. of elements in this concentrate are proposed. For elements of analytical groups III and IV dissolve the sample of salt (7–10 kg.) in hot distd. water in a 35–40-l. porcelain container heated by elec. coils, collect the insol. residue in a large Büchner funnel and wash with hot water. Acidify the filtrate with HCl (20 cc. of concd. HCl per l. of soln.), heat to 70–80°, introduce H_2S gas, after 1.5 hrs. add 0.1 g. of $HgCl_2$ dissolved in a little water, introduce H_2S gas for 2–3 hrs. more with frequent shaking and let stand overnight. Filter off the ppt. of the sulfides through a Büchner funnel, wash with water satd. with H_2S, dry the residue at 50–60° and save it for further analysis. After the sepn. of groups IV and V, make the filtrate slightly alk. with NH_4OH and pass H_2S gas through the soln. Let stand overnight, filter off the ppt., wash with water contg. $(NH_4)_2S$ and dry as previously. Analyze the ppts. by the usual methods. Sep. the Hg residue from Hg by roasting at 600°, treat the residue with HNO_3, filter off the insol. part, roast, remove SiO_2 with HF and H_2SO_4, fuse with $K_2S_2O_7$, combine the soln. of the melt with the main soln. and det. Pb and Cu. Transfer the sulfide residue of the elements of group III to a HCl soln., remove SiO_2 from the insol. part (as explained above) and det. Fe, Ni, Mn and Zn in the soln. Fourteen samples of salts from the Solikamsk deposits were analyzed according to the method described. The amts. of the elements found were from 10^{-6} to 10^{-4}%. W. R. Henn

The microestimation of sulfates in sea water and the body fluids of marine animals. D. A. Webb. *J. Exptl. Biol.* **16**, 438–45(1939).—The basic principle of the method is the addn. of an insol. iodate which reacts with the ion to be estd. so as to form a more insol. salt and liberate iodate ions into the soln. For the estn. of chloride $AgIO_3$ is used; for sulfate, $Ba(IO_3)_2$. The IO_3^- ion is then detd. iodometrically. Benjamin Prescott

Determinations by means of sulfocarbamide. II. The titrimetric determination of manganese dioxide, lead dioxide and per-compounds. C. Mahr and Hertha Ohle. *Angew. Chem.* **52**, 618(1939); cf. *C. A.* **33**, 4549⁴.—Oxidizing reagents can be detd. by the addn. of excess sulfocarbamide and titration of the excess with bromate-bromide soln. Exptl. results are shown for MnO_2, PbO_2, $K_2S_2O_8$ and H_2O_2. 5 references. K. Kammermeyer

Determination of carbon dioxide in aqueous solution. J. R. I. Hepburn. *J. Soc. Chem. Ind.* **58**, 340–2(1939).—The method serves to det. quickly and accurately both free and combined CO_2. Possible applications are the detn. of CO_2 in *spring waters, baking powders, self-rising flours* and for the analysis of carbonates which are not decompd. readily by mineral acid at room temp. The CO_2 is liberated in an app. under reduced pressure, absorbed in a measured vol. of 0.1 *N* $Ba(OH)_2$ and finally the excess is back titrated with oxalic acid. W. T. H.

Hydrogen peroxide determination. P. Thorsell and E. Bengtsson. *Svensk Farm. Tid.* **43**, 567–70(1939).—The usual nitric acid NH_4 molybdate reagent may replace neutral $(NH_4)_2MoO_4$ soln. in reducing the time for detg. H_2O_2 by adding KI and titrating the liberated I with 0.1 *N* $Na_2S_2O_3$. A. R. Rose

Summarized methods of analysis. IV. The sulfate ion. Quantitative methods—colorimetric. Julius Grant. *Chem. Products* **2**, 157–60(1939); cf. *C. A.* **33**, 9196¹.—

A discussion of general procedures, color matching, optical methods, app. and procedures utilizing benzidine (diazotization, H_2O_2 and $FeCl_3$, naphthoquinone sulfonate) and $BaCrO_4$, resp. 9 references. Leopold Scheflan

Revised procedure for the qualitative analysis of Group III cations. Wm. J. Tomsicek and James J. Carney. *J. Chem. Education* **17**, 29–31(1940).—Kolthoff, Stenger and Moskovitz (*C. A.* **28**, 3024[8]) showed that a buffered soln. of benzoic acid was better for sepg. Fe, Al and Cr from Ni, Co, Mn and Zn than most other methods. In this paper a complete scheme for the analysis of Group III is given and the results of several hundred analyses by students indicate that the procedure is suitable for beginners. No particular attention is paid to the possible presence of anions such as PO_4^{---}, F^- and $C_2O_4^{--}$. The soln. is neutralized, made slightly acidic with AcOH and boiled after adding NH_4Cl and NH_4 benzoate. The resulting ppt. is analyzed for Fe, Cr and Al in the conventional way. In the filtrate, Mn, Ni, Co and Zn are first pptd. as sulfides and in the filtrate tests are made for Groups IV and V. The sulfide ppt. is dissolved in hot HNO_3 and the Mn pptd. as MnO_2 by boiling with HNO_3 + $KClO_3$. In the filtrate from the MnO_2 pptn. Ni and Co are pptd. as hydroxides and thus sepd. from Zn by means of excess NaOH. The Zn is finally identified by the sulfide pptn. and as the 8-hydroxyquinolate. Ni is eventually identified by the pptn. with dimethylglyoxime and Co is identified by Vogel's test. W. T. H.

Gas determination in aluminum. E. Schmid and H. D. Graf v. Schweinitz. *Aluminium* **21**, 772–8(1939).—When the H_2 dissolved in Al was detd. quite considerable differences were obtained, depending on whether the detn. was made by hot-extn. with or without cold deformation, detn. of equil., bombardment with ions, or chemically. Special expts. were made with pure Al which showed that the reason for the error in the results is H_2 originating from surface reactions between metal and adsorbed water with formation of Al_2O_3 and H_2. This addnl. H_2 is the greater the larger the ratio of surface to vol. This was the case also in the two most accurate methods, viz., elec. bombardment and hot-extn., which both gave in spite of very large differences in the dimensions of specimens, practically the same amts. of H_2 for specimens of the same dimension. If a specimen is exposed to air after a detn. H_2 is found again, also after cold deformation. But while cold deformation does not influence the result of the detn. very much, exposure to air does so very much more; the effect of cold deformation is due only to enlarged surface, which again adsorbs more humidity. Twelve references.

M. Hartenheim

Systematic characterization of atomic groups (in organic compounds) with respect to analytical chemistry. J. V. Dubsky. *Collection Czech Chem. Commun.* **11**, 295–312 (1939); cf. *C. A.* **31**, 7785[6]; **32**, 74[6], 4472[5].—A lecture read at Delft on May 25, 1939 in which the relations between the structure of the mol. of an org. reagent and the ability to form characteristic color tests with various cations are pointed out. W. T. H.

Identification of the halogen in organic halogen compounds. David W. Wilson and Cecil L. Wilson. *J. Chem. Soc.* **1939**, 1956–8(1940).—The microchem. procedure here described is based upon the fact that AgI, AgBr and AgCl formed under suitable conditions can be distinguished from one another under the microscope. The predominant forms of AgCl are octahedra, cubes and squares but AgBr forms triangular and hexagonal plates. AgI is easily sepd. from AgCl and AgBr by means of NH_4OH but the insol. AgI can be dissolved in pyridine from which it crystallizes in characteristic, transparent, oblong shapes which are easily recognized if the specimen is not allowed to become dry. There is no difficulty in identifying the iodide and the chloride or bromide is easy to recognize when it is fairly pure. When both chloride and bromide are present, considerable care is necessary in accomplishing satisfactory sepn. by means of dil. NH_4OH. As little as 1 γ of either Cl, Br or I can be recognized. One part of Cl in the presence of 10 of Br or one of Br in the presence of 30 of Cl can be detected and 1 part of I in the presence of 50 parts of either of the others is detectable. A pos. test for Cl can be obtained when no ppt. is visible to the naked eye. W. T. H.

Methods of determining formaldehyde. A. Foschini and M. Talenti. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., **1939**, 54–60; cf. *C. A.* **33**, 7238[3].—A review. L. E. Gilson

Analytical procedures employing the Karl Fisher reagent. II. The determination of alcoholic hydroxyl. W. M. D. Bryant, J. Mitchell, Jr., and Donald Milton Smith. *J. Am. Chem. Soc.* **62**, 1–3(1940); cf. *C. A.* **33**, 8524[3].—The analysis depends upon the general reaction $ROH + CH_3COOH = CH_3COOR + H_2O$. By employing a large excess of AcOH and making use of BF_3 as an esterification catalyst it is possible to shift the equil. almost completely to the right. The H_2O content is then detd. by direct titration with the Karl Fisher reagent (cf. *C. A.* **33**, 8524[3]). This new hydroxyl procedure is applicable to aliphatic and alicyclic alcs. including branched-chain types and hydroxyl acids, also such aromatic alcs. as have the hydroxyl group attached to an aliphatic side chain. Phenols do not react completely. Aldehydes, ketones, acetals, ketals and amines affect the procedure unfavorably. Differences in the relative esterification rates of aliphatic and strictly aromatic alcs. make it possible to differentiate these 2 classes of compds. by this method. **III. The determination of organic acids.** J. Mitchell, Jr., Donald Milton Smith and W. M. D. Bryant. *Ibid.* 4–6.—The basis of this procedure is the estn. of water liberated by the reaction $RCOOH + CH_3OH \rightarrow RCOOCH_3 + H_2O$ catalyzed with BF_3. The procedure is applicable to aliphatic acids generally, including branched-chain and hydroxyl-substituted types, and also aromatic acids having the carboxyl attached to an aliphatic side chain. Typical aromatic acids having the carboxyl group attached directly to the ring do not react quantitatively. Boric acid, anhydrides and strong inorg. acids may interfere. A. B. Garrett

The determination of organic peroxides. Herman A. Liebhafsky and Wm. H. Sharkey. *J. Am. Chem. Soc.* **62**, 190–2(1940).—Iodometric methods for the analysis of peroxides were modified to meet the following requirements: (1) a reaction system homogeneous even during the titration; (2) a negligible blank; (3) liberation of I_2 complete within 10 min.; (4) accuracy to within 2 drops of 0.01 *N* soln. Homogeneity and rapid I_2 liberation are obtained in glacial AcOH. The addn. of $NaHCO_3$ to the reaction mixt. eliminates the necessity of a blank. KI soln. is added to the mixt. contg. AcOH, $NaHCO_3$ and the peroxide; the mixt. is then titrated with 0.01 *N* thiosulfate. Several observations are made concerning the reaction rates. A. B. Garrett

Behavior of diethylmalonylurea and certain pyrazolone derivatives with various reagents. Antonio Perotti. *Boll. chim. farm.* **78**, 497–505(1939).—A study of the behavior of Millon's reagent; Dénige's reagent; a mixt. of 1 g. $CO(NO_3)_3$, 1 g. $CaCl_2$ in 10 cc. H_2O; 5% vanillin in alc. in the presence of H_2SO_4; and of a mixt. of 10% $CO(NO_3)_3$, 10% KCN in the presence of 10% NH_4OH on barbital (I), antipyrine (II), pyramidone (III), mixts. of 1 mol. I and 1 mol. II; 1 mol. I and 2 mols. II; 1 mol. I and 1 mol. III; 1 mol. I and 2 mols. III; 1 mol. I, 1 mol. II and 2 mols. III; and Antinevralgico "Alpha" (IV). Mixts. of I and II gave no reactions characteristic of I whereas mixts. of I and III indicated the existence of free I. The behavior of IV suggested the formation of a complex between I, II and III and this finding was confirmed by photomicrographs of the cryst. products. C. R. A.

Determination of tartaric acid by oxidation with silver salt. A. N. Smolin. *Uchenye Zapiski Fakul'teta Estestvoznaniya Moskov. Gosudarst. Pedagogicheskogo Inst. (Lab. Org. i Biol. Khim.)* **1938**, No. 3, 189–93; *Khim. Referat. Zhur.* 2, No. 4, 79(1939).—The method is based upon the fact that tartaric acid reduces an ammoniacal soln. of silver nitrate; the reduced Ag is dissolved and detd. by the Volhard method of titrating with alkali thiocyanate. To 10 cc. of the soln. contg. about 75 mg. tartaric acid, add an excess $AgNO_3$, 1.3–1.5 cc. of a concd. NH_4OH and an excess of alkali hydroxide. Carry out a

control expt. in which the vol. of the tartaric acid soln. is replaced by an equal amt. of water. Heat the soln. for 2 hrs. at 50–60°, cool, add 0.5–1 cc. of NH_4OH soln., mix and dil. to a known vol. Filter, and dissolve the Ag residue in dil. HNO_3 and titrate with KCNS soln. by the method of Volhard. The method can be used for the detn. of tartaric acid in the presence of citric, malic, oxalic and succinic acids and is as accurate as the detn. based on the low soly. of $KHC_4H_4O_6$. W. R. Henn 1

Determination of aromatic aldehydes. A. Eitel and G. Lock. *Monatsh.* **72**, 385–91; *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse*, Abt. IIb, **148**, 83–9(1939).—A modification of the method of Houghton (*C. A.* **28**, 2641[2]) is used. The reagent is prepd. from 2.5 g. 2,4-$(O_2N)_2C_6H_3$-$NHNH_2$ and 50 cc. concd. H_2SO_4 in 950 cc. H_2O; 100 cc. of this reagent is used per millimole of aldehyde. Use of BzH (0.9852 g.) in 100 cc. acid-free EtOH (99.28% of BzH present), 5 cc. of the soln. and 50 cc. of the reagent, dild. to 200 cc. with H_2O, stirred a few min. and allowed to stand overnight, give 98.72–99.24% of BzH as the hydrazone, m. 238°; with dioxane as the solvent, the yield of hydrazone varies from 98.88 to 99.15%. Similar results were obtained with the 3 ClC_6H_4CHO. *m-Chlorobenzaldehyde 2,4-dinitrophenylhydrazone*, Bordeaux-red, m. 248°; *p-isomer*, light brown, m. 264° (m. ps. cor.). C. J. West 2

The determination and identification of phenolic compounds in very dilute solution by means of an improved indophenol reaction. L. F. Levy. *J. S. African Chem. Inst.* **22**, 29–36(1939).—The principle underlying the Houghton and Pelly (cf. *C. A.* **31**, 3184[4]) method was adopted: the pH of the phenol soln. was adjusted to 9.2–10.5, a little of 2,6-dibromo-4-aminophenol was added, mixed and then 2 mols. of 0.05% NaOCl soln. added for each mol. of the reagent. The indophenol color developed in 3–5 min. It was found that an aq. or alc. soln. of 2,6-dibromo-4 aminophenol chlorostannate, on addn. to the buffered soln., produces a colorless soln. which lends itself perfectly to the estn. of the phenols in such solns. The phenols are identified by the blue color of the indophenols which are stable in AcOH soln. buffered to pH = 3–4. A. B. Garrett 3

Introductory study of nitriding of hardened high-speed steel [N detn. in steel] (Morrison, Gill) **9**. Properties of liquid amalgams [in detn. of Cl, Br and I] (Ponomarev, Gubel'bank) **6**. Extn. of ferric iron from HCl solns. by dichloroethyl ether and the formula of the Fe compd. in the ether [extn. of $FeCl_3$ from solns.] (Axelrod, Swift) **2**. Micromethod for detn. of m. ps. (Izmailov, Tkachenko) **10**.

pH Determinations. Solomon F. Acree. U. S. 2,178,550, Nov. 7. Various details of pH determinations and buffers and indicators for such use are described, including a process of preparing a series of indicators standardized as to pH and chosen concn. without added buffers. The process consists in adding to chosen concns. of the indicators having useful colorimetric pH ranges between pH 0 and pH 14 the requisite amts. of standard alkali or acid and making comparisons thereof in thin layers by Beer's law against pH color standards to form a series of indicator standards varying from pH 0 to pH 14 by definite predetd. small increments. The CO_2 content of a sterile buffer standard is adjusted to equil. with the CO_2 of the atm. and Na acid orthophthalate may be used. 4

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

X-rays in mineralogy. Design of a serviceable apparatus. M. A. Peacock. *Univ. Toronto Studies, Geol. Ser.* No. 42, 79–93(1939).—In the study of minerals older methods do not suffice for their identification, e. g., chem. analysis, crystal habits, etc. Since the x-rays have been applied to the study of minerals many which previously could not be classified or were difficult to classify can be grouped with their resp. kind. The x-ray has made possible measurements of the distance between the several planes of atoms; hence by calcn. the size of the unit cell becomes known. H. E. Messmore 6

Fungi as destructive and constructive agents of minerals and rocks. František Ulrich. *Věda Přírodní* **19**, 45–50 (1938); *Mineralog. Abstracts* **7**, 408.—The lublinite variety of calcite occurring in cretaceous rocks of N. Bohemia and W. Moravia is frequently of biogenetic origin, the fibers of various hyphomycetes detg. the crystn. and structure of the $CaCO_3$. C. A. Silberrad 7

Greenockite from Llallagua, Bolivia. Samuel G. Gordon. *Notulae Naturae, Acad. Natural Sci. Phila.* No. 1, 1–6(1939).—The greenockite from the Sn mines of Llallagua is remarkable for its red color and cyclic twinned crystals. Results of spectroscopic and microchem. tests show the mineral to consist essentialy of Cd, Fe and S, with traces of Zn, Si and Al (the Fe being probably due to admixed pyrite or marcasite, the greenockite occurring usually on marcasite). The crystals vary in habit, being pyramidal, thick tubular or prismatic. Crystals twinned on $i(10\bar{1}2)$ are common, being simple contact twins of 2 individuals or cyclic twins with 4 individuals in 4 equiv. positions. Crystallographic measurements (given) identify the crystals with forms already recorded for greenockite. Drawings and one photomicrograph are included. A note on twinned wurtzite from Frisco, Utah is also given. Microchem. tests show the mineral to be ZnS, and the twins examd. are similar to those in greenockite. Edward B. Sanigar 8

Nickeliferous pyrite from the Denison Mine, Sudbury District, Ontario. Ellis Thomson and J. S. Allen. *Univ. Toronto Studies, Geol. Ser.* No. 42, 135–9(1939).—Nickeliferous pyrite from the Denison Mine was of a faint violet shade modifying the usual color of pyrite. Several types were observed, one creamy in color, one of the above-mentioned violet, and the third was intermediate between these. The sp. gr. was approx. 4.81 and the Ni content amounted to approx. $^1/_2$ atom per unit cell of Fe_4S_8, the Ni replacing the Fe. This mineral has essentially the chem. and structural properties of pyrite. H. E. Messmore 9

Mineral of domeykite group from Běloves near Náchod (Bohemia). Ladislav Janota and S. Kraus. *Věda Přírodní* **19**, 152(1938); *Mineralog. Abstracts* **7**, 409.—The mineral is silver-gray and metallic, and contains 73.21% Cu with As. It is disseminated in cuprite. Besides cuprite, olivenite and tyrolite occur in this neighborhood. C. A. Silberrad 10

Studies of mineral sulfo-salts. I. Cosalite from Canada and Sweden. L. G. Berry. *Univ. Toronto Studies, Geol. Ser.* No. 42, 23–31(1939).—Cosalite from McElroy Township, Timiskaming district, Ontario, for which a reliable analysis and d. measurement were available, is orthorhombic; space group $D_{2h}^{16} = Pbnm$ or $C_{2v}^{9} = Pbn$. The unit cell, $a_0 = 19.05 \pm 0.03$, $b_0 = 23.82 \pm 0.03$, $c_0 = 4.047 \pm 0.01$ A., contains $8[(Pb,Cu)_2Bi_2S_5]$. Cosalite from the Cariboo Gold Quartz Mine, and the Island Mountain Mine, Cariboo district, British Columbia, and from Nordmark, Sweden, give powder photographs identical with that on the Ontario material. H. E. Messmore 11

Occurrence of cosalite in British Columbia. H. V. Warren. *Univ. Toronto Studies, Geol. Ser.* No. 42, 151–5 (1939).—Certain ore shoots at the Cariboo Gold Quartz Mine contain the rare minerals cosalite and galenobismutite, closely assocd. with native Au. These minerals were deposited at approx. the same time. Some ankerite was found as an uncommon gang mineral. Galena, sphalerite and chalcopyrite also occur in minor quantities. The cosalite contains approx. 41.2 Pb, 39.3 Bi, 16.0 ± 0.3 S, 0–3.6 Cu and 0–1.8% insol. The formula should be Pb_2- 12

Bi_2S_3. The cosalite contains 0.15–10.10% free Au. H. E. Messmore

Rammelsbergite from Ontario. M. A. Peacock and C. E. Michener. *Univ. Toronto Studies, Geol. Ser.* No. 42, 95–112(1939).—The mineral occurred with maucherite and temiskamite, at Moose Horn Mine, Elk Lake, Ontario. It is white in color; with crystals approx. 0.06 mm. in diam. The mineral is anisotropic, gives polarization colors and consists of 27–28% Ni, 66–68% As, and usually 2–3% S. Occasionally 1–2% Co is present, with traces of impurities. This particular sample was described as pseudo-orthorhombic, with cell edges of $a_0 = 5.74$, $b_0 = 5.81$ and $c_0 = 11.405$ A., the cell const. Ni_8As_{12}. H. E. Messmore

Magnesiochromite from Caribou pit Coleraine Township, Quebec. A. L. Parsons. *Univ. Toronto Studies, Geol. Ser.* No. 42, 75–8(1939).—A sample of magnesiochromite for analysis and x-ray examn. was sepd. from impurities by use of Clerici's soln., and a magnetic separator. The chem. analysis of this sample agreed with those from other sources. The x-ray data gave the cube edge as 8.247 ± 0.005 A. H. E. Messmore

New occurrences of hot-spring calcite. E. Balogh. *Erdélyi Muzeum, Cluj-Kolozsvár* **1937**, 362–6; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 622.—Microscopic examn. of the hot-spring calcite of the Valea Vinului-Borpatak Valley shows it to consist of interlaced fibers of calcite, and not, as hitherto supposed, of aragonite. The peculiar form is attributed to the presence of NaCl in the water from which it has crystd. NaCl is also present in the calcite of Corund-Korond where a similar deposit occurs, also formerly regarded as aragonite. C. A. S.

Protocalcite. E. Balogh. *Erdélyi Muzeum, Cluj-Kolozsvár* **1937**, 147–55; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 621–2.—At one place in the Comarnic-Komarnic cave (Banater gebirge) there occurs a layer of flock-like material resembling a fungus growth, 1–2 mm. thick, consisting of a loosely knotted mass of needle-like crystals at most 0.5 mm. long by 1 3 μ broad, consisting of calcite, but apparently a mono- or tri-clinic form. The name protocalcite is suggested. C. A. Silberrad

Transparent green pyroaurite from Ontario. H. V. Ellsworth. *Univ. Toronto Studies, Geol. Ser.* No. 42, 33–45(1939).—Certain specimens of a dolomite from lot 27, concession X, Calvin Township and 3.5 miles east of Rutherglen, Ontario, contain small quantities of the rare mineral pyroaurite. The mineral occurs as small greenish barrel-shaped hexagonal crystals rarely over 1 mm. in diam. By analysis the formula is $Fe_2O_3.6MgO.CO_2.12.5$ or 13 H_2O. Upon heating to 150° 5 mols. of H_2O is lost, 2 mols. is lost between 210 and 260° and the remaining 5.5 mols. is expelled between 260 and 270°. After complete dehydration the mineral is a rich brownish color and still uniaxial or very slightly biaxial. H. E. Messmore

Vesuvianite from Great Slave Lake region, Canada. V. B. Meen. *Univ. Toronto Studies, Geol. Ser.* No. 42, 69–74(1939).—Vesuvianite occurs in Pre Cambrian sediments, near a granite contact, at Turnback Lake, about 40 miles north of Great Slave Lake, Northwest Territories. The vesuvianite crystals were up to 1 in. in length, chocolate brown with a greenish tint, and prismatic in form. $n\omega = 1.712$, $\epsilon = 1.708$. The vol. of the unit cell is 2890 cu. A., d. = 3.432. The mol. wt. of the unit cell is 6011; the cell const. is $(Ca, Mn, Na, K)_{27.72}(Al, Be, Fe^{++}, Fe^{+++}, Mg, Ti)_{27.72}Si_{35.41}(O, OH, F)_{168}$. H. E. M.

The cation exchange and swelling of montmorillonite as a function of preheating. U. Hofmann and Jo. Endell. *Beiheft Z. Ver. deut. Chem.* No. 35, *Angew. Chem.* 52, 708–9(1939); cf. *C. A.* **31**, 6147[1].—Exptl. data are presented for two Ca and Na bentonites each and one mica mineral. The bentonites lose the property of intercryst. swelling between 300 and 490°. References. K. Kammermeyer

Thorium-free monazite from Llallagua, Bolivia. Samuel G. Gordon. *Notulae Naturae, Acad. Natural Sci. Phila.* No. 2, 1–7(1939).—The monazite occurred in 3 different veins in the Sn mine in Llallagua as flesh-pink coarse granular aggregates of crystals intergrown with cassiterite, in a matrix of rounded fragments of quartzite cemented together by "wood tin," and as twin-crystals of monazite with small transparent crystals of wavellite on clear prismatic crystals of quartz, resp. No Th was detected by spectrographic examn. of the monazite from the first vein. No evidence of a greater concn. of radioactive material than is found in ordinary earth was obtained. Tables showing chem. analyses and crystal angles of 14 forms are given, together with details of methods of analysis and drawings of crystals. The crystals are translucent, sp. gr. 5.173, have $n\alpha = 1.785$, $\beta = 1.787$ and $\gamma = 1.840$ all ± 0.005, and are usually prismatic in habit with twins (simple contact pairs or cruciform penetrations) quite common. Edward B. Sanigar

Wulfenite, ralstonite and thomsenolite from Ivigtut, Greenland. Samuel G. Gordon. *Notulae Naturae, Acad. Natural Sci. Phila.* No. 11, 1–2(1939).—The thomsenolite occurs in tubular crystals often in fan-shaped aggregates. The ralstonite is present as small colorless limpid octahedra and cubo-octahedra, n (immersion method with Hg yellow light) being 1.399 ± 0.001. The wulfenite crystals are grayish yellow in color with an adamantine luster. Edward B. Sanigar

Anthraxolite from South Nahanni River, Northwest Territories. R. L. Rutherford. *Univ. Toronto Studies, Geol. Ser.* No. 42, 123–5(1939).—A specimen from Meilleur Creek, a tributary of the South Nahanni River, consisted of brittle anthraxolite with small fractures filled with quartz. This material consisted of moisture 1.9, volatile matter 6.0, fixed C 85.9 and ash 6.2%. It is brittle and breaks with pseudo-rectangular cleavage into small chunks. Anthraxolite is a coal-like material resulting from the metamorphism of petroleum. The chem. analysis of this material should be compared on an ash-free basis. H. E. Messmore

Role of physics and chemistry in mining geology. N. N. Kohanowski. *Mines Mag.* (Colo. School of Mines) 29, 513–14(1939).—A survey. Leopold Scheflan

Theories of formation of ore deposits. Edson S. Bastin. *Sci. Monthly* 49, 538–47(1939).—A review. E. H.

Geology and tectonics of the Outokumpu ore field and region. Heikki Vayrynen. *Bull. comm. géol. Finlande* No. 124, 91 pp.(1939)(in English); cf. Haapala, *C. A.* 30, 7508[6]; Mäkinen, *C. A.* 32, 2471[1].—Mainly geol. The ore body is estd. to contain 20 million metric tons of ore, rather uniform in compn., and averaging SiO_2 40, Fe 27.5, S 27, Cu 4.5, Zn 1.0, Co 0.2, Ni 0.1%, as well as 1 g. Au and 12 g. Ag per metric ton. The mineralogic compn. is quartz 40, pyrite 31.7, chalcopyrite 13, pyrrhotite 13.8 and sphalerite 1.5%. Michael Fleischer

Mindanao Mother Lode Philippines. Lawrence E. Smith. *Mines Mag.* (Colo. School of Mines) 29, 563–6(1939).—A survey of mining operations. Values are in the form of very fine Au assocd. with Cu sulfides and quartz. Among the minerals in the vein are chalcopyrite, chalcocite, enargite, cuprite, malachite, native Cu, pyrite, galena, sphalerite, calcite and quartz. Leopold Scheflan

Association of gold, tungsten and tin at outpost islands, Great Slave Lake. J. E. Hawley. *Univ. Toronto Studies, Geol. Ser.* No. 42, 53–67(1939).—In the Great Slave Lake region, minerals of W, Sn, Cu and Mo are assocd. with Au in mineralized zones in which also are found quartz-mica lenses of pegmatitic aspect, contg. staurolite and andalusite, the latter enclosing grains of blue corundum. Many quartz bodies range in size from 1 to 10 ft. in width, and 10 to 50 ft. in length. Segregations of muscovite and biotite, locally altered to chlorite, are contained within the quartz, as well as 3–4 in. crystals of red andalusite. Minor constituents are magnetite, ilmenite and specular hematite. The quartz is usually coarse-grained, glassy and white in color. Where replacement of andalusite has been extensive, grains of corundum are enclosed by mica. The Au appears to be the last mineral deposited and occurs as disseminated flakes, and as is so often the case no indication is available as to the temp. of the Au deposition. Samples from this region contained 0.05–0.20% Sn and nil–1.20% W, although no definite Sn mineral could be identified. The W occurred in either ferberite or powellite. H. E. Messmore

Copper-tourmaline-hematite veins at Highland Valley, B. C. John S. Stevenson. *Univ. Toronto Studies, Geol. Ser.* No. 42, 127–33(1939).—The veins are in close proximity to a quartz diorite area. They vary in width from that of a knife edge to 4 ft., but 10 in. is most common. The vein-filling material consists of tourmaline, quartz, specular hematite, magnetite, chalcopyrite, pyrite and chlorite, chalcocite, malachite and limonite. Tourmaline is by far the most abundant of these minerals, consisting of 5–90% of the veins. H. E. Messmore

Iron ore on the Mediterranean seaboard. J. H. Goodchild. *Mining Mag*, 61, 333–43(1939).—The geochem. significance of an occurrence of Fe ore on the coastal fringe of the Sierra Nevada is discussed. This is another example of the segregation of a weak base, Fe (cf. *C. A.* 32, 8993[4]). A comparison of such segregations assists in the study of the growth of new bodies that depend on the concn. of strong bases. In the case now considered, photographic illustrations of exposures are held to demonstrate clearly the processes of concn. or growth of rich ore bodies. Immense quantities of unstable matter are supposed to have disappeared during earlier stages, resulting in a greater freedom for the development of new structures. In most cases studied, the ore tends to reveal the effects of internal rather than external force; the dynamical aspect of the iron ore bodies, of the marbles, of the schists is that of growth in a field of potential. Here in Spain the stratigraphy indicates how and when such fields may develop. A. W. Furbank

Tungsten-molybdenum deposits of Kok-kul in the High Altai. G. D. Zinov'ev, V. D. Timofeev and T. M. Zubkov. *Soviet Geol.* 9, No. 8, 53–65(1939).—A list of 38 minerals found is given. Green, almost isometric, wolframite contg. 75.08 WO_3, 20.75 MnO and 2.30% FeO, and long, gray, layer wolframite contg. 76.72, 15.65 and 8.17%, resp., were found, as well as molybdenite, scheelite, etc. Com. exploitation is considered feasible. **New tungsten deposits of Cis-Balkhash in Kazakhstan.** A. S. Osipov. *Ibid.* 66–71.—The wolframite contains 75.65% WO_3, 10.86 MnO, 12.05 FeO and 0.25 $(Ta + Cb)_2O_5$. F. H. Rathmann

A recent discovery of commercial titanium ore. C. C. Coulter. *Mining J.* (Phoenix, Ariz.) 23, No. 9, 7(1939).—Large quantities of Ti ore of satisfactory com. grade were discovered in Hidalgo County, New Mexico, near the Arizona border. It is a replacement deposit of contact metamorphic origin. The content of TiO_2 increases with depth. The deposit averages 70 ft. in width and approx. 1000 ft. in length. Leopold Scheflan

Fluorite deposit of Chebargatin. E. K. Tepikin. *Soviet Geol.* 9, No. 7, 95–6(1939).—The CaF_2 content is 48–92%, av. 75%. 200,000 tons of ore is commercially available. F. H. Rathmann

Illinois mineral industry in 1938. A preliminary statistical summary and economic review. Walter H. Voskuil and G. N. Oliver. *Illinois State Geol. Survey, Rept. Investigations* No. 56, 5–24(1939). E. H.

Subsurface geology and oil and gas resources of Osage County, Oklahoma. II. Townships 22 and 23 North Ranges 8 and 9 East. C. T. Kirk, H. D. Jenkins, Otto Leatherock, W. R. Dillard, L. E. Kennedy and N. W. Bass. *U. S. Geol. Survey, Bull.* 900-B, 47–82(1939); cf. *C. A.* 32, 7864[5]. E. H.

The Pre-Cambrian. M. E. Wilson. *Trans. Roy. Soc. Can. IV* 33, 1–9(1939).—An outline of the history of geol. nomenclature and classification in the Can. Shield in Canada. It is suggested that wherever a continuous succession of lavas or sediments or both be found in the Archian complex of the St. Lawrence province they be given local series names and that Keewatin or Timiskaming be used only to designate groups of Keewatin or Timiskaming type; that as geol. controls detailed maps of areas favorable for study be made and that maps more detailed than 1 mile to 1 in. be extended to other favorable geol. areas beyond those where important mineral deposits have been made. J. W. Shipley

The Temiskaming-Keewatin problem in the Rouyn-Harricanaw region, N. W. Quebec. H. C. Gunning and J. W. Ambrose. *Trans. Roy. Soc. Can. IV* 33, 19–47 (1939).—No subdivision of the Archian in N. W. Quebec into Timiskaming and Keewatin can be made. Sediments and volcanic rocks are much mixed. Sediments were deposited at various places along with the volcanic rocks with interfingering and interbedding common. Beds of chloritic tuff in the Cadillac sediments indicate that some explosive eruptions occurred after Cadillac sedimentation was under way. Beds of iron formation and magnetite are restricted to the Cadillac group. The fine-grained sediments of the Kewagama and Cadillac groups are indistinguishable. J. W. Shipley

Calcium silicate and calco-magnesian rocks of the Mts. de Forez. Jean Jung and Paul Sainfeld. *Compt. rend.* 209, 887–8(1939).—Although the wollastonite-pyroxene-anorthite rock reported in 1883 from St.-Clément (Puy-de-Dôme) could not be identified, rock approximating to its description was found at St.-Bonnet-le-Courreau (Loire) forming enclaves of gneiss in anatectic granite and consisting of amphibolite and pyroxenite and often contg. almandine and in places fibrous wollastonite. C. A. Silberrad

The stock of "suzorite" in Suzor Township, Quebec. Carl Faessler. *Univ. Toronto Studies, Geol. Ser.* No. 42, 47–52(1939).—An outcrop of suzorite occurs in the Little Pichui River region of the Greenville area of Suzor Township, Laviolette County, Quebec. The outcrop forms an ellipse, with diams. of approx. 200 ft. and 1100 ft. The contact between the suzorite and the country rock could not be found, but in its place was a zone about 2 ft. wide of highly altered and loosened rock material originating from both the country rock and the instrusion. The suzorite rock is massive, dark-brown, very soft, coarse-grained and has little mech. strength. Sp. gr. is about 2.9. The rock contains over 50% of a dark-brown mica, some red feldspar, greenish pyroxene, and some colorless apatite. H. E. Messmore

Vesicular carbonaceous sediments in Lake of the Woods region. Jas. E. Thomson. *Univ. Toronto Studies, Geol. Ser.* No. 42, 141–50(1939).—Five exposures of vesicular graphitic sediments were observed in the Lake of the Woods region, the best occurring southwest of the town of Kenora on the northwest corner of Corkscrew Island. In one 25-ft. section of sedimentary material 6 vesicular chert zones were present with intervening nonvesicular material. Freshly broken samples of this chert show a dense black groundmass with spherical cavities varying in size from 0.5 in. to microscopic size and resembling pumice in structure. Some cavities are empty; some contain rounded masses of graphite. These sediments contain 92–97% SiO_2, 1.6–2.6 Al_2O_3 with smaller amts. of Fe, Ca, etc., and 0.40 to 1.98% C. The origin of this material is not definitely known. H. E. Messmore

Iron-stained rocks, Hematite Stream, North Canterbury. J. Healy. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* 13, 116(1938–39).—The hematite occurs in 2 types of bedded deposits which appear to be assocd. with igneous extrusions of the pillow-lava type. The more common type is a red siliceous rock occurring in alternating bands of hard and friable material and interbedded with greywackes. The other type consists of crushed quartz and jaspillite beds with a development of Fe-staining along the joint planes. Six samples contained an av. of 7.5% Fe. K. D. Jacob

Weathering in sunny places. A. Kieslinger. *Jber. Sonnenblickver.* 1937, 22–32(1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, 1939, 665–6.—Examples of phys. and chem. weathering, especially of marbles and calcareous schists of the Hohen Tauern, are described. In particular while phys. weathering results in projecting knobs of feldspar the presence of pyrite through production of H_2SO_4 produces hollows ("pit-weathering"). Knob-weathering is also conspicuous in the breunnerite serpentine, where in apparent contradiction it is the easily sol. carbonate that forms the knobs projecting from the silicates. "Lath-weathering" results from hardening owing to invading solns. along small fissures in the gneiss. C. A. S.

Hydrothermal reactions—Mg hydrosilicate (Jander, Fett) 6.

1 **Lee, J. S.:** The Geology of China. London: Thomas Murby and Co. 528 pp. 30s. Reviewed in *Am. J. Sci.* 237, 926–7(1939).

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Thermal metal recovery. E. J. Kohlmeyer. *Metall u. Erz.* **36**, 545–51(1939).—A general discussion of theory and practice of thermal methods for recovery of metals from ores. H. Stoertz

The role of Emulsol X-l in flotation. J. Bryant Kasey. *Mining J.* (Phoenix, Ariz.) **23**, No. 15, 3–4(1939).—Emulsol X-l, by enlarging the fine bubbles of a pine-oil froth, permits rapid drainage of gang; it does not vary in frothing properties over a wide range of pH values and has practically no collecting properties. Com. applications of this new frothing agent are described. L. Scheflan

Flotation of gold. I. N. Plaksin. *Zolotaya Prom.* **1938**, No. 10, 6–11; *Khim. Referat. Zhur.* **2**, No. 4, 98 (1939).—The upper limit of the flotation corresponds to 0.3–0.4-mm. size of the particles. The sulfide Au ores are most easily floated. The quartz and the oxidized ores usually can be floated by an addn. of the sulfide ores or by the addn. of special reagents which favor the formation of a stable froth. In a no. of cases not only Au, but also other valuable components of the ore (Cu, Pb, As, etc.) are sepd. by flotation. Before flotation the coarse particles of the Au must be sepd. by concn. on tables, in settling app., etc., as well as by amalgamation. A proper selection of the concn. of the pulp is important. The optimum ratio is solid:liquid = 1:2.5. W. R. H.

A new method of cyanidation of the sulfide gold ores and concentrates with addition of hydrophilic colloids. B. Nevskiĭ. *Zolotaya Prom.* **1938**, No. 10, 32; *Khim. Referat. Zhur.* **2**, No. 4, 98(1939); cf. *C. A.* **32**, 6989⁸.—The cyanidation of the sulfide Au ores is difficult because the ores are not easily wetted by solns. The hydrophobic properties of such ores are increased by flotation. The hydrophobic properties of the ores can be reduced by an addn. of hydrophilic colloids (saponin, tannin). The use of these substances increases the extn. of Au, as shown by the preliminary expts. at the Moscow Inst. of Noble Metals and of Gold. W. R. Henn

Addition to amalgamation plants. N. Antonova. *Zolotaya Prom.* **1938**, No. 6, 24–5; *Khim. Referat. Zhur.* **2**, No. 4, 98(1939).—Only 50–60% of Au contained in ores is extd. in the amalgamation plants. It is proposed to treat the tailings by flotation with butyl xanthate (70 g./ton) and pine oil (45 g./ton) with an addn. of soda and water glass. This gives a concentrate contg. about 88% of Au and about 98% of Zn of the tailings. The concentrate contains 38–41% of Zn and is ready for treatment in the metallurgical plant. The tailings from flotation yield a baryta concentrate (after a treatment on concn. tables) contg. about 85% of $BaSO_4$. The total extn. of Au from the ore is approx. 85%. W. R. Henn

Three years of operation with a Hadsel mill. Geo. A. Bell. *Eng. Mining J.* **141**, 32–3(Jan., 1940).—A new type machine employed by Demonstration Gold Mines, Ltd., at Baguio, P. I., is economical in work and maintenance, mechanically sound and ideal for 1-stage crushing of wet, sticky ore. A flowsheet is shown of the crushing and fine grinding section of the 250-ton cyanide unit, also a side elevation of the Hardinge-Hadsel mill. W. H. B.

An American view of the copper industry. E. O. Sowerwine. *Mining J.* (Phoenix, Ariz.) **23**, No. 14, 2–4(1939). —Descriptive. Leopold Scheflan

East Bohemian copper ore deposits (Sudeten province). Fritz Hoffmann. *Metall u. Erz* **36**, 513–16, 529–31 (1939).—Cu occurs as sulfide, with Cu ranging from 0.67 to 2.17%, and is found in microscopic state of division in coal. The coal is burned away, Cu loss being very small in this process. The product is further enriched by flotation. H. Stoertz

Styrian ores in greater Germany. Hans Malzacher. *Metall u. Erz* **36**, 497–504(1939).—Fe ore deposits in the Styrian district of Austria are described. These ores contain only traces of S and are almost completely free of P. High Mn content makes them very suitable for steel manuf. H. Stoertz

Black copper of Yunnan. H. Bruce Collier. *J. Chem. Education* **17**, 19–21(1940). E. H.

Smelting methods in the years 1937 and 1938. V. Tafel. 3 *Metall u. Erz* **36**, 384–9, 415–19, 441–8, 484–91, 504–7, 516–22, 532–41(1939).—A description of smelting methods used for Pt, Au, Ag, Cu, Bi, Pb, Sn, Sb, Zn, Cd, Hg, Ni, Co, Al, Mg, Ca, Ba, V, Cr, Mo, Mn, Be, Si, Se, Te and Tl. Electrolytic as well as dry and wet methods are discussed, and ore dressing methods are considered. H. S.

Effect of carbon dioxide on the velocity of reduction of magnetite and hematite by carbon monoxide. E. P. 4 Tatievskaya and G. I. Chufarov. *J. Phys. Chem.* (U. S. S. R.) **13**, 495–501(1939).—Exptl. data over the temp. range 400–900° and at gas pressures of 0.02 to 0.20 mm. Hg are given. The retarding effect of CO_2 on the initial stage of reduction of magnetite is considerable at 500° and negligible at 900°; CO_2 does not affect the initial reduction of hematite, but after a Fe_3O_4 surface layer has once formed, hematite behaves the same as magnetite. F. H. Rathmann

The open-hearth furnace and its auxiliaries. G. D. 5 Tranter. *Metal Progress* **37**, 34–8(1940).—A practical summary of recent improvements in design and operation. The use of hot metal, bottom patching, control, waste heat boilers, and insulation, combustion and temp. control are described. W. A. Mudge

Resistance-heated electric crucible furnaces for light metals. O. Gengenbach. *Elektrowärme* **9**, 227–34(1939). —Furnaces for melting small amts. of Al and Mg are re- 6 viewed and crucibles with resistance heating discussed in particular. Graphite crucibles have the great advantage of not adulterating the melt but the heat cond. is rather low so that the heating elements (when heating from the outside) must have a temp. of about 1050–1100° for a crucible temp. of about 900°. This reduces the life of the heating elements. Also the graphite burns off if the inner wall is not covered by the melt. Cast-Fe crucibles, sometimes 7 with low Cr content, give good service, if often cleaned as molten Al dissolves Fe. Molten Mg does not dissolve Fe so that cast Fe crucibles can very well be used for melting Mg. Care must be taken that the scale (oxide) which forms on the outside does not come in contact with the liquid metal as they form together a mixt. burning with an explosion. The energy consumption is about 1 kw. per 1 kg. crucible content. Melting processes are discussed and directions for pouring Al and Mg given in detail; furnaces 8 are described. M. Hartenheim

Apparatus for preparing gas for heat-treating metals. A. A. Shmykov. *Vestnik Metalloprom.* **19**, No. 4, 38–42 (1939).—An app. is described for prepg. gases used in heat-treating metals. The app. includes an NH_3 dissociator, chambers for the partial combustion of H_2 and purification of the gas, and dehydration cooling chamber for freezing out the moisture as well as absorber for drying the 9 gas and flow controllers. B. Z. Kamich

Progress in metals—specifications for furnace castings. W. L. Nelson. *Oil Gas J.* **38**, No. 22, 72(1939).—A tentative standard specification by alloy-casting manufacturers and consumers. Analysis and phys. properties of castings for various services are given. W. Andrew Wright

Aging of metals after deformation. N. F. Lashko, G. Ya. Slobodyanyuk and A. K. Khodulin. *Vestnik Metalloprom.* **19**, No. 4, 69–76(1939).—Aging of various steels contg. up to 1% Mn was investigated by variations in the

temp. of cold brittleness. Deformation was made by stretching, compressing, and bending followed by artificial aging at 250° for 30 min. Plastic deformation by various methods increased the temp. of cold brittleness. Deformation by compression had a greater effect on temp. of cold brittleness than the same degree of deformation by stretching. B. Z. Kamich

Metals in drilling. V. Drilling hoists. W. L. Nelson. *Oil Gas J.* **38**, No. 21, 54(1939).—The metallurgy of parts for drilling hoists. **VI. Engine and machine castings.** W. L. Nelson. *Oil Gas J.* **38**, No. 26, 57(1939).—The specifications of iron and steel castings for engine and machine parts are listed as to chem. analysis and phys. properties. **VII. Crown and traveling blocks.** W. L. Nelson. *Oil Gas J.* **38**, No. 25, 49(1939).—A discussion of the metallurgy of the various parts of crown and traveling blocks. W. Andrew Wright

Production of forged rolls for cold rolling. R. Scherer. *Stahl u. Eisen* **59**, 1105–11(1939).—The recent increase in cold rolling and generally higher roll pressures has focused attention on roll failures. Formerly cold rolls were cast but lately forgings have been used. The most frequent compn. is 0.9% C and 1.8% Cr. For long life, care must be taken in the grinding and polishing as well as in the compn., melting, and forging. Sharp changes in section must be avoided and gradual fillets used. Experience has shown that rolls not bored for water cooling have longer life, but are harder to produce. Defects such as flakes, fissures, sand seams, and grinding checks are illustrated. In water-quenching care must be taken to avoid troostite formation at the surface and to obtain a gradual transition from the hard surface to the softer center. In grinding care is necessary to avoid local overheating. During rolling damage may be caused by dragging or sliding of the work and too high roll pressures which may soften the surface and cause spalling and cracking. Also in *Heat Treating Forging* **25**, 598–603, 615–16(1939). S. Epstein

Fatigue of boiler iron. N. N. Afanas'ev. *Vestnik Metalloprom.* **19**, No. 3, 28–34(1939).—Fatigue tests were made at 350° and room temp. during repeated bending in one plane with boiler Fe of av. quality and contg. about 0.15% C. The fatigue limit at 20° was lower than at 350°. Holes in the sheets reduced the fatigue limit by 30%. Compression increased the fatigue as did aging after riveting. The results are compared with literature data. B. Z. Kamich

Crosshead speed vs. rate of strain. Lawford H. Fry. *Metal Progress* **37**, 46–8(1940).—An analysis of expts. with screw-driven testing machines shows loading of the tensile specimen at a continually varying and increasing speed despite const. screw speed. The yield point of steel is not very sensitive to these normal variations. The hydraulic machine permits rate of loading at any desired value. W. A. Mudge

Barrel polishing. E. G. West. *Machinery* (London) **54**, 713–17(1939).—Gray-iron castings fill a horizontal steel barrel from ¾ to completely full. A quantity of sand or emery is added together with water. Sometimes 10% H_2SO_4 is added to remove scale. Speed varies from 25 to 50 r. p. m., total running time from 36 hrs. for malleable to 60 and 90 hrs. for gray cast iron. Brass and bronze are usually treated in an open, inclined barrel. Sand, powd. pumice, coke, glass powder or other abrasive can be used in quantities varying up to the same vol. as the charge; the mixt. is covered with water. The operation takes 10 to 20 hrs. Light loading and low speed are used for Al castings. Richard P. Seelig

Pickling tanks. L. Vielhaber. *Emailwaren-Ind.* **16**, *Beizerei* 33(1939).—The best solution of the pickling-tank problem is to line concrete or masonry tanks with acid-proof metal, such as bronze or monel. Rubber-lined iron tanks are mentioned. M. V. Condoide

The study of metals and alloys. Morris Cohen. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 52–8(1939).—An address. Leopold Scheflan

The deep drawing of aluminum. A. G. C. Gwyer and P. C. Varley. *Metallurgia* **21**, 19–22(1939).—The ability to withstand repeated drawing operations without intermediate anneals, its lightness, nontoxicity, cleanliness and attractive appearance are increasing the use of Al and its alloys for deep drawing. Favorable drawing conditions are discussed. Expts. showing that the thinner the metal the less is the possible reduction on drawing are described. J. L. Gregg

Absorption of hydrogen by chromium. I. E. Adadurov, N. I. Pevnyi, I. F. Rivlin and G. P. Kushta. *Trudy Kharkov Khim.-Tekhnol. Inst. S. M. Kirova* **1**, 12–18 (1939).—Cr does not absorb H. The addn. of Cr to Pt does not affect its catalytic activity. The increase of stability of Pt and of steels contg. Cr is connected with the fact that Cr does not absorb H and when added to alloys lowers their absorbing power. M. V. C.

Nickel additions to high purity copper. Torsional properties. W. F. Chubb. *Metallurgia* **21**, 7–10(1939).—Torsional properties of O-contg. and O-free Cu alloys contg. up to 0.5% Ni were detd. The rigidity modulus and the limit of proportionality increased as the Ni content increased. J. L. Gregg

Nickel's role in milling equipment. John E. Kerr. *Eng. Mining J.* **140**, 54–7(Dec., 1939).—Alloyed steels and irons contg. Ni find many uses in crushing and grinding and ore treatment. Ni-Cr-Mo steels possess excellent depth-hardening characteristics and are used in jaw crushers, gyratory crushers and rolls. Tables show the materials used for these parts. W. H. Boynton

Pure silicon. A. B. Kinzel and Thomas R. Cunningham. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* **1138**, 5 pp.(1939).—A review of properties of Si in purified form of com. product. C. L. Mantell

Making engravers' zinc. A. G. Arend. *Process Engraver's Monthly* **45**, 254–5(1938); *Phot. Abstracts* **19**, 50.—Improved methods of manuf. include the use of electromagnetic fields to heat and stir the metal without oxidation. Sheets are rolled separately, the tolerance of thickness being maintained to 0.001 in. Pits in the finished sheet are punched-up from the back, an optical device being used to control the operation. The plates are polished, and test etchings are made on them before they are placed on the market.

Pseudomorphism in quenched and tempered railroad tires. I. N. Frantsevich, M. S. Borushko and N. F. Lashko. *Stal* **9**, No. 7, 51–60(1939).—Specimens of steel contg. 0.52% C quenched from 880° and drawn at 540–700° developed a pseudomorphic sorbitic structure oriented like martensite which had a low impact resistance. This structure can be avoided by quenching from 950°. H. W. Rathmann

The prevention of flakes by holding railroad rails at various constant temperatures. R. E. Cramer and E. C. Bast. *Trans. Am. Soc. Metals* **27**, 923–30(1939); cf. *C. A.* **33**, 6769⁴.—The formation of flakes was prevented in 2-ft. specimens of 131-lb. rails by holding 3 hrs. at 1100°F.; 4 hrs. at 900° and 700°F.; and 5 hrs. at 500°F. The steels contained 0.75 to 0.78% C and were etch tested for 1 hr. in a 50% soln. of hot HCl followed by a ½-hr. immersion in a hot 10% soln. of Na-pyrophosphate to prevent corrosion. W. A. Mudge

Rational method of cementation. M. M. Kuz'mina. *Mashinostroitel* **8**, No. 6, 17–19(1938).—In testing various carburizers the following mixt. was found most satisfactory: 75% charcoal, 15% Na_2CO_3 and 10% $BaCO_3$. Addn. of $CaCO_3$ and NH_4 salts did not affect noticeably the cementation of the steels. Tentative heat-treatments are suggested. B. Z. Kamich

Synthesis of gas suitable for cementation operations. S. I. Privalov, M. K. Chukavin, V. P. Zueva and N. P. Ogarkov. *Vestnik Metalloprom.* **19**, No. 1, 85–91(1939).—Gas suitable for cementation of steel was prepd. by synthesizing CH_4 from CO, CO_2 and H_2 in the presence of a catalyst comprising pumice stone impregnated with a soln. of $Ni(NO_3)_2$ contg. 15% powd. Cr_2O_3 and reduced with H_2 at 350°. The life of the catalyst was indefinite provided the temp. did not exceed 500–600° and its surface remained clean. The temp. in the retort was maintained at 400°. If the starting gas has 4–5 times as much H_2 as

$CO + CO_2$ the resulting gas did not have to be scrubbed of the CO_2. B. Z. Kamich

Anticementation paste. A. Agatov. *Khim. Mashinostroeinie* 8, No. 6, 29–30(1939).—A paste suitable for protecting metal surfaces against cementation consists of CuCl, $CuCl_2$, PbO and Bakelite. The following 3 modifications were used with satisfactory results: (1) 500 g. CuCl and 200 g. red lead are mixed with an alc. Bakelite soln. (4:1) to give the desired consistency; (2) 600 g. $CuCl_2$ and 200 g. red lead are mixed with 600 cc. alc., cooled, and mixed with 150 cc. of the alc. Bakelite soln.; (3) 300 g. $CuCl_2$, 300 g. CuCl and 200 g. red lead are mixed with 300 cc. alc., cooled, and mixed with 200 cc. of the alc. Bakelite soln. Best results were obtained with the first type of paste. B. Z. Kamich

Quantitative investigation on the cementation of iron and the decarburization of steels. Seizirо Simura. *Tetsu-to-Hagane* 25, 851–74(1939).—In investigating the cementation of pure iron and the decarburization of carburized high-carbon steels, a dilatometer was used whereby the inner atm. was varied freely. Thin tubular specimens, 8 mm. in outer diam., 0.75 mm. in wall thickness and 100 mm. in length, were taken as standard; they were heated at certain const. temps. for a long time in a tubular heat-resisting carburizing box, in which solid carburizing materials were placed or gas current was applied. Since austenite increases remarkably in vol. as the cementation proceeds, and contracts by decarburization, the stages of various changes accompanied with these phenomena were traced under various conditions in the carburizing box, by measuring the dilatation of the specimens. M. Ishida

The Rennerfelt-Kalling process for the decarburization of solid granulated pig iron. B. Kalling and I. Rennerfelt. *Stahl u. Eisen* 59, 1077–82(1939).—See *C. A.* 33, 7253[3]. S. Epstein

Influence of graphite ladle additions on the mechanical properties of gray cast iron. A. H. Dierker, R. P. Schneider and H. H. Dawson. *Ohio State Univ. Studies, Eng. Expt. Sta. Repts.* 8, No. 4, 3–6(1939).—Certain foundries add graphite to the iron at the spout during casting, especially to thin sections. The influence of such addns. (approx. 0.11%) using various grades of graphite was investigated. Chill depth, transverse strength, deflection, tensile strength and Brinell hardness were detd. on bars of difference size. Graphite ladle addns. definitely reduce the chilling tendency of cast iron; any appreciable influence on the mech. properties could not be found, however. Richard P. Seelig

Antifriction and abrasion-resisting qualities of cast iron. Masahiro Tasaki. *Imono* 9, 613–21(1939).—Coulomb's law of friction holds for steel-to-steel contact up to a load of 7 kg./sq. cm. and the coefficient of static friction is independent of the load; above the load limit, the coeff. becomes large and variable with accompanying roughening of the friction surface. Between 2 cast-iron surfaces and between surface of steel against a Cu-Pb alloy the law holds up to a load of 280 kg./sq. cm. and the friction surfaces remain smooth. The coeff. of kinetic friction varies with the speed and does not obey Coulomb's law. M. Ishida

Porous antifriction metalloceramic cast iron. M. Yu. Bal'shin and N. G. Korolenko. *Vestnik Metalloprom.* 19, No. 3, 34–41(1939).—The manuf. of metalloceramic cast Fe is discussed under the headings of (1) selection of materials, (2) grinding of the cast iron, (3) preliminary annealing, (4) mixing, (5) pressing, (6) caking and (7) reduction to proper size. The best starting materials are cast irons with min. content of Si and other addns. Si should not exceed 1.7% and optimum content is 0.8–1.3%. White cast iron is preferred to gray or forged because it is not subject to flattening and cleavage during grinding although the last 2 types are to some extent more economical. Grinding of the material to 150–200 mesh is considered adequate for cold pressing. The most satisfactory annealing temp. is 750–900°, the duration depending upon the degree of graphitization desired. Pressure required varies from 2000 to 5000 kg./cm. depending on porosity and size of the object. The optimum temp. for caking is 1100° for periods of 30 min. to 2 hrs. and cooling should be done gradually. B. Z. Kamich

Original or remelted aluminum for deoxidation of iron and steel? E. Piwowarsky. *Aluminium* 21, 744–6 (1939).—The discussion of the question whether for the purpose of deoxidizing steel, Al should be used as it comes from the original raw material (as is still requested by many steel men) or if remelted Al could be used, leads P. to conclude that at present the quality of remelted Al is perfectly satisfactory for all industrial purposes. Two types of remelted Al are now on the market (in Germany) of the following compns.: USt-AlI, less than 4% Cu, trace Sn, less than 0.05% Zn, less than 0.3% Pb, higher than 92% Al, the remainder Fe-Si-Ni-Mg-Mn-Ti-Co-Cr; and USt-AlII, with less than 4% Cu, less than 0.2 Sn, less than 0.8 Zn, less than 0.5% Pb, more than 90% Al, and the same remainder as for USt-AlI. As only 0.05–0.1% Al is used for deoxidation, and 0.2% max. for nonaging material, the other impurities which get into the steel with it are of no practical consequence. Si, on the contrary, is of great advantage, as even a few tenths % of Si makes the steel less sensitive to overheating, and above 0.2–0.4% increases the uniformity of hardening in eutectoid steels. Killed steel and cast steel require addns. of 0.15–0.45% Si; for deep-drawing steels the content must be kept below 0.1%. C steels for tool steels should contain 0.1–0.6% Si, structural steels 0.1–2.0%, alloy steels for hot working 0.2–2%, and spring steels 1–3%. M. H.

Steel in 1939. Walter S. Tower. *Mfrs. Record* 109, No. 1, 32(1940).—A survey. Leopold Scheflan

Measuring the temperature of molten steel. Takesi Sugano. *Tetsu-to-Hagane* 11, 933–44(1939).—To increase the accuracy of measurement by the optical pyrometer, a study was made of (1) the personal error of the observer, (2) the emissive power of the liquid steel in the ladle, and (3) fall of the temp. in the ladle during pouring. By the simultaneous use of a standard lamp and a standard optical pyrometer, (1) was detd. to be ±10° at the max. By comparing the true temp. detd. by the Fe-W thermocouple with the brightness temp. by the optical pyrometer, av. emissivities in the ladle were for the arc furnace, 0.55 for Ni-Cr steel, 0.56 for Cr-Mo-steel, 0.53 for Ni-Cr-Mo steel and 0.52 for carbon steel. In the open-hearth furnace, where the data are insufficient, the total av. value is 0.52. The fall of temp. during the pouring of the steel in the ladle varies for slag thicknesses of 0.4 to 1.0 cm. from 40° to 20°. M. Ishida

Manufacture of nitrided crankshafts. S. F. Yur'ev. *Vestnik Metalloprom.* 19, No. 5, 41–55(1939).—The warping of crankshafts during the nitriding process is caused by (1) internal stresses resulting from previous treatment and (2) the wt. of the crankshaft at high temps. The first type of deformation can be decreased by properly regulating the manuf. of the crankshafts while the second type can be eliminated completely by constantly rotating the crankshafts during the heating, nitriding and cooling. A nitriding furnace suitable for these operations is described. B. Z. Kamich

Nitriding of steel during quenching. V. I. Prosvirin and A. P. Belova. *Vestnik Metalloprom.* 19, No. 6, 57–64(1939).—Ball-bearing, C and other steels were nitrided in NH_3 (dissocn. 50–70%) at temps. of 550–840° prior to quenching by dropping them through a vertical tubular furnace into the oil without coming in contact with the air. The treated steels showed high surface hardness and resistance to corrosion in water. The anticorrosive properties were not decreased by tempering after quenching. The specimens showed no brittleness and the surfaces were highly wear-resistant. B. Z. Kamich

Nitriding of high-speed tool steel. N. P. Petrov. *Stanki i Instrument* 9, No. 5, 20–3(1938).—High-speed tool steel contg. C 0.72, Cr 3.80, W 17.27 and V 0.54% was nitrided in a closed bath contg. NaCN 90.7, KCN 3.75% and the rest Na_2CO_3 and NaOH. Nitriding was done at 520, 550 and 580°. At 520° the av. increase in the depth of the nitrided layer was 0.8–1.0 μ/min., at 550° it was

1.8–2 μ/min., and at 580° it was 2.0–2.5 μ/min. The nitrided layer had a finely dispersed eutectoid structure devoid of carbides. Cutting tools were also nitrided at 500, 520, 560 and 580° for 5, 10 and 15 min. The increased cutting speed was dependent upon the bath compn., time of nitriding and temp. Tools which were nitrided for 15 min. at 520° in the above bath showed the greatest increase in speed of cutting. B. Z. Kamich 1

Introductory study of the nitriding of hardened high-speed steel by the use of molten cyanides. J. G. Morrison and J. P. Gill. *Trans. Am. Soc. Metals* **27**, 935–1011 (1939).—The paper is a detailed introduction of a comprehensive investigation of the process of surface hardening of hardened high-speed steel by immersion in a molten cyanide bath. The steel used contained 0.70 C, 4.0 Cr, 1.01 V and 18.0 W. Part I includes (*a*) compn. of nitriding bath, (*b*) chem. reactions which take place, (*c*) aging of the bath, (*d*) contamination of the bath from Ni pots or thermocouple protection tubes, and (*e*) the galvanic characteristics of the bath. Part II includes (*f*) N content, (*g*) hardness, (*h*) microstructure, and (*i*) appearance of nitrided surfaces. The appendix gives a method of analysis for *detg. N in steel.* W. A. Mudge 2

Isothermal transformation in steels. Edmund S. Davenport. *Trans. Am. Soc. Metals* **27**, 837–86(1939).—See *C. A.* **34**, 3557. W. A. Mudge 3

Heat-treatment and properties of EI172 steel—a substitute for high-speed steel. M. V. Pridantsev. *Stal* **9**, No. 7, 35–40(1939).—Steel contg. C 1.00–1.15, Si 1.1–1.7, Cr 11.0–13.0, V 2.1–2.5, Mn less than 0.4 and S and P less than 0.03% was quenched from 1100–1300° in oil and drawn at 500–575°. The best quenching temp. was 1240°. The hardness after quenching was 53–58 Rockwell "C." The optimum draw was at 540° for 6–8 hrs., preferably followed by 2 1-hr. draws at the same temp. Drawing increased the hardness of the steel to 62–64 Rockwell "C." The residual austenite in the steel after quenching did not transform into martensite while at the drawing temp. but changed in compn. owing to pptn. of carbides. After drawing the austenite transformed into martensite on cooling below 200°. The hardness of this steel was slightly less at 500–600° than that of steel contg. W 18, Cr 4 and V 1%. When V was on the high side the lower C limit was definitely too low to obtain max. hardness. H. W. Rathmann 4

The tempering of high-speed steel. Morris Cohen and P. K. Koh. *Trans. Am. Soc. Metals* **27**, 1015–46(1939).—X-ray, hardness, sp. vol., elec. resistance, metallographic, dilatometric and magnetic measurements on hardened specimens, tempered at several temps. for periods ranging from 1 min. to several hundred hrs., were made to study the mechanism of tempering and secondary hardening of 18–4–1 high-speed steel. Four overlapping stages are defined; (1) decompn. of tetragonal martensite with pptn. and coalescence of cementite in a highly alloyed ferrite matrix, (2) pptn. of complex carbides from the residual austenite, (3) transformation of the residual austenite, and (4) pptn. of complex carbides from the ferrite matrix of state (1), and the re-soln. of the cementite. The initial softening of the steel is due to (1); the secondary hardening results from (2) and (3); and (4) is not encountered in normal com. tempering. Single tempering does not remove internal stresses because austenite transforms during cooling. Multiple tempering results in incremental transformation during successive coolings so that stresses are relieved and martensite is toughened by the subsequent heatings and may therefore result in slightly lower secondary hardness than the single tempering. W. A. M. 5

New high-speed tool steel. K. Osipov. *Novosti Tekhniki* **1939**, No. 23–24, 28–9.—The following 2 steels were found satisfactory as substitutes for the high-speed steel of 18% W: (1) C 1–1.2, V 2.8–3.5, Mo 2.5–3.5, W 2.5–3.2, and Cr 3.8–4.5%, and (2) C 1.2–1.4, V 3.5–4.5, Mo 2.5–3.5, W 2.5–3.2 and Cr 3.8–4.5%. The steels should have the following properties: Brinnel hardness of 255–207 after annealing, 63–65 Rockwell scale C after hardening, and 63–65 Rockwell scale C after tempering. Heat-treatments are described. B. Z. Kamich 6

A hardenability test for shallow-hardening steels. W. E. Jominy. *Trans. Am. Soc. Metals* **27**, 1072–85 (1939).—The end cooling principle has been successfully used to measure the hardenability of shallow-hardening steels contg. 0.96 to 1.20% C. Descriptive details are given and illustrated with curves and photomicrographs. W. A. Mudge 7

Experiments with a new creep-testing apparatus on the course of time-elongation curves of different steels. H. Esser and S. Eckardt. *Arch. Eisenhüttenw.* **13**, 209–22 (1939).—Discrepancies often found in the results of evaluation of creep curves led to a modification of the app. generally used in which special attention was paid to concussion- and vibration-free suspension and the lever system for the transmission of the movement of the specimen to the recorder. Curves taken with this instrument show that in a test of 4.5 hrs. duration the curve has a purely parabolic shape up to 500°, so that they can be represented by a straight line in a double-logarithmic coördinate system and extrapolated more correctly. A test of 12–14 hrs. is considered sufficient for all practical purposes. This parabolic shape permits the derivation in connection with discontinuity points, of certain characteristics of the material which is explained at length by the example of several plain and alloy steels. Nine references. M. H. 8

Effect of temperature of hardening and tempering upon the deformation of steel. A. I. Samokhotskiĭ. *Vestnik Metalloprom.* **19**, No. 4, 67–9(1939).—Specimens of steel contg. C 1.04, Mn 0.22, Si 0.27, P 0.031 and S 0.017% were quenched at 700, 740, 770, 800 and 830° and tempered at 300, 500 and 700°. Regardless of the quenching temp. an increase in the tempering temp. gradually decreased the sp. vol. in comparison with the quenched condition. By increasing the quenching temp. the sp. vol. increased. B. Z. Kamich 9

Effect of austenite grain size in steel upon the properties of machine parts. I. S. Kozlovskiĭ and M. A. Leonov. *Vestnik Metalloprom.* **19**, No. 2, 56–73(1939).—This paper deals with the relation between the grain size of austenite and the mech. properties of machine parts made on a mass production basis. On the basis of the results obtained suggestions are offered for obtaining the proper grain size for various machine parts. B. Z. Kamich 10

Improvement of the quality of freshly rolled steel on storage. István Gállik. *Anyagvizsgálók Kozlönye* **17**, 79–105(1939).—Aging had no effect on the tensile strength, yield point and uniform elongation of steel samples. The increase of total elongation was little, that of contraction and cohesion, however, more important. The qual. improvement is not connected with hardness or the shape of the sample. Soft steels reached the max. qual. improvement within 1–2 days; hard rail steels, in a few weeks. Mn retards the improvement. The foot of the fresh rail is regularly better than the head. On aging the head improves more than the foot. S. S. de Finály 11

Resistance to caustic embrittlement of boiler plate steel in relation to its aging sensitivity, heat-treatment and aluminum content. F. Nehl and W. Werner. *Stahl u. Eisen* **59**, 1155–7(1939).—Six boiler steels contg. 0.06 to 0.23% C, two of which were killed with Al to give 0.048 and 0.044% residual Al contents were cold worked and aged to det. the loss in impact resistance on aging. Also "Jones" caustic embrittlement tests were made, by immersing specimens bent by clamping into hot caustic $Ca(NO_3)_2$ and NH_4NO_3 solns. The specimens were tested in the as-rolled condition, after annealing, after quenching, and after normalizing and annealing. There was no definite relationship between aging embrittlement by the impact test and caustic embrittlement. Low-C steels showed a greater tendency to intercryst. corrosion by caustic than higher-C steel; so that it appears best for resistance to caustic not to go under 0.15% C. On the addn. of Al caustic embrittlement was only improved when the steel contained over 0.04% Al. In steels not killed with Al or with low Al content resistance to caustic embrittlement was obtained by annealing or normalizing and annealing at 730° to 780°, or quenching and similar annealing. Air cooling from the annealing temp. gave about 12

the same resistance as furnace cooling. Surface decarburization materially raised the sensitivity to caustic embrittlement. S. Epstein

The study of high-strength austenite stainless steel sheet for aircraft construction. Sozi Hori and Hidekiti Ōhasi. *Tetsu-to-Hagane* **25**, 875–80(1939).—The yield strength or proportional limit of 18/8 stainless steel was raised to a considerable extent by the age-hardening of previously cold-rolled sheet. This property, however, can be developed most effectively by the addn. of some suitable elements to the plain 18/8 alloy. The authors made some expts. on the influence of Ti (5 test samples with a Ti content varying from 0 to 1.6% were used) on the mech. properties in connection with the degree of cold-rolling and the temp. of aging which they receive. From the results, it is found that a marked increase of the yield strength can be obtained by the appropriate aging of cold-rolled sheet to which 0.5% Ti has been added. M. I.

Chromium steel castings. E. K. Smith. *Metal Progress* **37**, 49–54(1940); cf. *C. A.* **33**, 1029.—Mech. properties and some uses for cast 21 to 29% Cr steels, low-Cr (1 to 5%) steels and Cr-Ni steels, contg. 15 to 29% Cr and 8 to 35% Ni, are given. Cb reduced impact strength of the high-alloy stainless steels and of the low-Cr steels; with the latter, resistance to oxidation was increased and air hardening prevented. Ti prevented air hardening and lowered yield and tensile strengths. The use of N-bearing ferro-Cr improved grain refinement and ductility. W. A. Mudge

Characteristics of 5.0 and 7.0 per cent chromium steels with varying molybdenum and vanadium content. W. G. Hildorf, C. L. Clark and A. E. White. *Trans. Am. Soc. Metals* **27**, 1090–1113(1939).—Short-time tensile tests at room temp. and 1200°F., rupture tests at 1200°F., and microscopic examns. of 5.0 and 7.0% Cr steels, contg. 0.50 to 2.0% Mo and 0.0 to 1.0% V (21 steels total), show that: (1) Mo continuously increases strength, and (2) V decreases strength when greater than 0.50% for the 5.0% Cr steel and greater than 0.18% for the 7.0% Cr steel. The difference is explained microstructurally in terms of the amt. of the δ-constituent present. For the same Si content, an increase in Cr from 5.0 to 7.0% did not appreciably influence the rupture strength of the steels contg. 1.0% or more Mo, while it decreased the rupture strength of all steels contg. V. W. A. Mudge

The effect of columbium on the properties of chromium-molybdenum and nickel-chromium steels. Yukio Ōkura and Zinpei Ōmori. *Tetsu-to-Hagane* **11**, 964–75(1939).—Effects of Cb on the phys., mechanical, chem. and welding properties of low-carbon Cr-Mo steels and medium-carbon Ni-Cr steels were studied, Cb is a valuable alloying element for low-alloy steels; it has several advantages such as inhibition of air-hardening characteristics, increasing strength at high temp., increasing corrosion and oxidation resistances and the improvement of weldability, although it lowers the impact value. M. Ishida

A discussion of leaded steels. F. J. Robbins and G. R. Caskey. *Trans. Am. Soc. Metals* **27**, 887–915(1939); cf. *C. A.* **33**, 9248[5].—Addns. of 0.15 to 0.30% Pb were made to several selected grades of S. A. E. C steels. Mech. and machining tests and the practical aspects of fabrication show an opportunity for substantial savings in machining and fabrication costs without sacrifice in mech. dependability. Production difficulties are rapidly being overcome. Detailed data are given. W. A. Mudge

Nickel steel and the hydrogenation of fuels. Charles Berthelot. *Japan Nickel Rev.* **7**, 323–36(1939); cf. *C. A.* **33**, 2088[3]. E. H.

Steel, corrosion-resisting; bars and forgings. *Federal Specification* QQ-S-763, Apr. 20, 1939. **Aluminum-alloy, forgings, heat-treated.** *Ibid.* QQ-A-367a, May 23, 1939. **Tubing, aluminum-alloy (AL-3) (aluminum-manganese).** *Ibid.* WW-T-788a, May 23, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office, 5c each. L. Wilson Greene

Recent progress on the structure of alloys. Mario A. Rollier. *Chimica e industria* (Italy) **21**, 615–22(1939).—A summary, including tabulated data on alloys contg. the rarer metals. A. W. Contieri

The microscopic analysis of intermediate phases in some age-hardening alloys. Marie L. V. Gayler (Mrs. Haughton). *Proc. Roy. Soc.* (London) **A173**, 83–91 (1939); cf. *C. A.* **33**, 2456[1].—It was shown in a 4% Cu-Al alloy that the intermediate phase α $CuAl_2$ is metastable and becomes β $CuAl_2$ on aging by a polymorphic change. In a 4% Cu, 0.5% Mg alloy a second intermediate phase assocd. with ternary Al-Cu-Mg was observed in the (100) planes. In Duralumin a buff-colored phase distinct from either α or β was found after prolonged aging at 250°. 11 references. J. N. Lynn

Modern antifriction alloys. L. G. Gershenfel'd. *Mashinostroitel* **8**, No. 4, 17–21(1938).—The properties, compn., and manuf. of modern antifriction alloys are reviewed. B. Z. Kamich

Lapping hard-alloy tools. E. N. Malyuchkov and M. L. Gol'man. *Stanki i Instrument* **9**, No. 11, 21–6(1938).—Results are given on lapping with various abrasive materials and with B carbide pastes. Under factory conditions lapping can be carried out with B carbide pastes (graining 28–40 μ) and a circular speed of the disk equal to about 1 m./sec. B. Z. Kamich

Magnetic test for superstructure in Permalloy. S. T. Pan. *Phys. Rev.* **56**, 933–6(1939).—A search for indirect evidence for the existence of superstructures $FeNi_3$ and Fe_2Ni_2 by a magnetic method is described. A preliminary test showed that annealing at a temp. around 450° for 2 to 3 days followed by slow cooling at a rate of about 40° per hr. increased the satn. magnetization by 3.9% in Permalloy and 1.3% in Hipernik over the values found after the alloys were quenched from above 900°. These increases were reproducible and the magnitudes depended somewhat on the exact way of heat-treatment. It would thus appear likely that at least partial order exists in the annealed alloys. Subsequent measurements taken after annealing at, and quenching from, different temps. showed that the assumed ordering process takes place in temp. ranges 640–400° and 800–400° for the 76Ni-24Fe and 50Ni-50Fe alloys, resp. The satn. magnetization vs. temp. curves for the quenched and the slowly cooled states of the 76Ni-24Fe alloy have also been taken. At a rather slow cooling rate, about 30° per day from 700° to room temp., the increase in satn. value at room temp. is 6.0%. All these results agree very well with those just reported by McKeehan and Grabbe (*C. A.* **33**, 3650[8]) and Leech and Sykes (*C. A.* **33**, 7168[2]). B. Lewis

The use of aluminum alloys in aircraft. W. C. Devereux. *Metallurgia* **21**, 11–14(1939).—The advantages of Al and its alloys are pointed out and some parts made from such materials are described. J. L. Gregg

Diffusion of beryllium in copper and its alloys. N. A. Filin and M. L. Shtil'man. *Metallurg* **13**, No. 12, 93–8 (1938).—Cu, Cu-Al alloy contg. 8% Al and Cu-Zn alloy contg. 10% Zn were heated in Be powder at 600–800° for 2–10 hrs. and depth of Be diffusion was detd. by hardness tests and micrographic examn. Max. diffusion at 800° in 10 hrs. was 1 mm. for pure Cu, 3 mm. for the Cu-Al alloy and 0.3 mm. for the Cu-Zn alloy. H. W. R.

Chromium alloys for use in the chemical industry. V. K. Pershke and Kh. L. Tseĭtlin. *Khim. Mashinostroenie* **1938**, No. 5, 42–4; *Khim. Referat. Zhur.* **2**, No. 3, 137 (1939).—Cr cast iron (35% Cr) and Cr steels (EYa I (18% Cr and 8% Ni), EI 100 (12% Cr, 8% Mn and 3% Ni), EZh 17 (17% Cr), "furadit" (26% Cr), "fekhral" (14% Cr and 4% Al)), ordinary cast iron, boiler iron, Pb and Al were tested for corrosion resistance in the processes of acetylation, chlorination, phenylation, tolylation, sulfonation and nitration. The Cr cast iron and steels corroded not at all, or much less than ordinary cast iron, Fe, Pb and Al. W. R. Henn

Constitution and properties of ternary alloys in the copper corner of the copper-aluminum-beryllium system. N. A. Filin and L. L. Iokhel. *Metallurg* **13**, No. 12, 81–92 (1938).—The ternary diagram for Cu alloys contg. up to 5% Be and 12% Al consists of 4 fields of primary pptn., ternary solid soln. α, β, β′ and γ′. Addn. of Al increases

the hardness of Cu-Be alloys in the cast, annealed or quenched state. All alloys lying outside of the α solid soln. are subject to aging at 200–400°. H. W. R.

Copper-rich nickel-aluminum-copper alloys. III. Effect of heat-treatment on microstructure. W. O. Alexander. *J. Inst. Metals* **65**, Advance copy No. 853, 14 pp.(1939); cf. *C. A.* **33**, 2090⁸.—Of the series, only the alloys of 5% Ni with 1.5–4% Al, 6% Ni with 1–4% Al, 8% Ni with 1–6% Al, and 10% Ni with 1–4% Al showed thermal arrest points. After various heat-treatment they were examd. microscopically. The limit of α solid soly. decreases with the fall of temp. and results in the rejection of the 2 phases θ(Ni_3Al) and NiAl either singly, or, within a narrow compn. range, together. Alloys such as one contg. 6% Ni and 6% Al are hardened by pptn. of the Ni-Al solid soln. phase from the solid soln. Alloys contg. a relatively small percentage of Al and of varying Ni content are heat-treatable owing to the breakdown of the α solid soln. to produce θ(Ni_3Al). The breakdown mechanism is indicated by the microstructure after heat-treatment: (1) recrystd. stable "ragged" grain structure as developed by quenching and tempering treatments, (2) lamellar sepns. of α and θ in eutectoid form accompanied by recrystn. of the matrix, obtained by cooling at the rate of 33° per day from 700° to 600° and (3) the trefoil ppt. of θ(Ni_3Al) in α obtainable by cooling at 10° per day from 700° to 600°. David Margolis

Effect of composition upon physical and chemical properties of 10-carat gold alloys. Tracy C. Jarrett. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div.*, Pub. No. 1122, 9 pp.(1939); cf. *C. A.* **33**, 9257⁹.—When Ag is present in 10-carat Au alloys, the corrosion loss is greatly reduced and the brass yellow color softened. Ni is a whitening agent, tending to reduce corrosion loss and increase hardness, yield point, and ultimate strength, whereas Zn produces an opposite effect. C. L. M.

Aging of lead alloys containing antimony, calcium and barium. V. S. Lyashenko. *Metallurg* **13**, No. 12, 99–113 (1938).—Aging of binary Pb alloys contg. Sb 1.46–11.72, Ca 0.045–0.166 or Ba 0.24–0.53% at 20°, 50° and 80° was detd. by tensile tests, hardness, elec. resistance and microstructure. All alloys showed an increase in tensile strength and hardness. Elec. resistance of Pb-Sn and Pb-Ca alloys decreased on aging while that of Pb-Ba alloys showed no change. Max. tensile strength of Pb-Ca alloys was attained in 1–3 days at 80° after which it steadily decreased. H. W. Rathmann

The constitution of dilute alloys of lead with sulfur, selenium and tellurium. J. Neill Greenwood and Hill Wesley Worner. *J. Inst. Metals* **65**, Advance copy No. 854, 11 pp.(1939).—Solid soly. at 300° of S, Se and Te in Pb contg. less than 0.0005% impurities was studied by means of microexamn. and detns. of m. p. and elec. resistance. Deoxidized and vacuum cast ingots prepd. from dild. mother alloys were extruded into wire 2 mm. in diam. for the elec. resistance detn. by means of the Kelvin double bridge by Wolff. M. ps. were detd. to 0.1° with a modification of the app. used in m.-p. detns. of org. compds. The elec. resistance of wires (1) with 0.001% and 0.0005% S is 0.1% higher than for similarly treated pure lead; (2) with up to 0.001% Se in solid soln. is lowered from 20.65 micro-ohms/cc. for pure Pb at 17° to 20.61; (3) with 0.004% Te in solid soln. is increased to 20.70 micro-ohms/cc. The solid soly. in Pb of (1) S is less than 0.0001% by wt. or 0.0006 at. %; this is also the limit of soly. in molten Pb at the m. p. (2) Se is 0.0015% (0.004 at. %) at 300° and a eutectic of 0.005% Se m. 0.2° below the m. p. of Pb. (3) Te is 0.004% (0.0065 at. %) at 300° and a eutectic of 0.025% Te m. 0.7° below the m. p. of Pb. While the actual depression of the f. p. of Pb by addn. of these elements is small, the at. depression is very high. David Margolis

Alloys of magnesium research. IX. The constitution of the magnesium-rich alloys of magnesium, aluminum and silver. J. L. Haughton. *J. Inst. Metals* **65**, Advance copy No. 856, 10 pp.(1939); cf. *C. A.* **33**, 9259⁶.—The constitution of the alloys of Mg with Al and Ag were investigated up to about 40% Al and 50% Ag. A ternary eutectic is formed at 403° ± 1°, contg. 52.8% Mg and 28.2% Ag. Contour plans of the liquidus, secondary sepn., solidus and solid soly. surfaces are reproduced, as well as a no. of vertical sections through the constitution prism in the neighborhood of the ternary eutectic limits. Ag up to 5.2% is sol. in the Al-Mg solid soln. at the ternary eutectic temp. and does not appreciably alter the solid soly. of Al in Mg. Al up to 8.8% is sol. at the same temp. in the Ag-Mg solid soln. but it greatly reduces the soly. of Ag in Mg. The addn. of the third component to either of the binary systems increases the steepness of its solid soly. curve. 21 references. Iver Igelsrud

Tensile properties of rolled magnesium alloys. I. Binary alloys with aluminum, antimony, bismuth, cadmium, copper, lead, nickel, silver, thallium, tin and zinc. John C. McDonald. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1110, 12 pp.(1939).—The tensile properties of several Mg-base binary alloys were studied in rolled strips by a method adopted especially to eliminate comparisons in which the effects of working would play a part; rather, the results are comparable strictly on a basis of alloy compn. The following elements were studied up to the limits indicated: 9% Al, 7 Sb, 9 Bi, 18 Cd, 10 Cu, 11 Pb, 9 Ni, 12 Ag, 15 Tl, 10 Sn, 8 Zn. According to the desirability of their effect, the order becomes: Zn, Al, Ag, Tl, Cd, Ni, Cu, Sn, Pb, Bi and Sb. C. L. Mantell

Nickel alloys in the production, transportation, refining and combustion of oil. James A. Rabbitt. *Japan Nickel Rev.* **7**, 274–302(1939). E. H.

Nickel alloys in mining and utilizing coal. Sigeteru Niwa. *Japan Nickel Rev.* **7**, 313–22(1939). E. H.

Gas industry and nickel alloys. Giro Tomita. *Japan Nickel Rev.* **7**, 303–12(1939). E. H.

A high-strength silicon-brass die-casting alloy. A. U. Seybolt and Bruce W. Gonser. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1123, 10 pp.(1939).—After the tensile properties of a wide range of chill-cast Cu alloys of relatively low m. p. were investigated, an alloy was developed that seemed promising for use in die casting. This alloy has the following compn.: 83% Cu, 10 Zn, 5 Si, 1 Al and 1 Mn. C. L. Mantell

A study of the distribution of structural and physical characteristics throughout castings of red brass. A. M. Rahm. *Trans. Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1117, 15 pp.(1939).—Examn. of grain size, density, hardness, microstructure, chem. compn. and the usual data obtainable from tensile and impact tests was undertaken to establish general laws connecting various characteristics of red brass castings or to supply, at least, a substantial amt. of material for further study. C. L. Mantell

The system iron–cobalt–beryllium. W. Köster. *Arch. Eisenhüttenw.* **13**, 227–30(1939).—Fe forms with $FeBe_2$ a eutectic alloy series; the eutectic temp. is about 1155°, the Be content at this temp. is 11% and that of the α-solid soln. 8%. Co forms with CoBe also a eutectic alloy series, eutectic temp. is 1115°, and the Be content of the eutectic is 4.2% and of the γ-solid soln. 2.5%. The extent of the homogeneous space of the α-solid solns. solidifying from the melt was investigated in particular for ratios of Fe:Co of 2:1, 1:1 and 1:3. Four different phases were found in the Fe–Co–Be system: the α and γ phases and 2 Be compds. A mixing gap exists between the Fe-Be and Co-Be compd. in the solid state; this gap is, however, not very wide. The eutectic three-phase equil. melt E_1 (= solid soln. α_1 + $\vartheta_1(FeBe_2)$) of the system Fe–Be shifts with addn. of Co gradually to lower temps., and ends, together with the equil. of melt E_2 (= solid soln. ϑ_2 + solid soln. η_2) on the four-phase plane $\alpha_2 S_1 \vartheta_2 \eta_2$, at about 1100°. The Curie temp. of the homogeneous Fe-Co solid solns. is greatly reduced by Be; Co counteracts this reduction, as for the same Be content the Curie temp. increases considerably with Co content. The α-solid solns. with up to 25% Co and 7.5% Be were quenched from 1100° and tempered for half an hr. at different temps. Up to 300°, hardness of the alloys did not change, from 300 to 500° it increased, and beyond 500° it decreased slowly.

Max. Brinell hardness occurred at about 500° tempering with about 620 kg./sq. mm. Alloys poor in Co and Be attain the max. at about 700°. The hardness of the homogeneous alloys increases with increasing Co and Be. An alloy with 5% Co, 7.5% Be was tested for magnetic behavior for the same hardening treatment. The satn. increases from 400° tempering temp. to a max. at 700°; the change in magnetic satn. is a measure for the disintegration of the oversatd. solid soln. The sepn. is accompanied by an increase of remanence and coercive force, both of which reach a max at 600°; hardness increases from 300° and reaches max. at 500°. The Fe-Co-Be alloys are similar in magnetic behavior to the Fe-Co-W alloys, except that in the former the satn. increases with the disintegration. Martensitic alloys with 50% Co and 2–5% Be had immediately after quenching 80–100 oersteds coercive force at a satn. of 16,000 and a remanence of 5000 gausses. The binary Co-Be alloys with 1–2% Be were homogeneous after quenching with a correspondingly low coercive force of 5 oersteds, which increased on tempering at 700° to 80,105 oersteds at 14,000-gauss satn. and 5000-gauss remanence. M. Hartenheim

Electrical method for end-point determinations in the jet test for thickness of metal plating. A. J. Lindsey and L. E. Terrett. *J. Soc. Chem. Ind.* **58**, 288–90(1939).—In the jet test (cf. Clarke, *C. A.* **31**, 2568[9]) a stream of corrosive liquid is impinged under controlled conditions upon the surface of a plated metal object. The time required for the plating to disappear is a measure of the thickness of the metal coating. In order to overcome the difficulty in visually observing the disappearance of the plating, an elec. method was devised to indicate the instant at which complete removal occurs. In the app. developed a connection is made from a calomel electrode to the running stream of etching fluid by means of an agar jelly-KCl bridge tube. The standard jet and funnel reservoir are the same as those described by Clarke. The specimen, from one corner of which the plating has been removed, is connected to a galvanometer; the e. m. f. generated by the system being balanced by adjustment of a potentiometer. The latter is fed by a single-Pb accumulator. The galvanometer is a central zero pointer instrument with 0.2 microamp. per division sensitivity and a resistance of 770 ohms. The potentiometer resistance is rated at 400 ohms. To det. the thickness of a coating, the etching stream and a stop-watch are started simultaneously and the galvanometer needle is adjusted to the zero point as soon as possible. The watch is stopped when the needle begins a steady drift from zero. Tabulated data for visual and elec. measurements are given for the following coatings: Ni on brass, Zn on Fe, Cd on Fe, Ni on Ni-Ag (low Ni) and Ni on Ni-Ag (high Ni). The elec. method is quicker and more accurate than the visual method. L. Wilson Greene

Properties of hot galvanizing—shaping of pieces to be galvanized. W. Thalemann. *Oberflächentech.* **16**, 193–5, 199–202, 209–10(1939).—The importance of hot galvanizing as protection from corrosion is discussed. Of the yearly world production of 1.5 million tons Zn, about 900,000 are used for galvanizing, and 90% of the latter for hot galvanizing. The 3 processes most applied are the wet-galvanizing, in which the object is transferred wet as it comes from the pickling process after rinsing into the Zn bath, the dry-galvanizing, in which the object is first treated and dried before being placed in the bath and by which highly bright surfaces are produced, and the patenting galvanizing process, in which a thin Zn layer is deposited on a Pb or Pb-Mn layer. A corrosion-proof Zn layer is obtained only in a pure Zn bath, impurities might later create local elements which start corrosion. Hot galvanizing cannot be applied to objects which have to keep their dimensions exactly or the mech. properties of which suffer by the temp. applied. A galvanized object has 7 layers: (1) Fe, (2) diffusion layer ZnFe, (3) $FeZn_8$, (4) $FeZn_7$ (both hard Zn layers), (5) Zn (melt), (6) Zn hydroxide and (7) Zn carbonate. The impurities in the bath should not exceed 2%, viz., Fe 0.03, Pb 1.2, Cu 0.05, Al 0.05, Sn 0.20 and Zn oxide 0.05%. 1 An immersion of 1–3 min. produces a thickness of $^1/_{10}$–$^1/_{20}$ mm., about 350–700 g. per sq. m. for sheets, structures, etc., and for tubes $^1/_5$–$^1/_{10}$ mm. The thickness of the injurious hard Zn layers should be as small as possible. Besides control of correct temp. of about 460°, the immersion time should be as short as possible depending on the shape and wt. of the object. The life of a Zn coating deposit depends on the purity and thickness of layer 5, 2 its density, kind of attacking agents and on the mech. and phys. influences of the surrounding, in particular on the hard Zn layers. The corrosion resistance of Zn decreases in the order named for the following agents: atm. substances in closed rooms; cold tap and river water; air, rain and wind according to temp.; damp cement and plaster; sea water, about 2–4 times as corrosive as river water; distd. water, about twice as corrosive as sea water and 7 times as river water; emanations from wood, in- 3 creasing from maple over oak and pine to lime tree; free alkalies, e. g., K and Na lyes; dild. acids, acid oils, ammonia, all Cl compds., and galvanic elements and stray currents. Hints for selecting the proper galvanizing process, treatment of objects before and after, testing of the deposit especially for porosity, and cost (applicable mainly for German conditions) are discussed. Twenty references. M. Hartenheim

Types of attack of steel by zinc in hot galvanizing. W. 4 Radeker and R. Haarmann. *Stahl u. Eisen* **59**, 1217–27 (1939).—A discussion of attack by Zn on steel in galvanizing, particularly in galvanizing tanks. An instance is shown where ArCoFe was attacked much less by Zn than a 0.19% C 0.30% Si steel; but in very low-C steels with 0.05% C max. increase of the Si to 2% appreciably lowered the attack by Zn. In galvanizing tanks stresses formed by local differential heating of the tanks appeared to be a 5 cause of intercryst. Zn penetration and cracking. S. Epstein

Aluminum as surface protection for steel. H. Hoff. *Aluminium* **21**, 755–9(1939).—Al is capable of forming, in aq. solns., firmly adhering, electrically insulating films of alumina on steel; these protect the Fe as long as they exist (just as Zn deposits from hot-galvanizing). Tests made with a 0.5-mm. Fe sheet over 5 years show a change in wt., if the original sheet is 100%, after coating with Al 6 103, Zn 85, Pb 60, Sn 50%, without coating 15% of the original wt. by atm. corrosion. Several methods were developed to plate steel with Al by cold working, as no satisfactory process similar to hot-galvanizing has been found because of the formation of a compd. $FeAl_3$ at 500–600°. Rolling-on of Al foil can be done at room temp. or also at 300–400°; the latter process has the advantage that good adhesion is obtained with less rolling pressure while the cold process saves the heating furnace and inci- 7 dental work. Si and Mn added to Al shift the formation of $FeAl_3$ to higher temps. but as the best protection is obtained with pure Al, often a double-plating process is applied, at first an Al-Si alloy is rolled on upon which a pure Al foil is then rolled. The steel should be as soft as possible and free of Si, P, S and Cu as all these shift the recrystn. point to higher temps. so that it can be annealed (e. g., for deep-drawing steel) without changing the de- 8 sired structure. A steel was developed which has a recrystn. temp. of 520–530° and a beginning $FeAl_3$ formation at 570° which can be soft-annealed even after strong cold-deformation without defects. Al-plated Fe sheets can replace to a certain extent galvanized or tinplate; it has been employed successfully for bearing bushings as these have no tendency to freezing, and for the canning industry. M. Hartenheim

Some aspects of corrosion. Carlos J. Forn. *Bol. obras sanit. nacion* (Buenos Aires) **3**, 182–91(1939).—An 9 address, with special reference to *water systems*. O. W. Willcox

Discussion of problems related to corrosion and means of its prevention. V. A. Kistyakovskiĭ, *et al.* *Vestnik Akad. Nauk S. S. S. R.* **1938**, No. 6, 50–6; *Khim. Referat. Zhur.* **2**, No. 2, 135–6(1939).—A decrease of the S content from 0.06 to 0.02% increases approx. 10% the corrosion resistance of steel. An increase of the Cu content to over

0.25–0.30% does not increase noticeably the resistance of the steels. For best results the Cu content should be not over 0.3%. Discussion is included of subterranean corrosion of metals, means for overcoming the elec. corrosion processes, photoelec. methods of the investigation of the initial stages of corrosion, corrosion processes with the evolution of H, formation of oxide films on metals, prepn. of bright Zn deposits on metals by the electrolytic method, passivity of metals, passivators and activators, action of I vapors on metals, photogenetic phenomena during corrosion and effect of lyophilic colloids on the velocity of soln. of Fe in strong electrolytes. W. R. Henn

Corrosion tests with EW-treated and lacquered alloy sheets of the type aluminum-copper magnesium and those plated with aluminum, copper and magnesium. H. Wolf and H. Tuxhorn. *Aluminium* **21**, 767–72(1939).—The EW-process has the advantage over the MBV-process in that a purely chem. surface protection can be applied also to Al alloys contg. Cu; these, however, must be covered by an addnl. lacquer film. As the absorption of the EW layer for lacquers is inferior to that of the MBV layer a special lacquer was developed for this purpose (of a Na silicate base) which is colorless and gives an excellent corrosion protection; it dries quickly and requires only 5 g. per sq. m. surface. Numerous tests in atm. corrosion and HCl solns. were made and show almost no change of surface after 60 days. M. Hartenheim

A comparison of methods for estimating soil corrosivity. K. H. Logan. *Oil Gas J.* **38**, No. 27, 130, 133, 134, 136, 137, 138, 159, 160(1939).—A statistical comparison of available methods. W. Andrew Wright

Low-tin solders. V. S. Chernyak. *Mashinostroitel* **8**, No. 1, 44–6(1938).—The mech. properties of low-Sn (10–15%) solders were detd. at room temp. and at −183° and the results compared with high-Sn (33–50%) solders. The impact toughness of the low-Sn solders was 25–30% lower than for high-Sn solders, the decrease being considerable for those contg. Sb. The tensile strength of the low-Sn solders was about the same as that of high-Sn solders while those contg. Sb were stronger than 50% Sn 50% Pb. Brass sheets which were lap soldered were 15% weaker than those soldered with high-Sn solders. The impact toughness and tensile strength of 15% Sn solder increased at low temps. B. Z. Kamich

Rubber for pressing and forming of metals (Grodzinski) **30**. Galvanic action—in corrosion (Jorissen) **4**. Internal corrosion of gasoline pipe lines (Morris, Schulze) **22**. By-product fuels in steel industry (Fox, Clemmitt) **21**. Utilization of [blast-furnace] slags for production of cement (Tysskil) **20**. App. for magnetic sepn. of ore constituents (U. S. pat. 2,177,809) **1**.

Aston, James, and Story, Edward B.: Wrought Iron; Its Manufacture, Characteristics and Applications. 2nd ed. Pittsburgh: A. M. Byers Co. 97 pp. $1.

Bain, Edgar C.: Functions of the Alloying Elements in Steel. Cleveland: American Society for Metals. 312 pp. $4.

Halvorsen, Halfdan: Know Your Steel; Assemblage of Data on the Heat Treatments of Steel. Detroit: The Author. 107 pp. $2.

Kühn, Fritz: Geschmiedtes Eisen. Berlin: Ernst Wasmuth. 108 pp. M. 10.

The Engineering Properties of Gray Cast Iron. By Battelle Memorial Institute. Cleveland: Gray Iron Founders' Society. 56 pp. Reviewed in *Metals & Alloys* **10**, 681 (1939).

Korrosion. VII. Bericht über die Korrosionstagung. Nov., 1938. Berlin: VDI-Verlag G. m. b. H. 81 pp. M. 6. Reviewed in *Bull. Brit. Non-Ferrous Metals Research Assoc.* No. **123**, 246 (1939). Cf. *C. A.* **31**, 6176[1].

Aluminum metallurgy. P. G. Elizarov and V. N. Verigin. Russ. 51,794, Sept. 30, 1937. Al_2O_3 is heated *in vacuo* or in a neutral reaction zone in the presence of carbon-free reducing agents having a higher b. p. than Al that produce gaseous reaction products.

Ore froth flotation. Benjamin R. Harris. U. S. 2,177,985, Oct. 31. In a froth flotation process such as one for sepg. silica and siliceous materials from ores, use is made of a small proportion of a compd. of the general formula $RO[(CHY)_r(CHY)_rO_t]_m(CHY)_vN(A)\equiv$, where R is a high-mol.-wt. org. radical, Y is alkyl, H, or hydroxy or other anion, A is an anion, *s*, *m* and *v* are whole numbers, *r* is zero or a small whole number, *t* is zero or one, and at least one of the three indicated valence bonds attached to N is satisfied by a radical of the class consisting of alkyls, cycloalkyls, alkylols, aryls, aralkyls, aralkylols, and the radical of a heterocyclic ring of which the nitrogen is a member. In such compds., A may be a halogen and R may be a fatty acid acyl radical contg. 8–18 C atoms (numerous examples being given).

Briquetting finely powdered ores, blast-furnace dust, etc. Hungária Mütrágya-, Kénsav- és Vegyi Ipar R. T. Hung. 121,371, Sept. 1, 1939. The powd. substances are mixed with carbohydrate-contg. binders (molasses, sucrose, etc.) and pressed to briquets.

Apparatus (with an internal revolving cylinder and helical blades) suitable for sintering zinc ores, etc. Emil J. Bruderlin (to American Smelting and Refining Co.). U. S. 2,178,366, Oct. 31. Various structural and operative details.

Metallurgical furnace. William B. Boggs and Jack Parry (to M. H. Detrick Co.). Can. 385,083, Nov. 14, 1939. Structural details.

Automatic fuel regulation of open-hearth furnaces. Wm. C. Hogg and Lewis Rumford, II (Rumford to United States Steel Corp.). U. S. 2,177,805, Oct. 31. App. for regulating the temp. in a furnace of the regenerative type provided with means alternately to supply heat energy at opposite ends thereof, includes a pair of radiation-sensitive devices adapted to convert radiant heat energy into elec. energy having an intensity bearing a known relation to the temp. inducing the heat energy, means to irradiate each of the devices by radiation emitted by a portion of the inner refractory lining of the furnace which during each alternate heating of the furnace is subjected to the max. heating effects, means adapted to be actuated by the elec. energy thereby produced in the devices to lower and to increase the supply of heat energy to the furnace as the intensity of the elec. energy approximates max. and min. limits, resp., and means automatically to connect to the heat supply control means first one and then the other of the devices in synchronism with the alternate supplying of heat energy at opposite ends of the furnace.

Furnace regenerators suitable for use with open-hearth metallurgical furnaces. Wm. J. Irwin. U. S. 2,178,794–5, Nov. 7. Various structural features.

Water-cooled tuyères for blast furnaces or the like. Karl Steinbacher. U. S. 2,178,654, Nov. 7. Structural details.

Aluminum. Soc. internationale des carburants "Brevets Consalva," Soc. anon. holding. Belg. 432,408, Feb. 28, 1939. Alum is purified, converted to a mixt. of Al and K sulfides, and this mixt. reduced.

The treatment of waste materials containing aluminum and paper. Soc. de recherches et d'entreprises. Belg. 432,217, Feb. 28, 1939. The material is heated at a temp. sufficient to carbonize the paper without attacking the Al, disintegrated and sepd. pneumatically. The material is oxidized at a temp. sufficient to destroy the coloring matters without oxidizing the Al. If it is desired to recover the paper also, the waste material is treated with water or steam at above 100°, and sepd. by levigation.

Porous metal objects. Chester Tietig. Can. 385,061, Nov. 14, 1939. A mixt. of Cu powder 82–86, Zn powder a trace to 10, Al powder a trace to 1.2, graphite a trace to 1.2, and CuO 3–10% by wt. in finely divided condition is molded in desired forms at 12000–24000 lb. per sq. in., heated 1–3 hrs. in an atm. of H, and impregnated with lubricating oil. Cf. *C. A.* **33**, 526[4].

Purifying cadmium sponge containing zinc. Wm. J.

O'Brien (to Glidden Co.). U. S. 2,178,763, Nov. 7. The wet freshly pptd. sponge is gradually added to molten NaOH contg. borax and an alkali metal or alk. earth metal chloride or fluoride and heated to about 350–450° to melt the Cd, and the heating is continued until all of the water has been removed as evidenced by disappearance of foaming, with final heating to about 550° and sepn. of the purified Cd.

Metals for electrical switch contacts. Lyall Zickrick (to General Elec. Co.). U. S. 2,178,508, Oct. 31. Contacts contg. at least 85% of Cu or Ag together with 0.2–5% of Se are resistant to welding action upon heavy current inrush. The contact metal may also contain Pb 0.8–10%.

Heat-treatment of metal filaments such as those for use in incandescent lamps. Wm. P. Zabel (to General Elec. Co.). U. S. 2,179,367, Nov. 7. Various details of app. and operation for use with a nonoxidizing atm.

Heat-treating camshafts. Joseph D. Judge (to Hamilton Foundry and Machine Co.). U. S. 2,178,281, Oct. 31. App. is described, and a method of heat-treating a camshaft of heat-treatable cast iron which comprises heating the camshaft above its crit. temp., then subjecting only the cam lifts to a rapid quenching operation through the crit. temp. and to a temp. of only a few hundred degrees F. by air and water for hardening the cam lifts, rotatably moving the camshaft through a small angle while the rapid quenching operation is effective, cooling the remaining portions of the camshaft at a slower rate to a point somewhat below the crit. temp., and then quenching the entire shaft by immersion.

Heat-treatment apparatus suitable for carburizing metal articles. Albert C. Dames (to Timken-Detroit Axle Co.). U. S. 2,179,073, Nov. 7. A container is used having an enlarged portion for holding a heat-treating compd. such as a carburizing compd. adjacent a desired portion only of an article such as a pinion gear placed in the container for heat-treatment.

Carburizing pot. Thomas A. Frischman and Curtis G. Shontz (to Eaton Mfg. Co.). U. S. 2,178,683, Nov. 7. Various details of an interchangeable chimney-type sheet-metal carburizing pot suitable for use in carburizing ring gears, etc.

Hardening ferrous metal surfaces such as those of cams. Charles W. Dake (to Campbell, Wyant and Cannon Foundry Co.). U. S. 2,178,201, Oct. 31. The high point and camming surfaces of cast ferrous cams are radiantly heated from opposite sides by elec. resistance heating and then cooled (various details of app. and operation being described).

Metal bearings such as those for shafts. Randolph L. Strickland (to Detroit Aluminum & Brass Corp.). U. S. 2,178,149, Oct. 31. Bearings are formed comprising an outer supporting layer of hard metal such as low-C steel, an intermediate layer of soft readily conformable particle absorbing bearing metal such as a babbitt metal, and an inner bearing layer of metal such as pure Cu which forms a very thin hard coating or skin and prevents cracking of the intermediate layer.

Sheet porous metal suitable for bearings. Wm. G. Calkins and Anthony J. Langhammer (to Chrysler Corp.). U. S. 2,178,529, Oct. 31. For the manuf. of sheet porous metal, a mixt. including powd. metals having different m. ps., such as one contg. Cu, Sn, Pb, boric acid and graphite, is continuously fed directly between opposed arcuate surfaces of a pair of pressure rolls to compress the mixt. uniformly from opposite sides into sheet-like briquet form, followed by heating to a sintering temp. in a furnace having a nonoxidizing atm. App. is described. Various examples are given.

Metallic compositions suitable for porous bearings. Child H. Wills (to Chrysler Corp.). U. S. 2,177,853, Oct. 31. A compressed and sintered product is formed of powd. metals such as Cu and Fe or Cu and Sn intermixed with about 0.25–1% of finely divided particles of vermiculite from which chemically combined moisture has been removed by heat treatment.

Etching metals. Edward A. Sikorski (to General Chemical Co.). U. S. 2,177,751, Oct. 31. An etching bath contg. HNO_3 is used with a small proportion of urea which serves to inhibit evolution of N oxide fumes.

Treating ferrous metals, as for steel production. James C. Vignos (to Ohio Ferro-Alloys Corp.). U. S. 2,179,167, Nov. 7. A bath of molten ferrous metal having a higher C content than desired in the metal to be produced is oxidized to reduce the C content to about 0.05–0.5%; a sep. bath of molten oxidizing slag contg. sufficient oxide to reduce appreciably the C content of the metal without eliminating an appreciable amt. of P is then formed and mixed with the molten metal to reduce the C content of the metal and effect a stronge volution of gas, with accompanying elimination of Mn, Si and the like from the metal and absorption by the slag, and the metal is then sepd. from the slag.

Steel resistant to alternate high and low temperatures. Russell Franks (to Electro Metallurgical Co. of Canada, Ltd.). Can. 385,093, Nov. 14, 1939. For devices that are to be alternately heated to about 400° and cooled to below about 0° there is used a ferritic alloy steel contg. Cr 4–10%, C in amts. not over about 0.15%, Si not over about 0.75%, Mo about 0.25–1.5% and Cb about 6–16 times the C content.

Steel resistant to oxidation. Russell Franks (to Electro Metallurgical Co. of Canada, Ltd.). Can. 385,092, Nov. 14, 1939. A steel resistant to oxidation at about 300–800° contains about 2–4% Cr, C in amts. not above about 0.3%, Ti, Cb, or mixts. of the two in such amts. that the sum of the Ti and 0.5 of the Cb is at least twice the C and does not exceed 4 times the C by more than about 0.75%, and about 0.2–1.5% of Mo or W.

Quenching steel and other alloys. Clarence W. Wilson (to Calif. Fruit Growers Exchange). U. S. 2,178,925, Nov. 7. Metals, after heating, as for effecting hardening of alloy steels, are quenched in an aq. medium contg. an alkali or NH_4 pectate and a surface-tension depressant such as a soap.

Removing the red color from heat-treated silicon steel. Donald C. Hilty. U. S. 2,178,791, Nov. 7. The steel is subjected to the action of a slightly acid soln. contg. SO_2 at a temp. not above 60° to remove the red color without substantial scale removal.

Seamless tubes from columbium-containing austenitic chromium-nickel alloy steel. Vere B. Browne (to Allegheny Ludlum Steel Corp.). U. S. 2,179,114, Nov. 7. Ingots of an alloy contg. Fe together with Cr about 16–18%, Ni about 8.5–11% (but with the ratio of Cr:Ni not over 2:1) and Cb about 0.3–1% are formed into billets (using a ferrous alloy which may contain "usual contaminants in common amts.") and the billets are pierced at a temp. of about 1150–1260° to form tubes which are then finished as desired.

Alloy steel. Marcus A. Grossman and Walther Mathesius (to Walther Mathesius and United States Steel Corp.). Can. 385,023, Nov. 7, 1939. A shallow-hardening alloy steel having a high degree of resilience and resistance to shock and fatigue contains C 0.85–0.95, Mn 0.20–0.50, Cr 0.20–0.50 and V 0.075–0.20%. Cf. *C. A.* **33**, 5799[4].

Alloy steel. Gustav A. Reinhardt. Can. 385,709, Dec. 19, 1939. An alloy steel that can be easily welded contains Ni, Cu not more than 50% of the amt. of Ni, C not in excess of 0.20%, Mn 0.35–0.70 and Si 0.10–0.25%.

Steel alloy. Russell Franks (to Electro Metallurgical Co. of Canada, Ltd.). Can. 385,091, Nov. 14, 1939. A ferritic steel alloy comprises Cr 2–30, C up to about 0.5, W, Mo or both 0.5–2.5, Cb in amt. at least 8 times and not over 1.5% plus 10 times the C content of the steel. It may be used for welding rods or for uniting adjacent edges of ferritic Cr steel articles contg. 2–30% Cr and up to 0.5% C.

Iron or steel alloy. Vsevolod N. Krivobok (to Rustless Iron and Steel Corp.). Can. 385,485, Dec. 5, 1939. An iron alloy or steel resistant to high temp. contains Cr 10–25, Ni 7–15, W 2–4, Mo 0.7–3, and C 0.003–0.2%. Can. 385,486, Dec. 5, 1939. An iron alloy or steel resistant to high temp. contains Cr 10–25, Ni 7–15, Co 0.5–3, Mo 0.5–4, Mn 0.5–4, and C 0.03–0.2%. Can. 385,487, Dec. 5, 1939. An iron alloy or steel resistant to high temp. contains Cr

10–25, Ni 7–15, Ti 0.30–1.5, W 2–4, and C 0.03–0.2%. Can. 385,488, Dec. 5, 1939. An iron alloy or steel resistant to high temp. contains Cr 10–25, Ni 7–15, Ti 0.30–1.5, V 0.30–1.5, W 2–4, and C 0.03–0.2%. Can. 385,514, Dec. 5, 1939. An austenitic Fe or steel resistant to high temp. contains Cr 10–25, Ni 7–15, Me 1–2.5, Cu 1–2.5, Mn 2–5, Al up to 3, and C 0.03–0.4%. Can. 385,515, Dec. 5, 1939. An austenitic iron or steel resistant to high temp. contains Cr 10–25, Ni 7–15, Mo 1–5, Cu 1–3, W 2–3, and C 0.03–0.4%. Can. 385,516, Dec. 5, 1939. An iron alloy or steel resistant to high temp. contains Cr 10–25, Ni 7–15, Mo 2.5–3.5, Cu 2.5–3.5, Al up to 3, and C 0.03–0.4%.

Hard alloy. Walther Dawihl and Karl Schröter (to Canadian General Electric Co., Ltd.). Can. 385,867, Dec. 26, 1939. An alloy, hardened by heating to 1000–1200° and quenching in oil, consists by wt. of 30–50% of a mixt. of Fe with Co or Ni and 2–10% Cr, the remainder being TiC and WC in a ratio of 1:2 to 1:0.5.

Copper alloys. Franz R. Hensel and Earl I. Larsen (to P. R. Mallory & Co., Inc.). U. S. 2,178,992, Nov. 7. Alloys which are suitable for elec. contacts or conductors are formed of Cu together with Si 0.1–0.8, Co 0.5–3, and Ag 0.05–2.5%.

Copper alloy. Horace W. Gillett and Russell W. Dayton (to Bunting Brass & Bronze Co.). Can. 384,540, Oct. 10, 1939. An alloy consists of an integrated mass of metallic particles similar to commercial machinings, composed of about Cu 80, Sn 10 and Pb 10%. The compressive strength is about 90,000 lbs./sq. in. for a d. of 70% and 150,000/sq. in. for a d. of 95%.

Wrought copper alloys. Michael G. Corson (to Union Carbide and Carbon Research Laboratories, Inc.). Can. 385,128, Nov. 14, 1939. Cu alloys contg. 0.05–0.5% Cr are cast, wrought and annealed. A fine-grain structure is preserved and grain growth inhibited by keeping the alloy below 850° during every step of the process subsequent to the casting step, the Cr being maintained in a uniformly distributed, finely pptd. form, and the mixt. of ppts. Cr being insufficient to raise materially the hardness of the alloy.

Copper alloys suitable for trolley line and telephone drop wires. Wm. B. Price (to P. R. Mallory & Co.). U. S. 2,177,745, Oct. 31. Alloys of high strength and elec. cond. are formed of Cu together with Cd 0.05–0.95 and Co 0.05–0.95%.

Ferrous alloy. Joseph V. Emmons (to Cleveland Twist Drill Co.). Can. 385,208, Nov. 21, 1939. A high-speed steel having a low sp. gr., hardening at about 2000–2300°F., tempering at about 1000–1150°F., at which temp. secondary hardness is developed, contains C about 0.30–1.60, Si about 0.55–3.00, Mo about 0.6–15, and W 10–30% of the amt. of Mo.

Lead alloy. Jesse O. Betterton, Albert A. Smith, Jr., and Albert J. Phillips (to American Smelting and Refining Co.). Can. 384,675, Oct. 17, 1939. A Pb alloy, used, e. g., for a battery grid, contains Mg 0.01–0.3%, Ca 0.03–3%, and a corrosion-resistant constituent selected from the group consisting of Cd, Cu, Hg and Sn. It is characterized by its hardness and high tensile strength.

Magnesium alloys. John A. Gann (to Dow Chemical Co.). U. S. 2,178,573, Nov. 7. Alloys of good corrosion resistance contain Mg together with Ag 0.3–12, Al 0.5–12, and Mn 0.1–0.5%. U. S. 2,178,574 relates to alloys of Mg with Cu 0.5–15 and Pb 0.5–20%. U. S. 2,178,575 relates to alloys of Mg with Cu 0.5–15, Pb 0.5–20, and Sn 0.5–12%. U. S. 2,178,576 relates to alloys of Mg with Cu 0.5–15, Pb 0.5–20 and Zn 0.5–10%. U. S. 2,178,577 relates to alloys of Mg with Cu 0.5–15, Pb 0.5–20, Sn 0.5–10, and Zn 0.5–10%. U. S. 2,178,578 relates to alloys of Mg with Ag 0.3–12, and Mn 0.1–2%. U. S. 2,178,579 relates to alloys of Mg with Ag 0.3–12, and Zn 0.5–8%. U. S. 2,178,580 relates to alloys of Mg with Ag 0.3–12, Mn 0.1–2, and Zn 0.5–8%. U. S. 2,178,581 relates to alloys of Mg with Ag 0.3–12, Al 0.5–12, and Zn 0.5–8%. U. S. 2,178,582 relates to alloys of Mg with Ag 0.3–12, Al 0.5–12, Mn 0.1–1, and Zn 0.5–8%.

Ferrotungsten and ferromolybdenum. V. N. Gusarov. Russ. 52,046, Oct. 31, 1937. A continuous process of fusion and removal of the alloy from the furnace is described.

Tungsten alloy. Colin J. Smithells (to General Electric Co., Ltd.). Can. 384,709, Oct. 17, 1939. An alloy having a d. of not less than 16, consisting of large grains of W cemented together by a Ni-Cu-W alloy, is prepd. by mixing intimately W 83–96, Ni 3.5–16.5, and Cu 0.5–13.5%, subjecting to pressure to form a self-supporting body and sintering at not in excess of 1450°.

Protective coatings on magnesium and its alloys. Martin Tosterud (to Magnesium Development Corp.). U. S. 2,178,977, Nov. 7. The surface is treated with an aq. soln. contg. an alkali metal dichromate and $ZnSO_4$ or $CdSO_4$, the soln. being maintained at an acidity not greater than that initially produced by the dichromate (suitably a pH of 4 to 5).

Coating ferrous metal bearing surfaces. Geo. I. Finch (to C. C. Wakefield & Co. Ltd.). U. S. 2,178,251, Oct. 31. A foundation layer and a subsequently applied similar layer, both of ferrous metal, as in bearings for shafts, are both provided with an amorphous, vitreous layer by mechanically disrupting the crystal lattices of the surface without attrition and without substantial alteration of configuration.

Corrosion-resistant steel. Russell Franks (to Electro Metallurgical Co. of Canada, Ltd.). Can. 385,465, Dec. 5, 1939. Articles resistant to sea water of pH less than 7 are composed of an alloy steel contg. Cr 6–24, Ni 8–14, Mo 2.5–4, Mn 2–4, C not more than 0.12, and Si not more than 0.5%. The Mo and Mn impart resistance to the corrosive action.

Arc-welding electrode. Orrin E. Andrus (to A. O. Smith Corp.). Can. 385,517, Dec. 5, 1939. An electrode comprises a C steel rod and H occluded in the steel, the H being at least that which may be occluded in a like steel rod in the absence of an inhibitor by electrolysis of an electrolytic bath when the rod constitutes an electrode where nascent H is liberated.

Electrodes for welding bronze. S. V. Ermilov and A. L. Shermushenko. Russ. 51,964, Oct. 31, 1937. Bronze electrodes are covered with a paste of 50–60% carborundum, 10–25% $BaCO_3$ or chalk and 15–25% Al.

Soldering aluminum. Frank O. Albertson and Gustav A. Olsen (to Albertson & Co., Inc.). Can. 384,388, Oct. 3, 1939. The Al surface is cleaned by abrasion, a $AgNO_3$ soln. is immediately applied to deposit Ag and protect the Al surface from the action of Hg, $CuSO_4$ soln. is applied to produce a layer of Cu, and a "tinning compd." comprising $HgCl_2$ and free Hg applied, the Cu and Ag coatings protecting the Al from the Hg. Fused solder is then applied by spraying.

Solder. L. J. Peeters and E. F. de Cock. Belg. 432,074, Feb. 28, 1939. The solder consists of Zn 83–90, Al 6–10, Cu 2–5, and Mg 0.15–0.25%.

Composition for use in soldering metals such as aluminum. John F. Howarth (50% to Albert I. Elias). U. S. 2,179,258, Nov. 7. NaF 1–3, NH_4Cl 12–25 and $ZnCl_2$ 74–87% are used together.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

A micromethod for the determination of the melting points (of organic substances). N. A. Izmailov and Z. P. Tkachenko. *Farm. Zhur.* 1938, No. 3, 29–33; *Khim. Referat. Zhur.* 2, No. 4, 85–6(1939).—A simple app. has been developed for the detn. of the m. ps. of org. substances between 50° and 300°. It consists of a nichrome

plate (50 × 2 × 0.08 mm.) with a crescent into which the substance under investigation is placed. A welded Cu-constantan thermocouple is attached to the plate by means of a mastic made out of gypsum and liquid glass. The plate is heated with an elec. current through a transformer (100–20 v.). The current strength is regulated by a rheostat. The thermoelec. strength is measured by a galvanometer whose results are recalcd. into degrees from a curve obtained from the detn. of the m. ps. of known substances. The Cu-constantan plate is fastened to a porcelain plate and placed under a microscope. To avoid heat losses through radiation the porcelain plate is covered with a cover glass with an opening over the crescent. The app. can also be used for thermal analyses of mixts.
W. R. Henn

Catalytic hydrogenation of binary and more complex mixtures. V. V. Ipatiev, Jr., M. I. Levina and A. I. Karlblom. *Uspekhi Khim.* **8**, 481–528(1939).—Review and discussion of data, chiefly on the olefin, acetylene and aromatic alcs., ethers and unsatd. acids on Pt, Pd, Ni and Mo_2S_3 catalysts at temps. from 0–400°.
F. H. Rathmann

Catalytic oxidation of olefinic hydrocarbons. W. L. Faith and M. S. Dendurent. *Refiner Natural Gasoline Mfr.* **18**, 393–6(1939).—2-Pentene, trimethylethylene, tech. amylene, heptene, and caprylene were oxidized with a large excess of air to give maleic acid. The vapors were passed over a V_2O_5 catalyst. At temps. of 350° to 500° conversions of 17 ± 5% may be obtained with amylene. Increasing the no. of C atoms increases the conversion. The space velocity has little effect. 11 references.
C. H. Brooks

Action of hexachloroethane on Grignard compounds. V. V. Korshak. *J. Gen. Chem.* (U. S. S. R.) **9**, 1153–4 (1939).—EtMgBr, PhMgBr, *p*-MeC_6H_4MgBr and α-$C_{10}H_7MgBr$, resp., were treated with C_2Cl_6 in ether, in the mol. ratio 8 : 1 and 1 : 1, resp. The results were in both cases the same, the reaction products being C_2H_6, C_6H_6, C_7H_8, $C_{10}H_8$, PhI_2, *p*,*p*′-bitolyl, α,α′-binaphthyl, C_2Cl_4, $C_2H_2Cl_4$ and C_2HCl_5. The reaction mechanism is discussed.
Gertrude Berend

Isomeric transformations of unsaturated halogen derivatives in the aliphatic series. II. Saponification of 1-chloro-3-methyl-1,2-butadiene. T. A. Favorskaya. *J. Gen. Chem.* (U. S. S. R.) **9**, 1237–42(1939); cf. *C. A.* **33**, 9281⁴.—ClCH:C CMe_2 on heating with H_2O and $CaCO_3$ to 80° is isomerized to CH:$CCMe_2Cl$ and ClCH. $CHCMe:CH_2$, with simultaneous formation of propyne, CH_2·CHCl, Me_2C·CHCHO and a dimeric compd. $C_{10}H_{14}Cl_2$, b_9 103–5°, d_4^{20} 1.0957.
Gertrude Berend

Molecular symmetry of isopropyl tri-*tert*-butyl tetrathioörthosilicate. H. A. Klasens and H. J. Backer. *Rec. trav. chim.* **58**, 941–7(1939)(in French).—Examn. of the structure of $Me_2CHSSi(SCMe_3)_3$ (I) showed a curious case of augmentation of symmetry. I was prepd. by the action of Me_2CHSNa on $ClSi(SCMe_3)_3$. The crystals of I are tetragonal and isomorphic with $Si(SCMe_3)_4$, $Ge(SCMe_3)_4$ and $Sn(SCMe_3)_4$. The unit cell, contg. 2 mols., is the same for the 4 compds. (a = 11.2, c = 9.3 A.). The space group is D_{2d} ($P\bar{4}2_1c$). Thus there is the symmetry S_4 for the central atom around which the 4 groups are arranged in tetrahedric fashion. The maintenance of a tetrahedral structure on introduction of a Me_2CHS group in lieu of a $SCMe_3$ group is attributed to a "statistical symmetry."
C. R. Addinall

Thermal decomposition of acetone. J. G. Davoud and C. N. Hinshelwood. *Nature* **144**, 909–10(1939).—Allen (*C. A.* **30**, 5181²) showed that there is an induction period in the thermal decompn. of Me_2CO at 462°, which indicates chain formation. His data are reinterpreted: the results he observed are probably due to effects of a secondary nature, possibly to polymerization of the ketene formed from the Me_2CO.
G. M. Petty

Hydrogen exchange reactions of esters in relation to reactivity in condensation reactions. Weldon G. Brown and Kenneth Eberly. *J. Am. Chem. Soc.* **62**, 113–15 (1940).—NaOEt-catalyzed H exchange reactions of various types of esters with EtOD have been studied. The data indicate the following order of acidity in esters of the type RCH_2CO_2Et: Ph > H > Me > Et > Pr > $C_{10}H_{21}$, $C_{16}H_{33}$ > cyclohexyl > iso-Pr. Vinylogic effects in unsatd. esters diminish with increasing length of the conjugated bond system and are highly dependent upon geometrical configuration. The failure of certain esters to undergo self-condensation under the usual conditions is ascribed to low acid strength, a conclusion supported by other observations. Cf. *C. A.* **32**, 116⁶,⁸, 117¹, 2521⁸.
A. B. Garrett

Diketene—a new industrial chemical. A. B. Boese, Jr. *Ind. Eng. Chem.* **32**, 16–22(1940).—Of the 4 structures proposed for diketene, that of vinylaceto-β-lactone H_2C:C.CH_2.CO.O (I) appears to account for the reactions of diketene most satisfactorily with but 1 exception, the formation of pyruvaldehyde on ozonolysis. The primary importance of I is based upon its exceptional chem. reactivity and consequently in the products which may be synthesized from it. Its most common reaction is the addn. of substances with an active H atom to yield compds. contg. the $AcCH_2C$:O group. Thus, I reacts with H_2O in the presence of catalysts to give $AcCH_2CO_2H$ which in turn decomp. to Me_2CO and CO_2. With alcs. in the presence of acid catalysts, esters of $AcCH_2CO_2H$ result. This method of synthesizing esters is superior to the classical Na condensation of AcOEt both academically and industrially. This reaction is a general type applicable to all aliphatic alcs., primary to tertiary, alc. ethers, chlorohydrins, substituted alcs., glycols, glycerol and phenols. I and primary aromatic mono- and polyamines react smoothly to yield the corresponding acetoacetylamines in a high degree of purity and with excellent yields. Similarly I also reacts with aq. solns. of NH_3, primary and secondary aliphatic amines. Thus, compds. such as $AcCH_2CONHPh$, $AcCH_2CONH_2$, and similar type substances can be readily prepd. With urea or disubstituted ureas, I reacts in an inert solvent, yielding 4-methyluracil or its homologs. $PhNHNH_2$ and I at room temp. yield the phenylhydrazone of $AcCH_2CONHNHPh$. At higher temps. 1-phenyl-3-methyl-5-pyrazolone is obtained in excellent yield. With aromatic hydrocarbons in the presence of $AlCl_3$ I gives rise to 1,3-diketones such as $BzCH_2Ac$. Halogens add to I to form γ-haloacetoacetyl halides and β-butyrolactone is formed when I is hydrogenated. I may be further polymerized by catalysts to yield a tetramer of ketene, dehydroacetic acid, which is also a very valuable reagent because of the large no. of com. derivs. which can be prepd. from it. Pyrolysis of I at 500–600° converts it to ketene which is a powerful acetylating agent. B. presents an excellent summary of the applicability of I, now available in com. quantities, in synthetic org. chemistry. 50 references are cited.
W. A. Cook

Aldehyde-nitroparaffin condensation. B. M. Vanderbilt and H. B. Hass. *Ind. Eng. Chem.* **32**, 34–8(1940).—By means of condensations of nitroethane, the nitropropanes and the nitrobutanes with HCHO, AcH and PrCHO, resp., a no. of new mono- and dihydric alcs. have been prepd. Typical acetates of these alcs. have also been synthesized. Reduction of these nitro alcs. by catalytic hydrogenation over Raney Ni yields the corresponding amino alcs. The following examples illustrate the technique employed in the prepn. of the mono- and dihydric nitro alcs. *5-Nitro-4-octanol:* 144 g. freshly distd. PrCHO (2 mols.) was added slowly to a well agitated soln. of 206 g. $BuNO_2$ (2 mols.), 100 cc. 95% EtOH and 4 cc. of 10 *N* NaOH in a 3-necked 500-cc. flask, with the reaction temp. maintained at 30–35° by external cooling. After ⅔ of the aldehyde was added, an addnl. 4 cc. of 10 *N* NaOH and 15 cc. H_2O were added, then the remainder of the aldehyde, and the soln. was allowed to stand for 4 days at 35–8°. The alkali is then neutralized with an equiv. quantity of HCl and the mixt. distd. under slightly reduced pressure. After removal of small quantities of unreacted aldehyde and $BuNO_2$, together with EtOH and higher-boiling impurities, the pressure was reduced to 5 mm. and 310 g. of 5-nitro-4-octanol (88.5% yield of reactants employed), a pale yellow liquid, was obtained. *2-Ethyl-2-*

nitro-1,3-propanediol: 64 g. of 37.5% formalin (0.8 mol. CH_2O) was added dropwise to a well-stirred mixt. of 35.6 g. of $PrNO_2$ (0.4 mol.) and 0.1 g. hydrated CaO in a 500-cc. 3-necked flask, with the temp. controlled at 30°. After ½ the formalin had been added, the contents of the flask became homogeneous. After addn. was complete the reaction mixt. was allowed to stand at room temp. for 43 hrs. CO_2 in very slight excess was added and the $CaCO_3$ removed on a Filter-Cel suction filter. The ppt. was washed with 5 cc. H_2O and the combined filtrate and washings evapd. at 200 mm., with the residue finally being heated to 90° at 20 mm. in a water bath. On cooling, the residue solidified. The yield was 59.4 g. 2-ethyl-2-nitro-1,3-propanediol of 98–99% purity. The phys. consts. of the nitro alcs. are tabulated in the following order, resp.: b_{10} (unless otherwise noted), d_4^{25} and n_D^{25}: *2-nitro-1-propanol*, 99°, 1.1841, 1.4379; *3-nitro-2-butanol* 92° 1.1296, 1.4420; *2-nitro-3-hexanol*, 108°, 1.0575, 1.4480; *2-nitro-1-butanol*, 105°, 1.3332, 1.4390; *3-nitro-2-pentanol*, 100°, 1.0818, 1.4419; *3-nitro-4-heptanol*, 115°, 1.0275, 1.4460; *2-methyl-2-nitro-1-propanol*, m. 89.5–90°; *3-methyl-3-nitro-2-butanol*, 90°, 1.1021, 1.4469; *2-methyl-2-nitro-3-hexanol*, 109°, 1.0405, 1.4499; *2-nitro-1-pentanol*, 117°, 1.0818, 1.4405; *3-nitro-2-hexanol*, 112°, 1.0487, 1.4438; *5-nitro-4-octanol*, 124°, 1.0394, 1.4463; *2-methyl-2-nitro-1-butanol*, 98°, 1.1047, 1.4468; *3-methyl-3-nitro-2-pentanol*, 100°, 1.1157, 1.4518; *3-methyl-3-nitro-4-heptanol*, 119°, 1.0281, 1.4532; *3-methyl-2-nitro-1-butanol*, 111°, 1.08886, 1.4430; *4-methyl-3-nitro-2-pentanol*, 96–8°, 1.0599, 1.4477; *2-methyl-3-nitro-4-heptanol*, 111°, 1.0140, 1.4485; *2-methyl-3-nitro-4-heptanol* (stereoisomer), 121° (m. 53°); *2-methyl-2-nitro-1,3-propanediol*, m. 149–50°; *2-ethyl-2-nitro-1,3-propanediol*, m. 56°; *2-nitro-2-propyl-1,3-propanediol*, m. 81°; *2-nitro-2-isopropyl-1,2-propanediol*, m. 87–8°. The solid nitroglycols were purified by crystn. from hot C_6H_6-BuOH and from H_2O. The two solid monohydric alcs. may be purified by vacuum distn. or crystn. Naphtha-C_6H_6 was employed for *2-methyl-2-nitro-1-propanol*, and naphtha for *2-methyl-3-nitro-4-heptanol*. All the liquid nitro alcs. were yellow when obtained by vacuum distn. They were aerated at 75–100° for 0.5 hr. to hasten polymerization of any unsatd. contaminants, washed with satd. $NaHSO_3$ to remove aldehydes and fractionated through a modified Podbielniak column at 10 mm. The solids are white cryst. products. All dihydric nitro alcs. and those monohydric nitro alcs. contg. less than 7 C atoms are quite sol. in H_2O. The former are insol. in nonbenzenoid hydrocarbons as are the monohydric nitro alcs. contg. less than 6 C atoms. All nitro alcs. are stable up to 100° but unstable at 150° or above and show chem. properties characteristic of aliphatic alcs. and nitroparaffins. The m. ps. of the amino alcs. are as follows: *2-amino-2-methyl-1,3-propanediol*, 108–9°; *2-amino-2-ethyl-1,3-propanediol*, 37.5–8.5°; *2-amino-2-propyl-1,3-propanediol*, 58°; and *2-amino-2-isopropyl-1,3-propanediol*, 74°. The dihydric amino alcs. are more stable thermally than are the corresponding nitro alcs. They are also stable toward strong alkalies at ordinary temps. and form salts with acids. The acetates of 4 nitro alcs. were prepd. by the standard procedure, employing Ac_2O. Their b. p. (10 mm.), d_4^{25} and n_D^{25} are as follows: *Acetate* of: *2-nitro-1-butanol*, 103°, 1.1164, 1.4287; *3-nitro-2-butanol*, 103°, 1.1089, 1.4281; *2-methyl-2-nitro-1-butanol*, 109°, 1.0932, 1.4350; *diacetate of 2-ethyl-2-nitro-1,3-propanediol*, 157°, 1.1718, 1.4444. Optical stereoisomers are possible for all monohydric nitro alcs. prepd., except *2-methyl-2-nitro-1-propanol*, since each contains 2 asym. C atoms and the mol. is also unsym. Thus 2 *d*- and 2 *l*-forms or 2 racemic isomers are predicted for each compd. From the properties of most of the nitro alcs. prepd. and contg. 2 asym. C atoms, it was apparent that only 1 of the *dl*-isomers was formed or that the 2 *dl*-forms had nearly identical b. ps. However, the 2 nitro alcs. derived. from Me_2CHNO_2 and AcH and PrCHO, resp., were exceptions. Both of these compds. distd. over a definite boiling range. The reaction mixt. from the latter reactant had a sufficiently wide boiling range so that 2 isomers were obtained by careful rectification; one such fraction solidified on cooling which greatly facilitated further sepn. The condensation product from 2 mols. Me_2CHNO_2 and 2 mols. PrCHO on careful fractionation at 10 mm. yielded 60% *2-methyl-3-nitro-4-heptanol*, b. 111°, and 40% distd. close to 121°. The former was further purified by refractionation and the latter by crystn. from C_6H_{12}. A portion of each yielded the corresponding amino alcs. with different phys. consts. The acetates of both fractions were likewise different substances although the analysis of both fractions showed both compds. were *2-methyl-3-nitro-4-heptanol*. The solid stereoisomeric alc. yielded an acetate b_{10} 122°; the acetate from the liquid stereoisomer b_{10} 128°. The nitro alcs. show promise as new solvents; the amino alcs. as intermediates in the synthesis of wetting agents, emulsifiers and detergents. The following U. S. pats. are based on this work: 2,132,352, 2,132,353 (*C. A.* **33**, 1801,2); 2,139,120, 2,139,121, 2,139,122, 2,139,123 and 2,139,124 (*C. A.* **33**, 21496,6,7). W. A. Cook

A color reaction of maleic anhydride, *p*-benzoquinone and their partially substituted derivatives. Alexander Schönberg and Abdel Fattah Aly Ismail. *Nature* **144**, 910(1939).—When a trace of maleic anhydride is added at room temp. to a colorless soln. of PPh_3 in $CHCl_3$ or C_6H_6 a permanent orange-red color is produced immediately. The same color is produced with mono- but not with disubstituted derivs. of maleic anhydride. The color is also shown by *p*-benzoquinone and those of its derivs. in which not all of the H atoms are substituted. E. D. Walter

Effect of acetone on the magnitude of the rotation of the plane of polarization of tartaric acid and the rate of its chemical reaction with ethyl alcohol. A. P. Trofimenko and S. F. Babak. *J. Phys. Chem.* (U. S. S. R.) **13**, 417–20(1939).—Addn. of acetone to an aq. soln. of tartaric acid and EtOH simultaneously linearly decreases the optical rotation and the soly. of tartaric acid and the rate of its esterification with the alc. F. H. Rathmann

The Diels-Alder [diene synthesis] reaction. Samuel Lamdan. *Rev. centro estud. farm. bioquím.* **29**, 70–88 (1939).—Discussion. L. E. Gilson

Structure of cellulose and other polymers related to simple sugars. W. N. Haworth. *Chemistry & Industry* 1939, 917–25.—A general discussion of the structure of cellulose, starch, glycogen, xylan and lichenin, based mainly on H.'s work with methylation. The cellulose aggregate consists of 100–200 glucose residues, as detd. by methylation expts. under different conditions. Analysis of the methylated cellulose showed that no end groups were present if the methylation was carried out in an atm. of N, although the size of the cellulose aggregate was apparently reduced. Methylation in air resulted in the production of end groups, indicating that the end groups exposed during methylation recombine in the presence of N and this recombination is inhibited in the presence of air. Cellulose is considered to be constructed of straight chains linked together by "cross-linkages" or valency bonds at intervals of 25–30 glucose units, thus forming closed loops. These cross-linkages or bonds are considered to be weaker than the bonds in the main chain. Some of these weaker bonds break upon methylation, the ends recombining completely in the presence of N and incompletely in air. S. I. A.

The hydrogen peroxide oxidation of cyclic compounds catalyzed by pervanadic acid. Wilhelm Treibs. *Angew. Chem.* **52**, 698–700(1939).—A summary with 44 references. Karl Kammermeyer

The polymerization of unsaturated hydrocarbons, particularly styrene and α-methylstyrene. H. M. Stanley *Chemistry & Industry* 1939, 1080–3.—A review with 15 references. Mark Plunguian

The stereoisomerism of organic dyes and its relation to the constitution and properties of reversible polymeric dyes. G. Scheibe. *Angew. Chem.* **52**, 631–7(1939).—A comprehensive treatise with data, diagrams and 34 references. Karl Kammermeyer

Structure of the dimeric forms of *o*-isopropenylphenols. Wilson Baker and D. M. Besly. *Nature* **144**, 865(1939).—The authors conclude that the dimeric forms of *o*-isopro-

penylphenols are derivs. of flavan. This structure adequately explains their properties. E. D. Walter

Organomercury compounds of vanillin. G. Rossi and M. Ragno. *Ann. chim. applicata* 29, 146–7(1939).—Hg(OAc)$_2$ in alc. soln. is added to an alc. soln. of vanillin, heating gently. A gelatinous mass forms, which gradually separates as a white powder. This is recrystd. from glacial HOAc. It is vanillin-mercury acetate, and no longer gives the common reactions for the Hg ion. Treated with H_2SO_4, the corresponding sulfate deriv. is formed. It is insol. in H_2O and other common solvents. A. W. C.

Synthesis of myristicin. Victor M. Trikojus and D. E. White. *Nature* 144, 1016(1939).—Allylation of pyrogallol 1-Me ether gave a mixt. of 2 liquid monoallyl ethers (I and II) which were sepd. by fractional distn. and characterized as their 3,5-dinitrobenzoates, m. 111° and 134°, resp. I rearranged on pyrolysis to give 3,4,5-MeO(HO)$_2$-$C_6H_2CH_2CH{:}CH_2$, and this on methylenation with CH_2I_2 gave 30% of myristicin, $b_{0.2}$ 95–7°. II on pyrolysis gave a mixt. which, on methylation and subsequent bromination, yielded mainly dibromomyristicin dibromide. E. D. Walter

Reaction capacity of the methyl group. IV. Derivatives of acetophenone and chalcone. Louis Chardonnens and Josef Venetz. *Helv. Chim. Acta* 22, 1278–86(1939); cf. *C. A.* 33, 8597[8].—It has been shown that Bz and SO_2-Ph groups in the *o*- and *p*-position render a Me group active in the presence of an addnl. NO_2 group. The similar activity of the Ac group has been investigated by a study of 4,3-Me(NO$_2$)C$_6$H$_3$Ac (I). Although PhAc does not react with *p*-ONC$_6$H$_4$NMe$_2$ (II) condensation takes place with 3- (III) and 4-O$_2$NC$_6$H$_4$Ac (IV), though not with the 2-isomer (V). A mixt. of 3.3 g. III, 3 g. II and 3 g. anhyd. Na_2CO_3 in 50 cc. alc. was refluxed for 32 hrs. The crude product (1.3 g.) could not be purified by crystn. but chromatographic analysis of 0.5 g. in benzene, elution of the central zone with acetone and recrystn. from acetone and alc. gave 0.2 g. of dark violet crystals of *3-nitrophenylglyoxal p-dimethylaminoanil*, $C_{16}H_{15}N_3O_3$, m. 170°. Similarly condensation of IV with II produced the corresponding *4-nitrophenylglyoxal anil*, m. 158–60°. Attempts to condense I with II gave a nonhomogeneous product with the appearance of an azomethine from which no definite compd. could be isolated. Thus it is not possible to show the reactional aptitude of the nuclear Me group in I by means of condensation with NO derivs. since the Me group of the Ac group apparently also enters into the reaction. I condenses with BzH in the presence of 10% NaOH to yield 90% of *2-nitro-4-cinnamoyltoluene* (VI), $C_{16}H_{13}NO_3$, m. 145–8°, identical with the product obtained in 70% yields by using piperidine as the condensing agent. A mixt. of 10.7 g. VI and 6 g. II in 100 cc. acetone and 150 cc. alc. was refluxed for 50 hrs. in the presence of 6 g. Na_2CO_3 and gave 9 g. of crude product, purified by chromatographic analysis to yield 38% of pure black crystals of *2-nitro-4-cinnamoylbenzaldehyde p-dimethylaminoanil* (VII), $C_{24}H_{21}N_3O_3$, m. about 210° (decompn.). Similarly the condensation of 1.4 g. VI with 0.7 g. BzH by heating for 3 hrs. at 190–200° in the presence of piperidine gave 16% of *2-nitro-1-styryl-4-cinnamoylbenzene*, $C_{23}H_{17}NO_3$, m. 164–5°. The reactional aptitude of the Me group of *2,6-dinitro-4-cinnamoyltoluene* (VIII) should be more marked than that of the corresponding Me group in VI. By refluxing with 60 cc. $SOCl_2$ for 2 hrs., 20 g. of 4,3,5-Me-$(NO_2)_2C_6H_2CO_2H$ was converted into 75% of the corresponding *chloride*, $C_8H_5ClN_2O_5$, m. 59–60°, and this was condensed with the Na deriv. of $AcCH_2CO_2Et$ and saponfd. with H_2SO_4 to give 28% of *4-methyl-3,5-dinitroacetophenone* (IX), $C_9H_8N_2O_6$, m. 66.7°; *phenylhydrazone*, m. 255° (decompn.). Condensation of IX with BzH in the presence of piperidine yielded 58% of the required VIII, $C_{16}H_{12}N_2O_6$, m. 206–7°. A mixt. of 1.12 g. IX and 0.5 g. BzH in the presence of piperidine was heated for 3 hrs. at 170°. The reaction mass was crystd. from a min. of boiling AcOH and recrystd. from benzene, yielding 0.3 g. of small yellow prisms of *2,6-dinitro-1-styryl-4-cinnamoylbenzene*, $C_{23}H_{16}N_2O_6$, m. 191°. The unsatisfactory results obtained in the condensation reactions with the chalcones VI and VIII are attributed to the decompn. which takes place at 200° in the presence of piperidine. C. R. Addinall

The production of benzoic acid from toluene in an oxidizing solution of potassium dichromate in sulfuric acid. Jaroslav Schneider. *Chem. Obzor* 14, 153–9, 177–83, 199–203(1939).—In the oxidation of toluene by $K_2Cr_2O_7$ and H_2SO_4, the temp. and the concn. of the acid were the governing factors: below 20° a concn. of 65% H_2SO_4 was not sufficient to begin the reaction; at 25° this concn. initiated the reaction. At 0° with 69% H_2SO_4 about 21% of the $K_2Cr_2O_7$ remained unreduced at the end of 6 hrs. With 80% H_2SO_4 the $K_2Cr_2O_7$ was reduced completely even at 0°. In the factory the gradual addn. of H_2SO_4 and the gradual elevation of the temp. from 80° to 95° gave a 72% yield in 30 hrs. with the concn. of H_2SO_4 at 50% and used in a 97% excess. The consumption of toluene was 130% of the theoretical with the largest losses occurring during the distn. The oxidation of BzOH to $CO_2 + H_2O$ occurred simultaneously with the oxidation of toluene to $PhCH_2OH$, BzH and BzOH. At lower temps. the oxidations were accompanied by condensations of toluene, $PhCH_2OH$ and BzH by the H_2SO_4 to form oils of the benzophenone type, $BzC_6H_4CO_2H$ and anthraquinone; about 5% of the toluene entered into these condensation products. In the presence of $Mn(OH)_2$ or $FeSO_4$ the yield was increased 10–19%: the catalysts shortened the reaction time, lowered the reaction temp., did not lower the min. concn. of 50% H_2SO_4 and interfered with the crystn. Frank Maresh

Conversion of sulfanilamide into *p*-hydroxyaminobenzenesulfonamide by ultraviolet irradiation. Lawrance E. Shinn, Edna R. Main and Ralph R. Mellon. *Proc. Soc. Exptl. Biol. Med.* 42, 736–8(1939); cf. *C. A.* 33, 8296[6].—Preliminary. L. E. Gilson

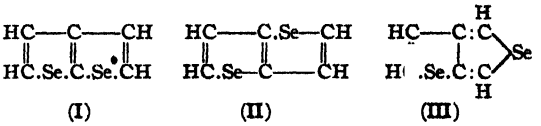
Difference in odor of *d*-, *l*- and *dl*-derivatives of amino- and bisaminomethylenecamphors. Bawa Kartar Singh and Awadh Behari Lal *Nature* 144, 910–11(1939).—The intensity of odor of the optically active forms of several new derivs. of amino- and bisaminomethylenecamphors was examd. In each series the *l*-form has the most intense odor, followed by the *dl*- and *d*-forms. E. D. Walter

Blue alkali salts of α-phylloquinone (vitamin K$_1$) and similar compounds. P. Karrer. *Helv. Chim. Acta* 22, 1146–9(1939).—On mixing with NaOEt, vitamin K$_1$ (I) and vitamin K$_2$ both give a blue color (*C. A.* 33, 5448[8]) which is not due to the presence of an impurity (*C. A.* 33, 5899[8]). This color reaction corresponds to those observed by Liebermann (*Ber.* 34, 1543 (1901)) on treating with NaOEt compds. contg. a reactive CH group obtained by acting on dihalonaphthoquinones with $CH_2(CO_2R)_2$, $PhCH_2CN$, $AcCH_2CO_2R$ and analogous compds. contg. an active CH_2 group. Electronic formulation of the equil. states of the anions of these compds. suggests a similar mesomeric formulation for the blue salts of I in which the CH_2 group attached to the naphthoquinone ring is activated by the neighboring ethylene linkage and analogous examples are cited in the blue salt of di-Me dihydrocrocetinate and the emerald-green salt of dihydromethylbixin (*C. A.* 27, 726). Other vitamin K-like compds. are in course of prepn. C. R. Addinall

Oxidative cleavage of the polyhydroxy side chains in the sugar condensation products of acetoacetic ester and of *o*-phenylenediamine. Sandor Müller and Ilona Varga. *Ber.* 72B, 1993–9(1939).—Antiketogenesis, the decrease or prevention of the formation of ketone bodies in fasting subjects or diabetics by the administration of glucose, makes it probable that in the organism sugars combine with the acetone bodies. A model of such compds. was prepd. by West (*C. A.* 22, 1140) from $AcCH_2CO_2Et$ and glucose as a cryst. substance, sensitive to acids, which, according to García Gonzáles (*C. A.* 29, 1088[4]), is Et 2-methyl-5-(*d-arabo*-tetrahydroxybutyl)furan-3-carboxylate (I). It takes up Br and reduces neutral $KMnO_4$ but is indifferent to Fehling soln. and is unchanged by $PhNHNH_2$. Its reactivity did not seem so pronounced as to warrant the conclusion that it can play any special role in antiketogenesis. West and co-workers (*C. A.* 30,

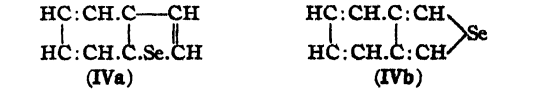
3787[8]), to be sure, have converted it into labile products with $HgSO_4$ and BzO_2H, showing its ready oxidizability, and García Gonzáles with $KMnO_4$ and alk. H_2O_2 obtained 2-methylfuran-3,5-dicarboxylic acid (II), but these oxidations shed practically no light on the mechanism of the reactions, especially whether they consist of a stepwise degradation or of a cleavage of the tetrahydroxybutyl side chain. M. and V. have now found that I can be oxidized under relatively mild conditions to well-defined products. The absorption of Br is itself an oxidation, for I becomes stable toward Br when the HO groups are acetylated. With somewhat more than 1 mol. $Pb(OAc)_4$ it gives in good yield an optically inactive *Et 2-methyl-5-formylfuran-3-carboxylate* (III), and *d*-glyceraldehyde and glycolaldehyde can also be detected. The side chain is therefore cleaved, chiefly between the trans 3,4-HO groups of the original sugar C chain. The presence of glycolaldehyde, even with a large excess of oxidizing agent, shows that cleavage between the 4,5-C atoms has also occurred, but the 3,4-cleavage must be the main reaction, for even 1 mol. $Pb(OAc)_4$ effects a complete transformation while the 4,5-cleavage causes a greater consumption of oxidizing agent since the resulting α-HO aldehyde (not isolated) is certainly further oxidized, with consumption of a 2nd mol. $Pb(OAc)_4$, to III more rapidly than is I itself. With excess of oxidizing agent there is also obtained glyoxal, whose formation is readily explained by further oxidation of the glyceraldehyde. The structure of III is established by its optical inactivity, its formation of a hydrazone (not an osazone) with $PhNHNH_2$, and its oxidation to II, m. 272–4°. The product (to be described later) of the hydrogenation of I and also West's "anhydroglucosecycloacetoacetic acid" give no furan derivs. with $Pb(OAc)_4$. The above oxidative cleavage is not limited to I. Its N isolog, Et 2-methyl-5-(*d-arabo*-tetrahydroxybutyl)pyrrole-3-carboxylate (IV) (García Gonzáles and Trujillo Torres, *C. A.* 29, 6889[7]), also undergoes the cleavage; the fate of the side chain was not followed but the good yield of *Et 2-methyl-5-formylpyrrole-3-carboxylate* (V) is considered proof of 3,4-cleavage. Similarly, 2-(*d-arabo*-tetrahydroxybutyl)quinoxaline, obtained from *o*-$C_6H_4(NH_2)_2$ and glucose, mannose or fructose, gives with $Pb(OAc)_4$ quinoxaline-2-aldehyde (VI). On the other hand, the benzimidazole derivs. obtained from *o*-$C_6H_4(NH_2)_2$ with galactose, arabinose, etc., which do not reduce Fehling soln., react differently with $Pb(OAc)_4$; no formylbenzimidazole is obtained. I (3.5 g. from 12 g. *d*-mannose, 5 g. powd. fused $ZnCl_2$, 6 cc. $AcCH_2CO_2Et$ and 6 cc. alc. heated on the water bath with stirring until a clear soln. is formed—about 10 min.), m. 147°, $[\alpha]_D^{25}$ −17.9° (MeOH). *d*-Fructose and *d*-galactose do not form I. Tetraacetate of I, m. 84°. *Tetrabenzoate* (72% from I with BzCl and pyridine), m. 107–10°, $[\alpha]_D^{25}$ −9.5° ($CHCl_3$). III, m. 56°, reduces Fehling soln. at room temp.; *$NaHSO_3$ compd.*, quite stable platelets which, however, become yellow after a time; *phenylhydrazone*, pale yellow, m. 100°; *semicarbasone*, m. 223°; *dimedon compd.*, almost colorless, m. 183–4°, forms yellow solns. IV (obtained in 10.8 g. yield according to García Gonzáles from 25 g. glucosamine-HCl and 25 cc. $AcCH_2CO_2Et$), m. 148–50°, $[\alpha]_D^{25}$ −24.1° (MeOH). V (2.2 g. from 5.4 g. IV), m. 132–3°, reduces Fehling soln. at room temp., is optically inactive; *semicarbazone*, m. 251°. VI (67% yield), m. 108°; phenylhydrazone, golden yellow, m. 231°; *semicarbazone*, m. 251°. With alk. H_2O_2 VI is oxidized to the acid, m. 212° (foaming). C. A. R.

Synthesis of condensed selenophenes by the action of acetylene on selenium. Sumio Umezawa. *Bull. Chem. Soc. Japan* 14, 363–73(1939).—Distn. of the tar (317 g.), obtained by the action of C_2H_2 on Se in an elec. oven, at atm. pressure to remove the selenophene (cf. *C. A.* 30, 5981[9]) gave an oily residue (150 g.) from which, after standing for a week or more in the dark, was isolated *isoselenophthene* (I) (21 g. or 6.7% of the original tar) as dark needles, m. 115–20°, which upon recrystn. from alc. formed rhombic crystals, m. 123–4.5°; the *picrate*, yellow, m. 163–5°, is readily decompd. by NH_4OH. I with Br_2 at low temp. gives *isotetrabromoselenophthene* m. 247.5° (cor.). I with concd. or fuming HNO_3 undergoes severe oxidation but in Ac_2O at −18° forms *isonitroselenophthene*, yellow, m. 108–9.5°, from alc. With concd. H_2SO_4 in Ac_2O at 70° I forms *isoselenophthenedisulfonic acid*, which is isolated as the *Ba salt* (+ $3H_2O$), forms a *K salt* (+ $1.5\ H_2O$), and with PCl_5 gives *isoselenophthenedisulfonyl chloride*, m. 234–6°. The remaining portion of the above oily residue (110 g.) was fractionally distd., giving the following 3 fractions: (1) b_{14} 93–100°, 30 g., 61.6% Se; (2) b_{14} 100–13°, 30 g., 63.2% Se; and (3) b_{14} 123–30°, 9 g., 42.2% Se. Fractions (1) and (2) consist essentially of selenophthene and a slight amt. of selenanaphthene and naphthalene. After removal of the last 2 by picrate formation, redistn. of fraction (2) gives 4.5 g. *cis-selenophthene* (II) as an almost colorless, highly refractive oil, b_{14} 90–3°, which gives the usual indophenol reactions and forms amorphous $Hg(OAc)_2$ and cryst. $HgCl_2$ complexes; II has the following phys. consts.: d_4^{25} 1.9354, n_D^{25} 1.6586, MR 44.55, calcd. for $C_6H_4Se_2$ (3 double bonds) 45.33; II and Br in CS_2 in the cold form *cis-tetrabromoselenophthene*, m. 271–2° (cor.). Steam distn. of the above oily residue, obtained after the sepn. of I, followed by fractional distn. gave a main fraction (30 g.), b_{11} 93–100°, from which the *picrate*, m. 154–5.5°, of *trans-selenophthene* (III), m. 51–51.5°, was obtained, which with Br forms the *trans-tetrabromoselenophthene*, m. 252.2–53° (cor.). The following structures of the above 3 forms were ascertained by dipole-moment measurements (cf. *C. A.* 33, 9064[3]):



(I) (II) (III)

In order to ascertain the structure of selenanaphthene (IV), m. 50–1° (cf. Mazzo and Solazzo, *C. A.* 23, 2417; Komppa and Nyman, *C. A.* 28, 2710[4]), formed by the action of C_2H_2 on Se, between the 2 possibilities,



(IVa) (IVb)

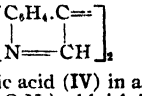
the synthesis of IV was accomplished in the following manner: diazotized *o*-$H_2NC_6H_4CH{:}CHCO_2H$ (10 g.) was treated with 7.8 g. KSeCN, giving 1.5 g. *o*-selenocyanocinnamic acid, m. 171–3°, which was converted with KOH to the corresponding selenolcinnamic acid which in turn was treated with $K_4Fe(CN)_6$, giving selenanaphthene, removed by steam distn., m. 50–1°, thus establishing its identity with the formula IVa. John F. Lontz

Transformations of indolyl methyl ketones into homologs of indole. II. Carlo Alberti. *Gazz. chim. ital.* 69, 568–83(1939); cf. *C. A.* 31, 8530[8].—Although indolyl Me ketones with the Ac group in β-position in the pyrrole nucleus are readily transformed by alk. alcoholates into alkylated homologs of indole (I), indolyl Me ketones with the Ac group in α-position do not undergo this transformation (cf. *loc. cit.*). β-Alkylindoles and α,β-dialkylindoles can thus be prepd., whereas direct alkylation of free I derivs. by alk. alcoholates (cf. Oddo and A., *C. A.* 27, 3933) gives only α,β-alkylated indoles. New expts. with α-acetylskatole (II) confirm the fact that homologs of I can be prepd. by means of alk. alcoholates, e. g., at high temps. and elevated pressures, II is decompd. completely, with partial elimination of its Ac group, and formation of amorphous *substances* with relatively low N contents and high mol. wts., probably degradation or condensation products of II. However, it is possible to transform α-acetylated indoles into dialkylated indoles by the action of NaOEt on the hydrazone or on the corresponding ketazine at elevated temps. II (1 g.), Na (1 g.) and anhyd. MeOH (15 cc.), heated in a Carius tube for 12 hrs. at 210–20° (a combustible gas is formed), the product (a yellow solid and red-yellow liquid) treated with water, almost neutralized with H_2SO_4, steam-distd. and the relatively small

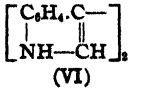
quantity of distillate extd. with ether, yield from the ext. a yellowish, semisolid *substance*, which turns brown with picric acid in C_6H_6-benzine but gives no ppt. No skatole or 2-ethyl-3-methylindole was present in the distillate. The residue from the steam distn., dried over H_2SO_4, and purified by soln. in Et_2O, pptn. by petr. ether, and treatment with EtOH, yields an amorphous, ocher-yellow *substance* (III), m. 240–80°, insol. in dil. mineral acids and caustic alkalies. Mol.-wt. detns. gave values of 270–360; the % N was 6.50–6.90. No II was present in any of the products at any stage of purification. The filtrate from the residue of the steam distn. yields a trace of a yellowish *substance* (IV) and a larger quantity of AcOH. At 180–90° for 8–10 hrs., the yields of III, IV and AcOH are lower, and some unaltered II remains. At 150–160° there is no reaction. With EtOH instead of MeOH, the reaction is similar; the residue from the steam distn. yields a *substance* with properties like those of III and which may be the same. Attempts to prep. β-acetylindole hydrazone by treating β-acetylindole (V) in EtOH, dil. EtOH or AcOH with aq. $H_2NNH_2.HCl$ (1 1.5) and neutralizing with anhyd. K_2CO_3 were unsuccessful. However, V (1.6 g.), $H_2NNH_2.H_2O$ (VI) (0.75 g.) and EtOH (5 cc.), refluxed for 4 hrs., yield 85–90% of *β-acetylindolol ketazine*, $[C_6H_4.NH.CH:CCMe:N—]_2$ (VII), S-yellow, m. 280 2° (decompn.), reduces Fehling soln. and hot NH_3-$AgNO_3$, insol. in dil. mineral acids (but a lemon-yellow color is imparted to them); its solns. in concd. H_2SO_4 are lemon-yellow and in concd. HNO_3 are bright red. Likewise V (1.6 g.), VI (0.3 g.) and EtOH (5 cc.), refluxed for 3 hrs., yield 1.4 g. of VII. Under the same conditions as with V, β-acetyl-α-methylindole (VIII) (1.7 g.), VI (0.75 g.) and EtOH (5 cc.) yield an oil which did not solidify, even *in vacuo* over H_2SO_4; however, the reaction mixt., poured into water, extd. with Et_2O, the ext. dried by Na_2SO_4 and the ether-sol. product purified by EtOH, yields 20% of *β-acetyl-α-methylindole ketazine* $[C_6H_4.NH.CMe:CCMe\ N—]_2$ (IX), m. 263 5°; the mother liquor contains chiefly unaltered VIII. A higher yield is obtained by refluxing VIII (1.7 g.), VI (0.25 g.) and EtOH (10 cc.) for 5 hrs.; the yield is 0.5 g. of IX. It does not reduce Fehling soln. or NH_3-$AgNO_3$; but after treatment with hot dil. H_2SO_4 for a long time (decompn. to VI and VIII), IX does reduce these reagents. It is insol. in dil. mineral acids, but colors them lemon-yellow. Its solns. in concd. H_2SO_4 are lemon-yellow and in concd. HNO_3 are intense violet-red. II (1.7 g.) and VI (0.8 g.) in EtOH (5 cc.), refluxed for 4 hrs. and treated with EtOH, yield 1.6–1.8 g. of *α-acetylskatole hydrazone*, $C_6H_4.NH.C(CMe:NNH_2)\cdot CMe$ (X), straw-yellow, m. 142–4°, insol. in dil. mineral acids; concd. H_2SO_4 turns it orange-yellow, then lemon-yellow, and dissolves it; concd. HNO_3 turns it red-yellow and then dissolves it; it reduces hot Fehling soln. and NH_3-$AgNO_3$ (the latter reduction is more rapid if the mixt. is first boiled with H_2SO_4). II (1.7 g.) and VI (0.25 g.) in EtOH (5 cc.), refluxed for 4 hrs., yield 1.2 g. of *α-acetylskatole ketazine*, $[—N\cdot CMeC\ CMe.C_6H_4.NH]_2$ (XI), orange-yellow, m. 234 6°, does not reduce Fehling soln. or NH_3-$AgNO_3$. XI is present in the mother liquor from the crystn. of X, and it is formed by heating X above its m. p. Also X in ether (straw-yellow soln.) and 0.13 g. I in ether ppt. 0.08 g. of XI, and X (0.1 g.) in C_6H_6, heated gently with yellow HgO (0.12 g.), yields 0.07 g. of XI. VII (1 g.), Na (0.9 g.) and abs. EtOH (10 cc.), heated in a Carius tube for 8 hrs. at 180–200°, dild. with water, almost neutralized with H_2SO_4 and steam-distd., yield β-ethylindole (XII); the residue from the distn. (which can be purified by extn. with ether before steam distn.) is a *compd.* (XIII), contg. 24.12% N, probably either a β-ethylindolylhydrazine or a hydrazo deriv. of V, m. 120–1°, sol. in dil. HCl, dil. H_2SO_4, concd. H_2SO_4 and concd. HNO_3 (repptd. by caustic alkalies), does not form a chloroplatinate or chloroaurate, does not reduce Fehling soln. or NH_3-$AgNO_3$, is not oxidized in cold ether by I or in C_6H_6 by yellow HgO, is not attacked by boiling 20% aq. H_2SO_4; with NH_3-$AgNO_3$ it forms a *Ag deriv.*, sol. in mineral acids and in AcOH but hardly sol. in excess NH_4OH. *Picrate*, yellow. V (1 g.), 0.8 g. VI and 5 cc. EtOH, refluxed for 3 hrs., a soln. of 1.4 g. Na in 15 cc. abs. EtOH added, the mixt. heated in a Carius tube for 10 hrs. at 180–200°, dild. with water, almost neutralized by dil. H_2SO_4 and steam-distd., yield XII; the residue is essentially XIII. IX (1 g.), 0.8 g. Na and 10 cc. abs. EtOH, heated as was VII, yield 2-methyl-3-ethylindole (XIV) in the steam-distillate; the residue yields a *compd.* $C_{11}H_{15}N_3$ (XV), probably a β-ethyl-α-methylindolylhydrazine or more likely a hydrazo deriv. of β-acetyl-α-methylindole, m. 162–3°, basic, sol. in dil. HCl, dil. H_2SO_4 (repptd. by alkalies), concd. H_2SO_4 and concd. HNO_3, does not form a chloroplatinate or chloroaurate, does not reduce Fehling soln. or NH_3-$AgNO_3$, is not oxidized in Et_2O by I or in C_6H_6 by yellow HgO. *Picrate*, yellow. *Ag deriv.*, only slightly sol. in excess NH_4OH, sol. in acids, not attacked by boiling 20% H_2SO_4. V (1.7 g.), 1 g. VI and 10 cc. EtOH, refluxed for 4 hrs., a soln. of 1.4 g. Na in 15 cc. abs. EtOH added, heated in a Carius tube for 8 hrs. at 180–200°, and treated as before, yield XIV and XV. X (1.6 g.) and a mixt. of 1.4 g. Na and 20 cc. abs. EtOH, heated in a Carius tube for 10 hrs. at 170–80°, dild. with water, and steam-distd., yield *2-ethyl-3-methylindole* (XVI), lustrous, m. 66°; *picrate*, pomegranate-red, m. 150–1°; the residue from the steam distn. is an unidentified *compd.* (XVII), m. 118–19°, insol. in dil. mineral acids, sol. in concd. H_2SO_4 with brilliant violet color, sol. in concd. HNO_3 with brown color, does not form a chloroplatinate or chloroaurate, gives a red color with picric acid soln. but no ppt. X (from 1.7 g. of II) and NaOEt (from 1.4 g. of Na), heated in a Carius tube for 10 hrs. at 170–80°, dild. with water, nearly neutralized and steam-distd., yield 1.2 g. of XVI; the residue consists chiefly of a little XVII. XI and NaOEt, treated as above, yield XVI and a small quantity of a substance similar in properties to III. From the present work, in conjunction with earlier work, on the synthesis of homologs of I by means of alk. alcoholates, certain general conclusions are justified. The behavior of α-methylindole (XVIII) differs from that of I and skatole (XIX) with respect to alkylation by alcoholates, in strict analogy to their other reactions, e. g., the prepn. of acids by the action of CO_2 on magnesyl derivs., polymerization, etc. A Me group in the α-position in the tetrolic nucleus renders the imidic H of XVIII sufficiently mobile to make possible substitution with alkyl radicals and to obtain α,β-dialkylated homologs by transposition of the alkyl from the N to the β-C atom. On the contrary, the absence of a substituent in I and the presence of an alkyl group in the β-position in XIX do not render the imidic H sufficiently reactive to effect alkylation. A difference between XVIII on the 1 hand and I and XIX on the other is to be found in the behavior with dil. H_2SO_4, i. e., whereas VIII is hydrolyzed, V and II are not attacked. In contrast to the behavior of the free bases, it is necessary to distinguish, in the transformation of indolic ketones to homologs of I by alcoholates, between ketone derivs. with CO in the β-position (V and VIII) and those with CO in the α-position (II). In the 1st case the presence of a neg. β-Ac radical imparts to the imidic H sufficient mobility to make possible attack by alcoholates, even when the α-position is free, as in V, whereas I does not react. Derivs. with alkyl groups on the N are thus formed, with liberation of NaOH, which splits the Ac group; with subsequent transposition of the *N*-alkyl radical to the β-C atom, the final products are β-alkylated or α,β-dialkylated I derivs. On the contrary, in XIX, substitution of α-H by an Ac group does not render the mol. sufficiently reactive to be alkylated. All 3 indolic ketones are transformed in the same way by VI and NaOEt into homologs of I by substitution of Ac by alkyl groups having the same no. of C atoms. There are 3 possible general ways of obtaining homologs of I by means of alk. alcoholates: (1) direct alkylation of indoles when the latter are already α-alkylated; (2) alkylation of β-acyl-substituted indoles and

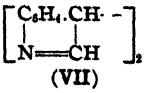
(3) reduction of indolic ketones through the corresponding hydrazones or ketazines for α- or β-acyl-substituted members. C. C. Davis

The pyrrole-indole group. II. 26. Dehydrogenation by means of sulfur. β,β′-Biindolyl from indole. Bernardo Oddo and Lina Raffa. *Gazz. chim. ital.* **69**, 562–8(1939); cf. *C. A.* **33**, 4239[7].—The paper is concerned with the reaction of indole (I) and S, which has been studied previously only by Madelung and Tencer (*C. A.* **9**, 2253, 2254). A mixt. of 2.5 g. I and 0.34 g. S, heated in a sealed tube for 48 hrs. at 115–25° (H_2S is evolved), the product washed with boiling petr. ether, dissolved in Me_2CO, aq. Na_2S added, dild. with water, the ppt. washed with water and ether-petr. ether, and purified from AcOEt, yields *β,β′-biindolyl* (II), lustrous, m. 286–7°, turns rose colored on long exposure to air, insol. in cold and hot dil. mineral acids and alkalies; its solns. in concd. H_2SO_4 are orange, by dil. with water turn bright red, and on further dil. turn colorless; its solns. in concd. HNO_3 are at first brown-red but soon turn ruby-red, and by addn. of water ppt. an unidentified dark red *compd.* which decomp. before fusion. At 0° aq. PhN_2Cl and alc. II give a brown-red liquid; aq. NaOAc added dropwise to this ppts. the *coupled compd.*, pomegranate-red, m. 162–5°. In further syntheses, the ratios of I to S were varied from 1 to 3 S atoms per I mol., with the conditions as before. In every case, II was the product, with yields which increased with increase in the S:I ratio. However, preliminary expts. indicate that at 190–200° sulfurated compds. are formed, with probable closing of the ring. Concd. aq. $NaNO_2$, added dropwise to II in cold glacial AcOH (the soln. turns intense brown-red with green reflection but with no pptn.), dild. with water, the ppt. purified from EtOAc and ligroin, the intensely orange mother liquor treated with $NaHCO_3$ and the addnl. ppt. purified as before, yields, after combination of the 2 ppts., not a NO deriv., but a *compd.* contg. 12.39% N ($C_{16}H_{10}N_2$ = 12.17%), dark orange, m. around 270° (decompn.), does not give a pos. Liebermann reaction, insol. in cold and hot concd. aq. alkalies. It is probably an oxidation product (III) of II as indicated also by the fact that if III in AcOH is treated with Zn + HCl,

(III) 

II is formed. II and picric acid (IV) in anhyd. PhMe ppt. the *picrate* $C_{16}H_{12}N_2(C_6H_3O_7N_3)_2$, bluish black with metallic reflection, m. 189° (with explosion), easily hydrolyzed. It is formed only in the presence of excess IV. A monopicrate could not be prepd. With aq. $AgNO_3$ (contg. NH_4OH), II in aq. Me_2CO ppts. the yellowish white *Ag deriv.*, sol. in excess NH_4OH, so unstable that it could not be analyzed. Attempts to prep. an iodate and perchlorate of II were unsuccessful, and the products were indefinite oxidation products of II. Thus II in Me_2CO or EtOH and aq. HIO_3 ppt. a *substance* which is at first greenish but turns black with liberation of I. Alc. II and $HClO_4$ give a soln. which slowly turns rose, then dark red after several days, with pptn. of a dark red *substance* which decomp. at a high temp. Gabriel, Gerhard and Wolter (*C. A* **17**, 3186) obtained from β,β′-biindolyl-α,α′-dicarboxylic acid a biindolyl which they designated α-biindolyl (V) to distinguish it from an another biindolyl, designated β-biindolyl, formed by heating V with HBr or HI and treating the product with alc. NH_3 (a protest is made against the widespread use of Greek letters, particularly in the German literature, to distinguish isomers while they are at the same time being used to indicate the positions of substituent groups). These isomers of G., G. and W. probably differed in the positions of the double bonds in the pyrrole nucleus, i. e., they might have been VI and VII,


(VI)

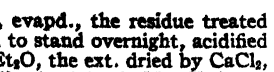

(VII)

but there was no indication of which was which. II, as prepd. by O. and R., had properties similar to those of the α-compd. of G., G. and W., and therefore the α-compd. of the latter was probably VI and their β-compd. was VII. To avoid confusion, the compd. of the VI structure should be termed β,β′-biindolyl and that of the VII structure *β,β′-biindolenyl*. C. C. Davis

Condensation products of *N*-aminocarbazole (biphenylenehydrazine) with fluorenone and its derivatives. M. Kh. Gluzman. *Trudy Khar'kov. gosudarst. Univ.* **3**, 73–9 (1938); *Khim. Referat. Zhur.* **2**, No. 4, 58(1939).—Condensation of *N*-aminocarbazole (I) with carbonyl compds. was investigated by Wieland (*C. A.* **7**, 596) and by Blom (*C. A.* **11**, 450). By condensing I with fluorenone (II) G. obtained fluorenone biphenylenehydrazone, $(C_6H_4)_2$-NN:C$(C_6H_4)_2$ (IV) and, correspondingly, he obtained 2-nitrofluorenone biphenylenehydrazone (V) by condensation of I with 2-nitrofluorenone (III). The method for the prepn. of *N*-nitrosocarbazole and of I was improved. For the prepn. of IV heat for 2–5 min. 1 g. of I and 1 g. of II in 10 cc. of alc. with a drop of concd. H_2SO_4. Light-red needles or flakes were obtained, m. 182–3° (rapid heating). For the prepn. of V heat for 30 min. 0.5 g. of I and 0.62 g. of III in 175 cc. of alc. with 3–4 drops of H_2SO_4. The V (0.8 g.) formed red needles from alc. The m. p. was not sharp. A change took place at 177° and melting at 198–203°. The soly. of IV and of V are given in a table. W. R. Henn

A new method of introduction of the nitrile group into compounds containing a methylene group with mobile hydrogen atoms. Carlo Musante. *Gazz. chim. ital.* **69**, 523–35(1939).—The expts. are based on the method of synthesis of isoxazoles described by Quilico and Fusco (*C. A.* **32**, 2117[4]) and involving the use of RC(:NOH)Cl compds, and had as their aim the prepn. of derivs. contg. the isoxazole nucleus carrying a CO in the 3-position. The reagent used in the earlier work, viz., PhC(:NOH)Cl, was replaced by EtOCOC(:NOH)Cl (I), which had already been used for synthesizing other heterocyclic compds. (cf. M., *C. A.* **32**, 9064[3]). Systematic expts. were started in which I was made to react with the Na salts of β-diketones, β-ketone esters, cyano ketones, cyanoacetic esters, etc., with a view to its condensation to isoxazole derivs., i. e., with compds. contg. CH_2 groups with active H atoms. It was not found possible to isolate in pure form the condensation products, and probably they are liquids or solids with very low m. ps. which cannot be distd. without decompn. even *in vacuo*, and which are obtained only in low yields. The present paper is not concerned with the isolation and purification of the condensation compds. but with their reactions with various reagents, with particular attention to reactions which prove that they are derivs. of isoxazole. $AcCH_2Ac$ (3 g.) and Na (0.69 g.) in abs. EtOH ppt. the Na salt (II); this, treated with alc. $EtO_2CC(:NOH)Cl$ (III) (4.55 g.) (the mixt. turns red-yellow, the II dissolves and NaCl is pptd.), allowed to stand for 24 hrs., filtered, evapd., water added, extd. with Et_2O, dried with $CaCl_2$, the residue (which could not be crystd.) treated with KOH in hot abs. EtOH, the pptd. K salt dissolved in water, washed with Et_2O, acidified with dil. H_2SO_4, allowed to stand for several hrs., and the ppt. purified by petr. ether, yields $NCCHAc_2$ (IV), m. 52–4° (cf. *Ber.* **31**, 2944 (1898)). It is sol. in aq. Na_2CO_3. The reaction between II and III was expected to be: I + II → $EtO_2CC(:N.O.CMe:CAc)$ + NaCl + H_2O, a reaction analogous to that between PhC(:NOH)Cl and II (cf. F., *C. A.* **33**, 8611[4]). But since the immediate product could not be isolated, the reaction mixt. was treated with alc. KOH in an attempt to form the corresponding acid. IV was the only product, however, and was formed by loss of CO_2 to form $HC(:N.O.CMe:CAc)$ and isomerization of the latter to IV. IV and $PhHNNH_2$ (V) (equimol. wts.) in AcOH, refluxed for 2 hrs. and dild. with water, yield 1-phenyl-3,5-dimethyl-4-cyanopyrazole, m. 90° (cf. Benary, *C. A.* **22**, 220). The condensation of II and III carried out as before, the filtered product evapd. *in vacuo*, water added, extd. with Et_2O,

the ext. washed with water, evapd., the residue treated with 10% aq. KOH, allowed to stand overnight, acidified with dil. H_2SO_4, extd. with Et_2O, the ext. dried by $CaCl_2$, evapd., the red-yellow oil dissolved in AcOH, V (same wt. as the oil) added, refluxed, dild. with water and the ppt. purified by dil. EtOH, yields *5-methylisoxazole-3,4-N-phenylmethylphthalazone*,



(VI), m. 178–9°, insol. in cold aq. Na_2CO_3 and in alk. hydroxides; sol. in boiling aq. KOH (yellow soln.). It is formed by elimination of 2 H_2O mols. from $HO_2CC(CMe{:}CAc)N(Ph)N{:}CMe$ and V, with cyclization. $BzCH_2Ac$ (4.55 g.), III (4.06 g.) and Na (0.6 g.) in EtOH, condensed by the same method as before, yield $BzCH(CN)Ac$ (VII), m. 74° (cf. Burns, *J. prakt. Chem.* [N. S.] **47**, 113 (1893)), sol. in aq. Na_2CO_3. In this condensation, alc. KOH can be replaced by dil. aq. KOH and the reaction carried out cold. VII and V form $MeC(CN){:}N.NPh.CPh{:}CCN$, m. 190° (cf. Burns, *loc. cit.*). VII and concd. HNO_3 (d. 152), boiled for several min., evapd. to a small vol., allowed to stand and the ppt. purified by water, yield an unidentified *compd.* contg. 8.43% N, m. approx. 70°. Bz_2CMe_2 (4.24 g.), III (2.87 g.) and Na (0.43 g.) in EtOH, condensed as before, yield $Bz(NC)CHBz$ m. 159–60° (cf. Claisen, *Ber.* **24**, 135 (1891)), sol. in aq. Na_2CO_3, gives a red color with alc. $FeCl_3$. $BzCH_2CO_2Et$ (7.68 g.), 5.5 g. III and 0.92 g. Na in EtOH, condensed as before, the initial oily product sapond. by alc. KOH, dissolved in water and acidified with dil. H_2SO_4, yield $NCCH_2COPh$. $EtO_2CC(CPh{:}N.O.CPh{:}CCO_2Et$ is formed first but could not be isolated, but with KOH formed unstable $KO_2CC(CPh{:}CCO_2K)N(O)C$, which lost CO_2 to form $HC(CPh{:}N.O.CPh{:}C)CO_2H$, which in turn isomerized to $Bz(NC)CHCO_2H$; this lost CO_2 to form $NCCH_2Bz$. $NCCH_2CO_2Et$ (VIII) (11.3 g.), 15.15 g. III and 2.3 g. Na in EtOH, condensed as before, allowed to stand for several hrs., evapd., water added, extd. with Et_2O, the red-yellow oil residue from the evapd. ext. (it decomposes when distd. *in vacuo*) dissolved in 10% aq. KOH (red soln.), allowed to stand for 12 hrs., clarified, acidified with H_2SO_4, the ppt. dissolved in aq. Na_2CO_3, repptd. by acid, and further purified by dil. EtOH, yield *carboethoxycyanoacetamide*, $H_2NCOCH(CN)CO_2Et$ (IX), lustrous, m. 162° (decompn. to an unidentified *compd.* with a higher m. p.); with alc. $FeCl_3$ it gives a blood-red color; in boiling concd. alk. hydroxides it evolves NH_3. *Ag salt*, $C_6H_7O_3N_2Ag$. When heated at 180° for a few min., IX forms an unidentified *compd.* contg. 20.55–20.95% N, does not m. below 270°. IX can be prepd. also from $H_2NCOCHNaCN$ and $ClCO_2Et$, which establishes its constitution. By the same condensation reaction used in prepg. IX, but substituting MeOH for EtOH, there is obtained *carbomethoxycyanoacetamide*, $H_2NCOCH(CN)CO_2Me$ (X), lustrous, m. 119° (decompn.); *in vacuo* over H_2SO_4 it loses its luster and changes its general appearance. At 180° it forms an unidentified *compd.*, which does not m. below 270°. With $FeCl_3$ it gives a red color. It does not react with Ac_2O nor with HNO_2. With hot aq. alk. hydroxides it evolves NH_3. With *p*-$O_2NC_6H_4N_2Cl$ its solns. in aq. NaOH turn intense red, and on acidification an unidentified *compd.*, $C_{11}H_9O_5N_5$, orange, m. 207–9°, is pptd. *Ag salt*, $C_5H_5O_2N_2Ag$. IX is formed by a reaction analogous to that between $PhC(:NOH)Cl$ and $NCCNaHCO_2Et$ (cf. Q. and F., *C. A.* **32**, 2117[4]), i. e., III + VIII → $EtO_2CC(CN){:}N.O.C(NH_2){:}CCO_2Et$ (XI) + NaCl. XI could not be isolated but was attacked by KOH with formation of 2 probable successive transitory products, viz., $HO_2CC(CN){:}N.O.C(NH_2){:}CCO_2Et$ and $HC(CN){:}N.O.C(NH_2){:}CCO_2Et$. The latter isomerizes to IX. In the formation of X, substitution of the Et group by the Me group takes place at the instant when VIII is mixed with NaOMe. Double decompn. takes place, with intermediate reversible formation of $NCCH_2C(OEt)(OMe)O$—, which can lose MeOH and regenerate the mesomeric anion $NCCH{:}C(OEt)O$— or lose EtOH with formation of the mesomeric anion $NCCH{:}C(OMe)O$— ⇄ $NCCHC(:O)OMe$ (XII), which belongs to $NCCH_2CO_2Me$. With excess MeOH, the equil. is displaced completely to formation of XII, which then reacts with III to form the condensation compd., $EtO_2CC(CN){:}N.O.C(NH_2){:}CCO_2Me$, which by sapon. forms X. The expts. show that the reaction between III and Na salts contg. CH_2 groups with active H atoms follows the same general course as benzalchloroxime and leads to isoxazole derivs. The presence of neg. groups (Ac, Bz, CO_2R, etc.) in the 4-position in the isoxazole nucleus renders the CO group in the 3-position particularly unstable so that, with the exception of the product from CH_2Ac_2 which is decarboxylated by alc. KOH, even cold aq. alkalies remove CO_2, with subsequent isomeriz[illegible] of the resulting isoxazole with a free 3-position to [illegible]-3-ketonic or β-diketonic nitrile. The use of III is a new "direct" method of introducing a CN group into a CH [illegible] with mobile H atoms, adjacent to a group which can [illegible] in ze with the =NOH group to an isoxazole. This is [illegible]ble in virtue of the facility with which isoxazole derivs. with neg. groups in the 4-position lose their CO groups in the 3-position by the action of alkalies, with opening of the nucleus.

C. C. Davis

New investigations of the isoxazole group. VII. Primary alcohols and aldehydes. Adolfo Quilico, Luigi Panizzi and C. Epifani. *Gazz. chim. ital.* **69**, 536–46 (1939); cf. *C. A.* **33**, 1728[8].—Although the reduction of phenylimido chlorides by $SnCl_2$ + HCl in Et_2O has been utilized in the prepn. of $O.CMe{:}C(CHO).CPh{:}N$ (cf. Q. and P., *C. A.* **32**, 7894[8]), this method is of no service in the prepn. of α- and γ-aldehydes, for the reduction continues beyond the stage of the Schiff base and the corresponding secondary amines of the aliphatic-aromatic type. Nor could α- and γ-aldehydes be prepd. by the use of nitriles according to the method of Stephen (*C. A.* **19**, 3261), for almost 100% yields of primary amines are obtained. Other investigators have encountered difficulties in other ways in attempts to synthesize heterocyclic aldehydes in general. α- and γ-Aldehyde derivs. of isoxazole should be of particular interest because of the positions of the CHO groups, and therefore it was decided to utilize the classic method of oxidation of the corresponding primary alcs., accessible from the amines. The expts. show that this synthesis can be carried out successfully. Aq. $NaNO_2$ (3.5 g.), added dropwise to boiling aq. $O.N{:}CMe.CH{:}CCH_2NH_2.HCl$ (6.0 g.) (the mixt. is maintained acidic by addns. of dil. HCl to prevent pith being formed), when N and other volatile compds. (including an irritating gas with the odor of PhNCO) are no longer evolved the mixt. filtered, satd. with $(NH_4)_2SO_4$, extd. with Et_2O, the dried ext. distd., and the yellow oily distillate (3.5 g.) fractionally distd. *in vacuo*, yields *γ-methyl-α-isoxazolecarbinol*, $O.N{:}CMe.CH{:}CCH_2OH$ (I), b_{25} 140°, slightly sweet odor, $d_4^{23.6}$ 1.1613, $n_D^{23.6}$ 1.48063. It can be oxidized by $K_2Cr_2O_7$ in H_2SO_4 to $O.N{:}CMe.CH{:}CCO_2H$, m. 210–11° (cf. Claisen, no reference). I in a dil. aq. alkali and BzCl yield the *benzoate*, $O.N{:}CMe.CH{:}CCH_2OBz$, m. 53.5–4.4°. I and *p*-$O_2NC_6H_4Cl$, warmed and treated with dil. NaOH, yield the *p-nitrobenzoate*, $O.N{:}CMe.CH{:}CCH_2OCOC_6H_4NO_2$-*p*, lemon-yellow, m. 82–3°. Aq. I (3.5 g.) and $K_2Cr_2O_7$ (5.5 g.), added slowly and alternately to

boiling H_2SO_4 (5 cc. of H_2SO_4 in 40 cc. of water), with continuous passing of steam during the addn. and then until the distillate no longer gives a reaction with *p*-$O_2NC_6H_4NHNH_2$ (II) in AcOH, the total distillate satd. with $(NH_4)_2SO_4$, extd. with ether (free of peroxides), the ext. dried, evapd., and the oil residue kept *in vacuo*, yield *γ-methyl-α-isoxazolealdehyde*, O.N:CMe.CH:CCHO (III), silky, m. 47–8°, sublimes *in vacuo* (30 mm. Hg) at 70–5°, penetrating aromatic odor, does not oxidize in air, reduces warm aq. NH_3-$AgNO_3$; with Piloty acid it gives a characteristic hydroxamic acid; it is sol. in warm 20% aq. KOH and on acidification O.N:CMe.CH:CCO$_2$H (cf. Claisen, no reference) is pptd.; the mother liquor, made alk., yields I. If, in the extn. of III, the ether contains peroxides, the oil which is extd. solidifies in a desiccator and, sublimed *in vacuo*, yields a *compd.* (IV) contg. 10.85–11.10% N, corresponding to $(C_5H_6O_2N)_2$ and perhaps a hydroperoxide, 2 III + H_2O_2. It has a penetrating odor of O_3. It m. 100–2° (decompn.). Its aq. solns. are acidic to Congo red, turn iodized starch paper intense blue and evolve O from acidic $KMnO_4$. III or IV and II in AcOH ppt. the *p-nitrophenylhydrazone*, O.N:CMe.CH:CCH:NNHC$_6$H$_4$NO$_2$-*p*, dark orange-yellow, m. 258–9° (decompn.). Aq. III or IV, $H_2NCH:NNHCONH_2$.HCl (V) and NaOAc ppt. the *semicarbazone*, O.N:CMe.CH:C-CH:NNHCONH$_2$, pearly luster, m. 225–6° (decompn.). Concd. aq. NH_2OH.HCl (contg. NaOAc and $NaHCO_3$) and III ppt., on standing, the *oxime*, O.N:CMe.CH:C-CH:NOH, m. 96.5–98°. III and excess CH_2N_2 in Et_2O evolve N and, by distn. of the ether and excess CH_2N_2 and steam-distn. of the residual oil, there is obtained *γ-methyl-α-acetylisoxazole*, O.N:CMe.CH:CAc, silky, m. 75–6°, characteristic odor. *p-Nitrophenylhydrazone*, dark yellow, m. 222–3°. *Semicarbazone*, lustrous, m. 203–4°. *Oxime*, m. 114–15°. Prepd. by the same method as I *α-methyl-γ-isoxazolecarbinol*, O.CMe:CH.C(CH$_2$OH):N (VI), b_{30} 134.5–5.5°, sweetish odor, $d_4^{13.8}$ 1.4628, $n_D^{13.8}$ 1.47967. Its chem. properties are similar to those of I. It is oxidized by CrO_3 to a 100% yield of O.CMe:CH.C-(CO$_2$H):N, already prepd. by Claisen (no reference). Alk. VI and BzCl yield the *benzoate*, m. 62–3°. *p-Nitrobenzoate*, silky, m. 92–3°. VI, oxidized by $K_2Cr_2O_7$ by the method used with I, yields *α-methyl-γ-isoxazolealdehyde* (VII), b_{30} 65–75°, becomes viscous but does not solidify when ice-cold, more penetrating odor than that of I, reduces warm NH_3-$AgNO_3$, gives the Angeli reaction with benzenesulfohydroxamic acid and the Cannizzaro reaction with aq. alkalies, does not oxidize in air, is oxidized by CrO_3 to O.N:C(CO$_2$H).CH:CMe, already known. *p-Nitrophenylhydrazone*, light orange, m. 228–9° (decompn.). *Semicarbazone*, pearly luster, m. 202–3° (decompn.). *Oxime*, m. 113–14°. VII and excess CH_2N_2 in Et_2O evolve N and, by evapn. and soln. in aq. V + NaOAc, yield the *semicarbazone*, O.N:C(CMe:NNHCONH$_2$).CH:CMe (VIII), m. 236°. O.N:C(CN).CH:CMe (cf. Q. and P., *C. A.* **33**, 1728[8]) (2.0 g.) in Et_2O, added dropwise to an ether soln. of MeMgI (from 0.67 g. of Mg and 4 g. of MeI) (the mixt. seps. into 2 layers), decompd. by ice and dil. H_2SO_4, the ether layer dried, distd., and the residual oil distd. *in vacuo*, yields γ-acetyl-α-methylisoxazole, b_{30} 75–80°. This identifies the constitution of VIII and therefore of VII. *Semicarbazone*, pearly luster, m. 237–8° (decompn.). I and VI are the 1st examples of primary alcs. in the isoxazole series. Likewise III and VII are the 1st primary alcs. in the same series to be described.

C. C. Davis

Syntheses of derivatives of isoxazole with fulminic acid. I. Adolfo Quilico, Giovanni Speroni and Ernesto Galeffi. *Gass. chim. ital.* **69**, 508–23(1939); cf. *C. A.* **34**, 4254.— In work published from 1929, Q. and his collaborators have shown that fuming HNO_3 (I) reacts with C_2H_2 (II) and Me_2CO (III) to form numerous products, some of which are isoxazoles, but the mechanism of the reactions was not established. It has now been found that all the isoxazoles formed from II and from III are of the HC:N.-O.CR:CH type, i. e., have the γ-position free and therefore contain the —CH:NO group, which in turn contains the characteristic group of fulminic acid (IV). This fact, in conjunction with the probability that IV is among the labile products of the reaction of I and II (cf. Wieland, *C. A.* **1**, 1270; **5**, 704), induced Q. and S. to investigate whether IV is an intermediate product of the formation of isoxazoles from II and III. The reaction would probably be: IV + HC:CR → [HON:CHC:CR] → HC:N.CR:CH, for other addn. reactions of IV are recorded in the literature. Since, however, the action of IV on the triple bond of II derivs. is not known, a systematic study was undertaken, the initial results of which with II are described in the present paper. It was difficult to find any exptl. conditions under which a compd. as easily polymerizable and unstable as IV would react with II. Bubbling of II into a suspension of Hg(ON:C)$_2$ (V) acidified by H_2SO_4 gave no definite results, but by conversion of V into NaON:C (VI) and treatment under the conditions described (which must be rigidly followed) satisfactory results were obtained. A VI soln. (prepd. from 40 g. of V in 125 cc. of water and 75 g. of Na-Hg contg. 8% Na), added dropwise to III already satd. with II and acidified with 4 cc. of 50% H_2SO_4 (the reaction mixt. treated with II throughout the addn. of VI), 50% H_2SO_4 also added dropwise simultaneously, with continuous agitation, and II passed for an extra 0.5 hr., yields a clear yellow soln. and a ppt. of V formed by decompn. of the complex compd. (VII) of Ehrenberg (*J. prakt. Chem.* **22**, 230 (1885)) which was in the soln. as a result of using an excess of V. With VII present, the yields are higher, so it probably acts as a catalyst. The reaction product, distd. (to remove III and water) until SO_2 is evolved, the distillate satd. with $(NH_4)_2SO_4$, extd. with Et_2O, the ext. dried by Na_2SO_4, evapd., the residue washed with 10% aq. NaOH, then with 10% H_2SO_4, dissolved in Et_2O, washed with water, dried again, evapd. and fractionally distd., yields *α-isopropenylisoxazole*, $H_2C:CMeC:CH.-CH:N.O$ (VIII) (6 g. from 5 syntheses), b. 151.5–2°, highly refractive, characteristic pleasant odor, $d_4^{13.8}$ 1.0126, $n_D^{13.8}$ 1.48054. Its soly. in water is 1 part in 120 parts at room temp. It is resistant to hot aq. alkalies and alk. alcoholates, and only by prolonged heating is it decompd. with evolution of NH_3. It is sol. in cold concd. HNO_3 (repptd. by water). Its solns. in concd. H_2SO_4 are light brown. Contrary to ethylene derivs. of the C_4H_6 series, it does not polymerize. It decolorizes Br water and reduces cold acidic $KMnO_4$ rapidly. VIII (1 cc.) and Br (0.55 g.) in CS_2, allowed to stand for several hrs., evapd., the residue washed with aq. $NaHCO_3$ and water, dried by Na_2SO_4, and fractionated *in vacuo*, yield the *di-Br deriv.*, $C_5H_3NOCBrMeCH_2Br$, highly refractive, characteristic mint-like odor, b_{12} 130–5°, does not solidify in a freezing mixt. VIII and $K_2Cr_2O_7$ in 10% H_2SO_4, refluxed for 7–8 hrs. (the liquid turns green), satd. with $(NH_4)_2SO_4$, and extd. with Et_2O, yields almost 100% of *α-isoxazole carboxylic acid* (IX), m. 149° (cf. Q. and Freri, *C. A.* **24**, 3484). Aq. $KMnO_4$ (8.8 g.), added dropwise to an ice-cold suspension of VIII (2.5 g.) in 10% H_2SO_4, most of the MnO_2 removed by (CO$_2$H)$_2$, filtered, steam-distd., the distillate satd. with $(NH_4)_2SO_4$, extd. by Et_2O, the ext. dried, evapd., the residue fractionally distd. *in vacuo*, and the distillate, which b_{37} 57–70°, redistd. at atm. pressure, yields 1.2 g. of *α-acetylisoxazole* (X). X

(1.5 g.) in anhyd. Et_2O, added dropwise to ice-cold Grignard reagent (prepd. from 0.68 g. of Mg and 4 g. of MeI in a current of H), allowed to stand for several hrs., the ppt. decompd. by ice-cold 5% H_2SO_4, satd. with $(NH_4)_2SO_4$, extd. by Et_2O, and the residue from the ext. distd. *in vacuo*, yields *α-isoxazoledimethylcarbinol* (**XI**), pale yellow, odorless oil, b_{15} 90–100°. When heated with P_2O_5, dild. with water and steam-distd., it is dehydrated to **VIII**. The mechanism of formation of **VIII** is clear from a consideration of the facility with which **II** derivs. and their hydration products condense to long-chain compds. **VIII** is formed from 1 mol. each of **II**, **III** and **IV**. **III** is not merely the solvent but takes part in the reaction. It is suggested that the initial reaction is: **II** + **III** → HC:CC(OH)Me_2 (**XII**), a reaction already known under other conditions. **XII** and **IV** then react thus: **IV** + **XII** $\xrightarrow{-H_2O}$ → [HON:CHC:CC(OH)Me_2] → **XI** ⟶ **VIII**. The ease with which **XI** is dehydrated to **VIII** makes it probable that **XI** rather than **VIII** is the chief product of the reaction of **II**, **III** and **IV**. This reaction is of great interest in that it offers a new method of synthesis of isoxazole derivs. with free γ-position. It should be possible to find conditions, in the absence of **III**, to synthesize isoxazole (**XIII**) itself; thus: =C:NOH + **II** → **XIII**, a reaction which would be analogous to the known one: $H_2CN{:}N$ + **II** → HN.N:CH.CH:CH. The analogy in these reactions between compds. with the —C:C— group and those with the —$COCH_2$— group (which is derived from the former by addn. of H_2O) suggests that β-ketone esters, β-diketones, $NCCH_2CO_2Et$, etc., may react with **IV** thus: =C.NO + $RCOCH_2COR$ → [HON:CH.C(COR).C(OH)R] → O.N:CH.C(COR):CR + H_2O. In this case there would be a parallelism between the synthesis of isoxazoles from **IV** and that from HClC:NOH (cf. Q. and Fusco, *C. A.* **32**, 2117[4]), since **IV** can be regarded as formed thus: HClC.NOH → C:NOH + HCl. Also the synthesis by **IV** explains the formation of isoxazole derivs. in the reaction between **I** and **II**. **IX** is probably formed as follows.

=C:NOH + 2 **II** → [HON:CHC:CCH.CH_2] → O.N

IX, or else: =C:NOH + **II** + **III**

→ [HON:CHC:CCH(OH)Me] → O.N:CH.CH:CC(OH)HMe $\xrightarrow{HNO_2}$ **X** $\xrightarrow{HNO_2}$ **IX**. The mol. refraction of **VIII** is higher than the refractions of dimethyl- and trimethylisoxazole, because of the exaltation by the double bond in the side chain. Mol. refraction data on isoxazoles are scanty, so the mol. refractions of HC:CMe.O.N:CCH_2OH and O.N:CMe.CH:CCH_2OH (to be described in a forthcoming paper by Q. and Panizzi), HC:N.O.CMe.CBr, HC:N.O.CMe:CCl, MeC:N.O.CH:CBr, MeC:N.O.CMe:CCl and MeC.N.O.CMe:CBr (cf. Q. and Justoni, *C. A.* **32**, 7455[1]) and O.N:CH.CMe:CMe and O.N.CMe:CMe:CH (cf. Justoni, *Rend. ist. lombardo sci.* **71**, No. 2 (1938)) were detd. The data are in harmony with previous data. The Br derivs. show smaller depressions than do the Cl derivs. A comparison of the values of the α-substituted derivs. with those of γ-substituted derivs. shows an interesting regularity, which may be of service in structural problems. In all cases the attenuating effect on the depression of the mol. refraction is greater when the substituent is in the α-position than when it is in the γ-position. C. C. Davis

The transformation of γ-isoxazolecarboxylic acids into derivatives of pyrazole. I. Sigismondo Cusmano. *Gass. chim. ital.* **69**, 594–601(1939).—Although it might be expected that γ-isoxazolecarboxylic acids would in general decomp. when heated, thus: RC:CH.C(CO_2H):N.O → RC:CH.CH:N.O → $RCOCH_2CN$, Claisen found (*Ber.* **24**, 3909(1891)) that no such cyano ketonic compds. are formed, but rather polymers or resins, and that only PhC:CH.C(CO_2H):N.O (**I**) behaved in this way. Furthermore Quilico and Freri (*C. A.* **24**, 3484) found that $HO_2CC.CH.CH{:}N.O$ did not decomp. when heated to HC CH.CH:N.O or thence to the successive product, $NCCH_2CHO$, but to pitchy or carbonaceous substances, even *in vacuo*. Also the temp. plays a part in the results, for some acids are decarboxylated at different temps. from others and the higher temps. necessary for some govern in turn the subsequent reactions. However, even if it has so far been impossible to find conditions under which isoxazolecarboxylic acids form cyano ketonic compds. (except with I), it should be possible to obtain definite and relatively simple compds. by heating an isoxazolecarboxylic acid in the presence of a compd. capable of combining with the CO and CN radicals at the instant of their formation; in this way the reaction should result in definite compds. rather than intractable polymers. $PhHNNH_2$ (**II**) was chosen as the reagent and, although various products were to be expected, the acidic nature of the isoxazolecarboxylic acids made the formation of stable salts of **I** seem likely, while it seemed possible, by proper control of heat, to obtain phenylhydrazones or definite compds. with other nuclei. Since **I** is the only acid of this series which does not decomp. too profoundly by heating, it was chosen for the 1st expt. **I** (1 g.) and 3 g. **II**, heated cautiously over a flame until gas (chiefly CO_2 and water) is no longer evolved, dild. with water, acidified with AcOH, poured into water, allowed to stand for 3–4 hrs., and the ppt. purified by C_6H_6, yield 80% of PhC·N.NPh.C(NH_2):CH (**III**), contains C_6H_6 of crystn., which it loses on exposure to air, m. 129–30°, is not altered by prolonged treatment with boiling dil. HCl in EtOH or with boiling aq.-alc. NaOH, sol. in dil. mineral acids (repptd. by NH_4OH). It has been prepd. by other reactions by Mouneu and Lazennec (*C. A.* **1**, 858), Seidel (*J. prakt. Chem.* **58**, 137 (1898)) and Justoni (*C. A.* **32**, 6243[2]), and the compd. prepd. by the method of S. was found to be identical with that obtained in the present work. The reaction of **I** and **II** probably involves the initial pyrogenic decompn. of **I** to PhC·CH.CH:N O, isomerization of the latter to Bz-CH_2CN; the latter with **II** forms the phenylhydrazone, PhC(CH_2CN):NNHPh, which isomerizes to **VI** (see below). Mono-Ac deriv., m. 153° (cf. 149° to 152.5° in the literature). **III** and BzH, heated over a flame for several min. (water is evolved), yield after dilu. with EtOH and standing, the *benzal deriv.*, PhC:N.NPh.C(N:CHPh):CH, yellow, m. 122°. Aq. $NaNO_2$ (1 g.) added dropwise to **III** (3 g.) in cold AcOH, allowed to stand for 1 hr., the products completely pptd. by addn. of water and the ppt. extd. by hot 5% aq. alc. NaOH, leaves a residue of a *compd.*, $C_{30}H_{23}N_7$ (**IV**), yellow, m. 217°, neutral, insol. in concd. mineral acids, except in concd. H_2SO_4 (repptd. by diln.). The alk. ext., acidified by dil. AcOH and the ppt. purified by C_6H_6, yields a *compd.*, $C_{15}H_{11}N_3{:}NOH$ (**V**), dark red, m. 207, acidic; its C_6H_6 solns. are dark green. In this reaction of **III**, it probably reacts in a tautomeric form, PhC:N.NPh.C(:NH).CH_3 (**VI**). **V** has the probable structure PhC:N.NPh.C(:NH).C:NOH, and is therefore a deriv. of **VI** rather than of **III**. This is supported by the acid hydrolysis of **V**, i. e., when refluxed in EtOH with concd. HCl for 3 hrs., it yields a *ketone*,

PhC(:N.NPh.CO.C:NOH, orange-yellow, m. 200°, acidic. On the contrary, IV is probably formed from the III structure and is an azoimino compd., PhN.N:CPh.CH:CN:NNHC:CH.CPh:N.NPh. Seidel prepd. a presumably identical compd., but regarded it as PhN.N:CPh.CH_2.C(:N.N:C.C(.NH).NPh.N:CPh (cf. *J. prakt. Chem.* **58**, 137(1898)). However, it does not give an Ac deriv. nor is it basic, so that the constitution assigned to it by C. is more reasonable. II. *Ibid.* 621 8.—As with other isoxazolecarboxylic acids, *p*-$O_2NC_6H_4C$(:CH.C(CO_2H):N.O (I) does not give a cyano ketone when decompd. alone pyrogenically; therefore it was of interest to study its behavior when heated with $PhHNNH_2$ (II), as was PhC(:CH.C(CO_2H):N.O (III) in the preceding expts. The same procedure was followed as in the reaction with III. Under these conditions there is obtained almost 100% of *1-phenyl-3-p-nitrophenylpyrazolone-5-imine*, *p*-$O_2NC_6H_4$-C(:N.NPh.C(.NH).CH_2 (IV), lustrous golden yellow, crystallizes with C_6H_6, which it loses on exposure to air, m. 185°, sol. in warm dil. acids (repptd. by NH_4OH), remains unaltered after several hrs. in boiling HCl (1:5) and 10% aq.-alc. NaOH, does not react with NH_2OH or semicarbazide. *Mono-Ac deriv.*, yellow, m. 210°, insol. in dil. mineral acids. *Benzal deriv.* (V), yellow, m. 175°, insol. in dil. mineral acids. Aq. $NaNO_2$ (0.75 g.), added dropwise to IV (3 g.) in cold dil. AcOH, allowed to stand for 0.5 hr., water added, a suspension of the ppt. in 5% aq.-alc. KOH heated almost to boiling, and filtered, leaves a residue which, purified by xylene, yields a *compd.*, $C_{30}H_{21}O_4N_9$, yellow, m. 310°, insol. in concd. and dil. mineral acids, sol. in concd. H_2SO_4 (repptd. by diln.), does not give an Ac deriv., i. e., its properties are similar to those of the compd. $C_{30}H_{23}N_{17}$ obtained in the earlier expts. (cf. preceding abstr.). The alk. soln., acidified by dil. AcOH, ppts. *1-phenyl-3-p-nitrophenyl-4-oximinopyrazolone-5-imine*, *p*-$O_2NC_6H_4C$:N.NPh.C(:NH).C:NOH (V), greenish yellow, decomp. approx. 290°, has both acidic and basic properties, sol. in cold. concd. HCl (repptd. by diln. with water); hot concd. mineral acids transform it into a *compd.*, $C_{15}H_{16}O_4N_4$, orange-red, m. 209°, acidic. VI and concd. HCl refluxed for 4 hrs., dild. with water, and the ppt. purified by aq. Me_2CO, yield a *ketonic compd.* *p*-$O_2NC_6H_4C$:N.NPh.CO.C:NOH (VII), orange-yellow, m. 209°, insol. in aq. mineral acids, sol. in aq.-alc. NaOH (pptd. by acidification.). A mixt. of IV, alc. AcOH and powd. Zn, allowed to stand for 15 min., refluxed, filtered, the filtrate made alk. by NH_4OH, extd. with Et_2O, the ext. washed and dried by Na_2CO_3, evapd., the residue dissolved in boiling AcOH, filtered and allowed to stand, yields *1-phenyl-3-p-aminophenylpyrazolone-5-imine*, lustrous, m. 110°; when treated with boiling Ac_2O it yields the *di-Ac deriv.* $C_{15}H_{12}N_4Ac_2$, lustrous, m. 235°; when treated in aq. HCl with hot aq. picric acid it forms the *picrate*, $C_{15}H_{14}N_4.2C_6H_3O_7N_3$, yellow, m. 220° (to a brown liquid). The behavior of IV with BzH and with HNO_2 is explained by assuming that like other RC:N.NR.C(:NH).CH_2 compds., it can isomerize to a tautomeric form: *p*-$O_2NC_6H_4C$:N.NPh.C(NH_2):CH (VIII). VI is formed from the IV form, since acids remove its imine group, with formation of VII. The formation of V with no basic properties of its parent compd. indicates that it is formed from the VIII form. The properties of the unidentified $C_{30}H_{21}O_4N_9$ indicate that it too is formed from VIII, and probably it is an *azoimino deriv.* of the constitution: PhN.N:C($C_6H_4NO_2$-*p*).CH:CN:NNHC:CH.C($C_6H_4NO_2$-*p*):N.NPh. IV is probably formed through a series of transformations, thus: I $\xrightarrow{-CO_2}$ *p*-$O_2NC_6H_4C$:CH.CH:N.O $\xrightarrow{+\ PhNHNH_2}$ *p*-$O_2NC_6H_4COCH_2CN$ → *p*-$O_2NC_6H_4C$(:NNHPh)CH_2CN → IV, and it is significant that, whereas decarboxylation of I leads to resinous products, fusion of I with $PhHNNH_2$ gives 100% of IV. C. C. D.

The salts of mercaptobenzimidazole. M. Kuraš. *Collection Czech. Chem. Commun.* **11**, 313–20(1939).—See *C. A.* **33**, 7298[9]. H. Gamc

Simple hydroxychromans and hydroxycoumarans. P. Karrer, R. Escher and H. Rentschler. *Helv. Chim. Acta* **22**, 1287–91(1939).— The supposition that the condensation of trimethylhydroquinone (I) with MeCH:$CHCH_2Br$ to 2,5,7,8-tetramethyl-6-hydroxychroman (II) (*C. A.* **33**, 3793[2]) also yields the isomeric *2-ethyl-4,6,7-trimethyl-5-hydroxycoumaran* (III) has been established by isolation of III from the condensation mother liquors and its identification with a product prepd. by the condensation of trimethylbenzoquinone (IV) with $EtCOCH_2CO_2Et$ (V) according to the procedure of Smith and McMullen (*C. A.* **30**, 3797[9]). A mixt. of 6.5 cc. V in a suspension of 1 g. Na in 80 cc. anhyd. benzene was refluxed and the cooled soln. was treated with 4.8 g. IV. After standing for 3 weeks, dil. HCl was added, the benzene layer was sepd., dried and evapd. Steam distn. of the residue and crystn. of the distillate from alc. in the presence of charcoal gave 1.4 g. of *2-ethyl-4,6,7-trimethyl-5-hydroxycoumarone*, $C_{13}H_{16}O_2$, m. 108°, catalytically reduced in AcOH in the presence of PdO_2 at 40–50° to colorless needles of III, $C_{13}H_{18}O_2$, m. 120° (from dil. alc.); *allophanate*, $C_{15}H_{20}N_2O_4$, m. 214°. Although condensation of MeCH.$CHCH_2Br$ with I yields both coumaran and chroman derivs. condensation with CH_2:$CHCH_2Br$ gives only the coumaran compd. whereas $Me_2C.CHCH_2Br$ (VI) produces only the chroman compd. and consequently the form of the deriv. depends on the mode of substitution of the 3rd C atom of the unsatd. halogen compd. VI was prepd. by the action of 50 g. PBr_3 in 50 cc. petr. ether at −5° for 1 hr. on 15 g. of $Me_2C(OH)$-CH:CH_2 in 100 cc. of petr. ether at −15° in the presence of CO_2. Overnight the temp. rose to 10–15°. After stirring for 1 hr. at room temp., the reaction mixt. was poured over ice and extd. with ether, yielding 40% (9 g.) of VI. A mixt. of 4.5 g. VI, 5 g. I and 3.0 g. $ZnCl_2$ was heated for 3 hrs. in a N atm. until evolution of HBr ceased. H_2O was added and the mixt. was extd. with benzene. Crystn. of the crude product from petr. ether and from alc. gave 1.3 g. of colorless crystals of *2,2,5,7,8-pentamethyl-6-hydroxychroman*, $C_{14}H_{20}O_2$, m. 95°. Absorption spectra measurements of the allophanates of II (log ε 2.760, max. 286.0 mμ; log ε 1.805, min. 251.5 mμ), III (log ε 2.980, max. 288.5 mμ; log ε 2.040, min. 253.5 mμ) and 2,4,6,7-tetramethyl-5-hydroxycoumaran (log ε 3.010, max. 287.5 mμ; log ε 2.070, min. 253.5 mμ), show that the coumaran allophanates exhibit a somewhat higher extinction coeff. than the allophanate of the isomeric chroman compd. Cryoscopic mol.-wt. detns. in benzene of the red oxidation compd. (VII) obtained by continued boiling of II, or its quinoid oxidation product, with excess of $AgNO_3$ in MeOH (*C. A.* **33**, 6310[1]) establish the simple formula $C_{13}H_{14}O_3$ (detns. in camphor corresponded to a bimol. product). The red quinones obtained by $AgNO_3$ oxidation of tocopherols are chromanquinones and VII is designated as 2,6,7-trimethylchroman-5,8-quinone. C. R. Addinall

Steric relations of α-tocopherol and further investigation of lower homologs of α-tocopherol. P. Karrer, H. Koenig, B. H. Ringier and H. Salomon. *Helv. Chim. Acta* **22**, 1139–45(1939); cf. *C. A.* **32**, 7035[9], 7036[8].—α-Tocopherol (I) contains 3 asym. C atoms in positions 2 in the chroman ring and 4′, 8′ in the side chain. Phytol (II) from chlorophyll shows no optical activity and may be a racemate, a mixt. of 2 racemates or a single latent optically active form. A small prepn. of *dl*-α-tocopherol allophanate from

synthetic II m. 3–4° lower than a similar prepn. from natural II. Prepns. of racemic I on a larger scale have shown that the 3,5-dinitrobenzoate, m. 66–7°, allophanate, m. 174–5°, and *p*-nitrophenylurethan, m. 130–1°, are independent of the source of II and that racemic I from natural II is a racemic compd. or a mixt. of racemates in regard to the asym. centers at positions 4′ and 8′. Since 8 isomeric active components are present in racemic I the previous isolation of the bromocamphorsulfonate and comparison with the corresponding salt of natural I has been repeated. Repeated fractional crystn. from alc. gave a difficultly sol. compd., m. 73°, $[\alpha]_D$ 39.6 ± 3° (bromocamphorsulfonate from natural I, $[\alpha]_D$ 39.9 ± 3°), and a more readily sol. compd. (III), m. 52° (bromocamphorsulfonate from natural I, m. 52°). III is probably a difficultly separably mixt. of several diastereomers. Synthetic I has the same physiol. activity as natural I and shows 100% activity in doses of 2–3 mg. The 3 isomeric racemic di-Me tocols (5, 8 (IV); 7,8 (V); 5,7) and *dl*-5,7-dimethyl-8-ethyltocol also show 100% activity in rats in doses of 6, 10, 10 and 10 mg., resp. I is the most effective and its activity is reduced by elimination of a Me group or conversion to an Et group. The dimethyltocols are readily prepd. in good yields by direct condensation of II with the requisite dimethylhydroquinone. A mixt. of 5 g. 2,5-dimethylhydroquinone, 11 g. II and 50 cc. anhyd. HCO_2H was refluxed in a N atm. for 5 hrs. with good mixing by the current of N. The cooled reaction product was poured into H_2O and the oily layer was extd. with ether. The washed and dried ext. was evapd. to dryness *in vacuo* and the 11 g. of brownish oil was boiled with 1.5 g. Na in 40 cc. MeOH in a N atm. for 1 hr. After diln. with 4 vols. of H_2O the product was extd. with ether, yielding 10 g. of oil which was taken up in petr. ether, adsorbed on an Al_2O_3 column and developed with 800 cc. petr. ether. Elution of the 2 central zones and treatment of the oils in benzene with HCNO gave IV *allophanate*, m. 151° (4.76 g. from 5 g. quinone and 10 g. II); *p-nitrophenylurethan*, m. 112°. Similarly 2 g. of 2,3-dimethylhydroquinone and 4 g. II yielded 0.5 g. of V *allophanate*, m. 146° (crystd. from alc. and acetone).

C. R. Addinall

New derivatives of 2-aminomethyltetrahydroquinoline and [1-aminomethyl]tetrahydroisoquinoline. Alois Gassmann and H. Rupe. *Helv. Chim. Acta* **22**, 1241–62 (1939); cf. *C. A.* **33**, 6317⁶. To a mixt. of 225 g. KCN in 1.5 l. H_2O and 150 g. 6-methoxyquinoline cooled to 5° was added gradually with vigorous stirring 337 g. BzCl and after 1 hr. the supernatant liquid was carefully poured off, washed 2 times with dil. HCl and H_2O and crystd. from alc., giving 243 g. (89% of theory) *1-benzoyl-2-cyano-6-methoxy-1,2-dihydroquinoline* (I), prismatic needles, m. 127°, from benzene (*amide oxime*, m. 148–9° (decompn.)), and, as a by-product from the mother liquor, *2-cyano-6-methoxyquinoline* (?) (II), m. 176–7°. Treating 5 g. II with a mixt. of 60 cc. pure HCl and 100 cc. ether with boiling gave the corresponding *acid amide*, whose *HCl salt* m. 237–8° after softening at 225°, while treatment with 30 cc. concd. HCl under reflux gave after a few hrs. the corresponding *acid*, m. 235–6° after softening at 233–4°; the position of the 2(?)-substituent in II and its derived products was not established with certainty. Reduction of 150 g. I in 400 cc. AcOEt with 100 g. freshly reduced Ni catalyst at 120 atm. and about 90° gave 110 g. *benzoyl-6-methoxytetrahydroquinoline-2-methylamine* (III), m. 131–2°. Treating 5 g. II in 15 cc. AcOH with 2 cc. concd. HCl and, with good cooling, 1.2 g. $NaNO_2$ in water gave *1-nitroso-2-benzoylaminomethyl-6-methoxytetrahydroquinoline*, yellow, m. 130–9°, from alc. Heating 100 g. III in 250 cc. concd. HCl for 15 hrs. gave BzOH and, upon treating with alkali and extn. with ether, 45 g. (70% of theory) *2-aminomethyl-6-methoxytetrahydroquinoline* (IV), b_{12} 196–7°; *di-HCl salt*, m. 224–5°; *tartrate*, m. 195° (decompn.); *perchlorate*, m. 278°. Warming 20 g. IV with 16 g. piperonal on a water bath gave a clear soln. which became turbid from the H_2O liberated and, after 12 hrs., formed a bright yellow, resinous mass which would not crystallize, but was dissolved in 350 cc. MeOH and shaken with H, using 25 g. freshly reduced Ni catalyst at 100 atm. initial pressure and 65°, giving, after purification through the HCl salt, *2-(3,4-methylenedioxybenzylaminomethyl)-6-methoxytetrahydroquinoline*, m. 53–4°, from ligroin; *mono-HCl salt*, m. 212–13°; *di-HCl salt*, m. 179–80° after softening at 171°; the base forms a difficultly sol. *sulfate*, *nitrate*, *HCl salt*, *phosphate*, *oxalate*, *perchlorate*, and *picrate*. Condensing 25 g. IV with 22 g. veratraldehyde for 15 hrs. on a water bath gave the corresponding Schiff base as a thick, resinous, faintly yellow oil which was hydrogenated at 100 atm. initial pressure at 70° to *2-(3,4-dimethoxybenzylaminomethyl)-6-methoxytetrahydroquinoline*, purified through its *HCl salt*, m. 182–3° after softening at 179°; the corresponding *sulfate*, *nitrate*, *HCl salt*, *phosphate*, *formate*, *oxalate*, *perchlorate*, and *picrate* are difficultly sol. while the *acetate*, *citrate*, and *tartrate* are readily sol. Condensing 35 g. of *1-aminomethyltetrahydroisoquinoline* (V) (cf. R. and Frey, *C. A.* **33**, 6317⁶) gave the corresponding Schiff base as a brown, resinous, thick oil, which was dissolved in 300 cc. MeOH and reduced with 30 g. Ni catalyst at 90 atm., giving, after purification through the HCl salt, *1-(3,4-methylenedioxybenzylaminomethyl)tetrahydroisoquinoline* as a bright yellow oil; *di-HCl salt*, m. 248–9° (decompn.); the corresponding HCl salt, *sulfate*, *nitrate*, *HBr salt*, *picrate*, *perchlorate*, *oxalate*, and *phosphate* are difficultly sol., while the *formate*, *acetate*, *tartrate*, and *citrate* are readily sol. Condensing 40 g. of V with 40 g. veratraldehyde on the water bath for 12 hrs., followed by catalytic hydrogenation of the resulting thick, oily Schiff base in 300 cc. MeOH with 35 g. Ni catalyst at 65° and 105 atm. gave, after purification through the oxalate, *1-(3,4-dimethoxybenzylaminomethyl)tetrahydroisoquinoline; oxalate*, m. 197° (decompn.); *HCl salt*, m. 221°. Reduction of 20 g. 1-nitroso-2-benzoylaminomethyltetrahydroquinoline (cf. R., Paltzer and Engel, *C. A.* **31**, 3923²) in 200 cc. alc. and 80 cc. 50% AcOH with 16 g. Zn dust gave 37 g. of the *Zn acetate double salt*, m. 245°, of *1-amino-2-benzoylaminomethyltetrahydroquinoline* (VI), m. 156°, purified by dissolving in dil. HCl and then treating with NaOH. VI possesses properties characteristic of a hydrazine and from it the following were prepd.: *benzal deriv.*, m. 158–9°, which upon warming with dil. HCl cleaves into its components; *piperonal deriv.*, sintering at 182°, m. 184–5°; *acetophenone condensation product*, m. 161–2°. The previously described sapon. of the hydrogenated "Reissert" compd., 2-benzoylaminomethyltetrahydroquinoline (*Ber.* **38**, 1610(1905)), to 2-aminomethyltetrahydroquinoline (VII) was improved, with a yield of 93–95%, by refluxing 100 g. of the hydrogenated product with 250 cc. concd. HCl for 16–18 hrs. VII (15 g.) in 100 cc. abs. alc., to which was added 7.5 g. anhyd. pyridine, with 13 g. nicotinyl chloride in 50 cc. abs. ether gave 16.5 g. of *1-nicotinyl-2-(nicotinylaminomethyl)tetrahydroquinoline*, m. 175–6°. VII (16 g.) in 50 cc. abs. benzene with 19 g. veratroyl chloride in 150 cc. abs. benzene gave 21 g. of *1-veratroyl-2-veratroylaminomethyltetrahydroquinoline*, m. 168°, crystd. from benzene and then from alc. Condensing 40 g. VII with 40 g. veratraldehyde by warming on a water bath gave an oily product which formed a difficultly sol. *picrate* and, upon dissolving in 300 cc. MeOH and reducing with 30 g. Ni catalyst at 90 atm., gave 61 g. (77.5% of theory) of *2-(3,4-dimethoxybenzylaminomethyl)tetrahydroquinoline*, m. 75°; the latter forms Au salts, gives a difficultly sol. $ZnCl_2$ *compd.* and salts such as the *HCl salt*, m. 191–2°, *HBr salt*, *nitrate*, *sulfate*, m. 161.5°, and *thiocyanate* and an easily sol. *acetate* which readily undergoes hydrolysis. Condensing 20 g. VII with 19 g. piperonal gave a thick, resinous oil, which formed a yellow *picrate* and a *perchlorate*; reduction of the crude condensation product with 20 g. catalyst at 80 atm. and 65° gave as an oil *2-(3,4-methylenedioxybenzylaminomethyl)tetrahydroquinoline; HCl salt*, m. 213–14°; *sulfate*, m. 177–8°; *phosphate*, m. 204–5°. Treating 24.5 g. of 1-methyl-2-aminomethyltetrahydroquinoline (VIII) (cf. R., Paltzer and Engel, *C. A.* **31**, 3923²) and 11.2 g. dry pyridine in 100 cc. abs. ether with 20 g. nicotinyl chloride in abs. ether gave 33.5 g. (85% of theory) of *1-methyl-2-(nicotinylaminomethyl)tetrahydroquinoline* (IX), yellow-green, m. 159–160°, most of whose salts are readily sol. in H_2O and form indigo- or cornflower-

blue solns. upon standing. IX forms both the theoretically possible *HCl salts*, a white *di-HCl salt*, sintering at 223° and a yellow *mono-HCl salt*, m. 223°, both of which can be interconverted, depending upon manner of prepn. (transformation equations are given). VIII (26.2 g.) in 11.7 g. dry pyridine and 100 cc. abs. benzene with 25 g. veratroyl chloride in 150 cc. abs. benzene gave 38.5 g. (83% of theory) of *1-methyl-2-veratroylaminomethyltetrahydroquinoline*, m. 161–2°, from alc.; *HCl salt*, m. 179–80°, tends to hydrolyze to the free base in H_2O and turns deep red upon standing, again reverting to the free base. Condensing 35 g. VIII with 35 g. piperonal followed by catalytic reduction in 300 cc. MeOH with 35 g. freshly reduced catalyst at 90 atm. and 65° gave *1-methyl-2-(3,4-methylenedioxybenzylaminomethyl)tetrahydroquinoline*, as a thick, yellow oil, whose salts, such as the *HCl salt*, m. 207–8°, *HBr salt* and *phosphate* are difficultly sol. Condensing 15 g. of VIII with 15 g. veratraldehyde followed by catalytic reduction in 250 cc. MeOH with 20 g. Ni at 85 atm. and 70° gave *1-methyl-2-(3,4-dimethoxybenzylaminomethyl)tetrahydroquinoline*, as a thick, yellow oil, whose *sulfate*, *HBr salt*, *phosphate* and org. acid salts are extremely difficultly sol.; *perchlorate*, m. 193° (decompn.).

John F. Lontz

2-Aminomethyltetrahydroquinoline and its derivatives. Helmut v. Bidder and H. Rupe. *Helv. Chim. Acta* 22, 1268–78(1939); cf. *C. A.* 33, 6317[6] and preceding abstr.— The following derivs. of *2-aminomethyltetrahydroquinoline* (I) were prepd. by hydrogenating the "Reissert" compd., 1-benzoyl-2-cyano-1,2-dihydroquinoline, and then sapong.; *mono-HCl salt*, m. 257°; *di-HCl salt*, m. 265° (decompn.); *mono-HBr salt*, m. 235–6° (decompn.); *Ac deriv.* using Ac_2O, $C_{14}H_{18}N_2O_2.2H_2O$, m. 48.5–49.5°; *benzal deriv.* m. 75–6°; *monoformate*, m. 117.5–18.5°; *monoformyl deriv.*, b_{10} 178–80°, m. above 20° but below 40° (*perchlorate*); *glycine Et ester deriv.*, $C_6H_4.CH_2.CH_2.CHR.NR'$ (II) (R=$CH_2NHCH_2CO_2Et$; R'=H) obtained by treating 20 g. of the base in 100 cc. benzene dropwise with 6.9 g. $ClCH_2CO_2Et$, could not be purified by distn. but forms a well-characterized *neutral oxalate*, m. 169–70° (decompn.); *urethan deriv.*, obtained by adding 6.72 g. $ClCO_2Et$ in 20 cc. $CHCl_3$ to 20 g. of base in 80 cc. $CHCl_3$ with good cooling (ice-HCl), giving 10.2 g. (70%) of the *II Cl salt* (m. 135.5°) from which is obtained the free ester as a colorless oil, b_{10} 120–5° (*perchlorate*, m. 124°); *imidazolone*, obtained by refluxing for 2 hrs. 20 g. of base in 60 cc. benzene with 6.72 g. $ClCO_2Et$ in 7.35 g. yield as a oil, b_{10} 245–7°, which solidifies and m. 197°, or more conveniently by introducing $COCl_2$ into an ether soln. of the base in the cold. Treating 50 g. of I with 30 g. ethylene oxide in a sealed tube in a boiling water bath gave 35 g. yield (crude) of *2-[bis(β-hydroxyethyl)amino]methyltetrahydroquinoline* (III), m. 92–3°, whose structure is not quite certain since smaller amts. of the corresponding *monohydroxyethyl deriv.*, m. 105.5–6.5°, sepd. by fractional distn., was always obtained as a by-product. III forms a *mono-Bz deriv.*, m. 115–6°, using BzCl in presence of K_2CO_3, and a *tri-Bz deriv.*, m. 95–6°, using BzCl in presence of C_5H_5N; the latter forms a *primary diorthophosphate*, m. 151 5° (decompn.), and a *mono-HCl salt*, m. 100.5–103.5° (decompn.). Treating 30 g. of the hydrogenated "Reissert" compd. with 20 g. ethylene oxide in a sealed tube in a shaking Carius oven for 24 hrs. at 110–120° gave 30 g. of *1-(2-hydroxyethyl)-2-benzoylaminomethyltetrahydroquinoline* (IV), m. 113–14.5°; use of solvents in this synthesis gave very small yields. Treating 20 g. of the *N*-methylamino compd. (*primary dicarbonate*, m. 123–5°) of I (cf. *C. A.* 31, 3923[3]) with 10 g. ethylene oxide for 2 hrs. at 110–20° gave (after the 2nd distn.) *1-methyl-2-bis(2-hydroxyethyl)aminomethyltetrahydroquinoline*, $b_{0.005}$ 177–9°, which failed to crystallize but showed definite basic properties; heating the base with epichlorohydrin at 100° gave the HCl salt of the original base and a thick yellow oil which forms a non-crystallizable HCl salt and a Bz or Ac deriv., but a more useful product could be obtained by applying the reaction to the Bz deriv. of the base. Thus treating 50 g. of the hydrogenated "Reissert" compd. with 140 g. epichlorohydrin in a sealed tube for 14 hrs. in a H_2O bath gave *2-benzoylaminomethyltetrahydroquinolyl-1-propylene oxide [2-(benzoylaminomethyl)-1-(2,3-epoxypropyl)tetrahydroquinoline]*, m. 118–19°; with $ClCH_2COMe$ and $PhCOCH_2Br$, in ether the corresponding salts of the base were formed but upon removal of the ether a violent reaction occurred with the formation of a dark brown resin; in the latter case, by using toluene and C_5H_5N, the compd. II (R=CH_2NHBz, R'=CH_2Bz), m. 163°, was obtained. Refluxing 1 mol. I with α-propyl-α-methylethylene oxide (cf. Fourneau and Samdahl, *C. A.* 25, 517) for 4 hrs. at 120–130° and treating the reaction product with dil. HCl gave the *mono-HCl salt*, m. 171–3° (decompn.), of the compd. II (R=CH_2NHCH_2CMePr-OH, R'=H); the free base is a thick yellow oil.

John F. Lontz

Cardiac glucosides. XV. Periplocin, the true cardiac glucoside of Periploca graeca. Arthur Stoll and Jany Renz. *Helv. Chim. Acta* 22, 1193–1208(1939); cf. *C. A.* 32, 2947[8].— With the exception of ouabain the genuine cardiac glucosides consist of a combination of aglucon, desoxy sugar and glucose. The specific enzyme of the drug cleaves only the linkage between the sugars whereas the aglucon-desoxy sugar linkage is broken only by acid hydrolysis. The investigations of Jacobs, Elderfield, *et al.*, (*C. A.* 25, 4888, 5172, 5173) have shown that the aglucon of *Periploca graeca*, periplogenin (I), is a desoxostrophanthidin or hydroxydigitoxigenin and that the sugar residues are attached through the HO group at position 3. Wood and bark collected in Smyrna by Renz were worked up within 4 weeks of collection. Dried and finely ground stalks and bark (1 kg.) were thrice extd. for 10 hrs. with 10 l. alc. to avoid enzymic cleavage since strophanthobiase is known to be inactive in aq. alc. The green ext. was concd. *in vacuo* at low temp. and the resinous residue was worked up with ether. The greenish powder (50 g.) was taken up in 92% alc., treated with $Pb(OH)_2$, freed from Pb with H_2S, evapd. to 1 l. *in vacuo* and extd. with $CHCl_3$. Evapn. *in vacuo* yielded 20–25 g. of residue which was thrice extd. with a mixt. of 400 cc. H_2O, 400 cc. $CHCl_3$ and 200 cc. alc. The 5 g. residue from the combined $CHCl_3$ layers contained practically the entire crude glucoside. Acetylation for 12 hrs. with Ac_2O in pyridine gave 7.3 g. of crude acetylated product, recrystd. from alc., yielding 1.8 g. of hexagonal flat prisms of *tetraacetylperiplocin* (II), $C_{44}H_{64}O_{17}$, m. 195°, $[\alpha]_D^{19}$ 20.0° (*c* 0.4508 in abs. alc.), hydrolyzed by standing for 2 days with H_2SO_4 at room temp. (after neutralization with NaOH and isomerization) to the known isoperiplogenin, m. 248°. II (0.476 g.) in 20 cc. abs. MeOH was treated with 0.80 cc. $(MeO)_2Ba$ (equiv. to 2.14 cc. 0.1 *N* H_2SO_4) for 13 hrs. at 0°. The Ba was pptd. with an equiv. amt. of 0.1 *N* H_2SO_4 and the soln. was evapd. to dryness *in vacuo*. The residue (0.380 g.) was taken up in alc., dild. with H_2O, and freed from alc. The filtered aq. soln. gave hydrated crystals which were recrystd. from acetone to yield thin leaflets of *periplocin* (III), $C_{36}H_{56}O_{13}$, m. 224° (decompn.; in bath preheated to 200°), $[\alpha]_D^{19}$ 22.9 (*c* 0.6988 in MeOH), giving a Liebermann reaction changing from red to green but no characteristic Keller-Kiliani reaction. This careful alk. sapon. gave the original glucoside in the intact form without splitting the alkali-sensitive lactone ring since sapon. in aq. media needed 5 equivs. of alkali in place of the 4 equivs. calcd. in the above cleavage. Acid hydrolysis of III gave the aglucon, I, and a new disaccharide, *periplobiose* (IV), similar to, but not identical with, strophanthobiose (V), m. 208°, $[\alpha]_D^{19}$ 31°. III (0.3665 g.) in 10 cc. abs. alc. was treated with 10 cc. of 0.1 *N* H_2SO_4 for 12 hrs. at 25° and for 2 hrs. at 40–50°. After diln. with H_2O, the aglucon was thoroughly shaken out with $CHCl_3$ and the ext. was evapd. to dryness *in vacuo*, yielding 54.1% (calcd. 56%) of I, m. 232°, $[\alpha]_D^{19}$ 29.8°, after recrystn. from dil. MeOH. The aq. layer was neutralized with $BaCO_3$, filtered and evapd. to dryness *in vacuo*. The colorless residue was taken up in MeOH, filtered and evapd., yielding 44.2% (calcd. 46.55%) of IV, $C_{12}H_{24}O_8$, m. 160–70°, $[\alpha]_D^{19}$ 30.8° 32.0°, reducing Fehling soln. and giving an orange-brown

boundary zone in the Keller-Kiliani reaction (free cymarose gives a cornflower-blue AcOH layer). Like strophanthobiose, **IV** is difficultly saponifiable with acids. Enzymic hydrolysis of **III** with strophanthobiase (*C. A.* **20**, 3013) splits out glucose and the resulting periplocymarin (**VI**) was sol. in $CHCl_3$. Extn. of the cleavage products from 300 mg. **III** with $CHCl_3$ yielded 210 mg. **VI** (90.5%). Recrystn. from dil. MeOH gave prisms of **VI**, $C_{30}H_{46}O_8$, m. 143–5°, $[\alpha]_D^{20}$ 27.6° (*c* 0.1628 in MeOH), identical with the prepn. described by Jacobs (*C. A.* **23**, 151). The glucose component was identified by the characteristic phenylglucosazone, m. 207°. Acetylation of **IV** and **V** gave cubic crystals of *pentaacetylperiplobiose*, $C_{23}H_{34}O_{14}$, m. 184°, $[\alpha]_D^{20}$ 13.2°; 13.3°. Since in both **IV** and **V** the sugar linkage (cymarose-glucose) is β-glucosidic in nature the difference between the 2 disaccharides may reside in a position isomerism of the forms 1(β)-glucosido-4-cymarose and 1(β)-glucosido-5-cymarose. Tables are given to compare the data of Lehmann (*Arch. Pharm.* **235**, 157(1897)) on **III** and **I** with those obtained in more recent investigations, and to compare the cardiac glucosides and derivs. from *S. kombe* and *P. graeca*. The av. lethal dose in frog units per mg. for **III** is 200–300. The corresponding value for digitoxin is about 400. C. R. Addinall

Syntheses in the steroid series. Elisabeth Dane. *Angew. Chem.* **52**, 655–9(1939).—A comprehensive summary with many formulas and 35 references. Karl Kammermeyer

Bile acids of turtle bile: trihydroxysterocholanic lactone. Chai Heung Kim. *J. Biochem.* (Japan) **30**, 247–9 (1939).—A tri-HO lactone, m. p. 208°, was isolated from turtle (*Emys orbicularis*) bile. It was identified by its formyl ester and by its tetraketone acid deriv. S. M.

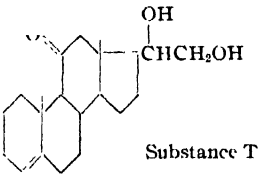
α- and β-3-Keto-7-hydroxycholanic acid. Sigeki Miyazi and Hideo Isaka. *J. Biochem.* (Japan) **30**, 297–302 (1939).—By partial hydrolysis of diformylchenodesoxycholic and diformylursodesoxycholic acid 2 different products were obtained, α- and β-3-hydroxy-7-formylcholanic acid, from which α- and β-3-keto-7-hydroxycholanic acids were obtained by successive oxidation and hydrolysis. Crystd. from AcOEt the α-form m. 96°, and crystd. from dil. alc. the β-form m. 117°. S. Morgulis

Tetrahydroxycholane, trihydroxycholene, and trihydroxybisnorsterocholanic acid from the bile of Rana catesbina Shaw. Yukiti Kurauti and Taro Kazuno. *Z. physiol. Chem.* **262**, 53–60(1939).—The ether ext. of bile from *R. catesbina* contained *trihydroxybisnorsterocholanic acid*, m. 172°, which gives a Liebermann reaction but no Hammersten reaction and is satd. Oxidation with CrO_3 in HOAc gives *triketobisnorsterocholanic acid*, $C_{26}H_{38}O_5$, m. 230–1°. The residual bile was freed of mucin with alc. and then NaCl added. A substance was salted out which on purification is shown to be the *Na salt* of a *tetrahydroxycholanesulfuric acid*, $C_{24}H_{41}O_4NaSO_3(H_2O)$, $[\alpha]_D^{18}$ 8.7°. It is stable to active H, $KMnO_4$ and Br. Hydrolysis with 15% KOH gave a *trihydroxycholene* (**I**), $C_{24}H_{40}O_3$, m. 177°, $[\alpha]_D^{18}$ 34.4°. This takes up 1 mol. of H to form *trihydroxycholane* (**II**), $C_{24}H_{42}O_3(H_2O)$, m. 185–6°, $[\alpha]_D^{18}$ 31.5°. **I** forms a *diacetate*, m. 180°, and a noncryst. triacetate. Oxidation of **I** gave a *triketocholene*, m. 240–2°, yielding a *trioxime*, m. 247°. The compd. gives a neg. Jaffé reaction, indicating that no keto group is at C_3. **II** gave a *triketocholane*, m. 245° and giving no Jaffé reaction. **I** gives an oil on Clemmensen reduction and on bromination gives a *di-Br compd.*, m. 180°. Milton Levy

Constituents of the adrenal cortex and related compounds. XXVIII. Allopregnane-3,21-diol-20-one diacetate and allopregnan-21-ol-3,20-dione acetate. T. Reichstein and J. v. Euw. *Helv. Chim. Acta* **22**, 1209–12 (1939).—The compds. *allopregnane-3,21-diol-20-one diacetate* (**I**) and *allopregnan-21-ol-3,20-dione acetate* (**II**), required for purposes of comparison, were prepd. from 3(β)-acetoxyetioallocholanic acid (**III**) by a method analogous to that used in the prepn. of desoxycorticosterone (*C. A.* **32**, 581[3]). A mixt. of 4.5 g. **III**, m. 247° (all m. ps. cor.) and 23 cc. of purest $SOCl_2$ was kept at 5° for 16 hrs., evapd. to dryness *in vacuo*, taken up in 50 cc. abs. Et_2O and added to ethereal CH_2N_2 (from 15 g. $H_2NCONHCH_2NO$) at −10°. After 3 hrs. at 0° and 16 hrs. at room temp. the reaction mixt. was concd. and, after filtration, taken down to dryness *in vacuo*. Crystn. of the residue (5.5 g.) from an ether-pentane mixt. gave *21-diazoallopregnan-3-ol-20-one acetate* (**IV**), m. 134.0–4.5° (decompn.), converted by boiling with AcOH to **I**. Sapon. of 5.5 g. **IV** by treatment with 4 g. KOH in 5 cc. H_2O and 250 cc. MeOH at room temp. for 4 hrs., diln. with 300 cc. H_2O, evapn. of the MeOH and extn. with Et_2O yielded 4.2 g. of crude *21-diazoallopregnan-3-ol-20-one*, m. 170–2° (decompn.), converted by warming with 40 cc. AcOH at 95–100° for 30 min. until evolution of N ceased. Recrystn. of the product from acetone-pentane and from MeOH produced 2.65 g. of colorless needles of *21-acetoxyallopregnan-3-ol-20-one* (**V**), $C_{23}H_{36}O_4$, m. 202–4°, acetylated by treating with Ac_2O in pyridine at room temp. for 24 hrs. to **I**, $C_{25}H_{38}O_5$, m. 151.0–2.5°. Oxidation of 200 mg. **V** with 150 mg. CrO_3 in 10 cc. of pure AcOH for 4 hrs. at room temp. and crystn. of the crude product from MeOH yielded fine needles of **II**, $C_{23}H_{34}O_4$, m. 197–9° (mixed m. p. with **V**, 180–96°). **I**, **II** and **V** reduce alk. Ag diammine strongly at room temp.

XXIX. Action of lead tetraacetate on allopregnanolone acetate, pregnanolone acetate and progesterone. T. Reichstein and C. Montigel. *Ibid.* 1212–21.—According to Dimroth and Schweizer (*C. A.* **17**, 3319) by heating with $Pb(OAc)_4$ in AcOH, 1 or 2 AcO groups can be introduced into a ketone in the neighborhood of the CO group. The introduction of AcO groups by this method into the $CHCOMe$ side chain of pregnane derivs. has been investigated. A mixt. of 0.5 g. of allopregnanolone acetate and 1.1 g. of pure $Pb(OAc)_4$ in 15 cc. anhyd. AcOH contg. 0.25 cc. Ac_2O was warmed at 68–70° for 24 hrs. The reaction product was evapd. *in vacuo*, suspended in H_2O and extd. with Et_2O. The washed and dried ext. was evapd. and taken up in benzene. The benzene soln. was dild. with an equal vol. of pentane and filtered through a 15-g. column of Al_2O_3. The column was washed with 900 cc. of benzene-pentane (1 1) and eluted with 250 cc. of benzene-ether (1 1). The residue from the benzene-pentane was recrystd. from ether-pentane and yielded 307 mg. of allopregnane-3,21-diol-20-one diacetate (**I**), m. 152.0–3.5°. The residue from the benzene-ether eluate was crystd. from ether-pentane and from ether, giving 11 mg. of colorless needles of slightly impure *allopregnane-3,17,21-triol-20-one triacetate* (**II**), $C_{27}H_{40}O_7$, m. 190–2°, reducing alk. Ag diammine in 1 min. Partial sapon. of 14 mg. **II** in 4 cc. of warm MeOH by treatment with 14 mg. $KHCO_3$ in 0.4 cc. H_2O for 44 hrs. gave 12 mg. of product sapond. in the 21-position (*C. A.* **33**, 1337[8]). Oxidation of this product in 1.7 cc. MeOH with 20 mg. HIO_4 in 1 cc. H_2O and 1 cc. MeOH in the presence of 0.15 cc. 2 *N* H_2SO_4 at room temp. for 16 hrs., extn. with Na_2CO_3, acidification and extn. with Et_2O gave 8.5 mg. of crude cryst. acid, m. 230–62°, which was sapond. by refluxing for 2 hrs. with 10 mg. KOH in 1.5 cc. MeOH. Acidification and extn. with Et_2O yielded 4 mg. of 3(β),17(β)-dihydroxyetioallocholanic acid, m. 272–4° (Me ester, m. 238–42°), identical with the product obtained by degradation of substance P from the adrenal cortex (*C. A.* **33**, 1338[8]). Accordingly **II** is the triacetate of substance P. **I** is not converted into **II** by heating with $Pb(OAc)_4$ in AcOH. It appears that the main reaction is an acetylation in position 21 and that the secondary reaction is an acetylation in position 17 followed by a further acetylation in position 21. Similarly 0.6 g. of pregnenolone acetate was converted by $Pb(OAc)_4$ in AcOH to give 132 mg. of hexagonal leaflets of 5-pregnene-3,21-diol-3-one diacetate, $C_{25}H_{36}O_5$, m. 164° (*C. A.* **32**, 581[4]), corresponding to the product obtained by this method by Ehrhart and coworkers (*C. A.* **33**, 6327[7]), and 12 mg. of colorless needles of the probable *pregnenetriolone triacetate*, $C_{27}H_{38}O_7$, m. 182–5°, reducing alk. Ag diammine strongly. The conversion of progesterone in good yields into desoxycorticosterone acetate (**III**) by heating with $Pb(OAc)_4$ in AcOH, distn. of the crude product in high vacuum and recrystn. is claimed in the I. G. patent, Brit. 502,474 (*C. A.* **33**, 7316[8]), and is also described by Ehrhart, *et al.* Careful repetition of example 3 of the patent cited, followed by laborious chromato-

graphic analysis, gave 3% of **III**, m. 158–60°. The method proposed by the patent is considered by R. and M. to be unpractical and the communication of Ehrhart is supposedly based on error. **XXX. Substance T.** T. Reichstein and J. v. Euw. *Ibid.* 1222–7.—The benzene residues from fraction C.17.A.2 (*C. A.* **32**, 7051[8]) of the amorphous mother concentrates from adrenal cortical exts. consist of a light-brown glassy mass (**I**). Sapon. of 1.6 g. **I** in 130 cc. MeOH by standing with 1.6 g. $KHCO_3$ in 30 cc. H_2O at room temp. for 44 hrs., evapn. of the MeOH and extn. with benzene gave 1.54 g. of amorphous material (**II**). Acetylation of **II** in 8 cc. of dry pyridine with 5 cc. Ac_2O for 44 hrs. at room temp. and extn. with Et_2O gave 1.8 g. of acetylated product which was chromatographically sepd. into the acetates of substance N, dehydrocorticosterone, corticosterone, substances S, Fa and M, and 38 mg. of pure *substance T diacetate* (**III**), $C_{25}H_{34}O_6$, m. 212–3°, and 25 mg. of less pure **III**. Similarly 2.04 g. of the benzene-sol. portion of fraction C.17.A.3 (*C. A.* **32**, 577[8]) gave 20 mg. **III**. **III** does not reduce alk. Ag diammine at room temp. and has therefore no ketol grouping in the side chain. It shows a strong band in the ultraviolet absorption spectrum with a max. at 240 mμ, characteristic of an α,β-unsatd. ketone. **III** (20 mg.) in 2 cc. MeOH was refluxed for 1 hr. with 9 mg. K_2CO_3 in 0.1 cc. H_2O and the crude free *substance T* (**IV**) was oxidized with CrO_3 in AcOH to 3,11-diketoetio-4-cholenic acid, m. 265–75° (Me ester, m. 178–80°), identical with Kendall's acid 1 (*C. A.* **31**, 8537[8]), also obtained by oxidation of corticosterone and dehydrocorticosterone with CrO_3. Since **III** is not oxidized by CrO_3 it cannot have a HO group in the 11-position. Accordingly, **IV** has the assigned formula and is a further isomer of corticosterone that can scarcely be expected to have biol. activity.



Substance T

C. R. Addinall

Steroids and sex hormones. LV. Preparation of 3-hydroxy-5,7-pregnadiene-21-carboxylic acid and its reduction products. Pl. A. Plattner and W. Schreck. *Helv. Chim. Acta* **22**, 1178–84(1939); cf. *C. A.* **33**, 6869[8]. In the course of investigations on the building up of the side chain of 17-keto steroids by the Reformatzky reaction, *3-hydroxy-5,17-pregnadiene-21-carboxylic acid* (**I**) and its derivs. were prepd. and also 3,17-dihydroxy-5-androstene-17-acetic acid (**II**) and its derivs., recently studied by Reichstein, *et al* (*C. A.* **33**, 6330[2]). **II** gave the *Me ester*, $C_{22}H_{34}O_4$, m. 159°, $[\alpha]_D$ −89 ± 2° (*c* 0.994 in $CHCl_3$); *3-acetyl Me ester*, $C_{24}H_{36}O_5$, m. 117°, $[\alpha]_D$ −68 ± 2° (*c* 0.995 in $CHCl_3$); *3,17-diacetyl Me ester*, $C_{26}H_{38}O_6$, m. 113° and 121° (2 crystal forms), $[\alpha]_D$ −70 ± 2° (*c* 0.968 in $CHCl_3$), converted by distn. at 15 mm. over a free flame and recrystn. from MeOH to *Me 3-acetoxy-5,17-pregnadiene-21-carboxylate* (**III**), $C_{24}H_{34}O_4$, m. 159°, $[\alpha]_D$ −69 ± 2° (*c* 1.01 in $CHCl_3$), also prepd. by direct methylation and acetylation of **II** and distn. at 11 mm. The absorption spectrum, showing an extinction max. at 230 mμ, indicated that the cleavage of AcOH had taken place at position 17 with formation of a double linkage conjugated with the CO_2Me group. Total sapon. of 650 mg. **III** by refluxing for 1 hr. with 50 cc. of 5% KOH in MeOH and acidification gave 530 mg. of crude **I**, $C_{21}H_{30}O_3$, m. 249–50°, $[\alpha]_D$ −82 ± 1° (*c* 0.998 in dioxane), after sublimation in high vacuum; *Me ester* (**IV**), m. 188–9°, $[\alpha]_D$ −73 ± 1° (*c* 0.994 in dioxane), showing an absorption curve similar to that of **III**. Thus in the sapon. no shift of the conjugated double bond took place. A mixt. of 320 mg. **IV** in 8 cc. acetone and 0.8 g. $(tert\text{-}BuO)_3Al$ in 32 cc. abs. benzene was refluxed overnight, treated with dil. H_2SO_4 and ether. The washed and dried ether layer gave 350 mg. of oily, yellow crystals. Chromatographic purification in benzene and recrystn. from MeOH yielded *Me 4,17-pregnadien-3-one-21-carboxylate*, $C_{22}H_{30}O_3$, m. 151–2°, $[\alpha]_D$ 80 ± 1° (*c* 1.00 in dioxane), no yellow color with $C(NO_2)_4$. The shift of the double bond is also apparent in the absorption curve. Partial reduction of 4.00 g. **III** in 200 cc. abs. alc. in the presence of 400 mg. of prereduced PtO_2 with 265 cc. H (calcd. 267 cc. for 1 mol.), chromatographing the product in benzene-hexane (1:4) and recrystn. of the crude main fraction (3.5 g.) from hexane gave *Me 3-acetoxy-5-pregnene-21-carboxylate* (**V**), $C_{24}H_{36}O_4$, m. 128·9°, $[\alpha]_D$ −57 ± 1° (*c* 1.00 in $CHCl_3$). The constitution of **V** is shown by the lack of any appreciable absorption above 220 mμ, as well as by its oxidation with $(tert\text{-}BuO)_3Al$ to *Me 4-pregnen-3-one-21-carboxylate*, $C_{22}H_{32}O_3$, m. 146–7°, $[\alpha]_D$ 84 ± 1° (*c* 0.991 in dioxane), no color with $C(NO_2)_4$. Partial reduction of **III** gave, as a by-product, the fully satd. *Me 3-acetoxyallopregnane-21-carboxylate*, $C_{24}H_{38}O_4$, m. 150–1°, $[\alpha]_D$ 0 ± 1° (*c* 1.00 in dioxane), also formed by reduction of **III** in AcOH in the presence of prereduced PtO_2 with 2 mols. H. Total sapon. of **V** by refluxing with 5% KOH in MeOH for 5 hrs., acidification, sublimation and crystn. from Et_2O-MeOH gave *3-hydroxy-5-pregnene-21-carboxylic acid*, $C_{21}H_{32}O_3$, m. 241–2°, $[\alpha]_D$ −56.4 ± 1° (*c* 0.985 in dioxane); *Me ester*, m. 132–3°, $[\alpha]_D$ −63.5° ± 1° (*c* 0.977 in dioxane), acetylated by Ac_2O in cold pyridine to **V**. **LVI. Conversion of 17-ethinyl-5-androstene-3,17-diol into progesterone.** M. W. Goldberg and R. Aeschbacher. *Ibid.* 1185–8.—Previous hydrogenations of the acetylenic linkage of 17-hydroxy-17-ethinyl derivs. of the androstane and androstene series have been accompanied by rearrangement of the C skeleton of the starting materials. Hydrogenation of 17-ethinyl-5-androstene-3,17-diol (**I**) has been accomplished without rearrangement so that the main product of the reaction is *5,16-pregnadien-3-ol-20-one* (**II**). A mixt. of 2 g. **I** and 4.1 g. $Hg(NHAc)_2$ was refluxed in 40 cc. abs. alc. for 20 hrs. and the soln. was satd. with H_2S. After concn. *in vacuo* the residue was exhaustively extd. with ether. The ext. was shaken out with H_2O, dried over Na_2SO_4 and evapd. to dryness. The product was taken up in acetone and filtered through a 40-g. Al_2O_3 column and ultimately eluted with Et_2O. The crude eluate (1.3 g.) was recrystd. from MeOH, yielding **II**, $C_{21}H_{30}O_2$, m. 211–13° (all m. ps. cor.); *Ac deriv.*, m. 175–7°, $[\alpha]_D$ −30.1 ± 1.5° (*c* 0.91 in 95% alc.); *oxime*, m. 219–20° (decompn.). **II** (200 mg.) was reduced in the presence of a Raney Ni catalyst to 5-pregnen-3-ol-20-one, which was oxidized according to Oppenauer to progesterone, m. 127° (after recrystn. from MeOH), $[\alpha]_D$ 185.3 ± 2.5° (*c* 0.68 in 95% alc.). At present, the mechanism of the formation of **II** from **I** by the action of $Hg(NHAc)_2$ is not understood. **LVII. Addition of aniline to 17-ethinyl-5-androstene-3,17-diol.** *Ibid.* 1188–90.—Previous to the publication of Loritsch and Vogt (*C. A.* **33**, 6236[1]) on the addn. of $PhNH_2$ and PhNHEt to 1-heptyne or 3-octyne in the presence of HgO or BF_3, a simple method of adding $PhNH_2$ to 17-ethinyl-5-androstene-3,17-diol (**I**) and its diacetate (**II**) had been worked out. A mixt. of 400 mg. **I** and 80 mg. $HgCl_2$ in 4 cc. of pure $PhNH_2$ was warmed at 60–70° for 20 hrs. and the excess $PhNH_2$ was steam-distd. from the brown crude reaction product. Recrystn. from dil. MeOH yielded 300 mg. of pure colorless *3,17-dihydroxy-5-pregnen-20-one anil* (**III**), $C_{27}H_{37}NO_2$, m. 190–2°, $[\alpha]_D$ −197.5 ± 2° (*c* 1.23 in $CHCl_3$). Oxidation according to Oppenauer by refluxing 100 mg. **II** and 500 mg. $(tert\text{-}BuO)_3Al$ in 4 cc. of dry acetone and 10 cc. benzene for 15 hrs. under reflux, chromatographing the crude oxidation product in benzene and recrystg. the eluate from 95% alc. gave 70 mg. of *3-keto-17-hydroxy-4-pregnen-20-one anil*, $C_{27}H_{35}NO_2$, m. 221–3°, $[\alpha]_D$ −19 ± 1° (*c* 1.00 in $CHCl_3$). Similarly the addn. of $PhNH_2$ to **II** and recrystn. of the addn. product from dil. EtOH gave *3,17-diacetoxy-5-pregnen-20-one anil*, $C_{31}H_{41}NO_4$, m. 207–9°, $[\alpha]_D$ −155 ± 2° (*c* 0.445 in $CHCl_3$). The constitution of the anils is not yet firmly established. **LVIII. Conversion of 17-ethinylandrostene-3,17-diol into pregnadien-3-ol.** L. Ruzicka, M. W. Goldberg and E. Hardegger. *Ibid.* 1294–1300.—The conversion of 17-

ethinyl-5-androstene-3,17-diol (I) by addn. of 1 mol. H to the acetylene group and consequent reductive cleavage of the OH group in the 17-position should give either 5,20-pregnadien-3-ol (II) or the corresponding 17-iso compd., both of interest for synthetical expts. in the pregnene series. I (942 mg.) in 55 cc. abs. alc. was added in 15 mins. to a well-stirred suspension of 27 g. Na in 120 cc. of boiling xylene. Further addns. of 60 cc. xylene and 16 cc. alc. were made and the clear soln. was cooled, dild. with 60 cc. of 96% alc. and 400 cc. H_2O. The colorless xylene layer was dild. with ether. The ether ext. was dried and evapd. and the reaction product was acetylated with 1.5 cc. Ac_2O in 10 cc. pyridine at room temp. in 20 hrs. After evapn. to dryness *in vacuo*, the reaction product was extd. with ether and recrystd. from hexane, taken up in 60 cc. of benzene-hexane (1:2) and filtered through 40 g. Al_2O_3. Elution with 250 cc. benzene-hexane mixt. and recrystn. from EtOH gave 711 mg. of 2-cm. long needles of *acetate*, $C_{23}H_{34}O_2$, m. 143–4°, $[\alpha]_D$ −70.3 ± 0.3° (*c* 5 in $CHCl_3$), sapond. by boiling for 2 hrs. with 0.1 *N* KOH in MeOH and recrystd. from alc. or ether to spears or needles of *pregnadien-3-ol* (III), $C_{21}H_{32}O$, m. 132–3°, $[\alpha]_D$ −74 ± 1° (*c* 1 in $CHCl_3$). Oxidation of 204 mg. III according to Oppenauer by boiling for 14 hrs. with 500 mg. of (*tert*-BuO)$_3$Al in 15 cc. benzene and 12 cc. acetone and working up by extg. with ether, chromatographing in hexane and crystg. from MeOH gave 179 mg. of pure *pregnadien-3-one* (IV), $C_{21}H_{30}O$, m. 142–3°, $[\alpha]_D$ 117.5 ± 1° (*c* 1 in $CHCl_3$), not seemingly identical with 4,17-pregnadien-3-one, m. 135° (*C. A.* **30**, 4509[2]). Catalytic reduction of III (500 mg.) in 30 cc. alc. and 60 cc. AcOH in the presence of 200 mg. of prereduced PtO_2 for 30 mins. and crystn. from alc. gave *allopregnan-3-ol* (V), $C_{21}H_{36}O$, m. 137.8°, $[\alpha]_D$ 16 ± 1° (*c* 1 in $CHCl_3$); *acetate*, m. 115–16°. Oxidation of 400 mg. V in 20 cc. AcOH with 230 mg. CrO_3 in 4 cc. AcOH and 1 cc. H_2O for 4 hrs. at room temp. and recrystn. of the crude gelatinous product from alc. produced *allopregnan-3-one* (VI), $C_{21}H_{34}O$, m. 116–17°; *semicarbazone*, m. 230° (decompn.); *hydrazone* (VII), m. 226° (decompn.). Heating 100 mg. VII, 0.2 cc. $H_2NNH_2.H_2O$ and 180 mg. Na in 2.5 cc. abs. alc. for 8 hrs. in a sealed tube at 200° and recrystg. the product from $CHCl_3$ and MeOH yielded 89 mg. of allopregnane, $C_{21}H_{36}$, m. 84–5°, $[\alpha]_D$ 18.0 ± 0.7° (*c* 1.388 in $CHCl_3$), identical with a sample prepd. from 3-hydroxy-21-acetoxy-5-pregnen-20-one by Steiger and Reichstein (*C. A.* **32**, 4996[8]). Both V and III were pptd. with digitonin, as was expected since the steric arrangement of the OH group at position 3 must be the same as in cholesterol (trans or β). Consequently III is a pregnadien-3(β)-ol with a double linkage in the 5,6-position but with the other in the 20,21-, 17,20- or even the 16,17-position. The possibility of a semicyclic position with cis-trans isomerism is not excluded. C. R. Addinall

7-Keto-3-hydroxy-5-etiocholenic acid and related compounds. T. Reichstein and H. G. Fuchs. *Helv. Chim. Acta* **22**, 1160–70(1939).—Oxidation of cholesteryl acetate with CrO_3 according to the method of Mauthner and Suida (*Monatsh.* **17**, 579(1896)) gave 7-ketocholesteryl acetate. This method has been used in the prepn. of 3,7-dihydroxyetioallocholanic acid (I) by the oxidation of Me 3(β)-acetoxyetio-5-cholenate (II). A mixt. of 5 g. II, m. 152–4° (all m. ps. cor.), in 50 cc. AcOH with 4 g. CrO_3 in 2.8 cc. H_2O and 8 cc. AcOH was warmed at 55° for 3 hrs. and evapd. to dryness at 30° *in vacuo*. The residue was taken up in H_2O and extd. with Et_2O. The washed and dried ext. was concd. and dild. with pentane, yielding 1.084 g. of colorless leaflets of *Me 7-keto-3(β)-acetoxyetio-5-cholenate* (III), $C_{28}H_{32}O_5$, m. 182–6°, $[\alpha]_D^{25}$ −74.8 ± 2°, $[\alpha]_{5461}^{25}$ −89.7 ± 3° (*c* 1.471 in acetone), together with a lower-melting mixt. which was taken up in benzene, treated with a 4-fold amt. of pentane and adsorbed on Al_2O_3. Elution with benzene-pentane (1:4 and 2:3) gave II. Elution with benzene-pentane (1:1) yielded *Me 7-ketoetio-3,5-choladienate*, $C_{21}H_{28}O_3$, m. 197–9°, crystg. from Et_2O-pentane, absorption max. 279 mμ, also formed by boiling 53 mg. III with 4 cc. of *N* HCl in MeOH for 15 min., evapg. to dryness, extg. with Et_2O and purifying by chromatographing in benzene-pentane. Catalytic reduction of 200 mg. III in 10 cc. AcOH in the presence of 100 mg. of prereduced PtO_2 for 4 hrs. with 24.1 cc. H gave a mixt. of *Me 3(β)-acetoxy-7(α and β)-hydroxyetioallocholanate* (IV), m. 118–33°, oxidized by CrO_3 in AcOH for 16 hrs. at 20° to yield *Me 3(β)-acetoxy-7-ketoetioallocholanate*, $C_{23}H_{34}O_5$, m. 176–9°. To sep. the 2 forms present in IV, 500 mg. of the mixt. in 6 cc. pyridine was warmed at 70–80° for 4 hrs. with 4 cc. Ac_2O. The mixt. was evapd. and extd. with Et_2O. The concd. ext. was dild. with pentane and, after standing for many days, yielded colorless frond-like needles of *Me 3(β), 7(α)-diacetoxyetioallocholanate* (V), $C_{25}H_{38}O_6$, m. 147–9°, $[\alpha]_D^{25}$ 64.1 ± 6°, $[\alpha]_{5461}^{25}$ 77.7 ± 6° (*c* 0.515 in acetone). The residue (350 mg.) from the mother-liquor was taken up in 2 cc. benzene, dild. with 8 cc. pentane and filtered through a 10-g. Al_2O_3 column. Washing with pentane, then with benzene-pentane (1:4) gave the *7(β) ester* (Va), m. 159–62°, $[\alpha]_D^{25}$ −3.1 ± 1°, $[\alpha]_{5461}^{25}$ −2.30 ± 1.5° (*c* 2.598 in acetone). Sapon. of 420 mg. V by refluxing with 0.8 g. KOH in 0.8 cc. H_2O and 20 cc. MeOH for 3 hrs., evapn., shaking out with Et_2O and acidification with HCl to Congo-red reaction yielded quantitatively *3(β),7(α)-dihydroxyetioallocholanic acid* (VI), m. 252–7° (decompn.); *Me ester* (VII) (by esterification with CH_2N_2), m. 194–7°. Acetylation of 361 mg. of crude VI with 2 cc. Ac_2O in 5 cc. of abs. pyridine for 2 hrs. on the steam bath gave fine colorless needles of *3(β),7(α)-diacetoxyetioallocholanic acid*, $C_{24}H_{36}O_6$, m. 237–41°. Similarly, sapon. of Va gave 3(β),7(β)-dihydroxyetioallocholanic acid (VIII), m. 230°; *Me ester* (IX), m. 224–9°. Oxidation of VII and IX with CrO_3 in AcOH gave the same *Me 3,7-diketoetioallocholanate* (X), $C_{21}H_{30}O_4$, m. 194–7°. Clemmensen reduction of 55 mg. X in 5.5 cc. AcOH and 7 cc. concd. HCl in the presence of 3 g. of amalgamated flowers of Zn and a slow stream of dry HCl for 2 hrs. with a further addn. of 2 g. of amalgamated Zn turnings and heating on the steam bath for 3 hrs., followed by extn. with pentane and sapon. gave etioallocholanic acid, m. 228–30°, characterized by the Me ester, m. 143–4° (Me etiocholanate, m. 99°). C. R. A.

System: butyl Mg bromide–$MgBr_2$–Et_2O (Doering, Noller) **2**. Absorption spectrum of hypericin (Pace, Mackinney) **3**. Raman effect in org. chemistry (Burgel, Pio) **3**. Lengths of links of unsatd. hydrocarbon mols. (Coulson) **3**. Chain length and chain-ending processes in AcH decompn. (Burton, *et al.*) **2**. Mechanism of oxidation of org. compds. by means of selenious anhydride (Mel'nikov, Rokitskaya) **2**. Interfacial activity of short-chain isomers (Addison) **2**.

Branched-chain paraffins. Gerardus H. Visser (to Shell Development Co.). Can. 384,905, Oct. 31, 1939. Isobutane is treated with C_3H_6 or butylene in the presence of H_2SO_4 of a concn. of about 90–100% at about −10 to 30°, the hydrocarbon product sepd. and distd. to sep. the fraction b. about 60–160°.

Diolefins. Aristid V. Grosse (to Universal Oil Products Co.). U. S. 2,178,584, Nov. 7. For converting monoolefins having less than 6 C atoms in straight chain arrangement into diolefins, the mono-olefin, e. g., C_4H_8, for the production of 1,3-butadiene, is subjected under dehydrogenating conditions (suitably for a short time at a temp. of 600° under 0.25 atm. pressure) to the action of a solid catalyst comprising a Cr, Mo or W compd., such as Cr_2O_3 on activated alumina.

Diolefins. Jacque C. Morrell (to Universal Oil Products Co.). U. S. 2,178,601, Nov. 7. For converting monoolefins having less than 6 C atoms in straight chain arrangement, such as *n*-butenes, into diolefins, treatment under dehydrogenating conditions (suitably for 0.5 sec. at 610° under 0.25 atm. pressure) is effected in the presence of a catalyst contg. a Ti, Zr, Ce, Hf or Th compd. such as TiO_2 on activated alumina. U. S. 2,178,602 (Jacque C. Morrell and Aristid V. Grosse, joint inventors) relates to the like use of catalysts contg. V, Cb or Ta compds. such as their oxides.

Products of reaction of hydrogen sulfide with olefins. Evan C. Williams and Clyve C. Allen (to Shell Development Co.). Can. 385,013, Nov. 7, 1939. Mercaptans, thio ethers or satd. hydrocarbons are prepd. by reaction of an olefin with H_2S at about 35–300° in the presence of a water-bonding agent, e. g., a carboxylic acid anhydride and a metal sulfide. 1

Olefin oxides. Karl Metzger and Leonid Andrussow (to I. G. Farbenind. A.-G.). U. S. 2,178,454, Oct. 31. See Brit. 507,538 (*C. A.* **34**, 447[1]). 2

Oxygenated organic compounds. William A. Bone and Dudley M. Newitt (to Canadian Industries Ltd.). Can. 384,682, Oct. 17, 1939. An aromatic hydrocarbon is treated, without catalyst, in the vapor phase with not more than a mol. equiv. of O under at least 10 atms. pressure. E. g., phenol is prepd. from C_6H_6 and O at 300–400°. Cf. *C. A.* **33**, 3810[7].

Stabilizing halogenated hydrocarbons. Irving E. Muskat and Lynn King (to Pittsburgh Plate Glass Co.). U. S. 2,178,695, Nov. 7. Normally unstable substantially satd. aliphatic hydrocarbons contg. substantial quantities of halogen, such as chlorinated naphtha, are brought into contact with concd. H_2SO_4 (suitably at 40–100° for 2–5 hrs.) to effect stabilization without decompn. of a major portion of the material. 3

Continuous reduction of aromatic nitro compounds. A. Ya. Vikman and V. S. Mukhanova. Russ. 52,006, Oct. 31, 1937. An aq. soln. or suspension of nitro compds. mixed with Fe chloride and HCl is continuously passed through a column filled with Fe shavings and heated to the reaction temp. 4

Hydrogenation of aliphatic hydrocarbon polymers containing tertiary carbon atoms. Samuel B. Thomas and Marion D. Taylor (to Shell Development Co.). Can. 385,774, Dec. 19, 1939. The liquid polymers are treated prelimnarily with a spent hydrogenation catalyst with avoidance of the formation of H_2S. E. g., liquid diisobutylene, contg. more than a crit. concn. of a catalyst-poisoning impurity, is passed with H through a min. of 3 converters connected in series, a Ni catalyst at least partially spent is maintained in the first converter at about 250–60° and an active Ni catalyst at about 195–200° in the subsequent converters. The operation is continued until the Ni catalyst in the first converter has nearly lost its power to remove S compds. from the diisobutylene, the first converter disconnected, the liquid diisobutylene and H are passed directly into the second converter, the temp. is increased to about 250–60° and the operation continued. 5

Unsaturated alcohols. Yu. S. Zal'kind and S. A. Zokis. Russ. 51,905, Oct. 31, 1937. Alcs. contg. at least one triple and two double bonds are prepd. from acetylene-bivinylmagnesium halides by the action of aldehydes or ketones. 6

Removing water from aqueous allyl alcohol. Harold R. Slagh (to Dow Chemical Co.). U. S. 2,179,059, Nov. 7. Methylene chloride is mixed with the aq. allyl alc., and water and methylene chloride are distd. from the mixt. 7

Catalytic formation of long-chain aldehydes from alcohols. Wilbur A. Lazier (to E. I. du Pont de Nemours & Co.). U. S. 2,178,761, Nov. 7. A process for the dehydrogenation of an aliphatic long-chain alc. such as dodecyl alc. to the corresponding aldehyde involves bringing the alc. into contact with a catalyst comprising a dehydrating metal such as Zn, Cu or Cd intimately assocd. with Cr_2O_3 at a pressure of less than 50 atm. (suitably about 1 atm.) and at a temp. of 50–450°, sufficiently high to cause evolution of H. 8

Ethers. Vladimir N. Ipatieff (to Universal Oil Products Co.). U. S. 2,179,092, Nov. 7. For the production of an ether such as ethyl ether, an olefin such as C_2H_4 is brought into contact with a dil. soln. of an acid contg. $ZnCl_2$ at 130–300° and under a pressure of 200–400 atm. 9

Producing ethers from olefins. Charles F. Oldershaw (to Shell Development Co.). U. S. 2,178,186, Oct. 31. A process of producing an ether, such as diisopropyl ether, from an olefin by bringing into contact a paraffin and olefin hydrocarbon mixt., such as one contg. C_3H_8, with an aq. olefin-hydrating inorg. acid catalyst such as 73% H_2SO_4 at a temp. such as 80–125° and under pressure, involves sepg. unreacted hydrocarbon material contg. ether from the reacted mixt., then extg. the remaining aq., ether-contg. soln. with a solvent for the ether which is incompletely miscible with the soln. under the extn. conditions, and treating the extd. olefin-hydrating inorg. acid catalyst with a further quantity of the paraffin-olefin hydrocarbon mixt. 10

***p*-Diazonium tertiary amines.** Walker M. Hinman and Walter G. Hollmann. U. S. 2,178,585, Nov. 7. A tertiary aromatic amine (such as ethylbenzylaniline for the production of an ethylbenzylaniline diazonium salt) which has a free para position and which has its N atom bearing one hydrocarbon radical having at least 3 C atoms and another hydrocarbon radical having at least one C atom, is subjected, in the form of an amine salt, such as the hydrochloride, in an acid medium, to the action of nitrous acid sufficient for the reaction of 1 mol. of tertiary amine with 4 mols. of nitrous acid, with resulting formation of a para diazonium salt of the tertiary amine. 11

Amino ketones. Ralph A. Jacobson (to E. I. du Pont de Nemours & Co.). U. S. 2,179,215, Nov. 7. For prepg. $(CH_3)_2CHCOC(CH_3)_2CH_2NHCH_3$ or other amino ketone, diisopropyl ketone or other compd. of the general formula $(CH_3)_2CHC(=O)R$ in which R represents a hydrocarbon radical is treated with CH_2O and with an amino-N-contg. compd. such as methylamine hydrochloride which contains a single N atom which is trivalent and attached to at least one H and otherwise joined only to hydrocarbon radicals, or a hydrohalide of such a compd. Various examples with details are given. 12

Polyglycerol esters. V. V. Dmitrov. Russ. 52,051, Oct. 31, 1937. Addn. to Russ. 23,393 (*C. A.* **26**, 1617). The method of Russ. 23,393 is extended to the prepn. of polyglycerol esters of fatty acids contg. 16 or more carbon atoms. 13

9-(Dialkylaminophenyl)acridines. N. S. Drozdov. Russ. 51,908, Oct. 31, 1937. 9-Chloroacridine is heated with dialkylaniline in the presence of $AlCl_3$. 14

Substituted phenols. Alois Zinke (to Beck, Koller & Co., Inc.) Can. 385,312, Nov. 28, 1939. Phenol is made to react with unsatd. constituents of cracked gasoline in the presence of a H halide and a chloride of Al, Fe or Zn. 15

Hydrohalogenation of vinylacetylene. Wallace H. Carothers and Arnold M. Collins (to E. I. du Pont de Nemours & Co.). U. S. 2,178,737, Nov. 7. Vinylacetylene is distributed in finely divided form in an aq. soln. of HCl or HBr and the addn. products formed are allowed to rise and form a liquid layer above the H halide soln. and are drawn off. 16

Salts of methylcholine ethers. Georg Roeder (to Merck & Co., Inc.). Can. 385,232, Nov. 21, 1939. An alkali metal salt of 1-dimethylamine-2-hydroxypropane is alkylated, e. g., with Me_2SO_4, and the product is further alkylated with an alkyl halide or sulfate. 17

Purifying alkyl sulfates. Egi V. Fasce and Emile C. Rolfs, Jr. (to Standard Oil Development Co.). U. S. 2,178,786, Nov. 7. A crude alkyl sulfate such as a crude alkyl sulfate mixt. contg. inorg. salts and water is treated with a substantially anhyd., water-sol. volatile org. liquid such as iso-PrOH which forms a const.-boiling mixt. with water and is vaporizable at a temp. below that at which the alkyl sulfate decomposes; a substantial portion of the added org. liquid is evapd. by heating, thus reducing the water content of the remaining alkyl sulfate compn., and inorg. salts are pptd. and sepd. 18

Vinyl chloride. V. P. Komarov, P. I. Pavlovich and B. S. Korotkevich. Russ. 51,962, Oct. 31, 1937. A portion of the reaction mixt. of dichloroethane and aq.-alc. NaOH is continuously injected into the reaction chamber, while the other part of the mixt. is continuously filtered into the chamber through solid NaOH. The vapors of vinyl chloride are continuously discharged from the reactor through a bubble tower used in which alc. and dichloroethane are removed. 19

Polymerizing vinyl chloride mixtures. Werner Heuer (to I. G. Farbenind. A.-G.). U. S. 2,179,040, Nov. 7. Gaseous vinyl chloride is polymerized (while maintained in the gaseous state) together with a normally liquid monomeric compd. of copolymerizable character such as vinyl acetate in intimate contact with an "indifferent" liquid such as water which is incapable of dissolving the monomeric compds. and which contains a polymerization catalyst such as K persulfate (suitably at 50–60°). 1

Polymers of isobutylene. Raphael Rosen and Robert M. Thomas (to Standard Oil Development Co.). U. S. 2,178,808, Nov. 7. An arrangement of app. is described, and a process for prepg. polymers of isobutylene, which comprises selectively depolymerizing a mixt. of polymers of isobutylene exclusively, polymers of normal butylene and copolymers of normal butylene with isobutylene, the mixt. consisting substantially of trimers of the butylenes, by passing the mixt. rapidly through a heated reaction zone at a depolymerization temp. of the order of 340–510° and providing sufficient time for depolymerization substantially only of the polymers of isobutylene exclusively, whereby the depolymerized reaction product is substantially pure isobutylene, sepg. the isobutylene from the undepolymerized polymers, and repolymerizing the sepd. isobutylene. 2

Heavy metal cyclic nitroso compounds. Edgar F. Rosenblatt (to Baker & Co.). U. S. 2,178,809, Nov. 7. Compds., various of which may be added to gasoline for improving its combustion, are produced by a method which may involve mixing a compd. of a heavy metal having at least one nitrite group, such as a Ag, Co, Ni, Cu or Cr compd., with an aromatic org. compd. having a reactive H, such as aniline, toluidine or naphthol, and adding an acid such as HOAc. 3

Dehydroacetic acid. Albert B. Boese, Jr. (to Carbide and Carbon Chemicals Ltd.). Can. 384,872, Oct. 31, 1939. Diketene is polymerized to dehydroacetic acid by slowly adding it to a volatile, inert solvent, e. g., C_6H_6, in the presence of a catalyst, e. g., pyridine. 4

Methacrylic acid. I. F. Markov. Russ. 52,085, Oct. 31, 1937. A mixt. of α- and β-chloroisobutyric acids is heated to boiling in the presence of activated C and hydroquinone; the methacrylic acid is distd. off as formed. 5

Methacrylic acid. I. F. Markov. Russ. 52,086, Oct. 31, 1937. Methacrylic acid is prepd. by passing a mixt. of α- and β-chloroisobutyric acids *in vacuo* over activated C at a temp. of 150–300° with or without the introduction of steam. 6

λ-Ketostearic acid and derivatives. Henry L. Cox (to Carbide and Carbon Chemicals Ltd.). Can. 385,794, Dec. 19, 1939. Processes are described for prepg. λ-ketostearic acid and its esters and salts.

Dehydrogenation of hydroxy carboxylic acids and their esters. Wilbur A. Lazier (to E. I. du Pont de Nemours & Co.). U. S. 2,178,760, Nov. 7. Materials such as hydrogenated castor oil, for the production of ketostearin, or butyl or ethyl 12-hydroxystearate, for the production of butyl or ethyl 12-ketostearate, are heated with a Ni catalyst prepd. by the H reduction of an O-contg. Ni compd. such as Ni chromite at 250–500°, on a carrier such as kieselguhr, use of various other catalysts for similar reactions being mentioned. 7

Removal of chlorides from solutions of amino acids. Louis Gerber (to Corn Products Refining Co.). U. S. 2,178,510, Oct. 31. A soln. of amino acids such as one produced by treating corn gluten with HCl and NaOH and which also contains chlorides such as NaCl, KCl and NH_4Cl is treated by pasing HCl gas through the soln. at a temp. of about 38–50°. 8

Use of ketene in preparing anhydrides. Anthony H. Gleason (to Standard Oil Development Co.). U. S. 2,178,752, Nov. 7. Mixed anhydrides are produced by treating ketene with an org. carboxylic acid such as tartaric, lactic or citric acid or glycine or furoic acid. 9

Tetrachloroethylene. Georg Basel and Erich Schaeffer (to Alex. Wacker Ges. für elektrochemische Industrie G. m. b. H.). U. S. 2,178,622, Nov. 7. Reaction is effected between gaseous hexachloroethane and C_2H_2 at 200–400° in the presence of contact surfaces such as activated C. Cf. *C. A.* **33**, 2151[3].

1,1,1-Trichloropropane. Arthur A. Levine and Oliver W. Cass (to E. I. du Pont de Nemours & Co.). U. S. 2,179,218, Nov. 7. An isomer of trichloropropane, b. 106–7°, and suitable for use as a solvent of oil and grease, is prepd. by reaction of HCl with 1,1-dichloro-1-propene (suitably in the presence of $AlCl_3$ at 5–10°).

Pentaerythritol. Joseph A. Wyler (to Trojan Powder Co.). U. S. 2,170,624, Aug. 22. Pentaerythritol is prepd. by alk. condensation of AcH with CH_2O substantially free from MeOH, in aq. soln. Cf. *C. A.* **33**, 5188[9].

Conversion of normal butene to isobutene. Adrianus J. van Peski and Hermanus F. J. Lorang (to Shell Development Co.). Can. 384,317, Sept. 26, 1939. A gaseous hydrocarbon mixt. contg. about 50% each of butane and normal butenes is brought into contact with a solid catalyst comprising a calcined mixt. of a P oxy-acid and a siliceous material at about 275–325° for about 2–50 sec. Polymerization of the butenes is substantially obviated.

Isolation of leucine and tyrosine from corn grits. Arthur M. Mark (to Corn Products Refining Co.). U. S. 2,178,210, Oct. 31. A process of treating a soln. of amino acids produced by the acid hydrolysis of corn gluten for elimination and recovery of glutamic acid, then adjusting the temp. and d. of the soln. and bringing it to a pH of 0.9–1.0 to effect pptn. of leucine, sepg. the ppt., adjusting the temp. and d. of the soln. and bringing it to a pH of 2.4–3.4 to effect pptn. of tyrosine.

Terpineol. Donald H. Sheffield (to Hercules Powder Co.). U. S. 2,178,349, Oct. 31. A process of producing terpineol from pinene involves treating pinene with a dil. aq. polybasic noncarboxylic acid such as H_2SO_4 or a monoaryl or monoalkyl deriv. of such an acid, such as benzenesulfonic acid, in the presence of an org. liquid such as acetone which is miscible with both the pinene and the acid and nonreactive therewith (suitably at a temp. of 35–45°).

Bis(aminophenyl) sulfone. Chinoin Gyógyszer- és Vegyészeti Termékek Gyára R. T. (Kereszty és Wolf). Hung. 121,910, Nov. 2, 1939. Nitrophenyl aminophenyl sulfide is acetylated to protect the NH_2 group, oxidized by $KMnO_4$ in glacial acetic acid, and the nitro group reduced in a soln. contg. dil. mineral acids in presence of Pd catalyst.

Dimethyl-*p*-phenylenediamine. M. E. Kats. Russ. 52,076, Oct. 31, 1937. Nitrosodimethylaniline is reduced with alkali sulfide in aq. soln. in the presence of Al salts.

1,2-Anthraquinonenaphthacridone. V. A. Titkov. Russ. 52,008, Oct. 31, 1937. 1,2-Anthraquinonenaphthacridone is prepd. by treating β-naphthoyl-1-aminoanthraquinone-2-carboxylic acid in a solvent with benzotrichloride.

Bivinyl. D. V. Tishchenko, A. N. Churbakov and V. N. Ryazantsev. Russ. 52,023, Oct. 31, 1937. Addn. to Russ. 46,570 (*C. A.* **33**, 3399[9]). By the method described in Russ. 46,570, bivinyl is prepd. from 1,2- 1,3- or 1,4-dichlorobutane or from their mixts. with 1,1- and 2,3-dichlorobutane.

2-Chloro-1,3-butadiene. D. V. Tishchenko and A. N. Churbakov. Russ. 51,994, Oct. 31, 1937. Addn. to Russ. 46,570 (*C. A.* **33**, 3399[9]). 2,2,3-Trichlorobutane is passed over a catalyst consisting of a mixt. of $MgCl_2$ and $MgSO_4$ on a carrier.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W. DOX

Melanin and its precursors. I. W. L. C. Veer. *Rec. trav. chim.* **58**, 949–55(1939)(in English).—Raper (*C. A.* **22**, 95) has shown that the oxidation of tyrosine (I) by tyrosinase (II) leads to the formation of dopa, 5,6-dihydroxyindole and 5,6-dihydroxyindole-2-carboxylic acid (III). According to his hypothesis the quinone of III is the red-colored precursor of melanin obtained by the oxidation of tyrosine with tyrosinase. The isolation of the red substance (IV) and the detn. of its structure seems to be of importance since Jacobs (*C. A.* **31**, 7108[6]) considered it an antipernicious anemia principle; Breijer (*Beitr. path. Anat.* **102**, 412(1939)) suggests that premelanin of the skin-epidermis acts in blood formation; and Szent-Györgyi postulates that orthoquinones may function in biol. oxidations. Although IV does not react with $PhNH_2$ it has been shown that it reacts with the more reactive $PhNHNH_2$ and substituted derivs. such as $4\text{-}O_2N.C_6H_4\text{-}NHNH_2$ and $4\text{-}BrC_6H_4NHNH_2$ forming monohydrazones probably by reaction with the CO group in the 5-position. I (1 g.) in 1 l. H_2O at 30° was treated with 100 cc. II (prepd. from meal worms in 0.02 *N* NH_4OH and enough 1% AcOH to bring the pH to 6.0–6.5. Oxygen was bubbled through the soln. for 5 min. and the stoppered vessel was shaken from time to time during a 30-min. standing. The oxidation was repeated and after about 2 hrs., 10–15 cc. of 1% AcOH was added. The dark ppt. (a compd. of I and II) was filtered off giving a pomegranate-red soln. of IV, insol. in Et_2O, $CHCl_3$, CCl_4, petr. ether, benzene, toluene, BuOH and *iso*-BuOH. The soln. from 1 g. I was treated with 1.2 g. $PhNHNH_2$ in 15 cc. of 30% AcOH yielding a red-brown powder of the *monophenylhydrazone hydrate*, $C_{15}H_{13}N_3O_3.H_2O$, m. about 168° (decompn.). Similarly were prepd. the corresponding mono-*p*-nitrophenylhydrazone hydrate, $C_{15}H_{12}N_4O_5.H_2O$, m. about 190° (decompn.), hydrolyzed on boiling with dil. H_2SO_4; and the *p*-bromophenylhydrazone dihydrate, $C_{15}H_{12}BrN_3O_3.2H_2O$, m. about 174° (decompn.). No addn. with 2,4-$(O_2N)_2C_6H_3NHNH_2$ according to the method of Brady (*C. A.* **25**, 3319) took place. C. R. Addinall

The pH optimum of fumarase. C. N. Ionescu, N. Stanciu and V. Rădulescu. *Ber.* **72B**, 1949–52(1939).—Although fumarase catalyzes reversibly the reaction: fumaric acid ⇌ malic acid, the pH optimum varies according to the direction of the reaction. For the reaction fumaric acid → malic, it is 7.16; for malic acid → fumaric, 8.33. This difference is explained by assuming that the change in pH value (1) alters the degree of dispersion of the enzyme, thus increasing or decreasing the active surface; and (2) influences the degree of dissocn. of the substrate. E. S. G. Barron

Nonosseous origins of serum phosphatase. Aaron Bodansky. *Proc. Soc. Exptl. Biol. Med.* **42**, 800–4 (1939).—Preliminary. L. E. Gilson

The biologic decomposition and synthesis of amino acids. Wilhelm Franke. *Angew. Chem.* **52**, 695–8, 703–8(1939).—A comprehensive summary covering earlier work (up to 1930), the discovery of amino acid oxyhydrases, the glutamic acid dehydrogenase, amine migration, carboxylic amine formation as a side reaction of the biol. amino acid decompn., the amino acid dismutation of anaërobic bacilli, and pathogenic and pathol. protein metabolism. 71 references. Karl Kammermeyer

Animal fat acid dehydrogenases and their coenzymes. I. O. St. A. Konrad Lang. *Z. physiol. Chem.* **261**, 240–8 (1939).—Liver and muscle contain a fat acid dehydrogenase (Thunberg technique, cf. *C. A.* **32**, 5929[9]). The activity increases with the length of the fat acid chain whether with even or odd nos. of C. The pH optimum is at 8.0 and the enzyme is sensitive to NaCN but not to F^- or iodoacetate. The enzyme requires a coenzyme which is not identical with cozymase or with codehydrogenase II. The fat acid codehydrogenase is relatively less sensitive to heating with acids or alkalies than are the other coenzymes. To prep. an active ext., rub 2 rat livers to a pulp without sand and ext. 6 times with 75-cc. portions of ice water. The residue is then ground with sand and extd. with 50 cc. ice-cold 0.05 *M* phosphate buffer at pH 8. The coenzyme is obtained from an ice-water ext. of rabbit muscle, which is boiled, filtered and mixed with 10 cc. 10% HOAc and 40 cc. satd. $Pb(OAc)_2$ per l. The ppt. is washed and decompd. with Na_2SO_4 soln. and H_2SO_4, the filtrate from $PbSO_4$ made 1% in H_2SO_4 and 25% phosphotungstic acid added. The ppt. is decompd. with $Ba(OH)_2$. The filtrate is treated with $AgNO_3$ and NH_3 and the Ag ppt. decompd. with H_2S. The resultant soln. is dried over H_2SO_4 in vacuum, dissolved in a little water and the insol. material discarded. The residue is again evapd. *in vacuo*. Yield is 0.125–0.15 g./kg. of rabbit muscle. II. O. St. A. Konrad Lang and Hermann Mayer. *Ibid.* 249–53.—The fat acid dehydrogenase described above has little effect on unsatd. fat acids and appears to be specific for satd. higher fat acids. The products are shown to be unsatd. fat acids. The codehydrogenase is probably muscle adenylic acid. M. L.

Formation of thyroxine from diiodotyrosine. Paul von Mutzenbecher. *Z. physiol. Chem.* **261**, 253–6(1939); cf. *C. A.* **33**, 5421[5].—On incubating a soln. of 20 g. diiodotyrosine-$2H_2O$ in 425 cc. of 0.1 *N* NaOH for 14 days the pH changed from 8.8 to 8.4, 11% of the total I appeared as I and the liquid gave a yield of 40 mg. of K thyroxine. The formation of thyroxine under these conditions explains its formation from iodized proteins especially after alk. incubation. Milton Levy

The complete separation of alkaline kidney phosphatase into protein and prosthetic groups and its reactivation. II. D. Albers. *Z. physiol. Chem.* **261**, 269–72(1939); cf. *C. A.* **34**, 456[7].—Dialysis of alk. kidney phosphatase prepns. for 200 hrs. completely inactivates the prepn. Addn. of $MgCl_2$ does not reactivate the dialyzed prepn. but addn. of dialyzate restores about 20% of the original activity. Long periods of dialysis therefore destroy some of the apoenzyme. Milton Levy

Enzymic decomposition of *l*-dihydroxyphenylalanine (dopa) by liver and intestine. Peter Holtz, Alexander Reinhold and Karl Credner. *Z. physiol. Chem.* **261**, 278–86(1939); cf. *C. A.* **33**, 8629[3].—Liver and intestine contain an enzyme catalyzing the decarboxylation of *l*-dihydroxyphenylalanine (I) to hydroxytyramine (II) as shown by the pharmacol. activity (blood pressure increase) of the prepns. after adding I and by anaerobic liberation of CO_2. The decarboxylase is present in kidney and liver of guinea pigs, rabbits, pigs, sheep, goats and chickens but not in rats, mice, cows or frogs. It is present in the upper intestinal tracts of guinea pigs and not of the other animals, nor in the colon or rectum of guinea pigs. The enzyme does not act on *d*-I. It is inhibited by KCN. Oxidation of I in liver and intestinal exts. goes quantitatively through II finally producing dihydroxyphenylacetaldehyde. The latter substance lowers blood pressure. Milton Levy

Liquefaction of starch. A method for estimation of the liquefaction of starch paste. Karl Mayer. *Z. physiol. Chem.* **262**, 29–36(1939).—Starch which has been treated with an amt. of I_2 just insufficient to produce a blue color is resistant to saccharification but is still liquefied by enzymes. Thus, a 1% starch paste treated with 0.65 cc. of 0.01 *N* I_2 per 100 cc. is liquefied but no sugar appears on adding malt enzymes, nor is the I_2 color reaction changed. To est. the liquefying power of exts. prep. a starch paste substrate as previously described (*C. A.* **30**, 116[8]) and add the proper amt. of I_2. To 50 cc. of the substrate add 5 cc. of buffer (pH 5 which is optimal), warm to 37°, add 10 cc. of enzyme soln. at 37° and measure the time of flow at suitable intervals in an Ostwald viscometer. For 0 time use water instead of enzyme soln. Milton Levy

The influence of radiation with the quartz lamp on the group characteristics of red cells. H. Buchwald. *Z. Immunitäts.* **96**, 236–41(1939).—Radiation with ultraviolet rays for 8 or 15 hrs. may lower the titer of agglutination of red cells but does not completely destroy their group reactivity. Julian H. Lewis

The solubility of pancreatic amylase in some organic solvents. Junius Larsen and Chas. F. Poe. *J. Biol. Chem.* **132**, 129–33(1940).—The amylase prepns. used in the soly. detns. were samples of com. amylopsin prepd. from fresh pancreas. More active prepns. were not obtained when ordinary alcs., esters and ethers were used as solvents. Slightly more active material was extd. by ethylene glycol and its ether. Of all solvents tried satd. aq. acetamide was the most selective, bringing about a 3–4-fold increase in activity. A. P. Lothrop

Molecular weight of egg albumin. F. W. Bernhart. *J. Biol. Chem.* **132**, 189–93(1940).—Analyses of the tyrosine, tryptophan and phenylalanine content indicate a minimal mol. wt. of 18,400 for electrodialyzed, moisture-free egg albumin. Calcns. indicate the presence of 310 amino acids per mole of albumin, this result resting on the assumption that no unknown basic amino acids or N-contg. prosthetic groups are present. This no. of amino acids per mole approaches closely the value of 288 calcd. by Bergmann and Niemann (*C. A.* **31**, 4350[6]). A. P. Lothrop

The effect of Röntgen rays on the blood codehydrogenases I and II. Wm. B. Bean, Richard W. Vilter and Tom D. Spies. *Ann. Internal Med.* **13**, 783–6(1939).—Detns. of codehydrogenases I and II were made before and after x-radiation on 3 healthy persons, 2 cases of myelogenous leucemia and 3 pellagrins in remission. Ether-sol. pigments having the color of porphyrin in 25% HCl, similar to those found in pellagra, appeared in all cases 12 hrs. after irradiation and disappeared within 48 hrs. Nicotinic acid, administered before irradiation, prevented the development of pigments but not the decrease in the coenzyme content of the blood. In those cases which received no nicotinic acid the blood codehydrogenases decreased 60 to 90% within 12 hrs. after irradiation and returned to normal after 24 hrs. A no. of other oxidation-reduction enzyme systems may be affected by exposure to x-rays. John T. Myers

Statistical analysis of biological elementary reactions. P. Jordan. *Arch. ges. Virusforsch.* **1**, 171–214(1939).—Review with 81 references. J. Pinchack

The chemistry of the enzymes. H. Bruce Collier. *Can. J. Comp. Med.* **3**, 293–300(1939).—A discussion of recent advances, without bibliography. J. Pinchack

The function of thymonucleic acid in living cells. Einar Hammarsten. *J. Mt. Sinai Hosp., N. Y.* **6**, 115–25 (1939).—A lecture on the intermolecular properties of nucleic acids and their relation to chromosome structure. J. Pinchack

Some biological aspects of protein chemistry. Max Bergmann. *J. Mt. Sinai Hosp., N. Y.* **6**, 171–86(1939).—A lecture with 25 references. J. Pinchack

Infrared absorption spectra of chlorophyllous pigments in living cells and in extracellular states. E. Katz and E. C. Wassink. *Enzymologia* **7**, 97–112(1939)(in English). —When unicellular organisms are ground with fine carborundum powder cell-free systems can be prepd. which contain the photosynthetically active pigments connected with their bearers which are probably of protein nature. The exts. can be prepd. with distd. water, phosphate buffer, etc. Exts. of this type were prepd. from the green alga *Chlorella*, a strain of purple S bacteria and a member of the Athiorhodaceae, *Rhodospirillum rubrum*. The absorption spectra of the exts. in the red and infrared region resemble closely those of the living cells. The shape is practically unaltered but the position is altered slightly. The changes depend upon the mode of extn. Under the ultramicroscope the ext. shows distinct colloid particles. Exts. prepd. with distd. water have an isoelec. point at pH 3.7. Different gas phases (O, air, N, H in the presence of Pd, H_2S) did not influence the infrared absorption spectrum of the purple S bacteria. Strong light affected the colloidal exts. much less than it affected the org. exts. Heat influences the spectrum. A new max. arises, probably owing to pigment liberated from the protein bearer. Measurements were made of spectra of exts. of *Chlorella* and purple S bacteria with various org. solvents. From the relation of the band max. to n of the solvent a value for the band max. of sep. pigment mols. was extrapolated. In all cases the absorption max. of pigment exts. in org. solvents shows an appreciable shift to the shorter wave lengths, as compared with the absorption max. of the pigment in the intact cells. This shift is especially obvious in the case of the purple and green bacteria. Dried pigment from an alc. ext. of purple S bacteria shows the same position of the max. as the ext. itself, an indication that the difference between the max. in living cells and org. exts. cannot be due to differences in concn. of the pigment. Felix Saunders

Carotene oxidase. James B. Sumner and Alexander L. Dounce. *Enzymologia* **7**, 130–2(1939)(in English).—Carotene oxidase, which occurs in the soybean, adds gaseous O to the double bonds of carotenoids and unsatd. fats, forming peroxides. The pH for optimum activity is at about 6.5. The enzyme has a neg. temp. coeff. between 15 and 30°. Felix Saunders

Extraction of proteins and proteolytic enzymes from yeast. Harold H. Strain. *Enzymologia* **7**, 133–41(1939)(in English).—Proteins, proteolytic enzymes and peptide-splitting enzymes are readily extractable from ground fresh yeast and from ground dried yeast. Extn. of these compds. from yeast is dependent upon rupture of the cell walls. It does not depend upon measurable autolysis of the cell proteins. Proteolytic enzymes in the exts. appear to be bound to the proteins. Autolysis of yeast is not inhibited by oxidizing agents which inactivate proteases of the papain type. Autolysis of yeast exts., like that of yeast itself, is inhibited by H_2S. Concn. of yeast exts. does not prevent hydrolysis of the protein. Concn. of yeast autolyzates does not lead to synthesis of protein. Oxygenation of concd. yeast exts. and of yeast autolyzates does not increase their protein content. Complex reactions between alanine and glucose are accelerated by the presence of phosphates and alkalies. These reactions are accompanied by a decrease in free amino groups. They are not assocd. with a decrease in basic N. Reactions between sugars and amino compds. may complicate interpretation of reactions which take place in killed tissues. Felix Saunders

Preparation and properties of "alkaline" phosphatase I. R. Cloetens. *Enzymologia* **7**, 157–60(1939)(in French); cf. *C. A.* **33**, 6366[6].—A method is described for the prepn. of "alk." phosphatase. Mg increases its activity 30–50 times. In the presence of Mg and 0.01 *M* substrate, 0.01 *M* KCN has no effect when the time of hydrolysis is 1 hr. and the pH 9.0. At pH 5–6 the enzyme is inactive. Alk. phosphatase I is more stable in acid than alk. phosphatase II. At its optimum pH alk. phosphatase I is stabilized by Mg. It is markedly inhibited by 0.01 *M* KF. Felix Saunders

Chromatographic adsorption of the enzymes of the snail, Helix pomatia, which act on chitins. L. Zechmeister, G. Tóth and É. Vajda. *Enzymologia* **7**, 170–5(1939)(in German).—Hepatopancreas exts. of *H. pomatia* were chromatographed on bauxite and a chitinase and a chitobiase were sepd. The latter can be extd. more easily. In contrast to the corresponding enzymes of emulsin, no generally valid sequence in the Tswett column can be given. The juice acts vigorously on the β-phenyl-*N*-acetyl-*d*-glucosaminide, but much more weakly on the α-isomeride. These 2 enzymes were sepd. chromatographically. The β-phenyl-*N*-acetyl-*d*-glucosaminidase accompanies in this case the chitinase and not the chitobiase. Felix Saunders

Chromatographic adsorption of the enzymes of emulsin which act on chitins. L. Zechmeister and G. Tóth. *Enzymologia* **7**, 165–9(1939)(in German).—The enzymes occurring in emulsin (Merck) which act on chitin or its breakdown products were submitted to chromatographic analysis. The chitinase which shows a specific hydrolyzing

effect on chitin and still more on chitodextrin is not adsorbed by a suitable bauxite column. It is found in the filtrate while a second enzyme, the chitobiase, which breaks down only low-mol. substrates, remains in the adsorbate. Therefore emulsin must contain both a polysaccharase and an oligosaccharase. The chromatographic behavior of an enzyme which acts on β-phenyl-*N*-acetyl-*d*-glucosaminide clearly differentiates it from chitinase. The corresponding α-compd. is neither attacked by the crude emulsin nor by its fractions, prepd. by chromatographic adsorption. Felix Saunders

Amylase determination in barley. K. Myrbäck and B. Örtenblad. *Enzymologia* **7**, 176–81(1939)(in German).—The β-amylase of barley is partly bound to an insol. protein and is inactive in this form. It can be freed by proteolytic enzymes and thus activated. The total amt. of amylase in barley can be detd. after treatment with papain. Felix Saunders

Oxido-reduction processes in the inhibition and activation of amylase. Józef Janicki. *Enzymologia* **7**, 182–92 (1939)(in German).—The activation of amylase by H_2S consists almost entirely of a removal of inhibiting substances. Ascorbic acid will strongly inhibit barley amylase. The inhibition is assocd. with a dehydrogenation of the ascorbic acid. It is reversible and can be prevented by H_2S and other reducing substances. The dehydrogenation of the ascorbic acid and, therefore, the inhibition of the amylase is strongly accelerated by traces of Cu so that it is important to use very carefully purified water. The dehydrogenation of ascorbic acid and inhibition of amylase also take place in starch-buffer soln. If the reoxidation is accelerated by the addn. of water contg. traces of Cu, then the reversibility of the activation brought about by H_2S can be demonstrated. Ascorbic acid also inhibits α-amylase. This inhibition results from an oxidation of ascorbic acid and can be prevented by H_2S. The disappearance of the α-amylase at the end of the ripening period of the barley cannot be ascribed entirely to the oxidation of ascorbic acid since the dextrinizing action and liquefying power of the amylase is not restored by H_2S. Felix Saunders

The inhibiting effect of hydrocyanic acid upon cell oxidase and peroxidase. Lawrence S. Malowan. *Enzymologia* **7**, 193–4(1939)(in English).—2,6-Dichlorophenolindophenol in its reduced form is an indicator for peroxidase. The colorless soln. changes to a deep red when horseradish ext. and 0.02 *N* H_2O_2 are added. The reaction is sensitive to HCN in concns. greater than $^1/_{600}$ *N*. Felix Saunders

Reputed synthesis of protein by aeration of protein-proteinase digests. II. K. Linderstrøm-Lang and G. Johansen. *Enzymologia* **7**, 239–40(1939)(in English); cf. *C. A.* **33**, 8643².—No protein synthesis could be demonstrated. Felix Saunders

Oxygenation of papain digests of wool. Formation of compounds insoluble in trichloroacetic acid. Harold H. Strain and K. Linderstrøm-Lang. *Enzymologia* **7**, 241–4 (1939)(in English).—A decrease in N sol. in Cl_3CCO_2H occurs only in strongly concd. digests exposed to the air. The disappearance of substances sol. in Cl_3CCO_2H is not accompanied by a decrease in amino groups. All the sulfhydryl groups, which are titrated to a slight extent in alc., disappear in air; hence a slight decrease in carboxyl groups is observed. There is no indication for the synthesis of peptide bonds by aeration. Felix Saunders

Characteristics of enzymic and autoclaved hydrolyzates of gelatin. N. I. Gavrilov and V. S. Balabukha-Poptsova. *Enzymologia* **7**, 245–55(1939)(in French).—During hydrolysis of proteins in the autoclave, and probably by enzymes, there is not only the process of hydrolysis and liberation of native anhydrides, but also cyclization, and perhaps rupture of rings. Felix Saunders

Specific enzyme deaminizing free and combined adenylic acid. Henry Borsook and Jacob W. Dubnoff. *Enzymologia* **7**, 256(1939)(in English).—An ext. of *Aspergillus wentii* contains a mixt. of peptidases which completely hydrolyzes Witte's peptone in 24 hrs. NH_3 is also liberated by this ext. The ext. does not liberate NH_3 from 0.01 *M* solns. of adenine, *dl*-alanine, allantoin, alloxan, *d*-asparagine, *d*-aspartic acid, creatine, *l*-cysteine, *l*-cystine, guanidine, guanine, glycine, glycocyamine, *d*-glutamic acid, hippuric acid, hypoxanthine, *l*-leucylglycine, *d*-lysine, *dl*-methionine, *d*-ornithine, *dl*-phenylalanine, *l*-proline, sarcosine, *dl*-serine, *l*-tryptophan, *l*-tyrosine, *d*-valine, xanthine, uracil, urea and uric acid but does liberate NH_3 from adenylic acid, adenylic acid pyrophosphate and nucleic acid. Felix Saunders

Crystalline constituents of the nonsaponifiable fraction of bone marrow. Harry N. Holmes and Ruth E. Corbet. *Science* **90**, 518(1939).—Four cryst. substances have been isolated from the nonsaponifiable fraction of whole bone marrow. One of the substances was cholesterol. The others have the following properties: (I) C 73.6%, H 13.4%, m. 66–7°, mol. wt. 296 (Rieche method, cf. *C. A.* **27**, 633), *benzoate* m. 35–6°, *acetate* m. 34–5°. (II) C 76.9%, H 13.0%, m. 61–3°, *benzoate* m. 137–8°, *acetate* m. 37–8°, mol. wt. 268. (III) C 82.2%, H 12.1%, m. 124° (not sharp), *benzoate* m. 123–5°. This substance formed a *digitonide*. Felix Saunders

Decomposition of hydrogen peroxide by catalase. Joseph Weiss and H. Weil-Malherbe. *Nature* **144**, 866 (1939).—Discussion. E. D. Walter

Synthesis of coenzymes I and II. S. P. Vilter, R. W. Vilter and T. D. Spies. *Nature* **144**, 943(1939); cf. *C. A.* **33**, 5482⁷.—The concn. of coenzymes I and II in normal human blood and leucemic blood is doubled after incubation with nicotinic acid amide. Washed erythrocytes, however, from normal blood and leucemic blood, resuspended in saline or serum, show no increase in the concn. of coenzymes I and II after incubation under similar conditions. Their concn. is greatly increased in a suspension of white cells of the lymphoid and myeloid series after incubation with nicotinic acid amide. E. D. Walter

Mucolytic enzyme in testis extracts. E. Chain and E. S. Duthie. *Nature* **144**, 977–8(1939).—An enzyme was obtained in "spreading factor" exts. from testis which hydrolyzed a polysaccharide in synovial mucin with liberation of reducing sugars. The possible identity of this enzyme with "spreading factor" is discussed. E. D. Walter

Isolation of a catalytically active flavoprotein from liver. V. Subrahmanyan, D. E. Green and A. H. Gordon. *Nature* **144**, 1016(1939).—A flavoprotein was obtained from pig liver which catalyzes the oxidation of aldehydes to their corresponding acids. This enzyme contains flavinadenine dinucleotide. E. D. Walter

Nicotinic acid. B. W. Fairbanks and Elizabeth Curzon. *North Am. Veterinarian* **20**, No. 11, 17–22(1939).—A review of the toxicity, detn., distribution, physiol. effects, etc., of nicotinic acid. 35 references. C. W. W.

Action of nuclease on cozymase. Heinz Heiwinkel. *Arkiv Kemi, Mineral. Geol.* **13A**, No. 19, 12 pp.(1939).—Nuclease from emulsin of sweet almonds was used. NaF completely inhibited the dephosphorylation of cozymase, but the latter was split into its 2 nucleotides by hydrolysis at the union of the 2 phosphate groups. J. J. Willaman

Enzymic phosphorylation and dehydrogenation in brain, nerve and sarcoma. Hans v. Euler. *Arkiv Kemi, Mineral. Geol.* **13B**, No. 11, 6 pp.(1939).—With the time of reduction of methylene blue as a measure, the dehydrogenase system of Jensen sarcoma and of rat brain was inhibited by insulin, but accelerated by muscle adenylic acid. J. J. Willaman

Dipeptidase action of extracts of Jensen sarcoma and of rat muscle. Bolesław Skarżyński. *Arkiv Kemi, Mineral. Geol.* **13B**, No. 13, 7 pp.(1939).—Exts. of rat muscle (I) and of Jensen sarcoma (II) hydrolyzed *dl*-alanylglycine with equal rate and to the extent of 50% only. I hydrolyzed glycylglycine to the extent of 25%, but II to 89%. Both split *l*-leucylalanine to about 50%, but neither acted on the *d*-form. J. J. Willaman

Water in nonaq. solns. [biol. systems] (Osterhout, Murray) **2**. Further expts. on decompn. and regeneration of nitrogenous org. matter in sea water (Brand, *et al.*) **2**. Structure of cellulose and other polymers related to simple sugars (Haworth) **10**.

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B—METHODS AND APPARATUS

GLENN E. CULLEN

Application of the Pulfrich photometer to the determination of sulfates by the method of Marenzi and Banfi. A. D. Marenzi and R. F. Banfi. *Anales farm. bioquím.* (Buenos Aires) **10**, 77–81(1939); cf. *C. A.* **33**, 1357[4]. - The blue color is developed by reaction of the benzidine with phosphotungstomolybdic acid reagent as in the colorimetric method, then estd. photometrically with filter S72 (max. transmission at 7290 A.). L. E. Gilson

Determination of phenols in blood and urine with the Pulfrich photometer. A. D. Marenzi. *Anales farm. bioquím.* (Buenos Aires) **10**, 82–7(1939).—The colorimetric method of M. (cf. *C. A.* **26**, 2999) is adapted to photometric detn. Filter S47 (max. transmission at 4630 A.) is used. L. E. Gilson

Determination of prothrombin. Armand J. Quick. *Proc. Soc. Exptl. Biol. Med.* **42**, 788–9(1939); cf. *C. A.* **33**, 8226[1].—Discussion based on previous papers (*C. A.* **31**, 2660[8]; **33**, 8258[3]). L. E. Gilson

The composition of the alveolar air and its clinical determination. R. Lemaire. *Anesthésie et analgésie* **5**, 326–30(1939).—Consistent results were obtained with the Henderson and Haggard technique (cf. *C. A.* **19**, 3506) as modified by Cordier (unpublished results). The Cordier modification involves a smaller mouthpiece and valves of lower resistance. Marion Horn

Histaminase. I. Chemical method for determining the activity of histaminase. Kiyooki Takahasi and Tosio Umeda. *J. Agr. Chem. Soc. Japan* **15**, 939–46; *Bull. Agr. Chem. Soc. Japan* **15**, 137–8(1939)(in English). Histamine-HCl 1 mg., phosphate buffer soln. having pH 7.2 2 cc., H_2O 10 cc. and toluene 1 cc. were taken in a test tube. Histaminase in hog kidney ext. was adsorbed on acid clay at pH 7.2. The histaminase prepn. was added. The mixt. was kept at 38° and stirred by an air current for 24 hrs. The filtrate was dild. to 20 cc., and then 0.2 cc. of satd. Na_2CO_3 soln. and 0.5 cc. of diazobenzenesulfonic acid satd. soln. were added. The quantity of histamine remaining unchanged was estd. by colorimetry. The value was corrected by reducing the quantity of histamine adsorbed in acid clay. Y. Kihara

Photometric estimation of silicic acid in biological materials. J. Bodnár and Tibor Török. *Z. physiol. Chem.* **261**, 257–68(1939).—Dry and powder the material to be analyzed and weigh 0.05–0.25 g. into a small Pt crucible with lid. Add 0.25 g. $KNaCO_3$ and mix. Heat gently at first and then more strongly ending with 40 min. in the full flame of the Teclu burner. Stir the melt occasionally. After cooling add 1–2 drops of methyl orange and just neutralize with a soln. of HCl (80 cc. concd. HCl and 920 cc. of H_2O). Heat on the water bath for a few min. Add 0.5 cc. of the HCl soln. to the cooled digest and transfer to a 15-cc. vol. flask, washing with three 1-cc. portions of H_2O. Add 0.5 cc. of 6.5% KCN (paraffined bottle) and 1.5 cc. of acid Mg mixt. (42 g. NH_4Cl, 22 g. cryst. $MgCl_2$, 1 g. citric acid and 1.3 g. $NH_4H_2PO_4$ in 200 cc. of the HCl above). Mix and add dropwise with shaking 3 cc. of 8% NH_3 (previously distd. through paraffined tubes). Fill to the mark, transfer to a centrifuge tube and spin for 5–10 min. Transfer 10 cc. of the supernatant fluid to a 25-cc. vol. flask, add 1.5 cc. of 5% NH_4 molybdate in 5% H_2SO_4 and 1.5 cc. of 2% hydroquinone in water acidified with 2 drops H_2SO_4 per 100 cc. Mix and after 5 min. dil. to the mark with a soln. made by dissolving 30 g. Na_2SO_3 in 200 cc. of H_2O and 160 g. of Na_2CO_3 in 800 cc. of H_2O, filtering and mixing. Read the color in a photoelec. colorimeter with a red filter. Standardize the method with known amts. of SiO_2. The method requires 2 hrs. and the difference of duplicates is usually less than 5% with 5–70 γ of Si. The KCN and citric acid form sol. complexes with any Fe present and the phosphate in the Mg mixt. ensures the formation of a ppt. even with very small amts. of P in the sample. Milton Levy

A new method for the estimation of vitamin C on the Zeiss step photometer. Franz Bukatsch. *Z. physiol. Chem.* **262**, 20–8(1939).—To est. vitamin C ext. 3 g. of fresh material (leaves, roots, etc.) with 3 cc. of 20% HPO_3, grinding with sand. Add 27 cc. of air-free H_2O and filter after 10 min. To 5 or 10 cc. of filtrate acidified with glacial AcOH add 5 cc. of nitrobenzene or xylene. Add 1 cc. of a soln. of 2,6-dichlorophenolindophenol equiv. to 0.5 mg. of vitamin C and shake. If the solvent layer does not become colored add another 1 cc. of the dye soln. Excess dye is taken up by the solvent and the concn. measured at a depth of 0.5 cm. with filter S53 for nitrobenzene and S50 for xylene. 0.5 (cc. of dye − factor X extinction) gives the amt. of vitamin C in the sample. The factor is detd. on pure vitamin. If the original ext. is colored it is extd. with the solvent to be used until all extractable color is removed. Milton Levy

The Wright technique in estimating the opsonic titer of serums. Paul vor dem Esche. *Z. Immunitäts.* **96**, 242–52 (1939). The Wright technique for detg. opsonins gives reliable results only when precautions involving prepn. of bacterial suspensions, the concn. of serum and the prepn. and staining of smears are observed. Julian H. Lewis

Experiences with the gold sol of Borovskaya. Hans Schubert. *Z. Immunitäts.* **96**, 267–74(1939).—This gold sol (*C. A.* **28**, 5485[3]) when carefully made is an inexpensive easily prepd. reagent which gives uniform and trustworthy results. Julian H. Lewis

The determination of purine nucleotides and nucleosides in blood and tissues. Stanley E. Kerr and Krikor Seraidarian. *J. Biol. Chem.* **132**, 147–59(1940); cf. *C. A.* **27**, 716. - The method previously described for the detn. of purine nucleotides in CCl_3CO_2H exts. of tissues has been simplified and also extended to permit the sep. estn. of adenine and hypoxanthine by the method of Hitchings (*Dissertation*, Harvard, 1933). A. P. Lothrop

A rapid micro-Kjeldahl method. Ancel Keys. *J. Biol. Chem.* **132**, 181–7(1940).—A rapid accurate micro-Kjeldahl method is described which can be used for the detn. of amts. of N corresponding to that contained in 0.1–0.2 cc. of blood serum. The method involves measurement of samples and standard acid with syringe pipets, distn. in partial vacuum and titration with a 0.2-cc. microburet. Under ordinary conditions of work, from 6 to 8 detns., including blanks and controls, can be carried out from start to finish in 2 hrs. by a single analyst who can also run as many as 40 detns. in a day with 2 stills. A. P. Lothrop

Apparatus for the continuous drying and extraction of biological materials. Application to the extraction of the neutral fat fraction of feces. Irving A. Kaye, I. Wallace Leibner and Edwin B. Connor. *J. Biol. Chem.* **132**, 195–207(1940).—An app. is described which is capable of drying biol. materials, such as feces, tissues, organs, bones, blood and other body fluids, and extg. org. substances such as fats, drugs and poisons. Oxidation is prevented by avoiding high temps. and an atm. of O_2, the vapors of the solvent having displaced the air. The drying time is considerably cut and the extn. is more thorough than in the usual extn. by the Soxhlet procedure. A new solvent, iso-Pr_2O, for the extn. of fat from feces is recommended and has proven more efficient than other common fat solvents. A method is described for the study of *the neutral fat fraction of feces.* A. P. Lothrop

The determination of arginine by means of flavianic acid. Hubert B. Vickery. *J. Biol. Chem.* **132**, 325–42 (1940).—In the method described for the detn. of arginine, which is a fundamental modification of the flavianic acid method of Kossel and Gross (*C. A.* **18**, 2871), the arginine is pptd. from protein hydrolyzates as the diflavianate which is purified by soln. in NH_4OH and repptn. in slightly acid

soln. as the monoflavianate which is filtered off and weighed. From 3 to 5 g. of protein is required for each detn. and the results are highly reproducible and apparently reliable. The results are usually a little higher than those obtained by the Ag pptn. method. A. P. Lothrop

A method for the determination of small amounts of potassium. T. E. Weichselbaum, Michael Somogyi and Howard A. Rusk. *J. Biol. Chem.* **132**, 343–56(1940).—A micromethod is described for the detn. of K in 0.5 cc. of serum, the useful range extending from a min. value of 15 to a max. of 40 mg. of K per 100 cc. of serum, a range that covers most abnormal and exptl. conditions. In extreme instances 1 cc. or 0.25 cc. may be used. The proteins and chlorides are pptd. from the serum by use of $CuSO_4$, Na_2WO_4 and $AgNO_3$ solns. The K is then pptd. as Ag K cobaltinitrite and the ppt. analyzed by either manometric detn. of nitrite or titrimetric detn. of Ag. The authors prefer the gasometric technique for its precision but the titrimetric procedure is more rapid and easier to perform. The 2 procedures are practically interchangeable as far as accuracy of results is concerned. *The K content of* the *serum* of 40 normal subjects was found to be as follows: min. 18.0, max. 20.6, av. 19.3 mg. %. The range is quite narrow and is at variance with the wide range of values found in the literature. A. P. Lothrop

A critical study of the *p*-dimethylaminobenzaldehyde method for determining tryptophan as contrasted with the glyoxylic acid method. J. L. D. Shaw and W. D. McFarlane. *J. Biol. Chem.* **132**, 387–92(1940); cf. *C. A.* **33**, 5058.—The *p*-dimethylaminobenzaldehyde method of May and Rose (*C. A.* **17**, 116) for the estn. of tryptophan in proteins gives erroneous results because tryptophan as combined in the protein mol. gives more color with the aldehyde reagent than does an equiv. amt. of free tryptophan. The mode of linkage and degree of oxidation of tryptophan influence the color reaction so that the source of error is the use of free tryptophan as the standard. The reliability of the glyoxylic acid method was confirmed. A. P. Lothrop

Estimation of sulfapyridine (M. and B. 693). H. H. van der Zoo de Jong. *Lancet* **1939, II**, 833. A modification of the method of Marshall, *et al.* (*C. A.* **31**, 8575[5]) is described in which diazotization of sulfapyridine is carried out in an aq. acid soln. To 1 cc. CCl_3COOH filtrate from serum or other body fluid add 0.1 cc. 0.15% $NaNO_2$ soln. and, after 3 min., 3 cc. of a 0.1% soln. of dimethyl-α-naphthylamine (I) in 95% alc. After 5–10 min. compare the color with that given by appropriate dilns. of a standard soln. contg. 0.02% phenol red and 1% Na_2HPO_4. To det. total sulfapyridine, add 0.5 cc. 20% CCl_3COOH to 1 cc. filtrate from serum or 1 cc. acid to 1 cc. filtrate from nonprotein fluids and heat in boiling water for 0.5 hr. Cool, adjust the vol. to 1.5 cc., add 0.15 cc. of 0.15% $NaNO_2$ soln., and after 3 min., 4.5 cc. reagent I. E. R. Main

Titration of vitamin C. A simplified technique of standardizing solutions of ascorbic acid. Névio Pimenta. *O Hospital* **16**, 439–43(1939).—In order to det. ascorbic acid in the soln. used to standardize 2,6-dichlorophenolindophenol it is proposed to replace the little stable 0.01 *N* iodine soln., whose titer must often be checked with $Na_2S_2O_3$, by the very stable 0.01 *N* KIO_3 soln. in the known mixt. with KI and dil. H_2SO_4. George Nachod

Changes in the chemistry of cerebrospinal fluid during encephalography. A. Levinson, I. Kaplan and D. J. Cohn. *J. Lab. Clin. Med.* **25**, 225–37(1939).—The phosphatase, sugar and total protein contents of cerebrospinal fluid are increased after injection of air into the spine and ventricles; Ca and P contents are increased in some cases; chlorides, nonprotein N, lipase, tributyrinase, esterase, amylase and antitrypsin contents show no significant variation. Probable causes for these changes are discussed. Howard W. Robinson

Studies in blood preservation. Fate of cellular elements in relation to potassium diffusion. Charles R. Drew, Katharine Edsall and John Scudder. *J. Lab. Clin. Med.* **25**, 240–5(1939); cf. *C. A.* **33**, 8653[3].—Heparinized human blood was kept at approx. 4° in a refrigerator and changes in the cellular elements were followed for an exptl. period of about 30 days. Red blood cell destruction plays at most only a small part in the steady increase of the K content of the plasma because there is little or no actual loss in the count during this period when the K of the plasma reaches a level 10 times normal. The hemoglobin content remains const. in the total sample though 15 to 25% may be found in plasma. The mean cell diam. of the red cells is reduced approx. 20%. The polymorphonuclear leucocytes are diminished by 50% in 48 hrs. and are amorphous masses in 15 days. The lymphocytes, monocytes and eosinophiles do not disintegrate so rapidly, the last named are very resistant. The thrombocytes rapidly fall to a level of about 30,000 in 72 hrs. and then remain const. Howard W. Robinson

A stable adrenal cortical extract. R. J. Schachter. *J. Lab. Clin. Med.* **25**, 281–5(1939).—Adrenal cortical ext., which was found to retain its potency upon standing at room temp. for at least 18 months, was prepd. from the glands of freshly slaughtered cattle with the use of only 2 extractives, EtOH and C_6H_6. The details of the method of prepn. are given. The ext. is free from N; 5 cc. injected intravenously into ether-anesthetized cats had no effect on the blood pressure, showing that the adrenaline content is low; and 2 samples tested for choline by Eagle (*Proc. Soc. Exptl. Biol. Med.* **30**, 1094(1933)) contained 1.8 and 1.2 γ per cc. Howard W. Robinson

The determination of urea in blood and urine by Conway units. Kurt Steinitz. *J. Lab. Clin. Med.* **25**, 288–91(1939).—The advantages of the Conway method (*C. A.* **27**, 3857) are summarized and the technique is briefly described. Howard W. Robinson

A new Sahli type hemoglobinometer. Russell L. Haden. *J. Lab. Clin. Med.* **25**, 325–7(1939); cf. *C. A.* **27**, 5359.—In this app. the glass standard is divided into 3 windows, separated by opaque bands. The central window contains standard color with which the specimen (blood dild. with 0.1 *N* HCl) is to be matched, the lower contains a color that is 5% darker, the upper window one that is 5% lighter. With this set-up the sample is dild. with water until the color approximates that of the lower window and then is dild. further until the color matches the middle window. The app. has been standardized to read in g. of hemoglobin per 100 cc. by comparing readings with those made on the Haden-Hausser lab. model instrument (*J. Lab. Clin. Med.* **16**, 68(1930)). H. W. Robinson

Analysis of protein by means of deuterium-containing amino acids. Hans H. Ussing. *Nature* **144**, 977(1939); cf. *C. A.* **32**, 8538[4].—A method is described for analysis of protein by means of amino acids contg. D. It is suggested that this method can be used for the detn. of alanine, valine, isoleucine and aspartic acid. E. D. W.

Anserine in muscle: possibility of determination by titration. E. C. Bate Smith. *Nature* **144**, 1015(1939); cf. *C. A.* **32**, 5011[9].—A possible titration method is described for the detn. of anserine in muscle. The detn. can be carried out in a few hrs. as compared with the several days needed for the Zapp and Wilson method (*C. A.* **33**, 6675). E. D. Walter

Microestn. of sulfates in sea water and body fluids of marine animals (Webb) **7**. Method for detg. very small quantities of Mo applicable to biol. material (Bertrand) **7**.

C—MICROBIOLOGY

LAWRENCE H. JAMES

Action of a quaternary ammonium type of wetting agent on metabolism of microörganisms associated with dental caries. Benjamin F. Miller, Zelma Baker and R. W. Harrison. *Proc. Soc. Exptl. Biol. Med.* **42**, 705–6(1939).—A preliminary report on Zephiran (alkyldimethylbenzylammonium chloride). L. E. Gilson

Relation between the reaction of the medium and the activity growth substances. Yu. V. Rakitin and L. M. Yarkovaya. *Compt. rend. acad. sci. U. R. S. S.* **23**, 952–4(1939)(in English).—The variation of growth

reaction with the acidity of the medium and buffer solns. was studied with reference to the coleoptiles of *Avena*, with sulfuric, oxalic, citric, and malic acids as media and 6% gelatin for control. It yielded results (in tables) showing that the intensity of growth reaction grows with the concn. of H_2 ions in the medium. A given amt. of growth substance varies within a wide range of activity according to the pH of the medium. The stronger the concn. of H_2 ions, the more active the growth substances. 8 references. A. H. Krappe

Biochemical preparation of inosose. A. J. Kluyver and A. G. J. Boezaardt. *Rec. trav. chim.* **58**, 956–8(1939)(in English).—A study of the oxidation of meso-inositol (I) by *Pseudomonas beijerinekii* showed an analogy between this biol. oxidation and the oxidative action of concd. HNO_3 in the Scherer reaction and suggested that the incomplete biol. oxidation of I by *Acetobacter suboxydans* would yield a monoketoinositol, inosose (II), identical with the product obtained by Posternak (*C. A.* **31**, 1774[9]) by the action of concd. HNO_3 on I. Yeast ext. (350 cc.) contg. 3% I in a 1 l. Schott aeration flask was sterilized, inoculated with *A. suboxydans* (strain E. I. 4, 7, 1) and incubated at 30° for 24 hrs. in the presence of a slow current of air. The aeration was increased and the incubation was carried on for 10 days. The reducing power of the medium was periodically detd. No increase was noted after 6 days. The medium was evapd. at 35°, extd. with boiling H_2O, filtered and evapd. to dryness. Recrystn. from boiling H_2O gave 90% of II, m. 200° (decompn.) and identical with the product obtained by P. in 16–25% yields. C. R. Addinall

Biologic nature of the bacteriostatic effect of sulfapyridine against the pneumococcus. Ralph R. Mellon and Ruth A. McKinney. *Proc. Soc. Exptl. Biol. Med.* **42**, 677–9(1939).—Preliminary. L. E. Gilson

The content of purine bases in yeasts during their growth in different media. B. Kagan and M. Stadnichenko. *Mikrobiol. Zhur.* **5**, No. 2, 93–102(1938); *Khim. Referat. Zhur.* **2**, No. 4, 67(1939).—Yeasts are very rich in proteins (45–70%). Their high content of purine bases (2–1.3% as compared with 0.13–0.26% and 0.18% in meat and eggs, resp.) makes them unsuitable as food products. K. and S. investigated the influence of culture media on the content of the purines in different races of yeast. *Saccharomyces cerevisiae* of the *Bast* and *S* race, and *Torula utilis* (Henneberg strain) were investigated. For the prepn. of the "yeast mass" a method was used (which is employed in yeast-producing factories) which consists of 2 stages: the rejuvenation of the culture and the cultivation of the last generation by air blowing. The cultivation was performed at 28° with air blowing for 12 hrs. in 3 media: dild. must (7° Ball), dild. molasses [3° Ball + $(NH_4)_2SO_4$, $MgSO_4$, KH_2PO_4] and the mineral soln. of Mayer (sucrose 15.0%, KH_2PO_4 5.0%, $MgSO_4$ 5.0%, $CaHPO_4$ 0.5%, NH_4NO_3 0.75%, distd. water 1 l.; pH = 5.0). The total purine N was detd. according to the micro method of Schmidt. Investigations showed that the amt. of purines depends on the condition of the growth of the culture. *Torula utilis* had a min. amt. of purines in molasses; the content of purines in the *Bast* race was considerably smaller when cultivated under plant conditions than under lab. conditions (0.80% and 1.69–1.93% of the purine N). *Torula utilis* contains a small percentage of the purine N (0.9%) in spite of a large amt. of the total N (9.19%). On cultivation in must and in Mayer's media a decrease of the total N (in must 8.20%, in Mayer's medium 7.75%) and a considerable increase of the purine N (in must 1.62%, in Mayer's medium 1.88%) is observed. A parallel decrease of the amt. of purines with the decrease of the amt. of the total N is observed in the *S* race. W. R. Henn

Biochemical properties of the acetic acid bacteria of the group of quick-vinegar bacteria. A. P. Vasil'ev and I. M. Shains'ka. *Mikrobiol. Zhur.* **5**, No. 3, 63–71(1938); *Khim. Referat. Zhur.* **2**, No. 4, 65(1939).—The assimilation of N and C from different sources by the following acetic acid bacteria of the quick-vinegar bacterial group was investigated: *Bacterium schützenbachii* (9 strains), *B. orleanese* (16 strains) and *B. curvum* (4 strains). The bacteria were taken from the Kiev vinegar works and raised on synthetic media of Simons-Drobot'ko (sources of C 1.0 g., N 1.0 g., K_2HPO_4 1.0 g., $MgSO_4$ 0.2 g., NaCl 5.0 g., distd. water 1.0 l., and washed agar agar 20.0 g.) in which the sources of C and N were varied. The degree of assimilation was detd. by the intensity of the growth of the bacteria. The sources of N (with glucose as the source of C) can be given in the following order according to their degree of assimilation of N: asparagine, NH_4NO_3, urea and KNO_3 (for *B. schützenbachii* only KNO_3 is a better source of N than NH_4). Urea is clearly unsuitable as a source of N. The following substances were investigated as sources of C: Na citrate, Na lactate, Na succinate, Na acetate, EtOH and glycerol. The sources of N were the same substances as in the previous expt. Best results were obtained with Na lactate and Na succinate, and worst results with Na acetate, EtOH and glycerol. The relation between the sources of N and C can be given as follows. The *B. curvum* medium with Na acetate and urea was not assimilated by any of the strains while the media with Na acetate and NH_4 N were assimilated by all strains. The results obtained show that the strains of the same kind can differ greatly according to their biochem. properties, and that the strains of different kinds can be similar according to their physiol. properties. These facts create doubts as to the existence of the types *B. schützenbachii*, *B. orleanese* and *B. curvum* as sep. classified substances. W. R. Henn

The effect of pH on growth and gas production by streptococci and lactobacilli. J. G. Davis and C. C. Thiel. *J. Dairy Research* **10**, 455–63(1939).—The pH range of growth of streptococci and lactobacilli in dextrose yeast casein digest broth was studied. Nearly all the group I and II streptococci grew at pH 8.8, but only the enterococci grew at pH 4.8; all group III types (heterofermentative) grew at pH 4.4. Only a few lactobacilli grew at pH 8.8 but most were able to grow at pH 4 if other conditions were favorable. The enterococci, *Str. lactis* and *Str. cremoris*, could be differentiated by the alk. limits of growth. A. H. Johnson

Production of growth substance on peptone broth by crown-gall bacteria and related nongall-forming organisms. S. B. Locke, A. J. Riker and B. M. Duggar. *J. Agr. Research* **59**, 519–25(1939).—Single-cell bacterial cultures of 3 organisms (virulent crown gall, attenuated crown gall and *Bacillus radiobacter*) differing widely in ability to induce overgrowths in plants, but similar in physiology, were found to be similar in their capacity to produce growth substance in peptone broth. Thus far evidence seems lacking for the view that β-indoleacetic acid or any other known growth substance produced in such cultures has a direct major relation to the pathogenicity of crown-gall bacteria. W. H. Ross

The nature of growth substance originating in crown gall tissue. S. B. Locke, A. J. Riker and B. M. Duggar. *J. Agr. Research* **59**, 535–9(1939); cf. preceding abstr.—Growth substances obtained by ether extn. from tomato crown gall tissue, tomato foliage and crown gall culture on peptone broth all appeared to contain either β-indoleacetic acid or material similar in its sensitivity to acid and alkali. Identification was based on the stability of a crude ext. in hot acid and basic solns. No evidence was obtained of the presence of auxin a or b in these exts. The growth substance measured might have come either from the plant or from the bacteria. W. H. Ross

Infrared absorption spectra of various strains of purple bacteria. E. C. Wassink, E. Katz and R. Dorrestein. *Enzymologia* **7**, 113–29(1939)(in English).—Different strains of purple bacteria have different infrared absorption spectra, as a rule with 2 max. The alc. ext. of bacteriochlorophyll in all cases shows the same absorption spectrum with 1 chief max. Tables are given of the values of the max. Most spectra were analyzable into 3 sym. absorption bands with a half-value width of the order of 0.05 eV. Position and relative magnitude of these bands differ in the various strains. The corresponding bands of most strains investigated lie close together.

With the purple S bacterium strain D, it was observed that the relative magnitude, especially of the 2 chief max. is not const. This variation is not due to fixed genetic variation within the strain. It could be influenced by some environmental conditions, e. g., the light intensity applied during the growth of the cultures. In the purple bacterium the same bacteriochlorophyll is in the intact cell, bound to different proteins, thus building up different photoactive complexes characterized by somewhat different infrared absorption. Felix Saunders

Nonactivation of pyruvic acid oxidation by free vitamin B_1 (thiamine). Fritz Lipmann. *Enzymologia* **7**, 142–5 (1939)(in German); cf. *C. A.* **32**, 9204[4]. — In contrast to the decarboxylation in yeast, the oxidation of pyruvic acid in *Bact. delbrückii* is not stimulated by the addn. of free thiamine to a system partially satd. with cocarboxylase. Felix Saunders

Determination of the products from C_2 and C_4 particles in the citric acid dissimilation of sugars by Aspergillus. V. Bolcato and P. Tono. *Enzymologia* **7**, 146–56(1939) (in Italian). C_2 and C_4 particles such as AcH, glycolaldehyde, glycolic acid, glyoxylic acid, fumaric acid, malic acid and oxalacetic acid were isolated and identified from the fermentation products of *A. niger* acting on a sucrose soln. in the presence of Na_2SO_3. The authors believe that the formation of citric acid is preceded by a breakdown of the sugar mol. into C_2 and C_4 particles. Felix Saunders

Flash of luminescence following anaerobiosis of luminous bacteria. Frank H. Johnson, K. L. van Schouwenburg and A. van der Burg. *Enzymologia* **7**, 195–224 (1939)(in English); cf. *C. A.* **33**, 791[2].—When O is added to a suspension of luminous bacteria, previously dark or dim because of O lack, a max. flash occurs after very short times of anaerobiosis. With long periods of anaerobiosis in the absence of added substrate, the flash is very small and is followed by a secondary rise in luminescence intensity during the course of some 2 min. The max. intensity during this interval exceeds both the flash and the normal level prior to the anaerobiosis. It gradually falls to the same intensity as this previous normal level. With suspensions contg. glucose, the same relations hold for short periods of anaerobiosis, although the abs. luminescities are greater. Long periods of anaerobiosis in the presence of glucose cause no change in either the flash or final level and no secondary rise appears. In the case of very long periods of anaerobiosis (more than 2 hrs.) both the flash and the final level are irreversibly reduced in proportion. Suspensions contg. substrates that cannot be metabolized in the absence of O show the same behavior as suspensions without added substrate. When glucose is added anaerobically to cells that have been aerated for a long time in the absence of substrate, the flash and final level become increasingly greater with the time of anaerobiosis. The intensity immediately following the flash is nearly the same as that of an aerated control suspension. The increase in flash occurs with compds. that can be metabolized in the absence of O (glucose, peptone, pyruvate). Other substances whose breakdown depends on the presence of O (glycerol, succinate) have no effect on the flash under these conditions, but an increase in luminescence occurs with subsequent aeration. In the case of fumarate the results are intermediate between these 2 general types of effect. Lactate, boiled bacteria and distd. water-cytolyzed bacteria have no effect. An interpretation is given in terms of reactions previously discussed. When added simultaneously with O, urethan readily decreases the intensity of the flash as well as that which immediately follows. In the case of strong concns. (1 *M*) the flash is nearly abolished, and luminescence is irreversibly extinguished. In concns. up to 0.01 *M*, cyanide has no effect on the flash when added simultaneously with O. Urethan acts directly on luciferase in the light-emitting oxidation, while cyanide does not act directly on any of the reactions immediately concerned in bacterial luminescence. Felix Saunders

Fixation of acetaldehyde in alcoholic fermentation. Carl Neuberg and Rudolf Ziffer. *Enzymologia* **7**, 225–7 (1939)(in German).—2,4-Dinitrophenylhydrazine can be used to fix AcH formed during alc. fermentation by yeast. Felix Saunders

Comparison of the cellulose decomposition by culture strains of the rice blast fungus, Piricularia oryzae Br. et Cav. Y. Inoue. *Ann. Phytopath. Soc. Japan* **9**, 33–40 (1939); *Rev. Applied Mycol.* **18**, 708.—Of 21 strains of *Piricularia oryzae*, the agent of rice blast in Japan, compared on a synthetic agar medium contg. cellulose for their cellulose-decompg. properties 9 were very active, 3 very weak and the remainder intermediate. In general the higher the degree of pathogenicity to rice the stronger the capacity for cellulose disintegration. O. E. S.

The pigment of Bacillus violaceus. IV. The nature of the violacein molecule and factors influencing its stability. Walter C. Tobie. *Bull. assoc. diplômés microbiol. faculté pharm. Nancy* No. **18**, 7–19(1939)(in English); cf. Sartory, Meyer and Waeldele, *C. A.* **32**, 5438[1], 9168[2].—Mainly a critical review on the chemistry of the violet pigment violacein (I), the precautions to be observed in its prepn. and purification, and its presumed physiol. function (cf. Friedheim, *C. A.* **26**, 4623). Exptl. evidence regarding the production of pyrrolic substances of high mol. wt. by the strong reduction of I (cf. *C. A.* **31**, 7071[6]) is given in detail. The pigment sublimes in a high vacuum and might be purified by this means. As reported by different workers, the properties of I vary considerably. It is possible that I represents a class of compds. rather than being an individual compd. A qual. test for I is the green soln. which it gives with pyruvic acid. The green color may be due to a dehydrogenation of I, the acid acting as H acceptor. A provisional structural formula for part of the I molecule is given, based upon the molecular formula of Wrede and Swane (*C. A.* **32**, 9162[2]) and upon the apparent relationship of I to indigo (*C. A.* **32**, 2563[3]). The pigment of Clemo and McIlwain (II) from a bacillus designated as *Chromobacterium iodinum* (*C. A.* **32**, 5402[6]) is not I but is apparently 1,2-dihydroxyphenazine 9,10-dioxide. To avoid confusion with I, the name *clemoine* is suggested for II and the name *Pseudomonas clemo* for the microörganism. 25 references. W. C. Tobie

The use of Brilliant Green, sodium azide and dextrose in the microscopic and Hotis tests for streptococcic mastitis. C. S. Bryan, E. D. Devereux, W. C. Hirschey and A. C. Corbett. *North Am. Veterinarian* **20**, No. 9, 41–6(1939).—Expts. were carried out to det. the effectiveness of Brilliant Green and Na azide in suppressing bacteria other than streptococci and to det. the value of dextrose and phys. factors in obtaining max. growth of streptococci during the time interval of the microscopic and Hotis tests. (Hotis and Miller, *U. S. Dept. Agr. Circ.* No. 400(1936).) From tests on the milk of several hundred cows it was concluded that better results were obtained from a selective preservative contg. Brilliant Green, Na azide and dextrose than from either preservative used alone and the use of a selective preservative yielding a final diln. of 1:50,000 of Brilliant Green, 1:15,000 of Na azide and 1:1000 of dextrose in the milk is recommended. This preservative increased the accuracy of the microscopic test as compared to the use of Brilliant Green alone and greatly reduced the time required to read the results by suppressing both the udder micrococci and contaminating bacteria. The use of this preservative in the Hotis test increased the 24-hr. reading from 60 to 81% efficiency and reduced the no. of negative cows giving positive tests from 7.3 to 2.6%. Similar improvement was obtained in the 48-hr. reading. The addn. of dextrose compensated for the low lactose content of the milk of mastitis-infected cows and permitted better growth of the streptococci in the sample. Colin W. Whittaker

Fermentation degumming of waste silk—useful thermophilic bacteria for fermentation degumming (Katagiri, Nakahama) **25**. Importance of biol. research for drinking water (Batta, *et al.*) **14**. Light absorption by derivs. of the bacteriochlorophylls (Stern, Pruckner) **3**.

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D—BOTANY

THOMAS G. PHILLIPS

The response of tobacco seedlings to the growth-promoting substance "heteroauxin." E. T. McEvoy. *The Lighter* **9**, No. 4, 14–16(1939).—The use of small concns. of heteroauxin produced no observable results on the growth of tobacco seedlings. Higher concns. accelerated the rate of growth of both tops and roots. If too high a concn. of heteroauxin was used the growth was inhibited. J. R. Adams

Surface sterilization of nodules with calcium hypochlorite. J. K. Wilson and T. Punyasingha. *J. Am. Soc. Agron.* **31**, 1016–19(1939).—The undesirable organisms on the surface of the nodules of leguminous plants can be removed by immersing the nodules in a soln. of $CaOCl_2$ for the desired length of time. The soln. is prepd. by triturating 10 g. of com. chlorinated lime with 350 cc. of water and filtering. The time of immersion is dependent on the type and size of the nodule. This treatment leaves the cells in the center of the nodules full of viable bacteria from which pure cultures of *Rhizobium* can be obtained. J. R. Adams

Chemical and botanical study of Ilex paraguayensis St. Hilary, variety euneura Loes. Paulo Lisbôa e Costa and Jose Badini. *Tribuna farm.* (Brazil) **7**, 89 100, 111–16, 133–40, 155–61, 177–84(1939).—A botanical description of *Ilex paraguayensis* (maté herb) is given as well as the geographic distribution. The maté leaves contain H_2O 66.4, mineral ash 2.3, org. substances 31.3, caffeine 0.4, tannin 9.34, protein 11.99, cellulose and lignin 9.4 and reducing substances 0.5%. E. S. G. Barron

A trenching experiment in a spruce forest and its bearing on problems of mycotrophy. Lars-Gunnar Romell. *Svensk Botan. Tid.* **32**, 89–99(1938)(in English).—The results of trenching in an old spruce forest appear to support strongly the microbiol. theory of "mor activation" (*C. A.* **29**, 5566[9]). A fundamental physiol. difference exists between litter-decompg. fungi and tree mycorrhiza fungi. The obligate tree mycorrhiza fungi seem to be practically unable to break down dead org. residues under conditions prevailing in nature and must derive their energy food from living and functioning roots of trees while prospecting the soil for available N and mineral nutrients. The facultative mycorrhiza formers with orchids (identified species, e. g., *Armillaria mellea* and a *Marasmius*), like ordinary litter-decompg. fungi, can be cultivated on wood, leaf litter, etc. Ruth Berggren

The osmotic pressure and osmotic resistance of some marine algae. Harald Kylin. *Svensk Botan. Tid.* **32**, 238–48(1938)(in German).—The osmotic pressure (o. p.) of marine algae was estd. in solns. of sea water (salt concn. = 3.3%; o. p. = 23 atm. at 20°) contg. varying amts. of sucrose. In 8 species of Chlorophyceae the o. p. varied from 36 atm. for the tips of *Chaetomorpha aerea* to 55 atm. for *Enteromorpha intestinalis* and *Cladophora rupestris*. In 10 species of Phaeophyceae the o. p. varied from 36 atm. for the large inner cells of *Asperococcus bullosus* (I) to 55 atm. for the small outer cells of young plants of *Laminaria saccharina* (II). The younger cells of *Pylaiella litoralis* (III), *Ectocarpus siliculosus* and *Elachista fucicola* have a somewhat higher o. p. than the older cells, while the smaller outer cells of I, II and *Laminaria cloustonii* have a higher o. p. than the larger inner cells. In 21 species of Rhodophyceae the o. p. varied from 31 atm. for *Griffithsia corallina* to 50 atm. for *Polysiphonia urceolata*, the pericentral cells of *P. nigrescens* (IV) and the main branches of *Antithamnion plumula* (V). In the cells of the short leaves of V and of the hair leaves of IV the o. p. is only 41 atm. On an av. the o. p. is lower in the red algae than in the green or brown. Pieces of thallus of 28 species of fresh marine algae showed differences of behavior when placed in sea water dild. with varying amts. of distd. water; e. g., pieces of *Bonnemaisonia asparagoides* were alive in 0.7% sea water and dead in 0.4%, while pieces of *Rhizoclonium riparium* and III were alive in 0.2% sea water and dead in 0.0%. Ruth Berggren

The requirement of growth substances by various species of Marasmius. Gösta Lindeberg. *Svensk Botan. Tid.* **33**, 85-90(1939)(in German).—Ten species of *Marasmius*, including *M. foetidus*, failed to grow in synthetic media of nutrient salts and glucose unless aneurin (Merck) was also present. *M. androsaceus* did not grow in the control synthetic media, even upon the addn. of aneurin, but did grow if both aneurin and biotin (biotin Me ester) were added. The addn. of biotin alone produced a definite though slight growth. *meso*-Inositol had no effect. The rate of growth of *M. androsaceus* increased with increase in the concn. of biotin, reaching a max. when the nutrient medium (aneurin concn. = 50 γ/l.) contained 50 mγ, or possibly less, biotin per 20 cc.; a further increase in the concn. of biotin had no effect. Of 2 strains of *M. perforans* studied, strain I (5–9 months old) assimilated a synthetic nutrient medium only after the addn. of aneurin, while strain II (1 year old) required both aneurin and biotin. Species of *Marasmius* can be divided into 2 groups, those which require the presence of aneurin in the synthetic nutrient soln. for growth, and those which require both aneurin and biotin. Most of the species studied belong to the former group. Ruth Berggren

Change of hydrophilic properties of root and leaves of sugar beet. E. F. Simonova. *Colloid J.* (U. S. S. R.) **5**, 749–54(1939). The sap of sugar beet grown without sprinkling contains more "bound water" per cc. than that of well-watered beets. The amt. of "bound water" was detd. by comparing the refractive indexes of original and dild. sap; it strongly depends on the degree of dilu. J. J. Bikerman

Behavior of topped beets remaining in the ground. F. Schneider. *Centr. Zuckerind.* **47**, 943–8(1939).—Beet-testing methods are described. 11 references. W. W. Binkley

Advances in botany. F. E. Denny. *News Ed.* (*Am. Chem. Soc.*) **18**, 59–63(1940).—A review with bibliography of 46 references. E. J. C.

Polyploidy and tobacco. A. Bartolucci. *Boll. tec. ist. sper. colt. tobacchi "Leonardo Angeloni" Scafati* **36**, 141-8(1939).—Of the natural and artificial causes which induce polyploidy in plants, B. used the 2 methods of centrifuging germinating seeds and treating seeds with colchicine. A microscopic technique was developed to observe the differences in size and shape of pollen grains from sterile and fertile plants. Fertile allotetraploids were induced by both methods in the crosses of several varieties of tobacco. N. T. Farinacci

Nature of tobacco mosaic virus. Ernesto Bertarelli. *Boll. tec. ist. sper. colt. tobacchi "Leonardo Angeloni" Scafati* **36**, 154–7(1939); cf. *Il Tabacco* **509**, 9–11(1939). —A discussion with 19 references. N. T. Farinacci

Grafting of citrus plants. V. Belyaeva. *Sovet. Subtropiki* **1938**, No. 11, 52–7; *Khim. Referat. Zhur.* **2**, No. 4, 63(1939).—The max. amt. of sol. substances in fruits was produced by grafting to *Pancirus frifoliata* (from 9.8% to 12.62%) and the min. amt. by grafting to *Citrus limonia* (from 8.7% to 10.9%). The same law holds for citric acid. W. R. Henn

Substances taking part in the growth of plants. V. Pevzner. *Uspekhi Sovremennoĭ Biol.* **8**, No. 3, 529–32 (1938); *Khim. Referat. Zhur.* **2**, No. 4, 69(1939).—Data are given on the single hormones, their chem. compn., their activities, their role in the organism of the lowest and the highest types of plants, and their connections with

each other and with the substances of other physiol. activities (enzymes, vitamins). W. R. Henn

(Plant) hormones and their significance during the growth of seeds. V. I. Tovarnitskiĭ. *Uspekhi Sovremennoĭ Biol.* 9, No. 1/4, 81–97 (1938); *Khim. Referat. Zhur.* 2, No. 4, 69(1939).—A review. W. R. Henn

Biochemical studies on "bakanae" fungus of the rice. III. Physiological action of gibberellin on the plants. Teiziro Yabuta and Takesi Hayasi. *J. Agr. Chem. Soc. Japan* 15, 403–13, *Bull. Agr. Chem. Soc. Japan* 15, 82–3 (1939)(in English); cf. *C. A.* 33, 8238⁸.—Barley, buckwheat, *Phaseolus radiatus* var. *typicus* Prain., rape seed, *Luffa cylindrica* Roem, tomato, cucumber, cucurbit and morning glory were cultivated in water culture soln. contg. 0.14–3.5 mg. of gibberellin in 100 cc. The plants showed abnormal elongation similar to the case of rice seedlings. It was also observed after injection and lanolin application. Gibberellin gave no stimulating action for flowering. Y. Kihara

Utilization of Panicum frumentaceum. II. The seeds. Tetuziro Ohara. *J. Agr. Chem. Soc. Japan* 15, 507–13 (1939); cf. *C. A.* 31, 3103². The length and width of the seeds were, resp., 1.73–1.93 mm. and 1.73–1.95 mm. The wt. of the seeds was 745.9 774.2 g. per l. The percentages of the bran, the hull and the seed were, resp., 5.2 8.0, 21.9 23.6 and 70.1 71.7%. **III. Chemical compositions of the seeds and the relations among the factors.** *Ibid.* 580–601.—The analysis of the air-dried powder of the seeds gave H_2O 13.71, crude protein 15.28, pure protein 14.65, crude fat 5.36, crude fiber 1.00, ash 2.25 and sol. non-N compds. 62.41%. There were no remarkable differences in chem. compn. between the varieties or the degrees of maturity. The correlations between protein and non-N compds., crude fat and ash, and ash and non-N compds. were neg., while those between crude protein and ash, and crude protein and pure protein were pos. **IV. Chemical properties of various parts of the unhulled seeds.** *Ibid.* 602–8.—The analyses of the bran, the hull and the seed were, resp.: H_2O 13.75, 11.63 and 14.29%; crude protein 7.20, 3.69 and 15.06%; crude fat 2.72, 1.68 and 5.70%; crude fiber 23.06, 33.07 and 1.16%; crude ash 10.49, 9.60 and 1.96%; sol. non-N compds. 42.78, 40.33 and 61.83%; SiO_2 7.46, 8.39 and 0.12%; CaO 1.22, 0.15 and 0.06%; SO_3 0.27, 0.09, and 0.01%; P_2O_5 0.55, 0.35 and 0.95%; phytin P 0.21, 0.12 and 0.27%; lipoid P 0.002, 0.001 and 0.016%; inorg. P 0.008, 0.015 and 0.029%; MgO 0.23, 0.19 and 0.20%; K_2O 0.35, 0.30 and 0.43%; Na_2O 0.09, 0.09 and 0.09%; Fe_2O_3 0.03, 0.02 and 0.02%. The seeds contained 56.41% starch, 0.17% dextrin and 0.21% total sugars. The protein of the seed mainly consisted of prolamin, while the bran contained a large amt. of glutelin and albumin. The seed proteins were rich in lysine, cystine and histidine; those of the bran and the hull, in arginine. Y. Kihara

Experiments on the utility of β-indoleacetic acid as a material promoting the formation of callus in grafts of grape. Wolfgang R. Muller-Stoll. *Angew. Botan.* 20, 218–38(1938).—Expts. described are on the effect of synthetic heteroauxin in aq. soln. on the "taking" of grafts of grape. Four different concns. contg. 0.1, 0.067, 0.05 and 0.025% of the active substance were tried in regard to the effect on the formation of callus (4 different methods of application were used): (1) immersion of stock and scion into the soil immediately before grafting, treatment of the grafts through (2) immersion, (3) painting and (4) spraying. In most tests the results were most satisfactory when a soln. contg. 0.05% β-indoleacetic acid was used. Addnl. expts. involving the application of a lanolin paste contg. heteroauxin (cf. *C. A.* 28, 3443¹; 30, 131²) gave unsatisfactory results. Karla Longrée

Intake of iron through the roots, and the application of iron. Increase in yield through application of ferrous sulfate in comparison with manganous sulfate. Oscar Loew. *Angew. Botan.* 20, 238–40(1938).—The question as to how iron is taken up by plants is difficult to answer because of the well-known fact that ferric salts cannot be taken up by roots through osmosis. L. offers the following hypothesis: dead root hairs whose cytoplasm with their tonoplasts has lost its character as an osmotic membrane take on the properties of a filter, thus allowing materials such as acid salts (especially of citric acid) and glucose to pass out and into the soil. These acid salts may dissolve ferric oxide or ferric hydroxide, while the glucose may reduce the ferric salts to ferrous salts which are able to pass through the membrane of an osmotic cell. Ferrous sulfate and manganous sulfate were compared as to their effect on plant (*Cryptomeria*) growth. L. assumes that the more favorable effect of the latter material might be due to its direct effect on increasing the formation of protein in the nucleus of the plant cell, while iron is believed to act indirectly. Karla Longrée

The separation of mixed viruses on the basis of the differential reaction of their components to acidity. G. A. Kausche. *Angew. Botan.* 20, 246–56(1938).—Employing a previously described method (cf. *C. A.* 32, 6689⁹) K. sepd. a mixt. of 2 different viruses from potato, var. "Sharpe's Express." The 2 components of the mixt. proved to be tobacco mosaic virus, which became inactivated after 4 days at pH values between 7.8 and 10.8, and virus Cs_{35}. Karla Longrée

The growth-substance theory in applied botany. Hans Söding. *Angew. Botan.* 20, 407–11(1938).—A discussion. Karla Longrée

Composition of the various parts of the oat plant at successive stages of growth with special reference to the formation of lignin. Max Phillips, M. J. Goss, B. L. Davis and H. Stevens. *J. Agr. Research* 59, 319–66(1939).—The compn. of the culms, sheaths and leaves, chaff, rachises and branches of the panicle, and roots of the oat plant at successive stages of growth was studied with the object of detg. the nature and percentage of the more important constituents, and thereby learning more about the formation of lignin by the growing plant and the possible mechanism involved in the process of lignification. The results obtained indicate that the plant does not synthesize lignin from cellulose, pectin or pentosans. The data are also not in harmony with Klason's hypothesis that coniferyl alc. is the intermediate substance utilized by the plant in the synthesis of lignin. It is suggested that lignin is synthesized by the plant directly from either glucose or sucrose. Among the first steps in the synthesis of lignin is the production of a substance or substances having firmly bound methoxyl groups which may be formed in the course of splitting up carbohydrates by a process of hydrolysis, oxidation, reduction and dehydration. The observed presence of large quantities of substances, presumably carbohydrates, contg. firmly bound methoxyl groups and the gradual decrease of these substances with the increase in the content of lignin lend support to this hypothesis. 50 references. W. H. Ross

Influence of boron on flower-bud development in cotton. K. T. Holley and T. G. Dulin. *J. Agr. Research* 59, 541–5 (1939).—Water-culture studies of the B requirements of cotton showed that this element is necessary for flower-bud development in this plant, and that flowering may be seriously limited by a supply of B that is sufficient for fair vegetative growth. The results gave no evidence that B has any relation to flower-bud initiation in cotton. W. H. Ross

Pollen analysis as a paleo-ecological research method. Stanley A. Cain. *Botan. Rev.* 5, 627–54(1939).—A review. Felix Saunders

Phototropism. J. Van Overbeek. *Botan. Rev.* 5, 655–81(1939).—Phototropism is discussed from the chem. point of view. Felix Saunders

Chemical composition of Suckleya suckleyana. C. G. Barr, H. W. Reuszer and Frank Thorp, Jr. *Science* 90, 497–8(1939).—Studies of the carbohydrate and N content of poison *Suckleya* show the sol. carbohydrates to be chiefly reducing sugars which vary from 1% in seedlings to 2.5% in 3-months-old plants. The sucrose content shows only moderate variation. The HCN varies from a min. of 0.018% at the time of min. sugar content to a max. of 0.240% when the sugar is highest. Young plants contain a higher percentage of protein or colloidal N than old plants, but the older plants were higher in sol. N. There is

no accumulation of starch during the period of protein N diminution but there is a rapid increase in reducing sugars. The presence of available carbohydrates may stimulate the synthesis of HCN-contg. glucoside. F. Saunders

Some comments on a reforestation discovery. N. Sylvén and Helge Johnsson. *Svensk Papperstidn.* **42**, 509–12(1939).—A chronological résumé of investigations of the crossing of poplar and other trees from 1721 to date. The use of Bordeaux soln., of Cu and Hg compds. and of wax and paraffin is mentioned. These references cause S. and J. to question the validity of the Swed. pat. 95,971 on "the process of reforestation, especially of the hybrids of poplar." Wilhelm Segerblom

The mechanism of action of potassium salts in resistance to the development of bacterial diseases of plants. O. Verona. *Nuovo g. bot. ital.* **45**, 174–8(1938); *Rev. Applied Mycol.* **18**, 729–30.—Tests using *Ricinus communis* plants inoculated 13 days after sowing with *Bacterium tumefaciens* showed the effects of adding salts of Ca, K, Na, Mg and NH_4, alone or in various combinations, or powd. S on the growth and size of the tumors produced. The results showed that nitrates favored the growth of tumors, chlorides and sulfates impeded it, S was unfavorable to tumor development and that cations had no particular effect. The beneficial effect of K salts in keeping down tumor size is apparently due to the anion and not the K. Oden E. Sheppard

Effects of plant and animal hormones on seeds damaged by formaldehyde. N. H. Grace. *Can. J. Research* **17, C**, 445–51(1939); cf. *C. A.* **33**, 8697[7].—Marquis wheat was immersed in solns. of formaldehyde and formaldehyde contg. either naphthylacetic acid or estriol in concns. of 0.1, 1, 5 and 10 p. p. m., and germinated on blotting paper or grown in soil at temp. of 70–75°F. A measure of physiol. activity was shown by both chemicals from the results of germination on blotting paper; the activity of the 2 chemicals was of the same order. Growth in soil failed to show anything but injurious effects from formaldehyde. In another expt., Marquis wheat was sprinkled with solns. of formaldehyde and indolylacetic acid and grown in soil at a temp. of 50–55°F. The sprinkling treatment, which supplied one part of indolylacetic acid to a million parts of wheat by wt., reduced formaldehyde injury in a statistically significant manner. Lower concns. of the chemical did not reduce injury to a significant extent. J. W. S.

Changes in gossypol during ripening and storage of cottonseed. M. Podol'skaya. *Masloboino Zhirovoe Delo* **15**, No. 3, 9–10(1939).—To ascertain whether gossypol is present in cottonseed as a primary product or as a deriv. formed from other colored compds. changes occurring in the seed were studied. Color changes from pale yellow through orange to red were observed by spectroscopic examn. The rapidity of the change varies in different kinds of seed, being faster in Egyptian than in American cottonseed. As a rule the gossypol in seed which has been stored a few months is in the red form. The yellow and orange-yellow forms are nearly or quite identical with the red and lemon-yellow forms in qual. reactions, soly. in various solvents and elementary compn. J. F. S.

The agglutination of Phytomonas tumefaciens by certain plant juices. J. Magrou. *Bull. assoc. diplômés microbiol. faculté pharm. Nancy* No. **18**, 20–3(1939); cf. *Ann. inst. Pasteur* **60**, 565(1938).—Plants inoculated 3–4 months previously with *Phytomonas tumefaciens* showed agglutinins. The upper limits of diln. of the plant juices at which agglutination occurred were $^1/_{1000}$ for *Pelargonium zonale* and $^1/_{10,000}$ for *Chrysanthemum frutescens*. There was no cross-agglutination for *Phytomonas malvacearum*, *P. flaccumfaciens*, *P. mori* or *Erwinia carotovora*. The agglutinin is destroyed at 100°. The divergent results of Lasseur and Renaux (*C. A.* **30**, 7149[9]) are discussed. Cf. *C. A.* **33**, 8679[7]. W. C. Tobie

Utilization of carbohydrates in leguminous symbiosis. G. Bond. *Nature* **144**, 906–7(1939).—The evolution of CO_2 from the root systems of nodulated and of nodule-free, nitrate-fed soybean plants growing in water culture was compared. The amt. of CO_2 produced by the nodules was slightly greater than that from the roots alone. If the respiration of nodules is partly anaerobic, then it is possible that in these water-culture plants the amt. of carbohydrate utilized in nodule respiration exceeded that used by the roots themselves. E. D. Walter

Two interesting summer grasses: Penniisetum clandestinum and Chloris gayana. Teófilo Henry. *Rev. mens. asoc. rural Uruguay* **66**, No. 8, 77–84(1939).—Samples of each of these grasses from several localities were analyzed for protein, ether ext. and cellulose. C. W. Whittaker

Respiration of certain woody plants in West Norway winter. Gunnar Ålvik. *Medd. Vestlandets forst. Forsøksstа.* **6**, 7–266(1939).—A comprehensive study of the respiration of 9 species of evergreen trees and shrubs, both broadleaf and needles, in relation to temp. and light intensity. Bibliography and 125 tables of data. J. J. W.

Composition of the alcoholic extract of cane leaves and its relation to the development of the cane. C. E. Beauchamp and F. Lazo. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* 1938, 40–55. Previous work (*C. A.* **33**, 6911[4]) was continued. Sugar cane was differentially fertilized with N, P and K. Crude chlorophyll was extd. from the leaves of the young cane (3½ months) and analyzed for N, P, K, Ca and Mg. At harvest, 23 months after planting, the yield and sugar percentage of the cane were correlated with the compn. of the crude chlorophyll at 3½ months. Diam. and wt. of stalks, no. of stalks per stool, total cane wt. and amt. of recoverable sugar in the cane juice at harvest were in definite proportion to the amt. of K in the crude chlorophyll of the young cane, which in turn was in definite proportion to the amt. of K in the fertilizer. Other relations: increments of P in the fertilizer did not increase the P content of the crude chlorophyll nor the yield of cane, except when the larger addns. of P in the fertilizer were accompanied by a larger addn. of K; where the fertilizer was low in K a large increment of P therein increased the sugar content of the juice, but with fertilizers rich in K the sugar content was high irrespective of the amt. of P in the chlorophyll; an increase of N in the fertilizer reduced the content of K, P, Ca and Mg in the crude chlorophyll, and the sugar content of the juice, but this latter effect was to some extent counteracted by an increase of K fertilizer; increase of P in the fertilizer reduced the content of Ca in the chlorophyll but increased the Mg content, while increase of K fertilizer had the reverse effect. On the other hand, increments of K increased the Ca in the chlorophyll but reduced the Mg content. The work indicates that the compn. of the crude chlorophyll of the young plants is a forecast of the results at harvest. O. W. Willcox

Agrobiology applied to sugar beets (Bellardini) **15**.

Bawden, F. C.: Plant Viruses and Virus Diseases. A New Series of Plant Science Books, Vol. 5. Leiden: Chronica Botanica Co. 272 pp. Fl. 7.

Brimble, L. J. F.: Intermediate Botany. 2nd ed. London: Macmillan and Co., Ltd. 562 pp. 8s. 6d. Reviewed in *Nature* **144**, 739(1939).

E—NUTRITION

PHILIP B. HAWK

Purity and activity of vitamin A preparations. P. Karrer. *Helv. Chim. Acta* **22**, 1149–50(1939).—Recently a particularly pure prepn. of vitamin A was reported (*C. A.* **33**, 8250[7]) with $E_{1\,cm}^{1\%}$ 328 mμ = 1800 (EtOH); Carr-Price unit, 92,000–94,000; biol. activity 2.32 international units, whereas axerophthol (*C. A.* **28**, 2040[8]) gave $E_{1\,cm.}^{1\%}$ 328 mμ = 1700; Carr-Price unit, 100,000; biol. activity 2.5 international units. Comparison of this latter prepn. with cryst. vitamin A (*C. A.* **31**, 8634[6]) showed no essential difference. It is an error to suppose that a prepn. obtained by crystn. is necessarily more pure than one produced by chromatographic analysis. The *p*-nitrobenzoate (*C. A.* **27**, 4808) and stearate of vitamin A (Kurt Schöpp, *Diss.* Zürich, p. 51(1934) were prepd. previously. C. R. Addinall

Pathological and physical studies on the blood of infants

with nutritional disturbances, especially toxicoses. Syoiti Akiba. *Oriental J. Diseases Infants* **24**, 13–16(1938)(in German).—A study of the migration velocity of the leucocytes in healthy infants and in those with various nutritional disturbances. *Ibid.* 17–20.—A continuation of the study of the migration velocity of the leucocytes and of the blood picture in normal infants and those with nutritional disturbances. *Ibid.* 21–3.—In those cases of nutritional disturbances, in which the blood has a relatively high viscosity, the migration velocity of the neutrophile leucocytes falls more markedly than in those with a lower viscosity of the blood. In general, severe cases were accompanied by a marked lowering of the leucocyte velocity and increase in blood viscosity. The injection of moderately large quantities of hypotonic dextrose, Locke, Ringer or saline solns., rather than blood transfusions, are recommended in the treatment of nutritional disturbances. Ruth Berggren

Vitamin C studies on surgical patients. Marshall K. Bartlett, Chester M. Jones and Anna E. Ryan. *Ann. Surg.* **111**, 1–26(1940).—After operation, the fasting level of vitamin C in the blood plasma shows a consistent drop with gradual return to the preoperative value. There is no increase in the vitamin C excreted in the urine after operation even after the intravenous administration of 1 g. of cevitamic acid. After operation the clearance curves for vitamin C may show a marked change in contour. These changes are influenced by the general nutritional state of the patient, by the degree of vitamin C depletion and by the extent of the surgical procedure. The more rapid clearance from the fasting blood of vitamin C administered intravenously after operation is possibly dependent upon an increased need for this substance in the process of tissue repair and wound healing. Rachel Brown

Preliminary observations on the effects of a low-calcium diet on goats and kids. G. E. Glock, M. M. Murray and R. E. Glover. *J. Comp. Path. Therap.* **52**, 229–48(1939). Goats fed on flaked corn and bran with a min. amt. of hay developed symptoms characterized by loss of wt. and appetite with marked swelling of the jaws, lameness and paresis. The condition of the jaws and long bones resembled osteofibrosis. Blood analyses showed that the serum Ca was as low as 4.9 mg. per 100 cc. (normal mean 10.0) and that the morg. P varied but tended to be greater than normal (mean 6.2). The serum phosphatase was considerably increased. Several animals died in low-Ca tetany with serum Ca of approx. 5 mg. per 100 cc. The state of tetany was relieved by the addn. of $CaCO_3$ or vitamin D to the basal ration which was deficient in both. Rachel Brown

The destruction of vitamin C in cooking. H. R. Kanitz and E. Dammann. *Z. Hyg. Infektionskrankh.* **122**, 16–23 (1939).—The oxidation of ascorbic acid by the O of the air in cold and in boiling water, even in the presence of plant oxidase, is influenced by the pH and the ion content of the medium. Neutral salts like NaCl or Na_2SO_4 alone favor the destruction of ascorbic acid, but in mixts. with $NaHSO_4$ and $CaSO_4$ the oxidation is inhibited. The oxidation goes on quickly at alk. reactions but not at acid. $NaHSO_4$ and Na_2SO_4 combined inhibit the oxidation of ascorbic acid in cold and boiling distd. or tap water even in the presence of plant oxidase. The addn. of NaCl increases this action. Oxidases markedly accelerate the destruction of vitamin C in cold water. Rachel Brown

Vitamin B deficiency and leucopenia. F. Oestreicher and G. A. Overbeek. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 249–52(1939).—Rats weighing 25–30 g. were fed the following diet: carbohydrate, 68; casein, 18; olive oil, 9; cod-liver oil, 1; salt mixt., 4; and 1 mg. aneurin and 1 mg. lactoflavin. In rats on this diet the erythrocytes increased normally from the low level observed in early youth, but the leucocyte level remained low (around 8000/cc.). Addn. of nicotinic acid did not affect this leucopenia, but did prevent or cure diarrhea which was observed in many of the animals. E. Curzon

Certain aspects of mineral requirements. John H. Talbott and Frederick S. Coombs. *J. Am. Dietet. Assoc.* **15**, 631–8(1939).—A discussion. E. Curzon

Planning the day's diet for vitamin content. Hazel E. Munsell. *J. Am. Dietet. Assoc.* **15**, 639–47(1939).—A discussion. E. Curzon

Seven centuries of scientific nutrition. C. M. McCay. *J. Am. Dietet. Assoc.* **15**, 648–58(1939). E. Curzon

The site of action of four water-soluble vitamins. Siegfried Maurer. *J. Am. Dietet. Assoc.* **15**, 659–66(1939).—Rats injected with 100 mg. ascorbic acid daily for 5 days a week were markedly retarded in learning the Carr maze. Seventeen patients suffering psychogenic psychoses were satd. with ascorbic acid, thiamine chloride and nicotinic acid. After treatment such patients were markedly improved. E. Curzon

Aspects of the function of vitamin E irrespective of its relation to the reproductive system. Herbert M. Evans. *J. Am. Dietet. Assoc.* **15**, 869–74(1939).—A discussion. E. Curzon

Recent vitamin research. I. Vitamins A, D, E. J. Ernestine Becker. *J. Am. Dietet. Assoc.* **15**, 875–84 (1939).—A review. 48 references. E. Curzon

Relation between thyroid and fattening results in swine. W. Zorn, H. Brüggemann and P. Moldrickx. *Z. Tierzücht. Züchtungsbiol.* **44**, 364–70(1939).—In studies on 157 fattening swine no correlation was found between the wt. and the I_2 content of the thyroid on the one hand and the food utilization on the other. No relation between these values and the fat-flesh ratio could be detected. E. C.

Thyroidectomy in swine for the purpose of increasing fat production. W. Zorn and H. Brüggemann. *Züchtungskunde* **14**, 376–88(1939).—If the thyroid glands were removed from pigs weighing 30–40 kg. and the animals were then fattened for about 90 days and slaughtered, an increase of about 14% in the percentage of fat in the carcass as compared with normal animals was found. Food utilization was poorer, however. No such effects were noted in swine thyroidectomized at a wt. of 60–70 kg. Thyroid glands implanted behind the ear of normal pigs were rapidly resorbed. E. Curzon

Formulas and tables for calculating the vitamin requirements of various animals. Paul Meunier and Yves Raoul. *Compt. rend. soc. biol.* **132**, 259–60(1939); cf. *C. A.* **33**, 2945[4]. L. E. Gilson

[Increase in] cholinesterase activity in blood serum and duodenum of beriberi pigeons. Wm. Antopol, Susi Glaubach and David Glick. *Proc. Soc. Exptl. Biol. Med.* **42**, 679–83(1939). L. E. Gilson

Influence of vitamin A on urea clearance in the rat. R. C. Herrin. *Proc. Soc. Exptl. Biol. Med.* **42**, 695–9(1939); cf. *C. A.* **33**, 4650[7].—In avitaminosis A there is a 23–77% decrease in urea clearance. It is a functional deficiency. Urine examn. and histological sections of the kidney show no morphological alterations. Feeding carotene to the deficient rats resulted in a 30–170% increase in urea clearance above the level in avitaminosis A. L. E. Gilson

Experiments on the antidermatitis component of the filtrate factor [of liver extracts] in rats. Paul György, C. E. Poling and Y. Subbarow. *Proc. Soc. Exptl. Biol. Med.* **42**, 738–40(1939); cf. *C. A.* **33**, 5899[9], 8710[9].—Crude salts of pantothenic acid were active in the cure of specific skin lesions and in promoting growth in rats fed a diet devoid of the filtrate factor. Autoclaving at pH 10 destroyed the activity of the prepns. L. E. Gilson

Vitamin E deficiency in dogs. H. D. Anderson, C. A. Elvehjem and J. E. Gonce, Jr. *Proc. Soc. Exptl. Biol. Med.* **42**, 750–5(1939).—Female dogs were kept on a mineralized evapd. milk diet low in vitamin E. Their pups showed a muscular dystrophy like that previously described in rats, guinea pigs and rabbits. In its early stages it was cured by synthetic α-tocopherol. L. E. Gilson

Cure and prevention of vitamin E-deficient muscular dystrophy [in rats] with synthetic α-tocopherol acetate. G. C. Knowlton, H. M. Hines and K. M. Brinkhous. *Proc. Soc. Exptl. Biol. Med.* **42**, 804–9(1939); cf. *C. A.* **33**, 8712[1]. L. E. Gilson

Vitamin K deficiency and prothrombin levels. Effect of vitamin K administration. Robert T. Tidrick, Frank T. Joyce and H. P. Smith. *Proc. Soc. Exptl. Biol. Med.* **42**, 853–7(1939).—In newly hatched chicks on a vitamin K-deficient diet the whole blood clotting time becomes pro-

longed when the prothrombin level falls to about 30% of the normal, and hemorrhages appear when it falls to about 10% of the normal. Large single doses (16 γ or more) of vitamin K correct the deficit almost completely in 6 hrs. and 8 γ produce the same effect in 18 hrs. A single dose of 1 γ produces a slight but noticeable effect. L. E. Gilson

Urinary elimination of trimethylamine during fasting. F. M. Chiancone. *Boll. soc. ital. biol. sper.* **14**, 560-1 (1939).—In white rats the elimination of trimethylamine increased markedly during fasting. Helen Lee Gruehl

Vitamin B_1 and the cure of hyperthyroidism. Luigi Scrutinio. *Boll. soc. ital. biol. sper.* **14**, 563(1939).—Vitamin B_1 exerted a beneficial action in hyperthyroidism. Helen Lee Gruehl

Action of large doses of ascorbic acid on the normal adult organism. F. Addarii and E. Jasonni. *Boll. soc. ital. biol. sper.* **14**, 565-7(1939).—Large doses of ascorbic acid were not toxic and produced no hypervitaminosis. Helen Lee Gruehl

New vitamins K, P, B_6 and H. B. A. Kudryashov. *Uspekhi Sovremennoĭ Biol.* **9**, No. 1/4, 16-38(1938); *Khim. Referat. Zhur.* **2**, No. 4, 69(1939).—A review. W. R. Henn

Nutrition of sheep and wool production. T. S. Krishnan. *Indian J. Vet. Sci.* **9**, 49-60(1939).—A review. E. H.

Oxidation-reduction and tissue changes during a non-protein vitamin regime. M. M. Mir-Salimov. *J. méd., Ukraine* **9**, 49-59(in French, 58-9)(1939).—The addn. of vitamins A and D (fish-liver oils) and B (yeast) to a protein-free diet reduces the wt. loss in rabbits and prevents the development of hypochromic anemia, which is observed with rabbits on a vitamin-free, protein-free diet. Little change was observed in total and reduced glutathione (I) in the blood, but oxidized I showed a marked increase in the blood and organs. The introduction of vitamins to a protein-free diet has little effect on blood sugar and the glycogen content of the organs, but causes the anaerobic glucolysis of the skeletal muscles to rise to normal, while that of the liver is decreased further. No change in tissue respiration was observed. S. A. Karjala

Pathologo-anatomical changes in pregnant rabbits on a protein-free diet. M. K. Ventskovskiĭ. *J. méd., Ukraine* **9**, 421-8(in French, 427-8)(1939).—Rabbits placed on a prolonged protein-free diet do not become pregnant, and those placed on the diet immediately, or 8-10 days after mating, yield dead embryos. Extensive pathologo-anatomical lesions were observed in the placenta, liver, spleen, adrenals, kidneys, uterus and ovaries. No lesions were observed in the embryos. S. A. Karjala

Hemorrhagic adrenal necrosis in rats on deficient diets. Floyd S. Daft and W. H. Sebrell. *U. S. Pub. Health Repts.* **54**, 2247-50(1939).—D. and S. observed extensive hemorrhagic necrosis of the adrenal gland of rats on deficient diets. The condition appears to be due most probably to a deficiency in some unidentified dietary factor. These animals have not shown the purpura or bone marrow changes reported by other investigators in rats on diets deficient in various factors of the vitamin B complex. It appears unlikely that the hemorrhagic adrenal necrosis is part of the syndrome described as panmyelophthisis, although there is not sufficient evidence to prove conclusively that the 2 conditions are entirely unrelated. J. A. K.

Hemorrhagic cortical necrosis of adrenals in rats on deficient diets. A. A. Nelson. *U. S. Pub. Health Repts.* **54**, 2250-6(1939).—The hemorrhagic cortical necrosis of the adrenals and other lesions found in rats on diets deficient in some fraction of the vitamin B complex are described. The panmyelophthisis which Gyorgy, *et al.* (*J. Exptl. Med.* **66**, 579-602(1937)) found to occur together with hemorrhagic necrosis of the adrenals in a large proportion of their rats was found in only 1 rat in this series, and this animal had no adrenal lesions. Six references. J. A. Kennedy

Vitamin B_2 complex. III. Further studies on the growth-promoting factor in the liver extract. Ume Tange. *Bull. Agr. Chem. Soc. Japan* **15**, 65-70(1939)(in English).—See *C. A.* **33**, 4634[8]. Y. Kihara

The B vitamins and fat metabolism. III. The effects of vitamin B_6 upon liver and body fat. Gertrude Gavin and E. W. McHenry. *J. Biol. Chem.* **132**, 41-6(1940); cf. *C. A.* **32**, 9198[4].—The percentage of body fat in rats fed a fat-free diet is raised and the body wt. increased by feeding vitamin B_6 in conjunction with thiamine, riboflavin and choline. Nicotinic acid slightly augments the effect of vitamin B_6 upon body fat but not upon body wt. If choline is administered as a supplement, the percentage of fat in the liver is normal, an indication that choline is able to control the level of liver fat whether fat is supplied in the diet or whether it is formed by synthesis from carbohydrate when thiamine is furnished. The deposition of fat in the liver which results when thiamine is administered, is not prevented by vitamin B_6, riboflavin or nicotinic acid. A. P. Lothrop

Protein metabolism. XII. The conversion of ornithine into arginine in the mouse. Roger F. Clutton, Rudolf Schoenheimer and D. Rittenberg. *J. Biol. Chem.* **132**, 227-31(1940); cf. *C. A.* **34**, 141[2].—Mice of const. wt. were given *dl*-ornithine contg. 13.6 atoms % of stably bound D for 9 days. The isolated arginine from the total body proteins contained 0.88% D, an indication that at least 7.5% of the total arginine of the animals was derived from ornithine. This finding establishes the continuous conversion of ornithine into arginine by the mouse and the continuous replacement of arginine in the protein linkages by free arginine. A method is described for *the synthesis of ornithine contg. stably bound D* from α-pyridone. A. P. Lothrop

Deficiency of vitamin B_6. J. V. Landor. *Lancet* **1939, I**, 1368-70.—A pellagrous condition is described, which is apparently caused by deficiency of some factor of the vitamin B_2 complex. The condition is cured by yeast or marmite but not by nicotinic acid. E. R. Main

Response of nutritional macrocytic anemia to anahemin. Henry Foy and Athena Kondi. *Lancet* **1939, II**, 360-3.—Nutritional macrocytic anemia as seen in Macedonia responds to highly purified liver prepns., such as anahemin, as well as to cruder prepns. This is in contrast to cases reported in India (cf. Wills, Clutterbuck and Evans, *C. A.* **32**, 2627[1]). Large doses of the filtrate factor alone were ineffective for the cases in Macedonia. E. R. M.

Vitamins D_2 and D_3 in infantile rickets. A comparison of therapeutic efficiency. Noah Morris and Mary M. Stevenson. *Lancet* **1939, II**, 876-9.—The cryst. vitamins D_2 and D_3, given in amts. equiv. to 2000 I. U. daily, were equally effective in promoting healing of active rickets in infants and children. E. R. Main

Vitamin K lack in normal and sick infants. H. Dam, E. Tage-Hansen and P. Plum. *Lancet* **1939, II**, 1157-61; cf. *C. A.* **32**, 9223[3].—A moderate reduction in prothrombin content of the blood, observed in normal infants during the 1st week of life, is assocd. with a vitamin K deficiency which develops during the 1st few days after birth. In icterus gravis neonatorum, anemia neonatorum and hydrops congenita the prothrombin content is greatly reduced. It increases rapidly after oral administration of vitamin K together with bile salts. E. R. Main

Nutritional deficiency of vitamin K in man. Robert Kark and Eugene L. Lozner. *Lancet* **1939, II**, 1162-3.—A dietary deficiency state is described in which the prothrombin time, detd. by the method of Quick, Stanley-Brown and Bancroft (*Am. J. Med. Sci.* **190**, 501-11(1935)) is lengthened. Oral administration of vitamin K, without bile salts, was followed by a prompt return of prothrombin time to normal. E. R. Main

The influence of vitamin deficiencies on other diseases. John B. Youmans. *Ann. Internal Med.* **13**, 980-6(1939).—A review with 21 references. John T. Myers

Vitamin B_1 excretion on a varied intake. Margaret D. Wright and Audrey Z. Baker. *J. Hyg.* **39**, 638-42(1939).—The daily urinary excretion of vitamin B_1 by a healthy subject on a good mixed diet varied between 40 and 80 units, frequently between 60 and 80 units. One week on a low-B_1 diet reduced the daily excretion to about 13 units. On higher B_1 diets the vitamin calorie ratio was 0.3 or over, but on low-B_1 diet it was approx. 0.1 On the low-B_1

diets the excretion was 4.5% to 8.0% of the intake and on high-B_1 diets it was 10% to 12%. John T. Myers 1

Some effects of prolonged vitamin E deficiency in the rat. Archer J. P. Martin and Thomas Moore. *J. Hyg.* **39**, 643–50(1939).—In virgin female rats restricted to a diet deficient in vitamin E, a brown discoloration of the uterus results. The change was noted after 3–4 months and was striking after 12 months. Animals which had been pregnant gave similar results. The discoloration could be prevented but not cured by vitamin E. Vitamin E deprivation in male rats gave a similar discoloration in the seminal vesicles. The pigmentation was always limited to the muscular layers, and was due to the deposition of small granules in the smooth muscle cells, some of the cells being degenerated. Prolonged E deprivation produced degeneration of the kidney convoluted tubules in a high proportion of animals. 24 references. John T. Myers 2

The use of ascorbic acid (vitamin C) in the treatment of asthma. Araujo Cintra. *O Hospital* **16**, 961–85(1939).—A review of the literature and description of 22 different asthmatic cases treated with ascorbic acid. G. Nachod 3

The influence of ascorbic acid upon the liver function and the mutual relation between vitamins B_1 and C. I. Influence of ascorbic acid upon the pigment-excreting function of the liver. Osamu Murakami. *Japan. J. Gastroenterol.* **11**, 1–6(1939).—Feeding guinea pigs on a vitamin C-deficient diet results in a decrease in the amt. of bile and the pigment-excreting function of the liver. Repeated subcutaneous injections of small amts. of *l*- or *d*-ascorbic acid into the guinea pigs with C-hypovitaminosis removes the disturbances of the hepatic functions and increases the amt. of vitamin C in the liver. The action of *d*-ascorbic acid seems to be a little weaker than that of the *l*-ascorbic acid. **II. Influence of ascorbic acid upon the sodium santoninate-managing function of the liver.** *Ibid.* 7–12.—Repeated injections of 10 mg. of *l*-ascorbic acid to normal guinea pigs for 7 days accelerated the Na santoninate-detoxicating function of the liver. C-hypovitaminosis brings about a decrease in the detoxicating power of the liver. An increase in detoxicative power follows injection of *l*-ascorbic acid. The detoxicating function of the liver depends upon the amt. of vitamin C in the organ. **III. Influence of ascorbic acid upon the indole-detoxicating function of the liver.** *Ibid.* 13–23.—The detoxicating ability of the liver is lowered in case of C-hypovitaminosis. Administration of repeated small amts. of *l*-ascorbic acid to guinea pigs with C-hypovitaminosis restores the detoxicating function of the liver for indole. **IV. Mutual relationship between vitamins B_1 and C in the detoxicating function of the liver for indole.** *Ibid.* 24–30.—Addn. of a small amt. of vitamin B_1 markedly strengthens the effect of ascorbic acid in this case. **V. Effect of ascorbic acid on the peripheral blood vessels.** *Ibid.* 31–9.—*d*- or *l*-Ascorbic acid in a concn. of 50 mg. % and 100 mg. % markedly dilates the ear vessels of a rabbit. The vasodilatory action is only temporary. **VI. Mutual relationship between vitamins B_1 and C, regarding the action of the blood vessel.** *Ibid.* 40–8.—Addn. of a small amt. of vitamin B_1 to a low concn. of a soln. of *l*- or *d*-ascorbic acid markedly increases the vasodilatory action of ascorbic acid. Benjamin Prescott 4 5 6 7 8

The influence of creatinine upon the metabolism of carbohydrate. Osamu Murakami. *Japan. J. Gastroenterol.* **11**, 69–74(1939).—Intravenous injections of creatinine into normal rabbits have no influence upon the blood sugar of the animals, but injections of creatinine after administration of glucose promote the fall of the blood-sugar level of rabbits abnormally elevated. Intravenous and intraperitoneal injections of creatinine into rabbits and guinea pigs do not promote the formation of glycogen from glucose given. Benjamin Prescott 9

Synthetic α-tocopherol and nutritional muscular dystrophy. Steward G. Morris. *Science* **90**, 424–5(1939).—Six rabbits suffering from muscular dystrophy were given synthetic α-tocopherol in doses ranging from 17 to 65 mg. All animals were cured except the one receiving 17 mg. The lower limit for a single curative dose is about 20 mg. Felix Saunders

Action of certain hormones as dietary constituents. Casimir Funk and Ian Casimir Funk. *Science* **90**, 443–5(1939).—On a deficient diet female sex organs undergo a marked retrogression with cessation of estrus. Estrin in such cases shows evidence of definite activity. A more complete diet causes no retrogression and estrin activity is not noticeable. Dihydrostilbestrol exerts the same activity on both types of food. Testosterone cannot replace estrin as a dietary hormonal precursor. The sex organs of the male are more resistant to dietary deficiencies, the animals showing only retrogression along with a significant loss in wt. Testosterone and gonadotropic hormone (pregnant mare serum) produce a small but definite effect. Oral administration of estrin to females depresses food intake, while testosterone and less so the gonadotropic hormone in males produce the opposite effect. Felix Saunders

Control of experimental alcaptonuria by means of vitamin C. Robert R. Sealock and Hannah E. Silberstein. *Science* **90**, 517(1939).—Alcaptonuria can be produced in guinea pigs by feeding tyrosine. When 0.5 g. of *l*-tyrosine was fed with a basal diet which contained 0.5 mg. ascorbic acid there was an excretion of 20–50% of the theoretical amt. of homogentisic acid. After the addn. of 5 mg. of ascorbic acid to the diet there was only a trace of homogentisic acid in the urine. Human subjects on a diet practically free from ascorbic acid excreted homogentisic acid after ingesting tyrosine. The excretion of homogentisic acid could be prevented by taking ascorbic acid. Felix Saunders

Role of manganese in the biological synthesis of ascorbic acid. M. N. Rudra. *Nature* **144**, 868(1939); cf. *C. A.* **33**, 5478[8], 8695[5], 8721[3].—The hypothesis is advanced that the inability of the guinea pig and man to synthesize their requirement of ascorbic acid is due to the lack or insufficiency of Mn in their tissues. E. D. Walter

Influence of age on the requirement of vitamin A. J. T. Irving and M. B. Richards. *Nature* **144**, 908–9(1939); cf. *C. A.* **33**, 2190[3].—Rats were put on a vitamin A-free diet at weaning and given dosages of vitamin A varying from 1/5 to 3 international units daily. They were killed at different ages and their teeth exam'd. The results show that the vitamin A requirement increases with age, not only for tooth formation, but also to avert the other pathol. changes assocd. with vitamin A deficiency. E. D. W.

Vitamin A content of the livers of a hundred healthy dogs. R. G. Linton and A. Brownlee. *Nature* **144**, 978–9(1939).—The vitamin A content of the liver of 100 healthy dogs averaged 678 blue units per g. of liver tissue, with a medial figure of 153.5 and a range of 4.5 to 19,625. E. D. Walter

Use of sodium metaphosphate for prepn. of soft-curd milk (Schwartz, *et al.*) **12**.

Diet in Health and Disease. Edited by **Humphry Rolleston, and Alan A. Moncrieff.** London: Eyre & Spottiswoode, Ltd. 382 pp. 14s. Reviewed in *J. Am. Med. Assoc.* **114**, 84(1940).

F—PHYSIOLOGY

HOMER W. SMITH

Hypertrophy of certain essential organs during the increase in metabolism which accompanies acclimatization to the cold. Results on the plasticity and renewal of these organs. L. Chevillard and André Mayer. *Ann. physiol. physicochim. biol.* **15**, 411–31(1939); cf. *C. A.* **32**, 7539[6], 7540[3]; **33**, 8735[2].—Under conditions of increased caloric loss the mass of the liver of Norman rabbits (Gambais variety) increases less rapidly than the metabolism. A comparison between mice and rabbits reveals that the mass of the liver increases more rapidly when the initial metabolism is less intense. The mass of the heart, lungs and kidneys also increases, the increase varying for the different organs and for different breeds. This hypertrophy is due to an increase in the mass of the fundamental cellular constituents (H_2O, inorg. substances, proteins, lipides, carbohydrates), the relative concns. of which vary little.

Certain essential organs seem to be endowed with a remarkable plasticity. The apparently stable, fundamental constituents of the cells are probably renewed. An attempt has been made to est. the order of magnitude of this speed of renewal for certain organs and constituents.
Ruth Berggren

Metabolism of the heart. C. A. Lovatt Evans. *Edinburgh Med. J.* **46**, 733–49(1939).—A review with 29 references.
Rachel Brown

The relationship between salivary output and intestinal effects with carbaminoylcholine chloride (Lentin). A. Henry Craige, Jr. *J. Am. Vet. Med. Assoc.* **95**, 701–9 (1939).—In the dog the smallest dose of carbaminoylcholine chloride with a definite sialagogue action is also the smallest dose which augments motility and secretion in the small intestine. Parotid and intestinal secretions were augmented with 0.004 mg. per kg. R. Brown

The influence of varying copper intake on normal blood copper of Northumbrian sheep. A. Eden. *J. Comp. Path. Therap.* **52**, 249–57(1939). One hundred and fifteen sheep showed a blood Cu range of 0.029 to 0.128 mg. % with a mean of 0.071. The natural grazing had a Cu content of 7 to 10 p. p. m. of the dry matter. A range of 0.016 to 0.164 with a mean of 0.090 was found in sheep receiving a small supplement of heavy mineralized cake contg. sufficient Cu to double the daily intake. The addnl. Cu did not bring very low values up to the mean value of the controls. Animals receiving monthly anthelmintic treatment with $CuSO_4$ soln. showed a more uniform blood Cu level but no pronounced elevation of mean value. Year-old sheep had a slightly higher blood Cu level than older animals.
Rachel Brown

Phosphorus metabolism. The synthesis of phospholipides, phosphoproteins and nucleoproteins. D. Bocciarelli, A. Galamini and M. Ligori. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 512–17(1939).—The metabolism of P is followed in dogs by utilizing the P^{32} isotope which has a period of 14 days. Thus the distribution of ingested P^{32} and its utilization by various organs can be measured. The liver is found to be active in the formation of phospholipides while the intestines are high in contents of nucleoproteins and phosphoproteins. A. W. C.

The effect of implantations of the adrenal cortex on the development of the thyroid in chick embryos. M. L. Rokhlina and A. N. Studitskiĭ. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 171–4(1937).—Implantation of the adrenal cortex of rats into the chorio-allantoic envelope of 8-day chick embryos inhibited the development of the thyroid in the embryos, this inhibition being especially evident 12–14 days after incubation. S. A. Corson

The role of the cerebrospinal fluid in the regulation of the functions of the nervous system and of the organism. L. S. Shtern. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 205–7 (1937).—A short review dealing with the role of the hemato-encephalitic barrier in regulating the exchange of substances between the blood and the nervous system.
S. A. Corson

Humoral regulation of the functions of the liver. IV. Influence of the metabolites of the gastric mucosa on glycogenesis and bile secretion. S. Rapoport and N. F. Khodnia. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 208–12(1937).—Metabolites of the gastric mucosa of dogs or cats were obtained 3–4 or 18–48 hrs. after feeding and injected into the portal veins of the corresponding animals. Injection of the metabolites of the fundic part of the stomach obtained 3–4 hrs. after feeding led to an increase in the blood sugar, a decrease in liver glycogen and a retardation in the bile secretion. Metabolites of the gastric mucosa taken 18–48 hrs. after feeding were ineffective, while the metabolites of the pyloric part of the stomach gave contradictory results. S. A. Corson

Modification of the biological properties of preserved arterial blood. N. F. Khodnia. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 213–15(1937).—Plasma retained its biol. properties better than serum. S. A. Corson

Seasonal variations of the comb-growth response in white Leghorn capons. L. Waterman. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 263–4(1939).—The effect of 100 γ of androsterone on the comb growth of capons kept during the 5 days of the expt. in a room free from daylight and lighted electrically for 8 hrs. daily was detd. Results indicate that the reduced sensitivity of capons to male hormones during the summer season is due to a large extent to daylight. E. Curzon

The influence of castration on adrenal weight in female rats. L. Waterman. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 263(1939).—The adrenal wt. of 23 noncastrated 200-g. female rats averaged 66 ± 2.6 mg.; one week after castration the adrenal glands of 14 200-g. female rats averaged 49 ± 2.1 mg. E. Curzon

Hormone influence on the feather color of partridge-colored Leghorn cocks. O. Mühlbock. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* **9**, 264–6 (1939).—The change in feather color of partridge-colored Leghorn cocks which is caused by estrogenic hormones is not affected by the simultaneous administration of large doses of testosterone propionate or of progesterone.
E. Curzon

The metabolism of calcium and phosphorus. C. I. Reed. *J. Am. Dietet. Assoc.* **15**, 667–74(1939).—A discussion. E. Curzon

The biological norm of the calcium-phosphorus relationships in the animal body. Carried out on the basis of practical cattle management. Max Nitsche. *Z. Tierzucht. Zuchtungsbiol.* **44**, 230–52(1939).—Studies on 11 rats (*Mus rattus*) show that the Ca-P content of the whole skeleton increases with age. The proportion of ash in an individual bone may differ from that in the whole skeleton; the increases with age will, however, be similar. The ash content of the rising submaxillary branch of the nose process (a nonspongy bone) of cattle and deer of varying ages and sex (including the fetus) was detd. The ash increased markedly in the fetus up to about the 7th month and a level of about 53%. Here it remained until about 3 weeks after birth. At one year the nose bone contained 60–61% of ash. In the 1–3-yr.-old period there was much fluctuation in the ash content of cattle owing to frequent neg. Ca-P balance. Alfalfa hay is a valuable cattle feed and has a good effect on bone ash.
E. Curzon

Glucolysis after phosphorylation in embryo extracts. O. Meyerhof and E. Perdigon. *Compt. rend. soc. biol.* **132**, 186–90(1939). Exts. of mouse and chick embryos prepd. by the special methods described readily converted a mixt. of Na pyruvate and hexose diphosphate into lactic and phosphoglyceric acids in the presence of cozymase and other necessary accessory substances. L. E. Gilson

Existence of an endocrine gland in the media of the renal arterioles. N. Goormaghtigh. *Proc. Soc. Exptl. Biol. Med.* **42**, 688–9(1939).—Preliminary work suggests that the afibrillar cells of the juxta glomerular app. have an endocrine function and regulate the tonus of the renal arterioles. L. E. Gilson

Recovery of vitamin C from the human bladder. Sol Sherry and Gerald J. Friedman. *Proc. Soc. Exptl. Biol. Med.* **42**, 707–9(1939); cf. *C. A.* **33**, 1372³.—When 0.5–30 mg. ascorbic acid was instilled into the human bladder 92–107% of it was present in the urine after periods of 1–5 hrs. No appreciable destruction occurred.
L. E. Gilson

Concentrating capacity of the kidney as revealed by in-

the administration of posterior pituitary ext. results in the formation of a more concd. urine than follows from the restriction alone. L. E. Gilson

Failure to recover pregnanediol glucuronidate in monkeys, rabbits and cats. U. Westphal and C. L. Buxton. *Proc. Soc. Exptl. Biol. Med.* **42**, 749–50(1939); cf. *C. A.* **33**, 8260³.—No pregnanediol glucuronate was found in urine of pregnant and normal female rabbits and cats. None was found in the urine of normal male and castrated female monkeys which were given injections of progesterone.
L. E. Gilson

Androgenic function of APL (chorionic gonadotropic

hormone)-stimulated ovaries in immature rats. R. R. Greene and M. W. Burrill. *Proc. Soc. Exptl. Biol. Med.* **42**, 761–4(1939). **Androgen production in normal intact and castrated immature female rats.** M. W. Burrill and R. R. Greene. *Ibid.* 764–6; cf. *C. A.* **33**, 7863[7].—Preliminary notes. L. E. Gilson 1

Blood pressure of pregnant rabbits and its response to pitressin. E. W. Page and Eric Ogden. *Proc. Soc. Exptl. Biol. Med.* **42**, 770–1(1939).—The response to pitressin was the same in pregnant and nonpregnant rabbits. L. E. Gilson 2

Changes in excretion of radioactive sodium and potassium and in carbohydrate stores twenty-four hours following adrenalectomy. Evelyn Anderson, Michael Joseph and Virgil Herring. *Proc. Soc. Exptl. Biol. Med.* **42**, 782–5(1939); cf. *C. A.* **33**, 7851[7].—Male rats 65 days old were used. Increased urinary excretion of Na, retention of K, lowered blood sugar and decreases in liver and muscle glycogen are detectable in 24 hrs. after adrenalectomy. L. E. Gilson 3

Localization of adrenal cortical hormones in the adrenal cortex of the cat. H. Stanley Bennett. *Proc. Soc. Exptl. Biol. Med.* **42**, 786–8(1939).—Preliminary. L. E. G.

Masculinization of adult female rabbits following injection of testosterone propionate. C. K. Hu and C. N. Frazier. *Proc. Soc. Exptl. Biol. Med.* **42**, 820–3(1939). L. E. Gilson 4

Utilization of pyruvic acid in eviscerated dogs. V. Capraro and E. Milla. *Boll. soc. ital. biol. sper.* **14**, 554–6(1939).—The viscera, particularly the liver, apparently were of little importance in removing lactic or pyruvic acid from the circulation. Helen Lee Gruehl

Formation of xanthuric acid from tryptophan in animals. F. M. Chiancone. *Boll. soc. ital. biol. sper.* **14**, 561–2 (1939). Helen Lee Gruehl

Effect of adrenal cortex extract on water-saline metabolism. F. Addarii and F. Scarlini. *Boll. soc. ital. biol. sper.* **14**, 563–5(1939).—This ext. increased water elimination and favored retention of Na and Cl. H. L. G. 5

Total and exclusive derivation of urea from arginine in birds. A. Clementi. *Boll. soc. ital. biol. sper.* **14**, 570–2 (1939); cf. *C. A.* **33**, 1800[8]. Helen Lee Gruehl

Problems of the chemical determination of the embryonic development. V. A. Dorfman. *Uspekhi Sovremennoĭ Biol.* **8**, No. 3, 367–89(1938); *Khim. Referat. Zhur.* **2**, No. 4, 62–3(1939).—A no. of theories are presented concerning embryonic development. Investigations are described on the biochem. processes in the egg (breathing) and a no. of physical-chem. indexes (oxidation-reduction potential, pH) are discussed. From the data it is concluded that the biochem. and the physical-chem. processes are not the same for different poles of the egg. W. R. Henn 6

Attempts to detect mucoprotein substances in the secretory product of the mammary gland in women, especially by the histochemical reaction with toluidine blue-gum sirup of Apathy. Jean Grynfeltt. *Arch. soc. sci. méd. biol. Montpellier et Languedoc* **20**, 278–82(1939).—Mucoproteins, produced by the cancerous breast, were not found in the secretions of the normal mammary glands of newborn infants, menstruating young girls, or pregnant, lactating or weaning women. Marion Horn 7

The variations in nitrogen compounds and proteins in the tissues of the aged and the action of cytotoxic antireticular serum on these variations. N. B. Medvedeva. *J. méd., Ukraine* **9**, 325–38(in French, 338)(1939).—Old age causes a reduction in sol. proteins and an accumulation of inert, insol. nonprotein-N (I) and noncoagulable substances in the liver, while an increase in I and in sol. protein, especially albumin, and products of protein decompn. are found in the heart and kidneys. The intestinal proteins are less sol. and less stable, and there is an accumulation of I, while the muscles and lungs contain large amts. of insol. protein and I. The skin is most resistant to old age. There is a tendency for a decrease in sol. protein and in its stability, but there is no accumulation of inert protein or products of protein decompn. There is an accumulation of protein and I in the brain, with an increased concn. of labile globulin. The injection of cytotoxic antimesenchymatic serum in these cases results in an increase in the amt. and stability of sol. protein, and elimination of insol. proteins and I, with a return of the concn. of protein fractions to values normal for adults. S. A. Karjala 8

Variations of the lipocytic coefficient with age. M. D. Gatsanyuk. *J. méd., Ukraine* **9**, 343–60(in French, 360)(1939).—The growth of rats from 3–4 months to old age (2 yrs.) is accompanied by an increase in cholesterol (I) in the brain, lungs, liver, kidneys, blood and muscle by 191.7, 39.6, 34.8, 33.0, 25.0 and 12.8%, resp., when the comparison is made with old under-nourished rats. In well-fed rats the increases in I are 81.9, 44.2, 57.0, 36.3, 69.9 and 40.7%, resp. During the period of 3–4 months to 1 yr. the fat acid (II) content of the blood, lungs, brain and kidneys falls 23.7, 26.2, 12.5 and 11.7%, resp., and increases 46.7 and 22.8%, resp., in the muscles and kidneys. In old under-nourished rats II falls 63.2, 33.9 and 24.7%, resp., in the brain, lungs and kidneys. In all of the organs of old well-fed rats an increase in II was observed; it amounted in the blood, liver, muscles, lungs, kidneys and brain to 306.6, 113.7, 168.5, 140.8, 99 and 49.1%, resp. The H_2O content fell with age in the brain and muscles, showed no change in the blood, and increased in the kidneys and lungs of well-fed old rats and in the liver of adult rats. The lipocytic coeff., I/II, increases during the young-to-adult and adult-to-old age transitions in the brain, blood, lungs and kidneys, and decreases in the liver and muscles. It falls in the blood, muscles, lungs and liver of old well-fed rats owing to the large increase in II, does not change in the kidneys, and increases in the brain. No correlation was found between the variations in H_2O content of the tissues and the variations in I/II. S. A. Karjala 9

Hemodynamics in persons of advanced age. II. I. M. Turovets. *J. méd., Ukraine* **9**, 477–83(in French, 483)(1939); cf. *C. A.* **33**, 2569[1].—A study of 21 subjects aged 90–130 yrs. indicated that basal metabolism and the minute and systolic vols. of the heart are lowered. There is a greater difference between the O_2 content of arterial and venous blood and the coeff. of utilization of O_2 is increased. A slight venous hypoxemia, sometimes accompanied by arterial hypoxemia, generally occurs. The blood content and blood circulation decrease. S. A. Karjala 10

A biochemical investigation of blood regeneration in donors. V. V. Koval'skiĭ, A. I. Kotnitskiĭ, O. V. Bogatyrchuk, M. F. Krasnetsova, N. D. Landa and E. O. Fialko. *Klin. Med.* (U. S. S. R.) **16**, 976–80(1938).—The normal K level of 18.2–22.4 mg. % in the serum of donors begins to rise 1 day after blood removal, and reaches a max. of 19.2–25.2 mg. % on the 7th–13th day. In the same period the K level of the plasma increases from 20.5 to 22.7 mg. %. No changes in Ca, Na or Mg were observed, so the changes in K cannot be due to an increased tissue permeability but must be due to erythrocyte destruction. The K/Ca ratio increases from the normal of approx. 2 to 2.4. Blood sugar falls 5–30.5% (av. 18.4%) after blood removal, and begins to increase only at about the 20th day. This decrease in sugar is considered to be due directly to the increase in K. The erythrocyte count falls immediately after blood removal but rises on the 14th–15th day. It then falls again on the 15th–20th day and begins to rise only some time after the 20th day. The hemoglobin content falls also on the 2nd–9th day, rises slowly and falls again on the 14th–20th day, closely paralleling the erythrocyte count. The protein content of the plasma falls from 1006–1086 to 860–940 mg. % N on the 3rd–10th day after blood removal, rises to 970–1050 on the 11th–20th day, and falls again to 898–978 mg. % N on the 21st–27th day. The residual N of the plasma increases from the normal 33 to 36 mg. % on the 1st–9th day, then decreases to 26 mg. % on the 9th–22nd day, followed by an increase to 32 mg. % by the 29th day. The amino acid content of the plasma shows fluctuations similar to those of the residual N. S. A. Karjala 11

The effect of blood transfusion on basal metabolism. V. D. Anchelevich. *Klin. Med.* (U. S. S. R.) **16**, 981-5 (1938).—The O content of the blood decreases until the 3rd day after transfusion, and then it begins to increase. In pernicious anemia the increase in O begins on the 2nd day. Reserve alkali and CO_2 in the blood increase after transfusion. No correlation was observed between the increase in hemoglobin and that of O in the blood.
S. A. Karjala

Glutathione in preserved blood. S. G. Gekhman and I. P. Vasovskiĭ. *Klin. Med.* (U. S. S. R.) **16**, 1002-6 (1938).—The total glutathione (I) of preserved blood falls 1-4 mg. % on the 1st day and then remains const. for 5-6 days, after which rapid decompn. occurs, resulting in the complete disappearance of I in 24-26 days.
S. A. Karjala

Muscle protein of herring. Saburo Wakamatu. *J. Agr. Chem. Soc. Japan* **15**, 915-20(1939). The muscle of herring contained 4.03% of H_2O-sol. N, 9.03% of 0.2% KOH-sol. N, 2.24% of 70% alc.-sol. N and 8.19% of 10% NaCl-sol. N. The muscle was extd. with H_2O, alc. and ether. The N distribution of the residue was: total N 12.52, amino N 7.56, basic N 3.92, ammonia N 0.41 and melanin N 0.63%. From the hydrolyzates of the protein, cystine 0.57, tyrosine 2.42, glutamic acid 9.86, alanine 2.84, leucine 12.51, proline 2.63, phenylalanine 3.37, serine 1.48, aspartic acid 3.50, histidine 2.35, arginine 5.17, lysine 12.11, tryptophan 1.13 and valine 1.70% were isolated; they were calcd. as moisture- and ash-free protein. No glycine was found. From the ext. of 1 kg. of the muscle, creatine 2.03, creatinine 0.26, methylguanidine 0.33, hypoxanthine 0.51 g. and xanthine trace were isolated. In the ext. of 1 kg. of the muscle, from which the bloody colored parts were removed, 0.27 g. of the Ba salt of inosinic acid and 0.90 g. of taurine were found. In 1 kg. of the muscle protein, which was prepd. by extg. the muscle with H_2O to remove the ext., 0.757 g. of methylguanidine, 0.814 g. of hypoxanthine and a trace of xanthine were isolated. Y. Kihara

Acid-soluble phosphate compounds in intestinal mucosa at rest and during resorption. Einar Lundsgaard. *Z. physiol. Chem.* **261**, 193-208(1939). —After 24 hrs' fast and under amytal anesthesia, rat intestinal mucosa contains 459 (440-488) mg. of acid-sol. P per 100 g. dry wt. Of this, an av. of 29% is inorg., 35% is readily hydrolyzable and 36% is hydrolyzable with difficulty. Cat and rabbit intestinal mucosa are similar. During glucose resorption in rats, the inorg. P drops to 23%, the readily hydrolyzable fraction increases to 38% and the total is unchanged. Cat mucosa shows no definite change. During fructose resorption by rats the inorg. P falls to 16%, the readily hydrolyzable P rises to 52% and difficultly hydrolyzable falls to 32% with a possible slight rise in total acid-sol P. Corresponding changes occur in cat and rabbit mucosa but are less pronounced. The changes in P fractions produced by resorption are local in the rat intestine, only those parts of the mucosa participating showing them. The glycogen contents are unchanged during resorption. Killing the animal by KCN injection does not alter the relations within 1-1.5 min. This preliminary observation makes it doubtful that the process of phosphorylation and dephosphorylation is rapid enough to account for the rate of resorption of fructose. Milton Levy

Chemical transformation of triosephosphoric acids during glucolysis. H. Jost and H. Linde. *Z. physiol. Chem.* **261**, 225-39(1939).—Glyceraldehydephosphoric acid (I) is converted to lactic acid by fresh muscle exts. more rapidly than is dihydroxyacetonephosphoric acid (II). The latter must first be converted to hexosediphosphoric acid (III) which then is changed to I in order to form lactic acid. I is the probable direct precursor of phosphoglyceric acid in the ext. In dialyzed muscle ext. the formation of III from I and II (aldolase action) is demonstrable with racemic II although its formation from I or II alone is inhibited because of inactivation of the isomerase which converts II to I. The accumulation of III in muscle juices and exts. depends on the fact that the primary split product, II, is not converted into I sufficiently rapidly for dehydrogenation and accumulates to an extent consistent with the equil. between II and III. 1
Milton Levy

Sex hormones and related substances. (Sterols). XIII. Cholesterol formation in the animal. Wilhelm Dirscherl and Hans Traut. *Z. physiol. Chem.* **262**, 61-86(1939); cf. *C. A.* **33**, 2901[8].—Male white mice were fed oats. Their contents of digitonin-precipitable substances varied between 0.29 and 0.37% (mean 0.32%) of the body wts. and their daily excretion was 1.1-1.6 (mean 1.3) mg. above their intake. Cholesterol is therefore synthesized in the body. The sterols of the digitonide average 1 double bond per mol. Feeding of sec. Bu esters of stearic, oleic and linoleic acids or of sec. BuOH did not increase the sterol synthesis. No indication of sterol synthesis from fat acids was found. Milton Levy 2

Influence of estrogen on the electrolyte pattern of the immature rat uterus. N. B. Talbot, Oliver H. Lowry and E. B. Astwood. *J. Biol. Chem.* **132**, 1-9(1940); cf. *C. A.* **32**, 6715[5]. Six hrs. after administration of a single dose of estrogen to stimulate its growth, the extracellular phase of the immature rat uterus swells 50-75% while the cells increase only 1/3 as much. The cells take on their normal quota of K but definitely less than their quota of P and probably of solids so that there is an increase in the K P ratio. This is followed during the next 24 hrs. by a phase characterized by marked cell growth during which the cells take up approx. normal amts. of cell constituents. 3 4
A. P. Lothrop

The picric and picrolonic acid precipitates of gonadotropic extracts. Fritz Bischoff. *J. Biol. Chem.* **132**, 35-9 (1940); cf. *C. A.* **32**, 3474[1]. Picric and picrolonic acids completely ppt. the pituitary gonadotropic hormone and inactive material at about pH 3. It dissolves at pH 4.5 while some of the contaminating proteins are still insol. The insol. ppts. or the sol. exts. retain their activity when assayed with Cu to delay resorption or when administered simply in divided doses, 5 times instead of once daily. This observation shows that the weak response to the picrolonic acid ppt., when administered in the conventional assay, need not be explained on the basis of a reversible chem. inactivation. 5
A. P. Lothrop

Inheritance effect of exercise on the phospholipide and cholesterol content of muscle. W. R. Bloor. *J. Biol. Chem.* **132**, 77-82(1940); cf. *C. A.* **31**, 6716[6].—Muscles of rats exercised through the 2nd and 3rd generations show large increases in phospholipide and especially in cholesterol in addn. to hypertrophy. These findings seem to indicate that exercise through several generations may result in increased phospholipide and cholesterol content of muscle. There was an increase in the cholesterol content of all the muscles examd. and in the phospholipide content of all but the heart and diaphragm. A. P. L. 6 7

Colloidal sulfur-polysulfide mixture. Absorption and oxidation after oral administration. Harry Greengard and Jean Rea Woolley. *J. Biol. Chem.* **132**, 83-9(1940). —Orally administered colloidal S in doses of 500-750 mg. is completely absorbed, oxidized and excreted in the urine as sulfate, recovery being quant. in most cases. The absorption and elimination are very rapid, the urinary sulfate increasing markedly within 2 hrs. Probably less than 10% escapes oxidation. If 100-mesh powd. S is substituted, absorption occurs after 8-16 hrs. at which time it is probably in contact with the bacteria in the lower bowel. 8
A. P. Lothrop

The relation of urea and glycine to creatine synthesis. R. B. Fisher and A. E. Wilhelmi. *J. Biol. Chem.* **132**, 135-46(1940); cf. *C. A.* **31**, 7979[8].—The available evidence does not require the hypothesis that urea and glycine together are precursors of creatine in muscle tissue. No increase was observed in controlled expts. on the effect of injecting large amts. of these substances on the creatine content of rat muscle. There was no detectable synthesis of creatine when isolated rabbit hearts were perfused with urea and glycine under the same conditions in which a quant. conversion of arginine to creatine has been demonstrated. Reasons are adduced for thinking that investigations into the effect of administering 9

amino acids and other substances on the creatine content of muscle or on the rate of excretion cannot provide evidence about creatine precursors in the body. Cf. Beard and Pizzolato, *C. A.* **32**, 7126[1]. Forty-three references. A. P. Lothrop

The increase in phospholipide and total phosphorus metabolism of the kidney following the administration of ammonium chloride with radioactive phosphorus as an indicator. Louise Harris Weissberger. *J. Biol. Chem.* **132**, 219–26(1940).—NH_4Cl acidosis brings about an increase in the vol., acidity, total P and radioactive P content of the urine and an increased P turnover in the kidney phospholipide, in the whole kidney and in the blood. These findings lend support to the view that the kidney phospholipide is concerned in the regulation of blood and body acidity by renal excretion of acid phosphate and explain the increased turnover in kidney phospholipide early in fat absorption. The rats were fed Na_2HPO_4 3 contg. radioactive P with and without NH_4Cl. A. P. Lothrop

The metabolism of creatine and creatinine. III. Formation of creatine by isolated rat tissues. Zelma Baker and Benj. F. Miller. *J. Biol. Chem.* **132**, 233–7 (1940); cf. *C. A.* **33**, 8658[7].—Isolated rat kidney produced 4–8 mg. of creatine per 100 g. and liver 1.2–3.2 mg. in a 4-hr. incubation period in Ringer-phosphate or bicarbonate medium with no added substrate. These 4 represent approx. 10–30% increases. The process of creatine formation is apparently enzymic in nature. It is heat-labile and is inhibited by cyanide and by anaerobiosis. No significant increases were found in cardiac, skeletal and intestinal muscle, brain, testis and spleen. The specific, enzymic method of Miller, *et al.* (*loc cit.*) for the detn. of creatine was used. A. P. Lothrop

Experimental tumorigenesis with subcutaneous tablets of estradiol. Alexander Lipschütz and Luis Vargas, Jr. *Lancet* **1939**, I, 1313–18; cf. *C. A.* **33**, 2956[6].—Uterine 5 and extra-uterine tumors produced in guinea pigs by introducing 20-mg. tablets of estradiol under the skin are similar to those produced by injections of follicular hormones over a long period. The continuous absorption and flow from the tablets enhance the tumorigenic action of estradiol. E. R. Main

Biological effects of the synthetic estrogen hexestrol: 4,4′-dihydroxy-γ,δ-diphenyl-*n*-hexane. N. R. Campbell, E. C. Dodds, W. Lawson and R. L. Noble. *Lancet* **1939**, II, 312–13.—Hexestrol (I) stimulates the mammary glands 6 and sensitizes the uterus of the ovariectomized rabbit to the action of progesterone. In the rat, implantation is prevented, body growth is reduced and the gonads become atrophied after prolonged administration. The increase in wt. of the uterus of immature rats is approx. 7 the same as that produced by stilbestrol (II). When assayed by injection into ovariectomized rats, I was more active than II and both were 2–3 times more active than estrone. When given by mouth or applied intravaginally the activity of I was about equal to that of II. E. R. M.

Antitumorigenic action of progesterone. Alexander Lipschütz, Ruperto Murillo and Luis Vargas, Jr. *Lancet* **1939**, II, 420–1.—The production of uterine and extra-uterine tumors by estradiol benzoate (I) in castrated fe- 8 male guinea pigs is prevented to a large extent by simultaneous injections of progesterone in a dosage 150 times greater than that of I. E. R. Main

Stilbestrol and anhydro-oxyprogesterone. Their effects on menstruation and lactation. Robert Wenner and Karl Joël. *Lancet* **1939**, II, 688–91.—Administration of 25 mg. stilbestrol (I) by mouth, or 15 mg. given intramuscularly, was required to produce proliferation of a resting or atrophic endometrium. Administration of 50–60 9 mg. produced glandular cystic hyperplasia. The stage of transformation and menstruation following proliferation can be produced by oral administration of 500–600 mg. anhydro-oxyprogesterone. Lactation was either prevented or inhibited by oral administration of 5–15 mg. I. E. R. Main

Antitumorigenic action of testosterone. Alexander Lipschütz, Luis Vargas, Jr., and O. Ruz. *Lancet* **1939**, II, 867–9.—Administration of testosterone propionate (I) simultaneously with estradiol benzoate (II) prevents the development of uterine and extra-uterine fibroids in castrate guinea pigs when the amt. of I given is 12 times that of II. This amt. of I also prevents the increase in uterine wt. and the formation of atypical growth of the endometrium caused by II. E. R. Main

The new endocrinology. I. The pituitary. E. C. Dodds. *Lancet* **1939**, II, 800–2. **II. Chemistry of the sterols.** *Ibid.* 844–5. **III. The male sex hormone.** *Ibid.* 894–6. **IV. The female sex hormone.** *Ibid.* 953–4. **V. The corpus-luteum hormone.** *Ibid.* 998–9. **VI. Diagnostic value of urinary hormones.** *Ibid.* 1038. **VII. The suprarenal.** *Ibid.* 1087–9. E. R. M.

Effect of estrogens on the urinary volume. E. P. Sharpey-Schafer and I. Schrire. *Lancet* **1939**, II, 973–4.—Intramuscular injections of estradiol benzoate, in doses of 100,000 I. B. U. daily for 10 days, caused no detectable change in urinary vol. in women before or after the menopause, in castrated women or in men. E. R. Main

Neutralization of action of heparin by protamine. Erik Jorpes, Pehr Edman and Torsten Thaning. *Lancet* **1939**, II, 975.—The inactivation of heparin by protamine, reported by Chargaff and Olson (*C. A.* **32**, 1313[4]), is confirmed. The effect is demonstrable *in vitro* and *in vivo*. For administration to man, 35–60 mg. of protamine-SO_4 in a 2% soln. in dil. HCl, adjusted to pH 2.7 and sterilized by autoclaving, is injected intravenously. An amt. of protamine which represents 40–70% of the amt. of heparin injected is required to neutralize the effect of heparin. E. R. Main

Comparison of the effects of stilbestrol and estrone on the mammary tissue of castrated female rats. Eric Jacobsen and S. Skaarup Christensen. *Acta Path. Microbiol. Scand.* **16**, 359–64(1939).—Stilbestrol had a stimulating effect on the mammary tissue of 63 castrated female rats, qualitatively similar to that of estrone. 13 references. J. T. Myers

Effect of estrogen on bones, joints and ligaments of castrated guinea pigs. Charles J. Sutro and Leo Pomerantz. *Arch. Surg.* **39**, 992–1000(1939).—Castrated male guinea pigs can be feminized by injections of estrogens as revealed by enlargements of the nipples and formation of areolae. The ligaments of the symphysis pubis, especially the posterior ones become hypercellular, increase in thickness and invade the interpubic cartilages and posterior cortexes of the pubic bones. In some instances there were secondary degenerative changes in the interpubic cartilages. Even transplanted segments became hypercellular if sufficient estrogen was given. No other bones or ligaments showed changes. Guinea pigs weighing about 400 g. were used. The expts. lasted 28–80 days and the total amt. of estrogen administered was 12,000–60,000 rat units. 13 references. John T. Myers

Action of the orchidic hormone on the liver glycogen. Giacomo Fichera. *Arch. ital. med. sper.* **4**, 39–44(1939).—Injections into healthy fasting rabbits of 1 mg. testosterone propionate per kg. body weight cause a remarkable decrease of the liver glycogen (on the av. 4.16 mg.). Either the orchidic hormone attacks the hepatic cell directly or it stimulates the elaboration of glycogenolytic hormones from other endocrine glands. George Nachod

The effect of crystalline corpus luteum hormone, progesterone, on the ovaries and related endocrine organs. Charles Mazer and S. Leon Israel. *Am. J. Obstet. Gynecol.* **38**, 625–31(1939).—In doses of 0.5 mg. thrice weekly for 9.5 weeks, progesterone, unlike impure corpus luteum hormone, did not inhibit follicular growth, ovulation and luteinization in the normal adult rat. Larger doses were inhibitory in all respects and therefore considered unphysiol. J. Pinchack

The effects of extracts of normal and abnormal thyroids on the rabbit heart and liver. Joseph B. Wolffe. *Western J. Surg., Obstet. Gynecol.* **47**, 638–45(1939).—U. S. P. thyroid ext. administered in daily doses of 1.5 g. for 10 weeks had but a slight effect on the heart and liver of 6 normal rabbits. But exts. from diseased human thyroids produced definite electrocardiographic changes in approx.

50%, and histopathological changes in the myocardium and liver in approx. 70% of the animals injected. These effects appeared to be reversible and varied with the type of diseased thyroid used. J. Pinchack

Influence of anticoagulants on the proportions of elements in the blood. V. Chorine. *Ann. inst. Pasteur* **63**, 213–56(1939).—The effects of anticoagulants on the various elements, sugar and proteins in the blood are described. Benjamin Prescott

The supposed optical inactivation of *d*-tartaric acid by the pancreas. Carl Neuberg and Elisabeth Peiser. *Enzymologia* **7**, 228-30(1939)(in German).—Pancreas tissue does not racemize *d*-tartaric acid. F. S.

Citric acid in muscular respiration. Jacques Thomas. *Enzymologia* **7**, 231-8(1939)(in French).—The formation of malic acid from oxalacetic acid is of the same order whether the conditions are aerobic or anaerobic. This fact excludes the possibility of passage through the cycle of Krebs and Johnson (*C. A.* **31**, 8655[6]) in which O is necessary for the transformation of citric acid into malic acid. Furthermore, the yield of malic acid is of the same order in the presence of malonate in aerobiosis, a fact which is equally at variance with the mechanism proposed by K. and J., since the transformation of citric acid into malic acid would be blocked at the succinic acid stage. The formation of dinitrophenylhydrazones shows that, in the presence of arsenite, malic, fumaric and succinic acids are transformed into oxalacetic acid and must be considered as forming a part of a homogeneous system where each constituent is transformed easily into the other. Citric acid cannot be considered a constituent of the system for it is not transformed rapidly into a C_4 acid and consequently if it were a part of the cycle it would slow down the rhythm of the exchange. The catalytic effect of the C_4 acids is shown definitely in the first 10 min. of respiration, whereas citric acid does not begin to show its catalytic effect for 1 hr. If the citric acid acted as a catalyst it would be maintained in a const. amt. in muscle, a fact which could not be verified, so that citric acid must be considered as a substance being metabolized by the tissues rather than a catalyst of respiration. The argument that the Krebs theory is supported by the fact that injection of succinic, malic or fumaric acid leads to secretion of citric acid in the urine loses its value because other acids which do not take part in the respiratory cycle will produce the same effect. Citric acid is probably formed in the kidney. Felix Saunders

Comparative study of the metabolic effects of testosterone propionate in normal men and women and in eunuchoidism. Allan T. Kenyon, Kathryn Knowlton, Irene Sandiford, F. C. Koch and Gertrude Lotwin. *Endocrinology* **26**, 26–45(1940); cf. *C. A.* **32**, 7987[6,8].—Intramuscular injections of 25 mg. of testosterone propionate, daily or twice daily, in a eunuchoid, produced reduction in the urinary excretion of N, Na, K and Cl, together with a gain in wt., due largely to water held in assocn. with the salts and water retained. A considerable reduction in the urinary excretion of inorg. P accompanied that of the other constituents. During recovery Na, Cl and water were rapidly lost from the body, inorg. P and K less rapidly and less completely, while N stored was retained in great part for weeks. Two normal young men responded the same as the eunuchoids, except that the 0.03 g. of N retained per kg. per day, during the period of max. effect, was half that of the eunuchoids. One normal young woman responded essentially as the eunuchoids and the normal men. The second young woman showed a definite reduction in the urinary excretion of inorg. P but otherwise distinctly less evidence of a testosterone propionate effect. The concn. of urea and nonprotein N in the blood was definitely reduced by such treatment, while those of hemoglobin, plasma proteins, and serum Na, K and Cl were unaffected. The reduction in urinary electrolyte excretion, studied in the eunuchoid, was unaccompanied by important changes in urinary NH_3, pH, bicarbonate or concn. of titratable acid. Creatine excretion, in the eunuchoid, intensified by ingestion of creatine, was substantially reduced by the androgen and increased during recovery. Percutaneous administration of 25 and 50 mg. daily of testosterone in an ointment, in the eunuchoid decreased the urinary excretion of N. The basal metabolic rate, fasting R. Q., pulse rate and blood pressure of the normal subjects were not conspicuously affected by testosterone propionate. The basal metabolic rate of the eunuchoid was slightly increased; the pulse rate and blood pressure were unaffected. The 102.7–252.2 g. of protein estd. as retained by these subjects is not accounted for by increases in the bulk of genital tissues and represents deposit of new material elsewhere in the body. This retention, together with the reduction in the urinary excretion of inorg. P, K and creatine points to a somatropic influence of androgens and provides a clue to the explanation of unusual body growth accompanying precocious puberty. Felix Saunders

Tolerance of male and female mice respectively to estrogens and androgens. Charles D. Kochakian. *Endocrinology* **26**, 54–60(1940).—Each sex of the Little dba mice was better able to tolerate the "sex hormone" of the opposite sex. Testosterone propionate in daily doses of 0.4 and 0.2 mg. was not fatal but caused a decrease in gain in body wt. in the males. Estradiol dipropionate in doses of 0.25 and 0.10 mg. per day killed more females than males. Testosterone propionate added to the estrogen partially nullified its fatal effects. Testosterone propionate caused a definite and striking loss of hair in the male mice but had only a slight effect in the females. Felix Saunders

Composition of bones of mice receiving estrogens and androgens. John H. Wentworth, Paul K. Smith and Wm. U. Gardner. *Endocrinology* **26**, 61–7(1940).—The continued administration of large doses of estradiol benzoate to mice produces significantly higher concns. of inorg. substances in the femurs and pelves than in control mice or mice receiving testosterone propionate or estradiol benzoate plus testosterone propionate. The ratio of Ca to P in the femurs, but not in the pelves, of the mice receiving estradiol benzoate is significantly higher than in other groups. The higher ash content of the untreated females as compared with the untreated males indicates the influence of the animal's own hormones on skeletal growth. Felix Saunders

Mechanism of estrin therapy in the relief of dysmenorrhea. Somers H. Sturgis and Fuller Albright. *Endocrinology* **26**, 68–72(1940).—The course of estrin therapy should be started about the 6th day of the cycle and should be of the order of magnitude of 1.5 mg. of estradiol benzoate given intramuscularly every 3 days for 6 injections. Such therapy prevents the formation of a secretory endometrium presumably because of an inhibitory action of estrin on gonadotropic hormones and hence on ovulation. Felix Saunders

Relation of hyperemia to the action of estrin. Oscar Hechter, Maurice Lev and Samuel Soskin. *Endocrinology* **26**, 73–9(1940).—The effects of estrin can be divided into 2 groups (*a*) those specific actions of estrin which do not depend on hyperemia, and (*b*) those actions which are secondary to the production of the hyperemia, and which are assocd. with the acetylcholine-liberating action of estrin. Distention is dependent upon hyperemia since this effect is inhibited by atropine and duplicated by yohimbine. Distention may depend in part on the specific effect of estrin on the uterine cells, since some distention occurs when the hyperemic effect of estrin is inhibited by atropine. Distention is not always assocd. with hyperemia and *vice versa*. The accumulation of tissue water is due mainly to the specific action of estrin. Although hyperemia plays a role in this water accumulation, it is slight as compared to the direct action of estrin on the uterus. Felix Saunders

Experimental studies on the menstrual cycle of the baboon (Papio porcarius). VI. The effect of progesterone upon the first part of the cycle in normal female baboons. Joseph Gillman. *Endocrinology* **26**, 80–7 (1940).—The normal adult female baboon, when given progesterone in the first or turgescent part of the cycle, exhibits specific perineal reactions which may or may not

be accompanied by bleeding at the end of 4–7 days after progesterone administration. The perineal reaction consists of a sudden deturgescence when the sex skin may become completely absorbed. The min. quantity of progesterone necessary to produce this effect is 3 mg. Bleeding occurs if a single dose of 20 mg. is used and is pptd. on the 5th day after the injection when the perineal swelling has reached its lowest ebb. Doses smaller than 20 mg. produce deturgescence without bleeding. The 2 reactions, deturgescence with or without bleeding, permit an easy and accurate assay of progesterone uncomplicated by operative procedures. Felix Saunders

Influence of various physiological substances on the glycogenolysis of surviving rat liver. H. P. G. Seckel. *Endocrinology* **26**, 97–101(1940); cf. *C. A.* **33**, 1380⁹.—Rat liver glycogenolysis, as it proceeds in surviving tissue slices suspended in a buffered salt soln., is inhibited by large doses of cortical hormone (eschatin) added *in vitro*. The degree of inhibition averaged 41% for a 60-min. interval and a concn. of 6 units per 5 cc. In female rats the results were influenced by the hormonal tides of the sexual cycle. The inhibitory effect on hepatic glycogenolysis of cortical hormone is greater than that of insulin added *in vitro* and cannot be increased by combining the 2 hormones. One essential function of the cortical hormone is an inhibition of the glycogenolytic enzyme of the liver cells. Felix Saunders

Metabolism of nitrogen, sulfur and glutathione in thymectomized albino rats. Marta Sandberg, David Perla and Olive M. Holly. *Endocrinology* **26**, 102–6(1940).—After thymectomy urinary N excretion increases progressively but fecal N excretion remains unchanged. Exogenous and endogenous S metabolism is disturbed. Total urinary S and neutral S excretion increases. Fecal S, inorg. and ethereal sulfate excretion remains unchanged. Total glutathione in the blood of thymectomized rats rises slightly, but begins to return to normal 6 weeks after operation. A drop in reduced glutathione develops more slowly but persists longer. The main disturbance is in oxidized glutathione, which rises considerably after operation. After 18 weeks all glutathione values have returned to normal. Felix Saunders

Relation between thymus and sexual organs. Hugo Chiodi. *Endocrinology* **26**, 107–16(1940).—See *C. A.* **33**, 706⁸·⁹. Felix Saunders

Output of protein metabolism hormone of the pituitary anterior lobe. Karl E. Paschkis and Annie Schwoner. *Endocrinology* **26**, 117–22(1940).—Protein feeding is followed by the excretion of a factor in the urine which, when injected into rats, produces a decrease of blood urea N and of blood amino N. This factor is not present in the urine after a protein-free carbohydrate-fat diet. The same reaction to injection of urine after protein intake is obtained by injecting alk. exts. of the pituitary. Protein feeding is the adequate stimulus for the secretion of this hormone. Felix Saunders

Effect of estrin on the anterior pituitary of male rats after pituitary stalk section. Unto U. Uotila. *Endocrinology* **26**, 123–8(1940).—Large doses of estrin injected into male rats act on the anterior pituitary without the mediation or any modifying effect of the pituitary stalk. This is shown by the following facts: (*a*) the anterior pituitary hypertrophies and shows the same cytological changes in rats which have received estrin whether the stalk be intact or severed; (*b*) estrin suppresses the secretion of gonadotropic hormones in stalk-cut and intact male rats to an equal extent, as shown by the appearance of a marked atrophy of the testes and seminal vesicles in both groups. The adrenals hypertrophy equally after estrin treatment in intact and stalk-sectioned animals, an indication that estrin also affects the corticotropic function of the anterior hypophysis without any mediation or modification of the pituitary stalk. Estrin acts directly on the anterior hypophysis. This action is a part of the humoral control of the basic secretory rhythm of the gland. F. Saunders

Regulation of thyrotropic function by thyroxine after pituitary stalk section. Unto U. Uotila. *Endocrinology* **26**, 129–35(1940).—The thyrotropic function of the anterior hypophysis has a basic secretory rhythm which is for the most part controlled humorally by variations in the thyroxine level without the mediation of the hypothalamo-hypophyseal pathways. Hypothalamic impulses through the pituitary stalk, or to a lesser extent the cervical sympathetics, can under certain conditions modify this basic thyrotropic secretory rhythm. F. Saunders

Effect of thyrotropic hormone on pregnant rabbits. Beatrice Whiteside. *Endocrinology* **26**, 136–41(1940).—Pregnant rabbits were injected with thyrotropic hormone. In every case the gestation was interrupted, either by abortion or by the death of the fetuses. The organs of the fetuses were extremely degenerated. The thyroid of the mother was hyperplastic. Her ovaries showed signs of degenerative changes. Felix Saunders

Treatment of pituitary dwarfism with growth hormone. Joseph M. Looney. *Endocrinology* **26**, 163–6(1940).—A case report. Felix Saunders

Response of the ovaries to gonadotropic extracts in splenectomized rats. Frederick E. Emery, Thaddeus J. Bugelski and Edward L. Schwabe. *Endocrinology* **26**, 167–9(1940).—Rats splenectomized at approx. 30 days of age were injected for 30 days with antuitrin-S, APL and pituitary gonadotropic ext. The wts. of the ovaries and uterus at the end of treatment were not significantly different from those of control rats. Felix Saunders

Correlation of pituitary and spleen in experimental and control mice. J. M. Twort and R. Lyth. *Endocrinology* **26**, 170–1(1940).—Data relating to the wt. of spleens and approx. superficial area of the pituitary gland in over 4000 mice and the pituitary dry wt. of over 2500 mice were analyzed to det. whether the wt. of the spleen influenced the size or wt. of the pituitary gland. When mice with large spleens were considered there was a definite pos. correlation between the 2 glands. There was a slight neg. correlation in tumor-bearing mice. F. Saunders

Morphological changes in female mice receiving large doses of testosterone. Hans Selye. *J. Endocrinology* **1**, 208–15(1939).—Daily administration of 5 mg. of testosterone propionate to adult female mice for 20 days causes a decrease in the total size of the ovaries, disappearance of normal corpora lutea and marked follicle stimulation with the formation of follicular and occasionally of corpus luteum cysts. The adrenal cortex becomes atrophic, the hypophysis decreases in wt. without showing any indication of degranulation of the anterior lobe chromophile cells. The kidneys are markedly changed but the liver and spleen show no changes. These large doses do not produce the toxic actions of estrogen overdosage. Felix Saunders

Metabolism of glutathione. H. Waelsch and D. Rittenberg. *Science* **90**, 423–4(1939).—Glycine contg. 1.18 atoms % N^{15} excess was fed to rats. After 2 hrs. the concn. of N^{15} in the reduced glutathione (GSH) of the liver and the intestine, together with the N^{15} content of the protein glycine and the nonprotein N of these organs was detd. Since the speed of deamination of glycine is slow the N^{15} is probably all in the glycine portion of the GSH. The concn. of N^{15} in the glycine of the liver GSH is 0.27 atom % and the min. rate of turnover of GSH is 22.3% (intestine 9.6%) in 2 hrs. In the same period only 1.6% (intestine 1.5%) of the protein glycine of the liver was exchanged. GSH is a very unstable and reactive compd. in the living organism. Felix Saunders

Toxic effects of desoxycorticosterone esters in dogs. Daniel Kuhlmann, Charles Ragan, Joseph W. Ferrebee, Dana W. Atchley and Robert F. Loeb. *Science* **90**, 496–7 (1939).—Dogs on a maintenance diet were injected subcutaneously with 20 mg. of desoxycorticosterone acetate in peanut oil daily for 70 days. There is a striking decrease in serum K, a slight increase in serum Na, serum protein and nonprotein N and no definite change in blood sugar or Ca. All the dogs showed a curious periodic weakness with inability to stand or raise the head. These bouts of paralysis, except for the persistence of reflexes, closely resemble familial periodic paralysis in man, which is also assocd. with marked decrease in serum K. The attacks are alleviated by KCl. Intake and excretion of

water are increased. There is no change in heart contour. There is an increase in arterial pressure. All symptoms disappear 3–4 days after withdrawal of the hormone.
Felix Saunders

Ketone bodies, nonprotein nitrogen, lactic acid, chlorides and carbon dioxide-combining power of the blood of healthy pregnant women. With remarks on the technique of the determination of the blood values. H. Rossenbeck. *Arch. Gynäkol.* **168**, 709–43(1939).—In 10 nonpregnant and 33 pregnant women the normal standards of the blood constituents mentioned in the title were detd. The methods used and described in detail for ketone bodies and nonprotein N were those of Pincussen-Engfeld and Parnas-Wagner, resp. Average figures follow:

Condition	Month of pregnancy	Acetone + diacet acid, mg %	β Hydroxy butyric acid, mg %	Total ketone bodies, mg %	Nonprotein nitrogen mg %	Lactic acid, mg %	Cl, mg. %	CO_2-combining power, vol. %
Nonpregnant	..	1 0	2 2	3 0	32 3	18 9	386.3	49.6
Pregnant	II	2.0	8 6	9.6	32.0	.	398 6	41.2
	III	2 8	7 5	8.6	24.5		416.9	39 0
	IV	1 8	5 1	7.4	23 4	22 8	384 8	43.9
	V	1.4	5 0	5 7	26.7	14 0	383.0	46 8
	VI	1 1	3.8	7 0	24 8	18 9	394.0	48.3
	VII	1 3	5 1	6 8	23 9	20 3	388 1	43.8
	VIII	0 6	3 4	4 8	25 3	20 9	391.0	47.0
	IX	0 8	3.1	4 2	29 2	16 2	393 8	46.2
	X	1 2	3 9	5 1	26.1	19 6	378 9	50.5

As is seen in the table and accompanying charts, the main deviations from normal occur during the 2nd to 4th months of pregnancy, after which time a trend to normal figures is evident.
H. P. G. Seckel

A quantitative study of estrogen-progesterone interaction in the formation of placentomata in the castrated rat. Irving Rothchild, Roland K. Meyer and M. A. Spielman. *Am. J. Physiol.* **128**, 213–24(1940).—Rats were treated with progesterone, or progesterone-estradiol combinations from the 4th to the 8th day of pseudopregnancy inclusive, after being castrated and the uterus traumatized on the 4th day. The injections were given either once or twice daily. The size of the placentomata formed under these conditions varied directly with the progesterone dose and the no. of daily injections. The addn. of estradiol in varying doses to a const. progesterone dose caused increase in the size of the placentomata until an optimal level is reached. Further increase in estradiol level resulted in the formation of smaller placentomata and finally in the complete inhibition of the reaction. Placentomata could be formed in the absence of the pituitary gland, after appropriate progesterone treatment.
E. D. Walter

The identity of the glycotropic (anti-insulin) substance of the anterior pituitary gland. H. Jensen and J. F. Grattan. *Am. J. Physiol.* **128**, 270–5(1940); cf. *C. A.* **33**, 6931⁹.—Adrenotropic anterior pituitary fractions as well as adrenal cortical exts. and cryst. corticosterone acetate produce a definite glycotropic effect. On the other hand, administration of thyrotropic prepns. (free from adrenotropic hormone), prolactin and follicle-stimulating hormone prepns., as well as cryst. thyroxine fail to render the animals (mice) resistant to insulin under the exptl. conditions. The results suggest that the glycotropic effect of the anterior pituitary is produced by the adrenotropic factor.
E. D. Walter

Sucrose-taste thresholds of rats and human subjects. Curt P. Richter and Kathryne H. Campbell. *Am. J. Physiol.* **128**, 291–7(1940); cf. *C. A.* **33**, 5056².—Thirteen rats recognized the difference between distd. H_2O and sucrose soln. in av. concns. of 0.5%. Forty-five young adult human subjects first recognized the difference between distd. H_2O and sucrose soln. in av. concns. of 0.17% and first recognized a sweet taste in av. concns. of 0.41%. Nineteen adults from the lab. staff and clinic patients showed similar results. The sugar-taste threshold of 58 children averaged 0.68% and of 52 elderly individuals 1.23%. Rats and man have nearly the same sucrose-taste thresholds.
E. D. Walter

The mechanism of the inhibiting effect of electrolytes and heparin on blood coagulation. Anthony J. Glazko and David M. Greenberg. *Am. J. Physiol.* **128**, 399–407(1940); cf. *C. A.* **33**, 1804⁷.—A study was made of the inhibiting effect of various electrolytes and of heparin on the 2nd phase of coagulation. The potency of the electrolytes increased with valency, but not as a function of the ionic strength of the soln. The polyvalent anions and heparin inhibit coagulation by acting directly on thrombin. The inhibiting action of multivalent cations was due to their effect on fibrinogen. An explanation of the results is advanced on the basis that alterations of the elec. potentials of thrombin and fibrinogen interfere with the formation of a coagulation enzyme-substrate intermediate.
E. D. Walter

The effect of acid stimulation of the duodenum upon experimental hyperglucemia and utilization of glucose. E. R. Loew, J. S. Gray and A. C. Ivy. *Am. J. Physiol.* **128**, 298–308(1940); cf. *C. A.* **33**, 5518².—With 62 dogs 108 expts. have failed to yield evidence to indicate that acid stimulation of the duodenum enhances the utilization of intravenous glucose or reduces the hyperglucemia produced by absorption of glucose, injection of adrenaline or removal of the pancreas.
E. D. Walter

Acute hypoproteinemia following a single severe hemorrhage in the fasting dog. Robert Elman. *Am. J. Physiol* **128**, 332–7(1940).—The results indicate that there is no rapid mechanism for the restoration of the concn. of serum protein or serum albumin lost by hemorrhage in the fasting dog, and emphasize the importance of inducing such a restoration therapeutically in patients suffering severe blood loss.
E. D. Walter

Calcium in ciliary and muscular movement. G. S. Carter, O. Gatty, J. H. Schulman and H. Walston. *Nature* **144**, 980–1(1939).—The unbalance obtained by reducing the Ca content of physiol. solns. can to some extent be offset by the addn. of small quantities of lipides to the soln. in the case of the beating frog heart and of *Mytilus* cilia. The use of adsorbents and dispersants of protein film and of lipide film suggests that ciliary and muscular cell membranes have some lipide constituents on their outer sides.
E. D. Walter

Connection between carbohydrate and potassium metabolism in normal and adrenalectomized animals. F. Verzár and J. C. Somogyi. *Nature* **144**, 1014–15 (1939).—After adrenalectomy, rats show changes in the behavior of the different sugars in the blood and also disturbances in K metabolism. It is suggested that the connection between these 2 phenomena is due to a phosphorylation process leading to the formation of glycogen or intermediary substances.
E. D. Walter

Hematological studies on cattle. III. Fluctuations in the hemoglobin of Indian Nellore oxen as affected by seasonal variation. Miguel Manresa and Prudencio R. Falcon. *Philippine Agr.* **28**, 187–205(1939); cf. M. Gomez and Santos, *Ibid.* **28**, 79–98.—The av. hemoglobin index of Indian Nellore cattle was 9.79 g. per 100 ml. of blood over a period of 1 year. In both males and females the indexes for the year showed bimodal curves; the first curve is of 7 months duration starting from October and ending in April with the mode in January. Increasing body temp. caused a decreasing hemoglobin index and vice versa. Relative humidity probably does not affect the hemoglobin content. Normal fluctuations in hemoglobin indexes did not affect the percentages of large mono-

nuclears, polymorphonuclears and mast cells. Except for 2 months the percentage of lymphocytes showed trends in the same direction as the hemoglobin but when the hemoglobin was high the content of eosinophiles was low.
Colin W. Whittaker

Changes in the serum protein composition in growing animals. R. I. Golubitskaya. *Méd. exptl.* (Ukraine) **1939**, No. 4, 20-3.—Exptl. acidosis (produced by intravenous injections of isotonic HCl solns.) had no effect on the total protein content or on the proportion of the different protein fractions of the serum of rabbits between the ages of 1 month and 2 years. S. A. Corson

Golgi apparatus and vitamin C. I. Review. Atunobu Miwa. *Oriental J. Diseases Infants* **25**, 38-9(1939)(in English).—Vitamin C probably plays a part in the fixation of Golgi app. by the reduction of $AgNO_3$ and osmic acid. **II. Experimental studies. 1.** *Ibid.* 40.—An aq. soln. of vitamin C, 1 50,000, reduces 10% $AgNO_3$; a vitamin C soln., 1.6000, reduces 10% $AgNO_3$ contg. 1% glacial AcOH. Histochem. pictures showed that the Golgi app. and vitamin C in the tissues of rabbits and hens were closely related. The histochem. pictures of the Golgi app. and vitamin C in the tissues were greatly enlarged after an injection of vitamin C into the portal vein of the living rabbit. Ruth Berggren

Rogers, Charles Gardner: Textbook of Comparative Physiology. 2nd ed. London: McGraw-Hill Publishing Co., Ltd. 715 pp. 30s.

Tuttle, W. W., and Knowlton, G. Clinton: An Introduction to Experimental Human Physiology. London: Henry Kimpton. 138 pp. 7s. 6d.

G—PATHOLOGY.

The nicotinamide content of the blood in diseases of the liver. Its diminution in connection with hepatic insufficiency. Noel Fiessinger, Michel Albeaux-Fernet, André Lwoff and Andriés Quérido. *Bull. mém. soc. méd. hôp. Paris* **55**, 1111 18(1939); cf. *C. A.* **33**, 2928[9], 6372[6], 6128[3].—The blood nicotinamide (I) was normal in infectious benign icterus, compensated cirrhoses and in 1 case of cancer of the liver, but was markedly decreased in 3 cases of severe cirrhotic icterus, one of which had a rapid fatal termination. The urine porphyrin was high in benign icterus, compensated cirrhoses and alc. polyneuritis with a normal I, as well as in decompensated cirrhoses. No const. relation was found between the diminution in I and the increase of porphyrin in the urine. The decrease in I, like the lowering of total and esterified cholesterol in the blood, may be considered a symptom of severe hepatic insufficiency. A spontaneous increase in I permits a favorable prognosis. Ruth Berggren

The nicotinamide content of the blood in pathological conditions. L. Justin-Besançon, A. Lwoff, A. Quérido and J. M. Inbona. *Bull. mém. soc. méd. hôp. Paris* **55**, 1217 24(1939); cf. *C. A.* **33**, 2928[9], 6372[6], 6428[3].—Of 30 patients with various clinical manifestations the blood nicotinamide (I) was below normal in 1 patient with severe icterus during hepatic cirrhosis, in 1 with alc. polyneuritis, in 3 with hemopathies of different etiology and in 2 with scurvy, one of whom also had pulmonary tuberculosis. The uncomplicated scurvy improved after treatment with ascorbic acid and nicotinamide. In the patient with scurvy and tuberculosis the glossitis and aphthous stomatitis disappeared rapidly after the administration of nicotinamide. I was rarely lower than 0.40 mg. %.
Ruth Berggren

The role of the pituitary gland in water balance. Peter Heinbecker and Harvey L. White. *Ann. Surg.* **110**, 1037-49(1939).—Diabetes insipidus results only after functional or anatomic removal of all the neural hypophysis. The anterior lobe normally probably plays a diuretic role. Creatinine clearance is unchanged and urea clearance somewhat elevated during the transitory phase of exptl. diabetes insipidus. Rachel Brown

The control of water and electrolyte balance in surgical patients. J. Russell Elkinton, Monroe T. Gilmour and Wm. A. Wolff. *Ann. Surg.* **110**, 1050-66(1939).—Electrolyte and water balance in surgical patients can be evaluated fairly accurately by simultaneous detns. of hematocrit value, plasma protein, chlorides and CO_2-combining power. From the 2 latter figures the total base is approximated. Hemoconcn., as shown by a rising hematocrit or plasma protein value, is an indication of serious depletion of the extracellular water. A falling total base concn. indicates serious extracellular base depletion, and, when corrected for hemoconcn., can be used to calc. the amt. of base required. The analytic results also indicate the type of parenteral fluid needed, either whole blood, plasma, physiol. saline, bicarbonate and lactate, or glucose in distd. H_2O. Rachel Brown

Changes in blood chemistry after burning injuries and in other grave surgical conditions; with some references to treatment by desoxycorticosterone acetate. W. C. Wilson and C. P. Stewart. *Edinburgh Med. J.* **46**, *Trans. Med.-Chir. Soc. Edinburgh* **118**, 153-73(1938-39).—After burns serum Na and chlorides fall, while serum K, nonprotein N and urea N and blood chlorides, nonprotein N and urea N rise. There is usually an increased corpuscular concn. Na is lost from other extracellular fluids as well as from blood serum. Evidence indicates that it is lost into the damaged tissues. Some Na passes from serum into red blood cells. The circulatory failure of secondary shock in burns is not due primarily to a low level of serum Na or to any other blood change. Desoxycorticosterone acetate (I) rapidly restores the normal Na level of extracellular fluids and corrects the other blood abnormalities. I also has an occasional effect in improving circulatory efficiency during secondary shock and acute toxemia of burns. In other surgical conditions assocd. with grave circulatory disturbance I has an occasional beneficial action on circulatory failure. It has no obvious effect in bacterial infections. I was administered in oil soln. Rachel Brown

Cancer and its biochemical factors. Maurice Copisarow. *Edinburgh Med. J.* **46**, 781-807(1939).—A review with 287 references. Rachel Brown

A chemical study of ketosis in a dairy herd. C. W. Duncan, C. F. Huffman and H. A. Tobin. *J. Am. Vet. Med. Assoc.* **95**, 690-700(1939).—In 9 Jersey cows suffering from acetonemia the ketone bodies in the blood varied from 1.55 to 79.05 mg. per 100 cc. (mean 23.09 mg.) and the variation in the urinary ketone bodies was 20.3 to 549.5 mg. (mean 154.5 mg.). Four weeks after treatment by a changed diet and administration of chloral hydrate ketone bodies in the blood had decreased to 2.96 and in the urine to 53.6 mg. Ketone bodies in the milk varied from traces to 42.9 mg. No disturbance was indicated in plasma Ca, Mg and Cl. Acidosis was not encountered. There was no relationship between the blood ketone bodies and the CO_2-combining capacity of the blood. The qual. Na nitroprusside test could not be correlated with the amt. of ketone bodies detd. in the urine. 37 references. Rachel Brown

Serum protein changes in different types of cattle during immunization against rinderpest virus. M. H. French. *J. Comp. Path. Therap.* **52**, 183-91(1939); cf. *C. A.* **33**, 3867[8].—Immunization of cattle against rinderpest is attended by changes in the serum protein fractions which are not dependent on breed. There is an increase in globulin, chiefly euglobulin, and a decrease in albumin proportions. The time taken to develop the max. euglobulin content appears shorter with zebu than with other types of cattle examd., but the max. value is of the same order for each type. Rachel Brown

The cerebrospinal fluid in the bovine: its composition and properties in health and disease with special reference to turning sickness. J. Carmichael and E. R. Jones. *J. Comp. Path. Therap.* **52**, 222-8(1939).—Thirty-three bovine spinal fluids gave the following av. values: 10.6 leucocytes per cu. mm., 34.3 mg. total protein per 100 cc., 36.8 mg. glucose, 685.1 mg. chlorides as NaCl, 16.1 mg. nonprotein N, 10.8 mg. urea N, 1.4 mg. creatinine and 5.5 mg. Ca per 100 cc. The Lange colloidal Au test was neg. In 15 cases of turning sickness increases were noted in cell count, globulin and total protein and in one there was a

pos. Lange reaction. Five specimens taken from rinderpest, trypanosomiasis and East Coast fever showed little abnormality. Rachel Brown

The role of endocrine glands in the pathogenesis of allergic reactions. II. Arthus' phenomenon in rabbits thyroidectomized at the peak of sensitization. G. S. Voronyanskiĭ. *Méd. exptl.* (Ukraine) **1939**, No. 4, 7–13. —Fifteen male rabbits were sensitized by 6 injections of 2-cc. doses of normal horse serum into the marginal ear vein at 5-day intervals. Total thyroidectomy performed during the interval between the last sensitizing dose and the toxic dose led to mitigation of Arthus' phenomenon but could not completely prevent its development. S. A. Corson

Physicochemical indexes of the allergic state in animals of different ages. G. Miroshnik. *Méd. exptl.* (Ukraine) **1939**, No. 4, 14–19.—Rabbits and guinea pigs were sensitized by horse serum injections. During the sensitization stage the animals showed no significant changes in the pH (Mislowitzer's method, cf. *C. A.* **21**, 431), buffer capacity and Ca content (de Waard method, cf. *C. A.* **14**, 1559) of the blood serum. During the anaphylactic shock there was a decrease in blood pH and in most cases also in the serum Ca. Guinea pigs can be easily sensitized irrespective of age, while in rabbits the strongest reaction was obtained at the age of 3 months, the most feeble reaction—at the age of 1 month. S. A. Corson

A serological reaction in tuberculosis. John B. West and Ruth M. Easterling. *Am. Rev. Tubercl.* **40**, 599–603 (1939).—In 1930 Hinton (*C. A.* **24**, 2800) proposed a cholesterol agglutination reaction. Bacilli of 3 strains were extd. with 4 portions of ether (Squibb) and the residue was dried at room temp. The ether-insol. residue was then extd. with 5 vols. of 95% EtOH by wt. For serological tests a mixt. of 9 parts of 0.6% soln. of cholesterol in abs. alc. was added to 1 part of bacterial antigen. Liver (from miliary tuberculosis) antigen was likewise prepd. Serums were inactivated at 55° for 15 min. and used in 0.1-cc., 0.3-cc. and 0.5-cc. amts., and to each was added the "glycerinated indicator" prepd. according to Hinton's outline. The tubes contg. the mixt. were shaken for 3 min. at 250 oscillations per min. and then incubated at 37.5° for 16 hrs. and then read, like the Hinton glycerol-cholesterol reaction for syphilis. Of 161 serological tests on cases diagnosed as active tuberculosis clinically, by x-ray, by sputum or by some combination of all 3, all were pos. except 3. Of 18 inactive tuberculosis 4 gave pos. reactions, and the remainder neg. Of 328 control serums only 2 were pos. The work is being continued. H. J. Corper

The effect of tuberculous infection on the carbonic anhydrase of rabbit blood. Cecilia Shiskin. *Tubercle* **20**, 227–38(1939).—The carbonic anhydrase of 17 normal rabbits (41 estns.) varied from 1.18 *E* to 2.26 *E* with an average of 1.56 *E* per cu. mm. of whole blood, and from 2.92 *E* to 6.4 *E* with an average of 4.2 *E*. per cu. mm. of red corpuscles (Meldrum and Roughton (*C. A.* **28**, 2734[3]) have assigned the value *E* to that amt. of enzyme which, when dissolved in 4 cc. of the phosphate-bicarbonate mixt. (equal vols. of 0.2 *M* Na_2HPO_4 and 0.2 *M* KH_2PO_4 and a soln. of $NaHCO_3$ made by dissolving 0.2 *M* $NaHCO_3$ in 0.02 *M* NaOH, prepd. fresh every 4 days), gives a value $(R - Ro/Ro)$ equal to unity at 15°C., if *R* is the rate of evolution of CO_2 during the second quarter of the process (as given by the reciprocal of the time taken) in the presence of catalyst, and *Ro* the rate in the absence of the catalyst, then $(R - Ro/Ro)$ is a suitable measure of catalytic activity). No significant difference was observed between the male and female rabbits. In rabbits infected with tuberculosis, while the av. value remained unchanged both in whole blood and corpuscles (1.50 *E* and 4.18 *E*), much lower values were observed in individual rabbits. In 3 of these rabbits *in extremis*, samples of blood showed a reduction in carbonic anhydrase to $1/2$ or even $1/3$ of the value obtained a few days previously. This marked fall in the carbonic anhydrase could not be ascribed to the reduction in red cells. It would appear that this decrease might be attributed to the action of the enzyme of a toxin, which is not necessarily specific to tuberculosis. In the healthy rabbit the carbonic anhydrase appeared to be more than sufficient for normal requirements and the animal was even capable of maintaining this when infected with tuberculosis. When it became acutely ill toward the end of the disease, however, there was in some cases a striking reduction in the enzyme. H. J. Corper

Proposal for a standard method for the preparation of tuberculin and of an anti-tuberculosis vaccine. G. Petragnani. *Tubercle* **20**, 314–20(1939).—In 1926 Petragnani published a paper on the prepn. of a tuberculin (anatuberculin) (*Atti accad. fisiocritici. Siena*). He uses 10 strains each of virulent human and bovine tubercle bacilli and some avian strains, cultured in liquid synthetic medium (Sauton's). In the first month the neutral reaction changes progressively toward the alk. side until pH 9 is reached, when a gradual lowering to a marked acid reaction sets in (pH 4), which indicates the exhaustion of the medium and the maturation of its antigenic properties in the 2nd month. After the addn. of an equal vol. of sterile water, 7 cc. of formalin at 40 vol. per l. are added, followed by further incubation for 20 days. Ten cultures of human and bovine strains and one avian are filtered through a sterile gauze and cotton filter. The culture liquid is adjusted at pH 7.2 and is again incubated for 10 days. The liquid is anatuberculin. The bacillary bodies pressed out and weighed are triturated in a large mortar with a 3-fold quantity (wt.) of pure sterile NaCl and used to prep. integral anatuberculin, which consists of adding 1 cc. of normal NaCl with formalin to a homogenous emulsion of tubercle bacilli. This must never be exposed to a temp. above 37–38°. Three parts of NaCl are added to the moist bacilli in a sterile porcelain or glass mortar with grinding and the slow addn. of water and 6% formalin (at 40 vols.) till a concn. of 1.8% NaCl and 0.6% of bacillary bodies is reached. The mixt. is kept for 4 to 8 wks. in the incubator and an equal quantity of slightly alk. water is added. This is integral anatuberculin. This injected in doses of 0.1, 0.2 or 0.5 cc. into animals and children causes a nodule after several weeks which becomes a cold abscess and may rupture. This antituberculosis vaccine produces a marked sp. allergy for tuberculin and increases the resistance to infection in man and animals. Twelve Italian references to the original observations are appended. H. J. Corper

Acute or chronic tuberculous lesions produced by colonial variants of tubercle bacilli. K. C. Smithburn. *Tubercle* **20**, 420–5(1939).—Four lines of cultures derived from a single strain of bovine tubercle bacilli by cultivation at different pH values showed marked differences in colony morphology which were used in tests of their pathogenic properties. Cultivation at pH 6.0 yielded colonies which were coarsely granular and markedly attenuated. Lesions produced by these organisms were of the "hard" tubercle type, were non-invasive, and showed little tendency toward caseation. A pH of 6.8 proved to be the optimum for the cultivation of smooth colonies which were highly virulent. These organisms produced "acute" or "soft" tubercles which were invasive and showed a marked tendency to caseation. Cultivation of the organism at pH 6.4 through several generations yielded granular colonies which were moderately attenuated. Cultivation at pH 7.2 yielded finely granular, flat colonies which were slightly attenuated. Lesions produced by the latter two lines of cultures were of both the "acute" and "chronic" type, the cultures grown at pH 7.2 inducing the formation of the greater no. of "acute" lesions. H. J. Corper

Influence of experimental nephritis, hepatitis or hepatonephritis from various causes on the various nitrogenous constituents of blood serum of dogs. E. Aubertin and R. Martinet. *Compt. rend. soc. biol.* **132**, 264–7(1939).—Nephritis, hepatitis, or both were produced in dogs by poisoning with CCl_4, P in oil, or U nitrate, or by resection of the bile duct, or by intravenous injection of horse hemoglobin. Increases in most of the N compds., except albumin and sometimes creatine, were found (no analytical data given). L. E. Gilson

[Inhibiting] action of diethyl ether on histamine release in anaphylaxis. G. Katz, C. T. Frey and L. Ireland Frey.

Proc. Soc. Exptl. Biol. Med. **42**, 716–18(1939).—Preliminary. L. E. Gilson 1

Cystinuria in two Scotch terriers. Edwin R. Blamey and Erwin Brand. *Proc. Soc. Exptl. Biol. Med.* **42**, 747–9 (1939).—The urine contained 200–400 mg. cystine per l. Some calculi formed in one dog. L. E. Gilson

Influence of sex and age on the diabetic traits in a strain of rats. Versa V. Cole and Ben K. Harned. *Proc. Soc. Exptl. Biol. Med.* **42**, 758–61(1939); cf. *C. A.* **32**, 8551[7], 8596[1].—Females of the Yale strain exhibit a low glucose tolerance similar to that of the males. The estrus cycle is not a factor. After 240 days of age the severity of the diabetic trait increases in the males. L. E. Gilson 2

Macromolecular [protein] component of chick embryo tissue diseased with western-strain encephalomyelitis virus. D. G. Sharp, A. R. Taylor, Dorothy Beard, Harold Finkelstein and J. W. Beard. *Proc. Soc. Exptl. Biol. Med.* **42**, 790-2(1939); cf. *C. A.* **34**, 781[8], 808[9].—Preliminary report on ultracentrifugation expts. L. E. G. 3

Hyaluronic acid in pleura fluid associated with malignant tumor involving pleura and peritoneum. Karl Meyer and Eleanor Chaffee. *Proc. Soc. Exptl. Biol. Med.* **42**, 797-800(1939).—Hyaluronic acid (cf. *C. A.* **32**, 7937[2]) was present to the extent of 0.14–0.18% in the chest fluid of a patient with a malignant tumor. L. E. Gilson

Immunological studies on the cellular constituents of C. diphtheriae. Sam C. Wong and T. T'ung. *Proc. Soc. Exptl. Biol. Med.* **42**, 824–8(1939).—A method for the isolation of a type-specific protein from *C. diphtheriae* is described. Both the lipoid and carbohydrate fractions are group-specific while the alkali-sol. protein is type-specific. The type-specific substance is heat-labile and is converted into a group-specific protein by heating 30 min. at 56°. 4
L. E. Gilson.

Hypoglucemia and increased insulin sensitivity following hypothalamic lesions [in dogs]. Allen D. Keller. *Proc. Soc. Exptl. Biol. Med.* **42**, 837–8(1939).—Preliminary. L. E. Gilson

Biochemistry of insulin shock. II. Chlorides in the tissues. Filippo Romeo. *Arch. farmacol. sper.* **68**, 99-104(1939); cf. *C. A.* **34**, 155[2]. Rabbits were killed by insulin shock. Cl diminished in practically all the organs except the nervous tissue, where it increased. Helen Lee Gruehl

Ascorbic acid content of the organs in experimental infection with influenza virus. F. De Ritis and G. Stolfi. *Boll. soc. ital. biol. sper.* **14**, 634-5(1939).—In the rat there were no appreciable alterations in ascorbic acid content of the organs after infection. Helen Lee Gruehl

Histaminemia and histaminolysis in Quincke's edema. L. Businco. *Boll. soc. ital. biol. sper.* **14**, 646-8(1939).—At the end of an attack the histamine titer and histaminolytic power of the blood increased markedly. In the same person during normal periods the histamine titer diminished to values still somewhat above normal. H. L. G. 7

Experimental rickets from the administration of beryllium carbonate. L. Businco. *Boll. soc. ital. biol. sper.* **14**, 649–51(1939). Helen Lee Gruehl

Chemical constitution of ovarian cyst fluid. G. Stolfi. *Boll. soc. ital. biol. sper.* **14**, 657–9(1939).—In comparative tests with blood, the cyst fluid contained about the same amt. of N, more NaCl and less protein. The P and glucose values varied greatly. Helen Lee Gruehl 8

Various fractions of residual nitrogen of the blood during traumatic shock. G. Stolfi and L. Provenzale. *Boll. soc. ital. biol. sper.* **14**, 661-2(1939).—In rabbits traumatic shock caused an increase in urea and creatinine but did not alter the creatine, amino acid or uric acid N of the blood. Helen Lee Gruehl

Hemoglobin and porphyrin metabolism in various anemic conditions, particularly pernicious anemia. L. Cotti. *Boll. soc. ital. biol. sper.* **14**, 710–12(1939).—In hemolytic icterus and pernicious anemia there was an increase in porphyrin excretion independent of the amt. of hemolysis. Fecal porphyrin excretion increased in hypochromic anemia. Helen Lee Gruehl 9

Sugar metabolism and insulin therapy in acne vulgaris. H. C. Semon and F. Herrmann. *Roy. Soc. Med., Sect. Dermatol.* **1939**; *Brit. J. Dermatol. Syphilis* **51**, 477–81 (1939).—Ten men and women with acne showed glucose-tolerance curves characterized by a lag in return to the initial fasting blood-sugar level. This lag was especially marked in women during the premenstrual and menstrual periods, when the acne was exacerbated. Improvement in the skin condition uniformly followed administration of 5–10 units insulin, generally twice weekly. M. Horn

Arteriosclerosis. Ludwig Aschoff. *Z. ges. Neurol. Psychiat.* **167**, 214–37(1939).—A review, with an extensive bibliography, emphasizing the chem. factors (Ca, lipoids, vitamins, hormones) in the pathogenesis of arteriosclerosis. Marion Horn

Arteriosclerosis. W. Frey. *Z. ges. Neurol. Psychiat.* **167**, 237-73(1939).—A review, with an extensive bibliography, of the diagnosis, incidence, pathogenesis, prevention and treatment of arteriosclerosis. Marion Horn

The carcinolytic power of serum in certain diseases of the visceral organs. N. E. Kavetskiĭ. *J. méd., Ukraine* **9**, 61-5(in French 65)(1939).—The carcinolytic power of the serum falls sharply in visceral cancer, and also to a lesser extent in those diseases of a precancerous state, such as chronic gastritis, with diminution of gastric juice, gastric ulcers, etc., which show an inhibition of the active mesenchyme. A sharp fall in the carcinolytic power of the serum is also noted in pneumonia. S. A. Karjala

The carcinolytic power of the blood serum and of extracts of organs of rats resistant to Jensen's sarcoma. S. R. Muchnik and M. Vurgaft. *J. méd., Ukraine* **9**, 67–72 (in French 72)(1939).—The blood serum and exts. of the liver and kidneys of rats resistant to Jensen's sarcoma have a higher carcinolytic power than those of normal rats and of rats with tumors. S. A. Karjala

Blood glutathione in certain internal diseases. G. L. Vitkovskaya. *Klin. Med.* (U. S. S. R.) **16**, 991–5(1938). —The normal content of reduced glutathione (I) in the venous blood of healthy persons is 21–30 mg. %. No changes in I were observed in cases of heart disease without acute symptoms and in rheumatic polyarthritis. Patients with diseases of the endocrine system show a decrease in reduced I while hyperthyroidism is characterized by an increase in reduced I. S. A. Karjala 5

The glutathione content of the blood of leucemic patients. K. M. Malenkova. *Klin. Med.* (U. S. S. R.) **16**, 1007-9(1938).—Leucemic patients have a higher content of total glutathione (I) than normal subjects while the ratio of oxidized I to reduced I is below normal. The I content of erythrocytes differs only slightly from normal, most of the increased I being found in the leucocytes. S. A. Karjala 6

Changes in the oxidation-reduction potential [of the blood] in cardiovascular diseases and pneumonia. A. D. Bogdanova. *Klin. Med.* (U. S. S. R.) **16**, 1372–7(1938).—The oxidation-reduction potential (I) of the blood of patients with insufficient blood circulation is decreased, but in cases of compensative disorders no changes are observed. At the crisis in pneumonia a reduction in I occurs, with a rise to normal during convalescence. I is an unsatisfactory diagnostic measure in these cases. S. A. Karjala

Carotene in the blood and its pathological significance. Ya. S. Khentov, F. A. Rachevskiĭ and A. M. Shendel. *Klin. Med.* (U. S. S. R.) **17**, No. 8, 20–5(1939).—The carotene (I) content of the blood lies within the limits of 0.02–0.05 mg. % in normal subjects, and in patients with cancer of the stomach, cholecystitis, stomach ulcers, etc., while in patients with bronchial asthma, tuberculosis or cancer of the lungs, diabetes, pernicious anemia, hypertonia, arterial sclerosis, cirrhosis of the liver, severe hepatitis, etc., it increases to 0.06–0.2 mg. %. Carotenemia is due to a reduction in the oxidative processes of the organism as a result of destroyed liver function. Thyroidin, prolan, insulin and raw liver increase the oxidative processes and liver function and decrease the amt. of I in the blood. S. A. Karjala 10

Iron metabolism in anemic conditions. II. The determination of the iron balance after iron treatment. L. A. Brodovich. *Klin. Med.* (U. S. S. R.) **17**, No. 8, 69–74 (1939); cf. *C. A.* **33**, 8776[3].—The administration of 1 g.

of Fe lactate often results in considerable retention of Fe in both healthy persons and anemic patients. There is no greater tendency for retention of Fe in cases of hypochromic anemia than in normal subjects. S. A. Karjala 1

Species specificity of proteins from the optic lens. Leo Markin and Preston Kyes. *J. Infectious Diseases* **65**, 156-9(1939).—The lack of agreement on the species specificity of lens protein among workers using anaphylaxis as the immune reaction for comparisop of species may be due to, among other factors, the use of too small groups of animals. The authors, experienced in the use of pigeons and convinced of their superiority for anaphylaxis, repeated the usual expts. with a large group of these animals and concluded that the constituent proteins of the lens are the same in mammalian species as widely sepd. as dog and beef. Autosensitization to lens protein, though produced in guinea pigs, could not be produced in pigeons. 2
Julian H. Lewis

The value of the complement-fixation test in the diagnosis of psittacosis. K. F. Meyer and B. Eddie. *J. Infectious Diseases* **65**, 225-33(1939); cf. *C. A.* **33**, 8283[9].—The complement-fixation tests with cocto-antigens prepd. from virulent mouse spleens or preferably Rivers-Li tissue cultures of the virus are invaluable aids in the early and late diagnosis of human psittacosis. Convalescent human serum and immune goat serum may shorten the course of the disease. 3
Julian H. Lewis

The pallida reaction. H. Gärtner. *Z. Immunitäts.* **96**, 225-35(1939).—Experience with the pallida reaction for syphilis in which an ext. of spirochetes is used as antigen indicates that the method is of chief value as a connecting link between the Wassermann reaction and the flocculation reactions. Certain precautions in the technique of the reaction are described. 4
Julian H. Lewis

Apparent deviations of the Kauffmann-White scheme in the use of immune serums obtained with isolated O antigen. Richard Haas. *Z. Immunitäts.* **96**, 275-86(1939). In spite of the practical significance of the Kaufmann-White scheme of antigens of the typhoid-paratyphoid-enteritis bacilli no investigations have been made on the application of the scheme to dissolved constituents of the organisms. Rabbits immunized with endotoxin solns. of paratyphoid B or D made by extg. the bacilli with trichloroacetic acid produce antiserums that react with these solns. The antiserums show cross reactions between paratyphoid B and D which are attributed to the presence in both of antigen XII. By absorption with heterologous strains antiserums are obtained which according to the Kaufmann-White scheme are specific for antigen *O*. Typhoid endotoxin antiserums neutralize paratyphoid B endotoxin and vice versa. This effect is due to the presence of the XII—*O* antigen. 5
Julian H. Lewis

The serological diagnosis of Weil's disease. W. Gaehtgens. *Z. Immunitäts.* **96**, 287-319(1939); cf. *C. A.* **28**, 5122[6].—The large increase of cases of Weil's disease demands certain and ready means of diagnosis. The isolation of the causative organisms comes first in importance, then the serological tests, agglutination or complement fixation, with *Spirochaeta icterogenes* as antigens. Both serological methods give good diagnostic results, but each has advantages over the other. 6
Julian H. Lewis

Antibody formation for mucin. K. L. Freiherr v. Godin. *Z. Immunitäts.* **96**, 320-6(1939).—Mucin as such cannot form precipitins. The precipitins formed by injecting the best purified mucin are due to the rest protein that remains as a contaminant. Since the contaminating protein cannot be removed the inactivity of mucin was detd. by indirect evidence which involved quant. serological tests that accounted for the contaminating protein. 7
J. H. L.

The biological action of the acetylpolysaccharide from human tubercle bacilli. Yosiharu Takeda, Tatuo Ota and Minoru Sato. *Z. Immunitäts.* **96**, 326-34(1939).—Acetylpolysaccharide isolated from the aq. ext. of defatted human tubercle bacilli produced immune precipitins. It also reacted with 82% of the serums from tuberculous patients and 54% of the serums from lepers. It did not react with human serum from patients with no pulmonary tuberculosis. In tuberculous guinea pigs it gave a diffuse reddish skin reaction with hemorrhage or necrosis. 8
J. H. L.

The influence of the thyroid hormone on anaphylactic shock in guinea pigs. H. W. Stietzel. *Z. Immunitäts.* **96**, 352-60(1939).—Thyroid hormone inhibits anaphylactic shock instead of increasing it as formerly believed. The degree of inhibition corresponds to that produced by ascorbic acid. The intraperitoneal injection of a thyroid prepn. increases the globulin fraction of guinea-pig serum. 9
Julian H. Lewis

The production of active immunity by cutaneous application of ointments. R. Torikata and S. Ozu. *Z. Immunitäts.* **96**, 413-26(1939).—Cocto-antigen applied to the skin in the form of an ointment for 24 hrs. produces a higher titer of antibodies but more slowly than does the same amt. of antigen given intravenously. Cocaine added to the ointment decreases antibody production. An irritant added has no effect on the amt. of antibody formation but lowers the rate. 10
Julian H. Lewis

The isolation of a glucose-containing cerebroside from spleen in a case of Gaucher's disease. Nellie Halliday, Harry J. Deuel, Jr., L. J. Tragerman and W. E. Ward. *J. Biol. Chem.* **132**, 171-80(1940).—The cerebroside sepd. from the spleen of a patient suffering from Gaucher's disease resembled kerasin except that it contained glucose rather than galactose. In all probability this glucose-contg. cerebroside is the result of an anomaly in carbohydrate metabolism rather than the characteristic of the disease. It is suggested that the term "glycolipide" be reserved for those cerebrosides having glucose as the component carbohydrate while "galactolipide" be used to describe those contg. the galactose mol. 11
A. P. L.

Properties of the inhibitor associated with the active agent of chicken tumor I. Albert Claude. *Am. J. Cancer* **37**, 59-63(1939); cf. *C. A.* **32**, 5491[8].—The inhibiting factor found in exts. of slowly growing chicken tumor I appears to be a protein. 12
E. R. Main

Antistreptolysin S titers in rheumatic fever. E. W. Todd, Alvin F. Coburn and A. Bradford Hill. *Lancet* **1939, II**, 1213-17; cf. *C. A.* **33**, 1034[3]. The titer of antistreptolysin S in the serum of children with active rheumatic fever tends to be lower than in the serum of nonrheumatic children or rheumatic children during periods of rheumatic inactivity. The titer is lowest when the symptoms are the most pronounced. The antistreptolysin O titer tends to become increased during active rheumatic fever. 13
E. R. Main

Spectroanalytical investigations on the magnesium content of blood with various diseases. Elizabeth Zimmer. *Spectrochim. Acta* **1**, 93-106(1939).—The general physiol. and pharmacol. properties of Mg are reviewed. Chem. detns. are restricted to micromethods. Details concerning app. and procedure are given for spectrochem. detns. of Mg in blood. The light source is an interrupted arc between Cu electrodes with 0.03 cc. blood mixed with 0.06 cc. of 0.9% NaCl soln. dried on the anode and a small amt. of AuCl soln. added to supply an internal standard. Parallel detns. of Mg in natural and in ashed blood samples showed that albumin in the former appears to enhance the Mg line. Mg values obtained with unashed blood were reduced by 53% to correct for this effect. Relative values of Mg in blood of 67 patients with various diseases range from 3.4 to 5.7 mg. per 100 cc. The av. error is ± 13%. Correlation of the Mg content of blood with particular diseases could not be established. 14
W. F. Meggers

Observations on human beings with cancer, maintained at reduced temperatures of 75°-90° Fahrenheit. Lawrence W. Smith and Temple Fay. *Am. J. Clin. Path.* **10**, 1-11(1940).—Exposures of 4-5 days at these temps. repeated 3 times caused a drop in blood urea, nonprotein N and chlorides with no other definite changes in blood chemistry. The urinalysis is unchanged. The basal metabolic rate is reduced, but direct calorimetry should give less erratic results. 15
John T. Myers

Histologic structure of carcinomas of the stomach and quality of gastric secretion. Alexander Brunschwig and T. Howard Clarke. *Ann. Internal Med.* **13**, 1001-4

(1939).—There was no correlation between the type of carcinoma and the character of gastric secretion. John T. Myers

Tissue metabolism and phosphatase activity in early callus. J. P. Tollman, D. H. Drummond, A. R. McIntyre and J. Dewey Bisgard. *Arch. Surg.* 40, 43–53 (1940).—The levels of phosphatase and of Ca in infected fractures in rabbits were lower than in sterile fractures. There was a uniform rise in the level of blood phosphatase in the infected series. In both infected and sterile fractures, high levels of phosphatase activity were assocd. with the presence of large Ca deposits. J. T. M.

Experimental goiter due to calcium. C. Alexander Hellwig. *Arch. Surg.* 40, 98–102(1940).—$CaCO_3$ is as effective in producing goiter in white rats as is $CaCl_2$. Addn. of vitamins to a goitrogenic diet did not prevent hyperplasia of the thyroid. Prolonged feeding of the goitrogenic diet did not produce secondary thyroid atrophy. A diet rich in Ca and low in I produced parenchymatous goiter. A diet rich in Ca and relatively rich in I produced colloid goiter. The amt. of I required to prevent goiter is variable and depends on the presence and intensity of pos. goitrogenic agents. John T. Myers

Etiology of stone in the common bile duct. R. Franklin Carter, Carl H. Greene, J. Russel Twiss and Richard Hotz. *Arch. Surg.* 40, 103–19(1940).—When the gall bladder becomes functionless, the common duct takes over the function of concg. the bile. Concn. in the duct may be increased by stasis and by gastric achylia which predisposes to infection. These factors favor the deposition of bile sand and the formation of Ca bilirubinate stones. John T. Myers

Immunological experiments with highly concentrated suspensions of the Rous I tumor-producing agent. C. R. Amies and J. G. Carr. *J. Path. Bact.* 49, 496–513(1939). —The tumor agent has at least 2 antigenic components, corresponding to 2 antibodies. One of the antibodies is present in Rous immune fowl serum and the other in anti-fowl rabbit serum. Concd. suspensions were obtained by sedimenting the agent from cell-free tumor exts. by means of centrifuging at pH 5.0–5.5 and digesting the resuspended deposit with com. trypsin at pH 9.0, the process being repeated several times. John T. Myers

Fluorine with relation to teeth. C. G. Gillespie. *Calif. State Dept. Health Weekly Bull.* 18, 145–6(1939).—F can be removed from water by filtration through pure tricalcium phosphate, by freezing the water and eliminating the core in which F is concd., and by distn. It is stated that F values reported earlier than 5 yrs. ago should be discarded because no account was taken of interfering substances. J. Pinchack

The pancreatic enzymes and food allergy. Anton W. Oelgoetz, Paul A. Oelgoetz and J. Wittekind. *Med. Record* 151, 276–9(1939).—The hypothesis that food allergy is caused by diminished duodenal pancreatic enzymes is supported by demonstration of such enzymes in organs and tissues, data for the liver being given. A test for pancreatic enzymes in blood serum is described, which involves the use of starch suspension plus Lugol soln. J. Pinchack

Sensitization to simple chemicals. V. Comparison between reactions to commercial and to purified dyes. Rudolph Hecht, Ludwig Schwarzschild and Marion B. Sulzberger. *N. Y. State J. Med.* 39, 2170–3(1939); cf. *C. A.* 32, 2601[9].—On the basis of patch tests with com. and chemically purified tetrabromofluoresceins in 8 hypersensitive patients, it is suggested that not the dye itself but some impurity or by-product of manuf. may be responsible for allergic reactions or may act synergistically with the dye to produce such reactions. J. Pinchack

Preliminary note on the production of cirrhotic changes in the liver by furfural feeding. Waro Nakahara and Kazuo Mori. *Proc. Imp. Acad.* (Tokyo) 15, 278–81 (1939)(in English).—Of the known constituents of saké, including carbohydrates, amines, MeOH, EtOH, EtMeCO, C_3H_4O and furfural, etc., only furfural produced any pathol. changes in expts. on 700 rats over a period of 300 days. Forty cc. furfural was mixed with 1 kg. polished rice and over a period of 2 months the dose was increased to 100 cc./kg. Sixty-two rats fed on this rice died during the first 37 days and showed no liver symptoms. The rest of the rats all showed symptoms ranging from somewhat localized whitish areas to generalized cirrhotic changes. The longest survival time was 88 days. M. Schubert

The influence of rice-bran oil on the growth and histology of normal and tumorous tissues in tissue culture. Syuzo Morigami. *Gann* 33, 384–9(1939).—Okada (*Osaka Igaku Zasshi* 37, 827(1938); cf. *C. A.* 34, 1804) reported that daily ingestion of a small amt. of rice-bran oil prevented the production of cancer in livers of dimethylaminoazobenzene-fed rats. In the present study the action of various fractions of rice-bran oil was tested upon the outgrowth of normal and tumorous tissues *in vitro*. Rice-bran oil (R) was sapond. with alc. KOH and the unsaponifiable material was extd. with ether. The ether-sol. material was divided into acetone-sol. fraction (L) and acetone-insol. fraction (U). The fraction U was treated with CH_3OH and 3 different cryst. substances, U_1 and U_2 and U_3, have been isolated. All the fractions were tested in concn. of 0.05% in the culture medium of normal chicken embryo fibroblasts and tissue of rat sarcoma due to benzopyrene. The results showed that fraction R stimulated the growth of normal fibroblasts. Fraction L significantly stimulated the growth of both normal and sarcomatous tissues. Fraction U had definite inhibitory action upon both normal and sarcomatous tissues. Fractions U_1 and U_2 more or less stimulated the growth of fibroblasts, but U_3 inhibited the growth markedly. K. Sugiura

Serological study on the specific type substance in the saliva and salivary glands of man. I. Saliva. Eisyoku Kin. *J. Chosen Med. Assoc.* 29, 1988–2024(German abstr., 128–9)(1939).—The specific type substances present in the saliva of type A and type B groups are heat-stable (100°C. for 20 min.), and are not sol. in alc. or Et_2O. *Anti-A* or *-B* serum (immunized against saliva of type A or B), does not give specific pptn. reaction with the saline ext. of salivary glands or lipides of the glands. S. Tashiro

Marañón, G.: Manual de las enfermedades endocrinas y del metabolismo. Buenos Aires: Libreria Hachette, S. A. 355 pp. Reviewed in *J. Am. Med. Assoc.* 114, 277(1940).

Segal, Jacob: Pulmonary Tuberculosis: A Synopsis. London: Oxford Univ. Press. 150 pp. $2.75. Reviewed in *Am. J. Pub. Health* 29, 1356(1939).

H—PHARMACOLOGY

CARL F. SCHMIDT

An investigation on the alleged toxicity of cod-liver oil for pigs. N. J. Scorgie and Wm. C. Miller. *Empire J. Expl. Agr.* 7, 357–68(1939).—Genuine cod-liver oil is not a factor in the causation of toxic liver dystrophy of pigs, even when given in excessive amts. J. R. Adams

Phosphotungstic tuberculin. Yosio Miyazima. *Oriental J. Diseases Infants* 24, 30–1(1938)(in English).—Human and bovine types of tubercle bacilli were cultured on an albumose-free medium for 8 weeks. The phosphotungstic tuberculin (I) was prepd. from the filtrate of this culture by the method of Boquet and Sandor (*C. A.* 31, 6688[7]). The intracutaneous reaction of I in tuberculous guinea pigs was the same as that of the old-style tuberculin (II) for the human type but somewhat stronger than that of II for the bovine type. I was less toxic than II, the min. lethal dose of I being 1.0 cc. Subcutaneous injection of I produced an increase in the body temp. of the tuberculous guinea pig. Both I and II gave pos. reactions in the tuberculous guinea pig after the same time interval. I showed a marked resistance to ultraviolet light. Treatment of I with pepsin or trypsin for 12 hrs. caused rapid soln. and destruction of the active material. Animal charcoal adsorbed the active material of I in 3 hrs. Ruth Berggren

The oxidation-reduction potentials of living tissues. III. The influence of intravenous injections of adrenaline,

histamine, potassium cyanide and vitamin C on the oxidation-reduction potentials in the living rabbit. Tatuo Araki. *Oriental J. Diseases Infants* 25, 33–5(1939) (in German).—An injection of 0.05, 0.1, 0.2 or 0.5 mg. adrenaline per kg. body wt. decreased the oxidation-reduction potentials (o-r p.'s) of the liver and muscle, as estd. by A.'s method (*Ibid.* 22, 29(1937)) and somewhat later increased that of the spleen. These results are attributed to the circulatory changes produced by adrenaline. Under the exptl. conditions the influence of the oxidation-promoting action of adrenaline is hardly perceptible. An injection of 0.5, 0.75, 1.0 or 2.5 mg. histamine per kg. immediately raised the o-r p.'s of the lungs and liver and lowered those of the muscle and subcutaneous tissue. The histamine, in general, produced a decrease, followed later by a small increase, in the o-r p. of the spleen and kidneys. These results are due to the action of the histamine on the vascular system and cells. Directly after an injection of 0.5 mg. KCN per kg. the o-r p. of the liver rapidly increased and then gradually decreased, the o-r p. of the kidneys increased, while those of the muscle, subcutaneous tissue and spleen decreased distinctly. In the venous blood the o-r p. underwent a sudden marked fall, followed by a gradual recovery. These changes are probably caused by a direct action of the KCN on respiration enzymes. After the injection of 50 mg. vitamin C per kg. the o-r p.'s of all the organs were generally lowered; in the liver the decrease was slight and followed by an increase. The lowering is attributed to the strong reducing power of vitamin C and the increase is probably due to its oxidation-promoting action. In the organs other than the liver the reducing action predominates over the oxidation-promoting action. Vitamin C markedly detoxicates KCN, has an activating action on respiration enzymes and plays an important role in the o-r processes. **IV. The oxidation-reduction potentials of various organs during serum anaphylaxis in the rabbit.** *Ibid.* 36–7.—In rabbits sensitized with horse serum the o-r p.'s of the liver and lungs were increased, while those of the other organs were not appreciably changed. In general, the o-r p.'s of the organs were increased in the initial stages of anaphylactic shock and then decreased if sufficient anaphylatoxin was present. These changes were evident in all the organs, but the degree of change varied with each organ. The increase was most distinct in the liver, lungs and spleen; e. g., the o-r p. was increased by 50 mv. in the liver and by 28 mv. in the lungs. In the other organs the capacity of the o-r p. to increase is small and, in addn., is suppressed by the action of other factors, so that the o-r p. in these organs is eventually lowered. Ruth Berggren

Sodium chlorate poisoning. Ernest C. McCulloch. *J. Am. Vet. Med. Assoc.* 95, 675–82(1939).—The lethal oral dose of $NaClO_3$ for chicks is slightly greater than 5 mg. per g. of body wt.; for sheep it is between 2.06 and 2.50 mg. per g. of body wt. Rachel Brown

The influence of manganese on body weight and propagation. O. Ehrismann. *Z. Hyg. Infektionskrankh.* 122, 171–88(1939).—The feeding of MnO_2 to white mice increased the body wt. The span of life was not affected. The body wt. of the young of MnO_2-treated females increased rapidly during growth and remained higher in later life than the controls. The litters were reduced from a normal of 4.95 to 4.23. The no. of stillbirths increased almost 40%. The organs of mice fed MnO_2 showed an increased amt. of Mn over normal. Rachel Brown

Burn therapy. M. A. Lesser. *Drug Cosmetic Ind.* 45, 681–3, 686–7(1939).—A review with 22 references. H. M. Burlage

Distribution of intravenously injected silver through the body organs. A. Curatolo. *Atti accad. Lincei, Classe sci. fis., mat. nat.* 29, 522–4(1939).—Using the micro-method (*C. A.* 33, 2928[2]) C. dets. the Ag content of the body of rabbits after injections of Ag (collargol). Most of the Ag is eliminated in the urine. The liver, spleen, lungs, kidneys, bone marrow and heart retain decreasing amts. of Ag, while the brain, testicles and muscles do not retain detectable amts. A. W. Contieri

Intestinal tuberculosis and calcium gluconate. Vito V. Pisani. *Am. Rev. Tuberc.* 40, 571–80(1939).—The conviction that Ca therapy may be of benefit in intestinal tuberculosis is based upon the following considerations: Ca has antiphlogistic and antispasmodic properties, exerting thereby a favorable influence upon the nutritional changes in the tissues; ulceration is mainly due to such changes; it restores the normal Ca-ion concn., thus creating an environment less favorable for the growth and multiplication of the tubercle bacilli; it stimulates phagocytosis; it stimulates fibrosis; above all, it tends to restore the normal physiology of the intestines by counterbalancing the existing vagotonia through the stimulation of the sympathetic filaments. Such a pharmacol. property alone is sufficient to place Ca as an invaluable adjunct in the treatment of intestinal tuberculosis. H. J. Corper

Pleural sensitivity to procaine. K. M. Soderstrom. *Am. Rev. Tuberc.* 40, 733–7(1939).—That it is possible for the pleura of an individual taking pneumothorax collapse therapy to develop a hypersensitivity to procaine local anesthesia was demonstrated by 11 cases observed in the past 2½ yrs. at Firland Sanatorium. This demonstration of sensitivity indicates that procaine and probably all local anesthetics, are causative agents or allergens in the development of a specific hypersensitivity in a certain few patients. H. J. Corper

The treatment of tuberculosis by means of antituberculosis endotoxoid and specific serum. E. Grasset. *Tubercle* 20, 397–419(1939).—Tuberculosis endotoxoid, obtained from the tubercle bacillus by an extn. process of repeated freezing at a low temp. and submitted in the presence of hydrolyzed peptic medium, to the detoxicating action of formalin (0.2%), possesses, in an atoxic nonsensitizing form, high antigenic properties both *in vivo* and *in vitro*. The ext. contains the water-sol. lipoid fraction of the tubercle bacillus and a low bacillary protein content. When injected in doses increasing from 0.05 to 1.5 cc. over a period of several months, endotoxoid exerts a definite therapeutic action in tuberculous patients. The therapeutic action manifests itself in a variety of tuberculous conditions by a general action which is antitoxic, progressive and durable. There is a decrease in temp. and pulse and an increase in wt.; toxic phenomena disappear and the general condition is improved. No contra-indications have been observed. H. J. Corper

Action of neurotropic substances on secretory (salivary) nerves during experimental sensitization. N. G. Ponirovskiĭ and N. Ya. Ganetskaya. *Méd. exptl.* (Ukraine) 1939, No. 4, 1–6.—Expts. were performed on 8 dogs with chronic salivary fistulas. After the salivary response to small doses of a 1% soln. of pilocarpine-HCl was established, horse serum was administered to the dogs according to R. Weil. Observations were made for 90 min. The first (subcutaneous) and second (intravenous) injections of the serum (given 30 min. after the beginning of the salivation induced by pilocarpine) led to increased salivation. In dogs undergoing alternating tests with pilocarpine and adrenaline the second serum injection decreased the salivary response. The third intravenous serum injection produced, after a short period of increased salivation, an inhibition of the pilocarpine salivary response. S. A. Corson

The influence of yellow bone marrow extract on experimental benzene leucopenia. F. Oestreicher. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* 9, 260–3(1939).—The leucopenia and relative lymphopenia produced in rats by subcutaneous administration of benzene are not affected by administration of yellow bone marrow exts. prepd. according to the method of Zichis (*C. A.* 31, 2271[1]). E. Curzon

Effect of treatment with cocaine on the hemostatic action of adrenaline or ephedrine. Gustave Derouaux. *Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.* 9, 266–8(1939).—See *C. A.* 33, 8792[5]. E. Curzon

Toxicity of helminths. R. Mandoul. *Ann. parasitol. humaine et comparée* 17, 187–92(1939).—In *Ascaris megalocephala* there is a material toxic for the guinea pig which is sol. in trichloroacetic acid, in alc. at 50° and is nondialyzable. This substance may be of polypeptide nature. No

such material is found in *Moniesia expansa* or in *Fasciola hepatica*. E. Curzon

Chemotherapy of strongylosis of rats. Albert Erhardt and Karl Denecke. *Ann. parasitol. humaine et comparée* 17, 199–205(1939).—A control method for studies of the chemotherapy of strongylosis of rats is described. A 1:6 combination of ascaridole and CCl_4 had no vermicidal action on *Strongyloides ratti*. E. Curzon

Pharmacology of hydrogen, sulfur and the halogens. Hans Braun. *Süddeut. Apoth.-Ztg.* 79, 805–9(1939).—Twenty-one references. W. O. E.

Arrest by metallic aluminum of the injurious action of silica dusts on conjunctival tissue. A. Policard and J. Rollet. *Compt. rend. soc. biol.* 132, 190-2(1939); cf. *C. A.* 33, 7382[7].—Dusts of various silica minerals introduced into the cornea of the rabbit eye as previously described produced much less damage if previously mixed with 10% of Al metal powder. L. E. Gilson

Action of cobalt minerals on conjunctival tissue as observed with the corneal biomicroscope. A. Policard and J. Rollet. *Compt. rend. soc. biol.* 132, 192-3(1939); cf. *C. A.* 33, 7382[6].—The powd. minerals were introduced into the rabbit cornea as previously described. Cobaltite (CoAsS) and pitchblende produced no permanent opacity but smaltite from various sources produced a permanently opaque spot in all cases. L. E. Gilson

Action of sodium thiosulfate on coproporphyrinuria in experimental lead poisoning in [adult] rabbits. Léon Binet, L. Pérel and Geneviève Glotz. *Compt. rend. soc. biol.* 132, 195–6(1939); cf. *C. A.* 33, 8797[1].—The intraperitoneal injection of 0.2 g. Pb acetate causes the appearance of coproporphyrin in the urine within 48 hrs. The coproporphyrinuria persists for weeks if not treated but disappears in 2 days if about 1 g. of $Na_2S_2O_3$ is injected daily. L. E. Gilson

Effects of extract of Rauwolfia heterophylla on the cardiac vagus. Raymond-Hamet. *Compt. rend. soc. biol.* 132, 213 16(1939); cf. *C. A.* 33, 1038[8].—In dogs small doses of the ext. did not affect the excitability of the cardiac vagus, but large doses completely abolished the cardiac effects of faradization of the peripheral end of the cut nerve without affecting the sensitivity to injections of acetylcholine. L. E. Gilson

Parasympathomimetic drugs and intrapleural pressure. Jean Troisier, Maurice Bariéty and Denyse Kohler. *Compt. rend. soc. biol.* 132, 255-9(1939); cf. *C. A.* 33, 9441[2].—In dogs large intravenous doses of eserine, acetylcholine and pilocarpine produced a transient decrease in intrapleural pressure, while small doses sometimes produced a transient increase. L. E. Gilson

The experimental basis for a method for the quantitative evaluation of the effectiveness of chemotherapeutic agents against streptococcus infection in mice. J. T. Litchfield, Jr., H. J. White and E. K. Marshall, Jr. *J. Pharmacol.* 67, 437–53 (1939).—Incorporation of sulfanilamide in the food of mice appears to be the most satisfactory method of maintaining a nearly const. blood concn. of the drug. The mouse eats with sufficient regularity and frequency to insure the continuous presence of sulfanilamide in the intestine. There is no significant difference between prefeeding and immediate treatment with sulfanilamide, but delaying treatment 4 hrs. after infection causes a significant decrease in the no. of mice surviving. L. E. Gilson

Some aspects of the pharmacology of sulfapyridine. E. K. Marshall, Jr., and J. T. Litchfield, Jr. *J. Pharmacol.* 67, 454–75(1939); cf. *C. A.* 33, 3457[1].—Sulfapyridine (I) is more toxic than sulfanilamide (II) for mice, rabbits and dogs on the basis of blood concn. Acetylsulfapyridine is more toxic than acetylsulfanilamide. I is no more depressant to renal function in dogs than II, but when conjugated as acetylsulfapyridine may cause marked lowering of kidney function as detd. by creatinine clearance. Absorption of I from the gastrointestinal tract is slower, less complete and more variable than that of II. I, like II, readily penetrates all tissues and body fluids, reaching concns. not far from that in the blood, but unlike II it is usually present in higher concn. in the liver than in other tissues. The mode of excretion of I is like that of II. L. E. Gilson

Detoxication by finely dispersed oil-in-water emulsions and their intravenous use. A. C. Frazer and V. G. Walsh. *J. Pharmacol.* 67, 476–86(1939); cf. *C. A.* 33, 4279[9].—The emulsions contained 5% of olive oil in globules less than 0.5 μ in av. diam. (cf. *C. A.* 29, 4475[8]). The detoxicating action on diphtheria and tetanus toxins is independent of either the alky. or the soap content of the emulsion. The toxin is adsorbed on the surface of the oil globules. When 2 toxins are added successively to the emulsion the first is detoxified and the second is not. The antigenic properties of the adsorbed toxin are not affected. The oil globules are too small to cause fat embolism. Inclusion of oxidative catalysts in the emulsion must be avoided since the oxidation products are toxic. The usual adult human dose is 20 cc. intravenously repeated *ad lib.* L. E. G.

Prolonged administration of large doses of acetanilide in monkeys with special reference to blood changes. Paul K. Smith. *J. Pharmacol.* 68, 1–13(1940).—The principal effects of the long-continued administration of extremely large doses of acetanilide were an increase in the rate of red cell destruction and the conversion of part of the hemoglobin to forms incapable of combining with O. In monkeys ingesting 100 mg./kg. daily for 18 weeks the hemopoietic organs were able to keep pace with blood destruction, but doses 5 times as large produced anemia. Little tolerance, no addiction and no electrocardiographic abnormalities were observed. The larger doses caused no significant damage to any organ except that considerable hemosiderin-like pigment was deposited in the liver. Fifty references. L. E. Gilson

Responses of intestinal smooth muscle of the dog to benzedrine sulfate. Alfred Farah and J. O. Pinkston. *J. Pharmacol.* 68, 14–21(1940).—Isolated segments of intestine from dogs 3–12 weeks old were used. The usual response to benzedrine sulfate in concns. of 0.3–150 γ per cc. bath fluid was a decrease in tone and in the amplitude of the pendular and peristaltic movements. The colon was much more sensitive than the small intestine. In live dogs doses of 0.25–5.0 mg./kg. had an inhibiting action on intestinal contractions. L. E. Gilson

Effect of added glucose on rate of appearance of free sugar in liver pulp. S. Soskin, R. Levine and M. Taubenhaus. *Proc. Soc. Exptl. Biol. Med.* 42, 689–92(1939).—Added glucose delays the appearance of free sugar, probably by inhibiting the first step in glycogenolysis (phosphorylation). **Effect of insulin on rate of appearance of free sugar in liver pulp.** M. Taubenhaus, R. Levine and S. Soskin. *Ibid.* 693–5.—Insulin inhibits glycogenolysis in the hashed liver if injected into the dogs 30–45 min. before removal of the liver, and reinforces the retarding action of added glucose. Insulin added directly to hashed liver *in vitro* has no such inhibiting action. L. E. G.

Response to type I pneumococcal vaccine of persons belonging to different blood groups. Victor Ross. *Proc. Soc. Exptl. Biol. Med.* 42, 710–12(1939).—Little or no difference was found. L. E. Gilson

Effect of desoxycorticosterone acetate on plasma volume in patients during ether anesthesia and surgical operation. Chas. Ragan, Joseph W. Ferrebee and G. W. Fish. *Proc. Soc. Exptl. Biol. Med.* 42, 712–16(1939).—The subcutaneous injection of 16–20 mg. desoxycorticosterone acetate 3–4 hrs. before operating under Et_2O anesthesia prevented the decrease in plasma vol. which usually occurs. The injection of crotin immediately before anesthetization gave inconclusive results. L. E. Gilson

Effect of fluoride on solubility of enamel and dentine. J. F. Volker. *Proc. Soc. Exptl. Biol. Med.* 42, 725–7 (1939).—Powd. human tooth enamel and dentine were much less sol. in AcOH-AcONa buffer of pH 4 after having been washed with 0.1% NaF soln. L. E. Gilson

The fresh-water annelid, Tubifex, as a pharmacological test object. James C. Rice. *Proc. Soc. Exptl. Biol. Med.* 42, 727–8(1939).—The animal is injured by low concns. of phosphate ion and by Cl_2 and chloramines in the concns. sometimes present in tap water from a chlorinated water supply. L. E. Gilson

A pressor substance produced by anaerobic autolysis of renal cortex. Joseph Victor, Alfred Steiner and David M. Weeks. *Proc. Soc. Exptl. Biol. Med.* 42, 767–9(1939). Anaerobic autolysis of renal cortex or cell-free renal cortex ext. of the dog produces a powerful heat-stable pressor substance that passes through a collodion membrane. Oxygen inhibits its formation. The substance produces an immediate effect when injected intravenously and the effect is more sustained in hypertensive than in normal dogs. L. E. Gilson

Effect of testosterone propionate on creatinuria. J. R. Coffman and F. C. Koch. *Proc. Soc. Exptl. Biol. Med.* 42, 779–82(1939).—Castration of adult male rats does not alter creatine excretion. Normal and castrated rats react in a similar fashion to exogenous creatine and testosterone propionate as far as creatine and excretion and wt. changes are concerned. Ingested creatine produces an intense creatinuria which is greatly inhibited by testosterone propionate. L. E. Gilson

Specific chemotherapy of experimental staphylococcus infections with thiazole derivatives of sulfanilamide. O. W. Barlow and E. Hombuiger. *Proc. Soc. Exptl. Biol. Med.* 42, 792–7(1939).—"Sulfathiazole" (2-sulfanilamidothiazole) and "sulfamethylthiazole" (2-sulfanilamido-4-methylthiazole, cf. *C. A.* 33, 7795[8]) prolong the lives of mice infected with a highly virulent strain of *Staphylococcus aureus* and prevent the development, or allow the healing, of abcesses in kidneys and other organs. "Sulfaphenylthiazole" (2-sulfanilamido-4-phenylthiazole) is less effective. L. E. Gilson

Effectiveness of neoarsphenamine, sulfanilamide and sulfapyridine in marrow cultures with staphylococci and α-streptococci. Edwin E. Osgood. *Proc. Soc. Exptl. Biol. Med.* 42, 795–7(1939); cf. *C. A.* 33, 6374[9].—In cultures of living human marrow inoculated with hemolytic *Staphylococcus aureus* or *Streptococcus viridans* neoarsphenamine in concns. of 3–9 p. p. m. was far more effective than 1:10,000 concns. of either sulfanilamide or sulfapyridine, and did not significantly damage marrow cells. L. E. Gilson

Mechanism of the therapeutic effect of metrazole and insulin convulsions. E. Spiegel and M. Spiegel-Adolf. *Proc. Soc. Exptl. Biol. Med.* 42, 834–6(1939); cf. *C. A.* 33, 8809[4].—Preliminary discussion. L. E. Gilson

Comparison of certain pharmacological and antibacterial properties of *p*-hydroxylaminobenzenesulfonamide and sulfanilamide. A. Calvin Bratton, H. J. White and E. K. Marshall, Jr. *Proc. Soc. Exptl. Biol. Med.* 42, 847–53 (1939).—The prepn., properties, stability and colorimetric analysis of *p*-hydroxylaminobenzenesulfonamide are described. It is not particularly toxic to animals. When injected into dogs it appears to be completely converted into sulfanilamide within 5 min. Tested against β-hemolytic streptococcus *in vitro* it is not more than 10 times as active as sulfanilamide. L. E. Gilson

Acute toxicity of mononitrobenzene in mice. Michael B. Shimkin. *Proc. Soc. Exptl. Biol. Med.* 42, 844–6(1939). —Painting a large area of the abdomen with $PhNO_2$ killed most of the mice in 1–3 days. The subcutaneous injection of 0.025 cc. (dild. with oil) killed all within 48 hrs.; 0.01 cc. killed 2 out of 15. Methemoglobin appeared in the blood and the white corpuscle count decreased markedly. Necrotic changes occurred in the liver. Sublethal doses painted on, or injected into, skin sarcomas and mammary carcinomas had no effect on the growth of the tumors. L. E. Gilson

Pharmacological studies on monosodium phosphate. Sante Gajatto. *Arch. farmacol. sper.* 68, 87–98(1939).—The m. l. d. for rabbits was 1.4828 g./kg. given intravenously. $CaCl_2$ did not prevent death of the animals which had received a lethal dose of the phosphate but it prolonged the period of survival. The disodium phosphate was 3 times as toxic as the monosodium phosphate. Helen Lee Gruehl

Pharmacological determination of the cardiokinetics in avitaminized and hypervitaminized pigeons. Vittorio Erspamer. *Arch. farmacol. sper.* 68, 150–4(1939).—The min. emetic dose of ouabain was practically the same in normal pigeons and in those with avitaminosis or hypervitaminosis B_1. The changes thus produced in the sensitivity and excitability of the nervous system regulating vomiting did not seem to modify the exptl. conditions. Helen Lee Gruehl

Pharmacology of *p*-succinylaminophenylsulfonamide. Luigi Liaci. *Arch. farmacol. sper.* 68, 155–62(1939).—This drug was widely distributed throughout the body tissues and fluids with concns. decreasing in the following order: bile, kidneys, aqueous humor, blood, spleen, synovial fluid, lungs, ovaries, liver, brain and cartilage. It was eliminated largely through the biliary tract. Helen Lee Gruehl

Influenza virus and sulfonamide preparations. Marcello Perez. *Boll. soc. ital. biol. sper.* 14, 536–8(1939).—Di-Na 4'-sulfonamidophenylazo-7-acetylamino-1-hydroxynaphthalene-3,6-disulfonate, *p*-succinylaminophenylsulfonamide and pure paraminosulfamide were most effective in rats in combating pneumonia from the influenza virus when used in doses of 0.1 cc. (25% soln.) per day. Pure paraminosulfamide gave the best results. H. L. G.

Pharmacodynamic action of derivatives of the octyl series. I. Action on isolated guinea-pig intestines. F. Cavalli. *Boll. soc. ital. biol. sper.* 14, 550–2(1939).—Primary octyl ether and alc. inactivated smooth muscle to subsequent $CaCl_2$ stimulation; octyl bromide and thiocyanate exerted a more marked effect on the tonus than on the contractions; methyloctylamine increased the contractions at first and then gradually diminished their amplitude with no effect on the tonus; primary octylamine, secondary octylamine and diethyloctylamine increased the amplitude of the contractions. Helen Lee Gruehl

Some pharmacological properties of the "diethylaminoethyldiphenylacetate and phenylethylbarbituric acid" combination. F. Cavalli. *Boll. soc. ital. biol. sper.* 14, 552–3(1939).—The assocn. stimulated the medullary centers, the autonomic nervous system and smooth muscle. Its toxicity was the mean of its components. No cumulative effect was demonstrated in animals. H. L. G.

Action of mercurial diuretics on the elimination of uric acid in normal persons and in those with liver disease. Alfredo Ferrannini and Giacomo Fontana. *Boll. soc. ital. biol. sper.* 14, 557–8(1939).—In both instances the mercurial substances increased the vol. of urine and the elimination of chlorides and uric acid. Helen Lee Gruehl

Hydrocyanic acid and its toxic action. V. K. Solov'ev. *Khimiya i Oborona* **1938**, No. 11, 20–1; *Khim. Referat. Zhur.* 2, No. 4, 70(1939).—The properties and the physiol. action of HCN are described as well as the characteristic signs of its poisoning. Methods of protection against HCN and of first-aid treatment are explained. W. R. Henn

Fatal accidents with local anesthesia. Georges Canuyt. *Anesthésie et analgésie* 5, 161–256(1939).—This report summarizes clinical and exptl. observations on fatalities following local anesthesia by cocaine and procaine, discusses methods of preventing such accidents, and presents the medico-legal aspects of the subject. The incidence of local anesthesia mortality, not precisely known, is very small but nevertheless is far higher than would occur if proper dosage and technique were used. Adrenaline apparently is not responsible for deaths due to local anesthetic solns., but on the contrary renders such solns. less toxic. Bibliography. Marion Horn

Comparative action of the hydrochlorides of *d*-, *l*- and *r*-ephedrines on the nerve fiber. F. Meidinger. *Anesthésie et analgésie* 5, 273–6(1939).—In producing local anesthesia in the frog sciatic nerve trunk and the rabbit corneal nerve endings, *l*-ephedrine > *r*-ephedrine > *d*-ephedrine. The compds. act additively with scurocaine and cocaine in producing local anesthesia, but do not potentiate these drugs. Marion Horn

Use of ethyl bromide in practical obstetrics. J. Lerouge. *Anesthésie et analgésie* 5, 303–10(1939).—Highly purified EtBr (I) has been found preferable to EtCl (II) for use as an analgesic in labor, since the excitation phase seen with II does not occur with I. I is as rapid in effect as II, producing analgesia in 40 sec. and uterine relaxation in 110

sec. The patients resume consciousness rapidly between whiffs but exhibit amnesia. Toxic accidents previously observed with I are believed by L. to have been due to impurities. Marion Horn

A peculiar form of intoxication with rubiazole. M. van der Meiren. *Arch. belges derm. syph.* **1**, 226; *Brit. J. Dermatol. Syphilis* **51**, 495(1939).—Administration of 4–6 tablets of rubiazole (carboxysulfamidochrysoidine) 4–5 days a week for 2 months led to sudden appearance of ascites, hydrothorax and edema. Much of the serum protein was found to have been transferred to the edema fluid. The patient recovered in 2 weeks after discontinuation of the drug. Marion Horn

Some cases of barbiturate poisoning. G. Giraud, P. Mas, Merle, Sentein and Boisbeunet. *Arch. soc. sci. méd. biol. Montpellier et Languedoc* **20**, 413–14(1939).—Six cases of barbiturate poisoning are reported. Two patients died after ingestion of 6 g. gardenal (I) and an unknown dose of (probably) I, resp. Four recovered after ingestion of an unknown dose of barbital (II), an "entire flacon" of somnifen (III), 0.5 g. II + 0.5 g. $HgCl_2$, and an unknown dose of II + 20 aspirin tablets, resp. Intravenous strychnine therapy was used in the first 5 cases. The patient recovering after III poisoning had frequently taken medicinal doses of III and I. Marion Horn

Variations in the gaseous composition of the blood after the injection of insulin in schizophrenia. I. M. F. Merezhinskiĭ, A. S. Cherkasova and I. A. Sazanskiĭ. *J. méd., Ukraine* **9**, 395–401(in French 401)(1939).—The injection of insulin (I) into schizophrenic patients generally causes an increase in O_2 in venous blood, the max. corresponding to the point at which hypoglucemia is most marked. Variations in CO_2 showed no general trend, while N_2 showed little change. The injection of glucose after I results in a decrease in the O_2 in venous blood. II. *Ibid.* 403–10(in French, 410).—The O_2 content of venous blood falls immediately after injection of I, and begins to rise only after 1.5–2.5 hrs. The max. value is approx. 19% above its initial value. The O_2 difference in arterial and venous bloods before injection of I is within the limits 7.23–14.83 vol. %, while at the point of shock the difference is only 0.71 vol. %. S. A. Karjala

The blood supply of the tissues of the organism at high altitudes and its changes after caffeine administration. I. P. Baĭchenko, G. E. Vladimirov, I. M. Dedyulin, L. I. Ostrogorskaya and Ya. A. Epshtein. *Klin. Med.* (U. S. S. R.) **17**, No. 11, 99–112(1939).—The difference in O_2 content of arterial and venous bloods decreases at high altitudes. A slight increase in arterial pressure is also observed. After acclimatization the minute vol. of the heart decreases but never reaches the value normal at sea level. The administration of 0.2–0.4 g. of caffeine causes a greater increase in the minute vol. of the heart at high altitudes than at sea level. S. A. Karjala

Relation between the trypanocidal and spirocheticidal activities of neoarsphenamine. V. Spirocheticidal activity of the several American brands of neoarsphenamine. T. F. Probey. *U. S. Pub. Health Repts.* **54**, 2242–7(1939); cf. *C. A.* **27**, 4301.—The min. effective dose of neoarsphenamine in exptl. syphilis may vary from test to test, probably because of the variable factors in the exptl. infection to which the virulence of the organism may contribute rather than to differences in curative activity of the drug. Seventeen lots of neoarsphenamine, representing 7 American brands, are recorded as being uniformly active in curing exptl. syphilis in rabbits with one treatment late in the active stage of the disease. Fifteen references. J. A. Kennedy

Effect of sulfapyridine and sulfanilamide with and without serum in experimental meningococcus infection. Sara E. Branham. *U. S. Pub. Health Repts.* **55**, 12–25(1940).—Extremely small amts. of these drugs give some protection in mice. Wt. for wt., sulfapyridine has a protective action about 10 times that of sulfanilamide but the action of the former is somewhat less regular. There is a variation in response to the drugs by individual strains of the meningococci. For some strains, serum therapy was more successful; for others the drugs have been far better. Combination of either of the drugs with serum has given results far better than with either agent alone. One serum had practically no protective action on any strain when used alone, but marked protection could be obtained when it was given with the drugs. Normal horse serum gave no protection with the drugs. It seems reasonable to treat patients with the combined therapy unless some contraindication is known. Eighteen references. J. A. Kennedy

Metabolism of pyruvic acid in man. P. E. Simola and F. E. Krusius. *Z. physiol. Chem.* **261**, 209–24(1939); cf. *C. A.* **33**, 7141.—After doses of 50 g. of Na pyruvate in men the α-ketoglutaric acid content of the urine increases by 40 times (from 28 to 1243 mg./24 hrs.) in the following 24 hrs. A lesser increase of pyruvic, lactic and citric acids and of acetone body excretions also results. The excretion of α-ketoglutaric acid reaches a max. between the 2nd and 6th hr. after dosing. The citric acid and acetone excretions reach a max. 4–6 hrs. after the dose. A dose of $NaHCO_3$ equiv. to the Na pyruvate caused no increase in α-ketoglutaric acid excretion. Citric acid increased to as great an extent after $NaHCO_3$ as after pyruvate, but the max. occurred between 24 and 48 hrs. after dosage. No increase in acetone bodies followed the $NaHCO_3$ dosage. Milton Levy

The influence of sulfanilamide and similar compounds on anthrax. G. Ivanovics. *Z. Immunitäts.* **96**, 252–4 (1939).—Substances of the sulfanilamide type influence anthrax infections slightly or not at all. J. H. Lewis

The effect of insulin upon urea formation, carbohydrate synthesis and respiration of liver of normal and diabetic animals. Wm. C. Stadie, Francis D. W. Lukens and John A. Zapp, Jr. *J. Biol. Chem.* **132**, 393–409(1940).—Insulin inhibits the deamination of the unnatural *d* isomers of amino acids by isolated liver slices from normal animals, an indication that it may directly influence protein metabolism. The corresponding *l* natural isomers are unaffected and furthermore, in the complete absence of insulin the deamination is much greater than normal. The new formation of carbohydrate by liver slices of normal or diabetic animals is uninfluenced by the addn. of insulin to the equilibrating medium. In the diabetic cat, there was a subnormal formation of new carbohydrate in spite of the high rate of deamination. The "contrainsular" activity of the pituitary was manifested in 2 ways: (*a*) in the hypophysectomized-depancreatized cats the hypernormal deamination by liver slices found in the depancreatized cat was restored to normal; (*b*) diabetic cats receiving prior injections of anterior pituitary exts. showed in 4/5 of the cases hypernormal rates of liver deamination. As a limited working hypothesis, it is suggested that a possible action of insulin is to regulate protein metabolism by partially inhibiting the oxidative deamination of the *d*-isomers of nonglycogenic and glycogenic amino acids. The activity of prepns. of *d*-deaminase was uninfluenced by insulin. **The effect of insulin upon oxidations of isolated minced muscle tissue.** W. C. Stadie, J. A. Zapp, Jr., and F. D. W. Lukens. *Ibid.* 411–21.—The mean O_2 consumption of muscle mince of normal pigeon breast suspended in phosphate buffer at pH 6.8 together with boiled muscle ext. was increased 43% by the presence of citrate. The effect is apparently not catalytic since the excess of O_2 was always less than the O_2 equiv. of the citrate added. Insulin at 1 unit per cc. increased the O_2 uptake 13% (mean) but this effect is apparently independent of the presence of citrate. This effect of insulin was not significantly enhanced when muscle mince from diabetic pigeons or cats was used. Kreb's citrate cycle hypothesis (*C. A.* **32**,7134[2]) and the relation of insulin to it remains a matter for future experimentation. **The effect of insulin upon the ketone metabolism of normal and diabetic cats.** *Ibid.* 423–43.—Ketone utilization by the muscles was calcd. from measurements of (*a*) excess hepatic ketone formation over urinary ketone excretion, (*b*) oxidation of added acetoacetate by muscle mince equilibrated *in vitro*, (*c*) simultaneous equilibration of muscle mince with diabetic liver slices as source of ketones and (*d*) measure-

ment of portal-hepatic blood ketone difference. An av. value of 1300 micromoles per kg. of cat per hr. was found for the utilization of ketones by muscle. Utilization in the diabetic cat was essentially the same as in the normal animal, a demonstration that oxidation of ketones by muscle is independent of the presence of insulin. No utilization of *dl*-β-hydroxybutyrate added to muscle mince could be demonstrated in either normal or diabetic cats, a possible indication that acetoacetate is the sole form of ketone oxidized by muscle. There was found in 4 of 6 cases an increase of both β-hydroxybutyrate and total ketones, evidence that muscle as well as liver may be a source of ketones in the diabetic. The mol. ratio of O_2 consumed to ketone produced from fat acids by the liver was close to the value of 1.25 required by the "multiple alternate oxidation" hypothesis of Jowett and Quastel (*C. A.* **30**, 1427[9], 1428[5,6]). This is evidence that the higher fat acids yield not 1 but 4 mols. of ketones per mol. of acid oxidized. On the basis of the observed O_2 to ketone ratio, it is possible to calc. the non-ketone respiration of the liver and contrast its characteristics in the fasted normal, the diabetic and the insulin-treated diabetic cat. The non-ketone O_2 available for the possible oxidation of fat acids to carbohydrates is essentially zero, an indication that the hypothesis of the overproduction of carbohydrates from fats in diabetes is untenable. Insulin in the presence of fructose, fumarate and *d*-lactate inhibited the formation of ketones by the diabetic liver. The effect was enhanced by prolonged equilibration of slices with insulin-contg. media. Prior insulin treatment of diabetic cats restored the metabolism of the liver slice to a status intermediate between the normal and the diabetic. There was a marked reduction of ketone formation and a type of nonketone respiration suggesting partial oxidation of fat acids beyond the ketone stage. In Houssay cats (hypophysectomized and pancreatectomized) ketone formation by the liver was essentially that of the fasted normal cat, a suggestion that insulin controls ketone formation indirectly by acting antagonistically to the ketogenic pituitary hormone. A. P. Lothrop

Hyperglucemic effect of cobra venom in the guinea pig and rabbit. Gabriel Bertrand and Radu Vladesco *Compt. rend.* **209**, 585-7(1939).—Injection of cobra venom causes hyperglucemia in guinea pigs and rabbits, while unfiltered suspension of dried horse serum does not. J. McAfee

The effects of 3,4-benzopyrene on human skin. Gian Battista Cottini and Gian Battista Mazzone. *Am. J. Cancer* **37**, 186-95(1939).—Daily application of a 1% soln. of benzopyrene (I) in C_6H_6 to the skin caused erythema, pigmentation, desquamation, formation of verrucae and infiltration, in chronological order. These manifestations regressed when treatment was discontinued and seemed to represent prototypes of a precancerous process. In patients with pemphigus vulgaris, treatment with I caused a bullous eruption comparable to the spontaneous disease. The treatment caused temporary amelioration of squamous-cell cancer and a retardation in the progress of mycosis fungoides lesions. Basal-cell cancer, desquamating lesions of psoriasis and xeroderma pigmentosum were unaffected by I. E. R. Main

Cyanosis caused by sulfonamide compounds. David Campbell and Thomas N. Morgan. *Lancet* **1939**, II, 123-7.—Either methemoglobin or sulfhemoglobin is found in the blood during the cyanosis which develops during treatment with sulfanilamide or sulfapyridine. The methemoglobinemia is reduced after oral or intravenous administration of methylene blue while the sulfhemoglobinemia is unaffected. Methylene blue removes methemoglobin formed as a result of administration of nitrite to rabbits or prevents formation of methemoglobin when injected simultaneously with nitrite. E. R. M.

The effect of sulfonamides on blood serum. G. Allan Scott and O. Meerapfel. *Lancet* **1939**, II, 244-6.—Two cases are described in which prolonged treatment with sulfonamide derivs. led to an alteration in the blood serum which precluded the finding of suitable donors for blood transfusion. Normal serum treated for 4 days *in vitro* with sulfanilamide in a concn. of 2.5% agglutinated blood cells of donors of the corresponding blood group and also cells of universal donors. E. R. Main

Encephalomyelitis following administration of sulfanilamide. J. H. Fisher, M. B. Sydney and J. R. Gilmour. *Lancet* **1939**, II, 301-5.—Two cases are described. E. R. Main

Chemotherapy of experimental anthrax infection. J. C. Cruickshank. *Lancet* **1939**, II, 681-4.—Sulfanilamide and sulfapyridine (I) were therapeutically effective in anthrax infection in mice, the latter having the greater effect. With moderate doses, 10-20 mg. I daily, the survival time was lengthened and, with very large doses, complete curative effect was obtained in about 1/3 of the treated mice. Neoarsphenamine and tryparsamide tested in the same manner had no significant effect. E. R. Main

Action of the sulfonamides in experimental anthrax. H. B. May and S. C. Buck. *Lancet* **1939**, II, 685-6.—Treatment with sulfanilamide, sulfapyridine (I) or 4,4′-diaminodiphenyl sulfone glucoside delayed death in mice infected with anthrax bacilli, but no ultimate decrease in mortality was found. I was more effective than the other compds. Two commercially available anthrax antiserums had no protective action in mice. An antiserum prepd. in the rabbit gave a high degree of protection, which was not increased by use in combination with I. E. R. Main

Hematuria during treatment with M. and B. 693. T. C. Backhouse. *Lancet* **1939**, II, 736-8.—Hematuria was observed in 13 of 109 cases of pneumonia in Melanesian natives treated with sulfapyridine (I). The hematuria was assocd. with the appearance of crystals of the acetyl deriv. of I in the urine. In one case without hematuria, small calculi were found obstructing both ureters. E. R. Main

Granulopenia following administration of M. and B 693 (sulfapyridine.) G. O. A. Briggs. *Lancet* **1939**, II, 739-40. E. R. Main

Chemotherapy of meningococcal meningitis. A review of 147 consecutive cases. H. Stanley Banks. *Lancet* **1939**, II, 921-6.—In 65 cases treated with serum and sulfanilamide (I) the fatality was 12.3%. In 72 cases treated with I, sulfapyridine, or a combination of the 2, the fatality was 1.4%. The initial dosage of the drugs should be sufficient to maintain a concn. of at least 5 mg.% in the cerebrospinal fluid for 3 days, with a lower concn for a further period of 5-6 days. Groups I and II meningococci were equally susceptible to chemotherapy. E. R. Main

Effects of drugs in myotonia. E. Guttmann and A. B. Stokes. *Lancet* **1939**, II, 979-81.—Administration of quinine-HCl caused definite improvement in myotonia. Neither prostigmine nor benzedrine was effective. E. R. Main

Renal calculi following alkali therapy. Thomas Moore. *Lancet* **1939**, II, 1118-19.—Two cases are described in which primary stones were formed as a result of excessive consumption of alk. mixts. in the course of treatment of peptic ulcer. E. R. Main

Clinical studies in acidosis and alkalosis; use and abuse of alkali in states of bicarbonate deficiency due to renal acidosis and sulfanilamide alkalosis. Alexis F. Hartmann. *Ann. Internal Med.* **13**, 949-56(1939).—Plasma $BHCO_3$ reduction may occur in chronic nephritis and other forms of renal insufficiency, with a production of a real acidosis of the "metabolic type" without abnormal acid retention. This is due to inadequate reabsorption of $BHCO_3$ by the renal tubules from the glomerular filtrate. Severe and persistent acidosis was noted in an infant of 4 months when the only demonstrable renal lesion was failure of the tubules to reabsorb $BHCO_3$. The administration of alkali, especially *r*-lactate, in such cases will relieve and prevent recurrence of significant acidosis. Plasma $BHCO_3$ reduction which follows sulfanilamide administration is compensatory for a primary CO_2 deficit owing to alkalosis and is not relieved by alkali. John T. Myers

Picrotoxin in the treatment of acute barbiturate poisoning: a review with report of two cases. Edward C. Reifenstein, Jr., Edward C. Reifenstein, Sr., Justin W. Mignault and Angelo J. Raffaele. *Ann. Internal Med.* **13**, 1013-27

(1939).—Picrotoxin is effective in acute barbiturate intoxication. 27 references. John T. Myers

The influence of emulsions of olive oil on the biological actions of alkaloids. G. Norman Myers. *J. Hyg.* **39**, 705–15(1939).—When alkaloidal salts of arecoline, pilocarpine, atropine, morphine, diacetylmorphine or strychnine were mixed with olive oil emulsions in a fine state of division, allowed to stand at 37.5° for varying times up to 24 hrs. and then injected into animals, their biol. activity was apparently unchanged. This suggests that the droplets of the emulsion do not have the power of adsorbing alkaloidal salts at their surfaces. Arecoline-HBr when mixed with olive oil and injected intravenously sometimes showed a pressor action in chloralized cats, whereas an aq. soln. always produces the normal depressor effect. J. T. M.

The toxicity of indene. G. R. Cameron and Cecile R. Doniger. *J. Path. Bact.* **49**, 529–33(1939).—Indene exerts toxic effects on rats, mice and guinea pigs, such as liver necrosis, sometimes of the cytolytic type (acute yellow atrophy), less frequently splenic and renal focal necrosis. No changes were noted in the blood or in other organs. Toxic effects are produced only by exposure to high concns. or by the administration of large amts. Hence it is not a highly noxious agent. However, limits should be set for its use in insecticides. John T. Myers

Responses of the human post-partum uterus to posterior pituitary extracts. Sprague Gardiner and James T. Bradbury *Am. J. Obstet. Gynecol.* **39**, 1–10(1940).—There are considerable differences in the uterine responses of the post-partum patient and of the lab. animal to posterior pituitary exts. Therefore the present methods of com. assay using the virgin guinea-pig uterus are not an index of the actual clinical oxytocic potency of pitressin (I). Since 1 cc. of a 1:100 diln. of either I or pitocin (II) has been found to be the usual min. oxytocic dose in human subjects, a human oxytocic unit is approx. 0.01 cc. of pituitrin, I or II, and is equiv. to 0.1 international oxytocic unit. J. Pinchack

Alcohol tolerance: its importance in relation to chemical tests for drunkenness. Henry W. Newman. *Calif. and Western Med.* **52**, 9–11(1940).—The chem. diagnosis of drunkenness is inconclusive unless confirmed by clinical observation or performance tests. This assumption is based on the fact that dogs show a tolerance to alc. which varies from animal to animal, and which increases with habituation and decreases with abstinence. J. P.

Sulfanilamide therapy—a review of the literature. Joseph C. Doane, Nathan Blumberg and J. George Teplick. *Med. Record* **151**, 439–43(1939). J. P.

Topical dentine anesthesia. Harold A. Ossenman. *N. Y. J. Dentistry* **9**, 383–6(1939).—Directions are given for the anesthetization of dentine by: (1) a surface-tension depressant, detergent and dehydrating agent composed of 3 parts $CHCl_3$, 1 part EtOH and 1% (all portions by vol.) of a 25% aq. soln. of "sodium diamyl carbinyl sulfate"; (2) a liquid compn. of 5% thymol, 4% benzocaine and 4% (all % by wt.) of (1) contg. 2 instead of 1% diamyl compd.; and (3) a paste composed of 1 part thymol, 1/4 part thymyl *p*-aminobenzoate and 2 parts (all parts by wt.) benzocaine. J. Pinchack

The clinical use of sulfamethylthiazole in infections caused by Staphylococcus aureus: Preliminary report. W. E. Herrell and A. E. Brown. *Proc. Staff Meetings Mayo Clinic* **14**, 753–8(1939).—Exptl. results in mice (total dose, 18 g. drug/kg.) as well as preliminary clinical work (1 case) indicate that 5-methylsulfathiazole is a rather efficient drug in infections caused by pneumococcus and especially *Staphylococcus aureus* at a much lower toxicity than that found for sulfapyridine. J. P.

The toxicity for human beings of diethylene glycol with sulfanilamide [Senate Document No. 124]. Herbert O. Calvery and Theodore G. Klumpp. *Southern Med. J.* **32**, 1105–9(1939); cf. Cannon, *C. A.* **32**, 1333[6]; Lynch, *C. A.* **32**, 8562[1].—The 105 fatalities and 260 survivals following the ingestion of the diethylene glycol elixir of sulfanilamide released in 1937 are analyzed graphically as to distribution of dosage. A varying tolerance to the solvent was indicated, most individuals surviving doses fatal to others. J. Pinchack

Sulfamethylthiazole. A report of its clinical use in staphylococcus septicemia with apparent success. A report of animal experiments. Grayson Carroll, Louis Kappel, Lloyd Jones, Fred W. Gallagher and Francis W. DiRocco. *Southern Med. J.* **33**, 83–7(1940).—The first 5 cases of *Staphylococcus aureus* infection to be cured by 5-methylsulfathiazole (2-g. doses given orally) or its Na salt (250–500 mg. given intravenously) are presented. About 70% of the white mice injected with a lethal dose of staphylococci were saved by the drug or its Na salt, given for 10–15 days. Similar results were obtained in rats and rabbits. J. Pinchack

Results of intravenous and intra-arterial administration of fluids in traumatic shock produced experimentally. Douglas B. Kendrick, Jr. *Surgery* **6**, 520–3(1939).—The intravenous route of administering a 5% *d*-glucose soln. in saline soln. is preferable to the intra-arterial in averting exptl. shock in dogs. Shock due to intestinal trauma developed several hrs. earlier under ether than under sodium pentobarbital anesthesia. J. P.

The activity of isolated segments of the colon of dogs, with special reference to the influence of certain drugs. Robert E. Reagan and Charles B. Puestow. *Surgery* **6**, 663–78(1939).—Pitressin (20 pressor units) increased the tonus of isolated, surviving segments of the dog colon, but had very little effect on its movements. Morphine sulfate (0.4 and 0.8 mg./kg.) increased the tonus and the frequency and strength of contractions. Atropine sulfate (0.016 mg./kg.) had little if any effect on motility. Prostigmine gave the most uniformly strong contractions of all the drugs used. The effects of 1 cc. of a 1:2000 soln. varied from marked increase in tonus to tonic contraction. Physiol. saline soln. had very little if any effect on colonic motility, but 10–20% solns. markedly increased tonus and the no. and strength of contractions. A short increase in colonic movement was caused by 20 cc. of a 50% glucose soln. The last 2 drugs were given intravenously, the others intramuscularly. The above results were also obtained when the colonic mesentery was previously cut. J. Pinchack

Studies of intestinal motility: the effect of intravenous solutions and of insulin upon peristalsis. Wm. P. Kleitsch and Charles B. Puestow. *Surgery* **6**, 679–96(1939).—Intestinal motility being related to surgical complications, the effects of intravenous solns. commonly used in surgery and of insulin upon peristaltic rate and intestinal tonus were detd. on isolated intestinal transplants of dogs. Physiol. saline soln. definitely increased the rate and strength of peristaltic contractions. Dextrose (10% soln.) alone was practically ineffective, but when combined with physiol. saline displayed definite enterokinetic properties. Insulin progressively decreased peristaltic rate and intestinal tonus. When given with 10% dextrose soln., it decreased intestinal tonus and strength of contractions and slightly reduced the peristaltic rate. Each expt. is preceded by a literature review. J. Pinchack

Influences of local asphyxia, organ extracts and temperature changes on engrafted subcutaneous and visceral tumors in rats. Frederick M. Allen. *Urol. Cutaneous Rev.* **44**, 12–18(1940).—Very powerful destructive effects upon exptl. visceral tumors were occasionally produced by heat or cold. The results are not specific or controllable enough for practical application. Pancreatin, peptone, insulin, adrenaline, anterior or posterior pituitary emulsions and adrenal cortical ext. exhibited no specific tumor-killing action. J. Pinchack

Tryparsamide in the treatment of syphilis. A review of the literature. Josephine Hinrichsen. *Venereal Disease Information* **20**, 293–322(1939).—175 references. J. P.

Experimental studies on the effect of glutathione and vitamin B in infections. J. v. Deschwanden. *Schweiz. med. Wochschr.* **69**, 642–6(1939).—Irradiated yeast, rich in vitamin B and glutathione, did not affect the resistance of rabbits to the pyretic action of dinitrophenol but it did show a favorable influence against infection with virulent

Staphylococcus albus as compared to control expts. Glutathione increases bactericidal power and antibody formation. Vitamin B is important for its interrelationships to other vitamins and the endocrine system. Twenty-two references. Maurice M. Rath

Experimental chronic cadmium poisoning. Robert H. Wilson and Floyd DeEds. *Science* 90, 498(1939).—$CdCl_2$ was added to the diet of albino rats in concns. ranging from 0.0031 to 0.05%. The symptoms of toxicity observed were bleaching of the enamel of the teeth, anemia and cardiac hypertrophy. The bleaching of the teeth is similar to, if not identical with, that produced by fluorides and occurs at all dosage levels. The degree of bleaching is proportional to the dosage. The anemia is likewise present at all levels and the severity increases with the increase in the dosage. The cardiac hypertrophy is most evident on concns. of 0.0062, 0.0125 and 0.025%, and less evident at a concn. of 0.05% because the rats die before the hypertrophy can fully develop. Felix Saunders

Influence of simultaneous administration of calcium and phosphorus salts on the calcium and phosphorus levels of the serum. Min Sen Li. *Monatsschr. Kinderheilk.* 79, 317–22(1939).—A prepn. called "tricalcol," contg. Ca and P bound to colloidal proteins, was administered by mouth to healthy and sick infants. To a group of 6 healthy infants 15 g. of tricalcol was given in 1 dose. After 3 hrs. the serum Ca began to rise and was found at a peak of 11.8–13.7 mg. % after 5 to 7 hrs.; it returned to normal after 24 hrs. The serum P was somewhat depressed. To another group of 6 healthy infants 5 g. tricalcol was given 3 times a day over a period of 8 days. In the course of 4 days, the serum Ca rose to between 12.2 and 13.3 mg. % on fasting and stayed there until administration of the prepn. was stopped; it returned to normal by the 14th day. The serum P was depressed to from 2.5 to 4 mg. %. A third group of infants with rickets (4 cases) and rickets plus tetany (6 cases) received 5 g. tricalcol 3 times a day for 10 days. The serum Ca slowly rose from subnormal figures (7–9 mg. %) to normal ones (9 to 11.5 mg. %) within 8 days; the serum P remained low. In a few cases a drop of the serum Ca was observed after tricalcol was stopped. The slow action of the prepn. renders it unfit for practical application. H. P. G. S.

The calorigenic action of adrenaline: proportionality with dose. Fred. R. Griffith, Jr., F. E. Emery and Julia E. Lockwood. *Am. J. Physiol.* 128, 281–90(1940); cf. *C. A.* 33, 9454⁹.—Intravenous injection of adrenaline at rates of 0.00025, 0.00050, 0.00100, 0.00200, 0.00400, 0.00700 and 0.01000 mg. per kg. per min. for 5 min. affects the O consumption of chloralose-anesthetized cats as follows: The min. effective rate of injection is either 0.00025 or 0.00050 mg. per kg. per min. and more probably the latter. At all rates of injection above threshold, O intake is increased approx. the same amt. (+6 to +8%) during the 5-min. injection period itself. At rates of injection below 0.007 mg. per kg. per min. O consumption continues to increase to a max. 5 to 10 min. after injection is over. The max. calorigenic effect (+16%) occurs at this time after injection at the rate of 0.004 mg. per kg. per min. At the 2 highest rates of injection, 0.007 and 0.010 mg. per kg. per min., O consumption during injection is increased no more and no less than with smaller rates. The total effect following injection is, however, less. The total calorigenic effect for the 35-min. exptl. period increases from threshold to max. at 0.004 mg. per kg. per min. and then decreases progressively at rates beyond this. The calorigenic effect parallels closely in threshold, max. and decline at higher rates of injection, the simultaneous changes in blood-sugar level but is quite unlike the increases in blood lactic acid. E. D. Walter

A statistical study of cobalt polycythemia in the dog. Geo. Brewer. *Am. J. Physiol.* 128, 345–8(1940); cf. *C. A.* 31, 2690⁶.—Co in sufficient dosage causes a significant increase in erythrocyte no., hemoglobin concn. and percentage vol. of packed erythrocytes in the dog without toxic symptoms appearing. Five mg. of Co per kg. of body wt. seems to be close to the crit. concn. required to increase the erythrocyte no. and hemoglobin concn. whereas the hematocrit is increased only by somewhat larger doses. E. D. Walter

Benzedrine and brain metabolism. P. J. G. Mann and J. H. Quastel. *Nature* 144, 943–4(1939).—Benzedrine stimulates the O uptake of brain *in vitro* when this respires in the presence of certain amines. This is accomplished by an inhibition of the formation of toxic aldehydes. E. D. Walter

The treatment of actinomycosis by the intravenous administration of sodium iodide. E. Murray Pullar. *Australian Vet. J.* 15, 104–17(1939).—App. for administering NaI is described and 13 case records are discussed. Colin W. Whittaker

The treatment of babesiellosis (B. argentina) with acaprin. John Legg. *Australian Vet. J.* 15, 121–3 (1939).—Six ml. of acaprin applied subcutaneously to cattle reacting acutely to *B. argentina* caused rapid disappearance of the parasites from the peripheral blood and rapid recovery. Colin W. Whittaker

Protective action of ascorbic acid against intoxication by glucosides of the digitalis group. I. Intoxication by digitalis glucosides and ascorbic acid. Tomaso Galli, Domenico Bussa and Giorgio Montolivo. *Boll. soc. ital. biol. sper.* 14, 547–8(1939).—Ascorbic acid protected guinea pigs from the lethal effects of chronic intoxication with digilanide but did not prevent acute intoxication. It somewhat lessened the effects of acute strophanthin intoxication. **II. Bario-digitalis intoxication and ascorbic acid.** *Ibid.* 548–9.—Ascorbic acid protected guinea pigs from intoxication with small doses of $BaCl_2$ and digitalin (or strophanthin) but with larger doses the increase in survival was inversely proportional to the intensity of the dose. Helen Lee Gruehl

Clement, F. W.: Nitrous Oxide-Oxygen Anesthesia: McKesson-Clement Viewpoint and Technique. Philadelphia: Lea & Febiger. 274 pp. $4. Reviewed in *J. Am. Med. Assoc.* 114, 85(1940).

Courville, Cyril B.: Untoward Effects of Nitrous Oxide Anesthesia with Particular Reference to Residual Neurologic and Psychiatric Manifestations. Mountain View, Calif.: Pacific Press Publishing Association. 174 pp. $4.75. Reviewed in *J. Am. Med. Assoc.* 114, 279(1940).

Hewer, C. Langton: Recent Advances in Anaesthesia and Analgesia (Including Oxygen Therapy). 3rd ed. Philadelphia: Blakiston Co. 333 pp. $5.

Alcohol: Its Action on the Human Organism. Alcohol Committee of the Brit. Med. Research Council. 3rd revised ed., London: His Majesty's Stationery Office. 159 pp. $0.30. Reviewed in *Am. J. Pub. Health* 30, 96–7(1940).

I—ZOÖLOGY

R. A. GORTNER

Variations in the water content of the frog. E. F. Adolph. *Ann. physiol. physicochim. biol.* 15, 353–67 (1939).—If the loss in body wt. of the frog exceeds 10%, the renal elimination ceases while the speed of absorption of H_2O through the skin increases considerably. If the H_2O content of the body is excessive, the elimination increases while the absorption remains const. In the frog, for any algebraic change in the H_2O content, the mechanisms which compensate a deficit act more quickly than those which compensate an excess. The polyuria produced by an excess of H_2O is much greater in frogs which are kept in H_2O than in frogs which are not. The results permit a description of the kinetic equil. of the H_2O content. Ruth Berggren

Observations on capitellids, especially their respiration. Arne Lindroth. *Zool. Anz.* 127, 285–97(1939).—Earlier work (*Zool. Bidr. Uppsala* 17 (1938)) showed that under good respiratory conditions *Nereis virens* had regular 5-min. ventilation periods, when the circulation was active and the hemoglobin became satd. to a max. degree, followed by 20-min. rest pauses, when the vascular activity gradually ceased and the O of the hemoglobin was consumed. The respiratory function of the blood and of the circulatory system was mainly that of O storage, the transport func-

tion being subordinate. Expts. on capitellids, especially *Capitella capitata*, indicated that they probably behaved like *Nereis virens*. In order to renew the O supply of the red cells, peristaltic contractions of the abdomen occurred which promoted simultaneously the ventilation of the abdomen with fresh sea water and the circulation of the hemolymph bearing the blood corpuscles. Deterioration of the respiratory medium produced an increased activity of the ventilation mechanism in *Capitella* and finally dyspnea appeared. The periodicity of the O supply was then absent. Cf. *C. A.* **33**, 3896[8]. Ruth Berggren

The effect of colchicine and sex hormones on the oxygen consumption of fish. Hans Mann. *Zool. Anz.* **127**, 315–18(1939).—The O consumption in g. O_2/kg. body wt./24 hrs. of female perch (*Perca fluviatilis*), male bitterlings (*Rhodeus amarus*) and female roach (*Leuciscus rutilis*) were as follows: normal, 1.85, 20.75, 2.1; after intraperitoneal injections of hormones (each perch received 1 cc. follicular hormone (Glandobulin, Richter) which was repeated 4 hrs. later; each bitterling received 0.075 cc. and each roach 1 cc. testicular hormone (Orchitique, Choay), 2.34, 30.95, —; after treatment with colchicine (each perch received an intraperitoneal injection of 1 cc. colchicine (2:1000) which was repeated 4 hrs. later; the bitterlings and roach were kept in a colchicine soln. (0.75:1000) for 90 min.), 2.80, 33.4, 2.50; after combined treatment with colchicine and sex hormones, 2.90, 39, 3.33, resp. The measurements on the perch and roach were made 6–10 hrs. after treatment and those on the bitterlings 24 hrs. after treatment. Similar injections of cond. water produced no change in the O consumption of the fish. The results offer further proof of the synergism of colchicine and the hormones. Ruth Berggren

Relation of blood feeds to the maturation of ova in Anopheles elutus. M. Yoeli and G. G. Mer. *Trans. Roy. Soc. Trop. Med. Hyg.* **31**, 437–44(1938); *U. S. Pub. Health Eng. Abstracts* **18**, Ma, 20 (July 2, 1938).—After the ovaries of *A. elutus* reach a certain stage in development, a blood feed is necessary for the maturation of the ova. In an effort to det. the sp. fraction of blood which is thus required, expts. showed that neither hemoglobin alone nor serum alone is capable of inducing maturation of ova. Hemoglobin can bring the ova only to stage II of development and no further. In this respect hemoglobin is no different from raisins or sugar. If ova at stage II are fed serum, then complete ripening occurs. The sp. egg-maturing factor is present in the stroma of the erythrocytes as well as in the cell-free serum and is active after heating the serum for 1 hour at 100°. In serum coagulated by boiling, the sp. factor is assocd. with the coagulum and is absent in supernatant liquid, whereas the extd. serum is still active. It is not clear whether the substance is an "accessory" or a protein. Lipoids extd. from serum or red cells are inactive, whereas the extd. serum is still active. C. R. Fellers

Variations in the refractory period and chronaxia of fish myocardium under the influence of substances acting on the autonomous nervous system. D. T. Barry, A. Chauchard, B. Chauchard and Paul Chauchard. *Compt. rend. soc. biol.* **132**, 216–19(1939).—Very dil. solns. of acetylcholine or yohimbine salts decreased, and atropine or adrenaline increased, the chronaxia and refractory period of the isolated fish heart. L. E. Gilson

Action of mammalian sex hormones in the lizard, Sceloporus occidentalis. Aubrey Gorbman. *Proc. Soc. Exptl. Biol. Med.* **42**, 811–13(1939).—Adult males and females were treated with theelin and with testosterone propionate. Neither hormone significantly affected the thyroid, adrenals, ovaries or mesonephros. Testes were not affected by testosterone but were slightly reduced in size by theelin. Both hormones produced enlargement of the oviduct. L. E. Gilson

Alternative to cyanide for killing insects. J. E. Campbell-Taylor. *Microscope Entomol. Monthly* **3**, 267(1939). —NH_4OH does not leave insects stiff and rigid after killing as does $CHCl_3$, and is preferred to the highly poisonous KCN. An app. and method are described. L. W. G.

Segmentation of the ova of Rhabditis pellio (nuclear-plasmic relations and synthesis of thymonucleic acid). Alberto Stefanelli. *Boll. soc. ital. biol. sper.* **14**, 519–20 (1939).—In 8 generations the nuclear-plasmic relation was const. Synthesis of thymonucleic acid accompanied increased segmentation. Helen Lee Gruehl

Preserving insect specimens and preparing material for display. Richard L. Post. *Ann. Rept. Entomol. Soc. Ontario* **69**, 115–19(1938).—Chem. methods for the treatment and preservation of insect specimens are described in detail. K. D. Jacob

Studies on oxyuriasis. XXI. The chemistry of the membranes of the pinworm [Enterobius vermicularis] egg. Leon Jacobs and Myrna F. Jones. *Proc. Helminthol. Soc. Wash., D. C.* **6**, 57–60(1939).—Attempts to establish the nature of the protein composing the outermost membrane of the pinworm egg were unsuccessful. The shell proper is composed of chitin and the innermost membrane is a sterol. It appears that an effective *ovicide* must contain substances that will dissolve proteins and lipoids in order to reach the embryo. Cf. *C. A.* **32**, 7572[9]. K. D. J.

The fertilizing substance in Arbacia pustulosa. I. M. Hartmann and O. Schartau. *Biol. Zentr.* **59**, 571–87 (1939).—The secretion fluid of the eggs contains an agglutinating and an activating principle for the sperm. The activation effect is destroyed by light; heating to 95° destroys the agglutinating principle only. The activating substance is Echinochrome A, which belongs to the group of naphthoquinone dyes. The limit of its biol. activity is 1:2,500,000,000. Various other artificial or vegetable dyes proved to have similar activity although higher concn. was necessary. A. E. Meyer

The eye pigment of Ephestia kühniella and its comparison with the eye pigments of other insects. Erich Becker. *Biol. Zentr.* **59**, 597–627(1939).—Methods of extn. and chem. reaction of the pigments in the eyes of insects are described. The pigments are divided into 2 groups, the high-mol. dark-red or brown "Ommins," which are related to melanin, and the "Ommatins," which are probably chromoproteins. A. E. Meyer

The behavior of the melanophores of hypophysectomized Selachii and Amphibia after administration of corticotropic hormone. Paul Dittus. *Biol. Zentr.* **59**, 627–52(1939).—Corticotropic hormone of the anterior pituitary was tested for absence of direct melanophore action on interrenal-ectomized Selachii and also for absence of thyrotropic hormone. The substance causes in the hypophysectomized animals increase of depth and frequency of respiration and expansion of the melanophores. This reaction permits the detection of minute quantities of corticotropic hormone. *Amblystoma mexicanum* may also be used as a test animal. A. E. Meyer

Chemical study of Fugu (Spheroides rubripes) poison. I. Nitrogen distribution in the purified poison. Zyunzi Nagai and Takaaki Ito. *J. Biochem.* (Japan) **30**, 235–8 (1939).—The ovary of the Fugu fish contains a strong poison. Fresh ovaries are rubbed up and extd. with 10 vols. of H_2O on a boiling water bath for 2 hrs. The ext. is dialyzed, then evapd. to $^1/_5$ its vol. under low pressure. Impurities are removed by successive pptn. with $HgSO_4$, phosphotungstic acid and $AgNO_3$, and the excess metal is removed (H_2S, hot satd. baryta). The brownish hygroscopic residue is very active. The isolation of the poison in cryst. state was not successful. The total N of the purified poison equals the amino N. On heating in an alk. medium 30% of the N is liberated as NH_3. The poison gives a pos. ninhydrin but neg. biuret, Millon or Sakaguchi reaction; it does not give off N with hypobromide; it does not give any color with $FeCl_3$, H_2SO_4 or HNO_3; it decolorizes warm $KMnO_4$ but not Br_2. It does not yield acylated derivs., is not pptd. by salts of heavy metals, Reinecke's salts, or by flavianic, picrolonic, rhodanilic and rufianic acids; it is not adsorbed by permutite, alumina, kaolin, etc. S. Morgulis

Studies on growth of the silkworm. Different synthetic and catalytic elements and their biological significance during growth. Akira Akao. *J. Biochem.* (Japan) **30**, 303–49(1939).—A very extensive study of the changes in

dry substance, ash, C, H, Na, K, Ca, Mg, Fe, Zn, Mn and Cu during the entire life span of the silkworm. The newly formed caterpillar contains much Zn, Fe and Cu during its entire growth period and little ash, Na, K, Ca or Mn. The behavior of Mg is rather unique in that it is highest in the early stages and reaches a high peak again during pupation. The distribution of the various ash components was also followed in the caterpillar, pupa, cocoon and egg. The cast-off skins and cocoons had a particularly high Ca content. Of the catalytically important elements, Zn was concd. in localities of great vital activity, as in the silk glands, egg stalk, hemolymph, etc., whereas the shed skin or cocoon contained very little Zn. On the other hand, Mn was concd. in the skin and cocoon while little was present in the embryo or hemolymph. This leads to the belief that Zn and Mn play entirely different roles as catalysts in the metamorphosis of the silkworm. The 4 important catalytic elements are present in the silkworm in the following quant. relationship: Zn > Fe > Mn, Cu. S. Morgulis

The inorganic composition of the body fluids of three marine invertebrates. James D. Robertson. *J. Exptl. Biol.* **16**, 387–97(1939).—The body fluids of *Echinus esculentus* and of 2 decapod crustaceans, *Homarus vulgaris* and *Cancer pagurus*, were analyzed before and after dialysis with sea water in which they were living. The compn. of the perivisceral fluid of *Echinus* is identical with that of sea water, complete physicochem. equil. existing between the 2 fluids. The blood plasmas of *Homarus* and *Cancer* are in dynamic equil. with sea water. They contain more Na, K and Ca and less Cl, Mg and sulfate than sea water. The antennary gland fluid of *Cancer* contains less Na, K, Ca and Cl and more Mg and sulfate than the blood plasma. The antennary glands and the surface membranes are important factors in regulating the inorg. compn. of the blood. Benjamin Prescott

The relation between the electrolytic solution pressures of the metals and their toxicity to the stickleback (Gasterosteus aculeatus L.). J. R. Ericksen Jones. *J. Exptl. Biol.* **16**, 425–37(1939).—Lethal concn. limits were detd. for the H^+ and the ions of 18 metals on the stickleback. The lethal concn. limits formed and based on a mg./l. basis were in the following order of increasing toxicity: Sr, Ca, Na, Ba, Mg, K, Mn, Co, Cr, Ni, Au, Zn, Cd, Pb, Al, Cu, H, Hg, Ag. All the ions with the exception of the metals of the alkalies and alk. earths bring about death of fish by pptg. the gill secretions, causing asphyxiation. The alkali and alk. earth metals appear to enter the body and act as true internal poisons. The position of Fe is uncertain. On a mg./l. or molar concn. basis there is a marked relationship between toxicity of the metals and their soln. pressures. The metals of low soln. pressures (Ag and Cu) are the most toxic while those with higher soln. pressures act more slowly. Benjamin Prescott

Observations on the blood of certain ascidians, with special reference to the biochemistry of vanadium. D. A. Webb. *J. Exptl. Biol.* **16**, 499–523(1939).—The bloods of a no. of species of Ascidiacea were examd. with reference to the presence of a V chromogen. The chromogen is always contained, together with H_2SO_4, in a special type of cell called vanadocyte. Exptl. evidence and theoretical considerations show that the V chromogen is not a respiratory pigment. No function can be ascribed to it. It is not a protein or porphyrin compd. but seems to consist of V in assocn. with a straight-chain complex of pyrrole rings, comparable to a bile pigment. Benjamin Prescott

Spawning induced prematurely in the trout with the aid of pituitary glands of the carp. Arthur D. Hasler, Roland K. Meyer and Howard M. Field. *Endocrinology* **25**, 978–83(1939).—Both mature eggs and sperm were obtained from rainbow trout 6–7 weeks in advance of the onset of the normal spawning period in Wisconsin by intraperitoneal injections of fresh or Me_2CO-dried pituitary glands of the carp. Pregnant mare serum and the follicle-stimulating fraction prepd. from sheep pituitary failed to induce spawning prematurely. Felix Saunders

1 **Effect of the crustacean eye-stalk hormone on water metabolism and melanophore expansion in the frog.** Stephen W. Gray and Walter Ford. *Endocrinology* **26**, 160–2(1940).—The crustacean eye-stalk hormone (ESH) is present in a fresh-water form (*Cambarus blandingii acutus*) as well as in a marine form (*Uca pugilator*). ESH from both marine and fresh water crustaceans has an effect similar to that of pitressin and vertebrate pituitaries on
2 frog melanophores, and on frog water uptake. Felix Saunders

The quality of blood catalase in warm-blooded and cold-blooded animals. A. V. Blagoveshchenskiĭ and A. V. Vadova. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 415–18 (1937)(in English).—The authors measured blood-catalase activity at 0° and 10°, computed $K = l/t \ln a/(a - x)$, and $E_a = 1.986 \ln K_{10}/K_0 . T_1 . T_2/(T_2 - T_1)$. The values found for E_a were: dog, 2,200; dingo, 2,700;
3 cat, 5,000; bear, 7,000; hedgehog, 4,500; *Macacus mulattus* Shaw, 13,100; *Macacus memestrinus*, 12,600; pheasant, 5,200; quail, 4,700; sparrow, 3,200; guinea pig, 6,300; rabbit, 10,200; hamadril, 16,500; Armenian viper, 17,050. In most cold-blooded animals blood catalase was destroyed at 10°. The E_a values are low in young animals. Walter H. Seegers

Supplementary report on the causative agent of polyhedral disease of silkworm. M. Hosokawa and K. Kyo.
4 *J. Chosen Med. Assoc.* **29**, 1921–4 (English abstr. 124–5) (1939).—A virus was isolated which produced polyhedral disease in 224 of 295 worms in 3–6 days after the inoculation. The worms first treated with the virus heated 1 hr. at 60° are sometimes slow in development of the disease, or sometimes are completely immunized. By means of Hosokawa's eosin-Giemsa stain, this causative virus can be identified in the subcutaneous fatty tissues of the
5 diseased worms. S. Tashiro

Blood chemistry of fish. II. Blood-sugar contents of fresh-water fishes in different seasons. S. K. Gon. *J. Chosen Med. Assoc.* **29**, 1925–30(English abstr. 125) (1939); cf. *C. A.* **33**, 244[8].—The blood-sugar contents of eel (*Astroconger myriaster*), carp (*Cyprinus carpio* L.) and kamulchi (*Acanthogobius hasta*) are, resp., in mg. per 100 cc.: in spring 141, 149, 120; in summer 44, 132, 95; in autumn 80, 98, 86 and in winter 130, 256 and 86.
6 S. Tashiro

Catalysts and determiners in the embryos of echinoderms. Milena Pitotti. *Pub. staz. zool. Napoli* **17**, 193–205(1939); cf. Ries, *Ibid.* **16**, 363; Ranzi and Falkenheim, *Ibid.* **16**, 437; *C. A.* **32**, 5083[3].—Cells of the sea urchins *Psammechinus miliaris*, *Paracentrotus lividus* and *Sphaerechinus granularis* which are differentiating into endoderm give a distinct benzidine reaction for peroxidase, whether
7 the cells are developing normally or not. Thus normally ectodermal cells give the reaction if endodermalized by the presence of Li; normally endodermal cells being ectodermalized by CNS ion give a neg. reaction. Cells developing normally into ectoderm give the reaction only in a very early stage of tissue differentiation. Reactions for phenolase and for the SH group decrease more rapidly during normal growth than when Li or NaCNS is present 37 references. W. C. Tobie

8 **Action of pyocyanine and of thionine on the regenerative process in Hydromedusae.** Romulo Deotto. *Pub. staz. zool. Napoli* **17**, 206–20(1939); cf. Runnström, *C. A.* **29**, 4458[6].—One part of thionine or of pyocyanine in 250,000–600,000 of sea water accelerated the regeneration of lost members, markedly with the gastrozoids of *Obelia geniculata* (600 specimens) and slightly with the polyps and body of 630 *Tubularia larinx*. 44 references. W. C. T.

9 **Amylase in amphioxus.** Wm. L. Doyle. *Nature* **144**, 867(1939).—The intestine of amphioxus was examd. for amylase activity. The greatest activity per unit area was in the cecum and the least in the lower intestine. The optimum amylase activity was at pH 7. E. D. W.

Hanström, Bertil: Hormones in Invertebrates. Monographs on Animal Biology. Oxford: Clarendon Press; London: Oxford Univ. Press. 198 pp. 12s. 6d.

12—FOODS

H. A. LEPPER

Organoleptic characters in bromatological chemistry. Cordélia Nobrega Duarte and Paulo Guimarães da Fonseca. *Arquiv. hig. saúde pública* (São Paulo) **4**, No. 6, 49–55 (1939).—Didactic. O. W. Willcox

The problem of mixed breads. Mario Sampaio Melo. *Arquiv. hig. saúde pública* (São Paulo) **4**, No. 6, 31–45 (1939).—Wheat flours (analyses given) from 17 sources were used in baking tests with addns. of cassava flour (I), corn starch (II) and rice starch (III) in various proportions singly and together. Bread made from wheat flour and I was satisfactory in every respect up to a content of 12% of I. Increase of I to 15% induced a slight change of flavor that was perceptible to fastidious persons, but for the kilo-loaf trade among the working classes increasing the proportion of I to 30 or 40% evoked no complaints. Addns. of II were optimum up to 8% and good up to 12%; beyond that the flavor disqualified the bread for fastidious consumers but the kilo-loaf trade made no objection to 25%. Addns. of III were good up to 10%; beyond that panification was difficult. Breads made from 70% of wheat flour and 10% each of I, II and III were satisfactory in all respects. The loaves in all outward aspects were similar to bread from 100% wheat flour and the flavor was not affected by the combined addns. O. W. Willcox

Milk, dry, powdered, skimmed and whole. *Federal Specification* **C-M-351b**, Apr. 4, 1939. **Ice cream; sherbets and ices.** *Ibid.* **EE-I-166a**, Apr. 20, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office, 5¢ each. L. Wilson Greene

The use of sodium metaphosphate for the preparation of soft-curd milk. Charles Schwartz, K. K. Jones, T. W. Mack and R. W. Vance. *J. Dairy Sci.* **23**, 19–35 (1940).—Na metaphosphate when added to milk in an av. ratio of approx. 41 mg. to 100 ml. prevents the formation of a curd when the milk is treated with a pepsin-HCl coagulant. For the milk samples used the metaphosphate required to prevent curd formation varied from 30 to 52 mg. per 100 ml. of milk. When metaphosphate is added to milk before heating, the amt. should be increased to 75 mg. per 100 ml. of milk. Addnl. Ca can be added to milk and zero curd tension can be obtained by adding metaphosphate. Expts. *in vitro* indicate that metaphosphate-treated milk is more easily digested than untreated milk. Na metaphosphate is nontoxic in the doses used. When added to milk it seems to form a sol. complex with Ca that may be absorbed and utilized by the body. The addn. of Na metaphosphate to a diet decreases Ca excreted in the feces and increases the Ca excreted in the urine. Na metaphosphate increases the Fe absorption from an Fe-contg. milk diet. Na metaphosphate appears to be a safe, simple and economical means of prepg. soft-curd milk either in the home or in the dairy. In contrast to the other methods available this treatment requires no addnl. equipment and very little addnl. labor. A. H. Johnson

Detecting mustard gas in potable water or milk. A. Tasman. *Chem. Weekblad* **36**, 786(1939).—A method devised by the Dutch Artillery Lab. at Delft is described: The sample is shaken with a certain prepd. charcoal, filtered and dried. The charcoal grains are then subjected to the known reactions, e. g., the hepar and $AuCl_3$ reactions. A. H. Krappe

Crude milk sugar and poultry feed suitable outlets for milk solids in whey. W. E. Stringer. *Food Ind.* **11**, 72–4(1939); cf. *C. A.* **33**, 9464[9].—Flow sheets for manuf. of these products are given. Whey yields 2.75% crude lactose and 3.25 poultry feed including 1% albumin. C. R. Fellers

Laboratories approved for the phosphatase test. F. W. Gilcreas. *Health News, N. Y. State Dept. Health* **15**, No. 32, 134(1938); *U. S. Pub. Health Eng. Abstracts* **19**, Mi, 8 (Mar. 11, 1939); cf. *C. A.* **33**, 8322[5].—Continued experience with the phosphatase test has proved it to be an invaluable aid in controlling the *pasteurization of milk*. Coöperative tests with 14 different labs. showed an excellent agreement of results. A precision greater than 97% was found in the use of the test. Cf. *C. A.* **33**, 2598[8]. C. R. Fellers

The surface and center of butter stored in kegs. W. Mohr and E. Schrimpl. *Molkerei-Ztg.* (Hildesheim) **53**, 1212–13(1939).—Butter was stored in kegs for 6 months at −20°, thawed 3 days and kept for 13 days at 15–16°. Butter from the surface was markedly inferior in flavor to butter from the center, but chem. and phys. tests indicated very little or no difference between the samples. Wrapping butter in air- and water-impermeable paper before storage decreased surface deterioration. E. C.

The bacterial flora of New Zealand Cheddar cheese. I. R. Sherwood. *J. Dairy Research* **10**, 426–48(1939).—Of the lactic acid bacteria isolated, 720 strains from 36 typical Cheddar cheeses were classified. The dominant organism in New Zealand cheese was shown to be *Streptobacterium plantarum*. *Sbm. casei* occurs much less frequently while betabacteria and betacocci are found in still smaller nos. Betabacteria tend to replace *Sbm. plantarum* in the final stages of cheese ripening. The flora of good-quality cheese consists mainly of 1 or 2 varieties of *Sbm. plantarum*, often assocd. with *Sbm. casei* or a small proportion of betabacteria. In poor-quality cheese a larger no. of types of lactic acid bacteria frequently occur. A simple routine method is described for distinguishing different groups present in cheese. The effects which different strains of lactobacilli and betacocci produce in cheese were correlated with their biochem. characteristics. *Sbm. casei* in general appears to be beneficial to cheese quality. The strains of *Sbm. plantarum* isolated have been grouped in 4 varieties, mainly on the basis of sugar reactions. One variety was shown to be beneficial to cheese quality, another variety had little apparent effect, while the remaining varieties produce serious defects—bad flavors, discoloration and occasionally open texture. The same defects were produced by most strains of betabacteria and betacocci when present in large nos. The biochem. characteristics of the lactobacilli studied showed a regular graduation from *Sbm. casei* through *Sbm. plantarum* to *Betabacterium breve* that is indicated from the generally accepted system of classification. A. H. J.

Bacterial contamination of "brynza" (cheese made from sheep's milk), methods for rendering it harmless for consumption and indexes for its evaluation. I. P. Vizir, L. Garkavi and R. Rutman. *Mikrobiol. Zhur.* **5**, No. 4, 65–76(1938).—The frequent bacterial contamination of cheese and the observed cases of poisoning (mainly intestinal microbes *Proteus vulg.* and *B. coli*) made it necessary to find methods for a general evaluation of the suitability of the product. The following are recommended: the degree of acidity should not be below 200° T., which may be taken as an index of the aging of the cheese; the *Es. coli* titer should not exceed 0.01 g.; and the concn. of salt in the finished cheese should not be below 5% to insure its keeping qualities. **II. Dynamics of the bacterial and of the physical-chemical processes.** P. Vizir and L. Garkavi. *Ibid.* 77.—The dynamics of the bacterial and the physical-chem. processes in the aging of "brynza" prepd. from raw and from pasteurized milk, from milk to which *Streptococcus lactis* has been added, and from milk contaminated with *Proteus vulg.* and *B. breslau* were investigated. The bacterial contamination of the cheese can be in most cases explained by the primitive methods employed in the production of "brynza." Pasteurization increases considerably the time of aging of the cheese, but does not interfere with the fermentation process. The slowly increasing acidity (the main bactericidal factor), which does not reach a high degree, leads to an increased bacterial contamination. The use of enzymes made from sour milk microbes accelerates the aging of "brynza." Through *Khim. Referat. Zhur.* **2**, No. 4, 70(1939). W. R. H.

Processing and thiamine. Aaron Arnold and C. A. Elvehjem. *Food Research* **4**, 547–53(1939).—The thia-

mine content of beef kidney, beef spleen and beef-lung tissue was decreased by 70–80% during a thermal treatment of 120 min. at 115.6°. In a moist meat product-grain mixt. the greatest loss occurred during the 1st hr. of heat-treatment. Hog muscle lost over 80% thiamine during a heat-treatment of 110 min. at 121°. C. R. F.

Studies on the bacterial flora of North Pacific salmon. Jane E. Snow and Paul J. Beard. *Food Research* **4**, 563–85(1939).—The most commonly occurring genera are *Achromobacter, Micrococcus, Pseudomonas, Kurthia, Flavobacterium* and *Proteus*. Of the various biochem. tests used as spoilage indexes for salmon, H_2S shows most promise. Indole is rejected as inadequate as an index of decompn. It is suggested that several types of bacterial activity be used to judge the extent of decompn. in salmon rather than a single index. Cf. *C. A.* **21**, 463. C. R. Fellers

Studies in fish spoilage. VI. Breakdown of carbohydrates, proteins and amino acids during spoilage of cod muscle press juice. S. A. Beatty and V. K. Collins. *J Fisheries Research Board Can.* **4**, 412–23(1939); cf. *C. A.* **33**, 5441[2].—After the early postmortem changes, such as breakdown of glycogen and phosphocreatine and the formation of traumatic NH_3, autolysis of cod fish muscle press juice that is contaminated by spoilage bacteria is negligible in proportion to the action of bacteria. Samples of the press juice were (1) preserved with toluene, (2) kept in stoppered bottles with very small amts. of air and (3) exposed to the air, at 0.5°, 5° and 25°. The decrease in amt. of lactic acid, sugar and the amino acids was measured, as well as the production of trimethylamine, CO_2 and NH_3. Juice passed through a Seitz E. K. filter acted like (1) with little oxidation of lactic acid, sugar or the amino acids. Juices treated in (2) and (3) showed surprisingly slight differences, showing that, during early spoilage, the bacterial growth is both anaerobic and aerobic, the actual oxidation of the substrate being mainly anaerobic. Later when the press juice is definitely spoiled, aerobic oxidation assumes the major part if air is available. Spoilage occurs in 2 stages irrespective of the availability of air: first the oxidation of lactic acid and sugar, and, secondly after these reactions are well under way, the oxidation of the amino acids and the hydrolysis of proteins. The second stage represents advanced spoilage. As $(CH_3)_3N$ production occurs mainly during the first stage, it is a good criterion as to the probable production of toxic compds. resulting from protein and amino acid breakdown. Dorothy A. Meyer

Some data on the nutritive value of the banana. Celina Fonseca. *Arquiv. hig. saúde pública* (São Paulo) **4**, No. 6, 59–62(1939).—New analyses of the maca and nanica varieties show dry substance 35.12–30.67, proteins 1.05–1.13, glucose 17.96–16.53, sucrose 2.03–2.41, ash 0.78–0.55, acidity as H_2SO_4 0.35–0.18%. The presence of small amts. of succinic, malic and tartaric acids is noted. Vitamins B and C are present. O. W. Willcox

Fruit-juice standarization. Christopher P. Norbury. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, Bristol* **1938**, 226–30(Pub. 1939).—Fruit-juice standards in various countries are briefly discussed. K. D. Jacob

A comparative investigation of different methods for the determination of fruit acids. N. V. Saburov, M. I. Kalebin, L. P. Khakhina and A. Danilova. *Nauch. Zapiski Inst. Narodnogo Khoz. im. Plekhanova* **1938**, No. 1, 3–50; *Khim. Referat. Zhur.* **2**, No. 4, 82(1939).—The method of Hartmann and Hillig (*C. A.* **24**, 2209), in which the org. acid is preliminarily pptd. in the form of Pb salts, gave best results in the detn. of tartaric acid in the presence of citric and malic acids, but is awkward because it requires the use of a centrifugal app. and of H_2S. The method of Täufel and Marloth (*C. A.* **24**, 2966) can be used only if the amt. of tartaric acid is less than 0.3%. Good results were obtained by a modification of the method of Muttelet (*C. A.* **16**, 3142), in which the org. acids are sepd. preliminarily in the form of Ba salts. The method of Kometiani (*C. A.* **26**, 669) for the detn. of citric acid in the presence of malic and tartaric acids by transforming the citric acid into pentabromoacetone is not suitable. Good results were obtained (in fruit juices as well) by the method of Hartmann and Hillig (*C. A.* **21**, 2451), which is based on an analogous oxidation. It can be simplified by replacing the gravimetric detn. of pentabromoacetone by the volumetric detn. The method of Kogan (*C. A.* **24**, 2692) based on the oxidation of citric acid to acetonedicarboxylic acid with the detn. of the latter in the form of acetone is inaccurate. When modified the method becomes more accurate, but is tedious. The detn. of $H_2C_2O_4$ in the presence of tartaric, citric and malic acids by the method of Bau (*C. A.* **12**, 2037) (pptn. as CaC_2O_4 in a H_3PO_4 soln.) gives more accurate results than the method of Butkevich (which is also based on the smaller soly. of CaC_2O_4 in the detn. of the acidity of the soln. as compared with the soly. of the Ca salts). Although the method of Butkevich is faster for single analyses, the method of Bau requires less time in case of mass analyses. In the analyses of fruit juices by means of these methods pectin must be preliminarily pptd. The polarimetric and the permanganate methods of Hartmann and Hillig (*C. A.* **27**, 146) gave the best results in the detn. of malic acid in the presence of tartaric and citric acids, but they required the use of a centrifugal app. and of H_2S. The method of Auerbach and Krüger (*C. A.* **18**, 511, 868), in which the org. acids are sepd. in the form of the Ba salts, is simpler. W. R. H.

Micromethods for the determination of sugars, of nitrogen and of amino acids in fruits and vegetables. N. V. Saburov, L. V. Kaperina, P. V. Sokolov and R. S. Shcherbakov. *Nauch. Zapiski Inst. Narodnogo Khoz. im. Plekhanova* **1938**, No. 1, 51–75; *Khim. Referat. Zhur.* **2**, No. 4, 83(1939).—The iodometric method of Tompsett (*C. A.* **25**, 309) was found to be the best of the 6 investigated methods. The iodometric method of Shaffer and Hartmann (*C. A.* **11**, 1327) is less accurate, but simpler. The ferricyanide method of Ionescu (*Z. Untersuch. Lebensm.* **62**, 363(1921)) is rapid, but requires some skill and is less accurate. The permanganate method of Bierry and Goiren (cf. *C. A.* **22**, 3675, 3676) is accurate, but awkward and is more suitable for single detns. than for many simultaneous analyses. When a less accurate method is required a combination of Bierry-Goiren's and Tompsett's methods can be used. The manganometric method of Fontès and Thivolle (*C. A.* **21**, 2712) is not recommended. N can be detd. in fruits and vegetables by the micro-Kjeldahl method. If the products give a heterogeneous mass after grinding, the combination micro- and macro-Kjeldahl method is recommended. In detns. of small amts. of the amino N in fruits and vegetables without concg. the exts. the micro-app. of Van Slyke is not very suitable. The macro app., in which the usual gas buret is replaced by a microburet, gives good results. Amino N in amts. to 1.5 mg. can be detd. in this app. with an av. accuracy of 0.01 mg. W. R. Henn

Standards of identity, fill of container, and quality and label statements for canned peaches. *Federal Register* **4**, 4920–4(1939).—Regulations under the Federal Food, Drug, and Cosmetic Act provide a standard of fill of container and a definition and standard for canned peaches as mature yellow or white, cling or freestone varieties packed in water, peach juice or light, medium-heavy or extra-heavy sirups (made with sucrose with or without dextrose) in the forms of whole, half (peeled and unpeeled), peeled slices, diced, or mixed pieces of irregular sizes and shapes. The variety, form and packing medium must be stated on the label as well as the other optional ingredients, spice, flavoring, vinegar, peach pits or kernels. The standard of quality includes the factors of tenderness, size, uniformity of size and shape of units, absence of peel (except unpeeled forms), freedom from blemishes, and from crushed or broken units. A method is detailed for detg. tenderness. Statements are provided for labeling peaches substandard in fill of container or in quality explaining wherein the product falls below the standard. H. A. L.

Standards of identity, fill of container and quality and label statements for canned apricots. *Federal Register* **5**, 93–8(1940).—Regulations under the Federal Food, Drug, and Cosmetic Act for standards of identity, fill of container and quality for canned apricots and labeling requirements

are practically analogous to those for canned peaches (cf. preceding abstr.). H. A. Lepper

Standards of identity, fill of container and quality and label statements for canned pears. *Federal Register* 5, 102–7(1940).—Regulations under the Federal Food, Drug, and Cosmetic Act for standards of identity, fill of container and quality for canned pears and labeling requirements are practically analogous to those for canned peaches (cf. 2nd preceding abstr.). H. A. Lepper

Standards of identity, fill of container and quality and label statements for canned cherries. *Federal Register* 5, 98–102(1940).—Regulations and labeling requirements under the Federal Food, Drug, and Cosmetic Act for standards for canned cherries are analogous in principle to those for canned peaches (cf. 3rd preceding abstr.). The standard provides for red sour, light-colored sweet and dark-colored sweet varieties, pitted and unpitted. Quality factors are freedom from blemishes and from pits in pitted cherries, min. size and uniformity of size of units and percentage of cherry flesh in unpitted cherries. Specific directions for detg. pits and percentage of cherry flesh are included. H. A. Lepper

The vitamin C content of German apple varieties and its dependence on habitat, light intensity, fertilizing, density of fruit hanging and storage. Wolfgang Kessler. *Gartenbauwiss.* 13, 619–38(1939).—The ascorbic acid content of several varieties of apples, exclusive of peel, was detd. by the Fujita and Ebihara adaptation of the Tilmans method (cf. *C. A.* 31, 5399[4,9]). Certain modifications were made. The vitamin C varied in the different varieties from 0.3 mg./100 g. for the Rote Stern Renette to 23.4 mg./100 g. for the Ontario. For a given variety, those from southern Germany were, in general, a richer source of the vitamin than the northern apples. Fruit, which had ripened unevenly because of shading, showed 30–50% more ascorbic acid on the red side. This was not attributed to an assocn. with the red pigment but to the light intensity; the latter increased the vitamin content. Naturally light-colored apples were often richer in ascorbic acid than the dark-red varieties. Fruit from trees which were heavily loaded were poorer in vitamin C than fruit from trees less densely populated. The overfertilizing of trees with N depressed the ascorbic acid content of the fruit. The storage of apples at temps. below 5° for 5 months resulted in very little loss of vitamin C. C. K. Horner

Factors affecting adsorptive power of magnesia for carotene. G. S. Fraps, A. R. Kemmerer and S. M. Greenberg. *Ind. Eng. Chem., Anal. Ed.* 12, 16–18(1940).—The adsorptive powers of Mg compds. were studied to secure prepns. which adsorb xanthophyll and do not adsorb carotene, and thus could be used in the purification of the solns. of carotene in petroleum ether obtained in detns. of vitamin A potency of foods. Nineteen samples of MgO and $Mg(OH)_2$ from various sources were tested as received and after activation by heating with an equal vol. of water for 30 min. on a steam bath. All adsorbed carotene, and so could not be used for purifying carotene solns. Activated Mg heated in a muffle furnace at 400° and then reactivated adsorbed 76% of the carotene, 25% at 750° and 0.5% at 900°. When 14 other samples were heated to 900° and activated, 7 had adsorptive powers for carotene lower than before heating, 2 had the same, and 5 had higher powers. The adsorptive powers were lowered as the Mg compds. were mixed with increasing amts. of water, until they became zero for the samples tested. Exposing Mg compds. to CO_2 or air lowered the adsorptive powers of activated Mg for carotene. All samples of activated Mg which did not adsorb carotene when freshly prepd. did so after about a week. However, some samples of $MgCO_3$ did not adsorb carotene when purchased, while others required activation. Activated $MgCO_3$ seems to be more stable than activated MgO or $Mg(OH)_2$. The adsorptive power of the reagent for carotene and for xanthophyll should be measured before it is used. D. A. Meyer

Vitamin C content of vegetables. XII. Broccoli, cauliflower, endive, cantaloup, parsnips, New Zealand spinach, kohlrabi, lettuce and kale. Katherine Wheeler, Donald K. Tressler and C. G. King. *Food Research* 4, 593–604(1939); cf. *C. A.* 30, 3030[6].—The indophenol titration technique for ascorbic acid detn. gave results in concord with the usual guinea-pig assay for vitamin C for all these vegetables. The approx. av. ascorbic content expressed as mg. per g. of edible portion of the freshly harvested vegetables is: parsley 2.0, broccoli 1.3, kale 1.3, cauliflower 0.9, kohlrabi 0.65, New Zealand spinach 0.45, cantaloup 0.35, lettuce 0.16 and endive 0.14. The leafy vegetables and cauliflower and broccoli lost their ascorbic acid rapidly after harvesting unless promptly refrigerated. Parsnips lost much of their ascorbic acid during winter storage. C. R. Fellers

Vitamin values of garden-type peas preserved by frozen-pack method. II. Vitamin A. E. N. Todhunter. *Food Research* 4, 587–92(1939); cf. *C. A.* 33, 7915[9].—Quick-frozen peas contained 10 intern. units of vitamin A per g. Controls on fresh peas were not made. The blanching (scalding) period did not affect the vitamin A content. Varietal differences were slight. Cooking by boiling had no effect on the vitamin A content of frozen peas. III. Thiamine (vitamin B_1). Margaret L. Fincke. *Ibid.* 605–11.—Frozen peas contained 2–4 γ of thiamine per g. A 2-min. blanching period at 71° conserved the thiamine better than longer blanching periods. Hot water and steam blanching gave the same results. C. R. Fellers

A proteolytic enzyme of lima beans (Phaseolus lunatus L.). Ward B. Davis. *Food Research* 4, 613–19(1939).—A proteinase of the papain type was found in Fordhook variety of lima beans. The enzyme was demonstrated by its digestion of casein and its liquefaction of gelatin. The enzyme is easily destroyed by the heat employed in the blanching process incident to freezing or canning lima beans. It is not believed that the proteinase is of significance in quick-frozen lima beans held in storage. C. R. Fellers

Sugar content and keeping quality of the cooking onion. Alfred Zeller. *Gartenbauwiss.* 13, 598–604(1939); cf. *C. A.* 33, 5888[8].—Statistical analyses of results, including those of other investigators, confirmed the reports that the keeping quality of the onion is assocd. with a higher sugar (especially sucrose) content. Proposed means of obtaining better onions are: harvesting at a detd. time shortly before complete ripening, culturing on a loose sandy soil and storing at higher temps. (smoking, drying). C. K. Horner

Vegetable juices of standardized flavor. John B. Rolle. *Food Ind.* 11, 75, 113–14(1939).—The freshly chopped or crushed vegetables are extd. for 24 hrs. at 60°F. in tightly closed stoneware containers with a predetd. quantity of condensate. This gives a juice of standardized essential oil or essence strength. Manufg. methods are detailed. C. R. Fellers

Honey containing vitamin C. C. Griebel and G. Hess. *Z. Untersuch. Lebensm.* 78, 308–14(1939).—The identity of the strong reducing substance in thyme and mint honey with ascorbic acid was proved by converting it into the dehydro form and causing it to react with 2,4-dinitrophenolhydrazine (cf. Ammon, *et al.*, *C. A.* 31, 727[4], 747[2]). Since the dehydro form of ascorbic acid contains 2 carbonyl groups which react with phenylhydrazine the authors preferred naming the condensation product a dihydrazone instead of an osazone. The 2,4-dinitrophenoldehydroascorbic acid dihydrazone obtained in the honey analysis m. 266°. This checks the prepn. from synthetic ascorbic acid. Buckwheat honey contains traces of ascorbic acid. A titrometric I method for the detn. of ascorbic acid in honey is presented. M. M. Piskur

Honey and the lead contamination problem. H. A. Schuette and A. J. Ihde. *Food Research* 4, 555–62(1939). -Pb is not a normal constituent of honey. The source of Pb in honey is from Pb arsenate sprays. Extg. app. also contaminates extd. honey. Eighty-three % of the honey samples examd. were substantially free from Pb. Only 1 sample contained as much as 6.8 p. p. m. C. R. F.

Guavas and guava jellies. C. C. Guimaraes and Maria de Abreu. *Arquiv. hig. saúde pública* (São Paulo) 4, No. 6, 75–9(1939).—The proximate compns. of various varieties

are given. The presence of vitamins B and C in guava jelly is verified. Certain adulterants are detectable because pure guava jelly contains no starch nor citric acid. O. W. Willcox

How fumigation affects popping quality of corn. H. D. Young, R. T. Cotton and G. B. Wagner. *Food Ind.* 11, 14, 56(1939).—HCN, CS_2, C_2H_4O, chloropicrin and CCl_4 adversely affect the popping ability of popcorn for 10–20 days. In most cases, however, this injurious effect disappears after 30 days. C. R. Fellers

The method of quantitative estimation of the aroma of scented tea. Kenzi Ueno. *J. Agr. Chem. Soc. Japan* 15, 1013–17(1939).—The aroma of tea scented with the flower of navel orange was approx. estd. by the degree of the odor or the amt. of indole. Y. Kihara

Cytochrome oxidase in tea fermentation. J. Lamb and E. A. Houghton Roberts. *Nature* 144, 867–8(1939); cf. *C. A.* 33, 7917[8].—Evidence is given that the oxidase responsible for the oxidation of ascorbic acid in the tea leaf may be identified with cytochrome oxidase, and that it is unlikely that an ascorbic acid oxidase is present. E. D. Walter

Solvent powers of organic liquids on flavoring materials. J. G. Davidson. *Glass Packer* 17, 783–5(1938).—An ideal solvent for flavoring substances should impart no odor or taste to the final flavored product, it should be nontoxic in the max. concns. that can be reasonably used, it should be H_2O-sol. and inexpensive. There is at present no good substitute for EtOH. Data on relative toxicities of many of the proposed solvents are incomplete. Soly. data for common org. solvents are given in graph form. C. R. Fellers

Ensile experiments with and without addition of whey and of mineral acid and sugar. V. J. C. de Ruyter de Wildt. *Verslag. Landb. Onderzoek.* No. 45, C, (9), 207–54 (1939)(Summary in German, 249–54); cf. *C. A.* 33, 1406[6].—Pure cane sugar and "Biosil" acid were used. It was found that withered grass needed much less acid than fresh grass. With withered grass and the addn. of acid only, the same results were obtained as the addn. of the double amt. of acid per kg. dry substance plus a little more than 1% sugar to fresh grass. An excellent silage was obtained by the addn. of 3% sugar to fall grass, contg. about 16% crude albumin in the dry substance, with small ensile losses, and no butyric acid. With 2% sugar in a closed concrete silo a good lactic acid silage was produced, which contains 1.82% lactic acid, 0.15% butyric acid at a pH of 3.97; here, however, only $^2/_3$ of the silage was submerged in the juice. By using 10% whey and 1% extra sugar in an open silo poor results were obtained. J. C. J.

Measurement of coagulation [of milk] (Wannow) 2. Making a lacquer for tin cans [for food] (Rubinskiĭ) 26. Detn. of CO_2 in baking powders, self-rising flours (Hepburn) 7. Purification and disposal of milk wastes (Hepburn) 14. Phosphate esters [for preparing chocolate mixts. for coating cakes] (U. S. pat. 2,177,983) 13. Malt-like sirups for baking processes (U. S. pat. 2,179,203) 16. Preventing caking of hygroscopic materials [dry liver concentrate, dried meat ext.] (U. S. pat. 2,175,083) 13.

Kay, H. D., Aschaffenburg, R., and Neave, F. K.: The Phosphatase Test for Control of Efficiency of Pasteurization. Shinfield, England: Imperial Bur. of Dairy Science. 54 pp. $.75.

Apparatus for evaluation of the quality of flour and paste. Erdély és Szabó Tudományos Müszergyár (B. Gy. Bán, inventor). Hung. 121,488, Sept. 15, 1939. The app. is equipped with 2 horizontal axes bearing kneading devices, one of which is operated by an elec. motor. The kneading container can move freely and its movements during kneading are recorded by a suitable measuring device.

Leavened baked products. Jacob Freilich and Charles N. Frey (to Standard Brands Inc.). U. S. 2,178,959, Nov. 7. Leavening (as of various specified doughs and batters) is effected by the conjoint action of yeast and H_2O_2 (suitably in the presence of an alk. material such as $NaHCO_3$ giving the dough mass a pH of 6.5–8.5), the leavening being principally effected by the H_2O_2.

Milk preparation. László Pikler. Hung. 122,066, Nov. 15, 1939. Fresh or condensed milk is mixed with substances (dextrin-maltose, betaine chloride) that ppt. proteins on heating. Ca salts (lactate or hydrolactate) may be added to obtain an infant food.

Apparatus for vacuum and carbon dioxide treatment of eggs or other foods. Charles E. Evans (50% to L. G. Howard). U. S. 2,179,327, Nov. 7. Various structural and operative details suitable for the treatment of eggs, etc., with CO_2 under pressure.

Sugarless gelatin food products. Llewellyn R. Ferguson (to General Foods Corp.). U. S. 2,178,569, Nov. 7. Various details are given of mixts. which may contain gelatin, mono-Na citrate or tartrate or similar salts, etc., with or without saccharin and other flavorings.

Dry pectin compound. Philip B. Myers (to Sardik Inc.). Can. 385,242, Nov. 21, 1939. To render it readily dispersible in water or fruit juices, pectin is treated with a sol. Ni salt in such amt. that the amt. of Ni present will be 0.1–1.0% of the total wt. of the Ni and pectin so combined.

Fumigant for fruit. John D. Maxcy (to Carbide and Carbon Chemicals Ltd.). Can. 385,741, Dec. 19, 1939. A volatile liquid fumigant is essentially composed by vol. of ethylene oxide about 1 and ethylene dichloride about 3 parts; it has a toxic effect of about twice the amt. of ethylene oxide and about 3 times the amt. of ethylene dichloride employed separately.

Refrigerating and preserving vegetables. James A. Thomas (to Esotoo Fumigation Co. Ltd.). U. S. 2,178,675, Nov. 7. Vegetables such as spinach, beets, carrots, asparagus, Brussels sprouts or celery are cooled with ice contg. SO_2 or with water contg. SO_2 from the melting of such ice.

Food product from papaya. Leroy L. Matoush (to Papaya Corp. of America). U. S. 2,178,593, Nov. 7. Papaya fruit and seeds are separately crushed; the fruit juice is extd., the seeds are treated with a weak acid such as citric acid (as by use of lime juice), and the resulting liquor is mixed with the fruit juice. Various details of operation are described.

Drying apparatus for honey. J. Charlemagne Préfontaine. Can. 385,174, Nov. 21, 1939. The honey is poured over a vertical perforated surface while hot air is discharged against the honey.

Stock feeds. Hans Fattinger. U. S. 2,170,713, Aug. 22. Nondusting products are formed by mixing various stock feeds with an emulsion formed by the admixt. of the carbonation sediment from sugar manuf. and molasses or a sirup from beet- or cane-sugar manuf. or "wood sugar."

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

Industrial research in 1939. Advances in the United States and other countries. Wm. A. Hamor. *News Ed. (Am. Chem. Soc.)* 18, 1–13, 49–58(1940). E. J. C.

Strategic mineral supplies in the U.S. S. R. (Russia). G. A. Roush. *Military Engr.* 32, 22–8(1940); cf. *C. A.* 33, 4345[1].—A discussion relating to the following: Mn ore, Pt, asbestos, phosphates, Fe ore, coal, petroleum, potash, Al, Hg, chromite, magnesite, Zn, Cu, Pb and Ni. Production and consumption figures for 16 years through 1937 are tabulated. L. Wilson Greene

Chemicals and coast defense. A. M. Prentiss. *Coast Artillery J.* **82**, 281–301(1939); cf. *C. A.* **33**, 7921[7].—The properties and tactical uses of chem. warfare agents are discussed. L. Wilson Greene

With or without mustard (gas)? Lathrop R. Bullene. *Coast Artillery J.* **82**, 255–8(1939).—Tactical. L. Wilson Greene

Toxicity of chloropicrin. Béla Ritlop. *Orvosi Hetilap* **83**, 1003–5(1939).—Expts. on cats indicate that chloropicrin should be classified as an irritating rather than a lethal war gas. S. S. de Finály

Economics of health in chemical industries. Emery R. Hayhurst. *Chem. Industries* **45**, 518–21(1939). E. H.

Occupational diseases in chemical processes. Emery R. Hayhurst. *Merck Rept.* **48**, No. 2, 4–10(1939). E. H.

Chlor-acne in railway workers. H. Haldin-Davis. *Brit. J. Dermatol. Syphilis* **51**, 380–3(1939).—Acne was observed in 12 workers engaged in making elec. circuits from wires insulated with perchloronaphthalene ("perna"). The condition is common in those engaged in manuf. or handling of this insulating agent indoors. It may be avoided by covering the skin with "rosalex" and washing at the end of the day with Westrosol soap, which is a 2% soln. of trichloroethylene. Marion Horn

Lead poisoning in industry and its prevention. M. R. Mayers and M. M. McMahon. *N. Y. State Dept. Labor, Div. Ind. Hyg., Special Bull.* **195**, 68 pp.(1938); *U. S. Pub. Health Eng. Abstracts* **19**, IHS, 3(Feb. 25, 1939).—A summary. C. R. Fellers

Harmfulness of aluminum dust taken into the lungs. O. Ehrismann. *Z. Hyg. Infektionskrankh.* **122**, 166–70 (1939).—In expts. with rabbits and guinea pigs exposed to Al dust no pathol. injuries were observed. R. Brown

Plants containing rotenone—industrial dermatitis. J. Racouchot. *Arch. maladies profes.* **2**, 149(1939); *Brit. J. Dermatol. Syphilis* **51**, 493.—An important new group of insecticides derived from plants contg. rotenone, and including such substances as derris, is rapidly replacing the arsenicals previously used in France. Workers prepg. these substances developed in 2–3 days a violent dermatitis of the genital region, and also often a rhinitis with anosmia, and irritation of the tongue and lips. Further trouble has been obviated by improving ventilation, providing masks and paying strict attention to personal cleanliness. Marion Horn

Chemurgic plastics. Robert D. McMillen. *Mfrs. Record* **108**, No. 12, 22–3, 54, 60(1939).—An illustrated description of the development, manuf. and uses of plastics made from agricultural raw materials. L. Scheflan

Casein plastics. Geo. H. Brother. *Ind. Eng. Chem.* **32**, 31–3(1940).—The history of the casein plastic industry is traced from the original galalith of the "wet process," through the "dry process" of making rods and sheets, to the present process of making button and buckle blanks from partially hardened plastic. Noteworthy recent com. developments include the discovery of alum as a partial hardener and of hypochlorite soln. as a polish. B. produced a thermoplastic HCHO-hardened casein from acid casein which has not been sufficiently plasticized, however, to use in injection molding. Possible combinations of casein with phenolic or urea thermosetting resins, and problems connected therewith, are discussed. Continued application of x-ray, infrared ray, ultracentrifuge and unimol. film technique to the investigation of protein structure is expected to aid in establishing a sounder basis from which improved protein plastics may result. H. K. Salzberg

Adhesives. Natural glues in the veneer and plywood industry. S. Horwitz. *Wood* **4**, 462–5(1939).—A discussion of the prepn. and com. applications of vegetable and animal glues. Leopold Scheflan

Cellophane. Donald A. Waterfield. *Newark Eng. Notes* **3**, No. 2, 12(1939).—A brief description of films manufd. from regenerated cellulose, cellulose nitrate, cellulose acetate, rubber hydrochloride, proteins, and Al silicate. Leopold Scheflan

The scouring action of soap and the modern sulfonated textile auxiliaries. J. Davidsohn and A. Davidsohn. *Am. Dyestuff Reptr.* **29**, 43–6(1940).—An attempt is made to show that emulsification is not only brought about by hydrolysis, but that it depends on the constitution of the soap compd. The new sulfonated products are reviewed briefly. Thirty-one references. W. H. Boynton

Polish; metal. *Federal Specification* **P-P-556a**, Apr. 4, 1939. **Polish; silver.** *Ibid.* **P-P-571b**, Apr. 4, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office. 5¢ each. L. Wilson Greene

Superfinish [method of surface polishing]. O. A. Wallace. *S. A. E. Journal* **46**, 69–92T(1940).—Chem. and mech. surface effects of different types of abrasive polishing are described. H. A. Beatty

Effect of water-soluble salts on the electric properties of paper boards. Yu. V. Koritskiĭ. *Vestnik Elektroprom.* **1939**, No. 9, 25–7.—Both Russian and imported paper boards were dried to a const. wt. at 105°, and then placed in atms. of various relative humidities until const. in wt. after which the sp. vol. resistance was tested at 1500 v. d. c. The variation in water-sol. salt content from 0.31 to 0.58% had no practical effect on elec. resistance. Analogous results were obtained when the specimens were dried at 105° and then impregnated with transformer oil. B. Z. K.

Keeping goods dry in transit. R. L. Hockley. *Chem. & Met. Eng.* **46**, 775–6(1939).—Moisture damage to goods in transit is often very large. The interior of metallic containers frequently corrodes owing to variations in humidity from temp. changes. Activated silica gel, in small quantities, will rapidly reduce the moisture content in sealed packages. The activated gel absorbs 45% of its wt. of moisture with no apparent indication of its water content. H. E. Messmore

Fire-resisting, sound-absorbing materials. D. S. Novakhovskaya. *Stroitel. Materialy* **1938**, No. 7, 45–7; *Khim. Referat. Zhur.* **2**, No. 4, 107(1939).—Acoustical "pemzolit" made out of pumice stone with a portland cement, or magnesia cement can be shaped in a hydraulic press under a pressure of from 5 to 10 kg. per sq. cm. Similar products were prepd. from boiler slag, Donets coal and ceramsite with binders of portland cement, white cement and gypsum. Lab. expts. showed that these materials can be used as fire-resisting, sound-absorbing materials. W. R. Henn

Fumigants. I. Reaction products of trichloroethylene and nitric acid. 1. Mitio Kono and Tadasi Sakai. *J. Agr. Chem. Soc. Japan* **15**, 478–82(1939).—When 30 g. of concd. HNO_3 was added to 200 g. of trichloroethylene, drop by drop, and the product was distd. with steam, a light-yellow oil was obtained. It has a strong fumigating action for insects. It was sufficient to use 0.7–1 lb. for 1000 cubic ft. of space. The properties of the product resemble those of chloropicrin. Sp. gr. 1.665 and b. p. 110–70°. It contained chloropicrin, its isomer and methyl amine. Y. Kihara

Value of insecticidal sprays as an antimalarial measure. P. Moreau. *Rev. méd. franç. d'extreme-orient* **16**, No. 3, 264–74(1938); *U. S. Pub. Health Eng. Abstracts* **19**, Ma, 25(July 29, 1939).—An aq. ext. of pyrethrum contg. 5.5% pyrethrins keeps well when sealed in cans. Upon dilu. it forms a stable, homogeneous suspension that is easy to spray. Better results are obtained at high temps. and low humidity. A daily spraying at 5 p. m. with a 1% dilu. of the concd. product effectively controls mosquitoes. C. R. Fellers

What stimuli guide Anopheles maculipennis in seeking food? P. Van Thiel. *Bull. soc. path. exotique* **30**, 193–203(Feb. 10, 1937); *U. S. Pub. Health Eng. Abstracts* **18**, Ma, 33(Sept. 24, 1938).—Exptl. tests indicate that CO_2 gas is an attractant for female mosquitoes. C. R. F.

Lignin from sorgo residue as source of plastic material (Sorgato) **23**.

Davis, George G., Salmonsen, Ella M., and Earlywine, Joseph L.: Pneumonokonioses (Silicosis) Literature and

Laws. III. Chicago: Chicago Medical Press. 1033 pp. 8.50. Reviewed in *Foundry* **66**, No. 6, 74(1938).

Gant, V. A.: Lead Poisoning. Chicago: Industrial Health Book Co. 100 pp. $1.00. Reviewed in *J. Ind. Hyg. Toxicol.* **21**, 476–7(1939).

Thuillier, Henry F.: Gas in the Next War. London: Goeffrey Bles. 180 pp. $1.50. Reviewed in *Chem. Warfare Bull.* **25**, 179(1939).

Wenzel, J.: Gefahren beim Umgang mit organischen Lösemitteln und ihre Bekämpfung. Suppl. No. 29 to *Zentr. Gewerbehyg. Unfallverhüt.* Berlin: Julius Springer. 95 pp. M. 4.80. Reviewed in *J. Ind. Hyg. Toxicol.* **21**, 438(1939).

Plasticization of polymerized styrene. Arthur J. Warner and Archibald A. New (to International Standard Electric Corp.). Can. 385,103, Nov. 14, 1939. A chemically stable carbocyclic compd. contg. not fewer than 2 and not more than 3 fused rings, b. above 240°C., having a low elec. moment, and capable of swelling polymerized styrene, e. g., 4–20% of phenanthrene, is added to monomeric styrene, and the mixt. polymerized.

Vinylidene chloride plastic derivative. John H. Reilly and Ralph M. Wiley (to Dow Chemical Co.). Can. 385,754, Dec. 19, 1939. A chlorinated diphenyl oxide contg. 3–6 Cl atoms/mol. is dissolved in monomeric vinylidene chloride b. 31.5–32°, and the mixt. subjected to polymerizing conditions. The workability of the polymer is increased at low temps. and the toughness and strength increased by heat-treatment.

Use of zein and formaldehyde to form plastic products. Oswald Sturken (to Corn Products Refining Co.). U. S. 2,178,924, Nov. 7. A mixt. formed at least mainly of zein and CH_2O in aq. soln. is plastified (suitably at 65° for 3–5 min.), molded into desired shapes, and the shaped products are cured, as by heating under pressure.

Molding thermoplastic material such as cellulose acetate compositions. John B. Tegarty (to Sterling Injection Molding, Inc.). U. S. 2,178,410, Oct. 31. Various details of app. and operation suitable for progressive sectional molding of steering-wheel rim covers, etc.

Phosphoric acid esters of nitroalcohols. Byron M. Vanderbilt (to Commercial Solvents Corp.). U. S. 2,177,757, Oct. 31. Tert. esters of phosphoric acid of the general formula: $OP(OCH_2CRR_1NO_2)(OCH_2CR_2R_3NO_2)(CH_2CR_4R_5NO_2)$ where R, R_1, R_2, R_3, R_4 and R_5 represent H or alkyl are produced by a process in which PCl_5 is treated with a primary aliphatic nitro alc., details being given of the production of the tertiary phosphate of 2-methyl-2-nitro-1-propanol, m. 155°, and the tertiary phosphate of 2-methyl-2-nitro-1-butanol, m. 23–5°, suitable for use as a *plasticizer in cellulose ester compns.*

Molding powder. Béla Bártfay. Hung. 121,977, Nov. 2, 1939. Filling materials contg. lignin or protein are treated with the second ingredient of a formaldehyde resin at room temp. or at not above 70°. After impregnation, the product is treated with aq. formaldehyde and dried by an air current at 70°.

Molding powders. V. V. Malyshev, I. D. Abramson and D. L. Bokhan. Russ. 51,858, Sept. 30, 1937. Natural or artificial plastic materials, their solns. or emulsions, with or without plasticizers, fillers and pigments, are atomized in a current of hot air or other gas.

Artificial resins. S. N. Ushakov. Russ. 51,730, Sept. 30, 1937. Phenol-aldehyde resins of the novolac type or their mixts. with polyatomic alcs. are partially etherified or esterified and then condensed with polybasic acids.

Artificial resins. G. S. Petrov. Russ. 51,859, Sept. 30, 1937. Aromatic amines are condensed in two stages with aliphatic aldehydes, in the first stage at a temp. below the b. p. of the aldehyde and without catalysts in the second stage at higher temp. and in the presence of acidic catalysts. The condensation product is washed with water contg. sulfonic acids.

Polyvinyl acetal resins. Geo. O. Morrison and Aubrey F. Price (to Shawinigan Chemicals Ltd.). U. S. 2,179,051, Nov. 7. Substantially colorless polyvinyl resins characterized by a high percentage replacement of hydroxyl groups are produced by a process which involves treating a hydrolysis product of a polyvinyl ester (other than polyvinyl formate) such as polyvinyl acetate with a satd. aliphatic aldehyde contg. at least 2 C atoms in the mol. such as acetaldehyde in the presence of a catalyst such as H_2SO_4 and water, the water being present in an amt. between the min. which will protect the aldehyde and the produced resin from discoloration by the catalyst and the max. compatible with maintaining homogeneous reaction conditions when the acetal reaction exceeds 85%. Several examples are given. Cf. *C. A.* **33**, 9489[9].

Stabilization of a polyvinyl acetal resin. William O. Kenyon and Thomas F. Murray, Jr. (to Canadian Kodak Co., Ltd.). Can. 384,966, Nov. 7, 1939. The stability of a resin prepd. from a polyvinyl alc. and an aldehyde with H_2SO_4 as condensation catalyst is improved by hydrolyzing off, in the presence of HCl, sufficient amts. of the groups that contribute to instability and stopping the hydrolysis before an appreciable amt. of the acetal groups is hydrolyzed off.

High-molecular hydroxylated condensation products from crotonaldehyde. Willi Schmidt, Julius Thewalt and Alexander Rothhaas (to I. G. Farbenind. A.-G.). U. S. 2,178,523, Oct. 31. See Fr. 828,266 (*C. A.* **33**, 2758).

Insulating material for electron discharge tube parts. Russell E. Palmateer (to Hygrade Sylvania Corp.). U. S. 2,179,453, Nov. 7. An oxyacid of N such as HNO_3 is used with powd. Al, Be, Ti or Zr to form a tacky compn., and with an oxide of one of the same metals in uncombined form.

Insulated electrical conductors. David R. Brobst (to Bell Telephone Laboratories, Inc.). U. S. 2,178,365, Oct. 31. An insulation suitable for use on wires, etc., may be formed of cellulose acetate 100, triphenyl phosphate 35, tritolyl phosphate 40 and dimethyl phthalate 40 parts. Such an insulation is flexible and flame-resistant.

Electrical cable insulation. P. N. Gorshkov, P. P. Nikotin, N. A. Chesnokov and G. M. Nodel'man. Russ. 51,970, Oct. 31, 1937. The fire resistance of the insulation is increased by introducing chlorine derivs. of biphenyl and hydrocarbons into natural or synthetic rubber.

Stable adhesive for use on carton flaps, etc. Arthur Bennett. U. S. 2,177,856, Oct. 31. Rubber latex (suitably a latex oxidized with H_2O_2) is given increased adhesiveness under pressure (which adhesiveness is retained for several months on carton flaps or the like) by the addition of a small proportion of Co nitrate.

Adhesive for uniting plies of materials such as those of fir wallboard. Theodore W. Dike and Harry Galber (to I. F. Laucks, Inc.). U. S. 2,178,566, Nov. 7. A semi-fluid aq. alk. oilseed residue proteinous adhesive such as one derived from soybean flour, is used which is substantially free of self flow and has a No. 18 wire MacMichael viscosity between 10 and 90.

Adhesives suitable for use with paper, cloth, metals, etc. Julius G. Little (to Hercules Powder Co.). U. S. 2,179,339, Nov. 7. A pressure-sensitive, nonhardening adhesive compn. consists of a tacky mixt. comprising about 25–80% of a liquid org. hydrogenated abietate such as hydrogenated methyl abietate together with a resin such as hydrogenated rosin which forms at least most of the remainder of the compn.

A cement for uniting paper to glass. Lajos Huszár. Hung. 121,456, Sept. 15, 1939. A mixt. of 500 g. gelatin, 7500 g. water, 750 cc. of 26°Bé. $Ca(ClO_3)_2$ soln. and 100 g. boric acid is specified.

Phosphate esters (frothing, wetting, penetrating, detergent and emulsifying agents) for various uses. Benjamin R. Harris. U. S. 2,177,983, Oct. 31. Numerous examples are given of products, suitable for use in *prepg. chocolate mixts. for coating cakes* and for various other purposes, such as may be produced by bringing into contact a higher fatty acid ester of glycerol having at least one free glycerol hydroxy group and the higher fatty acid radical of which preferably contains 12 or more C atoms in a "pretreatment" stage with P_2O_5 at a temp. of 115° or somewhat higher in a preliminary "conditioning" treatment, without combination of the P_2O_5 with the ester, sepg. the

P_2O_5 and assocd. material, and subsequently effecting phosphatic esterification, as by suitable further treatment with P_2O_5, etc. U. S. 2,177,984 relates to generally similar processes and products, except that in the pretreatment stage of the process the fatty acid glycerol ester material is (instead of treatment with P_2O_5) treated with an alkali metal bisulfate, strong H_2SO_4, SO_3, or pyrosulfuric acid or its acid-reacting salts. Numerous details of the prepn. and use of the products are given.

Alkyl hydroxy aromatic compounds. Lawrence H. Flett (to National Aniline & Chemical Co.). U. S. 2,178,571, Nov. 7. By chlorinating a petroleum distillate, such as kerosene, liquid petrolatum, etc., and condensing the chlorination product with a nuclear hydroxy aromatic compd. and particularly with a nuclear hydroxy aromatic compd. of the benzene series (such as phenol, a cresol, cresylic acid, chlorophenol, salicylic acid, etc.), compds. are obtained which may be employed as intermediates for the production of sulfonation products which are *wetting, detergent, emulsifying*, and other agents. In addn. to their use as intermediate products in the manuf. of the sulfonated compds., the mixts. of alkyl hydroxy aromatic compds. may themselves be employed as detergents, e. g., in the form of solns. of alc.-water mixts. contg. caustic alkali. Also, they may be employed as *insecticides, germicides, parasiticides, or vermicides;* as *wetting agents* in conjunction with emulsifying agents; as *assistants in emulsification;* as *solvents;* as *intermediates for the production of resins* in which phenols are caused to react with resin-forming ingredients of various types; as *plasticizers* for resinous products, cellulose plastics, and other synthetic or natural plastics; and as *intermediates for the production of azo dyes*, for example, azo dyes sol. in org. solvents and (or) useful for the dyeing of cellulose ethers and esters, etc. Numerous examples with details are given, among which is a process which involves chlorinating a kerosene b. 195–300° (mostly 225–275°) and contg. about 5.6% of unsatd. hydrocarbons, to produce a chlorination product contg. mono-, di- and poly-chlorinated hydrocarbons, condensing the resulting chlorination product with a cresol in the presence of $ZnCl_2$ as a condensing agent, to form a mixt. of higher alkyl cresols, and recovering the latter.

Sulfonation of mineral oil extracts. Robert L. Brandt (to Colgate-Palmolive-Peet Co.). U. S. 2,179,174, Nov. 7. An ext. comprising aromatic and other unsatd. constituents such as may be obtained by treating a Texas Gulf Coast oil distillate with a selective solvent such as liquid SO_2 is treated, while in soln. in liquid SO_2, with a sulfonating agent such as a 20% oleum for a time not exceeding 15 min. to obtain a product which may be used as a *detergent* or *wetting* or *emulsifying* agent.

Polymerized alkylolamine derivatives (detergent, emulsifying and flotation agents, etc.). Morris B. Katzman and Albert K. Epstein (to Emulsol Corp.). U. S. 2,178,173, Oct. 31. Compds. suitable for use *in cosmetic emulsions* such as cold creams, etc., which may involve polymerizing alkylolamines at elevated temps. and preferably in the presence of a polymerization catalyst to produce polymers contg. at least 2 N atoms, then treating the resulting polymers with a member of the group consisting of carboxylic acids and alcs. contg. a chain of at least 6 C atoms and derivs. thereof capable of producing esters and ethers to produce esters and ethers of the polymerized alkylolamines and finally treating the resulting product with a substance selected from the group consisting of acid-reacting oxygenated P, oxygenated S and oxygenated B derivatives of alcohols contg. at least 6 C atoms. Various examples and procedure are given. U. S. 2,178,174 relates to products suitable for use in furniture polishes, etc., and which may be obtained by treating an alkylolamine with a higher fatty acid contg. at least 6 C atoms or a deriv. thereof capable of forming esters to produce esters of the alkylolamines, and then treating the resulting product with an acid-reacting substance corresponding to the general formula $(RO)_xXY_w$, where R is an alkyl or acyl radical contg. at least 6 C atoms, X is the residue of an aliphatic polyhydroxy substance, Y is a member selected from the group consisting of oxygenated P, oxygenated S and oxygenated B radicals which is attached to the polyhydroxy substance through an ester linkage, and v and w are small whole numbers. Among the higher mol. wt. carboxylic acids which may be utilized either as such or in the form of derivs. such as acyl halides, esters, particularly triglycerides, anhydrides, etc., for reaction with the alkylolamines to produce esters are the following: caproic, capric, caprylic, hydroaromatic acids such as abietic acid, aromatic acids such as benzoic, benzoylbenzoic, naphthoic, toluic, and naphthenic acids, hydroxystearic acid, higher mol. wt. satd. and unsatd. fatty acids, particularly those derived from natural fats and oils, such as palmitic acid, stearic, lauric, myristic, melissic, oleic, ricinoleic, linoleic or mixed higher fatty acids derived from animal or vegetable fats and fish oils such as lard, oleo oil, coconut oil, corn oil, cottonseed oil, soybean oil, partially or completely hydrogenated vegetable oils such as cottonseed oil, corn oil, sesame oil, and fatty acids of various waxes such as beeswax and carnauba wax. Examples with various procedural details are given.

Aliphatic polyamines. Anderson W. Ralston and Robert J. Vander Wal (to Armour and Co.). U. S. 2,178,522, Oct. 31. Products suitable *for emulsifying oils* and *fats*, use as *lubricants*, as *plasticizing agents* and *modifying agents for resins*, etc., as *detergents*, and in *insecticides* and *fungicides*, are obtained by a process which involves hydrogenating a polymerized nitrile material such as polymerized linseed oil fatty acid nitriles, oleonitrile or stearonitrile. Various examples with details of procedure are given.

Aromatic polyalkylene ethers. Herman A. Bruson (to Rohm & Haas Co.). U. S. 2,178,831, Nov. 7. Compds. such as lauryloxy-, oleyloxy- and cetyloxy-benzene and other compds. of the general formula $A(OC_nH_{2n})_xORA'$ in which A represents an aliphatic or cycloaliphatic hydrocarbon radical, A' represents H or an aliphatic, cycloaliphatic aryl or arylaliphatic hydrocarbon radical, the sum of the aliphatic C atoms in A and A' being at least four, R is an aromatic nucleus, $—C_nH_{2n}—$ is an alkylene group contg. 2–5 C atoms inclusive, and x is an integer from 1 to 5 inclusive, the sulfonation products of which may be used as *wetting agents*, etc., are produced by heating an alc. of the general formula AOH, e. g., lauryl alc., with an aromatic alkylene ether halide of the general formula $A'R(OC_nH_{2n})_xX$, in which X represents a halogen atom, in the presence of an alkali so as to split out alkali metal halide. Various examples with details of procedure are given.

Aromatic polyalkylene ether sulfonates. Herman A. Bruson (to Röhm & Haas Co.). U. S. 2,178,830, Nov. 7. By sulfonation of compds. such a lauryloxyethoxyethoxybenzene, oleyloxyethoxyethoxybenzene, cetyloxyethoxyethoxybenzene and the like, compds. are produced which in the acid form have the general formula $A(OC_nH_{2n})_xOR(A')(SO_3H)_y$ in which A represents an aliphatic or cycloaliphatic hydrocarbon radical, A' represents H or an aliphatic, cycloaliphatic, aryl or arylaliphatic hydrocarbon radical, the sum of the aliphatic C atoms in A and A' being at least four, R is an aromatic nucleus, $—C_nH_{2n}—$ is an alkylene group contg. 2–5 C atoms inclusive, x is an integer from 1 to 5 inclusive and y is one of the integers 1 and 2. Such products may be used as assistants in dyeing, mercerizing, washing, laundering, desizing and sizing operations; in the prepn. of emulsions for spinning and throwing oils, cutting oils, insecticides, finishing compds. contg. waxes and oils; for dispersing pigments and dyes for rubber, inks and leather finishes; in cleaning operations for windows, floors, walls; removing residues of insecticide sprays from fruit, deinking of newsprint, removing dust from the air in air-conditioning systems; in plating baths for deposition of Ni, Sn, Cr, Cd and other metals to give bright deposits and prevent pinholeing; as wetting or spreading agents for insecticides, parasiticides, fungicides, and pest repellents on plants, animals, fabrics, wood; for increasing the absorptive power of paper towels and cotton; and for breaking petroleum emulsions. These compds. also have a fungicidal and bactericidal action. Numerous examples with details are given.

Sulfonated carboxylic acid esters of alcohol amine de-

rivatives (wetting, cleansing, penetrating, emulsifying, lathering, frothing, flotation, and anti-spattering agents). Albert K. Epstein and Morris Katzman (to Emulsol Corp.). U. S. 2,178,139, Oct. 31. Various details are given of the manuf. and uses of products which are preferably prepd. by treating a lipophile deriv. of an alc. amine, contg. at least one free or esterifiable hydroxy group, with a halo carboxylic acid such as chloroacetic or bromoacetic acid, or with a halo carboxylic acid halide such as chloroacetyl chloride or bromoacetyl bromide, to form a chloroacetate or bromoacetate, and then converting the latter into the sulfonic acid deriv. by reaction with an alkali sulfite. Other halo carboxylic acids or derivs. thereof which may be utilized are those derived from mono-, di- and poly-carboxylic acids including, e. g., iodoacetic acid, α-chloropropionic acid, α-chlorobutyric acid, α-bromocapric acid, chlorosuccinyl chloride, dichlorosuccinyl chloride, chlorosuccinic acid, dichlorosuccinic acid, mono- and di-bromoglutaric acid and the corresponding glutaryl bromides, nitrochlorobenzoyl chlorides, etc. Of particular utility are the haloacetic acids and their halides. Instead of initially producing the lipophile deriv. of the alc. amine and then introducing the sulfo carboxylic acid radical, the lipophile radical may be introduced subsequent to the introduction of the sulfo carboxylic acid radical by reaction preferably with a higher fatty acid halide or other lipophile radical. Thus, e. g., an alc. amine such as triethanolamine may be treated with chloroacetyl chloride in such proportions as to esterify one or more hydroxy groups, however, leaving free at least one hydroxy group. The resulting halogen contg. ester may then be treated with the required amt. of an alkali sulfite in aq. media to replace the halogen group by a sulfonic group. The resulting sulfo carboxylic acid ester of the alc. amine may then be isolated and purified or caused to react in the impure state but in dry form with an equiv. amount of a long chain or higher mol. wt. acyl halide to esterify the remaining free hydroxy group.

Esters derived from isocyclic compounds. Karl Daimler and Carl Platz (to I. G. Farbenind. A.-G.). U. S. 2,179,209, Nov. 7. Products useful as *wetting, cleansing* and *dispersing agents*, etc., in treating textiles, etc., are produced, which have the general formula $R_1{}_nAOR_2COY$, where R_1 is an aliphatic or cycloaliphatic hydrocarbon radical having at least 3 C atoms, *n* is a whole number from 1 to 3, A is an isocyclic ring system from the group consisting of hydrogenated and nonhydrogenated benzene and naphthalene radicals, R_2 is an aliphatic hydrocarbon radical, and Y represents $—OR_3SO_3H$, R_3 standing for an aliphatic, cycloaliphatic or aromatic radical. Various details and examples are given of the production and use of compds. such as the isoöctylphenoxyacetic acid ester of hydroxyethanesulfonic acid (I) and the tetradecylphenoxyacetic acid ester of I.

Tetravalent sulphur compounds of high molecular weight (wetting, penetrating, dispersing and detergent substances). James H. Werntz (to E. I. du Pont de Nemours & Co.). U. S. 2,178,353, Oct. 31. By the reaction of dodecyl methyl sulfide or other dialkyl sulfide with a halogenated aliphatic acid such as chloroacetic acid, and of like reactants, products are obtained such as: chloride of dodecylmethylthetine; dodecylmethylthetine; bromide of benzyloctadecylthetine; chloride of octadecylbenzylthetine; bromide of octadecylethyl-α-lauroylthetine; bromide of octadecylethyl-α-propionylthetine; bromide of dodecylmethyl-α-lauroylthetine; bromide of dodecylmethylthetine; bromide of dodecylmethyl-α-propionylthetine; bromide of dodecylmethyl-β-propionylthetine; bromide of benzyloctadecyl-α-lauroylthetine; and chlorides of a mixt. of C_8 to C_{20} alkylmethylthetines, various details for the production of these and similar compds. being given.

Condensation products (peptizing and dispersing agents). Herman A. Bruson and Clinton W. MacMullen (to Röhm & Haas Co.). U. S. 2,178,829, Nov. 7. Products useful for prepg. dispersions of dyes, pigments, S, ZnO etc., *for prepg. emulsions*, as *assistants in dyeing* and *mercerizing*, as *wetting agents* with alk. media, or as *tanning* or *moth-proofing agents* or *detergents*, are produced by condensing in an acid medium an aldehyde and a sulfonate of an aromatic ether of the general formula ROAX in which R is a sulfonated aromatic radical, A is a bivalent radical contg. at least 2 C atoms between X and the O atom, and X represents a hydroxyl, alkoxy, aryloxy, ester, sulfuric ester or sulfonic acid radical or halogen. Numerous examples are given, including condensation of formaldehyde with a sulfonated *p-tert*-octylphenoxyethyl sulfuric acid ester and similar compds.

Forming sheets of vinylidene chloride polymerization products. Richard S. McClurg and Donald L. Gibb (to Dow Chemical Co.). U. S. 2,176,091, Oct. 17. A preformed sheet of polymeric vinylidene chloride is passed through rolling equipment and repeatedly rolled and cross-rolled until the thickness has been reduced at least 50%, all the operations being carried out at temps. substantially below the softening point of the polymer. The rolled sheet has an ultimate tensile strength at least 25% greater than that of the unrolled sheet, is capable of withstanding at least 20 times as many double bends, and exhibits stretch in accordance with Hooke's law without plastic flow.

Cleaning composition. Frederic L. Bishop, Jr. (to American Window Glass Co.). U. S. 2,179,004, Nov. 7. A compn. suitable for cleaning glass sheets to be used in the manuf. of laminated glass is prepd. by mixing dichloroethyl ether with a small proportion of a chloride of Fe, Mn, Zn, Ca or Na.

Apparatus for preparing cleaning or washing solutions from materials such as granular detergents and water. Robert Behrman. U. S. 2,178,735, Nov. 7. Various structural and operative details.

Artificial elastic compositions. J. Carlier. Belg. 432,957, March 31, 1939. A solution of a polymerized vinyl acetate in an org. solvent is treated with an alginate or an algin obtained from alginic acid extd. from seaweed, or from an algulose.

Composite product of gold leaf, etc., for imprinting or ornamentation of leather, cloth, etc. Donald D. Swift (to M. Swift & Sons, Inc.). U. S. 2,175,492, Oct. 10. A base strip of Al is coated with a wax such as beeswax and then with Au leaf or an electrolytic Au deposit, with an overlying sizing colored, as with yellow ochre, to match the metal, and the product is provided with a paper backing. Various mfg. details are described.

Spray-coating surfaces such as those of laminated board. Arthur M. Howald and Leonard S. Meyer (to Plaskon Co., Inc.). U. S. 2,178,358, Oct. 31. A mixt. of particles of finely divided cellulose such as paper or pulp impregnated with a thermosetting substance such as a formaldehyde-urea compn. is suspended in a volatile nonsolvent liquid such as water and the suspension is used for spray coating and the resulting coating is finished by hot-pressing.

Coating lithographic plates. Wm. H. Wood (to Harris-Seybold-Potter Co.). U. S. 2,179,245, Nov. 7. A coating suitable for Zn or Al plates comprises a water-sol. reaction product of a halogen such as Cl or Br and polyvinyl alc. which may be treated with a light-sensitizing Cr compd.

Apparatus for coating with a plastic film. Edward L. Mack and Earle H. Morse (to Reynolds Research Corp.). Can. 385,484, Dec. 5, 1939. Base material is coated with a film of plastic material by extruding the plastic material onto the base material moving at a rate greater than the rate of extrusion, so that the film is stretched while unsupported and thus increased in length and decreased in thickness before contact with the base material.

Stencil sheets. Henry M. Carscallen. U. S. 2,177,768, Oct. 31. A stencil sheet for mimeotyping, adapted to be used upon an opaque, hard backing sheet, having indicating indicia along at least one margin, is substantially rectangular in shape, of transparent paper-like material, pervious to the passage of ink therethrough, and has a colored coating of wax-like material covering one side of the sheet and bonded thereto, the coating being transparent along at least one margin for the width of the indicia

upon the backing paper, and of lesser transparency over the area of the sheet extending away from the margin.

Sand-blasting stencil sheet. Alfred J. Jennings (to E. I. du Pont de Nemours and Co.). Can. 385,085, Nov. 14, 1939. A compn. consisting of crepe rubber 25, wood flour 20, montan wax 8, clay 25, whiting 15, mercaptobenzothiazole Zn salt 1, ZnO 4, stearic acid 0.5, S 1, and phenyl β-naphthylamine is sheeted, vulcanized, and coated with a compn. of crepe rubber 100, brown factice 20, rosin 10, burgundy pitch 5, pine tar 5, mineral oil 5 and ZnO 10 parts.

Electric switchboard panel. William R. Seigle (to Johns-Manville Corp.). Can. 384,291, Sept. 26, 1939. A panel of Ca aluminate cement and asbestos fibers contains Al stearate in amt. of 2 parts by wt. to 100 parts of the sheet to reduce the moisture-absorptiveness.

Forming fibers of molten mineral materials. Daniel C. Drill (to American Rock Wool Corp.). U. S. 2,178,871, Nov. 7. Various details of app. and operation.

Suspension of light-polarizing particles. Edwin H. Land (to Polaroid Corp.). U. S. 2,178,996, Nov. 7. A vehicle such as cellulose acetate compn. carries a dispersion of minute crystals comprising a sulfate of quinine, quinidine, cinchonine or cinchonidine combined with NH_4I and I.

Preventing caking of hygroscopic materials. Havard L. Keil (to Armour and Co.). U. S. 2,175,083, Oct. 3. Materials such as dry liver concentrate, bile salts, and dried meat extract, are prevented from caking owing to absorption of atm. moisture by admixt. with monostearin or a compd. of similar type in small proportion.

Asbestos yarn suitable for use in brake linings, insulation, etc. Willis A. Gibbons (to U. S. Rubber Products, Inc.). U. S. 2,179,087, Nov. 7. A core of drafted and spun asbestos yarn having a relatively rough irregular surface is provided with a cover of loose asbestos fibers rolled into intimate engagement with the irregular surface.

Accelerating reaction between fluids. Joseph D. Griffin Brit. 507,343, June 14, 1939. The phys. or chem. reaction between a liquid and 1 or more fluids, none of which is a bacterial nutrient, is accelerated by passing the fluids downwardly under pressure through a totally enclosed bacterial filter comprising a permeable mech. support filmed with a culture of microörganisms and carrying in its interstices bacterial growths, and continuously or intermittently supplying to the filter a nutrient, preferably in the form of an aq. soln., for the bacterial mass. App. is described. Phys. reactions described are the heating or cooling of liquid or gas, air-conditioning and the extn. of PhOH from a liquid by a solvent such as C_6H_6. Chem. reactions described are: waste liquid from a rayon plant, contg. Na_2S, $Na_2S_2O_3$ and S in soln. and strongly alk. with Na_2CO_3, is treated in the filter with air to produce Na_2SO_4 and CO_2; a similar result follows from the treatment of Na_2CO_3 with SO_2 and air, or with H_2S, CS_2 and air; if the Na_2CO_3 is replaced with dil. H_2SO_4, the effluent is a more concd. H_2SO_4; ammoniacal liquor treated in the filter with H_2S produces $(NH_4)_2SO_4$; pyrites in finely divided form in H_2O is treated with air to form H_2SO_4; hard water is softened by being passed together with a soln. of lime and soda through the filter, in conjunction with air, CO_2 produced by the bacteria from the nutrient and air causing $CaCO_3$ to be pptd. and insol. colloidal products being flocculated by contact with the bacterial mass.

Fumigating gas. Roger G. Aitken and Charles J. S. Warrington (to Canadian Industries Ltd.). Can. 385,868, Dec. 26, 1939. A fumigating gas is prepd. by treating with an acid a mixt. of an alkali metal or alk. earth metal cyanide with an insol. metal sulfite or an aldehyde-bisulfite compd., e. g., a mixt. of NaCN and $CaSO_3$.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Location of ground water by the radio absorption method. Volker Fritsch. *Gas- u. Wasserfach* 82, 757–63 (1939).—Radio methods for investigating underground water supplies must differentiate between free water and that held in pores and cracks of the water-bearing rocks. Exact knowledge of the cond. of these waters and their effect upon radio waves is necessary. This must be supplemented by geologic, hydrologic and mineralogic knowledge to give usable results. Several radio absorption methods are available which give usable results when measurements are carefully made. R. W. Ryan

Some mineral springs of the eastern Balkans. A. Azmanov. *Trud. Podz. Bogat. i Min. Indust. Bulgarija* 7, 199–209(1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 629.—Chemical examn. of the springs at Beronovo, Varbica, Stara Bela Reka and Geravna (Bulgaria) shows all to contain alkali and S. The most productive is that at Varbica which also contains considerable amts. of NaCl, I, H_2S and CH_4; those at Stara Bela Reka and Geravna are characterized by the presence of alkali bicarbonates and I. Contact with some bituminous formation is inferred. C. A. Silberrad

Mineral spring at Bad Karlsbrunn (Silesia). J. Holluta and W. Herrmann. *Verh. Naturforsch. Ver. Brünn* 69, 14–20(1937)(Pub. 1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 627–8.—The water from the recently bored Norbert spring contains per 100 kg.: Cl 0.3, SO_4 0.031, HPO_4 less than 0.05, HCO_3 84.88, K 0.372, Na 1.651, Li trace, Ca 21.076, Sr 0.195, Ba 0.0037, Mg 2.551, Fe^{II} 1.542, Mn^{II} 0.140, Al 0.313, Th trace, H_2SiO_3 6.361, H_2TiO_3 0.004, free CO_2 207.88 g., org. matter equiv. to 177 mg. $KMnO_4$. The temp. was 7.03° (air 3.25°) pH 6.2, radioactivity 4.8 Mache units; that of the neighboring spring ("under the three beeches") was 5.9 units. C. A. S.

The hot medicinal springs of Budapest. F. Papp. *Z. Hydrol.* 17, 79–282(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 629–30; cf. *C. A.* 33, 2631[1].—A detailed account of 115 hot springs in the neighborhood of Budapest, giving the temp. (varying from 20° to 77°), productivity (totalling 56,800,000 l./day, and varying with the level of the Danube) and compn. They are sulfurous and radioactive, and the chief mineral contents are bicarbonates of Ca and Mg. The probable origin is discussed. C. A. Silberrad

Methods of water analysis. Goldstein and E. Leclerc. *Rev. universelle mines* 15, 589–92(1939).—The fact that, in spite of the enormous no. of water analyses made every day and everywhere, no definitely established method has so far been developed is commented on and ascribed to the variety of constituents in a water, in particular of org. matter. A plan for a generally applied analysis is developed which takes into account an examn. by the senses (odor, taste), phys. and phys.-chem. examn., chem. detn. of anions and cations, detn. of non-electrolytes (SiO_2), gas content and discharges, and of residues, oxidizable matter and hardness. The method of Mohr for the detn. of Cl (in form of chlorides) is recommended and a standard method for its application developed. Max Hartenheim

Simple calculation of the correct carbon dioxide content of natural waters and some practical applications. Joseph Tregl. *Gas- u. Wasserfach* 82, 715–18(1939).—If combined CO_2 is replaced by carbonate hardness and CaO by total hardness in the formula of Tillmans, Hirsch and Heckmann (*C. A.* 25, 1310) for correct CO_2 content (i. e., a CO_2 content that will permit deposition of $CaCO_3$ and formation of a protective layer), the formula becomes "correct CO_2" = [carbonate hardness]^2 × [total hardness]/80. Application of this formula to deacidification of water, consumption of chemicals, and judging the quality of the purified water are illustrated. The formula can be applied at elevated temp. as well as at low temp. R. W. Ryan

Water purification in the principal public distribution

systems in Belgium. L. Jansen. *Rev. universelle mines* 15, 554–62(1939).—The methods used in the waterworks of seven large towns, and the original and final compns. of the water are described in detail. M. Hartenheim

Importance of biological research for drinking water. G. Batta, A. Monoyer and G. van Beneden. *Rev. universelle mines* 15, 568–73(1939).—Certain microscopic organisms which are somewhat more highly developed than the pathogenic microbes are mainly ferruginous bacteria which develop especially in Fe- and Mn-rich waters: *Gallionella ferruginea, Leptothrix ochracea, Leptothrix trichogenes, Crenothrix polyspora, Leptothrix echinata, Leptothrix lopholea, Crenothrix fusca, Bacillus manganicus.* Lacking organic nourishment, the ferruginous bacteria take the energy for their growth by oxidation of Fe and Mn compds. Their presence in water reservoirs is not harmful before deferrization or in the filters where they act as purifying agents; they are harmless to the human organism. If they threaten to clog the filters, as indicated by coloring of the water and a taste of fish or ink, their accumulation must be broken up by washing the filters with H_2O_2-water or adding chloramine to the water. Corrosion of water tanks and pipes is sometimes due to *Vibrio desulfuricans* which uses the O of the sulfate mols. to absorb org. substances, and the resulting sulfides start corrosion. Biol. research into the nature and conditions of life of these microorganisms and filters to be used, and treatments to be applied are discussed. In particular, for *water that is used in the sugar extn. of beets,* SO_2 has the best antiseptic action but has to be added largely in excess due to its rapid oxidation of the sulfites into sulfates. Max Hartenheim

Pure water by a single distillation. A. A. Guntz. *Bull. assoc. diplômés microbiol. faculté pharm. Nancy* No. 18, 24–32(1939).—A sketch is given showing the dimensions of the heating app. previously described (*C. A.* 28, 5907[8]; 30, 8065[2]). The properties of water distd. by various methods and the advantages of the Guntz method are discussed. W. C. Tobie

Preparation of "absolute water" by means of "Allassions." R. Loosjes and W. R. Domingo. *Chem. Weekblad* 36, 835–6(1939); cf. Austerweil, *C. A.* 32, 6375[9].—Results obtained with a com. base exchanger show that the water prepd. is the equiv. of distd. water and is obtained at a price 1/16 of that of com. distd. water. A. H. Krappe

Fluorides in food and drinking water—a comparison of effects of water-ingested vs. food-ingested sodium fluoride. F. J. McClure. *Natl. Inst. Health Bull.* No. 172, 53 pp.(1939).—With growing young rats as the exptl. animal, chronic fluorosis was studied particularly from the standpoint of severity of effects produced by NaF—in quantities equiv. to 22.6, 45.2 and 90.4 p. p. m. of F in the drinking water, ingested in the food, as compared with similar quantities ingested in the drinking water. So far as may be shown by (*a*) the av. daily body gain, (*b*) ash and F content of bones and teeth, (*c*) the appearance of the teeth, and (*d*) the total F retained in the final body wt., there were no noticeable differences which could be attributed to either of the 2 media of fluoride ingestion. Acute toxic effects of NaF ingested in the drinking water at a level of about 180 p. p. m. of F were observed, thus confirming previous observations made at the National Inst. of Health. These acute effects of water-ingested fluorides at certain high levels of intake are not to be confused with conditions and effects accompanying fluoride consumption in drinking waters of mottled-enamel areas. Judging from F-balance studies on growing young rats, the av. total retention of F from NaF may equal 30 to 40% of the intake, at the concns. studied. By far the greater portion of this F is deposited in the bones and teeth. The degree of tooth hypoplasia in the rat is directly correlated with the quantity of F present. It has been suggested that the F content of the bones and teeth of exptl. animals may be developed into a biol. test for effective fluorides in foods as well as a means of indicating a pathol. condition in the affected tissue. Observations on the effects of NaF as fed to young rats include the following: (*a*) there is the suggestion of a stimulating effect of 22.6 p. p. m. of F in the diet, on appetite and perhaps on the daily body gain; (*b*) the stimulating effects of fluorides on water-drinking was again observed; (*c*) NaF at a level equiv. to 45 p. p. m. or more of F in food and water gave evidence of a reduced rate of gain; (*d*) an increase in ash content of bones occurred from NaF ingested at levels equaling 22.6 to 600 p. p. m. of F. With the rat, 0.03 to 0.04% F represents approx. the max. that may be present in the whole tooth and the tooth enamel still retain its normal macroscopic appearance. The quantities of F in a large no. of foods, as reported in the literature, are summarized. Although it is extremely difficult to judge the actual conditions of ingestion, and while pos. statements are not warranted, it would appear that an accumulation of F in the bones of adults living in areas where mottled enamel is endemic may be expected. An accumulation of abnormal and perhaps pathol. quantities of F in the bones of adults living in these areas appears within the realm of probability. Future study of chronic fluorosis requires that emphasis be placed on the localization of F in the organism, particularly in the bones and teeth, which relates directly to the cumulative effects of fluoride ingested. There is a need for more information relative to quantities of fluorides in foods, the toxicity of natural food fluorides as compared with pure inorg. fluorides, the associative factors involved in fluoride absorption and metabolism, and direct information is needed from epidemiological biochem. studies relative to the involvement particularly of bone tissue among the human populations of mottled-enamel areas 89 references. J. A. Kennedy

Fluorine in Florida waters. A. P. Black and T. W. Stearns. *Proc. 11th Ann. Convention, Fla. Sect., Am. Water Works Assoc.* 1937, 5–7; *U. S. Pub. Health Eng. Abstracts* 18, W, 67(May 7, 1938).—Of the 498 municipal or private water samples examd. for F in Fla., 21% contained 0.1 p. p. m. or less; 31% contained 0.1–0.5 p. p. m.; 13% contained 0.5–1.0 p. p. m.; and 35% contained 1.0–3.7 p. p. m. Almost without exception those samples which contained 1.0 or more p. p. m. of fluorides came from deep-seated supplies in the Hawthorn formation located in the southwest section of Fla. C. R. Fellers

Small iron-removal water-treatment plants. J. H. Bass. *Ohio Sanitarian* 2, No. 1, 10–12(1939); *U. S. Pub. Health Eng. Abstracts* 19, W, 77(Aug. 26, 1939).—The com. product "Birm" is a catalytic material which is used in an ordinary pressure filter. The CO_2 content of the raw water should be less than 50 p. p. m. and the pH value should be greater than 6.5 for effective Fe removal. C. R. Fellers

Super- and dechlorination practices in water treatment. A. I. Andrews. *Official Bull. N. Dakota Water and Sewage Works Conf.* 6, No. 7, 9–10(1939); *U. S. Pub. Health Eng. Abstracts* 19, W, 77(Aug. 26, 1939).—Cl added in concns. as high as 12 p. p. m., in a sufficiently long contact period, will completely oxidize the taste-producing substances present in the water. The most successful dechlorinating materials are SO_2, $NaHSO_3$, $Na_2S_2O_3$ and activated C. Water contg. phenols, Fe, *Crenothrix*, H_2S, algae and highly polluted with ind. waste, have all been successfully treated by this method. C. R. Fellers

Hypochlorous acid in the sterilization of water, and particularly in the antialgae treatment of refrigeration water in central stations. A. Grégoire. *Rev. universelle mines* 15, 584–9(1939).—The bactericide and algicide action of HOCl is much faster than that of H_2O_2. In presence of bacteria and putrescent materials it is characterized by O in the nascent state, ClO ions, H ions, and a corresponding formation of HCl. The first two are excellent bactericides and algicides and favor flocculation and pptn. of the suspended matter. The Solvay process is described in full; the HOCl soln. is thereby produced on site by a simple app. from Cl, H_2O and either Na_2CO_3, Mg oxychloride or pure Ca-contg. minerals. Operating results of an installation are shown in curves and diagrams. Max Hartenheim

Sulfuric acid for algae control in cooling water. Russell D. Koons. *Refiner Natural Gasoline Mfr.* 18, 397–8

(1939).—Maintenance, under close supervision, of a pH of 7.9–8.1 in the cooling water, by the addn. of H_2SO_4 retarded the growth of algae in the cooling tower and prevented slime accumulation in the condensers. No scale or corrosion troubles were encountered. The cost of acid was less than the saving in maintainance costs. C. H. B. 1

Effect of prechlorination on the number of bacteria and the alteration of the film in English filters. I. P. Ossadchich. *Microbiology.* (U. S. S. R.) **5**, 831(1936); *U. S. Pub. Health Eng. Abstracts* **18**, W, 50–1(Mar. 26, 1938).—In general, when chlorinated water is treated in slow sand filters the bacterial content of the filtrate increases. Chlorination destroys the film which is normally present and liberates the bacteria. The adsorptive power of the filter is reduced and the bacteria are washed out. The increase of bacteria can be prevented if a residual Cl content not greater than 0.3–.5 p. p. m. is maintained. C. R. F. 2

Influence of temperature on the self-purification of water with special regard to bacteriological content. Karl Viehl. *Z. Hyg. Infektionskrankh.* **122**, 81–102(1939).—According to expts. carried out in the lab. on the self-purification of water at different temp. and aerobic conditions, the cell count was greater the lower the temp. Also in river water observed for 4 yrs. there were more cells in the winter than in the summer in so far as the biol. balance was not destroyed. 48 references. Rachel Brown 3

Bacteriological control of purified waters. J. van Beneden. *Rev. universelle mines* **15**, 574–8(1939).—App., testing solns., methods of investigation and reactions used are given in detail for detn. of tubercle bacilli, typhoid bacillus and other toxic impurities. M. Hartenheim 4

Relation between the number of bacteria and the suspended solids in water. Y. Takabatake. *Nagasaki J. Med. Sci.* **14**, 828(1936); *U. S. Pub. Health Eng. Abstracts* **18**, W, 146(Dec. 3, 1938).—The relation between the observed bacterial contents of filtered and unfiltered water varied with the culture medium used and the temp. of incubation. Bacteria from reservoir water grew best when incubated at low temps., and those assocd. with suspended solids in river water developed better at higher temps. Relations between the bacterial count and the suspended solids content of unfiltered reservoir water are seen more clearly with incubation at 20° than at 37°. C. R. Fellers 5

Experimental investigations for the preparation of water with a definite concentration of silver ions by the electro-oligodynamic method. S. V. Moiseev. *Voprosy Pitaniya* **1938**, No. 4–5, 189–97; *Khim. Referat. Zhur.* **2**, No. 4, 109(1939); cf. *C. A.* **33**, 8360[3].—In his investigations of the patented electro-oligodynamic method for disinfecting large amts. of water M. proved that only d. c. should be used. When Ag water with a high concn. of Ag is obtained (which depends on the current d. and the area of the Ag anode), it should be dild. for disinfecting and preservative purposes. When 11 million intestinal bacteria per 1 cc. were added to Ag solns. they were destroyed immediately in concns. of from 8.53×10^{-5} to 3.16×10^{-6}. At a concn. of Ag of from 8.20×10^{-7} to 1.55×10^{-7}/cc. they were either destroyed completely after 1–3 hrs. or they remained in amts. of 1–2/mg. of the Ag water. W. R. Henn 6

Bioflocculation and contact aeration. E. W. Steel. *Water Works & Sewerage* **85**, 158–61(1938); *U. S. Pub. Health Eng. Abstracts* **18**, S, 66–7(July 9, 1938).—Numerous expts. on various phases of contact aeration of settled sewage show distinct advantages with cost reduction in operation. C. R. Fellers 7

Construction and operation of an active-carbon filter plant at the Buckau-Magdeburg Water Works. Werner Kühne and Erwin Heller. *Gas- u. Wasserfach* **82**, 769–74, 784–8(1939).—Taste and odor are successfully removed from Elbe River water by a new active-carbon filtration plant after the water is treated with $Al_2(SO_4)_3$ and fuller's earth used to remove the smallest particles of ppt. The fuller's earth also removes phenols. Regeneration methods for the active C varied with the adsorbed impurities—under some conditions undesirable tastes and odors were removed by treatment with As-free HCl followed by steaming. Enough steam must be used completely to remove volatile taste- and odor-formers. R. W. Ryan 8

A new material for well filters, "Remanit 1800M." H. Hougardy. *Pumpen- u. Brunnenbau, Bohrtech.* **32**, 773(1936); *U. S. Pub. Health Eng. Abstracts* **18**, W, 148(Dec. 10, 1938).—This substance is a Cr-Mn steel contg. Cr 18, Mn 9, Si 0.4 and C 0.1%. C. R. Fellers 9

Results of filter cleaning with sulfur dioxide at Wheeling, W. Va. A. R. Todd. *Taste and Odor Control J.* 5, No. 3, 1–4(1938); *U. S. Pub. Health Eng. Abstracts* **19**, W, 40 (June 3, 1939).—Samples of filter sand were successfully cleaned with a 3–4% soln. of SO_3. A filter of 2,000,000 gals. capacity was treated with 2550 lb. of SO_2 gas. The water contg. this gas was circulated through the filter for 12 hrs. The filter was washed 7 times and allowed to operate normally through the rewash valve. The filter produced good, clear non-acid water after 12 hrs. The treatment costs only 10–12% as much as replacing old filters. C. R. Fellers 10

Iron removal in a rapid filter. Alfred Schumacher. *Gas- u. Wasserfach* **82**, 733–6, 748–52(1939).—One of the Berlin water sources had high Fe content, not satisfactorily removed by existing rapid sand filters. The progress of Fe removal was studied on a small filter with 6.15 sq. m. surface (diam. about 1.4 m.) with a useful filter depth of about 1700 mm. Tests indicated that the washing method commonly used disturbed the filter sand so greatly that an excessively long period was required again to obtain satisfactory Fe removal. Better results were obtained by a short "pressure wash" requiring about 7 min. which reduced water requirements to 4 cu. m. per sq. m. of filter surface and allowed the active contact material to remain on the sand grains. The expts. indicated that an even deeper filter bed would be desirable. Filter velocities of 4.0 m. per hr. and higher shortened the filter cycle so greatly as to be uneconomic. Filter efficiency was calcd. on the basis of Fe removed; this showed that the top 100 cm. of the filter removed little Fe and the next 300 mm. the bulk of the Fe, except toward the end of the cycle. R. W. Ryan 11

Cell reduction and chemical decomposition in the sand filters of water works. Karl Stundl. *Z. Hyg. Infektionskrankh.* **122**, 1–15(1939).—The processes of cell destruction and purification on sand filters are not clear. According to biol. investigations the Ciliata are of little use in the layer of sand but reduce the nos. of bacteria in the water above the sand and in the sludge. The decompn. by bacteria is dependent on the depth of the filter and the O conditions. A greater activity occurs in shallow than in deeper sand layers after prolonged operation. R. B. 12

Softening municipal water supplies by the zeolite process. Eskel Nordell. *Proc. 11th Ann. Convention, Fla. Sect., Am. Water Works Assoc.* **1937**, 18–30; *U. S. Pub. Health Eng. Abstracts* **18**, W, 67(May 7, 1938); cf. *C. A.* **31**, 1917.—Fifteen advantages of the zeolite process over soda-lime are given. Automatic zeolite water softeners which require no manual operation are now available. Fe and Mn can be removed by natural zeolite but the use of a special Mn zeolite is advised. A new nonsiliceous zeolite known as "Zeo-Karb" is now used to replace the bicarbonates with H. This process liberates CO_2 which is removed by aeration. The Zeo-Karb is regenerated with acid. C. R. Fellers 13

The treatment of industrial water by the Magno process. K. Schilling. *Spinner u. Weber* **57**, No. 34, 84, 86(1939). —A method of filtration is described using a product obtained by fractional heating of natural dolomite mineral and contg. MgO, $MgCO_3$ and $CaCO_3$. L. Schefian 14

Some experience in the factory supervision of the water softener in the light of the lime-soda-water diagram. I. W. Arbatsky. *Wärme* **62**, 302–5(1939); cf. *C. A.* **33**, 4713[8].—One manner of supervision of the water softener consists in removal of the color of phenolphthalein through the addn. of $BaCl_2$. The lime-soda-water diagram is established on 2 principles: (1) the water softening proceeds with the pptn. of insol. materials, (2) the water is characterized not by its hardness or alky. but by the excess or deficiency of lime or soda. Descriptions and illustra- 15

tions of the coördinate systems and axial scales employed are contained as well as typical examples of the vectorial addn. of lime or soda excesses. The inaccuracies of the ordinary methods applied to the water softener are discussed with reference to the diagram. H. Kwart

Prevention of incrustation in municipal and domestic water systems with phosphates. Lawrence Kirk. *Official Bull. N. Dakota Water and Sewage Works Conf.* 6, No. 11, 3(1939); *U. S. Pub. Health Eng. Abstracts* 19, W, 102 (Nov. 4, 1939).—Several of the polyphosphates have good anti-incrusting power. A phosphate mixt. called 918-X was evolved as giving excellent service. This combination of chemicals removes Ca from the system. C. R. F.

The supervision of the water supply [in the textile industry]. R. Boye. *Spinner u. Weber* 75, No. 34, 76, 78, 80 (1939).—The necessity of testing the water supply regularly and chem. methods of examn. are discussed. Leopold Scheflan

The significance and production of suitable water for use in the textile industry. Kehren. *Deut. Textilwirt.* 6, No. 19, 11–12(1939).—Deleterious ingredients in ordinary water and methods of their removal are discussed. Surface water is seldom of proper chem. compn. for all-around use in the textile industry; a deep well is the best source of water for this purpose. Leopold Scheflan

Methods of the conditioning of water in the staple-rayon industry. F. Castner. *Zellwolle u. Deut. Kunstseiden-Ztg.* 5, 231–5, 279–82(1939).—A discussion with illustrations showing various com. installations and processes. Leopold Scheflan

Combating corrosion by water. G. Degrémont. *Rev. universelle mines* 15, 562–8(1939).—On the basis of the electrochem. corrosion theory, the various factors influencing and reducing the aggressiveness of water are discussed. The formation of a protective film is facilitated by presence of $CaCO_3$. A more effective and quicker way to render water less corrosive is by coagulation, usually with Al sulfate; the pH of the water can be lowered by this treatment from 0.1 to 1.0 units, but a neutralizing agent should be used with this treatment to avoid excessive acidification. M. H.

A chemical method for protection of pipes in wells and pipe lines against corrosion by aggressive waters; a new theory of the formation of protective layers in water pipes. Aladár Jendrassik. *Magyar Mérnok- Épitészegylet Kozlonye* 73, 307–20(1939).—To explain the formation in iron pipes of a protective layer of rust and Ca carbonate, it is suggested that the rust layer deposited on the pipe walls has a depolarizing effect; in consequence of this effect the ferrous ions formed in the pipe and the rust layers can bind considerable amts. of CO_2. This explains the sedimentation of $CaCO_3$. The $Fe(HCO_3)_2$ formed diffuses through the rust layer and comes into contact with the oxygen dissolved in the water; CO_2 is freed and $Fe(OH)_3$ ppts. The formation of ferrous compds. was proved by repeated expts. The protection of pipes against aggressive waters is a practical application of the new theory. Chem. agents are introduced into the pipe line to ppt. on the walls a layer, consisting chiefly of $CaCO_3$ and $Fe(OH)_3$. These agents must consist of (1) oxidizing, (2) alk. and (3) lime-contg. materials. The final crust is subsequently formed by the water itself. The iron content of the water reaches its normal value after 7–8 weeks. Recently the method has been applied in pipe lines 550 and 1257 m deep with best results. S. S. de Finály

Destruction of lead pipes. L. W. Haase. *Kleine Mitt. Mitglied. Ver. Wasser-, Boden- u. Lufthyg.* 13, 293 (1937); *U. S. Pub. Health Eng. Abstracts* 19, W, 58 (July 22, 1939).—The soln. of Pb depends upon the presence of O_2, the chem. compn. of the water and the period of contact with water. Sol. plumbates are formed with alkali and alk. earth metals. The destruction of Pb pipes may be caused by chem. action from the outside, by phys. action such as frost and erosion, by stray elec. currents, by reactions which depend upon the compn. of the Pb and are promoted by chem. action from inside or outside the pipe, and by unsuitable laying and use. C. R. Fellers

Fishponds of the high Vogelsberg and their productivity. E. Merker. *Allgem. Forst- u. Jagd-Ztg.* 115, 86–99(1939).—Annual variation in heat content, transmission of light, pH, alky., Ca and Mg contents, Na and K contents, Mg and Fe contents, O_2, and phosphate content of fishponds at 500 meters height are discussed in relation to productivity. J. McAfee

Sanitary installations in tropical colonies and the sewer system of the purifying stations in Elizabethville (Belgian Congo). E. Devroey. *Rev. universelle mines* 15, 641–7 (1939).—The particular importance of offal removal and sewerage in tropical climates is discussed, various tropical installation described in general and that of Elizabethville in detail. M. Hartenheim

Semiplant studies of chemical precipitation of sewage. Edgar Whitbee. *Texas Eng. Expt. Sta., Bull.* No. 45, 33 pp.(1938); *U. S. Pub. Health Eng. Abstracts* 19, S, 66–7(May 27, 1939).—The $FeCl_3$ generator in which the Fe salt was manufd. from Fe turnings and Cl, consumed an av. of 42.8 lbs. of Fe and 223 lbs. of Cl daily to produce 160 lbs. $FeCl_3$. The av. efficiency of conversion of Cl to $FeCl_3$ was 47%. The remainder of the Cl formed HCl, remained as free Cl, or satisfied the Cl demand of the water. Atm. losses were very small. Conclusions: Chem. pptn. will remove 2 kinds of material: those which can be settled, and those which can be coagulated and settled. Strong sewage can be coagulated with a dose of 5.25 grains per gal. of $FeCl_3$. The effluent will be clear and will not cause a nuisance when moderately dild. $FeCl_3$ coagulation of sewage is economically successful only under certain conditions, e. g., when the sewage is dil. and either neutral or only slightly acid in reaction and of low total alky. The process was found uneconomical at Dallas, Tex. C. R. Fellers

Bacteria of the paratyphoid-enteritis group in the sewage of greater Berlin. H. Papenberg. *Dept. Sci. Ind. Research* (Brit.), *Water Pollution Research Summary Current Lit.* 10, No. 8, 282 (1937); *U. S. Pub. Health Eng. Abstracts* 18, S, 17 (Mar. 5, 1938).—Typical *Salmonella schottmülleri* were found in 2 of the 152 samples of Berlin sewage examd. One isolation was made of *B. paratyphosum A* (London). Breslau and Gaertner bacteria were not found. These findings show the desirability of frequent sludge removal to reduce the possibility of enteric infections. C. R. F.

New experiments in ferric chloride generation. Charles D. Yaffe. *Munic. Sanit.* 9, 298–9, 308(1938); *U. S. Pub. Health Eng. Abstracts* 18, S, 109(Dec. 17, 1938); cf. *C. A.* 32, 2785.—$FeCl_3$ was the most economical coagulent to use for pptn. at the El Paso sewage plant. It is prepd. by the action of Cl on Fe. The Cl soln. is introduced into 2 of the generating towers which are filled with Fe turnings. Entering at the bottom, the soln. after contact with the Fe, passes from the tops of the tanks to the bottom of the third tank where addnl. Cl is added when necessary. The $FeCl_3$ thus prepd. passes from the top of this tank into the pre-aeration tank where it is mixed with the sewage. One of the chief troubles encountered is the H_2 which plates out on the Fe and prevents the Cl from coming into contact with the Fe. Again accumulation of fine particles of C, Si and other impurities present in the Fe coat the Fe and prevent it from reacting with the Cl. Various plans were tried for the elimination of the "H_2 binding." The process of producing $FeCl_3$ should be kept sep. and distinct from the treatment problem if best results are to be obtained. C. R. Fellers

Developments in the design of small septic-tank systems. E. A. Hepburn. *Health Bull.* (Melbourne) Jan.–June, 1938, 1463–77; *U. S. Pub. Health Eng. Abstracts* 19, S, 105(Aug. 26, 1939). C. R. Fellers

Sludge digestion and the handling of sludge in small treatment plants. G. F. Catlett. *Proc. 11th Ann. Convention, Fla. Sect., Am. Water Works Assoc.* 1937, 63–9; *U. S. Pub. Health Eng. Abstracts* 18, S, 47(May 14, 1938).—Sludge digestion takes place in 3 steps. The nitrogenous and carbohydrate substances are attacked first, then the more resistant nitrogenous material, and finally the more resistant carbohydrates and fats. Imhoff tanks are more applicable to municipalities, and septic tanks are best for

home use. There are no activated-sludge or chem.-pptn. sewage-treatment plants in Fla. C. R. Fellers

Balance of oxygen in an activated sludge tank. N. A. Baziakina. *State Acad. Communal Economy* (Moscow) **1936**, 40 pp.(English summary); *U. S. Pub. Health Eng. Abstracts* **18**, S, 104(Dec. 10, 1938).—A measured amt. of air was pumped into the tank and the amt. of O_2 used in purification was detd. by analysis of the air leaving the tank. Detns. were made of the amt. of O_2 necessary for the formation of nitrites and nitrates and for the oxidation of org. matter in the activated sludge and sewage and the changes occurring in the biochem. O_2 demand (B. O. D.) of the sewage during purification. It is concluded that the B. O. D. of the sewage, as detd. by the nitrate method with incubation for 20 days, indicates the amt. of material biologically oxidized and that the purification process in an aeration tank may be expressed as the quant. reduction of the B. O. D. at the expense of the O_2 absorbed. At the beginning of the process, some of the constituents of the sewage are absorbed by the activated sludge. Later the adsorbed substances are oxidized and the sludge is regenerated. The efficiency of an activated-sludge tank can only be maintained when all the substances brought in by the sewage are oxidized and the activated sludge is restored to its original state. The rate of oxidation of org. matter decreases as the purification process progresses. The intensity of the aeration of the sewage must vary as the sewage passes through the tank. The rate of the biochem. process of oxidation of the org. matter in the aeration tank with an adequate supply of air dets. the time required for the purification according to the concn. of the sewage and the B. O. D. of the purified liquid. This time cannot be reduced by increasing the intensity of aeration. C. R. Fellers

Activated carbon as a means of controlling odors and sludge stability at the Rockford, Mich., sewage-treatment plant. Kenneth L. Carr. *Taste and Odor Control J.* 5, No. 7, 1–3(1939); *U. S. Pub. Health Eng. Abstracts* **19**, S, 126(Oct. 21, 1939).—The primary settling tanks were the main source of odors. The sludge was unstable. The addn. of 17.8–25 lbs. of activated C per million gals. of sewage reduced odor and stabilized the sludge. C. R. Fellers

Direct measurement of the rate of ground-water flow in pollution studies. Elfreda L. Caldwell and Leland W. Parr. *J. Infectious Diseases* **62**, 259–71(1938); *U. S. Pub. Health Eng. Abstracts* **18**, W, 137(Nov. 26, 1938).—The use of NH_4Cl and subsequent estn. of Cl and NH_3 in soil water was used to det. rate of flow and direction. C. R. Fellers

Subsoil pollution in relation to possible contamination of the ground water from human excreta deposited in experimental latrines. Elfreda L. Caldwell. *J. Infectious Diseases* **62**, 272–92(1938); *U. S. Pub. Health Eng. Abstracts* **18**, W, 138–9(Nov. 26, 1938).—Intestinal organisms in privy vaults and latrines are confined to the depositary except as they are mechanically transported by such agencies as primary fluid flow. Under usual conditions, fecal contamination is limited to a few feet around the vaults. C. R. Fellers

Recuperation of materials in the purification of industrial waste waters. M. Prüss. *Rev. universelle mines* **15**, 630–6; *Gesundh.-Ing.* **62**, 587–90(1939).—The economies which can be derived from a possible recuperation of valuable material from waste water are discussed in general, and a few examples of installations are given (mainly in operation in Germany) where fats, Fe, Cu, and coke and coal slimes are recovered. Max Hartenheim

Purification and disposal of milk wastes. E. A. Hepburn. *Health Bull.* (Melbourne) Jan.–June, **1938**, 1478–90; *U. S. Pub. Health Eng. Abstracts* **19**, S, 103(Aug. 26, 1939).—The vol. of the waste must be dild. as much as possible so as to facilitate oxidation. Septic tanks are unsuitable for preliminary treatment of the wastes, as the high acidity of stale milk wastes prevents the development of the desired organisms. The detention period in the preliminary settlement tanks should be not less than 8 hrs. for a flow tank and 2–4 hrs. for a vertical flow tank. Secondary treatment of the waste may be by means of irrigation, filtration or the activated-sludge process. C. R. Fellers

Utilization of waste waters and waste slimes. A. Heilmann. *Rev. universelle mines* **15**, 636–40(1939).—A no. of (German) clarification plants are discussed where the gas developed in settling tanks is collected and used for industrial purposes. The av. compn. of the gas is CH_4 65–95%, CO_2 5–35%, N 0–6%, H 0–8%, H_2S 0–0.25%. The quantity discharged depends to a large extent on the org. substances contained in the waste waters. The gas possesses, after removal of CO_2, a heating value of 8500 kg.-cal./kg. It is burned in gas engines or mixed with city gas; in the former case, 300–500 l. is consumed for 1 HP hr. Quite recently, it is purified of CO_2 and compressed in steel bombs under 250 atm. for driving automobiles; the bombs are exchanged when empty in gas stations. Max Hartenheim

Chloropicrin as a prewarning gas in ship fumigation. G. C. Sherrard. *U. S. Pub. Health Repts.* **54**, 2297–302(1939). J. A. Kennedy

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Application of ion exchangers having an artificial resin basis to desalting of waters (Richter) **18**. Aspects of corrosion [in water systems] (Forn) **9**. Water in production of cotton goods (Boguslavskiĭ) **25**. Detn. of CO_2 [in spring waters] (Hepburn) **7**. Value of treated town's refuse as an org. manure (Tripp) **15**. Detecting mustard gas in potable water (Tasman) **12**. Darkening (blackout) of gas and water works (Riehl, Fick) **21**. Fluorine with relation to teeth [F removal from water] (Gillespie) **11G**.

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Public Water Supplies in Virginia: Descriptions and Chemical Analyses. Richmond, Va.: Virginia Dept. of Health. 159 pp. Reviewed in *Am. J. Pub. Health* **30**, 91–2(1940).

Apparatus for treating water with purifying reagents such as those for flocculation. Samuel B. Applebaum (to Permutit Co.). U. S. 2,179,246, Nov. 7. Water-treating app. for continuous flocculation comprises a settling chamber, a cylindrical upright member, liquid inlet and outlet means at opposite ends of the member directing a vertical flow therethrough of liquid carrying impurities to be flocculated, the outlet means communicating with the settling chamber, means for adding a reagent to the liquid entering through the inlet means, high speed agitator means adjacent the inlet end of the member for imparting speedy horizontal rotary motion to the flowing liquid with agitation and homogenization thereof, relatively slow-motion horizontal rotary agitator means in a succeeding relation to the high-speed means, two vertical shafts for driving the agitator means and means for respectively rotating the shafts at different speeds and mounted above the member.

Apparatus for gentle agitation of liquids, as in chemical treatments of water, etc. Eric Pick (to Permutit Co.). U. S. 2,179,271, Nov. 7. Various structural, mech. and operative details.

Cation-exchanging products from lignite or peat. Walther Sütterlin and Hans Wassenegger (to I. G. Farbenind. A.-G.). U. S. 2,172,301, Sept. 5. The cation-

exchanging properties of lignite or peat are improved by heating with an alkali metal sulfite or bisulfite or an alk. earth metal bisulfite, in the presence of water, to a temp. between 100° and about 200°, under nonalk. conditions, and with CH_2O or AcH. Several examples with details of procedure are given.

Sewage treatment. John G. Bevan (to Guggenheim Bros.). U. S. 2,177,857, Oct. 31. An arrangement of app. is described, and a treatment of sewage contg. putrescible matter which involves subjecting the sewage to the action of a water-sol. compd. of a trivalent metal, such as $Fe_2(SO_4)_3$, to coagulate the putrescible matter, sepg. the coagulated matter as a sludge, subjecting the sludge, without drying, to the action of an acid such as H_2SO_4 capable of regenerating (and in an amount not substantially in excess of that required to regenerate) the sol. metal compd., maintaining oxidizing conditions within the body of the acid-treated sludge and utilizing the acid-treated sludge in conjunction with added trivalent metal compd. for the treatment of addnl. sewage to coagulate putrescible matter in it.

Digester (with superposed chambers) for conversion of organic wastes such as garbage, etc., by bacterial action. Geo. H. Earp-Thomas. U. S. 2,178,818, Nov. 7; Can. 385,163, Nov. 21, 1939. Various structural, mech. and operative details.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Classification of clay and sand-carbonate soils. N. V. Frolova. *Soviet Geol.* 9, No. 7, 62–70(1939). F. H. R.

Summary of recent investigations on Brazilian soils. A. Barreto. *Soil Sci.* 48, 317–21(1939).—It is difficult to predict the fertility of lateritic soils on the basis of ordinary types of lab. study. Titration with alc. NaOH gives results which are helpful. The method is as follows: Vigorously shake 5 g. of air-dried soil with 50 to 100 cc. of 4 alc. 0.1 *N* NaOH. After settling 5 to 10 min. an aliquot of the supernatant soln. is drawn off for titration with 0.1 *N* HCl, bromothymol blue being used as indicator. The result, expressed as cc. of NaOH neutralized per 100 g. soil, is designated as the "alcoxic index." The more fertile soils give indexes ranging from 400 to 800. A soil from Estrado da Bahia, Brazil, had an "alcoxic index" of 350 for the *A* horizon, 850 for the *B* and 650 for the *C* horizon.

M. S. Anderson

Soil types of Manchukuo. III. Determination of exchangeable lime in calcareous soil. Rokuro Kawasima. *J. Agr. Chem. Soc. Japan* 15, 151–5(1939); cf. *C. A.* 33, 4361⁷.—The exchangeable lime in soils contg. $CaCO_3$ in a pptd. form was detd. Both Hissink's and Chapman and Kelley's (*C. A.* 25, 551) methods were inadequate, while Puri's (*C. A.* 29, 6993⁶) NH_4 carbonate soln. method was suitable. **IV. A saline alkali soil.** Rokuro Kawasima and Masanao Nagata. *Ibid.* 809–14.—The surface soil of a saline alkali soil contained a lower concn. of sol. salts but a higher amt. of bivalent cations. pH of the surface soil was 8.36–8.75, while that of the subsoil was 9.19–9.37. The H_2O-sol. salts consisted of 90% of Na salt. The soil can be reclaimed by adequate draining. **V. Acid mineral soil in South Manchuria.** Rokuro Kawasima. *Ibid.* 815–18.—An acid mineral soil of low lime satn. was widely distributed along the coast of South Manchuria. The 7 acidity of the surface soil was generally weaker than that of the subsoil owing to the herbaceous covering. **VI. Steppe soil between Harbin and Tsissikhar.** *Ibid.* 947–52.—A steppe soil contained 95.2% of exchangeable Ca and had pH (H_2O) 8.08–8.29. The silica-sesquioxide ratio and silica-alumina ratio in the colloidal clay were, resp., 2.74 and 3.6.

Y. Kihara

A study of two granite soils developed under tropical and temperate weathering conditions. Edward Crompton. *Mem. Proc. Manchester Lit. and Phil. Soc.* 83, 117–27(1938–39).—The effects of different weathering conditions on the development of 2 soil profiles formed from granite are compared. The Malacca sample came 8 from a location where the atm. humidity is tremendously high, pptn. occurs as torrential downpours and the climate is equable with temps. varying only a degree or 2 from 87°F. At Shap, source of the second sample, pptn. occurs 9 as moderately light cyclonic rain with some snow in the winter and the av. winter temps. are very little above freezing and in the summer the hottest month only 55°F. The Malacca soil is a slightly lateritic red earth and the Shap soil is a shallow, immature heath podzol. Mech. analysis shows no very great variation throughout the Malacca profile with the clay fraction running about 30–40% in the first 10 ft. The surface soil is the most acidic. There is much greater variation in the percentages of the several fractions in the Shap profile. The org. matter content is much higher in the Shap soil and there is generally a considerable accumulation of humus in the form of a peaty layer just below the surface. At Shap the soil changes to hard parent rock at a depth of 1 ft. 7 in. while the Malacca soil changes to disintegrating rock at a depth of 12 ft. The uniformity of percentages in the mech. analyses of the Malacca soil is also found in the chem. analyses. The Shap soil, on the contrary, gives greater variations in chem. compn. The ferrosilicate minerals in these soils are more abundant in the fine sand than in the coarse sand. The mech., chem. and mineralogical analyses are tabulated.

J. R. Adams

Forest soil studies. I. Relation of rate of decomposition of tree leaves to their acid-base balance and other chemical properties. W. M. Broadfoot and W. H. Pierre. *Soil Sci.* 48, 329–48(1939).—Mature, undecompd. leaves and needles representing 19 species of forest trees were studied with respect to differences in chem. properties, and rates of decompn. The pH values of the different samples varied from 3.46 to 6.68, with most of the values below 5.0. The N contents varied between 0.5% for leaves from the sugar maple and 2.06 for 6 those of the black locust. The ash contents varied from 1.94 for material from pitch pine to 11.54 for a sample from black walnut. Ca varied from 19.1 milliequiv./100 g. for scrub pine to 162.8 for dogwood. The excess-base content of the different samples varied from 38.2 milliequiv./100 g. for a sample of pitch pine to 214.7 for black walnut. Some variation exists in the chem. compn. of different samples from the same tree species. Greater differences, however, are found between the different species and genera with respect to N, Ca, ash and excess base. In general, the pH of residual material increased progressively as decompn. proceeded. There was no definite relationship between the pH of the original material and the pH of the residual org. matter. Leaves high in excess base generally gave, upon decompn., a residue of high pH value, while those of low excess base gave a low pH value. After a 6-month period, decompn. averaged less than 25% for samples of pitch pine, scrub pine, white pine, beech and sycamore, whereas it averaged over 45% for samples of yellow poplar, staghorn sumac, black locust and black walnut. Properties closely assocd. with rate of decompn. are H_2O-sol. org. matter content and excess-base content. The multiple coeff. of correlation between percentage decompn. during a 6-month period and these 3 variables was 0.862.

M. S. Anderson

The acidic properties of peat and muck. Irvin C. Feustel. *U. S. Dept. Agr., Tech. Bull.* 690, 41 pp.(1939). —Typical samples of peat and muck were divided into 3 fractions, viz.: the material dissolved by alkali and subsequently pptd. by acid, material dispersed to colloidal dimensions and the remaining residue. These were termed humic acid, colloid and residue, resp. C-N ratios indicated significant differences in the character of the org. materials present in the different peats and in the different fractions. The residue fractions had exceptionally high

ratios while that of the colloid and humic acid fractions was relatively low. The humic acid fraction generally accounted for the major portion of the total acidity possessed by each sample of peat or muck. Base-exchange capacities detd. by leaching with a neutral normal soln. of $Ba(C_2H_3O_3)_2$ were materially less than the base-neutralizing capacities detd. by titration. The arbitrary values for NH_3 absorbed and retained on drying 5 hrs. at 105° were of lesser magnitude than the base-exchange capacities. Each set of detns. demonstrated significant differences among the different types of materials. The results obtained indicate that the NH_3-retaining and base-exchange capacity detns. each measure different and variable fractions of the total acidic H present in the peat and muck materials. W. H. Ross

Agronomic and horticultural considerations in the use of simple chemical soil tests. M. F. Morgan. *Am. Fertilizer*, **91**, No. 10, 5–6, 24, 26(1939).—The characteristics of the various rapid chem. tests that are most commonly used in various sections of the country are described. These soil tests can serve as a useful guide toward a more intelligent use of fertilizers and other soil-improving practices, but only as they are applied in relation to results obtained on many soils of known soil management and crop production and of phys. soil type similar to the particular soil in question. W. H. Ross

Determination and distribution of boron in soils. W. O. Robinson, R. R. Whetstone and H. G. Byers. *Am. Fertilizer* **91**, No. 11, 7–9, 24, 26(1939).—A H_3PO_4 digestion method is described for detg. sol. B in soils and a fusion method, with Na_2HPO_4 and H_3PO_4 as a flux, for detg. total B. Results are given of the analysis for the B content of a no. of soil profile samples. Peat, coastal plain and podzol soils are the lowest in acid-sol. B, while chernozem and Sharkey clay soils are the highest. The total B is highest in the Hagerstown soils. In the Sharkey soil practically all the total B is acid-sol. whereas in the Hagerstown soil not more than 10% of the total B is acid-sol. W. H. Ross

An indirect method for determining the moisture content of soils at the sticky point. Feng Chao-Lin. *Soil Sci.* 48, 323–8(1939); cf. *C. A.* **31**, 5915⁷.—A "sticky point" method is described based upon the fact that when drops of water are slowly added to a plain surface of fine soil a nearly hemispherical mass is formed, which, if picked up and kneaded by hand, just reaches the stage at which it no longer sticks to the hands or blade of the knife. The method is rapid and is applicable to all kinds of soil except those contg. large quantities of sol. salts. M. S. A.

Methods for estimating the corrosivity of soils. K. H. Logan and E. A. Koenig. *Gas* **16**, No. 1, 19–22(1940).—Eight methods were used to evaluate the corrosiveness of soils: (1) soil resistivity (Shepard resistivity meter); (2) soil resistivity at moisture equiv.; (3) soil acidity; (4) acidity-resistivity test; (5) the Columbia rod test; (6) the Putnam test; (7) the nipple-and-can test; and (8) the Denison electrolytic test. Av. results for these tests were plotted against pit depths. The resulting graph did not show a great deal of difference in the degree of correlation of the results of most of the tests with pit depths. All methods show in a very general way the corrosiveness of the soil samples, but whenever several test results having the same value were obtained, widely divergent pit depths are assocd. with them. There appears to be no fixed relation between the results of the tests and the max. pit on the joint of the pipe nearest the sample tested. R. W. Ryan

The adsorbed ions of colloidal clay as a factor in nitrogen fixation by Azotobacter. T. M. McCalla. *Soil Sci.* **48**, 281–6(1939); cf. *C. A.* **32**, 7180⁸.—Colloidal clay served successfully as a basic medium for the fixation of atm. N by *Azotobacter* when added to a nutrient soln. In a comparison of different supplements to Ashby's medium norite gave no fixation of N, permutite very slight fixation and bentonite and zeolite were very effective. A colloidal clay was electrodialyzed. Nutrients such as Ca, K and P were added in const. amts., but with varying amts. of Sr or Ba and reciprocal amts. of Mg. The media were then sterilized, inoculated with *Azotobacter* and aerated for 3 days, by forcing air through the suspension. The best fixation of atm. N occurred with a high level of Mg in the case of the Ba and Mg series. Variable amts. of Mg and Sr gave approx. const. N fixation. Fixation was good in the presence of H-clay. Suspended inert solid material did not serve as effectively in promoting N fixation as did a colloidal material with a base-exchange capacity. M. S. Anderson

Calcium deficiency. T. R. Swanback. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* 422, 16–18(1939); *Tobacco Substa. Windsor, Rept.* 1938.—Although the soil pH was not less than 5.0, a neg. test was often found for replaceable Ca in Conn. tobacco soils. The deficiency results in leaf and bud injury. Excessive rains produced considerable Ca deficiency (previously unobserved) in Conn. Suggested remedy is the addn. of not more than 500 lb. of Ca per acre in order to supply Ca and yet not fix the minor elements. In addn., $CaSO_4$ at the rate of 500 lb. per acre may be applied. C. R. Fellers

Nitrogen fertilization of grassland. IV. Report of 12 cutting seasons. H. J. Frankena and M. P. Both. *Verslag. Landb. Onderzoek.* No. 45, A (10), 255–97(1939) (summary in German, 296–7); cf. *C. A.* **31**, 3614⁴.—Expts. were conducted during 1936, '37 and '38. As N fertilizer Ca NH_4 saltpeter was applied in spring in progressive amts. and sufficient P and K all on different soils. The yield on clay soils shows a max. in early June, sandy soils the same, but clay-humus soils a little later. Results were greatly influenced by weather conditions, the least on clay soils. With only 1 application of N fertilizer in spring, the aftereffect on the second cut is small, and this decrease is smaller in proportion to the increase of yield of the first cut. It is desirable to distribute the N application over 2 cuts. Early-cut hay has greater nutrition value than later cuts; albumin and starch both decrease. As yield increases albumin decreases. Only with a very early cutting time the albumin is increased a little by N fertilization, but at later periods it has no effect. The N absorption is greatly influenced by the type of soil; it is greatest in clay soils and lowest in humus soils. N fertilization does not have much effect on the botanical compn. All results are extensively tabulated. **V. Report of 4 treated experimental plots.** H. J. Frankena. *Ibid.* (11), 299–334 (summary in German, 333–4).—It is recommended to alternate the grazing and cutting periods; thus, grazing in early May, then applying 40–60 kg. N/ha. and cutting at the end of June. The daily growth is not the same for the different cutting periods; during the first months there is a large increase in daily dry matter decreasing in summer. The chem. compn. of the grass is primarily a function of the period of growth. Rapid growth produces high value; N fertilization increases the albumin content in young grass as well as the difference between crude and pure albumin. The botanical compn. of the grasses as per dry matter analysis is quite different for the seasons: more weeds in spring, more clover in summer and more meadow-grass in fall. **VI. Crop yield of seven experimental plots with nitrogen fertilization during spring.** H. J. Frankena and M. P. Both. *Ibid.* (12), 335–60(summary in German, 359–60).—In 1937 increasing amts. of Ca NH_4 saltpeter were applied on the 3rd, 18th and 31st of March and the 12th of April, and in 1938 on Feb. 21st, March 9th and 30th and April 10th. The first cuts for 1937 were on May 3rd, 13th and 25th and June 3rd, and the second cuts May 3rd and June 9th. For 1938 the first cuts were May 12th and 24th and June 9th, the second cuts May 13th and June 9th. The highest yield for 1937 was from plots fertilized on March 31st. In 1938 the N fertilizer applied on March 9th gave best results on all cuts. For the June 9th cut the fertilization of March 30th gave the best results. Weather conditions greatly affect the action of N fertilization. Although the N applied earlier in the season did not change the N content of the grass to a great extent, N content was decidedly higher after the last N application than that of the plots without N fertilization, especially during the earliest cutting periods. J. C. Jurrjens

Phosphorus in Wyoming pasture, hay and other feeds.

O. C. McCreary. *Wyo. Agr. Expt. Sta., Bull.* **233**, 20 pp. (1939).—Wyo. soils are often deficient in P. The P in the dry matter of plants is relatively high in those which grow rapidly. Since plants grow rapidly only when a sufficient amt. of moisture is present, there is a close relationship between the percentage of P in pasture grasses and rainfall. Grasses, sedges and rushes have similar P contents if collected at the same stages of growth and if grown on soils of similar moisture content. The Ca-P ratio of Wyo. grasses varies from 2:1 to 6:1. The grains such as corn, oats, barley and wheat are low in Ca and relatively high in P. C. R. Fellers

Phosphates and their utilization. F. S. Lodge. *Am. Fertilizer* **91**, No. 9, 9–11, 26(1939).—A review. W. H. Ross

Effect of boron supply on growing tobacco. Giuseppe Leone. *Boll. tec. ist. sper. colt. tabacchi "Leonardo Angeloni" Scafati*, **36**, 149–53(1939).—B was added to soil plots in Salerno, Italy, at the rate of 9 kg. of $Na_2B_4O_7$ per acre. Turkish tobacco of the type, Xanti-Yaka, grown on the B-treated plots contained less nicotine than controls. Cigarets made from the processed tobacco of each kind were of better quality in the B-fertilized tobacco. The characteristics and analyses of the soil and the smoking properties of the tobaccos are included in the discussion. N. T. Farinacci

Effect of ammonium and nitrate nitrogen on the mineral composition and sap characteristics of barley. D. I. Arnon. *Soil Sci.* **48**, 295–307(1939); cf. *C. A.* **31**, 8098[2].—Detn. of Ca, Mg, K, N and P, as well as of pH, cond. and total sugars of the expressed sap were made on 5-week-old barley plants grown in nutrient solns. supplied with either NH_4 or nitrate as a sole source of N. The plants were grown at different seasons with control of variables such as pH, aeration and concn. of Mn. The plants utilizing NH_4 had higher P and lower Ca, Mg and K contents than the plants grown with nitrate. Shoots grown in NH_4 solns. at pH 5 had a total cation content of 576 milliequivs. per 100 g. of dry tissue, and 48 8 milliequivs. of anions. In the nitrate soln. the shoots had 331 milliequivs. of cations and 439 of anions. In the first case all N was calcd. as cations and in the latter all N as anions. Variations in pH of the culture soln. had but little influence on the plant compn. Varying the pH of the nutrient soln. between the range 4.0 and 6.7 had little influence on the pH of the expressed sap. The sap of shoots of NH_4-grown plants had a consistently high sugar concn. and lower cond. than the nitrate-grown plants. The sap of roots had in each case lower cond. than that of the shoots. Nitrate-grown plants had a greater adsorptive power for Mn than did the NH_4-grown ones. M. S. Anderson

Influences of potassium upon the contents of sugar and starch in the stems and leaves of paddy rice. Tatuo Koyanagi. *J. Agr. Chem. Soc. Japan* **15**, 757–67; *Bull. Agr. Chem. Soc. Japan* **15**, 119–22(1939)(in German).—When excess of K as fertilizer was added, the yield of paddy rice decreased. With increase in quantity of K, the contents of sugar and N decreased while that of starch increased at the former stage. At the latter stage the contents of sugar and starch increased with the quantity of K. The relation of the sugar content was greatly affected by the amt. of N fertilizer. The quantities of ash and K_2O in the stems and leaves increased with the amt. of K fertilizer added. Y. Kihara

Absorption of iron from finely ground magnetite by citrus seedlings. H. D. Chapman. *Soil Sci.* **48**, 309–15 (1939).—Magnetite was ground to particle sizes of approx. 1 μ diam. An undetectable quantity of Fe was dissolved from 0.1 g. of magnetite in 100 cc. of soln. in the presence of 2.5 g. $CaCO_3$ when CO_2-free air was passed through. When CO_2 gas was passed through, a small but detectable quantity of iron was dissolved. When $CaCO_3$ was omitted from the suspension, and CO_2 passed through, 0.5 p. p. m. of Fe was found in the soln. Ground magnetite as a source of Fe in sand cultures for citrus seedlings is made possible by the formation of intimate contacts between roots and Fe_3O_4 particles. Under these conditions extn. or soln. of Fe is different from those prevailing in the nutrient soln. external to the particles. It is probable that the no. as well as the intimacy and character of contacts is important in detg. nutrient adequacy or inadequacy. M. S. A.

The use of soil conductivity bridge for determining injury to transplanted tomatoes from improper fertilization. Jackson B. Hester. *Am. Fertilizer* **91**, No. 9, 5–8 (1939).—Data showing the use of the cond. bridge in detecting injury from improper fertilization are given. Plants set in soil that has a resistance of approx. 300 ohms are likely to be injured from excessive salt concn. The injury can be eliminated or minimized by any one of several methods, such as, (*a*) adopting proper method of band placement; (*b*) putting the phosphate down with some N and sidedressing with N and K_2O; (*c*) placing a small amt. of the fertilizer underneath the plant and sidedressing later; and (*d*) broadcasting and mixing with the soil before planting. W. H. Ross

Use of calcium cyanamide. Alexander Gordon. *Sugar News* **20**, 513–16(1939).—There is little choice between $CaCN_2$ and $(NH_4)_2SO_4$ as a source of N for sugar-cane cultivation. Cumulative effect on clayey soils and juice qualities are better where $CaCN_2$ is used. W. W. B.

Statistical investigations on sugar-beet yields (and soils). J. R. Bruinsma. *Mededeel. Inst. Suikerbietenteelt* **9**, 373–95(1939).—Data from 105 com. fields show close correlation between $CaCO_3$ in the soil and sugar percentage content of the beets; the relation is asymptotic and reaches a max. with about 1.6% of soil $CaCO_3$. O. W. Willcox

Agrobiology applied to the sugar beet. Guido Bellardini. *Ind. saccar. ital.* **32**, 539–45, 574–86, 601–11(1939).—Applications of agrobiological principles in the quant. coordination of abs. units of growth factors (fertilizers) with abs. units of quantity of plant life (yielding ability) are summarized. Breeding and selecting operations for obtaining new varieties with larger yields should be guided by the inverse yield/nitrogen law. O. W. W.

Criteria for the evaluation of agricultural ground limestone. R. M. Salter and C. J. Schollenberger. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 71–82 (1940).—Sieve analyses of numerous samples of agricultural ground limestone indicate the advisability of classification into the grades superfine, pulverized, standard agricultural ground, meal and screenings, with approx. 100, 93, 72, 46 and 28%, resp., passing a 48-mesh sieve, the median size used in testing. A plot of cumulative percentage through Tyler sieves *vs.* logs mesh diams. is in each case a concave curve, but all are practically straight lines of uniform slope if only the finer and more valuable fractions are considered. Calcns. of relative value based on the complete sieve analysis (cf. Bear and Allen, *C. A.* **26**, 5799) and on the straight line size compn. noted give nearly identical results, indicating that graphic computation from a chart with few sieve data should be sufficiently accurate for practical purposes. Tests with 48–65 mesh separates from representative stones varying from nearly pure $CaCO_3$ to $CaMg(CO_3)_2$, incorporated in soil and decompn. of carbonate noted after different periods of exposure to natural conditions, indicate that for short periods the rate of decompn. varies approx. inversely with the dolomite content and is independent of earthy impurities except as the latter dil. the stone; the relation is formulated. Data are cited, showing that the evaluation of limestone according to these methods is in accord with results observed in long-continued field trials with materials of known size compn. Twenty-two references. C. J. Schollenberger

Losses of fertilizer constituents by leaching during an abnormally wet growing season. M. F. Morgan and O. E. Street. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **422**, 6–16(1939); *Tobacco Substa. Windsor, Rept.* **1938**; cf. *C. A.* **30**, 8472[3]; **29**, 7395[4].—Losses from a normally fertilized sandy soil during the 1938 growing season were approx.: N 100–150 lb. per acre, K_2O 50–75, CaO 140–160 and MgO 30–40. The leaching losses were usually in inverse proportion to the wt. of the crop on the 30-in. lysimeters. It is certain that extensive rainfall removes vast quantities of plant nutrients from Conn. soils. C. R. Fellers

Effects of fertilizers, especially of potassium, on sweet potatoes as the source of alcohol. I. Akira Suzuki, Sinzi Doi, Teiziro Uemura, Yintyang Wang, Seizi Tada and Rikizo Takahasi. *J. Agr. Chem. Soc. Japan* **15**, 989–1005(1939).—When sweet potatoes were cultivated with complete fertilizer, the yield was unusually high. Lack of P gave a noticeable decrease in yield. Sweet potatoes cultivated with a complete fertilizer had high starch and dextrin contents, but a low sugar content. When incomplete fertilizer was used, the hydrolysis in the digestion was small, starch was more easily hydrolyzable and the fermentation ratio was higher. Y. Kihara 1 2

Apparent discrepancies in the amount of magnesia in phosphatic fertilizers as determined by various methods. W. Catesby Jones. *Am. Fertilizer* **91**, No. 7, 5–6(1939).—Results are given for the MgO content of 7 mixed fertilizer samples as detd. by 8 methods of analysis. The Bartlett-Tobey method using the acidimetric titration suggested by Shuey is considered to be an ideal method for detg. MgO in fertilizers, particularly when P_2O_5 and CaO are to be detd. in the same sample. The 3 detns. can be made from the same soln., thus necessitating only one weighing of the sample. W. H. Ross 3

Fertilizers, 1940. Charles J. Brand. *Mfrs. Record* **109**, No. 1, 41, 60(1940).—Descriptive. Leopold Scheflan

Some European impressions relating to fertilizers. C. H. Kunsman. *Am. Fertilizer* **91**, No. 10, 7–8, 22, 24 (1939).—A discourse. W. H. Ross 4

The value of treated town-refuse as an organic manure. E. H. Tripp. *Chemistry & Industry* **1939**, 1102–4.—See *C. A.* **34**, 8441. E. H.

The nitrification of ammonium thiocyanate (a weed eradicant) and the effect of this compound upon the soil population. Allan G. Sandhoff and C. E. Skinner. *Soil Sci.* **48**, 287–94(1939).—Addns. of NH_4CNS and NaCNS to soil were studied in relation to their use as weed eradicants. Their influence was studied by nitrate production and NH_3 content. When 1.25% NH_4CNS was added to unlimed garden soil, there was no change in algae or protozoa content. Bacterial nos. were not changed in 7 weeks, but were reduced in 9 weeks. With addns. of 0.075% NH_4CNS or NaCNS to limed soil, there was always a significant increase in bacterial nos. Bacteria grew vigorously on media, the only N source of which was NaCNS. The application of NH_4CNS in amts. used in the practice of weed eradication forms quickly available N to the extent of only 1/2 of the N in the compd. M. S. Anderson 5

Field experiments in the control of the apple maggot, 1938. Philip Garman. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **428**, 72–3(1939).—During seasons of heavy rainfall rotenone is much less effective in apple maggot control. High temps. and humidities destroy rotenone films rapidly and the flies can continue their egg-laying in spite of application at 10-day intervals. C. R. Fellers 6 7

Biology and combating of the apple and pear sawfly (Hoplocampa testudinea Klg., Hoplocampa brevis, Klg.). Helmut Velbinger. *Gartenbauwiss.* **13**, 492–566(1939).—A strong spraying of trees with a quassia-contg. soln. in combination with As, Cu and lime, 3–6 days after fall of blooms, gives good results. The treatment with sprays contg. nicotine, S, lime, $PbAsO_3$, cresol combinations has hardly any effect against the insects. C. K. Horner 8

Control of the oriental fruit moth in peaches and quinces. Philip Garman. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **428**, 77–9(1939).—Field tests showed slightly less reduction in injury with bentonite-nicotine spray as compared with talc-oil-S dust. Even though the trees were well covered with the spray and dust, the reduction in total injury was only 15%. Pb arsenate and lime-S spray gave fairly good control of quince insects. A sticker was advantageous. Derris seemed to be of some value in controlling the oriental fruit moth on quinces. C. R. F. 9

Control of damping-off and bedrot by vapors of benzene and *p*-dichlorobenzene. P. J. Anderson. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **422**, 39–40(1939); *Tobacco Substa. Windsor, Rept.* **1938**.—The damping-off of seedling tobacco plants is usually caused by the fungus, *Pythium debaryanum*. This disease was controlled by placing sufficient *p*-dichlorobenzene in shallow pans so that 7 g. will be vaporized per sq. yd. of seed bed. The fumes of benzene were also effective against both damping-off and downy mildew of tobacco. C. R. Fellers 1

Further trials with soybean-oil meal. T. R. Swanback. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **422**, 19–20 (1939); *Tobacco Substa. Windsor, Rept.* **1938**; cf. *C. A.* **32**, 7194[4].—This material possesses certain advantages over cottonseed meal which was formerly extensively used for tobacco fertilization. The fiber content of soybean-oil meal is only 5.9% as against 10.8% for cottonseed meal. Ammonification is much slower in the soils contg. cottonseed meal. A 3-year summary shows a 13% crop value increase resulting from the use of soybean oil meal in place of the cottonseed meal on tobacco crops. C. R. Fellers 2

Fungistatic properties of the fatty acids and possible biochemical significance. Charles Hoffman, T. Robert Schweitzer and Gaston Dalby. *Food Research* **4**, 539–45 (1939).—The normal satd. fatty acids contg. 1–14 C atoms were studied over a pH range of 2.0–8.0. Capric acid is of especial value because it possesses marked fungistatic properties over a wide pH range. The effectiveness varies according to the chain length, the concn. of the acid, and the pH of the media. A branched-chain acid is usually less effective against molds than the corresponding straight-chain acid. Unsatn. tends to increase the fungistatic effectiveness of an acid. At neutrality, the acids contg. 8–12 C atoms are the most effective. At pH 2.0–3.0 formic acid is slightly more active than AcOH, but above pH 3.0 the latter is more effective. It is possible that the fungistatic properties of a fatty acid may be indicative of anticarcinogenetic properties. C. R. F. 3

Tests of apple sprays. M. P. Zappe and E. M. Stoddard. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **428**, 68–71(1939); cf. *C. A.* **32**, 1038[4], 7198[5].—Cu sprays were not so good as S for scab control and had the added disadvantage of russeting the fruit, injuring foliage and decreasing the killing power of the Pb arsenate. Leaf injury was not serious except where Cu oxychloride was used. Curculio injury was best controlled by lime-S and Pb arsenate and least by Cu sprays. Of the several Cu sprays tested Coposil was most promising. C. R. F. 4 5 6

Chemistry and preparation of insect sprays containing pyrethrum. A. F. Caldwell. *J. Malaya Branch Brit. Med. Assoc.* **1**, No. 4, 336–41(1938); *U. S. Pub. Health Eng. Abstracts* **19**, Ma, 28(Sept. 2, 1939).—Watery pyrethrum sprays are preferred for airplane fumigation because there is no fire hazard. Unless the pyrethrum contains at least 0.5% pyrethrins, it is of little insecticidal value. A prepn. of low fire risk is manufd. by cold percolation with kerosene followed by diln. to contain 0.075% pyrethrins. CCl_4 may be substituted for 1/2 of the kerosene further to reduce the danger of fire, providing high-pressure spray app. is available. C. R. Fellers 7

Use of karaya gum as an activator for nicotine sulfate against Aphis rumicis. Philip Garman. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **428**, 76(1939).—This gum when used as an activator for nicotine sulfate against aphids under lab. conditions showed no increased toxicity. To 1000 cc. of water were added 0.2 g. nicotine sulfate and 1 g. of karaya gum. When a wetting agent such as Na oleate was used in addn. to the gum, the toxicity was increased by 8–27%. C. R. Fellers 8

Continued experiments with stickers. Philip Garman and C. E. Shepard. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **428**, 74–5(1939).—Lab. tests conducted with glass plates and a no. of different adhesives for sprays gave very inconclusive results. Of several soaps, including potash fish-oil soap, NH_4 oleate and triethanolamine oleate, none improved the adhesion of the sprays. The use of adhesives under field conditions with Baldwin apples resulted in some improvement in apple maggot control. C. R. Fellers 9

Studies on oxyuriasis—chemistry of membranes of pinworm egg ovicides (Jacobs, Jones) III. Compn. of alc.

ext. of cane leaves [fertilizer effect on] (Beauchamp, Lazo) **11D.** Process studies of manuf. of $CaCN_2$ (Heilmann) **4.** Beet cultivation (Wintzell) **28.** Aliphatic polyamines [for use in insecticides and fungicides] (U. S. pat. 2,178, 522) **13.** Alkyl hydroxy aromatic compds. [as insecticides, parasiticides or vermicides] (U. S. pat. 2,178,-571) **13.** Org. Hg compds. [fungicides] (U. S. pat. 2,178,099) **17.**

Belgrave, W. N. C.: Annual Report on the Departments of Agriculture, Malaya, for the year 1938. Kuala Lumpur, Federated Malay States. Govt. Press, W. H. Wyatt, Govt. Printer. 91 pp. $1.00 or 2s. 4d.

Fertilizer. Herman B. Siems (to Industrial Patents Corp.). Can. 384,997, Nov. 7, 1939. Calcined phosphate rock is neutralized with HNO_3 in the presence of the fertilizer materials.

Agent for treatment of soil and plants. József Sellei. Hung. 121,474, Sept. 15, 1939. Add to one l. of a slightly alk. aq. soln. not more than 70 g. of a fluorescent dye and less than 40 g. water-sol. copper salt and (or) less than 80 g. water-sol. iron salt (e. g. 100–300 mg. eosin to 100 l. water or to 60 kg. peat). The liquid may be absorbed by peat before application to the soil. Expts. proved that such dyes stimulate the formation of chlorophyll. Cf. *C. A.* **33**, 7951[1].

Preparing peat for use as a fertilizer, etc. Edward H. Sams. U. S. 2,178,051, Oct. 31. A method of treating peat to render it quickly suitable for such uses as the feeding and bedding of animals and fertilizing consists in removing any unwanted coarse growth there may be over the peat bed, breaking up the surface of the bed to expose the top layer of the bed and to produce an aerobic condition, cultivating readily decayable vegetable matter into the peat, producing heat in the bed by allowing the vegetable matter to decay, permitting the mixt. to stand to effect an initial drying thereof, ridging the mixt. until its moisture content is further reduced, and removing peat from the bed to be used as fertilizer.

Horticultural germicides. Ned M. Sleeper (one-third to Alfred L. Barber and one-sixth each to Rex Lake and William T. Gordon). U. S. 2,178,270, Oct. 31. Infections such as fire blight in pear trees are treated by use of a soln. of a metal complex such as a ferric complex of a tannin.

16—THE FERMENTATION INDUSTRIES

FREY

The microbiological cause of the so-called raspberry disease of cider; production of acetaldehyde by the combined action of alcoholic yeast and acetic bacteria. Gustave Guittonneau, Germain Mocquot and Jean Tavernier. *Compt. rend.* 209, 809–11(1939).—The modern method for the prepn of sweet cider favors the occurrence of "raspberry" disease both by slowing up the alc. fermentation and by allowing the diffusion of acetic bacteria from imperfectly disinfected material. Rachel Brown

Gaseous products of cucumber pickle fermentations. M. K. Veldhuis and John L. Etchells. *Food Research* 4, 621–30(1939).—CO_2 was formed during the fermentation of cucumber pickles in brines ranging from 20 to 80% satn. with NaCl. Larger quantities of gases were evolved during fermentations in 40–60% satd. brines than in brines of 20, 30 and 80% satn. H gas was produced in considerable amts. by all the fermentations observed in 60% satd. brines. In general, H production was much more limited than CO_2. Gases formed in the interiors of hollow pickles or "bloaters" had the same compn. as gasses collected at the tops of the fermenting vats, i. e., CO_2 and sometimes H. C. R. Fellers

Determination of small amounts of alcohol in kefir (alcoholic milk beverage). D. B. Iokhel'son. *Lab. Prakt.* (U. S. S. R.) **14**, No. 8, 20–2(1939).—Kefir is a milk beverage contg. 0.25 to 0.6% alc. Its quality is detd. by a definite relation between lactic acid and alc. The detn. is based on the oxidation of the alc. by an excess of $Cr_2O_7^{--}$ in a H_2SO_4 soln. and detn. of the excess Cr_2O_7 by iodometric titration. Dil. 1 ml. of kefir to 50 ml. with water, pour 5 ml. of this soln. into a 15-ml. flask, add 0.3 g. of MgO, shake, close the flask with a glass tube 1.5 cm. in diam., provided with 2 funnel-like enlargements, and terminating in a cylindrical funnel fitted with a ground-glass stopper. Pour 1 ml. of 0.5% soln. of $K_2Cr_2O_7$ and 1 ml. of strong H_2SO_4 into the cylindrical funnel; they are collected in the joint between the 2 enlargements. Place the app. on an asbestos gauze and heat. The alc. (which is distd. off for 3–5 min.) is oxidized by the Cr mixt. to AcOH. No loss of the liquid or of alc. can occur. Distil off 3–4 ml., cool, remove the upper part and rinse it out with 150–200 ml. of water. Acidify the excess $Cr_2O_7^{--}$ with 5 ml. of a 25% H_2SO_4 soln., add 0.2 g. of cryst. KI, shake the soln., let stand for 10 min. (covered with a watch glass) and titrate with a 0.01 *N* $S_2O_3^{--}$ soln. with an addn. of 1 ml. of starch soln. The end point is reached when the blue color changes to light-green. The concn. of the Cr mixt. is detd. by distg. water through it instead of kefir and the amt. of alc. by the difference in the amts. of the 0.01 *N* $S_2O_3^{--}$ soln. used. The proposed method gives better results than the standard OST 7761 method. The av. error was about 0.1%. Five references are given. W. R. Henn

Attempt to estimate glycerol in wines. Vicentina Cunha. *Arquiv. hig. saúde pública* (São Paulo) **4**, No. 6, 65–6(1939).—On decolorizing the wine and treating it with Br, resorcinol and H_2SO_4 a color is obtained which matches perfectly with a similarly treated standard glycerol soln. O. W. Willcox

Effects of fertilizers—on sweet potatoes as source of alc (Suzuki, *et al.*) **15.** Rubber and brewing industry (Griffiths) **30.**

Acetic acid. Anna Brünner. Hung. 121,908, Nov. 2, 1939. A fermentation device equipped with aerating pumps is described.

Malt-like sirups suitable for use in brewing and baking processes. Leo Stein, James F. Walsh and Haskell C. Needle (Walsh and Needle to American-Maize-Products Co.). U. S. 2,179,203, Nov. 7. A method of producing a malt-like sirup from corn steep water and corn sirup involves first substantially neutralizing the steep water to effect pptn. of the heat-coagulable proteins, filtering to remove the pptd. materials, blending the filtered steep water with a corn sirup, concg. the resulting liquid to produce a sirup of the desired consistency and thereafter heating sufficiently to impart to the sirup a characteristic malt aroma and flavor. Various details of procedure are described.

Starch-decomposing substance. István Friedmann. Hung. 122,085, Nov. 15, 1939. Malt is germinated and the green malt of 50–60% water content is treated in an airtight app. at a temp. not exceeding 60–82° for not more than 3 hrs. to obtain a product of 30–50% water content. This is then dried at 30–40° or extd. with water and the soln. evapd. *in vacuo*.

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Methylcellulose in pharmacy. Gordon A. Bergy. *Am. Professional Pharmacist* **5**, 691–4(1939).—The advantages, properties, prepn. and possible uses in pharmacy especially for the prepn. of pastes, dentifrices, creams, depilatories and hair dressings are discussed. H. M. Burlage

Cosmetic manual. Night creams. Joseph Kalish. 2 *Drug Cosmetic Ind.* **45**, 678–80, 691(1939).—The term "night cream" is used for products known as tissue creams, nourishing creams, skin foods, etc., since the latter names are considered as misleading by the Federal Trade Commission. They have as the active ingredient a vegetable or animal fatty substance which is easily absorbed by the skin and has a softening effect and is used to supply oils and fatty materials lacking in the dry skin. Ingredients 3 and manuf. are discussed. Formulas for beeswax-borax creams of the oil-in-H_2O type (40), cold cream and stearate type (2), those with oil-in-H_2O emulsifiers other than beeswax and borax (6), H_2O-in-oil creams with lanolin (11) and with absorption bases (6) are offered. H. M. Burlage

The tightness of various types of containers for packaging hygroscopic and efflorescent chemicals. John F. Ross and L. Kaplan. *Bull. Natl. Formulary Comm.* **8**, 4 76–87(1939).—$CaCl_2$ U. S. P. XI and Na_2HPO_4 U. S. P. XI were used in the tests and the results indicated that plain cardboard containers and untreated cardboard canisters are not suitable for packaging these types of chemicals. Specially treated cardboard canisters and tin cans appear to be sufficiently impervious to moisture and to meet the usual com. requirements. Glass bottles with screw caps and suitable liners appear to represent the tightest practi- 5 cal com. package and are suitable for storage of the chemicals under av. conditions. No major differences were found between the values obtained with unopened and opened and reclosed packages. Percentage loss varies with the quantity of chemical under test. An attempt was made to eliminate the package size by calcg. the loss in g. per sq. cm. of container surface. H. M. Burlage

The new assay process as applied to fluidextracts of Belladonna leaf, hyoscyamus and stramonium. *Rept. Am. Pharm. Assoc. Lab., Bull. Natl. Formulary Comm.* **8**, 88–93(1939).—As a result of a crit. study of the National Formulary VI methods, revisions for the 3 assays are offered. H. M. Burlage 6

Volatile oil content of Salvia. *Rept. Am. Pharm. Assoc. Lab., Bull. Natl. Formulary Comm.* **8**, 93–6(1939).—Clevinger's method was used. Three samples of official sage yield 1.2, 1.1 and 1.3% volatile oil and the following consts. are reported: d_{25} 0.918, 0.925, 0.925; $[\alpha]_{25}$ (100- 7 mm. tube) 9.2, 6.7, 7.5; n^{20} 1.4616, 1.4645, 1.4640; acid no. 1.8, 2.0, 1.8; ester no. 4.9, 6.8, 4.5 15 references. H. M. Burlage

Sulfanilamide. John R. Sampey. *Furman Bull.* **22**, No. 2, 3–13(1940).—A review with abstracts of patents and a bibliography of 117 references. E. J. C.

Drying and curing bright leaf tobacco with conditioned air. Albert H. Cooper, Carl D. Delamar and Henry B. Smith. *Ind. Eng. Chem.* **32**, 194–8(1940).—See *C. A.* **33**, 7489[2]. J. E. D. 8

Economy in salve bases. H. v. Czetsch-Lindenwald and F. Schmidt-La Baume. *Deut. Apoth.-Ztg.* **54**, 1110–11(1939).—Suggestions are offered how and to what extent certain substitutes may be employed in lieu of the usual bases in the prepn. of indifferent salves, salves with oil-sol. addns., salves with insol. or difficultly sol., and with H_2O-sol. addns. W. O. E.

Anodynes of the ancients. A. Süssenguth. *Pharm. Zentralle* **80**, 677–9(1939). W. O. E.

The more recent drug-plant literature. Heinz Harms. *Süddeut. Apoth.-Ztg.* **79**, 813–14, 817(1939).—A compilation is presented of the publications on domestic drug plants. W. O. E.

Drug plants of the German Homeopathic Pharmacopeia. Acalypha indica L. Herbert Schindler. *Süddeut. Apoth.-Ztg.* **79**, 822–4(1939).—This species is described together with 6 other species of the same genus in connection with their distribution, therapy and application. 24 references. W. O. E.

The evaluation of the acidity of powders of Veratrum viride by the Daphnia method. Isadore Cohen. *Am. J. Pharm.* **111**, 426–9(1939); cf. *C. A.* **33**, 4318[2].—The *Daphnia* method for the evaluation of powders of *Veratrum* is described. Biol. standardization of drug powders, solid exts., etc., whose activity is due to a complex rather than any one active agent, is necessary to insure the uniform potency of the final prepn. Two lots of *Veratrum viride* tested by this method have shown that one lot was 1.7 times more toxic than the other. It is obviously apparent that if the 2 lots of powdered *Veratrum viride* tested were extd. in accordance with the U. S. P. Standards the method of extn. alone could not guarantee the uniform potency of the prepns. The *Daphnia* method offers a rapid, inexpensive and accurate means of evaluating the activity of such substances which owe their activity to a complex especially when the locomotion of the *Daphnia* is visibly affected in their presence. W. G. Gaessler

Efficiency of bactericidal agents in different ointment bases. Louis Gershenfeld and Russell E. Brillhart. *Am. J. Pharm.* **111**, 430–42(1939); cf. *C. A.* **27**, 3734.—A report is given on an investigation of 48 ointments checked by the U. S. Food & Drug Administration agar plate and agar cup plate techniques. The tests indicated that bactericidal agents used in the newer water-miscible ointment bases produced greater bacteriostatic action as revealed by the production of inhibition zones than in the older type of bases when tested by the F. D. A. agar plate and agar cup plate techniques. W. G. Gaessler

A new approach to the standardization of digitalis. Arno Viehoever, N. H. Sokoloff and A. A. Taransky. *Am. J. Pharm.* **111**, 466–74(1939).—Digitalis leaf exhibits protective action on the heart of *Daphnia magna* against depressants (e. g., yohimbine). The degree of protection appears to be directly proportional to the amt. of digitalis. Mixts. of digitalis glucosides exhibit the same protective action. Further work is necessary fully to explore the feasibility of this method for assay purposes. W. G. G.

Qualitative and quantitative analysis of the inorganic constituents of the flowers of Opuntia ficus indica and the decoction of the flowers. Carmelo Battaglini. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., 1939, 70–3.—Analyses of the ash of the flowers and decoction of the flowers of this Mexican cactus are given. The K content is high. The decoction acts as a diuretic, probably because of the high K content. L. E. Gilson

Comparison of the rates of diffusion, in distilled water, of various salts of *p*-aminobenzoyldiethylaminoethanol (procaine base). Jean Régnier and André Quevauviller. *Compt. rend. soc. biol.* **132**, 219–22(1939); cf. *C. A.* **33**, 6379[3], 7887[1].—The rates of diffusion of the salts decreased in the order: HCl salt, benzoate, citrate, phenylpropionate, gluconate. **Passage of different salts of procaine base through a cellophane membrane. Effects of time and concentration on the diffusion of the hydrochloride.** Jean Régnier, André Quevauviller and André Fieyre. *Ibid.* 252–5. L. E. Gilson

Bactericidal action of x-rays in the presence of dyes. Chien-Liang Hsu and T. T'ung. *Proc. Soc. Exptl. Biol. Med.* **42**, 828–30(1939).—Mercurochrome, eosin and methylene blue exerted a bactericidal action on numerous 9 pathogenic Gram-pos. organisms concurrently exposed to x-rays. L. E. Gilson

Chemical and biological assays of the tertiary alkaloids, quaternary bases, and galenical preparations of Phaeanthus ebracteolus (Presl) Merril. Faustino Garcia and Araceli A. Ylagan. *Rev. filipina med. farm.* **30**, 457–64 (1939).—Methods are discussed. L. E. Gilson

Comparative disinfecting action of Sepso tincture and [illegible] of iodine. Karl Wurm. *Z. Immunitäts.* **96**,

193–216(1939).—Sepso tincture, an alc. soln. of complex compds. of certain metals with Br and bromic acid, is offered as a substitute for the tinct. of I. It is slightly less active as a disinfectant than the tinct. of I but *Bacillus prodigiosus* sown on the skin are killed by it very quickly. Its advantages are less toxicity and less corroding action on metals. Julian H. Lewis

Beauty in poisons. Victor Lewitus. *Am. Druggist* **100**, 24–5(Oct., 1939).—Photomicrographs are given of acetanilide, As_2O_3, boric acid, caffeine (2), $CuSO_4$, dinitrophenol, dionine, ephedrine sulfate, hexamethylenetetramine, oxalic acid, KCl, $KMnO_4$, NaCl, strychnine sulfate, stypticin, sulfanilamide and tartar emetic. J. P.

A practical guide to the use of pharmaceutical flavors. Geo. C. Schicks. *Druggists' Circ.* **83**, 28–9(Oct., 1939). J. Pinchack

The composition of some commercial contraceptive jellies. Leo Shedlovsky and Harry Bodner. *J. Contraception* **4**, 179–88(1939).—Methods of analysis are briefly described and results are tabulated for 75 jellies and creams. More than half of the jellies were found to be modified starch glycerite or gum glycerite jellies with boric and lactic acids. In so far as a jelly depends on pH for its spermicidal effect, it appears desirable to have a high buffer capacity; about half of the jellies tested appeared to be of this type. Surface-active materials were found in nearly all the creams but very few jellies. J. P.

Some useful prescriptions. Bernard Fantus. *J. Lancet* **60**, 25–9(1940).—Formulas are given for several analgesic, antiasthmatic and cardiosedative capsules contg. aspirin, pyramidone and carbromal, resp., as major ingredients. Several examples follow on the value of sirups of acacia, licorice, cherry, cinnamon and *Eriodictyon* in disguising unpleasant tastes of prescriptions. The term "iso-elixir" is suggested in writing prescriptions for alc. liquid extractives. It signifies mixing the "low-alc. elixir" and the "high-alc. elixir" in such proportion as to equal the alc. strength of the liquid galenical or chemical that is to be dissolved. The vehicle value of glycerol is illustrated in several hypnotic and diuretic prepns. A formula for compd sirup of NH_4 mandelate is submitted; it consists of 1 g. sol. saccharin, 50 g. NH_4Cl, 80 g. $(NH_4)_2CO_3$, 200 g. mandelic acid, 400 g. sucrose, 0.04 cc. benzaldehyde, 0.1 cc. fennel oil, 1 cc. anethole, 175 cc. licorice fluidext. and water to make 1000 cc. J. Pinchack

Nasal preparations. Milton A. Lesser. *Chem. Products* **2**, 151–4, 160(1939).—The compns. of various pharmaceutical formulas are given. Leopold Scheflan

Chemical aspects of skin treatment. C. R. Theiler. *Chem. Products* **3**, 13–16(1939).—A discussion of the types of medicaments, dusting powders, liquid suspensions, lanolin, skin secretions and mineral lubricants. Leopold Scheflan

Chemical composition of Indian senna leaves (Cassia angustifolia). P. Bhaskara Rama Murti and T. R. Seshadri. *Proc. Indian Acad. Sci.* **10A**, 96–103(1939).—With regard to the conflicting reports respecting the compn. of Indian senna leaves a detailed chem. examn. of leaves obtained from Koilpatti in the Tinnevelly District was made. An aq. ext. of the leaves contains a considerable amt. of Ca salts. In the ash (forming 9.6% of the leaves) are detectable Fe, Mn, Ca, Mg, K, Na, phosphate, sulfate, carbonate, chloride and silicate. The amts. of the important components are (in terms of the oxides): SiO_2 2.7, MgO 7.2, CaO 31.6 and P_2O_5 3.6%. For the isolation of the org. compds. the leaf powder is first extd. with petr. ether. This ext., after removal of the petr. ether and purification of the residue with benzene, gives free myricyl alc. admixed with wax. For the sepn. of the flavonols the alc. ext. of the leaf powder previously extd. with petr. ether is treated with water which dissolves the flavonols. These are pptd. as lead salts. The free flavonols (0.1% of the leaves) are sepd. by fractional crystn. from alc. into the less sol. isorhamnetin and the more sol. kaempferol. For the isolation of the anthraquinone derivs. the residue of an alc. ext. of leaf powder previously extd. with petr. ether is extd. with hot benzene which, after purification, gives rhein in a yield of 0.03% of the leaves. If the alc. ext. is boiled with HCl prior to the extn. with benzene the yield is 0.07%, indicating the existence of a rhein glucoside in the leaves. The remaining benzene soln. contains small amts. of emodin. Dora Stern

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Colorimetric detn. of Mn in presence of org. substances and of Cu, Al, Zn, Ca, Mg, Fe and P, with special reference to drug prepns. (Schulek, Menyhárth) **7**. Prevention of anesthetic explosions (Morrill) **24**. Alkyl hydroxy aromatic compds. [as germicides] (U. S. pat. 2,178,571) **13**. Polymerized alkylolamine derivs. [used in cosmetic emulsions] (U. S. pat. 2,178,173) **13**. Preventing caking of hygroscopic materials [bile salts] (U. S. 2,175,083) **13**.

Acta Japonica Medicinae Tropicalis (*New journal*). Published quarterly by The Institute for Research in Tropical Medicine, Taihoku Imperial University, Taihoku, Formosa, Japan. Vol. **1**, No. 1 appeared in May, 1939.

Fren, George W.: Condensed Review of Pharmacy. 4th ed. New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd. 109 pp. 10s.

Ulmer, Chester I., Fischelis, Robert P., and Joint Committee on Professional Relations of Medical Society and Pharmaceutical Associations of New Jersey: New Jersey Formulary. 3rd ed. Trenton, N. J.: New Jersey Pharm. Assoc. 64 pp. Reviewed in *Am. Professional Pharmacist* **5**, 724(1939).

The Merck Index. 5th ed. Compiled by **Joseph Rosin, C. R. Addinall, Alfred I. Cone,** *et al.* Rahway, N. J.: Merck & Co. Inc. 1060 pp. $3.00. Reviewed in *Am. Professional Pharmacist* **5**, 727–9(1939).

New York Hospital Formulary. 2nd ed. + Supplement. New York Hospital. 99 pp. $1.00. Reviewed in *Am. Professional Pharmacist* **5**, 658(1939).

The Second Supplement of the United States Pharmacopoeia XI. Board of Trustees and Committee of Revision. Easton, Pa.: Mack Printing Co. 178 pp. $1.50. Reviewed in *Am. Professional Pharmacist* **5**, 723 (1939); *Merck Report* **48**, No 4, 28 (1939).

Pharmaceutical iodine compounds. Dr. Wander Gyorgyszerés Tápszergyár R. T. Hung. 121,544, Sept. 15, 1939. Compds. suitable for parenteral administration can be produced by treating 1,3-dipiperidyl-2-propanol with alkali iodides, with or without solvents.

Therapeutic composition containing insulin. David A. Scott and Albert M. Fisher (to Governors of The University of Toronto). U. S. 2,179,384, Nov. 7. A compn. contg. insulin, protamine and Zn is suitable for blood-sugar-lowering action—Cd, Ni or Co also may be used. Cf. *C. A.* **33**, 3076[9].

Therapeutic bismuth compound solutions. Clarence W. Sondern and Geo. O. Doak (to Geo. A. Breon & Co.). U. S. 2,178,126, Oct. 31. A soln. of stable character, being free from decompn. products after normal periods of storage, and relatively stable against light, adapted for intramuscular injection in the treatment of syphilis, comprises an aq. soln. of an alkali metal Bi saccharate and sugar in amt. sufficient to render the soln. substantially hypertonic.

Strophanthus glucoside. Arthur Stoll and Jany Renz (to Chemische Fabrik vorm. Sandoz). U. S. 2,179,204, Nov. 7. For the prepn. of *k*-strophanthoside, an ext. rich in the glucoside is made by treating the seeds of *Strophanthus kombé* with EtOH or a mixt. of EtOH and $CHCl_3$, the soln. thus obtained being evapd. and the residue treated with an acetylating agent such as Ac_2O to form a heptaacetyl compd. of the glucoside which is then sepd. by fractional crystn. and sapond. by treatment with a nonaq. soln. of an alcoholate such as a soln. of $Ba(OMe)_2$ in MeOH, followed by crystn. of the glucoside. Cf. *C. A.* **33**, 3401[1].

Nuclear-substituted derivatives of the morphine series. Lyndon F. Small and Howard M. Fitch (to the Government of the U. S. A. as represented by the Secretary of the Treasury). U. S. 2,178,010, Oct. 31. The compds.

methyldihydrothebainone, $C_{19}H_{25}O_3N$; isomethyldihydrothebainone, $C_{19}H_{25}O_3N$; methyldihydrocodeinone, $C_{19}H_{23}O_3N$; isomethyldihydrocodeinone, $C_{19}H_{23}O_3N$; methyldihydrocodeinone enol acetate, $C_{21}H_{25}O_4N$; isomethyldihydrocodeinone enol acetate, $C_{21}H_{25}O_4N$; methyldihydromorphinone, $C_{18}H_{21}O_3N$; methyldihydromorphine, $C_{18}H_{23}O_3N$; isopropyldihydromorphinone, $C_{20}H_{25}O_3N$; amyldihydrothebainone, $C_{23}H_{33}O_3N$; amyldihydrocodeinone, $C_{23}H_{31}O_3N$; amyldihydromorphinone, $C_{22}H_{31}O_3N$; benzyldihydrothebainone, $C_{25}H_{29}O_3N$; phenyldihydrothebainone, $C_{24}H_{27}O_3N$, are obtainable by reacting a substance from the group consisting of the enol ethers and enol esters of dihydrocodeinone with a Grignard reagent the org. radical of which corresponds to the substituent named, hydrolyzing the resulting product to produce a dihydrothebainone substituted by the org. radical of the Grignard reagent, and, where necessary, converting the resulting substituted dihydrothebainone to the correspondingly substituted named morphine deriv. Benzene may be used as a solvent in prepg. these compds., and numerous details of procedure are given. The products may be used as therapeutic narcotics and are relatively free from undesirable respiratory and emetic effects.

Alkyl guaiacols. Roland R. Read (to Sharp & Dohme, Inc.). U. S. 2,178,608, Nov. 7. *tert*-Hexyl guaiacol, distg. 275–290°, is produced by heating guaiacol and *tert*-hexyl alc. at 100–130° in the presence of $ZnCl_2$ and HCl. It is a germicidal compd., as are also: *sec*-Bu guaiacol, b. about 245–270°; *sec*-Am guaiacol, b. about 250–268°; *sec*-hexyl guaiacol, b. about 255–275°; and cyclohexyl guaiacol, b. about 300 308°.

Organic mercury compounds. Karl Görnitz, Willy Harnack and Otto Wurm (to Schering A.-G.). U. S. 2,178,099, Oct. 31. By effecting reaction between a sol. Hg salt such as mercuric acetate, nitrate, chloride or sulfate and an unsatd. hydrocarbon contg. an ethylene linkage, such as C_2H_4, C_3H_6, or cyclohexene or methylcyclohexene, with a halogenated aldehydic carbonyl compd. such as chloral hydrate, chloral, bromal or trichloroacetaldehyde ethyl semiacetal or chloral methyl semiacetal, in the presence of a lower aliphatic alc., *disinfectant* and *fungicidal compds.* are produced such as: α-trichloro-β-hydroxy - β - (acetoxymercuriethoxy)ethane, α - trichloro-β - ethoxy - β - (acetoxymercuriethoxy)ethane, α - trichloro - β - ethoxy - β - (nitratomercuriethoxy)ethane, α-trichloro - β - methoxy - β - (acetoxymercuriethoxy)-ethane, α - trichloro - β - isopropoxy - β - (acetoxymercuriethoxy)ethane, α - trichloro - β - butoxy - β - (acetoxymercuriethoxy)ethane, corresponding isoamyl and bromo compds., α-trichloro-β-ethoxy-β-(acetoxymercuriisopropoxy)ethane, α - trichloro - β - methoxy - β-(acetoxymercuricyclohexyloxy)ethane, and the like.

Concentrated, stable pyelographic solutions. Iván Egger. Hung. 122,081, Nov. 15, 1939. The concd. aq. soln. of the sodium salts of iodine-contg. org. acids is stabilized by 0.5–10.0% (preferably 5%) triethanolamine.

Diuretics suitable for rectal administration. Chinoin Gyógyszer- és Vegyészeti Termékek Gyára R. T. (Kereszty és Wolf) Hung. 122,012, Nov. 15, 1939. Org. compds. contg. Hg fixed to a C atom of an aliphatic side chain, and contg. also a carboxyl group, are made to react with theophylline in soln. in an org. solvent (preferably $CHCl_3$). The alkali or alk. earth salts of the product may be formed and added to cacao butter as filler.

Isolating follicle hormones from the urine of pregnant individuals. Erwin Schwenk and Friedrich Hildebrandt (to Schering A.-G.). U. S. 2,178,109, Oct. 31. A method of isolating follicle hormones from crude solns. contg. small amts. of follicle hormones together with a relatively large amt. of other substances of diverse character which normally accompany the hormones comprises subjecting the starting material to a steam distn. whereby the volatile phenols are removed, treating the same with compds. of alk. reaction whereby the neutral impurities are rendered insol., acylating the pretreated material in alk. soln. and saponifying the acylation products obtained thereby.

Tooth filling. Wm. G. Turner. U. S. 2,178,821, Nov. 7. A soln. for satg. a fibrous filling such as absorbent cotton for solidifying and hardening when subjected to water is prepd. from gum sandarac 3 lb., gum camphor 2 oz., methyl salicylate 2 oz., thymol 2 oz. and alc. 2 qts.

Adsorptive filter for removing nicotine and other toxic ingredients from tobacco smoke. Ödön Páll. Hung. 121,494, Sept. 15, 1939. The active ingredient of the filter is a loose mass of silica gel moistened with a 5% aq. soln. of boric acid; or, the grains of the gel may be covered by a solid layer of boric acid.

Selecting tobacco types on the basis of their nicotine contents. László Barta. Hung. 121,978, Nov. 2, 1939. Sections of the same size, cut from tobacco leaves, are rubbed with sand or glass powder, washed into a test tube, treated with CNBr and an amine (e. g., β-naphthylamine), shaken, and allowed to stand for 1–2 hrs., and the color intensities are detd. The tobacco plants showing the darkest red colors are selected for further planting.

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

E. M. SYMMES

History of [oil of] vitriol manufacture in England. H. W. Dickinson. *Trans. Newcomen Soc.* 18, 43–60(1937–38). E. H.

The concentration of spent sulfuric acid containing organic admixtures. D. A. Kuznetsov and M. I. Rusakova. *Trudy Inst. Khim. Tekhnol. Mendelejeff. chem.-tech. Inst.* 1938, No. 3 4, 28–36; *Khim. Referat. Zhur.* 2, No. 4, 88(1939). The concn. of H_2SO_4 contg. org. admixts. was studied in order to det. the possibility of re-use of H_2SO_4. The H_2SO_4 was placed in a Würz flask on an elec. plate, into which hot air was passed. The flask was connected with a condenser. For comparison, the following substances were concd.: dil. pure H_2SO_4 soln., a mixt. of H_2SO_4 36, C_2H_5OH 19, H_2O 45%, spent H_2SO_4 of the iso-PrOH production process with a H_2SO_4 concn. of 40–80, and 93%, and spent H_2SO_4 from the iso-BuOH production process with a H_2SO_4 concn. of 15–60, and 80%. Repeated returns of the spent H_2SO_4, after concn; to the production process caused a gradual increase of org. admixts. With increase of the content of org. admixts. decompn. of H_2SO_4 is increased, while temp. of decompn. is lowered. The loss of H_2SO_4 was small in all expts. The max. loss from decompn. of H_2SO_4 was 1.83%, while the total loss was about 3%. The sepn. of resin substances on the walls of the app. is a considerable disadvantage of the concn. process. W. R. Henn

Sodium carbonate; granular (monohydrate crystals). *Federal Specification* O-S-581a, June 29, 1939. **Soda, laundry; modified (washing soda).** *Ibid.* P-S-641a, June 29, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office, 5¢ each. L. Wilson Greene

Anhydrous sodium hydroxide. Production by partial pressure evaporation. Donald F. Othmer and Joseph J. Jacobs, Jr. *Ind. Eng. Chem.* 32, 154–60(1940).—Anhyd. NaOH was prepd. continuously from 50% aq. solns. on a pilot scale, with kerosene as diluent in the evapn. Kerosene remaining on the solid NaOH was removed by centrifuging and solvent washing. The total, calcd. heat cost was about 350 lb. of coal per ton of 50% NaOH soln., or about 150 lb. from a 70% NaOH soln., i. e., 1/3 the present cost. Because of the protective film from the kerosene, no corrosion of equipment was found. Steel equipment might be used. The NaOH produced was a fine, cryst. powder, free-flowing and of rapid chem. activity because of great surface area. E. M. Symmes

Thiodiglycol. Unit process and operations involved in its synthesis from ethylene oxide and hydrogen sulfide. Donald F. Othmer and Donald Q. Kern. *Ind. Eng.*

Chem. **32**, 160–9(1940).—The Meyer synthesis (*Ber.* **19**, 3259 (1886)) is expensive. In production from $(CH_3)_2O$ and H_2S the gas-phase reaction is extremely slow, but after soln. in thiodiglycol (I) the gases react rapidly. The reaction is of the third order. With simple app., data useful for manuf. on a large scale were obtained, and I was produced in almost theoretical quantities when the gases were supplied in correct, mol. proportions. E. M. Symmes 1

Removal of oxygen from gases by means of active copper. F. R. Meyer and Grete Ronge. *Angew. Chem.* **52**, 637–8(1939).—Highly active Cu prepns. were made from $CuCO_3$-$Cu(OH)_2$ mixts. by dissolving in concd. NH_4OH and from $CuCl_2.2H_2O$ and NaOH. Both prepns. were pptd. on infusorial earth and activated with H_2 *in situ*. Diagrams of the absorption tower and the app. used for O_2 detn. are shown. Use and regeneration of the Cu prepns. are possible at about 200°. A Ni prepn. likewise gave good results. An ammoniacal soln. of $Fe(OH)_2$ was used for the detn. of O_2. Karl Kammermeyer 2 3

Price and production policies in the sulfur industry. Carey C. Thompson. *Furman Bull.* **22**, No. 2, 24–32 (1940). E. J. C.

The application of ion exchangers having an artificial resin basis to the desalting of waters. A. Richter. *Angew. Chem.* **52**, 679–81(1939); cf. Griessbach, *C. A.* **33**, 4746[5], 8417[5].—Examples of partial and complete desalting by the use of "wofatite" H and (OH) exchangers are discussed. Exptl. data show successful operation, e. g., reduction of total solids from 1400 mg./l. to 45 and 13 mg./l. for single and double desalting, resp. K. Kammermeyer 4

Oxidation of arsenious acid. S. M. Golyand, S. I. Libin and A. A. Sokov. Russ. 51,903, Oct. 31, 1937. H_3AsO_3 is oxidized to H_3AsO_4 by air in the presence of pyrolusite. 5

Boric acid. I. N. Kostyukovskiĭ. Russ. 52,048, Aug. 31, 1937. In the prepn. of H_3BO_3 from ascharite, the crystn. and the sepn. of $MgSO_4$ are accelerated by adding to the mother lye $Mg(OH)_2$ or $MgCO_3$ or substances forming the latter with $MgSO_4$ in amts. sufficient for the combination of free H_3BO_3.

Fluosilicic acid. I. G. Russ. Russ. 51,906, Oct. 31, 1937. H_2SiF_6 is prepd. by treating a mixt. of fluorspar and hydrated SiO_2 with a 20–40% H_2SO_4 at a temp. not exceeding 90°. 6

Hydrocyanic acid gas generator of the cyanide feed type. Kenneth W. Goulet. U. S. 2,178,372, Oct. 31. Various structural and operative details.

Nitrates or nitrites in the manufacture of sulfuric acid. Lajos Solt. Hung. 121,393, Sept. 1, 1939. Nitrates or nitrites are used instead of nitric acid. Their aq. solns. are led through a reaction column, centrifuge or other app. and decompd. by sulfuric acid or vapors of SO_2. The nitrous gases formed are used in the ordinary manner. 7

Recovery of sulfur dioxide from gases. George H. Gleason and Alfred C. Loonam (to Guggenheim Bros.). Can. 385,341, Nov. 28, 1939. In the recovery of SO_2 from gases by absorption in a medium consisting essentially of dimethylaniline, to release the SO_2 the soln. is heated to higher than 100° under greater than atm. pressure. An app. is described. 8

Alkali carbonates. Ya. E. Seferovich. Russ. 52,077, Oct. 31, 1937. Alkali nitrates are treated with NH_4 carbamate and liquid NH_3. The alkali carbamate formed is sepd. and converted to carbonate by means of superheated steam. 9

Aluminum fluoride; cryolite. N. A. Ivanov, G. S. Morozov and G. V. Labutin. Russ. 51,940, Oct. 31, 1937. A mixt. of alunite and CaF_2 is leached with H_2O and the product converted by NH_4OH or Na_2CO_3 to basic Al fluoride. This is heated to distil off AlF_3 or converted to Na_3AlF_6 by fusion with Na_2CO_3.

Aluminum fluosilicate. V. G. Shcherbakov. Russ. 51,957, Oct. 31, 1937. $Al(OH)_3$ is dissolved in a mixt. of HF and H_2SiF_6 and SiO_2 is added. The reaction mass is cooled and Al fluosilicate sepd. in the usual manner.

Ammonium sulfate. John W. R. Rayner (to Imperial Chemical Industries Ltd.). U. S. 2,178,082, Oct. 31, $(NH_4)_2SO_4$ is crystd. from a soln. in the presence of trivalent Fe, Al or Cr cations and oxalic anions, which serve to control the form and size of crystals produced.

Lead and lead oxide composition. Andrew Mayer (to National Lead Co.). Can. 385,766, Dec. 19, 1939. A bath of molten Pb is kept in rapid motion in a pot against a fixed baffle, with air admitted for contact with the Pb suspended above the bath, and the bath maintained at 700–850°F.

Magnesium hydroxide. Fritz Wienert (to Magnesium Development Corp.). U. S. 2,178,983, Nov. 7. A calcined raw material contg. at least a substantial proportion of CaO, such as a calcined lime or dolomite, is slaked with an aq. soln. contg. an alkali metal or alk. earth metal nitrate, alkali metal chlorate or $CaCl_2$, together with a minor proportion of boric acid or an alkali borate, and the resulting suspension is treated with $MgCl_2$ soln.

Silicon carbide. Raymond C. Benner, Romie L. Melton and John A. Boyer (to Carborundum Co.). U. S. 2,178,773, Nov. 7. A mixt. of sand and C is passed through a tubular furnace chamber, the central portion of which is heated to at least the temp. of formation of SiC, and the mixt. is maintained out of contact from the walls of the furnace in the cooler portions of the furnace chamber, to prevent sticking and produce a product composed of individually sepd. crystals of SiC substantially free from faces produced by artificial fracture.

Soda preparation. István Steiner. Hung. 121,391, Sept. 1, 1939. Ammonia soda is dissolved in water, purified by filtration, sedimentation, etc., and evapd. *in vacuo*. Water glass may be added to improve its washing effect.

Purifying caustic soda. Irving E. Muskat and Wm. F. Waldeck (to Pittsburgh Plate Glass Co.). U. S. 2,178,694, Nov. 7. An impure aq. soln. of NaOH substantially satd. with NaCl is concd. so that monohydrate will crystallize, cooled to crystallize a substantial quantity of both relatively coarse hydrated NaOH and relatively fine NaCl crystals, and such coarse and fine materials are sepd. by passing the resulting liquor with which they are assocd. through a filter of suitable porosity.

Sodium hyposulfite. M. N. Merlis. Russ. 52,052, Oct. 31, 1937. $Na_2S_2O_4.2H_2O$ is prepd. from Na formate by treatment with aq. soln. of SO_2.

Sodium phosphate. Ya. I. Mikhailenko and A. P. Kreshkov. Russ. 51,896, Oct. 31, 1937. Ferrophosphorus is fused with pyrite and the melt is extd. with HCl. The ext. is treated with NaOH to form Na phosphate and ppt. $Fe(OH)_3$.

Sodium plumbite doctor solution. Joseph E. Drapeau, Jr. (to Glidden Co.). U. S. 2,178,742, Nov. 7. A Na plumbite doctor soln. contg. a higher percentage of Na plumbite than can normally be maintained in aq. soln. comprises a soln. of PbO in an excess of NaOH over that necessary to form Na plumbite with the PbO, and between 0.25% and 5%, based on the PbO content, of a water-sol. polyhydroxy acid, such as tartaric acid, a water-sol. salt of a polyhydroxy acid in which the cations are univalent, such as Na K tartrate, a water-sol. polyhydroxy alc. or phenol or a water-sol. sucrose.

Stannic oxide. Ákos Pintér. Hung. 122,067, Nov. 15, 1939. Sn is heated with S vapors to form the sulfide, and the sulfide is oxidized to SnO_2.

Decolorizing titanium tetrachloride. Frederick Gage (to Pittsburgh Plate Glass Co.). U. S. 2,178,685, Nov. 7. Decolorization is effected by contact with a lower-valence Ti compd. such as $TiCl_3$ or $TiCl_2$ (suitably at 135° for 2–4 hrs.).

Zinc oxide. Richard W. French (to Superior Zinc Corp.). Can. 384,730, Oct. 17, 1939. By-product Zn residue contg. an alkali metal salt, a substantial amt. of $ZnCO_3$ and combined S is heated with water to dissolve the alkali metal salt, the residue calcined under oxidizing conditions to convert $ZnCO_3$ and any S compd. mainly into $ZnSO_4$, ZnO and SO_2, the sulfate removed by washing, and the ZnO ground.

Zirconium hydroxide. Ya. M. Pesin. Russ. 49,075, Oct. 31, 1937. Acidic solns. of Zr salts contg. also salts of Fe, Al, etc., are partially neutralized at boiling temp. to the extent that the ratio of acid to total oxide is 0.35–2.0. In this range, $Zr(OH)_4$ ppts. with a small amt. of Fe; the other metals remain in soln.

Carbon dioxide. Ralph H. McKee and James W. Martin (to Macmar Corp.). U. S. 2,178,968, Nov. 7. A soln. of $KHCO_3$ is heated while there are suspended in it sharp-edged, inert particles, such as ground coke which serve to facilitate the liberation of CO_2. App. is described.

Hydrogen peroxide. John C. Michalek and Edward C. Soule (to Mathieson Alkali Works, Inc.). U. S. 2,178,640, Nov. 7. *p*-Hydrazotoluene is used as the reduced intermediate subjected to oxidation in the manuf. of H_2O_2 by cyclic oxidation and reduction of an intermediate in a solvent, such as benzene, in which H_2O_2 is of limited soly.

Highly concentrated hydrogen peroxide solutions. Heinrich Schmidt (to Pennsylvania Salt Mfg. Co.). U. S. 2,178,496, Oct. 31. App. is described, and a process which involves bringing into intimate contact a mixt. of water and H_2O_2 vapors and an aq. soln. of H_2O_2 contg. at least 10% of H_2O_2, so as to effect condensation of at least a portion of the H_2O_2 vapor, while at least a portion of the water vapor remains uncondensed.

Hydrogen-nitrogen mixtures. Lee C. Updegraff (to Dominion Oxygen Co., Ltd.). Can. 384,432, Oct. 3, 1939. In producing H-N mixts. by reaction of a mixt. of air with excess hydrocarbon and treating the combustion products with steam in the presence of catalyst, the ratio of H to N is increased to at least 0.4 and the H efficiency raised to at least 80% by adjusting the ratio of hydrocarbon to O to about 4 atoms of C to 5 mols. of O, enriching the air with O, and keeping the ratio of hydrocarbon to O substantially unchanged.

Apparatus for producing hydrogen-nitrogen mixtures. Hendrik D. Erasmus (to Union Carbide and Carbon Research Laboratories, Inc.). U. S. 2,178,833, Nov. 7; Can. 384,470, Oct. 3, 1939. An app. for the production of mixts. of H and N suitable for use in the "bright annealing" of metals, from raw materials comprising hydrocarbons or material contg. hydrocarbons, mixts. of O and N, and steam, comprises a combustion chamber substantially filled with a mass of lump refractory material having an av. space factor of about 50%, the refractory mass being arranged in a series of concentric layers, each of which is composed of lumps of substantially the same size, the layers being graded progressively from relatively larger-sized lumps near the center of the chamber to relatively small-sized lumps near the periphery of the chamber; means for introducing combustion gases in a diffuse manner well within the body of the mass of refractory material, a steam jacket surrounding the combustion chamber in a concentric manner, and connecting with the discharge opening thereof, means for introducing steam into the steam jacket, a catalyst chamber contiguous to the combustion chamber and steam jacket and freely connected with the outlets therefrom, a porous mass of catalyst material substantially filling the catalyst chamber, baffle means between contiguous chambers, and means for removing and for scrubbing gases which have passed through the catalyst chamber.

Recovery of sulfur from gases. Conway von Girsewald, Gerhard Roesner and Josef Barwasser (to American Lurgi Corp.). Can. 384,396, Oct. 3, 1939. A gas contg. SO_2 is passed through a layer of fuel in a shaft furnace, without external heating, at such speed that free SO_2 is not contained in the effluent gas and the temp. of the effluent gas at its outlet point from the fuel does not reach 800°. The effluent gas is mixed with the necessary amt. of SO_2 for the conversion of the S still contained in it into the elementary form, with the simultaneous oxidation of the CO present to CO_2, and the resulting gas mixt. is subjected to secondary treatment with a catalyst at an elevated temp.

Decomposing bauxite. Vereinigte Aluminium-Werke A.-G. Brit. 506,885, June 6, 1939. In the Bayer process for the alk. decompn. of bauxite, make-up alkali is added in dil. soln. to the red mud to be washed. The alkali is preferably prepd. by causticizing Na_2CO_3 with CaO and added, together with the lime mud, to the red mud, the mixt. being thickened and then filtered. The dil. lye obtained is restored to the tank in which the concd. aluminate lye is dild. before the red mud is sepd. Cf. *C. A.* **33**, 3981[9].

Thermal decomposition of dolomite. Harold S. Booth. Can. 385,398, Dec. 5, 1939. Dolomite is brought into contact with molten NaCl, KCl, LiCl, $CaCl_2$ or alkali sulfate or mixts. thereof at a temp. between 360° and the decompn. temp. of $CaCO_3$.

Carbon blacks and lampblacks. Wm. B. Wiegand (to Columbian Carbon Co.). U. S. 2,178,382, Oct. 31. For producing a "nondeactive" heat-treated black in granular form, the black is caused to adsorb sufficient fixed alkali so that it has an "aq. sludge pH" of from about 6.0 to about 9.0, being thereafter converted to the granular form. U. S. 2,178,383 relates to products of like character having a normal O content and being free from added S acids, Se, Te and halogens, free or combined. Such products are suitable for use in paints, lacquers, rubber compns., etc.

Molybdenum catalyst for the hydrogenation of heavy hydrocarbons. V. F. Popov and S. B. Anisimov. Russ. 52,082, Oct. 31, 1937. Addn. to Russ. 42,982 (*C. A.* **31**, 7206[2]). Sol. salts of molybdic acid (e. g., NH_4 paramolybdate) are treated according to Russ. 42,982.

Silver catalysts. Gerardus H. Visser (to Shell Development Co.). Can. 384,172, Sept. 19, 1939. A highly active Ag metal catalyst is prepd. by electrolytically reducing an aq. soln. of an Ag compd., e. g., $AgNO_3$, to Ag in the presence of nascent H generated in the aq. medium.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Glasses, gage; flat (plain and reflex) (for pressures 125 pounds and over). *Federal Specification* DD-G-491, June 29, 1939. **Glasses, gage; reflex and round, tank (for pressures under 125 pounds).** *Ibid.* DD-G-496, June 29, 1939. **Glasses, gage; round, boiler (for pressures 125 pounds and over).** *Ibid.* DD-G-511, June 29, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office, 5¢ each. L. Wilson Greene

Note on the solubility of sodium chloride in a soda-lime-silica glass. H. Marshall Bateson and W. E. S. Turner. *J. Soc. Glass Tech.* **23**, 265–7(1939).—By melting increasing and excessive amts. of NaCl in the batches, it was found that a soda-lime-silica glass of initial compn. SiO_2 75, CaO 9.2 and Na_2O 15.8% dissolved NaCl at 1400° in amt. equiv. to 1.42% of Cl or 2.34% NaCl. H. F. Kriege

Flameless heating of glass-melting furnaces. N. P. Krasnikov. *Stekol'naya Prom.* 1938, No. 10, 25–6; *Khim. Referat. Zhur.* 2, No. 4, 104(1939).—In heating glass-melting furnaces by flameless burners which used purified peat "generator" gas, a high productivity of the furnace and a low consumption of fuel were obtained. W. R. Henn

Study of the possibility of reducing the iron oxide content of molten soda-lime-silica glasses by the action of chlorides. H. Marshall Bateson and W. E. S. Turner. *J. Soc. Glass Tech.* **23**, 253–64(1939).—Meltings have been made, mainly at 1400°, in Pt, of a glass of basic compn. SiO_2 75.0, CaO 9.2, Na_2O 15.8%, to which either 0.1 or 0.2% of iron oxide as Fe_2O_3 in the glass was added and the batch melted with the addn. of one of the chlorides, $FeCl_3$, NaCl, KCl or NH_4Cl, in amt. equiv., in terms of Cl, to 0.1, 0.2 or 0.4% of the glass. Analysis of the resultant glasses showed that during the melting process Fe as well as Cl was lost by volatilization, probably as $FeCl_3$, the

losses being very variable, but being, in general, lowest with NaCl and greatest with NH_4Cl. In no case did the loss of iron oxide reach 25% of the original amt., and, with NaCl, in no case did it reach 10%. Although NH_4Cl was the most effective of the reagents in eliminating iron oxide, its use in practice would be of doubtful benefit owing to its tendency to produce coloring effects varying from yellow to brown. H. F. Kriege

Cooling of flat glass. H. Yamamoto. *Glastech. Ber.* 17, 301–2(1939).—Flat glass prepd. by the Fourcault and the Pittsburgh vertical draw processes was examd. by means of a polariscope. The Fourcault glass showed noticeable strain only in narrow uniform bands along the edge, while in the Pittsburgh glass the bands were broader and the strain was frequently found in the center. The temp. distribution was detd. during operation by bringing the glass at various points into contact with a thermocouple, thus making it possible better to control cooling conditions. J. F. Hyde

Some experiments on the effects of humidity on the weathering of bottle glasses. Violet Dimbleby and W. E. S. Turner. *J. Soc. Glass Tech.* 23, 242–52(1939).—The alkali extd. from the interior of 3 different brands of 4-oz. medicine bottles by boiling for 5 hrs. with water was detd. very soon after the bottles had been made. Other bottles of each brand were then stored (some with interior as received, some after being washed) for a period exceeding 11 months, some at 25° in specially constructed chambers contg. P_2O_5 (and therefore of zero humidity), some in similar chambers at const. relative humidity of 76%, and some, with mouths covered by muslin, in a room subject to normal variations of atm. temp. and humidity. Observations of appearance were made throughout the period. At the end the acidity or alky. of interior and exterior was detd., and the general durability of the interior re-detd after a preliminary washing. The durability of bottles stored at zero humidity remained practically unchanged and no film of cryst. products of weathering was produced. Bottles exposed to a humid atm., either in an enclosed chamber or a room, developed cryst. films (more regular and finer when in the chamber) and the durability of the resulting surfaces was substantially improved as the outcome of such exposure. H. F. Kriege

The factory production of some special glasses for discharge lamps. P. Staton. *J. Soc. Glass Tech.* 23, 281–91 (1939).—The compns. of glasses suitable, on the one hand, for low-pressure and, on the other, for high-pressure mercury vapor lamps are set out and comments are made on the conditions to be observed in their com. prepn. Low iron oxide content is essential, especially in the hard glasses for high-pressure lamps, to ensure high transmission of ultraviolet light. Some expts. are recorded, showing that with certain borosilicate glasses the addn. of 0.5% NaCl to the batch resulted in an appreciable reduction in iron oxide content. Expts. are also recorded on a series of glasses of stated compn. contg. Co, Ni, Cu or Fe oxide or their mixts. designed to transmit ultraviolet light efficiently within certain wave-length limits and as little as possible visible light. The importance of wall thickness of the lamp bulb in this connection is referred to and the methods adopted for controlling the transmission are described. H. F. K.

Glass manufacture for electric lamps. The development of special glasses for mercury-discharge lamps. J. E. Stanworth. *J. Soc. Glass Tech.* 23, 268–80(1939).—Glasses contg. 5% boric oxide plus phosphoric oxide, 20–35% alumina, and 15% of the basic oxides, lime, baryta, magnesia, and zinc oxide, the remainder being silica, were studied with a view to finding suitable hard glasses for the inner tubes of high-pressure mercury-discharge lamps. Glasses of this type contg. more than approx. 27.5% alumina or more than approx. 7.5% lime, bubble too much during bench working in an oxy-coal gas flame. On the other hand, if the lime and alumina contents are too low, the glasses are difficult to found and work at the furnace. A glass of theoretical compn., SiO_2 56, Al_2O_3 24, CaO 7.5, BaO 7.5 and B_2O_3 5% has been melted on a semicom. scale in a small tank furnace constructed from china clayball clay blocks. Satisfactory lamps may be made from bulbs blown from this glass, and in addn. to having excellent lumen maintenance can be run horizontally without magnetic control. H. F. Kriege

Manufacture of colored glass of the Schott GG-3 type for filtering light. V. V. Vargin and L. O. Sarapin. *Optiko-Mekhan. Prom.* 7, No. 3, 9–14(1937).—The spectrum curve of B-Na glass (Schott GG-3) colored with CdS and Se is greatly affected by the Fe content of the glass. To obtain a steep spectrum curve, either the iron content must be lowered or the Cd content increased. Owing to the fact that Cd silicate is colorless the Cd surplus affects the curve very little. The color is chiefly detd. by sulfide S in the presence of a sufficient amt. of Cd; the former must not exceed 0.018 to 0.022%. Se affects absorption; a technically usable glass can be produced without Se. Because of a limited soly. of CdS and CdSe in glass, pptns. of black crystals may appear at too low melting temps. A greater part of Cd and S volatilizes during melting. Glass with a definitely steep curve of absorption can be obtained only with a definite regulation of the sulfide S content and careful thermal treatment; at higher temps. the limit of permeability is shifted to the red part of the spectrum. Partial or complete opalescence may appear when cooling in a large pot; the colloidal particles of pigments become largest at about 900°; to avoid opalescence, the glass should be heated to 1000° and rapidly cooled to 600°. Glass similar to the GG-3 type was produced with the addn. of 1 kg. $CdCO_3$ and 0.005 kg. Se for 100 kg. glass, at a temp. of 1400 and 1420° and after treatment at 660°. M. V. Condoide

Coloring of green bottle glass and the influence of the color on the workability. A. Dietzel. *Glastech. Ber.* 17, 303–6(1939).—The action of MnO_2 in bottle glasses is due to its high O content which is partially liberated at melting temps. and partly used in converting FeO to Fe_2O_3. There is a corresponding color change from blue-green to yellow-green. This is accompanied by improved thermal transmission through the glass during melting and lower heat reflection during working as shown by relative reflection measurements. Other oxidizing agents as As_2O_5 and CeO_2 have essentially the same effect as the MnO_2. J. F. Hyde

A study of the electrical resistance under varying conditions of some glasses and porcelains of possible utility for commercial insulators. Eric Seddon, W. J. Mitchell and W. E. S. Turner. *J. Soc. Glass Tech.* 23, 197–238(1939). —On 20 different glasses and 9 porcelains (glazed and unglazed), in the form of short rods, systematic measurements were made of the vol. resistivity *in vacuo* and of the surface resistivity under varying conditions, including temp. and humidity variation, and exposure, for varying periods of time extending to 12 months, to weathering in the atm. of a heavily industrialized neighborhood. Measurements on the weathered specimens were also made after the application to them of mech. and chem. cleaning processes. The degree of reproducibility of results was studied in detail. Wide variations in the surface resistivity of different specimens was the general experience whether after exposure to the ordinary atm. or to pure water vapor in a closed chamber. The vol. resistivity values of different specimens of any one material examd. *in vacuo* were in close agreement and remained practically const. with time; and the greatly varying resistivities of individual specimens were brought much closer; this shows the dominating effect of the film of moisture or dissolved electrolyte, the various forms of deposit losing potency in the absence of moisture. It was shown that a wide range of suitable glasses is available to meet the elec. requirements of telephone and telegraph insulators. H. F. Kriege

Effect of chemical pretreatment of glass surface on the silvering process. T. T. Nelman and B. N. Moskvin. *Optiko-Mekhan. Prom.* 7, No. 4, 8–10(1937).—A yellow-brown Ag layer consisting of sep. small crystals is formed shortly after silvering and pretreating the glass surface with $SnCl_4$, $TiCl_4$, $Th(NO_3)_4$, $AlCl_3$, $Pb(CH_3COO)_2$, methylene blue, or water; when $SnCl_2$ is used, a very thin blue layer appears on the surface which promotes the formation of mirrors. M. V. Condoide

Effect of chemical composition of silvering bath on the silvering process. B. N. Moskvin and T. F. Neiman. *Optiko-Mekhan. Prom.* 7, No. 3, 5–8(1937).—The effect of the concn. of reducing agents (inverted sugar with HNO_3) and of KOH and the effect of temp. on the ppn. of Ag when silvering were studied. The velocity of reduction was found to be most important. The best results were obtained with 0.5% and 1% concn. of the reducers (with a double amt. of $AgNO_3$). The temp. should lie between 13° and 18°. M. V. Condoide 2

The strength of glass-to-metal seals. C. J. Milner. *J. Soc. Glass Tech.* 23, 308–28(1939).—The results are based on bead seals of a particular glass on cylindrical wire of a metal which contracts more than the glass when cooled. It is found that the strength increases continually for increasing bead diam. on a given size of wire. For b/a (= bead diam./wire diam.) = 3, the strength is only 50% of that with b/a = 9. For const. b/a (= 9), the strength has a max. for a certain angle of contact of glass and metal of about 40°. For this angle the strength is about 20% greater than for angles of 0° or 90°. It is shown that, as a consequence of these results, the max. permissible stress measured at the center of a seal must depend on the shape and size of the seal. In favorable cases this max. may be considerably greater than the limit of 1 kg./sq. mm. laid down by Hull and Burger (cf. U. S. 2,167,482, *C. A.* 33, 8946[6]). Confirmatory expts. are described which show that the results may be applied to practical cases, and application to a particular case is discussed. H. F. K. 3

Apparatus for melting and fining glass. Games Slayter (to Owens-Illinois Glass Co.). Can. 385,354, Nov. 28, 1939. A batch of glass is melted at high temp., flowed in sheet formation, the gas bubbles are screened out, and the glass is flowed over a highly heated surface to cause dissolved gases to be evapd. 5

Electric heating of flowing molten glass. Leonard D. Soubier (to Owens-Ill. Glass Co.). U. S. 2,179,224, Nov. Means for regulating and controlling the temp. of molten glass as it flows through a predetd. length of a channel comprises an elec. resistor immersed in the glass in the channel, the resistor being in the form of a sheet metal plate comprising the floor and side wall portions of the predetd. length of the channel, the resistor being connected in circuit with a source of elec. current supply and having portions of varying thickness at different points lengthwise of the channel, whereby the elec. resistance is variable along the resistor so that a variable amt. of heat is supplied to the flowing glass at different points along the resistor. 6

Repair of furnace tanks or chambers holding molten glass or the like. Henry H. Blau and Kenneth K. Knaell (to Carborundum Co.). U. S. 2,178,134, Oct. 31. A repair method involves heating members of cast refractory such as blocks having a greater sp. gr. than the molten material in the tank or chamber to substantially the same temp. as such molten material, and depositing the heated members, which may be formed of Al_2O_3 and SiO_2, through the molten material in overlapping position to form a covering layer on a wall of the tank or chamber in contact with the molten material, and supporting the members within the angle of repose. 7 8

Fusing materials, as in making borax glass. Leroy G. Black (to American Potash & Chemical Corp.). U. S. 2,177,766, Oct. 31. App. is described, and a method of producing fused material in particle form, which comprises subdividing a supply of such granular material into a shower of sepd. particles as the same enters a heating zone, permitting the material to fall through the heating zone and thence through the cooling zone, supplying heat to the particles as they are falling through the heating zone and cooling them while passing through the cooling zone, and maintaining a portion at least of the walls of the heating zone under exterior gas pressure sufficient to cause the flow of gas from the walls into the zone to prevent contact of the falling material with the walls. 9

Apparatus for feeding glass-making materials to a melting tank. Carl A. Brown and Charles W. Craig (to General Elec. Co.). U. S. 2,178,418, Oct. 31. Various structural, mech. and operative details. 1

Glass sheet. Pete Magrini (to American Window Glass Co.). Can. 384,676, Oct. 17, 1939. A sheet is continuously drawn from a bath of molten glass, a gas is circulated in contact with both faces of the sheet in the same direction transversely from one edge to the other edge adjacent to the meniscus, and after the sheet is set a gas cooler than the sheet is blown against at least one face. An app. is described. Cf. *C. A.* 33, 8946[4].

Apparatus for forming glass sheet. Joseph H. Lewis (to Blue Ridge Glass Corp.). Can. 384,852, Oct. 31, 1939. Structural details.

Tempering glass sheets. Geo. E. Howard (to Hartford-Empire Co.). U. S. 2,178,520, Oct. 31. App. is described, and a method of case-hardening a sheet of glass, which comprises heating the sheet to a temp. approx. its softening point and until the sheet is substantially free from strains, chilling the glass on opposite sides in predetd. areas opposite one another, and locally heating the glass internally in the areas at a rate higher than that of heating other areas of the sheet not chilled as aforesaid by dissipating electrical energy locally therein to modify the temp. differentials in the glass resulting from the cooling of the surfaces of the areas.

Forming glass building blocks. Randolph H. Barnard. U. S. 2,179,317, Nov. 7; Can. 385,798, Dec. 26, 1939. 4

Producing tubes of glass or the like and forming the tubing into coils. Theodor Pfaff (to General Elec. Co.). U. S. 2,177,743, Oct. 31. Various details of app. and operation suitable for gathering a parison of glass between a blowpipe and a gathering iron, drawing a length of tubing of the desired dimension from the parison and bending it into the desired form while it is still plastic.

Glass-coated screen. Jesse T. Littleton (to Corning Glass Works). Can. 384,878, Oct. 31, 1939. A screen suitable for filtering acids and similar corrosive materials is prepd. by submerging a metallic screen in a bath of molten glass, withdrawing the coated screen, draining surplus glass from the screen in a heated chamber, and opening the mesh by playing a flame on the screen.

Tempering glass articles. Jesse T. Littleton and Ralph K. Day (to Corning Glass Works). Can. 384,877, Oct. 31, 1939. To temper more highly the inner surface areas having smaller radii of curvature than the remaining surface areas, a heated glass article is supported in vertical position, filled by selectively directing chilling fluid against inner surfaces of the article, the container immersed in a bath of chilling fluid while being filled, and the movement of fluid into and out of the container continued for a fixed period after its immersion. An app. is described.

Cracking-off machine suitable for use in the manufacture of articles of glassware. Albert B. Knight. U. S. 2,177,807, Oct. 31. Various structural, mech. and operative details.

Multicellular glass. Sanford L. Willis (to Corning Glass Works). Can. 384,273, Sept. 26, 1939. A mass of glass particles is heated under both mech. and gaseous pressure progressively to sinter the particles and entrap interstitial gas, and a vent is maintained in one direction from the sintering zone through the mass for the escape of gas; expansion is effected in the unconsolidated mass. An app. is described.

Impervious clay pots resistant to acids and alkalies. Sándor Bleier. Hung. 121,783, Oct. 16, 1939. Clay is suspended in water, neutralized, dild. and sedimented. The pptd. layers are mixed in given ratios, ground to fine powder, neutralized and dried. Pots are made as usual and fired as biscuit ware. The surface is cleaned with a strong alkaline soln. and enamel, m. 600–850°, applied by galvanoplasty. A final enamel is applied and the pot fired in the usual manner.

Refractory articles from Siemens-Martin slag. N. A. Sperantov and M. A. Matveev. Russ. 51,765, Sept. 30, 1937. The ground slag is melted with Na_2CO_3 and sand in amts. assuring a total content of SiO_2 in the mixt. of 60–2%, formed into articles and heated to 900–50°.

Refractory bricks suitable for use in furnace construc-

tion. Gilbert E. Seil (to E. J. Lavino and Co.). U. S. 2,170,254, Aug. 22. A body such as a fire-clay brick is provided with a dried but unfired, waterproof and cementatory adhering coating including a water-insol. base, such as chrome ore and periclase. 1

Ceramic insulation for spark plugs. Taine G. McDougal, Albra H. Fessler and Helen B. Barlett (to General Motors Corp.). U. S. 2,177,943, Oct. 31. A dense, nonporous body consists of a sintered mixt. of corundum with 0.5–80% (suitably 3%) of Ta oxide. 2

Insulator for radio tubes. Russell E. Palmateer (to Hygrade Sylvania Corp.). U. S. 2,179,381, Nov. 7. A composite insulator member for radio tubes comprises a sheet of refractory elec. insulating material such as mica and a sep. coating thereon of a refractory material comprising a dried hydrolyzed metallic salt of high elec. insulating qualities, such as dried hydrolyzed Al nitrate, to improve the surface insulation characteristics of the member. 3

Abrasive wheels, etc., with a binder of synthetic resin. Samuel S. Kistler (to Norton Co.). U. S. reissue 21,252, Oct. 31. A reissue of original patent no. 2,150,121 (*C. A.* **33**, 4756²).

Abrasive articles. Samuel S. Kistler (to Norton Co.). Can. 384,156, Sept. 19, 1939. A mixt. of abrasive grain and a synthetic-resin bond is pressed in a mold, and the pressed mixt. cured in an autoclave under an abs. pressure of about 2 atm. to prevent the water formed in curing from passing into steam and swelling the abrasive article. Cf. *C. A.* **33**, 4756².

Abrasive articles such as grinding wheels. Samuel S. Kistler (to Norton Co.). U. S. 2,177,940, Oct. 31. Abrasive grains are united by a rubber bond contg. aniline-formaldehyde resin.

Enamel coatings on the interior of tubes of glass, etc. Wm. M. Clark and Charles D. Spencer (to General Elec. Co.). U. S. 2,178,419, Oct. 31. App. is described, and a method of coating a vitreous tube which comprises applying a layer of an enameling mixt. to the inner surface of the tube, placing the tube around and spaced from an elongated electrical heating element, rotating the tube about its longitudinal axis while passing a controlled elec. current through the heating element to bake the enameling mixt. at a relatively low temp., gradually increasing the current through the heating element until the softening temp. of the vitreous tube is approached and then maintaining the tube at this high temp. until the coating matures. Such a method is suitable for use in the treatment of elec. lamp tubes.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C

Resistance of sulfur cements. C. R. Payne and W. W. Duecker. *Chem. & Met. Eng.* **46**, 766–70(1939).—The S cement described is composed of S 58.8, olefin polysulfide 1.2, crushed silica, graded 39.8 and C black 1.0%. Cement of this type has been successfully used in building metallurgical pickling tanks, dairy floors, and as resistant linings for acid and chem. storage tanks. Since S contracts about 12% upon solidification these cements are more or less porous. By proper manipulation the porosity can be reduced to 4%. S cement showed no corrosion when immersed in H_2O, 8 35% HCl, 15% HNO_3, 10–80% H_2SO_4 and H_3PO_4 for periods ranging from 24 to 52 weeks. Metallurgical pickling tanks constructed of brick jointed with S cement have withstood the action of all concns. of H_2SO_4 up to 65% for periods up to 8 years and showed no corrosion. From 30 to 56% HNO_3 and oleic acids are corrosive toward this cement, as is kerosene and other mineral and vegetable oils. Lime and a satd. soln. of an alk. cleaner show no corrosive action at room temp. but at 80° becomes corrosive toward the S cement. H. E. M. 5 6

Utilization of slags for the production of cement. A. Tysskiĭ. *Tsement* **1938**, No. 12, 12–15; *Khim. Referat. Zhur.* **2**, No. 4, 105–6(1939).—To increase the activity of blast-furnace slag it is recommended to add limestone and alumina to the molten liquid slag. This is best done in a mixing device into which the molten slag flows directly from the blast furnace. The temp. in the mixer is kept at a definite level to ensure a thorough mixing. The utilization of the waste blast-furnace gases lowers the cost and simplifies the construction of such an equipment. W. R. Henn 7

A study of pozzuolanas. Fernando Luiz Lobo Carneiro. *Ministerio trabalho ind. com., Inst. nacl. téc.* (Rio de Janeiro) **1939**, 3–34.—The crushing strength of a mixt. of 20 parts of pozzuolana and 80 parts of portland cement, figured on the strength of normal neat cement, increases from 65% on the 1st day to 102% on the 84th. Initial setting time is not changed. The 80–20 mixt. has satisfactory resistance to sulfate waters. Suggested specifications for the crushing strength of portland-pozzuolana cements for exposure to sulfate waters in kg. per sq. cm. are: 3rd day 60, 7th day 120, 28th day 220 and 84th day 300. Portland-pozzuolana mixts., with 1 exception, showed a considerably smaller coeff. of expansion than neat cement. O. W. Willcox 8 9

Effect of drying temperature on the activity of diatomite. S. M. Royak and A. T. Ivanova. *Vsesoyuz. Nauch.-Issledovatel. Inst. Tsement., Sbornik Rabot* **No. 18**, 3–14(1937).—The temp. of drying diatomite used in the production of pozzuolana portland cement does not affect the activity of this type of hydraulic admixts. when fired at temps. up to 700°. M. V. Condoide

Use of tripoli from Kuteĭnikovo and Kamenets-Podol'sk in the Ukraine for mortar and concrete. P. P. Budnikov and M. G. Sinyavskaya. *Trudy Khar'kov. Khim.-Tekhnol. Inst. S. M. Kirova* **1**, 89–96(in English, 96–7)(1939).—Kuteĭnikovo tripoli had 21.70% active silica and the Kamenets-Podol'sk type had 17.64%. Specimens prepd. from lime-tripoli mortars with slag had a higher mech. strength than those prepd. from lime-tripoli mortars with sand. The mech. strength of the specimens acquired after one month may be reached by steaming for 24 hrs. at 70°. The compns. of the tripoli, specimens and slag are listed. B. Z. Kamich

Impregnation of wood with wax materials and resins. Nowak. *Umschau* **43**, 840–2(1939).—Earlier work showed Bakelite resins penetrate poorly and render the wood brittle. The most recent developments involve the use of alkyd resin-montan wax mixts. in solns. of a solvent of high C, low b. p., good heat cond. and fireproofness such as trichloroethylene. The technique and the crit. factors involved in the impregnation of the wood and recovery of the solvent are briefly described. Impact, elasticity of compression, water content and water-absorption tests on impregnated red beech are graphically illustrated. H. Kwart

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Adhesive portland cement. Lloyd L. Smith. Can. 384,525, Oct. 10, 1939. A quick-drying cement for application to dry surfaces is prepd. by dissolving 5 parts stearin in water, adding the soln. to 33 parts of lime under controlled steam pressure to hydrate and slack the lime, mixing the dry lime stearin powder with 72 parts casein, and mixing with 1750 parts portland cement.

Pitch compositions suitable for coating roads, use as a paint, etc. Wm. Zaisser (50% to Harry S. Walker). U. S. 2,178,770, Nov. 7. A dry compn. contains pitch together with a dry pulverulent aggregate to prevent coalescence of the pitch in storage, the pitch being so finely pulverized as to be quickly and completely sol. in a cold solvent to form a freely flowing easily brushable paint.

Fireproofing cellulose materials. Edwin C. Clayton and Lawrence L. Heffner (to Wm. E. Hooper & Sons Co.). U. S. 2,178,625, Nov. 7. Fibrous materials such as wood or cotton fabrics are treated with an aq. soln. of a fire-

retarding agent and a wetting agent, and the impregnated material is subsequently coated with material such as Zn borate, applied as a dispersion in a substantially 60% chlorinated paraffin oil or the like. 7

Fireproofing wood. William W. Bell (to Celluloid Corp.). Can. 384,554, Oct. 10, 1939. Wood or like material is impregnated with a water-sol. triaryl ester of H_3PO_4.

Impregnating timber. Tsentral'nyi Nauchno-Issledovatel'skii Lesokhimicheskii Institut "Tsnilkhi" (inventors, V. S. Klimenkov and I. V. Filipovich). Russ. 51,842, Sept. 30, 1937. Wood is treated with an acyl or an alkyl peroxide or hydroperoxide, as an accelerator of polymerization, and then impregnated with vapor or soln. of vinyl chloride, chloroprene, or similar deriv. of bivinyl, and the impregnating material is polymerized.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

Characteristics of Diesel fuels influencing power and economy. A. J. Blackwood and G. H. Cloud. *S. A. E. Journal* **46**, 49–53T(1940).—See *C. A.* **34**, 869[4]. H. A. Beatty 3

Physicochemical properties of gasoline, alcohol and benzene fuels and their mixtures. P. Ribagnac. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 615–35(1937)(in French).—Test data assembled at the Bellevue Test Station (France) on the properties of various motor fuels are presented. The following properties of gasoline, alcs. and benzene fuels and their mixts. are discussed: heat of vaporization, f. p., vol. contraction, corrosivity, density, detonation, distn., gum deposition, water tolerance, *n*, inflammability, heat of combustion, stability, vapor tension, vapor lock, viscosity and volatility. Advantages and disadvantages of engine operation on either straight alc. or straight benzene or on mixts. of these with gasoline are enumerated. The ternary mixt. of alc.-gasoline-benzene is considered a good fuel because of the fact that the benzene acts in a three-fold manner, viz., to provide water stability, increase the heat of combustion and to increase the octane rating. In a 70-15-15 mixt. of MeOH, EtOH and benzene the EtOH supplies the calorific deficiency of the MeOH and also lessens the tendency to self-ignition. E. J. Mahler 4 5

Engine fuel testing and proposals for its further development. A. v. Philippovich. *Natl. Petroleum News* **31**, R-526–40(1939).—The disadvantages of present octane no. detns. include (1) the conditions are set to give a mean value applicable to road tests, (2) use of a single air-fuel ratio and mixt. temp., and (3) defects in the bouncing-pin method. A new knock-indicating instrument should be developed. C. H. Brooks 6

Use of gum inhibitors in refining of motor fuels. W. W. Scheumann. *Oil Gas J.* **38**, No. 25, 41, 42; *Refiner Natural Gasoline Mfr.* **18**, 518–20(1939).—A review, giving reasons for use, types, requirement, cost data and a typical flow sheet. W. Andrew Wright 7

Determination of richness of fuel by exhaust-gas analysis. H. Moynot. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 599–603(1937)(in French).—Based on the relationship between the H and CH_4 content of exhaust gases and the richness of the gasoline mixt. an assumption is made that an analysis of the exhaust gases is the key to an indication of the richness of the gasoline mixt. and a measure of control of the richness of different gasoline mixts. Examples are given of calcns. showing the amt. of gasoline converted to methane for rich and lean mixts. E. J. Mahler 8

Wood waste for fuel. I. Preparation of hog fuel. J. E. Hyler. *Southern Power and Ind.* **58**, No. 1, 57–9(1940).—When a market is available for sawdust, it is preferable to reduce the wood waste to that form. If not, wood waste can be satisfactorily fired alone, or in combination with coal, but it is desirable to reduce the wood to a uniform size suitable for handling by a pneumatic conveyer or the so-called blower system. Heavy pieces tend to smother the fire. Refuse hogs are very rugged and modern forms stand up well, especially the swing-type with sharp pointed hammers. Difficulties are discussed as well as maintenance problems. R. W. Ryan 9

By-product fuels in the steel industry. E. G. Fox and W. B. Clemmitt. *Trans. Am. Soc. Mech. Engrs.* **61**, 665–72(1939).—Coke-oven gas, blast-furnace gas and their mixts. are used for underfiring coke ovens, and for blast-furnace stoves, open-hearth furnaces, soaking pits and heating furnaces, annealing and heat-treating furnaces, boilers and gas engines. The economics of the use of mixed gases is discussed. George Ayers 10

Mechanism of formation of oxides of nitrogen in the explosion of combustible fuel mixtures. A. G. El'kenbard, R. I. Genkina and M. V. Polyakov. *J. Phys. Chem.* (U. S. S. R.) **13**, 464–72(1939).—Mixts. of CH_4-N_2-O_2 and CO-N_2-O_2 were exploded in glass vessels and the gaseous products analyzed. The amts. of NO formed are shown in 7 figures as functions of the exptl. conditions. The max. amts. of NO are obtained for an O_2/CH_4 ratio of 3, and a diam. of 100 mm. For the CO combustion, the max. NO concn. is obtained for $O_2/CO = 1.5$ at 40 mm., 2.0 at 85, 2.3 at 105, and more than 3 at 142 mm. pressure. The max. amt. of NO obtained in any case was 1.6%. F. H. Rathmann

Catalytic dehydrogenation of gaseous paraffins. Aristid V. Grosse and V. N. Ipatieff. *Ind. Eng. Chem.* **32**, 268–72 (1940); cf. following abstr.—Catalysts for the rapid and highly selective dehydrogenation of ethane, propane and the butanes to the corresponding olefins are prepd., for example, by satn. of activated alumina with an aq. chromic soln. giving less than 10 mole percent CrO_3 after drying and heating. H. A. Beatty

The catalytic dehydrogenation process (gaseous paraffins to olefins). A. V. Grosse, V. N. Ipatieff, Gustav Egloff and J. C. Morrell. *Refiner Natural Gasoline Mfr.* **18**, 478–85(1939); *Natl. Petr. News* **31**, R-520–1(1939); cf. preceding abstr.—Cr_2O_3-on-Al_2O_3 catalyst is used selectively to dehydrogenate iso-C_4H_{10} or C_4H_{10} and their mixts. The catalyst is regenerated by controlled combustion. The process operates at 1050°F. and slight pressure. The products are sepd. by conventional fractionation. The concn. of olefin in the product gas is several times higher, and the capacity of the equipment many times greater, than for thermal dehydrogenation. 4 references. C. H. Brooks

Low-temperature carbonization. Narrow brick retorts at the Fuel Research Station. II. J. Fraser Shaw. *Dept. Sci. Ind. Research* (Brit.), *Fuel Research, Tech. Paper* No. 50, 29 pp.(1939); cf. *C. A.* **27**, 3313.—An account of the experience with, certain details of setting and operation, and some improvements in the design of vertical continuously operating retorts. Fifty-seven different coals, covering a wide range of caking properties, volatile matter and sizes of charging were carbonized. The following broad generalizations were derived: (1) Cokes derived from noncaking and medium-caking coals are more combustible than those from strongly caking coals. (2) The size of coal carbonized has a marked effect on the throughput (rate at which charge travels through retort) and on the yield and nature of the tar produced. Increase of particle size permits an increased throughput and is accompanied by increased yield of tar of lower sp. gr. Special studies were made on retort wall temps., preferential combustion processes, etc. The com. setting of several low-temp. brick retorts is described and the yields are discussed. I. Hartmann

Crystallite growth during carbonization. H. E. Blayden, H. L. Riley and A. Taylor. *J. Am. Chem. Soc.* **62**, 180–96(1940); cf. *C. A.* **33**, 7521[8].—The investigations of crystallite growth during carbonization in the

temp. range 400–1300° have been extended to include 1 American and 2 Welsh anthracites, lignin and an Irish peat, and carbonization temps. up to 2200°. The anthracite crystallites show a decrease in the *c* dimensions as the carbonization temp. is increased from 400 to 900°. This has been interpreted as due to disruption of the crystallites. The peat coke crystallites show a very rapid growth in the *c* direction between 700 and 1000° which is probably due to a catalytic effect. A. B. Garrett

Coal situation and outlook. Jesse V. Sullivan. *Mfrs. Record* **109**, No. 1, 36, 72(1940).—Descriptive. L. S.

The chemist in the coal bin. Charles M. Hackett. *Mining Congr. J.* **25**, No. 11, 22–4(1939).—A review of various developments in chem. research which hold promise of expanding the uses of coal as a raw material in such chem. industries as artificial rubber, coal-tar products, various "crudes" or intermediates, drugs and serums. Leopold Scheflan

A formula for calculation of the calorific value of coal from chemical analysis. László Simegi. *Magyar Mérnok Épitészegylet Kozlonye* **73**, 345–6(1939).—Recent coals contain more carboxyl and fewer carbonyl groups than do older ones. The new formula was developed on the assumption that half of the O contained by the coals is present as water of hydration and half as carbonyl. The formula for the upper calorific value is: 81 [C − (O/2) 0.75] + 345 [H − (O/2) 0.125] + 25 S. The lower calorific value is calcd. by: 81 [C − (O/2) 0.75] + 285 [H − (O/2) 0.125] + 25 S − $6H_2O$. In very recent coals (lignites) the formula, like all other formulas, does not give quite reliable data. S. S. de Finály

A study of the equilibration method of determining moisture in coal for classification by rank. O. W. Rees, F. H. Reed and G. W. Land. *Illinois State Geol. Survey, Rept. Investigations* No. **58**, 34 pp.(1939).—The equilibration method first proposed by Stansfield and Gilbart (*C. A.* **27**, 4373) attempts to det. the moisture in coal at 100% humidity, which is assumed to be the true bed moisture. In this paper are presented the results obtained by applying this procedure to 21 Illinois coals, ranging in moisture content from 4 to 18%, as well as data obtained by other procedures, with which comparisons are made. Six of the coals were tested by the procedure and equipment similar to that described by Stansfield and Gilbart; a large air oven to provide const. temp. was used. The discrepancies in the results indicated inadequate temp. control. Therefore a const.-temp. water bath was substituted for the air oven and equilibrations of 15 other coals were made. In addn., equilibration tests were made at 3 or 4 humidities on these 15 samples; a N atm. without evacuation of the desiccators was used. The study led to the following conclusions: (1) The equilibration procedure as applied to Illinois coals studied produces data which, when plotted, give irregular moisture-humidity curves. Satisfactory extrapolation of these curves to give 100% humidity-moisture values is impossible. (2) Low and medium humidity values do not appear to affect the slope of the extrapolated curves. (3) Other procedures which are much simpler, but may involve slight modification of the standard procedure for sampling, appear to produce results suitable for classification by rank. (4) The general equilibration method may be useful for studying the nature of the moisture in coal. The vapor pressures of the saturated salt solutions used in equilibration tests were detd. by the static method used by Frowein employing an oil-filled siphon manometer, and by the Rayleigh manometer method for the measurement of low pressures. The latter procedure with certain modifications was found satisfactory. I. Hartmann

Briquetting of Chelyabinsk and Moscow soft coals. N. P. Chizhevskiĭ and P. I. Neverov. *Sovet. Met.* **1938**, No. 3, 7–13; *Khim. Referat. Zhur.* **2**, No. 4, 112–13(1939).—The object of the expts. was to obtain soft-coal briquets suitable for the blast-furnace process and for gasification in powerful generators. Besides the Chelyabinsk and the Moscow coals, mixts. of the Chelyabinsk with the Kizelov coal and of the Moscow with the Don coal PZh were investigated. Pressure, moisture content in the initial mixts., and the temp. of the molds and of the coals were measured. The content of moisture, ash, S and volatile substances were also measured in coals and in coke-briquets. Compn. of gases (obtained during the coking of the briquets in Bauer's app.), abrasive properties, resistance to crushing and drop tests were studied. The Chelyabinsk coal did not produce satisfactory briquets. Addn. of 25–35% of Kizelov coals, heating the mixt. to 70–80° and the molds to 90–100°, a moisture content of 12–15% and a pressure not less than 1200 kg./sq. cm. produced briquets suitable for industrial purposes. Addn. of resin increased the resistance to moisture and to abrasion. The Moscow coal produced strong, but thermally unstable briquets, which were also unstable to the action of water. Good briquets were obtained by addn. of 15–20% of the PZh Don coal under a pressure of 900–1200 kg./sq. cm., with a moisture content of 10–15%, and the temp. of the mixt. of 70–80° and of the molds of 90–100°. An addn. of 2–3% of resin lowered the hygroscopicity. The content of the Don coal in the mixt. can be reduced to 15%. The briquets were suitable for gasification in powerful generators. W. R. Henn

Treatment of coal at medium temperatures. N. A. Nikol'skiĭ and M. A. Stepanenko. *Coke and Chem.* (U. S. S. R.) **1938**, No. 12, 11–12; *Khim. Referat. Zhur.* **2**, No. 4, 113–14(1939).—The mixt. (which is coked at 600–800°) contains 20–5% of volatile substances and 7% of ash. When a larger amt. of ash is present the coal is enriched by the wet method and dried. After its removal from the furnace the coke is mixed with water. The "fixed carbon" contains moisture 2%, volatile substances 8–12% and ash 9–10% and has a heat content of 7200–7300 cal. From the treatment of the coal a tar is obtained which contains 35–45% of phenols in oils from which C_6H_5OH and *o*-, *m*- and *p*-$CH_3C_6H_4OH$ can be obtained. Treatment of gas coals yields up to 8.5% of tar, of which 1.0–1.1% is motor fuel and 2% is Diesel engine fuel. W. R. Henn

The effect of preparation on ash fusibility as revealed by a study of selected Illinois coals. L. C. McCabe and O. W. Rees. *Trans. Am. Soc. Mech. Engrs.* **61**, 693–8(1939); *Illinois State Geol. Survey, Rept. Investigations* No. **55**, 31 pp.(1939).—Based on work with 10 coal samples from different counties in Illinois, sizing indicates 4 different groups within which the ash-fusion relationships are similar. No similar groupings can be made from results of cumulative sp. gr. sepns., with possible exception of coals from St. Clair and Marion counties. The effect of combining portions of narrow sp. gr. range is to lower high ash-softening temps. and to raise low ash-softening temps. of the component portions. The greatest difference in ash-softening temp. was obtained with sized coals of narrow sp. gr. ranges. George Ayers

Determination, causes and significance of the ion content of air in mines. Ludger Funder. *Gerlands Beitr. Geophys.* **54**, 370–449(1939).—The content of small and large ions in the air within mines (coal, potash and ore) was studied. The ion content of the coal mines of Westphalia and the potash mines of Hanover is about that of the free atm.; but in the Harz Pb-Zn mines it is 10–30 times higher. The ionizing action of the different types of rocks is described in detail. The age of the mine and depth of the rocks have no influence. In coal mines, because of the low elec. cond. of the air, high electrostatic charges may result on the conduits for compressed air, causing discharge sparks which may ignite choke damps. J. F. Schairer

The underground gasification of coal. A. B. Chernyshev. *Vestnik Akad. Nauk S. S. S. R.* **1938**, No. 9–10, 44–9; *Khim. Referat. Zhur.* **2**, No. 4, 113(1939).—Failure of the first expts. is attributed to improper preliminary crushing of the coal. The following method (the "current" method) was found to be very effective. Two sloping excavations are made around the coal deposit, parallel to each other and connected by means of a horizontal excavation (the "fire shaft"). Through one of the sloping excavations a blast is directed into the "fire shaft," while the gas formed escapes through the other. A no. of unsolved questions are discussed. W. R. Henn

Principles of underground gasification [of coal]. S. I. Buyalov. *Ugol* **1938**, No. 11, 17–24; *Khim. Referat. Zhur.* **2**, No. 4, 113(1939).—A short description of the principles of underground gasification of coal. The "current" generator method of gasification can be used for steep, small deposits which have a thermally stable roof. The interlayer "pit hole" method can be used for large deposits and for deposits which have a porous roof. In the "current" method the blast is directed through a shaft. Owing to the high temp. of the process (up to 2000°) the periodic blowing for coals having a low-melting ash (below 1300°) is impracticable because a closing up of the "fire shaft" by the formed slag is possible. The inter-layer gasification is obtained by drilling holes 100 mm. in diam. at the bottom of the deposit. The coal is electrically fired through the holes. A hermetically sealed system is necessary to ensure the success of the underground gasification. A gas of heating value 1100–1300 cal. per cu. m. was obtained, at a cost for the Donbass region of 0.15–0.4 kopeks/1000 cal. W. R. Henn

Underground gasification of coal in the Moscow region. N. V. Lavrov, I. L. Farberov and R. N. Pitin. *Vestnik Inzhenerov i Tekh.* **1939**, No. 10, 423–4.—A method is described for the underground gasification of coal deposits near Moscow. The coals have a higher activity and ignitability than anthracite coals. Upon being heated the coals do not pass through the plastic state but their porosity increases sharply. When gasification is conducted below the fusion point of the ash the latter forms a highly porous structure which retains approx. the original form of the coal. B. Z. Kamich

Production and use of montan wax from Ukrainian brown coals. I. A. Rapoport and I. E. Nefmark. *Koshevenno Obuvnaya Prom. S. S. S. R.* **1939**, No. 8, 17–20.—A review. At present the manuf. of crude montan wax is well under way. Lab. expts. on refining the crude wax have been satisfactory, the yields were as high as 45–55% and the quality of the wax is claimed to be as good as the imported carnauba wax. Twenty-eight references. B. Z. Kamich

Influence of richness of fuel on the energy balance of combustion engines. Louis Thaler. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 604–10(1937)(in French).—Results of a study of the relationship between the energy release in combustion engines and the richness of the fuel mixt. are presented. Exhaust gases were analyzed to det. the amt. of waste energy. The energy balance is thus calcd. for a 4-cylinder automobile engine, an air-cooled aviation engine and a 2-cylinder Diesel motor. E. J. Mahler

Gasoline engine combustion. Hector Rabezzana, Stephen Kalmar and Alfred Candelise. *Automotive Ind.* 81, 534–42, 632–9(1939).—Small vol. increments burn at const. vol., then expand into both the previously burnt and the still unburnt portion of the mixt. until pressure equil. is reached. As the reaction progresses, each increment burns under different conditions of pressure, temp. and chamber vol. The time elapsed for a given linear flame displacement in space is detd. by the linear rate at which the flame travels with respect to the unburnt gas. A method for predetg. pressure-time characteristics of a chamber design is presented. The duration of the entire combustion cycle, depending chiefly on the reaction velocity, controls the peak pressure and also detonation. Consequently, for given fuel-air mixts. there is a definite relation between the max. pressure that can be obtained without detonation and the corresponding time elapsed from ignition. The initial stage of combustion is the most sensitive to the effect of the various factors governing the reaction velocity. Leopold Scheflan

Thermochemical conditions for the transformation of energy in combustion engines. Andre Mandel. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 611–14(1937)(in French).—In a discussion of the factors governing the functioning of internal-combustion engine, and of the factors responsible for the conversion of the fuel elements into power, the heat and chem. changes are considered of paramount importance. The prepn. of the air and the fuel and its movement within the chamber are discussed as is the discharge of heat energy after combustion. E. J. Mahler

Combustion engine exhaust pressure. R. Guyot. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 595–8(1937)(in French).—From a study of the relationship between exhaust pressures, temp. variations, inlet pressure and consumption of motor fuel in combustion engines, and with the aid of curves, G. proposes a method for the detn. of the correct air-fuel ratio for the optimum performance of a given engine under various atm. conditions. E. J. M.

Darkening (blackout) of gas and water works by the luminescent method. Nikolaus Riehl and Ernst A. Fick. *Gas- u. Wasserfach* **82**, 781–3(1939).—Paints and plastic strips capable of luminescence in ultraviolet light are affixed to valves, gages, stairs, pillars, etc., of gas and water works subject to air raids so as to facilitate operation without light visible to the fliers. These materials are illuminated by ultraviolet light from black or blue incandescent lamps of 80 or 120 w. size or by a recently developed low-current "blue-surface glow lamp." Both the ordinary incandescent lamp and the ultraviolet source are enclosed in gas-tight globes. The relatively small no. of gages and indicators in a gas or water works are easily fitted with special luminescent scales; the much larger no. of gages in an elec. plant must be removed and treated individually. The luminescent materials glow for a time after the ultraviolet source is shut off, giving a factor of safety. The operating facility of darkened plants using the luminescent materials has been much greater than anticipated, as the eye quickly adjusts itself to the low light intensity. R. W. Ryan

Standards for gas quality. F. Stief. *Gas- u. Wasserfach* **82**, 745(1939).—The following recommendations as to manufd. gas quality were made by the German Assocn. of Gas and Water Technologists: *Combustion characteristics.*—(1) The gross heat of combustion should be between 4200 and 4600 kg.-cal. per cu. m. (0°, 760 mm. Hg, dry) (corresponding to 440–482 B. t. u. per cu. ft.). The upper limit applies to coal (coke oven) gas and the lower to mixed coal and water gas. Variations in heating value at a given point should not exceed 1%, while a difference of not more than 50 kg.-cal. is permissible between the works and the consumer. (2) The density should be within the limits 0.4 to 0.5 (referred to air), the lower value applying to coal gas and the higher to mixed gas. Variations should not exceed ±3%. (3) Gas pressure should not be less than 60 mm. water column at any point. (4) Present methods of measuring ignition velocity do not give exact results but the flicker point on the Ott burner should be between 60 and 100, and on the "Test" burner, between 65 and 120, the lower limit applying to mixed gas and upper to coal gas. *Purity.*—The O content should be under 0.5%—preferably under 0.3% by vol. (2) H_2S should be under 2 g. per 100 cu. m. (the Pb acetate test is sensitive to 0.2 g. per 100 cu. m.). (3) NH_3 should be under 0.3 g. per 100 cu. m. (4) The permissible amt. of naphthalene varies with the temp. and can be calcd. by the formula: $\frac{5 \text{ to } 10}{p}$ = g. per 100 cu. m., in which p = pressure in atm. (5) Org. S should not exceed 25 g. per 100 cu. m.; cyanogen 15 g. per 100 cu. m. and NO around 0.2 cm. per cu. m. (6) The gas should be substantially free from tar. Various methods of "fine" purification are listed. R. W. R.

Discussion of standards for gas quality. Karl Bunte and Fritz Schuster. *Gas- u. Wasserfach* **82**, 745–8(1939).—The gas standards given in the preceding abstract are recommendations rather than legal standards. New developments have caused widening of permissible heating value limits. The reasons for establishing the various limits are given. As to purity, practical experience has indicated the practical possibility of reducing oxygen in the purified gas to 0.2 to 0.3%. The gas leaving the purifiers should be free from H_2S; the amount given in the standards takes into account the possibility of reforming H_2S in the distribution system. "Fine" purification methods offer the possibility of reducing organic S, H_2O, O

and NO considerably below the limits given. 16 references are given. R. W. Ryan

Combustion of gases. Karl Bunte, Horst Brückner and Gustav Choulat. *Gas- u. Wasserfach* 82, 763–5(1939).—An investigation of the compn. of the (intermediate) gas in the inner cone of the Bunsen burner showed that when the gas content was in excess of the theoretical amt. of O for complete combustion, the hydrocarbons were largely converted into CO and H, gases ready for combustion. However, traces of CH_4 are normally present in the intermediate gases from a normal manufd. gas, the fraction increasing with decreasing primary air in the fuel gas-air mixt. When gas from a detoxification plant, contg. all of the CO_2 formed, is burned in the same way, no CH_4 is found in the intermediate gas; this is attributed to the reaction of CO_2 and CH_4 to form CO and H. Hence the CO_2 favors hydrocarbon decompn. Only small amts. of O can exist along with combustibles in the intermediate gas; with an air-gas ratio of 1.03 combustion is complete. The CO content of the intermediate gas is less dependent on the initial CO content than on the total quantity of C-contg. gases. In CO-free gas, CO is formed in the inner cone by the water-gas equil. In the combustion of higher hydrocarbons, unsatd. hydrocarbons are found in the intermediate gas—when these unsatd. hydrocarbons are present in even very small amts. they assist in the formation of after-luminescence (aureole) of the flame. R. W. R.

Mixing gases in porous media. Richard Drucker and R. L. Huntington. *Oil Gas J.* 38, No. 34, 37–41(1940).—Gas recycling and pressure-maintenance are used in some producing fields to conserve gas, maintain reservoir conditions and improve production. The object of this paper is a study of the amt. and flow rate of dry gas necessary for optimum results. Lab. wells were used and data taken by analysis of gas and air mixts. Graphical data indicate that Fick's law of diffusion is not followed. Curves are given on single and three-dimensional flow. Until a mass of data has been taken on injection rates, well spacing, gas densities, permeability and porosity, an empirical attack is the only approach to a problem of such importance to field life from the viewpoint of dilu. of rich distillate gas with dry recycle gas. W. Andrew Wright

Secondary gas in the Donbass region. I. M. Pechuk. *Ugol* 1938, No. 11, 63–4; *Khim. Referat. Zhur.* 2, No. 4, 115(1939).—Cases of a violent escape of natural gas during drilling operations near the Kremennaya coal shaft in the Lisichansk region are described. In one case the initial yield of gas was 9000 cu. m./day with a pressure of 13 atm. The gas contained 96% of CH_4 and considerable He. The origin of the gas and of the salt solns. has not been detd., but it is not due to desorption of the coal of the Lisichansk region. W. R. Henn

Radiation of flue gases. A. Schack. *Arch. Eisenhüttenw.* 13, 241–8(1939).—In a specially developed app. the flue gas is passed through a cylindrical heat-resisting steel vessel which can be heated electrically. Formulas were derived of sufficient accuracy for the radiation above 450°. For CO_2, the formula is $q = 3.5\ (ps)^{1/3}(T/100)^{3.5}$ kg.-cal./m.² hr., for water vapor $q = 35\ p^{0.8}\ s^{0.6}(T/100)^3$ kg.-cal./m.² hr. T is abs. temp., p the partial pressure in atm. of the gas, s the thickness of the gas layer in m. The heat transmitted from or to the gas for CO_2 is $\alpha = S(ps)^{1/3}[0.0513(t_g + t_w) - 30.25]$ kg.-cal./m.² hr. degree, for water vapor $\alpha = Sp^{0.8}\ s^{0.6}[0.107(t_g + t_w) - 46.5]$ kg.-cal./m.² hr. degree, where p is partial pressure of radiating gas in atm., s as before, t_g gas temp., t_w temp. of area or surface radiated, S the degree of blackness of the radiated surface for infrared radiation (between 0 and 1; 1 = black body). The radiation of nonluminescent flames is the same as the radiation of CO_2 and H_2O, under same conditions, after completed reaction; the flame reaction does not increase the total radiation. Among other gases, hydrocarbons have a considerable radiation, CO has little, O and N have none. The heat transmission of a gas contg. little CO_2 and much H_2O is considerably better than that of a flue gas with much CO_2 and little H_2O. The radiation of gas bodies of different shapes (cylinder, between plates, sphere, etc.) is calcd.; the thickness of layer thus detd. can be used in the radiation formulas. M. Hartenheim

Determination of the yield of coke gas and of the amount of heat needed for coking. B. I. Kustov. *Coke and Chem.* (U. S. S. R.) 1938, No. 14, 38–40; *Khim. Referat. Zhur.* 2, No. 4, 114–15(1939).—Total amt. of gas used should be detd. by a measuring app. connected to the system after the benzene scrubbers. This permits control of the yield of the chem. products. The amt. of heat used in coking can be detd. from the formula adopted by the committee of the Essen Mining Industry. For the moist mixt. $q_b = V_0Q_H/G_b$, where V_0 is the amt. of gas in cu. m. which is supplied for the heating of the oven per unit of time, Q_H is the no. of cal./cu. m. of the gas, G_b is the charge of the moist mixt. for the same period of time. For the dry mixt. $q_c = (q_b - 12W)/(100 - W)$, where W is the percentage of moisture in the mixt.; 12 cal. is the approx. amt. of heat used for the evapn. of 1% of moisture in the mixt. W. R. Henn

Gas detoxification at Vienna-Leopoldau. H. C. Gerdes. *Gas- u. Wasserfach* 82, 774–5(1939).—Polemical with Marischka (cf. *C. A.* 33, 6563[1]). Steam requirements for the Bössner-Marischka process were calcd. as 0.13 kg. per cu. m. of the treated gas (0°, 760 mm. Hg., and dry) as compared with 0.49 kg. for the Ges. für Gasentgiftung (Hameln) process, both calcns. being made for the same initial gas with a final CO content of 1%. This is much lower than the ratio of 1:20 given by Marischka. Very large amts. of heat are required in the B.-M. process to drive off CO_2 from the catalyst; and if this is calcd. in terms of steam, total steam requirements would be 1.89 kg. as compared with 0.49 for the Hameln process. The price given for the ankerite catalyst is too low to include any prepn. cost. **Reply.** Carl Marischka. *Ibid.* 775–6.—The Bössner-Marischka process will give a gas of much lower than 1.0% CO content, and has a very large advantage in lower steam consumption as compared with the Hemeln process. The 1:20 ratio between the 2 processes was the result of actual calcns. This high steam cost is an important factor. Gerdes gives much too high figures for the heat required for regenerating the catalyst, and it should be possible to realize a much higher recovery. Furthermore, a continuous circulation of the catalyst through the gas and regeneration stages is used. The ankerite is used in the form in which it occurs naturally. **Reply.** Gerdes. *Ibid.* 776–8.—New calcns. have been made for the total steam requirements of the B.-M. and Hameln processes for final CO contents of 1% and lower, showing that this varies from approx. 2 for 1% CO to approx. 8 for gas with a final CO content of 0.1%. Calcns. as to heat requirements for catalyst regeneration were based on practical experience. The steam generated in the waste heat boiler would be in excess of total plant requirements. The low catalyst price would be more than offset by the addnl. heat required for catalyst regeneration. More exptl. data relative to the B.-M. process would be desirable. **Reply.** Marischka. *Ibid.* 778.—Owing to the pressure of other work it is impossible to make a thorough study of Gerdes' calcns. or publish addnl. exptl. results. The fact remains that the B.-M. process can give a nonpoisonous gas contg. only 0.3% CO. This has been proved in practice. R. W. Ryan

The mechanism of the synthesis of hydrocarbons from water gas. S. R. Craxford and Eric K. Rideal. *J. Chem. Soc.* 1939, 1604–14.—Expts. on the rates of formation and reduction of Co_2C on cobalt-thoria-kieselguhr catalysts under various conditions indicate that the first step in the Fischer-Tropsch synthesis of hydrocarbons from CO and H_2 is the reaction of these gases with the catalyst to give Co carbide. As indicated by the ortho-para hydrogen conversion, when the carbide is reduced only CH_4 is formed and no higher hydrocarbons. Reduction by H_2 leads to formation of oils. Curves are given for the rates of the reactions between Co and CO and between Co_2C and H_2 on the Fischer catalyst and also for the energies of activation of the reaction $Co_2C + 2H_2$ and for the total reaction $CO + 2H_2$. It is concluded that in order to obtain

oils the conditions of the synthesis have to be adjusted so that only very few chemisorbed H atoms are present on the catalyst surface. H. C. Thomas

Cost of hydrogen sulfide removal from refinery and sour natural gases. Basil Storrs. *Oil Gas J.* **38**, No. 23, 69, 70 (1939).—See *C. A.* **33**, 9594[8]. W. Andrew Wright

Improvements in the production of ammonia. Sh. M. Levin. *Coke and Chem.* (U. S. S. R.) **1938**, No. 11, 48; *Khim. Referat. Zhur.* **2**, No. 4, 116(1939).—The cost of steam is the main expense item in the production of concd. NH_4OH (30 tons of steam per ton of 100% NH_3). About $^1/_3$ of this amt. is used for the evapn. of the water. L. recommends increasing the no. of fixing plates without reducing the no. of the other plates. A saving of steam up to 5 tons per ton of NH_3 is possible. W. R. Henn

Production of two grades of crude benzene. G. N. Tyutyunnikov. *Coke and Chem.* (U. S. S. R.) **1938**, No. 10, 39–41; *Khim. Referat. Zhur.* **2**, No. 4, 115–16(1939).— On the basis of expts. performed under plant conditions T. recommends a no. of improvements in the production of benzene, mainly the construction of addnl. cooling app. and separators. Two grades of benzene can be successfully obtained. The amt. of the first grade can be increased to 50% of the total amt. of benzene distg. up to 180° if it is directly rectified after washing. The second grade is subjected to a preliminary rectification, then washed and again rectified. Such a system produces considerable saving in steam, decreases the loss of the product by 50% and makes the process more nearly continuous. By introducing only one powerful addnl. condenser in the Staro-Makeev plant the yield of first-grade benzene was increased to 38% (of the total amt. of crude benzene); it could be easily purified. W. R. Henn

Cleaning the benzene scrubbers with steam. A. S. Terent'ev and Ya. B. Chertkov. *Coke and Chem.* (U. S. S. R.) **1938**, No. 11, 47; *Khim. Referat. Zhur.* **2**, No. 4, 115(1939).—Results of cleaning the scrubbers with steam in the Staro-Makeev coke-chem. plant are given. Remove the oil from the scrubber, leave an opening of approx. 2 in. in the cover to create a partial vacuum, connect the scrubbers with a common collector for draining oil and condensate and force steam for 18–20 hrs. under a pressure of 5 atm. at 170° through 2-in. pipes. Up to 50 tons of steam is used per scrubber. The condensate seps. easily into layers without addnl. steam. The upper layer of oil is reused. Steaming is recommended twice a year. W. R. Henn

Errors in the method for the calculation of the yield of crude benzene to 180°. G. N. Tyutyunnikov and D. P. Dubrovskaya. *Coke and Chem.* (U. S. S. R.) **1938**, No. 11, 47–8; *Khim. Referat. Zhur.* **2**, No. 4, 115(1939).—The usual method for the calcn. of the yield of crude benzene by the lab. detn. of the amt. of the distillate to 180° gives high results, owing to the wrong recalcn. of the vol. units to the wt. units. Deviations from the true values amount to 3% when coal-tar oil is used, and to 0.5–1.0% with solar absorption oil. W. R. Henn

Extraction of fluorene from coal tar. P. P. Karpukhin and P. I. Mikhaĭlenko. *Trudy Khar'kov. Khim.-Tekhnol. Inst S. M. Kirova* **1**, 19–32(in English, 32–3)(1939).—Fluorene was extd. from coal-tar fractions 290–300°, 292–302°, 278–292° by use of the solvents ligroin, benzine, alc., and acetone. A yield of 67.5% pure fluorene was obtained from the fraction 290–300°, the solvents ligroin and benzine being about equally efficient. The fraction 292–300° yielded 53% pure fluorene after 3 crystns. from benzine. The fraction 278–292° contained large amts. of diphenylene oxide and was not suitable for fluorene extn. The results are tabulated. B. Z. Kamich

Adaptation of the periodic tar-distillation apparatus to the continuous process. A. G. Borts and G. G. Vodnev. *Coke and Chem.* (U. S. S. R.) **1938**, No. 11, 45–6; *Khim. Referat. Zhur.* **2**, No. 4, 114(1939).—At the Sergon coke plant, a tube still was constructed (replacing the individual stills) for the removal of water from tar. On passing from the storage tank through the tube still, the tar is heated to 170–80° and passed into the evaporator, where it loses water and the light-oil fractions. The mixt. of water vapor and oil is condensed and sepd. The dehydrated tar flows into a horizontal still which is under a pressure of 500–50 mm Hg, where it is distributed along 2 trays situated along the heated tubes. The vapors from the still pass through 3 dephlegmating columns. The pitch is removed from the vacuum still through an intermediate vessel connected with the still and with another vessel through which the pitch flows at the level of the heated tubes into the heat exchanger. Ways for improving this preliminary scheme of tar distn. are discussed. W. R. Henn

Electroplating with lead and chromium of metallic parts used in the coking industry. V. M. Kupchin. *Coke and Chem.* (U. S. S. R.) **1938**, No. 12, 46–8; *Khim. Referat. Zhur.* **2**, No. 4, 99–100(1939).—Electroplating with Pb and Cr to prevent corrosion was found effective. Fe parts were lead-plated from a soln. of Pb *m*-benzenedisulfonate (111 g./l.) and free *m*-benzenedisulfonic acid (30 g./l.) with a c.d. of 200–300 amp. per sq. m. The Pb-plated articles could be flattened, bent and sawed without sepg. the Pb coating. Under conditions of extreme corrosion (pipes in a condenser of NH_3 vapors) a protective layer of Pb 0.5–1.0 mm. thick is necessary. A 0.01–0.1-mm. layer of Pb is sufficient for atm. or gas corrosion. In their corrosion resistance the Pb-plated metal is equal to rolled and cast Pb and it is considerably more economical. The Cr platings are sufficiently resistant to corrosion in the atm. of the coke plants. Solid chromium surfacing is important for parts which are subjected to wear under conditions of little corrosion (rods of the hydraulic pump). W. R Henn

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Ni steel and hydrogenation of fuels (Berthelot) 9. Ni alloys in mining and utilizing coal (Niwa) 9. Gas industry and Ni alloys (Tomita) 9.

Motor fuel. James W. Jean. U. S. 2,179,151, Nov. 7. A fuel is obtained by fermentation and distn. of various materials and contains BuOH 38, EtOH 10, acetone 30, turpentine 4 and benzene 18 parts.

Diesel fuel. Ernest F. Pevere and Wilfred N. Meyer (to The Texas Co.). U. S. 2,178,327, Oct. 31. About 1–5% of dipropionyl peroxide is added to improve the ignition characteristics of the fuel.

Binder for coal briquets. Lajos Kováts. Hung. 121,424, Sept. 1, 1939. Seeds of lupines or soybeans are steeped in an acid soln. for 8–12 hrs., sepd., disintegrated, partly freed (if desired) of their oil content, and added to powd. coal in ratios varying from 1.5 to 4%. Cf. *C. A.* **33**, 3117[6].

Separating fuels such as coal and coke from heavier materials such as slate or cinders. Charles E. Pool (50% to Harry E. Davisson). U. S. 2,178,456, Oct. 31. App. is described, and a method of treating and segregating fuel such as coal and coke from materials having greater sp. gr. which comprises sepg. the materials in a bath the sp. gr. of which is intermediate of the sp. grs. of the fuel and the foreign material, removing the fuel from the upper level of the bath, adding powd. coal to the bath to form a top layer of coal on the surface of the bath, and coating the fuel with powd. coal as it is being removed from the bath by withdrawing it through the added layer of powd. coal floating on the bath.

Vertical retort setting for carbonizing coal, etc. Frederick J. West and Ernest West (to West's Gas Improvement Co. Ltd.). U. S. 2,178,026, Oct. 31. Various structural and operative details.

Vertical gas producer. V. I. Zhunko, L. S. Zaglodin and L. E. Lazebnik. Russ. 51,891, Oct. 31, 1937. Construction details.

Fuel-gas generator. Pécsi Kőszén- és Kokszkereskedelmi R. T. Hung. 121,797, Oct. 16, 1939. Structural details.

Generator for brown-coal gas. János Volenik. Hung. 121,314, Aug. 16, 1939. Structural details.

Pressure-operated valve for controlling the flow of gas through pipes to points of use. Marvin H. Grove. U. S. 2,177,825, Oct. 31. Various structural and operative details.

Gas odorizer suitable for treating gas bypassed from gas mains. Charles E. Gill (to Sharples Solvents Corp.). U. S. 2,178,519, Oct. 31. Various details of app. suitable for bringing a gas into contact with a treating liquid.

Recovering ammonium chloride from coke-oven gas liquor. Charles H. Heimbach and Norman B. Thompson (to National Tube Co.). U. S. 2,179,183, Nov. 7. An arrangement of app. is described, and a process for recovering NH_4Cl from coke-oven-gas liquor also contg. NH_4Cl and free NH_3, which involves passing the liquor through a multiple-effect evaporator so that the vapor driven from the liquor in the first effect is carried into the heater of the second effect and condensed, and so that foam forming in the first effect and contg. NH_4Cl is carried over into the heater of the second effect with the vapor and there condensed with the latter, the condensate from the heater being repassed through the evaporator to effect recovery of the NH_4Cl initially lost in the first effect by formation of the foam and the heater being vented to remove NH_3 gas sepg. therein from the liquor. The gas is subsequently redissolved in the liquor so as to be repassed through the evaporator whereby to permit a closed circulating system, portions of the liquor in the second effect are removed as required to keep the concn. of impurities in the system sufficiently low to prevent their interfering with the operation of the process.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

Petroleum-ization—1940. Hugh W. Field. *Refiner Natural Gasoline Mfr.* **18**, 450–5; *Natl. Petroleum News* **31**, R-522–4; *Oil Gas J.* **38**, No. 27, 110, 112, 115, 271(1939).—A discussion of the newer, chem. methods of refining. C. H. Brooks

Refining characteristics of Illinois Basin crude oil. Gustav Egloff, G. B. Zimmerman and J. C. Morrell. *Oil Gas J.* **38**, No. 24, 81–6(1939); cf. *C. A.* **33**, 3123[2].—Extensive tabular data for several crude oils and reduced crude oils from the Illinois Basin. W. Andrew Wright

Ultraviolet absorption spectra of synthetic mineral oils. Edmond Vellinger and Bernard Thomas. *Compt. rend.* **209**, 882–4(1939).—Comparison of the ultraviolet (λλ 2000–4000) absorption spectra of crude Pennsylvania oil with the same partially (with H_2SO_4) and completely (with oleum) refined, whereby the aromatic hydrocarbons were partly and completely removed, with various synthetic oils shows the latter to resemble the unpurified samples, though in some cases there is evidence that naphthalene or more condensed cyclic hydrocarbons were present in addn. to aromatic hydrocarbons proper. C. A. S.

Burning various types of oil-refinery fuels. A. L Wilson. *Trans. Am. Soc. Mech. Engrs.* **61**, 699–704 (1939).—See *C. A.* **33**, 4774[6], 8965[1]. George Ayers

The regeneration step in the Solutizer process for the extraction of mercaptans. D. L. Yabroff, E. R. White and A. V. Caselli. *Refiner Natural Gasoline Mfr.* **18**, 509–15(1939).—Values of the stripping const., K_s, were obtained for the aliphatic RSH compds. through C_7, when the Solutizer soln. is regenerated. Diln. of the soln. increases the value from 3 to 7 times. The value appears to pass through a max. with increasing no. of C atoms. The max. is displaced toward larger nos. of C atoms by diln. Examples of the calcn. of the steam requirement for stripping are given. C. H. Brooks

Reaction rates in cracking. W. L. Nelson. *Oil Gas J.* **38**, No. 24, 132(1939).—Graphical data are given for reaction consts. from 700 to 1900°F. for hydrocarbons ranging from lubricating oil to methane. To simplify the study, the reaction rates were considered as unimol. W. A. W.

Catalytic cracking of aliphatic hydrocarbons. Gustav Egloff, J. C. Morrell, Charles L. Thomas and Herman S. Bloch. *J. Am. Chem. Soc.* **61**, 3571–80(1939).—A no. of hydrocarbons cracked at atm. pressure in the presence of an activated SiO_2-Al_2O_3 catalyst showed the following behavior: A mixt. of butenes underwent extensive catalytic isomerization to isobutene in the temp. range 385–600°, accompanied by polymerization and cracking; between 450 and 600° the isobutene content of the C_4 product was 24.1 ± 1.5%. Pentenes showed reactions similar to those of the butenes, yielding 50% of isopentenes at 400°. A mixt. of octenes underwent both catalytic isomerization to isooctenes and catalytic cracking to gaseous products consisting principally of equal amts. of butene and isobutene. The results are consistent with the theory that isomerization precedes cracking. In the temp. range 375–400° the conversion was over 80%. The primary catalytic reactions of cetene (I) in the range 300–450° was isomerization to isohexadecenes; the secondary reaction was cracking to lower-boiling olefins, accompanied by isomerization of normal olefinic products to isoolefins. The isohexadecenes catalytically cracked approx. 3 times as rapidly as I itself. Octane catalytically cracked 7–8 times as rapidly as in thermal decompn., and the catalytic products contained more C_5-C_7 hydrocarbons and less CH_4, C_2H_6 and C_2H_4 than the pyrolytic products. The temp. required for the catalytic cracking of octane was 200° higher than that required for octenes. I was catalytically cracked largely to C_3, C_4 and C_5 hydrocarbons. The products in the gasoline-boiling range contained both branched-chain and straight-chain hydrocarbons, in contrast to the products of I cracking, which were essentially all branched-chain. Although the behavior in thermal cracking of cetane and I is quite similar, cetane is far more stable toward catalytic cracking than I. In both cases, the products of catalytic cracking are quite different from those of pyrolytic cracking. Results are given in tables and curves. C. J. West

Partial volumetric behavior of the lighter paraffin hydrocarbons in the gas phase. B. H. Sage and W. N. Lacey. *Refiner Natural Gasoline Mfr.* **18**, 466–73; *Oil Gas J.* **38**, No. 27, 189–92, 195–7(1939).—The residual partial specific vols. of both components have been detd. for CH_4-C_2H_6, CH_4-C_3H_8 and CH_4-C_4H_{10} mixts. These quantities have been used, in equations developed by S. and L., to predict the volumetric behavior of several gas mixts. up to 3000 lb. per sq. in. with an accuracy of 5% or better. 23 references. C. H. Brooks

High-octane aviation fuel by the sulfuric acid alkylation process. Anglo-Iranian Oil Co. Ltd., Humble Oil and Refining Co., Shell Development Co., Standard Oil Development Co. and Texas Co. *Oil Gas J.* **38**, No. 27, 104–8(1939).—A cooperative program has produced a method of converting C_3-C_5 olefins into aviation gasoline of high octane rating. The process involves the formation of alkyl esters from olefins and coupling these with H_2SO_4 (90% or higher) as the catalyst. Mercaptans, amines and dienes also react with the acid and lower its activity. Temps. above 70°F. decrease yields; the optimum is 32–50°F. A typical process has a contact time of 20–40 min.; 96–100% acid; an acid-hydrocarbon ratio of 1:1 and 8–14% of olefin concn. with a 5:1 isobutane-olefin feed ratio. Flow sheets, product analyses and lead susceptibilities are given. W. Andrew Wright

Catalytic desulfurization to improve aviation blending naphthas. Walter A. Schulze and R. C. Alden. *Refiner Natural Gasoline Mfr.* **18**, 474–7, 515; *Oil Gas J.* **38**, No. 27, 199, 200, 202–4(1939).—Aviation naphthas are passed over a bauxite catalyst at 700 to 750°F. The treated material is practically sulfur-free. C. H. Brooks

Pyrolytic and polymerization processes for the preparation of antiknock gasoline from hydrocarbon gases. M. Marder. *Chem. App.* **26**, 340–3, 355–60(1939).—A review of currently used processes. 18 references. G. W. S.

Addition of nonmetallic organic substances to increase the antidetonating (knock) properties of motor fuels. A. D. Petrov. *Uspekhi Khim.* **8**, 365–77(1939).—**P. gives data on the octane and cetene nos. of a large no. of satd.,**

unsatd. and aromatic hydrocarbons, alcs., ethers and ketones in their mixts. with gasoline, and discusses the effects of chain branching and ozonization on the knock properties of motor fuels. F. H. Rathmann

Internal corrosion of gasoline pipe lines. L. C. Morris and W. A. Schulze. *Oil Gas J.* **38**, No. 27, 205, 210, 212, 213(1939).—An extensive investigation has shown dissolved or entrained air and aq.-treating solns. to be the main factor. Studies were made on the vol. ratios of the 3 components, also on velocity, temp., solids, etc. Mercaptobenzothiazole at concn. of 1 to 2 lb. per 1000 bbl. of gasoline was found to be effective in reducing barnacle growth and pitting of the pipe. W. Andrew Wright

Gas recycling. I. Injection of gas into oil reservoirs. H. L. Baldwin. *Oil Gas J.* **38**, No. 21, 46, 48, 53(1939).—A general discussion on gas injection and pressure maintenance. **II. Testing and sampling methods used on condensate wells.** Geo. Weber. *Ibid.* No. 22, 48–50, 52, 53.—A description of various methods of sampling and testing. 27 references. **III. Phase retrograde phenomena of hydrocarbon mixtures in condensate production.** A. L. Vitter, Jr. *Ibid.* No. 23, 48–50, 60.—Retrograde condensation is discussed with the aid of phase diagrams and vaporization consts. of mixts. and the application of such data to reservoir conditions is considered. The advantages and present limitations of such a study are discussed. 31 references. **IV. Compression requirements for recycling.** F. W. Laverty. *Ibid.* No. 25, 32, 33, 54.—The economics of recycling depends on compression costs. Calcn. methods are demonstrated. 44 references. **V. The case of unitization in recycling.** Geo. Weber. *Ibid.* No. 26, 38–40, 42.—The condition of the field and its structure are considered. The practice is discussed from the basis of conservation and equity. Federal control and type of contract required receives attention. 76 references. W. Andrew Wright

Properties of lubricating oil for engine. Itiro Aoki. *J. Fuel Soc. Japan* **18**, 915–26(1939).—A discussion. F. I. Nakamura

Principles and methods of refining lubricating oils and paraffin wax. T. Brown. *Oil Gas J.* **38**, No. 33, 103–8 (1939). A study to ascertain the shape of a quaternary equil. surface and the significance of the quarternary tie lines, so that calcn. would give necessary plant-design data Preliminary study was on the system: acetone, chloroform, water and acetic acid. Examn. at 25° of a double-solvent dewaxing process was also made. The oil was a narrow refinery cut and the waxes m. 17, 23.6, and 56.86°. An attempt was made to apply phase-rule principles to wax sweating. The solvent refining of paraffin wax was studied. Relations between mol. wt. and m. p. of *n*-paraffins were found. Curves for odd and even nos. of C atoms converge above C_{22}. W. Andrew Wright

Power factor of insulating oil. H. W. Bousman. *Gen. Elec. Rev.* **42**, 409(1939).- The oil must be fluid at low temp., resistant to the effect of high elec. stress and resistant to chem. change. A simple cell for testing oils is described. C. G. F.

Viscosity index of lubricating oils. E. W. Dean, A. D. Bauer and J. H. Berglund. *Ind. Eng. Chem.* **32**, 102–7 (1940).—Previous viscosity index (V. I.) scales for petroleum oils have been based on Saybolt Universal viscosities and the consts. used in making the calcns. did not extend below 40 sec. Saybolt Universal viscosity at 210°F. The present paper reports the prepn. and availability of a table of kinematic consts. covering the range of 2.0–75.0 centistokes (equiv. to 32.8–349 Saybolt sec.) at 210°F. The low viscosity extension adopted here and covering the range below 4.20 centistokes (40 sec. Saybolt) at 210°F. is defined in the terms of the following equations: For 100 V. I.: $Y = 1.4825X + 0.91375X^2$; for 0 V. I.: $Y = 1.655X + 1.2625X^2$, where Y = kinematic viscosity at 100°F. and X = kinematic viscosity at 210°F. Saybolt Universal viscosities are not desirable for this low range, and the extension is in centistokes only. Although these equations extend to zero viscosity, they cannot be used in the range where the oils they represent have vapor pressures that are too high to permit accurate viscosity detns. at 210°F. The lower limit of the table that has been prepd. is 2.0 centistokes at 210°F. (32.8 sec. Saybolt). With this extension the V. I. scale now covers all ordinary lubricating oils. V. I. can be estd. conveniently by the use of nomographic charts of the type included in this article. Saverio Zuffanti

Practical methods of testing lubricants. J. H. Evans. *J. Inst. Petroleum* **25**, 729–50(1939).—A discussion of the testing of the following types of lubricants: lime-soap greases, soda-soap greases, mixed-base greases, Al stearate, mineral oils of varying degrees of refinement from light to heavy cylinder stock, Pb soap and extreme-pressure type oils and greases. A picture and specifications of the Karns Maag Consistometer are included. Specifications for the above lubricants are given. The use of fillers such as talc, graphite, waxes, rosin, clay or mica is not recommended in any greases intended for use with antifriction bearings, as they not only lap the components in, but continue wearing them away, causing frequent replacements. Tests on the consistency of the above greases at increasing temps. are included. The soda-soap greases examd. were grades universally recommended for the lubrication of antifriction bearings, and the expts. show them to thin down more quickly on heating than the lime-soap greases. Incidently these 2 types of greases account for about 95% of the grease-lubricated applications. The general softening range appears to lie between 140° and 160°F. and even though the m. ps. are so much higher than the lime-soap greases, they thin down between these temps. to such an extent that only very efficient enclosures could retain them. The lime-soap greases soften gradually, and are more viscous at the higher temps. The m. ps. of the greases above are given. Saverio Zuffanti

Behavior of various engine and gear lubricants in seizure tests. D. Clayton. *J. Inst. Petroleum* **25**, 709–28(1939). —An investigation of the effect of various lubricants on the seizure characteristics of hard steel in the 4-ball app. Ordinary lubricants, as well as extreme-pressure lubricants, give significant results. Two kinds of extreme-pressure lubricants were tested, early ones of the sulfurized-fatty oil type and more recent ones of the Pb soap-sulfur type. The former behave in a similar manner to the mineral and fatty oils, but with superior qualities. The latter are different, giving appreciable wear at the low loads, and slight rises of friction at moderate loads instead of a sudden rise to a high value at high loads; moreover, they take an enormously high load without welding occurring. Tests have been made of the effect on a mineral oil of the proportion of an extreme-pressure dope of the sulfurized-fatty oil kind, and it has been found that a range of qualities could be obtained. Kerosene and gasoline, although causing appreciable wear even at low loads, behave moderately throughout, the damage when "scuffing" occurs being less than with most mineral oils. There is some discussion of the applicability of the results to gear lubrication. Saverio Zuffanti

Tentative laboratory test for the ring-sticking properties of lubricants. J. C. McNicol, C. G. Williams and P. V. Lamarque. *J. Inst. Petroleum* **25**, 751–9(1939).—A simple lab. test for detg. the oxidation and ring-gumming properties of engine lubricants is described. The test, which consists principally in measuring the strength of a thin oxidized film of the lubricant, has been used for a preliminary study of the oxidation process over a range of temps. and exposure times with 1 lubricant, and at a fixed temp. with a no. of gasoline- and Diesel-engine lubricants of known service performance. Although the data obtained so far are not extensive, it is shown that, in lubricants which are prone to cause ring-sticking in Diesel engines, the strength of the oxidized film is much higher than with lubricants giving comparative freedom from ring-sticking. In addn., it is shown that high film strength is assocd. with high viscosity index of the lubricant. In a limited no. of gasoline-engine lubricants examd., volatility appeared to be a better criterion than the strength of the oxidized film. Saverio Zuffanti

Flow characteristics of lime-base greases. J. F. T. Blott and D. L. Samuel. *Ind. Eng. Chem.* **32**, 68–72

(1940).—By use of a capillary viscometer over a certain range of shearing stresses, the abs. viscosities at 25° of a no. of lime-base greases were detd. Some approx. yield values were measured in a concentric-cylinder torsion viscometer. Some empirical measurements were made on the flow of the greases under comparatively high shearing stresses. Math. expressions to the flow curves in the capillary viscometer were found which agree with the exptl. results except in the region of the yield values. These expts. suggest that the viscosity of the oil base is the main factor detg. the viscosity of the grease at shearing stresses well removed from the yield value and that the soap content probably controls the magnitude of the yield value.
Saverio Zuffanti

Routine method of analysis of bearing greases. G. W. Bond. *J. S. African Chem. Inst.* 22, 57-62(1939).—The method devised by B. (cf. *J. Assoc. of Certificated Engrs.* (S. A.) 9, 104(1935)) is compared with that of the S. A. Standards Institution (No. 10, (1935)). The definite advantages claimed for this method are greater rapidity and accuracy in the detns. The chief procedure employed is acetone extn. of the free fatty acids and free oils. The actual soap present is detd. by weighing. A. B. G.

Some physical constants of bitumen. P. C. Blokker, *et al. Angew. Chem.* 52, 643-8(1939).—A comprehensive treatise covering the following phys. properties: sp. gr., vol. coeff. of expansion, sp. heat, thermal cond., breakdown voltage, dielec. losses and consts., sp. elec. resistance, surface tension and total surface energy, and permeability to water vapor. Many data (including literature values) as well as analytical procedures and app. are given. 17 references. Karl Kaffmermeyer

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Ni alloys in production, transportation, refining and combustion of oil (Rabbitt) 9. Aliphatic polyamines [for use as lubricants] (U. S. pat. 2,178,522) 13.

Trendelenburg, Reinhard: Das Holz als Rohstoff. Seine Entstehung, stoffliche Beschaffenheit und chemische Verwertung. Munich and Berlin: J. F. Lehmanns Verlag. 435 pp. M. 14.50. Reviewed in *Nature* 144, 924 (1939).

Resolving oil-water emulsions such as those of petroleum oil. Raymond B. Millard. U. S. 2,179,131, Nov. 7. App. is described and a method which involves heating emulsions to a resolving temp. while flowing in a confined stream through a heating zone immersed in a body of aq. liquid maintained in a sepg. zone, introducing the heated emulsion directly into the body of aq. liquid in the sepg. zone to heat the body of aq. liquid to a suitable sepg. temp., therein sepg. the emulsion into an aq. phase which merges in the body of aq. liquid and an oil phase which accumulates above the upper surface of the body of aq. liquid, and thermo-siphonically circulating a confined stream of aq. liquid from the body thereof through the heating zone to a point within the oil phase and then discharging the aq. liquid downwardly through the oil phase and in direct contact therewith into the body of aq. liquid to maintain the body of aq. liquid and the oil phase at the sepg. temp.

Refining oils such as petroleum distillates. Sumner E. Campbell. U. S. 2,179,008, Nov. 7. An arrangement of app. is described, and a process of treating oil with reagents which involves introducing independent streams of oil and reagent into the lower part of a reaction zone contg. contact material such as quartz or glass substantially submerged in the reagent, passing the streams upwardly through the reaction zone to cause independent contact of the oil and reagent, and then sepg. the oil and reagent.

Recovering pyridine in the solvent refining of oils. James W. Weir (to Edeleanu Ges. m. b. H.). U. S. 2,178,506, Oct. 31. An arrangement of app. is described, and a process of refining a wax-contg. mineral oil which comprises dewaxing by means of anhyd. tech. pyridine as the diluent and admixing the dewaxed oil-pyridine soln. thereby obtained with an aq. alk. soln. for the purpose of producing a raffinate phase and an ext. phase whereby both phases absorb water from the aq. alk. soln., and which involves distg. the water-contg. raffinate and ext. solns. separately, thereby obtaining a greater yield of anhyd. pyridine to be returned to the dewaxing process than is obtainable in the absence of ramnate oil or ext. oil in the distn. step.

Conversion of hydrocarbon oil. Joseph G. Alther (to Universal Oil Products Co.). U. S. 2,179,079, Nov. 7. An arrangement of app. is described, and a process of cracking and continuous coking which comprises quickly heating a residual oil to a temp. of about 480–525° by passing the same through a heating coil subjected to high rates of heating by direct radiation from flames and hot refractory surfaces in a furnace without allowing the oil sufficient time in the heating coil to cause substantial coke formation and deposition therein, simultaneously and separately heating a lower-boiling oil to a cracking temp. of about 510–565°, discharging resultant highly heated products of both heating steps onto the moving surface of a conveyer disposed within a coking zone and thereon effecting reduction of the high-boiling components of the heated products to coke without addnl. heating, removing the coke from the coking zone, separately removing vaporous hydrocarbons supplied to and evolved within the coking zone therefrom, fractionating the vapors to form a relatively clean condensate of lower-boiling characteristics than the first-mentioned oil, supplying the condensate as the lower-boiling oil to the second-mentioned heating step, subjecting resultant fractionated vapors of the desired end-b. p. to condensation and recovering and sepg. the resulting distillate and uncondensed gases.

Cracking hydrocarbon oils. Lyman C. Huff (to Universal Oil Products Co.). U. S. 2,177,829, Oct. 31. In the selective cracking of relatively low-boiling and high-boiling hydrocarbon oils by sep. treatment of streams of oil of different b.-p. ranges, mixing the cracking products and continuing the cracking of the mixt. and fractionating this product, the fractionated vapors of the desired end b. p. are further fractionated into gasoline vapors of the desired end b. p. and satisfactory antiknock value and a higher-boiling condensate including high-boiling gasoline fractions of unsatisfactory antiknock value. The desired gasoline vapors are condensed and recovered. The higher-boiling condensate is subjected to reforming conditions of cracking temp. and substantial superatm. pressure in another independently controlled cracking zone; regulated quantities of the highly heated products from the last-mentioned cracking zone are introduced into a coking zone. Vaporous products from the coking zone are supplied to another low-pressure sepg. zone, liquid components from the first fractionating zone for mixed conversion products are introduced into the low-pressure sepg. zone to which the vaporous products from the coking zone are supplied. Residual liquid from this low-pressure sepg. zone are quickly heated in another separately controlled cracking zone to a temp. sufficient to induce subsequent coking of the residual liquid. The heated products from the last-mentioned cracking zone are introduced into the coking zone, wherein their high-boiling components are converted to substantially dry coke. Vaporous products from the low-pressure sepg. zone are fractionated to form a reflux condensate, which is supplied to the first-mentioned fractionating zone. Fractionated vapors of the desired end b. p. and comprising materials within the boiling range of gasoline from the last-mentioned fractionating zone are condensed and recovered.

Cracking hydrocarbon oils. Le Roy G. Story (to The Texas Co.). U. S. 2,178,329, Oct. 31. An arrangement of app. is described, and a process for the manuf. of gasoline, which comprises subjecting higher-boiling oil in mixt. with a minor proportion of normally gaseous hydrocarbons and in the absence of gaseous products of combustion to cracking conditions of temp. and pressure whereby a substantial amt. of lower-boiling products contg. oil of the gasoline-boiling range is formed from the higher-boiling oil and gaseous hydrocarbons, sepg. the reaction products into a fraction heavier than gasoline, a gasoline fraction and nor-

mally gaseous hydrocarbons, fractionating the normally gaseous hydrocarbons to sep. a fraction predominating in C_3 and C_4 hydrocarbons, recycling the fraction of C_3 and bringing C_4 hydrocarbons to the cracking operation and the oil and gaseous hydrocarbons into contact while under cracking conditions with about 1/2 to 1% of O as a catalyst to accelerate the conversion of the oil and gases to gasoline hydrocarbons.

Cracking hydrocarbon oils. James W. Gray and Jesse S. Walton (to Gasoline Products Co.). U. S. 2,178,834, Nov. 7. An arrangement of app. is described, and a process for treating high-boiling hydrocarbons to produce low-boiling hydrocarbons, which comprises bringing vapors in a primary fractionating zone into contact with a relatively heavy oil and collecting unvaporized heavy oil therein, thereafter subjecting vapors from the primary fractionating zone to further fractionation in a secondary fractionating zone to sep. relatively high-boiling oil therefrom as reflux condensate, passing reflux condensate thus obtained as a stream through the first portion of a cracking zone maintained under high-temp. and high-pressure conditions to produce conversion of such reflux condensate into lower-boiling products, injecting unvaporized heavy oil from the primary fractionating zone into a portion of the stream of high-temp. cracked products leaving the first portion of the cracking zone, passing such combined stream through the latter portion of the cracking zone maintained at cracking temp., injecting another portion of the stream of high-temp. cracked products into the latter portion of the cracking zone at a point subsequent to the injection of such heavy oil to raise the temp. thereof and effect further cracking of the heavy oil, passing the resulting stream of cracked products leaving the latter portion of the cracking zone to a sepg. zone wherein vapors and cracked residue are sepd., and passing such vapors into the primary fractionating zone.

Cracking and coking heavy hydrocarbon oils such as residual oils. Joseph G. Alther (to Universal Oil Products Co.). U. S. 2,179,080, Nov. 7. App. is described, and a process for the cracking and coking of heavy hydrocarbon oils, which comprises quickly heating the oil to a high conversion temp. while passing the same in a continuous stream through a heating coil subjected to high rates of heating by heat radiated directly to its surface from materials undergoing combustion and the hot refractory confining walls, introducing the heated products into a sepg. zone wherein the resultant heavy pitch-like residue separates from their vaporous components. The vaporous components are removed from the sepg. zone, subjected to condensation and the resulting condensate and uncondensed gases are sepd. The pitch-like residue is discharged from the sepg. zone onto the moving surface of a continuous conveyor within a coking zone causing the pitch-like residue to spread out in a relatively thin layer over the upper surface of the conveyor and it is reduced thereon to a relatively thin mass of coke-like material by means of its contained heat and by means of heat radiated thereto from the relatively hot refractory walls which sep. the coking zone from the combustion chamber. The coke-like material is passed on the conveyor beneath the combustion chamber at which point coking and devolatilization of the coke to the desired degree are completed by heating the material on the conveyor to a high temp. by heat radiated directly to its upper surface from materials undergoing combustion in the combustion chamber and the hot refractory walls thereof, the resulting combustion gases are removed from the combustion chamber without permitting any appreciable quantity thereof to commingle with the hydrocarbon vapors and gases evolved within and separately removed from the coking zone outside the combustion chamber, and the deposited bed of coke is continuously removed from the conveyor and quenched and discharged from the system.

Distilling and cracking hydrocarbon oils. Wayne E. Kuhn (to Texas Co.). U. S. 2,178,838, Nov. 7. An arrangement of app. is described, and a method of treating hydrocarbon oils to form therefrom low-boiling hydrocarbons suitable for motor fuel which comprises distg. crude oil to sep. therefrom a reduced crude, a virgin gas-oil condensate and a naphtha condensate, separately subjecting reduced crude oil thus obtained to relatively mild cracking conditions to effect conversion thereof to lighter products including a substantial proportion of constituents above the gasoline-boiling range, sepg. the resultant cracked products into vapors and residue in a sepg. zone, separately subjecting virgin gas oil thus obtained to relatively more drastic cracking conditions to effect conversion into lighter products including gasoline constituents, separately subjecting naphtha thus obtained to cracking conditions of temp. and pressure adequate to effect reforming of the naphtha to improve the antiknock value thereof, introducing the resultant hot reformed products into the sepg. zone to aid in the vaporization of the cracked reduced crude products, passing the sepd. vapors from the sepg. zone to a fractionating zone, where the vapors are fractionated to form a heavy condensate and a lighter condensate, separately subjecting lighter condensate thus obtained to cracking conditions of temp. and pressure by passage as a stream through a heating zone of restricted cross-section to effect conversion into lighter products including gasoline constituents, introducing heavy condensate from the fractionating zone into an intermediate point of the last-mentioned heating zone to effect cracking of the heavy condensate, passing the resultant cracked products into a second sepg. zone wherein vapors sep. from residue, passing the sepd. vapors to a second fractionating zone wherein the vapors are fractionated to form reflux condensate and lighter distillate and directing reflux condensate from the second fractionating zone to the heating zone of restricted cross-section to effect cracking of the reflux condensate.

Gasolinic hydrocarbons. Vladimir N. Ipatieff and Herman Pines (to Universal Oil Products Co.). U. S. 2,170,306, Aug. 22. Isobutane is alkylated with butylenes in the presence of isobutylene and of $AlCl_3$ at temps. of 0° or below. Cf. *C. A.* 34, 255[4].

Gasoline from gaseous hydrocarbons. Harold V. Atwell (to Process Management Co.). U. S. 2,178,824, Nov. 7. An arrangement of app. is described, and a method of producing motor fuel of high antiknock value, which involves causing CO and H to react over a catalyst such as Co and thoria on kieselguhr at a temp. and pressure such that liquid hydrocarbons in the gasoline-boiling range are formed, sepg. normally gaseous hydrocarbon constituents of the reaction products contg. more than one C atom and heating them to effect substantial cracking, mixing with the resultant cracked product normally liquid constituents from the first-mentioned reaction mixt., and heating the resulting mixt. to effect conjoint conversion of normally liquid and polymerization of normally gaseous hydrocarbons in it.

Motor fuels. Irving E. Muskat (to Pittsburgh Plate Glass Co.). U. S. 2,178,403, Oct. 31. A gasoline which may comprise principally volatile hydrocarbons such as those of straight-run gasoline or cracked gasoline or their mixts. is given improved antiknock properties by incorporation of about 5% or more of unsatd. aliphatic alcs. and ethers such as allyl or diallyl alc. or diallyl ether.

Motor fuel. Euphime V. Bereslavsky. Can. 384,497, Oct. 10, 1939. The S content of a high-boiling petroleum hydrocarbon is decreased to less than 0.25% by wt. of the fuel and an ignition accelerator, e. g., neopentyl nitrate, is added, to produce a compression-ignition fuel.

Polymerization of olefins. Howard L. Gerhart and Carl M. Hull (to Standard Oil Co.). Can. 384,808, Oct. 24, 1939. Normally gaseous olefins are continuously polymerized to normally liquid products by contact of the liquefied olefins with gaseous BF_3 at about 50–200°F. The reaction products are passed to a second zone of higher temp. to liberate BF_3 gas, which is returned to the process. An app. is described.

Polymerization of olefins. Howard L. Gerhart and Maurice H. Arveson (to Standard Oil Co.). Can. 384,809, Oct. 24, 1939. Gaseous hydrocarbons contg. compds. such as butylene and propylene are brought at about 300–500°F. and a pressure of about 100–500 lb./sq. in., into

contact with a small amt. of BF_3. Heavy polymerization products are removed from the lower part of the contact chamber, BF_3 and gaseous products are passed into a low-temp. zone for further reaction to form BF_3-hydrocarbon complexes, which are returned to the high-temp. zone to recover BF_3 and the liquid products of the reaction are scrubbed to remove traces of BF_3 and fractionated to sep. components of the gasoline-boiling range from higher-boiling and lower-boiling components. An app. is described.

Polymerizing gaseous olefins. Arthur H. Boultbee (to Shell Development Co.). U. S. 2,171,207, Aug. 29. An arrangement of app. is described, and a process of polymerizing normally gaseous hydrocarbons of the type produced in cracking, comprising tertiary base and nontertiary base olefins to produce gasoline-type motor fuel. The hydrocarbon is sepd. into a light fraction consisting essentially of ethane and lighter gases, a middle fraction consisting essentially of propane and propylene, and a heavy fraction substantially free from propane and lighter hydrocarbons comprising tert. base and nontert. base olefins. The heavy fraction is brought into contact with a polymerization catalyst at an elevated temp. under conditions to polymerize predominantly the tert. base olefins while only partially polymerizing the less reactive nontertiary base olefins. The polymer is sepd. from the unchanged olefin-contg. fraction, the latter combined with the middle fraction, the mixt. subjected to a thermal noncatalytic polymerization to produce addnl. polymers, the polymers are sepd. from residual gaseous hydrocarbons, and the latter returned to the fractionating zone.

Reduction of the permeability of a porous formation in an oil or a gas well. John J. Grebe and Sylvania M. Stoesser (to Dow Chemical Co.). Can. 385,751, Dec. 19, 1939. A soln. or dispersion comprising a water-insol. viscid material and a water-sol. org. solvent, e. g., an acetone-sol. tar and acetone, is introduced into the well and then into the formation in the presence of water.

Laminated material suitable for oil containers. Robert E. Burk and Everett C. Hughes (to Standard Oil Co. of Ohio). U. S. 2,178,447, Oct. 31. Containers such as those for oil or grease are formed with a layer of cellulose material such as chip board or chestnut board and an oil-resistant exposed inner layer of water glass, the cellulose material being moisture-satd. and provided exteriorly with a layer such as an asphalt compn., to prevent loss of moisture.

Compounds of the perylene series for coloring hydrocarbon oils, waxes, fats, plastics, lacquers, etc. Heinrich Neresheimer and Anton Vilsmeier (to General Aniline Works). U. S. 2,178,521, Oct. 31. By heating, at 180–300°, a reaction product of a halide of an acid, such as benzoyl chloride, and a benzanthrone with a compd. contg. at least 6 C atoms, which may be an aliphatic or cycloaliphatic unsatd. hydrocarbon or alc., ester, mercaptan, ether or thioether, in the presence of an acid-condensing agent such as HCl and $ZnCl_2$, products are obtained which, generally, color paraffin oil yellow with an olive fluorescence. Various examples with details are given. Cf. *C. A.* **33**, 6480[3].

Oil filter suitable for use with internal-combustion engines. Harry D. Crawford. U. S. 2,178,930, Nov. 7. Various structural details.

Refining hydrocarbon oil. Leon W. Cook (to Texaco Development Corp.). Can. 385,496, Dec. 5, 1939. Residual lubricating oil contg. hard and soft asphalt, dark-colored constituents, and oil of low and high viscosity index is dild. with sufficient propane to ppt. hard asphaltic constituents, the partially deasphalted mixt. is extd. with a mixt. of furfural and mixed chlorophenols contg. about 60–70% of the para isomer, the amt. of chlorophenol being enough to dissolve the remaining asphaltic constituents without substantially increasing the solvent action of furfural upon constituents of high viscosity index, an ext. phase is formed comprising asphaltic and dark-colored constituents and substances of low viscosity index dissolved in the bulk of the solvent, and a raffinate phase comprising oil of high viscosity index mixed with some of the solvent.

Refining hydrocarbon oils such as California lubricating oils. Ernst Terres, Josef Moos and Erich Saegebarth (to Edeleanu G. m. b. H.). U. S. 2,178,515, Oct. 31. A mixt. contg. a preponderant proportion of acetanilide is used as a selective solvent for aromatic constituents, etc., in effecting their sepn. from paraffinic constituents, for increasing the viscosity index of the oil treated.

Device for removing paraffin from oil wells. Cuthbert A. Still and Lawrence M. Still (L. M. Still to Aldrich C. Still). U. S. 2,179,475, Nov. 7. Various structural details.

Dewaxing petroleum oils. Le Roy G. Story (to The Texas Co.). U. S. 2,178,328, Oct. 31. Dewaxing of an oil such as a petroleum lubricating stock is effected by heating the oil to about 82° in the presence of a soap such as Al stearate 0.1–0.3% which is substantially insol. in water and effectively modifies wax crystn., chilling the mixt. to ppt. wax, and sepg. the wax by filtration.

Dewaxing hydrocarbon oil. Leon W. Cook and Charles C. Towne (to Texaco Development Corp.). Can. 385,648, Dec. 12, 1939. Filtration of wax is improved by adding a small proportion of the reaction product of rubber with a Sn or B halide or halogen acid to a lubricating oil in the presence of a chem. agent capable of depolymerizing the rubber; e. g., the reaction product of rubber and $SnCl_4$ is added together with glacial AcOH, the oil chilled to ppt. wax and the mixt. filtered. Cf. *C. A.* **33**, 4014[1].

Dewaxing lubricating oils. Edward J. Martin (to Sinclair Refining Co.). U. S. 2,178,078, Oct. 31. Dewaxing of a lubricating oil stock is effected by use of a solvent mixt. which may include C_6H_6 or toluene, ethylene glycol monomethyl ether and $PhNO_2$ (suitably after a preliminary extn. of the stock with $PhNO_2$).

Lubricating oils. Paul L. Salzberg (to E. I. du Pont de Nemours & Co.). U. S. 2,178,610, Nov. 7. A small proportion of an ester of an acid of P contg. at least one naphthenyl radical, such as trinaphthenyl trithiophosphite, is added to a lubricating oil such as a paraffin oil to reduce corrosion under high pressures, etc.

Lubricating oils of high film strength. Bert H. Lincoln and Waldo L. Steiner (to Lubri-Zol Development Corp.). U. S. 2,178,534, Oct. 31. A lubricating oil is mixed with 0.02–10% of a chlorinated aliphatic compd. such as methyl chlorostearate and with 0.02–10% of an org. S compd. such as butyl sulfide, both of which added compds. are sol. in the oil and have a b. p. above 140°. Numerous examples are given.

Refining lubricating oils with selective solvents. Louis A. Clarke (to The Texas Co.). U. S. 2,178,321, Oct. 31. An arrangement of app. is described, and a method of solvent refining high-grade paraffin-base lubricating oil and low-grade naphthene-base lubricating oil derived from different crude sources which comprises extg. the paraffin-base lubricating oil stock with a selective solvent comprising a chlorophenol mixt. contg. about 15% phenol, 31% orthochlorophenol, 51% parachlorophenol, and 3% dichlorophenol, forming a primary raffinate phase comprising highly paraffinic oil and a primary ext. phase rich in solvent and relatively paraffinic constituents of the oil, sepg. the two phases, causing the primary ext. phase to flow through a sep. extn. zone countercurrently to the naphthene-base lubricating oil and in the presence of fresh solvent, forming a secondary ext. phase contg. low viscosity index oil, and a secondary raffinate phase comprising oil of relatively higher viscosity index, and sepg. the two phases.

Voltolized antioxidant blending agent for use in refined petroleum lubricating oils. Peter J. Wiezevich (name now changed to Peter J. Gaylor; to Standard Oil Development Co.). U. S. 2,178,769, Nov. 7. A process of prepg. an antioxidizing hydrocarbon compn. for use in lubricating oil involves treating crude petroleum oil with a selective solvent such as liquid SO_2 or phenol to remove the nonparaffinic components and subjecting the latter to silent elec. discharge polymerization.

Sulfurized sperm oils and the like suitable for use with mineral lubricating oils. Herschel G. Smith and Troy L.

Cantrell (to Gulf Oil Corp.). U. S. 2,179,063, Nov. 7. Fat acid monoester material such as sperm oil is sulfurized at temps. of about 180–230° to produce sulfurized esters contg. minor amts. of by-products deleterious in lubricating compns. and such by-products are subsequently removed by agitation with an acid-washed clay. U. S. 2,179,064 relates to a similar use of acid-washed clay for refining a mixt. of a mineral oil with sulfurized sperm oil or the like.

Sulfurized esters of fatty acids. Herschel G. Smith (to Gulf Oil Corp.). U. S. 2,179,065, Nov. 7. An unsatd. fatty aliphatic monoester having the general formula RC=O(O)R′ in which R and R′ represent straight-chain aliphatic groups, one of which is satd. and the other unsatd., is sulfurized, as by heating with S, to saturate the unsatd. group and produce a substantially neutral S compd., such as sulfurized decylene palmitate which is suitable for *use with lubricating oils*, etc. U. S. 2,179,066 relates to the sulfurization of sperm oil, etc.

Lubricant. Seymour W. Ferris (to Atlantic Refining Co.). Can. 384,094, Sept. 19, 1939. Operative details are described for production of a viscous mineral oil suitable for lubricating internal-combustion engines, the oil having a viscosity-gravity const. of 0.827–0.791, a Saybolt Universal viscosity at 210°F. of 60–160 sec., and being substantially free of mineral oil constituents having a viscosity-gravity const. 0.07 higher than the viscosity-gravity const. of the oil itself.

Mineral-oil lubricants. John M. Musselman (to Standard Oil Co. of Ohio). U. S. 2,178,455, Oct. 31. To render it stable at high temps., a mineral oil of lubricating viscosity is mixed with a small proportion (suitably about 1% or less) of *o*-nitroso-*m*-cresol, nitrosobenzene or other compd. of the general formula $C_6R.NO$ in which R represents H, or H_3CH_3OH or $H_2(CH_2)_2OH$.

Lubricants containing sulfohalogenated monoesters. Herschel G. Smith and Troy L. Cantrell (to Gulf Oil Corp.). U. S. 2,179,062, Nov. 7. A lubricant suitable for lubricating Cd-Ag and other special alloy bearings under relatively high bearing temps., pressure and speeds, without corroding the bearings, comprises a mineral oil mixed with 0.2–2.5% of a substantially neutral, sulfochlorinated monoester contg. S 2–6% and Cl 2–7% and which is an addition product of S chloride and sperm oil or other unsatd. aliphatic monoester of the general formula $Me(CH_2)_nCH{:}CH(CH_2)_nC(.O)OCH_2(CH_2)_nCH{:}CH(CH_2)_n$-Me wherein *n* is 1 to 9, the amount of the sulfochlorinated monoester dissolved in the oil being sufficient effectively and substantially to retard the destructive action on said alloy bearings which would normally occur in the absence of said sulfochlorinated monoester.

Lubricants suitable for transmission and differential gears, etc. Carl F. Prutton and Albert K. Smith (to Lubri-Zol Development Corp.). U. S. 2,178,513, Oct. 31. As a principal lubricant, use is made of a halogenated org. ring compd. such as a chlorinated diphenyl ether and S in soln. in active form (suitably in lard oil or fish oil). U. S. 2,178,514 relates to lubricating compns. suitable for use under extreme pressures, e. g., in die-drawing metals; they comprise a lubricating oil mixed with an addn. agent, such as S, Cl or H_2S, capable of reacting with the metallic surface being lubricated and with an org. phosphite or phosphate (such as triphenyl phosphite or phosphate) having a vapor pressure less than atm. at 140°, which serves to inhibit corrosion.

Stable and noncorrosive mineral-oil lubricants. Herschel G. Smith (to Gulf Oil Corp.). U. S. 2,179,060, Nov. 7. A mineral-oil lubricating base is mixed with sulfurized sperm oil. U. S. 2,179,061 relates to a uniform blend of a mineral-oil lubricating base with a minor proportion (suitably about 10–14%) of a sulfurized fatty monoester derived from an ester having the general formula RC=O(O)-R_1 in which R and R_1 represent aliphatic groups at least one of which is unsatd. prior to sulfurization, such as a sulfurized oleate of oleyl alc. or ethyl oleate.

Lowering the pour point and inhibiting the oxidation of hydrocarbon oils for use as lubricants, etc. Henry G. Berger, William H. James and Darwin E. Badertscher (to Socony-Vacuum Oil Co.). U. S. 2,177,923, Oct. 31. A mineral oil such as a motor or transformer oil is mixed with (suitably about 0.1–0.5%) a product obtained by reaction of di- or tetra-wax phenol with *o*-phosphitobenzoyl chloride at an elevated temp. until the evaluation of HCl has substantially ceased or with various products obtained by reaction of a phenol, 1-naphthol or 9-anthrol in which at least one H is substituted by a high-mol.-wt. aliphatic hydrocarbon radical, the remaining H being substituted or not by the groups consisting of hydroxyl, aryl, alkyl, aralkyl, aroxy and alkoxy radicals, with a compd. having the general formula: $O{:}POC{:}CR'.CR'{:}CR'.CR'{:}CCO$-Cl in which the R's are from the group consisting of H, alkyl, aryl and alkaryl radicals, the final product of reaction possessing the property of depressing the pour point and inhibiting oxidation of the oil. Various examples with details are given.

Sulfurized cutting oil. Wm. H. Kobbe (to The Texas Co.). U. S. 2,178,325, Oct. 31. A light lubricating oil is used with an admixt. of about 2–6% of the product obtained by treating a polymer of dihydronaphthalene of the formula $C_{40}H_{40}$ to temps. sufficiently high to form a homogeneous product at a temp. of at least about 140° and not greatly above 165°. Cf. *C. A.* **33**, 8986[2].

Engine oil mixture. Herschel G. Smith (to Gulf Oil Corp.). U. S. 2,179,067, Nov. 7. A lubricant suitable for use in the crankcases of internal-combustion engines operating at high pressures and high temps. comprises a petroleum lubricating oil mixed with refined sulfurized sperm oil and tritolyl phosphate, butylstearate, etc.

Asphalt from petroleum residuum. Robert E. Burk and Charles H. Whitacre (to Standard Oil Co. of Ohio). U. S. 2,179,208, Nov. 7. A petroleum residuum is air-blown for 1–30 hrs. or longer in the absence of an added catalyst at a temp. of about 150–260°, and then heated to at least about 150° with a small amt. of a polymerizing catalyst such as H_2SO_4, $FeCl_3$ or B fluoride. Cf. *C. A.* **33**, 4419[1].

Asphalt from oil shale. A. K. Mityurev. Russ. 51,958, Oct. 31, 1937. Asphalt is produced by heating shale with inorg. substances, e. g., sand, preliminarily brought to a temp. of 700–1000°.

Purifying wood creosote. Tsentral'nyi Nauchno-Issledovatel'skii Lesokhimicheskii Institut "Tsnilkhi" (inventors, V. P. Sumarokov and V. D. Ugryumov). Russ. 51,841, Sept. 30, 1937. Creosote is first treated with NaOH soln. in the amt. of 5–15% of that required for complete soln. of the creosote. The alk. soln. is sepd. and the creosote then treated with excess NaOH. The alk. solns. are separately treated with H_2SO_4 and extd. with Et_2O. The exts. are distilled. The product from the first alk. treatment is less dense and lower in MeO than the product of the second alkali treatment.

Separation of pyroligneous liquor. Jesse M. Coahran. Can. 385,531, Dec. 12, 1939. In scpg. constituents of pyroligneous liquor, by a preliminary distn. to remove tar followed by a fractional distn. to remove methanol and a subsequent cold extn. with a volatile solvent to remove acetic acid, the hot distillate is passed from the preliminary distn. into heat-exchange relation to the cooler acid soln. to drive off the solvent and cool and partially condense the distillate before fractional distn., while only a portion is in the vapor phase; thus the latent heat of vaporization of the portion is utilized in the fractional distn. An app. is described.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Diameter variation in cellulose fibrils. A. J. Bailey and R. M. Brown. *Ind. Eng. Chem.* **32**, 57–63(1940).—Various plant fibers, including cotton, wood pulps and wood shavings, were disintegrated by mech. means alone and by beating after chem. treatments. Measurements of fibril diams. were made and analyzed statistically, and the results showed that cellulose fibrils exist as uniform and true morphological units with a more or less common and const. diam., 0.9-1.0 μ. This diam. is independent of origin, chem. treatment or mech. processing of the fibril. At least 2 phys. materials occur in the fiber wall: one a compact, dense, unit fibril incapable of being gelatinized in water by ordinary methods, and the other a substance forming a hydrogel in water. Fiber laminations have alternately strong and weak spots; the distance from center to center of either is about 1 μ. Anastomosing of fibrils appears to be extremely improbable, and zone markings on drastically swollen fibers are a doubtful basis from which to infer fibril dimensions. Freeness, viscosity and similar tests on pulps have only limited and empirical significance in following the course of beating. An explanation is given for the mechanisms of fibrillar reactions, fiber disintegration and the numerous phys. and chem. changes occurring during disintegration of fibers. By inference, true wall laminations would appear to be at least 1 μ thick, and thicker if heavily coated with gel. S. I. Aronovsky

The refractivity of cellulose as a function of the degree of swelling. P. H. Hermans and P. Platzek. *Rec. trav. chim.* **58**, 1001–7(1939)(in German).—The observation made by Meyer and Frey-Wyssling (*C. A.* **30**, 1555[8]) that the n of ramie fibers decreases on swelling in H_2O less than would be expected according to Wiener's theory of mixed substances is reaffirmed by measurements of isotropic fibers of regenerated cellulose for H_2O contents up to 24.4%. In agreement with M. and F.-W. it is concluded that the phys. assumptions of W.'s theory are not fulfilled under all circumstances in the system cellulose–H_2O. Possible explanations for this fact are discussed. With more swollen fibers with a H_2O content of 50% or more, the anomaly ceases, and for such fibers the Newton-Wiener mixt. formula is again valid. F. E. Brauns

Determination of cellulose in plants and bleaching cellulose materials. I. New method of cellulose estimation by bleaching powder. Sin-iti Honda. *J. Agr. Chem. Soc. Japan* **15**, 966–72; *Bull. Agr. Chem. Soc. Japan* **15**, 139–41(in English)(1939).—The wood of *Salix caprea* L. was extd. with alc. and C_6H_6. The residue was boiled with 2% Na_2SO_3 for 10 min., filtered and washed with hot H_2O. It was treated with 5 cc. of bleaching powder contg. 10% of available Cl for 10 min. After filtration and washing, it was again boiled with 2% Na_2SO_3 for 10 min. The chlorination was repeated and it was then treated with acid Na_2SO_3 soln. until the color reactions disappeared. Y. Kihara

Determinations of uronic acids in cellulosic materials. Roy L. Whistler, A. R. Martin and Milton Harris. *Textile Research* **10**, 109–19; *Am. Dyestuff Reptr.* **29**, 1–6; *J Research Natl. Bur. Standards* **24**, 13–25(1940).—Naturally occurring cellulosic fibers appear to be a more or less intimate assocn. of cellulose with other constituents, a portion of which appears to be composed of uronic acids, presumably contained in the pectic substance of the fibers. Treating pure uronic acid with a boiling soln. of HCl results in a steady evolution of CO_2 to completeness whereas pure carbohydrates show a much slower but const. evolution of CO_2 during the entire treatment. This difference in rate of evolution of CO_2 is the basis of a method of detg. uronic acid in the presence of cellulosic materials. The app. is described and illustrated and curves show the rates of evolution in mg. CO_2 per g. for periods up to 8 hrs. from galacturonic acid monohydrate, from glucose, from dewaxed cotton, from a mixt. of glucose and galacturonic acid, from a dewaxed and purified cotton. Tables show the evolution of CO_2 from galacturonic acid, glucose and a mixt. of both and the amt. of CO_2 evolved from the uronic acid groups of ramie and flax fibers. Twenty-one references. W. H. Boynton

Macromolecular compounds. CCXXVIII. The strength of fiber celluloses with different degrees of polymerization. H. Staudinger and J. Jurisch. *Zellwolle, Kunstseide, Seide* **44**, 375–6(1939); cf. *C. A.* **33**, 9291[8].—The relation of fiber strength to degree of polymerization cannot be compared for natural *vs.* artificial fibers, because the structure of the mols. in an artificial fiber varies with the spinning process. Thus a high-mol. cellulose of a mean degree of polymerization of 1000 and a highly degraded cellulose of a degree of 300 cannot be spun under the same conditions. A 0.5% xanthate soln. of the former is approx. as viscous as a 10% spinning soln. of the latter. Strength studies were made on material obtained by degrading, by acid treatment, the cellulose mols. of the natural fibers in the solid state. The strength increases rapidly with increasing degree of polymerization from 200 to 700; a further increase to 1000 increases the strength only slightly; a final increase of the degree of polymerization to 3000 produces practically no further change. Lowering the mean degree below 200 is accompanied by a rapid disintegration of the fiber. The decrease of strength is due to the increased number of intermolecular spaces (of 3-4 A.) in the fiber. To study the relation of mol. size to strength in oxycelluloses, the following natural fibers were oxidized for varying periods with 1% H_2O_2 in 2% NaOH at 50°: (*a*) unbleached ramie fibers that had been purified by extn. with 0.5 *N* NaOH in an atm. of N, (*b*) crude cotton which had been extd. with water, alc. benzene and acetone, (*c*) cotton which had been extd. as under (*b*) and which was purified further by boiling with 1% NaOH in an atm. of N, (*d*) cotton which had been treated as under (*c*) and which was mercerized with 20% NaOH for 20 min. at 20°, (*e*) bleached com. cotton yarn manufd. by Mez, A.-G. The mean degree of polymerization was detd. by viscosity measurements in Schweizer's reagent. Strength of the fiber decreases only slightly as the degree of polymerization decreases from 3000 to 1000; strength decreases rapidly on a further drop in polymerization to 200. If the degree of polymerization decreases below 200 the cellulose disintegrates; these results duplicate those obtained with hydrocelluloses. **CCXXIX. The strength of cellulose nitrate fibers of different degree of polymerization.** *Ibid.* 377–8.—Studies were made on the resistance to tearing in relationship to the degree of polymerization of nitrates of cotton celluloses obtained by oxidative degradation and extn. with org. solvents. The strength of the nitrate fibers decreases with decreasing degree of polymerization; the data are approx. the same as those obtained for the cellulose fibers. Nitration of viscose staple rayon and Cu rayon with a mixt. of HNO_3 and H_3PO_4 gave products of approx. the same strength as the original artificial fibers. L. Scheflan

The strength-stretch diagram of isotropic cellulose fibers in light of the theoretical relation between swelling isotropy, orientation and strength. I. Fibers in different degrees of swelling. P. H. Hermans. *Kolloid-Z.* **89**, 344–8(1939).—If one substitutes for the conventional experimentally detd. stretch value v, the calcd. "characteristic stretch value" v_t, the curves for strength of isotropic fibers of widely different degrees of swelling no longer cross each other aimlessly but form a rational family of curves. The course and position of these curves are satisfactorily explained on a previously developed theoretical relation between swelling anisotropy and strength having also in view the empirically known relation between swelling anisotropy and v_t. The curves are of common significance and have as a parameter the strength at the yield point. **II. Fibers produced by different methods.** P. H. Hermans and P. Platzek. *Ibid.* 349–54.—Expts. were made with three viscoses (figures show %): (1) alkali 5, cellulose 8, normally ripened; (2) alkali 4.5, cellulose 4, ripened less; (3) alkali 4.5, cellulose 2, un-

ripened. From these viscoses isotropic fibers were spun, the conditions of spinning (sol.-gel. transformation) detg. the special form of the characteristic Q-v_i curve, where Q is the swelling anisotropy indicative of orientation. There is impressed upon the gel at the time of its formation a certain deformation behavior, which persists throughout its subsequent swelling history. The course of the empirically detd. strength-stretch curves correspond quantitatively to those theoretically calcd. Cellulose fibers are described, swollen to less than 3% dry substance, which are still stretchable and capable of manipulation, while with certain cellulose hydrate fibers a stretching of 220% was observed. Jerome Alexander 1

The quantitative interpretation of force-extension diagrams of isotropic cellulose threads on the basis of a rational theory of the relation between degree of orientation and force (preliminary communication). P. H. Hermans. *Proc. Acad. Sci. Amsterdam* **42**, 798–807 (1939); cf. *C. A.* **33**, 9626⁴.—It is shown that the force-extension diagrams for swollen cellulose threads bear a direct and unequivocal relationship to the micellar orientation during elongation, as detd. by measurement of swelling anisotropy. By means of the theory previously developed from the microscopic structure of hydrate cellulose gels giving a relationship between degree of orientation, swelling anisotropy and tensile strength, it is even possible to construct theoretically force-extension diagrams of all isotropic threads so far investigated which are in satisfactory agreement with the exptl. diagrams. The conclusion that the force increases in inverse proportion to the square of the sine of the av. micellar angle of orientation is independent of the special assumptions made in developing the above theory. The relation between the swelling anisotropy and the characteristic degree of elongation (based on the dry state) for each existing spinned thread and which relation is independent of the degree of swelling during elongation leads to the conclusion that at the moment of coagulation (sol-gel transition) a definite structure is formed whose characteristic elements responsible for the course of orientation as a function of the elongation remain unaltered during all subsequent swelling and contracting processes. The typical course of orientation for any gel may, however, change with the conditions during gel formation. Mark Plunguian 2 3 4 5 6

Lignin from sorgo residue as a source of plastic material. Ippolito Sorgato. *Ind. saccar. ital.* **32**, 529–34(1939); cf. *C. A.* **33**, 9480¹.—On acidifying the spent alk. lye obtained in the manuf. of cellulose from sorgo bagasse by the soda process lignin is pptd. in a yield of 15% on dry substance. The lignin contains 12% of methoxyl; the yield of lignin can be increased by employing a coagulant, but in that case the content of methoxyl is slightly decreased. Various objects can be molded from the product. O. W. Willcox 7

Pulp man's paradise. Donald D. Bode. *Mfrs. Record* **109**, No. 1, 38, 62(1940).—A description of the use of the Australian pine as a raw material for the manuf. of wood pulp, paper, cellulose plastics, etc. Leopold Scheflan

Wood pulp. C. J. Friedlander. *Wood* **4**, 449(1939).—A brief outline of the processes followed in the production of wood pulp, its uses and the vol. of the production in various countries. Leopold Scheflan 8

Hemicellulose extract of various rayon wood pulps. G. A. Richter, C. H. Goldsmith and K. E. Glidden. *Rayon Textile Monthly* **21**, 26–7(1940).—Hemicellulose ext. as detd. in the viscose rayon industry is a more direct measure of the yield of cellulose, inasmuch as the β-cellulose that is retained undergoes xanthation and appears later as "regenerated" cellulose. Extn. procedure and the analytical method are outlined and results tabulated. Results are summed up as follows: (1) under normal steeping conditions, the hemicellulose ext. of various rayon sulfite pulps was approx. equal to the γ-cellulose content, (2) lower than normal steeping temp. and NaOH concn. increased the ext., (3) under steeping conditions of 18% NaOH soln. and 20° the hemicellulose ext. of various pulps increased in the following order (*a*) high α wood pulp from softwood, (*b*) hardwood sulfite and (*c*) several domestic and foreign softwood sulfites. W. H. B. 9

Burning pulp-mill waste from sulfite mill. Grover Keeth. *Trans. Am. Soc. Mech. Engrs.* **61**, 679–83(1939).—Waste sulfite liquor, contg. approx. as much dissolved org. material as pulp produced, when treated with lime reagent by the three-stage Howard pptn. process, yields (1) from the 1st settling tank an inorg. sludge product contg. Ca sulfite, (2) from the 2nd settling tank a lignin fuel product representing approx. 50% of the solids in the waste sulfite liquor and (3) from the 3rd settling tank a mixt. of org. material and unconsumed lime reagent. The lignin fuel product, as obtained from an Oliver type of rotary vacuum filter, contains 68–70% moisture and is essentially a basic Ca ligninsulfonate. After the moisture content had been reduced to approx. 50% on a special press, the lignin fuel was burned in admixt. with coal (85:15). On the dry basis, the lignin fuel contained C 46.68, H 4.11, O 23.28, S 4.12, N 0.53, ash 21.28% and had a heat value of 8103 B. t. u./lb. George Ayers

Cellophane (Waterfield) **13**. Effect of water-sol. salts on elec. properties of paper boards (Koritskii) **13**. Structure of cellulose (Haworth) **10**. Treatment of waste materials contg. paper (Belg. pat. 432,217) **9**. Printing on pellicles of hydrophilic colloid [cellulose hydrate] (Can. pat. 384,909) **26**.

Cellulose. József Kovách and Sándor Kasser. Hung. 122,064, Nov. 15, 1939. The disintegrated cellulosic substance is treated with 1–8% HNO_3 at not higher than 80° in a closed container under pressure. The fibers are washed and treated in the same app. with a 0.5–4.0% soln. of alkali or alk. earth hydroxides or hypochlorites at 20–100° to dissolve the incrusting substances. The acid and alkaline solns. are led back to the app. as pretreating mediums.

Working up cellulose fibers. Lajos Töreky. Hung. 121,871, Nov. 2, 1939. The disintegrated fibers are mechanically cleaned by air currents, washed with a soln. of NaOH or Na_2CO_3, boiled under 1–3 atm. pressure for 1–1.5 hrs. at 100–120° in solns. contg. either $Ca(HSO_4)_2$, $Ca(HSO_3)_2$ or NaOH. They may also be treated with cold HNO_3.

Cellulose solutions. Charles Graenacher and Richard Sallmann (to Soc. pour l'ind. chim. à Bâle). U. S. 2,179,181, Nov. 7. Oxides of tertiary amines, such as triethylamine oxide, are used in forming solns. of cellulose such as cotton linters which are suitable for prepg. pptd. cellulose.

Regenerated cellulose products such as those from cellulose xanthate. Johann Eggert and Walter Gellendien (to Deutsche Hydrierwerke A.-G.). U. S. 2,179,449, Nov. 7. Regenerated cellulose is used with a strengthening agent such as 2-furaldehyde, methyl-2-furaldehyde, furfuryl alc., methylfurfuryl alc., furfuryl acetate, methylfurfuryl adipic acid ester, furfuryl butyl ether, methylfurfuryl oleyl ether, or methylfurfuryl monoglycerol ether and naphthol, a naphtholsulfonic acid salt or cresol.

Treatment of organic derivatives of cellulose. George Schneider (to Camille Dreyfus). Can. 384,914, Oct. 31, 1939. To reduce its corrosive action and otherwise improve it, an org. deriv. of cellulose is treated while in the secondary soln. with a soln. capable of liberating Cl. E. g., cellulose acetate is treated with 5% of a 12.1% soln. of Ca hypochlorite.

Purifying cellulose ethers. Alexander S. Finlayson (to Hercules Powder Co.). U. S. 2,178,630, Nov. 7. A process for purifying substantially water-insol. cellulose ethers such as cellulose ethyl ether involves treatment in the solid form with an aq. soln. of a lower aliphatic acid such as formic acid contg. about 0.05–0.5% of the acid for a time sufficient to convert the insol. metallic constituents in the cellulose ether to compds. sol. in the dil. acid soln., and then washing with water.

Methyl ethers of cellulose. Robert R. H. Brown and Andrew J. Watters (to Canadian Industries Ltd.). Can. 385,198, Nov. 21, 1939. With cellulose in the presence of

aq. caustic alkali is incorporated an amt. of Me_2SO_4 not more than sufficient to form a methylcellulose contg. about 4–10% methoxyl groups per glucose unit of the cellulose, and the product is treated with a suitable proportion of a lower alkyl chloride.

Cellulose ether carboxylic acids. Julius Voss (to Kalle & Co. A.-G.). U. S. 2,179,457, Nov. 7. One mol. of cellulose such as alkali cellulose is caused to react with about 1–1.5 mols. of a halogenated fatty acid such as monochloracetic acid in the presence of about 3 4 mols. of NaOH and of a chemically indifferent Na salt such as NaCl (suitably at 35–40°) to obtain a product which on acidification with HCl yields pptd. cellulose glycolic acid.

Stabilizing cellulose esters such as cellulose acetate against acid fading when dyed. Herbert E. Martin (to Celanese Corp. of America). U. S. 2,177,903, Oct. 31. For stabilization, an ester such as a cellulose acetate dissolved in the org. acid soln. in which it is formed and which contains S compds., is mixed with Mg acetate, the mixt. is allowed to stand for 3–16 hrs. at 22°, and a diluent such as water is then added and stirred with the mixt. to effect pptn. of the cellulose ester in the presence of the Mg acetate used.

Cellulose esters. Howard S. Gardner, Jr. (to Canadian Kodak Co., Ltd.). Can. 385,316, Nov. 28, 1939. Cellulose is pretreated, without a catalyst, with the acylating acid contg. 5–20% of water, and then esterified.

Noncorrosive cellulose esters. George Schneider (to Camille Dreyfus). Can. 384,915, Oct. 31, 1939. An equal wt. of a weak org. acid is added to a ripened soln. of cellulose ester, the resulting soln. treated with Cl or hypochlorites in an amt. equiv. to 0.02–1% of free Cl based on the wt. of the cellulose ester, and the product treated with an antichlor.

Cellulose acetate pellicles. Ambrose W. Staudt (to E. I. du Pont de Nemours & Co.). Can. 384,434, Oct. 3, 1939. A pellicle is cast from a flowable cellulose acetate compn. contg. a solvent, a moistureproofing agent, a plasticizer and a blending agent comprising at least one of the class consisting of hydrogenated resin, gum elemi, sulfonamide-aldehyde resin, ethylene dibenzoylbenzoate, and lactic acid condensation resin. The greater part of the solvent is evapd. by circulating air at 70° or higher; the film is stripped from the casting surface, and the remainder of the solvent evapd. by circulating air at 80° or higher. An app. is described.

Extrusion apparatus suitable for the manufacture of multi-colored celluloid rods, etc. Camillo Orsini (to Nixon Nitration Works). U. S. 2,171,095, Aug. 29. Various structural details.

Cellulose acetate rayon and other products. Wm. A. Dickie and Percy F. C. Sowter (to Celanese Corp. of America). U. S. 2,178,741, Nov. 7. A process for the manuf. of artificial filaments, threads, yarns, ribbons, etc., comprises extruding a soln. of an org. deriv. of cellulose such as cellulose acetate in a solvent medium such as dioxane, glycol monoacetate or methyl glycol monoacetate through a shaping device into a coagulating liquid contg. a high concn. of the same solvent medium together with a nonsolvent such as water and subjecting the coagulated product to a drying operation (the solvent medium contg. a constituent which is less volatile at the drying temp. than is the nonsolvent mentioned).

Rayon from solutions such as those of viscose. James J. Polak and Johannes G. Weeldenburg (to American Enka Corp.). U. S. 2,179,195, Nov. 7. Filaments or the like are formed by extruding a soln. such as one of viscose through a minute orifice into a coagulating medium, the soln. contg. a dissolved cation-active NH_4 compd. having linked thereto an atomic grouping contg. benzene nuclei inducing cation-activity and an innocuous anion, such as toluene azophenyltrimethylammonium iodide which serves to lessen clogging. U. S. 2,179,196 relates to the manuf. of viscose yarn by extruding a viscose soln. through a minute orifice into a pptg. bath contg. a cation-active tetraalkylammonium salt such as dodecyltriethylammonium sulfate or the like and which serves to prevent or lessen clogging. Cf. *C. A.* **33**, 3588[1].

Sulfite digestion of cellulose. Torsten E. Waenerlund (to Mo och Domsjö Aktiebolag). U. S. reissue 21,251, Oct. 31. A reissue of original patent no. 1,809,499 (*C. A.* **25**, 4708).

Machine for defibering pulp. Joseph E. Bond. Can. 384,499, Oct. 10, 1939. Structural details.

Bleaching fibrous materials such as wood pulp or textile materials. Irving E. Muskat and George H. Cady (to Pittsburgh Plate Glass Co.). U. S. 2,178,696, Nov. 7. Bleaching is effected with a soln. of HOCl prepd. by treating water with Cl_2O which is substantially free of HCl, ClO_2 and oxides of N.

Bleaching wood pulp. John Schuber (to Solvay Process Co.). U. S. 2,178,649, Nov. 7. In treating an aq. pulp suspension with a Cl bleach soln., a pH of 8.3–10 is maintained during the treatment until the bleach has been substantially exhausted, and the alky. of the mixt. is then increased.

Treating sulfite pulp residual liquor. Geo. H. Tomlinson and Leslie S. Wilcoxson (Wilcoxson to Babcock & Wilcox Co.). U. S. 2,179,456, Nov. 7. App. is described, and a process of treating sulfite pulp residual liquor which involves burning it in a furnace under conditions yielding a dry noncombustible ash residue, removing substantially all of the ash produced from the furnace by flotation in the heating gases, and sepg. the ash from the gases after leaving the furnace.

Machine for refining paper pulp. Joseph E. Bond. Can. 384,500, Oct. 10, 1939. Structural details.

Semipulp from straw. Umberto Pomilio (to Pomilio Corp. Ltd.). U. S. 2,178,266, Oct. 31. An arrangement of app. is described, and a continuous process for the manuf. of semipulp from straw which consists in mixing the straw with an alkali soln. of 1% strength and in proportions of 1 part of straw to 3 parts of the soln., traversing the mixt. through a reaction tower raised to a temp. between 75° and 100° at such a rate that the material remains in the tower from 1 to 4 hrs., transferring the material to a vessel where it is washed with water, dewatering the material and introducing it with Cl dild. with air in proportions of 0.5 to 1 part by vol. of air to 1 part by vol. of Cl and in quantities such that there are 4 to 5 parts of Cl introduced to 100 parts of straw, traversing the material at such a rate that it remains in the reaction vessel 0.5–3 hrs., immersing the material, immediately after leaving the last vessel, in a cold water bath, transferring the material from the bath to another vessel and treating it with an alkali soln. of a strength of 0.1% and in quantities from 5 to 20 parts of soln. to 1 part of the vegetable material.

Recovery of lime sludge such as that from pulping wood. Herman L. Joachim. U. S. 2,178,586, Nov. 7. An arrangement of app. is described, and a process involving CaO production by calcining a wet $CaCO_3$ sludge contg. about 50% water, which involves adding about 10% of CaO to the wet sludge, to effect bulking and preheating by hydration of the CaO by the wet sludge.

Nitration of pulp sheets. Milton O. Schur (to Brown Co.). Can. 384,858, Oct. 31, 1939. Wood pulp for esterification is formed into lengths by chipping from a sheet of felted wood pulp, the lengths being thinner than the sheet from which they are chipped.

Paper. Joseph E. Plumstead (to Raffold Process Corp.). U. S. 2,178,606, Nov. 7. A process for the manuf. of paper having a carbonate filler such as $CaCO_3$ involves causing Cu sulfate, chloride, nitrate or acetate to react with a carbonate such as $CaCO_3$ and $MgCO_3$ in the presence of water and mixing the resulting product with fibrous material.

Paper. Kenneth W. Britt (to Scott Paper Co.). Can. 385,773, Dec. 19, 1939. The wet strength of paper is increased without materially affecting the normal physical characteristics of the sheet by introducing into the sheet in aq. soln. a synthetic resin in amt. not more than 5% by wt. of the fibers, drying the sheet at low temp. prior to conversion of the resin to the insol. state to a point where any residual liquid is confined substantially to the cellulosic structure of the fibers. Cf. *C. A.* **33**, 7567[1].

Self-cleaning screen plate for papermaking machine. Henry W. Downs, Jr. (to Union Screen Plate Co. of Canada, Ltd.). Can. 385,019, Nov. 7, 1939. Structural details.

Stock regulator for paper machines. Ernest Poirier. Can. 384,658, Oct. 17, 1939. A stream of paper stock is continuously flowed through a container under substantially const. head with resistance to flow opposed so that the stock level will drop with a rise in consistency and rise with a decrease in consistency, dilg. water is mixed with the stream of stock at a point immediately preceding the inlet to the container, and the hydrostatic head of stock in the container is caused to control the vol. of dilg. water added.

Screening mechanism for paper stock. Charles J. Lindequist (to Bird Machine Co.). Can. 385,314, Nov. 28, 1939. Structural details.

Stock-treating member for paper-stock machines. Harold D. Stuck (to John W. Bolton & Sons, Inc.). Can. 384,853, Oct. 31, 1939. The stock-treating member in a beater or a Jordan engine consists of a ferrous body with recesses in the upper parts of its front and back faces filled with a layer of nonferrous, acid-resisting metal hot-welded and compacted with the body to form an integral bar.

Drier felt for paper machines. William A. Barrell (to Lawrence Duck Co.). Can. 384,295, Sept. 26, 1939. Structural details.

Fourdrinier machine. Joseph H. Castonguay. Can. 384,361, Oct. 3, 1939. The delivery of stock onto the forming wire is controlled by directing compressed air against the stream of stock leaving the slice orifice to cause the stream to strike the wire at a tangent. An app. is described.

Steam-heated drier drums for use in paper manufacture, etc. Earl E. Berry and Lloyd Hornbostel (to Beloit Iron Works). U. S. 2,173,225, Sept. 19. Various structural and operative details involving cooling of the drum bearings by circulation of air.

Testing the folding endurance of paper and like materials. James d'A. Clark. U. S. 2,179,116, Nov. 7. App. is described, and a method of testing the folding endurance of a strip of material which consists in folding it double about a line across its width; squeezing the strip together at the folded edge; unfolding the strip and subjecting its ends to a predetermined tension, then folding the strip double in the reverse way to the previous fold about the same line, reapplying the squeezing pressure; unfolding the strip, reapplying the tension and continuing these steps successively until the strip breaks and recording the number of double folds so made before fracture.

24—EXPLOSIVES AND EXPLOSIONS

C. G. STORM

Recent developments in explosives. C. L. Barker. *Mines Mag.* (Colo. School of Mines) **29**, 611–12, 628, 632 (1939). Leopold Scheflan

Drying of Powder B. Influence of the surface film. R. Dalbert. *Mém. poudres* **29**, 69–75(1939).—Powders dried at 60 and 80° were removed at intervals of 14, 24, 48 and 72 hrs., the surface was filed off to a depth of 0.3–0.4 mm. and heating continued to det. the ratio of the rate of drying before and after scraping. Results showed that there was a marked difference in compn. of the internal and surface solvent. Et_2O does not diffuse through the grain or the surface film as rapidly as EtOH and is held back. H_2O is also held back in the residual EtOH. A. J. Phillips

Distribution of solvent through Powder B. H. Lacape and Ficheroulle. *Mém. poudres* **29**, 76–84(1939).—Three successively increasing thicknesses were removed from the periphery and ends of cylindrical grains of powder and the samples were exposed to various conditions of soaking and drying and tested for coeff. of elimination (loss of weight on heating for 4 hrs. at 108.5°) and coeff. of emission (loss of wt. after heating for 16 addnl. hrs. at 108.5°). The coeff. of elimination was highest for the central portion of the cylinders and it is indicated that there is less solvent in the external layer than in the center of the powder and that the external layers part with solvent less readily than the central portion. A. J. Phillips

Residual solvent of Powder B. H. Lacape and Ficheroulle. *Mém. poudres* **29**, 85–94(1939).—Powders contg. 1.15% of initial solvent of varying proportions of EtOH and Et_2O were dried at 45° in air of humidities varying from 0.4 to 0.9. Neither the hygroscopic condition of the air nor the compn. of the initial solvent influenced the rate of drying. Varying hygroscopicity had no influence on the compn. of the residual solvent, nor was evapn. retarded when drying was carried out in an atm. of EtOH. A. J. Phillips

Notes on the elimination of solvent from Powder B. L. Solier. *Mém. poudres* **29**, 49–68(1939).—Soaking of powders in satd. $CaCl_2$, C_6H_6, $LiCl_2$ and ligroin gave in the first two cases very translucent powders but in all cases the coeff. of emission was high owing to surface hardening of the powder by too rapid elimination of solvent. To reduce this effect, samples of BG_4 powder were soaked for 1–12 days in EtOH (80°, 60°, 40°, 20°) and then for 5, 12 and 20 days in H_2O at 30°. It was found that the coeff. of emission was not an accurate index of the residual solvent in the powder and the loss of weight in drying was due chiefly to EtOH. The heat test at 108.5° varied proportionally with the amt. of residual solvent. The percentage of residual solvent increases with decrease in the strength of alc., while the stronger the alc., the greater the opacity and the lower the stability. Steeping in H_2O without previous EtOH treatment showed poor elimination of Et_2O. Much better results with respect to coeff. of emission and stability were secured on high volatile powders when 1–10% Et_2O was added to the EtOH, followed by steeping in pure H_2O. Steeping in EtOH at 60° produced as rapid results as MeOH at 30°. Good results were secured with powders contg. centralite, while powders contg. diphenylamine turned blue. Soaking in hot H_2O resulted in a new hardening of the surface with retention of volatile solvent. A. J. Phillips

Gelatinization of nitrocellulose by mineral acid esters. L. Medard. *Mém. poudres* **29**, 10–11(1939).—Me_3BO_3, $PrNO_3$, $BuNO_3$ and $PrNO_3$ have no gelatinizing action on nitrocellulose. Me_2SO_4 and 80–20 $EtNO_3$-EtOH gelatinize collodion and pyrocotton but guncotton is incompletely affected. Nitroglycerin acts slowly in the cold but at 100° there was complete gelatinization in 4 hrs. Me_3PO_4 and Me_2SO_3 gelatinize the 3 different cottons, rapidly and completely. A. J. Phillips

Raman-effect investigations on oleums and sulfonitric acid mixtures. J. Chédin. *Mém. poudres* **28**, 7–42(1938).—From studies of individual constituents and mixts. of HNO_3, H_2SO_4, H_2O, P_2O_5 and N_2O_5, it is concluded that the amt. of HNO_3 in sulfonitric acid mixts. is the factor which dets. the degree of nitration of both cotton and toluene. Cf. Berl, Andress and Escales, *C. A.* **33**, 9069[4]. A. J. Phillips

Explosibility of aluminum powder-silica dust clouds. Ralph B. Mason and Cyril S. Taylor. *Ind. Eng. Chem.* **32**, 67–8(1940).—In connection with the use of Al powder as an agent for the prevention of silicosis (*C. A.* **31**, 6369[5]), the effect of silica dust on the explosibility of SiO_2-Al dust clouds in air was studied. The method of test and fineness of Al were the same as in a previous study of Al dust (*C. A.* **31**, 5582[2]). When the SiO_2 content was twice the concn. of the Al, no explosion resulted. The effect is similar to that of rock dust in preventing coal dust explosions. C. G. Storm

The prevention of anesthetic explosions. Warren P. Morrill. *Bull. Am. Assoc. Nurse Anesthetists* **7**, 308–9 (1939).—The causes for 102 fires and explosions with

gaseous anesthetics are analyzed and practical suggestions given for preventing these in the operating room. J. Pinchack

The proper control and best methods of venting dust explosions in industrial plants. Hylton R. Brown. *Fire Eng.* **92**, 534–7(1939); cf. *C. A.* **33**, 8655.—Observations made at industrial plants in the U. S. after dust explosions have indicated that it is impractical to build walls strong enough to withstand the pressures produced. The losses from dust explosions are heavy even in modern, well-equipped and efficiently operated industrial plants. Methods of preventing such explosions are described. Tables show the explosion pressure necessary to break different grades of glass. The Am. Standard safety code for the prevention of dust explosions in industry is given and the need for further studies is pointed out. L. S

Two illuminating-gas explosions. Holsten. *Feuerschutz* **19**, 135–9(1939).—The causes of gas explosions in an apartment house and in a factory building are discussed in detail and government regulations for preventing similar accidents are recommended. Leopold Scheflan

Cooling effect of the walls (of a closed bomb) in explosion of mixtures of (colloidal) powders. H. Muraour. *Mém. artillerie franç.* **17**, 835–7(1938); cf. *Ibid.* 381 (1930).—The area under the pressure-time curve, $\int p\,dt$, for thick powders of given compn. is independent of total time of combustion. For a mixt. of different-size grains this area is characteristic of the slower burning (thicker) granulation, but the quickness and temp. of explosion tend to characterize the faster granulation. Thus $\int p\,dt$ is proportional to the total no. of mol. impacts. But loss of heat to the walls of the bomb depends not only on no. of mol. impacts but also on the time factor. Various mixts. were fired in bombs of different sizes and surface areas, to study the relation between max. pressure and the ratio of surface to bomb vol. (S/V). The slopes of the resulting curves for the various mixts. differ only slightly—except that one curve (100% fast powder) has much less slope than the others. Here the shortened time minimizes the loss of heat to the walls. B. E. Anderson

The combustibility and smoldering property of artificial leather and shoe tip fabrics made from nitrocellulose. L. Metz and H. Hauske. *Feuerschutz* **19**, 120–3, 132–5 (1939).—The results of lab. and large-scale tests are described, the fire and explosion hazards are discussed and German government regulations on manufg. operations are given. Leopold Scheflan

How fires start and how they burn. David J. Price. *Fire Eng.* **93**, 8–11(1940).—A discussion of the principles of combustion and hazards from CO. Leopold Scheflan

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pH and stability of colloidal powders (Rouvillois) 2. Lecture demonstrations [on fires, extinguishing of fire and on spontaneous combustion] (Greenwood) 2.

Explosives. Willard de C. Crater (to Hercules Powder Co.). U. S. 2,179,323, Nov. 7. By the nitration of a mixt. of a carbohydrate such as sugar, glycerol and α-methyl glycerol, an explosive is produced.

Explosives. Joseph Simon (50% to Daniel Hewitt). U. S. 2,179,434, Nov. 7. An incompletely charred cotton treated with HNO_3 and H_2SO_4 to effect nitration is used with other materials such as KNO_3, $NaNO_3$ and S to form explosives.

Explosive. Harrison H. Holmes (to E. I. du Pont de Nemours & Co.). Can. 384,570, Oct. 10, 1939. A deflagrating explosive in pellet form consists of a mixt. of 15–45% NH_4NO_3 with black powder and at least one finely divided metal, e. g., Al, capable of undergoing rapid combustion at temps. normally occurring during the combustion of black powder.

Smokeless powder. Ellsworth S. Goodyear (to Hercules Powder Co.). U. S. 2,179,330, Nov. 7. A method of prepn. of progressive-burning, double-base smokeless powder, producing breech pressures when fired at sub-zero temps. which are not substantially greater than those produced when fired at ordinary temps., involves coating double-base smokeless powder grains at a temp. less than about 55° (suitably about 10–50°) with an admixt. of a nonvolatile, nonexplosive org. material such as butyl-acetyl ricinoleate which is a nonsolvent for the nitrocellulose but compatible therewith, and a solvent for the nitrocellulose, such as ethyl *o*-benzoylbenzoate, and rosin. Cf. *C. A.* **33**, 4040[4].

Progressive-burning smokeless powder. Elton R. Allison (to Hercules Powder Co.). U. S. 2,179,312, Nov. 7. Smokeless powder grains are coated with a lower alkyl ester, such as the methyl ester, of *o*-benzoylbenzoic acid m. 35–110°. U. S. 2,179,313 relates to the like use of coatings of similar m. p. range and comprising phenyl benzoate or other aryl ester of benzoic acid, or of a lower fatty acid such as β-naphthyl acetate. U. S. 2,179,314 relates to like use of coumarin as a coating. U. S. 2,179,315 relates to coatings of progressive-burning powder comprising a petroleum hydrocarbon-insol. resin derived from pine wood.

Match composition. János Pfeiffer and Gyula Büti. Hung. 122,094, Nov. 15, 1939. Ferrous lactate and $FeSO_4$, are dissolved in water, filtered, cooled and $KClO_3$ is added. Dextrose charred by heating to 150–200° added to the soln. Finally the mixt. is made up to a pulp with glue and starch.

Treating aluminum foil sheets for photoflash lamps. Harry W. Highriter (to Westinghouse Elec. & Mfg. Co.). U. S. 2,177,108, Oct. 24. Uniformity of the rate of combustion is improved by heating the foil to 150–500° for about an hr. or less (the time varying in inverse relation to the temp.).

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The use of semiwool metachrome dyes. Richard Kahl. *Monatschr. Textil-Ind.* **54**, 234–6(1939).—Chem. and mech. treatments are discussed in detail and four samples of dyed fabrics are shown. Leopold Scheflan

Black dye of the Navajos. Daniel T. O'Connell. *Science* **90**, 272(1939).—Carnotite is roasted in a pan over an open fire until its color changes from yellow to black. In a similar manner the pitch from pinyon trees (stunted pines) is heated until it becomes brittle and breaks into a black powder. The 2 powders are mixed and stirred into a soln. formed by boiling the entire plant of the squawberry bush (*Rhus trilobata*) in H_2O until the liquid assumes the color of tea. In a Navajo rug black-dyed wool was used in combination with wool colored with dyes prepd. from the roots of various plants. L. Wilson Greene

Use of alginic acid in the manufacture of printing colors. V. I. Butin and V. V. Tavrovskaya. *Khlopchato-Bumashnaya Prom.* **1939**, No. 6, 48–9.—Expts. have shown that alginic acid can be used partly or completely as a substitute for gum and tragacanth in the prepn. of printing colors. The acid can also be used partly as a substitute for starch except in cases where a color of special density is desired. The characteristics of various colors prepd. with alginic acid are described. B. Z. Kamich

Matching colors. C. H. S. Tupholme. *Textile J. Australia* **14**, 173–4(1939).—A description of the use of a color comparator for the measurement of colors in the textile industry. Leopold Scheflan

Scientific management and the dyehouse. John P. Redston. *Can. Textile J.* **56**, No. 22, 33–5(1939). Leopold Scheflan

Temperature control in the dyehouse. Frank S. Ward. *Can. Textile J.* **56**, No. 24, 39–42(1939).—An illustrated discussion of the importance of controlling related processes and applications in woolen and worsted manuf. Leopold Scheflan

The protection of the textile fiber during dyeing and dye stripping. W. Pflumm. *Spinner u. Weber* 57, No. 43, 70, 72(1939).—A discussion of appropriate chem. treatments. Leopold Scheflan

The dyeing of wool and of a mixture of wool and staple rayon with Naphthol AS dyes. H. Rath and P. Kubitzky. *Klepzig's Textil-Z.* 42, 632–4(1939).—To decrease the hazard of alk. damage during dyeing, an attempt was made to increase the water soly. of Naphthol AS by introducing a hydroxymethyl group into the α-position next to the β-OH. If the dyeing conditions are observed properly this deriv. is absorbed evenly by the fiber and reacts with diazotized bases and dye salts. The effect produced with wool is usually more yellowish than that obtained with staple rayon. The resistance to scouring of the dyed textile is not very high. Leopold Scheflan

The vat dyeing of wool. Frische. *Deut. Wollen-Gewerbe* 71, 1234–6(1939).—A discussion of chem. and mech. treatments. Leopold Scheflan

The protection of wool during redyeing. W. Pflumm. *Klepzig's Textil-Z.* 42, 684–5(1939).—The removal of dyeings is discussed. Good protective agents are proteins related to those in wool (e. g., bone glue), protein degradation products, sulfite liquors of the type used in mordant treatments and Cr dyeings, and "Modinal." The latter product has good leveling and reviving properties and improves the phys. qualities of wool. Three photomicrographs are shown. Leopold Scheflan

Dyeing tropical suitings. N. E. Scafe. *Textile J. Australia* 14, 180(1939).—In many cases fading arises from the fact that unsuitable tinting colors are used for sightening purposes and since they are not removed during the processing of the cloth, a residue of fugitive color, which remains incorporated in the dyed shade, vitiates its fastness. The suitability of any form of coloring matter for tinting sightening yarns depends primarily on the ease of its removal from the cloth during the ordinary processes of dyeing and finishing. This removal may be brought about when the coloring matter (1) is simply washed out of the cloth by friction during the scouring of the pieces, (2) is destroyed or decolorized by the alky. of the scouring bath or (3) is partly removed by being dissolved out of the cloth by the acid used in dyeing. Leopold Scheflan

Certain difficulties in the weaving and dyeing of silk and acetate rayon. W. Weltzien. *Zellwolle, Kunstseide, Seide* 44, 378–81(1939).—A detailed discussion of processing difficulties in strand-dyed Organzin as well as in the degumming of silk in the presence of acetate rayon. Chem. and mech. methods of overcoming these difficulties are described. Leopold Scheflan

Review of the newest and most modern advancements in the dyeing of artificial and mixed fibers. Carl-Heinz Fischer. *Deut. Wollen-Gewerbe* 71, 1205–7(1939). Leopold Scheflan

The practice of the dyeing of staple rayon and staple rayon mixtures. Wilhelm Kegel. *Deut. Textilwirt.* 6, No. 21, 29(1939); cf. *C. A.* 33, 8691.—As it is necessary to know what grade of staple rayon is present in a given product previous to dyeing operations methods for making such detns. are explained. Leopold Scheflan

Dyeing and finishing staple rayon and mixture fabrics. Harold DeWitt Smith. *Can. Textile J.* 57, No. 2, 27–8, 38(1940).—An address. Leopold Scheflan

The cause of irregular and streaky dyeing in the use of naphthol AS on rayon, staple rayon and their mixtures with cotton as well as the prevention of such defects. Frische. *Deut. Wollen-Gewerbe* 71, 1374–5, 1412–13(1939).—The occurrence of unsatisfactory dyeings is due to improper procedures. Correct treatments are discussed in detail. Leopold Scheflan

Dyeings that rub off during wear; cause and prevention. G. Nitschke. *Monatschr. Textil-Ind.* 54, 217–18, 233 (1939).—Poor results are due to faulty treatments or the use of improper dyes or other chemicals. Various remedies are recommended. Leopold Scheflan

Machinery for dyeing cellulose fibers. I. Ormond W. Clark. *Can. Textile J.* 56, No. 26, 35–6(1939); *Textile Bull.* 57, No. 10, 16, 18, 38–9; No, 11, 5–6(1940).—A discussion of the factors influencing the design, selection, operation and maintenance of the machinery used in the application of fast dyes to cellulose fibers as applied to the dyeing of raw stock, skein yarn, package yarn and warp yarn. **II.** *Ibid.* 57, No. 2, 34–7(1940).—A description of features of the modern dye jig, the pad dyeing process, fundamentals of modern padder design, the use of stainless-steel dye tanks, the prevention of creasing of fabric during dyeing and examples of modern continuous dyeing. Leopold Scheflan

Stencils and lacquers in film printing operations. Albert Franken. *Klepzig's Textil-Z.* 42, 589–90(1939).—A description of applications in the textile industry. Leopold Scheflan

The printing of shirting and its development. F. Ettel. *Melliand Textilber.* 20, 811–12(1939).—The widespread success of printing in the manuf. of shirting is based on the use of very fast dyes (Indanthrene fastness) and various mech. devices and processes which are reviewed. J. W. Perry

Progress of the textile industry. A. Foulon. *Deut. Textilwirt.* 6, No. 18, 6, 8(1939).—A review of recent developments in the German textile industry. L. S.

Important chemical developments in the textile industry. E. W. K. Schwarz. *Am. Dyestuff Reptr.* 29, 6–8, 19–21 (1940).—A review emphasizing the important place synthetic fibers have taken in the immediate past. W. H. B.

The refinement of textiles in science and industry. A. Foulon. *Deut. Textilwirt.* 6, No. 20, 16(1939).—A brief survey covering various chem. treatments. L. S.

Nomograms for various plant and laboratory computations. Leonard Shapiro. *Am. Dyestuff Reptr.* 29, 14–18 (1940).—Seven nomograms are given, resp., for: (1) vol. of cylindrical tanks, (2) conversion of yds. per lb. to oz. per sq. yd., (3) correction of yarn or fabric strength to 7.5% regain, (4) correction of fabric strength to 7.5% regain, (5) interconversion of yarn nos., (6) conversion of yarn nos. to the denier system and (7) interconversion of d. scales. W. H. Boynton

The new fibers. F. Bonnet. *Can. Textile J.* 56, No. 24, 43–5(1939).—A survey of recent developments in the manuf. of strong rayon, staple fiber, casein, nylon and vinyon in the textile field. Leopold Scheflan

The chemical technology of the retting of jute. Bernhard Kneer. *Klepzig's Textil-Z.* 42, 643–6(1939).—A detailed description of chem. and mech. com. treatments. The retting bath contains usually mineral oil 10–12%, train oil 6–8%, soap 0.6–0.8%, soda 0.15% and water 79–82%. Leopold Scheflan

A simple scheme for the examination of textile fibers in finishing plants. W. Schönberger. *Klepzig's Textil-Z.* 42, 751–4(1939).—For the alk. plumbite test, heat 5 cc. of 10% Pb acetate soln. with 10 cc. of 5% NaOH until the mixt. is clear and dil. with distd. water to 150 cc.; place the sample for no more than 5 min. in the reagent (temp. 80–90°) and rinse with dil. NaOH, distd. water, dil. AcOH and again with water. For the Neocarmin W test, use the com. product manufd. by Felix Sager & Dr. Gossler G. m. b. H., Heidelberg; immerse the sample for 3–5 min. and rinse with water, very dil. NH_3 and again with water. With Neocarmin B of Felix Sager & Dr. Gossler G. m. b. H., dye cold for 10 min. and rinse thoroughly with water. With 0.2 g. Alizarin Saphirol B and 1 cc. concd. H_2SO_4 per l., dye in boiling soln. for 2 min. and rinse with water. With 0.2 g. Alizarin Saphirol B and 10 cc. concd. NH_4OH per l., dye in boiling soln. for 2 min. and rinse with water. For Millon's test dissolve 1 cc. Hg in 9 cc. HNO_3 (d. 1.5) and add 10 cc. of water; pour the reagent over the original sample and observe sample and soln. 1–2 hrs. later. In a soln. of 10 g. $CuSO_4$ per 100 cc. water, immerse the sample for 10 min. and rinse thoroughly with running water. In 10 g. of $K_4Fe(CN)_6$ per 100 cc. water, immerse the sample (pretreated with $CuSO_4$ soln. and rinsed with water) for 10 min. (*A*) On treatment with alk. plumbite soln. white or light brown shows wool absent; light brown indicates casein fiber or insufficiently desulfured viscose rayon. Use original samples for subsequent treatments as

given under *B* and *C*. Black or brownish black and white or light brown shows that wool and other fibers are present. Use only samples that had been pretreated with the alk. plumbite soln. for subsequent treatments as given under *B* and *C*. Black or brownish black shows pure wool. (*B*) On treatment with Neocarmin W, pure yellow shows casein fiber, yellow tinged with green shows acetate rayon, antique gold shows degummed natural silk, greenish black shows natural silk (not degummed), yellowish olive, greenish olive and green show rayon or staple rayon that had been crease-proofed with urea-HCHO, absence of dyeing shows artificial resin fibers, polystyrene or polyvinyl chloride fibers, blue and blue-violet show Cu (Bemberg) rayon, Lanusa, Schwarza staple rayon, cotton, linen or ramie ((*a*) treatment of original samples with Neocarmin B giving light reddish violet shows cotton, dirty, deep reddish violet shows hemp, clear deep violet shows ramie, deep blue to violet-blue shows linen, Cu (Bemberg) rayon, Lanusa, or Schwarza. Strength of the material when wet indicates linen; (*b*) treatment of fresh samples with $CuSO_4$, $K_4Fe(CN)_6$ giving colorless to faintly pink shows cotton, Cu (Bemberg) rayon, Lanusa or Schwarza, red to deep red shows ramie, linen, hemp), violet or red-violet with Neocarmin B indicates viscose rayon, staple rayon or acid-dyed animalized staple rayon of the viscose type, yellowish olive or dirty yellow indicates casein fiber, yellowish green shows acetate rayon, brown to violet-brown shows natural silk, degummed or not degummed. (*C*) On treatment of original samples with Alizarin Saphirol B and comparison with wool and cotton as indicators, little or no dyeing in ammoniacal or acid soln. shows pure cellulose fibers, more distinct dyeing in acid soln. than in alk. soln. shows animalized staple rayons, Cisalfa (dyed very much less than wool), Fibramin and Artilana (dyed somewhat less than wool) and Vistralan (dyed deeper than wool). (*D*) On treatment of original samples with Millon's reagent, a soln. colorless to faintly yellow and fiber clear pink in 1 min. show Cisalfa, soln. colorless to faintly yellow and fiber clear red in 1-2 min. show Fibramin, soln. reddish orange in 20 min., becoming reddish on standing, and fiber turning slowly brown to brownish red show Artilana, soln. and fiber turning rapidly deep yellow show Vistralan. (Special test for Vistralan: Treat with HNO_3 (d. 1.39) and water (1.1); fiber becomes green in 2 hrs.). Addnl. confirmatory tests are suggested. L. S.

The alkali-solubility of viscose fibers in relation to stretching. P. Eckert, H. Riedel and E. Eder. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 275–7(1939).—The soly. of the fibers in 10% NaOH by wt. decreases with increasing pre-ripeness (alkali cellulose) and increasing after-ripeness (viscose) and stretching. The strength is decreased by prolonged pre- and after-ripeness and is increased by suitable stretching. These relationships are the reverse for elongation. Leopold Scheflan

A simple, rapid method for the quantitative separation of artificial hydrocellulose fibers and native cellulose fibers. Karl Schwertassek. *Melliand Textilber.* **20**, 797–800 (1939).—See *C. A.* **34**, 1171[2]. J. W. Perry

The ratio acid fiber. Carl-Heinz Fischer. *Deut. Wollen-Gewerbe* **71**, 1270–1, 1294–6(1939).—The reaction mechanism occurring during acid treatments of wool and staple-rayon fibers is discussed. During the treatment of a mixt. of the 2 fibers, a certain portion of the acid is absorbed by the wool; this lessens the hazard to the staple rayon constituent. However, there is no definite safe ratio between acid and mixed fibers. In all cases the amt. of the wool constituent is the decisive factor; the abs. amt. of acid to be used in dyeing operations and the latter increases with increasing wool concn. in the mixt. For pure staple rayon there is likewise no definite fixed safe ratio between acid and textile and as long as any acid remains in this textile it may cause damage; this is also true for the staple-rayon constituent in mixts. It is concluded that after completed refinement all woolen goods contg. staple rayon must be freed from residual acids so that the dyed goods, after wetting, show no pH values below 7.0. Leopold Scheflan

The importance of iron soaps for the autoxidation of fatty acids on the (textile) fiber. Kehren. *Melliand Textilber.* **20**, 807–11(1939); cf. *C. A.* **33**, 6058[6], 7118[3].—Expts. with a Mackey tester operated at various temps. from 55° to 89° showed that Fe soaps catalyze the oxidation of oleins free from highly unsatd. fatty components only at temps. above 85°. Only slight temp. rise was observed within shoddy samples impregnated with such oleins contg. Fe soaps and stored in a thermostat kept at 50–52°. Evidently dangers due to the mere presence of Fe soaps in oleins not contg. highly unsatd. components has been greatly overestd. J. W. Perry

Tensile strength of yarns. P. Larose. *Can. Textile J.* **56**, No. 23, 31–3; No. 25, 34–5, 44(1939); cf. *C. A.* **33**, 6055[9].—A discussion of the utilization of fiber strength, friction related to strength, fiber length and diam., effect of increasing twist, increased strength through doubling, irregularity of fiber qualities and distribution, reduction of strength by irregularity of twist and factors which enter in the detn. of fiber strength. Leopold Scheflan

Twist determination in single yarns. H. R. Bellinson. *Textile Research* **10**, 120–6(1940).—Twist in single yarns is detd. by untwisting and retwisting to the same twist in the opposite direction. The instrument used with a twist counter, and indicating the end point by measuring length, consists of a pendulum operating in conjunction with a photronic cell with the end point signalized by a buzzer. W. H. Boynton

Textile fiber atlas. I. Wool. Werner Von Bergen. *Rayon Textile Monthly* **21**, 17–20(1940).—This, the 1st installment of a series covering the various textile fibers, outlines the structure and properties of wool. Several photomicrographs of different qualities and parts of the wool fiber are included. W. H. Boynton

Electrophoretic studies of wool. Arnold M. Sookne and Milton Harris. *J. Research Natl. Bur. Standards* **23**, 471–7(1939)(Research Paper No. 1245).—See *C. A.* **33**, 9654[2]. Milton Harris

The chlorination of wool. Hans J. Henk. *Deut. Wollen-Gewerbe* **71**, 1129, 1132(1939).—The chem. reactions taking place during the chlorination are reviewed and disadvantages of chlorinating with HClO are discussed. Bromination is less harmful to wool than chlorination but is not generally applicable, owing to the cost of Br. The bromoamines formed during bromination are more stable than the corresponding Cl compds. Brominated wool is softer than chlorinated wool and its soly. in dil. acids, alkalies and salt solns. is lower. Shrinking is minimized to the same extent with both halogens. The use of halogens can be avoided entirely by pptn. of $Al(OH)_3$, TiO_2 or gelatin tannate in the fiber or by treatment with HCHO, CH_3CHO or acrolein. However, these treatments have not yet been developed satisfactorily for use on a com. scale. L. S.

Carbonizing wool piece goods. Robert R. Sleeper. *Can. Textile J.* **56**, No. 26, 39–40(1939).—A discussion of the H_2SO_4, $AlCl_3$ and gaseous HCl processes. L. S.

Changes in wool-scouring practice. H. Robinson. *Textile Recorder* **57**, 25–6(Dec., 1939).—A tech. description of the mech. and phys. treatments involved and of the types and strengths of the scouring solns. used. W. H. Boynton

The use of fat solvents in the washing of wool. A. Foulon. *Monatschr. Textil-Ind.* **54**, 247–8(1939); cf. *C. A.* **33**, 9654[6].—The best com. product recommended by F. for this purpose is Sulfinol L. Its use is discussed in detail. Leopold Scheflan

The moisture regain of acetylated silk fibroin. Edward Carr. *Textile Research* **10**, 126–30(1940).—Moisture regain measurements made, at 25° and 79.3% relative humidity, on non-acetylated and on acetylated fibroin show that the equil. moisture content of acetylated fibroin is slightly lower than that of non-acetylated fibroin and varies with the degree of acetylation. In the case of fibers acetylated by means of Ac_2O the decrease in moisture content is not attributable to the action of liberated AcOH. W. H. Boynton

Fermentation degumming of waste silk. V. Useful thermophilic bacteria for fermentation degumming. Hideo Katagiri and Tosio Nakahama. *J. Agr. Chem. Soc.*

Japan **15**, 1042-4; *Bull. Agr. Chem. Soc. Japan* **15**, 144 (in English) (1939).—Twelve strains of thermophilic bacteria were isolated from the degumming liquid at 55°. An aerobic bacillus having a strong degumming action for raw silk was discovered. It may belong to *Bacillus robustus* Blau. Degummase was easily dissolved out into the culture soln. after fermentation for 5 days. Cf. *C. A.* **32**, 7272⁴. Y. K.

Survey of leading American rayon staple fibers. H. R. Mauersberger. *Rayon Textile Monthly* **21**, 29–30(1940). —American rayon staple fibers are tabulated by companies. W. H. Boynton

Supplement to the article: Review of modern refinement of rayon and staple rayon. Max Peter. *Klepzig's Textil-Z.* **42**, 651(1939); cf. *C. A.* **34**, 1182⁹. L. S.

Determination of viscose rayon. R. W. McKay. *Am. Dyestuff Reptr.* **29**, 25–8(1940).—The amt. of viscose rayon in mixts. of viscose with cotton, wool or silk is detd. by a method depending on the soly. of viscose rayon in cold NaOH solns. Exptl. data show the optimum conditions for this analysis. The fabric or yarn cut into pieces about 0.2 cm. in length and weighing approx. 0.2 g. is placed in large test tubes. Into each of a no. of test tubes 50 cc. of 2 *N* NaOH is measured. All the tubes are cooled to −3°. After 0.5 hr. the cold alkali is poured into the tubes contg. the fibers and maintained at −3° for 1 hr.; the tubes are shaken every 10 min. The mixt. is then filtered through a glass filtering crucible with suction, and rapidly rinsed with 25 cc. of 2 *N* NaOH (at −3°) followed by 50 cc. of distd. water. The residue is further rinsed with 200 cc. of 0.2 *N* HCl. The rate of filtering is slowed down by reducing the suction, to allow the acid to be in contact with the fibers for 15 min. The residue is then washed free from chlorides and dried to const. wt. at 105°. Cotton, considerably degraded by chem. attack, becomes more sol. in cold NaOH solns. Several curves and tables are included and their accuracy is indicated as within 1% of the wt. of any of the constituents of the mixt. W. H. Boynton

Processing filament rayon yarns. W. Tabor Robinson. *Textile Bull.* **57**, No. 5, 16–17, 38(1939); cf. *C. A.* **33**, 9655². Leopold Scheflan

The collaboration of the machine industry in the growth and development of the industry of the manufacture of staple rayon. E. A. Anke. *Zellwolle, Kunstseide, Seide* **44**, 383–4(1939).—A survey of old and new industrial processes and installations. A schematic drawing is shown for the continuous mercerization of cellulose on a com. scale. Leopold Scheflan

A testing device for the determination of the water absorption of loose staple rayon. H. Bundesmann. *Deut. Wollen-Gewerbe* **71**, 1208–10(1939); cf. *C. A.* **33**, 4042⁷.— An illustrated discussion. Leopold Scheflan

Printed fabrics from staple rayon. R. Hunlich. *Monatschr. Textil-Ind.* **54**, 208–9(1939).—A brief discussion. Varicolored samples of four fabrics are shown. L. S.

How should rayon wastes be bleached? K. Liebsch. *Monatschr. Textil-Ind.* **54**, 249–50(1939).—The wastes are first pretreated with Na perborate and Na silicate at 60–70° and then bleached with Ca hypochlorite. The procedure is described in detail. Leopold Scheflan

Water in the production of cotton goods. A. V. Boguslavskiĭ. *Khloprhato-Bumazhnaya Prom*, **1938**, No. 10, 41–5; *Khim. Referat. Zhur.* **2**, No. 4, 109(1939).—The requirements of water used in the various operations of the manuf. of cotton goods are given: its transparency, freedom from sediments and from Fe salts, and permissible limit of suspended substances, hardness, and carbonaceous and nitrogenous substances. The amts. of water required in bleaching, mercerization, dyeing, boiling and filling are given. W. R. Henn

Defects in the sizing of cotton warps and their elimination. Th. Schinkl. *Spinner u. Weber* **57**, No. 43, 41–2 (1939).—Breaking of the threads because of low moisture contents is avoided by the use of synthetic fats; excessively high concn. of the size with subsequent undesirable aftereffects is counterbalanced by the addn. of "Aktivin" and Na perborate. Various other defects are discussed with suitable remedies. Leopold Scheflan

Products of decomposition of hyposulfite and rongalite under conditions of their use in cotton mills. B. V. Ponomarenko and Yu. I. Mirtova. *Khlopchato-Bumazhnaya Prom.* **1939**, No. 1, 37–9.—Decompn. of hyposulfite is accompanied by the evolution of SO_2 and starts at ordinary temp. and increases with rising temp. Rongalite is more stable at ordinary temp. and shows its reducing properties at 70°, giving off volatile products. Upon acidification it gives off H_2S and HCHO, while in alk. soln. it is more stable and decomps. only at high temps. B. Z. K.

Textile agents. C. J. T. Cronshaw. *J. Roy. Soc. Arts* **88**, 135–52(1939).—A review. E. H.

Leveling chemicals and procedures. G. Nitschke. *Deut. Textilwirt.* **6**, No. 17, 11–12, 14(1939).—A discussion of latest developments. 6 references. L. S.

Steaming and crabbing. G. L. Atkinson. *Can. Textile J.* **56**, No. 22, 36–7(1939).—A discussion of selecting goods for special treatment, varying widths and reactions to temp., preventing the "cockling" of piece goods, and faults due to excessive tension. Leopold Scheflan

Practical hints on the manufacture of crepe fabrics. M. Gerards. *Deut. Wollen-Gewerbe* **71**, 1264–5(1939).—Various suggestions on dyeing are given. L. S.

The utilization of Tiolan spun goods for woven textile products. R. Hünlich. *Deut. Textilwirt.* **6**, No. 18, 8, 12(1939); cf. *C. A.* **34**, 1180¹.—A description of chem. and phys. treatments. Various recipes are given in detail. Leopold Scheflan

A new process for increasing the wearability of fabrics. A. Hilbring. *Klepzig's Textil-Z.* **42**, 719–20(1939).—Fabrics which are brittle and lack fats are treated by machine with fats, oil or glycerol. The machine can be regulated so that 100 kg. of the fabric is treated with 200–2000 g. of glycerol, fat or oil. The feel of the goods is improved simultaneously. Leopold Scheflan

Is there any generally applicable assistant for the refining of textiles? W. Pflumm. *Deut. Wollen-Gewerbe* **71**, 1210–12(1939).—A discussion of the uses of the textile assistant Modinal in cleaning and dyeing operations. Leopold Scheflan

Normal finishing or superrefining for fabrics for work clothing. Karl Walter. *Deut. Wollen-Gewerbe* **71**, 1201–5 (1939).—A discussion of pretreatments, dyeing, shrinking, washproofing and finishing. Six samples of dyed fabrics are shown in different stages of finishing. L. S.

Practical hints on the finishing of better fabrics for men's coats. Herberger. *Deut. Wollen-Gewerbe* **71**, 1472–4(1939).—A discussion of chem. and mech. treatments. Leopold Scheflan

Estimation of the quality and wearability of worsted yarn fabrics. M. Dubrau. *Deut. Wollen-Gewerbe* **71**, 1166, 1168, 1170, 1172, 1174–6, 1178, 1180, 1182–4(1939). —An illustrated discussion of methods of measurement. Leopold Scheflan

Surface-active agents; their applications in the wet-processing of textiles. Andrew J. Kelly. *Cotton* (Atlanta) **103**, 51–3, 57(Nov., 1939).—An explanation of the properties of the surface-active agents. Methods of evaluation are outlined. Sulfonated oils or low-titer soaps are the principal bases with pine oil, tetralin, trichloroethylene, ethylene dichloride, certain alcs. and cresols as the more common solvents. *Ibid.* 61–3, 108(Dec., 1939).—"Synthetic surface-active agents" are here referred to as those products which are not simple alkali salts or fatty acids or sulfated fatty acids. Included in this are alkyl naphthalenesulfonic acids, sulfated fatty alcs., sulfated esters of polybasic acids, fatty acid condensation products, sulfated aromatic hydrocarbons, sulfated aliphatic hydrocarbons, quaternary aliphatic hydrocarbons, sulfonium and phosphonium groups, mineral oil sulfonates and combinations and variations. The requirements of a wet processing aid, the textile applications, the need for simpler tests for detergency, etc., are discussed. *Ibid.* **104**, 53–5(Jan., 1940).—Wet-processing for Sanforizing and the newer cation-active finishing agents are discussed. Sanforizing or pre-shrinking requires, along with good

penetration, the ability of the material to be easily re-wet after drying. It must be highly absorbent so that shrinking can be expected rapidly, uniformly and completely. Cationic compds. are strongly adsorbed by textile fibers; they also increase the fastness of certain dyes. Characteristics of "natural" and synthetic agents are listed.
W. H. Boynton

Spots occurring after boiling or alkaline treatments. Asu Vendor. *Monatschr. Textil-Ind.* **54**, 248–9(1939).— Such brown, greasy spots are caused by the pptn. of waxy, fatty, pectin, Fe or Cl ammino compds. as well as ordinary dust following the refinement of cotton. They can be removed by treatment with cold 2–4 °Bé. H_2SO_4. L. S.

Theory and practice of the drying of textiles. Martin Berg. *Spinner u. Weber* **57**, No. 41, 6–8; No. 42, 4, 6; No. 43, 42–6, 48(1939).—Descriptive. L. S.

The filtration of air. Otto Th. Koritnig. *Zellwolle u. Deut. Kunstseiden-Ztg.* **5**, 277–9(1939).— Air-conditioning treatments and devices for textile plants are described.
Leopold Scheflan

The supervision of air humidity and temperature in textile plants. Werner Wilk. *Deut. Wollen-Gewerbe* **71**, 1212–14(1939).—An illustrated discussion of various devices. Leopold Scheflan

Preservatives in the textile industry. Fritz Ohl. *Monatsh. Seide Kunstseide Zellwolle* **44**, 231–4(1939).— A discussion of the application and detn. of the efficiency of chlorothymol, chlorocresol and phenol salts, salts of *N*-chlorotoluenesulfonamide, halogenated alkyl phenols, chloroxylenol, hexylresorcinol, Me *p*-hydroxybenzoate, etc.
Leopold Scheflan

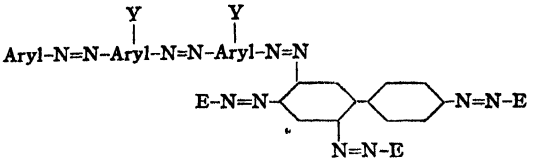
Textile mildews, their prevention and control. Eric Hardy. *Can. Textile J.* **56**, No. 23, 34(1939).—The occurrence of mildew in yarn or cloth is encouraged by farinaceous sizes, excessive alk. treatment, strong chlorination and nitrogenous decompn. of wool under harsh treatment. Cellulose provides nutrient for certain fungi, while silk gum and raw cotton contain enough albumin for others. An *Aspergillus* mold can grow in an acid condition after wool has been dyed. Phenols and dibromophenol destroy molds but their odors are irritating. Formalin is good except on gelatin sizes. Borax and salicylic acid are useful on all sizes. Hygroscopic $ZnCl_2$ maintains the elasticity of the fiber, but unless it is washed out from the cloth before singeing there may be some tendering of the fabric. Na_2SiF_6 in amts. of 1 part per 400 parts of fabric by wt. provides complete immunization. The nontoxic higher tertiary-alkyl phenol and salicylanilides are improved agents for this purpose. Leopold Scheflan

Scouring action of soap and modern sulfonated textile auxiliaries (Davidsohn, Davidsohn) **13**. Methods of conditioning of water in staple-rayon industry (Castner) **14**. Significance and production of suitable water for use in textile industry (Kehren) **14**. Supervision of water supply [in textile industry] (Boye) **14**. Stereoisomerism of org. dyes and its relation to constitution and properties of reversible polymeric dyes (Scheibe) **10**. Alkyl hydroxy aromatic compds. [intermediates for azo dyes] (U. S. pat. 2,178,571) **13**. Fireproofing cellulose materials [cotton fabrics] (U. S. pat. 2,178,625) **20**. Photographic emulsions on textiles (Dutch pat. 46,703) **5**.

Azo dyes. Fritz Straub and Willi Widmer (to Soc. pour l'ind. chim. à Bâle). U. S. 2,178,054, Oct. 31. From components such as 4-nitro-2-amino-1-phenol-6-sulfonic acid and 5,8-dichloro-1-hydroxynaphthalene and the like, dyes are obtained which dye blue and olive shades when after-chromed and which have the general formula

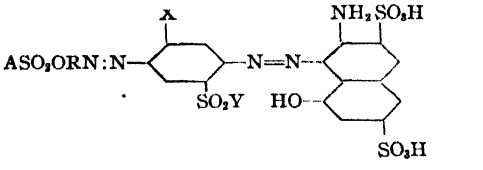
HOC:Cy.Cy:Cx.CH:CN:NROH in which *x* stands for Me or NO_2, one *y* stands for a sulfonic acid group and the other *y* stands for hydrogen, and R stands for a naphthalene radical which carries the OH group in 1-position and the azo group in 2-position and wherein two H atoms are replaced by halogen.

Azo dyes. Henry Jordan and Swanie S. Rossander (to E. I. du Pont de Nemours & Co.). U. S. 2,178,757, Nov. 7. Dyes which dye cotton fast brown shades have the general formula



in which Y is one or more of the group consisting of H, halogen, alkyl, alkoxy, carboxy, and sulfonic acid, the end Aryl has a single nucleus from the class consisting of benzene, naphthalene, biphenyl, and phenylalkylpyrazolone, the middle components have each a single nucleus from the class consisting of benzene, naphthalene, biphenyl and E is an azo dye coupling component having a single nucleus from the class consisting of benzene, naphthalene, biphenyl, phenylalkylpyrazolone and acetoacetanilide and the compd. has at least one water-solubilizing group.

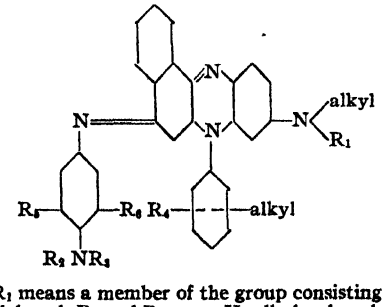
Disazo dyes. Adolf Krebser (to J. R. Geigy A.G.) U. S. 2,179,190, Nov. 7. From components such as *p*-phenylenediamine-*o*-sulfonic acid-azo-2,8-aminonaphthol-3,6-disulfonic acid and *m*-cresol and the like, disazo dyes are produced of the general formula



wherein A represents an aromatic radical of the benzene series, R represents the radical of a phenol coupled in the *p*-position, X represents one member of the group consisting of H, MeO, EtO and Me, and Y is one member of the group consisting of the OH group, the amido, alkylamido and phenylamido group, an alkyl, the benzyl and an aryl radical of the benzene series, said dyes being dark powders, sol. in water with violet to reddish blue color, dyeing animal fibers in an acid bath violet to reddish blue shades of good fastness to light and fulling. Cf. *C. A.* **34**, 1189[8].

Anthraquinone acid wool dyes. David X. Klein (to E. I. du Pont de Nemours & Co.). U. S. 2,179,217, Nov. 7. Dyes giving level blue to greenish blue shades are prepd. from the 1-amino-4-bromo-5- or -6-hydroxy-contg. aliphatic ethers of 2-anthraquinonesulfonic acid by condensation with arylamines such as aniline, *p*-aminoacetanilide, and the like. Several examples with details are given. Cf. *C. A.* **34**, 1193[4].

Dyes of the naphthophenosafranine series. Eugen Huber (to General Aniline Works). U. S. 2,178,793, Nov. 7. Products which dye clear blue shades are produced by sulfonating a dye of the general formula



where R_1 means a member of the group consisting of alkyl and cyclohexyl, R_2 and R_3 mean H, alkyl or hexyl, and R_4, R_5 and R_6 mean H, alkyl, alkoxy or halogen, until a test portion is sol. in aq. NaOAc soln. Cf. *C. A.* **33**, 1511[5].

Dyeing. Casimir J. Munter (to Hall Laboratories, Inc.). Can. 384,996, Nov. 7, 1939. Textiles are treated in a dyeing bath contg. an alkali metal tripolyphosphate.

Dyeing woolen materials with acid dyes. Colver P. Dyer (to Monsanto Chemical Co.). U. S. 2,179,371, Nov. 7. A method of promoting uniform dye impregnation of woolen textile material with the acid dyes involves using in the dyeing bath a condensation product of naphthalenesulfonic acid and CH_2O which is semigelatinous when mixed with 8.4 parts of water per unit wt. of naphthalene in the condensation product and which serves to retard the fixation of the acid dye to the textile material.

Dyeing mixed textile materials. Geo. H. Ellis and Charles F. Topham (to Celanese Corp. of America). U. S. 2,178,744, Nov. 7. A process for the coloration, with azo dyes, of mixed textile materials contg. filaments, yarns or the like of org. derivs. of cellulose such as cellulose acetate and cellulose filaments, yarns or the like such as those of a woven fabric involves impregnating the materials with the diazotizable base component and the coupling component of the dye for the org. deriv. of cellulose and with the diazotizable base component of the dye for the cellulose material, and then effecting diazotization of the diazotizable bases and coupling of the coupling component for the cellulose deriv. dye, and then coupling with a coupling component of the dye for the cellulose constituents.

Warp dyeing beam. Hubert M. Craig. U. S. 2,177,096, Oct. 24. Various structural details.

Apparatus for conditioning fibrous materials, as in treating cotton with atomized oil. Geo. Hill, Arthur G. Hill, Pearce H. Baker, Leon C. Mitchum and Edward A. Harper (to The Texas Co.). U. S. 2,178,539, Nov. 7. Various structural and operative details.

Treatment of artificial filaments, etc. Henry Dreyfus and Robert W. Moncrieff (to Celanese Corp. of America). U. S. 2,178,743, Nov. 7. App. is described, and a process of improving the tenacity, etc., of artificial filaments, foils, films, etc., of materials such as cellulose acetate which comprises stretching them during their travel from one point to another and while they are in actual contact with a liquid medium, such as water or an alc. or acetone soln., which is at a temp. above its b. p. at atm. pressure and is maintained in a closed vessel under a pressure greater than its vapor pressure at the temp. employed by means of a gas such as air.

Apparatus for handling rayon threads or the like, as in drying. Hayden B. Kline and Alden H. Burkholder (to Industrial Rayon Corp.). U. S. 2,178,104, Oct. 31. Various structural, mech. and operative details.

Insolubilizing organic cellulose derivatives. Walter Frey and Heinz Schwalenstöcker (to E. I. du Pont de Nemours & Co.). U. S. 2,170,017, Aug. 22. Threads, films, textiles or pressed masses comprising a sol. cellulose deriv. such as cellulose acetate or benzyl cellulose are treated with an acid halide of an org. acid which is at least dibasic, such as oxalyl chloride or succinyl chloride until the cellulose deriv. is rendered substantially insol. (suitably in CCl_4 or C_6H_6).

Processing of textile material. Charles N. Frey and Stephen Jozsa (to Standard Brands Inc.). Can. 384,728, Oct. 17, 1939. To desize and increase the wettability, textile materials are immersed in a heated bath contg. a diastatic enzyme and a 0.005–0.04% lecithin with a Lintner value of about 3° is prepd., withdrawn and kept hot until the contained starch has digested, and then rinsed and dried.

Treatment of cellulosic textiles. Joseph H. Shipp (to E. I. du Pont de Nemours & Co.). Can. 385,215, Nov. 21, 1939. Cellulosic fabric is immersed at 20° for 30 sec. in a soln. of 20 g. urea in 100 g. of 96% H_2SO_4, removed from the soln., washed with water and then with 3% NH_3 soln., and dried by ironing.

Treatment of rayon. George M. Allen, Herny J. McDermott and John W. Pedlow (to American Viscose Corp.). Can. 384,401, Oct. 3, 1939. Operative and structural details are described of an app. for the liquid treatment of rayon in coil form.

Knit goods of viscose rayon. Manfred Keller (to E. I. du Pont de Nemours & Co.). U. S. 2,178,759, Nov. 7. Circular knit goods such as underwear are formed of high tenacity rayon thread produced from viscose, having a denier of less than 65, a percentage elongation not in excess of 15, and a wet tenacity of at least 1.5 g. per denier, the thread comprising a plurality of fine filaments twisted together with about 6 turns per in.

Impregnation of silk, viscose rayon and cotton. Gyula Garai. Hung. 122,058, Nov. 15, 1939. Threads or fabrics are dried, treated with soaps of Fe, Al, Sb, Sn, etc., resins (e. g., copal) and other aromatic substances, or artificial resins. If artificial resins are used, the goods are aftertreated with CH_2O.

Fabric with an embossed pattern. Ernst Weiss (to Heberlein Patent Corp.). Can. 384,583, Oct. 10, 1939. A reserve is applied to selected areas of a cotton fabric to form a permanent part which will resist strong solns. of NaOH and repeated washings, and the fabric is treated with a soln. of NaOH (28–38°Bé.) under conditions to produce a strong shrinking action on the cotton fiber between the areas.

The bleaching and permanent azuring of tow, or long threads of flax or cotton. I. R. Maes. Belg. 432,640, March 31, 1939. The fibers are held in a stationary position in a vat, and there are forced through it successively: (1) a soln. contg. an oxidizing bleaching agent and a sulfuric ester of a dyestuff in order to obtain simultaneous bleaching and azuring; (2) slightly acidified water; (3) a soln. of Na acetate or carbonate and a reducing agent.

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

Technique of the painting process in the rock-cut temples at Badami. S. Paramasivan. *Proc. Indian Acad. Sci.* **10A**, 145–9(1939).—The paintings on stucco in Cave IV (about 6th or 7th century) are in tempera on a carrier of hard, compact, nonporous sandstone, and show no efflorescence. The ground is a rough plaster 0.4 mm. to 0.6 mm. thick, consisting of fine grains 14 μ to 70 μ in diam., mostly of SiO_2 and Al_2O_3. The fine particles made the use of a fine plaster on top of the rough plaster unnecessary. The plaster was of clay contg. Fe and Ca in small amts. The binder was glue. Pigments identified were yellow ocher, red ocher, C, lime and terre verte.
Wm. E. Trout, Jr.

Chalking of titanium dioxide pigmented exterior finishes. D. H. Dawson and R. D. Nutting. *Ind. Eng. Chem.* **32**, 112–16(1940).—D. and N. report, after a study of the chalking of special TiO_2 pigments (*C. A.* **33**, 4136) in enamel vehicle systems, mainly of the alkyd type, that accelerated cabinet exposures show excellent correlation with Florida and Delaware exposures in rapidly chalking enamel films but poorer correlation in more chalk-resistant films and definitely misleading results with respect to films failing by checking. They emphasize the need for including control panels in every weathering series and the necessity for reporting chalking rates in relative rather than absolute terms, as well as the importance of reporting the time of the year at which normal weathering exposures are started. 2 references.
Henri Marc

Primer, paint; zinc dust-zinc oxide (for galvanized (zinc-coated) or zinc surfaces). *Federal Specification* TT-P-641, Apr. 20, 1939. **Paint; rubber-base (for) cement floors.** *Ibid.* TT-P-91, May 23, 1939. **Varnish; Damar.** *Ibid.* TT-V-61, Apr. 20, 1939. **Varnish, rubbing; cabinet.** *Ibid.* TT-V-86, June 29, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office, 5¢ each.
L. Wilson Greene

Toward a better understanding of dry colors. H. B. Kirkpatrick. *Am. Ink Maker* **17**, No. 9, 47–9, 53(1939). L. Wilson Greene 1

The dry color "big three." Thomas P. Brown. *Am. Ink Maker* **17**, No. 12, 23, 25–6, 43(1939).—B. suggests a new nomenclature for the different classes of Cr yellows, Fe blues and Cr greens based on their printing tones and tints or their depth of color. He advocates a reduction in the no. of color standards. The general processes for the manuf. of these synthetic colors are described, as well as their chem. compn. Henri Marc 2

The measurement of ink consistency. Robert F. Reed. *Am. Ink Maker* **17**, No. 12, 27, 29, 31, 33(1939).—R. describes the "Inkometer," an instrument of the dynamometer type with which the characteristics of the ink film are measured at printing speeds. Thickness of the ink film and its temp. are controlled and readings are taken in units of torque at 3 accurately controlled speeds. Henri Marc 3

The development of the chemistry and technology of driers in recent years. A review of the literature from 1933. Felix Wilborn. *Farben-Ztg.* **44**, 1050–1, 1067–8, 1082–3, 1099–1100(1939).—Over 90 references. J. W. Perry

Preparing stable naphthenate driers. A. Drinberg and A. Parfenova. *Maslobol'no Zhirovoe Delo* **15**, No. 3, 29–32 (1939).—Naphthenate driers, prepd. in the form of acid salts from naphthenic acids refined by distn. with superheated steam, are preferable to the neutral salts because of better soly. and stability. They are readily oil-sol., leaving no insol. residue if gently warmed. As a drier Co naphthenate is superior to the linoleate; it is also paler in color and has lower viscosity. For prepn. of the driers the 2-stage method is recommended for Mn, Co and Ca naphthenates, and the fusion method (120–125°) for Pb naphthenate. Linseed-oil paint films show about the same O absorption and hardness with naphthenate as with linoleate driers. Tabulated data and curves show the ash content and metal content of acid and neutral naphthenates of Mn, Co and Pb; max., optimum and min. drier concn. in paints (same naphthenates); and the rate of drying of paint films, in comparison with Co linoleate as drier. Julian F. Smith 4

Slow increase in tung oil production. W. E. MacKee. *Am. Paint J.* **24**, 14, 16, 18, 20 (Jan. 8, 1940); cf. *C. A.* **34**, 8978. W. H. Boynton 5

The catalysis of stand-oil formation by soluble heavy-metal compounds. Felix Wilborn. *Farben-Ztg.* **44**, 1011 (1939).—Various heavy metal resinates were effective in increasing the extent of viscosity rise observed with linseed oil when heated to 300° for 16 hrs. and then cooled to room temp. The order of decreasing effectiveness of the resinates at 2% concn. was: Th, Pb, Ni, Co, Fe, Ca, Mn, Ce, Cr and U. If the viscosity of the heat-treated oil was measured at 60°, then (*a*) the Pb resinate (I) appeared much more effective than the virtually ineffective Th resinate (II) and (*b*) I was increasingly effective on increasing its concn. from 0.5% to 4%, while II was virtually ineffective at concns. less than 8%. J. W. Perry 6

Some studies in the drying of raw soybean oil films. L. L. Carrick and A. A. Jigger. *Am. Paint J.* **24**, 7–9, 18–19(Jan. 1, 1940).—A study of the effect of drying upon the I no., sapon. no., acid no., thiocyanate no., acetone-insol., Ac no., peroxide no., wt. and combustion analysis of the films. The relation of the age of soybean oil films to the change in wt., to the percentage of O, to percentage of acetone-insol., and peroxide no. are shown in curves and combustion data are given for soybean-oil films from the day of application to 100 days of aging. *Ibid.* 43–6(Jan. 1, 1940).—Data show that between the 10th and the 15th day of drying there is a 100% increase in acetone-insol., between the 15th and 40th day a steady increase, and between the 40th and 100th day it remains const. No definite conclusion can be drawn from the data already collected until the analyses of the volatile products evolved during drying of these films at various stages of drying have been finished. Thirteen references. W. H. Boynton 7 8 9

Tungstate and molybdate toners. Production of phosphotungstic acid, phosphomolybdic acid and mixed complex acid toners by precipitation of basic dyes. Arthur Linz and L. W. Coffer. *Am. Ink Maker* **17**, No. 9, 39–42, 55, 57, 59, 61, 63, 65, 67; No. 10, 29, 31, 33, 35; No. 11, 27, 29, 31, 33, 45(1939); cf. *C. A.* **32**, 5045[3].—Seven toners from each of 10 different dyes were prepd. and tested under as nearly identical conditions as possible, with phosphotungstic (I), phosphomolybdic (II) and phosphotungsto-molybdic acids (III). The latter was employed in the following ratios: 90W-10Mo, 75W-25Mo, 50W-50Mo, 25W-75Mo, and 10W-90Mo. A stock soln. of the dye was prepd. and divided into several equal portions. Each portion was pptd. with a different complex acid. Stock solns. of I and II were adjusted to the same mol. concn. Stock solns. of III were used in the mol. ratios given above. The calcns. upon which the soln. concns. were based, and analytical data for resulting toners, are given in detail. The following properties of the toners were detd.: sp. gr., oil absorption, ease of grinding, rub-out, transparency, tinting strength, resistance to baking, resistance to light (full strength and tints), and bleeding tests (with litho varnish, linseed oil, rosin oil, mineral oil, petrolatum, butyric acid, oleic acid, CH_3COOH, H_2SO_4, soda ash, NaOH, soap, H_2O, denatured alc., lacquer solvent, C_6H_6, mineral spirits, turpentine and hot paraffin). The following dyes were used: Thioflavine TG, Auramine O, Rhodamine 6G, Rhodamine B, methyl violet, malachite green, Brilliant Green, Brilliant Blue 6G (Peacock Blue), methylene blue and Victoria Blue BO. The data on the pptn. of the 70 toners and the properties of each are presented in 20 tables. The research is discussed under the headings: color of the complex acids, complex acid required and cost, filtering of pptd. colors, maintaining pH during pptn., yield, percentage of ash left after ignition of toner, ratio of dye to complex, color and brilliancy, sp. gr., oil absorption, vol. of ink, tinting strength and light fastness. L. Wilson Greene 10

Litho varnishes. Joseph Mattiello. *Am. Ink Maker* **17**, No. 11, 23, 47(1939). L. Wilson Greene 11

How should "synthetic varnishes" be applied? Heinrich Wulf. *Farben-Ztg.* **44**, 1136–7(1939).—Important points in applying alkyd resin varnishes are (1) rapid application as a thin film, (2) proper surface prepn. and (3) use of the right type of thinner depending on conditions. J. W. Perry 12

Making a lacquer for tin cans. N. Rubinskii. *Maslobol'no Zhirovoe Delo* **15**, No. 2, 42(1939).—A satisfactory lacquer for *food* tins was obtained by blending 1 part Albertol resin with 1 part oxidized linseed oil in 2 to 2.2 parts turpentine. Viscosity of the oil (pipet viscometer) was 480–600 sec., and of the lacquer 100–105 sec. (raw linseed oil, 7 sec. in the same viscometer). Two coats on tinplate, baked 25 min. at 180°, gave a finish which was hard to the fingernail test and withstood stamping and other operations to which the tinplate was subjected. The lacquer was transparent, clear and practically free from heavy metals (Pb 0.0027, Cu 0.0032%). A Co drier was used. A test of its utility for food tins showed that the finish retained satisfactory hardness after boiling 2 hrs. in aq. solns. of HOAc (5%), NaCl (3%), tartaric acid (2%) and sugar (60%). Julian F. Smith 13

Nitrocellulose baking lacquers. II. A. Kraus. *Farben-Ztg.* **44**, 1150–1, 1166–7(1939); cf. *C. A.* **32**, 1496[8].—Formulation problems are discussed. The character of the alkyd resin used influences greatly the mech. properties of the final film, with alkyds having a low oil content producing the more brittle, less elastic films. Low viscosity varieties of nitrocellulose are recommended for use in the ratio of 1 part to 4–6 parts of alkyd resin. The baking period at any given temp., e. g., 120°, can be shortened (1) by selecting an alkyd resin having more pronounced drying properties, (2) by using metallic driers and (3) by formulating with limited amts. of non-drying resins, e. g., certain phthalate resins. Gloss can be improved by relatively small amts. of higher-boiling solvents or of plasticizers having solvent power for nitrocellulose. Weathering expts. in progress show that properly formulated films withstand exposure for 2 yrs. without signs of failure. J. W. Perry 14

Developments in lacquers and enamels for industrial finishing during 1939. G. Klinkenstein. *Products Finishing* 4, No. 4, 34–6(1940). Leopold Scheflan

Acid-hardening artificial resin lacquers. A. Greth. *Angew. Chem.* 52, 663–6(1939).—A summary. K. K.

Continual observation of changes in weight at oven temps. [drying and oxidation of oils] (Beckel, Sharp) 1. C blacks andlamp blacks [for use in paints and lacquers] (U. S. pat. 2,178,382) 18. Pitch compns. for use as a paint (U. S. pat. 2,178,770) 20. Compds. of the perylene series, for coloring lacquers (U. S. pat. 2,178,521) 22. Luminous and radioactive compns. for luminous paints (U. S. pat. 2,178,961) 3.

Alkyd resin paints. Friedrich Frick (to I. G. Farbenind. A.-G.). U. S. 2,178,474, Oct. 31. A color pigment is used with an aq. emulsion of a synthetic resin such as may be formed from a polyhydric alc., a polybasic acid, an unsatd. fatty acid of the drying type, and an emulsifying agent such as the NH_4 salt of diisopropylnaphthalene sulfonic acid. U. S. 2,178,475 relates to coating compns. suitable for use on wood, felt, artificial stone, etc., which contain a filler such as Fe_2O_3, ground slate and talcum together with an emulsion of generally similar character. An aq. ammoniacal soln. of casein may be used with the various other specified ingredients.

Composition for water paints. E. Goffart. Belg. 432,762, March 31, 1939. The basis of the material is a double Ca Al silicate contg. excess lime, mixed dry with colored pigments, a certain proportion of casein or Ca caseinate, and a small quantity of K Al sulfate or $Al_2(SO_4)_3$.

Metal-paste pigments. Edwin L. McMahan (to Aluminum Co. of America). U. S. 2,178,179, Oct. 31. A stabilized metal-paste pigment having good persistence of leafing power comprises flakes of metal such as Al, together with a leafing agent such as stearic acid, and a small proportion (suitably about 0.1% or less) of phenol, monobenzyl amino phenol, *p-tert*-amyl phenol, or guaiaphene. U. S. 2,178,180 involves the use together of metal flakes, a leafing agent, and α- or β-naphthol. U. S. 2,178,181 involves the use together of metal flakes, a leafing agent, and α- or β-naphthylamine, amylamine, diamylamine or triamylamine.

Titanium-containing lithopone. A. M. Brusilovskiĭ, S. F. Lukovskiĭ, V. V. Andreev, F. S. Sigal and B. E. Boguslavskiĭ. Russ. 51,751, Sept. 30, 1937. A soln. of $Ti(SO_4)_2$ is treated with a Zn-contg. material, e. g., $ZnCO_3$, boiled, the pptd. titanic acid filtered off, the filtrate again treated with Zn-contg. material, and freed from Fe and other salts of heavy metals in the usual way, the purified $ZnSO_4$ soln. mixed with the previously sepd. titanic acid, the mixt. treated with BaS, and the pptd. pigment sepd. and heated to incandescence.

Water-dispersing zinc sulfide pigment. James E. Booge (to E. I. du Pont de Nemours & Co.). U. S. 2,178,334, Oct. 31. A process for the production of a ZnS pigment having a water absorption less than 40 involves adding to a dry calcined ZnS-contg. pigment about 0.18–0.36% of Na pyrophosphate and uniformly mixing.

Pigment for nitrocellulose lacquers. Adolf Detre. Hung. 121,983, Nov. 2, 1939. The pigment is ground with a heavy-metal soap. The chief component of the base material is salep roots or similar mucilaginous substance made up with water to a sirup, treated with 4 times as much of a sirup of vegetable gums contg. little arabin and much cerasin and assorin. A neutral, acid- and alkali-resistant filler (e. g., powd. steatite, serpentine, or Al silicate) is added to give the desired plasticity. In lacquers to be applied on metal surfaces, 1–2% mineral acid is added. This base material has less tendency to crack off than have those contg. lime and chalk.

Drying oil. Izador J. Novak (to Raybestos-Manhattan, Inc.). U. S. 2,178,604, Nov. 7. A blown drying oil of the nonconjugated type having a conjugated system, insol. in EtOH, sol. in petroleum solvents, liquid at 25°, and suitable for use with a synthetic resin on clutch facings, etc., is produced by blowing an oil such as soybean, linseed or hemp seed oil at 25–70°, with an O-contg. gas.

Preparing mineral oils for use in paints. Allan B. Ruddle. U. S. 2,178,705, Nov. 7. The oil is mixed and heated with a soln. of an alkali metal silicate and an alkali metal fluosilicate, and an alum is then added.

Bronze powder-containing coating compositions. Joseph F. Hofmann (to Acme White Lead & Color Works). U. S. 2,178,018, Oct. 31. A nonleafing coating compn. is prepd. by grinding bronze powder in a highly volatile solvent such as a hydrogenated naphtha of low b. p. until the powder is reduced to a state of extreme fineness, then mixing it with a synthetic resin varnish to form a uniform dispersion of the powder in the varnish and solvent.

Printing on pellicles of hydrophilic colloid. Ralph T. K. Cornwell (to Sylvania Industrial Corp.). Can. 384,909, Oct. 31, 1939. A pellicle of hydrophilic colloid, e. g., cellulose hydrate, is impregnated with an org. water-miscible dye solvent that is a swelling agent for the colloid, and printed in the gel state with an ink contg. a substantive sol. in the solvent. An app. is described.

Rosin size. Benjamin H. Thurman (to Refining, Inc.). U. S. 2,178,532, Oct. 31. An arrangement of app. is described, and a process of producing rosin size and continuously recovering turpentine from resinous material (such as a pine gum) which liberates turpentine when heated, the process involves: continuously flowing into a reaction zone closed from the atm. a stream comprising proportioned quantities of the resinous material and an aq. alk. soln. such as one of Na_2CO_3, heating the material in the reaction zone to form turpentine vapor and rosin size in the reaction products; continuously moving the reaction products into a sepg. zone; continuously withdrawing the turpentine vapor from the sepg. zone; condensing the turpentine vapor; and removing the rosin size from the sepg. zone. Various similar processes are described.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Hydrolysis of fats and fat acid esters. I. Saponification velocity of fats and fat acid esters. Toyoki Ono. *J. Agr. Chem. Soc. Japan* 15, 843–56; *Bull. Agr. Chem. Soc. Japan* 15, 131-2(in English)(1939).—The fats and oils were sapond. in the homogeneous medium consisting of C_6H_6 and KOH alc. soln. At lower temp., the fish oil was more easily sapond. than the vegetable oils. The sapon. of the solid fats was more rapid than that of the oily fats at 30°. The reaction velocity at 30° was large at the beginning of the sapon. and then diminished. The reaction was special and irregular. II. *Ibid.* 953–65.—When the amt. of the fat was larger than that of KOH used for the sapon., the reaction velocity diminished. The reaction velocity was also changed with the concn. of KOH. The castor oil and the perilla oil were sapond. by only alc. KOH with larger reaction velocity than the sardine oil, cacao butter and olive oil. It may be due to the soly. of the oils in alc. The reaction velocity of the fat acid esters decreased reciprocally with the mol. wt. Aromatic dicarboxylic acid esters were more easily sapond. than aromatic monocarboxylic acid esters. In the sapon. of glycerides of fat acids, the effect of the mol. wt. was not remarkable.

Y. Kihara

The solid acids of olive oil. René Marcille. *Compt. rend.* 209, 730-2(1939).—Different olive oils, e. g., from Northern Tunis, contain solid acids which sep. out in a variety of cryst. forms when the oils are cooled to 12–14° for 24 hrs. The Pb salts of solid fat acids from noncongealing oils are sol. in Et_2O, the acids show Bellier no. 25.75 (cf. *C. A.* 29, 6449⁴); the Pb salts of solid acids from

congealing oils are only partly sol. in Et_2O, the acids show m. p. 56.5°, Bellier no. 22.33. These differences indicate the presence of other solid acids besides palmitic acid (I). Sepn. of these acids through their K salts, or by differences in soly. in EtOH, could not be effected. By fractional addn. of LiOAc to the alc. soln. of 25 g. of the solid acids from noncongealing oils I (m. p. 59.5°, Bellier no. 18.75) was sepd. from the last 3 fractions as the Li salt. Three repetitions of this fractionation furnished 92 mg. of arachidic acid (II), characterized by its insoly. in EtOH, m. p. 73.5°, Bellier no. 60; 33 g. of solid acids from congealing olive oils rendered 42 mg. of less pure II. Abnormal Bellier nos. are obtained in the analysis of olive oils contg. II if only one-half of the usual vol. of EtOH is used in the fractional pptn. of the solid acids. The Hilditch-Schuster method gave no reliable results, even with very congealing oils; the solid lipides from such oils consist of oleodipalmitin. Alfred Burger

The Bellier number and its use in the detection of peanut oil in olive oil and various other applications. R. Marcille. *Ann. chim. anal. chim. appl.* **21**, 311-21(1939); cf. *C. A.* **29**, 6449⁴.—The test, while not very specific, is valuable for detecting of the adulteration of olive oil with peanut oil. Since the original publication is not easily accessible to many chemists, the present paper represents a complete review of the subject and, besides telling exactly how to carry out the work and interpret results, gives an account of some further expts. Fairly good results were obtained in estg. the quantity of peanut oil present and successful applications were the detection of peanut oil in canned sardines and in olive marc. The Bellier no. can also serve to establish the purity of various fat acids. W. T. H.

Cottonseed industry 1939. S. M. Harmon. *Mfrs. Record* **109**, No. 1, 46, 62(1940).—A survey. L. S.

Identification of commonly used waxes in admixture. Samuel Zweig and Abraham Taub. *Ind. Eng. Chem., Anal. Ed.* **12**, 9-14(1940).—The systematic identification of waxes is based on variation in proportion of acids, alcs. and hydrocarbons, differences in chain length of the two components of the ester, and the presence of addnl. distinctive components such as resin-like substances and ketones. The methods employed are based on the detn. of phys. and chem. consts. such as m. p., sapon. value, acid value, acetyl value and solution temp. Sapon. values below 50 indicate the presence of paraffin or ozocerite; low acid value below 3 or 4 excludes the presence of more than 10% beeswax, montan or candelilla wax and indicates the absence of rosin or stearic acid. Acid values greater than 20 suggest the presence of more than 10% stearic acid, or 13% rosin or montan wax. A m. p. above 75° indicates more than 10% carnauba wax in the mixt., and a high m. p., ozocerite and montan wax. Acetyl values above 21 indicate more than 38% carnauba or 11% cetyl alcohol; below 10, carnauba is absent or is present in less than 15%. For 0.25 g. in 10 cc. BuOH, pptn. temps. above 53° suggest carnauba more than 7-10% or ozocerite more than 5%; above 75° ozocerite more than 20% and below 50° carnauba or ozocerite less than 5%. Information to be obtained from soly. in hexane, EtOH and AmOH is described. The hydrocarbon fraction of the wax mixt. offers a means for detecting the presence of ozocerite or paraffin. The wax hydrocarbons are carbonized when heated to 110° with concd. H_2SO_4 while the paraffin hydrocarbons are not, and can be extd. from the dild. acid mixt. with ether or ligroin. A schematic outline for the identification of the various waxes and allied substances mentioned above and their semiquant. evaluation, graphs for pptn. temp. studies and phys. and chem. properties of fractions sepd. from wax as well as a compilation of the important distinguishing characteristics of each wax, are included. W. A. Cook

The trend of soap progress. H. L. Ramsey. *Soap* **16**, No. 1, 30-1, 69(1940).—Recent progress has been chiefly in the chemistry of fatty materials. The greatest improvement has been in soap powders whose properties have been enhanced by addns. of various chemicals such as phosphates. E. Scherubel

Laboratory boiling of soap in glass. Robert E. Divine. *Oil & Soap* **17**, 2-4(1940).—By using a cone-shaped Pyrex glass vessel of 1700-ml. capacity it is possible to carry out small-scale sapon. satisfactorily. The cone is supported by a flat ring of galvanized iron in a large beaker of boiling water. Steam for agitation is generated in a 1-l. Erlenmeyer flask. A glass tube conducts the steam to the bottom of the cone and the ascending bubbles of steam furnish the mixing required. The flask is also equipped with a short piece of rubber tubing and a screw clamp which serves as an air vent to safeguard against sucking the contents of the cone into the steam generator when heating is stopped. The use of this app. is said to permit plant operations to be duplicated in glass vessels as small as 750-ml. capacity. E. Scherubel

Effect of alkaline electrolytes on the foaming ability of soap solutions. G. L. Yukhnovskiĭ. *Trudy Khar'kov. Khim.-Tekhnol. Inst. S. M. Kirova* **1**, 98-107(1939).—Tabular and graphical results are given on the effect of soda on the foaming ability of various soap solns. The foaming ability of the soap solns. was detd. by titrating the soda with a 0.5% soap soln. until a foam was obtained which remained stable for three min. B. Z. Kamich

Detersive efficiency of tetrasodium pyrophosphate. I. W. W. Cobbs, J. C. Harris and J. R. Eck. *Oil & Soap* **17**, 4-21(1940).—Washing tests were conducted to det. the effect of single builders with soap to obtain data on the specific action of each alkali and the program was extended to include both binary and ternary combinations of alkalies. There are 63 graphs from which it is concluded that tetrasodium pyrophosphate has the ability to increase suds, detergency and also the amt. of builder without diminishing the cleansing efficiency of the soap. It also permits a low pH for use in household soaps. Its value in combination with other builders awaits completion of work on ternary and quaternary combinations. E. S.

Scouring action of soap and modern sulfonated textile auxiliaries (Davidsohn, Davidsohn) **13**. Changes in gossypol during ripening and storage of cottonseed (Podol'skaya) **11D**. Compds. of the perylene series for coloring waxes and fats (U. S. 2,178,521) **22**. Aliphatic polyamines [for emulsifying oils and fats] (U. S. pat. 2,178,522) **13**.

Treatment of fish oils. William Hassard. Can. 384,364, Oct. 3, 1939. Fish oils are treated with an emulsion of aq. $KMnO_4$ and Mg hydrosilicate, and the mixt. centrifuged.

Soap making and glycerol recovery. Benjamin H. Thurman (to Refining, Inc.). U. S. 2,179,001, Nov. 7. An arrangement of app. is described, and a method of making soap by the reaction between a saponifiable material and a saponifying material, which includes the steps of: saponifying a mixt. of the materials under heat while maintaining the temp. below that value at which discoloration owing to traces of unreacted saponifiable material will result, thus producing a soap mixt. contg. soap, glycerol and traces of unreacted saponifiable material; then processing the soap mixt. to saponify the traces of unreacted saponifiable material to produce a completely saponified soap product still contg. glycerol; then heating the soap product to a higher temp. and subjecting same to a vacuum the heating being sufficient to cause vaporation of glycerol under the vacuum conditions; sepg. glycerol vapor from the soap while maintaining the soap in molten, plastic or semiplastic condition while subjected to the vacuum conditions and promptly, substantially as soon as the soap has been deposited in the vacuum, removing the same without impairing the vacuum. Cf. *C. A.* **33**, 3620⁸.

Soap. Benjamin Clayton (to Refining, Inc.). U. S. 2,178,987, Nov. 7. An arrangement of app. is described, and a 2-step process for making soap which involves: continuously mixing in stream flow saponifiable and saponifying materials and effecting substantially complete sapon. while maintaining a temp. below the m. p. of the resultant soap when anhyd., thereafter transferring the resultant mixt. to a sep. and independent high-temp.

treating zone and there imparting a temp. substantially above the m. p. of the soap when anhyd., quickly removing a stream of the mixt. from the high-temp. zone and introducing the same into a vapor sepg. chamber, continuously removing the vaporized materials and removing the molten anhyd. soap from the vapor sepg. chamber. Cf. *C. A.* **33**, 1168[8]. U. S. 2,178,988 relates to app. for making soap by such a process.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Standardization of the methods of sampling products preceding control analyses in sugar industry and refinery. Georges Capelle. *Sucr. belge* **59**, 81–7(1939).
W. W. Binkley

Classification of raw sugar for refining purposes. Walter Godchaux, Jr. *Sugar J.* **2**, No. 4, 14–15(1939).—A classification based on solid impurities, color and filtration no. is recommended. Colin W. Whittaker

Experiments conducted by the American Sugar Refining Co. on the keeping qualities of raw sugar. M. D. Scott. *Sugar J.* **2**, No. 5, 29–30(1939).—It is concluded from storage expts. that a humidity-controlled warehouse is advisable in semitropical climates. C. W. Whittaker

The "Fortier" (sugar) mill clarification process. W. A. Rolston. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* **1938**, 202–10.—This process consists in separately collecting, heating and liming the juice of the 3rd mill and returning it for maceration between the 2nd and 3rd mills. A pos. increase in purity, more colloid elimination and a reduction of vol. of ppt. from the mixed juice are obtained. Application of the alk. maceration fluid reduces the acidity of the mixed juice and diminishes corrosion. O. W. Willcox

Notes on the mechanism of continuous clarification. Diaz Campain. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* **1938**, 91–6.—Multiple-compartment sugar-juice clarifiers with peripheral feed (Diazco type) are compared with clarifiers of the central feed type; the former presents hydraulic conditions in which there is less turbulence. O. W. Willcox

Basic lead acetate, its composition and clarifying qualities. C. R. v. Stieglitz. *Dept. Agr. Brisbane, Queensland, Bur. Sugar Expt. Stas., Tech. Commun.* No. **10**, 173–6(1939).—Twenty-five samples of Horne's dry lead were obtained from different sources and compared. Substantial variations in compn. and moisture content were found. The clarifying efficiency varied chiefly with the state of subdivision of the product, but the polarization sugar values showed little difference. Small variations in Pb content are apparently without much significance, but close attention should be paid to the moisture content. O. W. Willcox

New viewpoints on juice purification. F. Tödt. *Centr. Zuckerind.* **47**, 886–7, 894–5(1939).—After thin juices were boiled 2 min. the CaO content was reduced to 0.0071 and 0.0041% by 0.01 and 0.02% soda; to 0.0037 and 0.0023% CaO by 0.01 and 0.02% KH_2PO_4; boiling 5 min. with 0.02% soda left 0.0029% CaO; 0.02% KH_2PO_4, 0.0012% CaO. Na_2HPO_4 delimed as effectively as KH_2PO_4. Soda treatment introduces 3 times as much alkali on a mol. basis as does treatment with KH_2PO_4. Phosphate deliming impedes color formation caused by invert sugar in the same manner as the sulfurization of beet chips. W. W. Binkley

Gas formation in diffusion batteries. Gottfried Mück. *Deut. Zuckerind.* **64**, 1002(1939).—Two theories prevail on gas formation in diffusion batteries: (1) the action of acidic juices on metal portions of the batteries, (2) the action of microörganisms on carbohydrates in the juices. The gases consisted of 1 part CO_2 and 4 parts H. W. Binkley

Nitrogen content of sugar-cane juices and color of cream jaggery. G. Ganapathi Ayyar and K. Bhushanam. *Madras Agr. J.* **27**, 161–6(1939).—A study was made of the inferior color of cream jaggeries sometimes developing during the later stage of the boiling of carbon-treated juices. No correlation was found between the sucrose or glucose contents and the discoloration, but a close relationship was found between the N content of the juices and the color produced. More than 80% of the N was present in sol. form and more than 50% was present as amino acids. The discoloration was produced experimentally by boiling jaggery with asparagine and it is concluded tentatively that the color production is due to interaction of amino acids and reducing sugars. Numerous detns. of color, glucose, sucrose, N and Brix of raw and filtered juices are reported. Colin W. Whittaker

Studies on beet cultivation and juice production by better-quality factories. T. Wintzell. *Centr. Zuckerind.* **47**, 933–5, 961–3, 977–9, 997–8, 1014–16, 1030–2, 1049–52 (1939).—18 references. W. W. Binkley

Prevention of deterioration of sugar in storage. W. S. Daubert. *Sugar J.* **2**, No. 5, 24–8(1939).—Precautions necessary to avoid deterioration of sugar in storage are reviewed, especially moisture content, particle size, freedom from bagacillo, cleanliness, etc. Colin W. Whittaker

Indeterminate losses in the production of sugar from sugar beets. H. Claassen. *Sucr. belge* **59**, 72–4, 87–92, 108–14(1939).—Indeterminate losses are due to the methods of weighing, sampling and analysis of beets; action of microörganisms during diffusion; action of elevated temps.; defecation and carbonation; passage of difficultly sol. sugar-lime compds.; evapn. and cooking. W. W. Binkley

Fiber content of commercial varieties of Louisiana sugar cane. M. A. McCalip. *Sugar J.* **2**, No. 4, 25–8, 31 (1939).—See *C. A.* **33**, 9700[5]. Colin W. Whittaker

Present state of the high-test molasses industry. Committee Report. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* **1938**, 232–5.—Acid inversion of cane sirups with subsequent neutralization with lime has the disadvantage of much decompn. of sugars and incrustation of evaporators, which are avoided by invertase inversion according to the Guerrero process: juice from the last grinding mill, which is rich in proteins and amino acids, is pasteurized, cooled, treated with $(NH_4)_2SO_4$, phosphate and other yeast nutrients, and seeded with a special strain of yeast (No. 206 CC) which contains approx. 10 times as much invertase as bakers' yeast. After 10–12 hrs. the yeast suspension is centrifuged to 12% of its original vol. and fed continuously to the stream of sirup coming from the evaporators at 55 Brix, a pH of 6.0–6.5 and previously cooled below 60° at the rate of 4 vols. yeast suspension to 100 vols. sirup; 65% inversion is obtained in 10 hrs. or in 5 hrs. with 8 vols. of yeast; 67.67% inversion can be obtained in 30 hrs. with 1.25% yeast. Exts. indicate that by leaving the yeast in the sirup a product balanced in protein and carbohydrate is obtained which can compete with any other cattle feed. O. W. Willcox

Some physical properties of molasses. A. H. Praeger and J. L. Heron. *Dept. Agr. Brisbane, Queensland, Bur. Sugar Expt. Stas., Tech. Commun.* No. **9**, 149–70 (1939).—The Brix of final molasses depends on the compn. of the sample; the result is more accurate with the smaller dilns. No practical relationship is found between refractometric Brix, densimetric Brix and dry substance. For a given reduction in the supersatn. coeff. viscosity is reduced to a greater extent by heating than by diln. Molasses of high Brix values show anomalous viscosities, perhaps because of the formation of complex internal structures. No definite value for surface tension could be obtained, but it is perhaps of the order of 60 dynes/sq. cm. O. W. W.

Manufacture of high-test molasses. M. A. Mascaró. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* **1938**, 199–201.—The concd. cane juice (40–42 Brix) is mixed with dild. acid and heated to 215–20°F. by pumping

through the 1st of 2 high-speed heaters; in the receiving tank the inversion is allowed to proceed until the temp. has fallen to 175°F., when the liquid is again passed through a similar heater to a 2nd tank where the purity is allowed to drop to the desired figure. This system advantageously replaces the ordinary "stationary" heating in a single tank, as there is less caramelization and decompn. O. W. Willcox

Molasses dilution tests. G. H. Jenkins. *Dept. Agr. Brisbane, Queensland, Bur. Sugar Expt. Stas., Tech. Commun.* No. 8, 137-48(1939).—Factory-scale expts. showed that dilg. massecuites with water gives a substantial improvement in the purity of centrifugal sugar, but in the app. used it was not practicable to reduce the supersatn. coeff. lower than 1.09 without appreciable resoln. of cryst. sugar. On the other hand, resoln. can definitely be avoided by heating at the satn. temp. of the molasses; the supersatn. can thus be reduced practically to 1.00 without resoln., with proportionate reduction of viscosity. Where the utmost reduction of viscosity is required diln. is definitely inferior to reheating. O. W. Willcox

Utilization of blackstrap molasses. Wm. L. Owen. *Proc. 12th Ann. Conf., Asoc. tecnicos azucar., Cuba* 1938, 227-31.—An outline of recent trends. O. W. W.

Spontaneous combustion of Egyptian sugar-cane molasses. C. A. Browne. *Ind. Eng. Chem., News Ed.* 17, 734-6(1939).—Summary of a report by H. Naus Bey. Molasses stored in tanks frequently undergoes spontaneous decompn., causing frothing and overflow. In open tanks, exposed to the sun, it may even completely carbonize. The most important factors in bringing about this condition are high concn. (over 42° Bé.) and high temp. in conveying and storing the molasses. Contributing factors of lesser importance are an alk. reaction of the molasses, and the use of SO_2 in the defecation process. The decompn. is not caused by microorganisms, but is due to the formation of highly labile unsatd. org. nonsugars of high C content, by progressive dehydroxylation. Mineral salts act as catalysts in this reaction. Illustrated. F. W. Zerban

Bagasse furnaces. E. W. Kerr. *Trans. Am. Soc. Mech. Engrs.* 61, 685-91(1939).—Bagasse, the woody fiber remaining after removal of the juice from sugar cane, makes up approx. 27.5% of the wt. of the cane (La), contains approx. 50% moisture, and is used as fuel in the generation of steam for the refinery. Practically all types of boilers are used for burning bagasse, water-tube boilers predominating. Types of bagasse furnaces are grate, hearth and combination grate and hearth; boiler and furnace efficiencies average 50%, with best installations averaging 55–60% (66% for a Ward furnace). Cuban bagasse contained H 5.8, C 46.31, O 45.82, N 0.26 and ash 1.81%. The calorific value of bagasse is 8000–8600 B. t. u./lb. on the dry basis. George Ayers

Modernization of the Maine potato starch industry. Charles A. Brautlecht. *Rept. New Engl. Assoc. Chem. Teachers* 41, 59–72(1939).—A survey. L. Scheflan

Use of the Kurnakov recording pyrometer in the study of changes in starch. V. I. Nazarov and A. V. Nikolaev. *Compt rend. acad. sci. U. R. S. S.* 24, 263–5(1939)(in English); cf. *C. A.* 33, 4072[8].– Heating curves for potato-starch suspensions in 1 *N* solns. of NaCl, KCl and KNO_3 show endothermal effects (during gelatinization) at 62.5°, 57.5° and 56°, resp., which are in approx. agreement with the values obtained by the Gorbachev method. When starch suspensions in 1 *N* solns of HCl and HNO_3, resp., are heated, both gelatinization and dextrinization show endothermal effects. Heating curve data for air-dried starch, com. sol. starch, and for starch in formamide are discussed. George Ayers

Behavior of topped beets remaining in the ground (Schneider) **11D.** Use of $CaCN_2$ [for sugar-cane cultivation] (Gordon) **15.** Statistical investigations on sugar-beet yields (Bruinsma) **15.** Importance of biol. research [for water that is used in sugar extn.] (Batta, *et al.*) **14.** Structure of cellulose and other polymers related to simple sugars (Haworth) **10.** Stock feeds [use of carbonation sediment from sugar manuf. and molasses or sirup from beet- or cane-sugar manuf.] (U. S. pat. 2,170,713) **12.**

Decolorizing sugar solutions. Hans O. Kauffmann (to Buffalo Electro-Chemical Co.). U. S. 2,178,587, Nov. 7. An aq. soln. of sugar of high sugar content is treated, at a moderately elevated temp. (suitably about 55–60°), with a hypochlorite and a precipitant agent such as mono-Ca phosphate, and subsequently treated with H_2O_2 in about 5 times the quantity required to dechlorinate the soln. for preventing return of color.

Separating sugar from mother liquor by centrifuging. Walter E. Smith. U. S. 2,179,436, Nov. 7. Centrifuging is effected in a separator sealed against the passage of air currents through it while the temp. of the sugar mass is raising by the operation of the separator at a speed necessary to cause a rise in the temp. sufficient to increase the fluidity of the molasses during the sepn. and maintaining the air in the separator in a satd. condition by the addn. of moisture.

Recovery of sucrose from sugar-beet molasses. Roy H. Cottrell and Vernal Jensen. Can. 384,347, Oct. 3, 1939. Lime is added to the molasses at a temp. below 17° to ppt. Ca sucrate, sludge obtained from a subsequent step in the process at about 80° and contg. hot Ca sucrate is added to the resulting mixt. of cold Ca sucrate and mother liquor, forming a filter-feed mixt. above 17°. The mixt. is filtered, the filtrate heated to ppt. hot Ca sucrate, the product sepd. into a sludge at about 80° and a substantially clear hot waste liquor, and the sludge added to the mixt. of cold Ca sucrate ppt. and mother liquor in a previous step of the process. An app. is described.

Crystallized glucose. Glucoseries réunies, Soc. anon. Belg. 431,954, Feb. 28, 1939. The crystals obtained from a first centrifuging are mixed with a solvent for the impurities in such proportion that the mixt. is sufficiently fluid to be centrifuged.

Treating sugar-bearing materials such as massecuite. Charles A. Olcott. U. S. 2,178,805, Nov. 7. App. is described, and various details of a method of heating sugar-bearing materials which comprises subjecting different portions of the material to the action of a heating device different portions of which are at different temps.

Dustless starch grits. Wm. J. Lauterbach (to Corn Products Refining Co.). U. S. 2,178,235, Oct. 31. Starch (preferably corn starch flushed from the tables) is heated in fluid suspension (preferably at a temp. of 65° for 10 min.) to effect requisite gelatinization and swelling without substantial cell disruption, the fluid is removed from the starch magma, the partially gelatinized starch is dried, and fines are screened out and are preferably returned to the gelatinizing tank for reprocessing. Cf. *C. A.* 33, 9702[8].

29—LEATHER AND GLUE

HENRY B. MERRILL

Recent investigations on unusual hide defects. W. Hausam, E. Liebscher and T. Schindler. *Collegium* 1939, 529–36.—A description with photographs is given of hard, flat deposits, 4–4.5 cm. wide, 8–9.5 cm. long and 1.5 mm. thick, found in a flesh split from an Argentina beef hide. The deposits were of ossified tissue similar to that often found in muscle but seldom in skin. Suc deposits are caused by various kinds of injuries. In the present instance the deposits were found to contain molds (*Aspergillus, Penicillium*) and this is suggested as the cause of their formation. Decompn. of bated beef hides at the level of the hair roots, resulting in splitting of the skin into

2 layers, was caused by infection from an old skin left for several days in the bate. The decompd. skin was slimy and foamy. A piece of good hide placed, under anaerobic conditions, on an infected hide was entirely destroyed in 24–48 hrs. A gas-forming anaerobe was isolated, which was similar to, but not identical with, the Fraenke gas bacillus. When injected into mice or guinea pigs, it did not cause hide infections or death of the animals. A mixed culture from the hide was much more active than pure cultures. There was a true symbiotic relation between the anaerobe, a coccus and *B. mycoides*. I. D. C.

Factory organization in tanning-extract manufacture. III. General organization. Josef A. Sagoschen. *Collegium* **1939**, 497–528, 536–43; cf. *C. A.* **33**, 7612[4].—Organization problems of the plant as a whole are discussed. These are divided into (1) factors affecting choice of a site for the plant, such as supply and source of raw materials, transportation, and waste disposal, (2) construction problems, including those of design, construction materials and safety, and (3) manufg. problems. I. D. Clarke

Characteristics of vegetable and synthetic tanning materials. XVI. The technological tanning properties of pine bark extracts. F. Stather, H. Herfeld and H. Schopel. *Collegium* **1939**, 561–81; cf. *C. A.* **34**, 281[8].—Dewaxing the bark before extn. did not influence the yield of tannin or case of filtration of the ext. The finer the bark was ground before extn the greater was the amt. and purity of the ext. As the extn. temp. increased, tannin and sugar in the ext. increased, but buffer capacity did not change. At 20° and 100° tannin values were 10.8 and 13.7%, resp., nontannin 8.6 and 9.9% and total sugar 1.6 and 3.2%. Fractional extn. gave fractions of about the same purity; succeeding exts. had somewhat lower buffer capacities but greater ease of salting out and combining power. Dialysis through parchment caused some improvement in purity and other properties of the ext. Sulfiting the ext. decreased insolubles, fixable tannin and ease of salting out but increased purity and amt. of tannin. Sulfited exts. gave a softer, more elastic leather. Best results for sulfiting were obtained by using 40% of a 1.1 sulfite-bisulfite mixt., based on the insolubles, and heating for 9 hrs. at 95–98°. Increasing the time of heating from 9 to 20 hrs. made little difference. At 70° sulfiting action was negligible. Use of 100% of sulfite or pressure at 125–130° gave an ext. of low purity which produced a dark, tinny leather. Sulfited exts. fermented only moderately and produced almost no acid. I. D. Clarke

Enzyme preparation from Aspergillus oryzae in the leather industry. B. G. Babakina and A. D. Zamyslov. *Biokhimiya* **4**, 316–26(1939).—Directions are given for the prepn. and use of a potent depilating enzyme from *Aspergillus oryzae*. H. Priestley

Softening of sheepskin with weak pickling solutions. V. Mikheev. *Kozhevenno-Obuvnaya Prom. S. S. S. R.* **1939**, No. 8, 28–9.—Both HOAc and weak H_2SO_4 increased the strength of the areolar tissue of sheepskin in comparison with the usual methods of treatment. The effect of HOAc was greater than that of H_2SO_4. The apparent sp. gr. decreased more with the weak H_2SO_4 than with the HOAc. The HOAc soln. contained 5 g./l. of 100% HOAc, 30 g./l. of salt, the liquid:pelt ratio being 1:4. The temp. of treatment was 35–37° and the pH was maintained automatically at 4–4.7. The H_2SO_4 soln. had 2 g./l. of 100% H_2SO_4, 5 g./l. of salt, and a liquid:pelt ratio of 1:4. The temp. was 35–37° and the pH was 3.5–4.0. The pelts which were thus softened and then chrome-tanned were lighter and had a larger tensile strength than those which were pickled by ordinary methods. B. Z. Kamich

Commercial practice and analytical methods in the production of gelatin and glue. F. W. Horst. *Gelatine, Leim, Klebstoffe* **7**, 147–57(1939).—Details of the commercial operation are discussed in relation to their effect on the quality of the product. Don Brouse

Tanning hides with iron compounds. Werner Huehn (to I. G. Farbenind. A.-G.). U. S. 2,178,102, Oct. 31. See Brit. 495,638 (*C. A.* **33**, 3628[2]).

Tanning materials. Laurence R. B. Hervey (to Arthur D. Little, Inc.). U. S. 2,178,874, Nov. 7. A sexivalent Cr compd. such as $Na_2Cr_2O_7$ is treated with an acid resistant to oxidation and of sufficient strength, such as H_2SO_4, to liberate free chromic acid and keep the trivalent Cr in soln., and the resulting product is treated with an unsatd. org. compd. such as oleic acid to produce a reaction product contg. a trivalent Cr salt.

Synthetic tanning agents. Friedrich W. Guthke (to I. G. Farbenind. A.-G.). U. S. 2,179,038, Nov. 7. Tanning agents are produced by a process which involves subjecting a water-sol. sulfonated condensation product derived from a phenol or naphthol and CH_2O or the like to an after-treatment with CH_2O or the like and a phenol or naphthol, and effecting reaction of urea and CH_2O or the like in the material. Several examples with details are given.

Synthetic tanning material. S. S. Vasserman and N. V. Otmennikov. Russ. 51,798, Sept. 30, 1937. The sulfonation product of a mixt. of crude anthracene and naphthalene is condensed with S.

Bleaching glue. Walter M. Urbain and Lloyd B. Jensen (to Industrial Patents Corp.). Can. 384,588, Oct. 10, 1939. A mixt. of KNO_3 1–2 and H_2O_2 about 0.6% based on the glue-liquor solids is agitated with the glue liquor, and then the glue liquor dried.

Unhairing hides and skins. Wm. H. Hill (to American Cyanamid Co.). U. S. 2,174,497, Sept. 26. Unhairing is effected by use of an alk. hydrolyzing agent such as $Ca(OH)_2$ or NaOH together with biguanide or guanylthiourea or other unhairing accelerator of the general formula $R'R''NC(:NH)NHC(R)NH_2$ in which either or both R′ and R″ are H or alkyl or aryl groups and R is a S atom or a NH group.

Disazo dyes for leather. Mordecai Mendoza (to Imperial Chemical Industries Ltd.). U. S. 2,177,371, Oct. 24. From components such as 4-amino-4′-nitrodiphenylamine-2′-sulfonic acid, a *m*-diamine of the benzene series, and 3-amino-5-sulfosalicylic acid, disazo dyes are produced which dye leather brown shades.

30—RUBBER AND ALLIED SUBSTANCES

DAVIS

Hevea latex of large particle size. J. McGavack. *Ind. Eng. Chem.* **31**, 1509–12(1939).—New exptl. data on the proportions of particles of various sizes in modified *Hevea* latexes are presented. Latexes were creamed, the creams were dild. to 2.5% solids, were added to gelatin soln. and then photomicrographs obtained. In some expts. the creaming and diln. were repeated several times to remove water-sol. substances as completely as possible. The smaller the proportion of creaming agent (NH_4 alginate), the larger was the av. diam. of the particles and the smaller was the amt. of rubber recoverable. Measurements of the no. of particles, total vol. and total diam. for various size intervals are tabulated and size-distribution curves given. The proportion of N retained by rubber particles in washed latexes was found to be approx. proportional to the surface area of the particles. Hence it is possible to fractionate latex into portions contg. different av. diams. of the particles and having different N values. A type of latex particularly suitable for waterproofing and insulating and which yields a highly purified rubber can thus be prepd. C. C. Davis

Tentative procedures for testing the variability of normal and concentrated latex. Crude Rubber Committee, Div. Rubber Chem., Am. Chem. Soc. *Ind. Eng. Chem., Anal. Ed.* **11**, 593–7(1939).—The procedures are offered as reliable methods of sampling; of detg. total solids, dry

rubber content, coagulum, alky., pH value, viscosity, yield point, Cu, Mn, water-sol. substances and acetone-sol. substances; and of prepg. films. The procedures do not include tolerances and are not actual specifications for purchasing and selling. C. C. Davis

Industrial sources of rubber in the U. S. S. R. A. A. Nichiporovich. *VNIIKiG and the Kauchukonos Trust. Sel'skokhozgiz* (Moscow) **1938**; *Khim. Referat. Zhur.* **2**, No. 1, 102–3 (1939).—Sources of rubber and the evaluation of different types of rubber and gutta-percha plants are described. The characteristics of the most important rubber plants, the physiology of the formation and accumulation of rubber in these plants, methods of discovery, and the detn. of rubber in the plants are given. Improved methods for different grades of rubber, and diseases are discussed. W. R. Henn

Plantation research. Herbert Ashplant. *India-Rubber J.* **98**, 585–7 (1939).—A review of recent work. C. C. Davis

German specifications for the testing of rubber. P. Kluckow. *Gummi-Ztg.* **53**, 1147–8 (1939).—A review and discussion of current approved methods. C. C. Davis

The measurement of the plasticity of rubber. Wm. M. Widenor. *India Rubber World* **101**, No. 2, 41–6 (1939).—An illustrated review of some of the important methods of measuring plasticity, with a bibliography. C. C. Davis

Application of the interferometer to the measurement of dimensional changes in rubber. Lawrence A. Wood, Norman Bekkedahl and Chauncey G. Peters. *J. Research Natl. Bur. Standards* **23**, 571–83 (1939) (Research Paper No. 1253).—The interferometer method for the measurement of small dimensional changes is adapted to soft rubber. A detailed description is given concerning the prepn. of specimens, app., procedure and calcns. Emphasis is placed on the measurement of thermal expansivity and the dimensional changes involved in transitions between different forms of rubber. The lower limit of temp. is set only by the refrigerating liquid, temps. as low as −185° being utilized. The upper limit of temp. is set only by the rubber itself. Results obtained in a study of the expansivity and transitions of "stark" (frozen) rubber are given as an illustration of the application of the method. Other possible applications are the measurement of the swelling of rubber by vapors and the detn. of stress-strain relations under compressive loads. The chief limitation of this method with rubber arises from the plastic flow of unvulcanized rubber at elevated temps. The method also has the inconvenience of requiring continuous observation. Compared with other methods of measuring small dimensional changes, the method is of advantage in its high sensitivity, the small size of the specimen required, the ease of obtaining temp. equil., the absence of a confining liquid and the simplicity of the calcns. N. B.

Dynamic fatigue life of rubber. S. M. Cadwell, R. A. Merrill, C. M. Sloman and F. L. Yost. *Ind. Eng. Chem., Anal. Ed.* **12**, 19–23 (1940).—The results of systematic and extensive expts. on the resistance of vulcanized rubber to oscillatory stresses are described, with pictures and diagrams of the equipment. For linear vibration, 4 conditions were studied: (1) compression cycles in which the max. lengths were less than the normal lengths; (2) compression-extension cycles, in which the ranges were from below to above the normal length; (3) extension cycles from normal back to normal length, and (4) extension cycles in which the min. lengths of the vibratory cycles were greater than the normal lengths. For a given length of vibratory travel, life was shortest under condition (3). For any particular min. length during vibration, the greater the vibratory travel, the shorter was the life. For given conditions of vibration, the harder the rubber the shorter in general was its life. Temp. affected the resistance to vibration, but its influence is not simple since at elevated temps. heat aging accelerates deterioration, and at subnormal temps. increased stiffness tends to shorten life. The dynamic fatigue life of rubber under a vibrational shearing stress was found to follow the same general principles found for rubber in linear vibration. C. C. Davis

Tensile properties of rubber compounds at high rates of stretch. Frank L. Roth and Wm. L. Holt. *J. Research Natl. Bur. Standards* **23**, 603–16 (1939) (Research Paper No. 1256).—The stress-strain relationships and work of extension of 4 vulcanizates were studied. The rates of stretch were great enough so that the conditions may be considered adiabatic. One mixt. was "pure gum"; the other 3 contained 25 vols. of channel black, soft black and clay, resp., per 100 vols. of rubber. The tensile properties of ring-specimens were detd. from a study of the position of the wt. as a function of time. The position of the wt. was recorded at equal intervals of time on a paper tape, 1 end of which was fixed to the wt. The tape was pulled through a spark gap as the wt. fell. The timing of the sparks was controlled by a tuning fork. Specimens were stretched to the point of rupture in about 0.5 to 0.75 sec. The work of extension was detd. as a function of the elongation of the specimen from the instantaneous positions and corresponding speeds of the wt., and from this the stress-strain relationships were obtained. A comparison of these data with similar data for a rate of stretch which lay in the range of speeds common to the usual routine tests failed to show that tensile properties measured at high rates of stretch offer any better indication of resistance to abrasive wear than the same properties measured at the usual rates. N. Bekkedahl

Rubber for pressing and forming of metals. Paul Grodzinski. *Rubber Age* (London) **20**, 269–70 (1939).—A discussion, with diagrams, of the applications of various types of rubber mixts. to various constructions. C. C. Davis

Heat formation in rubber—a method of measurement. N. N. Mikhailov and S. E. Polyak. *Caoutchouc and Rubber* (U. S. S. R.) **1939**, No. 4–5, 27–38.—The authors describe an original *app.* for measuring the amt. of heat evolved when a standard sample of rubber is subjected to a vibrational load. The app. consists of a stand with 2 columns supporting a loaded elastic beam motivated by an elec. motor through a roller-bearing eccentric. The vibrations of the beam are transferred through a ring-type dynamometer to a piston bearing on the sample. The sample is set into a cylindrical chamber in a brass block which can be raised or lowered by means of a screw for the insertion of the sample and varying of static load. Provisions are also made for heating and cooling the sample by means of a nichrome coil and copper coil for elec. current and liquid air, resp. The resonance of the system is regulated by varying the static load on the beam. The dynamometer mounts 2 mirrors, free to rotate through a small angle whose axes are at right angles. The mirrors reflect a ray of light, originating from a lantern with a very small aperture, into a recording camera. When a vibration load is applied, the light "spot" traces out an ellipse upon the photographic plate or opaque glass screen. The heat evolved by each cycle can be calcd. by measuring the area, height, breadth and distance of ellipse center from the vertical axis. Appropriate equations and formulas are given. Bernard Kilberg

Rubber and the brewing industry. J. P. Griffiths. *India-Rubber J.* **98**, 593–7, 619–24, 652–4 (1939).—An illustrated description, dealing with the various uses of rubber equipment, its maintenance (with particular reference to cleaning), specifications for quality, chem., phys. and mech. testing, etc. C. C. Davis

Sheeting; rubber. *Federal Specification* **ZZ-S-311a**, May 23, 1939. **Blankets; rubber.** *Ibid.* **ZZ-B-426**, May 23, 1939. Washington: Supt. of Documents, U. S. Govt. Printing Office, 5¢ each. L. Wilson Greene

The applications of high-frequency currents in the rubber industry. H. A. Leduc. *India-Rubber J.* **98**, 726–31 (1939).—See *C. A.* **32**, 5248[8], 6095[3]. C. C. Davis

Waste in the rubber industry. B. King. *Trans. Inst. Rubber Ind.* **15**, 125–30 (1939).—A discussion of various problems involving materials and processes. C. C. D.

Carbon-black adsorption and its effects. A review of the technical literature. Charles J. Glaser, Jr. *Rubber Age* (N. Y.) **46**, 101–2 (1939).—The conclusion is reached that the proportion of O adsorbed on C black in rubber plays

a very important part in the effect of the black on the rubber mixt. ZnO and stearic acid reduce or nullify the tendency of the adsorbed O to affect the rate of vulcanization. C. C. Davis

Pine tar as an ingredient for rubber mixtures. A. M. Ushakov. *Lesokhim. Prom*, 6, No. 1, 29–32(1938); *Khim. Referat. Zhur.* 2, No. 3, 125(1939); cf. *C. A.* 33, 4820⁷.—The moisture, ash, mech. impurities, water-sol. and volatile acids, acid no., η and flash temp. of pine tars were detd. The moisture content was detd. by settling; the upper layer of tar was analyzed for emulsified water, according to the method of Dean and Stark. The mech. impurities were found in the residue when the tar was dissolved in acetone. The ash was detd. in the residue of the volatile substances. The water-sol. acids were extd. with water by refluxing, followed by titration. The acid no. was detd. by titrating an alc.-C_6H_6 soln. of the tar (alkali blue as indicator). η was measured in a Hutchinson viscometer for dense glues. The flash temp. was detd. according to OST 7872. Investigations of different grades of crude tars in rubber showed that retort tars are superior to furnace tars and to birch dry-distn. tars. Cooked tars are better than crude tars. Increased cooking decreases moisture, water-sol. acids, volatile substances, acid no., plasticity and resistance to aging and to hardness, and increases the mech. properties. Preliminary expts. showed that the most suitable tar for tires contained: water up to 0.5%, ash up to 0.3%, volatile substances at 150° (without water) up to 5%, water-sol. acids up to 2 mg. per g. of KOH, acid no. 30–40 mg. per g. of KOH, mech. impurities 0.1–0.25%, η according to specifications. The expts. are only preliminary. W. R. Henn

Examination of a sample of sublimed litharge. J. R. Scott. *J. Rubber Research* 8, 125–9(1939).—Expts. showed that, in rubber-S-PbO mixts., sublimed PbO gave vulcanizates with mech. properties only slightly superior to those of corresponding vulcanizates prepd. with PbO made by the ordinary grinding process, and inferior to those of vulcanizates prepd. from dispersive PbO (Tegoglätte). PbO in general and sublimed PbO in particular tend to give property-time of vulcanization curves with 2 points of reversion. C. C. Davis

Effect of reclaimed rubber on temperature coefficient of vulcanization. W. S. Coe. *Ind. Eng. Chem.* 31, 1481–5 (1939).—The temp. coeffs. of vulcanization of 5 rubber mixts. contg., resp., no reclaimed rubber and 4 different types of reclaimed rubber (alkali, whole tire, acid whole tire, tread and red inner tube), were estd. on a basis of free S, T-50 test and stretch modulus data for the numerous cures for various lengths of time at different temps. The temp. coeffs. of the 4 mixts. contg. reclaimed rubber were considerably higher than the coeff. of the mixt. contg. no reclaimed rubber. The coeffs. estd. from the modulus data were lower than those estd. from free S data. The coeffs. estd. from the T-50 test data were intermediate between the values by the other 2 methods. The T-50 test method has the advantage over the other 2 methods in simplicity and rapidity and it is satisfactory for most practical purposes. The free-S method seems to be the most accurately reproducible method. Although favored by some investigators because of the greater practical significance of mech. properties, the modulus method involves considerable discretion in the establishment of proper exptl. conditions and thereby a reliable basis of comparison. C. C. Davis

Physicochemical constants of the hydrocarbon fraction used for regenerating rubber. K. Kuchinskaya and N. Panov. *Sbornik Trudov Opytnogo Zavoda im. Akad. S. V. Lebedeva* 1938, 50–2; *Khim. Referat. Zhur.* 2, No. 4, 24 (1939).—The hydrocarbon fraction, dried over $CaCl_2$ for 24 hrs. and filtered, gave d_{20} 0.8360, vapor pressure (by the dynamic method) $\log p = 7.88 - (2083.21/T)$, heat of vaporization (at 145°) 77.3 cal. per g., heat capacity at 20.5° to 150.5° $C = 0.3746 + 2 \times 0.000863t$, mol. wt. 130.06. W. R. Henn

Gutta-percha and balata. II. Collection and analysis. H. J. Stern. *Rubber Age* (London) 20, 277–80(1939); cf. *C. A.* 34, 659⁸.—Descriptive. C. C. Davis

Guayule. S. M. Mashtakov. *Caoutchouc and Rubber* (U. S. S. R.) 1939, No. 9, 36–40.—Data are given on the physicochem. characteristics of rubber extd. from 6 types of guayule. The rubber, tar and water-sol. material in the bark were 2.87–9.92, 10.74–15.31 and 21.94–27.82%, resp.; for the wood the resp. values were 0.05–2.71, 3.24–6.52 and 4.17–15.57%. The mol. wts. of the rubber varied from 21,900 to 44,000. The η of C_6H_6 solns. of the rubber decreased with decreasing concn. The tars had low acid nos. (9 to 14). B. Z. Kamich

The processing of Thiokol. O. Kölbl. *Gummi-Ztg.* 53, 1101–2, 1118, 1134–5(1939).—A discussion of mixing, calendering, extruding, bonding of Thiokol and rubber and vulcanizing in factory practice. Recipes for various types of articles made with Thiokol-A are included. C. C. D.

Determination of the heat capacities of the liquid products of synthetic-rubber production. N. Panov and I. Dadnikov. *Sbornik Trudov Opytnogo Zavoda im. Akad. S. V. Lebedeva* 1938, 36–40; *Khim. Referat. Zhur.* 2, No. 4, 24(1939).—The detns. were made by immersing a bulb contg. the substance (heated to a definite temp.) in a water calorimeter. The values obtained were: for piperylene (b. 41.6°) $C = 0.3747 + 2 \times 0.000986t + 3 \times 0.000010446t^2$; for primary BuOH (b. 116.6°) $C = 0.6053 + 2 \times 0.000488t + 3 \times 0.000002t^2$; for *sec*-BuOH (b. 110.2°) $C = 0.655 + 2 \times 0.00046t + 3 \times 0.000006124t^2$; for *sec*-AmOH (b. 138.1°) $C = 0.592 + 2 \times 0.00113t + 3 \times 0.00000042t^2$; for MeEtCO (b. 79.9°) $C = 0.4242 + 2 \times 0.00081t + 3 \times 0.00000346t^2$; for Bu_2O (b. 140.5°) $C = 0.217 + 2 \times 0.00466t + 3 \times 0.0000066t^2$. W. R. Henn

Theories of acceleration. L. B. Sebrell. *Ind. Eng. Chem.* 31, 1468–71(1939).—The various theories which have appeared during the last 31 years are reviewed (cf. *Chemistry and Technology of Rubber*, pp. 304–31; *C. A.* 31, 8993⁵).— Earlier theories attempted to explain acceleration on a purely chem. basis, whereas the trend is now toward a phys. or physicochem. basis. C. C. Davis

Temperature coefficient of vulcanization R. H. Gerke. *Ind. Eng. Chem.* 31, 1478–81(1939).—A survey of data on the temp. coeff. of vulcanization, published by various investigators, supports the view that the reaction involved in vulcanization is a chem. reaction. C. C. Davis

Low-temperature set as a measure of state of vulcanization. J. H. Fielding. *Ind. Eng. Chem., Anal. Ed.* 12, 4–9(1940).—A new method for measuring the tendency of rubber under tension to freeze is described. In its purpose it is analogous to the T-50 test of Gibbons, Gerke and Tingey (*C. A.* 27, 4438) but is simpler and more rapid, requires none of the usual scientific equipment and involves only linear measurements. Yet from a practical point of view it gives precise results. It is designated as *the 0° set test*. The sample is stretched to a predetd. elongation, is immersed in ice water for 2 min., released from tension, is held 1 min. longer in the ice water and its new length measured. The result is expressed as percentage set (based on the original length) or as fractional set (based on the initial elongation). Detailed data on representative vulcanizates are given, and the effects of various compounding ingredients are discussed. In all cases undercured samples showed relatively high sets; overcured samples showed low sets. The decrease in set was at first gradual, then rapid, then again gradual. The states of cure for which the change was rapid depended on the temp., but at 0° the rapid change was close to the so-called optimum cure (an exception was a vulcanizate contg. no S). This is fortunate from the point of view of the practical utility of the new test. There was no general and simple relation between 0° set and stretch modulus values, because the latter is influenced by many factors other than combined S. As a control test, the 0° set test should be used for the range of cure in which it is most sensitive, and actually this means over a substantial part of the curing range of the most important recipes of today. C. C. D.

Vulcanization of latex. C. E. Bradley. *Ind. Eng. Chem.* 31, 1485–8(1939).—A review of earlier and more recent developments, with particular emphasis on the practical aspects. C. C. Davis

Vulcanization from a thermodynamic viewpoint. Ira

Williams. *Ind. Eng. Chem.* **31**, 1464–8(1939).—Thermodynamic data on vulcanization have been concerned chiefly with the heat of reaction of rubber and S. A study of the change in free energy in the reaction: isoprene → natural rubber, indicates that this process is possible under suitable conditions, and an investigation of the thermodynamics of the most important side reactions might be of aid in establishing conditions for this synthesis. Furthermore a study of the free energy of the rubberlike polymer of isoprene should be of help in comparing this product with natural rubber. The properties which resemble those of vulcanized rubber which are imparted to raw rubber by the incorporation of a finely divided powder involve only a relatively small change in energy. Data on the reactions (1) chloroprene → vulcanized chloroprene polymer and (2) chloroprene → plastic polymer → vulcanized polymer, would probably throw light on the nature of the change from the plastic to the nonplastic state of this system. C. C. Davis

Effect of rubber variability on vulcanization. J. D. Hastings and Edgar Rhodes. *Ind. Eng. Chem.* **31**, 1455–60(1939).—The paper comprises a survey of past studies of the variability of plantation rubber and new expt. data on rubber tested comparatively by the old rubber-S (100·10) mixt. and by the new A. C. S. recipe (cf. Babcock, *et al.*, *C. A.* **30**, 8679[7]). The new data were obtained from 157 samples of No. 1 smoked sheet from various localities, but all were prepd. at the same time to eliminate seasonal effects. The variability of the rubber was judged by the tensile moduli of the vulcanizates. The 2 recipes gave results which are more in harmony than might be expected from criticisms of rubber-S mixts. by technologists in the past. Although perfect correlation was not found, there was in no case a reversal of the order of quality of any 2 samples when tested by the 2 recipes. Examples of variability resulting from uncontrollable causes, notably tapping systems, are shown, and the variations due to these causes are compared with those introduced by the producer during prepn., e. g., coagulant, rolling, washing, drying, smoking, etc. In conjunction with other work, the results indicate that differences in present-day methods of prepg. smoked sheet do not account for as much variability as supposed. Variability is largely a result of inherent variations in latex, including differences in the trees, soil and other environmental conditions and in estate methods. Sackett's conclusion (cf. *C. A.* **28**, 4267[5]) that the consumer must eliminate most of the variability by blending is still warranted. C. C. Davis

Control by individual incorporation of vulcanizing agents. D. F. Twiss. *Ind. Eng. Chem.* **31**, 1461–4 (1939).—The various methods of practical compounding whereby ingredients which play an active part in vulcanizing rubber are incorporated by diffusion are reviewed and discussed, with references to the journal and patent literature. The most promising method seems to be that in which a secondary amine is converted, in the presence of S and ZnO, to a dithiocarbamate ultra-accelerator, by diffusion treatment with CS_2, but which is modified by using, in place of the amine itself, a deriv. which is readily decompd. by CS_2 at room temp. within the rubber mixt. The vulcanizing activity of the accelerator formed *in situ* is increased by subsequent treatment with NH_3 or an amine or by the earlier incorporation of an org. base. These accessory compds. also accelerate the action of CS_2 on the aldehydeamine. C. C. Davis

X-ray structure of vulcanized rubber. Geo. L. Clark. *Ind. Eng. Chem.* **31**, 1397–1401(1939).—A crit. review and discussion of the work of various investigators since 1925 and of the part which x-ray data have played in studying the structure of rubber. C. C. Davis

Oxidation of vulcanized rubber. Effect of temperature, state of cure and thickness. A. R. Kemp, J. H. Ingmanson and G. S. Mueller. *Ind. Eng. Chem.* **31**, 1472–8 (1939).—Previous expts. on the rate of oxidation of vulcanized rubber at 60–80° were continued in the 100–10° range, and the results correlated with these earlier expts. (cf. I. and K., *C. A.* **32**, 9554[5]). Three mixts. were tested, contg., resp., smoked sheet 100, 100, 100; S 3, 3, 0; ZnO 20, 20, 20; di-*o*-tolylguanidine 0.75, 0.75, 0; phenyl-α-naphthylamine 0, 1, 0; tetramethylthiuram disulfide 0, 0, 3. Within the range where considerable loss of tensile strength took place, and in the temp. range 60–90°, the rate of oxidation was substantially a straight-line function of the time; at 100° and 110° this relation was no longer linear, and the rate decreased with increase in time. The higher the temp., the higher was the rate of oxidation, and at 60–110° the rate doubled with each 7.5° increase, a temp. coeff. of 2.5. The tensile strength decreased as a straight-line function of the time of aging and proportion of O consumed. The proportion of O consumed, judged by gain in wt. for 50% loss of tensile strength, depended on the temp., e. g., at 60° and at 110° the O requirements were 1.30 and 0.65%, resp., of the rubber hydrocarbon. When the vulcanizates were heated in CO_2 at 80° and 110° long enough to cause a 50% loss of tensile strength in O, the tensile strength increased, probably a result of further vulcanization. The higher the state of vulcanization the greater was the rate of oxidation, and the latter was apparently autocatalytic in overvulcanized rubber. The higher the state of vulcanization, the smaller was the proportion of O to lower the tensile strength a given amt. Variations in thickness of 0.43 1.90 mm. of vulcanizate (2) did not influence its rate of oxidation or rate of loss of tensile strength at 80° and 3.5 kg. per sq. cm. pressure of O. Vulcanizate (3) oxidized less rapidly than vulcanizates (1) and (2), but the mechanism of oxidation and deterioration was apparently the same. C. C. Davis

Cellophane [films from rubber hydrochloride] (Waterfield) **13**. C blacks and lampblacks [for use in rubber compns.] (U. S. pat. 2,178,382) **18**. Sand-blasting stencil sheet [contg. and coated with crepe rubber] (Can. pat. 385,085) **13**. Elec. cable insulation [use of rubber] (Russ. pat. 51,970) **13**.

Preserving rubber. Robert L. Sibley (to Monsanto Chemical Co.). U. S. 2,176,860, Oct. 17. Rubber is treated with about 1% of an aldehyde deriv., such as the butyl aldehyde deriv., of a ketone-phenol condensation product derived by use of acetone, Me Et ketone, cyclohexanone or Me- or Et-substituted cyclohexanone, where the ketonic O atom of the ketone is replaced by 2 *p*-hydroxy-substituted phenyl radicals.

Preserving rubber, etc. United States Rubber Products, Inc. Brit. 506,565, May 31, 1939. Rubber, unsatd. fatty oils, essential oils, petroleum oils and their derivs. such as gasolines, soaps, aldehydes, synthetic resins, etc., are preserved by incorporation of a small proportion, e. g., 0.1–5%, of an *N*-carbamyl deriv. of an amino-diarylamine of formula R′NHR″NHC(:X)NRR, wherein R′ is aryl, R″ is arylene, X is O, S or an imide radical and R is H or a hydrocarbon group. The compds. may be made, e. g., by the reaction of a carbamyl halide on a primary amino-substituted diarylamine. Among examples, (1) *p*-aminodiphenylamine is heated for 90 min. with an excess over the mol. equiv. of urea at 150° with evolution of NH_3, the molten mass is poured into H_2O with agitation and the ppt. is washed with hot H_2O and dried; the product is *p*-anilinophenylurea, and (2) *p*-aminophenyl-*p*-tolylamine is dissolved in C_6H_6 and phenyl mustard oil added; on standing, a gray powder seps. which may be washed with C_6H_6 and dried; the product is *p*-(*p*-tolylamino)diphenylthiourea. In Brit. 506,566, May 31, 1939, a carboxyalkylaminodiarylamine of formula R′NHR″-NHY, wherein R′ is aryl, R″ is arylene and Y is a carboxy-substituted alkyl group, is incorporated. The COOH group itself may be substituted. The compds. may be made, e. g., by the interaction of a primary amino-substituted diarylamine and a halo carboxylic acid or deriv. thereof. Thus, equimol. proportions of *p*-aminophenyl-*p*-tolylamine, monochloroacetic acid and anhyd. AcONa are heated together in alc. soln. for about 1 hr., the soln. then made alk. with dil. aq. NaOH and filtered, the filtrate acidified and the white ppt. formed filtered off, washed and dried.

CHEMICAL ABSTRACTS

Vol. 34 MARCH 20, 1940 No. 6

1—APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

Laying out a modern industrial laboratory. Irving E. Muskat. *Chem. Industries* **45**, 531–3(1939). E. H.

Recent developments in laboratory apparatus. William 3 B. Warren and Howard Draving. *Chem. Industries* **45**, 669–73(1939). E. H.

Selection of safe metals for chemical equipment. Paul V. Faragher. *Chem. Industries* **45**, 682–4(1939). E. H.

Modification of the stirring device of the Hortvet cryoscope. W. J. Blackie and G. F. Flemons. *Analyst* **65**, 26–7(1940).—The stirring is accomplished with the aid of blowing by means of the ordinary copper water-blast 4 and filter pump and a modification of a vacuum operated wind-screen wiper. Full details are given for prepg. the app. which has been used successfully for 3 yrs. W. T. H.

A hot-wire cutter for glass tubing. A. A. Hirsch. *Ind. Eng. Chem., Anal. Ed.* **12**, 48(1940). G. G.

Removal of adhered rubber stoppers. A. J. Bailey. *Ind. Eng. Chem., Anal. Ed.* **12**, 52(1940). G. G.

Cleaning Jena glass filters. Herbert Hawley. *Analyst* **65**, 27(1940).—In the routine examn. of ghee at Guindy, Madrass, continued use of the filters with the phytosteryl, acetate test resulted in gradual clogging and the obstruction could not be removed by means of solvents. A few min. treatment with 4% HF followed by immediate washing cleared the obstruction and restored the original filtering speed. W. T. H.

Useful micro immersion filter. Christina C. Miller. 6 *J. Chem. Soc.* **1939**, 1962.—Details are given of the micro immersion filter which contains a disk 1.5 mm. thick cut from a Whatman ashless filtration accelerator; it is used in the detn. of SiO_2 and the mixed oxides of insol. silicates. C. J. West

Preparation of microscopic glass spheres. C. R. Bloomquist and A. Clark. *Ind. Eng. Chem., Anal. Ed.* **12**, 61–2(1940). G. G.

Evaporation and distillation processes in the chemical industry. B. A. Matthias. *Chem.-Ztg.* **64**, 12–14, 24–5(1940).—A review. E. H.

Distillation of nitroglycerin in vacuo. R. Vandoni and Tribot. *Mém. poudres* **29**, 206–10(1939).—For the prepn. of pure nitroglycerin for Raman spectrum study, doubly distd. glycerol was nitrated with distd. 100% HNO_3 and redistd. H_2SO_4, washed with cold H_2O, slightly ammoniacal H_2O and H_2O at 45° and vacuum dried over solid potash. Twenty-five g. of the product was distd. for 7 hrs. at 50°/0.003 mm., with a modification of the method of Chiaraviglio and Corbino (*C. A.* **8**, 2061). A. J. P.

Measurements on gases and liquids that are corrosive or difficult to handle. Fritz Kretzschmer. *Z. Ver. deut. Ing.* **84**, 25–33(1940).—A description of app. and methods for measuring pressure, content in a container, vol. of flow, and weight of corrosive, low-boiling or fermentable liquids, solns. or gases. E. H.

Conveying liquids and gases in the chemical industry. B. A. Matthias. *Chem.-Ztg.* **63**, 653–6(1939).—A review, dealing especially with pumps. 29 references. E. H.

Electrical equipment trends in the chemical industry. C. C. Levey. *Chem. Industries* **45**, 534–7(1939). E. H.

Some improvements on the apparatus of Holdheide, Huber and Stocker for determining carbon dioxide. H. Schanderl and G. Bosian. *Ber. deut. botan. Ges.* **57**, 75–83(1939); cf. *C. A.* **30**, 4195⁷. L. P. Miller

A fixed-path acoustic interferometer for the study of matter. J. C. Hubbard and I. F. Zartman. *Rev. Sci. Instruments* **10**, 382–6(1939). E. H.

Thermal manometer, a new device for recording low absolute pressures. R. S. Vincent and A. Simons. *Proc. Phys. Soc.* (London) **51**, 1003–9(1939); cf. Hickman, Hecker and Embree, *C. A.* **31**, 5642⁸.—Hg is kept boiling, by an external heater, in a Pyrex tube (76 × 2.8 cm.) connected to the system in which the pressure was to be measured and the condensation temp. of the vapor recorded by the use of a thermocouple. It is not satisfactory for following rapid fluctuations of pressure but is otherwise satisfactory in the range 0.1 to 100 mm. H. A. Frediani

An optical pyrometer for general use. J. G. Hagedoorn. *Physica* **6**, 1126–8(1939)(in English).—Details are given describing an optical pyrometer possessing a large 5 field of view, high magnification, and capacity for the measurement of the brightness of very small objects. Earl H. Brown

A new radiation pyrometer. John Strong. *J. Optical Soc. Am.* **29**, 520–30(1939).—The pyrometer described measures with a thermopile and galvanometer the emission of energy in an isolated narrow band of wave lengths centered at 8.8 μ. These radiations are isolated by successive reflections from quartz crystals. The instrument can be used to measure low as well as high temp. (0 ± 100°). John W. Knowlton

Potentiometer circuit for portable optical pyrometer. R. C. Machler. *Rev. Sci. Instruments* **10**, 386–8(1939). E. H.

Preparation of semipermeable tubes for determination of osmotic pressure. E. Blegen. *Skand. Arch. Physiol.* **81**, 8–10(1939).—A collodion tube is placed in 5% $CuSO_4$ and then in 5% $K_4Fe(CN)_6$, whereby $Cu_2Fe(CN)_6$ is pptd. These tubes may be used over a long period for osmotic-pressure detns. B. C. P. A.

Apparatus for measuring the moisture in powder by a method of entrainment. G. Fleury and H. Liegier. *Mém. poudres* **29**, 222–5(1939).—App. modification. Cf. *C. A.* **25**, 5991. A. J. Phillips

A cell adapted for conductivity measurements of protein solutions. Thomas J. Dietz. *J. Franklin Inst.* **229**, 260–3(1940).—A description of a cell, with sealed-in Pt disk electrodes of cross-sectional area equal to that of the cell, designed for use with small vols. of protein solns. and to avoid the trapping of air bubbles at the electrodes. Edward B. Sanigar

Electric temperature regulators. H. Hirst. *Elec. Engr. and Merchandiser* (Australia) **16**, 247–50(1939).—A review. Four types of regulators are considered and 9 discussed: Direct (metal) expansion regulators, resistance thermostats, contact regulators, potentiometric regulators. C. G. F.

Pressure-spring thermometers. Characteristics of the various types. L. G. Bean. *Instruments* **12**, 298–300 (1939).—A review. E. H.

Absorption refrigerators in the chemical industry. W. Niebergall. *Z. Ver. deut. Ing.* **84**, 41–7(1940).—A review with 17 references. E. H.

Glass as chem. engineering material (Quarendon) 19.

Colvin, F. H., and Stanley, F. A.: Grinding Practice. New York: McGraw-Hill Book Co. 310 pp. $3.

Kieser, A. J.: Handbuch der chemisch-technischen Apparate, maschinellen Hilfsmittel und Werkstoffe. Lfg. 14. Berlin: J. Springer. Pp. 1251–1346. M. 8.50. Cf. *C. A.* **33**, 3633[9].

Razous, Paul: Théorie et pratique du séchage industriel. 4th ed. Paris: Dunod et Cie. 334 pp. Fr. 92. Reviewed in *Chimie & industrie* **42**, 650(1939).

Stowe, Loyd R.: The Simple and Direct Answer to All Problems of Heat Transfer in Boilers. Chicago: The Author. 90 pp.

Svedberg, The, and Pedersen, K. O.: Die Ultrazentrifuge. Bd. VII of Handbuch der Kolloidwissenschaft. Dresden: Th. Steinkopff. 433 pp. M. 26.25.

Laboratory Glass Blowing with Pyrex Brand Glass. Corning, N. Y.: Corning Glass Works (Lab. and Pharmaceutical Division). 20 pp. Free.

Milling Methods. Vol. 134. 1939. New York: Am. Inst. Mining and Metallurgical Engineers. 458 pp. 45s. Reviewed in *Chem. Eng. Mining Rev.* **32**, 128 (1939).

High-vacuum molecular distillation apparatus. Kenneth C. D. Hickman (to Distillation Products, Inc.). U. S. 2,180,050, Nov. 14. Various details of an app. with a revolving drum which may contain an electrically heated heating medium such as an animal, vegetable or mineral oil, a phthalic acid ester, molten Sn or a Bi alloy, etc. U. S. 2,180,053 relates to a vacuum distn. app. with juxtaposed vaporizing and condensing disks. U. S. 2,180,052 (Kenneth C. D. Hickman and John C. Hecker, joint inventors; to same assignee) also relates to a vacuum distn. app. with rotating vaporizing and condensing plates, etc.

Distilling liquids of high boiling point. Karl Sondermann (to American Lurgi Corp.). U. S. 2,179,833, Nov. 14. App. is described, and a method of distg. liquids having relatively high b. ps. including fatty acids and glycerol which comprises establishing a body of liquid to be distd. in a suitable vessel, heating the body of liquid to distn. temps., subjecting the liquid to agitation and vertical circulation, establishing a second body of liquid within the vessel from a portion of the agitated and vertically circulated liquid, subjecting the second body of liquid to heat to finish the distn thereof, collecting vapors from both bodies of liquid in a common vapor space, and withdrawing distn. residues from the second body of liquid.

Gas and liquid contact apparatus suitable for use in fractional distillations. Arthur J. V. Underwood. U. S. 2,180,888, Nov. 21. Various structural and operative details.

Balances for analytical work. Baird & Tatlock (London) Ltd. and Hans J. Fuchs. Brit. 506,747, June 2, 1939.

Pressure fillers for pipets. Harold W. Gardner. Brit. 506,779, June 5, 1939.

Mixing and beating apparatus for large batches of materials. Walter F. Dehuff (to American Machine & Foundry Co.). U. S. 2,181,078–9, Nov. 21. Various structural, mech. and operative details.

Apparatus suitable for control of mixing operations. Yves A. Bouget and John N. Selvig (to Western Elec. Co.). U. S. 2,180,393, Nov. 21. Various details of an app. suitable for use in mixing fibrous pulp material with water for insulating wire, etc.

Float-operated device for controlling the level of liquids such as those in tanks. Edward T. Dahl (to Mason-Neilan Regulator Co.). U. S. 2,180,844, Nov. 21. Various structural, mech. and operative details.

Extensometer. Jens Sivertsen (to Tinius Olsen Testing Machine Co.). U. S. 2,180,175, Nov. 14. Various details of app. suitable for measuring changes in the length of specimens such as those of steel.

Hydrometer. Charles Nurnberg. U. S. 2,180,995, Nov. 21. Various structural details.

Adsorption apparatus for recovering solvent vapors from air. Leonard A. Logan (to Carbide and Carbon Chemicals Corp.). U. S. 2,180,712, Nov. 21. Various structural and operative details of an app. suitable for use with granular activated carbon as an absorbent material. Cf. *C. A.* **34**, 663[3].

Apparatus for controlling the pressure of fluids such as steam or oil vapors. James Briscoe (to Manning, Maxwell & Moore Inc.). U. S. 2,180,395, Nov. 21. Various structural, mech. and operative details.

Tank, etc., suitable for use in shipping natural gas, hydrogen, helium, etc. Carleton O. Booth. U. S. 2,179,682, Nov. 14. Various structural features.

Adsorber apparatus for solvent-vapor recovery. Robert H. Osterloh and William L. Scarborough (to E. I. du Pont de Nemours & Co.). U. S. 2,180,119, Nov. 14. Various structural details.

Dispensing container for vaporizable materials such as insecticides. Harold T. Weiss. U. S. 2,180,752, Nov. 21. Various structural details.

Gas-analyzing apparatus. Philip T. Sprague, Charles A. Sprague and Arnold Soller. U. S. 2,179,867, Nov. 14. Various structural and operative details of an app. suitable for use with liquids for absorbing O, CO_2 or SO_2 from mixed gases.

Liquefaction and separation of gases such as those of the air. Adolf Messer. U. S. 2,180,715, Nov. 21. App. is described, and a method of reducing the starting time of an intermittently operated air-sepg. plant of the type which includes a rectification column, which comprises storing a portion of the liquid O formed by the plant during its normal operating period in a sep. storage tank, and permitting the liquid O to evap. in the rectification column during a normal shutdown period, to maintain the column cold.

Apparatus for handling and delivery of normally gaseous material such as liquefied oxygen. Wm. F. Mesinger (to Linde Air Products Co.). U. S. 2,180,090, Nov. 14. Various structural and operative details.

Device for delivering measured quantities of liquids such as oils, etc. Frederick W. Berwick and Albert G. Berwick (to De Laval Separator Co.). U. S. 2,180,702, Nov. 21. Various structural, mech. and operative details.

Apparatus for maintaining a constant hydrostatic pressure upon liquids such as those undergoing polymerization in molds. Charles M. Fields and Reuben T. Fields (to E. I. du Pont de Nemours & Co.). U. S. 2,180,818, Nov. 21. Various structural, mech. and operative details.

Tube thermometers containing fluids such as mercury. Charles R. Palmer (to The Palmer Co.). U. S. 2,180,285, Nov. 14. Various details of structure and color striping.

Glass-tube thermometer. Wm. M. Young (to Taylor Instrument Companies). U. S. 2,179,773, Nov. 14. Various structural details.

Thermocouple. Raymond R. Ridgway (to Norton Co.). Can. 386,183, Jan. 9, 1940. Structural details are described of a thermocouple having contact elements of B_4C and graphite.

Catalytic devices for gas burners. The Gas Light and Coke Co., John A. Brigg and Ernest W. Voice. Brit. 507,083, June 9, 1939. A substance, e. g., PbO_2, that removes oxides of S from air or gases coming into contact with the catalyst is provided in the neighborhood of the catalyst. A moisture-absorbing material, e. g., SiO_2-gel or Al_2O_3-gel, may also be provided.

Portable gas-testing device suitable for determining carbon dioxide in furnace gases. Frank W. Dwyer. U. S. 2,181,013, Nov. 21. A small portable gas-testing app. comprises a block of transparent material having a caustic soln. container therein, a pressure gage therein, means for placing the gage and receptacle in communication, means including a single sliding valve for admitting gas into and permitting its discharge from the receptacle, means for intermixing the gas and soln. and a graduated

scale for indicating the percentage of CO_2 in a given sample of gas introduced through the valve. 1

Tube and header heat-exchange apparatus suitable for heating or cooling air. Lawrence C. Soule (to Carrier Corp.). U. S. 2,180,854, Nov. 21. Various structural details.

Production and handling of liquefied carbon dioxide. Eric Geertz and Jesse E. Taylor (to Cardox Corp.). U. S. 2,180,231, Nov. 14. An arrangement of app. is described, and a method of handling a liquefied gas which must be maintained above 75 lb. per sq. in. pressure to maintain it as a liquid comprising passing the gas through a plurality of stages of compression, cooling the gas after each stage of compression to remove the heat absorbed by the gas, condensing the compressed gas to obtain liquid, lowering the temp. and pressure of the liquid to a predetd. selected sub-atm temp and its corresponding vapor pressure, which will be above 75 lb. per sq. in., and delivering the low-temp., low-pressure liquid without change in temp. and pressure to an insulated container charged with a fluid at a pressure which will prevent the pressure of the incoming liquid from dropping below 75 lb. per sq. in. 2 3

Refrigerating apparatus suitable for use with sulfur dioxide, etc. Frederick W. Binns (to Virginia Smelting Co.). U. S. 2,180,624, Nov. 21. Various structural and operative details of an app. in which a refrigerant such as SO_2 and a stable heat-exchange medium such as a salt brine are used.

Apparatus for generating acetylene from calcium carbide and water. Hermann Holler and Otto Mues (to I. G. Farbenind. A.-G.). U. S. 2,180,085, Nov. 14. An app. in which the quantity of water added is limited so that a pulverulent residue is obtained includes at least one revolving screen for the reception of the Ca carbide to be gasified, a water inlet pipe arranged above the axis of each revolving screen and having at least one exit opening so that only the carbide within this screen is moistened, at least one revolving plate mounted below the revolving screen and at least one means mounted above the plate for moving the reacting material over the plates and a casing enclosing all the aforesaid parts. 4

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

William Arthur Bone, 1871–1938. R. J. Sarjant and D. T. A. Townend. *Fuel Econ. Rev.* **18**, 33–8(1939).—Biography with portrait. E. H.

Alwin Mittasch's 70th birthday. H. G. Grimm. *Z. Elektrochem.* **46**, 1–2(1940).—Biography with portrait. G. G.

J. E. Verschaffelt, seventieth birthday. F. de Block. *Natuurw. Tijdschr.* **21**, 182–4(1940).—Biography with portrait. G. G. 5

William Thomas Burgess. A. More. *Analyst* **65**, 1–2(1940); *J. Chem. Soc.* **1940**, 100.—Obituary. W. T. H.

Elek 'Sigmond. László Mados (Kotzmann). *Mezőgazdasági Kutatások* **12**, 203–4(1939).—Obituary. S. S. de Finály

Chang Po-Tuan of T'ien-T'ai, his Wu Chên P'ien, essay on the understanding of the truth. A contribution to the study of Chinese alchemy. Tenney L. Davis and Chao Yün-Ts'ung. *Proc. Am. Acad. Arts. Sci.* **73**, 97–114 (1939). E. H. 6

Historical observations during a recent chemical trip to Europe. C. A. Browne. *J. Chem. Education* **17**, 53–63 (1940). E. H.

Schelling and chemistry. Rud. Winderlich. *Chem.-Ztg.* **63**, 680–1(1939).—Biographical note on Friedr. Wilh. Jos. Schelling (1775–1854). E. H. 7

The work of "Doctor Cellula" Anton Giuseppe Pari (1802–1891). Gino Testi. *Soc. ital. progresso sci., Atti XXVII riunione Bologna* **6**, 589–94(1939).—The nickname was given to Pari by his contemporaries because he maintained, throughout 60 yrs. and in all his innumerable contributions, a theory that in all the universe there are but 2 forms of energy, one consisting of minute elements having an attractive power and the other of minute elements having a repulsive power. E. H. 8

The Imperial Institute as an information center. Harry Lindsay. *Rept. Proc. 16th Conf. Assoc. Special Libraries Information Bureaux* (London) **1939**, 10–20.—**The accessibility of British university thesis literature.** Luxmoore Newcombe. *Ibid.* 21–30. **The accessibility of thesis literature of the United States.** Watson Davis. *Ibid.* 31–4. **Notes on thesis literature in France.** Julian Cain. *Ibid.* 35. **Author abstracts as an aid to documentation.** Gordon S. Fulcher. *Ibid.* 41–5. **Errata and corrigenda.** J. N. Goldsmith. *Ibid.* 46–9. **The cinema and the information services.** Thomas Baird. *Ibid.* 50–61. **B. B. C. libraries and information bureaux.** Guy Pocock. *Ibid.* 62–76. **Microphotography in 1939.** Leonard A. Sayce. *Ibid.* 77–83.—A series of papers not primarily chem. in nature but of much interest on the library side of chemistry. E. J. C. 9

The second centenary of the founding of the first chair of chemistry in Italy (1737–1937). Mario Betti. *Soc. ital. progresso sci., Atti. XXVII riunione Bologna* **6**, 501–10(1939).—History of the chair of general chemistry at the University of Bologna, with biographies of its occupants, Jacopo Bartolomeo Beccari, Vincenzo Menghini, Vincenzo Pozzi, Luigi Laghi, Giovanni Marchetti, Pellegrino Salvigni, Antonio Santagata, Domenico Santagata and Giacomo Ciamician, and (in the chair of organic chemistry) Pietro Piazza. E. H.

Modern chemical education. A. J. Staverman. *Chem. Weekblad* **36**, 859–61(1939).—A description and discussion. T. H. Dunkelberger

The 1938–1939 college chemistry testing program. F. D. Martin. *J. Chem. Education* **17**, 70–6(1940). E. H.

Chemical engineering design courses—a survey. Frank H. Conrad and W. E. Yates. *J. Chem. Education* **17**, 85–9(1940). E. H.

A convenient laboratory still [for water]. Edward Rietz. *J. Chem. Education* **17**, 95(1940). E. H.

An improved heat of vaporization demonstration. Vinton R. Rawson. *J. Chem. Education* **17**, 94–5(1940). E. H.

The measurement of temperature. L. Louis Mulder. *Gesundh.-Ing.* **62**, 677–82(1939).—A review. E. H.

The present position of the measurement of pH. W. Kordatzki. *Chem.-Ztg.* **63**, 685–7, 709–10(1939). E. H.

A solution supersaturated at its boiling point. Lawrence H. Amundsen. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 73(1939).—A lecture demonstration. A soln. of 2,3-dihydro-5,6-diphenylpyrazine, supersatd. at its b. p., can be prepd. by boiling for 15 min. or longer a soln. of 100 g. benzil and 45 cc. of 68% ethylenediamine in 300 cc. of 95% EtOH. Crystn. is induced by adding a crystal of the compd. or by scratching the inside of the container. If the source of heat is removed and boiling allowed to cease before inducing crystn. the soln. boils again when crystn. takes place because of the heat evolved by the process. Leopold Scheflan

Some old chemistry books. Edward R. Atkinson. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 84(1939).—The book *Coelum Philosophorum* by Philipp Ulstad (1527) is definitely alchem. in nature and deals with the prepn. of various medicinals. *A Comparative View of the Phlogistic and Antiphlogistic Theories* by William Higgins (1789) constitutes a vigorous expt. support of Lavoisier's principles and in it the at. hypothesis is arrived at following an understanding of what is now called the law of multiple proportions; this was 12 years prior to Dalton's earliest

work on this subject. *Experiments and Observations on the Atomic Theory* by William Higgins (1814) was written by the author to retain the credit due him as the first to apply the at. hypothesis to chemistry. L. S.

The physics and chemistry of estuarine waters in Chesapeake Bay. Curtis L. Newcombe, Wm. A. Horne and Boland B. Shepherd. *J. Marine Research, Sears Foundation Marine Research* 2, 87–116(1939); cf. *C. A.* 32, 8642[3]; 33, 9061[2].—The Chesapeake Bay waters in the region of Solomons Island, Md., were studied during June, 1936–June, 1938. The temps. in the summer, Oct., 1st week of Dec., Jan.-Feb. and middle of June are approx. 25, 15, 7, 3–4 and 20°, resp. The variation from surface to bottom rarely exceeds 4° and for long periods between Sept. and June it is only about 1–2°. In winter the temps. are often continuously lower at the surface than at the bottom. The hourly changes are usually less than 0.5°. The annual chlorinity at Station 1 (about 38° 18′ N. lat. and 76° 25′ W. long.) varied from 0.581 to 1.023% at the surface and from 0.886 to 1.250% at the bottom. During the summer, at about 10 or 14 m., there is usually an abrupt graduation from the less dense surface waters to the bottom stratum of heavier water possessing a relatively uniform chlorinity. The O satn. is as high as 150% in Jan., probably due to phytoplankton abundance, and as low as 33% in summer, perhaps due to the mixing of bottom with surface waters. The very low O concn. in the bottom waters over relatively large deep areas of the bay during June-Sept. is significant. Surface waters unusually low in O are considered to have their origin in the deeper areas of the bay. Secchi disk readings, though subject to error, reveal marked seasonal, as well as horizontal, variations from the bay up the Patuxent River. The extent of the seasonal variations in the bay is about 2.3 m. and the max. bay-river variations about 3.2 m. The phosphate content of the bay waters in summer is commonly as high as 0.23×10^{-3} mg. atoms P/l. at the surface and 1.0×10^{-3} mg. atoms in the bottom waters. The av. concn. is about 0.95×10^{-3} mg. atoms P/l. in the waters at the upper stations in the Patuxent River. Min. concns. occur during the winter when turbidity is min. and the abundance of phytoplankton organisms is max. The nitrite concn. varies from 0 to 0.6×10^{-3} mg. atoms NO_2-N/l. The bottom concns., occasionally as high as 1.1×10^{-3} mg. atoms/l., are higher than the surface values. Zero values are frequently found in the surface layers of the Chesapeake area in early summer. During the summer the NH_3-N varies from 0 to over 8.0×10^{-3} mg. atoms/l.; local variations are pronounced. Although the Chesapeake waters are apparently much richer in NH_3-N than ocean water, the local N cycles must be studied before definite conclusions can be reached. The waters in the upper reaches of the Patuxent River during the summer contain as much as $50–116 \times 10^{-3}$ mg. atoms Si/l. The concns. at the lower river stations and in the bay commonly range around $20–30 \times 10^{-3}$ mg. atoms Si/l.

Ruth Berggren

Chemical studies of the western Pacific Ocean. V. The vertical variation of minor constituents in the "Kurosio" region. 1. Yasuo Miyake. *Bull. Chem. Soc. Japan* 14, 461–6(1939); cf. *C. A.* 33, 8063[5].—Variation of temp., chlorinity, d., and dissolved O in the Japan Current followed in general its structure: (a) a homogeneous surface layer of 100 m. with temp. 18°, chlorinity 19.23, d. 1.0251 and 5 ml. of O/l.; (b) the main part of the "Kurosio" at about 100 to 150 m., with temp. 15.2°, chlorinity 19.15, d. 25.65 and 4.34 ml. O/l.; (c) the subarctic intermediate water between 150 m. and 700 m., with diminishing temp., chlorinity and O, but increasing d.; (d) the deep water (studied between 700 and 1000 m.), with decreasing temp. and O, and increasing chlorinity and d. The O min. reported elsewhere at 700 m. was not found here. The pH diminished gradually from 8.25 at the surface to 7.78 at 1000 m. **VI. The vertical variation of minor constituents of the "Kurosio" region. 2.** *Ibid.* 467–71.—Silicate content (as Si) varied with structure increasing from 0.2 mg./l. in the surface layer to 2.28 mg./l. at 1000 m. The low values, as compared with those of the California Current, are attributed to the vertical stability of the "Kurosio." Phosphate (as P) increased from 2.0 γ/l. at the surface to 11.7 γ/l. at 1000 m., following a staggered curve. The max. reported elsewhere at 700 m. was not found here. B content increased slightly from 4.61 mg./kg. at the surface to 5.44 mg./kg. at 1000 m. Cu content was shown to increase a hundredfold, but the possibility of contamination from the Nansen water bottles necessitates further study. No appreciable vertical variation of F was found.

Wm. E. Trout, Jr.

Aluminum reflectors. A. G. C. Gwyer and N. D. Pullen. *Metallurgia* 21, 57–60(1939); *Metal Ind.* (London) 56, No. 1, 7–10; No. 2, 33–5(1940).—In Al treated by the Brytal anodic process a min. in reflectivity occurs at 3 μ. This is at the wave length of max. absorption by water and suggests that the min. reflectivity of the treated Al is caused by absorption by water in the anodic film. When films were heated and waxed while hot or heated in oil the min. reflectivity at 3 μ did not occur and reflectivity was high for all wave lengths investigated.

J. L. Gregg

Isotopes as a tool in chemical research. Joseph Joffe. *Newark Eng. Notes* 3, No. 1, 10–11(1939).—A review.

Leopold Scheflan

Volta effect and the periodic system of the elements. O. Scarpa. *Atti accad. Lincei, Classe sci. fis., mat. nat.* 29, 273–6(1939).—The Volta effects referred to as contact potential and referred to brass in the *Critical Tables*, are detd. with reference to Pt. Values reported are K 2.84, Na 2.39, Hg 1.13, Mg 1.04, Al 1.01, Zn 0.95, Cd 0.91, Pb 0.74, Sn 0.66, Sb 0.49, Ni 0.43, Bi 0.41, Fe 0.38, Cu 0.19, Au 0.07, and Ag 0.04 volts. Plotted against at. nos., these values fall into periods corresponding to their positions in the Mendeleev system. A. W. C.

Chemical force as the action of a matter field. F. Hund. *Ann. Physik* 36, 319–27(1939).—Math. H. C. T.

The determination of internuclear distances and of dissociation energies from force constants. G. B. B. M. Sutherland. *J. Chem. Phys.* 8, 161–4(1940).—Math.-theoretical. G. M. Petty

Calculation of force constants in some methyl compounds. J. W. Linnett. *J. Chem. Phys.* 8, 91–8(1940).—Force-const. calcns. on C_2H_6, the Me halides, MeCN and MeNC are described. The potential function used is based on a valency type force field with the introduction of one cross term rendered likely by phys. considerations. The applicability of this function to the mols. under consideration is tested with C_2H_6. The C–C bond force const. in MeCN is considerably greater than in C_2H_6 indicating that the bond has some double-bond character in the cyanide, as has been suggested by Pauling, Springall and Palmer (*C. A.* 33, 4480[7]). The bending const. of the HCH angle remains const. in the 4 Me halides, there being changes, however, on passing to the other compds. Other variations in the force consts. of corresponding links, similar to these, are studied and their significance discussed. G. M. Petty

Directed valence. George E. Kimball. *J. Chem. Phys.* 8, 188–98(1940).—The problem is treated from a group-theory point of view. G. M. Petty

Magnitude of the coördination numbers and the chemical formulas of complex compounds. B. Ormont. *J. Phys. Chem.* (U. S. S. R.) 13, 646–50(1939); *Acta Physicochim. U. R. S. S.* 11, 87–96(1939)(in English).—Theoretical. The inadequacies of present theories of coördination nos. as regards the description of the formation of stable configurations and the actual structure in crystals are discussed and rules to correct these defects are suggested. F. H. Rathmann

Dimensions of the phosphine and arsine molecules and the possibility of optically active derivatives. G. B. B. M. Sutherland, E. Lee and Cheng-Kai Wu. *Trans. Faraday Soc.* 35, 1373–9(1939).—Assuming the valence force field to det. the apical angle from purely vibrational data, the following dimensions are given for PH_3 and AsH_3, resp.: XH band: 1.46 and 1.56 A.; XHX angle:

99° and 97°; the height of the pyramid: 0.67 and 0.75 A. The height of the barrier restricting the passage of the P atom through the plane of the H atoms is detd. to be about the same as in NH_3; the frequency is, however, roughly 1000 times less. From a study of PD_3 it is suggested that the substitution of large groups in place of the H atoms might produce a mol. for which the frequency of inversion is sufficiently slow to enable optically active isomers to be sepd. at low temps. Victor R. Deitz 1

Effect of the restriction of rotation and of anisotropy of the internal field on the polarization of liquids. A. Peterlin and H. A. Stuart. *Z. Physik* **113**, 663–96(1939).—The combined effects of restriction of rotation and anisotropy of the internal field on the polarization and artificial double refraction are calcd. for pure liquids with polar and non-polar mols. and dil. solns. Though the theory represents the exptl. results in some cases, in others (particularly those involving magnetic double refraction) the agreement is poor. Other factors than those considered here must be included. E. J. Rosenbaum 2

Physicochemical study of the ozonides of ethyl cinnamate and of styrene. Raman spectrum, ultraviolet absorption, heat of ozonization, dielectric constant and dipole moment. E. Briner, A. Gelbert and F. Perrottet. *Helv. Chim. Acta* **22**, 1491–6(1939) (in French); cf. *C. A.* **32**, 4419[7]; **33**, 8068[8].—The Raman spectrum of the ozonide of PhCH:$CHCO_2Et$ (I) presents lines peculiar to other ozonides, as well as an intense frequency characteristic of the double bond. The ultraviolet absorption of I is apparently not modified as much by ozonization as that of other compds. studied. The heat of ozonization of I, detd. by a direct method, is 94 Cal. Ozonization does not change perceptibly the dielec. const. and dipole moment of I; this indicates that the elec. symmetry of this substance is not notably affected by the fixation of 3 atoms of O. Because of its instability, measurements on the ozonide of PhCH:CH_2 did not give satisfactory results. Ruth Berggren 3

The magnetic susceptibility of silver subfluoride. Simon Freed, Nathan Sugarman and Richard P. Metcalf. *J. Chem. Phys.* **8**, 225–6(1940).—The molal susceptibility of Ag_2F is -64.3 ± 1.2 e. m. u. $\times 10^{-6}$ both at 24°C. and at 77°K. Conduction electrons contribute a considerable diamagnetism which is related to the anisotropy of the crystals. G. M. Petty 4

Magnetic susceptibility of nickel chloride. H. R. Nettleton and S. Sugden. *Proc. Roy. Soc.* (London) **A173**, 313–23(1939).—Since the susceptibility of $NiCl_2$ in aq. solns. is const. over a wide range of concns., and the Ni content of a soln. can be detd. accurately by well-known methods, this compd. is a suitable reference standard for susceptibility work. The Gouy method was used to det. with high precision the susceptibilities of 2 aq. solns. of $NiCl_2$ of different concns. The av. mol. susceptibility at 20° ($\times 10^6$) is 4436 ± 12. Full exptl. and theoretical details are given. W. W. Stifler 5

Magnetic susceptibilities of some cupric salts. James Reekie. *Proc. Roy. Soc.* (London) **A173**, 367–78(1939).—The Gouy method was used to measure the mass susceptibilities of powd. $CuSO_4.5H_2O$, $CuSO_4.K_2SO_4.6H_2O$, and $CuSO_4.(NH_4)_2SO_4.6H_2O$ from room temp. down to 1.6°K. Throughout this entire region $CuSO_4.5H_2O$ follows the Curie-Weiss law in the form $\chi_M'(T + 0.7) = 0.4595$. Both of the double sulfates follow the Curie-Weiss law in the form, $\chi_M'(T - 0.3) = \text{const.}$, down to 14°K., but in the liquid-He region they obey the simple Curie law. The satn. moments of the Cu^{++} ion in the 3 crystals are calcd. as 1.923, 1.917 and 1.907 Bohr magnetons, resp. The theoretical interpretation of these results is discussed and it is shown that while Jordahl's cryst. field theory (*C. A.* **28**, 3284[3]) accounts satisfactorily for the behavior of the double sulfates, it does not give an adequate explanation of the results for $CuSO_4.5H_2O$. Apparently either the system of energy levels of the Cu^{++} ion in the simple sulfate is quite different from that in the double sulfates or else the effects of magnetic interaction become appreciable at relatively high temps. W. W. Stifler 6

Magnetic studies of solid solutions. I. Methods of observations and preliminary results on the precipitation of iron from copper. F. Bitter and A. R. Kaufmann. *Phys. Rev.* **56**, 1044–51(1939).—One of the new Fe-free magnets in the magnetic laboratory at M. I. T. (*Rev. Sci. Instruments* **10**, 373–81(1939)) was used to study alloys of Cu, contg. up to 0.7% Fe, at temps. from 20° to 1000°. Magnetization curves for fields up to 40,000 gausses were obtained, chiefly by the Curie method, although the Gouy method was used in some cases. The Fe atoms in soln. seem to retain a permanent magnetic moment of approx. 3.5 Bohr magnetons. The Curie-Weiss law is followed at high temps. For an alloy contg. 0.7% Fe by weight, the Curie point is 150°K. The behavior of this soln. is sluggish and it can be supercooled by 100°. The manner of pptn. of the Fe from the soln. is complex. Apparently there is a rearrangement of the atoms in the soln., followed by a pptn. of a non-magnetic phase. By cold working this is converted into a ferromagnetic phase which can be made to grow thermally although it does not seem to grow readily of its own accord. Powder compacts did not give as satisfactory results as cast samples. The theory and methods of measurement are given in some detail. W. W. Stifler 7

Dependency on size of the diamagnetic susceptibility of quartz. Yosomatu Simizu and Noboru Takatori. *Science Repts. Tohoku Imp. Univ.*, K. Honda Anniversary Vol., First Ser., **1936**, 306–11; *Neues Jahrb. Mineral., Geol.* Ref. I, **1939**, 660.—The diamagnetic susceptibility of powd. quartz decreases appreciably with decreasing size of the grains. C. A. Silberrad 8

Paramagnetic dispersion in iron ammonium alum. P. Teunissen and C. J. Gorter. *Physica* **6**, 1113–22(1939) (in English); cf. *C. A.* **33**, 2005[2], 8460[9].—The app. previously used to study the paramagnetic dispersion in Fe NH_4 alum was modified so that the high-frequency coils were inside the Dewar flask, instead of surrounding it. This change made it possible to increase the range of frequencies from $0.2 - 3.8 \times 10^6$ cycles, previously used, to $0.095 - 7.0 \times 10^6$ cycles. The new results lead to a revision of some of the conclusions previously deduced, and now agree well with the equation based on the concept of spin temp. No pos. evidence of anisotropy in dispersion in the crystal was found. Apparently the concept of spin temp. is applicable to magnetic fields well above those provided for in the theory. A discussion of the dependence of the relaxation consts. on temp. shows that the description of the thermal motion of the crystal lattice by one Debye-temp. is too simple to account for the observed phenomena. W. W. Stifler 9

Paramagnetism of the rare earths. B. Cabrera. *J. chim. phys.* **36**, 237–55(1939).—The theory of the paramagnetism of the cations of the rare earths is outlined and the phys. interpretation of the consts. introduced in the various modifications of the simple Curie law is discussed. The results of many expts., extending over several years, on the oxides, anhyd. sulfates, and octahydrates of Gd, Tb, Dy, Ho and Er are summarized without details of the actual measurements. These cations all obey the Curie-Weiss law. The chief conclusions are given in the table 10

Cation	No. of expts.	Magnetic moment	No. of Weiss magnetons
Gd^{+++}	113	44,150	39.06
Dy^{+++}	121	58,980	52.19
Ho^{+++}	65	58,520	51.78
Er^{+++}	90	53,080	46.96
Tb^{+++}	36	?	?

The value of the Weiss magneton is taken as 1130.3. While some data are given for Tb, the results are not concordant. Since measurements of χ at different temps. were made without disturbing the specimen, the relative values of χ, which give the law of variation with temp., are probably 10 times as reliable as the abs. value. W. W. Stifler 11

The electric quadripole and magnetic dipole moments of Li^6 and N^{14}. M. E. Rose. *Phys. Rev.* **56**, 1064(1939).—Theoretical. G. M. Petty 12

Dipole-dipole resonance forces. G. W. King and J. H. Van Vleck. *Phys. Rev.* **55**, 1165–72(1939).—Math.-theoretical. The sign and size of the dipole-dipole resonance energy which obeys the inverse-cube law are detd. Sp. calcns. are made and curves of energy vs. distance are drawn for H, Na, Cd and Hg. G. M. Petty

The dipole moments and structures of chlorine compounds of germanium, chromium, selenium and tellurium. C. P. Smyth, A. J. Grossman and S. R. Ginsburg. *J. Am. Chem. Soc.* **62**, 192–5(1940).—The dipole moment of GeH_3Cl was measured in the vapor state and the moments of CrO_2Cl_2, Ph_2SeCl_2 and $TeCl_4$ were measured in soln. The ratio of the moment of GeH_3Cl to the previously published value of GeH_3Cl_2 (cf. *C. A.* **34**, 2974) shows that the large size of the Ge atom largely eliminates induction between 2 Cl atoms attached to it. The considerable value of the moment of the mol. shows that the Ge-Cl bond moment is about 2 or greater than this by the amount of the small Ge-H moment. The very small moment of CrO_2Cl_2 shows that the Cr-Cl bond is of the same magnitude as the more or less semipolar Cr-O moment and probably as large as 3. The large moments found for Ph_2SeCl_2 and $TeCl_4$ indicate unsym. tetrahedral structures for their mols. The Se-Cl and Te-Cl bond moments necessary to produce such moments are much larger than those calcd. as the electronegativity differences between the elements. A. B. Garrett

Frictional dispersion of the dielectric constants of organic liquids at very high frequencies ($\lambda = 15$ cm.). R. Odenwald. *Ann. Physik* **35**, 690–700(1939); cf. *C. A.* **33**, 1778, 9085, 32227.—Measurements of the dielec. consts. of $PhNO_2$ dissolved in Shell oil *K20* as a function of concn. and temp. are extended to higher frequencies ($\lambda = 14.86$ cm.). The results agree with the Debye dipole theory. E. O. Wrig

The effect of solvent on the internal rotation of carbonic ester. Masasi Yasumi. *J. Chem. Soc. Japan* **60**, 1208–14 (1939).—The dipole moments of dimethylcarbonate and diethylcarbonate were measured in the solvents benzene, hexane and butane in the temp. range −40° to +70°. The dipole moments increase with increase in temp. This phenomenon is considered theoretically. T. K.

Dielectric evidence of molecular rotation in the crystals of certain nonaromatic compounds. Addison H. White and W. S. Bishop. *J. Am. Chem. Soc.* **62**, 8–16(1940).—Dielec. const. data are given for 2 derivs. of C_2H_6, 1 deriv. of cyclopentane, 5 derivs. of cyclohexane, and 13 derivs. of camphane. In most of these solids the dielec. const. rises abruptly at a transition, as temp. is increased, to a value characteristic of polar compds. These and other data (cf. *C. A.* **31**, 6943[1]) constitute convincing evidence that extensive rotational motion of large org. mols. is much more commonly found in crystals than has been suspected. This is more frequently found among the derivs. of cyclic polymethylenes than among the generality of org. compds., whose polarizations have normally been found to be so low in the solid state as to be ascribed to distortional effects only. The most significant phys. characteristic of these crystals in which there is mol. rotation is their low heat of fusion. It appears likely that among these nonaromatic compds. very low heat of fusion is more immediately assocd. with the ability of a mol. to rotate in the crystal lattice than with its spherical shape. For rotation in the crystal to be possible, however, a certain degree of either spherical or circular geometrical symmetry obviously is required of the mol., and its center of figure should not be displaced too far from its center of gravity. A. B. Garrett

Dielectric evidence of molecular rotation in the crystals of certain benzene derivatives. Addison H. White, B. S. Biggs and S. O. Morgan. *J. Am. Chem. Soc.* **62**, 16–25 (1940).—These dielec.-const. measurements show that mol. rotation may occur in the cryst. form of benzene derivs. as well as in aliphatic compds., provided certain requirements of symmetry are met. These data represent an extension of the ideas of the importance of symmetry (cf. *C. A.* **31**, 6943[1]) to a new class of compds., substituted benzenes, which are geometrically sym. about one axis, but electrically assym. Two kinds of evidence of molecular rotation in certain aromatic crystals are obtained: (1) The dielec. const. behaves like that of the corresponding liquid, and (2) among these solids, ϵ may be correlated with the dipole moment of the mol. Although each of the mols. involved possesses considerable volumetric symmetry about one axis through its center of gravity, the less sym. of them cease rotating abruptly at transitions, while the more sym. exhibit reduced frequency of rotation but no transitions as the temp. declines. A. B. Garrett

Investigation of the dielectric losses in the mixtures nitrobenzene–benzene and ethyl alcohol–benzene. G. M. Panchenkov and O. K. Davtyan. *J. Phys. Chem.* (U. S. S. R.) **13**, 651–9(1939).—The tangent of the angle of dipolar loss of the systems EtOH–benzene (I) and $PhNO_2$–benzene (II) varies with concns. parallel with the change of mol. polarization; tan δ_{12} increases to a max. at 50% EtOH and 80% $PhNO_2$ in I and II, resp. The values of tan $\delta_2 \times 10^3$ for EtOH rise from 60 at 0%, to 81 at 40% and then fall to 40 at 100% EtOH; for $PhNO_2$ the value of tan $\delta_2 \times 10^3$ decreases continuously from 210 to 23. Values of the time of relaxation, τ, calcd. from the equation $\tau = 6\Delta\eta/-5kT$, as derived from the Einstein viscosity equation, are obtained from the viscosities of the mixts. and found to give values of the mol. radius half as great as obtained from the dielec. data. The discrepancy is explained as due to the rotation of the mols. contg. a terminal polar group. F. H. Rathmann

Polar structure of some benzein indicators. Myron A. Elliott and S. F. Acree. *J. Research Natl. Bur. Standards* **23**, 675–81(1939)(Research Paper No. 1263).—The dipole moments of α-naphtholbenzein and thymolbenzein in benzene soln. are 4.3×10^{-18} and 6.8×10^{-18} e. s. u., resp. The values are much lower than would be expected from the conventional static dipolar structure of mols. of the benzein type. It is suggested that there is resonance in the quinone-phenolate anion between at least 2 structures. One of these should have a dipole moment of about 3.9×10^{-18} e. s. u., and hence this type must predominate in the benzein derivs. studied. S. Glasstone

Note on the viscosity of gases and molecular mean free path. A. E. Schuil. *Phil. Mag.* **28**, 679–84(1939).—The viscosity data for a no. of gases are compiled and tabulated (54 references). From these values mean free paths and mol. diams. are calcd. E. J. Rosenbaum

Supersonic effects of water vapor in carbon dioxide and their relation to molecular vibrations. W. H. Pielemeier, H. L. Saxton and D. Telfair. *J. Chem. Phys.* **8**, 106–15 (1940). G. M. Petty

Virtual entropy of silicon tetrafluoride, calculated from the molecular constants. I. G. Ryss. *Compt. rend. acad. sci. U. R. S. S.* **24**, 568–9(1939)(in German).—Using the available electron diffraction, Raman and infrared data, the entropy (translational, rotational and vibrational) of gaseous SiF_4 was calcd. as follows (°K., entropy in cal./degree mol.): 298.2°, 67.439; 373.2°, 71.560; 400°, 72.876; 473.2°, 76.347; 500°, 77.476; and 573.2°, 80.494. In the above calcns., the Si-F distance was taken as 1.55 A. (cf. Braune and Pinnow, *C. A.* **31**, 4177[9]); if the distance is taken as 1.54 A. (cf. Brockway and Wall, *C. A.* **29**, 995[1]), the above entropy values must each be diminished by 0.039 cal./degree mol. The error in the calcd. entropy values is probably less than ±0.5 cal./degree mol. George Ayers

The entropy of long-chain compounds in the gaseous state. Maurice L. Huggins. *J. Chem. Phys.* **8**, 181–7 (1940); cf. *C. A.* **34**, 7071.—Equations are derived for the entropy of long-chain normal hydrocarbons in the gaseous state at 25°. (1) The translational entropy, computed classically, varies with chain length according to the relation $S_t = a + b \ln n$. (2) The entropy of rotation of the mol. as a whole, calcd. statistically, assuming either a ball-like mol. or absolutely random kinking, is also linear with respect to $\ln n$. (3) The entropy of internal vibrations, assumed (following Pitzer, *C. A.* **31**, 4863[9]) to be an additive function of contributions assocd. with the various types of bonds and bond angles present, obeys the equation $S_{iv} = a + bn$. (4) The entropy of internal randomness, for randomly kinked mols. with no rotation, with hindered

rotation, or with completely free rotation, is likewise linear in n. The equation deduced for long-chain paraffins, contg. but one adjustable const. (connected with the degree of hindrance of the rotation about the C-C bonds) agrees well with values deduced from sp. heat data for short-chain paraffins. G. M. Petty

Compressibilities and expansion coefficients of gases at low pressures, and their relation to molecular volume. J. B. M. Coppock. *Proc. Roy. Soc.* (London) **A173**, 201–11(1939).—A simple method is described for expressing compressibilities and related low-pressure data for non-polar gases in terms of their effective mol. vols. There is a linear relation between the compressibilities and expansion coeffs. and the corresponding mol. vols. for non-polar gases. The deviations of the polar gases from the linear relations of the non-polar gases when expressed in terms of the mol. vol. appear to be proportional to the dipole moment. R. F. D.

Thermodynamic properties from P-V-T data. Robert York, Jr. *Ind. Eng. Chem.* **32**, 54–6(1940).—A method of residuals is proposed which is especially useful for evaluating isothermal changes in thermodynamic properties from P-V-T data. In this advantage is taken of the fact that, along the isometric of the gas, approx. a linear relation exists between pressure and temp. This technique may be applied to evaluate isothermal changes in internal energy, enthalpy, entropy and free energy. Kenneth H. Slagle

Dissociation treatment of condensing systems. III. Properties of saturated vapors of H_2O, NH_3, CH_3Cl and CO_2. T. P. Tseng, S. K. Feng, C. Cheng and W. Band. *J. Chem. Phys.* **8**, 20–3(1940); cf. *C. A.* **33**, 9068[7].—The dissocn. treatment gives a satisfactory theory of the satd. vapor pressure curves in temp. ranges not too close to the crit. point. Curves are given for PV/NkT and for surface energy for H_2O, NH_3, MeCl and CO_2. There is a discrepancy in the energy curves for H_2O at low values of T/T_c; this may be removed by considering the small size of the clusters involved in the equil. between vapor and liquid (the surface energy in a cluster may differ from that for the liquid in bulk). A method of estg. mean cluster size leads to reasonable results. G. M. Petty

Volatility of technical p-nitroaniline with water vapors. A. V. Lebedev. *Khlopchato-Bumazhnaya Prom.* **1938**, No. 10, 33–5; *Khim. Referat. Zhur.* **2**, No. 4, 124(1939).—When diazo solns. are obtained from treatment of tech. p-nitroaniline (I) with hot water, vapors of light volatile substance (o-nitroaniline (II) and p-nitrochlorobenzene) and of water are given off. Lab. expts. (adsorption of the evolved vapors by a 0.5% soln. of H_2SO_4 after collecting them with an aspirator from above the vessel in which the diazo reaction has taken place) showed that the mixing, dissolving and diazotization of tech. I is accompanied by an evolution of nitro compds. (when mixing 0.17–0.25 g., dissolving 0.062 g. and diazotizing 0.055 g. per 38 g. of nitroaniline), whereas no volatile products are evolved from the purified nitroaniline (purified by a 4-fold treatment with hot water followed by filtration) under similar expti. conditions. It was shown (by prepg. mixts. of the purified I with II) that the volatility of the tech. solns. of I is caused by the presence of impurities of II.
W. R. Henn

Determination of the vapor pressure of aluminum chloride and its melts with sodium chloride at high temperatures. I. I. Naryshkin. *J. Phys. Chem.* (U. S. S. R.) **13**, 690–2(1939).—The values of A and B in the equation, $\log p = -(A/T) + B$, for $AlCl_3$-NaCl melts at 150–560° are: 100% $AlCl_3$, 4873, 13.602; 65.5%, 2004, 6.321; 59.4%, 2284, 5.416; and 51.8%, 4673, 7.181, resp. F. H. Rathmann

Density of molten antimony trichloride. D. I. Zhuravlev. *J. Phys. Chem.* (U. S. S. R.) **13**, 684–6(1939).—The d. of $SbCl_3$ is given by $d = 2.622 - 0.002268(t - 100) - 0.32 \times 10^{-5}(t - 100)^2 + 8.8 \times 10^{-12}(t - 100)^4 - 3.4 \times 10^{-14}(t - 100)^5$ from 73 to 505°. The vapor ds. in g./cc. are 0.028 at 324°; 0.123, 428°; 0.147, 442°; 0.171, 456.5°; 0.213, 470°. The crit. consts. are $T_k = 523°$; $d_k = 0.814$ g./cc., $p_k = 58.7$ phys. atm. F. H. R.

Determination of the surface tension by the Jaeger method when the specific gravity of the investigated liquid is not known. S. D. Gromakov. *J. Phys. Chem.* (U. S. S. R.) **13**, 551(1939); cf. *C. A.* **12**, 875.—The equation $P_1 = (2\sigma/r) + h_1 g[(P_2 - P_1)/(h_2 - h_1)]$, most applicable in the region $h_2 - h_1 = 30$–50 mm., is obtained.
F. H. Rathmann

Surface tension of water and heavy water. A. H. Cockett and Allan Ferguson. *Phil. Mag.* **28**, 685–93 (1939).—A micromethod was used to det. the surface tension of H_2O and D_2O in the temp. range 15–75°. For H_2O the values are represented by $\gamma_t = 75.23 - 0.06667t^{1.2}$; for D_2O, $\gamma_t = 74.64 - 0.1082t^{1.1}$. E. J. R.

The surface tension of 100% phosphoric acid and an interpretation of the structure of 100% phosphoric acid. Takesi Takeda. *J. Chem. Soc. Japan* **60**, 885–94(1939); cf. Shibata, *C. A.* **30**, 6667[8].—From the data of viscosity measurement and of Raman spectra, the stereochemistry of 100% phosphoric acid is discussed. T. Katsurai

Effect of carbon dioxide on the surface tension of mercury. R. C. L. Bosworth. *Trans. Faraday Soc.* **35**, 1353–4(1939).—The surface tension of Hg in the presence of air contaminated with various proportions of CO_2 was detd. by the max. bubble method, cf. *C. A.* **33**, 2383[7]. With increasing content of CO_2 the surface tension at first falls to a min. some 8% lower than the value in pure air at 3% CO_2, and thereafter rises very slowly with increasing CO_2 content, the value in pure CO_2 being about 1.5% lower than the value obtained in pure air.
Victor R. Deitz

Surface tensions of two-phase liquid systems containing benzene. J. W. Belton. *Trans. Faraday Soc.* **35**, 1354–61(1939); cf. *C. A.* **30**, 1285[6].—Two systems were investigated at 25°: (1) benzene–CS_2–water and (2) benzene–HOAc–water by a bubble-pressure method (cf. *C. A.* **30**, 669[9]). The adsorptions at the liquid-liquid interfaces were detd. from the Gibbs equation. The adsorption of HOAc at the aq. phase-vapor interface may be detd. by an indirect method; it is almost equal to that at the liquid-liquid interface. Victor R. Deitz

Pressure and temperature effects on the viscosity of liquids. David Frisch, Henry Eyring and John F. Kincaid. *J. Applied Phys.* **11**, 75–80(1940).—The free energy of activation for viscous flow is related to an entropy and energy of activation by the same equations as any equil. and is perfectly general and independent of the mechanism. The equations are developed for a bimol. flow process in which pairs of mols. lying in adjoining layers roll over each other. At low pressures the heat of activation for viscous flow is about $^1/_3$ the energy of vaporization, but as the pressure is raised it increases rapidly because of the work term PV/n'. Calcns. for n- and iso-C_5H_{12}, Et_2O, C_6H_6, H_2O and Hg over pressures ranging from one to 12,000 kg./sq. cm. and at ordinary temps. are found to agree satisfactorily with expti. values. The effect of pressure on viscosity can be calcd. with reasonable success from thermodynamic data only. S. L. Gerhard

The viscosities of chemically related liquids and their dependence on molecular weight and molecular volume. II. David T. Lewis and A. R. Morgan. *J. Chem. Soc.* **1939**, 1341–5; cf. *C. A.* **32**, 8229[6].—It is suggested that any equation representing the variation of viscosity of liquids must contain fundamental terms representing temp., mol. wt. and mol. vol. An equation is derived: $\log \eta = A(\log M)/T + x \log P + \log y$, in which M is the mol. wt., P the parachor, and A, x and y are consts. This equation holds for chemically related series, the generality being ascribed to similarity of cohesive pressures in such series. The fused salts AgCl, AgBr and AgI show indications of a similar relation, but lack of reliable parachor data prevents definite conclusions being drawn as to the effect of the mol. vol. Kenneth H. Slagle

Purification and criteria of purity for physicochemical organic standards. L. Gillo. *Ann. chim.* **12**, 281–347 (1939).—A crit. expti. study of the literature was made to ascertain the nature of the impurities, and their detn., commonly found in MeOH (I), $CHCl_3$ (II) and C_6H_6 (III), and the methods of purification of I, II and III. The article includes expti. procedures either adapted from

the literature or developed by G. The principal impurity common to I, II and III is H_2O which is usually of the order of 0.001%. After one distn. over Na, the H_2O content of I is 0.003%; after a second distn., 0.00005%. The concn. of CH_2O and Me_2CO is approx. 10^{-4}%. Me_2CO is difficultly removed from I by simple distn., and chem. means must be used. II is difficultly purified because of its instability and sensitivity to light and O. The concn. of $COCl_2$ in II cannot be reduced below 3×10^{-4}%. III can be prepd. anhyd. by distn. A procedure is given for the detn. of thiophene in III that is more sensitive than the colorimetric or chronometric methods. This consists in the combustion of a sample of III in a current of H and in the presence of a hydrogenation catalyst, e. g., Pt; S is converted to H_2S and the latter is detd. by reaction with dimethyl-*p*-phenylenediamine to yield methylene blue. In this manner an H_2S content of 2×10^{-6}% can be detd., corresponding to $10^{-6} - 10^{-5}$% thiophene. 154 references. David E. Adelson

Theory of the Clusius separation. P. Debye. *Ann. Physik* **36**, 284 94(1939).—The theory of the Clusius (*C. A.* **33**, 4748) sepn. as applied to liquids is developed for the case of two plates, where the concn. dependence of the diffusion consts. is neglected as is the temp. dependence of the viscosity. The equil. and the time course of the process are discussed. H. C. Thomas

Determination of the vapor pressure of solid salts. III. Vapor pressure of TlCl, TlBr, TlI, $PbCl_2$, $PbBr_2$, PbI_2, $ZnCl_2$, $ZnBr_2$, ZnI_2, $CdCl_2$, $CdBr_2$ and CdI_2, and their thermodynamic calculations. Kitizo Niwa, Munemitu Sato and Masao Yosiyama. *J. Chem. Soc. Japan* **60**, 918–28 (1939); cf. *C. A.* **33**, 4484[5].—The vapor pressures of these solids were measured and their heats of sublimation and at. energies were calcd. T. Katsurai

Comment on Born's thermodynamics of melting. Lewis Balamuth. *J. Chem. Phys.* **8**, 127 8(1940).—Born's theory (*C. A.* **33**, 8072[2]) ignores the departure of the lattice from long-range order before melting occurs. For this reason, no thermodynamic theory of a lattice under finite strain can be safely extrapolated to the m. p. The data of Siegel and Quimby (*C. A.* **32**, 6140[2]) on the temp. variation of a single Na crystal (90–210°K.) do not support the contentions of either Born or Brillouin (*Phys. Rev.* **54**, 916(1938)). G. M. Petty

Vitrification of water. B. J. Luyet. *Phys. Rev.* **56**, 1244(1939).—A procedure for obtaining amorphous water is described. A cylindrical stream of water flowed vertically. A brass disk, 12 mm. in diam. and 2 mm. thick, cooled in liquid air, was mounted 2 mm. behind the stream, with the plane of the disk parallel to the stream. Another brass disk of the same size, mounted on a rod, similarly cooled, was thrown against the first disk, using the spring of a toy pistol. The water between the disks was a film a few microns thick. Pieces of this film remained dark between crossed Nicol prisms for about 30 sec. As the temp. approached the m. p., crystals large enough to be observed with a microscope were seen. G. M. Petty

Diffusion of various metals in aluminum. A. Beerwald. *Z. Elektrochem.* **45**, 789–95(1939).—The diffusion consts. of Cu, Mg, Mn, Ag, Si and Zn in Al were measured. For D in sq. cm./day, the consts. A and Q of the formula $D = A \exp. (-Q/RT)$ are: Cu, 7250, 32,600; Mg, 10,230, 28,600; Ag, 95,400, 32,600; Zn 1,000,000, 27,800; Si, 77,800, 30,550, resp. No results could be obtained for Mn. Analyses were made spectroscopically. H. C. T.

The thermoelectric force of pure beryllium crystals and its change in the transverse magnetic field. E. Grüneisen and H.-D. Erfling. *Ann. Physik* **36**, 357–67(1939).—The thermoelec. force of hexagonal Be is strongly anisotropic: $e(\|/\perp)_{0°C.} = +13.7\ \mu$ v./deg. The decrease between +20° and −250° was measured for both principle directions against manganin. The change of the thermoelec. force of $Be_\|$ and $Be_\perp$ in a transverse magnetic field was detd. as a function of the field direction, field strength and temp. In all respects the behavior of Be is very similar to that of Bi (*C. A.* **30**, 7931[2]). H. C. Thomas

Photoelastic property of rock-salt crystals. Yōiti Kidani. *Mem. Ryojun Coll. Eng.* **12**, 101–14(1939); cf. *C. A.* **31**, 3844[4]; **33**, 9073[6].—The internal strain in natural and synthetic NaCl crystals, brought about by mech. pressure, is analyzed with monochromatic (5890 A.) polarized light. Standardization is made by means of flint glass, measured up to the load 60 g./sq. mm. yielding a relative coeff. of photoelasticity of 6.2×10^{-6} (g. cm.)$^{-1}$. For the elastic limit for natural and synthetic NaCl, the same value of 18–19 g./sq. mm. was obtained. Compared with the synthetic NaCl, the natural rock salt shows photoelastic properties. The math. side of the theory is extensively treated; a possibility of a quadratic relation for the ionic cryst. state and a linear relation for amorphous matter is described. Frederick C. Nachod

An introduction to crystal chemistry. Charles W. Stillwell. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 79–83(1939).—An outline of the basic principles of crystal chemistry. Leopold Scheflan

Demonstration of the mathematical identity of the equations of Laue and Bragg. A. Cavinato. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 319–21(1939).—The conditions for pos. interference of the space structure of crystals (Laue's equations) are shown to be mathematically identical to those of Bragg. A. W. Contieri

On phase changes in crystals arising from hindered molecular rotation. John G. Kirkwood. *J. Chem. Phys.* **8**, 205–12(1940).—Math.-theoretical. G. M. Petty

Surface reaction between oxonium ions and mica. R. Stevenson Bradley. *Trans. Faraday Soc.* **35**, 1361–6 (1939).—Sheets of mica, freshly cleaved muscovite, were immersed for short times in solns. of pH between 2.5 and 6 at 25°; they were then quickly withdrawn and plunged into KOH to check the reaction and then washed with distd. water. A drop of dil. NH_4I was allowed to dry slowly on the mica and the crystals formed differed from the oriented tetrahedral crystals found on untreated mica surfaces. A mixture of oriented tetrahedra and unoriented cubes occurs, the proportion of the latter increasing with the time of immersion in the acid soln. Log k, the velocity coeff. of the change, *vs.* the pH is a linear plot. The results are interpreted in terms of surface attack by oxonium ions, the surface concn. of which det. the reaction velocity. Victor R. Deitz

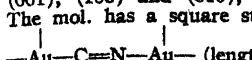
The growth, orientation and preparation of the surface of single crystals of copper. Allan T. Gwathmey and Arthur F. Benton. *J. Phys. Chem.* **44**, 35–42(1940).—A modification of the Bridgman method (*Proc. Am. Acad. Arts Sci.* **60**, 305(1925)) using the Quimby furnace was used for prepg. single crystals of Cu $^5/_8$ in. in diam. and 5 in. long. Identification and orientation of the single crystals was made by the action of various etching reagents and detn. of the reflection patterns. The electrolytic etching method gave a very bright and smooth finish. M. McMahon

Two graphical methods for the determination of the optical value of certain crystal faces. I. The representation of the relations between the position of the axis and the extinction position. H. Tertsch. *Mineralog. petrog. Mitt.* **51**, 163–71(1939).—By means of a Fresnel construction the optical vibration direction in a face of a biaxial mineral is detd. and a nomograph is offered relating the axial angle and extinction position for the 110 and 010 faces of *hornblende*. J. F. Schairer

Mechanism of transformation of face-centered cubic into hexagonal close-packed lattice. Z. Nisiyama. *Science Repts. Tohoku Imp. Univ.*, First Ser., **25**, 79–93 (1936); *Neues Jahrb. Mineral., Geol.* Ref. 1, **1939**, 605; cf. *C. A.* **29**, 2416[4].—The mechanism of the transformation of a cubic face-centered lattice (I) into a lattice with hexagonal close packing (II) as shown by a 70:30 Ni-Co alloy is investigated. It results in (111) and [$\bar{2}$11] of I being parallel with (0001) and [1$\bar{1}$00] of II, resp. C. A. S.

Crystal structure of dipropylmonocyanogold. R. F. Phillips and H. M. Powell. *Proc. Roy. Soc.* (London) **A173**, 147–59(1939).—Dipropylmonocyanogold crystals are in the orthorhombic system $a_0 = 17.06$, $b_0 = 22.36$, $c_0 = 10.0$ A., space group *Pca* with 16 mols. of $AuPr_2CN$

(I) per cell. A true mol. consists of four units of I as shown by a Patterson analysis and a Fourier synthesis on (001), (100) and (010), two of these being nonsym. The mol. has a square structure with each side being



—Au—C≡N—Au— (length 5.18 A.), the Au atoms being at the corners and 2 Pr groups linked to each Au atom. The four covalencies of the Au atom are at right angles to one another and coplanar, bond length about 1.3 A. The general position of overlapping Pr and CN groups is shown, particularly in the centrosym. projection on (001). Intermol. distances are not less than 3.4 A. R. F. D. 1

Lattice defects in silver halide crystals. Frederick Seitz. *Phys. Rev.* **56**, 1063–4(1939); cf. *C. A.* **33**, 2387[6]. —The ratio r of the no. of lattice defect atoms to the no. of normal atoms is $r(AgBr) = 29 \exp. (-5050/T)$; $r(AgCl) = 36 \exp. (-6250/T)$. G. M. Petty 2

A new modification of manganese dioxide. Oskar Glemser. *Ber.* **72B**, 1879–81(1939).—X-ray investigation of MnO_2 shows that there is not only a tetragonal MnO_2 existing in the form of the minerals *pyrolusite* and *polianite*, but a form giving an x-ray diagram that differs from the tetragonal. This can be prepd. in 3 ways: I. $MnSO_4$ is dissolved in H_2O and oxidized with HNO_3 and $(NH_4)_2S_2O_8$. The black product is filtered and washed with hot H_2O and dried at 60° for 2 days. II. A soln. of $MnSO_4$ is oxidized with KNO_3 and $KMnO_4$, a brown ppt. being obtained which is filtered, washed with hot H_2O and dried as above. III. $Ba(MnO_4)_2$ is dissolved in H_2O and H_2SO_4 (24.5%) added drop by drop until there is a slight excess. The $BaSO_4$ is removed by centrifuging and the soln. is evapd. at 45°. The ppt. is washed by decantation until the supernatant liquid is no longer violet-red. The brown powder so obtained is washed with hot H_2O and dried as above. Analysis of these products shows the compn. MnO_2, and x-ray examn. indicates that it is a new allotropic cryst. form of this compd., which G. designates γ-MnO_2. H. Stoertz 3

Crystal structure of cyclohexane at −180°. K. Lonsdale and H. Smith. *Phil. Mag.* **28**, 614–16(1939).—X-ray powder photographs of cyclohexane contained in a cellophane tube at liquid O temp. were obtained with filtered Cu K_α radiation. It is not certain whether this compd. has a low-temp. modification of low symmetry or whether 2 cryst. modifications partially coexist at this temp. E. J. Rosenbaum 4

X-ray measurements on wet insulin crystals. Dorothy Crowfoot and Dennis Riley. *Nature* **144**, 1011–12(1939). —X-ray photographs were made of Zn insulin crystals wet with mother (crystg.) liquor, NaH_2PO_4 soln. and Na citrate soln. The wet-crystal unit cell is a moderately expanded version of that of the air-dried crystals (*C. A.* **32**, 3683[8]): the cell dimensions of the wet and dry hexagonal crystals are, resp., a, 83.0, 74.8 A.; c, 34.0, 30.9 A.; for the rhombohedral true unit cell, a, 49.4, 44.4 A.; α, 114° 16′, 114° 28′. The wet-cell mol. wt. is 52,400; the liquid of crystn. weighs 14,800, which is 28% of the total. Striking differences in the x-ray intensities given by the different crystal structures are correlated with a reorientation of the mols. relative to the crystal axes, which occurs on drying. G. M. Petty 5

The gas mixtures of lower hydrocarbons. V. Adsorption of the gas mixtures. Kōe Uehara. *J. Chem. Soc. Japan* **60**, 1149–58(1939); cf. *C. A.* **30**, 6515[9].—The adsorption of the mixts. $CH_4 + C_2H_6$, $CH_4 + C_4H_8$, CH_4 + butane by active charcoal was studied at the pressure range 0.5–60 mm. The amount adsorbed is proportional to the partial pressure of the components. T. K. 6

Adsorption of acetic acid by mercury. R. C. L. Bosworth. *Trans. Faraday Soc.* **35**, 1349–52(1939).—Changes in the surface tension of Hg by the presence of air contg. AcOH vapor were followed at 20° to 260° by a method previously described (cf. *C. A.* **33**, 2383[7]), a variation of the max.-bubble-pressure method. The surface tension and its temp. coeff. are depressed, the latter reversing its sign over certain ranges of temp. The adsorption is accompanied by an evolution of heat of 6.1 kg.-cal. for close-packed films of 4×10^{14} mols./sq. cm. and rises to 8.3 kg.-cal. as the surface concn. is decreased to 0.25×10^{14} mols./sq. cm. Victor R. Deitz 7

Adsorption phenomena between liquid phases. Analytical study of photographically recorded curves. R. Mérigoux and M. Aubry. *J. chim. phys.* **36**, 221–33 (1939).—The time changes of the interfacial tension of H_2O—vaseline oil and H_2O—CCl_4 activated by oleic acid are studied by means of a du Noüy tensiometer arranged for photographic recording. The curves are analyzed in terms of a theory similar to the Langmuir theory of adsorption of gases on solids. H. C. Thomas 8

Adsorption isotherms for mobile monolayers. William Band. *J. Chem. Phys.* **8**, 178–80(1940).—Math.-theoretical. Some numerical predictions are made. G. M. Petty 9

Supplement to the studies on absorption of gas in the form of bubbles. Yositosi Ōyama and Katumi Iwase. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 371–4 (1939) (in English); cf. *C. A.* **33**, 3239[7].—The earlier study using bubbles of 0.3–1.6 cc. is extended to bubbles of CO_2 and air as large as 6.2 cc. Curves for the absorption of these bubbles, expressed per unit vol. of bubble, in 0.01 and 0.1 *N* caustic soda solns. show a definite min. and max. Absorption does not always increase in proportion to the subdivision of the bubble. E. O. Wiig 10

Wetting characteristics of solid surfaces covered with adsorbed films. F. E. Bartell and Kenneth E. Bristol. *J. Phys. Chem.* **44**, 86–101(1940).—Clean hydrophilic surfaces, such as quartz, pyrex, gypsum and mica, and clean organophilic surfaces, such as galena, cinnabar, sphalerite, Sb metal and stibnite, were treated with H_2O vapor and with org. liquid vapors so as to produce definite and controlled adsorption. Contact angles were measured with different liquids upon such surfaces using the sessile-drop method. The adsorbed films are sufficiently thick to mask the original surface properties. Surface tensions of adsorbed films were calcd. by use of Young's equation, with the assumption that the interfacial tension existing between the liquid drop used and the liquid film under it is the same as the interfacial tension between the two liquids in bulk (such an assumption being questionable). M. McMahon 11

States of monolayers on an aqueous subphase. William D. Harkins and Edward Boyd. *J. Chem. Phys.* **8**, 129–30 (1940); cf. *C. A.* **33**, 3225[1].—Dervichian's interpretations (cf. *C. A.* **33**, 9086[2]) are criticized. G. M. Petty 12

Statistical mechanics of condensation phenomena in mobile monolayers. William Band. *J. Chem. Phys.* **8**, 116–19(1940); cf. *C. A.* **33**, 5249[3], 9068[7].—Math. The dissocn. method is modified to cover the condensation phenomena observed in mobile monolayers. The theory agrees well with the curves of Adam and Jessop (*C. A.* **20**, 1542) for the fatty acids. G. M. Petty 13

New method of spreading monolayers of albumin and lipoid-albumin mixtures. Stina Ställberg and Torsten Teorell. *Trans. Faraday Soc.* **35**, 1413–16(1939).—A 60% aq. soln. of PrOH or iso-PrOH contg. 0.5 *M* AcONa was used as a solvent for both serum albumin and lipoids such as cholesterol and lecithin. The soln. can be heated to boiling without pptg. the protein. Such a soln. can be used for spreading monolayers of albumins, lipoids or mixts. thereof. It has excellent film-spreading properties both at the air/water and benzene/water interfaces. Victor R. Deitz 14

Surface films of heat-denatured serum albumin. Stina Ställberg. *Trans. Faraday Soc.* **35**, 1416–20(1939); cf. preceding abstr.—Surface films formed by "native" and heat-denatured serum albumin were spread from soln. in 60% PrOH contg. 0.5 *M* AcONa on a substrate of pH 7.0 (phosphate) contg. 0.15 *M* NaCl and at 20°. Denaturation was found to be accompanied by a 15% increase in area (0.98 to 1.15 sq. m./mg.), changes in the compressibility (0.016 to 0.027 cm./dyne), rigidity and "gelation-point," but by no significant alteration in the apparent dipole moment at low compression of 650–685 milli-Debye. Victor R. Deitz 15

Impedance of bimolecular films. R. B. Dean, H. J.

Curtis and K. S. Cole. *Science* **91**, 50–1(1940).—The prepn. of a bimol. film of tanned egg albumin with water on both sides is described. Using a film area of 0.07 sq. cm., the series resistance (670–1450 ohms) is plotted against the series reactance (0–250 ohms) for 30–200,000 cycles per sec. The capacitative impedances of the films had const. phase angles of 65–68° and capacities of 1.07–1.23 microfarad/sq. cm. at 1000 cycles/sec. This resistance is in marked contrast to very low resistances found in untanned protein films. Complex lipo-protein films may have an appreciable resistance and be able to produce diffusion potentials in biol. systems. The const. phase angle and a capacity of approx. 1 microfarad/sq. cm. is a characteristic of all living cell membranes. These are the first artificial films produced between two aq. phases with these properties. G. M. Petty

The depolarization of light diffused by several colloidal solutions. A. Boutaric and J. Breton. *J. chim. phys.* **36**, 193–200(1939); cf. *C. A.* **33**, 5289⁹.—The coeffs. of depolarization at 90° to the incident beam were measured for suspensions of gum mastic, sols of As_2S_3 and $Fe(OH)_3$, and suspensions of bentonite and clay. The coeffs. increase with concn. in a different manner for each suspension and for a given concn. depend on the manner of prepn. of the sol and on the time. H. C. Thomas

Magnetooptical and natural dispersions of isobutyl butyrate and ethylene chloride. W. J. G. Beynon. *Phil. Mag.* **28**, 548–61(1939); cf. *C. A.* **32**, 4076⁹.—The magnetooptical dispersion of isobutyl butyrate at 10.4° is $0.005616\ [\lambda^2/(\lambda^2 - 0.1106^2)]^2$ and the natural dispersion is given by $n^2 - 1 = 0.95409 + 0.009642/[\lambda^2 - 0.1106^2]$, with a temp. coeff. of 0.0005. For ethylene chloride at 18.4° the magnetooptical dispersion is $0.007569\ [\lambda^2/(\lambda^2 - 0.1227^2)]^2$ and the natural dispersion is given by $n^2 - 1 = 1.04803 + 0.01255/[\lambda^2 - 0.1227^2]$, with a temp. coeff. of 0.0006. The values of e/m in e. m. u. $\times 10^7$ are 1.018 and 1.028 for isobutyl butyrate and ethylene chloride, resp. Absorption bands in the infrared have no effect on dispersion in the visible or ultraviolet. E. J. R.

The influence of Brownian movement on the viscosity of solutions. R. Simha. *J. Phys. Chem.* **44**, 25–34(1940); cf. *C. A.* **32**, 1542⁴.—The viscosity of dil. solns. of nonspherical particles was calcd. as a function of their dimensions and of the concn. Three different cases were considered, depending on the magnitude of the factor K/D (D = rotational diffusion const. of the particles assumed as spheroids and K = velocity gradient of the flow in the viscosimeter): (1) K/D infinite, from Jeffery's results on the viscosity of a suspension of ellipsoids (*Proc. Roy. Soc.* (London) **A102**, 163(1923)), (2) finite K/D, in which irregular thermal motion is superimposed upon the orientation tendency and (3) $K/D \to 0$, complete Brownian movement, where the macroscopic flow is no longer able to bring about a regular rotational motion of the ellipsoids against the thermal motion, which, on the av., effects an isotropic distribution of the particle axes in the fluid. M. McMahon

The plastic state. Measurement of plasticity. Paul Bary. *Rev. gén. caoutchouc* **16**, 260–3(1939).—A crit. review of the physics and chemistry of the plastic state, in which important contributions by various investigators are discussed, leads to certain novel points of view. The various definitions of plasticity fail in that they are not in accord with the fact that plasticity is a function of temp. It is inappreciable below a definite temp. range, increases to a max. at a higher temp. and diminishes again to zero at an elevated temp. The fluidity μ can be calcd. by the equation: $\mu = (S.\Delta L)/(LFt)$, where S is the cross-sectional area of the test-specimen, L its length and F the stress to give an elongation ΔL in time t. The rigidity R within the plasticity range is the rigidity of the reticular and colloidal parts of the substance, and it can be estd. by the relation: $R = F/S$, where F is the min. stress to produce transverse shearing in a test-specimen of rectangular cross-section S. The plasticity P can then be defined by the product of the fluidity and the resistance to shearing, i. e., $P = \mu R$. These relations are very evident in a graph, with the abscissa representing temps. between the 2 transformation points, and the ordinate representing the fluidity on 1 scale and the resistance to shearing on a 2nd scale. The plasticity, as product of these 2 factors, is also represented by a curve with zero points at 2 end temps. and with an intermediate max. At this max. point, the substance is in the best state to be deformed by molding under pressure, with retention at this temp. of sufficient mech. strength so that it can be removed from the mold without having to be cooled. In general it is shown that plasticity can be defined on a phys. basis and can be measured at any temp. 18 references. C. C. Davis

Colloidal behavior of clays as related to their crystal structure. T. F. Ford, A. G. Loomis and J. F. Fidiam. *J. Phys. Chem.* **44**, 1–12(1940).—Detailed expts. with Na tannate, Na hexametaphosphate, Na pyrophosphate, Na silicate and clay suspensions confirm Garrison's view (*C. A.* **33**, 4849¹) that small amts. of these chemicals are adsorbed on sp. portions of the exterior of clay particles and reduce the viscosity of concd. suspensions by destroying the aggregation of the clay particles into structures. Curves show the amts. of salts required to produce gelation; they appear to be independent of the amt. of clay in a given amt. of H_2O. The effectiveness of the salts in both gelation and coagulation of clay suspensions increases decidedly with the valence of the pos. ion. Crystal structures of clays permit deriving chem. formulas for colloidal clay particles. The dual action of NaOH on suspensions is considered. M. McMahon

Effect of "T" and "R" activation on gold colloids. Giorgio Piccardi and Edmondo Botti. *Gazz. chim. ital.* **69**, 609–14(1939); cf. P., *Atti. accad. Lincei, Classe sci. fis., mat. nat.* **29**, 84(1939).—Aq. Au colloids were prepd. with highly purified reagents from normal and activated multidistd. water, and the differences in the colloidal suspensions with the 2 types of water were noted. With normal water, and relatively small proportions of Na_2CO_3, the color was bright-red, transparent and with a slight yellowish turbidity by reflected light. With increase in Na_2CO_3 the color passed to violet, dark-blue, light-blue and gray-blue or pale-lilac, with final pptn. of black Au. Neither with T-activated nor R-activated water were the times for the appearance of the colors significantly different from the times with the colloids prepd. from normal water. But the colors with both activated waters were displaced toward the blue in relation to those with normal water under the same conditions, e. g., under the conditions of time, temp. and concn. at which bright reds and violet-reds are evident with normal water, the colors were violet-red and violet, resp., with T-activated water, and violet and dark blue, resp., for R-activated colloids. The displacement was therefore even greater for the R-activated colloids than for the T-activated colloids. Also the colors tended to be more intense for both activated colloids. The bluer colors of the activated colloids indicate that their particles were larger than those in the normal colloids but more homogeneous. This was confirmed by reflected light, whereby the activated colloids showed a yellowish turbidity but clearer than the corresponding colloids in normal water. In the case of a normal and activated colloid of the same color, differences were still evident in the turbidity. The differences in colloids activated by T and R activations are quant. rather than qual., at least in appearance. Hence in the case of Au colloids, T and R activations seem to act in the same way rather than in opposite ways. Although the reason for this is not clear, it is of particular significance, since T and R activations have opposite effects on other colloids, such as As_2S_3 and $Fe(OH)_3$ (cf. P., *C. A.* **32**, 8859⁶). C. C. Davis

Chemical preparation of colloidal suspensions in nonaqueous solvents. I. Methyl alcohol and benzene. Arthur A. Vernon and Harrison A. Nelson. *J. Phys. Chem.* **44**, 12–20(1940).—The methods of Gorbowski (*Ber.* **36**, 125(1903)) and Gutbier (*Z. anorg. Chem.* **31**, 448; **32**, 348(1902)) for the prepn. of metal organosols with org. solvents were tried. With hydrazine hydrate, P, P-hydrazine, tannin, $SnCl_2$ and H as reducing agents, stable metallic organosols were prepd. in MeOH and benzene. Collodion (cellulose nitrate in amts. of 0.2% or

more) was a good protective agent with alc. suspensions; with benzene suspensions rubber was generally the protective agent used. Colloidal suspensions of metallic sulfides were pptd. in the same dispersion media by passing dry H_2S through dil. solns. of metallic salts. The more important sols studied are Au, Ag, Pb, Bi, Sb, Ni, Cu, Co, Cr. II. **Ether, 1,4-dioxane and acetone.** *Ibid.* 21–5. —The use of various reducing agents and of H_2S was found to apply equally well with ether, dioxane and acetone as solvents. The protective agents used were collodion for acetone and dioxane and rubber for ether. A comparison with results in Part I shows that the suspensions decrease in stability in the order: alc., dioxane, benzene, ether, acetone. M. McMahon

Influence of sol concentration on flocculation values. E. D. Fisher and C. H. Sorum. *J. Phys. Chem.* **44**, 62–70 (1940).—The flocculation values of pure hydrosols of Cr$(OH)_3$, Fe_2O_3, As_2S_3, MnO_2, SnO_2, $Al(OH)_3$, TiO_2 and $Th(OH)_4$ for the various coagulation ions show that the pure sols follow the rule of Burton and Bishop (*C. A.* **15**, 969) when coagulated by ions of varying valences; values increased for univalent ions, remained the same for bivalent ions, and decreased with multivalent ions. When sols were made impure with stabilizing electrolyte the behavior was contrary to the rule—flocculation values for all electrolytes decreased. Diln. with dehydrating agents (such as alcs.) produces a decrease in flocculation values attributable to the dehydrating nature of the dilg. liquids. M. McMahon

Phase-rule behavior of concentrated aqueous systems of a typical colloidal electrolyte—sodium oleate. Robert D. Vold. *J. Phys. Chem.* **43**, 1213–31(1939).—A preliminary report on the phase-rule behavior of Na oleate and water is presented. Visual observation of the temps. of phase change, dilatometric expts., isothermal vapor pressure detns., phase sepns., and microscopic examn. between crossed Nicols are some of the methods used in this investigation. Data and photomicrographs of various phases are presented. It is found that there are many more phases than had previously been recognized in systems of soap and water. All the equil. are successfully represented on a phase-rule diagram in which the independent variables are temp. and compn. L. Kolodny

Silicic acid gels. IX. Effect of a change of pH on the time of set of some acid gels. Charles B. Hurd and Harris W. Paton. *J. Phys. Chem.* **44**, 57–62(1940); cf. *C. A.* **32**, 2003⁷. The time of set of silicic acid gels, prepd. from solns. of Na silicate and AcOH, may be increased by addn. of more H_2O or more AcOH soln. Data show a quant., straight-line relation between the time of set of the mixt. and the time elapsed from the time of mixing the original soln. to the time of addn. of extra acid or H_2O. There is apparently no especially significant point in the setting process at which addn. of more acid has a particularly marked effect. The fibrillar condensation theory of silicic acid gel structure is discussed in view of these results. M. McMahon

A note on the diffraction of x-rays by vitrified and by frozen gelatin gels. W. H. Barnes and F. W. Matthews. *Biodynamica* No. **49**, 1–7(1939).—The observations of Luyet on the vitrification of gelatin gels (*C. A.* **32**, 3685⁷) are confirmed by x-ray examn. J. McAfee

Determination of the vapor pressure of solutions. II. Vapor pressure of deuterium oxide solution of potassium chloride. Kitizo Niwa and Eiiti Simazaki. *J. Chem. Soc. Japan* **60**, 985–94(1939); cf. *C. A.* **28**, 396⁶.—The vapor pressures of D_2O and of KCl solns., 0.1732 *M* to satn., were detd. at 4 to 13°. From various physicochem. data, such as heat of vaporization of deuterium oxide, the heats of sublimation and melting of heavy ice are estd. T. Katsurai

Viscosity of mixtures of ammonia and water at 20°. V. A. Pleskov and I. Igamberdyev. *J. Phys. Chem.* (U. S. S. R.) **13**, 701–2(1939).—A few values for the viscosities of liquid NH_3-H_2O mixts. at 20° are: 0% H_2O, 0.00146; 31.7, 0.00503; 61.86, 0.01249; 71.23, 0.01303; 80.2, 0.01267; 100, 0.01009. The max. at 71–2% H_2O corresponds to $NH_3.xH_2O$ (x = 2 or 3). F. H. R.

Viscosity of aqueous solutions of formic, cyanoacetic and oxalic acids. M. K. Srinivasan and B. Prasad. *J. Indian Chem. Soc.* **16**, 371–4(1939).—The viscosities of formic, cyanoacetic and oxalic acids were measured at 35°. The viscosity of these solns. is well represented by either of 2 equations, viz. (1) $(\eta - \eta_0)/\eta_0 = A\sqrt{\alpha c} + \beta(1 - \alpha)c$, connecting viscosity, concn. (c) and the degree of dissocn. (α) of an aq. soln. of a weak electrolyte, on the assumption that the increase in relative viscosity $(\eta - \eta_0)/\eta_0$ of such a soln. is due to 2 additive factors, *viz.* (a) $\Delta_1/\eta_0 = A\sqrt{\alpha c} + B\alpha c$, and (b) $\Delta_2/\eta_0 = \beta(1 - \alpha)c$, and (2) $(\eta - \eta_0)/\eta_0 = A\sqrt{\alpha c} + B\alpha c + \beta(1 - \alpha)c$. But the values of the viscosity consts. are not of the expected order. The results are also represented by the Jones and Dole equation, but the consts. have no theoretical significance for weak electrolytes. A. H. Krappe

Investigation of the electroconductivity of molten carnallite. A. A. Shcherbakov and B. F. Markov. *J. Phys. Chem.* (U. S. S. R.) **13**, 621–30(1939).—With an app. giving measurements to within ±0.4%, the electroconductivities of the systems KCl-NaCl (I), NaCl-$MgCl_2$ (II), KCl-$MgCl_2$ (III) and KCl-NaCl-$MgCl_2$ (IV) at temps. from 660 to 880° are detd. The conductivities are almost linear functions of temp. The isotherms for the systems I and II are smooth curves without particular points, III has two inflection points and a const. cond. region from 40 to 80 mol. % $MgCl_2$. F. H. Rathmann

Thermodynamic properties of solutions of amino acids and related substances. IV. Effect of increasing dipolar distance on the activities of aliphatic amino acids in aqueous solution at 25°. Elizabeth R. B. Smith and Paul K. Smith. *J. Biol. Chem.* **132**, 47–56(1940); cf. *C. A.* **32**, 3239⁶.—The osmotic and activity coeffs. of β-alanine, *dl*-β-aminobutyric acid, γ-aminobutyric acid, *dl*-β-aminovaleric acid, *dl*-γ-aminovaleric acid, and ε-aminocaproic acid were calcd. from isopiestic vapor-pressure measurements made in aq. soln. at 25°. The larger the dipole moment the lower the osmotic coeff., this effect being opposite to that of increasing the length of the C chain. Relations between the activity coeffs. and the dielec. consts. of the solns. are discussed. V. **Activities of some hydroxy- and *N*-methylamino acids and proline in aqueous solution at 25°.** Paul K. Smith and Elizabeth R. B. Smith. *Ibid.* 57–64.—The osmotic and activity coeffs. of *dl*-proline, *l*-hydroxyproline, *dl*-serine, *dl*-threonine, sarcosine, and betaine were calcd. from isopiestic vapor-pressure measurements made in aq. soln. at 25°. The strongly polar OH group in the hydrocarbon chain depresses the osmotic coeff. Amino acids with *N*-Me groups (sarcosine, betaine) have higher osmotic coeffs. than their straight-chain analogs (alanine, α-aminovaleric acid). Relations between the activity coeffs. and dielec. consts. of the solns. are discussed. D. S. Searle

Thermodynamics of acid-base equilibria. D. H. Everett and W. F. K. Wynne-Jones. *Trans. Faraday Soc.* **35**, 1380–1401(1939).—Theoretical. Analysis of the available exptl. data for the electrolytic dissocn. of some weak acids leads to values of $\Delta G°$, ΔH, $\Delta S°$ and ΔC_p for the 49 various equil. For a complete comparative study of the strengths of acids, the values of all the thermodynamic functions must be considered along with the dissocn. const. For ionization processes of uncharged acids at room temps., the heat-capacity change is always neg. and large and the entropy change is also usually neg. The thermodynamically derivable equation, $\ln K = A/T + (\Delta C_p/R)\ln T + B$, is used in this analysis. Simple electrostatic considerations based on Born's equation do not give values large enough to account for the whole of the heat-capacity change envolved in the equil.; orientation effects account for the remainder. Victor R. Deitz

Ionic equilibria in acid salts of dibasic acids. Cecil W. Davies. *J. Chem. Soc.* **1939**, 1850–3.—In a soln. of an acid salt of a weak dibasic acid in water 2 successive reactions occur: (1) $NaHA \rightarrow Na^+ + HA^-$ and (2) $HA^- + HA^- \rightleftharpoons H_2A + A^{--}$. Acid dissocn. of HA^- is usually unimportant compared with (2). The relative amts. of H_2A, HA^- and A^{--} are independent of the concn. and may be calcd. if the 2 dissocn. consts. of the acid are known.

As much as 25% of the acid radical may be present as H_2A and the same amt. as A^{--}. Because of the high concn. of A^{--} the ionic strength may reach 125% of the molar concn. of the salt. *Buffers* contg. polybasic acids should not be used in conjunction with solns. contg. multivalent cations. Calcns. of the *mobility* of the intermediate ion HA^- from cond. measurements give for Na H malonate, Na H succinate and Na H glutarate $\Lambda_0 HA^-$ values equal to 38.0, 35.8 and 29.7, resp. W. B. K.

Dissociation constant of β-resorcylic acid. C. T. Abichandani and S. K. K. Jatkar. *J. Indian Chem. Soc.* **16**, 385–8(1939).—The dissocn. const. K_1^a of β-resorcylic acid was detd. by the measurement of the e. m. f. of the cell without liquid junction: H_2|HA, NaA, NaCl|AgCl-Ag. The corrected value of K_1^a in pure H_2O was found to be 6.05×10^{-4} at 30°. A. H. Krappe

Hydrogen-ion concentration of solutions containing zinc hydroxide and sodium hydroxide. S. M. Mehta and M. B. Kabadi. *J. Indian Chem. Soc.* **16**, 379–84(1939); cf. *C. A.* **33**, 8087[6].—The H-ion concn. of solns. contg. ZnO and Na_2O in varying proportions was detd. by means of a glass electrode. The results obtained previously were confirmed. It is inferred that in solns. more dil. than 6 *N* the Na zincate is largely hydrolyzed, whereas in concd. solns. the hydrolysis is small. The possibility of isolating Na zincate from solns. stronger than 8 *N* is suggested. A. H. Krappe

Potentiometric method for the accurate measurement of hydrogen-ion activity. Walter J. Hamer and S. F. Acree. *J. Research Natl. Bur. Standards* **23**, 647–62 (1939)(Research Paper No. 1261).—A detailed description is given of the equipment and exptl. procedure for the precise detn. of H-ion activity by means of a cell without liquid junction; thus Pt|H_2(g)|soln. NaCl (or KCl)|AgCl|Ag. The electrodes function reversibly and exhibit no aging, hysteresis or polarization effects. The e. m. f. of the cell is reproducible to 0.02 mv., which is equiv. to 0.0003 pH unit. The method is applied to the detn. of pH values in mixts. of Na malonate and Na acid malonate. S. Glasstone

Quasi-reversible conduction and galvanic cells with liquid-liquid junctions. F. O. Koenig. *J. Phys. Chem.* **44**, 101–35(1940).—Four defects in the existing thermodynamic theory of cells with liquid-liquid junctions are considered with the object of (a) showing that it is possible to neglect the effects of diffusion in a less artificial manner than in the existing theory, (b) extending the definition of transport no. to include solns. subject to diffusion and thereby clarify relations between migration expts. and cells with liquid-liquid junctions, (c) discovering what thermodynamic laws hold if the restriction to cylindrical symmetry is abandoned, and (d) prepg. the way for a unified theory of cells with liquid-liquid junctions and gravity cells. Assumptions and definitions lead to a theorem which is called the condition for quasi-reversible conduction, or the *qrc* condition. By use of this *qrc* condition the thermodynamic laws of cells with liquid-liquid junctions are deduced. M. McMahon

Use of zeolitic membrane electrodes. C. E. Marshall. *J. Phys. Chem.* **43**, 1155–64(1939).—Exptl. data on the use of zeolitic membrane electrodes to measure cationic activity are presented and discussed theoretically. Details of the prepn. of electrodes, app., and technique are described. Chabazite and apophyllite crystals are the zeolitic membrane materials used. Measurements are made using both uni- and bivalent cations. Exploratory in nature, this investigation suggests the possibility of using zeolitic membrane electrodes for measuring cation activity in colloidal systems. L. Kolodny

Surface structure of passive iron. P. D. Dankov and N. A. Shishakov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 553–5(1939)(in English); cf. *C. A.* **33**, 6214[5].—Electronograms of passive Fe films (prepd. by condensing Fe vapor on mica or glass in vacuo, exposing to air, then submerging immediately in satd. aq. $K_2Cr_2O_7$, 0.05 *N* aq. K_2CrO_4 or strong HNO_3, washing the sepd. films with H_2O and drying) indicate (1) the presence of a thin layer of extremely small crystals of cubic Fe_3O_3 (γ-Fe_2O_3) having the oxide lattice const., *a*, equal to 8.29 ± 0.05 A., and (2) that the Fe lattice is approx. 1.5% greater than that of α-iron (shown by comparison of Fe lines with kaolin lines). The above data do not agree with the work of Finch (*C. A.* **33**, 4100[5]) unless a possible amorphous oxide component is assumed to be present in the film. George Ayers

Constants of gas reaction balance. D. A. Chernobaev and A. G. Zhivotovs'kiĭ. *Akad. Nauk. U. R. S. R., Inst. Khem. Tekhnol.* (Kiev) 1939, 90 pp.(English summary); cf. *C. A.* **29**, 3900[4]; **31**, 2078[4].—The equil. consts. of gas reactions are calcd. by precise and approx. methods, and accompanied by a series of tables. The most accurate results are obtained by spectroscopic methods, but calorimetric methods have attained a high degree of accuracy. A method is described for calcg. the equil const. for gases at high pressures based on the works of Newton and Dodge (cf. *C. A.* **29**, 3900[8]). Tables give a collection of data from the latest spectroscopic investigations, or, where these are lacking, other exptl. data. For the reactions of burning fuel, available spectroscopic data permit precise detn. of the const. By using the tables of free-energy values, log K_p for every 100° and in many instances for every 50°, up to 1500°K. can be detd. from the tables, and for higher temps. up to 3000° by interpolating: $\log K_p = (A/T) + B \log T + C$. A number of formulas are given for the reactions of the most important gases, and compds. of N, S, Cl and Br, and with an abs. error of not more than 0.001–0.002. B. Gutoff

The reaction of aluminum with siliceous slags. Friedrick Weibke and Erich Frey. *Z. Elektrochem.* **45**, 807–12 (1939).—The equil. of the reaction $4Al + 3SiO_2 \rightleftarrows 3Si + 2Al_2O_3$ was investigated in melts contg. Na_2O. The effects of time and of the various concn. factors are detd. The results are summarized in the form of an "equil. const." for the reaction. The const. does not depend on the Na_2O content. H. C. Thomas

Kinetics of phase change. II. Transformation-time relations for random distribution of nuclei. Melvin Avrami. *J. Chem. Phys.* **8**, 212–24(1940); cf. *C. A.* **34**, 1233[1].—Math.-theoretical. G. M. Petty

Hidden periods of crystallization and the equation for the velocity of formation of crystal nuclei. M. L. Chepelevetskiĭ. *J. Phys. Chem.* (U. S. S. R.) **13**, 561–71 (1939).—Exptl. data are given on the hidden periods of crystn. of several salts as a function of supersatn. and temp. The hidden period is a criterion of the rate of formation of nuclei and their growth. The equation for the rate of growth of crystal nuclei is analogous to that for the condensation of a liquid from a vapor with the addn. of a viscosity factor. From these data the approx. sp. surface energies of crystals on the boundary solid body-liquid are calcd. to be $A(M/\rho)\delta \times 12$; $Ca(H_2PO_4)_2.H_2O$, 2.4; $CaSO_4.2H_2O$, 7.2; $CaCO_3$, 60; $CaSO_4$, 65; $FePO_4.2H_2O$, 95; $BaSO_4$, 101; and CaF_2, 132, in good agreement with calcns. from hardness data according to Hertz, Auerbach and Fersman. F. H. Rathmann

The kinetics of thermodiffusion in liquids. K. Wirtz. *Ann. Physik* **36**, 295–302(1939).—See *C. A.* **33**, 9093[7]. H. C. Thomas

Growth of crystals from a stream of vapor. R. N. Haward. *Trans. Faraday Soc.* **35**, 1401–13(1939).—The rate of growth of a crystal mass from a vapor stream of known d. was detd. In no case is the condensation coeff. of const. magnitude. For salicylic acid (+24° to −40°) at stream ds. of 0.071 to 4.0 mg./min. on the surface area of the target used, the ratio of mols. leaving the furnace to those striking the target was a const. equal to 0.234; the rate of evapn. at +7° was 0.092 mg./min. The expts. are explained by a bimol. process occurring in a mobile surface phase and this is in agreement with the crystal structure. Results are given also for I at −44.4°, −46.8° and −52.6°; SnI_4 at 7°; anthracene and HgI_2 at 22.9 and 13.6°. Victor R. Deitz

Reaction velocities at low temperatures. I. A convenient low-temperature thermostat. R. P. Bell and J. K. Thomas. *J. Chem. Soc.* 1939, 1573–5.—A simple low-temp. thermostat is described which depends for its

cooling on the evapn. of a liquefied gas from an annular space around a vessel contained in a large Dewar flask. II. **The bromination of acetone between −40 and +10°.** *Ibid.* 1575–8.—At low temps. in solvents high in acetone the reaction between I and acetone does not go to completion. With Br the reaction is complete in 90.9% acetone and nearly so in 95% acetone. The bromination was studied with HCl (−40° to +10°) and with HBr (−20 to 0°) as catalysts. The Arrhenius equation is obeyed within the limits of exptl. error and the activation energy (19,900 cal.) is substantially the same as for H^+-ion catalysis in aq. soln. H. C. Thomas

The rate of dissociation of pentaarylethanes. W. E. Bachmann and Gerald Osborn. *J. Org. Chem.* 5, 29–39 (1940).—Pentaarylethanes (I) undergo reversible dissocn. into free radicals and if the rate of reaction with O is actually a measure of the rate of dissocn., the same rate should be found with other reagents capable of reacting rapidly with the radicals. It is found that a soln. of I in a mixt. of EtOH and pyridine (cf. Ziegler, Ewald and Orth, *C. A.* 24, 3773) readily reacts at 70–100° with the radicals with practically the theoretical amt. of I, forming triphenylmethyl ethyl ether and diarylmethylpyridinium iodides. Satisfactory solvents are *o*-$C_6H_4Cl_2$, PhBr, $C_6H_4Me_2$ and α-bromonaphthalene. In the method used a weighed sample of I is added to a measured vol. of I soln., the mixt. kept in a const.-temp. bath for a definite time, then removed quickly and chilled. An excess of standard $Na_2S_2O_3$ soln. is added and the excess titrated with a standard I soln. The rate of dissocn. of the following $Ph_3CCHPhR$ derivs. is measured at 80°: with R = Ph, *p*-C_6H_4Me, *p*-C_6H_4OMe, *p*-biphenyl, 2-fluoryl (II), α-naphthyl, and 9-phenanthryl (III). II is prepd. by coupling 2.79 g. Ph_3CNa with 2.91 g. phenyl-2-fluorylchloromethane ording to B. (*C. A.* 32, 7447[1]) in 49% yield. II m. 152–62° in air and 164–8° in N to an orange colored liquid. For the prepn. of III, *phenyl-9-phenanthrylchloromethane* (IV), m. 114–16°, is prepd. by satg. a cold soln. of 8.52 g. phenyl-9-phenanthrylcarbinol (V) in 70 cc. dry C_6H_6 contg. 3 g. $CaCl_2$ with HCl. The *bromo deriv.* of IV, obtained in 95% yield from V and AcBr, m. 115–16°. When 3.03 g. IV in 5 cc. C_6H_6 is allowed to react with an ice-cold soln. of Ph_3CNa, III is obtained in 80% yield. III m. 176–88° in air and 190–3° in N to a reddish orange liquid. The results show that the 9-phenanthryl, α-naphthyl and 2-fluoryl groups are most effective in promoting a rapid dissocn., the *p*-biphenyl and the *p*-C_6H_4OMe groups have an intermediate effect, while the *p*-C_6H_4Me and the Ph groups are least effective. The energies of activation for the dissocn. of pentaphenylethane and of III are detd. F. E. Brauns

Conversion of chlorophyll to pheophytin. G. Mackinney and M. A. Joslyn. *J. Am. Chem. Soc.* 62, 231–2 (1940); cf. *C. A.* 32, 4863[9].—For the pure *a*- and *b*-chlorophyll components, it is confirmed that the reaction involving loss of Mg is of 1st order with respect to acid. It is probably of the same order with respect to chlorophyll. The 2 H atoms replacing the Mg atom must therefore enter at different rates and in all probability the entrance of the 1st H is the rate-governing step. This would materially weaken the remaining Mg-N bond, in which respect it would then no longer be equiv. to the initial condition, presumably highly covalent in character. Chlorophyll *a* reacts from 7 to 9 times as rapidly as chlorophyll *b*. C. J. West

The absolute rates of heterogeneous reactions. II. Electrode reactions. George E. Kimball. *J. Chem. Phys.* 8, 199–204(1940); cf. *C. A.* 32, 7331[8].—The theory is extended to include reactions at electrode surfaces. The resulting expression for the rate of an electrode reaction includes both activation-controlled and diffusion-controlled reactions. The problem of the effect of stirring rate on reaction rate is discussed. The results are applied to the theory of reactions at "floating" electrodes, e. g., the soln. of metals in acids. The reaction rate expressions at such electrodes are of a very complex form, but can be approximated in special cases. The rate of such a reaction depends in general not only on the concn. of the principal reactants, but also on the concn. of every ion in the soln. G. M. Petty

Reactions in a medium of concentrated sulfuric acid. XVIII. The oxidation of artificial sulfides. Jaroslav Milbauer, J. Kurka and J. Mikolášek. *Chem. Obzor* 14, 193–5(1939).—In the oxidation of H_2S by H_2SO_4 contg. S the reaction $S + 2H_2SO_4 \rightleftharpoons 3SO_2 + 2H_2O$ proceeded irregularly because the S liberated from the catalysts formed in drops of an unequal size and in irregular dispersions. When the quantity of the catalyst remained at a 0.0001 *M* equiv. of the acid the oxidation of S began in the nascent state and proceeded almost linearly to a max. value. The time in mins. required to reach this max. was for the following sources of S: Ag_2S 20, As_2S_3 25, ZnS 25, Sb_2S_3 35, FeS 35 and HgS 75. In the presence of $HgSO_4$ this time of oxidation was Ag_2S 35, FeS 35, Sb_2S_3 45, ZnS 50, As_2S_3 65 and HgS 90. In the presence of SeO_2 the time of oxidation was Ag_2S 20, ZnS 20, HgS 30, FeS 33, Sb_2S_3 45 and As_2S_3 55. Both H_2SO_4 and SeO_2 increased the completeness of the reaction from 1 to 17%. **XIX. Notes on ethylene.** *Ibid.* 213–15.—Ethylene passed through H_2SO_4 becomes dark. This darkening, dependent upon partial pressures, was slow at room temps. but became faster at 200°; the small increase in the reaction velocity was due to the decrease in the absorption of C_2H_4 at elevated temps. $HgSO_4$ catalyzed the reaction producing the darkening; $(NH_4)_2SO_4$ retarded the reaction. During the reaction SeO_2 was reduced to free Se, the reaction being influenced by the equil. mass of SeO_2 and Se. The catalyst V_2O_5 was reduced, leaving a green soln. which retarded the darkening. At room temps. traces of SO_2 appeared when the C_2H_4 passed through H_2SO_4 contg. $HgSO_4$; at 200° the quantities of SO_2 appearing were large. The decompn. of C_2H_4 in H_2SO_4 contg. the catalyst $HgSO_4$ was slower than the decompn. of C_2H_2 by H_2SO_4 without any catalyst; the presence of H retarded the decompn. of both C_2H_4 and C_2H_2. **XX. The combustion of some sulfide minerals.** *Ibid.* 215–19.—The rate of the evolution of SO_2 from 50 cc. of 98.7% H_2SO_4 ventilated by 0.5 l. of N per hr. in the presence of 0.05–0.15 mol. of the mineral ore with or without the addn. of $HgSO_4$ or SeO_2 was detd. at 302°. Sphalerite was oxidized faster than artificially prepd. ZnS; the oxidation was 78.2% complete, was not influenced by $HgSO_4$, and was hastened by SeO_2. The oxidation of auripigment occurred at the same rate as the oxidation of pptd. As_2S_3; it was 72% complete, hastened by SeO_2 and not influenced by $HgSO_4$. The oxidation of antimonite was faster and more complete than the oxidation of pptd. Sb_2S_3; it was 42% complete, not influenced by $HgSO_4$ and hastened by SeO_2. The oxidation of cinnabarite was slower than the oxidation of pptd. HgS; it was 99.1% complete, hastened by SeO_2 and not influenced by $HgSO_4$. The oxidation of marcasite was faster and more complete (82.9%) than that of pyrites. The oxidation of these minerals in H_2SO_4 was identical to their behavior in concd. HNO_3. Frank Maresh

A new procedure for calculating combustion temperatures and its application to mixtures of alcohol vapor, water vapor and oxygen. H. Zeise. *Z. Elektrochem.* 45, 893(1939); cf. *C. A.* 33, 6698[4].—Corrections to Table 3 of the previous paper; the general conclusions remain unchanged. S. Glasstone

Kinetic study of combustion in mixtures of hydrogen, carbon monoxide and oxygen. M. Prettre. *Mém. poudres* 29, 283–325(1939).—Combustion is regulated by the O and H, the O and H having 2 mechanisms of combustion according to the sum of their partial pressures. The presence of KCl causes a lessening in the speed of oxidation in cases where the percentage of O is low. Cf. *C. A.* 27, 4083. A. J. Phillips

Effect of variation of piston surface on rate of compression of the crushers. Application to law of combustion of colloidal powders. H. Muraour and G. Aunis. *Mém. poudres* 29, 216–21(1939).—The combustion law may be put in the form $V = a + bP$, where *a* is negligible under high pressures. If the speed of combustion is proportional to the pressure, the rate of compression of the crusher, at a given interval, should be independant of the piston sur-

face. This theory was confirmed, for high pressures where a is negligible, by tests on tubular powders with pistons of ½, 1, 2, 3 and 4 sq. cm. When a is appreciable, the rate of crushing increases as the piston surface increases.
A. J. Phillips

The kinetics of exchange reactions. II. Propyl, isopropyl and isobutyl bromides. G. A. Elliott and S. Sugden. *J. Chem. Soc.* **1939**, 1836–8; cf. *C. A.* **33**, 9128[1].—By using Rd-Br as an indicator the kinetics of the exchange reactions between Br^- ion and PrBr, iso-BuBr and iso-PrBr were studied. The solvent was Me_2CO contg. 10% water by vol. E = 18.12, 20.21 and 22.94 kg.-cal., resp., and the effective collision diam. for iso-PrBr is unusually large. W. B. Keighton

The effect of mercuric bromide on the hydrolysis of alkyl bromides in acetone. Dennis R. Read and Wm. Taylor. *J. Chem. Soc.* **1939**, 1872–8.—Dissolved $HgBr_2$ accelerates the hydrolysis of MeBr, EtBr, iso-PrBr and *tert*-BuBr in aq. Me_2CO at 50°, the accelerating effect increasing markedly in the order given. Water has a smaller accelerating effect. Both water and $HgBr_2$ retard the esterification of an alc. with HBr. The HBr formed tends to deactivate the $HgBr_2$. The hydrolysis of *tert*-BuBr is also accelerated by AgBr, HBr, H_2O and *tert*-BuBr, the effect decreasing in that order, and all are less effective than $HgBr_2$. NaBr has no accelerating effect. $HgBr_2$ is an electrophilic reagent, water nucleophilic to MeBr, but increasingly electrophilic to *tert*-BuBr.
W. B. Keighton

Reaction velocity of aldehydes with ammonia. I. Reaction of furfural with ammonia. E. K. Nikitin and M. A. Abramova. *J. Gen. Chem.* (U. S. S. R.) **9**, 1347–55(1939); cf. *C. A.* **30**, 7496[6].—The concn. of furfural in H_2O is detd. with an accuracy of ±2% by treating at 12.5° 1 vol. of 1.5–3% furfural soln. with 2 vols. of a satd. Na_2CO_3 soln. in 7.5–8.5% NH_4OH, and comparing the rate of hydrofuramide pptn. with that of a standard soln. similarly treated. The results are calcd. by the formula previously given (*C. A.* **31**, 2126[8]). Lower concns. and the presence of aldehydes affect the results. C. B.

Catalytic hydration of carbon dioxide. Manfred Kiese and A. Baird Hastings. *J. Biol. Chem.* **132**, 267–80 (1940).—The velocity consts. for the hydration of CO_2 were measured by a manometric method. Br, HOBr, Cl and HOCl are strong catalysts for the hydration of CO_2, Br being stronger than Cl. They are particularly effective in the alk. range. I, HOI, halides, halates and perhalates have no significant catalytic effect. Sulfite and selenite are weaker catalysts than Cl and have an optimal activity between pH 7 and 8. Carbonic anhydrase is at least 10^3 times more active than an equal wt. of Br. The dissocn. const. of HOCl at 5° is $K' = 2.8 \times 10^{-8}$, and of HOBr at 5°, $K' = 1.0 \times 10^{-9}$. D. S. S.

Statistical fluctuations in autocatalytic reactions. Max Delbrück. *J. Chem. Phys.* **8**, 120–4(1940).—Math. The differential equations describing the statistical fluctuations of a simple autocatalytic reaction mechanism are set up and solved completely. G. M. Petty

Investigation of mixed oxidation-reduction catalysts. I. Mechanism of the activation of iron by copper. S. Kul'berg and E. Matenko. *J. Phys. Chem.* (U. S. S. R.) **13**, 600–4(1939).—Systems contg. benzidine, *o*-tolidine or *m*-phenylenediamine and Cu_2Cl_2 were oxidized by means of $FeCl_3$, and the course of the reaction was followed potentiometrically and colorimetrically. The simultaneous catalytic effect of Cu^{++} and Fe^{++} ions is greater than the sum of the individual effects, and the difference is greater the less stable the complex Cu-amine compd., in the order above given. Similar results were obtained with *p*-phenylenediamine, methylene blue and methyl violet.
F. H. Rathmann

Comparative characteristics of the adsorptive and catalytic properties of variously prepared synthetic ammonia iron catalysts. S. S. Gaukhman and V. A. Rolter. *J. Phys. Chem.* (U. S. S. R.) **13**, 593–9(1939); cf. *C. A.* **33**, 4386[5].—Adsorption isotherms for H and N on 2 Fe catalysts promoted by 2% Al_2O_3 are given for temps. from 184 to 425°. Phys. adsorption was found at 184°, two types of activated adsorption at 250–425° on the sintered catalyst only. For the ammonia synthesis at 360–385° the catalytic activity of the sintered catalyst was proportional to the activated adsorption. F. H. R.

Kinetics of the cyclization of biisobutyl over platinized charcoal. B. A. Kazanskii and A. L. Liberman. *J. Gen. Chem.* (U. S. S. R.) **9**, 1431–4(1939).—Because of the uniform rate of the catalytic aromatization of $(iso\text{-}Bu)_2$ over platinized C (with 14% and 20% Pt) at 300° by the method previously described (*C. A.* **33**, 9294[2]), the kinetic velocity of the reaction can be measured from the H liberated in the process. The mean apparent energy of activation of $(iso\text{-}Bu)_2$ (15,930–16,350 Cal./mol.) is nearly equal to the energy of activation of dehydrogenation (aromatization) of cyclohexane over the same catalyst (16,070 Cal./mol.) (cf. *C. A.* **30**, 6713[8]). C. B.

Activated carbon as a catalyst in certain oxidation-reduction reactions. Elmer C. Larsen and James H. Walton. *J. Phys. Chem.* **44**, 70–85(1940).—Activated C with reproducible catalytic properties was used to obtain more accurate data on factors affecting the rate of decompn. of H_2O_2 and the rate of autoxidation of $SnCl_2$ in acid soln. and of K urate in alk. soln. The rate of decompn. of H_2O_2 was followed by measuring the rate of O_2 evolution in a special app. (cf. *C. A.* **26**, 1850) for the following factors: (1) temp. of activation (activity reaches a max. for C activated at 825–875°), (2) source of C (lactose, dextrose, starch, and ash-free gelatin), (3) initial peroxide concn., (4) variation of quantity both of catalyst and of peroxide, (5) temp. of reaction, (6) pH, and (7) metallic salts. The decay in activity of C during H_2O_2 decompn. was investigated for (*a*) effect of moisture, and O_2, (*b*) maintaining const. concn. of peroxide and (*c*) repeated use of the same C. Detn. of the adsorption capacity for I_2 of carbons activated at different temps. showed a large increase in I_2 adsorption for high-temp. C owing to the combined effect of increased surface area and the formation of a new surface oxide. Results appear to agree with King's theory of the existence of 2 surface oxides on activated C—an alk. at high temps. and an acid at low temps. M. McMahon

Investigation of the lime-vanadium pentoxide system. A. N. Morozov. *Metallurg* **13**, No. 12, 21–8(1938). – Thermal and optical examn. of the $CaO\text{-}V_2O_5$ system contg. up to 50% CaO showed 3 compds., $CaO.V_2O_5$ m. 778°, $2CaO.V_2O_5$ m. 1015° and $3CaO.V_2O_5$ m. 1380°.
H. W. Rathmann

Application of physicochemical analysis to the study of the equilibria of the liquid phases in ternary systems. II. Layer separation in the systems: acetic acid–methylaniline–benzine (I) and acetic acid–dimethylaniline–benzine (II). E. F. Zhuravlev. *J. Phys. Chem.* (U. S. S. R.) **13**, 679–83(1939); cf. *C. A.* **34**, 3151.—Two ternary diagrams and 2 tables reproduce the data for the isotherms of these 2 systems at 20, 30, 40 and 45° and at 20, 25 and 30°, resp. In both cases the closed, concentric regions lie close to the AcOH-benzine side of the triangle as with the analogous aniline system. For I, the upper crit. ternary point is at 48.2°, for II at 41.7°; the long diams. of the "islands" correspond to 23% methylaniline, 77% AcOH for I and 20% dimethylaniline, 80% AcOH for II. No evidence was found for chem. compd. formation.
F. H. Rathmann

Determining the composition of solid phases of quaternary systems. V. I. Nikolaev. *Compt. rend. acad. sci. U. R. S. S.* **24**, 556–8(1939)(in English); cf. *C. A.* **31**, 3368[9].—Schreinemaker's method was applied to the quaternary mutual system $2NaCl + MgSO_4 \rightleftharpoons Na_2SO_4 + MgCl_2$, in which there are no solid solns., but where joint crystn. of 2 and 3 salts may be observed, and which contains a double salt, astrakhanite. The diagram is composed of 3 equilateral triangles which form half of a hexagon, with the H_2O point at the center and the $MgSO_4$, $MgCl_2$, NaCl and Na_2SO_4 points at the corners of the half hexagon. Four coördinates are used to calc. the compn. of liquid and solid phase and the motion is along a spiral. George Ayers

Derivation of the criteria for irreversible changes,

equilibrium and stability based on the uncompensated heat. Pierre Van Rysselberghe. *J. Chem. Education* **16**, 476–80(1939).—The second law of thermodynamics is expressed in terms of the uncompensated heat. The significance of this quantity and its connection with the work of irreversible cycles is considered. All the particular criteria for irreversible changes are derived from the fundamental one which states that in no natural process can the uncompensated heat be neg. The corresponding criteria of equil. and stability are established with special attention being paid to Gibbs' criteria. The chem. variable is defined and used in establishing new and convenient forms for the criteria of equil. and stability.
Kenneth H. Slagle

Entropy of dimethylacetylene from low-temperature calorimetric measurements. Free rotation in the dimethylacetylene molecule. Darrell W. Osborne, Clifford S. Garner and Don M. Yost. *J. Chem. Phys.* **8**, 131(1940).—The molal entropy of MeC:CMe at 291.00°K. and 536 mm. is 68.14 cal./deg. mole from calorimetric data, and 67.82 cal./deg. mole from mol. data. This close agreement indicates that there is no appreciable barrier restricting the rotation of the Me groups with respect to each other.
G. M. Petty

The exact formulas for the true and mean specific heats of platinum between 0° and 1600°. F. M. Jaeger and E. Rosenbohm. *Physica* **6**, 1123-5(1939).—Selected data based on 600 detns. of the mean sp. heats and the heat content of pure Pt between 0° and 1600° yielded the following: between 0° and 500°, $Q_{t°-0°} = 0.031357\,t + 0.04507 \times 10^{-4}\,t^2 - 0.0161 \times 10^{-7}\,t^3$, between 400° and 1600°, $Q_{t°\ 0°} = 0.031622\,t + 0.03172 \times 10^{-4}\,t^2$. The mean sp. heats between 20 and 400° are

t	$\bar{C}_{p_{t°-20°}}$
100	0.03187
200	0.03228
300	0.03264
400	0.03296

and between 400° and 1600°, $\bar{C}_{p_{t°-20°}} = 0.031701 + 0.03164 \times 10^{-4}\,t$.
Earl H. Brown

Specific heat of ethyl ether, nitrobenzene and carbon disulfide. Josef Mazur. *Z. Physik* **113**, 710–20(1939); cf. *C. A.* **33**, 8099[3,4].—The sp. heat in cal./g. (C_p) of nitrobenzene in the temp. range 5–20° is given by $0.338300 + 0.000556\,t$. C_p for Et_2O in the temp. range −100° to 20° is given by $0.54239 + 0.0005956\,t$. C_p for CS_2 in the range −100° to 20° is given by $0.22674 + 0.0007731\,t + 0.00000431\,t^2$. No evidence of any transition point was found.
E. J. Rosenbaum

Heat of fusion of ice. A revision. Nathan S. Osborne. *J. Research Natl. Bur. Standards* **23**, 643–6(1939)(Research Paper No. 1260).—A revision of the results of measurements made at the Natl. Bur. Standards in 1913 and 1915; more recent data for the heat capacity of water were used. The revised value is 333.5 ± 0.2 intern. joules/g.
John W. Knowlton

Heat of oxidation of the iodide anion by potassium dichromate. T. V. Ass, A. Kh. Batalin and I. A. Shcherbakov. *J. Phys. Chem.* (U. S. S. R.) **13**, 687–9(1939).—The heat of reaction for $KI + K_2Cr_2O_7 + H_2SO_4$ (I) is 28 Cal. per g. atom of I; for $KI + K_2Cr_2O_7 + HCl$ (II), *II* is 26 Cal. The velocity const. for I is 1st order, *K* 0.13; for II, *K* decreases as the reaction proceeds.
F. H. Rathmann

Studies of ionization in nonaq. solvents (German, Jamsett) **6**.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F. DUNCAN

Scattering of light in Bose-Einstein and Fermi-Dirac gas. B. N. Singh. *Phil. Mag.* **28**, 635–41(1939).—The modification produced by quantum phenomena in the classical expression for light scattering is calcd. For the non-degenerate case the effect of the Bose-Einstein and Fermi-Dirac statistics is to increase or decrease, resp., the classical scattering coeff. For the degenerate case the Bose-Einstein scattering tends to infinity, while the Fermi-Dirac scattering tends to zero. E. J. Rosenbaum

The electron as ring, magnet and top. Johannes Stark. *Tech. Blätter* **29**, 207–8(1939).—A review. R. Seiden

Radiation from a point charge revolving in a circular orbit. Hillel Poritsky. *Phil. Mag.* **28**, 617–31(1939).—Math. E. J. Rosenbaum

The propagation of electron waves in ionic single crystals. A. Von Hippel and J. W. Davisson. *Phys. Rev.* **57**, 156–7(1940). G. M. Petty

Shape of β-ray spectra and the mass of neutrino. L. A. Sliv. *Compt. rend. acad. sci. U. R. S. S.* **24**, 34–7 (1939)(in English).—Math. The Konopinski-Uhlenbeck (*C. A.* **29**, 6833[7]) formula for the energy distribution is modified, giving closer agreement with expt., particularly near the upper limit of the spectrum. Theory and expt. are compared for β-spectra of Ra E, Th C, P^{32}, N^{13} and Th C. On a log λ versus log $(E_m - 1)$ diagram, the new formula is shown to be intermediate between the K.-U. and the Fermi formulas. G. M. Petty

β-Decay and mesotron lifetime. Robert Serber. *Phys. Rev.* **56**, 1065(1939).—It is shown that there is no theoretical connection between β-decay and mesotron decay; both can occur, but they are completely independent processes. G. M. Petty

Meson theory of nuclear forces. H. A. Bethe. *Phys. Rev.* **55**, 1261–3(1939).—Theoretical. Present evidence is in favor of the "neutral theory," rather than the sym. theory. G. M. Petty

Binding energy of He^6 and nuclear forces. H. Margenau. *Phys. Rev.* **55**, 1173–5(1939).—Math. The energy difference $He^6 - Li^6$ is calcd. Conclusions are drawn concerning the detailed nature of the spin forces. G. M. Petty

Many-body interactions in atomic and nuclear systems. H. Primakoff and T. Holstein. *Phys. Rev.* **55**, 1218–34 (1939).—Math.-theoretical. The replacement of field interactions by two-body action-at-a-distance potentials is a poor approximation in nuclear problems. A satisfacory description of nuclei, other than the deuteron, can be obtained only by an explicit consideration, from the very beginning, of the role played by the field. G. M. P.

Coulomb energies and nuclear models. Harrison Brown and D. R. Inglis. *Phys. Rev.* **55**, 1182–3(1939).—Electrostatic energy differences of isobaric light nuclei estd. by use of the α-model do not agree with expt. as well as those given by Bethe (*C. A.* **32**, 8924[4]) for the central model. The comparison with expt. of the binding energies of alphas in the light 4 *n*-particle nuclei, given by Hafstad and Teller for the α-model (*C. A.* **33**, 1206[3]), is improved by inclusion of the Coulomb energy. G. M. Petty

The neutron's magnetic moment. O. Halpern and M. H. Johnson. *Phys. Rev.* **57**, 160(1940); cf. *ibid.* **55**, 601, 1125(1939); *C. A.* **33**, 6700[7].—A general discussion. G. M. Petty

The neutron-deuteron scattering cross section. Lloyd Motz and Julian Schwinger. *Phys. Rev.* **57**, 161–2(1940).—Math. The scattering cross section is 4.57×10^{-24} sq. cm. At best, this theoretical value is 20% too large. The discrepancy is due to polarization effects. G. M. Petty

The magnetic moments of light nuclei. M. Phillips. *Phys. Rev.* **57**, 160–1(1940).—Discrepancies between theoretical and exptl. values of nuclear magnetic moments are discussed. G. M. Petty

Multiple scattering of charged particles. Arthur E. Ruark. *Phys. Rev.* **57**, 62(1940).—Math. G. M. P.

A note on the wave functions of the relativistic hydrogenic atom. Leverett Davis, Jr. *Phys. Rev.* **56**, 186–7 (1939).—The normalized radial wave functions for the discrete levels of Dirac's relativistic hydrogenic atom are expressed in terms of generalized Laguerre polynomials. A general expression for the av. value of r^q is given. H. C. Thomas

The calculation of polarizabilities and van der Waals forces for atoms in *S* states. Julian K. Knipp. *Phys. Rev.* **55**, 1244–54(1939).—Math. The perturbation scheme of Møller and Plesset (*C. A.* **29**, 993[3]) is extended to the calcn. of at. polarizabilities and van der Waals force consts. The at. polarizabilities of Be and A are 4.14 and 1.28×10^{-24} cc., resp. The const. μ in the van der Waals energy, $-\mu/R^6$, is 222 and 63.7×10^{60} erg cm.^{6} for 2 Be atoms and for 2 A atoms, resp. The observed at. polarizability of A is 1.63×10^{-24} cc. G. M. Petty

Relative intensity of spectrum lines. F. H. Newman. *Phil. Mag.* **28**, 584–7(1939).—In an elec. discharge in the vapor of alkali amalgams the emission lines of the alkali component show a marked increase in intensity relative to the Hg lines as the temp. is raised. At const. temp. with an uncondensed discharge the alkali lines are relatively strong but with a condensed discharge they may be suppressed, leaving only the Hg lines. The explanation of these observations is discussed. E. J. Rosenbaum

Electric glow between carbon electrodes. F. H. Newman. *Phil. Mag.* **28**, 544–7(1939).—When a glow discharge is passed at low gas pressures between very pure C electrodes with a p. d. of 40 v. the luminosity fills the whole space surrounding the ends and the electrodes are not incandescent. The neg. electrode becomes pitted and covered with amorphous C and the glow becomes difficult to restart. A comparison of the glow spectrum with that of an elec. discharge under the same conditions indicates that the excitation potential of the Ångström bands is higher than that for the Swan, CN and CH bands. E. J. Rosenbaum

Theory of the cathodic-discharge portion of a low-pressure discharge. III. W. Weizel, R. Rompe and M. Schön. *Z. Physik* **113**, 730–9(1939); cf. *C. A.* **33**, 8488[8]. —Equations for the neg. glow are set up, considering as elementary processes the production of charge carriers by electron impact, the recombination, and the motion of the carriers in the field. These equations are solved by an approximation method. E. J. Rosenbaum

Electric strength of gases measured by corona discharge. W. M. Thornton. *Phil. Mag.* **28**, 666–78(1939). —The voltage at which a corona discharge starts on a wire was measured for 43 gases as a function of wire diam. and gas pressure. From these values the gradient in kv./cm. which just starts a glow in each gas at 1 atm. and 0° was computed and graphed against the reciprocal of the electron mean free path. The points lie along 6 straight lines of different slopes. The results are not related to the ionizing potentials of the gases or to electron configurations. Cl has the greatest elec. strength of the gases examd.; the monat. gases have the least. When Cl is substituted for H in a hydrocarbon the elec. strength is increased. E. J. Rosenbaum

Breakdown, glow discharge and photoelectric reaction. W. Rogowski. *Z. Physik* **114**, 1–52(1939); cf. *C. A.* **33**, 7186[9].—Theoretical. The photoelec. theory of breakdown is extended to include vol. ionization. In several respects the theory is similar to that for breakdown by pos. ionization; e. g., the transition from breakdown to glow discharge is qualitatively the same for both. The space charge can stabilize the discharge for sufficiently strong photoelec. reaction. E. J. Rosenbaum

The β-ray spectra of phosphorus, sodium and cobalt. J. L. Lawson. *Phys. Rev.* **56**, 131–6(1939).—The β-ray spectra of P^{32}, Na^{24} and Co were obtained by means of a magnetic spectrometer of high resolving power (1.6% momentum spread). The max. energies of the electrons from P and Na are 1.72 and 1.4 m. e. v., resp. The spectrum of the Co positrons, which have a max. energy of 1.50 m. e. v., suggests more than 1 continuous distribution. The effect of scattering is investigated. The results agree more nearly with the Fermi (*C. A.* **28**, 5329[1]) theory of β-decay than with that of Konopinski and Uhlenbeck (*C. A.* **29**, 6833[7]). The resolution of the spectrometer is illustrated by the sepn. of the *K* and *L* shell conversion electrons arising from a γ-ray in In. H. C. Thomas

Effect of pressure on the positive point-to-plane discharge in N_2, O_2, CO_2, SO_2, SF_6, CCl_2F_2, A, He and H_2. H. C. Pollock and F. S. Cooper. *Phys. Rev.* **56**, 170–5 (1939).—Curves are given showing the variation with abs. pressure over a range of 30 atm. of the d.-c. voltages at which corona and spark breakdown appear in a 3-mm. point-to-plane gap in H_2, A, air, CCl_2F_2, O_2, He, 50% O_2—50% He, 25% O_2—75% He, 25% O_2—75% A, 50% O_2—50% N_2, SF_6, CO_2. Voltage max. appear in the breakdown curves for point potential in air, CCl_2F_2, A, the mixts. SF_6 and CO_2. In the gases which readily form neg. ions there is found a stabilization of the corona, which is not effective at all pressures. The effect of x-ray irradiation on the gap strength is detd. and discussed. H. C. T.

The variation with the density of mercury vapor of the intensity of the spectral lines of mercury excited by electron impact. O. S. Duffendack and O. G. Koppius. *Phys. Rev.* **55**, 1199–1208(1939).—A source which closely approximates an ideal source—one in which electrons of definite and controlled energy are projected so that no electron makes more than one exciting or ionizing collision in its passage through the gas—is described. Theoretical formulas were developed which closely approximate the observed relation between the intensity of the Hg lines and the d. of the Hg vapor. Data and curves are also given for mixts. with A and with He. An analytical curve for the detn. of Hg in these mixts. can be derived from the data. These results are of immediate value in the practice of quant. spectrochem. analysis. G. M. Petty

The secondary emission from evaporated nickel and cobalt. D. E. Wooldridge. *Phys. Rev.* **56**, 1062–3 (1939); cf. *C. A.* **33**, 9132[8].—The secondary yield (0–1.5) was plotted against the primary energy (0–1000 e. v.) for Ni and Co evapd. at less than 2×10^{-7} mm. Hg. Theoretical curves fit the exptl. data very closely. G. M. P.

The "photo gas-kinetic effect." Maximilian Plotnikov, Jr. *Acta Phys. Polon.* **4**, 195–204(1935); *Chem. Zentr.* **1938, I**, 528; cf. *C. A.* **32**, 6166[7].—The previously described thermophotometric method for the measurement of radiant energy, which depends upon the "photo gas-kinetic effect," was further developed experimentally. Since the quartz shutter plate previously used absorbs completely wave lengths greater than 5 μ, a KCl plate was used, the transparency of which extends to 24 μ. The production of this plate and the app. used for the purpose are described in detail. It is possible to produce optically clear crystal calottes 7–8 cm. in diam. from which plates and prisms of the desired size can be cut. With this improved app., the transformation coeff. of the system platinized Pt-air-KCl-plate was detd. A value of 1.43% is reported. The possibility of further increasing the sensitivity of the method by the use of platinized Pt wire gauze or of graphite foil is explained. The arrangement of app. described reacts to heat radiated from the hand as well as to that radiated from water at a temp. slightly different from that of the room. M. G. Moore

Increasing the sensitivity of the thermophotometric method for the measurement of radiated energy. Maximilian Plotnikov, Jr. *Acta Phys. Polon.* **6**, 12–18(1937); *Chem. Zentr.* **1938, I**, 942; cf. preceding abstract.—Further work is reported on the previously described method (cf. *C. A.* **28**, 2228[8]) for the measurement of radiated energy by the conversion of such energy into kinetic energy. Various receiving targets for the radiation are described, the conversion coeffs. of which were detd. The greatest sensitivity was shown by graphite foils, less was shown by smoked or platinized Pt gauze, and still less by platinized Pt disks. M. G. Moore

Electron-diffraction examination of oxide films on light metals. Itirō Iitaka and Sigeto Yamaguti. *Nature* **144**, 1090–1(1939).—Mg, after polishing, is covered with an oxide film at room temp. and at 400°. There is an oxide film on Al, but no film on Be. G. M. Petty

A report on the development of the electron supermicro-

scope at Toronto. E. F. Burton, J. Hillier and A. Prebus. *Phys. Rev.* **56**, 1171–2(1939); cf. *Can. J. Research* **17, A**, 49–63(1939).—Improvements in the app., which reduce the resolving limit below 60 A., are described. G. M. Petty

Changes in the internal resistance of selenium barrier-layer cells caused by exposure to light. Arne Eld Sandström. *Phil. Mag.* **28**, 642–8(1939); cf. *C. A.* **32**, 5300[8]; **33**, 1602[8].—The resistances of 2 cells were measured before and after exposure to visible light, soft x-rays (3.5 to 20 A.) and hard x-rays (0.3 to 1.0 A.). The ratio of resistances after and before exposure is about 0.8 independent of voltage, and the change in resistance is of the same character for the various radiations. Both cells showed the same type of resistance increase on storage in darkness. A non-rectifying cell has the same resistance before and after exposure, and the changes noted are attributed to changes in the barrier-layer. E. J. Rosenbaum

The β- and γ-radiations from copper^{61} and europium^{152}. A. W. Tyler. *Phys. Rev.* **56**, 125–30(1939).—These radiations are studied with the aid of a magnetic spectrometer of high resolution. The max. energy of the Cu^{64} positrons is found to be 0.659 ± 0.003 m. e. v., that of the Cu^{64} electrons is 0.578 ± 0.003 m. e. v. The effect on the shape of the spectra of scattering within the source and from its support is studied. The spectra from thin sources support the Fermi theory of β-decay. Electrons from Eu^{152} have a max. energy of 1.885 ± 0.012 m. e. v. The energies of 3 of the β-rays of Eu are 0.123 ± 0.001, 0.163 ± 0.001 and 0.725 ± 0.003 m. e. v. H. C. Thomas

The absorption of mesotrons in air and in condensed materials. Enrico Fermi. *Phys. Rev.* **56**, 1242(1939).—The absorption of mesotrons by air is considerably larger than the absorption by equal masses of condensed materials. From one-half to all this difference is theoretically explained without any contribution from the decay of the mesotron. G. M. Petty

A new proof of the instability of the mesotron. Giuseppe Cocconi. *Phys. Rev.* **57**, 61–2(1940).—The data of Clay and van Gemert (*C. A.* **33**, 7188[6]) on the Pb absorption of those cosmic rays which come at an angle of 60° to the zenith were verified. The results can be explained by the instability of the mesotron. G. M. Petty

A measurement of mesotron lifetime. W. M. Nielsen, C. M. Ryerson, L. W. Nordheim and K. Z. Morgan. *Phys. Rev.* **57**, 158(1940).—By the use of data on the absorption of vertical cosmic radiation by Pb, the lifetime of the mesotron is calcd. to be 1.2×10^{-6} sec. The mean free path is 7×10^5 cm. G. M. Petty

Evidence for the occurrence of meson pairs. H. J. J. Braddick and G. S. Hensby. *Nature* **144**, 1012–13(1939).—Cloud-chamber photographs (2358) of cosmic-ray particles were taken under 30 m. of clay, with 3 different arrangements of Pb inside and outside the chamber; 80% show a single ray penetrating a Pb plate without appreciable deviation; most of these are mesons. 125 show evidence of electronic showers. In 5 photographs, 2 apparently assocd. particles go through the Pb plate without change of direction and without producing secondaries; these are meson pairs. G. M. Petty

Simultaneous penetrating particles in the cosmic radiation. G. Wataghin, D. de Souza Santos and P. A. Pompeia. *Phys. Rev.* **57**, 61(1940). G. M. Petty

Baade and Zwicky's theory of cosmic rays, and the helium content of beryls. John Read. *Nature* **144**, 1040 (1939).—Baade and Zwicky (*Proc. Natl. Acad. Sci. U. S.* **20**, 259(1934); *Astrophys. J.* **88**, 411(1938)) have suggested that the av. intensity of cosmic radiation is perhaps 35 times the present rate. If this is true, the exptl. evidence regarding the He content of beryls is not incompatible with the assumption that this He was produced by cosmic rays. The possibility of biol. effects due to cosmic rays would also need reconsideration. G. M. Petty

Investigation of cosmic-ray showers of atmospheric origin, using two cloud chambers. A. C. B. Lovell and J. G. Wilson. *Nature* **144**, 863–4(1939).—Data are given for cosmic-ray showers, obtained in 2 cloud chambers sepd. (1) horizontally by 5.5 and 19 m., and (2) vertically by 36 cm. Al and by 36 cm. Pb. From the small av. multiplication involved when Pb or Al is interposed between the chambers, and from the form of the cascade spectrum in air, it is shown that large showers will be relatively much more frequent in light elements than is indicated by the cascade theory applied to a single entrant particle. G. M. P.

Nature of cosmic-ray particles. Seth H. Neddermeyer and Carl D. Anderson. *Rev. Modern Phys.* **11**, 191–207(1939).—The principal methods are reviewed for the detn. of mass. Cloud-chamber expts. are made on the no. of secondaries ejected from 1 cm. of Pt by "single" primaries with momenta greater than 500 m. e. v. A large predominance of single neg. secondaries over positives and showers is found. An energy analysis indicates that the data are not easily explainable by assuming 200-*m* mesotrons and electrons. Some of these energies (>150 m. e. v.) may be explained by particles of smaller mass than 200 *m* and hence smaller energy losses on traversing matter. Earl A. Gulbransen

Evidence that protons are the primary particles of the hard component. Thomas H. Johnson. *Rev. Modern Phys.* **11**, 208–10(1939).—A review. 16 references. Earl A. Gulbransen

Recent studies at high elevations. S. A. Korff. *Rev. Modern Phys.* **11**, 211–19(1939).—A review. 22 references. Earl A. Gulbransen

Recent studies at high elevations. J. C. Stearns and D. K. Froman. *Rev. Modern Phys.* **11**, 220–1(1939); cf. *C. A.* **32**, 4424[6].—Results indicate that high-energy neutral radiation may be produced in Pb by cosmic radiation. Earl A. Gulbransen

Specific ionization of high-speed particles. Robert B. Brode. *Rev. Modern Phys.* **11**, 222–9(1939).—A review. Earl A. Gulbransen

Nature of cosmic rays below ground. Volney C. Wilson. *Rev. Modern Phys.* **11**, 230–1(1939); cf. *C. A.* **33**, 6140[8].—A review. Earl A. Gulbransen

Analysis of deep rays. Pierre Auger and Thérèse Grivet. *Rev. Modern Phys.* **11**, 232–4(1939).—A study is made of the relative proportion of soft and hard particles and their space distribution in cosmic radiation. An arrangement of counters is used in which one of the counters is protected from secondaries. A much higher proportion of soft particles is obtained than that found with the free counter arrangement. The deepest laboratory was equiv. to 75 m. of H_2O. Earl A. Gulbransen

Energy distribution and positive excess of mesotrons. Haydn Jones. *Rev. Modern Phys.* **11**, 235–8(1939).—A vertical cloud chamber is used to obtain the energy spectrum of penetrating cosmic rays (0.2×10^9 e. v. to 10×10^9 e. v.). The soft component was eliminated by absorption in a 10.2 cm. Pb shield. Comparison is made between the exptl. results and Euler's theoretical curve (*C. A.* **33**, 4634) for the hard component. More pos. mesotrons (about 29%) than negative were found for each energy. Earl A. Gulbransen

Showers produced by penetrating rays and allied phenomena. W. F. G. Swann. *Rev. Modern Phys.* **11**, 242–54 (1939); cf. *C. A.* **33**, 8103[8].—A description of an app. for recording showers produced by penetrating rays. Counters (180) arranged in trays of 18 each are connected to 180 electroscopes. A sheet of Pb is interposed between each tray of counters. The optical system is arranged so that each electrometer indicates its position in the system by a spot on a ground-glass screen. The elec. system is arranged so that no electroscope discharges unless one counter in each tray discharges simultaneously. Results obtained from the intensity zenith angle observations and the intensity altitude observations made by recent stratosphere balloon flights are given: (a) at higher altitudes the diminution of intensity with increase of zenith angle from the vertical was much less rapid than expected, (b) at an atm. depth of 2 meters of H_2O (equiv.), the horizontal intensity formed 25% of the vertical, while for a depth of 0.5 meters of H_2O the corresponding result was 80%. Earl A. Gulbransen

Behavior of high-energy electrons in cosmic radiation. C. G. Montgomery and D. D. Montgomery. *Rev. Modern Phys.* **11**, 255–64, 266(1939).—A discussion of the behavior of electrons and photons of high energy in the production of large bursts of cosmic radiation and the occurrence of nuclear "vaporizations." E. A. G.

Behavior of high-energy electrons in cosmic radiation. J. R. Oppenheimer. *Rev. Modern Phys.* **11**, 264–6(1939). —A discussion of the relative frequency of large bursts in different materials from the cascade theory. Earl A. Gulbransen

Burst frequency as a function of energy. Marcel Schein and Piara S. Gill. *Rev. Modern Phys.* **11**, 267–76 (1939).—Size frequency distributions of bursts were obtained from analyses of records made by Carnegie model C cosmic-ray meters (shielded by 12-cm. Pb) at different locations. The value of 10^{-4} was found for the creation probability of a burst by a mesotron of about 2×10^{10} e. v. energy in a thickness of 12 cm. of Pb. This leads to a cross section per nuclear particle (proton, neutron) of 2×10^{-30} sq. cm. This value is independent of the energy of the incident particle. The effect of altitude on the frequency of large bursts is discussed. E. A. G.

Recent experiments on cosmic rays. P. M. S. Blackett and B. Rossi. *Rev. Modern Phys.* **11**, 277–81(1939).—Preliminary results are briefly described for the following expts.: shower production by penetrating cosmic rays, origin of the ionization bursts, absorption of penetrating cosmic-ray particles in Au, the non-ionizing component of cosmic radiation, and second max. of the transition curve for showers. Earl A. Gulbransen

Recent experiments on cosmic rays. J. Clay. *Rev Modern Phys.* **11**, 281(1939); cf. *C. A.* **33**, 7188[6,7], 9122[1]. The decrease of radiation in the directions 0°, 60° and 75° from the vertical is measured as a function of the thickness of Pb interposed between the coincidence counters. The decrease is very different for rays from different directions. The results are in agreement with calcns. for 0° and 60° if 20 km. is taken for the layer of formation, an original energy distribution proportional to $E^{-2.93}$, and a lifetime between 1.7 and 2×10^{-6}. The agreement in the 75° direction is not satisfactory. E. A. G.

Narrow cosmic-ray showers. W. Bothe. *Rev. Modern Phys.* **11**, 282–7(1939).—A review. 20 references listed. Earl A. Gulbransen

Narrow cosmic-ray showers. J. Clay. *Rev. Modern Phys.* **11**, 287(1939); cf. preceding abstr. and Schmeiser and Bothe, *C. A.* **32**, 4872[7].—Expts. are made to check the second max. of showers under Pb by taking small-angle showers. A second max. measurement with coincident counters is found but smaller than that for expts. performed with the larger angle. The second max. is not as large as that found by S. and B. E. A. G.

Extensive cosmic-ray showers. Pierre Auger, P. Ehrenfest, R. Maze, J. Daudin, Robley and A. Fréon. *Rev. Modern Phys.* **11**, 288–91(1939).—A continuation of the study of air showers by the method of long-distance coincidences and Wilson cloud-chamber measurements. Earl A. Gulbransen

Mesotron production in the atm. Marcel Schein and Volney C. Wilson. *Rev. Modern Phys.* **11**, 292–5(1939).—A Rossi-Hsiung type expt. is made up to an altitude of 25,000 feet with four-fold coincident counters. An 8.1-cm. Pb sheet is placed between the counters and a 2.2-cm. Pb sheet alternately changed from a position above to one between the counters. From the difference between counting rates it was found that at 25,000 feet an av. of 2 ionizing particles is ejected in a forward direction by a Pb plate (38 cm. × 5.2 cm. × 2.2 cm.) by the action of photons. This leads to a cross section per proton for the creation of a mesotron by a photon of $\varphi_p \simeq 3 \times 10^{-27}$ sq. cm. Earl A. Gulbransen

Disintegration of mesotrons. Bruno Rossi. *Rev. Modern Phys.* **11**, 296–303(1939).—The variation of the hard component of cosmic rays with the zenith angle and the temp. effect indicates that the cosmic-ray mesotrons decay with a lifetime of 3×10^{-6}. Other phenomena considered (variation with height, barometer effect, shape of the energy spectrum, no. of secondaries, etc.), are not inconsistent with the lifetime assumed. There is no evidence that the mesotrons which have been stopped actually disintegrate into an electron and a neutrino. Earl A. Gulbransen

Scattering of slow neutrons by protons. Milton S. Plesset and Frederick W. Brown. *Proc. Natl. Acad. Sci. U. S.* **25**, 600–4(1939).—Math.-theoretical. The scattering of slow neutrons by protons is considered for the spherical-well potential and for the meson-type potential. Calcns. are made for the potential hole; the assumption frequently made that the interaction is of negligible width leads to appreciable inaccuracies. The introduction of the virtual level of the deuteron to describe the singlet scattering is also considered, and the sequence of virtual levels defined by the Kapur and Peierl's scattering procedure (*C. A.* **33**, 4119[9]) is detd. to illustrate the convergence of the method in the extreme case of the deuteron. G. M. Petty

Fast neutron measurements with recoil counters. S. A. Korff. *Phys. Rev.* **56**, 1241–2(1939); cf. *C. A.* **33**, 6142[1]. —The counting rate of a recoil counter in the presence of a Ra + Be neutron source as a function of voltage (1450–1950 v.) is shown graphically. No β- or γ-rays are counted below 1770 v.; all are counted above 1850 v. There is no plateau: the counting rate rises steadily with the voltage. This counter was used in studying the neutrons in cosmic radiation. G. M. Petty

Elastic collisions of protons and very fast neutrons. Mokitiro Nogami. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 244–50(1939).—The angular distributions and elastic cross-sections have been calcd. for neutrons whose energies are 15, 25, 30 and 35 m. e. v. Math. Helen S. Hopfield

A study of the diffraction of protons of medium energy by vapor molecules. H. J. Yearian. *J. Chem. Phys.* **8**, 24–8(1940).—The diffraction of 15–20-kv. protons by CCl_4 vapor was investigated. The principal difficulties encountered were with space-charge dispersion of the beam near the ion source, and with neutralization of the beam as it passed through the vapor. Cross sections for neutralization and reionization of protons (in H, air, CCl_4 and EtOH) and H mol. ions (in H, air, and CCl_4) were detd. The sensitivity of photographic film (Eastman Commercial Ortho) decreased rapidly as the film was outgassed, probably owing to loss of water, but increased 15 times when the film was treated with oil. Diffraction patterns showed 3 max., with measurements in satisfactory agreement with electron diffraction data. G. M. Petty

High-velocity atomic beams. I. Amdur and H. Pearlman. *J. Chem. Phys.* **8**, 7–12(1940).—A general method is developed for producing and for measuring the intensity of high-velocity at. beams. The app. is described. The method is applied to beams of H atoms with energies equiv. to 200- to 800-v. electrons. Measurement of the collision cross section of these atoms when scattered by mol. H confirms the prediction that such scattering is predominately due to repulsive forces between the beam and scattering particles. G. M. Petty

Diffuse radiation of neutrons in the cyclotron. D. G. Alkhazov, I. V. Kurchatov, M. G. Meshcheryakov and V. N. Rukavishnikov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 32–3(1939)(in French).—The effect of the dimensions of the accelerating chamber, the gas pressure and the magnetic field on the yield and energy of neutrons is discussed. Diffuse neutrons are due to the D + D reaction. G. M. Petty

Helium of mass three as an agent in nuclear reactions. Walter H. Barkas. *Phys. Rev.* **56**, 1242–3(1939).—Theoretical. The amt. of energy released by reactions involving He^3 is estd.: $H^2 \rightarrow Li^4$, $Li^6 \rightarrow B^8$, $Li^7 \rightarrow B^9$, $B^{10} \rightarrow N^{12}$, $C^{12} \rightarrow O^{14}$, $N^{14} \rightarrow F^{16}$, $O^{16} \rightarrow Ne^{18}$, $Ne^{20} \rightarrow Mg^{22}$, $Mg^{24} \rightarrow Si^{26}$, $Al^{27} \rightarrow P^{29}$, $Si^{28} \rightarrow S^{30}$, $Si^{29} \rightarrow S^{31}$, $P^{31} \rightarrow Cl^{33}$, $S^{32} \rightarrow A^{34}$, $S^{33} \rightarrow A^{35}$, $Cl^{35} \rightarrow K^{37}$, $A^{36} \rightarrow Ca^{38}$. Many of these product nuclei cannot be formed by any other process. G. M. Petty

α-Particle groups from the disintegration of beryllium by deuterons. Samuel K. Allison, Elizabeth R. Graves

and Lester S. Skaggs. *Phys. Rev.* **57**, 158(1940).—The reaction $Be^9(d,\alpha)Li^7$ was investigated, with Po, Be and C targets. There is an excited state of Li^7 at 0.48 m. e. v. G. M. Petty

Mass and stability of C^{14}. Ernest Pollard. *Phys. Rev.* **56**, 1168(1939).—When C is bombarded with 3-m. e. v. deuterons, a group of protons with the range 82.0 cm. is observed. The reaction is $C^{13} + D^2 \rightarrow C^{14} + H^1$; the energy change is +8.21 m. e. v.; the mass of C^{14} is 14.00780 ± 0.00020. C^{14} should emit an electron with an energy of 0.3 m. e. v.; it was not detected. G. M. P.

Pair emission in the proton bombardment of fluorine. J. R. Oppenheimer and J. S. Schwinger. *Phys. Rev.* **56**, 1066–7(1939).—A theoretical treatment is given for the data of Fowler and Lauritsen (*C. A.* **34**, 672[9]). G. M. Petty

A study of the protons from calcium under deuteron bombardment. Wm. L. Davidson, Jr. *Phys. Rev.* **56**, 1061(1939).—Upon bombarding CaO with 3.1-m. e. v. deuterons, groups of protons due to $Ca(d,p)$ were observed at 66 and 96 cm., corresponding to "Q" values of 4.51 and 6.30 m. e. v. The 66-cm. group is due to the reaction $Ca^{40} + H^2 \rightarrow Ca^{41} + H^1$. G. M. Petty

Evidence for incorrect assignment of the supposed Si^{27} radioactivity of 6.7-minute half-life. H. A. Bethe and W. J. Henderson. *Phys. Rev.* **56**, 1060–1(1939).—Three radioactive elements have been reported to result from the natural α-particle bombardment of Mg. One with 2.36 min. half-life emits neg. electrons: $Mg^{25}(\alpha,n)$. This assignment was verified. An activity of 11-min. half-life, originally assigned to Al^{29}, is probably due to an impurity. A positron activity of 6.7-min. half-life was assigned to Si^{27}: $Mg^{24}(\alpha,n)$. With 16-m. e. v. α-particles and very pure Mg, no positron activity, but only a neg. electron activity, was observed. The 6.7-min. activity is shown to be $Al^{29}.Mg^{26}(\alpha,p)$. Kuerti and Van Voorhis have found that Si^{27} has a half-life of 3.7 sec. (*C. A.* **33**, 9125[2]). The energy relations are reviewed. G. M. Petty

Internal conversion in 6.4-hour cadmium. R. G. Sachs. *Phys. Rev.* **57**, 159–60(1940).—It is demonstrated that the data and conclusions of Valley and McCreary (*Ibid.* **56**, 863) are not inconsistent with theory. G. M. Petty

The radioactivity of Mn^{56}. R. H. Bacon, E. N. Grisewood and C. W. Van der Merwe. *Phys. Rev.* **56**, 1168(1939).—The γ-rays from Mn^{56} fit an energy group with an extrapolated end point of 1.50–1.75 mc^2, indicating a γ-ray line at 600–700 e. kv. There is marked straggling out to 3.90 mc^2, indicating a γ-ray line at 1.7 m. e. v. The data of other workers indicate that there are other lines between these two. G. M. Petty

A study of the protons from vanadium, copper, manganese and scandium under bombardment by deuterons. Wm. L. Davidson, Jr. *Phys. Rev.* **56**, 1062(1939).—The following reactions were produced by 3.1-m. e. v. deuterons: $V^{51} + H^2 \rightarrow V^{52} + H^1$; Cu^{63}, $Cu^{65} + H^2 \rightarrow Cu^{64}$, $Cu^{66} + H^1$; $Mn^{55} + H^2 \rightarrow Mn^{56} + H^1$; $Sc^{45} + H^2 \rightarrow Sc^{46} + H^1$. Measurements and calcns. were made for V^{52}, Cu^{64} and ^{66}, Mn^{56} and Sc^{46} for the range of proton groups in air equiv., "Q" values, excitation levels and mass. The mass of Mn^{55} is 54.9643. G. M. Petty

Radioactive isotopes of indium from α-bombardment of silver. L. D. P. King and W. J. Henderson. *Phys. Rev.* **56**, 1169(1939); cf. *Ibid.* **55**, 1118.—Ag was bombarded with 16-m. e. v. α-particles. The 20-min. period is assigned to $Ag^{109}(\alpha,n)In^{112}$. The 72-sec. period from In plus fast neutrons and from In + γ was not observed. The 65-min. period is assigned to $Ag^{107}(\alpha,n)In^{110}$. A weak activity of 9 hrs. was traced to an impurity: $Cu^{63}(\alpha,n)$-Ga^{66}. Less than 0.01% Cu in Ag could be detected by this means. These three activities were identified chemically. Another weak period of 2–3 days may be due to an impurity or to an isomeric state of In^{112}. G. M. Petty

The fission of protoactinium. Niels Bohr and John A. Wheeler. *Phys. Rev.* **56**, 1065–6(1939); cf. *C. A.* **33**, 9115[8].—Estimates are made of the differences between the crit. energy of unstable deformations and the binding energy of the added neutron for the compd. nuclei $_{92}U^{236}$, −0.4 m. e. v.; $_{92}U^{238}$, −1.1 m. e. v.; $_{91}Pa^{232}$, −0.1 m. e. v.; $_{92}U^{230}$, −0.7 m. e. v.; $_{90}Th^{232}$, −1.7 m. e. v.; $_{90}Io^{231}$, −1.2 m. e. v. Fission is produced more easily in protoactinium than in Th, but less easily than in U^{235}. G. M. Petty

Division of uranium nuclei under the action of neutrons and the problem of the existence of transuraniums. V. G. Khlopin, M. A. Pasvik-Khlopina and N. F. Volkov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 118–21(1939)(in English).—Thin layers of U_3O_8 and of Na uranate were bombarded up to 36 hrs. with neutrons with an intensity equal to that of 30 curies of Rn + Be. The bombarded compd. and the recoil atoms were sepd. chemically. The activities of PtS ppts. from U and from recoil atoms are compared. These curves indicate the presence of transuranic elements. Differences between these exptl. procedures and results and those of Meitner and Frisch (*C. A.* **32**, 4869[6]) and of Bretscher and Cook (*C. A.* **32**, 4869[6]) are explained. G. M. Petty

Radioactive gases evolved in uranium fission. L. Wertenstein. *Nature* **144**, 1045–6(1939).—The gases were passed through 2 Geiger-Müller counters, with various time lags between them. Periods of 30 sec. and of 4 min. were detected. G. M. Petty

Study of uranium and thorium fission produced by fast neutrons of nearly homogeneous energy. R. Ladenburg, M. H. Kanner, H. Barschall and C. C. Van Voorhis. *Phys. Rev.* **56**, 168–70(1939).—The effective cross sections of the U and Th fission for neutrons of 2.4-m. e. v. are found to be 5×10^{-26} sq. cm. and 1×10^{-25} sq. cm. (±25%). The ratio of the cross sections for Th and U fission is const. to within 10% for neutrons of 2.1, 2.4, 2.9 and 3.1 m. e. v. av. energy. H. C. Thomas

The nonexistence of transuranic elements. Louis A. Turner. *Phys. Rev.* **57**, 157(1940).—A theoretical discussion. G. M. Petty

Artificial radioactive indicators. Charles Rosenblum and John F. Flagg. *J. Franklin Inst.* **228**, 471–94, 623–48(1939).—A review. The chem. applications which involve the use of active halogen, P, S, Mn, As, and Au are summarized. More extensive investigations of the mechanism and velocity of certain reactions and the botanical and biol. uses of indicators are included. 97 references. M. Farnsworth

The effect of pH on the precipitation and concentration of some radioelements. Maurice Bachelet. *Ann. chim.* **12**, 348–415(1939).—Fractional pptn. of hydroxides controlled by the pH of the soln. is used for sepg. radioactive substances. The carrying down of U X with a Fe(OH)$_3$ ppt. in $UO_2(NO_3)_2$ soln., the concn. of Act and the extn. of Rd-Act in solns. of La and Act, and the concn. of Pa in salts of Zr and Pa are studied. Other insol. salts are also used, particularly the phosphates. The pptn. of $UO_2(HPO_4)$ can be used to fractionate U and U X. Adsorption plays a role in the carrying down of U X by the ferric ppt. in the presence of alkali carbonates. The adsorption of Rd-Act on La and the adsorption of salts of La and Act by $BaSO_4$ are also investigated. M. Farnsworth

Radioactive nodules from Devonshire, England. Max Perutz. *Mineralog. petrog. Mitt.* **51**, 141–61(1939).—Globular concretions surrounded by bleached haloes were found in Permian beds west of Budleigh Salterton, Devon. In their interior a light, sandy matrix is impregnated by a dark hard material in radial and concentric sheets. Contact photographs of a plane section show a distribution of radioactive material closely connected with the structure of the black impregnation. The radioactive substance was centered in a thin amorphous film of a complex U vanadate at the boundary between the dark and the light portions of the nodules. Complete chem. analyses of the light and dark parts are given. The total proportion of the radioactive elements present corresponds to 0.3%–0.5% U or 10^{-7}% Ra. It is suggested that the Rn produced in the nodules diffusing from their surface might be responsible for the formation of the bleached haloes. J. F. Schairer

A quantitative study of pleochroic haloes. IV. New types of haloes. G. H. Henderson and F. W. Sparks.

Proc. Roy. Soc. (London) **A173**, 238–49(1939); cf. *C. A.* 28, 5753[6,7]; 31, 2090[7].—Four types of haloes, provisionally designated as A, B, C and D, are described, 3 of them for the first time. These haloes have 1, 2, 3 and 1 ring, respectively. Measurements of ring radii are given and are shown to be in fair agreement with the ranges of the α-particles from known elements of the U family. **V. Genesis of haloes.** G. H. Henderson. *Ibid.* 250–64.—The most probable parent of halo A is Ra F, of B Ra B or Ra C of C, Ra A, and of D Ra. All of these have lives which are exceedingly short on a geol. time scale. A hydrothermal genesis of these extinct haloes is postulated. M. Farnsworth 1

Theory of the isotope separation process of Clusius and Dickel. I. Ludwig Waldmann. *Z. Physik* **114**, 53–81 (1939); cf. *C. A.* **33**, 6672[6].—Math. The combination of convection, thermo-diffusion and ordinary diffusion is considered. The equations are solved for a plane arrangement. The equil. sepn. efficiency is obtained under simplifying assumptions and also the time of establishment of a steady state with and without gas flow. E. J. R. 2

Diffraction of x-rays by liquid and plastic sulfur. Newell S. Gingrich. *J. Chem. Phys.* **8**, 29–32(1940).—X-ray diffraction patterns of plastic S (at room temp.) and of liquid S (124–340°) were obtained. The position of the main peak ($(\sin\theta)/\lambda$) is 0.138–0.140 at 124–157°, 0.125–0.127 at 166–225° and 0.120 at 340°. At. distribution curves for plastic S and for liquid S at 124°, 166°, 175°, 225°, and 340° are all similar. The nearest neighbors are at 2.08 A. in plastic S and 2.07 A. in liquid S (124–340°). The no. of nearest neighbors is 2.0 for plastic S and 1.7 for liquid S. G. M. Petty 3

X-ray study of some meteoric irons. E. A. Owen and B. D. Burns. *Phil. Mag.* **28**, 497–519(1939).—X-ray diffraction patterns were obtained for 24 meteoric irons with Ni content up to 25.6%. These samples resembled artificially prepd. Fe-Ni alloys in their reaction to heat treatment. The parameter of the α-phase is very const. from one meteorite to another, but the γ parameter shows pronounced variations. This fact is explained in terms of the equil. diagram for Fe-Ni alloys. E. J. Rosenbaum 4

Tables of ultimate lines. Adolfo T. Williams. *Anales asoc. quím. argentina* **27**, 178–219(1939); cf. *C. A.* **33**, 5844.—A table of ultimate rays is arranged in order of decreasing wave lengths. For each ray there are given: emitting atom and its ionization state, wave length, intensity in the arc, in the spark or Geissler tube, and ray of the same atom most often found. There is a Grämont classification and ultimate rays emitted by thermal sources and by Geissler tube. Most of the ultimate rays are found in the region between 5000 and 1850 A., which is the easiest to photograph. There were found 1.9 rays per A. E. M. Symmes 5

Hydrogen showers in the auroral region. L. Vegard. *Nature* **144**, 1089–90(1939).—Two strong H lines were recorded in auroral spectrophotograms taken October 18, 1939. H lines are usually absent from the auroral spectrum. The occurrence of strong H lines is due to showers of H or to a kind of "H radiation" occasionally coming from the sun. The H combines with O, and the H_2O condenses, forming luminous night clouds. G. M. P. 6

Origin of the λ4932 emission in the spectra of novae. A. B. Wyse. *Nature* **144**, 1090(1939).—This line in nebulae is probably due to the $^1P_0 - {}^1D$ transition of O (III); in novae it is probably due to N. G. M. Petty 7

The structure of the solar spectrum between 400 and 600 mμ. Heinz Reiner. *Gerlands Beitr. Geophys.* **55**, 234–48 (1939).—An app. is described for the detn. of the extra-terrestrial energy spectrum. The absorption bands in the chromosphere have a strong radial distribution. J. F. Schairer 8

Atmospheric absorption of infrared solar radiation at the Lowell Observatory. II. The spectral interval: 5.5–8 μ. Arthur Adel and C. O. Lampland. *Astrophys. J.* **91**, 1–7(1940); cf. *C. A.* **33**, 2410[8].—Daily fluctuations and great seasonal variations of intensity occur in the infrared portion of the absorption spectrum of the earth's atm. between 5.5 and 8 μ. When the H_2O vapor in the atm. falls below 3 or 4 mm. of liquid equiv. a small amt. of solar energy near 6.3 μ penetrates the entire column of air owing to the gap in the doublet structure of the H_2O absorption band at this point. C. C. Kiess 9

The physical significance of the *M* − *S* differentiation. Karl Wurm. *Astrophys. J.* **91**, 103–12(1940).—Stars of class *M* are distinguished from class *S* stars by the greater strength of the TiO bands in the former and the greater strength of the ZrO bands in the latter. Since Ti is from 10 to 100 times more abundant in stellar spectra than Zr, the enhancement of the ZrO bands in *S* stars is shown to be due to their considerably lower atm. densities as compared with *M* stars of the same temp. The evidence indicates that the *S* stars are supergiants. C. C. Kiess 10

Excitation of the green auroral line of oxygen. K. G. Emeleus, R. H. Sloane and Eliza B. Cathcart. *Proc. Phys. Soc.* (London) **51**, 978–88(1939).—The exptl. conditions favorable for the emission of the green auroral line of O in discharges through mixts. of O and A were studied. It is found that the partial pressure of the O may be varied from a trace to several percent, but that the optimum value for the total gas pressure is a few mm. It is important that in the discharge there be a region of low ionization such as the aureole that surrounds the core in the constricted pos. column and that in this region there occur collisions of sufficient force between metastable A atoms and normal O_2 mols. to dissociate the mols. and raise the resultant O atoms to the ^1S state. C. C. K. 11

The quantal theory of continuous absorption of radiation by various atoms in their ground states. I. The atoms from boron to neon. D. R. Bates. *Monthly Notices Roy. Astron. Soc.* **100**, 25–9(1939).—A method of calcn., based on the wave mechanics, is used to derive the continuous absorption coeffs. of the unexcited atoms B, C, N, O, F and Ne, over a wide frequency range. Not only is the magnitude of the coeffs. given, but also their correct variations with frequency. These are illustrated graphically for each element. C. C. Kiess 12

The spectrum of 25 Orionis, 1933–39. Helen W. Dodson. *Astrophys. J.* **91**, 126–8(1940).—The behavior of the H emission in the spectrum of this star is described. C. C. Kiess 13

Stark effect and damping factor in the Fraunhofer spectrum. C. W. Allen. *Monthly Notices Roy. Astron. Soc.* **100**, 4–9(1939).—The equiv. widths of some Fe lines in the sun's spectrum and the intensities of the same lines emitted by an arc were measured to det. the curves of growth for these lines. A comparison of the damping factor given by these curves with the Stark effect for the lines by Panter and Foster (*C. A.* **31**, 8371[4]) shows a linear relationship that leads to a value of 14 dynes/sq. cm. for the pressure in the sun's reversing layer exerted by 1.8×10^{13} electrons per cc. C. C. Kiess 14

Photometry of the solar *D* lines. C. W. Allen. *Monthly Notices Roy. Astron. Soc.* **100**, 10–13(1939).—From new photometric measurements of the *D* lines of Na in the sun's spectrum their profiles have been redetd., in light both from the limb and from the center of the sun's disk. Both lines have central intensities of about 7%, but their equiv. widths are 560 and 770 mA., resp., for D_1 and D_2 in light from the center. The Ca^+ lines 8498, 8542 and 8662 A. were found to have central intensities of 35, 26 and 28%, resp. C. C. Kiess 15

CH bands in comet spectra. J. Dufay. *Astrophys. J.* **91**, 91–102(1940).—The wave lengths and their intensities observed in the band structure near 4300 A. in low-dispersion spectra of some comets are in close agreement with those calcd. for the $A^2\Delta \rightarrow X^2\Pi$ band of CH, this fact verifies it as a constituent of these objects. Addnl. though not as reliable evidence is supplied by the $B^2\Sigma \rightarrow X^2\Pi$ band near 3900 A. C. C. Kiess 16

Observation of the spectrum of Ne V. Fred W. Paul. *Phys. Rev.* **56**, 1067(1939).—The Ne lines 572.38, 572.12, 569.84, 568.45, 483.00, 481.30 and 480.38 (all ±0.05 A.) were observed; transitions are assigned. G. M. Petty 17

Positive column of the nitrogen arc at atmospheric pressure. Edward S. Lamar, Albert M. Stone and Karl T. Compton. *Phys. Rev.* **55**, 1235–44(1939); cf. *C. A.* **31**, 18

5633⁶.—A theory of the pos. column in an arc is developed, from which good values of N arc parameters are calcd. Power generation per unit vol., electron concn. and the power loss are calcd. The theory applies only to low-current arcs in ordinary space or to arcs below 30 amperes in gravity-free space. Equating power generation and power loss leads, eventually, to an arc equation of the Ayrton type. The inclusion of convection in a more complete theory is discussed. The departure from the above simplified theory, for arcs of large currents, is qualitatively of the type to be expected from the influence of convection. These results show that the mechanism of the pos. column of arcs is now understood. G. M. Petty

Lecture demonstration of resonance radiation of sodium. R. W. Wood. *Phys. Rev.* **56**, 1172–3(1939). G. M. Petty

New terms in iron I, II and III and additional far ultraviolet standards. Louis C. Green. *Phys. Rev.* **55**, 1209–17(1939).—The Fe spectrum excited in the Schüler discharge in He and Ne and the Fe arc and spark in N were studied from λ 2300 to λ 600. New terms were identified in Fe I, II and III, and a no. of unclassified levels were found in Fe II. Lists of all the lines identified from new or previously known levels are given; these include a no. of lines from λ 2225 to λ 1550, the wave lengths of which can be detd. with sufficient accuracy that they will be useful as standards. G. M. Petty

Zeeman effect in the second and third spectra of xenon. Curtis J. Humphreys, Wm. F. Meggers and T. L. de Bruin. *J. Research Natl. Bur. Standards* **23**, 683-99 (1939) (Research Paper No. 1264).—The Zeeman effect in Xe II and Xe III spectra was observed at "Physica" in Amsterdam and at the National Bureau of Standards. The light source in the first-named lab. was a Back lamp consisting of a spark between metal electrodes surrounded by Xe gas, whereas Xe Geissler tubes placed transversely between the poles of a magnet were used in the 2nd. Measurable patterns were obtained for 130 Xe II and for 62 Xe III lines. From these patterns the g values of 61 Xe II and 34 Xe III levels were calcd. Most of the patterns are only partially resolved but by using formulas for unresolved patterns to set up observational equations adjusted by the method of least squares, fairly consistent g values were derived. The g-sum rule was tested where possible, and was found to be obeyed by 2 different electron configurations of Xe^+. Observed g-values depart considerably from those given by the Landé formula in most instances, indicating a vector coupling scheme intermediate between LS and Jj for both Xe^+ and Xe^{++}. W. F. Meggers

Nuclear magnetic moments of the boron isotopes. S. Millman, P. Kusch and I. I. Rabi. *Phys. Rev.* **56**, 165–7 (1939).—The nuclear Landé g values of ${}_5B^{10}$ and ${}_5B^{11}$ have been measured by means of the mol.-beam magnetic-resonance method with the alkali tetraborates and metaborates. The values, in units of $e/2Mc$, 0.597 ± 0.003 and 1.788 ± 0.005 are assigned to B^{10} and B^{11}, resp. Assuming nuclear spins of 1 and 3/2 for B^{10} and B^{11}, resp., the corresponding magnetic moments are 0.597 ± 0.003 and 2.682 ± 0.008 nuclear magnetons. H. C. Thomas

Nuclear magnetic moments of N^{14}, Na^{23}, K^{39} and Cs^{133}. P. Kusch, S. Millman and I. I. Rabi. *Phys. Rev.* **55**, 1176 81(1939).—Nuclear gyromagnetic ratios of N^{14}, Na^{23}, K^{39} and Cs^{133} were measured by the mol.-beam magnetic-resonance method. The values are, resp., 0.402, 2.216, 0.391, and 2.572 nuclear magnetons. The shape of the resonance curve in some cases indicates a type of interaction of the nucleus with the rest of the mol. which may arise from the nuclear elec. quadripole moment. Magnetic moments calcd. from the observed hyperfine splitting of at. energy states, using the Goudsmit, Fermi-Segre formula (*C. A.* **27**, 3139, 4724) agree well with these results. G. M. Petty

Molecular spectra. Frank D. Carvin. *Newark Eng. Notes* **2**, No. 5, 5–7(1939).—A discussion of the results of the application of quantum mechanics to the problems of the spectra of mols. including the exptl. evidence of mol. spectra and an attempt to fit a math. explanation to this evidence. Leopold Scheflan

Intensity in spectra of diatomic molecules. V. Kondrat'ev. *J. Exptl. Theoret. Phys.* (U. S. S. R.) **7**, 477–82 (1937); *Chem. Zentr.* **1938, I**, 828.—The formula used by Hutchisson (cf. *C. A.* **24**, 5624) for the calcn. of the relative intensities of the bands in electron spectra of sym. diatomic mols. is also useful for the calcn. of the intensities in the spectra of asym. mols. when the bands arise through the combination of lower vibration levels. With OH and NO spectra as examples, it is shown that the formula mentioned gives a qualitatively correct distribution of intensity in these spectra. M. G. Moore

The excitation conditions of nitrogen spectra in the high atmosphere. Jean Cabannes and Rose Aynard. *J. phys. radium* **10**, 455–8(1939); cf. *C. A.* **33**, 9136⁶. W. F. Meggers

Temperature parameters from negative bands of nitrogen under excitation by electron impact. O. S. Duffendack and Kuang-Tseng Chao. *Phys. Rev.* **56**, 176–84 (1939).—In a field-free space, direct temp. detns. along the axis of a N discharge tube agree with results calcd. from measurements on the intensity distribution of the neg. bands of N. A theoretical heat conduction formula gives calcd. values in agreement with expt. The variation of temp. with gas pressure is accounted for by change in thermal cond. The temp. is independent of discharge potential from 40 to 800 volts. In a low-voltage arc the temp. is found to depend on the potential. In a cold-cathode glow discharge the temp. is found to be higher near the cathode-fall space. H. C. Thomas

In the shift of intensity in N_2^+ bands excited in helium and neon. Tosio Takamine, Taro Suga and Yosio Tanaka. *Sci. Papers Inst. Phys. Chem Research* (Tokyo) **36**, 437–48(1939).—A glass discharge tube contg. He or Ne at a pressure of 18 mm. Hg and N_2 at about 0.2 mm. Hg was excited with a condensed discharge and studied with a 1-m. grazing-incidence vacuum spectrograph with dispersion of 6 A./mm. A remarkable change in the distribution of intensity in the 2nd neg. band of N_2^+ is observed as the diluent gas is changed from He to Ne. In He the strongest band is at 1846.3 A., but in Ne it is at 1851.7 A. An explanation, based on sharp resonance between noble-gas ions and N_2^+ ions excited to certain levels, is tentatively outlined. W. F. Meggers

Band spectrum of indium hydride. B. Grundström. *Z. Physik* **113**, 721–9(1939).—The term schemes for the ground state $^1\Sigma$ and the excited states $^1\Pi$ and $^1\Sigma^*$ are given. The bands show perturbations as well as predissocn. The value of ν_0 of the 0,0 band of the $^1\Pi$–$^1\Sigma$ system is 16,905.00 cm.$^{-1}$; for the $^1\Sigma^*$–$^1\Sigma$ system, 16,259.64 cm.$^{-1}$. The types of predissocn. found are discussed. E. J. R.

A reinvestigation of the ultraviolet band system of carbon monoselenide. R. F. Barrow. *Proc. Phys. Soc* (London) **51**, 989–91(1939).—The ultraviolet CSe bands extending from 2760 to 3053 A. have been reobserved with higher dispersion than that heretofore employed. Twelve band heads shaded toward the red have now been measured and are well represented by the formula: $\nu = 35238 + (835.7u' - 2.2u'^2) - (1036.0u'' - 4.8u''^2) - 1.3u'u''$, where $u = v + 1/2$. The dissocn. energy of the ground state is 6.8 v. C. C. Kiess

Absorption spectrum of single-crystal ZnS phosphors. Charles J. Brasefield. *Phys. Rev.* **57**, 162(1940).—A wave length–transmission diagram is given. Absorption is partial for wave lengths less than 4250 A. and is complete for wave lengths less than 3650 A. G. M. Petty

Continuous absorption of N_2O. H. Sponer and L. G. Bonner. *J. Chem. Phys.* **8**, 33–7(1940).—The absorption of N_2O in the long-wave region of the near ultraviolet was reinvestigated with an absorption tube 105 feet long. The absorption in this region is extended and is resolved into several components. Twelve dissocn. processes are considered. G. M. Petty

The absorption coefficient of nitrogen dioxide in the visible spectrum. J. K. Dixon. *J. Chem. Phys.* **8**, 157–60(1940).—At 4850 A., Beer's law is obeyed from 0 to 70 mm. Hg. The absorption curve (4000–7000 A.) is sinus-

pidal, adjacent max. and min. differing by about 10%. [illegible] 773.4, 5 (broad); 1062.6, 3 (diffuse); 1204.6, 4; 1305.7, 5; 1401.8, 7 (broad). The max. are sepd. by 700 ± 100 cm.$^{-1}$. They are due to groups of excited levels which are uniformly sepd. G. M. Petty

The absorption in the middle ultraviolet of certain phenylhydrazides. D. Biquard and P. Grammaticakis. *Bull. soc. chim.* **6**, 1599–1615(1939).—The study of absorption in the middle ultraviolet (3700–2200 A.) of acidulated derivs. of phenylhydrazine shows that these products exist, in alc. soln., and at ordinary temp., principally under the form of true phenylhydrazide. The modification of the absorption spectrum of phenylhydrazine provoked by the substitution of one or more hydrogens by various aliphatic or aromatic acid groups shows that: (1) The substitution of a hydrogen in position α profoundly modifies the form and position of the absorption curve of phenylhydrazine, (2) the substitution of a hydrogen in β modifies the absorption only slightly, (3) the substitution of hydrogens in α and β profoundly modifies the absorption spectrum of phenylhydrazine, the absorption of the $\alpha\beta$ substituted deriv. being conditioned by the substituant in α. The methods of prepn. and purification are given for 21 phenylhydrazides which were studied. W. F. Meggers

The absorption of water vapor and carbon dioxide with reference to pressure and temperature dependence. Fritz Schnaidt. *Gerlands Beitr. Geophys.* **54**, 203–34 (1939).—Normal absorption, effective vapor pressure, line absorption and "rational" CO_2-spectrum are discussed. J. F. Schairer

Infrared and Raman spectra of polyatomic molecules. X. C_2D_2, C_2DH and C_2H_2. Fred Stitt. *J. Chem. Phys.* **8**, 56–9(1940); cf. *C. A.* **33**, 5291[2].—The infrared spectra of these compds. are reported from 450 to 4000 cm.$^{-1}$. All but 2 of 30 observed bands are assigned as fundamentals, first and second overtones, and one-one combination or difference bands. Most of the bands of these types which are infrared-active according to the selection rules are either observed or occur in a region where they may be masked by the presence of superimposed bands. **XI. Dimethyl sulfide.** R. Fonteyne. *Ibid.* 60–2.—The infrared spectrum of gaseous Me_2S (1.6–2.6 μ) and the Raman spectrum of liquid Me_2S (280–3000 cm.$^{-1}$) are reported. A tentative vibrational analysis is given. G. M. Petty

Infrared absorption spectra of AsH_3, AsD_3 and PD_3. E. Lee and C. K. Wu. *Trans. Faraday Soc.* **35**, 1366–73 (1939).—The infrared absorption frequencies were observed for AsH_3 to be 2122, 2185, 906 and 1005 cm.$^{-1}$; AsD_3: 1534, 660 and 714 cm.$^{-1}$; PD_3: 1694, 730 and 806 cm.$^{-1}$. The 4.7-μ (fundamental, ν_1) band of AsH_3 was detd. under high dispersion and a graph is presented. A value of 7.43×10^{-40} g. cm.^{2} is deduced for the A moment of inertia. The rotational structure of the band is complex, probably owing to overlapping of ν_2 and the interaction between the rotation levels of ν_1 and ν_2. The transmission of PD_3 near 760 cm.$^{-1}$ is given under high dispersion. The valency force field gives a good representation of the actual intramol. forces present. V. R. D.

Coriolis perturbations in the spectra of silane and germane. George M. Murphy. *J. Chem. Phys.* **8**, 71–8 (1940).—A Coriolis perturbation on the rotational structure of the fundamental frequency, ν_4, has been computed for silane and germane. Matrix elements of the Coriolis operator, A, for the lines $P(9)$, $P(10)$ and $Q(10)$ have also been obtained. The envelope of the resulting absorption curve has been compared with the exptl. curve and good agreement is found. The most striking difference in the two spectra is that in the case of silane, the Q branch degrades toward lower frequencies and in germane, toward higher frequencies. This is due to the relative position of the infrared inactive frequency, ν_2, to which the perturbation is due. G. M. Petty

Raman effect of fluorochlorobromomethane. Geo. Glockler and G. R. Leader. *J. Chem. Phys.* **8**, 125 (1940).—Raman lines (cm.$^{-1}$) and their relative intensities are reported for CHFClBr (d., 1.994; b_{734}, 38–39°): 225.0, 10; 313.0, 9; 425.0, 9; 648.9, 6; 658.7, 10; [illegible] 8, 7 (broad). G. M. Petty

The [illegible] structure of the hydrazoic acid bands in the photographic infrared. Eugene H. Eyster. *J. Chem. Phys.* **8**, 135–42(1940).—The third and fourth harmonics of the N–H stretching frequency in N_3H, at 9548.91 and 12,412.19 cm.$^{-1}$, resp., were studied. The rotational structure was resolved and analyzed, yielding the rotational consts. in both the ground and the excited states. The mol. parameters are: N_1–H, 1.012 A.; N_1–N_2, 1.241 A.; N_2–N_3, 1.128 A.; ΔHN_1N_2, 110°52′. G. M. Petty

Normal vibrations of chains of similar and similarly situated dynamical systems and the infrared spectrum of undecane. S. E. Whitcomb, H. H. Nielsen and L. H. Thomas. *J. Chem. Phys.* **8**, 143–52(1940).—The normal modes of vibration of chain mols. fall into 2 classes: end vibrations, in which the amplitude falls off exponentially from the ends toward the middle, and chain vibrations in which it varies harmonically as in a standing wave. The theory is developed, and calcns. are made for n-$C_{11}H_{24}$. The infrared spectrum of n-$C_{11}H_{24}$ was measured from 1 to 15 μ. Theory and expt. are in excellent agreement: 28 of 31 observed bands were accounted for as fundamentals, harmonics, or simple combination frequencies. G. M. Petty

Spectroscopic evidence for hydrogen bonds: comparison of proton-attracting properties of liquids. II. Walter Gordy and Spencer C. Stanford. *J. Chem. Phys.* **8**, 170–7 (1940); cf. *C. A.* **33**, 2396[8].—*m*-MeC_6H_4CHO, PhCH:CHCHO, furfural, Me_2C:$CHCH_2CMe$:CHCHO, *n*-C_6H_{13}-CHO, Et_2CHCHO, iso-BuCOMe, $(iso\text{-}Bu)_2CO$, MeCO-Am, Me_2C:$CHCOMe$, PhCOMe, *p*-MeC_6H_4COMe, cyclohexanone, fenchone, HCOO(iso-Am), $ClCH_2COOEt$, $Ac(CH_2)_3Br$, AcPh, furfuryl acetate, PhCOOMe, $PhCOOCH_2Ph$, *o*-$C_6H_4(COOBu)_2$, $(-COOEt)_2$, $CO(OEt)_2$, $PO(OBu)_3$, EtOBu, $(CH_2ClCH_2)_2O$, $(PhCH_2)_2O$, PhOEt, OCH_2CHCH_2Cl, Am_2NH, Am_3N, $PhCH_2NH_2$, $(PhCH_2)_2NH$, $PhNH_2$, *o*-$ClC_6H_4NH_2$, *m*-$ClC_6H_4NH_2$, $PhNMe_2$, *o*-$MeC_6H_4NH_2$, *o*-$H_2NC_6H_4COOMe$ and pyrrole are ranked according to their proton-attracting power by comparing the strength of the H bonds they form with MeOD. The perturbation caused in the OD vibrational band is taken as a measure of the strength of the D bridge. The order of proton-attracting power is ester < aldehyde and ketone < ether < amine. The strength of the D bond (formed with MeOD) bears a close relation to the basicity of the solvent, its solubilities for other proton-donor solutes, and to its reactivity with other compds. There is no correlation between solvent dipole moment and the strength of the bonds formed with MeOD. G. M. Petty

Absorption spectra of sugars in the near infrared. E. S. Barr and C. H. Chrisman, Jr. *J. Chem. Phys.* **8**, 51–5 (1940).—The infrared absorption spectra of aq. solns. of *l*-rhamnose, β-glucose, *d*-xylose, *d*-levulose, *d*-mannose, *d*-galactose, *d*- and *l*-arabinose, *d*-glucose, sucrose, maltose, *d*-lactose, and β-lactose were observed. A special technique of evapn. was used in the prepn. of samples, so as to minimize the effect of the solvent on the transmission curves. All 13 sugars gave very similar spectra; band locations were nearly identical, although there was some variation in intensities. Bands not previously reported were found at 2.16 and 2.35 μ, and the intense absorption in the region of 3.3 μ was partially resolved into component bands. G. M. Petty

Infrared O–H band and association. J. Errera, R. Gaspart and H. Sack. *J. Chem. Phys.* **8**, 63–71(1940).—Infrared absorption spectra in the 3-μ region were studied for alc. in CCl_4 and CS_2; for ternary mixts. alc. + pyridine + CCl_4 and alc. + Me_2CO + CCl_4; and for HDO in D_2O, dioxane and pyridine. (1) Alc. is completely dissocd. (in CCl_4 and CS_2) only at concns. below 0.1 vol. %. (2) In the mechanism of the assocn. of alc., at least 2 steps are distinguished: formation of double mols. and of polymol. complexes. The latter are very sensitive to an increase of temp. of 30–40°. (3) Alc. forms addn. compds. with mols. contg. O or N and these addn. compds. still exist after diln. in an inert solvent. (4) The O-H vibration gives rise to the same band in pure water and in a

soln. of HDO in D_2O. (5) For HDO dissolved in a solvent the mols. of which contain O, the doubling of the band of the addn. compd. H_2O + solvent disappears.
G. M. Petty

The infrared absorption spectrum of methylphenylacetylene. M. J. Murray and Forrest F. Cleveland. *J. Chem. Phys.* **8**, 133–4(1940).—The infrared spectrum of MeC:CPh (500–2300 cm.$^{-1}$) is compared with the Raman spectrum. The results do not permit the assignment of the fundamental whose overtone is responsible for the resonance splitting of the frequency near 2230 cm.$^{-1}$. 2
G. M. Petty

Interpretation of the Raman spectra and infrared spectra of the halogen derivatives of methane. H. Volkringer, J. Lecomte and A. Tchakirian. *J. Chem. Phys.* **8**, 126 (1940); cf. *C. A.* **31**, 6556[2]; **32**, 4878[7].—The $\delta_{12,345}$ and ν_{1234} Raman and infrared frequencies of CF_2Cl_2, $CFCl_3$, CCl_4, CCl_3Br, CCl_2Br_2, $CClBr_3$ and CBr_4 are compared. 3
G. M. Petty

Raman spectra of simple ethers. Forrest F. Cleveland, M. J. Murray, Herschel H. Haney and Julia Shackelford. *J. Chem. Phys.* **8**, 153–6(1940).—Displacements, intensities and depolarization factors are listed for the main lines of Et_2O, Pr_2O, $(iso\text{-}Pr)_2O$, Bu_2O, $(iso\text{-}Bu)_2O$, Am_2O, $(iso\text{-}Am)_2O$. All frequencies near 2900 cm.$^{-1}$ are polarized except the one near 2970 cm.$^{-1}$, which is highly depolarized. 4
G. M. Petty

Internal rotation of ethane, propane and butane derivatives by the Raman effect. Sizuo Nakamura. *J. Chem. Soc. Japan* **60**, 1010–19(1939).—The Raman spectra of 1-chloropropane, 1-bromopropane, 1-iodopropane, 1-bromobutane, ethylene glycol, ethylene chlorohydrin, ethylene bromohydrin and ethylene iodohydrin were studied in the solid and in the liquid states. These results seem to show that 2 mol. forms exist in the liquid, while in the solid one of them vanishes. The possible mol. forms are discussed. 5
T. Katsurai

Raman spectroscopic investigations. XV. Constitution of orthophosphoric acid and its salts. A. Simon and G. Schulze. *Z. anorg. allgem. Chem.* **242**, 313–68(1939); cf. *C. A.* **33**, 5741[6].—The prepn. and properties of anhyd. H_3PO_4 are described. Also D_3PO_4 (83%), $POCl_3$, $PSCl_3$, $PO(OMe)_3$, $PS(OMe)_3$, and the primary and tertiary orthophosphates of the alkali metals were prepd. The Raman spectra were studied at various concns. and exposure times, with prism spectrographs and Hg 4358 A. It was concluded that 100% H_3PO_4 changes to no new mol. forms on diln., and has a tetrahedral structure, with polar-bound H. The similar symmetry between H_3PO_4 and $H_2PO_4^-$ ion explain the unchanged spectrum obtained on diln., any variation in frequency being due to a superposed action of hydration and dissocn. These conclusions are supported by the character of the spectra of the ester-like substances studied; correspondence between the spectra of H_3PO_4 and its alkali salts; and the variation of the spectrum of the acid when dissolved in EtOAc (but non-appearance of $H_4P_2O_7$). Also, the spectrum of the acid remained unchanged on the addn. of mineral acids. The presence of acidic salts is improbable. Comparative absorption measurements in the ultraviolet, between 100% and dil. H_3PO_4, and its tri-Me ester show differences too small to permit a discussion of the probable mol. forms. The uniformity of the spectra of the primary and tertiary alkali salts shows the lack of influence of these ions on the respective anions. For equimol. concns., the values of the totally symmetric frequency of the $H_2PO_4^-$ ion are equal for all the alkali salts. The lowering of frequency, observed in the spectrum of D_3PO_4, as compared with that of H_3PO_4, falls short of the amount calcd. from the mass ratio. The appearance of a line of higher frequency in D_3PO_4 and K_2DPO_4 cannot be explained. It is proposed that the H bond is somewhat homopolar, and there is given a mechanism for proton migration in H_3PO_4 and its ions, explaining the formation of $H_4P_2O_7$ on melting, and other effects. The energy of the P—O bond, detd. from the Raman spectrum is 138 cal., which is in good agreement with that calcd. from the luminous spectrum (142 cal.). **XVI. Structure of monopersulfuric acid.** A. Simon and G. Kratzsch. *Ibid.* 369–74.—The prepn. of anhyd. H_2SO_5 is described. The Raman spectrum was studied to det. whether the anhyd. acid exists in the pseudo (enol) form, and whether the monobasicity of the acid is due to a S—H bond. The appearance of the OH band shows that the anhyd. acid is a pseudo acid with the H—O bond homopolar (giving $SO_2.O.OH.OH$). No evidence of a S—H bond was detected (which vibration should appear at about 2500 cm.$^{-1}$). The large number of lines shows the mol. to be unsym. 1
John W. Knowlton

Spectroscopic measurements of gaseous CN. I. Dissociation in the electric discharge. John U. White. *J. Chem. Phys.* **8**, 79–90(1940).—Free CN radicals in the gaseous state are formed in the elec. discharge through cyanogen. By the use of a very intense low-pressure spark as a background the 0,0 and 1,1 bands of the $^2\Sigma \rightarrow {}^2\Sigma$ transition of CN have been observed in absorption at short intervals of time after the end of this discharge. The intensities of the lines of the bands were measured by means of microphotometer traces of the spectra and of the characteristic curve of the photographic plate. They were corrected for the incomplete resolution of the spectrograph. Relative concns. of CN were calcd. from the sums of the intensities of the lines. The rate of disappearance of CN after the end of the discharge was found to be the same over a large range of pressure and diln. with A. A mechanism is proposed to account for this. In all cases the disappearance was exponential with a mean half-life of 11 milliseconds. The half-life of the first excited vibration state was 3 milliseconds, during which time about 10,000 collisions occurred. By diln. of the cyanogen in the discharge tube with A until the CN bands were no longer visible the partial pressure of CN could be calcd. on the assumption that near this point all the cyanogen present was observed in the form of CN. The min. detectable pressure of CN was of the order of 2×10^{-6} mm. The abs. f value of the $^2\Sigma \rightarrow {}^2\Sigma$ transition is 0.026 ± 0.006. By using the corresponding abs. absorption coeff. and the observed temp. distribution in a C arc the partial pressure of CN present in an arc is calcd. to be of the order of 10 mm. The app. is described.
G. M. Petty

Quenching and vibrational energy transfer in the fluorescence spectrum of S_2. Eric Durand. *J. Chem. Phys.* **8**, 46–51(1940).—The ultraviolet fluorescence of S_2 was excited by the strong Mg spark lines λλ 2928 and 2937 A. A typical Wood resonance progression was observed with pure S_2 only in the vessel, but the addn. of a few mm. of any of the rare gases caused changes in the fluorescence due to quenching and to the transfer of vibrational and rotational energy. The yields per collision for quenching and for vibrational transfer are of the order of magnitude of unity, and both show the same dependence on the at. wt. of the rare gas added, with a min. in the vicinity of A or Kr. Comparisons are made with the results obtained by other methods. Quenching occurs by the addn. of 2 quanta of vibrational energy to the S_2, followed by disruption due to predissocn.
G. M. Petty

Fluorescence of biacetyl. G. M. Almy, H. Q. Fuller and G. D. Kinzer. *J. Chem. Phys.* **8**, 37–45(1940).—Ac_2, in the vapor phase or in aq. soln., exhibits a bright green fluorescence when excited with light within its absorption band in the violet and near ultraviolet. The spectrum is the same as is shown in the fluorescence of Me_2CO vapor when excited with λ 3130. The fluorescence spectrum is insensitive to changes in Ac_2 pressure (0.1–50 mm.), temp. (10–100°), exciting wave length (3650–4358 A.) or amount of added O, which quenches the fluorescence strongly. The intensity of fluorescence, measured with photocell and amplifier, is const. in time, with weak excitation. The ratio of intensity of fluorescence to light absorbed is independent of the pressure and the intensity of the fluorescence is linearly proportional to the exciting intensity, at const. pressure. The fluorescence is quenched by O, the intensity falling to one-half at 0.013 mm. O. The Stern-Volmer law (cf. *C. A.* **14**, 2885) is followed over a range of O pressures in which the fluorescence drops to 20% of the intensity without O; at higher pressures the intensity falls more rapidly than expected. The O is

consumed, presumably in the quenching process, and the fluorescence returns to full intensity. From the quenching curve and from an expt. on the diffusion of the excited mols. into shadow the lifetime of the fluorescing mol. is estd. to be about 10^{-8} sec. These results can be understood on the assumption that the Ac_2 mol. emits the fluorescence after excitation and redistribution (spontaneous and through collisions) of the vibrational energy. In the case of Me_2CO the fluorescence builds up gradually from practically zero intensity, as expected if Ac_2 is accumulating; it is excited, not by light, but probably by collisions with excited Me_2CO or with combining radicals. The diffusion expts. can scarcely be reconciled with the assumption that the observed emission in pure Ac_2 is a recombination spectrum. G. M. Petty

Infrared dichroism in iodoform. Yeou Ta. *Compt. rend.* **209**, 990–2(1939).—Examn. of the infrared (λλ 14610–24780) absorption of a well-developed crystal of CHI_3, the space group of which is probably C_{3i}^4 (Nitta, *C. A.* **20**, 1735), shows pleochroism related to the CH link, similar to, but more marked than, that connected with the CH_2 link in pentaerythritol and diketopiperazine (Ellis and Bath, *C. A.* **33**, 9142[2]). C. A. Silberrad

Flame method of spectrochemical analysis. F. Majewsky. *Nature* **144**, 1047(1939).—M. has improved and adapted for routine use Ramage's method of spectrochem. analysis (*C. A.* **23**, 5429; **24**, 5796). About 50 mg. of material is rolled in filter paper, and the roll burned in an oxy-coal-gas flame before a spectrograph. Reproducibility depends on the uniformity of feeding the roll into the flame. This was difficult because the roll burst into flame just outside the oxy-coal-gas flame. This difficulty was overcome by carbonizing the roll before burning it. The heat treatment was combined with exposure to NH_4Cl vapor, to convert the mineral elements to chlorides. The sensitivity was increased 30 times for Ca, the chloride of which is more volatile than the carbonate. The burning time is about 75 sec. The technique gives promising results in a survey of the *mineral status of the leaves of fruit trees*. G. M. Petty

Lattice vibrations of crystals and the corresponding vibrations of their solutions. S. I. Weissman and Simon Freed. *J. Chem. Phys.* **8**, 227–8(1940).—Crystals of hydrated $EuCl_3$ possess structures in their absorption spectrum which are faint but accurate repetitions of the intense patterns arising from electronic transitions in the Eu ions. These repetitions occur on both sides of the intense patterns at intervals which are ascribed to oscillations of the lattice, thermally as well as optically excited oscillations. The spectra of aq. solns. of $EuCl_3$ and also of $Eu(NO_3)_3$ closely parallel the structures in the spectrum of the crystals. In the region where the crystals absorb, the solns. also absorb. The structures in the spectra of the solns. are somewhat more diffuse than the corresponding structures in the spectra of the crystals. Especially is this true for the structures at the intervals corresponding to lattice vibrations. G. M. Petty

Studies on luminescent materials. I. Theory of zinc sulfide copper crystal phosphor. Yasuo Uehara. *Bull. Chem. Soc. Japan* **14**, 539–46(1939).—See *C. A.* **33**, 4522[4]. J. E. D.

Studies on luminescent materials. III. Effect of temperature on the intensity of fluorescence of zinc sulfide crystal phosphor. Yasuo Uehara. *J. Chem. Soc. Japan* **60**, 900–10(1939); cf. *C. A.* **34**, 29[2].—The intensity of fluorescence of ZnS phosphor was measured in the range from room temp. to 450°. The intensity decreases with the rise of temp. The cause of this phenomenon is interpreted from the quantum mech. point of view. T. Katsurai

Magnetic rotatory dispersion and the refractivity of aqueous solutions of nickel sulfate throughout the range 5780 A. to 2482 A.; especially the magnetic rotation in the 3950-A. absorption band. R. W. Roberts and S. F. Adams. *Phil. Mag.* **28**, 601–13(1939); cf. *C. A.* **30**, 2099[4].—Verdet consts. at 22° were detd. for 2 aq. solns. of $NiSO_4$ and n was measured for the same solns. Absorption max. were found at 3950 A. and at 7200 A. The dispersion curve of the magnetic rotation near the 3950-A. band is asymmetric, confirming the suggestion of Gorter (cf. *C. A.* **33**, 3221[3]) that the rotation of the Ni ion is partially of the paramagnetic, temp.-independent type. E. J. Rosenbaum

Exchange reaction of gaseous bromine and hydrogen bromide. Laurence C. Liberatore and Edwin O. Wiig. *J. Chem. Phys.* **8**, 165–70(1940).—The exchange reaction $HBr^* + BrBr \rightleftharpoons HBr + BrBr^*$ (Br^* = Rd-Br) in the gas phase falls just short of attaining equil. in 2 min. This rapid rate of exchange is accounted for by a chain reaction involving Br atoms. G. M. Petty

Photochemical decomposition of ammonia adsorbed on copper sulfate and magnesia crystals. V. Beselovskiĭ. *J. Phys. Chem.* (U. S. S. R.) **13**, 586–92(1939).—Exptl. data are given for the rates of decompn. by Al, Zn, Fe and Cd sparks with various filters. The av. energy for the decompn. of adsorbed NH_3 is 99 Cal. on $CuSO_4$ and 106 Cal. on MgO. The max. are shifted, resp., 51 and 44 Cal. with respect to the gas phase. F. H. Rathmann

High-temperature photolysis of acetaldehyde. David C. Grahame and Gerhard K. Rollefson. *J. Chem. Phys.* **8**, 98–105(1940); cf. *C. A.* **33**, 8502[8].—An investigation of the high-temp. (60–350°) photolysis of AcH vapor gave results differing in certain details from those of previous investigators. The heat of activation for the over-all reaction is 8.6 ± 0.3 kg.-cal.: this leads to a value of 75 kg.-cal. for the energy of the C—C bond in AcH. The reaction between Me radicals is bimol. Relative quantum efficiencies for the production of free radicals in Me_2CO and AcH at elevated temps. were detd. at 2 wave lengths. G. M. Petty

Photochemistry of diiodoacetylene and tetraiodoethylene. John W. Tamblyn and Geo. S. Forbes. *J. Am. Chem. Soc.* **62**, 99–104(1940).—The photoiodination rate of diiodoacetylene (I) in hexane, with careful exclusion of O, was studied quantitatively in red and in blue light. Tetraiodoethylene (II) is found to be formed quantitatively. The equation $-d[I_2]/dt = k\lambda L_0 x\lambda [I_2]([C_2I_2]/(a\lambda + b\lambda[C_2I_2]))$ generalizes the data obtained; L_0 is the incident-light flux; $k\lambda$, $x\lambda$, $a\lambda$ and $b\lambda$ must be evaluated separately for each spectral interval considered. A chain mechanism occurs which varies with the λ of the light employed. A sp. rate const. was obtained. The data on the photolysis of II in hexane by λ 254 mμ indicate that at first one mol. of free I appears for each mol. of II which disappears, and gives a quantum yield of 0.8. A qual. study of the photolysis of I in hexane indicates a complicated process due to the formation of polymeric substances. A. B. Garrett

Physicochem. study of ozonides of Et cinnamate and of styrene—Raman spectrum, ultraviolet absorption (Briner, *et al.*) **2**. Use of radioactive elements as tracers in physiology (Cranc) **11A**. Study on corrosion of Fe by electron diffraction (Miyake) **9**. Radioactive isotopes in biology (Mullins) **11A**. Thermal and photochem. oxidation of chlorinated silanes (Emeléus, Welch) **6**. Geochem. investigations of volcanoes in Japan—Rn content of mineral springs Yahiko-Kakuda district (Iwasaki) **8**.

Belinfante, Frederik J.: Theory of Heavy Quanta. The Hague: Martinus Nijhoff. 126 pp.

Braddick, H. J. J.: Cosmic Rays and Mesotrons. Cambridge: Univ. Press. 68 pp. 5s.

Herzberg, Gerhard: Molecular Spectra and Molecular Structure. I. Diatomic Molecules. Translated by J. W. T. Spinks. New York: Prentice-Hall, Inc. 592 pp. $6.50.

Mezger, Chr.: Uratome und Elektriden als letzte Grundlage der Naturerkenntnis. Munich: Ernst Reinhardt. 104 pp. M. 3.60.

Millikan, Robert A.: Cosmic Rays. Revision of 1936 Page-Barbour Lectures of Univ. of Virginia and 1937 John Joly Lectures of Trinity College, Dublin. Cambridge: Univ. Press. 134 pp. 8s. 6d.

Stratton, F. J. M., and Manning, W. H.: Atlas of Spectra of Nova, Herculis 1934. Cambridge: Solar Physics Observatory. 4 pp. 16 plates. 25s.

Walker, O. J.: Absorption Spectrophotometry and its

Applications. Bibliography and Abstracts. 1932–1938. London: Adam Hilger, Ltd. 68 pp. 7s. 6d.

Spectroscopy in Science and Industry. London: Chapman and Hall. 134 pp. 15s.

Fluorescent screen material suitable for cathode-ray tubes. Roscoe H. George (to Radio Corp. of America). U. S. 2,180,734, Nov. 21. A fluorescent screen material comprises a reaction product resulting from the heating in air (suitably to a temp. of about 900–1000°) of a tungstate of an alk. earth metal such as that of Mg and an alkali metal nitrite such as $NaNO_2$ or $LiNO_2$.

4—ELECTROCHEMISTRY

COLIN G. FINK

Federal water power and electrochemical industries. Colin G. Fink. *Elec. Eng.* **59**, 59–62(1940).—The electrochemical industry is the only one that can absorb the large quantities of elec. energy produced by the many Federal irrigation and hydroelectric projects. The elec. power consumption of the world's electrochem. industry in 1939 was 4 times that in 1919. Electrolytic Mn is now produced commercially. C. G. F.

Some 1939 developments in industrial electric heating equipment. C. L. Ipsen. *Heat Treating Forging* **26**, 42–4(1940).—A review of elec. furnace developments. I. Hartmann

Electric tempering furnaces with fused salt baths. R. Gautheret. *Electricité* **23**, 335–42, 371–7(1939).—A review of electrode furnaces, their classification and construction. Tables of sizes, power input and illustrations are given. J. M. Noy

Oxygen in electric steel. V. T. Braga. *Teoriya Prakt. Met.* **1938**, No. 10, 33–7; *Khim. Referat. Zhur.* **2**, No. 4, 95–6(1939); cf. *C. A.* **34**, 688[8].—The content of O was detd. analytically according to Herty, verified from the diagram of Schenck, the formula of Chipman and from the velocity of C combustion. For optimum results a velocity of C combustion of 0.0085–0.01%/min. at the beginning of the melting period is decreased to 0.004%/min. in the last 20–30 min. and then adjusted to the required content of C at the end of the first period. The velocity of C combustion is decreased by the addn. of CaO and CaF_2 with an increase of the amt. of slag. For a partial sepn. of the metal from FeO at the end of the first period burned Fe ore briquets or ore in large lumps is added to facilitate penetration into the molten metal. A no. of tests showed that it is necessary to keep a well-defined Mn content during melting (≥0.2%) in the basic process and, more so, in the acid process in order to reduce the amt. of the nonmetallic impurities toward the end of the first period. The amt. of O in the metal depends on the percentages of Mn and Si; the data of Kerber and Elsen were verified for exptl. acid melting. The amt. of O in the cast metal varies for the acid process from 0.0062 to 0.0110%; for the basic process from 0.0057 to 0.0103%. The loss of Cr in the slag increases with increase in O content but decreases with increase in Mn and Si contents. W. R. Henn

The construction and functions of the electrolytic chlorine cell. Cölestin Haider. *Z. Elektrochem.* **45**, 795–806 (1939).—The theoretically necessary conditions are discussed for the operation of a cell with 100% Cl_2 + NaOH yield. The velocity of diffusion of NaOH into NaCl solns. at 20°, 36°, and 50° was detd. All the factors which influence the operation of the cell are collected into a scheme showing their relations. The formulas and equations thus derived are simplified to a basic formula introducing the concept of "characteristic cell number." The various data of cell construction are derived from the characteristic no. H. C. Thomas

The gas cell; mechanism of the electrolysis of water; polarization of the cells. N. Vasilesco-Karpen. *Compt. rend.* **209**, 988–90(1939); cf. *C. A.* **34**, 1257[6].—V.-K.'s views are applied to the Grove gas, and the Leclanché cell (dry battery). C. A. Silberrad

Conductometric method of controlling the acidity in the production of electrolytic manganese dioxide. E. Kh. Hel'gren and Yu. A. Larionov. *Zavodskaya Lab.* **8**, 925–31(1939).—An investigation of the elec. cond. of solns. obtained in the electrolytic production of MnO_2 showed that an increase in the concn. of the H_2SO_4 in the soln. is proportional to the ratio of the resistance of the starting soln. to the resistance of the soln. which is being tested. This relationship is not affected by temp. variations. The ratio of resistances was measured by vacuum tube circuit. The results indicate that the arrangement can be used for detg. the increase in the H_2SO_4 concn. in the soln. provided the temp. during the measurements is const. and the starting soln. is used as a standard of comparison. The cell must be cleaned often to remove the MnO_2 ppt. B. Z. Kamich

Practical plating suggestions. Edward Finnic. *Products Finishing* **4**, No. 2, 44(1939).—Recommendations are made for applying nonpitting agents to pitting Ni-plating solns., the removal of scum and dirt from the top of plating solns. by air skimming, and the prevention of contamination by anode rods. Leopold Scheflan

Nickel plating. Joseph G. Sterling. *Metal Ind.* (London) **56**, 14–15(1940).—See *C. A.* **33**, 5747[8]. J. E. D.

Electroforming with iron. The Ekko process. Arthur W. Bull, J. W. Bishop, M. H. Orbaugh and E. H. Wallace. *Rubber Age* (N. Y.) **46**, 23–6(1939).—See *C. A.* **33**, 7205[9]. C. C. Davis

Electrolysis of mixtures of salts of dibasic organic acids (succinic acid, glutaric acid, pyrotartaric acid, ethylmalonic acid) and nitrates. Fr. Fichter and Ernst Bloch. *Helv. Chim. Acta* **22**, 1529–40(1939); cf. *C. A.* **29**, 2094[7], 6150[9]; **30**, 7049[2]; **32**, 2845[9], 5707[5]; **33**, 487[1], 8172[4].—Ethanediol dinitrate (I) and 1,4-butanediol dinitrate are formed on electrolysis of succinate-nitrate mixts. Although the nature of the higher-boiling fractions has not been completely detd., no diethylene glycol was found after reducing sapon. Electrolysis of glutarate-nitrate mixts. gave 1,2-propanediol dinitrate (II), 1,3-propanediol dinitrate (III) and glycerol di(?)nitrate (IV). Electrolysis of Me succinate-nitrate mixts. and of Et malonate-nitrate mixts. gave II and IV. Since alkenes but, at least primarily, no alcs. are formed on the electrolysis of the salts of these dibasic acids, it is believed (cf. F. and Gunst, *C. A.* **34**, 679[9]) that the alkenes are not intermediate products in the formation of the alkyl nitrates. The alkyl nitrates are formed from alcs. and HNO_3 at the anode; only the formation of the nitrates of the higher alkyl homologs presupposes the action of the alkenes, which are added to the alkyl nitrates. The alkenes arising from the salts of the dibasic acids (ethene from succinate, propene from glutarate, Me succinate and Et malonate) give with HNO_3 at the anode I, II and III. The appearance of III (in addn. to II) in the electrolysis of glutarate-nitrate mixts. is attributed to a reaction between nitrate anions and C_3H_6 radicals immediately after the carboxyl groups have been split off (cf. F., *C. A.* **33**, 2815[1]). Dinitrates of higher alkene homologs appear in the electrolysis of the succinate-nitrate mixts., but not in the 3 examples of the C_5 series. Apparently ethene is especially reactive, although ethene is not the only substance adapted to such syntheses (*C. A.* **30**, 5133[1]; **32**, 7830[4]). In the electrolysis of mixts. with nitrates the formation of glycol dinitrates from alkenes and HNO_3 at the anode can occur only with simultaneous oxidation. That oxidation processes can occur at the anode in the electrolysis of these mixts. is shown by the abundant formation of IV from the primary occurring propene, as in the case of the 3 isomeric dicarboxylic acids of the C_5 series: Ruth Berggren

The hydrogen peroxide theory of electrolytic oxidation. S. Glasstone and A. Hickling. *Chem. Rev.* **25**, 407–41 (1939).—The primary postulate of the theory is that the OH radicals produced at the anode by the discharge of OH^- ions, which are always present in aq. solns., immediately combine irreversibly to form H_2O_2. Under most conditions the H_2O_2 is formed, even at relatively low anode potentials, probably as a thin concd. layer over the electrode surface. In the absence of a depolarizer capable of being oxidized, the H_2O_2 decomps. to give O and H_2O, but if a suitable depolarizer is present, it brings about oxidation in its own characteristic manner; this may be accompanied by oxidation due to the nascent O arising from the decompn. of H_2O_2 and possibly by evolution of O. The extent to which oxidation by H_2O_2 takes place will depend on its stability under the conditions of electrolysis, and all factors capable of affecting the decompn. of the H_2O_2 may be expected to have some effect on the electrolytic oxidation. The H_2O_2 formed at the anode can react in at least 5 ways: (1) it may bring about oxidation by accepting electrons from the depolarizer and being reconverted into OH ions; (2) it may bring about apparent reduction of highly oxidized compds. such as MnO_4^-; (3) its reaction with non-ionized org. compds. may result in the introduction of OH groups into their mols.; (4) the H_2O_2 or the active O arising from its decompn. may bring about oxidation of a general nature; (5) if no suitable depolarizer is present, O is evolved. If H_2O_2 is produced anodically, as postulated, then the catalytic effect of the electrode material on its decompn. should be related in some manner to the oxidation efficiency. The exptl. results obtained are in general agreement with those anticipated. G. and H. also discuss, in relation to the theory, the exptl. results obtained in detg. the effect of other factors—such as the catalytic action of certain ions and the effect of acidity, alkalinity, temp., c. d., depolarizer concn., and foreign ions—upon the oxidation efficiency. Louise Kelley

Electrical characteristics of low-pressure discharges. John W. Marden and George Meister *Trans. Illum. Eng. Soc.* (N. Y.) **34**, 1095–1107(1939).—The elec. characteristics of discharges depend collectively on the kind of gas, pressure, tube diam., length, the voltage drop at the electrodes and if Hg is present also to some extent on the temp. or corresponding Hg pressure. The voltage drop at the electrodes depends for a given set of conditions on the electrode construction and method of operation. The gradient (volts/cm. in the discharge path) decreases with increasing tube diam. and with increasing current; but increases with increasing inert gas pressure. In the case of Hg discharges at const. inert gas pressure, the gradient decreases somewhat with increasing pressure of Hg corresponding to an increase in temp. in the region investigated (2 48 microns corresponding to 30 70°). This effect is not appreciable with Kr, but it is large with He. The total lamp voltage, therefore, is the sum of the voltage drop at the electrodes plus the product of gradient multiplied by discharge length. C. G. F.

Coated carbon electrodes for applying fused masses of alloys. F. V. Buryak. *Avtogennoe Delo* **8**, No. 7, 22–7 (1937); *Chem. Zentr.* **1938, I**, 2052.—Expts. are reported for applying fused masses of Fe-Mn and Fe-Cr alloys to steel by means of C electrodes coated with these alloys. M. G. Moore

Chemical studies on the electrodeless ring discharge. I. The discharge in water vapor. Nobuzi Sasaki and Eiiti Ohara. *J. Chem. Soc. Japan* **60**, 1161–9(1939); cf. Rodebush and Wahl, *C. A.* **28**, 412⁶.—The results of R. and W. were verified and the working conditions studied in detail. **II. Discharge in water vapor.** Eiiti Ohara. *Ibid.* 1170–2. T. Katsurai

Selenium rectifiers. A. H. Cameron. *Elec. Engr. and Merchandiser* (Australia) **16**, 261–6(1939).—The semiconducting layer of the Se rectifier consists of Se. In the manuf. of the disks, a coating of Se (0.05 mm. thick) is applied to one side of a roughened Fe disk (the back electrode). A very thin Se coating is necessary to keep the internal losses down and to maintain constancy in rectifying characteristics. The final step is to cover the front face of the Se with a thin sprayed coating of one or the other metal. The normal working potential which may be applied to a Se rectifier disk is 18 v., a. c. The c. d. for continuous working in a forward direction is 50 ma./sq. cm. Under full load the effective ratio is 50:1. Owing to internal heating the current loading is limited. The rectifier's temp. should not exceed 35°. Artificial cooling is frequently resorted to. Among the units described and illustrated is a 1000-amp. 6-volt unit for electroplating plants and a high-voltage unit of 33,000 v., d. c., 30 ma. C. G. F.

Methods of measuring atmospheric electricity. I. The nature of the atmospheric electrical field and the vertical currents. H. Israël. *Gerlands Beitr. Geophys.* **55**, 314–33(1939).—A "potential-variograph" is described for measuring potential gradient in the vertical current. J. F. Schairer

***The hypothetical electrical field of the earth.** Adolf Schmidt. *Gerlands Beitr. Geophys.* **55**, 292–302(1939).—The history of the vertical elec. currents, derived from geomagnetic observations, is briefly discussed. The assumption that these currents are not real but only a consequence of remaining errors in the observations, is supported by a detailed comparison of these currents for the epochs 1885 and 1922. The nature of the errors and means for their elimination are discussed. J. F. S.

Determination of the piezo-electric effect. P. K. Hermann. *A E G Mitt.* **1939**, 497–502.—The piezo-elec. behavior of a crystal involves 18 measurements, comprising the 6 voltage components. Even though the conversion efficiency of applied mech. pressure into elec. energy is very small (about 1% for a quartz crystal) nevertheless an important field of application has been the production of *ultrasonic waves*. Utilizing a small quartz membrane, the construction of the Nieı and other piezo indicators is described. Numerous applications are cited, such as indicator for injector efficiency in gas lines, vibration intensity, etc. C. G. F.

Quasi-reversible conduction and galvanic cells with liquid-liquid junctions (Koenig) **2**. Elec. glass-melting furnace (U. S. pat. 2,181,030) **19**. Elec. contacts (U. S. pat. 2,180,956) **9**.

Butler, J. A. V.: Electrocapillarity. The Chemistry and Physics of Electrodes and Other Charged Surfaces. London: Methuen and Co., Ltd. 203 pp. 12s. 6d.

Deeley, Paul McK.: Electrolytic Capacitors. South Plainfield, N. J.: Cornell-Dubilier Elec. Corp. 276 pp. $3.

Sand, H. J. S.: Electrochemistry and Electrochemical Analysis. Vol. I. Electrochemical Theory. London: Blackie and Sons, Ltd. 133 pp. 4s. 6d.

Primary electric battery. Erwin A. Schumacher and Geo. W. Heise (to National Carbon Co.). U. S. 2,180,839, Nov. 21. An anode of metal such as Zn which is sol. in alk. electrolyte is used with a carbon cathode capable of transferring O from the air to the cathodic polarizing region and with an alk. electrolyte such as NaOH soln. in admixt. with electrolyte-immobilizing material such as starch or cellulose pulp and dispersed solid electrolyte-regenerating material such as $Ca(OH)_2$ or bentonite. *Cf. *C. A.* **33**, 3704[1,2].

Primary electric battery. Geo. W. Heise and Erwin A. Schumacher (to Union Carbide and Carbon Corp.). U. S. 2,180,955, Nov. 21. A liquid electrolyte such as a caustic alkali soln., which tends to become exhausted by substances formed in it during the action of the battery, is used with an electrolyte-forming solid material within the battery, and a mass of material within the battery for removing such substances from soln. comprising a mixt. of a reactant such as lime, an "extender" such as cellulose fluff and a binder of the electrolyte-forming material.

Dry cells. Price Drummond (to Union Carbide and Carbon Corp.). U. S. 2,179,816, Nov. 14. Various structural details.

Storage battery. Carl J. Dunzweiler (to Willard Storage Battery Co.). U. S. 2,180,463, Nov. 21. Structural details.

Storage battery. Mark A. Hopkins (to Prest-O-Lite Storage Battery Corp.). U. S. 2,180,959, Nov. 21. Structural details.

Storage-battery cover. Edward W. Smith (to Electric Storage Battery Co.). Can. 386,478, Jan. 23, 1940. Structural details.

Electrolytic condensers. Joseph L. Collins (to Sprague Specialties Co.). U. S. 2,180,798, Nov. 21. Filming electrodes such as those of Al are subjected to chem. etching in an etching soln. such as a 5–20% HCl soln. and the temp. rise caused by the exothermic reaction is measured and utilized as an indicator of the degree of etching.

Electrolytic production of chlorates from chlorides. Lucien Delavenna and Jean Maillard. U. S. 2,180,668, Nov. 21. App. is described, and a method of producing chlorates of alkali and alk. earth metals and H by electrolysis from the corresponding chlorides in aq. soln. comprising circulating the electrolyte along a single path, under the action of the H developed by the electrolysis, between a closed and diaphragmless electrolytic cell and a vessel positioned at a level above the cell sufficient to produce a pressure in the cell of about 400 g. per sq. cm., maintaining the electrolyte satd. by const. addn. thereto, in the vessel, of the chloride in cryst. form, collecting the chlorate in the vessel, and permitting the escape of the H at the upper part of the vessel.

Electrostatic separation of particles of zircon and rutile from each other. Frank A. Fahrenwald, Norman F. Parkinson and Geo. H. Barnes (to International Titanium Ltd.). U. S. 2,180,804, Nov. 21. See Brit. 498,246 (*C. A.* **33**, 4140[4]).

Recovering dissolved material from sea water. Arthur E. Zoppa. U. S. 2,179,537, Nov. 14. App. is described, and a method utilizing the energy of sea waves to deliver sea water at a higher level, utilizing the head of water thus delivered to generate elec. energy, and employing such elec. energy for water treatment.

Protective systems for electric induction furnace installations. Philip G. H. Burbridge, Geo. F. Travis, Richard H. Black, Metropolitan-Vickers Electrical Co. Ltd. and Electric Furnace Co. Ltd. Brit. 506,665, June 1, 1939. Relay arrangements are provided whereby the furnace with its assocd. app. will be cut off automatically from the source of furnace supply and (or) other changes of operating conditions effected in the event of failure, for instance, of the furnace lining that permits interconnection of the furnace charge with the induction coil, or in event of an earth fault developing in any part of the furnace circuit.

Electric boiler for heating or evaporating materials such as biphenyl. Edward M. Frankel and Arthur Pollak (to West Virginia Pulp & Paper Co.). U. S. 2,179,781–2, Nov. 14. Various details of structure and operation, including thermostatic control.

Temperature control device for electric heaters. Lloyd L. Young (to Radio Corp. of America). U. S. 2,179,838, Nov. 14. Various structural, elec. and operative details.

Carbon electrodes. Béla Markó. Hung. 122,731, Jan. 2, 1940. Ten to 20 kg. pitch, asphalt, paraffin or dextrin is heated, mixed with 100 kg. powd. coal, graphite, metals or other elec. conductor, pressed to form and ignited in chamotte containers.

Electrodes for electric discharge devices. Eugene Lemmers and Geo. M. Carpenter (to General Elec. Co.). U. S. 2,180,988, Nov. 21. A highly porous body is formed by compressing coarse refractory metal particles such as those of W and momentarily passing a heavy elec. current through the particles to weld them together only at their contacting edges, and the porous body is impregnated with an electron-emissive material.

Electric contacts. Franz R. Hensel and Earl F. Swazy (to P. R. Mallory & Co.). U. S. 2,180,826, Nov. 21. Contacts such as those for use with heavy currents are formed of a compn. comprising Si 0.05–5.0%, refractory material selected from W, Mo or their carbides 10–75%, and a balance substantially all Ag, the refractory material mentioned being in a finely divided state intermixed and bonded by an alloy contg. Ag and Si (the compn. being substantially free from Cu). U. S. 2,180,827 (Franz R. Hensel and Kenneth L. Emmert, joint inventors; to same assignee) relates to contacts formed of Ag together with Mg 0.05–15 and Zn 0.5–25%, etc.

Laminated electric contacts. Joseph A. Payette (to Metals & Controls Corp.). U. S. 2,181,083, Nov. 21. An elec. contact button is provided with a disk having a Ag facing and a high elec. resistance ferrous metal backing (structural details being described).

Electrical make and break contacts. Franz R. Hensel and Kenneth L. Emmert (to P. R. Mallory & Co.). U. S. 2,180,845, Nov. 21. Contacts are formed of an alloy contg. Ag together with Tl 0.05–15%.

Metal-nitride compositions suitable for electrical contacts. Franz R. Hensel (to P. R. Mallory & Co.). U. S. 2,180,984, Nov. 21. One or more of the nitrides of Ti, Zr, Hf, V, Cb and Ta 25–75% is used together with about 50% or less of W or Mo or their refractory carbides, the balance of the compn. being Au, Ag or Cu.

Electrical resistor. Erwin R. Stoekle (to Globe-Union Inc.). U. S. 2,179,566, Nov. 14. A resistor which may be bent to fit a curved housing comprises a thin strip of metal such as Al or Cu provided with a flexible Japan coating and with a resistance coating such as a carbonaceous material of graduated specific resistance along its length on one side, so that heat transfer by the metals trip serves to increase the elec. load-carrying capacity of the resistor.

Mercury-arc rectifier. Clarence W. Hansell (to Radio Corp. of America). U. S. 2,179,929, Nov. 14. Structural details.

Alternating-current rectifiers of the copper oxide type. Albert L. Williams, Leslie E. Thompson and Roger H. Cubitt (to Union Switch & Signal Co.). U. S. 2,180,026, Nov. 14. A process for the manuf. of a. c. rectifiers of the Cu oxide type in which the exposure of the rectifier blanks to the contaminating action of the oxidizing atmosphere during the period when the temp. of the blanks is low is arranged to be reduced or prevented by coating the blanks prior to heating them in the oxidizing atm., with a layer of black material such as C, graphite or cupric oxide for the purpose of increasing the rate at which heat is absorbed by the blanks until the blanks reach the final oxidizing temp.

Dry-plate rectifier. Emil Rupp and Adalbert Sperling (to Canadian General Electric Co., Ltd.). Can. 386,395, Jan. 16, 1940. The rectifier comprises a W element having a Ni support, and a layer of WO_2 on the W element in contact with a metal layer of the group Pb, Zn, Bi and Ag supported on a layer sheet of other metal.

Photoelectric cell. Clarence W. Hewlett (to Canadian General Electric Co., Ltd.). Can. 386,396, Jan. 16, 1940. A light-sensitive device is prepd. by evapg. and condensing Se on a plate of base metal, heating above the m. p. of Se to melt the evapd. layer, cooling, heating to convert the Se into a metallic light-sensitive form, sputtering a film of Cd on the Se surface, sputtering a film of Pt on the Cd surface, and cooling the Pt film with an insulating protection layer at the places where elec. contact with the film is made.

High-vacuum production in devices such as "radio tubes." John D. McQuade (to Kemet Laboratories Co.). U. S. 2,180,714, Nov. 21. A wire of high elec. resistance with a coating of elec. insulation is used with a compd. getter wire having a core of an alk. earth metal and a shell of Ni or Fe or a Ni or Fe alloy and with a metal envelope which substantially encloses the getter wire and holds it in firm contact with the insulated resistance wire. Cf. *C. A.* **33**, 1556[4].

Incandescent filament and lamp. Gjon Mili (to Westinghouse Elec. & Mfg. Co.). U. S. 2,180,538, Nov. 21. A lamp suitable for use in production of sound tracks on film has an incandescible W coil filament slightly bent into an arc of less than 90° and having substantially straight end portions, supplemental coils formed of a metal, such

as Ni or a Ni-Fe alloy, of lower m. p. than W enclosing the end portions, and leading-in conductors, the coil- 1 covered end portions mentioned being welded to the leading-in conductors.

5—PHOTOGRAPHY

E. R. BULLOCK

Recent developments in color photography. Gustav Grote. *Phot. Korr.* **74**, 17–22(1938); **75**, 103–7(1939); 2 cf. *C. A.* **31**, 2947⁵.—A review of recent patents in the following branches of color photography: screen processes; taking and projection; subtractive processes.
M. W. Seymour

Absolute color reproduction in photography with modern color films. Karl John. *Phot. Korr.* **75**, 113–19(1939).

Physics in color photography. David L. MacAdam. *J. Applied Phys.* **11**, 46–55(1940).—Review. S. L. G. 3

Spectral distribution of sensitivity of photographic emulsions sensitized by cyanine dyes. G. Schwarz. *Science ind. phot.* **10**, 233–41(1939).—Data are given which establish the existence of 2 types of color sensitizing for the cyanines. For most carbocyanines, the principal max. of the "sensitization of the 1st type" occurs at a wave length about 25–50 mμ longer, and the max. of the "sensitization of the 2nd type" occurs about 70–115 mμ longer, than the max. of absorption of the alc. soln. of the 4 dye. The max. of the 2nd type is very sharp; in some cases, this 2nd type of sensitization does not occur. One type of sensitization can be favored over the other by the choice of emulsions, and the production of the 2nd type can sometimes be encouraged by heating the sensitized emulsions. S. agrees in essentials with the conclusions of Leermakers, Carroll and Staud (*C. A.* **32**, 65¹), that the 2 types of sensitization correspond to 2 states of aggregation of the adsorbed dye mols. J. A. Leermakers 5

Use of spirals in emulsion coating and drying. Willy Nauck. *Phot. Ind.* **37**, 966–68(1939).—N. describes and discusses a method of handling film and paper in the drying operation which is stated to give several advantages over the current festoon method of drying. H. C. Carlton

The response of photographic materials to atomic particles. T. R. Wilkins. *J. Applied Phys.* **11**, 35–45 (1940).—Emulsions can be made in which no tracks are 6 produced even for α-rays and others in which α-ray but no proton tracks are discernible. Methods are described and useful equations and curves given for photographic counting of α-rays. Photographic emulsions can also be used for recording and identifying the tracks of individual particles. Descriptions are given of applications to the study of radioactive aggregates, counting of α-rays and protons, detn. of half-lives of radioactive elements, nuclear reactions in impregnated plates, detection of fission, cosmic rays, nuclear scattering and identification of radioactive isotopes. S. L. Gerhard

RCA aluminate developers. J. R. Alburger. *J. Soc. Motion Picture Engrs.* **33**, 296–314(1939).—The principle of operation and characteristics of a new developer described as a "peptized sol" buffer developer are given. The developer is characterized by the addn. of $KAl(SO_4)_2$ which reacts with the alkali (NaOH) to form an equil. soln. As the alkali is used up in the development reaction, the equil. is disturbed and the Al is pptd. as Al_2O_3. The function of the balanced soln. is to act as a buffer to hold the alky. of the soln. relatively low, while at the same time the ionization balance of the org. reducing agent is shifted so as to produce increased energy of the developer. Advantages of this developer are: long useful life with little replenishment, higher contrast and improved resolution for variable-area recordings and release prints, effective emulsion speed, γ and d. reasonably const. throughout the life of the developer, temp. effect greatly reduced, d. tolerances for variable-area recording increased approx. 100%, and the developed image hardened in the developer owing to the $Al(OH)_3$ present. J. G. S.

Chemical analysis of hydroquinone, metol and bromide in a photographic developer. H. L. Baumbach. *J. Soc. Motion Picture Engrs.* **33**, 517–24(1939).—The usefulness of chem. analysis as a supplement to sensitometric data is emphasized. Distribution ratios for hydroquinone and metol between H_2O and ether are given as functions of Na_2SO_3 concn. and pH. A new analytical method is presented for the detn. of metol and hydroquinone in a photographic soln. where the developing agents are salted out of the soln. at the proper pH by means of Na_2SO_3 and detd. volumetrically by titration with I_2. A modified Volhard method is presented for the detn. of sol. bromide where the interfering substances are removed by treatment with H_2O_2. Author

Photographic desensitizers. A. V. Belosvetov and V. A. Izmailovskiĭ. *Uspekhi Khim.* **8**, 546–60(1939).—Remarks on the paper by Seyewetz (cf. *C. A.* **32**, 66¹).
F. H. Rathmann

Theory of the photographic latent-image formation. J. H. Webb. *J. Applied Phys.* **11**, 18–34(1940).—The Gurney-Mott theory (*C. A.* **32**, 4449⁹) assumes, in agreement with earlier theories, that the latent image itself is a submicroscopic speck of Ag, but goes further by explaining its formation in terms of modern physics. The photocond. of AgBr allows the migration of electrons, which are trapped by colloidal Ag or Ag_2S particles. The ionic cond. of AgBr, ascribed to the thermal movement of interstitial Ag ions, allows the latter to be attracted to the specks negatively charged by trapped electrons, thereby forming Ag atoms, 1 for each light quantum absorbed by the crystal. Temp. effects, reciprocity-law failure, intermittency effect and Herschel effect are explained in terms of the theory. Bibliography. S. L. Gerhard

Tone separation. Helmer Bäckström. *Nord. Tids. Fot.* **23**, 196–98, 212–15(1939).—In a method for printing from a negative of excessive d. range, the bromide paper is soaked in the developer for about 4 min., given a partial exposure, allowed to remain on the enlarging board 6 about 2 min., then given the remainder of the exposure and finally developed. O. Sandvik

Three-color prints by chemical toning. Aloysius Sullivan. *Photo Art Monthly* **7**, 483–7(1939).—Bromide prints are protected locally by a soln. of wax in gasoline and then toned with a bath to convert the remaining area of the print to a $PbCrO_4$ (yellow) image. The wax is removed and the procedure repeated with the wax for 2 7 other tones, i. e., Ni dimethylglyoxime (magenta), and ferric ferrocyanide (blue). G. E. Matthews

Spectrochemical analysis by the step-sector method. R. Breckpot. *Spectrochim. Acta* **1**, 137–63(1939).
W. F. Meggers

Photographic factors influencing the concentration-calibration curve in quantitative methods of spectrochemical analysis. I. Photographic intensity ratios as an expression of intensity ratios of lines in a light source. Lester W. Strock. *Spectrochim. Acta* **1**, 117–22(1939). **II. Failure of the reciprocity law and intensity-retardation of development effect.** *Ibid.* 123–30. W. F. M.

Paper negatives simplified. Sigismund Blumann. *Photo Art Monthly* **7**, 492–3(1939).—Photographic paper can be rendered translucent by bathing in the following: tritolyl phosphate 50, toluene 49 and acetone 1 part. G. E. Matthews

Rapid processing of photographic plates for routine spectrographic analysis. H. B. Vincent and R. A. Sawyer. *Spectrochim. Acta* **1**, 131–6(1939).—Details are given concerning special app. and procedure which make it possible to develop, fix, wash and dry spectrograms in 3 to 4 min. W. F. Meggers

5P compds. with active methylene groups [for production of colored images] (Fr. pat. 840,880) **10.**

Cartwright, H. Mills: Photogravure. 2nd ed. Boston: Am. Photographic Pub. Co. 202 pp. $3.50.

Lester, Henry M.: Photo-Lab.-Index. Cumulative Formulary of Standard Recommended Photographic Procedures. London: Fountain Press, Ltd. 287 pp. 21s.

Stenger, Erich: History of Photography. Its Relation to Civilization and Practice. Translated by Edward Epstean. Easton: Mack Printing Co., 204 pp. $5. Reviewed in *Mech. Eng.* 62, 164(1940).

Strock, L. W.: Contribution to the Knowledge of the Photographic Latent Image and Development Process. Oslo: J. Dybwadn. 83 pp. Kr. 7.

American Annual of Photography. Vol. 54, 1940. Edited by **Frank R. Fraprie and Franklin I. Jordan**. Boston: Am. Photographic Pub. Co. 322 pp. $2.25.

Multicolor photography. Gustav Wilmanns, Wilhelm Schneider and Gerhard von Kujawa (to Agfa Ansco Corp.) Can. 386,563, Jan. 30, 1940. A colored negative is produced on a multilayer material having each layer differently light-sensitized and contg. a color former fast to diffusion selected so that the colors of the neg. are about the same as those of the photographed object. A multicolor print is printed directly onto a photographic multilayer material contg. color formers fast to diffusion selected so that the pos. colors in the material correspond exactly to those of the object to be reproduced.

Photographic developer. Louis C. Jones, Robert B. Barnes and Garnet P. Ham (to American Cyanamid Co.). U. S. 2,179,790, Nov. 14. In a developer for Ag halides, a quaternary ammonium hydroxide such as trimethylbenzylammonium hydroxide is used as an alky.-producing agent.

Sensitizing photographic emulsions. Kodak-Pathé. Fr. 840,957, May 8, 1939. The sensitizing action of certain compds. is increased by the presence of "supersensitizers." Thus the sensitization of a silver halide gelatin emulsion by compds. of the type of pinacyanol is increased by the presence of styryl compds. comprising a heterocyclic ring contg. nitrogen. The same supersensitizers increase the effect of pseudocyanines that have one heterocyclic ring contg. N and another ring contg. N, and which may contain S or Se, such as the thiapseudocyanines or the selenapseudocyanines. The effect of thiacarbocyanines or selenacarbocyanines is increased by dibenzothiacarbocyanines; that of 8-alkylcarbocyanines contg. S or Se is increased by a pseudocyanine compd.; that of oxaselenazolocarbocyanines or oxathiazolocarbocyanines which may contain in position 4' an alkyl or an aryl group, by a pseudocyanine compd. Usually 1 part of supersensitizer for 10 parts sensitizer is sufficient. Both supersensitizer and sensitizer, in the desired proportions, are dissolved in an org. solvent, preferably MeOH, and this soln. is added to the silver halide emulsion.

Photographic material. Walter Frankenburger and Hermann Schulz (to Agfa Ansco Corp.). U. S. 2,180,409, Nov. 21. A material suitable for use in color photography comprises a Ag halide emulsion layer contg. a phthalocyanine, sulfonated phthalocyanine or metal phthalocyanine dye.

Hardening photographic gelatin layers, etc. Johannes Brunken (to Agfa Ansco Corp.). U. S. 2,180,335, Nov. 21. See Can. 383,373 (*C. A.* **33**, 8334[9]).

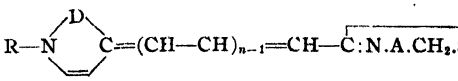
Photographic backing paper. Ernest L. Baxter (to Eastman Kodak Co.). U. S. reissue 21,268, Nov. 21. A reissue of original patent No. 2,153,130 (*C. A.* **33**, 4896[1]).

Photographic corrected color-separation images. Arthur C. Hardy (to Interchemical Corp.). U. S. 2,179,786, Nov. 14. A method of producing a corrected color component image of a colored object by use of a photographic element having 2 sensitive layers permanently attached to a support involves forming a negative image of one of the primary color components of the colored object in one of the sensitive layers, forming a positive image of another of the primary color components of the colored object in the other sensitive layer, the positive image being superposed and in register with the negative image, and printing both images simultaneously to form a corrected color component record of the colored object. A relatively fast back layer of negative emulsion is used with a relatively slow front layer of positive photographic emulsion, both being sensitized with suitable dyes.

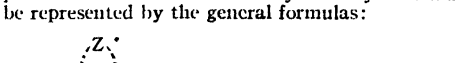
Dyes and dye bases. Bernard Beilenson (to Eastman Kodak Co.). U. S. 2,179,990, Nov. 14. Dye bases of the general formulas



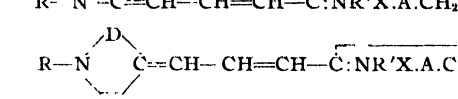
or



where A and D represent phenylene groups, *n* represents a positive integer not greater than two, R represents an alkyl group and Z represents the nonmetallic atoms necessary to complete a five-membered or six-membered heterocyclic nucleus, e. g., R can represent an alkyl group, such as Me, Et, Bu, allyl, β-ethoxyethyl or benzyl and Z can represent the nonmetallic atoms necessary to complete a five-membered heterocyclic nucleus, such as a thiazole, a 4-methylthiazole, a 4-phenylthiazole, a benzothiazole, a 4-chlorobenzothiazole, an α-naphthothiazole, and β-naphthothiazole, a thiazoline, a benzoxazole, an α-naphthoxazole, a β-naphthoxazole or a benzoselenazole or Z can represent the nonmetallic atom or atoms necessary to complete a six-membered heterocyclic nucleus, such as a quinoline nucleus, are prepd. by condensing a 3-methyl-2,4-benzothiazine with a cyclammonium quaternary salt contg. a reactive group, such as an iodine atom, an alkylthiol, an arylthiol group or a β-arylaminovinyl group for example, in the α- or γ-position. Heat and use of a basic condensing agent facilitate the formation of the dye bases, and these bases can be converted into cyanine dyes by heating the bases with alkyl *p*-toluenesulfonates or alkyl sulfates for several hrs. at about 150°. The resulting cyanine toluenesulfonates or alkyl sulfates can then be converted into the corresponding cyanine iodides or perchlorates for example by treatment with soluble iodides or perchlorates. The new carbocyanine dyes obtainable can be represented by the general formulas:



or

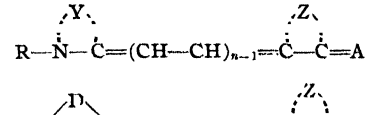


where A and D represent phenylene groups, R and R' represent alkyl groups, X represents an acid radical and Z represents the nonmetallic atoms necessary to complete a five-membered or six-membered heterocyclic nucleus. These dyes are useful for spectrally sensitizing photographic Ag halide emulsions. Numerous examples with details are given.

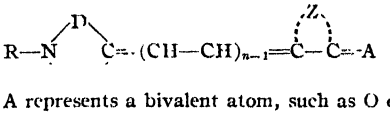
Dyes from imidazolones. Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 2,177,403, Oct. 24. Numerous examples are given of the production of *photographic sensitizing dyes* such as 3-ethyl-5-(3-methyl-2-thiazolinylideneethylidene) - 1 - phenyl - 2 - thio - 2,4(3,5)-imidazoledione, 3 - ethyl - 5 -(2 - ethyl - 1 - benzoxazolylidenecthylidene) - 1 - phenyl - 2 - thio - 2,4(3,5) - imidazoledione, 5 - (2 - ethyl - 1 - benzothiazolylideneethylidenc)-1,3 - diphenyl - 2 - thio - 2,4(3,5) - imidazoledione, and the like, which are obtained by condensing a cyclammonium quaternary salt, such as an oxazole, a thiazole, a thiazoline, a selenazoline, a selenazole, a pyridine or a quinoline quaternary salt, contg. a mercapto group in the α- or γ-positions, with an imidazolone contg. a nuclear reactive carbonyl or thiocarbonyl group, advantageously in the presence of a basic condensing agent.

Dyes from thiazolones. Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 2,177,402, Oct. 24. Numerous examples with details are given of the production of dyes suitable for use as special *sensitizers in photographic emulsions*, such as 2-diphenylamino-5-(2-ethyl-1-benzoxazolylideneethylidene) - 4(5) - thiazolone, or 2 - diphenylamino - 5 - (2 - ethyl - 1 - benzothiazolylideneethylidene) - 4(5) - thiazolone, which may be obtained, e. g., by condensing a cyclammonium quaternary salt, such as an oxazole, a thiazole, a thiazoline, a selenazole, a selenazoline, a pyridine or a quinoline quaternary salt, contg. a substituted mercapto group in the α- or γ-positions, with a thiazoline contg. a nuclear reactive methylene group, i. e., a nuclear methylene group adjacent to a nuclear carbonyl or thiocarbonyl group, advantageously in the presence of a basic condensing agent. 1

Dyes from thioöxazolediones. Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 2,177,401, Oct. 24. Dyes suitable for use as special *sensitizers with photographic gelatino-AgCl and -AgBr emulsions* and which have the general formulas 2



and



wherein A represents a bivalent atom, such as O or S, D represents a vinylene or phenylene group, *n* represents a positive integer not greater than three, R represents an alkyl group, Y represents the nonmetallic atoms necessary to complete a five-membered or six-membered heterocyclic nucleus, such as an oxazole nucleus (for example oxazole, benzoxazole or naphthoxazole), a thiazole nucleus (for example thiazole, benzothiazole or naphthothiazole), a selenazole nucleus (for example selenazole or benzoselenazole), a thiazoline nucleus, a selenazoline nucleus, a quinoline nucleus, a benzoquinoline nucleus or a pyridine nucleus and Z represents the nonmetallic atoms necessary to complete a thio-2,4(3,5)-oxazoledione nucleus, can, e. g., be prepd. by condensing a cyclammonium quaternary salt, such as an oxazole, a thiazole, a selenazole, a thiazoline, a selenazoline, a pyridine or a quinoline quaternary salt contg. a mercapto group in the α- or γ-position, i. e., one of the so-called reactive positions, with a thio-2,4(3,5)-oxazoledione, contg. a nuclear reactive methylene group, i. e., a nuclear methylene group adjacent to a nuclear carbonyl or thiocarbonyl group, advantageously in the presence of a basic condensing agent. The reaction, e. g., may involve the condensation of 1-phenylthiobenzothiazole ethiodide with 2-thio-2,4(3,5)-oxazoledione in the presence of Et_3N. Such a dye is called 5-(2-ethyl-1-benzothiazolylidene)-2-thio-2,4(3,5)-oxazoledione. In carrying out this type of condensation, it is advantageous to employ strong tert. org. bases as condensing agents, though inorg. condensing agents such as Na_2CO_3 or KOH can be used. Heating accelerates the reaction. Numerous examples with details of procedure are given. 3 4

6—INORGANIC CHEMISTRY

W. C. FERNELIU AND L. L. QUILL

Periodates of yttrium, erbium and cerium. R. K. Bahl and Surjit Singh. *J. Indian Chem. Soc.* **16**, 375–8 (1939).—Y, Ce and Er, like all other rare earths, form the corresponding rare earth mesoperiodate MIO_5, usually with 4 mols. of H_2O. Y differs from the rest in forming in addn a diorthoperiodate, $Y_4I_2O_{13}.11H_2O$ or $2Y_2O_3.I_2O_7.11H_2O$. A. H. Krappe

The reaction between magnesium oxide and titanium oxide in the solid state. III. Mechanism of the reaction. Yasuo Tanaka. *J. Chem. Soc. Japan* **60**, 949–57 (1939); cf. *C. A.* **33**, 4895⁸.—The reactions between MgO and TiO_2 at 780, 900, 1000, 1200°, the diffusion of Mg and Ti ions in the solid phase, and the formation of cryst. $MgO.TiO_2$ are discussed. T. Katsurai

Reaction between nitric acid and tin in presence of catalysts. II. G. S. Kasbekar and A. R. Normand. *Proc. Indian Acad. Sci.* **10A**, 37–40 (1939); cf. *C. A.* **31**, 7733¹.—Iodides of Na and K retard the reaction between HNO_3 and Sn. This retardation may be due to the specific action of the alkali ions. Molar solns. of NaI, KI and LiI inhibit the reaction for about 3 months and thereafter cause the formation of a thin layer of stannous iodide on the surface of the tin; this behavior is due to the formation of the oxidation products of HI in the reaction mixt. Helen S. Hopfield

The thermal and photochemical oxidation of the chlorinated silanes. H. J. Emeléus and A. J. E. Welch. *J. Chem. Soc.* **1939**, 1928–37.—The inflammability of the chlorinated silanes decreases with increasing chlorination. An investigation of the explosive limits for the thermal oxidation indicates a gradual transition from a degenerate chain reaction for $SiHCl_3$ to probably a branched chain reaction for SiH_3Cl. $Si(OH)Cl_3$ was isolated in the photo-oxidation of $SiHCl_3$ and the oxidation of the other chlorinated silanes is believed to take place through a similar primary hydroxylation process. $Si(OH)Cl_3$ decomposes slowly at room temp. to HCl and $SiOCl_2$. W. B. K.

Decomposition of mercuric ferrocyanide. Angel A. Bombelli. *Anales asoc. quím. argentina* **27**, 172–7 (1939).—$Hg_2Fe(CN)_6$ is a compd. of little stability and very sensitive to heat. In the presence of H_2O it breaks down to $2Hg(CN)_2 + Fe(CN)_2$. Its blue color is due to formation of ferric ferrocyanides by hydrolysis, oxidation and polymerization of $Fe(CN)_2$. E. M. Symmes

Constitution of cyano derivatives of gold. Charles S. Gibson. *Proc. Roy. Soc.* (London) **A173**, 160–1 (1939).—A zig-zag chain of alternate auric Au atoms (each linked to 2 Pr groups) and aurous Au atoms sepd. from each other by CN groups is proposed as the structure of dipropyldicyanodigold (I), $Pr_2Au_2(CN)_2$, which is obtained from Pr_2AuCN (II) by loss of half of the Pr radicals. I is insol. in H_2O and all org. solvents. Further loss of Pr radicals may be expected to produce aurous cyanide, a straight-chain structure. R. F. D. 6

The structure of copper salts of some complex cyanic compounds. I. The structure of copper salts of hexacyanides of cobalt and chromium. Mario A. Rollier and Enrico Arreghini. *Gazz. chim. ital.* **69**, 499–508 (1939).—When an excess of $CuSO_4$ was added to aq. $K_4Co(CN)_6$ (cf. Szegö and Ostinelli, *C. A.* **25**, 2917) at −13° with exclusion of air, a slightly exothermic reaction took place and a green ppt. was formed, which, dried *in vacuo*, yielded a stable, pale-green *substance* (I) contg. 41.75% Cu, 9.46% Co and 37% CN. It was not, therefore, a hexacyanide. That its magnetic moment was very low, indicated that a considerable proportion of the Cu was in the cuprous form. Perhaps CuCN was formed during the pptn. of $Cu_2Co(CN)_6$ at the expense of the conversion of Co from the cobaltous to the cobaltic form. I, washed with hot HCl (1:1), left 56.8% of the original wt. of a more intense green, stable *compd.* (II) contg. Cu 23.18, Co. 14.41, CN 38.0%. The green HCl ext. contained Cu but no Co. On the anhyd. basis, the compn. of II corresponded to $Cu_3[Co(CN)_6]_2$, in which all Cu is cupric and all Co is cobaltic. The absence of cobaltous Co was confirmed by soln. in 20% aq. KOH, and addn. of Seignette salt. No H was evolved nor was Cu_2O pptd., both of which reactions would have happened if bivalent Co had been present. The results indicate that II is *cupric cobalticyanide*, $Cu_3[Co(CN)_6]_2$ contg. 24.4% H_2O. The magnetic properties of II were detd., to confirm the absence of univalent Cu in II, and of $Cu_2Fe(CN)_6$ (III) and $CuK_2Fe(CN)_6$ (IV) to be 7 8 9

certain that Cu does not show any anomalous behavior in II. In prepg. III and IV by the method of Rigamonti (*C. A.* **31**, 6574[6]), it was found easier to prep. pure IV by using a large excess of $K_4Fe(CN)_6$ and a soln. contg. K_2SO_4 and $CuSO_4$ in a 4:1 ratio. After drying over P_2O_5 *in vacuo* (20 mm.) at room temp., III contained 30.8%, II 24.4% and IV 1.5% of H_2O. The following data give the temp., magnetic susceptibility (per g. χ. 10^6) and magnetic moment (in magnetons), of II, III and IV, resp.: 19° 5.60, 1.91; 19°, 5.99, 1.86; 17°, 3.80, 1.81. The magnetic moments are close to the 1.73 value which corresponds to 1 spinning electron, and it is in accord with the presence of only bivalent Cu in each compd. and with the absence of paramagnetism. Prepd. in the same way as II, *cupric chromohexacyanide*, $Cu_2Cr(CN)_6$ (V) is green and unstable (decompn. probably to $Cu(CN)_2$ and $Cr(CN)_2$). The unit cell of II contains 2 mols. and has a base dimension of 9.91 ± 0.05 A. The cell of V contains 4 mols., with a base dimension of 10.22 ± 0.05. The essential identity of structure of II, V, ferricyanides, ferrocyanides, cobalticyanides, chromocyanides and manganocyanides (to be described later) depends on the fact that the fundamental cryst. structure or skeleton is not the $M(CN)_6$ complex but a $[M^{+++}(CN)_6M^{++}]^{-}$, $[M^{++}(CN)_6M^{+++}]^{-}$ or $[M^{+++}(CN)_6M^{+++}]$ group, common to all. In each case, 4 such groups constitute the skeleton of the elementary cell. The structure is shown schematically by a detailed 3-dimensional diagram, and is thus correlated with data of other investigators on the same type of compds. Although derived in a different way, the structure assigned to these compds. as a result of the present work is essentially the same polynuclear complex type assigned by Cambi and Clerici for ferrous chromicyanides, manganicyanides and ferricyanides (cf. *C. A.* **22**, 2523). The results suggest that the structure of Prussian blue may be $[Fe^{++}(CN)_6Fe^{+++}]K.2H_2O$, i. e., the $4[Fe^{++}(CN)_6Fe^{+++}]$ groups constitute the skeleton of the elementary cell, within which are K atoms and at least 4 of the 8 H_2O mols. C. C. Davis

The theory of complex compounds. Anna D. Hel'man. *Compt. rend. acad. sci. U. R. S. S.* **24**, 549–52(1939)(in English).—The behavior of C_2H_4, CO and NO in Pt coordination compds. is readily explained by the assumption of high trans influence (Chernyaev, *C. A.* **23**, 2616), whereby the Pt acts first as an electron donor to the activated C_2H_4, CO or NO and then becomes an acceptor; this results in the formation of a 4-electron covalent bond and high activity of the inner sphere. Complex compds. with unsatd. mols. are formed only by bivalent Pt, and generally by metals in the lowest stage of oxidation. Only one unsatd. mol. of high trans influence can become a part of the complex and it is easily displaced by an excess of NH_3 or pyridine. Two or three mols. of thiourea can enter the complex since it is an electron donor only and can give four electrons for common use.

George Ayers

Cobalt salts of glyoximes. V. Livio Cambi and Lamberto Malatesta. *Gazz. chim. ital.* **69**, 547–61(1939); cf. *C. A.* **30**, 8160[1]; *Rend. ist. lombardo sci.* **71**, 327(1938).—Various complex cobaltous and cobaltic derivs. of α-glyoximes and their hydrolytic products are described. In this work, RC(.NOH)C(:NOH)R is abbreviated to GH_2, the RC(:NO—)C(:NOH)R radical to GH, the RC(:NO—)C(:NO—)R radical to G; α-monophenylglyoxime (I) and its radicals to MPIIf, MPH and MP, resp.; α-methylbenzoylglyoxime (II) and its radicals to MBH_2, MBH and MB, resp., and α-diphenylglyoxime (III) and its radicals to DPH_2, DPH and DP, resp. *Derivs. of* III.—$CoBr_2$ (22 g.) in abs. EtOH and 48 g. III, allowed to stand at 60° until crystn. is complete, 50 cc. fuming HBr added, refluxed for 1 hr., allowed to crystallize and fractionally crystd. from $CHCl_3$, yield the complex *bromide*, $[Co(C_{14}H_{11}O_2N_2)_2Br_2]H$ (IV), black en masse, green when pulverized; magnetic susceptibility (hereafter designated χ_M and χ_A) -320×10^{-6}, 26×10^{-6}. The mother liquor yields less-brominated compds. with ill-defined Co:glyoxime ratios (less than 1:2). IV (10 g.), 100 cc. abs. EtOH and 20 g. KOAc, refluxed for 15 min., yield the *hydrate*, $[Co(C_{14}H_{11}O_2N_2)_2(OH)_2]H.H_2O$, maroon-red, χ_M and χ_A at 18°, 208×10^{-6} and 104×10^{-6}, resp., loses 1 H_2O mol. at 120° *in vacuo* over P_2O_5. Above 120° it decomp. more profoundly. Direct pptn. of the anhyd. cobaltous salt is impossible because of the insoly. of III in all solvents. However, by refluxing a mixt. of III and $Co(OAc)_2$ in anhyd. Me_2CO, there is pptd. the *anhyd. cobaltous salt*, $[Co(C_{14}H_{11}O_2N_2)_2]$, black; χ_M and χ_A at 18°, 1512×10^{-6} and 1740×10^{-6}, resp., while the *cobaltic salt*, $[Co(C_{14}H_{11}O_2N_2)_2OH]$, remains in soln. and can be pptd. by water. *In vacuo* over P_2O_5 at 120°, it is dehydrated to the *cobaltic salt*, $[Co(C_{14}H_{10}O_2N_2)H]$, χ_M and χ_A -251×10^{-6} and 30×10^{-6}, resp. Attempts to prep. NH_4 salts of the $[Co(GH)_2Br_2]-NH_2R_2$ type by the use of Bu_2NH gave only indefinite products, but with Bz_2NH salification of the acid and simultaneous substitution of Br by OH take place. The product has the compn. $[Co(DPH)_2Br_{1.36}(OH)_{0.64}]-Bu_2NH_2$ and is probably a mixt. of 68% of the *cobaltic compd.*, $[Co(DPH)_2]Bu_2NH_2$, and the *cobaltic compd.*, $[Co(DPH)_2(OH)_2]Bu_2NH_2$. The mixt. showed χ_M and χ_A values at 18° of 455×10^{-6} and 16×10^{-6}, resp. *Derivs. of* I.—I (32 g.) in abs. EtOH and fuming HBr (several cc.), heated at 60–70°, 18 g. $CoBr_2$ added during 2 hrs. with continuous passage of dry air, kept hot for 2 more hrs. in dry air, boiled, filtered and allowed to stand, ppts. the *bromide*, $[Co(C_8H_7O_2N_2)_2Br_2]H$ (V), dark green; χ_M and χ_A at 18°, -209×10^{-6} and 48×10^{-6}, resp. It is also formed by treating the product of Na cobaltinitrite and I (2 parts) with fuming HBr and purifying by EtOH. With excess Bu_2NH in EtOH, an NH_4 salt is not obtained, and the alky. of the medium leads to partial hydrolysis of the Br of the pseudo acid: the product is the *compd.* $[Co(C_8H_7O_2N_2)_2Br(C_4H_{11}N)]$. V (10 g.) and KOAc in abs. EtOH, heated for 4 min. on a steam bath, yield, after drying over P_2O_5 (tendency toward a partial loss of I with probable formation of the sesqui salt, $Co_2(MP)_3$), the *cobaltic compd.*, $[Co(C_8H_7O_2N_2)_2(OH)_2]H$. It is difficult to obtain reasonably pure, e. g., in 2 of several prepns., χ_M at 18° was -192×10^{-6} and -202×10^{-6}, χ_A was 34×10^{-6} and 14×10^{-6}. I and $CoBr_2$ in abs. EtOH, maintained for several hrs. at 50–60°, ppt. the *cobaltous-cobaltic bromide*, $[Co(C_8H_7O_2N_2)_4Br_{3.8}-(OH)_{0.2}].6EtOH$, maroon-yellow, χ_M and χ_A 8944×10^{-6} and 9475×10^{-6}, resp. It loses its 6 EtOH mols. at 80–100°. Its constitution is probably $[Br_2Co^{+++}(MPH)_2]-Co^{++}[(MPH)_2Co^{+++}BrOH]$ (VI). VI and satd. alc. NH_3 heated on a steam bath ppt. the yellow *ammoniate*, $[Co_3(C_8H_6O_2N_2)_4(NH_3)_4(HBr)_2]4H_2O$ (VII), which, *in vacuo* at 120°, gives the *anhyd. compd.*, to which is attributed the constitution $Br[(NH_3)_2Co^{+++}(MPH)MP]-Co^{++}[MP(MPH)Co^{+++}(NH_3)_2]Br$ (VIII). At 18° χ_M is 8980×10^{-6}, χ_A 9487×10^{-6}. Cobaltous Co is proved by these values and by its decompn. to cobaltous compds., which also show that the NH_3 is united directly to cobaltic Co. Thus, mineral acids yield $[Co^{+++}(NH_3)_2(MPH)_2]X$ salts, *e. g.*, VIII in dil. AcOH and concd. HBr ppt. the dark yellow *cobaltic bromide*, $[Co(C_8H_7O_2N_2)_2(NH_3)_2]Br$, χ_M and χ_A at 18° -263×10^{-6} and 10×10^{-6}, resp. VIII in dil. EtOH and dil. HNO_3 ppt. the yellow *cobaltic nitrate*, $[Co(C_8H_7O_2N_2)_2(NH_3)_2]NO_3$, χ_M at 18°, -271×10^{-6}. VIII and $HClO_4$ yield the *cobaltic perchlorate*, $[Co(C_8H_7O_2N_2)_2(NH_3)_2]ClO_4$, χ_M at 18°, -274×10^{-6}. VIII in dil. AcOH and $K_2S_2O_8$ yield the *cobaltic persulfate*, $[Co(C_8H_7O_2N_2)(NH_3)_2]_2S_2O_8$, χ_M at 18°, -515×10^{-6}. VIII and H_3PO_4 yield the *cobaltic acid phosphate*, $[Co(C_8H_7O_2N_2)_2(NH_3)_2]HPO_4$, χ_M at 18°, -503×10^{-6}. These reactions are double decompns. and show that, in AcOH, VIII decomps. thus: $VIII \xrightarrow{+AcOH} 2[Co^{+++}(MPH)_2(NH_3)_2]Br + Co(OAc)_2$. In boiling water for 10 min. (the soln. is maroon-red), VI ppts. the *cobaltic hydroxide*, $[Co(C_8H_7O_2N_2)_2Br(OH)]H$, χ_M and χ_A at 18°, -202×10^{-6} and 8×10^{-6}, resp. The mother liquor contains approx. 1/3 of the Co as cobaltous ions. VI in boiling C_5H_5N for several min. ppts. the yellow *cobaltic pyridine bromide*, $Co(C_8H_7O_2N_2)_2(C_5H_5N)Br$, χ_M and χ_A at 18°, -248×10^{-6} and 17×10^{-6}, resp. Chilling of

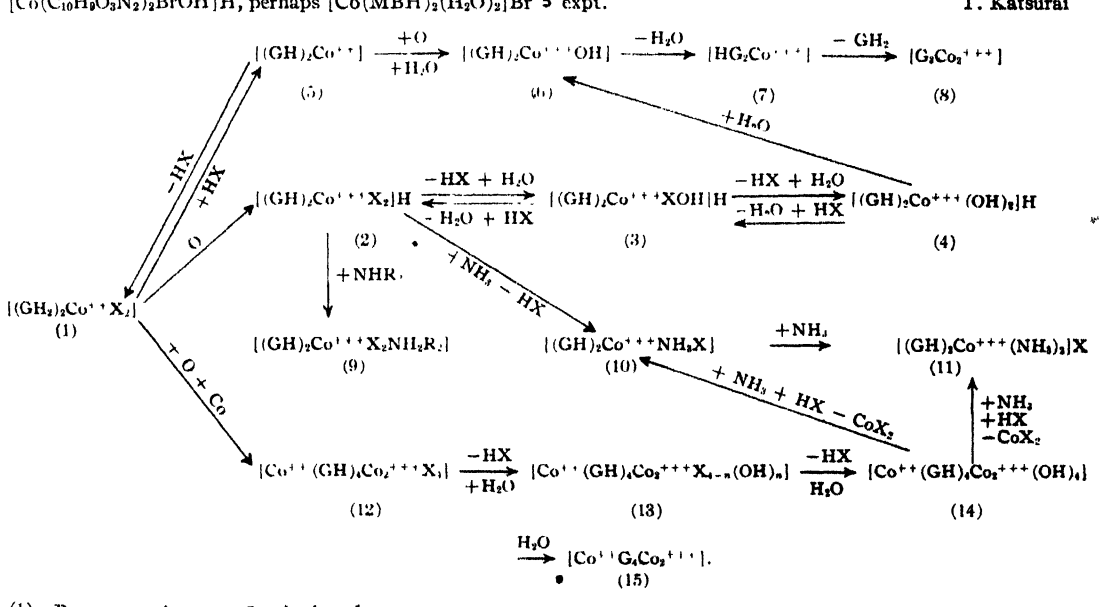
the mother liquor ppts. maroon *cobaltous-cobaltic pyridine bromide*, $[Co^{+++}(C_8H_7O_2N_2)_2(C_5H_5N)Br].CoBr_2$ (IX). It is stable only in the presence of C_5H_5N and on drying it becomes sky-blue, because of decompn. into the simpler *cobaltic pyridine bromide*, $[Co(MPH)_2(C_5H_5N)Br]$ (X) and $CoBr_2$. The blue mixt. showed χ_M and χ_A values at 18° of 9310 × 10^{-6} and 9625 × 10^{-6}, resp.; X, −250 × 10^{-6} and 15 × 10^{-6}, resp. In confirmation of these results, $CoBr_2$ and I in C_5H_5N in air formed X. On the other hand IX could not be prepd. by this method. VI and KOAc in abs. EtOH, heated for 20 min. on a steam bath, ppt. the complex *hydrated cobaltic hydroxide*, $[Co_3(C_8H_7O_2N_2)_4(OH)_4].4H_2O$. *In vacuo* at 100° it forms the *anhyd. hydroxide*, $Co_3(C_8H_7O_2N_2)_4(OH)_4$, the χ_M and χ_A values at 18° of which are 9110 × 10^{-6} and 9523 × 10^{-6}, resp. In an inert atm., alc. I and $Co(OAc)_2$ ppt. the violet-red *cobaltous salt*, $Co(C_8H_8O_2N_2)_2$, χ_M and χ_A 1525 × 10^{-6} and 1719 × 10^{-6}. It is difficult to filter and its aq. solns. tend to turn dark and decomp., so that it can be obtained pure only with great difficulty. The progressive decompn. was followed by analyses and magnetic measurements. All products analyzed to the point where the Co·N ratio was 1:2.98 were highly paramagnetic and therefore the product is not $[Co^{+++}(DP)(DPH)]$ or $[Co_2^{+++}(DP)_3]$, but is probably a cobaltous-cobaltic salt. *Derivs. of* II.—II (20 g.) and 15 g. $CoBr_2$ in abs. EtOH, exposed to air for 2 hrs., 66% aq. HBr (100 cc.) added dropwise (cooling), the ppt. dried *in vacuo* over KOH and purified by C_6H_6, yield the green *bromide*, $[Co(C_{10}H_2O_2N_2)_2Br_{1.5}(OH)_{1.5}]H$ (XI), χ_M and χ_A at 20°, −105 × 10^{-6} and 164 × 10^{-6}, resp. Its concd. alc. solns., dild. with cold water, ppt. a compd. $[Co(C_{10}H_9O_3N_2)_2Br_{1.5}(OH)_{1.5}]$ (XII), χ_M and χ_A at 20°, −105 × 10^{-6} and 164 × 10^{-6}, resp. Its concd. alc. solns., dild. with cold water, ppt. a *compd.* $[Co(C_{10}H_9O_3N_2)_2BrOH]H$, perhaps $[Co(MBH)_2(H_2O)_2]Br$ or a partial hydrolytic product $[Co(MBH)_2Br(OH)]H$. Its χ_M and χ_A values at 20° are −165 × 10^{-6} and 92 × 10^{-6}, resp. Aq. XII, boiled for 1 hr., ppts. a yellow *hydrated cobaltic compd.*, $Co_3(C_{10}H_9O_3N_2)_3.6H_2O$ (XIII). A similar compd. (XIV) is obtained by pptn. from a soln. of XII in dil. NaOH by dil. AcOH. Anhyd. compds. could not be prepd., since at 80° XIII and XIV decomp. XIII and XIV are diamagnetic. The general results of the previous expts. and those described in the present paper can be correlated best by reference to the accompanying schematic outline of the reactions and products.

C. C. Davis

Racemization of optically active coördination compounds. Application of the Arrhenius equation. E. Bushra and C. H. Johnson. *J. Chem. Soc.* 1939, 1937–45. —Optically active forms of $[Cr\ en\ (C_2O_4)_2]^-$ (I) were prepd. and the rates of racemization of I, $[Cr(C_2O_4)_3]^{---}$ (II), and $[Co(C_2O_4)_3]^{---}$ (III) were investigated at several temps. in water and in aq. Me_2CO. Inversion occurs through intramol. rearrangement of the coördinated radicals. In the aq. soln. at 18° the rate of inversion of II was nearly 20 times as fast as that of III, the values of E being 15.75 and 26.0 kg.-cal., resp., and of log PZ 8.05 and 14.5, resp. Univalent cations at high concns. accelerate the racemization of II and III, but not of I. Multivalent cations at low concns. accelerate the racemization of I and II, but not of III, and this effect is even more pronounced with respect to II in aq. Me_2CO. W. B. K.

Studies on the catalytic oxido-reduction of some metallic complex salts. XII. Catalytic oxidation of pyrogallol by the complex salts of platinum group. Syoitiro Kawakubo. *J. Chem. Soc. Japan* 60, 1031–6(1939); cf. Yamasaki, *C. A.* 30, 7019⁴.—Generally, the ammine complex salts of Pt, Pd, Rh and Ru have no catalytic action; some of them even show retarding action. The catalytic action of metallic complex salts depends on their constitution and on the nature of the central metal. **XIII. Reduction of quinone by hydrogen in the presence of [Pd en]Cl₂.** Yuzi Sibata and Eizi Matumoto. *Ibid.* 1173–6.—$[Pd\ en]Cl_2$ accelerates the catalytic reduction of quinone. If the absorbed quantity of H is expressed by C, and time by t, $K = C/\sqrt{t}$ gives a const. value for each expt.

T. Katsurai



(1) Paramagnetic μ_{eff} = 3 spinning electrons
(2), (3), (4), (6), (7), (8), (9), (10), (11) Diamagnetic
(5) Paramagnetic μ_{eff} = 1 spinning electron
(12), (13), (14), (15) Paramagnetic μ_{eff} per 3 Co − 3 electron spin

A new class of ammines of the thiostannate complexes. G. Spacu and A. Pop. *Bull. sect. sci. acad. roumaine* 21, 52–61 (1938–39).—See *C. A.* 33, 7689⁶. J. E. D.

A new class of complex ammines belonging to the group of iron and cobalt dinitrosothiosulfates. G. Spacu and C. Gh. Macafovici. *Bull. sect. sci. acad. roumaine* 20, No. 6, 1–11(1938).—See *C. A.* 33, 7690¹. J. E. D.

Studies of ionization in nonaqueous solvents. II.

The formation of certain ammines. Wm. L. German and R. A. Jamsett. *J. Chem. Soc.* **1939**, 1337–41; cf. *C. A.* **32**, 8294[9].—The reactions between salts and NH_3 in solns. in MeOH and in EtOH resemble those between solid salts and gaseous NH_3 rather than those that occur in aq. salt solns. with ammonium hydroxide. The compn. of the compds. formed was obtained by cond. titrations in the nonaq. solvents. The following compds. were found in MeOH: $Ag(NH_3)_2NO_3$, $Cu(NH_3)_2Cl_2$, $HgCl_2.2NH_3$, $CoCl_2.2NH_3$, $Cd(NH_3)I_2$, $CaCl_2.2NH_3$, and $Ni(NH_3)_2Cl_2$. The following compds. were found in EtOH: $Ag(NH_3)_2NO_3$, $Cu(NH_3)_2Cl_2$, $HgCl_2.1.5NH_3$, $CoCl_2.2NH_3$, $Cd(NH_3)_2I_2$, $CaCl_2.2NH_3$ and $Ni(NH_3)Cl_2$. 1

Kenneth H. Slagle

A study of complex compounds of platinum and complex amines. A. M. Rubinshtein. *Compt. rend. acad. sci. U. R. S. S.* **24**, 559–61(1939)(in English); cf. *C. A.* **33**, 6744[4].—K_2PtCl_4 and 5-iodo-2-aminopyridine (= iampy) in alc. slowly deposit a green ppt. of $PtCl_2.2iampy$, which when dissolved in C_5H_5N (= py) and heated 30–60 min. on the water bath gives a yellow ppt. of $PtCl_2.2py$. The latter compd., when heated on the water bath with thiourea (= th), and the resulting material acidified with HCl, gave 2th.2py. $PtCl_2$, which according to Kurnakov's rules, indicates that $2py.PtCl_2$ and $PtCl_2.2iampy$ have trans configurations. $PtCl_2.2C_5N_2H_6$, produced from α-aminopyridine and K_2PtCl_4, when treated with C_5H_5N, gives $(C_5N_2H_6)_2.2py.PtCl_2$ (I); this agrees with Jörgensen's rule. I and K_2PtCl_4 give grayish pink $[(C_5N_2H_6)_2py_2Pt].PtCl_4$. When Cl_2 is passed through a soln. of I, insol. red $[(C_5N_2H_4Cl_2)_2.2py.Cl_2Pt].Cl_2$ is formed. The elec. cond. of solns. of I indicates a tetrammine structure. I after prolonged heating with concd. HCl gives yellow $C_5N_2H_6.py.Cl_2Pt$. Thus, in $PtCl_2.2iampy$ the 5-iodo-2-aminopyridine is attached to the Pt through I, and not through N as in the case of the α-aminopyridine-Pt complexes. 2

George Ayers

The action of pyridine and of ammonia on certain complex amines containing benzidine. G. Spacu and C. Gh. Macarovici. *Bull. sect. sci. acad. roumaine* **20**, No. 8–10, 11–23(1938).—See *C. A.* **33**, 7689[3]. J. E. D.

Abeggs Handbuch der anorganischen Chemie. Die Elemente der achten Gruppe des periodischen Systems. Tl. 4. Nickel und seine Verbindungen. Leipzig: S. Hirzel. 310 pp. M. 40. Cf. *C. A.* **32**, 5324[7]. 3

Gmelins Handbuch der anorganischen Chemie. Ergänzungsband 1. Tl. 2. Aluminumlegierungen Patentsammlung. Berlin: Verlag Chemie. Cf. *C. A.* **33**, 4544[8].

Gmelins Handbuch der anorganischen Chemie. System-Nr. 68. Platin. Tl. A. Lfg. 2. Vorkommen. 165 pp. M. 19.50. Tl. B. Lfg. 2. Physikalische Eigenschaften des Metalls. 107 pp. M. 12.75. Tl. B. Lfg. 3. Electrochemisches Verhalten des Metalls. 81 pp. M. 10.50. Berlin: Verlag Chemie. Cf. *C. A.* **33**, 4154[4] 4

7—ANALYTICAL CHEMISTRY

W. T. HALL

Preservation of solutions for use in chemical analysis (sodium hypochlorite, ammonium molybdate and soluble starch). Hidehiro Goto, Ryozi Takeno and Tadasi Ikeda. *J. Chem. Soc. Japan* **60**, 945–8(1939).—0.1 *N* NaClO obtained by leaching bleaching powder with Na_2CO_3 soln. can be kept without change in a dark bottle; only 0.2–0.7% decompn. results after 1 year. A soln. which is 5 *N* in HNO_3, 3 *N* in NH_4NO_3 and contains 2.5% com. NH_4 molybdate can be kept without decompn. for at least 3 years. To preserve the starch soln. used in iodometry, a little HgI, CS_2, HCl or salicylic acid should be added. 5

T. Katsurai

The application of electrodeless ring discharge in high-frequency magnetic field for the spectral analytical search for traces. E. Fenner. *Spectrochim. Acta* **1**, 164–7 (1939).—Traces of Cd in Se and of Hg in gases which were too small to be detected in conventional spark or arc spectra were recognized when samples were inclosed in a tube inserted in a solenoid of 6 turns fed by a high-frequency current of 6 m. wave length. In like manner traces of Se in other materials are revealed by the Se lines at 2164.3 and 2413.5 A. 6

W. F. Meggers

3,5-Dinitro-4-methylbenzazide as a reagent for the identification of amines. Peter P. T. Sah. *Rec. trav. chim.* **58**, 1008–12(1939)(in English).—The use of 3,5-dinitrobenzazide (I) was extended to the identification of amines. Fifty amines were tested and the characteristics of their condensation products with I were obtained. The method consisted of refluxing I with an equiv. of the amine in anhyd. toluene and allowing the soln. to remain in the cold overnight. Primary amines gave the best results while secondary gave some difficulty owing to their greater soly. in C_6H_6 and toluene. The use of ligroin for recrystn. in the latter case gave better results. 7

J. C. Lo Cicero

***m*-Nitrobenzazide as a reagent for the identification of phenols.** Peter P. T. Sah and Tsu-Fen Woo. *Rec. trav. chim.* **58**, 1013–17(1939)(in English).—*m-Nitrobenzazide* (I) which on heating gives the isocyanate was made to condense with 33 phenols in boiling ligroin giving the corresponding urethans the phys. properties of which, i. e., soly., crystal structure and m. p., were obtained. 8

J. C. Lo Cicero

Polarographic determination of aluminum in magnesium alloys. B. A. Heller and A. M. Zan'ko. *Zavodskaya Lab.* **8**, 1030–2(1939).—Dissolve a 0.2–0.5-g. sample in a min. excess of 2 *N* HCl, cool, add a soln. of bromophenol blue, neutralize carefully at first with milk of lime until the yellow color begins to change to yellow-green and then neutralize completely with a satd. soln. of $Ca(OH)_2$ to the bright green color of the reference soln. (buffer soln. with a pH of 3.3, colored with bromophenol blue). When artificial lighting is used, the end of the reaction is detd. by the change of the yellow-green color of the soln. to a brown-green coloration. The soln. is then dild. to 100 ml., poured into an electrolyzer, and polarographed, starting with 1.4 v. The milk of lime should be prepd. from thoroughly ground $CaO(Ca(OH)_2)$. The procedure lasts 20 min. and is applicable for detg. Al in Mg alloys contg. up to 10% Al. The errors ranged up to 5–6%. 9

B. Z. Kamich

Determination of small amounts of antimony in mercury ores. M. Ya. Shapiro. *Zavodskaya Lab.* **8**, 986–8(1939). —The procedure is suitable for detg. small amts. of Sb in Hg ores contg. Fe, As and Si. Heat a 1–2-g. sample in a Kjeldahl flask with 10–20 ml. concd. H_2SO_4 until the supernatant liquid becomes clear, transfer the contents to a 200-ml. flask, dil. to the mark with a soln. of 10% H_2SO_4 contg. 1% tartaric acid, and filter. A 10–20 ml. portion of the clear filtrate is retained for colorimetric tests. To a Nessler tube add in the order given 10 ml. of a 0.5% gelatin soln., 5 ml. of 10% KI soln., 1 ml. of 10% pyridine soln., 1 ml. of H_2SO_3 (1.3), 60 ml. of H_2SO_4 (1:3), and 10 or 20 ml. of the test soln. To another Nessler tube add these same solns. 10 or 20 ml. of 10% H_2SO_4, and enough of an Sb soln. to give the same coloration. The Sb soln. contains 0.1 mg. Sb per ml. The method is applicable for detg. 0.03–3% Sb in ores contg. up to 8% Hg, up to 10% Fe, and up to 5% As. The detn. requires 2.5 hrs. 10

B. Z. Kamich

Activation of zinc in the determination of small amounts of arsenic. K. B. Khait. *Lab. Prakt.* (U. S. S. R.) **14**, No. 8, 22–6(1939).—Min. amts. of $CuSO_4$ which cause no losses of As during the activation of Zn were not over 1.88 mg. of Cu per 2 g. of Zn. In such amts. $CuSO_4$ can be used as an activating substance and complete conversion into AsH_3 is accomplished. A $PtCl_4$ soln. cannot be used as an activator of Zn because (up to 90%) As is adsorbed by the spongy Pt which covers the surface of Zn. A fu-

sion of Zn with $MgCl_2$ followed by its granulation was found to be a good activating substance for Zn. Add 1–1.5 wt. % of anhydrous $MgCl_2$ to fused metallic Zn and pour the liquid mass into cold water. Such granulated Zn causes no losses of As in the analysis. Three plots, 4 tables and 6 references are given. W. R. Henn

Estimation of arsenic. Paul Nitsche. *Pharm. Zentralhalle* **80**, 701–6(1939).—Four procedures are described but for org. substances such as *must, wines, bones, hair,* parts of *cadavers,* etc., it is recommended to destroy org. matter in the wet way and then carry out a modification of the Gutzeit tests. Full details are given for detecting as little as 0.5 γ of As. A 5% soln. of $HgBr_2$ is recommended for impregnating the paper upon which the stain is to be produced and the generator is kept in a bath of cold water. W. O. E.

Note on the use of nephelometer for the routine determination of traces of arsenic by Bougault's method. Jacques Thuret. *Ann. fals.* **32**, 328–30(1939).—Bougault's method consists essentially in reducing oxygenated As compds. in HCl soln. by means of hypophosphorous acid. The resulting turbidity can be measured with the nephelometer by comparison with standard solns. treated similarly. The standards, however, are not stable, even if stabilized by the addn. of gum arabic, and must be prepd. daily. The following procedure gave turbidities which showed no change after 1 month: dissolve 2.5 g. borax in 150 cc. distd. H_2O, add 1 g. powd. rosin, heat 15–20 min. with const. stirring, continue stirring while allowing to cool, and dil. to obtain the desired series of turbidity standards. A. Papineau-Couture

Studies of gravimetric analysis by means of the thermobalance. XXI. Determination of calcium, lead and thorium as picrolonate and of phosphorus, palladium, columbium, zirconium, gold, beryllium, tantalum and silicon by the oxine method. Tosiyasu Kiba and Tadasi Ikeda. *J. Chem. Soc. Japan* **60**, 911–14(1939); cf. Goto, *C. A.* **28**, 4331⁹.—The proper temps. of drying as detd. by the thermobalance are: Ca picrolonate octahydrate < 40°, hemihydrate 150–75°, anhydride 200–30°; Pb picrolonate sesquihydrate < 140°, hemihydrate 220–60°; Th picrolonate < 35°, anhydride 160–80°; oxine phosphomolybdate dihydrate 115–35°; Pd oxine 120–40°; Cb_2O_5-oxine 110–30°; Zr oxine 115–50°; metallic Au > 700°; BeO > 880°; Ta_2O_5 > 450°; $SiO_2.12MoO_3$ 600–50°. **XXII. Determination of arsenic.** Yukito Yosida. *Ibid.* 915–17.—Proper drying temps. are: As_2S_3 < 200°, As_2S_5 < 130°, $MgNH_4AsO_4.6H_2O$ < 60°, $Mg_2As_2O_7$ 850–950°, Ag_3AsO_4 550–780°, $UO_2NH_4AsO_4.3.5H_2O$ < 60°, $UO_2NH_4AsO_4.H_2O$ 200–310°, $(UO_2)_2As_2O_7$ 620–80°, $BiAsO_4.0.5H_2O$ 160°, $BiAsO_4$ 450–550°. **XXIII. Determination of cobalt, copper, iron, vanadium, uranium, molybdenum, selenium, thorium and silicon.** Hisazi Kato, Hiraku Hosimya and Sigeharu Nakazima. *Ibid.* 1115–18.— The proper heating temps. for various compds. used in gravimetric detn. are: $CoNH_4PO_4.H_2O$ 105–70°, $Co_2P_2O_7$ > 600°, $CoSO_4$ 500–600°, Co_3O_4 800–900°, CuO 800–950°, Fe_2O_3 > 800°, V_2O_3 > 650°, U_3O_8 800–900°, Ag_2MoO_4 250–500°, $PbSeO_4$ < 280°, ThO > 780°, $SiO_2.12MoO_3$ 480–550°, SiO_2 > 900°. **XXIV. The rapid method of determining metals as complex compounds and the gravimetric evolution method by the use of various fluxes.** Kiyosi Tani and Harumi Hasimoto. *Ibid.* 1119–23.— The thermal decompn. of various complex salts of Cu, Ni, Co, Cd, Zn, Pb, Bi was studied with the thermobalance. The proper temp. for heating to const. wt. was detd. for each complex salt. The proper heating temps. for fluxes used in the evolution of gas were detd. **XXV. Determination of mercury.** Yukito Yosida. *Ibid.* 1124–6.— The proper heating temps. were detd. for various compds. of Hg. T. Katsurai

Determination of small amounts of cobalt in the presence of large amounts of iron. P. V. Faleev. *Zavodskaya Lab.* **8**, 381–9(1939).—Co in Cu-Ni ores contg. large amts. of Fe was detd. as follows: Heat a 1–10-g. sample with 10 ml. of concd. HCl until evolution of H_2S ceases, add 5 ml. HNO_3, evap. to dryness, and repeat evapns. with 5-ml. portions of HCl. Heat the residue with 5 ml. HCl, dil. with 50–60 ml. hot water, dissolve the salts, filter, neutralize the filtrate with potash, filter, and dissolve the ppt. in the min. amt. of 80% HOAc. To the soln. (not exceeding 100 ml.) add 7–8 ml. HOAc, and ppt. the Co as $K_3Co(NO_2)_6$. Allow to settle for 24 hrs. and filter. The ppt. contains only small amts. of Fe which are removed by dissolving and repptg. under the above conditions. Det. the Co by weighing the $K_3Co(NO_2)_6$. B. Z. Kamich

Determination of cobalt and nickel in "mixtures" and hard alloys (tungsten carbides). V. G. Shcherbakov. *Zavodskaya Lab.* **8**, 389–91(1939).—The following methods were used: (1) Calcine the sample to destroy carbides and oxidize the W and Co. Sep. the Co and Fe from the W by pptn. with NaOH. Dissolve the ppt. in HCl, ppt. the Fe with NH_3 filter and electrolyze the filtrate for Co. (2) Treat the sample with HF and follow this with dropwise addn. of HNO_3 to destroy carbides. Ppt. the Co and Fe with NaOH, add 2–3 ml. of 30% H_2O_2 or 0.5 g. NH_4 persulfate, and boil the ppt. and soln. for 10 min. Filter, dissolve the ppt. in HCl, ppt. the Fe with NH_3 and det. the Co in the filtrate by electrolysis. The method was also used for samples contg. Ni instead of Co, but in this case NH_4 persulfate was used as the oxidizer. B. Z. K.

Determination of gold in ores by the wet method. O. E. Zvyagintsev, V. A. Vorob'eva and S. K. Shabarin. *Zavodskaya Lab.* **8**, 909–10(1939).—The method is applicable to both sulfide and oxidized quartz ores. Sulfide ores are first treated with HNO_3, the Au is extd. with I_2 soln., then reduced and amalgamated with Hg. The amalgam is dissolved in HNO_3, the extd. Au is dissolved in aqua regia, and it is then detd. by the drop reaction on a filter paper impregnated with $HgNO_3$. The sensitivity of the method is 0.005 g./ton. B. Z. Kamich

Determination of iron in iron salts of organic acids containing phosphorus. C. F. Bickford, A. E. Jurist and W. G. Christiansen. *J. Am. Pharm. Assoc.* **28**, 1028–9 (1939).—The Fe is pptd. as sulfide in ammoniacal soln., dissolved in acid, the Fe^{++} oxidized, pptd. as $Fe(OH)_3$ and weighed as Fe_2O_3. Org. matter is usually destroyed first but in some cases it is unnecessary. Thus with Fe adenylate, $C_{10}H_{12}N_5O_7PFe$, contg. 13.93% Fe, the value 13.36–14.42% Fe was obtained after destruction of org. matter and 13.72–14.05% when analyzed directly. A. Papineau-Couture

Elimination of iron by means of cupferron in the colorimetric determination of lead by the dithizone method. Mme. M. L. Panouse-Pigeaud and H. Cheftel. *Ann. fals.* **32**, 296–301(1939); cf. *C. A.* **30**, 3849⁷.—In the detn. of Pb by the dithizone method, under certain conditions the interference of Fe cannot be overcome by the use of KCN. It has already been proposed to remove Fe with cupferron (Clifford, *C. A.* **32**, 5934⁸), but the excess of the latter remaining in the soln. interferes with the subsequent colorimetric detn. of Pb (also noted by Clifford in private communication to the authors). This is overcome by destroying the cupferron residue by heating. The method (technique described in detail) consists essentially in destroying org. matter by H_2SO_4-HNO_3-$HClO_4$, pptg. Fe with cupferron in an acid soln., extg. the ferric complex with $CHCl_3$, evapg. the aq. soln. (contg. all the Pb) to white fumes, taking up in water and extg. with dithizone in the usual manner. A. Papineau-Couture

Volumetric determination of lithium. I. T. Polyanichka. *Zavodskaya Lab.* **8**, 1052–4(1939).—The method depends on the conversion of Li^+, Na^+ and K^+ to normal carbonates by evapg. in the oxalic acid and heating the residue. In one portion the three carbonates are titrated with HCl to a methyl orange end point and in another portion the $Na_2CO_3 + K_2CO_3$ is detd. similarly after dissolving them in 50 ml. of EtOH which has been satd. with Li_2CO_3. B. Z. Kamich

The assay of mercury. J. Sandilands. *Analyst* **65**, 13–17(1940).—The proposed method consists in heating the sample with partly dehydrated HIO_3 which converts the Hg from ores or mercurials into HgI_2 which is made to condense in the cooled front end of the tube. The excess I_2 formed by decompn. of HIO_3 is then removed by treat-

ment with $Na_2S_2O_3$ and the excess of the thiosulfate, if an excess is used, by careful treatment with I_2 soln. The soln. of the HgI_2 is then made acid and HgS formed by introduction of H_2S. The ppt. is dried and weighed after filtering with a sintered glass crucible. W. T. H.

Determination of small amounts of nickel. V. M. Peshkova. *Zavodskaya Lab.* **8**, 921–5(1939).—Small amts. of Ni (not less than 0.2 mg.) in the presence of large amts. of Co can be detd. gravimetrically with dimethylglyoxime. Smaller amts. of Ni should be detd. colorimetrically. If the colorimetric detn. of Ni involves its sepn. beforehand, then the ppt. of the glyoxime Ni salt is dissolved in a very little 2–3 *N* HCl and the soln. is neutralized with ammonia which is added in slight excess. B. Z. Kamich

Photoelectric method of determining silicon in cast irons and steels. A. L. Davydov, B. E. Reznik and Z. M. Vaisberg. *Zavodskaya Lab.* **8**, 1033–8(1939).—Si in cast irons and steels contg. P was detd. colorimetrically using Si-Mo blue complex. The detns. were made with and without sepn. of the Fe. Both methods gave equal accuracy. For steels contg. 0.1–0.8% Si the error was 3–5% and for cast irons contg. 0.5–4% Si the max. error was 2–5%. The method is more accurate and reliable than that which is based on the yellow Si-Mo complex. B. Z. Kamich

Determination of vanadium in cast irons and slags with the aid of *p*-phenylaminobenzoic acid. V. V. Stepin. *Zavodskaya Lab.* **8**, 1039–40(1939). - *p*-Phenylaminobenzoic acid was successfully used as an indicator instead of *o*-phenanthroline in detg. V in cast irons and slags. The indicator is sensitive enough for the detection of 0.5 γ V. B. Z. Kamich

Electrophotometric determination of fluorine in aluminum salts. M. M. Raĭnes and A. I. Krupkin. *Zavodskaya Lab.* **8**, 399–404(1939).– As little as 0.01–2.0 mg. of F in alums and $Al_2(SO_4)_3$ was detd. colorimetrically with the photoelec. cell. Two methods were used. A $ZrCl_4$ soln. was colored with a salt of alizarinsulfonic acid and the bleaching effect of F^- measured or the color was produced from Ti^{++++} and H_2O_2 and bleached. The F^- was distd. from $Al_2(SO_4)_3$ by the Tananaev method (cf. *C. A.* **29**, 1741[7]) but FeSi was used in place of CO_2. B. Z. Kamich

Preliminary investigation of the determination of fluorine in lime. C. J. Kochler. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 83–7(1940).—The use of fluoride as preservative in *foods* and in *treating* public *water supplies* makes the detn. of F in lime important. Existing methods which might be applied are reviewed critically; a procedure of steam distg. H_2SiF_6 from a 20-g. sample with 100 ml. 60% $HClO_4$ and glass beads, and titrating successive 80-ml. portions of condensate mixed with an equal vol. of EtOH and buffered by NaOH + $CH_2ClCOOH$, in the presence of Alizarine S indicator, with standard $Th(NO_3)_4$ soln., is described. Since many successive portions of distillate are necessary before the removal of F is complete, a math. treatment of the data obtained from the second and third portions, to arrive at the probable total of the series, was attempted without very encouraging results when the amts. to be recovered varied widely. The study is to be continued. Thirteen references. C. J. Schollenberger

Polarographic and photocolorimetric determination of oxygen in water. A. M. Zan'ko, F. A. Manusova and A. D. Nikitin. *Zavodskaya Lab.* **8**, 937–40(1939).—A comparative study was made of the polarographic and colorimetric (with NH_3-Cu complex) methods for detg. O in water. Both methods give comparable results to 1 ml. When the O content is 1 to 0.1 mg. the use of the polarographic method involves various difficulties including the effect of temp., contact of the sample with the O of the air, and small height of the O waves. A colorimetric method based on the reaction of *o*-tolidine on Cu can be used if the O content is below 1 mg./l. (down to 0.01 mg./l.). In this method a part of the NH_3 soln. of Cu is evapd. until NH_4Cl begins to crystallize, the soln. is cooled, the crystals dissolved, 1–2 ml. of 0.3% gelatin and 0.5–1 ml. of 1% tolidine are added, the soln. is dild. with a satd. soln. of NH_4Cl, and the Cu is detd. colorimetrically. B. Z. Kamich

The determination and detection of small quantities of phosphorus by the quinine molybdate complex. John A. Street. *Australian Chem. Inst. J. & Proc.* **6**, 395–9(1939).—A new reagent, quinine molybdate, for the microdetection of P and its application to the rapid detn. of minute amts. of P contained in purified C_2H_2 are described. The method takes advantage of the fact that quinine can combine with the phosphomolybdate ion, forming an exceedingly voluminous ppt. which can be easily centrifuged and measured. Take 2–5 ml. of the soln. contg. about 0.1–0.3 mg. of P in a centrifuge tube and add 2 or 3 ml. of quinine molybdate reagent. After heating in boiling water for 5 min. place the tube in the centrifuge together with a similar tube contg. a standard soln. of phosphate which has been treated in the same way. Centrifuge these 2 solns. and measure their resp. vols. Rapid estn. within 5% accuracy is possible. In order to obtain such an accuracy in detg. the phosphine in crude acetylene contg. 0.01–0.03% phosphine, special tubes for the centrifuge were designed. The reagent consists of: (*a*) Ammonium molybdate soln. prepared according to Noyes (*Qualitative Chemical Analysis*); (*b*) 6 *N* HNO_3; (*c*) 20% quinine nitrate. Standard 0.002 *N* phosphate solns. were used for cylinder gas analysis and 0.02 *N* for crude gas. To prep. quinine nitrate, dissolve 20 g. of quinine dihydrochloride in 150 ml. of water, heat the soln. to boiling and add an excess of $(NH_4)_2CO_3$ soln. Filter and wash the ppt. Dissolve it in 50 ml. of 6 *N* HNO_3 and dil. to 100 ml. with water. A sensitivity of 0.003 in one drop is claimed with a practical limit of 0.01 per drop. The application of the method to the detn. of P in iron and steel is suggested. R. S.

Determination of phosphorus and its halides. O. D. Khalizova. *Zavodskaya Lab.* **8**, 940–3(1939).—Yellow P, $POCl_3$, PCl_3, HCl and Cl_2 in air are detd. with the aid of 4 absorbing systems: (1) The Cl and $POCl_3$ are absorbed in water, the Cl^- being detd. nephelometrically in 1/2 of the soln. and the H_3PO_4 colorimetrically in the second half by the Denigès method. (2) Absorption in 0.1 *N* $AgNO_3$ to det. the elementary chlorine nephelometrically. (3) Absorption in Br water followed by evapn. of the soln. and detn. of total P by the Denigès method. (4) Absorption in $AgNO_3$ soln., filtration through a Schott filter, and washing of the ppt. with 3% HNO_3 to dissolve any ppt. formed from PCl_3. The Ag_3P is then oxidized with Br water and the P is detd. by the Denigès method. From the above mentioned detns. it is possible to calc. the P, $POCl_3$, PCl_3, HCl and Cl_2 in the air. B. Z. Kamich

Polarographic analysis of white metals. Danilo Cozzi. *Ann. chim. applicata* **29**, 442–7(1939).—Details of methods for the polarographic analysis of alloys contg. Pb, Sn, Sb, Cu and Zn are given. A. W. Contieri

Polarographic determination of the alloying constituents in alloy steels. M. v. Stackelberg, P. Klinger, W. Koch and E. Krath. *Arch. Eisenhüttenw.* **13**, 249–62(1939).—See *C. A.* **33**, 8523[1]. M. Hartenheim

Quantitative spectral analysis of "hydronalium" alloys. K. E. Mann. *Spectrochim. Acta* **1**, 108–16(1939).—Zeiss app. and procedure are used in making detns. of Mg, Si, Mn, Fe and Cu in hydronalium alloys contg. 2–10 % Mg 0.8–1.2% Si, 0.2–0.3% Mn and Fe and Cu as impurities. Av. errors range from 0.6 to 4.8%. W. F. Meggers

Spectral analysis of magnesium alloys. K. A. Sukhenko and L. A. Alifanov. *Zavodskaya Lab.* **8**, 966–8(1939).—The following detns. can be made: Na from the lines Na 5889 A. and Fe 5914 A. for concns. of 0.005 to 0.02%, Ca from the lines Ca II 3933.6 A. and Fe I 3930 A. for concns. of 0.005 to 0.15%. For Fe the line Fe II 2382 A. was used and also Cu 2403 A. In detg. Fe the const. electrode was made of electrolytic Cu. The last pair of lines made it possible to work in the concn. range of 0.01 to 0.07%. B. Z. Kamich

Origin of the colors obtained in testing for alkali chlorates by the dry method. Armando D. del Boca. *Anales farm. bioquím.* (Buenos Aires) **10**, 88–108(1939).—When fused $KClO_3$ is partially reduced by wood charcoal in the presence of a trace of Fe compd. the residual salt mixt. is

purple or red because of formation of perferrate, K_2FeO_4. Continued heating at high temp. converts the K_2FeO_4 to green ferrate, K_2FeO_3. L. E. Gilson

Determination of barium sulfate in the lead plates of batteries. E. T. Vil'yamovich. *Zavodskaya Lab.* **8**, 1057–9(1939).—The $BaSO_4$ is converted into $BaCO_3$ by extensive leaching with Na_2CO_3, the Pb is then pptd. as Pb(OH)Br with KBr soln. in the presence of a slight excess of NH_3, the soln. is filtered, and the $BaSO_4$ is repptd. and weighed. Time required for a detn. is 7–9 hrs. and the error did not exceed 1.12%. B. Z. Kamich

Rapid determination of sulfate in the presence of large amounts of chromate. A. A. Babalova, L. E. Sabinina and P. S. Pil'nik. *Zavodskaya Lab.* **8**, 911–13(1939).—The method is applicable to solns. where the sulfate content is approx. known. A definite amt. of titrated $BaCl_2$ soln. in alc. is added to the unknown soln., the ppt. of $BaSO_4$ and $BaCrO_4$ is filtered through a Schott filter, the $BaCrO_4$ is dissolved in HCl, and the CrO_4 is detd. by a conventional method. The sulfate is calcd. from the amt. of $BaCl_2$ added and $BaCrO_4$ formed. Analysis takes 2–2.5 hrs. B. Z. Kamich

Automatic device for controlling the change from chromate to bichromate ions. S. S. Orlov. *Zavodskaya Lab.* **8**, 913–16(1939).—A description is given of an automatic signalling device for controlling the reaction $2CrO_4^{--} + 2H^+ = 2HCrO_4^- = Cr_2O_7^{--} + H_2O$. The set-up includes a pair of PbO_2-covered Pt gauze electrodes. One of the half-cells contains a standard soln. of $NaHCrO_4$ which contacts the soln. to be titrated by means of a porous glass plate. B. Z. Kamich

Iodometric determination of sulfites. M. V. Gapchenko. *Zavodskaya Lab.* **8**, 1064–5(1939).—To the test soln. add 2 *N* NaOH and an excess of 0.1 *N* I_2 soln., and after acidifying with HCl titrate with 0.1 *N* thiosulfate. The addn. of the sulfite to the I_2 or the I_2 to the sulfite had no perceptible influence on the results. The presence of NaOH impedes the oxidation of the sulfites by the oxygen of the air. B. Z. Kamich

Detection of gases used in warfare. A. Gigon and M. Noverraz. *Schweiz. med. Wochschr.* **69**, 859–60(1939).—An to be tested for gases used in chem. warfare is bubbled by means of an aspirating pump through a tube contg. 2 cc. of an alc.-H_2O soln. to which bromophenol blue has been added. The acid reaction of the war gas changes the color of the indicator. The method is a modification of Kling's technique (cf. *C. A.* **32**, 8034[8]). With chloropicrin as an example, it was found that (with breathing at a rate of 21. per min.) a concn. which produced a change in color in 1½ min. would be harmless even after prolonged inspiration of the gas, whereas a concn. which produced a color change in 1 to 2 sec. would be lethal after 10-min. respiration. Maurice M. Rath

Spectral analysis of solutions and minerals. A. K. Rusanov and V. M. Alekseeva. *Zavodskaya Lab.* **8**, 963–5(1939).—The intensities of the lines Na 5890.0 and 5895.9 A.—Cr 5787.98 A. and Li 6103.59 A.—Mo 6030.06 A. were measured to det. Na and Li. With a 2-ml. sample the Na can be detd. down to a concn. of 0.001% and Li to 0.003%. These elements can be detd. in the presence of other alk. metals with a probable error of ±4.6% for Li within the concn. range of 0.001–0.2% and ±4.3% for Na for the concn. range of 0.001–0.1%. B. Z. K.

Rapid determination of carbon dioxide in ammonium salts containing carbon. G. Zavarov. *Zavodskaya Lab.* **8**, 1061–3(1939).—The Winkler method for detg. carbonates is modified to make it applicable to solns. contg. NH_4 salts. The NH_4 group is removed with formalin and an excess of NaOH and the soln. is then analyzed by the Winkler method; the carbonate is pptd. with $BaCl_2$ and the excess NaOH is titrated with HCl. The procedure requires only 10–12 min. and is applicable to solns. contg. urea. Corrections should be made for the acidity of the formalin and for the CO_2 in the alkali. B. Z. Kamich

Galvanometric titration of strong acids. A. P. Sergeev. *Zavodskaya Lab.* **8**, 907–9(1939); cf. *C. A.* **32**, 4457[9].—The method of galvanometric titration was applied to strong acids. The control soln. used was neutral. The acids titrated were 0.2 and 0.001 *N* HCl and 0.2 *N* HBr. The results compare favorably with those obtained by titrating in the presence of phenolphthalein. B. Z. K.

Biochemical method of large-scale extraction of prussic acid in sorghum for breeding purposes. M. I. Smirnova and G. A. Katanskaya. *Compt. rend. acad. sci. U. R. S. S.* **24**, 592–5(1939)(in English).—One-g. aliquot of leaves was triturated with glass and a few drops of toluene in a porcelain mortar. The mass obtained was placed in a graduated flask and made up to 100 cc. with H_2O. The flask was corked tightly, allowed to stand at room temp. for 12 hrs. during which time the extn. and splitting up of the glucoside were taking place and the HCN was partly liberated. Then the contents of the flask were stirred and 5 cc. of the suspension was drawn off into a conical flask 60 mm. high and 20 mm. wide at the bottom. The flask was tightly closed with a cork which had a strip of picrate paper (4 mm. × 30 mm.) attached by means of paraffin. It was kept in the dark at room temp. for 48 hrs. Two flasks were loaded with each of the samples. The intensity of the color assumed by the paper was used to est. the HCN content by comparison with the results obtained from standard solns. contg. KCN and tartaric acid. A. H. Krappe

Determination of hippuric acid by colorimetry. Georges Denigès. *Compt. rend.* **209**, 972–4(1939); cf. *ibid.* **107**, 163(1888).—The method, specially suited for detg. hippuric in the presence of benzoic acid, depends on the formation of the red cochineal-like substance by the action of NaOBr on hippuric acid; a similar reaction does not take place with benzoic acid. To 5 cc. of a soln. to be tested, on a boiling water bath, add 2 cc. of NaOBr. aq., recently prepd. by adding 20 cc. H_2O and 1 cc. Br to 10 cc. of a 30% soln. of NaOH. Stir the mixt. for 30 sec. and then add 1 cc. $CHCl_3$ or 1.5 cc. Et_2O which dissolves the red substance. Remove the colored soln. and det. the hippuric acid by the depth of color. The method is sensitive to 0.5 g./l. The NaOBr can be replaced by NaOCl but the color is more yellow and the test is less sensitive. C. A. Silberrad

Determination of silicic acid in aluminate solutions containing chromium and fluorine. K. A. Vasil'ev and O. D. Barinova. *Zavodskaya Lab.* **8**, 916–20(1939).—Acidify the sample with 20% H_2SO_4, heat to dissolve, and cool. If Cr is present it should be reduced. Then add 20–40 ml. ammonium molybdate, dil. to 300 ml., stir, and let stand for 15 min. Add 40 ml. HCl (1:1) and an excess of a titrated 1.2% soln. of 8-hydroxyquinoline, stopper and heat for 10 min. at 60–70° with periodic shaking. Cool, dil. to 500 ml. and stir. Filter, discard the first portions, and to a 100-ml. portion add 50 ml. H_2O, 60 ml. HCl (1:1) and 30 ml. of 80% oxalic acid, and titrate with 0.1 *N* bromide-bromate soln. in the presence of methyl red. B. Z. K.

Conductometric titration of sulfuric acid in a mixture of sulfuric and nitric acids. K. K. Savich. *Zavodskaya Lab.* **8**, 1059–61(1939).—The H_2SO_4 in mixts. of HNO_3 and H_2SO_4 was detd. by conductometric titration with benzidine-HCl after the mixt. had been previously neutralized with strong alkali. The elec. concd. decreases until all the H_2SO_4 is attached to the benzidine whereupon it makes a sudden jump. Best results are obtained when the HNO_3 and the H_2SO_4 are about 0.1 *N*. The benzidine-HCl soln. should be about 1%. Pt electrodes 1 sq. cm. and 5–6 mm. apart are convenient. During titration the electrodes become covered with benzidine hydrosulfate. B. Z. Kamich

Detection and determination of ortho-, pyro- and metaphosphate ions in their mixtures. B. Wurzschmitt and W. Schuhknecht. *Angew. Chem.* **52**, 711–15(1939).—A qual. method for *o-, pyro-, hexa-* and trimetaphosphate was developed on the basis of known reactions. The titrimetric detn. of pyrophosphate of Brizke and Dragunow was checked and improved by modifications. The method for detn. of phosphate ions in mixts. makes use of the selective extn. of phosphomolybdic acid (from *o*-H_3PO_4 and $(NH_4)_2MoO_4$) by means of org. solvents. The pyro-and meta-acid are not extractible. Total H_3PO_4 is detd. by the method of Lorenz and together with the above methods

permits the calcn. of the individual acids. Exptl. data and 6 references are given. Karl Kammermeyer

Microchemical determination of magnesium. P. Vukulov. *Zavodskaya Lab.* **8**, 494–5(1939).—The method is based on the vol. of HCl required to dissolve the $Mg(OH)_2$ ppt. First, ppt. the $Mg(OH)_2$ with excess 0.1 *N* NaOH, boil the soln. for 3 min., dil. to 100 ml. with water, filter, and titrate the filtrate with 0.1 *N* HCl, using Congo red indicator to det. approx. NaOH used to ppt. the Mg. To a portion of the test soln. corresponding to 1.1–1.2 ml. of 0.1 *N* NaOH, add NaOH in excess (0.1–0.2 ml.), 1 ml. distd. water, and 1 drop of Congo red, heat carefully to boiling, keep in boiling water for 3 min., and centrifuge. Neutralize the excess NaOH in the supernatant soln. with 0.1 *N* HCl, mix the $Mg(OH)_2$ ppt. with small amts. of 0.1 *N* HCl until a blue color is produced, heat the soln., keep in boiling water, and add more HCl to dissolve the ppt. completely. Titrate the excess HCl with 0.1 *N* NaOH. Any free acid or NH_4 salt in the soln. to be tested should be removed by titration to a pH of 3–5.2 and by gentle ignition. Differences between exptl. and actual values ranged from 0.000005 to 0.00003 mg./ml. soln. B. Z. Kamich

The use of perchloric acid in the digestion of plant materials. C. S. Piper. *Australian Chem. Inst. J. & Proc.* **6**, 421–7(1939); cf. *C. A.* **32**, 1608⁸.—HCl does not ext. completely the Mn, Fe and Cu from the ash of plant materials even when H_2SO_4 is used during the ashing process. The following digestion procedure makes treatment of the SiO_2 with HF unnecessary (in the detn. of Mn, Ca, Mg, Cu, Fe, phosphoric acid, etc.): To 1–5 g. of the plant material, dried 16–18 hrs. at 105°, add 4 ml. $HClO_4$ (sp. gr. 1.54) and 15–30 ml. HNO_3 (sp. gr. 1.42). Heat gently 3–5 min., and after the initial reaction has subsided, reduce to a vol. of 7–10 ml. (further reduction without addn. of H_2SO_4 often results in explosion); add 2–4 ml. concd. H_2SO_4 and reduce until dense fumes have been evolved for 5–10 min. Heat 2–3 min. further at a high heat. Certain detns. such as the estn. of Cu with diphenylthiocarbazone require 10–15 min. boiling after diln. of the digestion mixt. Solns. with pH values greater than 3–4 give interfering cherry-red colors with diphenylthiocarbazone in the detn. of Zn. George Ayers

Detection of urea in urine stains on carpets. G. N. Gee. *Analyst* **65**, 25–6(1940).—Expts. on carpets stained with human and animal urine showed that procedures depending upon the evolution of NH_3, the formation of biuret, color tests, liberation of N_2, etc., were unsatisfactory because of interference by the wool. Better results were obtained by extn. with EtOH and acetone followed by evapn. of the ext. and identification of the urea under the microscope. W. T. H.

Potentiometric titration of organic precipitates. VI. Determination of potassium, rubidium and cesium precipitated as their dipicrylamine complexes. Tosiyasu Kiba. *J. Chem. Soc. Japan* **60**, 1073–80(1939); cf. *C. A.* **32**, 5726².—By means of dipicrylamine, K, Rb and CS are pptd. The 6 nitro groups in the ppt. are titrated with Ti^{+++} soln. and the end point is detd. potentiometrically. T. Katsurai

Determination of allyl alcohol in the air. N. B. Baranov. *Zavodskaya Lab.* **8**, 931–2(1939).—Pass a definite vol. of air contg. the allyl alc. through 3 Petri tubes each contg. 15 ml. water, at a speed of 51./hr. The allyl alc. is usually absorbed completely in the first tube. Transfer the alc. soln. to an Erlenmeyer flask, add a definite vol. (10–25 ml.) of a bromide-bromate soln., then 40 ml. of a 10% H_2SO_4 soln., and allow the stoppered mixt. to stand for 15 min. Add 3 ml. of 1% KI soln., stopper, and after 15 min. titrate with 0.01 *N* $Na_2S_2O_3$. For 2 mg. allyl alc. the errors did not exceed 2% and for 0.1 mg. the error reached as high as 10%. The presence of MeOH in the air in amts. equal to that of the allyl alc. did not affect the detns., while an equal amt. of acetone increased the results slightly. Formaldehyde also increased the results slightly, but the errors were not higher than the exptl. deviations. B. Z. Kamich

Determination of acetone. Melvin W. Green. *J. Am. Pharm. Assoc.* **29**, 33–5(1940).—Of the 3 general methods for assaying Me_2CO (Hg-complex, oxime, and CHI_3 methods), the Hg method gives the lowest, the oxime method gives the highest, and both give variable results. The CHI_3 method gives more consistent values but they are too high, probably because a secondary reaction takes place. Ten rather than 5 equivs. of I are involved. A. Papineau-Couture

Analysis of acetylene-ethylene gas mixtures. Ya. T. Eidus. *Zavodskaya Lab.* **8**, 948–50(1939).—The C_2H_4 in C_2H_2 + C_2H_4 mixts. was detd. by absorbing the C_2H_2 in a Hempel tube contg. over 100 ml. of a soln. contg. 20 g. $Hg(CN)_2$ in 100 ml. of 2 *N* NaOH. Absorption of C_2H_2 was practically complete after 3 min. shaking while the vol. loss of C_2H_4 was 1.8%. The absorption of the C_2H_4 was 2.5–3 times slower than in an ammoniacal 2% soln. of $AgNO_3$. Diln. of the C_2H_2 with air or with an inert gas decreased the absorption of C_2H_2 during a 3-min. period. B. Z. Kamich

Potentiometric titration of glucose with alkaline tartrate solutions of copper, including Fehling's solution. H. T. S. Britton. *Analyst* **65**, 18–24(1940).—A series of potentiometric titrations gave results which were in agreement with the values obtained by Lane and Eynon, *C. A.* **17**, 1400, with methylene blue. The precise ratio of Na tartrate to $CuSO_4$ is not a matter of great importance although variations in the oxidizing effect of Cu on glucose are influenced by the alkali content. Na tartrate is just as good as Rochelle salt. The ease with which Cu_2O is reoxidized by the air in the vicinity of the end point shows that any attempt to use an outside indicator will lead to unreliable results. Detailed directions are given for carrying out the detn. W. T. H.

Isodihydroxycholenic acid. Specificity of the Hammersten cholic acid reaction. Kazumi Yamasaki, Kumao Takahasi and Chai Heung Kim. *J. Biochem.* (Japan) **30**, 239–46(1939).—Three isomeric dihydroxycholenic acids (3,12-dihydroxy-$\Delta^{7,8}$-cholenic, 3,12-dihydroxy-$\Delta^{8,14}$-cholenic and 3,12-dihydroxy-$\Delta^{8,9}$-cholenic) are formed from cholic acid in concd. HCl. The last (isodihydroxycholenic) is associated with the violet Hammersten color reaction. The isodihydroxycholenic acid is formed also when cholic acid is boiled in AcOH with $ZnCl_2$, $SbCl_3$ or $FeCl_3$. The original Yamasaki modification of the Hammersten reaction has certain disadvantages which are eliminated by the following procedure. A very small amt. of the test material is dissolved by warming in AcOH. Concd. HCl (3–4 drops) is added and the soln. is boiled carefully in a water bath until a slightly turbid soln. results. Left at room temp., the color changes from yellow to violet. The reaction is very specific. The color is affected by the side chain of the bile acid mol. The reaction is pos. for bile acids which contain a carboxyl on C_3 in addn. to 2 secondary alc. groups at C_7 and C_{12} as well as for 3-keto-7,12-dioxycholic acid. Bile acids like 7,12-dihydroxycholanic containing a secondary alc. or keto group at C_3 do not give the Hammersten reaction S. Morgulis

Detection and estimation of benzedrine. Edward T. Illing. *Analyst* **65**, 3–7(1940).—Benzedrine, or β-aminopropylbenzene, $C_{19}H_{13}N$, is allied to ephedrine and adrenaline. It diminishes gastro-intestinal activity, interferes with sleep and may cause pronounced psychological changes. It tends to abolish fatigue. A case of acute aplastic anemia followed the ingestion of 190 mg. in 19 days. Severe cardiovascular collapse resulted but the patient recovered. In the case of a sudden death due to hemorrhage in the cranium, an attempt was made to prove the presence of benzedrine in the viscera. Benzedrine is a liquid, slightly sol. in water, more sol. in EtOH and readily dissolved by acids, Et_2O, amyl, alc., EtOAc and $CHCl_3$. It is entirely volatile at 100° and appreciable loss results at lower temps. Benzedrine gives the general reactions for alkaloids. It is best detected by a modified Mohler test as was recommended for the detection of benzoic acid (cf. *C. A.* **26**, 2942). A purple color is obtained. A fairly stable color results if the following soln. is used as diluent. Take 40 ml. water contg. 2 g. KNO_3, add 20 ml. of concd. H_2SO_4 and then while cooling add 200

ml. of 7.5 *N* NH_4OH and 40 ml. of water contg. 0.8 g. of $NH_2OH.HCl$. As a rule it is convenient to dil. the final 15 ml. of test soln. to 50 ml. with the above diluent. 2–3 mg. of benzedrine in 50 ml. of soln. is convenient for matching the color obtained in the test. The benzedrine can be sepd. from viscera by the Stas-Otto process and the benzedrine extd. from the alk. soln. with $CHCl_3$. The acetate is appreciably volatile so that if acidification is required at any stage, tartaric acid is recommended. It is advisable to ext. a portion of the $CHCl_3$ ext. with HCl soln. to prove the presence or absence of benzedrine. The benzedrine salt can be treated with water and NaOH and the benzedrine distd. off in dil. HCl soln. after which the color test can be applied. The benzedrine content of medicinal tablets was detd. by 3 methods and satisfactory values obtained by the distn. procedure. W. T. H.

Examination and determination of 2-methyl-1,4-naphthoquinone. J. L. Pinder and J. H. Singer. *Analyst* **65**, 713(1940).—Samples should be tested by the m. p. The pure product m. at 106° but the lemon-yellow to light brown decompn. product has a m. p. of 235° and the methylnaphthalene, from which the methylnaphthaquinone is usually prepd. by oxidation with CrO_3, m. at 32°. The quinone can be estd. by means of its absorption spectrum. A satisfactory chem. assay can be based on the reduction to hydroquinone by means of $TiCl_3$ with the end point detd. by an internal oxidation-reduction indicator. Weigh out 0.2 g. of the sample, dissolve it in 10 ml. of MeOH and 15 ml. of AcOH. Add to the soln. 4 g. of Na_2CO_3 and 25 ml. of a 10% aq. Rochelle salt soln. Titrate with 0.1 *N* $TiCl_3$ with K indigosulfonate as indicator. A suitable colorimetric test can be carried out as follows: To 1–5 ml. of alc. soln. contg. 0.4–0.8 g. of the quinone, add 3 ml. of a mixt. of equal vol. MeOH and concd. NH_4OH soln. Add 3–5 drops of $NC.CH_2.CO_2Et$ and allow the mixt. to stand exactly 30 sec. Add 5 ml. of 6 *N* KOH soln., mix and allow to stand 15 min. out of sunlight. Dil. to 50 ml. and measure the absorption in the Hilger (Spekker) absorptiometer with a light blue No. 6 filter interposed. W. T. H.

Bromatometric determination of antipyrines. V. Madis. *Österr. Chem.-Ztg.* **42**, 290–3(1939).—The various methods employing I_2 and picric acid solns. for the analytical detn. of antipyrines are discussed. M. suggests a method using $KBrO_3$ soln. in the presence of $AuCl_3$ as indicator. The analysis is carried out as follows: Dilute a neutral antipyrine soln. to 40 cc. with H_2O and then add 10 cc. of 2 *N* HCl, 1 g. KBr and 1 cc. of 0.1% $AuCl_3$. Heat the mixt. to 40–45° and titrate with 0.1 *N* $KBrO_3$ soln. until a permanent yellow color results, which is the end point of the titration. The Br_2 freed during the titration adds on to the double bond of the antipyrine. The action of the indicator is as follows: The $AuCl_3$ is converted by KBr into $K[AuBr_4]$, which has an intense yellow color, but is immediately reduced by antipyrine to colorless $K[AuBr_2]$. A slight excess of Br_2 oxidizes the latter to a yellow complex of trivalent auribromide, the formation of which serves as the end point of the titration. The results obtained by this method are compared with those from Kolthoff's iodometric method. The method is applicable to the detn. of antipyrines in the presence of salts together with which it is usually prescribed. Antifebrin, caffeine, caffeine salts, phenacetin and salicylic acid do not interfere with the test, but the method cannot be used if pyramidon, quinine or codeine salts are present. E. J. Mahler

Photographic factors influencing concn.-calibration curve in quant. methods of spectrochem. analysis (Strock) **5**. Rapid processing of photographic plates for routine spectrographic analysis (Vincent, Sawyer) **5**. Spectrochem. analysis by step-sector method (Breckpot) **5**. Colorimetric micromethod for detn. of Na with Mn uranyl acetate (Leva) **11B**.

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8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Irregularities in the growth of crystals and lines on the faces of calcite. D. B. Gogoberidze. *Mém. soc. russe minéral.* **67**, No. 1, 1–5(1938); *Khim. Referat. Zhur.* **2**, No. 4, 36.—Irregularities in the growth of crystals are doublets, coarse mosaic structure, fine mosaic structure (Bragg and Compton), vicinals and combinations of lines on the faces of the crystals. W. R. Henn

Mineral identification by specific gravity. G. D. Van Arsdale. *Mining J.* (Phoenix, Ariz.) **23**, No. 11, 2-3 (1939).—The chem. compn., sp. gr., luster, streak and hardness of a no. of common minerals are tabulated and simple methods of detg. these properties, particularly sp. gr., in the field are described. Leopold Scheflan

Evidence of krypton in iodyrite. F. W. Hillis, R. C. McReynolds and Evelyn B. Feiring. *J. Chem. Phys.* **8**, 128–9(1940). G. M. Petty

Magnetic measurements on siliceous iron ores from Thuringia. Fritz Kutscher. *Beitr. angew. Geophys.* **7**, 350–6(1939).—Chamosite and thuringite ores have very low (almost no) magnetic properties as shown by measurements with the variometer. J. F. S.

Grain size and mineral analyses of pelites. Hans J. Harkort. *Sprechsaal* **72**, 530–1, 539–41, 547–8, 554–5, 561–4, 571–3, 579–83, 589–91(1939); cf. *C. A.* **33**, 7243⁷.—H. gives further details of his investigations. Sedimentation analyses are made with NH_4OH, Li_2CO_3 and $Na_4P_2O_7.10H_2O$. Classification was less than 2 microns, 2–5, 5–10, 10–20, 20–50 and more than 50 microns. Radiographs defined the minerals contained in these classes. Chem. analyses of the original minerals and of the particles under 2 microns and results of the sedimentation analyses are given for 3 Swiss clays, a mica sand and a kaolin sand. A radiographic examn. of colloid mineral particles taken from a source independent of the sedimentation analyses is added. J. M. Noy

Chemistry and our [Peru] mineral and metalliferous deposits. Frederico G. Fuchs. *Informaciones mem. soc. ing. Perú* **39**, 300–19(1938).—A review. Katharine Reinau

Mines and minerals of New Hampshire. Harold M. Bannerman. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 4–14(1939).—A survey of early mining activities, the occurrence of Cu, Pb, Zn, Ag, Au, feldspar, mica, etc., and the New Hampshire mineral industry. L. Scheflan

Stibnite deposit of Buzeins (Aveyron). Henri Vincienne and Julien Durand. *Compt. rend. soc. géol. France* **1939**, 224–5.—The stibnite occurs in a narrow (4–5 mm. wide) fissure in a very micaceous arkose contg. a little altered feldspar, some tourmaline and in places layey or phyllitous beds. The stibnite is generally well

crystd. but in places is altered to oxide or oxysulfide. No gang is present, only a little pyrite. The neighboring sandstone is in places impregnated with a brownish black material identified as kermes. The occurrence is connected with an intrusion of basalt, and was probably formed as a sublimate from the magma. It is of no economic importance. C. A. Silberrad

Philippine chromite. Dean F. Fraschie. *Mining Congr. J.* **25**, No. 12, 22–7(1939).—The occurrence and production of chromite ores in the Philippines are described. Leopold Scheflan

Mitchell's marble mountain. B. Bartholomew. *Mines Mag.* (Colo. School of Mines) **30**, 9–11(1940).—A description of marble mining in Colorado with a report of chem. analysis of Yule Colorado marble. L. Scheflan

Phosphate in Utah. J. Stewart Williams. *Utah Agr. Expt. Sta., Bull.* **290**, 44 pp.(1939).—Deposits totaling about 1,741,000,000 tons of rock phosphate of at least 40% quality are described. They contain F 0.2–3.08, Fe_2O_3 0.66–1.96 and Al_2O_3 0.72–2 56%. C. R. F.

Mineralogical composition of sands of the western Grand Erg (Sahara). Pierre Bellair. *Compt. rend. soc. géol. France* **1939**, 212–14; cf. *C. A.* **33**, 1242[1].—Examn. of addnl. collections of these sands confirms previous results, and shows that between Laghouat and El Golea the heavy constituents (of which zircon, tourmaline and ilmenite-magnetite form 95%) are most abundant at the bottoms of valleys, and from their appearance seem to have passed through at least one sedimentary cycle. South and southwest of El Golea, and especially beyond Timimun, the heavier constituents, especially zircon, diminish in quantity, being replaced by garnets, squarish tablets of dolomite usually with a blackish central spot, and further west grains of apatite. C. A. Silberrad

Bibliography of geology, mineralogy and paleontology of the Argentine Republic (including the American Antarctic). VIII. 1936, 1937 and 1938. Enrique Sparn. *Bol. acad. nacl. cienc. Córdoba* **34**, 227–336(1939); cf. *C. A.* **31**, 8445[8]. Katharine Reinau

Petrology of the Tertiary older volcanic rocks of Victoria. A. B. Edwards. *Proc. Roy. Soc. Victoria* **51**, 73–96(1939).—A detailed discussion including tabulations of the chem. compn. of the older volcanic basalts. 54 references. Leopold Scheflan

Resorbed feldspar in a basalt flow. Carl Fries, Jr. *Am. Mineral.* **24**, 782–90(1939).—The basalt appears to have picked up some andesine, partially resorbed it, and then pptd. more calcic plagioclase, preserving the andesine remnants as cores. C. H. Hale

The characteristics of quartz veins of Verkhnyaya Selemdzha. G. P. Volarovich. *Mém. soc. russe minéral.* **67**, No. 1, 133–9(1938); *Khim. Referat. Zhur.* **2**, No. 4, 38(1939).—Quartz veins of 2 different ages are described. The older veins form a net of lenses which have a distinct borderline with the contg. rocks and no sign of metasomatosis. Sericite, muscovite, chlorite, the carbonates of Ca and Fe and rare crystals of pyrite are assocd. with the quartz. No Au was found. The new quartz formations are in the form of irregular, branching veins. In contrast to the older formations a metasomatosis of the xenolites of the contg. rocks is observed. Assocd. minerals are calcite, siderite, sericite, chlorite, orthoclase, sagenite, arsenopyrite, scheelite, antimonite, galenas, pyrite, sphalerite and chalcopyrite. The young quartz veins contain Au. W. R. Henn

The volcanic chain of western Cameroons. Bernard Gèze. *Compt. rend. soc. géol. France* **1939**, 219–20.—The lavas of Mt. Camerun vary from limburgites to labradorites, with occasionally some scattered trachyte. Little Mt. Camerun (Etinde) consists of rocks rich in leucite and nephelite—*etindite*. Further N. N. E. Mts. Manenguba and Bambuto consist of trachyte, andesite and basalt, the older parts of which, as also those of Etinde, are in places lateritized. C. A. Silberrad

Granite pegmatites of the Mt. Antero region, Colorado. Geo. Switzer. *Am. Mineral.* **24**, 791–809(1939).—Numerous Be-rich pegmatites and veins occur in a granite stock near Mt. Antero. The temp. apparently ranged from approx. 600° as shown by formation of low-quartz as the 3rd mineral (after microcline and beryl) of the pegmatite, to less than 200° as shown by the formation of fluorite after adularia in the hydrothermal veins. S. describes twinned octahedra of fluorite and gives a new angle table for bertrandite. C. H. Hale

The breakdown of the molecules in magma as a factor in its differentiation. Yu. A. Bilibin. *Compt. rend. acad. sci. U. R. S. S.* **24**, 783–5(1939) (in French).—The simplification of the mols. in the course of their breakdown in the magma can be reduced to 2 chief types: loss of a certain quantity of Si and breakdown of the mols. of the feldspar type into simpler complexes. The breakdown of the mols. affects the differentiation of the magma and its products in 2 ways: (1) some constituents of the mols. may be eliminated in the initial stages of crystn. and (2) in the deep magmatic centers at high temps. the breakdown of the mols. occurs prior to crystn. At the cooling of the marginal layers, an assocn. of certain mols. follows under the following conditions: the cooling rates must lie within certain limits, the breakdown temp. in the compd. must lie within the temp. limits of the magmatic center that is cooling and the diffusion velocities of the different constituents of the decompd. mols. must be sufficiently different. A. H. Krappe

Crystallization in the magmatic rocks of Persia. Emanuel Christa. *Mineralog. petrog. Mitt.* **51**, 172–260(1939).—Detailed petrographic data on the lavas which are characterized by alkali feldspars with a discussion of miscibility in the system albite–orthoclase–anorthite. An analysis of trachyte is included. J. F. Schairer

Petrographic observations on the rocks from Persia collected by A. Gabriel. A. M. Sedlacek. *Mineralog. petrog. Mitt.* **51**, 261–93(1939).—Microscopic data on plutonites and metamorphic rocks from the deserts of eastern Persia. J. F. Schairer

The eruptive rocks from Lainzer Tiergarten in Vienna. Alexander Kohler and Arthur Marchet. *Mineralog. petrog. Mitt.* **51**, 102–40(1939).—Two series of extrusive volcanic rocks are described including many basic tuffs and a contact rock. J. F. Schairer

Metataxis and metablastesis in the migmatites of the northwestern Thuringian Forest. Werner Koch. *Mineralog. petrog. Mitt.* **51**, 1–101(1939).—Ortho- and para-rocks of many different mineral facies occur in Ruhlaer Sattel. The petrography of their alteration to migmatites is described. The relation of the migmatites to hybrid granites and palingenetic diorites is discussed. A chem. analysis of diorite is included. J. F. Schairer

Geochemical investigations of volcanoes in Japan. XIX. The randon content of mineral springs of Yahiko-Kakuda district. 1. Iwazi Iwasaki. *J. Chem. Soc. Japan* **60**, 999–1004(1939); cf. *C. A.* **33**, 8536[6].—The results of the detn. of the Rn contents in 20 hot springs in the Yahiko-Kakuda district are given. **XX. The influence of rain water on the density of the water from a fumarole. 1.** Sinya Oana. *Ibid.* 1005–7.—The vapor from the Ioyama, Hakone is condensed and its d. is detd. The d., in dry season, is found to be greater than that of tap water by 1.9 γ. When it rains the d. becomes smaller owing to diln. by rain water. From the results of the d. detn. the percentage compn. of the condensed vapor can be estd. **XXI. Density of mineral waters in the vicinity of Komagatake, Akita prefecture.** *Ibid.* 1008–9.—It is found that the higher the temp. of the mineral water, the greater the d. and the smaller the pH. It is suggested that the d. of magmatic water is greater than that of tap water. T. Katsurai

The Boxhole crater and Huckitta meteorite (Central Australia). C. T. Madigan. *Trans. Roy. Soc. S. Australia* **61**, 187–90(1937); *Neues Jahrb. Mineral., Geol., Ref. I*, **1939**, 718–19; cf. *C. A.* **33**, 5777[8].—In this crater Fe-stained shale and pieces of Fe were found, the latter being an av. octahedrite similar to that found in the Henburt crater (cf. Alderman, *C. A.* **26**, 4775). C. A. Silberrad

Apatites. M. P. Fiveg and A. P. Shubin. *O. N. T. I.*

(Moscow-Leningrad) 1938, 152 pp.; *Khim. Referat. Zhur.* 2, No. 1, 25(1939).—In the deposits of volcanic origin the concn. of the phosphates seldom occurs in commercially important quantities. The amt. of apatites in the Khibin deposits is estd. at 2 billion tons contg. 430 million tons of P_2O_5. The apatite ore after treatment in the Kirovsk plant gives a concentrate contg. 39.5–39.8% of P_2O_5. The waste products are used as fertilizers, or they can be made to yield (after an addnl. flotation) a nephelite concentrate for the production of the oxides of Al, Na and P and of cement. W. R. Henn

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9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Occurrence and uses of the rare metals. G. Berg. *Z. prakt. Geol.* **46**, 75–7(1938); *Neues Jahrb. Mineral. Geol., Ref. II*, **1938**, 554–5.- Hess's account of the production and uses of these metals (*C. A.* **32**, 1621[7]) is amplified. Addnl. details are given for Be, Cs, Rb, Ge, Ga, Zr, Co, Li, Mo, Pt, Pd, Rh, Se, Te, U, Ra, V, W, and Ilc. C. A. Silberrad

Roasting and cyanidation of arsenopyrite concentrates. J. A. Walker. *Chem. Eng. Mining Rev.* **32**, 122–4(1940).

Notes are given on the exptl. treatment of exceptionally high-grade arsenopyrite concentrates. Four lines of treatment were followed: (*a*) roasting of concentrate in air, (*b*) removal of As under N and subsequent roasting in air, (*c*) removal of As under SO_2 and subsequent roasting in air and (*d*) destruction of the Fe_2O_3 by soln. of calcine in acid. The calcine obtained was then cyanided. Each treatment is outlined. Conclusions include: (1) Roasting arsenopyrite concentrates in air, followed by cyanidation results in high-grade residues. (2) A high temp. "finish" improves the extn. of Au from the calcine. The removal of the bulk of the As under N, followed by roasting the resulting pyrrhotite in air gives calcine from which high Au extn. is possible, but in the plant such a method would be difficult to apply. The treatment that shows the greatest promise is oxidation of the concentrate under SO_2 to produce Fe_3O_4. This product is sol. in H_2SO_3 and the soln. of the Fe oxide leaves the Au free in the siliceous residue. This residue can be recovered by filtration and subsequently cyanided. W. H. Boynton

Cyaniding gold-copper ores. R. J. Lemmon. *Chem. Eng. Mining Rev.* **32**, 103–6(1939).—A brief review of past exptl. work on the extn. of Au by cyanidation from ores contg. Cu minerals. Details are given of the use of NH_4 salts in sepg. the Cu from the Au. If the excess NH_3 is not totally combined with some of the NH_3-sol. cupric salt, the free and uncombined NH_3 will dissolve the cuprammonium cyanides and the elimination of the salts from the Au soln. effluent prior to pptn. with Zn will not be effected. NH_3 can be supplied by stirring together lime and $(NH_4)_2SO_4$ soln. with 1 lb. pure $(NH_4)_2SO_4$ requiring 0.43 lb. slaked lime to yield 0.53 lb. of NH_3. Despite the complicated equations in the cuprammonium cyanide process, the working procedure is simple. W. H. B.

Canadian nickel, its history, production and uses. K. H. J. Clarke. *Eng. J.* **22**, 505–11(1939).—A review. C. G. F.

Instrumentation in production control in a Swedish acid open-hearth furnace. Sven-Erik Brundin and Johan Paues. *Jernkontorets Ann.* **123**, 441–82(1939).—Instrumentation is not generally applied in Swedish steel production because the furnace is fired with generator gas of variable compn. and difficult to analyze automatically. In a study made on a 17-ton furnace, the production time was reduced from 9 hrs. and 9 min. to 8 hrs. and 29 min. after installation of instrumental control without affecting the fuel requirements. H. C. Duus

Vanadium oxides in iron-refining slags. A. N. Morozov. *Metallurg* **14**, No. 1, 15–27(1939).—Petrographic and thermal study of the $CaO–V_2O_3$, $CaO–V_2O_4$, $CaO–V_2O_5$, $SiO_2–V_2O_3$, $SiO_2–V_2O_4$ and $SiO_2–V_2O_5$ systems showed the existence of the compds. $2CaO.V_2O_3$, $CaO.V_2O_3$, $CaO.V_2O_5$, $2CaO.V_2O_5$ and $3CaO.V_2O_5$. CaO does not form compds. with V_2O_4. SiO_2 does not combine with V_2O_3, V_2O_4 or V_2O_5. V_2O_5 and V_2O_4 are reduced to V_2O_3 by Fe at 1600–1650°. H. W. Rathmann

Nonferrous metallurgy 1920–1940. Frank Hudson. *Metallurgia* **21**, 37–9(1939). J. L. Gregg

Fuels and the metallurgical industry, with special reference to the iron and steel industry. Stacey G. Ward. *Proc. Staffordshire Iron Steel Institute* **54**, 44–66(1938–39); cf. *C. A.* **33**, 8545[8].—A lecture. G. T. M.

Developments in fatigue, creep, age-hardening, diffusion, microscopy, borocarbides, powders, electrodeposition and die castings. Frances H. Clark. *Mining and Met.* **21**, 18–23(1940). G. G.

Deformation and fatigue of metallic materials as detected by x-rays. Fritz Regler. *Forschungsarb. Metallkunde Rontgenmetallog.* No. **26**, 98 pp.(1939).—Deformation of metals causes both peripheral and radial broadening of x-ray diffraction spots. A no. of examples of peripheral broadening brought about by cold deformation and fatigue are shown. With moderate reductions the spots tend to merge to form lines and with increasing reduction the well-known fiber structures result. Wrought Fe members from an old bridge were examd. Some showed spots and others fibering. The significance of radial broadening is discussed. Measurements of this broadening indicated that radial line width tended to a max. characteristic of

the material, which was termed the "fracture line width." This was 6.30 mm. for pure Fe and as high as 7.80 for some alloy steels. On fractured fatigue specimens the line width rose slowly to a max. at the point of fracture. On notched specimens the width increased abruptly at the notch. The max. of the line width on materials subjected to fatigue but not fractured indicated the location at which fracture would ultimately occur. Measurements of the line width in and near welds indicated positions of stress concn. Several practical applications of radial broadening of x-ray lines are given. One is in reference to axles from an elec. locomotive in which one axle had failed. Broadening of the lines near a change in section indicated a point of dangerous stress concn. and that other axles would fail by fatigue. Others did, and the design was changed. Detailed directions for x-ray study of fatigue damage are given. J. L. Gregg

Radiographic development in the casting industries. Charles W. Briggs. *Metals & Alloys* **11**, 1–5(1940).—A historical review followed by a discussion of the importance of radiography to the designer and in mfg., and of its special application in the inspection of Al and steel castings. I. Hartmann

Flame hardening in the commercial heat-treating plant. W. G. Hamilton. *Heat Treating Forging* **26**, 23–5(1940).—The Gleason flame hardening machine is described and its application to the heat-treatment of large gears, cast-iron plungers, and internal cams is discussed. I. H.

Forgings for steam-turbine rotors. Hans Dahlstrand and H. J. Stein. *Heat Treating Forging* **26**, 9–15(1940).—An outline of present practice of making suitable forgings for steam-turbine spindles with special emphasis on the prepn. of ingots, forging, heat treatment, machining and special alloys developed recently for high-temp. operation. The latter include C-Mo-V, Ni-Mo, Cr-Ni-Mo alloys; their compn. and phys. properties are described. I. Hartmann

Influence of the degree of ammonia dissociation upon the nitrided surfaces. Yu. M. Lakhtin. *Aviapromyshlennost* **1939**, No. 10, 35–43.—Steel rods contg. C 0.33, Si 0.37, Mn 0.45, P 0.022, Cr 1.41, Mo 0.42 and Al 1.11% were nitrided for 24 hrs. at 520° under degrees of NH_3 varying from 5 to 90%. By increasing the degree of dissocn. up to 65–70% the hardness of the nitrided layer and the depth of N diffusion were not adversely affected. A higher degree of dissocn. produces large decreases in hardness of the nitrided layers and also in the depth of N diffusion. In the interval up to 45–50% dissocn. the microstructure of the nitrided layer did not change and at higher dissocns. the structure assumes a less differentiating character. No increase in brittleness was observed with increasing degree of NH_3 dissocn. B. Z. Kamich

The disposal of waste acids. W. W. Hodge. *Wire & Wire Products* **15**, 32–42(1940); cf. *C. A.* **34**, 6341.—A review of methods for the disposal and utilization of waste pickle liquor, including 19 references. George Ayers

Review of iron and steel literature for 1939. E. H. McClelland. *Heat Treating Forging* **26**, 28–33(1940).—The twenty-third annual review of iron and steel literature published separately in books and pamphlets. I. H.

A preliminary study of gases in cast iron. Wm. Y. Buchanan. *Foundry Trade J.* **61**, 423–4, 443–6(1939).—Existing knowledge is summarized and several brief abstracts are included. Exptl. work on dissolved gases, cast iron, rust treatment, mill-scale addn., etc., is described. Conclusions: (1) Sparking is said to indicate oxidation, i. e., gassy metal. This appears to be incorrect, as sparking occurs at high temps. and low Si range, whereas the gas vol. may be much greater in high-Si iron. (2) Fluidity and life must play an important part in the ultimate performance of the quantity of gas present as, for example, good castings can be had from high-P, or high-C, high-Si, medium-P iron even with excessive gas content, but the element of risk will always be present. (3) Moisture is the cause of most gas formation in cast iron. (4) Gas escaping rapidly through metal may to a certain extent delay freezing locally. (5) In high-duty irons the presence of gas is more severe than in low-grade irons, owing to the tendency to low fluidity and life in these irons. (6) Apart from the many causes of gas holes, dissolved gas must always be an addnl. contributing factor. (7) The permissible vol. of gas in molten cast iron can be established by some research. I. Hartmann

Ten years' progress in cast iron. J. G. Pearce. *Metallurgia* **21**, 41–2(1939). J. L. Gregg

Types of high-duty cast irons. A. J. Nicol Smith. *Foundry Trade J.* **62**, 51–2, 53(1940).—Two types of cast irons are considered: Those which have high strength properties, and "special irons," which are high-duty in respect to some other special property, such as corrosion resistance. Austenitic irons are the most important class of special irons; they have very good corrosion and heat resistance. Martensitic irons are wear resistant. High-Si irons have considerable heat resistance and good acid resistance, but are brittle and difficult to manuf. and machine. High-Cr irons have good corrosion and heat resistance; their mech. properties vary with the total C content. High-Al irons can be made with good mech. properties; they are very heat resistant, especially in oxidizing or sulfurous atms. I. Hartmann

Effect of sintering time, sintering temperature and pressure of compression on the mechanical properties of sintered iron. W. Eilender and R. Schwalbe. *Arch. Eisenhüttenw.* **13**, 267–72(1939).—A fundamental phenomenon of the sintering process is the occurrence of a sudden grain growth, which takes place for all grain sizes between 850° and 900°. This sudden growth is attributed to stresses within the crystal lattice, which are characteristic for the cold-deformed state. With increasing sintering temp. a rapid increase of strength is at first observed followed by a distinct drop in strength which however stops at higher temps. Increasing pressure increases tensile strength, elastic limit, elongation and density considerably. Sintering time increases tensile strength up to about 2 hrs.; after this the tensile strength remains const. Elongation increases steadily, and elastic limit shows a min. at about 30 min., but in general changes little with time. The sudden grain growth is not affected by the pressure. Sintering temp. has a very irregular effect on tensile strength, elastic limit, elongation and reduction of area, although the character of all these curves is fundamentally the same. From 500°, tensile strength increases rapidly to a max. at 800°, decreases to a min. at 1000° and increases again up to 1200°. M. Hartenheim

Progress in steel metallurgy during the last ten years. W. H. Hatfield. *Metallurgia* **21**, 33–5(1939).—A review in which new materials and new methods are briefly mentioned. J. L. Gregg

High-temperature steels. N. A. Minkevich and A. M. Borzdyka. *Metallurg* **14**, No. 1, 61–78(1939).—Steels contg. C 0.4, Cr 14.7, Mn 12.2, W 2.2 and Si 1.8% and C 0.4, Cr 14.1, Mn 13.6, Mo 3.1 and Si 1.65% were found satisfactory with respect to corrosion resistance and mech. properties for service at 850–950°. H. W. R.

Investigation of decarburization and oxidation of high-speed steel. N. M. Lapotyshkin. *Ural. Met.* (*Ural. Ind. Inst. im. S. M. Kirova*) **1938**, No. 11, 22–7; *Khim. Referat. Zhur.* **2**, No. 4, 96(1939).—High-speed steel (grade "R") contg. C 0.67, Mn 0.31, Si 0.36, Cr 4.3, W 18.22, and V 0.42% was used for the expts. Samples of this steel were heated to 1280°, held at this temp. and tempered. On heating the sample in the interval 700–1100° and holding it for 0.5–12 hrs., an increase of the temp. increases the degree of decarburization. The decarburized steel is rapidly transformed to normal steel at 950–1000°. At higher temps. a gradual transformation takes place. The greater the temp. the faster the ferrite zone appears. Heating in a neutral atm. effects min. decarburization; in an oxidizing atm. decarburization is max. With increase of temp. and time of holding of the steel, the loss of wt. increases, but the oxidation velocity decreases with an increase of the duration of holding. Holding at high temp. favors grain growth and formation of tube-type crystals in the decarburized layer. The results of the expts. are presented in the form of graphs,

diagrams and tables. Photographs of the microstructures are given. W. R. Henn

The critical cooling rate of steel. M. M. Zamyatnin. *Metallurg* **13**, No. 12, 29–38(1938).—Assuming Newton's law of cooling by conduction and the Stefan-Boltzmann radiation law, it is shown that the critical quenching rate of eutectoid steel is 200° per sec. at 900° for a specimen cooled solely by conduction and 600° per sec. for a specimen cooled solely by radiation. This difference is caused by the different form of the 2 cooling curves. Actual exptl. critical cooling rates are between the above values. H. W. Rathmann

The fatigue endurance of killed, capped and rimmed steels. J. F. McDowell. *Metals & Alloys* **11**, 27–32 (1940).—Killed, capped and rimmed steels of approx. similar chem. compn. and nearly identical phys. properties have been found to vary quite definitely in their ability to withstand stress reversals. The fatigue ratios (ratio of fatigue endurance to tensile strength) detd. are, resp., 0.50 for killed steels, 0.42 for capped steels and 0.37 for rimmed steels. In the calcn. of the limiting stress, cognizance of this fact must be taken when either of the latter two steels is involved. Skin decarburization is the cause of the low fatigue endurance of the rimmed and capped steels. Segregation of elements other than C away from the skin plays a minor role in the effect upon fatigue properties. I. Hartmann

The quality of steel in relation to hot-working properties. H. A. Dickie. *Proc. Staffordshire Iron Steel Inst.* **54**, 33–40(1938–39).—The steel compn. and the process of making inpurities and addns., affect the characteristics of hot-working of steel. Red shortness due to Cu may be minimized by addn. to the steel of Ni to the extent of about half the Cu content. G. T. Motok

Precipitation hardening of mild, unalloyed steels. H. Wilhelm and J. Reschka. *Arch. Eisenhuttenw.* **13**, 273–5 (1939).—Plain steels with 0.04–0.2% C were quenched in water from 650° and then stored at 18°; hardness and tensile strength were regularly tested over about 5 years. The hardness decreased after 100 days steadily up to 1500 days more or less according to C content, in av. 30–38%. This process is considered to be a kind of tempering effect, contrary to the effect of pptn. hardening, and seems to be dependent on temp. of storing. M. Hartenheim

Consideration on cast steels of high mechanical resistance. Georges Delbart. *Bull. assoc. tech. fonderie* **13**, 338–46(1939).—The primary structure, homogenization and final treatment of cast steel affect the mech. resistance. 9 references. G. T. Motok

Mechanical properties of rolled carbon steel at low temperatures. I. V. Kudryavtsev. *Vestnik Metallo-prom.* **19**, No. 3, 6–15(1939).—Various beam shapes made from low-C, open-hearth, Bessemer and Thomas steel were tested at temps. down to −70°. In lowering the temp. from 20° to −70° there was an increase in all cases of the tensile strength, yield point and relative elongation, with the yield point increasing much more rapidly than the tensile strength. The impact toughness was decreased. The results were not substantially affected by normalizing. For all steels the effect of riveting and subsequent aging was to reduce the impact toughness, open-hearth metal having the least decrease. For this steel the impact toughness was practically the same for the interval 20° to 0° both before and after aging, while for lower temps. the differences were not great. Bessemer steel had the largest drop in impact toughness, especially from 20° to 0° and the same was true for Thomas steel, but to a lesser extent. The hardness increased with decreasing temp. It is suggested that the serviceability of metals be judged from their impact toughness. B. Z. Kamich

Manganese in carbon steels. Bernard Thomas. *Metallurgia* **21**, 73–5(1940).—Two steels contg. 0.53 or 0.54% C, one with 0.67% Mn and the other with 0.81% Mn were tested in the form of strips 0.12 in. thick and thinner. They were tested by supporting each end and bending with a load applied at the middle of the specimen. Deflection at load and permanent set were detd. The steels were tested as-rolled, annealed and as quenched and tempered. Results were considered to prove that the 0.14% more Mn in the one steel greatly improved strength or "resilience." J. L. Gregg

The effect of special elements on the properties of chromium-silicon-vanadium high-speed steel. N. T. Gudtsov, A. N. Bekova, S. A. Kazeev and A. V. Polyakov. *Metallurg* **14**, No. 1, 51–61(1939).—Addns. of Mo (0.35–3.18%), Co (0.66–6.3%), Ti (0.12–0.38%) and a Cb-Ta mixt. (0.1–2.0%) were made to steel contg. C 1.0–1.2, Cr 10–13, Si 0.9–1.6 and V 2.0–2.5%. Mo and Ti improved the cutting properties; Co and the Cb-Ta mixt. showed no effect. Steel contg. 3.18% Mo was equal or slightly superior to a W 18, Cr 4 and V 1% steel. H. W. Rathmann

Properties and machinability of a leaded steel. T. J. Dolan and B. R. Price. *Metals & Alloys* **11**, 20–7(1940); cf. Robbins *C. A.* **33**, 9248⁵.—The usual static, impact and fatigue properties and the machinability of an ordinary S. A. E. 1045 steel, to which 0.20% Pb had been added, were studied. The steel was tested in 3 conditions, namely (*a*) cold drawn, (*b*) normalized and (*c*) quenched-and-tempered. In general the static phys. properties are very similar to those of an ordinary C (nonleaded) steel, and indicate that the addn. of a small amt. of Pb did not impair these properties in any way. The Charpy impact strengths of the cold-drawn samples are considerably lower than for the normalized and quenched-and-tempered specimens; all results are about in the range generally obtained for nonleaded C steel under similar testing conditions. The same is approx. true of the fatigue properties of the steels; the quenched-and-tempered leaded steel is highly "notch-sensitive." The relative machining qualities of these steels and of various other C steels and cast irons were evaluated by detg. the h. p. required to drill small holes in each metal in a special dynamometer drill press. The power required for the leaded steel specimens was lower than for any of the materials tested except for cast iron and for screw stock steel S. A. E. X1112. Economically the leaded steel is more expensive in initial cost, but the machinability tests indicate that in many applications a saving can probably be made in processing cost and in the general speeding up of production. 5 references. I. Hartmann

Hardenability of molybdenum S. A. E. steels. Robert M. Parke and Alvin J. Herzig. *Metals & Alloys* **11**, 6–13 (1940).—The hardenabilities of eight Mo-bearing S. A. E. steels, one Mn-Si-Mo steel, and one C steel were studied by obtaining their temp. *vs.* isothermal-reaction-time curves (S curves). The shapes of the alloy-steel curves are significantly different from those for C steels. Each of the 9 alloy steels has a more or less prominent reversal in its S curve below about 650°. The effect of the alloys in reducing the crit. quenching rate is clearly indicated by the shifting of the nose toward greater time. The effect of the alloys Ni, Cr and Mo on the lower portion of the curve is relatively small and greatly overshadowed by the effect of C. The effect of increasing C in expanding the region of austenite stability below 250° gives a more definite understanding of the varied response of low-, medium- and high-C steels to hardening. The results indicate the possibility of selecting steels with an alloy content sufficient to reduce the crit. cooling rate to fit the section size (or heat-treating practice) and with a C content that will enforce transformation to an acicular product of the desired hardness when treated by conventional liquid or air quenches. The S curve is a useful supplement to the equil. diagram for it defines a system that is not in equil., a condition prevailing in ferrous metallurgy far more frequently than the usually hypothetical equil. condition. I. Hartmann

Titanium in forging steel. Geo. F. Comstock. *Heat Treating Forging* **26**, 26–7(1940).—Residual-Ti contents of about 0.1% or more prevent the formation of coarse dendrites in small ingots of 0.35 to 0.40% C steel poured at about 1595 to 1620°, while similar amts. of Al or Zr were not effective. With over about 0.2% residual Ti content and addn. of 0.05 to 0.15% Al the grain-coarsening

temp. of forged 0.35 to 0.40% C steel was found to be above 1065°. I. Hartmann

Filtration of metallic systems and determination of the nature of phases in alloys. M. P. Slavinskiĭ and N. L. Kleĭman. *Metallurg* **13**, No. 12, 68–80(1938).—An alloy contg. Sn 83, Sb 11.5 and Cu 5.5% was fused, cooled at 0.3–0.4° per min. and filtered in a CO_2 atm. with a quartz sand filter at 280° and 240°. CuSn was sepd. at 280° and Sn_3Sb at 240°. The filtrate contained Sb 7.38, Cu 1.12% and balance Sn. An alloy contg. Sn 11.37, Sb 11.60, Cu 2.08, Cd 1.45, As 1.34% and balance Pb yielded SnSb, Sn_3Sb and 3 phases identified as eutectics. A Pb alloy contg. Ca 0.8 and Na 0.8% yielded Pb_3Ca ppt. and a Ca-free filtrate. H. W. Rathmann

β'-β Transformation in lithium-lead alloys. Thomas C. Wilson. *J. Chem. Phys.* **8**, 13–19(1940).—Measurements made by Grube and Klaiber (*C. A.* **29**, 987[4]) on Li-Pb alloys indicate that a peculiar transformation occurs in the β-phase of these alloys. The behavior of this transformation was investigated up to pressures of 10,000 kg./sq. cm. by measurements of the elec. resistance. These results, with those from rough thermal-expansion measurements, indicate that the transition occurs gradually on heating from a phase of abnormally high energy and entropy content to a phase of more normal character. X-ray analyses show that the transition is accompanied by movements of the Li atoms in the lattice to more orderly positions. G. M. Petty

Casting of alloy 6852. A. V. Provorov. *Aviapromyshlennost* **1939**, No. 10, 20–4.—The alloy 6852 contains 9.5–11.5% Al, 4.0–6.0% Fe, 4–6% Ni, 0.1% Mg and the rest Cu. The alloy was cast by pouring into sand molds and by centrifuging. The latter method gave a greater compactness and less gas inclusions and porosity than the former method. The castings from both methods had small-grained structures. The recommended heat-treatment: quenching in water at 900–915°, holding for 15 min., and tempering at 650–700° for 1.5–2 hrs. B. Z. Kamich

Light alloys of aluminum. A. von Zeerleder. *Metallurgia* **21**, 47–53(1939).—Although about 850 Al alloys are listed in Gmelins handbook, the no. really useful may be reduced to about 24. Of these 24, half are casting alloys and half are wrought alloys. Each of these groups may be divided into hardenable and non-hardenable alloys. Some of the more important alloys are discussed and properties of cast and wrought alloys are listed. Although Al is expensive, Al castings are frequently cheaper than Fe castings designed to do the same job. J. L. Gregg

Copper and copper alloys: a survey of technical progress during 1939. H. J. Miller. *Metallurgia* **21**, 43–6(1939).—A review with 56 references. J. L. Gregg

Alloy cast irons. P. A. Russell. *Proc. Staffordshire Iron Steel Inst.* **54**, 72–5(1938–39).—Principally alloying elements added to cast irons are Ni, Cr, Si, Mn, Cu and Mo. The addn. of elements causes much greater solidification shrinkage than in nonalloyed cast irons. G. T. Motok

The system iron–cobalt–antimony. W. Geller. *Arch. Eisenhüttenw.* **13**, 263–6(1939).—After a brief review of the binary systems Fe–Co, Fe–Sb and Co–Sb, the results of the thermal, dilatometric and structural examn. of the system Fe–Co–Sb are described in detail. This ternary system has a simple form; no new phases besides the phases of the 3 binary systems occur. The ε-phase of FeSb forms with CoSb a continuous series of solid solns.; both phases are orthohexagonal, of the form of Ni arsenide. Phases $FeSb_2$ and $CoSb_2$ both of which form peritectics in the binary marginal systems, also form a continuous series of solid solns. An alloy of 5% Sb, 76% Co and 19% Fe was quenched from 1000° and tempered at 850°; it lies outside the γ-α-transformation. Other alloys of this system showed that no pptn. hardening takes place; hence these alloys have no practical importance. Five references. M. Hartenheim

Forging and stamping of airplane propeller blades from magnesium alloys of high strength. S. M. Voronov and L. Ya. Shpolyanskiĭ. *Aviapromyshlennost* **1939**, No. 2, 24–33.—Mg alloys contg. 4.5–5% Al, 0.5–0.6% Zn and 0.3–0.5% Mn are forged much less easily than alloys of the type Dow F. The max. extent of deformation during forging should not be over 20–25% to prevent destruction of the material. The alloy has a more narrow temp. interval of forging than the alloys contg. 4–4.5% Al of the Dow F type. The recommended temp. interval is 330–350°. The stamped blades of the Al-Zn-Mn alloy should be heat-treated by either of the following methods: (1) heating at 350–400° for 6–12 hrs. followed by air cooling or (2) heating at 420° for 2 hrs. followed by 12-hr. aging at 200°. B. Z. Kamich

The heat treatment of "K" monel and "Z" nickel. Staff Development and Research Division, International Nickel Company, Inc. *Heat Treating Forging* **25**, 593–7(1939); **26**, 16–20, 25(1940).—"K" monel is an alloy contg. approx. Ni 66, Cu 29 and Al 2.75%. "Z" nickel is an alloy contg. approx. 98% Ni. These alloys are corrosion resisting and may be hardened by aging at moderate temps. The mech. properties obtained from various forms and tempers are indicated and the cycles of heat treatment and best heat-treating conditions are described in detail. I. Hartmann

Nickel-columbium alloys. S. A. Pogodin and A. N. Zelikman. *Metallurg* **14**, No. 1, 8–14(1939).—Ni-Cb alloys contg. up to 69% Cb and only traces of Al were prepd. by aluminothermic reduction of Cb_2O_5 and NiO using 95% of the stoichiometrically required Al. Cb recovery was 60–70%. Hardness tests, elec. cond. measurements and micrographic study indicated a max. soly. of 11–12% Cb in Ni solid soln. at 900°. At higher concns. Ni_3Cb was formed. H. W. Rathmann

Study on the corrosion of iron by electron diffraction. Sizuo Miyake. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 363–70(1939)(in English).—A study of the electron-diffraction patterns obtained from Armco iron immersed in NaCl solns. for varying lengths of time shows that the uppermost surface is γ $Fe_2O_3.H_2O$. When this is removed, there is revealed, depending on the time of immersion, an adherent layer of either γ Fe_2O_3 or a new substance, called the "two-ring substance" from its diffraction pattern. This new substance is shown probably to be intermediate in compn. between the other 2 oxides. E. O. Wiig

Effect of sulfur and sulfur compounds in naphtha upon certain corrosion tests. Sensitivity of the doctor test. L. M. Henderson, M. S. Agruss and Geo. W. Ayers, Jr. *Ind. Eng. Chem., Anal. Ed.* **12**, 1–3(1940).—The effects of a no. of mercaptans, sulfides, disulfides, of free S, dibutyl sulfone, and thiophene, dissolved in Stoddard solvent, varnish makers' and painters' naphtha, and rubber solvent upon the distn.-corrosion test, the Cu-strip corrosion test at 50°, and the doctor test were studied. There are two detg. factors pertaining to distn.-corrosion test on S compds. in naphtha soln.: (1) the b. p. of the S compd. with reference to the boiling range and end point of the solvent and (2) the stability of the S compd. at moderately high temps. In many instances the quantity of the S compd. also affects the corrosion test. In general a more corroded strip is obtained in this test with higher-boiling naphthas than with lower-boiling ones. A 0.05% soln. of free S in Michigan Stoddard solvent was found to be strongly corrosive to Cu in the Cu-strip test; a concn. of 0.003 to 0.004% free S just affects a Cu strip. The sensitivity of the doctor test for 7 mercaptans was detd. to be practically the same in each of three naphthas. 17 references. I. Hartmann

Electrode coatings for welding aviation steels. E. P. Rogozhkin. *Tekhnika Vozdushnogo Flota* **1939**, No. 3, 31–50.—The effects of various electrode coatings upon the arc stability in welding of aviation steels were studied. From the point of view of arc stability and appearance of the weld the following two coatings are suggested: (1) $BaCO_3$ 33.3, Cr_2O_3 16.6, MnO_2 16.6, and chalk 33.3% in case of direct polarity, and (2) $K_2Cr_2O_7$ 7.7, kaolin 30.8, pyrolusite 23.1, TiO_2 7.7, $NiCO_3$ 15.4, and chalk 15.4% in case of reversible polarity. The resulting welds were dense, clean, and had no gas or slag inclusions. B. Z. K.

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Machining of Copper and Its Alloys. London: Copper Development Assocn. 108 pp. Free. Reviewed in *Metallurgia* **21**, 86(1940).

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Flotation apparatus for separation of ore-pulp constituents. Alva H. Garrett (50% to Charles O. Parker). U. S. 2,179,622, Nov. 14. Various structural, mech. and operative details.

Froth flotation of ores with use of substituted biguanides as flotation reagents. David W. Jayne, Jr. and Arvid E. Anderson (to American Cyanamid Co.). U. S. 2,180,926, Nov. 21. In the flotation treatment of ores such as those of Cu, Pb and Au, use is made of ethylene-*o*-tolylbiguanide hydrochloride or other substituted biguanide of the general formula $RR_1NC(:NH)NHC(:NH)NH_2$ in which R and R_1 represent H or alkyl or aryl radicals, or of an acid salt or aldehyde condensation product of such a substituted biguanide.

Apparatus for concentrating ores by sedimentation. Charles E. Wood. U. S. 2,180,574, Nov. 21. Various structural and operative details.

Working up ores and other metallurgical raw materials. Aurél Bognár. Hung. 122,479, Dec. 15, 1939. Sulfide-contg. substances, or mixts. of free S with nonsulfide materials, are treated at temps. above 150° and pressures above 60 atm. with steam and oxygen or O-contg. gases. The nascent SO_3 converts the metals to sulfates. Nitric acid or nitrates or nitrous gases can be used as catalysts.

Rotary bowl and vibrating apparatus for classifying materials such as those of gold-ore pulps. Jes Asmussen (to A. O. Smith Corp.). U. S. 2,179,807, Nov. 14. Various structural and operative details.

Apparatus for separating materials, such as sand and titanium, by flotation. Russell S. Ellis. U. S. 2,180,278, Nov. 14. Various structural, mech. and operative details.

Treating vanadium ores also containing uranium and radium. John S. Potter (to S. W. Shattuck Chemical Co.). U. S. 2,180,692, Nov. 21. A process of treating a vanadiferous ore contg. U and Ra values involves prepg. a relatively thick mixt. of the ore, in comminuted condition but not comprising a large proportion of fines, with strong H_2SO_4, allowing the ensuing reaction to take place substantially by the heat of reaction alone, breaking up the resultant reaction mass and leaching with water to obtain a leach liquor contg. dissolved V and U values, together with radium-bearing slimes suspended therein sepg. from the residual sands the leach liquor with the suspended slimes, and then sepg. the slimes from the leach liquor as a radium-bearing concentrate.

Slags containing vanadium. Soc. industrielle & commerciale des aciers, Fr. 841,006, May 9, 1939. Slags contg. V are made from pig contg. V and Mn by eliminating the Mn and refining the remainder. Mn is eliminated by adding to the molten mass S or substances contg. S, such as pyrites. MnS is formed and is removed.

Hearth furnace adapted for heating billets, etc. George R. McDermott (to Surface Combustion Corp.). U. S. 2,180,089, Nov. 14. Various structural and operative details.

Gas-fired furnace suitable for melting or heating metals. Stephen Stanworth and James Stanworth. U. S. 2,180,774, Nov. 21. Various structural and operative details.

Checkerwork construction suitable for use with blast

furnaces. Arthur G. McKee. U. S. 2,179,666, Nov. 14. Various structural features.

Composition for foundry molds, etc. Norman J. Dunbeck (to Eastern Clay Products, Inc.). U. S. 2,180,897, Nov. 21. Sand is used with a reversible binder of nonswelling, colloidal montmorillonite.

Casting malleable iron. Albert W. Morris (to Morris Engineering Corp.). U. S. 2,179,513, Nov. 14. App. is described, and a method involving pouring the metal into a mold such as one of Cu contg. about 1% Fe.

Aluminum. Henri L. Gentil. Fr. 841,109, May 10, 1939. Compds. contg. Al, such as bauxite, clay, volcanic ash, etc., are treated with a reducing agent at 1800° and under a vacuum of 2 mm. pressure. Example is given of heating a mixt. of bauxite and Fe pyrite in an elec. furnace at 1800° under a pressure of 2 mm. Al is liberated, volatilized and condensed. SO_2 is a valuable by-product in the reaction.

Lithium-copper. Harold J. Ness (to Nesaloy Products, Inc.). U. S. 2,181,092, Nov. 21. Molten Cu in a furnace (details of which are described) is heated in the presence of Li vapor.

Separation of nickel from copper. Guenther Hamprecht and Gustav Pauckner (to I. G. Farbenind. A.-G.). U. S. 2,180,520, Nov. 21. A Cu-Ni matte is treated with Cu chloride soln. with the formation of Ni chloride and CuCl and part of the soln. of the latter is treated with Cl to form $CuCl_2$ and the soln. thus obtained is employed for the treatment of further amts. of the Ni-Cu matte, the other part of the soln. from the matte treatment being treated for pptn. of the Cu by the action of Ni-Cu matte.

Purifying lead and tin. Louis S. Deitz, Jr. (to Nassau Smelting & Refining Co.). U. S. 2,180,139, Nov. 14. A process of treating a commercially pure alloy consisting of upward of 80% of Pb or Sn to remove residual abrasive impurities which tend to cause surface irregularities in finished products made therefrom, while maintaining the composition of the alloy substantially unaltered, the alloy being one which would normally be used at temps. well above its freezing point without further purification for the manuf. of slush castings, extruded shapes, bearings, etc., comprises heating such an alloy to a temp. at which all of its constituents are molten and which approximates that at which it will be employed in the manuf. of the products, cooling the alloy to a temp. substantially lower than that at which it is initially heated and lower than that at which it will be employed in the manuf. of the products, removing the small quantity of insol. material produced, and reheating the alloy to a temp. suitable for its intended use.

Heat-treatments such as annealing, hardening or normalizing steels. Arthur H. Vaughan (to Electric Furnace Co.). U. S. 2,180,376, Nov. 21. App. is described, and a method involving treating a hydrocarbon-contg. gas with air in predetd. proportions to provide reaction products contg. CO_2, water vapor and undissocd. hydrocarbons in excess of the amt. of CO_2, removing at least a part of the water, reheating the remaining reaction products to about 980–1090° to react the CO_2 and undissociated hydrocarbons and provide a nondecarburizing gas, and utilizing the noncarburizing gas as an enveloping and protecting atm. in a heat-treating furnace.

Apparatus for heat-treating metal articles as in hardening crankshaft surfaces, etc. Francis S. Denneen, Wm. C. Dunn and Courtney N. Mitchell (to Ohio Crankshaft Co.). U. S. 2,180,038, Nov. 14. Various structural, mech. and operative details.

Inhibiting oxidation of metals such as steel during heating. Harold J. Ness (to Nesaloy Products, Inc.). U. S. 2,181,093, Nov. 21. App. is described, and a method of heating metals in an atm. contg. Li or a Li compd. and CO.

Light-metal pistons. The Birmingham Aluminium Casting (1903) Co. Ltd. and Frank G. Woollard. Brit. 507,084, June 9, 1909. A light-metal piston, e. g., of Al alloy, has a hard coating of an oxide of the metal or 1 of the constituent metals of the piston on its head part and a coating of a suitable soft bearing metal, e. g., Sn, on its skirt. The oxide coating may be dyed; it may be produced by anodic oxidation of the head immersed in a suitable bath, the skirt being protected during the oxidation process by means of a rubber or like impervious material.

Agglomerated materials such as compositions for electrical contacts. Paul Schwarzkopf. U. S. 2,179,960, Nov. 14. There are used together at least one metal selected from a first group consisting of W, Mo and Ta, and at least one metal selected from a second group consisting of Ag, Ni, Co, Fe, Cu, Al, Au, Cr, Sn, Zn and Pt, the metal of the first group present in individual dense particles coarser than those of the original metal powder obtained from its compds. or ores, and obtained in such coarser state by heat-treatment at temps. at least as high as sintering temp. and subsequent powdering, the metal of the second group forming substantially a solidified melt agglomerating the individual coarse particles and present in amts. of about 3–90% of the material or bodies.

Electric contacts. Franz R. Hensel (to P. R. Mallory & Co.). U. S. 2,180,956, Nov. 21. Contacts which are resistant to oxidation are formed of 50–99% of one or more of the nitrides of Ti, Zr, Hf, V, Cb and Ta, together with 1–50% of Ag, Cu or Au or their alloys.

Pig iron. Herman A. Brassert and Tom P. Colclough (to H. A. Brassert & Co.). Can. 386,453, Jan. 23, 1940. In a coke-fired blast furnace the m. p. of the slag is lowered by decreasing the ratio of lime to SiO_2 to about unity. This causes liquefaction of the slag-forming materials high enough in the furnace to permit superheating of the descending liquid slag by the ascending hot gases. This superheating increases absorption of impurities from the iron by the slag during the descent to the hearth. Excess S is removed by further treatment, e. g., by adding a Mn alloy and maintaining an oxidizing atm. in contact with the Mn slag surface.

Lithium treatment of furnace atmospheres in heating steel, etc. Harold J. Ness (to Nesaloy Products, Inc.). U. S. 2,181,094, Nov. 21. App. is described, and a method of creating an atm. contg. metallic Li in a furnace or the like which involves mixing a compd. of Li such as Li_2CO_3 with powd. C, introducing the mixt. with O or an O-contg. gas into a furnace and maintaining a sufficiently high temp. in the furnace to effect a reduction of the Li compd. to metallic Li. U. S. 2,181,095 relates to preventing oxidation of metals by a heating torch such as a gas torch which involves introducing Li or a Li compd. into the flame of the torch. U. S. 2,181,096 relates to making lithiated ferrous metals by heating metals such as steel to their m. p. in an atm. which exhibits a strong Li spectrum. U. S. 2,181,097 relates to conditioning a furnace in which a Li-contg. atm. is to be produced, which involves applying to the lining of the furnace a Li compd. such as LiCl or Li_2CO_3 in a liquid dissolving or suspending medium such as water.

Steel for the production of objects subjected to great wear. Kohle- und Eisenforschung G. m. b. H. Fr. 841,054, May 10, 1939. A steel highly resistant to wear, obtained by basic fusion, particularly, Thomas steel, comprises C 0.10–0.25, Mn 0.9–1.6, P 0.08–0.25, Si 0.6–2.5% and the remainder Fe and the usual impurities, is particularly suitable for the manuf. of rails, tires, piles and other objects subjected to great wear. The increase in the content of Si has greatly increased the toughness and the resistance to wear. Cu 0.25–0.5 and Cr 0.5% can be added to increase the corrosion resistance.

Increasing the resistance of steel to hydrogen under pressure. Kohle- und Eisenforschung G. m. b. H. Fr. 841,055, May 10, 1939. The resistance of steel contg. separately or together, Cr, Mo, V and other elements capable of forming carbides, to an attack by H under pressure is higher the lower the Mn content. Usually steel with a Mn content below 0.25% is fairly resistant.

Forming finned tubing of metals such as copper, brass or an aluminum alloy. Albert J. Townsend and Frank J. Bascombe. U. S. 2,179,530, Nov. 14. In flattening finned tubing, spaces between fin elements are filled with a deformable material such as Pb of sufficient hardness to

support the finning during deformation, followed by flattening and removal of the filling material. App. is described.

Dentures of cobalt alloys. Charles H. Prange (to Austenal Laboratories, Inc.). U. S. 2,180,549, Nov. 21. Dentures are formed of alloys having only slight shrinkage on solidifying and which contain Co together with Cr 10–40 and Mo about 5–20%.

Ferrous alloys suitable for cylinder liners, pistons, piston rings, etc. Walter E. Jominy (to General Motors Corp.). U. S. 2,179,695, Nov. 14. Alloys which have good wear resistance contain Fe together with C 2.25–4.0, Si 1.5–3.5, Ti 0.05–0.60, P 0.6–1.25 and Mn 0.3–1.0%.

Hard molybdenum alloy suitable for facing cutting tools, etc. Allen E. Wisler and Henry B. Woods (to Hughes Tool Co.). U. S. 2,179,836, Nov. 14. An alloy is used which may be formed of Mo 87, B 4, Cr 6 and C 3% (the proportions being variable).

Tin alloys suitable for casting pliable ornamental articles. Charles H. Bell, Louis S. Deitz, Jr., and Abraham I. Stein (to Nassau Smelting and Refining Co.). U. S. 2,180,137, Nov. 14. Sn is used with Cu 0.90–1.05 and Cd 0.01–0.1%.

Zinc alloys. Wm. H. Finkeldey (to Edes Mfg. Co.). U. S. 2,180,291, Nov. 14. Alloys which are suitable for casting, rolling, etc., contain Zn having not more than 0.01% impurities together with Al about 0.25–1.75 and Mg about 0.003–0.035%. U. S. 2,180,292 relates to alloys of Zn (of like high purity) with Al about 0.1–1.75, Mg 0.001–0.035 and Mn 0.002–0.25%. U. S. 2,180,293 relates to engraving plates formed from like high purity Zn alloyed with Al 0.25–1.75 and at least one of the metals Mg 0.003–0.035, Mn 0.002–0.25, or Cu 0.01–0.2%.

Metallic printing plates or cylinders. Josef Horn (50% to Erich Weber). U. S. 2,181,111, Nov. 21. A method of producing metallic printing plates or cylinders for relief printing comprises superimposing upon a pliant ground plate of Al or Mg or an alloy thereof, at least one intermediate layer of Zn, Cd or an alloy thereof, superimposing on the intermediate layer or layers at least one layer of heavy wear-resistant metal characterized by an ability to carry printing ink and consisting of Cu, brass, tombac, Cr, Ni, alpaca, Ag, steel or an alloy thereof, and removing all of the metal layers superimposed on the ground plate at the nonprinting areas to such an extent that the top surface of the ground plate is exposed.

Chromium-coating iron and steel articles. Karl Daeves, Gottfried Becker and Fritz Steinberg. Fr. 840,975, May 8, 1939. Fe and steel articles are treated with gaseous $CrCl_2$ through ceramic carriers, such as porcelain. (1) The articles are placed in a reaction furnace, in presence of the ceramic carriers, and a stream of gaseous $CrCl_2$ is passed through the furnace heated to 1000°; (2) the articles surrounded by pieces of porcelain or other ceramic substances previously enriched in $CrCl_2$, are heated to 950–1000°; or (3) the articles are heated, in presence of the carriers and of substances which at high temp. emit gaseous $CrCl_2$.

Preventing corrosion of ferrous metals by liquids such as nitrogen compounds. Robert W. Moncrieff and Edward B. Thomas (to Celanese Corp. of America). U. S. 2,180,427, Nov. 21. A liquid contg. a nitrogenous base, such as ethylene diamine, which normally has a corrosive action on Fe is used with an alk. earth metal compd. such as $Ca(OAc)_2$, which is convertible by aq. CO_2 into a water-insol. carbonate, in sufficient amount to inhibit materially such corrosive action.

Welding electrode. John T. Marvin (to General Motors Corp.). U. S. 2,180,813, Nov. 21. A flux-carrying electrode is made by molding finely divided metal powder into the desired shape, sintering to form a highly porous product and impregnating the product with fluxing ingredients which solidify and are held within the pores of the electrode. Various examples are given.

Electrode for use in spot welding. Geo. Goldstein (to General Motors Corp.). U. S. 2,179,693, Nov. 14. A coating of Hg is used between a body of material such as Cu and a tip which may be formed of Cu or "elkonite" and serves to permit movement of the tip.

Electrical contacts such as those of spot-welding apparatus. James P. Burke. U. S. 2,180,396, Nov. 21. A main body portion of a metal of high elec. cond. such as Cu is used with a retaining wall or band of high-strength metal such as Cr encompassing a portion of the main body portion, and a portion of high elec. cond. such as Cu encompassing the wall of high-strength metal.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Collected works of Sergei Nikolaevich Naumov. Edited by M. S. El'gort. *Acta Univ. Asiae Mediae*, Ser. VI, *Chemia* Nos. 10-33 (1937). **The life and work of Sergei Nikolaevich Naumov.** M. S. El'gort. *Ibid.* 11-20 (in German, 21-31). **The scientific achievements of Sergei Nikolaevich Naumov.** *Ibid.* 33-48 (in German, 49-65).—24 papers and a portrait are included. E. J. C.

Catalytic hydration of acetylene and of some alkylacetylenes. Raymond E. Schaad and Vladimir N. Ipatieff. *J. Am. Chem. Soc.* **62**, 178-80 (1940).—Hydration of propyne, 1-butyne (I), 1- and 2-pentyne, 1-hexyne and 1-heptyne (II) gives Me_2CO, 2-butanone, 2-pentanone, 2-hexanone and 4-heptanone (III), resp. If the hydrocarbon is liquid, it is dropped simultaneously with water at const. rates from burets into the upper end of a vertical Pyrex tube contg. solid H_3PO_4 catalyst (Ipatieff, U. S. pat. 1,993,512-13, *C. A.* **29**, 2546[5,6]) heated to 204° (I reacts at 150°); if the hydrocarbon is gaseous, it is passed from a weighed Al bomb through a calibrated flowmeter to the top of the catalyst tube. In addn. to the ketone formation there is formed a small quantity of oil with relatively high b. p. and *n* (probably condensation products); some isomerization also occurs; I appears to be changed to the 2-isomer; that II yields III shows that isomerization of II occurs before hydration. C_2H_2 and H_2O at 260–300° give 30–56% of AcH, with about 50% of condensation products (crotonaldehyde and aromatic hydrocarbons); in the case of C_2H_2 the catalyst needs reactivation after some 20 hrs. (heating in dry air at 500° for 16 hrs., followed by steaming at 260° for 16 hrs.). C_2H_2-C_2H_4 and C_2H_2-N mixts. also yield AcH, the C_2H_4 and N acting as diluents. C. J. West

Condensations by sodium. XV. Reactions of disodium compounds with ethylidene and methylene chlorides. Avery A. Morton and John T. Massengale. *J. Am. Chem. Soc.* **62**, 120-3 (1940); cf. *C. A.* **32**, 7437[7].—Amylidenedisodium (I) and $MeCHCl_2$ give 13% of BuCH:CHMe (80% of the max. possible estd. from the $BuCH(CO_2H)_2$ (II) usually obtained by carbonation). CH_2Cl_2 and I give 1-hexene. These reactions are in agreement with the view that I is present as an intermediate from which II is obtained by carbonation. PhNa prepd. from PhCl and Na in petr. ether at 30° and refluxed with PhMe at 52° for 2 hrs. was relatively inactive, carbonation showing that no exchange had occurred (MeI showed the same lack of exchange); if petr. ether is removed so that the b. p. is 85°, there results 26% $PhCH_2CO_2Et$ (III) and 35% $PhCH(CO_2Et)_2$ (IV); at 106° there were formed 17% III and 39% IV; the yields were still lower at higher temps. Exchange of PhNa with PhMe gave low yields when the Na compd. was heated for some time before adding all of the PhMe. Efforts to use this reaction for showing the existence of some benzylidenedisodium (V) along with benzylsodium (VI) as a product of the exchange reaction between PhNa and PhMe were qualitatively successful; styrene from CH_2Cl_2 and methylstyrene from $MeCHCl_2$

were both formed, though the yield was not over 4%. Me_2SO_4 and MeI give approx. the same yield of PhEt (43%) when added to the mixt. of V and VI; in neither case is iso-PrPh found among the products. Use of PhCl instead of AmCl as the source of PhNa gives the same yield but the product is less reactive with PhMe; that from PhCl is a black powder which settles quickly whereas that from AmCl is green and remains in suspension for some time. Attempts to use $PhCH_2Cl$ and $PhCHCl_2$ as sources of mono- and di-Na compds. were unsuccessful, either because the Na compd. formed was too reactive for isolation in the presence of incoming $PhCH_2Cl$ or because little or no reaction occurred with the metal. Behavior of the di-Na compds. with other dihalogen compds. such as $(CH_2)_4Cl_2$ and $PhCHCl_2$ was tried but no evidence of the expected reaction was found. Styrene was not obtained from $PhCH_2CH_2Cl$ and $PhCH_2Na$. **XVI. Formation of decane in the Wurtz reaction.** Avery A. Morton and Graham M. Richardson. *Ibid.* 123–6.—No decane is formed prior to formation of AmNa in the reaction between AmCl and Na. This Wurtz synthesis is divided into 2 distinct phases, that concerned with formation of organometallic compd. and that related to reaction of this intermediate with addn. of alkyl chloride. If free radicals are present in the early phase, their activity is limited to addn. with Na or to disproportionation and combination of the -idene product with 2 atoms of Na to form another organometallic compd. A curve gives the relation of acid and decane yields with changing ratio of Na to AmCl; as the ratio increases, the yield of decane decreases. **XVII. Comments on the formation of triphenylene.** Avery A. Morton, John T. Massengale and Graham M. Richardson. *Ibid.* 126–9.—*o*-$C_6H_4Ph_2$ and Ph_2 are not metallated by PhNa but are by AmNa. Under the conditions in which organometallic compds. are isolated in this work no evidence of metallation of PhCl could be detected. Triphenylene is not formed under the conditions of this work either as a result of metallation of *o*-$C_6H_4Ph_2$ or of PhCl. **XVIII. A study of the possible conversion of amylsodium to amylidenedisodium.** Avery A. Morton and Graham M. Richardson. *Ibid.* 129–31.—Amylidenedisodium (I) frequently is obtained in somewhat higher yields if the mixt. is warmed at 42° or is stirred for a very long time. Simultaneously lower yields of caproic acid are usually found. These results suggest that AmNa is capable of being converted into I but the change is an uncertain one and does not exceed 10% at the most. Active Ni appears to decomp. a portion of the AmNa at 42°. Under appropriate conditions $BuCH(CO_2H)_2$ is 1 of the carbonation products of the reaction of AmCl on Na in C_6H_6 although AmNa is completely removed by the solvent at room temp. Small quantities of C_6H_6 are not quantitatively metallated by AmNa. C. J. West

Chlorine derivatives of aliphatic series. XVI. Vicinal effect. D. V. Tishchenko. *J. Gen. Chem.* (U. S. S. R.) 9, 1380–8(1939); cf. *C. A.* 33, 4190[1,6].—The sapon. rate of aliphatic primary, secondary and tertiary 1,2-, 1,3- and 1,4-dichlorides is studied by heating the compds. in sealed tubes with aq.-alc. 0.1 *N* NaOH at the required temps. (30–100°) for 1–13 hrs. and titrating the cold reaction products with 0.1 *N* NaOH or HCl at definite intervals of time. The compds. tested are: $(CH_2CClMe_2)_2$; $CH_2(CClMe_2)_2$, b_5 51.5°; $(CClMe_2)_2$, m. 159–60°; $(CH_2CHClMe)_2$, b_{12} 62–2.5°, d_4^{13} 1.0529, n_D^{13} 1.4495, M. R.$_D$ 39.53; $CH_2(CHClMe)_2$, b_{761} 142–7°, d_4^{18} 1.0634, n_D^{18} 1.4399; $(CHClMe)_2$, b. 116–17°; $(CH_2CH_2Cl)_2$, b_{762} 155°; $CH_2(CH_2Cl)_2$, b. 120–2°, d_4^{19} 1.204, n_D^{19} 1.452, M. R.$_D$ 25.3; $(CH_2Cl)_2$. Again the tabulated results show that in each series the sapon. velocity decreases from 1,2- to 1,4-dichlorides and between the series from the primary to tertiary. With changes in the NaOH concn. the sapon. rate of tertiary dichlorides is practically unchanged, while that of primary and secondary dichlorides decreases sharply. For understanding of the varied reactivity and magnitude of dipole moments of polysubstituted org. compds. the conception of *"vicinal effect"* is suggested. The latter in the presence of neg. substituents (the valency electronic pair of the link C—X is nearer to X) decreases the dipole moments of the bond C—X and retards the ionization of atoms or the X groups. Pos. substituents (electron pair is closer to C) decrease the moments of the C—X bonds and facilitate the ionization of X groups. The vincinal effect is more pronounced with the greater propinquity of polar substituents and practically disappears at the 1,4-position. Chas. Blanc

Peroxide effect in the addition of reagents to unsaturated compounds. XXIV. The addition of hydrogen iodide to propene, 1-bromopropene, allyl chloride and allyl bromide. M. S. Kharasch, James A. Norton and Frank R. Mayo. *J. Am. Chem. Soc.* 62, 81–6(1940); cf. *C. A.* 34, 369[6].—In a thorough investigation of the addn. of HI to C_3H_6, CH_2:$CHCH_2Cl$ and CH_2:$CHCH_2Br$, only 1 (the "normal") addn. product was obtained in each case. The addn. of HI to 1-bromopropene yields a mixt. of approx. 33% 1,1- and 66% of 1,2-dihalides. It is shown that I is a catalyst for the addn. of HI and that peroxides accelerate this addn. because they liberate I from HI. $MeCHICH_2Cl$ and $EtCHIBr$ have been prepd. in the pure and nearly pure states, resp. C. J. West

1,2- and 1,4-Addition. IV. Nitrogen tetroxide and isobutylene. Arthur Michael and G. H. Carlson. *J. Org. Chem.* 5, 1–13(1940); cf. *C. A.* 33, 5803[6].—The action of N_2O_4 (I) on $Me_2C{:}CH_2$ (II) is investigated under various conditions. When II is treated with I in ether, bis(α,β-nitrosonitric ester) (III) of II does not sep. from the addn. products formed (cf. Sidorenko, *J. Russ. Phys. Chem. Soc.* 38, 955(1906); Wallach, *Ann.* 241, 296 (1888); Strack and Fanselow, *C. A.* 23, 1874). Liquid II, in the absence of a solvent, and I give III in 7–12% yield; in the presence of petr. ether in 0–13% yield. Moderate changes in low temps. do not alter the course of the reaction appreciably, the yield of III being 12% and 7.4%, resp., at −12° and −80°. When I reacts with gaseous II, oily products are obtained which were not further examd. because pronounced oxidation occurs. Unlike the oily product of the expts. carried out in the presence of petr. ether, which readily decomps. and cannot be sepd. into definite fractions, the liquid products from the expts. in ether are relatively stable and can be sepd. under reduced pressure into a blue distillable oil (IV) and a green residual oil. The products obtained in the presence of petr. ether yield with PhSNa in MeOH in addn. to $NaNO_3$ and $NaNO_2$, an oil, b_5 145–7°, which on oxidation with Cr_2O_3 in AcOH or with H_2O_2 in Ac_2O gives β-phenylsulfonyl-α-nitroisobutane (V), m. 89–90°, in addn. to some diphenyl disulfone, m. 193–4°. Although the thioether corresponding to V is probably formed from α,β-dinitroisobutane (VI), this compd. has not been isolated nor has the corresponding diamine been obtained by catalytic reduction of the addn. products formed in ether. Catalytic reduction of the crude oil and of IV gives, in addn. to NH_3, $Me_2CHCH_2NH_2$ which is probably formed chiefly from nitroisobutene and from VI through a series of reactions which also yield diisobutylamine. Reduction of IV gives NH_3 and β-hydroxyisobutylamine in practically equimol. proportions and it is probable that these products are formed from the α,β-nitronitrous ester deriv. (VII) of II. Based on the yields of the reduction products, α-nitroisobutene constitutes 5–12% of the crude addn. product and VII represents 16–23%. Assuming that the isolated diisobutylamine is formed from VI, VI constitutes at least 12% of the crude addn. product. **V. Nitrogen tetroxide and tetramethylethylene.** *Ibid.* 14–23.—The action of I on $Me_2C{:}CMe_2$ (VIII) is studied under various exptl. conditions. In ether almost const. yields (19.6–22%) of 2,3-dinitro-2,3-dimethylbutane (IX) are obtained, while without solvents or in petr. ether, only low yields of IX are formed. The nitric ester of 2-nitro-2,3-dimethyl-3-butanol (X) appears to be formed in variable amts. under all conditions used. In the absence of a solvent and under strong oxidative conditions the yield of X is considerable. X readily combines with IX, forming a double compd. (XI). Under the oxidizing action of an excess of I, all IX is transformed into XI. Accordingly isolation of IX is realized only under conditions tending to depress the oxidizing action of I and the yield of X. The

compn. of XI is deduced from the analytical data and from the relative amts. of NH_3, 2-amino-2,3-dimethyl-3-butanol and tetramethylethylenediamine obtained on catalytic reduction of XI. The possibility of the formation of X is discussed and it is suggested that I may oxidize VIII to the corresponding oxide and then act upon the latter to yield X. It is, however, more probable that X is formed by oxidation of the corresponding nitrosonitric ester which in turn is probably formed primarily by direct addn. of I to VIII. With an excess of VIII and ether, IX is obtained in about 20% yield. Under the oxidizing action of an excess of I, all IX appears to be combined with X to form XI. These results and the compn. of XI indicate that the crude reaction product formed in approx. equimol. amts. consists chiefly of IX and the nitric ester of 2-nitroso-2,3-dimethyl-3-butanol (XII). XII under the oxidizing action of I is converted into X, which combines with IX to XI. The results confirm those of Demianov and Sidorenko (*C. A.* **5**, 2100). The dinitrous ester as found by Schmidt (*Ber.* **36**, 1775(1903); **37**, 546(1904)) has not been observed. F. E. Brauns

Sulfur studies. XV. The synthesis of alkanesulfonic acids and certain derivatives. P. H. Latimer and R. W. Bost. *J. Org. Chem.* **5**, 248(1940); cf. *C. A.* **32**, 911[5].—Alkanesulfonic acids (I) are mostly prepd. by oxidizing mercaptans or disulfides. Hemilian's method modified by Strecker (*Ann.* **148**, 90(1868)) by heating alkyl halides with $(NH_4)_2SO_3$ has so far not been used for the prepn. of I above the pentanesulfonic acid. The following RSO_3H are prepd. by heating the corresponding alkyl halides with a soln. of 2 mols. $(NH_4)_2SO_3$ in an equal wt. of distd. H_2O for several hrs. The mixt. is then dild. and 0.5 mol. $Ba(OH)_2$ is added and the I isolated as their Ba salts. The Ba salts of I are sepd. from the Ba halides by extg. the latter with abs. EtOH in a Soxhlet. The yields of the *Ba salts* and the m. ps. of the *phenylhydrazonium salts* are as follows: R = *Me* 81.6%, 193–4° (decompn.); *Et* 83.0%, 182.8°; *Pr* 89.0%, 204.5° (decompn.); *Bu* 86.5%, 114–15°; *Am* 82.0%, 108–8.2°; C_6H_{13} 68.7%, 101–1.6°; C_7H_{15} 70%, 100–0.5°. The acid chlorides are prepd. according to Sprague and Johnson (*C. A.* **30**, 6703[8]). The *p-toluidides* (II) and *p-phenetidides* (III) are obtained by the action of a slight excess of the sulfonyl chloride on a pyridine soln. of the amine. The yields and m. ps. of the II and III are resp.: R = *Me* (IV) 6.7%, 102.0–2.7°, 54.5%, 126.5–7.4°; *Et* 45%, 80.0–0.5°, 38.4%, 80.4–1°; *Pr* (V) 49.5%, 67.0–7.8°, 61.0%, 101.0–1.5°; *Bu* 58.4%, 74.2–5.2°, 48.5%, 78.2–79°; *Am* 56%, 48.4–9.4°, 34.5%, 69–70°. In addn. to these compds. *o-benzoxyphenyl methanesulfonate*, m. 92–3°, and *β-naphthyl methanesulfonate*, m. 103.5–4.5°, are prepd. in 56% and 50% yield, resp. IV and V are tested for their chemotherapeutic and antipyretic actions and compared with those of phenacetin. F. E. Brauns

α-(Alkylsulfonyl) amides. Austin Pomerantz and Ralph Connor. *J. Am. Chem. Soc.* **61**, 3386–8(1939); cf. *C. A.* **32**, 1672[2]; **34**, 372[4].—α-Bromoamides were prepd. from the crude acid chloride of the α-Br acid and concd. NH_4OH (satd. at 0°), the chloride being added during 3 hrs. and NH_3 being passed through continuously at 0°; *α-bromovaleramide* m. 78.5–9°; *α-bromocaproamide* m. 58.5–9°; the yields are 50–70%. α-(Alkylthio)-amides were prepd. by adding the haloamide in portions with shaking to a soln. of the mercaptan in EtONa at 0°; after 2–5 days at room temp. the reaction is complete; with 0.15 to 0.30 mole of reactants the av. yields are 88%. *α-(Alkylthio)amides:* $EtSCH_2CONH_2$ m. 50.5–1°, $EtSCHMeCONH_2$ m. 65–5.5°, $PrSCHMeCONH_2$ m. 56.5–7°, $BuSCHMeCONH_2$ m. 60.5–1.5°, $EtSCHEtCONH_2$ m. 100.5–1°, $PrSCHEtCONH_2$ m. 78–8.5°, $BuSCHEtCONH_2$ m. 65–5.5°, $EtSCMe_2CONH_2$ m. 93.5–4°, $PrSCMe_2CONH_2$ m. 95–5.5°, $BuSCMe_2CONH_2$ m. 107.5–8°, $EtSCHPrCONH_2$ m. 101.5–2°, $PrSCHPrCONH_2$ m. 98.5–9°, $BuSCHPrCONH_2$ m. 64.5–5°, EtSCH(iso-Pr)-$CONH_2$ m. 111–11.5°, PrSCH(iso-Pr)$CONH_2$ m. 98.5–9°, BuSCH(iso-Pr)$CONH_2$ m. 75–5.5°, $EtSCHBuCONH_2$ m. 84.5–5°, $PrSCHBuCONH_2$ m. 100.5–1°, $BuSCHBuCONH_2$ m. 86.5–7°; *β-(butylthio)isobutyramide*, m. 54.4–5° (54%). *α-(Alkylsulfonyl)amides* were prepd. in an av. yield of 72% by oxidation of the mercapto amides in AcOH-Ac_2O with 30% H_2O_2 at about 0°: $EtSO_2CH_2CONH_2$ m. 98.5–9°, $PrSO_2CH_2CONH_2$ m. 104–4.5°, $EtSO_2CHMeCONH_2$ m. 126–6.5°, $PrSO_2CHMeCONH_2$ m. 122–2.5°, $BuSO_2CHMeCONH_2$ m. 114–14.5°, $EtSO_2$-$CHEtCONH_2$ m. 168–8.5°, $PrSO_2CHEtCONH_2$ m. 137–7.5°, $EtSO_2CMe_2CONH_2$ m. 92.5–3°, $BuSO_2CMe_2CO$-NH_2 m. 99.5–100.5°, $BuSO_2CMe_2CONH_2$ m. 77.5–8°, $EtSO_2CHPrCONH_2$ m. 117.5–18°, $PrSO_2CHPrCONH_2$ m. 125–5.5°, $BuSO_2CHPrCONH_2$ m. 125–5.5°, $EtSO_2CH$-(iso-Pr)$CONH_2$ m. 122–3.5°, $PrSO_2CH$(iso-Pr)$CONH_2$ m. 116–17°, $BuSO_2CH$(iso-Pr)$CONH_2$ m. 126.5–7°, $EtSO_2CHBuCONH_2$ m. 112–12.5°, $PrSO_2CHBuCONH_2$ m. 119–19.5°. The pharmacol. study will be reported elsewhere. C. J. West

Reaction of atomic hydrogen and azomethane. H. Heaikin and H. Austin Taylor. *J. Chem. Phys.* **8**, 1–7 (1940).—At 27° the only reaction between at. H and MeN:NMe is an addn. to the N double bond to produce $MeNHNHMe$ by a mechanism with a max. activation energy of 3–4 kg.-cal. At 110° there is, in addn., a rupture of the C-N bond in MeN:NMe, producing CH_4, and of the N-N bond in $MeNHNHMe$, producing $MeNH_2$. The energy of activation of each rupture is about 8 kg.-cal. At 195° an addnl. reaction is evident, involving assocn. of Me radicals with MeN:NMe. G. M. Petty

The synthesis of pentadecanoic acid. Charles F. Krewson. *Pharm. Arch.* **10**, 88–92(1939).—The following scheme employing the nitrile process for attaching an addnl. C to the chain is used: myristic acid → Bu myristate → myristyl alc. → myristyl bromide or iodide → myristyl cyanide → pentadecanoic acid. The prepn. of Bu myristate, m. 163–5° (90.8% yield), tetradecyl alc. (myristyl alc.) and myristyl bromide and iodide is given in detail. H. M. Burlage

Derivatives of fatty acids of high molecular weight. I. Characterizations of acids. Henry Gilman and Grover M. Ford. *Iowa State Coll. J. Sci.* **13**, 135–47(1939).—See *C. A.* **32**, 4943[1]. F. E. Brown

Preparation of pure stearic acid. J. P. Kass and L. S. Keyser. *J. Am. Chem. Soc.* **62**, 230(1940).—Pure stearic acid, m. 69.6–70.2° (cor.) and dissolving in concd. H_2SO_4 at 70° without discoloration, results in quant. yield by catalytic reduction of linoleic, elaidic or α- or β-eleostearic acid in AcOH at 3 atm. pressure of H at room temp. for 3 hrs. C. J. West

Chlorination of butyl trichloroacetates. Howard M. Waddle and Homer Adkins. *J. Am. Chem. Soc.* **61**, 3361–4(1939).—Bu (I), iso-Bu (II) and *sec*-Bu trichloroacetates (III) were prepd. in 82–9% yields by refluxing 2 moles Cl_3CCO_2H and 4 moles of the alc. for 6–8 hrs. In the chlorination of the esters, 2 moles (440 g.) was heated in the reaction flask to 120°, a 200-w. light bulb was placed 5 cm. from the surface and Cl was passed in at the rate of 15–20 g. per hr. at 120 ± 2° and continued until the wt. corresponded to 2 moles Cl (69.9 g.). Each of the esters gave 2 mono-Cl (approx. 0.5 mole) and a di-Cl deriv. (a few hundredths of a mole); about 0.25 mole of ester was recovered unchanged and about 25% was not accounted for except in intermediate fractions and the distn. residue. Chlorobutanols were obtained from 5 of the 9 Cl esters isolated. The lower-boiling Cl esters from II and III reacted with NaOH much more slowly than in the case of the other 5 esters; approx. 50% was recovered unchanged after several hrs. with 1 mole-equiv. of NaOH; iso-PrCHO was detected among the products from II; with 2 mole-equivs. of NaOH 32 g. of the ester of II gave 5 g. of iso-PrCHO and 4 g. of a glycol (?), b_7 69–70°. The Cl ester from III did not yield products which could be identified. *Trichloroacetates:* I, b_{24} 100–1°, d. 1.266, *n* 1.4495 (all d. and *n* values are for d_4^{20} and n_D^{20}); II, b_{24} 93–4°, d. 1.255, *n* 1.4456; III, b_{19} 88–9°, d. 1.252, *n* 1.4440; *2-chlorobutanol*, b_5 94–6°, d. 1.390, *n* 1.4728; *4-isomer*, b_5 113–16°, d. 1.417, *n* 1.4800; *dichlorobutanol*, b_5 127–31°, d. 1.497, *n* 1.4930; *2-chloro-2-methylpropanol*, b_5 80–1°, d. 1.369, *n* 1.4658; *3-isomer*, b_5 98–9°, d. 1.397, *n* 1.4742; *3-chlorobutan-2-ol*, b_5 83–4°, d. 1.378, *n* 1.4671;

1(?)-isomer, b_5 91–3°, d. 1.395, *n* 1.4713; *dichlorobutan-2-ol*, b_5 108–10°, d. 1.475, *n* 1.4850; *dichloro-2-methylpropanol*, b_5 101–5°, d. 1.477, *n* 1.4862; *2-chlorobutanol*, b_{28} 74–6°, d. 1.062, *n* 1.4410 (*phenylurethan*, m. 52.5–3.5°); *4-isomer*, b_{10} 72–5°, d. 1.125, *n* 1.4551 (*phenylurethan*, m. 54–5°); *dichlorobutanol*, b_8 87–93°, d. 1.273, *n* 1.4786; *3-chloro-2-methylpropanol*, b_{21} 76–8°, d. 1.083, *n* 1.4460 (*phenylurethan*, m. 63.5–4°); *1(?)-chlorobutan-2-ol*, b_{27} 68–70°, d. 1.068, *n* 1.4410 (*phenylurethan*, m. 78.5–9°). C. J. West

Preparation of acetyl bromide. Theodore M. Burton and Ed. F. Degering. *J. Am. Chem. Soc.* **62**, 227(1940).—AcBr is prepd. in 71.4–3.4% yields by adding slowly through the dropping funnel, with stirring, a slight excess of 99.5% AcOH (3.075 mols.) to 1 mol. of PBr_3; purified PBr_3 gives only 74.9% of AcBr; addn. of PBr_3 to an excess of boiling Ac_2O gives 81.7% of AcBr. C. J. West

Ketene and its dimer. Charles D. Hurd and Arthur S. Roe. *J. Am. Chem. Soc.* **61**, 3355–9(1939).—Ketene (I) reacts with *tert*-BuOH, *tert*-AmOH and PhOH, with concd. H_2SO_4 or *p*-$MeC_6H_4SO_3H$ as catalyst, to give approx. 90% of their acetates. In the presence of AcOK I reacts with acrolein, crotonaldehyde, HCHO and HCO_2Me to give complex products of high mol. wt.; the reactions occur even at −80°. I and HCO_2H give HCO_2Ac, b_{19} 33–3.5°, n_D^{19} 1.3940, d_4^{20} 1.1458; with $PhNH_2$ this gives PhNHCHO. Acetylketene (II), b_{28} 43–3.1°, has d^{25} 1.0817, γ^{25} 33.89, *P* 188; II displays 23% enolization toward iso-PrMgCl; the liberated gases contain 1.8 and 21.8% (by vol.) of C_3H_8 and C_4H_8. Heating 51.4 g. of II at 650° gives 19.8 g. I and 12.6 g. unchanged II. II (15.7 g.) and BzH give 8.38 g. of PhCH.CHAc. II and Et_2Zn in C_6H_6 or PhMe give a yellow solid that yields nothing but tars on hydrolysis or on reaction with BzCl. C_3O_2 does not react with BzH. C. J. West

Reduction of certain simple and substituted acid amides. I. Electroreduction of cyclic and open-chain peptide groups. N. I. Gavrilov and A. V. Koperina. *J. Gen. Chem.* (U. S. S. R.) **9**, 1394–1401(1939).—Studies of Tafel (*Ber.* **34**, 258, 1181(1901)) and Kindler (*C. A.* **21**, 2669) on the electrolytic reduction of org. acid amides are extended to the investigation of the reduction mechanism of the CO group in the CO-NH link in aliphatic and aromatic acid amides and their *N*-substituted alkyl, aryl, acyl and peptide derivs. The reduction was carried out in a closed porous cell with Pb electrodes (cf. Tafel, *Ber.* **33**, 2209(1900)) at 40° and 9 amp. and 120 v. (c. d. 0.187 amp./sq. cm.). The electrolysis was continued until the absorption of H in the cell had stopped (about 2 hrs.). The detn. of unabsorbed H was made at intervals of 5 min. The rate of H absorption, as well as the kinetics of reduction, was calcd. from the difference in the vol. of residual H formed during the electrolysis with and without the presence of the substance under investigation. The cathode soln. was prepd. by dissolving 0.01 mol. of the substance in a mixt. of 40 ml. H_2O, 30 ml. alc. and 5 ml. of concd. H_2SO_4. Greater proportions of H_2O or alc. were used for poorly sol. compds. $BzNPh_2$ was treated in an AcOH medium. A 20% H_2SO_4 soln. was used as the anode liquid. With some expts. the reaction products or the unaltered substances in the cathode soln. were isolated and identified. The following compds. failed to react: $PhCH_2CONH_2$ (I) and its *N*-Ph (II) and *N*-di-Ph (III) derivs.; $HCONH_2$; $AcNH_2$ and $AcNPh_2$; $EtCONMe_2$ (IV) and $EtCONPh_2$ (V); $Me_2CHCONMe_2$ (VI) and $Me_2CHCONPh_2$ (VII); $Me_3CCONMe_2$ (VIII); phenaceturic acid (IX); acetyl(*N*-phenyl)glycine, $AcNPhCH_2CO_2H$; acetylglycine and dimethyl- (X) and trimethylacetylglycine (XI); glycylglycine and glycylalanine. $PhCH_2CONHMe$ (XII) was reduced 40.2, $HCONMe_2$ (XIII) 52.7, $HCONPh_2$ (XIV) 55.8, $AcNHPh$ (XV) 55, $AcNPh_2$ (XVI) 66 and diketopiperazine 40%. $PhCONH_2$ and its *N*-Me and *N*-di-Me derivs., $PhCH_2CONMe_2$ (XVII), phenylacetopiperidide, $(PhCH_2CON.(CH_2)_4.CH_2)$ (XVIII), and hippuric acid (XIX) were reduced 96–100%. The tentative results show that in the aromatic amides the cathodic reduction of the CO group is only possible when it is directly linked with the aryl radical. The removal of the two even by 1 C atom inhibits the reduction (I and IX). The reactivity of I was successively increased with the substitution of 1 and 2 H atoms in the amido group (XII and XVIII). The same effect was produced by piperidine (XVIII). The introduction of Ph radical caused no increased reactivity (II and III). The aliphatic acid amides as a rule were inactive. The reactivity of $HCONH_2$ and $AcNH_2$ was increased by the introduction of Me and Ph radicals into the amido group (XIII, XIV, XV and XVI). $EtCONH_2$, iso-$PrCONH_2$ and Me_3CCONH_2 and their *N*-substituted Me and Ph derivs. are incapable of reduction (IV, V, VI, VII and VIII). Of the acylated amides only XIX was reduced. X was prepd. when 15 g. iso-PrCOCl was slowly introduced into 11 g. glycine and 30 g. of anhyd. K_2CO_3 in 100 ml. Et_2O and boiled 1–2 hrs. The residue from the ether, after the addn. of excess HCl, was extd. with ether and the ether expelled, giving white crystals, m. 103–4°. XI, m. 134–5°, was similarly prepd. in 26% yield from Me_3CCOCl. Chas. Blanc

3-Nitrophthalates of the monoethers of ethylene and diethylene glycol. A. J. Veraguth and Harvey Diehl. *J. Am. Chem. Soc.* **62**, 233(1940).—*3-Nitrophthalates* of $HOCH_2CH_2OR$ were prepd. by boiling the ether with the anhydride 15 min. after soln. resulted (if the b. p. is above 150°, PhMe is added); the oily layer is washed with hot H_2O and the deriv. crystd. from H_2O contg. sufficient EtOH for soln.; *Me* m. 128.4 9°; *Et* m. 118–8.6° (*monohydrate*, m. 94.2–4.5°); *Bu* m. 120–20.6° (121–20.6° given); *Ph* 112–13°; benzyl, an oil. The *3-nitrophthalate* of the mono-Me ether of diethylene glycol m. 87 90° (monohydrate) or 91.4–2.2° (anhyd.); the derivs. of the Et and Bu ethers are oils. C. J. West

Structure of the mixed polymer of butadiene and acrylonitrile. E. N. Alekseeva. *J. Gen. Chem.* (U. S. S. R.) **9**, 1426–30(1939).—An equimol. mixt. of butadiene (I) and acrylonitrile (II) contg. 1% BzO_2H was polymerized at 60° for 116 hrs. and the product was vacuum-distd. at room temp. II in the polymer was detd. by the Kjeldahl method. The polymer was ozonized and oxidized with H_2O_2 by the method of Pummerer, *et al.* (*C. A.* **30**, 4044[3]). The resulting carboxylic acids were methylated with abs. MeOH contg. 10% HCl and the distn. fractions analyzed, giving succinic, butanetricarboxylic, hexanetetracarboxylic and dodecanepentacarboxylic acids in definite proportions, indicating that about one-half of the polymerization product is formed by the alternate succession of I and II in the mol. About one-third of the polymer consists of the mols. in which 1 I unit corresponds to 2 or 3 mols. of II. Chas. Blanc

Cyclic methyleneimines. II. Hydrolysis of quaternary compounds and preparation of aliphatic secondary amines. Raymond Blundell and John Graymore. *J. Chem. Soc.* **1939**, 1787–9; cf. *C. A.* **33**, 1337.—*N,N',N''*-Trimethyltrimethylenetriamine (I) (from $MeNH_2$ and HCHO) and EtI at 0° after 12 hrs. give the *ethiodide*, m. 72° (decompn.); distn. with NaOH gives $MeNH_2$ and MeEtNH. The *propiodide* of I m. 105° (decompn.); NaOH gives $MeNH_2$ and MePrNH (*2,4-dinitrophenyl deriv.*, orange, m. 72–3°). MePrNH and HCHO in H_2O, made alk. with NaOH, give *methylenebismethylpropylamine*, b. 170–1°, d_4^{19} 0.795. The *butiodide* of I m. 123 5° (decompn.); on standing the product showed a high I content (presence of II). Hydrolysis by evapn. with HCl gives $MeNH_2$.HCl, Me_2BuN and MeBuNH (HCl salt, m. 171°; *2,4-dinitrophenyl deriv.*, golden, m. 81°). I forms a *complex* with NaI and a *diiodide* (II), m. 162°, with I. EtCl, PrCl and BuCl do not react with I; iso-PrI gives a very poor yield of a reaction product. C. J. West

Catalytic action of *p*-toluenesulfonic acid on acetylene γ-glycols. I. The action on 2,5-dimethyl-3-hexyne-2,5-diol and 3,6-dimethyl-4-octyne-3,6-diol. A. Babayan. *J. Gen. Chem.* (U. S. S. R.) **9**, 1410–11(1939).—Preliminary expts. showed that acetylene γ-glycols react with *p*-$MeC_6H_4SO_3H$ (I) by cleaving 2 mols. H_2O and forming corresponding divinylacetylenes. Thus, the distn. of 4.9

g. 2,5-dimethyl-3-hexyne-2,5-diol with 0.07 g. I at 140–60° gave 91.1% *divinylacetylene*, b. 117–20°, b_5 35°. Under similar conditions 3,6-dimethyl-4-octyne-3,6-diol (3.14 g. and 0.08 g. I) yielded 90% *1,2,5,6-tetramethyldivinylacetylene*, b_{680} 160–7°. Chas. Blanc 1

Constituents of the plants of Veronica species. Hukuziro Huzikawa, Yutaka Kudo and Hirosi Sengoku. *J. Pharm. Soc. Japan* **59**, 611–14(in German, 241–2)(1939). —The mannitol content of 8 species of *Veronica* ranged from 0.15 to 0.74%. The mannitol was identified as the hexa-Ac, tribenzylidene, or triformal deriv. F. I. N. 2

Synthesis of amino acids from benzoylaminomalonic ester. E. P. Painter. *J. Am. Chem. Soc.* **62**, 232–3 (1940).—P. confirms the use of $BzNHCH(CO_2Et)_2$ for the synthesis of amino acids as reported by Redemann and Dunn (*C. A.* **33**, 9285[1]); in addn. to those previously prepd. norleucine, α-amino-γ-phenoxybutyric acid and the lactone of α-amino-γ-hydroxybutyric acid have been obtained in good yields. The ester did not give condensation products with CH_2Br_2, $C_2H_4Br_2$ and $C_2H_4Cl_2$ with the proper halogen content, and the desired amino acids could not be isolated after hydrolysis. The use of anhyd. reagents in alkylation of the ester should be emphasized. C. J. West 3

Racemization of amino acids and dipeptides on acetylation with ketene. Wm. M. Cahill and Irving F. Burton. *J. Biol. Chem.* **132**, 161–9(1940); cf. *C. A.* **33**, 1317[3].—*l*(−)-Leucine and *l*(+)-glutamic acid when acetylated with ketene give either the active or racemic *N*-Ac deriv., depending upon the conditions employed. Racemization occurs only when the pH of the soln. is on the acid side of neutrality. Both glycyl-*l*(−)-leucine and *l*(−)-leucylglycine give the corresponding active Ac deriv. but when acetylated under racemizing conditions the former gives a completely racemized deriv. and the latter under the same exptl. conditions yields acetyl-*l*(−)-leucylglycine of max. optical activity. Similar results are obtained with Ac_2O under the proper conditions. This selective racemization may serve as a convenient tool for identifying terminal amino acids in peptides. A. P. Lothrop 4

Synthesis and properties of isocysteine and isocystine. Alfons Schöberl and Hans Braun. *Ann.* **542**, 274–91 (1939).—β-Alanine and o-$C_6H_4(CO)_2O$, heated at 160° for 1 hr., give 85% of *N*-phthalyl-β-alanine, m. 150–1°; Br and red P give 90% of the α-Br deriv. (I), m. 169–71°; Me ester, m. 103–4° (Gabriel, *C. A.* **2**, 1442, gives 52–3°); refluxing I with 48% HBr for 10 hrs. gives 82% of α-bromo-β-alanine-HBr (II), m. 188–90°; *Me ester-HCl*, m. 123–5° (decompn.). II (5 g.) in 8 cc. H_2O, neutralized with 22 cc. *N* NaOH and treated with 12 cc. Na_2S_2 (contg. 325 mg. polysulfide S), satd. with N_2 and allowed to stand in N atm. for 12–15 hrs. at room temp., shaken with animal charcoal, filtered, reduced to half its vol. under H *in vacuo*, acidified with 30 cc. concd. HCl, reduced with 4 g. Sn, dild. to 400 cc., treated with H_2S to remove the Sn and evapd. to dryness, gives 54.8% of isocysteine-HCl (III) (purified through the mercaptide), m. 137–9°. While III can be oxidized by H_2O_2 in aq. soln. contg. $FeSO_4$, isocystine (IV) is obtained cryst. by oxidation of 1 g. III in 4 cc. H_2O with 0.8 g. I in 36% yield (as the HI salt), m. 189–91°; NH_4OH gives 96.4% of free IV, m. 185° (decompn.). III and IV can be detd. colorimetrically by the use of phosphotungstic acid. $ClCH_2CH(OH)CO_2H$ (30 g.) and 300 cc. NH_4OH (satd. at 0°), heated 4 hrs. at 100°, give isoserine; o-$C_6H_4(CO)_2O$ at 160° gives 97.5% of *phthalylisoserine*, m. 196–7° (cor.); *Me ester* (V), m. 106–8° (cor.), 94.5% yield with MeOH and HCl; AcCl gives 100% of the *O-Ac deriv.* of the ester, m. 135–7° (cor.). Refluxing 21 g. V and 42 g. PCl_5 in 450 cc. C_6H_6 for 30 hrs. gives 49% of *α-chloro-β-phthalylalanine Me ester* (VI), m. 119–20°; if $CHCl_3$ is used as the solvent, the by-product, *N-phthalylisoserine monophosphate*, m. 188–9° (cor.), is isolated. Refluxing VI with 20% HCl for 5 hrs. gives 75.7% of *α-chloro-β-alanine-HCl*, m. 134–5°; from this III is prepd. as from II. The degradation products from IV and dithiodiglycolic acid (VII) treated with *N* NaOH at 50° and 100° and with *N* H_2SO_4 and H_2O at 100° are given; VII is stable to *N* H_2SO_4 after 12 hrs. at 100°; IV gives NH_3 only with *N* NaOH at 100° and gives SS only with H_2O (in 15.9% yield) and with *N* H_2SO_4 (in 32.6% yield). C. J. West 5

Structure of alginic acid. I. E. L. Hirst, J. K. N. Jones and Winifred O. Jones. *J. Chem. Soc.* **1939**, 1880–5; cf. *C. A.* **33**, 9287[6].—Two samples of Na alginate (I) were used, having $\eta_{sp.}/c$ 33.3 and 12.4 for c 1; both had $[\alpha]_D^{25}$ 139° (H_2O, c 1). The free acid (II) gave 21% furfural and had an equiv. wt. of 182 (titration with 0.1 *N* NaOH); the yield of CO_2 on boiling with 12% HCl was 70% of the theory, owing to the stability toward acid reagents. II is almost unaffected by boiling dil. HCl, H_2SO_4 or HNO_3; heating with H_2O at 150° led to little if any autohydrolysis. I, II or the Me ester of II could not be acetylated by Ac_2O and C_5H_5N or $ZnCl_2$; HI led to degraded products. Hot dil. alkali rapidly degraded II with the formation of orange decompn. products; thus, the methylation of II by Me_2SO_4 and 30% NaOH was unsatisfactory even when carried out in an O-free atm. II formed an insol. Tl deriv., which reacted slowly and incompletely with MeI and gave even less satisfactory results with Me_2SO_4. Therefore, a degraded II was prepd. by boiling 50 g. I with 400 cc. 10% MeOH-HCl for 17 hrs.; this acid (III) was obtained in a yield of 25 g.; it was sol. in H_2O, had $[\alpha]_D^{25}$ −134° (H_2O, c 1.6), and gave 20.4% furfural and 86.6% of uronic anhydride; the equiv. wt. was 203. The filtrate from III, neutralized with Ag_2CO_3, filtered, evapd., extd. with cold MeOH, evapd. to dryness with 600 cc. *N* TlOH and boiled with MeI for 2 days, extd. with MeOH and further methylated with MeI and Ag_2O, yielded 20.2 g. of a sirup, giving 1.9 g. of Et_2O-insol. solid and 18.3 g. of Et_2O-sol. sirup, 15 g. of which was the *Me ester*, $b_{0.002}$ 147° (bath temp.), n_D^{25} 1.4580, $[\alpha]_D^{25}$ 60° (H_2O, c 10), of *trimethylmannuronic acid*, pale-green viscid sirup, $[\alpha]_D^{25}$ 36.4° (H_2O, c 1.62); oxidation with Br gave a mixt. of 2,3,4-trimethyl-*d*-mannosaccharolactone Me ester and Me 2,3,4-trimethyl-*d*-mannosaccharate. Methylation of III as the Tl salt with MeI, followed by Purdie's reagents, gave a product exceptionally stable to acids; it was recovered unchanged after heating with 3% MeOH-HCl at 90° or 2% MeOH-HCl at 120° for 24 hrs. Boiling with 50% HNO_3 for 18 hrs. gave *meso*-dimethoxysuccinic acid; this indicates that in each of the mannuronic acid residues the Me groups were attached either to C_2 and C_3 or C_4 and C_5. Hydrolysis of the methylated III by heating with 4% MeOH-HCl at 150° for 24 hrs. gave the *Me ester* of *2,3-dimethylmethyl-d-mannuronide*, $b_{0.005}$ 180°, n_D^{25} 1.4650, $[\alpha]_D^{25}$ 59° (H_2O, c 2); hydrolysis gave 2,3-dimethyl-*d*-mannuronic acid (IV), $[\alpha]_D^{25}$ 30° (MeOH, c 1.5), 33° in 2% MeOH-HCl, unchanged after 12 hrs. Oxidation of IV with Br at 30° for 6 hrs. gave 2,3-dimethyl-*d*-mannosaccharic acid, $[\alpha]_D^{25}$ 16° (H_2O, c 4.2), −7.5° (alkali, c 2.1); this was oxidized by HIO_4 to $OHCCO_2H$ and $HO_2CCH(OMe)CH(OMe)CHO$, and further oxidized to $(MeOCHCO_2H)_2$. Thus, the major portion of the I mol. is composed of β-*d*-mannuronic acid residues; reasons are given for the view that I contains solely pyranose residues which must in this case be linked through C_1 and C_4. C. J. West 6

Condensation brought about by bases. VIII. The conversion of ethyl benzoyldimethylacetate to ethyl benzoate and ethyl isobutyrylisobutyrate in the presence of sodium ethoxide and triphenylmethane. The reversibility of the Claisen type of condensation. Charles R. Hauser and Boyd E. Hudson, Jr. *J. Am. Chem. Soc.* **62**, 62–6(1940); cf. *C. A.* **34**, 988[7].—$BzMe_2CCO_2Et$ (I) on standing in Et_2O with EtONa and Ph_3CH for 5 days at room temp. is completely decompd. into BzOEt and $Me_2CHCOCMe_2CO_2Et$ (II). That at least most of the II thus formed from I is in the form of its enolate is shown by the action of $Me_2CHCOCl$ on the reaction mixt., which results in the formation of 32% of *Et 2,2,4,4,6-pentamethyl-3,5-diketoheptanoate*, b_{18} 136–8°; cyclization gives hexamethylphloroglucinol. That the proton donor (Ph_3CH) is necessary for the conversion of I is shown by the fact that the I is recovered unchanged after standing for 5 days with EtONa in Et_2O; stronger proton donors, such as H_2O or EtOH, cause I to be cleaved to acids or 7 8 9

esters. $AcCMe_2CO_2Et$ with EtONa gives Me_2CHCO_2Et, $AcCH_2COCMe_2CO_2Et$ (III) and some AcOEt; it is assumed that the ester is cleaved to form AcOEt and the Na enolate of Me_2CHCO_2Et; the latter immediately enolizes the unchanged ester, which then condenses with AcOEt, giving III. These results illustrate the reversibility of the Claisen type of condensation. The mechanisms of these reactions are discussed. C. J. West

meso-**Methyltetradecylsuccinic acid.** Mitizo Asano and Tiaki Azumi. *J. Pharm. Soc. Japan* **59**, 605–6 (in German, 214–16) (1939).—A mixt. of 50 g. palmitic acid and 4 g. P was heated with 80 g. dry Br at 70–90° for 5 hrs., followed by heating for 4 hrs. more with 20 g. addnl. Br. About 200 cc. dry alc. was added slowly, with cooling, and the mixt. was heated for 1 hr. and cooled. The reaction mixt. was then extd. with ether, washed with a Na_2CO_3 soln. and evapd. to dryness. The oil was then distd., which gave 47 g. Et α-bromopalmitate (I), b_3 190–200°. Et methylmalonate (9 g.) in 15 cc. alc. and 1.2 g. Na and 18 g. I when heated at 130–40° for 9 hrs. gave 18 g. ester, b_4 220–30°, which on hydrolysis gave heptadecane-2,2,3-tricarboxylic acid (II), $C_{17}H_{32}(CO_2H)_3$, decomp. 127°. II (2 g.) when heated at 130–40° for 3 hrs. gave a compd., m. 90–5°, which when boiled with 20 cc. 5% alkali for 30 min. gave, after acidifying, *meso*-α-methyl-α′-tetradecylsuccinic acid, $C_{17}H_{34}(CO_2H)_2$, m. 98–101°. F. I. N.

Ionization constants and hydrolytic degradations of cyameluric and hydromelonic acids. C. E. Redemann and H. J. Lucas. *J. Am. Chem. Soc.* **61**, 3420–4 (1939); cf. Pauling and Sturdivant, *C. A.* **32**, 2087[2].—Improved methods are given for the prepn. of melon (I), its K and Na salts, and cyameluric acid (II) and its K and Na salts. Titration of the K salts of I and II, using the glass electrode, shows that hydromelonic acid (III) is much stronger than II; values of K_1, K_2 and K_3 are: III, large, 3.16×10^{-3}, 1.26×10^{-6}; II, 1×10^{-3}, 6.30×10^{-7}, 1.12×10^{-9}. Hydrolysis of III with 6 *N* HNO_3 (gently boiled for 1.5 hrs.) gives 72.5% of cyanuric acid (IV); hydrolysis of II gives 93.5% of IV. The titration data and results of hydrolysis indicate that the mols. of these 2 acids contain the planar cyameluric nucleus of P. and S. C. J. West

Thiourea complex salts of lead and thallium. C. Mahr and Hertha Ohle. *Ann.* **542**, 44–8 (1939).—A concd. soln. of $PbCO_3$ in $HClO_4$ (contg. 20% of free acid), treated with an equal vol. of $CS(NH_2)_2$ (I) (cold satd. soln.), gives the *complex* $Pb(ClO_4)_2.6I$, needles, easily sol. in H_2O; $Pb(ClO_3)_2.6I$, yellow, sol. in H_2O. $TlClO_4.4I$, needles, which may be recrystd. from H_2O; $TlClO_3.4I$, cryst. ppt. C. J. West

Exchange reaction of the oxygen atom between glucose or fructose and water. Tosizo Titani and Kokiti Goto. *Proc. Imp. Acad.* (Tokyo) **15**, 298–9 (1939).—The work of Koizumi and Titani (*C. A.* **33**, 4555[6]) on the exchange of one O in glucose for O^{18} is confirmed, and similar results are obtained with fructose (100 hrs. at 55° or 9–20 hrs. at 100°). C. J. West

Pectic substances. IV. Citrus araban. G. H. Beaven, E. L. Hirst and J. K. N. Jones. *J. Chem. Soc.* **1939**, 1865–8; cf. *C. A.* **33**, 4203[8].—Com. citrus pectin, used in this work, contained about 78% Me pectate, 7% araban (I), galactan and smaller amts. of other materials, including hesperidin (II). Preferential soln. of the araban occurs when the pectin is boiled with 70% EtOH; 3 extns. of 1 kg. give 10 g. II and 26 g. I, $[\alpha]_D^{19}$ −34° in H_2O; soln. of I in H_2O and pptn. with Me_2CO give I with $[\alpha]_D^{19}$ −118° in H_2O (about 70% pure); the impurities are removed by acetylation, 8 g. crude I giving 4.2 g. of di-Ac deriv., $[\alpha]_D^{19}$ −94° (Me_2CO). I undergoes hydrolysis with hot 0.01 *N* H_2SO_4 at a rate that indicates the presence of arabofuranose mols. in the polysaccharide; the rate is similar to that of apple and peanut arabans under the same conditions. I is methylated by heating the Tl deriv. with MeI; 10 g. I ($[\alpha]_D$ −80°) give 3.9 g. of a Me deriv., pale-brown, crisp solid with $[\alpha]_D^{19}$ −128° (MeOH); hydrolysis yields an equimol. mixt. of 2,3,5-trimethyl-*l*-arabofuranose, 2,3-dimethyl-*l*-arabinose and 3-methyl-*l*-arabinose; details are given of the identification of these sugars. The structural problem is therefore the same as that discussed in connection with the apple and peanut arabans; the higher rotation of the Me deriv. is believed not to indicate a difference in structure but to be due to the difficulty of sepg. the araban and pectic acid. C. J. West

Agar-agar. II. The isolation of derivatives of 3,6-anhydro-*l*-galactose from agar and the synthesis of their enantiomorphs. I. A. Forbes and E. G. V. Percival. *J. Chem. Soc.* **1939**, 1844–9; cf. *C. A.* **32**, 1214.—The isolation of the anhydro sugar has been reported in *C. A.* **33**, 1673[7], 2110[3]. Methylation of 2.4 g. of 3,6-anhydro-α-methyl-*d*-galactoside gives 2.3 g. of the *2,4-di-Me deriv.* (I), $b_{0.01}$ 90.5°, n_D^{15} 1.4641, n_D^{19} 1.4412, $[\alpha]_D^{19}$ 87° ($CHCl_3$, *c* 0.9), $[\alpha]_D^{19}$ 75° (H_2O, *c* 0.5); in *N* H_2SO_4 (*c* 1.2) $[\alpha]_D^{19}$ changes from 72° to 22° in 24 hrs.; the free sugar does not crystallize, $[\alpha]_D^{19}$ 14° ($CHCl_3$, *c* 1.3), 21° (H_2O, *c* 1.2). 2,3,4-Triacetyl-6-tosyl-α-*d*-galactosyl 1-bromide, shaken with Ag_2CO_3 in abs. MeOH for 15 hrs., gives *triacetyl-6-tosyl-β-methyl-d-galactoside*, a glass, $[\alpha]_D^{19}$ −3° ($CHCl_3$, *c* 1.5); titration in EtOH with *N* NaOH gives a *compd.*, $C_7H_{12}O_5$, m. 118°, $[\alpha]_D^{19}$ −114° (H_2O, *c* 0.7); methylation gives *2,4-dimethyl-3,6-anhydro-β-methyl-d-galactoside* (II), m. 82°, $[\alpha]_D^{19}$ −77° (H_2O, *c* 0.6), −86° (H_2O, *c* 0.5). I in MeOH ($[\alpha]_D^{19}$ 98°) and 7% MeOH-HCl gives II (const. rotation after 2 hrs.). II with *N* H_2SO_4 for 18 hrs. at 24 hrs. gives 2,4-dimethyl-3,6-anhydro-*d*-galactose, which forms an *anilide*, m. 118°, $[\alpha]_D^{19}$ 100° (EtOH), changing to 56° in 1 day; the amide (III) m. 150°, $[\alpha]_D^{19}$ 75° (H_2O, *c* 1). The lactone with 3% MeOH-HCl at 70° for 6 hrs. gives *Me 2,4-dimethyl-3,6-anhydro-d-galactonate* (IV), m. 49–50°, $[\alpha]_D^{18}$ 63° (H_2O, *c* 0.6), 73° ($CHCl_3$, *c* 0.6); it readily yields the above amide. The *l*-isomer of III m. 151°, $[\alpha]_D^{19}$ −74° (H_2O, *c* 0.7); the intermediate lactone $b_{0.01}$ 135° (30% of free acid), $[\alpha]_D^{19}$ −27° (H_2O, *c* 1), changing to −37° in 7 days and to −54° on heating at 80° for 24 hrs. (the equil. soln. contains 20% lactone). The *l*-isomer of IV $b_{0.02}$ 125°, m. 48–9°, n_D^{19} 1.4615, $[\alpha]_D^{19}$ −64° (H_2O, *c* 0.6), $[\alpha]_D^{19}$ −72.5° ($CHCl_3$, *c* 0.6). The natural product is therefore the *l*-isomer. The oil from the sepn. of the *l*-isomer on hydrolysis and treatment with $PhNH_2$ yields several crops of tetramethyl-*d*-galactose anilide but no other recognizable substance. 3,6-Anhydro-α-methyl-*d*-galactoside and the *l*-isomer of II on treatment with 6% H_2SO_4 for 3 hrs., followed by neutralization with $BaCO_3$, yield a small quantity of a resin, similar to that obtained when methylated agar is so treated, and a Ba salt (10–20%) which gives an immediate ppt. of CHI_3 in the cold with NaOI (levulinic acid formation). The yield of levulinic ester (16%) produced by the hydrolysis of methylated agar is of the same order as that estd. for the anhydro-*l*-galactose. It is concluded that the 3,6-anhydro-*l*-galactose units are preformed in agar. C. J. West

3,4-Dimethylgalactose. J. S. D. Bacon and D. J. Bell. *J. Chem. Soc.* **1939**, 1869–71.—3,4-Isopropylidene-β-methylgalactoside (8 lots of 2 g. each) in 40 cc. dry $CHCl_3$ and 70 g. N_2O_5 in 250 cc. $CHCl_3$, cooled with ice for 5 min., poured into ice water, shaken and the $CHCl_3$ soln. run into $KHCO_3$, give 14 g. of the *2,6-dinitrate* (I), m. 79°, $[\alpha]_D^{19}$ 40° ($CHCl_3$, *c* 10); some *β-methylgalactoside 2,3,4,6-tetranitrate*, m. 114–15°, $[\alpha]_D^{19.5}$ −12.4° ($CHCl_3$, *c* 4), $[\alpha]_D^{19.5}$ −7.1° (EtOH, *c* 7.1), was also formed; this was also prepd. from β-methylgalactoside and N_2O_5 in $CHCl_3$. Heating 15 g. I with 110 ml. Me_2CO contg. 5 ml. *N* HCl for 4 hrs. gives 10 g. of *β-methylgalactoside 2,6-dinitrate* (II), m. 110–11°, $[\alpha]_D^{19}$ 15.2° (EtOH, *c* 5). Repeated methylation of 10 g. II (MeI and Ag_2O in Me_2CO at 45°) gives 6.5 g. of the *3,4-di-Me deriv.*, m. 75–6°, $[\alpha]_D^{21}$ −13.3° ($CHCl_3$, *c* 6.5); refluxing this in 10 cc. EtOH with 35 ml. of 30% NaOH satd. with H_2S for 30 min., removal of the EtOH, addn. of K_2CO_3 and extn. with $CHCl_3$ give 3.5 g. of *3,4-dimethyl-β-methylgalactoside* (III), m. 102–3°, $[\alpha]_D^{19}$ −9.1° ($CHCl_3$, *c* 6.2). Refluxing 2.6 g. III with *N* HCl for 4 hrs. gives 2 g. of *3,4-dimethyl-β-galactose* (IV), m. 164–6°, $[\alpha]_D^{19}$ 95°, changing to 116.5° in 20 hrs. (0.6546 g. in 10 cc. H_2O); another sample changed from 95.7 to 117.1° in 16 hrs. (0.2220 g. in 10 cc. H_2O). IV

in MeOH-HCl showed little change in rotation in 2 days, an indication that position 4 is methylated. Oxidation of IV with Br (5 days at room temp. and 2 days at 40°) gives *3,4-dimethylgalactonolactone*, not crystd., $[\alpha]_D^{25}$ 89°, changing to 7° in 5240 min.; MeOH-NH_3 gives a poor yield of the *amide*, m. 172–4°; since this reacts with Na-OCl to form a cyanate, position 2 must be free. C. J. West

2,3,4-Trimethylmannose. W. N. Haworth, E. L. Hirst, F. Isherwood and J. K. N. Jones. *J. Chem. Soc.* **1939**, 1878–80.—A compd. (I), provisionally designated 2,3,4-trimethyl-*d*-mannose (II), has been isolated from the hydrolysis of methylated mannocarolose (*C. A.* **29**, 5419[8]) and of methylated yeast mannan (*C. A.* **31**, 5331[2]). Synthesis of II now shows that I differs markedly from it. α-Methyl-*d*-mannoside gives a 6-trityl deriv. (Watters, *et al.*, *C. A.* **33**, 6251[9]); the tri-Me deriv. m. 106–10°, $[\alpha]_D^{25}$ 33° ($CHCl_3$, *c* 1.04); hydrolysis of 12 g. by boiling in 100 cc. glacial AcOH with the gradual addn. of 40 cc. H_2O gives 6.62 g. of *2,3,4-trimethyl-α-methyl-d-mannoside*, $b_{0.005}$ 150° (bath temp.), n_D^{25} 1.4605, $[\alpha]_D^{25}$ 38° (*N* HCl, *c* 3.9); hydrolysis with 2 *N* HCl gives 6.1 g. of II, n_D^{25} 1.4715, n_D^{25} 1.4705, $[\alpha]_D^{25}$ 2° (H_2O, *c* 5.9); it does not yield a cryst. anilide or phenylhydrazone. Oxidation of 6 g. II in 10 cc. H_2O with 10 cc. Br at 40° for 14 hrs. gives 5.9 g. sirupy lactone, n_D^{25} 1.4730; esterification with 3% MeOH-HCl and heating the ester at 160° and 0.005 mm. gives *2,3,4-trimethyl-d-mannonolactone*, $b_{0.005}$ 160°, n_D^{25} 1.4750; *monohydrate*, m. 73°, $[\alpha]_D^{25}$ 138° (H_2O, *c* 2.25) after 5 min., changing to 81° in 95 hrs.; liquid NH_3 gives *2,3,4-trimethyl-d-mannonamide*, m. 143°, $[\alpha]_D^{25}$ 5° (H_2O, *c* 0.8). Oxidation of II with HNO_3, esterification and reaction with NH_3 in MeOH give *2,3,4-trimethyl-d-mannosaccharodiamide*, m. 228° (decompn.), $[\alpha]_D^{25}$ −17° (MeOH, *c* 0.46), −14° (H_2O, *c* 1.7). C. J. West

Synthesis of certain oligosaccharide acetates in the mannose series. Delbert D. Reynolds and Wm. Lloyd Evans. *J. Am. Chem. Soc.* **62**, 66–9(1940); cf. *C. A.* **33**, 1438. 6-Trityl-β-*d*-mannose 1,2,3,4-tetraacetate (prepd. in 150-g. yield from 100 g. mannose) (46 g.) with HBr in AcOH gives 19.3 g. of β-*d*-mannose 1,2,3,4-tetraacetate (I), m. 135.5–6.5° (m. ps. cor.). I (16 g.), 26 g. of Ag_2O, 100 g. Drierite (preheated at 240° for 2 hrs.) and 150 cc. EtOH-free $CHCl_3$, stirred 1 hr., with subsequent addn. of 5 g. I and then 26.6 g. acetobromogentiobiose in 100 cc. $CHCl_3$ during 1 hr., give 73.4% of *6-β-gentiobiosido-β-d-mannose hendecaacetate* (II), m. 122–3°, $[\alpha]_D^{25}$ −21.02° ($CHCl_3$, *c* 3.92). Acetobromogentiobiose in $CHCl_3$, added to abs. EtOH, Ag_2O and Drierite in $CHCl_3$, gives 82% of *Et gentiobioside heptaacetate* (III), m. 158–9°, $[\alpha]_D^{25}$ −23.06° ($CHCl_3$, *c* 4.12). Condensation of the α-isomer of I with acetobromoglucose gives 45.5% of 6-β-*d*-glucosido-α-*d*-mannose octaacetate (IV) (cf. *C. A.* **32**, 4531[2]). The sp. rotation of II as calcd. by Hudson's rules is −19.7°; that of III is −21.4°; it is pointed out that the values of the epimeric differences as required by H.'s scheme seem to hold for 6-linked sugars although they do not hold for 4-linked sugars. The difference for α-gentiobiose octaacetate and IV (17,900) agrees very well with that for α-*d*-glucose pentaacetate and α-*d*-mannose pentaacetate (18,200); the difference for II and 6-β-*d*-gentiobioside-β-*d*-glucose hendecaacetate (12,600) agrees in a satisfactory way with that for β-*d*-glucose pentaacetate and β-*d*-mannose pentaacetate (11,300). Since the epimeric difference is twice the rotational value of C atom 2, the farther the glucosido portion is removed from this C atom, the less influence it seems to have on the value of the epimeric difference. C. J. West

Reduction products of *d*-glucoheptulose. Fred L. Humoller, Stanly J. Kuman and Fred H. Snyder. *J. Am. Chem. Soc.* **61**, 3370–4(1939).—Diphenylmethanedimethyldihydrazine is a convenient reagent to sep. mixts. of *d*-glucoheptulose (I) and α-*d*-glucoheptose. When I is reduced with Na-Hg β-*d*-glucoheptitol (IA) and a compd. which Khouvine and Nitzberg (*C. A.* **27**, 1865) have called α-*d*-glucoheptulitol (II) were obtained. Evidence is presented to show that II is not a pure chem. entity but consists of mixed crystals of α-glucoheptitol (III) plus a small amt. of an optically active impurity; this evidence is as follows: From the values obtained in elementary analyses and in mol.-wt. detns. it is not possible to write a formula which is consistent with the chem. behavior of II. When II is heated in 10% H_2SO_4 it gives III. II with Ac_2O gives the *heptaacetate*, m. 115°, of III, and Ph_3CCl with C_5H_5N gives the *ditrityl deriv.*, m. 142–3°, of III. A satd. soln. of III in MeOH is also satd. with respect to II. Soly. values at 37 ± 1° in MeOH (mg. in 10 ml. MeOH) are: IA 48, II 63.5, III 69.9. C. J. W.

Polysaccharides. XXXIII. The methylation of cellulose. W. N. Haworth, E. L. Hirst, L. N. Owen, S. Peat and F. J. Averill. *J. Chem. Soc.* **1939**, 1885–99; cf. *C. A.* **34**, 7254.—The prepn. and methylation of Me_2CO-sol. cellulose acetate have been repeated; the closest adherence to the conditions prescribed in the earlier papers was observed and the conclusions reached previously have been confirmed in all essentials (Haworth, Hirst and Thomas, *C. A.* **25**, 3828). The investigation of Haworth and Machemer (*C. A.* **26**, 5921) has been extended inasmuch as a method has been devised whereby the necessity for the partial deacetylation of cellulose triacetate has been avoided. The method takes advantage of the fact that fully acetylated cellulose, although it is insol. in Me_2CO, nevertheless swells in dioxane or in a mixt. of Me_2CO and dioxane to give a clear, highly viscous soln. which is eminently suitable in regard to phys. state for the subsequent methylation process. A study is also reported of the direct methylation of cellulose, i. e., the methylation of cellulose (either as cotton sliver or cotton linters) without the intermediate formation of a cellulose acetate. In this method use is made of the fact that alkali brings about extensive swelling of the cellulose fibers with a consequent increased facility of penetration of the methylating agents. The cellulose is stirred for some hrs. with a large excess of 30% NaOH until the whole forms a gelatinous mass. Me_2SO_4 in dioxane is then added very slowly during 12 hrs. and the mixt. maintained at the required temp. throughout. The effectiveness of the methylation is to be judged by the fact that after 1 treatment at room temp. a methylated cellulose having 41% MeO is obtained. The conditions of direct methylation were varied in respect to temp. of methylation, no. of treatments with the methylating agent, the nature of the surrounding atm., the methylation being conducted in air or in an inert atm. of N. It appears that the normal methylation of an end group in cellulose which takes place in the presence of air does not occur if the preliminary methylation is carried out in a N atm. Results are given of the methylation of 14 samples of cellulose, all of which were hydrolyzed; the original should be consulted for the mass of exptl. detail. The technique of H. and M. was used for the detn. of the end group in the methylated products, except that the use of cold concd. HCl was abandoned in favor of a hot mixt. of equal vols. of glacial AcOH and 8% HCl as the hydrolyzing agent; by this method the formation of levulinic acid was reduced to a min.; no other acid product was found. **XXXIV. The methylation of cellulose in an inert atmosphere.** W. N. Haworth, R. E. Montonna and S. Peat. *Ibid.* 1899–901.—Cellulose was exhaustively methylated in an atm. from which O was excluded and all subsidiary operations, such as washing and filtration, were carried out as rapidly as possible and in the cold as long as any alkali was in contact with the cellulose. A progressive diminution of particle size of the methylated cellulose as the no. of methylations is multiplied was observed; the results of a chem. assay after 15 such methylations are given. Cryst. tetramethylglucose was identified as 1 of the products of hydrolysis and the proportion of this substance found corresponded to a min. chain length of 700 glucose units for the methylated cellulose. The mol. wt. of the cellulose detd. osmometrically corresponded to 450 units. It is probably more accurate to state that tetramethylglucose was undoubtedly present and the amt. of it isolated corresponded to a min. chain length of 700 glucose units. Actually 134 g. of methylated cellulose yielded 160 mg. of the glucoside. **XXXV. Hydrocellulose.** H. C. Carrington, W. N. Haworth, E. L. Hirst

and M. Stacey. *Ibid.* 1901–4.—Hydrocellulose (I) prepd. by the action of HCl had an I no. of 1.3 and a Cu no. of 3.3; it gave a bright-yellow color with I; it was sol. to the extent of 30% in 15% aq. NaOH. I (20 g.) gives 32 g. of an Ac deriv. with 43.2% Ac, $[\alpha]^{17}_{5770}$ −20° ($CHCl_3$, *c* 1); this material (22 g.) was fractionated by Me_2CO and pptn. with Et_2O and petr. ether into 3 parts (7, 3 and 11 g.) with $[\alpha]^{20}_{5770}$ −19°, −20° and −21.2°, with apparent chain lengths of 77, 63 and 68. The methylated I (84 g.) was fractionally pptd. from $CHCl_3$ by petr. ether (4, 5 and 60 g.) with $[\alpha]^{20}_{5770}$ −5°, −5° and −7° ($CHCl_3$, *c* 0.5) and apparent chain lengths of 44, 59 and 54. End-group assay on the methylated I showed the av. mol. size to correspond to a chain of about 70 glucose units. **XXXVI. Hydrocellulose.** W. N. Haworth, S. Peat and W. J. Wilson. *Ibid.* 1904–8.—A hydrocellulose (I) prepd. by soaking cotton sliver in 5% HCl at room temp. and which retained its fibrous form (Cu no. 2.6) was sepd. mechanically into fiber (II) and powder (III). III contained 5.5% ash and 1.3% moisture and II gave 0.2% ash and 4.5% moisture; the Cu nos. were 5.4 and 1.7. The I contains no acidic HO groups and no uronic acid groups. Each form gave more than 90% of cryst. glucose on acid hydrolysis. End-group assay showed that the I had an av. chain length of 120 glucose units and the II a chain length of 200; the I no. of the III corresponded to a chain length of 70 glucose units. I appears to be a cellulose which has undergone degradation in the sense that hydrolysis of some glucosidic linkages has taken place under the influence of the mineral acid used in its prepn.; it is thus constituted of fragments of the original cellulose chain mols., the essential structure of these fragments being the same as in the parent cellulose; the hydrolytic cleavage has proceeded further in III than in II. When cotton linters are boiled with 0.25 *N* or 2.5 *N* aq. NaOH only 3% is dissolved; 0.25 *N* NaOH dissolves 40% of III and 12% of II; 2.5 *N* NaOH dissolves 60% of III and 12% of II; the soly. in alkali appears to be inversely proportional to the length of the chain of glucose mols. Cellodextrin with a chain length of 12 units was completely dissolved by boiling 0.25 *N* NaOH and a dextrin of 18 units was sol. to the extent of 96% in 0.25 *N* and completely in 2.5 *N* NaOH. **XXXVII. Oxycellulose.** G. L. Godman, W. N. Haworth and S. Peat. *Ibid.* 1908–14.—Oxycellulose (I), prepd. by oxidation of cotton linters in cold acid by 0.25 *N* $KMnO_4$, retained the fibrous structure of the cellulose but had a Cu no. of 14 and was sol. to the extent of 50% in boiling 1% NaOH. I also contained 1.5% CO_2H groups. On boiling I with 0.25 *N* NaOH 50% is dissolved; extn. with 2.5 *N* NaOH dissolves 50% of the remainder (25% of the original I). I is not readily acetylated by methods which are appropriate for cellulose itself. The material insol. in 0.25 *N* NaOH did not possess the properties peculiar to I; its reducing power (Cu no.) was 0.27 and uronic acid residues were absent; it was no longer resistant to the usual acetylation process and was easily methylated by treatment of the acetate with Me_2SO_4 and 30% NaOH. The methylated deriv. (MeO 44.6%) was sepd. by pptn. from $CHCl_3$ with light petr. ether into 3 fractions which showed viscosities in *m*-cresol soln. corresponding to apparent chain lengths of 110, 92 and 55 glucose units. An assay of the chain length by the end-group method gave a value of 90 glucose units. It is considered that the material insol. in weak alkali is constituted of chain-mols. of glucose units united as in the original cellulose mol. and the av. length of these chains corresponds to 90 glucose units. The fraction of I sol. in 2.5 *N* NaOH had a Cu no. of 0.23 and underwent acetylation and methylation with the usual reagents; the Me deriv. was constituted of chain-mols. of approx. uniform size; the chain length, detd. by the end-group method, was 35 glucose units. It is apparent that the shorter-chain cellodextrin is produced by the fragmentation, under the influence of 2.5 *N* alkali, of the longer-chain mols. of the 0.25 *N* NaOH-insol. fraction. Profound and extensive decompn. has occurred in the fraction sol. in 0.25 *N* NaOH; the same decompn. occurs on treatment of I with 3% $Ba(OH)_2$; the products isolated include HCO_2H, AcOH, lactic acid, a dihydroxybutyric acid, whose *di-Me ether* has n^{20}_D 1.4402 (*Me ester*, n^{20}_D 1.4230), an acid $C_5H_7(OH)_4CO_2H$, whose tetra-Me ether has n^{20}_D 1.4560, $[\alpha]_D$ −4.8°, and a γ-lactone has n^{20}_D 1.4496, $[\alpha]^{20}_D$ 64.4°; the corresponding *acid*, $C_5H_7O_3(OMe)_3$, has $[\alpha]_D$ −7.5°, changing to 32.4° in 25 hrs. Cold acid hydrolysis of 10 g. of I (72% H_2SO_4 for 14 days at room temp.) gives 1.42 g. of a Ba salt of an aldobionic acid, $[\alpha]_D$ 61.7°. Acid hydrolysis of I (72% H_2SO_4 for 7 days at room temp., diln. with a large amt. of H_2O and boiling 16 hrs.) gives 81.2% of glucose; the 0.25 *N* alkali-insol. portion of I gives 89.7% of glucose. The 2.5 *N* NaOH-insol. portion has an apparent chain length of 60 glucose units. The results show that the fragmentation of the cellulose chain which normally occurs under the action of alkali is greatly accelerated if the cellulose is first treated with an acid oxidizing agent. The latter effects the conversion of a portion (6.5% in this case) of the terminal primary alc. groups of the glucose units into CO_2H groups. The high reducing power of I suggests that the fragmentation of the cellulose chain occurs during the oxidation with the formation to the extent of 50% of very short chains of glucose units (the max. chain length would seem to be 30–5 glucose units); the short-chain mols. dissolve in weak alkali and undergo degradation of the kind suffered by the reducing sugars under the same conditions. **XXXVIII. The constitution of glycogen from fish liver and fish muscle.** W. N. Haworth, E. L. Hirst and F. Smith. *Ibid.* 1914–22.—Glycogens from fish liver (dogfish, haddock and hake) and fish muscle (dogfish) have been examd. All of the methylated glycogens gave on hydrolysis an amt. of tetramethylglucose (av. 9.3%) which corresponds to a chain length of 12 glucose residues for the repeating unit. The amt. of dimethylmethylglucoside formed in the hydrolysis is never less than that of the tetramethylmethylglucoside; any formula proposed for the structure of glycogen must take account of the occurrence of dimethylglucose. Some of the samples of glycogen apparently reverted to an insol. form on standing 4 months; they were rendered sol. in cold H_2O by soln. in cold dil. AcOH or better in cold dil. mineral acid and pptn. with EtOH. C. J. West

Rates of reaction of cyclopropyl ketimines with water. John B. Cloke. *J. Am. Chem. Soc.* **62**, 117–19(1940); cf. *C. A.* **23**, 2438.—Details are given of the prepn. of Et (I) and Ph cyclopropyl ketimmonium chloride (II). The rate of hydrolysis at 0° was followed by transferring portions to alkali and extg. with CCl_4 the liberated base which is titrated with acid. Values for II of *k* min.$^{-1}$ for 0.05 and 0.1 *M* solns are 0.0249 and 0.0231 (computed graphically) or 0.0252 and 0.0243 (computed arithmetically). I is much more sol. in H_2O and is far more reactive with H_2O than is II; the value of *k* (graphic) is about 0.036 (approx. because of the very rapid extn. procedure used which was demanded by the great reactivity of the liberated base). The free base from I gives a value of *k* of about 0.5 (half-time value of about 1.5 min. for the base in H_2O at 0°); the value for the base from II ($k \times 10^3$ min.$^{-1}$) shows a drift from 10.1 to 7.3 (11.3 to 6.4) in a reaction mixt. which was not strictly homogeneous, probably caused by the reversing action of the NH_3. The value of *k* min.$^{-1}$ at 0° decreases as the H-ion concn. rises: I with 0.05 and 0.2 *N* HCl at 0°, 0.00284 and 0.00118; II with 0.01, 0.05 and 0.2 *N* HCl at 0°, 0.00747, 0.00435, 0.00189. That the free base from I is more reactive with H_2O than its HCl salt suggests that the dissolved salt may exist largely in the form of an enammonium tautomer. C. J. West

Allenes. II. The preparation of 1-cyclohexyl-2,3-pentadiene. Fred Acree, Jr., and F. B. LaForge. *J. Org. Chem.* **5**, 48–53(1940); cf. *C. A.* **34**, 7317.—In continuation of their studies of the structure of the 5-membered side-chain of pyrethrolene, *1-cyclohexyl-2,3-pentadiene* (I) is prepd. $MeCH{:}CClCHO$ (35 g.) in 200 cc. Et_2O is allowed to react with a Grignard reagent prepd. from 84 g. $C_6H_{11}I$ and 10 g. Mg in 300 cc. Et_2O and decompd. with NH_4Cl. *1-Cyclohexyl-2-hydroxy-3-chloro-3-pentene* (II) (30 g.), b_9 130–5°, m. 39–40°, n^{25}_D 1.4893, is obtained. Hydrogenation of II with Pd-$CaCO_3$ gives *1-cyclohexyl-2-pentanol* (III), b_9 112–14°, n^{25}_D 1.4620. Action of 6 g. PCl_5 on 5.2

g. II in 25 cc. cold petr. ether, boiling the mixt. for a few mins. on a water bath and washing the soln. with ice H_2O, dil. $NaHCO_3$ and H_2O give on distn. 4.2 g. *1-cyclohexyl-2,3-dichloro-3-pentene* (IV), b_{11} 131–3°, n_D^{25} 1.4965. When 10 g. IV in 25 cc. EtOH is dropped into a boiling suspension of 25 g. Zn in 25 cc. EtOH with stirring and the mixt. is boiled for 15 min., filtered and dild. with H_2O, an oil seps. which is extd. with Et_2O. The Et_2O soln. is washed with Na_2CO_3 soln., dried, distd. and gives 4.6 g. I, b_{12} 82–5°, n_D^{25} 1.481. I does not react with maleic anhydride. Its structure is proved by hydrogenation to amylcyclohexane, b. 200 5°, n_D^{15} 1.4474, and by ozonization whereby AcH, cyclohexylacetaldehyde (identified as its semicarbazone, m. 157–9°), and cyclohexylacetic acid (V) are formed. Oxidation of I with $KMnO_4$ yields AcOH and V. An attempt to apply the general series of reactions previously used for 1-phenyl-1,2-butadiene for the prepn. of I failed because $C_6H_{11}MgI$ reduces 2,2,3-trichlorobutanol to the butanol. F. E. Brauns

Physical properties and chemical constitution. IV. Methylcyclohexane and the multiplanar structure of the methylcyclohexane ring. David M. Cowan, George H. Jeffery and Arthur I. Vogel. *J. Chem. Soc.* **1939**, 1862–5; cf. *C. A.* **33**, 1458, 8180³.—Further exptl. work has shown that the methylcyclohexanes *A* (part III) are in fact slightly impure forms of *B'*, for their phys. properties changed appreciably during 6-months' keeping and redistn. over Na afforded material having properties agreeing closely with those originally recorded for *B'*; the properties of *B'* remained unchanged after keeping 1 yr. The view that *A* was a stable form of methylcyclohexane being no longer tenable, expts. were directed to obtain evidence for the existence of forms *B* and *B'*. Clemmensen reduction of pure 2-, 3- and 4-methylcyclohexanones (I), followed by catalytic reduction (to reduce methylcyclohexenes present) gives a product whose phys. properties agreed closely with those originally found for *B'*; this establishes the existence of the *B'* form but no evidence could be found for the *B* modification. The reduction of the semicarbazones of the 2- and 4-I with EtONa gives the *B*-form, which passed in several days into the *B'*-form; 3-I yielded apparently anomalous results; they do not exclude the possibility of the presence of varying quantities of another isomer. The expts. with 2- and 4-I seem to establish the existence of 2 forms of methylcyclohexane, 1 of which (*B*) is comparatively unstable and passes easily into a stable form (*B'*) and thus provides direct evidence for the existence of the methylcyclohexane ring in multiplanar form. The *B* form is particularly sensitive to chem. reagents; e. g., of some 18 prepns. from the semicarbazones it was possible to prep. the *B* form 6 times, the *B'* form being obtained in every other case; if a rubber stopper is used, the *B'* form is invariably obtained. Phys. data are given for many prepns. C. J. West

Pinacolone rearrangement of 1,2-dimethylcyclohexane-1,2-diol and 1,2-dimethylcyclopentane-1,2-diol. Hans Meerwein. *Ann.* **542**, 123–9(1939).—*cis*-1,2-Dimethylcyclohexane-1,2-diol, heated 3 hrs. at 150–60° with 25 cc. of 2% H_2SO_4, gives 70% of 1,1-methylacetylcyclopentane, b_{11} 50.2–50.9°, d_4^{20} 0.9083, n_D^{20} 1.44448. Bartlett and Bavley (*C. A.* **33**, 1471) obtained 87% of 2,2-dimethylcyclopentanone by heating *cis*-1,2-dimethylcyclopentane-1,2-diol with 30% H_2SO_4 but the trans isomer (II) gave only a nonvolatile brown resin. Repetition of this work showed that II with 30% H_2SO_4 gave only 7% of I but when 6 g. of II is added gradually to 42 g. concd. H_2SO_4 at −10° 22% of I results. The difference in the behavior of the 2 isomers is thus one of degree and not of kind. C. J. West

Structure of vinyl polymers. VIII. Polystyrene and some of its derivatives. C. S. Marvel and Neil S. Moon. *J. Am. Chem. Soc.* **62**, 45–9(1940); cf. *C. A.* **34**, 9787.—*o*-BrC_6H_4CHO and MeMgCl in Et_2O give 87% of *o-bromophenylmethylcarbinol* (I), $b_{6.5}$ 108.5°, d_{27}^{27} 1.470, n_D^{25} 1.5702; MeMgI gives a red product from which the I could not be removed completely. Heating 30 g. I with 5 g. $KHSO_4$ and 0.3 g. $C_6H_4O_2$ (II) at 155–60° and 21–30 mm. gives 33% of *o-bromostyrene* (III), b_4 65°, d_{27}^{27} 1.468, n_D^{25} 1.5893. I and $SOCl_2$ give 83% of *o-bromo-α-chloroethylbenzene*, b_2 63–5°, d_{20}^{20} 1.499, n_D^{20} 1.5693; it did not lose HCl on treatment with quinoline. III contg. 1–2% II polymerizes slowly and a solid product was obtained only after several months. III is polymerized in 3–5 min. at 175° or in several hrs. at 160°; with 0.2% Bz_2O_2 at 140–50° polymerization is complete in a few min. The *polymer* (IV) is a hard, brittle, transparent mass, which develops an amber color in a few months; pptn. from C_6H_6 or dioxane by pouring into a large excess of Et_2O or MeOH gives an amorphous powder, having n_D^{25} 1.6333 ± 0.003 for an approx. mol. wt. of 24,000. The *polymer* of the *m*-isomer of III (*n* 1.68) and that (V) of the *p*-isomer (*n* 1.62) are similarly prepd. Refluxing 1 g. of IV with 5 g. activated Zn in 500 cc. dioxane for 7 days gives a buff compd. with 35.4% Br (III has 43.7%). Cu bronze in $PhNO_2$ gives a black tar. Boiling 5 g. IV with excess Na in 2:1 C_6H_6 for 50 hrs. gives a product with about 37% Br; after 3 days in PhMe it contains 35% Br; complete removal follows 300–400 hrs. in boiling xylene. The last reaction gives a white or gray porous brittle mass; it appears that the Br is replaced by Na without a cyclization reaction. Reaction of the xylene soln. with CO_2 gives an acidic material but no definite products could be isolated. The debrominated polymer could not be oxidized to characteristic products and heating with Se at 400° for 20 hrs. gives brown gums. Refluxing V with Na in xylene for 550 hrs. removes 99% of the Br. This indicates a 1,3-structure for IV and V. α-Chlorostyrene and BF_3-AcOEt in EtOH slowly give 1,3,5-$C_6H_3Ph_3$; definite polymeric products could not be obtained. Styrene bromohydrin and AcCl (refluxed 10 hrs.) give 91% of *α-acetoxy-β-bromoethylbenzene*, b_3 105 7°, d_{20}^{20} 1.386, n_D^{20} 1.5380; quinoline and a little II give 34% of *α-acetoxystyrene*, $b_{3.5}$ 87.5–9.5°, d_{20}^{20} 1.074, n_D^{20} 1.5533; *dibromide*, m. 93.5–4.5°. True polymers could not be prepd. from α- and β-acetoxystyrene, β-bromostyrene or α-methoxystyrene. C. J. West

Amines related to 2,5-dimethoxyphenethylamine. I. Richard Baltzly and Johannes S. Buck. *J. Am. Chem. Soc.* **62**, 161–4(1940).—2,5-$(MeO)_2C_6H_3CH_2CH_2NH_2$ (I) yields a *HCl salt*, m. 139° (all m. ps. cor.). I (9 g.), 40 cc. 36% HCHO and 0.1 cc. HCO_2H, heated 3 hrs. at 125°, give *2,5-dimethoxyphenethyldimethylamine*, b_{23} 159°; *HCl salt*, m. 148°, rather hygroscopic; the methiodide in H_2O and AgCl give *2,5-dimethoxyphenethyltrimethylammonium chloride*, m. 184–5°, very hygroscopic. 2,5-$(MeO)_2C_6H_3Ac$ and $BrCH_2CO_2Et$, condensed by use of Zn-Cu alloy, the ester dehydrated by $POCl_3$ and sapond., give *2,5-dimethoxy-β-methylcinnamic acid*, m. 113.5°; catalytic reduction and sapon. of the ester give *β-(2,5-dimethoxyphenyl)butyric acid*, m. 79°; heating in a stream of NH_3 at 220–30° for 2 hrs. gives the *amide*, m. 121°; the Hofmann reaction with NaOCl gives 45% of *β-(2,5-dimethoxyphenyl)propylamine*, b_1 114°; *HCl salt*, m. 149–50°; Decker's method (D. and Becker, *C. A.* **7**, 1513) gives *β-(2,5-dimethoxyphenyl)propylmethylamine*, whose *HI salt* m. 131° and *HCl salt*, m. 146°; the corresponding *dimethylamine* forms a *HCl salt*, m. 182–3°; the *trimethylammonium chloride* m. 159–61° (monohydrate, m. 92°); the *iodide* m. 139°. $CH_2(CO_2Et)_2$ and 2,5-$(MeO)_2C_6H_3CHO$ with piperidine give di-Et 2,5-dimethoxybenzalmalonate, m. 183° (decompn.), catalytically reduced to *di-Et 2,5-dimethoxybenzylmalonate*, m. 156.5° (decompn.); reaction with MeI and EtONa and sapon. give *2,5-dimethoxybenzylmethylmalonic acid*, m. 143° (decompn.); heating above 150° gives *α-methyl-2,5-dimethoxyhydrocinnamic acid*, cream, m. 59.5°; *amide* (II), m. 99° (by heating acid in stream of NH_3 at 220–30° for 2 hrs.; the same amide results from 2,5-$(MeO)_2C_6H_3CHO$ and $MeCHBrCO_2Et$ with Zn, dehydrating with $POCl_3$, catalytic reduction, sapon. and reaction with NH_3); the dehydration with $POCl_3$ or the subsequent distn. results in extensive polymerization, the yield of unsatd. ester being about 20%. Hofmann reaction with II (addn. of II in dioxane to the NaOCl soln.) gives 70% of *β-(2,5-dimethoxyphenyl)isopropylamine*, b_2 137–40°; *HCl salt*, m. 117.5°; *HI salt*, m. 138°; this also results in poor yield

by catalytic reduction of 2,5-dimethoxynitropropenylbenzene (Kauffmann, *C. A.* **11**, 2794); Decker's method gives the corresponding *methylamine*, whose *HCl salt* m. 98.5°; the *dimethylamine*, $b_{0.5}$ 118–21°, forms a *HCl salt*, m. 138–9°; the *trimethylammonium chloride*, m. 203°, very hygroscopic; the *iodide*, m. 142°. **II.** *Ibid.* 164–7. —2,5-$(MeO)_2C_6H_3CHO$ and $BrCH_2CO_2Et$, condensed by the Reformatskiĭ method, give 80% of Et β-(2,5-dimethoxyphenyl)hydracrylate, yellow, b_1 164–7°; the *hydrazide*, m. 161.5° (all m. ps. cor.); the Curtius rearrangement yields *5-(2,5-dimethoxyphenyl)-2-oxazolidone*, m. 107°, cleavage of which by cold, concd. HCl gives *β-(2,5-dimethoxyphenyl)-β-hydroxyethylamine-HCl*, m. 158.5°; this and the other salts may be crystd. from abs. EtOH by addn. of Et_2O or AcOEt or both; the amine also results by reduction of *2,5-dimethoxyphenacylamine-HBr*, yellow, m. 195° (decompn.), which is prepd. by condensation of 2,5-$(MeO)_2C_6H_3COCH_2Br$ (I) and hexamethylenetetramine and hydrolysis with HBr. I and $PhCH_2NHMe$ in Et_2O give *2,5-dimethoxyphenacylmethylbenzylamine* (II), whose *HCl salt*, m. 167.5°; reduction with PtO_2 and H in EtOH gives *β-(2,5-dimethoxyphenyl)-β-hydroxyethylmethylamine-HCl*, m. 151.5°. II with MeMgI, followed by catalytic reduction, yields *β-(2,5-dimethoxyphenyl)-β-hydroxypropylmethylamine*, whose *HCl salt* m. 158–9°. 2,5-$(MeO)_2C_6H_3Ac$ and $BrCH_2CO_2Et$, condensed with Zn-Cu alloy, yield after sapon. *β-methyl-β-(2,5-dimethoxyphenyl)hydracrylic acid*, m. 121–2°; the *hydrazide*, m. 112°, results in 27% yield from the crude washed (but not distd.) ester; unsatisfactory results were obtained with the distd. ester or that prepd. from the acid, due to the tendency of the compds. to dehydrate when distd. or subjected to acids; Curtius rearrangement yields *5-methyl-5-(2,5-dimethoxyphenyl)-2-oxazolidone*, m. 159°; cold concd. HCl gives *β-(2,5-dimethoxyphenyl)-β-hydroxypropylamine-HCl*, m. 174°. Bromohydroquinone di-Me ether, converted into the Grignard reagent and reacted with Me_2NCH_2CN, the base liberated with NH_3, extd. with Et_2O and treated with EtOH-HCl, gives *2,5-dimethoxyphenacyldimethylamine-HCl* (III), m. 171° (decompn.), catalytic reduction of which yields *β-(2,5-dimethoxyphenyl)-β-hydroxyethyldimethylamine-HCl*, m. 155°; its *methochloride*, m. 185 6°. The free base from III and MeMgI give *β-(2,5-dimethoxyphenyl)-β-hydroxypropyldimethylamine-HCl*, m. 176.5°; *methochloride*, m. 213.5°. *α-Isonitroso-2,5-dimethoxypropiophenone*, pale yellow, m. 97–8°, was prepd. by Hartung's method (U. S. pat. 1,989,093, *C. A.* **29**, 1941[7]); catalytic reduction yields *β-(2,5-dimethoxyphenyl)-β-hydroxyisopropylamine-HCl*, m. 175 6° (decompn.). The α-Br deriv. of 2,5-$(MeO)_2C_6H_3COEt$ with excess of $MeNH_2$ in Et_2O gives *2,5-dimethoxy-α-methylaminopropiophenone* (IV), whose *HCl salt*, m. 172–3° (decompn.); catalytic reduction yields *β-(2,5-dimethoxyphenyl)-β-hydroxyisopropylmethylamine*, whose *HCl salt* (V) m. 170°. The *α-dimethylamino analog* of IV m. 154 6° (decompn.); *that* of V m. 198° (decompn.); the methochloride of the latter m. 221–3° (decompn.). It is assumed that the hydroxyisopropylamine group has the ephedrine, rather than the ψ-ephedrine, configuration; the relatively high m. ps. and the methods of prepn. support this view. C. J. West

Sympathicomimetics. Preparation of nitrogen-substituted β-phenylisopropylamines. Armando Novelli. *Anales asoc. quím. argentina* **27**, 169–71 (1939).—A series of *N*-alkyl derivs., $PhCH_2CHMeNRR'$ (R,R' = H or alkyl), were prepd. to det. the effect of the alkyl radicals joined to N on the pharmacol. action. $PhCH_2COMe$ was prepd. by the method of Julian and Oliver (*C. A.* **32**, 8387[4]). The amines were obtained as the HCl salts directly and purified by soln. in abs. alc. and pptn. by anhyd. ether. The yields were from 50–70%. The following *α-phenyl-β-alkylaminopropane hydrochlorides* are described: Me, m. 133-5°; Et, m. 145–6°; Bu, m. 168–9°; Am, m. 186–7°; di-Me, m. 156–8°; di-Et, m. 160–1°; piperidyl, m. 206–8°; all temps. uncor. E. M. Symmes

The reactions of arylacetoaminopolymethines. Terutar Ogata. *Proc. Imp. Acad.* (Tokyo) **13**, 325–7 (1937) (in German); cf. *C. A.* **28**, 5816[1].—The arylacetamino compds. (I) react readily with compds. having an active Me group (II) in the presence of acid-combining substances.

$$(C_nH_n\ldots)(CH{:}CH)_2NC_6H_5 + CH_3(C_nH_n\ldots) = (C_nH_n\ldots)\text{-}RNX\ (I)\ COCH_3\ RNX\ (II)\ RNX$$

$$(CH{:}CH)_2CH{:}(C_nH_n\ldots) + HX + CH_3CONHC_6H_5$$
$$NR$$

Amines may be identified by the highly colored aminocyanines, which they form with I. I reacts with malonic, alkylmalonic and glutaconic acids in the presence of trialkylamines to form polymethine cyanines, *meso*-alkylpentamethine cyanines and heptamethine cyanines, resp. A yield of 0.18 g. V (R = Me), needles, m. 217°, was obtained by heating 0.87 g. III, 0.12 g. IV (R = Me) and 0.6 cc. Et_3N for 20 min. at 80°, washing with Et_2O and then H_2O, and recrystg. twice from alc. $2EtIN.C_6H_4.O.C{:}CHNAcPh$ (III) + $RCH(CO_2H)_2$ (IV) → $2EtIN.C_6H_4.O.C{:}CHCR\ CHCH.O.C_6H_4.NEt$ (V) + $2CO_2$ + $2CH_3CONHC_6H_5$ + HI. By the same procedure 0.03 g. V (R = Et), gray-blue crystals, m. 220°, was prepd. from 0.87 g. III, 0.13 g. IV (R = Et) and 0.6 cc. Et_3N. The sensitizing max. were at 610 μμ for V (R = Me) and 615 μμ for V (R = Et). Ruth Berggren

Secondary amines from nitro compounds. Wm. S. Emerson and H. W. Mohrman. *J. Am. Chem. Soc.* **62**, 69–70 (1940).—Reduction was carried out with 0.1 mole NO_2 compd., 0.3 mole aldehyde and 2 g. AcONa in 150 cc. EtOH with 3 6 g. Raney Ni at an initial pressure of 40 lbs.; shaking was continued for 12–24 hrs., 0.42–0.62 mole of H being taken up. The following yields were obtained: PhNHMe 50%; PhNHEt 57, 63; PhNHBu 94, 96; PhNHAm 84; *N*-heptylaniline 40; $PhNHCH_2Ph$ 33; *N*-butyl-*p*-anisidine 31 (*p-bromobenzenesulfonamide*, m. 72–3°); *N*-butyl-α-naphthylamine 60 (*p-chlorobenzamide*, m. 242 3°); *N-amyl-α-naphthylamine*, b_4 136–46°, d_{20}^{20} 1.102, n_D^{20} 1.6460, 43% (*p-bromobenzamide*, m. 226–7°); *N*-butyl-*p*-toluidine 40, 85; *N-heptyl-p-toluidine*, b_4 135–50°, d_{20}^{20} 0.906, n_D^{20} 1.5055 (*p-bromobenzenesulfonamide*, m. 52–2.5°); *N,N*-dibutyl-*p*-toluidine, b. 295 6°, d_{20}^{20} 0.976, n_D^{20} 1.5514, 53% (*picrate*, m. 186 7°); *N,N-diheptyl-p-tdluidine*, $b_{2.5}$ 175–200°, d_{20}^{20} 0.943, n_D^{20} 1.5089, 34% (*HCl salt*, m. 136°). C. J. West

Molecular dissymmetry due to symmetrically placed hydrogen and deuterium. The α-pentadeuteriophenylbenzylamine problem. G. R. Clemo and G. A. Swan. *J. Chem. Soc.* **1939**, 1960 1; cf. *C. A.* **30**, 5950[6].—Since Adams and Tarbell (*C. A.* **32**, 4961[1]) failed to resolve α-pentadeuteriophenylbenzylamine (I), the previous work has been repeated. The C_6D_5 used m. 5.5°; the C_6D_5Bz m. 47° (oxime, m. 142°); the I b_1 135–40°; I *l-l tartrate*, m. 179–80°; crystn. 10 times from EtOH-light petr. causes no change in m. p. or $[\alpha]_D^{18}$ 12.4° (EtOH, *c* 1.120); the recovered I has no optical activity; the oxalate m. 204–5° and is also optically inactive. C. J. West

The reaction of alloxan with aromatic amines. Alloxan derivatives of *N,N*-dimethyl-*o*-diaminobenzenes. Hermann Rudy and K. E. Cramer. *Österr. Chem.-Ztg.* **42**, 329–36 (1939); cf. *C. A.* **33**, 4986[6].—*o*-$H_2NC_6H_4NMe_2$ and its homologs react with alloxan in different ways depending on conditions. Thus, the anil, *alloxan 5-(2-dimethylaminoanil)* (I), m. 248°, is formed in the absence of a condensing agent. The *p*-H atom to the NMe_2 group is so reactive that in addn. to the formation of I, a phenyldialuric acid likewise is formed. With excess of alloxan in the presence of HCl no anil deriv. is formed, but instead a substituted dialuric acid, *5-(3-barbiturylideneamino-4-dimethylaminophenyl)dialuric acid* (II), m. 265°, is obtained. Simple dialuric acids with an unsubstituted NH_2 group could not be isolated when a 1:1 mol. ratio of the amine and alloxan was employed. In a similar manner 4,3-$H_2N(Me_2N)C_6H_3Me$ reacts with alloxan, yielding the

corresponding anil, *2-dimethylamino-4-methylbarbituryli-deneaniline* (III), m. 248°, and with excess alloxan *5-[3-(barbiturylideneamino) - 4 - dimethylamino - 6 - methylphenyl]dialuric acid* (IV), m. 235–40°. From 3,4-H_2N-(Me_2N)C_6H_3Me and 1 mol. alloxan hydrate the anil, *2-dimethylamino-5-methylbarbiturylideneaniline* (V), m. 248°, is obtained and with excess alloxan, *5-[4-(barbiturylideneamino) - 5 - dimethylamino - 2 - methylphenyl]dialuric acid* (VI), m. 255–60°. The formation of II, IV and VI indicates a reactive nuclear H atom para to the NMe_2 group and another para to the alloxanimino fragment. The *o*-H atoms to the amino groups are unreactive in the formation of phenyldialuric acids. Thus, with 1,2-dimethyl-4-amino-5-dimethylaminobenzene and 1 mol. alloxan hydrate, only the anil, *2-dimethylamino-4,5-dimethylbarbiturylideneaniline* (VII), m. 248°, is obtained. It is noted, however, that besides the barbiturylideneaminophenyldialuric acids which form in these reactions other compds. which are oxidation products of the anils arise in more or less appreciable quantities and these are considered later in this article. The barbiturylideneaminophenyldialuric acids are a new type of alloxan deriv. These no doubt were the type of compds. that Kühling (*Ber.* 26, 543(1893)) mistakenly described as dialloxallyl-*o*-aminoditolylamines. The chem. properties of homologs of I are as follows: well-crystd. yellow compds. insol. in H_2O, EtOH, Et_2O, C_6H_6, sol. in AcOH and especially in hot C_5H_5N, also sol. in both alk. and acid solns. and can be recovered unchanged from such solns. after short exposure. The m. ps. reported are indefinite and less characteristic and refer to rapid heating conditions. For purposes of identification the reaction with CH_2N_2 was employed wherein the corresponding di-Me compds. were obtained. The latter derivs. gave sharp m. ps. as follows (R = dimethylalloxan residue): 2-$Me_2NC_6H_4N$:R, 186°; 2,4-$Me_2NMeC_6H_3N$:R, 175°; 5,2-Me(Me_2N)C_6H_3N:R, 174°; 4,5,2-Me_2(Me_2N)C_6H_2N:R, 175°. The stability of the alloxan 2-aminoanils was reaffirmed by that of the 2-dimethylaminoanils. Thus no cleavage into amine and alloxan was observed even after continued heating with dil. or concd. HCl in sealed tubes. There was some evidence of transformation of these products in which the alloxan fragment still remained linked to the original N atom and these will be described below. Na_2CO_3 and alk. solns. hydrolyze and degrade I and its homologs when heated. Alkali decomps. I into NH_3, CO_2 and *2-dimethylaminophenyliminomalonimide* (VIII), m. 239°. Similarly VII yielded *(2-dimethylamino-4,5-dimethylphenylimino)-malonimide* (IX), m. 250°. The structures of VIII and IX are not final although both yield mono-Me derivs. when treated with CH_2N_2, and both are sol. in alkali. However it is admitted that the tendency for the formation of a 4-membered ring is rare. An important fact in support of these structures is the violet color that results when both VIII and IX are treated with HCl-H_2O_2 and this, according to R. and C., is a specific color reaction for the Me_2N group with a free *p*-position and an *o*-orientated C:N— group. I and its homologs are stronger reducing agents than those of similar type already described in the literature. They reduce neutral $AgNO_3$ soln. rapidly at room temp. II and its homologs like the anils are more or less faintly yellow, well-crystd. compds. which decomp. when heated above 235°. They are amphoteric and dissolve unchanged in acids or alkalies. On continued contact with either soln. and when heated they are transformed in some unknown manner. The faintly acidic =NH groups can be methylated with CH_2N_2 with the formation of an alkali-insol. well-crystd. tetra-Me compd. Homologs of I and II react oppositely in their behavior toward $AgNO_3$. With HCl-H_2O_2 II and its homologs produce no violet color, which is in agreement with the fact that there is no available H atom in the *p*-position to the NMe_2 group. The reactions typical for the parent dialuric acids or for alloxantin, with $Ba(OH)_2$, NH_3 or $FeCl_3$-NH_3 and the murexide test are neg. for II and its homologs. The latter type compds. also exist in several mutually convertible forms which are differentiated by their m. p., soly., and H_2O of crystn. content. Thus there are 2 colorless forms of II sol. in MeOH, the one contg. 3, the other 4 mols. of H_2O of crystn. The trihydrate loses 2 mols. H_2O at 100° and 1 mm. while at 135° and 1 mm. it changes slowly into the anhyd. form. The tetrahydrate changes entirely to the anhyd. deep yellow form which m. 235–40° (decompn.). On exposure to air, the anhyd. form changes back to the tetrahydrate with rapid loss of color. Both MeOH-sol. forms become difficultly sol. in glacial AcOH on heating; on standing in a desiccator this transformation is reversed. Several possible explanations are advanced for these changes: first, a reversible hydrolytic cleavage of one alloxan fragment. This has been established to be true for anils previously described in the literature. Furthermore, a temporary addn. of H_2O may occur at the C:N— linkage or there may be a cis-trans isomerization. The strong reducing power of I is one of the most remarkable properties of this class of substances although no action is observed with atm. O_2. With H_2O_2, reaction is rapid and stable end-products consisting of substituted benzimidazolcs are isolated. In neutral or in AcOH soln. I, in the absence of air, dissolves completely. On introducing O and heating, no reducing action is noted and instead a weakly-basic compd. is formed, which forms a picrate, as well as double salts with $ZnCl_2$ and $HgCl_2$. This isolated oxidation product is insensitive to O but is degraded to 1-methylbenzimidazole by H_2O_2. The mechanism of the oxidation is as follows: H_2O adds on at the C:N- bond, producing a strong reducing agent, aminodialuric acid. This through addn. of O and elimination of H_2O is converted into dialuric acid. Finally the latter compd. through elimination of H_2O yields a *bis[5-(1-methyl-2,3-dihydro-3-benzimidoazolyl)-5-barbituryl] ether* (X), m. 365° (decompn.). The structure of X is based upon its elementary analysis, its reactivity to form metal salt double salt compds. and its smooth conversion into 1-methylbenzimidazole. X is oxidized to the latter compd. by heating with H_2O_2-AcOH and to all appearances, 1-methyldihydrobenzimidazolecarboxylic acid is an intermediate product. Similarly the conversion of VII into its corresponding *bisbarbituryl ether* (XI), m. 348°, occurs even more readily. The sensitiveness of this transformation is so marked that it takes place on recrystn. from AcOH. Its stability depends on the nuclear substituents. 1,2-Dimethyl-4-dipropylamino-5-aminobenzene and alloxan yield exclusively the corresponding *bisbarbituryl ether* by virtue of the easy conversion of its anil into the latter. Thus R. and C. have outlined a new method of prepn. of imidazole derivs. In most instances where a NMe grouping appears in such derivs. they have been prepd. through a condensation reaction involving an *o*-substituted -N:O group. X and XI arise in considerable quantity as secondary products in the synthesis of anils from amines and alloxan and can be prepd. readily in this manner inasmuch as they are difficultly sol. in anhyd. C_5H_5N in contrast to the remaining reaction products. Alloxan is the oxidant since it is converted into dialuric acid. I and its homologs in dil. Na_2CO_3 with H_2O_2-AcOH yield red cryst. compds. whose compn. differs from that of the corresponding anils by 1 less CO group. This reaction corresponds with the oxidation of alloxan to parabanic acid. The mechanism consists first in the addn. of H_2O to the anil, opening up the alloxan ring between N(1) and C(6), followed by an alk. cleavage to a hydantoin deriv. which by decarboxylation and oxidation yields the parabanic acid deriv. Thus, from I, *parabanic acid 4-(2-dimethylaminoanil)* (XII), m. 215°, is formed. The conclusion that these red oxidation products of alloxan anils are parabanic acid anils is supported on the one hand by analogy with alloxan degradation to parabanic acid and on the other hand by the violet color with HCl-H_2O_2; furthermore these oxidation products exhibit a pos. violet color where the *p*-H atom to the NMe_2 group is unsubstituted. This color reaction is also specific for the NMe_2 group in the other position to the C:N- linkage. Attempts to establish the structures of these red oxidation products of I and its homologs through clear-cut degradations or by synthetic means have been without success even until the present work. The parabanic acid anils are sensitive to both acids and alkalies. The hydrolytic

products resulting on heating with alkali are strong reducing agents and are rapidly oxidized in air. Energetic oxidation with H_2O_2 in AcOH at higher temps. also yields 1-methylbenzimidazole. It is possible that ring closure is brought about by atm. O although no intermediates have been prepd. The mechanism of the condensation of alloxan with *N,N*-dimethyl-*o*-diaminobenzenes to form the bisbarbituryl ethers is as follows: The reactants in a 1:1 mol. ratio yield the anil. This with another mol. of alloxan or the original reactants in a 1:2 mol. ratio of the amine and alloxan yields the corresponding barbiturylideneamino-substituted phenyldialuric acid. Oxidation of the latter with alloxan after addn. of water results in the formation of the desired bisbarbituryl ether. All three products, the anil, the barbiturylideneamino-substituted phenyldialuric acid and the corresponding bisbarbituryl ether are formed together when the condensation of the reactants occurs in alc. If the mol. ratio of reactants is 1:1 the ether is obtained only in traces. If the mono-HCl salt of the arylamine is reacted with excess alloxan, no anil is isolated, but instead only the other 2 products mentioned. The same observations apply likewise to the dimethylaminotoluidines similarly employed. With 1,2-dimethyl-4-amino-5-dimethylaminobenzene the exception to the rule is observed in that no barbiturylideneaminophenyldialuric acid is obtained but instead, the corresponding anil and ether were isolated. Although alloxan 4-dimethylaminoanil is readily hydrolyzed by acids, the isomers described by H. and C. are all stable toward both concd. and dil. mineral acids. In no instance was there a cleavage of the azomethine into its components but at the most an oxidation to a benzimidazole deriv. The *o*-orientated Me_2N group stabilizes the C.N- linkage. These observations of the behavior of the isomeric anils corresponds with earlier published descriptions of the properties of other isomeric Schiff bases. Hydrolysis of anils depends often on the acid concn. Dimroth and Zoepritz (*Ber.* **35**, 984 (1902)) established this fact and explained it through an intermediate salt-forming product. Thus the fact that I cannot be split either by dil. or concd. acids and even forms a stable salt form is not the only reason for its stability. There is some extraordinary process exerted within the mols. W. A. Cook

The constitution of diazoamino compounds. Angelo Mangini. *J. Soc. Chem. Ind.* **58**, 327–30(1939).—Dwyer's observations (*C. A.* **33**, 1682[6,7]) that a "normal" and an "aci" (coördinated quinoid) structure exist in certain nitro diazoamino compds. are incompatible with the exptl. results found by M. The formation of Na and K salts of nitro diazoamino compds. contg. the NO_2 group in the *o*-, *m*- or *p*-position in either or both aromatic rings would imply the existence of true *m*-quinoid salts if "aci" forms exist. It is considered that in the salts the alkali metal is attached to N. Their intense color may easily be interpreted on the polar theory of unsatd. chromophores by analogy with other salts through N or O atoms. The salts are regarded as in a strongly ionoid intramol. state due to the simultaneous presence of 2 antiauxochromes, N:N and NO_2. The chromoisomerism which was observed in Ag and Hg salts of diazoamino compds., the relation between their color and the aromatic groups and substituents present and the recent spectroscopic studies by Wohl (*C. A.* **33**, 9300[2]) are discussed in connection with the probable structure of the diazoamino compds. From numerous exptl. results it is concluded that their isomerism is of a geometrical type. F. E. Brauns

The action of Grignard reagents on heavy metal salts. III. Mixed Grignard reagents and silver bromide. Lionel Joseph with John H. Gardner. *J. Org. Chem.* **5**, 61–7(1940); cf. *C. A.* **32**, 923[6].—The action of AgBr on a no. of pairs of Grignard reagents has been studied and it has been found that with a mixt. of PhMgBr and various alkylmagnesium bromide compds. (I) in all cases except where the alkyl group is *tert*-Bu, some of the unsym. product is formed. With $PhCH_2MgBr$ and I the yields of benzylalkanes increase and those of the bibenzyl decrease with the increase of the chain lengths of I, except in the case of *tert*-Bu. There is a definite relation between the course of the reaction and the electronegativities of the radicals involved. The significance of the results obtained on the detn. of the mechanism of the reaction is discussed. F. E. Brauns

Preparation of phenylarsenoxides in relation to a projected study to their chemotherapeutic activity. I. Monosubstituted derivatives. G. O. Doak, Harry Eagle and H. G. Steinman. *J. Am. Chem. Soc.* **62**, 168–70(1940).—A series of monosubstituted phenylarsenoxides has been prepd. with a view of studying their action against *Treponema pallidum*. *p*-$O_2NC_6H_4AsO_3H$ (I) in suspension in dil. HCl with SO_2 and KI gives *p-nitrophenylarsenoxide*. The *o-isomer* (II) is a light-yellow powder; addn. of Me_2CO to an alk. soln. gives the *di-Na salt*, with 2 mols. of H_2O; this may have a quinoid structure for when buffered with $NaHCO_3$ it could not be titrated with I. The soln. of II in alkali is deep-brown and does not show the toxicity or activity of the typical arsenoxide. The *m*-isomer gives only the arsenous acid which does not lose H_2O at 100°. Reduction of 10 g. of the *m*-isomer of I in concd. HCl gives the dichloroarsine-HCl which with NH_4OH yields *m-aminophenylarsenoxide*, which could be crystd. from alk. soln. by addn. of satd. NaCl soln. but could be freed from the salt only with difficulty; it softens at 62° without a definite m. p. *m-Hydroxyphenylarsenoxide*, from the *m*-dichloroarsine, with 2 mols. H_2O, lost at 150° for 12 hrs., giving a brittle pulverulent mass; *o*-isomer, m. 182–4° (cor.); H_2O_2 and $FeCl_3$ give a deep-wine color. *m-Chlorophenylarsenoxide*, a white powder on pptn. from EtOH with ice H_2O, which becomes sirupy on removal of the H_2O. The *o*-Cl isomer softens at 208° (Hiratuka, *C. A.* **33**, 1575[8], gives the m. p. as 140–50°). The *di-Na salt*, with 1 mol. H_2O, of *o*-$HO_3SC_6H_4AsO_3H$ results on heating the *o*-I deriv. with Na_2SO_3, acidifying to litmus and pptg. with EtOH; reduction in HBr and treating the dibromoarsine with NaOH gives the *Na salt* of *o-sulfophenylarsenoxide*. *o-Iodophenylarsenoxide*, m. 267°. C. J. W.

Modified Bart reaction. G. O. Doak. *J. Am. Chem. Soc.* **62**, 167–8(1940).—Whereas *p*-$HO_3SC_6H_4AsO_3H$ and the *p*-H_2NO_3S deriv. can be prepd. by the Bart reaction (Oneto and Way, *C. A.* **33**, 7750[8]), the reaction fails with the meta and ortho compds. However, the alc. Bart reaction (Scheller, Fr. pat. 624,028) may be successfully applied; anilines substituted in the ring by NO_2, CO_2H or SO_2NH_2 groups gave excellent results but the reaction failed with 2,6- and 3,5-$Me_2C_6H_3NH_2$ and with metanilic acid. The amine (0.1 mole) in 250 cc. abs. EtOH with 10 g. H_2SO_4 and 28 g. $AsCl_3$ at 0°, diazotized with a satd. aq. soln. of the calcd. amt. of $NaNO_2$, then treated with 1 g. CuBr, the mixt. stirred and warmed to 60° until the evolution of N ceased. By this method *p*-$H_2NO_2SC_6H_4AsO_3H$ results in 57% yield; the *m-isomer* is formed in 58% yield, m. 218–19° (in a bath preheated to 215°); it is recovered unchanged after heating with concd. HCl at 100° and is only partially hydrolyzed by cold concd. H_2SO_4 after 24 hrs. *m*-$O_2NC_6H_4AsO_3H$ results in 54% and the 3-nitro-4-methyl deriv. in 40% yield; *m*-$HO_2CC_6H_4AsO_3H$ is formed in 76% yield. C. J. West

Addition of *N*-haloamides to olefins. M. S. Kharasch and Hill M. Priestley. *J. Am. Chem. Soc.* **61**, 3225–32 (1939).—Halosulfonamides of the type $R'SO_2NBrR$ react with a large no. of olefins to yield products in which the Br atom takes the same position as the Br atom in the "normal" addn. of HBr to these substances. The *N,N*-dibromosulfonamides, on the other hand, add to olefins to give products in which the Br atom takes the same position as the Br atom in the "abnormal" addn. of HBr to these compds. $PhSO_2NBrMe$ (10 g.) and 8 g. $PhCH{:}CH_2$, warmed slightly and then cooled, give *1-phenyl-1-bromo-2-(N-methylbenzenesulfonamido)ethane*, a sirup which forms a hard glassy mass. *p*-$MeC_6H_4SO_2NBrMe$ (32 g.), added in 5 portions to 16 g. $PhCH{:}CH_2$, gives 32 g. of *1-phenyl-1-bromo-2-(N-methyl-p-toluenesulfonamido)ethane* (I), m. 67°; refluxing with AcONa in AcOH for 4 hrs. gives 3.5 g. (and 5 g. less pure) of the *1-AcO deriv.*, m. 94°, from 10 g. I; NaOH in EtOH, refluxed 0.5 hr., gives the *1-HO deriv.*, a pale-yellow, thick oil; reduction with Na

in AmOH gives 80% of *methyl(2-phenyl-2-hydroxyethyl)-amine*, m. 78°. Boiling 2.5 g. I in 2.5 cc. quinoline for 10 sec. gives 1.4 g. of *1-phenyl-2-(N-methyl-p-toluenesulfonamido)ethylene*, m. 106–7°; this also results by refluxing I with 3% EtONa for 10 min.; catalytic reduction gives a sirup which is hydrolyzed to $PhCH_2CH_2NHMe$; this amine results in 1 step by the use of Na in AmOH. The *N-benzylbenzenesulfonamido analog* of I is an oil; the *N-benzyl-p-toluenesulfonamido analog* m. 99°; boiling with 2% EtONa gives *1-phenyl-2-(N-benzyl-p-toluenesulfonamido)ethylene*, m. 122°; catalytic reduction gives the *ethane*, m. 105°, which with Na in AmOH gives $PhCH_2NHCH_2CH_2Ph$, whose HCl salt m. 265°. Passing a fairly rapid stream of isobutylene (II) through a suspension of 5 g. of $PhSO_2NBrMe$ in 10 cc. $CHCl_3$ at 40° for about 15 min. gives 4.8 g. of *1,1-dimethyl-1-bromo-2-(N-methylbenzenesulfonamido)ethane* (III), m. 95°; liquid II may also be used; the *N-methyl-p-toluenesulfonamido analog* of III m. 93° (9.7 g. from 10 g. amide). Boiling 8.4 g. of III in 16 cc. quinoline for 1 min. gives 3.8 g. of *1,1-dimethyl-2-(N-methylbenzenesulfonamido)ethylene* (IV) or *1-methyl-1-methylene-2-(N-methylbenzenesulfonamido)ethane* (V), a viscous oil which, on catalytic reduction and hydrolysis, yields iso-BuNHMe. The *N-methylbenzylsulfonamido analog* of III, m. 123°, results in 1.5-g. yield from 2 g. of the amide and 2 cc. of liquid II in 6 cc. $CHCl_3$ in a sealed tube at 40°; quinoline gives the *N-methylbenzylsulfonamido analog* of IV or V, m. 60°; catalytic reduction gives *N-methyl-N-isobutylbenzylsulfonamide*, m. 83°. CH_2Cl_2: $CHCl_3$ (15 g.) and 26 g. of $PhCH_2SO_2NBrMe$ give 26 g. of *1-bromo-1-chloro-2-(N-methylbenzenesulfonamido)ethane*, m. 90°; the *N-methyl-p-toluenesulfonamido analog* (VI), m. 90°. With 1% EtONa (refluxing 50 min.) VI gives *1-chloro-2-(N-methyl-p-toluenesulfonamido)ethylene*, m. 91°. p-$MeC_6H_4SO_2NBrMe$ (10 g.) and 10 cc. liquid C_3H_6 in 30 cc. $CHCl_3$, heated 30–40 min. at 70–80° in a sealed tube, give 8.5 g. of *1-(N-methyl-p-toluenesulfonamido)-2-bromopropane* (VII), m. 92°; removal of HBr with 2% EtONa, catalytic reduction and hydrolysis give MePrNH; the *N-methyl-N-propyl-p-toluenesulfonamide*, m. 40°. p-$MeC_6H_4SO_2NH_2$ (11.5 g.) and 6.9 g. of Br are treated with 27 cc. of 20% NaOH and the lower layer is dissolved in 60 cc. lukewarm $CHCl_3$; dropwise addn. of 15 cc. of $PhCH{:}CH_2$ gives 14 g. of *1-phenyl-1-p-toluenesulfonamido-2-bromoethane* (VIII), m. 167°; anethole gives *1-p-anisyl-1-p-toluenesulfonamido-2-bromopropane* (IX), m. 167°; isosafrole gives the *3,4-methylenedioxyphenyl analog* of IX, m. 153°. The action of 8 cc. of 20% aq. NaOH upon 11.5 g. of VIII in 40 cc. EtOH gives 8.6 g. of *N-(p-tolylsulfonyl)styrenimine* (X), m. 95°. VIII and Br with 20% aq. NaOH gives $CH_2BrCHPhNBrSO_2C_6H_4Me$ which with $PhCH{:}CH_2$ gives *1-phenyl-1-bromo-2-[N-(1-phenyl-2-bromoethyl)-p-toluenesulfonamido]ethane*, $PhCHBrCH_2N(SO_2C_6H_4Me)CHPhCH_2Br$, m. 158°. X in Et_2O, shaken with 15 cc. of aq. HBr, gives *1-phenyl-1-bromo-2-p-toluenesulfonamidoethane*, m. 111°; the *1-Cl deriv.* m. 137° and the *1-I deriv.* m. 67°. Catalytic reduction of X in MeOH gives *N*-phenylethyl-*p*-toluenesulfonamide (XI), m. 67°, which is hydrolyzed to $PhCH_2CH_2NH_2$; this results in 1 step by the use of Na in AmOH. Treatment of XI with Br and NaOH and then with $PhCH{:}CH_2$ gives *1-phenyl-1-bromo-2-(N-phenethyl-p-toluenesulfonamido)ethane*, m. 97°. Refluxing X with H_2O for 2 hrs. gives *N-(2-phenyl-2-hydroxyethyl)-p-toluenesulfonamide* (XII), m. 113°. X and Cl_3CCO_2H, warmed until soln. results, give *1-phenyl-1-trichloroacetoxy-2-p-toluenesulfonamidoethane*, m. 125°; *1-EtO analog*, m. 106°; *1-crotonoxy analog*, m. 85°; *1-AcO analog*, m. 105°, results from XII and AcONa in AcOH or from X and AcOH. XII with Na in AmOH yields 2-phenyl-2-hydroxyethylamine.

C. J. West

Sulfanilamide compounds. II. Arylidene derivatives of N^1-substituted sulfanilamides. H. G. Kolloff and James H. Hunter. *J. Am. Chem. Soc.* **62**, 158–60(1940); cf. *C. A.* **32**, 6232⁷.—The arylidine derivs. were prepd. in 73–100% yields by condensing $H_2NC_6H_4SO_2NHR$ with ArCHO in the absence of a solvent; the products were crystd. from C_6H_6, PhMe, $C_6H_4Me_2$ or Me_2CO-petr. ether, though in some cases the crude material was simply washed with suitable solvents. *Sulfanilamide derivs: N^4-benzylidene*, m. 176°; 4-MeO deriv., m. 192–3°; 4-Me_2N deriv., m. 226–7°; *N^4-benzylidene-N^1-phenyl*, m. 175–5.5°; *4-MeO deriv.*, m. 166°; *4-dimethylamino deriv.*, m. 231°; *N^4-benzylidene-N^1-(4-nitrophenyl) deriv.*, m. 192°; *4-MeO deriv.*, m. 213.5°; *4-dimethylamino deriv.*, m. 231°; *N^4-benzylidene-N^1-(2-pyridyl) deriv.*, m. 245–6°; *4-MeO deriv.*, m. 212–12.5°; *4-dimethylamino deriv.*, m. 238.2–40°. Biol. data are given which indicate that, in general, introduction of an arylidene group results in a slight, but not particular significant, decrease in both the antistreptococcal and antipneumococcal activity; the latter was diminished to a greater extent than the former. In every instance the toxicity was found to be lowered. C. J. W.

Some alkamine esters of disubstituted methylcarbamic acids. John J. Donleavy and James English, Jr. *J. Am. Chem. Soc.* **62**, 218–19(1940).—Ph_2CHBr and AgNCO in Et_2O, refluxed and stirred for 3 hrs., give 80% of Ph_2CHNCO (I), b_4 148°. I and the desired amino alc. in dry Et_2O, refluxed 3 hrs., give the carbamate, which is pptd. by HCl and recrystd. from Me_2CO; these were also prepd. by reaction of $Ph_2CHCOCl$ in Me_2CO at 0° with satd. aq. NaN_3, extg. the isocyanate with Et_2O and reacting with the alc. (64% yield). *Diethylaminoethyl diphenylmethylcarbamate-HCl*, m. 179°; *diethylaminopropyl ester-HCl*, m. 183°; *dibutylaminoethyl ester-HCl*, m. 136°; *β-piperidinoethyl ester-HCl*, m. 119°; *diethylaminoethyl α-phenylethylcarbamate*, b_5 178°; *diethylaminopropyl ester*, b_3 164°; *diethylaminoethyl isopropylcarbamate*, b_5 123–5°; *HCl salt*, m. 114°. The compds. are highly active *local anesthetics* of toxicity comparable to cocaine; they are somewhat irritating, however. C. J. West

Identification of some aromatic compounds through their picrates. Olier L. Baril. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 15–18(1939).—A discussion of the value of picric acid as a reagent, sources and properties of picric acid, metallic picrates and org. picric acid derivs. 11 references. Leopold Scheflan

Preparation of *m*-halophenols. Herbert H. Hodgson. *J. Am. Chem. Soc.* **62**, 302(1940).—Commenting on the work of Natelson and Gottfried (*C. A.* **33**, 5385⁶), H. claims that the prepn. of m-BrC_6H_4OH is that covered by his Brit. pat. 200,714 (*C. A.* **18**, 274). C. J. West

Mercury and bromine derivatives of acetyl-*p*-phenetidine. Michele Ragno. *Ann. chim. applicata* **29**, 148–51(1939).—Fusion of 1 mol. of acetyl-*p*-phenetidine (I) with 3 and 4 mols., resp., of $Hg(OAc)_2$ gives tris(acetoxymercuri)- (II), and tetrakis(acetoxymercuri)acetyl-*p*-phenetidine (III). These form colloidal solns. in water, probably because of their high mol. wt. Treated with Br_2 in alk. soln. in proportions of 3 Br to each Hg, the corresponding tri- and tetrabromo derivs. (IV and V) of I are formed. II and III decompose on heating to 155° and 170°, resp., while IV and V melt at 165° and 268°, resp. A. W. C.

Monomercury derivatives of acetyl-*p*-phenetidine. Michele Ragno. *Ann. chim. applicata* **29**, 414–18(1939).—By heating equimol. solns. of acetyl-*p*-phenetidine and $Hg(OAc)_2$ in water, *3-(acetoxymercuri)-N-acetyl-β-phenetidine* (I) is formed, as white crystals, m. 169–70°. By elimination of the AcOHg group with Br, 3-bromophenacetin, m. 113–14°, results, thus proving the constitution of I, and also showing that the AcNH group has the same orienting effect as the OEt group. I does not form colloidal solns.

A. W. Contieri

Sulfonates of higher alkyl phenolic ethers. G. Spencer Hartley. *J. Chem. Soc.* **1939**, 1828–34.—Ethers of PhOH and MeC_6H_4OH were prepd. by refluxing with 0.6 equiv. of 0.5 *N* EtOH-KOH and 0.4 equiv. of alkyl bromide for 6 hrs.; the yields may be as high as 90%; Ph cetyl, m. 42°; *o*-, *m*- and *p*-tolyl cetyl, m. 21.5, 35 and 42.5°, resp.; *p*-tolyl dodecyl, m. 23.5°. Dioctyl ethers of dihydric phenols were prepd. from the phenol in 95% EtOH by adding in 5 portions 0.2 equivs. each of *N* EtOH-KOH and octyl bromide at intervals of 1 hr. and refluxing for an addnl. 2 hrs.; *o*-, m. 23.5°; *m*-, m. 37.5°; *p*-, m. 56°. Diethers of m-$C_6H_4(OH)_2$ were prepd. by refluxing the Na salts of the monoethers in EtOH with the equiv. of alkyl

bromide for 8 hrs.; the m. ps. of the dialkyl ethers are: C_6-C_8 12.5°, C_8-C_6 15°, C_8-C_8 37.5°, C_{10}-C_6 27°, C_{12}-C_4 29.5°, C_{14}-C_2 30.5°, C_{10}-C_8 31°, C_{12}-C_6 34°, C_{14}-C_4 34°, C_{16}-C_2 37.5°, C_{12}-C_{12} 60°, C_{16}-C_{16} 71.5°. Sulfonation of the ethers with a free position para to the ether group was carried out with H_2SO_4 at 70° with const. stirring. Salts were prepd. by neutralization with the appropriate base in EtOH and crystn. from EtOH with the addn. of H_2O. Acid titration tests, frothing in H_2O and soly. tests showed that resorcinol diethers were completely disulfonated by acid more concd. than 87% (by wt.) and not appreciably by acid less concd. than 79%; therefore 87% acid in the ratio of 330 cc. to 1 g.-mole of ether was used; no difference was noticed between the product of 10- and that of 30-min. reaction. Details are given of the purification of these derivs. *1,3-Dioctyloxybenzenedisulfonic acid*, with 6 mols. H_2O, m. 40° (high vacuum); it loses 5 mols. of H_2O on melting, resolidifies and then m. about 90°, losing the last mol. of water; the C_{12}-C_6 ether seps. with 2 mols. of H_2O. Sulfonation of ethers with no free position para to the ether group was effected with 1 mol. of $ClSO_3H$ in $CHCl_3$ to 1 mol. of ether. K salts were analyzed for a no. of mono- and disulfonates. All the salts are surface-active compds. and the series is designed to enable the effect of definite geom. changes in the surface-active ion to be examd. Only phys. properties relevant to purification and characterization are described. C. J. W.

Hydrolysis or alcoholysis of resorcinol ether sulfonic acids. G. Spencer Hartley. *J. Chem. Soc.* **1939**, 1834–6.—Resorcinol disulfonic acid dioctyl ether (I) with 6 moles H_2O, heated in abs. EtOH at 77° for 6 hrs., gives an almost quant. yield of the ether. The rate of complete reaction decreases with increasing H_2O content of the EtOH. Addnl. acid (such as HCl) had little effect in the driest alc., but considerably increased the rate when 6.5% of H_2O was present. In H_2O alone the soln. ($M/20$ of I) remained perfectly clear when kept at 100° for 12 hrs., even in the presence of HCl; when the monosulfonate was similarly treated in N aq. HCl, most of it was recovered as ether. In cellosolve and PrOH the rate of complete reaction of I is approx. the same as in EtOH; in iso-PrOH it is about 0.5 as great; at 100° the reaction in cellosolve proceeds 7 times as fast as at 77°; ether could be recovered after the acid had been heated in dioxane or MeCOEt, each contg. 5% H_2O. With an $M/20$ soln. of the anhyd. K monosulfonate in $N/3$ abs. EtOH-HCl, results were obtained which closely fitted the unimol. reaction velocity equation. It appears that the SO_3H group must be undissocd. and that it can then react with any HO group. The behavior of 4-cetyloxybenzenesulfonic acid, 5-methyl-2-cetyloxybenzenesulfonic acid and 1,2-dioctyloxybenzene-4-sulfonic acid in cellosolve is also described. C. J. West

Structure of cannabidiol, a product isolated from the marihuana extract of Minnesota wild hemp. I. Roger Adams, Madison Hunt and J. H. Clark. *J. Am. Chem. Soc.* **62**, 196–200(1940).—Minnesota wild hemp (cut after flowering had begun but before seed had "set" in the female tops) was air-dried for 6 weeks, beaten and the coarse stems removed. Countercurrent extn. with 95% EtOH in a series of 4 20-gal. crocks gave an ext. contg. 2 g. per 100 cc.; concn. at about 30° gave a red oil which, on distn. in a bath at 170–310°, b_3 100–220°; the petr. ether soln. was extd. with H_2O; removal of the petr. ether and fractional distn. finally gave a fraction b_2 175–95°, which is considered purified red oil (I). In C_5H_5N I yields about 33% of a *bis-3,5-dinitrobenzoate* (II), m. 106–7° (cor.), $[\alpha]_D^{25}$ −76° (0.057 g. in 5 cc. Me_2CO), of *cannabidiol* (III), $C_{21}H_{30}O_2$ or $C_{21}H_{32}O_2$, a pale-yellow resin, b_2 187–90°, d_4^{20} 1.040, n_D^{25} 1.5404, $[\alpha]_D^{25}$ −119° (0.0378 g. in 5 cc. 95% EtOH); III contains 2 active H atoms. III was liberated from II by the action of liquid NH_3 in PhMe in a bomb at room temp. for 5 hrs. Various color reactions are given for I and III, which indicate that the colors given by I are dependent in part on substances other than III. III gives a *bis*(*m-nitrobenzenesulfonate*), m. 119–20° (cor.); the same deriv. was obtained directly from I. Refluxing III with MeI and K_2CO_3 in Me_2CO for 4 hrs. and repeating the operation several times give, after a total of 134 hrs., the *di-Me ether* of III, pale yellow, b_2 175–7°, n_D^{25} 1.5254, d_4^{20} 0.9823, $[\alpha]_D^{25}$ −133° (0.0535 g. in 5 cc. 95% EtOH); using twice the theory of MeI and K_2CO_3 and boiling 8 hrs. give what appears to be a *mono-Me deriv.*, b_2 177–9°, n_D^{25} 1.5311, $[\alpha]_D^{25}$ −118° (0.0455 g. in 5 cc. 95% EtOH). Oxidation of III with $KMnO_4$ and $NaHCO_3$ in 50% aq. Me_2CO gives caproic acid, indicating the presence of the Am group in a phenolic ring. III is toxic but has no marihuana activity. The active I gives an analysis not substantially different from pure cannabinol (IV) isolated by Wood, Spivey and Easterfield (*J. Chem. Soc.* **69**, 539 (1896); **75**, 20(1899)). The structure of III and its relation to IV are discussed; half of the mol. is probably a dihydroxyamylphenyl nucleus, the other an unsatd. alicylic nucleus. C. J. West

Pyrogallol-acetone condensation products. A. v. Wacek and K. Kratzl. *Österr. Chem.-Ztg.* **42**, 286–9(1939).—Mono-ortho derivs. of pyrogallol were prepd. by converting the OH groups to acetals which were then substituted and hydrolyzed. Attention is called to the "gallacetonin" (I) of Wittenberg (*J. prakt. Chem.* **26**, 78(1882)) and to the product of Fabinyi and Szeki (*Ber.* **38**, 3527(1905)), having the formula $C_{21}H_{24}O_6$, and also to the fact that both were declared to be identical by Baker (*C. A.* **33**, 2520²) and not to be considered an acetal of pyrogallol but a spirohydrindene deriv. The authors confirm this assumption. I was prepd. by condensing the pyrogallol 1-acetate with Me_2CO to form gallacetonin acetate which was hydrolyzed to I. Various derivs. of I were prepd. The benzoates and benzenesulfonates of I were prepd. by dissolving I in 2 vols. of dry C_5H_5N and warming with BzCl or $PhSO_2Cl$ on a water bath for several hrs., after which dil. HCl was added and the pptd. product was digested with warm AcOH, and recrystd. from glacial AcOH. The benzoate m. 287 8° and the benzenesulfonate 213–16°. Attempts to prep. the acetal by condensation of pyrogallol and acetone in the presence of P_2O_5 failed. The Me deriv. of I was prepd. by boiling a mixt. of 1-methylpyrogallol, dry Me_2CO and P_2O_5 for 1 hr. The resulting liquid was decanted from the H_3PO_4, neutralized with 10% Na_2CO_3, steam-distd., extd. with Et_2O and fractionated. A yellowish oil, b_{17} 113–15°, was obtained. When pyrogallol 1-benzoate was acetylated a product recrystd. from alc. and m. 78° was obtained. The Bz group of this compd. cannot be sapond. without splitting off the acetyl group. Similarly by acetonating pyrogallol benzenesulfonate with Me_2CO and P_2O_5 a product resulted which was crystd. from alc. and m. 84°. The acetate of I was prepd. from pyrogallol 1-acetate in the manner outlined above for the prepn. of the Me ester with the addnl. step of neutralizing the phenol with NaOH after the Et_2O extn. The acetate b_{12} 123–8°. When this acetate was shaken with 5% KOH for 45 min. at room temp., acidified, extd. with Et_2O and evapd., cryst. leaflets (from H_2O), m. 89–90°, were produced. This product is pure white and is claimed to be I. It is readily sol. in alc., Et_2O, AcOH, C_6H_6, and less sol. in ligroin and H_2O. It also dissolves in alkalies and is pptd. by CO_2 and mineral acids. I was then reacted with BzCl in C_5H_5N; the product, crystd. from alc., m. 79°. Likewise, I, when heated with Ac_2O for 3 hrs., yields the acetate of I, crystd. from petroleum ether and m. 47–8°, b_{12} 150°. The condensation of 1-methylpyrogallol with MeCOEt was carried out according to the method for prepg. the methyl deriv. of I. A yellowish oil b_{12} 129–32° and having the formula $C_{11}H_{14}O_3$ resulted. Edward J. Mahler

Mono- and diesters of pyrogallol. A. v. Wacek and Franz K. J. Travnicek. *Österr. Chem.-Ztg.* **42**, 281–6 (1939).—Monoesters of pyrogallol (I) were prepd. by first protecting 2 of the OH groups and then allowing the esterification to take place. The inner carbonates of I were prepd. according to the method of Einhorn, Callinar and Pfeifer (*Ber.* **37**, 106(1904)) and transformed into the Ac, Bz and benzenesulfonyl compds. by reaction in pyridine. The monoesters were prepd. from the latter compds. by sapon. in water either on standing or by boiling. *o*-Diesters could not be formed by sapon. of triesters of the

type $C_6H_3(OR')(OR)_2$ (R and R' = Bz, Ac) because the latter were found to be too stable. However, the diesters could be prepd. as follows: The *2,3-carbonate 1-benzylcarbonate* (II), formed by treating the carbonate with $ClCO_2CH_2Ph$, was sapond. to form the 1-benzylcarbonate (III) which was acetylated in pyridine. On hydrogenation the 2,3-diacetate of III loses CO_2 and the $PhCH_2OCO$ radical in the form of PhMe, leaving the 1,2-diacetate of I. The following esters of I were prepared: *1-acetate 2,3-carbonate*, $C_9H_6O_5$ (IV), formed by introducing AcCl dropwise into the carbonate in cold pyridine while shaking, allowing to stand for 24 hrs., then pouring the mixt. into cooled dil. HCl, filtering the residue *in vacuo* and recrystg. it from ligroin, m. 121°. *Acetate*, $C_8H_8O_4$ (V), from IV heated with 3 parts water to 75° until soln. took place, evapd. *in vacuo*, the residue redissolved in Et_2O, evapd. and recrystd. from ligroin, m. 85°. *1-Acetate 2,3-dibenzoate*, $C_{22}H_{16}O_6$, from BzCl added to V in cold pyridine, allowed to stand for 22 hrs., heated to 80° for 1 hr., poured into ice-cooled dil. HCl, the ppt. dissolved in Et_2O, evapd. and the residue dissolved in C_6H_6, from which crystals appeared in 1–2 days, m. 124°. *1-Benzoate 2,3-carbonate*, $C_{14}H_8O_5$ (VI), prepd. like IV, crystals from ligroin-C_6H_6, m. 141°. *1-Benzoate*, $C_{18}H_{10}O_4$, from VI refluxed with 4 parts H_2O for 2 hrs.; the resulting oily ppt. crystd. on scratching the glass and then sepd. from C_6H_6 in fine crystals, m. 133°. *1-Benzenesulfonate 2,3-carbonate*, $C_{13}H_8O_6S$, prepd. like IV, crystals from ligroin-C_6H_6, m. 93°. *1-Benzenesulfonate*, $C_{12}H_{10}O_5S$, prepd. like the 1-benzoate above, and crystd. from C_6H_6, m. 122°. II, $C_{15}H_{10}O_6$, prepd. by adding $PhCH_2OCOCl$ dropwise to pyrogallol carbonate in $PhNMe_2$, heating to 50° for 4 hrs., pouring into ice-cold HCl and crystg. the ppt. from a 2:1 mixt. of ligroin-C_6H_6, m. 74°. III, $C_{14}H_{12}O_6$, from II heated in Me_2CO and H_2O to 60° for 4 hrs., evapd. and the ppt. recrystd. from ligroin-C_6H_6 (1·5), m. 110°. *2,3-Diacetate* (VII) of III, $C_{18}H_{16}O_7$, from AcCl added to III in cold $PhNMe_2$, allowed to stand for 5 hrs., poured into cold dil. HCl, and the ppt. recrystd. from ligroin-C_6H_6 (2.1), m. 105°. *1,2-Diacetate* of I, $C_{10}H_{10}O_5$, from VII hydrogenated in Me_2CO in the presence of Pd black to split off CO_2 and MePh, evapd., and crystd. from C_6H_6, needles, m. 115°.

Edward J. Mahler

Acylation of aldoximes. III. The configuration of diphenylcarbamyl and picryl ether derivatives prepared from syn aldoximes. Gertrude Vermillion, A. E. Rainsford and Charles R. Hauser. *J. Org. Chem.* **5**, 68–74(1940); cf. *C. A.* **34**, 3978.—According to Brady and co-workers (*C. A.* **20**, 179) the diphenylcarbamyl and picryl derivs. of α-aldoximes (I and II) prepd. from the Na salt have the anti configuration, for, when heated with alkali, nitriles are obtained. In the present work evidence is presented that I and II obtained from the Na salt of α-aldoxime have the syn configuration while the β-aldoximes under the same conditions give the β-derivs. which in the presence of alkali are decompd. immediately to nitriles. I and II are difficult to hydrolyze. The picryl ethers of α-3,4-methylenedioxybenzaldoxime on hydrolysis with alkali at room temp. give the corresponding α-aldoximes. Under the same conditions the isomeric β-deriv. is recovered practically unchanged, indicating that the β-aldoxime is not first formed and then isomerized, but that the α-aldoxime is formed directly. The pyridine-$BuNH_2$ test for configuration is not applicable to II. The results are in agreement with the hypothesis previously postulated (*C. A.* **34**, 3978) that the acylation of α-aldoximes in the presence of a sufficiently strong base involves no change in configuration. **IV. The benzoylation of syn and anti aldoximes.** Gertrude Vermillion, Earl Jordan and Charles R. Hauser. *Ibid.* 75–9.—The benzoylation of β-3,4-methylenedioxy-, β-3-nitro- and β-4-methoxybenzaldoxime is carried out in the presence of pyridine at 0° and room temp. and in all cases high yields of nitriles are obtained in addn. to small yields of α-derivs. in the first 2 cases. β-Aldoximes with BzCl in the presence of aq. alkali give benzoyl α-derivs. but in the presence of a H_2O-dioxane soln. or emulsion of alkali, nitriles are obtained. β-Aldoximes and BzCl in the presence of Et_3N give nitriles. α- and β-Aldoximes with BzCl in pyridine soln. give partially or entirely nitriles, but in the presence of Et_3N, β-aldoximes give nitriles and α-aldoximes entirely the Bz α-derivs. From these results it is concluded that, although changes of configuration may occur under certain conditions, no change takes place when either α- or β-aldoximes are benzoylated in a sufficiently basic soln.

F. E. Brauns

Nitrones. V. The action of potassium cyanide on carbonamidic nitrones. Vito Bellavita and Nerina Cagnoli. *Gazz. chim. ital.* **69**, 583–94(1939); cf. *C. A.* **34**, 10042.—Four new carbonamidic aldonitrones were prepd. by a reaction already known, i. e., by the reaction of NH_2OH, HCNO and the aldehyde (cf. Conduche, *Compt. rend.* **140**, 434–36; *Bull. soc. chim.* **35**, 418–30(1906); *C. A.* **2**, 999), and they were then made to react with KCN. The latter reaction is: $RCH{:}N(:O)CONH_2 + KCN \rightarrow RCH{:}NCONH_2 + KCNO$. The $RCH{:}NCONH_2$ compds. are a hitherto unknown type of ureides, and in the expts. almost 100% yields of the ureides were obtained. This reaction of nitrones is not new but has been known only of a few phenylnitrones (cf. *Rend. accad. Lincei* **1930, I**, 197) and cyclic nitrones (cf. *C. A.* **5**, 502), and even in the present expts., nitrones derived from hydroxylated aldehydes did not react thus. With Ac_2O, these new ureides form, when cold, $RCH{:}NCONHAc$ compds., when hot, $RCH{:}NCONAc_2$ compds., both stable in boiling aq. acids and bases. With BzCl, the ureides form stable $RCH{:}NCONHBz$ compds. With $COCl_2$, the ureides form dibenzalcarbonyldiureas of the $CO(NHCON{:}CHR)_2$ type, which will be described in a later paper. The ureides do not react with alk. hypobromites or with HNO_2. Detns. of the N of the ureides gave, in practically all cases, values approx. 3% below the calcd. values, because in the combustion with CuO, as in acid and alk. hydrolysis, these ureides form HCN as well as normal hydrolytic products. Although the reaction with KCN depends primarily on the nitrone group, it is also influenced by the character of the monovalent radical united to the N atom. A mixt. of *p*-ClC_6H_4CHO (10 g.), KCNO (12 g.) and $NH_2OH.HCl$ (12 g.) in a little water, kept ice-cold and agitated for 2 hrs. and the product purified by charcoal and EtOH, yields the *carbonamidic nitrone*, *p*-$ClC_6H_4CH{:}N(:O)CONH_2$, decomp. 132–5°. *p-Dimethylamino analog*, lustrous, decomp. 164–5°. *β-Resorcylaldehyde carbonamidic nitrone*, decomp. 132–5°, and in boiling water or EtOH. *Bourbonal carbonamidic nitrone*, decomp. 139–40°. These nitrones and some others already known were made to react with equimol. wts. of KCN. Alc. $PhCH{:}N(:O)CONH_2$ and KCN, refluxed for 0.5 hr., evapd., satd. aq. $NaHSO_3$ added, extd. with Et_2O, the ext. evapd., and the residual oil steam-distd. (it decomp. when distd. *in vacuo*), yield *benzylideneurea*, oil, hydrolyzed by H_2SO_4 to BzH, CO_2, NH_3 and HCN. An aq. suspension with BzCl yields, after making alk. by Na_2CO_3, *benzoylbenzylideneurea*, m. 103°. *Cinnamylideneurea*, lustrous, m. 75–7°; *Bz deriv.*, silky, m. 123°. Although *p*-iso-$PrC_6H_4CH{:}N(:O)CONH_2$ has been reported to decomp. at 121–2° (cf. *C. A.* **2**, 999), the compd. prepd. by B. and C. decompd. at 143–5°. With KCN it forms *cumylideneurea*, m. 110°, which, with BzCl and Na_2CO_3, forms the *Bz deriv.*, m. 125°. *o*-$O_2NC_6H_4CH{:}N(:O)CONH_2$ and KCN yield *o-nitrobenzylideneurea*, m. 103°; with cold Ac_2O + NaOAc it forms the *Ac deriv.*, m. 111°; with hot Ac_2O + NaOAc it forms the *di-Ac deriv.*, m. 70°; *Bz deriv.*, lustrous, m. 123°. *m-Nitrobenzylideneurea*, m. 123.5°; *Ac deriv.*, m. 131°, turns yellow on exposure to light; *Bz deriv.*, lustrous, m. 175°. *p-Chlorobenzylideneurea*, m. 112°; *Ac deriv.*, m. 73°; *Bz deriv.*, lustrous, m. 147°. *o*-$HOC_6H_4CH{:}N(:O)CONH_2$ and KCN in MeOH, heated and the oil distd. *in vacuo*, yields *salicylideneurea*, viscous lemon-yellow liquid, b_{25} 125°; *Bz deriv.*, lustrous, m. 118°. *Anisylideneurea*, m. 66–7°, is sapond. by concd. acids and bases only with difficulty; *Ac deriv.*, m. 51°; *Bz deriv.*, lustrous, m. 110°. *p-Dimethylaminobenzylideneurea*, silvery, m. 147°, turns brown on exposure to light; *Bz deriv.*, m. 152°; *Ac deriv.*, m. 180°. *Piperonylideneurea*, lustrous, m. 113.5°, sweet taste; *Ac deriv.*, lustrous, m. 108–9°; *Bz deriv.*, m. 167°. *4,3-HO(EtO)C₆H₃CH:NCONH₂*, straw-colored oil; *tri-*

Bz deriv., lustrous, m. 141°. *Furfurylideneurea*, silky, decomp. 132–3°; *Bz deriv.*, lustrous, m. 135°. C. C. D.

Addition of methoxyamine to α,β-unsaturated ketones and the rearrangement of β-methoxy amino ketones. A. H. Blatt. *J. Am. Chem. Soc.* **61**, 3494–9(1939).—$MeONH_2$ adds readily and reversibly to PhCH:CHBz (I) and a no. of its analogs which contain a substituent in the *p*- or *p'*-position to furnish solid β-methoxy amino ketones. No catalyst is needed; when a strong base is added, the reaction does not stop with the formation of this deriv. Bispropiophenones are also formed occasionally. $MeONH_2$ (2.5 g.) and 10.4 g. I in 25 cc. EtOH, boiled 3 hrs., give 78% of *β-phenyl-β-methoxyaminopropiophenone* (II), m. 54–5°; if the soln. is heated to 35° and then allowed to stand at room temp. for 18 hrs., the yield of II is 64%; there also results from 41.6 g. I 2.5 g. of *β,β'-methoxyiminobis(β-phenylpropiophenone)* (III), m. 178–9°; III also results in 0.6-g. yield from 1 g. I and 1.2 g. II in abs. EtOH on standing at room temp. for 67 days; vacuum distn. of III gives I. Distn. of II at 75 mm. gives I and $MeONH_2$. II may be pptd. unchanged from concd. H_2SO_4 by addn. of H_2O and alkali; the *HCl salt*, m. 133 4°, ppts. from *N* HCl but the HBr salt or picrate could not be prepd. The structure of II follows from its oxidation with NaOCl in the cold to the *monoxime Me ether* (IV) of CH_2Bz_2, m. 114 15°; IV was synthesized from CH_2Br_2 and $MeONH_2.HCl$ on boiling in EtOH for 2 hrs. (the *dioxime*, m. 57.5–8.5°, also results) and from PhC:CBz and $MeONH_2$. The equil. in the addn. reaction usually is quite favorable to the formation of the addn. product, which can be formed at room temp. or in boiling EtOH; in the presence of BzII the addn. reaction is reversed and the unsatd. ketone is regenerated, the addn. compd. acting as an oximating agent. PhCH·CHCOC$_6$H$_4$Me-*p* at room temp. gives 60% of *β-phenyl-β-methoxyamino-p-methylpropiophenone* (V), m. 43–4°; *p*-MeC$_6$H$_4$CH CHBz gives only *β,β'-methoxyiminobis(β-p-tolylpropiophenone)*, m. 185 6°. PhCH·CHCOC$_6$H$_4$Cl-*p* gives 70% of the *p-chloropropiophenone analog* (VI) of II, m. 51–2°; *p*-ClC$_6$H$_4$CH CHBz gives 86% of the *p-chlorophenyl analog* (VII) of II, m. 67 8°. PhCH CHCOC$_6$H$_4$OMe-*p* gives 65% of the *p-methoxypropiophenone analog* (VIII) of II, m. 52–3°, and the *p-MeO deriv.* of III, m. 183–4°. PhCH CHCOC$_6$H$_4$Br-*p* gives 83% of the *p-bromopropiophenone analog* (IX) of II, m. 66–7°, and *p*-BrC$_6$H$_4$CH CHBz gives 63% of the *β-p-bromophenyl analog* (X) of II, m. 52 3°. Soln. of II and its analogs in Ac_2O (warming for 1–2 min. in some cases) gives the *Ac derivs.* in quant. yield: II m. 94.5–5.5°, V m. 118–19°, VI m. 142–3°, VII m. 91–2°, VIII m. 115 16°, IX m. 157–8°, X m. 91 2°; the *p-methoxyphenyl analog* of II m. 130–1°. The Ac deriv. of IX, distd. at 15 mm., gives *p*-PhCH·CHCOC$_6$H$_4$Br which also results from the Ac deriv. and 1 equiv. of MeONa in MeOH in the cold. One equiv. of the methoxyamino ketone in 2 equivs. of 2 *N* MeONa (with addn. of MeOH for soln. if necessary), kept at 60° for about 10 min. and then allowed to stand overnight at room temp., gives α-aminobenzalacetophenones. II gives 94% of PhCH:C(NH_2)Bz, m. 100–1°; *α-aminobenzal-p-methylacetophenone*, m. 92–3°, 64%; *p-Cl analog*, m. 81–2°, 66%; *p-Br analog*, m. 114 15°, 83%; *α-amino-p-chlorobenzalacetophenone*, m. 88–9°, 80%; *p-Br analog*, m. 114–15°, 90%. C. J. West

Restricted rotation in aryl olefins. I. Preparation and resolution of β-chloro-β-(2,4,6-trimethyl-3-bromophenyl)-α-methylacrylic acid. Roger Adams and M. W. Miller. *J. Am. Chem. Soc.* **62**, 53–6(1940).—Bromomesitylene (I) and $(EtCO)_2O$ with $AlCl_3$ in CS_2 give *bromopropiomesitylene* (II), b_3 127–9°, d_{24}^{24} 1.2956, n_D^{20} 1.5490; cleavage of the EtCO group by refluxing with H_3PO_4 for 12 hrs. and nitration give a di-NO_2 deriv. of I, m. 199.5–201.5° (all m. ps. cor.), identical with that from the nitration of I (Fittig and Storer, *Ann.* **147**, 8(1868), give 189–90°). Reaction of II with EtMgBr, followed by carbonation, gives 51% of *α-methyl(2,4,6-trimethyl-3-bromobenzoyl)-acetic acid*, m. 123–4° (decompn.); warming with PCl_5 in $POCl_3$ for 1 hr. gives 53% of *β-chloro-β-(2,4,6-trimethyl-3-bromophenyl)-α-methylacrylic acid* (III), m. 157–8°. III and $ClSO_3H$ at −10° give 53% of the *5-chlorosulfonyl deriv.* (IV), m. 188–9°; III and liquid Br at 0° for 20 min. give the *3,5-di-Br deriv.* (V), m. 228–9°. III (10 g.) and 10 g. quinine (VI) in 150 cc. EtOH give 8.45 g. of *l*-VI.*d*-III which, recrystd. twice from EtOH, has $[\alpha]_D^{25}$ −46.8° (0.0995 g. in 25 cc. abs. EtOH); decompn. of 5.2 g. of the salt with 10 cc. concd. HCl in 100 cc. H_2O gives 2.4 g. of *d*-III, m. 155–6°, $[\alpha]_D^{25}$ 52.6° (0.0998 g. in 25 cc. EtOH), 69.4° (0.1008 g. in 25 cc. AcOH); the oily salt fraction gives the *l*-III, $[\alpha]_D^{25}$ −54° (0.0994 g. in 25 cc. EtOH). Refluxing the *d*-III in abs. EtOH for 15 hrs. or in glacial AcOH for 12 hrs. causes no change in rotation. Bromination of either the *d*- or *l*-III gives the inactive V. $ClSO_3H$ gives a *d*-IV, m. 183–4°, $[\alpha]_D^{25}$ −8.6°, and a *l*-IV, $[\alpha]_D^{25}$ 10° (0.1018 or 0.1002 g. in 25 cc. C_6H_6). The asymmetry of the mol. is undoubtedly due to restricted rotation between the C of the C_6H_6 ring and the olefinic C to which it is attached. Necessity for unsym. substitution in the C_6H_6 ring is demonstrated by the action of Br and $ClSO_3H$; Br gives a di-Br compd. with sym. substitution and an inactive product; $ClSO_3H$ gives a product still contg. an unsym.-substituted C_6H_6 and thus an active product. This compd. is typical of a general class of aryl olefins which should be capable of resolution. C. J. West

Interaction of sulfuryl chloride with arylamides of aromatic acids. II. Orienting influences of groups in substitution reactions in aromatic compounds. N. W. Hirwe, G. V. Jadhav and D. R. Sukhtankar. *J. Indian Chem. Soc.* **16**, 281–4(1939); cf. *C. A.* **33**, 5827².—Mixts. of 5 g. of aromatic arylamides, *o*-RC$_6$H$_4$CONHR′ (R = OH, OMe, Me and Cl; R′ = Ph, *o*-, *m*- and *p*-MeC$_6$H$_4$, *o*-MeOC$_6$H$_4$, and *m*-ClC$_6$H$_4$) and 1, 2 or 4 equivs. of SO_2Cl_2 in 40 cc. benzene were refluxed for 4–5 hrs. The reaction products were fractionally crystd. from alc. and identified by hydrolysis, synthesis or formation of Ac derivs. With derivs. of *o*-HOC$_6$H$_4$CO$_2$H, SO_2Cl_2 gives Cl derivs. contg. Cl in both the acidic and basic parts of the mol. By varying the proportion of reactive SO_2Cl_2 it is shown that the Cl first enters in the *p*-position to the OH group or NHCOR group and then in the *o*-position to these groups according to the nature of the reacting amide. Arylamides of *o*-RC$_6$H$_4$CO$_2$H (R = MeO, Me or Cl) gave only Cl substitution in the basic group. The following compds. were prepd.: *5-chloro deriv.* of salicylanilide (I), m. 203–4°; *4′,5-dichloro deriv.*, m. 215 16°; *2′,3,4′,5-tetrachloro deriv.*, m. 174–5°; *4′,5-dichlorosalicyl-o-toluide*, m. 17 *3,4′,5-trichloro analog*, m. 197–8°; *5-chlorosalicyl-m-toluide*, m. 144–5°; *4′,5-dichloro analog*, m. 221–2°; *3,4′,5,6′-tetrachloro analog*, m. 214 15°; *5-chlorosalicyl-p-toluide*, m. 215–17°; *2′,3,5-trichloro analog*, m. 164–5°; *4′-chloro-2-methoxybenzanilide*, m. 75–6°; *4′-chloro-2-methoxybenz-o-aniside*, m. 135–6°; *4′-chloro-o-toluanilide*, m. 132–4°; *2′,4′-dichloro analog*, m. 128°; *5-chloro-o-tolu-o-toluide*, m. 182°; *4′,6′-dichloro-o-tolu-m-toluide*, m. 120–1°; *2′-chloro-o-tolu-p-toluide*, m. 119–20°; *2,4′-dichlorobenzanilide*, m. 119–20°; *2,3′,4′-trichlorobenzanilide*, m. 143°. C. R. Addinall

The ozonization of cinnamic acid, sodium cinnamate, ethyl cinnamate and styrene. E. Briner and A. Gelbert. *Helv. Chim. Acta* **22**, 1483–90(1939)(in French); cf. *C. A.* **31**, 8520⁶; **33**, 535⁴, 6796⁸, 6813¹, 8068⁸.—Quant. ozonization of (1) PhCH $CHCO_2H$ in MeOH, (2) PhCH:$CHCO_2Et$ in CCl_4 and (3) PhCH:CH_2 in CCl_4 normally yields ozonides, which subsequently split into (1) BzOH and $OHCCO_2H$, (2) BzH and HO_2CCO_2Et and (3) BzH and HCO_2H, resp. As is generally the case when working with aq. solns., the ozonization of PhCH:$CHCO_2$-Na gives products (liberation of CO_2) which indicate a true destruction of the ozonide. The higher the degree of polymerization of styrene, the greater is the difficulty of ozonization. Ruth Berggren

Synthesis of some alkamine esters of alkylthiobenzoic acids. John J. Donleavy and James English, Jr. *J. Am. Chem. Soc.* **62**, 220–1(1940).—The alkylthiobenzoic acids were prepd. by reacting the diazonium salt with K Et xanthate and alkylation of the reaction mixt. with CH_3N_2, $MeCHN_2$ or Pr or Bu halides in yields of 80–100%: *m-Et* (monohydrate), m. 98°; *o-* and *m-Pr*, m. 121 and 104°; *o-* and *m-Bu*, m. 98 and 103°. *Acid chlorides* were prepd.

with PCl_5 as light yellow, viscous oils: *m-Me*, b_3 123°; *o-*, *m-* and *p-Et*, b_3 133, 127 and 118°, resp.; *o-* and *m-Pr*, b_3 145 and 138°; *o-* and *m-Bu*, b_3 151 and 147°. Refluxing the chlorides with 1 mole quantity of the desired amino alc. and about 2 moles of C_5H_5N for 3 hrs. gives the alkamine esters; the b. p. of the ester and m. p. of the *HCl salt* are given in each case. *o-Ethylthiobenzoates:* *β-diethylaminoethyl* (I), b_3 158°, m. 128°; *γ-diethylaminopropyl* (II), b_3 184°, m. 121°; *β-piperidinoethyl* (III), b_3 197°, m. 134°; *β-dibutylaminoethyl* (IV), b_3 187°, m. 116°. *o-Propylthiobenzoates:* I, b_3 176°, m. 123°; II, b_3 182°, m. 87°; III, b_3 190°, m. 128°; IV, b_3 208°, m. 93°; *o-butylthiobenzoates:* I, b_2 180°, m. 117°; II, b_2 193°, m. 96°; III, b_2 198°, m. 120°; IV, b_3 193°, m. 107°; *m-methylthiobenzoates:* I, b_5 185°, m. 153°; II, b_4 190°, m. 149°; *m-ethylthiobenzoates:* I, b_2 163°, m. 135°; II, b_3 170°, m. 125°; III, b_3 173°, m. 139°; *m-propylthiobenzoates:* I, b_3 172°, m. 110°; II, b_3 183°, m. 94°; III, b_3 182°, m. 116°; *m-butylthiobenzoates:* I, b_4 200°, m. 110°; II, b_3 194°, m. 96°; III, b_3 198°, m. 114°; *p-ethylthiobenzoates:* I, b_3 160°, m. 166°; II, b_3 185°, m. 138°. These compds. are less toxic than procaine; many surpass this local anesthetic in duration of anesthesia when tested on the rabbit cornea; the *o-* and *m*-ethylthio and methylthio compds. are more active than the corresponding *p*-derivs. C. J. W. 1

Constitution of usnic acid. Yasuhiko Asahina. *Proc. Imp. Acad.* (Tokyo) **15**, 311-14(1939).—A review is given of the structure of usnic acid, its di-Ac deriv., decarbusnol, usnolic acid, usnonic acid and dihydrousnic acid; 9 formulas are proposed. C. J. West 4

Geometrical inversion in the acids derived from the coumarins. VII. The behavior of acetylcoumaric acids. P. Suryaprakasa Rao, V. D. Nageswara Sastri and T. R. Seshadri. *Proc. Indian Acad. Sci.* **10A**, 267-74(1939); cf. *C. A.* **32**, 3362[2].—The transition of Ac derivs. of coumaric acids into coumarins (trans to cis inversion) under the influence of sunlight, heat and $HgCl_2$ has been studied. The Ac derivs. are prepd. with good yields (2.2 g. *acetylcoumaric acid* (I) from 2 g. coumaric acid) by acetylating the coumaric acids with AcONa and Ac_2O at 100°. At higher temps. (boiling Ac_2O) the yields are lower, especially for the substituted coumaric acids, owing to considerable conversion into the corresponding coumarins. *Acetyl-4-methylcoumaric acid* (II), m. 155°. *Acetyl-5-nitrocoumaric acid* (III), m. 217°. *Acetylpsoralic acid* (IV), m. 180-1°. *Acetylisopsoralic acid* (V), m. 210-11°. By exposing the acetylcoumaric acids in alc. to sunlight the corresponding coumarins are formed from I and II after 200 hrs. in 85-90 and 80-5% yield, resp., from III after 24, 48 and 200 hrs. in 5, 40 and 95-100% yield, resp. By heating I V 40-50° above their m. ps. the corresponding coumarins are obtained in 60-80% yield. Some resinous products are formed in addn. with evolution of CO_2. I-V boiled in alc. or aq. soln. with equimol. amts. of $HgCl_2$ give almost theoretical yields of the coumarins. Dora Stern 5

Addition reactions to conjugated systems. II. Caryophyllene and maleic anhydride. Norman F. Goodway and Trustham F. West. *J. Chem. Soc.* **1939**, 1853-5; cf. *C. A.* **33**, 1705[5].—Sandermann (*C. A.* **33**, 8698[6]) has suggested that the yellow color which always precedes the condensation of a diene and maleic anhydride (I) might be utilized to indicate the presence of diene constituents in essential oils but the results for a no. of simpler terpenes (caryophyllene (IA), α- (II) and β-phellandrene (III), α-pinene (IV), limonene (V) and 3-carene (VI)) show that the test is not applicable, all the terpenes developing some yellow color after the addn. of I in C_6H_6. Similarly the application of Fieser's color reaction (*C. A.* **32**, 1705[3]) of conjugated dienes with *p*-$O_2NC_6H_4N_2Cl$ gives a pos. reaction for VI; IA gives an orange-red color after 9 min., II after 3 min., III after 5 min. and VI after 7 min.; V gives a yellow color after 30 min., as does IV: the control gave a very pale yellow color after 30 min. The absorption spectrum of IA exhibits a max. at 2640-50 A., $\epsilon_{max.}$ 142 (in EtOH); from the low intensity it is considered that this is caused by 1-2% of some unsatd. impurity; the data are directly opposed to the presence of a compd. having conjugated ethylenic linkages, unless present only in traces. The adduct I-IA, boiled 8 hrs. with MeOH-HCl (satd. in the cold), gives a *di-Me ester*, b_3 180-3°, n_D^{25} 1.4960; the monoalkyl lactonic ester of the type derived from the normal adducts of II and bicyclohexenyl was not found. This result appears to throw doubt on the suggestion of Rydon (*C. A.* **33**, 5384[2]) that normal adduct formation takes place between IA and I and on the argument of diene addn. to a *cis*-butadiene system which involved a 7-membered ring structure for the parent terpene. C. J. West 6

Addition of magnesium iodide to camphor and terpene derivatives. Sydney T. Bowden and Thomas F. Watkins. *J. Chem. Soc.* **1939**, 1961.—A mixt. of dry Et_2O, Mg and dry I is boiled until the soln. is nearly colorless; addn. of camphor gives the *complex* $5C_{10}H_{16}O.2MgI_2.Et_2O$, m. 108° (slowly heated) and then m. 176°. No reaction occurs on heating 3-bromocamphor with MgI_2 in Et_2O for 8 hrs. Carvone gives the *complex* $2C_{10}H_{14}O.MgI_2.Et_2O$, m. 85° and then 125°; at 200° decompn. occurs with evolution of I vapor. Santonin gives the *complex* $2C_{15}H_{18}O_3.MgI_2$, yellow, decomps. before melting at 175°. C. J. W. 7

Triterpenes. LI. Conversion of betulin into lupeol. L. Ruzicka and M. Brenner. *Helv. Chim. Acta* **22**, 1523-8(1939); cf. *C. A.* **33**, 8594[9].—Betulin monoacetate (I) (*C. A.* **33**, 1703[8]) was oxidized in 80% yield by CrO_3 in AcOH to *acetylbetulinaldehyde*, $C_{32}H_{50}O_3$ (II), crystals from Et_2O-MeOH, m. 199-200° (*in vacuo*), $[\alpha]_D$ 30.3° ($CHCl_3$). II exhibited absorption max. at 2850 A. (log ε 1.7 1.8) characteristic of the carbonyl group and gave a gold color with $C(NO_2)_4$. It is possible that the so-called ketone of Vesterberg (*C. A.* **26**, 5934[4]), m. 182-3°, $[\alpha]_D$ 30.26°, obtained by oxidation of I is identical with II. Treatment of II with $NH_2CONHNH_2.AcOH$ gave the expected semicarbazone (III) of II, crystals from $CHCl_3$-alc., m. 270 80° (*in vacuo*), and a difficultly sol., N-contg., unidentified by-product, m. 291-4°. Treatment of II with Na-alc. at 180° gave desoxybetulin, $C_{30}H_{50}O$ (IV), m. 212.5-14.5°, which was identical with lupeol (V); for IV $[\alpha]_D$ 27.2° ($CHCl_3$), for V 26.4° ($CHCl_3$) (*C. A.* **32**, 4563[5]). IV gave a benzoate, m. 268-71°, $[\alpha]_D$ 60.9° ($CHCl_3$), and an acetate, m. 215-17°, $[\alpha]_D$ 40.7° ($CHCl_3$), both of which were identical with the corresponding derivs. of V. Oxidation of IV by Kiliani's mixt. (*Ber.* **34**, 3564 (1901)) at room temp. gave desoxybetulone, $C_{30}H_{48}O$ (VI), m. 168-70.5°, $[\alpha]_D$ 60.8° ($CHCl_3$), which was identical with lupeone (VII) (*loc. cit.*). The oximes of VI and VII m. 268-73° (decompn.) and are identical. To the 3 types of triterpenes (squalene, β-amyrin and α-amyrin) V is to be added as a fourth. David E. Adelson 8

Method of reaction of metalloörganic compounds. IV. Rearrangement of diaryl ethers into *o*-arylphenols. Arthur Luttringhaus and Grete v. Sääf. *Ann.* **542**, 241-58(1939); cf. *C. A.* **32**, 8383[5]; **33**, 2890[3].—Ph_2O and PhNa (from 0.2 mole PhCl) in C_6H_6, shaken for various times at various temps., the product decompd. with MeOH and H_2O and extd. with 2 *N* NaOH, give on acidification of the alk. ext. *o*-HOC_6H_4Ph (I), m. 58°; the C_6H_6 layer, shaken with Claisen's alkali, gives *2,6-diphenylphenol* (II), m. 101°. The neutral portion yields a Ph_2O fraction (which contains not more than 15% Ph_2), *2-phenoxybiphenyl* (III), m. 49.5°, and *di-2-biphenyl ether* (IV), $b_{0.05}$ 155-65°, m. 116°. In a typical expt. in which the reaction was kept at 7° for 3 hrs. and at 65° for 8 hrs., mole % yields were: Ph_2O 4, III 9.1, IV 0.5, PhOH 26.4, I 45.5, II 9.8; yields are also given for other conditions of time and temp. The formation of III and IV can be explained only by the formation of *o*-alkali substitution in the Ph nucleus. This is shown by shaking Ph_2O with excess PhNa in C_6H_6 for 3 hrs. at 6° and passing CO_2 through the soln. (with cooling for 2 hrs.); esterification and distn. give $PhCO_2Me$ and *o*-$PhOC_6H_4CO_2Me$, b_4 135-40°; the formation of III results from the reaction of Ph_2O and the Na deriv. (PhONa also being formed). I results in part from an intramol. rearrangement of the Na deriv. of I to *o*-$PhOC_6H_4ONa$ (V) and also by extramol. reaction in which the Na deriv. reacts with III to give III and V. Reaction of III with PhNa in C_6H_6 (3 hrs. at room temp. 9

and 6 hrs. at 64°) gives 22.4 mole % of I, 26% of IV and 39% of II; PhOH was absent. The mechanism of the formation of the other products is discussed. *o*-PhC_6H_4-OK and PhBr or PhOK and *o*-IC_6H_4Ph with Cu at 210–20° give III, b_{14} 200–1°, m. 49.5; HNO_3 gives a NO_3 *deriv.*, m. 149°. *o*-PhC_6H_4OK and *p*-$O_2NC_6H_4Br$ give *2-(4'-nitrophenoxy)biphenyl*, pale-yellow, m. 87.5°. Ph-OK and 3-IC_6H_4Ph give *3-phenoxybiphenyl*, b_{14} 196–200°, m. 14–16°; *p*-PhC_6H_4OK and PhBr at 210° give *4-phenoxybiphenyl*, b_{14} 222°, m. 68°. IV was synthesized from *o*-IC_6H_4Ph and *o*-PhC_6H_4OK at 210-20°. The synthesis of II from the Na deriv. of nitromalonaldehyde is described; *Ph ether* of II, m. 119°; *Me ether*, m. 42°. C. J. West

Oxidation of certain heteronuclear-substituted polybromobiphenyls. Francis H. Case. *J. Am. Chem. Soc.* **61**, 3487–90(1939).—The following brominated biphenyls were prepd. by reduction of the NO_2 compds. with $SnCl_2$ in EtOH, acetylation with AcOH-Ac_2O-H_2SO_4, bromination in AcOH-AcONa, deamination with satd. $NaNO_2$ in boiling EtOH contg. dil. HCl and hydrolysis of the Ac deriv. by alc. HBr. 2-$BrC_6H_4C_6H_3(NH_2)Br$-4,3 gives *2,3-dibromobiphenyl* (I), b_3 165–8°; oxidation with CrO_3 in 75% AcOH of I and the 3,4'-isomer gives *m*- and *p*-$BrC_6H_4CO_2H$, resp. 2-$H_2NC_6H_4C_6H_4Br$-3 gives *2-amino-3,3',5'-tribromobiphenyl*, m. 111–12° (*Ac deriv.*, m. 185–6°); deamination gives *3,3',5'-tribromobiphenyl* (II), m. 112–13°; *3',4,5'-isomer* (III), m. 102–3°. 2,4,6,3-Br_3-$(H_2N)C_6HC_6H_4Br$-4, m. 93–4° (*Ac deriv.*, m. 260–1°); *2,4,4',6-tetrabromobiphenyl* (IV), m. 105–6°. *2-Acetamino-3'-bromobiphenyl*, m. 93–4°; *3,3'-dibromo-6'-acetaminobiphenyl*, m. 145–6°; *2',3,5'-tribromobiphenyl* (V), b_6 213–16°. *2,6'-Dibromo-3'-acetaminobiphenyl*, m. 142°; *2,2',5'-tribromobiphenyl* (VI), m. 77 8°. *2',4-Dibromo-5'-aminobiphenyl*, m. 91–2° (*Ac deriv.*, m. 163–4°); *2',4,5'-tribromobiphenyl* (VII), m. 77–8°. 2,4,6-$Br_3C_6H_2I$ and PhI give 2,4,6-tribromobiphenyl, b_4 190–8°, m. 65–6°; oxidation gives only *p*-$BrC_6H_4CO_2H$. 3-Nitrobenzidine yields a *monourethan*, m. 167–8°; *5-Br deriv.*, m. 167–8°; 3-nitro-5-bromobiphenyl, m. 171 2°; *3-NH₂ deriv.*, m. 89–90° (*Ac deriv.*, m. 142 3°). Oxidation of II and the 2,3',5'-isomer gives 3,5-$Br_2C_6H_3CO_2H$; III gives *p*-Br-$C_6H_4CO_2H$; VI yields 2,5-$BrC_6H_4CO_2H$ (VIII); V gives *m*-$BrC_6H_4CO_2H$ and VIII; VII gives *p*-$BrC_6H_4CO_2H$ and VIII; IV gives only *p*-$BrC_6H_4CO_2H$. The Br derivs. may be arranged in the order of decreasing stability toward oxidation as follows: 4-Br, 3,5-Br_2, (2,5-Br_2 and 3-Br), 2-Br and 2,4,6-Br_3. C. J. West

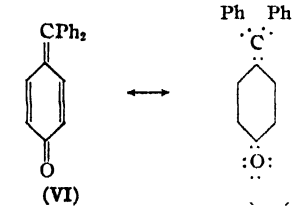
Optical rotatory powers of some 4-substituted benzohydrylamines. G. R. Clemo, C. Gardner and R. Raper. *J. Chem. Soc.* **1939**, 1958–60.—4-$MeC_6H_4CHPhNH_2$ gives a HCl salt m. 273°; the *d*-bromocamphorsulfonate, recrystd. repeatedly from 50% EtOH, m. 228°, $[\alpha]_D$ 57.5°; the base recovered in 1 expt. out of 6 had $[\alpha]_D$ −0.16° (EtOH, *c* 7.785); in the other 5 expts. the product was definitely inactive; the HCl also showed no measurable rotation. The base and $BrCH_2CO_2Et$, shaken with excess K_2CO_3 in abs. EtOH for 6 hrs., give *N-4-methylbenzohydrylaminoacetic acid*, m. 185°; $SOCl_2$ gives a *compd.* $C_{16}H_{18}ON$, m. 207°; this does not give cryst. salts with the commoner alkaloids. 4-BrC_6H_4Bz and $HCONH_2$, heated at 170–80° for 18 hrs., give *formo-4-bromobenzohydrylamide*, m. 127–8°; hydrolysis with satd. EtOH-HCl gives *dl-4-bromobenzohydrylamine* (I), b_1 155–60°, which is very unstable and absorbs CO_2 from the air; *Ac deriv.*, m. 153°. I and *d*-tartaric acid (II) give a *salt* which, cryst. 10 times from H_2O, m. 205°, $[\alpha]_D$ 7.2°; *l*-I, b_1 155–60°, $[\alpha]_D$ −7.1°, $[\alpha]_{5461}$ −12.8°, $[\alpha]_{4358}$ −24.6° (*Ac deriv.*, m. 183°); the recovered base from the mother liquors with *l*-II gives a *salt*, m. 205°, $[\alpha]_D$ −6.8°; *d*-I, $[\alpha]_D$ 10.2° (EtOH, *c* 1.347); *Ac deriv.*, m. 183°. The *4-Cl analog* (III) of I b_1 146°; *formyl deriv.*, m. 124°; *Ac deriv.*, m. 130–1°; *l*-III *d-tartrate*, m. 199°, $[\alpha]_D$ 9.8° (H_2O, *c* 1.735); *l*-III, b_1 145–50°, $[\alpha]_D$ −10.9°, $[\alpha]_{5790}$ −12.9°, $[\alpha]_{4358}$ −25.2° (EtOH, *c* 5.054); *Ac deriv.*, m. 169°; *d*-III *l-tartrate*, m. 199°, $[\alpha]_D$ −9.86° (H_2O, *c* 2.065); *d*-II, b_1 146°, $[\alpha]_D$ 10.8° (EtOH, *c* 2.184); *Ac deriv.*, m. 169°. The *4-I analog* (IV) of I b_1 173–6°; *formyl deriv.*, m. 143°; *Ac deriv.*, m. 170°; *l*-IV *d-tartrate*, m. 206°, $[\alpha]_D$ 3.85° (H_2O, *c* 1.234); *l*-IV, $[\alpha]_D$ −10.6°, $[\alpha]_{5790}$ −12.2°, $[\alpha]_{5461}$ −13.7°, $[\alpha]_{4358}$ −23.9° (EtOH, *c* 1.418); *Ac deriv.*, m. 195–6°; *d*-IV *l-tartrate*, m. 205°, $[\alpha]_D$ −3.8° (H_2O, *c* 1.044); *d*-IV, $[\alpha]_D$ 10.6° (EtOH, *c* 1.192); *Ac deriv.*, m. 195°. The presence of a small amt. of impurity in the *dl*-base has a marked effect on the success or otherwise of the resolution. The apparent failure to resolve $MeC_6H_4CHPhNH_2$ indicates that caution must be exercised in drawing conclusions from the failure to resolve $C_6D_5NHCH_2Ph$. Cf. *C. A.* **30**, 5950⁶. C. J. W.

Addition reactions of one-sided activated systems. R. Wizinger. *J. prakt. Chem.* **154**, 1–39(1939).—A review of the addn. compds. formed from diphenylethylene and its derivs. and related compds. with HCl, Cl_2, Br_2, I_2, ICl, NOCl, ClCN, $AcONO_2$, etc. References are given. C. J. West

Rearrangement of the triphenylmethyl ethers of *o*-cresol and brominated *o*-cresols. H. A. Iddles, W. H. Miller and W. H. Powers. *J. Am. Chem. Soc.* **62**, 71–3 (1940); cf. *C. A.* **34**, 4097.—6,2-$BrMeC_6H_3OH$ (20 g.) and 4.5 g. Ph_3COH in 135 g. AcOH, treated dropwise with 23 g. of H_2SO_4 and allowed to stand 3 weeks, give 55% of the *4-triphenylmethyl deriv.* (I), m. 149–51°; this also results from the bromination of 2,4-$Me(Ph_3C)C_6H_3OH$ in CCl_4 in 85.7% yield. I (1 g.) in 50 cc. C_6H_6, refluxed with 30 g. NaOH in 60 cc. H_2O while 2 g. Me_2SO_4 are added during 15 min., gives 0.8 g. of the Me ether, m. 183–4° (Boyd and Harvey, *C. A.* **22**, 1970). 2,4-$MeBrC_6H_3OH$ (II) and Ph_3COH with H_2SO_4 in AcOH give only 6.75% of the *6-triphenylmethyl deriv.*, m. 208–9°. 2,4,6-$MeBr_2$-C_6H_2OH (III) gives no condensation product with Ph_3COH. In an attempt to prep. the Ph_3C ether of 6,2-$BrMeC_6H_3OH$, the Na deriv. was treated with Ph_3CCl in Et_2O and the mixt. refluxed 5 hrs.; the only product was I. The Na deriv. of III did not react with Ph_3CCl. II and Ph_3CCl in C_5H_5N, on heating 10 hrs., give 48.7% of the *triphenylmethyl ether*, m. 113.5–14°; attempted rearrangement in AcOH-H_2SO_4 by $ZnCl_2$ or HCl was unsuccessful. This work substantiates the previous work (*C. A.* **34**, 4097) regarding the structure of the rearrangement product of *o*-$MeC_6H_4OCPh_3$. C. J. West

Stereoisomeric fuchsones. Wilhelm Bockemüller and Rudolf Geier. *Ann.* **542**, 185–203(1939).— α-$C_{10}H_7MgBr$ and 3,4-$Me(MeO)C_6H_3Bz$ give 50% of *phenyl(4-methoxy-3-methylphenyl)(1'-naphthyl)carbinol*, m. 131.5°; dry HCl in C_6H_6 gives 62.5% of the *chloromethane* (I), m. 102–4°; heating I at 120–30° for 1 hr. gives the form m. 155–60°; in a bath at 175° it melts in a few sec. Either form of I, heated in N for 8 hrs. at 110–30°, gives 85–90% of *7-α-naphthyl-7-phenyl-3-methylquinomethane*, yellow, m. 185–6°; the same compd. results in 44% yield on refluxing I in PhCl for 4 hrs.; only 1 form of this quinone was observed. α-$C_{10}H_7MgBr$ and 4,1-$C_{10}H_6(MeO)Bz$ give 18% of *phenyl-(4-methoxy-1-naphthyl)(1'-naphthyl)carbinol*, m. 224°; the *chloromethane*, yellow, m. 192° (decompn.); heating at 200° for 20 min. gives a *compd.*, violet needles, m. 217°, which is not the expected quinone. *p*-$ClC_6H_4CCl_2Ph$ and *o*-MeC_6H_4OH, 4 days at room temp., give 35% of *4-hydroxy-3-methyl-4'-chlorotriphenylcarbinol* (II), m. 112–13°; *acetate*, m. 124–5°. Heating II in PhCl for 2 hrs. gives *7-p-chlorophenyl-7-phenyl-3-methylquinomethane*, orange, m. 133–4°; isomeric forms were not observed. α-$C_{10}H_7CCl_2Ph$ (III) and *o*-MeC_6H_4OH, heated up to 90° (better yields are obtained by standing at 24 hrs. at room temp. and heating 1 hr. at 50°) and purified from C_6H_6, give 2 g. of a yellow compd. which, after a series of crystns., gives 2 isomeric *7-phenyl-7-α-naphthyl-3-methylquinomethanes*, yellow, m. 185–6°, and dark-yellow, m. 156–7°. III and α-$C_{10}H_7OH$ in C_6H_6, allowed to stand 2 days at room temp. and the dirty green-yellow reaction product subjected to a series of crystns. from C_6H_6-Et_2O, give 2 isomers of *(1,4-naphthoquinone)phenyl(α-naphthyl)methide*, citron-yellow, m. 197–8° (IV), and orange, m. 165° (V); the V after solidification m. 197–8°. If a hot C_6H_6 soln. of V is dild. with Et_2O, V seps. even though seeded with IV; IV behaves similarly. Warming a soln. of IV or V in C_6H_6 to 80° does not cause a rapid rearrangement of the

cis-trans isomers. *p*-$PhC_6H_4CCl_3Ph$ and α-$C_{10}H_7OH$ in C_6H_6 at 80°, followed by crystn. from PhMe-Et_2O, give 2 forms of *1,4-naphthoquinonephenyl-4'-biphenylmethide*, yellow, m. 165–72°, and orange-red, m. 161–4° (mixed m. p., 154–60°); the unsharp m. ps. are probably due to the transformation of 1 form into the other. Seeding a soln. of 1 form with a crystal of the other form has no effect upon the crystn. Reduction of either form with Zn in AcOH or catalytically yields *phenyl(4-hydroxy-1-naphthyl)(4'-biphenyl)methane*, m. 145–6°. These results indicate that in these fuchsone derivs. a mesomerism in the sense of the formulas VI ⟷ VII plays practically no role, the properties of the compds. being expressed by the structural formula VI.



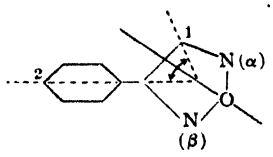
(VI)

C. J. West

Preparation of rubicene from fluorenone with the aid of metallic calcium. V. I. Khmelevskiĭ and G. I. Fedorov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1423 5(1939); cf. *C. A.* **33**, 7777⁹.—The substitution of Ca for Mg turnings in the method described in an earlier paper produced 13% rubicene. Similar reaction of 10 g. Ph_2CO with 2 g. Ca turnings yielded 20% *ms-diphenylanthracene*, m. 239°.

Chas. Blanc

Dioximes. CXXIV. Guido Tappi and Ugo di Vajo. *Gazz. chim. ital.* **69**, 615 20(1939); cf. Ponzio and T., *C. A.* **32**, 1682⁶.—Expts. on the mol. elec. moments (e. m.) of benzofurazans and of *o*-benzoquinone dioxime peroxides (cf. Milone and T., *C. A.* **33**, 7633⁹), which indicated that the latter are furoxans, made it possible that such measurements might also give a clue to the constitution of glyoxime peroxides, particularly pairs of isomeric methylaryl peroxides (cf. Ponzio, *C. A.* **23**, 375). Already pairs of certain methylaryl peroxides with low and high m. ps., resp., have been assigned MeC:N.O.O.N:CAr and MeC:N(:O)O.N.CAr structures, resp. (cf. Milone, *C. A.* **26**, 5564), but this decision was based on chem. reactions. In the present work, these types of compds. were studied further by comparisons of their e. m. Since methylphenylfurazan (I) and *p*-tolylfurazan (II) have almost equal e. m., the direction of the vectorial moment of phenylfurazan (III) should be approx. the bisector of the angle between the valence directions of the groups in 1- and 2-position. Hence III should have the configuration:



(β)

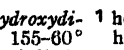
Since the addn. of a Me group in either of the 2 positions increases the e. m., the geom. problem of methylarylfurazans can be treated like that of the problem of a di-Ph deriv., the e. m. of which is equal to that of the heterocyclic C_8N_2O group. The e. m. of dimethylfurazan (IV) and diphenylfurazan (V) are significantly different, despite the fact that their resp. mols. have an element of symmetry; on the contrary V, II and I have almost the same e. m. Hence V does not have a planar configuration but rather one in which 3 rings (2 C_6H_6 rings and 1 heterocyclic ring) are located in different planes and without elements of symmetry. Based on the e. m. of various furazans and peroxides, the peroxides can be divided into 2 classes; 1 class comprises those having e. m. which differ from the e. m. of the corresponding furazans (diphenyl peroxide (VI), methylphenyl peroxide (VII) and methylanisyl peroxide (VIII) with low m. ps.); the 2nd class comprises those having e. m. approx. 0.75 higher than those of the corresponding furazans (dimethyl peroxide (IX), methylethyl peroxide (X), methylphenylglyoxime peroxide (XI) and methylanisylglyoxime peroxide (XII) with high m. ps.). The problem is however too complex to justify the conclusion that all the members of a particular class have identical structures. By calcg. the vector of I, and by assuming that the NO group increases the e. m. by 1.9 unit and that the extranuclear O atom is in α-position, it is found that the mol. has an e. m. of 4.97, which is close to the exptl. value of XI; therefore XI has a furoxan structure. With the O atom in β-position, the calcd. e. m. value is above 5.4, so that VII does not have a furoxan structure. The same conclusion is reached with respect to VIII and XII. Likewise calcns. indicate that neither IX nor X has a furoxan structure. Since the furoxan structure implies a higher electronic anisotropy than that for a dioxdiazine structure, it can be understood why true peroxides show a smaller increment (0.4) in their e. m. with respect to the corresponding furazans than the increment (0.75) of the corresponding furoxans. The increment of 0.75 caused by the NO group is close to that of *o*-benzoquinone dioxime peroxides, and therefore confirms the furoxan structure. VI has a non-planar configuration and it is not possible to establish its structure on a quant. basis. However, by taking into account the difference in e. m. between V and VI, it may be that the $C_2N_2O_2$ group has a dioxdiazine structure; if so, it would be in accord with arguments set forth by Milone (cf. *C. A.* **31**, 675⁵). In general then, a vector analysis of the e. m. of methylarylfurazans and of isomeric peroxides of methylarylglyoximes shows that only the peroxides with the higher m. ps. have a furoxan structure. On the contrary the e. m. of the isomeric methylaryl peroxides with the lower m. ps. and of dialkyl- and diarylglyoximes are in good accord with the e. m. calcd. on the basis that the $C_2N_2O_2$ group has a dioxdiazine structure.

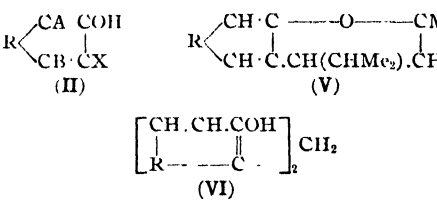
C. C. Davis

Quinonemethides. K. Fries and E. Brandes. *Ann.* **542**, 48–77(1939).—3,5,4-$Me_3(HO)C_6H_2CH_2OH$, suspended in C_6H_6 and treated with HBr for 15 min. (during which soln. results) and then until no further HBr is taken up, gives 85% crude *2,6-dimethyl-4-bromomethylphenol* (I), m. 103–5°; I could not be purified because it loses CH_2Br_2 to give $[3,5,4\text{-}Me_2(HO)C_6H_2]_2CH_2$ (II); on standing in the air the color changes in 1 day through rose and red to brown. The *acetate* (III) of I m. 68–9° and is much more stable. I with MeOH, EtOH, H_2O, dil. Me_2CO, NaOH, EtONa or $SnCl_2$-AcOH at room temp. gives II. Distn. of I with Zn dust yields mesitol (IV). III with Zn and HCl in Me_2CO or Zn, AcONa or AcOAg in Ac_2O gives the di-Ac deriv. of II; II results even on heating with Cu in indifferent solvents instead of the expected VII. I (8.6 g.) in 100 cc. C_6H_6 and 10.9 g. of AcONa in 100 cc. H_2O, shaken 1.5 hrs., give 1.4 g. of a crude orange-red product; extn. with C_6H_6 gives 0.8 g. of *(3,5-dimethyl-4,1-benzoquinone)-1-(3',5'-dimethyl-4'-hydroxyphenyl)methide* (V), orange-red, m. 172–3°; NaOH gives a blue salt, sol. in H_2O with a violet color. The portion difficultly sol. in C_6H_6 is *3,5,3',5'-tetramethyl-4,4'-stilbenequinone* (VI), which seps. from C_5H_5N as deep-violet rods, m. 330°, and from $CHCl_3$ as a less deeply colored compd. with 0.25 mol. H_2O, m. 215°. The C_6H_6 mother liquors from the crude mixt. of V and VI give 3.6 g. (crude) *3,5,3',5'-tetramethyl-4,4'-dihydroxy-α,β-diphenylethane* (VII), which, crystd. from AcOH and repeatedly from C_6H_6, m. 166–7°; *di-Ac deriv.*, m. 150-1°. Reduction of VII with Zn in boiling AcOH gives *3,5,3',5'-tetramethyl-4,4'-dihydroxystilbene*, m. 239–40°; *di-Ac deriv.*, m. 237–8°. A suspension of 0.1 g. of VI in C_6H_6, treated with HBr without cooling, gives 0.15 g. of *3,5,3',5'-tetramethyl-4,4'-dihydroxy-1,2-bromoethane*, m. (crude) 176° (decompn.); it splits off HBr on heating in indifferent solvents and with dil. NaOH, H_2O, C_5H_5N or alcs. regenerates VI. Reduction of V with Zn in AcOH gives II. Heating 0.3 g. of V in 2 cc. AcOH

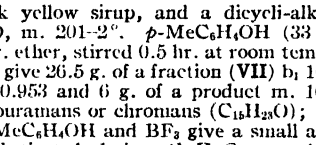
for 10 min. gives *3,3,5',5'-tetramethyl-4,4'-dihydroxydiphenylcarbinol acetate* (VIII), pale-yellow, m. 155–60° (decompn.); with Ac_2O-H_2SO_4 V gives the *4,4'-di-Ac deriv.* (IX) of VIII, m. 139–40°. V (0.1 g.) in 5 cc. Me_2CO and 3 cc. H_2O, allowed to stand several days (addn. of a little H_2O during this time) gives *3,5,3',5'-tetramethyl-4,4'-dihydroxydiphenylcarbinol*, m. 156–8° (decompn.). Passing HBr into 0.2 g. of V in 10 cc. AcOH without cooling until the whole forms a mass of crystals gives the *compd.* $C_{17}H_{19}O_2Br.H_2O$, deep blue-violet needles, m. 253–5°; H_2O regenerates V; Ac_2O-H_2SO_4 gives IX. IV and Br (0.03 mole of each) in 41 cc. AcOH-AcONa at −3° give *1,3,5-trimethyl-1-bromo-4-oxo-1,4-benzene dihydride* (X); it is reduced by Zn to IV; it liberates I from KI; after keeping some time the soln. does not give IV on reduction but a light-sensitive compd., whose *di-Ac compd.*, $C_{18}H_{20}O_3$ m. 186°. X, decompd. with ice H_2O, gives a yellow oil, sepd. by distn. into IV and II (identified as the di-Ac deriv.) and a *compd.*, $C_{18}H_{22}O_2$, m. 153° (*di-Ac deriv.*, m. 133°), which is probably an unsym. dihydroxydiphenylethane. Dibromomesitol (XI) with Br in AcOH-AcONa gives the *1,2,6-tri-Br analog* (XII) of X, yellow, m. 80–4° (decompn.); it liberates I from KI and on reduction yields XI. XII slowly rearranges at room temp. (quickly on heating) to dibromodimethyl-*p*-pseudophenol bromide (Auwers, *Ann.* **302**, 79 (1898)). XII and $PhNH_2$ in EtOH-AcONa give the *1-anilino-2,6-dibromo deriv.*, orange-yellow, m. 136°. XII (1 part) in 10 parts AcOH, treated at 0° with 2 parts coned. HCl, gives 91% of *2,4,6-trimethyl-3,5-dibromo-4-aminodiphenyl ether*, m. 153° (*HCl salt*, m. 298°; *Ac deriv.*, m. 233°). 4,6,2-$Me_2(HOCH_2)C_6H_2OH$ (5 g.) in C_6H_6 and HBr give 5 g. of *2-bromomethyl-4,6-dimethylphenol*, m. 73°; like the chloride (XIII) it does not yield the simple *o*-quinonemethide but gives the polymer $(C_9H_{10}O_2)_3$ (*C. A.* **1**, 2367). The *acetate* of XIII, b_{15} 151°, m. 30°; heating in C_6H_6 with Naturkupfer C for 24 hrs. gives the *diacetate*, m. 125°, of *o,o'-dihydroxybimesityl* (XIV), m. 167°; Br gives the *tetra-Br deriv.* (XV), m. 258°. Treating XIV in 2 *N* NaOH with $K_3Fe(CN)_6$ gives the *cyclic quinol ether*, m. 123°, which is reduced by Zn in AcOH to XIV; similarly XV gives the *cyclic ether* $C_{18}H_{16}O_2Br_4$ (XVI), yellow, m. 168° (identical with the 3,5-dibromo-4,6-dimethyl-1,2-quinonemethide of F. and K.); Zn in AcOH gives XV; AcCl gives a complicated reaction leading to the di-Ac deriv. of a trichlorobromodihydroxybimesityl. XVI and $PhNHNH_2$ in EtOH give the *compd* $C_{24}H_{28}O_2Br_3N_2$, red, m. 193°, in which 1 of the Br atoms in XVI is replaced by PhNHNH; this is quite stable toward acids and alkalies; Ac_2O and H_2SO_4 give a *di-Ac deriv.*, yellow-red, m. 221°; the *anilido compd.*, yellow, m. 206° (decompn.); heating with coned. HCl replaces the PhNHI group by an OH group; reduction with Zn in AcOH gives an anilinotribromodihydroxybimesityl. IV is conveniently prepd. (65% yield) by reduction of the *Ac deriv.*, m. 108°, of 2,6-di(chloromethyl)-4-methylphenol (XVII) (Auwers, *C. A.* **1**, 2577) with amalgamated Zn and HCl in Me_2CO. The Br analog of XVII in Et_2O, shaken with 2 *N* Na_2CO_3, first gives the deep-yellow soln. of the quinonemethide, which quickly becomes colorless with the production of the *compd.* $(C_9H_9OBr)_3$, m. 167°. HBr could not be added to the Br compd. in AcOH; the polymeric quinonemethide is formed as a dark elastic mass; action of Zn upon the AcOH soln. of the polymer did not give a homogeneous reaction product and IV could not be isolated. Shaking 1 part of 4,3,5,2,6-$MeBr_2(BrCH_2)_2C_6OH$ with 10 parts of 10% AcONa gives 60% of the *cyclic ether*, $C_{18}H_{14}O_2Br_6$, S-yellow, m. 194°, which is reduced by Zn in boiling AcOH to XV and on heating with HBr-AcOH for 2 hrs. at 115–20° yields 75% of 1,2-di[2-hydroxy-3-(bromomethyl)-4,6-dibromo-5-methylphenyl]ethane, m. 228° (*di-Ac deriv.*, m. 290°); heating with 20 parts of MeOH for 20 min. gives the corresponding *3,3'-di(methoxymethyl) deriv.*, m. 191°.

C. J. West

Cycli-alkylation of aromatic compounds by the Friedel and Crafts reaction. Herman A. Bruson and John W. Kroeger. *J. Am. Chem. Soc.* **62**, 36–44 (1940).—PhOH (29 g.), 55 g. $(CH_2CClMe_2)_2$ (I) and 3 g. $AlCl_3$ in 30 g. of petr. ether (b. p. 90–100°), stirred 1 hr. at room temp., heated on a steam bath for 2 hrs., treated with 2 g. $AlCl_3$, heated an addnl. 2 hrs. and treated with cold dil. HCl, give 80% of *5,5,8,8-tetramethyl-5,6,7,8-tetrahydro-2-naphthol* (II; R =  and A, B and X = H), m. 145–5.2°; $FeCl_3$ gives an emerald-green color; the *oxyacetic acid deriv.* (III) m. 164–5°; the *Et ether* (IV) b_5 132° (attempts to oxidize the ether with dil. HNO_3 gave a yellow NO_2 *deriv.*, m. 106–8°). Oxidation of II with $KMnO_4$ gives a small quantity of 1,1,4,4-tetramethyladipic acid, m. 190–3°, proof that no rearrangement of the entering group had occurred during the condensation with $AlCl_3$. The mother liquor from II yields a small quantity of the *benzochroman* (V), m. 240–1°. II and HCHO with HCl give the *methylenedinaphthol deriv.* (VI), m. 232°. PhOH also condenses with $[Me_2C(OH)CH_2]_2$, $(CH_2MeC{:}CH_2)_2$ and $Me_2C.CH_2.CH_2.CMe_2$ to give II. $PhOCH_2CO_2H$, I and $AlCl_3$ in $C_2H_4Cl_2$, stirred 1 hr. at room temp. and refluxed 5 hrs., give III. IV also results from PhOEt and I. Condensations were also carried out with the following phenols, the products having the general formula II (A, B and X are H except as indicated): *o-cresol* (X = Me), m. 125.5–6°; *m-cresol* (B = Me), m. 134–5°; *2,6-Me$_2$-C$_6$H$_3$OH* (X and A = Me), m. 164.5°; *pyrocatechol* (X = OH), m. 182–3°; *o-PhC$_6$H$_4$OH* (X = Ph), m. 98°; *o-cyclohexylphenol* (X = C_6H_{11}), m. 109–10°; *o-ClC$_6$H$_4$OH* (X = Cl), m. 103.5–4°; *m-HOC$_6$H$_4$OCH$_2$CH$_2$OCH$_2$CH$_2$Cl* (B = $CH_2CH_2OCH_2CH_2Cl$), m. 107–8° and 71–5°, sepd. by crystn. from petr. ether (b. p. 90–100°). *Diphenylene oxide* and I with $AlCl_3$ in petr. ether, stirred 8.5 hrs. at room temp. and refluxed for 1 hr., give a fraction b_4 170–240°, probably contg. a monocycli-alkylated deriv.,



(II) (V)



(VI)

$C_{20}H_{22}O$, a thick yellow sirup, and a dicycli-alkylated compd., $C_{28}H_{36}O$, m. 201–2°. *p*-MeC_6H_4OH (33 g.), I and $AlCl_3$ in petr. ether, stirred 0.5 hr. at room temp. and 2 hrs. at 85–90°, give 26.5 g. of a fraction (VII) b_1 107–8°, n_D^{25} 1.5137, d_4^{25} 0.953 and 6 g. of a product m. 100–1°, believed to be couramans or chromans ($C_{18}H_{28}O$); $(CH_2CMeCH_2)_2$, *p*-MeC_6H_4OH and BF_3 give a small amt. of VII and a disubstituted deriv., $C_{23}H_{36}O$, m. 193–5°. PhOH (25 g.) and 54.5 g. of $[Me_2C(OH)CH_2]_2$, melted together and dropped into 96 g. of 77% H_2SO_4 at 10°, stirred at room temp. for 22 hrs. and at 85–95° for 1 hr., give 30 g. of *1,1-dimethyl-3-isopropyl-5-hydroxyindan*, b_5 160–5°, m. 97–8°; it gives an emerald-green color with $FeCl_3$-EtOH and forms a sparingly sol. Na salt from 10% NaOH; it does not react with HCHO but yields an oxyacetic acid deriv., m. 112–13°; it is unchanged by warming with $AlCl_3$ in petr. ether. 2,6-$Me_2C_6H_3OH$ similarly gives a *compd.*, $C_{16}H_{24}O$, b_6 156°. $(CH_2CPh_2OH)_2$ (8 g.), 10 g. *o*-cresol and 8 g. $AlCl_3$ in 100 ml. petr. ether, refluxed 14 hrs. and hydrolyzed with dil. HCl, give 6 g. of *5,5,8,8-tetraphenyl-3-methyl-5,6,7,8-tetrahydro-2-naphthol*, m. 330–2°, and a small amt. of *1,1,4,4-tetraphenyl-1,3-butadiene*, pale violet, m. 195–6°. 1,4-Dichlorocyclohexane, PhOH and $AlCl_3$ give *5,8-endoethylene-5,6,7,8-tetrahydro-2-naphthol(?)*, m. 124–7°. I (9 g.), 6.2 g. *p*-MeC_6H_4SH and 1 g. $AlCl_3$ in 30 g. petr. ether, refluxed 4 hrs., give 4 g. of *2,5-dimethylhexane-2,5-bis(p-tolyl sulfide)*, m. 128–9°; *m-isomer*, m. 105–6°; *o-isomer*, m. 75–6°; the *phenyl sulfide*, m. 79–80°. I (36 g.) in 78 g. C_6H_6, stirred at 30° or lower while 16 g. $AlCl_3$ is added, then stirred at room temp. for 21 hrs. and refluxed 2 hrs., gives 61% of *1,1,4,4-tetramethyl-1,2,3,4-tetrahydronaphthalene*, b_8 82–4°, b_{760} 248°, n_D^{25} 1.5278, d_4^{25} 0.9482. I (36 g.), 78 g. C_6H_6 and 1 g. $AlCl_3$,

refluxed 4 hrs., give *1,1,4,4,5,5,8,8-octamethyl-1,2,3,4,5,6,7,8-octahydroanthracene*, m. 220–2° (*NO_2 deriv.*, m. 259–61°); tetralin gives the *1,1,4,4-tetra-Me analog*, m. 90–1°. Hydrindene and I with $AlCl_3$ give *5,5,8,8-tetramethyl-5,6,7,8-tetrahydro-β-naphthindan*, m. 93–4°; $C_{10}H_8$ gives 80.5% of *1,1,4,4,7,7,10,10-octamethyl-1,2,3,4,7,8,9,10-octahydronaphthacene*, m. 319–20°; the *compd.*, $C_{18}H_{22}$, from PhMe and I b_4 95° and the *compd.*, $C_{18}H_{21}Cl$, from *o*-ClC_6H_4Me m. 104–5°. I and thiophene give a *tetramethyltetrahydrobenzothiophene*, b_6 94°. These compds. and methods may be of interest in the synthesis of higher polynuclear structures in *vitamin* and *hormone* research. The term *cycli-alkylation* is introduced to denote the formation of a new cycle by attachment of a satd. bivalent aliphatic group to an aromatic nucleus. C. J. W. 1

Steric hindrance in the addition of halogens to triaryl phosphites. Ludwig Anschütz, Horst Kraft and Kurt Schmidt. *Ann.* **542**, 14 28(1939).—2,4,1-$Br_2C_{10}H_5OH$ (20 g.) and 3 g. of PCl_3, heated 18 hrs. on the water bath and the product taken up in 100 cc. xylene at 100°, give about 20% of *tri(2,4-dibromo-1-naphthyl)phosphite* (I), m. 289°; a suspension in CCl_4 does not add Cl or Br (in 48 hrs.). The *1,6,2-isomer* of I, crystd. from CCl_4-Et_2O, m. 245° (15% yield); this also does not add Cl or Br. 1,6,2-$Br_2C_{10}H_5OH$ and PCl_3, heated 6 hrs. at 140–50°, give a yellow-brown smear which loses HCl in the air; that this is *tri(1,6-dibromo-2-naphthyl) phosphite dichloride* follows from the reaction with boiling H_2O for several hrs., which yields the *phosphate*, m. 200–1° (decompn.). 1-$C_{10}H_7OH$ (22 g.) and 7 g. PCl_3, heated 12 hrs. at 75–100°, give 45–50% of *tri(1-naphthyl)phosphite* (II), very hygroscopic, m. 91° (crystd. from xylene and washed with Et_2O); in Et_2O it absorbs Cl (2 hrs.) to give the *dichloride*, light green very hygroscopic liquid, purified by treatment with C_6H_6 and Et_2O; hydrolysis gives the *phosphate*, m. 145°; *dibromide*, ruby-red, very hygroscopic oil. The *2-isomer* of II m. 94° (crystd. from xylene and Et_2O); *dichloride*, yellow oil, hydrolyzed to the phosphate, m. 110–11°; *dibromide*, brownish red oil. 1-$C_{10}H_7MgBr$ and PCl_3 in Et_2O give 30–5% of *tri(1-naphthyl)phosphine* (III), m. 282° (from dioxane); it forms a *complex* with 1 mol. $CHCl_3$, m. 262° (lost on heating *in vacuo* at 98°) and with 1 mol. of CCl_4. The *dichloride* of III has been obtained only as the *complex* with 1 mol. of $CHCl_3$, m. 160° (decompn.), and with 1 mol. of CCl_4, each of which is only slightly hygroscopic; hydrolysis with dil. NaOH gives tri(1-naphthyl)phosphine oxide hydrate, which yields the oxide, m. 341–3°, on heating. The *dibromide* of III is prepd. by passing $CHCl_3$-Br over the surface of III; it is reddish, only slightly hygroscopic and does not form complexes with $CHCl_3$ or CCl_4. Anthrol and PCl_3, heated 5–8 hrs. at 100 10°, give 10% of *tri(1-anthranyl)phosphite*, greenish yellow, hygroscopic, decomps. 182–90°; 5% H_2SO_4 (boiling 0.5 hr.) gives anthrone; it does not add Cl or Br but a portion is hydrolyzed and oxidized; the products isolated include 10,10-dichloroanthrone, 10-bromoanthrone, anthraquinone and 1- and 3-bromoanthraquinone; H_3PO_3 is also formed, but no phosphates or H_3PO_4. Tri(9-anthranyl)phosphine could not be prepd. The color of the fluorescence of these compds. in ultraviolet light is given. The results indicate that the retardation of the reaction is less dependent on the electroneg. character of the *o*-Br atom than on the space relations of the aromatic residue. C. J. West 2

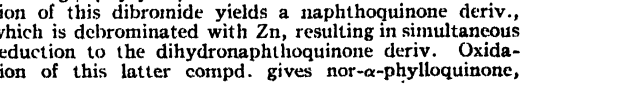
Water-soluble antihemorrhagic esters. Louis F. Fieser and Edward M. Fry. *J. Am. Chem. Soc.* **62**, 228–9 (1940).—A cooled suspension prepd. by slowly adding 0.6 cc. of $ClSO_3H$ to 2 cc. C_5H_5N and 5 cc. CCl_4, treated with 0.48 g. of vitamin K_1 hydroquinone (I) and boiled 10 min., gave a sticky solid, which was treated with 10 *N* NaOH, the C_5H_5N removed with Et_2O and the Na salt changed by EtOH-KOH to the *K salt of vitamin K_1 hydroquinonedisulfuric acid* (II), plates sol. in H_2O. *Na 2-methyl-1,4-naphthohydroquinonedisulfate* (III), with 2 mols. H_2O, and the *2,3-di-Me deriv.* (IV), with 2 mols. H_2O, were similarly prepd. I and $POCl_3$ in C_5H_5N give I-*diphosphoric acid* (V), which gives a gel with a small quantity of H_2O and a clear soln. with an adequate quantity. 2-Methyl-1,4-naphthohydroquinone and $POCl_3$ in C_5H_5N, followed by Na_2CO_3, give *Na 2-methyl-1,4-naphthohydroquinonediphosphate*, with 2 mols. H_2O; it is very hygroscopic and liquefies in moist air. II and IV were inactive in a dosage of 500 γ; V shows activity at dosages down to 25 γ but not at 10 γ; III shows antihemorrhagic activity at a level of 2 γ. A clinical trial with III is reported. C. J. West 3

Synthesis of vitamin K_1. Louis F. Fieser. *J. Am. Chem. Soc.* **61**, 3467–75(1939).—This gives the exptl. details of the prepn. of 2-methyl-3-phytyl-1,4-naphthoquinone (I) and the hydroquinone diacetate and dibenzoate previously reported in *C. A.* **33**, 8602[1]. 2,6-Dimethyl-1,4-naphthohydroquinone (4 g.) and phytol with $(CO_2H)_2$ give 0.54 g. of the *2-phytyl deriv.* analogous to I, viscous yellow oil with slight reddish tinge; *hydroquinone diacetate*, m. 55–6.5°. 2-Methyl-3-geranyl-1,4-naphthoquinone(II) is a viscous yellow oil; alc. KOH gives an intense indigo-blue color, changing to purple and then dull red; the use of myrcene gives a yellow oil. 2-Ethyl-3-phytyl-1,4-naphthoquinone is also a yellow oil. In these syntheses it is advantageous to sep. and purify the product in the reduced form prior to oxidation; the quinone is obtained in a pure condition without recourse to distn. or adsorption. Natural vitamin K_1 can be isolated very easily from alfalfa concentrates by a similar method. The 2-Et and 2,6-di-Me analogs are inactive in the chick-assay, whereas II shows moderate potency. Indications of a certain structural specificity are discussed and a tentative hypothesis is suggested concerning the action of 2-methyl-1,4-naphthoquinone. C. J. West 4

Synthesis of vitamin K_1. Louis F. Fieser. *Science* **91**, 31–6(1940); cf. preceding abstract. E. H.

Vitamin K-active derivatives of 2-methyl-1,4-naphthohydroquinone. S. Ansbacher, Erhard Fernholz and M. A. Dolliver. *J. Am. Chem. Soc.* **62**, 155–8(1940); cf. *C. A.* **33**, 6922[9].—2-Methyl-1,4-naphthoquinone (I), $EtCO_2H$, $(Et_2CO)_2O$, $EtCO_2Na$ and Zn dust, refluxed 30 min. in an oil bath at 160 70°, give 72% of *2-methyl-1,4-naphthohydroquinone dipropionate* (II), m. 74–5°. 2-Methyl-1,4-naphthohydroquinone (III) and BzCl in C_5H_5N, after standing 1 hr. and being heated at 110–20° for 30 min., give 84% of the corresponding *dibenzoate* (IV), m. 179°. Refluxing I with $PrCO_2H$, $(PrCO)_2O$, $PrCO_2Na$ and Zn for 1 hr. gives 55% of the *dibutyrate* (V), b_1 175–85°, m. 52–3°, also prepd. in 3.5 g. yield from 8.5 g. of III and PrCOCl in C_5H_5N (refluxing 1 hr.). III and iso-PrCOCl give 69% of the *diisobutyrate* (VI), m. 73–4°; the *divalerate* (VII), yellow oil, b_1 210°, results in 70% yield; the *diisovalerate* (VIII), yellow oil, b_1 185°, results in 48% yield. III and Me_2SO_4 with KOH in a N atm., heated for 45 min. on the water bath, give 55% of the di-Me ether (IX), b_{18} 174–8°, m. 48–9° (Giral, *C. A.* **28**, 4053[4], gives m. 23–4°). Biol. assays on chicks gave the following vitamin K unit values: III 0.5 γ; III diacetate, II and IV 1 γ; V 1.25 γ; VI 5 γ; VII 1.25 γ; VIII 3 γ; IX 5 γ; data are also given for the time of duration of the curative effect of III, III diacetate, II and V. A discussion is given of the relationship between structure and vitamin K activity. C. J. West 5

Nor-α-phylloquinone (norvitamin K_1) and similar compounds. (Preliminary communication.) P. Karrer, A. Geiger, A. Rüegger and H. Salomon. *Helv. Chim. Acta* **22**, 1513–16(1939)(in German).—β-$C_{10}H_7CH_2CH_2MgBr$ reacts with 2,6,10-trimethyl-14-pentadecanone (I) to form a tertiary alc. (II), which is converted into the chloride, from which 1 mol. HCl is removed with pyridine. To the resulting β-phytylnaphthalene is added 1 Br mol. Oxidation of this dibromide yields a naphthoquinone deriv., which is debrominated with Zn, resulting in simultaneous reduction to the dihydronaphthoquinone deriv. Oxidation of this latter compd. gives nor-α-phylloquinone, 6



(III). The position of the double bond in III is indicated by the violet reaction with EtONa (K., *C. A.* **34**, 1308[8]). III is a viscous yellow oil, crystd. at lower temps. It con-

tains C 82.34, H 10.23% (calcd. for $C_{60}H_{44}O_2$: C 82.5, H 10.16%). Potentiometric titration with $Na_2S_2O_4$ (*C. A.* **33**, 8191[6]) gave a mol. wt. of 448 (calcd. 438). The absorption spectrum showed max. at 242, 248, 261, 265, 326 mμ. II may also be prepd. by condensation of Na β-naphthylacetylide with I, resulting in an unsatd. tertiary alc., which, upon reduction, gives II. Similar naphthoquinone derivs. are also obtained by direct condensation of 2-methyl-1,4-dihydroxynaphthalene with dihydrophytyl bromide in the presence of a catalyst and oxidation of the condensation product. The properties of 2′,3′-dihydro-α-phylloquinone are similar to those of the natural α-phylloquinone except for its failure to give a blue color with EtONa. It contains C 82.15, H 10.57% (calcd. C 82.2, H 10.69%). Ruth Berggren

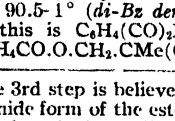
Diene synthesis of 2,3-dialkyl-1,4-naphthoquinones related to vitamin K. Louis F. Fieser and Charlotte W. Wieghard. *J. Am. Chem. Soc.* **62**, 153-5(1940).—As a route to 2,3-dialkyl-1,4-naphthoquinones of high mol. wt. which might show vitamin K activity, a study has been made of the addn. of suitable dienes to α-naphthoquinone (I) and the partial dehydrogenation of the products. 1,1,3-Trimethylbutadiene and I give 60.5% of 1,1,3-trimethyl-1,4-dihydroquinone, m. 129-9.5° (Diels and Alder, *C. A.* **24**, 847, give 162°); this is inactive in the chick assay at a dosage of 200 γ. 1,1-Dimethyl-3-*tert*-butylbutadiene (b_{12} 58–9°) and I give 13% of the *addn. product*, $C_{20}H_{24}O_2$, m. 142–3°; passing air through the EtOH soln. contg. a little KOH gives 35% of *1,1-dimethyl-3-tert-butyl-1,4-dihydroanthraquinone*, yellow, m. 102-3°; with EtOH-KOH there results an intense-blue color changing slowly to yellow; it shows no vitamin K activity when assayed at 400 γ. The reaction between myrcene and I gives 64% of an addn. product, $C_{20}H_{32}O_2$, m. 61–1.3° (Arbuzov and Abramov, *C. A.* **29**, 1384[2], give 58–8.5°); heating with Ac_2O and C_5H_5N for 1 hr. gives 84% of the *hydroquinone diacetate*, needles with a fluorescent greenish tinge, m. 121-2°; cleavage with MeMgCl and oxidation with Ag_2O give 70% of *2-(δ-methyl-γ-pentenyl)1,4-dihydroanthraquinone*, yellow, m. 89.8–90.8°; EtOH-alkali gives a red color changing rapidly on shaking with air to pale-yellow; it showed no vitamin K activity when assayed at 50 γ. C. J. West

Use of hydrogen fluoride in acylations and cyclizations. Louis F. Fieser and E. B. Hershberg. *J. Am. Chem. Soc.* **62**, 49–53(1940); cf. *C. A.* **33**, 6295[8].—*peri*-Naphthane (10 g.), 6.1 g. Ac_2O, 5 cc. Et_2O and 200 g. HF, stirred 60 hrs. at room temp., give 71% of the *3-Ac deriv.*, b_2 170-5°; AcOH gives similar results; *trinitrobenzene deriv.*, yellow, m. 114–14.5° (all m. ps. cor.); oxidation with $Na_2Cr_2O_7$ in AcOH gives 4-aceto-1,8-naphthalic anhydride, m. 193–5°; KOCl gives *3-peri-naphthoic acid*, pale-yellow, m. 188.4–9°. Hydrindene, AcOH and HF (64 hrs. at room temp.) give 73% of the 5-Ac deriv., b_8 134–7°; BzCl and HF after 36 hrs. at room temp. give 75% of the 5-Bz deriv., b_8 203–4°; α-$C_{10}H_7OH$ and HF (72 hrs. at room temp.) give 90% of *5-(α-naphthoyl)hydrindene*, b_8 255–65°, m. 71–2°. Certain of the hydrocarbons which do not react at room temp. and atm. pressure can be acetylated in an Fe pressure vessel under reflux at temps. up to that of the steam bath. Acenaphthene (61.6 g.), 22 cc. Ac_2O and 120 g. HF, heated in the pressure vessel for 1.5 hrs. at a gage pressure of 4 atm., give 37% of the 1-Ac deriv. Catalytic reduction of 7.5 g. of 1-acenaphthoyl chloride in xylene (0.35 g. of 2% Pd-$BaSO_4$ and 0.075 cc. quinoline-S reagent) at 150–60° for 5.5 hrs. gives 72% of *1-acenaphthaldehyde*, very pale yellow, m. 99.5–100.5°. $C_{10}H_8$ and Ac_2O give a mixt. of α- and β-Ac derivs. somewhat richer in the β-isomer than that obtained by the Friedel-Crafts reaction. $C_{10}H_8$ does not react with succinic anhydride at moderate temps. and tar formation occurs on attempting to push the reaction. At 50–5° phenanthrene (I) and Ac_2O give a mixt. from which the 2- and 3-Ac derivs. were isolated. I and crotonic acid at 3 atm. pressure for 43 hrs. give an orange oil, b_2 215–25°, which appears to be a mixt. of isomeric methylketocyclopentenophenanthrenes. β-$C_{10}H_7MgBr$ and $C_6H_4(CO)_2O$ give 37% of *o*-(β-naphthoyl)benzoic acid, with 0.5 mol. C_6H_6, m. 129–31° and then 166–7°; reduction with Zn in NaOH gives 97% of *o*-(β-naphthylmethyl)benzoic acid, m. 139.5–40°, which with HF at room temp. for 1 hr., followed by MeMgCl, gives 14% of 9-methyl-1,2-benzanthracene, m. 136–7.5°; the *9-allyl analog*, pale yellow, m. 115–16°, results in 35% yield. 1-Methyl-7-bromonaphthalene forms a *trinitrobenzene deriv.*, yellow, m. 92.5–3°; *o*-(8-methyl-2-naphthylmethyl)benzoic acid with HF at room temp. for 7 min. gives *1′-methyl-2,3-benz-10-anthrone* (II), prisms or pale yellow needles, m. 175–6°; alc. alkali gives a purple color which fades on shaking with air; oxidation with CrO_3 in AcOH gives *1′-methyl-2,3-benzanthraquinone*, orange-yellow, m. 227–9°; it does not give a red color with $Na_2S_2O_4$ in alkali. II and MeMgCl give *1′,10-dimethyl-2,3-benzanthracene* (III), fiery red needles, m. 138–9°, on slow crystn. from abs. EtOH; rapid cooling gives bronze plates, m. 133° (bath temp.), solidifies and then m. 138–9°; concd. H_2SO_4 gives an olive-green color; *picrate*, purple-black, m. 164–5°; *trinitrobenzene complex*, purplish black, m. 166.5–7.5°. The ultraviolet absorption spectrum of III is given. C. J. West

Compounds of the diphensuccindene series. XVI. Several derivatives of 10-diphensuccindene-9,12-dione. Kurt Brand and Hans W. Stephan. *Ann.* **542**, 29–34 (1939); cf. *C. A.* **31**, 1394[8].—10-Bromodiphensuccindene-9,12-dione (3 g.), 2.5 g. $NH_2OH.HCl$ and 1 g. concd. HCl in 100 cc. EtOH, boiled 8 hrs., give 10-diphensuccindene-9,12-dione dioxime, dark violet-red, m. 273-3.5°, which is purified by pptn. from dil. NaOH with 30% of AcOH and by crystn. from AcOH. $PhNHNH_2.HCl$ similarly (but with boiling 40 hrs.) gives the *bis(phenylhydrazone)*, black to red-violet, m. 242° (decompn.); *bis(p-nitrophenylhydrazone)*, violet, m. 305.5° (from $PhNO_2$); the reaction is carried out in $PhNO_2$. Either 10-diphensuccindene-9,12-dione does not exist as such or the conditions for its prepn. have not been found. C. J. West

Further evidence on the Mills-Nixon effect. Warren C. Lothrop. *J. Am. Chem. Soc.* **62**, 132–3(1940).—The successful diazo coupling of 5-hydroxy-6-methylhydrindene (I) with *p*-$O_2NC_6H_4N_2X$ (*C. A.* **31**, 4311[1]) confirms the view that no quant. stabilization of 1 Kekulé form exists; with increasing alkali content (0.119 to 2.49 cc. *N* NaOH) the yield of product decreases from 35.9 to 0.5%. Data on coupling in buffered solns. indicate that the derivs. of hydrindene and tetralin are all inferior to β-$C_{10}H_7OH$ in coupling ability and are more comparable with 2,4-Me_2-C_6H_3OH. I with allyl bromide with K_2CO_3 in MeEtCO, refluxed 64 hrs., gives 98% of *5-alloxy-6-methylhydrindene*, b_3 95–7°; heating 0.97 g. of the ether and 2.75 g. $PhNMe_2$ at 215° for 1 hr. gives 0.83 g. (86%) of *4-allyl-5-hydroxy-6-methylhydrindene*, m. 43–5°. *5-Alloxy-4,7-dimethylhydrindene*, b_2 107–8°, nearly quant. yield; pyrolysis at 280° as above gives 75% of *5-hydroxy-6-allyl-4,7-dimethylhydrindene*, m. 66-7°; on standing in the air it turns a bright violet in 2 months. These results indicate that the Mills-Nixon effect is at the most qual. in the case of hydrindene. C. J. West

Mechanism of the reaction between phthalic anhydride and an amino diol. Murray M. Sprung. *J. Am. Chem. Soc.* **61**, 3381-5(1939).—From a consideration of polycondensation reactions, an amino alc. should give a linear polymeric ester-amide, whereas an amino diol should give a product having a 3-dimensional network structure analogous to that of glyceryl phthalate; this product, furthermore, should show the property of passing suddenly through the sol-gel transformation at a definite, crit. stage in the polycondensation reaction. The reactions of $Me_2C(NH_2)$-CH_2OH (I) with adipic acid (II) and of $H_2NCMe(CH_2OH)_2$ (III) with succinic (IV), maleic (V), II and sebacic acids (VI) gave results anticipated on the basis of these considerations. With I and II the product was a thermoplastic resin and apparently a linear polymer. In the latter cases, cross-linked resins were formed which were converted to insol., infusible materials when the combined esterification and amidation reactions had proceeded to the extent of about 65–75% of that theoretically possible. However when III was caused to react with *o*-$C_6H_4(CO)_2O$ (VII) it was found possible to carry the reaction to com-

pletion without observing the formation of a gel structure. The product obtained under these conditions was a colophony-like, brittle, amorphous solid, which appeared to be a mixt. of several ingredients. Heating VII and III at 135–45° for 2.5 hrs. causes no formation of H_2O; the acid value decreases from 444 to 223 and the product is a soft stringy, reddish resin which could not be crystd. or distd.; this appears to consist mainly of *N*-(1,1-dimethylolethyl)-phthalamic acid and the 1st step consists essentially in addn. of the NH_2 group of III to the anhydride linkage of VII; acyl halides reverse the reaction, giving VII and III. The 2nd step is ring closure and takes place when equimol. quantities of VII and III are heated at 150–200° for 2 hrs., 1 mol. of H_2O being split off; the product is a sticky, thermoplastic, resinous-appearing substance which could not be crystd., but 50% of it b_6 207–20°, giving a pale-red liquid, solidifying to a stiff balsam-like material; distn. at 50 microns (172–8°) gives a pale-yellow liquid which, after repeated crystn., m. 90.5–1° (*di-Bz deriv.*, m. 121.5°); it is believed that this is $C_6H_4(CO)_2NCMe(CH_2OH)_2$ (VIIa), although *o*-$C_6H_4CO.O.CH_2.CMe(CH_2OH).NH.CO$ is not excluded. The 3rd step is believed to be dehydration through the isoamide form of the ester-amide to yield an oxazoline; 50% of the colophony-like resin obtained on heating 3 moles VII and 2 moles of III b_2 195–205°; redistn. at very low pressure and crystn. from $C_2H_4Cl_2$ give 2 compds., $C_{12}H_{11}NO_4$,  (VIII), m. 160.5° and $C_{16}H_{17}NO_5$ (IX), m. 165–5.2°. VIII in abs. EtOH gives a *picrate*, 2VIII.$C_6H_3N_3O_{10}$, m. 225 6°; H_2O ppts. from the mother liquor the 1 1 *picrate*, m. 146–7°. VIII is hydrolyzed by Na in abs. EtOH; it could not be reduced by Zn in AcOH. IX does not form a picrate; Na and EtOH gives some $C_6H_4(CO)_2O$ and a compd. m. 227–8° (decompn.). Heating VIIA with excess VII at 170–200° for 20 min. gives some VIII. A table shows the H_2O formed (%) and the nature of the product on heating I and II or its di-Et ester and III with II, IV, V and VI.

C. J. West

Synthesis of phenanthrene derivatives. Alexander Schönberg and Frank L. Warren. *J. Chem. Soc.* **1939**, 1838–41.— The behavior of 2-Ph$C_6H_4CO_2H$ (I) with $SOCl_2$ and $(COCl)_2$ at various temps. is described. I and 1.6 mols. of $(COCl)_2$ in C_6H_6 at 30° for 1 hr. give the chloride, which is freed from HCl and $(COCl)_2$ by evapn. with Et_2O; added dropwise to CH_2N_2 in Et_2O, it yields 60% of *ω-diazo-o-phenylacetophenone* (II), yellow, m. 106°; the crystals change from yellow to red in a few weeks without losing their cryst. form. Aq. colloidal Ag (Ag_2O and $Na_2S_2O_4$ in H_2O) converts II into 86% of *o*-Ph$C_6H_4CH_2CO_2H$ (III). Refluxing 1.5 g. III, 5 cc. AcOH, 5 cc. Ac_2O and 0.2 g. $ZnCl_2$ for 3 hrs. gives 55% of the acetate, m. 76–7.5°, of 9-phenanthrol (IV) (over-all yield from I, 37%). This method is more satisfactory than direct ring closure with H_2SO_4. IV (0.55 g.) and 6 g. Zn, gently heated in H, give 72% of phenanthrene (V). Various attempts to eliminate the NH_2 group from 9-phenanthrylamine gave only traces of V. The Et ester of III and $(CO_2Et)_2$ with EtOK give Et *α*-keto-*β*-2-diphenylylsuccinate, a yellow liquid; with H_2SO_4 at 100° for 3 hrs. there results 63% of phenanthrene-9,10-dicarboxylic anhydride, m. 321–4° (over-all yield from I, 42%); the hot C_6H_6 soln. has a blue-green fluorescence.

C. J. West

Preparation of dibenzopyrenequinone. I. The reaction of benzanthrone with benzoyl chloride. N. K. Moshchinskaya. *J. Gen. Chem.* (U. S. S. R.) **9**, 1376–9(1939).—In the condensation of benzanthrone and BzCl with excess of anhyd. $AlCl_3$ by the method of Scholl and Neumann (*C. A.* **16**, 2143), the poor yields of *dibenzopyrenequinone* (I) were traced to the contamination of the intermediate *1-benzoylbenzanthrone* (II) with the *2-isomer* (III). II, m. 197°, was sepd. from III, m. 205°, by repeated recrystn. of the reaction mixt., m. 162°, from PhCl. When treated with a mixt. of $AlCl_3$ and NaCl and O at 140° (cf. Vollmann, *et al.*, *C. A.* **32**, 145[9]), II was quantitatively converted into I, while III failed to react.

Chas. Blanc

Decomposition of hexoses to hydroxymethylfurfural. A. D. Braun. *Biokhimiya* **4**, 276–82(1939).—The formation of hydroxymethylfurfural from ketohexoses is catalyzed by acids; from aldohexoses, by both acid and base.

H. Priestley

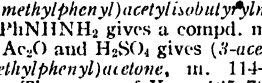
Attempted synthesis of morphenol. Alfred Burger and S. Avakian. *J. Am. Chem. Soc.* **62**, 226–7(1940).—4-Methoxydibenzofuran-1-carboxylic acid and $SOCl_2$ give 93% of the *acid chloride*, m. 162.5–3.5°; CH_2N_2 in Et_2O gives 86% of the *diazo ketone*, yellow, m. 150–1° (decompn.); NH_4OH in dioxane gives 75% of *4-methoxydibenzofuran-1-acetamide*, m. 203°; boiling with 20% EtOH-KOH for 3 hrs. gives 90% of the corresponding *acid*, m. 223–4°; treatment of the acid with concd. H_2SO_4, 85% H_2SO_4, HF at room temp., $SnCl_4$ in the cold and at the b. p. of the condensing agent, treatment of the acid chloride with $AlCl_3$ in ice-cold C_6H_6 or treatment of the acid bromide with $AlCl_3$ in $PhNO_2$ at room temp. and with boiling $SnCl_4$ did not yield a phenanthrene deriv.

C. J. West

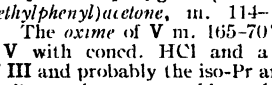
Synthesis of 1,3-diphenyldihydroisobenzofurans, 1,3-diphenylisobenzofurans and *o*-dibenzoylbenzenes from the diene addition products to dibenzoylethylene. Roger Adams and Marvin H. Gold. *J. Am. Chem. Soc.* **62**, 56–61(1940); cf. *C. A.* **33**, 7808[4].—*cis*- or *trans*-$C_2H_2Bz_2$ (40 g.) and 35 g. crude 2,3-dimethylbutadiene in EtOH, refluxed 3 hrs., give 54% of *1,2-dimethyl-4,5-dibenzoylcyclohexene* (I), m. 111–11.5° (all m. ps. cor.); concd. H_2SO_4 gives a lemon-yellow color; *monodinitrophenylhydrazone*, orange, m. 226–8° (decompn.). I with Br in AcOH gives *1,2-dimethyl-1,2-dibromo-4,5-dibenzocyclohexane*, m. 170–1° (decompn.). I (5 g.) in 75 cc. Ac_2O and a little H_3PO_4, refluxed 10 min., gives 99% of *1,3-diphenyl-5,6-dimethyl-4,7-dihydroisobenzofuran* (II), yellowish green fluorescent crystals, m. 225–6°; org. solns. show a blue fluorescence and H_2SO_4 gives an orange-brown color. Br (5 cc.) in 30 cc. AcOH, added slowly to a boiling suspension of 15 g. (II) in 200 cc. AcOH, 30 g. AcONa and 15 cc. H_2O_2 gives 90% of *1,2-dimethyl-4,5-dibenzoylbenzene*, m. 143–4°; H_2SO_4 gives a violet color; oxidation with alk. $KMnO_4$ in dil. C_5H_5N yields 64% of *2-methyl-4,5-dibenzoylbenzoic acid* (III), m. 196–7°. Refluxing 3 g. III, 3 g. NaOH and 75 cc. 90% EtOH until the soln. turns a dark brownish red color (about 45 min.), adding 3 g. active Zn dust and refluxing 5–45 min. (depending upon the Zn) until the soln. is light yellow, then pouring the soln. into 70 cc. AcOH, give 97% of *1,3-diphenyl-5,6-dimethylisobenzofuran* (IV), orange-yellow, m. 187–8°; the org. solns. show a brilliant blue-green fluorescence; H_2SO_4 gives a reddish orange color. Illumination of IV in EtOH for a few days gives a quant. yield of III. II and Br in $CHCl_3$ give 38% (60% on unrecovered II) of *1,3-diphenyl-5,6-dibromo-5,6-dimethyl-4,5,6,7-tetrahydroisobenzofuran*, m. 155–6° (decompn.); refluxing in Ac_2O-AcOH-AcONa gives a mixt. of IV and III. IV and maleic anhydride in C_6H_6 give a quant. yield of *1,4-diphenyl-1,4-oxido-6,7-dimethyl-1,2,3,4-tetrahydronaphthalene-2,3-dicarboxylic anhydride* (V), m. 254–5° (decompn.); concd. H_2SO_4 gives a lemon-yellow color. Refluxing V in MeOH satd. with HCl for 2 hrs. (passing HCl through during this time) and the residue with NaOH in dil. EtOH for 4 hrs. gives 68% of *1,4-diphenyl-6,7-dimethyl-2,3-naphthalic anhydride*, m. 324–5° (decompn.); H_2SO_4 gives a greenish yellow color. With concd. H_2SO_4 at room temp. (3.5 hrs.) 0.5 g. V gives 0.2 g. of *6,7-dimethyl-1,2,3,4-dibenzoylenenaphthalene*, red, m. above 325°. II also adds maleic anhydride but the reaction is so readily reversible that the isolation of pure products was not accomplished. *trans*-$C_2H_2Bz_2$ and butadiene in C_6H_6, heated 2 hrs. at 100°, give a quant. yield of *4,5-dibenzoylcyclohexene*, m. 111.5–12°; *1,2-dibromo-4,5-dibenzoylcyclohexane*, m. 148–9° (90%); *1,3-diphenyl-4,7-dihydroisobenzofuran* (VI), yellowish green, m. 120–1° (99%); *1,3-diphenyl-5,6-dibromo-4,5,6,7-tetrahydroisobenzofuran* (VII), yellow, m. 150–1° (decompn.); it is relatively unstable; *o*-$C_6H_4Bz_2$ results in 85% yield and 1,3-diphenylisobenzofuran in 69% yield. VI and VII form

compds. with maleic anhydride but pure compds. could not be isolated because of the reversal of the reaction. *trans*-$C_2H_2Bz_2$ and cyclopentadiene give 89% of *2,3-dibenzoyl-1,4-endomethylene-1,2,3,4-tetrahydrobenzene* (VIII), m. 78–9°; the *cis*-isomer gives an isomer of VIII, m. 160–1°. These isomers could not be converted into furans by the above methods. C. J. West

Reaction between quinones and metallic enolates. X. Trimethylquinone and the enolates of β-diketones. Lee I. Smith and E. W. Kaiser. *J. Am. Chem. Soc.* **62**, 133–8 (1940); cf. *C. A.* **33**, 7790⁹.—This is a continuation of the work of S. and MacMullen (*C. A.* **30**, 3797⁹). Ac_2CH_2 (3.8 g.) in EtOH-EtONa (0.75 g.), cooled to 0°, treated during 12 hrs. with 2.25 g. trimethylquinone (I) in 30 cc. EtOH and the deep purple soln. decompd. with concd. HCl, gives 72% of *(3,6-dihydroxy-2,4,5-trimethylphenyl)acetylacetone* (II), m. 129–30°; $PhNHNH_2$ gives a compd. m. 205–6° (decompn.). Refluxing II with concd. HCl and a little EtOH for 3.5 hrs. gives 2,4,6,7-tetramethyl-5-hydroxycoumarone (III) (S. and M.), m. 138–9°; *Ac deriv.*, m. 91–2°. II with Ac_2O and H_2SO_4, 1 hr. at room temp., gives 81% of *(3,6-diacetoxy-2,4,5-trimethylphenyl)acetone* (IV), m. 135.5–6°; attempts to remove the Ac groups by acid or alkali either give unchanged IV or III. The *oxime* of IV m. 172.5° (decompn.). II with $(iso\text{-}PrCO)_2O$ and H_2SO_4 (7 hrs. at room temp.) gives 56% of *(3-isobutyroxy-6-acetoxy-2,4,5-trimethylphenyl)acetone*, m. 127.5–8°; $(ClCH_2CO)_2O$ gives 17.5% of the *3-chloroacetoxy analog*, m. 162–3°. I and the enolate of $Me_2CHCOCH_2Ac$ give 81% of *(3,6-dihydroxy-2,4,5-trimethylphenyl)acetylisobutylmethane* (V), m. 131.5–2.5°; $PhNHNH_2$ gives a compd. m. 167° (decompn.). V with Ac_2O and H_2SO_4 gives *(3-acetoxy-6-isobutyroxy-2,4,5-trimethylphenyl)acetone*, m. 114–15.5°; concd. HCl gives III. The *oxime* of V m. 165–70° (decompn.). Refluxing V with concd. HCl and a little EtOH gives a mixt. of III and probably the iso-Pr analog, which was not sepd. Pure substances could not be isolated from the reaction of $PrCOCH_2Ac$ or $BzCH_2Ac$ and only unchanged diketone was isolated when the enolate of Bz_2CH_2 was used. The acylation of II and V involves a rearrangement of 1 of the side-chain Ac groups from C to the *o*-O atom; simultaneously the other HO is acetylated by the reagent used. A mechanism is suggested for the rearrangement. I and $AcCHNaCO_2Et$ in EtOH (3.5 hrs. at room temp.) give a good yield of *3-acetyl-4,6,7-trimethyl-5-hydroxyisocoumaranone*, m. 126.5–8°; it does not yield a Me ether with Me_2SO_4 or CH_2N_2 and does not form an oxime; steam distn. gives



and



(cf. S. and M.). **XI. Duroquinone and the enolates of cyanoacetic ester and of β-diketones.** *Ibid.* 138–40.—The enolate of 5 g. of $NCCH_2CO_2Me$ and 6 g. of duroquinone (I) in C_6H_6 (refluxing 7 days) give 2.38 g. of *3-cyano-5,7,8-trimethyl-6-hydroxycoumarin* (II), yellow, m. 261.5–3°; Ac_2O and H_2SO_4 give the *6-Ac deriv.*, m. 227–8°. Heating II with 81% H_2SO_4 for 3.5 hrs. on the steam bath gives 60% of the *3-carbamido deriv.* (III), m. 302° (block, decompn.) or 288–90° (decompn.); *Ac deriv.*, m. 243–4.5°. III could not be converted to the acid but the known acid was converted to III through the acid chloride. The enolates of Ac_2CH_2 could not be condensed with I; the possible bearing of this fact upon the mechanism of I-enolate reactions is discussed. C. J. West

Argentine plants. I. Hypaphorine from Erythrina cristagalli. V. Deulofeu, E. Hug and P. Mazzocco. *J. Chem. Soc.* **1939**, 1841–2.—Seeds of *Erythrina cristagalli* (100 g.) were mixed with 10 g. $Ca(OH)_2$, dried and extd. with EtOH, the semisolid ppt. obtained on cooling was filtered off, the filtrate evapd. on the water bath and *N* HCl added; a yield of 1.86 g. of hypaphorine-HCl (tryptophan betaine-HCl), m. 234–5°, $[\alpha]_D^{20}$ 89.2° (H_2O, *c* 0.69), was obtained; nitrate, m. 220–2°; *flavianate*, orange-yellow needles or red rhombic prisms, m. 235° (decompn.). C. J. West

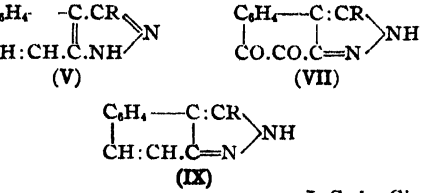
Ethanolamines of the oxindole series. Raymond B. Crawford and H. G. Lindwall. *J. Am. Chem. Soc.* **62**, 171–3(1940); cf. *C. A.* **30**, 5983⁴.—5-Nitroisatin (15 g.) in 15 cc. abs. EtOH and 10 g. of $MeNO_2$ at −15°, treated gradually with 15 drops of $EtNH_2$ with stirring and after 2 hrs. with 1 cc. AcOH, give 57% of *3-hydroxy-3-nitromethyl-5-nitrooxindole* (I), m. 145–7°; *1-Me deriv.*, m. 153° (82%); *1-Et deriv.*, m. 134–5° (72%). Reduction of 25.3 g. of I by suspension in 100 cc. concd. HCl and addn. of 41.6 g. Sn (temp. below 60°), followed in 0.5 hr. by 50 cc. concd. HCl and 41.6 g. Sn and boiling for 20 hrs., give 72% of *3-hydroxy-3-aminomethyl-5-aminooxindole* (II) (as *IICl salt*, m. above 300°); *picrate*, yellow, m. 198° (decompn.); *di-Bz deriv.*, m. 200–1°; *di(ethylcarbamido) deriv.*, m. 154°; *diurea deriv.*, chars without melting. *1-Me deriv.* of II: *di-HCl salt*, m. 170–3° (80%); *picrate*, yellow-brown, m. 201–3° (decompn.); *di-Bz deriv.*, m. 249–51°; *di(ethylcarbamido) deriv.*, m. 171–2°; *diurea deriv.*, m. 213–14°. *1-Et deriv.* of II: *di-HCl salt*, m. 137–7.5° (with 2 mols. H_2O, 40% yield); *picrate*, yellow, m. 179–80°; *di-Bz deriv.*, m. 227–7.5°; *di(ethylcarbamido) deriv.*, m. 183°; *diurea deriv.*, m. 224–5°. 7-Carbomethoxyisatin similarly gives *3-hydroxy-3-nitromethyl-7-carbomethoxyoxindole* (III), m. 159–61.5°; *1-Me deriv.*, m. 138–9° (80%); *1-Et deriv.*, m. 96–7.5° (60%). Reduction of III gives 80% of *3-hydroxy-3-aminomethyl-7-carboxyoxindole*, whose *HCl salt* m. 187–8°; *Bz deriv.*, m. 240–1.5° (53%); *ethylcarbamido deriv.*, m. 217–18° (45%); *urea deriv.*, m. 218–19° (42%). C. J. West

Natural hydroxy- and methoxyanthraquinones, and some new syntheses in the anthraquinone series. R. Eder and B. Siegfried. *Pharm. Acta Helv.* **14**, 34–7 (1939).—A tabulated list is given of 72 anthraquinones occurring in nature, with data on compn., m. p., color, occurrence and references. Their chem. relations and practical uses are discussed. Four new hydroxymethylanthraquinone derivs. were prepd. and their structural compn. detd. They are: (*a*) *1-hydroxy-5-nitro-4-methyl-A* (*A* = anthraquinone), m. 236.5–237° (corr.) (decompn.); (*b*) *1,5-dihydroxy-4-methyl-A*, m. 234–234.5° (corr.); (*c*) *1,8-dihydroxy-4-methyl-A*, m. 211–212° (corr.); (*d*) *1,8-dihydroxy-2-methyl-A*, m. 176.5–177° (corr.); *b*, *c* and *d* are isomers of chrysophanol. None of compds. *a*–*d* was as yet found in nature. The prepn. of *a*–*d*, starting with the condensation of 3-nitrophthalic anhydride with *o*- and *p*-cresol in presence of $AlCl_3$ or H_3BO_3, is given in detail. S. Waldbott

2-Aminophenylanthraquinone and 1,2-phthaloylcarbazole. P. H. Groggins. *Ind. Eng. Chem.* **32**, 98(1940); cf. *C. A.* **24**, 3772.—The previously reported amino deriv. obtained by the ammonolysis of 2′-chloro-β-phenylanthraquinone is not 2′-amino-β-phenylanthraquinone, but 1,2-phthaloylcarbazole, orange needles, m. 255°, from toluene and *o*-$C_6H_4Cl_2$, obviously resulting from a ring closure between the NH_2 group and the 1-position of the anthraquinone nucleus, probably by the oxidizing influence of the $PhNO_2$ used in the reaction. The m. p. corresponds to that of the product derived by heating 1-α-anthraquinonylbenzotriazole in Ph_2NH. It dissolves in concd. H_2SO_4 with a deep blue color and shows an instantaneous color change when a drop of HNO_3 is added to the soln., a reaction characteristic of the carbazole structure. John F. Lontz

A new case of the dehydrogenating action of thionyl chloride. A. Corbellini. *Atti X° congr. intern. chim.* **3**, 82–9(1939).—$SOCl_2$ (I), on reaction with *cis-o-[4,5-(1′,2′-naphtho)-3-pyrazolyl]cinnamic acid* (II), not only chlorinates it but dehydrogenates it as well. The resulting acid chloride with H_2O, MeOH, or EtOH gives the acid (III) or the corresponding Me and Et esters (IV), all yellowish orange and definitely different from II or its esters, all colorless. III is readily hydrogenated to II. II with $KMnO_4$ in alk. soln. gives V (R = *o*-$OHCC_6H_4$-) which then goes over to the acid (VI). VI is also obtained from IV by treating the latter with $KMnO_4$ in C_5H_5N. Oxi-

dation of IV with CrO_3 gives VII (R = *o*-$RO_2CC{:}CC_6H_4$-) (VII) which on further oxidation with $KMnO_4$ in KOH gives (*o*-$HO_2CC_6H_4CO)_2$. IV with NH_2NH_2 gives VIII (V, R = *o*-$CH{:}C(OH).NH.N{:}CC_6H_4$-). Apparently III must be *o*-[*4,5-(1',2'-naphtho)-3-pyrazolyl*]*phenylpropiolic acid*, with the structure IX (R = *o*-$HO_2CC{:}CC_6H_4$-).

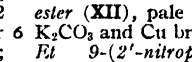
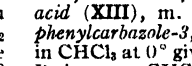


(V) (VII)

(IX)

J. C. Lo Cicero

Attempts to prepare optically active trivalent nitrogen compounds. I. Syntheses of 1,9-phenylenecarbazole and derivatives. Helen G. Dunlop and S. Horwood Tucker. *J. Chem. Soc.* **1939**, 1945–56.—Carbazole (I) (20 g.), 40 g. *o*-$ClC_6H_4NO_2$, 20 g. K_2CO_3 and 0.2–0.3 g. Cu bronze, boiled for 3 hrs., give 50–60% of 9-(2'-nitrophenyl)carbazole (II), yellow, m. 156° (cor.); without Cu the yield is 10% (Nelmes and Tucker, *C. A.* **28**, 766[9]); replacement of K_2CO_3 by 1 g. Cu bronze gives an unworkable tarry product; after 2 hrs. much I is recovered; after 4 hrs. the product is tarry. Boiling 10 g. II, 40 g. $SnCl_2$ and 150 cc. AcOH, satd. with HCl, and pouring into a large excess of hot, fairly concd. NaOH give 75% of *9-(2'-aminophenyl)carbazole* (III), m. 119–21° (cor.); Sn and HCl in AcOH give 50% III. III (5 g.) in 50 cc. glacial AcOH and 11 cc. H_2SO_4, diazotized at 0° with 1.35 g. $NaNO_2$ in 30 cc. H_2O and boiled 0.5 hr., gives 56% of *1,9-phenylenecarbazole* (IV), m. 136.5–8.5° (cor.), sublimes at 250° and 15 mm.; the use of excess $NaNO_2$ gives a lower yield; *picrate*, red, m. 165–9°; *sym-trinitrobenzene complex*, yellow, m. 192–4°. In the synthesis of IV replacement of the AcOH by MeOH gives 9-phenylcarbazole (V); when the diazonium sulfate from III is treated with NaOH an unworkable product is obtained; $AlCl_3$ in various solvents has no effect on V. Heating 5 g. I, 12 g. PhI, 5 g. of K_2CO_3 and 0.3 g. Cu bronze at 190–200° for 6 hrs. gives 65% V, m. 91–5°; *picrate*, scarlet, m. 126–9°; *sym-*$C_6H_3(NO_2)_3$ *complex*, orange, m. 132–4°. I and 4,3-$Cl(O_2N)C_6H_3Me$ with K_2CO_3 and Cu bronze at 220–30° for 3 hrs. give 35% of *9-(2'-nitro-4'-methylphenyl)carbazole*, yellow, m. 104–6°; no condensation occurs with $BaCO_3$; reduction as above gives 75% of the *2'-*NH_2 *deriv.*, m. 117–19°; through the diazo reaction there results *1,9-(4'-methylphenylene)carbazole*, m. 109–11° (cor.), sublimes at 210–70° and 15 mm.; org. solns. have a faint violet fluorescence; *picrate*, red, m. 145–50°; *sym-*$C_6H_3(NO_2)_3$ *complex*, yellow, m. 170–2°. I and *p*-IC_6H_4Me give 66% of *9-p-tolylcarbazole*, m. 105–7°; *sym-*$C_6H_3(NO_2)_3$ *complex*, red (yellow when powd.), m. 106–8°; fusion with KOH effects neither ring closure nor oxidation of the Me to the CO_2H group. I, 1,4,2-$Cl_2C_6H_3NO_2$, K_2CO_3 and Cu bronze at 220–30° for 4 hrs. give 35% of *9-(4'-chloro-2'-nitrophenyl)carbazole*, orange-yellow, m. 134–6°; *2'-*NH_2 *deriv.*, m. 84–6° (80% yield); the diazo reaction gives a black tar; sublimation at 230–50° at 15 mm. gives a yellowish compd., m. 138–40°. I and *p*-ClC_6H_4I with Cu bronze give 70% of 9-(4'-chlorophenyl)-carbazole, m. 140–3°; without Cu the yield is 17%. Boiling 9-(2',4'-dinitrophenyl)carbazole (VI) with Na_2S and S in MeOH for 2 hrs. gives the *4'-*NH_2 *deriv.*, red, m. 164–6° (*Ac deriv.*, m. 261–3°); the diazo compd., poured into EtOH, gives II; reduction of VI with $SnCl_2$ and AcOH-HCl gives 63% of *9-(2',4'-diaminophenyl)carbazole*, m. 128–30°; *di-Ac deriv.*, m. 230–5°. 9-(2'-Nitro-4'-acetamidophenyl)carbazole is reduced by $SnCl_2$ in AcOH-HCl to the 2'-NH_2 deriv., m. 235–45° (75% yield); attempts to effect ring closure by the diazo reaction failed. I could not be condensed with 4,3-$Cl(O_2N)C_6H_3Ac$, 4,3-$Br(O_2N)C_6H_3Ac$ or 4,3-$I(O_2N)C_6H_3Ac$. *p*-IC_6H_4Ac gives the *3-*NO_2 *deriv.*, pale yellow, m. 112–15°. Heating 10 g. I, 25 g. 4,3-$Cl(O_2N)C_6H_3CN$ and 10 g. K_2CO_3 at 180–90° for 12 hrs. gives 40% of *9-(2'-nitro-4'-cyanophenyl)-carbazole*, yellow, m. 172–4°; no condensation occurs with $BaCO_3$; above 200° or after 18 hrs. a charred mass results; reduction gives 70% of the *2'-*NH_2 *deriv.*, m. 186–8° (*Ac deriv.*, m. 241–3°); boiling the amine (4.2 g.) in 30 cc. AcOH and 75 cc. concd. HCl for 1 hr. gives a quant. yield of crude 9-(2'-amino-4'-carboxyphenyl)carbazole-HCl (VII), m. 210–20°; the ordinary diazo method of ring closure not being successful, it was modified by adding $PhNO_2$, which gives 18% of *1,9-phenylenecarbazole-4'-carboxylic acid* (VIII), pink, m. 340° (*Me ester*, pink, m. 155–62°); heating VII with Cu bronze gives IV; it was not decarboxylated with Cu in boiling quinoline or with Cu at 300°. The diazo compd. from VII in MeOH-concd. H_2SO_4 on boiling gives 9-(4'-cyanophenyl)carbazole, m. 175–7°. I, *p*-$IC_6H_4CO_2Et$, K_2CO_3 and Cu bronze, heated 6 hrs. at 220–30°, give 80% of the *Et ester*, m. 97–100°, of *9-phenylcarbazole-4'-carboxylic acid*, m. 215–19°; decarboxylation yields V. I (4.2 g.), 3 cc. Cl_3CCN, 4 g. $AlCl_3$ and 40 cc. PhCl, satd. with HCl, heated from 40 to 100° in 1 hr. and maintained at 100° for 1 hr., followed by hydrolysis with concd. HCl, give 84% of *3-trichloroacetylcarbazole* (IX), yellow, m. 206–8°; *Ac deriv.*, cream, m. 120–5°; warming IX with NaOH gives $CHCl_3$ and carbazole-3-carboxylic acid, m. 270°; the acid seps. with 1 mol. of AcOH of crystn.; from crude IX the yield of acid is 92%; Et ester (X), m. 165–7°; Et carbazole-9-carboxylate could not be converted into the 3-isomer by $AlCl_3$ in $PhNO_2$. X, *o*-$ClC_6H_4NO_2$, K_2CO_3 and Cu bronze, 5 hrs. at 200–10°, give 60% of *Et 9-(2'-nitrophenyl)carbazole-3-carboxylate*, yellow, m. 120–2°; reduction gives 70% of the *2'-*NH_2 *deriv.*, m. 140–2°; the diazo reaction gives *1,9-phenylenecarbazole-3-carboxylic acid* (XI), m. 305°; XI also results by passing dry HCl into a soln. of 2 g. IV, 1 cc. Cl_3CCN and 4 g. $AlCl_3$ in 5 cc. PhCl and allowing it to stand 3 weeks. Heating 4.2 g. I, 6 cc. Cl_3CCN and 8 g. $AlCl_3$ in 40 cc. PhCl for 1 hr. at 40 to 100° and 1 hr. at 100° and hydrolyzing with concd. HCl give 44% of *carbazole-3,6-dicarboxylic acid*, pale green, does not m. 360°; it is purified by boiling a soln. in C_5H_5N with 10–20 vols. AcOH and adding H_2O to produce a turbidity; *Et ester* (XII), pale yellow, m. 206–7°. XII, *o*-$ClC_6H_4NO_2$, K_2CO_3 and Cu bronze, heated 5 hrs. at 180°, give 70% of *Et 9-(2'-nitrophenyl)carbazole-3,6-dicarboxylate*, pale yellow, m. 202–3°; reduction gives 80% of the *2'-*NH_2 *deriv.*, m. 175–7°; the diazo reaction yields 46% of the *Et ester*, m. 185–7°, of *1,9-phenylenecarbazole-3,6-dicarboxylic acid* (XIII), m. above 360°. XII and PhI give *Et 9-phenylcarbazole-3,6-dicarboxylate*, m. 139–41°. IV and Br in $CHCl_3$ at 0° give the *3(?)-Br deriv.*, m. 205–10°; excess Br in warm $CHCl_3$ gives a *3,6(?)-di-Br deriv.*, m. 202–9°; addn. of HNO_3 to a boiling soln. of IV and I in AcOH gives an *iodotrinitro deriv.*, red, does not m. 340°. Heating I, BzCl and K_2CO_3 at 140–60° for 1 hr. gives 60% of the 9-Bz deriv. VIII was not prepd. in sufficient amt. for resolution expts.; XIII gives salts with brucine, quinine, morphine and ephedrine but dissocs. on attempted recrystn. and the recovered acid is inactive. C. J. West

Synthesis of the alkaloid pilosinine. A. M. Polyakova, V. A. Preobrazhenskiĭ and N. A. Preobrazhenskiĭ. *J. Gen. Chem.* (U. S. S. R.) **9**, 1402–9(1939).—Pyman (*C. A.* **7**, 978) isolated from *Pilocarpus microphyllus* 0.007% of the alkaloid pilosine (carpiline), $C_{16}H_{18}O_2^3N_2$, which when distd. with 20% KOH was decompd. into BzH and an optically active base, named by him *pilosinine* (I) and identified as  In the first synthesis of I here described Et succinate and HCO_2Et are with MeONa condensed at 20° to *Et formylsuccinate;* the free ester is reduced with Al-Hg and then distd. to give CO_2 and *Et pilosininate*,  b_{19} 154°, b. 273–6°; the latter on sapon. with dil. HCl gave the *free acid*, m. 64–5°, b_{10} 203°; its *chloride* (prepd. by heating with excess $SOCl_2$ at 50–60° for 5 hrs.), $b_{1.2}$ 107°, when treated

with 3 mols. CH_3N_3 in Et_2O at 0° formed *diazomethyl pilosinyl ketone*, $CH_2.O.CO.CH_2.CHCH_2COCHN_2$; the reaction mixt. directly introduced into 87 ml. of abs. alc. contg. 2.06 g. Ag_2O and heated at 80° yielded 70.7% *Et homopilosininate*, $CH_2.O.OC.CH_2.CHCH_2CO_2Et$, b_{15} 161°, n_D^{25} 1.456, M. R.$_D$ 40.31; the *free acid*, m. 86.5–7.5°, b_1 168°; its *chloride*, $b_{0.2}$ 126°, treated with CH_3N_3 gave *diazomethyl homopilosinyl ketone* (II); this, treated with glacial AcOH at 75°, afforded 84% *acetoxymethyl homopilosinyl ketone*, $b_{0.8}$ 168°; 4.49 g. of the ketone in 50 ml. H_2O is treated with 9 g. $Cu(OAc)_2$, 4 ml. of 40% CH_2O and 90 ml. of 25% NH_4OH at 100° for 1 hr., the Cu is removed with H_2S and the excess H_2S with N, the acidified reaction mixt. is vacuum-distd. to expel HCl, the residue is extd. with Et_2O, dissolved in the min. amt. of H_2O, alkalized with NH_4OH, extd. with $CHCl_3$, dried with Na_2SO_4 and the $CHCl_3$ distd. off *in vacuo*, giving *pilosinidine* (*HNO$_3$ salt*, m. 117–18°); pilosinidine (1 g.) is treated with 2 ml. MeOH and 0.9 g. MeI in a sealed tube at 50–60° for 2 hrs., the excess of MeOH and MeI is distd. off *in vacuo* at 30–40°, the residue in 5 ml. H_2O is made strongly alk. with 10 ml. of satd. K_2CO_3, the soln. is extd. with $CHCl_3$ and the $CHCl_3$ is expelled *in vacuo* at 25–30°, giving 70% I (*nitrate*, m. 158.5–60° (abs. alc.)). I is an oil, sol. in H_2O, alc., Me_2CO and poorly sol. in dry Et_2O. In the modified procedure II in dry ether is treated with gaseous HCl at 0° for 1 hr. and the ether vacuum-distd., giving 67% *chloromethyl homopilosinyl ketone*, $b_{0.7}$ 163°; 1.2 g. of the ketone in 10.5 ml. of abs. alc. and 1.45 g. $C_6H_4(CO)_2NK$ is refluxed 8 hrs. and the resulting phthalimide deriv. is decompd. with 20 ml. of 50% HCl by boiling 8 hrs., forming 90% *aminomethyl homopilosinyl ketone* (*HCl salt*, m. 140–3°); refluxing 0.95 g. of the ketone with 0.56 g. KSCN in 2 ml. H_2O for 8 hrs. yielded 74% pilosinidine-2-thiol, m. 202.5–3°; oxidation with $FeCl_3$ in H_2O gave pilosinidine. Chas. Blanc

Action of formamide on aryl acyloins. Formation of diarylglyoxalines and tetraarylpyrazines. Armando Novelli. *Anales asoc. quím. argentina* **27**, 161–8(1939).—As shown by Ingersoll and collaborators (*C. A.* **30**, 7550[2]) the active agent in the formation of primary amines from ketones heated with HCO_2NH_4 is $HCONH_2$, formed by dehydration of the salt. N. has extended the method to the synthesis of secondary and tertiary amines (*C. A.* **33**, 2493[6]). Benzoin with excess of $HCONH_2$ does not react normally but gives chiefly 4,5-diphenylglyoxaline (I), with a little tetraphenyl-*p*-diazine (amarone) (II). This reaction appears to be general for aromatic acyloins. From benzoin with HCO_2NH_4 at 230°, Leuckart (*J. prakt. Chem.* **41**, 330(1890)) obtained II almost quantitatively, with small amts. of BzH and 2,4,5-triphenylglyoxaline (lophine) (III) as by-products, and Davidson, Weiss and Jelling (*C. A.* **32**, 1702[4]), in the presence of excess of Ac_2O, obtained 36% I and *N*-desylformamide, $HCONHCHPhBz$ (IV). N. has tried the reaction with benzoin, anisoin, benzanisoin and *p*-toluoin, and in all cases obtained the corresponding analogs of I and II; analogs of III and IV were never found. HCO_2H (11.50 g.) and 11.50 g. $(NH_4)_2CO_3$ were heated at 165° in a distg. flask until no more water distd. over, allowed to cool, treated with 4.20 g. powd. benzoin, heated very slowly to 180–5° and kept 2 hrs. at that temp. At 120–50° there appeared an intense orange-red color (pointing to the intermediate formation of a dihydro deriv. of II), finally changing to a light yellow. The cooled product was powd., treated with 50 cc. boiling water, filtered, dried (yield, 4.30 g.), boiled 10 min. with 50 cc. of 10% HCl and filtered hot, and the treatment was repeated. The yellow insol. residue (0.45 g.), dissolved in a little boiling benzene and pptd. with 3–4 vols. petr. ether, yielded needles, m. 246–7°, giving an intense red color with concd. H_2SO_4 and identified as II by mixed m. p. with a sample prepd. according to D., W. and J.; yield, 10%. The acid filtrates, decolorized with C, pptd. with NH_3 and crystd. from dil. alc. or pyridine, yielded 75% I, m. 227–8° (mixed m. p.). Similarly anisoin gave 10% *tetra-p-methoxyphenylpyrazine*, m. 282–3°, giving an intense violet color with H_2SO_4, and 70% *4,5-di-p-methoxyphenylglyoxaline*, m. 183–4°. Benzanisoin, prepd. according to Jenkins (*C. A.* **26**, 2451), yielded *diphenyldi-p-methoxyphenylpyrazine*, m. 183–4°, giving a red-violet color with H_2SO_4, and *p*(or *5*)*-phenyl-5*(or *4*)*-p-methoxyphenylglyoxaline*, m. 214–15°. *p*-Toluoin (Gattermann, *Ann.* **347**, 364 (1906)) gave 8% *tetra-p-tolylpyrazine*, m. 295–6°, giving an intense red-violet color with H_2SO_4, and 75% *4,5-di-p-tolylglyoxaline*, m. 275–6°. The following reaction mechanism is suggested. There is first formed an unstable addn. product, $HCONHCPh(OH)CH(OH)Ph$, which loses water to form $HCONHCPh{:}C(OH)Ph$ or the tautomeric form, $HCONHCHPhCOPh$; this is then converted into the formylamine, $HCONHCPh{:}C(NHCOH)Ph$ (V), which by loss of HCO_2H yields I. V reacts in part with unchanged benzoin to form the dihydropyrazine, $PhC.NH.CPh$ ‖ $PhC.NH.CPh$, which is dehydrogenated to II.

C. A. R.

Triazolium salts. IV. Reduction of benzotriazolium salts. F. Krollpfeiffer, W. Graulich and A. Rosenberg. *Ann.* **542**, 1–13(1939); cf. *C. A.* **29**, 2165[9].—Attempts to increase the yield of *o*-$MeNHC_6H_4N.NMe$ (I) from the reduction of 1,2-dimethylbenzotriazole-Me_2SO_4 (II) (part III) were unsuccessful. The use of concd. NaOH gives 1-methylbenzotriazole (III). II (20 g.) gives 3.1 g. of I and 3.4 g. of the yellow oil $C_8H_{11}N_3$ (IV), b_1 108–10°. IV with Ac_2O and AcONa gives a *di-Ac deriv.*, m. 135–6°; partial hydrolysis with EtOH-NaOH gives the *mono-Ac deriv.*, m. 92–3°, which with Ac_2O regenerates the di-Ac deriv. I (10 g.) in 200 cc. 2 *N* AcONa, treated with 40 g. of $Na_2S_2O_4$ and boiled 5 min., gives 3.5 g. of $H_2NC_6H_4NHMe$, b_{13} 131–3°, identified by transformation into III through the diazo reaction. I yields a *mono-Ac deriv.*, pale yellow, m. 193–4°. HCl ppts. from an Et_2O soln. of I a deep violet HCl salt, which quickly becomes colorless; the very hygroscopic salt cannot be recrystd. without decompn. Boiling an EtOH soln. of the salt 10 min. gives NH_4Cl and 1-methylbenzimidazole (V); a similar result is obtained by heating I in EtOH. When the HCl salt from 6.2 g. I is added to 400 cc. ice water, there results 0.25 g. of a *compd.*, $C_{18}H_{16}N_6$, m. 275° (decompn.), not investigated further. If the aq. soln. is made alk. with NaOH (cooling) and extd. with Et_2O, there is recovered 4.1 g. of a reddish brown oil, b_1 112–25° (25.3% *N*); on warming to 60–70° NH_3 is formed; the undistd. product in Et_2O gives with HCl a dirty violet HCl salt; rubbing with EtOH gives at times only V.HCl and in other cases a yellow HCl salt, m. 154–5°; fractionation of the latter with MeOH-picric acid gives V picrate and an orange picrate (VI), decomps. 135–6°. Heating the Ac deriv. of I with 20 parts of 2 *N* HCl for 20 min. gives V (isolated as the picrate); reduction of the Ac deriv. yields 73% of 1,2-dimethylbenzimidazole. Attempts to rearrange I by heating either gave unchanged I or caused decompn. without the formation of characteristic compds. Boiling I with 2% EtONa in EtOH for 1.5 hrs. gives a compd., $C_8H_9N_3$, b_3 150–60°, decomps. about 120°; its picrate is the same as VI; Ac_2O gives the *Ac deriv.*, $C_{10}H_{11}N_3O$, m. 120–1°, and a small quantity of a compd. decompg. about 310°. IV gives with HCl a violet color (not as deep as that of I), changing to white in a short time; the HCl salt from 8.25 g. IV on boiling with EtOH gives 0.35 g. NH_4Cl and 4.8 g. of an oil, b_1 96–104° and partially solidifying (V). Reaction of 1 g. of IV with MeOH-picric acid gives 2 g. of V picrate. Heating 7.5 g. of the di-Ac deriv. of IV with 180 cc. 2 *N* HCl for 20 min. gives about 1 g. of an insol. resin; the other products are 0.3 g. of 3-methyl-5,6-benzo-1,2,4-triazine (m. 95–6°) and V (1.3 g. of picrate). Although not definitely proved, IV is believed to be *o*-$MeNHC_6H_4NHN{:}CH_2$. III and Me_2SO_4 give 1,3-dimethylbenzotriazole-Me_2SO_4 (VII), hygroscopic, m. 97–8°; VII absorbs moisture from the air so that the salt melts in the hand. Some II is present in crude VII (formation of 0.9 g. of I on reduction of 30 g. salt). VII is not reduced by $Na_2S_2O_4$ in the presence of AcONa. Reduction of 26 g. VII in 150 cc. 2 *N* HCl with Zn (addn. of some concd. HCl) gives 11 g. of *o*-$C_6H_4(N$-

$Me_2)_2$, m. 27.5–8.5°. On heating 3 g. VII in 90 cc. concd. NaOH and 120 cc. H_2O there results 17.5 g. of *o*-methylamino-α-methylphenylhydrazine (VIII), yellow viscous oil, b_{14} 142–3°; HCl ppts. from a C_6H_6 soln. a hygroscopic HCl salt. VIII and Ac_2O give 1,2,3-trimethyl-2-hydroxydihydrobenzimidazole; BzH in AcOH gives 1,3-dimethyl-2-phenyldihydrobenzimidazole. Reduction of VIII with Zn in HCl gives *o*-$C_6H_4(NMe_2)$. Heating VIII with 2 *N* HCl gives *N*-tetramethyldiaminophenazonium chloride, m. 190–5°. C. J. West

The reduction of 1,2,3-benzotriazole and its *N*-methyl derivatives by sodium in liquid ammonia. Norman O. Cappel and W. Conard Fernelius. *J. Org. Chem.* **5**, 40–7 (1940).—When 1,2,3-benzotriazole (I) is treated in liquid NH_3 with Na, no H is evolved and equimol. amts. of Na salts of I (II) and of dihydrobenzotriazole (III) are formed. This mixt., II and the Na salt of 1- and 2-methylbenzotriazole (IV and V) are not affected by a Na soln. The active H from the interaction of Na and the NH_4 ion, $(NH_4^+ + \epsilon^- \rightarrow NH_3 + H)$ reduces II and V to *o*-$C_6H_4(NH_2)_2$ but not III. Active H reduces IV to *o*-$H_2NC_6H_4NHMe$ (VI). In basic solns. where the H is generated by the interaction of K in liquid NH_3 in the presence of Fe

$(K \rightleftharpoons K^+ + \epsilon^-;\ NH_3 + \epsilon^- \rightarrow NH_2^- + H)$ the H is relatively ineffective in reducing the K salt of I to *o*-$C_6H_4(NH_2)_2$. The latter is identified as its *dibenzo[a,c]phenazine*, m. 204–6°, its *dibenzenesulfonyl derw.*, m. 190–1.5°, and di-Bz deriv., m. 305°. The *di-Bz deriv.* of VI m. 152.8–3.8°, the *dibenzenesulfonyl deriv.* m. 156–7°. The bearing of these results on the general subject of reductions in liquid NH_3 is discussed. F. E. Brauns

Chemistry of vitamin E. XX. Preparation of *o*-xylohydroquinone. Oliver H. Emerson and Lee Irvin Smith. *J. Am. Chem. Soc.* **62**, 141–2(1940); cf. *C. A.* **34**, 4289.—Details are given of the nitration of *o*-xylene (85% of the 3-NO_2 deriv.), the reduction to the 3-NH_2 deriv. (74%) and its oxidation to *o*-xyloquinone (33%) or an over-all yield of 21%; refluxing with Zn in dil. AcOH gives 95% of *o*-xylohydroquinone. **XXI. Dealkylation of hydroquinone ethers related to the tocopherols.** Lee Irvin Smith, Herbert E. Ungnade and Willa B. Irwin. *Ibid.* 142–4; cf. *C. A.* **33**, 7787.—1-(3,6-Dimethoxy-2,4,5-trimethylphenyl)butan-3-one and MeMgI give the corresponding 3-methylbutan-3-ol (I), an oil (*3,5-dinitrobenzoate* (II), light yellow, m. 148–8.5°). 2,2,5,7,8-Pentamethyl-6-hydroxychroman (III) and AcOAg in MeOH, refluxed 1 hr., give a quinone (IV), reductive methylation of which gives I, characterized as II. I can be cleaved by heating with excess MeMgI at 180° for 45 min., giving the hydroquinone (corresponding to IV) as a yellow oil; air oxidation yields IV: the tri-Ac deriv., from reductive acetylation could not be crystd.; HNO_3 in EtOH gives the red color of the *o*-quinone; since I does not give this reaction, it indicates that considerable demethylation of I had occurred. These reactions establish the structure of I and III and show that when the Grignard reagent reacts with dihydrocoumarins the products are 2,2-dialkylchromans. **XXII. Reaction between Grignard reagents and coumarins and hydrocoumarins.** Lee Irvin Smith and P. M. Ruoff. *Ibid.* 145–8; cf. *C. A.* **33**, 7791.—Coumarin (I) (25 g.), added during 2 hrs. to about 2 moles of EtMgBr in Et_2O at room temp. and then refluxed 1 hr., gives 20 g. of *diethyl-o-hydroxystyrylcarbinol* (II), m. 67–8°; concd. H_2SO_4 gives a deep red and $FeCl_3$ an olive-green color. Reduction gives 1-*o*-hydroxyphenyl-3-ethyl-3-pentanol, m. 74–5°, previously obtained from the dihydro deriv. of I and EtMgBr. Refluxing 4 g. II in 20 cc. AcOH for 1 hr. and distn., with repetition of the action of AcOH gives about 1 g. of *2,2-diethyl-3-chromene* (III), b_{14} 125–6°; H_2SO_4 gives a bright red color. Similarly I and MeMgI give the *di-Me analog* of II, m. 53–5°, which is cyclized to the *di-Me analog* of III, b_{18} 96–7°; *di-Bu analog* of III, b_{16} 164–5°, n_D^{25} 1.5220 (the analog of II was not isolated). The dihydro deriv. of I and BuMgBr give *1-o-hydroxyphenyl-3-butyl-3-heptanol*, m. 67–8.5°; AcOH-H_2SO_4 gives *2,2-dibutylchroman*, pale-yellow, b_8 165–8°, n_D^{25} 1.5097. In the prepn. of III and its analogs, there is also formed a large quantity of dark viscous oil, probably contg. polymeric substances. C. J. West

Synthesis of 5-hydroxy-8-methoxyflavone (primetin monomethyl ether). Wilson Baker, N. C. Brown and J. A. Scott. *J. Chem. Soc.* 1939, 1922–7; cf. *C. A.* **33**, 6844.—2,6-$(HO)_2C_6H_3Ac$ (60 g.), 300 cc. Me_2CO, 70 g. $PhCH_2Cl$ and 120 g. K_2CO_3, refluxed 3 hrs., 40 g. K_2CO_3 added and the refluxing continued for 6 hrs., give 55 g. of *2-hydroxy-6-benzyloxyacetophenone* (I), m. 109–10°; Et-OH-$FeCl_3$ gives a violet color; a small amt. of *2,6-dibenzyloxyacetophenone*, m. 71.5°, is also formed. I (24.2 g.) in 200 cc. H_2O contg. 20 g. NaOH, treated dropwise with 29.7 g. of $K_2S_2O_8$ in 600 cc. H_2O during 4 hrs. at 15–20° and allowed to stand 24 hrs., give on acidification 10 g. unchanged I; extn. of the filtrate with Et_2O and heating the aq. layer with 100 cc. concd. HCl and 300 cc. Et_2O give 85% of *2,5-dihydroxy-6-benzyloxyacetophenone* (II), yellow, m. 94°; NaOH gives a bright yellow color and $FeCl_3$ gives a light, transient green color, turning to orange; the concd. H_2SO_4 soln. is orange. II (12 g.) gives 11 g. of the *di-Me ether* (III), m. 74°. Heating 5 g. III with 20 cc. glacial AcOH and 10 cc. concd. HCl at 60° for 1 hr. gives 3.4 g. of *2-hydroxy-3,6-dimethoxyacetophenone*, bright-yellow, m. 61°; NaOH gives a yellow, concd. H_2SO_4 an orange, and $FeCl_3$ an intense blue-green color; it is only slightly volatile with steam; *Bz deriv.* (IV), m. 119°. Heating 5 g. IV with H_2SO_4 a bright orange-yellow, and $FeCl_3$ an intense reddish brown color; heating with AcONa in AcOH gives *5,8-dimethoxyflavone* (V), m. 144–5°; refluxing 0.5 g. with 5 g. $AlCl_3$ in 30 cc. Et_2O for 18 hrs. gives 0.15 g. of 5-hydroxy-8-methoxyflavone (VI), S-yellow, m. 209–10°, which is identical with the mono-Me ether of primetin; $FeCl_3$ gives an intense bluish green color; *Ac derv.*, m. 175–6°. Heating V or VI with HBr in AcOH gives 5,6-dihydroxyflavone, this being accompanied by a rearrangement involving the opening and closing of the heterocyclic ring. 2,6-$(HO)_2$-C_6H_3Ac (12.5 g.) and 17 g. NaOH in 150 cc. H_2O, treated dropwise with 24.4 g. $K_2S_2O_8$ in 500 cc. H_2O for 4 hrs. at 15–20°, give 4 g. of *2,3,6-trihydroxyacetophenone*, bright-yellow, decomps. above 230°; aq. NaOH gives a yellow color changing to a dark greenish blue; $FeCl_3$ gives a dull yellow-brown color; *tri-Ac deriv.*, m. 155°. 2,3-$(MeO)_2$-C_6H_3Ac and $AlCl_3$ in $CHCl_3$ give 2,3-HO(MeO)C_6H_3Ac, pale yellow, m. 54°; $FeCl_3$ gives an indigo-blue color; a sparingly sol. yellow Na salt is formed; oxidation with alk. $K_2S_2O_8$ gives *2,5-dihydroxy-3-methoxyacetophenone*, ocher-yellow, m. 172°; $FeCl_3$ gives a bluish green color; *di-Ac deriv.*, m. 127°. Oxidation of 2,5-HO(MeO)C_6H_3Ac with alk. $K_2S_2O_8$ gives *2,3-dihydroxy-5-methoxyacetophenone* (VII), yellow, m. 120°; $FeCl_3$ gives a green color; Pb-$(OAc)_2$ gives a yellow ppt.; a by-product is *2,2'-dihydroxy-5,5'-dimethoxy-3,3'-diacetylbiphenyl*, yellow, m. 202°; $FeCl_3$ gives a pale green color. Refluxing 1 g. VII, 0.8 g. Me_2SO_4 and excess K_2CO_3 in C_6H_6 for 10 hrs. and refluxing the oily product with BzCl and C_5H_5N give *2-benzoyloxy-3,5-dimethoxyacetophenone*, m. 142°; this did not give a methane with $NaNH_2$. *o*-Vanillin is oxidized by alk. $K_2S_2O_8$ to *2,5-dihydroxy-3-methoxybenzaldehyde* (VIII), yellow, m. 143°, which gives a transient green color with $FeCl_3$ and an orange color with aq. NaOH; a by-product is *4,4'-dihydroxy-3,3'-dimethoxybiphenyl-5,5'-dialdehyde*, yellow, m. 210°; $FeCl_3$ gives a greenish blue color and NaOH gives a yellow soln. VIII with Me_2SO_4 gives 2,3,5-$(MeO)_3C_6H_2CHO$, m. 63°, which is oxidized to 2,3,5-$(MeO)_3C_6H_2CO_2H$, whose *Me ester* b_{20} 178–80°; this ester and PhAc with Na under PhMe yield *2,3,5-trimethoxydibenzoylmethane*, pale yellow, m. 82°, which gives a deep reddish brown color with $FeCl_3$; it is decompd. on heating with HBr in AcOH. C. J. West

Quinovaic acid. VIII. Werner Schmitt and Heinrich Wieland. *Ann.* **542**, 258–73(1939); cf. *C. A.* **33**, 6862.—Novaquinone (I) (1 g.) in 150 cc. EtOH, treated with 4 cc. perhydrol and 400 mg. KOH in 12 cc. EtOH at 0° for 20 sec. and then with excess of H_2SO_3, the EtOH removed at 30–40°, the aq. layer extd. with Et_2O and the Et_2O with

satd. $NaHCO_3$, the $NaHCO_3$ soln. acidified and extd. with Et_2O, gives 80–90% of the *dilactonedicarboxylic anhydride* (II), m. 260° (decompn.); the acid (III) m. 285°. If very pure H_2O_2 is used, about 50% of the I is reduced to the dihydro deriv. (IV) and 50% is changed to II; in dioxane only IV results from the reaction with H_2O_2 (0.5 hr. at 100°). II with cold dil. MeOH-KOH gives the di-Me ester of III, m. 240°, which, warmed with *N* MeOH-KOH for a few min. and then treated with CH_2N_2, gives *tri-Me ester* of the *monolactonetricarboxylic acid* (V), $C_{33}H_{50}O_9$, m. 180°; V is stable to Br and gives no color with concd. H_2SO_4 or $FeCl_3$ in EtOH; it is unchanged on heating 1.5 hr. with Ac_2O, with PCl_5 in $SOCl_2$ or on warming with concd. H_2SO_4. Reduction of V with Zn in AcOH (boiling 3 hrs.) gives a compd., $C_{33}H_{50}O_8$ or $C_{33}H_{52}O_8$, m. 238°, which gives no color with $C(NO_2)_4$ or concd. H_2SO_4; in this reaction the CO group is reduced to a CHOH group and with the formation of an α,β-unsatd. ester; H_2O is split off; if the 2nd formula is correct, the double bond is also reduced. Heating V with *N* MeOH-KOH several min. on the steam bath gives a quant. yield of an *α-keto acid* (VI), $C_{32}H_{48}O_9$, m. 183°; no further change results after heating 3 hrs. On heating 600 mg. of VI in 4 cc. concd. H_2SO_4 at 35° while a stream of CO_2 is passed through, 90% of the theory of CO is split off in 2.5 hrs., giving 70% of the *mono-Me trans-C₂₉-monolactone tricarboxylate* (VII), m. 240–50° (decompn.); CH_2N_2 gives a *di-Me ester*, m. 179°. Heating VII at 250° gives the *anhydride* (VIII), m. 185°. With MeOH-KOH VIII yields the *cis*-isomer of VII, m. 190–200° (decompn.); *tri-Me ester*, m. 186°; on heating at 200° VIII is formed. A satd. soln. of I in EtOH and an excess of 2 *N* NH_3 give the *imine*, $C_{30}H_{41}O_8N$, m. 217°. IV and excess CH_2N_2 in Et_2O at 0° for 8 hrs. give an *isomer* of IV, m. 242° (decompn.); it does not give the $FeCl_3$ reaction and is stable to Br; with MeOH-KOH it gives a yellow soln. from which AcOH ppts. IV; oxidation yields I. IV with Me_2SO_4 in 4 *N* NaOH gives the *compd.* $C_{31}H_{41}O_8$, m. 192°; this contains 1 MeO group, is stable to Br, shows no $FeCl_3$ reaction and is not attacked by O_3 in EtCl or by MeOH-KOH. There is a discussion of the yellow derivs. of quinovaic acid. C. J. West

Preparation and reactions of karanjin. N. V. Subba Rao, J. Veerabhadrarao and T. R. Seshadri. *Proc. Indian Acad. Sci.* **10A**, 65–70(1939); cf. Manjunath, Seetharamiah and Siddappa, *C. A.* **33**, 2520⁸.—Karanjin (I), which was found to be useful for the treatment of leucoderma, was obtained in 0.9% yield by extg. pongamia oil (II) from the seeds of *Pongamia glabra* from Waltair for 30 hrs. with alc. in a special app. The yield varied with samples obtained from elsewhere. By shaking II with 2% of a mixt. of 2 parts concd. H_2SO_4 and 1 part H_2O cryst. K_2SO_4 was obtained; the protein mentioned by Desai, Sudborough and Watson (*C. A.* **17**, 3616) was not isolated. K was also found in the ash of II. I is only faintly bitter. By boiling I (2 g.) 3 hrs. with 3% aq. alc. KOH (100 cc. EtOH, 150 cc. H_2O, 7.5 g. KOH) with exclusion of air 0.9 g. karanjic acid was obtained in addn. to BzOH. I boiled with $Hg(OAc)_2$ in MeOH gave a yellow *diacetoxymercurikaranjin*, $C_{16}H_{10}O_4(HgOAc)_2$.
Dora Stern

Constitution of olive pigmentation. L. Musajo. *Boll. soc. ital. biol. sper.* **14**, 620–1(1939).—The coloring substance of the ripe fruit of *Olea europaea* L. is a rhamnoglucoside of cyanidin, the formula of whose chloride is $C_{27}H_{31}O_{15}Cl$. Helen Lee Gruehl

Long-chain alkyl derivatives of 2-aminopyridine. Thomas M. Sharp. *J. Chem. Soc.* **1939**, 1855–7.—2-Aminopyridine (I) (5.9 g.) in 25 cc. cymene and 1 mole of the appropriate alkyl halide are refluxed at 170–80° for 6–7 hrs.; the cymene is distd. off, the viscous residual oil is mixed with aq. NaOH and extd. with Et_2O; the resulting oil is distd. at 0.1–0.2 mm., taken up in Et_2O and shaken with H_2O and sufficient H_2SO_4 to render the aq. layer just acid to methyl red; evapn. of the Et_2O gives the 2-alkylaminopyridine; the sulfate of the 1-alkyl-2-pyridoneimine can be obtained from the aq. layer after evapn. but it is preferable to recover the base and convert it into the salt in dry alc. Decyl iodide gives a total yield of 10.5 g., of which 1.43 g. was *2-decylaminopyridine*, m. 51–2° (*picrate*, m. 78–9°); *1-decyl-2-pyridoneimine sulfate* (II), hygroscopic, m. 246° (decompn.); *picrate*, lemon-yellow, m. 111°. Undecyl bromide gives a yield of 9.6 g., of which 2.4 g. was the *undecyl deriv.* of I, m. 60–1° (*picrate*, m. 93–4°); the *undecyl analog* of II forms deliquescent needles not suitable for analysis; *oxalate*, effervesces at 205°; *picrate*, m. 116–17°. Dodecyl bromide gives 9.9 g., of which 2.6 g. are the *dodecyl deriv.* of I, m. 60° (*picrate*, m. 96–7°; *dodecyl analog* of II, m. 255° (decompn.); *picrate*, m. 88–9°. Tridecyl bromide gives 10.26 g., of which 2.6 g. are the *tridecyl deriv.* of I, m. 65–6° (*picrate*, m. 92–4°); *tridecyl analog* of II, m. about 265° (*picrate*, m. 88–93°). Tetradecyl chloride (III) gives 12.48 g., about half being the *tetradecyl deriv.* of I, m. 69° (*picrate*, m. 83°); *tetradecyl analog* of II, m. about 260° (*picrate*, m. 88°). I reacts with III in the presence of $NaNH_2$ to give only the deriv. of I. $PhCH_2Br$ gives 6.83 g., of which 1.42 g. was the benzyl deriv. of I; the *benzyl analog* of II m. 261° (decompn.). The dodecyl deriv. of I, heated 1 day with aq.-alc. KOH, did not form NH_3, whereas 1 g. of the dodecyl analog of II, refluxed with 20 cc. 50% aq. EtOH contg. 2 g. KOH, gave off NH_3 in 5 min. (completed in 56 hrs.) and yields 0.7 g. of 1-dodecyl-2-pyridone, whose *picrate*, yellow, m. 96–7°.
C. J. West

Sulfides and sulfones of pyridine and quinoline. A. R. Surrey and H. G. Lindwall. *J. Am. Chem. Soc.* **62**, 173–4(1940). —Refluxing a nearly satd. soln. of 2-chloro-5-nitropyridine in hot alc. and a slight excess of satd. aq. Na_2S for 4 hrs. gives 73% of *5,5'-dinitro-2,2'-dipyridyl sulfide* (I), yellow, m. 136–7°; reduction with $SnCl_2$ in concd. HCl gives 68% of the *di-NH₂ deriv.*, m. 80–1° and 130–1.5° (*di-Ac deriv.*, m. 265–6.6°); oxidation of 4.5 g. I in 80 cc. H_2O and 60 cc. concd. H_2SO_4 with 6 g. $K_2Cr_2O_7$ in 80 cc. H_2O gives 90% of the corresponding *sulfone*, m. 218.5–20.5°; *di-NH₂ deriv.*, m. 238–9°, 67% yield (*di-Ac deriv.*, m. 276–8°). *8,8'-Dinitro-5,5'-diquinolyl sulfide*, yellow, m. 280–1°, 90%; *5,5'-dinitro-8,8'-diquinolyl sulfide*, orange, m. 288.5–90°, 85%; oxidation of the latter with CrO_3 in AcOH (refluxing 15 min.) gives 54% of the *sulfone*, yellow, decomps. 245–60°.
C. J. West

Sulfanilyl derivatives of pyridine and quinoline amines. Robert Winterbottom. *J. Am. Chem. Soc.* **62**, 160–1 (1940). —Catalytic reduction of 7-nitroquinoline in Me_2CO with Raney Ni gives 95% of the NH_2 deriv. in 1 hr.; the 5- and 8-NH_2 isomers were obtained in 75 and 69% yield, resp. Acetylsulfanilyl chloride (I) (10 g.) and 4 g. 2-aminopyridine in 34 cc. Me_2CO contg. 5 cc. C_5H_5N give 9 g. of the *N¹-Ac deriv.*, m. 226–7° (all m. ps. cor.), of *2-sulfanilamidopyridine* (II), m. 190–1°; the Ac group is removed by refluxing with EtOH-HCl for 20 min. *3-Isomer* of II, m. 248–51° (decompn.); *N¹-Ac deriv.*, m. 272–5° (decompn.). I and 5-amino-2-acetylaminopyridine give 94% of the *N¹, 2-di-Ac deriv.*, m. 288–91° (decompn.), of *5-sulfanilamido-2-aminopyridine*, m. 210–11°. 3-Aminoquinoline (2.5 g.) and I in C_5H_5N, heated 2 hrs. on the water bath, give 5.4 g. of the *N¹-Ac deriv.* (III), m. 250–3° (decompn.), of *3-sulfanilamidoquinoline*, m. 185–6° (decompn.). The *HCl salt* of the *6-isomer* of III m. 238–40°. The 6- and 8-series were also prepd.
C. J. West

Coupling reactions of aminoquinolines with benzenediazonium chloride. A study of orientation in the quinoline ring. R. R. Renshaw, H. L. Friedman and F. J. Gajewski. *J. Am. Chem. Soc.* **61**, 3322–6(1939). —6-Aminoquinoline and PhN_2Cl in 0.25 *M* HCl (12 hrs.) or in AcOH-AcONa (10 min.) give *6-amino-5-phenylazoquinoline* (I), light-orange, m. 247–9°; the *HCl salt*, with 3 mols. H_2O, orange, m. 250–5° (the anhyd. salt results on heating at 120°). Reduction of I gives 5,6-diaminoquinoline (II), m. 135°. 7-Aminoquinoline in AcOH-AcONa gives *7-amino-8-phenylazoquinoline*, light orange, m. 170–3°; *HCl salt*, m. 210–11°; reduction with $SnCl_2$ and HCl gives *7,8-diaminoquinoline*, whose hydrate m. 95–7°; the *phenanthraquinone azine* m. 314°. 8-

Aminoquinoline gives *8-amino-5-phenylazoquinoline*, deep-orange, m. 133°; *HCl salt*, violet, m. 221–3°; reduction gives the 5,8-isomer (III) of II. 5-Aminoquinoline in dil. AcOH-AcONa gives 5-amino-8-phenylazoquinoline (IV), m. 191–4° (Jacobs and Heidelberger, *C. A.* **15**, 529, give 209–11°); in dil. HCl there results a mixt. of IV and of the 6-isomer; reduction of the mixt. gives mainly III and some II (identified as the azine, m. 294–5°). *py*-Aminoquinolines (V) were treated with PhN_2Cl under various conditions, since all solvents did not give pos. results. The 2-isomer of V in aq. MeOH or abs. EtOH gives small yields of 2-benzenediazoaminoquinoline (VI), light-tan, m. 165-6.5°; it is stable to hot dil. NaOH and HCl; the 3-isomer of VI results in dil. HCl-AcONa or dil. MeOH, light-tan, m. 156–7° (from H_2O) or 177–8° (from hot 10% NaOH) (both with decompn.); the difference in m. ps. is probably due to hydration; boiling dil. HCl gives the 3-isomer of V as does reduction with $SnCl_2$ and HCl. Coupling of the 3-isomer of V with PhN_2Cl in abs. EtOH gives *4-phenylazo-3-aminoquinoline*, light-red, m. 203–4°; HCl salt, dark-red, m. 228–30°; reduction gives 3,4-diaminoquinoline, m. 176.7° (*phenanthraquinone azine*, m. 280–1°). The 4-isomer of V did not couple under any condition tried; on mixing the components at −5° a light-red color appeared but rapidly faded with evolution of N; p-$O_2NC_6H_4N_2Cl$ gives a bright-red soln. at −10° which fades rapidly, giving the 4-isomer of V, N_2 and $PhNO_2$. *2-Benzenediazoamino-4-aminoquinoline*, orange-brown, m. 247.5–8.5°, is formed from 2,4-diaminoquinoline in dil. HCl and in better yields in dil. MeOH or AcOH; it is stable to boiling dil. HCl; the *2-p-nitrobenzenediazoamino deriv.*, orange, m. 315.5–16.5°; *HCl salt*, yellow, m. 323 5°. The above results are those to be expected from the application of the Erlenmeyer structure for quinoline. C. J. West

Preparation of 5,6-benzoquinoline. V. Sergeev. *Byull. Lako-Krasochnoĭ Prom.* **1938**, No. 2–3, 68–70; *Khim. Referat. Zhur.* **2**, No. 1, 102.—A method for the prepn. of 5,6-benzoquinoline from 2-naphthylamine, glycerol, H_3AsO_3 and H_2SO_4 is described. In a round-bottomed 1-l. flask equipped with a reflux condenser and with an elec. mixer place 25 parts of 2-naphthylamine, 54 parts of glycerol and 25 parts of H_3AsO_3. The mixt. becomes hot. While stirring constantly, heat the mixt. until reaction begins (very violently), remove the flame immediately, boil slowly for 2–3 hrs., dil. with water, and let the ppt. settle for 24 hrs. From the filtered sucked soln. sep. the 5,6-benzoquinoline with concd. KOH, dissolve the ppt. in HCl, boil several times with animal charcoal and filter. Obtain the base by pptg. it with KOH soln. The yield is 23 parts. W. R. Henn

Complexes of polynitro compounds. III. Compounds of polynitro substances with derivatives of carbostyril, etc. Andrew Kent, Donald McNeil and Robert M. Cowper. *J. Chem. Soc.* **1939**, 1858–62; cf. *C. A.* **32**, 2115⁴.—Details are given of compds. of *sym*-$C_6H_3(NO_2)_3$ (I) and picric acid (II) with carbostyril and its derivs. and various quinolones and quinolines. The most striking variation in the tendency for complex formation with I is provided among the C-methylcarbostyrils by the unique failure in this respect of the 6-Me deriv.; this appears to be constitutional and is contrary to the usually helpful influence of such substituents in amines or hydrocarbons; *N*-methylation of carbostyrils appears to reduce the probability of isolating homogeneous cryst. derivs. of I. The picrates obtained are manifestly "salt-like" in character if compared with the I complexes in color and m. p.; moreover they are frequently of different (i. e., 1:1) compn. Their similar ease of prepn. and moderate soly. in alc. suggests that the picrates of carbostyrils are not differentiated from 2-quinolone picrates as salts of "2-hydroxyquinolines," unless perhaps in the case of carbostyril picrates itself. These picrates may therefore be "H bond" adducts —NRC:O . . . HOX, stabilized by resonance. Picrates assumed to be "salt-like" in structure are indicated by the use of II as a suffix. Carbostyril (III) in EtOH gives the *complex* **I.2III**, S-yellow needles, m. 178°, and **III.II**, yellow needles, m. 132° (prepd. in Et₂O or from very concd. solns. in MeOH or EtOH). Thiocarbostyril (IV) in EtOH gives the *complex* **I.IV**, light-brown plates, m. 163–5° and **IV.II**, crimson needles, m. 145°. Dihydrocarbostyril (V) yields the *complex* **I.2V**, yellow plates, m. 137–8°. The 3-Me deriv. (**VI**) of III yields the *complex* I.2VI, light-yellow needles, and II.2VI, golden-yellow prisms, both with incongruent m. ps. The 4-Me deriv. (**VII**) of III yields the *complex* **I.2VII**, canary-yellow prisms, m. 226–7° and **VII.II**, light-yellow needles, m. 164–5°. 4-Methyl-2-thiocarbostyril (**VIII**) in $CHCl_3$ gives the *complex* I.2VIII, brown-yellow prisms, m. 190–2°, and 2VIII.II, orange-red plates, m. 193–5°. The *5-Me deriv.* (**IX**) of III m. 222–3°; it forms a *complex* **I.2IX**, light-yellow needles, m. 222–3°, and **IX.II**, yellow prisms, m. 156–7°. The 6-Me deriv. (**X**) of III forms the *complex* **X.II**, pale-yellow needles, m. 171–2°. The 6-Me isomer (**XI**) of VIII forms a *complex* **I.2XI**, orange prisms, m. 159–61° (in $CHCl_3$), and scarlet prisms with II (compn. not detd.), m. 140–2°. The *7-Me deriv.* (**XII**) of III m. 192–3°; it forms a *complex* **I.2XII**, canary-yellow needles, m. 203–4°, and **XII.II**, light-yellow needles, m. 163°. The 8-Me deriv. (**XIII**) of III forms the *complex* **I.2XIII**, golden-yellow needles, m. 181°, and **XIII.II**, light-yellow needles, m. 128–9°. The 4,6-di-Me deriv. (**XIV**) of III yields the *complex* **I.2XIV**, golden-yellow prisms with an incongruent m. p., and **XIV.II**, canary-yellow needles, m. 188°. The 4,7-di-Me deriv. (**XV**) of III forms a *complex* **I.2XV**, S-yellow needles, m. 213–14°, and **XV.II**, light-yellow needles, m. 189–91°. The 4,8-di-Me deriv. (**XVI**) of III gives a *complex* **I.2XVI**, S-yellow needles, m. 199–200°, and **XVI.II**, canary-yellow needles, m. 192–4°. 1-Methyl-2-quinolone (**XVII**) gives a complex **I.XVII**, light-yellow laminated plates, m. 77–9°, and **XVII.II**, yellow needles, m. 128–9°. 1-Methyl-2-thioquinolone (**XVIII**) yields the *complex* **I.2XVIII**, orange needles, m. 98–9°, and **II.2-XVIII**, orange prisms, m. 104°. 1,6-Dimethyl-2-quinolone (**XIX**) yields the *complex* **XIX.II**, canary-yellow needles, m. 150°. The *1,7-isomer* (**XX**) of **XIX** (pale yellow, m. 107–8°) gives a *complex* **I.XX**, pale yellow needles, m. 106–7°, and **XX.II**, lemon-yellow prisms, m. 132°. The 1,8-isomer (**XXI**) of **XIX** gives the *complex* **XXI.II**, canary-yellow needles, m. 134°. 2-Methoxyquinoline (**XXII**) forms the *complex* **I.XXII**, yellow plates, m. 89–90°, and **XXII.II**, yellow needles, m. 170–1° 2-Methylthioquinoline (**XXIII**) gives the *complex* **I.XXIII**, deep-yellow needles, m. 99–100°, and **XXIII.II**, yellow plates, m. 183–4°. 2-Methoxy-6-methylquinoline (**XXIV**) yields the *complex* **I.XXIV**, greenish yellow prisms, m. 72–3°, and **XXIV.II**, greenish yellow plates, m. 181–2°. The compd. **XXIII.II** was first obtained from IV and Me picrate (**XXV**) in MeOH; that it is not a mol. compd. follows from the synthesis by bubbling MeSH through MeONa in MeOH, adding 2-chloroquinoline in MeOH, boiling 2 hrs. and adding II. **XI** and **XXV** in boiling MeOH give *2-methylthio-6-methylquinoline picrate*, golden-yellow plates, m. 196–7°. **XVIII** and **XXV**, boiled 10 min. in MeOH, give *2-methylthio-1-methylquinolinium picrate*, deep-yellow plates, m. 175°; 1,6-dimethyl-2-thioquinolone was recovered unchanged even after 2 hrs. boiling. Crystn. of I from 6-methylquinoline gave the binary compd., pale-yellow needles, m. 63–5°; the 8-isomer afforded an analogous product, pale yellow with incongruent m. p. *2-Chloro-7-methylquinoline*, m. 81° (*picrate*, canary-yellow plates, m. 113–14°). *3-Methylquinoline oxide-HCl*, m. 192–4° (*picrate*, greenish yellow needles, incongruent m. p.). *6-Methylquinoline oxide-HCl*, m. 172–3° (*picrate*, pale-yellow needles, m. 174–5°). *1,6-Dimethyl-2-thioquinolone*, yellow, m. 137°. I and dibenzyl-*o*-toluidine give relatively lightly colored EtOH solns. which pptd. only the constituents; melts of these compds. in the proportions 1:1, 1:2 or 2:3 give viscous red liquids, disintegrated to colorless powders. *Dibenzyl-o-toluidine picrate*, canary-yellow prisms, m. 120–1°. Dibenzyl-*m*-toluidine (**XXVI**) and I in concd. EtOH soln. give a *compd.* **I.3XXVI**, ruby-red prisms, m. 71–2°; a soln. contg. the reactants in the ratio of 2:3 gives successive crops of complex until reduced to dryness; the

picrate of XXVI, yellow prisms, m. 126–7°. The *p*-isomer (XXVII) of XXVI and I (2:1 in EtOH) give the *complex* I.2XXVII, ruby-red needles, m. 62–4°; the *picrate* of XXVII, golden-yellow plates, m. 174–5°. I and 1-thiocoumarin in concd. C_6H_6 or EtOH soln. give colorless solns. which pptd. only the components; the *picrate*, yellow needles, m. 148°; *trans-o*-aminocinnamic acid gives a binary *complex* with I, brick-red needles, m. 131°. I and 2-thiocoumarin in EtOH give the binary *complex*, light-brown plates, m. 87°. 2,4,5-Trinitrotoluene and $(4\text{-}Me_2NC_6H_4)_2CH_2$ give a binary *complex*, dark-red needles, m. 92–3°; 2,4,6-$(O_2N)_3C_6H_2Me$ and *p*-$C_6H_4(NO_2)_2$ did not afford cryst. derivs. The m.-p. curves are given for I with VII, X and XVII. C. J. West

Synthetic experiments on 4-aminohydrocarbostyril and its derivatives. Takaoki Sasaki and Hidenosuke Ueda. *Proc. Imp. Acad.* (Tokyo) **15**, 315–20(1939); cf. *C. A.* **33**, 8617⁶.—*o*-$O_2NC_6H_4CH(NH_2)CH_2CO_2H$ (I) (4.2 g.) in a little NaOH, shaken with excess of $ClCO_2Me$ and acidified with dil. H_2SO_4, gives 93% of *o-nitro-*(*β-carbomethoxyamino*)*hydrocinnamic acid*, m. 165–6°; reduction with $FeSO_4$ in 10% NH_4OH (heating 0.5 hr. on the water bath) gives 91% of *4-carbomethoxyaminohydrocarbostyril*, with 0.5 mol. H_2O, m. 127–9° (decompn.); hydrolysis gives carbostyril (II). I gives 94% of the *Ac deriv.*, pale-yellow, m. 177°; reduction gives a nearly quant. yield of *4-acetylaminohydrocarbostyril*, m. 233–4°. The *chloroacetyl deriv.* of I m. 178° (95% yield); heating with NH_4OH (d. 0.9) at 100° for 1 hr. gives the *β-glycylamino deriv.*, with 1.5 mols. H_2O, m. 230° (decompn.); reduction gives 55% of *4-glycylaminohydrocarbostyril*, m. 147°, which was isolated as the *sulfate*, m. 220° (decompn.); *Bz deriv.* (*4-hippurylaminohydrocarbostyril*), m. 227°. I yields 95% of the *Bz deriv.*, m. 233°; reduction gives 91% of *4-benzoylaminohydrocarbostyril*, m. 220 1°; hydrolysis gives II. The *β-carbobenzoxyamino deriv.* of I m. 152° (80% yield); reduction gives II. The free NH_2 group of I is very labile and easily split off, so that 4-aminohydrocarbostyril cannot be prepd. C. J. West

ms-**Derivatives of acridine. XII. 9-Chloroacridine and acridol.** N. S. Drozdov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1373–5(1939); cf. *C. A.* **33**, 4595⁹.—Previously it was shown (*C. A.* **29**, 7334²) that when *ms*-chloroacridine (I) is treated with O in $PhNO_2$ (Marzin, *C. A.* **27**, 5332) and boiled in acid soln. or steam-distd. (Graebe and Lagodzinskii, *Ann.* **276**, 49(1893)), the resulting reaction product is not acridol but acridone in varying amts. According to Lehmstedt (*C. A.* **29**, 6893⁸) I does not react with O in $PhNO_2$. Further expts. showed that freshly recrystd. I is not oxidized or hydrolyzed into acridone, while a stored product is considerably reactive. It is evident that I on standing, particularly under the influence of daylight, is converted into the reactive complex ($C_{13}H_9ON$.-$C_{13}H_8NCl$).HCl (cf. *loc. cit.*). 2-Methyl-9-chloroacridine behaves like I and gives the reactive complex ($C_{14}H_{11}ON$.-$C_{14}H_{10}NCl$).HCl. Thus, the conflicting data on the relative reactivity of I and its derivs. can be explained by the use of products of different degrees of decompn. in storage.

XIII. The preparation and antimalarial action of substituted 9-aminoacridine. O. M. Cherntsov and N. S. Drozdov. *Ibid.* 1435–40.—Following previous procedures several new dialkylaminoalkyl derivs. of 9-aminoacridine are prepd. by the interaction of primary amines and their HCl salts with 9,9-diphenoxyacridans and 9-phenoxyacridines (*C. A.* **30**, 3432⁸) and the cyclization of substituted diphenyl-2-carboxylic acids (cf. D., *C. A.* **33**, 4251⁶). *2-Dimethylamino-9-*(*γ-piperidino-β-hydroxypropylamino*)*acridine*, red crystals, m. 213–15°, was prepd. in 50% yield from 1 g. 2-dimethylamino-9-phenoxyacridine (I) (cf. D. and Bekhli, *C. A.* **33**, 4595⁹) and 3-piperidino-2-hydroxypropylamine (II) with 10 g. PhOH by digesting 1–2 hrs. on a water bath and pouring the melt into alc. 10% NaOH; *6-Cl deriv.*, red crystals, m. 115–16°, resulted in 83% yield from 1 g. 2-dimethylamino-6-chloro-9-phenoxyacridine (III) and 0.5 g. II with 6 g. PhOH. *2-Dimethylamino-9-*(*γ-diethylamino-β-hydroxypropylamino*)*acridine*, reddish yellow viscous oil, (67%), obtained from 1.5 g. I and 0.9 g. 3-diethylamino-2-hydroxypropylamine (IV) with 7 g. PhOH; *6-Cl deriv.* (V), red-orange crystals, m. 108–9° (78%), formed from 2 g. 2-diethylamino-6-chloro-9-phenoxyacridine and 0.5 g. IV with 5 g. PhOH. *2-Dimethylamino-9-*(*δ-diethylamino-α-methylbutylamino*)*acridine* (68%), reddish oil, obtained from 1.7 g. I and 1 g. 1-diethylamino-4-aminopentane (VI) with 5 g. PhOH; *6-Cl deriv.* (VII), reddish yellow heavy oil, prepd. in 68% yield from 0.9 g. III and 0.5 g. VI with 5 g. PhOH. *2-Methoxy-9-*(*δ-diethylamino-α-methylbutylamino*)*acridine* (VIII), yellow fine crystals, resulted in 29% yield from 2.6 g. 4-methoxydiphenylamine-2-carbonyl chloride and 1.7 g. VI in 30 ml. C_6H_6 with 6 g. $POCl_3$, dissolving the filtered oily substance in alc. and pptg. with dil. NH_4OH. *3-Chloro-7-methoxy-9-*(*γ-piperidino-β-hydroxypropylamino*)*acridine* (IX), yellow fine needles, m. 130–1.5°, prepd. in 69% yield from 2.5 g. 3,9-dichloro-7-methoxyacridine (X) and 1.5 g. II with 10 g. PhOH. IX.HCl m. 255° (decompn.). *2-Nitro-7-methoxy-9-*(*γ-piperidino-α-hydroxypropylamino*)*acridine*, red crystals, m. 170–1° (72%), formed from 0.7 g. 2-nitro-7-methoxy-9-phenoxyacridine (*C. A.* **30**, 2195⁵) and 0.35 g. II with 4 g. PhOH. *1-Nitro-4-methoxy-9-methylaminoacridine*, dark yellow needles, m. 211–13°, from 0.15 g. $MeNH_2$.HCl, 3 g. PhOH and 0.4 g. 1-nitro-4-methoxy-9-phenoxyacridine, m. 231–2°. The latter was prepd. by fusing 0.9 g. 1-nitro-4-methoxy-9-chloroacridine with 5 g. PhOH and decompg. the HCl salt with dil. NH_4OH in alc. *p-*(*3-Chloro-7-methoxy-9-acridylamino*)*benzenesulfonamide* (XI), does not melt 300°, prepd. in 94% yield by heating 3 hrs. 1.4 g. X and 0.9 g. *p*-$H_2NC_6H_4SO_2NH_2$ with 5 g. PhOH and decompg. the HCl salt with concd. Na_2CO_3. It is insol. in H_2O, sparingly sol. in org. solvents and fairly sol. in C_5H_5N. All these aminoacridine derivs., except XI, were tested for their *physiol. action* in bird malaria. V, VII, VIII and IX showed considerable antimalarial action. C. B.

Heterocyclic compounds. X. The synthesis of substituted 1,2,3,4-tetrahydroacridones. Wahid Bukhsh and R. D. Desai. *Proc. Indian Acad. Sci.* **10A**, 262–6(1939); cf. *C. A.* **33**, 3356²; Hughes and Lions, *C. A.* **33**, 6115.—5-Methyl-, 7-bromo-, 5- and 7-methoxy- and 7-ethoxy-1,2,3,4-tetrahydroacridones were synthesized by condensing Et cyclohexanone-2-carboxylate with *o*-toluidine, *p*-bromoaniline, *o*- and *p*-anisidine and *p*-phenetidine, resp., by means of concd. HCl and heating the Et 2-arylamino-1-cyclohexene-1-carboxylates $CH_2.CH_2.CH_2.CH_2.C(CO_2Et):CNHR$, formed at 240–50°. 4- and 2-Methyl-1,2,3,4-tetrahydroacridone were prepd. by condensing 2- and 4-methylcyclohexanone with anthranilic acid at 120° and heating the 1-(*o*-carboxyanilino)-6- and -4-methyl-1-cyclohexenes, $MeC_6H_8NHC_6H_4CO_2H$, formed at 220°. $\Delta^{1 \text{ or } 2}$-Octahydronaphthacridone was obtained in a similar way by condensing *trans-β*-decalone with anthranilic acid to 2-(*o*-carboxyanilino)-$\Delta^{1 \text{ or } 2}$-*trans*-octalin and cyclizing the latter. *Et 2-arylamino-1-cyclohexene-1-carboxylates: o-toluidino*, m. 84–5°; *p-bromoanilino*, m. 77–8° (yield 5.5 g. from 4 g. *p*-bromoaniline); *o-anisidino*, m. 79–80° (yield 3 g. from 2.5 g. *o*-anisidine); *p-anisidino*, m. 71–2° (yield 3.5 g. from 2.5 g. *p*-anisidine); *p-phenetidino*, m. 88°. *1-*(*o-Carboxyanilino*)*-6-methylcyclohexene*, m. 130°; yield 5.5 g. from 5 g. anthranilic acid. *1-*(*o-Carboxyanilino*)*-4-methylcyclohexene*, m. 143°; yield 6 g. from 5 g. anthranilic acid. *2-*(*o-Carboxyanilino*)-$\Delta^{1 \text{ or } 2}$-*trans-octalin*, m. 164–5°; yield 7 g. from 6 g. anthranilic acid; the *monohydrate* m. 82°. *Substituted 1,2,3,4-tetrahydroacridones: 5-Me*, m. 355–8°; *7-Br*, does not m. 350°; *5-MeO*, m. 277–9°; *7-MeO*, m. 285–6°; *7-EtO*, does not m. 350°; *4-Me*, m. 345°; *2-Me*, does not m. 350°. $\Delta^{1 \text{ or } 2}$-*Octahydronaphthacridone*, does not m. 350°. Dora Stern

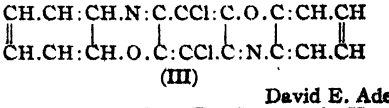
Reaction between hydrogen selenide, formaldehyde and secondary amines. Arthur H. Binz, Francis E. Reinhart and Harry C. Winter. *J. Am. Chem. Soc.* **62**, 7–8 (1940).—Morpholine (12 cc.) in 75 cc. H_2O, cooled in an ice bath and satd. with H_2Se and then poured into a cold

soln. of 37% HCHO (75 cc.) in 150 cc. H_2O, gives 9.1 g. of ***bis(4-morpholylmethyl) selenide*** (I), m. 136–8°; when a soln. of 0.7842 g. of I in 115 cc. of 80% EtOH at 40° is shaken in an open flask for 15 min., 98.1% of the total combined Se pptd. as elementary Se. Piperidine (11.6 g.), added slowly to 20 cc. 37% HCHO cooled in an ice bath, gives 3 g. of crude 1-piperidinemethanol which, satd. with H_2Se in Et_2O, gives 1.8 g. of ***bis(1-piperidylmethyl) selenide*** (II), m. 67°; this decomps. in H_2O. Both I and II are highly toxic when injected intravenously into rats, the lethal dose being of the order of 0.012–0.017 g. per kg. of body wt. Me_2NH and $(HOCH_2CH_2)_2NH$ gave oils which could not be purified. C. J. West

Analogs of ephedrine and adrenaline containing the morpholine nucleus and some of their esters. Nathan Rubin and Allan R. Day. *J. Org. Chem.* 5, 54–60 (1940).—To prep. compds. which have the combined effect of a local anesthetic and a vasoconstricting action, morpholine (I) is condensed with phenacyl bromide (III), phenethyl bromide (II), α-bromopropiophenone (IV), *p*-hydroxyphenacyl chloride (V) and 3,4-dihydroxyphenacyl chloride (VI). The amino ketones so obtained are catalytically reduced to the corresponding carbinols. The attempt is made to prep. from the amino ketones the corresponding hydantoins according to Bucherer (*C. A.* 29, 127[1]) but this is successful only in the case of ω-morpholinoacetophenone. Addn. of 18.5 g. II in 30 cc. EtOH to 17.4 g. I in 25 cc. EtOH gives 17.7 g. 4-phenethylmorpholine-HCl (VII), m. 246° (cor.). In the same way I and III give ω-morpholinoacetophenone-HCl (VIII), m. 222–3° (cor., decompn.) in 80–90% yield. With IV and I α-morpholinopropiophenone-HCl (IX), m. 224° (cor., decompn.), is obtained in 80–5% yield. When a soln. of 6.12 g. I is slowly added to 6 g. V in 10 cc. EtOH at a temp. below 15°, ***ω-morpholino-p-hydroxyacetophenone*** (X), m. 201–1.7° (cor.), is obtained in 90% yield. Its *HCl salt* m. 242–3° (cor., decompn.). I and VI give ***ω-morpholino-3,4-dihydroxyacetophenone*** (XI), m. 207° (cor., decompn.), in 85–90% yield; *HCl salt*, decomps. 224–5° (cor.). Reduction of VIII with Pd-charcoal in alc. yields ***1-phenyl-2-morpholinoethanol-HCl*** (XII), m. 188 8.7° (cor.) in 87.5% yield; its *free base* m. 80.9–1.3° (cor.); the *Bz deriv.* of XII m. 173.5–5°; the *cinnamate* m. 220–1°. In the same way reduction of IX gives ***1-phenyl-2-morpholino-1-propanol-HCl*** (XIII), m. 235° (cor.), in 80 5% yield; its *free base* m. 73–3.5°; the *Bz deriv.* m. 210–11°. Catalytic reduction of X give ***1-(p-hydroxyphenyl)-2-morpholinoethanol-HCl***, m. 178° (cor., decompn.), in 78% yield, and reduction of XI gives ***1-(3,4-dihydroxyphenyl)-2-morpholinoethanol-HCl***, decompg. at 250°, in 81–98% yield. When to 5 g. VIII in 40 cc. 50% EtOH, 2 g. KCN and 8 g. $(NH_4)_2CO_3$ is added and the mixt. heated on a water bath for 8.5 hrs. at 55–65°, ***5-phenyl-5-morpholinomethylhydantoin***, m. 204–4.5°, crystallizes in 93% yield; its *HCl salt* m. 206° (cor., decompn.). F. E. Brauns

Semiquinone radicals of the thiazines. L. Michaelis, M. P. Schubert and S. Granick. *J. Am. Chem. Soc.* 62, 204–11(1940).—A semiquinone radical is shown to exist as a univalent reduction product for thionine (I) and for methylene blue (II). In equil. with the dye and the leuco dye, it can exist only to a few percent of the total dye *in maximo* over the whole pH range covered by the customary buffers. In very strongly acid soln., such as from 10 to 26 *N* H_2SO_4, it is stable to a much higher extent and can be identified by an analysis of the reductive titration curve of the dye and by its color, which is yellow with distinct absorption bands in the blue. The semiquinone formation const. *k* reaches for I the value 1000 in 26.6 *N* H_2SO_4 but rapidly decreases to values less than 1 in less acid solns. For II this const. reaches in 22.9 *N* H_2SO_4 only the value 6. In a wide pH range around neutrality, *k* for both dyes is approx. 0.05. The greater stability of the radical in very acid soln. is ascribed to the formation of a bivalent cation having a structure, exhibiting equiv. resonance, of the same type as a Wurster radical. The existence of this radical is correlated with the reversibility of oxidation-reduction of thiazines and with their catalytic effect in biol. oxidations. C. J. West

Triphenodioxazine. Hans E. Fierz-David, Jacob Brassel and Fritz Probst. *Helv. Chim. Acta* 22, 1348–58(1939).—The yield (280 g.) and purity of 2,5-dichloro-3,6-di-*o*-anisidinoquinone (I) (Ger. pat. 253,091) were improved by adding 230 g. freshly distd. *o*-anisidine in small portions to a well-stirred mixt. of 200 g. $C_6Cl_4O_2$ (II), 150 g. anhyd. AcONa and 1 l. *o*-$C_6H_4Cl_2$ and refluxing for 3 hrs. By adding 100 g. I to a hot, well-dispersed mixt. of 250 g. anhyd. $AlCl_3$ and 1300 g. dry C_5H_5N and refluxing for 20 hrs., 80 g. 9,10-dichlorotriphenodioxazine (III) is obtained; III crystallizes from $PhNO_2$ as red needles which have no m. p. and give a blue color with concd. H_2SO_4. III is formed if the anilide or the *o*-phenetidine deriv. is used instead of the anisidine deriv.; the last 2 derivs. may be condensed to the dioxazine with $PhNO_2$ with or without addn. of $FeCl_3$. Addn. of 35 g. 1,2,5-$HOC_6H_3(NH_2)NO_2$ in 200 cc. alc. to 25 g. II and 20 g. AcONa in 400 cc. alc. followed by refluxing for 20 hrs. gives 35–40 g. 2,6-dinitro-9,10-dichlorotriphenodioxazine (IV) directly. Similarly, 3,7,9,10-tetrachlorotriphenodioxazine is obtained from 1,2,4-$HOC_6H_3(NH_2)Cl$. Reduction of IV by alk. $Na_2S_2O_4$ gives a blue dihydrodiamino deriv. which is oxidized by H_2O_2 to ***2,6-diamino-9,10-dichlorotriphenodioxazine***, $C_{16}H_{10}Cl_2N_4O_2$ (V); all yields are quant.; V appears as green leaflets from *s*-$C_6H_3Cl_3$. 3,7-Dinitro-9,10-dichlorotriphenodioxazine may be converted into the corresponding diamine in similar fashion. The condensation product from picramic acid and II is converted by concd. H_2SO_4 into ***1,3,5,7-tetranitro-9,10-dichlorotriphenodioxazine***, $C_{18}H_4Cl_2N_6O_{10}$, which forms Cu-colored crystals from $PhNO_2$ and imparts a violet-blue color to concd. H_2SO_4. Treatment of the condensation product (25 g.) from II and 1,2,4,5-$H_2NC_6H_2OMe(HNBz)Me$ with BzCl in $PhNO_2$ yields 13 g. ***2,6-di(benzoylamino)-3,7-dimethyl-9,10-dichlorotriphenodioxazine***, $C_{24}H_{22}Cl_2N_4O_4$; the latter is also obtained by reduction of the condensation product from 1 mol. of II and 2 mols. of nitrocresidine followed by benzoylation. Condensation of II with 1,2,5-$C_6H_4NH_2(OEt)_2$ followed by benzoylation in $C_6H_4Cl_2$ yields ***3,7-diethoxy-9,10-dichlorotriphenodioxazine***, $C_{32}H_{16}Cl_2N_2O_4$, which is green and which gives a blue soln. with concd. H_2SO_4; the *di-MeO deriv.* may be prepd. in similar fashion. ***2,3,5,6-Dibenzo-9,10-dichlorotriphenodioxazine***, $C_{32}H_{16}Cl_2N_2O_4$ (VI), which is green, is formed by condensation of II and β-$C_{10}H_7NH_2$ in $PhNO_2$; yield, 90%; VI is changed by 20% fuming H_2SO_4 into a reddish violet ***dye for wool.*** ***3,4,7,8-Dibenzo-9,10-triphenodioxazine*** is easily prepd. from α-$C_{10}H_7NH_2$, but cannot be obtained from 1,2,-$H_2NC_{10}H_6OEt$. ***- D1(1′ - naphthylamino) - 3,6-dichloro-1,4-benzoquinone*** (VII) is prepd. by refluxing for 7 hrs. a mixt. of 49.2 g. II, 63 g. freshly distd. α-$C_{10}H_7NH_2$, 39.3 g. anhyd. AcONa and 2 l. alc.; yield 35 g. (38.9%). Refluxing VII for 15 hrs. in $PhNO_2$ gives the ***dioxazine***, $C_{26}H_{12}Cl_2N_2O_2$, in 44% yield. Condensation of 4-phenylazo-1-naphthylamine (VIII) with II in alc. followed by heating in $PhNO_2$ contg. *p*-$MeC_6H_4SO_2Cl$ yields a green dioxazine, $C_{38}H_{20}Cl_2N_6O_2$ (IX) (Swiss pat. 180,698); sulfonation of IX gives a bluish green ***dye for wool and silk.*** IX is also obtained if the monoazo dye from $PhNH_2$ and 1,2-$MeOC_{10}H_6NH_2$ is used instead of VIII; by starting with 1,4-$BrC_{10}H_6NH_2$ a dibromodioxazine is obtained. When III is refluxed with $PhNH_2$ and $PhNH_3Cl$, a blue product results, $C_{36}H_{24}ClN_5O_2$. Refluxing the condensation product from II and 1,2,4-$H_2N(MeO)C_6H_3NHPh$ with C_5H_5N and $AlCl_3$ gives 2,6-dianilino-9,10-dichlorotriphenodioxazine. App. is described for extn. of solids by high-boiling solvents.



(III)

David E. Adelson

Synthesis of vitamin B_6. II. Stanton A. Harris and Karl Folkers. *J. Am. Chem. Soc.* 61, 3307–10(1939); cf. *C. A.* 33, 5397[4].—The original synthesis of vitamin

B_6 (**XI**) is represented by the reactions 3-cyano-4-ethoxymethyl - 5 - nitro - 6 - methyl - 2 - pyridone (I) → 2 - methyl - 3 - nitro - 4 - ethoxymethyl - 5 - cyano - 6 chloropyridine (V) → *2 - methyl - 3 - amino - 4 - ethoxymethyl - 5 - cyano - 6 - chloropyridine* (VI) → 2-methyl-3 - amino - 4 - ethoxymethyl - 5 - aminomethylpyridine (VII) → 2 - methyl - 3 - hydroxy - 4 - ethoxymethyl-5-hydroxymethylpyridine (VIII) → 2 - methyl-3-hydroxy-4,5-bis(bromomethyl)pyridine-HBr (**XII**) → **XI**. The key compd. in the improved synthesis is **VII**, which has been prepd. by 2 variations of these reactions: I → *5-amino analog* (II) → VI → VII and I → II → VI → *di-Ac deriv.* (III) → *2 - methyl - 3 - diacetylamino - 4 - ethoxymethyl - 5 - aminomethylpyridine* (IV) → VII. These variations are limited by the low yield in the reaction II → VI. Reduction of I with Adams catalyst in EtOH or AcOH gives 63.6% II, m. 250-5° (decompn.); reduction of I in Ac_2O gives 53.4% of the *acetate* of II, m. 260°; boiling II with an excess of Ac_2O gives a *diacetate*, m. 176°. II (2 g.) with 4 g. PCl_5 in 15-20 cc. $POCl_3$, allowed to stand overnight at 30°, gives 16.5% of VI, m. 146-7°; warm Ac_2O gives the *mono-Ac deriv.*, m. 134-6°; boiling Ac_2O for 30 min. gives 82.5% III, m. 90-2°. Reduction of 3.09 g. of III in 100 cc. AcOH contg. 0.82 g. of AcONa with 10 g. Pd-C and 0.5 g. Adams catalyst (absorption of 3 mols. H) gives 36.4% IV, whose *picrate* m. 190-1°; decompn. of the picrate with 1:1 HCl and hydrolysis by boiling for 1.5 hr. with 15% HCl gives VII, whose di-HCl salt m. 204-5° (after drying at 100° in a high vacuum); a *monohydrate*, m. 127-9°, results on crystn. from 95% EtOH. Variations in the synthesis of **XI** are represented by the reactions VII → VIII → **XI** and VII → *2 - methyl-3-amino - 4 - bromomethyl - 5 - aminomethylpyridine - 2HBr* (**IX**) → *di-HCl salt* (**X**) of the *4-hydroxymethyl analog* of **IX** → **XI** or VII → **X** → **XI**. Heating 1.55 g. of VII with 20% of boiling 48% HBr until about 0.5 of the acid has been distd. gives **IX**, m. 260-5°; heating with hot H_2O and stirring with AgCl gives **X**, m. 235-7°; VII is converted to **X** in 76.7% yield by heating 2.24 g. in 34 cc. of 2.5 *N* HCl for 4 hrs. at 175-80°. Through the diazo reaction **X** gives 45.4% of **XI**. VIII, m. 135-6°, heated with 2.5 *N* HCl at 155-60° for 6 hrs., gives 83% of **XI**; cleavage of VIII by heating 0.2 g. in 6 cc. concd. HCl at 132° for 1 hr. gives 45% of *2-methyl-3-hydroxy-4,5-bis(chloromethyl)-pyridine-HCl* (**XIII**), m. 206°; heating 50 mg. **XIII** with 10 cc. H_2O on the steam bath for 1 hr. gives 10 mg. **XI**. In recrystg. **XI** prepd. by the hydrolysis of **XII**, there results some *2-methyl-3-hydroxy-4,5-(epoxydimethoxy)-pyridine* (**XIV**), m. 239-40° (decompn.); **XIV** also results in small yields when **XI** or VIII is treated with 15 cc. of 50% H_2SO_4 for 1 hr. on the steam bath. **XIV** resists hydrolysis by heating with 2.5 *N* HCl at 175° for 4 hrs.; distn. with 48% HBr gives 86.5% of **XII**, m. 228.5°. C. J. West

Cinchona alkaloids. XXXI. Characterization and preparation of epiquinine and epiquinidine. Paul Rabe and Helmut Höter. *J. prakt. Chem.* **154**, 66-72(1939); cf. *C. A.* **33**, 3385².—Epiquinine (I) and epiquinidine (II) form a *sulfate*, I.II.$H_2SO_4.6H_2O$, $[\alpha]_D^{20}$ 38.5° (H_2O, *c* 0.5909); placed in a bath at 95° it m. 101-3°, decomps. 115°; at room temp. 1 part dissolves in 4 parts H_2O. I forms a *HBr salt*, with 3 mols. H_2O, m. 71-7°, $[\alpha]_D^{20}$ 32.9° (H_2O, *c* 0.7592), sol. in about 14 parts H_2O at room temp., easily sol. in hot H_2O. II, m. 113°, is best crystd. from AcOEt. The *IIBr salt*, with 1 mol. H_2O, m. 240° (slow heating); it is sol. in 3.4 parts of H_2O at room temp.; the thiocyanate, II.HCNS, m. 193°, $[\alpha]_D^{20}$ 44.5° (H_2O, *c* 0.4496); it is very difficultly sol. in H_2O and seps. from hot H_2O as an oil. Details are given of the rearrangement of quinine with AmOH-KOH, the sepn. of quinidine as the tartrate, the pptn. of I and II as the double sulfate and the isolation of II as the HSCN salt and of I as the HBr salt in 66 and 77% yield, resp. C. J. West

Erythrophleum alkaloids. I. Cassaine, a crystalline alkaloid from the bark of Erythrophleum guineense (Don). G. Dalma. *Helv. Chim. Acta* **22**, 1497-1512(1939); cf. *C. A.* **33**, 7810⁷.—Pulverized bark (5 kg.) from *Erythrophleum guineense* (I) (coastal forests near the mouth of the Congo) was treated with 10% NH_4OH and exhaustively extd. with ether. The ext. was concd., washed with 5% KOH and treated with 0.5 *N* HCl contg. $NaHSO_3$. The acid soln. was washed with ether, made alk. and extd. with ether. Treatment of the ether soln. with concd. H_2SO_4 in Et_2O pptd. cassaine bisulfate (II) which was crystd. from alc.-ether mixt. II was converted to III repptd. as II by addn. of H_2SO_4 and recrystd. Treatment of II with KOH soln. followed by ether extn. gave 5 g. cassaine (III), m. 138-40°. Repeated crystn. of II from alc.-ether yielded the pure compd., $C_{24}H_{39}NO_4.H_2SO_4.2H_2O$, m. 290° (*in vacuo*) (decompn.). By treating pure II with KOH, III, $C_{24}H_{39}NO_4$, is obtained; crystd. from ether, III m. 142.5°, $[\alpha]_D^{20}$ −111° (95% alc.), −103° (abs. alc.); −117° (0.1 *N* HCl). I.*HCl.H₂O*, m. 212-13°; *Ac deriv.* of III, m. 123-4°; *oxime* of III, m. 123-5°. Hydrolysis of 5 g. of III with *N* HCl gave 3.5 g. *cassainic acid*, $C_{20}H_{30}O_4$ (IV), crystals from ether, then Me_2CO-H_2O, m. 203°, $[\alpha]_D^{20}$ −126.3° (95% alc.). *Me ester* (V) of IV, crystals from MeOH-H_2O, m. 189-90°; *Ac deriv.* of V, m. 189-91°; *semicarbazone* of V, m. 246-7°. Alk. hydrolysis of 5 g. of III gave 2.9 g. of *allocassainic acid*, $C_{20}H_{30}O_4$ (VI), m. 222-4°, $[\alpha]_D^{20}$ 81.8° (95% alc.). Treatment of III with 10% CrO_3 in AcOH at 35-40° gave *dehydrocassainic acid*, $C_{20}H_{28}O_4$ (VII), crystals from Me_2CO-H_2O, m. 238-9°, $[\alpha]_D^{20}$ −164.5° (95% alc.). *Me ester* (VIII) of VII, m. 129-30°; *dioxime* of VIII, m. 130-2°; *disemicarbazone* of VIII, m. 290° (decompn.). Extn. of 1 kg. of I from the Ucle region of central Congo gave 5.5 g. of a base that appeared to be identical with Merck's Erythrophlein. Extn. of 2.5 kg. of I from the forests on the lower side of the Congo gave 0.25 g. of a base identical with III. II. **The carbon skeleton and position of the double bond in cassainic acid.** L. Ruzicka and G. Dalma. *Ibid.* 1516 23.—Hydrogenation of cassaine (I) in AcOH over PtO_2 at room temp. gave dihydrocassaine, $C_{24}H_{41}NO_4$ (II), m. 115-16°; $[\alpha]_D^{20}$ 0 ± 2° (95% alc.), −6.5 ± 1° (0.1 *N* HCl). Hydrogenation of I over Raney Ni also gives II. Alk. hydrolysis of II yielded *hydroxyketocassainic acid*, $C_{20}H_{32}O_4$ (III), m. 253-5° (*in vacuo*), $[\alpha]_D^{20}$ 0 ± 2° (95% alc.), −5 ± 1° (0.1 *N* NaOH). Reduction of III by Na-alc. gave *dihydrocassainic acid*, $C_{20}H_{34}O_4$ (IV), m. 262-5° (*in vacuo*), $[\alpha]_D^{20}$ −7 ± 1° (0.1 *N* NaOH); *Me ester* of IV, m. 172-4°. Dehydrogenation of IV with Se at atm. pressure and 340° gave 1,7,8-trimethylphenanthrene (V), m. 142 3°; *sym*-$C_6H_3(NO_2)_3$ adduct, m. 192-3°; picrate, m. 133-5°; all of these were identical with known specimens. When IV was dehydrogenated with Se in a sealed tube at 340°, a mixt. of V and its tetrahydro deriv. (VI) was obtained which was sepd. and identified as the *sym*-$C_6H_3(NO_2)_3$ adducts, m. 192-3° and 85-8°, resp. Dehydrogenation of VI with Se at atm. pressure and 340° gave V. Ultraviolet absorption spectra studies were carried out with several derivs. of I. I showed a max. at 2230 A. (log ε 4.26), cassainic acid at 2150 A. (log ε 4.3) and Me diketocassainate at 2230 A. (log ε 4.2), indicating a double bond in the α,β-position to the carboxyl group. Allocassainic acid did not exhibit an absorption band characteristic of α,β-unsatd. acids, thus suggesting that alk. hydrolysis of I shifted the double bond β,γ to the carboxyl. III showed a max. at 2800 A. (log ε 1.64). IV exhibited no absorption between 2000 and 3400 A., indicating a complete hydrogenation of the keto groups and the double bonds originally present. The ultraviolet absorption spectra are valuable tools in following the transformations of I into its various derivs. David E. Adelson

Constituents of the leaves of Leucothoe keiskei Miq. Haruya Simada. *J. Pharm. Soc. Japan* **59**, 619-20(in German, 242-4)(1939).—The leaves of *Leucothoe keiskei* (1.62 kg.) were extd. with ether and hydrolyzed with 10% alkali. The K salt gave with HCl ursolic acid, $C_{29}H_{47}CO_2H$, m. 289-90° (all m. ps. cor.), $[\alpha]_D^{13}$ 69.4°; Me ester, m. 171-2°; acetate, m. 295-6°. The Me acetylursolate m. 246-7°. The neutral fraction of the ether soln. gave uvaol, $C_{30}H_{50}O_2$, m. 232-3°; acetate, m. 157-9°. F. I. Nakamura

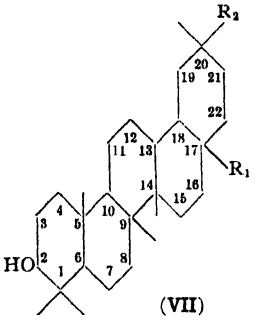
Synthesis of rubierythric acid, the chief glucoside of

Rubia tinctorum. Géza Zemplén. *Math. naturw. Ans. ung. Akad. Wiss.* **58**, 380–92(1939).—As rubierythric acid is according to the newest statements a β-2-primeveroside of alizarin, a synthesis from alizarin and acetobromoprimeverose has been successfully tried. The attempted synthesis with quinoline and Ag_2O was without result, nor could the product be obtained by treatment of β-2-triacetylalizaringlucoside (I) with α-acetobromoxylose, since the former compd. was very little sol. To produce I alizarin was dissolved in quinoline and treated with Ag_2O. Its long yellow needles m. 234–6°. The acetylated deriv. m. 199–200°, $[\alpha]_D^{18}$ −84.8° ($CHCl_3$). The treatment of acetobromocellobiose with sublimed alizarin in acetone and KOH led to yellow rhombic crystals of β-2-heptaacetylalizarincellobioside (II), m. 244–6°. The acetylation of II with pyridine and anhyd. AcOH gave yellow needles of β-2-octaacetylalizarincellobioside (III), m. 224–5°, and $[\alpha]_D^{18}$ −70.90° ($CHCl_3$). The successful synthesis was begun by dissolving sublimed alizarin and acetobromoprimeverose in acetone, adding KOH and shaking. The filtrate was then evapd. *in vacuo* and shaken out with $CHCl_3$ several times. The $CHCl_3$ fractions were united and washed out with dil. NaOH; the last wash liquid showed the bright red color of the glucoside instead of the blue of alizarin. The acetylation of the raw product obtained from this $CHCl_3$ soln. led to light yellow needles of β-2-heptaacetylalizarinprimeveroside (IV), $C_{39}H_{40}O_{20}$, m. 221–3.5°. The sapon. of IV in alc. by means of 33% NaOH gave finally the yellow needles of β-2-alizarinprimeveroside (rubierythric acid), m. 256–8°.
S. S. de Finály

A constituent of the fruit of Pyracantha angustifolia Schneid (Rosaceae). Haruya Simada. *J. Pharm. Soc. Japan* **59**, 621–3(in German, 255–6)(1939).—The fruit of *Pyracantha angustifolia* Schneid (1.1–2.1 kg.) was extd. with ether and hydrolyzed with a 10% alk. soln., which gave ursolic acid. The aq. soln. gave *d*-sorbitol, m. 73°, in a yield of about 9%, which was identified as the hexa-Ac or triformal deriv. The dry fruit contains also about 1.3% sugar as glucose.
F. I. Nakamura

Saponins and sterols. XIV. Anhydro derivatives of ursolic acid. Katuya Huzii and Sigeiti Ōsumi. *J. Pharm. Soc. Japan* **59**, 660–3(in German, 237–9)(1939); cf. *C. A.* **33**, 4979⁶.— Me ursolate (5 g.) when treated with 5 g. P in 200 cc. dry petr. ether gave after standing overnight Me ursylenate (I), $C_{31}H_{48}O_2$, m. 163.5°. An attempt to obtain an isomeric form of I with Zn-Hg failed. I (5 g.) when heated with alc. KOH at 145–50° (12–13 atm. pressure) gave ursylenic acid (II), $C_{30}H_{46}O_2$, m. 266–8°. Reduction of II (0.6 g.) in alc. with 6 cc. 1% $PdCl_2$ soln. and 0.3 g. C gave ursenic acid, $C_{30}H_{48}O_2$, m. 203.5°; Me ester, $C_{31}H_{50}O_2$, m. 138–40°. Hydrolysis of Me ursolate, Me sanquisorbigeninate and Me oleanolate with alc. KOH at 155° at a reduced pressure gave the corresponding acids quantitatively.
F. I. Nakamura

Saponins and sterols. XV. Dry distillation of ursolic acid with selenium and its constitution. Katuya Huzii and Sigeiti Ōsumi. *J. Pharm. Soc. Japan* **59**, 711–17(in English, 264–8)(1939); cf. preceding abstr.—Ruzicka and van Veen (*C. A.* **24**, 856) have previously obtained sapotalene (I) by dry distn. of ursolic acid (II) with Se, and Drake and Duvall (*C. A.* **30**, 7571⁹) isolated 2,7-dimethylnaphthalene (III) and 1,8-dimethylpicene. H. and O. have now isolated, besides I and II, 1,2,3,4-tetramethylbenzene (IV), 1,2,5,6-tetramethylnaphthalene (V) and 1,2,5-trimethyl-6-hydroxynaphthalene (VI). From the results of dry distn., the authors propose the formula VII for the structure of II (any one of the groups R_1 and R_2 represents CO_2H and the other Me). The reasons for proposing this structure are as follows: From the nature of the dry distn. products, it is assumed that II and oleanolic acid (VIII) have the same C skeletal structure. The OH groups should be located at C_2 due to the formation of VI. The double linkage is stable toward catalytic reduction like those present in triterpenes and hence it should be present at C_9-C_{10} or C_{12}-C_{13} as in VIII. Since Me ursolate is difficult of sapon. its CO_2H group should be of tertiary type and should not be located at C_1 (R., Giacommello and Grob, *C. A.* **32**, 3367⁶). If the CO_2H and the OH groups are in the 1,3- or 1,4-positions, it should give γ- or δ-lactones with $ZnCl_2$ and glacial AcOH, but instead, it gives ursylenic acid (preceding abstr.), showing they are not at these positions. II does not give a Br lactone



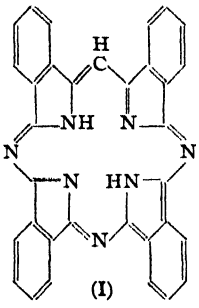
(VII)

or Ac lactone (Winterstein and Stein, *C. A.* **26**, 732), showing that the double bond exists at ε-ζ or some other positions further removed with respect to the CO_2H group. *Exptl.*—The mixt. of 40 g. II and 80 g. Se powder is heated 36 hrs. at 330–50°, and extd. with ether. After evapg. off the solvent, the residue is sepd. by distn. into the following fractions: (a), 40–70°, (b) 70–100°, (c) 100–5°, (d) 105–20°, (e) 120–8°, (all above fractions at 4 mm.) and (f) 120–60° (0.15 mm.) From fraction (a), IV is isolated. Tribromide, m. 219–20° (cor.), From (b), the picrate of III, m. 135–6° (cor.), is obtained, which on decompn. gives crystals of III, m. 97°. From (c) III is isolated; picrate, m. 128–9° (cor.); styphnate, m. 157°.
Nao Uyei

Constituents of "Senso." X. Isomers of anhydrogamabufotalin. Heisaburo Kondo and Setuo Ōno. *J. Pharm. Soc. Japan* **59**, 531–7(in German, 186–9)(1939); cf. *C. A.* **33**, 2528³·⁴.—Gamabufotalin (I) (0.5 g.) when refluxed on the water bath for 4 hrs. with alc.-H_2SO_4 gave an anhydro compd. (II), $C_{24}H_{32}O_4$, m. 204° (with $1H_2O$, m. 125–7°). Diacetylgamabufotalin when treated as above gave a compd. m. 125–7° Acetylation of II gave a compd., $C_{26}H_{34}O_5.H_2O$, m. 125; *p*-nitrobenzoate, m. 219–21°. I when treated with 0.5 *N* alc. HCl gave II. I when treated with *N* alc. HCl gave a compd., $C_{24}H_{32}O_4$, m. 258–9°, depressed the m. p. of I from 261–2° to 232°. I and concd. HCl gave a compd. (III), m. 258–9.° I in a mixt. of alc. and ether when treated with dry HCl gas gave III. The acetate of III did not crystallize, but analysis gave $C_{24}H_{32}O_4(C_2H_2O)_2$. I and HBr gave $C_{24}H_{33}O_4Br$. Catalytic reduction of 0.384 g. III gave a neutral compd. (0.17 g.), whose *p*-nitrobenzoate m. 184°, and an acidic compd. (0.2 g.), $C_{24}H_{40}O_4$, m. 210–12° (dihydroxycholanic acid). Catalytic reduction of 0.138 g. of II gave an acidic compd., $C_{24}H_{40}O_4$, m. 199–201°, isomeric with dihydroxycholanic acid, and a neutral compd. whose benzoate m. 185–90°.
F. I. Nakamura

Phthalocyanines and related compounds. XV. Tetrabenzotriazaporphine: its preparation from phthalonitrile and a proof of its structure. P. A. Barrett, R. P. Linstead and G. A. P. Tuey, with a note on a preliminary x-ray investigation by J. M. Robertson. *J. Chem. Soc.* **1939**, 1809–20; cf. *C. A.* **32**, 8423⁸.—*Tetrabenzotriazaporphine* (I) is best prepd. as follows: MeMgI (from 2.4 g. MeI and 6.5 cc. MeI in 100 cc. Et_2O) is added to a mixt. of 12.8 g. of finely powd. phthalonitrile (II) and 500 cc. Et_2O; the Et_2O is allowed to boil off during the reaction and after a few hrs. the remainder is removed on the steam bath and the residue is rapidly heated to 200°; 3 cc. H_2O are gradually added to the product; after heating 0.5 hr. at 200°, the cooled and powd. residue is extd. with a mixt. of EtOH and 10% HCl; the crude pigment is freed from Mg by soln. in concd. H_2SO_4, filtration and pptn. with ice, followed by crystn. from $C_{10}H_7Cl$. The yield of I is 4.7 g. (about 40%). I forms needles or plates with a strong purple reflex; a dil. $C_{10}H_7Cl$ soln. gives only needles.

The spectra of the 2 forms are identical. X-ray examn. gave *b* 4.725 A. (phthalocyanine (III) has a value of *b* of 4.72 A.); the structure, dimensions and arrangement of the I mols. in the crystal are almost or completely identical with those in the corresponding III mol. The spectrum of I shows max. at 6940, 6635 (inflexion), 6520, 6380, 6220, 5920, 5700, 4620 A.; corresponding values of log ε are 5.19, —, 5.03, 4.75, 4.66, 4.43, 4.03, 4.03. Values for III are 7030, 6680, 6360, 6040, 5760, 5560; log ε 5.23, 5.22, 4.75, 4.52, 4.02, 3.88. When I is heated in a stream of CO_2 under reduced pressure it tends to melt and then sublimes in lustrous needles. I is more resistant toward oxidizing agents than is III, but can be completely oxidized by both acid $KMnO_4$ and acid $Ce(SO_4)_2$; the oxidation follows the formula: $I + 5O + 5H_2O \rightarrow 4C_6H_4(CO)_2NH + CO_2 + 3NH_3$. $KMnO_4$ oxidation yields 84% of $C_6H_4(CO)_2NH$ (on the basis of the equation) and at the same time 3 moles of NH_3 are liberated. Under similar conditions III yields 4 moles of NH_3. For measuring the O uptake quantitatively, rather more drastic conditions than those for the oxidation of III are necessary, the I being heated at 100° with a considerable excess of $Ce(SO_4)_2$; an amt. of O corresponding to nearly 5 atoms per mole is then taken up. Under the same conditions III takes up only 1.1 atoms of O per mole and the method is therefore suitable for the estn. of mixts. of the macrocyclic pigments. In the $Ce(SO_4)_2$ oxidation III gives hardly any CO_2, whereas I gives 1 mole. These results exclude the possibility of I being a methylated III. In the $Ce(SO_4)_2$ oxidation the initial blue-green pigment becomes purple but the purple compd. reverts to the original pigment so readily as to prevent its isolation. Reducing agents such as $SnCl_2$ brought about the reversal instantaneously. The purple compd. is fairly stable to dil. H_2SO_4 but is very rapidly dissolved by the addn. of more $Ce(SO_4)_2$. II, treated with an equimol. amt. of MeLi at 0° and the product heated to about 200° with cyclohexanol, gives about 15% of a pigment approxg. in compn. to I; however, this appears to contain some tetrabenzodiazaporphine or a similar less nitrogenous pigment. Under these conditions only a small proportion of the Me groups supplied in the reagent appear as methine groups in the final product; the action of a deficiency of MeLi on II gives a better yield of total pigment (35%) but the product contains a large proportion of III. BuLi gives a mixt. of a triaza compd. and III. The results indicate that the tendency for organometallic compds. to yield macrocyclic pigments contg. C links is greatest with Me derivs.; those contg. larger groups tend to give more III and even with Me reagents some III can be formed under suitable conditions. If 2 moles of MeLi and 1 mole of II are caused to react in Et_2O and the residue is heated at 200° with cyclohexanol for 0.5 hr., there results *3-amino-1,1-dimethylisoindole* (IV), m. 146°; *picrate*, canary-yellow, m. 255°. IV results in 4–8-g. yields from 25 g. II in 100 cc. C_6H_6 with MeMgI from 32 cc. MeI in Et_2O, allowed to react with cooling for 7–8 min. and decompg. with NH_4Cl. IV is a strong base and displaces NH_3 from NH_4Cl. In the prepn. of I from equimol. quantities of II and MeMgI an excess of the II remains at the end of the 1st condensation; this nitrile is clearly responsible for the N links in I; possible mechanisms of the formation of I are discussed.



(I)

Heating I with an excess of Cu bronze in boiling quinoline for 12 hrs. gives the *Cu deriv.* (V), needles with purple luster, which sublimes *in vacuo*; V also results on adding powd. CuCl to the soln. of II in MeMgI, followed by heating at 200° as outlined above; V may also be prepd. from *o*-NCC_6H_4Ac (Helberger and von Rebay, *C. A.* **31**, 5370[9]). The spectrum of V shows max. at 6840, 6550, 6270, 6140, 6000, 4460 A.; log ε 5.21, 5.01, 4.58, 4.57, 4.49, 4.15. X-ray examn. of V gave a value of 4.78 A. for *b* (the Cu salt of III gave a value for *b* of 4.79 A.). V is oxidized by acid $Ce(SO_4)_2$ but the reaction is slower than with I and about 4.7 atoms of O are taken up. Concd. H_2SO_4 gives a brownish green soln. of V, giving a bluish green ppt. on dilu.; addn. of a drop of HNO_3 gives a deep greenish blue color; more acid gives a red color, changing to brown. Boiling I with $CuCl_2$ in $C_{10}H_7Cl$ for 8 hrs. gives *Cu monochlorotetrabenzotriazaporphine*, greenish blue, which cannot be sublimed; absorption spectrum max. at 6830, 6560, 6450, 6000 A. The Zn (VI) and Mg (VII) salts of I may also be prepd. from I and the metal. VI gives a spectrum with max. at 6780, 6540, 6260, 6130, 5980, 4440, 4265 A.; log ε 5.23, 5.00, 4.43, 4.42, 4.38, 4.20, 4.51; VII is more sol. than the other salts and a limited quantity of quinoline should be used in its prepn.; VII is also obtained by reaction of I and MeMgI and after the heating period, freeing the product from impurities by extn. with EtOH and extg. the residue directly with $C_{10}H_7Cl$; 12.8 g. II gives 5.1 g. VII; spectral bands of VII at 7220, 6810, 6580, 6300, 6150, 6000, 4480 A.; log ε 4.36, 4.96, 4.82, 4.30, 4.38, 4.18, 4.18. On standing in air VII appears to hydrate as does the Mg salt of III but no definite compd. was isolated. Boiling 5 g. I and 2.5 g. $FeCl_2$ in 100 cc. quinoline for 0.5 hr., dilg. with 8 vols. C_6H_6, removing the quinoline with dil. HCl and crystg. the ppt. from $C_{10}H_7Cl$ gives the *ferrous salt*, bronze needles, spectral bands in $C_{10}H_7Cl$ at 6570, 6350 (diffuse to 6260), 5820 A; log ε 4.74, 4.67, 4.23; like the ferrous deriv. of III, it is sol. in $PhNH_2$ and gives large crystals of a solvated pigment; it is also sol. in C_5H_5N. The Li deriv. of I is sol. in cold EtOH, Me_2CO, etc. **XVI. The halogenation of phthalocyanines.** P. A. Barrett, E. F. Bradbrook, C. E. Dent and R. P. Linstead. *Ibid.* 1820–8.—The halogenation of phthalocyanine (I) proceeds readily under conditions which do not effect halogenation of *o*-$C_6H_4(CN)_2$ or $C_6H_4(CO)_2O$; as in the case of aromatic compds., under mild conditions I forms addn. compds. with halogens. The position of the halogen atoms in these compds. is unknown. They are easily converted, particularly by heat, into substitution products in which the halogen atoms enter the C_6H_6 nuclei. In both processes the I skeleton is preserved. I reacts rapidly at room temp. with Br in CCl_4 without elimination of HBr. The amt. of halogen removed from the soln. depends upon the concn. and reaches a max. at 8 g.-atoms per g.-mol. of I. When the insol. octabromide is warmed with alkali, all the halogen is removed and I is reformed. Most of the halogen is also removed if the dry octabromide is heated. If the product is left in contact with Br in CCl_4 for several weeks, a slow irreversible fixation of halogen occurs and the final product contains up to 40% of Br not removable by warm alkali. The same change can be effected more readily by heating the octabromide in high-boiling solvents. The 2 stages in the reaction correspond with addn. and with substitution in the C_6H_6 rings. The substituted bromophthalocyanines formed in this way will still add a further 8 g.-atoms of Br from CCl_4 soln. When I is heated with Br to 300° under pressure, both addn. and substitution occur. Much HBr is evolved and a brown solid is formed. After the additive Br has been removed, a green bromophthalocyanine contg. over 60% of stable Br remains. The limit of substitution obtainable in this way appears to be reached when 13 of the 16 nuclear H atoms have been replaced. Lower temps. give less highly brominated products. The addn. of Cl resembles that of Br but is less easily followed quantitatively. At room temp. Cl gas converts free I and many of its metallic derivs. into brown chlorides, from which the halogen is completely liberated by warm alkali. When, however, I is heated at 250° with liquid Cl

under pressure, addn. and substitution both occur and the brown product yields a green dodecachlorophthalocyanine on treatment with alkali. These high-temp. reactions provide another illustration of the great stability of the I ring. I can also be chlorinated by the action of $SOCl_2$, SO_2Cl_2, PCl_5 + $POCl_3$ and other reagents; no addn. products appear and HCl is at once evolved; the products are blue to blue-green and not very highly chlorinated. When heated with SO_2Cl_2 under pressure at 230°, I gives a green Cl deriv. contg. 13 atoms of Cl per mol. High chlorination can be achieved without the use of pressure by passing Cl gas through a suspension of I in $SOCl_2$ at the b. p. This reaction is assisted by the presence of catalysts, particularly S_2Cl_2, C_5H_5N and I; the products are green and contain from 10 to 13 atoms of Cl per mol. ($SbCl_5$ in $C_6H_4(CO)_2O$ also gives a high degree of chlorination); if $AlCl_3$ or $FeCl_3$ is used, the metal becomes attached to the center of the I ring and cannot be displaced. Reaction also occurs in fuming H_2SO_4 but considerable fission results and the yields are small. Iodination has not been realized. Typical Cl derivs. of I yield their Cu and Pb derivs. with Cu and PbO_2 in high-boiling solvents, showing that the central acid H atoms are not affected by the halogenation. On the introduction of the 1st 4 atoms of halogen the color becomes slightly duller but is otherwise very little changed; further substitution leads to progressively greener shades, a pure green being obtained when about 10 atoms of halogen have been introduced. Chlorination of I leads to an increase of soly. in $C_{10}H_7Cl$ until about 8 atoms of Cl have been introduced; more highly chlorinated derivs. are very sparingly sol.; the soly. of the Br derivs. decreases after 4 atoms are introduced. With the entry of halogen atoms the soly. of I in H_2SO_4 decreases and the color of the soln. progressively changes to a brownish red. Oxidative fission of the Cl derivs. to chlorophthalimides and hydrolysis by H_2SO_4 at 170° gives the chlorophthalic acids or the anhydrides; 3 acids were isolated: 4-Cl (II), 4,5-di-Cl (III) and the tetra-Cl deriv. (IV); a I with 5.5 g.-atoms Cl per mol. gives 53% II; with 8.2 g.-atoms 22% III and 3% IV; with 10 g.-atoms (made with $SbCl_5$) 23% III and 19% IV; (made without $SbCl_5$) 33% III and 26% IV; with 13 g.-atoms 5% III and 50% IV; the yields are expressed in terms of the corresponding chloroisoindole corners of the I mol. The results indicate that nuclear substitution occurs preferentially in the 2 β (4 and 5) positions; substitution is uneven. The absorption spectra of the Cl derivs. show that introduction of Cl generally leads to a slight progressive shift of the absorption max. toward the red and to a weakening or extinction of the weaker bands of the I spectrum; owing to the lack of symmetry, the spectra of the chlorination products were not sharply defined, particularly after 8 Cl atoms had been introduced. Solns. of the pigments in concd. H_2SO_4 generally showed only a broad area of transmission from green to red. This was shifted toward the red by chlorination, particularly by substitution in the 3,6-positions; the octachlorinated pigment resembled the 4,5- rather than the 3,6-deriv. The transmission in H_2SO_4 did not approach that of the 3,6-compd. until 12 or 13 Cl atoms had entered the mol. C. J. West

Bile pigments. XXVII. Synthesis of 4,4'-dimethyl-3,3'-diethyl-5,5'-diaminopyrromethenes. Hans Fischer and Herbert Guggemos. *Z. physiol. Chem.* **262**, 37–46 (1939); cf. *C. A.* **33**, 5864[3].—Treatment of 4,4'-dimethyl - 3,3' - diethylpyrromethane - 5,5' - dicarboxylic hydrazide with $NaNO_2$ below 3° gave *4,4'-dimethyl-3,3'-diethyl-5,5'-dicarbazidopyrromethane* (I), m. 127° (decomp.), which on treatment with $PhNH_2$ at 140° gave *4,4' - dimethyl - 3,3' - diethylpyrromethane - 5,5' - diphenylurea*, m. 235°. I reduced with Zn and HOAc below 70° gave *4,4'-dimethyl-3,3'-diethylpyrromethane-5,5'-dicarboxamide*, m. 300°, with 1 mol of HOAc of crystn. I treated with Br in Et_2O gave *4,4'-dimethyl-3,3'-diethyl-5,5'-dicarbazidopyrromethene* (II) as the HBr salt, m. 133°, which on treatment with pyridine in H_2O gave the free *base*, m. 130°. Refluxing I with EtOH gave 4,4'-dimethyl-3,3'-diethylpyrromethane-5,5'-diethylurethan, m. 124–5°. II under the same conditions gave *4,4'-dimethyl-3,3'-diethylpyrromethene-5,5'-diethylurethane*, m. 147°. II on boiling in 50% HOAc gave β,γ-diimidoetioporphyrin II (III). I on boiling with 50% HOAc for 1 hr. gave *4,4'-dimethyl - 3,3' - diethyl - 5,5' - diaminopyrromethane diacetate* $C_{19}H_{32}N_4O_4$, m. 185°, which on heating with 4% NaOH for 2 hrs. and sepn. by chromatography gave *4,4'-dimethyl-3,3'-diethyl-5,5'-diaminopyrromethene* (IV), decompn. 157° with the formation of III. IV forms a *Cu complex*, m. above 350°, which is sol. in $CHCl_3$, etc., and is stable even to H_2SO_4. Milton Levy

Constitution of yeast ribonucleic acid. III. The nature of the phosphatase-resistant group. J. Masson Gulland and Elisabeth M. Jackson. *J. Chem. Soc.* **1939**, 1842–4; cf. *C. A.* **33**, 6260[7].—A mixt. of 5 g. of Boehringer yeast ribonucleic acid in the min. amt. of dil. NaOH, Clark and Lubs' borate buffer at pH 8.6 (200 cc.), purified phosphomonoesterase soln. (100 cc.) and Russell's viper venom (0.1 g.) were dild. to 500 cc. with H_2O and incubated at 37°; when the liberation of phosphate had ceased (75%), a ppt. of guanine was removed and the filtrate treated with $Ba(OH)_2$; after filtration of the Ba phosphate, MeOH pptd. a Ba salt (I) which was not obtained pure but which yields adenine on acid hydrolysis. The filtrate from I, neutralized with AcOH and treated with excess $Pb(OAc)_2$, gives a Pb salt (II). Decompn. of II with H_2S gives guanosine and uridine. The Pb salt of the nucleotide fraction yields a *nucleotide* (III), $C_9H_{14}O_8N_3P$, decomps. about 220°. Comparison of the low rates of acid hydrolysis of I and III with those of adenylic and guanylic acids indicates that they are pyrimidine nucleotides. Both I and III suffer dephosphorylation with mutton-bone phosphomonoesterase; Russell's viper venom liberated no phosphate from I in 72 hrs. but III slowly underwent dephosphorylation; this is the 1st occasion in which liberation of phosphate has been effected by this venom in the case of a deriv. of a nucleic acid and in terms of current views may possibly indicate that the phosphoryl radical is substituted for a H atom of the NH_2 group or of the HO at C_6 of cytidine. Hydrolyses with enzyme prepns. from sweet-almond cake came to a standstill when about 75% dephosphorylation had occurred and the addn. of fresh enzyme did not cause further fission; the course of the hydrolysis thus seems to be similar to that effected by both monoesterase and Russell's viper venom. Acid hydrolysis of the nucleotide fraction yielded adenine and cytidine, whereas the nucleoside fraction contained guanosine and uridine. It therefore seems established that the phosphatase-resistant group is assocd. with the cytidylic and adenylic radicals. C. J. West

Bile acids. LVII. Oxidation of the oximinoketohydroxamic acid, $C_{24}H_{38}N_2O_8$, by potassium permanganate. Martin Schenck. *Z. physiol. Chem.* **261**, 273–7(1939); cf. *C. A.* **33**, 8621[4].—Oxidation of the oximinoketohydroxamic acid, $C_{24}H_{36}N_2O_8$ (*C. A.* **28**, 1428[6]), by $KMnO_4$ in NaOH gives N_2 and cilianic acid, the latter probably resulting from the bilianic acid first formed. **LVIII. Behavior of the diketohydroxamic acid, $C_{24}H_{35}NO_8$, and other hydroxamic acids toward alkaline potassium permanganate.** *Ibid.* **262**, 47–52.—Hydroxamic acids generally give gases on treatment with alk. $KMnO_4$ soln. The gas may be chiefly N_2O as with acetohydroxamic and benzohydroxamic acids or chiefly N_2 as with the diketohydroxamic acid, $C_{24}H_{35}NO_8$ (*C. A.* **23**, 4482) or the β-acid, $C_{24}H_{34}N_2O_{10}$, and its corresponding amino acid (*C. A.* **32**, 7053[6]). The α-acid, which is isomeric with the β-acid, gives no N_2. The primary action of alk. $KMnO_4$ is supposed to be the reaction —CO(NHOH) → —CO_2H + $(OH)_2NH$ (or O:NH); the nitroxyl dimerizes to nitrosohydroxylamine, $H_2N_2O_2$, or a similar compd. This may split to N_2O and H_2O or to N_2 and H_2O if a reductant is present. Bilianic acid oxime lactam gives no gas. Milton Levy

Bile acids. LVII. Separation of the contents of cattle bile. Heinrich Wieland and Walter Seibert. *Z. physiol. Chem.* **262**, 1–19(1939); cf. *C. A.* **31**, 1032[6].—Hydroxycholanic acids can be sepd. by extn. of their Et_2O solns. with aq. HCl. Thus 15% HCl exts. cholic acid (I) completely without extg. desoxycholic acid (II) or 3,7-dihydroxycholanic acid (III); 25% HCl exts. II and III

completely but very little 3-hydroxycholanic acid and no cholanic acid. Esters are also extd. but much more slowly than the acids. Extn. is probably due to formation of oxonium salts. The crude acids (570 g.) from 10 l. of sapond. winter cattle bile were shaken with 0.5 l. of EtOH and the residue (crude I) sepd. by acid extn. from Et_2O and shown to contain fat acids and II in small amts. The alc. soln. was evapd. to 0.25 its vol., sapond. to remove esters and distd. to remove EtOH, and the liberated acids transferred to Et_2O, leaving a residue of resins derived from bile pigments. From the ether soln. I was extd. with 15% HCl and II and III sepd. from the residue. A balance sheet of these and minor fractions shows the isolation of 439.9 g. of I, 81.2 g. of II, 12 g. of III, 3.7 g. of cholesterol, traces (0.3 g.) of bile acids, 17.0 g. of pigments and 38.1 g. of fat acids, totalling 592.2 g., from the original material. The excess represents accumulated solvents in the materials weighed. The fat acids appear to be chiefly oleic acid. The trace fraction was esterified with CH_2N_2 and sapond. with alc. KOH which saponifies only the esters of lithocholic acid until autoclaved, when esters of *sapocholic acid* (IV) are sapond. The latter were fractionated with ether and KOH solns., giving 6.95 g. of sapocholic acid from 1.25 kg. of crude material. In addn., small amts. of ursolic and oleanolic acids were isolated and identified. These sapogenins probably are not metabolic products but come directly from the feed. IV forms a cryst. K salt and an *Ac deriv.* (V) $C_{32}H_{50}O_4$, m. 231.3°; *Me ester*, m. 185–6°. Free IV obtained cryst. after sapon. of Me acetyl sapocholate shows a double m. p. when dried below 175°. It first m. 207–12° with gassing, solidifies below 220° and m. again at 235–7°. The first m. p. is probably that of the solvated substance. V when titrated with alkali indicates a mol. wt. corresponding with the formula $C_{30}H_{48}O_3$ for IV. Milton Levy

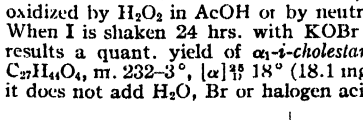
Preparation and properties of 3(α),11-dihydroxy-12-ketocholanic acid. Bernard B. Longwell and O. Winterstein. *J. Am. Chem. Soc.* **62**, 2003–3 (1940). 3-Hydroxy-12-ketocholanic acid (I) forms a *3-Ac deriv.*, m. 197–8°. Refluxing 5 g. of I with 15 cc. AcOH and 2.5 cc. Ac_2O for 1 hr., dild. to 50 cc. with AcOH and treatment during 3–4 hrs. at 50–60° with 0.7 cc. Br_2 in 10 cc. AcOH with stirring for an addnl. 4–5 hrs., addn. of 250 cc. H_2O and pptn. of the soln. of the reddish yellow gum in 350 cc. 95% EtOH by pouring into 2450 cc. H_2O gives 5.82 g. of the amorphous *3(α)-aceloxy-11-bromo-12-ketocholanic acid* (II), m. 159° (decompn.). Hydrolysis of 5.82 g. of II by refluxing with 115 cc. of 20% MeOH-KOH, pouring into 1150 cc. ice-H_2O and acidification gave 2.94 g. of 3(α),11-dihydroxy-12-ketocholanic acid (III), m. 205°, $[\alpha]_D^{25}$ 67.1° (1.3% in 95% EtOH) (50% over-all yield from I) (cf. Marker and Lawson, *C. A.* **32**, 5849[6]); CH_2N_2 gives the *Me ester* (IV), of III, m. 157°. III and 98–100% HCO_2H at room temp. for 24 hrs. give the *diformoxy deriv.*, m. 146–8°. Acetylation of III appears to be more complex than reported by M. and L. Refluxing 678 mg. of III with 21 cc. Ac_2O for 1.5 hrs. and soln. of the decompd. reaction product in hot 95% EtOH give 116 mg. of an *anhydride* (V), $C_{26}H_{38}O_6$, m. 268°, $[\alpha]_D^{25}$ 67.2° (0.3% in 95% EtOH); the yield varies from 17 to 32%; V appears to be formed from III by the loss of 1 mole of H_2O and acetylation of 1 HO group; the m. p. is that reported by M. and L. for their 3-acetate; V is either an 11(or 12)-enol lactone or a dimol. anhydride (more likely the latter); boiling V with 33% AcOH for 1 hr. gives a compd., m. 106°, which is considered to be the real *3(α)-acetate* (with 0.5 mol. of H_2O). The mother liquor and washings of V were poured into H_2O, extd. with Et_2O and the Et_2O washed with 5% Na_2CO_3; the acidic product, which did not crystallize, is a *di-Ac deriv.* (VI) of III, which is the only product on acetylation of III in C_5H_5N. Both V and VI yield III on alk. hydrolysis. To establish the position of the Br atom in II, 400 mg. of II and 200 mg. AcONa in 2.5 cc. AcOH were heated at 185–90° for 17 hrs.; repeated pptn. of the Na salt and crystn. from aq. EtOH of the acid gave about 98 mg. of $\Delta^{9,11}$-*3(α)-acetoxy-12-ketocholenic acid*, m. 201°, spectral max. at 241 mμ (ε = 9000). The acid succinate of IV is oxidized by CrO_3 in AcOH to give the *acid succinate of Me 3(α)-hydroxy-11,12-diketocholanate*, m. 194–6°, absorption max. 284 mμ (ε = 135), min. 250 mμ (ε = 80); sapon. did not give a cryst. product. III did not yield a semicarbazone under the many conditions reported (M. and L. report 17% of a compd. m. 232°); a hydrazone or oxime also could not be prepd.; apparently the steric hindrance exerted by the groups on the adjoining C atoms is too great to permit reaction with the 12-CO group. Heating 500 mg. of III with EtONa and $NH_2OH.H_2O$ at 197–200° for 8 hrs. and esterification with succinic anhydride give 78 mg. of the *II succinate*, m. 227° (decompn.), of the *compd.* $C_{24}H_{38}O_3$, m. 162–3°. Apparently the CO group at C_{12} had been eliminated and also the HO at C_{11}.

C. J. West

Sterols. LXXXII. Estrane derivatives. Russell E. Marker and Ewald Rohrmann. *J. Am. Chem. Soc.* **62**, 73–5 (1940); cf. *C. A.* **34**, 1028[7]. (The pp. for part LXXXI should be 3592–3.) –Reduction of estron (I) in acidic EtOH gives 3,17(α)-estranediol (II), m. 205–6°. The mother liquor from II, evapd. and oxidized in AcOH with CrO_3 at room temp. for 2 hrs., gives an oily product which partially sublimes at 80–90° (III) and partially at 125–40° (IV). IV is estranedione (V), m. 144–6° (from dil. Me_2CO) or 179–80° (from Et_2O-pentane); crystn. from dil. Me_2CO again gives the form m. 144–6°. Catalytic reduction of III in 300 cc. abs. EtOH and 3 cc. concd. HCl at 25° and 2 atm. for 5 hrs. gives 17(α)-estranol (VI), m. 105–7°; CrO_3 oxidation did not give a cryst. ketone. V yields a *Br deriv.*, m. 170–2°, which, refluxed with C_5H_5N for 9 hrs., gives *estrenedione* (norandrostenedione), m. 146–8°. Hydrogenation of 5 g. I in 300 cc. abs. EtOH with 0.5 g. Adams catalyst at room temp. and 3 atm. for 18 hrs. gives 4.6 g. of estradiol, m. 173.5°; 17-monoacetate (VII), m. 215–17°. Reduction of VII in AcOH-EtOH with Adams catalyst at room temp. and 10-lb. pressure for 14 hrs. and CrO_3 oxidation in AcOH give a ketone fraction, $C_{18}H_{28}O_2$, m. 102–4°, and VI. The ketone absorbs Br but the product is not cryst. and heating with C_5H_5N does not give a cryst. compd. Thus, cryst. nortestosterone could not be prepd. **LXXXIII. Oxidation products of sarsasapogenin. Studies on the C_{22} lactone.** *Ibid.* 76–8. The 3-keto lactone from sarsasapogenin (I) is catalytically reduced to the *epilactone*, $C_{22}H_{34}O_4$, m. 198–200°; *acetate*, m. 159–60°. The HO lactone (II) is oxidized by CrO_3 in AcOH to the *lactone dibasic acid*, $C_{22}H_{32}O_6$, m. 285–8° (decompn.); *di-Me ester*, m. 170–1°; this acid is also formed by oxidation of sarsasapogenone with HNO_3 in AcOH at 90° for 1 hr. Oxidation of the lactone acetate from I with CrO_3 at 90° for 3 hrs. gives the C_{22} keto acid (III), $C_{22}H_{34}O_4$, m. 285–7°. II and PhMgBr in Et_2O, refluxed for 2 hrs., the residue treated with Ac_2O and C_5H_5N for 18 hrs. at room temp. and the resulting yellow sirup oxidized with CrO_3 in AcOH, give the C_{19} dibasic acid (V), $C_{19}H_{30}O_5$, m. 218–20° (*C. A.* **34**, 4416). The Me ester of III yields an *acetate*, m. 198–9.5°; the *oxime* of III m. 206–8°. After acetylation of III (which yields a noncryst. sirup) CrO_3 does not yield IV. The lactone from III exists in 2 polymorphic forms (m. 188 and 198°), since the two yield the same acetates and upon oxidation give the same 3-keto lactone. **LXXXIV. Progesterone from hyodesoxycholic acid.** Russell E. Marker and John Krueger. *Ibid.* 79–81. 6-Ketocholestanol (25 g.), catalytically reduced with PtO_2 and H in MeOH, gives 20 g. of 3,6-cholestanediol (I), m. 190° (isomeric with that of Windaus, m. 216°); *diacetate* (II), m. 138°. Partial hydrolysis of the 3-Ac group by KOH in MeOH at 20° or by refluxing with $NaHCO_3$ in MeOH and oxidation with CrO_3 in AcOH give *6-acetoxycholestanone*, m. 101°; refluxing with 2% MeOH-KOH for 1.5 hrs. gives *6-hydroxycholestanone* (III), m. 190°. Heating III with $KHSO_4$ at 125–85° gives cholestenone. Hyodesoxycholic acid (IV) forms a *Me ester*, m. 86°. Reaction of the ester from 200 g. IV with PhMgBr, decompn. with HCl and refluxing the diphenyl alc. with Ac_2O for 2 hrs. and with AcOH for 6 hrs., followed by oxidation with CrO_3, give 110 g. of norhyodesoxycholic acid (V), $C_{22}H_{36}O_4$, m.

198°; *Me ester*, with 1 mol. C_6H_6, m. 95°. V (100 g.), treated as above, yields 42 g. of *bisnorhyodesoxycholic acid*, m. 240°; *Me ester* (VI), m. 146°; the intermediate *diphenyl alc.*, m. 222°. VI and 16 moles of PhMgBr, treated as above, followed by acetylation, yield *3,6-diacetoxyetiocholanyl Me ketone*, m. 100°; hydrolysis with MeOH-KOH, oxidation, hydrolysis of the ketone and sublimation from $KHSO_4$ give progesterone. **LXXXV. Oxidation of sarsasapogenin acetate with potassium permanganate.** Russell E. Marker and Ewald Rohrmann. *Ibid.* 222–3.—Sarsasapogenin acetate (I), oxidized with $KMnO_4$ in AcOH at 20°, gives the C_{22} keto acid, the C_{22} lactone and sarsasapogenoic acid. The C_{19} dibasic acid was not found. I is not affected by heating with $KMnO_4$ in a C_5H_5N-aq. Na_2CO_3 medium or with $KMnO_4$ in C_5H_5N alone. **LXXXVI. Desoxotestosterone and its conversion to testosterone.** R. E. Marker, E. L. Wittle and B. F. Tullar. *Ibid.* 223–6.—Oxidation of 230 g. $\Delta^{5,6}$-cholestene dibromide in 500 cc. CCl_4 and 8 l. AcOH at 48–50°, treated with 320 g. CrO_3 in 350 cc. H_2O and 800 cc. AcOH during 4–5 hrs. and stirred 6 hrs. at 50°, gives after a long purification, 5 g. of the *semicarbazone*, m. 285–7°, of *$\Delta^{5,6}$-androsten-17-one* (I), m. 105–7°; reduction of 1.75 g. with Na in PrOH gives 1.4 g. of *$\Delta^{5,6}$-androsten-17-ol* (II), m. 163–5° (*acetate* (III), m. 133 5°). Passing dry HCl through III in $CHCl_3$ at 0° for several hrs. and the product refluxed in EtOH with AcOK for 6 hrs. give a mixt. of II and the 4-isomer (IV), sepd. as the acetates. IV, m. 146 9°; the *acetate* (V) m. 97 100°; the *4-isomer* of I m. 78–80°. Oxidation of V with CrO_3 in AcOH at 50° for 1 hr. gives testosterone, m. 148–50°; if some III is present in the V, there also results 7-keto-$\Delta^{5,6}$-androsten-17-ol acetate, m. 215 17° (cf. Kuwada and Tutihasa, *C. A.* **33**, 8209[2]); the alc. m. 141.5 2.5° (*2,4-dinitrophenylhydrazone*, orange, m. 230–2°). Oxidation of IV with CrO_3 in AcOH gives androstenedione. C. J. West

Molecular rearrangement in the sterols. III. The structure of *i*-cholestanone. Kurt Ladenburg, Purnendu Nath Chakravorty and Everett S. Wallis. *J. Am. Chem. Soc.* **61**, 3483–7(1939); cf. *C. A.* **32**, 2539[6].—Whereas the existence of *i*-cholesterol has been confirmed (*C. A.* **31**, 7879[5]; **32**, 5849[1]), the formulation of the isomer has been questioned. Addnl. expts. are now reported which establish more rigidly the original formula proposed. *i*-Cholestanone (I) (0.25 g.) in AcOH and 2.5 cc. of 34% aq. HBr, allowed to stand overnight at room temp., gives a quant. yield of *α-3-bromocholestan-6-one* (II), m. 123°. Refluxing 4 g. of II in 60 cc. quinoline for 1 hr. in a N atm. gives 79% of *4-cholesten-6-one* (III), m. 104 5° (*oxime*, m. 184–5°); this also results from the α-3-Cl analog of II in somewhat smaller yield. III is considered the true "heterocholestenone," previously reported by Windaus and Dalmer (*C. A.* **13**, 1844), which was shown (*C. A.* **32**, 5849[1]) to be I; the absorption max. of III is at 2450 A., characteristic for conjugation across 2 rings. Refluxing I in AcOH and dil. H_2SO_4 gives the β-3-HO analog of II, m. 142–3° (Windaus, *Ber.* **36**, 3754(1903)); the *oxime* of the Ac deriv. m. 194–5°. I does not contain a double bond, since it is not oxidized by H_2O_2 in AcOH or by neutral or alk. $KMnO_4$. When I is shaken 24 hrs. with KOBr in quinoline there results a quant. yield of *α_1-i-cholestane-6,7-diacid* (IV), $C_{27}H_{44}O_4$, m. 232–3°, $[\alpha]_D^{25}$ 18° (18.1 mg. in 2 cc. Me_2CO); it does not add H_2O, Br or halogen acids nor does it give



an active Liebermann reaction. β-3-Chlorocholestan-6-one (W. and Stein, *Ber.* **37**, 3699(1904)) does not lose HCl with KOH in EtOH; EtONa in EtOH at 120° for 1 hr. gives the *β_2-isomer* (V) of IV, with 1 mol. of H_2O, m. 230–1°, $[\alpha]_D^{25}$ 55° (17.4 mg. in 2 cc. Me_2CO). The isomerism of IV and V can be explained by the relative positions of the groups at C_3 or possibly at C_5. α-3-Chlorocholestane-6,7-diacid (W. and Staden, *C. A.* **15**, 3279) with EtONa in EtOH at 150° for 8 hrs. gives the *α_2-isomer* (VI) of IV, m. 265°, $[\alpha]_D^{25}$ 46° (18.8 mg. in 2 cc. dioxane). The configuration of these acids is discussed. C. J. West

Color reactions of the sterols and steroids, their significance in the investigation of constitutive factors and of problems on the reciprocal action of hormones. G. Woker and I. Antener. *Helv. Chim. Acta* **22**, 1309–28 (1939)(in German); cf. *C. A.* **33**, 1356[9], 4612[6], 6370[6,9].—The color reactions produced by various sterols with completely satd. rings or with a double bond in rings A or B and by steroids with an unsatd. (aromatic) ring A, either alone or in combination with furfural (I), upon underlayering with concd. H_2SO_4 are given in tabular form. Stereoisomerism influences strongly the color reactions of androstanediols and androstanols. Androstan-3-on-17-*cis*-ol (*cis*-dihydrotestosterone) reacts intensively with I + concd. H_2SO_4 and with H_2SO_4 alone, while androstan-3-on-17-*trans*-ol gives with H_2SO_4 no reaction and with I + H_2SO_4 only a faint reaction which develops slowly. The reactions of the androstanediols with I cannot be attributed to a *cis*-OH in the 17-position. In the I + H_2SO_4 reaction a *cis*-OH in the 3-position shows the same auxochrome effect as in the 17-position. If the OH groups in positions 3 and 17 are both in the cis form, the auxochrome effect is at a max.; if both OH groups are in the trans position, the effect is at a min. The conversion of both CHOH groups of the 3,17-androstanediols into CO groups or the presence of only one CO group and absence of OH in the ring system (as in cholestanone and progesterone) is accompanied by inhibition of the color reaction with H_2SO_4 and by reduction in the intensity of the reaction with I + H_2SO_4. But with a double bond in the steroid skeleton, as in Δ^4-androstene-3,17-dione, even the reaction with H_2SO_4 alone becomes pos. The color-producing character is intensified still further, if one or both CO groups are reduced. The behavior of *cis*- and *trans*-testosterones and other derivs. with the double bond in the 4-position show the distinct effect of stereoisomerism, as well as other constitutive factors, on the color and fluorescence. The substitution of a H in the 17-position by the Me group results in an intensification and change of color, as shown by the reactions of the testosterone ring system. The color reactions of 17-methyl-Δ^5-androstene-3-*trans*-17(?)-diol also show the effect of substitution of H, probably in the 17-position, by the Me group. The reactions of the testosterone group compared with those of dehydroandrosterone and of the corresponding *cis*- and *trans*-diols and their substitution products reveal the influence of the position of the double bond. The introduction of a double bond into the bile acids also causes an intensification of the color reactions with I + H_2SO_4 and with H_2SO_4 alone. The reactions of pregnenolone or its acetate show the strong influence of the introduction of the double bond into the ring system of the sterols. The auxochrome action of the OH group in the 3-position is distinct. Expts. on the estrone and estradiol groups likewise reveal the significance of stereoisomerism. The color reactions of mixts. of estradiol (Roche) and ascorbic acid with H_2SO_4 or with I + H_2SO_4 are also tabulated. The color produced with I + H_2SO_4 deepened considerably, if the mixts. had been allowed to stand for 22 hrs. before testing, but was less intense if they had stood for 70–120 hrs. A possible explanation is given. Ruth Berggren

Color reactions of benzaldehyde with sterols and steroids on underlayering with concentrated sulfuric acid. I. Scherrer. *Helv. Chim. Acta* **22**, 1329–40(1939)(in German).—The reactions consisted in underlayering with concd. H_2SO_4 3 cc. alc. soln. of the substance to be tested either alone (under the conditions given by Woker and Antener, *C. A.* **33**, 4612[6], and by S.) or mixed with 0.05–0.2 cc. BzH. The colors produced when these reactions were carried out with hot satd. solns. of cholesterol, ergosterol (fresh cold satd. alc. soln. and the same after 4 months in daylight), sitosterol, stigmasterol, cholic acid, glycocholic acid and 3-acetoxycholenic acid in 96% alc. and by calciferol, desoxycorticosterone acetate, andro-

stane-3-*cis*-17-*cis*-diol, androstane-3-*cis*-17-*trans*-diol, androstane-3-*trans*-17-*cis*-diol, androstane-3-*trans*-17-*trans*-diol, androsterone, isoandrosterone (*cis*) (Ciba), isoandrosterone (*trans*) (Ciba), dihydro-*cis*-testosterone, dihydro-*trans*-testosterone, androstane-3,17-dione, Δ^4-androstene-3,17-dione, dehydroandrosterone (*cis*), dehydroandrosterone (*trans*), testosterone (Hofmann-LaRoche), testosterone (*cis*), testosterone (*trans*), methyltestosterone, Δ^5-androstene-3-*trans*-17-*cis*-diol, Δ^5-androstene-3-*trans*-17-*trans*-diol, 17-methyl-Δ^5-androstene-3-*trans*-17(?)-diol, progesterone, pregnenolone acetate, β-estradiol (*cis*), α-estradiol (*trans*), estrone, equilin and estrin in 70% alc. are given in tables. Ruth Berggren

7-Dehydroepicholesterol. A. Windaus and J. Naggatz. *Ann.* **542**, 204-18(1939).—Marker, *et al.* (*C. A.* **32**, 1866[9]), reported that reduction of ergosterone with (iso-PrO)$_3$Al (I) gave epiergosterol (II); repetition of this work showed that II is not formed but that the product is epialloergosterol (III) (W. and Buchholz, *C. A.* **33**, 4265[8]). Since III has not been obtained in a high state of purity, a study has been made of *7-dehydroepicholesterol* (IV). Epicholesterol is obtained in good yield by reduction of Δ^5-cholestenone with Raney Ni; its acetate (V) (25 g.) in 250 cc. AcOH, treated with 17.5 g. CrO_3 in 25 cc. 50% AcOH during 1 hr. at 50° and allowed to stand an addnl. 3 hrs., gives 18 g. of crude oxidation product. Crystn. from MeOH gives 3.8 g. of *3-cholesten-6-one-3,5-diol 3-acetate* (VI), m. 163°; because it has no characteristic absorption band at 220 mμ, it is not an α,β-unsatd. ketone; it easily loses AcOH (adsorption on Al_2O_3 or standing with 1% MeOH-MeONa), giving 4-cholestene-3,6-dione (VII), m. 123°; *phenylhydrazone*, yellow, m. 272°; both VI and VII give the same disemicarbazone. The mother liquor from V, evapd. to dryness, the residue taken up in 1:1 petr. ether-C_6H_6 and the products adsorbed on Al_2O_3, gives some unchanged V, some cholestenedione and *7-oxoepicholesteryl acetate* (VIII); the latest is probably not pure and m. 119°, absorption max. 234 mμ. Boiling 5 g. VIII and 15 g. I in 500 cc. iso-PrOH for 24 hrs., treating the partly concd. soln. with 300 cc. dil. MeOH-KOH for 1 hr. and pouring into 3 l. cold H_2O, dissolving the ppt. in Et_2O and pptg. with petr. ether give 4 g. of a mixt. of α- (IX) and β-*7-hydroxyepicholesterol* (X); acetylation (Ac_2O and C_5H_5N at room temp. for 1 day), adsorption on Al_2O_3 and fractional elution give as the 1st ext. 1.8 g. of the *diacetate*, m. 165°, $[\alpha]_D^{19}$ 20.2° (19.8 mg. in 2 cc. $CHCl_3$), of IX, m. 172-6°, $[\alpha]_D^{19}$ 38.1° (23.6 mg. in 2 cc. $CHCl_3$); *α-dibenzoate* (XI), m. 154°, $[\alpha]_D^{19}$ 93.7° (28.2 g. in 2 cc. $CHCl_3$). The 2nd fraction of the elution is the *diacetate*, m. 145°, sublimes undecompd. at 180° in a high vacuum, $[\alpha]_D^{19}$ 70.2° (16.8 mg. in 2 cc. $CHCl_3$), of X, m. 173°, $[\alpha]_D^{19}$ 9.1° (22.1 mg. in 2 cc. $CHCl_3$); *β-dibenzoate* (XII), m. 70-80°, $[\alpha]_D^{19}$ 10.7° (14.9 mg. in 2 cc. $CHCl_3$). On heating XI for 1.5 hrs. at 200°, BzOH sublimes at 190° and cholestatriene (XIII) distils over; the distn. residue does not show the absorption spectrum of IV and on recrystn. gives unchanged XI. Heating XII in 50-mg. portions at 195° for 3.5 hrs. gives BzOH, XIII and 14 mg. of the *benzoate* (XIV), m. 118-19°, $[\alpha]_D^{19}$ 48.5° (9.9 mg. in 2 cc. $CHCl_3$), of IV, m. 124-6°, $[\alpha]_D^{19}$ −70.5° (8.8 mg. in 2 cc. $CHCl_3$); XIV also results from XIII on heating in boiling PhNHMe but it is more difficult to purify; the m. p. of IV is not sharp because of H_2O of crystn. IV is not pptd. by digitonin. *Ac deriv.* of IV, m. 114-15°, $[\alpha]_D^{19}$ −35° (1.72 mg. in 2 cc. $CHCl_3$). Ergosterol and IV show the same rate of change on illumination with the Hg-quartz lamp. Illuminated IV has about 0.1 the antirachitic activity of illuminated 7-dehydrocholesterol. C. J. West

Cholesterilene. J. C. Eck and E. W. Hollingsworth. *Iowa State College J. Sci.* **13**, 329-33(1939).—In prepg. cholesterilene by dehydration of cholesterol with $CuSO_4$, the conditions of prepn. were more important than the methods of purification of the product. This method produces a better product than heating cholesterol with Zn dust, but not so pure as by the action of alc. HCl on allocholesterol. 2,4-Cholestadiene was prepd. by dehydrating cholesterol with Al_2O_3 in toluene. Heating of cholesterilene produced a possible peroxide, $C_{27}H_{44}O_3$, which frees I from KI. F. E. Brown

Dehydrocholestenone and its reduction with aluminum isopropylate. A. Windaus and O. Kaufmann. *Ann.* **542**, 218-24(1939).—Dehydrocholesterol (I) (10 g.) in 300 cc. C_6H_6, treated with 20 g. (*tert*-BuO)$_3$Al and 120 g. Me_2CO and refluxed 10 hrs., the product treated with very dil. H_2SO_4 and the C_6H_6 soln. washed with H_2O, gives a brown-yellow oil, which partially crystallizes on standing; *dehydrocholestenone* (II), m. 88°, is isolated by cooling the oil to −80° and washing with petr. ether cooled to that temp.; *semicarbazone*, m. 240° (decompn.); the absorption spectrum indicates an α,β-unsatd. ketone. Boiling 1.6 g. II and 1.5 g. (iso-PrO)$_3$Al in 50 cc. iso-PrOH for 9 hrs. and treating with 25 cc. 8% MeOH-KOH for 0.5 hr. give a yellowish residue which, from the spectrum, contains 16% I and 7% of 7-dehydrocepicholesterol (III); about 50% of the material is pptd. by digitonin (IV); of the portion not pptd. 2.5% is III; thus the reduction of II gives 48.75% of *allodehydrocepicholesterol* (V), 35.25% of *allodehydrocholesterol* (VI), 14.75% of I and 1.25% of III. The reduction product (1.6 g.) and excess of IV in EtOH give 3.2 g. of digitonide (VII), contg. I and VI; decompn. of VII with C_5H_5N and Et_2O and adsorption on SiO_2 gives in the 1st fraction VI, m. 115-16°, $[\alpha]_D^{19}$ 10° (10 mg. in 2 cc. $CHCl_3$); it contains H_2O of crystn. which is difficult to remove completely; *acetate*, m. 109°, $[\alpha]_D^{19}$ −56° (8.2 mg. in 2 cc. $CHCl_3$); *m-dinitrobenzoate*, m. 154° and 180-5°, $[\alpha]_D^{19}$ −78.5° (8.4 mg. in 2 cc. $CHCl_3$). The mother liquor from VII, evapd. to dryness, extd. with Et_2O or petr. ether and adsorbed on SiO_2 gives V, m. 93-4°, $[\alpha]_D^{19}$ 80° (11 mg. in 2 cc. $CHCl_3$); *acetate*, m. 96°, $[\alpha]_D^{19}$ 126.3° (9.5 mg. in 2 cc. $CHCl_3$); *m-dinitrobenzoate*, m. 150° and then 180-5°, $[\alpha]_D^{19}$ 159° (9.4 mg. in 2 cc. $CHCl_3$). C. J. West

Rate of dissocn. of pentaarylethanes (Bachmann, Osborn) **2**. Physicochem. study of ozonides of Et cinnamate and of styrene (Briner, *et al.*) **2**. Chemotherapeutic studies in azobenzenesulfonchloramide series (Stern, Taub) **17**. Ethers (U. S. pat. 2,181,085) **13**. Ethers of hydrogenated phenols (U. S. pat. 2,181,100) **13**. Purification and criteria of purity for physicochem. org. standards (Gillo) **2**.

Cheronis, Nicholas D.: Introduction to Organic Compounds, Experiments and Demonstrations. Chicago: The Author. 212 pp. $1.50. Reviewed in *Chemist* **16**, 359 (1939).

Fine Chemicals. Sixty-Three Organic Chemicals. New York: Carbide and Carbon Chemicals Corp.

Catalytic synthesis of hydrocarbons. I. G. Farbenind. A.-G. Fr. 841,030, May 9, 1939. Hydrocarbons with more than one carbon atom or of oxygenated derivatives of hydrocarbons (solid or liquid) are synthesized from CO and H in a liquid medium, using as catalysts agglutinated heavy metals, particularly those of group 8 of the periodic table (Fe is preferred). The agglutinated metals are obtained, either by heating the metals themselves (in powdery state) at 600-1000° in presence of a nonoxidizing gas, such as N, or by heating reducible metallic compds., such as oxides or hydroxides at 600-1000° in presence of a reducing gas, such as H. The addition of Al_2O_3, SiO_2, infusorial earth, compds. of Cu, Ti, Mn, Cr, W, Th, Zr, Ce and other rare earths increases the activity of the catalysts. As the liquid medium, a mineral oil or a tar oil is used. Cf. *C. A.* **33**, 5001[2].

Converting normally gaseous hydrocarbons into products of higher molecular weight. Frederick E. Frey (to Phillips Petroleum Co.). U. S. 2,180,672, Nov. 21. An arrangement of app. is described, and a process which involves passing normally gaseous hydrocarbons such as a mixt. high in CH_4 admixed with oxides of C into contact with a catalytic oxide of Al, Th, Zr or Cr at a temp. of 150-350° to produce hydrocarbons of higher mol. wt.

Catalytic synthesis of aliphatic hydrocarbons. Studien-

und Verwertungs A.-G. Fr. 841,043, May 9, 1939. See U. S. 2,149,515 (*C. A.* 33, 4270[8]).

Isomerization of olefins. N. V. de Bataafsche Petroleum Maatschappij. Fr. 841,004, May 9, 1939. See Brit. 501,896 (*C. A.* 33, 6338[7]).

Cyclization by intramolecular dehydrogenation. Soc. pour l'ind. chim. à Bâle. Fr. 840,970, May 8, 1939. As acceptor of hydrogen, there are used nitrated aromatic compds. which besides the group NO_2 contain at least another negative radical, such as sulfonic, carboxyl, hydroxyl, halogen or a 2nd NO_2. The use of a compd. instead of oxygen as a hydrogen acceptor permits the simplification of the reaction app. Many examples are given, in which the hydrogen acceptors are picric acid, *m*-dinitrobenzene, *m*-nitrobenzenesulfonic acid, nitrochlorobenzene.

Aldehydes of the polyhydrocyclopentanophenanthrene series. Soc. pour l'ind. chim. à Bâle. Fr. 841,058, May 10, 1939. Satd. or unsatd. derivs. of 17-formylpolyhydrocyclopentanophenanthrenes, of the type etiocholane, estrane, hydroestrane or their stereoisomers, are transformed into aldehydes, either by converting the carboxyl group to an acid halide group and reducing the acid halide (protecting, if necessary, the present OH groups by esterification) or by transforming the acid into anilide, converting the anilide by PCl_5 to an imide halide and reducing the latter with $SnCl_2$ and HCl.

Separating and refining lower alkyl amines. Rudolph L. Hasche and Lee G. Davy (to Eastman Kodak Co.). U. S. 2,180,006, Nov. 14. An arrangement of app. is described, and a process for the sepn. and refining of lower alkyl amines, which comprises subjecting a mixt. of primary amines, secondary amines, alc., water and NH_3, to treatment for removing NH_3 by distg. the mixt. at a temp. high enough to drive off the NH_3, treating the mixt. remaining with a nonoxidizing mineral acid which converts the amines to salts, removing at least a part of the alc. from the amine salts by distn., reconverting the amine salts to amines by reaction with an alkali metal hydroxide, and sepg. by distn. the primary amines from the other amines produced.

Ketones. Clayton M. Beamer (to Standard Alcohol Co.). U. S. 2,179,488, Nov. 14. For producing a ketone, such as acetone, a secondary alc., such as iso-Pr alc., is subjected in the form of vapor to the action of Cu coated with ZnO at a temp. range of about 330-400°.

Alkyl esters of 12-ketostearic acid. Henry L. Cox (to Union Carbide and Carbon Corp.). U. S. 2,180,730, Nov. 21. By reaction of 12-ketostearic acid with MeOH, BuOH, etc., (suitably in the presence of H_2SO_4) esters are formed. The Me ester m. 42.5°. The Bu ester m. 56°. These esters are suitable for use in lacquers and plastic compns. as stabilizers and plasticizers with gums and resins.

Aromatic esters. Anthony H. Gleason (to Standard Oil Development Co.). U. S. 2,180,953, Nov. 21. For prepg. an ester such as phenol acetoacetate, an aromatic hydroxy compd. such as phenol is caused to react with a ketene polymer such as diketene in the presence of an inert diluent such as ether and an esterification catalyst such as H_2SO_4.

Basic esters of biphenyleneacetic acid [9-fluorenecarboxylic acid]. Soc. pour l'ind. chim. à Bâle. Fr. 840,824, May 3, 1939. Biphenyleneacetic acid, compds. contg. the radical of the acid, or biphenyleneketene is treated with an amino alcohol, e. g., allylethylaminoethanol, piperidinoethanol, dibutylaminoethanol, diethylaminopropanol, or with a halide or an arylsulfonate of the amino alcohol. The basic esters obtained are watersol. Claim is made to the use of the new compds.

Halogen-containing organic compounds. Heinz Hunsdiecker, Cläre Hunsdiecker and Egon Vogt. U. S. 2,176,181, Oct. 17. A method of producing halogen-contg. org. compds. from org. substances contg. carboxyl groups, in the form of their Hg, Ag or Tl salts, involves the reaction upon the initial salt in the absence of water with Cl or Br in gaseous form, whereby CO_2 and a metal halide split off and a monohalogenated hydrocarbon remains. Details are given of the production of: pentadecyl bromide from Ag palmitate; undecyl bromide from Ag laurate; MeBr from Ag acetate; mixed alkyl bromides from Ag salts of coco oil fatty acids; pentadecylaldehyde hydrobromide from the Ag salt of α-hydroxypalmitic acid; 1,1-dibromoheptadecane from the Ag salt of α-bromostearic acid; 1-bromo-8,9-dichloroheptadecane from the Ag salt of 9,10-dichloroöctadecanoic acid; a product b_{18} 140–4° from Br and Ag sebacate; 9-bromononanoic acid ethyl ester (b_2 118°) from the Ag salt of sebacic acid monoethyl ester; acetyl bromide from Ag pyruvate; benzaldehyde hydrobromide from Ag mandelate; formaldehyde from Hg aminoacetate and Br in CS_2; heptadecyl chloride from Ag stearate; heptyl bromide from mercurous caprylate; pentadecylpyridinium bromide from mercuric palmitate; hexyl chloride and bromide from thallous ethanthate; heptyl bromide from mercuric caprylate; and 1,12-dibromododecane from dodecanedicarboxylic acid.

Making unsaturated organic chlorides, etc. Charles G. Harford (to Arthur D. Little, Inc.). U. S. 2,179,787, Nov. 14. A process for prepg. tertiary unsatd. org. chlorides, and chlorohydrin esters, such as dimethylvinyl chloride, involves treating a tertiary alkyl hypochlorite such as *tert*-Bu hypochlorite and a compd. of the formula YOH in which Y is an acyl radical, such as HOAc, with an org. compd. such as isobutylene having in its mol. 2 C atoms linked by an olefinic double bond, one of these C atoms being in a tertiary position and the other being linked to at least one H atom which is thereby replaced by a Cl atom to give a tertiary unsatd. chloride, in the case of a part of the org. compd., and, in the case of another part of such compd., adding to one of the 2 C atoms an —OY group, and to the other C atom Cl, so that the double bond is transformed into a single bond and a chlorohydrin ester is formed.

Brominating benzanthrone. Melvin A. Perkins and Joseph Deinet (to E. I. du Pont de Nemours & Co.). U. S. 2,180,835, Nov. 21. Bromobenzanthrones are prepd. by treating benzanthrone in an inert org. solvent such as $PhNO_2$ with sufficient Br to give the desired degree of bromination, in the presence of an amt. of sulfuric chloride mol. equiv. to the Br employed (suitably at 80–90°).

Derivatives of aminoarylsulfonamides. Wander Gyógyszerés Tápszergyár R. T. Hung. 122,625, Jan. 2, 1940. Two mols. of the same or different aminoarylsulfonamides are united through *ar*-NH_2 group to CO (phosgene), CS (carbon disulfide), or SO_2. Or, the sulfonamide group is introduced into the product of a previous reaction.

Derivatives of *p*-aminobenzenesulfonamide. Chinoin Gyógyszerés Vegyészeti Termékek Gyára R. T. (Keresztyn és Wolf). Hung. 122,450, Dec. 15, 1939. Carboxylated aliphatic groups (e. g., CH_2COOH) are united to a nitrogen atom of *p*-aminobenzenesulfonamide, either during synthesis or after the formation of the end product. The carboxyl groups may be neutralized by alkalies.

Compounds with active methylene groups. I. G. Farbenind. A.-G. Fr. 840,880, May 5, 1939. These compds. have on the atom of carbon next to the methylene group a chain (straight, branched or interrupted) of at least 9 C atoms. They are obtained by treating the esters and the Na compds. of malonic acid with acid chlorides contg. at least 10 C atoms, and by condensing with N_2H_4 or its derivs. or with primary aromatic amines the esters of acylmalonic acids thus obtained. The reaction is preferably carried out in a neutral solvent such as benzene or xylene. The compds. are particularly important as intermediary coloring products to be incorporated in silver halide emulsions for the production of colored images.

Carbonyl compounds of the cyclopentanopolyhydrophenanthrene series. Karl Miescher, Hans Kägi and Placidus Plattner (to Soc. pour l'ind. chim. à Bâle). U. S. 2,180,762, Nov. 21. For the manuf. of compds. such as testosterone, triarylmethyl ethers of a carbinol compd. of the cyclopentanopolyhydrophenanthrene series

such as those of androstenediol are subjected to thermal decompn.

Metal sulfhydryl compounds from keratin degradation products. Ernst Sturm and Richard Fleischmann (to Firma Johann A. Wülfing). U. S. 2,180,262, Nov. 14. A process for prepg. metal sulfhydryl compds. from keratin degradation products involves reducing the keratin degradation products in aq. soln. with a substance selected from the group consisting of: Na hyposulfite, formaldehyde compounds of Na hyposulfite, alk. earth metal hyposulfite and formaldehyde derivs. of alk. earth metal hyposulfite, under conditions in the neighborhood of neutrality, allowing the mixt. to stand in the absence of air, directly adding to the soln. a water-sol. salt of Cu, As, Sb, Au or Ag in quantity sufficient to saturate the sulfhydryl groups, and sepg. the metal sulfhydryl compds. formed. Various examples with details are given. Cf. *C. A.* **34**, 590[1].

Stabilizing polymerizable vinyl compounds. Sylvia M. Stoesser and Wesley C. Stoesser (to Dow Chemical Co.). U. S. 2,181,102, Nov. 21. Polymerization of a styrene compd. such as styrene or a homolog is inhibited by admixt. with about 0.1–5% of 3-methyl- or 3-phenylpyrocatechol or other pyrocatechol deriv. of the general formula $1,2\text{-}(HO)_2C_6H_{4-n}Y_n$, where Y represents a hydrocarbon radical and n is an integer from 1 to 4.

Thiazoles having a hydrogen atom in the 2-position. Hans Spiegelberg (to Hoffmann-La Roche, Inc.). U. S. 2,179,984, Nov. 14. A process for the manuf. of a thiazole having a H atom in the 2-position, such as 4-methyl-5-hydroxyethylthiazole, involves the reaction of H_2O_2 with a 2-mercaptothiazole, such as 2-mercapto-4-methyl-5-(β-acetoxyethyl)thiazole in concd. HCl soln. at a temp. of about 70° or lower, and adding $BaCl_2$ to ppt. the H_2SO_4 formed.

Treating sludges from reduction of aromatic nitro compounds. Dugald M. Carr and Wm. S. Pilcher (to E. I. du Pont de Nemours & Co.). U. S. 2,179,919, Nov. 14. App. is described, and a process for reducing an aromatic nitro compd. to an aromatic amine by means of iron with subsequent recovery of the excess iron from the resulting sludge involves adding liquid to the sludge to form a slurry, passing the slurry in a continuous stream through a settling chamber permitting the sepn. of the heavier particles upon deflection, abruptly deflecting the stream in a cyclonic path within the chamber, thereby causing the particles of metallic iron therein to settle, and removing the settled particles from the locus of the settling section.

Distilling acetic and similar acids from by-product cellulose esterification liquids, etc. Herbert G. Stone (to Eastman Kodak Co.). U. S. 2,180,021, Nov. 14. An arrangement of app. is described, and a process suitable for the recovery of acetic, propionic or butyric acid which involves (1) distn. in a column from crude aq. acid-liquids contg. suspended and occluded particles of cellulose ester, which would deposit in the column during the distn., (2) substantially continuously feeding a stream of the crude aq. liquid into a tank provided with a peripheral gutter, the tank contg. a large and substantially quiescent vol. of aliphatic acid-liquid, (3) baffling the stream at the point of feed into the tank to avoid disturbing the quiescent vol. of liquid, (4) substantially continuously overflowing the surface layer of the quiescent vol. of liquid into the gutter whereby the velocity of flow of the liquid in the tank is reduced and at least a major part of the particles are deposited in the tank as a sludge, (5) removing sludge from the tank, (6) substantially continuously withdrawing the improved acid-liquid in the gutter through conduit means, and (7) subjecting the improved aliphatic acid-liquid to further treatment including azeotropic distn.

Acetylene recovery from gaseous mixtures. Frederick R. Balcar (to Air Reduction Co.). U. S. 2,180,386, Nov. 21. App. is described, and a method of recovering acetylene from gaseous mixts. which involves bringing the gaseous mixt. into contact with a solvent for acetylene until acetylene has been dissolved therein substantially to the limit of its soly., rectifying the resultant acetylene-contg. liquid with substantially pure gaseous acetylene to free it of impurities more volatile than acetylene, rectifying in a sep. rectification zone the purified acetylene-contg. liquid, boiling the liquid descending through the sep. rectification zone to liberate contained acetylene together with impurities, passing the vapors from the boiling into the sep. rectification zone for use during the rectification therein, sepg. impurities less volatile than acetylene liberated by the boiling at an intermediate level of the sep. rectification zone, and returning a part of the acetylene effluent leaving the sep. rectification zone for use as the acetylene for removing impurities from the liquid formed by bringing the initial gaseous mixt. into contact with the solvent for acetylene.

Separating acetylene from gaseous mixtures. Frederick R. Balcar (to Air Reduction Co.). U. S. 2,180,496, Nov. 21. App. is described, and a process for the sepn. of C_2H_2 from gaseous mixts. in which the gaseous mixt. is brought into contact with a solvent capable of dissolving acetylene selectively from the gaseous mixt. and the solvent contg. dissolved acetylene subsequently is heated to liberate acetylene and the solvent from which the acetylene is liberated is returned for dissolving more acetylene; the process involves heating the gaseous mixt. prior to bringing it into contact with the solvent, scrubbing the acetylene liberated from the solvent and the effluent gas which is not dissolved by the solvent with a liquid absorbent capable of dissolving the solvent and having a higher b. p. than the solvent and sepg. the dissolved solvent from the liquid absorbent by scrubbing the incoming heated gaseous mixt. therewith before sepg. C_2H_2 therefrom.

Recovering ethylene from gaseous mixtures. Joseph L. Schlitt (to Air Reduction Co.). U. S. 2,180,435, Nov. 21. An arrangement of app. is described, and a method of recovering C_2H_4 in substantial purity by rectification from a complex gaseous mixt. also contg. C_3H_6, C_2H_6, CH_4 and H, which involves sepg. a portion contg. substantially all of the C_3H_6 and high-boiling constituents, thereafter sepg. from the remainder at the same pressure a portion contg. substantially all of the CH_4 and other constituents of lower b. p. than C_2H_4, and thereafter sepg. the C_2H_4 from the remaining constituents at a lower pressure.

Separating ethylene from gaseous mixtures. Wm. L. De Baufre. U. S. 2,180,200, Nov. 14. An arrangement of app. is described suitable for sepg. C_2H_4 from gaseous mixts. such as those also contg. H, CO, and CH_4 and which includes a rectifier for sepg. the C_2H_4 from the gaseous mixt., a compressor for compressing the sepd. C_2H_4 to a high pressure, means for throttling a portion of the C_2H_4 from the high pressure and for utilizing the throttled C_2H_4 as a refrigerant to produce liquid reflux in the rectifier. Cf. *C. A.* **33**, 5417[2].

Catalyst for making ethyl chloride. Robert D. Blue (to Dow Chemical Co.). U. S. 2,180,345, Nov. 21. Prepn. of a liquid catalytic medium suitable for use in the production of EtCl from C_2H_4 and HCl involves bringing a chlorinated aliphatic hydrocarbon, such as propylene chloride, into contact with metallic Al in the presence of a relatively small amt. of a halogen-contg. agent such as Br which is reactive with Al under substantially anhyd. conditions and is an activator for the reaction between the chlorinated hydrocarbon and the Al, at a temp. above about 20° (suitably about 50°) but below the b. p. of the chlorinated aliphatic hydrocarbon employed, under the vapor pressure of the reaction mixt. at the temp. employed.

Separation of methanol-acetone mixtures. Albert G. Bright and Webster E. Fisher (to Eastman Kodak Co.). U. S. 2,179,991, Nov. 14. An arrangement of app. is described, and a process which involves charging a column with a MeOH-acetone mixt., vaporizing the mixt. and bringing the vapors into contact with an aq. brine soln. for recovery of acetone at the head of the column and MeOH and brine at the base of the column.

Melamine. Soc. pour l'ind. chim. à Bâle. Fr. 841,022, May 9, 1939. The yield of melamine obtained by heating a soln. of dicyanodiamide in liquid NH_3 at 100° is

greatly increased when the amount of NH_3 is less than sufficient to dissolve all the dicyanodiamide. Thus, when a homogeneous soln. of dicyanodiamide in NH_3 heated for 6 hrs. at 100° gives 30% melamine, a heterogeneous reaction mixt. under the same conditions produces 55% melamine. 1

Melamine. David W. Jayne, Jr. (to American Cyanamid Co.). U. S. 2,180,295, Nov. 14. Dicyanodiamide is heated (suitably to 175–240°) together with ethanolamine or diethanolamine. 2

Trifluoromethyl benzaldehydes. Otto Scherer (to General Aniline Works). U. S. 2,180,772, Nov. 21. Trifluoromethyl-substituted benzaldehydes are produced by heating (suitably to about 80–150°) concd. H_2SO_4 and trifluoromethylbenzal fluorides, *e. g.*, *o*-trifluoromethylbenzal fluoride for the production of *o*-trifluoromethylbenzaldehyde, b_{16} 70° and reacting with Cl to form *o*-trifluoromethylbenzoyl chloride, b_{16} 90°. 4-Chloro-1-trifluoromethyl-2-benzal fluoride b_{18} 82–6°. 4-Chloro-1-trifluoromethyl-2-benzoyl chloride b. 214–17°. 2,5-Bis(trifluoromethyl)benzaldehyde b. 170 2°, and with Cl forms 2,5-bis(trifluoromethyl)benzoyl chloride, b_{10} 69–72°. 3,5-Bis(trifluoromethyl)benzaldehyde, etc., may be similarly produced, and various of the products may be used as *intermediates for the manuf. of dyes, pharmaceutical products, fungicides, insecticides,* etc. 3

Dibenzanthrone and isodibenzanthrone. Melvin A. Perkins (to E. I. du Pont de Nemours & Co.). U. S. 2,180,299, Nov. 14. In purifying these compds., the crude compd. is agitated, at a temp. not exceeding 50° in H_2SO_4 of a concn. such as 94.5–97.5%, in which the compd. is substantially completely but not entirely dissolved, until it is converted into large crystals. 4

1-Hydroxybenzothiazole. Edward M. Van Duzee (to Dow Chemical Co.). U. S. 2,179,987, Nov. 14. 1-Mercaptobenzothiazole is hydrolyzed with an aq. alkali such as NaOH soln. in the presence of an oxidizing agent such as Cl at a temp. of about −10° to 10° and 1-hydroxybenzothiazole is then sepd. directly from the reaction mixt. without acidifying it, as by crystn. 1

Epiallopregnan-3-ol-20-one. Erwin Schwenk, Bradley Whitman and Gerhard A. Fleischer (to Schering Corp.). U. S. 2,180,614, Nov. 21. A method of producing this compd. involves subjecting allopregnanedione to the action of H in the presence of a hydrogenation catalyst such as Pt black acting to limit the reduction substantially to the 3-keto group (suitably in an HOAc soln. contg. HBr). 2

Anthracene. Wm. J. Mattox and Aristid V. Grosse (to Universal Oil Products Co.). U. S. 2,180,814, Nov. 21. Toluene, at a temp. of about 500–700°, is brought into contact with a catalyst comprising essentially activated alumina and an oxide of Cr such as Cr_2O_3. 3

1-Amino-6-chloroanthraquinone. Myron S. Whelen (to E. I. du Pont de Nemours & Co.). U. S. 2,181,034, Nov. 21. In making this compd., 1,6-dichloroanthraquinone is mono-aminated with *p*-toluenesulfonamide. 1

β-Halo-1,3-butadienes. Heinrich Lange and Otto Horn (to I. G. Farbenind. A.-G.). U. S. 2,180,115, Nov. 14. Agents capable of splitting off H halides, such as NaOMe, are caused to react upon a butene dihalogenated in the 1,2-positions in the presence of a boiling org. solvent having a low b. p. such as MeOH, and the butadienes halogenated in the 2-position are eliminated as formed by the vapors of the solvent. Cf. *C. A.* **32**, 3203[6]. 4

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W. DOX

Pathological serum proteins. (A contribution to the significance of the Takata test and the relation of the liver to serum protein production.) Hans Kaunitz, Gonzalo F. Austria and Fortunio Sales. *Acta Med. Philippina* **1**, 53–68(1939); cf. *C. A.* **30**, 3055[7]. In certain clinical conditions the definite variations in ultraviolet absorption, especially of the globulins, can be explained only by physicochem. disturbances in the protein structure (Fuchs, K. and Lerch, *Z. klin. Med.* **128**, 332–42 (1935)). Certain deviations in serum viscosity are also attributed to structural alterations in the proteins, as well as to disturbances in their quant. distribution (K. and Kent, *Ibid.* **132**, 670–88(1937)). These and other similar disturbances are found chiefly in parenchymatous liver diseases. The decrease in the serum proteins, fibrinopenia and globulinemia in some liver diseases result from damage to the liver tissue. The liver is considered one of the main organs involved in serum-protein production. This has been confirmed chemically. Changes in the permeability of the blood capillaries and tissue cells at the onset of the disturbances are of pathogenic significance for the understanding of the early deviations from the normal serum protein picture. Pos. reactions in the Takata and certain other tests are attributed especially to qual. abnormalities of the serum proteins. The increase in the mol. wt. of the proteins (globulinemia) favors a decrease in serum stability. Changes in mol. size and physicochem. structure are the chief factors influencing the results of the Takata test. A pos. Takata test is usually accompanied by an increase in serum viscosity. Since the stability of the serum is largely dependent on the liver function, it is not surprising that many serum-instability reactions (e. g., the Takata test) are pos. in some parenchymatous diseases of the liver. The Takata test was studied in 241 cases. In 24 cases of Laennec's cirrhosis with ascites 22 gave pos. results. Of the remaining 217 cases 21 gave a pos. reaction. Nearly all of these 21 pos. cases had liver damage and hopeless diseases. If a disease has led to a disturbance in serum stability, the prognosis is bad. Edema, mostly ascites, occurred in ¾ of the pos. cases. Any modification in serum stability decreases the capacity of the serum to attract tissue fluid; this may result in the development of edema, especially if other factors, as vascular obstruction, are operating simultaneously. Other causes, however, also play a part in the development of edema. Cf. *C. A.* **30**, 3055[7]. Ruth Berggren 6

Plankton studies. II. The western North Atlantic, May–June, 1939. Gordon A. Riley. *J. Marine Research, Sears Foundation Marine Research* **2**, 145–62 (1939).—Temp., O, plant pigments, phosphate and nitrate were measured at 18 stations between the northern coast of Cuba and Woods Hole. In the surface waters of all stations the chlorophyll content was detd., and the O and nitrate production and consumption were estd. in exptl. light and dark bottles. The quantity of plant pigments at the 4 northernmost stations was greatest at the surface; the max. depth of occurrence was 100 m. or less. At the southern stations they occurred to a depth of 300–400 m. or more; the max. observed values were at 100 m. In the northern and in the tropical waters the mean quantity of plant pigments in the surface waters was 4100 and 1300 Harvey units/cu. m., resp., and the mean chlorophyll content was 2.1 and 1.0 mg./cu. m., resp. But the total crop in the entire vertical column was considerably greater in the southern waters. The mean O_2 production in the northern waters was 0.180 mg./l./day or about half the values that had been previously reported for temperate shallow-water regions during the spring bloom; in the tropical waters the mean was 0.091 mg. Differences in the quantity of the standing crop account for 55% of the variations in O_2 production. Other factors (temp., light, nutrients) apparently have no significant effect. Although the gross productivity (glucose production) of the southern surface waters is only half as great as in the north, it is suggested that because of the 7 8 9

greater transparency of the water, the max. depth of the photosynthesis is about 3 times as great, and the total productivity per unit area may be equal to or greater than that of temperate regions. Nitrate consumption was relatively much smaller than O_2 production; rough estimates indicate that only 10–27% of the glucose produced was transformed into nitrogenous material during the expts. The theoretical biol. implications of this phenomenon are discussed. Quant. measurements of zoöplankton were made at 5 stations. The total no. of animals was smaller in the tropical waters than at the northern stations but was approx. equal to the annual mean for certain other temperate regions, the English Channel and the North Sea, as well as the tropical waters of the Great Barrier Reef lagoon. Ruth Berggren

The biology of high-frequency perfusion. Schliephake. *Strahlentherapie* **66**, 296–302(1939); cf. *C. A.* **29**, 4032[5]; **33**, 1774[2].—A short review on the effect of irradiation with short waves on tissue chemistry is included. Ruth Berggren

The behavior of the plasma phosphatase and of the bone mineral content in animals treated with bone phosphatase. Ignazio Scimone. *Pathologica* **31**, 520–5(1939).—By intravenous injection of an aq. ext. of bone tissue, an increase of the plasma phosphatasic activity was observed. This increase is variable, reaching its max. 5–10 min. after the injection and disappearing in several hrs. G. A. Bravo

Carboxyl and amino groups of bilirubin. W. L. Dulière. *Bull. soc. chim. biol.* **21**, 1181–4(1939).—Results of attempts to det. the no. of carboxyl and amino groups were inconclusive L. E. Gilson

Inhibiting action of dihydroxymaleic acid on catechol oxidase. Marcel Florkin and G. Duchateau-Bosson. *Bull. soc. chim. biol.* **21**, 1204–7(1939).—At pH 7.3 dihydroxymaleic acid in concns. of 0.002 *M* or more inhibits the action of catechol oxidase. Ascorbic acid has no such action. L. E. Gilson

Physiological role of bile salts. Influence of bile salts on the passage of fat acids through dialyzing membranes. M. A. Macheboeuf and R. Perrimond-Trouchet. *Compt. rend. soc. biol.* **132**, 274–6(1939).—The sol. compds. formed from higher fat acids and glycocholic acid at pH 6.3 do not diffuse through collodion membranes. L. E. Gilson

The effect of stream conditions on lake plankton. Charles B. Reif. *Trans. Am. Microscop. Soc.* **58**, 398–403(1939).—The chem. conditions, temp. and pollution had no marked effect in causing a decrease of plankton in streams studied. L. Wilson Greene

Modification of the cortical frequency spectrum by changes in CO_2, blood sugar and O_2. F. A. Gibbs, Denis Williams and E. L. Gibbs. *J. Neurophysiol.* **3**, 49–58(1940).—The responses of the elec. activity of the normal cortex of men to alterations in normal blood constituents have been analyzed with the Grass frequency analyzer. Decrease or increase in CO_2 content in the internal jugular blood is assocd. with a shift in energy distribution in the cortical frequency spectrum toward the slow or fast side, resp. O_2 and glucose can be varied within wide limits with little change in the cortical frequency spectrum, but when the O_2 satn. or glucose concn. in the internal jugular falls to a critically low level, there is a sudden shift of energy distribution to the slow side. With exceedingly high concns. of glucose, the energy distribution shifts to the fast side. Expts. on rabbits indicate that the effects of high O_2 tension are similar to those of high glucose concns. The results suggest that the elec. activity of the cortex is a manifestation of the activity of a great no. of chem. oscillators having different natural periods but responding similarly to any given factor. Marion Horn

Study of blood serum proteins by electrophoresis. E. Jameson and C. Alvarez-Tostado. *J. Phys. Chem.* **43**, 1165–72(1939).—Salting-out and electrophoretic expts. are used to study changes in the blood serum proteins of the adult of one species as brought about by the ingestion of colostrum from an animal of a different species. The results of the salting-out expts. are plotted on several triangular phase-rule diagrams. Changes in rat and human serums are shown to take place after feeding cows colostrum. The α-fraction is greatly increased, while the γ-fraction is either split or a new fraction appears. Similar changes are shown to occur in highly immune rat serum. L. Kolodny

Chemistry of the van den Bergh reaction. Thomas B. Coolidge. *J. Biol. Chem.* **132**, 119–27(1940).—All of the bilirubin of plasma in jaundice is bound to the plasma albumin. The plasma bilirubin which gives a direct van den Bergh reaction in 10 min., when the procedure of Malloy and Evelyn (*C. A.* **31**, 7080[8]) is used, is attached to the plasma albumin as a dissociable complex. That which does not give a direct reaction is probably attached by a valence bond to a fraction of the plasma albumin pptd. by $(NH_4)_2SO_4$ between 61 and 72.5% satn. at pH 6.8. The role of MeOH in causing all the bilirubin to react is purely catalytic. The character of the van den Bergh reaction cannot be correlated with the concn. of cholic acid in the plasma. A. P. Lothrop

The preparation of a concentrated fecal phosphatase and its effect on dogs and rats. Yen Ping Chen, Smith Freeman and A. C. Ivy. *J. Biol. Chem.* **132**, 445–54(1940); cf. *C. A.* **32**, 3432[7].—A simple method is described for the prepn. of phosphatase from dog feces which gives a less toxic and enzymically more potent product than is obtained by methods previously proposed. It increased the serum phosphatase in dogs for at least 48 hrs. when injected intravenously. The prepn. was quite stable and showed no significant change in potency after several months storage. After intravenous injection into dogs, no changes occurred in the serum or urine Ca or inorg. P which could be unquestionably ascribed to the activity of the enzyme. However the serum sugar decreased 20 mg. or more in 8 out of 10 anesthetized dogs receiving the active prepn. An elevation of the serum phosphatase was maintained for 1 month in growing rats by the daily intraperitoneal injection of the enzyme prepn. No significant difference in the growth or well being could be noticed between groups receiving the active or inactivated prepns. although the group receiving the active prepn. had a higher av. serum phosphatase. A. P. Lothrop

Factors influencing microbial thermogenesis. Stanley E. Wedberg and Leo F. Rettger. *J. Bact.* **39**, 23(1940).—There is a correlation between maximal growth temp. and maximal heating temp. The minimal destruction temp. of such enzyme systems as indophenol oxidase and succinodehydrogenase appeared to bear a definite relation to the maximal growth temp. Catalase destruction could not be correlated. Peroxidase was heat-stable. John T. Myers

The use of radioactive elements as tracers in physiology. H. R. Crane. *Phys. Rev.* **56**, 1243–4(1939).—Reply to Barnett (*C. A.* **34**, 783[3]). The min. amt. of radioactivity which will affect cell permeability is about 10^6 disintegrations per cc. per sec.: tracer elements are not ordinarily used in such high concns. The possibility of biol. material discriminating between radioactive and stable isotopes is discussed. G. M. Petty

Radioactive isotopes in biology. Lorin J. Mullins. *Phys. Rev.* **56**, 1244(1939).—Reply to Barnett (*C. A.* **34**, 783[3]). Doses below 1 millicurie per l. of radioactive Na are without effect on the uptake of Na by cells. Concns. above 1 millicurie/l. have an effect. It is necessary to establish a limiting value for each radiation. G. M. Petty

Chemical studies on moccasin venom. II. Dialysis and attempts at fractionation of the hemorrhagic and hemolytic components. Samuel M. Peck and Walter Marx. *J. Mt. Sinai Hosp., N. Y.* **6**, 271–8(1940); cf. *C. A.* **31**, 8010[3].—Native moccasin venom consists largely of proteins and related substances. The pseudocryst. crude venom showed 14% N. In 2% soln., it gave pos. biuret and xanthoproteic reactions, was coagulated by heat, and was pptd. by tannic acid, CCl_3CO_2H, alc., acetone and by 0.3–0.6 satn. with $(NH_4)_2SO_4$. About one-half of its dry wt. was not dialyzable through cello-

phane. The content of carbohydrates and lipoids was very small. Hemorrhagin and hemolysin were assocd. with protein fractions, were practically nondialyzable through cellophane, and were pptd. by alc., acetone or $(NH_4)_2SO_4$ at 0.3–0.6 satn. The antihemorrhagic principle was found, partially purified, in the dialyzed supernatant liquid of a native venom soln. pptd. at 0.8 satn. with $(NH_4)_2SO_4$. It was free of hemolysin and contained very little hemorrhagin. J. Pinchack

Report on Ninth International Congress of Military Medicine and Pharmacy, Bucharest, Rumania (1937). Wm. S. Bainbridge. George Banta Publishing Co., Menasha, Wis.—A detailed report on the medical and pharmaceutical problems which arise during conflict. Detailed methods are given for the treatment of gassed wounded persons. A comparative study was made of the supply of foodstuffs and the alimentation of the sick and wounded in times of peace and war. Colorimetric analytical methods used in military hospitals are also discussed. H. J. P.

Determination of peroxidase activity in the presence of catalase. A. A. Kul'tyugin and P. S. Kanashenok. *Biokhimiya* 4, 133–8(1939).—The catalase activity on H_2O_2 is completely inhibited in the presence of *M* $NaNO_3$, whereas the peroxidase activity remains unchanged. H. Priestley

Are tyrosine and tryptophan produced in the enzymic decomposition of blood proteins by trypsin? A. I. Paradashvilli and N. I. Gavrilov. *Biokhimiya* 4, 139–41 (1939).—The general view is that tyrosine and tryptophan, of all amino acids, are the most easily detached from proteins by enzymic action. Expts. do not bear this out. After fermentation of the blood by trypsin, the phosphotungstic acid filtrate gave neg. colorimetric tests for tryptophan and tyrosine. H. Priestley

The reaction capacity of physiologically important substances in mixtures. II. The reaction capacity of acetone in the presence of glycine. A. M. Kuzin and N. A Nevraeva. *Biokhimiya* 4, 142–8(1939); cf. *C. A.* **33**, 650[4].—Addnl. proof that carbonyl compds. are activated by amino acids is shown by the fact that acetone, in the presence of glycine, reacts much more rapidly with I, $NaHSO_3$ and furfural. **III. Reaction of simple sugars in the presence of glycine.** A. M. Kuzin and Z. Makaeva. *Ibid.* 367–72.—Small amts. of glycine accelerate the reduction by glucose of Fehling soln. Larger amts. retard reduction and in a satd. soln. of glycine or other amino acid completely inhibit the reduction. Addn. of 0.7% glycine to Barfoed's reagent will completely prevent reduction by glucose. No reduction by glucose of Ag_2O, picric acid and Indigo Blue will occur when glycine is added to the soln. H. Priestley

Fermentability of the simplest diketopiperazines. E. D. Stakheeva-Kaverzneva and N. I. Gavrilov. *Biokhimya* 4, 154–9(1939).—Neg. results were previously obtained both by Abderhalden (cf. *C. A.* **21**, 1966; **27**, 93) and by Waldschmidt-Leitz, *et al.*, (cf. *C. A.* **22**, 3419) on the fermentation of simple diketopiperazines. When treated with aniline at 180°, simple diketopiperazines are rendered more labile to trypsinkinase. Glycyl leucine is hydrolyzed in 96 hrs. to the extent of 20% by trypsinkinase. Trypsin and erepsin cannot hydrolyze such diketopiperazines. H. Priestley

Mechanism of amylase activation by neutral salts. Ya. P. Barmenkov. *Biokhimiya* 4, 160–7(1939).—Previous measurements of the elec. charge on amylase did not take into account the presence of mucin, which carries an electroneg. charge. Free amylase is electropos. The mucin-amylase complex may be predominantly electroneg., and will migrate to the pos. pole; this gives the impression that amylase itself is electroneg. NaCl will break up the adsorption mucin-amylase complex and will cause the amylase to migrate to the cathode. H. Priestley

Formation and breakdown of amino acids by intermolecular transfer of amino groups. VI. Metabolism of *l*-(−)-aspartic acid in different animal tissues. M. K. Karyagina. *Biokhimiya* 4, 168–83(1939); cf. *C. A.* **33**, 2916[5,6].—Besides glutamic acid, the other dicarboxylic amino acid, *l*-(−)-aspartic acid, is also capable of intermol. transfer of amino groups to pyruvic acid, to form alanine. Two different enzyme systems appear to be involved in the aspartic and glutamic acid transformations. The transfer of aspartic acid was observed in skeletal and cardiac muscles, in liver, kidney and brain tissue, but not in testicular tissue. **VII. Amino-nitrogen transfer in the animal body.** M. G. Kritsman. *Ibid.* 184–8.—The process of amino-N transfer takes place not only in chopped-up isolated tissues, but also in the live animal body, whose blood, though itself unable to effect the transfer, still contains the transformation products. Intravenous, intramuscular or intraperitoneal injection of glutamic acid into rabbits, pigeons or white mice causes the rapid appearance of alanine in the blood and tissues. The pyruvic acid is supplied from endogenous sources. Injection of a mixt. of alanine and α-ketoglutaric acid leads to the formation of glutamic acid. **VIII. Amino-nitrogen transfer by α-aminomonocarboxylic acids carrying a second acid group: Cysteic acid and phosphoserine.** S. M. Bychkov. *Ibid.* 189–201.—A monocarboxylic acid carrying a second acidic group, such as $-SO_3H$ or $-OPO_3H_2$, also acts as a donor of amino groups, like dicarboxylic acids (glutamic and aspartic acids). The enzyme prepn. catalyzing the reversible amino-N transfer from and to glutamic acid (cf. K., *C. A.* **33**, 2916[6]), is inactive with aspartic acid, cysteic acid and phosphoserine. Cysteic acid and phosphoserine, unlike dicarboxylic amino and ketoacids, do not catalyze the amino-N transfer between 2 monocarboxylic acids, e. g., lysine and pyruvic acid. **X. Catalytic function of dicarboxylic amino and keto acids in amino-nitrogen transfer between monocarboxylic substrates.** A. E. Braunshtein and M. G. Kritsman. *Ibid.* 303–15.—It has previously been detd. that no amino-N transfer occurs between monocarboxylic acids. The presence of minute amts. (as low as *M*/16,000) of an amino or keto dicarboxylic acid will catalyze such a transfer between monocarboxylic acids. Citric, succinic, fumaric and malic acids will also act as catalysts under aerobic conditions, since they are precursors of α-ketodicarboxylic acids. H. Priestley

Invertase differences in melons. V. V. Arasimovich. *Biokhimiya* 4, 251–9(1939); cf. *C. A.* **33**, 7832[4].—In some types of Central Asian melons, invertase shows only hydrolytic activity, with synthetic activity completely absent, whereas in other types, the invertase can only synthesize but not hydrolyze. H. Priestley

Peroxidase oxidation of amino acids. Ya. A. Babin. *Biokhimiya* 4, 392–403(1939).—Exts. of various organs and tissues (notably the kidneys) can deaminate amino acids in the presence of H_2O_2. The peroxidase deamination is lost when the tissues are previously heated to boiling. Plant peroxidases from horseradish and milk, as well as the pseudo-peroxidase cytochrome c, can also deaminate amino acids. H. Priestley

Two stages of proteolytic breakdown of gelatin. M. S. Reznichenko, N. P. Koz'mina and P. I. Starosel'skii. *Biokhimiya* 4, 434–44(1939); cf. Reznichenko and Poptsova, *C. A.* **33**, 2917[1].—During the first 20–30-min. action of pancreatin on gelatin, no increase of amino N was observed; but owing to the disaggregating effect of the enzyme, the viscosity dropped to 25% of the original value, and 60–80% of the total protein was no longer pptd. by CCl_3CO_2H. H. Priestley

Comparative study of the properties of enzymes synthesizing carbon chains: carboligase and aldolase. A. M. Kuzin and E. V. Sukhareva-Budnitskaya. *Biokhimiya* 4, 445–8(1939).—Carboligase and aldolase are not identical. Carboligase is inactivated by dialysis and by heating to 50°, whereas the activity of aldolase remains unchanged. H. Priestley

Mechanism of sugar synthesis from products of glucolysis. I. Oxidation of pyruvic acid in the presence of glycine. A. M. Kuzin and Z. Makaeva. *Biokhimiya* 4, 449–56(1939).—The oxidation of pyruvic acid to hydroxypyruvic acid, which has often been postulated in enzymic reactions, has been accomplished experimentally. The *p*-nitrophenylhydrazone of hydroxypyruvic acid was

isolated from the reaction mixt. of pyruvic acid, glycine and I. H. Priestley

Comparative effects of acenaphthene in plants and of carcinogenic compounds upon animal tissues. A. A. Shmuk, A. Guseva and G. Il'in. *Biokhimiya* 4, 470–82 (1939); cf. *C. A.* 33, 7848[7].—Acenaphthene interferes with the metabolic processes of wheat sprouts. Respiration is reduced, and the sap is more acid, presumably through the formation of free H_3PO_4 from nucleoproteins. The glucolytic action is twice as intense as in normal sprouts. More N is accumulated, and a change is observed in the mineral constituents of the plant. Acenaphthene acts on plants in the same manner as carcinogenic compds. do on animals. H. Priestley

Free hydroxyl groups of proteins and their importance for the proteolysis by tryptic enzymes. A. Kizel and T. Evreinova. *Biokhimiya* 4, 492–7(1939).—The Millon reaction for tyrosine is not given by acetylated gliadin. Pepsin readily acts on acetylated gliadin, but pancreatin and papain are completely without effect. H. P.

Biochemistry and experimental morphology. Joseph Needham. *Chem. Products* 3, 9–14(1939).—A discussion of chem. implantation, organizers in adult tissue, difficulties of implantation, microchemistry and metabolism, anaerobic and aerobic glucolysis, oxidation-reduction in tissue, importance of organizers and nexus of biology and physiochemistry. Leopold Scheflan

Immunochemistry of catalase. II. Activity in multilayers. William D. Harkins, Lyman Fourt and Priscilla Chinn Fourt. *J. Biol. Chem.* 132, 111–18(1940); cf. *C. A.* 33, 7325[8].—The enzymic activity of catalase alternating with anticatalase on a conditioned multilayer plate (Blodgett-Langmuir-Porter multilayers) was studied. Catalase covered by anticatalase is only slightly less active than exposed adsorbed catalase. The activity per g. is about 0.1 to 0.2 of that in soln. The total activity does not increase with 2 layers of catalase on the plates, suggesting failure of the substrate to get past the first active layer. The activity of catalase layers picked up after spreading at the air-H_2O interface runs through the same range as that of layers deposited from soln. On exposure of plates to a reaction mixt. some enzyme is liberated into the soln. when the outermost layer is catalase, while an outer layer of anticatalase permits almost no loss of activity into the soln. D. S. Searle

Activation energy of urea hydrolysis catalyzed by soybean urease. Irwin W. Sizer. *J. Biol. Chem.* 132, 209–18(1940).—The hydrolysis of urea catalyzed by soybean urease was studied as a function of temp. between 0.2 and 50°. At all temps. CO_2 liberation was a linear function of elapsed time. The data are in accord with the Arrhenius equation in which the energy of activation is either 8700 or 11,700 cal. per g. mol. depending on the compn. of the digest. With certain enzyme prepns. the activation energy was 11,700 cal. below and 8700 cal. above a crit. temp. The activation energies of the urease–urea system were identical for extd. and purified soybean and jack bean urease and for unextd. urease still present in the soybean or jack bean. D. S. Searle

Factors affecting the activity of carbonic anhydrase. Manfred Kiese and A. Baird Hastings. *J. Biol. Chem.* 132, 281–92(1940).—The purification of carbonic anhydrase obtained from washed beef erythrocytes is described. Hydration of CO_2 and dehydration of H_2CO_3 are influenced equally by the enzyme. The enzyme activity may be inhibited by certain oxidizing agents ($KMnO_4$, I_2, periodate, perchlorate, chlorate, persulfate, bromate) and the activity restored by certain reducing agents (ascorbic acid, cysteine, hydroquinone). The effect of inhibitors was the same on both the hydration and dehydration activity. The enzyme activity was studied between pH 6.1 and 10.1. The rate of hydration was optimal at pH 8.1. CO at pressures up to 1200 mm. Hg did not inhibit the enzyme activity. Sulfide and cyanide strongly inhibited the enzyme. D. S. Searle

Electrokinetic aspects of surface chemistry. VI. Interaction of gelatin with casein and egg albumin at surfaces. Laurence S. Moyer and Elsie Z. Moyer. *J. Biol. Chem.* 132, 357–71(1940); cf. *C. A.* 32, 5419[6].—The mechanism of film formation on surfaces of particles in protein solns. was studied by means of electrophoresis measurements. When collodion particles coated with gelatin or egg albumin were placed in contact with a soln. of egg albumin or gelatin, resp., the particles assumed a gelatin surface in respect to their elec. mobilities. C, quartz, collodion or mineral oil particles in a mixt. of egg albumin and gelatin, and quartz particles in a mixt. of surface-denatured egg albumin and gelatin were likewise coated with gelatin. In the casein–gelatin system at pH 5.8–7.8 the resultant surface was detd. by the protein with which the particles were first coated. In a casein-gelatin mixt. the casein diffused more rapidly to the surface of quartz or collodion particles and largely prevented the adsorption of gelatin. Insol. casein particles were not influenced much by gelatin except between pH 5.2 and 3.7, in which range they were completely coated with gelatin. The mechanisms involved in the interaction of these proteins and their biol. significance are discussed. **VII. Electrophoretic behavior of microscopic particles in the presence of horse, human or rabbit serum.** *Ibid.* 373–86.—Quartz particles in horse serum probably adsorb an albumin component (Kekwick's albumin A), while collodion and mineral oil particles appear to adsorb a globulin (possibly Tiselius' globulin α (*C. A.* 32, 1728[8])). No trace of albumin B was found by exposing particles to serum, and it is possible that the colorless albumin B is to some extent a lab. product. Quartz and collodion particles in dil. rabbit serum show no significant differences in mobility when acetate buffer is used, but do in phosphate buffer. In dil. human serum quartz and collodion particles had identical mobilities between pH 4 and 5.8, but divergent mobilities above pH 5.8. Probably the quartz is coated with albumin and the collodion with globulin α. The common isoelec. point of these particles (pH 4.9) agrees with that found for the surfaces of the chylomicron emulsion in blood by Ludlum, Taft and Nugent (cf. *C. A.* 25, 1540). D. S. Searle

Photodynamic effect on oral mucosa. Tinkyoku Hai. *J. Chosen Med. Assoc.* 29, 2120–32(German abstr. 138–9)(1939).—An exposure of oral mucosa of rabbit to sunlight or C arc lamp produces no ill effect, but a similar exposure after an injection of 0.5 cc. per kg. body wt. of 0.5% trypaflavine causes local congestion, erosion and ulceration of mucosa after 24 hrs. This photodynamic effect becomes more pronounced if India ink is injected in an amt. stimulating to the reticulo-endothelial system (*R*), and becomes far less than normal if *R* is blocked by the ink. In the serum of the normal animal there is a very small but definite amt. of a substance which influences the photodynamic effect on the tissue. The amt. of this substance can be increased by stimulation of *R* without spleen. S. Tashiro

Hung-chü. I. Enzymic activities of Hung-chü. Hisieh Chiu Taoh. *J. Oriental Med.* 31, 741–9(English abstr. 50–2)(1939).—Both com. and pure strains of Hung-chü, *Monascus purpureus* Went (reddish yeast used for brewing Hung-chü, red wine), show the presence of amylase, glycolase, invertase, pepsin, trypsin, erepsin, lipase, reductase, catalase and glycerophosphatase, but no lecithinase. S. Tashiro

Amine oxidase and adrenaline. D. Richter and A. H. Tingey. *J. Physiol.* 97, 265–71(1939); cf. *C. A.* 33, 2589[9].—The rate of inactivation of adrenaline by amine oxidase has been measured at adrenaline concns. down to 10^{-7}. The degree of inhibition of amine oxidase by ephedrine was measured with 10^{-7} adrenaline as substrate. The amine oxidase concn. in the livers of a no. of animals was detd. Calcns. based on these measurements do not support the view that the amine oxidase is specifically concerned in the inactivation of sympathin or adrenaline. E. D. Walter

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B—METHODS AND APPARATUS

GLENN E. CULLEN

New application of kinetic colorimetry to the study and to the estimation of D vitamins and provitamins. Yves Raoul and Paul Meunier. *Compt. rend.* **209**, 546–8 (1939).—The reagent $SbCl_3$ in Ac_2O gives a max. intensity of color with calciferol in 45–60 secs., with ergosterol and lumisterol in 7–8 mins., and with cholesterol after a much longer period. These results are confused by mixts. and by the presence of vitamin A. A mixt. of the Carr-Price and Liebermann reagents has been devised to overcome these difficulties and consists of 30 cc. of $CHCl_3$ satd. with $SbCl_3$, 3 cc. Ac_2O and 5 drops of concd. H_2SO_4. The observation cell of the electrophotometer is charged with 3.5 cc. of this freshly prepd. reagent and 0.5 cc. of $CHCl_3$ contg. 50 γ of the sterol under investigation. The absorption is measured after 30 secs. through the blue screen, no. 30, and is followed for 4–5 mins. to permit graphical representation. The reaction develops slowly with cholesterol (with 1 double link) but with lumisterol, ergosterol and 7,8-dehydrocholesterol (contg. 2 conjugated double linkages) a definite intensity is immediately established which maintains a const. value. The primarily high intensity of compds. with 3 conjugated double linkages (vitamins D_2 and D_3) diminishes rapidly and reaches a const. level. Thus this kinetic colorimetry enables the estn. of the linkages in ring B of a sterol to be made. It is also possible to use the method for the detn. of compds. with antirachitic action, since it eliminates the interference of sterols with trans configuration. C. R. Addinall

Determination of nicotinamide in animal organs. P. Karrer and H. Keller. *Helv. Chim. Acta* **22**, 1292–3 (1939); cf. *C. A.* **33**, 1356[3].—An improved method for the extn. and detn. of nicotinamide (I) in animal organs is given. The finely divided material is thrice boiled out for 30 mins. with 3 vols. H_2O and the combined exts. are freed from fatty residues by shaking out 2 or 3 times with Et_2O. The aq. ext. is acidified with H_2SO_4 until 0.1 *N*, the liquor is boiled gently for 30 mins. and neutralized with $Ba(OH)_2$. The filtrate is concd. to 50–100 cc. and extd. *in vacuo* for 5–6 hrs. with BuOH. The I remaining after evapn. of the BuOH ext. is returned to the extd. residue which is then extd. twice by boiling H_2O. The aq. ext. is evapd. to dryness *in vacuo*, taken up in abs. MeOH and dry benzene, filtered and again evapd. to dryness *in vacuo*. The residue (1 part) is dissolved in MeOH contg. 3 parts by wt. of $(O_2N)_2C_6H_3Cl$ and the MeOH is distd. off. The dry mixt. is melted on the steam bath for 30 mins., taken up in 80% alc., made up to a definite vol. and, after addn. of a few drops of 10% alc. KOH, colorimetrically detd. in a step photometer. Muscle of rats, horses and cattle yielded 50.8, 46.6 and 38.3; horse and cattle livers 160.0 and 93.0; cattle kidneys 190.4; and baker's yeast 120.0 γ per g. C. R. Addinall

New method of determining coproporphyrin. Geneviève Glotz. *Compt. rend. soc. biol.* **132**, 194–5(1939).—Coproporphyrin, dissolved in 5% aq. HCl, shows a marked ultraviolet absorption band at 401 mμ. Concns. of 0.06–3.3 mg. % can be accurately detd. by means of the Zeiss spectrograph. L. E. Gilson

Chemical methods for the determination of vitamin C. A. A. Kolesnik. *Nauch. Zapiski Inst. Narodnogo Khoz. im. Plekhanova* **1938**, No. 1, 107–13; *Khim. Referat. Zhur.* **2**, No. 4, 80(1939); cf. *C. A.* **33**, 2602[7].—A review of different modifications of the detn. of vitamin C according to the method of Tillmans: Eckelen and Emmerie (*C. A.* **32**, 2558[1]), Bukin and Devyatkin modifications. The modification proposed by K. requires a cold extn. of the finely pulverized sample of the food product by a 5% CH_3COOH soln. After the extn. centrifuge the mixt., ppt. the proteins, the tannic substances and the pigments with $CaCO_3$ + $(CH_3COO)_2Pb$, centrifuge again, ppt. the Pb with H_2S gas, remove it with CO_2 and titrate the filtrate with a 0.001 *N* soln. of 2,6-dichlorophenolindophenol until a pink color is obtained. The results obtained by the use of this new method are very close to those obtained by the method of Bukin. The new method, however, does not require any expensive reagents. W. R. Henn

A new method for the colorimetric determination of vitamin C. E. Schulek and I. Floderer. *Angew. Chem.* **52**, 615–16(1939).—The method is based on the quant. reduction of Fe^{+++} to Fe^{++} by ascorbic acid and photometric detn. of Fe^{++} by means of the α,α'-bipyridyl complex. Directions and reagent compns. are given. Exptl. results on synthetic ascorbic acid and exts. of lemons and oranges are presented. Four references. Karl Kammermeyer

Comparison of the antihemorrhagic activity of natural and synthetic vitamin K_1 with the proposed standard, 2-methyl-1,4-naphthoquinone. A. D. Emmett, R. A. Brown and Oliver Kamm. *J. Biol. Chem.* **132**, 467–8 (1940).—It is suggested that the use of 2-methyl-1,4-naphthoquinone be tentatively adopted as a standard of reference for the bioassay of the potency of vitamin K_1 preps. By defining the biol. activity of 1 γ of this quinone as 1 standard unit of vitamin K_1, it was found in a series of 6 expts. with 260 chicks, with the Thayer-Doisy method (*C. A.* **33**, 8246[3]), that it is equiv. to 1.98 of the authors' curative chick units; this makes their conversion factor 0.5. Natural and synthetic vitamin K_1 have substantially the same values and the av. potency (450) is very nearly 500 standard units per mg. This gives a somewhat higher value for natural vitamin K_1 than the 262 units reported recently by Almquist and Klose (*C. A.* **33**, 9382[1]). A. P. Lothrop

A colorimetric micromethod for the determination of sodium with manganous uranyl acetate. Ernst Leva. *J. Biol. Chem.* **132**, 487–99(1940).—In the micromethod described Na is ppt'd. by Mn uranyl acetate as the triple acetate. The ppt. is treated with KIO_4 and the soln. of permanganate thus obtained is measured by comparison with a $KMnO_4$ standard in a colorimeter or directly in an Evelyn photoelec. colorimeter. Phosphate in biol.

material does not interfere but K causes high results if the molar ratio of K:Na in the sample exceeds 1.5. Quantities of 0.008 to 0.01 mg. of Na have been detd. photoelectrically by the method with an accuracy of ±8%. A. P. Lothrop

The determination of vitamin A and carotene with the photoelectric colorimeter. C. J. Koehn and W. C. Sherman. *J. Biol. Chem.* **132**, 527–38(1940).—Although the photoelec. colorimeter affords a rapid and reliable means of detg. carotene and vitamin A, there are certain inherent limitations in its use and to obtain a high degree of accuracy with the instrument, a calibration curve should be used in which the values of 2-log *G* are plotted against the concn. over a series of dilns. of the material to be detd. since 2-log *G* is not a strictly linear function of the concn. of the chromogens. Calcns. are given for converting colorimeter readings into I. U. of vitamin A and γ of carotene, the factor being 2120 for converting $E^{1\%}_{1\ cm.}$ (328 mμ) into I. U. of vitamin A per g. and 1645 for β-carotene in $CHCl_3$ soln. ($L^{1\%}_{1\ cm.}$ 440 mμ). A. P. L.

The colorimetric assay of total, α- and β-17-ketosteroids in extracts of human urine. N. B. Talbot, Allan M. Butler and E. MacLachlan. *J. Biol. Chem.* **132**, 595–603(1940); cf. *C. A.* **33**, 9345⁹.—A method is described for the detn. of total, α- and β-ketosteroids in crude alc. solns. of the neutral fraction of urine exts. in which the light absorption due to nonketonic substances is subtracted in the colorimetric assay. Purification of the exts. with Girard's reagent T causes no significant loss but clearing exts. with decolorizing charcoal is unnecessary and may entail appreciable loss of hormone. The accuracy of the detns. depends upon establishing the optimal conditions for hydrolysis and extn. A. P. L.

A micromethod for the determination of carbon dioxide in blood and other fluids. Edward S. West, Bert E. Christensen and Robert E. Rinehart. *J. Biol. Chem.* **132**, 681–6(1940); cf. *C. A.* **34**, 2898.—A simple inexpensive app. is described in which the total CO_2 content of plasma and other fluids can be detd. in 15 min. The results agree within 1% with those obtained with the manometric method. The method is based on the principle of Pettenkopfer (Lunge, *Tech. Gas Analysis*, p. 221; *C. A.* **28**, 2646⁶) in which the CO_2 is drawn into an evacuated vessel contg. standard 0.05 *N* $Ba(OH)_2$ soln., the excess of which is titrated with 0.03 *N* HCl from a microburet. A. P. Lothrop

The determination of total base in biological material by electrodialysis. W. V. Consolazio and John H. Talbott. *J. Biol. Chem.* **132**, 753–67(1940). An improved unit is described for use in the detn. of total base in serum, blood cells, urine, tissues and other biol. media by electrodialysis. It is easy to manipulate and allows increased efficiency and greater accuracy and recovery of total base is complete. Approx. 0.2 ml. or 0.2 g. of material is adequate. The app. can also be used for the detn. of NH_3 in urine or in other biol. fluid advantageously when only small amts. of material are available. Cf. Keys, *C. A.* **30**, 5603⁶, and Joseph and Stadie, *C. A.* **32**, 9132¹. A. P. Lothrop

Determination of magnesium in biological materials. An oxidation method. John P. Nielsen. *Ind. Eng. Chem., Anal. Ed.* **11**, 649–51(1939); cf. *C. A.* **26**, 4353; **29**, 6265⁸, 8036⁸.—Mg pptd. with 8-hydroxyquinoline is detd. by oxidation with ammonium hexanitratocerate and titration of excess cerate with ferrous ammonium sulfate; *o*-phenanthroline ferrous sulfate is used as indicator. Analyses of canned tomato ash by this method agree with those by A. O. A. C. tentative method. J. McAfee

The determination of small quantities of iodine in biological materials. J. Trtílek. *Chem. Obzor* **14**, 196–8 (1939).—In a modified Leipert app. (*C. A.* **27**, 4266) without any rubber tubing, with a dephlegmator between the distg. flask and condenser, and without the useless 2nd condenser vessel, T. oxidized the org. substances with CrO_3 in the presence of H_2SO_4 and traces of $CeSO_4$, reduced the iodic acid with Na_2AsO_3 and volatilized the free I under low pressure into NaOH. After the soln. was concd., the I was oxidized with Br water and titrated by the Winkler method. The modified method eliminated all of the criticisms raised against the original app. Addns. of 1–5 γ of I to 10 cc. of blood were detd. with an accuracy of 10–20%. In 50-cc. urine samples, which could be concd., the accuracy of the I detns. was higher than 10%. Frank Maresh

The identification of synthetic malaria therapeutics in the urine. P. Dubost and M. Allinne. *Bull. sci. pharmacol.* **46**, 367–75(1939).—The substances investigated were: quinacrine (chlorodiethylaminopentylaminomethoxyacridine-2HCl), rhodopraequine, a mixt. of equal parts of rhodoquine(8-(diethylaminopropylamino)-6-methoxyquinoline) and praequine (8-(diethylaminoisoamylamino)-6-methoxyquinoline) as salts of an org. acid, and premaline, a mixt. of praequine, rhodoquine and quinacrine. Rhodoquine and praequine can be pptd. in the urine with Tanret's reagent (*C. A.* **7**, 2234). If protein is present previous extn. with Et_2O is necessary. For colorimetric detn. of the extd. base the reaction with HIO_3 is convenient (violet color), but it is not specific if quinacrine has been given during the preceding month or quinine during the last 4 days. In this case, the diazo reaction must be used. Quinacrine alone, in absence of protein, can be pptd. with Tanret's reagent. In the presence of protein or other medicaments the fluorescence of the dil. urine is detd. If the concn. is very weak, extn. with AmOH (method of Lataste and Farinaud, cf. *C. A.* **33**, 3863⁵) is used. For detn. the base is extd. with Et_2ONH_4OH by Dantec's method (*C. A.* **30**, 3587⁹). The detn. of fluorescence is not impeded by quinine, as is the case if Dantec's soln. of Br and $SnCl_2$ is used. Premaline is identified by its quinacrine component. The elimination is about 1/10 of the ingestion daily and extends over a long time. The concn. seldom exceeds 2–3 mg. per l. for praequine and rhodoquine and 30–50 mg. for quinacrine. A. E. Meyer

The microdetermination of cholesterol in serum. Herbert K. Alber and J. T. Bryant. *J. Franklin Inst.* **229**, 118–25(1940).—The method is essentially a modification of that of Schoenheimer and Sperry (*C. A.* **28**, 6752⁹) and incorporates the modifications suggested by Fitz (*C. A.* **29**, 4787⁵). The chief changes are the use of a cool acetone-alc. extn. mixt., and of slightly larger amts. of serum than were originally proposed. The digitonin precipitant has been changed to 0.2 g. digitonin in 100 ml. 50 volume % EtOH, and the AcOH-acetic anhydride.H_2SO_4 ratio has been increased. The colorimetric detn. of the cholesterol using an ordinary Duboscq colorimeter has been accurately tested against standard Naphthol Green B solns., the efficiency and stability of which have been detd. against standard cholesterol digitonide solns. in glacial AcOH. The accuracy and precision of the modified method have been found to be equiv. to those of the more complicated method usually employed. Edward B. Sanigar

Method of assaying pituitary water-retention principle. Eldon M. Boyd and Edward G. Mack. *Endocrinology* **26**, 153–9(1940); cf. *C. A.* **34**, 527⁵.—A method is described for the assay of pituitary water-retention principle based on changes in the body water of leopard frogs (*Rana pipiens*) immersed in water at 4° and read in terms of a proposed frog unit. Felix Saunders

Enzymic degradation of polyamines. V. The occurrence of diamine oxidase in man, mammal and bird, with an appendix on the occurrence of cholinesterase in birds. E. A. Zeller, Hans Birkhäuser, Hans Mislin and Marianne Wenk. *Helv. Chim. Acta* **22**, 1381–95(1939)(in German); cf. *C. A.* **32**, 7059⁵; **33**, 1765⁴, 7832⁹.—*Detn. of diamine oxidase* (I).—The fresh organs are ground with sea sand, mixed with 3 times the amt. of 2.5% NaCl and dialyzed at 0°, first against distd. water and a few hrs. later against Sørensen phosphate buffer (pH 7.2). After 24 hrs. the mixt. is centrifuged and the supernatant liquid dialyzed, usually for 48 hrs. To 2.5 cc. of the dialyzed enzyme soln. is added 0.1–0.3 cc. 0.1 *M* cadaverine di-HCl dissolved in the above buffer, the vol. is dild. to 3.0 cc. with pure buffer soln., and 1–2 drops primary octyl alc. and 0.25 cc. toluene are added. With small organs the vols. are decreased (up to 1.5 cc.). In organs with very small amts.

of I the NH_3 liberated in 4–20 hrs. is detd. by the Parnas method (*C. A.* **29**, 1123[4]). In all other cases the O consumption in 1–2 hrs. is measured in the open Warburg manometer. Under these conditions the unit of I is the initial velocity of oxidation of 10^{-6} mol. cadaverine per hr. on complete satn. of the enzyme by the substrate. This corresponds to the formation of 17 γ NH_3/hr. and to the consumption of 11.2 cu. mm. O_2/hr. If histamine is used as the substrate, the "histamine unit" represents a larger amt. of I than the "cadaverine unit"; the factor is 1.3 for an optimal histamine concn. Errors due to the consumption of the 2nd O atom in the diamine-I reaction are negligible. The estn. of the blank values presents difficulties not yet solved. The av. I unit varied from 0 for the brain of a newborn infant and for the kidneys of a duck 4 weeks old and 0–2 for the liver of an adult pig to 20 for the renal cortex of an adult pig, estd. per g. fresh organ. The kidneys of most of the mammals studied, with the exception of the rodents, contained considerable I. The cortex was much richer in I than the medulla, except in man where both had about the same activity and in the human newborn where the medulla had a much higher I content. The concn. of I in the kidneys was smaller in birds than in mammals; the change in magnitude from one species of birds to another revealed no apparent regularity. I in the liver of mammals varied between 0 and 2 I units. With the exception of rodents, the values were regularly smaller than those of the corresponding kidneys, while in birds the relations were reversed. I was found in the intestinal mucosa of all the warm-blooded animals with the possible exception of the starling. The human adrenal and pancreas contained considerable I. For the prepn. of I the renal cortex of the pig is the richest source. *Detn. of cholinesterase* (II).—The fresh organs are ground with sand and 6 times the amt. of Ringer bicarbonate soln., and centrifuged. To 0.5 cc. supernatant fluid is added 2.5–4 mg. acetylcholine, the vol. is dild. to 2 cc. and II is estd. at 38° by the Ammon method (*C. A.* **28**, 1724[9]). Physostigmine was used in the control detns. The results, expressed in cu. mm. CO_2 liberated in 30 min., varied from 375 for the cerebral hemisphere of a kestrel 30 days old to 12.5 for the cortex of the hemisphere of a man 40 years old. Ruth Berggren

Miller, Elmer S.: Quantitative Biological Spectroscopy. Minneapolis: Burgess Pub. Co. 213 pp. $3.50.

Handbuch der biologischen Arbeitsmethoden. Edited by **E. Abderhalden.** Abt. II. Physikalische Methoden. Tl. 3. Heft 7. Lfg. 482. Pp. 3717–4328. M. 40. Inhaltsübersicht. 127 pp. Berlin: Urban & Schwarzenberg. Cf. *C. A.* **33**, 4281[2].

C—MICROBIOLOGY

LAWRENCE H. JAMES

Morphological, histological and chemical researches on the melanosis of the appendix. Francesco Bordonaro. *Pathologica* **31**, 497–513(1939).—The genesis of the melanin and the chem. nature of the natural chromogenic substances that produce melanins are discussed. The identification of melanoblastic elements in the appendix is very difficult because of the great no. of polynuclear leucocytes (giving melanin reactions). G. A. Bravo

Action of microörganisms on fats. I. The significance of color changes in dyes used for the detection of microbial action on fat. C. H. Castell and L. R. Bryant. *Iowa State Coll. J. Sci.* **13**, 313–27(1939).—Color changes in Nile Blue sulfate, or methylene blue, or *p*-aminodimethylaniline monohydrochloride are not due to simple reactions of a single type and cannot be used as specific indications of any one type (e. g., hydrolysis of fat). Extn. of dyes from aq. soln. and reduction are probable causes of color changes. F. E. Brown

Thiamine effects in bacterial metabolism. M. Silverman and C. H. Werkman. *Iowa State Coll. J. Sci.* **13**, 365–8(1939).—Some bacteria, e. g., *Propionibacterium peterssonii*, cannot oxidize pyruvate under anaerobic conditions in the absence of thiamine (vitamin B_1), but the addn. of 2 γ of thiamine to 2 cc. of their cell suspension produces fairly rapid oxidation. Other strains, e. g., *Aerobacter indologenes*, either do not require thiamine to oxidize pyruvate or else synthesize their own thiamine as required. F. E. Brown

Leucocidal toxin extracted from typhoid bacilli. Emery Westervelt Dennis and Haratune Senekjian. *Am. J. Hyg.* **30B**, 103–11(1939).—Typhoid leucocidin (I) is an integral part of the typhoid bacillus from which it can be extd. with *N*/4 CCl_3COOH. Purification of the ext. results in increased potency of the toxic somatic antigen complex but in a loss of leucocidal activity. I is not in an antigenic state in CCl_3COOH exts. One prepn. yielded 940 mg. of purified I from 8.55 g. of dry bacilli. The N and P each averaged 4.7%. After hydrolysis there was an av. of 19.9% of apparent carbohydrate calcd. as glucose. I must be heated to 100° for 2 hrs. for complete inactivation. Leucocidin can be demonstrated in similar exts. of *Salmonella typhimurium*, *S. schottmülleri*, *S. suipestifer* (voldagsen strain), *S. enteritidis*, *S. gallinarum* and *S. paratyphi*. Rachel Brown

The influence of normal blood and certain of its constituents on the growth and viability of the tubercle bacillus. R. Davies. *Tubercle* **20**, Suppl. 49 pp.(May, 1939).—The growth of a virulent human-type tubercle bacillus on an egg yolk-saline medium is completely inhibited in the presence of concns. of blood or corpuscles (hemoglobin, 10%) of 5 volumes % or over, and almost completely inhibited in the presence of 1 vol. % of blood. Growth is completely inhibited by 0.1% of ferrous NH_4 sulfate and is partially inhibited by 0.035% and 0.007% of this substance. Plasma (5 vol. %) has no significant effect on growth. Colloidal $Fe(OH)_3$ in concns. up to 0.028% has no significant effect on growth. A strain of tubercle bacilli remains viable for a longer time on a Long-agar medium contg. 5 or 10% of blood or 10% of corpuscles than it does on plain Long-agar medium or on this medium plus 1%, 5% or 10% plasma. Concns. of 1%, 5% and 16.7% of rabbit blood inhibit the growth of H 37 tubercle bacilli on Long's medium by 84%, 88% and 100%, resp. The red corpuscles also inhibit the growth but do not account for the whole of the inhibition observed with blood, the corresponding degrees of inhibition being 70%, 50% and 81%. Plasma may have a beneficial effect on the growth of the tubercle bacillus, which effect is masked in the expts. by the small quantity of red-corpuscle content which the plasma prepn. contains. The presence of blood or corpuscles in the medium permits the development of colonies of tubercle bacilli in the depths of the medium. The substance present in the red blood corpuscles which inhibits the growth is shown to be contained in the protein fraction of these corpuscles. The inhibitory action of red corpuscles evidenced with Long's medium is completely abolished by heating for ½ hr. at 100° or 20 min. at 120°. The heated red blood corpuscles have a slight beneficial effect on the growth. During the incubation period any hemoglobin in the medium is partly destroyed and partly converted into parahematin and hemochromogen. Suspensions of a virulent human strain of tubercle bacillus in distd. water, Long's medium + 1.5% Na citrate, and 0.9% saline + 1.5% Na citrate fail to produce tuberculosis when injected into guinea pigs after 1- and 4-day incubation at 37°, resp. Tubercle bacilli incubated with citrated whole human blood show no diminution in their ability to produce tuberculosis in guinea pigs even after 14-day incubation. It is suggested that the rapid death rate in the case of the first-mentioned suspensions is due to a lack of available sources of energy in the suspension medium. H. J. Corper

The pathogenicity of BCG after prolonged cultivation on glycerinated egg medium. William H. Feldman. *Tubercle* **20**, 253–62(1939).—A culture of BCG obtained from Calmette in 1930 was subcultured for 59 generations during a 6-yr. period on glycerinated egg yolk slants. A series of 12 guinea pigs and 18 rabbits were inoculated with 2 mg. subcutaneously, intraperitoneally or intravenously.

The expt. was continued for 15 months when the surviving animals were killed. In no instance was there observed a progressive, malignant, tuberculous disease. The data indicate that cultivation of a strain of BCG for a period of approximately 6 yrs. on glycerinated egg medium did not increase its virulence for guinea pigs or for rabbits. H. J. Corper

Uses and limitations of the coliform group in sanitary control of food production. Albert C. Hunter. *Food Research* **4**, 531–8(1939).—The term "coliform" is used to designate lactose-fermenting, aerobic and nonsporulating bacteria. Coliform bacteria, which are indole-pos., methyl red-pos., Voges-Proskauer-neg. and do not utilize citric acid as a source of C, are useful as a measure of excretal contamination. An editorial. C. R. F.

Two strains of Clostridium botulinum type E: incitants of human botulism. Elizabeth L. Hazen. *Health News, N. Y. State Dept. Health* **15**, No. 39, 162(1938); *U. S. Pub. Health Eng. Abstracts* **19**, Mi, 15(Apr. 29, 1939).—Type E *Clostridium botulinum* was isolated from Nova Scotia smoked salmon and also from German-canned sprats. Serological tests showed that these cultures were identical to type E strains originally isolated from fish in Russia. These 2 organisms were the cause of fatal cases of botulism in N. Y. Type E strains, largely overlooked in the past, are apparently widely distributed. C. R. Fellers

Glucides in the filtrates of tubercle bacillus cultures. K. O. Streng. *Compt. rend. soc. biol.* **132**, 202–5(1939).—The filtrates contain small amts. of simple glucides which do not reduce Fehling soln. but which are fermented to acids by dysentery bacilli. The compds. are probably polyalcohols. L. E. Gilson

Xanthoproteic reaction and presence of tuberculin in cultures of avian tubercle bacillus in Sauton medium. F. van Deinse. *Compt. rend. soc. biol.* **132**, 206–7(1939); cf. *C. A.* **33**, 6898[8].—With avian strains the culture fluid gave a xanthoproteic reaction 9–38 days before the appearance of tuberculin, with bovine strains the reaction was not pos. until 3–24 days after the appearance of tuberculin, and with human strains the xanthoproteic and tuberculin tests became pos. at the same time. L. E. Gilson

Ultrafiltration of the toxin of Bacillus perfringens type C. Serge Levenson and Pierre Grabar. *Compt. rend. soc. biol.* **132**, 210–13(1939); cf. *C. A.* **33**, 6378[8].—The hemolysin passes through a membrane with a pore diam. of 29 mμ but is all retained by one with a pore diam. of 23.5 mμ. A nonhemolytic purely toxic factor is present which passes to some extent through a membrane with a pore diam. of 6 mμ. L. E. Gilson

Fermentation of sugars by Ramibacterium ramosoides (Rüneberg) P. 1938. A. R. Prévot and R. Veillon. *Compt. rend. soc. biol.* **132**, 239–41(1939); cf. *C. A.* **32**, 7952[9].—In broth with added sugar the organism ferments glucose, maltose and lactose forming 1 part AcOH and 2 parts $EtCO_2H$, but no EtOH or lactic or succinic acid. Indole and NH_3 are also formed. L. E. Gilson

Physiological and systematic study of some Chlamydobacteriales. María S. Cataldi. *Rev. inst. bacteriol. dept. nacl. hig.* (Buenos Aires) **9**, 1–97(1939).—*Sphaerotilus dichotoma* and various species of *Leptothrix* (so-called iron bacteria) were studied. They are not autotrophic as some have claimed and cannot develop in completely mineral media. The presence or absence of Fe^{+++} or Mn^{++} salts does not seem to influence the quantity or quality of development. Expts. with various culture media are described. L. E. Gilson

Physicochemical aspects of bacterial growth. IV. Conditions determining stationary populations and growth rates of Bact. lactis aerogenes in synthetic media. R. M. Lodge and C. N. Hinshelwood. *J. Chem. Soc.* **1939**, 1683–92; cf. *C. A.* **33**, 3418[9].—The abundance of growth of *Bact. lactis aerogenes*, as measured by the max. stationary concn., does not necessarily correspond with the actual rate of growth in artificial lactose-tartrate and glucose-phosphate media at 40°. The influence of pH on the max. population depends on the nature and concn. of the medium: in a concd. glucose-phosphate soln. the max. population is independent of pH over an appreciable range. In a lactose-tartrate medium, contg. a small amt. of $NH_4H_2PO_4$, the max. population which the medium can support at first increases in proportion to, and then becomes independent of, the concn. of the main constituents. The onset of the stationary state appears to be due to exhaustion of the substances required for growth, accumulation of toxic products and changes of pH. At adverse pH values the stationary population is greatly diminished, but there is no corresponding change in the rate of growth. To account for this it is suggested that different stages of bacterial growth have different locations. V. **Influence of magnesium on the lag phase in the growth of Bact. lactis aerogenes in synthetic media containing phosphate.** *Ibid.* 1692–7.—A certain min. concn. of Mg ions is essential for the growth of *Bact. lactis aerogenes* in artificial media contg. glucose, $(NH_4)_2SO_4$ and KH_2PO_4: below this concn. there is no growth, but above it growth is normal and both rate and max. population are approximately independent of the amt. of Mg present. There is a limiting interval which may elapse between the introduction of the organism to a Mg-free medium and the subsequent addn. of Mg for growth to continue. In solns. contg. little or no Mg there is a lag phase in which it is believed that the bacteria are synthesizing a necessary intermediate growth substance and also dying off at a definite rate. If they are all dead before the end of the lag period, the length of which decreases with increasing Mg concn., no growth will be observed on addn. of Mg. The relation between the Mg concn. and the shortening of the lag phase can be deduced from a knowledge of the death rate, the mean generation time and the min. amt. of Mg necessary for growth. S. Glasstone

Physiological difference between 1,3- and 2,3-butylene glycol. Kinitiro Sakaguti and Osamu Kambayasi. *J. Agr. Chem. Soc. Japan* **15**, 1019–22; *Bull. Agr. Chem. Soc. Japan* **15**, 143(in English)(1939).—2,3-Butylene glycol, as well as glycerol, was utilized as a C source by various kinds of microörganisms, while 1,3-butylene glycol was assimilated only by *Oidium lactis* and *Bacillus mesentericus*. Ethylene glycol was utilized by *Bacillus mesentericus, Aspergillus oryzae* A, *Penicillium glaucum, Rhizopus chinensis, Monilia fructigena* and *O. lactis*. Y. Kihara

Production of 2,3-butylene glycol by fermentation. I. Kinitiro Sakaguti, Kisetu Ôhara and Sumihiko Kobayasi. *J. Agr. Chem. Soc. Japan* **15**, 1075–84; *Bull. Agr. Chem. Soc. Japan* **15**, 148(in English)(1939).—Ten strains of bacteria producing 2,3-butylene glycol in a yield of 30–40% from glucose were isolated from soil and vegetables. Seven of them belonged to *Aerobacter aerogenes* and the other three to *A. cloacae*. They produced not only glycol but also remarkable amts. of EtOH. The production of glycol was optimum at 37–8° and pH 6–7. The most preferable concn. of glucose was 8%. Soybean cake, fish meal and rice bran with the addn. of a small amt. of $(NH_4)_2SO_4$ were most suitable N sources. The production of 2,3-butylene glycol was detected in the culture soln. by the Voges-Proskauer test after treatment of the mediums with dil. H_2SO_4 and $KMnO_4$ soln. The existence of 0.2 g. of furfural in 1 l. of the culture soln. did not retard the fermentation. Y. Kihara

A note on the characters of a coccus isolated from South Australian stout. Lance S. Walters. *J. Inst. Brewing* **46**, 11–14(1940).—Morphological, cultural and physiol. characters are described. It is regarded as a variant strain of *Streptococcus tetragenus* (Claussen) (Shimwell and Kirkpatrick) and possesses the distinguishing character of fermenting xylose and arabinose. Quick Landis

Biochemical hydrogenation of steroids by putrefactive bacilli. Luigi Mamoli, Richard Koch and Hermine Teschen. *Z. physiol. Chem.* **261**, 287–96(1939); cf. *C. A.* **33**, 2157[1].—*Bacillus putrificus* (Bienstock), anaerobically cultured in yeast water at pH 6.8, with powdered androstenedione (I) gives 70–80% of etiocholanedione, testosterone (II) gives 70–80% of etiocholan-17-ol-3-one (III), and progesterone (IV) gives 80–90% of pregnanedione.

If the medium is a sterile yeast suspension, keto groups are reduced in addn. to the double bonds. Thus I gave III and *epi*-3,17-etiocholanediol (V), androstenedione gave isoandrosterone and isoandrostenediol, II gave III and V. Dehydroandrosterone gave androstenediol, IV gave the same product as before. Cholesterone is not acted upon. Stereo specificity is marked in these changes. Relationships between structural groups and the configuration of products are indicated. Milton Levy

Effect of sulfanilamide upon the Shwartzman phenomenon and upon the growth of meningococci in vitro. S. Stanley Schneierson. *J. Infectious Diseases* **65**, 97–102(1939).—Sulfanilamide and prontosil have no effect upon the Shwartzman active principles of meningococcus filtrates or upon meningococci killed by drying but do inhibit the Shwartzman reaction with washed living organisms provided the amt. injected does not exceed 100 million organisms. The drugs inhibit the reaction with washed living organisms because they are bacteriostatic and inhibit the formation of toxin. When larger amts. of organisms are given the liberated preformed toxin may produce a reaction. Julian H. Lewis

Mucoid dissociation in the colon-typhoid-salmonella group. H. R. Morgan and T. D. Beckwith. *J. Infectious Diseases* **65**, 113–24(1939); cf. *C. A.* **33**, 5439[6].—A relatively low temp. of incubation (10–20°) produces the mucoid dissociant among members of colon-typhoid-salmonella organisms. Carbohydrate is essential to the formation of the capsular substance. The polysaccharide of the capsule is active immunologically and appears to have a stable antigenic pattern since its formation and serological characteristics are independent of the configuration of the carbohydrate from which it is formed. Julian H. Lewis

An ectoenzyme of Clostridium welchii which decomposes blood group specific substance A. Fritz Schiff. *J. Infectious Diseases* **65**, 127–33(1939).—From cultures of *Cl. welchii*, a germ-free, group-specific enzyme was prepd. by filtration and pptn. with acetone. The production of the enzyme in cultures is suppressed in the presence of such carbohydrates as are fermented by *Cl. welchii*. The enzyme will specifically destroy the blood group specific substance *A*. It is destroyed at pH 6 and at values below this. It is inactivated by oxidation (standing at room temp.) and can be reactivated by reduction (with ascorbic acid under anaerobic conditions). The enzyme is not related to any hemotoxin. J. H. L.

The nutritive requirements of Salmonella. II. The formation of indole and tryptophan by the typhoid bacillus. Wm. Burrows. *J. Infectious Diseases* **65**, 134–41(1939).—Previously reported evidence (*C. A.* **33**, 7840[2]) for the synthesis of the "essential" amino acid tryptophan by the typhoid bacillus and the formation of indole by this organism is confirmed and extended through the presentation of quant. data. Julian H. Lewis

Studies on lactobacilli. I. Fermentation reactions of strains isolated from human mouths. R. W. Harrison. *J. Infectious Diseases* **65**, 142–6(1939).—The fermentation reactions of oral lactobacilli, isolated from patients with various degrees of dental caries activity, were studied in milk and 10 carbohydrates. There was little correspondence between morphology of the 111 strains tested and their fermentation reactions, except for the concn. of 2 of the 3 morphological groups in the group with more vigorous fermentative reaction. Julian H. Lewis

Nicotinamide and related compounds as essential growth substances for dysentery bacilli. Albert Dorfman, Stewart A. Koser, Harold R. Reames, Karl F. Swingle and Felix Saunders. *J. Infectious Diseases* **65**, 163–82 (1939).—The growth-promoting activity of spleen exts. for dysentery bacilli can be attributed to the presence of either nicotinic acid, which was isolated from pig spleen, or nicotinamide, whose presence was strongly indicated, or of both. Other known growth factors, with the exception of coenzymes I and II, were not capable of replacing either partially or completely nicotinic acid or its amide. Many of 33 representative cultures of the *Shigella* group were unable to grow in a synthetic medium but developed readily upon the addn. of small amts. of either the coenzymes, nicotinic acid or its amide. Those cultures which required nicotinic acid or its amide were able to develop through successive transfers when these compds. were supplied in the synthetic medium. No restraining action of nicotinic acid was observed in amts. up to 1000 γ/cc. medium, but with 3000 or more γ/cc. progressive inhibition was found. Within 24 hrs. after inoculation nicotinamide was 10 times as potent as nicotinic acid; less difference was noted in the growth-promoting effect with longer periods after inoculation. This may probably indicate a necessary conversion of the acid to amide before utilization. The dysentery bacillus growing in a synthetic medium contg. nicotinic acid synthesized a growth-promoting substance for several *Hemophilus* species which was probably coenzyme I or II or some related substance. A growth-promoting substance for staphylococcus was synthesized which may be thiamine or its component parts and possibly biotin. Riboflavin was also synthesized. A study of 24 compds. structurally related to nicotinic acid showed that any change in ring substitution resulted in loss of activity. Esterification resulted in decreasing activity with increasing length of the alkyl chain. Substitution on the amide N resulted in a marked decrease of activity. Nicotinuric acid was comparable in activity to nicotinic acid. A close correspondence was found between the activity of these compds. as essential growth factors for the dysentery bacillus, the reported activity for *Staphylococcus aureus* and the curative effect on canine blacktongue and human pellagra. J. H. Lewis

The fate of the capsule (P) substance of the anthrax bacillus in the organism. G. Ivánovics. *Z. Immunitäts.* **96**, 408–12(1939).—Evidence is given that the *P* substance from anthrax bacilli, a polypeptide of glutamic acid, is excreted entirely through the kidneys and that none of it is stored or destroyed in the body. J. H. Lewis

Influence of metals on diphtheria toxin formation. M. O. Hettche and M. Becker. *Z. Immunitäts.* **96**, 440–4 (1939).—In mediums contg. Fe in concns. ranging from 0.005 to 0.05%, diphtheria toxin production varies from 0 to normal amts. Bacterial growth under these conditions is not influenced. Fe as cation of complex Fe salts or Fe compds. is active while the Fe in the anion of these compds. is without action. The other metals of the Fe group, Ni and Co, are inactive. Cu does not decrease toxin formation but is a disinfectant. The protective action of Fe in guinea pigs infected with diphtheria does not depend on inhibition of bacterial ferments but on its effect on the reticulo-endothelial cells. J. H. Lewis

The production of an ectotoxin by the Schmitz dysentery bacillus. H. Buchwald. *Z. Immunitäts.* **96**, 445–54 (1939).—The production of an ectotoxin and the behavior of the toxin gives the Schmitz bacillus a special place between the true dysentery and the pseudodysentery organisms. Julian H. Lewis

Pituitary extracts and the virus of foot-and-mouth disease. The effect on the virus of certain chemical methods employed in their preparation. I. A. Galloway. *J. Hyg.* **39**, 597–614(1939).—Acetone desiccation of pituitary will not kill foot-and-mouth virus. Prepns. of crude prolactin by alk. extn. in the cold followed by pptn. and repptn. at pH 5.5 and sepn. of the crude thyrotropic fraction will destroy any virus. Prepn. of crude whole ext. of anterior lobe (B fraction) will destroy the virus. Alc. (60%) at 18°–20° did not render the material noninfectious. If any doubt exists as to the possible contamination of a hormone prepn. with the virus of foot-and-mouth disease, it can be made safe by suspending in a fluid with a pH of 4.5–5.0 at room temp. and bringing it back to neutrality. 12 references. John T. Myers

The value of the sodium *d*-tartrate fermentation test in the differentiation of the Salmonella organisms. S. W. Challinor and A. J. Rhodes. *J. Hyg.* **39**, 651–7(1939).—*B. paratyphi B* fails to ferment while *Salmonella aertrycke* and food-poisoning organisms do ferment Na *d*-tartrate. John T. Myers

The control of air-borne bacteria and fungus spores by means of aerosols. R. J. V. Pulvertaft and J. W.

Walker. *J. Hyg.* **39**, 696–704(1939); cf. *C. A.* **33**, 6525⁴.—NaClO may be used as the active ingredient in a bactericidal aerosol. Although less efficient than resorcinol prepns., it is cheaper and a good deodorant.
John T. Myers

The characters and systematic position of Morgan's bacillus. A. Sevin and R. Buttiaux. *J. Path. Bact.* **49**, 457–66(1939).—Morgan's bacillus no. 1 possesses distinct biochem. characters. It fails to ferment mannitol and lactose but ferments glucose, fructose and usually galactose with very slight gas production. It shows a community of antigens most marked in cultures on soft agar, and is antigenically related to *Proteus vulgaris*. 22 references.
John T. Myers

The effect of blood digest and hem on the growth of Corynebacterium diphtheriae. V. Glass. *J. Path. Bact.* **49**, 548–61(1939); cf. *C. A.* **33**, 6383¹.—Either peptic blood digest or hem will inhibit the growth of *C. diphtheriae*, especially under aerobic conditions. Some strains are more sensitive than others. This effect by blood digest is not changed by storage in the refrigerator but is reduced by boiling; that of hem gradually decreases on storage and the deterioration is accelerated by rise in temp. This inhibition is not accompanied by a diminution of the peroxidase activity. The amt. of hem required as "X" factor varies with different strains of *Hemophilus influenzae* and is of the same order as that required to inhibit *C. diphtheriae*. Under certain conditions inhibition is caused by hematoporphyrin. Ferri et ammonii citras (B. P.) (0.5%) caused no inhibition. The above inhibition may be partially neutralized by appropriate concns. of Na hyposulfite. HCN inhibits the growth of *C. diphtheriae*, especially under aerobic conditions, but is somewhat antagonistic to hem.
John T. Myers

The toxin of B. parapertussis and the relation of this organism to Hemophilus pertussis and Alcaligenes bronchiseptica. I. E. Bruckner and D. G. Evans. *J. Path. Bact.* **49**, 563–70(1939).—The toxin of *B. parapertussis* is very similar to those of *H. pertussis* and *A. bronchiseptica*, but is not so potent. It is extremely labile and no evidence that it is antigenic was obtained.
John T. Myers

The effect of iodine vapors on several viruses. M. Kaiser. *Arch. ges. Virusforsch.* **1**, 237–46(1939).—Expts. in rabbits show that vaccinia virus is inactivated by a min. or 30-sec. contact with I vapors. The I probably undergoes chem. combination with the virus, since it cannot be washed away nor does it irritate corneal epithelium in this form. A virus which has been subjected to I vapors for 5 min. is not altered by subsequent treatment with a 0.1 *N* soln. of thiosulfate. If the thiosulfate is applied after only 30-sec. contact with I, however, the virus shows some stabilization, i. e., it is not completely killed although no reactions occur upon injection in rabbit testicles. Myxoma virus behaves like vaccinia virus and is completely inactivated by 5-min. contact with I vapors. The dried, fixed virus of Lyssa (rabies) is considerably detoxified after 15-min. contact with I vapors, but the majority of guinea pigs succumb 8 days after the injection of treated virus.
J. Pinchack

The behavior of bacteriophages injected intracisternally. K. Burckhardt. *Arch. ges. Virusforsch.* **1**, 247–51 (1939).—*Escherichia coli* phages can be detected in the serum a short time after intraspinal injection of concd. solns. The smallest concn. of which it is still possible to detect traces is 10^{-6}. Such traces can be detected only if the total serum of the bled animal is used in the manner described.
J. Pinchack

The mode of action of formaldehyde upon phage protein. Hideo Moriyama and Shunkichi Ohashi. *Arch. ges. Virusforsch.* **1**, 252–66(1939)(in English).—HCHO inactivation of *Escherichia coli* phage is a mononuclear reaction directly proportional to the concn. of HCHO, the min. active one being 0.01%. Only about 5% of the HCHO is permanently combined, the rest being in a state capable of reducing I. Under certain conditions, the inactivated phage may be reactivated by diln. with water or by dialysis. Inactivation of phage by HCHO is enhanced by the OH ion.
J. Pinchack

The inactivation of phage protein by neutralization of its acidified solution. Hideo Moriyama and Shunkichi Ohashi. *Arch. ges. Virusforsch.* **1**, 267–72(1939)(in English); cf. *C. A.* **33**, 8678⁸.—*Escherichia coli* phage protein can be severely damaged if its acidified soln. is neutralized in a water medium contg. no salt. Inorg. salts ($CaCl_2$, $MgCl_2$, $BaCl_2$) prevent such inactivation in as low a concn. as *N*/160. It may be proper in some cases to use Ringer's or a dil. $CaCl_2$ soln. instead of water in isolating virus proteins.
J. Pinchack

The water content of the particle of vaccinia virus protein. Hideo Moriyama. *Arch. ges. Virusforsch.* **1**, 273–82(1939)(in English); cf. *C. A.* **33**, 4288⁴,⁵, 8678⁸.—An approx. water content of 90% was estd. in vaccinia virus and *Escherichia coli* phage protein by means of centrifugation, by measuring the sugar-insol. space of the particle and from the filtrability of the particle.
J. P.

The effect of pH on the bactericidal power of urine containing sulfanilamide. J. R. Sickler. *Proc. Staff Meetings Mayo Clinic* **14**, 715–19(1939).—The bactericidal activity of normal urine contg. sulfanilamide toward *Escherichia coli*, *Staphylococcus aureus*, *Aerobacter aerogenes*, *Bacillus proteus*, *Salmonella* and *Pseudomonas aeruginosa* was found to increase when the H-ion concn. was changed from pH 6.2 to 7.7. A great variation was found in the level at which sulfanilamide acts bactericidally on different strains of the same group of organisms commonly found in urinary tract infections.
J. Pinchack

The impermeability of the viable obstructed bowel of dogs to Clostridium botulinum toxin. Carroll J. Bellis and Winford P. Larson. *Surgery* **6**, 901–8(1939).
J. Pinchack

Action of mercury salts on the formation of vitamin B_2 in Aspergillus niger. G. S. Kitaviu. *Biokhimiya* **4**, 283–94(1939).—The addn. of 10–20 mg. % of $HgCl_2$ to a glucose or sucrose soln. brings about the production of gluconic acid by *A. niger*, instead of citric and oxalic acid normally formed.
H. Priestley

Can sucrose be fermented directly, or is preliminary hydrolysis essential? G. P. Toropova. *Biokhimiya* **4**, 336–41(1939).—Willstatter's view that disaccharides may be fermented by a special zymase, without previous hydrolysis, could not be substantiated in the case of sucrose. All enzymic prepns. capable of fermenting sucrose were always found to contain invertase. Cf. W., *C. A.* **16**, 2154, 2528, **20**, 770, 1632.
H. Priestley

Ergosterol content of yeast during autolysis. A. V. Trufanov and V. A. Kirsanova. *Biokhimiya* **4**, 377–80 (1939).—The ergosterol content of yeast, as measured by the colorimetric method of Heiduschka and Lindner (*C. A.* **23**, 2737), increases during autolysis. The increase is ascribed to the liberation of free ergosterol, part of which is said to be present in the yeast in a combined form.
H. Priestley

Germicidal properties of the oxides of nitrogen. H. G. Williams and T. A. Hartgraves. *J. Lab. Clin. Med.* **25**, 257–63(1939).—A mixt. of gases produced by passing compressed air through an elec. arc is shown by controlled bacteriol. expts. to be an effective bacteriostatic and bactericidal agent and should find usefulness in the treatment of infected wounds and chronic draining sinuses. The bactericidal power may be due to the formation and deposition of min. amts. of HNO_3 and other unknown agents. When correctly used the gas does no harm to patient or tissues. It is also fungistatic and fungicidal. The vegetative forms of bacteria and fungi are the least resistant to the gas; the spore forms are very resistant.
Howard W. Robinson

A simple method for determining bacterial reduction of nitrates. Wm. A. Randall and Robert J. Reedy. *J. Lab. Clin. Med.* **25**, 315–16(1939).—A soln. of KNO_3 is added to a suspension of living bacterial cells, and after 15 min. to one hr. later the mixt. is tested for the presence of nitrites. This procedure was tested with 24 different species of bacteria and gave complete agreement

with the routine method which consists in inoculating broth containing KNO_3 with the test culture and testing for the presence of nitrites after incubation. Organisms which reduce the nitrate and utilize the nitrite will very likely give a pos. test with the simple method and a neg. test with the routine method. Howard W. Robinson

Bacterial reduction of trimethylamine oxide to trimethylamine. H. L. A. Tarr. *J. Fisheries Research Board Can.* **4**, 367–77(1939).—Only 3 of 30 microörganisms isolated at random from 7 samples of fish muscle in various stages of decompn. formed trimethylamine (I) from trimethylamine oxide (II). The reduction of II by the bacteria capable of effecting this reaction is due to the presence in their cells of an enzyme capable of activating the mol. and thus rendering it susceptible to reduction by any of a large number of dehydrogenase systems. T. therefore questions the use of the test for I to det. spoilage in fish. J. J. Willaman

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D—BOTANY

THOMAS G. PHILLIPS

Accumulation of carbohydrates in leaves previously held in the dark. Paul P. Stanescu. *Compt. rend.* **209**, 803–5(1939); cf. *C. A.* **21**, 2292.—The daily rhythmic accumulation of carbohydrates in the leaves of *Prunus armeniaca* L. is faithfully reproduced by leaves maintained in the dark for different intervals prior to the expt. Leaves in which the photosynthesis was allowed to begin after 1 p. m. no longer presented the curves characteristic of the forenoon synthesis. Rachel Brown

The behavior of Phoma betae Frank. toward boron. O. Verona and I. De Marchi. *Ann. facoltà agrar. univ. Pisa* [N. S. 3rd] **2**, 645–54(1939).—B (as boric acid or Na borate) stimulates growth of *P. betae* at the concn. 0.01–0.02%; at a greater concn. it inhibits the development of the fungus. The cultures are not damaged by strongly alk. agents. G. A. Bravo

Notes on the Cordeauxia edulis or gehèb. P. Brilli and S. Mulas. *Agr. coloniale* (Italy) **33**, 565-70(1939).—*C. edulis* Hemsl. of the Italian Somaliland is a shrub that grows in sandy soils low in Ca and rich in Si and Fe. The rind and the almond of the fruit (edible) contain, resp., H_2O 10.71, 7.82; oil (of acid no. 1.93) 0.30, 12.44; ash 1.43, 3.01 (P_2O_5 in the ash 0.63%); protein 4.75, 11.81; cellulose 13.70, 3.36; N-free ext. 69.38, 61.56; reducing sugars (of the total fruit) 5.32, sucrose 11.61%. The leaves contain a red coloring matter, turning purple with alkali and are used for the prepn. of a tea substitute. G. A. Bravo

The culture of Hevea in Indochina. A. Thomas. *Rev. gén. caoutchouc* **16**, 248–56, 290–6(1939).—An illustrated description of present developments. C. C. Davis

Physiology of naphthoquinones and tannins in plants. Walter Lang. *Pharm. Zentralhalle* **80**, 713-16(1939).—A preliminary study has been inaugurated on the relations obtaining in the quinone metabolism of certain plants, notably between naphthoquinones (juglone) and tannins. In all probability, tannin formation is definitely promoted by light, without which carbohydrate provision fails to effect this synthesis, while juglone is a building stone of the *Pterocarya* tannin. W. O. E.

Variations in chemical composition of leaves (of tobacco) according to position on the stalk. T. R. Swanback. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **422**, 22–6(1939); *Tobacco Substa. Windsor*, **1938**, *Rept.*—There is a gradual and regular increase in the percentage of total N leaf by leaf from bottom to top. The uppermost leaves contain about 3 times as much N as the lowest. Ca is highest in the lowest leaves and decreases regularly to the top of the plant. The larger percentage of Ca in the older leaves is probably due to the higher percentage of cell-wall materials and the longer period of pptn. of the Ca into insol. salts, a form unsuitable for translocation. Mg follows the same course as Ca. There is only 1/3 as much Mg in the top leaves as in the lower fillers. K also shows a tendency to decrease at the top of the plant but the trend is not so definite. A wet season is always reflected in higher K and lower Ca in the tobacco leaves. C. R. Fellers

Influence of temperature on sensitivity to α-rays. M. Klusakova. *Compt. rend. soc. biol.* **132**, 280–2(1939).—Onion epidermis cells were almost as sensitive at 8° as at 28° to the lethal action of Po α-rays. L. E. Gilson

Formation of radiotoxins after irradiation with α-rays. F. Herčík and J. Zacek. *Compt. rend. soc. biol.* **132**, 283–4(1939); cf. *C. A.* **33**, 2940[8].—Expts. with onion epidermis gave inconclusive results. L. E. Gilson

Action of caffeine on vegetable cells. L. Montemartini. *Boll. soc. ital. biol. sper.* **14**, 618–19(1939).—Caffeine stimulated the cells of *Cladophora insignis* when used in concns. less than 0.05%. This action occurred best when the conditions of light and temp. were least favorable to photosynthesis. Helen Lee Gruehl

Inheritance of chemical composition by hybrids between N. tabacum and N. glauca. V. D. Tikhvinskaya. *Compt. rend. acad. sci. U. R. S. S.* **24**, 791–3(1939)(in English).—Growth expts. with seeds of *N. tabacum* 44/39 Dubeque and *N. glauca* and the hybrid F_1 with fertilizers NKP (2:2:1) and 2.3 g. of NH_4NO_3 dissolved in H_2O and supplied to the plants from below on June 30th were carried out, the vegetation period lasting 78, 120 and 85 days. The data (in table) of the chem. analysis of the leaves show that the hybrid plants approach *N. tabacum* in the content of total and protein N; the alkaloids are transmitted from *N. glauca*. The leaves of the hybrid and of *N. glauca* decrease in the alkaloid pptd. by silicotungstic acid until its content is only tenths and even hundredths of 1%; but the total of alkaloids increases quickly both in the hybrid and in *N. glauca*. Toward the end of the 2nd 10 days after flowering the amt. of alkaloids in the leaves of the hybrid plants is twice its former value. This means that the alkaloid of *N. glauca*, anabasine, is hereditarily transmitted. 7 references. A. H. Krappe

Action of chemical reagents on the inhibition of potato sprouting. G. I. Grechka. *Biokhimiya* **4**, 121–32(1939).—EtOH, in concns. of 2.5 ml. per 20 l. of space, has the property of inhibiting potato sprouting. The oxidase activity remains unchanged, whereas the catalase activity is somewhat raised. Once the alc. vapors are removed from the atm., protection from sprouting is lost. Treatment of potato tubers with a mixt. of chlorinated hydrocarbons (a by-product of Russian factories), in concns. of one to a thousand, for 24 hrs., inhibits sprouting for 2 months. H. Priestley

Effect of low temperatures on the reversibility of enzymic reactions as related to the hardiness of the plant. N. M. Sisakyan and B. A. Rubin. *Biokhimiya* **4**, 149–53(1939).—In nonhardy varieties of apple trees, the shift of enzymic equil. in the direction of hydrolysis and the loss of synthetic capacity occur at a higher temp. level than in the hardy sort. At low temps., the plant perishes because of this irreversible hydrolysis shift. H. Priestley

Participation of phosphatase in the synthesis of sucrose. A. L. Kursanov and N. N. Kryukova. *Biokhimiya* **4**, 229–40(1939); cf. *C. A.* **33**, 683[9].—Infiltration into chicory leaves of a mixt. of glucose, fructose and NaH_2PO_4 leads to an energetic formation of org. P compds. and sucrose. The synthetic action of invertase in the leaves of P-deficient sugar beets is only about a third of the normal value; infiltration of NaH_2PO_4 causes a lively sucrose synthesis. During P starvation, the leaves of the sugar beet contain only about half the normal amt. of hexose monophosphate. The amt. of hexose diphosphate is only slightly lower. Plants suffer during P starvation because of their inability to form sufficient hexose monophosphate, thus sharply decreasing sucrose synthesis. In most plants, the synthesis of sucrose from fructose is

much more vigorous than from glucose or invert sugar. The rate of sucrose synthesis in plants in many cases is limited by the amt. of fructose monophosphate present. H. Priestley 1

Sources of vitamin C formation in the living plant cell. B. A. Rubin, E. V. Artsikhovskaya, N. S. Spiridonova and O. T. Lutikova. *Biokhimiya* 4, 260–7(1939).—The ascorbic acid content increased when wheat sprouts were infiltrated by a soln. of sucrose. In a N atm., no increase was observed, whereas in O, the increase in ascorbic acid as a result of the infiltrated sugar was 2.5 times the normal content. **Oxidation processes in living tissues and the changes in their vitamin C content.** *Ibid.* 268–75.—Formation of vitamin C in germinating seeds is increased when the cells are supplied with a good source of O. Depressing the oxidative processes leads to a fall in the vitamin C content. H. Priestley 2

Differences in the dehydrogenase content of pea seeds. E. V. Dodonova. *Biokhimiya* 4, 342–51(1939).—As is well known, marked qual. differences are shown by dehydrogenase obtained from various sources in the plant world. Differences in enzymic activity of various strains of peas are discussed. Wrinkled peas have a higher dehydrogenase content than round peas. On hybridization, the F_1-hybrids contain an amt. of dehydrogenase intermediate in value to that of the parents. Ripe pea seeds show a lower dehydrogenase content than unripe seeds. H. Priestley 3

Localization of some chemical constituents in the vegetable cell. II. A. M. Goldovskiĭ and M. Z. Podol'skaya. *Biokhimiya* 4, 352–5(1939); cf. *C. A.* **32**, 3785⁹.—The carotenoids in the sunflower seeds are localized in the gel (nonlipoid) phase. During the mfg. process, the carotenoids may pass from the gel phase into the oil. H. P. 4

Action of potassium-nitrogen nutrition on the carbohydrate metabolism of the rubber plant Taraxacum koksagyz Rodin. A. Kalinkevich. *Biokhimiya* 4, 381–91 (1939); cf. *C. A.* **33**, 3952⁴.—The changes in the amt. of various sugars in the leaves and roots of kok-sagyz were detd. at various phases of development. An abundance of N and K brings about an increase in the sugar content. H. Priestley 5

Importance of partial proteolysis of root proteins for the hardiness of clover. V. V. Koperzhinskiĭ. *Biokhimiya* 4, 404–10(1939).—The hardy variety of clover is characterized by the ability to attain partial proteolysis of the protoplasmic proteins. The simpler proteins formed are less subject to denaturization on freezing. H. P. 6

The specific rotation of wheat and legume starch. M. I. Knyaginichev and Yu. K. Palilova. *Biokhimiya* 4, 423–33(1939).—The starch from primitive varieties with scaly grain has a lower sp. rotation (199.8°) than the starch of cultivated varieties with naked grain (204.0°). The starch from legumes has a lower sp. rotation (192.7°) than wheat starch. The value of the sp. rotation runs parallel with the degree of evolutionary development. H. Priestley 7

New investigations on the growth of the plant cell wall. Studies on the growing cotton hairs. Kurt Hess. *Klepzig's Textil-Z.* **42**, 629–32(1939).—Chem. and phys. studies reported show that the growth of the cell wall during the stage of the lengthening of the cell differs fundamentally from that during the stage of the thickening of the wall. The noncelluloses (waxes, phosphatides, proteins, etc.) are most active during the elongation stage (primary wall) and exert very little influence during the formation of the secondary wall. Cellulose is present in the primary wall only in small amts. When the noncelluloses are removed the cellulose arranges itself in the primary wall spontaneously in accordance with the lattice structure of the secondary wall, while the primary wall acquires the characteristic properties of thick walls. This artificial production of secondary-wall cellulose with the properties of ripe walls from irregularly arranged primary cellulose makes it likely that in the primary wall the cellulose formation is retained in a state which is passed *in vivo* during the formation of the secondary-wall cellulose. The mechanism of cellulose formation, therefore, involves the production of cellulose without any lattice structure and the subsequent action of lipoid-sol. substances which bring about the migration of the producing phase and thus form the lattice structure that is responsible for the properties of the secondary wall. Leopold Scheflan 8

Photoperiodic responses of several varieties of soybeans. H. A. Borthwick and M. W. Parker. *Botan. Gaz.* **101**, 341–65(1939); cf. *C. A.* **33**, 6371¹.—A study of floral differentiation was made upon 13 varieties of soybeans with 9 different photoperiods (8–24 hrs.). All varieties which normally mature seed in the field in 105 days or less initiated flower primordia under all photoperiods. Varieties requiring 125–175 days to mature seed did not initiate primordia under photoperiods longer than 16 hrs. The initiation of primordia in many varieties under continuous light showed that darkness is not a necessary condition but initiation proceeded more rapidly if there was a daily alternation of light and dark. Chem. analyses of the varieties Agate (initiating primordia under a 16-hr. photoperiod) and Biloxi (not initiating primordia under a 16-hr. photoperiod) were made weekly. Agate contained less total and sol. N and more carbohydrates than Biloxi. Starch reached a max. in Agate at 3 weeks and declined with age but in Biloxi a max. had not been reached in 6 weeks. The max. carbohydrate content in Agate occurred at the time floral initiation was beginning. J. T. S. 9

Effects of temperature, calcium and arsenious acid on seedlings of Poa pratensis. Aubrey W. Naylor. *Botan. Gaz.* **101**, 366–70(1939).—$CaCO_3$ had a depressing effect on germination of seed and on yield of dry matter up to 35 days of growth but at 90 days $CaCO_3$ had increased top growth by 33%. Temp. is more important than $CaCO_3$ in producing root growth which was greater at 15° than at 25°. Under conditions of high temp. (22–25°) liming shortly after germination may be most favorable for the establishment of a good stand. A concn. of arsenious acid of 0.01% improved germination and growth but concns. above 0.05% were toxic. Higher concns. of arsenious acid are required to kill the growing point than the leaves. Arsenious acid has a greater toxicity to *Poa pratensis* seeds than to some other grass seeds. J. T. Sullivan 10

Comparison of growth responses induced in plants by naphthaleneacetamide and naphthaleneacetic acid. John W. Mitchell and Wm. S. Stewart. *Botan. Gaz.* **101**, 410–27(1939); cf. *C. A.* **33**, 9371².—The growth responses in a no. of plants to naphthaleneacetamide (I) and to naphthaleneacetic acid (II) applied by different methods are described. Application of either I or II resulted in mobilization of solid materials toward the treated region. Mobilization was assocd. with secondary thickening in plants treated with I and with cellular proliferation when treated with II. J. T. Sullivan 11

Growth substances and gametic reproduction by Phycomyces. Wm. J. Robbins. *Botan. Gaz.* **101**, 428–49 (1939).—The intensity of gametic reproduction of *Phycomyces blakesleeanus* upon an agar medium contg. dextrose, asparagine, mineral salts and thiamine was decreased with the greater distance between the inocula and by larger amts. of asparagine. It was favored by increasing agar concn. and by the addn. of plant exts. The beneficial materials in agar could be extd. in part by dil. MeOH or by aq. pyridine. The addn. of plant exts. overcame in part the inhibitory effect of the larger amts. of asparagine. Little gametic reproduction was obtained at 25° in a liquid medium contg. the same nutrients unless a plant ext. was added. Conclusion: Growth substances in addn. to thiamine are concerned in the reproduction. J. T. S. 12

Evidence for auxin production in isolated roots growing in vitro. J. Van Overbeek. *Botan. Gaz.* **101**, 450–6 (1939); cf. *C. A.* **32**, 7961⁸; **33**, 5025³.—Isolated pea roots were cultivated *in vitro* under sterile conditions. Each week the roots were subcultured with the 10 mm. tip only and the remainder, approx. 700 mm., was discarded. The total amt. of auxin extd. from the discarded bases for 20 weeks was 9 times that extd. from the initial tip from which the cultures originated. At the end of 34 weeks the roots contained as much as 1000×10^{-6} γ indoleacetic acid equivs. of auxin per root. J. T. Sullivan 13

Vernalization of Marquis wheat and other spring cereals. D. J. Wort. *Botan. Gaz.* **101**, 457–81(1939).—Two microchem. methods were used to diagnose the vernalized state of Marquis wheat. Treatment of embryos with $FeCl_3$, washing, and then treating with $K_4Fe(CN)_6$ showed a change in the ability of the growing point to reduce $FeCl_3$ as vernalization progressed. A shifting of the isoelec. point of the embryo tissues from pH 5.32 to 4.88 upon completion of vernalization was detected by the use of McIlwain's buffers and staining with eosin and methylene blue. The results of treatments of wheat, oats, barley and rye with 125 different combinations of vernalization factors are described. J. T. Sullivan 1

Further experiments on the relation of vitamin B_1 to the growth of green plants. James Bonner and Jesse Greene. *Botan. Gaz.* **101**, 491–500(1939); cf. *C. A.* **32**, 9185[5].—The addn. of vitamin B_1 (I) to plants in culture increased the dry wt. The effect is lasting rather than temporary. Plants which did not respond to I contained more I in the leaves than plants which did respond to its addn. It is suggested that the amt. of I synthesized by the leaves of a given species regulates its response to addns. of I and that the leaf content may be used to diagnose whether or not addn. of I would promote growth. The leaves of plants supplied with I contained more I than plants not supplied. J. T. Sullivan 2

Chemistry and bromatology of mangarito and mandioquinha. Maria Conceição Fonseca Monteiro and Laura Abrantes Bueno. *Arquiv. hig. saúde pública* (São Paulo) **4**, No. 6, 69–71(1939).—Tubers of *Caladium sagittifolium* V. contain in the dry substance ash 4.87, sugar (traces), starch 71.68, fat 0.86, nitrogenous substances 12.36, cellulose and undetermined matter 10.21%. The normal moisture content is 67.44%; the corresponding figures for tubers of *Chaerophyllum bilbosum* L. are 4.30, traces, 79.94, 0.66, 5.10, 6.98 and 68.45%. O. W. W. 3

Excretion of thiamine and biotin by the roots of higher plants. P. M. West. *Nature* **144**, 1050–1(1939).—This work was designed to explain the higher microbial population in the soil in the immediate vicinity of the roots of higher plants. One hundred representative bacteria were isolated from each of the rhizospheres of flax grown in the green house and of tobacco grown in the field. A similar no. of control organisms was isolated from soil outside the zone of root influence. All organisms were then grown on 2 media, one of which contained cysteine, *m*-inositol, thiamine, β-alanine, nicotinic acid and biotin, the other of which did not. In every case those organisms that depend on previously synthesized growth factors were markedly more abundant in the rhizosphere. Flax seeds were grown under sterile conditions in water culture. The solns. were concd. and assayed for thiamine by the *Staphylococcus aureus* test and for biotin by *Rhizobium trifolii*. Measurable amts. of both substances were found. J. J. Willaman 4

Analysis and integration of various auxin effects. I. F. W. Went. *Proc. Acad. Sci. Amsterdam* **42**, 581–91 (1939).—A discussion of the mechanism of action of growth hormones. Four sep. reactions are recognized: preparatory reactions for both growth and for root formation, the growth reaction proper and root formation proper. II. *Ibid.* 731–9.—Six stages are recognized in the growth of a cell, and each of these is occasioned by the interaction of several substances and not by the action of a single growth substance. These interactions are shown in a diagrammatic scheme. J. J. Willaman 5

Value of plasmolytic methods for the demonstration of the active asparagine intake by Vallisneria leaves. W. H. Arisz and P. J. S. van Dijk. *Proc. Acad. Sci. Amsterdam* **42**, 820–31(1939).—By analysis of leaves for N before and after submerging in asparagine soln. and by measuring the osmotic pressure of the cells by incipient plasmolysis it was shown that asparagine is taken up by the leaf and that it is almost quantitatively responsible for the increase in osmotic pressure. The presence of O was required for the uptake of asparagine, but not for glycerol. J. J. W. 6

Observations in plants on the production of tumorous growths simulating those of cancer. M. M. Galiardo. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 59–66 (1939).—Tumors were induced on 6 species of trees by cutting off the main stem, by sprinkling the branches with human urine, or by placing excessive amts. of animal excrements under the tree. G. believes that tumors are caused by excessive nutrients in the tissues, and that these nutrients, probably nitrogenous, must be added to the list of plant carcinogenic substances. J. J. W. 7

Fat of spiny fern (Maizite) **27**. Ext. of spiny fern (Maizite) **17**. Tests on plant tissue as guide to soil's available nutrients (Wark) **15**. Chem. compn. of wood (Sharkov, Sartoniya) **23**. 8

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E—NUTRITION

PHILIP B. HAWK

The effect of treated fats on vitamin A potency. R. T. Harrelson, P. Mabel Nelson, Belle Lowe, H. C. Dyme and V. E. Nelson. *Iowa State Coll. J. Sci.* **13**, 353–64 (1939).—Some oleomargarines and some coconut oils after heating to 102–5° in thin layers for 24 hrs. destroyed vitamin A in butterfat to which they were added, and a few other heated samples did not. Rancid fats also destroyed vitamin A. Peroxides are not the only destructive factors. Heating below 80° did not produce the destructive effect. Addn. of heated fats to doughs to be baked may destroy vitamin A. The significant factors are not completely known. F. E. Brown 16

The relation of the vitamin B complex to the nutrition of domestic animals. Aaron Arnold and C. A. Elvehjem. *J. Am. Vet. Med. Assoc.* **96**, 56–61(1940).—A review with 48 references. Rachel Brown 17

Nitrogen metabolism and vitamin B_1 under various conditions of nutrition in birds. B. A. Lavrov and Mme. N. S. Yarusova. *Bull. soc. chim. biol.* **21**, 1139–50(1939); cf. *C. A.* **32**, 6698[8].—When pigeons were fed only raw buckwheat their N balance was very slightly neg., but if the buckwheat was heated to destroy vitamin B_1 the N balance became strongly neg. In pigeons deprived of all food vitamin B_1 had no effect on the N balance. In pigeons on a protein-free starchy diet absence of B_1 provoked a marked N excretion and hastened the appearance of polyneuritis, but if sufficient B_1 was fed the N catabolism was decreased to a low level and life was greatly prolonged. L. E. Gilson 18

Relation between acetylcholine and vitamin B_1. V. Erspamer. *Boll. soc. ital. biol. sper.* **14**, 655–6(1939).—Vitamin B_1 had no effect on the fall in blood pressure produced by acetylcholine. On living organs concns. of vitamin B_1 less than $^1/_{100,000}$ did not influence the action of acetylcholine while greater concns. were antagonistic. Injections of 30–100 mg. aneurine/kg. (not lethal) followed 19

by nonlethal doses of acetylcholine caused death whereas lethal doses of aneurine followed by lethal doses of acetylcholine inhibited the toxic effects and retarded death. Helen Lee Gruehl

Ascorbic acid and vagal excitability. Lorenzo Cioglia and Francesco Infantellina. *Boll. soc. ital. biol. sper.* **14**, 736–8(1939).—Ascorbic acid caused an elevation of the threshold of excitability in the peripheral branches of the vagus and a lowering of the threshold in the central vagus. Helen Lee Gruehl

Bacillary dysentery developing in monkeys on a vitamin M-deficient diet. Martha Janota and G. M. Dack. *J. Infectious Diseases* **65**, 219–24(1939).—Captive monkeys (*Macaca mulatta*) that are carriers of *Bact. dysenteriae* (Flexner) generally developed bacillary dysentery on a vitamin M-deficient diet. Some animals are more readily depleted than others. Monkeys on diets deficient in vitamin M and one or more of the following, A, C or D, did not react differently as far as colon lesions and infection with *Bact. dysenteriae* were concerned than did monkeys on only the vitamin M-deficient diet. J. H. Lewis

Deficiency of vitamin B_1 in man as determined by the blood cocarboxylase. Robert Goodhart and H. M. Sinclair. *J. Biol. Chem.* **132**, 11–21(1940); cf. *C. A.* **33**, 5014[9], 8272[7].—The amt. of cocarboxylase in the blood in general runs closely parallel to the total amt. of vitamin B_1 and its detn. provides a reasonably accurate index of the degree of satn. of the body with cocarboxylase and vitamin B_1. The only exceptions are the rare cases in which the ability of the tissues to phosphorylate the vitamin is apparently diminished, the cases in which the blood cell count is greatly increased (polycythemia vera or myeloid leucemia) and patients who have recently received intensive vitamin B_1 therapy over a very short period of time. Deficiency of vitamin B_1 is assocd. with cases of anemia, of subacute combined degeneration of the cord and of certain psychiatric disorders and there is an etiological relationship between vitamin B_1 deficiency and "alc." neuritis, nutritional neuritis and some cardiovascular disturbances. A definite deficiency of vitamin B_1 is not uncommon among hospital patients in England, but it is emphasized that vitamin deficiencies in man are almost always multiple and are therefore usually inadequately treated by administration of a single pure vitamin. A. P. Lothrop

The relation of vitamin B_6 and pantothenic acid to factor W studies. Simon Black, D. V. Frost and C. A. Elvehjem. *J. Biol. Chem.* **132**, 65–75(1940); cf. *C. A.* **32**, 981[6].—Purified prepns. of factor W still contain considerable amts. of pantothenic acid, and part of the growth-promoting activity of the prepns. is due to this vitamin, but the prepns. also contain at least 1 other factor which is required in addn. to pantothenic acid for normal growth in the rat. The factor W assay ration previously used was deficient in vitamin B_6 and significant growth responses are obtained when synthetic vitamin B_6 is added to that ration plus factor W concentrates. The original factor W has been sepd. by an acid-ether extn. into 2 factors, one of which is pantothenic acid. It is suggested that the term, factor W, should be reserved for the factor in the residue. A procedure for the prepn. of highly purified factor W concentrates is described. A. P. Lothrop

The relation between factor U and vitamin B_6. E. L. R. Stokstad, P. D. V. Manning and R. E. Rogers. *J. Biol. Chem.* **132**, 463–4(1940); cf. *C. A.* **32**, 9198[8].—Factor U is a H_2O-sol. growth factor required by chicks receiving a diet consisting essentially of polished rice and washed fish meal supplemented with riboflavin and the chick antidermatosis factor. It has now been shown that this diet is deficient in 2 factors, 1 of which is vitamin B_6. The greater part of the unknown factor U which is present in yeast is adsorbed on fuller's earth, the eluate showing some activity and the filtrate being entirely inactive. A. P. Lothrop

Anemia in chicks caused by a vitamin deficiency. Albert G. Hogan and Ernest M. Parrott. *J. Biol. Chem.* **132**, 507–17(1940); cf. *C. A.* **30**, 750[7].—When chicks receive a simplified ration contg. the well-recognized vitamins and in addn. a 95% alc. ext. of dried liver, they grow slowly and become anemic. The red cell count, the percentage of hemoglobin and the red cell vol. are all decreased. The amt. of hemoglobin per cell is increased and the cells are longer and wider than normal and are less fragile and the vol. of the individual cells is increased. The antianemic agent has not been identified with any vitamin previously described. It belongs to the old vitamin B complex and has been designated as vitamin B*c*, the *c* being added because the substance is essential for the chick. A. P. Lothrop

Essential fat acids, vitamin B_6 and other factors in the cure of rat acrodynia. H. A. Schneider, H. Steenbock and Blanche R. Platz. *J. Biol. Chem.* **132**, 539–51(1940).—Acrodynia, as it is known in the rat, can be cured by the so called "essential fat acids" and this action is independent of vitamin B_6. It can also be cured by rice bran concentrate and this action is independent of fat acids but dependent upon vitamin B_6 plus a 2nd "accessory factor" which is present in the filtrate from fuller's earth treatment of rice bran concentrate. Vitamin B_6 both in crude prepn. and in cryst. form has only a temporary effect on acrodynia in the absence of the 2nd factor. The Burr and Burr syndrome (*C. A.* **23**, 4501) could be produced by the addn. of dried brewers' yeast to the acrodynia-producing diet and was cured by both "essential fat acids" and rice bran concentrate. Gradations between the severe symptoms of acrodynia and the mild symptoms of the Burr and Burr syndrome were obtained by feeding increasing amts. of yeast. A. P. Lothrop

Vitamin A deficiency. III. Blood analysis correlated with a visual test. L. B. Pett and G. A. LePage. *J. Biol. Chem.* **132**, 585–93(1940); cf. *C. A.* **34**, 1058[7].—There is a definite correlation between the vitamin A level in the blood and the Pett visual test for vitamin A deficiency. Vitamin A in blood was detd. by a modification of Lindqvist's procedure (*C. A.* **33**, 2949[2]); an ordinary microcolorimeter was used. A. P. Lothrop

Vitamin deficiencies and the nervous system. Geo. R. Cowgill. *Yale J. Biol. Med.* **12**, 205–11(1939).—A consideration of the contributions of animal experimentation. G. H. W. Lucas

Vitamin A and organic metabolism. I. The action of vitamin A on protein metabolism in normal persons and in patients with liver disease, with special reference to deaminization and urea formation. Marco Pescarmona. *Arch. sci. med.* **68**, 547–62(1939).—The amino acid and urea N in blood and urine in persons with and without liver disease was studied during a 12- to 15-day treatment with 120,000 units of vitamin A daily. The blood showed only insignificant changes, but in the urine the amino acids decreased while urea was augmented. The difference was more marked in hepatic patients. A. E. Meyer

Role of vitamins and calcium in the diet in the utilization of proteins. K. P. Basu and K. Gupta. *J. Indian Chem. Soc.* **16**, 449–59(1939).—Absence of vitamins A, B_1, B_2 (all heat-stable factors), B complex or D from the diet of rats for a short time has little or no effect on the digestibility of casein. However, absence of any of these vitamins increases the percentage of digested casein that is retained, i. e., the biol. value. Autoclaving casein decreases the biol. value and the digestibility; while the absence of Ca has no effect on the former but increases the latter. Dorothy A. Meyer

The William Henry Welch lectures. I. New light on the biological role of vitamin E. Herbert M. Evans. *J. Mt. Sinai Hosp., N. Y.* **6**, 233–44(1940).—Review with 41 references. J. Pinchack

Digestibility of oxidized soybean oil (Palsgaard emulsion oil). H. R. Kanitz. *Z. Untersuch. Lebensm.* **78**, 385–6(1939).—The material sol. in petr. ether in the excreta of 2 groups of rats during a preliminary bread diet period was detd. When 84.1 mg. and 336.4 mg. of oxidized soybean oil (I) per day, per rat were added the amts. of excreted fat increased to, resp., 7.67 and 8.83% based on the resp. amts. of I fed. The digestibility was 91.2–92.3%. This corresponds to the digestibility of cacao fat. M. M. Piskur

Oxygenase properties of carotene. O. Ya. Borodina. *Biokhimiya* 4, 356–66(1939).—Carotene functions as an oxygenase in the presence of a peroxidase of plant or animal origin. Unsatd. vegetable oils inhibit the O action of carotene. H. Priestley

The effect of vitamin A upon hair and nail growth. Bruno Schwemmler. *Münch. med. Wochschr.* 86, 1228–7 (1939).—Vitamin A stopped loss of hair in patients suffering from hyperthyroidism after 8 to 10 days, and increased both hair and nail growth. Appreciable growth was observed after 24,000 international units was given twice daily. When 28,000 to 48,000 units 3 times daily was given, the av. increase in growth of hair was between 1.2 and 1.5 mm. Vitamin A in thyrotoxicosis inhibits the falling out of hair by fixing the hair to the follicle and favorably affecting cornification in the hair follicle and nail bed. Vitamin A also has a sedative action and in these patients sleep was deeper and more restful. M. M. R.

Prophylaxis and therapy of vitamin B hypovitaminoses with concentrated yeast (Philocytin). Friedrich Diehl. *Münch. med. Wochschr.* 86, 1301–5(1939).—Concd. yeast (4–5 g. 2 or 3 times a day) administered after meals gave good results in vitamin B deficiency. This prepn. supplies the organism with all factors of the vitamin B complex and is indicated in disturbances of metabolism due to long-lasting fever and Basedow's disease, polyneuritis of alcoholism and pregnancy, and myelosis. Maurice M. Rath

Vitamin C balance in tumor patients. Silvio Antes and Clemente Molo. *Schweiz. med. Wochschr.* 69, 619–23 (1939). In 62 patients with tumor diseases, there was severe vitamin C deficiency as detd. by examn. of the urine by Jezner and Niederberger's titration method. In spite of a considerable deficiency, no scorbutic symptoms were ever noted. The hypovitaminoses among patients with malignant tumors are apparently the result of cachexia and do not depend upon alimentary injuries. Administration of vitamin C to these patients can noticeably reduce the deficiency symptoms. Maurice M. Rath

Vitamin C requirement of the child. W. Tobler *Schweiz. med. Wochschr.* 69, 677–9(1939).—A review. Maurice M. Rath

Heat-labile factors necessary for the proper growth and development of cats. F. M. Pottenger, Jr., and D. G. Simonsen. *J. Lab. Clin. Med.* 25, 238–40(1939).—In a study covering a period of 3 yrs., kittens born of parents fed cooked food (cooked meat, dry feed raw milk and cod-liver oil) showed many deficiencies, such as low birth wt., poor dental development, and disturbance of genital development, when compared to a control group of kittens born of parents fed raw food. The defects were increased in the second and third generations and a study of the microscopic sections of the lungs of this group showed hyperemia, some edema, and partial atelectasis, while those most deficient showed bronchitis and pneumonitis. The third-generation kittens of parents fed cooked food never survived more than 2 months. H. W. Robinson

Ultraviolet irradiation and vitamin C° metabolism. Claus W. Jungeblut and Rose R. Feiner. *J. Lab. Clin. Med.* 25, 263–9(1939).—The levels of vitamin C in the brain, liver, spleen, and adrenal gland of guinea pigs, rabbits and rhesus monkeys exposed to prolonged ultraviolet irradiation, that failed to produce any evidence of erythema on the exposed skins, were identical with those in the same organs of control animals. There was a drop in the content of vitamin C in these organs when a superficial burn was produced on the skin of guinea pigs before exposure. A derangement of vitamin C metabolism by excessive doses of radiant energy apparently takes place only when there is injury to the tissues. H. W. R.

Whey as a source of vitamins and vitamin products. G. C. Supplee. *Ind. Eng. Chem.* 32, 238–40(1940).—Removal of butterfat, casein, lactalbumin, Ca, P and lactose from milk by the usual methods leaves a soln. of mineral substances, small amts. of protein to which sterols are bound, residual lactose and water-sol. vitamins. It was first shown that the addn. of 7–12% of this fraction to a basal ration of butterfat, casein, lactose, minerals and cod-liver oil is required for normal growth, reproduction, lactation and rearing of the young. Later studies showed that a combination of equal parts of milk vitamin fraction and crude rice polishings is a sufficient addn. to a basal ration of purified protein, dextrin, mineral salts, Crisco and cod-liver oil to maintain normal development and high fecundity in both sexes of 8 successive generations of white rats. In a study extending from 1923 to 1936, over 4000 litters of white rats were started from a single colony. During the first 7 years of this period fluid whole milk (*ad lib.*) was a part of the basal ration of ground whole yellow corn, linseed meal, crude casein, ground alfalfa leaf meal, NaCl and Na_2CO_3. The av. no. per litter was 7.058. During the following 6 years, whole milk powder plus milk vitamin concentrate replaced the fluid milk. The av. no. per litter uniformly increased annually to 8.377 for 1936. Vegetable, butterfat, meat and cereal supplements and ultraviolet irradiation had failed to halt the progressive decline in fertility and ability of the mother to raise the young. The record litter was 23, obtained in 1935. The following factors have been directly identified in whey: G, B_1, B_6, K, provitamin D, and the estrogenic hormone; E and W are assumed to be present. Pptd. lactalbumin carries 7% lipide matter, 40–50% of which is cholesterol, activatable to a D potency of 1000 U. S. P. units per g. The remaining lipide has substantial K activity, as does also the dealbuminized whey. The following supplements were found to be equiv. in protecting rats from acrodynia: whey concentrate 200–300 mg., dry yeast 50–100 mg., water-sol. concentrate from rice polish 35–50 mg., fluid whole milk 4–5 cc., per day. Whey is so rich in vitamin G that it has become a source of com. quantities of the cryst. product. H. K. Salzberg

Seasonal variations in the vitamin A content of certain visceral organs of the geelbek or Cape salmon (Atractoscion aequidens C. and V.). Christopher J. Molteno and Wm. S. Rapson. *Biochem. J.* 33, 1390–3(1939).—The total vitamin A of the liver of this fish decreased at the onset of intensive feeding and then gradually increased. The amt. of vitamin A in the visceral oils was directly related to the oil content of the viscera. There was a direct relation between the amt. of oil in the liver and its iodine value, which varied inversely with the percentage of vitamin A in the oil. The results were in accord with the view that vitamin A is assocd. with the process of fat assimilation in the geelbek. E. W. Scott

Vitamin P. Harold Scarborough. *Biochem. J.* 33, 1400–7(1939).—The evidence upon which the existence of vitamin P is based is reviewed; on the basis of the published work there is no conclusive proof of its existence. However, in human subjects suffering from multiple vitamin deficiency the capillary fragility was increased. Orange and lemon juices and certain exts. from them contained a substance, flavanone in nature, which increased the resistance of capillary walls to pressure. This substance was not ascorbic acid. E. W. Scott

Inhibition of experimental production of liver cancer by feeding liver. A study in nutrition. Waro Nakahara, Kazuo Mori and Tadasi Huziwara. *Gann* 33, 406–28 (1939); cf. *C. A.* 33, 5899².—Each group of normal albino rats was maintained upon one of the following diets in which 0.2 to 0.6 g. of dimethylaminoazobenzol (butter yellow) was mixed for each kg. of food. It was supplemented with a small slice of fresh carrot every other day. The diets tested for the preventive effect upon production of liver cancer were: polished rice + dried beef liver; polished rice alone; polished rice + purified protein; polished rice + butter; polished rice + inorg. salt mixt.; polished rice + vitamin B_1; polished rice + vitamin B_6; polished rice + nicotinic acid; polished rice + liver eluate (as vitamin B_2); polished rice + nonadsorbable liver filtrate (as vitamin L and factor W); and polished rice + purified protein + butter + salt mixt. + vitamin B_1 + nicotinic acid + liver eluate and filtrate. In most of the expts., all rats living for 150 days were killed for examn. The results showed that feeding of liver prevented the hepatoma production. At the 200th day, the liver of the liver-fed rats showed slightly uneven surface and slight

proliferation of connective tissue. From 50 to 100% of the rats on the other diets showed liver cancer. K. S

The effect of vitamin B_1 on blood calcium. Heiki Lee. *J. Chosen Med. Assoc.* **29**, 2113–19(English abstr. 137–8) (1939).—One hr. after injection of 2–3 mg. B_1 into healthy men or dogs, serum Ca rises 1.4–0.9 mg. per 100 cc. and returns to normal after 3 hrs. This effect of B_1 on serum Ca occurs also in splenectomized animals, but not in the parathyroidectomized; this suggests that B_1 must act through the parathyroid. S. Tashiro

The effect of diet on the severity of scurvy. H. Yokohama. *J. Chosen Med. Assoc.* **29**, 2256–306(German abstr. 143–4)(1939).—Severity of scurvy of guinea pigs fed with scurvy-producing diets depends upon the compn. of such diets. When the diet is rich in carbohydrate, scurvy is very mild. When fat dominates, it is very severe; with protein the severity is intermediate. S. Tashiro

Biological standardization of vitamin A. P. Tainsh and H. Wilkinson. *Chemistry & Industry* **1939**, 1051–2.—Rats fed on 2 basal diets, the Morgan and the British Pharmacopeia 1936, gave different responses to both vitamin A and to β-carotene. There was also a difference in liver storage and in fecal excretion of a carotenoid. T. and W. emphasize the importance of arriving at a basal diet free from these discrepancies. J. J. Willaman

Vitamin K-active derivs. of 2-methyl-1,4-naphthohydroquinone (Ansbacher, *et al.*) **10**. Synthesis of vitamin K_1 (Fieser) **10**. Water-sol. antihemorrhagic esters (Fieser, Fry) **10**.

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F—PHYSIOLOGY

HOMER W. SMITH

Chemical nature of iodothyroglobulin. I. Abelin and A. Keller. *Helv. Chim. Acta* **22**, 1365–9(1939); cf. *C. A.* **28**, 1756[1].—Thyroid exts. of cattle, sheep and swine were freed from fat and connective tissue, finely chopped and shaken with an equal vol. of 1% NaCl soln. contg. 0.02% NaOH. After filtration the residue was similarly extd. and the combined filtrates were shaken 24 hrs. with satd. $(NH_4)_2SO_4$ soln. The thyroglobulin ppt. was freed from $(NH_4)_2SO_4$ by dialysis and stabilized by addn. of tricresol. The dialyzed soln. was filtered and brought to a pH of 6. After standing, a ppt. (I) formed which had an I content of 0.20–0.25%. The filtrate from the last pptn. was brought to a pH of 4, thereby pptg. a solid (II) contg. 0.4% I. From several thyroid extns. at a pH of 6 a product (III) contg. 0.1–0.14% I was obtained. I, II and III were H_2O-sol. and gave the ordinary protein and I reactions. They were further purified by a second pptn. at the appropriate pH. The total I content (*C. A.* **6**, 2901) of I, II and III was 0.28, 0.41 and 0.14%, resp., and the thyroxine I content (Blau, *C. A.* **27**, 5767; **29**, 5471[7]) was 21.19, 19.80 and 19.54%, resp., of the total I content. I, II and III were fed to rats. II and III produced practically the same increase in basal metabolism, while the increase caused by I was stronger and faster; no strict relationship between activity and I content could be deduced. A mixt. of 3 parts of II with 4 parts of I with resulting I content of 0.33% worked stronger and quicker than II which had a higher I content (0.41%). In 14 days the rats treated with I and II lost 29 g.; those treated with I or II lost 11–13 g. The mixt of I and II elevated the respiratory frequency from 88 to 126 per min.; I or II from 84 to 97. The activity of iodothyroglobulin (IV) cannot be interpreted as a mere sum of the physiol. effects of its I-contg. substituents. IV is not a homogeneous substance. IV can be sepd. into 3 fractions contg. organically bound I which varies in amt. from fraction to fraction. Each fraction contains thyroxine and the nature of the protein combined with the thyroxine seems to be of physiol. significance. David E. Adelson

Action of nicotinic acid on the erythrocytes and leucocytes of blood in normal animals. Antonietta Orrù. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 333–43 (1939).—Intramuscular injection of nicotinic acid in rabbits, guinea pigs and doves produces cycles of increased production of red corpuscles. The reason the red corpuscles do not show a continued increase during the period of administration of nicotinic acid, is probably due to the exhaustion of some other factor concerned in the manuf. of erythrocytes, which must be replenished by diet before nicotinic acid can again accelerate the erythrocyte formation. Increase in lymphocyte formation was also noted on administration of nicotinic acid. A. W. Contieri

Tissue glutathione after extirpation of the spleen in dogs and rabbits. F. Šantavý. *Compt. rend. soc. biol.* **132**, 285–6(1939).—In dogs, one month after splenectomy the reduced and total glutathione of the blood, liver, lungs, pancreas, kidneys and adrenals showed a considerable decrease. In rabbits under the same conditions the glutathione showed no change or a slight increase. L. E. G.

Peripheral vascular action of estrogen, observed in the ear of the rabbit. Samuel R. M. Reynolds and Frances I. Foster. *J. Pharmacol.* **68**, 173–84(1940).—In ovariectomized rabbits the intramuscular injection of 250–10,000 units of estrone, estradiol, estradiol dipropionate or amniotin caused dilatation of the capillaries and venules of the ears. Arterial blood pressure was not affected. L. E. Gilson

Variations of blood calcium and phosphorus and the calcium:phosphorus ratio in the postoperative period after the removal of osseus tissue in otorhinolaryngology. Giulio Zanzucchi. *Boll. soc. ital. biol. sper.* **14**, 724–5(1939).—In the majority of cases studied Ca increased in the first 24 hrs. (av. increase 12.92%) and continued to increase during convalescence In general P diminished. The Ca/P ratio increased from an av. of 2.83 before the operation to 3.39 after 24 hrs. It reached 4.36 during convalescence. Helen Lee Gruchl

The correlation of physicochemical properties of serum with its effect on the growth of tissues in vitro. I. The hydrogen-ion concentration of diluted serum. W. S. S. Ladell. *S. African J. Med. Sci.*, Feb. Suppl. to Vol. 4, 35–40(1939) —Five series of estimations were made. In 2 of them the serum was dild. with Tyrode soln. and in 3 the diluent was "embryo ext.," representing 1 chick embryo in 5 cc. of saline. The serum used was stale horse serum, different samples being used for each series. The Tyrode used contained 0.05 instead of 0.1% of bicarbonate and more $CaCl_2$ and $MgCl_2$ (0.04 and 0.02% instead of 0.02 and 0.01%, resp.) than that usually advised, but has given good results. The pH of various mixts. of serum with Tyrode soln. has been measured with the quinhydrone electrode. The diln. curves obtained are similar to those obtained on mixing 2 simple buffers. The pH of the Tyrode was lower and that of the serum higher than the point at which growth of tissues *in vitro* is optimal. The addn. of a small quantity of serum to Tyrode brings the pH to the optimal value. These facts may be correlated with the effect of various dilns. of serum upon the growth of tissues *in vitro*. 15 references. W. R. Henn.

Studies in the physiology of the embryonic nervous system. IV. Development of acetylcholine in the chick

embryo. Zing Yang Kuo. *J. Neurophysiol.* **2**, 488–93 (1939).—Assays for acetylcholine (I) in chick embryos aged 2–12 days by all six methods proposed by Chang and Gaddum (*J. Physiol.* **92**, 17–18(1938)) revealed that I was present in chicks as young as 2.5 days and that the I content increased up to the 4th day and thereafter fluctuated randomly. The I content showed no correlation with the development of synapses or primary sympathetic trunks (found in the chick nervous system from the end of the 3rd day), with the *anlagen* of the primary sympathetic trunks (which do not arise earlier than the 6th day), or with the spontaneous reflex movements (which appear only from the 4th day, increase in frequency up to the 8th day and thereafter steadily decrease). The results suggest that I is not concerned with transmission of nerve impulses in the embryo Marion Horn

The vitamin C content of the cerebrospinal fluid. VIII. The passage of vitamin C into the cerebrospinal fluid in cases of injured blood-brain barrier. Mitio Kasahara and Ituo Gamino. *Z. ges. Neurol. Psychiat.* **166**, 733–4(1939); cf. *C. A.* **33**, 8743⁸.—When ascorbic acid was injected intravenously into adult male rabbits, it appeared in the cerebrospinal fluid to a greater extent after meningeal irritation by subdural injection of 0.5 cc. 3% aleuronate than it appeared before such meningeal damage. M. Horn

The xanthoprotein colorimetric value of nondeproteinized cerebrospinal fluid in comparison with the remaining humoral syndrome. Trude Bruns *Z. ges. Neurol. Psychiat.* **166**, 759–87(1939).—The quant. xanthoprotein test (Becher's method, cf. *C. A.* **20**, 1666) performed on 229 samples of human spinal fluid gave values which roughly paralled the results of the usual tests for spinal fluid pathology (lipoid, sugar, globulin, sedimentation, etc.). In general spinal fluids which were normal by the usual tests showed xanthoprotein values within normal limits (20–32 by Becher's scale), while those which were pathol. by the usual tests showed xanthoprotein values occasionally below the normal limit but usually far above, extending up to 1000. The highest xanthoprotein values were found in meningitis, untreated paresis and diabetic neuritis. However, 32 (14.5%) of the 229 samples showed no correlation between the results of the xanthoprotein and the other tests: in 11 cases the xanthoprotein values were elevated and the others normal, in 4 the xanthoprotein values were low and the others normal, and in 17 the xanthoprotein values were normal and the others pathol. It is suggested that the alterations in the tyrosine and tryptophan portions of the protein mols. in the cerebrospinal fluid, as shown by abnormal xanthoprotein values, may be the first signs of impending disturbance of the nervous system, and that the xanthoprotein test may hence provide a more sensitive indicator than the previously used tests for spinal fluid pathology. Marion Horn

The cerebrospinal fluid at various ages, with special reference to degeneration and senility. Carl Riebeling. *Z. ges. Neurol. Psychiat.* **167**, 133–46(1939).—Graphs are given, showing the changes in the protein, ammonia and water contents of the brain, and the protein, cell and ammonia contents of the cerebrospinal fluid from birth to senility, in man. Changes in the cerebrospinal fluid are discussed in relation to normal and pathol. changes in the brain. Marion Horn

Chemical changes in the blood vessels occurring with age. M. Bürger. *Z. ges. Neurol. Psychiat.* **167**, 273–80 (1939).—In human aortas from individuals aged 10–70 yrs., the cholesterol, Ca, total P and acid-sol. P contents increased with age, while the lipoid P and phosphatide contents did not change markedly and the total lipoid increased to 50 yrs. and then decreased somewhat. Aortas from cattle aged 1–15 yrs. and from horses aged 1–over 25 yrs. likewise showed an increase in cholesterol and Ca contents with age. The human, beef and horse aortas all showed decreases in N content and increases in the S/N ratio as the age increased. Apparently the protein in the aortas is replaced by chondroitinsulfuric acid in the aging process. Marion Horn

Radioactive phosphorus as an indicator of phospholipide metabolism. IX. The influence of age on the phospholipide metabolism of various parts of the central nervous system of the rat. The comparative phospholipide activity of various parts of the central nervous system of the rat. B. A. Fries, G. W. Changus and I. L. Chaikoff. *J. Biol. Chem.* **132**, 23–34(1940); cf. *C. A.* **33**, 9400⁹.—Phospholipide activity is highest in the rat on the day of birth in all parts of the central nervous system but there is a decline from birth until the rat attains a wt. of 50 g. which is so precipitous that when that wt. is reached the spinal cord retains only 5% of the activity present in the newborn animal. As growth proceeds beyond 50 g., the phospholipide activity decreases but at a much slower rate than between birth and 50 g. so that the spinal cord in a 200-g. rat possesses 20% of the activity present in a 50-g. rat. Only 15% of the activity is retained by the 300-g. animal. The forebrain, cerebellum and medulla also lose activity but the rate of decline is less than that which occurs in the cord. Phospholipide activity is highest in the spinal cord from birth to the time the rat reaches a wt. of 50 g. but after this the relative activities of forebrain, cerebellum and medulla rise steadily and by the time a wt. of 200 or 300 g. is attained they are as great in those divisions as in the cord or even greater. The phospholipide activity was studied by detg. the deposition of labeled phospholipide at 24- and 48-hr. intervals after administration of P^{32}. A. P. Lothrop

The biochemical behavior of lead. I. Influence of calcium, phosphorus and vitamin D on lead in blood and bone. Albert E. Sobel, Henry Yuska, David D. Peters and Benj Kramer. *J. Biol. Chem.* **132**, 239–65(1940).—The influence of the 3 dietary factors, Ca, P and vitamin D, must be considered in the biochem. behavior of Pb. Pb deposition in the bones can be explained by postulating that Pb, P and vitamin D form a system of Pb deposition analogous to the system of calcification. The addn. of Ca tends to remove P from the system for Pb deposition. The blood Pb values can be explained by assuming a relationship between blood Pb and dietary Pb to P ratios similar to the relationship between blood Ca and dietary Ca to P ratios. The influence of vitamin D on blood Pb is similar to its influence on blood Ca on corresponding dietary Pb to P ratios. Simultaneous Pb deposition and removal of Ca from bone is possible but increased calcification does not necessarily mean increased Pb deposition. It is concluded that Pb deposition is directed by a system of its own which is governed by the same laws as is Ca deposition but does not necessarily go in the same direction. The effect of Ca on the deposition of Pb is essentially competitive because it tends to remove P available for Pb deposition. Fifty references. A. P. Lothrop

Sulfonium reactions of methionine and their possible metabolic significance. Gerrit Toennies. *J. Biol. Chem.* **132**, 455–6(1940).—Methionine forms sulfonium compds. with MeBr or MeI which are H_2O-sol., neutral substances. The suggestion is made that the biol conversion of methionine into cystine might involve the formation of a sulfonium deriv. and the participation of hydroxyamino acids in the following manner: $HO_2CHNH_2(CH_2)_2SMe + HO_2CCHNH_2CH_2OH \rightarrow HO_2CCHNH_2(CH_2)_2S(Me)(OH)\text{-}CH_2CHNH_2CO_2H \rightarrow$ (by removal of MeOH and cleavage) $HSCH_2CHNH_2CO_2H$. Similar reactions may be postulated for hydroxyglutamic acid and threonine, and combinations of decarboxylation and ω oxidation could lead to the same final product. According to this hypothesis the —SMe group itself is an essential factor in the genesis of cystine from methionine. A. P Lothrop

Conversion of 3,17-etioallocholanedione into androsterone. Ralph I. Dorfman. *J. Biol. Chem.* **132**, 457–8 (1940); cf. *C. A.* **33**, 8749⁸.—Androsterone has been isolated from the urine of a man with evidence of deficient testicular secretion after feeding 100 mg. of 3,17-etioallocholanedione per day for 10 days. It thus appears that this latter substance may be an intermediate in the conversion of the testis hormone, testosterone, into the urinary androgen, androsterone. A. P. Lothrop

The factor curative of nutritional achromotrichia. Paul György, C. E. Poling and Yellapragada Subbarow. *J. Biol. Chem.* **132**, 789–90(1940); cf. *C. A.* **32**, 4201⁸.—

When concentrates of pantothenic acid with a degree of purification up to 40–50% are added to an achromotrichia-producing diet, the cutaneous lesions show distinct regression and the blackening of the fur also becomes definitely evident, the curative doses varying between 75 and 200 γ in terms of pantothenic acid. As a rule, however, the fur does not become completely black and depigmented areas often persist. It appears, therefore, that concentrates of pantothenic acid with a purification up to 40–50% contain 1 factor but not the only factor concerned in the cure of nutritional achromotrichia in rats. A. P. Lothrop

Experimental variation of the urea content of blood. E. B. Drevermann. *Med. J. Australia* 26, 747–51(1939).—Expts. on blood urea indicated that the urea content varied considerably with the diet. The ingestion of blood caused a significant rise in blood urea. The rise in blood urea after gastrointestinal hemorrhage is due in part to the urea formed by digestion of the blood proteins and due in part to the diminished excretion from a compensatory retention of fluid. G. H. W. Lucas

Malignant and nonmalignant uterine and vaginal lesions in mice receiving estrogens and estrogens and androgens simultaneously. W. U. Gardner and Edgar Allen. *Yale J. Biol. Med.* 12, 213–34(1939).—Subcutaneous injection of estrogens in variable amts in female mice from 8 strains resulted in 27 out of 249 showing epithelial lesions in the cervix or vaginal formix. Three of the lesions were carcinomas. Some mice would not tolerate the estrogen treatment for long periods. G. H. W. Lucas

Hibernation of the hedgehog. VI. Serum magnesium and calcium. Artificial hibernation. Chemical physiology of diurnal sleep. Paavo Suomalainen. *Ann. Acad. Sci. Fennicae* **A53**, No. 7, 68 pp.(1939); cf. *C. A.* **34**, 1067[2].—Though fasting for 7 days does not change serum Mg or Ca of the hedgehog, the former is 2.2 mg. % in summer waking state and 6.1 mg. % during midwinter hibernation, while the latter varies parallelly but to a lesser extent. In summer, Mg shows a marked diurnal rhythm, increased during sleep, but Ca does not vary distinctly. Blood sugar and adrenaline contents of adrenals are minimal in midwinter hibernation, but lowered in diurnal sleep. Injection of *M* $MgCl_2$ followed by subjection to low temp. produces anesthesia, low sensibility, low muscle tonus and poikilothermism, but blood sugar and adrenaline increase. *M* $MgCl_2$ and insulin (small dose) with cold, or insulin alone with cold, produces artificial hibernation with sensibility, muscle tone, blood sugar, adrenaline, serum Mg and Ca and body temp. as in normal hibernation. Transfer to room temp. produces awakening and normal values for the above variables. Adrenaline injection causing hyperglucemia does not influence serum Mg of the hedgehog. Normal men show diurnal increase in serum Mg in sleep. Diabetic patients show no abnormality in serum Mg and Ca and administered insulin does not cause consistent change. J. McAfee

The influence of the spleen on the formation of hematopoietic substance in the liver. Piero Foà. *Arch. fisiol.* **39**, 42–50(1939).—The liver of splenectomized animals contains less hematopoietic principle than that of normal animals. Theory: the spleen supplies the liver with some material necessary for the formation of the antianemic substance; this is probably derived from the blood destroyed in the spleen. A. E. Meyer

Gastric absorption, normal and under the influence of ortho- and parasympathicolytic substances. V. Martini, G. C. Morando and N. Minuto. *Arch. fisiol* **39**, 164–75(1939).—Solns. of glucose and sucrose (10–20%) introduced into the stomach are generally poorly absorbed. This is not influenced by the concn. The relative variations which occur are considerable. Atropine does not cause a definite change. Glycine is still less absorbed than glucose, frequently not at all. The injection of F 933 produces a 10-fold increase of absorption. A. E. M.

Pyruvic acid and methylglyoxal as intermediate products of the oxidative metabolism of carbohydrates. P. Foà and P. Fornaroli. *Arch. fisiol.* **39**, 210–17(1939).—After injection of lactic acid, its concn. in the blood increases to a max. and then decreases in a definite function of time, whereas pyruvic acid and glucose show considerable variations in their disappearance. Pyruvic acid disappears at a more rapid rate than lactic acid and simultaneously lactic acid and glucose increase. While lactic acid is formed from pyruvic acid, the reverse process does not occur. Methylglyoxal forms considerable quantities of glucose and lactic acid in the blood but pyruvic acid to only a minimal degree. A. E. Meyer

The action of the vagi on glucose metabolism. V. Zagami. *Arch. fisiol* **39**, 297–326(1939).—Pigeons show after vagotomy and in starvation a higher glycogen content in heart and liver but lower in the pectoral muscle, than nonoperated starved controls. The glucemia is increased by vagotomy. Insulin produces in both groups an increase in cardiac and a decrease in hepatic and muscle glycogen. The blood-sugar curve after insulin and adrenaline in both groups is identical. A. E. Meyer

The elimination of organic and inorganic phosphorus in muscle work. Piero Foà and Pietro Fornaroli. *Arch. fisiol.* **39**, 367–71(1939).—With increase of the intensity of work the elimination of inorg. P increases. The difference of P elimination between moderate and intense work is const. but not very striking. The org. P remains unchanged. A. E. Meyer

The antigonadotropic properties of serum from dogs treated with pituitary-like gonadotropic hormone. Francesco Guercio and Dino Cazzola. *Arch. fisiol.* **39**, 372–95 (1939).—Treatment with prolan causes in rabbits and dogs the appearance of antihormones. The potency can be maintained for an indefinite time with adequate treatment. Pos. complement deviation and precipitin tests were obtained in the rabbit. A quant. relation between the antihormonic and antigenic reactions could not be found. Antibodies were not found in the dog after 8 months' treatment. The ovaries in animals treated with prolan and antihormone serum simultaneously show complete neutralization. A. E. Meyer

The effect of ovariectomy and splenectomy on the antigonadotropic characteristics of rabbit serum. Francesco Guercio and Dino Cazzola. *Arch. fisiol.* **39**, 396–406 (1939).—Splenectomized rabbits did not develop antibodies against urinary gonadotropic hormones, and splenectomy after treatment caused the disappearance of the antibodies from the blood. The antihormonic effect, however, was not influenced by removal of the spleen. The identity of antihormones and antibodies is denied. Ovariectomy does not prevent the formation of antihormones. A. E. Meyer

The relation between antihormonic serum and zoölogical specificity. Francesco Guercio and Dino Cazzola. *Arch. fisiol.* **39**, 407–14(1939).—Three times the min. dose of pregnancy urine, sufficient to produce a pos. reaction in the virgin rabbit, was ineffective if 10 cc. of blood from a dog that had received treatment with urinary gonadotropic substance had been injected one hour before. A. E. Meyer

Current conceptions of the physiology of the kidney. J. M. Hayman, Jr. *Am. J. Clin Path.* **10**, 12–20(1940). John T. Myers

Renal function. M. Herbert Barker *Am J. Clin. Path.* **10**, 21–9(1940).—A review with 11 references. John T. Myers

Vitamins, hormones and yeast adenylic acid as induction substances in embryonal development. Paavo Suomalainen and Sulo Toivonen. *Ann. Acad. Sci. Fennicae* **A53**, No. 6, 20 pp.(1939).—The following substances were investigated: vitamins A, B_1 C, and D_2, riboflavin, adrenaline, thyroxine, heteroauxin and yeast adenylic acid. Induction did not take place in amphibian embryos with the vitamins. Adrenaline produced a conspicuous arching in the ectoderm. The most effective induction substance was yeast adenylic acid. H. J. Prebluda

Synthesis of ascorbic acid (vitamin C) in the egg of the hen during hatching. Paavo Suomalainen. *Ann. Acad. Sci. Fennicae* **A53**, No. 8, 13 pp.(1939); cf. *C. A.* **34**, 1455.—Ascorbic acid (I) is absent in the unhatched egg of the hen. During the first 2 weeks of incubation the total and reduced I increase; after this period there is an abrupt

decrease in both values. The total I is at its highest in the liver of chicks just emerged from the eggs, while the reduced I increases continuously for 4 days after the emergence. An aq. soln. of either glucose, mannose or sorbose when injected into the egg has no effect on the synthesis of I in the embryo. H. J. Prebluda

Temperature coefficients of enzymes in the course of development of the chicken embryo. E. V. Kolobkova. *Biokhimiya* 4, 295–302(1939).—Enzyme activity increases, and the temp. coeffs. decrease, as the embryo develops. H. Priestley

The working of muscles to exhaustion while a reserve of energetic substances is maintained. O. I. Falnshmidt. *Biokhimiya* 4, 411–22(1939).—No change occurs in the muscle content of energetic substances (creatine- and adenosinephosphoric acids, and glycogen) on the introduction of curare into rabbits. In curare-treated rabbits, the fatigued muscles fully maintain their reserve of energetic substances. The action of curare apparently depends on shutting off the motor innervation of the muscles, since the muscles of animals whose ischiadic nerves have been cut behave similarly. H. Priestley

Mechanism of ascorbic acid oxidation in animal tissues. B. I. Gol'dshtein and D. V. Vol'kenzon. *Biokhimiya* 4, 457-69(1939); cf. *C. A.* **33**, 1013[5].—Ascorbic acid is oxidized in Jensen rat sarcoma (but not in liver, kidney or spleen), during aeration and in the presence of pyrogallol and phenoloxidase. Addn. of H_2O_2 or peroxidase to the tissues of Jensen rat sarcoma and the spleen will cause the oxidation of ascorbic acid. The action will be still more intense if both H_2O_2 and peroxidase are added. Ascorbic acid in liver and kidney tissue is not oxidized by H_2O_2 and peroxidase H. Priestley

Regulation of respiration through phosphagen transformations. V. A. Belitser. *Biokhimiya* 4, 498–502(1939); cf. *C. A.* **33**, 6417[4], 6424[1].—Previously, it had been shown that decompn. of phosphagen leads to an increase in respiration; resynthesis, to a decrease. This is explained on the basis that the decompn. products of phosphagen are respiratory stimulants. The addn. of an aq. ext. of rabbit kidney or liver (which contains phosphagen decompn. products) markedly increases the respiratory effect of creatine H. Priestley

A biochemical study of cerebral tissue and of the changes in cerebral edema A. M. Stewart-Wallace. *Brain* **62**, 426–38(1939).—Cortical gray matter contained on the av. 84.3% H_2O as compared to 70.7% in the white matter of the cerebral hemispheres and to 70.6% in the white matter of the cerebellar hemispheres, while intermediate values were found for the thalamus (75.1%) and corpus callosum (75.5%). In the cells of the white and gray matter there were 7.8 and 6.9 milliequiv. of Na per 100 g. of cell water, resp., as compared to 2.5 in red cells and 0.29 in muscle cells. The amt. of K (11 3 and 11.2 milliequiv. % in white and gray matter, resp.) was approx. equal to the amt. in both red cells and muscle cells (11.4 and 12.4, resp.). P, expressed as percentage of dry weight, had values of 40.0 and 41.7 milliequiv. % in gray and white matter, resp. In local cerebral edema, some of which were assocd. with tumor of the brain, there was a large increase in the fluid content restricted to the white matter, of the centrum ovale which did not affect the cortex, thalamus, corpus callosum or internal capsule. Increases in H_2O, Na, Cl and K in the edematous tissue were in the same relative proportions as would be the case if the added fluid were a serum filtrate; this suggests that in cerebral edema there is an increase in interstitial fluid derived from circulating blood. The P content was slightly but consistently lower on the edematous side. Maurice M. Rath

Bromine content in human organism. J. Karp and Gerda Wolfsohn. *Schweiz. med. Wochschr.* **69**, 834–5 (1939).—In 66% of 40 normal subjects, the blood Br level varied between 600 and 800 γ. In the rest there were variations between 500 and 1033 γ. The Br content of cooking salt had no effect on the Br level of the blood. Subjects who lived in areas where the soil was rich in Br had normal blood values. Maurice M. Rath

The significance of unimolecular layers of fat acid in the control of animal oxidation. J. M. O'Connor. *Proc. Roy. Irish Acad.* **45B**, 355–71(1939).—The production of energy in animals is fairly const. Some member of the oxidizing system must respond to altered conditions to meet the change in the need for energy. Evidence has been adduced (*C. A.* **32**, 232[8]) to show that pH may play a role here. Studies using tissue exts. or sections have been made, but not with animals. In animals, as tissue is destroyed it is replaced and so a certain constancy of result may be expected. Frogs were placed in sealed vessels of accurately known vol., and O_2 consumption and CO_2 production were measured. These expts. were made at temps. of 4–30° on 150 animals. When O_2 consumption is plotted against t, a wide scattering of values is seen at 13–17°, and when log O_2 used is plotted against abs. temp. there is a discontinuity at 14°. At about 21° there is an increase, then at 30° the curve becomes linear again. With Langmuir's theory (*C. A.* **28**, 698[8]), it is suggested that the COOH groups of the fat acids on the catalyst hold the O_2 adsorbed, and the variation in the surface of the fat acid will det. the partial pressure of O_2. The sudden increase in O_2 used at about 15° is attributed to the melting of a unimol. layer of palmitic acid and the increase at 21° to the expansion of a unimol. layer of palmitic acid. The O_2 consumption is thus related to the change of fat acids from liquid condensed to liquid expanded states. In the frog, the increases in O_2 consumption seem to be proportional to the amt. of palmitic and myristic acids. M. S.

Vitamin B_1 in the animal organism. III. The maximum storage of vitamin B_1 in various species. P. C. Leong. *Biochem. J.* **33**, 1394–6(1939); cf. *C. A.* **31**, 4711[2].—The max. level of storage in the muscle and liver of the guinea pig, fowl and pigeon was studied. The highest concns. in the muscles of the guinea pig, fowl, pigeon and rat were 0.3, 0.3, 1.2 and 0.6 I. U. per g., resp. The corresponding values obtained for liver were 0.7, 0.7, 1.1 and 2.6. E. W. Scott

Metabolites of contracting muscle. Utilization of fumarate. Kenneth Harrison. *Biochem. J.* **33**, 1465–9 (1939).—A no. of fatty acids and α-monocrotonin (I) were supplied to frog sartorii stimulated 12 times a min. under completely aerobic conditions. Formic, oxalic, acrylic, crotonic, tiglic, sorbic, muconic, succinic, maleic and acetoacetic acids and I were not used in significant amts. during exercise. Fumaric acid disappeared at the rate of 8.6 mg./g. dry wt./hr.; a rough calcn. indicated that the amt. of fumarate consumed, if completely oxidized, would account for 94% of the total heat developed by the muscle. This rough calcn. is being checked by further expts. E. W. Scott

Vegetative nerves and the alveolar resorption of lung. I. The influence of nerve sections on the alveolar resorption. B. Resorption of particles. Kiyoshi Hurui. *J. Oriental Med.* **31**, 751–65(English abstr. 53)(1939); cf. *C. A.* **34**, 504[3].—The alveolar resorption of thorotrast (Heyden) is studied histologically as well as with röntgenograms with rabbits. The resorption is not affected by sympathectomy; but 5 days after vagotomy or 7 days after vago-sympathectomy, the resorption is greatly enhanced. S. Tashiro

The effect of anterior pituitary extracts on the insulin content of the pancreas. C. H. Best, James Campbell and R. E. Haist. *J. Physiol.* **97**, 200–6(1939); cf. *C. A.* **34**, 1059[8].—The subcutaneous injection of diabetogenic exts. of the anterior pituitary gland produces a prompt and extensive fall in the insulin content of dog pancreas. When, after 7 daily injections, the ext. is discontinued, a rise in insulin content is noted and the normal value is regained within 4 days. The rise and subsequent fall of the fasting blood-sugar values follow a curve the shape of which bears an interesting relationship to that which illustrates the decrease and recovery of the insulin content of pancreas. When permanent diabetes is established in dogs, the insulin content of the pancreas may vary from approx. 0.2 unit per g. to amts. too small to estimate. No evidence of recovery of the insulin content has been secured in animals in which permanent diabetes has been observed over long periods (up to 198 days). E. D. Walter

Fatty infiltration of the liver in pregnant ewes. L. C. Snook. *J. Physiol.* **97**, 238–49(1939).—Fatty infiltration of the liver is not a normal concomitant of pregnancy in the rat, rabbit, guinea pig or sheep. The fatty infiltration of the liver assocd. with ketosis in the pregnant ewe does not necessarily provoke harmful symptoms. In ketonemic, pregnant ewes the glycogen content of the liver is apparently reduced to negligible amts. Fatty infiltration of the liver was not assocd. with necrotic changes in the liver tissue. 2
E. D. Walter

Evocation in the chick. M. Abercrombie. *Nature* **144**, 1091–2(1939).—Evocation of neural tissue by chem. substances, including carcinogens, is possible in the chick embryo. Coagulated presumptive epidermis is also an evocator. The process of evocation in the chick is similar to that in the newt, but the degree of reactivity to individual chemicals is different from that of the newt.
E. D. Walter 3

Crystalline pressor substance (angiotonin) resulting from the reaction between renin and renin-activator. Irvine H. Page and O. M. Helmer. *J. Exptl. Med.* **71**, 29–42(1940).—Renin reacts with renin-activator to form a strong pressor substance which is heat-stable, H_2O- and EtOH-sol., fluorescent, acid-stable and alkali-labile. It is reducing and is destroyed by strong oxidizing substances. It forms cryst. salts with oxalic and picric acids. It is suggested that this be called *angiotonin* (I). I produces a sharp, immediate rise in arterial pressure when injected intravenously; pithing and dissipation of the anesthetic appear to increase the response; tachyphylaxis occurs, in contrast to renin, only after many single doses. The responses to adrenaline and I do not parallel one another; cocaine, atropine and stilbestrol do not affect the pressor action of I; suprarenalectomy in brief expts. is also without effect. Max. amts. of I result when the proportion 5 between renin and activator is roughly 3–100; this is not a stoichiometric relationship in the chem. sense. The temp. suitable for good yields is about 38° and the time of reaction 10–20 min. Renin destroys I when incubated with it. I causes marked contraction of intestinal segments of rabbits without reducing their rhythmic motion. It sensitizes the intestine to further doses of I and alters the intestine such that renin-activator contracts it. I also constricts the vessels of a rabbit ear perfused with blood or 6 Ringer soln. C. J. West

Experimental hypertension. X. The oxygen consumption of the ischemic kidney. C. Gerbi, B. B. Rubenstein and H. Goldblatt. *J. Exptl. Med.* **71**, 71–6(1940).—The consumption of O by slices of renal tissue of the rabbit was studied by means of the Warburg manometric method. The ischemic kidney of the rabbit shows a definite diminution of O consumption, compared with the normal kidney 7 (3.9 ± 1.4 for ischemic, 10.0 ± 2.2 S. C. for normal).
C. J. West

Color reactions of sterols and steroids, their significance in investigation of constitutive factors and of problems on reciprocal action of hormones (Woker, Antener) **10**.

Buruiana, L., and Nicolae, L.: Cercetari asupra repartitiei sulfului in laptele câtorva mamifere. Bucharest: Tipografia cooperativa (Litera Crestina). 47 pp. [S 8 contents of milks of numerous species and their relation to age, period of lactation and alimentation.]

Engel, P., and Muñoz Giraldo, Benjamin: Endocrinologia. Glandulas de secreción interna. Bogota: Editorial Rozas. 214 pp.

Izquierdo, Jose Joaquin: Analisis experimental de los fenomenos fisiologicos. Mexico: Ediciones Ciencia. 334 pp.

Neel, Axel V.: Content of Cells and Proteins in the 9 Normal Cerebro-Spinal Fuid. Diagnostic Importance of Demonstrating Small Pathological Changes in the Cells and Proteins. London: Oxford Univ. Press. 142 pp. 7s. 6d.

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Pedersen-Bjergaard, Kaj: Comparative Studies Concerning the Strengths of Oestrogenic Substances. London: 1 Oxford Univ. Press. 198 pp. 15s.

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G—PATHOLOGY

Reactions resembling anaphylaxis ("tachyphylaxis") produced by sodium 2′-hydroxy-8′-acylaminonaphthalene-1′-azobenzene-2,5-disulfonate. H. E. Fierz-David, W. Jadassohn and E. Pfanner. *Helv. Chim. Acta* **22**, 1456–64 (1939)(in German); cf. *C. A.* **31**, 3148[2]; **32**, 4652[4], 5049[8], 5052[1]; **33**, 3876[7].—Compds. of Na 2′-hydroxy-8′-acylaminonaphthalene - 1′ - azobenzene - 2,5 - disulfonate with fat acids contg. more than 12 C atoms always induce *in vitro* intense, and for the most part neutralizable, contractions in the uterus of a guinea pig which has not been previously treated. Treatment with a member of this series following preliminary treatment with another 4 member of the same series frequently results in complete failure of the uterus to react. The corresponding compds. with fat acids contg. 12 or fewer C atoms never cause distinct contractions, but occasionally such compds. (C_{8-12}) produce neutralization. These substances, which induce contractions, do not effect an arrest of anaphylactic hypersensitivity and, conversely, reactions can be induced with these substances after previous induction of anaphylactic contractions of the muscle. The analogy between these reactions and the so-called "tachyphylaxis" is pointed out. The phenomenon is still unexplained.
Ruth Berggren

The physicochemical etiology of cancer (with special emphasis on the relation to solar irradiation). A. H. Roffo. *Strahlentherapie* **66**, 328–50(1939); cf. *C. A.* **26**, 1304, 5330; **27**, 2997; **28**, 3125[3]; **29**, 507[2], 5871[4,5], 5886[8]; **30**, 126[3], 2494[9], 4521[8]; **31**, 1828[5], 4347[8], 4713[2], 6082[8]; **33**, 1030[9], 2901[8], 5417[7], 8209[3], 8277[6]. Ruth Berggren

Phosphatase activity in chronic arthritis. Charles Leroy Steinberg and Louise Catherine Suter. *Arch. Internal Med.* **64**, 483–92(1939).—Serum phosphatase detns. were made in 62 patients with various types of arthritis and in 6 healthy persons. Normal values were found in chronic atrophic and hypertrophic arthritis. Abnormal values suggest the possibility of complicating conditions or an erroneous diagnosis. J. B. Brown

Blood guanidine. Further observations. Ralph H. Major, C. J. Weber and M. J. Rumold. *Arch. Internal Med.* **64**, 988–93(1939); cf. *C. A.* **33**, 5480[6].—The compd. previously designated "guanidine" is a guanidine deriv., possibly glycocyamidine. In exptl. renal insufficiency, both with and without accompanying hypertension, there is an increase in "guanidine." J. B. B.

Multiple myeloma. Helmuth Ulrich. *Arch. Internal Med.* **64**, 994–1016(1939).—A review of the literature and clinical findings in a case of multiple myeloma are included in this study. Blood protein was high (over 10% serum protein); blood calcium high with normal or high serum P; Bence-Jones protein was present in urine. J. B. Brown

Lipocaic and fatty infiltration of the liver in pancreatic diabetes. Lester R. Dragstedt, Cornelius Vermeulen, W. Carter Goodpasture, Paul B. Donovan and Wm. A. Geer. *Arch. Internal Med.* **64**, 1017–38(1939).—The depancreatized dog is not restored to normal by the adequate administration of insulin and pancreatic juice. The deficiency is corrected by feeding pancreas and certain exts. of pancreas but not exts. of other organs. These facts demonstrate that lipocaic is an internal secretion of the pancreas. Two types of fatty infiltration of the liver develop in diabetes mellitus and in pancreatic diabetes: one is due to poor control of the diabetes by in-

sulin which is followed by normal or high blood lipides with acidosis, and the other is due to lipocaic deficiency accompanied by low blood lipides, impaired hepatic function, decreased dextrose excretion and insulin sensitivity. Ninety-two % of 154 depancreatized dogs developed fatty infiltration of the liver. A lipocaic assay method is described. Liver fat analyses by histological examn. and chem. procedures are compared. Two g. of choline per day are required to relieve fatty infiltration in depancreatized dogs. High-fat, low-protein diets accelerate and low-fat, high-protein diets delay appearance of fatty livers. A fat-free alc. ext. of pancreas is described, contg. only a few mg. of choline, which contains an adequate curative dose of lipocaic. Lipocaic is insol. in 90% alc. so that the hormone is probably removed from insulin during its purification. J. B. Brown

Elevation of urea nitrogen content of the blood following hematemesis or melena. Leon Schiff, Richard J. Stevens and Ellen S. Garver. *Arch. Internal Med.* **64**, 1239–51(1939).—The urea N of the blood is frequently elevated in hematemesis and melena, the degree of rise being of definite prognostic significance. In single hemorrhage with recovery the rise is max. in 24 hrs. with a sharp drop to normal by the 3rd day. Where there is a 2nd nonfatal hemorrhage, there may be secondary rise in 24 hrs. In repeated bleeding there is persistent high blood urea N. J. B. Brown

Physiologic basis of intravenous dextrose therapy for diseases of the liver. Samuel Soskin and Mayer Hyman. *Arch. Internal Med.* **64**, 1265–70(1939).—Mostly a review. J. B. Brown

The pathology of chloride metabolism in man. Alexander Lyall. *Brit. Med. J.* **1939, II**, 760–4.—This is largely a review of the importance of Cl metabolism in intestinal obstruction, pyloric stenosis, chronic nephritis, edema, obesity hypertension and Addison's disease, including some original observations by L. J. B. B.

Clinical porphyrinuria with a report of a case of the idiopathic type. F. G. Chandler, G. A. Harrison and C. Rimington. *Brit. Med. J.* **1939, II**, 1173–80.—The chemistry of the porphyrins is reviewed. "The urine may contain uroporphyrin or coproporphyrin or both and 2 isomers of each (I and III) have to be considered; methods for the sepn. and identification of these are described; in our case of acute idiopathic porphyrinuria, uroporphyrin III accounted for about 99% of the total urinary porphyrins." J. B. Brown

A secretory depressant in the achlorhydric gastric juice of patients with carcinoma of the stomach. Alexander Brunschwig, T. Howard Clarke, John Van Prohaska and Robert L. Schmitz. *Surg. Gynec. Obstet.* **70**, 25–30 (1940).—The achlorhydric gastric juices of 21 out of 27 patients with gastric carcinoma were found to contain a substance which inhibits gastric secretion. The inhibitant is inactivated by boiling for 10 min. J. B. B.

Chemical changes in the blood and their clinical significance. V. C. Myers and E. Muntwyler. *Physiol. Rev.* 20, 1–37(1940).—The review article considers blood vol., hemoglobin, serum proteins, nonprotein N, urea N, uric acid, creatinine, guanidines, sugar, fat, phospholipides, cholesterol, bilirubin, carotene, acid-base balance, Na, K, Ca, Mg, Cl, P, phosphatase and S. 228 references. H. R. Getz

Immunity in invertebrates. C. G. Huff. *Physiol. Rev.* 20, 68–89(1940).—A review article which discusses natural, acquired, cellular, humoral immunity, and hypersensitivity, questioning specificity of acquired immunity. When antibodies already exist, the response to vaccination is more marked. Bacteriolysins of invertebrates are thermostable; this indicates that the antibodies differ from those of vertebrates. Complement has not been found, but complementary action does occur. 191 references. H. R. Getz

The functional significance of specific agglutinins and precipitins. Paul R. Cannon. *Physiol. Rev.* **20**, 89–115(1940).—The article is a review pointing out the need of greater emphasis on the early effects of agglomerating antibodies in tissues. Agglutinins may combine with their resp. antigens in blood or tissues, promoting adherence of microörganisms to one another and tissues. Precipitins react similarly in blood or tissues causing an accelerated removal or prompt localization of antigen near the portal of entry. The evidence strengthens the view that agglomerating reactions act to immobilize and destroy foreign proteins entering parenterally. Toxicological by-products may constitute actual disease, also exaggerated antigenic stimuli may cause cellular injury or death. Pathol. effects all follow cellular stimuli. Therefore, it seems logical to blame the stimulus rather than the cell, recognizing that biol. processes may be harmful at times, but in fundamental aspects be protective. 131 references. H. R. Getz

Precipitin antiserums for malignant tissue. Lawrence S. Mann and Wm. H. Welker. *Proc. Soc. Exptl. Biol. Med.* **43**, 18–19(1940).—Preliminary. Specific antiserums (rabbit) were prepd. for the proteins of various malignant tissues (human and rat). L. E. Gilson

Effect of specific kidney antiserums on the normal kidney. Alexander M. Buchholz. *Proc. Soc. Exptl. Biol. Med.* **43**, 20–2(1940).—In dogs the injection of potent dog kidney antiserum (rabbit) produced within one hr. a drop in blood pressure, appearance of protein, red blood cells and granular casts in the urine, and the microscopic pathol. changes of extreme diffuse vascular dilatation, increase of Bowman's space, branching of glomeruli, tubular degeneration and leucocytic infiltration of the entire kidney. L. E. Gilson

Preparation and diagnostic value of an antiserum for placental protein. Harold R. Cohen and Vincent C. Freda. *Proc. Soc. Exptl. Biol. Med.* **43**, 22–3(1940). L. E. Gilson

Peptone shock in fetal dogs and its significance in the metabolism of histamine. Carl A. Dragstedt, Max Ramirez de Arellano and Alfred H. Lawton. *Proc. Soc. Exptl. Biol. Med.* **43**, 28–9(1940); cf. *C. A.* **33**, 4308[1].—The liver of a 200-g. dog fetus contained 5 mg. of histamine per kg. The skeletal muscles contained very little, perhaps none. Peptone shock can be produced in the dog fetus and is assocd. with the liberation of histamine as in the adult dog. L. E. Gilson

Isolation of antibody from agglutinate of type I pneumococcus by treatment with acid. Kwan-Hua Lee and Hisen Wu. *Proc. Soc. Exptl. Biol. Med.* **43**, 65–9(1940); cf. *C. A.* **33**, 8283[7].—By treating the agglutinate of type I pneumococcus (pptd. by immune rabbit serum) with dil. HCl at pH 2 all the antibody is liberated, and after removing the cells and neutralizing as much as 87% can be recovered in a form at least 95% pure. The vaccine can be used repeatedly for the isolation of the antibody. L. E. Gilson

Metabolic changes in diphtheria and influence of adrenal cortical hormone and vitamin C. J. Dieckhoff. *Deut. med. Wochschr.* **65**, 1418–21(1939).—The decrease in the respiratory metabolic rate of rabbits which follows the injection of diphtheria toxin can be prevented by the administration of adrenal cortical extract and ascorbic acid. The use of these substances is therefore advocated in treating diphtheria. Arthur Grollman

The water and salt exchange of the body under normal and pathological conditions. E. Kirk. *Deut. med. Wochschr.* **65**, 1741–5(1939).—A discussion of some clinical conditions in which there is a disturbance of the salt and H_2O metabolism. Arthur Grollman

The carcinogenic action of phenanthrene derivatives obtained from cholesterol. A. H. Roffo. *Z. Krebsforsch.* **49**, 341–7(1939).—See *C. A.* **33**, 8277[6]. Harriet F. Holmes

The carcinogenic action of benzopyrene in the rabbit. O. Schürch. *Z. Krebsforsch.* **49**, 353–62(1939).—Cancers can be produced by painting the ears of rabbits with benzopyrene as well as with tar. The latent period is a long one, and from 3 paintings a week with a 0.5% benzopyrene soln., cancers appear on an av. after 2 yrs. and 3 months. As compared with tar painting benzopyrene painting shows more tendency to produce follicular hyperkeratoses, keratinized precancerous warts, epithelial horns

and carcinomas with marked keratinization. One malig- 1
nant metastasizing melanoma was obtained and 2 very large fibromatous tumors markedly rich in collagen fibrils. One of these fibromatous tumors disappeared after the injection of estroglandol, but the other fibromatous tumor and the benzopyrene carcinomas were not affected by estroglandol injection. Harriet F. Holmes

The presence of *d*(−)-glutaminic acid in tumor proteins. I. C. Dittmar. *Z. Krebsforsch.* **49**, 397–8(1939).—By 2
the method of Kögl (*C. A.* **33**, 5060[6]) glutaminic acid was isolated as chlorohydrate from the proteins of Jensen sarcoma, Rous sarcoma and chicken muscle. The prepns. all gave the normal optical rotation of *l*(+)-glutaminic acid and had the same m. p., while Kögl from the lowering of the m. p. and diminished optical rotation concluded that up to 40% of the *d* (−) form of glutaminic acid was present in tumorous tissue. It is to be noted, however, that Kögl was working solely with carcinomas, 3
and it is probable that the changes in the proteins that he described apply only to epithelial tumors. II. *Ibid.* 441–2.—Further work on the isolation of glutaminic acid from tumor proteins indicates the presence of *d*(−)-glutaminic acid as shown by alterations of m. p. and optical rotation in benzopyrene mouse sarcoma, mouse sarcoma 179, mouse chondroma 72, and mouse carcinoma (5 Fischer). However, the presence of *d*(−)-glutaminic acid does not seem to be specific for tumor proteins, for 4
material free from necrosis from Jensen and Rous sarcomas gives no *d*(−)-glutaminic acid, while necrotic material from Jensen sarcoma shows a change in m. p. and optical rotation indicating the presence of *d*(−)-glutaminic acid. The glutaminic acid from the relatively fresh tissue of the benzopyrene sarcoma shows only a slight amt. of the *d*(−)-form. The appearance of *d*(−)-glutaminic acid seems to depend not on the malignant change 5
of the cells but on their necrotic disintegration.
H. F. H.

The preparation of an antigenic toxin from Salmonella enteritidis. Fred L. Humoller, A. C. Lonert and Clement G. Bottino. *J. Infectious Diseases* **65**, 206–13 (1939).—A method for the isolation of an antigenic endotoxin from *S. enteritidis* organisms grown on liquid medium is described and consists essentially of concn., dialysis and pptn. with alc. The same substance was apparently ob- 6
tained from organisms grown on broth, broth diffusate and on synthetic medium, but it could not be obtained from sterile culture fluids. The toxic fraction obtained when injected repeatedly in sublethal amts. into mice induced a slight but, nevertheless, definite immunity against lethal doses of the toxin and the living *S. enteritidis* organisms. When injected in minute amts. into rabbits the toxin produced hyperglucemia and leucopenia. The 7
chem. and biol. properties of the toxic fraction appear to be very similar to those of certain fractions obtained by previous workers from related organisms grown on solid mediums. Julian H. Lewis

The specificity of proteolytic enzymes from tumors. Joseph S. Fruton, Geo. W. Irving, Jr., and Max Bergmann. *J. Biol. Chem.* **132**, 465–6(1940); cf. *C. A.* **33**, 9340[4].—The proteolytic enzymes in exts. of breast carcinoma and bone sarcoma split *l*-leucinamide either not at all or rather 8
slowly. Bashford mouse carcinoma ext. hydrolyzed *l*- and *d*-leucinamide at similar rates. All the tumor exts. hydrolyzed carbobenzoxy-*l*-glutamyl-*l*-tyrosine. The breast and Bashford carcinomas acted also on carbobenzoxy-*d*-glutamyl-*l*-tyrosine which contains the unnatural *d*-glutamic acid. Enzyme solns. from carcinomas are much less stable than those of other tissue exts. and also show a marked autodigestion at pH 4–5 in the presence of cysteine.
A. P. Lothrop 9

A comparison of the optical forms of glutamic acid from normal and cancerous tissue. J. M. Johnson. *J. Biol. Chem.* **132**, 781–2(1940).—Jensen rat sarcoma was hydrolyzed with 20% HCl and the normal livers of rats bearing this tumor and also livers from normal rats were used for comparison. *l*(+)-Glutamic acid was the principal constituent of the glutamic acid fraction from normal and tumorous liver tissue but a small amt. of *d*(−)-glutamic acid was apparently also present in the hydrolyzate of normal as well as tumorous tissue. These findings suggest the possibility of a slight racemization during hydrolysis of the protein. Cf. Kögl and Erxleben, *C. A.* **33**, 7376[4].
A. P. Lothrop

Chemical studies on the nature of susceptibility to spontaneous carcinoma of the mammary gland in mice. Leonell C. Strong. *Yale J. Biol. Med.* **12**, 255–67(1940).—A study of the action of the antioxidant salicylaldehyde (dil. in olive oil) has shown that male mice of 3 distinct strains differ significantly in their tolerance to this substance. The max. degree of tolerance was reached when the hemoglobin level was at its peak and then declined with advancing age. The suggestion is made that the oxidation-reduction phenomena within the body are part of the susceptibility to carcinoma mechanism.
G. H. W. Lucas

Utilization of lactic acid, pyruvic acid and methylglyoxal in the diabetic organism. P. Foà and P. Fornaroli. *Arch. fisiol.* **39**, 218–28(1939).—Lactic acid and methylglyoxal cannot be used directly by the depancreatized dog. It seems that pyruvic acid is used directly in the diabetic organism as concluded from its rapid disappearance after injection and the simultaneous decrease of sugar in blood and urine. Lactic acid and methylglyoxal are probably not normal products of carbohydrate metabolism as is pyruvic acid. Na pyruvate is recommended for the treatment of diabetic acidosis. A. E. Meyer

Serological diagnosis of malignant tumors: the determination of the iodine value as a method of diagnosis of neoplastic affections. Giuseppe Oliva and Giovanni Fassone. *Arch. sci. med.* **68**, 477–504(1939).—Dry 1 cc. of serum on filter paper or on kaolin and ext. for 8 hrs. with 25 cc. Et_2O; wash 2 times with 10 cc. Et_2O. Evap. to dryness and take up the residue with 10 cc. of a mixt. of equal parts of 0.01 *N* I in 96% EtOH and 0.6% $HgCl_2$ in EtOH. After 8 hrs. add 50 cc. H_2O, 2 cc. 10% KI soln. and 3 drops of starch soln. and titrate with 0.01 *N* $Na_2S_2O_3$. Titrate a blank and express values in cc of difference of both titrations. Normal persons (12) showed values from 0.19 to 0.43, av. 0.27; patients with malignancies (26) 0.72 2.93, av. 1.33; patients with benign tumors 0.35 to 0.74, av. 0.58; patients with hepatic disease without jaundice 0.25–0.44, av. 0.35, and with jaundice av. 1.09; with kidney disease 1.02–1.45. Patients with a large no. of other ailments were investigated also. A. E. Meyer

Glucemic and carotinemic curves after insulin and adrenaline in normal and diabetic persons. Giuseppe Oliva and Marco Pescarmona. *Arch. sci. med.* **68**, 537–46 (1939).—The blood carotene is not influenced by either adrenaline or insulin. The high carotene content found in the blood of diabetic patients is an indirect consequence of metabolic disturbances connected with the disease.
A. E. Meyer

Crystalline horse hemoglobin as an antigen. Wm. C. Boyd and Saul Malkiel. *J. Bact.* **39**, 32(1940).—Injection into rabbits of cryst. horse hemoglobin together with killed microörganisms (*Monilia*) enhances the antigenic strength of the organism. John T. Myers

Quantitative studies with antiserums to pneumococcus carbohydrate-anticarbohydrate precipitates from horse and rabbit antiserums. Henry P. Treffers and Michael Heidelberger. *J. Bact.* **39**, 35–6(1940).—Certain water-sol. antibodies (from anti-type I, type II, and C pneumococcus horse serums) are identical antigenically, but a water-sol. antibody (horse anti-egg albumin) represents a different protein. The groupings responsible for the antibody function constitute either a small part of the total protein mol. or else fail to influence antigenic behavior for other reasons. John T. Myers

"Incomplete" or "univalent" antibody, a common constituent of antiserums. Michael Heidelberger and Manfred Mayer. *J. Bact.* **39**, 37(1940).—Fractional exhaustion with homologous antigen usually leaves a significant portion of antibody in soln. even in the presence of excess antigen. This form of antibody seems to be "univalent" or else it contains too few immunologically reactive groupings to build up the large insol. aggregates

presumably formed by the union of multivalent antigen with multivalent antibody. John T. Myers

Normal tobacco plant protein and tobacco mosaic virus protein as anaphylactogens and precipitinogens in the guinea pig. Helen Purdy Beale and Beatrice Carrier Seegal. *J. Bact.* **39**, 38–9(1940).—Normal tobacco protein was a relatively poor anaphylactogen while the tobacco mosaic protein was good. Hence this will not serve as a test for normal tobacco protein in the presence of mosaic virus protein. John T. Myers

Combined artificial fever and chemotherapy in dementia paralytica. A. E. Bennett, J. C. Nielsen, A. H. Fechner and Paul T. Cash. *Arch. Phys. Therapy* 20, 620–7(1939).—Clinical remissions in paretic dementia were about 20% greater after a full course of combined artificial fever and tryparsamide therapy than from malarial inoculation. The percentage of serological reversal was also higher after combined therapy and the percentage of full clinical remissions in early paresis was better than 60%. Maurice M. Rath

Blood changes in dystrophia and myotonia. J. N. Cummings and O. Maas. *Brain* **62**, 422–5(1939).—There was no significant difference in the serum K levels in 2 normal subjects, 2 patients with myasthenia gravis and in 2 patients with loss of muscular power, before and after exercise. Patients with myotonia but no wasting of muscles showed definite fall in serum K after exercise. Myotonic patients with wasting showed no alteration in the K level after exercise. It is highly probable that the lowering of the serum K after exercise is accompanied by an increase in muscle K. Based on this assumption, the greater ability to use affected muscles after mild exercise is either due to, or is accompanied by a, more normal level of K in muscle. Maurice M. Rath

Congenital myotonia in the goat. G. L. Brown and A. M. Harvey. *Brain* **62**, 341–63(1939).—Myotonic muscles were abnormally sensitive to K ions. A dose of KCl which had no effect in normal muscle produced a contraction of considerable tension in the myotonic muscle. Although approx. the same doses of acetylcholine were required to produce an equiv. tension max. in the myotonic as in the normal muscle, a given dose of acetylcholine produced in the former a response of much greater duration. Curarization of the muscle did not modify the characteristic responses of the myotonic muscle to mech. stimulation nor did it have any effect on the response of these muscles to KCl. Eserine in a dose of 200 γ produced at least a 50% potentiation of the nerve twitch tension when injected arterially into the tibialis group of a normal goat and had the same effect on the myotonic goat. 21 references. Maurice M. Rath

Elimination of volatile phenols in the urine of patients with pernicious anemia. M. Volterra. *Schweiz. med. Wochschr.* **69**, 627–9(1939).—The excretion of volatile phenols in these patients was slight but increased after treatment with liver prepns. Maurice M. Rath

The mechanism of diabetic disturbance using the "nitrogen minimum excretion" as a measure of gluconeogenesis. S. J. Thannhauser. *Endocrinology* **26**, 189–200 (1940).—A method is described for studying gluconeogenesis and N min. excretion (I) on patients with diabetes on a N min. diet. I was normal in 4 cases of moderate diabetes even with temporary omission of insulin. It was slightly increased in 3 cases of severe diabetes. With the omission of insulin I of these patients increased and simultaneously large amts. of sugar, 4–7 times higher than the amt. expected from the increased figures of I, appeared in the urine. Insulin does not act directly on gluconeogenesis but acts on intermediate sugar disintegration. Irradiation of the pituitary caused only a slight temporary depression of I. Injection of exts. of total pituitary and adrenal cortex had no influence on I of patients with moderately severe diabetes. Felix Saunders

Amebic dysentery. XXIII. Chemotropic reaction of dysenteric amebas to bacteria, bacterial toxins and other substances. Y. Matuura. *J. Oriental Med.* **31**, 611–64 (English abstr. 45–6)(1939).—Unlike polymorphonuclear leucocytes, dysenteric amebas (A) are not attracted by pathol. and nonpathol. bacteria or by bacterial toxins. A and polymorphonuclear leucocytes are not mutually chemotropic. Leucocytic infiltration in the amebic lesions must be caused by the secondary bacterial infection but not by A. A is chemotropic to its own ext. and mildly attracted to the blood of human subjects, rabbits, guinea pigs and cats, but not to that of horses. The reaction to other substances, such as kaolin and paraffin, is also studied. **XXIV. Chemotropic reaction of dysenteric amebas to the organs of dogs, rabbits and cats.** *Ibid.* 665–714(English abstr. 47).—A does not show any signs of chemotropism to the normal tissues of lung, liver, spleen, kidney, brain, muscle, thyroid gland, pancreas, adrenal gland, testicle and ovary of rabbits, cats and dogs. **XXV. Galvanotropism of dysenteric amebas.** *Ibid.* 715–19(English abstr. 48).—Like non-pathogenic amebas, A too shows negative (cathodic) galvanotropism. Cf. *C. A.* **32**, 5058[9]. S. Tashiro

Chemical studies on bacterial agglutination. V. Agglutinin and precipitin content of antiserums to Hemophilus influenzae, type B. Hattie E. Alexander and Michael Heidelberger. *J. Exptl. Med.* **71**, 1–11(1940); cf. *C. A.* **32**, 3815[6].—The quant., abs. methods of agglutinin and precipitin analysis previously developed for antipneumococcus serums have been shown to be applicable to horse and rabbit anti-influenza type B serums and plasma. With the aid of these methods and improved immunization schedules the antibody content of the rabbit serums was increased 5–10 times. The method recommended for the purification of rabbit antipneumococcus antibody was also applicable to rabbit anti-influenza type B serums. C. J. West

Electrophoretic study of nephrotic serums and urine. L. G. Longsworth and D. A. MacInnes. *J. Exptl. Med.* **71**, 77–82(1940).—The electrophoretic patterns of the serums and urine of 2 cases of lipoid nephrosis were obtained and compared with a typical pattern of normal serum. The patterns of the pathol. serums deviated widely from the normal; this indicated relatively low albumin and high globulin content. The comparison of the patterns of nephrotic serums cleared by centrifugation and by Et_2O extn. showed that a large portion of the β-globulin consisted of a labile lipoprotein. The pattern of the nephrotic urine proteins resembled that of normal serum with, however, significant differences. C. J. West

Sensitization of animals with simple chemical compounds. VII. Skin sensitization by intraperitoneal injections. K. Landsteiner and M. W. Chase. *J. Exptl. Med.* **71**, 237–45(1940); cf. *C. A.* **33**, 5489[4].—A method is described by which sensitization to 2,4,6-$(O_2N)_3C_6H_3Cl$ can be satisfactorily attained by means of intraperitoneal injection of the compd. when killed tubercle bacilli suspended in paraffin oil were used as adjuvant. Sensitivity of the contact dermatitis type results therefrom. It follows that, although skin sensitization of this type is most easily obtained by dermal application, this route of administration is no necessary condition for such sensitivity. C. J. West

Molecular weight of diphtheria toxin, antitoxin and their reaction products. A. M. Pappenheimer, H. P. Lundgren and J. W. Williams. *J. Exptl. Med.* **71**, 247–62(1940).—Purified diphtheria antitoxic horse pseudoglobulin (I) has been prepd. which is homogeneous by sedimentation, diffusion and electrophoresis. Immunologically, however, the prepn. contains only 43.5% antitoxin specifically precipitable by toxin. The inactive I remaining after sp. pptn. was found to have the same phys. and chem. properties as the original active I. Although the mol. wt. of antitoxin is the same as that of normal horse serum globulins, the electrophoretic mobility does differ from those normally present. The mol. wt. of diphtheria toxin is 70,000 and of antitoxin 150,000. From ultracentrifuge studies on the 2 reactants and on mixts. of toxin and antitoxin in the sol. inhibition zones, the av. mol. compn. of the sp. floccules at certain reference points throughout the equivalence zone and the max. "valence" of toxin and antitoxin with respect to each other have been calcd. The significance of the results are discussed in

relation to antigen-antibody reactions in general and a possible explanation for the exceptional behavior of the toxin-antitoxin reaction in the region of excess antitoxin is suggested. C. J. West

Quantitative theory of the precipitin reaction. VII. The egg albumin-antibody reaction in antisera from the rabbit and horse. Michael Heidelberger, Henry P. Treffers and Manfred Mayer. *J. Exptl. Med.* **71**, 271–82 (1940); cf. *C. A.* **31**, 7111[1].—In 2 rabbits subjected to prolonged injections with cryst. egg albumin the antibodies in one showed progressive changes such as those noted previously; the antibodies in the other did not. The significance of this behavior in the production of sera for therapeutic use is pointed out. Quant. studies are reported on the low-grade or incomplete antibody present in the early stages of immunization of a horse with egg albumin and on the flocculating antibody from later bleedings from the horse and the dissocn. of the sol. prezone compds. by rabbit anti-egg albumin is studied. Rough velocity estns. are reported. The bearing of the findings on the mechanism of precipitin and flocculation reactions and of the Danysz effect (*C. A.* **31**, 5863[7]; **33**, 8782[2]) is discussed in terms of the union of multivalent antigen with multivalent antibody. C. J. West

Immunological studies of pollinosis. I. The presence of two antibodies related to the same pollen-antigen in the serum of treated hay-fever patients. Mary Hewitt Loveless. *J. Immunol.* **38**, 25–50(1940).—The skin-sensitizing naturally occurring antibody (atopic reagin) was characterized by thermolability—2–5 hrs. at 56° destroyed it. A thermostable antibody produced in normal individuals and also in pollen-sensitive persons by injections of pollen-antigen was not destroyed when kept at 56° for 24 hrs. Numerous serological properties of the 2 kinds of antibody are described. Charles A. Zittle

Boyd, Wm.: A Textbook of Pathology. 3rd ed. Philadelphia: Lea and Febiger. 1064 pp. $10.00. Reviewed in *J. Am. Med. Assoc.* **111**, 1874(1938); *Military Surgeon* **85**, 194(1939).

Rogers, Leonard, and Megaw, John W. D.: Tropical Medicine. 3rd ed. London: J. and A. Churchill, Ltd. 544 pp. 16s. Reviewed in *Indian Med. Gaz.* **74**, 585 (1939).

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H—PHARMACOLOGY

CARL F. SCHMIDT

The effect of prontosil on avian malaria: a preliminary report. Candido M. Africa, Francisco J. Dy and Lily J. Soriano. *Acta Med. Philippina* **1**, 19–29(1939).—Intramuscular injections of prontosil into "maya costa" (*Padda oryzivora* Linnaeus) exptly. infected with *Plasmodium praecox* resulted in complete disappearance of the parasites. Ruth Berggren

Influence of certain drugs and anesthetics upon gastrointestinal tone and motility. J. Dewey Bisgard and E. K. Johnson. *Ann. Surg.* **110**, 802–22(1939).—Drugs commonly employed in the pre- and postoperative care of patients have either strong motor or strong inhibitory influences upon the tone and peristaltic activity of the gastrointestinal tract. The influence an individual anesthetic has upon the gastrointestinal tract may be dependent upon its influence upon the relative quantities of O in the blood or tissues during anesthesia. When inhaled, O stimulates and CO_2 inhibits gastrointestinal motor activity. Rachel Brown

The hyperglucemic action of snake venoms. Gabriel Bertrand and Radu Vladesco. *Compt. rend.* **209**, 818–21 (1939); cf. *C. A.* **34**, 1395[5].—A substance with hyperglucemic action was found in varying amts. in all of 14 venoms examd. It should not be confused with echidnase or with echidnovaccin. Rachel Brown

Methylene blue as an antidote for poisoning by oat hay and other plants containing nitrates. W. B. Bradley, H. F. Eppson and O. A. Beath. *J. Am. Vet. Med. Assoc.* **96**, 41–2(1940); cf. *C. A.* **33**, 4693[6].—Two g. of methylene blue is sufficient to protect cattle weighing up to 250 kg. against the ingestion of 6.3 kg. of plant material contg. 5% of KNO_3. Rachel Brown

Treatment with sulfanilamide of meningo-encephalitis associated with canine distemper. M. L. Morris and T. J. Murray. *J. Am. Vet. Med. Assoc.* **96**, 80–6(1940).—Of 30 dogs affected with meningo-encephalitis and treated with sulfanilamide 93% recovered. The blood-sulfanilamide level was maintained at not less than 15 mg. %. Rachel Brown

The control of the blood flow through the intestine as studied by the effect of adrenaline. Robert H. Goetz. *Quart. J. Exptl. Physiol.* **29**, 321–31(1939); cf. *C. A.* **33**, 9439[6].—The effect of adrenaline (I) upon the intestinal blood vessels depends upon the dose. The smallest doses produce only increase in intestinal vol.; after larger doses a feeble and transient early decrease takes place followed by a prolonged dilatation. No relation could be detected between the effect of I on the intestinal vessels and the course of the blood pressure response. The results support the view that I acts as a blood-distributor and not blood pressure-augmentor hormone. Rachel Brown

The clearance of sodium evipan. S. C. Das and J. Raventós. *Quart. J. Exptl. Physiol.* **29**, 343–54(1939).—The effects produced on the respiratory activity of the rabbit by continuous intravenous injection of Na evipan (I) can be explained on the assumption that about $1/_{25}$ of the amt. present in the body is inactivated every min. The relations between dosage and duration of respiratory depression in the rabbit indicate a clearance of about $1/_{22}$ per min. The effects of continuous intravenous injection in mice and monkeys indicate, resp., rates of clearance of $1/_{35}$ and $1/_{80}$ per min., while the dosage-duration of narcosis relation indicates rates of $1/_{110}$ and $1/_{140}$ per min. Rachel Brown

Antagonism of evipan by picrotoxin, coramine and cardiazole. S. C. Das. *Quart. J. Exptl. Physiol.* **29**, 355–65 (1939).—The production of a steady state of respiratory depression by continuous intravenous infusion of Na evipan (I) into rabbits affords a convenient method for measuring the efficiency of analeptic drugs and for comparing their relative activities. Picrotoxin (II) causes an increase in the depth of respiratory movement as well as in the rate, whereas coramine (III) and cardiazole (IV) improve the rate of respiration rather than the depth. Three-tenths mg. of II causes the same increase in amplitude of respiratory stimulation as 10 mg. of III or of IV. II takes 3–5 min. to develop its max. effect while III or IV reaches its max. very quickly. When the respiratory depression is severe III often fails to produce a stimulant effect and may even augment the depression. II produces a stimulant effect in such cases. II is detoxified at the rate of $1/_{10}$ and IV at the rate of $1/_{16}$. There is a linear relation between the doses of I and the log of the doses of II which balance each other. Continuous infusion of III superimposed on the continuous infusion of I at first shows an increase in respiratory activity and then a fall and a final depression which may be greater than that produced by I alone. Rachel Brown

Action of morphine and its derivatives, especially dihydrohydroxycodeinone, on the sensitivity to acetylcholine of leech muscle treated or not with eserine. P. Dodel, G. Dastugue and A. Bresson. *Compt. rend. soc. biol.* **132**, 267–8(1939).—The denervated noneserinized leech muscle was sensitized to acetylcholine by dil. solns. of heroine (1:1000); dionine, thebaine and papaverine (1:5000); apomorphine (1:10,000); morphine and codeine (1:400,000); and by dihydrohydroxycodeinone in dilns. approaching that commonly used for eserine (1 in several millions). If the muscle was first treated with eserine dil. solns. of all the above compds. antagonized the action of acetylcholine to some extent. L. E. Gilson

Two new substituted vinyl barbituric acids. James P. Hendrix. *J. Pharmacol.* **68**, 22–35(1940).—5-Ethyl- and 5-propyl-5-(1-methyl-1-butenyl)barbituric acids are potent narcotics showing a wide margin of safety in rats and

dogs. **The Et compd. has been tried in human subjects with satisfactory results.** The action was relatively brief. Both compds. were less depressant to blood pressure upon intravenous injection in dogs than was isoamylethylbarbituric acid, and, like the last-named, decreased the O utilization of white rats. L. E. Gilson 1

The effect of intravenous injections of sodium diphenylhydantoinate (dilantin) on respiration, blood pressure and the vagus nerve. Victor G. Haury and Miles E. Drake. *J. Pharmacol.* **68**, 36–40(1940).—Na diphenylhydantoinate when injected intravenously in dogs or rabbits produces an immediate 30–65% fall in blood pressure. This action is peripheral. The compd. has a depressant action on the vagus nerve and has a marked depressant action on respiration. Lethal doses produce death by respiratory failure. L. E. Gilson 2

Use of pentamethylenetetrazole (metrazole) as a respiratory stimulant in acute alcoholic depression. F. D. McCrea and Haywood M. Taylor. *J. Pharmacol.* **68**, 41–4(1940).—Dogs given 3–5 cc. abs. EtOH per kg. intravenously went into a coma from which they were partially aroused for periods of 30–45 min. by injection of moderate doses of metrazole, after which they again became comatose. If they were given 7 cc. EtOH per kg even large doses of metrazole did not arouse them. Recovery from coma began 3–12 hrs. after injection of the alc., depending on the amt. injected. The metrazole had no effect on the duration of the coma or on the rate of disappearance of the alc. from the blood stream. L. E. Gilson 3

Effect of age of cats on susceptibility to digitalis. H. B. Haag and R. L. Corbell, Jr. *J. Pharmacol.* **68**, 45–9 (1940).—The lethal doses of 2 tinctures of digitalis, one specimen of amorphous gitalin and 2 samples of ouabain were detd. for kittens 5–10 weeks old and for adult cats. No difference in tolerance was found for the different age levels. Therefore children should not be given digitalis in doses proportionately larger than those recommended for adults. L. E. Gilson 4

The passage of bromide, iodide and thiocyanate into and out of the cerebrospinal fluid. G. B. Wallace, B. B. Brodie, Seymour Leshin and Elliott Brand. *J. Pharmacol.* **68**, 50–5(1940); cf. *C. A.* **33**, 2986[9].—When the salts are injected intravenously into dogs the anions begin to pass promptly into the spinal fluid, but, their passage into the spinal fluid, unlike the case of other tissue fluids, is slower and never reaches the concn. present in the blood serum. Furthermore the serum must attain a certain min. concn. of iodide or thiocyanate ion before any passes into the spinal fluid. The bromide ion may also have a threshold value, but if so it is very low. When injected into the spinal cistern all 3 of the ions pass quickly into the blood at the same rate and there is no evidence of any barrier to their passage. L. E. Gilson 5 6 7

Some pharmacological properties of unsymmetrical ethyl-*o*-ethylphenylurea. Axel M. Hjort, Edwin J. De Beer, Johannes S. Buck and David W. Fassett. *J. Pharmacol.* **68**, 56–61(1940).—Unsym. ethyl-*o*-ethylphenylurea, m. 71°, prepd. by reacting *o*-EtC_6H_4NHEt with nitrourea, is sol. in water to the extent of 0.0185 g. per g. satd. soln. at 25°. It is more sol. in water, equally effective as a hypnotic, and less toxic than its isomer propyl-*o*-tolylurea. Its median hypnotic dose for mice, rats and dogs lies between 50 and 70 mg./kg. It lowers body temp. and depresses blood pressure. In chronic and acute toxicity studies in rats it produces no pathol. changes in the vital organs. **Hypnotic effect of repeated injections of unsymmetrical ethyl-*o*-ethylphenylurea in albino rats and the influence of sex thereon.** A. M. Hjort, E. J. De Beer and D. W. Fassett. *Ibid.* 62–8.—The effect was greater in females than in males. L. E. Gilson 8 9

Some tetrahydroisoquinolines. A note on the relative lethal and circulatory effects of some 2-alkyl derivatives. Axel M. Hjort, Edwin J. De Beer and David W. Fassett. *J. Pharmacol.* **68**, 69–72(1940); cf. *C. A.* **33**, 4320[8] and following abstr.—In a series of 2-alkyl-1,2,3,4-tetrahydroisoquinoline homologs the toxicity increased with lengthening of the alkyl chain (from Me to Am) in the normal homologs, but not to the degree found with homologous ureas. The isohomologs (iso-Pr, iso-Bu and iso-Am) showed no consistent trend with lengthening of the chain. All the compds. had a depressor action. L. E. Gilson 10

Tetrahydroisoquinolines. IV. Circulatory and adrenolytic effects. Axel M. Hjort, Edwin J. De Beer and David W. Fassett. *J. Pharmacol.* **68**, 73–9(1940); cf. *C. A.* **33**, 4320[8] and preceding abstr.—The action of 25 substituted 1,2,3,4-tetrahydroisoquinolines was studied. Most of those with secondary and tertiary amine N produced adrenaline vasomotor reversal in dogs. In general the tertiary amines were more effective than the secondary. The methoxy derivs. were more active than the ethoxy. The 2-alkyl, but otherwise unsubstituted, derivs. were the most potent of the isoquinoline adrenolytic agents so far studied. The more active ones compare favorably with ergotoxin, F 883, F 933 and yohimbine in antagonizing adrenaline. L. E. Gilson 11 12

Further observations on the effect of parenteral injection of certain methylated purines on creatine-creatinine metabolism. A. Link Koven and Howard H. Beard. *J. Pharmacol.* **68**, 80–4(1940); cf. *C. A.* **32**, 7126[1].—In young rats injections of theophylline and aminophylline produced increases in muscle creatine somewhat smaller than those produced by comparable doses of caffeine and theobromine. Urinary excretion of creatine was increased. Increases in the creatine of the liver, kidneys and heart, and in creatinine excretion, did not occur. L. E. G. 13 14

Cyclopropane studies. VIII. Effect of premedication with morphine or amytal on the heart rate, rhythm and blood pressure in dogs under cyclopropane anesthesia. Benjamin H. Robbins and James H. Baxter, Jr. *J. Pharmacol.* **68**, 85–95(1940); cf. *C. A.* **33**, 5914[7].—In nonpremedicated dogs cyclopropane increased the heart rate and blood pressure, but cardiac irregularities were rarely observed before the respiration was greatly depressed. After morphine premedication cyclopropane decreased the heart rate and blood pressure, and cardiac irregularities were always produced but could be abolished by 1–2.5 mg./kg. of amytal given intravenously. After amytal premedication cyclopropane produced no cardiac irregularity and no significant change in heart rate and blood pressure. L. E. Gilson 15 16

Some new aspects of morphine action; effect on intestine and blood pressure; toxicity studies. Donald Slaughter and E. G. Gross. *J. Pharmacol.* **68**, 96–103 (1940).—Eserine enhances the action of morphine on the intestine by making small ineffective doses effective. Eserine enhances the action of morphine in lowering the blood pressure of the cat. Toxicity studies on white rats indicate an enhancing effect of these drugs since $^1/_2$ the m. l. d. of each when given together kills more animals than the m. l. d. of either when given alone. It is believed that morphine acts through a cholinergic mechanism to produce these results. **New aspects of morphine action; effects on pain.** Donald Slaughter and Donald W. Munsell. *Ibid.* 104–12.—Morphine effect is enhanced by prostigmine when pressure-pain responses in cats are detd. Atropine counteracts the effect of morphine or of morphine and prostigmine together. In many ways morphine acts like a cholinergic drug. The mechanism of such action is discussed. L. E. Gilson 17 18

Cardiovascular changes following the intravenous administration of barium chloride. Paul K. Smith, Alexander W. Winkler and Hebbel E. Hoff. *J. Pharmacol.* **68**, 113–22(1940).—$BaCl_2$ was injected into dogs with ligated ureters at a slow uniform rate until death occurred. The effects on the heart were irregular. Numerous electrocardiograms and arterial blood pressure records are shown. L. E. Gilson 19

Toxicity of lasiocarpine. K. K. Chen, Paul N. Harris and Hans A. Schulze. *J. Pharmacol.* **68**, 123–9(1940).—Lasiocarpine is an alkaloid from *Heliotropium lasiocarpum*, family Borraginaceae. The intravenous injection of 50–100 mg./kg. in rats and mice causes death, usually after several days delay. The principal lesion is necrosis of the liver. Cloudy swelling of the kidneys also occurs. In dogs repeated daily doses of 10–20 mg./kg. produce no 20

injury. The drug has a depressor action in anesthetized cats. It does not affect the blood sugar of rabbits when injected in sublethal doses. L. E. Gilson

Action and toxicity of platyphylline and seneciphylline. K. K. Chen, Paul N. Harris and Charles L. Rose. *J. Pharmacol.* **68**, 130–40(1940).—At least 17 different alkaloids have been found in different species of *Senecio*. Platyphylline (I) and seneciphylline (II) occur in *S. platyphyllus*. Intravenous injection of II in mice, rats and guinea pigs produces tonic convulsions. Death may be immediate or may be delayed several days in which case it is due to necrosis of the liver. Cloudy swelling of the kidneys is also produced. Lethal and near-lethal doses of I produce convulsions in all exptl. animals but there is no delayed death and no damage to liver or kidneys. I also has an atropine-like action. L. E. Gilson

Prevention of the blood pressure fall during procaine spinal anesthesia in the rabbit. Elizabeth M. Cranston and Raymond N. Bieter. *J. Pharmacol.* **68**, 141–9(1940). —Drugs or drug combinations found effective were: synephrine, synephrine plus pitressin, ephedrine plus pitressin plus metrazole, ephedrine plus pitressin, neosynephrine plus pitressin, and neosynephrine plus pitressin plus metrazole. L. E. Gilson

Effect of sympathomimetic and other substances on the contraction of skeletal muscle. Edith Bülbring and J. H. Burn. *J. Pharmacol.* **68**, 150–72(1940).—When skeletal muscle, perfused with defibrinated blood, is stimulated at a rapid rate so that fatigue is produced, adrenaline augments the height of the contraction although it reduces the blood flow. This augmentation is largely but not entirely due to improvement of transmission of nerve impulses. A similar augmentation is produced by ephedrine, tyramine, synephrine and dihydroxyphenylethylamine, but much higher concns. are required and the action is more prolonged. Cocaine acts in the same way and possibly this action is the basis of its power to increase phys. endurance. Ergotoxine and posterior hypophysis ext. also augment the muscle contraction. The effect appears to be produced by all vasoconstrictor substances. L. E. Gilson

Studies on the mechanism of the protective action of xanthine against carbon tetrachloride poisoning. J. C. Forbes and E. L. Outhouse. *J. Pharmacol.* **68**, 185–93 (1940); cf. *C. A.* **33**, 3884[5].—The subcutaneous injection into rats of substances known to exert a protective action against CCl_4 or $CHCl_3$, such as xanthine, India ink, $Ca_3(PO_4)_2$ and Na ricinoleate, always causes a marked drop in serum esterase concn. Control rats poisoned with CCl_4 show a marked rise in serum esterase while those protected with xanthine do not. Feeding a high-fat diet increases susceptibility to CCl_4 and $CHCl_3$ and also causes a marked rise in serum esterase. The rise in serum esterase does not bear any definite relation to the lipide content of the liver. Serum esterase decreases markedly during the period of rapid liver repair following acute CCl_4 poisoning. L. E. Gilson

Comparative effects of propylene glycol, other glycols and alcohol on the liver directly. H. W. Newman, W. Van Winkle, Jr., N. K. Kennedy and M. C. Morton. *J. Pharmacol.* **68**, 194–200(1940); cf. *C. A.* **33**, 9395[6], 9441[8].—Propylene glycol decreased the O consumption and CO_2 output of the isolated cat liver perfused with cat blood, but increased the glycogen of the liver and the lactic acid of the blood and decreased the utilization of glucose by the liver. Addn. of insulin to the perfusion with propylene glycol caused a further decrease in the O consumption, prevented the increase in blood lactic acid and increased the utilization of the glycol. Ethylene, diethylene and dipropylene glycols were not utilized by the perfused liver, but depressed O consumption and increased lactic acid production. The dipropylene glycol was the least toxic of the 3. EtOH was metabolized by the perfused liver, but depressed its functional activity as indicated by decrease in O consumption, increase in lactic acid formed, and decrease in glycogen. L. E. Gilson

An experimental comparison of sulfanilamide and benzylsulfanilamide with particular reference to the significance of variations in experimental technique. John S. Lockwood and Harry J. Robinson. *J. Pharmacol.* **68**, 201–15(1940); cf. *C. A.* **33**, 7368.—Benzylsulfanilamide was slightly less effective than sulfanilamide in treating exptl. streptococcic peritonitis in mice. Exptl. methods are discussed. L. E. Gilson

Interpretation of diodrast clearances in the dog. H. L. White and Peter Heinbecker. *Proc. Soc. Exptl. Biol. Med.* **43**, 8–10(1940). **Interpretation of diodrast clearances in man.** H. L. White, Thomas Findley, Jr., and Joseph C. Edwards. *Ibid.* 11–14. L. E. Gilson

Serum albumin regeneration following intravenous injection of amino acids (hydrolyzed casein) in hypoproteinemia produced by severe hemorrhage. Robert Elman and Harriet Wolf. *Proc. Soc. Exptl. Biol. Med.* **43**, 14–16 (1940); cf. *C. A.* **33**, 5453[4].—Enzyme-digested casein was used. Only 70% of the N was amino acid N; the rest probably was present as dipeptide. Its intravenous injection into a bled dog was followed in a few hrs. by a significant increase in serum albumin. Since the serum globulin concn. and the relative red cell vol. both decreased it is inferred that serum albumin was regenerated. L. E. Gilson

Vitamin C and mushroom poisoning. G. Holland and W. Chlosta. *Deut. med. Wochschr.* **65**, 1852–4(1939).—The administration of ascorbic acid to a patient suffering from mushroom poisoning prevented the occurrence of petechial hemorrhages. In poisoned guinea pigs the administration of ascorbic acid also prevented hemorrhages in the internal organs but did not prevent the death of the animals. Arthur Grollman

Action of *p*-aminobenzylsulfamide and carboxysulfamidochrysoidine in experimental diphtheria intoxication. Bruno Bartolini and Alessandro Bocca. *Boll. soc. ital. biol. sper.* **14**, 603–4(1939).—The sulfamide prepns. exerted no prophylactic action in exptl. diphtheria intoxication. Helen Lee Gruehl

Action of barium and magnesium on contractile activity of the chick-embryo heart. Rita Rondinini. *Boll. soc. ital. biol. sper.* **14**, 605–7(1939).—$MgCl_2$ and $BaCl_2$ exerted the same action as did $CaCl_2$ and KCl. H. L. Gruehl

Pharmacological studies on phenylisopropylamine. V. Action on isolated rabbit intestines. A. Chistoni and E. Beccari. *Boll. soc. ital. biol. sper.* **14**, 612–14(1939); cf. *C. A.* **33**, 6958[7].—In concns. less than 1:10,000 phenylisopropylamine acted like ephedrine and in greater concns. it acted like adrenaline. Helen Lee Gruehl

Influence of the portal of entry (subcutaneous or peritoneal) on the degree of toxicity of some poisons. G. Battelli. *Boll. soc. ital. biol. sper.* **14**, 642–4(1939).—Apomorphine was more toxic when injected subcutaneously; atropine and Na barbital were more toxic when injected intraperitoneally. The basis for these results is discussed. Helen Lee Gruehl

Cerebral action of camphor, sodium santonate and cocaine with simultaneous administration of β-phenylisopropylamine. G. Rizzotti and F. Sivieri. *Boll. soc. ital. biol. sper.* **14**, 664–7(1939).—The assocn. of β-phenylisopropylamine with any of the above substances prolonged and aggravated the symptoms and caused convulsions in doses which individually had no such effect. H. L. G.

Immediate rigor mortis from 2,4-dinitrophenol. S. Cerquiglini. *Boll. soc. ital. biol. sper.* **14**, 672–4(1939). Helen Lee Gruehl

Effect of the antidiabetogenic duodenal factor on the antiinsulin action of the glucotropic principle of the anterior lobe of the hypophysis. A. De Barbieri. *Boll. soc. ital. biol. sper.* **14**, 674–6(1939).—The glucotropic principle completely inactivated the hypoglucemizing action of insulin in rabbits. Previous oral administration of the antidiabetogenic factor apparently inactivated the glucotropic principle. Helen Lee Gruehl

Action of insulin and the antidiabetogenic duodenal factor on experimental ketosis. A. De Barbieri and D. Puzzuoli. *Boll. soc. ital. biol. sper.* **14**, 676–8(1939).—Both substances produced a marked diminution in ketosis caused by the ingestion of Na acetoacetate. H. L. G.

Action of adrenal cortex extract on nitrogen metabolism. F. Addarii and F. Scarlini. *Boll. soc. ital. biol. sper.* **14**,

691–2(1939).—Adrenal cortex ext. increased N elimination but the percentage increase was lower than that of the diuresis. Helen Lee Gruehl

Relation between the pancreas and sodium chloride. F. Addarii. *Boll. soc. ital. biol. sper.* **14**, 692–4(1939).—Injections of insulin into depancreatized dogs caused an elevation of the sugar, Na and Cl titers of the blood to normal values and a secondary lowering of the acetone and N. Urinary Na and Cl rapidly diminished after a transient slight increase of Na excretion. Helen Lee Gruehl

Relation between the vitamin content and the hypoglucemizing action of Rosa canina. Luigi Callegari. *Boll. soc. ital. biol. sper.* **14**, 698–9(1939).—Vitamins B_1 and C were apparently not the substances responsible for the hypoglucemizing action of the ext. of *Rosa canina*. Helen Lee Gruehl

Comparative studies of the octyl series. Renzo Agnoli. *Boll. soc. ital. biol. sper.* **14**, 702–3(1939).—Octyl bromide, secondary octylamine, dioctylamine and trioctylamine caused varying degrees of hypotension in the rabbit. Octyl sulfocyanide, primary octylamine and diethyloctylamine gave indefinite results. Diethylamine-HCl caused hypertension. Octyl ether produced initial hypotension and return to normal pressure with subsequent persistent hypotension for several minutes. Helen Lee Gruehl

Pharmacological action of Cupressus sempervirens. Alberto Garello Cantoni. *Boll. soc. ital. biol. sper.* **14**, 703–5(1939).—Expts. on the smooth muscle of the intestinal roundworm (*Ascaris lumbricoides*) showed that an infusion of the buds of the cypress had no vermifuge properties. The essential oil distd. from the leaves was effective only in large doses. Helen Lee Gruehl

Pharmacological action and the association of Verbascum thapsiforme with Urtica dioica L. Alberto Garello Cantoni. *Boll. soc. ital. biol. sper.* **14**, 705–8(1939).—Infusions of both plants were tested on frog heart. The assocn. caused no change in the actions of the drugs. H. L. G.

Absorption of iodine after percutaneous and intestinal administration of salt waters containing bromine and iodine. Mario Cavazzini. *Boll. soc. ital. biol. sper.* **14**, 716–17(1939).—Absorption of I through the skin and intestines of rabbits was demonstrated by the presence of I in the urine. Helen Lee Gruehl

Modifications of the phosphorus/nitrogen and calcium/nitrogen ratios in the bones of young rats after prolonged administration of sodium bromide. B. Tanzi. *Boll. soc. ital. biol. sper.* **14**, 728–30(1939).—Four litters of rats were treated with NaBr and the femur and tibia analyzed. In general, the water content, N, P and Ca titers diminished to varying degrees. The P/N and Ca/N ratios diminished in some instances and increased in others. Helen Lee Gruehl

Phosphorus/nitrogen and calcium/nitrogen ratios in the osseus tissue of rats during hematoporphyrinized growth. B. Tanzi. *Boll. soc. ital. biol. sper.* **14**, 730–2(1939).—In general, the P/N and Ca/N ratios of the femur and tibia of rats treated with hematoporphyrin-HCl diminished. The degree of diminution varied in the 2 bones under different conditions of light and dark and with various com. prepns. Helen Lee Gruehl

Pharmacological action on the uterine muscle of a new alkaloid (basergine) from ergot compared with that of a posthypophysis derivative (orasthine). Tullio Meneghini. *Boll. soc. ital. biol. sper.* **14**, 735–6(1939).—Both substances were active only in concns. above 1:40,000 but the type of contraction varied. Basergine could exert a reversible action in weak concns. while orasthine did not. The combined action of the 2 drugs varied according to which was added first. Helen Lee Gruehl

Hypoglucemizing and antidiabetic action of citric acid. L. Cannavò and G. Ortoleva. *Boll. soc. ital. biol. sper.* **14**, 740–1(1939).—Oral administration of 5 to 8 g. citric acid or Na citrate lowered blood sugar of persons with diabetes or other forms of hyperglucemia and had little effect on normal persons. Helen Lee Gruehl

The action of mixtures of quinine and pituitary (posterior lobe) extract on the uterus of the virgin guinea pig. H. A. Shapiro. *S. African J. Med. Sci.*, Feb., Suppl. to Vol. **4**, 9–12(1939).—A com. sample of pituitary (posterior lobe) ext., having a strength of 10 international units/cc., was used in this investigation. The biol. assays were performed on the isolated virgin guinea-pig (approx. 250 g.) uterus suspended in a bath the temp. of which was maintained at 37°. Nine biol. assays of quinine-HCl solns. were made against corresponding dilns. of the com. sample of known wt. made with glass-distd. water. In addn. 5 assays with the dihydrochloride of quinine as diluent were made. Consistent results were obtained in all expts. An addn. of quinine, whether in the form of the mono- or the dihydrochloride, to pituitary ext. lessened very considerably the action of the hormone as tested on the virgin guinea-pig uterus. The expts. with the dihydrochloride suggest that quinine may exert a paralyzing action on the uterine muscle of the virgin guinea pig, a point which is being investigated further. The results obtained may not be directly applicable to man, as the action of mixts. of quinine and pituitary ext. may be different on human uterus. If similar conditions are present in the human uterus the 2 substances should be given separately if their full effects are to be obtained. Two references are given. W. R. Henn

The present state of the chemotherapy of gonorrhea. R. A. Rubi. *Rev. med. cienc. afines* **1**, 18–27(1939). E. H.

Arsenical encephalopathy. I. Clinical study. A. Tzanck and S. Lewi. *Ann. dermatol. syphilig.* **10**, 752–70 (1939).—Arsenical encephalopathy is produced by trivalent arsenicals of the arsenobenzene type and by quinquevalent arsenicals derived from 3-amino-4-hydroxybenzenearsonic acid, e. g., stovarsol, treparsol, acetylarsan. It is never produced by mineral arsenicals (arsenic anhydride, arseniates, cacodylates, etc.) nor by quinquevalent org. arsenicals derived from p-aminobenzenearsonic acid, e. g., atoxyl or tryparsamide, despite the fact that these compds. may exert toxic action on the peripheral nervous system. Intravenous, intramuscular, subcutaneous, oral and vaginal administration of arsenicals have all led to encephalopathy. According to Budlowsky (*Deut. derm. Ges. in der Tschech. Rep.* (Dec. 3, 1933)) patients with encephalopathy give neg. skin tests to arsenicals. However, Kapuscincki (*Ceska Dermatol. Samberger Festschr.* **148**(1931)) claims to have induced passive sensitization to neoarsphenamine by injection of serum from a patient showing intolerance to this drug. Five cases are presented of encephalopathy due to neoarsphenamine; two of the patients were pregnant women, who seem, as a group, to be especially susceptible to this disorder. Marion Horn

The effect of eserine on spinal reflexes in the dog. Jerome K. Merlis and Hampden Lawson. *J. Neurophysiol.* **2**, 566–72(1939).—Eserine (physostigmine salicylate), given intravenously in doses of 0.01–2.0 mg./kg. in 5 cc. Ringer's soln., proved predominantly depressant to the knee-jerk and augmentory to the flexion (tibialis anticus) and crossed extension (quadriceps) reflexes of the chloralosed or barbitalized dog. Similar effects were obtained when the drug, in 0.025–0.2% concn. in Ringer's soln., was applied to the spinal cord by perfusion through the lumbar subarachnoid space in the intact or spinal dog. Various theories of the mode of action of eserine are discussed. Marion Horn

Brain potential changes in man during cyclopropane anesthesia. Morton A. Rubin and Harry Freeman. *J. Neurophysiol.* **3**, 36–42(1940).—There are 6 discrete changes in the frequency of brain potentials in man during cyclopropane anesthesia and recovery from it. The changes are too abrupt to be explained by a postulated decrease in metabolism of neurons, and may be caused partially by a decrease in cell permeability during anesthesia, which in turn influences the ionic relationship between the cells and their environment. In addn., a blocking of afferent impulses, known to occur during anesthesia, may bring cortical neurons to various levels of excitation at which synchronization can occur. Although there is not as great individuality of potential patterns during anesthesia as in the waking state, it is nevertheless pos-

sible to differentiate between anesthetized individuals on the basis of their encephalograms. In the few instances in which the patient was allowed to rebreathe his own CO_2 early in anesthesia to prevent respiratory failure this always hastened the onset of deep anesthesia and made the slow rhythms characteristic of this stage much more regular than usual. Marion Horn

Ocular rotation in anesthesia and under the influence of supranuclear centers. Ernest A. Spiegel and Dean A. Collins. *J. Neurophysiol.* **3**, 59–65(1940).—Ocular rotation in cats was produced to a marked extent by the brain-stem anesthetics Na pentobarbital, Na phenobarbital, Na barbital, dial-urethan and urethan. Only a slight degree of ocular rotation was produced by the cortex anesthetics ether, chloroform and Gréhaut's mixt. (5% chloroform in 50% alc.). However, another so-called cortex anesthetic, chloralose, produced marked ocular rotation. Marion Horn

Some experiments on chemotherapy of sulfanilamide for gonorrhea. Zaii Sai. *Japan. J. Exptl. Med.* **17**, 387–406(1939)(in English).—The concn. of sulfanilamide which completely inhibits the bacterial growth in general corresponds to the amt. present in the blood of patients who are being treated with 2–5 g. of the drug per day. By comparison of exptl. data of results with blood inactivated by heating at 58° for 30 min. and fresh blood S. is able to show that there is a certain factor in fresh blood which coöperates with sulfanilamide in the killing of the gonococcus. C. Jarowski

The effect of alcohol upon the chemotactic response of leucocytes. R. S. Klepser and W. J. Nungester. *J. Infectious Diseases* **65**, 196–9(1939).—Polymorphonuclear cells of deeply intoxicated rats lost their pos. chemotaxis toward pneumococci. The white cells of human blood to which alc. had been added showed the same failure to be attracted to pneumococci. The av. distance traversed by each cell in a given period of time was less in the alc. blood, and more cells were nonmotile than in the normal group. Rats chronically intoxicated are more susceptible to pneumococcus infections than control animals. J. H. L.

The therapeutic properties of sulfanilamide in experimental pneumococcal infections. L. H. Schmidt and Carolyn Hilles. *J. Infectious Diseases* **65**, 273–84(1939); cf. *C. A.* **33**, 7892[3].—Sulfanilamide had marked therapeutic properties when administered to mice infected intraperitoneally with types I to XXXII pneumococci. Administration of 10 mg. of sulfanilamide as frequently as every 6 hrs. was necessary for obtaining max. therapeutic response. Such treatment maintained a concn. of 8–12 mg. % free sulfanilamide in the blood. When mice were treated this intensively, the initial therapy could be delayed for 6–12 hrs. after pneumococci had invaded the blood without complete loss of the beneficial effects of therapy. With some groups of pneumococci sulfanilamide had a high degree of curative action, with others it had less curative action but marked life-prolonging properties, and with still others the drug had no curative action but did prolong life. Julian H. Lewis

Effects of neoarsphenamine and sulfarsphenamine on experimental fuso-spirochetal infection in guinea pigs. Theodor Rosebury, Genevieve Foley and Fred L. Rights. *J. Infectious Diseases* **65**, 291–300(1939).—The results of expts. on the effect of neoarsphenamine and sulfarsphenamine on exptl. fuso-spirochetal infections of guinea pigs are in accord with clinical and other data in indicating that topical application of these drugs is a rational form of therapy in accessible fuso-spirochetal infections of man, but do not support the practice of intravenous or intramuscular administration of arsenicals in treatment of these diseases. Julian H. Lewis

Carbohydrate metabolism in ether anesthesia. I. Fate of injected *d*-lactic acid in the dog, the rabbit and the rat. N. M. Phatak. *Anesthesia and Analgesia* **19**, 18–26 (1940).—A slower rate of disappearance of *d*-lactate from the blood of dogs and rabbits was obtained than ever published previously for this or *dl*-lactate. It was not excreted in significant amts. in urine and was well utilized in dogs, rabbits and rats. Whereas during anesthesia ether interfered with the proper utilization of this *d*-lactate, it furnished a ready store for replenishing depleted stores of liver glycogen and counteracted the severe acidosis of ether anesthesia. G. H. W. Lucas

The effect of certain barbiturates on the response to vasoactive substances. Richard Kohn-Richards and Clyde Grimes. *Anesthesia and Analgesia* **19**, 31–4(1940). A study of the influence of several barbiturates on blood-pressure changes produced by acetylcholine in decapitated cats showed that some, like pentothal, increased the depressant action of the acetylcholine and others, like evipal, counteracted the drug. These drugs did not change the typical effect of histamine. The vasopressor responses to pituitrin were increased 15–20% by both pentothal and nembutal. G. H. W. Lucas

Intracaine; its application to spinal anesthesia. R. S. Sappenfield and E. A. Rovenstine. *Anesthesia and Analgesia* **19**, 48–52(1940).—Intracaine, closely related to procaine (the amino group in the para position on the benzene nucleus of procaine is replaced by an alkoxy radical), was studied in about 100 cases for spinal anesthesia. A 2.5% soln. was found satisfactory. Doses of 25–75 mg. produced sensory anesthesia for 45–60 min. When doses of 100 mg. or over were given, anesthesia was shorter than that expected from similar amts. of procaine. It did not exhibit any special advantages. G. H. W. Lucas

An antidiabetogenic effect of a primary alcoholic extract of pituitary tissue administered orally. J. B. Collip. *Can. Med. Assoc. J.* **42**, 109–13(1940).—A preliminary report on the study of the effects of oral administration of a primary alc. ext. of prime pituitary tissue to diabetic patients, normal persons, depancreatized and normal monkeys, rabbits and rats showed that the ext. exerted considerable influence on carbohydrate metabolism. It had no effect in the absence of the pancreas. G. H. W. Lucas

The toxicity changes of various arsenobenzene preparations through oxidation; the increased toxicity of the substances formed when the above solutions were exposed to air. III. The toxicity of the oxidation product of these preparations for mice and the physicochemical properties of these products. Koeki Kondo. *Folia Pharmacol. Japon.* **27**, 324–48(Breviaria 59–60)(1939); cf. *C. A.* **34**, 819[9].—The toxicity of neo- and myo-arsenobenzene to mice always increased when the solns. were exposed to air for some time. The latter changed more rapidly than the former. All solns. changed color on standing and finally a ppt. formed. Neoarsenobenzene changed the most rapidly and myoarsenobenzene the most slowly. Increased temp. hurried this reaction. The pH decreased and viscosity increased as the solns. changed to a wine-red. G. H. W. Lucas

Diethylaminoethylephedrine (isalon) in comparison with ephedrine with respect to its effect on respiration, bronchial muscles and their spasms, as well as to its toxicity. Hirosi Matumoto. *Folia Pharmacol. Japon.* **27**, 349–64 (Breviaria 60–1)(1939); cf. *C. A.* **33**, 8807[6].—Ephedrine in moderate dosage increased respiration in rabbits a little more than did isalon; in large doses both arrested it. Both drugs produced relaxation in the bronchial musculature of the ox and relaxed bronchial muscle in the rabbit which had been thrown into a spasm by acetylcholine or histamine. The action of ephedrine was more pronounced than that of isalon, but was weaker than that of adrenaline. Isalon was somewhat more toxic than ephedrine to mice when injected subcutaneously or intravenously. G. H. W. Lucas

Cellular reactions to lipoid fractions of the tubercle bacillus. Robert M. Thomas. *Yale J. Biol. Med.* **12**, 283–6(1940).—Phthiocerol, an alc. deriv. from human and bovine tubercle bacilli, when placed in the abdominal tissue of rabbits did not produce a granulation of tissue resembling that appearing in an active tuberculous process. G. H. W. Lucas

Studies on the cancerogenic azo and related compounds. Riojun Kinosita. *Yale J. Biol. Med.* **12**, 287–300(1940). —Some 50 azo and related compds. were tested for their potency in producing hepatic cancer in rats. Butter Yellow was the most potent and growths induced showed a very

high malignancy in histological structure, growth, metastasis, etc. G. H. W. Lucas

The influence of liver extract on the oxygen consumption of mammalian erythrocytes. I. Properties of the constituents of the system. G. A. Overbeek. *Rec. trav. chim.* **58**, 1018–32(1939); cf. Michaelis and Salomon, *C. A.* **24**, 5356; Damblé, *C. A.* **27**, 2204; Deutsch and Wagenfeldt, *Deut. Arch. klin. Med.* **171**, 73(1931).—Centrifuged Ringer soln. ext. of blood-free liver, like methylene blue, augments erythrocyte respiration. Both factors can be made limiting by increasing the concn. of the other components. Rabbit and human cells are most affected by liver ext., hog poorly, rat not always. This order parallels the magnitude of blood catalase index, though the effect is not related to catalase level. Glucolysis may be involved since NaF favors the effect. Rat and rabbit cells respond alike to methylene blue. Augmentation by liver ext. is observed in cells from pernicious anemia patients, and in concd. hemolyzates. The latter are not affected by methylene blue. Boiled or ultraviolet-irradiated liver exts. and antianemic liver prepns. are inactive. Rat livers yield more active exts. than rabbit livers. Addn. of substrate (glucose, lactate but not pyruvate) is necessary for liver ext. effects and the R. Q. is 0.9. II. **Influence of cyanide and narcotics.** *Ibid.* 1033–9.—Very small quantities (6.25 γ/ml.) of KCN inhibit liver ext. augmentation, larger (200 γ/ml.) the methylene effect. At KCN concns. not inhibiting, variation in methylene blue concn. does not change the result; perhaps this is explained by the dual nature of the respiration (cf. *C. A.* **26**, 1326). Phenylurethan and ethylurethan have almost no inhibitory effect on erythrocyte or hemolyzate respiratory augmentation by liver ext. Anaerobic Thunberg detn. indicates absence of dehydrogenases insensitive to narcotics. Methylene blue augmentation is inhibited by urethans. J. McA.

The cardiac action of nicotine and its interpretation with reference to the humoral transmission of nerve impulses. I. The action on the myocardium. V. Gronchi. *Arch. fisiol.* **39**, 51–68(1939).—Nicotine has a triphasic action on the myocardium inhibition (I), excitation (II) and a 3rd phase characterized by regular rhythm with increased inotropism and decreased chronotropism. On repeated administration of nicotine the first phase disappears. As in the heart it produces in the isolated skeletal muscle first an increase, later a progressive decrease, of elec. excitability. II. *Ibid.* 69–87.—Phases I and II are not caused by excitation and paralysis of the ganglia by a direct and simultaneous stimulation of the cholinergic and adrenergic nerve endings with preponderance of the vagal effect in phase I and the sympathetic in phase II. Phase III corresponds with a paralysis of both nerve endings combined with a direct and reversible action on the muscle. This latter fact is proved by the decreasing responsiveness of the myocardium to adrenaline, acetylcholine and faradic stimulation. It was not possible to prove an influence of nicotine on the automatism of the myocardial tissue. A. E. Meyer

Variations of iodine and bromine in the thyroid of animals treated with bromine. Giovanni Moruzzi. *Arch. fisiol.* **39**, 249–73(1939); cf. *C. A.* **33**, 3887[1].—Br is a normal constituent of animal organs, but the quantity is usually too small to permit an estn. as to whether it is specific for the organ. Feeding NaBr to dogs and rabbits leads to a selective accumulation in various organs, especially the pituitary, gonads and thyroid. Prolonged medication produces in most organs a gradual increase which reaches a max. after a long time and is followed by a slow decrease. The thyroid attains the max. quite rapidly and a prompt and sustained decrease follows, which may attain finally 98% of the initial max. The Br is usually present in a nondialyzable form. A. E. Meyer

The mechanism of the disappearance of the vasomotor reflexes of the carotid sinus produced by ergobasine. Leonardo Donatelli. *Arch. fisiol.* **39**, 327–66(1939).—Ergobasine depresses the vasoconstrictor bulbar centers; in small doses it sensitizes the muscular receptors to adrenaline-like substances. In large doses it depresses them. A. E. Meyer

Modifications of basal metabolism in pernicious anemia during liver therapy with special reference to the change in the blood picture. Pier M. Casassa and Giulio Saita. *Arch. sci. med.* **68**, 563–82(1939).—There is in pernicious anemia a general trend toward a lower metabolic rate, but the acute cases show rather an increased rate. The peripheral blood picture itself does not correspond to definite changes in the metabolic rate. During the reticulocyte crisis an increase occurs which is followed by a decrease while the blood count improves. Later on an increase follows again. A normal blood count does not entail normal metabolism. A. E. Meyer

Effect of certain drugs and mineral deficiencies on helminthiasis of ruminants. Karam Chand. *Indian J. Vet. Sci.* **9**, 267–78(1939).—The following cheap anthelmintics, singly and in combinations, were tried against *Haemonchus* and *Oesophagostomum* in calves and sheep: powd. butea, $CuSO_4$, kamala, melon (pumpkin) seeds, spineless cactus, turpentine oil, veronica anthelmintica and Na arsenite. The most effective was $CuSO_4$ with kamala, which lowered the egg count of the parasite in calf and sheep feces 90%. $CuSO_4$ with Na arsenite eradicated 58% of the parasites. Mineral deficiencies in the diet lowered the resistance of the animals to parasitic infestation. Dorothy A. Meyer

The effect of sulfanilamide and sulfapyridine on a toxic lyzate derived from pneumococci. Charles M. Carpenter, Gerald M. Barbour and Helen Ackerman. *J. Bact.* **39**, 27–8(1940).—When 1 mg. of sulfanilamide was mixed with 1 m. l. d. of type I toxic lysate 95% of the mice died as compared with 96% of the controls. With sulfapyridine only 12% died. With type III lysate 93% of the controls died and none with sulfapyridine. J. T. M.

Some relations of chemical structure to toxicity and to antibacterial action. Sanford M. Rosenthal and Hugo Bauer. *J. Bact.* **39**, 28(1940).—The S in sulfanilamide may be replaced by As, C or P and active compds. obtained. As regards the amino group, the *p*-position in the benzene group seems to be essential. Oxidation of the amino group does not decrease activity but increases toxicity. John T. Myers

The effect of sulfanilamide and its derivatives (sulfanilylsulfanilamide, the soluble sodium salt of this compound and sulfapyridine) on the gonococcus and gonococcal infections. A. Cohn. *J. Bact.* **39**, 44–5(1940); cf. *C. A.* **33**, 2978[8].—Expts. *in vivo* and *in vitro* indicate only slight differences between the different chemotherapeutic agents on single gonococcus strains. A given patient may be resistant to one compd. and responsive to another. John T. Myers

Study of mouse temperatures, with reference to the effect of temperature on sulfanilamide therapy. W. P. Larson, Milton Levine, Raymond M. Bieter and Wm. F. McLimans. *J. Bact.* **39**, 45(1940).—Infected mice treated with sulfanilamide lived longer at room temp. than at 37°. John T. Myers

Pathological changes following prolonged administration of sulfathiazole and sulfapyridine. Geoffrey Rake, H. B. van Dyke, W. C. Corwin, C. M. McKee and R. O. Greep. *J. Bact.* **39**, 45–6(1940).—Sulfathiazole caused fewer pathol. changes than did sulfapyridine. John T. Myers

Tutin: its pharmacological action and its antagonism to sodium amytal. Edward E. Swanson. *J. Am. Pharm. Assoc.* **29**, 2–4(1940).—Tutin, $C_{20}H_{23}O_8$, a glucoside of *Coriaria thymofolia*, has a convulsant action similar to that of coriamyrtin and picrotoxin; it is slower in the onset of action but longer in duration. Comparisons were made with coriamyrtin, picrotoxin, metrazole and thujone, in mice and rabbits, by the detn. of convulsive and lethal doses, injected subcutaneously and intravenously. In rabbits Na amytal can detoxify 55 min. lethal doses of tutin, 45 of coriamyrtin, 40 of picrotoxin, but only 7.5 of metrazole and 5 of thujone. Intravenously, tutin can detoxify in rabbits a little more than 2 min. lethal doses of Na amytal injected subcutaneously. A. P.-C.

Toxicity of triethylene glycol and the effect of *p*-aminobenzenesulfonamide upon the toxicity of this glycol. W.

M. Lauter and V. L. Vrla. *J. Am. Pharm. Assoc.* 29, 5–8(1940).—Triethylene glycol (I) is less toxic than diethylene glycol when given to rats; it is therefore doubtful that the ether linkage in the higher glycols is responsible for the increase in toxicity reported previously. The lethal dosage when given by stomach tube undild. is between 10 and 15 cc. I per kg. body wt.; 10 cc. per kg. shows definite toxic symptoms and retards wt. increase. Aq. solns. do not seem to be more toxic than when I is given undild. Adult rats are killed by 5% solns. while young rats barely survive this concn. Young rats thrive well on 3% solns. and the increase in wt. is absolutely normal. In view of the fact that as low as 0.25% of diethylene glycol showed impairment of growth in rats, further investigations of I and higher mol. wt. glycols would seem worth while. A. Papineau-Couture 1

Pharmacologic study of devil's club root (Fatsia horrida). Leonard J. Piccoli, Michael E. Spinapolice and Morris Hecht. *J. Am. Pharm. Assoc.* 29, 11–12(1940).—Oral administration of aq. exts. of devil's club root had no hypoglucemic effect on the blood of rabbits that had been starved for 15–24 hrs. A. Papineau-Couture 2

The toxicity of a new mercurial diuretic, Esidron. II. Acute toxic effects produced by a massive dose of the drug. L. L. Chastain and George C. Mackie. *Southern Med. and Surg.* 102, 5–6(1940).—No acute toxicity was evident in dogs with up to 7 times the av. human therapeutic dose (2.5 mg./kg.) of Esidron (the sodium salt of *N*-hydroxymercuripropylquinolinamic acid compd. with theophylline). Typical Hg poisoning, with blood pressure and respiratory changes secondary to the cardiac effects, was produced only with 22.5–37.5 mg. of the drug per kg. **III. The effect of continued use of the drug and its diuretic action.** Geo. C. Mackie and L. L. Chastain. *Ibid.* 7–8.—The diuretic action of 6.5 mg. Esidron per kg. rabbit (given intravenously) was not altered by premedication with a series of 2.5 mg. subcutaneous doses per kg.; nor were there any toxic symptoms. Hg metabolism proceeded normally during continued medication with the latter dosage. J. Pinchack 3 4

Mecholyl and histamine effects on peripheral circulation and relief of arthritic pain. Abraham Cohen and Harry Rosen. *Arch. Phys. Therapy* 21, 12–16(1940).—Ointments contg. acetyl-β-methylcholine chloride (I) dilated the capillaries and arterioles of the web of the frog foot. Histamine-HCl (II) dilated the capillaries but in general constricted the arterioles with resultant slowing of the circulation. Ointments contg. II produced satisfactory erythema in arthritic patients but caused urticaria in 4 cases, 3 of whom presented previous histories of allergy. I ointments produced erythema in all patients with no untoward reactions. Both I and II produced a greater effect when they were incorporated in an analgesic-balm type of base, compd. menthol ointment, than in a petrolatum-lanolin base. Heat enhanced the action of both drugs. An ointment contg. 0.25% I used with the application of heat relieved arthritic pain resulting from circulatory disturbances in 88% of 96 cases. M. M. R. 6 7

Signs of intoxication after use of minute quantities of atropine. W. Müller. *Med. Welt* 13, 1230–1(1939).—Toxic symptoms developed in 3 patients when ointment containing atropine (0.2–1 mg.) was introduced into the conjunctival sac. In one patient, toxicity was noted when 0.7 mg. of atropine was taken orally. The described sensitivity to such small doses is contrasted to the great tolerance of patients with parkinsonism and postencephalitis who are known to tolerate up to 40 mg. daily. Maurice M. Rath 8

Treatment of multiple sclerosis with lecithin. I. Miner. *Münch. med. Wochschr.* 86, 1038–40(1939).—Lecithin (10–20 mg. in 5 cc. of physiol. saline soln.) was injected intrathecally in persons with disseminated sclerosis with considerable improvement in 80% of 130 cases. Lecithin has a specific antilipase activity and is an activator of cellular processes in the organism. Both of these reactions probably account for its favorable therapeutic action. It may be that lecithin acts further to inactivate the pathogenic virus by fixation of the pathol. lipase to an exogenous substrate. Administration by this method caused no apparent toxic reactions. Maurice M. Rath 9

The significance of neurovegetative disturbances in throat, nose and ear diseases and their treatment with Bellergal. Gerhard Theissing. *Münch. med. Wochschr.* 86, 1121–3(1939).—Bellergal, a combination of bellafolin and ergotamine, together with phenobarbital, gave good results in patients suffering from migraine and Ménière's disease. Complex disturbances of the autonomic nervous system, which apparently is hyperactive, are benefited by the use of the 3 drugs, which are used because they act favorably on both the vagus and sympathetic systems. Maurice M. Rath 10

Effect of potassium chlorate upon poliomyelitis experimentally produced in the monkey. C. Contat and C. Spycher. *Schweiz. med. Wochschr.* 69, 719–22(1939).—A virulent poliomyelitis strain was inoculated intracerebrally into *Macacus rhesus*, all of which died in 7–11 days after inoculation. To the virus suspension, *in vitro*, was added $KClO_3$ (2.5–5.0%) for 2 hrs. Injection of the suspension had no effect. When $KClO_3$ (0.1 g. per kg. body wt.) was given by mouth every 2 hrs. 100 hrs. after inoculation, poliomyelitis appeared to be checked. Given within 48 hrs. after injection, $KClO_3$ prevented poliomyelitis from developing. Animals cured by $KClO_3$ proved immune to a second inoculation 10–15 days after the first injection or end of treatment. Five to 10 times the therapeutic dose for humans proved nontoxic in monkeys. $KClO_3$ was successfully used to treat 40 patients with acute poliomyelitis. M. M. R. 11

Effect of diethyl- and allylisopropyl-barbituric acid on control of blood sugar. Z. Horn. *Schweiz. med. Wochschr.* 69, 741–2(1939).—See *C. A.* 30, 6825⁸. Maurice M. Rath 12

Hydrocyanic acid poisoning: acute segmental edema of the cornea, Kayser-Fleischer's ring and renal diabetes. M. Amsler. *Schweiz. med. Wochschr.* 69, 1012–15(1939).—After being exposed to HCN vapors in a disinfecting room, corneal changes, such as opacity and radial strips, were noted in 1½ hrs. Sugar (5%) was found in the urine but this disappeared quickly, although functional disturbances of the kidneys were still noticed a year later. Maurice M. Rath 13

Action of tyrosine and glycocoll on the blood-sugar content in Eck-fistula dogs. Toei Ka. *Tôhoku J. Exptl. Med.* 37, 113–18(1939); cf. Kesztyüs and Martin, *C. A.* 31, 3151⁹.—The blood-sugar level in the normal dog was not changed by the intravenous administration of 0.1 g. per kg. of tyrosine. In the Eck-fistula dog this amt. produced a slight hyperglucemia followed by a slight hypoglucemia. In the normal dog 0.1 g. per kg. of glycocoll produced a long-continued hypoglucemia and no hyperglucemia, in the Eck-fistula dog a slight elevation occurred, followed by hypoglucemia. A slight but definite hyperglucemia followed by a slight hypoglucemia resulted when 0.5 g. per kg. glycocoll was given. In general, there was an increase in the blood-sugar concns. after giving tyrosine or glycocoll to the Eck-fistula dog. The hypoglucemic effect of glycocoll is not altered by that operation. Maurice M. Rath 14

Influence of pilocarpine on the adrenaline output from the suprarenal glands in dogs and cats. Takuzi Hirano. *Tôhoku J. Exptl. Med.* 37, 119–38(1939).—Pilocarpine was administered to cats and dogs provided with a cava pocket. One mg. per kg. given subcutaneously evoked an accelerated effect on the output of adrenaline in the dog; given intravenously, 1–2 mg. per kg. accelerated the adrenaline output in anesthetized dogs, but the amt. was small and acceleration occurred much sooner than in the nonanesthetized dogs. In cats 1 mg. per kg. was not effective, whereas 2 to 5 mg. usually was. In the cava-pocket expt., which is carried out under anesthesia and laparotomy, the rate of adrenaline output was decidedly reduced when a small amt. of the drug was given. Intermediate amts. caused a transitory reduction followed by an acceleration. The blood flow through the suprarenals in both cats and dogs was usually diminished after giving pilocarpine. Maurice M. Rath 15

Gonorrheal myelitis with associated porphyrinuria following sulfanilamide. Frank G. Norbury. *J. Lab. Clin. Med.* **25**, 270–4(1939).—The urine of a patient with gonorrheal myelitis who had taken sulfanilamide contained porphyrin pigments, which were confirmed by spectroscopic examn. Howard W. Robinson 1

The hematologic study of seventy-six pneumonia cases treated with sulfapyridine, including a fatal case of agranulocytosis. J. R. E. Morgan and H. K. Detweiler. *J. Lab. Clin. Med.* **25**, 275–81(1939).—The drug produced no significant decrease in hemoglobin or erthrocyte levels. Of 35 patients with a persistent leucocytosis after the third day of therapy, 65% had a demonstrable complicating factor and of these 46% were pulmonary in character. Leucopenia was present in 8 patients. When the total leucocyte count fell to 4000 there was a relative lymphocytosis; below this level the lymphocytic and granular series were reduced in total nos., maintaining the relative lymphocytosis. The leucopenia could not be correlated to age, sex, causative organism, dosage, or blood levels of the drug, but patients with low initial leucocyte counts are much more liable to leucopenia. A case of sulfapyridine-treated hemolytic streptococcal pneumonia, which developed a fatal agranulocytosis, is reported in detail. Howard W. Robinson 2

Pharmacology of tetanus toxins. Syotin Haku. *J. Chosen Med. Assoc.* **29**, 2025–74(German abstr. 129–32) (1939).—The active principle of the toxins which cause the typical tetanus in mice decomps. at 60–70° (60 min.). The toxins also contain a principle which has the power to accelerate at a high temp. the movement of isolated heart of bullfrog; this principle is inactivated at 80°. It acts on intracardial ganglionic cells. A new perfusion app. having devices for maintaining const. temp. at different temps. is described. S. Tashiro 3

The influence of wrapping the gastric vagus nerve with magnesium strips on the secretion of the gastric pouch. Takeo Yositosi. *J. Oriental Med.* **31**, 767–85(English abstr., 54)(1939).—From 2 to 3 weeks after wrapping with Mg strips the vagus nerves (below the diaphragm) of dogs having a gastric pouch, there is a marked decrease in gastric function, as judged by acidity, peptic activity and amt. of secretion. Contrary to Best and Orator's finding, the effect is paralytic not stimulatory. This effect is not local but general owing to the absorption of Mg salts produced by oxidation of the metal. S. Tashiro 4

Selective action of sulfanilamide on the parasites of experimental malaria in monkeys in vivo and in vitro. L. T. Coggeshall. *J. Exptl. Med.* **71**, 13–19; *J. Bact.* **39**, 30–1 (1940).—With mixed malaria infections in the same exptl. animal sulfanilamide (I) eradicates a virulent *P. knowlesi* (II) infection, leaving the animal with a milder chronic *P. inui* (III) infection. Detns. of the metabolic activity of the 2 parasites *in vitro* showed that II consumed approx. 6 times more O than III. The addn. of I in concns. less than that necessary to effect a cure almost completely inhibited the respiration of I *in vitro*, whereas the same concn. of I against the same no. of III had no apparent effect. C. J. West 5

Chemical and immunological studies on the agent producing leucosis and sarcoma of fowls. Elvin A. Kabat and Jacob Furth. *J. Exptl. Med.* **71**, 55–70(1940); cf. *C. A.* **33**, 3778[8].—The activity of the agent producing sarcoma or leucosis in material deposited by high-speed centrifugation is the same as that of the original crude exts. Material sedimentable at high speed contg. approx. 10^{-6} mg. N produces tumors at the site of injection. Small quantities of material sedimentable at high speed are present in normal chicken serums and about twice as much in leucemic serums (strain 1). Normal chicken and mouse spleens and all other human and mouse tissues examd. contain large amts. of material sedimentable at high speed. Extn. of leucemic blood cells with saline yields little addnl. virus. The washed cells readily produce leucosis even after irradiation with amts. of x-rays sufficient to destroy the leucemic cells but not the virus. Freezing at −60° preserves the activity of the high-speed deposits for at least 6 months. Addn. of 5% satd. Na_2SO_4 slightly delays deterioration of high-speed deposits in the ice box. Most of the agent measured by inoculation of chicken and the fraction sedimentable at high-speed measured by its N content is pptd. by 1/3 satn. with Na_2SO_4. C. J. West 6

Detection and estn. of benzedrine (Illing) 7. Vitamin K-active derivs. of 2-methyl-1,4-naphthohydroquinone (Ansbacher, *et al.*) 10. Water-sol. antihemorrhagic esters (Fieser, Fry) 10. Sympathicomimetics (Novelli) 10. S studies—synthesis of alkanesulfonic acids and derivs. [tested for therapeutic and antipyretic action] (Latimer, Bost) 10. 7

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I—ZOÖLOGY

R. A. GORTNER

The treatment of paragonimiasis. I. Experimental treatment and efficacy in dogs harboring lung flukes (Paragonimus westermanii). Sadamu Yokogawa and Mantoku Ro. *Acta Japon. Med. Tropical.* **1**, 1–18 (1939)(in English).—Intramuscular injections of prontosil sol. combined with emetine-HCl were more satisfactory than emetine alone in the treatment of dogs experimentally infected with lung flukes. The rapid death of the adult flukes was due to the parasiticidal action of emetine, causing degeneration of the adult worms, and to the action of prontosil in stimulating antibody production in the host. Where treatment was successful, varying degrees of transformation and degeneration of some of the eggs occurred on the 3rd day of treatment. The toxic manifestations were due chiefly to the emetine. The treatment was more effective, the lighter the infection, the longer the interval after the initial infection and the more vigorous the production of antibodies in the host. Ruth Berggren 10

The anaerobic consumption of glycogen in male and female Ascaris (from swine). Mantoku Ro. *Acta Japon. Med. Tropical.* **1**, 29–36(1939)(in English).—In 20 expts. on 167 male and 150 female *Ascaris lumbricoides* the glycogen content varied from 3.78 to 6.74% (av. 5.37%) in the males and from 3.55 to 6.67% (av. 4.99%) in the females. The av. daily glycogen consumption per 100 g. fresh *Ascaris* for the 1st, 2nd and 3rd days of starvation under anaerobic conditions at 37° was 1.31, 0.15 and 1.17 g., resp., for the males and 1.33, 0.60 and 0.14 g., resp., for the females. Ruth Berggren 11

The effect of potassium cyanide on the rate of regeneration in Planaria. J. Bassina. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 184–8(1937).—Regeneration was inhibited by KCN. S. A. Corson 12

Advances in zoölogy during 1939. D. P. Costello. *News Ed. (Am. Chem. Soc.)* **18**, 25–9(1940).—A review with bibliography of 17 references. E. J. C. 13

Advances in entomology. C. H. Richardson. *News Ed. (Am. Chem. Soc.)* **18**, 64–7, 70–2(1940).—A review with bibliography of 93 references. E. J. C. 14

The lipides of Taeniarhynchus saginatus. I. A. Smorodintsev and K. V. Bebeshin. *Bull. soc. chim. biol.* **21**, 1194–1203(1939); cf. *C. A.* **33**, 5520[2].—About 3/4 of the total lipide ext. consists of neutral fats. The remainder is a mixt. of cholesterol, cholesteryl esters, lecithin, cephalin and cuorin. L. E. Gilson 15

Experimental reversal of sex in salamanders by the injection of estrone. Richard J. Ackart and Stanley Leavy. *Proc. Soc. Exptl. Biol. Med.* **42**, 720–4(1939).— 16

The injection of cryst. estrone into young larvae of *Amblystoma tigrinum* in some cases converted the gonads into ovo-testes resembling retarded ovaries with irregular medullary remains. L. E. Gilson

Respiratory exchange of the fresh-water annelid, Tubifex. Fred G. Brazda. *Proc. Soc. Exptl. Biol. Med.* **42**, 734–6(1939). L. E. Gilson

Oxygen consumption of the parts of the amphibian gastrula. L. G. Barth. *Proc. Soc. Exptl. Biol. Med.* **42**, 744–6(1939).—Preliminary. L. E. Gilson

Thyroid treatment and the cyclostome endostyle. Miriam Stokes. *Proc. Soc. Exptl. Biol. Med.* **42**, 810–11 (1939).—Expts. indicate that although the adult lamprey possesses an active thyroid, the body cells of the young ammocoetes, including the cells of the endostyle, are not sensitive to thyroid treatment. Metamorphosis in cyclostomes is related to influences other than the developing thyroid. L. E. Gilson

Effects of testosterone propionate on the female viviparous teleost, Xiphophorus helleri Heckel. Francis M. Baldwin and Howard S. Goldin. *Proc. Soc. Exptl. Biol Med.* **42**, 813–19(1939).—Sex reversal was produced in about 50% of the treated fish. L. E. Gilson

Effect of α-dinitrophenol on the development and metamorphosis of amphibians. M. Aloisi. *Boll. soc. ital. biol. sper.* **14**, 638–9(1939). Helen Lee Gruehl

Changes in plasma inorganic phosphate associated with endocrine activity in Xenopus laevis. II. The effect of insulin in hypophysectomized animals. Velva Schrire. *S. African J. Med. Sci.* **4**, Feb. Suppl. 1–3(1939); cf. *C. A.* **33**, 7598.—Inorg. phosphate was estimated by Youngsburg's method (*C. A.* **25**, 1857). Hypophysectomy was performed by Hogben and Slome's method. Only the anterior lobes were removed. Controls were subjected to all stages of hypophysectomy up to, but not including, removal of the anterior lobe. The animals were injected with insulin 2 months after operation. The water was changed every day and the animals were fed with minced meat twice a week. The animals were not fed for one week prior to the insulin injections. More blood was obtained from the animals if they were not fed during the preceding week. About 50 hypophysectomized animals were each injected intraperitoneally with 2 units of cryst. insulin, contd. in 0.25 cc. frog Ringer soln. and controls with frog Ringer soln. only. The injection of insulin into the animals with the pituitary intact leads to a fall in blood inorg. phosphate (from 5.2 mg. % to 3.2 mg. %, with an increase to 4.2 mg. % after 50 hrs.). A smaller fall was obtained in hypophysectomized animals. This difference can be attributed to the diminished action of adrenaline in hypophysectomized animals. Eleven references. **III. Injection of adrenaline into normal and hypophysectomized animals.** *Ibid.* 4–8.—Each of about 70 hypophysectomized animals and the same no. of operative controls injected intraperitoneally with 100 γ adrenaline in 0.25 cc. Ringer soln. A transient secretion of mucus was observed in both types after 2 hrs. The injection of adrenaline led to an initial fall in plasma inorg. phosphate (from 5.2 mg. to 4.5 mg. %) followed by a rise above normal level (to 5.6 mg. %). Removal of the anterior lobe of the pituitary abolished the initial fall but did not affect the subsequent rise. Eighteen references. W. R. Henn

Purification of the chromatophorotropic hormone of the crustacean eyestalk. A. A. Abramowitz. *J. Biol. Chem.* **132**, 501–6(1940); cf. *C. A.* **31**, 6350⁸.—The chromatophorotropic hormone of the eyestalk of the fiddler crab, *Uca pugilator*, is probably a nitrogenous base and its purification has been effected on the basis of its basic properties. It has been purified 100- to 200-fold by pptg. inert material with $Ba(OH)_2$ or Pb subacetate from aq. exts. and further removal of impurities by adsorption on fuller's earth. The active substance is pptd. in the histidine Ag fraction and then converted into the phosphotungstate which is decompd. and the hormone is dissolved in alc. in a slightly alk. medium and dried. The activity of the dried material was from 200,000 to 400,000 *Uca* units per mg. A. P. Lothrop

X-ray diffraction studies of nerve axis cylinder. F. O Schmidt, R. S. Bear and G. L. Clark. *Biodynamica* No. **50**, 1–3(1939); cf. *C. A.* **31**, 8032⁴·⁵.—Squid nerve axons shrunk in dil. EtOH exhibit a diffuse ring at 10, and a sharp ring at 4.7 A. with Cu Kα radiation. Evidence of orientation was not found. J. McAfee

The ability of the tadpole to stabilize ascorbic acid (vitamin C) and the role of ascorbic acid in the development of the frog. Paavo Suomalainen. *Ann. Acad. Sci. Fennicae* **A53**, No. 9, 12 pp.(1939).—The freshly laid undivided eggs of *Rana temporaria* do not contain ascorbic acid (I). Synthesis of I commenced upon the development of the egg. Max. values for I were noted in tadpoles which had just freed themselves from the jelly and possessed external gills. I decreased during later stages of development. No significant difference was observed in the content of reduced or total I in tadpoles which had developed in mannose or glucose soln. or in H_2O. I had a slight growth-promoting effect on tadpoles. No changes were observed in the rate of development when the tadpoles were kept for 10 days in an aq. soln. of I. Tadpoles secreted into the aquarium H_2O a substance which stabilizes I. H. J. Prebluda

The biology of the Porifera from the standpoint of radiation. W. Arndt. *Sitzber. Ges. naturforsch. Freunde Berlin* **1936**, 315–55(Pub. 1937).—An extensive review on the effects of different wave lengths and intensities of radiation (mostly visible light at different depths of fresh and salt water) upon respiration, pigmentation and other chem. and physiol. phenomena in sponges. Over 100 references. W. C. Tobie

Diffusion of chloride and glucose into frog muscle. R. B. Fisher and V. Subrahmanyan. *J. Physiol.* **97**, 233–7(1939).—The diffusion of Cl and glucose into the gastrocnemii of Hungarian frogs occurs *in vitro* in stages which are similar in magnitude for the 2 substances but sepd. in time. The Cl permeation of the muscle is always greater than that of glucose. E. D. Walter

12—FOODS

H. A. LEPPER

Calorific value of Indian foodstuffs. K. P. Basu and M. C. Malakar. *J. Indian Chem. Soc.* **16**, 427–32(1939).—The calorific value, moisture and N content of about 100 common Indian foodstuffs were detd. and reported. The calorific values were detd. by the Benedict-Fox oxycalorimeter (cf. *C. A.* **19**, 3040); and in the calcns., the calorific value of 1 l. of O_2 was taken to be 4.825 cal. D. A. M.

Review: The significance of physical methods of preservation for food hygiene. M. Knorr. *Jahreskurse ärtzl. Fortbild.* **30**, No. 10, 1–13(1939).—A brief discussion of the use of cold, either alone or combined with inert gases (CO_2 or N_2), dry ice, freezing, heat, desiccation and sterile filtration in the preservation of foods, and the effects of some of these methods on certain food components, as vitamins, minerals, proteins and enzymes. Ruth Berggren

Chemical preservatives and their determination in food products. V. S. Kobzarenko. *Akad. Nauk. U. S. S. R., Inst. Khem. Tekhnol.* (Kiev) **1939**, 113 pp.(English summary).—The history, toxicity, physiol. action and legislative regulation of food preservatives are reviewed. A new volumetric method for detn. of HCO_2H is based on the reactions $HCOONa + 2HgCl_2 = 2HgCl + NaCl + HCl + CO_2$, and $HgCl_2 + 2NaOH = HgO + 2NaCl + H_2O$. The method described is accurate to ±2.81%. The bromometric method ($HCOOH + Br_2 = 2HBr + CO_2$) is simpler. The results are accurate to ±0.81%, with a total acid content of 18 mg. In tests on preserved

sirups, the error averaged 4–7%; this is much better than the standard method used heretofore, where the error was as high as 17%. Benzoic acid does not interfere, but formaldehyde, salicylic and sulfurous acids do. The bromometric method for formaldehyde in an acetate medium ($CH_2O + 2Br_2 + H_2O = 4HBr + CO_2$), gives satisfactory results, permitting the detn. of 30–5 mg. of formaldehyde. Hexamethylenetetramine can be detd. only in aq. solns.; in the analysis of food products such detn. is difficult. The tryptophan reaction permits the detection of minute quantities, and in doubtful cases micro reactions are practical. Shake 20–30 g. of the finely divided product with 200 cc. of water and after 1.5 hrs. transfer to a 500-cc. flask, acidify with 10 cc. 25% phosphoric or 1 cc. sulfuric acid (1:4), and distil off 50 cc. with steam. Salicylic acid is detd. with an error less than ±2% by evapg. a petr. ether ext., taking up with 10 cc. H_2O, neutralizing with 0.05 *N* KOH, evapg. on a water bath in a Pt dish, igniting, dissolving in 15 cc. H_2O and titrating with 0.1 *N* HCl and methyl red. An iodometric method depends on the formation of $C_6H_2I_2(OI)CO_2Na$, which on addn. of NaOH forms $C_6H_2I_2(ONa)CO_2Na + NaIO + H_2O$. The NaIO is titrated with thiosulfate; error 0.8–1.5%. For benzoic acid the method of Fischer and Stauder (*C. A.* **25**, 1001) gives low results in fruit products, alcohol-free juices and pastries, in the presence of proteins. Schwaibold's method (*C. A.* **26**, 5670) modified by K. was more satisfactory. Thirty g. of the finely divided substance was heated 20–30 min. with 25 cc. H_2O and a few drops of phenolphthalein, 0.5 *N* NaOH added to faint alky., the mixt. cooled, shaken with 30 cc. of 15% $K_4Fe(CN)_6$, and 30 cc. of 30% $ZnSO_4$. The proteins were pptd., the flask was filled to the mark, and 50 cc. of the clear liquid was transferred to a funnel, weakly acidified with H_2SO_4, vigorously shaken for 2–3 min. with 40 cc. benzene, then with 20, and again with 10 cc. Up to 97% of the acid was thus extd. The benzene was distd. from the ext. made weakly alk. with 0.5–1 cc. *N* KOH. The benzoate was purified by extg. with ether the soln. acidified with HCl. The carbonate method of estn. gave much better results than the colorimetric. The ether ext. was evapd., taken up with 10 cc. of water, neutralized with 0.05 *N* NaOH and methyl red, evapd., ignited with KNO_3 for 15–20 min. to Na_2CO_3, taken up with water and titrated with 0.02 *N* HCl and methyl red to pale pink. Methods of detection and estn. of *p*-hydroxy- and *p*-chlorobenzoic and cinnamic acids are evaluated and described, as well as those for H_2O_2, F, boric acid and borax. 120 references. B. Gutoff

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Dehydration equipment as applied to food processing. Francis Rosseau. *Food Ind.* **11**, 687–702(1939).—Various types are described and figured. C. R. Fellers

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Flavor in food: A technical analysis of the sensation of flavor, presenting current theories and relating experiments that may lead to new developments in the extract field. Gordon R. Maybee. *Spice Mill* **62**, No. 7, 40–44 (1939); cf. *C. A.* **33**, 3899[4]. G. Adams

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Reduction-oxidation potential indicators in quality control of foods. I. Correlation of resazurin reduction rates and bacterial plate counts as indexes of the bacterial condition of fresh and frozen foods. Bernard E. Proctor and David G. Greenlie. *Food Research* **4**, 441–6(1939).—A modified resazurin technique is useful in providing a fairly rapid and moderately accurate means of detecting foods contg. large nos. of bacteria. Extremely high counts can be detected in 30 min. in such products as comminuted meats and broken-out eggs. Com. applications of the method are pointed out. C. R. Fellers

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Quantitative determination of tin in foods. E. Mathiesen and F. Jakobsen. *Tids. Kjemi Bergvesen* **19**, 147–50(1939).—The volumetric detn. of tin in the residue after wet ashing ($H_2SO_4 + HNO_3 + HClO_4$) of foods, especially canned foods, was investigated. Tin is detd. by oxidation with 0.002 *N* $HBrO_3$ after previous reduction with granulated Al in an atm. of CO_2. The optimal conditions of analyses have been settled, in particular with regard to the rapid accomplishment of the detn. H. Kringstad

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Selenium in vegetation; a search for the element in New South Wales wheat. M. S. Benjamin and A. W. Miles. *J. Australian Inst. Agr. Sci.* **5**, 221–3(1939).—No more than a trace of Se was present in any one of 20 wheat samples obtained from the chief wheat-producing districts of New South Wales. J. R. Adams

Some suggestions on the value of the determination of germination capacity and its practical accomplishment by the selenium method. Barthold Thomas. *Z. ges. Getreidew.* **26**, 155–9(1939).—Two modifications of the method (cf. *C. A.* **32**, 8012[8]) are suggested to obviate the tedious procedure of sectioning the individual grains. By one procedure the seeds are treated briefly with concd. H_2SO_4. After thorough neutralization with $NaHCO_3$ the seed coats are made to slip off easily by treatment with acetone. Since the concd. acid is inconvenient to use in rapid practical tests, an alternative measure is to soak the seeds (duplicate samples of 100 grains each) in 25% H_2O_2 for 2 hrs. The seed coats are sufficiently softened to permit adequate penetration by soaking at 37° overnight in a 2% soln. of the reagent ($NaHSeO_3$). By subjecting the seeds to a 2-min. evacuation under the water pump the seed coats over the embryos become taut and transparent so that any red coloration can easily be observed. Results by the 2 methods presented in comparison with those obtained by the standard germination technique (percentage germination after 10 days on moist sand), indicate an accuracy within 10%, which is considered sufficient. G. Adams

Chemical methods in the evaluation and testing of cereals and cereal products. U. Hanke. *Mühlenlab.* **9**, 17–22, 81–8(1939).—A summary of the more important methods with comments on their suitability and accuracy. G. Adams

The glutenous wheat investigations of the Reich's institute for cereal milling. Ernst A. Schmidt and A. Schulz. *Z. ges. Getreidew.* **26**, 148–51(1939).—Information is given for a no. of varieties of summer and winter wheats of the 1938–39 harvest concerning the no. and percentage of samples classified as glutenous wheat. Averages are reported by varieties for gluten content, swelling capacity and test no. G. Adams

Translocation of moisture in the bulk of stored grain. A. Kizel, N. Vasil'eva and G. Tsygankova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 786–90(1939)(in English).—Seeds of a soft variety of spring wheat were immersed in water on a strainer and allowed to dry on a thick cushion of gauze and thoroughly dried in thermostats at 28.3°, in layers 4–5 cm. thick. The expt. was conducted in 6-l. flasks insulated with felt and oil cloth and provided with wooden lids. A little refrigerator was designed to pass through the lid and cool the grain locally. The lid was pierced by a thermometer. The cooled portion of the grain was isolated in a gauze bag impregnated with paraffin. The bag was filled with about 60 g. of the same grain contained in the vessel. The refrigerator was a short cylindrical glass vessel of about 20–25 cc. capacity with 1 inlet and 1 outlet tube sealed in and insulated from the rest of the grain by a double-glass muff closed hermetically. The figures obtained show that grain gives off water to its cooled portions. Small differences in temp. suffice to bring about such translocation even in cases where the water content of the grain is extremely low. The importance of this fact for grain storage is pointed out and also the necessity of a uniform temp. throughout its vol. A. H. Krappe

The applicability of the colorimetric maltose determination in the recognition of germination injury in cereals and flour. K. Trognitz. *Z. ges. Getreidew.* **26**, 172–6(1939).—The chem. changes in cereal grains resulting from germination are discussed. The maltose content as detd. by the method of Schmidt (cf. *C. A.* **33**, 8435[7]) is considered a reliable index of germination injury. G. Adams

Clove oil as a mounting medium in microscopy for rapid detection of traces of flour from sprouted and malted grains. Ernst Berliner. *Mühlenlab.* **9**, 87–90(1939).—For rapid microscopic evaluation of flours clove oil is recommended as a mounting medium. The hollow spaces

arising in starch grains corroded through diastatic hydrolysis appear so prominent in clove oil that each grain so attacked can be readily recognized in transmitted light even at low magnification. The punctiform or crater-shaped depressions of corn starch are scarcely to be confused with the picture of the corroded grains. From a study of clove oil mounts B. concludes that the clefted hilum described in the literature as especially characteristic of rye and legume starches is not preformed but occurs only in water and other starch-swelling media as a consequence of suddenly occurring expansion within the grain. G. Adams

Three methods for determining foreign matter in flour. Bernard L. Blumberg and Charles W. Ballard. *Food Ind.* **12**, 36–8(1940).—Methods are described for detecting the eggs, excreta and larvae of the confused flour beetle, *Tribolium confusum*, in flour, are described. C. R. Fellers

Artificial bleaching of flour. G. Destrée. *Ann. zymol.* **6**, 314–36(1939).—A review of the action of the various bleaching agents used on the constituents of flour and of methods of detecting these agents. A. Papineau-Couture

The content of vitamin B_1 of Latvian white flours and breads of various milling grades. E. Zariņš and I. Robežniece. *Acta Univ. Latviensis, Kim. Fakultat. Ser.* **4**, No. 9(in Lettish, 423–8; in German, 429–30)(1939).—Latvian flour mixts. and breads prepd. from these mixts. were analyzed by converting the vitamin to thiochrome according to the Jansen method. The mixts. contg. (*a*) 97%, (*b*) 67–78, (*c*) 50–67 and (*d*) 0–50% white flour contained (*a*) 369, (*b*) 424, (*c*) 218 and (*d*) less than 50 γ of vitamin B_1 per 100 g. of the dry flour. The breads prepd. from these resp. flours contained (*a*) 290, (*b*) 391, (*c*) 230 and (*d*) less than 50 γ of vitamin B_1 per 100 g. of dry bread; black bread contained 249 γ. Bran contg. flours and breads contained very small quantities of vitamin B_1. The cocarboxylase content of the flours and breads was smaller than the smallest quantity which can be detected by the Roth method. Frank Maresh

Bread baking test suggested for pastry flours. J. A. Shellenberger. *Food Ind.* **12**, 52–4(1940).—The standard baking test of the Am. Assocn. of Cereal Chemists, Cereal Lab. Methods, 3rd Ed., is recommended for use in the lab. testing of soft-wheat pastry flours in preference to making test-cake batches. The nature and character of the test loaves, though not perfect, give much helpful information. C. R. Fellers

Preparation and evaluation of potato starch flour. Waldemar Kröner. *Z. ges. Getreidew.* **26**, 162–70(1939). —The article gives a flow sheet and detailed description of the present German process for manuf. of potato flour. The quality factors, color, odor, gloss, microscopic purity, moisture, ash, acid-insol. ash, active and bound Cl, SO_2 and sulfite, acidity and pH interval are discussed, the limits permissible being noted for the 3 quality grades. G. Adams

The influence of flour maltase on the determination of maltose-forming capacity according to Rumsey. A Rotsch. *Mühlenlab.* **9**, 65–70(1939); cf. *C. A.* **34**, 783[2].—Glucose was not detected in the usual dil. (1:10) ext. of flour, but when a more concd. ext. was prepd. by agitating 3 parts of flour with 5 of water and centrifuging at high speed glucose could be detd. by the reduction of a Cu sulfate–Na acetate soln. (Steinhoff's soln.). In an aq. suspension of flour a continuous increase in the glucose content was observed over a 1–3 hr. period, the amt. formed being dependent upon the temp. and the pH. At 0° there was little or no glucose formation and at a pH greater than 6 the rate of formation was slower than at a lower pH. The glucose:maltose ratio varied from 1:3 to 1:5 or 1:6 in the flours studied. In samples contg. flour from sprouted grain a higher glucose value was obtained along with a higher maltose value, this glucose formation being due apparently to the activity of cereal maltase. Sucrose and maltose solns. were not changed by aq. exts. of flours, except for flours from sprouted grain; such exts. over a longer period could act on a maltose soln. slightly decreasing its rotation. In normal flours, however, the enzyme appeared to be insol. in water. Because of the glucose formation the values obtained in the usual maltose detn. were too high; with wheat flours they were as much as 10% higher than the true values for the maltose-forming capacity. G. Adams

Properties and use of dusting meals. P. Pelshenke. *Mehl u. Brot* **39**, 517–19, 533–6, 549–51(1939).—As substitutes for the coarse-grain meals usually used to prevent sticking in the working and molding of bread dough, 26 meals of various origin are considered from the standpoint of adaptability and suitable purity as indicated by the total and acid-sol. ash content. Meals from spruce, fir, and beach wood, from grain hulls, oat straw, ivory nuts, and coffee grounds are listed, information being given on the ants. to use per kg. of dough, on the vol. in cc. per 100 g. of meal, and on the moisture, total ash, and acid-sol. ash content. G. Adams

Factors which influence the colloidal properties of dough. C. O. Swanson and R. J. Clark. *Kansas Agr. Expt. Sta., 9th Biennial Rept.* **1938**, 67.—The use of a supercentrifuge as a method of detg. absorption of water by flour has now given way to the use of a small mech. mixer. Dough-mixer curves were made on flour on all varieties milled and baked, providing much material for the study of correlation of curve characteristics with baking value. Baking was done by the checkerboard sponge method in units of 36 loaves. An instrument for recording automatically the rate of gas production and retention was used. In general, the recording-dough-mixer curves are characteristic of individual varieties of wheat. Abnormal values were obtained from drought-damaged wheat. When the dough-mixer curves were first used in testing, it was supposed that the peak of the curve represented the end of the mixing time. However, results show that the distance from the start to the peak of the curve represents the sum of all the mech. punishments the dough is to receive in baking, such as mixing, dividing, rounding, molding and stretching during fermentation. After the mixing has proceeded to the top of the curve the dough begins to break. It loses elasticity, probably due to the fact that the gluten strands become too attenuated. The break occurs when these elongated gluten particles begin to sep. The duration curve of the peak stage varies greatly in the different varieties. The rounded-peak curves are preferred to those with a sharper peak. C. R. Fellers

Basic questions on the sour-dough process. J. Lemmerzahl. *Mehl u. Brot* **39**, 273–8, 309–12, 325–8, 342–5(1939).—A survey relating practical procedures to scientific findings. G. Adams

The bacteriological control of dairy produce. P. Clerkin. *Agr. Progress* **16**, 218–23(1939).—The various methods for detg. the quality of dairy products from the bacteriol. standpoint are discussed. K. D. Jacob

Protein standards for milk production. J. Mackintosh. *Agr. Progress* **16**, 195–201(1939).—Under the conditions prevalent on numerous farms in the South of England the protein standard for milk production can be lowered 20–30% without detriment to the condition of the cow and the yield and quality (fat and solids-not-fat) of the milk. K. D. Jacob

Factors affecting the composition of milk. D. H. Jacobsen and G. C. Wallis. *N. Dakota Agr. Expt. Sta., Bull.* **331**, 5–28(1939).—One-day composite samples of milk from individual cows were obtained at monthly intervals for 5 years. These samples were examd. for ash, fat, total solids, Ca and P. Fat, solids and minerals in the colostrum milk were high but variable as compared with normal milk. Milk from Holsteins varied in fat content from 1.5 to 5.5 with an av. of approx. 3.4%; these same values for Jerseys were 3.5–9.0 with an av. of about 5.3%; Guernseys 3.5–8.0 with an av. close to 4.9%; and Ayrshires 3.7–5.2 (approx.) with an av. of about 4.4%. A definite lowering of the fat content was present during the summer months in all breeds. All breeds except Holsteins gave milk of higher fat percentage near the end of the lactation period. With Holsteins the fat

was highest shortly after parturition. Normal values for percentage of total solids for the several breeds were: Holstein 10.5–12.3, Ayrshire 12.5–14.3, Jersey 14–16 and Guernsey 14–16. Holstein milk was often below the legal min. for milk in both fat and solids-not-fat content. Values for ash in mg. per 100 ml. of milk for the several breeds are approx.: Holsteins 690, Ayrshires 709, Jerseys 770 and Guernseys 748. In general, the ash, Ca and P decreased during the 1st month of lactation, remained fairly const. until near the end of lactation, then increased steadily. Av. Ca values expressed in mg. per 100 ml. of milk were: Holsteins 114, Ayrshires 132, Jerseys 146 and Guernseys 146. Values for P were Holsteins 87, Ayrshires 105, Guernseys 108 and Jerseys 112. The increase at the end of lactation for P content was not nearly so marked as for Ca. The mineral content was lowest during the summer months. C. R. Fellers

Determination of ascorbic acid in commercial milks. Warren W. Woessner, C. A. Elvehjem and Henry A. Schuette. *J. Nutrition* **18**, 619–26(1939).—Ascorbic acid was detd. by a modification of the method of Mindlin and Butler (*C. A.* **32**, 2968[9]). The photoelec. colorimeter makes possible the elimination of many of the interfering substances which are formed when the milk is treated with H_2S. Among these substances is reduced riboflavin. No daily variation in the milk of individual cows was observed. Com. raw milks are only slightly less potent in ascorbic acid than fresh raw milks. Pasteurization destroys about 50% of the ascorbic acid present in the raw milk. Mineral modification and homogenization have a destructive effect on ascorbic acid content of milk. C. R. Fellers

Chemical properties of various kinds of milk and the detection of tubercle bacilli in milk. K. Ida. *J. Pub. Health Assoc. Japan* Dec., **1936**, 1–5; *U. S. Pub. Health Eng. Abstracts* **18**, Mi, 7(Jan. 15, 1938).—For detection of *Mycobacterium tuberculosis* the samples were centrifuged and the sediment either inoculated into guinea pigs or else plated out on Petroff's medium. All samples of raw and pasteurized milks gave a peroxidase reaction. Reductase was present in all samples of milk regardless of the temp. of storage. The time required for natural coagulation of the samples was largely dependent on the temp. of storage. In the raw milk catalase was at its max. activity when kept at 20–22°, while in the pasteurized samples max. activity was obtained at 37°. C. R. Fellers

Oily, metallic-flavored milk. Hans Herzfeld and Erich Vollbrecht. *Deut. Molkerei-Ztg.* **60**, 635–6, 670–1(1939).—Processed milk of good flavor stirred 2 min. with a Cu rod in one instance, and with an Fe rod in another, developed, resp., an oily-metallic, and a metallic flavor. Contact of milk with Cu even for one sec. led to the development of a mild oily-metallic flavor. An increase in temp. up to 80° intensified the strength of the off-flavor, and hastened its development. Aeration of the milk weakened the off-flavor and retarded its development. In continuous processing, the milk obtained in the early stages tended more strongly toward the development of the off-flavor than milk obtained in the late stages. Cleaning mixts. corrosive toward tinned equipment influenced the flavor of milk adversely when milk was processed in equipment cleaned with these mixts. The development of the off-flavor bore no relationship to variations in the character of the raw milk. A. Leviton

A modification of the Ritter test for copper in butter. B. E. Horrall and W. F. Epple. *J. Dairy Sci.* **23**, 53–60 (1940).—A modified Ritter test for Cu in butter is described. Results are low when the pH of the butter serum is high. This may be corrected by the use of a small amt. of 0.1 *N* H_2SO_4. Three different classifications were made in the test to det. the extent of the copper contamination: neg., in which the butter contained on the av. 0.221 p. p. m. of Cu and showed no bluish purple in the curd; slight, which had a slight bluish color in the curd and in which the butter contained on the av. 0.291 p. p. m.; and pos., which had a deep blue color and contained on the av. 0.583 p. p. m. The Cu contamination of Indiana butter was found to be 39.1% neg., 39.6% slight and 21.3% pos. The modified test although qual. is fairly accurate in detg. the extent of Cu contamination in butter and is also rapid and inexpensive. A. H. J.

The phosphatase test for control of efficiency of pasteurization. H. D. Kay, R. Aschaffenburg and F. K. Neave. *Milk Plant Monthly* **29**, No. 1, 42–3(1940).—A review. A. H. Johnson

Amylase and phosphatase tests for the efficiency of pasteurization. Arnold B. Storrs. *Milk Sanitarian* **6**, No. 7, 13–14(1937); *U. S. Pub. Health Eng. Abstracts* **18**, Mi, 9(Jan. 15, 1938); cf. *C. A.* **32**, 5088[7].—The amylase test is of definite value in detg. the efficiency of pasteurization. A lack of definite color change, coupled with the tendency of the starch-I blue color to fade rapidly makes interpretation difficult. The amylase test differentiates between heated and unheated milks while the phosphatase test will detect a very small amt. of raw milk in heated milk. Phosphatase is a fairly const. constituent of cow milk; amylase content is more variable. C. R. Fellers

The relation between cooked flavor and peroxidase reactions in milk, skim milk and cream. I. A. Gould. *J. Dairy Sci.* **23**, 37–46(1940); cf. *C. A.* **34**, 1086[9].—A close relationship was observed between the temp. at which the cooked flavor appeared in milk and those at which peroxidase was inactivated, as detected by *p*-phenylenediamine-HCl and guaiac reagents. A similar but less exact relation occurred from skim milk, whereas no relation between the temps. was found to exist in the case of cream. The addn. of sufficient quantities of Na and NH_4 sulfite and glutathione to milk to produce an intense "cooked" flavor had no appreciable effect upon the peroxidase reaction nor upon the oxidation-reduction potential of the milk. However, appreciable quantities of H_2S greatly affected the oxidation of the peroxidase reagents and markedly lowered the oxidation-reduction potential of the milk. A. H. Johnson

Cooked flavor in milk. Its source and significance. D. V. Josephson and F. J. Doan. *Milk Dealer* **29**, No. 2, 35–6, 54–62(1939).—When milk, cream, skim milk and some other dairy products are heated to a sufficiently high temp., or held for a sufficient period of time at lower temp., sulfhydryl compds. are formed from one or more of the proteins present. These sulfhydryl compds. appear to be responsible for the cooked flavor of heated milk and milk products. They are also responsible for the decrease in oxidation-reduction potential noted in heated dairy products, since they are active reducing substances. The sulfhydryl compds. are active antioxidants and appear to be responsible for the inhibition of the development of tallowy or oxidized flavor in milk heated over 170°F. In becoming oxidized (spontaneously or due to Cu contamination) the sulfhydryls apparently lose their flavor characteristic and the milk or milk product which previously exhibited a cooked flavor becomes indistinguishable from similar unheated milk. Most heated milk products do not become tallowy or oxidized until the sulfhydryls are first oxidized and the cooked flavor has disappeared. Washed-cream buttermilk in some cases appears to be an exception to this rule. The sulfhydryl substances in heated milk not only protect the milk against the development of tallowy flavor but also acts as an antioxidant toward ascorbic acid (itself an antioxidant toward tallowy flavor). Milk, cream and skim milk heated above 170°F. do not exhibit such rapid losses of ascorbic acid on storage as does raw milk or milk pasteurized in the conventional manner. While the sources of sulfhydryl compds. have not been definitely ascertained, the lactalbumin of milk seems to be the most likely ingredient responsible, with the protein of the fat globule membrane as a possible addnl. source. Some constituents of the milk serum seem to exercise a modifying role in the reaction brought about by the heat. A. H. Johnson

Curd-tension reduction of homogenized milk. A. C. Maack and P. H. Tracy. *Milk Plant Monthly* **29**, No. 1, 58(1940).—The lowered curd tension of homogenized milk is due partially to a disturbance of calcium caseinate-phospholipide complex and also to increased nos. of fat globules which tend to give weaker structure to the

curd. Under normal conditions of storage, there is no appreciable change in the curd tension of milk before it is used. A. H. Johnson

The control of sediment in homogenized milk. A. J. Hahn and P. H. Tracy. *Milk Plant Monthly* **29**, No. 1, 58(1940).—Clarification of milk after homogenization prevents sediment formation in homogenized milk. Destabilization of milk protein increases the amt. of sediment, while stabilization of protein decreases it. A. H. Johnson

Preparation and use of low-lactose milk. P. H. Tracy and W. J. Corbett. *Food Research* **4**, 493–8 (1939).—The low-lactose milk was prepd. by pptg. the colloidal casein in skim milk in such a manner that the whey and its solids can be sepd. The destabilizing agent used was Hygell, a powd. substance prepd. from the carob or locust bean. The method is detailed. By the use of this product ice cream contg. 9% normal serum solids and 4% low-lactose solids can be made that will not be sandy. Com. uses are suggested. C. R. Fellers

The "boiled-down" butter residue, the milk product richest in lecithin. W. Ritter and Ths. Nussbaumer. *Schweiz. Milchztg.* **65**, 291, 297–8(1939).—When butter is "boiled down," a residue rich in phosphatides seps. The lipides in this residue are sol. in benzene. Water is detd. by treatment of the residue at 85° in a vacuum oven. The phosphatides can be pptd. from a benzene soln. by means of acetone. Cephalin can be sepd. from lecithin by the dissolving of the phosphatides in benzene, and the pptn. of cephalin from the benzene soln. by means of ale. The phosphatides obtained by solvent extn. and subsequent volatilization of the solvent can be emulsified in water and pptd. by means of suitable quantities of acid, or metallic salts ($CaCl_2$, $MgCl_2$, $CuSO_4$, $AlCl_3$, etc.). Phosphatides comprise between 5–20% of the residue, and the quantity of, as well as the ratio between cephalin and lecithin in different samples of butter vary widely. The phosphatide content of the residue is 8–10 times as great as the phosphatide content of buttermilk. Cholesterol in the acetone filtrate, following the pptn. of phosphatides, is detd. by pptn. with digitonin. A. Leviton

Methods for disposing of dairy wastes. H. A. Trebler. *Milk Plant Monthly* **29**, No. 1, 60(1940); cf. *C. A.* **33**, 9464[2]. A. H. Johnson

A comparison of the imperviousness of commonly used paper milk containers when in contact with contained liquids. R. B. Stoltz and T. V. Armstrong. *Milk Plant Monthly* **28**, No. 12, 54–8(1939).—There is some variation in the amt. of liquid soaked up by paper milk containers. The use of 40% cream appeared to render the containers less impervious than when milk or skim milk was used. Holding at higher temp. allowed great absorption of the contained liquid. Paraffining at high temp. was not as satisfactory as paraffining at low temp., because of the greater drainage of the hot paraffin from the container. A. H. Johnson

Aluminum labels and foils weaken bottle-washing solutions. C. A. Shillinglaw and Max Levine. *Food Ind.* **12**, 41(1940).—Na aluminate is much less effective as a disinfectant than caustic soda in concns. of 1–2%. Hence, care is required to maintain alkali strength where Al caps and foils pass through the soaker washers for glassware. C. R. Fellers

Influence of dietary carotene on the carotene and vitamin A contents and the Reichert and iodine value of butterfat with special reference to seasonal variations. Sailendra Mohan Das-Gupta. *Indian J. Vet. Sci.* **9**, 249–66(1939).—Effects of feeding paddy straw, which contains little or no carotene, and grass and their mixts. were studied on 2 cows. The carotene and vitamin A contents and the Reichert values of their butterfat increased on the ingestion of grass, and were lowered on the ingestion of paddy straw. Assays of a large no. of butterfats from Vikrampur showed that the amts. of carotene, vitamin A, and the Reichert and I values were higher in the winter, when the cows feed on fresh grass, than in the autumn, when the cows live on paddy straw. The butter from an individual cow on the same diet gave similar results in spite of the adverse effects of the cold temp. and stage of lactation. Striking results were obtained by feeding a cow red palm oil, for the carotene, vitamin A and Reichert value progressively increased as the dosages of oil were increased. These results suggest that carotene may play some part in the production of more-volatile fatty acids in cow milk fat. Dorothy A. Meyer

Report of Dairy Research Institute. Starters for butter. W. J. Wiley, G. A. Cox and H. R. Whitehead. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* **13**, 20 (1939).—Addn. of about 0.5% of starter to pasteurized and chilled sweet cream and holding overnight at a low temp. before churning improves the flavor of the butter. No acidity develops in the cream under these conditions, although the resultant butter has a somewhat "brighter" flavor than if made from sweet cream alone. Appreciable biacetyl is produced in the cold cream by the action of *Str. cremoris* in the starter and not by the action of the betacocci which at higher temps. are responsible for the production of biacetyl in starters. Typical mixed cultures of *S. cremoris* and betacocci produce biacetyl rapidly during their period of logarithmic growth rate, but after reaching a peak value the production of biacetyl falls rapidly and approx. 90% is destroyed in 12 hrs. Pure cultures of betacocci, when grown in milk at 21°, do not produce appreciable quantities of biacetyl over long periods of time. **Land-cress (Coronotus didymus) taint in cream and butter.** F. H. McDowall. *Ibid.* 20.—The taint occurs during the spring months and is accentuated by the pasteurization process. Steam distn. of the plant and extn. of the distillate with petr. ether yielded 0.02–0.03% (based on the undried material) of an essential oil which had a strong odor of cress and contained 70–80% of benzyl cyanide; 1 or more S-contg. compds. was also present. Neither the oil nor artificial benzyl cyanide give the true land-cress taint when added to cream or butter. **The chemistry of incipient oxidation defects in butter.** C. R. Barnicoat and L. S. Palmer. *Ibid.* 21.—Incipient off-flavors such as "flat," "bitter," "stale storage" and "metallic" may be promoted by oxidation catalysts, including traces of Cu and Fe, but ferric Fe is inactive. These incipient oxidation changes may occur long before there is any evidence of oxidation in the butterfat and the addn. of oxidized fats or fat-sol. peroxides to butter fails to produce these types of off-flavors, but tends to promote "oxidized," "oily" or "tallowy" flavors. Oxidation of the lecithoprotein appears to be responsible for these incipient off-flavors. Most of the antioxygenic effect found in milk plasma appears to be due to the presence of sol. phosphates and citrates. The proteins also have this property to some extent and vitamins C and E seem to have antioxygenic properties. Also in *Minn. Agr. Expt. Sta., Tech. Bull.* **134**, 3–63(1939). K. D. Jacob

Effect of citric acid and sodium citrate on flavor, aroma and keeping quality of butter and ghee. Prito G. Khubchandani. *Agr. Live-Stock India* **9**, 162–6(1939).—Since Indian butter is supposed to be lacking in aroma as compared to English butter, K. studied the possibility of improving the flavor and aroma in the former by addn. of citric acid and Na citrate. The effect of such addn. in the manuf. of ghee has been especially considered. K. based his investigations upon the observations of Hammer and his associates (*C. A.* **16**, 596, 764), who reported that *S. citrovorus* and *S. paracitrovorus* ferment citric acid in milk with the production of acetylmethylcarbinol and its oxidation product biacetyl, and it is generally agreed that biacetyl is mostly responsible for producing the flavor and aroma of butter. The expt. was divided under 2 heads: addn. of citric acid and Na citrate to (1) cream and (2) starter culture. It was found that: (1) The effect of added citric acid and Na citrate in cream gives rise to increased aroma, but comparatively poorer keeping quality in butter. (2) Ghee made from such butter had a more pleasant aroma as compared with control samples. The keeping quality was improved by citric acid. (3) The use of *S. citrovorus* cultures, treated with citric acid and Na citrate 24 hrs. prior to inoculation into the cream, gave a better flavor and aroma in the resulting

butter than the use of untreated cultures. (4) The keeping quality of such butter was not affected. Edward A. Ackermann

Directions for the preparation and examination of lactic acid casein. Walter Müller and S. Lichtenberger. *Molkerei-Ztg.* (*Hildesheim*) **53**, 1362–4(1939).—See *C. A.* **34**, 534[7]. A. Leviton

The various protein nitrogen fractions in the types of cheese in most common use. Domenico Picchinenna. *Ann. chim. applicata* **29**, 452–4(1939).—The partition of N among various protein groups in several common cheeses is given. A. W. Contieri

Control work in cheese plants. Paul Ritter. *Schweiz. Milchztg.* **65**, 135–6(1939).—The following practice is recommended: reductase tests on delivered milk; rennet and indicator-paper tests on milk obtained in the stalls; identification by means of microscope of bacteria in kettle milk; acidity detns. on samples of rennet, and on whey obtained in rennet fermentation tests; acidity detns. on expressed liquor from cheese in press, and on rennet-contg. milk drawn from the kettle; pH and propionic bacteria detns. on 24-hr. old cheese. A. Leviton

A quick method for the determination of water in cottage cheese and in cream cheese. Ebinger. *Deut. Molkerei-Ztg.* **60**, 1071(1939).—Grind 5 g. of cheese with 15–20 g. of sand in a beaker. Add 10 cc. of 96% alc., and grind the mixt. until no white curd particles are visible. Evap. the alc. and water on a water bath, while stirring the contents of the beaker. After 7–8 min., the contents are dry and fine-grained. A. Leviton

Hydrogenated lard as a culinary fat. Ruth Jordan. *Purdue* (*Ind.*) *Agr. Expt. Sta., Rept. of the Director* **1937**, 64–6.—The lard was rendered from hogs fed a corn-soybean-mineral ration. The partially hydrogenated lard, the natural product and several com. shortenings were compared in pastry. Hydrogenation somewhat decreased the shortening value of the "soybean lard," but the latter had about the same shortening value as com. hydrogenated fats. The hydrogenated "soybean lard" was judged to be less intense and more desirable in flavor than the natural lard. Tests for flavor of the fats in hot baking-powder biscuits indicated a similar trend. C. R. Fellers

The hemolytic index as a criterion of the deterioration of meat. N. V. Kul'bysheva. *Voprosy Pitaniya* **7**, No. 4–5, 103–5(1938); *Khim. Referat. Zhur.* **2**, No. 4, 137–8(1939).—The method of Arutyunyan (*C. A.* **32**, 9316[4]) for judging the freshness of meat was examd. Of 20 series of expts. in only 5 did the hemolytic index coincide with the other methods for detn. of freshness (bacteriol. method of Feldman, content of NH_4 salts, Nessler no.). The hemolytic index depends on the grade and on the fat content of meat. Arutyunyan's method cannot det. the beginning of the deterioration of meat, it is not more sensitive than methods based on the chem. condition of meat proteins, and it is too complicated to justify its use. W. R. Henn

Comparative investigations on the ammonia content of meat. József Gerencsér. *Közlemények az Összehasonlító Élet- Kórtan Köréből.* **27**, 175–82(1940).—The NH_3 content was 9.17–65 mg. in 100 g. muscle in samples of beef obtained directly from slaughter houses. Beef obtained on the market contained 20.29 mg. ammonia in 100 g. (87.32 mg. in 100 g. dry matter). Pork obtained from slaughter houses contained 13.21–24 mg. ammonia in 100 g. against 21.59 mg. for pork obtained on the market. No significant differences were found in the ammonia contents of various muscles or in muscles originating of animals of various ages, sex or fat contents. The exact time of slaughtering cannot be detd. on basis of the ammonia content of the meat. Ebers' test (showing decompn. of meat) must be considered positive when the amount of ammonia exceeds 30 mg. in 100 g. muscle (or 123.4 mg. in 100 g. dry matter). The rate of the steady increase of ammonia content during storage seems to be 0.2–0.6 mg. % per hr. S. S. de Finály

Freezing makes beef tenderer. O. G. Hankins and R. L. Hiner. *Food Ind.* **12**, 49–51(1940).—Enzymes continue to act, though slowly, on meats held at freezing temps. Tenderizing may be due to both the mech. action of freezing the meat and to enzyme action. An app. measuring shearing strength is described. The tenderizing action at −23.3° was much greater than at −6.7°. However, there was no difference between −6.7° and −40° in tenderness. C. R. Fellers

Susceptibility of frozen-defrosted poultry meat to drip. C. H. Koonz and J. M. Ramsbottom. *Food Research* **4**, 485–92(1939).—Similar cooking shrinkages were obtained from unfrozen and frozen birds (−13.3 to −45.5° C.). White meat showed greater drip on defrosting than dark meat. The pH values of the dark meat were normally higher than those for the white meat. C. R. F.

Frozen storage of poultry. III. Peroxide-oxygen and free fatty acid formation. W. H. Cook and W. H. White. *Food Research* **4**, 433–40(1939).—The free fatty-acid content of poultry fat is usually low and shows no relation to storage conditions at freezing temps. The storage temp. is the most important factor in peroxide-O_2 formation in poultry fat, the amt. increasing with increase in the storage temp. At const. temp., low relative humidities accelerate peroxide-O_2 formation. This seems to be due to surface drying which exposes more of the fat to the air. Even after 25 months' storage at −13.5° the max. peroxide-O_2 titration observed was only about 8 ml. of 0.002 *N* $Na_2S_2O_3$ per g. of fat. Chicken fat is resistant to oxidation at temps. of −13.5 to −18°. C. R. F.

Increasing the storage capacity of fish with formalin ice. H. Keller. *Z. Fleisch- u. Milchhyg.* **50**, 72–3(1940).—The presence of 0.2 to 0.3% formalin (40% soln. of CH_2O) in ice used to pack fish allowed storage 5 to 6 days longer than was possible with ordinary ice. The formalin ice with the above concns. of CH_2O contributed no abnormal odor or taste to the fish. It is postulated that the psychrophile bacteria on fish produce NH_3 which reacts with CH_2O to yield innocuous hexamethylenetetramine. M. M. Piskur

Quantitative indexes of the chemical changes taking place in red fish during cold storage. N. V. Malin. *Voprosy Pitaniya* **7**, No. 4–5, 148–55(1938); *Khim. Referat. Zhur.* **2**, No. 4, 138–9(1939).—Fish fat contains a considerable amt. of easily oxidized unsatd. fats. To measure the changes taking place in fish under refrigeration, the acid no. of the Et_2O ext. is detd. as follows: Boil for 1 hr. under a reflux condenser a mixt. of 50 g. of the chopped fish with 80 cc. of ether. Decant the ether ext., to 20 cc. of the ext. add 20 cc. of C_2H_5OH, shake and titrate with a 0.1 *N* base (phenolphthalein as indicator). W. R. Henn

Blood substituted for flour in sausage manufacture. R. G. Walker. *Food Ind.* **12**, 49(1940).—Owing to the cohesive properties of blood plasma, sausages contg. blood do not burst when cooked. The blood also has a high binding value. The blood from cows contains 17.7% albumin and that of pigs 19.2%. Both red cells and plasma are used in sausages of various types in Europe. Normally 10% of blood plasma is used in sausages. The fresh blood is treated with Na citrate to prevent coagulation, strained and centrifuged to effect sepn. of red cells. C. R. Fellers

The pectic substances of plants. VI. The relation between jelly strength, viscosity and composition of various pectins. Ernest W. Bennison and Frederick W. Norris. *Biochem. J.* **33**, 1443–51(1939); cf. *C. A.* **32**, 2177[9].—There was little relation between chem. compn. and jelly strength or viscosity of pectins. In general, a high urone content connoted satisfactory jelly strength. Methoxyl content was not a criterion of jelly strength. The method of prepn. of pectins was a vital factor with respect to jelly strength and viscosity. Autoclave prepn. in the absence or presence of sucrose inhibited jelly formation. Jelly strength and viscosity of the same pectin were closely related. The power of pectin to form jellies was dependent to some extent on composition, but primarily on mol. size as indicated by viscosity. Any pretreatment which caused the polygalacturonide chain to disintegrate also caused a loss of jelly strength. E. W. Scott

[Report on] fruit cold storage. Anon. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* 13, 73–5(1939).— *Staining of pears during storage* occurred when the wrapped fruit was left in contact with ordinary corrugated pads in which Na silicate was used as the adhesive, but not by pads treated with dextrin, nor by contact with either plain white lining-paper or shredded white paper. Excellent *control of gray mold* (*Botrytis* sp.) of Winter Cole pears in storage was obtained by wrapping the fruit in Cu-treated papers. *Effect of borax on the cool-storage quality of apples.* Jonathan apples from trees sprayed with 0.1–0.2% borax solns. showed no reduction in keeping quality. Application of more than 0.5 lb. borax per tree as a top-dressing had an adverse effect. *Storage of apples on CO_2 atm.* Ballarat apples stored best in an atm. contg. CO_2 2.5 and O_2 18.5% at 39°F. A temp. of 39°F. and an atm. contg. CO_2 5 and O_2 16% were best for Washington apples. K. D. Jacob

The determination of ascorbic acid in fruit juices. Danilo Cozzi. *Ann. chim. applicata* 29, 434–42(1939).— Various methods of detg. ascorbic acid in fruit juices are described. The polarigraphic method, although giving high results, is better than the iodometric method, which gives even higher results. A. W. Contieri

The sugar and ascorbic acid contents of the juices of some Hungarian fruits. Gyula Gyenes. *Közlemények az Összehasonlító Élet- Kórtan Köréből.* 27, 200–4(1940).— Invert sugar was detd. by method of Shaffer-Hartmann (cf. *C. A.* 15, 1328), ascorbic acid by the method of Tillmans. The obtained values were: cherry 7.80% invert sugar and 0.310% ascorbic acid; mahaleb 5.25, and 0.170%; apricot 5.67, 0.045; peach 6.43, 0.015; tomato 4.02, 0.350. No connection was found between the contents of ascorbic acid and of invert sugar. S. S. de Finály

The analytical study of fruit and vegetable juices at present on the (French) market. A. Guillaume and Mlle. M. Michon. *Ann. fals.* 32, 301–19(1939).— Analyses are given of a no. of com. samples of red and white grape juices, apple, orange, grapefruit, mandarin, strawberry, gooseberry, cherry, raspberry, black currant, loganberry and tomato juices, and of corresponding lab.-prepd. juices. Analysis comprised detn. of d., acidity, alc., total solids, ash, sugars, total N, pectins and viscosity (methods used are described). The results are discussed on the basis of the method of interpretation described by Pien and Meinrath (*C. A.* 32, 7593[8]) showing that a no. of the com. samples had been "cut" with a dil. sugar soln. Generalization of the method would necessitate extensive work to establish reliable data on the compn. of pure juices from different varieties of fruit in different regions. A. Papineau-Couture

Suitability of the iodometric method for sulfurous acid in the examination of sultanas, fruit jellies and jams. Béla Mayer and László Heltai. *Mezőgazdasági Kutatások* 12, 209–16(1939).—As the gravimetric SO_2 detn. made in a CO_2 current is not suited for large scale examns. of samples, comparison was made to prove the suitability of the German official method prescribed for SO_2 detns. in wine or must. For sultanas the gravimetric method without a CO_2 current gives low values; the titrimetric detn. with 0.02 *N* iodine soln. gave high values. The iodometric method seems suitable for preliminary investigation to make possible a selection of samples. Iodometric detn. cannot be used for fruit jams (very high values). For SO_2 content (both free and total) of fruit jellies the iodometric gives reliable results, equal to those obtained by the gravimetric method. S. S. de Finály

Effect of sulfur fumigation on quality of rice. A. Sreenivasan. *Agr. Live-stock India* 9, 149–54(1939).— Shipments of parboiled rice are often subjected to S fumigation prior to their being imported. S. studied the extent to which such treatment affects the quality of the rice. The quantities of SO_2 retained by the rice grains after fumigation under different conditions were considered a good measure of this extent. A weighed quantity of the SO_2-treated rice was crushed, extd. with successive small quantities of water and filtered. The SO_2 in the filtrate was estd. by direct titration with standard 0.01 *N* I_2 soln. and by pptn. with $BaCl_2$, after initial oxidation with H_2O_2. Based on his findings, S. draws the following general conclusions: Rice grains exposed to a 3% concn. of SO_2 fumes inside a wide-mouthed bottle absorb appreciable quantities of the gas even at the end of 5 min. The quantity of the gas absorbed increases with the humidity of the atm. and with decreased air supply. Long exposure or drying in a current of air or in the sun results in partial removal of the gas; a further small quantity is lost during cooking. But a small amt. is always held tenaciously by the grain and it imparts a definite flat and acidic taste and odor to the cooked product. SO_2-treated rice cooks rapidly and to a squashy consistency owing to partial hydrolysis of the starch during cooking in the somewhat acid medium. Such rice also digests more slowly than untreated rice. Freshly fumigated rice is yellowish in color, though the color becomes very much lighter on exposure. The cooked product, however, is perfectly white. The conditions existing in shiploads and in large-scale operations are different, so that in practice the extent to which S fumigation affects the quality of the rice may not be as pronounced as in the expts. performed. Further expts., on a large scale, are therefore desirable. E. A. A.

Carotene (vitamin A) content of fresh and frosted peas. C. R. Stimson, Donald K. Tressler and L. A. Maynard. *Food Research* 4, 475–82(1939).—Fresh frozen and fresh peas have approx. the same carotene content. About 25% of the carotene is lost during 11 months' storage at −17.8°. Fresh peas contain approx. 6.1 I. U. per g. of vitamin A. A ratio of vitamin A to carotene of 1.5 was obtained. C. R. Fellers

Vitamin A values of sweet potatoes, turnips and carrots. Florence L. MacLeod and Evelyn Utley. *Tenn. Agr. Expt. Sta., 15th Ann. Rept.* 1937, 34–6(1938); cf. *C. A.* 30, 1451[6]; 31, 8735[8].—Cooked sweet potatoes are about twice as rich in vitamin A, as detd. by the animal bioassay method, as raw sweet potatoes. When corrected for moisture content the increase due to cooking is 36%. The vitamin A value also increases progressively during storage. The yellow turnip is a poor source of vitamin A as even 6 g. fed daily to rats depleted of vitamin A, made no wt. gains. Rutabagas contain considerably more vitamin A than turnips but much less than sweet potatoes. The Chantenay variety of carrot contained 40 Sherman units per g. in the raw state and about 60 units after cooking. Storage of carrots did not increase their vitamin A content. C. R. Fellers

Simulation, by chemical agents, of cooking potato tissue. Catherine J. Personius and Paul F. Sharp. *Food Research* 4, 469–73(1939); cf. *C. A.* 33, 7916[1,4].— The starch of potato tissue can be gelatinized by 40% chloral hydrate, 40% CHOH, 2 *N* soln. of Na salicylate and by a soln. of NH_4CNS prepd. by adding 40 g. of NH_4CNS to 200 ml. of water and 50 ml. of 95% EtOH. By treatment with $(NH_4)_2C_2O_4$, cell adhesion can be so reduced that it is characteristic of cooked tissue. It is possible to simulate cooking by first treating potato tissue with a cold gelatinizing agent and subsequently with $(NH_4)_2C_2O_4$. The texture of the potato appears to be the same whether cooking is simulated by chem. means or is accomplished by heat. Two changes are necessary for converting raw potato tissue into cooked tissue: (1) gelatinization of the starch and (2) a marked decrease in the cell adhesion of the tissue. These factors do not explain the differences between mealy and soggy potatoes. C. R. Fellers

The relation of the calcium ion to the sloughing of potatoes. W. E. Pyke and Gestur Johnson. *Am. Potato J.* 17, 1–9(1940).—Satisfactory control of sloughing of potatoes is obtained when approx. 12.5% of the salt used in the water in which the tubers are boiled is a sol. Ca salt. The total salinity of the cooking water should be about 1%. $CaCl_2$ gives good results but is too hygroscopic for home use. A satd. soln. of $CaSO_4$, salted in the usual manner, gives excellent control of sloughing. Ca sulfamate, which is readily sol., nonpoisonous and nonhygroscopic, is now available at moderate prices and is

very satisfactory. Also in *Colo. Agr. Expt. Sta., Farm. Bull. Quart.* 2, 11–12(1940). K. D. Jacob

How to use dextrose in canning. E. W. Eickelberg. *Food Ind.* 12, 33–5, 50–1(1940).—In the sirups for canning most fruits and such vegetables as beets, tomatoes, peas and rhubarb, dextrose can be advantageously used in place of a portion of the sucrose. While 100% dextrose can be used in citrus fruits and juices, about 25–35% is most desirable for other products such as berries, peaches, pears, cherries and prunes. Dextrose improves the flavor in many fruits because the natural flavor of the fruit is not masked. While at lower concns. dextrose sirups are only 66–75% as sweet as sucrose sirups of the same concn., at higher sirup concns. there is less difference in sweetness. Dextrose increases "shelf life" of products in which it is used. This is particularly true of canned citrus fruits and juices. The reducing properties of the dextrose retards deterioration of flavor. C. R. Fellers

Appropriate means for detecting artificial honey. J. Grossfeld. *Z. Untersuch. Lebensm.* 78, 380–5(1939).—A scheme for analysis of honey is given. In some cases adulteration with artificially inverted sugar can be detected by the Fiehe method (*C. A.* 3, 83). Most artificial honeys contain sulfate. Analysis for this radical can serve for detecting adulteration of flower honey, but, is not recommended for all honeys for sulfate is a natural constituent of leaf honey. Adulteration with starch sirup can be detected as follows: Dissolve 10 g. of sample in water, add 1 cc. of $K_4Fe(CN)_6$ and ZnOAc clarifying soln. and make to 100 cc. Filter 1 cc. in a test tube, add 1 drop of 25% HCl and 10 cc. of 95% alc., shake and observe against a dark background immediately and after 2 hrs. The presence of 1% starch sirup will cause an opalescence to develop after mixing; with 0.5% starch sirup an opalescence develops in 2 hrs. The sensitivity of the test can be improved with the use of iso-PrOH or PrOH. However, these modifications may cause a turbidity with leaf honey. M. M. Piskur

Experimental work on lactic acid in preserving pickles and pickle products. I. Rate of penetration of acetic acid and lactic acids in pickles. Frederick W. Fabian and C. K. Wadsworth. *Food Research* 4, 499–509(1939); cf. *C. A.* 33, 9473[2].—In the freshening of salted pickles NaCl is extd. to the greatest extent during the 1st hour. Little NaCl is removed after 24 hrs. NaCl is removed from small pickles much more quickly than from large ones. AcOH penetrates pickles more rapidly than lactic acid. The rate of acid penetration is greatest during the first 24 hrs. and equil. is reached after about 40 hrs. Not only is the concn. of the acid important but also the ratio of wt. of pickles to wt. of acid present. **II. Preserving value of acetic acid and lactic acids in the presence of sucrose.** *Ibid.* 511–19.—The pH value of AcOH and lactic acids is not a reliable indicator of the preserving power of the acids. AcOH possesses much higher preserving value in pickle products than lactic acid. In mixts. of the 2 acids, the preserving power was usually in proportion to the AcOH present regardless of the percentage of sugar present until the sugar concn. reached 22° Baumé. Lower concns. of sugar affected the preserving power of the acids but little. An acidity of not less than 2.0% AcOH or a combination of AcOH and lactic acid, where the latter makes up from 20–40% of the total acidity calcd. as AcOH, is recommended for preserving pickles or pickle products. **III. Use of lactic acid in pickles and related products.** *Ibid.* 521–9; cf. *Fruit Products J.* 16, 209–211, 214, 217, 240–3(1937).—Lactic acid is unsuitable for the manuf. of sour pickles both from the point of view of flavor and preserving properties. Lactic acid alone is likewise unsuitable for sweetened pickle products. When used with AcOH in ratios of 0.4:1.6 and 0.2:1.8, the flavor was improved. A combination of AcOH and lactic acid improved the flavor of dill pickles. Approx. 5 times as much AcOH should be used as lactic acid. C. R. Fellers

New method for preventing oil separation. C. W. Lenth. *Food Ind.* 11, 678–9(1939).—The addn. of a small amt. of glycerol to peanut butter prevents sepn. of oil and makes finer grinding of peanut solids practicable. From 1.5 to 2.0% of glycerol usually gives the desired results. The taste and keeping quality are unaffected. C. R. Fellers

The antiseptic action of phenols, phenolcarboxylic acids and the esters of lichen substances. VI. The antiseptic action of orcinoldicarboxylic ester on soy sauce. Hukuziro Huzikawa. *J. Pharm. Soc. Japan* 59, 615–16 (in German, 239–40)(1939); cf. *C. A.* 33, 9547[8].—4-Methoxy-1,3-orcinoldicarboxylic acid, 3-mono-Me ester, di-Me 4-methoxy-1,3-orcinoldicarboxylate, 1,3-orcinoldicarboxylic acid, 3-mono-Me ester, di-Me 1,3-orcinoldicarboxylate and di-Et 1,3-orcinoldicarboxylate were all inactive at the concn. ranging from 0.015 to 0.03%. **VII. The antiseptic action of the compounds of the olivetol series on soy sauce.** *Ibid.* 617–18(in German, 240–1).—Olivetol, 2,5-dihydroxyvalerophenone and Me olivetolcarboxylate showed an antiseptic action, while *p*-Me ether of olivetolcarboxylic acid and di-Me ether of olivetolcarboxylic acid did not show antiseptic action. F. I. Nakamura

Determination of the crude fiber in coffee substitutes and coffee supplements. H. Thaler, H. Beitter and Th. v. Spiess. *Z. Untersuch. Lebensm.* 78, 387–92(1939).—The caramelization of coffee supplements and substitutes, i. e., chicory, rye, barley, etc., during roasting causes an increase in the results obtained on analysis for crude fiber. The crude-fiber results on a chicory subjected to various degrees of roasting varied from 6.21 to 81.7% when detd. by the Weender method and from 6.64 to 9.71 by the Scharrer and Kürscher method (*C. A.* 25, 5718[7]). The latter method is considered more suitable. M. M. P.

The fermentation process in tea manufacture. IV. Tea tannin and its fermentation products. C. J. Harrison and E. A. Houghton Roberts. *Biochem. J.* 33, 1408–20(1939); cf. *C. A.* 33, 7917[8].—The prepn. and properties of tea tannin were described. Tea tannin from the green leaf appeared to be a mixt. of *l*-epicatechin, gallocatechin and their simpler condensation products. The galloyl ester of epicatechin was present only in some types of leaf. Tannins in made tea were much more complex. In fermentation the catechol or pyrogallol nucleus only became oxidized and the product then underwent extensive condensations. At 40° the condensation was faster than the enzymic processes and tea manufd. under such conditions contained more highly condensed tannins. Strongly cationoid polyphenols such as tea tannins were readily oxidized by peroxidase while anionoid gallic acid was oxidized slowly. E. W. Scott

Ensilage. G. Luchetti. *Ann. facoltà agrar. univ. Pisa* [N. S. 3rd] 2, 46–60(1939).—The addn. of NaCl (0.1%) to tightly closed silos favors the development of free acidity. Addn. of H_2SO_4 (0.14% of 47°Bé. acid) to the compressed product increases free volatile acids. The max. of milk-modifying microörganisms in the feed was found in the closed silages with NaCl, while the max. of peptonizing microörganisms was found in the silages treated with H_2SO_4; gas-forming microörganisms were found in both cases. G. A. Bravo

The value of grass and grass drying. M. W. Goodwin and G. L. Schuster. *Del. Agr. Expt. Sta., Bull.* 214, 21(1938), *Ann. Rept.* 1938.—The protein content of grass clipped and dried in a Billingham type dryer when 5–7 in. in height is 15–24% as compared with 7% for the 1st crop of hay as normally harvested. C. R. Fellers

Calcium lactate as a mineral supplement for bacon pigs. H. D. Meberg. *Meldinger Norges Landbrukshögskole* 19, 294–306(1939).—Feeding expts. on pigs with Ca lactate and $CaCO_3$ as a source of Ca showed equally good results. M. recommends $CaCO_3$ since it is considerably cheaper than Ca lactate, as a mineral supplement for domestic animals. V. Aschehoug

Dairy cattle feeding investigations. Carotene content of pasture plants. H. W. Cave and F. W. Atkeson. *Kansas Agr. Expt. Sta., 9th Biennial Rept.* 1938, 80–2; cf. *C. A.* 33, 5043[6].—Carotene detns. were made on 13 pasture plants at different stages of growth. There was a marked reduction of carotene during the hot months. The carotene increased again after the fall rains. Studies

were made on the utilization of the carotene in green rye by dairy cows when the daily intake was excessive. Of the carotene ingested daily, an av. of 0.086% was recovered daily as carotene in the butter and an av. of 0.154% as vitamin A, or a total of 0.24% in terms of international units. When the carotene intake is excessive the ratio of carotene to vitamin A in the butter of Holstein and Ayrshire cows becomes rather const. at about 1:2. C. R. Fellers

The ascorbic acid contents of some Hungarian feeds. Ferenc Tompa. *Közlemények az Összehasonlító Élet-Kórtan Köréből.* **27**, 195–200(1940).—Ascorbic acid contents found by the method of Tillmans were: alfalfa hay 0.01689, meadow hay 0.01610, red-clover hay 0.01323, sainfoin hay 0.01134, vetch hay 0.01024, barley straw 0.01075, wheat straw 0.00628, rye straw 0.00000, oat straw 0.01539, corn ears and stem 0.01131, barley 0.00071, wheat 0.00058, rye 0.00066, corn 0.00033, oats 0.00205%. Ascorbic acid contents 3 days and 6 days, resp., after germination were: barley 0.00931–0.02120, wheat 0.00821–0.02367, rye 0.03723–0.04398, corn 0.01276–0.02410 and oats 0.02460–0.03023%. The ascorbic acid content was about the same for seed germinated in darkness as for seed kept in sunlight. Feed exts. lost their reducing power in alk. medium within 20 min.; exts. of cereal germs, after 30 min. S. S. de Finály

Feeding cows rations which contain adequate amounts of carotene. J. L. Henderson. *Milk Plant Monthly* **28**, No. 12, 26–7(1939).—Rations which are high in carotene content decrease the incidence of spontaneously developed oxidized flavor in milk and render the milk less susceptible to metal-induced oxidized flavor. Rancid flavors are also reduced by green feed and this effect is attributed to the carotene content. Carotene concentrate, carrots, various green feeds and alfalfa preserved in such a way as to preserve its green color have been used successfully for this purpose. Such feed not only prevents the development of off-flavors in the milk but also supplies better nutrition to the cow and operates to produce milk of higher vitamin content. A. H. Johnson

Feeding vitamin A to cows. W. H. Martin. *Milk Plant Monthly* **28**, No. 12, 42(1939).—Feeding of vitamin A at 30,000, 90,000 or 300,000 unit levels for 10 to 20 days to cows on dry rations failed to produce any marked improvement in the flavor score of fresh or 3 day old milk. However, it reduced the incidence of oxidized flavor and improved the score of copper-treated milk. Feeding of 1/6 to 1/3 g. daily of carotene for 10 days immediately after vitamin A feeding caused some improvement in the flavor scores of stored milk and reduced the intensity of oxidized flavor in copper-treated milk. The effect of feeding vitamin A on the color of milk was variable. A. H. Johnson

Stability of carotene in dehydrated alfalfa and oat-plant meal. L. F. Payne and D. C. Warren. *Kansas Agr. Expt. Sta., 9th Biennial Rept.* **1938**, 93; cf. *C. A.* **25**, 4206.—After 1 year's storage in a dry warm place 100-lb. bags of alfalfa leaf meal and oat-plant meal contained 81,600 and 63,600 I. U. vitamin A per lb., resp. The loss of carotene content of the 2 samples for the year was 66.4 and 79.4%, resp. C. R. Fellers

Sprouted fodder and germinated grain in stock feeding. I. Leitch. *Imp. Bur. Animal Nutrition, Tech. Commun.* No. **11**, 63 pp.(1939).—Published data on the changes in compn. of the seed during germination and growth of the seedling and on feeding expts. with grain prepd. by conf. methods with culture solns. and with grain germinated under simpler conditions with water are presented and summarized. The evidence is neg. as regards any special value of sprouted fodder for milk production, growth of calves, or pig fattening, but at 1 center sprouted maize has given excellent results with fattening bullocks. There is no conclusive evidence that germinated oats have any beneficial effect on reproduction in farm animals. The use of germinated grain in rations not contg. fresh green food has been found to increase egg production and the fertility and hatchability of eggs. Fifty-five references. K. D. Jacob

Value of orange pulp for livestock feeding. W. M. Cory. *Calif. Citrograph* **25**, 32(1939).—Fresh oranges and the dried orange pulp have a definite value for livestock feeding. The dried pulp has an av. of 6 lbs. of digestible protein and 72.2 lbs. of digestible carbohydrates in 100 lbs. of feed. Fresh oranges have about one tenth this feeding value. J. R. Adams

The optimum of crude fiber and protein in cattle feeds. Joel Axelsson. *Kgl. Lantbruksakad. Tid.* **78**, 323–34 (1939); cf. *C. A.* **32**, 4634[5]; **33**, 8716[5], 8726[2,3], 8848[2].—The results of 71 expts. by Kellner (K. and Köhler, *Landw. Versuchs-Sta.* **53** (1900); Fingerling, *et al.*, *Ibid.* **114**, 1; **116**, 1(1933); *C. A.* **29**, 496[5]; **31**, 3530[7]; **32**, 6698[6]) form the basis of this study. In fattening oxen the utilization of the food is at a max. when the feed contains 20–21% crude fiber; it becomes perceptibly poorer if the crude fiber content is below 18% or above 23%. About 10% of the stored energy consists of protein energy. Protein synthesis occurs simultaneously with fat formation. Protein tissue is necessary to store fat. The energy exchange is optimal if the protein content of the feed is 10–18% of the digestible org. matter. Optimal contents of crude fiber and protein in a feed are necessary for the best possible nutritive exchange. The digestible nutrients of 71 feeds, in which the crude fiber content of the dry matter varied between 14 and 32%, gave the same value as the av. found by K. for the pure foods; but 34 feeds with optimal contents of crude fiber and protein gave a higher value equal to that found by K. for pure starch. The varying exchange found by K. for different foods is attributed to his failure to use optimal amts. of crude fiber and, especially, of protein. The evaluation of feeds must be based on the metabolizable rather than the net energy value. Ruth Berggren

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Effect of injuries caused by *Eurygaster integriceps* Put. on baking properties of wheat (Marushev, Grivanov) **15**. Odoriferous principle of green tea (Takei, *et al.*) **17**. Uses and limitations of coliform group in sanitary control of food production (Hunter) **11C**. Modern conversion of fresh bones [nutrient fat from] (Ohl) **29**. Manuf., compn. and action of bone meal for fertilizer and stock food (Engels) **15**. Preliminary investigation of detn. of F in lime [for treating foods] (Koehler) **7**.

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Food and Life. Yearbook of Agriculture, 1939. Washington: U. S. Dept. Agriculture. 1165 pp. $1.50.

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Liverseege's Adulteration and Analysis of Foods and Drugs. London: J. and A. Churchill Ltd. 36s.

Flavoring solutions for foods, tobacco, etc. Frits E. Stockelbach. U. S. 2,180,932, Nov. 21. Mono- or diethyl glycerol is used as a solvent for flavoring substances such as lemon oil, orange oil and vanillin or various mixed esters such as those constituting imitation raspberry or banana flavors.

Concentrated milk. Fernand Sornet and Gabriel Etienne. Fr. 841,130, May 10, 1939. See Brit. 495,746 (*C. A.* **33**, 3480[4]).

Heat-exchange apparatus suitable for treating milk. Harvey Feldmeier (to Cherry-Burrell Corp.). U. S. reissue 21,270, Nov. 21. A reissue of original patent No. 1,840,573 (*C. A.* **26**, 1678[2]).

Soluble dried solids of milk. Harold K. Salzberg (to Borden Co.). U. S. 2,181,003, Nov. 21. See Brit. 503,811 (*C. A.* **33**, 7426[3]).

Centrifugal apparatus suitable for homogenizing butter with milk in producing cream. Howard L. Saylor (to Homogenizer Corp., Ltd.). U. S. 2,180,301, Nov. 14. Various structural and operative details.

Curing meat. Walter M. Urbain (to Industrial Patents Corp.). U. S. 2,180,750, Nov. 21. A curing paste suitable for use on fresh pork bellies, etc., is formed of salts such as NaCl, $NaNO_3$ and $NaNO_2$ and a starch-contg. material such as a tapioca paste which may be prepd. by cooking tapioca flour with water contg. H_3PO_4.

Pickling meat. August Nietiedt. U. S. 2,180,165, Nov. 14. Fresh meats such as hams and beef are permeated with a soln. of NaCl and KNO_3 and then wrapped in a narrow meshed cloth, subjected to centrifugal action to remove excess treating soln. (which is recovered for further use) and then subjected directly to a smoking process.

Iodized vitaminic fish oils. Henry Brinton. U. S. 2,179,917, Nov. 14. A product suitable for addn. to poultry rations or other use as a food ingredient is prepd. by adding I to an oil such as sardine oil or burbot oil and dispersing the oil as by emulsification with dried milk, or flour or starch and water, under conditions maintaining the vitaminic properties of the oil substantially unimpaired.

Coloring citrus fruits. Longfield Longfield-Smith (to Mrs. B. C. Skinner). U. S. 2,179,762, Nov. 14. A coloring process involves providing as a dye concentrate soln.: a mixt. of a soln. of an oil dye in a water-insol. solvent selected from the following group: $CHCl_3$, CCl_4, $C_2H_4Cl_2$, $C_2H_2Cl_4$, $C_2H_3Cl_3$, C_2CHCl_5, $C_2H_2Cl_2$, C_2HCl_5, perchloroethylene and $C_6H_4Cl_2$, with a water-sol. solvent selected from the following group: butanol, ethers of monoethylene glycol, ethers of diethylene glycol, cyclohexanol, diacetone alc., EtOH, PrOH the mixed oil-dye solns. being dissolved in a soap soln., emulsifying this dye concentrate soln. with water, and exposing the citrus fruit surfaces in contact with the emulsion at a temp. of about 32–38° until the desired degree of color has been imparted to the fruit.

Fumigant suitable for treating fruits, etc. John D. Maxey (to Carbide and Carbon Chemicals Corp.). U. S. 2,180,744, Nov. 21. See Can. 385,741 (*C. A.* **34**, 1412[5]).

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

Recent developments in chemical technology. Fritz ter Meer. *Chem. Fabrik* **1940**, 1–3; cf. *C. A.* **33**, 5085[8].
J. H. Moore

Visualizing the American chemical industry. S. Isermann. *Progressive Perfumery & Cosmetics* **1938**, 61–3.—This industry represents almost one-fifth of all the manufg. enterprises in the U. S.
Leopold Scheflan

New industrial applications for metallic naphthenates. John S. Trevor. *Chem. Industries* **45**, 661(1939).
E. H.

Review: Gas warfare and air defense. R. v. Heuss. *Jahreskurse artzl. Fortbild.* **30**, No. 9, 24–34(1939).
Ruth Berggren

Vesicants [in warfare]. D. H. Wester. *Pharm. Weekblad* **76**, 1317–24, 1342–62, 1378–90, 1410–28(1939).—A review.
G. G.

What the fireman needs as gas defense. Carbonnier. *Fire* **32**, 146–7(1940).—A description of the essential properties of the ideal type of self-contained and self-controlled breathing app. for fire-fighting purposes.
L. S.

Benzine poisoning. H. H. Jansen. *Führer-Wielands Sammlung von Vergiftungsfällen* **9**, No. 10, 133–50(1938); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 471(1939).—Three cases of epilepsy are attributed to acute benzine poisoning.
George Ayers

Researches on bone marrow occupational lead poisoning. G. Montegrosso. *Medicina Lavoro* **30**, No. 1, 1–8(1939); *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 472(1939).
George Ayers

Injury by Asplit. E. Schrader and W. Rösgen. *Münch. med. Wochschr.* **86**, 1239–41(1939).—Among men working with this product (a mixt. of phenol-formaldehyde resin, quartz dust, *p*-toluenesulfonyl chloride and kaolin, used for making containers for acids and alkalies) different symptoms have been observed. Irritation of the skin, especially itchy eruption, irritation of the mucous membranes of the respiratory tract, gastro-intestinal disturbances, disorders of the nervous system, ranging from slight feelings of illness to stupor, unconsciousness and epileptic convulsions, occurred. The workers most often affected were those who heated the substance to 140°F.
Maurice M. Rath

Toxicity of coal-tar naphtha distillates. H. Taylor. *Chemistry & Industry* **1939**, 1078–80.—Coal-tar naphtha distillates are used for the fumigation of houses against the bedbug. Distillates b. 160–90°, were shown by expts. on rats to have definite narcotic action at concns. greater than 0.10% by vol.; in one expt. a single exposure to 0.16% caused the death of all exptl. rats in less than 6 hrs. These results are contrary to those reported in *C. A.* **32**, 3028[5].
E. G. Meiter

Silicosis and allied disorders. History and industrial importance. H. B. Meller, *et al. Air Hyg. Foundation America, Inc., Med. Ser., Bull.* No. 1, 178 pp.(1937).—The occurrence pathology, diagnosis and prevention of silicosis are discussed. Research projects are outlined.
Leopold Scheflan

The prevention of silicosis; experimental investigations on the action of certain nonsiliceous dusts and silica in the origin and development of silicosis. Carl Naeslund. *J. Ind. Hyg. Toxicol.* **22**, 1–30(1940).—Rabbits and guinea pigs were exposed to quartz, colloidal and amorphous silica, leptite, cement and glass dusts. Coal, soda, $Ca(OH)_2$, $Al(OH)_3$, Al, iron oxides, and MgO were mixed with silica dusts and the effects of mixed dusts were studied. Al and $Al(OH)_3$ retarded the rise of silicosis and inhibited fibrosis. Alk. dusts increased the irritation of silica.
A. L. Elder

Poisoning from thallium dust. Wilhelm Schwarte. *Münch. med. Wochschr.* **86**, 1299–1300(1939).—A typical case of Tl poisoning is reported, caused by inhaling a considerable amt. of Tl dust during cleaning of a draw in which grain impregnated with Tl acetate had been placed.
Maurice M. Rath

The percentage of particles of different sizes removed from dust-laden air by breathing. A. M. van Wijk and H. S. Patterson. *J. Ind. Hyg. Toxicol.* **22**, 31–5(1940).—About 25% of particles of size 0.2 μ and about 80% of size 2 μ are removed. The percentage increases slowly until at a size of 5 μ about 95% of the particles are removed. A. L. Elder 1

Dust sampling—a device for adjusting the nozzle distance in the Devers circular konimeter. Walter S. Weeks. *Can. Mining J.* **61**, 29(1940).—The modification suggested for the Devers circular konimeter which is quite widely used for dust sampling in a no. of Canadian mines consists of replacing the springs by a circular fiber disk which is pressed against the glass by a screw bearing on the center of the disk. Details are shown by sketches. W. H. B. 2

The van der Grinten dust-protective hood and clothing. H. Hebestreit. *Zentr. Gewerbehyg. Unfallverhüt.* **24**, 55–6 (1937); *U. S. Pub. Health Eng. Abstracts* **18**, IHS, 1–2 (Jan. 15, 1938); cf. *C. A.* **33**, 6600⁹.—This type of hood and clothing is entirely effective in preventing finely ground color powders reaching the skin or face of the workers. It is made of batiste material which is rendered air and watertight by treatment with varnish or rubber. The hood is light, covers the whole head and has a large celluloid window in order not to limit the vision. C. R. F. 3

Furfural plastics—a survey of developments in recent years. L. Light. *Brit. Plastics* **11**, 314–15(1939).—A review with 15 references. E. H. 4

Plastics progress during 1939. Molding presses. George K. Scribner. *Modern Plastics* **17**, 43–4(1940). **Coatings.** W. T. Pearce. *Ibid.* 44–5.—8 references. **Cellulose esters.** Harold K. Haviland. *Ibid.* 45 6; cf. *C. A.* **34**, 190⁸.—17 references. **Cellulose ethers.** S. L. Bass and A. E. Young. *Ibid.* 46–8; cf. *C. A.* **33**, 5539⁷.—28 references. **Laminates.** G. E. Landt. *Ibid.* 48. **Phenolic resins.** L. M. Debing. *Ibid.* 48–52.—32 references. **Thermoplastic resins.** H. S. Bunn. *Ibid.* 52–6.—55 references. **Urea resins.** M. H. Bigelow. *Ibid.* 56–8.—48 references. E. H. 5

New foliated plastic, "drevolit." Ya. M. Lukomskiĭ and O. M. Klimova. *Lesokhim. Prom.* **1938**, Nos. 3–4, 11–15; *Khim. Referat. Zhur.* **2**, No. 4, 130(1939).—Wood was satd. with an alc. soln. or with an aq. suspension of resin obtained by condensation of phenol with lignin, together with urotropine in the amt. of 14% of the resin. "Drevolit," which differs from "lignofol" by the new type of org. binding substance (phenol-lignin resin), possesses similar mech. and dielec. properties. Its water resistance is slightly lower, especially when prepd. from a water suspension of resin. Its possible uses in industry are described. W. R. Henn 6

Can protein plastics be made elastic? Johann W. Eggert. *Gelatine, Leim, Klebstoffe* **7**, 171–3(1939).—Three methods for increasing elasticity of protein plastics are: (1) mech. working to produce long micelles, (2) addn. of glycerol in comparatively large amts. and (3) partial soln. of the protein with nonaq. compds. of which salicylic acid is the best example. The 1st and 3rd methods are recommended. Don Brouse 7

Use of ebonite as a plastic. André Sorin. *Rev. gén. mat. plastiques* **15**, 236–8(1939).—Practical operating directions. A. Papineau-Couture 8

Effect of nonvolatile material on solvent balance. Plasticizers. John B. Dorsch. *Ind. Eng. Chem.* **32**, 279–82 (1940); cf. *C. A.* **32**, 3640⁸.—Continued study of the evapn. of solvent mixts. from films of nitrocellulose-estergum lacquers showed that relative humidity, temp., length of period for total evapn. and age of the lacquer had little effect upon the solvent balance. The age of the nitrocellulose, etc., may, however, cause variation. Both the solvent type of plasticizer (dibutyl phthalate) and the nonsolvent (blown castor oil) increased the hydrocarbon retention of the films. Arnold M. Collins 9

Mixed plastics made of synthetic resins and proteins. Albert Lefèvre. *Rev. gén. mat. plastiques* **15**, 231–5(1939).—A brief review of a no. of Fr. pats. relating to processes providing for the stabilization of synthetic-resin (especially urea-CH_2O) plastics by the addn. of relatively small amts. of proteinic colloids, and processes relating to the modification (stabilization, plastification) of protein plastics by the addn. of synthetic resins. A. Papineau-Couture 1

Thermoplastic resins obtained from depolymerized rubber. J. Grange-Neyrand. *Rev. gén. mat. plastiques* **15**, 228–31, 260–4(1939).—A description (based on pat. specifications) of the prepn. of depolymerized rubber by the use of chlorostannic acid ($SnCl_4.2HCl.6H_2O$), of its general properties, and of its use for the production of thermoplastic resins and of artificial pearls and mother-of-pearl. A. Papineau-Couture 2

The coumarone and indene resins industry. Emile Chomard. *Rev. gén. mat. plastiques* **15**, 200–5, 239–40, 258–60, 285–7(1939).—A brief review of the general properties of coumarone and of indene, of their polymerization, of the com. prepn. of coumarone and indene resins, of their properties and of their applications in varnishes (giving typical formulas for quick-, medium- and slow-drying varnishes), linoleum, lining materials, etc. A. P.-C. 3

Progress in alkyd resins. A. G. Hovey. *Modern Plastics* **16**, 80, 82, 86, 88(1938). E. J. C.

Some aspects of the synthesis and use of glycerophthalic resins. Carlo Stresino. *Atti X° congr. intern. chim.* **4**, 268–74(1939).—See *C. A.* **33**, 2674. J. E. D.

Urea-resin finishes—their function and characteristics. C. A. Knauss. *Can. Chem. Process Inds.* **24**, 9–10(1940).—Urea-CH_2O resins are characterized by pale color and relatively low-temp. baking schedules. In an aq. medium, the reactions of urea and CH_2O are dependent upon the catalyst used, the mol. ratio of the components and the temp. of reaction. The usual reaction consists of 1 mol. of urea and 2 mols. of CH_2O, which form dimethylolurea which then combines, either by condensation or polymerization, to form a complex compd. contg. a no. of cross linkages which account for the gelation of the resin. The properties and types of solns. are discussed. Urea-CH_2O resins are used in 4 types of products: (1) high-baking enamels, (2) low-baking enamels, (3) air-drying enamels and (4) emulsions. W. H. Boynton 4

Fatty-acyl-modified resins—dicyclopentadiene, coumarone and indene types. A. W. Ralston, R. J. Vander Wal, S. T. Bauer and E. W. Segebrecht. *Ind. Eng. Chem.* **32**, 99–101(1940).—High-mol. wt. acyl groups have been introduced by a Friedel-Craft reaction between fractions contg. resin forming substances and fatty acid chlorides, the products being mixts. of monomers, dimers, trimers, tetramers or higher polymers varying from viscous liquids to solids. The starting materials were (*a*) the crude solvent naphthas contg. as a major constituent coumarone (I), indene (II) or dicyclopentadiene (III), resp., together with lesser quantities of the other 2, and (*b*) a commercial I-resin produced by the polymerization of a I-contg. fraction. Stearoylation of the I-fraction using 100, 67, 33 and 10% of an equimol. proportion of stearoyl chloride, resp., resulted in a series of soft solids; except in the 1st 2 cases, heating at 100° for 65 hrs. gave hard resins, decidedly less brittle than the heat-treated unmodified sample. Mol. wt. detns. by the cryoscopic method in benzene indicate the products to be essentially mixts. of dimers and trimers; the mol. wt. of the product from equimol. wt. of stearoyl chloride indicates only a small amt. of polymerization. Acetylation of I fraction with 10, 33 and 67% of an equimol. proportion of oleoyl chloride gave soft solids which polymerized further to hard resins when baked at 100° for 65 hrs.; the mol. wt. of the 67% product corresponds closely to that of an acylated dimer. Acylation of I fraction with linolenoyl chloride resulted in products ranging from very viscous liquids to soft solids, all of which formed hard resins when heated at 100° for several hrs. and some of which possessed the property of air drying; the 10 and 100% products had mol. wts. of 335.3 and 506.0, resp., the former increasing to 564.2 upon baking at 100° for 40 hrs. The products from II fraction and 10, 33, 67 and 100% equimol. proportions of stearoyl chloride were highly viscous liquids or soft solids; when heated at 100° for several hrs. the 10 and 33% products polymerized further to hard resins, while the others were not affected by this treatment; the mol. wt. of the 67% 5

product indicates that it contains a considerable amt. of the stearoylated dimers. Acylation of II fraction with oleyl and linolenoyl chlorides resulted in all cases in highly viscous oils which, when heated for several hrs. at 100°, gave hard resins; the 33, 67 and 100% products from linolenoyl chloride dried upon exposure to atm. conditions; the 100% linolenoyl sample had a mol. wt. of 1500. The III fraction with stearoyl chloride produced solids in the case of the 10 and 33% runs, which upon heating gave hard solids, while higher proportions showed little tendency to polymerize further upon heating. Oleoyl chloride and III yielded products ranging from solids to viscous liquids as the % of the former was increased; all of these changed to hard, flexible resins upon heating. With 33 and 67% linolenoyl chloride a viscous liquid and hard resin, resp., were obtained, both polymerizing further in air and formed hard resins when heated. The I resin, m. 94° (ball and ring) was acylated in same manner and the products are tabulated; the mol. wt. of product from equimol. proportions of stearyl chloride was 971.6. Solubilities in various solvents and stability toward H_2O, 18% HCl and 20% NaOH, are described. John F. Lontz

Copolymerization of maleic polyesters. John B. Rust. *Ind. Eng. Chem.* **32**, 64–7(1940).—Diethylene glycol (6.32 mols) and 6.12 mols of maleic anhydride, heated at 200° for 8 hrs., yield a viscous, clear ester (I) by linear condensations; when this ester was heated 50 hrs. at 50° with Bz_2O_2 (added in C_6H_6 soln.), a hard clear tough machineable resin was produced by addn. polymerization involving the system —C=C—C=C—O. Bz_2O_2 and acetyl benzoyl peroxide catalyze copolymerization of I with vinyl derivs. (such as vinyl acetate), the properties of the final product depending upon the catalyst, temp. and ratio of vinyl deriv. to I. After an induction period, copolymerization proceeds in definite stages wherein are successively produced (1) a slimy gelatinous mass, (2) a gel, (3) a hard rubbery mass, (4) a soft flexible resin and (5) a tough glassy solid. In mixts. of I and vinyl acetate, clear cured resins are obtained only with vinyl acetate concns. up to 32%, since insol. polymerized vinyl acetate is probably formed in more concd. mixts. Styrene has approx. the same limit of compatibility as vinyl acetate, while mixts. of equal parts of styrene and vinyl acetate yield clear cured masses in amts. up to 40% of the casting soln.; Me methacrylate is compatible in all proportions. George Ayers

Ash-forming constituents of [electrical-] insulating papers. D. A. McLean. *Ind. Eng. Chem.* **32**, 209–13(1940).—The ability of cellulosic materials (insulating paper) to neutralize dil. acids and bases and to soften H_2O (*C. A.* **33**, 9626[9]) is attributed to exchange reactions occurring at the acidic groups assocd. with the noncellulosic components pectic substances and lignin). The mechanism of these exchanges is described. It is shown that the acid neutralization value is directly proportional to the ash content of the paper and that it is equiv. to the alky. of the ash. The metallic constituents of the ash (Si, Fe, Cu, Mn, Ca, Mg) are present in the paper as metallo-org. compds. which enter into the exchange reactions. The ash content is not appreciably reduced by prolonged H_2O extn. but is by extn. with dil. HCl. Washing the acid-extd. paper with $CaCl_2$ restores the ash content. Pentosans are not removed by acid extn. Detns. were made of β- and γ-cellulose, lignin and uronic acid anhydride. These are shown to contribute to the cation exchanges. Fourteen com. insulating papers (kraft, linen and hemp) were used in this study. All expts. are described and the data are given in tables and graphs. 10 references. A. J. S.

Synthetic resin adhesives. A. Foulon. *Nitrocellulose* **10**, 221–3(1939); cf. *C. A.* **33**, 830[3].—A review. E. M. Symmes

The utilization of phenol-lignin resin for gluing plywood. G. D. Kreitser and O. M. Klimova. *Lesokhim. Prom.* **1938**, No. 3–4, 22–4; *Khim. Referat. Zhur.* **2**, No. 4, 130–1(1939).—Phenol-lignin resin to which was added 14% by wt. of urotropine was a suitable adhesive for plywood. Cleaving strength of 30 kg./sq. cm. was obtained. W. R. Henn

Modern adhesives. Synthetic glues in the veneer and plywood industry. S. Horwitz. *Wood* **5**, 4–7(1940); *C. A.* **34**, 1413[9].—A discussion of the use of blood albumin glues, water glass, cellulose ester adhesives and synthetic-resin adhesives. Leopold Scheflan

The development of modern surface-active materials. I. Wetting, foaming, detergent and emulsifying agents. Their properties and actions. J. W. Orelup. *Progressive Perfumery & Cosmetics* **1937**, 5–7.—A review. L. S.

Detergents from kerosene. Alkyl sulfates. A. R. Padgett with Ed. F. Degering. *Ind. Eng. Chem.* **32**, 204–8 (1940).—A 95–100° fraction of kerosene was chlorinated to 25–33% and aerated to remove HCl. The 120–135° fraction of monochlorides was isolated in 80–90% yield. One mole of this added to 1 mole of NaOH in H_2O and AmOH was hydrolyzed at 160–170° for 9 hrs. After distn. of H_2O with some AmOH the alcs. were extd. with Me_2O. The 125–140° fraction gave 30% yield. Treatment with $HOSO_2Cl$ followed by $NaHCO_3$ gave Na alkyl sulfates in 55% yield. This was compared with the Na 2′, 3′, 4′, 5′ and 6′ dodecyl sulfates prepd. from the pure alcs., Na lauryl sulfate and the product extd. from "Dreft" with alc. Both by measurement of stability of foam and the interfacial tension when 0.2% soln. are dropped in benzene the order of effectiveness decreases progressively from the primary through the order 2,3,4,5,6-dodecyl sulfates. Of the primary sulfates the foam test shows the "Dreft" ext. best, Na lauryl sulfate next and the kerosene deriv. close to the Na 2-dodecyl sulfate. By interfacial tension measurement there is little choice between the kerosene deriv. and Na lauryl sulfate, and the "Dreft" ext. is nearly as good. Foster Dee Snell

Casein, its production and uses. Knut A. Wickman. *Kgl. Lantbruksakad. Tid.* **78**, 367–85(1939)(summary in German).—A lecture including a description of the compn. and properties of casein, the prepn. of rennet and acid caseins, the importation and exportation of casein by Sweden, the prepn., properties and uses of galalith, casein glue and, especially, lanital, and the use of casein in the *paper, textile* and *paint industries* and in *medicine*. The possibility of the eventual production of lanital in Sweden is discussed. Ruth Berggren

Airplane dope. Relation of tautening and weathering qualities to composition. Frank W. Reinhart and Gordon M. Kline. *Ind. Eng. Chem.* **32**, 185–93(1940); cf. *C. A.* **32**, 5101[3].—Evidence is given to show that cellulose acetopropionate and cellulose acetobutyrate are probably the only satisfactory plastic bases for use in place of the hazardous cellulose nitrate in airplane dopes. In these the optimum hydroxyl content is about 0.2 equiv. Aryl phosphate plasticizers give the best initial tautness which is maintained during exposure. A close correlation is shown to exist between the properties of unsupported films and the behavior of doped fabrics. This may result in a considerable saving in time, labor and material in the preliminary evaluation of new compds. and formulas. Henry J. Wing

Pendulum and "cloudburst" methods of measuring and testing hardness. S. R. Williams. *Instruments* **12**, 257–61, 301–3(1939). E. H.

Electricity in chemical plants. Kennard Pinder. *Elec. Eng.* **59**, 77–83(1939).—Chemical plants are among the largest users of electricity. P. discusses precautions to be observed in selecting elec. equipment because of flammable or corrosive fumes. C. G. F.

Entomological branch. C. F. C. Beeson. *Rept. Forest Research India* **1937–38**, Pt. 1, 33–9(Pub. 1939); *Rev. Applied Entomol.* **27A**, 611–12.—Owing to the use of flour paste in their manuf., pith helmets are attacked by *Rhizopertha dominica* F. Of insecticides tested for use in the paste 10% Na_2SiF_6 was as effective as 3% soln. of As_2O_3 and $CuSO_4$ (3:1), but both were inferior to a 3.5–4% soln. of As_2O_3 and $CuSO_4$. $CuSO_4$ alone is least effective. Edwin J. Seiferle

Studies on repellents for biting flies. C. G. MacNay. *Can. Entomol.* **71**, 38–44(1939).—Expts. were undertaken to det. which of many materials, cited in the literature as repellents for blood-sucking Diptera, were most effective and which were most lasting in effect. The materials

tested were incorporated in olive oil for application. The mosquitoes present in the wooded areas of Ontario where the tests were made were chiefly *Aedes hirsuteron*, *A. stimulans*, *A. vexans* and *A. trichurus*. Results showed a mineral oil ext. of pyrethrum, 1 fluid oz. of which contained the ext. of 0.2 lb. of pyrethrum flowers, to be the most promising of the materials tested. Various forms of essences of thyme and geranium were promising. Cinnamaldehyde and cresol, although comparatively effective, were too irritating to the skin to be useful. Ph salicylate, bay laurel, pine oil, clove and citronella possessed some value. Fractions of oil of tar obtained by distn. were all apparently fairly effective and, being colorless, did not possess the objectionable qualities of the original tar-oil. Numerous other compds. and mixts. were of less value and some were also irritants. Edwin J. Seiferle

Patent litigation in 1939. Nelson Littell. *News Ed.* (*Am. Chem. Soc.*) **18**, 97–101(1940); cf. *C. A.* **33**, 1411[6]. E. J. C.

Plastic state (Bary) **2**. Detection of gases used in warfare (Gigon, Noverraz) **7**. Alkyl esters of 12-ketostearic acid [for use in plastic compns.] (U. S. pat. 2,180,730) **10**.

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Ether-esters of alkoxybenzoic acids. Ernest F. Grether and Russell B. DuVall (to Dow Chemical Co.). U. S. 2,176,070, Oct. 17. Ether-esters generally suitable for use as *plasticizers for nitrocellulose, cellulose acetate* and *ethylcellulose* or the like are obtained by treating an ether-ester of a hydroxybenzoic acid, such as β-ethoxyethyl salicylate with an alkylating agent such as Et_2SO_4, EtCl, diisopropyl sulfate or the like (various details for regulating the reaction being described). The β-ethoxyethyl 4-ethoxybenzoate is a colorless liquid. The β-ethoxyethyl 2-methoxybenzoate b_4 135–40°. The β-ethoxyethyl 4-methoxybenzoate b_2 120–30°. Other esters are mentioned; e. g., β-ethoxyethyl 3-hydroxybenzoate may be treated with diamyl sulfate to produce β-ethoxyethyl 3-amoxy-

benzoate; β-naphthoxyethyl 2-hydroxybenzoate with BuCl to produce β-naphthoxyethyl 2-butoxybenzoate; phenoxyethoxyethyl 4-hydroxybenzoate with Me_2SO_4 to produce β-(phenoxyethoxy)ethyl 4-methoxybenzoate; 3-propoxybenzoic acid with monoisopropyl ether of trimethylene glycol to produce γ-isopropoxypropyl 3-propoxybenzoate; 4-methoxybenzoic acid with mono-*o*-xenyl ether of ethylene glycol to produce β-*o*-xenoxyethyl 4-methoxybenzoate; 3-ethoxybenzoic acid with 2-chlorophenoxy ether of ethylene glycol to produce β-2-chlorophenoxyethyl 3-ethoxybenzoate; 2-methoxybenzoic acid with ethyl ester of triethylene glycol to produce the ω-monoethyl ether of triethylene glycol monoester of 2-methoxybenzoic acid; 2-ethoxybenzoic acid with 2-methylphenyl ether of diethylene glycol to produce β-(β-(2-methylphenoxy)ethoxy)ethyl of 2-ethoxybenzoate; etc.

Ethers of hydrogenated phenols. Harold R. Slagh and Francis N. Alquist (to Dow Chemical Co.). U. S. 2,181,100, Nov. 21. Compds. which may be used as *modifiers for synthetic plastics*, as *perfume bases*, or as *insecticides*, and which have the general formula $XOCH_2$-$\overset{\displaystyle R}{\underset{\displaystyle CH_2.O}{C}}$ in which R represents H or CH_3 and XO represents a hydrogenated phenol residue (inclusive of residues derived from hydroxy compds. produced by the catalytic hydrogenation of phenol and nuclear-substituted derivs. such as cyclohexanol, halocyclohexanols, alkylcyclohexanols, tetrahydronaphthols, cyclohexylphenols, phenylcyclohexanols, cyclohexylcyclohexanols, etc.) are prepd. by treating a Na salt of a hydrogenated phenol compd. with 1-chloropropylene 2,3-oxide or 1-chloro-2-methylpropylene 2,3-oxide in the presence of an inert solvent such as toluene or benzene, as by heating to 60° or a higher temp. Details are given of the production of 1-(2-phenylcyclohexyloxy)propylene 2,3-oxide, a mobile water-white liquid, 1-(cyclohexyloxy)propylene 2,3-oxide, a sweet smelling oil, and 1-(2-cyclohexylphenoxy)propylene 2,3-oxide, also a sweet smelling oil, and general mention is made of the production of corresponding ethers of 2-chlorocyclohexanol, 2-methylcyclohexanol, 4-*tert*-butylcyclohexanol, tetrahydro-1-naphthol, 4-cyclohexylphenol, 2-chloro-4-cyclohexylphenol, 2-cyclohexyl-4-*tert*-butylphenol, 3-phenylcyclohexanol, 4-cyclohexylcyclohexanol, etc. 3

Molding machine for plastic material. John Lauterbach (to Owens-Illinois Glass Co.). Can. 386,346, Jan. 16, 1940. Structural details. 4

Casein compositions suitable for molding. Jean Delorme (to George Morrell Corp.). U. S. 2,180,626, Nov. 21. A thermoplastic solid material is prepd. by subjecting an acid casein to the action of a benzyl compd. such as benzyl chloride in the presence of EtOH and an alkali carbonate, first at normal room temp. not exceeding 70° for a period less than 14 hrs. and afterward continuously mixing the ingredients and subjecting them to a temp. of about 80° for 4–8 hrs. and until a smooth homogeneous paste is produced. 5

Molded articles such as laminated material comprising phenolic resin. Harry M. Dent and Arthur J. Norton (to General Plastics, Inc.). U. S. 2,180,934, Nov. 21. A core contg. about 15–20% of a hardened phenolic resin and a filler is provided with surface-strengthened exterior faces contg. about 60–65% of such resin. 6

Molded bodies of synthetic resin containing photographic designs. Walter D. Ford. U. S. 2,180,002, Nov. 14. A cast color-contg. substantially transparent body of synthetic resin compn. is formed having an undulous photographic design molded in its inner surface, the obverse surface of the body being smooth, regular and unbroken, the transparency and varying thickness of the body in the area of the design producing light and shadow variations to render the detail of the design clearly viewable through the body from the obverse surface. 7

Apparatus for treating thermoplastic material, as in preparing synthetic resins, etc., for molding. Ralph E. Thompson. U. S. 2,179,968, Nov. 14. Various structural and operative details. 8

Artificial resins. Vereinigte chemische Fabriken Kreidl, Heller & Co. Nfg. Fr. 840,900, May 5, 1939. Substances contg. one or more ethylenic bonds, such as styrene, acrylic and methacrylic acids, vinyl and acrylic esters, are polymerized wholly or in part in the gaseous, or a semi-gaseous state, in the presence of the usual catalysts without any solvent. The speed of the reaction and the degree of polymerization are regulated by the pressure, temp. and concn.; these are regulated by the addn. of an inert gas. 9

Artificial resins. I. G. Farbenind. A.-G. Fr. 841,028, May 9, 1939. The resins are obtained by condensing benzyl halides, substituted or not, or their homologs, in absence of condensing agents at a temp. which is gradually raised to 180°. The condensation is terminated when the evolution of hydrogen halide (a by-product in the reaction) ceases. The resins manifest greater elasticity and adhesive power when the condensation is made in presence of aromatic hydrocarbons. After the condensation, the resins are subjected to a complementary treatment, which consists in adding to them in their molten state, small quantities of basic substances, such as NH_3, amines, monophosphate of NH_4, urea or formamide. The resins are sol. in benzene, toluene, xylene, styrene, CCl_4, Me-benzene and decahydronaphthalene, insol. in the lower alcs., acetone, cyclohexanol, cyclohexanone and acetate of cyclohexanol. They are completely insol. in mineral acids and are therefore particularly suitable as a coating material for vessels and other instruments in contact with acids. 10

Phenol-aldehyde resins. Edmond F. Fiedler (to General Elec. Co.). U. S. 2,180,981, Nov. 21. A method of making a permanently fusible phenol-aldehyde resin involves treating a phenol and an aldehyde in the presence of an acid catalyst, partly dehydrating the reaction product under reduced pressure until it has a flow point of about 60–90°, neutralizing the partly dehydrated product, and dehydrating the neutralized product under pressure until substantially all the remaining water has been removed. 11

Alkyd resin suitable for coatings, etc. Horace A. Hampton, Arthur Hill and Edwin B. Robinson (to Imperial Chemical Industries Ltd.). U. S. 2,181,054, Nov. 21. A synthetic resinous material is obtained by a process which involves causing to react at 170–240° pht halic anhydride, a drying oil acid, semidrying oil acid or a glyceride of such acids, 20–40% of colophony and 2.5–7% of maleic acid, the amts. of colophony and maleic acid being based on the wt. of the fatty ingredient, and a polyhydric alc. in amt. not substantially exceeding a 10% excess over that required to esterify the total acidic reagents employed. 12

Resinification of terpene hydrocarbons. Joseph H. James (to Clarence P. Byrnes, as trustee). U. S. 2,180,418, Nov. 21. A terpene hydrocarbon mixt. such as a Georgia pine oil is heated and treated with a gas contg. free O under conditions producing a liquid formed mainly of mixed O derivs. of terpene hydrocarbons, and the product is resinified. Several examples with details are given. 13

Finely divided resin. Carlton R. Ferris and Estol T. Carte (to Carbide and Carbon Chemicals Ltd.). Can. 385,888, Dec. 26, 1939. A soln. of vinyl resin in a volatile solvent is atomized in a stream of a highly heated inert fluid contg. small amts. of the vapors of the solvent and unchanged polymerizable vinyl compds., the soln. having a total-solid content of about 12%. The resin in finely divided form is cooled below its softening temp. and sepd. from the fluid stream. The fluid stream is cooled to condense and recover the solvent and unchanged vinyl compds. An app. is described. 14

Resinous condensation products. I. G. Farbenind. A.-G. Fr. 840,826, May 3, 1939. Polycarboxylic acids, phthalic anhydride, or phthalic acid esters are condensed with compds. contg. reactive OH groups, which tend to polymerize and condense themselves or the products they form, in presence, or in absence of solvents and thinners. Examples are given. 15

Insulating electrical conductors such as wires. Edward C. Strube (to American Anode Inc.). U. S. 2,179,965, Nov. 14. App. and operative details are described, for providing an elec. conductor with an *in situ* deposit of solids from latex, the deposit including the water-insol. reaction product of a metallic salt such as one of Zn

and at least some of the normally water-sol. ingredients of the deposit naturally occurring in the latex.

Sound and vibration insulating panels. Edwin O. Groskopf (to Patent and Licensing Corp.). U. S. 2,180,305, Nov. 14. A method of uniting a layer of relatively impermeable fibrous sound-deadening or vibration-damping material such as felt to the surface of an impervious metal panel or the like involves ifterposing between the materials a film of an aq. emulsion of a waterproof substance such as asphalt, etc., contg. an inverting agent such as kerosene to cause the emulsion to coalesce when 20–90% of its original water content still remains in the film and subjecting the assembled materials thereafter to temps. above 100° so that the film will hold the assocd. materials against displacement from each other during conversion into steam of the remaining water content of the film.

Wall heat insulation formed of materials such as "rock wool." Edwin H. Wenzel. U. S. 2,179,678, Nov. 14. Various structural details.

Polyvinyl halide compositions. Claude H. Alexander (to B. F. Goodrich Co.). U. S. 2,179,073, Nov. 14. Compns. suitable for *elec. insulation* comprise a polyvinyl halide and a silicate of Ca, Ba, Sr, Pb or Ag. Cf. *C. A.* 34, 831[8].

Etching spark-plug insulators. Richard Stribeck (to Robert Bosch G. m. b. H.). U. S. 2,180,779, Nov. 21. For improving the stability to temp. change of spark-plug insulators consisting of a burnt ceramic mass of insol. and sol. components such as corundum and ceramic material, the insulators are superficially etched with an etching medium such as HF or KOH which attacks the sol. components but does not substantially attack the insol. components.

Adhesive suitable for wall-paper hanging. Rudolf Köhler (to Henkel & Cie., G. m. b. H.). U. S. 2,180,152, Nov. 14. A viscous aq. colloidal soln. is used contg. 3–8% of a water-sol. salt of an ether of cellulose with a lower mol. carboxylic acid such as the Na salt of a cellulose ether glycolic acid.

Wood-veneer glue. Russell G. Peterson (to George H. Osgood). U. S. 2,180,547, Nov. 21. A glue having a consistency adapting it to be applied by rolls contains an artificial resin partial condensation product such as a urea-formaldehyde condensation product and a cellulosic flour such as a wood flour, together with $NaNO_3$ or KNO_3, which serve to give the product good quality of penetration and strength.

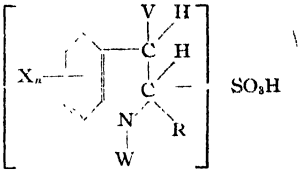
Glue bases. Geo. H. Osgood. U. S. 2,180,542, Nov. 21. A glue base suitable for use with an alk. medium comprises a protein material such as milk casein, blood albumin or egg albumin, used together with seed hulls such as pea hulls, which are impregnated with the protein in pptd. condition. Glues formed from such material are suitable for use with wood plies, etc. U. S. 2,180,543 relates to a wood-veneer casein glue having the desired body and working life, adapted to form a bond of the desired strength and water resistance, and comprising an admixt. of an aq. alk. medium, isolated milk casein and Na formaldehyde bisulfite, as sep. ingredients, the amt. of the water being at least 4 times the amt. of the casein whereby the amt. of Na formaldehyde bisulfite may be at least about 2.75–3.0% of the amt. of casein.

Wetting, cleansing and dispersing agents for use in textile treatments, etc. Fritz Guenther and Karl Saftien (to I. G. Farbenind. A.-G.). U. S. 2,169,976, Aug. 15. By treating an amine contg. at least one aliphatic radical with at least 8 C atoms and at most one H atom directly attached to N, such as stearoyldiethylethylenediamine, with an oxidizing agent, such as Caro's acid, there are obtained textile assistants of the general formula $R_1R_2R_3N(OR_4)OH$, where R_1, R_2, R_3 and R_4 stand for aliphatic or aromatic radicals, at least one of which radical contains an aliphatic chain of at least 8 C atoms. Numerous examples with details are given.

Aromatic aliphatic ether chlorides. Herman A. Bruson (to Röhm & Haas Co.). U. S. 2,176,834, Oct. 17. A process of prepg. compds. of the general formula $R_1R'(OA)_nCl$ in which R is a cycloaliphatic radical, R′ is an aryl radical, A is an alkylene radical having at least 2 C atoms or a polyalkylene ether radical in which the alkylene groups contain at least 2 C atoms and n is an integer less than 8, involves heating a cycloaliphatic alc. or cycloaliphatic compd. contg. an olefin linkage with a polyalkylene ether chloride $R'(OA)_nCl$ in the presence of a surface-active siliceous clay catalyst to temps. of about 180–210°. Details are given of the production of β-camphylphenoxy-β′-chlorodiethyl ether, b_{1-2} 205–20°, and various related compds. which may be sulfonated to produce *wetting, emulsifying, cleansing* and *dispersing agents*.

Sulfonic acids of aromatic compounds. Charles A. Thomas (to Sharples Solvents Corp.). U. S. 2,180,314, Nov. 14. Sulfonic acids of polyphenyl polynaphthyl derivs. of paraffin hydrocarbons contg. 8–20 C atoms and their alkali metal salts are useful as *washing, wetting* and *emulsifying agents*, details being given of the production of the Na salt of phenyldecylbenzenesulfonic acid, the Na salt of naphthyldodecylnaphthalenesulfonic acid, etc.

Sulphonated indole derivatives. Kurt Engel (to J. R. Geigy A.-G.). U. S. 2,180,801, Nov. 21. *Wetting, dispersing, emulsifying, penetrating* and *washing agents* (suitable for emulsifying Ca soaps) are produced, which are sol. salts of indolesulfonic acids of the general formula



where R is a high-mol. aliphatic radical with more than five C atoms, W being one of the group consisting of H, alkyl, benzyl and phenyl, V being a member selected from the group consisting of H, alkyl, benzyl and phenyl groups, and X represents H or methyl, n being 1 or 2, the salts being when neutralized and evapd. white to slightly colored powders, sol. in water to clear solns. As initial materials, use may be made of the indole prepd. from palm-nut fatty acid *o*-toluidide or its dihydro reduction product, α-heptadecenylindole, an indole prepd. from hydrogenized cod-liver oil fatty acid benzyl-*o*-toluidide, etc.

Quaternary ammonium derivatives of amides. Albert K. Epstein and Morris Katzman. U. S. 2,176,896, Oct. 24. *Wetting, detergent* and *emulsifying agents*, etc., suitable for use in various processes are produced, which have the general formula $RCON(Y)(CX_2CX_2'NX'')_nOCZ(N(A)=)_m$, where RCO is an acyl radical contg. at least 4 C atoms, Y, X, X′ and X″ are the same or dissimilar members selected from the group consisting of H, alkyl, cycloalkyl, and alkylol, Z is a hydrocarbon residue, A is an anion, m and n are whole numbers, and at least one of the 3 indicated valence bonds attached to N is satisfied by a radical of the class consisting of alkyls, cycloalkyls, alkylols, aralkyls, aryls, aralkylols, and the radical of a heterocyclic ring of which the N is a member. These products, in general, are prepd. by initially treating a polyamine, e. g., ethylenediamine with a higher-mol.-wt. carboxylic acid or deriv. thereof such as halide, under conditions such as to ensure a substantial yield of amide. The resulting amide is then treated with a preferably lower-mol.-wt. halocarboxylic acid or halide or other deriv. thereof to produce another amide linkage and with an org. nitrogenous base such as pyridine to produce a quinquevalent nitrogen. The order of the steps may be reversed, if desired; that is the reaction with the higher-mol.-wt. acid or deriv. thereof may be carried out last, or the two amidification steps may be carried out in optional order and the reaction with the pyridine or the like may be carried out thereafter. Numerous examples with details are given.

Basic condensation products. Valentin Kartaschoff (to Chemische Fabrik vorm. Sandoz). U. S. 2,180,809, Nov. 21. See Fr. 828,619 (*C. A.* 33, 2817).

Fabric-reinforced artificial leather. Milton O. Schur and Benjamin G. Hoos (to Brown Co.). U. S. 2,180,723, Nov. 21. App. is described, and a method of producing a sheet of fabric-reinforced, binder-impregnated felt suitable for use as a leather substitute which involves progressively and simultaneously passing a felt and a fabric such as a reinforcing cloth under separately applied tensions through a bath of settable liquid binder such as a rubber latex compn. in which the lower roll of a pair of squeeze rolls rotates partially submerged, causing the wet impregnated felt and the wet impregnated fabric to pass in superposed relationship about the submerged periphery of the lower roll and thence into the nip of the rolls with the felt lying directly on the submerged periphery, maintaining the tension on the fabric greater than on the felt as they are passing into the bath and about the lower roll, and setting the binder content of the composite sheet being progressively delivered by the squeeze rolls. Cf. *C. A.* **34**, 1987.

Leather substitute. Geza Ganz. Fr. 841,007, May 9, 1939. A thin layer of fibrous matter, such as felt or linen cloth, is impregnated with a liquid mixt. contg. casein, rubber or rubber latex, a small quantity of finely divided S, 4–5% of oil and some sugar, dried, treated with acetic acid and alum or with a soln. of tannin, dried again and vulcanized. Instead of casein, skimmed sour milk is used advantageously.

Rubber-like polymerization products. Martin Müller-Cunradi and Walter Daniel (to I. G. Farbenind. A.-G.). U. S. 2,180,082, Nov. 14. Butadiene or a substitution product such as isoprene, etc., is polymerized in the presence of solid highly polymerized isobutylene. U. S. 2,180,083 relates to the similar polymerization of vinyl carbazole.

Polymerizing unsaturated hydrocarbons. Raymond C. Lassiat (to Houdry Process Corp.). U. S. 2,180,361, Nov. 21. An arrangement of app. is described, and a process which involves admitting a hydrocarbon material contg. unsaturates such as C_4H_8 and C_3H_6 for the polymerization reaction and high-boiling material to a fractionating zone, withdrawing from the latter a distillate fraction composed, to substantial extent, of the unsaturates, subjecting the latter under polymerizing conditions to a polymerizing operation, sepg. from the resulting products a cut comprising polymers and an excess of hydrocarbons b. within the boiling range of the distillate fraction mentioned, and feeding the cut to the fractionating zone at a level sep. from but adjacent and below that for the admission of initial hydrocarbon material mentioned, thereby simultaneously to blend the polymers with the higher-boiling material and minimize loss to the resulting fluid of desired unsaturates in the starting material. Cf. *C. A.* **33**, 7815[2].

Polymerization of chlorohydrocarbons. Röhm and Haas A. G. Fr. 840,867, May 5, 1939. $(:CHCl)_3$ is polymerized by light, heat, pressure, oxygen, H_2O_2, tetralin peroxide, benzoyl peroxide, etc. The products are 90–9% liquid dimers with a small residue of solid polymers. The liquids are incombustible, have a certain narcotic power, and may be used as solvents, detergents, softeners, artificial waxes and as intermediaries for the prepn. of synthetic products.

Detergent compositions. Coleman R. Caryl and Alphons O. Jaeger (to American Cyanamid & Chemical Corp.). U. S. 2,181,087, Nov. 21. A stable neutral powder, noncaking and readily sol. in water, comprises a spray-dried mixt. of the sulfosuccinic ester of an aliphatic alc. having 5 to 8 C atoms and a water-sol., nonhygroscopic carrier such as Na_2SO_4, which is stable at spray-drying temps. and the satd. soln. of which has a pH of 6.5–8.5.

Protective coating for construction materials. Leon Billé. Fr. 841,112, May 10, 1939. Asbestos fibers and natural or artificial cement are mixed and kneaded, while cold, with a paint or a soln. of an adhesive, to form a coating for construction materials against corrosion. Lime or an aggregate of sand, limestone dust, emery or carborundum is added to increase the hardness of the coating.

Stabilizing zein solutions. Corn Products Refining Company. Fr. 840,862, May 5, 1939. All of the insol. protein such as denatured zein, which acts as a catalyst and causes the zein to become insol., is eliminated from the zein soln. by filtration. To obtain good results all or at least a part of the following conditions should be observed before the filtration. (1) The soln. is cooled to a temp. slightly below 20°, (2) the pH regulated to 7.4, (3) the soln. is aged, before clarification, (4) treated with an absorbing agent such as animal charcoal and then (5) mixed with a corn-oil solvent.

Activators for oxygen baths, preventing separation of hydroxy compounds of heavy metals. Richard Neu (to "Unichem" Chemikalien Handels A.-G.). U. S. 2,176,508, Oct. 17. A bleaching bath or other O bath comprising an aq. soln. of an active O-yielding compd. selected from peroxides, perborates, persulfates, and percarbonates contains, as an addnl. ingredient, an activator which comprises a product resulting from the reaction of an amine from the group which consists of alkylamines, hydroxyalkylamines, amino alcs., ethers of amino alcs., amino alkyl polyalcs., amino alkyl thiols, and cyclic amines; with a salt of Cu, Mn, Ni, Co, Fe or Ag, the salt being a H_2SO_4 deriv. of an org. compd. of high mol. wt. having the general formula: $R—X_L—R'(Y_L—SO_3H)_n$, where R represents a high-mol.-wt. hydrocarbon radical contg. from 6 to 30 C atoms; X represents a radical selected from the group which consists of S, O, COO, OCO, NR″, SO_2, NR″SO_2, and CONR″; R′ represents a radical selected from the group which consists of the alkylene radicals, hydroxyl substituted alkylene radicals, halogen substituted alkylene radicals, and arylene radicals; R″ represents H or a hydrocarbon radical; Y represents S or O; *n* represents 1 or 2; and L represents 0 or 1. Among suitable activators are: the Cu salt of the dodecyl H_2SO_4 ester with triethylamine; the Mn salt of the glycerol monododecyl H_2SO_4 ester with triethylanolamine; and the Co salt of the oleylmethylaminoethanesulfonic acid with γ-amino-α,β-propylene glycol.

Antifreeze composition. Ben W. Jarboe. Can. 386,547, Jan. 30, 1940. A cooling medium, m. about −50°F., b. about 225°F., d. about 1.26, consists approx. of $CaCl_2$ 4.25 lb., $Na_2Cr_2O_7$ 0.05 lb., oil 0.02 gal., and water to make 1 gal. of mixt.

Foundry-core materials. Harold K. Salzberg (to Borden Co.). U. S. 2,181,004, Nov. 21. Finely divided relatively inert solid material such as sand is used with a binder consisting principally of a mixt. of milk solids with an acid or salt such as Na oxalate capable of and in sufficient amt. for reacting in water with the Ca of the milk solids to form a Ca salt less sol. in water than $Ca_3(PO_4)_2$.

Magnetic cores. C. Lorenz A.-G. Fr. 840,991, May 8, 1939. See Brit. 502,394 (*C. A.* **33**, 7445[2]).

Finely divided magnetic substances. Rudolf Brill and Karl Schoenemann (to I. G. Farbenind. A.-G.). U. S. 2,179,810, Nov. 14. Mixed crystals of at least one oxide of a magnetic metal such as Fe_2O_3 and smaller amts. of at least one oxidic addnl. substance such as CaO or Al_2O_3 which is capable of forming mixed crystals with the first mentioned oxide and is more difficultly reducible are subjected to a reducing treatment (such as heating with H) effective for the reduction of the first mentioned oxide only and the reduction product is comminuted to obtain finely divided magnetic material suitable for *sound-record carriers*, etc.

Synthetic skating surface. Andrew S. MacBride. U. S. 2,179,664, Nov. 14. Skating surfaces are formed of a mixt. of naphthalene 7, gum dammar 2 and carnauba wax 10 parts with a surface lubricant such as an oil.

Chemical heating pad for permanent hair waving. Frederick L. Reynolds (to United States Appliance Corp.). U. S. reissue 21,276, Nov. 21. A reissue of original patent No. 2,153,678 (*C. A.* **33**, 5556[3]).

Polystyrene films. Edgar C. Britton, Harry B. Marshall and Clyde W. Davis (to Dow Chemical Co.). U. S. 2,179,975, Nov. 14. Polystyrene is used with a solvent consisting essentially of an aromatic hydrocarbon such as xylene, toluene or benzene or a chlorinated aromatic hydrocarbon such as mono- or di-chlorobenzene together with

about 1–5% of dioxane, which serves to facilitate removal of films from casting surfaces.

Translucent screen suitable for use in viewing projected images. Edwin H. Land (to Polaroid Corp.). U. S. 2,180,113, Nov. 14. Various details of manuf. are described of a sheet of transparent plastic material such as a cellulose acetate compn. contg. distributed particles such as globules of glycerol.

Composition suitable for sealing wounds of plants. Martin Müller-Cunradi, Michael Otto, Walter Daniel and Robert Werner (to I. G. Farbenind. A.-G.). U. S. 2,180,081, Nov. 14. Use is made of a high.-mol. polymer of an isoölefin such as that of isobutylene (suitably with brown-coal-tar pitch, or tetrahydronaphthalene, paraffin oil and wool grease).

Waterproofing composition suitable for use on various materials. Arthur F. Taggart and Warley L. Parrott. U. S. 2,180,971, Nov. 21. A mobile, liquid, penetrative waterproofing compn. that forms upon evapn. of its volatile constituents a fine-grained to glass-like water-repellent film, comprises a normally solid water-repellent crystallizable org. material selected from the group consisting of fats and waxes of org. origin, an evapg. hydrocarbon solvent, and a natural asphalt, mixed in such proportions that upon concn. of the compn. the natural asphalt and hydrocarbon solvent will thicken before the crystallizable material begins to precipitate, whereby the natural asphalt arrests the normal crystal growth of the crystallizable material as it ppts. from the solvent, and causes the crystallizable material to ppt. in the form of extremely fine size crystals.

Packing material. I. G. Farbenind. A.-G. Fr. 840,-905, May 5, 1939. Flax, hemp or other fibrous matter is covered with a thin protective film by immersing it in an aq. suspension or in an org. soln. of polyvinyl chloride and then passing through the heated rollers of a calender.

Ethers suitable for use in fly spray compositions. Francis N. Alquist and Harold R. Slagh (to Dow Chemical Co.). U. S. 2,181,085, Nov. 21. Various details are given of the production of ethers such as 1-(2-phenylphenoxy)-propylene 2,3-oxide, b_{12} about 190–200°; 1-(3-phenyl-, (2′-bromo-4-phenylphe-, about 230–41°; by treating 1-chloropropylene 2,3-oxide or 1-chloro-2-methylpropylene 2,3-oxide with an aq. soln. of an alkali metal salt of a suitable phenylphenol compd. The reaction mixt. is stirred and warmed at a temp. between 60° and the refluxing temp. thereof until the reaction is substantially complete. The mixt. is then cooled, the crude ether product sepd. therefrom as by decantation, extn., or filtration, and thereafter fractionally distd. to obtain the desired ethers in substantially pure form. An alternative procedure consists of treating metallic Na with a phenylphenol dissolved in a suitable water-free org. solvent such as benzene, and subsequently heating the reaction mixt. with a chloropropylene oxide compd. to form the desired compd. In a like manner, the phenylphenols and their nuclear-substituted derivs. may be treated with 1-chloro-2-methylpropylene 2,3-oxide, i. e., chloroisobutylene oxide, to produce homologous 1-(aryloxy)-2-methylpropylene 2,3-oxide, such as 1-(2-phenylphenoxy)-2-methylpropylene 2,3-oxide, and the like. These compds. are similar in characteristic to those disclosed above. By substituting other phenylphenol compds. there may be obtained the corresponding ethers of 2,6-dichloro-4-phenylphenol, 4-bromo-6-phenylphenol, 3-chloro-6-phenylphenol, 2-*tert*-butyl-4-phenylphenol, 2-octyl-6-phenylphenol, 2-benzyl-6-phenylphenol, 2-(δ-phenylbutyl)-4-phenylphenol, 4-cyclohexyl-6-phenylphenol, 2-methoxy-4-phenylphenol, 4-cyclopentyl-6-phenylphenol, 2-ethenyl-4-phenylphenol, 2,4-dinitro-6-phenylphenol, 2-chloro-4-phenyl-6-methylphenol, 2,4-dimethyl-6-phenylphenol, 2,4′-dichloro-4-phenylphenol, 2′,4′,6-tribromo-4-phenylphenol, 4′-isopropyl-6-methyl-4-phenylphenol, 2′-ethoxy-4-iodo-6-phenylphenol, etc.

Marking laundry. John L. De Fraine and James Y. Smith (Smith to De Fraine). U. S. 2,180,508, Nov. 21. A clear lacquer such as a vinyl resinoid compn. is used with a luminescent pigment such as ZnS, fluorene and retene to form markings which are substantially invisible under ordinary light but visible under ultraviolet rays.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Deep waters in the subsoil of Western Libya. E. Niccoli. *Chim. ind. agr. biol.* **15**, 614-25(1939).—Analyses of 12 well waters of the Provinces of Tripolis and Misurata; from 3 wells a development of gas was observed (CH_4 82–97%). G. A. Bravo

Isotopic composition of water from some rivers and lakes of the U. S. S. R. R. V. Teis. *Compt. rend. acad. sci. U. R. S. S.* **24**, 779–82(1939)(in English).—A comparison of the densities of water samples taken in different points of the U. S. S. R., purified by the method of flotation temps. and the method of flotation pressures, furnished density differences ranging from 0 to 2.7 γ for the rivers and from +2.2 to 0 γ for the lakes. As a rule lake water is denser by 2 γ than river water. The water from the rivers of the Transbaikal region is lighter than that of the other rivers measured. The water of rivers and lakes fed with melting ice and snow has a lower density and cannot be used as a standard for density measurements. 7 references. A. H. Krappe

Chemical study on the removal of free acids in the river Tama. Hikoziro Miura. *J. Chem. Soc. Japan* **60**, 958–70 (1939).—Most of the free acid in the water can be removed by the addn. of a certain amt. of andesite or clay. T. K.

Corrosive rains in the Vesuvius region. Ottaviano Bottini. *Ann. chim. applicata* **29**, 425–33(1939).—Samples of rain waters collected in the Vesuvius regions contain up to 173 p. p. m. solids, and vary in pH from 2.78 to 6.99. Cl, SO_3, SO_4 and NO_3 ions have all been detected. A. W. Contieri

Determination of traces of titanium in natural waters. V. T. Chulko. *Zavodskaya Lab.* **8**, 950–2(1939).—Salts of quadrivalent Ti present in natural waters in amts. up to 0.001 mg./l. can be detd. colorimetrically with thymol and H_2SO_4 provided the Ti is ppted. along with the $Al(OH)_3$ coagulant at a pH greater than 6. Treat a 1-l. sample of water with enough soda so as to have a pH greater than 6 after it has been coagulated with alum soln. contg. 80–100 mg. Al_2O_3. Allow the mixt. to stay for several hrs., filter, and dissolve the ppts. in H_2SO_4. Boil the soln. with H_2O_2 until colorless, then filter, wash with 10% H_2SO_4 and H_2O_2, and evap. the filtrate to fumes of H_2SO_4. Dil. with concd. H_2SO_4 to 6–10 ml., add 3–5 drops of the reagent prepd. by dissolving 1 g. of thymol in a small amt. of 80% HOAc, and dil. to 100 cc. with concd. H_2SO_4. Compare the coloration with a standard soln. at the end of 30 min. B. Z. Kamich

The preparation of permutite by the wet method. M. V. Boltina and A. A. Mukhina. *Vodosnabzhenie Sanit. Tekh.* **1938**, No. 12, 15–17; *Khim. Referat. Zhur.* **2**, No. 4, 110(1939).—Permutite was obtained by the method of Dem'yanenko and Boltina (*C. A.* **26**, 5683). A method for the prepn. of the aluminate from a soln. of $Al_2(SO_4)_3 \cdot 18H_2O$ and NaOH and its purification from $Fe(OH)_3$ is given. By the reaction of a soln. contg. 150–200 g./l. of Na_2AlO_3 with 30°Bé. water glass, a gel is obtained after 2–3 min. It is dried in air for 24 hrs. at 80°, and sieved to a particle size of 0.1–2.0 mm. A highly effective permutite is obtained. About 1330 g. of alum, 600–700 g. of NaOH, 2–5 l. of water glass and 0.5–1 g. of Al powder are used for each kg. of permutite. W. R. Henn

Quality of lime desired for water treatment. Charles P. Hoover. *Am. Soc. Testing Materials, Symposium on*

Lime **1939**, 43–9(1940).—Lime for water treatment may be in lumps, pebbles or ground to suit the user's requirements. It should be fast slaking; 100 g. crushed to 1/4–1/8 in. added to 400 ml. distd. H_2O at 25° with const. stirring should show a temp. rise of at least 40° in exactly 3 min.; if it does not, the price should be penalized 1¢ per ton for each 2° the temp. rise falls short of 40°. The percentage of CaO which is most desirable depends upon local conditions; specifying 88% CaO, a bonus or penalty of 1 1/2% of the price for each 1% excess or deficiency in CaO detd. in each carload or day's delivery by truck is fair to both producer and consumer. The Scaife test for H_2O-sol. CaO is difficult to carry out properly; Ellms' test and the sugar test, easier and fully as satisfactory, are described. Elaborate detns. of inert materials are superfluous; only a knowledge of available CaO and slaking properties is necessary. Data on F in lime are included; analyses showed 50–340 p. p. m. With 100 p. p. m., a 20 gr./gal. dose could add only 0.034 p. p. m. F to the water. C. J. Schollenberger

Prevention of after-precipitation in lime-treated industrial and municipal waters by threshold treatment. Owen Rice, Everett P. Partridge and R. E. Hall. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 50–5(1940); cf. *C. A.* **33**, 1410[7], 1425[4].—Supersatn. of Ca salts in water supplies can be stabilized by addn. of Na hexametaphosphate, $(NaPO_3)_6$ (I). The process is termed threshold treatment because the required addn. is far below the stoichiometric relation; 1–2 p. p. m. is the optimum to prevent after-pptn. of $CaCO_3$ in CaO-treated water, deposition of scale in pipes and tanks, and to remove old scale by gradual soln. It is effective in domestic water heaters operating at 80° or even higher. Added prior to CaO-Na_2CO_3 softening, I largely inhibits cold softening, which is sometimes a useful property, but has little effect upon the hot process; it is believed that I prevents the formation of crystal nuclei of $CaCO_3$, so the soln. remains supersatd. indefinitely at the usual temps. I is absolutely nonpoisonous in the quantity used and the process has already been approved for use with public water supplies at a no. of places. It is believed that a very thin film of I is adsorbed upon surfaces, not preventing the gradual soln., disintegration and complete removal of old scale, but having a protective action upon metal surfaces and so preventing corrosion. C. J. Schollenberger

Scale prevention in gas and oil engines. F. J. Matthews. *Gas & Oil Power* **34**, 319–20(1939).—Carbonate deposits in engine jackets can be prevented by adding Na metaphosphate to the cooling water (0.5–2 lb. per 100,000 gal.). Even old deposits can be slowly removed by circulating water contg. 5 lb. of Na metaphosphate per 100,000 gal. George Ayers

The National Plumbing Laboratory. Francis M. Dawson and A. A. Kalinski. *Am. J. Pub. Health* **30**, 66 8 (1940). J. A. Kennedy

Industrial hygiene for the smaller plant. Glenn S. Everts. *Am. J. Pub. Health* **30**, 17–21(1940). J. A. Kennedy

Coliform bacilli and water supplies. E. F. W. Mackenzie and F. C. Hilton-Sergeant. *J. Roy. Army Med. Corps* **70**, 14–25, 73–81(1938); *U. S. Pub. Health Eng. Abstracts* **18**, W, 81(June 25, 1938).—Fecal *Escherichia coli* can be recovered more readily by the Eijkman test than by any other known method. C. R. Fellers

Typhoid fever from drinking water. Lomry. *Bruxelles-Med.* **18**, 344–52(1938); *U. S. Pub. Health Eng. Abstracts* **18**, W, 128 (Nov. 5, 1938).—The typhoid bacillus can live in ordinary pure water less than a month; paratyphoid bacteria can live up to 2 months under similar conditions. About 10% of the typhoid cases in Belgium are caused by drinking water. C. R. Fellers

Chlorinated copperas. F. O. Baldwin. *Water Works & Sewerage* **85**, No. 3, 197(1938); *U. S. Pub. Health Eng. Abstracts* **18**, W, 91(July 9, 1938).—In routine and exptl. lab. tests incident to flocculation control, it was found that freshly prepd. chlorinated $FeSO_4$ (copperas) soln. produces results more comparable with com. plant operations than when "stale" solns. were used. Such control requires an accurate, rapid and safe method of prepg. the chlorinated $FeSO_4$. The following procedure is recommended: Weigh out 1.195 g. copperas and wash it carefully into a 500-cc. aspirator bottle by means of a funnel with 200 cc. of distd. water. Connect the Cl cylinder by means of tubing to the bottle and add 36 cc. of Cl. Shake well. No color should be given by the soln. with *o*-tolidine reagent. Add 2 cc. more of Cl and shake well. Complete oxidation is usually obtained after the addn. of 38–39 cc. of the Cl. Dil. by washing and with distd. water to the 400-cc. mark on the bottle. One cc. of this soln. added to 500 cc. of water is equiv. to 50 lb. per million gallons on the plant scale. This strength of soln. hydrolyzes within 3 hrs. Stronger solns. are somewhat more stable. C. R. Fellers

Results of seven years' operation of the Soest sewage-treatment plant. Heinrich Blunk. *Gesungh.-Ing.* **62**, 323–30, 338–41(1939).—The plant originally consisted of settling basins with sep. sludge-digestion and open trickling units. The sludge-digestion chamber is heated and the sludge continuously stirred from the bottom up except for a brief period once a week when this direction is reversed. Fresh sludge is added daily. Measurements of gas evolution indicated that about a third of the org. matter in the fresh sludge is digested the first day, another third is digested within a few weeks, and the remaining third is practically nondigestible. At a digestion temp. of 27–8° about 21 cu. m. of gas is produced per cu. m. of sludge. The digested sludge is disposed of in the fluid condition for use as *fertilizer*. When the retention period was 2 hrs. the effluent from the settling basins seldom contained more than 0.2 cc. per l. of suspended solids. At a load of 1.2 cu. m. of sewage per cu. m. of filter material daily, the open trickling units operated satisfactorily even at a temp. of −10°, giving a nonseptic effluent having an O_2 content only 2–3 p. p. m. below satn. The $KMnO_4$ consumption was reduced from 200–400 p. p. m. to 50–100 p. p. m. by passage through these units. Increase in the amt. of sewage treated from about 2500 cu. m. per day to 6000–7000 cu. m. per day so far reduced the retention period in the settling basins that the effluent from them could not be satisfactorily purified in the open trickling units. These units were therefore enclosed and subsequent biol. treatment by means of activated sludge with aeration in a unit similar in construction to an Imhoff tank was added. The effluent from the trickling units is stable; the final plant effluent is entirely clear. The sludge from the final activated sludge unit differs in character from that obtained with sewage not previously biologically treated (in trickling units). This is also true of the flora and fauna present in the activated sludge unit. M. G. Moore

Effect of acidity of sewage on the behavior of bacterial filters. P.-G. Liègeois. *Rev. universelle mines* **15**, 597–9 (1939).—Bacterial reduction of sewage is conducted under anaerobic conditions. There are formed CO, CH_4, NH_3, H_2S and CO_2. Pathogenic bacteria are not destroyed by this method. The oxidizing method consists in complete aeration of the effluent; H_2O, CO_2 and mineral are formed. *Nitrosomonas* and *Nitrosococcus* convert amino N to nitrites and these are further converted to nitrates by *Nitrobacter*. L. finds that in several cases this oxidizing process was severely restricted or completely inhibited if the waste waters contained acid, e. g., dairy wastes. Expts. indicate that satisfactory operation of bacterial filters in such cases is possible only after neutralization of the acids, e. g., by filtration through calcareous material. M. Hartenheim

Correction of water for brewery (van Daele) **16**. Cinderella of phosphates [$NaPO_3$ treatment of water] (Hall) **18**. Use of refining waste pulp mass in purification of waste waters (Samyshkina) **23**. Detn. of oxidizable matter in alk. waste waters (Khristiansen, Kalendarova) **23**. Methods for disposing of dairy wastes (Trebler) **12**. Preliminary investigation of detn. of F in lime [for use in treating water] (Koehler) **7**. Geochem. investigations of volcanoes in Japan—influence of rain water on d. of H_2O

from fumarole—d. of mineral waters in vicinity of Komagatake, Akita prefecture (Oana) 8.

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Thresh and Beales' Examination of Waters and Water Supplies. 4th ed. Revised by **J. F. Beale and E. V. Suckleng**. London: J. and A. Churchill, Ltd. 42s.

Removal of acid from water. Eric L. Holmes (to Permutit Co.). Can. 385,929, Dec. 26, 1939. Acid-contg. water is passed through a granular bed of a resin prepd. by the reaction of at least 1⅓ mols. of a monosaccharide, a disaccharide, or a substance that yields a monosaccharide or a disaccharide on hydrolysis, with 1 mol. of *m*-phenylenediamine or a 5-alkyl-*m*-phenylenediamine. The resin is regenerated by passing an alk. soln. through it.

Aerating tank for treatment of sewage by activated sludge. Karl Imhoff. U. S. 2,180,148, Nov. 14. Various details involving use of devices for mechanically agitating and also for spraying the liquid.

Apparatus for testing the rate of oxidation of sewage, etc. Carl H. Nordell (to Advance Engineering Co.). U. S. 2,180,847, Nov. 21. Various structural and operative details.

Pneumatic ejector plant suitable for raising liquids such as sewage. Harry Bentley (50% to W. C. Holmes & Co. Ltd.). U. S. 2,180,274, Nov. 14. There are used together a pair of ejector vessels, each having an inlet and an outlet, an air compressor of reversible type connected to the vessels to withdraw air from or deliver air to either vessel according to the direction of operation of the moving parts of the compressor, the air withdrawn from one vessel being delivered to the other vessel, and means responsive to liquid level conditions within the vessels for reversing the compressor.

Fuel gas from organic substances and wastes. László Zaitz. Hung. 122,564, Dec. 15, 1939. To org. matter contg. 90% moisture, at 25–8° and pH 7.2–7.8, in a closed container is added 5% of activated sludge. Tree leaves or other vegetable matter may be added. The mass is made alk. with $Ca(OH)_2$. The gases formed consist of easily purifiable methane. The sludge residue can be used as *fertilizer*.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Chemical work at soil-survey laboratory, Wellington. Anon. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* **13**, 59–60(1939).—Soils from the Kermadec Islands showed high fertility, were almost uniformly base-satd. and were fairly well supplied with plant foods. Cook Island soils also had a high content of available plant 6
food, almost complete base satn. and a slightly alk. reaction. The soils contained carbonate, possibly in the form of siderite. Some laterite soils from Western Samoa and Niue Island contained appreciable quantities of Cr. Neither Cr nor Ni in exchangeable form was found in soils from Western Samoa, Niue or Cook Islands, but a laterite soil from Siota, in the Solomon Islands, which is derived from serpentine rock and apparently is infertile, showed 7
appreciable amts. of both elements in this form. The nonexchangeable Cr in the Samoa and Niue soils seems to have no markedly toxic effect on plant growth.

K. D. Jacob

Some black soils of the Scioa (Ethiopia). Piero Belloni *Agr. coloniale* (Italy) **33**, 577–81(1939).—Analyses of 22 soils are tabulated. G. A. Bravo

Soils of Valdinievole. E. Lucchetti. *Ann. facoltà agrar. univ. Pisa* [N. S. 3rd.], **2**, 39–45(1939).—Complete 8
chem. and phys. analyses of 29 soils of the Lucca and Pistoia provinces are given. G. A. Bravo

Some microbiological examinations on reclaimed peat soils. G. Martelli. *Ann. facoltà agrar. univ. Pisa* [N. S. 3rd.], **2**, 28–31(1939).—Soils from the drainage of Massarosa (Lucca Province) show normal NH_3-producing power, slight N-fixing power, and no nitrification power.

G. A. Bravo 9

Microbiological investigation of the maremma soils collected between Lake Burano and Mount Fiora. G. Luchetti and R. Marcolini. *Ann. facoltà agrar. univ. Pisa* [N. S. 3rd.], **2**, 114–34(1939).—The max. no. of microörganisms was found in a calcareous soil (3,400,000 per g. soil), and the min. (200,000) in a clayey soil. The NH_3-producing power was max. in summer and in the clayey soils, the nitrification power was max. in autumn in the very loose soils, and the N-fixing power was max. in spring. 42 references. G. A. Bravo

The fertility of the soils of the East of Scotland area. A. M. Smith. *Scottish J. Agr.* **22**, 353–7(1939).—A survey of the soils showed 19% of the samples with pH values below 5.5 and 26% with values above 6.5. In 32% of the samples the lime requirement was more than 30 tons/acre and in 43% the requirement ranged from zero to 30 tons/acre. About 34% of the samples were low in available K (*Aspergillus niger* method) and about 23% were well supplied with this element. Deficiencies in available P (sol. in dil. HCl) were serious in about 23% of the samples, whereas about 32% contained adequate supplies of P.

K. D. Jacob

Chemical work at the Cawthron Institute. Theodore Rigg. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* **13**, 55–9(1939).—The leached condition of the topsoil and the presence of an Fe-humus pan at a depth of 12–20 in. are typical features of all pakihi soils at Westport. Podzolization is now taking place on the recent sands adjacent to the sea-beach at Sergeant's Hill and at other localities on the West Coast. Chem. analyses of the recent and older sands and of typical pakihi soil of the same textural type are tabulated. By means of the Bray method (cf. *C. A.* **24**, 453) soils could be rapidly classified into low-, medium- and high-P groups. By adoption of the following group limits for results by the standard citric acid method—namely, low, less than 0.02; medium, 0.02–0.04; high, greater than 0.04% P_2O_5 for 0–3 in. depths of soil—a good correlation was obtained for the results by the 2 methods for soils with a low P content. The correlation for soils in the medium and high groups was not so good, owing possibly to the influence of org. phosphates, which would be more sol. in citric acid soln. Detns. of K by Spurway's method (cf. *C. A.* **27**, 4004) gave results about ⅓ of those obtained by citric acid extn., but the correlation was sufficiently close to warrant the transposition of the results using this ratio. K. D. J.

Some applications of mineralogy to soil studies. Ann Nicholls. *J. Australian Inst. Agr. Sci.* **5**, 218–21(1939).

—A summary is given of a mineralogical study of a no. of Victorian soils. Such a study indicates: (1) the probable source of the soil-forming material, (2) the state of maturity of the soil, and (3) the fertility of the soil. J. R. Adams 1

The identification of minerals in soil colloids. G. Nagelschmidt. *J. Agr. Sci.* 29, 477–501(1939).—X-ray, optical, dehydration and chem. methods for the identification of minerals in soil colloids are discussed with special regard to their limitations. These are mainly due to uncertainties about the variation of phys. properties of standard minerals with decreasing grain size and the possible existence and importance of amorphous material. The aggregate method in x-ray analysis is described. Various techniques for dehydration and optical analysis are discussed, and it is concluded that they are useful only when used with x-ray data. The advantages of combining various chem. methods with x-ray analysis are pointed out. Standard data are given for quartz, cristobalite, oxides and hydroxides of Fe and Al and minerals of the kaolinite, montmorillonite and mica groups and the evidence for their occurrence in soil colloids is reviewed. Over 100 references are given. J. R. Adams 2

Pore space and apparent and true densities of soils. László Mados (Kotzmann). *Mezogazdasági Kutatások* 12, 205–9(1939).—The proportion of pore space was detd. in various samples originating from different layers of 13 soil profiles of different characteristics. Hygroscopic capacity was not found to be related to pore space or to true d. $P = 100(D_t - D_a)/D_t$, where D_t is true d. and D_a apparent d. The true densities of soils seem to be generally 2.6–2.7. The apparent densities ranged from 1.2 to 1.7, the values for pore space from 35 to 50% (detd. in summer time). For the calcn. of the removable soil water the formula $W = P - (4Hy + 12)D_a$ is recommended, where W is the amount of removable soil water, P the pore space, Hy the hygroscopic capacity and D_a the apparent d. of soil. S. S. de Finály 3

Suction force of the soil. Ruth Waeffler. *Botan. Centr., Beihefte* 59A, 275–334(1939).—Both soils and artificial substrates (as quartz, kaolin, Si carbide and C) showed with similar H_2O contents an increase of suction force with decreasing particle size. In pot culture, suction force decreased from the surface downward and from the outside, inward. Wetting of the upper soil layer gives rise to a temporary inversion; and the same change is noted with soils in the open after a rain. In drought the suction force of different soils increases at dissimilar rates. During the day there is more or less of a parallelity between suction force and satn. deficit of the surface layer of the soil to a depth of about 10 cm. R. C. Burrell 4

Technique of determination of the thermal parameters of soils in their natural state. V. Z. Bogomolov and A. F. Chudnovskiĭ. *J. Tech. Phys.* (U. S. S. R.) 9, 1325–30 (1939).—Measurements of *heat cond.* by the method of const. flow should not be used for soils, as the heat changes the humidity of the soil and, hence, its cond. To avoid this difficulty a metal plate, approx. 20 × 13 cm., is dipped into the ground; it is hot or is heated in position by an elec. current. The temp. of the ground opposite the center of the plate and about 2 cm. distant from it is recorded. The time when this temp. reaches its max. and the difference of temps. between the plate and the ground at another moment are sufficient to calc. the heat cond. and the vol. heat capacity of the ground. The product of heat cond. and heat capacity can be used for testing the humidity of grounds. J. J. Bikerman 5

Quick tests show southern soil needs. Frank Moser. *Better Crops with Plant Food* 23, No. 2, 11–13, 42–4(1939); cf. *C. A.* 33, 3942⁹.—A comparative study is made of the quick tests on some of the Piedmont and Coastal Plain soils of the cotton belt. The P tests are all based on the Deniges color reaction and the methods are satisfactory for diagnosing the P requirements of these soils. The Purdue and Bray methods tend to give consistently higher readings than the other methods. In general, the amts. of available P as shown by the rapid test methods are in accordance with the fertilizer treatments. The rapid test methods for detg. K_2O are modifications of the Na cobaltinitrite method and they are of approx. equal value for detg. K_2O in the soil. The differences in the replaced K in Cecil sandy clay loam and Orangeburg fine sandy loam as detd. by these methods are in agreement with the amts. added in a fertilizer. The rapid test methods for detg. available K_2O are suitable for soils contg. either a high or a low amt. of K_2O. Cf. B., *C. A.* 24, 453. J. R. Adams 6

Potentiometric determination of exchangeable hydrogen in unsaturated soils. Kenneth A. Maehl. *Ind. Eng. Chem., Anal. Ed.* 12, 24–7(1940).—The method used is similar to that described by Schollenberger and Dreibelbis (*C. A.* 24, 5407) except that the glass electrode is used for the potentiometric titrations. A small portion of the filtered ext. from 25 or 50 g. soil is used to obtain a voltage reading on the glass electrode. The mg. equiv. of H exchanged per 100 g. soil is then obtained directly from a curve which is constructed from data obtained on the cumulative rise in e. m. f. when a neutral soln. of NH_4OAc is titrated potentiometrically with AcOH. Thus, a single titration is sufficient for a large no. of samples. The glass electrode assembly and procedure are discussed. John O. Hardesty 7

Soil sterilization. W. S. Braintree. *Gardeners' Chronicle* [3], 103, 304–5(1938).—Formalin, phenol and toluene are discussed as soil disinfectants and a mixture of 11 parts of NH_4 carbonate to 1 part of Cu sulfate at the rate of 0.5 oz. per gallon of H_2O is recommended for combating damping off. Colin W. Whittaker 8

Soil solution as governed by H-ion concentration and other factors. A. T. Perkins. *Kansas Agr. Expt. Sta., 9th Biennial Rept.* 1938, 46.—Liming apparently increases the percentage of coarser particles at the expense of the smaller ones, and increases the percentage of the heavier minerals at the expense of the lighter minerals. C. R. Fellers 9

Soil acidity and liming, and some factors that should determine the standards for lime for the soil. Elmer O. Fippin. *Am. Soc. Testing Materials, Symposium on Lime* 1939, 56–70(1940).—A general review and discussion of the subject, including tests for need of lime, forms and fineness of limestone, rates of application and the use of ground raw dolomite or that selectively calcined to produce $CaCO_3.MgO$ as filler, conditioner or source of bases for mixed fertilizers. 121 references. C. J. S. 10

The occurrence of boron and manganese deficiencies in a sandy soil. Allan Walkley and H. K. Kemp. *J. Australian Inst. Agr. Sci.* 5, 229–30(1939).—Turnips, swedes and oats grown on a light-gray sand from McLaren Flat, South Australia showed symptoms of B deficiency, and the oats also developed symptoms of Mn deficiency when grown in the subsoil taken from this area. J. R. A. 11

Retention by soils of the nitrogen of urea and some related phenomena. John P. Conrad and C. N. Adams. *J. Am. Soc. Argon.* 32, 48–54(1940).—Untreated soils progressively removed at least some of the N of $CO(NH_2)_2$ and $CaCN_2$ from solns. as they percolated through them. This property was largely lost by percolating $CO(NH_2)_2$ at 90°, but persisted at 2, 11 and 40°. Two explanations for this retention of the urea N are offered: (1) a small amt. of adsorption by the soil of the $CO(NH_2)_2$ itself or (2) the transformation of $CO(NH_2)_2$ to $(NH_4)_2CO_3$ followed by the strong retention of the latter. Growth results with milo as well as the analyses of the small amt. of percolates from untreated columns, columns preheated to about 85° and columns in which percolation took place under toluene gave good evidence that the transformations of $CO(NH_2)_2$ in the soil, at least during the relatively short percolation time, was largely catalytic rather than microbial. J. R. Adams 12

The use of potash on Idaho soils. H. W. E. Larson. *Better Crops with Plant Food* 23, No. 7, 15–18, 42–5 (1939).—Peat and muck soils respond consistently to high K_2O-contg. complete fertilizers. No consistent results are obtained from K_2O fertilizers on cut-over soils. Southwestern Idaho mineral soils show more response to K_2O fertilizers than those in any other irrigated district. Quality and yield of truck crops are improved by the use of

fertilizers which contain K_2O. Alfalfa, beets, potatoes and peas show the greatest response to sol. phosphate alone or N plus P_2O_5 applications more consistently than they do to K_2O or K_2O plus P_2O_5 combinations. J. R. Adams

Phosphorus studies on Philippine soils. I. The readily available phosphorus of soils as determined by the Truog method. Ricardo T. Marfori. *Philippine J., Sci.* **70**, 133–42(1939); cf. *C. A.* **25**, 160.—Examn. of 90 soil samples, mostly rice soils of Luzon, showed that for some soil types about 30–40 p. p. m. of available P is the min. limit for a good crop of rice. When the total P content of the soil was const. the readily available P increased with increase in Ca content. When the Ca content remained const. the readily available P increased with increase in total P. Exceptions were with virgin soils rich in org. matter. Eighteen references. John O. Hardesty

Ammonification of dicyanodiamide and its derivatives in soil. H. Murata. *Trans. Third Comm. Intern. Soc. Soil Sci.* **A**, 137–9(1939).—Although dicyanodiamide (I) occasionally appears as a decompn. product of $CaCN_2$ in normally aerated soils and is considered injurious by preventing nitrification, it has some fertilizer value for paddy rice, which does not require nitrate. I is ammonified under waterlogged conditions; a low value for P_{O_2} (E_h less than 250 mv. at pH 7) and the presence of FeO or actively decompg. org. matter is favorable. Nevertheless, the practical value of I is not great, because it is not absorbed by the soil and is but slowly ammonified, so that it is likely to be lost in the drainage before it can be utilized. Guanyl urea, a deriv. of I, as sulfate or phosphate is an excellent fertilizer for paddy rice; the N is held by the soil even more firmly than NH_3, and it is ammonified under the same conditions as I. Eight references. C. J. S.

Tests on plant tissue as a guide to the soil's available nutrients. D. C. Wark. *J. Australian Inst. Agr. Sci.* **5**, 224–7(1939).—There is considerable variation in the nitrate N (I) and the P_2O_5 phosphorus (II) in certain localized areas of plant tissue. The level of these salts is influenced by the fertilizer treatment of the soil. The I tends to be highest in plants from the plots receiving the heaviest dressings of nitrogenous fertilizer and the II content is highest in plants receiving the heaviest dressings of superphosphate. With wheat, the I is higher in a fallow crop than in a stubble crop while the II is lower. Oats show a lower level of I but a higher level of P than barley. Peas show a very high level of II. During dull weather, when photosynthesis is reduced, the I content of the samples is higher than during bright sunshine. The test for N in plant tissues gives a reliable indication of the N status of the soil. J. R. Adams

The acidity of mulberry soils. I. The effect of acidity upon the absorption of nutrients by the mulberry tree. Husao Koyama and Tokusi Hukuta. *J. Sci. Soil Manure, Japan* **13**, 852–60(1939).—The growth and yield of the mulberry tree were max. in a plot of neutral reaction. The absorption of N, P_2O_5, K_2O and CaO by the plant was more intense in neutral than in acid soil, but the absorption of SiO_2 was the reverse. Y. Kamoshita

Effect of soil treatment on the vitamin B_1 content of wheat and barley. P. C. Leong. *Biochem. J.* **33**, 1397–9 (1939).—The observation of Harris (*C. A.* **28**, 6506[8]) that the vitamin B_1 potency of wheat was not influenced by soil treatment was confirmed. Similar results were obtained with barley. E. W. Scott

Smoke pollution [of soils]. H. Trefor Joues. *Agr. Progress* **16**, 224–9(1939).—A detn. of water-sol. sulfate is very useful in confirming or disproving cases of alleged smoke damage to crops and soils and in explaining differences in productivity of the various parts of affected fields. Treat 20 g. soil in a beaker with approx. 100 cc. hot water and stir for 5 min. Transfer the soil quantitatively to a filter paper, filter into a 500-cc. flask and wash the soil with hot water to a total vol. of nearly 500 cc. Cool the filtrate, dil. to 500 cc. and det. the sulfate as $BaSO_4$. If the ext. is brown and turbid add a few drops HCl and boil. Sulfate (SO_4) figures in excess of 0.02% for grassland and 0.03% for arable land indicate smoke pollution. Grassland soils northeast of Leeds contained 0.220, 0.184, 0.065, 0.051, 0.037, 0.022 and 0.020% sulfate (as SO_4) at distances of 0, 2, 3, 4, 7, 10 and 19 miles from the city, resp. K. D. Jacob

Root activity and the oxygen requirement in relation to soil fertility. Kenneth S. Karsten. *Am. J. Botany* **26**, 855–60(1939).—A method is described for detg. soil O_2 by the dropping-Hg electrode. The O_2 content of soils varied with soil type, water, N and org. matter content. The O_2 content is less than expected on the basis of pore space because of the respiration of soil microörganisms. Addn. of N and org. matter increases microbiol. activity and growth; this decreases the O_2 content of the soil. If the O_2 content is sufficiently reduced, root activity is decreased and the entire plant is affected. N. McK., Jr.

The nitrogen nutrition and growth of certain deciduous trees of northeastern United States. Harold L. Mitchell and Robert F. Chandler, Jr. *Black Rock Forest Bull.* No. 11, 94 pp.(1939).—Series of from 3 to 6 quarter-acre plots were established in stands of mixed hardwoods on each of 6 different sites. One plot of each series served as a control and the others were supplied with varying amts. of nitrogenous fertilizer (a mixt. of equal wts. of $NaNO_3$ and $(NH_4)_2SO_4$). Near the end of the same growing season that the fertilizer was applied, leaf samples for chem. analysis were taken from dominant and codominant trees on each plot. The av. radial increment of trees on the variously fertilized plots was detd. by means of increment borings. Both the growth and the foliage-N content of the trees increased with N supplements through a range of N supplies equiv. in effect to those of poor to good natural soils. Further addns. of N resulted in successively smaller increases in radial increment and leaf-N concn. These relationships could be expressed algebraically with the Mitscherlich formula. On the fertilized plots the leaves of all species were 30–150% greater in size and much darker green in color than those of trees on the control plots. Red, white and chestnut oaks, red maple and aspen made fairly satisfactory growth in N-deficient soils and approached max. radial increment at a significantly lower relative N supply than any of the other trees studied. Beech, sugar maple, pignut hickory and black gum appeared to be intermediate in the scale of N-deficiency tolerance. Yellow poplar, white ash and basswood made poor growth in N-deficient soils and approached max. growth only at very high levels of N availability. There was a high degree of correlation between tree growth and leaf-N concn. The ability of the N-deficiency-tolerant species to sustain growth in soils of low N availability is attributed to the fact that, on such sites, the leaf-N concn. of these trees is significantly greater, in relation to their resp. optima, than for the intermediate or N-demanding species. With the method of foliar diagnosis, detns. of the relative N-supplying capacities of 50 representative forest sites throughout the northeastern United States indicated that 20% are N-deficient and only 15% have a high N supply. Inspection of stands on sites thus evaluated revealed not only a growth relationship but a high degree of correlation between soil-N supply and the frequency of incidence of the N-requiring species. As with N, there was a good correlation between the amts. of P and K applied to the soil and the concns. of these elements in the leaves of the trees studied. Thirty-one references. K. D. Jacob

Experimental studies at Ohio State University in ornamental horticulture during 1938. L. C. Chadwick and D. C. Kiplinger. *Trans. Iowa State Hort. Soc.* **73**, 167–71 (1938).—In soil adjusted to pH values of 5.0–8.0, the best yields of blooms from *rose bushes* were obtained at pH 5.0. On soils of pH 5.0–5.5, the response of roses to applications of Zn salts was greater than that to applications of Mn, Mg or B compds. (0.5–1.0 lb. per 50 sq. ft.). Treatment of rose bushes with Bordeaux mixt. before storage had no beneficial effect on the survival of the bushes when they were subsequently planted. Practically complete *control of weeds in potting soil* was obtained by treating the soil in covered boxes with chloropicrin (3 cc. or more per sq. ft.). Remove the covers after 4 days, turn or shred the soil to hasten aeration and allow all traces of the gas to

leave the soil (usually after 10–14 days) before it is used for planting. The best results are obtained when the soil temp. is at least 45.5°F. and the moisture content is 50–60% of the water-holding capacity. Compost heaps should be treated with 5–10 cc. chloropicrin per cu. ft. K. D. Jacob

The occurrence in soil of bacteria, actinomycetes and molds capable of transforming tyrosine to melanin or other pigments. Charles E. Skinner. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 130–2(1939).—Plating on Conn's Na asparaginate glucose agar with 0.1% tyrosine, etc., indicated that organisms of these genera, alike in producing red or black pigments, are very common and numerous in soils. The black pigment or melanin is sol. in weak alkali, pptd. by acids, insol. in EtOH and Et_2O but disperses in EtOH and H_2O. It is believed to be identical with the "humic acid" of various investigators. The red pigment changes quickly to the black when heated with weak NaOH soln., and appears to be the precursor in all cases; not all organisms produce the enzyme effecting the transformation, and with some the red pigment remains unchanged, or alters only very slowly to brown. The pigments are produced only by oxidation from tyrosine and in a few cases from phenylalanine, which have been shown to be produced from both inorg. and org. N by many organisms, and it is suggested that this is the source of "humic acid." C. J. Schollenberger

Microbial activity in relation to organic matter transformations in the soil. S. C. Vandecaveye. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 120–9(1939).—Samples from horizons *A* and *B* of 15 virgin soils of 5 genetic groups and 0–8- or 10-in. samples of the same under cultivation, alone and with 1–2% ground sweet clover hay or wheat straw with a N carrier to total 3% N in the addn., were incubated at 22–28° for detg. CO_2 production, microbial counts and proximate analyses for org. constituents by the methods of Waksman and Stevens (*C. A.* 24, 2965), total C and N and pH. Microbial counts were also made on samples of the same soils direct from the field at intervals. The effects of the addns. upon the microflora varied with the soils—in some, bacteria were stimulated, in others repressed relative to other species. These differences are attributed mainly to differences in the soil humus. The proximate analyses indicated that a high content of H_2SO_4-sol. C and N, cellulose, hemicellulose and proteins was assocd. with a heavy growth of *Actinomyces*, although these did not reach their max. until bacteria and fungi had consumed the H_2O-sol. C and N and declined. A low C/N in some soils was accompanied by a predominance of bacteria and relative scarcity of fungi, although there were exceptions. Conclusion: Data from proximate analyses alone are insufficient to explain the differences in microbial activity observed. Eleven references. C. J. Schollenberger

The influence of reaction on the development of an acid-tolerant Azotobacter. Robert L. Starkey. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 142–50(1939).—It is generally accepted that *Azotobacter vinelandii* (I) does not fix N at pH values below 6; if I develops in soils more acid, combined N is utilized. *Azotobacter indicum* (II) was isolated by Starkey and De (*C. A.* 33, 6385[3]) from Indian rice soils at pH 4.9–5.2. Differences in the morphology of I and II are briefly discussed. Expts. on development and behavior under lab. conditions are described. II can develop on solid or in liquid media contg. no fixed N, from about pH 3 to 9; much slime is produced, watery on alk. and very tenacious on acid agar, showing a buff color above and colorless below pH 6. Acidity generally increases as growth progresses, especially when NH_4 salts are present, but if nitrate is present there may be a tendency toward alky. N in both forms is utilized and urea is hydrolyzed to NH_3, but urea is unfavorable to growth. N fixation is inhibited by these N compds. $CaCO_3$ in media has an unfavorable effect upon the growth of II. Eighteen references. C. J. Schollenberger

The utilization of phenolic compounds as a source of energy by Azotobacter of the soil. G. Guittonneau and R. Chevalier. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 161–7(1939)(in French); cf. *C. A.* 32, 4188[6].—Expts. with pure cultures of *Azotobacter* and suspensions of soils plated on SiO_2 gel contg. either mannitol (I), the Na salt of BzOH (II), salicylic (III), *o*-(IV), *m*-(V) or *p*-(VI) hydroxybenzoic acids or PhOH (VII) as the source of C, in all cases adjusted to neutrality and incubated 15 hrs. at 30° for colony counts, indicated that the benzene nucleus and phenolic groups are utilized as sources of energy by *Azotobacter*. This has long been known with respect to II, but not of the other related compds. Tests with suspensions from different soils comparing 2 g. I with different concns. of III indicated that 0.125–0.25 g./200 ml. medium was second best, although in all cases much inferior to I, and varying with the soil used. 0.1–0.5 g. of II, IV and VI gave about the same no. of colonies, but none appeared when the same amts. of V were used; other expts. indicated that V is not toxic, but simply is not utilized as a source of energy and it is suggested that this is dependent upon some peculiarity in mol. structure. 0.05–0.1 g. of VII gave about the same nos. of colonies; 0.2 g. was very toxic. The fixation of N observed in some expts. was about 75% as great with III as with I, figured on equal wts.; the abs. amt. of N fixed was about 1% of I consumed. The expts. so far have indicated the presence of 5 strains or classes of *Azotobacter* in the soils tested, which can be distinguished by their ability to grow with these substances as the sole sources of energy. The optimum concns. and conditions recommended for purifying and distinguishing *Azotobacter* strains by this means are specified. C. J. Schollenberger

The nature and amount of extracellular nitrogen in Azotobacter cultures. C. Kenneth Horner and Dean Burk. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 168–74(1939).—The results of an extensive investigation on the extracellular N compds. produced by *Azotobacter* are summarized. On the new synthetic N-free media, concns. of 25–50 mg. N/100 ml. are easily obtained. Some 20 strains of *Azotobacter*, including *chroöcoccum* (I), *vinelandii* (II), *agilis* and *agilis* var. *atypica*, are included. In 1–4-day cultures, 10–25% of the total N was sol. and extracellular; at 1–3 weeks this increased to 50–75% of the total N. The increase was largely due to autolysis, but even in the youngest cultures much of the sol. N is a normal vital secretion. Virtually all the N secreted is org. and amounts to 10 3% of the org. C liberated, slightly less than the C/N of the cells themselves. Pptn. reactions of the sol. N indicated it to be very heterogeneous, of simple to complex proteinaceous nature. In a 2-day culture, the N was 75% dialyzable through cellophane, permitting the passage of N compds. of mol. wt. 6000–10,000; the proportion was somewhat less in old cultures. The growth and N fixation of cultures in cellophane bags were not affected by continuous removal of the excreted N, by dialysis into medium outside. Amino N was detected regularly when the total N fixed exceeded 5 mg./100 ml. and increased to 1–2 mg./100 ml. but decreased from 10–40 to 5–15% of the total with age. A considerable part of the N in one old culture was dicarboxylic acid amino N, but amino N in general was not predominant; so far as *Azotobacter* is concerned, there is no proof that aspartic acid is specifically an intermediate in N fixation. NH_3 was not found until all sugar had been consumed and autolysis had set in, and the max. found in this later work with undoubtedly pure cultures was 12% of the total N, compared with 50% reported previously, from cultures now believed to have been contaminated; the former figure is in line with findings by others. It is certain that exhaustion of the sugar supply is a prerequisite for NH_3 accumulation, and NH_3 is not proved to be an intermediate in N fixation by *Azotobacter*. Nitrite was found only in cultures supplied with nitrate; up to 0.05 p. p. m. NH_2OH was detected only in cultures of II and small amts. of oxime N were found quite regularly with some strains of I. Factors which increased growth of the organisms, e. g., supplying Mo when deficient, also increased the production of sol. N; it increased 2–3 fold when combined N was supplied, more with org. N than with inorg. N. Conclusion: $^1/_6$–$^1/_3$ of the N fixed by *Azoto-*

bacter can be liberated again as sol. org. N; in pure cultures, only 10% of the N fixed will be released as NH_3. Five references. C. J. Schollenberger

Studies on Azotobacter and nitrifying organisms in relation to various fertilizer treatments in soils under citrus culture conditions. M. Winnik and Miriam Goldberg. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 175–83(1939).—Microbiol. studies of poor red sandy loams in lysimeters under irrigated citrus culture, some with lupines as a green manure crop, with the SiO_2-gel plating technique of Winogradsky, with kneaded earth plates for detg. *Azotobacter* activity and P_2O_5 deficiency, are reported. It is concluded that supplying the usual fertilizers, including about 1 kg. N/tree in green manure during the 9-yr. expt., definitely decreased the activity of *Azotobacter*. N alone was more repressive than when P_2O_5 and K_2O also were supplied, and in nitrate than in green manure. There were no tests with minerals alone, without N. $(NH_4)_2SO_4$ was injurious to *Azotobacter*, even with P_2O_5, K_2O and green manure, probably because it reduced the $CaCO_3$ of the soil and caused a temporary reduction of pH from 7.4 to 6.7. $NaNO_3$ was somewhat less repressive than the other mineral N carriers, probably because it caused a slight increase in available P_2O_5, as shown by analyses. All fertilizers, including nitrates, increased the activity of nitrifiers; the effect of green manure was notable, and $(NH_4)_2SO_4$ stimulated nitrification more than nitrates did. The activity of the latter is attributed to increased available P_2O_5. It is concluded from other data that when the P_2O_5 supply is adequate, N fertilizers will have less unfavorable effect upon *Azotobacter*. Four references. C. J. Schollenberger

The effect of benzoic acid compounds on the abundance of microörganisms, including Azotobacter organisms, in a soil. Herbert W. Reuszer. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 151–60(1939); cf. *C. A.* **32**, 9156[1].—BzOH or its Ca or Na salts were added to a soil, 1, 2.5 and 5% dry wt., moistened to 20% and incubated for 1–15 weeks at 28°. Samples were examd. for pH and nitrate contents, bacteria, *Actinomyces*, mold fungi and *Azotobacter* counts on plates with the usual media. Addns. of BzOH initially lowered pH from the original figure 7.4 to about 6, but after 1 week the soil mixts. varied from pH 7 to 8, approx. in line with the size of the addn. BzONa had but a slight effect initially, but caused rapid rise to max. pH 10 with the largest addn., 9 and 8.5 with the others; the Ca salt had slight effects, probably from its lower soly., and not consistent with the foregoing, although pH was raised. Nos. of organisms were increased most rapidly by the smaller addns., but the larger amt. of BzONa had a repressive effect attributed to high pH. The variety of organisms was reduced, especially by the larger addns. The larger addns. of BzOH and BzONa caused the appearance of a strain of *Azotobacter* producing green pigment, never before observed; the fact that this appeared only after 3–5 weeks and that its growth seems actually to be favored by high concns. of BzONa is taken as evidence that it is a rare form originally present. It is believed that cultivation upon media contg. BzOH may prove of value in studying *Azotobacter*. Five references. C. J. S.

Respiration rates of Rhizobium; their estimation and significance. Franklin E. Allison and Sam R. Hoover. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 32–38 (1939).—Expressed as Q_{O_2}, (cu. mm. O_2 consumed/mg. dry wt. organisms/hr.), the respiration rates of alfalfa and clover bacteria are 5–40 in presence of glucose. For most other bacteria, Q_{O_2} does not exceed 200, although *Azotobacter* may show the exceptionally high value 5000. With *Rhizobium*, Q_{O_2} at 28° is usually 5–8, the higher value with young cultures. In the absence of substrate, rates of 2–5 were maintained by endogenous respiration; values above 8 indicate growth or assimilation. Coenzyme *R* is essential for respiration and growth, but increases respiration only under conditions permitting subsequent growth, indicating interrelated effects. The resting cell technique for measuring substrate oxidation is rather unsatisfactory with truly resting *Rhizobium*, because Q_{O_2} is low with or without substrate; it is sometimes useful with actively assimilating and proliferating cells, but the results then represent both substrate oxidation and growth. A resting cell must be defined as one both nonproliferating and nonassimilating. Fifteen references. C. J. S.

Symbiotic nitrogen fixation. W. W. Umbreit and P. W. Wilson. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 29–31(1939).—The status of the problem is reviewed, with the conclusion that the classical methods of org. investigation do not offer much promise of aiding its solution, but studies of the enzymes concerned and the influence of variations in pN_2, pO_2 and pH_2 may be more useful. Red clover inoculated with an efficient strain of *Rh. trifolii* and kept under different values for pN_2 fixed N in proportion thereto up to 0.15 atm.; above that point there was no difference in fixation. pO_2 had little direct influence, and it is believed that O_2 is important in N fixation only indirectly through its effect upon carbohydrate metabolism of the host plant. H_2 has an inhibiting effect proportional to pH_2, but does not affect the growth of clover supplied with combined N, nor nonsymbiotic fixation of N by *Azotobacter*. Argon and He had no effect upon N fixation by clover. The specific effects of H_2 upon symbiotic N fixation promise a means for distinguishing N-fixation reactions from those involved in other phases of N metabolism. Eleven references. C. J. Schollenberger

Symbiotic nitrogen fixation by leguminous plants. Artturi I. Virtanen. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 4–19(1939); cf. *C. A.* **32**, 7958[7]; **33**, 3950[8], 7024[6].—A description of the technique of expts. proving that legume seedlings in sterile cultures grow best when N is supplied as *l*-aspartic acid (I) rather than inorg. salts. Glutamic acid was a fair source of N, but no other amino acid was well utilized. Similar expts. showed that cereal seedlings were unable to utilize amino acids directly. Inoculated legumes grown in otherwise sterile sand or cellulose excrete much more combined N than in H_2O cultures, because the solids adsorb the excreted products, which can then be extd. almost quantitatively by H_2SO_4 or HCl at pH 4. 90–98% of this N was in α-amino acids; α-aminomonocarboxylic and aromatic amino acids were absent. About 50% of the N excreted by inoculated peas harvested at flowering was in I; no glutamic acid was found, but the remaining amino N was in β-alanine, considered a decompn. product of I. These excreted N compds. are not products of protein breakdown, but I is the primary product of the biol. fixation of N and is taken up by the host plant from the nodules. In studies of the mechanism of N fixation, exptl. proof of fixation of N_2 from air by excised root nodules in a dil. neutralized soln. of oxaloacetic acid (II) was obtained; the results were checked by Kjeldahl detns. and are interpreted as evidence of the central position of II in biol. N fixation; II was demonstrated in legumes during the period of active N fixation but not later. The synthesis of amino acids in plants supplied with nitrate or NH_4 salts is briefly discussed in the light of the foregoing. A reply to Wilson (*C. A.* **33**, 5971[1]) is appended. C. J. Schollenberger

Some soil factors in nitrogen fixation by legumes. Wm. A. Albrecht. *Trans. Third Comm. Intern. Soc. Soil Sci.* A, 71–84(1939).—From studies on total growth, N fixation and compn. of soybeans grown on a medium of quartz sand and electrodialyzed beidellite clay (T = 65 millicquiv./100 g.) satd. to different degrees with Ca, with H, Ba, Mg or K as the other cation, it is concluded: N fixation and growth are directly related to Ca satn., although addnl. Ca supplied in a larger amt. of clay at the same degree of satn. also caused increases. Similar results were obtained whether H or Ba was the other cation, provided pH exceeded 5.5, the isoelec. point for soybean plants; below pH 5.5, no Ca could enter the plants, there was little growth and no N fixation, while at higher pH values, Ca supply was the principal factor and pH was important only as it was related thereto. In other expts., methylene blue, an org. cation of high mol. wt., was added to the colloidal clay-sand mixt. to simulate org. matter in a clay soil. Ca utilization and N fixation were high and independent of the level of Ca satn., suggesting that the

org. cation displaced H from the clay and was itself so firmly held that the release of Ca was facilitated. At low levels of Ca satn., P_2O_5 in the seed was lost to the substrate and there was little growth and no N fixation in 6 weeks. When 0.2 milliequiv. Ca was supplied for each plant, all P_2O_5 was retained and there was good growth and fixation in that time. Mg seems not to be directly active in N fixation, but increases the activity of Ca; without Mg, there was no N fixation when the plant tissues contained less than 0.50–0.55% Ca, when Mg was supplied fixation was marked with 0.45% Ca. K showed an antagonistic effect toward Ca; there was much less N fixation and the plants contained less Ca but more K when the latter partly replaced Ca in the clay. With the relative excess of K, the C/N in dry matter was widened. It is suggested that the loss of Ca and relative increase in active K during soil development may account for changes in flora and decrease in tendency to accumulate N and org. matter. Six references. C. J. Schollenberger

Direct estimation of biological nitrogen fixation. A gasometric method. Charles Hurwitz and P. W. Wilson. *Ind. Eng. Chem., Anal. Ed.* **12**, 31–3(1940).—A method is described for the detection of uptake of free N by biol. agents which is based on the principle of quantitatively replacing N fixed, as well as O respired, with O of known purity. Tests with *Azotobacter* cultures indicate that it is reliable and reasonably accurate. Its advantages over Kjeldahl methods for use with heterogeneous substrates, as seeds and plant tissues which are initially high in org. N, are discussed. John O. Hardesty

Minor element fertilization of horticultural crops. F. S. Jamison. *Better Crops with Plant Food* **23**, No. 7, 19, 39–42(1939).—A discussion is given of the use of minor elements in fertilizers for raising horticultural crops and overcoming nutritional deficiencies. J. R. Adams

The influence of fertilizer treatment on the carotene content of poor pasture grass, and on the relation of this constituent to the ash and organic fractions. F. E. Moon. *J. Agr. Sci.* **29**, 524–43(1939); cf. *C. A.* **32**, 8661⁷.—$(NH_4)_2SO_4$ and $NaNO_3$, applied at monthly intervals, increased the carotene content of poor pasture grass by 28%. Monthly applications of K_2SO_4 produced an increase of 6.2%. A single dressing of $CaCO_3$, enough to satisfy the CaO requirement of the soil, produced no effect on carotene content, while monthly dressings of superphosphate also had no influence except in June, when an increase of 14.5% was produced. All 5 treatments significantly increased the yields of dry matter and carotene. Marked seasonal variations in the carotene contents were noted. Ash content was increased by the 3 nonnitrogenous fertilizers, protein content by $NaNO_3$, $(NH_4)_2SO_4$ and superphosphate, ether ext. by superphosphate and $(NH_4)_2SO_4$, while N-free ext. was decreased under all but the $CaCO_3$ treatment. None of the 5 fertilizers had any effect on the mean fiber content of the grass. Correlations of carotene with crude protein, fiber, N-free ext. and ash were computed for each fertilizer treatment and several significant differences were observed. J. R. Adams

Results of continuous fertilizer experiments on the experimental plots of the Agricultural Experiment Station, Berlin-Lichterfelde. A. Jacob and R. Gottwick. *Ernähr. Pflanze* **36**, 1–8(1940).—Expts. were carried out from 1930 to 1936 with potatoes, winter rye, lupines, beets, winter wheat, oats and maize grown on sandy soil and receiving different fertilizer treatments as follows: control; N in conjunction with P; complete fertilizer with K in different forms, namely, $K_2Mg(SO_4)_2$, K_2SO_4, kainite, 40% manure salts and KCl. The beneficial action of K on yields was slight during the 1st yr. but increased each year thereafter with $K_2Mg(SO_4)_2$ giving best results. No change occurred in the mineral contents of the fertilized plants except that the K content of straw and foliage was higher in the plants receiving high amts. of K_2O. John O. Hardesty

Cotton fertilizer tests on two valley soils. I. E. Miles and Russell Coleman. *Better Crops with Plant Food* **23**, No. 4, 11–14, 43–5(1939).—Most of the bottom soils of Mississippi, as represented by Lintonia silt loam and Ocklockonee fine sandy loam, show a K_2O deficiency. J. R. Adams

Fertilizing tomatoes in eastern Virginia. E. R. Purvis and J. M. Blume. *Better Crops with Plant Food* **23**, No. 9, 19–21, 40(1939).—N and K_2O are essential to the early growth of tomatoes and should be applied before setting on soils of low fertility. Many of the old agricultural soils of Virginia are in need of CaO. J. R. A.

How to prevent fertilizer burn. Wm. H. Ross and Lawrence M. White. *Better Crops with Plant Food* **23**, No. 1, 21–2, 45–7(1939).—The burning effects of excessive applications of fertilizer mixts. of the ordinary type may be considered as roughly proportional to their effect on the concn. of the soil soln. Other factors, such as the nonfertilizing sol. salts, being the same, an increase in the plant-food content of a sol. fertilizer material tends to decrease its burning effect. The arrangement in ascending order of the tendency per unit of total plant food value of different fertilizer materials to change the concn. of soil soln. is as follows: double superphosphate, $NH_4H_2PO_4$, superphosphate, NH_3, cottonseed meal, K_2SO_4, KNO_3, $CO(NH_2)_2$, KCl, NH_4NO_3, $(NH_4)_2SO_4$, manure salt, $NaNO_3$ and kainite. Burning from the use of fertilizer mixts. is decreasing because of the use of synthetic products. Contributing factors are the replacement of kainite and low-grade K_2O salts with high-grade KCl or K_2SO_4, the substitution in part of free NH_3 and $CO(NH_2)_2$ for other sol. nitrogenous materials and the need of less fertilizer per acre because of the increased plant food content of the mixts. Burning of crops is also being reduced by improved methods of application. J. R. Adams

Availability of the natural phosphates. A. A. Sanfourche and B. Tallibart. *Compt. rend. acad. agr. France* **25**, 953–9(1939).—Availability tests of the P_2O_5 of superphosphate and crude phosphate rock in soils of pH 7.5, 7.3, 6 and 5 show that the P_2O_5 of the superphosphate is more available than that of the rock in all but the most acid soil. In this soil the 2 sources of P_2O_5 show the same P_2O_5 availability. J. R. Adams

New calcined phosphates. Hans Huber. *Chem.-Ztg.* **64**, 22–4(1940).—A review of recent work on fertilizers made from rock phosphate by calcination; 25 references. E. H.

Reasons for the P_2O_5 in phosphorite being more available to plants after chlorination. V. V. Butkevich, A. A. Germanov and K. I. Gadalova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 574–6(1939)(in English).—Expts. show that about 33% (the most active part) of the $CaCO_3$ in phosphorite is destroyed by Cl. As a result of chlorination this hydrolytically alk. salt is converted into $CaCl_2$. The CO_2 is therefore no longer apt to cause the formation of $CaCO_3$ in the soln. Chlorination of phosphorite made its aq. ext. (1:5) change its pH from 6.5–7.0 to 3–3.5. The acidity of this ext. as detd. by titration against phenolphthalein became 100–240 cc. of the 0.1 *N* $Ba(OH)_2$ per 100 g. of chlorinated phosphorite. This increase in acidity of the phosphorite meal has a pos. influence on the availability of the P_2O_5 in phosphorite to plants. HCl can be used instead of Cl applied in the form of exothermic chlorination. 14 references. A. H. Krappe

Potassium metaphosphate—a potential high-analysis fertilizer material. S. L. Madorsky and K. G. Clark. *Ind. Eng. Chem.* **32**, 244–8(1940).—Prepn. of KPO_3 from KCl and H_3PO_4 was studied over the temp. range 300–900°. Products obtained at 700° or above were practically H_2O-insol., nonhygroscopic and contained relatively little free acid and unreacted KCl. Chem. analyses and vegetative tests showed that the K and P in KPO_3 are available to plants. Methods were developed for directly *detg. meta- and pyrophosphates in the presence of orthophosphate.* Phys. properties and the economic advantages of KPO_3 as a fertilizer are discussed. John O. Hardesty

Fluoride-induced reversion in mixtures of superphosphates and calcined rock phosphate. W. H. MacIntire and L. J. Hardin. *Ind. Eng. Chem.* **32**, 88–94(1940); cf. *C. A.* **32**, 3537⁷.—Analytical results showed that the development of citrate-insol. P_2O_5 in mixts. of super-

phosphate and calcined phosphate is due to the formation of fluorphosphate, chiefly through the reaction between component fluorides and $Ca_3(PO_4)_2$. The resulting phosphate-fluoride compd. is similar to the native phosphorite of raw rock phosphate but decidedly more available to plants. Defluorinated phosphate can be mixed with fluoride-free superphosphates in any proportion without loss of available P_2O_5. John O. Hardesty

The biological action of boric acid. E. Lucchetti. *Ann. facoltà agrar. univ. Pisa* [N.S. 3rd], **2**, 304–36 (1939).—In the action of B on the microörganisms, on the biochem. and enzymic activity of the soils, and as a fertilizer, there is a stimulating and a toxic concn. It is doubtful if B is indispensable for plants, but it can modify their functional activity. 50 references. G. A. Bravo

Shallow-soil orchards respond to potash. J. R. Van Haarlem and G. H. Dickson. *Better Crops with Plant Food* **23**, No. 1, 6–8, 41–2(1939).—Leaf scorch of apple trees, probably due to a K_2O deficiency in the Vineland fine sandy loam, was remedied by the use of a K or a K-P fertilizer. The fertilizers used were KCl and superphosphate. The use of K fertilizer caused a much greater tree growth over a period of 5 yrs. than did either P or K-P fertilizers. Some of the wide differences between the results on the K and K-P plots were due to the deeper and better texture soil in the K-P plots. J. R. Adams

The effect of potash upon the yield, size and carbohydrate accumulation of potato tubers. Tomota Sugawara. *J. Sci. Soil Manure, Japan* **13**, 829–39(1939).—In plants deficient in potash the leaves became dark green, then yellowish brown at their edge, gradually curled down and finally dried up. Increase of potash supply caused no marked effect on the ratio of length to diam. of tubers but had a beneficial effect on the size and yield of tubers. Starch accumulation in tubers was increased by heavy application of potash and was lowered by potash starvation. The growth of tubers and also of their starch grain was directly proportional to the amount of potash added to the soil. Y. Kamoshita

Garden uses of potassium permanganate. John Derbyshire. *Gardeners' Chronicle* [3], **105**, 220(1939).—Periodic sprinkling of each cu. yard of a compost pile with 6 gallons of a soln. contg. 3 oz. of $KMnO_4$ increased the rate of decomposition. Other agricultural uses of $KMnO_4$ are discussed. Colin W. Whittaker

Growth and quality of sugar-beet root as influenced by periodical supply of nitrogen and potassium. I. V. Gulyakin. *Compt. rend. acad. sci. U. R. S. S.* **24**, 712–15 (1939) (in English).—Previous expts. (cf. *C. A.* **33**, 6502[7]) were continued and Hellriegel's nutrient mixt. was applied as before; it was shown that high amts. of N are absorbed by the plant during leafage. When subsequently intensive root growth and sugar storage are taking place, the N requirements are considerably reduced. If the sugar beet is given less N at that time, the protein breakdown in the aging leaf is accelerated; within limits it has a pos. effect on the root yield. With too rapid a breakdown of the proteins the leaves die away prematurely and the root weight is decreased. Leaf growth is also detd. by a supply of K, a deficiency of which eventually reduces the root weight. 5 references. A. H. Krappe

Fluctuation in the nitrogen content of cereal grains. P. Boischot and J. Herviaux. *Compt. rend. acad. agr. France* **25**, 944–9(1939).—The N enrichment of the soil by the commonly used fertilizers caused no marked variation in the N content of the grain. This was true in the case of each of the 3 fertilizers tested. J. R. Adams

Action of arsenic salts on the microflora of the soil. R. Perotti and O. Verona. *Ann. facoltà agrar. univ. Pisa* [N. S. 3rd], **2**, 32–8(1939).—The action of As salts (Na arsenites, etc.) on the microörganisms of the soils was examd. in the course of arsenical treatments for destroying *Cuscuta* in alfalfa and clover. An occasional transient decrease in NH_3-producing and nitrification powers was observed; probably As ions do not accumulate in the soils, but are removed by microörganisms and converted to volatile compds. G. A. Bravo

Toxic limits of replaceable zinc to corn and cowpeas grown on three Florida soils. O. E. Gall and R. M. Barnette. *J. Am. Soc. Agron.* **32**, 23–32(1940).—The toxic limits in milliequivs. per 100 g. of soil of replaceable Zn for corn were 0.688 and 1.376 on a Norfolk sand, 0.758 and 1.137 on an Orangeburg fine sandy loam and 1.615 and 2.153 on a Greenville clay loam. The corresponding figures for cowpeas were 0.275 and 0.482, 0.379 and 0.758 and 0.538 and 1.077. The application of $Ca(H_2PO_4)_2$ at the rate of 233 lb. per acre to the Norfolk sand and 1800 lb. per acre to the Orangeburg fine sandy loam and Greenville clay loam did not change the toxic limits of the replaceable Zn for corn or cowpeas. The presence of P_2O_5 as a plant nutrient, however, stimulated the growth of corn and cowpeas on the Orangeburg and Greenville soils, while no effect was noted on the Norfolk sand. The use of $CaCO_3$ at the rate of 1000 lb. per acre on the Norfolk sand and 4000 lb. per acre on the other 2 soils definitely increased the concns. at which replaceable Zn became injurious to corn and cowpeas and greatly alleviated the toxic condition. J. R. Adams

Organic and inorganic fertilizers; their relative effectiveness. E. John Russell. *Scottish J. Agr.* **22**, 319–31 (1939).—There is no definite evidence that farmyard manure and other org. fertilizers are superior to equiv. quantities of inorg. fertilizers in increasing the yields and improving the quality of crops. Farmyard manure and composts are of particular value in supplying humus to the soil and improving its phys. properties. K. D. Jacob

The manufacture, composition and action of bone meal for fertilizer and stock food. O. Engels. *Knochenverarb. u. Leim* **1**, 43–9, 75–8(1939).—A review with 10 references. Don Brouse

Brazilian raw material for phosphatic fertilizers. L. F. de Moraes Rego. *Mineracão e met.* (Rio de Janeiro) **2**, No. 12(1938); *Neues Jahrb. Mineral. Geol.* Ref. II, **1938**, 656.—The most hopeful deposit is at Ipanema in São Paulo, where a bed of apatite in the hydrothermal phase of a nephelite-rich magma contains on an av. 10–15% apatite. In north Brazil a deposit of bauxite contains about 20% of P_2O_5, but so intimately mixed therewith as to be economically worthless at present. C. A. Silberrad

Farm manure. Robert M. Salter and C. J. Schollenberger. *Ohio Agr. Expt. Sta., Bull.* **605**, 69 pp.(1939); cf. *C. A.* **32**, 8653[6].—The practical handling of farm manure and its utility in maintaining soil productivity are discussed, with data on compn., recovery of fertility elements in feed, chem. changes in rotting, losses of valuable constituents and means for reducing the same, including addn. of superphosphate and other chemicals. 118 references. C. R. Fellers

Decomposition of the organic compounds in barnyard manure. N. Bengtsson and Chr. Barthel. *Trans. Third Comm. Intern. Soc. Soil Sci.* **A**, 133–6(1939).—To a mixt. of dry sand with about 10% ground mixed cow manure including straw and 0.05% KH_2PO_4 was added 0.1–0.2% KNO_3 or equiv. $(NH_4)_2SO_4$, and to a part of each lot H_2SO_4 to change from pH 8 to 6. Portions of 300 g. were moistened with 15% H_2O contg. soil ext. for inoculation, sealed in jars, incubated at 20–22° and examd. annually for 4 yrs., for total N, NH_3, nitrate, α-humus, cellulose, pentosans, lignin, total org. C, pH and protein N. The analytical data obtained are tabulated but not discussed in detail. After 1 yr., the pH of the mixt. without addn. was 7.5, with H_2SO_4 5.5; about 0.1% α-humus was present in all, and 73–95% of the cellulose, 59–84% of the pentosans, 13–38% of the lignin, 28–55% of the total org. C and 4–16% of the protein originally present had been decompd. Four-yr. samples were at about pH 7 and 5, resp., with little change in humus; 82–100% of the cellulose, 68–92% of the pentosans, 22–61% of the lignin, 44–71% of the total org. C and 15–44% of the protein had been decompd. The decompn. proceeded farther in the alk. mixts. The addns. of N, narrowing C/N from 99 to 46 or 30, had no significant effects upon the course of decompn. C. J. Schollenberger

Comparison of different sulfates used as fertilizer. P. Boischot, G. Drouineau and J. Herviaux. *Compt. rend. acad. agr. France* **25**, 939–44(1939).—The addn. of

S in the form of $(NH_4)_2SO_4$, K_2SO_4 or $CaSO_4$ (superphosphate) gave increased potato yields. The S of the superphosphate was most effective as it was not removed from the soil as rapidly as the S from $(NH_4)_2SO_4$ or K_2SO_4 and consequently remained in contact with the plant roots for a longer time. In calcareous soils, the superiority of K_2SO_4 over KCl was due in large part to the presence of the S. J. R. Adams

Content and effect of boron in some artificial fertilizers, farmyard manure, wood ashes and seaweeds. M. Ödelien. *Meldinger Norges Landbrukshögskole* **19**, 239–70(1939); cf. *C. A.* **33**, 3949[1].—Several pot expts. show a great effect of B deficiency and of exceedingly small quantities of B on plant growth and crops. The increase in the crop of dry matter was up to 76,000 times that of the quantity of B applied. Of the fertilizers commonly used in Norway, it is only farmyard manure which seems to be of importance for the supply of B to the plants. Relatively small amts. of B added to a single fertilizer may, in the course of a series of years, provide as much B as the quantity of farmyard manure commonly applied in Norwegian agriculture. V. Aschehoug

The method of proximate analysis and its application to the study of plant residues, composts and humus formations. Selman A. Waksman. *Trans. Third Comm. Intern. Soc. Soil Sci.* **A**, 101–19(1939).—A review and discussion of the advantages of the analytical methods of W. and Stevens (cf. *C. A.* **24**, 2965) compared with others applicable to soils, marine sediments, composts, humus fertilizers, sewage sludges, garbage, etc. The course of decompn. of org. matter in these materials is outlined and briefly discussed. 101 references. C. J. Schollenberger

Seaweed. E. G. Ing. *Gardeners' Chronicle* [3], **103**, 165–6(1938).—Fresh seaweed collected on the Jersey coast contains 1500 lbs. H_2O, 400 lbs. organic matter, 100 lbs. of ash, 8–14 lbs. N, 15–20 lbs. K_2O, 2–6 lbs. phosphoric acid, 10–12 lbs. of CaO and 30–40 lbs. NaCl per ton. "Colley" (*Laminaria digitata*) in the fresh state contains 1.12% of K_2O or 5.7% when dry. The K_2O content of *Fucus* varies from 0.55 to 0.83 in the fresh weed and from 2.2 to 3.6% in the dried weed. Owing to the rapid loss of soluble salts and gases seaweed should not be allowed to rot alone but should be composted. Colin W. Whittaker

Hypochlorite oxidation of decomposed plant residues. Arthur G. Norman. *Trans. Third Comm. Intern. Soc. Soil Sci.* **A**, 85–93(1939).—Expts. on oxidation of various plant residues with nearly neutral or unadjusted hypochlorite solns. at high diln., e. g., 50 mg. acid lignin with 100 ml. NaOCl soln. contg. 200–250 mg. available Cl for 2 hrs. to 5 days but with other conditions not specified, led to the following conclusions: Aerobic decompn. processes result in the progressive accumulation of lignin and nitrogenous complexes peculiarly susceptible to oxidation by hypochlorite. Lignin does not change in reactivity during natural decompn. processes; hence the NaClO oxidation with conditions carefully controlled for uniformity and with a large initial excess of oxidant is adapted to study of the humus layers on a forest floor, in peat deposits, etc. The method is not adapted to comparisons of widely varied materials, however, and does not furnish abs. results because the reaction is practically only about 1/3 complete. The indications are not a measure of the "degree of humification," but of the accumulation of lignin and resistant nitrogenous residues. Ten references. C. J. Schollenberger

Chemical treatment of winter wheat seed as a measure to increase frost resistance. A. Vetukhova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 605–8(1939)(in English).—In continuation of previous research (cf. *C. A.* **33**, 6386[9]), it was sought to increase the frost resistance of winter wheat by the application of KSCN, KI, KCl, K_2SO_4, NaCl, $CaCl_2$, $BaCl_2$, NaOH, KOH, $Ba(OH)_2$, $Ca(OH)_2$ and some phosphates. The effect of the salts and hydroxides of alkali metals in 0.01 *N* and 0.001 *N* concns. is one of increasing frost resistance of plants under natural conditions of hibernation. The same is true of the action of the trisubstituted K phosphate. The stability of the colloidal system was also strongly affected by the chem. treatment of the seeds. Substances and concns. increasing the hydrophility of the colloids also increase frost resistance. 7 references. A. H. Krappe

Resistance of azaleas to fumigation with methyl bromide. J. Lounsky. *Bull. inst. agron. sta. recherches Gembloux* **8**, 126–31(1939); cf. *C. A.* **33**, 5115[5].—With few exceptions, fumigating azalea plants in vacuum for 2 hrs. with MeBr at the rates of 40 and 80 g./cu. m. had no injurious effect on the plants. The tests were made on 34 varieties. J. R. Adams

Deformed heart of cabbage. III. S. Leefmans. *Mededeel. Tuinbouw-Voorlichtingsdienst* No. **11**, 52 pp. (1939).—Biol. information is given for the midge, *Contarinia nasturtii* Kieffer, which causes deformed heart of cabbage and cauliflower in Holland. The most economical spray is 0.1% nicotine + 1.5% soap or + 0.5% NH_3 and 0.75% oleic acid, both of which give satisfactory control of the emerged adults. Pyridine at 2% concn. is necessary in years of severe injury. Derris alone or with $C_{10}H_8$ is less satisfactory and more costly. Soil fumigation with CS_2 to kill larvae and pupae showed promise. E. J. S.

[Report on] tobacco research. Anon. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* **13**, 75–80(1939).—In the *soils* of the Tobacco Research Sta. the coarse, medium and fine sands contained 0.03, 0.06 and 0.075 p. p. m. B, resp. Six samples of *tobacco leaf* from the Riwaka district averaged CaO 4.86, MgO 0.81, Fe 0.014, Mn 0.0048, N 2.05 and P_2O_5 0.49% and B 24 p. p. m. on the dry basis. The Mg, Mn, N and B contents of the samples showed considerable variation. *Disinfection of tobacco seed* with either alc., $AgNO_3$ or Uspulun had no significant adverse effect on germination of the seed but usually had a beneficial effect. The *mosaic disease* was accentuated in plants that received extra applications of K fertilizer, whereas high applications of N fertilizer had an ameliorating effect. It appears that, within certain limits, the N:K ratio rather than N alone is the factor operating in overcoming the dwarfing tendency produced by the virus. K. D. Jacob

Control of sweet-potato wilt by chemical treatments. T. F. Manns and J. W. Heuberger. *Del. Agr. Expt. Sta., Bull.* **214**, 30–2(1938); *Ann. Rept.* **1938**; cf. *C. A.* **32**, 6390[3].—The wilt disease caused by *Fusarium batatatis* was fairly well controlled by sprout dipping treatments with various Cu and Hg compds. such as $HgCl_2$ (1 oz. to 16 gal. of water), Bordeaux mixt. (4–4–50), Cuprocide (3–5 lb. to 50 gal. of water), New Improved Semesan Bel (1 lb. to 8 gal.) and Coposil (6 lb. to 50 gal.). The use of nutrients in the dipping soln. may aid by insuring rapid growth of the sprouts immediately after planting. C. R. Fellers

Effect of the injuries caused by Eurygaster integriceps Put. on the baking properties of wheat. A. I. Marushev and K. P. Grivanov. *Socialistic Grain Farming* (U. S. S. R.) **1938**, 187–91(in Russian); *Rev. Applied Entomol.* **27A**, 554–5(1939).—Analysis showed no gluten in wheat flour prepd. from grains of which 25% had been damaged by this pentatomid, and loaves baked from this flour did not rise and were not sufficiently porous. The life history of the pest is given and biol. control methods are suggested. Edwin J. Seiferle

Personal experiences in the control of grape-vine mildew. H. V. Gole. *Agr. Live-Stock India* **9**, 155–6 (1939).—The Imp. Chem. Industries Ltd., Bombay, prepd. 2 Cu fungicides, a CuO paste and a Cu_2O powder (the latter known in trade by the name of Perenox) as substitutes for Bordeaux mixt. These 2 fungicides were given a trial in 1937 and each was sprayed on 80 vines separately. Three sprayings were given and these proved adequate to give effective protection to the crop from the mildew. The results proved very satisfactory, but as the weather conditions at the time of the trials were not very favorable for the infection and growth of the disease, another trial was given during 1938. A plot contg. 260 vines was selected for the expt. A mixt. of Cu_2O was prepd. by mixing 1 lb. of powder to 40 gal. (USA) of water. The vines were pruned on the 1st of April and were given

their 1st spray on the 20th of May. The 2nd spray was given on the 18th of June. A dusting with S was given between the 2 sprays. The results were satisfactory. A 33% mixt. of Perenox showed better results than Bordeaux mixt., but the results require further confirmation. Other advantages in using Perenox in preference to Bordeaux mixt. are: (1) It can be prepd. quickly and without much difficulty. The compn. of Perenox remains const. for a given strength of the mixt. (2) It remains in suspension for a longer time and does not deteriorate by keeping for a day or two. (3) It is not affected by the atm. and therefore does not lose its fungicidal properties. It may keep its effect for more than 20 days with full potency throughout the period. (4) It will not cause any leaf-burn injury, observed occasionally when Bordeaux mixt. is used. The CuO paste had given good results in 1937 but it was not available for trial in 1938. The paste leaves dark spots on bunches and thereby spoils their appearance. It use was therefore considered objectionable. The paste requires to be kept in air-tight containers as otherwise it gets dried and loses its phys. texture. A sudden and severe attack of powdery mildew was also checked quickly by a liquid spray of $KMnO_4$ (8 oz. to 40 gal. of water). This should be followed immediately by dusting with S. Edward A. Ackermann

Use of chloropicrin in nematode control. H. Goffart. *Anz. Schädlingskunde* **15**, 121–5(1939).—Field expts. were carried out against the potato nematode, *Heterodera schachtii*. Two portions of bare land were wet with 10 cc. chloropicrin (I) in 2 l. H_2O/sq. m., and 2 with 20 cc. I in 2 l. H_2O/sq. m.; one of each of these pairs was carefully covered with roofing paper, while the others were left open. Another area was injected with 4 10-cc. portions of I/sq. m. placed in holes 15–20 cm. deep and 50 cm. apart. Two untreated check areas were left. After 4 weeks potatoes were planted in these areas and growth of plants and degree of infestation by nematodes were observed. Results showed that growth differences in covered and open areas were slight, and growth was poor on the untreated areas. The injected area showed the best, almost complete, control of the nematodes. It appeared to be essential for good control that the soil be covered after treatment. There is considerable discussion of mech. handling of I. 33 references. E. J. S.

Biology and control of Rhizoecus kondonis Kuw., a citrus pest. H. Saito. *Agr. and Hort.* **14**, 1761–6 (1939)(in Japanese); *Rev. Applied Entomol.* **27A**, 617 (1939).—This coccid attacks rootlets of citrus in Japan. Biol. data are given. Chloropicrin and Ca cyanamide are effective for control, but injure the trees, while CS_2 is less effective. A H_2O soln. of cyanide (0.7% in winter and 0.3% in summer) gives good control and does not injure the trees. Edwin J. Seiferle

Some mealy bugs of Egypt and experiments on their control by means of chemicals. M. Beshir and M. Hosny. *Ministry Agr. Egypt, Tech. Sci. Service, Bull.* No. 209, 16 pp.(1939).—Good control of the hibiscus mealy bug (*Phenacoccus hirsutus* Green) was obtained by spraying the infested plants with either tar oil (4–5%) or Volck mineral oil (2–3%) emulsions. Because of foliage injury, tar-oil sprays were not satisfactory for citrus trees, vegetable crops and ornamental flowering plants, but they were not injurious when they were applied to deciduous plants in autumn or winter. K. D. Jacob

Brief report of an experiment in combating Helopeltis on cacao by dusting with derris. J. G. Bettem. *Bergcultures* **12**, 1790–6(1938); *Rev. Applied Entomol.* **27A**, 523.—Applications of a dust consisting of 1 part 10% rotenone-contg. derris powder in 13 parts talc produced temporary reduction in no. of nymphs and adults of *H. antonii Sign.* on cacao in Java. Edwin J. Seiferle

Grasshopper control methods developed in both laboratory and field. R. R. Walton and F. E. Whitehead. *Okla. Agr. Expt. Sta., Ann. Rept.* **1936–1938**, 79–82 (1939); cf. *C. A.* **32**, 2276[3].—Two years' field tests show that max. control in Okla. is obtained by liberal use of an inexpensive bait consisting of 50 lb. each of bran and sawdust, 4 lb. of Na arsenite and 10–12 gals. of water. Cottonseed hulls can be advantageously substituted for the sawdust. The addn. of Am acetate or ground lemons did not appreciably increase the attractiveness of the bait. C. R. Fellers

Effectiveness of pyrethrum against the eggs of Chilo simplex Butl. T. Onoe and J. Hukuda. *Oyo Dobuts. Zasshi* **11**, 146–7(1939); *Rev. Applied Entomol.* **27A**, 620 (1939).—Expts. in Japan showed that pyrethrum exts. in 0.5% soap soln. are more effective against week-old eggs of *C. simplex* than against those that are a day old. Since developed embryos were observed in all the eggs killed, it is considered that the pyrethrum affects embryos in a late stage of development. A soln. with a pyrethrin content of about 0.009% killed all the eggs. E. J. S.

Entomological notes from Bahia. IV. G. Bondar. *Rev. Entomol.* **10**, 1–14(1939).—B. discusses the taxonomy and economic importance of several pests of cocoa in Bahia. In combating the hemiptera, *Monalonion* spp., which may cause a crop loss up to 50–60%, a spray of kerosene and soap emulsion or of Bordeaux mixt. is effective. Edwin J. Seiferle

[Report on] fruit research. Anon. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* **13**, 66–72(1939).—$ZnCl_2$, $HgCl_2$ and $Hg(CN)_2$ solns. gave no *control of apple canker*, caused by *Nectria galligena*. A soil dressing of 0.5 lb. borax per tree gave com. *control of internal cork of apples* for at least 3 seasons. Borax sprays (0.1–0.2%) caused no foliage injury when they were used to control internal cork, provided the spray soln. was thoroughly mixed and lime was used in conjunction with the Pb arsenate sprays. *Premature defoliation of apple trees*, which seems to be caused by Mg deficiency, was overcome by injecting Mg salts into the trees. Low figures for Mg in apple leaves were assocd. with high figures for K. *Control of brown-spotting of apricots* was effected by spraying the trees with 0.1% borax soln. or by applying 0.5 lb. borax as a top-dressing around the tree in the spring. Fruit from B-treated trees contained 34.5–46.5 p. p. m. of B as compared to 5.7 p. p. m. in fruit from control trees. There was definite evidence that *pitting of cherries* is assocd. with low B content in the fruit. K. D. Jacob

Orchard insects of 1938. C. H. Richardson and Harold Gunderson. *Trans. Iowa State Hort. Soc.* **73**, 139–47 (1938); cf. *C. A.* **33**, 4732[1].—Ca arsenate was slightly less effective than Pb arsenate in preventing entries and stings of apples by codling moth. The efficiencies of arsenate sprays were not increased by the use of soybean flour as a sticker and spreader, but the As content of fruit that received such sprays exceeded the legal tolerance and was approx. 3 times that of fruit that received Pb arsenate-lime sprays. The use of soybean flour in arsenical sprays is inadvisable unless the fruit is to be washed for spray-residue removal. K. D. Jacob

The false tiger of pear (Monostira unicostata Mls. Hem. Heter.). J. P. Vidal. *Bull. soc. hist. nat. Afr. nord* **30**, 27–32(1939); *Rev. Applied Entomol.* **27A**, 570.—A spray consisting of 5 lb. of 40% nicotine sulfate, 1 [Brit.] gal. CH_3OH, 10 lb. castile soap and 100 [Brit.] gal. H_2O gave complete mortality of the nymphs of this tingid in Morocco, and did not injure the foliage of pear. The description and bionomic notes of the pest are given. E. J. S.

The peach tree borers of Illinois. S. C. Chandler. *Illinois Natural Hist. Surv. Div. Circ.* **31**, 36 pp.(1939).—The peach borer, *Conopia exitiosa* (Say), was controlled 98% in 13-yr. old trees by application of 2 oz. *p*-$C_6H_4Cl_2$ (I) around the base of the tree, care being taken to allow no direct contact with the tree, and covering the crystals with earth. The most effective times for application coincide with periods when the soil temp. is at least 55°F., the min. for effective volatilization of the compd. Four liquid substitutes, cottonseed-oil emulsion, mineral-oil emulsion and Dendrol, a miscible oil (II), all impregnated with I, and $C_2H_4Cl_2$ emulsion (III) (without I) are as effective under normal treating temps. as I, and appear to be less likely to injure the trees. Dichloroethyl ether was not so satisfactory. In cold soil III is more effective than I. Solns. of I in II and in Niagara Tar Oil gave good control of the lesser peach borer, *Synanthedon pictipes* (G. &

R.), when painted on the injured areas, but the latter is more likely to injure the tree. Adult shot-hole borers, *Scolytus rugulosus* Ratz., were fairly well controlled by the soln. of I in II, but the grubs were not appreciably affected. Treatment with I injures nursery stock. E. J. S.

The tung-oil tree measuring-worm, Buzura suppressaria Guen. (Lepidoptera). Ming-Tsang Cheo, Chi-Ying Liu and Tung-Lwen Ma. *Chedah Agr. Quart.* **1**, 137–205 (1937)(English summary); *Rev. Applied Entomol.* **27A**, 614(1939).—Biol. data are given for this defoliating pest and cultural practices for its control are outlined. Pb arsenate and pyrethrum were effective larvicides, but the latter is too costly to be practical. Edwin J. Seiferle

A new insect pest of chrysanthemum. W. E. H Hodson and S. G. Jary. *Agriculture* (England) **46**, 54–6(1939); *Rev. Applied Entomol.* **27A**, 519.—A nicotine-soap wash gave some control of the leaf-mining larvae of the trypetid, *Paroxyna misella* Lw., a new nursery pest in Britain. The insect also caused terminal galls. Biol. observations were made. Edwin J. Seiferle

Diptera as pests of agricultural plants. I. R. Nozu *J. Plant Protection* **26**, 482–91(1939)(in Japanese); *Rev. Applied Entomol.* **27A**, 556.—Spraying with nicotine sulfate killed the larvae of *Chloropisca notata* Mg. in the leaves of rye. Derris was also effective. Biol. observations are given. Edwin J. Seiferle

Injuriousness of the wheat thrips (Haplothrips tritici Kurd.). K. P. Grivanov. *Socialistic Grain Farming* (U. S. S. R.) **1938**, 179–86(in Russian); *Rev. Applied Entomol.* **27A**, 554(1939).—Analysis showed that heavily infested wheat still contained 28% gluten and so was suitable for baking. Data are given on the degree of infestation of the grain and the resultant effect on grain wt. Edwin J. Seiferle

Construction of nests of Atta cephalotes L. and Atta sexdens L. (Hym. Formicidae). Gerold Stahel and D. C. Geijskes. *Rev. Entomol.* **10**, 27–78(1939)(in German).—These leaf-cutting ants are injurious to cultivated plants in Dutch Guiana. A detailed study was made of their nests as a basis for control. CS_2, poured into the nests through the entrance and the latter then stoppered with earth, gives good control of *A. cephalotes* but is less satisfactory against *A. sexdens*. Edwin J. Seiferle

The occurrence of the fir needle aphid in the municipal forests of Zofingen. Siebenmann. *Schweiz. Z. Forstw.* 90, 190–2(1939); *Rev. Applied Entomol.* **27A**, 517.—*Chermes nordmannianae* Eckstein was well controlled on silver fir when dusted with a com. insecticide during the period (September) when it has no wax coating. Winter spraying with a tar distillate or an oil emulsion was also effective. Forestral practice is outlined. E. J. S.

Pests of cocoa in the territory of New Guinea. J. L. Froggatt. *New Guinea Agr. Gaz.* **4**, 66–8(1938); *Rev. Applied Entomol.* **27A**, 544.—Larvae of the cerambycids, *Dictamnus*, can be destroyed by introducing small quantities of *p*-$C_6H_4Cl_2$ into their mines. A 5% soln. of *p*-$C_6H_4Cl_2$ in kerosene killed the termites, *Calotermes papua* Desn., when poured into their workings. Other pests are enumerated. Edwin J. Seiferle

Great outbreak of the winged locust, Eirenephilus longipennis Shiraki in 1938 in the province of Tokati, and the actual results of its extermination. S. Kuwayama and K. Osima. *Oyo Kontyû* **1**, 251–68(1939); *Rev. Applied Entomol.* **27A**, 618(1939).—Petroleum oil as a spray gave 90% mortality of this and other acridians, but was not so effective as a dild. emulsion. A spray contg. 3 lb. pyrethrum, 2 lb. soap and 48 gal. H_2O gave 36% mortality and paralyzed many more hoppers. Biol. and ecological information are given. Edwin J. Seiferle

Proposed standard method for testing fungicides. R. R. L. Fernbach, Nicholas D. Duffett and Clarence L. Weirich. *J. Bact.* **39**, 8(1940).—The method differs from the Federal Food and Drug Administration phenol coeff. technique in method of prepn. of the inoculum. *Tricophyton roseceum* is grown in Petri dishes on Sabouraud A agar, the whole culture transferred to a flask and shaken with glass beads and saline, filtered through cheesecloth, the spores are washed with saline and made up to contain 10,000 spores per cu. mm. John T. Myers

Biological technique for the evaluation of fungicides. A. E. Muskett. *Agr. Progress* **16**, 212–17(1939).—A lab. method for detg. the efficiencies of fungicides in controlling *Helminthosporium avenae* Eid. in seed oats is described. Select at random a sample of 500 seed oats from an infected bulk sample that has been treated with fungicide and arrange the grains equidistantly in 9-cm. Petri dishes (15 grains per dish) the bottoms of which are lined with 2 moist filter papers per dish. Pack the closed dishes in an open container, cover with a damp cloth and place the container in an incubator at 22°. After 4 days take the dishes out of the container, remove the lids and expose the seeds to light from a Hanovia quartz Hg-vapor lamp, operating at a distance of approx. 30 cm., to stimulate sporulation of the fungus. Return the dishes to the incubator as before and on the 9th day examine the seeds for the presence of *Helminthosporium* in an actively sporing state. In detg. the results only those seeds which show the presence of spores produced *in situ* upon conidiophores are counted as infected or improperly disinfected. The results obtained by this test agree very closely with those from pot and field tests. If in a control sample showing approx. 50% of infected grains, the test reveals the presence of 5% or more infected grains, the fungicide is likely to be of little value and is rejected for further testing. Should the percentage fall between 0 and 5 a re-test is made and the sample is rejected after this 2nd test if the infection is greater than 1%. When the infection falls between 0 and 1% the sample is subjected to pot and field tests. K. D. Jacob

Wood ash as a repellent against insect pests. T. Moriyama. *Formosan Agr. Rev.* **35**, 500–4(1939)(in Japanese); *Rev. Applied Entomol.* **27A**, 618(1939).—In lab. expts. *Ceratia* (*Rhaphidopalpa*) *similis*, a pest of cucurbits, did not feed on cucumber leaves dusted with ash, but accepted leaves wet with water filtered from the ash which had been steeped in it. M. concludes that the repellent action of the dry ash is due, therefore, to phys. causes. Edwin J. Seiferle

Distribution of nicotine between water and petroleum oils. L. B. Norton. *Ind. Eng. Chem.* **32**, 241–4(1940).—The distribution ratio of nicotine between H_2O and petroleum oils is 1.11:1 at concns. below 1%; it increases with increase in concn. to > 6:1 at 50–70% nicotine and then decreases at higher concns. An excess of acid drives the nicotine completely into the H_2O phase while smaller amts. hold equiv. amts. of nicotine in the H_2O. Alkalies in concns. above 0.1 *N* drive the nicotine into the oil phase and soln. in the oil is complete with 5 *N* NaOH. Only the nicotine in the free state is shared with the oil. Nicotine in spray mixts. is distributed in approx. equal concns. in the oil and H_2O regardless of the concn. of the nicotine and of the presence of fungicides or emulsifiers. Transfer of some of the nicotine from H_2O to oil occurs as the spray dries on foliage. John O. Hardesty

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Results of seven years' operation of Soest sewage-treatment plant (Blunk) **14**. Phosphate in Utah (Williams) **8**. Dispensing container [for insecticides] (U. S. pat. 2,180,752) **1**. Trifluoromethyl benzaldehydes [fungicides, insecticides] (U. S. pat. 2,180,772) **10**. Fuel gas from org. substances and wastes [sludge residue used as fertilizer] (Hung. pat. 122,564) **14**. Ethers of hydrogenated phenols [insecticides] (U. S. pat. 2,181,100) **13**.

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α-Naphthylacetylamino acids. Otto Isler (to Hoffmann-La Roche Inc.). U. S. 2,179,979, Nov. 14. α-Naphthylacetylglycine, m. 153–4°, is formed by treating α-naphthylacetyl chloride with glycocoll. It forms water-sol. alkali salts. Production of α-naphthylacetyl-*l*-leucine, m. 146–7°, and of α-naphthylacetylsarcosine, m. 147–8°, also is described. These compds. may be used for *promoting the growth of plants* and as dissolving agents. 4

Insecticide. Alexander Wacker, Ges. für elektrochem. Ind. G. m. b. H. Fr. 840,969, May 8, 1939. An insecticide contg. finely divided Cu oxychloride 10–20 parts, S 10–30 parts and other substances capable of increasing the suspension capacity of the insecticide, such as bentonite, 50–60 parts. 5

Insecticide and fungicide. Russell W. Millar and Russell L. Maycock (to Shell Development Co.). Can. 386,197, Jan. 9, 1940. A soln. contg. NH_3 and H_2S is prepd. in a molar ratio between 2.6:1 and 2.7:1, and then satd. with S.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Hydrogen-ion control in brewing. Benno Lowy. *Pacific Chem. Met. Inds.* **4**, No. 1, 7–9(1940).—A review. E. H.

Some researches on Saccharomyces cerevisiae. G. Luchetti and E. Bartolini. *Ann. facoltà agrar. univ. Pisa* [N.S. 3rd.] **2**, 608–18(1939).—The optimum conditions 7
for fermentation of glucose are: acidity (calcd. as H_2SO_4) 0.5%, peptone 0.35%, concn. of the sugar 2–3.5%, P_2O_5 0.03%, temp. about 32°. G. A. Bravo

Bulgaria's typical milk product—joghurt. Janks Antonoff. *Deut. Molkerei-Ztg.* **60**, 1035–6(1939).—Directions are given for the prepn. of joghurt. The pure cultures and the properties of joghurt are discussed. A. L.

Calculation of the initial density of must which has 8
undergone partial alcoholic fermentation to produce a natural sweet wine. Henri Laganne. *Ann. fals.* **32**, 330–4(1939).—Mathematical. A. Papineau-Couture

Composition of the outer coats of barley. Etienne Ivanyi. *Brasseur franç.* **3**, 470–1(1939).—The 3 outer coats of barley can be detd. by treating the grain for 30 min. at 50° with 45% (exactly) H_2SO_4, removing the softened outer coats by means of a hand-operated mech. stirrer, and sepg. them by levigation. The percent- 9
age of the outer coats decreases as the size of the grain increases. In order to evaluate correctly the influence of the outer coats, they should be calcd. to a basis of the same external surface of the grain. A. Papineau-Couture

Distinction between the nitrogenous constituents of barley. Urion and Raux. *Brasseur franç.* **3**, 393–403 (1939).—A crit. study was made of some aspects of **Bishop's method (*C. A.* 22, 3729). The fineness of the** flour considerably influences the degree of extn. of the various nitrogenous fractions; when the degree of extn. reaches a max., microscopic examn. shows that grinding has destroyed all cellular organization, but has left the starch grains intact. For the barley variety that was studied, the limiting values obtained confirmed the principle of the regularity of the nitrogenous compn. and the exptl. results of Bishop. Tests using tannin are not satisfactory owing to the nonspecificity of the reagent. In the analysis of the saline dispersion, it is advisable to use only reagents and operations which, in buffered medium, give reproducible pptns.; this led to elimination of a no. of reagents, and to the retaining of heat, $MgSO_4$ and uranyl acetate. A. Papineau-Couture

Relation between the chemical composition of barley and that of the malt obtained from it. L. R. Bishop. *Brasseur franç.* **3**, 374–7(1939).—Certain regularities have been noted in the chem. compn. of barley. The percentage of each type of protein is related to the total N content, and that of each type of carbohydrates depends on the total carbohydrate content. The proportions of each of the constituents taken individually are varietal characteristics. These regularities persist in the malt and in the wort, so that the compn. of the malt and the wort can be predicted from that of the barley, which permits an easy control of malting conditions and of barley selection. A. Papineau-Couture

Nitrogenous composition of barley and malt and its relation to disintegration. Hermann Fink. *Brasseur franç.* **3**, 377–81(1939).—**The nitrogenous compn. of barley depends on the percentage total N and the variety.**

Increase in total N is accompanied by a decrease in salt-sol. and increase in alc.-sol. N (expressed as percentage of total N); the glutelin content remains substantially const. for a given variety and shows little if any variation between varieties. Lab.-scale malting tests showed that a barley with high salt-sol. N content, when malted by a definite method, always gives a malt with high salt-sol. N content; and a malt with high salt-sol. N content gives a wort high in N (calcd. on the N content of the malt). It follows that the solubilization value of malt depends directly on the nitrogenous compn. of the barley, and hence on the total N content and variety. A. P.-C. 1 2

Mutual relation of albumin and starch contents in malting barleys. C. Krügel, C. Dreyspring and F. Heinrich. *Superphosphate* **12**, 177–83(1939); cf. *C. A.* **25**, 5493; **27**, 1439.—The proportion of albumin and starch changes not only with the different varieties in the same exptl. yr., but also with the same variety in different yrs.; a decrease in the albumin content is invariably accompanied by an increase in the starch content and vice versa. Both albumin and starch are in mutual relationship in the barley grain, but the proportion is not rigid. These results are not contradictory to those obtained by Wimmer and Lüdecke (*Landw. Vers.-Sta.* **125**, 129–60(1936)). K. D. Jacob 3

Yield differences and viscosity as criteria of malt disintegration. Paul Kolbach. *Brasseur franç.* **3**, 355–8 (1939).—A general discussion. A. Papineau-Couture 4

Can the malting process be recognized by analysis of the malt? Eugène Ketelbant. *Brasseur franç.* **3**, 359–63(1939).—From a general discussion of the problem, it is concluded that there are too many factors involved to give certainty on the basis of the analytical results. A. Papineau-Couture

Relations between malting conditions and malt quality. B. D. Hartong. *Brasseur franç.* **3**, 341–4(1939).—A general discussion. A. Papineau-Couture 5

Malt analysis and the information it can give regarding the quality of malt. Curt Enders. *Brasseur franç.* **3**, 352–5(1939); *Brewers Digest* **15**, No. 2, 21–4T(1940).—A general discussion. A. Papineau-Couture

Malt analysis. A. Popp. *Brasseur franç.* **3**, 467–8 (1939).—A brief discussion of the ordinary so-called "com." analysis of malt, outlining the significance and interpretation of the chief detns. A. Papineau-Couture 6

Relation between the qualities of malt and of beer. F. Tombeur and J. de Clerk. *Brasseur franç.* **3**, 444–8 (1939).—From a discussion of published work and from tests carried out on 22 brews of Pilsen beer, it is concluded that, as a rule, well-disintegrated malts obtained from the best barleys give the best beers, but there are numerous exceptions. A. Papineau-Couture 7

Correction of water for the brewery. Robert van Dacle. *Fermentatio* **1939**, 337–51.—An address briefly reviewing the properties of the constituents of natural water from the standpoint of the brewing industry, the chief processes of water treatment and their relative suitability for brewery waters. A. Papineau-Couture

Influence of malt quality on the technology of beer making. H. Lüers. *Brasseur franç.* **3**, 423–7(1939).—A discussion and review with 71 references. A. P.-C. 8

Air and beer. R. de Smedt. *Fermentatio* **1939**, 355–61, 371–86.—A review of the action of air on the following factors: turbidity due to yeasts and to oxidation, foam, bitterness, color, "sunlight" taste, "pasteurized" taste. A. Papineau-Couture

The factors which govern the characteristics of beers. J. Raux. *Brasseur franç.* **3**, 320–4(1939).—An address. A. Papineau-Couture 9

The "volutin" of yeast. P. Biebuyck. *Fermentatio* **1940**, 3–13.—"Volutin" consists of granular formations in the yeast, which serve as reserve material and which can be colored by various dyes, particularly methylene blue. There is no direct relationship between the volutin content of yeast, on the one hand, and its fermenting power or protein content, on the other. Volutin disappears during the storing of yeast; most rapidly if it is kept under water, less rapidly if kept dry, and least rapidly when kept under a nutritive medium (suitably beer). Volutin increases considerably during fermentation, provided the fermenting medium contains the necessary nutritive elements, especially P; the denser the wort, the higher the volutin content. Dil. H_2SO_4 and alk. earth bicarbonates exert an adverse influence on the formation of volutin. A. Papineau-Couture

Chemistry and bromatology of mangarito and mandioquinha (Fonseca Monteiro, Abrantes Bueno) **11D.**

Doemens, A., Heller, H., and Barth, F.: Deutscher Brauerkalender. 1939–40. Nuremberg: F. Carl. $2.

Mariller, Chas., and Grosfilley, J.: Le contrôle chimique en distillerie. Paris: Dunod et Cie. 347 pp. Fr. 95. Reviewed in *Chimie & industrie* **42**, 707(1939); *Ind. Eng. Chem., News Ed.* **17**, 718.

Owen, Wm. L.: Blackstrap Molasses as Raw Material for Biochemical Industries. Hoboken: Russel' Palmer. 113 pp. $3.50.

Transformation of lactose of whey into ethyl alcohol. Willm Kauffmann. Fr. 840,863, May 5, 1939. A pure culture of a lactic enzyme is added to whey, and in 3 days 70% of the lactose is transformed into ethanol. The pure culture is taken from substances contg. lactic enzymes such as cheese.

Denatured alcohol. Louis J. Figg, Jr. (to Eastman Kodak Co.). U. S. 2,179,997, Nov. 14. Ethylenediamine about 0.5–5% is used as a denaturant. U. S. 2,179,998 relates to the use of quinoline and U. S. 2,179,999 to the use of tetrahydrofurfuryl alc. for denaturing alc. Cf. *C. A.* **33**, 7956[2]. U. S. 2,180,000 (Louis J. Figg, Jr., and James W. Rhea, joint inventors; to same assignee) relates to denaturing alc. with use of acetal, dimethylacetal, etc. Cf. *C. A.* **34**, 1126[5].

Artificial maturing of alcoholic liquors. Lucius F. Little. U. S. 2,180,685, Nov. 21. A liquor such as new whiskey, in contact with charred wood, is subjected to the action of infrared rays (suitably for 48–170 hrs. and at a temp. of about 45–65°). App. is described.

Purifying neutral oils derived from distillation of hard wood. Louis J. Figg, Jr. (to Eastman Kodak Co.). U. S. 2,180,001, Nov. 14. A purified product suitable for use in *denaturing alc.* is obtained from "neutral" oils by extg. impurities from them with ethylenediamine, distg. the oil through steel wool and washing out the residual ethylene diamine, as by use of a 1% soln. of H_2SO_4 and of water.

Liquid-treating apparatus suitable for cooling wort and treating it with conditioned air, etc. Harry G. Mojonnier (to Mojonnier Bros. Co.). U. S. 2,179,949, Nov. 14. Various structural and operative details.

Beer substitute. Georg Roeder. Fr. 841,151, May 10, 1939. A feebly alc. beverage, rich in nutritive elements, is obtained by mixing whey with malt and subjecting the mash to the usual treatments of brewing. Prior to the operation, the whey is freed from albumin by heating and adjusted to a degree of acidity favorable to diastatic action.

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Odoriferous principle of green tea. XI. Primary alcohols from the oil of black tea. Sankiti Takei, Yzaïro Sakato and Minoru Ono. *Bull. Inst. Phys. Chem. Research* (Tokyo) **17**, 871–9(1938); cf. *C. A.* **32**, 7663[4].—

The oil of black tea contains 10% of alcs., sepd. by fractionation, or conversion into urethans or esters, into BuOH and *iso*-BuOH, *iso*-AmOH, 3-methylbutanol, hexyl alc., 2-hexen-1-ol, octyl alc., benzyl alc., phenethyl alc. and geraniol. B. C. P. A.

Influence of the pH on the stability of solutions of calcium gluconate used in therapy. Emilio Durio. *Ann. chim. applicata* **29**, 463–6(1939).—The stability over a period of 2 yrs. of Ca gluconate in solns. of pH 6.8–7.8 was investigated, a total of 1000 vials being held for examn. Of the samples with pH 7.6 and 7.8, only 0.8 and 0.1% of the vials, resp., showed any pptn. of Ca gluconate. The pH was adjusted by addns. of pure NaOH. A. W. Contieri

An x-ray study of acetylsalicylic acid when incorporated in certain sugars. Ronald L. McFarlan and J. Wallace Reddie. *J. Applied Phys.* **11**, 80–2(1940); cf. U. S. pat. 2,086,386 (*C. A.* **31**, 5949[4]); *C. A.* **32**, 7665[3].— Aspirin (I) was mixed with a sucrose and glucose sirup at 121° and held at this temp. until all visible traces of I disappeared. Debye-Scherrer powder patterns were made of all samples, which were also analyzed for recoverable I by the official A. O. A. C. method. Below a concn. of 0.7% of I the x-ray method cannot detect the presence of cryst. I. Neither does it show whether or not small fractions of I at any of the concns. studied are in any other than the cryst. state. In the samples where I was added at 121° there is no x-ray evidence of cryst. I in excess of 0.7%. The change in the diffuse pattern of the sugar bases on addn. of I also indicates a change from the cryst. to the amorphous state for at least some of the I incorporated at 121°. S. L. Gerhard

Some synthetic pyridine derivatives of therapeutic value, and the preparation of an iodized derivative. Gualtiero Seppi. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., 1939, 7–14.—Diiodoisopropanol, $(CH_2I)_2CHOH$, heated with pyridine at 120° gave the pyridinium deriv. $[C_5H_5N(I)CH_2]_2CHOH$, needle crystals from alc. m. 216–217°, very sol. in water, insol. in Et_2O, Me_2CO and $CHCl_3$. Other pyridine derivs. of possible pharmaceutical interest are discussed. L. E. Gilson

Arsenic derivatives of thymol and carvacrol and the antihelmintic action of arsenic derivatives of thymol. Mario Filomeni. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., 1939, 21–31.—Substitution of Cl, Br or I in the *p*-position with respect to the OH slightly increased the vermicidal power of thymol. Substitution of the arsonic acid group, $—AsO_3H_2$, in the same position completely abolished the vermidical activity, and the subsequent further substitution of Br or I in the position between the OH and Me groups did not restore any of the activity. The prepn. of the above bromothymolarsonic acid and also 5-carvacrolarsonic acid and the reduction of the latter to 5-carvacrolarsenoxide are described. L. E. Gilson

Cosmetics for the eyes. H. Janistyn. *Seifensieder-Ztg.* **66**, 678–9, 728–9, 783–4, 823, 853(1939); **67**, 5, 35 (1940).—Recipes are given for prepns. for use around the eye, on lids, brows, pupils, lashes, and eyebrow pencils and lotions. A. Guillaudeu

New violet perfumes. H. Janistyn. *Seifensieder-Ztg.* **67**, 16, 25–6(1940).—Synthetic violet perfumes based on the ionones were improved by adding violet-leaf oil. Nonadien-2,6-al-1 has been recognized in this oil. Leaf alcohol (hexen-3-ol-1) is the carrier of the "green odor" of grasses, leaves, etc. The trans form carries the odor. The cis form does not have this odor. Leaf aldehyde obtainable by oxidation of the alc. with chromic acid, has been recognized in the following green plants: tea, ivy, "Fallnetz," clover, oak, beech, wheat, robinia, mulberry, black radish, violet leaves, cucumbers. Ethereal oil of cucumber consists largely of nonadienol with some nonadienal. Esters of hexenol occur in peppermint oil. Nonadienol and nonadienal are now produced synthetically in Germany. The alc. in amts. of 0.05–5.00% is a valuable addn. to many perfumes. The aldehyde has a very strong odor resembling fresh cucumbers. It may be used in very small proportions. A. Guillaudeu

Alginic acid and its use in pharmacy. A. P. Tatarov. *Farmatsiya* **1938**, No. 4, 11–13; *Khim. Referat. Zhur.* **2**, No. 4, 122(1939).—Alginic acid was obtained from *Laminaria saccharina* (33% of dry wt.). The plant was treated with water, 0.5% HCl soln., 0.5% Na_2CO_3 soln. at 70° and again with HCl. The pure alginic acid (which was in the form of a gelatinous mass) was washed and dried. W. R. Henn

Chemical composition of essential oil of the hybrid of peppermint No. 272. N. I. Libizov. *Farmatsiya* **1938**, No. 6, 28–31; *Khim. Referat. Zhur.* **2**, No. 4, 122(1939); cf. *C. A.* **34**, 1129[6].—The morphological hybrid differs little from the ordinary peppermint. It is little affected by rust (Uredinales); the yield of essential oil is 22.1 kg. per hectare. The essential oil contains menthol 58.83, menthone 6.17, menthyl propionate 7.07, dihydrocarvone 8, *l*-limonene 3 and α-pinene 0.4%. W. R. Henn

The new pharmaceutical agents of 1938. Kurt Handke. *Chem. Ztg.* **63**, 729–32, 740–1(1939); cf. *C. A.* **33**, 9543[3]. E. H.

Cosmetics—a fertile field for chemical research. Florence E. Wall. *J. Chem. Education* **17**, 77 81(1940). E. H.

Fermentation experiments in various tobaccos. I. Mihailovici and I. Trafiuc. *Bul. cultivarii fermentarii Tutunului* **28**, 298 326(in French, 327 9)(1939).—The optimum fermentation conditions (size of fermentation lots, initial humidity) of 4 Rumanian tobacco varieties and various grades were detd. in a series of parallel expts. A. H. Krappe

Extract of the spiny fern. J. Maizite. *Acta Univ. Latviensis, Kim. Fakultat. Ser.* **4**, No. 14(in Lettish, 503–26; in German, 527–8)(1939); cf. *C. A.* **32**, 7213[3].—The rhizomes of 45 samples of *Aspidium dilatatum* collected from different regions of Latvia, contained an av. of 10.15% ext., the av. content of crude filicinic acid in the ext. was 35.12%; the biol. evaluation (quantity to kill small fish in 30 min.) indicates 0.0186 g. In garden plots the ext. reached 12.9% in June, 14% in July and fluctuated from 10.7 to 8.9% during the remaining months, reaching a min. in Oct. Because the rhizomes in southern Germany contained small quantities of filicinic acid, it is apparent that the *Aspidium dilatatum* grown in northern regions is more active than plants grown further to the south. The quantity of ext. produced by *Aspidium dilatatum* fluctuated more than the quantity produced by *Aspidium euspinulosum*. The crude filicinic acid contained quantities of aspidin, albaspidin and aspidinin, traces of flavaspidic acid, and traces of a white substance, "nephrodin," m. at 188–9° and turning red. F. M.

Investigations of medicinal plants. Ilse Esdorn. *Ber. deut. botan. Ges.* **57**, 166–75(1939).—A review of recent German work. Ten references. Lawrence P. Miller

The use of hemolytic complement as a means of measuring the toxicity of antiseptics. Henry Welch, C. M. Brewer and A. C. Hunter. *J. Bact.* **39**, 7–8(1940).—Complement acts as a biocatalyst or activator. By adding appropriate dilns. of germicides to a mixt. of whole blood and artificially opsonized staphylococci, "toxic end points" were obtained at dilns. completely inhibiting phagocytosis. Hemolytic complement resisted greater concns. of germicides than did phagocytic complement; hence the 2 were evidently different. John T. Myers

Evaluation of a number of medicinal dyes by the tissue culture technique. I. L. Schechmeister and A. J. Salle. *J. Bact.* **39**, 8–9(1940).—The medicinal dyes including crystal violet, methyl violet, methyl violet B, methyl violet 6B, brilliant green, methylene blue, proflavine, acriflavine, parafuchsin and neutral fuchsin had pronounced bacteriostatic but poor germicidal power. They were more toxic to embryonic tissue than were the better nondye germicides. John T. Myers

Erythrina alkaloids. V. Comparative curare-like potencies of species of the genus Erythrina. Karl Folkers and Klaus Unna. *J. Am. Pharm. Assoc.* **28**, 1019–28 (1939); cf. *C. A.* **33**, 5404[6].—Data are presented which show the presence of alkaloids with a curare-like action in 28 addnl. species of *Erythrina*. Altogether, 50 species were tested out of the 105 species known to date. The

pharmacol. activity is expressed by "paralysis potency values." No species has been found so far which is devoid of alkaloids of paralyzing activity, although there is a wide variation in the potencies of the seeds of the different species. There is, however, a considerable uniformity of the paralysis potency values of seeds of the closely related species. This uniformity often extends even to certain taxonomical divisions of the genus. The paralysis potency values for seeds of *Erythrina* parallel closely the inherent botanical characters of the plants, and it is possible in some cases when proper herbarium material is absent to distinguish between certain seeds on the basis of this assay. Species of the genera *Rhynchosia*, *Canavalia*, *Clitoria* and *Mucuna* were tested similarly for paralysis potency. All were found to be devoid of alkaloids with the exception of the seeds of *R. pyramidalis* and *Clitoria arborescens*. These were found to possess some curare-like activity which, compared to that of *Erythrina* seeds, was extremely weak and probably represented only traces of active alkaloids. The curare-like action of the exts. of all species of *Erythrina* tested in frogs was of short duration when compared to the duration of paralysis of exts. of curare or curare plants.

A. Papineau-Couture

Chemical investigation of some Florida volatile oils. P. A. Foote and A. W. Matthews. *J. Am. Pharm. Assoc.* 28, 1030–2(1939).—Greenish yellow, mint-flavored oil of *Pycnothymus rigidus* Bart. fam. Lamiaceae had the following characteristics: d_{15}^{20} 0.9323, α_D −4.14°, n_D^{20} 1.4681, acid value 1.75, ester value 135.51, ester value after acetylation 272.17, boiling range 160–220° (greater portion distg. 214–15°). The oil seems to contain pulegone and about 47% of thujyl alc. (nearly all in the free state). Tests for N, S, phenols and aldehydes were neg. Oil of *Solidago rigida* Linné, fam. Compositae had the following characteristics: d_{15}^{20} 0.8500, α_D 38.15°, n_D^{20} 1.4798, acid value 0.39, ester value 8.68, ester value after acetylation 160.15. The main bulk of the oil distd. over at 165°. Tests for N, S, phenols and ketones were neg. The oil probably contains some borneol and also some other alc. or alcs. Presence of α-pinene in the terpene fraction was indicated but not definitely established. Oil of *Erigeron canadensis* Linné, fam. Compositae (showing distinct evidence of resinification) had the following characteristics: d_{15}^{20} 0.8642, α_D 71.70°, n_D^{20} 1.4809, acid value 1.94, ester value 17.12, ester value after acetylation (Boulez's method, *C. A.* 1, 1412) 7505. Less than 20% distd. over at about 145°, about 60% passed over in the region of 170°, leaving a dark brown residue of higher boiling material. Tests for N, S and phenols were neg. A pos. aldehyde reaction was obtained, but the amt. present seems to be very small. The ester value after acetylation by Boulez's method corresponds to 16.82% terpineol. The fraction b. 170.5° probably contains α-limonene. Oil of *Heterotheca subaxilliaris* Lam., fam. Carduaceae had the following characteristics: d_{15}^{20} 0.8877, n_D^{20} 1.4931, acid value 0.48, ester value 26.13, ester value after acetylation 160.91, boiling point (micro method) about 200°. Tests for N and S were neg. The ester values correspond to 9.15% combined and 42.28% free $C_{10}H_{18}O$.

A. Papineau-Couture

Chemotherapeutic studies in the azobenzenesulfonchloroamide series. II. *m*- and *p*-Derivatives. Seymour Stern and Abraham Taub. *J. Am. Pharm. Assoc.* 28, 1032–6(1939).—*Azobenzene-m-sulfonamide*, *m*-$C_6H_5N{:}NC_6H_4SO_2NH_2$, a new intermediate, was synthesized by heating a mixt. of 11 g. *m*-aminobenzenesulfonamide in 46 cc. glacial AcOH and 6.8 g. nitrosobenzene in 40 cc. glacial AcOH at 80–90° for 2 hrs., cooling, pouring on 1 kg. of chipped ice, washing the ppt. with water, refluxing the ppt. 1 hr. in 640 cc. 0.1 *N* NaOH in presence of activated charcoal, filtering, acidifying the hot filtrate with 0.5 *N* HCl, washing the ppt. till free from chlorides, drying (yield 12 g.), recrystg. from 110 cc. of hot 80% MeOH and air-drying, giving a yield of 8.1 g. of black crystals, m. 168–9°, sol. in EtOH, MeOH, Me_2CO, C_5H_5N, hot alkali; insol. in H_2O, C_6H_6, Et_2O, EtOAc or HCl. *Na azobenzene-m-sulfonchloroamide* (I), $C_6H_5N{:}NC_6H_4SO_2N$-$NaCl.2H_2O$, was prepd. by adding 82.8 cc. NaOCl (contg. 0.2899 g. NaOCl per cc. and 2% NaOH) with const. stirring to a mixt. of 5.2 g. azobenzene-*m*-sulfonamide and 50 cc. H_2O over a period of 45 min., heating to 75–80°, cooling rapidly with continuous stirring for 1 hr., washing the ppt. with water, drying (yield 5.3 g.), and purifying by dissolving in 240 cc. of water at 90° contg. 3.24 g. NaOH, 4.3 g. NaCl and 24 cc. NaOCl soln., filtering, cooling, washing the ppt. with water and drying, giving a yellowish orange, amorphous powder, insol. in C_6H_6, CCl_4 and anhyd. Et_2O, sol. in hot H_2O, hot abs. alc., C_5H_5N and Me_2CO. *Azobenzene-p-sulfonyl chloride* was prepd and converted into the corresponding sulfonamide (m. 228–9°) by the method of Gray, *et al.* (*C. A.* 31, 6347[5]), and transformed to *Na azobenzene-p-sulfonchloroamide* (II) by the method of Chrzaszczweska and Dobrowolski (*C. A.* 32, 1674[8]). An attempt to produce *K azobenzene-3,3′-disulfonate* by the method of reduction of Mahrenholtz and Gilbert (*Ann.* 202, 331–40(1880)) yielded K azoxybenzene-3,3′-disulfonate. To prep. the corresponding azobenzene deriv. and avoid the azoxy stage, it is necessary to carry the reduction far enough to produce a colorless reaction mixt. and convert the probable hydrazo compd. so produced to the azo stage by spontaneous air oxidation, which method (technique described in detail) has the advantage of being rapid. *Disodium azobenzene-3,3′-di(sulfonchloroamide)* (III) was prepd. by adding to a well-stirred mixt. of 6.8 g. of azobenzene-3,3′-disulfonamide and 50 cc. of water, 100.5 cc. NaOCl soln. (contg. 0.04443 g. NaOCl per cc. and 5% free NaOH) over a period of 45 min., stirring for 1 hr., washing the insol. material with water, drying (yield 9.1 g.) and purifying by dissolving in a hot soln. contg. 4.8 g. NaOH, 4.8 g. NaCl, 310 cc. H_2O and 50 cc. of NaOCl soln., filtering, adding 150 cc. satd. NaCl soln., cooling, washing the sepd. amorphous material with H_2O, and drying; this yields a product insol. in abs. alc., CCl_4, C_6H_6, dry Et_2O and Me_2CO, sol. in hot water, slightly sol. in hot C_5H_5N. *Disodium azobenzene-4,4′-di(sulfonchloroamide)* (IV) was prepared by adding to 6.8 g. of azobenzene-4,4′-disulfonamide in 50 cc. of water 82.8 cc. NaOCl soln. (contg. 0.05398 g. NaOCl per cc. and 4% free NaOH) with stirring over a period of 45 min., heating to 65°, filtering out the impurities, chilling, stirring 1 hr., satg. with 53.8 g. NaCl, filtering and washing with water, and drying (yield 9.0 g. of orange-red material). It was purified by dissolving in 102 cc. of water at 80° contg. 3.6 g. NaOH and 48 cc. of the NaOCl soln., filtering, adding 450 cc. satd. NaCl soln., heating to 80°, adding 30 g. NaCl, chilling to 25°, washing the ppt. with water, and air-drying, yielding an orange powder, insol. in CCl_4, C_6H_6, Et_2O and Me_2CO, slightly sol. in hot abs. alc. or C_5H_5N, and very sol. in H_2O. Preliminary bacteriol. tests carried out at room temp. against *Staphylococcus aureus* for 5 min. and 2 hr., resp., indicated the following order of activity: chloramine-T 1.0, I 0.15, 10; II 10.0, 100; III 0.1, 10; IV 0.1, 10. Results by the agar cup-plate method indicated that I and II are slightly less penetrating than chloramine-T and II and IV are equal to chloramine-T. A. P.-C.

Salts of isopropanolamine. I. Triisopropanolamine. Geo. W. Fiero. *J. Am. Pharm. Assoc.* 28, 1036–8 (1939).—A study of the salts of triisopropanolamine indicated that their properties made them similar and slightly superior to triethanolamine as emulsifying agents for liquids and creams. Creams prepd. with these salts did not discolor with age to the extent found with triethanolamine creams. **II. Mixed isopropanolamines.** *Ibid.* 1038–40.—A mixt. of 43% di-, 43% tri- and 14% mono-isopropanolamines possessed greater emulsifying power either for pharmaceutical emulsions or cosmetics than triisopropanolamine or triethanolamine. Unlike the latter, it appears that the myristates of isopropanolamines are superior to the laurates as emulsifying agents and possess lower surface tension. Salts of mixed isopropanolamines were softer than either those of triisopropanolamine or triethanolamine and were lighter colored than the latter. Creams contg. mixed isopropanolamines did not become colored on aging to the extent found in triethanolamine creams. A. Papineau-Couture

Water-in-oil emulsifying agents. I. Some constituents of lanolin and similar compounds. J. L. Powers, H. B. Leask and R. S. Warner. *J. Am. Pharm. Assoc.* **29**, 14–17(1940).—The unsaponifiable fraction of lanolin was sepd. into 4 fractions: (1) mixed aliphatic alcs., (2) isocholesterol, (3) cholesterol, (4) an amorphous gummy residue. The relative efficiencies of certain components of lanolin and some analogous compds. as water-in-oil emulsifying agents with petrolatum were detd. The emulsifying efficiency of cholesterol is much less than that of mixts. of cholesterol and cholesterol esters when used with petrolatum for emulsifying water. No one combination of petrolatum and water-in-oil emulsifying agent as a suitable ointment base can be recommended until after further study. A. Papineau-Couture

Hydrogenated oil as an ointment base. II. Geo. W. Fiero. *J. Am. Pharm. Assoc.* **29**, 18–23(1940); cf. *C. A.* **25**, 5737; **34**, 221[6].—Stability to rancidity, consistency and water retention of com. hydrogenated vegetable oils were studied to det. their suitability for ointments; none of the hydrogenated vegetable oils developed more than a trace of rancidity when kept at body temp. in the dark in unstoppered glass tubes, but lard and partially hydrogenated lard became distinctly rancid under the same conditions. In sunlight all the partially hydrogenated oils (I value over 50) developed rancidity to some degree, but less rapidly than lard; hard hydrogenated oils (I value less than 10) did not develop rancidity as rapidly as partially hydrogenated oils. Hydrogenated oils of different manufacturers did not deteriorate exactly in proportion with the I value, but hydrogenated cottonseed oils of various I values prepd. from the same batch of oil deteriorated in relationship to the I value. Of all the com. partially hydrogenated oils, sesame oil was superior from the stand point of rancidity; samples of the same batch of oil hydrogenated to various degrees indicated that it was much more stable than hydrogenated cottonseed oil of the same I value. Two pieces of *app. for dctg. the relative consistency of fats* are described. In the main, the consistency varied with the softening point. The softening point of the same kind of oil from different manufacturers did not vary with the I values, probably owing to the differences in hydrogenating temps., differences in original oils, etc. The data on water retention showed lack of uniformity with samples of different manufacturers; none retained as much water as hard hydrogenated castor oil with the exception of coconut oil contg. lecithin, which retained about 5 times as much as other coconut oils without lecithin. With the exception of partially hydrogenated lard, none of the partially hydrogenated oils retained as much water as partially hydrogenated castor oil. A. Papineau-Couture

Liquor antisepticus N. F. VI. C. O. Beebe, L. W. Busse and A. H. Uhl. *J. Am. Pharm. Assoc.* **29**, 24–6 (1940).—N. F. antisepticus solution (I), before purified talc is used to clarify the product, is a cloudy, milky appearing soln.; the deletion of any one ingredient has little beneficial effect. Boric acid exhibits no effect on the antiseptic value (PhOH coeff.) of I. A higher PhOH coeff. will result upon the reduction of the amts. of volatile oils used in the prepn. of I. If a soln. is to be prepd. which will remain clear at ordinary temps. without clarification, only certain amts. of the ingredients in I can be used. When decreased amts. of the ingredients in I are used, provided the chlorothymol is not less than 0.5 g. per l., the antiseptic value is equal to that of the present official soln. The following formula is offered for criticism: H_3BO_3 25 g., chlorothymol 0.7 g., menthol 0.15 g., methyl salicylate 0.15 g., eucalyptol 0.15 g., oil of thyme 0.05 cc., alc. 300 cc., distd. water to 1000 cc. A. P.-C.

Assay of sarsaparilla preparations. Preliminary report. B. Fantus and H. A. Dyniewicz. *J. Am. Pharm. Assoc.* **29**, 26–8(1940).—If saponin increases the absorption of drugs, sarsaparilla may be more than a mere flavoring vehicle and should be assayed for its saponin content. The hemolysis method seems to give satisfactory results; but if accepted as assay method for the official prepns., further experimentation will be required to standardize it. Results are reported giving the relative values of a no. of [illegible] and also fluidexts. and syrups of sarsaparilla. The "hemolytic index" showed that the variability of the [illegible] products on the market is so great that if the medici[illegible] and effect of the prepns. depended upon it, physicians might easily lose confidence in them. A. Papineau-Couture

A monograph for Ringer's solution as a solvent. Norman Pinschmidt and John C. Krantz, Jr. *J. Am. Pharm. Assoc.* **29**, 28–30(1940).—A formula and monograph for a physiol. salt soln. as a solvent for parenteral use are proposed for the National Formulary. A. P.-C.

Review of tentative changes in the ampoule monographs of the National Formulary. R. K. Snyder and E. N. Gathercoal. *J. Am. Pharm. Assoc.* **29**, 30-3(1940). A. Papineau-Couture

Decomposition rate of ethyl nitrite in brown mixture, U. S. P. Edward Greenfield and H. Walter Kuhl. *J. Am. Pharm. Assoc.* **29**, 35(1940).—The decompn. rate of $EtNO_2$ in brown mixt., U. S. P., is so rapid and extensive as to render it valueless in the latter prepn. A. P.-C.

Dry Moroccan roses. G. Igolen. *Parf. France rev. marques* **17**, 175–6(1939).—Steam distn. of dry Moroccan roses gave a 0.03% yield of a green essential oil, solid at ordinary temp. and having the following consts.: d_{15} 0.8628, α_D 0°, n_D^{45} 1.4627, f. p. 27°, m. p. 28.7°, acid value 19.6, ester value 35.07, ester value after formylation 68.74, rhodinol 19.80%. On being treated with petr. ether (b. 62–70°) the oil yielded a very dark green, semisolid concrete with acid value 18.2, ester value 64.4, m. p. (Pohl) 46–7°. Treatment of the concrete by the usual method gave a viscous, very green absolute with acid value 28, ester value 70. Steam distn. at atm. pressure of 3 kg. of the solid oil, with cohobation for 4 days, yielded 31.5 g. (1.05%) of green essential oil, having the following characteristics: d_{15} 0.8666, α_D^{20} −0°20′, n_D^{20} 1.4637, f. p. 11°, acid value 16.8, ester value 39.2, ester value after acetylation 129.06, ester value after formylation 105.21, rhodinol 30.90%, reduces ammoniacal $AgNO_3$; on oxination, 1 cc. of the oil requires 1.3 cc. 0.5 *N* KOH. The oil contains 26.8% stearoptenes (Gildemeister's method). The following were found in the oil: eugenol, pelargonic and phenylacetic acids, (probably) nonanal, benzaldehyde, geraniol and rhodinol. A. Papineau-Couture

The chemistry of sulfanilamide and sulfapyridine. C. C. Lucas. *Bull. Acad. Med. Toronto* **13**, 103–107 (1940). J. Pinchack

Crystalline zinc insulin with protamine. A preliminary note on a newer insulin modification. Barnett Greenhouse. *Conn. State Med. J.* **4**, 78–82(1940). A newer insulin modification is presented in which the protamine is combined with a soln. of Zn insulin crystals as a base instead of the amorphous insulin with Zn, as in the com. protamine Zn insulin. One cc. of the suitably buffered protamine soln. contg. 2.5 mg. protamine per cc. added to 4 cc. U-50 cryst. Zn insulin yields a U-40 diln. There is 5–10 times less Zn in this prepn. than in com. protamine Zn insulin. The new prepn. is clinically identical with the com. product both in appearance and effect, but is superior to the latter in that it is nonallergic. J. Pinchack

Vitamin cosmetics. M. G. de Navarre. *Progressive Perfumery & Cosmetics* **1937**, 10–11.—A discussion of skin absorption of vitamins, natural *vs.* synthetic vitamins, the skin vitamin (possibly vitamin A or D or a mixt. of both), vitamin-cream formulation, and the use of vitamin F in cosmetics. Leopold Scheflan

The newest stage in liquid shampoos. J. W. Orelup. *Progressive Perfumery & Cosmetics* **1937**, 12–14.—A discussion of the properties important in shampoos and of the new types of shampoo that have been developed by the use of new types of wetting, foaming, detergent and emulsifying agents. Leopold Scheflan

Protection against sunburn. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1938**, 18–20.—The wave lengths of sunlight that are destructive to the skin lie in the region 2920–3200 A. A protective agent should absorb not less than 75% of the rays in this region, should not absorb longer waves, should be stable in sunlight in a thickness of 0.02 mm., and should be nontoxic and physiologically inactive. Various chem. mixts. were tested

with the Orelup radiometer. A mixt. of 0.4% diphenylbutadiene, 0.6% stilbene and 0.45% cinnamic acid gave about 90% absorption for the wave lengths 3500–3400 A. However, it is unstable in sunlight, entirely losing its absorptive power after about 5 min. The skin test must be made in the sun, under the same conditions under which the prepns. are to be used. Leopold Scheflan

Improving the soap shampoo. J. W. Orelup. *Progressive Perfumery & Cosmetics* **1938**, 21–2, 28–9.—Ordinary liquid soap shampoos contain 20–30% soap. The shampoo can be improved greatly by reducing the soap concn. and adding about 5% of the new detergents. While 5% is insufficient to inhibit the formation of Ca and Mg soaps when the shampoo is used with hard water, it will keep them in a colloidal state so that they can be washed out readily. The addn. of the new detergents keeps the stearates and palmitates in soln. The chemistry and production of sulfonated-oil shampoos is discussed briefly. Leopold Scheflan

Establishing the value of sunburn preventive material. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1938**, 26–8.—Detailed description of the use of the Orelup radiometer. Leopold Scheflan

The modern bath oil. J. W. Orelup. *Progressive Perfumery & Cosmetics* **1938**, 34–5.—The use of the newer colloidal detergents, e. g., Intramine C, with sulfonated oil improves the properties and stabilizes the sulfonated oil. Intramine C, which is a good dispersing agent, should be used in the proportion of 2 parts to 3 parts of the sulfonated castor oil. Leopold Scheflan

Formulating sunburn preventive preparations. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1938**, 35–7. Preventives for sunburn usually contain fluorescent substances that convert ultraviolet to visible rays in the violet or blue region. Among suitable fluorescent compds. are esculin, esculetin, umbelliferone, and esters and other substitution products of anthranilic acid. Screening materials that depend mainly on absorption or invisible fluorescence for their protective action include the salicylates, cinnamates and certain fatty oils. Coconut oil absorbs 23% of the ultraviolet spectrum, peanut oil 24, olive oil 23, poppyseed oil 23, cottonseed oil 26, and sesame oil 39%. The inclusion of preservatives and antioxidants prevents oxidation and rancidity. The addn. of a small amt. of cholesterol tends to increase pigmentation and facilitate the tanning of the skin in the sun. Methods of prepn. of such products are described briefly. L. S.

The relationship of the chemistry of perfumes to other branches of the organic chemical industry. S. Isermann. *Progressive Perfumery & Cosmetics* **1938**, 37–8.—A brief survey with particular consideration of benzaldehyde, coumarin, artificial geranium, vanillin and naphthalene. Leopold Scheflan

Factors in sunburn. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1938**, 45–6.—The photodynamic or photosensitizing agents increase the sensitivity of the skin to the action of ultraviolet rays. Examples are hematoporphyrin, certain essential oils (citrus oil, oil of bergamot) and dyes (eosine); these should not be present in prepns. for prevention of sunburn. Emulsifiers contg. soaps made from fixed alkalies tend to increase the erythemal action of the sun, probably owing to hydrolysis in the sunlight with liberation of the alkali. Hence, ordinary vanishing creams contg. K stearate should not be employed; an org. base such as triethanolamine is to be preferred to a fixed alkali for such creams. Leopold Scheflan

The gist of protection against sunburn. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1938**, 51–2.—Violuric acid in very dil. solns. gives only partial protection at 2900 A. By adding dil. solns. of similar compds. having absorption peaks at 3100 and 3200 A., a mixt. is obtained that absorbs the entire hazardous range with the exception of a narrow band at 2900 A., which can be screened out by the addn. of either uric or cinnamic acid. Such screening materials can be incorporated in oils, creams, liquid emulsions, water lotions and alc. lotions. L. S.

The efficacy of vitamin F. Maison G. de Navarre and Richard J. Maicki. *Progressive Perfumery & Cosmetics* **1938**, 58–9.—A discussion of use in cosmetics, unit potency and the 1:1:3 cholesterol-lecithin-vitamin F ratio. Leopold Scheflan

Skin food. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1938**, 59–60, 66–7, 77–8, 84–5, 91–3, 101–2, 108–11.—A discussion of the skin and its constituents, the use of cholesterol, oxycholesterol, ergosterol and other sterols, vitamin D and various bases, the nature and functions of substances that may directly or indirectly affect the skin, the chem. nature of lecithin and water-sol. vitamins B and C and their functions in the body and cosmetic possibilities, the nature and characteristics of proteins, hormones and lipides and their effects on life processes, applications of lipide derivs. including higher alcs. to cosmetics, the transmission of "skin food" into the skin, the process of tissue culture and the significance of the amino acids in cell life. Leopold Scheflan

The fixing of perfumes. S. Isermann. *Progressive Perfumery & Cosmetics* **1938**, 50–1; cf. following abstr.—The fixing of a perfume is mainly a phys. process although chem. reactions are contributing factors. Fixatives are enumerated which (1) are odorless or practically so, (2) have an odor and accentuate the other odors in the mixt. without changing the characteristic of the principal ingredient, (3) have a tendency to develop the bouquet, (4) make it difficult to imitate the mixt. Leopold Scheflan

Fixatives. S. Isermann. *Progressive Perfumery & Cosmetics* **1938**, 68–70, 83–4, 94–5, 103; **1939**, 118, 123–4.—Sp. suggestions are offered as to the fixatives to be used for fixing rose, jasmin, heliotrope, lilac and lily of the valley, carnation, gardenia, narcissus, violet, bouquet-type odors, oriental types, amber types and spicy odors and for the use of fixatives generally, particularly of gums and gum resins; flexibility in fixations, the faculty possessed by some odors of acting as their own fixatives is discussed. Theories of the action of fixatives in cosmetic prepns. are discussed. Leopold Scheflan

The background for the development of American perfume bases and cosmetics. S. Isermann. *Progressive Perfumery & Cosmetics* **1938**, 75–6, 86–7.—A discussion of production and of the status of the U. S. as a source of perfumery raw materials. Leopold Scheflan

Adaptations of the new surface-active materials to cosmetics. J. W. Orelup. *Progressive Perfumery & Cosmetics* **1938**, 78–9.—A review. Leopold Scheflan

The effect of hard water on cosmetics. Benjamin Kapp. *Progressive Perfumery & Cosmetics* **1938**, 107–8.—Water softened by ordinary methods cannot be employed in the prepn. of cosmetics because sol. electrolytes remain which interfere with emulsions. A wetting agent of the Intramine type minimizes the detrimental effect of water hardness as it forms water-sol. Ca and Mg salts, removes deposits of insol. metallic soaps and increases the detergent action, penetration and emulsification properties of the finished product. It is beneficial in various types of cosmetic prepns. Leopold Scheflan

The development of cosmetic creams. I. R. Hollenberg. *Progressive Perfumery & Cosmetics* **1939**, 115–16, 125–6, 139–40.—A survey of the evolution of the manuf. of cosmetic creams from about 150 A. D. to the present. Some theories on emulsions are described as well as methods of identifying the type of emulsion present in a cosmetic prepn. Leopold Scheflan

Molds and bacteria in cosmetics. Benjamin Kapp. *Progressive Perfumery & Cosmetics* **1939**, 116–18.—Deterioration of cosmetic prepns. by bacteria or molds can be prevented by the use of antioxidants, antiseptics, germicides and preservatives. Antioxidants should be sol. in the oil phase and insol. in the water phase. Preservatives should be sol. in either phase or both. Both antioxidants and preservatives should be compatible with all other ingredients in the formula, should not impair the potency of the other ingredients, must not change the characteristics of the finished product, must be nontoxic and non-irritating, should be practically odorless and colorless, should be effective in low percentages and their cost should be low in proportion to their effectiveness. Examples of antioxidants and preservatives are Peru balsam, Tolu

balsam, benzoic acid, Na benzoate, salicylic acid, gum benzoin, *p*-hydroxybenzoic acid and its Na salt and esters, Antranox M and Preservatol. Leopold Scheflan

The chemical constitution of oil of rose and its history from a chemical standpoint. S. Isermann. *Progressive Perfumery & Cosmetics* **1939**, 130–3, 140–3, 149–51.—A historical description of studies on stearoptene, geraniol and citronellol and a discussion of the structure, function and characteristics of other constituents of rose oil, namely nerol, linaloöl, phenylethyl alc., farnesol, EtOH, octyl aldehyde, nonyl aldehyde, citral and eugenol. Leopold Scheflan

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Detection and estn. of benzedrine (Illing) **7**. Report of Ninth International Congress of Military Medicine and Pharmacy, Bucharest, Rumania (1937) (Bainbridge) **11A**. Casein, its production and uses [in medicine] (Wickman) **13**. Trifluoromethyl benzaldehydes [for pharmaceutical products] (U. S. pat. 2,180,772) **10**. Flavoring solns. for tobacco (U. S. pat. 2,180,932) **12**. H_2O-sol. condensation products contg. P for disinfecting compns. (U. S. pat. 2,180,260) **29**. Ethers of hydrogenated phenols [as perfume bases] (U. S. pat. 2,181,100) **13**.

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Therapeutic asymmetric arseno compounds. Karl Streitwolf, Alfred Fehrle and Walter Herrmann (to Winthrop Chemical Co.). U. S. 2,180,778, Nov. 21. Compds. which are well tolerated when intravenously, subcutaneously or intramuscularly injected are made by reducing to asymmetric arsenobenzenes arsonophenoxyacetic acids or arylarsonic acids which have an imidazole ring contg. glycolic acid as substituent, together with other therapeutically active arylarsonic acids, or by producing the asymmetric arsenobenzenes according to known methods from the derivs. of the corresponding arsonic acids contg. trivalent arsenic and in cases in which the product to be obtained contains a primary amino group or groups, acylating such group or groups or causing the arsenobenzene to react with compds. capable of condensing with a primary amino group such as formaldehydebisulfite or glycide. Several examples with details are given. Cf. *C. A.* **33**, 7494[4].

Therapeutic extract of duodenal mucosa. Archibald B. Macallum and Nelles B. Laughton. U. S. 2,180,905, Nov. 21. An ext. which is suitable for the treatment of diabetes mellitus is obtained by extg. duodenal mucosa with an acidified alc. solvent, removing the solvent, extg. the residue with aq. acid, adding Ca acid phosphate to the soln., and pptg. the Ca acid phosphate, as by use of Na_2CO_3.

Therapeutic derivatives of pyrazinecarboxylic acid. Otto Dalmer, Claus Diehl and Eugen Walter (to Merck & Co.). U. S. 2,176,063, Oct. 17. Therapeutic compds. of relatively high stability and low toxicity are prepd. by the condensation of pyrazinecarboxylic acid hydrazide with aldehydes and ketones such as acetaldehyde, acetone, Me Et ketone, methylheptenone, trichloroacetaldehyde, biacetyl, Ph Me diketone, benzaldehyde and salicylaldehyde for the production of hydrazides of pyrazinecarboxylic acid: ethylidenehydrazide, m. 170–1°; isopropylidenehydrazide, m. 143–5°; isobutylidenehydrazide, m. 131–2°; isoöctylidenehydrazide, m. 70–1°; trichloroethylidenehydrazide, m. 180–1°; α-benzoylethylidenehydrazide, m. 145–6°; benzylidenehydrazide, m. 236–7°; and 2-hydroxybenzylidenehydrazide, m. 207–8°. Dipyrazinecarboxylic acid hydrazide, m. 223–5°.

Injectable preparations for lowering the blood pressure. Jenő Rakonitz. Hung. 122,712, Jan. 2, 1940. Aromatic nitro compds. contg. carboxyl, hydroxyl or other negative groups are emulsified in an oily medium. The COOH or OH groups may be esterified to increase the soly. Desensitizing substances contg. more than 7 C atoms are used as solvents or diluents.

Glucoside from Strophanthus kombe. Chemische Fabrik vorm. Sandoz. Fr. 840,965, May 8, 1939. A new cryst. glucoside, which contains one mol. of glucose more than *k*-strophanthin-β, is prepd. from the seeds of *Strophanthus kombe* (1) by dissolving an ext. of the seeds in an appropriate solvent, such as MeOH, EtOH or PrOH, pptg. the glucosides with a solvent immiscible with water, sepg. the ppts. and repeating the operation till the new glucoside is obtained; (2) by extg. (from the crude glucosidic prepn.) cymarin with $CHCl_3$, *k*-strophanthin-β with a mixt. of alc. and chloroform and crystg. the new glucoside, which remained in the mother liquor; (3) by acylating the ext. of the seeds or the seeds themselves, in presence of org. solvents such as pyridine, extg. the acylated glucoside and sapong. with an alkali or alk. earth alcoholate. The new glucoside is very sol. in water and lower alcs., insol. in ether and other solvents of fats, and crystallizes in a mixt. of MeOH-$CHCl_3$. It is used in therapy. Many examples are given.

Tertiary *N,N*-dicycloalkylalkylamines. Frederick F. Blicke. U. S. 2,180,344, Nov. 21. Compds., various of which are effective antispasmodics, of the general formula XXYN in which Y represents an alkenyl, alkyl, cycloalkyl, cycloalkylalkyl, aryl, or aralkyl radical and X represents a cycloalkylalkyl group in which the alkyl residue is attached to the N atom are substantially water-white, relatively viscous liquids of high b. p., which generally have a faint, characteristic, amine-compd. odor and form salts which are generally white cryst. solids, and may be prepd., e. g., by reacting a hydrocarbon-substituted primary amine such as methylamine with a cycloalkylalkyl halide in a liquid nonreactive org. solvent either at room temp. or by use of heat and pressure and reaction promoters such as NaOH, Na_2CO_3, K_2CO_3, $CaCO_3$, etc. Details are given of the production of: methylbis(cyclohexylmethyl)amine, b_{11} 144–7°; methylbis(β-cyclohexylethyl)amine, b_{23} 188–93°; methylbis(γ-cyclohexylpropyl)amine, b_{20} 202–4°; methylbis(δ-cyclohexylbutyl)amine, $b_{26.5}$ 225 7°; methylbis(β-cyclopentylethyl)amine, ethylbis(cyclohexylmethyl)amine, b_{12} 149–53°; ethylbis(β-cyclohexylethyl)amine, b_{21} 194–7°; ethylbis(δ-cyclohexylbutyl)amine, b_{19} 230–6°; ethyl(cyclohexylmethyl)(β-cyclohexylethyl)amine, b_6 146–9°; propylbis(β-cyclohexylethyl)amine, b_7 160–5°; isopropylbis(β-cyclohexylethyl)amine, b_7 171–4°; butylbis(β-cyclohexylethyl)amine, b_7 176–8°; amylbis(β-cyclohexylethyl)amine, b_7 178–181°; heptylbis(β-cyclohexylethyl)amine, b_6 197–202°; cyclohexylbis(β-cyclohexylethyl)amine, b_5 190–3°; phenylbis(β-cyclohexylethyl)amine, b_6 213–218°; benzylbis(β-cyclohexyl-

ethyl)amine, b_8 207–210°; and allylbis(β-cyclohexylethyl)amine, b_4 170–2°, and their hydrochlorides, etc. 1

Oxidation products of sterols containing two ketonic groups. Chinoin Gyogyszer és Vegyészeti Termékek Gyára R. T. (Kereszty és Wolf). Fr. 840,962, May 8, 1939. Sterols and their derivs. which contain free OH groups and whose carbon skeleton, contg. carbon atoms 1–22, is identical with those of cholesterol, allocholesterol or epicholesterol, are, after temporary protection of the double bond, oxidized by appropriate agents, such as permanganates or chromic acid to products contg. two keto groups. After restoration of the double bond, the reaction mixt. is freed by fractional crystn. or by extn. with two solvents, one miscible with water and one immiscible, from by-products, such as the sterol deriv. oxidized at carbon atom 3, and then subjected to chromatographic purification, with benzene as a solvent and Al oxide as adsorbant. The benzene filtrate, which contains all of the product contg. two ketonic groups not absorbed by Al_2O_3, is evapd., the residue dissolved in petr. ether and subjected, after addn. of an indicator such as Sudan III, to a chromatographic sepn. with Al_2O_3 as adsorbent. The product contg. two ketonic groups is completely adsorbed by the Al_2O_3 column, androstenedione in the upper zone and corpus luteum in the middle zone. They are extd. by ether or alc. The purification can be carried further by repeating the chromatographic sepn., using a mixt. of petr. ether and C_6H_6 as solvent (androstenedione is adsorbed, while corpus-luteum hormone passes into the filtrate), or by conversion to semicarbazones and fractional crystn. Many examples are given. 2 3 4

Ketones of the cyclopentanopolyhydrophenanthrene series. N. V. Organon. Fr. 840,994, May 8, 1939. In presence of alkali or alk. earth metals, the satd. or the unsatd. derivs. of allocholanic or etiocholanic acids, which may carry oxygen in their cyclic system, are condensed with compds. of the general formula $R'R''CHCO_2R$, where R′ and R″ are hydrogen, alkyl, alkoxyl or an esterified carboxyl, and R is alkyl. The condensed products are sepd. from the reaction mixt., sapond. and decarboxylated. 5

Cyclic ketones of the cyclopentanopolyhydrophenanthrene series. Soc. pour l'ind. chim. à Bâle. Fr. 840,854, May 3, 1939. The ketones, satd. or not, are obtained by transforming the free secondary carbinol groups of the ring into ketone groups, in compds. of cyclopentanopolyphenanthrene series, which contain side chains with multiple bonds in position α, β or β, γ with respect to the ring. After reducing, if necessary, the triple bonds to double, the compds. are treated with oxidation agents, such as permanganate or chromic acid in glacial acetic acid, or with dehydration agents, such as compds. with a carbonyl group in presence of metallic alcoholates (acetone or cyclohexanone in presence of butylate or propylate of Al, Cu or Pb). With unsatd. cyclic compds., it is often necessary to add a halogen or a halogen acid, in order to protect temporarily the double bonds in the ring. Among examples, 0.5 part of 17-ethinyl-$\Delta^{5,6}$-androstene-3,17-diol in 10 parts of acetone is added to a soln. of 1 part of Al butylate in 40 parts of toluene, the whole is refluxed for 2 hours and heated to the b. p., then dild. with 100 parts of ether and washed with an aqueous soln. of a mineral acid. The evaporation of the solvents leaves a ethinyl-$\Delta^{4,5}$-androstene-17-ol-3-one, melting at the temp. of 270–272°. 6 7 8

Nutrient amino acids. Kenneth S. Kemmerer (to Mead Johnson & Co.). U. S. 2,180,636, Nov. 21. A process of prepg. a nutrient material suitable for oral, rectal and intravenous administration, contg. all of the amino acids resulting from the hydrolysis of a highly purified protein material such as casein, involves washing acid-pptd. protein with acidified water until free from inorg. salts, refluxing the washed protein with an inorg. acid such as H_2SO_4, HCl or H_3PO_4, heating the hydrolyzed material to 82–105°, dilg. with water, adding $Ba(OH)_2$ sufficient to neutralize the hydrolytic agent, adding activated carbon, filtering, concg. in a vacuum, carefully adding addnl. $Ba(OH)_2$ for complete removal of the hydrolytic agent and inorg. acid, adding H_2S to ppt. heavy metals, filtering, concg. and drying. U. S. 2,180,637 relates to a process for prepg. a product of generally similar utility which may involve prepg. a mixt. of water 5 qts., highly purified casein 1 lb., Na_2CO_3 20 g., and pancreas 3 lbs., adding a mixt. of toluene 2 gals. and $CHCl_3$ 1 gal. for each 200 gals. of the initial mixt. (the Na_2CO_3 being sufficient to maintain a pH of 6 to 9) digesting the material at a temp. of about 38° to effect practically complete hydrolysis of the protein, adding another portion of pancreas and continuing the digestion until there is no increase, from day to day, in the amino N content and protein tests are negative, adding an amt. of acid chem. equiv. to the Na_2CO_3 used, adding decolorizing carbon, boiling for a short time, filtering and drying the filtrate. 9

Phenylmercuric citrate. Ralph P. Perkins (to Dow Chemical Co.). U. S. 2,181,098, Nov. 21. This compd. is made by heating phenylmercuric hydroxide with citric acid and is a white powder decompg. 200–204°, highly *germicidal*.

3,7-Diamino-9,10-dialkylphenanthridinium halides (antiseptics). Walter G. Christiansen and Wm. Braker (to E. R. Squibb & Sons). U. S. 2,176,889, Oct. 24. Details are given of the production of 3,7-diamino-9,10-dimethylphenanthridinium chloride (reddish brown crystals), 3-amino-9-((p-dimethylaminophenyl)iminomethyl)-10-methylphenanthridinium chloride (m. 119–21°), and of the intermediates: 3,7-dinitro-9-methylphenanthridine, 3,7-diamino-9-methylphenanthridine, 3,7-diacetamino-9-methylphenanthridine, 3,7-diacetamino-9,10-dimethylphenanthridinium sulfate.

Allantoin ointment. Frederick R. Greenbaum (to National Drug Co.). Can. 386,238, Jan. 9, 1940. Stearic acid is melted at water-bath temp. and held at 70°, 40 g. of allantoin crystals is separately dissolved in 500 cc. distd. water heated to slightly below the b. p., glycerol 400 and triethanolamine 20 g. are added, the temp. is raised to 70° and the mixt. poured slowly with stirring into the stearic acid until a white uniform ointment is obtained to provide triethanolamine stearate 60 and excess $C_{18}H_{36}O_2$ 590 g.

Tetracyclic condensation products. I. G. Farbenind. A.-G. Fr. 841,080, May 10, 1939. The products are obtained by treating γ-(1-naphthyl)-butyric acid halide with CH_2N_2 to form corresponding diazoketones, transforming the group $—CH_2-N_2$ of the diazoketones, by the action of HBr, into $—CH_2$-halogen, and condensing the latter with metallic derivs. of α-malonic acid ester or of an acetoacetic ester to form esters of the corresponding keto acids. The esters after sapon. and eventually re-esterification, are subjected to a ring closure operation by means of condensing agents, such as H_2SO_4 or $SnCl_4$, in the latter case, after transforming the acid group into acid halide. The naphthalenic ring and the acid radical of γ-(1-naphthyl)butyric acid may be partly substituted by alkoxy groups. Among examples, γ-(6-alkoxy-1-naphthyl)-α-methylbutyric acid, treated according to the method, yields, as a final product, a hydroxy ketone with great estrogenic activity.

Water-soluble gold complexes of keratin degradation products. Shering-Kahlbaum A.-G. Fr. 840,958, May 8, 1939. See Ger. 663,854 (*C. A.* **33**, 3204).

Degradation products of sterols. Lothar Strassberger and Helmut Jacobi (to Schering Corp.). U. S. 2,180,095, Nov. 14. Compds. such as cholesterol acetate dibromide, sitosterol acetate dibromide or stigmasterol acetate dibromide are oxidized with chromic acid and the resulting mixt. is poured into water, extd. with ether and the ethereal soln. shaken with 2 *N* aq. NaOH soln. The ppt. formed is filtered off and suspended in ether and the ethereal suspension is acidified with dil. H_2SO_4, sepd. from aq. acid and evapd. to dryness. The residue is dissolved in glacial HOAc, debrominated with Zn dust and heated on a water bath; the soln. is evapd. to dryness and the residue is triturated with MeOH, and, on crystn., products are obtained such as 3-hydroxycholenic acid, m. about 232°, 3-hydroxynorcholenic acid, m. about 240–2°, or 3-hydroxybisnorcholenic acid, m. 295–302°. Other products obtained are: 3-acetoxycholenic acid methyl ester, m. 154–

5°; 3-acetoxynorcholenic acid methyl ester, m. 240–2°; 3-acetoxycholenic acid, m. 183–4°; and 3-acetoxynorcholenic acid. Various of these products may be used as intermediates in producing male sex hormones, dehydroandrosterone, the corpus luteum hormone, pregnendione, bile acids, etc.

Perspiration accelerators for application to the skin. Edward E. Henderson and David O. Meeker (to Cutasy Laboratories, Inc.). U. S. 2,180,280, Nov. 14. A mineral oil 45–70, petrolatum 13–25, and waxes such as paraffin, spermaceti, ozocerite or beeswax 20 35% are used together.

Removing gases from organic liquids such as oils, as in preparing them for molecular distillation. Kenneth C. D. Hickman (to Distillation Products, Inc.). U. S. 2,180,051, Nov. 14. In prepg. a vitamin concentrate by high-vacuum distn. of a fish oil contg. vitamin and also absorbed gases which would cause at least partial oxidation and thermal destruction of the vitamin during distn., the absorbed gases and oxidizing substances are removed from the oil previous to distn. by subjecting the oil in a thin film to extreme agitation and to a pressure of less than about 0.005 mm., until the internal pressure of the gas in the oil is below about 0.015 mm. An app. with rotating plates may be used.

***l*-Ascorbic acid.** Franz Elger (to Hoffmann-La Roche Inc.). U. S. 2,179,977, Nov. 14. 2-Keto-*l*-gulonic acid or a deriv. such as the methyl ester is heated in a soln. of acid reaction (suitably in a mixt. of EtOH and $CHCl_3$ with HCl). U. S. 2,179,978 relates to a process in which 2-keto-*l*-gulonic acid or a deriv. such as the methyl ester is heated with an alkali salt of a weak acid such as $NaHCO_3$ or NaOAc in substantially anhyd. alc. soln. such as MeOH.

Vitamin D concentration. Sidney E. Miller (to General Mills, Inc.). U. S. 2,179,560, Nov. 14. Material contg. either natural or synthetic vitamin D is dissolved in an org. solvent such as C_6H_6 or ether and the soln. is passed through a mass of activated tri-Ca phosphate which adsorbs a major portion of the vitamin D; the phosphate is washed with an org. solvent and the vitamin D is sepd. by distg. off the solvent.

Vacuum distillation of fish oils containing vitamins. Kenneth C. D. Hickman (to Distillation Products, Inc.). U. S. 2,180,356, Nov. 21. A process of mol. distn. of fish oils to obtain concd. fat-sol. vitamins involves segregating components distg. up to 170°, sepg. a fraction at about 170 195° and returning it to the fresh incoming oil to be distd., and sepg. a fraction high in vitamin content at about 195–230°.

Condensation products of 1-methyl-1-cyclopenten-5-one with 1-vinyl-3,4-dihydronaphthalene, etc. Wilhelm Bockemüller (to Winthrop Chemical Co.). U. S. 2,179,809, Nov. 14. Condensation is effected by heating 1-methyl-1-cyclopenten-5-one (suitably used in excess in an inert atm. and at a temp. of about 200°) with compds. such as 2,3-dimethylbutadiene (forming trimethyltetrahydroindanone, b_{12} 129–30°) with 1-vinyl-1-cyclohexene (forming an oily product $b_{0.1}$ 104–5°), with 1-vinyl-3,4-dihydronaphthalene (forming a product $b_{0.05}$ 160–80°); and various details are given of the production of 1-vinyl-3,4-dihydronaphthalene, etc. Condensation products obtained may be used as *intermediates in the synthesis of hormone-like substances*, e. g., by the condensation of 1-methyl-1-cyclopenten-5-one with 1-vinyl-6-methoxy-3,4-dihydronaphthalene and sapon. of the methoxy group in the condensation product formed, estrone-like products are obtained.

Hexamethylenetetramine salts of aromatic acids. Monroe D. Edelman and Edmond T. Tisza (to Pyridium Corp.). U. S. 2,179,618, Nov. 14. Compds. suitable for use as *antiseptics* for the treatment of infections of the urinary tract are produced, such as methenamine phenylacetate, softening 80–90°, methenamine β-phenylpropionate, m. 124–5°, methenamine γ-phenylbutyrate, beginning to char at 205° but not m. up to 250°, methenamine cinnamate, m. 133–4°, and methenamine β-hydroxy-β-phenylpropionate, m. 141–3°, which are sol. in water, alc., $CHCl_3$ and benzene and insol. in ligroin. Various details of manuf. are given.

Stabilized bactericides. Walter G. Christiansen (to E. R. Squibb & Sons). U. S. 2,176,890, Oct. 24. A compn. of good stability comprises a slightly alk. soln. of a Hg deriv. of a substituted phenol such as (acetoxymercuri)nitro-*p*-*tert*-butylphenol together with gelatin, egg albumin, pectin, casein, lysalbinic acid or protalbinic acid.

Stable germicidal heteroatomic mercurimercapto compounds. Russel J. Fosbinder and Lewis A. Walter (to Maltbie Chemical Co.). U. S. 2,176,457, Oct. 17. By refluxing a mercaptopyridinecarboxylic acid in a solvent such as EtOH with an ethyl-, propyl-, butyl- or like mercuric chloride, products are obtained such as 2-(ethylmercurithio)-5-pyridinecarboxylic acid, 2-(propylmercurithio-5-pyridinecarboxylic acid, and 2-(butylmercurithio)-5-pyridinecarboxylic acid (details of the production of which are given and which all decompose when strongly heated). They may be used as antiseptics in aq. soln. and have the general formula $N.CH.C(CO_2M)\cdot CH\cdot CH\cdot CSHgR$, where R is an alkyl radical and M is H, alkali metal, alk. earth metal, NH_4, alkylammonium or alkanolammonium, being stable toward free oxygen even at elevated temps. and in the presence of metal ion catalysts.

Disinfectant. Richárd Müller. Hung. 122,466, Dec. 15, 1939. Gases satd. with Ag or with a Ag compd. are led through finely porous substances (diatomaceous earth, carbon, cotton, etc.). For use, the product is heated and pure air is led through it. This air contains disinfectant Ag particles.

Water-absorbing therapeutic and cosmetic creams. Neovasol Vegyipari Kft. (István Lajos Waldmann and Miksa Dénes, inventors). Hung. 122,444, Dec. 15, 1939. One or more hydrogenated animal or vegetable oils are mixed with disinfectants (e. g., salicylic acid, tricresol) and emulsifiers (e. g., cholesterol, alc. sulfonates), finally with aliphatic acids and water.

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

E. M. SYMMES

Optimum conditions for slaking of lime under steam pressure. V. I. Endovitskiĭ and A. B. Kvitnitskiĭ. *Trudy Khar'kov. Khim.-Tekhnol. Inst. S. M. Kirova* **1**, 51–61 (in English, 61–2) (1939).— On lab. scale the slaking of lime was complete in 25 min. under a pressure of 4.5 atm. The slaking of lime-sand mixts. in an autoclave under a pressure of 4.5 atm. was also complete in 25 min.
B. Z. Kamich

Conditions for the deposition of soda from the brines of the Mikhallov soda lakes. O. D. Kashkarov. *Byull. Inst. Halurgii* **1938**, No. 4, 22–47; *Khim. Referat. Zhur.* **2**, No. 4, 101–2 (1939).—The object of the expts. was to det. the optimum conditions for the deposition of soda and of the proper methods for its extn. Three methods were investigated: (*a*) crystn. with cooling, (*b*) solar evapn. and (*c*) flame evapn. Crystn. with cooling gives optimum results (90–3%). Up to 80% was obtained by this method when a purer product was desired. Considerable contamination of the product and low yields make flame evapn. the least successful. Solar evapn. gives low yields. Crystn. with cooling is less sensitive to the concn. change of the brine.
W. R. Henn

The industrial utilization of Sivash brine. A. S. Eliseev. *Byull. Inst. Halurgii* **1938**, No. 7, 32–9; No. 8, 32–47; *Khim. Referat. Zhur.* **2**, No. 4, 101 (1939).—Sivash brine is an important raw material for production of Br

and of Mg salts. The concn. varies from 2–4° to 12–14°Bé. $Mg(OH)_2$ can be pptd. from weak solns. The solns. may be preliminarily concd. in evaporators to a definite concn., or the natural solns. may be utilized. In natural evapn. of sea water in the sun, sepn. of $CaSO_4$ takes place at 26°Bé. and of NaCl at 32°Bé. Further concn. of the mother liquor yields the mixed salt NaCl and $MgSO_4$, KCl, $MgCl_2$ and, finally, $MgCl_2$ (bischoffite). The following scheme is proposed: Gypsum is sepd. from a 26°Bé. soln. in evaporators by an addn. of basic $CaCl_2$. After the pptn. of NaCl, the soln. (34°Bé.) contg. 13.9% of $MgCl_2$ and about 2.8 kg. of Br/cu. m. is first sent to the Br producing plant and later into the $Mg(OH)_2$ plant. The $Mg(OH)_2$ is obtained by adding CaO and a coagulant in the form of a pulp contg. 83% of water. A $Mg(OH)_2$ of high dispersity is obtained after roasting. The weak solns. are decarbonized with milk of lime, the Br is sepd., the soln. dild. to a weak concn., and $Mg(OH)_2$ sepd. by addn. of a weak milk of lime soln. W. R. Henn

Cinderella of the phosphates. R. E. Hall. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 18–21(1939).—$NaPO_3$ in acid or alk. soln. and particularly at elevated temps. reverts to orthophosphate, suppresses the ionization of many metallic salts in soln., coagulates albumin (ortho- and pyrophosphate do not), has a high dispersive action and is very effective in causing stabilization of supersatn. of Ca salts, particularly $CaCO_3$. One to two p. p. m. of $NaPO_3$ added to a hard bicarbonate water will prevent pptn. of $CaCO_3$, while a water contg. 300 p. p. m. of hardness as $CaCO_3$ will not yield a ppt., even when treated with Na_2CO_3. In city water works, after-pptn. following the reduction of the hardness of water by treatment with lime can be avoided by the addn. of 1–2 p. p. m. $NaPO_3$. This "threshold treatment" also largely eliminates the deposition of scale in water heaters. Leopold Scheflan

Prepn. of strong and "superstrong" cooking acid (Eliashberg) **23**. Potassium metaphosphate (Madorsky, Clark) **15**. Apatites (Fiveg, Shubin) **8**.

Bernard, L. M.: Le mirage de l'iode. Paris: Soc. d'Editions géographiques, maritimes et coloniales. 169 pp. Fr. 36. Reviewed in *Chimie & industrie* **42**, 665 (1939); *Chem. Trade J.* **106**, 22(1940).—Iodine resources and industry are discussed.

Concentration of nitric acid. Frederick C. Zeisberg (to E. I. du Pont de Nemours & Co.). Can. 386,477, Jan. 23, 1940. Dil. HNO_3 is treated with H_2SO_4 in a dehydration zone, the residual acid elevated to the upper portion of a denitrating zone by direct contact of steam, the residual acid denitrated, and the weak HNO_3 vapors returned from the upper to the lower portion of the dehydration zone. An app. is described.

Sulfuric acid. Bernard M. Carter (to General Chemical Co.). U. S. 2,180,727, Nov. 21. An arrangement of app. is described, and a method for catalytically making SO_3 in a plurality of stages, which involves forming a gas mixt. contg. SO_2 and O in amt. by vol. less than that needed in practice for complete conversion of the SO_2, bringing the gas mixt. at a reactive temp. into contact with a first body of catalytic material of given cross-sectional area and of vol. substantially less than that normally employed when all the gases involved in the conversion reaction are passed through the first body of catalytic material, whereby part of the SO_2 is oxidized to SO_3, the temp. of the gas mixt. increased and the O content diminished, introducing further quantities of oxidizing gas at relatively low temp. into the partially oxidized gas mixt. to cool it to approx. initial conversion temp. and to supply O needed for oxidation of further amts. of SO_2, whereby the gas volume is substantially increased, and then passing the resulting gas mixt. in contact with a second body of catalytic material having a cross-sectional area greater than the area of the body of catalytic material of the preceding stage in direct proportion to the increase in gas volume between the stages.

Sulfuric anhydride. James B. Castner (to Canadian Industries Ltd.). Can. 386,314, Jan. 16, 1940. The air required for producing SO_2 for SO_3 manuf. is predried by activated alumina or SiO_2 gel or a mixt. of the two. An app. is described.

Recovery of sulfur dioxide from gases. Raymond F. Bacon. U. S. 2,180,495, Nov. 21. App. for absorption treatment of a gas contg. SO_2 with a liquid medium such as an aq. soln. of borax and boric acid comprises an absorption chamber, a stripping chamber at a lower elevation, means for introducing a liquid absorption medium into the absorption chamber, a conduit connecting the absorption chamber with the stripping chamber, means for liberating absorbed SO_2 within the stripping chamber, means for collecting SO_2, and means for returning absorption medium after stripping to the absorption chamber. All parts of the app. are so designed that stoppage will not be caused by finely divided solid that is pptd. during the process. Cf. *C. A.* **33**, 3082[8].

Preparation of pure alkali salts of acids of a high degree of oxidation. I. G. Farbenind. A.-G. Fr. 849,849, May 3, 1939. An acid-forming element, or a compd. of the element in a lower state of oxidation, is heated in the presence of O with an alkali oxide, or in the presence or absence of O with an alkali peroxide. In examples (1) 1 mol. Fe_2O_3 is heated, in an atm. of O or air free from CO_2, with 6 mols. Na_2O to form Na_6FeO_6; (2) 1 mol. NaI heated to 300–600° with 2 mols. Na_2O_2 in an atm. of O or air forms Na_5IO_6; (3) 1 mol. of Bi_2O_3 with 3 mols. of Na_2O in an atm. of O or air free from CO_2 and H_2O, at 500° forms Na_3BiO_4; (4) 1 mol. PbO in O free from CO, with 2 mols. Na_2O forms Na_4PbO_4; and (5) 1 mol. Pr_2O_3 in O with 2 mols. Na_2O at 400° forms Na_2PrO_3.

Alkaline earth metals. Frank R. Kemmer. U. S. 2,179,823, Nov. 14. A mixt. of Al and a finely divided material contg. an alk. earth metal oxide such as MgO is heated to a temp. above the m. p. of Al and below the b. p. of the alk. earth metal, the heated mixt. is evacuated, and an inert gas such as H, He or CH_4 is admitted to the evacuated mixt. so as to force molten Al into intimate assocn. with the material; the mixt. is then heated to the temp. of volatilization of the alk. earth metal and the latter is distd.

Water-soluble titanium compounds. Edward N. Kramer (to E. I. du Pont de Nemours & Co.). U. S. 2,180,961, Nov. 21. For producing solubilized Ti values, a residual Ti-contg. product from the clarification stage of a Ti-oxide-producing operation is treated with H_2SO_4 of such strength (suitably about 85% or higher) as substantially completely to convert the Ti content of the residue to the sulfated condition, and the resultant acid-Ti sulfate mixt. is utilized in effecting solubilization of a Ti ore.

Aluminum chloride. Wm. H. Shiffler and Ward P. Anderson (to Standard Oil Co. of Calif.). U. S. reissue 21,265, Nov. 14. A reissue of original patent No. 1,887,566 (*C. A.* **27**, 1458).

Ammonium thiocyanate. Roger A. Mathes (to B. F. Goodrich Co.). U. S. 2,179,943, Nov. 14. A suspension of NH_4 dithiocarbamate in a neutral, nonionizing, org. solvent such as toluene or benzene, in which the product is practically insol., is heated to a temp. not over about 100° until evolution of H_2S is complete.

Calcium cyanamide. Ernst Winter and Herbert Polack (to Akt.-Ges. für Stickstoffdünger). U. S. 2,180,382, Nov. 21. See Ger. 677,275 (*C. A.* **33**, 6732[4]).

Granular calcium hypochlorite. Homer L. Robson and Harold D. Kaufmann (to Mathieson Alkali Works). Can. 386,058, Jan. 2, 1940. Moist $Ca(ClO)_2$ is formed into curved flakes, 0.01–0.03 in. thick, dried and crushed between yielding-surfaced rolls, 2–4 in. in diam., to produce grains of minus 20 mesh. An app. is described.

Pure iron oxides. János Nagy. Hung. 122,496, Dec. 15, 1939. Substances contg. Fe oxides are treated with sulfuric acid or NH_4 sulfate, the insol. part is sepd. and the soln. is treated with ammonia in 2 or 3 fractions. In the first fraction sufficient ammonia is added to ppt. metal hydroxides that ppt. more readily than Fe hydroxide. After the sepn. of the ppt., a 2nd ammonia treatment ppts. iron as hydroxide. After filtration a 3rd treatment

with NH_3 seps. metal hydroxides pptg. less readily than Fe hydroxide. The remaining soln. can be regenerated by crystn. and used again.

Lead arsenate. James W. Swaine (to General Chemical Co.). Can. 386,481, Jan. 23, 1940. Pb oxide and H_3AsO_4 are fed into a reaction zone contg. catalyst and made to react during an initial phase, in which a pH not above 8 and higher than induced by the catalyst is maintained. In the second phase the major portions of the reactants are fed into the resulting reaction mass in amts. regulated to keep the pH lower than induced by the catalyst and not less than about 1.5.

Ammonia-soda process with production of a pure caustic soda. John C. Garrels and Howard Roderick (to Michigan Alkali Co.). U. S. 2,180,755, Nov. 21. In the operation of the ammonia-soda process in which carbonic acid compds. are formed and lime is treated with NH_4Cl soln. for recovery of NH_3, leaving a $CaCl_2$ soln., the latter is clarified, the carbonic acid compd. of the process is treated with the $CaCl_2$ soln. to form $CaCO_3$, the $CaCO_3$ is calcined and the product is treated with Na_2CO_3 in the presence of water to form NaOH and $CaCO_3$, followed by filtering, drying and returning the last produced $CaCO_3$ to the cycle and sepg. of the NaOH in pure form.

Hydrated sodium tetrasilicate. Walter F. Wegst and John H. Wills (to Philadelphia Quartz Co.). U. S. 2,179,806, Nov. 14. A Na silicate soln., contg. more SiO_2 than is represented by the mol. ratio of $1Na_2O$ to $2SiO_2$ and contg. not substantially more than about 75% of water, is seeded with crystals having a mol. ratio of Na_2O to SiO_2 of 1 to 4 and contg. approx. 7 mols. of water.

Tetrazylazide and its salts. Walter Friederich and Karl Flick (to Dynamit-A.-G. vorm. Alfred Nobel & Co.). U. S. 2,179,783, Nov. 14. For the production of tetrazylazide and its salts, cyanogen halides are treated with a soln. of hydrazoic acid, an alkali metal azide or an alk. earth metal azide.

Titanium gluconate. Titan Company Inc. Fr. 840,907, May 8, 1939. To a soln. of titanyl sulfate (orthotitanic acid dissolved in sulfuric acid $TiO_2:H_2SO_4 = 1.1$) is slowly added powd. alk. earth gluconate. Water is then added to dissolve the titanium gluconate formed by the reaction. Alk. earth sulfate is sepd. by filtration or decantation, and the titanium gluconate is extd. from the soln. by an org. agent, preferably MeOH.

Vanadium oxide catalyst suitable for use in various oxidation processes. Harold B. Foster (to National Aniline & Chemical Co.). U. S. 2,180,353, Nov. 21. A catalyst carrier such as pumice or alundum, is assocd. with a compd. prepd. by reducing an O-contg. pentavalent V compd. such as metavanadic acid, with HCl, HBr or HI and subsequently igniting the resulting mixt.

Working up gas mixtures rich in krypton. Egyesült Izzólámpa és Villamossági R.T. Hung. 122,516, Dec. 15, 1939. The oxygen of the gas mixts. obtained by evapn. of liquefied gases is used to oxidize the combustible components of the gas mixt. The remaining O is removed by oxidation of solid combustibles in suitable app.

Sorptive carbon. Victor C. Hamister (to National Carbon Co.). U. S. 2,180,735, Nov. 21. App. is described, and a process for producing sorptive carbon, which involves forming a composite body contg. carbonaceous material, such as cocoanut charcoal, and a metal carbonate, such as limestone, which is decomposable at temps. of about 700° (the carbonate being nonuniformly distributed in the body, as by suitable placement in clay saggers) and heating a region of the body to above 700° where the proportion of carbonate is relatively low, so as progressively to liberate CO_2 from the carbonate and partially oxidize the carbonaceous material.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Glass as a chemical engineering material. I. Some recent developments. R. Quarendon. *Ind. Chemist* **16**, 9–14(1940); cf. *C. A.* **33**, 4825⁶. G. G.

Manufacturing lime for the glass industry. A. H. Nieman. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 32-5(1940).—Both burned lime and raw limestone are used in glass manuf.; the former still predominates. Lime should be hard burned and of uniformly high quality, low in Fe and $SrSO_4$; S is an undesirable impurity frequently taken up from the fuel in burning. Various finenesses are required, No. 10 to dust, in both lime and limestone; hydrate finds some use when an extremely fine product is desired. C. J. Schollenberger

Batch materials, old and new. Alexander Silverman. *Am. Glass Rev.* **58**, No. 53, 3 pp. (1939)(reprint).—An outline of batch materials is given in alphabetical order of the chem. elements. G. G.

Quantitative spectrochemical analysis of boric oxide in glass. II. Kenzo Harai. *J. Chem. Soc. Japan* **60**, 1159–60(1939); cf. *C. A.* **34**, 231⁸.—It has been confirmed that the presence of a small quantity of PbO does not affect the result of the analysis. T. Katsurai

New Uviol glass of the binary system CaF_2–SiO_2. Choong Shin-Piaw. *J. Chem. Phys.* **8**, 129(1940).—Glassy beads contg. 70–79% CaF_2 and 21–30% SiO_2 were prepd. The d. is 2.80–2.90. The m. p. is 1460°. The limit of transparency is about 2050 A.; it varies irregularly with the d. G. M. Petty

Sodium fluosilicate for the production of frosted glasses. F. H. Zschacke. *Sprechsaal* **72**, 583–4, 591–2(1939).—Na_2SiF_6 is successfully used for frosted glasses instead of cryolite. Part of the F should be added as CaF_2. Al_2O_3 and too much $CaCO_3$ are detrimental to frosting, Sb_2O_3 and ZnO favor frosting and good colors, while BaO is good instead of CaO, but not good in all cases. J. M. Noy

Rapid determination of the moisture content of clay and ceramic materials. I. E. Dudavskiĭ and L. E. Medvedeva. *Soviet Geol.* **9**, No. 7, 54–61(1939).—The materials are immersed in paraffin, which is then heated to 130–50°, and the loss in wt. is detd. F. H. Rathmann

New Thermofor kiln and clay-regeneration processes for maintaining decolorizing clays at high efficiencies. T. P. Simpson and John W. Payne. *Natl. Petroleum News* **31**, R-486–92; *Refiner Natural Gasoline Mfr.* **18**, 438–43, 455; *Oil Gas J.* **38**, No. 27, 147, 150, 152, 154, 156, 159(1939).—The kiln consists of heat-transfer tubes in a stationary jacket. Angle iron is stacked between the tubes with the apexes upward, to conduct heat to the tubes. Air is supplied to the bottom and spent clay fed at the top. Circulation of molten metal or salt through the tubes controls the temp. The carbonaceous matter of the clay supplies the heat for regeneration. C. H. Brooks

New process for the intensive preparation of heavy ceramic masses. Adolf Möser. *Ziegelwelt* **70**, 179–83 (1939); *Chem. Zentr.* **1939, II**, 2266.—The following are discussed: working with heated moistened masses; direct steam treatment of the mass and deairing; steam "conversion," high-pressure silos; conversion by expansion of enclosed air with simultaneous steam treatment. M. V. Condoide

Technological and physicochemical properties of grog at different degrees of firing. A. I. Kramarenko. *Trudy Kharkov. Khim.-Tekhnol. Inst. S. M. Kirova* **1**, 63–87 (in English, 87–88)(1939).—Al_2O_3 and Fe_2O_3 are easily sepd. from grog fired at 600–900° when heated with 6% HCl; however, addns. of amorphous SiO_2 and Fe_2O_3 retard the sepn. The Al_2O_3 of grog reacts on firing not as a part of the clay complex but chiefly as Al_2O_3, in the firing interval 600–800°. No evidence of the existence of metakaolin was obtained. On the basis of petrographic data it is possible to assume the presence of pseudomorphosis from kaolinite of the dehydrated residue; the Debye

graphs show the absence of a cryst. lattice at 600° and 800°. The formation of a cryst. modification of Al_2O_3 begins at 900–1000°. According to the Debye graph it is the γ-Al_2O_3. The presence of Fe oxides (10%) prevents this formation, but amorphous SiO_2 (10%) has no effect. Mullitization begins at 1200° (formation of sillimanite according to petrographic study); in the presence of 10% Fe_2O_3 mullitization begins at 1000°. Pologi kaolin fired to grog at 600° shows after a 2nd firing an exothermic reaction with the following maxima of positive thermal effects (at 930° + 1.58 cal.). Repeated firing lowers the effect of the exothermal reaction. Kaolin fired at 800° shows a positive thermal effect only at 1170° and 1200° (+0.68 cal.); samples of Pologi kaolin fired to 1000° and 1200° show no positive thermal effect. Kaolin samples fired at 600° and afterward to 1000° and 1030° with 10% Fe_2O_3 show a positive thermal effect. Samples fired to 800°, 1000° and 1200° and then fired with 10% Fe_2O_3 addns. give no positive thermal effect. Kaolin samples fired at 600° and 1200° and then repeatedly fired with 10% SiO_2 addns. give no positive thermal effect; while those fired at 300° show positive thermal effect.
M. V. Condoide

Methods of determining slag resistance of refractories. P. P. Budnikov. *Trudy Kharkov. Khim.-Tekhnol. Inst. S. M. Kirova* **1**, 34–49(in English, 49–50)(1939).— To det. slag resistance of grog, magnesite and chrome-magnesite brick a hole, made in the sample brick, is filled with basic metallurgical slag. Two C electrodes are introduced into the hole. The slag resistance of different refractories was also detd. by measuring the fusing temps. of mixts. of refractory and slag, or with other chem. agents. Results are tabulated. M. V. Condoide

Fused porcelain. W. E. Herbert. *Brit. Dental J.* **66**, 321–37(1939); *Chem. Zentr.* **1939, II**, 925.—A review of the properties of fused porcelain and the technique of manuf. of porcelain fillings, crowns and teeth.
M. V. Condoide

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Hauptliste der chemischen Abteilung der deutsche Steinzeugwarenfabrik für Kanalisation und chemische Industrie, Mannheim-Friedrichsfeld. 1939 ed. Berlin: V. D. I. Verlag. 224 pp.

Glass-melting furnace. Paul G. Willetts (to Hartford-Empire Co.). Can. 386,048, Jan. 2, 1940. Structural and operative details are described for forming an insulated glass-furnace bottom by placing a layer of glass-resistant nonshrinking refractory blocks, having a glassy matrix phase separable by heat, upon a layer of granular material over a layer of insulating material, filling the spaces between the blacks by casting a slip contg. refractory grains capable of reacting with the glassy matrix phase, and heating the bottom to free a portion of the glassy matrix phase for reaction with the slip to form a monolithic structure. 1

Electric glass-melting furnace and operation. John H. Thomas (to Owens-Ill. Glass Co.). U. S. 2,181,030, Nov. 21. App. is described, and a method of melting glass which involves establishing a body of glass materials, passing an a. c. in a predetd. convoluted path embedded in the body and which borders on the periphery of an interior zone of the body of glass materials and thereby preheating the glass adjacent the path by means of heat generated by the ohmic resistance to the current within the path, and passing the preheated glass materials into the interior zone through the interstices of the path and causing the glass to be finally heated by the induced flow of elec. current from the a. c. in the path. 2 3

Furnace operation for glass production. Samuel A. Forter (to Forter-Teichmann Co.). U. S. 2,179,848, Nov. 14. In a reversing regenerator furnace that has a plurality of ports on each of the two sides of the furnace and a corresponding plurality of regenerator units, continuity of furnace operation is maintained by establishing flow from the auxiliary conveying means through one of the ports while the associate regenerator unit is withdrawn from service. App. is described. 4

Glass-skimming and -conditioning apparatus. Thomas F. Pearson (to Crown Cork & Seal Co.). U. S. 2,180,767, Nov. 21. App. for conditioning glass in a forehearth comprises a refractory bridge supported by the forehearth side walls and spaced rearwardly from the front wall of the forehearth and extending transversely thereof with its bottom surface above the forehearth floor to form a channel therebetween and with its upper surface below the normal level of glass within the forehearth, a skimmer and means for moving the skimmer through the glass from a vertical plane adjacent the bridge to a position rearwardly thereof to draw the upper surface of relatively cold glass from the space between the front wall and the bridge rearwardly over the bridge and to circulate hot glass forwardly under the bridge to the space. 5

Container for molten glass. Paul G. Willetts (to Hartford-Empire Co.). Can. 386,049, Jan. 2, 1940. Electrocast grains (about 85 parts) in graded sizes and contg. mullite crystals and siliceous glass capable of sepg. from the grains under heat are intimately mixed with about 15 parts of 100-mesh Al_2O_3, the mixt. is firmly compacted in the bottom of the container to expose it to contact with molten glass over at least a part of the area of the bottom, and the container is heated to cause the siliceous glass to react with the finely divided Al_2O_3 and produce addnl. mullite crystals and decrease the amt. of glass in the material. 6

Apparatus for manufacture of glassware such as bottles. Thomas F. Pearson (to Crown Cork & Seal Co.). U. S. 2,180,766, Nov. 21. Various structural, mech. and operative details. 7

Blowing and heat-treatment of glass articles such as bottles. Henry W. Hess. U. S. 2,180,737, Nov. 21. App. is described, and a method which involves blowing a hollow article from plastic glass, allowing the escape of blowing gas from the interior of the article during the shaping operation, controlling the speed and temp. of the blowing gas so as to cool the interior surface of the article approx. equally with the cooling of the exterior surface by its contact with the mold, thereafter removing the article from the mold as soon as it will retain its shape when suspended, suspending the removed article and cooling its entire surface substantially uniformly to below annealing temp. by applying blasts of moving gases to its entire surface. 8

Mirrors. The British Thomson-Houston Co. Ltd. Brit. 506,116, May 23, 1939. A backing for glass mirrors comprises a metallic reflecting layer of Ag with a reinforcing layer of Ag and a protective coating of Na silicate contg. a reducing agent that will absorb the O occluded in the backing. The reflecting layer may be chemically de- 9

posited, and the reinforcing layer electrolytically deposited, and the reducing agent may comprise comminuted graphite. The protective layer may be applied in 2 layers, the 1st comprising an aq. Na silicate soln. contg. Na_2O 13–14 and SiO_2 31–32% and the 2nd comprising Na silicate contg. comminuted graphite.

Deterioration-resistant reflector of silver, etc. John R. Cain. U. S. 2,179,491, Nov. 14. Over a foundation layer of pure Ag of a thickness of about 0.03 in. or more, having a reflecting surface, there is placed a thin transparent vitreous enamel coating fused on the reflecting surface and contg. oxides of Si and Pb as major constituents and oxides of Na and B as minor constituents and having a working range well under the m. p. of pure Ag.

Laminated glass. Frederic L. Bishop (to American Window Glass Co.). U. S. 2,180,625, Nov. 21. A method of manuf. involves heating a soln. comprising a strengthening material such as an acrylic acid ester and a solvent therefor, and heating a glass sheet, forming a layer of the heated strengthening material on the heated glass sheet, the materials being heated to a temp. sufficient to drive off a portion of the solvent or other liquid present, drying the layer of strengthening material, and then uniting the coated glass sheet with another similarly coated sheet with the layer of strengthening material between the glass sheets.

Safety glass [nonshattering and bulletproof]. Krétatermékgyár Kft. Hung. 122,726, Jan. 2, 1940. Glass sheets are cemented together at 100–200° with resinous material previously treated with rubber, oil, glycerol, benzene, gasoline, AcOEt or formic acid.

Apparatus for making clay products such as flat disks. Charles E. Doll and Claude F. Copeland. U. S. 2,180,895, Nov. 21. Various structural, mech. and operative details.

Green ceramic coloring material. Gustav Jaeger and Heinrich Diehl (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). U. S. 2,180,056, Nov. 14. A green coloring material, resistant to heating, is obtained by heating together, to about 1100–1500°, Be oxide or a Be compd. yielding the oxide on heating, and Cr oxide or a Cr compd. yielding the oxide on heating.

Lightweight fluid-pervious ceramic bodies suitable for heat insulation. Earnest T. Hermann. U. S. 2,180,757, Nov. 21. A method of mfg. a ceramic pervious body comprises shaving of agglomerate particles from a mass of plastic argillaceous material in such condition that the particles have no tendency to interbond plasticly on contact with each other, subjecting the particles to a heat-treatment at a temp. sufficient to cause each particle to develop an internal bond and produce significant firing shrinkage in the particles but insufficient to cause a bond between the particles, coating the fired particles with an aq. medium contg. an argillaceous bonding material so as to obtain plastic interbonding of the particles, forming the coated particles into a body having a high percentage of mutually intercommunicating voids and a multiplicity of internal surfaces defining the voids, and then causing the particles to interbond to form an integral body by heat-treatment thereof at a temp. in excess of the first-named temp.

Horizontal tunnel kiln for ceramic ware. Jules J. Durieux. U. S. 2,180,041, Nov. 14. Various structural and operative details.

Refractory units for lining furnaces such as rotary kilns. Gilbert E. Seil (to E. J. Lavino and Co.). U. S. 2,180,969, Nov. 21. Shaped blocks of material such as refractory bricks are provided with a cementatory adhering coating of material such as a refractory cement on a portion only of their faces.

Zirconia zircon-silicon refractory suitable for furnace linings, etc. John D. Morgan (to Power Patents Co.). U. S. 2,179,982, Nov. 14. A method of making a bonded refractory involves mixing about 16–66 parts of finely crushed (220-mesh) ZrO_2 with 2–8 parts of milled grain zircon, wetting the mixt. with water and about 6 parts of H_3PO_4 to a creamy consistency, reducing the mixt. to the consistency of a thick paste by digestion for several hrs. at about 93–175°, adding water to increase the fluidity of the mixt. and thoroughly mixing with it about 76–20 parts of coarsely ground ferrosilicon (10–60-mesh), digesting the mixt. while agitating it and while heat-drying it to a suitable consistency for casting, and shaping, drying and hardening the product.

Abrasive article. Samuel S. Kistler (to Norton Co.). Can. 386,354, Jan. 16, 1940. To a phenol-formaldehyde condensation product is added an agent capable of absorbing water liberated when the material is heated to polymerize it, abrasive grains are added, and the mixt. is molded into desired shape and heated. The dehydrating agent prevents swelling.

Abrasive-coated articles such as paper. Raymond C. Benner and Norman P. Robie (to Carborundum Co.). U. S. 2,179,487, Nov. 14. Abrasive grains are secured to a backing such as paper by a heat-hardened bond consisting mainly of the reaction product of lignin, a phenol, and an aldehyde and suitably contg. not more than 40% lignin.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

How many specifications for cement? Report of special subcommittee of American Society Testing Materials Committee C-1 on cement. F. H. Jackson, *et al.* *ASTM Bull.* No. **102**, 39–42(1940).—Specifications are proposed. G. G.

The quaternary system CaO–Al_2O_3–$CaSO_4$–H_2O at 25°. F. E. Jones. *Trans. Faraday Soc.* **35**, 1484–510(1939). —That portion of the system of particular interest in cement chemistry has been worked out, i. e., the Ca sulfoaluminates arising during the setting of portland cement and by the action of sulfate waters on concrete. A space model was constructed including cryst. $Ca(OH)_2$ and the gel form of hydrated Al_2O_3 as solid phases. Only the high-sulfate form of Ca sulfoaluminate occurs [$(CaO)_3$.-Al_2O_3.$3CaSO_4$.$32H_2O$] which turns out to be sol. in H_2O and in dil. solns. of both lime and $CaSO_4$. Above a certain concn. of $CaSO_4$ it is stable but in lime solns. it is sol. only within a limited range of concns. Victor R. Deitz

The hydration of magnesian lime and the autoclave test. F. C. Welch. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 20–31(1940).—Bricks were bonded with mortars made in various ways, including some with lime autoclaved at 8 atm. to ensure full hydration of MgO, and the specimens were kept under different conditions and examd. at intervals. Pats of plaster for base and finish coats were prepd. with limes varying in MgO content, some previously autoclaved, and after different periods of aging in the lab. were autoclaved with the same procedure as used in testing limes. No relation between behavior on autoclaving of mortar and plaster contg. unhydrated MgO and under conditions of practical service was noted. It is concluded that continued hydration of MgO in mortar joints or plaster coats has no harmful effects. In small-scale tests, lime putties were prepd. from dolomitic lime; the results indicated that under conditions favorable to retention of the heat of hydration, MgO is almost completely hydrated overnight.
C. J. Schollenberger

The effect of the addition of finely ground inert materials to concrete. Robert Chapman and P. E. Olsen. *J. Inst. Engrs. Australia* **11**, 383–8(1939); cf. *C. A.* **34**, 6053.—A discussion. George Ayers

Variations in properties of dolomitic-lime putties with method of hydration. John E. Conley. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 7–19(1940). —Dolomitic limestones were calcined and hydrated under

controlled conditions in lab. expts. and vol., plasticity and settling rate of the putties studied. Putty properties depend upon type and characteristics of the original limestone, modified by treatment in calcination and hydration. Plasticity of putties from both dry and moist hydrates increased with temp. of hydration to an optimum at approx. 90°. Hydration with H_2O in excess of theory increased plasticity and vol. Electrolytes including Na_2SiO_3, NaCl, Na_2SO_4, NaOH, Na_2CO_3 and $NaHCO_3$ generally decreased plasticity with these dolomitic hydrates; effects upon putty vol. and rate of hydration varied. $CaCl_2$ and $MgCl_2$ affected plasticity little, but increased rate of hydration and decreased vol. AcOH improved the plasticity and increased rate of hydration and vol. Control of calcination to produce an active MgO and temp. control to ensure complete hydration of MgO are desirable in making hydrate for finishing plaster. Settling rates varied with conditions in calcination and hydration and are not abs. measures of plasticity; with hydration in the range 35–107°, settling rates varied inversely with temp. With highly plastic hydrate putties the settling rate is usually slow, but the properties are not necessarily assocd.; hydrates that yield high putty vols. are generally slow settling. Sixteen references.
C. J. Schollenberger

γ-Ray analysis of concrete containing iron. P. A. Shaikevich. *J. Tech. Phys.* (U. S. S. R.) **9**, 1478–83 (1939).—The analysis enables the observer to detect deformation of metal parts included in concrete, of holes in it, etc. J. J. Bikerman

Lime characteristics and their effect on construction. Walter C. Voss. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 103–16(1940).—Some connections between chem. compn. considered in ASTM specifications for builder's lime and such practical factors as putty yields, vol. changes and workability of mortars and the use of lime in concrete are discussed. The wt. of lime solids in 1 cu. ft. of putty, at any given time after slaking, equals 1.7 times the difference between the wt. of 1 cu. ft. of the putty at that time and 62 lb. Forty-five lb. lime solids is a rational av. value for 1 cu. ft. putty. Apparent yields of putties are misleading and tend to oversanding; they should be on the lime solids basis. Waterproofed limes produce light-wt. putty in fictitious yield. Cement mortars stabilize slowly and expand more, but at a lower rate, than high-lime mortars. Mortars made with dolomitic hydrate shrink more than those with high Ca hydrate; the latter show lower expansion after many cycles and stabilize rapidly, but have the most rapid initial expansion on wetting; they increase in wt. but decrease in vol. on seasoning from carbonation and increased density. The initial permeability of concrete can be reduced 50% by replacing 10% of the cement by lime solids, and this is structurally safe practice. C. J. Schollenberger

The preservation of wood. G. Batta. *Ind. chim. belge* **10**, 395–403(1939).—A review. E. H.

Bakelited wood and its physical and chemical properties. E. N. Rassadina. *Lesokhim. Prom.* **1938**, No. 3–4, 24–8; *Khim. Referat. Zhur.* **2**, No. 4, 130(1939); cf. *C. A.* **34**, 1095⁴.—The even distribution of bakelite in wood and its presence not only in the large pores of wood but also in cells and walls of the phloem are the main requirements for the production of nonswelling wood. Five to 10% solns. of bakelite penetrate the phloem, leaving bakelite distributed unevenly between bubbles of air and liquid. Swelling of birch wood compressed 25% after satn. was a min. when 5–10% solns. of bakelite were used. Water absorption decreased with an increase of the bakelite content. The introduction of not less than 20% of resin for the reduction of swelling is necessary if the wood is not compressed after satn. Optimum results are obtained from the satn. with resinite instead of with alc. solns. of bakelite. The following mech. properties were detd.: vol. wt. 0.87, compression strength 1460 kg./sq. cm., static bending strength 2060 kg./sq. cm., absorption of water after 12 days 10% (30% with a chopped sample) and swelling in tangential direction 3% (against 7.5% for natural wood). W. R. Henn

Fire resistance. The comparative resistance to fire of various species of timber. J. Bryan and L. S. Doman. *Wood* **5**, 19–23(1940).—Lab. tests on many types of wood were made to det. (1) the resistance to ignition from relatively small heat sources, (2) resistance to the penetration from a large heat source as would obtain in an established fire, and (3) rate of spread of burning or rate of heat evolution. In the app. for testing the rate of burning the specimen ($50^1/_2$-in. cubes) is burnt in the combustion tube, which being suspended from a balance arm, enables the loss of wt. to be measured. In the inflammability test the flame from the burner ignites the face of the lower specimen ($^1/_2$ in. thick, 5 in. square) and the time taken for this in turn to ignite the specimen (5 in. square, $^1/_2$ in. thick, $^1/_8$ in. away) opposite is recorded. In the flame penetration test the specimen (5 in. square, $^1/_2$ in. thick) rotates above the blow pipe, so that the flame describes a circle one in. in diam. The app. used are described and shown. More than eighty kinds of wood are classified according to fire resistance. L. S.

Henderson, F. Y.: Timber. Its Properties, Pests and Preservation. London: Crosby Lockwood and Son, Ltd. 186 pp. 9s. 6d.

Humphrey, C. J., and Richards, C. Audrey: Railroad-Tie Decay—Comprising the Decay of Ties in Storage and Defects in Crossties Caused by Fungi. Washington: Am. Wood-Preservers' Assocn. $2.

Knight, Bernard H., and Knight, Rena G.: Builders' Materials. London: Edward Arnold and Co. 304 pp. 15s.

Metz, Ludwig: Holzschutz gegen Feuer und seine Bedeutung im Luftschutz. Berlin: V. D. I. Verlag. 148 pp. M. 12.

A. S. T. M. Am. Standard Specifications for Gypsum Plastering, Including Requirements for Lathing and Furring. Philadelphia: Am. Soc. for Testing Materials. 25 cents.

Elsners Taschenbuch für den Strassenbau. Edited by **Bernhard Rentsch**. Jg. 3. 1939. Berlin: Otto Elsner Verlagsges. 571 pp. M. 4.50.

Stucco cement composition. Vito Morgero. U. S. 2,179,754, Nov. 14. A coating for the exterior of buildings is formed of sand, plaster such as rock wall or gypsum plaster, portland cement and milk, the sand being at least twice the wt. of the portland cement and the plaster being of no greater wt. than the portland cement.

Bituminous nonskid pavement. Joseph H. Conzelman (to Alabama Asphaltic Limestone Co.). U. S. 2,180,339, Nov. 21. A pavement is formed comprising a compacted layer of bituminous mixt. having a lower portion contg. a well balanced dense aggregate, the particles of which are coated and bonded together with bitumen to form a stable water-sealing strata and an upper portion contg. an unbalanced relatively open aggregate the particles of which are coated and bonded together with bitumen to provide a nonskid tractive surface, the upper portion forming a substantial part of the layer and merging into and being integral with the lower portion.

Improvement of bituminous road materials. Pétrole et Matieres Premieres. Fr. 840,925, May 8, 1939. In the bituminous matter is incorporated 0.5–20% of an insol. metallic soap dissolved in a carboxylic acid of a high mol. wt., with or without such a metallic salt as chloride, sulfate or nitrate. The insol. soap is preferably an Al soap; the oleate is the most recommended. As a solvent, oleic acid is preferred. The metallic salt is preferably a sulfate of Al, Fe, Cr or Mn.

Composite polychlorophenol product suitable for preserving wood, etc. Kent R. Fox, Edmund C. Hyry and Ira Hatfield (to Monsanto Chemical Co.). U. S. 2,180,142, Nov. 14. A solid homogeneous fused mass having a conchoidal or vitreous fracture, that is sol. in petroleum solvents of the fuel oil boiling range, consists essentially of a polychlorophenol such as tetra- or penta-

chlorophenol, which normally tends to bloom when applied as a soln. to wood, and a resin such as rosin or ester gum compatible with the polychlorophenol and sol. in such petroleum solvents in a proportion sufficient to prevent substantial blooming when the compn. is applied as a soln. to protect wood from decay organisms and fungi.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

Fuel specifications for injection engines. J. J. Broeze. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 672–84(1937)(in French).—In a crit. study of Diesel fuel specifications it is stated that only those specifications are of value which give a direct indication of engine performance, e. g., viscosity, C residue, and ignition quality. The importance of viscosity in relation to proper starting and atomization has declined with advance in engine design. The relationship between ignition quality and C deposition is demonstrated by means of diagrams of the combustion chamber showing the typical C deposit with different ignition delay times. The Conradson C test is claimed to be a sufficient indication of the carbonizing tendency of the fuel until a better test can be devised. An attempt has been made to correlate the different Diesel fuel indexes with the cetane no. by means of charts. Closest agreement was found with the Diesel index proposed by Becker and Fischer (*C. A.* **29**, 316[9]). Results of Sunbury and Delft starting tests with 18 straight and doped fuels in various engines under different conditions are tabulated. E. J. Mahler

Use of heavy fuels in injection motors. J. J. Broeze. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 685–95(1937)(in French).—Heavy low-grade oils can be burned cheaply in Diesels provided the engine is adjusted for their use. Problems presented by the high viscosity and low ignition quality of the fuel can be overcome by special injection design and by preheating. Carbon formation which is a real problem can be removed by the use of high wall temps. and by utilizing the scrubbing action of the hot flame gases which points the way for the adoption of two stroke or four-stroke engine of the turbulent chamber type; this necessitates the use of heat-resistant materials. Fuel injection temps. should be around 50–60°. Fuel consumption curves are given together with lubricating-oil contamination figures. A 0.2–0.4 mm. lining of chromium on the cylinder wall prevents excessive wear. E. J. Mahler

Causes of corrosive deposits in motors using "heavy fuel" (gasoline-alcohol mixtures). L. Boisselet and J. Fric. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 708–11 (1937)(in French).—Corrosive deposits were observed in carburetors, gasoline lines and vessels contg. the French "heavy gasoline" composed of 65–75% heavy gasoline and 25–35% of abs. alc. denatured with various substances. Tests were carried out to det. the effect of each component of the mixt. on various metals. The deposits were traceable to the dye used in the fuel, viz., rhodamine B, and to the denaturant employed in the alc. E. J. Mahler

Diesel-fuel specifications: present and future. W. H. Hubner, Gustav Egloff and G. B. Murphy. *IIme Congr. mondiale pétrole* **3**, Sect. 4, 646–71(1937)(in English).—A survey was made of Diesel-fuel specifications supplementing a previous similar survey made 2 yrs. before (cf. *C. A.* **29**, 7609[9]). The following requirements are discussed: ignition quality, viscosity, cleanliness, distn. characteristics, Conradson carbon, ash, S and corrosive acids, flash point, pour point, gravity, gum, etc. Incorporated in the survey are the proposed A. S. T. M. fuel specifications for high, medium and low-speed Diesels, U. S. Army and Navy specifications for aircraft and submarine Diesel fuels, the recommended fuel specifications for eight railroads operating Diesel trains, and lastly the fuel specifications advanced by 53 Diesel-engine manufacturers throughout the world. Graphs are given showing the relationship between cetane no. and the various calcd. ignition quality expressions, e. g., Diesel index, viscosity-gravity const. b. p.-gravity const., U. O. P. number, and octane blending value. The effect of solvent extn. and of Diesel dopes on ignition quality is indicated. Particular attention is given to the effectiveness of ethyl nitrate in various fuels under various conditions. Its low b. p., 193°, is claimed to be a disadvantage. Other Diesel dopes are listed. Fuller cooperation between engine manufacturers and fuel producers is urged. E. J. Mahler

The development and present position of carbonization in a gas current. A. Thau. *Z. Ver. deut. Ing.* **83**, 1277–82(1939). E. H.

The coal resources of McCone County, Montana. A. J. Collier and M. M. Knechtel. *U. S. Geol. Survey, Bull.* 905, 80 pp.(1939). E. H.

Investigation of water in coal. Hatiro Kodama. *J. Chem. Soc. Japan* **60**, 861–74(1939).—It is suggested that water exists in coal in a dissolved state, and varies directly with the relative humidity. The satn. values are given for Manchurian coals. Since chem. reaction takes place in the coals above 50°, coal should not be heated at 105–10° in the detn. of water content. T. Katsurai

Determination of the quantitative relationships between the volatile and the humic constituents of coal by the salt-flotation method, and the adoption of a new classification of coals. P. D. Lysenko. *Coke and Chem.* (U. S. S. R.) **1938**, No. 11, 4–14; *Khim. Referat. Zhur.* **2**, No. 4, 111(1939); cf. *C. A.* **33**, 3997[2].—About 60–70% of gas coals can be used in the coking mixt A mixt. contg. moisture 3.8, ash 7.31, S 1.96 and volatile substances 30.6% yielded gas 347 cu. m. per ton, anhyd. tar 4.35% (sp. gr. 1.13), metallurgical coke 94.5%, shaft coke 74.1%, NH_3 0.364% and C_6H_6 1.56%. The coke contained moisture 1.22, ash 9.87, volatile substances 0.98 and S 1.64%. Cast iron made with this coke was of better quality and required 14% less coke. W. R. H.

Atmospheric oxidation of coal at moderate temperatures. Rates of the oxidation reaction for representative coking coals. L. D. Schmidt and J. L. Elder. *Ind. Eng. Chem.* **32**, 249–56(1940).—Rates of oxidation of samples representative of 8 coal beds were measured at temps. below 100°. The characteristic rates of oxidation of the coals increased with increasing volatile matter content. A coal of 38% volatile matter oxidized 3 times faster than a coal of 18% volatile matter (dry basis). The rate of oxidation of each fresh coal decreased rapidly as the coal consumed O, the rate being inversely proportional to the $1/4$ root of the amt. of O consumed. For all coals tested, the rate of oxidation was proportional to the 0.61 power of the O concn. in the gas phase. The rate of oxidation of coal from the Pittsburgh bed increased by a factor of about 1.7 for each 10° rise in temp. In general, the relative storing qualities of coals depend upon their friabilities as well as their characteristic rates of oxidation. For the coals tested, higher rates of oxidation tended to be compensated by lower friabilities. Joseph H. Wells

Ignition of coal and high-speed gasification. D. A. Frank-Kamenetskiĭ. *J. Tech. Phys.* (U. S. S. R.) **9**, 1457–64(1939).—Theoretical. Reactions between gas and solid are considered and the conditions stated for the rate of reaction detd. by the reaction const. and for it detd. by the rate of the gas flow. When the reaction is exothermic and the gas flow rapid the transition from one state to the other takes place suddenly at a definite temp. This explains the results of Grodzovskiĭ and Chukhanov (cf. *C. A.* **30**, 6163[7]). J. J. Bikerman

A new formula for the calculation of the fuel value of coals from analytical data. László Sümegi. *Magyar Mérnök Építészegylet Közlönye* **74**, 15(1940).—The formula of the former paper (*C. A.* **34**, 1459[8]) contains no values corresponding to the amount of heat produced by the oxidation of CO groups. Practical expts. proved that

the formula gives good results; hence this factor may be neglected. S. S. de Finály

Modern problems in internal-combustion engineering. W. J. Walker. *Trans. S. African Inst. Elec. Engrs.* 30, 116(1939).—A new theory for the detonation of fuels proposes that nuclear points of combustion act in the same manner as elec. emission devices which energize the air and form ozonides of explosive properties. The latter lead to secondary combustion. Colloidal Lead stabilized with 0.25% rubber gave pronounced anti-knocking properties. Detonation problems in gas, oil, Diesel engines and turbines are covered. George Papps

Purification of wood generator gas from tar by mechanical methods. V. Gundobin and B. Ladyshkin. *Lesokhim. Prom.* **1938**, No. 5, 5-8; *Khim. Referat. Zhur.* 2, No. 4, 131(1939).—In scrubbers best results were obtained in the 4-plate scrubbers with a const. circulation of tar at 50°. The coeff. of absorption in percentage of the initial content of tar in the gas was 82.4% for tar and 76% for AcOH. A sepn. of 96.3% of tar was obtained in Thiessen's app. W. R. Henn

Calorimetric determination of heat losses from small amounts of unburned flue gas. Wilhelm Bühne. *Brennstoff- u. Wärmewirt.* 21, 202-5(1939).—See *C. A.* 33, 8381[3]. J. E. D.

Hydrogenated coal-tar chemicals. George R. Lawson. *Chem. Industries* 45, 679-81(1939). E. H.

Fuels and metallurgical industry (Ward) 9. Fuel gas from org. substances and wastes (Hung. pat. 122,564) 14. Tank for shipping natural gas (U. S. pat. 2,179,682) 1.

Crawford, D. R. G.: Gas Producer Operator's Handbook. London: Crosby Lockwood and Son, Ltd. 78 pp. 4s. 6d.

Mott, R. A., and Wheeler, R. V.: Quality of Coke. Second Report of Midland Coke Research Comm., Iron and Steel Industrial Research Council. London: Chapman and Hall, Ltd. 464 pp. 36s. Reviewed in *Industrial Power* **1939**, 342; *Colliery Guardian* **160**, 90(1940).

Coal and Iron in Latin America. Washington: Pan American Union. 31 pp. 5 cents.

Coal Trades' Diary and Colliery Managers' Guide for 1940. Croydon, Surrey: F. W. Bridges, Ltd. 6s. 6d.

Jahrbuch für den Ruhrkohlenbezirk, 1938. Issued by Verein für die bergbaulichen Interessen in Essen. Essen: Verlag Glückauf G. m. b. H. 646 pp. M. 26.

Report on A. S. T. M. Standard Specifications for Classification of Coals by Rank and by Grade and their Application to Canadian Coals. Prepd. for Assoc. Comm. on Coal Classification and Analysis of National Research Council of Canada. Ottawa: National Research Council. 25 cents.

Burning low-volatile solid fuels. Lawrence W. Corbett (33% to Ralph N. Doble and 34% to Wm. H. Doble). U. S. 2,180,196, Nov. 14. App. is described, and a method of burning low-volatile solid fuel in domestic heaters substantially completely without the use of a secondary air supply, involves feeding the fuel by gravity to the apex of a conical fuel bed in such a manner as to establish and maintain a thin fuel bed, producing a gentle undulating motion in the fuel bed sufficient to prevent agglomeration without effecting substantial interchanges of green and hot fuel lumps, supplying air under pressure to the under side of the fuel bed through a resistance whereby the distribution of air supply is rendered substantially independent of the character of the bed, and removing the ash from the edges of the conical fuel bed.

Thermostatic and electric system for controlling the combustion of fuels such as oil. Willis H. Gille (to Minneapolis-Honeywell Regulator Co.). U. S. 2,180,675, Nov. 21. Various details.

Combustion apparatus of the vaporizing pot type. Ben Valjean (to Motor Wheel Corp.). U. S. 2,180,443-4, Nov. 21. Various details of app. suitable for the combustion of fuel oil.

Apparatus for analyzing gases such as exhaust gases from internal-combustion engines. Philip T. Sprague and Charles A. Sprague. U. S. 2,180,322, Nov. 14. Various structural and operative details of an app. suitable for use with absorbing agents for various constituents of the gas.

Treating natural gas. Bernard M. Laulhere (to Fluor Corp., Ltd.). U. S. 2,180,596, Nov. 21. Natural gas contg. hydrate-forming compds. is passed, under high pressure and at a temp. above that of hydrate formation at such pressure, through a cooling zone in which the gas is cooled to a temp. below the temp. of hydrate formation in the presence of water introduced to the gas stream in sufficient quantity to prevent clogging accumulations of pptd. hydrates in the cooling zone at their temp. of formation. App. is described.

Evaporative apparatus for odorizing natural gas with materials such as "calodorant." Wm. A. Green and Edward Rolle (to Standard Oil Co. of Calif.). U. S. 2,180,584, Nov. 21. Various structural and operative details for treating natural gas with an odorizing material as it flows through a tube or pipe line.

Retort closure and spraying device suitable for use in producing and carbureting gas. Paul W. Thayer. U. S. 2,180,565, Nov. 21. Various structural, mech. and operative details.

Gas producer. Heinrich Koppers (to Koppers Co.). U. S. 2,179,638, Nov. 14. Various structural and operative details.

Gas producer with a revolving grate. Heinrich Koppers (to Koppers Co.). U. S. 2,179,637, Nov. 14. Various structural and operative details.

Intermittently operated water-gas generator. Paul van Ackeren (to Koppers Co.). U. S. 2,179,650, Nov. 14. Various structural and operative details.

Controlling apparatus for the displaceable elements of water-gas manufacturing plants and other plants involving cyclical changes. Davison & Partner Ltd. and Marcus William Corss Smythson. Brit. 506,217, May 24, 1939.

Removing liquid tar and sludge from water gas. Charles H. Printz (to Gas Machinery Co.). U. S. 2,180,848-9, Nov. 21. Two communicating containers for wash water are provided, one above the other. Gas is continuously passed into the upper portion of the upper container. Liquid tar and sludge settle through the wash water of the upper container and into the lower container. The communication between two containers is closed periodically and the settled and segregated liquid tar and sludge are drawn off. The wash water in this container is replenished, and the communication between the containers reopened, without interrupting the flow of the gas.

Sulfonate sludge recovery. Frank W. Corkery (to Pennsylvania Industrial Chemical Corp.). U. S. 2,180,728, Nov. 21. A method of recovering sulfonate sludge from still residue resultant from the treatment and distn. of light oil derived from the by-product coking of coal and contg. water-insol. sulfonates formed by acid purification and alk. neutralization in the light oil prior to distn. consists in pptg. sulfonates from the still residue by agitating the still residue with low-boiling aliphatic hydrocarbon, wetting the ppt. by agitating the mixt. with water before the pptd. sulfonates coagulate, effecting stratification of the mixt. and settling of the ppt. expedited by injection of live steam into the mixt. to form a water layer contg. the sulfonates and a hydrocarbon layer contg. the other still-residue ingredients in soln., sepg. the layer of still-residue soln. and the sulfonate-contg. water layer, and by drying recovering the sulfonates as a residual sludge.

Coke-oven battery. Singleton H. Kimmel (to Koppers Co.). U. S. 2,179,635, Nov. 14. Various structural and operative details.

Regenerative coke oven. Joseph Becker (to Koppers Co.). U. S. 2,180,857, Nov. 21. Various structural details.

Operating mechanism for coke-oven doors. Ragnar Berg and Robert W. Crist (to Koppers Co.). U. S. 2,179,608, Nov. 14. Various structural, mech. and operative details.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

Properties of crude petroleums from Peru. Alfonso Montero Muelle. *Informaciones mem. soc. ing. Perú* **40**, No. 1, 56–66; No. 2, 88–107; No. 3, 88–98(1939).—Data on Peruvian crude oils obtained by methods of the U. S. Bureau of Mines are compiled in such a way as to be comparable with data on foreign crude oils. K. R. 2

Determination of molecular weights (of petroleum fractions). Application of the Reid bomb. Hector A. Gonzalez and Gabriel Castañeda. *Bol. informaciones petroleras* (Buenos Aires) **16**, No. 180, 29–33(1939).—The mol. wts. of gasoline, illuminating oil, absorption oil, gas oil and crude petroleum were detd. from the vapor pressure of dil. solns. of the fractions in Et_2O in the Reid bomb. Katharine Reinau 3

The problem of salts in crude petroleum. Julio V. Canessa and Manuel F. Romero. *Bol. informaciones petroleras* (Buenos Aires) **16**, No. 178, 12–16(1939). Katharine Reinau

Industrial processes of desalting (of petroleum). Bernando Rikles and Jose Stowasser. *Bol. informaciones petroleras* (Buenos Aires) **16**, No. 178, 17–30(1939).—A general review, particularly of U. S. work, which also includes some results on Argentinian crude oils with various processes. Katharine Reinau 4

Selective refining of mineral oils by means of phenols extracted from primary tars. Jeanette Cornea-Mavrodi and Virgil Niculescu. *Bull. sect. sci. acad. roumaine* **20**, No. 1–3, 35–45(1938).—See *C. A.* **33**, 8418. J. E. D.

Refinery gas: A raw material of growing importance. Robert E. Wilson. *Chemistry & Industry* **1939**, 1095–1101; *Ind. Eng. Chem., News Ed.* **17**, 697–8(1939).— 5 Chemical Industry Medal address for 1939. It is predicted that exploitation of veritable chem. mines in oil refiners' backyards will in the next 20 years yield developments of an importance far exceeding the dramatic growth of this industry in its first 2 decades. Cracked gases amounting to 940,000,000 cu. ft. per day are available from oil-refinery operations. Their uses are: (1) direct utilization of compds. sepd. from refinery gas, (2) raw material for the chem. industry and (3) conversion into motor fuel and other products primarily useful within the petroleum industry. Increasing quantities of butane are being incorporated in motor fuel. Propane is an extraordinarily versatile precipitant in solvent extn. processes because its solvent properties change so rapidly over the convenient temp. range between its b. p. (−44°F.) and its crit. temp. (212°F.). One company is making commercially more than 100 synthetic chemicals starting 7 from C_2H_4, C_3H_6 and the butylenes. Approx. 600,000 gals. of polymer gasoline is being synthesized daily from olefin gases. Also there is present plant capacity in excess of 300,000 gals. per day for isolating relatively pure hydrocarbons and treating them with other hydrocarbons to produce aviation gasoline. D. F. Brown

Effect of supercharge on the comparative evaluation of the knock of fuels. M. M. Maslennikov and G. E. Bliznyukov. *Tekhnika Vozdushnogo Flota* **1939**, No. 11, 30–9.—The effect of supercharge on the comparative evaluation of the knock of motor fuels was studied with a Waukesha engine using Grozny aviation gasoline, Baku gasoline, Orsk gasoline, and Dubroval gasoline contg. ethyl fluid or c. p. benzene. The antiknock effect of the ethyl fluid was apparently not affected by supercharging. The greatest stability against knocking was shown by unsatd. compds., the naphthenes and aromatic compds. were about 9 equal but both were next to the unsatd. compds., while the paraffins knocked the worst. The octane number detd. by the C. F. R. method gives an indication of the value of the fuel for work under supercharge only when there is a small difference (up to 10%) in the content of paraffins and unsatd. compds. When the difference is large, fuels with the same antiknock properties under supercharging will have different octane numbers by the C. F. R. method. Such discrepancies may reach up to four octane units. B. Z. Kamich

Southern oil in 1939 worth $800,000,000 at the well. Victor H. Scales. *Mfrs. Record* **109**, No. 1, 37, 66(1940).—A survey of manuf. Leopold Scheflan

Fundamental mechanical aspects of boundary lubrication. H. Blok. *S. A. E. Journal* **46**, 54–68T(1940). H. A. Beatty

Switch oils with low carbon formation. K. A. Andrianov and A. K. Vardenburg. *Vestnik Elektroprom.* **1939**, No. 9, 23–5.—C formation in switch oils as a result of the elec. arcs. was reduced by as much as 50% after the oils were subjected to an addnl. refining with H_2SO_4. The C formation was not influenced by addns. of water or paraffin. C formation increased rapidly when Ni was substituted for Cu as the electrode metal. This is probably due to the catalytic dehydrogenation of the oil in the presence of the Ni at high temp. caused by the elec. arcs. B. Z. Kamich

Influence of paraffin upon the characteristics of bitumen. III. Vasile Th. Cerchez and Virgil Niculescu. *Atti X° congr. intern. chim.* **4**, 211–15(1939).—See *C. A.* **33**, 7543[1]. J. E. D.

Asphalts obtained from Argentinian petroleums. Alberto Zanetta. *Bol. informaciones petroleras* (Buenos Aires) **16**, No. 174, 3–11(1939).—Data on the Argentine product in comparison with asphalts from other countries and fields. Katharine Reinau

Naval store studies. C. F. Speh. *Mfrs. Record* **109**, No. 2, 30–1, 54(1940).—A historical review. L. S.

Destructive distillation of agricultural wastes. P. Burke Jacobs. *Ind. Eng. Chem.* **32**, 214–26(1940).—The history and development of the continuous destructive distn. process as applied to wheat straw, cornstalks, oat hulls, rice hulls, and sawdust is described. Product compn. and yields are given, and uses of the products are discussed. H. G. Bowlus

Recent advances in chem. utilization of wood in United 6 States [wood distn. products] (Benson) **23**. Modern problems in internal-combustion engineering (Walker) **21**. Purification of wood generator gas from tar by mech. methods (Gundobin, Ladyshkin) **21** Isomerization of olefins (Fr. pat. 841,004) **10**.

Laffitte, P.: La détonation, la projection de la flamme et la cause du phénomène du choc. Paris: The Author. 10 pp. Reviewed in *Chimie & industrie* **42**, 466(1939).

A. S. T. M. Standards on Petroleum Products and Lubricants. 1939. Prepd. by Comm. D-2 on Petroleum Products and Lubricants. Philadelphia: Am. Soc. for Testing Materials. 336 pp. $2.

The Cracking Art in 1938. Edited by **Gustav Egloff.** Chicago: Universal Oil Products Co. Research Labs. 458 pp.

Fractional distillation of petroleum oils and solvents, etc. Merrell R. Fenske (to Pennsylvania Research Corp.). U. S. 2,180,512, Nov. 21. Various details of app. and operation which may be controlled with use of a colorimeter and photoelec. cell, etc. 8

Distillation and cracking of petroleum oil hydrocarbons. Geo. Armistead, Jr. (to Gasoline Products Co.). U. S. 2,179,989, Nov. 14. Crude petroleum is distd. to form a crude residuum, a gas-oil condensate and a naphtha condensate. The naphtha condensate is passed to an elongated cracking zone of restricted cross section. The crude residuum is introduced into the same cracking zone intermediately between the ends thereof into admixture with the cracked naphtha, and the admixed hydrocarbons are passed through the remainder of the cracking zone. The cracked products are sepd. into vapors and residue, the vapors sepd. into a heavy gas oil condensate and a desired distillate, the gas-oil condensate from the crude

distn. is introduced into a second elongated cracking zone of restricted cross section, the aforesaid heavy gas-oil condensate is introduced into the second cracking zone intermediately between the ends thereof and into admixture with the condensate therein. The products from the second cracking zone are fractionated to recover desired products.

Gas lift or natural flow oil well. Howard C. Pyle (to Union Oil Co. of Calif.). U. S. 2,181,099, Nov. 21. Means for reducing the bottom-hole back-pressure required for a given rate of production in a naturally flowing or gas-lift well comprises a well contg. tubing and casing and means supported by the tubing near the bottom of the casing substantially to seal the annular spacing therebetween and means to maintain a reduced gas pressure in the annular space between the tubing and the casing above the sealing means.

Solidifying or sealing off formations traversed by a well. Franklin A. Bent and Albert G. Loomis (to Shell Development Co.). Can. 386,195, Jan. 9, 1940. A nonaq. drilling fluid comprising an org. compd. of Si dispersed in a nonaq. solvent selected from the group consisting of mineral oil, gasoline, naphtha, benzene, alcs., esters and ketones is introduced under pressure, and the insol. ppt. deposited on the walls of the borehole and within the adjacent formations. An app. is described.

Sealing water-bearing strata. Hijman Limburg (to Shell Development Co.). Can. 386,200, Jan. 9, 1940. A soln. of asphalt bitumen in an org. solvent, e. g., pyridine, adapted to ppt. asphalt when dild. with water, is introduced into water-bearing strata.

Separator suitable for treating emulsified water and oil from wells. Henry V. King. U. S. 2,180,811, Nov. 21. Various structural and operative details.

Fractionating hydrocarbon oils such as Venezuelan distillate oils. Gerritt W. Nederbragt (to Shell Development Co.). U. S. 2,180,763, Nov. 21; Can. 386,199, Jan. 9, 1940. A process for producing a normally liquid, essentially nonaromatic hydrocarbon product involves dewaxing a wax-bearing hydrocarbon mixt. in the presence of a selective solvent for aromatic hydrocarbons to produce a soln. of a substantially wax-free hydrocarbon mixt. in the solvent, removing the wax from the soln., cooling the soln. to a temp. between about −35° and −125° sufficiently low to solidify a portion of the hydrocarbons as a solid phase and form simultaneous liquid raffinate and extract phases, the solvent being capable of forming the two liquid phases at the low temp. and having a sufficient solvent power to dissolve all liquid hydrocarbons in a single liquid phase at a higher temp. at which at least a portion of the wax-free hydrocarbons are solidified, sepg. the solid phase from the liquid phases, sepg. the remaining liquid phases one from the other, combining hydrocarbons in the sepd. solid phase with hydrocarbons in the sepd. liquid raffinate phase and reliquefying the hydrocarbons in the solid phase to form a normally liquid, essentially nonaromatic product.

Refining hydrocarbon oils with mixed solvents. James W. Weir (to Edeleanu G. m. b. H.). U. S. 2,179,909, Nov. 14. For sepg. high viscosity index from low viscosity index components, an oil such as a dewaxed Calif. oil distillate is treated with a mixt. of a pyridine type solvent and an auxiliary selective solvent such as $PhNO_2$, aniline or chloraniline which does not react with alkali, in the presence of an alkali metal hydroxide soln. in sufficient amount to form 3 phases, the ext. phase being dispersed in a continuous raffinate phase, and the 3 phases are then sepd.

Removing gum-forming and color-imparting substances from cracked unsaturated hydrocarbon oils. Rudolph C. Osterstrom (to Pure Oil Co.). U. S. 2,180,324, Nov. 14. An arrangement of app. is described, and a process for effecting the removal of gum-forming and color-imparting compds. from cracked low-boiling unsatd. hydrocarbon oils, which involves passing a solely petroleum liquid mixt. of such oils and hydrocarbon polymers contg. the compds. through a heating zone, where the mixt. is heated in the liquid phase to a temp. of the order of 3:5° while maintained under pressures of the order of 1200 lb. per sq. in.

Treatment of a synthetic hydrocarbon oil. Hendrikus Stokman (to Shell Development Co.). Can. 386,196, Jan. 9, 1940. The oil produced by polymerization of olefins with an active halide polymerization catalyst is treated to decrease chemically bound halogen to not more than 0.002% by contact with a bleaching clay in amt. 2–4% by wt. of the oil at 200–300° for above 10 min. and insufficiently long to render the oil unstable.

Sweetening sour hydrocarbon distillates. Virden W. Wilson (to Buffalo Electro-Chemical Co.). U. S. 2,181,036, Nov. 21. A distillate such as a gasoline distillate is treated with an alc. soln. of caustic alkali and an oxidizing agent yielding H_2O_2. U. S. 2,181,037 describes an arrangement of app. and a method of sweetening sour distillates by treatment with a MeOH soln. of a caustic alkali and water and an oxidizing agent capable of liberating H_2O_2.

Separation of paraffins from nonparaffins in a hydrocarbon oil. Virgil Leland Hansley (to E. I. du Pont de Nemours & Co.). Can. 385,898, Dec. 26, 1939. The oil is extd. with a mixt. of *N,N*-dialkylformamide and $(ClCH_2CH_2)_2O$.

Liquid products from normally gaseous hydrocarbons. Mathias Pier (to I. G. Farbenind. A.-G.). U. S. 2,179,829, Nov. 14. App. is described, and a process which involves heating normally gaseous hydrocarbon material such as C_4H_{10} in a tubular space to above 500° to effect at least partial dehydrogenation and then subjecting the dehydrogenated material to polymerization by passing it through a space surrounding the tubular space mentioned and which is maintained at an elevated temp. at least about 20° lower than the tubular space.

Regenerating aluminum chloride catalysts used with hydrocarbon oils. Geo. A. Boyd (to Standard Oil Co. of Ind.). U. S. 2,180,220, Nov. 14. A catalyst complex formed by the reaction of an $AlCl_3$ catalyst with a hydrocarbon oil is broken down by treatment with CO and a promoter such as H, Cl or HCl at a temp. above room temp. but below 260° (suitably about 65–70°).

Absorbent clay suitable for treating oils, etc. Walter S. Baylis and Wm. Kelley (to Fullerite, Inc.). U. S. 2,180,576, Nov. 21. An arrangement of app. is described, and a process of producing a highly active acid-treated fuller's earth or clay which includes: mixing a quantity of unground hydrous Al silicate and a strong mineral acid with sufficient water to make a readily flowable pulp therefrom; heating the mixt. under pressure with substantially no agitation thereof, whereby the natural grain size of the silicate particles is preserved; washing the treated mixt. to remove free acid and sol. salts therefrom; and drying the washed silicate.

Extraction of naphthenic acid. Johannes H. W. R. van Tonningen (to Shell Development Co.). Can. 386,508, Jan. 23, 1940. A hydrocarbon oil, e. g., a kerosene distillate, contg. naphthenic acids boiling within the distn. range of the kerosene is treated with an aq. NH_3 soln. to form a hydrocarbon layer and an aq. layer contg. a larger portion of the carboxylic acids, and the layers sepd. An app. is described.

Stabilizing liquid hydrocarbon materials such as gasolines. Charles H. Fisher (to Pennsylvania Coal Products Co.). U. S. 2,176,883, Oct. 24. For inhibiting discoloration and gum formation during storage, the material is mixed with about 0.01% or less of a tetraalkylhexahydroxyspirobiindan.

Gasoline. Bernard H. Shoemaker (to Standard Oil Co. of Ind.). U. S. 2,180,372, Nov. 21. An arrangement of app. is described, and a process of producing high knock-rating gasoline from heavy hydrocarbon oil, which comprises heating the hydrocarbon oil charging stock to cracking temp. and converting about 25–40% thereof to gasoline, sepg. unvaporized heavy residue from the vapors of gasoline and unconverted heavy oil, cooling the vapors of gasoline and unconverted heavy oil and bringing them into contact with a catalytic mass of argillaceous earth at a temp. of about 370–425°, thereafter conducting the vapors

to a fractionating zone, therein sepg. gasoline from unconverted heavy oil and recycling the unconverted heavy oil, consisting of about 60–75% of the charging stock, to the cracking step.

Gasoline products. Eldon E. Stahly and Erwin M. Hattox (to Standard Oil Development Co.). U. S. 2,180,374, Nov. 21. An arrangement of app. is described, and a process suitable for the treatment of gaseous mixts. from oil cracking, etc., which involves treating a mixt. contg. at least one low-boiling isoparaffin with at least one member of the group consisting of normally gaseous mono-olefins, dimers, trimers, tetramers and higher polymers thereof, co-, inter-, and cross-dimers, trimers, tetramers and higher analogous polymers thereof, in the presence of a catalyst taken from the group consisting of a catalyst of the type QX.ZX wherein Q stands for a metal other than Al, Z stands for Al, the molar ratio of ZX to QX being greater than 1 to 1, and X is a halogen.

Fuel oil. Garland H. B. Davis (to Standard Oil Development Co.). Can. 386,368, Jan. 16, 1940. An improved fuel oil contains both waxy and asphaltic materials and a small amt. of an aliphatic or an aromatic amine and a hydroxylated deriv. of these.

Oil filter suitable for use with internal-combustion engines. Conrad E. Frudden (to Allis-Chalmers Mfg. Co.). U. S. 2,179,784, Nov. 14. Various structural details.

Petroleum lubricating oil mixtures. Arnold C. Vobach (to Sinclair Refining Co.). U. S. 2,180,697, Nov. 21. About 0.5–2.5% of a phenyl stearate of Al, Ba, Cd, Cr, Mg or Ni is mixed with a petroleum lubricating oil such as a Diesel-engine oil to improve stability and lessen sludge deposition. U. S. 2,180,698 relates to a mixt. of oil with about 0.5–2.5% of stannous phenyl stearate; and U. S. 2,180,699 relates to a mixt. of oil with about 0.5–2.5% of Zn phenyl stearate

Lubricating oils. Union Oil Company of California. Fr. 840,962, May 8, 1939. The introduction into lubricating oils of 0.8–3.0% of a metallic soap of a chlorinated acid contg. at least 14 C atoms increases the oiliness and prevents the formation of gummy deposits around the valves and segments of Diesel motors. A Ca soap is preferable. The chlorine content is about 20% of the acid, which corresponds to dichloro acids. Instead of a metallic soap of a chlorinated acid it is possible to use a mixt. of a metallic soap of a nonchlorinated acid together with a small amount of a compd. that will increase the oiliness and the pellicular resistance of the oils, such as the Me, Et and Am esters of halogenated fatty acids, the Me and Et esters of chlorinated synthetic petroleum acids, chlorinated naphthalene or sulfonated lard. Soaps of organic bases, such as triethanolamine, also can be used.

Lubricating oils suitable for use under high pressure and in metal cutting, etc. Bert H. Lincoln, Waldo L. Steiner and Alfred Henriksen (to Lubri-Zol Development Corp.). U. S. 2,180,008, Nov. 14. About 0.1% or more of a halogenated resorcinol such as chlorinated resorcinol is added to an oil such as S. A. E. 30 lubricant, and numerous similar mixts. are described.

Improvement of lubricating oils. Ruhrchemie A.-G. Fr. 840,980, May 8, 1939. See Brit. 490,930 (*C. A.* 33, 1139[1]).

Lubricating composition. George S. Cavanaugh (to Pennzoil Co.). Can. 386,360, Jan. 16, 1940. The sludge-dissolving property of mineral oil is increased by adding diethylene oxide, at least 0.05%, but in insufficient amt. materially to change the fire and flash characteristics of the oil.

Low-pour-test lubricating distillates. Herschel G. Smith (to Gulf Oil Corp.). U. S. 2,180,070, Nov. 14. In the manuf. of a high yield of low-cold-test lubricating distillates from low-grade crudes, a procedure is employed which involves reducing such a crude and recovering an uncracked pressable distillate and a residuum, distg. off from the residuum a heavy pressable distillate and a light overhead cylinder stock, mixing the pressable distillates and filter pressing the same to remove cryst., readily pressable wax; diluting the overhead cylinder stock, centrifuging the same for removal of wax, reducing the same to recover a lubricating distillate, uniting the lubricating distillate with the filter-pressed distillates, adding sufficient amorphous wax to render the wax content of the mixt. centrifugeable, removing the wax content by centrifuging in a liquid separator at low temps. and recovering a low-cold-test neutral oil.

Regeneration of used oils. László Hunyadi and Jenő Koch. Hung. 122,424, Dec. 15, 1939. Used oils are treated with clarifying substances, filtered and distd. A special app. effects automatic change of the direction of the oil in the filters.

Lubricants. Standard Oil Development Co. Brit. 508,335, June 29, 1939. A lubricant for extreme pressures or for cutting tools is made by causing a high-boiling org. compd. contg. an aliphatic chain to react with a sulfide, hydrosulfide or polysulfide of H, NH_3, alkali metal or alk.-earth metal. Preferably, an aliphatic hydrocarbon is caused to react with a polysulfide to give an org. polysulfide. Also, a chlorinated petroleum fraction may have all or part of its Cl replaced by S by treatment with 1 of the sulfides, hydrosulfides or polysulfides. A solid aliphatic hydrocarbon may be used in place of the petroleum fraction. An unsatd. hydrocarbon obtained by dehydrogenation or cracking of an aliphatic hydrocarbon, or a higher aliphatic alc., ketone or ester (preferably of 10 or more C atoms), may be caused to react with an inorg. polysulfide to produce an org. polysulfide.

Lubricant. Lawrence M. Henderson, William A. Whittier, Norman D. Williams and Harry L. Moir (to Pure Oil Co.). Can. 386,187, Jan. 9, 1940. A small amt. of S is made to react with a fatty substance, e. g., lard oil, a small amt. of P or a P compd. added, the mixt. heated to about 230°F. until the reaction is complete, and the product cooled.

Grease. Vernon L. Ricketts (to Shell Development Co.). Can. 386,507, Jan. 23, 1940. A grease contains a viscous mineral oil, a soda soap, and a minor proportion of Na salicylate.

Asphalt from petroleum residuum. Charles H. Whitacre (to Standard Oil Co. of Ohio). U. S. 2,179,988, Nov. 14. A mixt. of asphaltic residuum and cylinder stock is oxidized, and after discontinuing the oxidation the material is subjected to the action of about 0.1–1.0% of $AlCl_3$ at an elevated temp. not substantially higher than that of the oxidizing operation (suitably about 180°). Cf. *C. A.* 34, 1478[5].

'23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Simplified method for the volumetric determination of α-cellulose. S. V. Goncharov and F. G. Burvasser. *Bumashnaya Prom.* 17, No. 10, 27–9(1939).—In a modification of the previous method (*C. A.* 31, 7639[9]) α-cellulose (I) is oxidized directly without preliminary soln. in 80% H_2SO_4 + AcOH. After the trituration of 0.3 g. of disintegrated sulfite pulp with 8 ml. of 17.5% KOH for 15 min., filter on a Büchner funnel, wash I with 10 ml. of *N* H_2SO_4, transfer it into a flask contg. 50 ml. H_2O, 50 g. of concd. H_2SO_4 and 2.5 g. $K_2Cr_2O_7$, boil 5 min. (exactly), cool, make up to 500 ml., withdraw 25 ml. of the soln. and titrate excess of $K_2Cr_2O_7$ with $Na_2S_2O_3$. Make a blank test. Chas. Blanc

The preparation of cellulose ethers. Thomas P. Clémens. *Rusta-Rayonne* 14, 431–5(1939).—A review of the chief Lilienfeld pats. (Brit. and Fr.). A. P.-C.

(Cellulose) plastics in ribbon form. Paul A. Koch. *Melliand-Textilber.* 20, 479–83(1940).—A review of vari-

ous products made from viscose or cellulose acetate by spinning through slits, by applying viscose to textile fabrics or by enclosing sheet material between 2 cellulose films, etc. Emphasis is placed on the possibilities of obtaining artistic effects, e. g., by printing, embossing or coloring such products, by plaiting strip material, etc. J. W. Perry

Lowering the viscosity of nitrocelluloses. Jules Michel. *Rev. gén. mat. plastiques* **15**, 282–5(1939).—A review and discussion of pats. on the lowering of the viscosity of nitrocellulose in acid and in alk. medium, and of the application of this lowering of viscosity to the prepn. of alc.-sol. nitrocelluloses. A. Papineau-Couture

Saccharification of wood. H. Schöller. *Chem.-Ztg.* **63**, 737–40, 752–4(1939); cf. *C. A.* **33**, 7543⁴.—A review. E. H.

The industrial hydrogenation of lignin. A. J. Bailey. *Pacific Chem. Met. Inds.* **4**, No. 1, 13–14, 16(1940).—A review with 34 references. E. H.

"Milky" viscose rayon. S. Poznanski. *Atti X° congr. intern. chim.* **4**, 804–11(1939).—See *C. A.* **33**, 5180². J. E. D.

Direct spinning of artificial fiber through the acetate method. I. Materials and the stability of the spinning solution. Risaburo Yosimura and Yosihiro Kisibata. *Repts. Osaka Imp. Ind. Research Lab.* **20**, No. 2, 100 pp. (1939).—This report describes in detail the materials, methods, and the factors affecting the stability of the spinning soln. F. I. Nakamura

Detection of toxic vapors in the rayon industry. Raoul Relaitre. *Rusta-Rayonne* **14**, 465, 467(1939).—A brief outline of tests for detecting H_2S ($Pb(OAc)_2$ paper), SO_2 (paper impregnated with starch, KI, KIO_3 and glycerol) and CS_2 (paper impregnated with Et_2NH and Cu acetate). A. Papineau-Couture

Recent advances in the chemical utilization of wood in the United States. H. K. Benson. *Atti X° congr. intern. chim.* **4**, 105–16(1939). —A discussion of wood as a source of paper pulp, cellulose derivs., staple fiber, naval stores, wood-distn. products, synthetic lumber and wood plastics. E. H.

Chemical composition of wood. II. V. I. Sharkov and F. A. Sartaniya. *Lesokhim. Prom.* **1938**, No. 3–4, 17–21; *Khim. Referat. Zhur.* **2**, No. 4, 130(1939); cf. *C. A.* **33**, 3584⁷.—On the basis of a generalization of previous data, conclusions are drawn as to the genesis of wood. W. R. Henn

Dispersion of wood material in a solution of zinc chloride. D. N. Lektorskiĭ. *Lesokhim. Prom.* **1938**, No. 5, 21; *Khim. Referat. Zhur.* **2**, No. 4, 129(1939).—The soly. of wood in solns. of KI, LiCl and $ZnCl_2$ of different concns. was investigated. Only solns. of $ZnCl_2$ dissolved the wood material. To prep. the soln. dissolve 150 g. of $ZnCl_2$ in 100 cc. of water contg. 0.15 g. of HCl, and treat 0.1–0.2 g. of the wood material with 100 cc. of the soln. for 5–15 min. at 135°. The product was shown to be a colloidal soln. by means of the Tindall app. and the ultramicroscope. The character of the process of soln. of the wood material depends on the acid used for dissolving $ZnCl_2$. On diln. with water the solns. decomp. with a sepn. of the wood material in the form of flakes. The color and the stability of the solns. point to a high degree of dispersion of the wood material in soln. W. R. Henn

Manchurian woods for manufacture of pulp. III. I. Miura. *Cellulose Ind.* (Tokyo) **15**, 4–6(1939); cf. *C. A.* **32**, 8134¹.—Pulps from Manchurian woods, the cooking properties of which had previously been studied (*loc. cit.*), were subjected to a two-stage bleaching process and the yield and properties of the resultant pulps detd. Of the woods examd., *Picea obovata*, Ledeb. (I), and *Abies nepherolepis*, Max. (II), are considered to be suitable raw materials for paper and rayon. They yield 41.4 and 37.5% (or 153 and 139 kg. per cu. m. of wood) of bleached pulp, having 89.5 and 91.8% of α-cellulose, resp. *Pinus koraiensis*, S. and Z. (III), and the hardwoods (two sorts of aspen, lime and birch) give bleached pulps which are inferior to I and II, although except for III their yields per cu. m. of wood are much greater than that of I and II. The aspens are easily digested by the sulfite process and give readily bleachable pulps. Max. yield per cu. m. of wood was obtained with *Betula mandshurica*, Nakai (41.4% or 298 kg. per cu. m. of wood), which has the highest vol.-wt., but the pulp from this wood has only 79.2% of α-cellulose. B. C. P. A.

Chemical composition of wood bark. V. Uronic acids in wood bark. V. I. Sharkov. *Lesokhim. Prom.* **1938**, No. 3–4, 16–17; *Khim. Referat. Zhur.* **2**, No. 4, 130 (1939); cf. *C. A.* **33**, 1050⁹.—Analytical data on the compn. of uronic acids in wood bark obtained by the methods of Nanji, Paton and Ling are: fir—bast 5.98–6.51%, bark 3.95–4.31%; birch—bast 7.35%, bark 2.20%; aspen—bark 3.56%. A part of the uronic acids which are contained in bark is not an integral part of pectins but is a part of the hemicellulose of the cell wall. A method was developed for the analysis of pectins, fruits, berries and fleshy roots. The method has not been verified for the analysis of wood material. W. R. Henn

Hydrolysis of peanut hulls. Frank C. Vilbrandt, C. B. Mather and R. S. Dicks. *Ind. Eng. Chem.* **32**, 169–72 (1940).—The action of water and of dil. sulfuric acid on peanut hulls at 20°, 50°, 80° and 100° with liquid-solid ratios of 10:1 and 8:1 was studied. Hydrolysis by water gave in 48 hrs. 5% of the dry wt. of the hulls as reducing sugars. Hydrolysis with 0.4 *N* H_2SO_4 gave in 48 hrs. 22% of reducing sugar. The amt. of reducing sugar increased with acid concn. up to 4.5 *N*; above 4.5 *N* and 80° the sugar decomposed. The rate of hydrolysis increased with temp., but little action occurred below 80°. The yield of sugar increased with time of treatment and approached a max. in about 48 hrs. H. G. Bowlus

Machines for chopping sawmill wood waste. G. S. Kovalevich. *Bumazhnaya Prom.* **17**, No. 10, 37–43 (1939).—From a comparison of the performance of the Karlstadt (Sweden) and Wieger (Germany) machines at the Solombal'skiĭ paper mill, the preference is given to the former installation. Chas. Blanc

The Swedish sulfate pulp industry. Erland Waldenström. *Wochbl. Papierfabr.* **70**, Tech. Tl. 943–4(1939).—A historical review. Louis E. Wise

Production of pulp by the nitric acid process. VIII. I. Simoda, N. Ebara, and T. Murakoski. *Cellulose Ind.* (Tokyo) **15**, 7–9(1939); cf. *C. A.* **33**, 8403¹.—Attempts were made to produce from straw HNO_3 pulp for rayon. Varying concns. of acid with and without admixture of H_2SO_4 were tried, and in each case digestion was carried out for 2 hrs. at 100° with a 2% aq. NaOH after-treatment at the same temp. for 1 hr. Complete digestion was obtained with 5% HNO_3, the pulp having 93.6% of α-cellulose (I). Max. I (95.6%) was reached with 9% HNO_3, but the ash content was never less than about 0.6% and is thus greater than that of com. sulfite pulps for the same purpose. In many respects, however, the HNO_3 straw pulp was superior to com. sulfite pulps, notably in I and pentosan content (min. 1.85%). With HNO_3–H_2SO_4 mixt. the I contents with 3–4% HNO_3 and 3% H_2SO_4 were similar to those with 7–8% HNO_3 alone, and pentosans were slightly reduced. It was not possible, however, to reduce the ash content of the pulp below the relatively unsatisfactory value of 0.6–0.8%. With 5% HNO_3 alone the pulp yield was about 31%, while with the mixed acids above it was reduced to about 28%. B. C. P. A.

Combined bleaching of pulp. F. P. Komarov. *Bumazhnaya Prom.* **17**, No. 10, 14–19(1939). F. P. Komarov and N. V. Lebedev. *Ibid.* No. 11, 16–20; cf. *C. A.* **34**, 884³.—In these 2 preliminary communications the literature is reviewed and the tentative lab. expts. are discussed. 30 references. Chas. Blanc

Rapid determination of (pulp) concentrations. D. N. Zhokhov. *Bumazhnaya Prom.* **17**, No. 10, 31–7(1939).—A discussion, with math. treatment, of the detn. of pulp in aq. suspension, based on the sepn. of pulp by centrifuging. Illustrations are given. Chas. Blanc

Causes of the contamination of Syask pulp with dirt. D. M. Shilinskiĭ. *Bumazhnaya Prom.* **17**, No. 10, 19–26 (1939).—A discussion with suggestions for improvement. Chas. Blanc

Preparation of strong and "superstrong" cooking acid. M. G. Eliashberg. *Bumazhnaya Prom.* **17**, No. 10, 8–14; No. 11, 6–13(1939). **Strong cooking acid for sulfite pulping.** K. V. Khodakov. *Ibid.* 14–15.—A discussion of the methods and installations for the production and recovery of strong SO_2 solns. and their uses in sulfite pulping, based chiefly on foreign practice. Chas. Blanc

The use of refining waste pulp mass in the purification of waste waters. A. I. Samyshkina. *Bumazhnaya Prom.* **17**, No. 10, 43–4(1939).—A complete decolorization and a reduction of 35% of org. matter in paper-mill waste waters can be effected by the addn. of refining waste mass in the process of filtration. Chas. Blanc

Determination of oxidizable matter in alkaline waste waters. L. Kh. Khristiansen and O. A. Kalendarova. *Bumazhnaya Prom.* **17**, No. 10, 55–7(1939). It is claimed that a greater accuracy can be attained in the detn. of org. matter in waste waters of sulfite and sulfate pulping by oxidation with $KMnO_4$ in alk. medium and avoiding boiling temp. Dil. waste water or strong waste liquor to a content of 0.15–0.25 g. of org. matter in 1000 ml. To 25 ml. of the soln. add 25 ml. of 0.1 *N* $KMnO_4$ and 10 ml. of 5% NaOH, immerse the flask in a boiling water bath and digest 40 min. Introduce 10 ml. of 25% H_2SO_4, let stand 10–15 min. and titrate back the excess of $KMnO_4$ with standard soln. of oxalic acid. Chas. Blanc

Purification of smoke gases and recovery of escaping chemicals in soda-regenerating installations of sulfate-pulp mills. S. M. Vishnevskiĭ. *Bumazhnaya Prom.* **17**, No. 11, 20–8(1939).—A review of Soviet and foreign practices, with literature references and illustrations. Chas. Blanc

Mangrove woods from Tanganyika for papermaking. Anon. *Bull. Imp. Inst.* **37**, 331–44(1939).—"Makandaa" wood (*Ceriops candolleana* Arn.) had the following compn. on the dry basis (H_2O 7.7%): resins (alc.-C_6H_6 ext.) 9.5, alkali soly. (via Schorger) 25.6, cellulose 49.1, ash 1.1%, fiber length 0.7–1.6 mm. (av. 1.4 mm.), fiber diam. 0.011–0.033 mm. (av. 0.021 mm.). Cooking 5 hrs. to a max. temp. of 160° with 4% NaOH soln. (20 parts NaOH per 100 parts oven-dry wood) yielded 38.9% of slightly undercooked, somewhat shivy pulp, which could not be bleached satisfactorily with 40% (on the dry wt. of the pulp) of standard bleaching powder, and which produced a slight shivy, dark-brown, hand-made sheet of very weak, soft paper. Cooking under more drastic conditions gave a considerably lower yield (32.8–33.9%) of pulp which could be bleached to a cream color with 30% of standard bleaching powder. "Mchuu" wood (*Avicennia officinalis*) showing considerable staining had the following compn. on the dry basis (H_2O 8.0%): resins (alc.-C_6H_6 ext.) 1.5, alkali soly. (via Schorger) 16.7, cellulose 54.7, ash 2.3%, fiber length 0.4–1.3 mm. (av. 1.0 mm.), fiber diam. 0.011–0.030 mm. (av. 0.020 mm.). Cooking 5 hrs. to a max. temp. of 160° with 4% NaOH soln. (24 parts NaOH per 100 parts oven-dry wood) yielded 42.1% of well-cooked pulp, free from shives which could not be fully bleached with 40% of standard bleaching powder and which produced a dark-brown, well-formed hand-made sheet of very weak, soft paper, free from shives but contg. numerous small brown specks. Two-stage bleaching with a total of 20% of standard bleaching powder produced a pulp of excellent whiteness, but with a shrinkage of over 10% (yield 32.3% on dry wood). "Makaka" wood (*Rhizophora mucronata*) had the following compn. on the dry basis (H_2O 7.6%): resins 4.4, cellulose 63.4, ash 1.5%, fiber length 0.8–2.1 mm. (av. 1.5 mm.), fiber diam. 0.016–0.043 mm. (av. 0.026 mm.). Cooking under the same conditions as for "mchuu" yielded 47.5% of well-cooked pulp completely free from shives, which could not be bleached with a reasonable quantity of bleaching powder, and which produced a dark-brown, well-formed hand sheet of very weak and soft paper, of loose spongy texture and free from shive. Cooking under more drastic conditions considerably reduced the yield (39.6–44.7%) without a corresponding improvement in the bleachability of the pulp. A. Papineau-Couture

Air requirements in paper manufacture. A. B. Davies. *Wochbl. Papierfabr.* **70**, Tech. Tl. 796–7(1939); cf. *Ind. Heating Engr.* **1**, No. 2, 42(1939).—For every ton of paper made from wood, rag or esparto pulp approx. 410 tons of air is circulated. This figure varies between wide limits. An analysis is made of how this air is utilized (e. g., in ventilation, boiler firing, for conveying purposes, dust removal, drying, humidifying, heating, and conditioning of paper). Louis E. Wise

The use of bitumen in the production of fibrous products. Fritz Ohl. *Wochbl. Papierfabr.* **70**, Tech. Tl. 903–4 (1939).—Description of the incorporation of bitumen in paper, pulp and paperboard. Louis E. Wise

Retention of aluminum ion and hydrogen ion in papers. Herbert F. Launer. *J. Research Natl. Bur. Standards* **23**, 663–74(1939) (Research Paper No. 1262); cf. *C. A.* **33**, 6593⁴.—The lower pH of the soln. obtained by the extn. of paper with hot rather than with cold H_2O is attributed to increased hydrolysis of the Al salts in the paper. It is shown that neutral paper fibers selectively adsorb Al ions; hence the amt. of Al salt in the paper is much larger than would be expected from the concn. in the soln. used in its manuf. The addn. of fibers to an Al soln. raises the pH by an amt. depending on the nature of the fiber and the concn. of the soln. The pH changes observed on heating Al solns. are greater in the presence of paper fibers than in their absence. The addn. of rosin decreases the acidity of paper and also the difference in pH resulting from hot and cold extn. This is attributed to the formation of insol. Al resinate. S. Glasstone

Combating resin difficulties in paper mills. M. N. Beletskaya. *Bumazhnaya Prom.* **17**, No. 11, 28–36 (1939).—The literature on the nature and the methods of combating the injurious resins is discussed (cf. Konopatzkiĭ, *C. A.* **30**, 3230⁶). Storing unbleached pulp at 40° for 10 days eliminates the contamination of beaters, paper machine and the paper, because of the oxidation of injurious resins (volatile cymene hydrocarbons and unsatd. aliphatic acids). The best effect is obtained by adding 0.2% of NaOH on the wt. of fiber in the process of beating. The subsequent addn. of $Al_2(SO_4)_3$ aids in a more complete fixation of the sol. resins on the fiber. Chas. Blanc

The extractor press in the machine used in manufacturing carton. Wilhelm Spahr. *Wochbl. Papierfabr.* **70**, Tech. Tl. 913–14(1939).—The advantages of this press are indicated in practical mill runs. Louis E. Wise

Preservatives used in the paper, carton and board industry. Fritz Ohl. *Wochbl. Papierfabr.* **70**, 839–41 (1939).—There appears to be no one universal preservative. The toxic effects of Hg^{++} salts and fluorides must be considered when edibles are stored in paper containers. HCHO may cause discoloration of packed rayon materials. Relatively large amts. of H_3BO_3 and 2-$HOC_6H_4CO_2H$ are required for effective preservation. Preservative manufacturers should know what specific materials and chemicals are used in subsequent paper manufg. conditions of operation, temps., pH, etc. Special attention is drawn to *chlorothymol* with its very high phenol coeff.; *chlorocarvacrol*, various salts of chlorophenol and the chlorocresols, *chloramine T*, *chloroxylenols*, *hexylresorcinol*, 2-HOC_6H_4Ph (which is relatively harmless to man, but has a phenol coeff. of 20, and which actually improves sizing). Combinations of preservatives are often essential in special cases. Substituted phenols with long side chains, while excellent preservatives, are impractical because of their insoly. in H_2O. Louis E. Wise

Casein, its production and uses [in paper industry] (Wickman) **13**. Comparison of imperviousness of commonly used paper milk containers when in contact with contained liquids (Stoltz, Armstrong) **12**. Photomicrographic measurement of units of vegetable fibers (Vikhrov) **25**. Compns. for softening paper (U. S. pat. 2,180,133) **29**.

Bromley, H. A., and Shore, J.: Articles of Stationery and Allied Materials: Their Chemistry and Technical Examination. London: Grafton and Co., Ltd. 136 pp. 10s. 6d.

Hard, Arnold: Story of Rayon. London: United Trade Press, Ltd. 3s. 6d. Reviewed in *Textile Mercury Argus* **101**, 567(1939).

Postl, H.: Pappe und Karton. Vienna: H. Postl. 147 pp. M. 30.

Deutsches Papiermacher-Jahrbuch, 1939. Kalender der Papier-Industrie. Handbuch für den Papiermacher. Schotten: W. Engel. 390 pp. M. 3.

Regenerated-cellulose pellicle. Thomas F. Banigan (to E. I. du Pont de Nemours & Co.). U. S. 2,179,571, Nov. 14. A softened, wet, regenerated-cellulose pellicle is formed which is subject to shrinking by loss of water and is subject to staining when shrunk in contact with iron, and which contains sufficient triethanolamine, tripropanolamine or tributanolamine to prevent rusting of iron when the pellicle is dried in contact with iron.

Wood cellulose for the manufacture of cellulose derivatives such as cellulose acetate. Lionel E. Goff (to Cellulose Research Corp.). U. S. 2,180,517, Nov. 21. A process of converting unbleached sulfite wood fibers into a permeable network of activated cellulose comprises removing the ligneous material by treatment of the fibers with an amt. of Cl that is exhausted in the order of 20–30 min., removing the reaction products with dil. alkali, removing oxidizable material by a hypochlorite bleach, terminating the bleach having a pH greater than 7.4 before the cellulose is substantially degraded, and rendering the residual membranous material permeable by boiling in NaOH soln. of about 7% concn. Cf. *C. A.* **34**, 1172[9].

Precipitating cellulose triacetate. Carl J. Malm (to Eastman Kodak Co.). U. S. 2,180,009, Nov. 14. For pptg. substantially fully acetylated cellulose from a reaction mixt. in which it is dissolved, the reaction mixt. is introduced into a pptg. bath of HOAc of 40–60% strength and the strength of the pptg. bath is maintained throughout such introduction; the ester is removed from the pptg. bath and is treated with hot water until a product is obtained which upon drying is soft and nonborny.

Forming products such as filaments and threads from solutions of cellulose derivatives such as cellulose acetate. Wm. A. Dickie and Percy F. C. Sowter (to Celanese Corp. of America). U. S. 2,179,544, Nov. 14. A liquid coagulating medium is used, and the product, after coagulation, is subjected to the action of a liquid such as an acetone mixt. contg. at least 50% of nonsolvent plasticizing agents for the cellulose deriv. material, such as tritolyl phosphate or diethyl phthalate.

Apparatus for the manufacture of artificial filaments from materials such as viscose or cellulose esters. Louis S. Fryer (to Industrial Rayon Corp.). U. S. 2,181,052, Nov. 21. Various structural and operative details.

Cellulose ester compositions suitable for films, threads, coatings, molded products, etc. Lucas P. Kyrides (to Monsanto Chemical Co.). U. S. 2,180,281, Nov. 14. A mono-*N*-cyclohexyl aromatic sulfonamide of the benzene series such as *N*-cyclohexyl paratoluenesulfonamide is used as a plasticizer with cellulose esters such as cellulose acetate or nitrate.

Animalization of textile fibers. I. G. Farbenind. A.-G. Fr. 841,158, May 12, 1939. The coloring properties of wool are conferred upon artificial fibers by incorporating into the latter polymerization products, contg. N and resistant to acids and alkalies, obtained by the reaction of ethylenimine, its polymers or homologs with isocyanates or isothiocyanates. The polymerization products suspended in higher alcs. or in aromatic amines are added to the spinning solns. of cellulose, acetylcellulose or other artificial substances and emulsified. Among examples, 200 g. of the polymerized product dissolved in 500 g. cyclohexanol is emulsified with 10 l. viscose and subjected to known spinning treatments. The fiber differs from normal fiber only with respect to the coloring properties.

Circulation of groundwood stock. V. Calvin Harvey. Can. 386,113, Jan. 9, 1940. Operative and structural details are described of an app. for continuously conveying the groundwood stock output of several grinders mixed with water to a storage tank by jets spaced within the tank to mix the output intimately prior to delivery to a papermaking machine.

Circulation system for wood-pulp digesters. Einar Morterud. U. S. 2,179,796, Nov. 14. Various structural and operative details.

Apparatus for refining paper stock. Edwin Cowles (to The Cowles Co.). U. S. 2,180,080, Nov. 14. Various structural and operative details.

Shaking-mechanism for Fourdrinier papermaking machines. Bernard A. Malkin. Brit. 506,625, June 1, 1939.

Two-layer drier felt for papermaking apparatus. Thomas Hindle and Sam Lord. U. S. 2,180,054, Nov. 14. Various structural details.

Refining clay such as that for use in coating paper. Sanford C. Lyons (to Bird Machine Co.). U. S. 2,180,742, Nov. 21. A process of refining an aq. clay suspension contg. Fe_2O_3 as a coloring impurity, in which the Fe_2O_3 is reduced to a substantially colorless, water-sol. ferrous salt, involves treating the suspension contg. the dissolved ferrous salt formed with sufficient alkali metal polymetaphosphate to inhibit reversion of such salt to Fe_2O_3 and sepg. the clay from the suspension. Cf. *C. A.* **33**, 4036[3].

Ornamental coloring of paper. Ethan F. Bassford (to George La Monte & Son). U. S. 2,180,387, Nov. 21. App. is described, and a method of making ornamentally colored paper which comprises making paper having portions of a surface thereof of substantially differing absorptiveness for a liquid colored material, portions of lesser absorptiveness being of predetd. form, and producing a shaded effect in local areas adjoining the portions of lesser absorptiveness by successive applications of the coloring material, one application of the coloring material being an all-over application thereof to the surface of the paper, and another application of the colored material being made by spreading free coloring material from portions overlying the portions of lesser absorptiveness onto the adjoining local areas of the surface having greater absorptiveness.

Removal of printing ink from paper. Berthold Rassow and Edgar Herferth. Fr. 841,053, May 10, 1939. The fibrous material is treated with an aq. soln. of a pyrophosphate of an alkali metal or of NH_4.

Cigaret paper. Earle C. Pitman (to E. I. du Pont de Nemours & Co.). U. S. 2,179,953, Nov. 14. A discontinuous coating of a wax m. about 60°, such as a petroleum wax, and a mineral oil is used for prepg. a water-resistant cigaret paper.

24—EXPLOSIVES AND EXPLOSIONS

C. G. STORM

Calorimetry of explosives. E. Burlot, M. Thomas and M. Badoche. *Mém. poudres* **29**, 226–82(1939).—Sources of error in calorimetric tests have been investigated. With a solid explosive (dinitrophenol) the C. S. E. bomb gave the max. value for heat of combustion, but with a liquid explosive (nitroglycerin) divergencies were greater. Max. and mean divergencies in the value of *Q* for tetryl, trinitro-*m*-cresol, dinitrophenol, tri- and di-nitrophenetole, $C_6H_2Me(NO_2)_2$ and $NHPh_2$ were 0.05, 0.03; 0.07, 0.04; 0.0[2], 0.01; 0.07, 0.03; 0.05, 0.03; 0.08, 0.03 and 0.09, 0.03. Heats of combustion and formation of 25 nitrated products and 2 amines are tabulated. Corrections to be applied and precautions in connection with complete combustion, deposition of C, destruction of the pan, and attack on the Ni electrodes, are discussed. A. J. Phillips

Influence of moisture on the Abel heat test for nitroglycerin at 80°. R. Vandoni. *Mém. poudres* **29**, 204–5 (1939).—Nitroglycerin after distn. at 50°/0 003 mm.,

when dry, contg. 0.8% moisture and satd. with H_2O gave heat tests of 21, 30 and 45 min. Its resistance is therefore related to its moisture content. A. J. Phillips

Verification of the law of combustion of colloidal powders. H. Muraour and G. Aunis. *Mém. poudres* 29, 197–203, 211–15(1939).—Satisfactory agreement between exptl. and theoretical calcns. was obtained with cylindrical, semicylindrical and tubular powders contg. nitroglycerin and centralite, and Et centralite with Et phthalate when fired in a 150-cm. bomb. A. J. Phillips

Decomposition of nitrocellulose as a result of varied treatments. J. Desmaroux, R. Vandoni, L. Brissaud and Mlle. T. Petipas. *Mém. poudres* 29, 134–96(1939).—Nitrocellulose decomps. in 3 ways which may take place simultaneously but at different rates of speed, namely (1) by hydrolysis of the glucose linkages, (2) sapon. of the NO_3 groups and (3) oxidation of the glucose framework. (1) can be detd. by measurements of osmotic pressure or viscosity, (2) by decrease in percentage of N and (3) from CO_2, CO and CH_4 measurements. Details are given for the purification of ramie fiber and samples of nitroramie contg. 14, 13.75, 12.78, 12.10, 11.88 and 11.33% N were prepd. and heated for various periods (*a*) in 25% HNO_3 at 50°, (*b*) in distd. H_2O in sealed tubes at 120° and (*c*) at 108.5° in absence of O_2, to study their methods of decompn. In (*a*) the gaseous products were measured and the loss in weight owing to loss of N, soln. and oxidation of nitroramie calcd. Curves are given for loss in wt. by soln., rate of hydrolysis as a function of N content, combustion and sapon. Similar curves are given for (*b*). For (*c*) the vol. of evolved gas is given as a function of time, the heating being carried out in a vertical tube with connections at the base to limit contact of nitrocellulose with decompn. products. The nitrocellulose was converted into a residual mass which gave no further amts. of gas owing to exclusion of O of the air. X-ray examn. of samples from (*a*) and (*b*) showed the structure of trinitrocellulose is still present even when denitration has lowered the N content to 11%. In no case was a diagram for cellulose found. A. J. P.

Loss in weight at 75° of nitrocellulose and other substances impregnated with nitroglycerin. J. Chédin. *Mém. poudres* 29, 95–110(1939).—The materials tested were ballistite paste, 2 samples of SD paste, and bleached cotton linters impregnated with nitroglycerin and dynamite. Results were calcd. from actual loss in weight and from the results of extn. with $CHCl_3$, the figures by the 2 methods agreeing within 1–2%. The dynamite lost all of its nitroglycerin and differences in the rates of evapn. from the different substances are attributed to differences in total surface exposed from which evapn. takes place. Further tests were made with 2 SD pastes, mercerized cotton, nitrated mercerized cotton (11.84% N), nitrated hydrocellulose (12.16% N), CP_2 film (11.74% N), and CP_1 (13.46% N). For bleached cotton linters, mercerized cotton and kieselguhr (in dynamite) the losses were in accord with the equation $dy = Kydt$, there being no indication of chem. affinity but only adsorption. With ballistite and SD pastes and the other nitrated products evapn. occurs according to $\log y/y_0 = Kt$. Some residual nitroglycerin equiv. to 5–6% of the nitrocotton is fixed and not evapd. according to this formula. It is considered that either the structure of the nitrocellulose or the NO_2 groups is responsible for this fixation and that gelatinization which begins during the heating period is not responsible. No significant differences were found in the amt. of fixation in samples whose N content varied from 11.7 to 13.46%. The gelatinized CP_2 film lost the smallest amt. of nitroglycerin owing to its small amt. of evapg. surface. Nitroglycerin above 5–6% is held by adsorption as indicated by x-ray examn., there being no visible trace of nitroglycerin present. A. J. Phillips

Hazard of static electricity during surgical anesthesia with oxygen-ether mixture. M. H. Remund and S. Wehrli. *Schweiz. med. Wochschr.* 69, 660–2(1939).—Static charge of the insulated table and patient apparently caused 2 explosions when ether and O mixts. were used during surgical anesthesia. Grounding of all app. is advisable. Maurice M. Rath

The induction period in thermal explosions. D. A. Frank-Kamenetskii. *J. Chem. Phys.* 8, 125–6(1940); cf. *C. A.* 33, 6049⁹.—The calcn. of the induction period, as done by Rice and Campbell (*C. A.* 33, 8015⁶), "cannot be regarded as an appropriate method for comparing the theory of thermal explosions with expt. and, in particular, for computing the thermal effect of explosive reactions." The reasons are based on the geometry of the app. and the technique of the expt. G. M. Petty

Serious explosion in a wood-flour factory. Reutlinger. *Feuerschutz* 19, 157–8(1939).—The wood-flour explosion and subsequent fire in a German factory was caused by heating due to friction during the grinding of the wood flour; the grinding stones were too close together. Recommendations are made for the construction of such hazardous industrial plants. Leopold Scheflan

Fire in a leather factory. Brunswig. *Feuerschutz* 19, 154–6(1939).—The use of modern combustible lacquers and dye solvents in leather factories is a serious fire hazard. A typical fire in a German leather factory is described and methods of avoiding similar happenings are suggested. Leopold Scheflan

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Al paint as fire hazard (National Safety First Assocn.) 26.

Davis, Harold Joe: Industrial Hazards of Static Electricity. Tulsa, Okla.: The Author. 10 pp. 25 cents.

Table of Common Hazardous Chemicals. Prepd. by Comm. on Hazardous Chemicals and Explosives of National Fire Protection Assoc. and Am. Chem. Soc. under direction of G. W. **Jones and A. H. Nuckolls.** 4th ed. Boston: National Fire Protection Assoc. 24 pp. 20 cents.

Picryl fluoride and explosives containing it. Laurence G. Wesson (to Veader Leonard). U. S. 2,179,605, Nov. 14. Picryl fluoride, a brownish yellow compd. m. about 150–160°, is made by treating picryl chloride with F (using NaF and HOAc) and is used in explosives such as those for bombs or shells.

Electric fuseheads as used in blasting detonators. Wilfrid Taylor and Cecil R. L. Hall (to Imperial Chemical Industries Ltd.). U. S. 2,180,129, Nov. 14. At least one face of a sheet of rolled brass foil is subjected to an etching treatment, as by the use of an NH_3 soln., and the etched face is secured to an insulating material such as pressboard by a thermoplastic cement such as a polyvinyl acetate compn.

Miners' and other lamps. Oldham and Son Ltd. and Harry Holt, Jr. Brit. 506,019, May 22, 1939. Addn. to 478,068 (*C. A.* 32, 4788⁴).

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Recent progress in the field of ice colors. P. Predelli. *Atti X° congr. intern. chim.* 4, 250–6(1939). E. H.

The relationship of coal tar and pure vegetable dyes. J. W. Orelup. *Progressive Perfumery & Cosmetics* 1938, 99–100.—A discussion of the connection between the structure and chemistry of dyes. Leopold Scheflan

The absorption of substantive dyes by cellulose from solutions of very high dye and salt concentrations. S. M. Neale and W. A. Stringfellow. *J. Soc. Dyers Colourists* 56, 19–21(1940).—An attempt is made to find some upper limiting value to the absorption of dyes by making use of the highest concns. of dye and salt attainable without causing pptn. of the dye. The absorption under conditions approaching satn. is influenced by swelling or by oxidation

of the cellulose in the same way as it is for normal dyeings. W. H. Boynton

Note upon the absorption of the substantive dye Sky Blue FF by cotton cloth dyed with the vat dye Cibanone Orange R. S. M. Neale and W. A. Stringfield. *J. Soc. Dyers Colourists* **56**, 21–3(1940).—A comparison of the absorptive capacity of a sample of oxycellulose having both acidic and reducing properties due to "accelerated" oxidation and an ordinary oxycellulose having the same —COOH value. The unoxidized specimen contg. approx. 1% of vat dye had a decidedly higher absorption value for Sky Blue FF than the original untreated yarn, whereas the effect of accelerated oxidation had brought about a much smaller decrease in substantive dye absorption than that shown by cotton oxidized to the same—CO-OH value by the direct action of alk. hypobromite. Results are tabulated. W. H. Boynton

Adsorption of naphthols in the presence of different electrolytes and peptizing agents and at different temperatures. J. A. Nabar, P. M. Barve, A. M. Patel and B. N. Desai. *Proc. Indian Acad. Sci.* **10A**, 344–58(1939).—Cotton cloth was dyed with Naphthol AS-G, Naphthol AS, Naphthol AS-TR, Naphthol AS-BO and Naphthol AS-SW. Concns. of dye in solns. before and after immersion of cloth were detd. by titration with Trivasol Red TR. Addn. of alc., gum tragacanth, and agar-agar lowered the amt. of dye adsorbed. For low concns. of NaOH, NaCl, Na sulfate, Na phosphate, and soap the amt. of dye adsorbed was increased; as the concn. was increased, the adsorption passed through a max. and then decreased. At higher temp. the rate of adsorption was greater and at equil. the amt. of adsorbed dye was greater than at low temp. The effect of temp. appeared to be more marked for dyes of higher substantivity. Donald C. Bond

The dyeing properties of new fibers. H. M. Bunbury. *J. Textile Inst.* **30**, P172–80(1939).—See *C. A.* **33**, 6601[3]. R. K. Worner

Dyeing of yarn in the Brandwood apparatus. N. A. Bazarov, N. A. Yushkov and N. A. Shubina. *Byull. Ivanovo Nauch. Tekh. Issledovatel. Inst.* **1938**, No. 4–5, 90–6; *Khim. Referat. Zhur.* **2**, No. 4, 124–5(1939).—To correct unevenness in dyeing, the following changes in the process were introduced. (1) For dyeing, a condensate or preliminarily softened water was used instead of the hard water which formed a ppt. on the surface of the bobbin. (2) The mother liquors of the dyes were allowed to stand for 24 hrs. to sep. the mech. admixts. (3) The method of wetting was simplified. (4) A method was developed for the prepn. of the mother liquor in the dyeing bath. To reduce the concn. of the dyeing bath an electrolyte (NaCl, from 200 to 400%) was added which gave a 25–50% saving of the dye. (5) The max. temp. for each color was detd. W. R. Henn

New methods for diazotype printing. T. W. A. Borgesius and H. I. Waterman. *J. Soc. Dyers Colourists* **56**, 236(1940).—A description of an investigation of the possibility of prepg. paper for diazotype printing, starting from proteins, particularly casein. Casein changes by treatment with HNO_2 into a yellow compd. which becomes brown with alkalies and gives darker colored coupling products with various aromatic amino and hydroxy compds. Paper was successfully coated with diazo-casein to permit its use for printing purposes. Light sensitivity is great and the fastness to light of the prints is good. Prints of sufficient intensity were not obtained but research is being continued. W. H. Boynton

Acid or gas or atmospheric color fading on dyed acetate rayon goods. Herbert R. Mauersberger. *Rayon Textile Monthly* **21**, 109–11(1940).—Gas fading occurs on solid colored acetate goods, dyed in a single operation. The shades affected are generally in colors in which blue occurs or is a part such as greens, navies, grays, violets, tans, black, blue-reds, etc. Gas fading occurs in fabrics made from acetate yarns irrespective of the source of the yarn and in mixed goods where acetate rayon is used for warp and viscose for filling. All viscose rayon goods do not show gas, acid or atm. fading. The gases involved in the fading seem to be those formed by the combustion of illuminating gases, elec. coils, gas burners, etc. Inhibitors are somewhat effective but not certain in results. W. H. Boynton

The removal of dyes from textiles by rubbing. Olgerts Ripa. *Acta Univ. Latviensis, Kim. Fakultat.* Ser. 4, No. 12(in Lettish, 455–68; in English, 469–71)(1939).—A dyed textile 4 × 25 cm. was fastened about a wooden pulley. Tangent to the pulley was a wooden lever wrapped with a white fabric which accumulated the dye from the rubbing. After 100 revolutions the dye adhering to the white fabric was evaluated with a Pulfrich photometer. Tables give the dye rubbed off in relation to speed of rotation, pressure, no. of revolutions, size of rubbing surfaces, and size of dye particles. Frank Maresh

Wood's light. François Dervaux. *Tiba* **17**, 555, 557, 591, 593(1939); cf. *C. A.* **33**, 9002[9].—An address dealing with the use of ultraviolet light for testing purposes in the textile and dyeing industry. A. Papineau-Couture

Microphotographic measurement of the units of vegetable fibers. V. E. Vikhrov. *Bumazhnaya Prom.* **17**, No. 10, 29–31(1939).—A single procedure is suggested for projecting a magnified microscope image of a stained prepn. on a photographic paper and measuring the fiber units with the aid of a calibrated plate. Chas. Blanc

A chemical method for the preparation of hemp fibers. V. M. Bondarenko. *Len i Konoplya* **5**, No. 10, 41–3 (1938); *Khim. Referat. Zhur.* **2**, No. 4, 126(1939).—Pectin substances were destroyed and the fiber was freed from the accompanying components by treating hemp straw with H_2SO_4 and starch paste. The acid hydrolyzed starch to glucose and formed an acid medium in which pectin produced a gel that was washed away. The acid was neutralized with wood ash. A fiber was obtained which was equal to that obtained by natural retting in color strength and elasticity. Good results were also obtained by treatment with wood ash or with ash obtained from the combustion of malt grains from alc. distilleries. W. R. H.

Apparatus for measurements of lengths of cotton fibers. Burt Johnson. *Ark. Agr. Expt. Sta., Bull.* **381**, 22 pp. (1939).—The construction and operation of a mech. fiber comber for seed cotton is given. A photoelec. cotton fiber sorter for seed cotton is also described. C. R. Fellers

The problem of the measurement of the fineness of wool. H. J. Henning. *Klepzig's Textil-Z.* **43**, 36–45(1940).—A detailed description of phys. methods of measurement. 12 references. Leopold Scheflan

The degumming of natural silk. Joseph Nivière. *Rusta-Rayonne* **14**, 427, 429, 455–9(1939).—A brief discussion of the nature and compn. of sericin, the purpose of degumming, the properties required of soap for degumming and processes (diastases, alkalies) which have been tried (unsuccessfully) to replace washing with soap. A. Papineau-Couture

Lipase for defatting of silk waste products. M. V. Korchagin. *Uchenye Zapiski Fakul'teta Estestvozn. Moskov. Gosudarst. Pedagogicheskogo Inst. (Lab. Org. i Biol. Khim.)* **1938**, No. 3, 113–29; *Khim. Referat. Zhur.* **2**, No. 4, 126 (1939).—Waste products of the silk industry can be defatted by a prepn. from pig pancreas contg. 0.12–0.15% (on the wt. of silk) of enzyme with lipolytic index 1. The dependence of fat removal on the concn. of the enzyme, the time of action and the pH were detd. Max. activity was found at pH = 8.0–9.0. W. R. Henn

Progress in the staple-rayon industry. H. G. Bodenbender. *Chem.-Ztg.* **63**, 669–72, 677–9(1939). E. H.

"Tenasco." L. Rose. *J. Textile Inst.* **30**, P202–9 (1939).—"Tenasco" is the registered name given by Courtaulds Ltd. to high-tenacity yarns made by a modification of the ordinary viscose-spinning process. The conditions of stretch spinning are chosen so as to yield a dry tenacity considerably higher than normal and depending on the requirements of service. The fibers are particularly suitable for use in industrial textiles, such as tire cords. Ruby K. Worner

Factors affecting the service qualities of certain textile fabrics. K. Hess; Esther Nelson and Hazel Fletcher. *Kansas Agr. Expt. Sta., 9th Biennial Rept.* **1938**, 121–2.—Tests on various com. soap powders and bleaching agents

are discussed. A new method was devised for measuring the absorptive properties of fabrics such as Turkish towels. It consists of allowing water to drop from a pipet on a sample of the fabric, of known dimensions and wt. until a drop of water comes through. A factor representing the absorption capacity was calcd. by multiplying the no. of cc. of water and dividing by the wt. of the sample in g. Slightly higher results than are obtained by use of the porous porcelain disk method were obtained. C. R. F.

The action of alkylene oxides on cellulose. L. G. Lawrie, R. J. W. Reynolds and D. Ward. *J. Soc. Dyers Colourists* **56**, 6–17(1940).—The treatment of cotton material, previously activated wth NaOH, with controlled quantities of $(CH_2)_2O$ resulted in a marked change in the properties of the material. Other alkylene oxides act similarly. The stiffness and transparency of the cloth are enhanced and the cloth lends itself remarkably well to a variety of finishing treatments. Chem. considerations relating to the reaction and the mode of application and a wide variety of finishes obtainable are indicated. In practice the fabric is impregnated or printed with aq. NaOH soln. and in the case of impregnation, the excess removed by expressing in a mangle, or by hydro-extn. The impregnated cloth without drying is then treated with $(CH_2)_2O$ in soln. or as a gas. The cloth is acidified, washed and bleached, and finally washed and dried. Subsequent finishing processes are applied. The steps of the above procedure are discussed separately. The strength of the $(CH_2)_2O$-treated cloth, the dyeing properties of $(CH_2)_2O$-treated cotton and the use of other alkylene oxides are noted. The effects so far produced by the reaction of $(CH_2)_2O$ on cotton material treated with NaOH are grouped for description purposes as follows: over-all effects; (*a*) organdie-like, (*b*) linenized and (*c*) parchmentized and printed effects, (*d*) window-pane, (*e*) printed damask, (*f*) figured velveteen, and (*g*) "lace." Basic conditions for the production of the various effects in CCl_4 which have been successfully employed in practice are summarized. Expt̄l. work on $(CH_2)_2O$ treatment of viscose rayon, linen and jute indicates some outstanding advantages on these fibers. W. H. Boynton

Washing wool and rayon fabrics. A. Foulon. *Seifensieder-Ztg.* **67**, 2–3, 12–13(1940).—Review. A. Guillaudeu

The bleaching of cotton linters. Eugène Roux. *Tība* **17**, 573–7(1939).—A brief outline of the principal methods used commercially. A. Papineau-Couture

Catalytic damage to bleach [for textiles]. G. Dierkes. *Klepzig's Textil-Z.* **43**, 46–50(1940).—Ferrous and ferric iron in water cause decompn. of peroxide liquors, the rate of which increases with increasing alky. The catalysis can be repressed and the evolution of O can be regulated by the use of stabilizers. Hard waters low in Fe are suitable without treatment for the peroxide bleaching process. Leopold Scheflan

Boiling of mixed textiles in Van-Flanderen apparatus. S. S. Frolov and V. M. Rybakova. *Byull. Ivanovo Nauch. Issledovatel. Tekh. Inst.* **1938**, No. 4–5, 81–5; *Khim. Referat. Zhur.* **2**, No. 4, 125(1939).—The app. is used for the treatment of crêpes from artificial silk with NaOH or with a caustic soap. The boiled and bleached textiles had high capillarity, slightly decreased strength, high ash content and a high extn. no. The app. preserves the structure of the textiles. W. R. Henn

Boiling of textiles containing mechanical cottonin. N. Kozhin and I. Yumanov. *Byull. Ivanovo Nauch. Issledovatel. Tekh. Inst.* **1938**, No. 4–5, 85–90; *Khim. Referat. Zhur.* **2**, No. 4, 125–6(1939).—The brownish streaks found after boiling textiles made of the lower grades of cotton and mech. cottonin are compds. of Ca or Mg with adsorbed org. substances of the boiling alkali. The ash content of textiles with streaks is considerably higher than that of pure textiles (2.84% against 0.07–0.12%). Oxides of different metals were found in the ash which were evidently introduced by the textiles and mainly by water. Different softeners for water were tried to improve the quality of water. Best results were obtained from boiling with $Na_2Si_4O_9$. A soln. for boiling was developed which contained NaOH 192 kg., Kontakt 30 kg. and silicate of 30°Bé. 40 kg. W. R. Henn

The use of sodium hydroxide in boiling of cotton. N. Kozhin and N. Mokhova. *Byull. Ivanovo Nauch. Issledovatel. Tekh. Inst.* **1938**, No. 4–5, 77–80; *Khim. Referat. Zhur.* **2**, No. 4, 125(1939).—The amt. of NaOH needed for bucking and the loss of wt. of cotton were investigated with 6 samples of cotton and cottonin. The loss of wt. depends mainly on the grade of cotton; a preliminary treatment of the cotton has an insignificant effect. Impurities in cotton have a decided effect on the amt. of NaOH required. Boiling of 1st-grade cotton (freed from mech. impurities) takes 1.52% of NaOH while 5.03% is needed for boiling the impurities taken from the cotton. W. R. Henn

The shrinking of textiles during wet washing and chemical dry cleaning. H. Rath, A. Enz, J. Middelhoff and E. Schäffer. *Klepzig's Textil-Z.* **43**, 29–35(1940); cf. *C. A.* **34**, 1183⁷.—Samples of cotton, a mixt. of staple rayon and cotton, staple rayon, staple rayon muslin, cotton flake, and damask from a mixt. of cotton and staple rayon, resp., were washed by standard procedures with aq. and nonaq. solns. (Asordin) and changes produced in various phys. properties are shown in detail. Chem. washing causes less shrinking than aq. washing. In general most of the shrinking is reached after the fifth washing. L. S.

The resistance of linen and hemp fabrics to weathering and rotting. Werzmirzowsky. *Melliand-Textilber.* **21**, 12 14(1940).—Samples of sand-bag fabric made (*a*) from hemp and (*b*) from linen both unimpregnated and treated with $CuSO_4$ soln. were exposed for 1–6 months (1) to the weather at high altitude in the Riesengebirge, in central Germany and on a North Sea island, (2) stored in a room kept at 18 20° with a relative humidity of 80–90% and (3) buried under a 10-cm. sand layer kept at about 20°. Tabulated data show that loss in strength was less in all cases for the fabric made from hemp. The impregnated fabrics showed less loss in strength for all cases except the samples exposed to the weather. Impregnated samples so exposed showed a loss in strength which increased proportionally with the amt. of light falling on the sample with the result that the loss in strength for some of the impregnated samples was greater than that of corresponding unimpregnated samples. J. W. Perry

Casein, its production and uses [in textile industry] (Wickman) **13**. Trifluoromethyl benzaldehydes [intermediates for dyes] (U. S. pat. 2,180,772) **10**. Compns. for softening textile materials (U. S. pat. 2,180,133) **29**.

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Huc, E.: Manuel de la blanchisserie mécanique. Paris: J. B. Baillière et Fils. 416 pp. Fr. 30. Reviewed in *Chimie & industrie* **42**, 346(1939).

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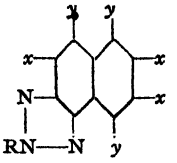
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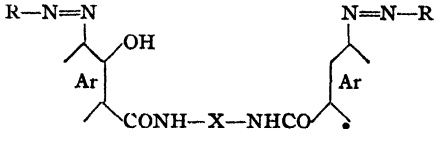
Azo dyes. Gerald Bonhote and Carl Apotheker (to Soc. pour l'ind. chim. à Bâle). U. S. 2,176,521, Oct. 17. By the reaction of diazo compds. such as those of aniline, 2,5-dichloroaniline, 1- or 2-naphthylamines or various other specified components with a nonsulfonated 2'-arylpseudonaphthazimide hydroxylated in the 2-position of the naphthalene nucleus and contg. no hydroxyl group in the 2'-aryl residue, dyes are obtained of the general formula



where R stands for an aromatic radical of the benzene or naphthalene series, two *x*'s stand for H atoms and one *x* stands for a hydroxyl group, the two *y*'s which stand in *o*-position to hydrogen atoms standing also for H atoms and the *y* standing in *o*-position to a hydroxyl group standing for a radical —N:NR$_1$, in which R$_1$ stands for an aromatic radical of the benzene or naphthalene series, which are dark powders which when produced on vegetable fiber dye the same reddish yellow to red, violet, blue, brown and black tints of good fastness.

Azo dyes. Friedrich Felix and Rudolf von Capeller (to Soc. pour l'ind. chim. à Bâle). U. S. 2,177,427, Oct. 24. From components such as 2,6-dichloro-4-nitroaniline and the Na salt of 6-ethoxy-3-methyl-2'-sulfodiphenylamine, etc., dyes are produced of the formula Cx:CH.C(N:NR$_1$):Cy.CH·CNHR$_2$, where R$_1$ stands for an aromatic isocyclic 6-membered nucleus, R$_2$ stands for a sulfonated aromatic, isocyclic six-membered nucleus, and *x* and *y* stand for org. substituents of nonionogenic nature, which dyes are light to dark powders which are sol. in water and dye textiles such as wool, silk and acetate rayon yellow, red, violet, brown and blue tints. Numerous examples are given.

Azo dyes. Hans Krzikalla and Wolfgang Alt (to General Aniline Works). U. S. 2,181,057, Nov. 21. From components such as 2-acetoxynaphthalene-3-carbonyl chloride and Na 4,4'-diaminobiphenyl-3,3'-di-ω-methanesulfonate, etc., dyes are produced which are suitable for dyeing wool, silk, viscose, rayon, etc., and which have the general formula

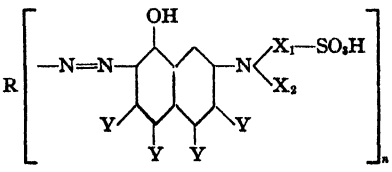


where R and Ar represent aromatic radicals, and wherein X stands for an arylene radical contg. at least one salt-forming member of the group consisting of sulfonic and carboxylic acid groups, which groups are externally attached to the arylene radical by means of an aliphatic chain.

Azo dyes. Leopold Laska, Arthur Zitscher and Rudolf Heil (to General Aniline Works). U. S. 2,180,297, Nov. 14. Dyes are produced of the general formula [1-[3-(—HNCO)-2-(HO)RN:N]-2-X-4-(N:C)-5-XC$_6$H$_2$]$_n$R$_1$ where *n* stands for one of the members 1 and 2, the X's stand for members of the group consisting of halogen, alkyl, alkoxy, phenoxy, trifluoromethyl, alkylsulfonyl and dialkylaminosulfonyl, R means a member of the group consisting of naphthalene, halogen-substituted naphthalene, alkoxy-substituted naphthalene, carbazole, benzocarbazole and anthracene, and R$_1$ a member of the group consisting of radicals of the benzene, naphthalene and biphenyl series, yielding, when produced on the fiber, orange to blue and brown dyeings of good fastness particularly to light. Numerous examples are given.

Azo dyes. Compagnie nationale de matières colorantes et manufactures de produits chimiques du Nord réunies établissements Kuhlmann. Fr. 840,951, May 8, 1939. The dyes, *p*-[2(or 4)-aminonaphthylazo]mono-, di- or trihaloanilines, are prepd. by diazotization of halogenated *p*-C$_6$H$_4$(NH$_2$)$_2$ and coupling with α- or β-naphthylamine, or by diazotization of a halogenated *p*-H$_2$NC$_6$H$_4$NO$_2$, coupling with α- or β-naphthylamine, and reducing the nitro group. The dyes have great affinity for cellulose esters, and dye cellulose acetate in yellow, orange and brown. Diazotized on the fiber and developed with the aid of the usual coupling compds. they give polyazo dyes of black, green-black, violet and brown shades.

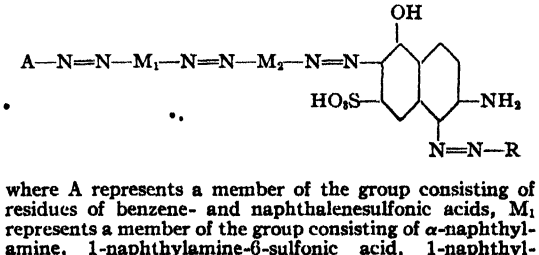
Azo dyes soluble in water. Erich Fischer and Richard Huss (to General Aniline Works). U. S. 2,176,853, Oct. 17. From components such as diazotized sulfanilic acid and 2-(sulfoethylamino)-8-naphthol-6-sulfonic acid dyes are produced of the general formula



where R stands for a member of the group consisting of radicals of the benzene and naphthalene series and biphenyl, *n* means the number 1 when R is a radical of the benzene or naphthalene series and 2 when R is biphenyl, X$_1$ stands for a member of the group consisting of alkyl and hydroxyalkyl and X$_2$ for a member of the group consisting of hydrogen, alkyl and sulfoalkyl, and wherein the naphthalene nucleus contains at least one sulfonic acid group in the positions indicated by Y, which compds. penetrate deeply into *leather* and yield dyeings of various shades. Numerous examples are given.

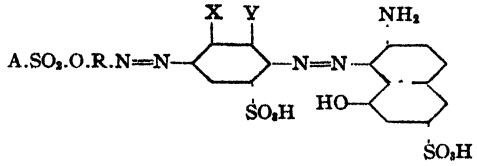
Monoazo dyes. Richard Fleischhauer (to General Aniline Works). U. S. 2,181,051, Nov. 21. From components such as 2-aminobenzoic acid and 1-acetylamino-3-naphthol-6-sulfonic acid, etc., naphthalene monoazo dyes are obtained of the general formula 1-X-3-HO-4-AN:N-6-NaO$_3$S-8-XC$_{10}$H$_3$, where A stands for the radical of a diazo component of the benzene and naphthalene series contg. in ortho position to the N atom a group capable of being metallized, one X stands for an acylamino group and the other X stands for H, which dye animal fibers various shades of good fastness properties when aftertreated with Cr salts. Numerous examples are given.

Polyazo dyes. Adolf Krebser (to J. R. Geigy A.-G.). U. S. 2,180,245, Nov. 14. From components such as aniline-*o*-sulfonic acid, 1-naphthylamine-7-sulfonic acid, aminohydroquinone dimethyl ether, metanilic acid and 2,5-aminonaphthol-7-sulfonic acid, dyes are produced which dye cotton greenish blue shades and which have the general formula



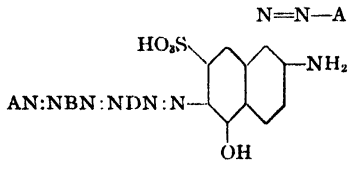
where A represents a member of the group consisting of residues of benzene- and naphthalenesulfonic acids, M$_1$ represents a member of the group consisting of α-naphthylamine, 1-naphthylamine-6-sulfonic acid, 1-naphthylamine-7-sulfonic acid, and a mixt. of 1-naphthylamine-6-sulfonic acid and 1-naphthylamine-7-sulfonic acid, M$_2$ represents a member of the group consisting of aminohydroquinone dialkyl and aminohydroquinone diaralkyl ethers, and R represents a member of the group consisting of aminosulfonic acids of the benzene and naphthalene

series. U. S. 2,180,246 relates to disazo dyes of the general formula



where X represents a member of the group consisting of H, an alkyl and alkoxy group, Y represents a member of the group consisting of H and an alkoxy group (one, at the most, of X and Y being different from H), R represents the residue of a phenol, coupled in the *p*-position and A represents an aromatic residue of the benzene series, being dark powders, sol. in water with reddish to bluish-violet color, dyeing animal fibers in an acid bath violet shades of good light fastness.

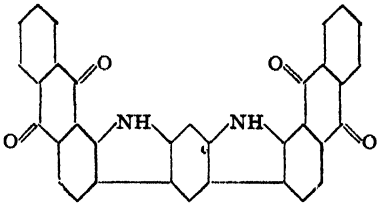
Polyazo dyes. I. G. Farbenind. A.-G. Fr. 841,081, May 10, 1939. The new dyes have the formula



where A is an aromatic radical contg. *o*-hydroxy carboxylic acid groups, and B and D are aminobenzene or aminonaphthalene radicals coupled in position para to the amino group, B and D may also contain sulfonic acid groups. The dyes are obtained by diazotizing disazo compds. of the formula: AN:NBN.NDNH$_2$ (A, B and D having the same significance as in the dyes) and combining them with monoazo dyes, obtained by coupling an aromatic diazo compd. contg. *o*-hydroxy carboxylic acid groups with 2-amino-5-naphthol-7-sulfonic acid. The new dyes dye vegetable fiber in various shades which by a subsequent treatment with a Cu salt are transformed in shades of great fastness to washing and light. Among examples, a disazo compd., obtained by coupling a diazotized *p*-aminosalicylic acid-azoaniline with 3-toluidinemethanesulfonic acid, is combined with the monoazo compd., obtained by coupling, in an acid medium, diazotized *p*-aminosalicylic acid with 2-amino-5-hydroxynaphthalene-7-sulfonic acid. The polyazo compd. dyes cotton in currant shade which by treatment with a Cu compd. becomes black-currant of great fastness to washing and light.

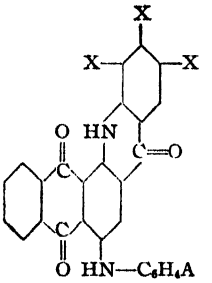
Complex metal compounds of polyazo dyes. Fritz Straub and Walter Hanhart (to Soc. pour l'ind. chim. à Bâle). U. S. 2,180,776, Nov. 21. Numerous examples, with details, are given of the production of complex compds. (suitable *for dyeing and printing cotton*, etc., generally in blue shades) by causing metal compds. such as salts of Cu, Cr or Ni and alk. reducing agents such as alk. solns. contg. glucose to react in the same working operation with azo dyes contg. at least one nitro group in *p*-position to an azo group as well as lake-forming groups, this reaction being carried out in such a manner that in addn. to the metallization of the dye the nitro group is converted into a reduction stage which links two radicals of the azo dye by the azo or azoxy group.

Vat dyes of the anthraquinone series. Georg Kränzlein, Martin Corell and Bernhard Popp (to General Aniline Works). U. S. 2,176,430, Oct. 17. 1,3-Bis(anthraquinonylamino)-4,6-dinitrobenzene compds. of the general formula RHNC:CH.C(NHR):C(NO$_2$).CH:CNO$_2$, where R represents an anthraquinone radical which may contain substituents, may be transformed into very intense and very fast vat dyes by reducing the nitro groups to amino groups and by transforming the 1,3-bis(anthraquinonylamino)-4,6-diaminobenzene compds. thus obtained, by way of the azimino compds. into the dicarbazoles corresponding with the formula



wherein the anthraquinone radicals may contain substituents as, for instance, chlorine, methoxy, phenylamino or benzoylamino. In some cases, it is of advantage to brominate the compd. The dicarbazoles obtained are vat dyes which dye vegetable fiber very intense scarlet, brown and violet tints. They have good fastness, especially to boiling with Na$_2$CO$_3$ and to light. Several examples with details of procedure are given.

Vat dyes of the anthraquinoneacridone series. Erwin Kramer (to General Aniline Works). U. S. 2,180,419, Nov. 21. By reactions such as that of a 4-haloanthraquinoneacridone with a 2-*p*-aminophenylanthraquinone, dyes are formed which dye olive-green shades and which have the general formula



where X stands for H or a halogen, and A stands for a 2-anthraquinonyl group in the *p*-position of the benzene group.

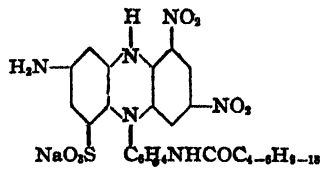
Dyes of the anthraquinone series. Ernst Runne and Ludwig W. Berlin (to General Aniline Works). U. S. 2,176,437, Oct. 17. By various described reactions, there are produced anthraquinones substituted in the 1- and 4-positions by NHX and in the 2-position by CONHY, where Y and one of the X's represents a hydroxyalkyl group and the other X represents H, alkyl or hydroxyalkyl; the compds. being dyes of high soly. which dye closely woven acetate rayon even and intense shades.

Alkyl sulfone dyes of the anthraquinone series. David X. Klein (to E. I. du Pont de Nemours & Co.). U. S. 2,176,630, Oct. 17. Various examples are given of the production of 1-amino-5-alkylsulfonyl-2-anthraquinonesulfonic acids and their alkali salts which carry in the 4-position an alkylamino, arylamino, aralkylamino or cycloamino radical, the alkyl sulfone radical being a methyl sulfone or ethyl sulfone radical, which dye animal fibers bright level blue to blue-green shades.

Wool dyes of the anthraquinone series. I. G. Farbenind. A.-G. Fr. 841,049, May 9, 1939. The dyes are prepd. by combining aminoanthraquinones, anthrapyridones or anthrapyrimidones, which contain residues exchangeable by amino groups, with aminophenylsulfonic aryl-esters or with aminophenylsulfonic arylamides, and sulfonating the products thus obtained. The dyes dye wool even in neutral medium and manifest great fastness to washing. 11 examples are given.

Nitro dyes of the azine series. Richard Fleischhauer (to General Aniline Works). U. S. 2,176,420, Oct. 17. By reactions such as condensation of 1-(*N*-benzoylethylamino)-4-aminobenzene with 1-chloro-2,4-dinitrobenzene-

6-sulfonic acid, etc., dyes are obtained of the general formula



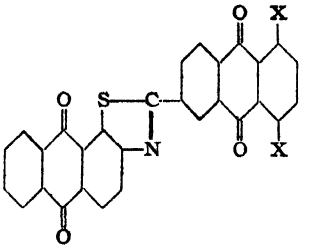
which are black powders sol. in water and dye wool and silk dark reddish brown shades of good fastness to fulling, light, sea water and perspiration.

Dyes of the methine series. Werner Müller and Carl Berres (to General Aniline Works). U. S. 2,179,895, Nov. 14. Dyes giving greenish yellow to orange to violet-red dyeings on cellulose acetate rayon and other materials and probably having the general formula RR_1N—arylene—$CH.C:X$ in which R stands for haloalkyl, R_1 stands for H, alkyl, haloalkyl, hydroxyalkyl, alkoxyalkyl, aralkyl or aryl, the grouping $:C:X$ stands for the radical of a compd. contg. a reactive methyl or methylene group, in which the $:C:$ portion is formed from the reactive methyl or methylene group, and the group RR_1N— stands in *p*-position to CH are obtainable by condensing a compd. with a reactive methylene group with a *p*-aminoaryl aldehyde of the general formula: RR_1N—arylene—CHO, where R and R_1 mean the same as stated. The aldehydes used as starting components in the said process have been described, e. g., in U. S. 2,141,090 (*C. A.* **33**, 2730[1]) and other aldehydes may be used, e. g., *p*-(phenylmethylamino)benzaldehyde and *p*-(ethoxyphenylmethylamino)benzaldehyde. As compds. with reactive methylene groups there may be used, e. g., derivs. of cyanoacetic acid, such as their esters, and amides, further derivs. of malonic acid, such as malonitrile, malonic ester, or the like, pyrazolones, indolines, α-methylindolines, α- and γ-alkylpyridines, alkylquinolines, hydroxythianaphthene, diketohydrindene, acetophenone, dinitrotoluene, etc. Numerous examples with details are given, and by the presence of haloalkyl radicals in the dye mol., a strong displacement of the shade to the short-wave side of the spectrum is effected. Further, the presence of hydroxyalkyl radicals effects in part an essential improvement of the soly. of the dyes, so that particularly dark and abundant dyeings are obtainable. Likewise by haloalkyl, hydroxyalkyl and aryl radicals the fastness to sublimation and to light are improved, particularly in dyeings on acetate rayon. The dyes are also suitable for sensitive Ag halide emulsions.

Dyes of the diphenylamine series. Hans Krzikalla, Heinz Pardon and Fritz Hess (to General Aniline Works). U. S. 2,177,113, Oct. 24. Dyes of good penetration, dyeing yellow to brown shades and suitable for dyeing *leather*, wool and silk or *wood* are produced by causing dinitrobenzenes having exchangeable constituents and also contg. sulfonic or carboxylic groups, such as the Na salt of 2,4-dinitro-1-chlorobenzene-6-sulfonic acid to react with amines of the general formula $\overline{CX_1:CY_1.C(NH_2):CY_2.CX_2:C}NR_1R_2$, in which R_1 and R_2 are hydrogen, alkyl, cycloalkyl or aralkyl radicals, X_1 and X_2 are H or any substituents free from a negative action and Y_1 and Y_2 are H or any desired substituents. Several examples with details are given.

Dyes and dye intermediates of the perylene series. Erich Clar (to E. I. du Pont de Nemours & Co.). U. S. 2,179,920, Nov. 14. 1-β-Naphthoxyanthraquinone is converted to new dye intermediates and dyes by effecting dehydration and condensation by fusing with $AlCl_3$ in the presence of a flux such as NaCl. By this condensation, it appears that there is first formed, at least transitorily, the 3-hydroxy-12,*Bz*-1-oxido-1,2-benzoperylene, which is then converted into the 12,*Bz*-1-oxido-1,2-benzoperylene and 12,*Bz*-1-oxido-1,2-benzoperylene-3,10-quinone. Where the reaction is carried out by the introduction of an oxidizing agent, including air, the 12,*Bz*-1-oxido-1,2-benzoperylene is converted directly to the 3,10-quinone in the reaction mass.

Dyes and dye intermediates of the anthraquinone series. Donald P. Graham (to E. I. du Pont de Nemours & Co.). U. S. 2,179,551, Nov. 14. Compds. of the general formula



in which X stands for substituent amino, arylsulfonylimino, or aroylimino groups, dye tan to reddish brown shades. U. S. 2,179,552 relates to the production of compds. of the general formula of an anthraquinone substituted in the 1- and 4-positions by aroylamino groups of the benzene series and in the 6-position by the group —CONHY where Y stands for an anthraquinone radical directly attached to the N, which dye red to brown shades.

Dye intermediates of the anthraquinone series. Edwin C. Buxbaum (to E. I. du Pont de Nemours & Co.). U. S. 2,180,336, Nov. 21. Details are given of the production of intermediates for producing dyes which, in the form of their sulfonic acids, dye in greener shades of blue of better fastness to light than in the case of similar compds. not contg. the cyano group and suitable for dyeing cellulose acetate rayon. Production is described of anthraquinone (I) intermediates such as: 1-amino-2-sulfo-4-bromo-5-cyano-I; 1-amino-2,4-dibromo-5-cyano-I, m. about 284–8°; 1-amino-2-bromo-5-cyano-I, m. about 228–33°; 1-amino-2,4-dibromo-5-cyano-I; 1-amino-2,4-dibromo-8-cyano-I; 1-methylamino-4-bromo-5-cyano-I, m. about 250–1°; 1-methylamino-2,4-dibromo-5-cyano-I; 1-methylamino-4-bromo-5-cyano-I, m. about 310°; 1-methylamino-2,4-dibromo-8-cyano-I; 1-benzoyl-amino-4-bromo-5-cyano-I; 1-benzoylamino-2,4-dibromo-5-cyano-I; toluylamino-, 1-acetylamino-, 1-formylamino-5- or -8-cyano-I, etc. U. S. 2,180,337 relates to sulfonated dyes and intermediates for their production, of generally like character, such as: 1-amino-2-bromo-4-*p*-toluidino-5-cyano-I; 1-amino-2-sulfo-4-toluidino-5-cyano-I; 1-amino-2-bromo-4-*p*-toluidino-8-cyano-I; 1-methylamino-4-*p*-toluidino-5-cyano-I; and corresponding to toluylamino, acetyl, and formyl compds. of the like aniline, toluidine, xylidine or *p*-dodecylaniline derivs.

Dihaloquinizarins (dye intermediates). Edwin C. Buxbaum (to E. I. du Pont de Nemours & Co.). U. S. 2,181,046, Nov. 21. Various details are given for the production of a dichloroquinizarin, m. 249–50°, in which one of the Cl atoms is in the 6- or 7-position, and of a corresponding dibromoquinizarin, m. 225–7°, which by heating with Ac_2O and a trace of H_2SO_4 yields a diacetoxydibromoanthraquinone, m. about 250°.

α-Aminoanthraquinones. Friedrich Felix, Paul Grossmann and Max Bommer (to Soc. pour l'ind. chim. à Bâle). U. S. 2,180,805, Nov. 21. By reactions such as by heating together 1-methylamino-4-(γ-chloro-β-hydroxypropylamino)anthraquinone, acetone, water and Na thiosulfate, α-aminoanthraquinones are produced, of the general formula of an anthraquinone substituted in the 1-position by —NHR and in the 4-position by $—NH_xSSO_3H$ in which R stands for H, alkyl or a six-membered aromatic nucleus, and *x* stands for an alkylene or hydroxyalkylene radical contg. at least 2 and not more than 3 carbon atoms, which products form dark powders which dissolve in water to violet to blue and to green-blue solns. and dye similar tints.

Anthraquinonylaminoanthraquinones. Joseph Deinet (to E. I. du Pont de Nemours & Co.). U. S. 2,181,048, Nov. 21. *Dyes* giving orange-red or red to deep-purple

dyeings are prepd. from 2-halo-6-anthraquinonecarbonyl chloride by condensation with amino compds. of the anthraquinone series including the heterocyclic substituted anthraquinone compds. such as anthrapyridones, anthrapyrimidines and anthraquinonebenzacridones, various examples being given of the production of dyes of the general formula of an anthraquinone substituted in the 6-position by Cl and in the 2-position by the group RHNCO— where R stands for a radical of the anthraquinone series attached to the —N— in an α position.

Anthraquinone compounds containing nitrogen. Soc. pour l'ind. chim. à Bâle. Fr. 841,096, May 10, 1939. A 1-halo-3-acylanthraquinone compd. is condensed with a compd. which contains at least 2 H atoms linked to a N atom, such as NH_3, primary amines and amides, etc., and the product obtained is sapond. The reaction is preferably carried out in a solvent of a high b. p., such as $C_6H_5NO_2$, $C_6H_4Cl_2$, $C_6H_3Cl_3$, etc., and in presence of an agent capable of neutralizing the hydrogen halide. The 1-halo-3-acylanthraquinones are obtained by condensing 1-halo-3-anthraquinonecarboxylic acid halide with an aromatic hydrocarbon in presence of $AlCl_3$. The products, which can be further treated with compds. contg. a reactive halogen atom, are valuable *cotton dyes* and may be used as intermediaries in prepn. of other dyes.

Cerulein derivatives. Eduard Peyer (to Durand & Huguenin A.-G.). U. S. 2,180,769, Nov. 21. See Fr. 836,711 (*C. A.* **33**, 5672[2]).

Dyeing vegetable fibers with insoluble azo dyes. I. G. Farbenind. A.-G. Fr. 840,792, May 3, 1939. See Brit. 498,534 (*C. A.* **33**, 4437[6]).

Dyeing mixed wool and casein fiber. Achille Vandekerckove. Fr. 840,879, May 5, 1939. At low temp there is obtained a fabric partly white and partly colored, because casein fiber has greater affinity for colors than has wool.

Dyeing ethers and esters of cellulose. Soc. pour l'ind. chim. à Bâle. Fr. 841,192, May 12, 1939. Dyes contg. in their mols. at least once the group $-OCH_2CH_2OSO_3H$, dye ethers and esters of cellulose. The operation is effected in the usual dyeing apparatus. Among examples, a tissue of rayon acetate is dyed for ½ hour at 40–80° and then for an hour at 80°, in a bath contg. 1 part of the dye, obtained from diazotized *p*-nitroaniline and the sulfuric ester of 2-amino-4-methylphenyl-β-hydroxyethyl ether, according to Fr. 616,100, as its NH_4 salt, and 30 parts Na_2SO_4 in 1000 parts of water.

Dyeing package yarn. Harry S. Drum, Wm. C. Dodson and Wm. H. Jaxheimer (to Smith, Drum and Co.). U. S. 2,180,896, Nov. 21. App. is described, and a method of operation which involves maintaining yarn packages superposed in a vat and submerged in dye liquor, stopping the supply of dye liquor, circulating water through the packages and into the vat to mix with and displace the dye liquor until the discharge is substantially clear, and then draining the vat.

Coloring organic cellulose derivatives such as cellulose acetate, etc. James G. McNally and Joseph B. Dickey (to Eastman Kodak Co.). U. S. 2,180,012, Nov. 14. Dyeing is effected in orange-yellow or orange-red shades by use of the monoazo dye produced from 1-amino-3-nitro-4-methoxybenzene and dimethylaniline or other dyes of the general formula $\overset{\displaystyle R}{\overset{|}{C}}H{:}C(NO_2).CH{:}CR_1.CH.CN$ where R represents the residue of an acyl coupling component of the benzene series contg. but one benzene nucleus and R_1 represents an alkoxy group. Numerous examples are given.

Wet treatment of raw bast fibers such as those of flax. Helmuth Korte (to I. G. Farbenind. A.-G.). U. S. 2,180,087, Nov. 14. Raw bast fibers are subjected to mech. treatment in a decorticator to remove woody matter from them, and then subjected in the form of roving on cross-wound bobbins to a wet treatment adapted to improve the phys. properties of the fibers, as by use of solns. of HOCl, NaOH and Cl. Cf. *C. A.* **33**, 406[6].

Treatment of artificial fibers, cotton, silk, etc. György Bordás. Hung. 122,659, Jan. 2, 1940. The fibers are treated with a hot soln. of chlorinated lime, NaF and oxalic acid in water, washed, treated with $NaHSO_4$, H_2SO_4 and FeS, washed in soapy water and dried. The dry fibers are then treated in baths contg. Na phosphate, olive oil or wool fat or potassium soap, washed with dil. sulfuric acid and dried.

Making fibrous matter hydrophobic. I. G. Farbenind. A.-G. Fr. 841,087, May 10, 1939. Hydrophobic properties are conferred upon textiles, by treating with an org. compd. contg. a hydrophobic radical and a group capable of forming complex compds., and with a sol. metallic compd. capable of forming complex compds., such as the compds. of Cr and Zr. As org. compds., those contg. a mercapto or a OH group and a carboxyl group linked to the aromatic ring in ortho position, such as salicylic acid and its derivatives, are particularly suitable. The hydrophobic radical is preferably an aliphatic radical contg. at least 10 C atoms, which can be linked to the salicylic acid group. As sol. compds. of Cr and Zr, there are used the salts which give in water a strong acid reaction, such as chlorides, nitrates, etc.

Aftertreatment of rayon yarn. Johann J. Stöckly and Kurt Schmidt (to North American Rayon Corp.). U. S. 2,179,985, Nov. 14. App. is described, and a process for the aftertreatment of yarn such as that formed from viscose which involves only partially filling a compartment of a tank with such spun goods, passing uniformly distributed aftertreating liquid such as water from below through the spun goods, controlling the rate of flow of the treating liquid through the goods so that a uniform distribution of the goods in the tank takes place, and discharging the aftertreating liquid from the upper end of the tank.

Textile finishing. Theodor Rotta and Kurt Quehl, Fr. 841,178, May 12, 1939. A waterproof finish, resistant to washing, is formed on cellulose fiber, without affecting appreciably its inner structure, by treating the textile, either with swelling products at a concentration sufficient to produce a partial swelling effect but insufficient to transform the fiber into transparent polysaccharides, or with substances which, at the temp. of treatment, are incapable of producing more than a limited swelling effect. The increase in the wt. of the fiber by the treatment should not exceed 10–50%.

Finishing textile materials. Harold I. Huey (to Sayles Finishing Plants, Inc.). U. S. 2,179,505, Nov. 14. App. is described, and a process of imparting a silk-like finish to fabrics such as those of cotton which involves impregnating the fabric with a NaOH soln. of 20° Twaddell or greater concn., at room temp., exposing the impregnated fabric while under tension to a dry heat above 93° until substantially dry, and removing the NaOH, as by washing.

Finishing composition for textile materials such as cellulose acetate rayon. Richard R. Sitzler (to Celanese Corp. of America). U. S. 2,180,436, Nov. 21. A finishing compn. is prepd. by a process involving reaction of an alkali bisulfite such as $NaHSO_3$ with more than an equimol. proportion of a cyclic ether such as ethylene oxide (suitably by heating with water).

Textile and leather treatments such as finishing and fat liquoring. Thomas A. Printon (to National Oil Products Co.). U. S. 2,180,256, Nov. 14. Rice oil is used (suitably after being sulfonated and in various mixts.).

Decorating narrow fabrics such as ribbons. Alexander Milhomme (to Progressive Silk Finishing Co.). U. S. 2,180,745, Nov. 21. A process of decorating ribbons and similar narrow fabrics having a relatively heavy weft and a relatively fine warp involves passing the fabric between a pair of scratch rollers to effect a displacement of the weft and then running the fabric through intermeshing rib rollers, the spacing of the ribs being about the same as the spacing of the weft and the ribs running parallel and extending the full width of the weft so that a design is applied uniformly to both sides of the fabric.

Felted fabric suitable for use as a shoe felt, etc. Hugo Boeddinghaus (to American Felt Co.). U. S. 2,181,043, Nov. 21. A mixt. of natural fibrous material such as

wool and stretched thermoplastic fibers such as those of a vinyl resin is formed into a batt, the batt is felted to bond the material and heated to shrink the thermoplastic fibers and effect shrinking of the entire fabric in both directions. An arrangement of app. is described. 1

Automatic weighing appartus for textile materials. Joseph B. Howe (to Geo. S. Harwood & Son). U. S. 2,179,743, Nov. 14. Various structural, mech. and operative details.

Mercerization. Herman A. Bruson and Clinton W. MacMullen (to Röhm & Haas Co.). U. S. 2,176,833, Oct. 17. See Fr. 834,169 (*C. A.* **33**, 3612[1]). 2

Sizing agents. Carl Mascke. Fr. 841,162, May 12, 1939. A nonoxidizable textile sizing agent, sol. in benzine, is obtained by partially sapong. a mixt. of resins and semidrying or nondrying oils. The sapon. is carried out only to a point at which the agent is still sol. in benzine. Several examples are given, among others, 2 parts of colza oil, 8 parts of resin and 1 part of wax are heated with $^1/_{10}$–$^1/_{50}$ of their wt. of borax.

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

Changes and improvements in paint manufacture seen by the laboratory. C. E. Rogers. *Am. Paint J.* **24**, 24, 26–7(Jan. 22, 1940).—A general discussion emphasizing the improvements in white pigments and some of the newer drying oils, or combinations of oils. W. H. B. 3

Phosphorescent paints. O. Petzold. *Paint Manuf.* **10**, 7–10, 23(1940).—Pigments, dispersing agents, solvents, plasticizers, resins and thickening agents are considered. W. H. Boynton

Notes on the prepn. of luminous paints. Fritz Ohl. *Seifensieder-Ztg.* **67**, 7–8, 27–8(1940).—A review of suitable compns. A. Guillaudeu 4

Aluminum paint as a fire hazard. National Safety First Association. *Bulletin Natl. Safety First Assoc.* **1939**, Jan., 6; June, 47; July, 54; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 472(1939).—Al paint on rusty Fe surfaces may sometimes be ignited by striking the hot surface with a steel rod. George Ayers

Paint-mixture control by the viscosity method. E. A. Zahn. *Products Finishing* **4**, No. 2, 30–1, 34–6(1939).—A simplified viscometer, shown diagrammatically, makes it possible to take viscosity readings in as little as 20 sec. The app. consists of a bullet-shaped cup of a capacity of approx. 44 cc. which is suspended on a long looped handle. The cup has an orifice at the bottom through which the material flows when the cup is lifted from the liquid. The time required for complete drainage, beginning when the cup leaves the liquid and ending when the stream breaks at the base, is considered to be the viscosity in sec. The readings taken with this instrument are converted to centipoise readings by a single conversion factor. This instrument can be used to control the viscosity of batches of paints and is very useful in the supervision of mixts. in automatic dipping tanks and other automatic application devices. Leopold Scheflan 5

Paint coatings in place of metal coats. H. F. Sarx. *Angew. Chem.* **52**, 715–17(1939).—A summary. Karl Kammermeyer 6

The analysis of chrome green and similar composite pigments. J. H. van der Meulen. *Chem. Weekblad* **36**, 855–9(1939).—Objections are raised to the methods of Kappelmeier (*C. A.* **25**, 5302; **28**, 3690[7]) and a new procedure is described in detail. The mixt. of $PbCrO_4$, Prussian blue and $PbSO_4$ is decompd. by boiling with Na_2CO_3. Chromate is detd. iodometrically in the filtrate after acidifying with HCl; the oxidation of some of the ferrocyanide by the chromate upon acidifying does not alter the result. To another portion of the filtrate an excess of a soln. of pure $K_4Fe(CN)_6$ is added and the soln. is acidified; the chromate is quantitatively reduced and the excess ferrocyanide is detd. with $KMnO_4$. From the result the amt. of ferrocyanide in the soln. can be calcd. After the chromate in another portion of the filtrate is reduced with H_2O_2, the sulfate can be detd. gravimetrically as $BaSO_4$. T. H. Dunkelberger 7

A method of quickly drying inks. E. L. Duhring, *Printing Review*, Autumn, **1939**, 936; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 431(1939).—The first side of the printed web is heated with steam in the Curtis installation. George Ayers 8

A method of quickly drying inks. D. Macgregor. *Printing Review*, Autumn, **1939**, 936; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 432(1939).—The disadvantages of ozone for acceleration of drying of inks are discussed. George Ayers 9

Ink and the offset printer. G. W. Whitfield. *Brit. & Colonial Printer* Nov. 2, **1939**, 355; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 432(1939).—A discussion of the effect of damping water on litho inks. George Ayers

Specifications for oiticica oil. Charles Holdt. *Am. Paint J.* **23**, 21–2, 46–8(Sept. 25, 1939); cf. *C. A.* **33**, 8045[6]. **Further remarks on oiticica oil.** Otto Eisenschiml and Gerald Eisenschiml. *Ibid.* **24**, 26–7, 58, 60, 62(Feb. 5, 1940).—Polemics. W. H. Boynton

Evaluation of nitrocellulose lacquer solvents. A study of hydrocarbon diluents by the constant-viscosity procedure. V. W. Ware and W. M. Bruner. *Ind. Eng. Chem.* **32**, 78–82(1940); cf. *C. A.* **33**, 9685[8].—The const.-viscosity procedure was applied to BuOAc, iso-BuOAc, iso-Bu propionate and pentaacetate solns. of nitrocellulose, covering the whole range of dilns. with toluene, high-solvency naphtha or ordinary naphtha. With BuOAc and iso-BuOAc, tests were also carried out in the presence of nitrocellulose-resin mixt. (2 1). The value as a diluent decreases in the order, toluene, high-solvency naphtha and ordinary naphtha; this decrease is considerably greater with nitrocellulose-resin mixts. than when nitrocellulose alone composes the entire "solids," especially with dilns. above 20%. BuOAc and iso-BuOAc are similar in solvency characteristics and diluent acceptance, even in the presence of resin. Iso-Bu propionate, which has high solvent strength, is a suitable high-boiling ingredient of nitrocellulose lacquers. George Ayers 10

Reaction of maleic anhydride with abietic acid and rosin. A. G. Hovey and T. S. Hodgins. *Ind. Eng. Chem.* **32**, 272–9(1940).—The literature on the structure of the acids assocd. with rosin and of their addn. products with maleic anhydride (I) is reviewed. Wood rosin (II) and gum rosin (III) behaved identically in their reactions with I at 200°. III gave a product with higher m. p. and lower sapon. no. than II. An old, oxidized sample of II gave a lower sapon. no. and much darker color. These products corresponded with purified prepns. made from abietic acid and I in mol. wt. and compn. but melted much lower. Arnold M. Collins 11

Recovery of thinners in rotogravure. G. Degaast. *Bull. mens. anciens élèves inst. chim. Paris*, Apr., **1939**, 122–31; *Rev. Current Lit. Paint, Colour, Varnish & Allied Ind.* **12**, 431(1939). George Ayers 12

Nitrocellulose lacquers. Fritz Ohl. *Nitrocellulose* **10**, 219–21(1939).—A review. E. M. Symmes 13

Cellulose derivatives in lacquers. C. Maters. *Paint Ind. Mag.* **55**, 15–16, 18–19(1940).—See *C. A.* **34**, 648[3]. W. H. Boynton 14

Protective enamel finishes for magnesium-base alloys. E. E. Halls. *Products Finishing* **4**, No. 3, 42–6(1939).—The crit. feature in enameling Mg alloys is detd. by the fact that Mg is highly electropos., thus rendering enameling and painting difficult and making it necessary to convert the Mg surface to an inert layer by any one of a no. of aq. pretreatment processes, mostly having a chromate base. Tables show the performance of enameled Mg alloys in salt spray atm., in hot and cold humid atm. and 15

under open-weather conditions, as well as the alloy compn. of the test specimen and the characteristics of the primers and enamels used on the test specimen. The results of all types of exposure tests show the benefit to be obtained by the use of chromate pretreatment or a special primer. Extraordinary improvements are obtained by the use of a chromate primer, even without chromate pretreatment, as well as by the use of both a chromate primer and a chromate pretreatment. An appreciable advantage can be obtained by using an ordinary red oxide variety of primer; however, the benefit is not quite so marked as with the Zn chromate type. The data show that satisfactory results are obtainable without departing far from normal com. practice. An aq. chromate pretreatment and a synthetic Zn chromate primer provide the groundwork. Finishing coats may then be cellulose or baking, synthetic, oil, crystal or crinkle. Thus, all types of workpieces can be finished without any deviation from the present finishing procedures. Leopold Scheflan

Manufacture of oilcloth. Felix Fritz. *Nitrocellulose* **10**, 223–6(1939); cf. *C. A.* **33**, 9686[1].—A review. E. M. Symmes

Casein, its production and uses [in paint industry] (Wickman) **13**. Recent advances in chem. utilization of wood in United States [wood-distn. products] (Benson) **23**. Alkyl esters of 12-ketostearic acid [for use in lacquers] (U. S. pat. 2,180,730) **10**.

Deheuiles, M.: Pour finir un meuble. 3rd ed. Paris: Dunod et Cie. 163 pp. Fr. 15.

Jakobsen, Jakob: Spray-Painting Hazards. Clinical and Experimental Hematological Study, with Special Reference to Changes in Differential Blood-Cell Count. London: Oxford Univ. Press. 402 pp. 21s.

Llewellyn, H. M., and Eldridge, H. J.: The Decoration of New Plaster and Cement. Teddington: Paint Research Station. 20 pp. 1s. Reviewed in *J. Oil Colour Chem. Assoc.* **22**, 120(1939).

Science Library Bibliographical Series, No. 503, 1939. Luminous Paints, 1920–38. London: Science Museum. 51 references.

Paint and tile base. Frank W. Corkery. U. S. 2,180,729, Nov. 21. A viscous elastic compn. suitable for position for mastic tile which is solid at normal room temp. and having a color intensity below a No. 10 color on the coal-tar resin color scale, consists of a self-compatible oxidized mixt. of an oxidizable drying oil and an oily aromatic substance composed preponderantly of the dimers of coumarone and indene and having by virtue of freedom from any substantial content of polymers in stages of polymerization higher than that of the dimers elasticity in high order and no definite m. p., the material consisting in substantial proportion of its oxidized aromatic initially oily component and being solid at normal room temp.

Stabilizing luminescent colors and paints. I. G. Farbenind. A.-G. Fr. 841,006, May 9, 1939. Addn. of 10–20% of B_2O_3 or of anhyd. Na_2CO_3 to luminescent colors and paints contg. alk. earth sulfides stabilizes the colors and the paints against humidity, without affecting appreciably the intensity of the luminescence. An appropriate binder, such as a polystyrene lacquer, is added to the product. Many examples are given.

Apparatus for mixing paint pigments and vehicles, etc. David A. Wallace. U. S. 2,179,970, Nov. 14. Various details of a mixing and grinding app.

Preparing pigment pastes. Leo Roon and Arthur Minich (to Nuodex Products Co.). U. S. 2,180,721, Nov. 21. An app. with coöperating rolls is described, and a method of speeding up the making of pigment pastes which involves commingling a pigment and an org. liquid vehicle selected from the group consisting of oils, varnishes, resins, and plasticizers, to form a pigment-vehicle system. A grinding aid for conditioning the pigment-vehicle system is added to such system for increased utilization of grinding energy and concurrently expediting distribution of pigment particles in the vehicle. The pigment-vehicle system comprises a soln. of one or more xylene-sol. high mol. wt. org. polymers, selected from the group consisting of natural and synthetic rubber, and one or more wetting agents capable of forming a homogeneous soln. with the polymer constituent, the latter being present in quantities not exceeding 2.5% based on the total wt. of the resulting mass and the grinding aid soln. having a viscosity of not less than 50 centipoises. Thereafter grinding energy is applied to the mass for the purpose of finely subdividing the pigment constituent and distributing the pigment particles uniformly throughout the vehicle.

Modified oils for use in varnishes, nitrocellulose compositions such as lacquers. Laszlo Auer (to J. Randolph Newman, as trustee). U. S. 2,180,342, Nov. 21. Castor oil or various other specified fatty oils are given a thickened body or solidified to produce products sol. in acetone, BuOAc or benzene by heating with various compds. such as NH_4I, Ba thiocyanate, CdI_2, $ZnBr_2$, *p*-cresol or 2,5-dichlorobenzenesulfonic acid, *p*-nitrophenol, etc., (suitably together also with Li_2SO_3 or Li_2CO_3). Numerous details of treatment and of uses of the products are given.

Varnishes having high-paraffin hydrocarbon tolerance. Evart E. Mayfield (to Hercules Powder Co.). U. S. 2,180,535, Nov. 21. A method of making a varnish, contg. a paraffin hydrocarbon-insol. resin derived from pine wood, involves cooking the resin at a temp. of about 295-315° with China wood or linseed oil or other drying or semidrying oil and with a compd. of Zn, Pb, Sn, Mn or Co, such as PbO, etc.

Flat liquid coating composition. Charles G. Harford (to Monsanto Chemical Co.). U. S. 2,180,145, Nov. 14. A film-forming liquid such as a clear varnish has incorporated with it a ground aerogel such as a silica aerogel having in the mixt. substantially the structure of the gel as originally formed.

Chlorinated rubber-cellulose ester compositions suitable for coatings, etc. Heinrich Michaelis, Jr. (to Richard M. Ritter). U. S. 2,179,980, Nov. 14. A process of prepg. a homogeneous, stable and nonsepg. composite product of chlorinated rubber and a cellulose ester such as cellulose acetate or nitrate involves heating the chlorinated rubber to above 100° for a prolonged time with a drying or nondrying oil, plasticizer or oil-modified alkyd resin, to effect sufficient modification, then dissolving the modified chlorinated rubber in one portion of a neutral solvent for it and for the cellulose ester, and dissolving the cellulose ester in another portion of the mutual solvent, and then blending the 2 solns. Various examples are given. Cf. *C. A.* **33**, 3616[4].

Printing materials such as floor coverings. Philip H. Pennell (to Armstrong Cork Co.). U. S. 2,179,562, Nov. 14. App. is described, and a method involving applying a film including an oil such as heat bodied linseed oil and a resinoid such as an amberol mixt. which is but difficultly sol. in the oil, the film having a thixothropic body susceptible to rapid micelle formation when shearing forces cease to be applied, heating the film while in a horizontal position and at rest, and moving the material carrying the film through an inclined path and curing it at a temp. sufficient to effect substantially complete conversion of the resinoid with the oil.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The fat of the spiny fern. J. Maizīte. *Acta Univ. Latviensis. Kim. Fakultat. Ser.* **4**, No. 14(in Lettish, 529–45; in German, 546)(1939).—In the prepn. of crude filicinic acid from *Aspidium dilatatum*, Mg residues remained from which petr. ether removed 35–39% of a green fat solidifying from 30 to 21°. The fat possessed the consts.: acid no. 0.66, sapon. no. 157.4, esterification no. 156.7, Hehner no. 89.8, Reichert-Meissl no. 8.32, Polenske no. 0.37 and I no. 116.7. The fat contained 14–21% of an unsaponifiable fraction, 7.2% glycerol, 60.5–77.5% water-insol. fraction, and 1.6% of volatile water-sol. acids contg. *n*-BuOH. In the unsaponifiable fraction the phytosterol was 0.59% of which 0.43% was combined and 0.16% remained free; the solid fats approached 5.6%, while the liquid fats consisted of oleic acid contg. 16–21% linoleic acid. Frank Maresh

Fatty acids and glycerides of the fat from the seeds of Garcinia indica (kokum butter). N. L. Vidyarthi and C. J. Dasa Rao. *J. Indian Chem. Soc.* **16**, 437–42 (1939).—The component fat acids were detd. by the Pb salt sepn. and ester fractionation and found to be: myristic 1.2, palmitic 5.3, stearic 52.0, and oleic 41.5%. The component glycerides of the fat were detd. by resolving it into 2 fractions by systematic crystn. from acetone. The amt. of fully satd. glyceride was detd. by successive oxidation of the fat. The glycerides as detd. were: tristearin 2.0, oleodistearin 59.0, dioleostearin 21.0, oleopalmitostearin 14.0, oleodipalmitin 2.0, and palmitodiolein 2% in round nos. E. Scherubel

Fatty acids and glycerides of the oil from sapota seeds (Acharas sapota). N. L. Vidyarthi and M. Venkatesh Mallya. *J. Indian Chem. Soc.* **16**, 443–8(1939).—The seeds of *Acharas sapota*, an evergreen tree of southern India, weigh about 0.5 g. and contain 20% of liquid fat having the following consts. $d_{31°}$ 0.8725, $n_{31°}$ 1.463, sapon. no. 205.4, I no. (Wijs) 59.8, acid no. as percentage of oleic acid 8.94, R. M. no. 2.8, Hehner no. 92.6 and unsaponifiable 1.8%. The component fat acids found were: lauric 1.6, myristic 6.2, palmitic 12.6, stearic 12.0, oleic 66.2, and linoleic 1.4%. The component glycerides were calcd. to be: oleopalmitostearin 5.0, dioleomyristin 23.0, dioleopalmitin 36, dioleostearin 28.0, and trolein 5% with another 3.0% of disatd. monoolein in which probably the satd. acids are lauric, myristic and a little palmitic acid. E. Scherubel

Properties of coconut oil prepared directly from fresh coconut milk. D. M. Birosel, F. Millar, Jr., E. Nessia and F. Tagorda. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 39–49(1939).—Coconut oil obtained directly from fresh coconut meat by expressing the milk by roller press, centrifuging and coagulating the proteins, was analyzed for its phys. and chem. properties. Its compn. was detd. by converting the glycerol esters of the oil into fat acids, methylating them and fractionating the Me esters. The sapon. nos. and I nos. of the fractionated Me esters were also detd. The consts. obtained lie within the range given for coconut oils in general. The av. percentages of fat acids from 3 distns. are: caproic 0.38, caprylic 6.54, capric 8.95, lauric 55.06, myristic 16.89, palmitic and stearic 7.36, oleic 4.01, linolic 0.81. Butyric and all other fat acids lower than caproic were not present in detectable amts. in the mixed fat acids of the coconut oil sample. E. Scherubel

The vitamin A and D content of some seal oils. Herman Lövenskiold. *Tids. Kjemi Bergvesen* **19**, 118–19 (1939).—The liver oil contained 1300–10,000 I. U. vitamin A (by ultraviolet absorption) about 10 I. U. per g. vitamin D. The oil from dried seal flesh ("klappmyss") contained 100 I. U. vitamin D per g. H. Kringstad

The use of tall oil for the preparation of textile detergents. Hans J. Henk. *Seifensieder-Ztg.* **67**, 22(1940).—Tall oil, a by-product of sulfite pulp manuf., contains about 50% fat acids and 40% rosin acids. Where the odor of tall oil is permissible, soaps can be prepd. without other fat acids. Such soap can be used to disperse petroleum, paraffin oil, vat dyestuffs, etc. Tall oil soap can be used for the most varied textile requirements, including scouring raw wool, washing white woolens, washing cotton, dyeing, desizing, degumming of silk. Tall oil soap should not be present during Cl bleaching because it is easily oxidized and the odor is increased. In the peroxide bleach, also, tall oil soap increases the consumption of bleach by 50%. The soap is pptd. by hardness in waters. A. Guillaudeu

Cold-process soaps. J. M. Vallance. *Soap* **16**, No. 1, 21–4; No. 2, 30–1, 67(1940).—Various aspects of cold-process soap manuf. are discussed including raw materials, temps., type of frames, oxidation, builders and fillers, perfumes, utilization of scrap and special types of this soap. E. Scherubel

Soap stabilization. R. L. Sibley. *Soap* **16**, No. 2, 21–2(1940).—Rancidity tests were made by incorporating 0.1% of 43 different antioxidants in a neutral soap made from 3 parts edible tallow and 1 part coconut oil; and 5 g. of the treated soap were then placed in a 250-cc. glass-stoppered flask, and a piece of filter paper satd. with H_2O was torn into small pieces and added to the soap. The tightly stoppered flask was kept at a const. temp. of 50° in an oven. The color and odor were noted daily and compared with a control. All of the antioxidants tried were thioureas and all were superior to thiourea itself in respect to antioxidant properties. In general aryl substituted thioureas are superior to the alkyl substituted thioureas. Cottonseed oil to which thioureas were added was subjected to Wheeler's peroxide test. It was found that the thioureas as a class are effective in delaying rancidity, yet, the order of effectiveness does not appear to be of the same degree as that shown in the organoleptic test. In general thioureas protect soap against deterioration resulting from oxidation and further stabilize the soap against discoloration in light. E. Scherubel

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Hydrogenated oil as ointment base (Fiero) **17**.

Lea, C. H.: Rancidity in Edible Fats. New York: Chem. Pub. Co. 230 pp. $4.

Leplae, E.: Le palmier à huile en Afrique. Son exploitation au Congo belge et en Extrême-Orient. Brussels: G. van Campenhout. 108 pp.

Peyre, P.: Les oléagineux; sur l'olivier. Paris: P. Peyre. 270 pp. Fr. 40.

Scansetti, V.: L'industria dei saponi. Milan: Ulrico Hoepli. 599 pp. L. 22.50. Reviewed in *Chimie & industrie* **42**, 869(1939).

Schönfeld, H., and Hefter, G.: Chemie und Technologie der Fette und Fettprodukte. 2nd ed. Bd. IV. Seifen und Seifenartige Stoffe. Vienna: J. Springer. 610 pp. Cf. *C. A.* **32**, 1505[8].

Glycerine and Its Derivatives. Chicago: Glycerin Producers Assocn., Research Labs. 24 pp.

Sixty New Synthetic Waxes. Boston (89 Bickford St.): Beacon Co. 16 pp.

Soap Makers' Directory for 1939. Published from 21, City Road, London. 2s. 6d.

Centrifugal separator suitable for separating animal oils from cellular tissue, etc. Hans O. Lindgren (to De Laval Separator Co.). U. S. 2,179,941, Nov. 14. Various structural and operative details.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Estimation of optically active nonsugars and application to (beet) distillery juices. Ippolito Sorgato. *Ind. saccar. ital.* **32**, 535-8(1939).—Control calcns. should be based on total reducing sugars rather than on sucrose or loss of polarization. For this purpose it is necessary to take account of optically active nonsugars, which are estd. from the polarization and the detn. of invert sugar before and after total inversion. Only in this way is it possible to keep track of losses by fermentation in the diffusion or increases in polarization due to inversion of sucrose in the preparative operations. O. W. Willcox 2

Weighing of final bagasse. Colin W. Waddell. *Sugar News* **20**, 187-90(1939).—Mech. features of 3 automatic bagasse scales. W. W. Binkley 3

Biochemical and anatomic characteristics of starch. I. A. Veselovskiĭ. *Khlopchato-Bumazhnaya Prom.* **1939**, No. 5, 45-6.—Biochem. analysis of pure starch obtained from various types of potatoes indicates that the ash content, viscosity (η), and P are definitely related, the η increasing with increasing ash and P. For P content ranging from 0.063 to 0.124% and ash from 0.147 to 0.361% the η ranged from 4.1 to 14.1% (for 0.3% starch soln. referred to water). The larger the grains of starch the easier it is hydrolyzed with acid. Fibers sized with various starches were tested for strength and those treated with starch from the potato were the strongest. B. Z. Kamich 4

Sp. rotation of wheat and legume starch (Knyaginichev, Palilova) **11D**.

Cross, Wm. E.: La caña de azucar. Buenos Aires: Facultad de Agronomia Veternaria, Universidad de Buenos Aires. 231 pp. Reviewed in *Facts About Sugar* **35**, No. 1, 36(1940).

Gilmore, A. B.: Louisiana Sugar Manual, 1938-39. 28th ed. New Orleans: The Author. 258 pp. $5.

Habif, N.: Combustion de la bagasse. Cairo: Paul Barbey. 100 pp.

Gupta, C. P.: Philippine Sugar Industry. Delhi: Assocn. for Development of Swadeshi Industries. 85 pp. Re. 1. Reviewed in *Science and Culture* **5**, 60(1939).

Mitra, M. N.: Indian Sugar Industry. Tikatully, Dacca: B. R. Mitra. Rs. 3. Reviewed in *Science and Culture* **5**, 127(1939).

Vandercook, John W.: King Cane. Sugar in Hawaii. New York: Harper and Bros. 192 pp. $2.50.

Laboratory Manual for Queensland Sugar Mills. 2nd ed. Brisbane: Division of Mill Technology, Bureau of Sugar Expt. Stations, Queensland. 206 pp. 10s. Reviewed in *Intern. Sugar J.* **41**, 399(1939).

Sugar Reference Book and Directory, 1939. 8th ed. Hoboken: Russell Palmer. 184 pp. $5.25.

Drying starch. Helmut Schorn and Carl V. Daumas (to N.-V. "Agratherm"). U. S. 2,180,968, Nov. 21. App. is described, and a process which involves dropping starch particles such as raw starch from a centrifugal app. through a hot gas (such as air heated to 300°) flowing countercurrent to the starch.

29—LEATHER AND GLUE

HENRY B. MERRILL

The precipitation of natural tanning agents with calcium hydroxide. Vladimír Němec. *Tech. Hlídka Koželužská* **15**, 80-1, 83-5(1939)(German summary). The usual pptn. of tanning agents with lime water pptd. the agents but left a soln. too dil. for analyses. N. pptd. the tanning agents with powd. CaO. In an Erlenmeyer flask treat 50 cc. of the tanning ext. with 2 g. of powd. CaO, attach a reflux air condenser, heat for 5 min., cool and filter through a Schleicher-Schüll blue label 11-cm. filter. Place 25 cc. of the filtrate in a quartz or Pt dish, evap. to const. wt., and ash the residue in an elec. oven. In exts. of quebracho, chestnut, pine, oak, mangrove, mimosa and sumach barks all natural tanning agents were pptd. by the powd. CaO. When the tanning agents were in the form of condensed compds. the fraction which was not pptd. by the CaO corresponded quantitatively to the fraction of nontanning agents; the size of this fraction was independent of the sugar content of the ext. When the tanning agents were in the form of hydrolyzable products, the CaO pptd. some of the nontanning agents, principally monosaccharides which detach themselves from their org. structure and combine with the CaO to form an insol. substance. Filtrates contg. agents in the form of condensed compds. were red or brown in color; those filtrates contg. the agents in the form of hydrolyzable products were pale yellow or colorless. The brief heating of the exts. under the condenser prevented some of the oxidations which occur at room temp. The evapn. in a Pt evapg. dish was more rapid than that occurring in a quartz dish. Also in *J. Intern. Soc. Leather Trades Chem.* **24**, 5-8(1940) (in English). Frank Maresh 6 7 8 9

Tanning extracts in the evolution of the tanning methods. Erberto Durio. *Chim. ind. agr. biol.* **15**, 675-7 (1939).—A review. G. A. Bravo

The chemistry of tanning extracts. Elena Ageno Valla. *Chim. ind. agr. biol.* **15**, 666-70(1939).—A review. G. A. Bravo

Theory of mineral tannage (summary). Egon Elöd and Theodor Schachowskoy. *Kolloid Beihefte* **51**, 1-122 (1939); cf. *C. A.* **31**, 7692[3].—Data previously presented are reviewed. The following conclusions are drawn: (1) Previously employed exptl. methods are inadequate to decide which of the several theories, advanced to explain the facts of chrome tanning, is the correct one. (2) From examn. of gelatin films treated with mineral tanning agents under comparable conditions, it is concluded: (*a*) many materials previously described as tanning agents really have no influence on the soly. of gelatin; (*b*) each tanning agent is most effective in a characteristic pH range, which is related to the pH value at which the hydroxide or basic salt is pptd.; (*c*) Cr sulfate is more effective than the nitrate or chloride; (*d*) the quantity of Cr salt required for a given tanning effect declines slowly with increasing basicity and particle size up to basicity = 60 to 70% and av. mol. wt. = 4000, above which the rate of decrease is very rapid. (3) From absorption spectra of solns. of Cr^{III} and Co^{III} salts, with and without gelatin, it is concluded that combination between these metals and gelatin occurs neither by primary valence union nor by addn. of unaltered metal complexes to the gelatin, but rather by formation of mol. compds. of highly basic metal salts with gelatin. (4) The combination of Cr salts with gelatin is not comparable to the combination of Cr salts with glycine. (5) Detanning expts. show that a small part of the Cr is fixed much more tenaciously than most of the tanning agent, perhaps because of combination with several micelles. (6) It is impossible from present data to det. with which protein groups the Cr combines. From x-ray evidence, a regular, crystal-like distribution of Cr throughout the collagen micelle seems improbable. (7) Cr nitrate and chloride, as well as the sulfate, can produce leather that withstands the boil test. The importance of shrinkage temp. as a criterion of tannage is perhaps overestd., since untanned skin withstands boiling at certain pH values (12.5 to 13.0). (8) If mineral tanning does not consist of primary valence combination, then other lyophilic col-

loids should be capable of being tanned. This was confirmed with polyvinyl alcs. H. B. Merrill

Use of phosphates in the tannery. Paul I. Smith. *Hide & Leather* **99**, No. 2, 30–3(1940).—A discussion of the use of pyro- and meta-phosphates in H_2O softening, deliming, prepn. of fat liquors and pretanning. H. B. Merrill

Flora of tan liquors. P. Chambard and M. Seux. *J. Intern. Soc. Leather Trades Chem.* **23**, 542–9(1939)(in French).—The role of mycoderma yeasts in vegetable tan liquors has received little study. Three species (I) an unidentified mycoderma, (II) an unidentified torula and (III) a monilia (*M. variabilis*) were isolated from com. tan liquor, and grown in sucrose-malt peptone (or dry malt) medium. When the sucrose was replaced by pure gallotannin, growth of I and II was inhibited, and III was retarded. Addn. of glucose (10%) permitted growth of all 3 organisms in concns. of tannin up to 8% (scanty above 4%). Analyses showed that no tannin was destroyed by I and II, indicating that these organisms cannot utilize polygalloyl glucose. In the absence of glucose, III destroyed about 10% of the total tannin present in 2% tannin soln. in 15 days; the percentage destroyed decreased with increasing tannin concn., and increased markedly when glucose was added. Regardless of the initial pH value, fermentations by I, II and III resulted in final pH values of 3.1–3.2, 2.6 and 2.9–3.0, resp. Both volatile and nonvolatile acids were produced. AcOH and AcOOEt were identified by odor. Conclusion: Of the 3 yeasts studied, only the monilia can split gallotannin, but all produce notable amts. of acid by fermentation of sugars in the presence of moderate concns. of tannin. H. B. Merrill

A chemical analysis of vegetable-tanned leather. Václav Kubelka. *Tech. Hlídka Koželužská* **15**, 85–7, 95–100, 107–11(1939).—A review contg. 145 references and covering the analysis and role of water, fats, N, exts., acids and minerals in leather. Frank Maresh

Manufacture of a readily wetted chrome-tanned leather. V Casaburi. *Atti X° congr. intern. chim.* **4**, 870–7(1939). See *C. A.* **33**, 6085[2]. J. E. D.

Germproofing of leather. Fred O'Flaherty. *Hide & Leather* **98**, No. 20, 24–6(1939).—Several standard tannery processes have incidental disinfecting action (liming, pickling, Cr and HCHO tannage). Usually a disinfectant is added at one or more stages to inhibit mold growth. Recently a demand has arisen for leather that will not support the growth of skin-disease organisms, especially athlete's foot. Phenol-Hg compds. are effective in very high dilns. The possibility of causing dermatitis in hypersensitive individuals must always be considered. H. B. Merrill

Evaluating the germproofness of leathers. Fred O'Flaherty. *Hide & Leather* **99**, No. 2, 23–6(1940); cf. preceding abstr.—The evaluation is complicated by the variety of germ life encountered and the marked influence upon the effectiveness of any germproofing agent of the conditions under which it is applied. The phenol coeff. obtained with one organism under a given set of conditions has no significance for any other organism or for a different set of conditions. Germproofness of leather can be evaluated by placing a sample on Sabouroud's medium inoculated with the organism under test, usually a mold. Germproofness is indicated by a mold-free halo surrounding the sample after incubation. With a fungicide, this halo may contain colonies of bacteria, since one antiseptic is seldom effective against both molds and bacteria. Leather is not a good medium for the growth of the *Trichophyton* organism responsible for athlete's foot, since this organism grows best at pH values just under 7, while the aq. exts. of most leathers have pH values from 3 to 5. To test the effect of leather on the athlete's foot organism, the leather is moistened with perspiration, inoculated with *Trichophyton*, incubated 24 hrs. at high humidity, and a transfer made from the leather to Sabouroud's medium. Lack of growth of *Trichophyton* on the medium indicates that the leather has killed the organism. H. B. M.

Recent processes for treating rabbit furs and hair. Vittorio Casaburi. *Boll. staz. sper. ind. pelli mat. concianti Napoli* **17**, 219–30(1939).—A critical review of Italian patents on treatment with pancreatin and other enzymes, with a mixt. of Na_2S and carob-seed gel, with phosphotungstic acid and other compds., with citric acid, HCHO, H_2O_2 and an Al salt, and with metatungstic acid. G. A. Bravo

An improved Reed-Churchill extractor. R. W. Frey and I. D. Clarke. *J. Am. Leather Chem. Assoc.* **34**, 614–22 (1939).—The outer container is glass; this permits examn. of the tubes during extn. All metal parts are monel. Electric heating, stirring and temp. control to 0.1° are provided. Details of construction are given. H. B. Merrill

Advances in the manufacture and use of glue. H. Goette. *Knochenverarb. u. Leim* **1**, 81–9, 137–9, 164–6 (1939).—A review of German patents. Don Brouse

Modern conversion of fresh bones. Fritz Ohl. *Knochenverarb. u. Leim* **1**, 156–60, 175–7(1939).—By improved treatment in an autoclave, the yield of nutrient fat, stock food and glue from fresh bone can be increased. For example, at a total cost of 120 RM 1000 kg. fresh bone stock will yield 160 kg. nutrient fat, 450 kg. stock food, and 120 kg. glue with a total value of 310 RM. Don Brouse

Fire in a leather factory (Brunswig) **24**. Leather treatments (U. S. pat. 2,180,256) **25**. Dyes of the diphenylamine series [for dyeing leather] (U. S. pat. 2,177,113) **25**.

Casaburi, V.: Metodi di analisi e ricerche delle industrie del cuoio presso la R. Stazione Sperimentale per l'Industria delle Pelli e delle Materie Concianti coordinati dal Direttore. Naples: Stabilimento industrie editoriali meridionali. 343 pp. L. 100.

Laurence-Lord, D.: Sole Leather or Hides and Leather. Southend-on-Sea: Technical Book Co. 162 pp. 5s.

Unhairing skins. Mihály Krasznay. Hung. 122,490, Dec. 15, 1939. Water-sol. alkali or NH_4 salts of org. or inorg. acids are used at a controlled pH value. Na_2S and alkali-resistant emulsifying or dispersing substances also are added.

Treating hides and skins for depilating and bating. Otto Röhm. U. S. 2,179,899, Nov. 14. In a process which includes treating hides or skins in aq. soln. with (1) at least one oxidizing agent selected from a group consisting of alkali nitrates, alkali nitrites, alkali percarbonates, alkali peroxides and hydrogen peroxide, (2) a reducing agent comprising an O-contg. S compd. and (3) a depilating and bating agent comprising a mold tryptase; the treatment with the depilating and bating agent comprises a sep. step from the treatment with the oxidizing and reducing agents.

Apparatus for treating animal skins with liquids such as dyes and "dopes." Louis J. Strobino. U. S. 2,180,562, Nov. 21. Various structural and operative details are described of an app. having a support such as a rotatable drum with a convex surface covered with fibrous material such as plush which may hold a treating liquid among its fibers.

Condensation products having a tanning action. Hermann Schütte (to I. G. Farbenind. A.-G.). U. S. 2,179,800, Nov. 14. A dihydroxydiphenylsulfone is treated, at a temp. of 100–160°, with glycolic acid, in the presence of a sulfonating agent such as concd. H_2SO_4.

Water-soluble condensation products containing phosphorus and suitable for preparing tanning or disinfecting compositions, etc. Josef Schäfer (to J. R. Geigy A.-G.). U. S. 2,180,260, Nov. 14. A process for the manuf. of water-sol. condensation products contg. P involves condensing a mixt. of 1 mol. of a sulfonic acid of a monohydric phenolic compd. of the benzene series and at least $1/2$ mol. of an unsulfonated monohydric phenolic compd. of the same class with at least one of the group consisting of P halides and P oxyhalides at temps. over 120° and neutralizing.

Compositions suitable for softening leather, paper and

textile materials. Luther B. Arnold, Jr. (to E. I. du Pont de Nemours & Co.). U. S. 2,180,133, Nov. 14. A softening agent is prepd. by treating a mixt. of a substantially satd. higher aliphatic petroleum hydrocarbon material such as petrolatum, and a long-chain aliphatic alc. having 12–20 C atoms with a quantity of a sulfating agent such as H_2SO_4 or chlorosulfonic acid, which is not greater than that required for complete sulfation of the alc. in the mixt. under relatively mild conditions (suitably at 55–65°) to avoid the condensation of the components of the mixt.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Molecular weight of sol and gel in crude Hevea rubber. A. R. Kemp and H. Peters. *J. Phys. Chem.* **43**, 1063–82 (1939); cf. *C. A.* **33**, 9712[2].—The instability of high-mol. rubber in tetralin and the difficulty of dispersing rubber gel in C_6H_6 make these objectionable as solvents for detg. the av. mol. wt. of crude rubber. On the contrary, hexane is an excellent solvent for fractionating sols from crude rubber and for viscosity mol. wt. detns. Crude rubber was extd. with *n*-hexane and the mol. wt. of the sol rubber was calcd. from the viscosity of the soln. The Staudinger formula for mol. wt., $M = \eta_{sp}/C\,3 \times 10^{-4}$ (where C is the base molal concn., i. e., 1 mole is taken as 68 g. per l. of C_5H_8) is dependent to a greater extent on the concn. than the Arrhenius equation, $M' = \log_{10}\eta_r\,10^4/C$. The av. mol. wt. detd. by the viscosity method is of questionable value because of the insol. gel present. The mol. wt. distribution of polyprenes in crude rubber depends on the proportion of sol and gel present and these vary widely. The soly. and diffusion rate of sol into hexane from crepe rubber decrease as the mol. wt. of the rubber increases. Sol rubber of a mol. wt. of 210,000 is practically insol. and diffuses very slowly into hexane. The av. mol. wts. of sol rubber fractions from unmilled crepe rubber vary from about 60,000 to 210,000. Milling results in oxidative breakdown of rubber hydrocarbon macromols. to a smaller but more uniform size. Hot milling results in higher av. mol. wts., with a different distribution from that by cold milling. A polar solvent such as abs. EtOH reduces the viscosity of rubber in hexane. The addn. of alc. or Me_2CO to hexane peptizes gel rubber, probably because of a reduction of assocn. or van der Waals forces between the long-chain mols. The peptized gel can be converted to hexane-insol. gel by removing the peptizing agent. Swelling of rubber in an org. solvent depends on the nature of the gel present; a gel that has been peptized swelled much more in hexane when the peptizing agent has been removed. S. I. Aronovsky

Action of K-N nutrition on carbohydrate metabolism of rubber plant Taraxacum kok-sagyz (Kalinkevich) **11D.** Electroforming with Fe—Ekko process (Bull, *et al.*) **4.** Use of ebonite as a plastic (Sorin) **13.** Thermoplastic resins obtained from depolymerized rubber (Grange-Neyrand) **13.** Culture of *Hevea* in Indochina (Thomas) **11D.** Plastic state - measurement of plasticity (Bary) **2.** Rubber-like polymerization products (U. S. pat. 2,180,082) **13.** Leather substitute [impregnated with rubber or rubber latex] (Fr. pat. 841,007) **13.** Rubber-coating knit materials (U. S. pat. reissue 21,269) **25.** Chlorinated rubber-cellulose ester compns. for coatings (U. S. pat. 2,179,980) **26.**

Barker, P. W.: Rubber Industry of the United States, 1839–1939. Washington: U. S. Bureau of Foreign and Domestic Commerce. 42 pp. 10 cents.

Neal, Arthur M.: Significance of Accelerated Aging Tests for Rubber. Wilmington: Rubber Chemicals Division, E. I. du Pont de Nemours and Co., Inc. 12 pp.

Annual Bibliography of Rubber Literature (excluding Patents) 1937. New York: Rubber Age.

A. S. T. M. Standards on Rubber Products, 1939. Methods of Testing Specifications. Prepd. by Comm. D-11 on Rubber Products. Philadelphia: Am. Soc. for Testing Materials. 210 pp. $1.75.

Bibliography of Rubber Patents and Literature—1938. Compiled by J. J. Berliner, *et al.* New York: J. J. Berliner. 43 pp. $3.50. Reviewed in *Rubber Age* **46**, 106(1940).

Rubber as an Engineering Material. Akron: B. F. Goodrich Co. 25 pp.

Second Report of Rubber-Foundation Covering the Period January 1-December 31, 1938. Amsterdam (Heerengracht 182): Rubber-Stichting. 128 pp.

Shell Carbon and its Uses in Rubber Industry. San Francisco: Shell Chem. Co. 40 pp.

Rubber compositions. Fritz Rostler and Vilma Mehner (to Naftolen-Ges. zur Verwertung der Rostler-Mehner'schen Verfahren m. b. H.). U. S. 2,180,367, Nov. 21. A mixt. suitable for use in the manuf. of products such as sheets or tubes comprises rubber together with hydrocarbons of the general formula $(C_5H_4)_n$ of viscous character and high mol. wt. and compatible with rubber in all proportions, sol. in H_2SO_4, highly reactive with S and present in the mixt. to the extent of 5% to 100% the amt. of the rubber for co-vulcanization with the rubber. Various mixts. are described.

Rubber composition suitable for shoe soles, etc. Frederick J. Maywald and Frederick J. Maywald, Jr. (to Maywald-Fleming Patents Co.). U. S. 2,180,906, Nov. 21. Fibers such as those of wool of substantially greater length than 0.1875 in. are milled into rubber with an amount of oily lubricant such as petrolatum, sufficient to render the fibers slippery and in excess of the amt. of oily material added as softeners to rubber, to facilitate even distribution of the fibers without breaking them.

Inhibiting deterioration of rubber. Raymond F. Dunbrook (to Firestone Tire & Rubber Co.). U. S. 2,180,936, Nov. 21. Rubber is mixed with a small proportion of a reaction product of a terpene hydrocarbon such as α-pinene with a secondary aryl amine such as diphenylamine or of a reaction product of a hydroxy deriv. of a terpene hydrocarbon such as terpineol with a primary or secondary aryl amine such as aniline.

Preserving rubber. Samuel G. Burroughs (to Pennsylvania Coal Products Co.). U. S. 2,176,881, Oct. 24. For preventing oxidation and discoloration of rubber there is incorporated with it about 2% of a tetramethylhydroxyspirobiindan in which the methyl groups are attached to the satd. rings and the hydroxy groups to the aromatic rings, such as 3,3,3',3'-tetramethyl-5,6,5',6'-tetrahydroxy-1,1'-spirobiindan. U. S. 2,176,882 (Charles H. Fisher, inventor; to same assignee) relates to a like use of an alkylhydroxyspirobiindan having at least 2 hydroxy groups and different alkyl radicals, such as 2,3,3'-trimethyl-3,3'-diethyl-5,6,5',6'-tetrahydroxy-1,1'-spirobiindan.

Preserving rubber. Albert M. Clifford (to Wingfoot Corp.). U. S. 2,180,666, Nov. 21. Rubber is mixed with an antioxidant which may be produced by reaction of a primary aromatic amine such as aniline or α-naphthylamine with an equimol. proportion of a satd. monohydric aliphatic hydrocarbon alc. such as MeOH, BuOH or iso-PrOH at a temp. of about 275–300° for 7–15 hrs., in the presence of a catalyst such as $ZnCl_2$ or $SnCl_4$.

Preservation of rubber. Joseph R. Ingram (to Monsanto Chemical Co.). Can. 386,493, Jan. 23, 1940. Rubber is treated with an aryloxy substituted diarylamine, e. g., 4-*p*-cresoxyphenyl-β-naphthylamine.

Apparatus for calendering sheet rubber. Paul Gleissner. U. S. 2,180,046, Nov. 14. Various structural, mech. and operative details.

Cellular rubber products. Albert N. Ward and Frank

T. Purkis (to Dunlop Rubber Co. Ltd.). U. S. 2,180,725, Nov. 21. Products are formed from foamed aq. dispersions of latexes contg. a bivalent oxide such as ZnO and with addn. of an aq. soln. of NH_4 salts such as the sulfate, nitrate or acetate normally having a pH less than 7 but conditioned, by adding alk. reagents, to have a pH greater than 7.

Sheet material for separating tacky rubber. George W. Coggeshall (to S. D. Warren Co.). Can. 386,086, Jan. 2, 1940. For carrying, sepg. and protecting tacky rubber during milling and for curing operations, a strong flexible fibrous sheet material, thickness not less than 0.004 in., having smoothed surfaces filled with an org. adhesive, and a bursting strength (Mullens test) of at least 100 lb., is coated with a lacquer compn., at least 0.007 lb. per sq. yd. on each side, contg. as a major proportion of the solid content a fiber-forming substance selected from the group consisting of plasticized org. esters of cellulose, plasticized cellulose ethers, vinyl resins and acryl resins. Cf. *C. A.* **34**, 908[3].

Deodorizing rubber products. Lester S. Cooper (to Rubatex Products, Inc.). U. S. 2,179,494, Nov. 14. A process of producing a deodorized gas-expanded sealed cell rubber structure involves mixing S with rubber and blending the mixt. with a deodorizing material such as Pb carbonate adapted to react with the S and the H_2S that is subsequently formed during the expansion of the rubber mix, regulating the consistency of the rubber mix so that it will entrap gas and retain it, gassing the rubber mix, and heating it to effect at least a 6-fold expansion with deodorizing reactions, and setting the expanded rubber in vulcanized condition.

Rubber mills, etc., with coöperating rolls. Carl F. Schmuck (to Farrel-Birmingham Co.). U. S. 2,179,961, Nov. 14. Various structural and mech. details.

Diaryldithiocarbamyl derivatives (rubber-vulcanization accelerators). Paul C. Jones (to B. F. Goodrich Co.). U. S. 2,177,547, Oct. 24. By the reaction of approx. equimol. quantities of an alkali metal salt of a diaryldithiocarbamic acid, such as Na diphenyldithiocarbamate, and an NH_4 halide such as NH_4Cl with at least an equimol. quantity of CH_2O (suitably with heating to 50°), a product is obtained such as tris(diphenylthiocarbamylmercaptomethyl)amine.

Electrically heated device for vulcanizing tires, tubes, etc. Albert Hoving. U. S. 2,179,819, Nov. 14. Various structural, elec. and operative details.

Rubber vulcanization. Paul C. Jones (to B. F. Goodrich Co.). U. S. 2,177,548, Oct. 24. As vulcanization accelerators, use is made of tris(diphenylthiocarbamylmercaptomethyl)amine and various compds. of the general formula $(RSA)_3N$ in which R represents an org. radical with the free valence on a C atom and A represents an alkylene group.

Hard expanded rubber products Dudley Roberts and Lester S. Cooper (to Rubatex Products, Inc.). U. S. 2,176,946, Oct. 24. Products such as elec. insulators, etc., are formed of a hard and rigid gas-expanded rubber contg. a multiplicity of small sealed cells of gas and contg. a substantial amt. of hard rubber dust, the material having a d. of about 20–40 lb. per cu. ft.

Closed cell expanded rubber material. Geoffrey P. Denton (to Rubatex Products, Inc.). U. S. reissue 21,245, Oct. 24. A reissue of original patent No. 1,905,269 (*C. A.* **27**, 3638).

Thread comprising a plurality of rubber filaments. Wm. M. Spencer (to Filatex Corp.). U. S. 2,177,538, Oct. 24. Various mfg. and structural details of a composite compressible thread.

Rubber floor tile. Albert C. Fischer. U. S. 2,176,068, Oct. 17. Tile of soft rubber floor tile material is surrounded with an edging of rubber film of the same compn., vulcanized to a greater hardness than the rest of the tile.

Carbamyl dithiocarbamates (rubber vulcanization accelerators). Ira Williams (to E. I. du Pont de Nemours & Co.). U. S. 2,171,420, Aug. 29. Compds. of the general formula RANCOSCSNBB wherein R represents an aromatic radical free of substituents other than hydrocarbon, hydroxyl, alkoxy and halogen radicals, A represents a neutral aliphatic radical and B,B together represent two separate and distinct aliphatic hydrocarbon radicals or a pentamethylene radical having two separate and distinct carbon atoms bonded to the N are prepd. by a process which comprises adding about one mol. proportion of an arylalkylcarbamyl halide to a salt of a dialkyldithiocarbamic acid in an inert volatile solvent and sepg. the arylalkylcarbamyl dialkyldithiocarbamate from the solvent. Various details and examples are given of the production of compds. such as: phenylmethylcarbamyl dimethyldithiocarbamate, m. 135–7°; phenylmethylcarbamyl pentamethylenedithiocarbamate, m. 99–101°; phenylethylcarbamyl dimethyldithiocarbamate, m. 89.5-90.5°; phenylethylcarbamyl pentamethylenedithiocarbamate, m. 99–100°; ethyl-*o*-tolylcarbamyl dimethyldithiocarbamate, m. 84–7°; ethyl-*o*-tolylcarbamyl pentamethylenedithiocarbamate, m. 93–5°; β-hydroxyethylphenylcarbamyl dimethyldithiocarbamate, m. 142–3°; *p*-methylbenzylphenylcarbamyl dimethyldithiocarbamate, m. 118–19°; ethyl-α-naphthylcarbamyl dimethyldithiocarbamate, m. 107–9°; ethyl-α-naphthylcarbamyl pentamethylenedithiocarbamate, m. 138.5–40°; methyl-4-hydroxyphenylcarbamyl dimethyldithiocarbamate, m. 136-8°; and methylphenylcarbamyl dicyclohexyldithiocarbamate, m. 102-4°. U. S. 2,171,421 relates to the use of such compds. as *rubber vulcanization accelerators*.

Rubber vulcanization. Lorin B. Sebrell and Albert M. Clifford (to Wingfoot Corp.). U. S. 2,173,732, Sept. 19. As accelerators, use is made of a benzothiazyl ester of butyldithiocarbamic acid or other compds. of the general formula $S.R_1.N:CSC(:S)NHR$ in which R_1 is arylene and $-SC(:S)NHR$ is the residue of a dithiocarbamic acid derived from a primary amine. Cf. *C. A.* **34**, 907[3].

Preserving rubber. Wm. P. Ter Horst (to Wingfoot Corp.). U. S. 2,178,545, Nov. 7. Vulcanization is effected in the presence of (suitably about 1% of) a reaction product consisting of about one mol. of an aromatic hydroxy compd. such as β-naphthol, 5 mols. of CH_2O and 2 mols. of NH_4HS.

Extruding apparatus for making rubber threads or filaments. Max Draemann. U. S. 2,178,955, Nov. 7. Various structural, mech. and operative details.

Re-elasticizing rubber threads associated with a reaction product of glue and formaldehyde. Thomas L. Shepherd. U. S. 2,178,498, Oct. 31. A fabric contg. threads which comprise rubber with which glue has been incorporated to render the threads relatively inextensible and in which the glue has been rendered insol. by treatment of the threads with CH_2O is further treated with an aq. soln. of urea (suitably in 10% aq. soln.) by which the glue content of the thread is rendered sol. and the rubber threads are rendered elastic. Cf. *C. A.* **33**, 6652[3].

Solid rubber products. Henry H. Harkins (to Dominion Rubber Co., Ltd.). Can. 385,213, Nov. 21, 1939. To prevent premature hardening or embrittlement in a solid rubber stock contg. filling, vulcanizing and hardening ingredients including a partially polymerized phenolic resin, the mass is quickly cooled directly after the processing operation and the cooled stock heated to harden the resinous body and cure the rubber.

Rubber tires. Thomas H. Ainlay (to B. F. Goodrich Co.). Can. 385,795, Dec. 19, 1939. There is imbedded in uncured rubber a cord fabric of cotton warp and cellulose acetate weft impregnated with a substance that dissolves cellulose acetate at the vulcanizing temp., and the rubber is vulcanized.

Pneumatic tire casing of vulcanized rubber having cords embedded in it. Herman T. Kraft (to General Tire & Rubber Co.). U. S. 2,179,374, Nov. 7. Various structural and mfg. details.

Side-drive belts, etc., of rubber and fibrous material. Pierre A. Cady (to Raybestos-Manhattan, Inc.). U. S. 2,178,558, Nov. 7. A belt having a reinforced end structure adapted to be engaged by connecting devices such as bolts or pins is formed with a core having a plurality of plies of fibrous material such as textile fabric and rubber,

the number of plies of fibrous material being increased adjacent the ends of the belt.

Molding condensation products of rubber. Herbert A. Endres (to Wingfoot Corp.). U. S. 2,178,537, Nov. 7. Products such as dishes, etc., are formed with heat and pressure in a mold from a substantially unoxidized condensation deriv. of rubber obtained by decompg. with water the reaction product of chlorostannic acid and a rubber cement. Products thus derived and formed may be dipped in Cl water to make them more resistant to oil and grease.

Rubber antioxidants. Albert M. Clifford (to Wingfoot Corp.). U. S. 2,178,536, Nov. 7. Rubber is vulcanized in the presence of (suitably about 1% of) the product derived by the reaction, in one step and suitably in the presence of HCl, of an aldehyde such as CH_2O, a diaryl amine such as *N,N'*-diphenyl-*p*-phenylenediamine and a phenolic compd. such as β-naphthol. Such products serve as "age resisters."

Vulcanization accelerator. Charles O. Miserentino (to Dunlop Tire and Rubber Corp.). Can. 385,087, Nov. 14, 1939. A monobasic org. acid is treated with a secondary amine, and the reaction product treated with CS_2. Cf. *C. A.* **33**, 4462[9].

Shaping and vulcanizing rubber belting, etc. John M. Bierer (to Boston Woven Hose & Rubber Co.). U. S. 2,179,443-4, Nov. 7. Various details of app. and opera-

CHEMICAL ABSTRACTS

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I—APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

Gorokhov laboratory extraction apparatus. M. Bauman, A. Barbarash and N. Pil. *Maslobοino Zhirovoe Delo* 15, No. 4, 25–7(1939).—Construction and operation details and diagrams are given. Chas. Blanc

New problems of distillation. Molecular distillation. M. Furter. *Mitt. Lebensm. Hyg.* 30, 200–16(1939).—The principles involved in ordinary, vacuum and mol. distn. are discussed. W. J. Peterson

Distillation and rectification with steam. K. Thormann. *Chem. Fabrik* 1940, 3–9.—Advantages of steam distn. are mentioned, followed by a math. discussion of pressure relations, heat and material exchanges, quant. ratios, condensation and rectification, with 9 phase diagrams. J. H. Moore

Design for distilled water. Auburn A. Ross. *Chem. & Met. Eng.* 47, 100–1(1940).—App. in a plant of Eli Lilly and Co. for producing and delivering to the manufg. equipment distd. water of U. S. P. quality is described. The capacity is 100 gal. per hr. E. H.

Automatic evaporation balance. Léon Gros. *Ann. chim. anal. chim. appl.* 22, 9–10(1940).—With the app. described, as much as 1250 ml. of water can be evapd. within 24 hrs. without supervision. It is recommended for the detn. of total solids in water. The dish in which the residue is to be weighed is placed on the balance and under this is a small gas flame. If, at any time with fresh liquid constantly flowing the evapn. is too rapid, the counterpoised arm of the balance drops and thereby the supply of gas to the burner is reduced. Under normal conditions, the introduction of water into the dish takes place at the same rate at which there is evapn. At the end, the contents of the dish are dried in a drying oven at 100°. W. T. H.

The sedimentation balance for measurement of size-distribution of fine materials. Fred C. Bond. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 1129, 11 pp. (1939). Alden H. Emery

A new apparatus for determining chemical attack on glasses. Masao Nagaoka. *Glastech. Ber.* 17, 327–9 (1939).—The app. of glass construction is adapted to the powder method of detg. soly. A quartz tube holds the reagent and fits into a compartment, which is jacketed and fitted with a boiling flask and condenser to maintain const. temp. The Pt gauze basket carrying the sample is suspended from an eccentric to furnish adequate stirring. This arrangement permits detn. of wt. loss, alky., also elec. cond. Weight loss seems to be the most suitable measure of chem. attack. A treatment of 48 hrs. gives satisfactory results. J. F. Hyde

A new electrical proportioner. Arthur Kuntze and Karl Branditz. *Chem. Fabrik* 1940, 34.—The app. is for regulating mixts. of gases or liquids. A diagram of connections is shown. J. H. Moore

Scientific principles in the construction of pressure and steam boilers. E. Siebel. *Chem. Fabrik* 1940, 25–30.—Math. and descriptive, with 17 cuts and graphs. J. H. Moore

Concentration by flotation of nonmetallic minerals. H. Vigneron. *Génie civil* 115, 467–9(1939).—A review. Flotation methods have a wide application in the chem. industry as well as in the phys. treatment of minerals. Ann Nicholson Hird

An emulsifier. R. Cluzan. *Bull. trav. soc. pharm. Bordeaux* 77, 216–20(1939).—The app. which is described and illustrated turns out opaque emulsions contg. particles small enough to show Brownian movement. S. W. G.

Two constant-pressure devices. Archibald Clow and Geo. Shand. *J. Sci. Instruments* 16, 354–5(1939).—The manostats, 1 all glass, the other with a Hg regulating valve, are described in considerable detail with 3 cuts. When provision is made for variations in atm. pressure they are capable of maintaining a system of quite small vol. within 0.1 mm. of the desired pressure without any mech. attention. J. H. Moore

Photoelectric control apparatus in chemical industries. W. Jackel. *Chem. App.* 27, 1–2(1940).—A review of recent developments. G. W. Stroebe

Flow of gas-liquid mixtures through consolidated sand. Holbrook G. Botset. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 1111, 13 pp.(1939). A. H. E.

Liquefied hydrochloric acid. J. H. Frydlender. *Rev. prod. chim.* 43, 1–4(1940).—A review of manuf. and uses. E. H.

A new instrument for the magnetic determination of carbon in a steel bath. H. K. Work and H. T. Clark. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 1132, 11 pp.(1939).—The Carbanalyzer has been shown by exhaustive tests to be sufficiently accurate to fill a need of the industry. It is relatively inexpensive, requires little upkeep, and can be used by a furnace melter. Accuracy on single samples is good while the av. of 3 or more taken in rapid succession is highly accurate. It is a special form of permeameter. Alden H. Emery

The absorption of sulfur dioxide in water. L. C. Jenness and J. G. L. Caulfield. *Paper Trade J.* 109, No. 26, 37–41(1939).—Coeffs. of absorption of SO_2 in H_2O were detd. in a tower packed with 1-in. Raschig rings, covering an approx. range of liquor velocities from 0.09 to 0.69 ft. per min., with gas velocities of 0.037–0.30 ft. per sec. At fixed liquor velocity, the coeff. varies as a power function of the gas velocity, the exponent occurring at higher gas velocities; at fixed gas velocity the coeff. varies as a power function of the liquor velocity, with higher values of the exponent of the gas velocity increasing at higher gas velocities. Resistance to absorption is appreciable in the liquid film at low liquid velocities, but shifts to the gas film at high liquid velocities. A. Papineau-Couture

An apparatus for preventing losses of I_2O_5 in analysis for carbon monoxide. I. N. Ozhiganov. *Lab. Prakt.* (U. S. S. R.) 14, No. 9–10, 21–2(1939).—A thick-wall glass tube (inner diam. 9 mm.) contains a hollow cylinder sealed at both ends, which moves freely in the tube. The upper cone-shaped end of the cylinder is ground to fit the inner wall of the glass tube. The app. is attached after the container of air to be examd. A flow of water forces the air out of the container, the water passes into the app., raises the inner cylinder in the tube and stops the flow of water by pressing the cone-shaped end of the cylinder against the inner wall of the tube. This app. prevents losses of I_2O_5. W. R. Henn

Chlorine compressors. L. A. Smirnov. *Khim. Mashinostroenie* 1938, No. 4, 26–30; *Khim. Referat. Zhur.* 2, No. 4, 139–40(1939).—Cl is liquefied by compression under 15–18 atm. and cooling with water. Details of construction are described and advantages and disadvantages shown of the Amag-Gilpert, Skoda and Krebs machines for the production of liquid Cl. W. R. Henn

An electronic flow meter. Joseph M. Weinberger. *Electronics* 13, 30–1(1940).—An automatic recording device for the flow of water or other liquids through pipes. The vertical gage glass tube contains an opaque liquid. As this liquid rises in the tube, it intercepts a beam of light focussed on a photoelec. cell. This cell is connected through a linear d.-c. amplifier to a recording voltmeter. The use of a photocell provides a practically frictionless and inertialess means of measurement with none of the attendant losses inherent in mech. app. The threshold of operation is much lower than in any mech. system. Details of construction are given. C. G. F.

Grinding-rate curve of the Yentai aluminous shale in a porcelain-ball mill. Masayosi Wada. *Suiyokwai-Shi* 10, 73–8(1939).—Aluminous shale from the Yentai coal field was ground in a porcelain-ball mill. The rate of grinding was expressed by the formula $\omega = Kt^M$ where ω is the cumulative percentage weight of the −0.15-mm. products, t is the cumulative time of grinding in min., K and M are consts. A certain relation exists between the diam. of balls d, and K and M, and if log K is plotted against $1/d$ or log $(1 - M)/M$ against log d, a straight line is obtained. Hideo Nishimura

Gallons in any standard pipe. W. F. Schaphorst. *News Ed. (Am. Chem. Soc.)* 18, 109(1940).—Scales are given showing standard pipe size, length of pipe line, and total gallons in pipe, with the solution of illustrative problems employing this nomograph. W. C. Ebaugh

Pendulum sklerometers. K. Balyi. *Földtani Kozlony* 68, 59–67(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I. 1939, 25.—An improved form of Kuznetsov and Lavrent'eva's sklerometer (*C. A.* 26, 12) is described, the chief difference being that the 90° wedge with which the pendulum ends has a portion 1 mm. wide filed so as to make a pair of blunter wedges. Details as to use and method of calcg. H are given. C. A. Silberrad

A new and novel Freon refrigerating machine. J. B. Ritter. *Natl. Engr.* 43, 589–90(1939). A. N. H.

Some practical considerations on temperature control. Luis De Florez. *News Ed. (Am. Chem. Soc.)* 18, 102-3 (1940).—In cracking oil, control of temp. and flow not only dets. quality of product but the ability to operate continuously. Disturbances must be analyzed and corrected; it is found that there is a similarity in these factors to those used in the math. equation for a damped pendulum. Controls must be arranged to care for the time factor, fuel-oil ratio, temp. gradients along the coil, etc., automatically resetting other controls for temp., flow, and pressure. Improvements in multiple-junction thermocouples with amplifying devices are suggested, and coordination between process, operating, and instrument forces is stressed. W. C. Ebaugh

Vacuum thermocouples of the radiation-type pyrometry. S. S. Stack. *Gen. Elec. Rev.* 42, 365 6(1939).—The radiation pyrometer responds to intensities of all wave lengths. The energy radiation from the hot object is focussed on a blackened hot junction of a vacuum-enclosed thermocouple element. The thermocouple generates an e. m. f. which is approx. proportional to the temp. rise of the hot junction, or $E = 65K(T^4 - T_0^4)$ where K is a const., T the abs. temp. of the hot object and T_0 that of the thermocouple. The element is a thin metal strip (0.001 mm. thick) mounted between 2 heavy anchor supports which serve as the lead wires and as the cold junctions for the couple. The e. m. f. is 65 microvolts/1°. The hot junction is at the center of the strip where the 2 metals are joined in the form of a line across the strip (compn. not given). C. G. F.

Relation of uniform pyrometer records to uniform products. J. A. Doyle. *News Ed. (Am. Chem. Soc.)* 18, 135–7 (1940); *Heat Treating Forging* 25, 604–8(1939).—Emphasis on temp. control often leads to disregard of other important factors affecting uniformity of product, and the real test of uniformity is in the product. Direct relations exist between the surface exposed, time and rate of heating and cooling, positions of articles undergoing heating, and atm. conditions present. Much of the inequality frequently attributed to material is due to unsound shop practice in heating and cooling, and reflects the custom of disregarding the influence of phys. factors other than heat that affect uniformity. "Process specification" has been suggested as a means to the desired end. W. C. E.

Importance of the atmosphere in industrial furnaces. R. Martin. *Gas World* 111, No. 2889 Ind. Gas Suppl., 136–8(1939); 112, No. 2894 Ind. Gas Suppl., 6–8(1940). —See *C. A.* 34, 662⁷. P. J. Wilson, Jr.

Electric relay circuit for a thermostat. Kenzo Harai. *J. Chem. Soc. Japan* 60, 1258–60(1939).—A bulb is utilized for the temp. regulation of a thermostat, and the working conditions are studied. T. Katsurai

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Metal containers for shipping and storing white lead and similar materials (U. S. pat. 2,182,813) 26.

Kieser, A. J.: Handbuch der chemisch-technischen Apparate, maschinellen Hilfsmittel und Werkstoffe. Lfg. 15. Berlin: J. Springer. 92 pp. Cf. *C. A.* 34, 1519¹.

Twenhofel, W. H.: Principles of Sedimentation. New York: McGraw-Hill Book Co. 610 pp. $6.00.

Shell and tube converter for chemical reactions or contact treatments. Thomas B. Prickett (to Houdry Process Corp.). U. S. 2,181,153, Nov. 28. Various structural details.

Hermetic closures for bottles and like containers for corrosive liquids. Mallinckrodt Chemical Works. Brit. 507,702, June 20, 1939.

Specific gravity indicator. Howard H. Decker (to Schutte & Koerting Co.). U. S. 2,182,172, Dec. 5. Various details of a device with a float and indicator suitable for indicating the sp. gr. of fluids in tanks to which the device may be attached.

Multiple gravity meter. Frank G. Boucher (to Standard Oil Development Co.). U. S. 2,183,115, Dec. 12. Various structural, mech. and operative details.

Thick walled pressure vessels such as drums and headers of different steels. Howard J. Kerr (to Babcock & Wilcox Co.). U. S. 2,183,043, Dec. 12. Various structural details of app. which may include different metals such as chrome steel and C Mo steel welded to each other.

Apparatus with a deflector for proportioning reflux in distillations, etc. Thomas M. Gunn (to Socony-Vacuum Oil Co.). U. S. 2,182,378, Dec. 5. Various structural and operative details.

Hydrogen-ion concentration meter. Donald H. Cameron (to B. D. Eisendrath Tanning Co.). U. S. 2,181,866, Dec. 5. An app. is used comprising, in combination, a glass electrode, a thermionic tube in close proximity thereto, a short conductor connecting the electrode to the grid of the tube, a circuit including in series, a measuring potentiometer and a standardizing potentiometer, connecting the electrode to the cathode of the tube, the potentiometers being located in remote relation to the thermionic tube, and a relay located adjacent to the potentiometers for eliminating the glass electrode and measuring potentiometer from the circuit. U. S. 2,181,867 relates to an app. suitable for making chart records of pH concns.

Apparatus for cleaning filter beds such as those of sand. Francis L. Pruyn. U. S. 2,182,094–5, Dec. 5. Various structural, mech. and operative details.

Supports for filter pads. Oscar E. Quave and Ben B. Breslow (to Utility Fan Corp.). U. S. 2,182,501, Dec. 5. Various structural details.

Cleansing absorbent filtering material such as active carbon containing solvent material such as trichlorethylene. Edgar R. Sutcliffe and William E. Edwards (Edwards to Sutcliffe, Speakman & Co. Ltd.). U. S. 2,181,672, Nov. 28. Various details of app. and of use of steam as a filter-cleaning medium are described.

Apparatus for separating suspended solid matter from gases. Thomas B. Allardice. U. S. 2,182,862, Dec. 12. Various structural and operative details.

Apparatus for trapping out dust from air. Henry W. Pfeffer and Harry O. Danz (to American Blower Corp.). U. S. 2,182,854, Dec. 12. Various structural details. 1

Spray tower for removing fine particles from gases by sprays of liquid. Reginald G. Bowman (to Traufhber Engineering Co.). U. S. 2,182,533, Dec. 5. Various structural and operative details.

Valve suitable for controlling the flow of gases under pressure. Marvin H. Grove. U. S. 2,181,428, Nov. 28. Various structural and operative details. 2

Apparatus for bringing gases into contact with liquids. Robert V. Kleinschmidt (to Arthur D. Little, Inc.). Can. 386,611, Jan. 30, 1940. Structural details.

Apparatus suitable for washing gases and similar operations. Robert G. Guthrie and Oscar J. Wilbor (to Peoples Gas By-Products Corp.). U. S. 2,183,071, Dec. 12. Various structural and operative details.

Rotor unit for spraying liquids such as those for washing gases. Herbert A. Faber. U. S. 2,182,471, Dec. 5. Various structural details. 3

Atomizing liquids, as in humidifying air. Albert J. Loepsinger (to General Fire Extinguisher Co.). U. S. 2,182,897, Dec. 12. Various details of app. and operation.

Syphonic apparatus for delivering measured quantities of liquids from bottles, etc. Harold G. Conrade and Lawrence T. Payne. Brit. 507,771, June 21, 1939. 4

Apparatus with conical devices for separating suspended solids from liquids such as waste lye from sulfate cellulose production. Isak E. Johansson. U. S. 2,181,456, Nov. 28. Various structural details of an app. in which a helical motion and centrifugal action facilitates clarification of liquids.

Screw and hopper apparatus suitable for feeding powdered or granular materials. Guy L. Rigor (to St. Regis Paper Co.). U. S. 2,181,205, Nov. 28. Various mech., structural and operative details. 5

Steel balls for ball mills. Charles W. Hagenbuch and Frederick A. McCoy (to Sheffield Steel Corp.). U. S. 2,182,805, Dec. 12. Balls suitable for use in grinding are formed of heat-treated C-Mn-Mo steel alloy hardened throughout from the outer surface to the center and with a deep wearing zone in the surface portion and a central solid core of coarser grained structure, the alloy used contg. C 0.6–1.1, Mn 0.3-1.1, Mo 0.1–0.8, impurities not more than 0.3, and Fe not less than 96.7%. 6

Tube or ball mill suitable for grinding wet materials. Joseph E. Kennedy (to Kennedy-Van Saun Mfg. & Eng. Corp.). U. S. 2,181,943, Dec. 5. Various structural, mech. and operative details.

Impact crusher. William H. Schacht. Can. 386,679, Feb. 6, 1940. Structural details.

Multiple-stage impact crushing. William H. Schacht. Can. 386,680, Feb. 6, 1940. Operative details are described. 7

Apparatus for gasifying solid carbon dioxide. Roy E. McIlrath. U. S. 2,181,195, Nov. 28. Various structural details.

Condenser. Joseph J. Thompson (to Kellogg Co.). U. S. 2,182,183, Dec. 5. Various structural details of an app. suitable for condensing vapors of a solvent used for extg. caffeine from coffee or for similar purposes. 8

Apparatus for gas treatments of molten materials, as in removing carbon from iron or its alloys. Adolf Vogt (to Alex. Wacker Ges. für elektrochemische Industrie G. m. b. H.). U. S. 2,182,064, Dec. 5. An app. for treating hot molten materials with a gas such as O at low pressure comprises a container having an opening and a closed casing surrounding the container, the container having walls of nonporous material which are lined internally with a high-temp. resisting porous lining, the walls being provided with a plurality of openings whereby the air or gas contained in the lining escapes through the openings into the outer space enclosed by the casing. 9

Apparatus for immersing articles in plating baths and performing other like operations involving traversing and periodic raising and lowering. W. Canning & Co. Ltd. and Ernest R. Canning. Brit. 508,246, June 28, 1939.

Long-tube vertical evaporator. Floyd H. Walker (to (Whiting Corp.). U. S. 2,181,750, Nov. 28. Various structural details.

Centrifugal drier. Edward L. Miller (to American Machine and Metals, Inc.). U. S. 2,182,346, Dec. 5. Various structural details.

Drying and heating apparatus. Geo. R. Lewers (to Underpinning & Foundation Co.). U. S. 2,181,190, Nov. 28. Structural details.

Retorts. Wilhelm Groth. Brit. 507,986, June 23, 1939. In an annular shaftlike distn. retort with central introduction of flushing gas and a heat-exchange chamber arranged underneath the distn. chamber, from the gas-collecting space of which heat-exchange chamber the preheated flushing gas is withdrawn and passed through a heater before being admitted to the distn. chamber, 2 concentric pipes enter from below centrally into the heat-exchange chamber, the space between these pipes being used for the delivery of cold flushing gas and terminating in the lower part of the heat-exchange chamber while the inner pipe serves for the delivery of the heated flushing gas and extends upward into the lower part of the distn. chamber.

Apparatus for the central introduction of flushing gas into an annular shaft-like retort. Georg Merkel. Brit. 507,985, June 23, 1939. The inner wall bounding the distn. space is formed by 2 pipes arranged 1 above the other and sepd. by an interval, the upper pipe being closed by a flat or arched base shielding the open mouth of the lower pipe which serves for the introduction of the flushing gas.

Protecting retorts such as those of various kiln stokers against high temperatures. Ross C. Johnson. U. S. 2,181,371, Nov. 28. Stoker app. involves the combination with a fire-box having an opening in the base thereof to atm., and a retort therein spaced from the walls of the box and having tuyère openings in the upper portion thereof, of a partition member extending across the fire-box between the tuyère openings of the retort and the air opening of the fire-box and dividing the fire-box into a combustion chamber and a cooling chamber, the partition comprising a stationary section having a dumping door therein for establishing communication between the combustion chamber and the cooling chamber, and means extending outwardly of the fire-box for operating the door to open and close the same.

Roller-rail assembly for use in heat-treating furnaces. Henry H. Harris. U. S. 2,182,202, Dec. 5. Structural and mech. details.

Heat-exchange apparatus suitable for heating air with steam. Marcus E. Fiene (to General Elec. Co.). U. S. 2,181,726, Nov. 28. Various structural and operative details.

Tube and shell heat-exchange apparatus suitable for use in high-temperature chemical operations. James M. Jenkins (to Andale Co.). U. S. 2,181,486, Nov. 28. Various structural details.

Tube and shell heat-transfer apparatus suitable for cooling gases or vapors. Daniel R. McNeal (to Andale Co.). U. S. 2,181,704, Nov. 28. Various structural details.

Tube and header heat-exchange apparatus suitable for use with water, etc. Wm. C. Keeran (to Vapor Car Heating Co.). U. S. 2,181,602, Nov. 28. Various structural details.

Reversible heat-transfer apparatus suitable for various heating or cooling systems. Harry R. Crago (to General Elec. Co.). U. S. 2,182,691, Dec. 5. Various details of thermostatic control, etc.

Heat-exchange apparatus suitable for condensing steam. Albert J. Townsend. U. S. 2,181,927, Dec. 5. Various structural details.

Carburizing box suitable for use in heat-treatments. Henry H. Harris. U. S. 2,182,201, Dec. 5. Structural details.

Heat-transfer process suitable for refrigerating systems. Wm. H. Sellew. U. S. 2,182,453, Dec. 5. App. is de-

scribed, and a cyclic process utilizing at least 2 solns. having a common solvent, such as aq. NaOH solns. of different strength, in which solvent is vaporized from the second of the solns., absorbed into the first of the solns. at a temp. at least as high as the temp. of vaporization from the second soln., and the entire heat effect accompanying the vapor absorption is absorbed in a medium within the cycle, such absorbed heat being subsequently rejected from the cycle at a higher temp.

Heat-transfer processes for refrigerating, etc. Wm. H. Sellew (to P. R. Mallory & Co.). U. S. 2,182,098, Dec. 5. Various features of app., materials used, and operative details are described suitable for a continuous soln. cycle heat-transfer process which includes the vaporization of a volatile component from a soln., the subsequent condensation of such vapor, the absorption of the heat effect accompanying such condensation by a second similar soln., the vaporization thereby of a volatile component from the second soln. at a lower temp. than that at which the volatile component was originally vaporized from the first soln., successive repetitions of this step with the absorption of the heat effect accompanying the last condensation by a dissimilar soln. and the vaporization thereby of a volatile component from the dissimilar soln. at a lower temp. than that at which the first volatile component was vaporized and the subsequent utilization of the vapor so formed from the dissimilar soln., the dissimilar soln. having a different elevation in b. p. temp. than the first soln. when the two solns. are in thermal contact, the two solns. being of different chem. compn., such as solns. of NaOH and of NH_3.

Absorption refrigerating apparatus. Curtis C. Coons (to Hoover Co.). U. S. 2,181,561, Nov. 28. Various structural and operative details.

Absorption refrigerating apparatus suitable for use with ammonia. Nils Widell (to Servel, Inc.). U. S. 2,181,528, Nov. 28. Various structural and operative details.

Continuous absorption refrigerating apparatus suitable for use with ammonia. Nils Widell (to Servel, Inc.). U. S. 2,181,221, Nov. 28. Various structural and operative details.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

William Thomas Burgess, 1861-1939. A. More. *J. Chem. Soc.* 1940, 100.—Obituary. G. G.

Wallace Hume Carothers, 1896-1937. John R. Johnson. *J. Chem. Soc.* 1940, 100-2.—Obituary. G. G.

Reginald Craven, 1896-1939. T. H. Reade. *J. Chem. Soc.* 1940, 102-3.—Obituary. G. G.

William Risden Criper, 1855-1939. E. Hayward. *J. Chem. Soc.* 1940, 103-4.—Obituary. G. G.

Joshua Willard Gibbs. L. S. Dmitriev. *Uspekhi Khim.* 8, 641-5(1939). **Remarks on the paper of J. W. Gibbs "Equilibrium of heterogeneous substances."** V. K. Semenchenko. *Ibid.* 666-72. **Work of Gibbs in the field of statistical mechanics.** *Ibid.* 673 86. F. H. R.

Percival George Lloyd, 1871-1939. J. T. Calvert. *J. Chem. Soc.* 1940, 104.—Obituary. G. G.

George James Robertson, 1898-1939. J. Read. *J. Chem. Soc.* 1940, 104-5.—Obituary. G. G.

Pavel Polievktovich Shorygin, 1881-1939. B. U. Belov, *et al. Uspekhi Khim.* 8, 768-77(1939).—In memoriam. A photograph and a list of 138 papers, lectures and textbooks are given. F. H. Rathmann

John Trotter, 1864-1939. W. G. R. Murray. *J. Chem. Soc.* 1940, 105 6.—Obituary. G. G.

To the memory of Alexander Tschirch. Dezső Wéber. *Magyar Gyógyszerésztud. Társaság Értesitője* 16, 3-7 (1940). S. S. de Finály

Fritz Ullmann, 1875-1939. Kurt H. Meyer. *Helv. Chim. Acta* 23, 93-100(1940).—Obituary with portrait and list of publications. G. G.

In memory of W. L. A. Warnier. H. A. J. Hietink. *Chem. Weekblad* 37, 54-5(1940). G. G.

Robert Mayer and catalysis. A. Mittasch. *Chem.-Ztg.* 64, 38-40(1940).—Historical. E. H.

Anselme Payen—discoverer of cellulose. J. David Reid and E. C. Dryden. *Textile Colorist* 62, 43-5(1940).—A historical review of the work of Payen, who showed in 1838 that wood was composed of at least two parts, one of which he called "cellulose" and the other "incrustant material." Ruby K. Worner

Anselme Payen, distinguished French chemist and pioneer investigator of the chemistry of lignin. Max Phillips. *J. Wash. Acad. Sci.* 30, 65-71(1940). E. H.

How Hans Christian Oersted paved the way for the practical use of aluminum. M. H. Haas. *Aluminium* 21, 810-23(1939).—In continuation of *C. A.* 34, 293[8] this part describes the work and reproduces the original publications and German translations relating to the practical production of Al. Recently, Oersted's process according to $3K + AlCl_3 = 3KCl + Al$ was revised, but found to be not quite correctly represented by this formula which in fact should read $3K + 4AlCl_3 = 3KAlCl_4 + Al$, so that K Al chloride is obtained as a by-product and not KCl. These expts. are described at length. M. H.

Quantitative investigation of prehistoric metal objects. Helmut Otto. *Nachrbl. deut. Vorzeit* 14, 71-4(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 213.—The results, as regards compn. and probable origin of the ores of the constituent metals of some 850 prehistoric, mostly late Bronze Age metallic articles is discussed. C. A. S.

Employment of mid-German ores in the early Bronze Age. Helmut Otto. *Forschungen u. Fortschr.* 14, 298-9 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 212-13.—As a result of spectroanalytical examn. of some 460 metal articles of early Bronze Age, the probable ores from which their constituent metals were derived were detd. C. A. Silberrad

Molecular or short-path distillation. H. I. Waterman and C. van Vlodrop. *Rev. chim. ind.* (Paris) 48, 314-22 (1939).—A review with 25 references. E. H.

Cleaning of a Babylonian tablet. Elisabeth Packard. *Tech. Studies Field Fine Arts* 8, 90-7(1939).—A badly cracked baked clay tablet with its surface in a flaking condition and its inscriptions obscured by incrustation could not be cleaned by phys. methods and immersion in HCl. It was, therefore, placed under a binocular microscope (16 ×) and a small cotton swab dipped in 5% HCl soln. applied to the incrustation which was of 2 kinds. The $CaCO_3$ dissolved and was easily removed with the swab and the siliceous material was softened so that it could be removed by phys. means. Lastly, a 10-20% soln. of polyvinyl acetate was allowed to flow into the cracks and flaking sections and allowed to dry out for several days between applications. Surplus polyvinyl acetate was removed from the surface with acetone. A. H. Krappe

Chemical studies in lake metabolism. Ken Sugawara. *Bull. Chem. Soc. Japan* 14, Suppl. 375-451(1939).—The term "lake metabolism" is introduced to cover the relations among the factors governing the cycles of changes in the life and compn. of lakes and lake waters. A detailed study of the variation in the compn. of lake muds, and their temp., pH, bacterial counts, etc., at different depths and seasons was made on 5 Japanese lakes. Deposition, N content, etc., reach a max. about November. The total N decreases with depth. Numerous tables are given, summarizing the findings. Thirty-one references. Marcelle Schubert

The salt and phosphorus content, the temperature and the flow of water, as well as the wind velocities, in the Irbesch narrows, measured from the lightship "Laima." E. Zariņš and J. Ozoliņš. *Acta Univ. Latviensis, Kim. Fakultat.* Ser. 4, No. 13, (in Lettish, 473-99; in German, 500-2)(1939).—Daily samples of water collected at 0 and

at 15-m. depths, at 7:00 a. m., in the narrows connecting the Bay of Riga with the Baltic sea from June, 1937, until June, 1938, show that the salt content depended upon the direction of water flow which in turn depended upon the direction and velocity of the wind. The water temp. depended upon the air temp.; at 0 meters it reached a min. of +0.3° in Jan. and a max. of 19.5° in Aug.; at 15 m. it reached a min. of +0.6° in Jan. and a max of 16.5° in Sept. At 0 meters the salt content attained a max. of 7.05% in Nov. and a min. of 6.15% in Aug.; at 15 m. the salt content attained a max. of 7.06% in Nov. and a min. of 6.49% in Sept. If the temp. of the water rose, the salt content fell, and reversely. The content of P_2O_5 could not be related to the salt content, the temp. or flow of water; due to the activity of the phytoplankton the P_2O_5 remains at a low level. At 0 meters it reached a max. of 13 mg. P_2O_5 per cu. m. in March and a min. of 4 mg. in Jan.; at 15 m. it reached a max. of 15 mg. in March and a min. of 4 mg. in Sept. The P content was higher at the lower levels because of the absence of the plankton. In contrast to the waters from the Bay of Riga, the waters from the Baltic sea contained more P. Water from the Bay of Riga contains only 5% salt. Because the water at the 0 and 15-meter strata does not move in the same direction, the changes in the temp. and salt content in these 2 strata do not correspond. Frank Maresh

Limiting densities and molecular weights of oxygen, carbon dioxide and hydrogen sulfide. Atomic weights of carbon and sulfur. E. Moles, T. Toral and E. Escribano. *Trans. Faraday Soc.* **35**, 1439–52(1939); cf. *C. A.* **33**, 1189⁸.—For the three gases used the limiting pressure vs. the pressure is a linear plot within the limits of the exptl. error, namely, 1 in 100,000 on an individual ratio. The at. wt. of C is 12.007 ± 0.0002 and that of S is 32.063. Victor R. Deitz

Determination of the molecular radii of organic liquids from density and the velocity of sound. Werner Schaafs. *Z. Physik* **114**, 110–15(1939).—Under simplifying assumptions an expression for mol. radius as a function of d. and the velocity of sound is derived. The values obtained for many substances are close to those computed from the mol. refraction. E. J. Rosenbaum

Connections between the velocity of sound and the constitution of organic compounds. Werner Schaafs. *Z. Physik* **114**, 251–6(1939); cf. preceding abstr.—The values of the van der Waals' *b* were computed for a no. of org. compds. from velocity-of-sound data by a method previously published. From 17 of these values the contributions to *b* arising from the various kinds of bonds were obtained. To test the assumption that these contributions are additive, the *b* values for 32 other compds. found by use of this assumption were compared with those computed from the velocity of sound. The agreement is good. E. J. Rosenbaum

Non-adiabatic processes in an oscillating magnetic field. P. Caldirola. *Nuovo cimento* **16**, 242–52(1939).—A math. study of the action of an oscillating magnetic field on a system having an angular and a magnetic moment moving in the direction of a fixed field. J. B. A.

The magnetic susceptibility of methemoglobin. Paulette Berthier. *Compt. rend.* **209**, 774–6(1939).—Working at 11°, with methemoglobin (I) prepd. at low temp. and kept at 0° until used, B. found that (1) in the presence of HCl I remains paramagnetic and becomes increasingly paramagnetic on standing; (2) with NaOH in low concn. I is paramagnetic but becomes diamagnetic as pH increases. The values of the magnetic susceptibility $k_0 \times 10^6$ at different pH's are: 1.1, +0.46; 3.2, +0.04; 7.2, +0.15; 8.2, −0.18; 14.0, −6.21. Flocculation of I occurs between pH 1.1 and 3.2. In pure H_2O at pH 7.2, k_0 remains const. with time. Marcelle Schubert

The heat effect at the "paramagnetic Curie temperature" of vanadium dioxide. W. Klemm and L. Grimm. *Naturwissenschaften* **27**, 787(1939).—Hoschek and K. showed the presence of a "paramagnetic Curie temp." for $VO_{1.9}$ to $VO_{2.1}$ between 60 and 70° (*C. A.* **33**, 8133⁷). The expected heat effect at this point was likewise found: −1.1 kg.-cal per mol. for $VO_{1.9}$, −0.8 for VO_2, −1.1 for $VO_{2.1}$. The difference between the heat effect at stoichiometric compn. and above or below it is interesting; it shows up also in the sp. heat values for these compns. B. J. C. van der Hoeven

Magnetothermal properties of some anomalous paramagnetic salts at low temperatures. G. A. Milyutin and S. S. Shalyt. *Compt. rend. acad. sci. U. R. S. S.* **24**, 680–2(1939)(in English).—The magnetothermal properties of anhyd. $FeCl_2$ (I), $CoCl_2$ (II) and $CrCl_3$ (III) were investigated at low temp., by means of a vacuum calorimeter and a magnetic field of 1000–11,000 gausses. The magnetocaloric effect was found neg. for I and II and pos. for III and linear in all cases. For I the effect was found pos. at 14.2°K. and H = 5500 gausses, imperceptible at H = 9500 gausses and neg. at H = 11,100 gausses. A superposition of two effects is believed to take place where the pos. effect is assocd. with the orientation of magnetic carriers in the external magnetic field and the neg. effect is accounted for by the increase of the potential energy of the orbital moments in the elec. field of the crystal due to their being forced out of their quenched positions. The magnetocaloric effect in III was found pos. above and below the sp. heat jump (16.8°K.). Application of a magnetic field caused a shift in the sp. heat jump toward a lower temp.—of 0.4°K. for I, 0.7°K. for II and could not be detd. for III. Frank Gonet

The theory of paramagnetic relaxation. H. Dänzer. *Physik. Z.* **40**, 557–9(1939).—Math. D. demonstrates the connection between the thermodynamic theory of Casimir and du Pré (*C. A.* **32**, 6918⁴) and that of Kronig (*C. A.* **33**, 3222⁶). J. B. Austin

Influence of molecular form and free rotation of dipole groups on dielectric relaxation. A. Budó. *Physik. Z.* **40**, 603–11(1939).—Math. The mean mol. moment in a high-frequency field is calcd. on the basis that the mols. have n free rotating groups whose axis of rotation remains fixed with reference to any mol. coördinate system. For frequencies not too high, the mean dipole moment is given in terms of n + 3 relaxation times. J. B. A.

Dielectric relaxation phenomena in relation to molecular and intermolecular structure of dipole liquids. Erich Fischer. *Physik. Z.* **40**, 645–63(1939).—Dielec. loss is detd. in C_6H_6 soln. as a function of concn. in the range below 1.5 mol. % for: acetone, EtCOEt, dipropyl ketone, dibutyl ketone, MeOH, EtOH, C_3H_7OH, $C_4H_{13}OH$, C_6H_{17}-OH, cetyl alc., $C_8H_{17}Cl$, $C_8H_{17}Cl$, $C_{16}H_{31}Cl$, lauryl chloride, cetyl chloride, C_3H_7Br, $C_8H_{13}Br$, cetyl bromide, $C_6H_5NO_2$, C_6H_5Cl, *o*-$C_6H_4Cl_2$, 1-chloronaphthalene, 1-chloroanthraquinone, 2-chloroanthraquinone, 2,3-dichloroanthraquinone, 1,8-dichloroanthraquinone. For mols. of fixed moment the effect of mol. size and form is given by Perrin's theory and by the tables of Budó, Fischer and Miyamoto (*C. A.* **33**, 7633⁵) which are based on mol. friction of elliptical particles. For mols. other than spherical, which have an axis of free rotation, the variation of relaxation time with the direction of the moment relative to the axis of rotation is given qualitatively by the theory. The effect of rotational hindrance potentials is discussed. For aliphatic chain mols. the magnitude of the relaxation time and the increase with length of chain are related to the different moment directions and to the freely rotating groups. The abs. magnitude of the relaxation time in dil. solns. is explained on the basis of mol. viscosity which is a const. fraction of macroscopic viscosity. Taking viscosity effects into account, the relaxation time of pure acetone, $C_6H_5NO_2$ and C_6H_5Cl agrees with Debye's quasi-cryst. structure. The alcs. do not indicate this structure but are discussed in terms of a special structure. J. B. Austin

Dielectric losses due to relaxation in glasses at high frequencies. Yu. Skanavi. *J. Tech. Phys.* (U. S. S. R.) **9**, 612–23(1939).—Theoretical. Dielec. losses in amorphous bodies are due at low frequencies to relaxation and cond., and at high frequencies also to structural losses. The fraction due to relaxation is calcd. on the assumption that it is caused by ions of admixts. which are present in the "pores" of the body. The final equation contains the

radius of the spherical pores and the min. energy of the ions able to cross them. J. J. Bikerman

Dielectric losses due to polar molecules in solid paraffin wax. D. R. Pelmore. *Proc. Roy. Soc.* (London) **A172**, 502–16(1939).—The dielec. losses of solns. of spermaceti in 9 paraffins of various setting points and in hexadecane, octadecane and docosane were detd. over various temp. ranges. The behavior of ethyl stearate was compared with that of spermaceti in a paraffin of chain length about 26 C atoms and in hexadecane. The results show that the chain length of the ester is without effect on the relaxation time provided that this chain is longer than that of the mols. of the paraffin matrix. The absorption in hexadecane was found to be much greater than in the harder wax. Expts. with dioctyl sebacate and dioctyl azelate in a paraffin of setting point 57–60° showed that the dielec. loss was pos. or negligible according to the relative sense of the two polar groups. When these were arranged so that the dipole components transverse to the chain had opposite sense, no dielec. loss was observed; when the dipole components had the same sense, the dielec. loss had a max. value at any given temp. for a particular frequency. The relaxation time corresponded closely with that anticipated from chain length. The expts. seem to confirm the conclusion that the dielec. losses are due to rotation of C chains about their long axes. H. C. Thomas

The dielectric constants of some oxides, hydroxides and hydrated oxides. Oskar Glemser. *Z. Elektrochem.* **45**, 865–70(1939); cf. *C. A.* **32**, 3245[1], 6516[9].—The dielec. consts. of hydroxides and oxides of Al, Be, Mg, Zn and Fe and of the hydrated oxides of Fe were obtained by the immersion method of measurement. The importance of the choice of condenser is stressed. Synthetic (finely divided) materials gave a much higher dielec. const. than the corresponding minerals. The mobility of the atom group is greater in the former than in the latter. The increased displacement polarization means a higher dielec. const. The dielec. consts. of amorphous ferric hydrated oxide, α-FeOOH (goethite), and γ-FeOOH (goethite), including their dehydration products, were measured. At different temps. abnormally high dielec. consts. occur, because of Fe_3O_4 formation. M. McMahon

Thermodynamic properties of substances. III. Vapor volumes as functions of reduced temperature alone. Harold A. Fales and Clara S. Shapiro. *J. Am. Chem. Soc.* **62**, 393–406(1940); cf. *C. A.* **32**, 1267[6], 4400[8,9].—The reduced vapor vol. of chemically different substances is found to be an exponential function of reduced temp. alone. The form of this function is identical with those for vapor pressure and for vol. ratio; it is $\ln V_g/V_{cr} = k''(1-\tau^2)^{m''}/\tau^{n''} = x$, where $V_{gas} = V_{cr}.e^x$. The accuracy of this equation is well within exptl. limits and is in good agreement with vapor-vol. equations of other investigators. Data are given for 30 gases. An extensive bibliography is given on exptl. data for vapor vols. and crit. properties as well as exptl. test equations used by different observers. The parameters of this equation and the results of their application are discussed generally. A. B. Garrett

Thermodynamic surfaces of water. Arthur Lewis Clark and L. Katz. *Trans. Roy. Soc. Can.* III, **33**, 59–72(1939).—A *P-V-T* surface was constructed to represent H_2O in its vapor, liquid and various solid modifications. Another surface using vol., entropy and internal energy as coördinates (Gibbs surface) was built to represent water, water vapor and ice in the region around the triple and crit. points. The Gibbs surface is compared with others built by Kamerlingh Onnes, Boynton, Zemansky and Maxwell. The main point of difference is in the slope of the satd. vapor curve in equil. with the solid. In the model described a neg. sp. heat of satn. is used. J. W. Shipley

Phase equilibria in hydrocarbon systems. Joule-Thomson coefficients for gaseous mixtures of methane and *n*-butane. R. A. Budenholzer, B. H. Sage and W. N. Lacey. *Ind. Eng. Chem.* **32**, 384–7(1940); cf. *C. A.* **33**, 9106[9].—Joule-Thomson coeffs. for 5 mixts. of methane and *n*-butane were detd. exptly. for 5 temps. between 70° and 310°F. at pressures between 50 and 1500 lb. per sq. in. abs. From these data, together with the isobaric heat capacity at infinite attenuation, the heat capacities of several mixts. were calcd. as functions of pressure and temp. The results are presented in graphic and tabular form. F. L. Browne

Method for separating para-hydrogen from oxygen and carbon monoxide. E. Bergmann, L. Farkas and L. Sandler. *J. Am. Chem. Soc.* **62**, 445(1940).—O was absorbed by a satd. soln. of Ph_3CNa in Bu_2O contg. solid Ph_3CNa; 20 cc. of this soln. will absorb 130 cu. m. of O; under these conditions there is no appreciable conversion of para-hydrogen. CO was absorbed by Cu_2O-NH_3 soln. C. J. West

Boiling points of the system of formic acid and water. Sotozi Takagi. *Bull. Chem. Soc. Japan* **14**, 508–9(1939) (in English).—The b. ps. of the binary system HCO_2H–H_2O were detd. for concns. of HCO_2H between 95.6 and 16.9% and pressures of 25, 49, 100, 252 and 774 mm. Hg. The data for the azeotropic mixts. were obtained by carrying out the expts. to the coincidence of const. b. ps. starting from samples of higher and lower concns. than that of the azeotropic mixts. The results obtained are thus of considerable accuracy, i. e., the error is within ±1° in temp. and within ±0.1% in compn. Dora Stern

Some thermodynamic parameters of antimony trichloride. D. I. Zhuravlev. *J. Tech. Phys.* (U. S. S. R.) 9, 1331–2(1939).—Vapor pressure, d. of liquid and vapor, and heat of vaporization of $SbCl_3$ are tabulated for the temp. interval between m. p. and crit. temp. J. J. B.

New applications of the parachor. Petru Bogdan. *Bull. sect. sci. acad. roumaine* **22**, 104–8(1939); cf. *C. A.* **33**, 6674[1].—A so-called new parachor $P_n = T^{1/4} V^{1/4}$ where T is the abs. b. p. and V is the mol. vol. at that temp. is developed. Illustrations of the calcn. are given and the values are listed for some 46 compds. The value of the new expression lies in the fact that only the b. p. needs to be detd., as values of mol. vols. can be obtained by the use of suitable consts. A. A. Vernon

New methods of measuring the viscosity of viscous liquids with rising temperatures. K. Göhde. *Chem. Fabrik* 1940, 9–11.—A detailed description, with 1 cut and 7 graphs, of the "viscograph," with which low or high viscosities can be accurately and quickly detd. with continuously varying temp. J. H. Moore

The absorption of ultrasonic waves by acetone-water mixtures. P. A. Bazhulin and Yu. M. Merson. *Compt. rend. acad. sci. U. R. S. S.* **24**, 690–1(1939) (in French).—The coeff. of absorption (α) of the system acetone-water was measured at frequencies from 19,000 to 3800 kilohertzes; it reached a max. at 60 to 70% acetone. The coeff. was found to vary inversely as the temp. in the range 20–38°. Frank Gonet

Experiments on the molecular structure of liquids by means of models. W. Kast and H. A. Stuart. *Physik. Z.* **40**, 714–18(1939).—The models are small circular or roughly elliptical disks of brass or Al. Dipoles are introduced by attaching magnets. A large no. of disks are shaken on a glass plate and the groupings observed. Mols. of Hg, HCl, CCl_4, CS_2 and HCN are simulated. Expts. are made with different densities of packing. J. B. A.

Melting as a disorder phenomenon. K. Wirtz. *Metallwirtschaft* **18**, 843–6(1939); cf. *C. A.* **33**, 4484[9].—A résumé of the latest theories on melting. 10 references. H. S. v. K.

Factors influencing the thermal conductivity of non-metallic materials. J. B. Austin. *Am. Soc. Testing Materials, Symposium on Thermal Insulating Materials* 1939, 3–67.—A survey is made of all factors recognized as, or suspected of, influencing thermal cond. In general, those compds. that crystallize in a lattice of high symmetry, such as MgO, are better conductors than more complex compds. such as $2MgO.SiO_2$. Among the simpler compds., the best conductors are those whose mols. have most nearly the same wt. and electronic structure. Thermal cond. increases with increasing purity. Phys. texture has a greater effect on cond. than any other single factor. Two ideal structures are considered. The first,

that of pores embedded in a solid matrix, resembles a sponge. The cond. of a material having this structure decreases approx. linearly with increasing porosity and the cond. of the aggregate is but little affected by the relative conductivities of the 2 phases. The 2nd structure, that of solid grains surrounded by air, resembles a powder. The cond. of a material having this structure decreases approx. logarithmically with increasing porosity and is greatly affected by the cond. of the air-sepg. grains. For many amorphous substances (and many com. materials such as refractory brick can be considered amorphous) the thermal cond. increases linearly with temp. For single crystals the cond. decreases markedly with increasing temp. There is no well-established variation of thermal cond. with heat flow. Various methods of reporting measurements, such as true cond. and mean cond., are discussed and compared. J. B. Austin

Electrical conduction of commercial boron crystals. J. H. Bruce and A. Hickling. *Trans. Faraday Soc.* **35**, 1436-9(1939).—Observations with d. c. and a. c. on the elec. cond. in B crystals are described. Neg. resistance is developed in a short time and for a given crystal the results are consistent. Relatively enormous currents (sufficient to produce red heat) which the small crystal carried did not prevent the path of resistance from being approx. reversible. The a. c. data were recorded photographically. Victor R. Deitz

Electrical conductivity of metals. John Bardeen. *J. Applied Phys.* **11**, 88–111(1940).—Review. S. L. G.

Temperature coefficients of cuprous oxide rectifiers. M. I. Vitenberg. *J. Tech. Phys.* (U. S. S. R.) **9**, 1315–24(1939).—The elec. resistance of 18 Cu_2O rectifiers was measured between −19 and 50° for both directions of the current. It was possible to define a magnitude independent of the c. d. and to calc. the temp. dependence of the rectifying effect. J. J. Bikerman

Piezoelectric polarity and symmetry of some crystals. I. A. Bellanca. *Periodico mineral.* (Rome) **9**, 323–31(1938); *Mineralog. Abstracts* **7**, 246–7(1939).—The piezoelec. behavior of gypsum proves it to be holo- and not hemi-symmetric. C. A. Silberrad

Application of a new photoelectric method to the determination of the optical constants of some pure metals. J. Bor, A. Hobson and C. Wood. *Proc. Phys. Soc.* (London) **51**, 932–41(1939).—An optical system is described, for the detn. of optical consts. of metals, which includes a pair of photoelec. cells; one replaces the eye and the other compensates for unsteadiness of light source. A Lindemann electrometer is utilized for detg. extinction positions. The n and extinction coeff. obtained for Cu, Ni, Cr, Pd and Zn are tabulated for the range of 4000–11,000 A. The ns obtained for Cu and Ni differ slightly in magnitude from those previously reported, but the n-wave length curves are parallel. H. A. Frediani

Optical constants of copper-nickel alloys. J. Bor, A. Hobson and C. Wood. *Proc. Phys. Soc.* (London) **51**, 942–51(1939).—The n, extinction coeff. and absorption coeff. for pure Cu, pure Ni and 13 intermediate alloys were detd. in the range 4000–10,000 A. The absorption band is shifted about 500 A. (to shorter wave lengths) as the Ni content is increased from 0 to 17%. No absorption band was found for Ni concns. above 25%. The min. in k (extinction coeff.) changes from 5600 A. in pure Cu to 6000 A. for 17% Ni. No min. appears above 25% Ni. The effect of varying concns. in these alloys on the optical properties is shown graphically. H. A. Frediani

The optical absorption of superconducting films of tin. R. Hilsch. *Physik. Z.* **40**, 592–4(1939).—The change to the superconducting state is not accompanied by a measureable change in transparency within the range 3800 to 9000 A. Colloidal Pb and Tl in KCl crystals produce no change in absorption at liquid-He temps. J. B. Austin

Optics of extremely thin metallic films. D. Hacman. *Z. Physik* **114**, 170–7(1939); cf. *C. A.* **33**, 6151[5].—Theoretical. E. J. Rosenbaum

Temperature dependence of the diffusion constants of atomic hydrogen and of protons in iron. A. Günther-schulze and Hans Betz. *Z. Physik* **114**, 82–91(1939).—

1 The rate of diffusion of electrolytically produced H atoms through Fe was detd. in the temp. range −40° to 50°. The diffusion coeff. in sq. cm./day is given by $D_e = 0.0193T - 5.66$, where T is the abs. temp. The diffusion coeff. for protons is practically const. in the range −66° to 22°. At liquid-air temps., Fe is not permeable to protons, presumably because the H atoms also present remain in the metal at that temp. and fill the holes, thus preventing the protons from moving. The fact that no
2 metal other than Fe shows proton diffusion is probably due to the low rate of diffusion of H atoms. E. J. R.

Building up of crystals. Ulrich Dehlinger. *Die Physik* **5**, 9–22(1937); *Neues Jahrb. Mineral. Geol.*, Ref. I, **1938**, 514.—An account of recent work with special reference to heteropolar and metallic linkages, distribution of foreign ions, mosaic and secondary structures and crystal plasticity. References. C. A. Silberrad

3 **The basicity of heteropolyacids, a structure problem.** O. Kraus. *Naturwissenschaften* **27**, 740(1939); cf. *Fortschr. Mineral. Krist. Petrog.* **21**, 63(1937).—In crystn. of iron silicotungstates an unknown salt, intensely yellow, tetragonal leaflets, 2–3 mm. diam., 0.5–1 mm. thick, was obtained. The crystals are combinations of (001) and (h01). The crystals are air stable, decompd. in cold water, optically pos., symmetry C_4. The lattice
4 consts. are $a = 12.18$, $c = 18.82$ A., $c/a = 1.5452$, translation group T_0, from the analysis $Fe_8HSi_2W_{24}O_{84}.52H_2O$ follows 1 mol. per cell, $d_{x\text{-ray}} = 4.19$. The cell corresponds in size and shape to that of the 30-H_2O acid $H_4SiW_{12}O_{40}$ with $a = 12.98$ and $c = 18.52$ A. (*C. A.* **30**, 1280[8]). The anomalous optical conduct is explained from a stress introduced by replacing more than 4 H atoms of the 8-basic acid $H_8SiW_{12}O_{42}.28H_2O$. It is likely that the cations have taken the place of some of the H_2O in the acid lattice.
5 It is concluded that the basicity of the heteropolyacids is essentially a space problem. B. J. C. van der Hoeven

Polymorphism of iodides of choline esters. Cécile Stora. *Compt. rend.* **210**, 107–9(1939); cf. Loury, *C. A.* **34**, 716[8].—X-ray examn. of the 2 forms of the iodides of the lauryl (I), palmityl (II) and stearyl (III) esters of choline shows the A form (tablets, slightly double refracting $\gamma - \alpha = 0.008 - 0.009$) to be monoclinic, space group $C_{2h}' - P_{2m}$, β 70°53′, with 4 mols. in
6 the unit cell. The B forms of all 3 (leaflets, strongly double refracting, $\gamma - \alpha = 0.035 - 0.039$) appear to be triclinic. The B form is less stable than the A, changing spontaneously thereinto, rapidly in the case of I, slowly in that of III, whereas no such change has so far been observed in II. Other crystallographic data are given. C. A. S.

The single-crystal x-ray diffraction pattern of calcite. Franklin Miller, Jr. *Phys. Rev.* **56**, 757–64(1939).—
7 The method of analysis of double spectrometer rocking curves developed by Smith (*C. A.* **29**, 42[3]) is reconsidered and allowance for a simple type of mosaic structure is made. The (1, −1) rocking curve of Mo $K\alpha_1$ from calcite predicted by the equations and that exptly. measured by L. G. Parratt (*Rev. Sci. Instruments* **6**, 387–99(1935)) are consistent as regards Fourier components of long period and large amplitude and hence show that the theory of the double spectrometer is not entirely wrong, but the
8 inconsistency of the short-period components is difficult to explain. A single-crystal pattern is deduced and indicates that the crystals used by Parratt do not have the flat-topped Darwin-Ewald-Prins diffraction pattern.
John T. Burwell

Chemistry of the "inert" gases. IV. Solid-solution formation between "inert" gases and other substances. B. A. Nikitin. *Compt. rend. acad. sci. U. R. S. S.* **24**, 562–4(1939)(in German); cf. *C. A.* **30**, 4755[9]; **34**, 685[3].—
9 When passed in the gaseous state into a tube contg. Rn under very low pressure and at temps. between −90° and −136°, HCl, H_2S, SO_2 and CO_2 form crystals which also contain considerable Rn, but NH_3 does not carry down any appreciable quantity of Rn. Crystals of HCl, HBr, H_2S, SO_2, CO_2 or Me_2CO at approx. −96° to −136° absorb Rn from the gaseous phase; very little Rn is absorbed by PhOH or $PhNH_2$ crystals at −130° and −110°, resp., in 2 hrs., whereas with NH_3 and H_2O crystals at

−110° (and −10° for the latter) practically no Rn is absorbed in 2 hrs. Crystals of NH_3 formed at −185° in the presence of A and Ne absorb practically none of the "inert" gases; at −140° to −185° HCl crystals formed in a similar manner contain practically no Ne and only a small amt. of A. Co-crystn. with HCl or H_2S is proposed as a quant. method for the sepn. of Rn from A and Ne. Retention of Rn in the crystal lattices of certain hydrides (such as HCl or H_2S) possibly depends on (1) the large size of the Rn atom and (2) the large dipole moment of the hydride. V. **Combination of radon with phenol.** *Ibid.* 565-7.—By analogy with substances of roughly similar phys. properties such as H_2S which forms an addn. compd. with PhOH (Terres and Vollmer, *C. A.* 29, 8302[4]), Rn could be expected to form a similar addn. compd. Powd. PhOH at −35° rapidly takes up H_2S; the reaction occurs at room temp. only after seeding with the addn. compd. The dissocn. pressures of $H_2S.2PhOH$ (I) are (mm. Hg, °C.): 108, −10°; 198, 0°; 440, 15°; 580, 20° and 760, 25.3°. Solid PhOH does not take up Rn directly, but isomorphous solid solns. of PhOH with H_2S and Rn can be prepd. by 3 methods: (1) repeated crystn. of I after exposure to air contg. Rn; (2) preliminary crystn. of H_2S with Rn and recrystn. of its PhOH addn. compd. at 15°; and (3) pptn. of I in the presence of Rn. The Berthelot-Nernst distribution const., D = [(percentage of Rn in crystals × percentage of H_2S in gas)/(percentage of Rn in gas × percentage of H_2S in crystals)], is a const. (1.19 − 1.30) within exptl. error for material prepd. by each of the 3 methods. It follows that $Rn.2PhOH$ was formed; the m. p. probably lies in the vicinity of 50°. Argon also forms solid solns. with I, with D = 0.002. SO_2, HCl and HBr form analogous addn. compds. in which log p is a linear function of temp., where p = dissocn. pressure. The dissocn. pressure of H_2S hydrate is 1 atm. at 3°. George Ayers

The crystal chemistry of intermetallic AB_2 compounds (Laves phases). Gustav E. R. Schulze. *Z. Elektrochem.* 45, 849–65(1939).—F. Laves' (cf. *C. A.* 29, 7146[6]; 34, 67[8]) investigation of the crystallography of alloys is reviewed. Laves phases are AB_2 intermetallic compds. whose structure and combination mechanism are detd. by the crystal lattice; they crystallize, for example, in the structures of $MgCu_2$, $MgNi_2$ and $MgZn_2$. In the discussion of the geometric properties of this lattice it is shown that the A atoms show a very high coördination no., 16, while the B atoms have a coördination number of 6; this indicates the metallic character of combination forces from the A atoms. The coördination ratios are shown to be very characteristic for the combination mechanism of the Laves phases. A comparison of the at. distances in Laves phases and in pure components show distance shortenings in the Laves phases. The B lattice is of greater importance than the A lattice. Thermodynamic considerations show that the energy of combination in the B partial lattice of a Laves phase is greater than the energy of combination of the B atom in elementary condition. The participation of the second outermost electron shell of the B atom in the compd. is responsible for this increase in energy of combination. A Laves phase occurs when an A atom with decided inclination to metallic combination meets with a B atom whose second outermost electron shell is not closed off and which has about 20% smaller radius. The structure, stoichiometry and order of proportion of the atoms of the Laves phases are explained on the basis of their combination mechanism. M. M.

Adsorption error in the determination of gaseous densities and the adsorption of gases on vitreous silica. G. A. R. Hartley, T. H. Henry and R. Whytlaw-Gray. *Trans. Faraday Soc.* 35, 1452–61(1939).—The gases CO_2, C_2H_4, N_2O, O_2, A, N_2, CO and SO_2 were adsorbed at 21° on a quartz bulb of internal surface 271 sq. cm. at pressures from 30 to 760 mm. The adsorption on clean surfaces is very small and a great deal less than adsorption on glass surfaces for the same gases. O_2 is adsorbed to the extent of 0.20 × 10^{-6} cc./sq. cm. at 760 mm. and 21°; A, 0.42 × 10^{-6}; CO, 0.44 × 10^{-6}; N_2, 0.74 × 10^{-6}; CO_2, 1.44 × 10^{-6}; C_2H_4, 1.51 × 10^{-6}; N_2O, 1.61 × 10^{-6}; SO_2, 11.0 × 10^{-6}. The probable errors produced by adsorption in the mol. wts. of gases detd. by means of the silica microbalance by the method of limiting pressures is found for SO_2 to be 1 part in 8000. This error can be corrected to yield a final accuracy in the mol. wt. of 1 part in 40,000. Victor R. Deitz

Thin protein membranes. O. Gatty and J. H. Schulman. *Trans. Faraday Soc.* 35, 1510–13(1939).—Stable protein multilayers can be stretched by the dipping technique across silk and across fine-mesh wire gauzes made from Cu of 30 μ mesh of wire 10 μ in diam. The resulting films are impermeable to isamine blue but sufficiently permeable to NaCl for 200 layers to hold a diffusion potential, different from that in the absence of the membrane, at a value which decays with a half life of 20 min. The diffusion const. of NaCl is lower in the membrane than in water and the partition coeff. leads to lower salt concns. in the membrane. Victor R. Deitz

Studies of solutions of hydrocinnamic acid and of lauryl sulfonic acid with the film balance. James W. McBain and Warren V. Spencer. *J. Am. Chem. Soc.* 62, 239–44 (1940).—Data are presented for film-balance expts. upon several specimens of hydrocinnamic acid, cinnamic acid and dodecylsulfonic acid with special reference to the long time periods necessary for recovery after sweeping and the formation of a semi-insol. pellicle upon suitable compression of certain surfaces. The results indicate that the various phenomena of surface pressure and of time frequency pass through a high max. in an intermediate range of dil. soln.; whether a pellicle forms or not depends on the concn. and the degree of compression of the surface. Some substances apparently never form it, but when a pellicle is formed and sufficiently compressed, the final pressure is characteristic only of the substances. A. B. Garrett

Surface tension in the PLAWM trough. J. W. McBain, J. R. Vinograd and D. A. Wilson. *J. Am. Chem. Soc.* 62, 244 8(1940); cf. *C. A.* 31, 2497[1].—The PLAWM trough was devised by replacing the superficial floating barrier of the Pockels-Langmuir-Adam surface film trough by a water-tight, flexible barrier made of vulcanized dipped latex rubber. This barrier was cemented to the bottom and walls of the trough and fastened to a float in the line of the surface. The trough was used to study film characteristics of solns. of hydrocinnamic acid, K laurate, Na butylbenzenesulfonate and laurylsulfonic acid. The data indicate that the surface tension of solns. of hydrocinnamic acid is not fully established until after periods of time enormously greater than expected from classical diffusion processes. The existence of Type III curves with a min. was critically established. In these a trace of solute reduces the surface tension of the solvent to a fraction of its value and further small addn. raises the surface tension again to a still low max. or const. value This was shown for laurylsulfonic acid and butylbenzenesulfonate. With K laurate addn. of alkali appears to lower the flat max. to the value of the min. A. B. G.

The influence of electrolytes on the balloelectric effect. P. H. Burdett, J. E. Magoffin and F. K. Cameron. *Textile Research* 10, 149–66(1940).—A study of the p. d. with reference to the gas-liquid interface formed by spraying a liquid into a gas from an atomizer. The app. used is considered successively under 5 headings: (*a*) the air supply, (*b*) the sprayer, (*c*) the tray, (*d*) the electrometer and (*e*) the slide, and the procedure is outlined. Balloelectricity is defined as a surface phenomenon and occurs only on the rupture of an interface. The phenomenon cannot be simply a sepn. effect between the components of the double layer because the net effect would then be zero, owing to the recombination of the neg. and pos. carriers on the collector. The orientation of solvent mols. in the surface must be involved. The addn. of electrolytes probably affects the orientation of dipoles in the surface and thus controls the balloelec. effect. Cations seem to have 2 effects: the more important is due to their size which affects the rate of change of potential with concn. and the other due to their elec. properties, affects the intercept of the P-log c curve. The anions seem to

have only one effect which is due to their size. Probably the mechanism of the phenomenon is a transference of electrons from the gas to the liquid and from the liquid to the gas as the case may be. Among the conclusions are: (1) it is possible to measure the p. d. between the ground and small droplets of water or aq. solns. sprayed from an atomizer, (2) the potential has a neg. sign for pure water, (3) very small amts. of electrolytes make the potential more neg. but slightly larger amts. reduce the neg. potential below the value for pure water, (4) if the potential is plotted against the log of the concn. of cation, a straight line is obtained, (5) the elec. properties of the cations have some effect which is not fully understood at present, (6) the mechanism of the phenomenon consists of the transfer of electrons between the liquid and gas phases, (7) the ion size is probably of significance in the coagulation and dispersion of colloidal systems by electrolytes and (8) the p. d. at the liquid-gas interface is too small to be of practical importance in textile mill waste treatment. Certain changes in the app. are suggested. Forty references. W. H. Boynton

Subsieve sizing analysis of finely divided minerals by elutriation or sedimentation. II. Kazuo Kanazawa. *Suiyokwai-Shi* **10**, 97–104(1939); cf. *C. A.* **32**, 4408[3].—The Wiegner-Gessner sedimentation app. does not fractionate, but gives only the distribution of the sizes. The distribution of the sizes is calcd. from the sedimentation curve which is automatically photographed on bromide paper wound on a rotating drum. This drum can be adjusted to make 1 revolution in 1 hr. or in 24 hrs. as circumstances demand. However, this app. can be applied in sizing analysis of mineral particles from 0.1 mm. downward, but is not so simple as the Andreasen pipet and the results cannot be checked under a microscope. Therefore it is suitable for testing the settling conditions through its sedimentation curve. H. Nishimura

Wettability of solid surfaces. Henri Devaux. *Compt. rend.* **210**, 27–9(1940); cf. *C. A.* **27**, 4983.—The phenomenon is described in detail, and the essential similarity of, e. g., a film of water on a new glass surface (as of a newly blown glass vessel) to a film of oil on water is emphasized. Its dependence on the nature of the surface, which may vary from point to point with the polarity of the mols. exposed at the point, is discussed. C. A. S.

Heat diffusion in clay and peat. N. A. Nasedkin and G. I. Pokrovskiĭ. *J. Tech. Phys.* (U. S. S. R.) **9**, 1515–26 (1939).—The distribution of water and temp. in a column of peat heated at one end was detd. In calcn. it was supposed that the air in peat is present as sep. bubbles the vol. of which depends on the temp. and the surface tension of the surrounding water. The theory is not supported by expts. J. J. Bikerman

Physical processes in the course of deformation of sand. G. I. Pokrovskiĭ. *J. Tech. Phys.* (U. S. S. R.) **9**, 644–53 (1939).—A cylinder was filled with sand, the air between the sand particles displaced by water, and the sand-water mixt. compressed by a piston permeable to water and impermeable to sand. The lowering of the total vol. ΔV was compared with the vol. Δv of the water that was squeezed out; the relative compression $(\Delta V - \Delta v)/\Delta V$ of sand was 0.05. In kerosene it was 0.04. It is concluded that the modulus of *elasticity* of sand is much less than that of quartz in bulk. When the sand runs through a metal funnel (tin, brass or iron) it acquires an elec. charge the magnitude of which decreases with increasing no. of runs. This *triboelec.* effect also shows that the surface of sand differs from its interior. J. J. Bikerman

Dialysis through cellulose membranes. Viktor Nowatke. *Roczniki Chem.* **19**, 135–41(1939).—The permeability of viscose cellulose membranes of the type of cellophane was detd. B. C. P. A.

Scattering of polarized light in colloids. R. S. Krishnan. *Proc. Indian Acad. Sci.* **10A**, 395–8(1939); cf. *C. A.* **32**, 4041[8].—For light scattered in the transverse horizontal direction $\rho_\theta = [1 + (\tan^2\theta)/(\rho_h)]/[\tan^2\theta + (1/\rho_v)]$. It is assumed that for large anisotropic particles the vol. scattering and the anisotropic scattering are uncorrelated. Detns. of ρ_θ made on graphite sol, As_2S_3 sol, and toluene emulsion to test this assumption give results significantly lower than the calcd. values. Graphite sol, which contains highly anisotropic particles, shows greater deviation than toluene emulsion, which contains isotropic droplets. Donald C. Bond

The binding of water in hydrates of manganese dioxide, titanium dioxide and thorium dioxide. Oskar Glemser. *Z. Elektrochem.* **45**, 820–9(1939).—The greater proportion of the H_2O in MnO_2, TiO_2 and ThO_2 hydrates is found to be loosely bound, the binding being capillary or osmotic (Hüttig's definition). The prepns. can be thought of as penetrated by canals of radius of about 100 A. The remainder of the H_2O is considered as bound in the interior of the colloid. H. C. Thomas

Freezing points of pure high polymers. Edwin L. Lovell and Harold Hibbert. *J. Am. Chem. Soc.* **62**, 230–1 (1940).—It is pointed out that the authors' formula (*C. A.* **33**, 6799[4]) for the setting points of the polymer homologous series of $HO(CH_2CH_2O)_nH$ is identical with that derived by Huggins (*C. A.* **34**, 707[1]); this agreement is important addnl. evidence for the purity (uniformity of chain length) of this series of synthetic polymers. C. J. West

Combination of gelatin with acids and bases. Leo Friedman, Karl Klemm and Frank K. Thompson. *J. Phys. Chem.* **43**, 1133–7(1939).—The literature on the acid and base-binding capacity of gelatin is reviewed and the values obtained by various investigators presented in tabular form. Acid and base-binding capacities were detd. by electrometric titration and by viscosity studies and compared with the values obtained in the literature. The combining capacity of gelatin with several different acids and bases was detd. and found to vary according to the acid or base used. The combination of gelatin with acids and bases apparently is not simply a combination of gelatin with the H or OH ions. L. Kolodny

Solubility of gases. II. Comparison of organic solvents with water. D. D. Eley. *Trans. Faraday Soc.* **35**, 1421–32(1939); cf. *C. A.* **34**, 925[5].—Using the data of Lannung (cf. *C. A.* **24**, 1565[6]) and of Valentiner (cf. *C. A.* **21**, 2210, 5574), the former for acetone, C_6H_6, ether, CCl_4, MeOAc, MeOH, EtOH and the latter for H_2O, the solubilities of He, H_2, N_2, NO, O_2, CH_4, CO_2, N_2O show that the partial molal vol. of a gas is smaller in water than in any of the org. solvents. The more neg. energy of soln. for H_2O is attributed to different energy required to form a cavity in the solvent. Similarly the difference between the entropies of soln. are considered to arise from a difference in the entropies of cavity formation. V. R. D.

The solubility of calcium oxalate in various salt solutions. H. Shehyn and D. B. Pall. *J. Phys. Chem.* **44**, 166–71(1940).—The soly. of $Ca(C_2O_4)_2$ was detd. in solns. of Na_2SO_4, NH_4Cl and $(NH_4)_2SO_4$ at room temp. (27.5, 28 or 30°), at 50° and at 95° and in a soln. of NH_4NO_3 at 27.5°. A regular rise in soly. at a given temp. (28°) was noticed as the ionic strength increased from 0.01 to 0.20. This result agreed with outside data for the soly. in solns. of NaCl. H. S. v. Klooster

The solubilities of certain inorganic compounds in ordinary water and in deuterium water. Robert D. Eddy and Alan W. C. Menzies. *J. Phys. Chem.* **44**, 207–35(1940).—By use of the method of Menzies (cf. *C. A.* **30**, 5863[8]) the soly. in H_2O and in D_2O of NaBr, NaI, Na_2SO_4, KBr, $BaCl_2$, CdI_2 and $HgCl_2$ at temps. ranging from 0° to 105–180° was detd. with an accuracy of 1%. The limits of existence for the various salts and their hydrates and deuterates were located and the transition temps. of 6 hydrates and analogous deuterates compared. These incongruent m. ps. were sometimes lower and sometimes higher for deuterates than for the corresponding hydrates. The molar solubilities were recorded for rounded temps. at intervals of 5°. One metastable new hydrate and deuterate was discovered but its exact compn. could not be ascertained. H. S. v. Klooster

Hydrogen bonds involving the C–H link. IX. Nitriles and dinitriles as solvents for hydrogen-containing halogenated methanes. M. J. Copley, G. F. Zellhoefer and C. S. Marvel. *J. Am. Chem. Soc.* **62**, 227–8(1940); cf.

C. A. **34**, 978[1].—Soly. data are given for CH_2Cl_2 (I) and $CHCl_2F$ (II) in $Me(CH_2)_6CN$, PhCN, $(CH_2)_2(CN)_2$ (III), $(CH_2)_3(CN)_2$ (IV), $(CH_2)_4(CN)_2$ (V) and $(CH_2)_5(CN)_2$ (VI). III and IV dissolve less than the calcd. amt. of I and II; V dissolves almost the exact calcd. amt. and VI takes up more than the calcd. amt. This evidence for H-bond assocn. in the dinitriles is of interest in view of the recent estn. that HCN is similarly assocd. to the extent of 3% at the b. p. (*C. A.* **33**, 9110[2]). C. J. West

Partial vapor pressures from nicotine solutions at 25°. L. B. Norton, C. R. Bigelow and W. B. Vincent. *J. Am. Chem. Soc.* **62**, 261–4(1940).—The partial vapor pressures of nicotine and water in all binary solns. at 25° were detd. by the dynamic gas-satn. method. The deviations from Raoult's law are very large and in the direction of higher vapor pressure of both components. The results agree with the Duhem equation, $d \ln P_1/d \ln x = d \ln P_2/d \ln (1-x)$. The activity coeffs. of nicotine in dil. soln. decrease very rapidly with increasing concn. With increasing percentages of nicotine, the loss of nicotine relative to that of water first increases rapidly, then remains nearly const. over a long range, and finally increases very rapidly during free evapn. A. B. Garrett

Ebullioscopic investigations of solutions of azides and cyanides in hydrogen fluoride. Willi Klatt. *Z. physik. Chem.* **A185**, 306–12(1939); cf. *C. A.* **31**, 8259[7].—The molal b.-p. rise of solns. of AgN_3 in HF indicates the formation of 4 ions per mol.; that for HgN_6 indicates 3. Formation of $AgFH^+$, HN_3H^+ and 2 F^- in the first reaction and of $HgN_6H_2^+$ and 2 F^- in the second is postulated. PbN_6 produces a ppt. of insol. PbF_2 with evolution of gaseous HN_3. Alk. cyanides are decompd. by HF with the evolution of HCN. $Hg(CN)_2$ dissolves and produces a b.-p. rise approx. twice the molal rise. A table is included showing the action of HF on the fluorides, chlorides, cyanides and azides of 24 metals. T. H. D.

Apparent molal volumes of strong electrolytes in aqueous solutions. M. K. Srinivasan and B. Prasad. *Trans. Faraday Soc.* **35**, 1462–5(1939).—The ds. of aq. solns. of $NaNO_3$, NaCl, KNO_3 and KCl were measured at 35° ± 0.005°. The apparent molal vols., ϕ, in cc. are given as follows for the above salts, where c = d. in g./cc.: $\phi(NaNO_3) = 30.30 + 1.27\sqrt{c}$; $\phi(NaCl) = 18.10 + 1.24\sqrt{c}$; $\phi(KNO_3) = 40.80 + 0.96\sqrt{c}$; $\phi(KCl) = 28.40 + 1.5\sqrt{c}$. The ds. are tabulated from 0.001 to 1.0 with an accuracy of 9 parts in a million. Victor R. Deitz

Study of surface and interfacial tensions of solutions of the cyanines. Maurice Aubry. *J. chim. phys.* **36**, 263–70(1939); cf. *C. A.* **33**, 6677[8].—Measurements were made of the variation of the surface tension and the interfacial tension of aq. solns. of a color indicator (methyl bromide-2,2-diethyl thiocarbocyanine). Surface tension falls regularly as a function of the concn. and as a function of the temp. The interfacial tension is measured in contact with pure CCl_4. It falls very rapidly. This falling or lowering as a function of concn. is of the form $\Delta\gamma = BC^n$. The interpretation of this phenomenon is based on the hypothesis of a hydrophilic and a hydrophobic side of the colored mol. It is the hydrophobic side which would be oriented in the direction of the surface of CCl_4. The hydrophilic side is directed toward the water. The measure of interfacial tensions could be utilized as a rapid method of detg. the coloring material. This method will be utilized for the study of adsorption of color indicators by the Ag halides. R. K. Carleton

Viscosity and density of aqueous solutions of barium chloride, magnesium chloride, cobalt chloride and nickel chloride at 35°. A. S. Chakravarti and B. Prasad. *Trans. Faraday Soc.* **35**, 1466–71(1939).—The viscosity of all the solns. studied obeys the Jones and Dole equation: $\eta/\eta_0 = 1 + A\sqrt{c} + Bc$ (*C. A.* **23**, 5375). The calcd. values of A (0.015, 0.017, 0.018) for $BaCl_2$, $MgCl_2$ and $CoCl_2$ agree with the exptl. values (0.018, 0.017, 0.018); for $NiCl_2$ the calcd. value is 0.018; exptl. 0.028. The B values are 0.285, 0.370, 0.370 and 0.316, resp. The apparent molal vols., ϕ, are linear functions of $\sqrt{c}$, for concns. greater than 0.025 mol./l.: $\phi(BaCl_2) = 28.2 + 5.5\sqrt{c}$; $\phi(MgCl_2) = 15.0 + 6.0\sqrt{c}$; $\phi(CoCl_2) = 16.0 + 4.2\sqrt{c}$; $\phi(NiCl_2) = 10.0 + 9.6\sqrt{c}$. The max. error in the tabulated ds. is 16 parts per million. Victor R. Deitz

The viscosity of solutions of electrolytes as a function of the concentration. VI. Potassium bromide and lanthanum chloride. Grinnell Jones and Robert E. Stauffer. *J. Am. Chem. Soc.* **62**, 335–7(1940); cf. *C. A.* **33**, 3633[3].—The abs. ds. and relative viscosities of many solns. of KBr were detd. at 0° and of solns. of $LaCl_3$ at 25 and 0°. The results confirm the Root equation (cf. *C. A.* **27**, 1562) for ds., the Jones and Dole equation (cf. *C. A.* **23**, 5375) for viscosities and the Falkenhagen and Vernon equation for the effect of the interionic attraction on viscosity. **VII. Silver nitrate, potassium sulfate and potassium chromate.** Grinnell Jones and John H. Colvin. *J. Am. Chem. Soc.* **62**, 338–40(1940).—The abs. ds. and the relative viscosities of many solns. of $AgNO_3$, K_2SO_4 and K_2CrO_4 were detd. at 0° and 25°. The results confirm the Root equation (cf. *C. A.* **27**, 1562) for ds., the Jones and Dole equation (cf. *C. A.* **23**, 5375) for the viscosities and the Falkenhagen and Vernon equation for the effect for interionic attraction on the viscosity. The results do not confirm Simon's proposed law (cf. *C. A.* **18**, 2452) that isomorphous substances have the same effect on viscosity. A. B. Garrett

The conductance of solutions or organosubstituted ammonium chlorides in liquid hydrogen sulfide. E. E. Lincken and J. A. Wilkinson. *J. Am. Chem. Soc.* **62**, 251–6(1940).—These data duplicate earlier measurements (cf. *C. A.* **19**, 1519) using modern bridge technique (cf. *C. A.* **22**, 1892; **24**, 3181) and extend the concn. range as well as the no. of compds. studied to include solns. of mono-, di-, tri- and tetra-substituted Me-, Et- and Pr-NH_4 chlorides. The data indicate that the mol. cond. increases both with the no. and the size of the substituted groups, the no. having a greater effect than the size. The cond. concn. curves show a min. which is characteristic of solns. of electrolytes in solvents of low dielec. const. (cf. *C. A.* **27**, 5233). An app. for the prepn., purification and liquefaction of H_2S is described. A. B. Garrett

Dissociation constants and titration exponents of several less common alkaloids. N. Schoorl. *Pharm. Weekblad* **76**, 1497–1501(1939).—By the method of Kolthoff (*C. A.* **20**, 561; *Biochem. Z.* **162**, 289–353(1925)) the dissocn. consts. of several alkaloids were detd. colorimetrically. Solns. of 0.01 *N* salts were titrated with 0.01 *N* NaOH, temp. 23°, pH + pOH = 14. For monobasic alkaloids: dicodide-HCl (equiv. wt. 384) (probably with 2.5 H_2O) pK = 6.05, dilaudide-HCl (321.6) pK = 6.2, β-eucaine-HCl (283.5) pK = 4.65, eucodal-HCl (405.5) pK = 5.4, heroine-HCl (405.4) pK = 6.4, homatropine-HBr (356) pK = 4.3, scopolamine-HCl (H_2O) (375.5) pK = 6.5, stovaine-HCl (271.6) pK = 6.1. For dibasic alkaloids: alypine-HCl (314.4) $pK_1 = 4.5$, $pK_2 = 10.2$, optochine-HCl (376.4) $pK_1 = 5.5$, $pK_2 = 9.95$, yohimbine-HCl (390.4) $pK_1 = 6.55$, $pK_2 = 11$. Calcd. titration exponents for titration in 0.1 or 0.01 *N* soln. are given for all (54) alkaloids, including those previously studied by Kolthoff. B. J. C. van der Hoeven

Dissociation of carbonic acid in ordinary and in heavy water. G. Alexander Mills. *J. Am. Chem. Soc.* **62**, 449 (1940).—The ratio of the apparent 1st dissocn. consts. of proto- and deuterocarbonic acids is 2.68 at 25° (Rule and La Mer, *C. A.* **32**, 7328[2]); the predicted value is 3.6. In conjunction with cond. data the true dissocn. const. was estd. to be $4 \times 10^{-4.3}$. From the smooth plot of $-\log K^H$ against K^H/K^D the value of 2.9 is obtained for this ratio, which compares more favorably with 2.68 than the predicted value of 3.6. C. J. West

Activity coefficients in concentrated aqueous solutions of strong electrolytes described by means of a formula containing the mean ionic diameter as single parameter. II. Corrected formulation. Pierre Van Rysselberghe and Sylvan Eisenberg. *J. Am. Chem. Soc.* **62**, 451–2(1940); cf. *C. A.* **34**, 3084.—By use of a corrected formula the following values were calcd. for the ionic diam. in the range of concns. 0.1 to 3 *M*: LiCl 3.82, LiBr 3.93, LiI 4.29, NaCl 3.31, NaBr 3.53, NaI 3.69, KCl 2.93, KBr 3.02,

KI 3.22, RbCl 2.72, RbBr 2.71, RbI 2.64, CsCl 2.42, CsBr 2.36 and CsI 2.17. C. J. West

Ionization constants of acid-base indicators in ethanol. L. S. Guss and I. M. Kolthoff. *J. Am. Chem. Soc.* **62**, 249–51(1940).—These data are used to correct earlier data (cf. *C. A.* **25**, 5824) in terms of relations indicated by the limiting law and to consider the effect of varying ionic strength on some indicator-buffer equilibria. The behavior of acid-base indicators in ethanol is much the same as in methanol. At infinite dilns., the curves approach the slope of 5.8 required by the Debye-Hückel limiting law. At higher salt concns., the ionic diam. and individual mol. characteristics bring about variations that are to be expected. Thermodynamic ionization consts. of a no. of indicators were measured. A. B. Garrett

The reduction equilibrium of chromic oxide. G. Grube and M. Flad. *Z. Elektrochem.* **45**, 835–7(1939).—By equilibration of Cr_2O_3 in streams of H_2O vapor and H_2, analysis of the solid and calcn. of the O_2 partial pressure from the known dissocn. of steam, the equil. of the reaction $2\ Cr + {}^3/_2\ O_2 \rightleftharpoons Cr_2O_3$ was detd. The O_2 pressures are 7.4×10^{-25}, 5.1×10^{-23}, and 3.8×10^{-22} atm. at 895°, 968°, 1002°, resp. The heat of reaction between 895° and 968° was found to be 252.4 kg.-cal.; between 968° and 1002°, 279.7 kg.-cal. H. C. Thomas

The equilibrium FeO + H_2 ⇌ Fe + H_2O at temperatures up to the melting point of iron. John Chipman and Shadburn Marshall. *J. Am. Chem. Soc.* **62**, 299–305 (1940).—The data established the equil. conditions involving steam, H, solid iron, and liquid oxide over a sufficient range, 1200–1515°, to permit extrapolation to the m. p. of iron. Below the m. p. of the oxide the new results and those of Emmett and Shultz (cf. *C. A.* **26**, 5249) are expressed by an equation which agrees essentially with the data of Jominy and Murphy (cf. *C. A.* **25**, 2629). Above the m. p. the value of $K = P_{H_2O}/P_{H_2}$ is given by $\log K = 1583/T - 1.021$. The m. p. of the equil. oxide was found to be 1369° and the heat of fusion 10,000 cal. per mol. The m. p. of O-free and O-satd. iron was found to be, resp., 1535° and 1524°. A. B. Garrett

Relative oxidation potentials of ketones. Fred W. Cox and Homer Adkins. *J. Am. Chem. Soc.* **61**, 3364–70 (1939).—Thirteen representative ketones were compared with each other as oxidizing agents. This was done by equilibrating 2 ketones against each other in the presence of (*tert*-BuO)$_3$Al and the alcs. corresponding to the ketones. The concn. of the ketones at equil. was detd. by means of a polarograph. For purposes of comparison the value of 1 is assigned to iso-Pr_2CO; all the other ketones studied, with possibly 1 exception, are stronger oxidizing agents than the standard; other values are: Bu_2CO 0.97, Pr_2CO 0.95, iso-Bu_2CO 0.93, Et_2CO 0.68, *tert*-BuCOPh 0.64, PrCOPh 0.62, BuCOPh 0.55, AmCOPh 0.52, EtCOPh 0.51, iso-PrCOPh 0.39, Ph_2CO 0.32, cyclohexanone 0.19. In general, there is a parallelism between the depolarization or "reduction" potential as measured on the polarograph and the strength of a ketone as an oxidizing agent as detd. by equilibration. The aliphatic ketones have a high depolarization potential and a low oxidation potential, whereas the quinones have a very low depolarization potential, and a high oxidation potential. However, the depolarization potential cannot be safely used as a guide in predicting the strength of a ketone as an oxidizing agent. The oxidation potential of a ketone cannot be considered apart from the reducing power of the alc. corresponding to it. C. J. West

Experiments with atomic hydrogen: a search for higher hydrides of nitrogen, phosphorus and sulfur. K. G. Denbigh. *Trans. Faraday Soc.* **35**, 1432–5(1939).—NH_3, PH_3 and H_2S were brought into contact with at. H in an attempt to prep. higher hydrides, corresponding to PF_5 and SF_6. All 3 gases caused H atoms to recombine; PH_3 and H_2S were in addn. decompd. The reaction products, condensed in liquid air, were then analyzed by thermal decompn. at const. vol. Changes in the reactant gases were noted by detg. the pressure increases; higher hydrides would have caused greater pressure increases. No evidence of higher hydride formation was detected. A case of poisoning of a Pt spiral in catalysis of H atom recombination was noted at a point where Pt was exposed to stopcock grease. Victor R. Deitz

The region of validity of the Arrhenius [reaction velocity] relation for reactions in solutions. Walter Hückel, Irmgard Schneider and Willy Doll. *Z. physik. Chem.* **A185**, 313–20(1939).—Below 60° the Arrhenius relation does not apply to the sapon. of acid cyclohexylphthalate with KOH and of *cis-o*-methylcyclohexylphthalate with NaOH. Above 60° the expression applies satisfactorily to these cases. For the sapon. with KOH of acid cyclohexylphthalate and of *trans-o*-methylcyclohexylphthalate the relation is satisfactory from 40° to 90°. The presence of colloidal particles of alkali salts in the solns. at low temps. is suggested as a possible cause of the discrepancies. T. H. Dunkelberger

Exchange of bromine-ions between silver bromide and a bromine solution. A. Polesitskiĭ. *Compt. rend. acad. sci. U. R. S. S.* **24**, 668(1939)(in English).—A repetition of expts. reported in a former paper (cf. *C. A.* **33**, 3654[4]) attempting to prove that a full exchange of Br ions between freshly coagulated AgBr and KBr soln. takes place in a few min. One g. AgBr was mixed with equiv. amts. of $AgNO_3$ and KBr, coagulated by stirring, filtered off and treated with 10 cc. KBr soln. One of the components (AgBr or KBr) contained radioactive Br. The activity, measured at intervals with a Geiger-Müller counter, gave the degree of exchange. The exchange was found to proceed very rapidly at first (10% exchange in the first min.) then the ratio dropped abruptly, requiring 20 to 30 hrs. to reach completion. This is attributed to aging of the ppt. "Preaged" ppts. were found to have slower rates of exchange, and melted AgBr showed no exchange. Frank Gonet

Investigation of intersolvate exchange of bromine ions in various solvents. S. Z. Roginskiĭ and V. E. Tartakovskaya. *Compt. rend. acad. sci. U. R. S. S.* **24**, 709–11 (1939)(in English).—Radioactive halogens were used as indicators in studying the pptn. of Ag halide salts from aq.-alc. solns.; an unequal rate of pptn. of the halogen ions was found. The conditions necessary for the effect to appear are (1) slowness of intersolvate exchange, (2) presence of substances that react in different ways with solvate ions of the 2 different types, (3) slowness of the isotopic exchange between the products of (2) and the initial substance in soln. The effect of the lag in intersolvate exchange was observed in the following systems: (*a*) EtOH-water, (*b*) acetone-water, (*c*) glycerol-water, (*d*) glycerol-acetone and (*e*) MeOH-water. Pos. effects were also reported in the pptn. of a soln. of Hg_2^{++} ions. The effect has a purely kinetic character (the velocity differs from system to system) and disappears if the soln. is kept at room temp. for a long period of time. The period was found to be shortened by raising the temp. or by the addn. of acid. The authors believe that the magnitude and the stability of the effect point to an existence of solvates contg. mols. of only one of the solvents in the envelope surrounding the ions. Frank Gonet

The exchange reaction of the nuclear hydrogen atoms of phenol. II. The exchange reaction in acid solution. Masao Koizumi. *Bull. Chem. Soc. Japan* **14**, 353–62 (1939); cf. *C. A.* **33**, 2399[4].—The reaction $C_6H_5OH + HDO = C_6H_4DOH + H_2O$ was studied at 4 temps. between 90 and 120° with various concns. of HCl. The reaction is of the 1.26 order with respect to the H-ion concn., this unexpected order being due to an increase in the collision factor with acid concn. The activation energy was detd. as 27.3 kg.-cal. A mechanism is suggested to account for the fact that the activation energy is higher in acid than in alk. soln. John E. Vance

The kinetics of saponification of methyl acetate in dioxane-water mixtures at 25°. Tzu-Ching Huang and Ho-Sheng Hsieh. *J. Chinese Chem. Soc.* **7**, 1–13(1939). —The cond. method was used to measure the velocity of hydrolysis at 25° of 0.01 *N* AcOMe by 0.01 *N* NaOH in 0 to 30% mixts. of dioxane in water. The bimol. velocity const. increases with the amt. of dioxane present, accord-

ing to the equation: $k = 69x + 11.8$, where x is the mol. fraction of dioxane. Wm. H. Adolph

The kinetics of the thermal decompositions of the lower paraffins. V. The nitric oxide inhibited decomposition of butane. E. W. R. Steacie and H. O. Folkins. *Can. J. Research* **18, B**, 1–11(1940); cf. *C. A.* **33**, 4855⁸.—The inhibition by NO of the thermal decompn. of C_4H_{10} was studied in detail over the temp. range 500° to 550°. In all cases inhibition decreased with increasing C_4H_{10} concn. This suggests that radical recombination occurs in the normal decompn. by ternary collisions with C_4H_{10} mols. acting as third bodies. The activation energies of the normal and inhibited reactions were detd. For high pressures the 2 values agree well, viz., 58,200 and 57,200 cal. per mol., resp. The products of the inhibited reaction were also found to be the same as those of the normal reaction. Conclusion: Free-radical processes predominate, involving comparatively short chains. J. W. Shipley

The catalytic decomposition of azodicarbonate ion. Cecil V. King. *J. Am. Chem. Soc.* **62**, 379–85(1940).—The decompn. of azodicarbonate ion to give N_2, N_2H_4 and CO_2 or carbonate ion was found extremely sensitive to general acid catalysis. Data were obtained for catalysis by H^+ ion (in NaOH solns.), water, AcOH, NH_4 ion, acetoxime, maltose and sucrose; data are also given on the salt effect. The decompn. of the azodicarbonate ion is catalyzed by H_2O, H^+ ion and other acids in accordance with the equation $dx/dt = C_{N_2(COO)_2^{--}}(k_1C_{H_3O^+} + k_2C_{H_2O} + k_3C_{HA} + \ldots)$. The fact that catalysis by sucrose is diminished by bases is recognized as evidence that the above equation does not completely explain the mechanism of the reaction. The molar catalysis consts., as evaluated, agree well with the Brönsted equation $k_m/p = G(q/pK_A^\circ)^x$ where $G = 7.40 \times 10^8$ and $x = 0.86$. This value of G is the highest yet found for acid catalysis while the value of x is similar to that found in several other cases. A. B. Garrett

Calculation of the intermediate equilibria in catalytic kinetics and the geometry situs. A. A. Balandin. *Compt. rend. acad. sci. U. R. S. S.* **24**, 741–7(1939)(in English).—Math. General expressions are given in terms of equil. consts. for the equil. concns. in systems of any no. of components involving any given intermediate states. A. O. Allen

Amphoteric metal hydroxides as mono- and poly-component catalysts, in the role of inorganic enzymes. XLIX. Alfons Krause. *Roczniki Chem.* **19**, 129–34 (1939); cf. *C. A.* **33**, 1231⁷.—Hydrated CuO added to amorphous $Fe(OH)_3$-$Mg(OH)_2$ mixt., prepd. by simultaneous pptn., gives a highly active catalyst (Fe:Mg:Cu = 1:0.06:0.17) for the reaction $HCO_2H + 2H_2O_2 \rightarrow CO_2 + 2H_2O$, at 20°. The reaction mechanism is discussed. B. C. P. A.

The catalytic action of silver. Dino Dinelli. *Ann. chim. applicata* **29**, 448–51(1939).—Cu_2O pptd. from a soln. of $CuSO_4$ contg. traces of $AgNO_3$ is capable of catalyzing the oxidation of aldehydes to acid just as Ag_2O would. Cu_2O from a soln. free of $AgNO_3$ has no such ability. The reaction was checked with the oxidation of furfurole to pyromucic acid and BzH to benzoic acid. Both reactions give about 92% yields. A. W. C.

Measurements of the reaction velocity of hydrogen and oxygen at the surface of a platinum catalyst. E. F. M. van der Held and H. P. Reindl. *Physica* **6**, 997–1008 (1939).—The rate of combination of H_2 and O_2 on an electrically heated Pt wire was found proportional to PH_2 and to $(PO_2)^{1/2}$. The expts. were made at a total pressure of about 1 atm., N_2 being used as a diluent. P. H. E.

Equilibrium diagram of the nickel-rich nickel-beryllium system. Masazō Okamoto. *Nippon Kinzoku Gakkai-Si* **3**, 444–8(1939).—The equil. diagram of Ni-Be alloys on the Ni side was detd.; it coincides well with that given by Masing-Dahl (cf. *C. A.* **24**, 2410). The solid-soly. of Be in α-phase is 2.8% at 1100°, 2.6% at 1000°, 2% at 900°, and less than 1% at room temp. The Curie point of solid soln. satd. with Be is 255°, and the supersatd. α with 2.7% Be shows the Curie point at about 90°. The β-phase is a solid soln. corresponding to NiBe, and the solid-soly. of Ni decreases from higher to lower temp. H. Nishimura

Behavior of pyridine in binary systems with certain phenols and ketones. K. Hrynakowski and H. Ellert. *Roczniki Chem.* **19**, 156–66(1939).—The fusion diagrams suggest formation of *2:1 compds.* in the systems: C_5H_5N–*o*-, m. 17°, –*m*-, and –*p*-$C_6H_4(OH)_2$, transition point (t. p.) 33°, and –*m*-$NH_2C_6H_4OH$, m. –9°, and *1:1 compds.* in the systems C_5H_5N–*p*-$C_6H_4(OH)_2$, m. 78.2°, and –1,2,3-$C_6H_3(OH)_3$, t. p. 44.5°. Compds. are not formed in the systems C_5H_5N–*o*-$C_6H_4(OMe)_2$, –*o*-$NH_2C_6H_4OH$, –CHPh:CHCOMe, –benzil, and –COPhMe. B. C. P. A.

The system silver sulfate–aluminum sulfate–water. J. A. Addlestone, L. R. Marsh and G. C. Hall. *J. Phys. Chem.* **44**, 256–9(1940).—The 0°, 25° and 45° isotherms of the ternary system Ag_2SO_4–$Al_2(SO_4)_3$–H_2O were detd. The only stable solid phases are Ag_2SO_4 and $Al_2(SO_4)_3$·$18H_2O$. H. S. v. K.

A new method of isothermic calorimetry. G. Karagunis and G. Coumoulos. *Chim. Chronika* **10–12**, 215–17 (1938)(in Greek).—The method is based on the fact that substances with dipole moments produce sudden changes in the dielec. consts. upon fusion. By detg. the capacity change produced on heating a mixt. of the solid-liquid phase of a material at the m. p., the added heat is estd. By proper choice of dipole substances varying isothermic temps. can be produced. L. Y. Dyrenforth

Heat capacity of iron carbide from 68° to 298°K. and the thermodynamic properties of iron carbide. Harry Seltz, Hugh J. McDonald and Cyril Wells. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1137**, 11 pp.(1939). The heat capacities of Fe_3C were detd. experimentally from 68° to 298.1°K. The entropy was calcd. $S_{298.1} = 25.7(\pm 1)$ e. u. From the soly. curves of Wells for C and Fe_3C (β) in austenite the free energy and heat of formation of carbide are evaluated. At 298.1°K., $\Delta H = 5800$ cal., $\Delta F^\circ = 4700$ cal. for the formation of Fe_3C (α) and $S_{298.1} = 24.7$ e. u. The temp. at which $\Delta F^\circ = 0$ for $3Fe(\gamma) + C(\text{graph.}) = Fe_3C(\beta)$ is 1082°K Alden H. Emery

Thermal data. XI. The heat capacities and entropies of guanidine carbonate, glutamic acid hydrochloride, ornithine dihydrochloride, *d*-lactic acid and *l*-lactic acid. Hugh M. Huffman, Emory L. Ellis and Henry Borsook. *J. Am. Chem. Soc.* **62**, 297–9(1940).—The heat-capacity data were detd. between 90 and 298.1°K. The values of $S_{298.1}$ are: guanidine carbonate 70.59, glutamic acid hydrochloride 59.33, ornithine dihydrochloride 70.25, *d*-(*l*+)-lactic acid 34.30 and *l*(*d*−)-lactic acid 34.00. A preliminary value for the heat of fusion of *d*(*l*+)-lactic acid was found to be 4030 cal. per mol. A. B. Garrett

The heat capacities, heats of transition and fusion, and entropies of ethylene dichloride and ethylene dibromide. Kenneth S. Pitzer. *J. Am. Chem. Soc.* **62**, 331–5(1940).—The data were obtained from 15°K. to room temp. The following m. ps. (0°C. = 273.10°K.) and heats of fusion were detd.: $C_2H_4Cl_2$, 237.2 ± 0.1°K., 2112.0 ± 2 cal./mol.; $C_2H_4Br_2$, 283.0 ± 0.2°K., 2615.8 ± 5.0 cal./mol. The following temp. and heat of transition values were detd.: $C_2H_4Br_2$, 249.54 ± 0.10°K., 463.8 ± 2.0 cal./mol. From these data, the following values of entropy at 298.1°K. were calcd.: $C_2H_4Cl_2$(l), 49.84 ± 0.15 cal./degree mol.; $C_2H_4Br_2$(l), 53.37 ± 0.20 cal./degree mol. Ethylene dichloride shows no sharp transition but has a peak in the heat-capacity curve near 177°K. which may correspond partially to the transition in ethylene bromide. Since measurements of the dielec. const. (cf. *C. A.* **31**, 6943¹) show only small changes in passing through these regions, and since the difference in these transitions seems very great for 2 such similar compds., it is proposed that the coöperative or coupling effect between the rotation of 1 mol. and its neighbors may be relatively small. This would explain the whole curve for the chloride; the gradual rise in the bromide curve from 150° to 250°K. is also to be expected. Above 250°K. some fundamentally different crystal structure, based on rotating mols., may become more stable for the C_2H_4-

Br_2 thus giving rise to the sharp interphase transition. A. B. Garrett

The heat of formation of aluminum oxide (corundum) and of lanthanum oxide. W. A. Roth, Ursula Wolf and Olga Fritz. *Z. Elektrochem.* **46**, 42–5(1940).—By use of highly purified Al and improved technique, the molal heat of formation of Al_2O_3 (corundum) was detd. to be 402.9 ± 0.3 kg.-cal. at 22° and const. pressure, and that of La_2O_3 to be 539 ± 4 kg.-cal. La_2O_3 appears in at least 2 modifications, the one having the larger mol. vol. being stable at the lower temps. From the new value for Al_2O_3 the heat of formation of Al_4C_3 is recalcd. to be 50 ± 3 kg.-cal./mol. N. Bekkedahl

The heat of formation of chromic oxide. W. A. Roth and U. Wolf. *Z. Elektrochem.* **46**, 45–6(1940).—The heat of formation of Cr_2O_3 was detd. to be 268.9 ± 0.6 kg.-cal./mol. at 21° and const. pressure. From this value the heat of formation of CrO_3 was calcd. to be 137.1 ± 0.4 kg.-cal./mol. at 20° and const. pressure. N. Bekkedahl

The surface energy of cadmium oxide and the heat of formation of cadmium hydroxide. R. Fricke and F. Blaschke. *Z. Elektrochem.* **46**, 46–9(1940).—From $Cd(OH)_2$ crystals 2 different prepns. of CdO were made: (1) by heating 2 hrs. at 800° and (2) by heating 3 hrs. at 350°. The former prepn. was blue-black in color, whereas the latter was greenish yellow. The heats of soln. of the compds. were detd. to be 28.72 kg.-cal./mol. for $Cd(OH)_2$, 34.02 for the 350° prepn. of CdO, and 33.46 for the 800° prepn. of CdO. X-ray investigations found the mean particle sizes to be 190 and 2500 A. for the 350° and the 800° prepns., resp. From the differences of 0.56 kg.-cal. in molal heat contents and about 4700 sq. m. in molal surface areas between the 2 forms of CdO, the total molal surface energy of CdO is calcd. to be about 500 ergs/sq. cm. The heat of formation of $Cd(OH)_2$ from CdO and liquid H_2O is calcd. to be 5.30 and 4.74 kg.-cal./mol. for the 350° and the 800° prepns., resp. N. Bekkedahl

Thermal equilibrium between columbium pentoxide and carbon. Pierre Sue. *J. chim. phys.* **36**, 280–2(1939); cf. *C. A.* **33**, 4497[1]. —The equil. between Cb_2O_5 and C permits the calcn. of the heat of formation of the tetroxide. The value obtained in this work confirms a result obtained before in the equil. between Cb tetroxide and the vapor of water. The equil. used in the studies were: $Cb_2O_4 + H_2O \rightleftarrows Cb_2O_5 + H_2 + 18.2$ kg.-cal.; $Cb_2O_5 + C \rightleftarrows Cb_2O_4 + CO - Q_2$; $2CO \rightleftarrows CO_2 + C + 39$ kg.-cal.; $Cb_2O_5 + CO \rightleftarrows Cb_2O_4 + CO_2 - Q_4$. The system is considered to be composed of: Cb_2O_5, Cb_2O_4, CO_2, CO and C; it comprises 3 constituents and 4 phases. It is univariant.

$$K_4 = \frac{p^2CO}{pCO_2} = \frac{X^2}{P - X}$$

The mean of the values for the heat of reaction is 44 kg.-cal. A part of the heat of formation of Cb_2O_5 and of CO equals 463 and 26.4 kg.-cal. The heat of formation of the tetroxide is: 463.1 − (44 + 26.4) = 393 kg.-cal. In the work on the equil. between Cb_2O_4 and H_2O, the value found was 387 kg.-cal. R. K. Carleton

The coefficient of compressibility of liquids. P. Guareschi. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 61–9 (1939).—G. has previously shown that the frequency of characteristic at. or mol. vibration can be expressed as follows: $\nu_0 = (1/\pi\sigma)\sqrt{H\nu/2\alpha m}$, where σ = mol. diam., α = coeff. of assocn. Einstein's formula for the characteristic mol. frequency of a solid can be expressed as $\nu_0 = CN^{-1/3}\ V^{1/6}/M^{1/2}K^{1/2}$, where V = at. or mol. vol., C = a const. whose value is about 0.25, M = at. or mol. wt., K = coeff. of compressibility of the fluid. From these equations, which are equal, the value of K can be calcd. $K = 0.0625(2\pi\alpha V/NH\nu)$; also $K = 9.45(n^2V/[\lambda + {}^5/_2RT(1 + \beta)])e^{(-\phi/RT)}$, which shows the variation of K with temp. (n_f = the degrees of freedom of rotation and vibration of the mols.). A. W. Contieri

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Measurement of elec. cond. in control of drying of Neoleucorite (Medvedkov, Khaĭtser) **13**. Adsorption of metallic colloids on protein bodies (Kausche, Ruska) **11D**. Electron-diffraction study of anodic films (Harrington, Nelson) **4**.

Beauchamp, Wilbur L., Mayfield, John C., and West, Joe Y.: Science Problems for the Junior High School; Basic Studies in Science, III. New York: Scott, Foresman and Co. 756 pp. $1.68. Cf. *C. A.* **33**, 5736[4].

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F. DUNCAN

Classical theory of electrons. H. J. Bhabha. *Proc. Indian Acad. Sci.* **10A**, 324–32(1939).—Math. B. shows that when a point charge is present in an electromagnetic field the conservation of energy and momentum does not in general lead to conservation of angular momentum for the system as a whole, and if it is demanded that the equations of motion of a point charge do not contain higher derivs. of the acceleration than the first, then the set of equations possible, consistent with the conservation laws, is unique, and the only possible equations are those originally derived by Lorentz. F. Gonet

The development of the quantum mechanical dispersion theory according to a procedure suggested by M. von Laue. G. Moliere. *Ann. Physik* **36**, 265–74(1939).—A theoretical discussion of the quantum mech. dispersion theory of radiation in which is shown that the ordinary degree of approximation (corresponding to the Kramers-Heisenberg formula, cf. *C. A.* **19**, 3222) is insufficient for optical frequencies. H. C. Thomas

Dielectric constant of space containing electrons. S. R. Khastgir and K. Sirajuddin. *Phil. Mag.* **28**, 532–43(1939); cf. *C. A.* **31**, 5260[8].—The effective dielec. const. in the space between the anode and grid of a screen-grid tube was measured. With increasing wave length the dielec. const. decreases to a min., increases to a max. and then decreases again. The wave length for which the dielec. const. is a max. is greater the smaller the electron concn. An explanation of the observations is given. E. J. Rosenbaum

The role of electrons in certain physicochemical phe-

nomena. N. Vasilesco-Karpen. *Bull. sect. sci. acad. roumaine* 22, 117–29(1939).—Theoretical discussion of electrode potentials based upon the assumption that there is an exchange of electrons as well as ions when a metal is introduced into a soln. of its ions. A. A. Vernon

Electron energy levels of sodium chloride. S. R. Tibbs. *Trans. Faraday Soc.* 35, 1471–84(1939).—Theoretical. The band width of the lowest conduction levels for the (100) direction in NaCl is calcd. Comparison of this breadth (5.45 e. v.) with the corresponding results for free electrons shows that the conduction electrons have an effective mass of the order of magnitude of that of a free electron. Lattice-point wave functions are ascribed to an electron at a vacant, neg. ion and the energy levels deduced therefrom agree with data on *F*-centers. Victor R. Deitz

The probability of reversal of electron spin in collisions in nitric oxide gas. H. O. Kneser. *Physik. Z.* 40, 681(1939).—Preliminary note. Sound measurements at room temp. show no effect of relaxation on absorption. The sp. heat calcd. from the velocity of sound agrees with static measurements. It is concluded that inversion of spin by collision occurs in a relatively short time ($< 10^{-6}$ sec. at 1 atm.). J. B. Austin

Experimental refutation of the statistical concept of the Bohr model of the atom. J. Stark. *Physik. Z.* 40, 590–1(1939).—It is claimed that expts. by Gebauer and v. Traubenberg (*Naturwissenschaften* 18, 417(1930)) and Stark and Patschl (*C. A.* 32, 2023[2]) on H-canal rays disprove the Born-Jordan-Sommerfield concept of the meaning of ψ in the Schroedinger equation. J. B. A.

The separation of the energy steps in atomic nuclei. Paul O. Müller. *Physik. Z.* 40, 615–17(1939).—Taking the nucleus as a sphere of incompressible fluid, the characteristic frequencies of surface and volume waves are calcd. From these can be calcd. energy levels that agree with expt. J. B. Austin

The stability of an elongated-drop model of the nucleus. G. C. Wick. *Nuovo cimento* 16, 229–41(1939).—Math. A study of a drop with a configuration other than spherical leads to the conclusion that it would be unstable. J. B. Austin

A struggle for accuracy. The historical development of the accuracy of the determination of lattice constants with special regard to the asymmetric method. M. Straumanis. *Oesterr. Chem.-Ztg.* 43, 1–14(1940).—58 references. F. C. Nachod

Rectification in discharge tubes. V. T. Chiplonkar. *Proc. Indian Acad. Sci.* 10A, 381–7(1939).—The rectification in discharge tubes was measured in 2 pressure ranges (500 to 20 × 10^{-4} and 0 to 1.8 cm. Hg) for air (i. e., a mixt. of O and N), O and N in differently designed tubes, to try to find a tube without rectification. Rectification was found to be present in all cases and all conditions, though its direction and magnitude vary within wide limits. Frank Gonet

Discharge in tubes in a high vacuum at impulse voltages up to 2.5 million volts. I. A. S. Zingerman and M. I. Korsunskiĭ. *J. Tech. Phys.* (U. S. S. R.) 9, 1345–56 (1939).—Cathodic oscillograms show that the lag of discharge behind the voltage diminishes when the voltage (50–2500 kv.), the gas pressure (10^{-6} to 10^{-2} mm. Hg), and the length of the tube (40–500 cm.) increase. II. A. S. Zingerman. *J. Tech. Phys.* (U. S. S. R.) 9, 1357–63(1939).—At a given voltage the ionization of the gas begins when the product of gas pressure by length of tube has a const. value. The breakdown consists of sep. stages lasting 10^{-6} to 10^{-7} sec. The resistance of the tube decreases from 10^{8} ohms at the start to 100 ohms at the end of the discharge. The yield of electrons increases with voltage. The state and material of the cathode affect the ionization but are without influence on the breakdown. J. J. Bikerman

Recoil of metastable atoms and decreased breakdown of inert gases. W. Rogowski. *Naturwissenschaften* 27, 755–6(1939).—Collision of metastable atoms can liberate electrons. By assuming that these electrons are the initial electrons of spatial recoil and assuming a growth of electron shower by Townsend rule it is found possible to explain the breakdown laws of R., Fucks and Wallraff (*Arch. Elektrotech.* 29, 326(1935); *C. A.* 30, 8008[3]) with quadratic self-excitation characteristics. Owing to diffusion there also is a surface recoil effect of metastable atoms, liberating electrons from the cathode. For Ne in the neighborhood of the breakdown min. this recoil effect is relatively important. B. J. C. van der Hoeven

A new use of Fourier analysis of electron-diffraction patterns. P. Debye. *Physik. Z.* 40, 573–7(1939).—A comparison is made of the treatments of Pauling and Brockway (*C. A.* 30, 1649[4]) and of Roualt (*C. A.* 33, 4863[7]), particularly with respect to the convergence of each method. There should be no difficulty due to convergence in the former (radial distribution) method, while the latter may be subject to the practical difficulty that the desired value of the at. distances is not sufficiently clear in the density curve. J. B. Austin

Optical demonstration of electron diffraction. Jean J. Trillat. *J. phys. radium* 10, 465–9(1939); cf. *C. A.* 26, 1855; 33, 2796[8].—The interpretation of the previously described diagrams is confirmed and clarified by use of the reciprocal lattice model of Burgers and van Amstel (*C. A.* 31, 1691[8]). A. O. Allen

Electronic diffraction with small voltages. Jean J. Trillat. *Compt. rend.* 209, 201–5(1939).—The difficulty of obtaining electronic diffraction diagrams at low voltages is due to the difficulty of obtaining a sufficiently thin film, an adequate vacuum, and suitably sensitive plates. The last difficulty can be overcome by sensitization with Na salicylate (cf. Thorvert, *C. A.* 27, 5662). Other modifications in the process are also described which enable good results to be obtained with voltages of 3000 and less. C. A. Silberrad

Secondary electron emission and charging-up phenomena in insulators. H. Hintenberger. *Z. Physik* 114, 98–109(1939).—The rate of charging-up was measured when surfaces of mica, electrolytic and cryst. Al_2O_3, or single crystals of NaCl were bombarded with electrons of various velocities. The yield of sec. electrons depends on the state of charge of the insulator. The surface is charged either pos. or neg., depending on the velocity of the incident electrons, while under it there is a neg. space-charge. E. J. Rosenbaum

Emission of composite cathodes subject to simultaneous bombardment with electrons and irradiation. P. Borzyak. *J. Tech. Phys.* (U. S. S. R.) 9, 1380–92(1939).—B. could not reproduce the "Shmakov effect," i. e., a lowering of the secondary emission by illumination of Cs_2O cathodes. Neg. results were also obtained with Sb-Cs cathodes. Cs_2O cathodes do not show the Dember effect, i. e., an increase of the electron emission over the additive value at a simultaneous illumination and bombardment. This indicates the inadequacy of the usual interpretation of the Dember effect. This effect may take place when the elec. cond. of the surface layer is considerably raised by illumination; and an opposite effect might be observed when the cond. of the surface layer is insufficient to let pass the sum of the electrons produced by electrons and light. J. J. Bikerman

The behavior of willemite under electron bombardment. E. R. Piore and G. A. Morton. *J. Applied Phys.* 11, 153–7(1940).—Under scanning conditions in a specially designed tube a willemite screen not only deviates from the potential of the accelerating electrode, but also shows potential variations on the surface, which are functions of scanning frequency and current d. and may amount to several thousand v. The dependence of light intensity on voltage can be represented by a power law. S. L. G.

Existence and characteristics of absorbable ionizing radiations emitted by ordinary metals. J. A. Reboul. *J. phys. radium* 10, 470–6(1939); cf. *C. A.* 33, 5738[9]. A. O. Allen

Nature of the particles emitted by sodium chloride irradiated by electrons. M. M. Vudynskiĭ. *J. Tech. Phys.* (U. S. S. R.) 9, 1377–9(1939).—NaCl bombarded by electrons having the energy of 600 e. v. emits only electrons. J. J. Bikerman

Quantum yield of antimony-cesium [photo-] cathodes. S. Yu. Luk'yanov. *J. Tech. Phys.* (U. S. S. R.) 9, 1175–9(1939).—From the relative spectral sensitivity i and the abs. integral sensitivity I the yield was calcd.; it was 0.3 electron per quantum, i. e., higher than any other yield recorded. i had a max. at 420 mμ. I was 40–50 microamp./lumen, when the temp. of the irradiation was 2350° abs. J. J. Bikerman 1

The antimony-cesium photocathode. S. S. Prilezhaev. *J. Tech. Phys.* (U. S. S. R.) 9, 1439–54(1939).—The cell contg. an Sb-Cs cathode was connected with a side tube contg. Cs. The side tube was kept at a temp. t_1, to maintain a definite vapor pressure of Cs in the cell; and the cathode was heated to a temp. t_2, to change the amt. of Cs adsorbed. The "adsorption equilibrium" was reached in a few hrs. The equil. value of the total photosensitivity at a const. t_1 rose with increasing t_2 to a max. and then fell; when t_1 increased from 20 to 186° the temp. of the max. was shifted from 140 to 260°. When the sensitivity i increased, the work function φ diminished according to an equation $\log i = B_1 - B_2\varphi$ (B_1 and B_2 being const.); in the max. of sensitivity φ was 1.30 e. v. The spectral sensitivity always had a max. at 4300 A. and a trace of a relative max. at 5300 A. The surface of Cs-Sb cathodes has a high elec. resistance which is lowered by an increase of temp. This and the gradual increase of the thermionic emission with increasing potential show that Sb-Cs cathodes are nonmetallic. 2
J. J. Bikerman

Gas-filled photocell with magnetic deflection. L. Goncharskiĭ. *J. Tech. Phys.* (U. S. S. R.) 9, 1455–6 (1939).—Ions produced by photoelectrons are deflected by magnetic field and do not reach the photocathode. 3
J. J. Bikerman

Theory of the electrostatic β-particle energy spectrograph. II. F. T. Rogers, Jr. *Rev. Sci. Instruments* 11, 19–22(1940). E. H.

The design of a magnetic β-ray spectrometer. J. L. Lawson and A. W. Tyler. *Rev. Sci. Instruments* 11, 6–18(1940). E. H.

A cloud chamber for lecture experiments. R. Hilsch. *Physik. Z.* 40, 954–5(1939).—The app. permits projection of α-ray tracks. J. B. Austin

Arc-welded atom smasher. Charles H. Jennings. *Welding Engr.* 24, No. 12, 17–19(1939).—Design details and field erection are discussed. A. N. Hird

New investigation of the multiple decomposition of atomic nuclei by cosmic rays. Georg Stetter and Hertha Wambacher. *Physik. Z.* 40, 702–6(1939); cf. *C. A.* 33, 2798⁴.—Tests at different altitudes show that the no. of stars per day per sq. cm. and the mean energy per star increase with height. The no. of particles of low energy is greater at the lower altitudes. The energy ranges from 35 to 370 m. e. v. with a max. at about 50. The angular distribution of the star particles to the vertical is detd. and discussed. J. B. Austin 4

The absorption of cosmic rays in the atmosphere and mesons. Werner Kolhörster and Ilse Matthes. *Physik. Z.* 40, 617–19(1939).—The height at which mesons are formed is calcd. as 7.2 km. With this value and data on atm. absorption coeffs. the mean free path is 5.75 ± 0.19 km., which is approx. const. in the range of height 2.6 to 6.2 km. Below 2 km. the coeff. falls off; this can be explained by assuming the formation of a new secondary radiation, possibly slow mesons. J. B. Austin 5

Neutrons of cosmic ultraradiation. G. Cocconi and V. Tongiorgi. *Naturwissenschaften* 27, 740–1(1939).—A filter paper contg. Rd-Mn of 2.5-hr. half period was wrapped around an Al counter tube 0.15 mm. thick; control tests were made with Po + Be. Neg. results as to cosmic neutrons were obtained at altitudes of 120, 2000 and 3500 m. This work does not contradict the results of Montgomery (*C. A.* 33, 6701⁸), which are of a lower order of frequency than here measured. Results of Halban and Kowarski (*C. A.* 32, 3253⁸) disagree with the authors' results. B. J. C. van der Hoeven 6

Energy distribution and excitation function of neutrons from the transformation of lithium by α-rays. O. Haxel and E. Stuhlinger. *Z. Physik* 114, 178–84(1939).—The slow neutrons produced by bombarding Li^7 with α-particles were studied as a function of α-particle energy with counters lined with B. Energy levels of B^{10} were found at 0.77, 1.32, and 2.09 m. e. v. E. J. Rosenbaum 7

Neutron spectra of the elements boron and beryllium on bombardment with α-rays. E. Stuhlinger. *Z. Physik* 114, 185–96(1939); cf. preceding abstr.—The yields of slow neutrons from B^{11} and Be^9 bombarded by α-particles were studied by a method previously described. Energy levels of the N^{14} nucleus were found at 4.0, 4.75, 5.47, 6.12, and 6.55 m. e. v. For C^{13} the levels are at 9.2, 10.0, and 10.5 m. e. v. Resonance levels of N^{15} were located at 14.64, 14.88, 15.07, 15.23, 15.42, 15.63, 15.79, 15.94, 16.11, 16.24, 16.42, 16.54, 16.63, 16.74, 16.86, 16.99, 17.09, 17.27, and 17.45 m. e. v. The corresponding values for C^{13} are 11.5, 12.3, 12.9, and 13.6 m. e. v. 8
E. J. Rosenbaum

Nuclear disintegrations. Enrico Fermi. *Elec. Eng.* 59, 57–8(1940).—The fission of U in which the U nucleus splits into 2 fragments of comparable size, achieved by the bombardment of U with neutrons, has stimulated great activity in research and may lead to further results of far-reaching importance. C. G. F. 9

The chemical elements and naturally occurring atoms from the viewpoint of isotopes and nuclear investigations. O. Hahn, S. Flügge and J. Mattauch. *Physik. Z.* 41, 1–14(1940).—A review covering the literature from the end of 1937 to the end of 1939. A table shows the wt., nuclear constitution, frequency of occurrence, packing fraction and mass defect for the isotopes of all the elements. Fifty-five references. J. B. Austin 10

The interaction of fast neutrons with uranium nuclei. La. Goldstein, A. Rogozinski and R. J. Walen. *J. phys. radium* 10, 477–86(1939); cf. *C. A.* 33, 8108¹. A. O. Allen 11

Nuclear fission of uranium irradiated with neutrons. Willibald Jentsche and Friedrich Prankl. *Physik. Z.* 40, 706–13(1939).—The energy distribution of the fragments is given. Through exact measurements of the range, the ionization curve for the particles of highest energy is obtained. The particles fall into 2 groups whose origin is discussed in terms of nuclear structure. The energy spectrum for slow and fast neutrons is given. *Th* also shows 2 groups. J. B. Austin 12

The bursting of uranium and thorium nuclei into light atoms. Otto Hahn and Fritz Strassmann. *Physik. Z.* 40, 673–80(1939).—A review of recent work by the authors (*C. A.* 33, 474⁵, 3684⁶, 4511⁵, 8107⁷, 9121⁵). J. B. A. 13

The β-γ coupling of radioactive $_{33}As^{76}$. N. K. Saha. *Naturwissenschaften* 27, 786(1939).—The work of Harteck, *et al.* (*C. A.* 32, 6543²) and of Norling (*C. A.* 33, 3255⁵) on the multiplicity of the β-spectrum of As^{76} can be explained on the basis of the Fermi theory of β disintegration (cf. Bethe, *et al.*, *C. A.* 33, 3678⁷). The As^{76} β-spectrum is a superimposition of 3 elementary spectra with upper limits at 0.8, 1.7 and 2.5 m. e. v. This indicates 2 possible states of excitation of the $_{34}Se^{76}$ nucleus, one having a γ quantum of 1.7 m. e. v. coupled with the 0.8-m. e. v. β spectrum, one having a weak 0.8-m. e. v. γ quantum coupled with a 1.7-m. e. v. β spectrum. More recent work of Harteck (*C. A.* 34, 23⁴) confirms this view. B. J. C. van der Hoeven 14

Concentration of N^{15} by the separating-tube process of Clusius and Dickel. R. Fleischmann. *Physik. Z.* 41, 14–18(1940); cf. Clusius and Dickel, *C. A.* 33, 474⁸.—With 2 tubes 12 m. long and 9 and 11 mm. in diam. 770 cc. gas with 9.2% $N^{14}N^{15}$ was obtained in 6 weeks. From this concentrate 110 cc. contg. 18% $N^{14}N^{15}$ was obtained in 2.5 weeks. J. B. Austin 15

The "chief" and "auxiliary" valencies in complex compounds and mobility of the coördinated particles. A. Polesitskiĭ. *Compt. rend. acad. sci. U. R. S. S.* 24, 540–1 (1939) (in English).—The equivalence of the 4 I atoms in K_2HgI_4 was shown by the method of radioactive indicators. EtI irradiated by slow neutrons was extd. with dil. KI soln., practically all of the radioactive I passing into the aq. layer. In the reaction $HgI_2 + 2KI \rightarrow K_2HgI_4$, first 16

radioactive KI was used, then radioactive HgI_2. By conversion into $Ag_2HgI_4 \rightarrow 2AgI + HgI_2$ and extn. of the HgI_2 with KI soln. and repptn. as Ag_2HgI_4, both AgI and final Ag_2HgI_4 ppts. were measured on the Geiger-Müller counter and both ppts. were always found to be radioactive. When radioactive AgI was boiled with an equiv. amt. of aq. KI, the former lost half of its radioactivity. There was also interchange of Br between AgBr and KBr in soln. No exchange of I atoms occurred on 3 hrs. boiling of IO_3^- ion with KI soln., or of Br atoms on 8 days boiling of BrO_3^- ion with KBr (mentioned as Br in original paper). George Ayers

Absolute intensities of the β-lines of Th B + C + C″ and the internal conversion coefficient of γ-rays. A. Flammersfeld. *Z. Physik* **114**, 227–44(1939).—A magnetic spectrograph with a Geiger counter was used to obtain the β-spectrum of Th B + C + C″ down to very small energies. The abs. intensities of 29 lines were detd. With the very pure samples used, part of the Th C″ was lost by recoil. This was prevented by covering the source with a thin lacquer film. In the energy range 7–12 e. kv. 4 new lines were found. The internal conversion coeffs. were detd. for γ-rays of energy 40, 237.9, and 1620 e. kv. The first of these agrees well with theoretical values for a quadripole transition, but the others are larger. E. J. Rosenbaum

Method of studying the radioactivity of rocks. Edmond Rothé and Mme. A. Hée. *Compt. rend.* **210**, 30–2 (1940).—The method, termed that of "layers of varying thickness," consists in detg. the radioactivity of varying thicknesses of finely powd. rock, obtained by placing in minute trays all of the same diam. but of varying depth amts. of 0.5, 5, 18 and 30 g. of the powder and plotting the measured activity against the thickness. The resultant curves are compared with similar curves given by similarly prepd. powders of (I) a neutral salt contg. 3.77×10^{-5} g. $Th(NO_3)_4$, and (II) $BaCl_2$ contg. 52.2×10^{-12} g. $RaCl_2$. With I the curve is approx. a straight line; with II the curve ends in a horizontal portion indicating that above a certain thickness the radioactivity depends only on the surface portion of the sample. Comparison with these standard curves of those given by the powd. rocks (15 examples given) gives an approx. indication of the amts. of Th and Ra present. C. A. Silberrad

Detection of radioactivity in works of art. Robley D. Evans, Marie Farnsworth, Sanborn C. Brown and Geo. L. Stout. *Tech. Studies Field Fine Arts* **8**, 98–108(1939). —On the assumption that the radioactivity (α-rays) of lead-bearing pigments might throw light on the age of paintings and help to detect forgeries, an app. was devised, allowing the registration of such rays from paintings enclosed in a box. Unfortunately, the results are not conclusive, for a highly radioactive lead paint is not necessarily modern; its radioactivity may be due to contamination. Conversely, an inactive lead paint is not necessarily old; it may come from a somewhat unusual source. A. H. Krappe

Effect of chemical combination on x-ray emission spectra. An experimental study of the $K\alpha_{1,2}$-doublet of the elements $_{11}Na$-$_{16}S$. Nils G. Johnson. Separate, *A.-B. Ph. Lindstedts Univ.-Bokhandel, Lund* **1939**, 72 pp.—Secondary fluorescent x-rays and a spectrograph with a concave grating were used. The compds. studied were halides, oxides, hydroxides, silicates, phosphates, sulfides, sulfates, chlorates, nitrides, phosphides, carbides and alloys. The doublet shifts toward shorter wave lengths for cations, and toward longer wave lengths for anions. For the same emitting cation the shift increases with at. no. of disturbing anions, and the increase is greater for emitting elements of a high valency than for those of a low valency. S. L. Gerhard

Cathode-ray excitation of the *K* β-spectrum of sulfur. The influence of the anticathode material on the line structure. Osvald Lundquist. *Kgl. Fysiograf. Sällskap. Lund, Handl.* **48**, No. 7, 1–20(1937)(in German); cf. *C. A.* **24**, 2948.—Spectra were detd. for 19 metallic sulfides, 4 sulfites and 24 sulfates, with anticathodes of Al, Fe, Co, Ni, Cu, Zn and Ag. The quant. data calculated and discussed. 10 references. W. C. Tobie

The M_1 and M_2 x-ray absorption edges of lead. J. W. McGrath. *Phys. Rev.* **56**, 765–7, 1068(1939).—The M_1 and M_2 absorption edges of lead were measured and found to occur at 3.219 ± 0.005 A. and 3.469 ± 0.005 A. resp. Methods of computing edge energies are discussed and it is noted that many *M* edges show discrepancies between observed and calcd. values. The proposed explanation and meaning of these discrepancies are discussed with particular reference to lead. J. T. B., Jr.

Theory of x-ray scattering by groups of particles. R. Hosemann. *Z. Physik* **113**, 751–68(1939).—The intensity distribution in the central spot does not depend on whether the individual scattering particles are cryst. or not, but it does depend on whether the distances between scattering centers occur with the same frequency. A method is given for obtaining the mass frequency distribution from measurements on the central spot. E. J. R.

New x-ray method for the determination of the submicroscopic structure of materials. R. Hosemann. *Z. Physik* **114**, 133–69(1939); cf. preceding abstr.—Exptl. details are given for obtaining a narrow, fan-like beam of x-rays suitable for studying the central spot in diffraction patterns. The quant. evaluation of the photographs is given in terms of the theory previously published. The method is applied to the structure of hentriacontane and of different samples of triacetylcellulose and ramie fiber. The crystallites in paraffin are very thin plates of more than 400-A. height and great width. All the cellulose fibers show similar patterns when they are oriented in the plane of the x-ray beam. This indicates that sections across the fiber direction are similar. For the different fibers the distributions of micelle lengths differ with respect to the lengths which are most probable. A brief review of the various cellulose models is given and the extent to which the theories are consistent with the results reported here is discussed. E. J. Rosenbaum

Atmospheric absorption. III. Mme. A. Vassy and E. Vassy. *J. phys. radium* **10**, 459–64(1939); cf. *C. A.* **34**, 939[2].—Further discussion of the previously described observations shows that by adding terms due to scattering by aerosols, the entire atm. light absorption can be accounted for. A. O. Allen

The fine structure of hydrogen lines. J. Stark. *Physik. Z.* **40**, 591–2(1939).—By analogy between the spectra of H and the alkalies it is to be expected that each doublet component of the H lines should consist of 3 components, a line of the principal series and 2 secondary lines. The data of Heyden (*C. A.* **31**, 8359[2]) confirm this conclusion. J. B. Austin

Influence of the fine structure on the Stark effect of ionized helium. H. Kubota. *Bull. Inst. Phys. Chem. Research* (Tokyo) **18**, 9–14(1939); cf. *C. A.* **33**, 6152[3].—A comparison between observed and calcd. values. B. C. P. A.

The energy exchange between translation and rotation through collisions. H. Haber. *Physik. Z.* **40**, 541–51 (1939).—The formation of AlH at the cathode in a discharge tube contg. an inert gas and H with Al electrodes is studied by observing the band spectrum emitted at the cathode. In the energy exchange between translation and rotation the result is detd. only by the energy of the colliding particles. J. B. Austin

Equilibrium between phosphorus paranitride $(PN)_n$ and PN deduced from band spectra. Henri Moureu, Boris Rosen and Georges Wetroff. *Compt. rend.* **209**, 207–9(1939); cf. *C. A.* **33**, 4934.—Examn. of the absorption spectrum shows that $(PN)_n$ when heated at 450° emits vapors of PN, the intensity of the spectrum increases as heating increases, but soon begins to indicate presence of P vapor owing to dissocn. of PN, which at 800° is practically complete. C. A. Silberrad

Ultraviolet absorption spectrum of nitrous oxide at +20° and −90°. Jacques Nicolle and Boris Vodar. *Compt. rend.* **210**, 142–4(1940).—Examn. of the ultraviolet absorption spectrum of N_2O at pressures of 100–760 mm., in thicknesses of 70–574 cm., at 20° and −90°

Quantum ... that the absorption is unaffected by pressure; that S is less at −90° than at +20°; that the ratio of mol. extinction coeff. at 20° to that at −90° is 2.95; that the origin of absorption at −90° is at 2350 A.; and that the absorption studied is only one of the branches of Duncan's band with center at about 1900 A. Various other inferences are deduced as probable, including confirmation of Plyler and Barker's results (*C. A.* **26**, 917). C. A. Silberrad 1

Ultraviolet spectrophotometry of Zea mays pollen with the quartz microscope. Fred M. Uber. *Am. J. Botany* **26**, 797–807(1939).—The theory of absorption-spectrum measurement with the quartz microscope is discussed and photoelec., Geiger-Mueller counter and photographic methods of ultraviolet spectrophotometry with the microscope are described. Walls of *Zea mays* pollen grains of different genetic constitutions have similar transmission curves having a broad min. about 2900 A., a max. at 2500 A. and some variation among pollen varieties in the region 3200–3600 A. A single wall transmits 15–20% at 2000 A. Contents of pollen grains are characterized by a min. in transmission around 2600 A., a max. at 2500 A. and a low but const. transmission from 3000 A. to 3600 A. An 8-μ layer of pollen transmits 19–23% at 2650 A. Only a limited correlation of corn pollen absorption spectra with chem. constitution is possible at present. Nelson McKaig, Jr. 2

Effect of ions of the lyotropic series on the infrared absorption spectrum of water. A. M. Buswell, R. C. Gore and W. H. Rodebush. *J. Phys. Chem.* **43**, 1181–4 (1939).—In seeking a more satisfactory explanation of the lyotropic series of ions, the effects of these ions on the dispersion medium or solvent are studied. The effects of addns. of ions of various radii and various energies of interaction on the infrared absorption bands of water are studied. It is shown that the effect of the halogen anions upon the mol. absorption coeff. of water is in a lyotropic sequence parallel with the resp. halogen ionic radii. The absorption of a viscous soln. of $CaCl_2$ is compared with that of double-distd. water. Two opposing effects of the dissolving of an ion on the water mols. are postulated. These are a depolymerization of the liquid structure and an electrostatic orientation of water mols. around the dissolved ion. The infrared absorption is detd. with a prism spectrometer. L. Kolodny 3

Investigation of the frequency of the O-H group in binary mixtures by the method of combination dispersion. III. Combination spectra of solutions of methanol in benzene (I), chlorobenzene (II), fluorobenzene (IV), acetone (V), dioxane (VI), ethyl ether (VII), isoamyl ether (VIII), pyridine (IX) and piperidine (X). V. I. Malyshev. *Compt. rend. acad. sci. U. R. S. S.* **24**, 676–9(1939)(in English); cf. *C. A.* **33**, 3692[4].—An investigation of the dispersion spectra of 3.5, 5.0 and 10.0% alc. solns. in I gave a slight widening of the line ν = 3611 cm.$^{-1}$ and the authors conclude that the benzene mols. hinder the assocn. of MeOH more than do CCl_4. Lines for II were found at ν = 3630 cm.$^{-1}$, and bands were found in the 20% soln. The results for IV were analogous to those in II and the authors conclude that replacing Cl by F does not affect the oscillation of O-H in the MeOH mol. Expts. with bromobenzene were unsuccessful because of its intense decompn. by light. In V, a comparatively wide band was found at ν = 3532 cm.$^{-1}$, and the authors conclude that either because of the greater elec. moment or the pressure of an O atom, the oscillation of O-H was disturbed in a different manner from I–IV. Hence VI was used and a band appeared at ν = 3516 cm.$^{-1}$ (being double in the 2.0 and 3.5% solns.), with no bands for assocd. MeOH mols. VII gave a max. at ν = 3516 cm.$^{-1}$, analogously to VI. From expts. with VI, VII, VIII, the authors conclude that the O-atom and not the moment causes the disturbance of the oscillation of the O-H groups in alc. In IX and X, a max. was found at ν = 3406 cm.$^{-1}$ for IX, showing even more disturbance by the N atom than by the O atom. The authors conclude that the solvents can be divided into 2 groups; those with O and N, and those without, where the former cause an intense disturbance, which is attributed to the formation of a H-bond between the OH group of the alc. mol. and the O or N mol. of the solvent. Frank Gonet 4

Infrared transmission of thin films of various organic materials. A. J. Wells. *J. Applied Phys.* **11**, 137–40 (1940).—Measurements were made on cellophane, ethylcellulose, cellulose acetate, Duco household cement, polystyrene, Glyptal, Pliofilm, rubber, Plexiglas, Me methacrylate polymer, XYSG Vinylite and Shawinigan V-15 resin from 400 to 3000 cm.$^{-1}$. Methods for making thin films are described. In general these materials become more transparent in the region from 400 to 900 cm.$^{-1}$, in some instances surpassing KBr. The most transparent materials in this region are Plexiglas, ethylcellulose and Me methacrylate resin. S. L. Gerhard 5

Raman effect in ethane and butane. Sizuo Nakamura and Eizo Kanda. *J. Chem. Soc. Japan* **60**, 1275–8 (1939); cf. *C. A.* **34**, 1563[4].—The Raman spectra of ethane in the liquid state and of butane in the liquid as well as in the solid state have been taken and the geometrical forms of mols. are discussed. Conclusion: The butane mol. has the trans form in the solid state, while in the liquid state it contains another rotational isomer besides the trans form. T. Katsurai 6

Studies of hydrocarbon mixtures by means of the Raman effect. III. Hiroatu Okazaki. *J. Chem. Soc. Japan* **60**, 1269–74(1939); cf. *C. A.* **33**, 9140[1].—The petroleum prepd. by Fischer's method (catalyzer, Fe and Co) was analyzed by means of the Raman effect. It was confirmed that the petroleum consists chiefly of normal paraffins contaminated with olefins and benzene. Normal pentane, hexane and octane from petroleum (Kahlbaum and Frenkel-Landau) were also analyzed and their impurities estd. T. Katsurai 7

Raman spectra of crystalline powders: hydrates. Étienne Canals and Henri Collet. *Compt. rend.* **209**, 212–14(1939); cf. *C. A.* **32**, 6948[3].—The Raman spectra (3200–3800 cm.$^{-1}$) $MgSO_4.n_1H_2O$, $Na_2HPO_4.n_2H_2O$ and $CuSO_4.n_3H_2O$ (n_1 = 7 and 6, n_2 = 12, 7 and 2, n_3 = 5 and 3) are compared, showing differences between salts with the same no. of H_2O mols., and between hydrates of the same salt with different nos. of H_2O mols. C. A. S. 8

The spectral emission of nickel at different temperatures. F. Cennamo. *Nuovo cimento* **16**, 253–60(1939); cf. *C. A.* **33**, 9132[9].—The emission is detd. between 1 μ and 7 μ at temps. above the Curie point. The Wien law is verified in the range 590° to 1145°K. The following relation is derived $\lambda_m T = 0.060\ T^{0.22}$, where λ_m is the wave length of max. emission at temp. T. The reflecting power is calcd. J. B. Austin 9

Birefringence measurements in the far ultraviolet. Roger Servant. *Compt. rend.* **209**, 206–7(1939); cf. *C. A.* **30**, 6642[1].—With S.'s vacuum polarimeter the birefringence of barite and gypsum was detd. at 17° for λλ 2749.2–1693.9 and 2355.5–1726.6, resp., in which intervals the birefrigence increased from 19.82 to 72.15 and from 11.18 to 24.39. C. A. Silberrad 10

The fundamental chemical reactions in the light emission of sulfide phosphors. Rudolf Schenck. *Z. Elektrochem.* **46**, 27–38(1940).—A review. G. G. 11

Binding of excess sodium in sodium chloride crystals with added strontium chloride. H. Pick. *Z. Physik* **114**, 127–32(1939).—The absorption spectra of NaCl crystals with added $SrCl_2$ and colored by excess Na were obtained at room temp. and at −210°, after irradiation with light in the F band and with x-rays. At room temp. the F band and 2 bands belonging to the cation overlap; this gives the unresolved band the appearance of a shift to the red. These bands are resolved at low temps. E. J. Rosenbaum 12

Luminescent materials. IV. Molecular vibration structure of fluorescence spectra of zinc sulfide crystal phosphor. Yasuo Uehara. *J. Chem. Soc. Japan* **60**, 1293–301(1939); cf. *C. A.* **34**, 1565[8].—The fluorescence of the pure zinc sulfide crystal phosphor is attributed to the resonance radiation. A theoretical formula is derived for the temp. dependence of photoconductance of the

zinc sulfide crystal phosphor. It is confirmed that the formula holds for a certain range of temp. T. Katsurai

Method for determining the amounts of light emitted by mixed phosphors with mixed emitters. P. Brauer. *Z. Physik* **114**, 245–50(1939); cf. *C. A.* **34**, 3243.—A device is described for automatically repeating the illumination of a phosphor and its subsequent heating in such a position that the emitted light is collected in a spectrograph. The results on a CaO-Sm,Pr phosphor are given as an example. E. J. Rosenbaum

Infrared luminescence of the rare elements: application to analysis. Marcel Servigne. *Compt. rend.* **209**, 210–12 (1939); cf. *C. A.* **33**, 4773.—The infrared emission spectra of Nd and Pr (oxides) dild. in $CaWO_4$ were detd. as far as λ 12,000 A. This spectrum is specially valuable with Nd, which gives no lines in the near infrared (λ less than 8600). It is apparent when $5/10^6$ Nd is present in the diluent, and is unaffected by the presence of 100 times its amt. of Sm. The method is exemplified by the near infrared spectrum of a sample of scheelite showing traces of Pr, Sm, Eu, Tb, Dy, Er and Gd, while the distant infrared spectrum shows Nd distinctly. C. A. Silberrad

Ultraviolet luminescence of deformed and undeformed sodium chloride crystals. M. L. Kats and R. E. Solomonyk. *Compt. rend. acad. sci. U. R. S. S.* **24**, 683–6 (1939) (in German).—The ultraviolet spectra of deformed and undeformed NaCl crystals were investigated and the authors conclude that there are 3 kinds of centers in the deformed NaCl crystals, where the emission of the short-wave band (2400 A.) can be explained by transitions from a center level to the ground level, the middle band by perturbations of the former through plastic deformation, and the long-wave band by the presence of impurities introduced by chem. transformation during the tempering process. Frank Gonet

Fluorescence of sodium formate in soda solution. Albert Grumbach and René Millet. *Compt. rend.* **210**, 49–50(1940); cf. *C. A.* **28**, 1928.—Neither pure Na formate nor pure NaOH is fluorescent, but if a trace of formate is added to NaOH, fluorescence is developed. The same effect occurs if a drop or so of soln. of the formate is added to one of NaOH (care was taken to ensure exclusion of any CO_2 and complete absence of any org. matter). The intensity varies with the amt. of formate, being a max. for the addn. of 0.36 g. to a soln. contg. 60 g. NaOH in 100 cc. H_2O. C. A. Silberrad

A new luminous material containing bivalent europium, and the color and excitation of fluorite. Karl Przibram. *Mitt. Inst. Radiumforsch. No. 412a; Anz. Akad. Wiss. Wien* **75**, 24–5(1938); *Neues Jahrb. Mineral. Geol.*, Ref. I, **1938**, 567–8.—Addn. of a few percent of Eu oxalate or sulfate to pure $CaCl_2$ and heating to 300–400° gives a mixt. showing the blue fluorescence of $EuCl_2$, the Eu^{+++} being largely reduced to Eu^{++}. By daylight the prepn. has a blue color, similar to that of Weardale fluorite, which is to be ascribed either to the Eu^{++} ion or to partially or wholly reduced Ca. C. A. Silberrad

Fluorescence and pH of solutions of uranine. Augustin Boutaric and Madeleine Roy. *Compt. rend.* **209**, 162–4 (1939); cf. Bouchard, *C. A.* **30**, 3328.—The fluorescent power (φ) of solns. of uranine (0.59/l.) of varying pH is detd. It increases with pH, at first moderately rapidly and then more slowly, approx. doubling for a rise in pH from 4.6 to about 6, trebling at pH 7, and becoming approx. const. at slightly under a quadruple value at pH 8 and above. The effect of addn. of other substances was examd., confirming the inhibitory effect of resorcinol (cf. Perrin, *C. A.* **26**, 3434). In other cases the apparent effect of the addn. is solely due to change in pH. C. A. Silberrad

Chemiluminescence of 3-aminophthalic hydrazide (luminol). E. S. Vasserman. *Compt. rend. acad. sci. U. R. S. S.* **24**, 704–6(1939) (in English).—The action of various catalysts upon the glow of luminol oxidized by H_2O_2 was investigated. Cu excites a strong but very short flash, Fe^{II} and Mn^{II} give a short but weak flash, Ni salts do not react at all. Co^{III} acts very weakly, while Co^{II} gives the strongest and most durable effect (especially at pH 10.6–11.0 and in the presence of a carbonate ion). Frank Gonet

Thermoluminescence. H. Steinmetz. *Mitt. Wien. Ges. No.* 104 in *Mineralog.-Petrog. Mitt.* **50**, 87(1938); *Neues Jahrb. Mineral. Geol.*, Ref. I, **1938**, 539; cf. *C. A.* **31**, 2933.—Methods of measuring thermoluminescence are described, and its connection with fluorescence and mineral coloration is described. C. A. Silberrad

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Ra-contg. U ore from Timor (Harloff) 8. Ultraviolet absorption spectrum of prolactin (White, Lavin) 11A. Photochem. dehydrogenation of 7-dehydrocholesterol (Tominaga) 10.

Boll, Marcel: Les deux infinis; galaxies, étioles, planètes, micelles, réseaux, noyaux, neutrons, photons. Paris: Larousse. 247 pp.

Loeb, Leonard B.: Fundamental Processes of Electrical Discharge in Gases. New York: J. Wiley & Sons 717 pp. $7.00.

Stark, Johannes: Physik der Atomoberfläche. Leipzig: Verlag S. Hirzel. 80 pp. M. 3.60.

Standards on Electronics, 1938. New York: Institute of Radio Engineers. 59 pp.

Luminescent material suitable for use in cathode-ray tubes. Humboldt W. Leverenz (to Radio Corp. of America). U. S. 2,182,087, Dec. 5. A Mn-activated Be germanate of Zr, Ti or Th or the like is used. Cf. *C. A.* **34**, 12543.

Fluorescent screen for cathode-ray tube. Nicolaas W. H. Addink and Jan H. de Boer (to Radio Corp. of America). U. S. 2,182,860, Dec. 12. A luminescent screen comprises a mixt. of Cd tungstate and Mg silicate which emits white light under the impact of a beam of electrons, the spectral emission being substantially invariant with respect to the velocity of the impacting electrons.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electric arc furnaces. John Young. *Can. Metals Met. Inds.* **3**, 17(1940).—The operation, elec. characteristics and automatic current regulation of elec. arc furnaces are briefly reviewed. W. H. Boynton

Electric steel furnaces. Robert Boutigny. *J. four élec.* **48**, 172–80, 206–14(1939).—Construction and operation are described of Heroult arc furnaces for plain and special steel production. C. F. Bonilla

Stainless steel rolled products. P. B. Greenawald. *Trans. Electrochem. Soc.* **77**, 9 pp.(preprint)(1940).—The presence of the high Cr % in the steel necessitates close control during elec.-furnace melting. The com. success of stainless steel is due primarily to the elec. furnace and the ability to keep the C content of the alloy down to 0.10%. Addn. of small percentages of S or Se to the alloy improves the machining properties. The surface of stainless steel can be made mirror bright, practically matching Cr plate. C. G. F.

Recent developments in carbon radiator furnaces. R. Germain. *J. four élec.* **48**, 157, 243–5(1939).—These cylindrical furnaces have an axial C rod that radiates to the charge. C. F. Bonilla

Silico-calcium. Lucien Bergeret. *J. four élec.* 48, 276–7(1939).—Silico-calcium seems to have a good future as a strong deoxidizer for steel. The com. product analyzes 41.67% Ca, 0 to 1.2% C, and is a soln. of $CaSi_2$ in Si. The Ca silicate slag formed in deoxidizing is very fusible and seps. well, compared to that from Al. Si-Ca

also has applications as a *thermite, in certain explosives,* and for *smoke screens.* In its manuf. a single-phase furnace is used, with a c. d. not exceeding 5 amp./sq. cm. of electrode cross section area. The reaction is: $2SiO_2 + 2C + CaC_2 = Si_2Ca + 4CO$. The slag density must be decreased to get good sepn. from the molten metal. Energy efficiency = 45%; 6000 kw.-hr./ton. C. F. Bonilla

1 **The Soderberg electrode in the aluminum industry.** Robert Sevin. *J. four élec.* **48**, 51–6(1939).—Since 1934 Al production in closed cells with the Soderberg electrode has increased from 20,000 to 175,000 tons/yr., now constituting 30% of all Al. The gases are led to towers with circulating soda soln. which dissolves the F. By adding AlF_3 to the decanted soln. $^3/_4$ of the cryolite requirement is regenerated. Lower voltage (4.5 to 5.3) is required, and the same purity maintained. C. F. Bonilla

2 **Effect of electrode spacing and current density in aluminum production.** Louis Ferrand. *J. four élec.* **48**, 129–32(1939).—German, Italian and French Al cells are compared. The Fr. use lower c. d. (1.16 amp./sq. cm. vs. 1.5 to 1.6), larger spacing between electrodes (5.7 cm. vs. 4.4 to 4.7), lower current efficiency (78% vs. 85 to 90%) and the same energy consumption (20 kw.-hr./kg.). New horizontal anode furnaces being built in these countries tend toward lower c. d. (0.85 to 1), and lower energy (13.9 to 16.4) consumption. C. F. Bonilla

3 **Chromium plating plastic molds.** Arthur W. Logozzo. *Monthly Rev. Am. Electroplaters' Soc.* **27**, 11–21(1940).—Metal molds for plastics are Cr plated for resistance to abrasive wear and corrosion. Cr has a low coeff. of friction which permits free extn. of the molded product from the mold. The min. thickness of Cr should be 0.001 in. A uniform coating of Cr is important. If the mouth of a deep slot is more heavily plated than the recess, a back taper results which prevents free removal of the plastic from the mold. Prior to plating, the mold must be highly polished. The mold is given an alk. cleaning and then an anodic treatment in a CrO_3 soln. It is Cr plated and the final Cr plate is polished. To secure a more even current distribution on the mold, inside anodes are used. The "octopus" anode is much used. It consists of a no. of Pb wires, about $^1/_8$ in. in diam., attached to a Pb-coated conducting bar. These wires can be placed so as to project into slots and recesses. A. Brenner

4 **Chromium plating dies and gages.** D. A. Cotton. *Proc. Am. Electroplaters' Soc.* June, **1939**, 61–7.—The Cr plating of molds for plastics considerably increases their life and prevents sticking of the product. Unplated molds are etched by the plastic. This is prevented by Cr plating. C. gives many examples of savings effected by salvaging worn or undersized parts with Cr plating. By Cr plating the rams of hydraulic presses, the wear on the leather packing was greatly reduced. Preparatory to Cr plating, all objects are given a 15–20 sec. anodic treatment in the Cr bath. Cr-plated parts which have been worn undersized are replated without stripping by use of the anodic treatment. However, if steel is exposed, all the Cr must be stripped before replating. A. Brenner

5 **Continuous electrodeposition of bright chromium at high speed on fine wires.** Albert Guerillot. *Proc. Am. Electroplaters' Soc.* June, **1939**, 37–8.—Cu wire, 0.06 to 0.07 mm. in diam., is plated with bright Cr for use in making "silver" braid. Ag-plated wire tarnishes too readily. The wire is passed successively through a tank of dil. HNO_3 (1:10,000), next through a rinse tank, then into the Cr plating tank and finally through another rinse tank. The rate of production is about 250 m. of wire per hr. from each coil. A. Brenner

6 **Electrodeposition of black molybdenum finishes.** R. A. Hoffman and R. O. Hull. *Proc. Am. Electroplaters' Soc.* June, **1939**, 45–9.—The black Mo finish is useful for decorative purposes and can be lacquered. This finish is produced in a bath contg. 4–5 oz. of $(NH_4)_2MoO_4$ and 3.5 oz. of $NiSO_4$ in a gallon of soln. The operating conditions are: pH = 4.3 to 4.7; temp. = 55° to 80°; cathode c. d. = 2 to 5 amp./sq. ft.; time = 8 to 10 min.; agitation is desirable. A deposit 0.001 in. thick is produced. The basis metal should be previously electroplated with Zn or Cd. Die-cast Zn or Al can also be coated with the Mo. The black coating consists of about 45% Mo, 10% Ni, and the remainder O. Its sp. gr. is about 1.01. The amt. of deposit obtained per amp. hr. decreases as the c. d. is raised. After 0.001 in. has been deposited, gassing begins and the rate of deposition considerably decreases. After 1 hr., deposition practically ceases, and the max. thickness of coating obtained is 0.002 in. The coating obtained on irregularly shaped objects is fairly uniform. The black coating flakes off on severe flexing. The coating is permanent in air. Applied directly to steel, it affords no protection against corrosion, but it increases the protective value of Zn coatings on steel. A. B.

7 **Notes on the adhesion of electrodeposited metals to steel.** A. W. Hothersall. *Proc. Am. Electroplaters' Soc.* June, **1939**, 1–7.—The adhesion of coatings to the basis metal is due to at. forces. Mech. interlocking may occur in some cases but contributes little to the strength of the bond. The existence of at. forces is shown by the well-known fact that some electrodeposited metals continue the crystal structure of the basis metal. Electrodeposited Ni continues the crystal structure of Fe for a short distance. The adhesion of Ni to various basis metals approximates the tensile strength of the metals. A thin oxide film on steel does not necessarily prevent good adhesion of Ni, as good adhesion was obtained on clean steel which had stood 2 days in a 100° oven. Although lack of proper cleaning of the steel is the usual cause of poor adhesion of Ni coating, a low degree of adhesion may result from weakness of the surface layer of the steel. Machined or emeried steel surfaces are weak and Ni coatings are readily detached from them. A little better adhesion is obtained on a polished steel surface. By heating the latter in H at 250° for 1 hr. before plating, good adhesion was obtained. Anodic etching of the steel in H_2SO_4 removes the weakened surface layer of machined or polished steel. The concn. of H_2SO_4 may vary from 30 to 80%. The steel rapidly becomes passive in the acid and the current drops. The steel dissolves with a current efficiency of about 20% even while passive. A. B.

8 **Stress in electrodeposited copper as determined by x-rays.** Elbert M. Mahla. *Trans. Electrochem. Soc.* **77**, 11 pp.(preprint)(1940).—The relative amt. of stress in deposits of Cu made at different temp. and c. d. was detd. by the measurement of the elongation of the spots on a Debye-Scherrer transmission x-ray film relative to their width. Stress was plotted against c. d. and temp. in a 3-dimensional diagram. In deposits made at low temp., temp. was shown to be a greater factor than c. d. in detg. the stress, while at high temp. c. d. was the principal factor. No direct relationship between hardness and stress was observed. C. G. F.

9 **The application of x-ray diffraction analysis to electroplating problems.** Herbert R. Isenburger. *Proc. Am. Electroplaters' Soc.* June, **1939**, 77–83.—A review. A. Brenner

10 **X-ray investigation of electrolytic zinc deposits.** G. F. Kosolapov and B. Yu. Mett. *J. Tech. Phys.* (U. S. S. R.) **9**, 1421–4(1939).—The anisotropy of Zn deposited from a cyanide bath increases with c. d. between 1 and 7 amp./sq. dm. and with the thickness of the deposit; it decreases with rising temp. and c. d. between 7 and 14 amp./sq. cm. It is lowered by stirring and not affected by addn. of glycerol. The luster of Zn deposits increases with their anisotropy. J. J. Bikerman

11 **Microscopic and drop-test methods on metallic electrodeposits.** J. W. Higgins. *Am. Soc. Testing Materials, Bull.* No. 100, 21–4(1939).—The microscopic method of detg. the thickness of Cu or Ni deposits with a filar micrometer and drop tests for detg. the thickness of Zn, Cd and Cr coatings are briefly outlined. Details of specimen prepn., compn. of test solns., etc., are given. Leopold Pessel

12 **The chemical determination of local thickness of electrodeposited metallic coatings by the B. N. F. jet-test.** S. G. Clarke. *Proc. Am. Electroplaters' Soc.* June, **1939**,

24–30.—Further improvements were made in the jet-test (*C. A.* **31**, 2568[8]). A modified reagent (labeled "FC") has been proposed for testing Cu, Ni, Co and bronze coatings. This soln. has the following compn.: $FeCl_3.6H_2O$, 300 g./l.; $CuSO_4.5H_2O$, 100 g./l. It supersedes soln. "1A" (contg. HCl and AcOH in addn. to the above salts) which had been found to be somewhat unstable. It dissolves Ni somewhat faster than the "1A" soln. Curves are given for the rate of penetration of coatings as a function of temp. The details of the method are essentially as given in *C. A.* **31**, 2568[9]. A. Brenner

Experiments on the distribution of electrodeposits on a cup-shaped cathode. G. E. Gardam. *Proc. Am. Electroplaters' Soc.* June, **1939**, 16–22.—The metal distributions obtained in Ni, Sn, Cd, Cu, and Cr plating baths were detd. on hemispherical bowls, 2 in. in diam. The local thickness of plating was detd. by the B. N. F. jet method. The av. thickness of coating in each test was about 0.0006 in., but all results were calcd. to the basis of an av. thickness of 0.001 in. for the cup. Some knowledge of the primary current distribution on the bowl can be obtained from Maxwell's equation for a freely charged hemispherical bowl. In practically all cases the metal distribution was more uniform than the primary current distribution. The expts. showed that a more uniform metal distribution was obtained at low c. d. in Ni baths and $CuSO_4$ baths. Increase of temp. and agitation decreased the proportion of metal going to the inside of the bowl. The bright Co-Ni baths, contg. formaldehyde, gave a poorer metal distribution than the ordinary Ni bath, but the sulfonate bright Ni gave about the same metal distribution. The cyanide Cd, cyanide Cu, and acid tin baths gave more than twice as much metal on the inside of the bowl at the bottom as did a $CuSO_4$ bath. Various geometrical factors, such as position of the bowl in the tank, arrangement of anodes, size of tank, etc., had only a small effect on the metal distribution. A. Brenner

The role of diffusion in electroplating processes. J. T. Burt-Gerrans. *Proc. Am. Electroplaters' Soc.* June, **1939**, 39–42.—A review. A. Brenner

External heating of plating solutions. Dale Augsburger. *Monthly Rev. Am. Electroplaters' Soc.* **27**, 23–8 (1940).—See *C. A.* **33**, 5750[8]. A. Brenner

Recent developments in British plating practice. C. Francis-Carter. *Proc. Am. Electroplaters' Soc.* June, **1939**, 9–16.—The subjects reviewed are: bright Ni plating, bright Zn plating, the Rochelle salt Cu cyanide bath, vapor and solvent degreasing, filtration, the use of rubber tank linings, rectifiers and plating specifications. A. Brenner

Electrodeposition in France. M. Ballay. *Proc. Am. Electroplaters' Soc.* June, **1939**, 30–6.—Electroplating practice in France is similar to that in the U. S. A. A. Brenner

Theoretical training for the electroplating industry. J. U. MacEwan. *Proc. Am. Electroplaters' Soc.* June, **1939**, 43–5.—A discussion. A. Brenner

Determining film thickness with the recording spectrophotometer E. Q. Adams and L. S. Ickis, Jr. *Gen. Elec. Rev.* **42**, 450–1(1939).—Films on anodized Al reflectors were measured under the microscope equipped with a micrometer eyepiece, with a precison of about 10%; and then by the spectrophotometer, which appears the more accurate of the 2 methods. With the spectrophotometer, results are exactly reproducible and represent the av. conditions for an appreciable area of the sample. C. G. F.

An electron-diffraction study of anodic films. R. A. Harrington and H. R. Nelson. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. **1158**, 14 pp. (1940).—Al anodized at room temp. usually gave diffuse patterns. Anodic films formed on Al in a wide variety of electrolytes at ordinary temps. are amorphous. Anodic treatment in solns. at higher temps. tends to produce anodic films having less random structure. Heating the anodic film on Al at temps. up to 650° does not appreciably change its structure, although cryst. oxidation products are formed on unanodized Al at temps. above about 300°. Depending on certain conditions, anodic films formed on Ta and Ti are at least partly cryst. or are amorphous. Immersion of anodized or unanodized Al in water at temps. above 80° produces a thin layer of böhmite (α-$Al_2O_3.H_2O$). A film produced in this way is transformed to γ'-Al_2O_3 at temps. around 650°. Immersion of metallic Al in boiling chem. solns. gives definitely cryst. films, in contrast to the usual results with anodic treatment. C. L. Mantell

The cathodic behavior of zinc relative to iron in hot water. Gerhard Schikorr. *Gas- u. Wasserfach* **82**, 834–7 (1939).—See *C. A.* **33**, 7671[6]. R. W. Ryan

The refining of monel scrap by oxidation with water. Keeiti Ota. *Nippon Kinzoku Gakkai-Si* **3**, 425–8(1939).—On the assumption that a violent oxidation will remove C and Si from molten monel scrap, the metal was treated in a high-frequency elec. furnace with water or steam as oxidizing agent. The results of expts. were fully satisfactory. H. Nishimura

Single potential of pure aluminum. II. Isamu Igarasi and Kiyoiti Kodama. *Nippon Kinzoku Gakkai-Si* **3**, 428–30(1939).—The single potential of pure Al was measured by the direct-reading method with the aid of vacuum tube Ux-54. Thus const. values were obtained, E_H = 1.22 v. for 99.99% Al, E_H = 0.81 v. for 99.8% Al, in *N* KCl soln. at 25°. The local elements on the specimen have marked effect on its electrode potential immediately after being placed in the soln. By bubbling O through the KCl soln., the potential of 99.99% Al was temporarily decreased and then immediately increased. The exptl. results indicated that the change in potential by bubbling gas into the soln. is not due to formation of a gas-metal electrode, and the surface condition of the sample has considerable effect on its potential; the smoother the surface of the sample, the more basic it is. Cf. *C. A.* **32**, 8954[3]. H. Nishimura

The polarization of the electrolytic hydrogen evolution on alloys of nickel with iron and cobalt in alkaline solution. G. Grube and U. Croatto. *Z. Elektrochem.* **45**, 815–20 (1939).—The effect of the surface on polarization at a Ni cathode was measured in 6 *N* KOH for increasing and decreasing c. d. A highly polished surface gave higher values for the cathodic potential than roughened surfaces. The time change of the potential at polished and roughened Ni cathodes and at roughened Fe cathodes was found to depend on the surface; for polished Ni the increase is more rapid and the end value reached sooner than for rough Ni. Curves are given showing the relation of the cathode potential to the c. d. for Ni-Co alloys contg. 100, 30, 20, 10, 5, 0% Ni and for Ni-Fe alloys contg. 100, 80, 60, 40, 20, 0% Ni. The mixed crystals in the region of the face-centered cubic structure of Ni-Co show little effect on polarization; above 70% Co in the region of hexagonal mixed crystals the effect is pronounced. No sharp effect corresponding to a phase change was found in the Ni–Fe system. H. C. Thomas

Photoelectric cells sensitive to long wave length radiation. The bismuth sulfide cell. Colin G. Fink and Johnstone S. Mackay. *Trans. Electrochem. Soc.* **77**, 27 pp.(preprint)(1940).—A Bi_2S_3 photoelement having a threshold wave length of 50,000–80,000 A. was developed and studied. This threshold wave length is higher than any yet recorded for other photoelements. Approx. 80% of the cell's spectral activity is beyond the visible region, whereas cells now in com. use are sensitive primarily in the shorter or visible wave lengths. The total photoelec. sensitivity of the Bi_2S_3 cell compares favorably with that of the vacuum tube photoelec. cells, being much greater than that of the Na and about the same as that of the Cs cell. The unipolar cond. of the exptl. Bi_2S_3 cell is very small, but when the cell is further developed so as to give unipolar conductance much quicker and higher response is expected. The cell is applicable as the basis of temp. control in low-temp. systems. C. G. F.

Heat-transfer methods in arc interruption. C. G. Suits. *Gen. Elec. Rev.* **42**, 432–5(1939).—The elec. char-

acteristics of arcs burning in various gases were measured. For common gases the relation E = const. I^{-n} where n lies between 0.5 and 0.7 and E is the gradient in v./cm. This is probably one of the most fundamental elec. aspects of the steady-state arc. A second important aspect is the pressure effect. In all gases the gradient, E, increases with increase in gas pressure, but this increase in E is small. Thus, N_2 pressure must be increased 10-fold to double E. Gases studied are N_2, A, He and H_2. For these E = const. p^m where m ranges between 0.16 and 0.31. A third fundamental is the gas effect. E varies greatly from gas to gas. To produce a similar change in a single gas would require enormous pressures. Thus, E at an arc current of 10 amp. is 5 v./cm. for Hg vapor, 8.5 for A, 22 for N_2, 32 for He and 90 for H_2. Any factor that changes E likewise changes I, the c. d. For N_2, E = const. $p^{0.31}$ and I = const. $p^{0.80}$. For a 10-amp. arc current and 1 atm. I = 5.7/sq. cm. for N_2; 570 for H_2. The elec. properties of an arc in a given gas can be duplicated in any other gas. H_2 at 1 atm. behaves like N_2 at 110 atm. because then the convection heat loss of N_2 is equal to that of H_2. The elec. properties of the arc are detd. by the thermal properties of the gas. Arcs in gases have the same elec. properties at the pressures for which the convection heat transfer is the same. The electrons in the arc column are in thermal equil. with the arc gas. Electron temp. and gas temp. are sensibly the same: the energy transfer between electrons and gas mols. is almost perfect. Sudden cooling will interrupt the arc—on which certain circuit-interruption devices are based. C. G. F.

Restriking phenomena of arcs. S. Horikosi. *Electrotech. J.* (Japan) **3**, 280–6(1939).—Expts. were made with a. c. arcs between Cu electrodes; the phenomena were recorded with the aid of a high-speed light switch and Kerr cell (Dunnington, *Phys. Rev.* **38**, 1506(1931)), with a high-speed camera and with a cathode-ray oscillograph. Restriking may be due to ionization by collision or to thermal ionization. Extinction of arc was accomplished in 2 ways: sudden cooling; or, increasing the heat capacity of the surrounding medium (oil is substituted for air). When thermal breakdown occurs, the diam. of the arc column is large and the temp. rises gradually. When breakdown is due to ionization by collision, a narrow, hot arc column, just like a spark, appears. C. G. F.

The gettering powers of various metals for the gases hydrogen, oxygen, nitrogen, carbon dioxide and air. Louis F. Ehrke and Charles M. Slack. *J. Applied Phys.* 11, 129–37(1940).—Measurements were made on Al, Mg, Th, U, misch metal (Ce and La), Zr and Ba as getters in the absence of elec. discharges or other sources of ions. The superior powers of diffuse layers as compared to those of bright layers were confirmed. Ba and misch metal were the most active, but Ba is not effective in the presence of Hg vapor. Mg and Al showed little activity in the absence of a discharge. Th and U showed considerable activity for H and O but the high temp. necessary for flashing makes these inconvenient to use. S. L. G.

Reignition voltage characteristics of grid-controlled discharge tubes. Y. Watanabe and Y. Nakamura. *Electrotech. J.* (Japan) **3**, 243–6(1939).—Expts. were made on hot-cathode and on Hg-pool-cathode rectifier tubes. The characteristic reignition voltage is best represented by $V_r = V_0 + kt^n$ where V_0 is the ionization voltage, t the time and k and n are consts. C. G. F.

Color of the light from alloy lamps. T. Asada and H. Yosinaga. *Electrotech. J.* (Japan) **3**, 247–50(1939).—Metal-vapor discharge lamps were made by use of Zn-Cd and Cd-Hg in place of Hg of the standard lamp. These metals do not attack quartz. It was found that the compn. of the alloy vapor arc could not be predetd. from the single vapor pressures. Increasing the voltage may increase the intensity of that component having the lower vapor pressure. C. G. F.

Spectral distribution of radiation from lamps of various types. B. T. Barnes, W. E. Forsythe and W. J. Karash. *Gen. Elec. Rev.* **42**, 540–3(1939).—Spectral intensities over the range 2200 to 26,000 A. for lamps of various types measured with a quartz double monochromator. The percentage of overall input radiated in the visible range (3800–7600 A.) is 7.9 for the 260-watt Na vapor lamp; 9.8 for 415-watt Ne; 9.3 for 456-watt Hg in glass; 14.3 for 1170-watt Hg in quartz; 12.4 for 17.5-watt fluorescent (daylight color); 14.8 for 17.5-watt fluorescent (blue color); 9.6 for 100-watt W vacuum (2865°K.); 17.4 for 1000-watt W photoflood (3360°K.). C. G. F.

Fluorescent lamps and their applications. A. B. Oday and R. F. Cissell. *Trans. Illum. Eng. Soc.* (N. Y.) **34**, 1165–88(1939).—Because of high luminous efficiency and low percentage of radiant energy, the lamps are particularly suitable for producing high levels of illumination with resultant cool foot candles. The fluorescent materials used in the lamp are particularly sensitive to middle ultraviolet (2000 to 3000 A.). About 1/3 the energy input goes into the 2537 A. unit line at the center of the middle ultraviolet region. Less than 2% of the energy is represented in the visible Hg lines. Part of the energy is consumed in keeping the electrodes hot to insure the free emission of electrons. The 13% of the energy that is converted into visible, useful light is higher than is obtained from filament lamps of comparable light output. Combination of the higher efficiencies of fluorescent lamps with the lower percentage of radiant energy results in the radiant heating effect per foot candle being only 1/4 that from incandescent W lamps. Synthetic "phosphors" are so prepd. as to have their max. excitation sensitivity in the vicinity of 2537 A. In addn. to the "phosphor," a Mn salt is usually present as an activator. Among the fluorescent materials used, the emitted range and emitted peak are: $CaWO_4$ 3800–7000 A.; 4400 A.; $MgWO_4$ 3800–7200; 4800; Zn silicate 4500–6200; 5250; Zn Be silicate 4500–7200; 5950; Cd borate 4000–7200; 6150. In general, the voltage drop at each electrode is 12 to 18 v. The drop across the lamp, when operating, is about 2/3 of the total supply voltage. The useful life of the lamps is over 2000 hrs. For a 1-in. diam. glass tube, 18 in. long, the ratings are 15 w., nominal lamp amp. 0.30; nominal lamp v. 56; circuit voltage 110–125. The power factor is about 90%. Details for other sizes are given. C. G. F.

Developing methods for prepn. of red lead from galena answering requirements of storage-battery industry (Sakharova, Levitina) **18** Use of glass electrode in biol. lab. (Holden) **11B**. Ni-Cd alloys [for elec. contacts] (U. S. pat. 2,182,380) **9**. Fluorescent screen for cathode-ray tube (U. S. pat. 2,182,860) **3**. Device for elec. heating of used lubricating oil in still (U. S. pat. 2,181,484) **22**. App. for immersing articles in plating baths (Brit. pat. 508,246) **1**. Elec. contacts (U. S. pat. 2,182,381) **9**.

Lead oxide-sulfate storage-battery plate compositions. James O. Johnstone (to Glidden Co.). U. S. 2,182,479, Dec. 5. A substantially dry compn. suitable for making battery pastes comprises particles of a Pb oxide carrying a coating of basic Pb sulfate equiv. to a 5–15% content of normal Pb sulfate.

Microporous battery separators of hard rubber. Eardley Hazell (to United States Rubber Products, Inc.). U. S. 2,181,891, Dec. 5. A microporous battery-plate separator of vulcanized hard rubber is formed with the longitudinal grain characteristic of calendered rubber and with the rubber phase continuous and forming at least about half of the separator by wt., the rubber being intimately assocd. with dispersed finely divided cellulosic material such as 40 mesh cellulose flock and colloidal clay ingredients.

Microporous diaphragms suitable for storage-battery separators. Wm. J. Burgess (to Electric Storage Battery Co.). U. S. 2,181,299, Nov. 28. Diaphragms of good strength and resistant to electrolytic oxidation are made by a process which involves mixing latex with a hydrophillic colloid and with S in sufficient quantity for vulcanization to hard rubber, drying the mixt. until the moisture content is reduced to about 5%, consolidating the material by pres-

sure, wetting the consolidate mass, and vulcanizing in the presence of moisture to obtain a product of high electrolytic permeability.

Electrolytic condenser. Joseph A. Poitras (to Solar Mfg. Corp.). U. S. 2,181,607, Nov. 28. Structural details of a rubber bushing, etc.

Electrolytic condenser. Cornelis de Lange and Adriaan J. J. Lambeek (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,183,092, Dec. 12. Structural details.

Electrical condenser. Frederick J. Given (to Bell Telephone Laboratories, Inc.). U. S. 2,181,695, Nov. 28. Various mfg. details in the use of materials such as Al foil, paper and Pb foil.

Electrolytic cell suitable for use as a wet condenser. Anthony F. P. J. Claassen and Cornelis de Lange (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,183,091, Dec. 12. Various structural details.

Electrolytic capacitors. Donald E. Gray (to Cornell-Dubilier Corp.). U. S. 2,182,376, Dec. 5. In the manuf. of an electrolytic capacitor, a metal foil such as a foil of Al is passed through a soln. of electrolyte (such as one formed from B_2O_3, NH_4OH and glycerol) of comparatively thick consistency at such a rate as to produce a thick and uniform coating of electrolyte on the foil, an uncoated fibrous spacer such as one of paper or cloth is applied to the coated foil under controlled pressure serving to impregnate the spacer with the coating and to remove excess electrolyte, and the foil and spacer are wound with associated capacitor elements into a supply roll from which the wound material may be withdrawn in units for individual capacitors as desired. App. is described.

Electroplating metals such as steel, etc., with brass. Christian J. Wernlund (to E. I. du Pont de Nemours & Co.). U. S. 2,181,773, Nov. 28. An electroplating process is employed which involves electrolyzing a soln. contg. Zn and Cu cyanides and an alkali metal hydroxide, the ratio of the concn. of Zn cyanide to the concn. of the hydroxide in the soln. being maintained chemically equiv. to a Zn cyanide to caustic soda ratio of approximately 1.1, the concns. being expressed as wt. of solute per unit vol. of solvent, and maintaining the soln. at a reasonably const. temp., so as to maintain a substantially const. compn. of electrodeposit when changes occur in the c. d.

Apparatus for electroplating, as with copper. Charles W. Lowe (to Electrical Research Products, Inc.). U. S. 2,181,490, Nov. 28. Various structural and operative details of an app. with rotating electrodes used with a circulating electrolyte.

Chromium plating. Frank H. Beall. U. S. 2,182,214, Dec. 5. A low-etching Cr plating bath for plating clear, adherent Cr comprises an aq. soln. of chromic acid, in part free and in part combined as an alkali salt, the free acid constituting 20–40% of the total, and not less than approx. 5 oz. per gal., and sulfate to the amount of not over approx. 0.4% of the total chromic acid (the total chromic acid being 30–50 oz. per gal.).

Electroprocessing apparatus suitable for cleaning and plating, etc. Guerin Todd (to Hanson-Van Winkle-Munning Co.). U. S. 2,182,184, Dec. 5. Various structural, mech. and operative details.

Cores for use in electrodeposition of pipe couplings. Alfred C. Arbogast (to Northern Indiana Brass Co.). U. S. 2,181,256–7, Nov. 28. Various structural details.

Copper-coated lead powder. Charles L. Mantell (to Hardy Metallurgical Co.). U. S. 2,182,567, Dec. 5. An arrangement of app. is described, and a process for the manuf. of Pb particles with a Cu plating upon them which involves passing a d. c. through an aq. acetate electrolyte contg. HOAc and relatively large proportions of Cu and Pb in soln. in an electrolytic cell contg. a cathode, a lead anode, and a copper anode, maintaining the cathode c. d. in excess of that at which lead deposits from the electrolyte in massive form so that the lead deposits from the electrolyte as substantially nonadherent fine particles and the particles become plated with Cu from the soln. and controlling the ratio of Cu to Pb in the resulting Cu-coated Pb particles by varying the ratio of exposed Cu per anode surface in the soln. to exposed Pb anode surface in the soln.

Hydrogen peroxide. Gustav Adolph and Max E. Bretschger (to Buffalo Electro-Chemical Co., Inc.). Can. 386,573, Jan. 30, 1940. Bisulfate-H_2SO_4 acid soln. is electrolyzed and distd. The distn. residue is cooled until a pasty crystal mass of H_2SO_4 and bisulfite is obtained, the crystals are sepd. from the acid, the acid is purified, the purified H_2SO_4 is added in proper amt. to the electrolyzed soln. of the sepd. crystals and the mixt. is distd.

Electric induction furnace. David Pisarev. U. S. 2,182,819, Dec. 12. Various structural, elec. and operative details. U. S. 2,182,820 relates to details of an induction heating coil.

Induction furnaces. The British Thomson-Houston Co. Ltd. Brit. 508,255, June 28, 1939. Means for regulating the magnitude and(or) the phase position of the voltages feeding the furnace windings to any extent with regard to each other in a 2- or multi-phase coreless induction furnace is described.

Induction furnace suitable for heating strip metal in a coil. Ernest G. Schlup (to American Rolling Mill Co.). U. S. 2,181,921, Dec. 5. Various structural details.

Apparatus for electrothermal decomposition of oil to produce carbon black. Victor F. Hanson (to E. I. du Pont de Nemours & Co.). U. S. 2,181,759, Nov. 28. Various structural, elec. and operative details.

Apparatus for irradiating foods, etc. Orrick H. Biggs (to Hygrade Sylvania Corp.). U. S. 2,181,293, Nov. 28. An app. is used including the combination of an ultraviolet lamp comprising tubular envelope of Corex glass transmitting radiations at 2537 A., an atm. of inert gas such as Ne or He at low pressure and Hg vapor within the envelope, electrodes about 2 in. apart and within the envelope at each end, app. for operating the lamp at a c. d. of 40 milliamps. per sq. cm., a refrigerating chamber around the lamp, a door in the refrigerating chamber, means actuated by the closing of the door for starting the operation of the lamp, and means to extinguish the lamp after a predetd. interval.

Device for rectifying high alternating voltages. Frans M. Penning (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,182,736, Dec. 5. Various structural, elec. and operative details.

Light-sensitive electric device. Foster C. Nix (to Bell Telephone Laboratories, Inc.). U. S. 2,181,494, Nov. 28. A photo-e. m. f. cell is used comprising a metal base such as a Ni or Cu disk, a Tl member such as a film adjacent to and in contact with such metal base, and a film of Tl and S on the face of the Tl member remote from the base.

Electrostatic precipitator for gas purification Edward H. R. Pegg (to Westinghouse Elec. & Mfg. Co.). U. S. 2,181,147, Nov. 28. Various structural, elec. and operative details.

Electrostatic precipitator for gas purification. Gaylord W. Penney (to Westinghouse Elec. & Mfg. Co.). U. S. 2,181,767, Nov. 28. Various structural, elec. and operative details.

Reflectors. Egbert Gowlland. Brit. 508,205, June 28, 1939. Reflectors of high light-reflecting efficiency are made by forming on a support, e. g., of glass, a thin opaque metallic backing, preferably of nonoxidizable metal, e. g., Ge, Cr, Rh, and thereafter forming thereon a thin layer of Al. The metals are evapd. electrically in a highly exhausted chamber to deposit on the support and backing.

High-voltage ionic electrical discharge device. John G. Trump (to Research Corp.). U. S. 2,182,185, Dec. 5. Various structural, elec. and operative details.

Exhaustion of a photoelectric tube. Harvey C. Rentschler and Donald E. Henry (to Canadian Westinghouse Co. Ltd.). Can. 386,837, Feb. 13, 1940. A sealed, evacuated envelope is finally exhausted by connecting it to a refrigerated bulb contg. degasified charcoal.

Gaseous electric discharge devices of the positive column type. Hans Alterthum and Arved Lompe (to

General Elec. Co.). U. S. 2,182,776, Dec. 12. Various details of a device having a gaseous atm. contg. Ne together with A and a vaporizable material such as Hg. U. S. 2,182,777 also relates to a device contg. Ne and A. U. S. 2,182,778 (Hans Alterthum, Arved Lompe and Kurt Wiegand, joint inventors; to same assignee) also relates to a device which contains Ne, A and Hg. U. S. 2,182,779 (Hans Alterthum and Arved Lompe, joint inventors; to same assignee) relates to a device contg. Ne together with Kr or Xe and Hg. U. S. 2,182,780 also relates to a device contg. Ne, Kr or Xe and Hg. Cf. *C. A.* **34**, 9484.

Electric discharge lamp. Gilles Holst (to Canadian General Electric Co., Ltd.). Can. 386,576, Jan. 30, 1940. A hygroscopic material, e. g., C, is placed between a gaseous elec. discharge lamp and a removable and transparent enclosing container to avoid changes in the starting voltage of the lamp.

Electric discharge lamp with a filament of the oxide-coated coiled-coil tungsten wire type. Orrick H. Biggs (to Hygrade Sylvania Corp.). U. S. 2,181,294, Nov. 28. Various structural, elec. and operative details.

Metal-vapor lamps such as mercury-vapor lamps suitable for ultraviolet irradiation. Friedrich Meyer, Hans-Joachim Spanner and Edmund Germer (to General Elec. Co.). U. S. 2,182,732, Dec. 5. Various details of a lamp which may contain a rare gas under low pressure with metal vapor.

Fluorescent lamp. Henry W. Myers (to Hygrade Sylvania Corp.). U. S. 2,181,305, Nov. 28. The interior of the glass envelope of an elec. gaseous discharge lamp is coated with a luminescent material formed of 65 parts of Mn-activated Cd borate of a grain size less than 10 microns, 170 parts of Mn-activated Mg tungstate of a grain size less than 10 microns and 140 parts of a Zn Be silicate of a grain size less than 10 microns, the Zn Be silicate initially comprising ZnO 50, Be oxide 12, SiO_2 36 and Mn fluoride 2%.

Incandescent lamp. Wilhelm Röver. U. S. 2,182,904, Dec. 12. A lamp suitable for use to avoid visibility by aircraft is provided with a filament adapted to maintain an operating temp. below 1600° when fed from a lighting circuit of standard voltage, and a coating of white lacquer is applied to the exterior surface of the bulb, with an overlying coating of black lacquer, the coatings covering substantially the major portion of the bulb except for a small free portion or "window."

Electric incandescent reflector lamp. Orrick H. Biggs and Stuart S. Davis (to Hygrade Sylvania Corp.). U. S. 2,181,295, Nov. 28. Various structural details.

Electric incandescent lamps with reflector bulbs. Orrick H. Biggs (to Hygrade Sylvania Corp.). U. S. 2,181,291, Nov. 28. A sealed glass bulb has part of its inside surface coated with a light-reflecting layer of substantially pure Al over which is placed a transparent protective artificial coating of Al oxide, a wire filament being mounted within the Al-coated portion of the bulb and the bulb being filled with A at a pressure above half an atm. U. S. 2,181,292 also relates to various details of a bulb provided with a reflecting coating.

5—PHOTOGRAPHY

E. R. BULLOCK

The platinum process. Colin N. Bennett. *Home Photographer* **7**, 289, 312(1939).—A method of prepn. and processing of platinotype and palladiotype papers suitable for amateur use is described. Platinotype paper has about twice the speed of printing-out papers, and the prints are as permanent as the base on which they are made. R. F. W. Selman

The photographic emulsion and its contribution to science and industry. Olaf Bloch. *J. Inst. Metals* **64**, No. 1, 35–56(1939). E. H.

Anomalous dilution effects with trisodium phosphate as developer alkali. P. C. Smethurst. *Brit. J. Phot.* 86, 275–6(1939).—With the M. C. M. 100 developer (*C. A.* **32**, 5715[1]), diln. with H_2O must be to 10 times its vol. to obtain only the same d. in a given time from a given exposure as is obtained with the full-strength developer in half the time. R. B. Willcock. *Ibid.* 291–2; cf. *C. A.* **33**, 9164[9]. P. C. Smethurst. *Ibid.* 319–20. H. E. Durham. *Ibid.* 352. Discussion. A. M.

Substitution of dyes for the silver of photographic images and the fixation of dyes on gelatin in order to obtain negative or positive images. A. Seyewetz. *Bull. soc. franç. phot.* [4], **1**, 1–5(1939).—See *C. A.* **33**, 6179[4]. C. L. B.

Contrast relations of the image in photography through turbid media. Maximilian Plotnikov. *Phot. Korr.* **75**, 138–45(1939).—The effect of variation in wave length of the exposing light on the definition of test objects photographed through certain cloudy materials has been investigated. The exposures were made on one of 5 brands of dye-sensitized plates, for simultaneous development with controls in a M-Q developer. The turbid media were: soap soln., colloidal S solns. and gelatin soln., all contg. particles of (presumably) very small size; Agfa Isopan FF film; dild. milk; and NH_4Cl fumes, and tobacco smoke. Except with the 3 last, a considerable and progressive improvement in contrast is seen on passing from the near ultraviolet at around 380 mμ, through the visible colors, to infrared at around 900 mμ. The dild. milk shows longitudinal scattering (J. Plotnikov, *C. A.* **26**, 929), and no improvement, on the whole, in definition of the image between blue and infrared. NH_4Cl and tobacco clouds, possibly because they consist of relatively large particles, show, also, no very appreciable improvement with increasing wave length. P. describes, in conclusion, a preliminary attempt to express numerically (for the Agfa film) the variation of contrast with wave length. E. R. Bullock

The sensitometry and exposure determinations for infrared photographic plates. A. Petrikalns and J. Bungs. *Acta Univ. Latviensis, Kim. Fakultat. Ser.* **4** (in Lettish, 369–402; in German, 403–4)(1939).—For the study of plates used in civilian and military aerial photography P. and B. describe a modified Scheiner sensitometer with 21 stages and an exposure ratio of 1:100. They used a light from an Osram DIN-sensitometer lamp passed through a Schott filter RG 8 (2 mm.) and BG 17 (3 mm.), and measured the sensitivity of several films with a Thallofide cell connected with a compensating voltmeter. In field measurements during April and May the intensity of the infrared rays and the blue rays was measured; the intensities of these spectral ranges did not bear any relation to each other. Frank Maresh

Sensitometry of photographic papers. Loyd A. Jones and Charles A. Morrison. *J. Franklin Inst.* **228**, 445–70, 605–22, 755–69(1939).—The fundamentals, principles and methods of the sensitometry of photographic papers established by Jones, Nutting and Mees (*C. A.* **9**, 762–3) in 1914 are reviewed. The necessity for the use of intensity-scale exposure rather than the older time-scale methods is shown. An account of the evolution of the design of an optical wedge sensitometer which fulfills the required sensitometric specifications leads to the description of a new instrument used in this study of the sensitometric characteristics of photographic papers. Details of the complete sensitometric process are given. The resultant characteristic curves from the different types and grades of papers are described and interpreted. The typical characteristic curve of modern papers is discussed and a revised method of detg. numerical values, which describe the curve for practical purposes, is given. The new interpretation of the shape of the shoulder region of the curve is significant with respect to the quality of tone reproduction. The new group of characteristic values—

speed, max. gradient, exposure scale, max. —is defined and discussed. Numerical values obtained by the new sensitometric method are given in tabular form for most of the current types and grades of photographic papers. Authors

Transferring photographic designs to ceramic ware (U. S. pat. 2,181,452) 19.

Henney, Keith, and Dudley, Beverly: Handbook of Photography. New York: McGraw-Hill Book Co. 871 pp. $7.50.

Saint-Genies, Jacques de L.: Note sur l'optique des films gaufrés. Application à la cinématographie en couleurs. Paris: Éditions de la Revue d'optique théorique et instrumentale. 92 pp.

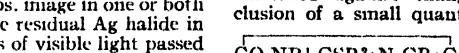
Color photography. Eastman Kodak Co. Brit. 507,841, June 19, 1939. Color-developed reversed images are produced in a photographic element such as described below and contg. developed neg. and undeveloped pos. images of Ag halide by a process that includes the steps of exposing and color-developing the pos. image in one or both of the outer layers and exposing the residual Ag halide in the middle emulsion layer by means of visible light passed through the outer emulsion layer or layers contg. the color-developed pos. Ag-plus-dye image in addn. to the developed neg. Ag image, color-developing the exposed residual Ag halide in the middle emulsion layer and removing the pos. and neg. Ag when the residual Ag halide has been exposed and color-developed in all the emulsion layers. The element is one having 3 Ag halide emulsion layers inseparably coated on the same side of a single support of which one of the outer emulsion layers is not specially color sensitized while the other outer emulsion layer and the middle emulsion layer are selectively color-sensitized, one being sensitized to the red region and the other to the green region of the spectrum. The not specially color-sensitized layer is destined to record the blue component image and may be adjacent to the support or farthest from it. Preferably the color-developed reversed images are produced in an element as described and contain neg. Ag images and undeveloped images of Ag halide in all the emulsion layers by first exposing the residual undeveloped Ag halide in one of the outer layers alone by means of visible light and color-developing it, then exposing the residual undeveloped Ag halide of the middle emulsion layer alone by means of visible light passed through such first exposed and color-developed outer emulsion layer and then color-developing it, then exposing the residual undeveloped Ag halide of the outer emulsion layer and color-developing it and finally removing the neg. and pos. Ag to leave the transparent pos. dye images in the layers. The element may be one in which the color sensitizer in the outer emulsion layer that is color sensitized is resistant to development, the residual Ag halide in such layer being first exposed alone by means of light to which it is selectively sensitized and color-developed. The element may have an antihalation layer on one or both sides of the support which is removable together with the metallic Ag and permits exposure of the residual halide of the bottom layer (and middle layer if necessary) through the support. The antihalation layer may be one contg. Ni sulfide, preferably in a gelatin or like layer. The antihalation layer may be between the emulsion(s) and the support, which may consist of a cellulose ester, paper or the like.

Photographic materials with antihalation layers. Geo. A. Dawson (to Du Pont Film Mfg. Corp.). U. S. 2,182,794, Dec. 12. A transparent support with a coating of sensitized material on one side is provided on the other side with a layer contg. a polymeric material contg. amino N such as piperidylmethylzein which is insol. in water and 5% NH_4OH soln. but sol. in dil. HOAc, and an antihalation dye. Numerous examples are given.

Light-filter layers. I. G. Farbenindustrie A.-G. Brit. 508,011, June 26, 1939. The layers are made by illuminating a photographic material comprising 1 or more Ag halide emulsion layers contg. dye components that are fast to diffusion (i. e., capable of conversion into dye by color degelopment or by azo-coupling and which, when added to the emulsion as a soln. or dispersion, cannot be removed or can only be removed with difficulty from a layer prepd. with the emulsion by any solvent or dispersion medium that normally dissolves or disperses the dye component) with colored or white light, if required, through a filter serving as a pattern, and producing a dye image by color development or by azo-coupling.

Light-sensitive photographic emulsions. Carl A. Schleussner. U. S. 2,181,383, Nov. 28. A photographic emulsion such as one contg. added glass beads or glass dust is treated with oscillations of approx. 100 meters wave length to produce a substantial increase in temp. of the emulsion and is artificially cooled during the treatment to maintain it at a substantially const. temp. of about 38°.

Stabilizing photographic emulsions. John D. Kendall. Brit. 508,073, June 22, 1939. Photographic material comprising a light-sensitive Ag halide emulsion and a support, i. e., a glass plate, film or paper therefor, is stabilized against changes during storage by the inclusion of a small quantity of a compd. of the formula



in which R^1 is a hydrocarbon or substituted hydrocarbon radical, e. g., an alkyl, aralkyl or aryl radical, an unsatd. aliphatic radical or a hydroxyphenyl radical, R^2 is H, a hydrocarbon radical, an NH_4 radical or a metal, e. g., an alkali metal, and A and B are similar or different and represent H or hydrocarbon radicals, which may be substituted, or together represent the remainder of a homocyclic ring with either H atoms or other univalent atoms or groups attached to the C atoms. Specified compds. are 2-thio-3-phenyl-, 2-thio-3,6-dimethyl-, 2-thio-3-ethyl-6-methyl-, 2-thio-3-allyl-6-methyl-, 2-thio-3-phenyl-6-methyl-, 2-thio-3,6-dimethyl-5-ethyl-, 2-thio-3-methyl-6-phenyl-, 2-thio-3,5,6-trimethyl-, 2-thio-3-ethyl-5,6-dimethyl-, 2-thio-3-allyl-5-ethyl-6-methyl-, 2-thio-3,5-diethyl-6-methyl-, 2-thio-5-benzyl-3,6-dimethyl- and 2-thio-5-benzyl-6-methyl-3-ethyl-4-ketotetrahydropyrimidines, 2-thio-3-methyl-, 2-thio-3-ethyl-, 2-thio-3-allyl-, 2-thio-3-phenyl-, 2-thio-3-(3′-hydroxyphenyl)-, 2-thio-1-methyl- and 2-thio-1-ethyl-4-ketotetrahydroquinazolines, Et 2-thio-4-keto-3-methyltetrahydropyrimidyl-3-acetate and 2-methylthio-4-keto-3,6-dimethyldihydropyrimidine.

Photographic developer. James R. Alburger (to Radio Corp. of America). U. S. 2,181,801, Dec. 5. A developer suitable for use with sound-track film may be formed, per l. of water, from Na_2SO_3 50, hydroquinone 15, Na_2CO_3 80, KBr 9, NaOH 30 and K alum 40 g.

Photographic developers. Paul Goldacker, Georg Maiser and Ernst Schmitz-Hillebrecht (to Agfa Ansco Corp.). U. S. 2,181,941, Dec. 5. Developing agents are used with an aliphatic hydroxyalkylamine contg. in its mol. at least one alkyl chain having at least 2 hydroxyl groups combined with different C atoms, such as methylglucamine, lactamine or mannamine, which serves as an alk. agent.

Color-forming photographic developers. Edmund B. Middleton and Andrew B. Jennings (to Du Pont Film Mfg. Corp.). U. S. 2,182,815, Dec. 12. An aromatic amino photographic developing agent is used with a dicyanoacetamidobisazole such as dicyanoacetamido-1,2,4,5-*p*-*β*-benzobisthiazole or the like.

Prismatic screen for additive photography. Gabriel G. Moreno (to C. M. C. Corp.). U. S. 2,182,993, Dec. 12. A method of producing a prismatic screen adapted for use in additive photography comprises: making a photographic record of an object composed of actinic and nonactinic parallel lines, the actinic lines having a width more than equal to but not materially exceeding twice the width of the nonactinic lines, developing the photographic record to form a graded image of all actinic lines, harden-

ing the gelatin of the photographic record and bleaching the record to remove the images and assocd. gelatin to form a prismatic relief consisting of a plurality of parallel spaced flat faces sepd. by V-shaped depressions having flat oppositely inclined opposing faces, the resulting screen being capable of transmitting more than 75% of light supplied thereto.

Tank and associated apparatus for liquid treatments of films. Albert W. Tondreau (to Warner Bros. Pictures, Inc.). U. S. 2,182,886, Dec. 12. Various structural and operative details for treating motion picture films after exposure. 2

Photographic film. Martin Marasco (to Du Pont Film Mfg. Corp.). U. S. 2,182,814, Dec. 12. A light-sensitive layer is joined to a support by means of an adhesive layer of a polymeric, amino-H-contg. substance such as piperidylmethylzein which is sol. in aq. HOAc of concns. of 2-5% but insol. in water and in 5% aq. NH_3 soln. This layer permits stripping after previous desired treatment. 3

[illegible] for printing. Max Herbst and Walter [illegible]ger (to Agfa Ansco Corp.). U. S. 2,181,485, Nov. 28. A process of producing a gelatin relief for printing comprises incorporating in a Ag halide gelatin emulsion a solid substance of which the main part has a particle diam. not exceeding 1 μ which substance does not affect the Ag halide and is insol. in the photographic treating baths, sensitizing the Ag halide emulsion for a spectral region different from its initial sensitivity, dyeing the Ag halide emulsion in a color complementary only to a part of the spectral region, casting the emulsion on a support to form a layer, producing a latent image in the layer, developing the image to a Ag picture, and etching the layer to form a relief.

Apparatus for making photographic prints. Kalle & Co. A.-G. Brit. 508,259, June 28, 1939.

Black and white photographic pictures. Johannes Kleine and Gustav Wilmanns (to Agfa Ansco Corp.). U. S. 2,181,944, Dec. 5. See Can. 382,711 (*C. A.* **34**, 8518[2]).

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

The reduction of columbium pentoxide with hydrogen. Preliminary communication. G. Grube, O. Kubaschewski and K. Zwiauer. *Z. Elektrochem.* **45**, 885-8(1939).—On heating in argon, Cb_2O_5 is quant. changed to CbO_2, slowly at 1150° and much more rapidly at 1300°. Cb_2O_5 is reduced to CbO_2 by moist H_2; reduction of the dioxide to lower oxides is much more difficult. Reduction with dry H_2 gives the same product as with moist H_2 (p_{H_2O} = 1.44 mm. Hg), but is much more rapid. By varying working conditions the reduction products CbO_2, Cb_2O_3, CbO and Cb_2O can be obtained. The oxides are dark-gray to deep black; Cb_2O is gray with a slight metallic luster. Debye pictures show no elementary Cb in the four oxides. CbO_2, CbO and Cb_2O have independent lattices. Cb_2O_3 is a stoichiometric mixt. of CbO and CbO_2. M. McMahon 4

The lower oxidation steps of ruthenium in hydrochloric acid solution. G. Grube and H. Nann. *Z. Elektrochem.* **45**, 874-80(1939).—In the electrolytic reduction of $RuCl_3$ in coned. HCl solns. the bivalent stage occurs near the metal sepn., while in dil. HCl soln., the univalent stage occurs. These lower oxidation steps were identified and detd. by potentiometric titration with H_2O_2. In 2 *N* HCl soln. the bivalent Ru appears to be relatively stable, while the univalent Ru is rapidly changed according to $2Ru^+ \rightarrow Ru + Ru^{++}$. This change also occurs so rapidly in 0.1 *N* HCl soln. that a 0.01 *M* soln. was decomposed at room temp. in 24 hrs. In HCl solns. weaker than 2 *N*, bivalent Ru is not stable: $3Ru^{++} \rightarrow Ru + 2Ru^{+++}$. The potential of the reaction $Ru^+ - e^- \rightleftarrows Ru^{++}$ in 0.1 *N* HCl lies in the region E_H = +0.03 to 0.05 v. Accordingly, in HCl soln. univalent Ru is by no means a strong enough reducing agent to decompose H_2O, as was assumed by Manchot (*C. A.* **26**, 1534; **27**, 4493). In the HCl soln. it changes to the bivalent stage not by decompn. of H_2O, but with the sepn. of metallic Ru. M. McMahon 5 6

Combination of zinc nitrate with alkali metal nitrates. Robert Chauvenet. *Compt. rend.* **210**, 50-2(1940); cf. *C. A.* **33**, 1619[4].—Similar detns. of the surface tension of solns. (2*N* except $CsNO_3$, which was 0.607 *N*) of varying compn. indicate max. or min. deviations from the tension calcd. by the additivity law for solns. contg. the mixed salts as represented by the following formulas: ($Zn(NO_3)_2$ = I) 9I.7LiNO$_3$, I.LiNO$_3$, and 3I.5LiNO$_3$; 5I.3CsNO$_3$, I.CsNO$_3$, and 7I.9CsNO$_3$; 2I.NaNO$_3$, I.NaNO$_3$, I.2NaNO$_3$, and I.3NaNO$_3$. The only double salt indicated by this method or those previously described that has been obtained in the solid state is I.NaNO$_3$.5.5H$_2$O. C. A. S. 7

Constitution of thiocyanic acid. Fernand Gallais and Daniel Voigt. *Compt. rend.* **210**, 104-6(1940).—In aq. solns. contg. 59-193 g./l. of the acid, prepd. either by the method of Gluud, *et al.* (*C. A.* **20**, 2983), or by acting with H_2SO_4 on $Ba(NCS)_2$, the mol. magnetic rotations ($\times 10^3$) were detd. for $\lambda\lambda$ 5780, 5460 and 4360 as 177, 204 and 343, resp. This agrees with the values deduced from Gabiano's value for Et isothiocyanate (cf. *C. A.* **27**, 4972), and indicates that the acid is isothiocyanic. C. A. Silberrad 8

Quadrivalent molybdenum. III. Oxychloromolybdous acid. Stability of acid solutions of quadrivalent molybdenum. W. F. Jakób and L. Cyrus-Sobolewski. *Roczniki Chem.* **19**, 146-50(1939); cf. *C. A.* **27**, 5668.—$K_4[Mo(CN)_4(OH)_4]$ heated with dil. HCl yields $Mo(CN)_2(OH)_2$, which is boiled under reflux (3 hrs.) with coned. HCl. The soln. is coned. *in vacuo* to a sirup, which is extd. with Et_2O. This dissolves $H_2Mo^{V}OCl_5$, leaving H_2MoCl_5 in the aq. layer, from which a violet oil seps., yielding solid $MoCl_3(OH).3H_2O$ (I) when dried. Solns. of I are violet, yield a brown ppt. with aq. NH_3, and do not change color with CNS^- or MoO_4^{--}. **IV. Decomposition of octacyanomolybdous acid. Dicyanic acids.** *Ibid.* 151-5.—$K_4Mo(CN)_8$ boiled with 3% H_2SO_4 yields HCN and $Mo(CN)_2(OH)_2.xH_2O$, oxidized by H_2O_2 to $H_4Mo(CN)_8.3MoO_2.xH_2O$. B. C. P. A. 9

Complex chlorides of quadrivalent rhenium. B. Jeżowska-Trzebiatowska and Cz. Jodko. *Roczniki Chem.* **19**, 187-98(1939).—$HReO_4$ in 30% HCl and MI (24 hrs. at 20° in a CO_2 atm.) yield $M_4[Re_2OCl_{10}]$ (M = K, NH_4, quinoline), together with $M_2[ReCl_5OH]$ (M = K, NH_4, Rb, quinoline) and M_2ReCl_6. B. C. P. A. 10

Hydrate isomerism and hydrolysis of ruthenium trichloride. G. Grube and H. Nann. *Z. Elektrochem.* **45**, 871-4(1939).—On dissolving the salt $RuCl_3.H_2O$, obtained by concn. of a $RuCl_3$ soln. in a vacuum desiccator over coned. H_2SO_4, in ice-H_2O, the freshly prepd. brown to greenish brown soln. contains no ionized Cl. After a short time the color of the soln. changes to green. In the absolutely green soln. there is one ionized Cl for each Ru. Previously only the first two steps of the hydrate isomerism in Ru could be detected:

$$\left[\begin{matrix}Cl_3\\Ru\\H_2O\end{matrix}\right] + H_2O \rightarrow \left[\begin{matrix}Cl_2\\Ru\\(H_2O)_2\end{matrix}\right]Cl + H_2O \rightarrow$$

$$\left[\begin{matrix}Cl\\Ru\\(H_2O)_3\end{matrix}\right]Cl_2 + H_2O \rightarrow [Ru(H_2O)_4]Cl_3$$

If the green soln. of the salt $\left[\begin{matrix}Cl_2\\Ru\\(H_2O)_2\end{matrix}\right]Cl$ is heated, the color changes to brown and sol. hydrolysis products are formed, with sepn. of free HCl. M. McMahon

Nitrosyl compounds of platinum. A. D. Hel'man and

Z. P. Maksimova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 748–51(1939)(in English).—On allowing a satd. soln. of K or NH_4 chloroplatinite to stand 3–4 days in a NO atm., a green soln. (I) formed, apparently contg. the ion $PtNOCl_5^-$. Addn. of $[Pt.4NH_3]Cl_2$ soln. to I gave a reddish gray ppt. of $[Pt.4NH_3][PtNOCl_5]_2$. Adding pyridine to I gave an immediate ppt. of $PtNOpyCl_2$ (II) (green). Dissolved in pyridine, II gave a yellow ppt. of $Ptpy_2Cl_2$ which reacted with thiourea to give *trans*-$Ptpy_2th_2$. Hence II has a trans configuration. N_2O does not react with chloroplatinite. A. O. Allen

Studies on the catalytic oxido-reduction by some metallic complex salts. XIV. Catalytic reduction by rhodium complex salts. Masaakira Iguti. *J. Chem. Soc. Japan* **60**, 1787–92(1939); cf. *C. A.* **34**, 1582[3].—Unstable rhodium complex salts such as $[Rh(NH_3)_5H_2O]Cl_3$ and $[Rh(NH_3)_4Cl_2]Cl$ accelerate the reduction of quinone by H_2, but stable complex salts such as $[Rh(NH_3)_6]Cl_3$, $[Rh(en)_3]Cl_3$ have no catalytic action. Rhodium chloride acts as a strong catalyst in the reduction of quinone, fumaric acid, methylene blue, sodium nitrite and hydroxylamine. T. Katsurai

Contribution to the constitution of heteropolyacids. II. A new class of ammines. The phosphododecatungstate complexes. G. Spacu and V. Nicolaescu. *Bull. sect. sci. acad. roumaine* **22**, 130–41(1939).—Detailed description of method of prepn. and analysis of $[Co\ en_2(NO_2)_2]_3H_4[P(W_2O_7)_6].8H_2O$, $[Co(NH_3)_4(NO_2)_2]_3H_4[P(W_2O_7)_6].7H_2O$, $[Cr(NH_3)_5Cl]_2H_3[P(W_2O_7)_6].17H_2O$, $[Co(NH_3)_5NO_2]_2H_3[P(W_2O_7)_6].11H_2O$, $[Coen_2Cl_2]_6H[P(W_2O_7)_6].15H_2O$ (*trans*), $[Cr(NH_3)_5SCN]_3H[P(W_2O_7)_6].14H_2O$, $[Coen_3]_2H[P(W_2O_7)_6].16H_2O$, $[Cren_3]_2H[P(W_2O_7)_6].19H_2O$, $[Cren_3]_2HN:C(NH_2)_2.H[P(W_2O_7)_6].19H_2O$. A. A. Vernon

7—ANALYTICAL CHEMISTRY

W. T. HALL

The fundamental reactions in analytical chemistry. V. Reactions of sodium vanadate with metallic ions. Yosinaga Oka. *J. Chem. Soc. Japan* **60**, 1279–86(1939); cf. *C. A.* **33**, 3286[9]. T. Katsurai

New reactions in qualitative analysis. Einar Jensen. *Tids. Kjemi Bergvesen* **19**, 57–60, 75–7(1939).—A review. H. Kringstad

Application of spectral analysis in mineralogy, geochemistry and metallurgy. V. M. Goldschmidt. *Tids. Kjemi Bergvesen* **19**, 82–6(1939).—A review on the quant. spectrographic methods and of the work carried out by G. H. Kringstad

The origin of iodometry. Anon. *Ann. chim. anal. chim. appl.* **22**, 203(1940). Alphonse Dupasquier (*Ann. chim. phys.* (2), **73**, 310(1840)) in recommending the detn. of the H_2S content of mineral waters by titrating with I_2 soln. to a starch end point appears to be the originator of iodometric methods. Fordos (*Compt. rend.* **16**, 1065 (1843)) discovered $Na_2S_4O_6$ and showed that it was formed by the action of $Na_2S_2O_3$ and I_2. This is the basic reaction of iodometry. Bunsen (*Annalen* **86**, 129(1853)) pointed out the general applicability of iodometry and the same year Schwartz, a German pupil of Pelouze, proposed the substitution of H_2SO_3 for $Na_2S_2O_3$. W. T. H.

Use of the limit of perceptibility in a qualitative test for determining the approximate quantity of some constituent. G. Gutzeit. *Helv. Chim. Acta* **23**, 17–24(1940). The sensitivity of a chem. test can be used to advantage in detg. the approx. quantity of a constituent. Two interesting examples of this are described. In one case, certain samples of solder proved unsatisfactory as a result of the presence of about 0.2% S. It was easy to det. whether enough S was present to do harm by making a S-print with sensitized paper impregnated with a soln. of $SbCl_3$ and just enough HCl to prevent hydrolysis. From a polished section pressed against the paper, a red spot of Sb_2S_3 developed when too much S was present. Of various reagents that react with solns. contg. Au, the sensitivity increases in the following order: $(NH_4)_2S$, H_3PO_2, H_2S, HCO_2H, $HgNO_3$, $FeSO_4$, H_2O_2 + KOH, *p*-dimethylaminobenzylidinerhodamine. Au can be detd. quickly in a mineral by dilg. the sample until the test with the last-named reagent is barely perceptible. It will detect as little as 0.02 γ of Au. W. T. H.

Possible source of error in gravimetric determinations involving the use of hydrogen peroxide followed by nitron. Ralph C. Young and Peter M. Bernays. *Ind. Eng. Chem., Anal. Ed.* **12**, 90(1940).—In the standard method for detg. Re the sulfide is oxidized with 30% H_2O_2 to perrhenic acid which is later pptd. with nitron. Trouble was encountered caused by the presence of a little nitrate in the concd. H_2O_2 from 3 well-known firms. W. T. H.

Analysis in gammas. M. Zürcher. *Mitt. Lebensm. Hyg.* **30**, 190–200(1939).—A review of the development of microanalytical techniques illustrating the practicability of various types of analysis with an accuracy of 1 γ. W. J. Peterson

Use of organic reagents in the scheme of general [qualitative] analysis. Elio A. Moreira. *Rev. brasil. chim.* (São Paulo) **8**, 251–5(1939).—Known methods are discussed. L. E. Gilson

The availability of some oxine derivatives in analytical chemistry. Jacob Molland. *Tids. Kjemi Bergvesen* **19**, 119–22(1939).—8-Hydroxyquinoline-5-sulfonic acid and halogen derivs. of this acid (in the 7-position) have proved to be valuable in colorimetric detn. of Fe and metavanadates. 7-Nitrous-8-hydroxyquinoline-5-sulfonic acid is a suitable pptg. agent for Pb and can also be used for some alkaloids. H. Kringstad

Indicators. G. Schwarzenbach. *Mitt. Lebensm. Hyg* **30**, 148–64(1939).—Application of the Brönsted acid base concept in analytical problems has presented many new possibilities in the study of indicators. For example, the orthodox pH range from 0 to +14 may now be changed conveniently to include the range from −10 to +16. Anilinesulfonephthalein dyes are discussed in these terms. W. J. Peterson

Adsorption by ionic precipitates and adsorption indicators. James J. Lingane. *Pacific Chem. Met. Inds.* **4**, No. 1, 17–20(1940).—A review with 17 references. W. T. H.

Bromocresol green-methyl orange as alkalinity indicator. F. M. Hull. *Public Works* **70**, No. 4, 34(1939).—The combination of bromocresol green and methyl orange for routine detn. of total alky. is much better than methyl orange alone. The alk. soln. is blue and the acid, yellow. The prepn. of the indicator is given. George Papps

Estimation of small amounts of arsenic in copper. Bartholow Park. *Ind. Eng. Chem., Anal. Ed.* **12**, 97–8 (1940).—Dissolve 10 g. of metal in a mixt. of 20 ml. concd. H_2SO_4, 20 ml. concd. HNO_3 and water to make 100 ml. Boil off brown fumes, add 10 g. of tartaric acid which has been dissolved in a little water, dil. to 350 ml. and electrolyze until practically all Cu is deposited. Remove and wash the electrodes. Neutralize the electrolyte with NH_4OH and add 3.4 ml. of 6 *N* HCl for each 100 ml. of soln. Sat. with H_2S to ppt. the As. Dissolve the sulfide ppt. in boiling hot HNO_3 and det. the As spectrographically or by any other desired method. The results were checked by adding 0.25 mg. of As to 50 g. of Cu which was free from As. 17 references. W. T. H.

Colorimetric determination of arsenic in ferrous and nonferrous alloys. Clement J. Rodden. *J. Research Natl. Bur. Standards* **24**, 7–11(1940)(Research Paper No. 1267).—Dissolve 0.1-g. sample in 7.5 ml. of 7.5 *N* HNO_3, evap. to dryness, cool, add 5 ml. of concd. HCl and transfer to a distg. flask with 10.0 ml. more of this acid. Add 2 ml. of HBr and 0.3 g. of hydrazine sulfate dissolved in 10 ml. of concd. HCl. Distil in a stream of CO_2 and

catch the distillate contg. $AsCl_3$ in a little water. To the distillate add 10 ml. of concd. HNO_3 and evap. to dryness to oxidize the As to H_3AsO_4. Heat the residue at 130° for an hr. Take 10 ml. of soln. prepd. from 1 g. NH_4 molybdate, 100 ml. 5 *N* H_2SO_4, mix with 1 ml. of 0.15% hydrazine sulfate soln. and add the mixt. to the H_3AsO_4 soln. Use 10 ml. of the reagent for each 30 mg. of As. Cool and to the cold soln. add more molybdate soln. to make the concn. not over 3 γ per ml. Measure the light transmission of the blue soln. in a photoelec. colorimeter with the reagent in the comparison cell. W. T. H.

Determination of small quantities of beryllium in magnesium alloys by a spectrographic method. A. Beerwald. *Z. Elektrochem.* **45**, 833–5(1940).—The method chosen is based on the work of Scheibe and Rivas (*C. A.* **30**, 6302[7]). Solns. to be analyzed are evapd. upon spectrally pure carbon and made to cause light emission by means of elec. sparks. Very good results were obtained by comparison of the Be doublet at 3131.06 A. and 3130.42 A. The former is the stronger line and can be compared with the Al line at 3050.07 A. W. T. H.

Microchemical determination of cadmium with anthranilic acid. P. Wenger and E. Masset. *Helv. Chim. Acta* **23**, 34–8(1940).—To a soln. contg. 1–3 mg. of Cd at pH 6, and contg. no HCl or AcOH add, at the b. p., 0.55 ml. of a freshly prepd. 2% soln. of Na anthranilate. Stir, allow to cool completely, filter, wash twice with 1 cc. of 96% EtOH, dry at 135–140° and weigh. Good results were obtained with 3 types of microchem. filters. Cf. *C. A.* **29**, 6169[2]. W. T. H.

Volumetric determination of bismuth and of the acidity of solutions of bismuth salts. L. Malaprade. *Ann. chim. anal. chim. appl.* **22**, 5–8(1940).—It is difficult to neutralize free acid in a soln. of Bi^{+++} salt because during the neutralization fresh H^+ is formed by hydrolysis. If, however, a $Bi(NO_3)_3$ soln. contg. only a little excess HNO_3 is treated with excess $Na_2S_2O_3$, the Bi^{+++} ions are converted into $Bi(S_2O_3)_3^{---}$ anions which are not hydrolyzable. Free HNO_3 can then be neutralized by titrating with KOH to a methyl red end point. Too much HNO_3 should not be present at the start or there is likely to be decompn. of the thiosulfate and pptn. of some Bi_2S_3. If now the neutralized soln. contg. KNO_3 is titrated with KOH to a phenolphthalein end point, the following reaction takes place; $2Bi(S_2O_3)_3^{---} + 5OH^- + NO_3^- \rightarrow BiO.NO_3BiO_2H + 6S_2O_3^{--} + 2H_2O$ and this titration will serve for the detn. of the Bi. To apply this method of analysis to a solid subnitrate, oxide or sulfide, dissolve the sample in as little HNO_3 as possible, add a few drops of methyl red indicator soln. and titrate with KOH until the indicator begins to show a yellow color. Now add about 10 g. of $Na_2S_2O_3$ crystals and add dil. HNO_3 very carefully until the ppt. of Bi salt dissolves. When the ppt. shows a very slow rate of dissolving, add a few drops of the acid at a time and wait for some time before adding fresh acid and in this way use very little excess acid after a permanent pink color of the methyl red is reached. Then titrate back carefully with KOH soln. Now add 10 drops of phenolphthalein indicator soln. and titrate slowly and carefully, particularly toward the last. The results obtained with a sample of 0.365 g. of Bi_2O_3 were within 0.5% of the truth. W. T. H.

A new method of separation and determination of gold in sea water. Masayosi Isibasi and Mutuaki Sinagawa. *J. Chem. Soc. Japan* **60**, 1265–8(1939).—The sea water is evapd. until reduced to about 6% of the original vol. Formalin is added as the reducing agent and the sea water is subjected to dialysis. Colloidal Au remains with a certain amt. of insol. salts. The Au is then collected by means of cupellation. T. Katsurai

Sources of error in the volumetric determination of iron by the Kessler-Reinhardt method. H. Blumenthal. *Wiss. Abhandl. deut. Materialprüfungsanstalt* **1939**, No. 3, 75–9.—The titration of Fe^{++} by MnO_4^- in HCl solns. gives accurate stoichiometric results when not more than 10 ml. of HCl and sufficient $MnSO_4 + H_3PO_4$ are present in a final vol. of at least 500 ml. If, however, more than 1% of Cu is present in the sample analyzed, the results will be low. The error is caused by the fact that dissolved O_2 in the presence of Cu^{++} has an oxidizing effect upon Fe^{++}. W. T. H.

Basis of the colorimetric determination of magnesium by means of "titan yellow." H. Ginsberg. *Z. Elektrochem.* **45**, 829–33(1940).—Titan yellow is the Na salt of dihydrothio-*p*-toluidinesulfonic acid. If $Mg(OH)_2$ is formed by the addn. of NaOH to a soln. contg. the dye, the surface of the ppt. in alk. soln. is colored a dark red. In the colorimetric test for Mg a state of equil. exists between the dyestuff and the so-called color lake. The value of this equil. was detd. at various concns. so that a suitable curve could be drawn for the interpretation of the results. The points on the curve do not correspond to the formation of a definite lake and the intensity of the color does not increase indefinitely but reaches a max. The lake formation, therefore, follows the simple laws of adsorption. Math. analysis shows the justification of the colorimetric comparison in the presence of both lake and dyestuff but the latter should always be present in excess. W. T. H.

Detection of mercury by formation of a ring of mercuric iodide. R. Cambar. *Bull. trav. soc. pharm. Bordeaux* **77**, 207–15(1939).—The Hg is plated on a Cu strip from which it is removed, after drying, by gentle heat in a dry tube in which a particle of I has been sublimed into a drawn-out and cooled portion of the tube. The ring of HgI_2 is formed by direct reaction in the narrow part of the tube. S. W. Goldstein

The analytical chemistry and microchemistry of thallium. Georges Denigès. *Bull. trav. soc. pharm. Bordeaux* **77**, 193–202(1939).—Properties similar to those of Pb are utilized in analyses for Tl. Det. the Tl in a sample by a colorimetric and nephelometric procedure with KI reagent. Dil. the weighed sample with 10 times its wt. of water, and filter. To an aliquot add 2 drops per cc. of sirupy gum arabic soln., and 1 drop per cc. of 10% KI soln. Compare with a control using $Tl_2(SO_4)_3$ soln. Results are best when the sample contains between 0.005 and 0.10 g. Tl per l. Microcryst. ppts. obtained with 10% HIO_3, 5% Na benzoate and picric acid (satd. soln.) are described. S. W. Goldstein

Determination of traces of metavanadates. Jacob Molland. *Compt. rend.* **210**, 144–6(1940).—A soln. of a metavanadate added to one of 8-hydroxyquinoline-5-sulfonic acid gives a permanent brown color which can be used to est. V colorimetrically with an error of 2.05% in a soln. contg. 5×10^{-5} g. mol./l. of NH_4VO_3, or 2.55 mg./l. V, and a smaller error in stronger solns. The coeff. of extinction $k = (1/e) \log_{10} (I_0/I)$ is proportional to the concn. of metavanadate if the ratio $[NH_4VO_3]/[C_9H_6N(OH)(HSO_3)]$ is less than 0.375. C. A. Silberrad

Determination of zinc as zinc mercuric thiocyanate. Imre Sarudi (nee Stetina). *Österr. Chem.-Ztg.* **42**, 297–8(1939).—To a soln. contg. about 0.1 g. Zn and 1–2 milliequiv. of HNO_3 add 40 ml. of a reagent prepd. with 27 g. $HgCl_2$ and 39 g. KCNS per l. After 30 min. filter and wash successively with water, EtOH and Et_2O and weigh. The sensitivity is increased by adding to the soln. contg. the ppt. about one-third as much 96% EtOH and by washing with 33% EtOH instead of water. W. T. H.

Chlorine. Anon. *Dept. Sci. Ind. Research* (Brit.), *Methods for the Detection of Toxic Gases in Industry, Leaflet* No. 10, 7 pp.(1939).—The test recommended consists in drawing samples of air through a bubbler contg. *o*-tolidine soln. until the depth of color produced is equal to that of a series of standards prepd. from $K_2Cr_2O_7$. W. T. H.

Rapid determination of carbon and silicon in cast iron. F. Roll. *Giesserei* **27**, 9–11(1940).—A practical method for detg. the probable Si + C content of a sample of cast Fe before the molten alloy is poured consists in examg. the fracture of a wedge-shaped piece of metal. Full details are given for prepg. the small casting and the appearance of the fracture is shown by 10 illustrations of cast Fe contg. 2.7% C and 1.17% Si to 3.46% C and 2.09% Si. This practical test has little use when the main mass of metal has already been poured from a cupola furnace. The time estd. as necessary for detg. C by burning and

measuring the vol. of CO_2 is about 9 min. and for detg. the Si about 28 min. according to current German practice. The wedge test can be finished in about 2.5 min. from the time the sample of molten metal is ladled out. W. T. H.

Arsine. Anon. *Dept. Sci. Ind. Research* (Brit.), *Methods for the Detection of Toxic gases in Industry, Leaflet* No. 9, 6 pp.(1939).—The method consists in drawing the air through paper which has been impregnated with $HgCl_2$ soln. and comparing the color of the stain, if any, with that obtained with known quantities of AsH_3. W. T. H.

Phosgene. Anon. *Dept. Sci. Ind. Research* (Brit.), *Methods for the Detection of Toxic Gases in Industry, Leaflet* No. 8, 7 pp.(1939).—The only simple method now known for detecting small quantities of $COCl_2$ in the atm. is by the use of a test paper contg. diphenylamine and *p*-dimethylaminobenzaldehyde. The yellow or orange stain will detect as little as 4 γ per l. It has been made quant. by drawing a known vol. of air with a hand pump of specified capacity through the test paper and comparing the stain with a reference color chart. W. T. H.

Precipitation of barium sulfate in the presence of ammonium chloride. J. T. McHenry, G. A. Ampt and E. Heymann. *J. Am. Chem. Soc.* **62**, 448–9(1940).—In the pptn. of $BaSO_4$ in the presence of NH_4Cl a linear relation exists between the log of the amt. sorbed and the NH_4Cl concn. $BaSO_4$ ppt. in the presence of *N* NH_4Cl contains 7 mg. of NH_3 (as $(NH_4)_2SO_4$) per 1 g. of $BaSO_4$; in the ppt. about 50% of the NH_3 is present as $(NH_4)_2SO_4$. On boiling with 0.02–0.01 *N* NaOH, NH_3 distils over very slowly, 10–15 hrs. being required to expel most of it. This can be explained on the assumption that the contaminating salt is mainly present inside of the macrocrystal. C. J. West

Analysis of mixtures containing monopotassium and monoammonium phosphates. D. I. Kuznetsov and A. A. Kozhukovskiĭ. *Compt. rend. acad. sci. U. R. S. S.* **24**, 752–4(1939)(in English).—The NH_3 is expelled by evapg. to dryness 3 times with aqua regia before pptn. of the $KClO_4$. The P_2O_5 was weighed as $MgNH_4PO_4.6H_2O$ and the results were as accurate as when converted into $Mg_2P_2O_7$. A. O. Allen

Method for the determination of carbonate in small amounts of materials. F. E. Jones. *J. Soc. Chem. Ind.* **59**, 21–3(1940).—The method is a modification of the vacuum type method which has been used since 1924 in Australia for the examn. of baking powder. Similar methods have been described by Edwards, Parkes and Nanji (*C. A.* **30**, 1875[8]) and by Cornell (*C. A.* **31**, 1644[4]). Two 4-in. test tubes are connected by means of side arms which are blown into the glass. The sample is decompd. in one of them by means of 2.5 *N* HCl which is added from a dropping funnel attached to the top of the tube. Then suction is applied to the system and the CO_2 is absorbed in a measured vol. of standard $Ba(OH)_2$ soln. The excess of the base is titrated with acid to a phenolphthalein end point. W. T. H.

Analysis of sulfite solutions containing selenium. A volumetric method. R. C. Shaver and C. R. McCrosky. *Ind. Eng. Chem., Anal. Ed.* **12**, 74–6(1940).—$KBrO_3$ will oxidize H_2SO_3 completely before it reacts with red Se in the colloidal state, provided proper conditions are maintained. To 25 ml. of soln. contg. K_2SO_3 + Se + starch soln. add all but about 1 ml. of the necessary quantity of 0.1 *N* $KBrO_3$ as detd. by a preliminary titration. Stir mechanically and add all at once 70 ml. of 6 *N* HCl. After the electron-beam sectrometer which has been set by the preliminary titration shows a closed shadow again, titrate dropwise until the sectrometer shadow remains open for at least 1 min. This titration shows the BrO_3^- required to oxidize SO_3^{--} to SO_4^{--} and the Se to H_2SeO_3. After this oxidize the H_2SeO_3 to H_2SeO_4 by the method of Norris and Fay (*Am. Chem. J.* **18**, 704(1896)). The starch is added before acidification in order to stabilize the red Se formed and serves as indicator in the final titration. W. T. H.

Stability of peroxidized titanium solutions. Gilbert H. Ayres and Edmay M. Vienneau. *Ind. Eng. Chem., Anal. Ed.* **12**, 96(1940).—The color produced by H_2O_2 in solns. contg. 4–80 mg. Ti per l. proved stable over a period of 2 yrs. The readings agreed in most cases at 15 different concns. within the limits of accuracy of the colorimeter used. W. T. H.

Differentiation of inks and their chloride and sulfate migrations. John Finn and Robert E. Cornish. *News Ed. (Am. Chem. Soc.)* **18**, 174(1940).—Some practical applications of the method of detg. the age of ink (cf. *C. A.* **32**, 7851[8]) are described. Thus in a court case it was shown that the entries on a physician's record could not possibly have been made at one time. W. T. H.

Pharmaceutical part in passive defense. Chemical detection. Louis Maricq. *J. pharm. Belg.* **21**, 749–55(1939).—A discussion of the procedures and app. required for detection and identification of toxic gases. S. W. Goldstein

Extraction of strychnine in toxicology. E. Kergonou. *Bull. trav. soc. pharm. Bordeaux* **77**, 203–6(1939).—Results obtained by electrodialysis and extn. by the Stass-Otto method are compared. The former recovers a greater part of the alkaloid (94–100%), but the following modification of the S.-O. procedure gives yields of 37–55% and will detect about 2 mg. per kg. Dissolve the residue obtained by the S.-O. method in a little distd. water acidified with HCl, ppt. the strychnine with Mayer's reagent satd. with HgI_2, recover the ppt. by centrifuging, suspend it in distd. water and remove the Hg with H_2S. Evap. the soln. on a water bath, alkalinize and ext. the strychnine with $CHCl_3$. S. W. Goldstein

Determination of small amounts of copper and manganese in dyes and other organic materials. G. F. Palfrey, R. H. Hobert, A. F. Benning and I. W. Dobratz. *Ind. Eng. Chem., Anal. Ed.* **12**, 94–6(1940).—Methods for detg. small quantities of Cu and Mn in *dyes, intermediates, rubber chemicals* and *rubber* which may contain Fe, Pb, Zn, Ba, Al and small quantities of Cd are described. The methods give results which are accurate to within 5% of the small quantity of Cu or Mn which is actually present. The org. matter is destroyed by suitable treatment with H_2SO_4, HNO_3 and H_2O_2. The Cu is detd. colorimetrically by means of diethyldithiocarbamate with suitable modifications when Pb or Zn is present. The Mn is detd. colorimetrically after oxidation to MnO_4^{II} by KIO_4. W. T. H.

Analysis of the products of the sulfonation of fatty alcohols. E. Schmidt. *Teintex* **4**, 650–3(1939).—Hydrolysis of a H_2SO_4 ester of a satd. fatty alc. regenerates the pure alc. Hydrolysis of any unsatd. fatty alcs. that have been treated with H_2SO_4 will yield a mixt. of pure alc. and glycol because of addn. to the double bond. On these reactions is based a means of analyzing sulfonated products. The sample is boiled with an acid and the mixt. extd. with ether or ligroin. The ext. is filtered and evapd. to const. wt. Instead of the —C.OSO$_3$H group, some com. products contain the —C.SO$_3$H group which is not split with dil. HCl. Its products dissolve in the acid or form an intermediate layer between the ether and the acid, resulting in a yellow coloration of the acid layer. These products can easily be isolated. If a mixt. of sulfonated alcs. does not contain the —C.SO$_3$H group the following procedure is used: To 25 cc. of warm distd. H_2O add 5–7 g. of the sample. After adding 50 cc. of 6 *N* HCl, reflux the mixt. for 1 hr. and then ext. with 2 portions of ligroin to dissolve the alcs. Wash the ext. with H_2O and filter over anhyd. Na_2SO_4. If the —C.SO$_3$H group is present in the original sample, it is necessary to modify the procedure, as it is sol. in the ether ext. In this case wash the ether ext. with 70 vols. of warm EtOH contg. some NaOH, and reflux 30 min. on a water bath. This step removes any substances contg. the —C.SO$_3$H group from the ligroin ext. or the ether ext. Saverio Zuffanti

Determination of formaldehyde in protein solutions. (A note on a new micromethod). J. O. Alcock and J. S. Otto. *S. African J. Med. Sci.* **4**, No. 1–2, 31–5(1939).—A modification of the method of Oyama (*C. A.* **30**, 5150[2]) is described. When the ppt. formed by trypaflavine and

CH_2O is redissolved and treated with dil. HNO_2, there is formed a highly colored "nitrated" compd. suitable for colorimetric comparison with a standard. The test is remarkably sensitive and suitable for general purposes. The color is sufficiently stable and proportional to the concn. of CH_2O taken. Two graphs and 2 tables are given.
W. R. Henn

Hydroxamic acids in qualitative organic analysis. David Davidson. *J. Chem. Education* **17**, 81–4(1940).— Hydroxamic acids can be regarded as the *n*-hydroxy derivs. of the acid amides or as the oximes of the carboxylic acids. In either case, they can also be represented by amine oxide formulas. These tautomeric substances can be prepd. in so many ways and they are so easily detected that the possibility of using them in org. qual. analysis is clear. Thus an *ester* can be identified as follows: To 1 drop of the sample, add 0.5 ml. of *N* $NH_2OH.HCl$ in MeOH and 0.5 ml. of 2 *N* KOH in MeOH. KCl will ppt. from the MeOH soln. Heat to boiling, cool, make acid with 0.5 ml. of 2 *N* aq. HCl and test with a drop of 10% $FeCl_3$ aq. soln. A red color will develop. An *alc.* can be detected by taking 0.5 ml. AcCl and an equal vol. of dimethylaniline and then 0.5 ml. or 0.5 g. of the sample. The mixt. will sep. into 2 layers. Add ice to decompose excess AcCl and treat 1 drop of the oily ester layer with hydroxylamine, etc., as in the case of esters. *Ethers* give neg. tests by the above procedures but they can be converted into esters by heating with org. acids in the presence of a little concd. H_2SO_4. The ester formed can be detected as above. *Carboxylic acids* can be treated with $SOCl_2$ and when the excess has been removed by evapn. the resulting acyl chloride can be tested as in the case of esters. *Phenols* can be changed to esters by treatment with AcCl. *Nitro compds.* can be reduced to an alkylhydroxylamine which gives BzCl a *n*-alkylhydroxamic acid and this yields a colored complex with $FeCl_3$. *Aliphatic amides* are converted rapidly to hydroxamic acids by boiling with $NH_2OH.HCl$ soln. *Cyanates* by treatment with $NH_2OH.HCl$ can be converted to hydroxamic acids which give a purplish blue complex with $FeCl_3$. 36 references
W. T. H.

Preparation of semicarbazones by functional exchange. Bernard Angla. *Ann. chim. anal. chim. appl.* **22**, 10–15 (1940).—In org. analysis the carbonyl group is often characterized by the formation of a carbazone. The usual method consists in treating with semicarbazide-HCl in the presence of alkali acetate. Sometimes pyridine is used instead of alkali acetate and in other cases the free semicarbazide is employed. It has been found that the semicarbazone can also be formed by the action of semicarbazide-HCl upon the bisulfite compds. of aldehydes or ketones or even upon oximes. The method consists in causing the carbonyl compd. to react with the semicarbazone of a volatile aldehyde or ketone. The semicarbazone of acetone appears to be most suitable; it is easily prepd. pure and there is less danger of side reaction taking place than when a substance like the semicarbazone of HCHO is used. In most cases the formation of the new semicarbazone takes place in the presence of AcOH and it is necessary to make sure that all the acetone formed is eliminated. In some cases it is better to work in a neutral soln. CO_2 gas is often effective in removing acetone and in providing the necessary acidty. W. T. H.

Aniline vapor. Anon. *Dept. Sci. Ind. Research* (Brit.), *Methods for the Detection of Toxic Gases in Industry, Leaflet* No. **11**, 9 pp.(1939).—To detect aniline vapor in the atm. a sample of air is passed through a small bubbler contg. dil. HCl. This yields a soln. of aniline chloride which, if the concn. of aniline is considerable, gives with bleaching powder a purple coloration, rapidly changing to a dirty red. The concns. of aniline in air likely to be encountered give only a trace of color. The test can be made more sensitive by making the soln. slightly ammoniacal after the bleaching powder is added and then adding a little phenol soln.; a permanent deep-blue color is produced even with 1 part of aniline in 100,000 parts of air. W. T. H.

Analysis of aniline-water solutions. John Griswold. *Ind. Eng. Chem., Anal. Ed.* **12**, 89–90(1940).—A rapid procedure for titrating aniline with 0.02 *N* Br_2 soln. or with 1.5 *N* $KBrO_3$-KBr soln. and with potentiometric detn. of the end point is described. For detg. water in aniline, the method of mixing with rapeseed oil and observing the first indication of clouding proved satisfactory. These methods are not new, but the procedure here described is rapid. W. T. H.

Analysis of naphthenic acids. J. R. M. Klotz and Edwin R. Littmann. *Ind. Eng. Chem., Anal. Ed.* **12**, 76–7(1940).—Com. naphthenic acids are complex mixts., some of which contain acids which are appreciably volatile during evapn. of petroleum ether. If the unsaponifiable matter has been removed by preliminary extn. this loss can be allowed for in the final titration. Take 2–3 g. of the naphthenic acid, dissolve in 25 ml. of EtOH and titrate with 0.5 *N* NaOH to a phenolphthalein end point. Dil. with 25 ml. of water and shake with two sep. 15-ml. portions in a separatory funnel. Return the aq. layer to the funnel, after clearing it with EtOH, add 15. ml. of 10% H_2SO_4 and again shake with 25 ml. of petroleum ether. Discard the lower aq. layer and filter the combined petroleum ether soln. through dry paper into a weighed Erlenmeyer flask. Rinse the funnel with 10 ml. of the petroleum ether. Evap. to dryness and heat 2 hrs. at 110–115°. After a const. wt. has been obtained by drying, dissolve the acids in 25 ml. of EtOH and again titrate with NaOH. W. T. H.

Determination of total creatinine, especially small quantities. Th. von Fellenberg. *Mitt. Lebensm. Hyg.* **30**, 220–39(1939).—Yeast ext. (4 g.) is brought to 100 cc. with H_2O and 5 cc. of the soln. (0.2 g. ext.) is evapd. with 10 cc. concd. HCl in a deep porcelain dish. The residue is taken up with H_2O and then poured through an 8-mm. (diam.) column contg. a layer of 3 g. of Al_2O_3. Five cc. of the clear filtrate (0.1 g. ext.) is treated with 1 drop HCl and evapd. to dryness over a water bath. The residue is treated with 1.5 cc. of 1.2% picric acid and 1 cc. of 10% NaOH. After 5 min. the soln. is dild. to 50 cc. and compared with 0.5 *N* dichromate soln. The no. of mg. of creatinine in 50 cc. of the reaction soln. = $[(h + 2.3)/h_1] \times 0.787$ where h = height in mm. of 0.5 *N* dichromate soln., h_1 = mm. of the creatinine reaction product. Accurate values of from 0.2 mg. to 1.0 mg. per 50 cc. of final soln. can be detd. W. J. Peterson

Microdetermination of homocystine in pure solution with the dropping-mercury cathode. Adolph Stern and Eliot F. Beach. *Proc. Soc. Exptl. Biol. Med.* **43**, 104–8 (1940); cf. *C. A.* **33**, 9346⁴.—Homocystine and homocysteine can be detd. polarographically after addn. of NH_4OH, NH_4Cl and $CoCl_2$. In solns. contg. 26 γ per cc. the accuracy is ±3%. The quantity of sulfhydryl in mixts. of homocystine and cystine can be detd. with the same accuracy but it is not possible to distinguish homocystine from cystine qualitatively by this method.
L. E. Gilson

Electrometric method for the determination of mercaptobenzothiazole. Petru G. Spacu. *Bull. sect. sci. acad. roumaine* **22**, 142–5(1939).—Mercaptobenzothiazole can be analyzed electrometrically by measuring the voltage of a cell composed of a AgCl electrode, 80% acetone soln. of mercaptobenzothiazole, normal calomel electrode. 0.05 *N* $AgNO_3$ is used as the titrating agent. The inflection point was at +0.197 v., and the error of analysis about −0.5%. A. A. Vernon

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Improved method for iodometric detn. of pyruvic acid (Schrader) **11B**.

Slooff, A.: Het Bepalen van Chloor, Broom en Jodium in Organische Verbindungen door Hydreering. Delft: W. D. Meinema. 71 pp.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Heat of diffusion of helium as a criterion of the utility of minerals for the determination of age by the helium method. E. K. Gerling. *Compt. rend. acad. sci. U. R. S. S.* **24**, 570–3(1939)(in German).—A value of 34,000 cal./g. atom, calcd. for the heat of diffusion of He in a 2
mineral, guarantees the complete preservation of the original quantity of He in the mineral and indicates that the mineral lattice is free from appreciable derangement. The method of calcn. of the heat of diffusion from exptl. data is described and values of the heat of diffusion of He for 5 minerals are listed. George Ayers

Hardness of gem zircon. Karl Chudoba. *Deut. Goldschmiede-Ztg.* **41**, No. 1, 10–11(1938); *Neues Jahrb. Mineral. Geol.*, Ref. I, **1938**, 427.—The hardness of zircon 3
varies with its density, zircons of d. 4.68 and 3.92 having hardnesses of 490 and 320, resp., while one of intermediate d. had H = 420. C. A. Silberrad

Crystal structure of nocerite. Antonio Scherillo. *Periodico mineral.* (Rome) **9**, 229–48(1938); *Mineralog. Abstracts* **7**, 233(1939).—The unit cell of nocerite has *a* 8.84, *c* 3.12 A., and contains 3 mols. $Ca_3Mg_3O_2F_8$, space group C_h^1 or C_{2h}^1. C. A. Silberrad

X-ray determinative tables for minerals. I. A. K. 4
Boldyrev, V. I. Mikheev, G. A. Kovalev and V. N. Dubinina. *Ann. inst. mines* (Leningrad) **11**, Pt. 2, 1–157 (1938); *Mineralog. Abstracts* **7**, 226–7(1939).—Values of *d*/*n* of lines in x-ray patterns ranging from 7.384 to 1.029 with other details are given for a large no. of minerals including many new detns. These with explanatory matter are given in English as well as in Russian. C. A. S.

Silver-bearing tetrahedrite in British Columbia. H. V. 5
Warren. *Mining Mag.* **60**, 123–5(1938); *Neues Jahrb. Mineral. Geol.*, Ref. I, **1938**, 562.—The "grey copper" of British Columbia is almost wholly tetrahedrite with a little tennantite. The chief impurities are Zn and Fe, the Zn especially is a disturbing factor in flotation processes. Ag-bearing tetrahedrite (freibergite) and Hg-bearing (schwazit with 6.6% Hg) are found. They are distinguished from ordinary tetrahedrite by a weaker luster and a red-brown streak; the Pb-bearing variety (malinowskite) is rare. Freibergite is the most important variety; 6
it is found with 5% Ag at many places in Canada, and always contains a considerable amt. of Zn, besides its chief constituents, Cu, Sb and S, and is assocd. with siderite, pyrite, arsenopyrite and sphalerite as older, and galena and Cu pyrite as younger, associates. C. A. S.

Weberite, a new mineral from Ivigtut (Greenland). Richard Bøgvad. *Medd. Grønland* **119**, No. 7, 11 pp. (1938); *Mineralog. Abstracts* **7**, 225(1939).—Weberite 7
occurs as pale-gray grains in cryolite and was first detected in the insol. residue with fluorite, topaz, quartz and mica; d. 2.96, *H* 3.5, monoclinic, n_α 1.346, n_β 1.348, n_γ 1.350, 2V 83° pos. Analysis: Al 11.65, Fe 0.37, Mg 10.43, Ca 0.08, Na 19.08, K 1.19, F 57.58, corresponding with Na_2MgAlF_7. C. A. Silberrad

The formula proposed for the mineral, vredenburgite. M. R. Anantanarayana Iyer. *Rec. Mysore Geol. Dept.* **34**, 8
75–84(1935)(Pub., 1936).—Partial analyses of 3 samples of vredenburgite and of the portions sol. and insol. in Na oxalate and H_2SO_4 are given and the formula, $a(Fe_2O_3.Mn_3O_3).b(Mn_3O_4.Fe_3O_4)$, is suggested. **A graphical representation of the composition of some manganese minerals including a discussion of the nature of the mineral vredenburgite.** *Ibid.* **35**, 73–85(1936)(Pub., 1937).—Minerals contg. Fe and Mn, and belonging to 3 classes represented 9
by bixbyite, jacobsite and vredenburgite, are plotted. Through *Mineralog. Abstracts* **7**, 208(1938). C. A. S.

Crystallization of merwinite in one Ural slag from a Martin furnace. D. S. Belyankin and L. I. Korchemkin. *Trav. inst. pétrog. acad. sci. U. R. S. S.*, No. **12**, 203–12 (1938); *Mineralog. Abstracts* **7**, 286(1939).—Tabular crystals of merwinite were found lining a cavity in a Martin furnace slag composed of monticellite, gehlenite and spinel. The merwinite, which contained about 15% of spinel, gave on analysis SiO_2 31.33, TiO_2 0.86, Al_2O_3 5.94, Fe_2O_3 7.28, MnO 5.66, MgO 11.20, CaO 36.25, Na_2O 1.48, K_2O 0.18; n_α 1.705, n_β 1.711, n_γ 1.724. C. A. S.

Petrography of slags rich in manganese. V. V. Lapin. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. **13**, 225–39(1938); *Mineralog. Abstracts* **7**, 285(1939).—Tephroite, γ- and β-2CaO.SiO_2, melilite, manganosite (n = 2.23), Mn-spinel and glass were detd. in a Mn-rich slag. Cf. Moskvin, *C. A.* **29**, 5779⁶. C. A. Silberrad

Mineralogical composition of a manganese-rich slag. D. S. Belyankin and I. M. Shumilo. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. **13**, 241–6(1938); *Mineralog. Abstracts* **7**, 286–7(1939).—There were sepd. from a Mn-rich slag: Mn-spinel, Al_2O_3 61.41, FeO 0.28, MnO 32.28, MgO 4.10, CaO 1.92; d. 3.98, n 1.79; Ca aluminate with Al_2O_3 75.0, CaO 20.20% monoclinic; and Mn aluminate with Al_2O_3 74.70, MnO 14.22, MgO 3.08 and BaO 4.52, d. 3.68, *a* 5, *c* 32 A. C. A. Silberrad

Nemalite from Lojane (Serbia). Miroslav Tajder. *Vesnik Geol. Inst. Jugoslavije* **6**, 239–40(1938)(in Croatian with German summary); W. F. de Jong. *Ibid.* 241–2; *Mineralog. Abstracts* **7**, 360(1939).—Nemalite occurs as fibrous aggregates in the Lojane chromite mine: analysis shows it to be $Mg(OH)_2$, n_α 1.5668, n_β 1.5690, n_γ 1.5890. X-rays show *a* 3.12, *c* 4.72 A., and that it is identical with brucite. C. A. Silberrad

Detrital diaspore in South Wales. J. C. Griffiths and Alan Stuart. *Geol. Mag.* **77**, 74–6(1940).—In a sandy boulder-clay at Ludchurch, Pembrokeshire, numerous grains of a platy colorless mineral detd. as disapore occur. It has d. more than 2.9, n_α 1.702, n_β 1.722, n_γ 1.748, and is assocd. with pyroxene, amphibole, staurolite, kyanite, brookite, anatase, topaz, garnet, apatite, muscovite and andalusite. Several of the grains are figured, and crystallographic details given. C. A. Silberrad

Leucite. E. Onorato. *Periodico mineral.* (Rome) 9, 85–97(1938); *Mineralog. Abstracts* **7**, 237–8(1939).—Leucite is monoclinic, with a unit cell, *a* 13.00, *b* 12.95, *c* 13.70, β 90°, contg. 16 mols. $KAl(SiO_3)_2$. The pseudocubic crystals are composed of twinned lamellae; it is optically orthorhombic. C. A. Silberrad

Cuprorivaite, a new mineral. Carlo Minguzzi. *Periodico mineral.* (Rome) **9**, 333–45(1938); *Mineralog. Abstracts* **7**, 225–6(1939); cf. *C. A.* **33**, 8145⁷.—The mineral occurs as blue grains in material from Vesuvius together with colorless quartz and green grains in white powdery calcite. Analysis of the blue grains (d. 2.866) gives SiO_2 62.51, Al_2O_3 2.95, Fe_2O_3 0.34, CuO 16.23, CaO 11.98, Na_2O 2.55, K_2O 1.00 and H_2O 2.43%. The green grains seem to be an alteration product of the blue. C. A. Silberrad

Tirodite. J. A. Dunn and P. C. Roy. *Records Geol. Survey India* **73**, 295–8(1938); *Mineralog. Abstracts* 7, 317(1939).—Tirodite, a new variety of amphibole, occurs at Tirodi (Central Provinces) as honey-yellow prisms in metamorphosed Mn ore intruded by granite, d. 3.312, H 6.5, n_α 1.629, n_β 1.639, n_γ 1.650. Analysis: SiO_2 53.26, Al_2O_3 1.25, Fe_2O_3 2.63, FeO 1.06, MnO 8.25, MgO 31.26, CaO 1.11, Na_2O 1.56, K_2O 0.07, H_2O 0.05. It differs from dannemorite and richterite by contg. more Mg. C. A. Silberrad

Emerald deposits of Sverdlovsk mining district (Urals). N. M. Uspenskiĭ. *Ann. inst. mines* (Leningrad) 11, 161–97(in English, 197–205)(1938); *Mineralog. Abstracts* **7**, 332–3(1939).—The emerald mines are in the Monetnaya range some 70 miles N. N. E. of Sverdlovsk (Ekaterinburg). They are in a complex of metamorphic rocks amphibolites, etc., with large lenses of talcose rocks contg. relics of serpentine and peridotite. These are surrounded by intrusions of granite and gabbro-diorite whence various pegmatitic veins penetrate the metamorphic rocks. The fluorite-beryl veins are of late formation at temp. of probably 200–500°. The rocks with 42 minerals occurring therein are described. C. A. S.

Phillipsite from basalts of N. E. Bohemia. Karel

Tuček. *Sborník Národního Musea v Praze (Acta Musei Natl. Pragae)* **1B**, 85–90(1938)(in English with Czech summary); *Mineralog. Abstracts* **7**, 347(1939).—Two interesting occurrences of phillipsite are described near Nová Paka; one at Kumburk Hill, externally transparent, internally opaque crystals 3–4 mm. across; the other at Stupná, small crystals n 1.49, d. 2.28. C. A. Silberrad

Aegirite-augite in natrolite veins in the dolerite from Nemuro (Hokkaido). J. Suzuki. *J. Faculty Sci., Hokkaido Imp. Univ.*, Ser. IV, No. 2(1938); *Neues Jahrb. Mineral., Geol.* Ref. II, 1938, 863.—An example of metasomatic transformation of ordinary augite in aegirite-augite by the action of soda-rich residual solns. into a dolerītic rock is described. It is schematically represented by: 4 mol. ordinary augite + 2 mol. labradorite-bytownite + 3NaOH + $8SiO_2$ + CO_2 + O → 1 mol. aegirite-augite + $4CaCO_3$ + 3 mol. albite, and 1 mol. albite + $2H_2O$ → 1 mol. natrolite + $3SiO_2$. C. A. Silberrad

Clinochlore from Dobro Polje. Miroslav Tajder. *Vesnik Geol. Inst. Jugoslavije* **6**, 235–8(1938)(in Croatian with German summary); *Mineralog. Abstracts* **7**, 359–60(1939).—Green scales of clinochlore form veins in serpentine; analysis: SiO_2 30.62, Al_2O_3 17.51, Fe_2O_3 1.60, FeO 3.62, MnO 0.35, MgO 32.35, H_2O + 12.62, H_2O − 1.54; n (mean of α and β) 1.583, $\gamma - \alpha$ 0.0088. C. A. Silberrad

Nontronite from weathered crust on slopes of Northwestern Altai. G. D. Afanas'ev. *Trav. inst. pétrog. acad. sci., U. R. S. S.* No. 7–8, 135–53(1936); *Mineralog. Abstracts* **7**, 104(1938).—A green clay from the weathered zone consists of chromo-ferric beidellite. The av. of 2 analyses gives SiO_2 41.75, TiO_2 0.58, Al_2O_3 17.30, Cr_2O_3 0.60, Fe_2O_3 15.45, FeO 0.45, MgO 0.63, BaO 0.04, CaO 7.52, Na_2O 0.10, K_2O 0.48, H_2O + 5.81, H_2O − 8.67; n_α = 1.559, n_β = n_γ = 1.587; pleochroism marked. The heating curve shows arrests between 92° and 120°, between 463° and 553° and at 911°. The relation to kaolinite is discussed. C. A. Silberrad

The petrography of some English fuller's earths and the rocks associated with them. E. F. Newton. *Proc. Geol. Assoc. London* **48**, 175–97(1937); *Mineralog. Abstracts* **7**, 98–9(1938).—Several English occurrences of fuller's earth are described with complete analyses of colorless cleavage flakes sepd. from 2 of them, the compns. of which are $Or_6Ab_9An_2$ and $Or_7Ab_{10}An_2$. Sphene, zircon, apatite and zinc blende occur in the earths in practically unworn condition. The earths were probably deposited through chem. action in shallow water, free from normal sedimentation. C. A. Silberrad

Thulite from Myôzinzima, Sisakazima Islands, Japan. Toyohumi Yosimura. *J. Faculty Sci. Hokkaido Imp. Univ.*, Ser. 4, **4**, 17–22(1938); *Mineralog. Abstracts* **7**, 358.—The thulite occurs in pink spots and minute crystals at the contact of pegmatite and aplite with limestone and amphibolite in gneisses. It is apparently derived from the epidote in the basic rocks: n_α 1.705, n_γ 1.710, d. 3.23; the analysis is given, corresponding with $H_2(Ca, Fe)_4Al_6Si_6O_{26}$. C. A. Silberrad

Teineite. Toyohumi Yosimura. *J. Faculty Sci. Hokkaido Imp. Univ.*, Ser. 4, **4**, 465–70(1939); *Mineralog. Abstracts* **7**, 316.—Teineite, a new tellurate mineral, occurs as sky-blue prismatic crystals up to 1 cm. long together with tellurite in the oxidized portions of Te veinlets in the Teine mine, Hokkaido. It is orthorhombic $a:b:c$ 0.705:1:0.786, d. 3.80, H 2.5, n_α 1.767, n_β 1.782, n_γ 1.791; analysis: TeO_3 48.0, SO_3 6.6, CuO 28.0, H_2O 12.2, insol. 6.1, corresponding with $Cu(Te,S)O_4.2H_2O$ (cf. Watanabe, *C. A.* **27**, 3684). C. A. S.

Wulfenite from Kravarica-Tal (Serbia). Ljudevit Barić. *Vesnik Geol. Inst. Jugoslavije* **7**, 205–15(1938); *Mineralog. Abstracts* **7**, 360(1939).—Minute yellow crystals of wulfenite occur with sulfides in limestones invaded by trachyte at Kravarica, near Krepoljin in N. E. Serbia. C. A. Silberrad

Fulgurites from Witsands (S. E. Kalahari). A. D. Lewis. *S. African Geogr. J.* **19**, 50–7(1936); *Mineralog. Abstracts* **7**, 106(1938).—In 8 sq. m. of sand dunes some 2000 fulgurites are estd. to occur, many in broken fragments, but 5 were excavated to a depth of 8 ft. and their ends not reached. The av. thickness of the fused walls is 0.035 in. The mode of formation is discussed. C. A. Silberrad

Tektites and pseudotektites from Dutch East Indies and Philippines. Catherine M. Koomans. *Leidsche Geol. Meded.* **10**, 63–81(1938); *Mineralog. Abstracts* **7**, 275–6(1939).—Analyses of tektites from the Philippines, Java and Siam, of pseudotektites (pseudo-Americanites) from Patagonia and the Philippines, and of obsidian pebbles from Java and Sumatra are given. Tektites are completely glassy, pseudotektites contain crystallites; the surface sculpture of both is due to corrosion in the soil. The compn. of tektites is considered to resemble that of sedimentary, and that of pseudotektites that of igneous, rocks. C. A. Silberrad

Some new carbon minerals—kansasite. John D. Buddhue. *The Mineralogist* (Portland, Ore.) **6**, No. 1, 7–8, 20–2(1938); **Jelinite and associated minerals.** *Ibid.* No. 9, 9–10; *Mineralog. Abstracts* **7**, 265(1939).—A fossil resin, d. 1.05–1.06, from shale assocd. with coal seams near Ellsworth (Kansas) was first named kansasite, and later renamed jelinite. The soly. behavior of amber (d. 1.085) from Equilleres, Basses Alpes, France, differs from that of Baltic amber in its reaction to solvents and is named *pseudosuccinite*. For hartite (*C. A.* **17**, 2255) the formula $C_{18}H_{32}$ is suggested. C. A. Silberrad

Composition of meteors. John D. Buddhue. *Popular Astronomy* **45**, 166–9(1937); *Mineralog. Abstracts* **7**, 64(1938).—Spectra of comets show the presence of C, N, O, Na and probably Fe and H; those of meteors of Fe, Mg, Ca, Mn, Si, Cr, Al and probably Co, Na, Ni, C, H, O, N and S. The meteoritic dust found as magnetic spherules in deep-sea deposits and on the Greenland ice contains Fe, Co, Mg and Si. C. A. Silberrad

The Benld meteorite, Illinois No. 2. Ben Hur Wilson. *Popular Astronomy* **46**, 548–58(1938); *Science* **89**, 34–5(1939); *Mineralog. Abstracts* **7**, 273(1939).—The meteorite fell on Sept. 29, 1938, wt. about 4 lb. It has a velvety black crust 0.5–1.0 mm. thick, with dark-gray interior, well-developed chondrules and specks of metal; d. 3.69. C. A. Silberrad

Microscopic examination of the Lowicz meteorites. Maria Kołaczkowska. *Arch. minéral. soc. sci. Varsovie* **14**, 47–51(in German)(in Polish, 52–6)(1938); *Mineralog. Abstracts* **7**, 174–5(1938).—The brecciated silicate grains are olivine, plagioclase and pyroxenes (both orthorhombic and monoclinic). From the d. the metal content of 2 pieces is calcd. as 71 and 53.5%. A polished surface shows in places green phosphorescence after exposure to x-rays. C. A. Silberrad

Opaque constituents of the Lowicz meteorites. Stanisław Jaskólski. *Arch. minéral. soc. sci. Varsovie* **14**, 15–36(in German)(in Polish, 37–46)(1938); *Mineralog. Abstracts* **7**, 174–5(1938).—These include grains of kamacite showing Neumann lines with a little taenite bordering plessite, and accessory schreibersite, chromite, troilite and ilmenite, the last often as rods enclosed in chromite. C. A. Silberrad

Spectroanalytic investigation of the Lowicz meteorites. H. Moritz. *Arch. minéral. soc. sci. Varsovie* **14**, 65–8(1938); *Mineralog. Abstracts* **7**, 174–5(1938).—Spectrum analysis showed the presence of 26 elements, usually in amts. less than 0.001%. C. A. Silberrad

Chief constituents of the Lowicz meteorites. St. J. Thugutt. *Arch. minéral. soc. sci. Varsovie* **14**, 57–60(in German)(in Polish, 61–4)(1938); *Mineralog. Abstracts* **7**, 174–5(1938).—Analysis of the metallic portions gave Fe 91.09, Ni 8.51, Co 0.50 and insol. 0.53. Analyses of the anorthite, olivine (d. 3.4065), and pale-green bronzite are given. C. A. Silberrad

Radium content of the Lowicz meteorites. Jan Ciechocki. *Arch. minéral. soc. sci. Varsovie* **14**, 69–74(1938); *Mineralog. Abstracts* **7**, 175(1938).—The Ra content of these meteorites is less than 10^{-12}. C. A. Silberrad

New light on the Glorietta, New Mexico, meteorite.

H. H. Nininger. *Am. J. Sci.* **238**, 56–60(1940).—This meteorite is a combination siderite and pallasite. The Pojoaque and Santa Fe meteorites are fragments of the Glorietta. Alden H. Emery

Mexican minerals. Carlos F. de Landero. *Mem. rev. acad. nacl. cienc. Antonio Alzate* **54**, 385–99(1934)(Pub., 1938).—A general historical outline of the development of mining and metallurgy in Mexico from the Spanish conquest is followed by monographic treatment of the history of a no. of Mexican minerals. A. H. Krappe

The diamond deposits of Sierra Leone. J. D. Pollett. *Bull. Imp. Inst.* **35**, 333–48(1937); *Mineralog. Abstracts* **7**, 127–8(1938).—The rocks of the diamondiferous area are granites (? pre-Cambrian) invading schists and intruded by dolerite. The diamonds are usually octahedral, less frequently dodecahedral and rarely cubic. Assocd. minerals are corundum, zircon, ilmenite, epidote, rutile, garnet and occasionally spinel and chrysoberyl. The last 2 are mainly at the granite-schist contacts. C. A. Silberrad

The Gwanda gold belt. R. Tyndale-Biscoe. *Rept. Geol. Survey Southern Rhodesia* No. **30**, 33 pp.(1937); *Mineralog. Abstracts* **7**, 155–6(1938).—The belt consists of ancient schists, quartzites and ironstones, enveloped by granite. Au occurs in all the older rocks except serpentine, and in the granite near its contact with the schists. Some 70 mines or claims are described. C. A. Silberrad

The ore deposits of the Sudetenland, their origin and economic importance. A. Watznauer. *Mitt. Ver. Naturfr. Reichenberg* **60**, 20–8(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 763–5.—A brief account is given of the ores of Sudetenland. Those of the Erzgebirge contain predominantly Cu with a little Ag, Sn, W and U; while in the Riesen- and Isergebirge Cu ores also predominate, thus near Wernsdorf 600,000 tons of ore averaging 2.74% of Cu is visible, and elsewhere there are smaller quantities of ores of Pb (also contg. Ag), Sn and Fe and a little Au. C. A. Silberrad

Natural resources and mining in the former German colonies. F. Friedensburg. *Tech. u. Wirtschaft* **31**, 24(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 767–8.—Brief accounts are given of the minerals so far discovered in Togo (Fe, Au and bauxite), Cameroons (Au and Sn) and southwest Africa (Au, Cu, V, Li-mica, wolfram, tantalite, magnetite and diamonds). C. A. Silberrad

Minerals from Gyöngyösoroszi. Kálmán Sztrókay. *Földtani Közlöny* **68**, 30–2(1938); *Mineralog. Abstracts* **7**, 117(1938).—Hydrothermal veins in pyroxene-andesite contain galena, sphalerite, fluorite, dolomite, quartz, amethyst, pyrite and barite. C. A. Silberrad

Mines and mineral resources of Newfoundland. A. K. Snelgrove. *Newfoundland Geol. Survey, Information Circ.* No. **4**, 1–162(1938); *Mineralog. Abstracts* **7**, 117(1938).—The most important ores, etc., some of which are worked, are of Fe, Cu, Zn, Pb and fluorite, and in smaller amts. of Au, Ni and chromite. These are described with the minerals found. C. A. Silberrad

The lead-zinc deposit of Trebice-Lipovica (Raška-Novi Pazar). St. Pavlovitch *Bull. serv. géol. roy. Yougoslav.* **6**, 247–60(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 636.—The deposit lies in more or less propylitized hornblende-andesite, which has resulted in the formation of epidote, chlorite, sericite and carbonates; the vein walls consist of carbonates—smithsonite, siderite and calcite, which occasionally form nests in the vein. The richest vein at Trebiće, 0.5 m. wide to a depth of some 19 m., contains pyrite and marcasite with recent smithsonite and siderite, sphalerite, galena and Cu pyrite. In depth it decreases to 3–4 cm. and contains galena, pyrite and sphalerite with quartz as gang. At 3-m. depth the ore averages Zn 25.80%, Pb 12.75, with Ag 140 g. and Au 1.9 g./ton. Three phases are distinguished: resulting in the formation of (1) quartz, pyrite, galena and sphalerite, (2) lamellar pyrite and marcasite and (3) Pb and Zn carbonates. The deposit is of hydrothermal origin. C. A. Silberrad

Galena at Mežica. M. Munda. *Rudarski Zbornik* [2], **2**, 79–90(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 751–2.—The fissures and fault-breccias of the Zn-Pb deposit of Mežica (Miess, Carinthia) contain foliated galena, owing to pressure. Examn. of polished sections shows the galena to have behaved as a plastic mass in which sphalerite, calcite and pyrite are embedded, the pressure causing twins to form in the sphalerite and calcite, or to cause them to be deformed cataclastically. C. A. Silberrad

Two finds of ore in the Mesozoic of Mt. Djumbir, Nizhna Tatra (Slovakia). V. Zoubek. *Věstník Státního Geol. Ústavu, Č. S. Rep.* **13**, No. 4/5(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 776.—A vein of galena and tetrahedrite contg. also barite has been proved on the south side of Mt. Djumbir, and cupriferous siderite and ankerite in neighboring cryst. rocks. C. A. Silberrad

Ores of the Buron (Caucasus) deposit. F. I. Abramov, I. S. Volynskiĭ, I. A. Pudovkina and S. Solomkina. *Tsvetnye Metal.* **1938**, No. 1, 10–21; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 615–16.—The deposit occurs in pre-Paleozoic metamorphic rocks, mica-quartz-sericite schists, between granite and Jurassic keratophyres and tuffs. The chief minerals are pyrite (often 40–50, sometimes 75–80% of the total ore), pyrrhotite (av. 15–20%), magnetite, sphalerite, chalcopyrite, galena (with which last 3 the pyrrhotite is closely connected) and arsenopyrite. Accessory minerals are cassiterite, tetrahedrite, bismuthinite, native Bi, secondary pyrite and goethite. The gang includes quartz, calcite, chlorite and tourmaline. A tabular scheme for sepn. of the ores is given. C. A. S.

Distribution of minerals of different types in the Buron deposit. F. I. Abramov, I. S. Volynskiĭ, A. D. Maslennikov and I. A. Pudovkina. *Tsvetnye Metal.* **1938**, No. 3, 15–23; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 616–17.—The deposit consists of 2 lenses averaging 9.58 and 5.00 m. thick in which 6 types of ore are described: compact pyrite with (1) magnetite or (2) pyrrhotite, (3) compact pyrrhotite, (4) disseminated pyrite, (5) disseminated pyrrhotite with chalcopyrite and (6) disseminated galena. One occurs in the center of the deposit, 5 occur at the sides and 3 between them. C. A. S.

The iron and manganese ores of Central Brazil. K. Endell. *Tech. Blatter* **1936**, 842; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 294.—Valuable deposits of Fe and Mn extend over an area 125 × 160 km. in the state of Minas Geraes, some 200 m. north of Rio, from Itabira do Matto Denho to Queluz. At Casa de Pedra some 10^8 tons of hematite is in sight which can be largely worked in open pits. C. A. Silberrad

Manganese ore in the Banjalucka Kozara (N. Bosnia). T. Jakšić. *Rudarski Zbornik* No. **2**, 1, 1–12(1938)(in Croatian with French summary); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 648–9.—The ore is mainly psilomelane, with a little pyrolusite, the former is oölitic of syngenetic and partly epigenetic origin. It is best developed at Bache Bajinac where it forms a bed averaging 1 m. thick, but in places 2.5. Some 600 tons has so far been extd. of av. compn. Mn 40.71–51.20, Fe 3.33–6.32, SiO_2 9.0–21.8 and H_2O 3.60–12.48%. The amt. in sight is estd. at 480,000 tons. C. A. Silberrad

Manganese minerals of Prełuczny. Roman Krajewski *Bull. service géol. Pologne* No. **2**, 1–28(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 440.—The Mn ores of Prełuczny, in the eastern Polish Carpathians, occur at the contact of gneiss and cryst. schists. They consist of rhodocrosite, rhodonite and manganiferous hornblende to a total estd. amt. of 16,555 tons. On the av. the ore contains Mn 30%, Fe 8, SiO_2 23 and CO_2 6–16. They appear to have resulted from the interaction of org. SiO_2 and manganiferous mud at the sea bottom. In the cryst. schists in the neighborhood sulfidic ores of Cu, Pb and Zn occur. C. A. Silberrad

Molybdenum in the Upper Silurian alum schists of East Thuringia. Rudolf Hundt and W. Krebs. *Z. prakt. Geol.* **46**, 111–12(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 562–3.—MoO_3 occurs in soln. in a spring near Saalfeld, and also in an ocherous deposit there. Either there must be Mo-contg. minerals in some of the

neighboring veins or in the Silurian rocks. Nearly every analysis of the Upper Silurian alum schists of East Thuringia shows the presence of Mo, the amt. probably varying with the amts. of C, pyrite and marcasite. C. A. S. 1

Radium-containing uranium ore from Timor. C. E. A. Harloff. *Ing. in Nederl.-Indië* **5**, IV. *Mijnb. en Geol. "De Myning"* **1938**, 67; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 794; cf. *C. A.* **31**, 6144⁷.—The supposed find of Ra-bearing U ore in Timor is an error owing to a mistake in a museum. The ore is identical with a wulfenite-contg. sklodowskite from Katanga (Congo), and must have come from there. C. A. Silberrad 2

Bauxite of Poços de Caldas. M. da Silva Pinto. *Boll. do S. F. P. M.* (Rio de Janeiro) No. 22 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 647; cf. *C. A.* **33**, 2853².—The high plateau of Poços de Caldas (Minas Geraes, 250 m. W. N. W. of Rio) consists essentially of foyaite and phonolite, the surface of which through extensive post-Tertiary weathering has been lateritized with production of a layer of bauxite 3–5 m. thick beneath some 30 cm. of a sterile layer. There is no "iron hat," and the transition to the underlying parent rock is very sharp. The av. compn. of the laterite is Al_2O_3 60, Fe_2O_3 5–7, TiO_2 2, SiO_2 1 and H_2O 30%. The Fe content is almost identical with that of the parent phonolite The total amt. of bauxite is estd. at 16×10^7 tons. C. A. Silberrad 3

Memorandum on the occurrence of bauxite in British Guiana. D. W. Bishopp. *Geol. Survey Brit. Guiana Bull.* No. 8, 67 pp. (1938); *Ceram. Abstracts* (in *J. Am. Ceram. Soc.*) **18**, 312 (1939) —A compilation of information that has been published since 1910. The deposits are described and their geology and origin are discussed. Analyses are included. E. H. 4

Onyx-marble deposits and connected springs of San Rafael, Argentina. Richard Stappenbeck. *Z. prakt. Geol.* **45**, 203–10 (1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 637–8.—Seven occurrences of onyx marble in the foothills of the Andes near San Rafael in Mendoza are described. They are all near mineral springs the waters of which contain Ca, Mg, Fe, Mn and Co, and which have genetic connection with neighboring outpourings of basalt. Aragonite replaces calcite in places, indicating variation in temp. The water of one spring contains traces of Br. C. A. Silberrad 5

Onyx marble and aragonite in the neighborhood of Tetovo (S. Serbia). Fran Tućan. *Jugoslaw. Akad. Wiss. u. Kunst, Rad* **261**, 33–54 (1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, **1938**, 638–40.—In the springs near Tetovo large quantities of onyx marble (I), calc sinter (II) and aragonite (III) are formed. Their structures are minutely described. Analyses are given showing in I 4.48% of FeO and 0.15 MnO, and in III 0.17% SrO and 0.11 of BaO. III is converted to calcite by heating for 30 min. at 400°, 5 hrs. at 380° or 36 hrs. at 350°. II consists almost entirely of calcite but contains in cracks a few crystals of III. C. A. Silberrad 6

Determination of translucency of marble. G. Gerth and W. Prüfer. *Stein-Ind. u. Strassenbau* **33**, 20 (1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, **1938**, 391–2.—Various com. marbles are classified according to their degree of translucency, for measuring which an arrangement depending on a Se photocell is described. The translucency depends on the structure, color and presence of other minerals; coarsely cryst. marble is more transparent than the finely cryst. variety. C. A. Silberrad 7

The "Heinrichsfreude" seam No. 4 of the Szyby Piast mine at Ledzini (Upper Silesia). A. Bolewski. *Bull. serv. géol. Pologne* **9**, No. 1 (1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 699.—In the middle of this seam fireclay forms a stratum 20–40 cm. thick; it is described as laterite; small masses, showing rhythmic pptn., consist of $Al(OH)_3$ 25–32%, and Al silicate 42–43%; SiO_2 is present as chalcedony; Seger cone 32–36. Similar material occurs in the hanging wall and in the clayey coal, which is considered to have originated as organically coagulated suspensions and solns. C. A. Silberrad 8

Minerals of the Mansfeld copper schists. Heyer. *Kohle u. Erz* **35**, 361–5, 413–16 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 438–9.—The Mansfeld Cu schists consist of 55% quartz and clay, 24% limestone and dolomite, 10% org. material, 10% sulfidic ores and 1% gypsum. The chief minerals are bornite, chalcopyrite, chalcocite, covellite, azurite, malachite, cuprite, tile-ore and native Cu. A list of 44 other minerals found is given. C. A. Silberrad 9

Mechanical and mineralogical constitution of sands of the Saane River (Switzerland). August Müller. *Ber. schwyz. naturforsch. Ges.* **2**, 78 pp. (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 832.—In the 0.25–0.1 mm. fraction of the sand of the Saane River 30 minerals were identified in addn. to quartz, feldspar and calcite. Crystallographic and morphological descriptions are given. C. A. Silberrad 10

The sands of East Greenland. Armin v. Moos. *Medd. Grønland* **103**, No. 4, 76 pp. (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 832–3.—Sands from 3 localities were examd. They contained in addn. to quartz, ores and garnet, (1) feldspar, mica, hornblende and epidote; (2) carbonates, clay slate, zircon, titanite, tourmaline and rutile; and (3) epidote and apatite. C. A. Silberrad 11

Asphalt rock from Dubrovnik. F. Schwarz. *Berg- u. hüttenmänn. monatsh. montan. Hochschule Leoben* **86**, 113 (1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, **1938**, 727–8.—This asphalt rock consists of brecciated limestone with 13.9% of asphalt in the interstices. It is unlikely to become a source of oil, but crushed should be useful for *road making*. C. A. Silberrad 12

Petroleum and asphalt. III. The composition of petroleum. B. The methanes. N. Wing-Easton. *Geol. en Mijnb.* **16**, 99–103 (1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, **1938**, 710; cf. *C. A.* **33**, 3303¹.—Various theories of the origin of petroleum are discussed and the actual process is considered to be probably more complicated, the various intermediate products acting and reacting with each other, while the catalytic effect of such substances as V, I, SiO_2 and C which may be present, and bacterial action require consideration. The theories of the origin of sapropel-coal from planktonic material, and of coorongite are discussed. Lastly it is suggested that the predominance of naphthenes in Tertiary and of paraffins in earlier oils is due to the fact that in the earlier plants cellulose, and in the latter lignin, predominates. C. A. Silberrad 13

Geological thermometry. Einar Jensen. *Tids. Kjemi Bergvesen* **19**, 91–4 (1939).—A review on methods for detn. of the temp. at which minerals are formed. H. Kringstad 14

The contribution of differential pressures to magmatic differentiation. R. C. Emmons. *Am. J. Sci.* **238**, 1–21 (1940).—During crystn. of magmatic liquid the crystals and liquid phase may have very different compns. Differentiation requires the phys. sepn. of these 2 phases. Such sepn. through pressure differentials created by fracturing of brittle wall rocks is believed to be a leading process in sepn. of granitic liquid from more basic crystals. Alden H. Emery 15

Barium in the igneous rocks of the Ukraine. P. I. Lebedev. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. 12, 155–71 (1938); *Mineralog. Abstracts* **7**, 299 (1939).—In the charnockite series BaO varies between 0.20 and 0.48%, in the monchiquite-camptonite between 0.16 and 0.68%, and is very small in amt. in the nephelite-syenite. The distribution is compared with that in other regions. C. A. Silberrad 16

Viscosity of molten mixtures of diabase and picrite. M. P. Volarovich and R. S. Fridman. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. 13, 197–201 (1938); *Mineralog. Abstracts* **7**, 297–8 (1939).—The viscosity of diabase-picrite mixt. at 1200–1300° increases with addn. of picrite and between 1300° and 1400° is a max. for 20% picrite. C. A. Silberrad 17

Moving and contraction forms of lava. F. Bernauer. *Z. Volkanol.* **17**, 237–75 (1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, **1938**, 432–4.—The various forms assumed by 18

solidifying lavas are discussed, as deduced from observations at Vesuvius, Etna and the Lipari Islands. C. A. Silberrad

Petrography of the ore-bearing region of Altai and of Kalba. N. A. Eliseev. *Petrograph. Inst. F. Yu. Levinson-Lessing, Acad. Sci. U. S. S. R., Petrography of U. S. S. R., Ser. I, Regional Petrography* **6**, 248 pp. (1938); *Mineralog. Abstracts* **7**, 303.—A detailed account of the igneous, metamorphic and sedimentary rocks of the western Altai, including the Palaeozoic spilite-keratophyre series, various intrusive and contact-altered rocks. 88 analyses. C. A. Silberrad 2

Petrography of northeastern Altai. A. P. Lebedev. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. **13**, 77–103 (1938); *Mineralog. Abstracts* **7**, 302.—The igneous and metamorphic rocks of the lake Telezkoe region are described and 4 analyses given. C. A. Silberrad

Vesuvius in July, 1937. Karl Höhn. *Z. Volkanol.* **17**, 283–5(1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, **1938**, 438.—A small new crater has appeared to the west of the cinder cone, whence a const. stream of steam and HCl is emitted. Marked activity was observed in the main crater with emission of several lava streams. C. A. S. 3

New alkaline intrusive body on Kola Peninsula. N. I. Soustov. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. **12**, 89–105(1938); *Mineralog. Abstracts* **7**, 300–1.—An intrusion of alkali-syenite and nephelite-analcite-syenite occurs south of the Khibina tundra (Kola Peninsula). Crystn. of microcline-perthite and nephelite was followed by cataclastic effects, and late magmatic products (analcite, cancrinite, calcite, albite, biotite and fluorite) filled the cracks, partially replacing feldspar and nephelite. Two complete analyses C. A. Silberrad 4

A new Kamchatka rock. A. I. Morozov and N. N. Shavrova. *Bull. Kamchatka Volcanol. Sta. Acad. Sci. U. S. S. R.* **1938**, No. 3, 19–20; *Mineralog. Abstracts* **7**, 304(1939).—*Kamchatite* is a porphyritic igneous rock from the Sredinnyi range in Kamchatka. It consists of orthoclase (large phenocrysts), bluish hornblende, pyroxene and epidote. Analysis gives SiO_2 51.70, TiO_2 0.47, Al_2O_3 13.13, Fe_2O_3 2.29, FeO 6.03, MnO 0.19, MgO 3.61, CaO 8.13, BaO 0.16, Na_2O 1.95, K_2O 6.24, P_2O_5 0.14, H_2O −0.09, loss on ignition 1.92. It is thus chemically similar to potash-rich monzonite or shonkinite, but contains no plagioclase. C. A. Silberrad 5, 6

The pegmatite area south of the Orange River, Namaqualand. T. W. Gevers, F. C. Partridge and G. K. Joubert. *Mem. Geol. Survey, S. Africa* No. **31**, 172 pp. (1937); *Mineralog. Abstracts* **7**, 338–9(1939); cf. *C. A.* **32**, 1619[3].—The pegmatite veins occur over some 10 miles between Goodhouse and Vioolsdrift, the longest being over a mile by 50 yards in width. The chief replacement processes are muscovitization, albitization and lithianization. Bi veins in greisen and highly quartzose pegmatites, and beryl and scheelite in quartz-tourmaline veins are described; as also occurrences of chrysoberyl, phenakite, bertrandite, spessartine, tantalite-columbite, euxenite, monazite, xenotime, uranophane, soddyite, a mineral near pyrochlore, rutile, spodumene, lepidolite, lithiophilite, bismuthinite, bismoclite, sphene, daphnitic chlorite, zoisite, prehnite, epidote and apatite. Nonpegmatitic deposits of Cu ores, amethyst and tremolite are also described. Chem. analyses of several of the rarer minerals are given. C. A. Silberrad 7, 8

Granites of Scotland. J. G. C. Anderson and M. Macgregor. *Mem. Geol. Survey, Gt. Brit.* **32**, 1–70(1939).—An account of the economically important occurrences of granite in Scotland, including as such all medium or coarse-grained light-colored igneous rocks with an appreciable (say 5%) content of quartz, thus including tonalites or quartz-diorites. Five typical analyses are given and the results of various tests of 16 of the chief varieties, and also brief accounts of the methods of quarrying. C. A. Silberrad 9

Structure and petrographical composition of the Lovozersky tundras. N. A. Eliseev, I. V. Zelenkov, N. K. Nefedov and V. A. Unksov. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. géol.* **1938**, 235–68; *Mineralog. Abstracts* **7**, 301–2(1939); cf. Gerasimovskiĭ, *C. A.* **32**, 1614[7]; Chirvinskiĭ, *C. A.* **32**, 6198[7].—The plutonic complex of Lovozero (Luyavrurt) is intruded into pre-Cambrian and Devonian rocks, which have been thermally altered at the contact. The intrusion consists of various phases: (1) various nephelite-syenites, tawite, urtite and juvite; (2) loparite-bearing foyaite, urtite and luijaurite; (3) eudialyte-bearing luijaurite; and (4) a late dike complex principally represented by monchiquite and tinguaite. Several modal analyses are given. C. A. Silberrad 1

Dolerite plugs in Antrim (Ireland). S. I. Tomkeieff. *Geol. Mag.* **77**, 56–64(1940).—Two dolerite plugs (I) at Tieveragh, into Old Red Sandstone, and (II) at Tievebulliagh, into older lavas (olivine-dolerite and olivine-basalt), and the resulting metamorphism caused (*a*) in the intruding dolerite, and (*b*) in the rock intruded into, are described in detail: I(*a*) the dolerite has become almost olivine-free and fine-grained while the pyroxene shows an approach to pigeonite; I(*b*) in the sandstone buchite has been formed with cordierite, and clino- and ortho-pyroxenes; II(*a*) the olivine-dolerite of the plug shows a definite decrease in granularity toward the contact, where it passes into basalt; II(*b*) in the lavas intruded into there is serpentinization of the olivine, albitization of plagioclase and formation of porcellanite. C. A. Silberrad

Sanidinedacite of Zvecan and Sokolica and alum-rock of Boljetin near Kosovska-Mitrovitza. Fran Tućan. *Jugoslaw. Akad. Wiss. u. Kunst, Rad* **261**, 137–82(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 817–19.—The sanidinedacite of Zvečan is really a liparite contg. phenocrysts of sanidine measuring up to 5 × 2 cm.; phenocrysts of andesite are almost as numerous; inclusions of hornblende, pyroxene, titanite and calcite occur in the sanidine, and the two first named and occasionally quartz occur also as phenocrysts. These are all described in detail with analyses and crystallographic details. What T. calls sanidinedacite occurs at Sokolica; it contains concretions of corundum and hypersthene (both pleochroic). Further N. E. near Boljetin, the sanidinedacite has been completely pneumatolytically and hydrothermally metamorphosed, part being completely silicified, and part alunitized (I) or kaolinitized (II) resulting in rocks contg., resp. (I) 10.87% SO_3, and (II) 75.36% SiO_2, and 17.4% Al_2O_3 with only a trace of Fe_2O_3. C. A. Silberrad 4

Rhön trachyte tuff. F. v. Wolff and W. Jäger. *Jb. halleschen Verbandes* **16**, 13–24(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 822.—The clayey portion of the Rhön trachyte tuff, consisting of volcanic glass and fragments of sanidine, augite, hornblende and biotite, was centrifuged into heavier and lighter fractions, the latter consisting of amorphous substances and muscovite flakes; analysis showed this portion to contain little MgO or CaO, which enables it to absorb Mg and Ca ions and explains its good hydraulic setting powers in their presence. C. A. Silberrad 7

Two remarkable tephrites and a basalt from N. W. Bohemia. A. Senger. *Firgenwald* **11**, 119–22(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 902.—The tephrites are leucite-hauynite-tephrite occurring on the W. slope of the Schlossberg in rolled nodules, and hauynite-leucite tephrite, contg. 10–15% of leucite, found near Rabenstein. They are minutely described. A basalt consisting of glass with microlites of feldspar and augite and phenocrysts of diopsidic augite, olivine and plagioclase occurs near Schönbach. C. A. Silberrad 8

Basalts of Cheskaia Bay. Z. A. Sazonova. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. **12**, 107–54(1938); *Mineralog. Abstracts* **7**, 302(1939).—These basalts are described with several analyses. Attention is specially paid to the chloritic mesostasis (palagonite) found in them. It is suggested that the palagonite is of later magmatic origin, spheroids thereof being attributed to liquation differentiation of the residual magma. C. A. Silberrad 9

Basic rocks of the Pindus and western Macedonia. Jan H. Brunn. *Compt. rend.* **210**, 109–11(1940).—The rocks of the axis of the N. W. portion of the Pindus range are basic and include lherzolites, spilites, dolerites and

scoriaceous basalt, all not or very little serpentinized, thus differing from the similar rocks of the Albanian continuation of the range. Elsewhere outcrops of dolerite and basalt occur and in places similar rocks with harzburgite and gabbros, which are more visibly connected with volcanic vents, these latter occurrences being often assocd. with radiolatites and Cretaceous limestones.
C. A. Silberrad

The pyroxenite intrusion near Africanda Station on the Kola Peninsula. B. M. Kupletskiĭ. *Trav. inst. pétrog. acad. sci. U. R. S. S.* No. 12, 71–88(1938); *Mineralog. Abstracts* 7, 301(1939).—A small igneous complex intrusive in Archaean gneiss is composed of pyroxenite, olivinite rich in titanomagnetite and knopite (cf. *C. A.* 32, 4108[9]), and is cut by veins of nephelite-pegmatite. The pyroxenite resembles jacupirangite and consists of diposide-hedenbergite (n_α 1.695, n_γ 1.721), augite, acmite, magnetite and calcite. One of the alkali pegmatites is composed of nephelite, pyroxene, titanomagnetite, calcite and apatite. The calcite in these rocks is of magmatic origin, and represents the hydrothermal phase of the magma. It is suggested that the pyroxenite and olivinite were formed from an ultrabasic magma which has assimilated carbonate rocks, while the nephelite rocks represent the original magma. Several complete analyses.
C. A. Silberrad

Desert polish and sunburn of deserts and fossil deserts. J. Sioma. *Sprawozdanie Komisji Fizjograficznej Polskiej Akad. Umiejętności* 71, 165–79(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1938, 316.—S. does not consider that desert polish, etc., necessarily prove the former existence of desert conditions but that this formation resembles the hard pan resulting from an Fe-, Mn- or Ba-contg. formation in the subsoil that is now on the surface through erosion or denudation. Such formations with wad or psilomelane occur at many places in the Lysogóry hills of Poland. 25 analyses support this theory.
C. A. Silberrad

Petrography of sandstones of Zurawno. Włodzimierz Wawryk. *Arch. Mineralogiczne* 14, 75–105(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, 1938, 673–4.—These sandstones, some 70 m. thick, extend over an area 20 × 9 km., and are divided into loose, slightly compact, compact and very compact portions. They consist of varying proportions of glauconite, limonite and chalcedony, the compactness being due to cementation by calcite or silica. In places there occur inclusions of ilmenite, magnetite, zircon, rutile, tourmaline, staurolite, kyanite, etc. 19 complete analyses.
C. A. Silberrad

Iron sulfide impregnations in Finnish slate rocks. H. Hausen. *Tek. Fören. Finland Förh.* 59, 267–74(1939).—A brief résumé is given of Fe sulfide impregnations in the Finnish slate rocks. Pyrrhotite is widely distributed, and contains no Ni or noble metals. Pyrite is less widely distributed, but is occasionally found in beds of workable ore. Geophysical prospecting gives misleading results, for the deposits are often technically worthless.
H. C. Duus

The geochemical and geological factors of the formation of crude oil under the conditions existing in the Dnepr-Donets incline. V. B. Porfir'ev. *Trudy Neftyanoĭ Konf. Kiev* 1938; *Akad. Nauk U. S. S. R. (Inst. Geol. Nauk)* 1939, 149–161.—Various theories of oil formation are discussed. Nineteen references.
A. A. Boehtlingk

New data on the chemistry of waters beneath the Dnepr-Don depression and their connection with the size of the oil deposits. K. I. Makov. *Trudy Neftyanoĭ Konf. Kiev* 1938; *Akad. Nauk U. S. S. R. (Inst. Geol. Nauk)* 1939, 233–42.—A detailed analysis is given of waters from 20 different locations.
A. A. B.

Vaucluse gold mine, Orange County, Va. (Bass) 9. Soil genesis from andesite in Grenada, British West Indies (Hardy) 15. Catalytic action of clays and other silicate minerals and compds. on aromatic amines and phenols (Eisenack) 10. Mounting-media with high index of refraction [for mineralogical use] (Perruche) 11B.

Billingsley, Paul R., and Locke, Augustus: Structure of Ore Districts in the Continental Framework. New York: American Institute of Mining and Metallurgical Engineers. 51 pp.

Verrill, A. Hyatt: Minerals, Metals and Gems. Boston: L. C. Page & Co. 293 pp. $3.00.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Some new metals. G. Stafford Whitby. *Can. Mining Met. Bull.* No. 333, 56–64(1940).—A general discussion of extn. and uses of Mg, ionium, polonium, U, Se, Te, Ti, Ta, Cb, Be, Li, In, etc.
Alden H. Emery

Metal production figures for 1939. United States Bureau of Mines. *Mining J.* (Phoenix, Ariz.) 23, No. 17, 5–11, 38–48(1940).—A survey covering Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington and Wyoming.
Leopold Scheflan

Wetting in flotation. H. Freundlich. *Wetting and Detergency Symposium*, Feb. 19–20, 1937, *Brit. Sect. Intern. Soc. Leather Trades' Chem.* 1–10.—A review with 39 references. **Wetting metals by metals with particular reference to tinning and soldering.** E. J. Daniels and D. J. MacNaughtan. *Ibid.* 77–84.—See *C. A.* 32, 2494[1].
M. M. Piskur

Lime in base-metal flotation. E. H. Rose. *Trans. Can. Inst. Mining Met.* 42 (in *Can. Mining Met. Bull.* No. 331), 533–6(1939).
Alden H. Emery

The frothing power of various frothers in flotation. Zyoitiro Hunakosi. *Suiyokwai-Shi* 10, 113–19(1939).—From expts. on the flotation of pyrites H. finds that the frothing quality is proportional to the max. height of the froth layer.
Hideo Nishimura

Mineral dressing. A. H. Fahrenwald. *Eng. Mining J.* 141, 80–3, 91(1940).—There is increased application of the sink-and-float process. New flotation agents have been studied and improvements made in crushers and screens. Overgrinding is greatly lessened, mineral recovery improved and increased economy effected by use in the ball-mill-classifier circuit of mineral-recovery devices and processes such as (1) amalgamation, (2) the flotation cell, (3) corduroy strake and (4) the jig. **Iron-ore beneficiation.** Joseph Rudolph. *Ibid.* 83, 84.—Heavy-medium concn. is applied in new com. scale plant on the Mesabi. The possibilities of low-grade ores and the flotation of fine tailings are discussed.
W. H. B.

The Vaucluse gold mine, Orange County, Va. Charles E. Bass. *Econ. Geol.* 35, 79–91(1940).—The Au is assocd. with pyrite, quartz and ankerite along a shear zone in a quartz-sericite-chlorite schist. Data are given on mining production and costs from 1935 to 1938, when the mine closed.
Michael Fleischer

Operations at the Old Eureka mine. L. A. Norman, Jr. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 1136, 15 pp.(1939).—The ore for 1938–39 averaged 0.62 oz. Au per ton. It is treated in a stamp mill, then in one of the few remaining installations of successfully operating vanner tables, followed by flotation and cyanidation to reduce losses. Recovery in the stamp mill was 90.37%, total recovery, 97.17%. Costs were $16.090 per ton.
Alden H. Emery

Gold-antimony deposits of Nullagine. M. R. McKeown. *Chem. Eng. Mining Rev.* 32, 143–4(1940).—Auriferous conglomerate deposits are best known and good recovery has been effected by cyanidation. Oxidized ore has been successfully treated on the mine by cyanidation, and flotation for concn. of the Sb followed by cyanidation

of the flotation tailings has given recoveries of 85% of the Sb and 95% of the Au. W. H. Boynton

Results of researches on aluminum in Poland. Jan Czochralski. *Aluminum and Non-Ferrous Rev.* **4**, 333 (1939).—A review. Iver Igelsrud

Aluminum and its applications. James W. Cameron. *Can. Mining Met. Bull.* No. **330**, 445–64(1939).—A review. Alden H. Emery

The separation of aluminum from scrap metals. C. C. Downie. *Aluminum and Non-Ferrous Rev.* **4**, 318–19 (1939).—Scrap Al mixed with heavy metal scrap is charged into a soln. of salts of the alkalies, alk. earths, or other metals baser than Al and of a sp. gr. greater than Al. The Al floats and is sepd. Iver Igelsrud

Copper metallurgy. W. B. Boggs. *Eng. Mining J.* **141**, 87–8(1940); cf. *C. A.* **33**, 2857[1].—Differences in smelter practice in the Southwest and in Canada are noted. Noranda uses slag and tailings for stope filling underground. **Lead metallurgy.** G. L. Oldright. *Ibid.* 89, 94; cf. *C. A.* **33**, 2857[6].—A review for 1939. Sintering in connection with blast-furnace operations, S recovery, rough-drossing and Pb-alloy production are discussed. **Zinc metallurgy.** S. M. Shelton and H. R. Hanley. *Ibid.* 90–1; cf. *C. A.* **33**, 2859[6]. **The uncommon metals.** R. S. Dean and V. H. Gottschalk. *Ibid.* 92–3.—La is prepd. by electrolyzing its fused chloride. Its use for hardening Al and Mg alloys has been suggested. Other metals reviewed include Mn, Ti, Zr, Mg, Ba, Ca, Cb, Ta, Cr, B, Cd, Ga, In, Sb, Bi, Mo, Se, Te and As. W. H. Boynton

A complex process for treating iron ore containing phosphorus and phosphorite. A. M. Malets. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 10, 27–30(1939); cf. *C. A.* **33**, 4560[6].—Ore contg. Fe and P is heated with C in a hearth furnace at 1300–1500°. Fe_2P is formed and drawn off as a liquid. The gases from the reaction contain 32–5% CO and can be used for *fuel*. The Fe_2P is treated at 1200–1500° with CaO and Fe_2O_3 and gives Fe suitable for making steel. The phosphate slag can be ground and used for *fertilizer*. Almost all its P_2O_5 is citrate-sol. In the starting ore, the Fe : P ratio should be 3:1, the ratio of Ca:Si should be 1.1–1.3 and there should be less than 2% S. Since no one ore fulfils these conditions, it is necessary to produce the proper compn. by mixing various ores. H. M. Leicester

Comparative values of iron ore at the blast furnace. George W. Hewitt. *Blast Furnace Steel Plant* **27**, 1231–7 (1939); **28**, 50–2, 70(1940). C. B. Jenni

The nickel industry in 1939. Wider applications in non-ferrous alloys. Robert C. Stanley. *Metal Ind.* (London) **56**, 107–10(1940); cf. *C. A.* **33**, 7705[5]. E. H.

Nickel industry in Urals. B. Bogitch. *Rev. mét.* **36**, 421–8(1939); cf. *C. A.* **34**, 349[1].—Three main deposits of Ni ores are known, Khalilov, Akermanovka and Actuba, all of them characterized by a Ni content of about 2%, though the total content of the metal is estd. as several hundred thousand tons. Only open-pit mining is used, and the ores melted without any dressing. Only one modern plant at Orsk is in operation; 2 others melting the ore are very small and obsolete. The ore is sintered, fluxed to take care of excessive gang content and melted for mat in 1.60 × 13.4 m. water-jacketed furnaces. Low Ni content is taken care of by slow descent of the charge and prevention of fine accumulation in the center of furnaces. About 0.25% Ni is lost in slag and 350 kg./ton of coke used, producing mat with 30% Ni, 20% S and 50% Fe. It is purified in 5–10-ton magnesite-lined convertors. J. D. Gat

Uses and metallurgy of ferrous scrap metals. M. W. Von Bernewitz. *Blast Furnace Steel Plant* **27**, 1226–30 (1939).—Importance of scrap as a commodity and its use in metallurgical processes are discussed. C. B. J.

Bessemer blowing with constant pressure at the wind box. Sherman Chase. *Blast Furnace Steel Plant* **27**, 1029–32(1939).—Improvements to blowing equipment, bottom design and tuyère design can be made only when the process of Bessemer blowing is more thoroughly understood. The effect of stalagmitic growths on tuyères has either been ignored or misinterpreted. Math. analysis is presented for the process. C. B. Jenni

Sprung-arch roofs of high-temperature furnaces. J. Spotts McDowell. *Blast Furnace Steel Plant* **27**, 592–7, 947–51(1939); **28**, 161–8, 178(1940).—Properties of available refractories including silica brick, alumina-silica brick, magnesite brick, chrome brick, chrome-magnesite brick and forsterite brick are fully discussed. Details of arch construction and the mechanics of high-temp. arches are discussed. C. B. Jenni

Comments on Southern blast furnace practice and some of its peculiarities. J. E. Urquhart. *Iron Steel Engr.* **16**, No. 9, 72–80(1939).—Proximity of iron ore, limestone and coal deposits and mild climatic conditions make it unnecessary to build up large inventories of stocks. Because of lean ore, slag vols. average 2000 lb. per ton and coke consumption is increased. Potential value of ore prepn. has not been realized until recently. Research program on red ore had 3 objectives: improvement of pig-iron quality, more efficient furnace practice, and elimination of furnace irregularities prevalent in southern practice. Tests showed that there was no appreciable swelling of the ore; calcination of the calcite component began slightly under 1100°F. and temp. of completion of reaction was governed by size of pieces and pressure in the furnace; size of ore particles has little effect in its degree of reducibility at 2200°F. but a marked effect at 1700°F.; the slight reduction that took place between 1100° and 1600°F. was probably due to the calcination of the $CaCO_3$ component so that the liberation of CO_2 retarded the contact between the Fe oxides and the CO; the CO_2 liberated on calcination of the calcite in the ore is of little value and is probably a detriment to the coke efficiency, since it is liberated at temps. high enough to react with the coke to form CO, which when formed is so high in the furnace that it has little opportunity to reduce the basic ore. Coals used for coking all require washing, but little work has been done on pulverizing the coal. Sizing of coke has not been followed with the exception of breeze removal. Furnace design and operation, effects of humidity, flue-dust disposal, slag utilization, and gas cleaning are discussed. C. B. Jenni

Effect of the solution-loss reactions on blast-furnace efficiency. P. V. Martin. *Blast Furnace Steel Plant* **27**, 669–73, 1039–42, 1126–31(1939).—See *C. A.* **33**, 9226[6]. C. B. Jenni

Refining of metal in the basic open-hearth furnace. W. B. Lawrie. *Blast Furnace Steel Plant* **27**, 675–9, 943–6, 1043–5(1939); cf. *C. A.* **33**, 6206[2].—The chemistry of refining in the basic open-hearth furnace is developed. The influence of fluorspar on the slag, the action of Mn in the removal of S, the effect of FeO, the behavior of Cr, Ni, P, C and iron oxides are all discussed. Twenty-three references. C. B. Jenni

Physical and chemical properties of stoppers in open-hearth service. Joseph A. Sarandria. *Blast Furnace Steel Plant* **27**, 1133–6(1939).—Resistance to abrasion or erosion must be high in stopper heads. Porosity and water absorption affects the resistance to spalling and the possible penetration of the metal. The P. C. E. or softening point must be high enough to stand steel temps., so that there is a min. amt. of fusion reaction with the nozzle. The cold-fired strength should be sufficient to withstand the assemblying where the stress is concd. on the bolt hole and shoulder. The load-bearing capacity should be high at steel temps., because the stopper must resist the pressure of the ferrostatic head of the metal and the manual pressure exerted in making the shut-off. The thermal cond. properties must produce a definite temp. gradient. Data are given on chem. compn. and phys. properties of various stopper heads. C. B. Jenni

The manufacture of rimming steel at Briton Ferry. J. S. Lewis. *Engineering* **148**, 687(1939); cf. following abstr.—The cold-pig iron and scrap process, in the open-hearth furnace, is used. About 40% pig iron and cast iron and 60% high-grade scrap with enough lime or limestone (10–12% limestone) to make a good slag are employed. The steel should contain about 0.3% C when

clear. Ore or scale is then added until the C is down to 0.14–0.16%. Enough oxide should then be present to bring it down to 0.08% or less. Prior to tapping the bath analysis should be C under 0.08, P under 0.04, S under 0.05 and Mn under 0.15–0.18%. Low casting temp. aids the rimming properties. The best ladle addns. for deoxidation are Al and ferromanganese. About 3–5 oz. of Al per ton is necessary. To secure the best rimming action the Mn content is brought to 0.32–0.36% by adding about 8 lb. of ferromanganese (80% Mn) per ton of steel. The best even rim is obtained with large molds with a ratio of length to cross section less than 4:1. The molds should not be hotter than hand warm and should be coated with dehydrated tar. Small nozzles are best. The pouring rate by this method is about 1 ton per nozzle per min. A flat rim with inappreciable rise or fall during the rimming action is obtained. Iver Igelsrud

Rimming steel from open-hearth furnaces. J. S. Lewis and R. S. Rolfe. *Blast Furnace Steel Plant* **27**, 1223–5(1939); cf. preceding abstr.—Practice as carried out at Briton Ferry and at Bilston, England, are described. C. B. Jenni

Practical aspects of steel making. C. L. Altenburger. *Iron Steel Engr.* **16**, No. 12, 11–21(1939).—Influence of size and quality of scrap is emphasized. The greater the Si content of the charge, the greater will be the C at meltdown. When bath Si is very low or the proportion of total scrap which is light is high, the heat will melt soft. Residual Mn in the bath depends on the ratio of FeO to MnO in the slag and on temp. Variation in the nature of fuel used is discussed. The cleaning of the furnace after a heat is stressed. Slag characteristics and slag control are briefly considered. C. B. Jenni

Steel plant at Corby. M. T. Colclough and R. P. Lemoine. *Rev. mét.* **36**, 326–34(1939).—One of the latest developments of British steel metallurgy is the Corby plant operating on ores low in Fe and high in P. The article describes, in general, the plant and equipment used at the plant together with metallurgical peculiarities of the ore prepn., smelting and steel-making processes. J. D. Gat

Macroscopic structure of steel ingots. Luigi Bruno. *Rev. mét.* **36**, 335–54(1939).—An extensive investigation covering the nature and distribution of blowholes and pipe in ingots made in open-hearth and arc furnaces. It developed from the successful attempts to make *open steel* having a good surface with 0.30% or more C in basic elec. and open-hearth furnaces. The steel of the desired type could be produced with C reaching up to 0.40% without any rising in the molds, particularly when somewhat reducing slags were used. The usual slags cause an excessive gas evolution. *Recovery of C, Mn and Si in open steels* of the type described is given. The mechanism of blowhole formation is explained along the generally accepted lines for killed, semikilled and wide-open steels. J. D. Gat

Greases in every steel mill. Harry D. Kolb. *Blast Furnace Steel Plant* **27**, 939–42(1939).—Classification and properties of greases are discussed. Recommended greases for specific applications in steel equipment are given. C. B. Jenni

Recent investigations on the viscosity of liquid metals and alloys. W. Claus and F. Blank. *Metallwirtschaft* **18**, 917–24, 938–43(1939). G. G.

Nature and kinetics of growth of the intermetallic phases produced in the course of interdiffusion of metals. V. S. Bugakov and D. Ya. Gluskin. *J. Tech. Phys.* (U. S. S. R.) **9**, 1293–1301(1939); cf. *C. A.* **30**, 7952[8].—At the boundary between Cu and Cd above 400° the compd. $CuCd_3$, and below 400° also a narrow layer of Cu_2Cd_3, is formed. Ag and Zn at 400–450° give AgZn, Ag_3Zn_8 and $AgZn_3$. Ag and Cd produce AgCd and Ag_5Cd_8. Apparently the formation of phases having high heats of formation is favored. The thickness of the diffusion layer increases linearly with the square root of time. The rate of its growth is given for various phases and temps. Micro-sections and x-ray patterns were used. J. J. B.

Residual tensions produced by bending. N. N. Davidenkov and E. M. Shevandin. *J. Tech. Phys.* (U. S. S. R.) **9**, 1112–24(1939).—Expts. on a Cr-Mo steel are reported. J. J. Bikerman

Salt-bath quenching. Saburo Abe. *Tetsu-to-Hagane* **25**, 1065–73(1939).—Steel heated above the critical point and quenched in a salt bath at a temp. between 180° and 400° until it is completely transformed is tougher at a high hardness than the same steel quenched in oil and tempered to the same hardness. This treatment is very effective for C steels of about 0.7–0.9% C, Cr steels of about 0.7% C, Ni-Cr steels and Ni-Cr-Mo steels of 0.3% C. It is not effective for Ni steels of about 0.7% C, Ni-Cr steels and Ni-Cr-Mo steels of about 0.7% C. Davenport and Bain attribute to the presence of micro cracks in the oil-quenched pieces their inferior toughness. In the present expts. no cracks were found in the oil-quenched alloy steels. A. believes the superior toughness of the salt-bath quenched samples is due to the microstructure, which is different from that of steel quenched into oil, and also to the lower stress of transformation. M. Ishida

Metal coloring theory and practice. Joseph B. Kushner. *Products Finishing* **4**, No. 5, 32–4, 36, 38(1940).—Detailed directions are given for producing yellow, red, rose, green, antique and white shades of Au; sp. formulas are shown. Suitable heat treatment is discussed. Leopold Scheflan

Wear and tear in rolling and sliding friction. Anton Eichinger. *Eidgenoss. Materialprüfungs- u. Versuchsanstalt Ind., Bauw. Gewerbe, Zurich*, Diskussionsber. No. **121**, 32 pp.(1938).—Expts. on the wear and tear incurred in rolling and sliding friction led to a classification of such wear and tear under 3 heads: (1) Mech., leading to deformation of the material and subsequent fatigue affecting the marginal layer. Remedies are choice of the proper material, cooling and lubrication. (2) Electromagnetic. There is no wholly effective remedy, but the effect is less serious since the surface remains smooth and is even improved in quality. (3) Technologic-chemical, in the case of dry friction or insufficient removal of the generated heat. It leads to the formation of surface oxidation or nitration layers. This is not an unmixed evil, since such layers offer resistance to wear and tear. Combinations of the 3 classes increase the difficulty of the practical problem of wear and tear and require careful analysis of each individual case. A. H. Krappe

Role of metals in deep-well drilling. W. L. Nelson. *Oil Gas J.* **38**, No. 29, 37, 52(1939).—The metallurgy of steels required under the extreme conditions of modern deep wells. W. Andrew Wright

Metals in drilling. IX. Drilling string and casing. W. L. Nelson. *Oil Gas J.* **38**, No. 29, 69(1939); cf. *C. A.* **34**, 1285[1] and preceding abstr.—The metallurgy of steels used for drilling strings and casings. **X. Miscellaneous alloy equipment.** *Ibid.* No. 31, 53. W. Andrew Wright

Metallographic grinding with abrasives fixed in lead disks. Kurt Amberg. *Metal Progress* **37**, 146–9(1940); cf. *C. A.* **32**, 1062[3]. W. A. Mudge

Brittleness of polycrystalline solid solutions containing α-iron or magnesium as base. Ya. B. Fridman and M. S. Denisova. *J. Tech. Phys.* (U. S. S. R.) **9**, 1465–77 (1939).—The reduction of the cross section of a bar under tension was detd. as a function of the real tension. It was less for Fe + 3% or 5% of Ni than for Fe. The real tensile strength increases on addn. of Ni at −195° more than at 20°. The brittleness of Mg is lowered by 3–5% of Al but its real tensile strength remains almost unaffected. J. J. Bikerman

Recrystallization texture of aluminum after compression. Charles S. Barrett. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. **1141**, 18 pp. (1940).—Results of this study invalidate or require modification of several theories of recrystn. textures of Al, notably those relying on Taylor's "local distortion," those attributing the retention of the polycryst. texture to a retention of orientation in individual areas, and those proposing a twinning mechanism in recrystn. C. L. M.

Correlation of deformation and recrystallization textures of rolled 70–30 brass. R. M. Brick. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1144, 20 pp.(1940).—Results of an x-ray analysis of the deformation texture of heavily rolled, polycryst. 70:30 brass are given. The influence of the reductions and anneals prior to final rolling were studied. C. L. Mantell

Plastic deformation and recrystallization of aluminum single crystals. J. A. Collins and C. H. Mathewson. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1145, 17 pp.(1940).—Strain-annealing expts. are reported on a wide variety of orientations covering nearly the entire range of slip on a single system and corresponding to amts. of shear (ratio of shearing distance to distance between lamellae) at the conclusion of a test of from 0.08 to 0.57. C. L. Mantell

Tensile deformation of critically oriented brass crystals. H. L. Burghoff. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1149, 8 pp.(1940).—Deformation of 4 single-crystal specimens of 70:30 α-brass, critically oriented, provided a demonstration of the applicability of the max. resolved shear stress law with deformation possible on different slip systems in adjacent regions of a crystal at the same time. C. L. Mantell

Variation of internal friction with grain size. Clarence Zener and R. H. Randall. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1146, 7 pp. (1940).—An investigation of the precise manner in which the internal friction due to thermal currents flowing back and forth between adjacent grains varies with grain size. C. L. Mantell

The reaction conditions in refining aluminum with cryolite and sodium fluosilicate. L. Tronstad and J. H. Reimers. *Aluminium* 21, 834–8(1939).—In remelting Al, the oxide films formed on the surface and as suspensions in the melt must be removed before pouring, to ensure a sound product free of inclusions and pores and of good mech. properties and corrosion resistance. In small furnaces blowing N or Cl through the melt is a reliable method for the removal. In large melting and remelting furnaces the refining agent is added either to the solid charge (for this purpose cryolite is particularly suitable) or to the melt (in this case Na_2SiF_6 is preferable). In the system Al_2O_3–Na_3AlF_6 no Al_2O_3 is absorbed below the transformation point of the Na_3AlF_6; beginning at 650°, the absorption starts and increases with increasing temp. Cooling to below the transformation point ppts. the absorbed Al_2O_3 in submicroscopic form. Na_2SiF_6 dissociates on heating, the dissocn. pressure of SiF_4 reaching 760 mm. at 716°. The NaF formed melts only at 1000°. While the chem. reactions between Al_2O_3 and Na_3AlF_6 take place in the solid state, melting occurs in Na_2SiF_6 only above 690°, owing to formation of polyeutectic systems. Al_2O_3 is not absorbed in the crystal lattice below 680°. The absorption of Al_2O_3 by Na_2SiF_6 is due to formation of Na_3AlF_6 and SiO_2 (probably in solid soln.) and of SiF_4, which loosens the oxide films. α-Al_2O_3 is less reactive than γ-Al_2O_3. Nine references. M. Hartenheim

Copper and copper alloys. Their properties and applications. H. W. Brownsdon. *Trans. Inst. Marine Engrs.* 51, 277–89(1939).—A discussion with 8 micrographs, 10 graphs and 53 references. Ann Nicholson Hird

The boiling point of magnesium and magnesium alloys. Armin Schneider and Udo Esch. *Z. Elektrochem.* 45, 888–93(1939).—A simple, ebullioscopic method for the detn. of the b. p. of Mg and Mg alloys is described. The value 1103 ± 5° for the b. p. of Mg is in good agreement with the best literature values. Exptl. results for Mg alloys with Al, Ag, Cu, Sn and Pb up to 40 atomic % show that at temps. in the vicinity of the Mg b. p. the meltings should be regarded as "ideal concd. mixts." M. McMahon

Nickel; engineering application of the metal and its alloys. K. H. J. Clarke. *Can. Metals Met. Inds.* 3, 12–14(1940).—The uses of Ni and Ni alloys are classed in 3 groups: ferrous alloys, nonferrous alloys, and pure Ni. A survey shows that 65% of Ni entering world industry is in steel, cast iron or high Ni-Fe alloys. Ni strengthens, toughens and hardens the ferrite without loss of ductility and it lowers the crit. temps. and slows down the rate of transportation of austenite into the other forms. The use of lower quenching temps. necessary for heat treatment results in finer grain with improved elastic properties, impact resistance and toughness; it reduces fuel costs and equipment wear. Special uses are noted for low-alloy steels, corrosion and heat-resisting steels, cast irons, special alloys of the Invar and Permalloy types, nonferrous Ni alloys and pure Ni. W. H. Boynton

Melting practice, structure and mechanical properties of gray cast iron. P. Bardenheuer. *Giesserei* 26, 543–49, 564–6(1939).—The most essential characteristics for high-grade cast iron are: finest distribution of graphite, and pure pearlitic matrix. Ferrite is formed only under abnormal cooling conditions. Other forms of matrix such as sorbite, martensite, etc., can be obtained by suitable treatment. The most unfavorable condition exists when crystn. of the graphite eutectic takes place after undercooling; this occurs when no nuclei are present to initiate crystn. Too high melting temp. has this effect. This may be offset by ladle addn. of ferrosilicon or ferromanganese. Low-Cr, high-Si contents and also elevated P and S percentages counteract undercooling. Addns. of Ca silicide and similar compds. have the same effect. Moreover, the formation of the pseudo-eutectic can be avoided by suitable selection of the slag (rich in ferrous oxide). Dissolved gases can act as nuclei. Melting in the cupola has the advantage that in the production of high-grade low-C alloys the iron is not overheated; enough nuclei are preserved to take care of graphite pptn. Only in very few cases (thin sections) addns. of ferrosilicon or similar materials are required. On the other hand, melting in the reverberatory furnace is rather slow. The formation of artificial nuclei by ladle addns. to alloys with less than 3.4% C is recommended. A method to produce high-grade cast iron in the reverberatory furnace is: using malleable as raw material, placing a definite amt. of ferrosilicon on the bottom of the crucible; pouring the iron with simultaneous spraying of powd. ferromanganese. Another method is melting the iron from an inferior charge and alloying it in the furnace. The elec. furnace and high-frequency furnace are similar in their effect. The danger of overheating is greater. They allow thorough removal of S and P. The process is economical only under certain conditions. In most cases the elec. furnace is used for subsequent desulfurization. High-frequency furnaces act like arc furnaces. The same addns. are required to offset overheating. The advantage of chill casting with subsequent annealing is demonstrated. As in malleable casting it is essential that the metal solidify as white iron. The compn. was: C 2.62, Si 2.10 and Mn 1.3%. Hypereutectic alloys with high Si content show, when sand-cast, coarse graphite lamellae with agglomerated ferrite; they have good strength properties. Annealed chill castings of this type have only ferrite in the matrix; they have good strength but poor deflection and repeated-impact properties. R. P. S.

Desulfurization of pig iron with calcium carbide. C. E. Wood, E. P. Barrett and W. F. Holbrook. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 1131, 15 pp. (1939).—Metal contg. 0.01% or less of S can be produced by use of CaC_2 at a cost that does not appear to be excessive for this type of metal. Desulfurization with carbide offers some advantages over use of alkalies in the production of metal with extremely low S; as S approaches 0.02%, the efficiency of alkalies decreases rapidly, while carbide continues to be effective. Methods for adding carbide to the melt are described. Alden H. Emery

Rapid dephosphorization of steel by a solid flux. Paul Girod. *J. four élec.* 48, 97–8(1939).—P in Thomas elec. steel can be reduced to 0.02% by placing 1.7% by wt. of the steel of a patented mixt. of iron oxide, lime fluxing agent and activating agent in the ladle before the molten steel is added. Ladle preheat should be to 500° to 600°. If P must be reduced to 0.015% the dephosphorizer is spread on the hearth of the finishing furnace, then the metal is poured in. C. F. Bonilla

Influence of the treatment of the surface of the notch on the cold brittleness of steel specimens. E. M. Shevandin. *J. Tech. Phys.* (U. S. S. R.) **9**, 1103–11(1939).—The crit. interval of brittleness is not affected by the state of the surface of the notch (whether made by file or chisel, whether etched by HNO_3 or not, etc.). The sudden transition on a lowering of the temp. from partly brittle to wholly brittle fractures of notched specimens is produced by fissures along the boundaries of grains. Specimens with many indentations show a narrower crit. interval than those with one notch. J. J. Bikerman

Relation between the critical temperature of cold brittleness and the rate of deformation. N. N. Davidenkov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1051–62(1939).—A material becomes brittle at the temp. at which its yield value exceeds its brittleness value; the latter is independent of temp. The theories of Becker (*C. A.* **21**, 1385) and Prandtl (*Z. angew. Math. Mech.* **85**(1928)) 3 connecting the yield value with temp. and rate of deformation v give similar relations between the crit. temp. and v for intact specimens, but different expressions for notched specimens. Study of notched samples has, therefore, a special importance. J. J. Bikerman

New device for studying the cold brittleness of steel at high velocities of impact. F. F. Vitman. *J. Tech. Phys.* (U. S. S. R.) **9**, 1063–9(1939).—A knife (or a double 4 knife for notched samples) is fixed to a wheel which can be rotated at various speeds so as to change the rate of impact of the knife on the specimen. The deformation of notched steel at which a fracture takes place decreases when the rate of impact increases; at the rate of 50 m./sec. the deformation became zero (i. e., the specimen became brittle). J. J. Bikerman

Influence of the rate of deformation on the cold brittleness of steel. I. F. F. Vitman and V. A. Stepanov. 5 *J. Tech. Phys.* (U. S. S. R.) **9**, 1070–85(1939); cf. preceding abstr. The crit. temp. of brittleness of steel cylinders (0.2% of C, av. grain size 53 μ) was at the rates v of impact of 6×10^{-4} and 83 m./sec., resp., −165 and −75° (ground cylinders) and −155 and −45° (rolled cylinders), resp. Some ground cylinders were bent; the pressure at the yield point increased from 50 kg./sq. mm. at 13° to 112 kg./sq. mm. at −170°. This pressure $p = ae^{b/t}$, t being the temp. and a and b consts. If the brittleness value is independent of the rate of impact, the relation between p and v can be found; p increases by 60% 6 when v increases 10^4 fold. 44 references. J. J. B.

Critical temperature of brittleness. T. A. Kontorova. *J. Tech. Phys.* (U. S. S. R.) **9**, 1086–9(1939).—In the relation between the rate v of impact and the crit. temp. T of brittleness (cf. Vitman and Stepanov, preceding abstr.), $v = v_0 e^{-U/kT}$, v_0 has the meaning of the ratio of the 7 breaking strength to the viscosity of the material, and U is the activation energy for transition of an atom from one to another position of equil. From Vitman and Stepanov's results U is 5200 cal./mol. J. J. Bikerman

Simplified method of determination of the critical temperature of impact brittleness. N. N. Davidenkov, N. A. Zlatin and E. M. Shevandin. *J. Tech. Phys.* (U. S. S. R.) 9, 1090–102(1939).—Notches cut on the opposite ends 8 of a horizintal diam. are broken by a wt. hitting from above, and their deformation assocd. with rupture is measured at various temps. This deformation decreases on lowering of temp. and becomes zero at the lower boundary of the "crit. interval." The position of this boundary strongly depends on the size of the ring, the depth of the indentation, etc.; but keeping all these dimensions const. it is possible to compare various steels and to obtain for them a correct order of brittleness. J. J. Bikerman

Optical method of determining the texture of transformer steel. E. S. Yakovleva. *J. Tech. Phys.* (U. S. S. R.) **9**, 1280–5(1939).—Light reflection from electrolytically etched surfaces allows detn. of the orientation of grains in metals. A steel (3.6% of Si) with grains between 5 and 0.5 mm. had, e. g., 37% of grain (cube) edges in the direction of rolling ±10°; 54% of the cube faces were inclined to the rolling plane under the angles of 30–42°. J. J. Bikerman

Steels for high-temperature service and their testing. A. E. White. *Am. Soc. Testing Materials, Bull.* No. **100**, 15–20(1939).—Methods and evaluation of short-time high-temp. tests, tension-creep tests, stress-rupture tests and surface-stability tests are briefly reviewed. L. Pessel

Austenite grain size of carbon steel. Sitiro Yanagisawa and Masaki Yamasita. *Tetsu-to-Hagane* **25**, 1027–34 (1939).—Test pieces were taken from 20 sheets of high-C steels with about the same chem. compn. which were made in both the acid and the basic open-hearth furnace. In the normalized condition, 2 kinds of test pieces showed the same results with respect to the tensile test, but in Charpy's impact test, the basic steel is inferior and the impact value depends on the coarseness and fineness of austenite grains. Further expts. were made with the McQuaid-Ehn test and it was proved that the grain size detd. by this method indicates the inherent nature of steel and that the steels having the same grain size show about the same phys. properties regardless of the kind of steel-refining furnace used. The result of the test with reference to the change of austenite grain size in the process of refining discloses that the control of grain size is necessary for the improvement of the quality of steel. M. Ishida

Austenitic manganese steels; development, structure, heat treatment; use of 10–14% manganese in these steels. J. A. De Bondy. *Can. Metals Met. Inds.* **2**, 279–81(1939).—A review. Leopold Pessel

Forms of nitrogen in chromium, nickel-chromium and nickel-chromium-molybdenum steels. Isao Hayasi and Masaru Ebisuda. *Tetsu-to-Hagane* **25**, 1035–42(1939).—Percentage of N was detd. in both HCl soln. of the steel and in the HCl-insol. residue. In the quenched state, most of the N will be dissolved in austenite or martensite of Cr, Ni-Cr and Ni-Cr-Mo steels. Tempering at high temps. will cause most of the N to sep. as $(Fe, Cr, N)_3C$, i. e., almost all N atoms will be dissolved in the space lattice of Fe_3C with Cr atoms. Ni and Mo have no effect on the N sepn. When Al in these steels exceeds 0.05%, the phenomenon will suddenly disappear. Ti will fix about 93% of the N in liquid steel as nitride when 0.7% of the Ti exists in these steels in a form that is soluble in HCl. M. Ishida

Nickel-containing permanent-magnet steels. Masaru Yamaguti. *Japan Nickel Inform. Bur., Tech. Inform.* **B-13**, 91 pp.(1939). E. H.

Determination of silicate inclusions in steel. Sasaburo Kobayasi Yosikazu Kanamori and Kasuzo Kosiya. *Tetsu-to-Hagane* **25**, 1074–80(1939).—In the detn. of silicate inclusion in steel, by Dickenson's nitric acid process (*C. A.* **20**, 2643), considerable time is taken for dissolving samples and the manipulation is comparatively tedious. In a suggested modification, samples weighing about 100 g. are treated in HNO_3 (1:3) at about 90° for 30–40 min., and the excess acid is neutralized with NH_4OH. The residual silicate inclusion is treated with $KMnO_4$ soln. and H_2O_2 as in Dickenson's process. By this rapid process, one complete analysis can be finished within only three days, and the result is sufficiently reliable. Sisco's electrolytic method (cf. *C. A.* **22**, 2718) is recommended for detn. of silicate inclusion in 18/8 steel or other high-Cr steels, which are difficult to dissolve in HNO_3. M. Ishida

A study on extruded rods of aluminum alloys. Masahide Kosaki and Hyōzi Nakata. *Nippon Kinzoku Gakkai-Si* **3**, 449–60(1939).—Excellent mechanical properties of extruded duralumin and superduralumin metals 9 are attributed to a peculiar microstructure due to extrusion. Hideo Nishimura

Effect of various additions on the crystallization of eutectic aluminum-silicon alloys. G. Gürtler and E. Schulz. *Giesserei* **26**, 537–43(1939).—The addn. of Na shifts the f. ps. of the Al-Si eutectic to a lower temp. and higher Si concn. If excessive amts. of Na are added, bands form; their appearance indicates that there may be a ternary eutectic. Strength and ductility are increased by this

refinement. Excessive Na is to be avoided on account of 1
the tendency to formation of oxide skin and foam inclusion. The properly refined alloy contains the unavoidable Fe in the form of tetragonal Al_4Si_2Fe. If over-refined or insufficiently refined (to a certain degree) these crystals do not form in the ternary eutectic but they form as coarse primarily solidified crystals. This effect can be offset by adding about 0.3% Mn; this transforms the lamellae into conglomerations, mostly dendritic; in this 2
form they are practically harmless. Addn. of 0.3 to 0.4% Co has a similar effect. If the customary 0.4% Mg is added (Mn also being present) solidification from the melt takes place as follows: primary Al crystals, binary eutectic Mg_2Si, ternary eutectic Al-Si-Mg_2-Si. In the ternary veins further Fe- and Mn-bearing crystals occur whose compn. depends on the speed of solidification. The veins with ternary eutectic are of greater hardness than the other zones. This leads to difficulty in machining 3
although it does not impair the total strength of the casting. The most effective means for avoiding vein formation is rapid cooling; thus crystal segregation is avoided. Long homogenizing annealing also yields a more uniform structure. A further way to reduce the veins is a reduction in Si to about 10%. In the Mg-bearing alloy the refinement by Mn addn. is not as important as in the plain alloy. On the other hand, lack of Mn increases the tendency to shrink-hole formation. Cu addns. act in a 4
manner similar to Mn. The addn. of 0.3% Ti increases crystn. nuclei of the primary Al crystals. One % Zr has a similar effect, but has the advantage that the Zr-bearing crystals are dendritic, whereas the Ti-bearing crystals are brittle lamellae. The addn. of P has the opposite effect from Na: it brings about a finer distribution of the primary Si, while the eutectic is coarsened. For some applications, e. g., bearing surfaces, a structure with 5
evenly distributed hard crystals such as produced by P in a 21% Si alloy is of particular advantage.
Richard P. Seelig

Effect of titanium and iron on aluminum-silicon alloys. Hideo Nishimura and Eitaro Matumoto. *Suiyokwai-Shi* **10**, 105-12(1939).—Ti in less than 0.5% has practically no effect on the properties of Silumin, and the alloy is amenable to the usual modification by metallic sodium, but when there is also present with Ti about 6
0.5% of Fe the refining effect of Na is overcome by the growth of the ternary compound $Al_3Fe_2Si_2$; this produces a coarse, brittle material. Hideo Nishimura

An investigation of superduralumin (effect of iron). Hideo Nishimura. *Nippon Kinzoku Gakkai-Si* **3**, 420–4 (1939); cf. *C. A.* **33**, 953[7].—Increase of Fe in Al alloys contg. Mg and Cu suppressed age-hardening when they were quenched at room temp. or tempered at 50 150°. 7
From the investigation of the diagram of the Al Cu Fe system, and the irregular dilatation of quenched specimens on tempering, it was ascertained that the soly. of Cu in Al is decreased by the formation of a N compd. Similarly aging of Al-Cu-Mg alloys contg. Fe is somewhat suppressed by the decrease of solid-soly. and the formation of a N compd. Hideo Nishimura

Effect of chromium addition to magnesium alloys on the rate of corrosion. Susumu Morioka. *Nippon Kinzoku Gakkai-Si* **3**, 431–6(1939).—The addn. of Cr to Mg alloys contg. Al is as effective in reducing the rate of corrosion 8
in 0.1 *N* HCl as is the addn. of Mn, but in Mg alloys contg. both Al and Mn, Cr has little or no effect. All alloys thus prepd. contained only 0.01–0.03% Cr, irrespective of Cr content in mother alloys used and it is somewhat doubtful whether the beneficial effect is due to Cr. The effects of Sn, Cd, Pb, Ca, Sb, Ni, Si, Ce, Se, Ba, Mo, V or Zr added 9
to Electron AZG alloy contg. small amount of Cr were studied. Hideo Nishimura

Copper-base alloys containing 20% of iron. Masazō Okamoto. *Nippon Kinzoku Gakkai-Si* **3**, 437–43(1939).—Of 42 copper-base alloys contg. 20% Fe and various elements as Al, Si, Zn, Co, Cr, Ni, Mn, Ag, Sn and Be, only the alloy contg. 0.6% Be, 1% Ni and 20% Fe was improved in mechanical properties by heat treatment.
Hideo Nishimura

Structural changes due to quenching and tempering of β-phase alloys of the copper-antimony system. Atomi Ōsawa and Nisaku Sibata. *Science Repts. Tohoku Imp. Univ.*, First Ser. **28**, 197-216(1939).—See *C. A.* **33**, 3736[6]. A. D.

The copper-rich alloys of the copper-nickel-phosphorus system. D. K. Crampton, H. L. Burghoff and J. T. Stacy. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. **1142**, 17 pp.(1940).—The solidus surface and limits of α solid soly. were detd. for Cu-Ni-P alloys contg. up to 8% Ni and 1% P. Soly. of Ni and P decreased markedly with decreasing temp., as little as 0.2% Ni + P forming a second phase at 500° when present in suitable proportions. Because of this low soly., attractive combinations of cond. and strength were shown to be obtainable in quenched and aged alloys. Best properties were found to be obtained in alloys in which the ratio of Ni to P was about 5:1. The exact nature of the pptg. phase was not established in the investigation, but it appeared that the phase pptd. in the age-hardening range of temps., at and below about 500°, was different from that pptd. at somewhat higher temps. Investigation of the properties of alloys contg. Ni and P in the ratio of about 5:1 showed that the most useful hardenability is attained in alloys contg. about 1.25 to 1.5% Ni + P and that hardness or strength attainable by age-hardening increases only gradually for higher alloy contents. Such alloys were found to be capable of extensive cold-working after age hardening, so that the strength could be still further increased. Addn. of alloying elements such as Sn, Cd and Zn yielded slightly modified but also attractive properties, strength being increased while cond. was somewhat decreased. C. L. Mantell

Ternary α-solid solution of copper-nickel-silicon alloys. Masazō Okamoto. *Nippon Kinzoku Gakkai-Si* **3**, 411–20 (1939); cf. *C. A.* **33**, 3315[2].—The solid-soly. of the α-field of the Cu Ni-Si alloy system was detd. The phases pptd. from the α-solid solns. are found to be χ (which further decomps. slowly into α and γ), γ, γ′ or β_1. The aging behaviors of about 70 specimens of the ternary supersatd. solid solns. quenched at temps. at which the thorough soln. into α-solid solns. takes place, by tempering at 435–550°, were exaind. by a Vickers hardness tester. The alloys on the line $CuNi_2Si$ shown by Corson (cf. *C. A.* **21**, 1090) show marked age-hardening, but those alloys cannot always be said to show the max. age-hardening. E. g., the alloys 0.5% Si-3% Ni-balance Cu and 0.5% Si-6.0% Ni-balance Cu show good hardenabilities. The marked hardenability by tempering can be obtained in the alloys having the γ′-precipitant and the large soly. change. Hideo Nishimura

Transformations in eutectoid alloys of copper and tin. III. Conditions of formation of the β′-phase. I. Isaichev. *J. Tech. Phys.* (U. S. S. R.) **9**, 1286–92(1939); cf. *C. A.* **28**, 4356[5].—The β′-phase of martensite type is obtained on quenching of alloys contg. 23.6–25% of Sn. It has a definite orientation relative to the β-phase from which it is prepd. X-ray patterns were used. J. J. Bikerman

The preparation of solid chromium-nickel alloys by reduction of chromic oxide in the presence of nickel. G. Grube and K. Ratsch. *Z. Elektrochem.* **45**, 838–43(1939). —The reduction of Cr_2O_3 in the presence of Ni by H_2-H_2O mixts. at temps. of 1100°, 1200° and 1300° was studied. Alloys contg. from 0.09 to about 69% Cr were obtained. Curves are given showing the O_2 pressures (calcd. from the known dissocn. of steam) of Cr_2O_3 in equil. with various Cr-Ni alloys. H. C. Thomas

Production of solid columbium-nickel alloys by reduction of columbium pentoxide in the presence of nickel. G. Grube, O. Kubaschewski and K. Zwiauer. *Z. Elektrochem.* **45**, 881–4(1939).—Previous literature states that pure Cb_2O_5 is reduced only to Cb_2O_3 in H_2 at atm. pressure. Reduction to the metal was successful in pressed mixts. of Ni carbonyl powder and Cb_2O_5. Metallic, compact Cb-Ni alloys with a Cb content of 37% were obtained at 1100–1150° in dry H_2. Appreciable H_2 absorption by the alloys can be avoided if H_2 treatment is stopped immediately after the conclusion of the reduction. Alloys ob-

tained in this way were used for thermal, microscopic and x-ray expts. on the phase diagram of the Ni-Cb system. Addn. of Cb to Ni lowers the solidification temp. to a eutectic melting at 1265°; the eutectic point is assumed at 24% Cb. At the eutectic temp. approx. 20% Cb is dissolved in solid Ni; with decreasing temp. the soly. decreases decidedly. Between 24 and 31% Cb a type of crystal crystallizes from the melt which possibly has the formula Ni_3Cb. M. McMahon

Temper-hardening of nickel alloys containing silicon. Keizō Iwase and Masazō Okamoto. *Nippon Kinzoku Gakkai-Si* **3**, 405–11(1939).—Ni alloys contg. less than 9% Si were quenched at the temp. at which complete solid soln. is obtained and tempered at 550-700°. The alloys contg. 7% Si showed max. hardenability, even if the alloys contg. 9% Si were harder. The addn. of 5% and 10% of Cu raises the hardness of alloys both of tempered and quenched states with the shortening of the tempering time required to attain the max. hardness. The influences of 2% of Fe or 2% of Co on the temper-hardening of Ni-Si alloys are similar. Both elements decrease the aging rate of the alloys and make the temper-hardenability large. The addn. of Al hardens the alloys, the form of the time-hardness curve resembling that of Ni-Si binary alloys. Five % Si-Ni alloy showed temper-hardening upon the addn. of more than 4% Mn. Hideo Nishimura

Low-temperature silver-brazing alloys. H. A. Folgner. *Iron Age* **142**, Pt. II, No. 15, 161–2, 164–9, 290(1938).—The applications of Sil-Fos (Ag 15, Cu 80, P 5%) and Easy-Flow (Ag 50% with equal proportions of Cu, Zn and Cd) are described. A special flux is required. B. C. P. A.

The influence of different elements on the system iron–iron sulfide. Rudolf Vogel. *Naturwissenschaften* **27**, 761–4(1939).—A review of recent work by V. and coworkers on the effect of foreign elements on the Fe-FeS equil. Part of the work has been published: for C (*C. A.* 25, 5655), for P (*C. A.* **26**, 410), for V (*C. A.* **33**, 524[1]), for Cr (*C. A.* **32**, 4125[7]), for Mn (*C. A.* **31**, 7321[9]), for Ni (*C. A.* 25, 672). Results with Si and Ti are to be published. The systems mentioned are briefly discussed and schematic diagrams given. The importance of this work for desulfurization of iron, for the prepn. of S steels and for the structure of meteorites is stressed. B. J. C. van der Hoeven

The rate of precipitation from supersaturated aluminum-magnesium solid solutions after cold-work deformation. H. Vosskühler. *Metallwirtschaft* **18**, 873–7(1939).—Two tech. Al-Mg alloys contg. 8.76 and 3.65% Mg, besides traces of Mn, Fe and Si (less than 0.72%) were annealed for 4 hrs. at 420°, quenched in water, cold-rolled (0, 20, 40 and 60%) and subsequently tempered at 200° for periods up to 1000 hrs. The effect of various periods of tempering on tensile strength, yield point, elongation and elec. resistance was recorded graphically and structurally. The tensile strength curves show first a steep drop due to crystal recovery, then a rise as a result of pptn., followed by another, gradual, drop due to coagulation of the ppts. The alloy with 3.65% Mg showed recrystn. after 1 hr. when tempered at 250° but started to recrystallize at 200° after heating for 50 hrs. H. S. van Klooster

Barrel polishing. E. G. West. *Machinery* (London) **54**, 760-1(1939); cf. *C. A.* **34**, 1285[7].—Ball-burnishing is frequently used for plated articles. The cold-working action of the balls causes hardening of the deposited metal. Care must be taken to prevent removal of the plate at corners and edges. Ag and Au deposits are polished by this method; a soap soln. is used. The resulting finish often possesses enhanced corrosion-resisting properties. Times may vary between 15 min. and 2 hrs. The burnishing for Ni is longer, up to 4 hrs. Heavier balls and still longer periods are used for Cr-plated articles. Cd, Sn and Zn plates may be ball-burnished. Pores, detrimental to corrosion resistance, may be closed to a certain extent. Slightly oily sawdust may be used for the final barreling. Richard P. Seelig

Protecting metals by organic coatings. O. J. Schierholtz. *Can. Metals Met. Inds.* **3**, 1–5, 11(1940).—A discussion of the use of org. coatings in the prevention of corrosion. Nine factors contributing to paint failures are noted. Corrosion prevention may be effected by: (*a*) exclusion of moisture and other atm. destructive agents through provision of a finishing coat which is as impermeable as possible, and (*b*) electrochem. protection in the primer coat, by including substances which tend to stifle the chem. processes which cause corrosion. The efficiency of a coating as regards exclusion can be detd. by a cond. test. Water vapor diffusion tests indicate wide differences in permeability of various org. substances. The problem of adhesion, the methods of application, primer and finishing coats, pigment dispersion and pigment-vehicle ratio, and vehicles are briefly considered. W. H. Boynton

Laboratory corrosion tests. Goldowsky. *Bull. soc. roy. belge ing. ind.* **1939**, 803–19.—A discussion of the general principles governing the choice of corrosion tests, specifically for light alloys. Service conditions, corrosive media (air, sea water, ethyl gasoline) and features of design (welds, rivets, protective coatings) are considered. Leopold Pessel

Soil-corrosion studies, 1937. Corrosion-resistant materials and special tests. Kirk H. Logan. *J. Research Natl. Bur. Standards* **23**, 515–42(1939)(Research Paper No. 1250); cf. *C. A.* **33**, 5345[9], 9267[2].—Approx. 1600 specimens of ferrous and nonferrous materials were examd. after soil exposures of from 5 to 9 yrs., and the results are tabulated. No marked differences in the corrodibility of ferrous materials prepd. by different methods were observed. Addn. of small amts. of Cr, Cu or Ni to Fe or steel had no marked effect. Ferrous alloys contg. large amts. of Cr showed definitely lower rates of loss of wt. than other ferrous materials. They had fewer pits per unit area, but the alloys contg. Cr only were pitted deeply in certain soils. Addn. of Ni to Fe-Cr alloys appeared to improve the corrosion resistance. An alloy contg. Cr 23, Ni 13, Mn 1.8% showed less corrosion resistance than one contg. slightly lower amts. of these constituents. Two ferrous alloys contg. Ni and Cu in considerable amts. showed better resistance than the other ferrous alloys with the exception of those contg. high amts. of Cr. Cu and its alloys corroded at much slower rates at most test sites than the commonly used ferrous alloys. Dezincikification affected specimens of high Zn content in several soils. Most of the coatings inspected reduced the extent of corrosion of the pipes, as compared with unprotected pipe, but became severely affected themselves. A vitreous enamel and two thick rubber coatings provided almost complete protection to the specimens to which they were applied, without showing any visible sign of deterioration. Leopold Pessel

The corrosion of aluminum in different types of mortar. L. Tronstad and R. Veimo. *Aluminium* **21**, 839–42(1939).—Cement mortars attack Al, owing to an alk. reaction; the attack increases with increasing alky., porosity and humidity of the mortar. The mortars investigated were portland cement (pH 12.75 ± 0.1), slag cement (12.75 ± 0.1), aluminous cement (11.9 ± 0.1), stucco gypsum (7.6 ± 0.1), floor gypsum (6.9 ± 0.1). Eloxation of Al does not protect it against cement mortars. Asphalt coatings on Al in alk. mortars swell considerably and are partly destroyed; asphalt emulsions in particular cannot be recommended because of their peptization. The corrosion of Al in gypsum mortars can be suppressed almost entirely by surface protection by eloxation or by coating with asphalt; adhesion is, however, not very good, especially in floor gypsum. M. Hartenheim

Corrosion-resisting properties of bronze condenser tubes. II. Electrode potential-time relations. J. Chapman and J. W. Cuthbertson. *J. Soc. Chem. Ind.* **58**, 330–4(1939); cf. *C. A.* **33**, 4941[9].—Electrode-potential measurements were obtained for four bronzes (85–87 Cu, 12–14 Sn, 0.03–0.14 P). Curves were plotted for (*a*) stagnant sea-water; and for sea-water stirred by (*b*) N_2, (*c*) air and (*d*) O_2. The 14 and 12% Sn alloys were most

resistant to *a*, *c* and *d*; whereas cupro-nickel was best in *d*. Film pretreatments were chosen from the above time-potential curves. Increased protection toward sedimentation attack was found for cupro-nickel and bronze alloys. This attack was simulated by placing fine sand on the submerged sample of condenser tubing. F. W. Fink

Cause of and remedy for pitting and corrosion of locomotive tubes and sheets with special reference to status of embrittlement. R. E. Coughlan, *et al.* *Am. Ry. Eng. Assoc., Bull.* No. 414, 214–19(1939); cf. *C. A.* **33**, 2257[1].—"Embrittlement" or "intercryst. corrosion," in riveted seams of locomotive boilers has been encountered and definitely identified on a no. of American railroads. Intercryst. cracking is not due to water conditions alone but to a combination of factors that simultaneously create following conditions: (1) An embrittling water; (2) high cold working or applied stress in the metal; (3) slow leakage and concn. in the riveted seam; and (4) contact of the concd. soln. with the stressed metal. Experience with locomotives indicates that neither Na_2SO_4 nor a combination of Na_2SO_4 and NaCl afford protection. Use of lignin-contg. materials, such as sulfite liquor, and tannins, such as quebracho, under controlled conditions has materially reduced cracking. "Embrittlement Detectors" developed by the Bureau of Mines have been applied to locomotives in different sections of the country for checking the embrittling characteristics of various water conditions, and corrective treatment is being applied where warranted. R. C. Bardwell

Corrosion of steels and protection by means of oily paints. Bancelin. *Bull. assoc. franç. techniciens pétrole* No. 50, 95–121(1939).—The effects of natural agents such as water and air on the corrosion of iron are discussed in contrast to the action of chem. agents such as acids. The prepn., testing and application of oily paints for protection against natural corrosion are outlined. E. J. Mahler

Properties of light-metal welds. Study of the corrosion resistance of welded aluminum alloys. P. Brenner. *Metal Ind.* (London) **55**, 405–8, 429–33; *Aluminium* **21**, 846–54(1939).—Sheet specimens of 8 light alloys were gas welded (butt welds) and exposed to a stirred soln. contg. 3% NaCl and 0.1% H_2O_2. At various time intervals, specimens were withdrawn for tensile tests and microscopic examn. With Cu-free alloys, the test period was extended for 2 years. Pure Al and the Al-Mn and Al-Mg-Mn alloys showed greatest resistance. After 2 years, their loss of strength was negligible, even if the welds were hammered. An Al-Mg alloy which was in the unwelded state approx. as corrosion-resistant as the above-mentioned alloys showed considerable loss of strength in the welded condition. This behavior was connected with the quantity and character of the Mg_2Al_3 compd. sepg. from the solid soln. Coarser pptns. were less harmful than fine ones and tests indicated the possibility of improvement by the use of initially heterogeneous material. An Al-Cu-Mg alloy (Pantal) lost about 20% of its strength in the unwelded age-hardened condition after a 2-year corrosion test, and about 30% in the welded condition. Re-hardening the welded material restored its strength and corrosion resistance. The Al-Cu-Mg alloy (Bondur) showed low resistance, especially after welding. Considerable improvement could be effected by the use of plated material, pure Al plate being superior to a plate of Al-Mg-Si alloy. Thirteen references. Leopold Pessel

The metallography of welded steel, cast iron and malleable cast iron. F. Roll. *Metallwirtschaft* **19**, 19–21 (1940).—A review. G. G.

The heat economy in the open-hearth furnace. Saburo Umino. *J. Fuel Soc. Japan* **18**, 635–49(English abstr. a65)(1939).—From the practical results of 42 furnaces it is concluded that about 1.45×10^6 kilocalories is necessary to increase the capacity by 1 ton of steel per hr. and that the capacity is independent of the variety of fuel. The heat consumption per ton of steel decreases with the increase of the capacity. The refining time per ton of steel is inversely proportional to the heat supplied in unit time, and the time is always longer with a cold charge than with a mixed charge of molten pig from scrap. The heat quantity to be supplied per unit time increases with the increase of the furnace size. In a charge of cold pig iron with scrap, heat of about 0.274×10^6 kilocalories must be added for an increase of 1 ton in the size of the furnace; whereas, in molten pig about 0.046×10^6 kilocalories is supplied. An increase of the furnace size, however, diminished the fuel consumption per ton of steel, almost independently of the charge. The capacity per unit size of furnace in Japan and in Germany is about 6 and 5 times that in U. S. A., resp. F. I. N.

The mixing of alloy cast irons. H. Uhlitzsch and K. Appel. *Giesserei* **26**, 266–73, 310–18(1939).—Cast-iron diagrams for 0.5% Ni, 1.5% Ni, 0.25% Mo, 0.75% Mo, and 0.5% Cr were established from about 140 Ni, Mo and Cr alloyed test melts; the diagrams include the pearlitic field for test-piece diams. of 30, 20, 10 and 6 mm. The ratio of wall thickness to test-piece diam. was detd. by comparing analysis results of the cast piece with the diagram. All 3 alloying metals broaden the pearlitic field, Ni displaces the left boundary line to the left and the right to the right, while Mo and, in a greater degree, Cr both move the limit curves to the right. From the displacement of the left pearlite line by Δ Si, the ratios (Ni: Δ Si), (Mo: Δ Si) and (Cr: Δ Si) were formed, which are found to be independent of the percentage of the added metal. Thus the plan of mixing diagram for the 3 named alloying metals succeeded in including C, Si, added metal and wall thickness or piece diam. and made possible a simple calcn. of alloying. This was checked with numerous examples of calcns. Alloy diagrams for simultaneous addns. of Ni and Cr, as well as Ni and Mo, are outlined and also examples of calcns. are used. The diagram for the simultaneous addn. of all 3 alloys can also be made. The influence of the 3 addn. metals investigated on the structure and mech. properties is briefly considered. C. B. Jenni

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Fuel economy in large British metallurgical plant (Berthelot) **21**. Cathodic behavior of Zn relative to Fe in hot water (Schikorr) **4**. Corrosion at coke plants (Bockhammer) **21**. New instrument for magnetic detn. of C in steel bath (Work, Clark) **1**. Corrosion survey (Bosby-shell, Yeaw) **21**. Mexican minerals [mining and metallurgy in Mexico] (Landero) **8**. Arc welding in pulp and paper mills (Card) **23**. By-product fuels in steel industry (Fox, Clemmitt) **21**. App. for immersing articles in plating baths and performing other like operations (Brit. pat. 508,246) **1**. App. for gas treatments of molten materials, as in removing C from Fe or its alloys (U. S. pat. 2,182,064) **1**.

Hudson, J. C.: The Corrosion of Iron and Steel. London: Chapman and Hall, Ltd. 304 pp. 18s.

Worsdale, R.: Manufacture of High Strength Light Alloy Extrusions. Melbourne: Tait Book Co. Pty. Ltd. 38 pp. 3s.; postage, 2d.

The Picture Story of Steel. New York: American Iron and Steel Institute. 47 pp.

Reducing ores such as those of iron. Frans M. Wiberg (to Det Norske Aktieselskab for Elektrokemisk Industri). U. S. 2,182,009, Dec. 5. App. is described, and a method comprising the steps of causing the ore to pass through a furnace in opposite direction to CO-contg. reducing gas, taking out a portion of the gas before it has continued through the whole body of ore, leading the portion of gas through at least one carburetor for regenerating the same with respect to CO and utilizing the same as reducing agent in the furnace, causing the rest of the gases to continue through the body of ore and supplying air to the same for effecting the required reduction temp., leading the process in the furnace so that only the partial reduction of the ore is effected, introducing the partially reduced ore together with solid reducing agent into a second furnace, where it is melted and completely reduced, and leading at least one portion of the gases generated in the second furnace through the carburetor together with

the portion of gases taken out from the first-mentioned furnace for assisting the reduction process in the furnace.

Apparatus for aerating, as in ore flotation. Lionel E. Booth. U. S. 2,182,442, Dec. 5. Various structural, mech. and operative details.

Extracting vanadium from vanadium-bearing silicates. Bruno Mayer (to Vanadium Corp. of America). U. S. 2,183,027, Dec. 12. A process of treating silicate furnace slags contg. a minor amt. of V and a relatively larger amt. of contaminant from the group consisting of Fe, Mn and Al comprises comminuting the slag, roasting it in an oxidizing atm. at a temp. of about 760–980°, and leaching the roasted slag with a mineral acid, the amt. and concn. of the acid being such as preferentially to ext. the V, leaving such ordinarily easily sol. constituents as the oxides of Fe, Mn, Al and Si for the most part in the insol. residue. Cf. *C. A.* **33**, 3546[8].

Pot suitable for use in melting metals for pressure casting. Nathan Lester (to Lester Engineering Co.). U. S. 2,182,403, Dec. 5. Various structural details.

Basic open-hearth furnaces. Alexander M. Morton. U. S. 2,182,674–5, Dec. 5. Various structural features.

Apparatus for introducing fuel into an open-hearth furnace. Levi S. Longenecker. U. S. 2,182,497, Dec. 5. Various structural and operative details. U. S. 2,182,498 relates to an open-hearth steel method which involves melting down a charge by intense flame of low luminosity directed against at least one side of the charge and refining with luminous flame alternately directed from opposite ends lengthwise of the furnace. App. is described.

Furnaces for melting and refining metals, etc. Stein and Atkinson Ltd. and Tom A. Booth. Brit. 507,936, June 23, 1939. The furnace chamber is provided with 1 or more tuyère openings which may be closed or into hich removable tuyère devices are insertable and the chamber is adapted for being maintained in rotation or in such oscillation about a longitudinal axis that the tuyère openings pass below the surface of the charge.

Continuous heat-treating furnace. Arthur H. Vaughan (to Electric Furnace Co.). U. S. 2,181,928, Dec. 5. Various structural and operative details of a forced-circulation fuel-fired furnace suitable for use in annealing metals, etc.

Metallurgical furnace suitable for heating strip metal in coils. James C. Woodson (to Lee Wilson Engineering Co.). U. S. 2,182,218, Dec. 5. Various structural and operative details.

Apparatus for heat-treatments such as hardening metal articles. Warren H. Farr (to Budd Wheel Co.). U. S. 2,182,790, Dec. 12. Various structural, mech. and operative details.

Apparatus for heat-treating and hardening the ends of railroad track rails. Frederick M. Graham. U. S. 2,182,120, Dec. 5. Various structural, mech. and operative details.

Drum furnaces for the bright-annealing of metal articles conveyed in countercurrent, with heat recovery and exclusion of air by means of a protective gas atmosphere. Deutsche Waffen- und Munitionsfabriken A.-G. Brit. 508,061, June 19, 1939. These comprise a rotating drum in which the articles are introduced through a heat-exchange zone into a heating zone, and a 2nd drum, arranged concentrically with the 1st, in which, on returning, the articles pass successively through the heating zone, then through the heat-exchange zone and finally through a cooling zone.

Apparatus for annealing portions of metal tubes, etc. Frederick C. Kuhnle (to American Brass Novelty Co.). U. S. 2,182,294, Dec. 5. Various structural, mech. and operative details.

Continuous strip annealing furnace. Albert N. Otis (to General Elec. Co.). U. S. 2,181,738, Nov. 28. Various structural and operative details of a furnace for simultaneously annealing a plurality of sep. strips.

Muffle furnace utilizing steam, for blue-finishing steel strip. Aaron Simon (to Triangle Mechanical Laboratories Corp.). U. S. 2,182,060, Dec. 5. Various structural and operative details.

Apparatus suitable for heating the ends of aluminum tubes in brazing them, etc. Philip A. Smith (to Western Cartridge Co.). U. S. 2,182,364, Dec. 5. Various structural and operative details.

Apparatus for heating metal bodies, as in effecting flame hardening. Cecil V. Eskridge (to Oxweld Acetylene Co.). U. S. 2,181,937, Dec. 5. App. for heating metal bodies comprises at least two blowpipe heads individually provided with a plurality of outlets disposed in a plurality of substantially parallel rows, the outlets of each row being disposed in staggered relation with respect to the outlets of an adjacent row, the heads having mutually abutting edges inclined with respect to the parallel rows of outlets; and means for supplying a combustible mixture of gases to the outlets.

Apparatus (with a rotatable retort and spiral screw conveyor) for continuously heating and cooling ferrous or nonferrous metals, as in bright-annealing of small pieces. Kristian A. Juthe (to American Electric Furnace Co.). U. S. 2,182,616, Dec. 5. Various structural, mech. and operative details.

Metal-treating apparatus suitable for pickling coils of metal strip. Florence C. Biggert, Jr., and Charles F. Buente (to United Engineering & Foundry Co.). U. S. 2,181,503, Nov. 28. Various structural, mech. and operative details.

Treating metal powders such as copper and iron. Joseph E. Drapeau, Jr., and Louis G. Klinker (to Glidden Co.). U. S. 2,181,123, Nov. 28. The compressibility of a powd. metal such as Cu, a Cu alloy or Fe, when compressed into solid shapes such as bearings, is improved by subjecting the powder to mech. deformation, as by use of an impact hammer, to set up internal stresses in the powder particles and thereafter heating the powder in a nonoxidizing atm. at a temp. and for a time sufficient substantially to reduce the internal stresses, but sufficiently below the m. p. to prevent sintering, while preserving the powd. character of the material.

Separating copper and zinc from their alloys. Charles R. Kuzell (to Phelps Dodge Corp.). U. S. 2,182,128, Dec. 5. App. is described, and a method which involves subjecting the molten alloy to the action of an oxidizing gas to oxidize the Zn and sweep a portion of the oxidized Zn out of the treating receptacle, subjecting the residue to the action of a reducing agent such as coke while molten to reduce contained ZnO, and vaporizing the resulting elemental Zn. U. S. 2,182,129 relates to a generally similar method in which, after the treatment with oxidizing gas, a molten oxide or slag phase contg. ZnO is sepd. from the metal phase contg. Cu and subjected to the action of a reducing agent for Zn liberation.

Zinc. Melville F. Perkins and Roland G. Crane (to American Smelting and Refining Co.). U. S. 2,181,148, Nov. 28. App. is described, and a process for treating oxidized zinciferous material such as an oxidized ore or calcine, which involves charging it, together with solid carboniferous material such as coke dust (both materials being in a fine state of subdivision), into a retort wherein the zinciferous material is reduced in suspension, passing the products of reaction as a stream to an incandescent carboniferous bed, supplying an oxidizing gas to the stream in amt. sufficient to oxidize the carboniferous suspensoids entrained in the stream and render the carboniferous bed self-cleaning, passing the stream through the bed, and recovering Zn from the emerging gases.

Porous metal articles such as bearings formed of powdered copper and tin. Wm. F. Bolesky, Walter Waleke and John A. Lutz. U. S. 2,182,741, Dec. 5. In making porous metal articles by heating compressed powd. metals such as Cu and Sn in approx. the desired shape to an alloying temp., there is incorporated in the initial mixt. a powd. material of vegetable origin such as soybean meal having a natural oil content held in its cellular structure, this material being forced to the outer surfaces of the body undergoing heating and serving to give the article a uniform porous structure.

Apparatus for testing the indentation and scratch hardness of materials such as metals. Eugene P. Polushkin.

U. S. 2,182,235, Dec. 5. Various structural, mech. and operative details.

Thin-walled internal-combustion engine pistons suitable for plating with cadmium. Russell H. McCarroll (to Ford Motor Co.). U. S. 2,181,947, Dec. 5. A sand casting is formed of Fe together with C 1.0–2.0, Mn 0.5–1.5, Si 0.5–1.5, Cu 1.5–3.5, P 0.12% or less and S 0.16% or less, the casting is heated to about 900° for 20 min., then air-cooled in 30 min. to about 650°, then reheated to about 760° and held at this temp. for an hr., then gradually cooled to about 540° in an hr., then air-cooled to room temp. and machined to finished dimensions.

Steel. John C. Witherspoon (to American Steel and Wire Co. of N. J.). U. S. 2,181,468, Nov. 28. A method of producing low-metalloid steel in a basic open-hearth furnace involves regulating the slag on the bath in the furnace so that when the C content of the bath is reduced to around 0.1% the Fe oxide content of the slag substantially exceeds the silica content of the slag, and at that time adding sufficient siliceous material to the slag to drop the C content of the bath to a C content within the range of low-metalloid steel in not more than 25 min. when operating at furnace temps. of 1650° or less.

Steel treatment. Samuel Epstein and Hugo C. Larson (to Bethlehem Steel Co.). U. S. 2,181,695, Nov. 28. In the manuf. of rimmed steel, Fe oxide and a highly oxidizing reagent such as $KClO_3$, $NaNO_3$, $KMnO_4$ or $K_2Cr_2O_7$ are added to the molten metal after tapping, and serve to control rimming action.

Alloy steel. Gustav A. Reinhardt (to Youngstown Sheet and Tube Co.). U. S. 2,182,135, Dec. 5. See Can. 385,709 (*C. A.* **34**, 1300[7]).

Steel containing lead. Oscar E. Harder (to Inland Steel Co.). U. S. 2,182,758, Dec. 5. A steel contg. C up to 1.7% and substantially uniformly dispersed Pb 0.1–0.478% has its machinability so improved by the presence of the Pb that a sawability test shows an index better than that of otherwise similar steels contg. no Pb. U. S. 2,182,759 relates to alloy steels such as those contg. 0.5–6.0% of metals such as Cr, Ni, Mo, etc., together with C up to 1.7, Si up to 2.5, P up to 0.15, S up to 0.3 and Pb 0.03–1.0%, together with Fe, and in which the Pb gives improved machinability.

Cobalt alloys suitable for dental castings. Arthur Szabo (to Nobilium Products, Inc.). U. S. 2,182,041, Dec. 5. Alloys may be formed approx. of Co 55, Cr 28, Fe or Ni 7, Pt, Pd or Ir 9, W 0.5, Si 0.2 and C and impurities 0.3%.

Iron alloys. Joseph V. Emmons (to Cleveland Twist Drill Co.). U. S. 2,183,014, Dec. 12. Alloys which are suitable for dies, etc., contain Fe together with C about 0.15–1.6, Mn about 4 or less, Cr about 3.25–6.0, Si about 3 or less, W about 8–20, Ni 0.1–10 and Mo about 12–28% of the amt. of W present. Cf. *C. A.* **34**, 1301[8].

Nickel-cadmium alloys. Franz R. Hensel (to P. R. Mallory & Co.). U. S. 2,182,380, Dec. 5. An alloy contg. Ni about 80% and Cd about 20% is suitable for elec. make and break contacts.

Electrical contacts. Franz R. Hensel and Earl I. Larsen (to P. R. Mallory & Co.). U. S. 2,182,381, Dec. 5. An alloy of Cu with Tl 20% or less is suitable for forming contacts, and may also contain Cd, Zn, Se, As, Ca, Mg, Hg or S.

Tubes, etc., for use at high temperatures in heating fluids such as in cracking oils under high pressure. Harold D. Newell (to Babcock & Wilcox Tube Co.). U. S. 2,182,177, Dec. 5. Tubes, etc., having high-creep strength and corrosion-resistance properties are formed of an Fe alloy contg. Cr about 2 0–3.25, Mo about 0.9–1.75 and C below 0.2%.

Coating screw threads. Charles E. S. Place (to Clare L. Brackett). U. S. 2,181,835, Nov. 28. A coating mixt. is used consisting of an aq. dispersion of wetted graphite in latex in the proportions of 10% or less by wt. of latex dry solids to graphite.

Apparatus for quenching articles such as those just galvanized. Ray C. Kivley (to Western Elec. Co.). U. S. 2,182,966, Dec. 12. Various structural, mech. and operative details.

Corrosion preventive compositions for coating metals. Robert B. Lebo (to Stanco, Inc.). U. S. 2,182,992, Dec. 12. A compn. suitable for coating articles of iron, Cu, brass, Al, etc., is formed of degras and an equal or smaller proportion of an alkali metal salt of an oil-sol. sulfonic acid material derived from the treatment of a petroleum oil with concd. H_2SO_4 (suitably in mixt. also with petrolatum or petroleum naphtha or a petroleum lubricating oil).

Welding seams in materials such as ferrous metals. George M. Deming (to Air Reduction Co.). U. S. 2,182,796, Dec. 12. Various details of app. and operation.

Welding flux and welding rod. Arthur R. Lytle and Thomas H. Vaughan (to Dominion Oxygen Co., Ltd.). Can. 386,702, Feb. 6, 1940. An Al-base alloy is coated with a mixt. of an inorg. welding flux and a partial polyvinyl acetal resin acetalized with propionaldehyde 52–82, butyraldehyde 42–82 or valeraldehyde 33–62%. The resin burns slowly without disagreeable odors, and without depositing a char.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Review of organic and physiological chemistry. K. Felix. *Jahreskurse ärtzl. Fortbild.* **30**, No. 11, 35–44 (1939).—A brief review of recent work on vitamin E, α-, β- and γ-tocopherols, durohydroquinone and pseudocumohydroquinone and some of their derivs., nicotinamide, adermine, aneurine, cocarboxylase, corticosterone, dehydrocorticosterone, hydroxycorticosterone, hydroxydehydrocorticosterone, progesterone, adrenosterone, *d*-amino acid oxidase, xanthine oxidase and a "new yellow enzyme." Ruth Berggren

Potential use of hydrogen fluoride in organic chemical processes. J. H. Simons. *Ind. Eng. Chem.* **32**, 178–83 (1940).—Anhyd. H_2F_2 is available in quantity, by distn. from CaF_2 and H_2SO_4, at 20–50 c. per lb. The product contains 0.1–0.2% of H_2O, less than 0.1% of SiF_4 and a trace of SO_2. It is a powerful alkylating agent somewhat analogous to $AlCl_3$ but giving less of tarry by-products. Acylations proceed smoothly and many ring closures and special reactions are catalyzed. Halogenated compds. have the less active halogens replaced by F, such as conversion of $PhCCl_3$ to $PhCF_3$. H_2F_2 catalyzes most of the reactions promoted by H_2SO_4, H_3PO_4, $AlCl_3$ and BF_3 but efforts to correlate such properties with structure were unsuccessful. In none of the condensation reactions is F introduced into the structure if halogens are absent. High efficiency, low yield of by-products or tars and ease of recovery suggest advantages in many applications. Anhyd. H_2F_2 does not react with most metals in the absence of H_2O and O_2. It can be handled in steel but not in cast iron. Cu is preferable to Fe for condensation vessels as formation of FeF_3 on the surface is believed to promote tar formation. Resins, cellulose and silica-contg. materials must be avoided. Foster Dee Snell

The development of the technical applications of hydrogenation. E. F. Armstrong and K. A. Williams. *Chimie & industrie* **42**, 234–42(1939); *Chemistry & Industry* **1940**, 3–9. E. H.

Preparation of some pure hydrocarbons for the purpose of testing the physical methods in use for the examination of hydrocarbon mixtures. I. H. I. Waterman, J. J. Leendertse and D. W. van Krevelen. *J. Inst. Petroleum* **25**, 801–8(1939); cf. *C. A.* **32**, 6847[4].—The method of synthesis and phys. properties of octylbenzene, octylcyclohexane, hexadecane, octadecylbenzene, octadecyl-

cyclohexane, and hexatriacontane are given. For these compds. the no. of rings per mol. may be derived from the sp. refraction with an accuracy of 0.2 ring per mol. In calcg. the no. of tertiary C atoms by a comparison of the no. of rings per mol. derived from the sp. refraction and also from the sp. parachor, about 1 tertiary C atom would be found, which, within the limits of accuracy of observational error, agrees with the actual content. II. H. I. Waterman, J. J. Leendertse and J. F. Sirks. *Ibid.* 809–12.—The octadecylcyclohexane prepd. from cyclohexyl iodide and octadecyl chloride has been shown to be identical with that prepd. from octadecylbenzene by hydrogenation at 200–60° using high-pressure H and Ni on kieselguhr as catalyst. Hydrogenation under these conditions did not cause undesirable structural changes. Joseph H. Wells

Physical properties of purified 2,2,3-trimethylpentane. Donald B. Brooks, Frank L. Howard and Hugh C. Crafton, Jr. *J. Research Natl. Bur. Standards* **23**, 637–41 (1939) (Research Paper No. 1259); cf. *C. A.* **33**, 2481[9].—2,2,3-Trimethylpentane was prepd. from *tert*-BuCl and MeCOEt by Grignard's reaction, the resulting methyl-*tert*-butylcarbinol converted to olefins which were fractionated, hydrogenated, and the resulting products purified and fractionated. App. and methods are described. The following properties were detd., the m. p. being in doubt: b_{760} 109.843°; dT/dp 0.0480° per 1 mm. Hg, n_D^{25} 1.40285, n_D^{15} 1.400038, dn/dt −0.000494 per degree, d_{25} 0.71617 g./ml., d_{25} 0.71218 g./ml., change of d. with temp. −0.000797 g./ml. degree. W. Purdy

Condensation of olefins and paraffins by means of sulfuric acid. H. I. Waterman, J. J. Leendertse and R. Hesselink. *Rec. trav. chim.* **58**, 1040–7 (1939) (in English). Mixts. of branched pentanes and pentenes were condensed at 0–9°, using H_2SO_4 as catalyst. The products formed (yields of 177% based on olefin) ranged from isobutane to mixts. b_{17} above 175°. Very little unsatn. remained in the products, and no cyclic compds. were present. A ratio of 3.1 of pentane to pentene was found to give the best yields in satd. products. The catalyst was very stable, having been used 7 times with no decrease in activity. The reaction is believed to take place in several or more stages, first the preliminary condensation of olefins and paraffins, then a partial destruction, then a further condensation between newly formed products. J. C. Lo Cicero

Production of active amyl alcohol from fusel oil. A. M. Birun. *Nauch. Zapiski Inst. Narodnogo Khoz. im. Plekhanova* **1938**, No. 1, 120–30; *Khim. Referat. Zhur.* 2, No. 4, 137 (1939).—The difference in the velocity of the chlorination of the active and the inactive amyl alc. was used for their sepn. The inactive amyl alc. is chlorinated 2.5 times faster, forming a chloride b. 101°. The chlorination expts. were performed by satg. amyl alc. (with α_D −2.13°, n 1.4095) with HCl under atm. pressure as well as in sealed tubes. In the 1st case the chloride was distd. off as soon as formed, in the 2nd case the alc. was satd. at 2–10° and heated in sealed tubes. After the process the chlorinated alc. was fractionated. A higher content of the active alc. was obtained from chlorination under pressure. To increase the yield of alc. it is not necessary to reach a complete satn. with HCl at room temp., but a highly active alc. with α_D 1.8° and contg. 75% of the active alc. was obtained from a complete satn. Optimum conditions for the chlorination were 108–11° for 3–5 hrs. W. R. Henn

Pyrolysis of the higher aliphatic alcohols. Henry Gault, Louis Palfray and Pao-Ting Hsu. *Compt. rend.* **209**, 999–1000 (1939).—On heating dodecanol at 200° with H under 100 kg. pressure in the presence of Raney Ni an approx. theoretical yield of undecane (I) was obtained. That this is not due to hydrogenolysis (cf. Wojcik, *et al.*, *C. A.* **27**, 1861) is proved by the same result being obtained when N replaces H. Varing the conditions showed the yield of I to increase with temp., pressure and time, and that under ordinary pressure a small quantity of lauraldehyde was actually obtained, whence it is inferred that this is first formed and then dissocd. to CO + I, the CO then reacting with H to form $CH_4 + H_2O$. C. A. S.

The nitro paraffins and their derivatives. C. L. Gabriel. *Chem. Industries* **45**, 664–8 (1939). E. H.

Preparation of aliphatic aldehydes by catalytic dehydrogenation of the alcohols in the liquid phase in the presence of nickel. Alexandre Halasz. *Compt. rend.* **209**, 1000–2 (1939); cf. *C. A.* **33**, 6255[7].—Various higher primary alcs. were heated with 5% Ni in a metal bath, the temp. being carefully regulated and kept const. The yield varies with time of heating and temp. and, though small, is generally better than obtained in any other way. Thus with lauric alc. heated at 250° the percentage of aldehyde formed increased with time to 20% after 2 hrs., but thereafter decreased. The yield also increased with the temp., e. g., after 1 hr. heating lauryl alc. at 220° gave 3.5%, at 250° 15% and at 280° 19%. Reduction of the pressure had no appreciable effect. Satisfactory results were obtained with the normal satd. alcs. contg. 11, 12, 14, 16 and 18 C. The aldehydes are readily sepd. as their bisulfite compds. C. A. Silberrad

The synthesis of polyenealdehydes by primary valence catalysis. W. Langenbeck and O. Gödde. *Atti X° congr. intern. chim.* **3**, 230–8 (1939) (in German).—Crotonaldehyde reacts with salts of piperidine to form 1-piperidylbutadiene (I) which condenses with AcH at 0°. This product is decompd. by means of Ac_2O-HOAc to piperidine and 2,4-hexadienal. I condenses with crotonaldehyde giving a product which undergoes an ionone-type of ring closure so that subsequent treatment with Ac_2O-HOAc yields dihydro-*o*-tolualdehyde and piperidine. However, if HOAc is present during the condensation, piperidine is split out before ring closure can occur and 2,4,6-octatrienal is the chief product. R. E. Reeves

Chemical constituents of sulfated oils. Robert M. Koppenhoefer. *J. Am. Leather Chem. Assoc.* **34**, 622–39 (1939).—One sample each of sulfated castor oil (I), sulfated neat's-foot oil (II) and sulfated cod oil (III) was analyzed by the usual methods and fractionated into sulfated compds., free fat acids and neutral oil by Hart's method (*C. A.* **31**, 4012[8]). The samples were com. oils of medium degree of sulfation. The fractions were examd. by the usual methods for oxidation, unsatn., hydroxylation, polymerization, etc. It was found: (1) The results of the fractionations agreed very well with those calcd. from the analyses of the oils. (2) About 20% of the combined SO_3 was lost during the fractionation, probably by thermal decompn. during removal of solvents. (3) Sulfation of I occurred primarily at the OH group, and secondarily at the double bond. Di-HO acids were identified in the fat acids recovered from the sulfated compds. (4) Sulfation of II occurred primarily at the double bonds of unsatd. acids. Monohydroxystearic acid was identified in the fat acids recovered from the sulfated compds. (5) Sulfation of III occurred at the double bonds, preferentially of the more unsatd. acids. The fat acids recovered from the sulfated compds. contained di-HO acids, and mono-HO unsatd. acids. (6) Free fat acids and neutral oil fractions from I and II were very little oxidized. Those from III were highly oxidized. (7) The neutral oil fractions contained large amts. of mono- and diglycerides. (8) Isoöleic acid was formed during the sulfation of II. H. B. Merrill

Syntheses of thioglycol from ethylene oxide and hydrogen sulfide. Hęou-Feo Tseou and Tsu-Ling Pan. *J. Chinese Chem. Soc.* **7**, 29–32 (1939).—Thioglycol is synthesized by passing ethylene oxide and H_2S through a pyrex tube filled with Fe or Al sulfide heated to 350°. When the reaction is well controlled the yield is practically quant. Wm. H. Adolph

Coördinated copper compounds with propylenediamine. Panchanan Neogi and Kanai Lal Mandal. *J. Indian Chem. Soc.* **16**, 433–6 (1939).—Attempts to prep. tris-propylenediamine salts with a view to their resolution into optical isomers led to the discovery of bispropylenediamine salts, which were not resolvable. These salts are of a violet color, very sol. in H_2O, yielding beautiful violet solns. The *d*-tartrate, *d*-camphorsulfonate and

d-nitrate were also prepd. and their rotations measured. A. H. Krappe

Synthesis of α-amino acids by means of alkylacetoacetic esters. I. V. V. Feofilaktov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 755–8(1939)(in English).—Continuing previous research (*C. A.* **34**, 378[3]), the coupling of alkylacetoacetic esters, $RCHAcCO_2Et$ (I), with benzenediazonium salts was carried out in an aq. alkali soln. in the cold for 4–6 hrs., the coupling product being a reddish brown oil (presumably of structure $RCAc(N{:}NPh)CO_2Et$ (II)), which was extd. with ether and hydrolyzed directly with alc. aq. alkali. After elimination of the alc. and acidification, the phenylhydrazone, $RC(:NNHPh)CO_2H$ (III), of the α-keto acid sepd. as a ppt. or brownish oil quickly transformed into a mass of yellow crystals. The reduction of III was carried out in alc. with Zn dust and alc. HCl in the cold (0°) for 6–8 hrs. After elimination of the alc. and of the excess HCl through distn. under reduced pressure, the residue was treated in water, first with $PbCO_3$, then with Ag_2CO_3. The filtrate was freed from the Ag by means of H_2S, and after evapn. the free α-amino acid was obtained. Similarly, isoleucine, alloisoleucine, leucine, phenylalanine, and alanine were obtained by coupling. A. H. Krappe

Synthesis of phenylalanine from benzylmalonic and benzylcyanoacetic esters through the phenylhydrazone of phenylpyruvic acid. II. V. V. Feofilaktov and E. Vinogradova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 759–60(1939)(in English).—Expts. were carried out with a view to simplifying the method of the practical prepn. of the phenylhydrazones and the alkylpyruvic acids, starting from alkylmalonic and alkylcyanoacetic esters. Accordingly, the following scheme is recommended for the synthesis:

$$RCH(CO_2Et)_2 \rightarrow RC(:NNHPh)CO_2H \rightarrow RCH(NH_2)CO_2H$$

Thus through the coupling of PhN:NOK with benzylmalonic ester the phenylhydrazone of phenylpyruvic acid was obtained with a yield of about 60% of the theoretical amt.:

$$PhCH_2CH(CO_2Et)_2 \quad [PhCH_2C(N{:}NPh)(CO_2Et)_2] \rightarrow PhCH_2C(:NNHPh)CO_2H$$

Benzylmalonic ester, used as the initial product, had the following properties: b. p. 162° 19.5 mm.; n_D^{20} = 1.4871; d_4^{20} = 1.0763; *MR* = 66.85 (calculated 66.56). Similarly, through the coupling of K diazotate with benzylcyanoacetic ester the same phenylhydrazone of phenylpyruvic acid was obtained, the yield being 30% of the theoretical amt. 3 references. A. H. Krappe

Highly condensed products from some amino acids. Yukiti Go and Hisaya Tani. *Bull. Chem. Soc. Japan* **14**, 510–16(1939)(in German); cf. *C. A.* **29**, 1779[5].—Glycine-*N*-carboxylic anhydride, $OC.NH.CH_2.CO.O$ (I), m. 100°, is obtained in 92% yield from 35 g. (1 mol.) *N*-carbobenzoxyglycine on warming with 100 g. (5 mol.) $SOCl_2$ for about 1 hr. at 40° with the exclusion of moisture. *l*-Alanine-*N*-carboxylic anhydride, $OC.NH.CHMe.CO.O$ (II), m. 92° (decompn.), is obtained in 70% yield by warming 2.8 g. *N*-carboxymethoxy-*l*-alanine (from *l*-alanine and $ClCO_2Me$) with 4 cc. $SOCl_2$ at 40°, distg. off the excess $SOCl_2$ and heating to 65°. *l*-Leucine-*N*-carboxylic anhydride, $OC.NH.CH[CH_2CHMe_2].CO.O$ (III), m. 77–8° (decompn.), is obtained in 90% yield in an analogous way as II. I, II, and III give high-mol. compds. with the loss of CO_2 when kept in humid air or heated to 100° in pyridine. Expts. with polyglycine from I and with poly(glycine + leucine) (from equimol. amts. of I and III on heating in pyridine) showed that these compds. are not digested by enzymes. These findings and röntgenograms of the high-mol. compds. suggest that the compds. do not contain shorter chains than those present in hexapeptides. It is, however, impossible to decide whether the polymerization products contain long chains only or mixts. of long chains and rings. D. Stern

The optical activity of vitamin C. Br. Jirgensons. *Acta Univ. Latviensis, Kim. Facultat.* Ser. 4, No. 11 (in Lettish, 441–52; in German, 453)(1939).—The 0.05 *M* *l*-ascorbic acid showed $[\alpha]_D^{19}$ 24.1°. In the presence of 0.05–5.0 *M* HCl, HNO_3, H_2SO_4, or AcOH the optical activity remained unchanged. In the presence of 0.01–0.02 *M* NaOH, KOH, $EtNH_2$, Et_3N or NH_4OH it rose to 50°; in the presence of 0.05–0.25 *M* bases it ranged from 100 to 144°. In the presence of inorg. salts ranging from 0.1 to 2.0 *M* (NaCl, Na_2SO_4, KCl, KCNS, $FeSO_4$, $NiSO_4$, $MnCl_2$, $AlCl_3$, $SbCl_3$, $K_4Fe(CN)_6$) the optical activity changed very little; 2 *M* $CaCl_2$ lowered it; *M* $MgSO_4$, 0.1 *M* $BeSO_4$ and *M* $ZnSO_4$ raised it into the range 28–36°. $ZrO(NO_3)_2$ alone, with HCl or with NaOH elevated the optical activity as high as 70°. $Th(NO_3)_4$, especially in the presence of HCl or NaOH, increased it as high as +196°; in order to achieve this value the ratio: 1 mol. ascorbic acid, 2 mols. $Th(NO_3)_4$ and 5.5 mols. NaOH had to be maintained. In the presence of EtOH, MeOH or PrOH the optical activity rose slightly (30–50°); the amino acids glycine, alanine, valine, $NH_2CH_2CH_2CO_2H$, and sarcosine were more effective than the alcs., raising the activity into the range 45–60°; $NH_2CH_2CH_2CO_2H$ was the most potent of this group. F. Maresh

***tert*-Butyl esters of aliphatic dibasic acids.** H. J. Backer and J. D. H. Homan. *Rec. trav. chim.* **58**, 1048–61(1939)(in French).—Di-*tert*-Bu esters (I) of aliphatic dibasic acids with an even no. of C atoms (up to sebacic) have higher m. ps. than the neighboring odd-numbered acids. I also have higher m. ps. than the corresponding Me and Et esters with the single exception of $MeO_2C(CH_2)_8CO_2Me$. The striking oscillation in the m. ps. of I is apparent in the following series of m. ps. of the esters from the *oxalate* (II) to the *sebacate* (III) resp.: 71°, −7°, 36°, −10°, 32.5°, −15°, 29°, −18°, 18°. Two general methods were followed in the prepn. of the esters, the 1st, using C_5H_5N as catalyst, the 2nd Me_2NPh (IV). The acid chlorides (0.2 mol.) in 2 vols. of anhyd. C_6H_6 are added dropwise to 1 mol. Me_3COH (V) (dried over Na) in 0.6 mol. C_5H_5N (distd. over KOH). The reaction mixt. is agitated and maintained below 50°. Upon completion of the 1st stage the soln. is heated in a water bath for 3 hrs., cooled and the ppt. filtered and washed with C_6H_6. The filtrate is made acidic to Congo red and the 2 layers formed are sepd. The H_2O layer is extd. thrice with C_6H_6 and the combined C_6H_6 solns. are washed successively with 2.0 *N* H_2SO_4 and Na_2CO_3 soln., then dried over anhyd. Na_2SO_4 with a little fused K_2CO_3. The C_6H_6 is removed *in vacuo* and the products (except II) are likewise distd. *in vacuo*. When IV is used as catalyst $CHCl_3$ (dried over $CaCl_2$) is used as solvent and extns. are made with petr. ether. The following di-*tert*-Bu esters were prepd.: II (87% yield); *malonate*, b_{10} 93° (78% yield); *succinate*, b_{11} 115° (31%); *glutarate*, b_{13} 125.5°; *adipate*, b_{10} 134° (60%); *pimelate*, b_{11} 174° (60%); *suberate*, b_{11} 160° (64%); *azelate*, b_{13} 174° (70%); *sebacate*, b_{13} 185° (74%). Several mixed ester-salts were prepd. by sapon. of the acid radicals with alc. KOH. J. C. Lo Cicero

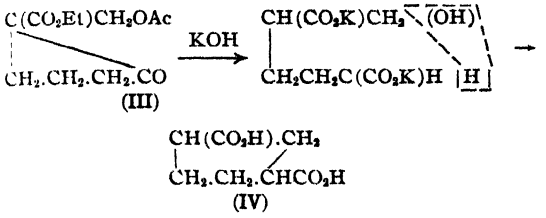
The reactivity of carbonyl cyanide. R. Malachowski. *Atti X° congr. intern. chim.* **3**, 240–1(1939)(in German).—Carbonyl cyanide resembles $COCl_2$ in its reactions with primary and secondary amines, HO groups and acid anhydrides. $PhNMe_2$ undergoes a condensation with the CO group of $CO(CN)_2$. No exptl. details. *Deuterium cyanide*, d_{15} 0.7198, m. 0.115° and b. 0.75° above the m. p. and b. p., resp., of HCN. R. E. Reeves

Diene syntheses. S. Goncharov. *Akad. Nauk. U. R. S. S., Inst. Khem. Tekhnol.* (Kiev) **1937**, 83 pp.—The progress made in the chemistry of cyclodienes is reviewed and analyzed. Attention is drawn to the ease and completeness with which a great many important compds. have been synthesized since Diels began his work with the azodicarboxylic esters (*C. A.* **4**, 319; **5**, 702; **18**, 2331; **22**, 1144). The study of group relationship in the diene syntheses helped in solving some of the broader problems

of stereochemistry. Numerous references are given. B. Gutoff

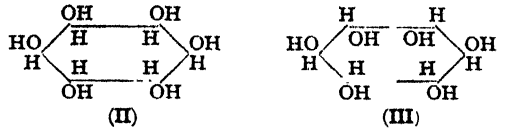
Aldehydo acids and aldo-enol lactones. IV. Specific transformations of certain aldehydo acids and γ-aldo-enol lactones in an alkali medium. M. M. Shemyakin. *Compt. rend. acad. sci. U. R. S. S.* 24, 768–72(1939)(in English); cf. *C. A.* 34, 89[1].—In continuing previous research, the transformation of certain aldehydo acids and γ-aldo-enol lactones in contact with alkalies leading to a dicarboxylic acid was examd. more closely. The acids so produced are of particular interest for stereochemistry. Five of them are truxillic acids, the remaining 6 truxinic acids, 2 of the latter being *new*, viz.: (1) m. 196°, empirical formula $C_{18}H_{16}O_4$. Isomerization into a known truxinic acid proved it to be 1 of the diphenylcyclobutanedicarboxylic acids so far unknown; (2) m. 245°. Some particulars about the truxinic acid, m. 196°, prepd. in the previous paper and its derivs. conclude the article. 7 references. A. H. Krappe

Norcamphoric acid (1,3-cyclopentanedicarboxylic acid). Henry Gault and Lyse Daltroff. *Compt. rend.* 209, 997–9(1939).—Et 2-ketocyclopentanecarboxylate (I) condenses with HCHO in the presence of K_2CO_3 to give Et 1-hydroxymethyl-2-ketocyclopentanecarboxylate (II), which cannot be sepd. from unaltered I. Sepn. was effected, however, by fractional distn. of the acetylation product of the mixed esters; that of the enolic form of I b_{17} 130°, and that of II b_{17} 160°. The latter (III) on hydrolysis gives norcamphoric acid (IV) in almost theoretical yield:



the ring being broken between 1 and 2, and reformed between the CH_2 of the CH_2OH group attached to 1 and 3. It has not so far been possible to det. whether the product is the cis or trans isomer. C. A. Silberrad

The constitution of conduritol and certain cyclohexanetetrols. Gerda Dangschat and Hermann O. L. Fischer. *Naturwissenschaften* 27, 756–7(1939).—Previous work on quinic and shikimi acids (*C. A.* 33, 5374) was continued with the related compds. conduritol (Kubler, *C. A.* 3, 1150), a tetrahydroxycyclohexene, and betitol (v. Lippmann, *Ber.* 34, 1159(1901)), a cyclohexanetetrol, m. 224°. Conduritol acetonates to a monoacetone compd., m. 100–1°, indifferent to $Pb(OAc)_4$, hence carrying the acetone group on C atoms 4,5 (cis). It is assumed that the 3- and 5-HO groups are trans. The diacetate of acetonconduritol, m. 79°, is oxidized by neutral $KMnO_4$ to a di-HO compd. (I) which upon treatment with $Pb(OAc)_4$ in C_6H_6 and further oxidation with $EtCO_3H$ and sapon. yields mucic acid. The tetraacetate of conduritol, $b_{0.6}$ 165°, oxidized in similar manner gives an intermediary product, tetraacetylmucic dialdehyde, decompg. 184°, and after $EtCO_3H$ treatment tetraacetylmucic acid, decompg. 246°. Allomucic dialdehyde tetraacetate, decompg. 164°, tetraacetylallomucic acid, decompg. 228°, and allomucic acid are prepd., resp., by acetylation of I followed by mild sapon. and $Pb(OAc)_4$ treatment, $EtCO_3H$ oxidation and by sapon. I is derived from 6,1,2,3/4,5 inositol (II), m. 270–5°, for which the name alloinositol is proposed. From the oxidation product of tetraacetylconduritol another inositol, decompg. 285–90°, structure 3,6/1,2,4,5 (III), is derived and named *mucoinositol*. This structure disagrees with the work of Grotepass (*Diss. Göttingen* 1931). The mucoinositol may be identical with the Posternak epiinositol (*C. A.* 31, 1774[9]). Catalytic reduction of conduritol gives dihydroconduritol, m. 204°; its acetone compd., m. 80°, is obtained by reduction of the conduritol acetone compd. By reduction of 4,5-isopropylidene-3,4,5-trihydroxycyclohexanone from quinic acid with Ni and H_2 under pressure or with $(iso\text{-}PrO)_3Al$ there is obtained after deacetonation a tetrol, m. 208°, α_D −8.3° (H_2O). By the Ponndorf method (*C. A.* 20, 1611) is obtained from the same substance after deacetonation an isomer, m. 151°, α_D −61.0° (H_2O). The 3 HO groups in both compds. have the same position as in quinic acid, consume 2 moles HIO_4. Reacetonation is difficult. Neither of the isomers is identical with betitol.



B. J. C. van der Hoeven

Preparation of several styrene derivatives by the action of organomagnesium compounds on *p*-cyclohexylacetophenone. I. Zugrăvescu and Mme. S. Zugrăvescu. *Bul. Soc. Chim. Romania* 20A, 225–30(1938).—In continuing the previous study (cf. *C. A.* 33, 4228[3]), efforts were made to replace the 2 Ph radicals by aliphatic groups by the action of the Grignard reagent on $p\text{-}C_6H_{11}C_6H_4\text{-}COMe$ (I) with a view of obtaining a carbinol of the type $p\text{-}C_6H_{11}C_6H_4C(OH)R_2$. This reaction, however, leads to mixts. of an alc. and an olefin (styrene deriv.) from which it was impossible to sep. the desired product, the formation of the olefin being favored by using an excess of the Grignard reagent, which apparently serves as a dehydrating agent. Treating 30 g. of I in Et_2O with the Grignard reagent prepd. from 25 g. EtBr and 4 g. Mg followed by heating 4 hrs., replacing the Et_2O with C_6H_6 and heating an addnl. 6-hr. period, and decompg. with AcOH after standing for 12 hrs., gave 26 g. *2-p-cyclohexylphenyl-2-butene*, b_{14} 169°; the structure of this olefin was proved by oxidizing with $KMnO_4$ to I and AcOH. Similarly, treating 30 g. I with the Grignard from 23 g. PrBr and 4 g. Mg yielded 18 g. of *2-p-cyclohexylphenyl-2-pentene*, b_{12} 157–8°, oxidation of which gave I and $EtCO_2H$. Treating 30 g. I with the Grignard reagent from 25 g. BuBr and 4 g. Mg yielded *2-p-cyclohexyl-2-hexene*, b_{18} 191–2°, oxidation of which gave I and $PrCO_2H$. I and PhMgBr likewise yielded *α-p-cyclohexylphenyl-α-phenylethylene*, b_{13} 223–4°. The above styrenes readily decolorized Br solns. John F. Lontz

Polystyrene. William C. Goggin. *Chem. Industries* 45, 674–8(1939). E. H.

Reaction capacity of the methyl group. V. Nitro- and dinitrotoluenes. Louis Chardonnens and Peter Heinrich. *Helv. Chim. Acta* 22, 1471–82(1939)(in French); cf. *C. A.* 28, 1343[6]; 33, 8596[4], 8597[3].—*p-Nitrobenzaldehyde p-dimethylaminoanil:* 13.7 g. *p*-nitrotoluene (I), 5 g. $p\text{-}ONC_6H_4NMe_2$ (II), 10.6 g. calcined Na_2CO_3 and 150 cc. alc. were refluxed for 40 hrs. After prolonged cooling the ppt. was washed with alc. and then with water, and dried. One crystn. from benzene and 2 from alc. gave 0.4 g. (1.5% yield) bronze-red platelets, m. 219°, sol. in benzene, Me_2CO and $CHCl_3$, difficultly sol. in alc. and Et_2O. *4-Nitrostilbene:* 13.7 g. I, 10.6 g. BzH and 4 g. piperidine (III) were refluxed at 175–85° for 16 hrs. The black residue was washed with a very small amt. of MeOH, dissolved in 10 cc. boiling glacial AcOH and allowed to stand for several days. Crystn. of the brown ppt. from AcOH and then MeOH gave 0.8 g. (3.5% yield) yellow needles, m. 155.5°. *4-Nitro-4'-dimethylaminostilbene:* 1.37 g. I, 1.49 g. $p\text{-}Me_2NC_6H_4CHO$ (IV) and 0.4 g. III were refluxed at 175–185° for 16 hrs. The dark red mass was ground with a little cold glacial AcOH, and the ppt. dried at 150°. Crystn. from AcOH and benzene gave 0.6 g. (22% yield) brick-red platelets, m. 250°. The corresponding reactions with *o*-nitrotoluene were always neg. *2,4-Dinitrotoluene* (V) and II: 1.82 g. V, 1.5 g. II, 1.1 g. calcined Na_2CO_3 and 100 cc. alc. were refluxed for 1, 2, 3 and 5 hrs. Each reaction mixt. was concd. to 20 cc. by distn. and allowed to stand for 24 hrs. The ppts. were washed with very little alc. and then with water,

and dried. A benzene soln. contg. 0.4 g. of the crude product was analyzed chromatographically on Al_2O_3. The 2 principal zones contained the azomethine (VI) and the nitrone (VII). Heating for 1, 2, 3 and 5 hrs. gave 1.84 g. crude product (*A*), m. 176–8°; 1.65 g. crude product (*B*), m. 190–2°; 1.72 g. crude product (*C*), m. 194–203°; 1.95 g. crude product (*D*), m. 196–200°; resp. Analysis of 0.4 g. *A*, *B*, *C* and *D* for crude VI gave 0.162 g., m. 202°, 0.252 g., m. 201°, 0.253 g., m. 204°, and 0.226 g., m. 200°, resp., and for crude VII gave 0.150 g., m. 190°, 0.114 g., m. 188°, 0.044 g., m. 184° and 0.003 g., m. 192°, resp. Combination and crystn. of the samples gave VI, m. 209–10°, and VII, m. 194°. The 2 following expts. were made to det. whether VI could be formed from VII by loss of O_2: (1) 3.3 g. VII, 1.1 g. calcined Na_2CO_3 and 100 cc. alc. were refluxed for 20 hrs. The vol. was reduced to 20 cc. by distn. After cooling the ppt. was washed with water and dried, and the product treated with 50 cc. boiling benzene. Crystn. of the residue from Me_2CO gave 2.5 g. violet cryst. powder, m. 238° (decompn.). (2) 0.33 g. VII, 0.11 g. Na_2CO_3, 0.15 g. II and 10 cc. alc. were boiled for 20 hrs. The vol. was then reduced to 2 cc. Purification gave 0.16 g. violet ppt., m. 237 8°. Both violet compds. are the 2,4-dinitro-*p*-dimethylaminobenzanilide. VI was not found in the mixts. *2,6-Dinitro-4'-dimethylaminostilbene:* 1.82 g. 2,6-dinitrotoluene (VIII), 1.49 g. IV and 0.4 g. III were refluxed for 5 hrs. at 150–60°. The hot reaction mass was poured into a flask, dissolved in 20 cc. boiling glacial AcOH and allowed to stand. One crystn. from benzene and one from glacial AcOH gave 1.7 g. (55% yield) large irregular bright violet-red crystals with a dark green metallic luster, m. 139°, very sol. in Me_2CO, pyridine and $PhNO_2$, difficultly sol. in AcOH and benzene, very slightly sol. in alc. *2,6-Dinitrobenzaldehyde p-dimethylaminoanil:* 18.2 g. VIII, 5 g. II, 10.6 g. Na_2CO_3 and 200 cc. alc. were refluxed for 32 hrs., filtered hot, evapd. to 50 cc. and allowed to cool. The black cryst. mass was washed with very little cold alc., then with much water, and dried *in vacuo* over $CaCl_2$. Chromatographic analysis of the benzene soln. on Al_2O_3 gave a violet-red zone (next to lowest zone), which was extd. with Me_2CO. Evapn. of the solvent and crystn. from a mixt. of alc. and Me_2CO gave 0.4 g. (about 1% yield) small violet-red prisms with a green luster, m. 150°, easily sol. in benzene and Me_2CO, slightly sol. in alc. *2,5-Dinitrostilbene* (IX): 18.2 g. 2,5-dinitrotoluene (X), 10.6 g. BzH and 4 g. III were refluxed for 16 hrs. at 165–75°. After treatment with steam the cooled black mass was washed with MeOH, dissolved in 50 cc. hot glacial AcOH and filtered. The filtrate was reduced to 20 cc. The brown cryst. powder, which sepd. slowly on standing, was recrystd. from glacial AcOH and from alc., giving 4.5 g. (16% yield) small brown needles, m. 149.5°, readily sol. in cold benzene and Me_2CO and in hot AcOH, moderately sol. in alc. *2,5-Dinitrostilbene dibromide* (XI): 2.7 g. IX was dissolved in glacial AcOH, 1.6 g. Br_2 added dropwise with shaking, the mixt. heated for 20 min. on a water bath and boiled for 2 min. On cooling 1.8 g. small yellow needles, m. 203–5°, sepd. Diln. of the mother liquor with water contg. a little H_2SO_3 gave 0.8 g. crude XI, m. 200°. The total yield of crude XI was 60%. Crystn. from benzene gave a fine white powder and from AcOH, small, slightly yellow needles. Pure XI, m. 220–2°, is easily sol. in cold $PhNO_2$, pyridine and Me_2CO and in hot benzene and glacial AcOH, and very slightly sol. in alc. *2,5-Dinitro-4'-dimethylaminostilbene:* 1.82 g. X, 1.49 g. IV and 0.4 g. III were refluxed for 8 hrs. at 160–70°. The warm black mass was poured into a flask, 25 cc. MeOH added, the mixt. heated to boiling and allowed to stand for 12 hrs. The ppt. was washed with MeOH and dried at 100°. Crystn. from Me_2CO and benzene gave 0.45 g. (14% yield) fine violet needles, m. 168°, fairly sol. in AcOH, Me_2CO and benzene, slightly sol. in alc. *3,4-Dinitrobenzaldehyde p-dimethylaminoanil* (XII): 18.2 g. 3,4-dinitrotoluene, 7.5 g. II, 10.6 g. Na_2CO_3 and 200 cc. alc. were refluxed for 8 hrs. After prolonged cooling, the ppt. was washed with very little alc., then with much lukewarm water, and dried at 120°. One crystn. from Me_2CO and 2 from benzene gave violet platelets (XIII), m. 220°. Analyses gave no definite information as to their nature. The Me_2CO mother liquor from XIII was reduced to half its vol. The resulting product, after 2 crystns. from Me_2CO, gave 2.8 g. XII (9% yield), dark green needles, m. 186–8°, very sol. in $PhNO_2$ and pyridine, fairly sol. (with a violet-red-brown coloration) in Me_2CO and benzene, slightly sol. in alc. *3,4-Dinitrobenzaldehyde* (XIV): 3.14 g. XII was dissolved in cold benzene and the soln. shaken with 500 cc. 15% HCl; the HCl soln. was renewed 2–3 times. The benzene layer was washed with dil. Na_2CO_3 and water, and dried over anhyd. Na_2SO_4. The solvent was distd. off, the oily residue ground with a little petr. ether and the ppt. dried on a porcelain plate. Crystn. from water and from petr. ether contg. 5% benzene gave 0.65 g. yellowish needles, m. 62.5°, readily sol. in the ordinary org. solvents except petr. ether. *Phenylhydrazone of* XIV: To a benzene soln. contg. 0.15 g. $PhNHNH_2$ and 1 drop glacial AcOH was added 0.2 g. XIV. Crystn. of the resulting ppt. from benzene gave 0.2 g. irregular violet-red crystals with a green luster, m. 184 6°, easily sol. in $PhNO_2$, pyridine and Me_2CO, fairly sol. in benzene, slightly sol. in alc.

Ruth Berggren

Simple formation of *o*-nitrosophenol from benzene and hydroxylamine by air oxidation. Preparation of *o*-nitrosophenol and nitrosocresol from benzene or toluene by hydrogen peroxide oxidation. Oskar Baudisch. *Naturwissenschaften* **27**, 768–9(1939).—Solns. of the Cu salts of nitrosophenol are prepd. as follows: A soln. of 1 g. $Cu(NO_3)_2$ and 3 g. $NH_2OH.HCl$ is made in 300 cc. H_2O, pH 1.9 (soln. A), 200 cc. of this soln. are vigorously mixed with 20 cc. C_6H_6 in the presence of air. By raising the pH to 2.2, following addn. of 0.2 g. guanidine carbonate, the blue color of the soln. changes to pink and after 1 hr. to deep red. Upon sepn. from the excess C_6H_6 and acidification with excess HCl, petr. ether will ext. green *o*-nitrosophenol. With Cu acetate instead of nitrate (1 g. with 3 g. $NH_2OH.HCl$ in 300 cc. H_2O, pH 3.78, soln. B) the same takes place upon shaking with C_6H_6 and air. The early pink soln. has pH 3.07, and upon standing will discolor in 15 min. to yellow, pH 2.85. Contd. shaking gives the same deep red soln. from which *o*-nitrosophenol can be recovered. Between pH 2.2 and 4 rapid autoxidation takes place; a higher pH gives side reactions, a lower pH decomposes the red salt. Toluene does not give nitrosocresol at pH 2.2. Shaking soln. B with C_6H_6 for some time and adding a little H_2O_2 will cause a red color to appear, deepening upon standing, due to nitrosophenol formation. Soln. A with toluene at pH 2.2 and vigorously stirred will give a red color upon addn. of H_2O_2. Acidification with HCl and extn. with petr. ether yields green nitrosocresol. **A simple method for preparation of nitrosophenols from phenol and derivatives.** Oskar Baudisch and Schuyler H. Smith. *Ibid.* 769.—Phenol (1 g.), 2 g. Cu acetate and 0.7 g. $NH_2OH.HCl$ in 100 cc. H_2O, on addn. of 2 g. H_2O_2, give a deep red soln. from which after a few days at 0° free *o*-nitrosophenol can be recovered by adding petr. ether and acidifying with HCl. The united petr. ether exts. yield 15–20% nitrosophenol. With Ni the results are less favorable; with other metals no reaction takes place. With *p*-cresol in a similar manner *p*-nitrosocresol is obtained.

B. J. C. van der Hoeven

Catalytic action of clays and other silicate minerals and compounds on aromatic amines and phenols. Alfred Eisenack. *Zentr. Mineral., Geol.* **1938A**, No. 10, 305–8.—A preliminary note. Clays, mixed with solid amines or suspended in liquid amines, catalyze slow reactions producing dyes and colorless by-products. The reactions, obtained with a large no. of amines and with phenol, were also catalyzed by kaolin, weathered feldspar and basalt, serpentine, pptd. Mg and Al silicates, silica gel, permutite, and $Fe(OH)_3$, but not by active C, pptd. $CaCO_3$ or cellulose. The materials which catalyze the reactions are excellent adsorbents for the dyes produced.

Michael Fleischer

Preparation and utilization of nitrosoamines. N. N. Voznesenskiĭ and B. I. Izrail'son. *Khlopchato-Bumashnaya Prom.* **1938**, No. 10, 29–33; *Khim. Referat. Zhur.* 2, No. 4, 123–4(1939).—The following amines were investigated: *m*-, *o*- and *p*-nitroaniline, 4-nitro-2-aminotoluene, 5-nitro-2-aminotoluene, 4-nitro-2-aminomethoxybenzene, 5-nitro-2-aminomethoxybenzene, 2-nitro-4-chloroaniline, dichloroaniline, chloroanisidine, 6-chloro-2-aminotoluene, 5-chloro-2-aminotoluene and 4-chloro-2-aminotoluene. For each of the mentioned amines an optimum procedure for diazotizing and for the prepn. of the nitrosoamines is given. From the investigation of the nitrosoamines the following conclusions have been reached. (1) Amines having nitro groups in the *o*- or *p*- positions to the NH_2 group very easily form the nitrosoamines in the cold. (2) Amines having Cl in the mol. change to nitrosoamines with greater difficulty and require for this a prolonged heating. (3) Amines having a NO_2 group in the *m*-position form no nitrosoamines either in the cold or on heating. Methods for the prepn. of different printing dyes (developed by V. and I.) are given. (1) From the starting material (5-nitro-2-aminomethoxybenzene) for Azo Red with different naphthols satd. hues of bordeaux, garnet, brown, yellow, black, etc., are formed. (2) From nitroaniline, fast colors of red, yellow and brown are obtained. W. R. Henn

New method of preparing α-alkyl- and α-acylphenylhydrazones and α-alkylphenylhydrazines. Panos Grammaticakis. *Compt. rend.* **209**, 994–7(1939).—Phenylhydrazones of the type PhCH:NNRPh (I), where R is alkyl or acyl, are readily prepd. by the action of an alkyl or acyl halide, RX, on the Na deriv. (II) of PhCH:NNHPh, prepd. as a white hygroscopic powder insol. in C_6H_6 or Et_2O, by acting with Na thereon in C_6H_6 or Et_2O: PhCH:NNNaPh + RX = PhCH.NNRPh + NaX. II with MeI gives I (R = Me), m. 104°, b_{18} 212 13°, which hydrolyzes with HCl to $PhNMeNH_2$. Similarly EtI, iso-BuBr, $PhCH_2Cl$, AcCl and BzCl give I with R = Et, m. 50°, b_{14} 214°; iso-Bu, b_{13} 219–20°; CH_2Ph, m. 111°; Ac, m. 122°, $b_{\text{below 1}}$ 175 6°; and Bz, m. 123°, $b_{\text{below 1}}$ 240–1°, resp. C. A. Silberrad

Mercuration of benzene and chlorobenzene. Costin D. Nenitzescu, Dimitrie A. Isăcescu and Carol Gruescu. *Bul. Soc. Chim. Romania* **20A**, 127–34(1938).—The introduction of Hg as the acetate into the C_6H_6 nucleus is reviewed briefly along with consideration of Maynard's (*C. A.* 18, 2141) proposed equil. reaction, $C_6H_6 + Hg(OAc)_2 \rightleftharpoons PhHgOAc$ (I) + AcOH, to which some exception is taken in view of the inability to duplicate the high yield through the use of EtOH for the removal of the AcOH component of the equil. and the formation of polymercurated products. The present study was accordingly directed toward ascertaining empirically the proportions of $Hg(OAc)_2$, C_6H_6 and AcOH which would give the highest yields of I; for this purpose the detn. of I in the presence of $Hg(OAc)_2$ was based upon the large difference in the solubilities of these 2 compds. in dry C_6H_6. The expts. were made with 10 g. (1/30 mol.) $Hg(OAc)_2$ using 1, 10, 20, 25, 35 and 45 mol. ratios of C_6H_6 and 5, 10, 15, 20, 30 and 40 mol. ratios of glacial AcOH, with 3, 6 and 9 hrs. of heating; the results are tabulated and indicated diagrammatically. It was observed that the larger the amt. of AcOH, the quicker the $Hg(OAc)_2$ goes into soln.; the smaller the amt. of C_6H_6 and the greater the amt. of AcOH, the greater is the amt. of polymercurated compds. The yield of I increases with excess C_6H_6 and with the AcOH up to a max. between 10–20 mols., beyond which it drops off; it also increases with time up to a max. and then declines. The optimum condition for the prepn. of I consists of warming 160 g. $Hg(OAc)_2$ with 137 g. C_6H_6 and 600 g. AcOH for 9 hrs. on the water bath, removing the excess AcOH and C_6H_6 under diminished pressure and extg. the reaction mixt. (166 g.) in a Soxhlet app., which gave a 155 g. (92%) yield of I; for conversion to PhHgCl, 100 g. of I was heated with 200 cc. 25% KCl with stirring for 5 hrs. on the water bath, yielding 98 g. of product, m. 249°. Applying this reaction to PhCl, a 50% yield of *p*-ClC_6H_4HgOAc (II) (cf. Hanke, *C. A.* **17**, 2275), m. 194°, from MeOH, was obtained, and the product was identified by converting to *p*-ClC_6H_4Br with H_2O and Br. On account of the difficulty in wetting II with H_2O it was not possible to apply the above conversion to the chloride; however, by treating 220 g. II with 500 cc. of a mixt. of 2 parts AcOH and 1 part 6% KCl soln. a 196-g. yield of *p*-ClC_6H_4HgCl (cf. Nesmeyanov and Povch, *C. A.* **28**, 6429[1]), m. 240°, from Me_2CO, was obtained.

John F. Lontz

Nitrones. VI. Synthesis of benzylideneureas. Vito Bellavita and Nerina Cagnoli. *Gazz. chim. ital.* **69**, 602–8(1939); cf. *C. A.* **34**, 1638[1].—Although RCH:N(:O)-$CONH_2$ compds. have long been known, the corresponding thio compds., which should be formed by the reaction: RHCO + $H_2N(:O)CSNH_2$ (I) → RCH:N(:O)$CSNH_2$, have not been described. Expts. were therefore undertaken to learn whether this reaction can be realized in a practical way. Since $H_2N(:O)CONH_2$ (II) is formed from HOCN (III) and NH_2OH (IV) (cf. Francesconi and Parrozzani, *Gazz. chim. ital.* **31**, II, 337(1901)), it was thought possible to prep. I from HSCN (V) and IV. The method of prepn. of F. and P. for II was utilized in the attempt to prep. I, but prolonged contact of equimol. proportions of KSCN (VI) and IV.HCl yielded no I. Therefore the reaction of aq. VI and IV.HCl was studied more fully. Both at room temp. and on a steam bath, aq. VI and IV.HCl (equimol. wts.) form S and NH_3, while the soln. contains hyposulfite, sulfite, sulfate and carbonate. Probably IV reacts in the $H_3N.O$ (VII) form, i. e., as an oxidizing agent in distinction to a reducing agent (cf. *Ber.* **29**, 2445(1896); *Rend. accad. Lincei* **10**, II, 305(1901)). The reactions would then be: V + VII → III + NH_3 + S; III + $2H_2O$ → NH_4HCO_3 or V + VII + $2H_2O$ → $(NH_4)_2CO_3$ + S. Therefore no I is formed. Further study of this reaction was postponed, and attention was turned to the reaction of VI, IV.HCl and an aldehyde. When the chief product of this reaction forms slowly, S is a by-product, the quantity of which corresponds almost to that in the VI. When the reaction is rapid, the mother liquor contains a little sulfate, much sulfite and thiosulfate. The chief products are benzylideneureas which had been obtained previously by reduction of the corresponding carbonamidic nitrones by KCN. This reaction is therefore another excellent method of synthesizing benzylideneureas in almost 100% yields. Also it makes possible the synthesis of ureides corresponding to certain hydroxylated aldehydes which cannot be prepd. from the corresponding nitrones. This synthesis is explained by the initial oxidation of V, thus: V + VII → III + S + NH_3. III then reacts thus: III + IV → II. The next reaction is: II + RCHO → RCH:N(:O)$CONH_2$ + H_2O. The nitrone then acts as an oxidizing agent, thus: 2RCH.N(:O)$CONH_2$ + S → 2RCH:N$CONH_2$ + SO_2. The synthesis was carried out by continuous grinding of 1 mol. of aldehyde, 1 mol. of VI and 2 mols. of IV.HCl in a little water (keeping cold) until the reaction was complete (usually 2–3 hrs.), and washing the product with water. The mother liquor contains the S chiefly as sulfite and hyposulfite, but also a little as sulfate, sulfide and free S; NH_3 and CO_2 are also detectable. In prepg. liquid benzylideneureas and those with low m. ps., the reaction mixt. should be allowed to stand for 18–24 hrs., then steam-distd. and the part of the distillate having no aldehyde odor recovered. The following derivs. of urea were prepd by the new method; about half had been prepd. in the earlier work by means of KCN; therefore no data are included except for the new compds.: benzylidene, 100% yield, decompd. by hot dil. alkalies; cinnamylidene, very low yield; cuminylidene; *o*-nitrobenzylidene; *m*-nitrobenzylidene; *p-nitrobenzylidene*, lustrous, m. 131°; *p-nitrobenzylideneacetyl*, m. 128°; *p-nitrobenzylidenebenzoyl*, m. 196°; *p*-chlorobenzylidene; salicylidene; anisylidene; *resorcylylidene*, pale yellow, m. 198°; *resorcylylideneacetyl*, m. 77°; *resorcylylidenebenzoyl*, m. 152°; *vanillylidene*, m. 122°; *vanillylideneacetyl*, m. 103–4°; *vanillylidenebenzoyl*, m. 152°; 3-ethoxy-4-hydroxybenzylidene; piperonylidene;

piperonylideneacetyl, m. 109° (cf. 108–9° in previous work); *p*-dimethylaminobenzylidene; *p*-dimethylaminobenzylidenecacetyl, m. 108° (cf. 180° recorded in the previous work); furfurylidene, m. 135° (cf. 132–3° of previous work). C. C. Davis

Introduction of arsenic into the aromatic nucleus by means of mercury compounds. Costin D. Nenitzescu, Dimitrie A. Isăcescu and Carol Gruescu. *Bul. Soc. Chim. Romania* **20A**, 135–8(1938).—A convenient method has been developed for the prepn. of Ph_2AsCl (I) by the action of $AsCl_3$ on PhHgCl and applied also to the prepn. of an arsphenamine intermediate, 4,3-$HO(O_2N)C_6H_3$-AsO_3H_2 (II). Thus, heating 2 mols. PhHgCl with 1 mol. $AsCl_3$ for 6 hrs. at 110°, followed by extn. with light benzine, gave 75% of I, m. 44–5°; in another expt. distn. of the product after removal of the benzine gave 8% $PhAsCl_2$ and 61% I. Treating 78 g. *p*-ClC_6H_4HgCl with 60 g. $AsCl_3$ for 8 hrs. at 110°, followed by extn. with light benzine and distn. *in vacuo*, gave 29 g. *p*-$ClC_6H_4AsCl_2$, b_{15} 142–5°. Treating 40 g. of the latter in 250 cc. H_2O with Cl to a complete soln., followed by concg. to 180° gave 63% of cryst. *p*-$ClC_6H_4AsO_3H_2$, while further concg. gave an addnl. 26%. Treating 7 g. of the arsonic acid in 27 cc. concd. H_2SO_4 with 3.5 g. $NaNO_3$ for 3 hrs. on a water bath and then, upon cooling, with 50 g. ice and 25 cc. H_2O yielded 4,3-$Cl(O_2N)C_6H_3AsO_3H_2$ (cf. Kazimierczak, *C. A.* **33**, 6263[2]), the latter (7 g.) was hydrolyzed with 25 g. 40% KOH for 10 hrs. on a water bath, treated with 12 cc. 27% HCl, decolorized with charcoal, and made acid to Congo test with HCl, which gave 65% of II.
John F. Lontz

A soluble derivative of sulfanilamide. Gualterio Seppi. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., **1939**, 32–8.—*p*-$AcNHC_6H_4SO_2Cl$ reacted readily with ethanolamine to form *p*-acetylaminobenzenesulfonhydroxyethylamide, m. 124.5°. By boiling with dil. H_2SO_4 the Ac group was split off, giving *p*-aminobenzenesulfonhydroxyethylamide, $H_2NC_6H_4SO_2NHCH_2CH_2OH$, m. 98 100°, sol. in less than 10 parts water. L. E. Gilson

Color changes in phenols and in their derivatives. Ya. I. Blyakher. *Farmatsiya* **1938**, No. 5, 4–8; *Khim. Referat. Zhur.* **2**, No. 4, 122(1939).—B. observed the change of color of the ordinary and of the sterilized phenols (cryst. and liquid phenol, tricresol, Na salicylate, guaiacol, resorcinol and pyrogallol) in the pure state, in solns. and in the form of ointments, under direct and dispersed sunlight and in darkness, in the presence of O, in the absence of air, in CO_2, and under lab. and drug-store conditions. The change of color of the phenols and of their derivs. takes place more rapidly in direct sunlight than in dispersed sunlight. In darkness their colors change very little. The coloration takes place in any medium, but it is more intensive and rapid in O. Sterilization does not stop the coloration process. The intensity and the velocity of the coloration of phenols increases with the increase of their at. wt. The least coloration is observed in phenol (a yellow-brown color after keeping in direct light without any access of air). Resorcinol is more energetic in its color change (a brown-red color after 3.5 months under the same conditions) and pyrogallol has the most change of color (dark-brown color). W. R. Henn

Effect of substituents on the germicidal activity of phenols. II. Alkyl derivatives of 2,4-dichlorophenol. Szu-Liang Chien and Li-Yung Yin. *J. Chinese Chem. Soc.* **7**, 40–5(1939); cf. *C. A.* **31**, 1155[9].—$2,4\text{-}Cl_2C_6H_3OH$ is treated with an acyl chloride and the resulting oily layer, after washing with water and drying with $CaCl_2$, is distd. under reduced pressure, yielding the 2,4-dichlorophenyl ester. Four esters are prepd.: acetate, b_{80} 167–8°; propionate, b_{14} 148°; butyrate, b_{20} 161–3°; valerate, b_{16} 172°. By the Fries' rearrangement the esters are converted into the corresponding 2-hydroxy-3,5-dichlorophenyl alkyl ketones with the m. ps. indicated: Me, 95–6°; Et, 115–16°; Pr, 49–50°; Bu 46–7°. The ketones are converted by the Clemmensen reduction into the corresponding alkyldichlorophenols: Et, b_{22} 202–3°; Pr, b_{14} 136–7°; Bu, b_{11} 161–3°; Am, b_{24} 165–7°. It is suggested that the 6-alkyl-2,4-dichlorophenols should possess high germicidal activity. **III. Chlorinated hydroxyphenyl alkyl sulfides.** Szu-Liang Chien and Kuo-Tzu Chow. *Ibid.* 46–51.—**2-Chloro-4-aminophenol** (72 g.), prepd. by the method of Christiansen (*C. A.* **17**, 3865), is treated with 360 ml. dil. HCl and diazotized with 35 g. of $NaNO_2$. The mixt. is added slowly to 112 g. of Et xanthate in 350 ml. H_2O and kept at 70–75°. The xanthate ester is refluxed with 80 g. NaOH, acidified and again refluxed with Zn and C_6H_6. The oil which seps. is distd. under reduced pressure. A yield of 35 g. (43%) of 3-chloro-4-hydroxyphenyl mercaptan, b_{7-9} 108–11°, m. 39–40°, is obtained. The mercaptan is treated with the alkyl alc. in the presence of NaOH and the alkyl iodide added. The mixt. is then refluxed and extd. with C_6H_6, the C_6H_6 distd. off, and the residual oil distd. under reduced pressure. Four 3-chloro-4-hydroxyphenyl alkyl sulfides are prepd.: Me, b_{10} 130–1°; Et, b_{8-9} 128–9°; Pr, b_{10} 140–2°; Bu, b_{8-10} 145–8°. Wm. H. Adolph

Synthesis of 2-α-hydroxyethyl-4-(hydroxymethyl)anisole and some of its derivatives. Maurice Anglade. *Compt. rend.* **210**, 52–5(1940).—2,4-$MeCHCl(ClCH_2)$-C_6H_3OMe (I) is prepd. by satg. at 15° with HCl a well agitated mixt. of 156 g. anisyl chloride, 50 g. paraldehyde, 100 g. concd. HCl and 50 g. H_3PO_4. The product is washed and poured into a soln. of NaOMe in MeOH; on distn. 110 g. *p*-methoxymethylanisole, b_{15} 107–8°, and 38 g. *2-α-methoxyethyl-4-methoxymethylanisole* (II), b_{15} 144–5°, n_D^{20} 1.5055, d_4^{20} 1.048, d_0 1.066, are obtained. If NaOEt in EtOH replaces the NaOMe in MeOH the result is 120 g. *p*-ethoxymethylanisole, b_{18} 119–20°, and 35 g. *2-α-ethoxyethyl-4-ethoxymethylanisole*, b_{18} 157–8°, n_D^{25} 1.4980, d_4^{24} 1.011, d_0 1.029. II treated with AcCl in petr. ether in the presence of $ZnCl_2$ gives I. This is poured into a soln. of fused NaOAc in AcOH forming the diacetate, which is pptd. on addn. of H_2O, and is sapond. by 40% KOH in aq. EtOH at 100°. The alc. is distd. off and the aq. soln. concd. and allowed to cool when the glycol, *2-α-hydroxyethyl-4-(hydroxymethyl)-anisole*, crystallizes out; purified by recrystn. from EtOH, it forms small needles, m. 126°. On treatment with PhNCS in C_6H_6 with a trace of Na the double phenylurethan is obtained as needles, m. 142–3°. Oxidized with $KMnO_4$ it gives *p*-methoxyisophthalic acid. The presence of a small amt. (10%) of *o*-methoxybenzyl chloride in the anisyl chloride has no effect. C. A. Silberrad

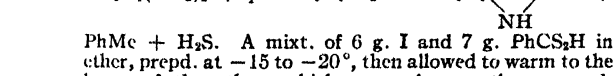
The constitution of celastrol. II. O. Gisvold. *J. Am Pharm. Assoc.* **29**, 12–14(1940); cf. *C. A.* **33**, 7305[8].—Celastrol, a red pigment found in the outer bark of the root of *Celastrus scandens*, has the formula $C_{22}H_{30}O_3$. The mol. contains an OH group sufficiently acidic to be methylated by CH_2N_2. The remaining 2 O atoms seem to be present in the form of an *o*-quinone which can be reduced catalytically and reoxidized by atm. O.
A. Papineau-Couture

Condensation of aldehydes with amides. IV. *m*-Hydroxybenzaldehyde. Rup Kishore Mehra and Kantilal C. Pandya. *Proc. Indian Acad. Sci.* **10A**, 279–81 (1939); cf. *C. A.* **33**, 8589[6].—*m*-HOC_6H_4CHO, heated several hrs. on the water bath with $EtCONH_2$, $BzNH_2$ and $PhCH_2CONH_2$, gives the corresponding (*m*-hydroxybenzylidene)amides. The best yield is obtained with 1 mol. aldehyde/2 mols. amide. In contrast to the behavior of salicylaldehyde (cf. *C. A.* **32**, 7434[2]) the yield is not improved by the presence of traces of org. bases like pyridine. No condensation takes place with $HCONH_2$ and $AcNH_2$. *(m-Hydroxybenzylidene)propionamide*, m. 210°, yield 27.5%. *(m-Hydroxybenzylidene)benzamide*, m. 205°, yield about 58%. *(m-Hydroxybenzylidene)-phenylacetamide*, m. 190°, yield 40%. **V. *p*-Hydroxybenzaldehyde.** Mohammad Manzur and Kantilal C. Pandya. *Ibid.* 282–4.—*p*-HOC_6H_4CHO, heated for 4–5 hrs. with $HCONH_2$, $AcNH_2$, $EtCONH_2$, $BzNH_2$ and $PhCH_2CONH_2$ at 130–40°, gives the corresponding (*p*-hydroxybenzylidene)amides in very good yield. In contrast with the behavior of salicylaldehyde (*C. A.* **32**, 7434[2]) the yield is only slightly improved by the presence of traces of org. bases like pyridine. The products are more or less yellow powders. *(p-Hydroxybenzylidene)-*

formamide, decomp. 216° (yield 60–3%); (*p-hydroxybenzylidene*)*acetamide*, does not m. till 340° but decomp. (yield 87.5–92%); (*p-hydroxybenzylidene*)*propionamide*, decomp. 195° (yield 82–4%); (*p-hydroxybenzylidene*)*benzamide*, becomes dark red at 190°, swells at about 215° (yield 81–3%); (*p-hydroxybenzylidene*)*phenylacetamide*, does not m. 340° but decomp. (yield 80–1%). VI. *o-*, *m-* **and** *p*-**Methoxybenzaldehydes.** Rup Kishore Mehra and Kantilal C. Pandya. *Ibid.* 285–8.— *o-*, *m-* and *p*-$MeOC_6H_4CHO$ heated several hrs. with $AcNH_2$, $EtCONH_2$, $BzNH_2$ and $PhCH_2CONH_2$ at 100–40° give the corresponding (methoxybenzylidene)bisamides, $MeOC_6H_4CH(NHR)_2$, in 37–58% yield, thus differing from *o-*, *m-* and *p*-HOC_6H_4CHO which all form (hydroxybenzylidene)amides, $HOC_6H_4CH{:}NR$. The $MeOC_6H_4CHO$ do not condense with $HCONH_2$. (*o-Methoxybenzylidene*) *derivs.*: *bisacetamide*, m. 223°; *bispropionamide*, m. 196–7°; *bisbenzamide*, m. 233°; *bis*(*phenylacetamide*), m. 197°. (*m-Methoxybenzylidene*) *derivs.*: *bisacetamide*, m. 206°; *bispropionamide*, m. 201°; *bisbenzamide*, m. 201–2°; *bis*(*phenylacetamide*), m. 181–2°. (*p-Methoxybenzylidene*) *derivs.*: *bisacetamide*, m. 230–1°; *bispropionamide*, m. 228°; *bisbenzamide*, m. 223–4°; *bis*(*phenylacetamide*), m. 243°. *p*-$MeOC_6H_4CHO$ yields with $HCONH_2$ a small amt. of pale-yellow crystals, m. about 171°. Dora Stern

A new adrenal base. J. J. Pfiffner and H. B. North. *J. Biol. Chem.* **132**, 461–2(1940).—A new phenolic base has been isolated from cattle adrenal glands for which the name *andrenodiamine* is suggested. It is the only phenolic amine other than adrenaline thus far isolated in pure form from the adrenal gland. *Andrenodiamine*, m. 219–21° (decompn.), min. mol. wt. 216; *O-Ac deriv.*, m. 176–7° (decompn.); *mono-Me ether*, m. 132–3° (decompn.); *di-HCl salt*, sinters at 195°, m. 215–16° (decompn.). All m. ps. are uncor. It has no pressor or oxytocic activity. Adrenodiamine has absorption max. at 231, 271 and 300 mμ and min. at 248, 290 and 360 mμ.
A. P. Lothrop

Cleavage of the acid group in carbodithioic acids. H. Wuyts and J. van Vaerenbergh. *Bull. soc. chim. Belg.* 48, 329–39(1939).—The reaction analogous to decarboxylation has been effected with (aromatic) carbodithioic acids and certain basic products. Thus, with *o*-$C_6H_4(NH_2)_2$ (I) carbodithioic acids gave a mixt. of the substituted benzimidazoles, corresponding to a reaction of the intact acid, and benzimidazolethiol (II), by the reaction, e. g., with *p*-toluenecarbodithioic acid (III):



PhMe + H_2S. A mixt. of 6 g. I and 7 g. $PhCS_2H$ in ether, prepd. at −15 to −20°, then allowed to warm to the b. p. of the ether, which was subsequently removed, yielded phenylbenzimidazole (about 55%), m. 288°, and II, m. 292°. Similarly, 10.8 g. I in 40 cc. ether and 20 g. α-$C_{10}H_7CS_2H$ (IV) in an equal vol. of ether gave 17 g. (71%) α-naphthylbenzimidazole, m. 271°, and a small amt. of II. III (8.4 g.) and 6 g. I yielded PhMe (identified by n_D^{25} (1.4950) and by the 2,4-dinitro deriv.), 60% *p*-tolylbenzimidazole, m. 265°, and II. III (11 g.) and 12 g. benzidine gave 5 cc. of PhMe, thiocarbonylbenzidine, $H_2NC_6H_4C_6H_4NCS$, m. 187°, and a substance identical with the dithioöxamide, $[H_2NC_6H_4C_6H_4NHC(:S)]_2$, of Cecchetti and Sarti (*C. A.* **23**, 3444). IV and benzidine gave an incomplete reaction in boiling ether, but in boiling C_6H_6, using 8 g. and 10 g., resp., of the components, $C_{10}H_8$, 62.5% of thiocarbonylbenzidine, and 28% of the dithioöxamide deriv. were obtained. *Thioacylated derivs.* were obtained from III and the following bases: $PhNH_2$, m. 144°; *m*-$C_6H_4(NH_2)_2$, (mono deriv.) m. 173°; *p*-$Me_2NC_6H_4NH_2$, m. 151° (obtained along with an *anil*, m. 145°); *m*-$O_2NC_6H_4NH_2$, m. 154°. Results are tabulated.
John F. Lontz

Soluble salts of acetylsalicylic acid and their hydrolysis. J. H. Křepelka and J. Pavlíček. *Collection Czech. Chem. Commun.* **11**, 325–44(1939).—The following salts of acetylsalicylic acid (I) were prepd. by reaction with the appropriate carbonate in H_2O and MeOH: (the compd. prepd. in H_2O is given first) $2C_9H_7O_4Li.H_2O$ (II), $C_9H_7O_4Li$; $C_9H_7O_4Na$ (III); $C_9H_7O_4K.2H_2O$ (IV), $C_9H_7O_4K$; $C_{18}H_{14}O_8Mg.3H_2O$ (V), $C_{18}H_{14}O_8Mg$; $2C_{18}H_{14}O_8Ca.7H_2O$ (VI), $C_{18}H_{14}O_8Ca.2H_2O$; $2C_{18}H_{14}O_8Sr.7H_2O$ (VII). II m. 126.5° and is stable in air; III and IV are hygroscopic and m. 217.5 and 65°, resp. V and VII are stable in air; VII begins to decomp. at 115°. The m. p. of V, VI and VII cannot be detd. because of apparent decompn. *Tetramethylammonium acetylsalicylate* (VIII), which is prepd. by concn. of a mixt. of aq. solns. of I and Me_4NOH, is anhyd., unstable, hygroscopic and very sol. in H_2O, alc. and Et_2O. VIII softens at 112° and m. 120° (partial decompn.). Hexamethylenetetramine acetylsalicylate (IX) is a hygroscopic salt which m. 118–19° and which liberates CH_2O upon exposure to light. The amt. of CH_2O thus produced is dependent on the temp. and H-ion concn. The course of hydrolysis of aq. solns. of all the above salts except VIII was studied at 60° by detn. of AcOH at regular intervals. The stability of the salts prepd. in nonaq. media was somewhat greater than that of the same salts prepd. in H_2O. The work confirms the conclusion that the sol. salts of I are the more unstable the more pos. is their cation. David E. Adelson

Lichen pigments of the pulvinic acid series. VI. Synthesis of atromentinic acid. Mitizo Asano and Sinobu Huziwara. *J. Pharm. Soc. Japan* 59, 675–9(in German, 284–6)(1939); cf. *C. A.* 29, 7309[3]; 33, 5838[4].—*p,p'*-Dimethoxydiphenylketipinonitrile (I) (Kögl, *et al.*, *C. A.* 23, 1128) (0.3 g.) in 15 cc. glacial AcOH, when refluxed over the flame with HI, gave atromentinic acid, $C_{18}H_{12}O_7.H_2O$, m. 330–2°; atromentinic lactone, $C_{18}H_{10}O_6$, m. 342–6°; diacetylatromentinic lactone, m. 270–1°. I (2 g.) in 40 cc. glacial AcOH and 24 cc. 60% H_2SO_4, on refluxing over the flame, gave 2 g. crude *p,p'*-dimethoxypulvinic anhydride (II), m. 266–8°; the Et ester, $C_{22}H_{20}O_7$, m. 155–7°; *p,p'*-dimethoxypulvinic acid, $C_{20}H_{16}O_7.H_2O$, m. 212°. II (0.2 g.) in 40 cc. glacial AcOH and 8 cc. HI on refluxing as before gave 0.1 g. atromentinic acid, m. 330–2°. **VII. Reduction of vulpinic acid.** Mitizo Asano and Yosio Arata. *Ibid.* 679–87(in German, 286–90); cf. *C. A.* 29, 7309[2].—Reduction of 10 g. vulpinic acid with 1% Na-Hg gave the following compds.: compd., m. 67° (yield 0.25 g.), which did not depress the m. p. of Me dihydrocornicularate, and the other dihydrovulpinic acid (I), $C_{18}H_{12}O_4(OCH_3)_2$, m. 194–6° (yield 6 g.). I forms the benzoate, m. 138–9°, and isodihydrovulpinic acid, $C_{18}H_{12}O_4(OCH_3)_2$, m. 123–7°. Hydrolysis of I with $Ba(OH)_2$ gave dihydropulvinic acid (II), $C_{18}H_{14}O_5$, decompg. 208–10°. II (1 g.) in 5 cc. Ac_2O, when boiled for 15 min., gave after decompg. in glacial AcOH cornicularic lactone carboxylic acid (III) (lactone of carboxycornicularic acid), m. 218–19°; Me ester (IV), $C_{19}H_{14}O_4$, m. 170–2°. Hydrolysis of III with KOH gave cornicularic acid, m. 118–21°; semicarbazone, m. 212–14°. II (2 g.) when heated under reduced pressure gave cornicularic lactone (V), $C_{17}H_{12}O_2$, m. 136–6.5°. Reduction of IV with Na-Hg gave a neutral compd., which when hydrolyzed with $Ba(OH)_2$ gave phenylsuccinic acid, m. 166–8°, and anacidic compd. m. 139–42°, which when hydrolyzed with $Ba(OH)_2$ gave phenyladipic acid, m. 247–50°. Reduction of V with Na-Hg gave a neutral compd., $C_{17}H_{16}O_2$, m. 69–71°, and an acidic compd. which was not identified. Reduction of V with Zn and AcOH gave a neutral compd., m. 90–2°, and an acidic compd., $C_{17}H_{16}O_3$, m. 133–4°, which did not depress the m. p. of dihydrocornicularic acid. Reduction of vulpinic acid with Pd-C gave dihydrovulpinic acid, m. 194–6°. Reduction of pulvinone, $C_{17}H_{12}O_3$, m. 242–3.5°, with Na-Hg gave dihydropulvinone, $C_{17}H_{14}O_3$, m. 215–19°; benzoate, m. 140–1°. F. I. Nakamura

The preparation of nitrogen-substituted phthalimides. Gustav Vanags. *Acta Univ. Latviensis, Kim. Fakultat.* Ser. 4, No. 8 (in German, 405–21; in Lettish, 422)(1939). —Aniline (3.1 g.), 7.4 g. phthalic anhydride and 60 cc. AcOH, refluxed in an air condenser for 45–60 min. or until a 0.5 cc. sample boiled for 1 min. showed a yellow

or a brown color (a green color indicated the presence of unacetylated aniline), were treated with 450 cc. H_2O, brought to a boil and cooled. Overnight the yield of $C_6H_4(CO)_2NPh$ was 95.8%; recrystd. in AcOH, it m. 208°. In a 2nd method 1 mol. aniline-HCl, 2 mols. phthalic anhydride, 1.1 mol., AcONa and 40 mols. AcOH were refluxed in an air condenser for 50 60 min., treated with 200 cc. H_2O, brought to a boil and cooled. Using either method V. prepd. the following *N-arylphthalimides:* *o*-tolyl, from *o*-toluidine, m. 183°, sol. in EtOH and AcOH, formed needles in EtOH; *m*-tolyl, m. 176°, sol. in EtOH and AcOH, formed pearly plates from AcOH; *p*-tolyl, m. 204°, sol. in EtOH and AcOH, formed glistening needles from EtOH; 2-ethylphenyl, from *o*-ethylaniline, m. 137°, sol. in EtOH and AcOH, formed long plates from EtOH; 4-ethylphenyl from *p*-ethylaniline, m. 177°, more sol. than the *o*-compd., formed silky needles from EtOH and AcOH; 2,4-dimethylphenyl, from *m*-xylidine, m. 155°, formed hexagonal plates; 2,5-dimethylphenyl, from *p*-xylidine, m. 163°, sol. in EtOH and AcOH. 2,6-Dimethylphenyl, from 1,3,2-xylidine, m. 204°, sol. in AcOH and slightly sol. in EtOH, formed hexagonal plates from EtOH; 3,5-dimethylphenyl, from 1,3,5-xylidine, m. 135°; 2,4,6-trimethylphenyl, prepd. from mesidine, m. 171°; 2,4,5-trimethylphenyl, from pseudocumidine, m. 147°; *o*-biphenylyl, from *o*-$H_2NC_6H_4Ph$, m. 165°, from $PhNO_2$; *m*-biphenylyl, from *m*-$H_2NC_6H_4Ph$, m. 154°, formed long, soft needles from AcOH, sol. in EtOH with difficulty; *p*-biphenylyl, from *p*-$H_2NC_6H_4Ph$, m. 285°, from $PhNO_2$, sol. with difficulty in AcOH; 4-triphenylmethylphenyl, from *p*-$H_2NC_6H_4CPh_3$, m. 247°, from AcOH; α-naphthyl, from α-naphthylamine, formed plates in AcOH, m. 181°; β-naphthyl, m. 216°, from AcOH; α-tetrahydronaphthyl, from tetrahydro-α-naphthylamine, sol. in EtOH and AcOH, formed needles in EtOH, m. 142°; 2-fluorenyl, from 2-aminofluorene, m. 288°, from $PhNO_2$; 4-acetoaminophenyl, m. 283°, from AcOH; 4-anilinophenyl, from *p*-$H_2NC_6H_4CH_2Ph$, formed green-yellow fine needles from AcOH, m. 270°; 4-dimethylaminophenyl, formed yellow needles in AcOH, m. 260°; 4-phthalimidoazobenzene, prepd. from *p*-aminoazobenzene, formed yellow needles in AcOH, m. 252°. 2-Phthalimidopyridine formed glossy needles in EtOH, m. 226°. *N-Alkylphthalimides:* Me, prepd. from $MeNH_2$, formed long needles in dil. AcOH, m. 134°; Et, m. 78°, formed long (10–15 cm.) fine needles in dil. AcOH; iso-Pr, m. 86°, from AcOH; Bu, m. 34°, iso-Bu, m. 93°, from EtOH; heptyl, m. 40°, from dil. EtOH; heptadecyl, m. 63°, from AcOH. Other *N*-derivs are: allyl, formed thin platelets from dil. AcOH, m. 70°; benzyl, m. 115°, from EtOH; α-phenethyl, prepd. from $PhCHMeNH_2$, m. 43–4°, from EtOH; β-phenethyl, m. 130°, formed pearly scales in EtOH, sol. in AcOH; benzohydryl, m. 225°, from AcOH, formed isomers of isoquinoline compds.; β-tetrahydronaphthylphthalimide, m. 128°, formed needles in EtOH, sol. in AcOH; cyclohexyl, m. 168° from EtOH; camphyl, m. 55°, from AcOH. Unless specified AcOH means glacial AcOH. Frank Maresh

Preparation of mellitic acid. Ettore Vallesi. *Ann. chim. applicata* **29**, 455–63(1939).—By use of the best of the modern charcoals very pure mellitic acid was prepd. with fairly high yields. A. W. Contieri

Constitution of two new terpenes, menogene and menogerene ($C_{10}H_{16}$ and $C_{10}H_{14}$). The mechanism of cyclization of citronellal and citral. Riki Horiuti, Hirosi Otuki and Osamu Okuda. *Bull. Chem. Soc. Japan* **14**, 501 7 (1939)(in English).—The constitution of the cyclic terpenes $C_{10}H_{16}$ (I) and $C_{10}H_{14}$ (II) obtained by the action of H_2SO_4 on *citronellal* (III) and *citral* (IV), resp. (cf. *C. A.* **22**, 3886), has been established. I is now named *menogene* and II *menogerene*. I, from III with 50% H_2SO_4, $b_{764.5}$ 184–6°, d_4^{20} 0.8624, n_D^{20} 1.5026, $[\alpha]_D^{18}$ 49.11°, $[R_L]_D$ 46.59 (calcd. for $C_{10}H_{16}$ 45.24); *nitrosite*, scales from MeOH-$CHCl_3$, m. 154.5–5.0°, $[\alpha]_D^{20}$ −174.06°. I, reduced with H in EtOH in the presence of Pd oxide, gives *p*-menthane (V). I absorbs only 1 mol. Br. I, warmed with an equiv. amt. of maleic anhydride in C_6H_6 or Et_2O, gives a *solid* (VI), m. 205–8°, $[\alpha]_D^{25}$ −18.76° (in Me_2CO); by treating VI with 30% KOH a *cryst. powder*, m. 228–30°, is formed, which yields a *dibromide*, m. 282–5°. The dropwise addn. of HCl to a mixt. of I with EtONO in glacial AcOH produces at low temp. a deep blue color which changes to green, yellow, deep red, and brown with rising temp. On distn. with Na I yields small amts. of Me_2CO. From the phys. and chem. behavior it is concluded that I is a *p*-menthadiene contg. 2 conjugated double bonds, 1 of which is semicyclic. This leads to the formula $Me_2C{:}CH{:}CH{:}CH.CHMe.CH_2.CH_2$. By treating IV with 20% H_2SO_4 are obtained Me_2CO, Me_2CHOH (formed by the reduction of Me_2CO in the course of distn. with Na), *1-methyl-1,5-cyclohexadiene* (b_{760} 110 11°, d_4^{20} 0.8451, n_D^{20} 1.4783, unstable in air, decomp. explosively by distn., adds 2 mol. H in the presence of Pd oxide, is oxidized by $KMnO_4$ to succinic acid), *p*-cymene (VII) and II, b_{760} 180 1°, d_4^{20} 0.8672, n_D^{20} 1.5005, $[R_L]_D$ 45.66 (calcd., 44.78 for $C_{10}H_{14}$). II gives in glacial AcOH a *dibromide*, m. 114.5–15°. II is unstable; by distn. after long standing or by treatment with 20% H_2SO_4 it changes into the isomeric VII. With EtONO and HCl II gives the same color reactions as I. On distn. with Na II yields Me_2CO. By hydrogenation of II in the presence of Pd oxide are formed *dl*-α-phellandrene and small amts. of V. From the foregoing properties it is concluded that II has the formula $Me_2C\,C.CH{:}CH.CMe\,CH.CH_2$. The constitution proved for I agrees with the formeryl found formation of isopulegol and menthoglycol as intermediates in the transformation of III into I. In the transition of IV into II (and finally into VII) dehydroisopulegol and menthoglycerol are assumed to be intermediates. Dora Stern

Contact isomerization of menthene. N. D. Zelinskiĭ. *Compt. rend. acad sci. U. R. S. S.* **24**, 542–4(1939)(in English).—3-*p*-Menthene, prepd. by dehydration of *l*-menthol over SiO_2 gel at 325°, was isomerized over SiO_2 gel at 375°, 400° and 450°, resp. After fractionation of the products, with or without the presence of Na, the main fractions were hydrogenated over Pt-charcoal at 165 70°, and the resulting materials dehydrogenated over Pt-charcoal at 300°. The products were treated with fuming H_2SO_4 (5% SO_3) to eliminate *p*-cymene and then distd. over Na, resulting in unidentified $C_{10}H_{20}$ mixts. (probably cyclopentane derivs.) having b. ranges of 154.5 162° under 746–751 mm., n_D^{20} 1.4301–1.4308 and d_4^{20} 0.7811–0.7830. In each case, unsatd. acyclic hydrocarbons were also formed during the isomerization of 3-*p*-menthene over SiO_2 gel. Passage of the $C_{10}H_{20}$ mixt. over Pt-SiO_2 gel at 300° yielded (after fuming H_2SO_4 treatment and distn. over Na) a mixt. of isomeric decanes together with lower members of the alkane series. George Ayers

Reactions of 2,2′-diacylbiphenyls. The reaction between 2,2′-diacylbiphenyls and ethylmagnesium bromide. Edith Ju-Hua Chu. *J. Chinese Chem. Soc.* **7**, 24 6 (1939); cf. *C. A.* **29**, 5108[2].—To the Grignard reagent prepd. from 0.02 mole EtBr and 0.04 mole Mg in 20 ml. ether is added 1.8 g. (*o*-$BzC_6H_4)_2$. The mixt. is refluxed for 2 hrs., hydrolyzed with ice water and AcOH and extd. with a mixt. of ether and benzene. On recrystg. from acetone, *2,2′-bis[(hydroxyethylphenyl)methyl]biphenyl*, m. 221.7 2.7°, is obtained. In a similar way 4 other new *2,2′-bis[(hydroxyethylaryl)methyl]biphenyls* are synthesized, the aryl groups being *p*-biphenylyl, *m*-tolyl, *p*-chlorophenyl and *p*-phenetyl, with the m. ps. 183.6–4.6°, 156.3–7.3°, 228.5–9.5°, 135–6°, resp. Wm. H. Adolph

Diarylmethane derivatives VI. Occurrence of the bis(4-methoxyphenyl)methyl radical. W. Th. Nauta and D. Mulder. *Rec. trav. chim.* **58**, 1062–9(1939)(in English); cf. *C. A.* **33**, 7769[1].—Treatment of (*p*-MeO-$C_6H_4)_2CHCl$ (I) (Bergmann and Hervey, *C. A.* **23**, 3918) with mol. Ag gave a red soln. from which colorless crystals of (*p*-$MeOC_6H_4)_2CH_2.C_6H_6$, m. 190–1°, sepd. quant. from C_6H_6 (cf. Bergmann and Fujise, *C. A.* **25**, 942, who report

189–90°). This showed that dimerization rather than disproportionation had occurred. When O was present, (p-$MeOC_6H_4)_2CO$ (II), m. 143–4°, was isolated. From 470 mg. of I, 386 mg. of II was formed; *2,4-*$(NO_2)_2C_6H_3NHNH_2$ *deriv.* m. 199–200°. A small amt. of p-MeC_6H_4CHO (III) was isolated by steam distn.; 2,4-$(NO_2)_2C_6H_3NHNH_2$ deriv., m. 250–1° (cf. Brady, *C. A.* **25**, 3319). In a typical expt. 17.1 millimols. of I gave 9.3 millimols. of II, 0.8 of III and 0.5 of p-$MeOC_6H_4OH$ (not definitely identified). Addn. of NO gave similar but less well-defined results. **VII. Properties of the diphenylmethyl radical.** *Ibid.* 1070–80.—The poor yield of $(Ph_2CH)_2$ (I) obtained by Montagne and others (*Rec. trav. chim.* **25**, 488(1906)) on treatment of Ph_2CHCl (II) with Ag was due to the action of O. When O is excluded, the yield is quant. In pure O, the yield is 2 8%, together with $(Ph_2CH)_2O$ (III), Ph_2CO (IV), Ph_2CHOH (V) and Ph_2CH_2. An atm. of NO gave III and IV with undefined products. A pale yellow color was observed in the reaction between II and Ag. Whether the radical is colored (cf. Gilman and Kirby, *C. A.* **20**, 2323) and present in very small amt. or is not highly colored is uncertain. In a typical expt. 6.651 g. of II with Ag absorbed 206.8 cc. of O (S. T. P.) and gave 1.197 g. of IV and 0.31 g. of V in the steam distillate, and 2.87 g. of III and 0.43 g. of $(Ph_2CH)_2$ in the residue. W. F. Bruce

Abnormal acetoacetic ester synthesis. II. Reaction of sodium with fluorene and benzyl benzoate. Heou-Fco Tseou and Tse-Shui Chow. *J. Chinese Chem. Soc.* **7**, 27 8(1939); cf. *C. A.* **32**, 5302.—$PhCH_2OBz$ (30 g.), 20 g. of fluorene and 3.5 g. Na are refluxed at 170–90° for 13 hrs. Ice water is added, the mixt. filtered and the residue is washed and recrystd. from toluene, giving 74% of benzylfluorene instead of the expected Bz compd.

Wm. H. Adolph

Nitrogen heterocycles. XLV. Nitrosation of primary amines. (Diaminoisophthalaldehyde. 3.) 4,5,6-Triaminoisophthalaldehyde and its condensations. Paul Ruggli and Hugo Frey. *Helv. Chim. Acta* **22**, 1403 12(1939); cf. *C. A.* **33**, 8608⁴.—Although diazotization of 4,6-diaminoisophthalaldehyde (I) in concd. H_2SO_4 is possible to the extent that it can be demonstrated qualitatively by coupling with β-$C_{10}H_7OH$, the reaction with $NaNO_2$ in chilled concd. HCl is of more practical interest. A mixt. of 8 g. I and 80 cc. concd. HCl at −10 to −15° was stirred and treated with 7 g. $NaNO_2$ in 15 cc. H_2O over a period of 10 mins. After 5 mins. addnl. stirring, the mixt. was poured into 1.5 l. H_2O and filtered off, yielding 8 g. (85%) of *5-nitroso-4,6-diaminoisophthalaldehyde* (II), $C_8H_7N_3O_3$, m. 260–73° (decompn.), condensing with p-$MeC_6H_4NH_2$ in AcOH to coppery leaflets of the corresponding *dianil*, $C_{22}H_{21}N_5O$, converted into violet-black needles by recrystn. from AcOEt and cleaved by hot HCl to the original II. Reduction of the deep-violet soln. of 8 g. II in 125 cc. concd. HCl by addn. of 30 g. $SnCl_2$ and working by neutralization, extn. with acetone and recrystn. from H_2O gave 60% of long, faintly beige-colored needles of 4,5,6-triaminoisophthalaldehyde (III), $C_8H_9N_3O_2$, m. 200.5° (decompn.); *mono-Ac deriv.*, m. 293° (also prepd. by catalytic reduction of II in the presence of Raney Ni catalyst); *benzal deriv.*, m. 154–6°; *dioxime*, m. 254°. Alk. condensation of III with excess AcPh gave cm.-long red needles of linear *2,7-diphenyl-9-aminobenzodipyridine*, $C_{24}H_{17}N_3$, m. 224–5°, and similarly with excess $AcCH_2CO_2Et$ produced carmine-red needles of the corresponding *3,6-dicarboxylate* (IV), $C_{20}H_{21}N_3O_4$, m. 160°; *mono-Ac deriv.*, $C_{22}H_{23}N_3O_5$, m. 234° (decompn.). Sapon. of IV yielded the free dicarboxylic acid, $C_{16}H_{13}N_3O_4$, m. 318° (decompn.), which was decarboxylated by subliming from BaO and Cu powder at 350–400° to 2,7-dimethyl-9-aminobenzodipyridine. The mother liquors from the crystn. of IV also yielded yellow crystals of a *condensation product*, $C_{14}H_{17}N_3O_4$, m. 201.5°, formed by the loss of 1 mol. H_2O from the addn. of 1 mol. III and 1 mol. $AcCH_2CO_2Et$. Diazotization of 0.2 g. IV in 5 cc. of chilled concd. HCl by the addn. of 2.8 cc. of 2% $NaNO_2$, salting out with 40 cc. of 20% AcONa and crystn. from alc. or hot dioxane gave 0.2 g. of a yellowish *trisazolium hydroxide*, $C_{20}H_{20}N_4O_5$, m. 195° (decompn.). III has 3 NH_2 groups in vicinal positions and consequently gives good yields of a *quinoxaline deriv.*, $C_{22}H_{18}N_8O_2$, m. 289–90° (decompn.), by condensation with Bz_2 in alc. in the presence of 10% NaOH in MeOH. Similarly, condensation with phenanthrenequinone gives a difficultly-sol. compd. **XLVI. 4,6-Diaminoisophthalaldehyde. 3.** *Ibid.* 1413 27.—The 3,6-dicarboxylic ester produced by the addn. of 2 mols. $AcCH_2CO_2Et$ to 4,6-diaminoisophthalaldehyde (I) was sapond. to the free acid which was decarboxylated by heating with Cu in quinoline at 160–230° for 20 min. The resulting 2,7-dimethylbenzodipyridine (II) was converted into the hexa-Br deriv. which was transformed by heating with oleum to the crude benzodipyridine-2,7-dicarboxylic acid (III). A mixt. of 0.25 g. III, 2 cc. of 10% NH_4OH and 2 cc. alc. was triturated, dild. with 20 cc. H_2O and heated. The NH_3-free product was dild. with 10 cc. H_2O and boiled with 0.5 g. $AgNO_3$ in 10 cc. H_2O. The crude Ag salt (0.45 g.) was boiled with 70 cc. MeOH and 0.4 g. MeI for 1 hr., filtered and concd. to 20 cc., yielding 0.2 g. (70%) of yellow needles of *di-Me benzodipyridine-2,7-dicarboxylate*, $C_{16}H_{12}N_2O_4$, m. 272° (with darkening). Decarboxylation of III gave benzodipyridine (IV); *perchlorate*, m. 268° (explosive on rapid heating); *MeI deriv.*, m. above 200° (decompn.). Reduction of 0.2 g. IV in 5 cc. of boiling AmOH with 0.35 g. Na and recrystn. from alc. gave octahydrobenzodipyridine, m. 111.5°, identified through the di-NO and di-Ac derivs., m. 179° (decompn.) and 143°, resp. Reduction of II with Na in AmOH gave as main product a resin which was converted into a colorless cryst. *octahydro-2,7-dimethylbenzodipyridine diperchlorate*, $C_{14}H_{22}Cl_2N_2O_8$, m. 285–6° (decompn.). The resinous free base yielded 2 isomeric *di-NO derivs.*, m. 164.5 and 151.5 2.0°, resp. Condensation of 0.2 g. II with 0.5 g. of p-$Me_2NC_6H_4CHO$ at 170–5° in the presence of 10 drops of piperidine produced 0.45 g. of orange-red *2,7-bis(p-dimethylaminostyryl)benzodipyridine*, $C_{32}H_{30}N_4$, m. about 340° (with darkening), dissolving in HCl to give violet, blue, green and yellow solns. with increasing acid concns. Condensation of II with o-$C_6H_4(CO_2Et)_2$ by heating in the presence of Na for 14 hrs. at 100° gave a scarlet cryst. powder which on sulfonation dyed wool and silk bluish red in an acid bath. A unilateral condensation of 0.6 g. I with 6 cc. $AcCH_2CO_2Et$ occurred on heating in the presence of 9 drops of piperidine for 30 min. at 170°. The impure *3-acetyl-6-formyl-7-aminocarbostyril* yielded yellow crystals of a pure *Ac deriv.*, $C_{14}H_{12}N_2O_4$, m. 320–40° (decompn.). Treatment of 1 g. I in 100 cc. alc. at 30° with 14 g. of dry $OHCCHNaCO_2Et$, boiling for 1 hr. after standing for 3 days, filtering off the brown amorphous ppt. (V), adding 1 cc. H_2O and standing for 8 days gave a Na salt which was dissolved in 50 cc. H_2O, acidified with 10% HCl and recrystd. from dioxane, yielding *di-Et 2,6-diaminoisophthalaldiformylacetate*, $C_{18}H_{20}N_2O_6$, m. 250° (decompn.). V was dissolved in H_2O, filtered and pptd. with dil. HCl. The amorphous product (0.06 g.) was decarboxylated by heating *in vacuo* with 0.3 g. BaO and 0.5 g. Cu at 150° to yield a bright yellow sublimate of IV. Condensation of I with excess cyclohexanone in the presence of piperidine produced *2,3,6,7-bis(tetramethylene)-benzodipyridine*, $C_{20}H_{20}N_2$, m. 250–1° (with darkening); *dipicrate*, m. 195° (decompn.). A mixt. of 8 g. I in 150 cc. alc., 24 cc. $PhCH_2CN$ and 12.5 cc. of 30% NaOH was heated for 30 min. on the steam bath. Working up and purification through the di-HCl salt gave a free *base* (VI), $C_{24}H_{18}N_4$, m. 301°; *tetra-Ac deriv.*, $C_{32}H_{26}N_4O_4$, m. 238.5–9.5° (decompn.). Sapon. of VI with HCl produced a *carboxyl deriv.*, $C_{24}H_{18}N_2O_3$, which gave a Na salt and a *mono-Ac deriv.*, m. 365°. Condensation of 4 g. of 4,6-dinitroisophthalaldehyde with 8.4 g. of dry $PhCH(Na)CO_2H$ by heating with 34 cc. Ac_2O and 1.2 g. $ZnCl_2$ for 40 hrs. at 80° gave a powdery dicarboxylic acid which was esterified through the Ag salt to *di-Me 4,6-dinitroisophthalate* (*phenylacetate*), $C_{36}H_{30}N_2O_8$, m. 152.5–3.5°. Condensation of methazonic acid (VII) with o-$H_2NC_6H_4CHO$ yields 3-nitroquinoline and similarly a cold mixt. of VII and I in the presence of a min. of HCl gave 20% of yellow-

orange needles of a *compd.* $C_{16}H_{14}N_6O_5$, m. 290° (decompn.), of undetermined compn. C. R. Addinall

Propionylation of the naphthols in pyridine. Alfred Léman. *Compt. rend.* **210**, 78–80(1940); cf. *C. A.* **32**, 4973⁴.—The esterification of α- and β-naphthols, 1,7-$C_{10}H_6(OH)_2$ (I) and 1,7,3-$C_{10}H_5(OH)_2SO_3H$ (II) by means of an excess of $(EtCO)_2O$ in an equal vol. of pyridine was examd. at varying temps., continuing the interaction for varying periods, the excess of anhydride being then decompd. by H_2O. With α- and β-naphthols esterification was quickly completed even in the cold, e. g., in 15 min. at 18°, and almost as quickly in the presence of H_2O from the start. Practically the same result was obtained with I, though the effect of H_2O from the start was not examd. But with II esterification is very incomplete, amounting to only 18% after 60 min. at 100°. Esterification in this way can thus be used to est. the 3 naphthols but not II. C. A. Silberrad

Synthesis of vitamin K_1. A. A. Klose and H. J. Almquist. *J. Biol. Chem.* **132**, 469–70(1940); cf. *C. A.* **33**, 8729².—Vitamin K_1 was synthesized by refluxing in the dark for 20 hrs. 1 g. of 2-methyl-1,4-naphthoquinone, 1 g. of Zn dust and 0.6 cc. of phytyl bromide in 2 cc. of glacial AcOH and 10 cc. of petr. ether. The reaction product was dissolved in hexane, repeatedly washed with H_2O, filtered and fractionated in a mol. still. The vitamin was recrystd. repeatedly from MeOH by cooling with solid CO_2. It is probable that the synthetic product contains a small amt. of cyclized vitamin K_1. A. P. Lothrop

Acenaphthene series. I. 5-Benzoylacenaphthene and its related compounds. Edith Ju-Hua Chu. *J. Chinese Chem. Soc.* **7**, 14–19(1939).—5-Benzoylacenaphthene is synthesized from acenaphthene and BzCl by the method of Dziewonski and Rychlik (*C. A.* **20**, 1075⁷), but an improved yield (77%) is obtained when $PhNO_2$ is employed as solvent. By the Beckmann rearrangement, it is detd. that the oximes favor the trans form. 5-Benzoylacenaphthene reacts readily with PhMgBr to form colorless cryst. phenyl-5-acenaphthylcarbinol, m. 200.8°. Wm. H. Adolph

Retropinacolone rearrangement of 10,10-diaryl-9,10-dihydro-9-phenanthrols. Edith Ju-Hua Chu and Fan Wei. *J. Chinese Chem. Soc.* **7**, 20–3(1939); cf. *C. A.* **29**, 5108².—Two new 10,10-diaryl-9,10-dihydro-9-phenanthrols, in which the aryl groups are *p-phenetyl* and *p-chlorophenyl*, are prepd. by reduction of the corresponding 10,10-diaryl-9-phenanthrones by either Zn dust and NaOH or iso-PrMgBr; the m. ps. are 146.2° and 159.3°, resp. These 2 compds. undergo rearrangement on treatment with I and AcOH to give 9,10-diarylphenanthrenes, m. 207° and 244°, resp., the structures of which are established by oxidation. Wm. H. Adolph

Tetracinnamoylethane. J. Swiderski. *Roczniki Chem.* **19**, 142–5(1939).—Na added to dicinnamoylmethane in PhOMe, followed by I in Et_2O, gives *s-tetracinnamoylethane*, m. 230°, converted by boiling Ac_2O into *3,4-dicinnamoyl-2,5-distyrylfuran*, m. 168°. B. C. P. A.

The action of selenium on indoles, quinolines and their perhydrogenated derivatives. Sin-itiro Huzise and Kozo Tiba. *Bull. Chem. Soc. Japan* **14**, 478–82(1939)(in German); cf. Ehrenstein and Bunge, *C. A.* **29**, 471⁸; Treibs and Dinelli, *C. A.* **29**, 4356⁶.—The dehydrogenating action of Se on *trans-decahydro-6-methylquinoline* (I) and *octahydro-α-methylindole* (II) and the behavior of *quinoline* (III), *6-methylquinoline* (IV), *α-methylindole* (V) and *indole* (VI) on heating with Se are studied. I (4 g.) heated with 6 g. Se 27 hrs. at 160–290° gives IV and *tetrahydro-6-methylquinoline* (VII). The mixt. is sepd. by forming the chloroaurates and sorting out the dissimilar crystals. IV.$HAuCl_4$, light yellow needles, m. 181–2°; VII.$HAuCl_4$, deep yellow prisms, m. 134–5°. II.HBr (3.6 g.) heated with 6 g. Se 15 hrs. at 310–35° gives V, 0.46 g. propylbenzene and NH_3. The dehydrogenation products in the foregoing processes are obtained in a rather small yield III, IV and V when heated with Se at 310–20° remain unchanged to 80–90% whereas VI, treated in the same manner, may be recovered only in small amt. while H_2Se is developed. In addn. crystals, m. 192–5°, are formed. Dora Stern

The structure of rottlerin. III. K. S. Narang, J. N. Ray and B. S. Roy. *Proc. Natl. Inst. Sci. India* **5**, 249–51(1939); cf. *C. A.* **32**, 4983⁸; **33**, 601².—The previously proposed structure for tetrahydrorottlerone (I) is withdrawn and it is suggested that I is 2,2-dimethyl-3-(β-phenylpropionyl)-5,7-dihydroxybenzopyran. E. W. Scott

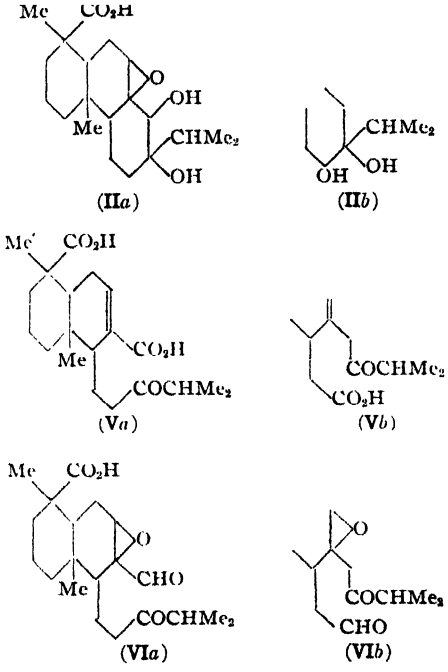
Amination in the heterocyclic series by sodium amide. R. Norris Shreve, E. H. Riechers, Harry Rubenkoenig and A. H. Goodman. *Ind. Eng. Chem.* **32**, 173–8(1940).—$NaNH_2$ is prepd. from Na and NH_3 in a ball-mill reactor and ground by steel balls, maintaining the NH_3 atm. Control is by the rate of H evolution. A purity over 95% is obtained. Addn. of C_5H_5N in theoretical amt. to the reactor cooled to 110° gives *2-NaHNC$_5$H$_4$N*. Such addn. is slow with the mill rotating. The temp. is gradually raised to 120° during the addn. and subsequently to 130°. When evolution of H ceases 2 hrs. later the mill is let cool to 75° and hot H_2O added to hydrolyze to 2-$H_2NC_5H_4N$ (I) and NaOH. On filtration and cooling I seps. as an oil and is vacuum-distd. A 2nd NH_2 group is introduced with more difficulty. In this case addn. of the theoretical amt. of C_5H_5N to the reactor cooled to 170° was started and that temp. was maintained. Heat is removed by air reflux of C_5H_5N. About 2–4 hrs. are required for addn. of C_5H_5N and 6–8 hrs. total. On cooling to 90° hot H_2O is added, the product filtered and 2,6-$(NH_2)_2C_5H_3N$ crystd. from the mother liquor contg. 12–15% of NaOH. It is recrystd. from C_6H_6. The yields never exceeded 55%. The use of white mineral oil as diluent showed no advantage. The best yields were with 2–5% of H_2O in the pyridine. Addn. of NaOH did not improve the yield. Optimum yields were obtained with this equipment at 160–170°. Lowering the amt. of C_5H_5N from theory showed no advantage, increasing it gave more monoamine. Addn. of NH_4Cl with the H_2O to decomp. the NaOH offered no advantage. Addn. of C_9H_7N to 2 moles of $NaNH_2$ suspended in boiling xylene was carried out in other equipment. Reaction took about 1 hr. and was followed by decompn. with H_2O and pptn. of diquinolyl and diquinoline from the xylene layer by concd. HCl. The aq. layer made alk. with NaOH was extd. with Et_2O and the xylene and ether exts. vacuum-distd. The *2-aminoquinoline* was recrystd. from PhMe. Foster Dee Snell

Sulfonation of 5,6-benzoquinoline. Jaroslaw Böhm. *Roczniki Chem.* **19**, 109–15(1939); cf. *C. A.* **33**, 3796⁸.—5,6-Benzoquinoline and 20% oleum at 100° (2 hrs.) yield 5,6-benzoquinoline-3′- and -5′-sulfonic acid, together with small amts. of a 3rd, unidentified acid, decompg. 369–78°. The products were identified by conversion into the corresponding phenols. 3′-Amino- and 3′-hydroxy-5,6-benzoquinoline m. 175.5–6.5° (literature 158°) and 245–7° (literature 208–11°), resp. B. C. P. A.

Constitution of matrine. XXVI. Genalkaloids of matrine and *d*-lupanine. Eiji Ochiai, Y. Ito and Masatake Maruyama. *J. Pharm. Soc. Japan* **59**, 705–10 (in German, 270–3)(1939).—*d*-Lupanine (I) when treated with 3% H_2O_2 gave *d-lupanine mono-N-oxide*, $C_{15}H_{24}N_2O_2$, which forms the following derivs.: *picrate*, decompg. 189°; *perchlorate*, decompg. 247°; *Au salt*, decompg. 216°; and *methiodide*, decompg. 137°. I (1.2 g.) in 5 cc. 9% HCl when treated with freshly prepd. CaO_2 for 30 min. gave *trilupine*, $C_{15}H_{24}N_2O_3$ (*d*-lupanine di-*N*-oxide), m. 127°. In like manner both matrine or hydroxymatrine when treated with CaO_2 gave the original compds. quantitatively. Sulfonation of I gave *thiolupanine*, $C_{15}H_{24}N_2S$, m. 102°; *thiolupanine picrate*, decompg. 225°. Sulfonation of matrine gave the original compd. quantitatively. *N*-Isoamylpiperidine and 2-methylindolizine when treated with H_2O_2 gave *N*-isoamylpiperidine oxide, m. 135° (picrate, m. 117°), and 2-methylindolizine oxide, an oil (picrate, m. 165°), resp., while *N*-isoamyl-α-piperidone gave the original compd. The structure of matrine is discussed on the basis of the above information. F. I. N.

Constitution of abietic acid. Di- and tetrahydroxy-

and chlorotrihydroxyabietic acids, and their oxidation products. Leon Sternbach. *Roczniki Chem.* **19**, 167–86(1939).—Abietic acid is oxidized ($KMnO_4$ in KOH) to dihydroxyabietic acid (I) (*Me ester*, m. 106–7°) and its oxide (II), together with an isomer (III), m. 130–50°, of tetrahydroxyabietic acid. III and HCl in $COMe_2$ give chlorotrihydroxy- (IV) and normal tetrahydroxyabietic acid. IV treated with *N* NaOH at 40° yields II, together with *tetrahydroxyabietolactone*, not melting at 330°, $[\alpha]_D$ −75.8° ± 1.5° in $CHCl_3$. II or III in aq. $COMe_2$ at room temp. undergo gradual conversion into *β-tetrahydroxyabietic acid*, softening at 130°, m. 151°, $[\alpha]_D$ − 67.7° ± 0.4° in MeOH. IV is oxidized by CrO_3 in AcOH to a *product*, $C_{20}H_{31}O_4Cl$, m. 154–6° (*semicarbazone*, m. 204–6°). I is oxidized by $Pb(OAc)_4$ to a *keto dicarboxylic acid* (V), $C_{20}H_{30}O_6$, m. 212–2.5°, while an isomeric *acid* (VI), m. 132–4°, is obtained similarly from II. II is probably IIa or IIb, V is Va or Vb, and VI is VIa or VIb.



B. C. P. A.

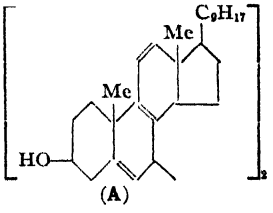
The splitting of digitonides. Werner Bergmann. *J. Biol. Chem.* **132**, 471–2(1940).—The steroids and digitonin from digitonides can be more readily recovered by a simple modification of Schoenheimer's method (*C. A.* **27**, 1898) in which the C_5H_5N is removed by vacuum distn., thus avoiding the filtration of considerable vols. of Et_2O-C_5H_5N mixt. contg. suspended digitonin. Yields of recovered steroid as high as 95–8% may be obtained. A. P. Lothrop

Criteria for purity of chlorophyll preparations. G. Mackinney. *J. Biol. Chem.* **132**, 91–109(1940).—Because the prepn. of chlorophyll has been fraught with much uncertainty in the past, a method of prepn. is described which, although no new principle is involved, is so simplified as to largely remove these uncertainties. When the highly sensitive spectroscopic method of analysis is used, purity is assured only when the pigment is homogeneous and forms an entirely sep. zone on the Tswett column. The means to this end depend on the selection and standardization of the adsorbent. A. P. Lothrop

Some tetramethylammonium nucleates. Sergio Berlingozzi and Italo Bruzzesi. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec. **1939**, 15–20.—Yeast nucleic acid forms stable salts with 2 and with 4 mols. of Me_4NOH. The aq. solns. can be sterilized by boiling, without decompn.

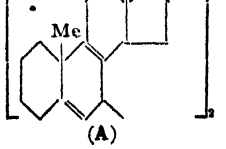
L. E. Gilson

The constitution of dehydroergopinacol. Tosio Ando. *Bull. Chem. Soc. Japan* **14**, 482–6(1939)(in English); cf. *C. A.* **33**, 8502⁶.—*Ergopinacol* (I) *diacetate* is not dehydrogenated when treated with $Hg(OAc)_2$, thus differing from ergosterol (II) which forms under these conditions dehydroergosterol (III) (cf. Windaus and Linsert, *C. A.* **22**, 4534). This indicates that the double bonds conjugated in II are no longer in conjugation in I. That is consistent with Inhoffen's tentative formula for I (cf. *C. A.* **31**, 4984⁴). *Dehydroergopinacol* (IV) *diacetate* (V), obtained from IV with Ac_2O in pyridine or by exposing the acetate of III and eosin in EtOH to sunlight in the absence of air, forms needles from C_6H_6-EtOH, m. 195–6.5° (cor.), decomp. 200.5° (cor.), $[\alpha]_D^{23}$ −242° (11.9 mg. in 1 cc. $CHCl_3$). It shows an ultraviolet absorption max. at 275 mμ in 0.048% hexane soln. It gives a pink, light green and finally dark green color in the Rosenheim test. Whereas III (absorption max. at 320 mμ) contains 3 conjugated double bonds, the absorption max. 275 mμ of V indicates that only 2 of the double bonds of the latter are conjugated. A constitution (A) agreeing with this finding and with Inhoffen's formula for I is proposed for IV.



Dora Stern

The photochemical dehydrogenation of 7-dehydrocholestene. Akira Tominaga. *Bull. Chem. Soc. Japan* **14**, 486–9(1939)(in English).—In order to see whether or not the HO group in the 3-position of ergosterol takes part in the photochem. formation of the bimol. dehydrogenation product, the so-called ergopinacol (I), the behavior of *7-dehydrocholestene*, $C_{27}H_{44}$ (II), on irradiation is investigated. II is prepd. according to the method of Dimroth and Trautmann (*C. A.* **30**, 4506⁴). The specimens of II obtained under various conditions show an ultraviolet absorption spectrum which reveals that II is contaminated with isomeric cholestadiene which, however, is supposed to remain unaffected by the following irradiation. An alc.-C_6H_6 soln. of 300 mg. II and 300 mg. eosin, freed from air by a CO_2 stream and exposed to sunlight for a week, gives 40 mg. *"7-dehydrocholestenepinacone,"* $C_{54}H_{86}$ (III). The transition of II into III shows that the HO group in the 3-position is not necessary for the investigated photochem. dehydrogenation process, which is in favor with Inhoffen's formula for I (*C. A.* **31**, 4984⁴). A corresponding formula (A) is assigned to III. III m. 269–70° (cor., decompn.), $[\alpha]_D^{19}$ 260° (3.3 mg. in 1 cc. $CHCl_3$), and gives the color reactions of steroids.



Dora Stern

Sterols. XX. Homogeneity of bessisterol and properties of its double bonds. Satoru Kuwada and Sizuo Yosiki. *J. Pharm. Soc. Japan* **59**, 717–24(in German, 282–4)(1939); cf. *C. A.* **34**, 1026⁸.—Bessisterol (I) (0.5 g.) and 0.5 g. azobenzenecarbonyl chloride when heated on the oil bath at 170–80° gave bessisterol azoben-

zenecarboxylate, $C_{42}H_{56}N_2O_2$, m. 237.5–9.5°. I (1 g.) and 1 g. *m*-$(O_2N)_2C_6H_3COCl$ gave the *m*-dinitrobenzoate (II), $C_{56}H_{58}N_4O_6$, m. 199.5–204.5°, $[\alpha]_D^{25}$ 3.29°. Hydrolysis of II with alc. KOH gave I, $C_{28}H_{48}O.0.5H_2O$, m. 174–5°, $[\alpha]_D^{25}$ −13.5°; acetate, m. 185°, $[\alpha]_D^{25}$ −13.47°; benzoate, m. 202°, $[\alpha]_D^{25}$ 0°. Bessistenol (3 g.) in 25 cc. pyridine and 3 g. *m*-$(O_2N)_2C_6H_3COCl$ gave bessistenol *m*-dinitrobenzoate, $C_{56}H_{52}N_2O_8$, m. 206–9°, $[\alpha]_D^{25}$ 4.5°; bessistenol, $C_{28}H_{50}O$, m. 113–15.5°, $[\alpha]_D^{25}$ 17.53°; acetate, m. 115.5–17.5°. F. I. Nakamura

17-β-Hydroxyprogesterone. J. J. Pfiffner and H. B. North. *J. Biol. Chem.* **132**, 459–60(1940).—A new compd., 17-β-hydroxyprogesterone, which is an isomer of desoxycorticosterone, has been isolated in pure form during the prepn. of the various adrenal hormones from cattle glands. *17-β-Hydroxyprogesterone*, m. 212 15°, $[\alpha]_D^{25}$ 102°; *disemicarbazone*, darkens at 240°, sinters at 280–90°, blackens but does not m. below 360°; *dioxime*, sinters at 240°, m. 250–1° (decompn.). All m. ps. are uncor. It has no progestational activity and slight, if any, adrenal cortical activity. Its androgenic activity is of the same order as that of androsterone when tested in the castrated rat. A. P. Lothrop

Hydroxamic acids in qual. org. analysis (Davidson) **7**. Action of benzyl alc. on peptides and proteins (Overhoff) **11A**. Azo derivs. of sulfanilamide (Mossini) **25**.

Kipping, F. S., and Kipping, F. B.: Organic Chemistry. Revised ed. London: W. & R. Chambers, Ltd. 1029 pp. 9s.

Methyl Ethyl Ketone, Its Uses and Data on Its Properties. San Francisco: Shell Chemical Co. 58 pp.

Purifying chlorinated aliphatic hydrocarbons. John H. Reilly (to Dow Chemical Co.). U. S. 2,183,046, Dec. 12. A chlorinated satd. aliphatic hydrocarbon such as ethylene chloride contg. unsatd. impurities is treated with S chloride, and the chlorinated aliphatic hydrocarbon is distd. from the resulting mixt. in a relatively pure condition.

Catalytic dehydrogenation of hydrocarbons, as in forming propylene from propane. Herbert P. A. Groll and James Burgin (to Shell Development Co.). U. S. 2,182,431, Dec. 5. A process for the catalytic dehydrogenation of a hydrocarbon predominantly to an unsatd. hydrocarbon contg. fewer H atoms but the same number of C atoms to the mol. comprises bringing the substantially anhyd. vapors of a dehydrogenatable hydrocarbon contg. at least 2 C atoms into contact with a catalyst essentially consisting of an "activated alumina," prepd. by calcining, at a temp. of 300–800°, an Al hydroxide which was slowly pptd. from its aq. alk. soln. at a temp. of about 500–650°, whereby rupture of C-to-C bonds is substantially obviated and the treated hydrocarbon is predominantly dehydrogenated to an unsatd. hydrocarbon contg. the same number of C atoms.

Polymerizing olefins. Richard Michel (to I. G. Farbenind. A.-G.). U. S. 2,182,617, Dec. 5. Polymerization of a normally gaseous olefin contg. at least 3 C atoms such as C_3H_6 or iso-C_4H_8 is effected in the presence of a catalyst such as concd. H_3PO_4 and of an excess of a normally formed reaction product such as isononylene or triisobutylene to suppress further formation of the latter during the polymerization.

Interpolymerization of olefins such as isobutene and normal butene. Richard M. Deanesly and Aaron Wachter (to Shell Development Co.). U. S. 2,181,640, Nov. 28. A process for the interpolymerization of a tertiary olefin with a dissimilar olefin of a lower order of reactivity comprises heating the tertiary olefin with a substantial mol. excess of the dissimilar olefin in the presence of an acidic polymerization catalyst under a superatm. pressure and at a temp. of from 60–250° for a time sufficient to effect substantial interpolymerization with no substantial decompn. of the olefinic reactants and products.

Catalytic hydrogenation of ε-caprolactam to amines. Wilbur A. Lazier and Geo. W. Rigby (to E. I. du Pont de Nemours & Co.). U. S. 2,181,140, Nov. 28. By the catalytic hydrogenation of ε-caprolactam at a temp. of about 200–400°, amines such as hexamethylenediamine, etc., are produced. Several examples with details are given.

Amines. Rudolph L. Hasche (to Eastman Kodak Co.). U. S. 2,182,807, Dec. 12. See Brit. 501,763 (*C. A.* **33**, 6340[8]).

Forming ether derivatives of polyhydric alcohols. Eddy W. Eckey (to Procter & Gamble Co.). U. S. 2,182,397, Dec. 5. In forming an ether deriv. of a polyhydric alc., such as a stearic acid ester of a polyglycerol, a mixt. of an ester consisting of a polyhydric alc. partially esterified with a carboxylic acid, such as stearic acid, a "water carrier" such as toluene having a lower b. p. than such other materials and immiscible with water, and a catalyst which may be H_2SO_4 or a sulfonic acid, is subjected to boiling and the water thus formed is distd. off.

Hydroxyalkyl ethers of benzophenone. Gerald H. Coleman and Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,182,786, Dec. 12. By reactions such as that of a hydroxybenzophenone of a nuclear halogenated deriv. with an alkylene chlorohydrin (suitably in a solvent such as aq. EtOH with heating to 55–65°), products are obtained such as the β-hydroxyethyl ether of 4-hydroxybenzophenone, m. about 83°, the β-hydroxyethyl ether of 3-chloro-4-hydroxybenzophenone, an amber oil, and other compds. such as β-hydroxyethyl ethers of 4'-chloro-4-hydroxybenzophenone, 3,4'-dichloro-4-hydroxybenzophenone, 3-bromo-4-hydroxybenzophenone, 2-hydroxy-3,5,6-trichlorobenzophenone, 2-hydroxybenzophenone, 2-hydroxy-3-chlorobenzophenone; hydroxybutyl ether of 2',4',6'-trichloro-4-hydroxybenzophenone, hydroxyamyl ether of 3,5-dibromo-4-hydroxybenzophenone, hydroxypropyl ether of 3-chloro-4'-bromo-4-hydroxybenzophenone, etc. Cf. *C. A.* **33**, 6877[7].

Terpene ethers. Donald H. Sheffield (to Hercules Powder Co.). U. S. 2,182,826, Dec. 12. See Brit. 494,504 (*C. A.* **33**, 2535[2]).

Cyclic acetals of formaldehyde. Kurt Billig (to I. G. Farbenind. A.-G.). U. S. 2,182,754, Dec. 5. An aq. soln. of CH_2O is treated with an α-alkylene oxide, such as ethylene oxide, for the production of glycol formaldehyde acetal, at a temp. of about 50–100° in the presence of a strongly acid condensation catalyst such as H_2SO_4 and the resulting intermediate condensation product is heated to about 100–150° in the presence of a catalyst which may be HCl, HBr or their acid-reacting metal salts.

Separating ketones of the sterol series. Fritz Hanusch (to C. F. Boehringer & Soehne G. m. b. H.). U. S. 2,183,072, Dec. 12. For the sepn. of androstenedione and progesterone from cholestenone, the mixt. is dissolved in a solvent such as benzene and the resulting soln. is extd. with a soln. of a metal salt (other than a salt of an alkali or alk. earth metal) such as a concd. soln. of $ZnBr_2$ or Sn chloride to dissolve the androstenedione and progesterone without dissolving the cholestenone. Several examples, with details, of similar treatment are given.

"Bis-phenols." Edgar C. Britton and Fred Bryner (to Dow Chemical Co.). U. S. 2,182,308, Dec. 5. A method of making a "bis-phenol" such as bis(4-hydroxyphenyl)dimethylmethane by treating a phenol such as PhOH with a ketone such as acetone in the presence of an inorg. acid such as HCl involves the steps of washing the reacted mixt. with water to remove most of the inorg. acid, neutralizing the residual inorg. acid (suitably with lime), and then distg. off the unreacted phenol for obtaining a purified product.

Derivatives of a phenol obtained from cashew-nutshell oil. Solomon Caplan (to Harvel Corp.). U. S. 2,181,119, Nov. 28. A new compd. called cardanol, of the probable formula $C_{14}H_{27}C_6H_4OH$, b_{10} 225°, is obtained by distg. cashew-nutshell liquid at a greatly reduced pressure or in a stream of steam at atm. pressure, and by catalytic hydrogenation yields a compd. of the probable formula

$C_6H_4OHC_{14}H_{29}$ (1,3), m. about 50.5° and b. about 380° (b_{10} 240°). Ethylation with Et_2SO_4 produces ethyl cardanol, b_{10} about 235°, and reaction with benzoyl chloride forms cardanyl benzoate, b_7 about 290°. With α-chloropropionic and chloroacetic acids, cardanol reacts to form cardanolpropionic acid, $C_{14}H_{27}C_6H_4OC_2H_4COOH$, and cardanolacetic acid, $C_{14}H_{27}C_6H_4OCH_2COOH$. Hydrogenated cardanol may be used as a plasticizer in cellulose acetate lacquers, etc., or for reaction with CH_2O in producing synthetic resins and its alkyl ethers may be used as high-boiling heat-transfer liquids. Ethers of cardanol and of hydrogenated cardanol may also be used as *plasticizers for lacquer materials* and as *fixatives for perfumes*. Cardanol benzoate has an odor similar to that of Russian leather and may be used *for odorizing* other *leathers* or *artificial leather*.

Catalytic hydrogenation of mononitrated phenols. Clyde O. Henke, Wm. A. Douglass and Roland G. Benner (to E. I. du Pont de Nemours & Co.). U. S. 2,183,019, Dec. 12. Catalytic hydrogenations such as that of *p*-nitrophenol to *p*-aminophenol in the liquid phase in the presence of a Ni catalyst are effected at temps. of about 50–175° under a pressure above 100 lb. per sq. in. and with the initial reactants adjusted to a pH of about 6.0–11.6.

Dinitro derivatives of saturated nonbenzenoid hydrocarbons. Henry B. Hass and Leon W. Seigle (to Purdue Research Foundation). U. S. 2,181,531, Nov. 28. For the production of a dinitro compd. such as 2,3-dimethyl-2,3-dinitrobutane, a salt of a secondary nitro deriv. of a satd. nonbenzenoid hydrocarbon such as the Na salt of 2-nitropropane is condensed with a secondary halo nitro deriv. of a satd. nonbenzenoid hydrocarbon having the halogen and the nitro group on the same C atom, such as 2-chloro-2-nitropropane (suitably by heating in abs. alc. for 7 hrs. at refluxing temp.).

Hydrogenating aromatic hydrocarbons, as in forming 1,4-dihydrobenzene from benzene or dihydrotoluene from toluene. Charles B. Wooster (to E. I. du Pont de Nemours & Co.). U. S. 2,182,242, Dec. 5. In a liquid solvent which may be liquid NH_3 or an aliphatic amine which dissolves alkali metal, reaction is effected between an aromatic org. compd. such as benzene or toluene, an alkali or alk. earth metal or Mg, and a hydrolytic agent such as MeOH which reacts with Na in liquid NH_3 soln. in the absence of a catalyst to evolve H but which will not react completely with NH_3 to form an NH_4 salt (suitably by heating with refluxing). Various examples are given.

Pyrolysis of *sec*-butylbenzene and its derivatives. Robert R. Dreisbach (to Dow Chemical Co.). U. S. 2,182,313, Dec. 5. Allylbenzene is produced by pyrolyzing vaporized *sec*-butylbenzene (suitably by brief heating with superheated steam at about 550°). Chloro-*sec*-butylbenzene, similarly pyrolyzed, yields chloroallylbenzene. A mixt. of isomeric ethyl-*sec*-butylbenzenes yields ethylallylbenzenes, ethylvinylbenzenes, styrene and some ethyl- and diethyl-benzenes. Similarly, *sec*-butyl-3,5-dichlorobenzene may be pyrolyzed to obtain allyl-3,5-dichlorobenzene, *sec*-butyl-3-bromo-benzene may be pyrolyzed to obtain allyl-3-bromobenzene, *sec*-butyl-3-chloro-5-methylbenzene may be pyrolyzed to obtain allyl-3-chloro-5-methyloenzene, etc. In pyrolyzing such *sec*-butylbenzene compds. numerous by-products are frequently obtained. These by-products usually include styrene homologs and analogs useful in prepg. synthetic resins.

Hydrolysis of 1,3-dihalobutanes. Edgar C. Britton and Gerald H. Coleman (to Dow Chemical Co.). U. S. 2,181,297, Nov. 28. In prepg. a product such as 1-chloro-3-hydroxyisobutane, a 1,3-dihaloisobutane such as 1,3-dichloroisobutane is treated with an aq. alk. agent such as NaOH at a temp. between 75° and 200° (suitably 175° for 23 hrs.). Several examples are given.

Chlorinating nitromethane. Byron M. Vanderbilt (to Commercial Solvents Corp.). U. S. 2,181,411, Nov. 28. For the production of chloropicrin an aq. soln. of nitromethane is treated with a chlorinating medium contg. Cl and an alkali or alk. earth metal hypochlorite with the Cl present in sufficient amt. to convert all the metal hydroxide formed into the corresponding hypochlorite.

Benzenecarboxylic acid fluorides containing trifluoromethyl groups. Herbert Kracker, Otto Scherer, Fritz Müller and Willy Schumacher (to General Aniline Works). U. S. 2,181,554, Nov. 28. Benzoyl fluorides contg. trifluoromethyl groups (and which may be used as intermediates in making dyes and pharmaceutical compds.) are produced by the reaction of HF or SbF_3 by heating with benzoyl chlorides substituted by one or more trichloromethyl groups. Products thus obtainable include: trifluoromethylbenzoyl fluoride, b. 158–62°; 4-trifluoromethyl-3-chlorobenzoyl fluoride, *m*-trifluoromethylbenzoyl fluoride, b. 159–63°; 3,5-bis(trifluoromethyl)benzoyl fluoride, b. 158–62°; 5-trifluoromethyl-1,3-benzenedicarbonyl fluoride, b_{15} 88°; 4-trifluoromethyl-1,2-benzenedicarbonyl fluoride, and various related compds., details of the production of some of which are given.

Triaryl phosphates. Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,182,817, Dec. 12. Products are formed which do not cause blushing of cellulose ether compns. when used in them as plasticizing agents, and which have the general formula $[(4\text{-}Me_3C\text{-}2\text{-}MeC_6H_3O)_n\text{-}(RO)_{n'}]P{:}O$, where R represents an aryl radical and n and n' each represents an integer, the sum of n and n' being equal to 3, as by treating a P oxyhalide with *p-tert*-butyl-*o*-cresol and if required with another phenol such as PhOH, cresol, naphthol, *p*-cyclohexylphenol, 2,4-dimethylphenol, etc., and an alkali metal salt of a phenol. Details are given of the production of: tris(*p-tert*-butyl-*o*-tolyl) phosphate, b_8 304–8°; bis(*p-tert*-butylphenyl) *p-tert*-butyl-*o*-tolyl phosphate, b_8 314–18°; and di-*p*-xenyl *p-tert*-butyl-*o*-tolyl phosphate, b_8 178–385°, and mention is also made of the production of other products such as *p-tert*-butyl-*o*-tolyl dinaphthyl phosphate, bis(*p-tert*-butyl-*o*-tolyl) 2,4-dichlorophenyl phosphate, *p-tert*-butyl-*o*-tolyl bis(2-methyl-5-isopropylphenyl) phosphate, *p-tert*-butyl-*o*-tolyl bis(*p*-cyclohexylphenyl) phosphate, bis(*p-tert*-butyl-*o*-tolyl) *p-tert*-octylphenyl phosphate, *p-tert*-butyl-*o*-tolyl bis(2,4,6-triethylphenyl) phosphate, etc.

Mixed triaryl phosphates. Edgar C. Britton and Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,182,309, Dec. 5. Mixed triaryl phosphates contg. a single 2,4-dibromophenyl group and which may be used as plasticizers with cellulose esters or ethers or a core fluid for golf balls may be prepd. by treating a P oxyhalide with 2,4-dibromophenol to form 2,4-dibromophenyl-phosphoric acid dihalide and then treating this intermediate with a phenol such as PhOH, cresol, naphthol, *p*-phenylphenol or the like to form the mixed triaryl phosphate product. Details are given of the production of 2,4-dibromophenyl diphenyl phosphate, b_5 273–83°, and having a sp. gr. of 1.627, 2,4-dibromophenyl dicarvacryl phosphate, b_8 295–305°, and having a sp. gr. of 1.4, 2,4-dibromophenyl phenyl *o*-tolyl phosphate, b_8 270–85°, and having a sp. gr. of 1.56, and 2,4-dibromophenyl di-*o*-tolyl phosphate, b_8 290–300°, and having a sp. gr. of about 1.58; and general mention is made that the 2,4-dibromophenyl phosphoric acid dihalide may be treated with *p*-ethylphenol to form 2,4-dibromophenyl bis(*p*-ethylphenyl) phosphate; with *o*-chlorophenol to form 2,4-dibromophenyl bis(*o*-chlorophenyl) phosphate; with *p-tert*-butylphenol and *p*-phenylphenol to form 2,4-dibromophenyl *p-tert*-butylphenyl *p*-xenyl phosphate; with 2,4-dimethylphenol to form 2,4-dibromophenyl bis(2,4-dimethylphenyl) phosphate; with α-naphthol to form 2,4-dibromophenyl di-α-naphthyl phosphate; with isopropylphenol and *m*-cresol to form 2,4-dibromophenyl isopropylphenyl *m*-tolyl phosphate; with 2,4,6-triethylphenol to form 2,4-dibromophenyl bis(2,4,6-triethylphenyl) phosphate; with thymol and phenol to form 2,4-dibromophenyl thymyl phenyl phosphate; with *o*-cyclohexylphenol to form 2,4-dibromophenyl bis(*o*-cyclohexylphenyl) phosphate; etc.

Alkylated phenols. Donald R. Stevens and Joseph E. Nickels (to Gulf Research & Development Co.). U. S. 2,181,823, Nov. 28. A monohydroxy phenolic compd.

alkylated in the hydroxylated nucleus, such as 2,6-di-*tert*-butyl-4-phenylphenol, is produced by heating a mixt. of an olefin such as isobutylene and a monohydroxy phenolic compd. such as *p*-hydroxybiphenyl in the presence of a soln. of an alkali metal sulfate or NH_4 sulfate in H_2SO_4.

Alkylation of naphthenes. Aristid V. Grosse (to Universal Oil Products Co.). U. S. 2,182,557, Dec. 5. A process for the production of alkyl derivs. of naphthene hydrocarbons having at least 6 C atoms in the ring, such as methylcyclohexane involves treating the naphthene hydrocarbon with a cycloparaffin having less than 5 C atoms in the ring, such as cyclopropane, in the presence of a metal halide such as $AlCl_3$ and a H halide such as HCl (suitably at a temp. of −10°).

Sebacic acid. Herman A. Bruson and Lloyd W. Covert (to Röhm & Haas Co.). U. S. 2,182,056, Dec. 5. Sebacic acid is produced by a process which involves heating a functional deriv. of ricinoleic acid such as castor oil with an alkali metal hydroxide or carbonate in aq. soln. to above 175° and under superatm. pressure at least equal to the vapor pressure of the reaction mixt. at the temp. used.

Reactions such as the production of acetaldehyde and vinyl chloride from ethylene chloride. James L. Amos (to Dow Chemical Co.). U. S. 2,183,036, Dec. 12. For converting a 1,2-olefin dihalide substantially only to the corresponding aldehyde and monohalo-olefin, one part of the dihalide is mixed with about 1.3–8.1 parts of steam superheated to give the resultant mixt. a temp. of about 300–800° and it is passed over a surface catalyst such as activated alumina at such a temp.

Hydroxypropanone. Raymond W. McNamee and Charles M. Blair (to Carbide and Carbon Chemicals Ltd.). Can. 386,591, Jan. 30, 1940. Hydroxypropanone is prepd. by dehydrogenating 1,2-propylene glycol vapor at about 265° in the presence of a reduced Cu and Cr catalyst.

Stabilizing vinyl acetate. Gelu S. Stamatoff (to E. I. du Pont de Nemours & Co.). U. S. 2,182,528, Dec. 5. Polymerization of monomeric vinyl acetate is inhibited by the addn. of about 0.2% or less of rosin or a resinate of Cu, Zn, Mg, Al or Co.

Diisobutylene. Wallace A. McMillan (to The Texas Co.). U. S. 2,181,642, Nov. 28. An arrangement of app. is described, and a process for the manuf. of diisobutylene from an unsatd. C_4 hydrocarbon fraction contg. isobutylene, which comprises selectively converting the isobutylene into *tert*-butyl chloride by bringing the hydrocarbons in the liquid phase into contact with dry HCl, sepg. the *tert*-butyl chloride by fractionation, decompg. the isobutyl chloride to isobutylene and HCl, under the influence of heat, subjecting the resulting mixt. while hot and at a slightly reduced temp. to polymerization in the presence of a catalyst immune to HCl poisoning, whereby the isobutylene is polymerized to diisobutylene, sepg. the diisobutylene from the HCl and recycling the HCl for conversion of addnl. isobutylene to *tert*-butyl chloride.

***β*-Lactose.** Paul F. Sharp and David B. Hand (to Cornell Research Foundation). U. S. 2,182,618, Dec. 5. App. is described, and a process of producing *β*-lactose which consists in heating any other form of lactose while in a pulverulent condition in an atm. of water vapor at a temp. maintained above the transition point and vapor pressure sufficiently high to cause the formation of a temporary soln. on the surface of the lactose particles, while limiting the amt. of moisture so that the particles remain in a pulverulent condition, continuing the process until the lactose is converted into the beta form, and then permitting the surplus moisture to escape, leaving dry cryst. *β*-lactose. U. S. 2,182,619 relates to a process of producing *β*-lactose crystals which involves heating *α*-lactose hydrate crystals at a sufficiently high temp. to drive off the water of crystn., maintaining some of the water of crystn. so driven off in a moisture-confining zone (of a described app.) in intimate assocn. with the crystals and maintaining the temp. above the transition point until the crystals are substantially transformed into *β*-lactose crystals, and then allowing the water to escape, so that dry *β*-lactose crystals remain.

Methyl violet purification. Orville S. Frank (to Sherwin-Williams Co.). U. S. 2,181,369, Nov. 28. A process for deodorizing methyl violet comprises subjecting an aq. soln. of a water-sol. methyl violet salt to the extg. action of a solvent liquid which forms a separable layer with the soln. and which is incapable of dissolving all of the methyl violet from the aq. soln., whereby the liquid takes up objectionable malodorous bodies from the aq. soln., and sepg. the resulting 2 liquid phases.

Azeotropic distillation and concentration of acetic and propionic acids. Jack J. Gordon and Arthur W. Bright (to Eastman Kodak Co.). U. S. 2,171,549, Sept. 5. An arrangement of app. is described, and a process, which as applied to the concn. of aq. HOAc may be continuous and may comprise vaporizing and feeding the aq. HOAc, fractionating water and HOAc from the HOAc, bringing this fractionated acid and water into contact with a small quantity of PrOAc and PrOH entrainer in a zone near but above the feed, removing the resultant vapors from the contact zone, bringing these vapors into contact in a second zone with further and larger quantities of PrOAc and PrOH entrainer, fractionating and vaporizing a ternary azeotrope PrOAc, PrOH and water vapors from the second zone, condensing and sepg. these vapors to obtain PrOAc and PrOH entrainer and employing this sepd. entrainer for the aforementioned smaller and larger PrOAc and PrOH entrainer additions by returning the sepd. entrainer to the two zones mentioned. U. S. 2,171,550 (Jack J. Gordon, sole inventor; to same assignee) involves a method for controlling the entrainer content of a balanced azeotropic distn. system, employing a multicomponent entrainer comprising a major portion of aliphatic ester and a minor portion of aliphatic alc. greater than 3% for dehydrating aq. solns. contg. at least one lower aliphatic acid, which comprises gradually adding to the system from time to time during a 24-hr. period, small amounts of the aliphatic alc., for control and replenishment. In concg. HOAc, a major proportion of PrOAc and a minor proportion of PrOH may be used, as may also BuOAc and BuOH or AmOAc and AmOH.

Salts of diarylaminoalkylcarbinols. Chemische Werke Albert (Emil Eidebenz and Hans Mengele, inventors). Ger. 675,817, May 17, 1939 (Cl. 12*q*. 32.21). Salts readily sol. in water are prepd. by converting diarylaminoalkylcarbinols into salts of mono- or polyhydroxy monocarboxylic acids. The carbinols and acids may be fused together in the presence of a little water to produce the salts. Thus, (dimethylaminomethyl)di-2,5-xylylcarbinol is fused with lactic acid to give a sol. lactate. Other examples are given.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W. DOX

The growth of populations of Protista and the allelocatalytic effect. Wilhelm Ludwig and Charlotte Boost. *Arch. Protistenk.* 92, 453–84(1939); cf. L., *Biol. Generalis* 4, 351–76(1928).—From an analysis of the population curves (sp. growth velocity plotted against increase in population) it follows that populations of *Protista* in media, which have not been changed, behave as if, firstly, the initial amt. of nutrient is gradually consumed and, secondly, the conditions for increase become more and more favorable through accumulation of the auto-excretion products in the surrounding medium, until the optimal

concn. is exceeded. Allelocatalytic effects in *Protista* are widely distributed. In most cases, at least, the allelocatalytic effect presumably depends upon an action of the auto-excretion products which favors the population increase, perhaps through a change in the pH or the oxidation-reduction potential of the medium. The biol. basis for this is seen in the fact that most *Protista* in nature live in dense populations, so that the optimal concn. of auto-excretion products is not small. Ruth Berggren

Organisms in time. Theodore W. Torrey. *Quart. Rev. Biol.* **14**, 275–88(1939).—A review, including a section on comparative biochemistry. J. B. Brown

Alkali fibrinate and caseinate as catalases. Martin H. Fischer and Werner J. Suer. *Kolloid-Z.* **89**, 13–20 (1939).—See *C. A.* **33**, 6886[2]. S. A. Corson

Use of isolated radiation in experiments with the rat. II. Effects of darkness and of visible and infrared radiation on three successive generations of rats. (*a*). **Growth and storage of vitamin A.** Ethel M. Luce-Clausen and Elizabeth F. Brown. *J. Nutrition* **18**, 537–49(1939); cf. *C. A.* **23**, 4498; **24**, 1889.—Radiation in the visible region of the spectrum promotes growth in rats fed the Sherman B diet as compared with rats fed the same diet but kept in darkness. This effect is more pronounced in the third generation, and is more marked in males than in females. Radiations in the near and far infrared regions have a growth-promoting effect which is lesser in degree than that of visible light. Rats kept in darkness and fed the Sherman B diet, and also groups fed a diet contaminated with F store more vitamin A in livers at a more rapid rate for wt. at given ages than do comparable groups exposed for 12 hrs. a day to visible light. Lack of retinal stimulation by light may play a part in this result. III. (*b*) **Reproduction.** *Ibid.* 551–62.—Age of onset of 1st estrus and also of opening of the vagina are delayed in rats kept in darkness. Radiations in the visible region of the spectrum speed up these physiol. functions in rats. Radiation plays a definite part in promoting the normal survival of young born in succeeding generations reared under controlled conditions of light. The most effective radiations are in the visible, but near and far infrared radiations are also of some value. Radiation plays a part in rat reproduction. In the near and far infrared equal results were demonstrated, with equal energy equivs. in these 2 regions. By using in the visible region $^1/_3$ the energy of that used in the infrared, the best results were obtained. C. R. Fellers

Tyrosinase in feather germs. Donald R. Charles and Mary E. Rawles. *Proc. Soc. Exptl. Biol. Med.* **43**, 55–8 (1940).—Exts. of black chicken feather germs show a cyanide-sensitive, heat-labile tyrosinase activity, forming melanin from tyrosine without added peroxide, in about 80% of trials when 1 cc. of the reaction mixt. contains ext. of 50–750 mg. of young barb tissue. Exts. of red feathers show a similar activity in about 60% of cases, forming black rather than red pigment. Exts. of White Leghorn germs do not contain tyrosinase and do not inhibit the tyrosinase of black feather germs. L. E. Gilson

Histological demonstration of vitamin A in rats by means of fluorescence microscopy. Hans Popper. *Proc. Soc. Exptl. Biol. Med.* **43**, 133–6(1940).—Vitamin A shows a green fluorescence in ultraviolet light which disappears rapidly during the irradiation. Fluorescent green droplets can be seen in tissue sections, especially in the Kupffer cells of the liver, if the animal has not been deprived of vitamin A. L. E. Gilson

Changes of cholinesterase at end plates of voluntary muscle following section of sciatic nerve. R. Couteaux and D. Nachmansohn. *Proc. Soc. Exptl. Biol. Med.* **43**, 177–81(1940).—The main bulk of the enzyme at the end plates is located outside the nerve endings. With their removal only a small amt. disappears. Later the enzyme concn. decreases but still remains high. Regeneration of the muscle fibers leads to an increase in both concn. and total amt. of cholinesterase. L. E. Gilson

Relation of calcium proteinate and colloidal tricalcium phosphate to the partition of calcium in the blood stream. David M. Greenberg and Clarence E. Larson. *J. Phys. Chem.* **43**, 1139–50(1939).—The partition of the Ca and inorg. phosphate is detd. by ultrafiltration of the blood serum through collodion membranes. Ca is varied by injection of Ca salts, of parathyroid hormone and of large doses of vitamin D. Variation in the serum protein is produced by plasmapheresis. Evidence is presented for the formation of a colloidal $Ca_3(PO_4)_2$ in serum. A linear equation based on the law of mass action governing the relations between Ca and total serum protein is derived. The dissocn. const. of the Ca proteinate and the max. Ca-combining power of the protein of the serum are evaluated. Plasmapheresis expts. are used to obtain data from which the Ca-combining power of albumin and globulin is derived for normal blood Ca levels. L. Kolodny

Seasonal variations in the chemical composition of vertebrate tissues. V. V. Koval'skiĭ. *Biochem. J.* (Ukraine) **12**(in Russian, 355–61; in English, 362–8) (1938).—An outline of the biol. importance of the problem of seasonal variations in the animal organism is followed by a review of research in this field from 1916 to the present time. A. H. Krappe

The reaction between iodoacetic acid and denatured egg albumin. Lawrence Rosner. *J. Biol. Chem.* **132**, 657–62(1940).—The denatured egg albumin used in the work was not permitted to coagulate by adjusting the reaction to pH 7.3 and placing the mixt. for 10 min. in H_2O which had been brought to a boil. Iodoacetic acid reacts much more rapidly with such a soln. than with a coagulum. There is an initial rapid production of iodide lasting no longer than 10 min., and then the reaction slackens and after 40 min. proceeds at a steady, much slower pace. The initial sharp rise in iodide is undoubtedly mainly a result of the interaction between the iodoacetate and the —SH groups of the protein. The slower steady yield is due to some other group or groups as yet unidentified. Extrapolation of this non-sulfhydryl iodide to zero time yields a value for available cysteine of 0.55% in heat-denatured and 0.87% in urea-denatured egg albumin. With solns. of native albumin no iodide was found at the end of 5 hrs. in the presence of iodoacetate. The —SH groups in a soln. of denatured albumin are quite labile, their disappearance probably indicating their oxidation. On the other hand, the non-sulfhydryl groups are apparently not susceptible to destruction, since their rate of iodide production is not diminished after standing. A. P. Lothrop

An esterase from muscular tissue. M. B. Matlack and I. W. Tucker. *J. Biol. Chem.* **132**, 663–7(1940).—An enzyme is present in beef and other muscular tissues which has the characteristics of an esterase and shows marked activity at temps. below 0°. The enzyme is so firmly attached to the muscle protein that even autolysis does not liberate it and it appears, therefore, to be a true muscle enzyme. It can be prepd. from well-washed tissue by the use of dil. alkali, digitonin, digitalin or saponin. It shows its best activity at pH 6 in the presence of phosphate and is considerably inhibited by bile. A. P. L.

Phosphatase studies: the hydrolysis of aminoethyl phosphate and β-glycerophosphate by fecal and kidney phosphatase. Russell V. Bowers, Edgar L. Outhouse and J. C. Forbes. *J. Biol. Chem.* **132**, 675–80(1940); cf. *C. A.* **30**, 3510[7].—The optimum pH for fecal and kidney phosphatases acting on both Na aminoethylphosphate (I) and β-glycerophosphate (II) are 8.8 and 9.2, resp. The optimum Mg concns. for the activation of fecal phosphatase are different for the 2 substrates, being 0.08 to 0.1 *M* for I and 0.005 *M* for II. Kidney phosphatase on the other hand requires 0.005 *M* for both. This is a hitherto unknown characteristic of fecal phosphatase and, since there is no apparent difference in the Mg requirement when kidney phosphatase is used, it definitely indicates a fundamental difference between the 2 enzymes. The results suggest that the use of aminoethyl phosphate as substrate might be of value in distinguishing between phosphatases from different sources. The rate of hydrolysis of I by both enzymes is only approx. $^2/_3$ that of II. A. P. Lothrop

The ultraviolet absorption spectrum of prolactin.

Abraham White and G. I. Lavin. *J. Biol. Chem.* **132**, 717-21(1940); cf. *C. A.* **31**, 7075⁷.—The ultraviolet absorption spectrum of cryst. prolactin has a band with the max. absorption at about 2800 A. Narrow bands appear in photographs taken with the continuous light source of the H discharge tube and suggest the presence of tryptophan, tyrosine and phenylalanine. A. P. L.

Stimulation of growth in Aspergillus niger under exposure to low-velocity cathode rays. C. E. Buchwald and R. M. Whelden. *Am. J. Botany* **26**, 778-84(1939).—Growth of *Aspergillus niger* was stimulated by irradiation with cathode rays of 1.5-3.0 kv. No explanation of the effect is known. Nelson McKaig, Jr.

The action of benzyl alcohol on peptides and proteins. J. Overhoff. *Atti X° congr. intern. chim.* **3**, 263-7(1939) (in German).—In attempting to degrade proteins by means of org. reagents it was found that gelatin and casein dissolve easily in benzyl alc. when heated to 200°. Under these conditions glycine, alanine, glycine anhydride, and aspartic acid remain unchanged. Glutamic acid forms an oil; benzoylglycylglycine is converted to the *benzyl ester*, m. 125°, and the benzyl ester of hippuric acid, m. 91°. The latter can be formed directly from the constituents. Com. gelatin was heated 1 hr. at 210° with 3 parts benzyl alc., filtered, and most of the product was pptd. by ether. The benzyl ester of proline remained in soln. and was recovered by evapn. During the reaction 2% of the total N was evolved as NH_3. No free amino groups were formed, but the ether-insol. product contained one benzyl group for each 7 N atoms. It was partly sol. in H_2O or alc. and sol. in 50% alc. It contained 13.9% N and gave a pos. biuret reaction. The benzyl groups were removed by acid hydrolysis, leaving a weakly acid substance which became strongly acid on benzoylation. R. E. Reeves

Properties of the steady state compared to those of equilibrium as shown in characteristic biological behavior. Alan C. Burton. *J. Cellular Comp. Physiol.* **14**, 327-49 (1939).—The steady state is the common basis of constitution of biol. systems which explains many of the common characteristics of their behavior. Felix Saunders

Ion exchanges in accumulation and loss of certain ions by the living protoplasm of Nitella. S. C. Brooks. *J. Cellular Comp. Physiol.* **14**, 383-401(1939); cf. *C. A.* **33**, 8645².—Three processes occur during the absorption of the ions. (*a*) Induced accumulation takes place rapidly, even in 1 min., but may possibly continue 1-3 hrs. The measured amts. of absorbed ions greatly exceed the amt. susceptible to combination with the plasma membrane and correspond approx. with the salt-combining groups of the constituents present in *Nitella* protoplasm. (*b*) Primary accumulation appears noticeably after 1-3 hrs. of immersion of *Nitella* in these salt solns. This process is intermittent, reaching several successive max. which greatly exceed the permissible amts. of ions calcd. to be combined with the protoplasmic constituents. These ions seem to be accumulated by exchange for metabolic products (org. ions). These org. ions may include many so-called waste products. Alternating with these periods of absorption occur periods during which the radioactive ions are lost from the cells. This loss is due in part to the displacement of these ions from combination with the protoplasm, as well as to replacement of these ions from the protoplasmic matrix. The first of these loss phases is conspicuous. All of these processes can be formulated as ion exchanges and are believed to take place between the water phase and the condensed phases of proteins, fats, etc. In these condensed phases ions move from 1 reactive group to another, exchanging positions with the previously present ions at the other groups. By this means ions pass rapidly through the plasma membrane, provided that easily movable ions are present for exchange. The permeabilities involving 2 univalent inorg. ions are of the order of 10^{-7} g. mols. cm.$^{-2}$ hr.$^{-1}$, a rate closely comparable with those observed for water and for small nonelectrolyte mols. Felix Saunders

Effect of radiation from radioactive indicators on the penetration of ions into Nitella. Lorin J. Mullins. *J. Cellular Comp. Physiol.* **14**, 403-5(1939).—Radiation from radioactive Na decreased the amt. of penetration of ions where the concn. of radioactive ion is greater than 1.0 mc. per l. This decrease in the case of induced accumulation is presumably due to a decrease in the no. of exchange positions in the protoplasm. If any "isotope effect" exists it must be masked by the radiation effects of these radioactive indicators. Felix Saunders

The bilichrysins. A new type of bile pigment. Rudolf Lemberg and Wm. Hutton Lockwood. *J. Proc. Roy. Soc. N. S. Wales* **72**, 69-74(1939).—Two new types of bile pigment, differing from all other known types, and yellow in color, have been prepd. from biliverdin (I) and mesobiliverdin (II) by oxidation with alc. I soln. *Mesobilichrysin* (III) is obtained by adding 10.24 ml. 0.1 *N* alc. I soln. slowly, with shaking, to a soln. of 300 mg. II and 200 mg. $Zn(OAc)_2$ in 40 ml. MeOH contg. 0.2 ml. concd. NH_4OH. The soln. now shows the band of *mesobiliviolin* at 622 mμ. The soln. is a pure blue and shows intense red fluorescence. The soln. is poured into $CHCl_3$, washed with 2% HOAc to remove Zn, and then washed to neutrality. An unstable *mesobiliviolin II* (IV) can be extd. from the $CHCl_3$ soln. with 1% HCl. The $CHCl_3$ soln. is dried overnight with Na_2SO_4. On concg. the brown-violet soln. crystals of III are obtained. Left in the soln. is a violet violin, *mesobiliviolin III*, which cannot be extd. from $CHCl_3$ with 1% HCl, and which shows bands at 544 and 501 mμ. The crystals are filtered off, washed with very little $CHCl_3$, and recrystd. from pyridine. The pyridine soln. is dild. with H_2O and poured into $CHCl_3$. The aq. layer contains the pigment. Cautious addn. of HCl drives it into $CHCl_3$. The $CHCl_3$ soln. is extd. several times with 10% HCl to remove pyridine and the violin, then washed to neutrality, concd. till crystn. starts, and allowed to cool. Yield after 2 recrystns., is about 40 mg. The analysis fits the formula $C_{33}H_{38}N_4O_7$, m. (rapid heating) 240° (d.). III is easily sol. in pyridine, sparingly so in EtOH, $CHCl_3$, Me_2CO, EtOAc and Et_2O, and insol. in petr. ether and H_2O. III is likewise obtained from II in the absence of air, and so seems to be an isomerization product of IV. III cannot be extd. from $CHCl_3$ with 25% HCl, but goes into 50% H_2SO_4, returning to $CHCl_3$ on dilu. In ammoniacal soln. there is a band at 416 mμ. NaHg added to an alk. soln. of III destroys the yellow color, and a leuco compd. (V) can be extd. from the soln. by $CHCl_3$ after acidifying with HOAc. V quickly oxidizes in air, yielding a compd. which shows a band in the blue-green and intense green fluorescence with $Zn(OAc)_2$. To prep. *bilichrysin* (VI), 2.07 ml. alc. I soln. is added slowly, as above, to 62 mg. I in a soln. of 50 mg. $Zn(OAc)_2$, 30 ml. MeOH and 0.1 ml. concd. NH_4OH. The soln. of the *violin* (VII) Zn compd. is greenish and shows intense red fluorescence. The VII is extd. with $CHCl_3$ and allowed to stand for 3 days. The pigments are then extd. with 1% Na_2CO_3 and brought into Et_2O with tartaric acid. Use of 10% HCl removes the violins and leaves a yellow pigment in the Et_2O layer. The Et_2O layer is washed with H_2O, concd. and the residue recrystd. from MeOH, giving yellow needles. When $Zn(OAc)_2$ is added to a soln. of VI in the air, the bands of *biliviolin* Zn appear, with the stronger at 637.8 mμ, characteristic of protoviolins. This shows that the vinyl groups have not been affected during the prepn. A table differentiates the bile pigments and gives their characteristics. Conclusion: The chrysins contain one atom of O more than the verdins. Marcelle Schubert

The oxidation of pyrocatechol and 1,2,4-trihydroxybenzene by polyphenoloxidase. Harold Jackson. *Biochem. J.* **33**, 1452-9(1939); cf. Wagreich and Nelson, *C. A.* **30**, 8256⁷.—The oxidation of pyrocatechol (I) by polyphenoloxidase in the presence of $PhNH_2$ was reëxamd. The amt. of dianilino-*o*-quinone (II) formed diminished as the introduction of $PhNH_2$ into the oxidizing I was delayed; the total O absorbed remained const. at 3 atoms per mol. of I. The oxidation of 1,2,4-trihydroxybenzene (III) at pH 5.9 was catalyzed by polyphenoloxidase. In the presence

of $PhNH_2$, 2 atoms of O per mol. of III was absorbed; autoxidation under the same conditions required 4 atoms of O. The only product which could be isolated in both cases was a hydroxymonoanilinoquinone. These results do not support the theory that enzymic oxidation of I proceeds to hydroxyquinone, or that the formation of II takes place by the interaction of $PhNH_2$ with hydroxyquinone or any higher oxidation product of I than *o*-quinone. E. W. Scott 1

Factors preventing oxidation of ascorbic acid in blood serum. E. M. Mystkowski and D. Lasocka. *Biochem. J.* **33**, 1460–4(1939).—Natural protein-Cu complexes, such as are obtained from serum, acted as feeble catalysts in the oxidation of ascorbic acid by air, but since they also bind a certain amt. of Cu or Fe, they also protected the ascorbic acid from oxidation. Amino acids, and chlorides regardless of the cation, in addn. to serum proteins had an inhibitory action on the oxidation. E. W. Scott 2

Transamination in pigeon-breast muscle. Philip P. Cohen. *Biochem. J.* **33**, 1478–87(1939); cf. *C. A.* **33**, 7835[5].—Of 21 amino acids studied, *l*(−)aspartic acid (I) and *l*(+)alanine (II) were the most active in the formation of glutamic acid (III) from α-ketoglutaric acid (IV); *d,l*-α-aminobutyric acid and valine were slightly active, but none of the others was. Of a series of ketonic acids tested, oxaloacetic (V) and pyruvic (VI) acids showed the greatest activity in causing the disappearance of III. The results can be explained by assuming the existence of 3 enzyme systems which are concerned with the following reactions: III ⇌ IV, I ⇌ V, II ⇌ VI. By combining these systems the following may be brought about: IV + II ⇌ III + VI, IV + I ⇌ III + V, V + II ⇌ I + VI. The occurrence of the last reaction in pigeon breast muscle has not yet been conclusively demonstrated. Transamination in this tissue was inhibited by high concns. of cyanide. NaF, As_2O_3 and octyl alc. had slight inhibitory effects. Pyrophosphate, malonate, iodoacetate and bromoacetate had no effect. A no. of other amino compds. which were tested had no effect in transamination. The differences in these results from those reported by Braunstein and Kritzmann (*C. A.* **33**, 2916[5]) were explained by the failure of the latter to use a suitable control in their expts. E. W. Scott 3

The polysaccharide complex present in serum proteins and the effect of pepsin on serum protein fractions. L. F. Hewitt. *Biochem. J.* **33**, 1496–1505(1939); cf. *C. A.* **32**, 9122[1].—A series of digestions with pepsin and trypsin followed by acid acetone pptns. provided a simple method of isolating the carbohydrate complex. The properties of the polysaccharides present in seroglycoid and globoglycoid were studied. The results were all compatible with the view that these carbohydrates contain galactose-mannose-acetylhexosamine. Some nitrogenous material was present in the prepns. Very brief treatment of seroglycoid with pepsin gave a breakdown product similar to "serum mucoid." The latter which is never found in normal serum is possibly produced by disintegration of seroglycoid. E. W. Scott 4

Detoxication. III. The use of the glucuronic detoxication mechanism of the rabbit for the resolution of *d,l*-menthol. Richard T. Williams. *Biochem. J.* **33**, 1519–24(1939); cf. *C. A.* **33**, 2550[2].—The resolution was effected in 2 ways: (1) the NH_4 salts of the menthylglucuronides excreted in the urine after feeding *d,l*-menthol were fractionally crystd. and (2) the *l*-menthol was nearly all eliminated by refeeding the menthol excreted since the *l*-form was more easily oxidized in the rabbit and the remaining *d*-menthylglucuronide was easily purified by crystn. *d*-Menthol was obtained in about 10% yield. The excretion of conjugated menthol was complete in about 30 hrs. after a dose of 3 g. was given *d-Menthyl-β-d-gluconide* m. 120–2°, $[\alpha]_D^{25}$ 6.4° (*c* = 2 in abs. alc.) (*NH_4 salt* m. 200–2°, $[\alpha]_D^{25}$ 8.1° (*c* = 1 in H_2O)); *d-menthylphenylurethan* m. 112–13°, $[\alpha]_D^{25}$ 75.7° (*c* = 1 in $CHCl_3$); *d-menthyl-3,5-dinitrobenzoate* m. 153–4°, $[\alpha]_D^{25}$ 77.1 (*c* = 0.8 in $CHCl_3$). E. W. Scott 5

Metabolism of sulfur. VIII. Oxidation of the sulfur-containing amino acids by enzymes from the liver of the albino rat. Grace Medes and N. Gulezian. *Biochem. J.* **33**, 1559–69(1939); cf. *C. A.* **33**, 8251[6].—The enzymes (4) which were extd. from the livers were: cytochrome oxidase which oxidized cysteine to cystine and had no effect on methionine or cysteinesulfinic acid (I); an enzyme which oxidized the S of cysteine to inorg. sulfate (possibly only to the sulfinic acid stage); an enzyme which oxidized the S of I to inorg. sulfate; and an enzyme which oxidized cysteine to cysteic acid (according to iodometric titration). This last oxidation probably was the 1st step in the production of taurine. I was possibly an intermediate. **IX. The nonproduction of glycogen from cystine, cysteine and methionine and their partially oxidized derivatives.** Grace Medes and Italia Vitanza. *Ibid.* 1570–2.—Cystine, cysteine and methionine, fed to rats starved for 24 or 36 hrs. before receiving 0.0178 mol. equiv. of the compd. per sq. cm. body surface in 4 hourly portions, did not give rise to glycogen in the liver, as shown by analysis 1 hr. after the final feeding. Methionine sulfoxide, cysteinesulfinic acid and cysteic acid also did not cause glycogen deposition in the liver when they were fed. E. W. Scott 6

Cytochrome c as a carrier with the glucose-dehydrogenase system. John R. Hawthorne and Douglas C. Harrison. *Biochem. J.* **33**, 1573–9(1939).—Cytochrome c (I) in the presence of cytochrome oxidase prepns. acted as a carrier to bring about the aerobic oxidation of glucose by the glucose–dehydrogenase system. The cytochrome oxidase prepns. by themselves induced some oxidation of glucose in the presence of the dehydrogenase system, possibly because of cytochrome a and b present in the oxidase prepns. In acting as a carrier in this oxidation I was not directly reduced by the dehydrogenase–coenzyme systems but required for its reduction an addnl. factor which was present in heart muscle and in the cytochrome oxidase prepns. made from heart muscle. E. W. Scott 7

The hydrolysis of glucosaminides by an enzyme in Helix pomatia. A. Neuberger and Rosalind V. Pitt Rivers. *Biochem. J.* **33**, 1580–90(1939).—An enzyme ext. was prepd. from *Helix pomatia* which hydrolyzed specifically β-glucosaminides. It showed its greatest activity at 37.5° and pH 3.6. It hydrolyzed *N*-formyl and *N*-acetylglucosaminides, but had no action on the *N*-propionyl, *N*-butyryl and *N*-*p*-toluenesulfonyl derivs. or on nonacylated glucosaminides or glucosaminides which were completely O-substituted. It was possible to sep. the β-glucosidase and β-glucosaminidase in the *Helix pomatia* ext. E. W. Scott 8

The interaction between porphyrins and lipoid and protein monolayers. E. Stenhagen and E. K. Rideal. *Biochem. J.* **33**, 1591–8(1939).—It was shown that bilirubin and the capillary-active porphyrins strongly penetrate lipoid monolayers and that this penetration involved a weak polar interaction and was largely influenced by the interaction of the hydrophobic portions of the mols. Specific interaction was found to occur with amine monolayers, the strength of the interaction being independent of the capillary activity of the reactant. Protein films interacted and were tanned by the more active capillary-active porphyrins, but in some cases no adsorption of the porphyrins occurred in spite of strong reaction with amine films. This was due, in part at least, to polar interaction within the protein monolayer itself, as the reactivity of the amine group was negligible in mixed amino acid films, where strong polar attraction between the basic and acidic groups occurs. Electrophoresis expts. with human serum albumin and hemato- and proto-porphyrin indicated the absorption observed in these cases parallelled the absorption noted in films, suggesting that the same forces were operating. E. W. Scott 9

Hydrolysis of hyalurinic acid by bacterial enzymes. Karl Meyer, Gladys L. Hobby, Eleanor Chaffee and Martin H. Dawson. *J. Exptl. Med.* **71**, 137–46(1940).—An improved method is described for prepg. the enzyme which hydrolyzes the polysaccharide acid contained in vitreous humor, umbilical cord, synovial fluid and the mucoid phase

of group A hemolytic streptococci. Prepns. have been obtained from pneumococci, group A hemolytic streptococci, *Clostridium welchii* and from splenic tissue, which display the same sp. activity. The hydrolytic enzyme is not the same as that responsible for the lysis of pneumococci. In pneumococci and hemolytic streptococci, the major portion of the enzyme is bound to the cell structure; the enzyme from *Clostridium welchii* is assocd. with other carbohydrate-splitting enzymes in the culture medium and not with the bacterial cells. It is suggested that the disappearance of the mucoid capsules of group A hemolytic streptococci is due to enzymic hydrolysis of the acid polysaccharide. The relation between enzyme activity and the virulence and invasiveness of group A hemolytic streptococci is briefly considered. C. J. West

Serological tests for homologous serum proteins in tissue cultures maintained on a foreign medium. Karl Landsteiner and Raymond C. Parker. *J. Exptl. Med.* 71, 231–6(1940).—Connective tissue cells (fibroblasts) derived from skeletal muscle of 12-day-old chick embryos were cultivated for almost 8 months (35 weekly passages) in rabbit plasma and rabbit embryo tissue juice dild. with Tyrode soln. When fluids sepd. from these cultures were tested with immune precipitins developed against chicken serum, they gave pos. reactions which showed no tendency to diminish with an increasing no. of culture generations. Barring the intervention of unknown precipitable substances, these results indicate that connective tissue can produce proteins which are identical with, or closely related to, serum proteins. The expts. further demonstrated that tissues cultivated in a foreign plasma do not lose their species specificity. C. J. West

Practical model of the animal cell membranes. Harry N. Holmes. *J. Phys. Chem.* 43, 1151–3(1939).—It is shown how working models of animal cell membranes of double permeability can be prepd. A membrane permeable to water-sol. and also to fat-sol. substances is made by dissolving lecithin (1%) in common collodion solns. of cellulose nitrate. Good membranes of double permeability can also be formed by the addn. to collodion solns. of 1% of oleic acid, stearic acid, cholesterol, a 5 to 1 mixt. of lecithin and cholesterol, rosin, and similar substances. A collodion-lecithin sac contg. an emulsion of toluene in water contg. Na oleate as emulsifying agent is shown to be permeable to the toluene. L. Kolodny

Role of desoxyribosenucleic acid in cell division. T. Caspersson. *Chromosoma* 1, 147–56(1939).—Desoxyribosenucleic acid (I) appears necessary for cell division. An increase of nucleic acid occurred in acid nuclei deficient in nucleic acid during the prophase. Further study of the local synthesis of this high-polymeric material by ultraviolet absorption measurement in the single living cell was made to det. the quantity of nucleic acid during the various stages of mitotic prophase in the *Gomphocerus*. The results were against a direct correlation between nucleic acid synthesis and chromatid contraction. Since I was found localized in the reproductive cellular elements and to be present in large amt. before cell division, C. concludes that there is a correlation between these 2 phenomena. M. M. R.

Experiments on the enzymic splitting of *O*-acetylaneurin by cholinesterase. H. Süllmann and H. Birkhaüser. *Schweiz. med. Wochschr.* 69, 648–50(1939).—Acetylaneurin was split by exts. of human brain, but with less speed than was acetylcholine. Hydrolysis did not occur when acetylaneurin was subjected to horse serum rich in cholinesterase. Maurice M. Rath

Lipase action in mixts. of raw and pasteurized homogenized milk (Gould, Trout) 12. Review of org. and physiol. chemistry (Felix) 10.

Brimble, L. J. F.: A School Course of Biology: with Suggestions for Practical and Field Work. London: Macmillan and Co., Ltd. 470 pp. 6s.

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B—METHODS AND APPARATUS

GLENN E. CULLEN

Use of the glass electrode in the biological laboratory. Henry Francis Holden. *Australian J. Exptl. Biol. Med. Sci.* 16, 193–204(1938).—Suitable equipment is described for H-ion concn. detns. with the glass electrode when only small amts. of material are available. Methods of making small glass electrodes are described, and also an electrode chamber suitable for detns. on blood. B. C. P. A.

The isolation of α-phylloquinone (vitamin K from alfalfa) and the history of its discovery. P. Karrer, A. Geiger, R. Legler, A. Rüegger and R. Salomon. *Helv. Chim. Acta* 22, 1464–70(1939)(in German); cf. *C. A.* 33, 8191[6] —*Isolation of α-phylloquinone* (I): 30 kg. dried alfalfa powder is extd. with 40 l. boiling petr. ether (b. 40–60°). The ext., contg. about 400–600 g. solids, is evapd. to 20 l. Portions of 5 l. are dild. with 5 l. petr. ether. Finely powd. $ZnCO_3$ (total = 20 times the wt. of dry matter in the ext.) is added in small amts. with stirring and the mixt. is agitated for 2 hrs. If the supernatant liquid is still green, more $ZnCO_3$ is added until the soln. becomes reddish brown. An excess of $ZnCO_3$ results in a loss of I. After the $ZnCO_3$ has settled, the clear supernatant liquid is poured off, 5 l. petr. ether is added to the $ZnCO_3$ residue, the mixt. is stirred and the supernatant fluid is again poured off. The residue is filtered and washed with petr. ether until the washings are colorless. All the petr. ether solns. are combined, evapd. to 500 cc. and allowed to stand for 2 days at −10°. The colorless residue is filtered off and washed with petr. ether. The solvent in the filtrate is removed *in vacuo* on a water bath. The residue, a dark brownish red waxy substance, contg. 100,000–150,000 K units (Dam) per g., is subjected to mol. distn.; the portion coming off up to 150° contains practically all the vitamin K. The mol. distillate (II) usually contains about 200,000 units/g. It is liquefied by warming slightly and poured, with stirring, into 3–4 times the amt. of Me_2CO. The solid portion is filtered off; the filtrate is placed in an ice-box and filtered after 12 hrs. Evapn. of the filtrate to ⅓ its vol. results in a small crop of crystals which are removed. The Me_2CO is evapd. *in vacuo* and the remaining reddish brown oil (III) is taken up in 9 parts of petr. ether. A layer of dehydrated $MgSO_4$, 35 cm. high, is placed in adsorption tubes, 60 cm. high and 8 cm. in diam. First 350 cc. petr. ether is drawn into each tube and then 120 cc. of the petr. ether soln. of III dild. with an equal vol. of petr. ether. The column is washed with 800 cc. petr. ether and then with about 1500 cc. petr. ether contg. 10% benzene. This filtration through $MgSO_4$ removes 30% impurities. The solvent is evapd. and the residue (IV) is subjected to a chromatographic sepn. Layers of $ZnCO_3$, 40 cm. high, are placed in 27 tubes, 60 cm. high and 3 cm. in diam. Into each tube is drawn 50 cc. petr. ether and then a soln. of 1.5 g. IV in 50 cc. petr. ether. After washing with 150 cc. petr. ether and then 100 cc. petr. ether contg. 10% benzene, the chromatogram is developed. The portions of the columns having high extinction coeffs. ($E^{1\%}/1$ cm. at 248 mμ) are combined and subjected again to chromatographic sepn. on $ZnCO_3$. A prepn. of I which is chromatographically uniform is obtained after 7–8 such adsorptions. About 0.5 g. pure I can be isolated from 200 g. II, i. e., about 15–20% of its vitamin K content. Vitamin K from alfalfa (*C. A.* 33, 5448[5]) was the first pure prepn. of vitamin K isolated. Ruth Berggren

A new method for the determination of mucin in saliva. Lóránd Kesztyüs and Katalin Piribauer. *Magyar Orvosi Arch.* 40, 363(1939).—Mucin is removed from saliva with 20% HOAc. The N content of whole and mucin-free saliva is then detd. E. Borek

A micromethod for the determination of total, acid-soluble and lipin phosphorus contents of blood. Pál Dömösi. *Magyar Orvosi Arch.* 40, 287(1939).—The splitting of org. phosphates by dry fusion with KNO_3 and $CaCl_2$ is the new procedure. E. Borek

Estimation of blood sugar by the practitioner. H. R. Millar. *Brit. Med. J.* 1939, II, 1035–6.—A modification

of Folin and Wu's blood sugar method is described, whereby the use of the colorimeter is avoided. Simple dilution of the final colors in specially calibrated tubes and comparison with the naked eye gives results within ±10 mg. %. J. B. Brown

Blood preservation. The serum potassium of cadaver blood. John Scudder, Dorothy R. Corcoran and Charles R. Drew. *Surg. Gynecol. Obstet.* **70**, 48–50(1940); cf. *C. A.* **33**, 8653[3].—The av. concn. of human serum K, 35 hrs. after death, is 101 mg. % as compared to 17.2 in normal venous blood and 29.7 in the plasma of cardiac blood taken at the time of death. The increase is more rapid in cadaver blood than in blood stored in a refrigerator at 4°. J. B. Brown

Studies of liver function by means of Quick's hippuric acid test. J. G. Probstein and Sol Londe. *Ann. Surg.* **111**, 30–45(1940).—For Quick's liver function test (cf. *C. A.* **30**, 3493[8]) 4 g. of BzONa is superior to the recommended 6-g. dose. Estn. of the hourly output of hippuric acid for 4 hrs. permits an evaluation of the degree of impairment of the liver function. If the hippuric acid excreted in 2 hrs. represents 50% or more of the ingested BzONa, normal liver function is indicated. Rachel Brown

Metabolism of the isolated perfused cat brain. A. L. Chute and D. H. Smyth. *Quart. J. Exptl. Physiol.* **29**, 379–94 (1940).—A method of perfusing the isolated cat brain and an app. for recording continuously the O consumption of such a prepn. are described. Blood flows were 60–90 cc./100 g./min. at pressures of 120–150 mm. Hg. Flows of 45 cc./100 g./min. were incapable of maintaining cerebral function as judged by the presence of the corneal reflex. Oxygen consumption was 200–300 cc./100 g./hr. Oxygen usage was always in excess of that required for the complete oxidative removal of carbohydrate. Usage of both glucose and lactate were observed. The brain showed a predilection for the former. 32 references. Rachel Brown

A micromethod for the determination of alkapton in urine. V. Figura. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 329–32(1939).—Alkapton in alk. soln. reduces $AgNO_3$ to AgO, which is redissolved in HNO_3 and titrated with NH_4SCN with ferric ammonium alum as indicator. To 1 cc. urine in a centrifuge tube add 5 cc. of a soln. made up of 50 cc. 20% $AgNO_3$ soln., 40 cc. concd. NH_4OH, and 10 cc. oxalic acid. After 5 min., add 5 drops of 10% $CaCl_2$ soln. In the presence of alkapton AgO is formed, which is carried down by the Ca oxalate also formed. Centrifuge the soln., carefully remove the liquid with a pipet, redissolve the AgO and titrate the soln. with 0.1 *N* NH_4SCN soln. Analyses of aliquot portions of a soln. indicate that results to within 0.5% are obtained on 1- 2-cc. samples of urine. A. W. C.

Isolation of desired qualities of radiant energy for biological experimentation. Loyd A. Jones and Clifton Tuttle. *J. Nutrition* **18**, 611–18(1939); cf. *C. A.* **24**, 1889.—Radiation chambers equipped with thermopiles and other equipment are described. C. R. Fellers

Comparison of the methods of Bang and of Rückert for the determination of fat. Mihály Kaszab. *Közlemények az Összehasonlító Élet- Kórtan Köréből* **27**, 182–8(1940).—Bang's method gave for blood serums of domestic animals free fat acids and lipoids 144.85- 212.34 mg. %; Rückert's method, 156.06–221.81 mg. %. The content of protein-bound fat was 37%, and that of lipoids 24% of the content of free fat acids, detd. by means of digestion by pepsin in the blood serums of horses and oxen. The greatest deviations of Rückert's method were observed in analyzing pig serums. The av. errors of the method were ±7.29% in detns. of total fats, ±3.91% for neutral fats and cholesterol and ±8.76% for phosphatides. For large nos. of detns., Rückert's method seems to be suitable. S. S. de Finály

Refractometric protein determinations in the blood serums of poultry. Mihály Szücs. *Közlemények az Összehasonlító Élet- Kórtan Köréből* **27**, 188–94(1940).—Detns. of total protein of blood serums of hen, duck, goose and turkey by the refractometric method were 5–15% higher than the detns. by the Kjeldahl method. Total proteins detd. by the Kjeldahl, the gravimetric and the refractometric methods, resp., were: for hen 4.13, 4.45, 4.89; for turkey 4.97, 5.13, 5.13; for goose 4.50, 4.73, —; for duck 3.84, 4.88, 5.12. The gravimetric and the refractometric methods, resp., gave for globulin: hen 2.12, 2.53; turkey 1.87, 2.18; goose 1.79, —; duck 1.62, 2.00; for albumin: hen 2.04, 2.36; turkey 2.76, 2.94; goose 2.85, —; duck 2.73, 3.13. S. S. de Finály

Experimental study of the stability of the Nessler reaction and its application to the photometric determination of nitrogen. Léon Gillo. *Bull. soc. chim. biol.* **21**, 1117–38(1939).—The Nessler reaction as used in biochem. detns. is discussed. The final mixt. should be at least 0.1 *N* in free NaOH to obtain the max. color. The presence of various salts, especially Na_2SO_4, promotes turbidity. The addn. of 1% of purified gum Senegal prevents turbidity, even in the presence of high concns. of Na_2SO_4. A method of purifying the gum is described. Extinction coeff. curves are given for photometric detns. with different light filters. L. E. Gilson

Submicrodetermination of phosphate ion. Christian Dumazert and Marcel Mourgue. *Bull. soc. chim. biol.* **21**, 1151–62(1939).—The prepd. sample contg. 10–180 γ P as phosphate is treated under specified conditions with acidified NH_4 molybdate soln. to ppt. the P as NH_4 phosphomolybdate. The ppt. is distd. with NaOH and the NH_3 in the distillate detd., by use of the microapp. and method previously described (*C. A.* **33**, 2845[1]). L. E. Gilson

Stabilization and determination of bilirubin in duodenal fluid. G. Barac. *Bull. soc. chim. biol.* **21**, 1163–70 (1939).—The addn. of 7.5 mg. % of ascorbic acid to an alk. soln. of bilirubin prevents destruction by the alkali and stabilizes the color, thus facilitating the colorimetric or photometric detn. HCHO, $Na_2S_2O_4$ and $Na_2S_2O_3$, used in the same manner, had no protective action. L. E. Gilson

Spectrum of bilirubin in alkaline media. A. Lambrechts and G. Barac. *Bull. soc. chim. biol.* **21**, 1171–80(1939).—The addn. of 200 mg. of ascorbic acid to a soln. of 5 mg. or more of bilirubin in 1 l. of 0.01 *N* NaOH stabilizes the color. The soln. shows a single strong absorption band at 430 mμ. L. E. Gilson

Analysis of biological compounds containing deuterium by interferometric refractometry. R. Jonnard. *Bull. soc. chim. biol.* **21**, 1185–93(1939).—A proposed method for estg. the relative amt. of the D isomer in an org. compd. utilizes the difference in *n* of solns. of known concn. of the compd. in pure H_2O and in heavy water of known D_2O content (20–40%). The interferometric refractometer of J. is used. L. E. Gilson

Simplified method of obtaining acid-precipitable lipide-protein combinations (cenapses) from serum. Michel A. Macheboeuf and L. Dizerbo. *Compt. rend. soc. biol.* **132**, 268–71(1939).—The serum albumin was sepd. into 6 fractions. All contained considerable lipides. **Precipitation of serum albumins and the lipides which accompany them by ammonium sulfate at different pH values.** M. A. Macheboeuf and J. Duboy. *Ibid.* 272–4.—With the $(NH_4)_2SO_4$ concn. at 400 g./l. the albumin pptd. at pH 5.2 contained 1.4% or less of lipide, that pptd. at pH 3.6 contained 19% and that pptd. at pH 2.6 contained 30% lipides. L. E. Gilson

A rapid micromethod for determining diodrast and inorganic iodide iodine in blood and urine. H. L. White and Doris Rolf. *Proc. Soc. Exptl. Biol. Med.* **43**, 1–7(1940).—The sample is digested in an acid soln. of $KMnO_4$ to oxidize all I to iodate and destroy org. matter. The excess $KMnO_4$ is then reduced by $NaNO_2$ and the excess $NaNO_2$ destroyed by urea. The iodate is titrated with a 0.0004715 *N* $Na_2S_2O_3$ soln. in presence of an excess of KI. Complete details are given. L. E. Gilson

Photoelectric study of the Liebermann-Burchard reaction and its significance in the determination of cholesterol. Wm. S. Hoffman. *Proc. Soc. Exptl. Biol. Med.* **43**, 38–42(1940).—The color changes that take place

during the reaction and the influence of time, temp. and type of color filter used on the accuracy of the detn. are discussed. L. E. Gilson

Urinary excretion of vitamin B_6 in the rat. John V. Scudi, Harold F. Koones and John C. Keresztesy. *Proc. Soc. Exptl. Biol. Med.* **43**, 118–22(1940).—A colorimetric method for detg. vitamin B_6 in urine is described. At high dose levels (10 mg. or more per kg.) 50–70% is excreted by both normal and deficient rats. L. E. G.

Production of renin by constricting the renal artery of an isolated kidney perfused by blood. K. G. Kohlstaedt and Irvine H. Page. *Proc. Soc. Exptl. Biol. Med.* **43**, 136–40(1940). L. E. Gilson

Clinical detection of barbiturates in urine. F. Servanton. *Bull. trav. soc. pharm. Bordeaux* **77**, 221–8 (1939).—A crit. review of methods. S. W. G.

The determination of the pH of human milk with alizarin. M. E. Kayser. *Deut. med. Wochschr.* **65**, 1476–7(1939).—In prepg. human milk powder it is necessary to know its pH in order to avoid the use of milk with an abnormal degree of acidity. Alizarin offers a convenient colorimetric procedure for this purpose. Arthur Grollman

The diagnostic value of carcinoma reactions. VI. Reexamination of the albumin A reaction of Kahn. K. Hinsberg, R. Merten and K. Mucke. *Z. Krebsforsch.* **49**, 371–4(1939); cf. *C. A.* **33**, 2974[2].—It is maintained by Kahn (*Verh. intern. Krebs-Kongr., Madrid* **1933**, II) that by means of a nephelometric method a decrease in albumin A (the albumin fraction most difficult to ppt.) can be demonstrated in the serum of carcinoma patients. Reëxamn. of the work makes it seem improbable that the nephelometric method is a suitable method to indicate albumin shifting, even if such shifting were specific for cancer. Nephelometric measurements are only reliable when dealing with ppts. of particles of equal size, and with albumin solns. this is not the case. **VII. The diagnostic value of the ether test for the differentiation of icteric carcinoma and noncarcinoma serums.** D. Albers and R. Merten. *Ibid.* 375–8.—Ascoli (*C. A.* **30**, 3059[2]) has maintained that serums made artificially icteric by the addn. of bilirubin or bile after drying on filter paper do not give up the bilirubin when treated in the cold with ether if the serums are normal or pathologic but noncarcinomatous, while serums from carcinoma cases give up the bilirubin readily. While checking up on the various carcinoma reactions, all icteric serums have been tested with the ether test to see if carcinomatous icteric serums could be differentiated from noncarcinomatous icteric serums. Twenty of the 22 carcinomatous icteric serums gave pos. tests, while all 9 noncarcinomatous icteric serums gave neg. tests. Harriet F. Holmes

The influence of light on the determination of alcohol in blood according to the method of Widmark. Ludv. Hallén-Paulsen. *Tids. Kjemi Bergvesen* **19**, 61–2(1939). —The influence of ultraviolet (quartz-mercury lamp) light on $N/20$ $K_2Cr_2O_7$ in H_2SO_4 as used for the alc. detns. is shown to cause reduction which increases with intensity of radiation. Irradiation by sunlight in 228 min. caused a reduction which was equiv. to 2.89% alc. in blood. It is pointed out that care must be taken in alc. detns. in blood to avoid too strong irradiation of the soln. H. Kringstad

Interfering substances in the alcohol determination in blood according to Widmark's method. Ottar Dybing, Klaus Hansen and G. Rasch. *Tids. Kjemi Bergvesen* **19**, 114–17(1939).—By statistical analysis a law is derived by which the error of alc. detns. in blood can be calcd. H. Kringstad

Estimation of purified papilloma virus protein by infectivity measurements. W. Ray Bryan and J. W. Beard. *J. Infectious Diseases* **65**, 306–21(1939).—A procedure for turbidity measurements of the purified papilloma virus protein by means of the photoelec. colorimeter and the correlation of the results with protein detd. directly by N analyses are described. An accurate method for the estn. of infectivity assocd. with the virus protein was found in the statistical study of the relation of protein inoculated to the incubation period of induced lesions. The inoculation of decreasing amts. of protein resulted in the appearance of lesions after proportionately long incubation periods. The high degree of correlation of protein and incubation period was shown by the high value of the correlation coeff. and its small standard error. Julian H. Lewis

The effect of iodine and mercury on amino nitrogen values with nitrous acid. A. B. Kendrick and Martin E. Hanke. *J. Biol. Chem.* **132**, 739–51(1940); cf. *C. A.* **31**, 1836[5].—By the addn. of iodide, the HNO_2 amino N values of cystine and glycine become theoretical by the volumetric as well as the manometric method in the absence as well as in the presence of Hg. $(AcO)_2Hg$ lowers the amino N value of glycine to the theoretical, while Hg lowers it from 106 to 103%. With cystine both cause marked increases from 108 to 140% or more. Cystine and glycine form considerable CO_2 during the HNO_2 reaction, the amt. from glycine being slightly lowered and that from cystine considerably increased by addn. of iodide. CO_2 formation from glutamic acid is nearly zero The authors prefer the interpretation that added I oxidizes some abnormal reducing groups in deaminizing cystine and glycine and this prevents the reduction of HNO_2 by these groups which otherwise cause formation of extra N_2 (cf. Dunn and Porush, *C. A.* **33**, 3406[1]). In both the volumetric and manometric methods the KI should be dissolved in, and added with, the nitrite instead of the glacial AcOH. A. P. Lothrop

The spectral analytical determination of metals in microscopic preparations. Walther Gerlach. *Spectrochim. Acta* **1**, 168–72(1939).—The use of high-frequency excitation for the analysis of biol. prepns. has certain advantages but is not sufficiently sensitive for the detection of minute traces of heavy metals. Minute samples, scraped from microscope slides into a small cavity on a carbon electrode impregnated with pure NaCl, when excited in an interrupted arc and photographed with a quartz spectrograph will disclose traces of metals. The sensitivity appears to be 100 times that of high-frequency excitation. Analyses of liver sections and gum tissue are given as examples. W. F. Meggers

The diazo reaction. I, II, III. Maffo Vialli and Vittorio Erspamer. *Arch. fisiol.* **39**, 1–19, 20–32, 33–41(1939).—The diazo reaction was applied in acid and alk. mediums to a large no. of substances and the color reactions obtained were tabulated. The tests included a variety of aliphatic and aromatic compds. and exts. from animal tissues. Besides sulfanilic acid, reagents contg. *p*-nitroaniline, *p*-toluidine and benzidine were used, making use of org. solvents such as BuOH. The modification introduced by Hanke and Koessler, of adding H_2NOH, was also investigated. This latter method stabilized the color with glucose, carbosil and adrenaline. A. E. M.

A one-hour renal condition test. Wm. G. Exton and Anton R. Rose. *Am. J. Clin. Path.* **10**, 73–96(1940).—For 15 hrs. preceding the test take no medicine or alc. and keep the water intake as low as possible. For the preceding 3 hrs. take no liquid at all. Empty the bladder and one hr. later empty the bladder again and preserve the urine for examn. On this sample det. sp. gr., vol. or rate of excretion, rate of excretion of albumin, urea, chloride, formed elements, casts, etc. 17 references. John T. Myers

Double pipet for nonprotein nitrogen and sugar determinations. Thaddeus J. Domanski. *Am. J. Clin. Path., Tech. Suppl.* **4**, 16–18(1940).—The pipet delivers 2 cc. between the 2 upper calibration marks and a remaining 5 cc. is delivered when the pipet is blown out. John T. Myers

A modified Folin-Malmros micro blood glucose determination. Jonas Kamlet. *Am. J. Clin. Path., Tech. Suppl.* **4**, 20–4(1940). Cf. *C. A.* **23**, 4492. J. T. Myers

Some new methods of investigation applied in biological sciences. R. Sterckx. *Ann. zymol.* **6**, 337–54(1939).—Attention is drawn to the electronic microscope, to recent developments in radiophysiology and to work on D and

heavy water, from the standpoint of their value in biol. investigations. A. Papineau-Couture

Determination of ascorbic acid in the presence of hemoglobin. Rudolf Lemberg and John W. Legge. *J. Proc. Roy. Soc. N. S. Wales* **72**, 62–8(1938).—The rapid loss of ascorbic acid (I) occurring in a soln. of oxyhemoglobin (II) during pptn. of proteins is due neither to a reaction between I and II, nor to an oxidation by O_2 catalyzed by the pptn. of the acid hematin-denatured protein. It is caused by the O set free at the moment II is pptd. by HPO_3 in the presence of I. The oxidation can be prevented by forming a CO-hemoglobin or by reducing the II and carrying out the pptn. under anaerobic conditions. A small amt. of I is adsorbed on denatured protein in a concd. soln; however, this varies up to 10% of the total I oxidized. H. J. Prebluda

Peroxidase reaction. CXVIII. Relation between peroxidase-positive granules and Giemsa-stained granules of leucocytes after the administration of morphine hydrochloride. Akira Sato and Saburo Kuribayasi. *Tôhoku J. Exptl. Med.* **36**, 583-9(1939); cf. *C. A.* **34**, 2050[9].—The percentage of cells with strongly peroxidase-pos. granules among pseudoeosinophile leucocytes increased rapidly and reached the max. 2 days after the first administration of morphine-HCl. Then it showed a decrease and approached the initial on the 5th day of expt. The percentage of the cells with Giemsa-stained granules among pseudoeosinophile leucocytes increased in no. and reached the max. 5–6 days after the first injection of morphine-HCl. It decreased and approached the initial on the 10th day of expt. The increase of peroxidase-pos. granules has nothing to do with the increase of the Giemsa-stained granules. The former is the result of the effect of morphine on cerebral hemispheres, while the latter is the manifestation of the effect of the alkaloid on the organism. **CXIX. Arakawa's reaction and vitamin C content of human milk. 3. Are the methods for determination of vitamin C reliable?** Siroku Isono. *Ibid.* 590–602; cf. *C. A.* **33**, 8275[7].—Expts. were performed to test the accuracy of Harris and Ray's method for vitamin C detn. No definite conclusions were reached. From this work the question whether the difference of the vitamin C-like substance between Arakawa-pos. and -neg. milk is the difference of vitamin C itself or vitamin C plus some other substance remains unsolved. The author believes that it is not altogether satisfactory to rely on animal experimentation for the purpose of assaying the vitamin C which may remain undetd. by Harris and Ray's method. (*C A.* **27**, 4280, 4564). B. Prescott

Application of the enzymic method of ascorbic acid determination. E. R. Kratinova. *Biokhimiya* **4**, 220–8 (1939).—The enzymic method, which excludes all reducing substances other than ascorbic acid, agrees with the direct titration method for the ascorbic acid content in the adrenals, testes and skin of rats and guinea pigs. During the months of May, Sept. and Oct., the liver and spleen of these animals contain non-ascorbic acid-reducing substances. At this period, it is preferable to employ the enzymic method for the detn. of ascorbic acid. H. Priestley

The methods for vitamin B_2 determination in vegetable materials. K. L. Povolotskaya. *Biokhimiya* **4**, 327–35 (1939).—The best method at present available is that of Emmerie (*C. A.* **30**, 6403[2], 7193[8]), slightly modified by using 3 successive adsorptions on PbS and elution of each portion of the ppt. with 3 portions of aq. pyridine. H. Priestley

Photocolorimetric determination of vitamin D. V. L. Solyanikova. *Biokhimiya* **4**, 483–91(1939).—The Tortelli-Jaffé reaction, which is the most sp. one for vitamin D, yields an absorption spectrum with bands at 545–550 and 590–600 mμ. The reaction obeys Beer's law, and may, therefore, be used for the quant. photocolorimetric vitamin D detn. H. Priestley

Phenol granulation of the leucocytes and its staining with specific lipoid stains (Sudan). P. P. H. de Bruijn. *Acta Neerland. Morphol.* **2**, 321–44(1939).—**Granulation was formed in the neutrophile leucocytes and monocytes** of human blood by the action of phenol compds. as α- and β-naphthol, resorcinol and carbolic acid. The phenol granulation is stained with specific lipoid stains and basic dyes. The phenol action is based on a splitting of a previously invisible, protein-lipoid complex present in granular form. This splitting results in a change in the refraction of light of this complex which makes the granulation visible and also makes the granulation specific for staining. Maurice M. Rath

Urinary excretion of calcium acetylsalicylate. F. Dellamartina. *Schweiz. med. Wochschr.* **69**, 742–4(1939).—In normal subjects 0.5 g. Ca acetylsalicylate, taken orally, was completely excreted in the urine within 12 hrs. When excretion is delayed, a pathol. process is indicated. Maurice M. Rath

Reducing substances in the blood plasma of rheumatisants. Rene Dandurand, C. Wesler Scull and Ralph Pemberton. *J. Lab. Clin. Med.* **25**, 348–53(1940).—Details are given of a slightly modified procedure of the method of Polonovski and Warembourg (*C. A.* **28**, 2742[5]) for the estn. of substances in blood plasma that reduce chromic acid. The index chromic total (I. C. T.), the index chromic glucose (I. C. G.) and the index chromic residue (I. C. R.) were detd. on the fasting blood plasma of 55 patients with chronic arthritis of various types and on a few normal individuals. Further detns. of these levels were made on the plasma of 17 subjects in this series following the administration of glucose by mouth. The subjects were classified into atrophic, hypertrophic, mixed arthritis, fibrositis and miscellaneous rheumatoid groups. The blood plasma of rheumatisants presents deviations from normal in the direction of an excess of reducing substances other than glucose. The distribution of reducing materials in the blood of these patients following administration of glucose supports the view that when the rate of removal is delayed the disturbance is not one of specific interference with the metabolism of glucose, but is probably referable to a circulatory mechanism. Howard W. Robinson

The determination of pH values of biologic fluids. I. Albert Glaubiger and K. Geo. Falk. *J. Lab. Clin. Med.* **25**, 369–76(1940).—The pH values (25°) of buffer solns., bacteriol. media and biol. products were detd. by routine colorimetric procedures (Hellige color disk comparator method, cf. U. S. 2,050,608 (*C. A.* **30**, 6611[7]), and the method employing a comparator block with Sörensen's standard buffer solns. and indicators (Clark, Detn. of H Ions, *C. A.* **21**, 3328) and the electrometric method (MacInnes-Belcher glass electrode, *C. A.* **27**, 2848, and sat. calomel electrode in conjunction with the Young electron ray meter). For most of the test solns. the colorimetric values agree well within ±0.3 pH units with the electrometric values. The effects of diln. with water or saline on the pH values of the various specimens are given. Howard W. Robinson

The determination of acetylsulfapyridine. I. John V. Scudi and Harry J. Robinson. *J. Lab. Clin. Med.* **25**, 404–8(1940).—Acid hydrolysis of acetylsulfapyridine produces cleavage of both the Ac and the sulfonamide groupings. The liberated sulfanilic acid after diazotization couples much more slowly with dimethylnaphthylamine than sulfapyridine. This retardation causes variable results when the method of Marshall (*C. A.* **32**, 8466[7]) for the detn. of acetylsulfanilamide is applied to the estn. of acetylsulfapyridine. Alk. hydrolysis does not cleave the sulfonamide grouping; therefore the retardation in the coupling rate is eliminated. Acetylsulfapyridine in known amts. was added to 25 normal urine specimens and subjected to alk. hydrolysis. An av. recovery of 103% (±2, max. deviation 5%) was obtained. For blood acid hydrolysis was employed since some filtrates developed a yellow color during alk. hydrolysis. In applying the method of Marshall, it was found that 0.5 cc. of 8 *N* HCl added to 10 cc. of blood filtrate contg. a known amt. of acetylsulfapyridine produced complete coupling within 60 to 70 min. The excess acid was neutralized with 0.7 cc. of 4 *N* NaOH before replacing water of evapn. The hydrolysis was incomplete when 4 *N*

HCl was used. In blood a recovery of 92% (±2%) was obtained by using acid hydrolysis. II. *Ibid.* 409–10.— The detn. of acetylsulfanilamide, with *N*-(1-naphthyl)-ethylenediamine dihydrochloride (*C. A.* **33**, 5017[4]) as the coupling component, has been applied to the detn. of acetylsulfapyridine. Two variations in the method of Marshall were introduced: an increase of acid (8 *N* HCl) for the hydrolysis of blood filtrates, and an alk. hydrolysis for urine. An av. recovery of 96% was obtained in a series of 13 blood filtrates in which concns. of 4, 6, 10 and 16 mg. % of acetylsulfapyridine were present. An av. recovery of 100% was obtained from 16 normal urine samples to which acetylsulfapyridine had been added in concns. of 20, 25, 30 and 40 mg. %. H. W. Robinson

A method for rapid determination of magnesium in body fluids and some preliminary results on clinical material. Benedict Cassen. *J. Lab. Clin. Med.* **25**, 411–13(1940).—A spectrographic procedure that is more suitable for routine detns. than the method of Thomson and Lee (*C. A.* **31**, 4688[4]) is developed. The dild. body fluid soln. is atomized by a fine glass spray jet directed into and on the surface of C spark electrodes. The pressure for the operation is supplied by an O tank. An exposure is made on an Eastman O-III ultraviolet plate in a small quartz spectrograph; the density of the 2795.5 line is detd. with a Hartmann Comparator. The method of calibration is described. The normal whole blood values are 6 to 7 mg. per 100 cc., the plasma values 3 to 4 mg., and the cerebrospinal fluid av. value is 3 mg. The values show a tendency to be slightly higher than those reported as detd. by chem. methods. Satisfactory results were obtained on oxalated blood, and on plasma without removal of protein. Howard W. Robinson

A microdiffusion method for the estimation of acetone. S. C. Werch. *J. Lab. Clin. Med.* **25**, 414–20(1940).— The method employs the "Conway unit" (*C. A.* **27**, 3857) and the acetone is estd. by observing the time necessary to cause pptn. of Nessler's soln. From expt'l. results the relationship of concn., temp. and time is incorporated in the formula: $D = 179\ t^2/(24° - \Theta)^2$ where D = diln., t = time and Θ = temp., and for convenience a monographic chart is constructed. The method is applied to specimens of urine and blood. Howard W. Robinson

The use of honey as a levulose-tolerance test. J. B. Greco. *J. Lab. Clin. Med.* **25**, 420–3(1940).—Levulosemia curves were obtained on 10 normal persons, each of whom had received 100 g. of honey (equal to 40 g. of levulose) after fasting for at least 8 hrs. Levulose values in the blood (Roe method, *C. A.* **29**, 1126[9]) were zero when honey was given, 6 to 11 mg. % one hr. later, 4.0 to 9.5 mg. % 2 hrs. later, 2 to 4 mg. % 3 hrs. later. The use of honey is recommended as a levulose-tolerance test for the examn. of hepatic function because the results agree with those of Scott (*C. A.* **29**, 5874[2]) who used pure levulose; honey in the dose administered is well tolerated and there is no evidence of vomiting, nausea or diarrhea which is customary in the use of levulose; and also it is much cheaper than pure levulose. In 5 cases the total sugar concn. was detd. (Hagedorn-Jensen method, *C. A.* **17**, 2721) on blood secured at intervals so that the glucemic curve could be calcd. from the difference of the 2 curves. Howard W. Robinson

Determination of nicotinic acid in urine. Leo Schindel. *J. Lab. Clin. Med.* **25**, 515–16(1940).—Creatinine yields a red color with dinitrochlorobenzene in alk. soln. which is proportional to creatinine concn. On diln. of the soln. the shade changes from purple to orange. This substance may cause an error in the detn. of nicotinic acid in urine with 2,4-$(O_2N)_2C_6H_3Cl$. Cf. Vilter, Spies and Mathews, *C. A.* **33**, 5426[8]. Howard W. Robinson

An improved method for the iodometric determination of pyruvic acid. G. A. Schrader. *J. Lab. Clin. Med.* **25**, 520–6(1940).—The essential improvements are the addn. of an excess of 0.01 *N* I prior to liberation of pyruvate-bound bisulfite with $NaHCO_3$, a decrease in the amt. of bisulfite with a consequent decrease in amt. of 0.1 *N* I and in total vol. of soln., and the use of 0.01 *N* $Na_2S_2O_3$ which permitted a more accurate adjustment of the end point prior to and after the liberation of pyruvate-bound bisulfite. By the method 0.10 to 5.0 mg. of the acid can be accurately detd. The method was applied to rat urine and intestinal contents after the administration of pyruvate (nearly neutralized Na salt) to the animal. Cf. Clift and Cook, *C. A.* **27**, 2466. H. W. R.

Prothrombin time determination. Orville R. Kelley and W. E. Bray. *J. Lab. Clin. Med.* **25**, 527–30(1940).— The method is essentially that described by Quick (*Am. J. Med. Sci.* **190**, 501(1935)) with modifications designed to make it more suitable as a routine clinical lab. procedure. The prepn. of the thromboplastin, the prepn. of blood and the technique of the prothrombin time detn. are given in detail. The av. prothrombin time of the blood of 100 normal adults was 23 sec. which is the same as that reported by Quick. Howard W. Robinson

Purification of mare gonadotropic hormone. Harold Goss and H. H. Cole. *Endocrinology* **26**, 244–9(1940).— Expts. are given on the purification of the gonadotropic hormone of mare serum. The very potent serum of ponies and also the less potent horse serum were used. If the first 70% Me_2CO ppt. obtained by the Cartland-Nelson procedure (*C. A.* **31**, 6310[8]) is redissolved in 50% Me_2CO, pH 6–7, there is a 2-fold purification. When this 50% Me_2CO soln. of the hormone is further fractionated, by increasing the acidity in steps, a very potent fraction comes out between pH 5.5 and 4.5, which contains 4000–7000 rat units/mg. solids. At pH 6.0 the hormone begins to ppt. at 52.5% Me_2CO concn. (by vol.) and is completely removed at 60% concn. Cf. *C. A.* **27**, 763; **29**, 8082[9]. F. S.

The quantitative separation of the skeleton of small animals. V. Subrahmanyan, J. Duckworth and W. Godden. *Biochem. J.* **33**, 1421–4(1939).—A proteolytic method, employing papain or trypsin, is described for sepg. the entire skeleton of the rat for the estn. of Ca, Mg and P. E. W. Scott

Biological synthesis of hippuric acid in vitro. Henry Borsook and Jacob W. Dubnoff. *J. Biol. Chem.* **132**, 307–24(1940).—A tissue slice technique for the study of the synthesis of hippuric acid (I) and a micromethod for detg. 3 γ of I in 1–4 cc. of soln. are described. Guinea pig, rabbit and rat kidney and liver tissues synthesize I from BzOH and glycine. Dog kidney, but not liver, tissue forms I. Of 23 amino acids and amides only glycine formed I in the presence of BzOH and rat liver slices. I is not formed by macerated tissue or by intact tissue poisoned by toluene or KCN. Intact rat liver slices poisoned by KCN do not hydrolyze I. These results are in accord with deductions from the thermodynamic data which indicate that the synthesis of I is attended by a gain in free energy, and that it must be coupled with an energy-donating reaction, and cannot be simply the reverse of hydrolysis. The equil. consts. at 25° and 38° for the reaction I + H_2O = BzOH + NH_2CH_2COOH were calcd. The results are discussed with reference to the hydrolysis and synthesis of I in the whole animal (dog). D. S. S.

Use of the Feulgen reaction in cytology. I. Effect of fixatives on the reaction. B. B. Hillary. *Botan. Gaz.* **101**, 276–300(1939).— Expts. *in vitro* with agar blocks impregnated with nucleic acid show that the Feulgen nuclear stain gives 2 types of time curves depending on the presence or absence of chromic acid in the fixative. Chromic acid produces the type of staining curve with the prolonged max. Tannins have the same effect as chromic acid except in the presence of formalin. For a satisfactory stain hydrolysis for 5 min. with any of the regularly used cytological fixatives is sufficient. J. T. Sullivan

A method and apparatus for perfusing gastrocnemius muscle, with spinal roots, gangliated cord and blood vessels intact, and its applications. Syotin Haku. *J. Chosen Med. Assoc.* **29**, 2075–102 (German abstr. 132–5) (1939). S. Tashiro

Mounting-media with a high index of refraction. Lucien Perruche. *Bull. soc. franç. microscop.* **7**, 142–4 (1938).—The properties of a no. of media for biol. and mineralogical use are described. W. C. Tobie

Quantitative test for biotin and observations regarding its occurrence and properties. Esmond E. Snell, Robert E. Eakin and Roger J. Williams. *J. Am. Chem. Soc.* 62, 175–8(1940); cf. *C. A.* 34, 1050³.—A sensitive and accurate assay for biotin (I) is described which involves the growth of a strain of *Saccharomyces cerevisiae* from a small seedling. Under the test conditions the response of this organism to I is quant. within a concn. range from 0.00002 to about 0.001 γ of I. Assay results on crude exts. agree well at different levels within this range and the curves obtained are very similar to those obtained with pure I. The following I contents are reported (γ per g.): cane molasses, Hawaiian 2.7, Cuban 1.7, beet molasses 0.06–0.9, liquid urine 0.09, urine solids 2, liquid whey 0.12, whey solids 2.5, egg white 0.05, egg yolk 0.37 (autolyzed 24 hrs. 0.35), yeast (moist, autolyzed) 0.13, Beacon dog meal 0.53, casein, tech. 0.125, casein, purified 0.002, potato 0.010, autolyzed liver 3.89. The effectiveness of I under the conditions of assay depends to a large extent on the presence of vitamin B_6 (and of β-alanine) in the medium. I in liver concentrates is destroyed by HNO_2 at a rate which indicates that it may be an α-NH_2 acid. C. J. West

Detn. of CH_2O in protein solns. (Alcock, Otto) 7. Resazurin test for detecting mastitis (Russell, *et al.*) 12.

Osgood, Edwin E.: A Textbook of Laboratory Diagnosis with Clinical Applications for Practitioners and Students. 3rd ed. Philadelphia: P. Blakiston's Son and Co. 676 pp. $6.00.

C—MICROBIOLOGY

LAWRENCE H. JAMES

The filtrable tubercle bacilli. Yosio Miyazima. *Oriental J. Diseases Infants* 24, 25-9(1938)(in English).—The effects of treating guinea pigs with filtrable tubercle bacilli and with the nonacid-fast tuberculins (I) prepd. from them were compared with those produced by the regular tuberculin (II). I was markedly resistant to ultraviolet light. Pepsin and trypsin destroyed the active material in I in 8 hrs.; the activity of II was destroyed in 12 hrs. by pepsin and in 8 hrs. by trypsin. The active material of both I and II was adsorbed by animal charcoal in 3 hrs. Ruth Berggren

The effect of some fungi upon each other. E. Rennerfelt. *Svensk Botan. Tid.* 32, 332–45(1938)(in German).—*Penicillium rugulosum* (I) was cultured in nutrient solns. (salts + agar) contg. 20 g. carbohydrate/l. The color of the underside of the mycelium varied with different nutrients. The radial growth of I was fastest in media contg. malt ext. Since both the source of C and the inorg. salts influence the effect of one fungus culture upon another, the salts were kept as const. as possible. A suspension of *Cadophora fastigiata* (II) in agar was inoculated with a piece of the mycelium of I (cultured in glucose + agar). The color of the underside of the mycelium of I grown in the presence of II varied with different carbohydrates and the amount of inoculum. The growth of I was strongly inhibited and the color intensified in the presence of II. The agar surrounding I showed a "free zone," in which the growth of both fungi was suppressed except for a few stunted red mycelia of II. This zone was most distinct after 6–8 days of growth; at the end of 10 days it was 2–3 mm. wide in media contg. glucose, levulose or maltose, indistinct in media contg. sucrose, lactose or galactose and, due to the rapid growth of I, absent in media contg. malt ext. The effect of I on some Torulopsideae (*Rhodotorula glutinis* (III), *Torulopsis candida* (IV) and *Geotrichoides* No. 103 (V)) in cultures contg. tech. glucose was also studied. The observed phenomena depend on the ability of I to form bios growth substances and perhaps also A-growth substances. The differences in the effects of these growth substances upon the other fungi depend partly upon the extent to which these fungi can grow in synthetic nutrients. II and IV, which develop poorly in synthetic nutrients, are markedly influenced by the bios growth substances, while III and V, which grow fairly well in artificial nutrients, show no acceleration in development. The growth of the II mycelium was markedly inhibited; of the Torulopsideae, a faint inhibition was noted only in IV. The colors which appeared in mixed cultures were striking. In II and usually also in I the colors became darker, but in III the carotene pigment was destroyed. After varying intervals I overgrew the other fungi. II could inhibit the growth of I to a greater extent than the Torulopsideae. R. B.

The action of radium emanation on Brucella. M. Azzariti. *Pathologica* 31, 534–5(1939).—Ra emanation shows a germicidal action and dissociate microorganisms of the *Brucella* group, and particularly *B. abortus*. G. A. Bravo

Mercuric chloride, potassium mercuric iodide and Harrington's solution in skin disinfection. Behavior and uses. Philip B. Price. *Surg. Gynecol. Obstet.* 69, 594–601(1939).—$HgCl_2$, K_2HgI_4 and Harrington's solution behave similarly as skin disinfectants, each acting only as a skin antiseptic. In each case a film forms on the skin which is resistant to further disinfection and under which bacteria multiply. Ammonium sulfide removes this film, allowing subsequent disinfection in the underlying layers of skin. J. B. Brown

Studies on the chemical sterilization of surgical instruments. I. A bacteriological evaluation. E. H. Spaulding. *Surg. Gynecol. Obstet.* 69, 738–44(1939).—The bactericidal action of 7 common chem. sterilizing solns. was detd. on 8 species of sporulating bacilli. J. B. Brown

Action of sulfanilamide on mastitis streptococci in vitro. J. O. Heishman and W. T. Miller. *J. Am. Vet. Med. Assoc.* 96, 176–9(1940).—Some strains of Lancefield group B streptococci survived concns. of sulfanilamide of 800 mg. per 100 cc. for 14 hrs. and 200 mg. for 72 hrs. at 38.5°. The results were influenced by the type of medium used. The bactericidal action was enhanced as the temp. was raised. No correlation was noted between the *in vivo* and *in vitro* action of sulfanilamide. R. Brown

The proteolytic enzymes of Vibrio cholera and Vibrio El Tor. H. Beeuwkes. *A. van Leeuwenhoek J. Microbiol. Serol.* 6, 48–55(1939–40).—See *C. A.* 33, 4288⁹. A. D.

Silicosis and type III pneumococcus pneumonia; an experimental study. Arthur J. Vorwald, Anthony B. Delahant and Morris Dworski. *J. Ind. Hyg. Toxicol.* 22, 64–78(1940).—Silica added to blood-broth culture has no effect on growth of type III pneumococci. Silicotic rabbits showed no unusual susceptibility to type III pneumococcus infections; the disease runs its normal course; from the few cases observed, silicosis may actually enhance the resistance of the rabbit to type III pneumococcus infection. A. L. Elder

Resistance of Endamoeba histolytica cysts to chlorine in aqueous solutions. William S. Stone. *Am. J. Trop. Med.* 17, No. 4(1937); *U. S. Pub. Health Eng. Abstracts* 18, W, 97(Aug. 13, 1938).—When a sufficient concn. of Cl in distd. water was present to destroy *Escherichia coli* and *Streptococcus fecalis*, cysts of the ameba were also killed. Practical aspects of these lab. results are pointed out. C. R. Fellers

Anaerobic technique; a modified deep agar shake. Norman J. Miller, Orville W. Garrett and Paul S. Prickett. *Food Research* 4, 447–51(1939).—Specially designed oval glass tubes are used for the nutrient agar. After solidification of the agar and inoculation of the tubes, the latter are filled about ⅔ full with reduced methylene blue agar contg. 1:20,000 parts of dye and 2% dextrose at pH 8.2 in order to det. the rate and depth of O_2 absorption. The depth to which O_2 penetrated into the medium never exceeded 15 mm. C. R. Fellers

Improved technique for isolating typhoid bacilli. Charles R. Tyler and Carolyn Oldenbusch. *Quart. Bull., City N. Y. Dept. Health* 6, No. 1, 12–16(1938); *U. S. Pub. Health Eng. Abstracts* 18, PHA, 22(Nov. 5, 1938).—The conclusion is reached after examg. 2800 specimens using Brilliant-Green agar media, Endo media, and a slightly modified Hajna Bi-sulfite media, that the greatest no. of positives were obtained in 48 hrs. by the last-named media.

It is recommended that both surface-inoculated and poured plates be used for the isolation of colonies. C. R. Fellers

Simple media for distinguishing the three types of Corynebacterium diphtheriae. Maurice Welsch and J. Thibaut. *Compt. rend. soc. biol.* **132**, 319-22(1939).—The use of K tellurite in media is discussed. **Morphological and biochemical properties of human Corynebacteria.** *Ibid.* 322-6.—The fermentation of different sugars by various strains is discussed. **Value of agar medium containing potassium tellurite and extract of blood clot for the bacteriological diagnosis of diphtheria.** Maurice Welsch, G. Demelenne-Jaminon and J. Thibaut. *Ibid.* 326-9. L. E. Gilson

Effect of temperature on bacteriostatic action of sulfanilamide on members of the Enterococcus group. Erwin Neter. *Proc. Soc. Exptl. Biol. Med.* **43**, 52-5 (1940); cf. *C. A.* **34**, 1047[9].—A 1% concn. of sulfanilamide in the culture medium retarded growth somewhat at 37° but usually completely checked growth at 43° without killing the organisms. L. E. Gilson

Action of sulfanilamide in vitro on aerobic sporogenic bacilli. L. Rosenthal. *Proc. Soc. Exptl. Biol. Med.* **43**, 78-80(1940).—Sulfanilamide, 1:1000 in the nutrient media, inhibits spore formation and induces degenerative changes in the bacilli of the subtilis-mesentericus-mycoides group. L. E. Gilson

Bacteriostatic actions of three thiazole derivatives of sulfanilamide on bacteria in broth cultures. C. A. Lawrence. *Proc. Soc. Exptl. Biol. Med.* **43**, 92-7(1940).—2-Sulfanilamido-4-phenylthiazole (sulfaphenylthiazole), 2-sulfanilamido-4-methylthiazole (sulfamethylthiazole) and 2-sulfanilamidothiazole (sulfathiazole) were much superior to sulfanilamide and sulfapyridine in their inhibitory actions on pneumococci types I, II and III and β-hemolytic streptococcus A. Concns. as low as 5 mg. % were bacteriostatic. Concns. of 1 mg. % were bacteriostatic for gonococcus. The first 2 were also markedly bacteriostatic for *Staphylococcus aureus*. L. E. Gilson

[Stimulating] effects of culture filtrates and old medium on growth of the ciliate, Colpidium campylum. R. P. Hall and J. B. Loefer. *Proc. Soc. Exptl. Biol. Med.* **43**, 128-33(1940); cf. *C. A.* **33**, 9350[9]. L. E. Gilson

Carbohydrate metabolism of Oidium lactis and Bacillus subtilis in a complex carbohydrate-rich medium. Theodore E. Friedemann. *Proc. Soc. Exptl. Biol. Med.* **43**, 148-51(1940); cf. *C. A.* **33**, 9354[2].—Both organisms produced about 70% of lactic acid on the basis of glucose consumed. About 20% of the C_3 intermediates from the sugar was further metabolized into 2 mols. of HCO_2H and 1 mol. each of EtOH and AcOH. No succinic acid was produced. L. E. Gilson

Pantothenic acid and nicotinic acid as essential growth substances for Morgan's bacillus, Proteus morganii. Michael J. Pelczar, Jr., and J. R. Porter. *Proc. Soc. Exptl. Biol. Med.* **43**, 151-4(1940).—Both compds. are necessary for growth of the organism. L. E. Gilson

Urea-treated virus as a vaccine against rabies. Anson Hoyt and Douglas Warner. *Proc. Soc. Exptl. Biol. Med.* **43**, 154-6(1940).—Rabies virus fixed in rabbit brain maintained its antigenicity and sometimes its infectivity in the presence of concns. of urea sufficient to liquefy most of the brain tissue. L. E. Gilson

In vitro conversion of prontosil soluble to sulfanilamide by various types of organisms. Wesley W. Spink, Frank W. Hurd and Jean Jermsta. *Proc. Soc. Exptl. Biol. Med.* **43**, 172-5(1940).—Different species of bacteria, and different strains of the same species, differed greatly in their ability to decolorize prontosil soluble. It was less easily decolorized than methylene blue under the same conditions. Sulfanilamide was one of the products formed. L. E. Gilson

Toxicity of basic fuchsin for certain bacteria. Cassandra Ritter. *Am. J. Pub. Health* **30**, 59-65(1940).—The dyes tested against 10 strains of bacteria which might be found in water are the homologs Pararosaniline or Magenta O, Rosaniline or Magenta I, Magenta II, new fuchsin or Magenta III, and 2 com. dyes—Pararosaniline and Rosaniline. The results for all organisms bear a relative titer corresponding to the no. of CH_3 groups in the dye radical, the bacteriostatic titer increasing with the larger no. of CH_3 groups. The 2 com. dyes showed bacteriostatic titers only slightly higher than those of the pure salts of which they are largely composed. This suggests the presence in these dye batches of small amts. of the higher homologs. The results of tests of a series of com. samples of basic fuchsin, composed of both acetate and chloride salts, suggest that the anion has small part in detg. the bacteriostatic titer. Basic fuchsin is used in fuchsin lactose broth for water analysis in a concn. of 0.0015%. This concn. of Pararosaniline or of Rosaniline would eliminate unwanted spore bearers but would not inhibit the coliform group, according to the expt. here reported. Either Pararosaniline or Rosaniline dyes can be used in fuchsin lactose broth where bacteriostatic action is desired. The former are preferable as the other homologs at times exhibit an erratic inhibitory effect on the *Escherichia coli* members of the coliform group. Magenta II and III are not suitable. All samples of basic fuchsin submitted for certification up to this time have been found satisfactory in accordance with the results of these expts. New batches of the dye can be tested by detg. the bacteriostatic titer, in comparison with the titer of the standard dye, for one coliform group organism and one aerobic spore-forming organism. Nine references. J. A. Kennedy

A biochemical study of the fermentation of rare sugars by members of the colon and aerogenes groups of bacteria. III. *d*-Fucose. J. Thomas Field and Charles F. Poe. *J. Biol. Chem.* **132**, 473-6(1940); cf. *C. A.* **29**, 4403[8].—Some 42 organisms of the *Escherichia* and *Aerobacter* groups of bacteria were used in detg. gas formation in media contg. fucose. Gas production took place very slowly and in 96 hrs. the colon cultures averaged 8% and the *aerogenes* cultures 11% of gas. The pH values with both groups of organisms in media contg. 0.1% of fucose reached a min. in about 7 hrs. (5 to 5.25) and then gradually increased to a max. of about 8.7. The min. was considerably lower (4.6) with 0.5 and 1.0% of fucose, and the acidity which developed killed the organisms in about 30 hrs. After 72 hrs., incubation the *aerogenes* group produced on the av. about twice as much lactic acid and 4 times as much succinic acid as the colon group and the ratio for the volatile to nonvolatile acids and for the acetic to succinic acid were more than twice as large as for the colon group. All members of the *aerogenes* group also formed acetylmethylcarbinol. The colon group produced more gases and alc. A. P. Lothrop

Fractionation of the bactericidal agent from cultures of a soil bacillus. Rollin D. Hotchkiss and René Dubos. *J. Biol. Chem.* **132**, 791-2(1940); cf. *C. A.* **33**, 8678[7].—Three cryst. substances have been isolated from cultures of a spore-bearing soil bacillus which are highly bactericidal for Gram-pos. microorganisms. Two acid substances are isolated by soln. of the crude material in alc., pptn. with 15 vols. of Et_2O and fractional crystn. of the dried ppt. from hot abs. alc. The one least sol. has been designated *graminic acid*, m. 232-4° (uncor.), $[\alpha]_D^{25}$ 115°. The more sol. is called *gramidinic acid*, m. about 230°, $[\alpha]_D^{25}$ −100°. The substance which remains sol. in the alc.-Et_2O mixt. but which is insol. in abs. Et_2O and crystallizes from Me_2CO is named *gramicidin*, m. 228-30°, $[\alpha]_D^{25}$ 5°. An actively growing type I pneumococcus is sterilized within 1 hr. by addn. of 10 γ of the acids or by 5 γ of gramicidin. Even 1 γ of this latter substance injected intraperitoneally will protect a large percentage of mice infected intraperitoneally with 10,000 fatal doses of virulent pneumococci. Gram-neg. organisms are unaffected either *in vitro* or *in vivo*. Gramicidin is highly toxic and 0.3 mg. will kill mice when given intraperitoneally. The nonprotective graminic and gramidinic acids are considerably less toxic. **Chemical properties of bactericidal substances isolated from cultures of a soil bacillus.** *Ibid.* 793-4.—Gramicidin has a mol. wt. of approx. 1400 and may be represented by the provisional formula, $C_{74}H_{108}N_{14}O_{14}$. It contains neither free basic nor acidic groups and is apparently a polypeptide contg. 10

mols. of α-amino acids of which 2 or 3 are tryptophan residues, these and a 14-16-C satd. aliphatic acid accounting for about 85–90% of the wt. of the substance. Gramicidin contains neither —OMe nor AcO— groups and histidine, arginine, tyrosine and NH_3 have not been found in the hydrolyzate. Graminic and gramidinic acids are similarly built up from amino acids but contain 1 free CO_2H group per mol. and apparently only 1 tryptophan group. Both contain tyrosine also. Graminic acid has a mol. wt. of approx. 900 ($C_{44}H_{63}N_9O_{11}$) and gramidinic acid of 1000 but reliable analyses have not yet been obtained on this compd. On acid hydrolysis gramicidin and gramidinic acid yield nearly 1/2 of their amino acids in the form of *d*- (the so-called unnatural) amino acids and this may possibly have some significance in their biol. activity.
A. P. Lothrop

Growth substances in agar. Wm. J. Robbins. *Am. J. Botany* **26**, 772–8(1939).—Spore formation, growth and the formation of gametes and zygotes by *Phycomyces blakesleeanus* were benefited by Difco agar. The beneficial materials could be partially extd. with MeOH, more completely with 5% aq. pyridine and are believed to be unknown growth substances. The development of *Phycomyces* was similarly benefited by potato, brown sugar, oatmeal and corn meal in the presence of thiamine; this indicates that these materials contain the same unknown growth substances. The presence of such substances is a factor to be considered in expts. with agar cultures. Nelson McKaig, Jr.

An improved method for the detection of bacterial urease. Justina H. Hill and E. C. White. *J. Bact.* **39**, 6(1940).—Organisms grown on a solid medium are washed free from NH_4 salts, suspended in a buffered urea soln. and incubated for 24 hrs. The suspension is satd. with NH_3-free Na_2CO_3. Any NH_3 produced by ureolysis is detected by its action of a small piece of indicator paper suspended above the emulsion. John T. Myers

A quantitative method for testing the bactericidal efficiency of volatile compounds. Milton J. Foter and Earnest R. Kline. *J. Bact.* **39**, 6–7(1940).—A standard amt. of the test organism is streaked on an agar plate and placed in a vacuum jar. Definite amts. of air were removed with an open-end manometer and replaced with air satd. with allyl isothiocyanate. Thus exact air and vapor mixts. could be prepd. John T. Myers

A clear liquid medium for the "aerobic" cultivation of anaerobes. John H. Brewer, *J. Bact.* **39**, 10(1940).—The base of the medium is glucose infusion broth, contg. 0.05% of agar. To this is added 0.1% of Na thioglycollate to insure the proper oxidation-reduction potential.
John T. Myers

The rough colony phase of Chromobacterium violaceum. W. G. Hutchinson. *J. Bact.* **39**, 13–14(1940).—Repeated cultures in broth contg. 0.5% LiCl produced rough forms. They differed biochemically only in fermenting glucose much more slowly. John T. Myers

The effect of certain cultural procedures on the rate of lactose utilization by slow lactose-fermenting bacteria. J. O. Mundt and E. R. Hitchner. *J. Bact.* **39**, 14(1940).
John T. Myers

The inhibiting effect of acetic acid with sodium chloride and sucrose on microörganisms. A. S. Levine and C. R. Fellers. *J. Bact.* **39**, 17(1940).—At equiv. pH values, greater toxicity was observed in those tubes contg. the greater amt. of acid. The toxic effect of acetic acid was only slightly enhanced by the presence of 5% NaCl and 20% sucrose. John T. Myers

Gradient of E_H and its significance in bacteriological media and body tissues. John W. Williams. *J. Bact.* **39**, 19(1940).—Since skin has more oxidized tissue than muscle, hydrolyzates of skin, muscle and hair are indicated for the growth of pathogenic fungi. Growth of fungi on hair is subsurface, on skin intermediate and on muscle superficial. John T. Myers

The incorporation of radioactive phosphorus in the nucleoprotein and phospholipide of Escherichia coli. Clara H. Williams, Leslie A. Sandholzer and Stanley N. Van Voorhis. *J. Bact.* **39**, 19–20(1940).—Radioactive P in the culture medium was incorporated in the nucleoprotein and phospholipide fractions. The ratio of radioactive P to total P was const. in each fraction and in the medium. John T. Myers

The inactivity of colchicine for bacteria. Marshall W. Jennison. *J. Bact.* **39**, 20–1(1940). John T. Myers

The relation of hydrogen-ion concentration to pigmentation of Actinomycetes. Jean E. Conn and H. J. Conn. *J. Bact.* **39**, 21(1940); cf. *C. A.* **34**, 1049⁸.—Some species produce pigments which are virtually H-ion indicators and the color observed in the medium varies with the final H-ion concn. The color can be changed by varying the amt. of glucose in the medium, thus changing the amt. of acid produced. John T. Myers

The production of hydrogen peroxide by type 3 strains of group A β-hemolytic streptococci. Faith P. Hadley and Philip Hadley. *J. Bact.* **39**, 21–2; *Proc. Soc. Exptl. Biol. Med.* **43**, 102–4(1940).—The amt. of peroxide produced may vary with different strains, with different colonies of the same strain and even with different parts of the same colony. John T. Myers

Studies in vitro on the stability of ascorbic acid toward intestinal microörganisms. Raymond M. Young and L. H. James. *J. Bact.* **39**, 23–4(1940).—Stock cultures of *Es. coli* and *A. aerogenes* oxidized ascorbic acid within 15 to 24 hrs. under both aerobic and anaerobic conditions. Sugars spared the oxidation of ascorbic acid. *Proteus*, *Alcaligenes* and *Lactobacillus* strains showed varying degrees of protection of ascorbic acid against atm. oxidation.
John T. Myers

The demonstration of phosphatase in Neisseria. Harold W. Leahy, Herbert E. Stokinger and Charles M. Carpenter. *J. Bact.* **39**, 24(1940).—*Neisseria* were grown for 6 days in ascites fluid-veal broth, centrifuged, washed in saline, lyophilized and stored at 5°. Phosphatase was present in the cells but in none of the supernatant liquids.
John T. Myers

The present status and problems of bacterial chemotherapy. E. K. Marshall, Jr. *J. Bact.* **39**, 25–6(1940); cf. *C. A.* **33**, 8821⁴. John T. Myers

The effect of sulfanilamide on the growth of Escherichia coli in certain synthetic media. R. H. Broh-Kahn. *J. Bact.* **39**, 26(1940).—Sulfanilamide may be bacteriostatic in the absence of mol. O. No correlation was discovered between its action and the accumulation of H_2O_2. It blocks enzymic reactions catalyzed by *Es. coli*, thus preventing the accumulation of foodstuffs either essential or beneficial to the growth of bacteria. John T. Myers

The biological significance of morphological changes in the pneumococcus induced by sulfapyridine. Ralph R. Mellon and Ruth A. McKinney. *J. Bact.* **39**, 26–7 (1940); cf. *C. A.* **34**, 1347⁴.—The variational effects of the drug on the pneumococcus *in vivo* may be viewed as the biol. counterpart of the action of H_2O_2 *in vitro*.
J. T. Myers

The mode of action of sulfanilamide. The effect of varying the medium upon bacteriostasis. Eleanor A. Bliss. *J. Bact.* **39**, 27(1940).—A strain of Lancefield A streptococcus is less susceptible to the drug in beef infusion broth contg. neopeptone than in broth contg. proteose peptone. A group G strain was very susceptible in broth contg. 25 of neopeptone but not affected in peptone glucose water contg. 0.7% each of neopeptone, proteose peptone and Pfansteil peptone. The nutritive value of the medium was not entirely responsible for these differences.
John T. Myers

The action of sulfanilamide in vitro on various species of Lactobacillus and Propionibacterium. Keith H. Lewis and Joseph E. Snyder. *J. Bact.* **39**, 28–9(1940).—Lactobacilli usually grew well in broth contg. 0.5% of sulfanilamide while *Propionibacterium* failed to grow. However, a no. of factors including amt. of inoculum and compn. of medium may cause wide variations in the results.
John T. Myers

The effectiveness of sulfanilamide in vitro and in vivo toward anaerobic hemolytic streptococci. E. H. Spaulding and Amedeo Bondi, Jr. *J. Bact.* **39**, 29–30(1940).—Permanently anaerobic hemolytic streptococci of Lance-

field's group A may be resistant to sulfanilamide in mice, but this resistance is not manifest in studies *in vitro*. John T. Myers

The nucleic acid-pneumococcal horse serum reaction. D. B. Lackman, M. G. Sevag and S. Mudd. *J. Bact.* **39**, 32–3(1940).—Nucleic acids from streptococci, pneumococci, bull spermatozoa, yeast cells, tobacco mosaic virus and thymus gland give a ppt. with serums from horses injected with pneumococci over a period of 3–5 yrs. The reaction is due to the nonspecific combination of some part of the globulin in hyperimmune pneumococcal horse serums with nucleic acid to form an insol. salt at pH values higher than those at which the proteins in normal and immune serums form insol. salts with nucleic acid. John T. Myers

Some chemical properties of normal serum globulins. Forrest E. Kendall. *J. Bact.* **39**, 34(1940).—The globulin fraction of normal human serum contains at least 5 serologically different proteins. Some have been isolated in a sufficiently pure form to permit study of their chem. properties. One of them reacts with other proteins and with certain bacterial proteins to give compds. insol. in water, but sol. in dil. salt solns., but the reaction is not specific. John T. Myers

Immunochemistry of the type-specific substance of meningococcus type II. A. E. O. Menzel and Geoffrey Rake. *J. Bact.* **39**, 34(1940).—The type-specific substance of type II meningococcus (Kappa) corresponding to the protective antibody is closely connected with certain protein fractions. It constitutes a prosthetic group firmly attached to meningococcal protein. J. T. M.

The anaphylactogenic property of Salmonella pullorum agglutinins. J. C. Foster, M. Scherago and R. H. Weaver. *J. Bact.* **39**, 35(1940).—Agglutinins for *S. pullorum* in immune rabbit serum are capable of sensitizing guinea pigs; hence they are antigenic. John T. Myers

Anti-egg albumin horse antibody. Alwin M. Pappenheimer, Jr. *J. Bact.* **39**, 36–7(1940).—The flocculation reaction between egg albumin and anti-egg albumin horse serum is analogous in almost every respect to the Ramon diphtheria toxin-antitoxin reaction. The antibody is concd. in the water-sol. pseudoglobulin fraction of the immune serum. There is evidence that the mol. compn. of the specific floccules is the same. John T. Myers

Inhibition of antibodies by degraded soluble antigens of vaccinia. Joseph E. Smadel and Thomas M. Rivers. *J. Bact.* **39**, 39–40(1940).—The heat-labile and heat-stable antigens of vaccinia can be degraded so that they no longer ppt. with sp. antibodies but still inhibit them. John T. Myers

The reaction of measles virus to ether. Geoffrey Rake and Morris F. Shaffer. *J. Bact.* **39**, 40(1940).—The agent of measles resists treatment with ether. J. T. M.

Studies on the effects in vitro of new sulfanilamide derivatives upon microörganisms. Carl A. Lawrence. *J. Bact.* **39**, 46(1940).—Thiazole derivs. are superior to sulfanilamide and sulfapyridine. John T. Myers

The development of sulfapyridine-fast strains of the gonococcus. Louise Westphal, Ruth L. Charles and Charles M. Carpenter. *J. Bact.* **39**, 47(1940). John T. Myers

Influence of carotenoids on the growth and acid resistance of the paratubercle bacillus. E. Darzino. *Ann. inst. Pasteur* **63**, 455-61(1939).—Carotene added to the glycerol gelatin media produces greater acid resistance in bacteria than a culture on gelatin without carotene. The increase in the no. of bacteria in carotene dets. the increase of their acid resistance and the progressive disappearance of their pigments involves the attenuation of their acid resistance. This increase in acid resistance is due to the elevation of the melting point of their fatty material. This increase confers on these bacilli a greater resistance toward heat, acids and dil. alkalies. The carotene is not essential for the life of these acid-resistant bacilli. Benjamin Prescott

Distribution of nitrogen and nitrogen metabolism in tetanus toxin. A. R. Prévot and H. J. Boorsma. *Ann. inst. Pasteur* **63**, 600–10(1939).—Tetanus toxin is dependent on a state of equil. of the nitrogenous constituents of the culture media, a ratio expressing the stage of the digestion of polypeptides. The titer of the toxin is a function of the ratio of polypeptide carboxyl to total carboxyl. This ratio is not the only factor inherent in the culture media which acts on the toxin. The normal content of vitamins in the media is very important. Deficiencies in these factors can be corrected by adding org. exts. or synthetic vitamins B_1,B_2 and P-P. Benjamin Prescott

Mandelic acid as a urinary disinfectant. R. von Werz. *Münch. med. Wochschr.* **86**, 1080–3(1939).—See *C. A.* **33**, 6961[5]. Maurice M. Rath

The specific nutritive requirements of Clostridium acetobutylicum (Weizmann). II. Ch. Weizmann and Bruno Rosenfeld. *Biochem. J.* **33**, 1376–89(1939); cf. *C. A.* **31**, 5505[3].—This organism belongs to those heterotrophic bacteria whose synthetic power is very restricted; it cannot synthesize the factors required for growth. Even in the presence of asparagine, combinations of aneurin, nicotinic acid and β-alanine, or uracil cannot replace the growth factors present in maize or yeast. Biotin is one of the active growth factors required. In order to bring the nutritive level of a synthetic medium up to 70% of the nutritional level represented by a maize mash both asparagine and biotin must be present. The missing 30% of the full requirements is due to a "third factor" which is present in the first dialyzates of autolyzed yeast. E. W. Scott

The biochemistry of microörganisms. LXIII. Itaconic acid, a metabolic product of a strain of Aspergillus terreus Thom. Christopher T. Calam, Albert E. Oxford and Harold Raistrick. *Biochem. J.* **33**, 1488–95(1939); cf. *C. A.* **33**, 9358[9].—Itaconic acid was isolated as a metabolic product of a strain of *Aspergillus terreus* Thom, isolated from American cotton yarn and positively identified as this mold, when it was grown on Czapek-Dox 5% glucose soln. The results obtained did not support the view that, with this mold, citric acid is an intermediate stage in the formation of itaconic acid from glucose. Five other strains of this mold produced no itaconic acid; 3 gave succinic acid, one formed fumaric acid and one gave oxalic acid. E. W. Scott

The production and utilization of lactic acid by certain propionic acid bacteria. Allen S. Phelps, Marvin J. Johnson and Wm. H. Peterson. *Biochem. J.* **33**, 1606–10(1939); cf. *C. A.* **33**, 2166[9].—*P. pentosaceum* produced only *l* (+) lactic acid (I) from glucose and arabinose and *P. technicum* only I from glucose. These 2 organisms and *P. shermanii* failed to racemize optically active lactic acid. The growth rates on the optical isomers of lactic acid varied in the order $d(-) < l(+) < dl$. The ultimate level of growth was the same in each case. The presence of both $d(-)$ and $l(+)$ lactic dehydrogenases in these organisms was shown. The latter had the greater activity. E. W. Scott

Antigenic property of monocytogenetic substance in blood. Itio Sato. *J. Chosen Med. Assoc.* **29**, 2326–70 (German abstr. 146–7)(1939).—The stimulation of the reticulo-endothelial system by India ink causes appearance of a large amt. of monocytogenetic substance in blood. This substance is a saponifiable lipide and possesses antigenic power. S. Tashiro

Antigen specificity of various pure proteins and their digestive products. M. Hasimoto and S. Kitamura. *J. Oriental Med.* **31**, 721–39(German abstr., 49)(1939). S. Tashiro

Soluble antigen of lymphocytic choriomeningitis. II. Characteristics of the antigen and its use in precipitin reactions. J. E. Smadel, M. J. Wall and R. D. Baird. *J. Exptl. Med.* **71**, 43–53(1940); cf. *C. A.* **33**, 6950[6].—The sol. antigen of lymphocytic choriomeningitis which is readily separable from the virus is a relatively stable substance and appears to be of a protein nature. A specific precipitin reaction can be demonstrated when immune serum is added to solns. of antigen which have been freed by certain serologically inactive substances. C. J. West

Protein fractions of a strain of group A hemolytic streptococci. III. Michael Heidelberger and Henry W. Scherp. *J. Immunol.* **37**, 563–70(1939).—Further studies

(*C. A.* **25**, 5909) are reported of the protein fractions of a strain of hemolytic streptococci of group A, which furnish new evidence that much of the nucleic acid present in a neutral-extractable nucleoprotein is bound more firmly than in dissociable salt linkage. This nucleoprotein and the proteins derived from it by alk. degradation have similar serological properties. Charles A. Zittle

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D—BOTANY

THOMAS G. PHILLIPS

Applicability of the preheating treatment in the extraction of tissue fluid from cotton leaves. Noboru Yamada. *J. Coll. Agr., Tokyo Imp. Univ.* **14**, 417–28(1939).—Comparisons were made of the vol., the osmotic value and the pH value of the sap obtained by the preheating and prefreezing methods of treating cotton leaves prior to sap extn. In some cases the osmotic value of the sap expressed from heated samples was slightly higher than that from frozen samples, which difference, however, is practically negligible. The amt. of sap obtained by either of these treatments is apparently the same. It is notable that the heat method alters the pH value of the tissue fluid during treatment, while with the freezing method the sap shows a pH value similar to that expressed from untreated leaves. The most suitable length of time for heating was found to be from 15 to 30 min. The heat method is quite reliable in studying the osmotic value of the tissue fluid from cotton leaves, causing no serious changes in the osmotic concn. of cell sap. This method, moreover, is simple, time-saving, economical and suitable for extended collections, its only drawback being that it is inapplicable in studying the H-ion concn. of the sap. 27 references. Edward A. Ackermann

The chemotaxis of algae gametes. Franz Moewus. *Arch. Protistenk.* **92**, 485–526(1939); cf. *C. A.* **32**, 8457[2]; **33**, 4030[4,8]; **34**, 469[7].—Under aerobic conditions the sugars (1% solns.) most favorable for motility are gentiobiose for *Chlamydomonas eugametos* (I), cellobiose for *Chl. dresdensis* (II) and cellotriose for *Chl. braunii* (III); *l*-arabinose, *d*-ribose, *d*-xylose, *d*-mannose, *d*-galactose, *d*-fructose and *l*-sorbose have no effect. I formed and excreted crocin, while the other species formed and excreted motility substances probably related to crocin but not to derivs. of *cis*- and *trans*-crocetin esterified with gentiobiose. The no. of crocin mols. required to make a cell of I, II or III motile are 1, 10^6 and 10^6, resp. Crocin dark cells (IV), young gametes (V) and reactive gametes (VI) are chemotactic toward sugars which affect the motility. The sugar with the lowest stimulation threshold is also the one with the most favorable action on the motility. The stimulation threshold of the most favorable sugar is $M/10^4$ for all 3 species. With I, II and III the crocin solns. which act as chemotactic agents must be 10^4, 10^5 and 10^6 times more concd., resp., than the crocin solns. in which the cells occur. IV, V and VI behave differently toward *cis*- and *trans*-crocetin di-Me ester. IV in a soln. contg. neither *cis*- nor *trans*-crocetin di-Me ester are chemotactic toward all cis/trans mixts. of 100/0 to 0/100. V, in a concd. aq. soln. of *cis*-crocetin di-Me ester, do not become chemotactic until the mixt. contains 80 parts by vol. of the cis and 20 parts by vol. of the trans ester; they are not chemotactic toward cis/trans mixts. of 100/0 to 85/15. VI, in a definite cis/trans mixt., are chemotactic toward cis/trans mixts., if the difference between the solns. amounts to at least 19/19; they are not chemotactic at differences of 0/0 to 18/18. VI are also chemotactic toward natural gamete filtrates; here the cis/trans difference must be at least 20/20; at differences of 0/0 and 10/10 no chemotactic attraction results. The seeking of gametes for copulation is a chemotactic process, in which only the sex substances act as chemotactic agents. All phenomena of chemotaxis, as well as the speed of the chemotactic reaction, agree wholly with the phenomena of group formation and the ideas developed from the theory of the relative sexuality. Ruth Berggren

The size of the tobacco mosaic particle from x-ray determinations. John W. Gowen. *Proc. Natl. Acad. Sci. U. S.* **26**, 8–10(1940); cf. *C. A.* **31**, 3959[1], 7073[6].—Ordinary tobacco mosaic and several of its derivs. were irradiated with x-rays from Cr, Cu and Ag, the effective wave lengths being 2.1, 1.5 and 0.7 A. The survival curves show that the inactivation rates of tobacco mosaic and its derivs. are essentially alike. The av. size of the vital vol. of the mosaic particle is 7.5×10^{-18} cc. The mol. wt. of the tobacco mosaic virus, confirmed by x-ray expts., is 16–20 million. The large portion of this mol. is important to its reproduction, a smaller portion being capable of change without affecting this power to reproduce. The virus entity may be a repeat mol. with a mol. wt. of 40–100 million; this conclusion gives added significance to the relative strengths of the bonds between the different mol. elements. Ruth Berggren

The nature of absorption of radioactive isotopes by living tissues as illustrated by experiments with barley plants. R. Overstreet and T. C. Broyer. *Proc. Natl. Acad. Sci. U. S.* **26**, 16–24(1940); cf. *C. A.* **32**, 9177[1]; **33**, 9516[7].—Equil. studies indicate that plant roots may absorb radioactive ions by simple exchange of radioactive isotopes of the surrounding culture medium for nonradioactive isotopes initially present within the plant. Barley plants with low K levels absorb radioactive and nonradioactive isotopes of K in nearly const. proportions from dil. KCl solns. in which the radioactivity of the dry salt is of the order of 1 microcurie/l. Under similar conditions barley plants with moderately high K levels favor the radioactive isotopes in absorption. Under the exptl. conditions, plants with high K levels or plants maintained at low temps. do not show a net absorption of K but do absorb radioactive K, indicating a process of exchange of radioactive isotopes in the culture medium for nonradioactive isotopes in the roots. The fraction of K in the root capable of rapid exchange for isotopes in the culture medium has been calcd. and is believed to be assocd. with the colloidal phases of the protoplasm and the cell wall; it may have a special significance for the study of certain aspects of the ionic interrelations of the root and culture medium. Ruth Berggren

Adsorption of metallic colloids on protein bodies. I. The reaction of colloidal gold-tobacco mosaic virus. G. A. Kausche and H. Ruska. *Kolloid-Z.* **89**, 21–6(1939).—The addn. of colloidal gold to tobacco mosaic virus led to the formation of a red flaky ppt. upon acidification (as viewed under the ultramicroscope). In this it differed from the X-potato virus which forms the ppt. even in neutral solns. This red ppt. is considered to be the result of adsorption of gold-sol particles on the tobacco mosaic virus protein mols. Addn. of NaCl to neutral solns. of gold sol and tobacco mosaic virus protein led to a blue ppt., this being an aggregate of gold particles only without any interaction between the colloidal gold and the protein. Alkalinization dissolves the red gold sol-protein combination and denatures the protein. S. A. Corson

Chemical studies on the quality of inbred lines of sweet corn. J. T. Sullivan and J. R. Roach. *Purdue* (*Ind.*) *Agr. Expt. Sta., Rept. of the Director* **1937**, 9; cf. *C. A.* **33**, 8242[6].—Sol. polysaccharides were detd. on 18 inbred lines of sweet corn, stored at const. temp. and sampled periodically for analysis. The sol. polysaccharides at first increase during storage and then decrease. Starch decreases and then increases. In the 1st 25 hrs. of storage respiration accounts for more than $^1/_2$ of the loss in sugars, the range in the different samples being from 0.3 to 1.1% of the initial sugar content. During the next 50 hrs. of storage the amt. of sugar lost by respiration was usually

less than during the 1st period. At the end of 75 hrs. of storage the corn differed from its original condition by having less moisture, less sugar, less total carbohydrate and a greater proportion of the more complex and less sol. carbohydrates. The kernels have a greater water absorbing capacity. Golden Bantam No. 1409 showed the highest sugar content at all times except at harvest and the lowest rate of sugar loss during storage. Golden Standard had the highest initial sugar content but lost sugar more rapidly than any other variety. Its polysaccharide content was the lowest at all times. C. R. Fellers

The role of manganese in the assimilation of nitrate. Hans Burström. *Planta* **30**, 129–50(1939).—Continued (cf. *C. A.* **33**, 4628[4], 5444[8]) expts. with roots of wheat seedlings confirmed the assimilation of nitrate only in the presence of Mn. All other neutral salts tried hindered assimilation (conversion to protein), i. e., Li, Na, K, Mg, Ca, Sr and Ba, besides heavy metals, as sulfates, carbonates or phosphates. It was established that this effect depended solely upon the cation. The interference was such as to suggest that it was due to an exchange of cations. The expts. support the hypothesis that the Mn that effects the assimilation is adsorptively bound in the cell plasma and the other cations obstruct assimilation by displacing the Mn from this attachment. Mn participates in the reduction of both nitrate and nitrite. Support is found for the belief that a single oxidation reduction reaction accomplishes the whole reduction process of nitrates to (NH_3 or RNH_2). The interdependence of the basal respiration of the roots and the assimilation of nitrate is discussed thermodynamically, with the emphasis upon the fact that Mn catalyzes both processes. Twenty-two references. E. L. Green

The effect of β-indolylacetic acid upon the size of starch grains of potato (Solanum tuberosum). M. Zika. *Planta* **30**, 151–9(1939).—After treatment of the seed pieces with β-indolylacetic acid (I), the yield of tubers was considerably increased and the starch granules were larger than usual. Likewise a subsequent effect of the more vigorous development could be observed in the following vegetative period. Varieties differed in their sensitivity to added I. Even leaf cuttings demonstrated the effect of the concn. of I upon the size of the starch granules. Preliminary trials with other plants indicated a general application of this relationship. E. L. Green

The retardation of cell elongation by naturally occurring ether-soluble substances. Poul Larsen. *Planta* **30**, 160–7 (1939).—Three different ether-sol. growth-retarding substances were found in ripe tomatoes. Two of these were water-sol., and of these one might be identical with "blastokolin" and is acid; the other is neutral. In maize grains a growth-substance inhibitor sol. in ether and not acid was found. The existence of these substances was proved by the paste method of Laibach (cf. *C. A.* **28**, 3443[1]) and by their ability to retard growth initiated by a soln. of auxin. E. L. Green

The analysis of permeability measurements. Fr. Bachmann. *Planta* **30**, 224–51(1939).—The processes of the gain and loss of water during plasmolysis and deplasmolysis are regarded as diffusion phenomena more or less disturbed by turbulence. The velocity of inward and outward movement of water depends principally upon the velocity of diffusion of the materials dissolved in the interior plasma. If undisturbed diffusion takes place also in the wall or in the cell sap, then this applies to those regions and their solutes as well. Even if the water permeability of the total plasma is obviously high, with few exceptions the possibility still remains that in the boundary layers it is decidedly less. The permeability of the boundary layer may not vary if only the diffusion coeffs. of the solutes of the interior plasma and ratio of total plasma depth to boundary-layer depth fluctuate. E. L. G.

Discovery of inactive growth substance, of antigrowth substance, and of their significance in the regulation of growth. Hans Voss. *Planta* **30**, 252–85(1939).—Embryos of maize sepd. from endosperm and scutellum require the reserve growth substance of the grain for their normal and original development. Heteroauxin cannot replace the natural growth substance in the germination stage. In this case the 2 hormones for elongation have different effects. The scutellum of maize contains inactive growth substance which can be demonstrated by freshly decapitated oat coleoptiles. This inactive growth substance of the scutellum is sol. in alc., ether, chloroform, and water and is heat-stable, but in contrast with active growth substance it is not destroyed by treatment with perhydrol. The auxin of the endosperm migrates to the scutellum as a result of swelling, is inactivated there, and can then be transported acropetally into the embryo. A slower apical transport of active natural growth substance was shown for higher concns. The cells of the coleoptile store the inactive growth substance of the scutellum, and the apical cell activates a definite quantity in a unit time. This limited activating power of the apical cell is an important factor in the regulation of the extension of the coleoptile. The activation is affected by the quantity of active growth substance already present in the coleoptile; the age of the cells also has an effect. All the cells of the coleoptile can activate the growth substance of the scutellum up to a certain degree of differentiation. There must be a dominant polarity in the coleoptile that prevents all except the apical cell from constantly exercising this function. As the cells age, they lose not only their activating power but also their responsiveness to added growth substance. Both factors contribute to the limitation of the growth of the coleoptile. Especial importance for the regulation of the growth of the young maize seedling attaches to a substance that can be extd. from the endosperm and scutellum which is to be regarded as an antigrowth substance (Hemmstoff). This reduces the responsiveness of the cells to growth substance and thus retards the elongation of the mesocotyl and coleoptile, but promotes or initiates root growth. The Hemmstoff diffuses through the coleoptile without regard to polarity. Its effect follows a probability curve. It is probably formed under the influence of light. One hundred and twenty-seven references.
E. L. Green

Analysis of positive and negative phototropic bendings. Marga Wilden. *Planta* **30**, 286–8(1939).—The 2 sides of oat coleoptiles were tested upon decapitated coleoptiles (1) after dividing into illuminated and shaded halves, (2) by attaching the illuminated or shaded side of the undivided tip to the stump of another coleoptile. The results differ from those of Asana (*C. A.* **33**, 1781[6]). For both methods the ratio of growth substance on the illuminated side to that on the shaded side is less than 1 for pos. bendings and more than 1 for neg. E. L. Green

The importance of carotenoids in the utilization of light in photosynthesis. K. Mothes, I. Baatz and H. Sagromsky. *Planta* **30**, 289–93(1939).—Expts. on marine diatoms and brown algae are reported in which no direct effect of illumination upon respiration could be found. The utilization of various spectral regions was studied, and the type of response (mitosis, injury, respiration, photosynthesis, etc.) recorded. The refinements of technique have disclosed responses that remove support for certain concepts and make it appear that the living forms of the pigments absorb light differently from their exts.
E. L. Green

The influence of the neutral salts of alkali and alkaline earth metals on plant growth. Heinrich Borriss. *Ernähr. Pflanze* **35**, 289–97(1939).—A method of investigating the action of K, Na, Rb, Li and Ca ions on the growth of seedlings of *Spergula arvensis*, caryophyllaceous *Gypsophila elegans*, *Silene coeli-rosa*, *Agrostemma githago* and *Nicotiana rustica* is described which consists in placing the seedlings in contact with blotting paper, which is supported on a glass plate, and extending into the neutral salt soln. The salts used in 0.01 *M* solns. were all in the form of chlorides to eliminate the influence due to different anions. The temp. was maintained at 20°, light was excluded and the surrounding air was satd. with H_2O during the period of 160 hrs. required for measuring the rate of elongation of the hypocotyl. K produced best results in all cases and was followed closely by Na in *Spergula arvensis*. Rb caused a rapid rate of growth for the first 40 to 60 hrs.

The use of KNO_3 soln., as compared with either KCl soln. or distd. H_2O, greatly increased the K content of the hypocotyl and cotyledon of *Agrostemma githago*. Other methods of measuring the effect of nutrients on plant growth are discussed. John O. Hardesty

The chemical composition and possible effects of Carpobrotus edulis N. E. Br. Florence V. Stephen-Lewis. *S. African J. Med. Sci.* **4**, No. 1–2, 7–9(1939).—Water extd. 39.56%, and 90% alc. extd. 32.48%, of material from the dried leaves and stems. The ash from these was 26.4% and gave pos. reactions for K, Na and Ca. An ext. made with Prollius fluid was neg. to tests for alkaloids. The alc. ext. was dark red and gave a brownish red brittle residue on evapn. This was sol. in NaOH and a ppt. appeared on acidifying. The ppt. gave pos. reactions for phlobaphenes to Ware's formaldehyde test and the $FeCl_3$ test. A brownish decoction made by heating the dried material with water on a water bath gave a deposit on cooling. This dissolved on heating and on adding alc. It was acid in reaction and formed a heavy froth on shaking. Molisch's test for carbohydrates and tests for tannin with $FeCl_3$ and Fe alum were pos. A small portion of this ext. was evapd. to dryness and gave a crimson color with concd. H_2SO_4, an indication of the presence of saponin or of catechol tannins. No saponins were found by various methods of extn. The presence of tannin was confirmed by its complete pptn. by boiling the ext. with formaldehyde and HCl and by its pptn. with Br water. Hydrolysis of the ext. by boiling with 10% HCl gave a red ppt. and the filtrate on suitable treatment yielded a glucosazone, m. 202°. The ppt. gave a pos. Ware's reaction for phlobaphenes. The hide-powder method gave 8.052% of tannin. A portion of the decoction was treated with Pb acetate, the Pb ppt. treated with 50% alc. and ammonia according to Fleischer's method (*Arch. Pharm.* **205**, 97 (1874)). The final Pb-free filtrate showed the presence of malic and citric acids. Six references are given. W. R. Henn

The culture behavior of a species of Rosellinia. I. Inhibitory effect of certain chemicals on the production of perithecia. S. N. Das Gupta. *J. Indian Botan. Soc.* **16**, 359–70(1937).—In proportions given for the standard medium, glucose, asparagin, $MgSO_4$ and K_2PO_4 individually have no inhibitory effect. Asparagin and K_2PO_4 exert a strong inhibitory effect when used together. The effect is accentuated by the addn. of glucose and starch and lessened by the addn. of $MgSO_4$. Glucose completely inhibits the formation of perithecia at concns. of 0.4% and higher, but the growth rate of the fungus is not affected. K_2PO_4 inhibits the formation of perithecia at about 0.6% concn., an amt. considerably higher than that used in standard synthetic media. K. D. Jacob

March of transpiration of a leaf from its measurable stage to its fall. P. Parija and B. Samantarai. *J. Indian Botan. Soc.* **18**, 65 77(1939).—Expts. were carried out on attached leaves of *Helianthus annuus*, *Datura alba* and *Ixora undulata*. From the time the leaf is large enough for experimentation, the transpiration first increases and then falls to a steady value, after which it decreases. With evergreen leaves the steady phase of transpiration is much longer. The transpiration of the exptl. leaf is affected by the environmental humidity of the plant. K. D. J.

Synthetic growth substances. L. C. Chadwick and D. C. Kiplinger. *Trans. Iowa State Hort. Soc.* **73**, 171–5 (1938); *Proc. Am. Soc. Hort. Sci.* **36**, 809–16(1939); cf. *C. A.* **33**, 9362[7].—Softwood cuttings of 89 species of ornamental plants responded favorably to treatment for 24 hrs. with solns. of indolebutyric acid (0.5–2.0 mg./100 cc.). Only 1 plant, *Cornus florida rubra*, showed no rooting of untreated cuttings but good rooting when treated. In general, the rooting percentage between untreated and treated cuttings was not changed by the use of indolebutyric acid if the untreated cuttings were allowed to remain in the bench the normal length of time. By treating the cuttings, the time required to reach the normal rooting percentage was decreased. With plants that produce roots with a definite arrangement in regard to the node and position of cut, treatment with indolebutyric acid failed to change the relationship. Narrowleaf evergreens difficult to propagate by cuttings were not benefited by treatment. With softwood cuttings the quality of the root systems was greatly improved by treatment with growth substances. K. D. Jacob

The distribution of chemical substances in tobacco. II. Protein substances. I. D. Vladescu and N. Dimofte. *Bul. cultivarii fermentarii Tutunului* **28**, 330–43(in French, 343)(1939).—An examn. of the variation of the protein elements in tobacco leaves of different levels and within each leaf, the stem, the root, and the flower led to the following results. In percentage of dry substance the protein substance increases continuously from the first base to the last top leaf (358% for the Molovata variety, 182% for the Ghimpatzi variety). The protein substance increases in the stem from the base to the top (241%). The secondary roots are richer in protein than the main root; the flower is richest in protein elements. The quantity of protein substances in 100 leaves of various levels differs with their wt. and the protein percentage of the dry substance of these leaves. The distribution of the protein substance throughout the various plant organs varies with the development of the plant. At the time of flowering the following distribution was found in the Ghimpatzi variety: leaves 51%, stem 27%, flower 13%, root 9% of the protein content of the entire plant. Cf. *C. A.* **32**, 8472[4]. A. H. K.

Effects of alkali salts on germination of seeds. B. T. Mulwani and A. G. Pollard. *Agr. Live-stock India* **9**, 548–55(1939).—Seeds were germinated in 50 g. of soil or sand in Petri dishes to which varying concns. of NaCl were added. The smallest concns. of NaCl stimulated germination. When this was exceeded, the seeds were injured. The order of decreasing sensitivity of seeds to NaCl injury was corn, oats, wheat, barley, peas, sugar beet, red clover, mangold, mustard, lucerne and paddy. Delay in time of germination and injury to barley was in the following order of decreasing severity: Na_2CO_3, $MgCl_2$, NaCl, Na_2SO_4. The presence of 0.5% $CaSO_4$ decreased injury caused by Na_2CO_3 and $MgCl_2$. Nelson McKaig, Jr.

Respiration and fermentation in the carrot, Daucus carota. II. Fermentation and the Pasteur effect. Paul B. Marsh and David R. Goddard. *Am. J. Botany* **26**, 767–72(1939); cf. *C. A.* **34**, 469[1].—Respiration expts. with thin slices of carrot tissue produced a ratio of anaerobic to aerobic CO_2 of 1.15 indicating the existence of the Pasteur effect. No measurable amts. of org. acids were produced by respiration in N_2. Fermentation occurred and the R. Q. was increased from 0.8 to 3.3 when respiration was inhibited by O pressures of 5 to 1%, resp. By sepg. the respiration and fermentation mechanism through use of CO, CN^- and NaN_3, it was found that the results were not consistent with the Lipmann theory (*C. A.* **28**, 188[9]) of oxidation of a fermentation enzyme unless the oxidation is catalyzed by cytochrome oxidase. The results were consistent with, but did not prove, the Meyerhof (*C. A.* **20**, 1817) oxidative resynthesis theory. The Pasteur effect is not poisoned by Et isocyanide, KCN or low O pressure. NaN_3 and CO induce aerobic fermentation; the effect of the latter is reversed by light. Nelson McKaig, Jr.

Differential growth in plant tissues. II. A modified auxin test of high sensitivity. Kenneth V. Thimann and Charles L. Schneider. *Am. J. Botany* **26**, 792–7(1939); cf. *C. A.* **33**, 1009[7], 6908[3].—Concns. of indoleacetic acid as low as 0.01 γ per l. can be detected by the curvature of *Avena* coleoptiles slit into 4 parts longitudinally. This is 30 times the sensitivity of the usual *Avena* coleoptile test. The increased sensitivity of the test is caused by mech. factors affecting the curving sections. A *tool*, consisting of a brass holder with a slit 1.5 mm. wide to hold the coleoptile and a cutter which slides along the slit and cuts the coleoptile with an inserted piece of safety razor blade, is described. Nelson McKaig, Jr.

Factors influencing the efficiency of photosynthesis. Robert Emerson and Charlton M. Lewis. *Am. J. Botany* **26**, 808–22(1939); cf. Warburg and Negelein, *C. A.* **16**, 1316.—The efficiency of photosynthesis (I) in *Chlorella pyrenoidosa* depends on a no. of factors. Traces of heavy

metals usually present as impurities in the water or Fe salt used in the culture soln. and which were independently added as stock solns. of microelements (*C. A.* **32**, 7517[8]) increased the efficiency. A light intensity of about 900 lux followed by a reduction for a few days before harvesting appeared optimum. The age of the culture affects the efficiency by the amt. of growth and light absorption due to mat thickness and the exhaustion of nutrients from the medium, which are interdependent. The quantum yield depends upon the wave length of light used. Cultures grown at 10° were 7% less efficient than those grown at 20°. Optimal adjustment for one factor depends upon the other factors. Conditions during measurement of I were best at 10°, and under a light intensity of about 300 lux. Yields with Na light from a. c. sources were similar to those obtained from d. c. The efficiency of I depends on CO_2 concn. It was 25% lower at 0.5% and somewhat lower at 12% than at 5% CO_2 at 10° with 10 min. light and dark periods, with thick suspensions and low light intensities. Higher light intensity diminished the dependence of yield on CO_2 concn. By suitable control of the above factors, quantum yields of 0.33 were obtained with a probability that higher values could be obtained by further adjustment of conditions. Hence the earlier assumed max. of 4 light quanta per mol. of CO_2 is not correct, and either methods of measurement or the postulated chem. mechanism of I is in error. Manometric measurements of respiration were made at 30–60-sec. intervals with an improved cathetometer reading to 0.01 mm. Light and dark periods of less than 10 min. each did not reduce errors in respiration measurement because of large temporary deviations from the steady pressure values. Quantum yields are highly dependent upon the portion of the respiration curve measured, the incident illumination, the calibration of the bolometer and deviations of the CO_2/O_2 ratio (γ) from unity, possibly by formation of intermediate products. The exptl. technique is described in detail. Nelson McKaig, Jr.

Nature of growth differences in two sorghum varieties. I. Influences of preliminary soaking on early growth and auxin content. Robertson Pratt and Harry G. Albaum. *Am. J. Botany* **26**, 822–6(1939).—Standard Yellow Milo (I) and Dawn Kafir (II) seed were soaked in distd. water for different lengths of time, germinated on cork floats and the rate of root and shoot growth measured. The rate of shoot growth of I was decreased by increased time of soaking but the rate of root growth was increased for the first 24 hrs. of soaking and then decreased by longer immersion. II was unaffected by the treatment. Frequent changing of the water used for soaking increased the effect in the case of I. *Avena* tests showed I seed had 70–80% the auxin content of II, but after soaking I had 40–45% the auxin content of II. Nelson McKaig, Jr.

The effect of boron in the substrate on calcium accumulation by soybean plants. C. E. Minarik and J. W. Shive. *Am. J. Botany* **26**, 827–31(1939).—B was added at 14 concns. to soybeans grown in sand cultures with B-free nutrient solns. B injury occurred in 18 days at 10 p. p. m. and necrotic spots caused by Fe toxicity were caused by B at lower concns. B-deficiency symptoms occurred at B concns. of less than 0.025 p. p. m., plants receiving 0.025–1.0 p. p. m. were healthy, above 2.5 p. p. m. B toxicity occurred. Max. amts. of Ca calcd. on both the ash and tissue bases were found in leaves of plants receiving optimum B. No effect of B on total ash occurred. Except for the 2.5 p. p. m. concn. of B, the total leaf tissue produced was closely proportional to the percentage of Ca found in the leaves; this indicates that tissue production and Ca content were affected by B in the same way and to the same degree. The fact that increasing concns. of B decreased the moisture content of the leaves indicates that B exerts some control over the swelling of plasma colloids. Nelson McKaig, Jr.

Hydrogen-ion concentration of leaf juice in relation to environment and plant species. Annie M. Hurd-Karrer. *Am. J. Botany* **26**, 834–46(1939).—The acidity of the juice from normal wheat leaves during the vegetative period ranged from pH 5.85 to 6.38. pH decreased to about 5.5–5.3 during maturation. Unhealthy plants became prematurely acid, none having a pH lower than 5.3. Temps. above 20° and light periods of 17 hrs. increased the acidity; this explains the abnormal acidity of spring-sown winter wheat. Acidity was decreased by 8-hr. light periods, which favored vigorous growth. The effect of temp. on acidity was dependent upon the temp. injury. There was no difference in the pH of different wheat varieties, or of wheat grown on soil to which varying amts. of lime had been added. Juice acidities reported for 59 crop plants are reviewed, in addn. to 52 references. Nelson McKaig, Jr.

The effects of magnesium and calcium on "white-tip" of rice. Alan L. Martin. *Am. J. Botany* **26**, 846–52 (1939).—Growth of rice plants in soil and water cultures deficient in Mg caused leaf chlorosis (I) similar to the "white-tip" observed in the field. I was eliminated by addn. of 81 p. p. m. Mg to the soil cultures and 27 p. p. m. to the water cultures, but the addns. were toxic unless Ca was also supplied. Ca concns. of 9 p. p. m. or more in Mg-free cultures caused stunting and brown leaf spots which were not present when Mg was added. The greatest benefit from the antagonistic action of Mg and Ca occurred with Mg:Ca ratios of 1:1 or 1:3 when Ca and Mg were present in concns. of 27, 81 or 243 p. p. m. Nelson McKaig, Jr.

Chemical structure of substances inducing polyploidy in plants. A. A. Shmuk and A. Guseva. *Compt. rend. acad. sci. U. R. S. S.* **24**, 441–6(1939)(in English).—The polyploidogenic action of over 100 carbocyclic and heterocyclic compds. was detd. by evapn. of the Et_2O soln. contg. 1 mg. of substance on a filter paper in a Petri dish, moistening the paper with water and sprouting wheat seed. The action was related to the structure of the acenaphthene and naphthalene derivs. tested, and in agreement with the action of similar derivs. of other compds. The following α-derivs. of naphthalene (I) were active: Cl (II), Br (III), I (IV), COOEt (V), OCH_3 (VI), CN, NO_2 (VII) and CH_3; the following were inactive, β-Cl, β-Br, β-I, α- and β-SO_3H and salts, and α- and β-NH_2, α-COOH and salts, β-OCH_3, α- and β-OH, β-CN and β-CH_3. I was weakly active. Acenaphthene (VIII) and its 5-Cl (IX) and 5-Br (X) derivs. and acenaphthylene (XI) were active. The following 5-derivs. of VIII were inactive: I; SO_3H and salts; NH_2; OH; COOH and salts; NO_2; also the 1,2-di-Br; 1,2-di-OH (*cis* and *trans*); 5,6-di-NO_2 and x-tetrabromoacenaphthene. p-Dibromobenzene (XIII) was feebly active. The effects of II to XI, 3,5-dibromopyridine (XII) and XIII, were tested on different plants. Of these, all were effective in inducing polyploidy in wheat and barley, all but II and XIII in tobacco and *N. rustica* and all but II, III, VI, VIII, X and XIII in flax. Peas, vetch and clover responded only to V, VII and XII. Similarities between the compds. studied and those inducing carcinoma in animals are discussed. Nelson McKaig, Jr.

Mechanism of auxin-formation in green plants. L. P. Zhdanova. *Compt. rend. acad. sci. U. R. S. S.* **24**, 505–8 (1939)(in English).—The place of auxin formation in *Hydrangea hortensis* (I) was detd. by removing the growth points of 1 shoot, stripping leaves from a second and using a third shoot as control. A second plant was stripped of leaves. The shoot tips were tested for auxin 5 to 6 days later by Went's method (cf. *C. A.* **33**, 5887[6]). None was found in stems lacking growth points or plants from which all leaves were removed but it was present in the tips of leafless shoots. Apparently auxin is produced in growth points from substances stored by leaves and which can move freely in the plant. All buds were removed from *Vicia faba* (II) plants 1 month old and 7–9 days later auxin was extd. from the leaves with Et_2O. The auxin content was much lower than that in leaves of normal plants. Leaves cut from whole and decapitated I and *Helianthus tuberosus* were kept in light and darkness. Under both conditions, leaves from decapitated plants gave no geotropic response but the response of leaves from normal plants was marked, an indication that auxin is developed in the buds and flows down the stems to the leaves. Covering whole plants or only the leaves of tobacco (III) or

chrysanthemum (IV) with varying amts. of gauze to influence the incident light showed that a decrease in auxin in the tips was decreased to a similar extent by decreased illumination of either the whole plant or only the leaves. Vacuum infiltration of 0.2 and 0.4 mol. glucose daily into III and IV kept for 10–15 days in the dark caused auxin production which was absent in plants receiving no glucose. Introduction of 2% glucose into stems of leafless I produced auxin in the growing tips which was absent from controls receiving distd. water. Auxin-free tips 2.5 cm. long of II were grown on glucose soln. for 5–6 days and tested for auxin. Its presence proved that plant leaves did not synthesize or store auxin precursors. It is concluded that the mechanism of auxin formation includes photosynthesis of sugars in the leaf and their transport to the growing buds where they are converted to auxin. From the buds, auxin flows to the lower stems and leaves. Nelson McKaig, Jr.

Qualitative variations of rubber in the roots of kok-sagyz at the second year of vegetation. S. M. Mashtakov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 509–12 (1939) (in English); cf. *C. A.* **33**, 6645[3].—The 2nd year's development of kok-sagyz differs from the first in the development of a root sheath during the spring growth of the 2nd yr. and its destruction by soil microörganisms during and after the summer dormant period. The rubber content increases during the spring period. The percentage of rubber in the whole root increases but the total amt. is unchanged as the sheath disappears. The η and mol. wt. of the rubber in the new tissue increased during spring growth, becoming similar at the beginning of the dormant period to that of autumn in 1-year-old roots. The indexes of the sheath rubber are highest in early spring and exceed those of the new root tissue until June, when depolymerization occurs as the sheath is destroyed. The acid no. of 2nd-year spring roots is 60% less than 1st-year autumn samples. Kok-sagyz can be harvested during the 1st 6 weeks of the 2nd yr. without loss of rubber quality. Nelson McKaig, Jr.

Biochemical features of alpine fodder plants. S. O. Grebinskiĭ. *Compt. rend. acad. sci. U. R. S. S.* **24**, 513–16 (1939) (in English).—*Geranium collinum* Steph. (I) and leaves of *Ligularia macrophylla* D. C. (II), used as forage, were collected at altitudes from about 1500 to 3100 m. and analyzed. The whole plant and leaves of I increased in ash, N and ratio of sol. sugars to total carbohydrates and decreased in reserve carbohydrates (sol. in 2% HCl), cellulose and total carbohydrates with increase in altitude. Similar results were obtained for II except that ash decreased with increase in altitude because of thickening of the leaves. Nelson McKaig, Jr.

The effect of estrone and thyroxine on resting buds. Clara Zollikofer. *Ber. deut. botan. Ges.* **57**, 67–74 (1939).—Placing severed twigs in solns. of estrone for about 20 hrs. resulted in some stimulation of buds in *Corylus avellana*, *Forsythia viridis* and *Aesculus hippocastanum*. A concn. of 50 ME (Schering units) per l. was optimum for the catkins and 500 ME for the leaf buds. The action of thyroxine in stimulating the unfolding of leaves, observed by Hykes (*C. A.* **27**, 4557), was confirmed. Lawrence P. Miller

The significance of growth substance for the formation of adventitious shoots and roots. O. Fischnich. *Ber. deut. botan. Ges.* **57**, 122–34 (1939).—Further expts. confirm previous conclusions (*C. A.* **32**, 8482[8]) that high concns. of growth substance lead to root production, but low concns. favor shoot formation. Callus tissue which ordinarily would form roots could be induced to form shoots through lowering of the growth substance content by inverting the cutting or by removing portions of the bark. L. P. M.

The disappearance of the germinative capacity of seeds, especially of cereals. Georg Lakon. *Ber. deut. botan. Ges.* **57**, 191–203 (1939).—Loss of germinative capacity is a gradual process and in wheat, rye, barley and oats it is first manifested by the death of the cells of the radicle. Living embryos and living portions of partly dead embryos reduce Se salts to red metallic Se, and this test is recommended for detg. the germinative capacity of these seeds. Conditions are also given for using the Se test with corn, the embryos of which are difficult to excise, and which differ from the other seeds studied in that the cells forming the shoot are the first to become nonviable. L. P. M.

Photoperiodism and flowering hormones. H. Ullrich. *Ber. deut. botan. Ges.* **57**, General Meeting No., 40–52 (1939).—A review. Lawrence P. Miller

The significance of hydrocyanic acid in seed germination. Josef Keil. *Jahrb. wiss. Botan.* **88**, 345–72 (1939); cf. Laibach and Keil, *C. A.* **32**, 2980[8].—HCN is the germination-inhibiting substance in seeds contg. it; for normal germination of such seeds the presence of some HCN is, however, essential. The transport of β-indoleacetic acid is unaffected by HCN, but the response of the cells to growth substance is reduced when HCN is present. The seed coats have a regulatory effect on the action of HCN; thus, the testa of apple seeds can resorb considerable free HCN as well as amygdalin. L. P. M.

The detection of small quantities of growth substance. Hildegard Funke. *Jahrb. wiss. Botan.* **88**, 373–88 (1939).—A modified oat coleoptile test is described which, with natural auxin is 6–7 times, and with heteroauxin, 1.5–3 times more sensitive than previous tests, when small amts. are involved. Lawrence P. Miller

Talc as a carrier of substances inducing root formation in softwood cuttings. V. T. Stoutemyer. *Proc. Am. Soc. Hort. Sci.* **36**, 817–22 (1939); cf. Grace, *C. A.* **32**, 7071[9].—Treatments with dusts contg. indolebutyric acid and naphthaleneacetic acid were, in general, as effective as soln. treatments. High concns. in dust form were less injurious to sensitive tissues than in aqueous solns. A concn. of 1 to 1000 is suggested as an all-purpose dust. The addn. of thiourea in preliminary tests induced increased heaviness of root systems. Lawrence P. Miller

Effect of growth substances and maturity on rooting of cuttings of certain shrubs. L. E. Longley. *Proc. Am. Soc. Hort. Sci.* **36**, 827–30 (1939).—Treating cuttings for 20 hrs. with a soln. of indolebutyric acid contg. 2.2 mg. per 100 cc. in general increased rooting, although certain species which are difficult to root did not respond. Lawrence P. Miller

Histology and physiology of rotenoids in some Papilionaceae. I. R. R. Le Geyt Worsley. *Ann. Applied Biol.* **26**, 649–83 (1939).—Rotenoids (rotenone, tephrosin, deguelin, toxicarol) are defined by W. as naturally occurring substances which give a blue or green color when treated with strong HNO_3 soln. followed by strong NH_4OH soln. Twenty-two species of this plant family were examd. for rotenoids; the compds. were found in 14 species, the rotenoid content varying from traces in the seeds of 1 species to appreciable quantities in nearly every organ of another species. The seeds and roots of most species contained rotenoids. The occurrence of rotenoids in the various cells and tissues of the plants is described, and their fate in the germinating seed and young plant is followed. Rotenoids disappear in the germinating seeds of all species examd. and in the lignifying pith of the stems of 2 species. Expts. indicated that rotenone is not available as a food reserve. Rotenoids are probably of some direct use to the germinating seed and the seedling; but appear to be waste products in all other tissues. These substances are apparently confined to 2 plant subtribes, Tephroseae and Lonchocarpeae of the tribes Galageae and Dalbergeae. C. H. Richardson

Calculations of bioelectrical potentials. VI. Some effects of guaiacol on Nitella. W. J. V. Osterhout. *J. Gen. Physiol.* **23**, 171–6 (1939); cf. *C. A.* **33**, 8642[1].—The apparent mobilities and partition coeffs. of the alk. metals in the outer nonaq. layer of the protoplasm of *Nitella flexilis* were calcd. The order of mobilities resembles that in water; the partition coeffs., except for Cs, increase with the ionic radius. With Cl^- as unity, the following mobility values were found before and after exposure to guaiacol: Li 2.04, 5.83; Na 2.33, 7.30; K 8.76, 8.76; Rb 8.76, 8.76; Cs 1.72, 3.38; NH_4 4.05, 4.91; 0.5 Mg 20.7, 20.7; 0.5 Ca 7.52, 14.46. The partition coeffs., with KCl as unity, before and after exposure to guaiacol are: Li 0.0133, 0.149; Na 0.0263, 0.426; Rb 1.0, 1.0; Cs 0.0152, 0.82; NH_4 0.0182, 0.935; Mg 0.0017,

0.0263; Ca 0.02, 0.323. K is unchanged. The effect of guaiacol on the mobilities of the Na and K ions in *Nitella* resembles that in *Halicystis;* but in *Valonia* guaiacol increases the mobility of the Na ion and decreases that of the K ion. C. H. Richardson

Life factors in molecule building. J. N. Rakshit. *Chem. Products* **3**, 5–6(1939).—For a study of the mechanism of photosynthesis and the influence of the "life factor" in the formation of mols., oil-bearing grasses and plants were examd. Monthly examns. of oils were made. Yield, moisture, sp. gr., acid value, phenol value, aldehyde and ester value are tabulated for one series of samples from *Ocimum*. Leopold Scheflan

The role of sorbitol in the carbon metabolism of the Kelsey plum. I. Changes in the composition during growth and storage. Izak Donen. *Biochem. J.* **33**, 1611–20(1939).—The mature fruit contain an av. of 2.8% sorbitol most of which was accumulated during the latter part of the growth cycle. During storage the sorbitol seems to be lost before there is any loss of sugar. E. W. Scott

Studies in tree physiology. I. Introduction; water contents of certain Canadian trees. R. Darnley Gibbs. *Can. J. Research* **17, C**, 460–82(1939). **II. Seasonal changes in the food reserve of field birch (Betula populifolia Marsh).** *Ibid.* **18, C**, 1–9(1940).—During the period January, 1936 to July, 1938, the upper parts of *Betula populifolia* Marsh were analyzed for water, reducing sugars, sucrose, total sol. sugars, ether-sol. material, polysaccharide hydrolyzable by taka-diastase, and residual polysaccharides extd. by dil. acid. From 38 to 63% of the taka-diastasé hydrolyzate from the wood is nonfermentable, presumably pentose. The residual acid ext. is 69–100% nonfermentable. Hexosan is low in winter, rises to a max. just before leaf-opening, decreases sharply during spring growth and accumulates in summer. Ether-sol. material is not stored in winter. Sucrose and to a lesser extent reducing sugars are high in winter. There is a significant correlation between reducing sugars and water content of the twigs. Food reserves of the cortex behave much as do those of wood. J. W. Shipley

Vegetative propagation of conifers. IV. Effects of cane sugar, ethyl mercuric phosphate and indolylacetic acid in talc dust on the rooting of Norway spruce. N. H. Grace. *Can. J. Research* **18, C**, 13–17(1940); cf. *C. A.* **34**, 472[4].—Norway spruce cuttings collected in Nov. from the upper part of the tree were treated with a series of talc dusts contg. indolylacetic and naphthylacetic acids, each at 0, 1000 and 5000 p. p. m., combined with cane sugar at 0 and 10%, and Et mercuric phosphate at 0 and 50 p. p. m., and propagated in a greenhouse. Indolylacetic acid at 1000 p. p. m. increased rooting by about 10% to 42.5%, 3 months after planting, but at 5000 p. p. m. reduced it significantly. Naphthylacetic acid reduced rooting at both concns. Indolylacetic acid increased the length of root per rooted cutting. Sugar in combination with indolylacetic acid inhibited the increase in root length caused by the hormone alone: org. Hg alone or in combination with indolylacetic acid reduced root length, but sugar and Hg in combination exerted no greater inhibition than either alone. Mean root length was affected only by indolylacetic acid, which increased it. J. W. Shipley

Distribution of boron in the organs of Nicotiana rustica. Gabriel Bertrand and Lazare Silberstein. *Compt. rend.* **210**, 70–3(1940); cf. *C. A.* **33**, 8244[1].—The B content of *Nicotiana rustica*, gathered when it began to flower, averaged 7.4 mg. per kg. of dried material, but is very unequally distributed, being least (4–7 mg./kg.) in the roots and lower stalk, and most (10.5–13.5 mg./kg.) in the youngest leaves and inflorescence, except the corolla which contains only 3.2 mg./kg. The distribution resembles that in the lily (*C. A.* **32**, 3789[5]). C. A. S.

Chemical determination of ethylene in the emanations from apples and pears. Elmer Hansen and Bert E. Christensen. *Botan. Gaz.* **101**, 403–9(1939); cf. *C. A.* **33**, 8694[4].—A new procedure for C_2H_4 (*C. A.* **33**, 2938[8]) was applied to the emanations from apples and pears. Soly. tests showed that C_2H_4 is the active gas. C_2H_2, propylene and butylene were not found in amts. that could be detected by the bromination procedure. The amts. of C_2H_4 produced during ripening were 0.001 to 0.280 ml. per kg.-hr. J. T. Sullivan

The periodic partial failure of American cotton in the Punjab. I. Early breakdown of the photosynthetic apparatus. R. H. Dastur. *Indian J. Agr. Sci.* **9**, 285–90(1939); cf. *C. A.* **30**, 6785[2].—Different stages of the disintegration of the chloroplasts in 4F Punjab-American cotton (*G. hirsutum*) are described. Disintegration occurs in two ways, produced by mech. and chem. causes. The mech. decompn. of chloroplasts is caused by the daily increase in the size of the starch grains. The chloroplasts bulge, form a network with the starch grains in the meshes and become ruptured. Substances giving reactions of tannins are formed later in the cells. The appearance of minute pores marks the starting point of the chem. type of disintegration. The chloroplasts first swell and large cavities appear, then fuse together forming a spongy mass in the cells. Tannins develop and cover the dissolving chloroplasts. Both types of disintegration are produced experimentally in normal leaves, mech. rupture by interfering with the normal transport of carbohydrates from the leaves by ringing the stem, chem. disintegration by application of NaCl to the soil. The breakdown of the photosynthetic app. is found to occur prematurely in the leaves of plants that develop the external symptoms of the "disease" under investigation while no such disintegration of chloroplasts is noticed in the leaves of normal plants. **II. Formation and accumulation of tannins in the leaves.** *Ibid.* 291–303.—The accumulation of tannins giving the osmic acid test occurs in the leaves of plants which later develop the external symptoms of the disease, viz., the reddening and shedding of the leaves and the poor opening of bolls. Such accumulation does not occur at any stage in normal plants. The accumulation of tannins at an early stage can be regarded as an index of an abnormal and unhealthy condition. J. T. S.

The comparative composition of double and normal flowers. Cécile Sosa-Bourdouil. *Bull. muséum natl. hist. nat.* (Paris) **10**, 308–10(1938).—Detns. of moisture, reducing sugars, total C, H, N and sol. and protein N were made on normal and double flowers at comparable stages of development. The only important difference was that the double flowers contained a lower percentage of total N than the normal flowers, but showed no changes in the ratio of sol. to protein N. The total N (parts per 100 of dry wt.) for the normal and double flowers, resp., were: *Leucoium vernum*, 3.84, 2.75; *Anemone coronaria*, var. *Capelan*, 2.85, 2.44; *Matthiola incana*, 3.91, 3.50. W. C. Tobie

The floridean starch of Furcellaria fastigiata. Its seasonal variations. Ed. Gueguen. *Bull. soc. sci. Bretagne* **14**, Extra No., 55–63(1937); cf. *C. A.* **24**, 3033, 4805.—As a reserve carbohydrate, *Rhodymenia palmata* contains only floridoside (I) (cf. *C. A.* **24**, 4803); *Furcellaria fastigiata* contains I and starch. The starch was demonstrated and detd. by pancreatin-hydrolysis of the plant (after extn. of I with alc.) to yield glucose. Quant. values obtained in monthly analyses are tabulated. The approx. amts. of starch and of I in *Furcellaria fastigiata* and of I in *Rhodymenia palmata* (as parts per 1000 of fresh plant) are: October, 22, 13, 25; March, 0, 5.2, 3.5; September, 26, 8, 54. Conclusion: For correct values of carbohydrates in seaweeds, detns. must be made throughout the year, not in the summer alone. W. C. Tobie

Isolation of a crystalline selenium-containing organic compound from plant material. M. J. Horn and D. Breese Jones. *J. Am. Chem. Soc.* **62**, 234(1940).—Announcement is made of the isolation from plants of an *amino acid*, $C_{21}H_{44}N_6Se_2SO_{12}$; it decomps. 263–5° and has equiv. wt. 130.5; the N is all in the form of NH_2; it gives a strong ninhydrin reaction. C. J. West

The distribution and role of cane sugar in plants. John Parkin. *Gardeners' Chronicle* [3], **103**, 12–13, 112–13, 167, 240(1938).—A review of the sucrose-hexose and glucose-fructose ratios in plant leaves, photosynthesis in plants,

movement of carbohydrates in plants, presence of maltose in leaves, sugar in fruits, carbohydrate and sucrose chemistry, etc. Colin W. Whittaker

Absorption of calcium and formation of oxalic acid in higher green plants. Carsten Olsen. *Compt. rend. trav. lab. Carlsberg*, Ser. chim. **23**, 101-24(1939).—CaC_2O_4 (I) is deposited in the tissues of plants abundantly producing $H_2C_2O_4$ (II), and the amt. of II formed is largely detd. by the amt. of I pptd. In *Picea excelsa* the amt. of non-oxalate Ca (III) is practically const. In other species III increases when the Ca absorbed exceeds a limiting value, i. e., acid production cannot parallel Ca absorption under conditions particularly favorable to the latter. In *Fagus silvatica* (IV), a producer of II, 62% of all the Ca in the leaves is present as I, 9% is in soln. in the sap; therefore the dissolved Ca is but 25% of III. *Tussilago farfarus* does not form II, and only 35% of the leaf Ca is in soln. Ca and II increase in the leaves of IV and of *Primula elatior* throughout the summer. Malic acid (V) in largest amt. is found in young beech leaves free from II. As summer advances the amt. of V diminishes while that of II increases, and the pH of the sap increases from 3.8–6.0. *Dianthus barbatus* (VI), which produces II, when grown in H_2O contg. some Ca shows an increasing dry-material production with a decreasing Ca concn. With *Sinapis alba*, a nonproducer of II, the growth phenomenon is a direct function of the Ca content of the solution. *Spinacia oleracea* and VI, producers of II, thrive when N is supplied as $(NH_4)_2SO_4$. When a nitrate is used, contrary to the literature, less II is formed. NH_4 ions inhibit Ca absorption more than do those of K. Five tables and 5 sets of graphs are presented G. Albert Hill

The vitamin C content of various rosebushes and related plants. E. Zariņš and C. Putniņa. *Acta Univ. Latviensis, Kim. Fakultat.* Ser. 4, No. 10(in Lettish, 431–8; in German, 439-40)(1939).—Rosebushes at the botanical gardens of the Latvian university were harvested in October and stored at 4°. The fruit was ground in quartz sand and a mixt. of 2% *m*-phosphoric acid + 8% Cl_3-AcOH, pptd. with Hg acetate, reduced with H_2S, neutralized with $MgCO_3$ and titrated with 0.01 *N* 2,6-dichlorophenolindophenol soln.; this gave the total ascorbic acid + the dehydroascorbic content. A direct titration of the grindings gave the ascorbic acid content. The ratio of the ascorbic acid to the dehydroascorbic acid in various plants in mg. per 100 g. of fruit was determined. Fruits from the rosebush stored at 4° in the dark did not lose any of their vitamin C for several weeks. Frank Maresh

Ultraviolet spectrophotometry of *Zea mays* pollen with quartz microscope (Uber) **3**.

Boysen-Jensen, P.: Die Elemente der Pflanzenphysiologie. Translated from the Danish by Fritz Mattick. Jena: G. Fischer. 458 pp. M. 22.

Turner, Wayne I., and Henry, Victor M.: Growing Plants in Nutrient Solutions; or Scientifically Controlled Growth. New York: J. Wiley & Sons. 154 pp. $3.00.

E—NUTRITION

PHILIP B. HAWK

Does the silver fox need vitamin C in its feed? Erling Mathiesen. *Norsk Pelsdyrblad* **1939**, No. 13, 456–7.—Feeding expts. with 3 groups of silver foxes, each comprising 5 animals, were raised on a food contg.: Group (1) cabbage as a source of vitamin C, (2) ascorbic acid, (3) neg. control without any vitamin C. The lack of vitamin C in the control group was proved by feeding expts. on guinea pigs that died in the regular time with typical scurvy symptoms. After 3 months' feeding expt. no difference in wt. and appearance of the foxes could be observed. Silver fox does not seem to have any need of vitamin C in its feed. V. Aschehoug

Vitamin B_1 deficiency in silver foxes. H. Kringstad and G. Lunde. *Norsk Pelsdyrblad* **1940**, No. 14, 5–8, 19–20.—Silver-fox pups fed a vitamin B_1-free diet showed cessation of growth, and afterwards decrease in wt. accompanied by cramps or paralysis. The animals died when no vitamin B_1 was administered. The same basal diet with an adequate amt. of vitamin B_1 insured normal development of the animals. No cramps occurred. Growth curves and illustrations of sick animals were given. The amt. of vitamin B_1 used in the expt. was 0.2 mg. (corresponding to 70 I. U.) vitamin B_1 per day per animal. This dose proved to be sufficient to prevent beriberi. The vitamin B_1 contents of the most important feeds are summarized. V. Aschehoug

Vitamin D in diet. J. Lindsay and V. H. Mottram. *Brit. Med. J.* **1939**, I, 14–15.—Palatable sources are described. B. C. P. A.

Review: Dietetics. Arno Ed. Lampé. *Jahreskurse ärtzl. Fortbild.* **30**, No. 8, 1–19(1939).—A brief review of recent work on important components (vitamins, inorg. constituents, amino acids, etc.) of some foods and on the dietetic treatment of certain diseases. Ruth Berggren

Experimental renal insufficiency produced by partial nephrectomy. XI. Diets containing dried extracted liver. Alfred Chanutin and Stephan Ludewig. *Arch. Internal Med.* **64**, 513–25(1939); cf. *C. A.* **32**, 7080⁴.—Diets contg. 10, 20, 40, 60 and 80% dried extd. liver were fed to rats with intact kidneys and to unilaterally nephrectomized and partially nephrectomized rats. The intact and unilaterally nephrectomized rats showed no effect on blood pressure by the diet. The kidney wt./surface area increased with protein intake, except with the 80% diet which gave a low ratio. The urea ratio per g. kidney was fairly const., indicating a direct relation between the degree of renal hypertrophy and renal function. In the partially nephrectomized animals the frequency and degree of hypertension were not related to the diet, most marked hypertension appearing in the 20% diet, and the lowest incidence in the 80% diet. The total solids of the kidney increased with increased protein intake. The 40% diet showed the most renal insufficiency. Except in the 80% diet, the blood urea and urine concns. increased with the protein intake. **XII. Diets containing dried extracted meat.** *Ibid.* 526–41.—Expts. similar to those in the previous report were carried out with dried extd. meat. Total solids of the kidney per unit of surface area increased progressively with increased dietary protein. Urinary vols. during concn. tests also increased. Greatest incidence of urines with low sp. gr. appeared in the 40, 60 and 80% ext. of meat diets. Proteinuria was highest and also the most marked changes in renal function occurred in the 40% diet. Renal insufficiency was greatest in this diet and least in the 80% diet. **XIII. A summary of the effect of whole liver, whole meat, extracted liver and extracted meat diets on renal hypertrophy, renal function, blood pressure and cardiac hypertrophy.** *Ibid.* 747–55.—Diets contg. protein components varying from 10 to 80% of whole meat, extd. meat, whole liver and extd. liver were fed for periods of 75–175 days to intact and to partially nephrectomized rats. In the intact rat each increment of the protein component generally caused progressive renal hypertrophy and an increase in the urea clearance. Variations in the protein content did not affect the vol. or sp. gr. during a concn. test with a 24-hr. specimen. The blood pressures and the size of the hearts were not appreciably affected by augmenting the protein components. The main effect of the type of protein component was manifested by the larger amt. of heart muscle per unit of surface area required to maintain a given blood pressure in the animals on the whole meat and whole liver diets. In the partially nephrectomized animals the effect of increasing the protein component of the diet was similar to that in the intact animals. **XIV. Diets containing dried whole yeast.** *Ibid.* 756–66.—In the partially nephrectomized animals there was a progressive increase in the dry kidney wt./surface area ratios with increasing concn. of yeast in the diet. The incidence of hypertension was greatest in the 60% yeast diet. No marked renal insufficiency was observed. J. B. B.

Biophotometer test as an index of nutritional status for vitamin A. Grace Steininger and Lydia J. Roberts. *Arch. Internal Med.* **64**, 1170–86(1939).—Results are given of over 2000 biophotometer tests on 459 persons and

the significance of the data is discussed. Although some relation exists between the biophotometer readings and the state of vitamin A nutrition, the relation is not close enough to warrant the use of the test as a means of diagnosing subclinical deficiency. J. B. Brown

Treatment of multiple sclerosis with nicotinic acid and vitamin B_1. Matthew T. Moore. *Arch. Internal Med.* **65**, 1-20(1940).—Nicotinic acid produces vasodilatation of the skin, brain and spinal cord. No harmful effects followed parenteral administration of 120 mg. of nicotinic acid and 33.2 mg. thiamine chloride daily for prolonged periods. J. B. Brown

Vitamin A deficiency in diabetes mellitus. J. G. Brazer and A. C. Curtis. *Arch. Internal Med.* **65**, 90-105(1940). —All of a group of 20 patients with juvenile diabetes have poor light adaptation. Daily administration of 60,000 U. S. P. units of vitamin A as cryst. carotene for 14 days was ineffective in improving the light adaptation, but the same dosage of vitamin A in the form of concd. fish oils caused a return to normal of light adaptation in 3-21 days. In such patients there appears to be inability to convert carotene to vitamin A. J. B. Brown

The relation of the anterior pituitary gland to carbohydrate metabolism. F. G. Young. *Brit. Med. J.* **1939, II**, 393-6.—A review. J. B. Brown

The antirachitic value of human milk. J. C. Drummond, C. H. Gray and N. E. G. Richardson. *Brit. Med. J.* **1939, II**, 757-60.—Twenty-six samples of human milk showed an av. of 6 I. U. vitamin D per 100 cc. with little or no seasonal variation. The vitamin content is affected by the diet. The contents of Ca and P, both total and dialyzable, in a no. of samples of human milk are included. The authors discuss at length the interrelationships between vitamin D, Ca and P in infant nutrition. J. B. Brown

The vitamin K activity of 2-methyl-1,4-naphthoquinone and its clinical use in obstructive jaundice. James M. Macfie, A. L. Bacharach and M. R. A. Chance. *Brit. Med. J.* **1939, II**, 1220-3.—Intramuscular injection of natural vitamin K concentrate in jaundice is ineffective in controlling hemorrhage, but the substitution of 2-methyl-1,4-naphthoquinone is effective in raising the prothrombin index. This compd. may be of value in the treatment of postoperative bleeding in jaundice. J. B. Brown

The significance of cevitamic acid deficiency in surgical patients. John A. Wolfer and Frederick C. Hoebel. *Surg. Gynecol. Obstet.* **69**, 745-55(1939).—Although there is no proof that vitamin C deficiency is related to nonunion of wounds, there is considerable evidence that such a relationship exists. Methods and dosage for obtaining vitamin C satn. are described. J. B. Brown

The newer knowledge of vitamin C in health and disease. E. Neige Todhunter. *J. Am. Dietet. Assoc.* **16**, 1-11(1940).—A discussion. E. Curzon

Recent vitamin research. II. Vitamins C, B complex and the less well-known vitamin factors. J. Ernestine Becker. *J. Am. Dietet. Assoc.* **16**, 16-33(1940); cf. *C. A.* **34**, 1358[8].—A review. 33 references. E. Curzon

Diseases of sheep with special reference to feeding troubles. A. C. Rosenberger. *Bull. Dept. Agr., Calif.* **27**, 242-7(1938).—General. C. R. Fellers

Protein levels of rations in growing chicks. A. E. Tomhave. *Del. Agr. Expt. Sta., Bull.* **214**, 15(1938), *Ann. Rept.* **1938**.—Reducing the protein level of the ration from 18.2% protein to 16% at the 9th, 10th, 11th and 12th week did not result in material decrease in wt. for White Leghorn and for Barred Rock pullets. More feed was required, however, to produce 1 lb. of gain where the protein was reduced. There was a direct relationship between the no. of bare-breasted birds and the level of protein fed. C. R. Fellers

Adaptation to a low-calcium intake in reference to the calcium requirements of a tropical population. Lucius Nicholls and Ananda Nimalasuriya. *J. Nutrition* **18**, 563-77(1939); cf. Ceylon Govt. Press, *Sessional Paper XXIX*(1937).—Accepted standards for daily Ca intake in Europe and America are too high. A metabolic adaptation to a low-Ca diet is shown by, (1) the low amts. of Ca in the urines of those on low-Ca diets, when compared with the amts. in the urines of those on high-Ca intake; (2) the high percentage of Ca retention by growing children on about 0.2 g. of Ca daily. The Ca contents of many skeletons of children and adults were detd. Daily standard Ca allowances are suggested as follows: age 1-7 years, 0.5 g.; age 7-12 years, 0.75 g.; age 12-20 years, 1.0 g. A standard allowance of 0.5 g. Ca is sufficient for adults, excluding lactating women. C. R. Fellers

The role of the antidermatosis vitamin and a new water-soluble growth factor in the nutrition of the mature fowl. J. C. Bauernfeind and L. C. Norris. *J. Nutrition* **18**, 579-91(1939); cf. *C. A.* **33**, 6406[6].—An exptl. diet deficient in the vitamin was developed by subjecting the cereal portion and the liver ext. to prolonged dry heat-treatment and the casein to special purification (not given). The diet was adequate in vitamins A, B, B_4, B_6, D, E, G, K and the antiencephalomalacia factor. Nicotinic acid was found either to be present in the diet or else not needed in avian nutrition. This diet when supplemented with the antidermatosis vitamin (filtrate factor) was deficient in another new factor required for chick growth. This factor is not identical with any of the known vitamins. It is destroyed by prolonged dry heat-treatment, stable in yeast to autoclaving, water-sol., adsorbable upon fuller's earth and present in milk, liver, yeast and fresh green grass. Both the antidermatosis vitamin and the new factor were necessary for reproduction in the hen. Supplementing the deficient diet with both factors, however, failed to promote normal reproduction or to maintain the wt. of the hens, but egg production was satisfactory. 27 references. C. R. Fellers

Simplified rations for the chick. A. G. Hogan and L. R. Richardson. *J. Nutrition* **19**, 1-11(1940); cf. *C. A.* **30**, 750[7].—If vitamins A, B_1, B_2 and D are otherwise provided, then all the unrecognized vitamins required by the chick are present in aq. and alc. exts. of liver. Partial sepn. of the unidentified essential nutrients can be attained by extg. first with EtOH and then with H_2O. Both exts. must be present if the ration is to be adequate. Tikitiki contains an essential nutritive element but this same nutrient seems also to be present in the EtOH-sol. fraction of liver in even greater concn. C. R. Fellers

Adequacy of a milk diet for the rat. Luther R. Richardson and Albert G. Hogan. *J. Nutrition* **19**, 13-19(1940). —Milk is apparently deficient in some nutrient other than Fe, Cu, Mn or I, which is essential for normal reproduction in the rat. The exptl. rats produced only $1/2$ as many litters per female as did the controls. The reproductive performance of the 4th generation was not inferior to that of any of the preceding three. C. R. Fellers

Biological assay of thiamine with chicks. Thomas H. Jukes and Hubert Heitman, Jr. *J. Nutrition* **19**, 21-30 (1940); cf. *C. A.* **34**, 4775.—A method is described using a basal diet consisting principally of polished rice, fish meal and autoclaved yeast. A response curve was drawn in which the level of thiamine added to the diet is compared with the "polyneuritic mortality index," the latter value being expressive of the degree of protection afforded by a suboptimal level of thiamine fed during the assay period of 28 days. The thiamine requirement of the chick was estd. as between 130 and 150 γ of thiamine-HCl per 100 g. of diet for the prevention of polyneuritis. The thiamine content of the polished rice used in the basal diet was about 0.4 γ per g. A growth factor essential for the chick, absent from autoclaved yeast, was found to be present in polished rice. C. R. Fellers

Prevention of hyperplasia in the forestomach epithelium of rats fed white flour. George R. Sharpless. *J. Nutrition* **19**, 31-7(1940); cf. *Ann. Surg.* **106**, 502(1937). —Hyperplasia of the squamous epithelium in the forestomach of rats fed a diet of white flour is prevented by adding lactoflavin, nicotinic acid, cystine and rice polish concentrate to the diet. With a diet of white flour, protein or starvation is not an important factor in production of the lesions. The relation of local irritation to formation of the lesions and the relation of the nonspecific protective factors to sensitivity of epithelial cells to proliferative stimuli is discussed. C. R. Fellers

State of vitamin A in the liver of the rat after feeding various forms of the vitamin. E. LeB. Gray, K. C. D. Hickman and Elizabeth F. Brown. *J. Nutrition* 19, 39–46(1940).—Vitamin A, fed to rats in the following forms: U. S. P. Reference Oil, vitamin A caproate, distd. ester concentrate, vitamin A stearate, vitamin A alc. and β-carotene, was recovered in the livers as the esters, the percentage recovery being in the order of the substances listed. 55.6% of the vitamin fed as U. S. P. Reference Oil was recovered, as against 39.3% recovery from that fed as alc. and 9.7% recovery from β-carotene. A small amt. of the vitamin alc. was always present, the significance of which is at present unknown. The type of ester in each case was similar, which suggests a selective utilization of fat acids by the rat for the purpose of esterifying the vitamin. C. R. Fellers 1

Choline in the diet of chickens. O. D. Abbott and C. U. DeMasters. *J. Nutrition* 19, 47–55(1940).—The addn. of choline to the basal diet increased egg production, decreased mortality, inhibited abortion of egg yolks, and decreased the percentage of fat acids in the livers. The concn. of fat acids in the livers of the males fed diets with and without choline was considerably lower than that in the livers of pullets fed the same rations. C. R. F. 2

Quantitative requirements of the components of the vitamin B complex for lactation and growth of nursing young of the albino rat. Barnett Sure and Alethea Beach. *J. Nutrition* 19, 57–69(1940); cf. *C. A.* 24, 5339.—Following depletion of vitamin B reserves, the rearing of the young rat can proceed at a rate comparable with that secured on an optimum stock diet when the following supplements are furnished daily to the mother: 120 γ thiamine, 120 γ riboflavin, 50 γ vitamin B_6, 15 mg. choline chloride, 1 cc. of a soln. of "W" factor equiv. to 1 g. of liver ext., and 6 mg. nicotinic acid. It was not detd. whether the nicotinic acid is really essential for the lactating rat. 31 references. C. R. Fellers 3

Essential nature of choline for lactation and growth of the albino rat. Barnett Sure and Alethea Beach. *J. Nutrition* 19, 71–6(1940).—Choline was indispensable for growth and lactation. C. R. Fellers 4

Influence of the nitrogen content of the diet on the calorie balances of pre-school children. Jean E. Hawks, Jeanne M. Voorhees, Merle M. Bray and Marie Dye. *J. Nutrition* 19, 77–89(1940); cf. *C. A.* 32, 5450[1].—Five pre-school children served as subjects for 2 long-time balance expts., in each of which they received 2 diets, (1) contg. 3 and (2) contg. 4 g. of protein per kg. of body wt. The increase in protein content of the diets did not change the const. level of cal. utilization. Excretory values for both groups were remarkably const. and the retention figures varied in the same manner and to the same degree as the intake values. The change from the 3- to the 4-g. protein diet increased the N content of the excreta, thus increasing the actual no. of cal. eliminated. It also increased the av. proportion of the intake cal. eliminated from 7.3 to 12%. Thus, subtracting 10% from the intake values to care for excretory losses does not always give accurate results. The change also reduced the actual no., as well as the percentage, of the intake cal. available for body needs, but at the same time it produced greater wt. gains in the children. C. R. Fellers 5

Minimum vitamin A and carotene requirements of mammalian species. H. R. Guilbert, C. E. Howell and G. H. Hart. *J. Nutrition* 19, 91–103(1940); cf. *C. A.* 33, 8709[8].—In the horse the 1st detectable symptom of vitamin A deficiency is night blindness. The depletion time for the Percheron colts varied from 265 to 439 days. The horses at depletion were nervous and irritable. One I. U. of vitamin A from the U. S. P. Reference Oil was equiv. to 0.21 γ of carotene. Vitamin A and β-carotene requirements expressed in γ per kg. body wt. are for cattle 5.1–6.4 and 26–33; sheep 4.3–6.3 and 25–35; swine 4.4–6.3 and 25–39; horse 4.2–5.3 and 20–30; rat 4.6–5.3 and 15–20. The necessity for 2 standards for expressing requirements, 1 for vitamin A and 1 for carotene, is pointed out. C. R. Fellers 6

Vitamin A prevents "cottonseed meal injury." A. H. Kuhlman, Earl Weaver and W. D. Gallup. *Okla. Agr. Expt. Sta., Ann. Rept.* 1936–38, 67–8(1939); cf. *C. A.* 30, 2236[9].—The fact that cottonseed meal is not toxic when fed to dairy cattle is again verified. The supposed toxicity is really an avitaminosis A in the ration. Even when fed in amts. greatly in excess of the quantities usually fed, no injury to animals results. C. R. Fellers 7

Over ten percent fiber in chick rations is undesirable. Robert Penquite. *Okla. Agr. Expt. Sta., Ann. Rept.* 1936–38, 156–7(1939); cf. *C. A.* 30, 2236[7].—Various percentages of ground peanut hulls were used in chick rations for chicks up to 12 weeks old. The optimum amts. of fiber were from 4 to 10%. Decreased growth, higher mortality and retarded feather development were noted when the fiber content of the ration exceeded 10%. A chem. analysis of the amt. of crude fiber in a ration gives little information about its bulk. Nontoxic fiber fed to chicks in excessive amts. probably serves mainly as a diln. factor. C. R. Fellers 8

Turkey-nutrition investigations. T. T. Milby. *Okla. Agr. Expt. Sta., Ann. Rept.* 1936–38, 168–80(1939).—Turkeys require more protein than chicks. Approx. 22.4% protein in the ration gave as good growth and development as larger amts. When properly supplemented, frozen or dried *grasshoppers* are a valuable protein and fat component in the ration of turkeys. This is contrary to previous findings. Dried, ground grasshoppers substituted for a mixed protein supplement on an equal crude protein basis did not support normal growth, but frozen grasshoppers, supplemented with animal protein produced excellent wt. gains. Turkeys require more fiber than chickens, inasmuch as 20% ground peanut hulls in the ration gave best results (cf. preceding abstr.). C. R. Fellers 9

The vitamin A-suppressing factor in soybeans. S. M. Hauge, J. H. Hilton and J. W. Wilbur. *Purdue (Ind.) Agr. Expt. Sta., Rept. of the Director* 1937, 8–9, 40; cf. *C. A.* 31, 5466[9].—Soybeans contain a factor which interferes with the transference of vitamin A potency (carotene) of the ration to the milk fat secreted by the cows. The factor is present in the oil and is adsorbed by activated C (Nuchar). The vitamin A content of the butter was affected most. There was little or no effect on the carotene content of the butter. Extn. of soybeans with hexane, Et_2O or acetone did not remove the suppressing factor. C. R. Fellers 10

The composition of optimal and marginal diets. A. L. Bacharach and J. C. Drummond. *Chemistry & Industry* 1940, 37–40. G. G. 11

Comparative activity of vitamin H, curative of egg-white injury, administered orally and parenterally to rats. Paul György and Catharine S. Rose. *Proc. Soc. Exptl. Biol. Med.* 43, 73–4(1940).—The factor or vitamin (cf. *C. A.* 34, 480[7]) is 3–5 times more effective when given parenterally. L. E. Gilson 12

Negative effect of synthetic vitamin B_6 hydrochloride in nutritional deficiency in man. Robert Kark, Eugene L. Lozner and Arnold P. Meiklejohn. *Proc. Soc. Exptl. Biol. Med.* 43, 97–9(1940).—Report of 6 cases. L. E. Gilson 13

Identity of natural and synthetic crystalline vitamin B_6. E. J. Reedman, W. L. Sampson and K. Unna. *Proc. Soc. Exptl. Biol. Med.* 43, 112–15(1940); cf. *C. A.* 34, 477[8].—Rat curative and prophylactic tests show that natural and synthetic B_6 are identical in their physiol. action. A single dose of 50 γ cures severe symptoms of B_6 deficiency in 70–80% of the test rats within 14 days. Ten γ per rat per day insures normal growth. L. E. Gilson 14

Toxicity of vitamin B_6. Klaus Unna and Wm. Antopol. *Proc. Soc. Exptl. Biol. Med.* 43, 116–18(1940).—The toxicity for rats, dogs and monkeys is very low. The median subcutaneous lethal dose for rats was 3.1 g./kg. for the free base and 3.7 g./kg. for the hydrochloride. Death was preceded by tonic convulsions lasting 36–72 hrs. Dogs given 20 mg./kg. daily by mouth for 75 days were not injured in any way. L. E. Gilson 15

Antidermatitic effect of vitamin B_6 analogs. Klaus

Unna. *Proc. Soc. Exptl. Biol. Med.* **43**, 122–4(1940).— Ten derivs. were studied. The di- and triacetates of B_6 were as potent as B_6, on an equimol. basis. Probably they are hydrolyzed after absorption. Methylation or ethylation of one of the hydroxymethyl groups diminished the vitamin activity considerably but less than the methylation of the phenolic OH. Replacement of one or more hydroxymethyl groups by Me or NH_2 groups destroyed the vitamin activity. L. E. Gilson

Isolation, determination and synthesis of vitamin B_6 and vitamin K. C. R. Addinall. *Merck Rept.* **48**, No. 3, 8–11; No. 4, 16–20(1939).—Brief reviews. S. W. G.

Agranulocytosis and vitamin C. H. Kalk. *Deut. med. Wochschr.* **65**, 1624–9(1939).—Injection of ascorbic acid gave dramatic therapeutic effects in 6 patients suffering from agranulocytosis. This therapy was ineffective in the leucemias. Arthur Grollman

Hypovitaminosis B_1 and cardiopathies. III. The aggravating action of vitamin B_1 deficiency on the cardiac disturbances of hyperthyroidism and diabetics and on ordinary cardiopathies. Georges Bickel. *Arch. maladies coeur vaisseaux* **32**, 869–78(1939); cf. *C. A.* **34**, 1058[3].—A review with 31 references. Marion Horn

Pine disease in sheep. H. H. Corner. *Agr. Progress* **16**, 181–7(1939).—Administration of 1 mg. Co as $CoCl_2$ per day for 14 days was sufficient to maintain sheep in a healthy state for 6 months on land where the pine disease was prevalent. A similar quantity was effective as a cure. In practice, administration of Co to affected sheep resulted in a recovery rate of 97.6%. A mineral mixt. contg. sterilized steamed bone flour 1 cwt., NaCl 1 cwt. and $CoCl_2$ 1 oz. gives satisfactory results. K. D. Jacob

Milk corrects calcium deficiency. Charles F. Nelson. *Milk Plant Monthly* **28**, No. 11, 35 6(1939).—Clinical studies indicate that nearly 70% of human diets are deficient in Ca. Many diets are also low in P_2O_5. Milk corrects these deficiencies in the diet and reduces diseases due to them. A. H. Johnson

The effect of hot alcohol on purified animal proteins. Robert L. Harris and H. A. Matill. *J. Biol. Chem.* **132**, 477–85(1940); cf. *C. A.* **29**, 6929[2].—A lowered nutritive value of heat- or alcohol-treated proteins may be caused primarily by the formation of new enzyme-resistant configurations involving essential amino acids. The amt. of free amino N in liver and kidney globulins is decreased 50% by hot alc. extn., possibly because of the formation of new anhydride linkages involving the ε-amino group of lysine and available OH groups since there was no loss in total N. Both liver and kidney globulins lose much of their S as H_2S. Liver globulin II showed a marked decrease in digestibility by pancreatin *in vitro* and was the only protein fraction to show this effect. The proteins of the liver and kidney were fractionated according to the method of Luck (*C. A.* **30**, 8256[9]). A. P. Lothrop

Diphtherial intoxication and vitamin C content of the suprarenals of guinea pigs. Calvin C. Torrance. *J. Biol. Chem.* **132**, 575–84(1940); cf. *C. A.* **32**, 219[9]; **33**, 8284[3].—No significant differences were found between the vitamin C content of the suprarenal glands of guinea pigs injected with a sublethal dose of diphtheria toxin and that of the control animals. After injection of a small dose of toxin the ascorbic acid content of the suprarenals of both the control and exptl. animals on the same diet increased steadily for 8 days. In another expt. with a different group of animals a significant decrease in the vitamin C content of the suprarenals occurred 48 hrs. after the injection of the same dose of toxin. This dose, while not customarily fatal to animals weighing from 230 to 280 g., apparently caused the death of 2 of the 17 animals because of a seasonal increase in susceptibility. Amts. of toxin which are usually fatal were assocd. with significant decreases in the ascorbic acid content of the suprarenals. With those which are always fatal, the changes were even more marked. It appears, therefore, that the smallest amt. of toxin which will affect the vitamin C content of the suprarenal glands is the least dose which will prove fatal to some of the test animals and that this dose varies with the susceptibility. The problem of demonstrating beyond question that diphtheria toxin and vitamin C do not combine in the tissues is an extremely difficult one, but in these expts. no evidence of a direct combination was obtained. The burden of proof must rest with those who hold otherwise, since no evidence of such a combination *in vitro* has been obtained. A. P. Lothrop

Choline metabolism. II. The interrelationship of choline, cystine and methionine in the occurrence and prevention of hemorrhagic degeneration in young rats. Wendell H. Griffith and Nelson J. Wade. *J. Biol. Chem.* **132**, 627–37(1940); cf. *C. A.* **34**, 499[2].—The characteristic signs of hemorrhagic degeneration in rats produced by a low-choline basal diet are all intensified by the addn. of cystine and prevented by the addn. of methionine to the diet. It appears, therefore, that these 2 amino acids are concerned with this new dietary deficiency and that their amts. in proteins in part det. the requirement of the young rat for choline. The injurious effect of cystine is prevented by relatively small amts. of choline and this fact may be of importance in explaining many reports in the literature of the damaging action of cystine and of various proteins on the kidneys. **III. The effect of cystine, fat and cholesterol on hemorrhagic degeneration in young rats.** W. H. Griffith. *Ibid.* 639–44.—Supplements of cystine, fat or cholesterol increase the severity of the hemorrhagic degeneration occurring in young rats on a low-choline, low-fat and low-cholesterol diet. These toxic effects are prevented by choline. The results suggest that hemorrhagic degeneration is a manifestation of the same deficiency which results in fatty and cholesterol livers in older rats on a low-choline diet. However, the effect of choline deficiency in young rats is not limited to a relatively noninjurious deposition of liver lipides, but the kidney, particularly, undergoes an extremely rapid and acute hemorrhagic degeneration which may result in death within 10 days. It has not yet been detd. whether this new aspect of choline deficiency is another phase of abnormal lipide metabolism or whether a new role of choline in the body is involved. A. P. Lothrop

Vitamins and their analysis. P. Karrer. *Mitt. Lebensm. Hyg.* **30**, 131–47(1939).—A review. W. J. P.

The liver and carbohydrate metabolism. Samuel Soskin. *Endocrinology* **26**, 297–308(1940).—Carbohydrate metabolism represents a dynamic balance between blood-sugar formation in the liver and its utilization by the body tissues. Any disturbance in carbohydrate metabolism is likely to affect both sides of the equil., whether directly or by secondary compensatory changes. All problems concerned with carbohydrate metabolism must therefore be considered from both aspects. Felix Saunders

The adrenal cortex and carbohydrate metabolism. C. N. H. Long, B. Katzin and Edith G. Fry. *Endocrinology* **26**, 309–44(1940).—Adrenalectomized mice and rats maintained on Na salts retain practically normal carbohydrate levels when fed, but on fasting the levels decline more rapidly than in normal animals. Fasted adrenalectomized animals also excrete less urine N. The administration of cortical ext. or active cryst. adrenal steroids to either fasted normal or adrenalectomized mice and rats is followed by large increases in liver glycogen and slight hyperglucemia. The muscle glycogen is not affected. At the same time there occur increases in N excretion of sufficient magnitude to suggest that the increased protein catabolism is the source of this newly formed carbohydrate. In fed animals very large quantities of glycogen accumulate in the liver and under these circumstances the muscle glycogen may also increase. When the disposition of a known quantity of absorbed glucose is followed in rats it is found that the administration of cortical ext. apparently decreases the proportion of glucose oxidized while there is an increased proportion deposited as liver glycogen. In partially pancreatectomized rats adrenalectomy with subsequent maintenance on Na salts decreases glucose excretion and administration of cortical ext., corticosterone, etc., by mouth either exacerbates the glucosuria of animals with intact adrenals or causes its reappearance in adrenalectomized animals maintained on Na salts. Desoxycorticosterone has only a feeble effect. Not only is

the general condition of fasted hypophysectomized rats greatly improved by the injection of cortical ext., but also the liver glycogen and blood glucose of these animals are increased to supernormal levels. The urine N excretion is also increased. Cortical ext. is "diabetogenic" in fasted hypophysectomized-depancreatized rats in the sense that it increases the blood glucose and urine N. Expts. on the "diabetogenic" effect of anterior pituitary ext. in adrenalectomized-depancreatized animals indicate that not all this activity is mediated by the adrenal cortex, but rather that a synergism exists between the 2 hormones. It is suggested that 1 of the properties of the cortical hormone is a stimulation of protein catabolism, and that the increased carbohydrate levels, N and K excretion following its injection into animals is an expression of this effect.
Felix Saunders

The pituitary gland and carbohydrate metabolism. F. G. Young. *Endocrinology* **26**, 345–51(1940).—A review.
Felix Saunders

The V-factor content and oxygen consumption of tissues of the normal and blacktongue dog. Henry I. Kohn, James R. Klein and Wm. J. Dann. *Biochem. J.* **33**, 1432–42(1939).—The concn. of coenzyme-like substances (V-factor) was detd. in the brain, heart, striated muscle, liver, kidney, pancreas and blood of dogs (*a*) with acute blacktongue due to nicotinic acid (I) deficiency, (*b*) in normal health immediately after cure of blacktongue with small doses of I and (*c*) in normal health after receiving large amts. of I. The O consumption of brain, liver, kidney and striated muscle was studied *in vitro*. The concn. of V-factor was 70% lower in the liver and 35% lower in the muscle of the dogs in group (*a*) compared to these tissues from dogs in group (*c*). In dogs in group (*b*), the liver and muscle were 45% and 25% lower, resp. No differences were found in the other tissues examd. The decrease in coenzyme content of the liver was accompanied by an increase of 35% in the O consumption; in kidney the coenzyme content was unchanged, but ability to oxidize lactate was decreased by 50%. In blacktongue the percentage of coenzyme in the reduced form was increased in most tissues except brain and kidney. No evidence was found to indicate that blacktongue results from a generalized decrease of coenzyme level in the tissues.
E. W. Scott

The metabolism of pyruvic acid in normal and vitamin B_1-deficient states. IV. The accumulation of pyruvic acid and other carbonyl compounds in beriberi and the effect of vitamin B_1. B. S. Platt and G. D. Lu. *Biochem. J.* **33**, 1525–36(1939); cf. *C. A.* **33**, 8727[3].—The results of a comparative study of the bisulfite-binding substances and pyruvic acid in the blood, milk and urine, of normal and vitamin B_1-deficient human subjects were given. The pyruvate level in normal human blood was of the order of 0.5 mg./100 g. Maintained raised levels of blood pyruvate seemed to be specifically assocd. with vitamin B_1 deficiency. In the rapidly developing fulminatory types of beriberi the initial level of blood pyruvate was a definite indication of the degree of the deficiency.* Several hrs. were required for the removal of accumulated pyruvate after administration of vitamin B_1; about 5 mg. was necessary to restore the pyruvate to normal. **V. The effect of exercise on blood pyruvate in vitamin B_1 deficiency in man.** G. D. Lu and B. S. Platt. *Ibid.* 1538–43.—In subjects deficient in vitamin B_1 exercise caused an increase in the blood pyruvate. Values as high as those found in fulminating beriberi were sometimes obtained after heavy exercise. Even after light work, the pyruvate level was maintained for 30 min. In normal subjects there was no appreciable increase unless the subject was exhausted and then the return to normal was attained in less than an hr. **VI. The fate of injected pyruvate in the normal rabbit.** G. D. Lu and D. M. Needham. *Ibid.* 1544-8.—Estns. of carbohydrate changes in the blood of normal rabbits immediately after the injection of pyruvate indicated that the injection caused a sudden increase of nonglucose-reducing substance and also lactate which later gave rise to glucose. Only 2–3% was found in the muscles 8 min. after the injection of pyruvate. There was little or no change in the muscle lactate or glucose. When small amts. of pyruvate were injected, there were no changes in the phosphate partition in the blood or muscles. Lactic acid was formed *in vitro* by incubating blood with pyruvic acid if hexose diphosphate and adenylic acid were present. This suggests that pyruvate removal *in vivo* may be closely bound with this important energy-yielding oxidation-reduction.
E. W. Scott

Diffusion of radioactive sodium into the muscles of potassium-deprived rats. Leon A. Heppel. *Am. J. Physiol.* **128**, 449–54(1940); cf. *C. A.* **33**, 8728[7].—The penetration of Na into the muscles of K-deprived rats was studied by means of the radioactive isotope of Na. Both the extracellular and intracellular fractions of the muscle Na exchanged readily with the Na in the plasma. The membranes of the muscle cells were apparently permeable to Na. In K-deprived rats a decrease was found in the content of K in spleen, kidney and heart, but the changes were small compared to the loss incurred by skeletal muscle.
E. D. Walter

The relation of diet to the restitution of the gonadotropic hormone content of the discharged rabbit pituitary. Maurice H. Friedman and Gertrude S. Friedman. *Am. J. Physiol.* **128**, 493–9(1940); cf. *C. A.* **33**, 5475[1].—The rabbit pituitary is more responsive to seasonal influences than to changes in dietary protein. It appears that the protein requirements for the formation of the gonadotropic hormone can be fully met by nitrogenous products derived from the tissues of the rabbit even during the stress of serious N deficit.
E. D. Walter

The water content of various organs of the albino rat on a high-carbohydrate and a high-fat diet. John Haldi and Glenville Giddings. *Am. J. Physiol.* **128**, 537–43 (1940).—The effect of prolonged feeding of a high-carbohydrate and a high-fat diet on the H_2O content of the organs of the albino rat was detd. on both nonexercising and exercising animals. No sex difference was found in the percentage of H_2O in the various organs except in the case of the kidneys on both diets in the nonexercise series and on the fat diet in the exercise series. Exercise had no effect on the hydration of the organs. Neither diet had any effect on the hydration of the heart, lungs, gonads and pituitary. Both diets had a dehydrating effect on the brain, spleen and adrenals. The carbohydrate diet produced a slight increase in the H_2O content of the muscle, whereas the fat diet had a dehydrating effect on the liver, kidneys, thymus and thyroid. Ketosis played no part in the results of these expts. as the urinary excretion was within the normal range.
E. D. Walter

The relation of the anterior pituitary and the adrenal cortex in the metabolism of carbohydrate. Jane A. Russell. *Am. J. Physiol.* **128**, 552–61(1940); cf. *C. A.* **33**, 7860[4].
E. D. Walter

Rat bradycardia. D. G. H. MacDonald and E. W. McHenry. *Am. J. Physiol.* **128**, 608–14(1940).—From the effect of injections of various B vitamins to deficient rats, of daily injections of various B vitamins to paired-fed rats and from the equal effects of thiamine and yeast on paired and *ad lib.* diets it is apparent that thiamine alone of the members of the vitamin B complex studied is effective in reducing rat bradycardia. That bradycardia is not solely the result of inanition was shown in paired feeding expts.; animals receiving thiamine had a rate considerably above those of the basal group. The quantity of food consumed was shown to be a factor in causing bradycardia. Bradycardia is not relieved by administration of thiamine unless food is also given. A sparing action of dietary fat on thiamine requirement for the prevention of bradycardia has been shown.
E. D. Walter

Spectacled eye condition in rats. J. J. Oleson, C. A. Elvehjem and E. B. Hart. *Proc. Soc. Exptl. Biol. Med.* **43**, 161–4(1940); cf. *C. A.* **33**, 2564[7]; **34**, 477[6], 491[5].—Corn-germ oil healed the spectacled eye condition. α-Tocopherol did not, fuller's earth filtrate of liver ext. did, though slowly. The factor concerned is not identical with any of the common vitamins, pantothenic acid, factor W, or the factor which prevents nutritional achromotrichia.
L. E. Gilson

Optical activity of vitamin C (Jirgensons) 10. Effect of refining on digestibility [and vitamin content] of edible oils and fats (Menezes, Banerjee) 27.

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F—PHYSIOLOGY

HOMER W. SMITH

The action of estrogens in inducing mitoses in the muscle, connective tissue and epithelium of the prostate and seminal vesicle of mice as determined by the colchicine technique. Richard Tislowitz. *Anat. Record* **75**, 265–73(1939).—Diethylstilbestrol produces changes in the prostate and seminal vesicle similar to those induced by estrogens with the steroid structure. P. D. Adams

Biological activity of methyldihydrotestosterone, a synthetic male-sex hormone. III. Effect on castrated young male rats, with special reference to the histological structure of the hypophysis. Saburo Ugami. *Bull. Inst. Phys. Chem. Research* (Tokyo) **17**, 853–7(1938); cf. *C. A.* **32**, 7976⁹.—The effect is described of different daily doses of the hormone on the wt. of the seminal vesicles, prostate, penis, hypophysis, adrenals, thymus, kidneys and heart, and on the structure of the hypophysis. In general it counteracts the effect of castration. **IV. Effect on normal young male rats, with special reference to the effect on the testis.** Saburo Ugami and Syuhei Susuki. *Ibid.* 858–63.—The effect of different daily doses on the wt. of the testicles, epididymis, hypophysis, seminal vesicles and adrenals is described. In the first two cases large doses have less effect than smaller ones. B. C. P. A.

Advances in the domain of experimental physiology. E. Schütz. *Jahreskurse ärtzl. Fortbild.* **30**, No. 9, 1–14 (1939).—A brief review of recent work on heat regulation and brain physiology and the important role of CO_2 is included. Ruth Berggren

Bilirubin and urobilin content of bile obtained by duodenal drainage. Normal values and values for patients with cholecystitis. M. Royer. *Arch. Internal Med.* **64**, 445–56(1939).—Bilirubin and urobilin concns. are greater in bladder bile than liver bile, but the concn. of urobilin is not so increased as bilirubin; this is due to the fact that the former is absorbed by the walls of the gall bladder. In cholecystitis production of urobilin has been observed in the gall bladder in nearly half the cases. J. B. Brown

Basal secretion of digestive enzymes in old age. Jacob Meyer, E. Spier and F. Neuwelt. *Arch. Internal Med.* **65**, 171–7(1940).—Salivary amylase is decidedly reduced in old age, whereas pancreatic amylase is only slightly lowered. In the very old the latter may approach the values found in the young. Lipase is unchanged with age. The proteolytic enzymes, trypsin and pepsin, are lowered with age. J. B. Brown

Iron transportation and metabolism. III. The normal fluctuations of serum and "easily split off" blood iron in individual subjects. Carl V. Moore, Virginia Minnich and Jo Welch. *J. Clin. Investigation* **18**, 543–52(1939); cf. *C. A.* **31**, 7956⁷·⁹.—The conditions affecting the color intensity and stability of ferric thiocyanate in isoamyl alc. were studied. The color was const. for an hr. in a dark room; it was unchanged in intensity and quality in 2–4 *N* acid; it was directly proportional to the amt. of Fe present in ranges from 0.05 to 1.0 mg. % serum Fe. Variations within the daily cycle and over a 6-mo. period were 0.01 to 0.065 mg. %. Liver and Fe medication had no effect on the serum-Fe level. "Easily split off" Fe varied in normal subjects as much as 1.48 mg. %; it is probably not concerned with Fe transport. **IV. Observations on the absorption of iron from the gastrointestinal tract.** Carl V. Moore, Wm. R. Arrowsmith, Jo Welch and Virginia Minnich. *Ibid.* 553–80.—Absorption of Fe from the gastrointestinal tract was studied by following the increase of serum Fe. This increase is a relative measure of the rate of Fe absorption, although it does not represent the entire absorption, since Fe is being continually withdrawn from the serum. With rise in serum Fe there is a small concurrent rise in lymph Fe. The rate of absorption (height of serum-Fe curve) is directly proportional to the dose up to the point of intestinal irritation. Water-sol., highly ionized ferrous salts were about equally absorbed in patients with either normal or achlorhydric gastric juices. Ease of ionization seems to be the detg. factor under these conditions. Fe seems to be absorbed primarily as ferrous Fe. Ferric Fe is absorbed in proportion to the degree to which it is reduced in the intestine or by virtue of simultaneously ingested reducing agents such as vitamin C. Differences of gastric acidity are relatively unimportant because of the high acidity of the Fe salts themselves. Insol. ferrous and ferric phosphates caused no increase in serum Fe. The height or character of the serum-Fe curve was not affected by bile pigment, chlorophyll, secondary anemia fraction and gastric mucin. On the basis of this work and that reported in the literature a picture of Fe absorption is presented. J. B. Brown

Species specificity of the gonadotropic factors in vertebrates. Charles W. Creaser and Aubrey Gorbman. *Quart. Rev. Biol.* **14**, 311–31(1939).—As a result of expts. on the leopard frog with various gonadotropic materials and a review of the literature it is concluded that a qual. species variation exists in gonadotropic hormones. J. B. Brown

The water balance in marine mammals. E. S. Fetcher, Jr. *Quart. Rev. Biol.* **14**, 451–9(1939).—A review. The blood f. p. depression of marine mammals is about 0.69°. Whole blood Na, Ca and Cl are somewhat higher than in land mammals. Urine total salt concns. are 16–82 g./l. Urea concns. are normal. Marine mammals living on invertebrates probably have a special mechanism for reduction of urinary salt concn. J. B. Brown

The effect of obstetrical anesthesia upon the oxygenation of maternal and fetal blood with particular reference to cyclopropane. Clement A. Smith. *Surg. Gynecol. Obstet.* **69**, 584–93(1939).—The O content of the arterial and venous blood of women in labor was detd., also of 3 groups of mothers and their infants at the time of birth. Fetal blood at the time of birth showed wide variations in O content, but as a rule there tended to be an anoxemia even on the arterial side. Ether anesthesia elevated the O of the maternal blood. Nitrous oxide produced anoxemia in both maternal and fetal bloods. Cyclopropane definitely raised the maternal and fetal O, but the latter was lower than with ether. Cyclopropane was present in maternal and fetal bloods in about equal amts. J. B. Brown

The action of some androgenic substances on the immature female rat and guinea pig. J. R. Groome. *Quart. J. Exptl. Physiol.* **29**, 367–77(1939).—Six immature female rats injected with 500 γ testosterone proprionate daily for 8 days showed on the 9th day an abnormal increase in body wt. not due to fat deposits, abnormal presence of graafian follicles and in 4 cases of corpora lutea in the ovary, hypertrophy of the uterus, of the preputial glands and of the clitoris-like organ, mucification of the vaginal epithelium and no mammary development with one exception. Solid testosterone implantations, of which 15 mg. were absorbed in 30 days by 2 oöphorectomized immature guinea pigs, were assocd. with an increase in body wt. without fat deposits, and with hypertrophy of the uterus and clitoris and the formation of horny styles on the latter. A successful testicular graft was made in one guinea pig which received 200 rat units of gonadotropic hormone in 10 days. After 30 days there was uterine hypertrophy but no increase in body wt. or in the length of the clitoris. Rachel Brown

Secretion and "formation" of adrenaline in isolated adrenal glands. V. O. Osinskaya. *Méd. exptl.* (Ukraine) **1939**, No. 4, 24–31.—Expts. were performed on 50 pairs of isolated adrenal beef glands, one of the pairs always serving as a control. The total adrenaline content of the left gland was usually greater than that of the right gland, though the concn. per g. of tissue was approx. the same in both glands. Perfusion of the isolated gland with

Ringer-Locke soln. led to an increase in the total adrenaline content of the gland as compared with the corresponding nonperfused gland. Acidification of the Ringer-Locke soln. with AcOH or HCl to a pH of 4.5 had no effect on the total adrenaline content but increased markedly the rate of extn. of adrenaline by the perfusate. Alk. Ringer-Locke soln. (pH of 9.0–10.0) produced some increase in the rate of extn. and in the total adrenaline content of the perfused gland. S. A. Corson 1

Glycogen content, reducing substances and intensity of glycogenolysis in different organs. O. V. Fastyuchenko. *Méd. exptl.* (Ukraine) **1939**, No. 4, 32–7.—Glycogen (Simonovich and Kochnevaya modification of Pflüger's method) and reducing substances (Urbach's modification of Hagedorn-Jensen's method) were detd. in the tissues of the pancreas, thyroid, adrenal, kidney, spleen, salivary glands and lungs. True sugar (Raymond and Blanco modification (cf. *C. A.* **23**, 173) of Somogyi's method) was detd. in the pancreas. The marked decrease in the glycogen content of the isolated tissues (kept for 30 min.–2 hrs. at 18, 22 and 37°) was not accompanied by any significant increase in reducing substances. This is explained by lactic acid formation. True sugar in the pancreas amounts to 50–70% of the total reducing substances. S. A. Corson 2

Quantitative chemical study of the urinary excretion of thiamine by normal individuals. Daniel Melnick, Henry Field, Jr., and Wm. D. Robinson. *J. Nutrition* **18**, 593–610(1939); cf. *C. A.* **33**, 2162[6], 8636[3].—The reaction between thiamine and diazotized *p*-aminoacetophenone in alk. soln. was used for the chem. detn. of thiamine in urine. There is a diurnal variation in the amt. excreted due to an appreciable lag in excretion following meals. The av. 24-hr. urinary thiamine values of 15 men and 9 women were 198 and 93 γ, resp.; 14% of the oral dose of 5 mg. of extra vitamin were excreted by the men during the first 24-hr. period following ingestion and 12% by the women. The percentage of the available vitamin, which is excreted in the urine, is a function of how great an excess is present. Standards are given for the interpretation of the urinary thiamine values in the diagnosis of thiamine deficiency. 24 references. C. R. Fellers 4 5

The chemistry of egg formation. R. M. Conrad. *Kansas Agr. Expt. Sta., 9th Biennial Rept.* **1938**, 96; cf. *C. A.* **32**, 3803[5]; **33**, 7861[1].—A summary of investigations at the Kan. Agr. Expt. Sta. C. R. Fellers 6

Hydrogen-ion concentration of the fluid content of the alimentary canal of the horse. J. H. Whitlock, E. E. Leasure, C. H. Kitselman, C. C. Morrill and W. W. Thompson. *Kansas Agr. Expt. Sta., 9th Biennial Rept.* **1938**, 111.—A quinhydrone pH indicator was used to det. the H-ion concn. of fluid samples from the alimentary canal of the horse. The detns. were made within 14 min. after the death of the horse. The values are as follows: stomach 0–7.63; duodenum 6.48–8.04; jejunum 6.87–7.97; ileum 7.35–7.89; cecum 6.02–7.79; large colon 6.15–8.00; rectum 5.39–7.13. C. R. Fellers 7

Metallic elements and blood formation. M. O. Schultze. *Physiol. Rev.* **20**, 37–68(1940).—A review discussing the formation of red blood cells and hemoglobin, synthesis of hemoglobin and component parts, methods for studying the relationship of metals to blood formation, the relation of Fe, Co, Cu, Ge, Mn, Zn and V to blood formation. 427 references. H. R. Getz 8

Functions of the carotid and aortic bodies. C. F. Schmidt and J. H. Comroe, Jr. *Physiol. Rev.* **20**, 115–58(1940).—The article reviews and discusses the anatomy and physiology including the part played by chemoreceptor activity in respiratory control, special features of chemoreceptor reflexes to circulation, and offers an explanation of chemoreceptor activity. 89 references. H. R. Getz 9

Reaction of the hypophysis to arterial hypertension of central origin. Gonadotropic hormones. Adalbert van Bogaert and F. van Baarle. *Compt. rend. soc. biol.* **132**, 335–40(1939).—In dogs exptl. hypertension of central origin sometimes causes the appearance of hypophyseal gonadotropic hormone in the spinal fluid. No folliculin appears in the urine. L. E. Gilson

Variations in plasma potassium after bleeding and transfusion. J. L. Moglia. *Compt. rend. soc. biol.* **132**, 513–14(1939).—See *C. A.* **33**, 8741[3]. L. E. Gilson

Adrenalectomy and the cyclic vaginal response to estrone. G. Di Paola. *Compt. rend. soc. biol.* **132**, 517–18(1939).—See *C. A.* **33**, 8741[4]. L. E. Gilson

Effect of adrenocorticotropic hormone in four-day-old rats. Henry D. Moon. *Proc. Soc. Exptl. Biol. Med.* **43**, 42–4(1940).—Rats 4 days old are a more sensitive test animal for the hormone than rats 21–23 days old. L. E. Gilson

Effect of adrenocorticotropic hormone on the thymus of rats. Robert H. Crede and Henry D. Moon. *Proc. Soc. Exptl. Biol. Med.* **43**, 44–6(1940); cf. *C. A.* **32**, 5460[4].—Pituitary adrenocorticotropic hormone caused acute thymic atrophy in normal rats 21–23 days old but not in adrenalectomized rats. Castration did not prevent this thymic atrophy, hypophysectomy decreased it a little. L. E. Gilson 3

Response of thyroidectomized rats to adrenocorticotropic hormone. Henry D. Moon and Wayne Hansen. *Proc. Soc. Exptl. Biol. Med.* **43**, 46–8(1940).—The adrenal hypertrophy of both normal and thyroidectomized male rats 22 days old was directly proportional to the amt. of the hormone injected. Feeding desiccated thyroid to the normal rats did not modify the effect. L. E. Gilson

Vaginal cycle of Microtus guentheri and its response to estrogenic and gonadotropic hormones. Bernhard Zondek and Felix Sulman. *Proc. Soc. Exptl. Biol. Med.* **43**, 86–8(1940).—In *Microtus guentheri*, of the Muridae, a crop-destroying rodent of Palestine, no vaginal cycle with a cornification stage occurs as in white mice and rats, but injections of very large doses of estrogenic hormone induce cornification. Gonadotropic hormone from pregnancy urine has no effect, that from mare serum induces follicle maturation without luteinization, and that from animal hypophysis produces both follicle maturation and corpus luteum formation, hence the animal may be used to test gonadotropic hormones and det. their origin. L. E. Gilson

Conversion of *S*-benzylglutathione to benzylmercapturic acid in the rat. Jacob A. Stekol. *Proc. Soc. Exptl. Biol. Med.* **43**, 108–10(1940); cf. *C. A.* **33**, 4300[8].—The prepn. of *S*-benzylglutathione is described. When 0.5 g. was fed to a rat *N*-acetyl-*S*-benzyl-*l*-cysteine was found in the urine. This shows that the peptide was hydrolyzed and the *S*-benzylcysteine then acetylated. L. E. Gilson

Diminution of the acetylcholine content of the retina after prolonged functional disuse. Hsi-Chun Chang, Wei-Ming Hsieh, Lao-Ying Lee and Tsung-Han Li. *Proc. Soc. Exptl. Biol. Med.* **43**, 140(1940).—In dogs, keeping the lids of one eye sewn shut for 170 days decreased the acetylcholine of the retina to less than half the normal content. The eyes were not otherwise affected. L. E. Gilson

Attempt to modify growth, development and tumor incidence in mice with thymus extracts. George van S. Smith and E. Elizabeth Jones. *Proc. Soc. Exptl. Biol. Med.* **43**, 157–60(1940).—Repeated injections of calf thymus ext. had no effect on growth or development of albino mice. A marked lowering of fertility occurred in the 2nd and 3rd generations. This resulted in survival of too few females to tumor-susceptible age to permit any conclusions as to effect on incidence of spontaneous tumors. Injections of *p*-thiocresol continued for 5 generations had no effect on the fertility, growth or development of the same strain of mice, or on the incidence of spontaneous tumors or growth of inoculated tumors. L. E. Gilson

Hormonal inhibition of lactation. R. P. Reece, J. W. Bartlett, I. L. Hathaway and H. P. Davis. *Proc. Soc. Exptl. Biol. Med.* **43**, 183–6(1940); cf. *C. A.* **33**, 7862[9].—The effectiveness of pituitary estrogens in inhibiting lactation in the rat can be increased by simultaneous administration of gonadotropic principle from human pregnancy

urine. Many cells in mitoses are seen in the mammary parenchyma of rats so treated. L. E. Gilson

New problems in the physiology of work. IV. Carbon monoxide. O. Ehrismann. *Deut. med. Wochschr.* **65**, 1522–5(1939).—A review with 21 references. A. G.

Chemical determinations of certain constituents of blood of nonlactating Red Scindi cows. Arcadio C. Gonzaga. *Philippine J. Animal Ind.* **6**, 253–6(1939).—Examn. of blood from 15 cows gave values for constituents per 100 cc. blood as follows: blood sugar 39.43, total nonprotein N 20.43, urea N 10.51, serum Ca 9.93, inorg. phosphate 6.72, chlorides as NaCl 485.67 and Fe 42.05 mg.; hemoglobin 12.55 g. and O_2 16.82 cc. J. O. Hardesty

The present status of the blood-coagulation problem. Harry Eagle. *Symposium on the Blood and Blood-Forming Organs, Univ. Wisconsin* **1939**, 242–64. E. H.

The presence of vasoconstrictor substances in the blood of dogs rendered hypertensive by section of the vasomotor nerves. Henri Hermann, F. Jourdan and A. Delrieu. *Arch. maladies coeur vaisseaux* **32**, 545–55, 631(1939).—Marked and lasting hypertension is produced in dogs by section of the vasomotor innervation of the aorta and carotid sinus. This effect is not abolished by removal of the adrenal glands, and hence is not dependent on production of adrenaline by these glands. Sympathin is believed to be the substance responsible for the hypertension. Marion Horn

The oxidase reaction of normal and tumor tissues. E. E. Faerber. *S. African J. Med. Sci.* **4**, No. 1–2, 1–6 (1939).—A preliminary expt. indicated that ether, unlike some other narcotics, does not paralyze the cellular dehydrogenase. The brain gray matter, the heart and the skeletal muscle of the mouse give strongly pos. oxidase reactions. The brain white matter, the nerve and the spleen give either neg. or feebly pos. oxidase reactions. The reaction of the spleen may account for certain peculiar respiratory phenomena. A rapidly growing mouse sarcoma gave a neg. or very slightly pos. oxidase reaction. Fourteen references are given. W. R. Henn

Studies on the erythrocytes, hemoglobin and iron content of the blood of normal subjects at the altitude of the Witwatersrand (6000 feet). P. H. Symons. *S. African J. Med. Sci.* **4**, No. 1–2, 18–30(1939).—The subjects of the investigation were healthy adult lab. workers and medical students acclimated by a min. residence of several months at this altitude. The results of the Haldane carboxyhemoglobin method agreed closely with those of the Fe-detn. method for hemoglobin as modified by S. The following mean values are suggested as being normal for the altitude of Witwatersrand for adult males and females, resp.: hemoglobin (in percentage on Haldane scale) 106.9 and 102.0, erythrocytes (in millions per cu. mm.) 6.02 and 5.44 and color index 0.89 and 0.94. A comparison of the results of this investigation shows that from an increase of the altitude of nearly 6000 feet (1) the hemoglobin content is not significantly altered, (2) the erythrocyte count is significantly increased, and (3) the color index is significantly decreased. The results of cell vol. detns. show that the erythrocytes present no marked tendency toward microcystosis; they are apparently normocytic and slightly hypochromic. The mean erythrocyte count of normal adult females at an altitude of 6000 feet is approx. 0.6 million less than that of normal adult males at the same altitude. Nineteen references are given. W. R. Henn

The correlation of physicochemical properties of serum with its effect on the growth of tissues in vitro. II. The effect of diluting serum on its buffering power. W. S. S. Ladell. *S. African J. Med. Sci.* 4, No. 3, 61–76(1939); cf. *C. A.* **34**, 1720[7].—Different concns. of horse serum in Tyrode soln. were titrated with CO_2 in an app. designed for this purpose, the pH being measured by means of the quinhydrone electrode. The expts. were controlled by blank titrations and by titrating in the same way as the mixts. a soln. of $NaHCO_3$ contg. base equiv. to that in blood. The results obtained for undild. serum and the $NaHCO_3$ were found to agree with those obtained by other investigators on the acid-base equil. in blood. The effect of dilg. serum with saline gives results similar to those recorded for decreasing alkali reserve of the plasma, and the buffering power of serum is much decreased on diln. The prolonged exposure to air of various serum-saline mixts. caused the undild. serum to become more alk., while the highly dild. mixts. became more acid. In the former there is a loss of CO_2, while in the latter CO_2 is absorbed in spite of its low tension in atm. air (due to the salts of the alk. earths in the Tyrode). The poor growth of tissues *in vitro* (noted in low and high concns. of serum, resp.) might be explained in part by the poor buffering power of the mixt. acting in conjunction with the growth-inhibiting factor (in the first instance) and by good buffering power at a pH too alk. for optimal growth (in the 2nd instance). The good growth at medium concns. of the serum is attributed to the relatively good buffering power of the mixt. near the optimal pH and to the fact that such a soln. is apparently able to absorb CO_2 at very low tension; these counteract the growth-inhibiting factors in the serum. Four graphs, 2 tables and 18 references are given. W. R. Henn

Sheep-sterility investigations. W. M. Webster. *New Zealand Dept. Sci. Ind. Research, Ann. Rept.* **13**, 45–6 (1939).—Acid samples of seminal fluid were fertile with few exceptions and, within certain limits, the fertility increased with increasing acidity. No samples having pH values greater than 7.0 were fertile when tested by artificial insemination. With semen showing initial pH values of 6.5–7.5, storage for 0.5 hr. under oil at atm. temp. caused the pH to decrease to 5.5–6.0. The change was most rapid on warm days, but slowed up considerably after the 1st 0.5 hr. When the semen showed initial pH values of 7.5–8.0 a relatively slight decrease in pH occurred during the 1st 0.5 hr. of storage under oil. The seminal plasma has a high content of glucose and the acid drift is assocd. with oxidation of the glucose to lactic acid. The extent of the drift depends on the no. of spermatozoa in the semen and their activity. K. D. Jacob

The effect of picric and flavianic acids on the potency of the follicle-stimulating anterior pituitary hormone. H. Jensen and Sibylle Tolksdorf. *J. Biol. Chem.* **132**, 519–26(1940).—The effect of picric and flavianic acids on the potency of hypophyseal follicle-stimulating prepns. has been studied and the claim of Fevold (*C. A.* **33**, 3857[5]) that this hormone is reversibly inactivated by these acids could not be substantiated. The apparent reactivation which Fevold observed is interpreted as being due to the addn. of tannic acid which causes the hormone to manifest itself more markedly and not to removal of the picric or flavianic acids. Although there is undoubtedly a chem. difference between the follicle-stimulating and the luteinizing hormones of the pituitary, it cannot be based on a difference in reaction with picric, picrolonic or flavianic acids. A. P. Lothrop

The formation of creatine from glycocyamine in the liver. Henry Borsook and Jacob W. Dubnoff. *J. Biol. Chem.* **132**, 559–74(1940); cf. *C. A.* **34**, 2012[8]. —Liver slices of the cat, rabbit and rat convert glycocyamine into creatine, the increase being 5–20 times the amt. originally present in the slices. When methionine is present in Ringer soln., the amt. of creatine formed by rat liver was on the av. about 50% greater than in its absence. No other substance among 34 compds. tested, including amino acids, methylated amines and betaine, effected this methylation in rat liver. It seems reasonable to conclude that rat liver slices transfer the Me group of methionine to glycocyamine, thus converting it into creatine. A. P. Lothrop

Relative amount of hepatic glycogen deposited by glucose, glycine and *dl*-alanine. Eaton M. MacKay, Arne N. Wick and Herbert O. Carne. *J. Biol. Chem.* **132**, 613–17(1940).—When equiv. amts. of glucose, glycine and *dl*-alanine are fed to rats, the amt. of glycogen deposited in the livers is approx. the same, the max. hepatic glycogen concns. being 2.00, 2.36 and 1.96%, resp. The rate of glycogen deposition, on the other hand, is very different, the peak of glycogen formation occurring in 6, 10 and 14 hrs., after feeding glucose, *dl*-

alanine and glycine, resp. These findings cannot be interpreted on the basis of differences in the rate of absorption from the intestine. It is easy to see from these data the reason for diverse conclusions reached in regard to the glycogen-forming efficiency of compds. when observations are made at a single point. A. P. Lothrop

Water and electrolyte content of normal and hydronephrotic kidneys. Lillian Eichelberger and Walter G. Bibler. *J. Biol. Chem.* **132**, 645–56(1940); cf. *C. A.* **33**, 2189.—The mean values for the total water and electrolyte concns. in kidneys from normal dogs were: total water 802.2 ± 5.0 g.; chloride 67.7 ± 5.3; Na 82.6 ± 5.8; K 58.3 ± 4.0; Ca 2.16 ± 0.53; Mg 5.7 ± 0.5 millimols. per kg. of fat-free tissue. The values for water, fat, Na and Cl were always more for the roughly dissected medulla than for the cortex, indicating the necessity of analyzing whole kidneys since the distribution of water and electrolytes differs so distinctly in the medulla and cortex and since the 2 zones are distributed in different ratios in different portions of the kidney so that an exact dissection cannot be made. In hydronephrotic kidneys there was a significant increase in total water content but no change in Na, K or Mg concns. There was a decrease in Cl and an increase in Ca which, however, were of doubtful statistical significance. A. P. Lothrop

Studies in histochemistry. XV. The histological distribution of cholinesterase in the adrenal gland. Wm. Antopol and David Glick. *J. Biol. Chem.* **132**, 669–73(1940); cf. *C. A.* **31**, 43663.—The cortical region of the adrenal gland possesses little cholinesterase activity, but the medulla is relatively potent. Pig, beef and rabbit adrenals were examd. and no species differences were found. No variations were observed in the enzyme activities of the cell types in the cortex. A. P. Lothrop

Comparative studies on creatine, phosphorus and potassium in various tissues. Victor C. Myers and Geo. H. Mangun. *J. Biol. Chem.* **132**, 701–9(1940); cf. *C. A.* **7**, 1221.—The correlation between creatine and total acid-sol. P is approx. the same in brain and in widely differing muscles from the rabbit, dog and human being. Change in creatine concn. is assocd. with a variation in K in the approx. ratio of 1 mole of creatine to 2 moles of K, thus supporting the hypothesis that phosphocreatine is present in the form of the di-K salt. A. P. Lothrop

The utilization of acetone bodies. III. The influence of adrenalectomy. Norton Nelson, Isabelle Grayman and I. Arthur Mirsky. *J. Biol. Chem.* **132**, 711–15(1940); cf. *C. A.* **33**, 1466.—The general decrease in metabolic activity consequent to adrenalectomy is likely responsible for the marked reduction in the rate of acetone body utilization which was observed. It is probable that a similar reduction in the rate of their formation also occurs in spite of the fact that the adrenals *per se* are not essential for this process. A. P. Lothrop

The relation of the follicle-stimulating activity of fresh pituitary tissue to the action of the enzymes contained in the tissue. W. H. McShan and Roland K. Meyer. *J. Biol. Chem.* **132**, 783–4(1940); cf. *C. A.* **33**, 7121.—The proteolytic enzyme (probably cathepsin) of fresh pituitary tissue inactivates the luteinizing hormone without the destruction of the follicle-stimulating activity. Impurities can be removed from the clear centrifuged water ext. of the pituitaries by pptn. with Me_2CO, and the follicle-stimulating material which remains in the Me_2CO soln. can be recovered assocd. with relatively little solid matter. It may be possible to use this inexpensive and simple procedure in the prepn. of follicle-stimulating material of low solid content for the study of the chemistry of this hormone. A. P. Lothrop

The composition of unsaponifiable lipides. Heinrich Waelsch and Warren M. Sperry. *J. Biol. Chem.* **132**, 787–8(1940).—The D content of the unsaponifiable lipides isolated from the carcass (less brain, liver and intestinal tract) of rats in which the body water had been enriched with D for 4–7 days was surprisingly high, exceeding in most rats that found in brain, liver or intestine. They were sepd. into cholesterol, alcohol, keto and hydrocarbon fractions. The findings emphasized are (1) the proximity of D concns. in the cholesterol, keto and hydrocarbon fractions, suggesting a close metabolic relation among them and (2) the high D content of the alc. fraction which contained approx. twice as much D as the other unsaponifiable fractions and more, with few exceptions, than any fat acid fraction isolated from any tissue during this work. The latter finding suggests that the compds. comprising the alc. fraction are intermediates in the synthesis of fat acids. An alternate interpretation would be that they are formed in the dismutation of aldehydes (plasmal) *in vivo* or *in vitro* during alk. hydrolysis. The investigation of the unsaponifiable fraction with D as an indicator is being continued with particular attention to the possible role of aldehydes in its genesis and in the synthesis of fat acids. A. P. Lothrop

Inhibition of isohemoagglutination of blood plasma. Kitiro Kurokawa. *Tohoku J. Exptl. Med.* **36**, 523–41 (1939).—Blood anticoagulants like Na citrate and NaF exert no influence on the isohemoagglutination in the amts. usually employed. Dextrose used for the purpose of diln. or handling the erythrocytes of the serum causes a lowering of the agglutination titer $^2/_3$ that of a NaCl soln. The amt. of cholesterol, lecithin or euglobulin in the erythrocytes or in the serum has no correlation with the agglutination titer, but the titer of different group sera toward the same erythrocytes runs parallel with the lipoid content, but not in a strict math. sense. B. Prescott

The influence of intravenous oxygen injections on respiration and the intermediary carbohydrate metabolism by breathing oxygen-poor or carbon dioxide-saturated air. Tetusaburo Isikawa. *Tohoku J. Exptl. Med.* **36**, 542–60 (1939).—Dogs were injected intravenously with O, 0.3 cc. per kg.; 3 injections were given with a 15-min. interval between each injection. The blood CO_2 showed no changes but the O consumption showed a decrease. Lactic acid showed a tendency to decrease slightly with the blood sugar unaffected. When a gaseous mixt. with a 10% reduction in O is inhaled, there is an increase in respiration, a decrease in blood CO_2, a decrease in O consumption, and an increase in blood lactic acid and blood sugar. If under these conditions O injections are given, the blood CO_2 decreases, O consumption decreases, blood lactic acid increases and blood sugar decreases. Breathing a gaseous mixt. which has 12.2–15.4% CO_2 caused an increase and larger respiratory movements as well as an increase in the pulse rate. O consumption increased in small amts. with a decrease in lactic acid and a slight increase in blood sugar. Benjamin Prescott

Changes in blood albumin and osmotic pressure of its colloids on rapidly alternating diminution and restoration of atmospheric pressure. Tetusaburo Isikawa. *Tohoku J. Exptl. Med.* **36**, 561–82(1939).—Diminishing the atm. pressure and then raising it causes an increase in serum albumin, with a rise in hemoglobin (Hb) concn. The increase in both blood components is not due solely to a blood concn., since the colloidal osmotic pressure changes are not the only conditions to be dealt with, because in using higher pressure the serum albumin increases much faster than the Hb concn. Repeating the decompression and pressure reduction 3 times in dogs shows the following picture in the arterial blood: The Hb and serum albumin show slight increases. There appears to be a tendency toward a decrease. The decrease in albumin is larger than the Hb concn. The assumption is that under these conditions the capillaries become permeable to the proteins in the blood, especially the osmoactive albumin fraction, whereas on the other hand the mobilization of the albumin fraction from the protein depot organs takes place more intensively as the diminished pressure becomes increased. Benjamin Prescott

Peroxidase reaction. CXX. Arakawa's reaction and vitamin C content of human milk. 4. Is the amount of vitamin C in Arakawa-positive milk not sufficient for a growing infant? Siroku Isono. *Tohoku J. Exptl. Med.* **37**, 33–44(1939); cf. *C. A.* **34**, 20092.—The more intense the negativity of Arakawa's reaction of human milk, the greater is the content of vitamin C (-like substance) in general. Human milk pos. to Arakawa's

reaction seems to furnish a sufficient amt. of vitamin C for a growing baby clinically. An infant fed on human milk with a low titration value by the 2,6-dichlorophenolindophenol method is free from scurvy. If the vitamin C-like substance in Arakawa-neg. milk is vitamin C itself, then that milk contains more than a necessary amt. of vitamin C. Benjamin Prescott

Peroxidase reaction. CXXI. Blood platelet count of sucklings according to Arakawa reactions of their mothers. Masayuki Sindo. *Tohoku J. Exptl. Med.* **37**, 45–61 (1939).—Infants of mothers whose milk gave a neg. Arakawa reaction showed increased blood platelet count (435,000 thrombocytes per cu. mm.), of those with an intermediate reaction a count of 384,000 and of those mothers with a normal Arakawa-pos. reaction a count of 301,000. A slight anemia occurred in the Arakawa-neg. group while all others were normal. Vitamin B prepns. given to infants or mothers moderately increased the blood platelet count in the Arakawa-neg. group. Infants and mothers not given vitamin B prepns. showed normal platelet counts in the Arakawa-pos. group, but an increase in those with an intermediate reaction and a maximal av. count of 458,000 in the neg. group. A close relation exists between blood platelet counts of infants and the Arakawa reactions of their mothers. M. M. R.

Peroxidase reaction. CXXII. Arakawa's reaction and content of methylglyoxal-like substance of human milk. Siu Sato. *Tohoku J. Exptl. Med.* **37**, 62–77(1939).—The methylglyoxal-like substance of human milk is poor in Arakawa-pos. milk and rich in Arakawa-neg. milk. Avitaminotic diseases of all kinds, namely beriberi, infantile preberiberi, B-avitaminotic dyspepsia, rickets, anemia and hereditary syphilis had a large amt. of the methylglyoxal-like substance in the mother's milk, but grippe and dyspepsia (except avitaminotic dyspepsia) had a relatively small amt. One case of pertussis had a large amt. of the substance in the mother's milk. Seasonal variations were observed in this study. B. Prescott

Changes in the intermediate carbohydrate metabolism and serum albumin in respiration at increased atmospheric pressure. Tetusaburo Isikawa. *Tohoku J. Exptl. Med.* **37**, 1–32(1939).—Rabbits were exposed to pressures of 60, 85 and 130 lb. in a pressure chamber and variations in lactic acid, sugar, hemoglobin, albumin and colloid-osmotic pressure of the blood noted immediately after the pressure was removed. Lactic acid, hemoglobin content, albumin and colloid-osmotic pressure diminished. Blood sugar increased, the increase being greater with greater pressure and duration of the stay in the chamber. Maurice M. Rath

Effect of sodium bicarbonate upon oxygen consumption of the rabbit retina in vitro. Norio Oyama. *Tohoku J. Exptl. Med.* **37**, 78–87(1939).—As detd. by Warburg's method (cf. *C. A.* **18**, 2036), within a pH range 6.88–7.88 the O consumption of rabbit retina in Ringer soln. at 38° increased with increasing alky. Within the range in $NaHCO_3$ concn. $1.2 \times 10^{-3} - 3.4 \times 10^{-2}$ *M*, O consumption increased with increasing concn. The changes in O consumption were closely related to the H-ion concn. and buffering capacity of the medium. $NaHCO_3$ is an excellent agent to maintain O consumption of the retina const. for long periods of time. The $NaHCO_3$ concn. and the atm. of soln. in the respiratory vessel play an important role. With 1 cc. of the $NaHCO_3$-Ringer soln. (3.4×10^{-2} mols.) respiration remained const., but with lower concns., the medium became gradually acid and finally a temporary decrease in respiration occurred. M. M. R.

Chemistry of the human skin. IV. The electrokinetic effect of various ions on suspended particles of stratum corneum. Vernon A. Wilkerson. *J. Gen. Physiol.* **23**, 165–70(1939); cf. *C. A.* **33**, 7866⁸.—The electrokinetic p. d. of skin particles in salt solns. is ultimately decreased if sufficient salt is added. The inhibitory effect of cations decreases in the order: Al, Ca, Ba, K, Na. Alkali halides with common neg. ions affect the electrokinetic p. d. in the order: Li > Na > K > Rb; the same order is given by such inert interfaces as cellulose and glass. Similar salts with common pos. ions give the series: Cl > I > Br, whereas passive surfaces give the order: I > Br > Cl. Evidently skin selectively absorbs Cl; this theory coincides with the known high Cl concn. of skin (Lepore and McCoord, *C. A.* **27**, 2198). The greatest rate of flow under the force of an elec. current would be given by concns. of neutral salts of 0.0001 *M* to 0.0002 *M*. C. H. Richardson

Oral use of pregneninonol in functional menometrorrhagia. E. C. Hamblen, N. B. Powell, W. Kenneth Cuyler and C. J. Pattee. *Endocrinology* **26**, 201–7(1940).—Oral therapy (estradiol followed by estriol glucuronide and pregneninonol) was given cyclicly to 7 young women with functional meno-metrorrhagia. Patients tolerated well the oral administration of as much as 160 mg. of pregneninonol daily for 14 days each month for several months. Bleeding of cyclic character and normal amt. occurred during treatment. There was an increase in pro-gestational response. The therapy produced no significant alterations in the urinary titers of Na pregnanediol glucuronide and androgens. Felix Saunders

Inhibition of lactation post partum with testosterone propionate. Jacob S. Beilly and Samuel Solomon. *Endocrinology* **26**, 236–40(1940).—The therapeutic rationale of testosterone propionate in inhibition of lactation post partum is discussed. Felix Saunders

Mode of action of testosterone propionate on the female genital tract. John W. Huffman and Louis H. Bos. *Endocrinology* **26**, 259–63(1940).—Testosterone propionate inhibits functional uterine bleeding and menstruation. Pregnant mare serum ext. produces the same responses in the rabbit ovary either before or after prolonged administration of testosterone propionate. The inhibition by testosterone propionate of cyclic changes in the female genital tract is not due to a direct action on the ovary but rather to pituitary inhibition. Felix Saunders

Obesity in the rat following the injection of chromic acid into the hypophysis. Albert W. Hetherington. *Endocrinology* **26**, 264–8(1940).—Chromic acid was injected into the hypophyses of rats *via* a parapharyngeal approach. Only 3 of 51 animals operated showed any resultant adiposity. Analysis showed that these animals contained up to 50% more fat than their litter-mate controls. All were somewhat dwarfed. Histological examn. revealed extensive damage to the hypothalami and hypophyses of the fat rats. In neg. cases hypothalamic injury was slight or absent, although hypophyseal injury was often severe. No obese cases with intact hypophyses were discovered. Felix Saunders

Androgenic action of desoxycorticosterone. Charles W. Hooker and Vincent J. Collins. *Endocrinology* **26**, 269–72(1940).—Daily injections of 2 mg. of desoxycorticosterone acetate into capons for 5 days resulted in an av. increase of slightly more than 3 mm. in the length plus height of the combs. Daily injections of 1 mg. into castrated rats maintained the wt. of the prostate and seminal vesicles but did not prevent castration changes in the histology of these organs. Administration of 0.5 and 0.25 mg. to mice gave results essentially similar to those obtained with rats. The androgenic activity of the compd. is approx. $^1/_{30}$ as great as that of androsterone. The compd. resembles androsterone more than testosterone in being relatively more active upon the comb than upon the rodent accessories. Felix Saunders

Experiments on the biological properties of stilbestrol and stilbestryl dipropionate. C. H. Mellish, A. J. Baer and A. C. Macias. *Endocrinology* **26**, 273–9(1940).—Stilbestrol and stilbestryl dipropionate are at least as effective as an equal wt. of estrone in producing growth and development of the immature rabbit uterus and sensitizing it to progesterone. Neither deriv. showed progestin-like action when administered to immature female rabbits in doses of 1.0 and 4.0 mg., resp., over a period of 10 days. Subcutaneous implants of 10 mg. of both compds. were made in 30-day-old rats. The animals were autopsied at 56–8 days of age. Stilbestrol inhibited body growth in both sexes. In males the dipropionate showed a more effective inhibition of body growth and a more prolonged action than did stilbestrol. Both compds.

inhibited the growth of gonads of both sexes. Stilbestrol markedly reduced the gonadotropic potency of the anterior pituitary of the female but showed relatively little inhibitory action on the male hypophysis. Stilbestryl dipropionate reduced the gonad-stimulating power of the male pituitary. Chorionic gonadotropin increased the ovarian wt. of rats previously treated with stilbestrol. The wt. increment was equal to that produced by human pregnancy urine ext. in untreated animals of the same age but less than that resulting from its administration to immature animals. The derivs. increase the wt. of the pituitary but do not change the wt. of the adrenals. Felix Saunders

Influence of estriol, estradiol and progesterone on the secretion of gonadotropic hormones in parabiotic rats. Clyde Biddulph, Roland K. Meyer and Laurence G. Gumbreck. *Endocrinology* **26**, 280–4(1940).—In 31–41-day-old female-female pairs 0.025 γ of estradiol, 1.5 γ of estriol and 1 mg. of progesterone per day are required to prevent the hypersecretion of gonadotropic hormone that occurs after castration of the female rat. In female-male pairs 0.15 γ of estradiol and 10 γ of estriol per day are necessary to prevent hypersecretion in the male. The order of effectiveness of the estrogens in preventing castration hypersecretion, i. e., estradiol > estrone > estriol, is the same as the order of their effectiveness in producing vaginal cornification. Felix Saunders

Glycogen breakdown and synthesis in animal tissues. Carl F. Cori. *Endocrinology* **26**, 285–96(1940).—A discussion of the enzymes concerned with the breakdown and synthesis of glycogen and their interaction with various hormones. Felix Saunders

Characteristics for the transport of oxygen by the blood of mink and marten. Walter J. Scott, Laurence Irving and Virginia Safford. *J. Cellular Comp. Physiol.* **14**, 281–6(1939).—Oxygen dissocn. curves for the blood of mink (*Mustela vison*) and marten (*Martes americana*) resemble the curves for the blood of other mammals. At pCO_2 40 mm., the pressure for half satn. of the hemoglobin is 37 for mink, 38 for marten blood. The O capacity of mink blood is 23.9 cc. per 100 cc. of blood; for marten blood it is 24.3 cc. Felix Saunders

Effect of hypertonic and hypotonic solutions on the respiration of chicken erythrocytes. F. R. Hunter. *J. Cellular Comp. Physiol.* **14**, 412–14(1939).—The rate of O consumption of chicken erythrocytes placed in a hypertonic environment is irreversibly decreased. Hypotonic environments have little or no effect until a large part of the cells are hemolyzed. Felix Saunders

Urinary output of creatine and creatinine associated with physical exercise, and its relation to carbohydrate metabolism. W. Hobson. *Biochem. J.* **33**, 1425–31(1939).—The excretion of creatine and creatinine in 97 male students resident in a physical-training college was studied. The subjects showed a higher creatinine-N coeff. than the accepted "normal" value. Although creatinuria is usually not found in adult males, it occurred in 96 of the subjects, the range for 24 hrs. excretion being 92 to 1200 mg. with a mean of 637. No correlation was detected between increasing physical fitness and the magnitude of the creatine or creatinine excretion. Subjects placed on a low-carbohydrate diet showed a disclination to undertake muscular work and fatigue ensued more rapidly than usual. Under these conditions creatinuria diminished or disappeared. E. W. Scott

Diffusing factors. III. Juan Madinaveitia. *Biochem. J.* **33**, 1470–7(1939); cf. *C. A.* **33**, 6934[3].—Crude rattlesnake venom contained a diffusing factor similar to that obtained from testes, accompanied by another factor which caused a slow spread of indicators through the skin. Cryst. crotoxin contained only the second factor. Although the crude venom and filtrates from *Cl. welchii* have proteolytic activity, it is unlikely that this is assocd. with the diffusing factor, since testicular exts. have no such activity. The diffusing factors from testicle and *Cl. welchii* were strongly adsorbed by alumina Cγ from which they were eluted with Na_2CO_3 or Na_2HPO_4. The similar behavior of the factors from these sources suggested that they were the same or closely related proteins. E. W. Scott

Acetylcholine metabolism in the central nervous system. P. J. G. Mann, M. Tennenbaum and J. H. Quastel. *Biochem. J.* **33**, 1506–18(1939); cf. *C. A.* **33**, 8271[4].—Glucose (I) at low concns. (below 20 mg./100 g.) brought about the synthesis of acetylcholine (II) in intact brain slices (rat). Fructose and galactose had only slight effects in the synthesis, but mannose had an activity near that of I. The failure of Stedman and Stedman (*C. A.* **33**, 8271[1]) to confirm this effect of I was shown to be due to limitations of their technique. Preformed "bound" II was found in brain tissue freshly obtained from the rat and the suggestion that it did not exist (S. and S.) was based on insufficient evidence. The effect of ether (III) in enhancing formation of II in minced brain tissue at 37° in the absence of an aq. medium was confirmed. III was highly inhibitory to formation of II in brain tissue in phosphate- or bicarbonate-Locke medium. In brain suspensions in aq. solns. both III and $CHCl_3$ rapidly broke down "bound" into free II. The effects of III on brain tissue, in the absence of an aq. medium, closely resembled the accelerating action of K ions on the formation of II in brain slices. The explanation which was suggested for the effect of K ions was also postulated for the effect of III. E. W. Scott

Do the potassium ions inside the muscle cells and blood corpuscles exchange with those present in the plasma? L. A. Hahn, G. Ch. Hevesy and O. H. Rebbe. *Biochem. J.* **33**, 1549–58(1939).—Labelled K as $K^{42}Cl$ was administered to rabbits and frogs and its penetration into the corpuscles, muscles and other organs investigated. After 1 day, corpuscles contained about 60% as much K^{42} as the same wt. of plasma. The amt. was about 30 times less than that predicted on a basis of equipartition of K^{42} between the K ions of the corpuscles and those of the plasma. The bulk of the K ions present in the corpuscles of a fully grown rabbit were therefore not replaced in the lifetime of the corpuscles. The gastrocnemius of frogs contained after 1 hr. 1.25 times and after 24 hrs. 1.35 times as much K^{42} as does the same amt. of plasma at the same time. Its labelled K content was thus about 10 times larger than would be expected on the assumption that all the K^{42} taken up by the muscles is present in the extracellular space. The amt. of K^{42} found was 20 times less than expected if an exchangeability of all the K present in the muscle cells is assumed. A similar result was obtained with rabbits. The K^{42} content of the skeleton was about double that expected if all the K^{42} is confined to the extracellular space. When labelled Na was injected about 50% of the Na of the corpuscles was replaced with Na^{24} within 1 day. Gastrocnemius tissue contained 8.5% of the Na^{24} content of the same wt. of plasma. The same figure for other tissues was much higher. The extracellular space of the total rabbit was calcd. to be 28% of the body wt. E. W. Scott

Blood-serum changes in the dog during recovery from exercise on the treadmill. Minerva Morse and F. W. Schlutz. *Am. J. Physiol.* **128**, 417–24(1940).—Serum lactate often continues to rise and bicarbonate to fall for some min. after exercise, but the fall in bicarbonate after exercise exceeds the rise in lactate. Inorg. phosphate and K fall markedly for some time after exercise but usually return to the initial level within 2 hrs. Serum chloride often continues to rise for at least 10 min. after exercise and remains above the initial level 2 hrs., but the concn. of serum protein, with few exceptions, falls rapidly below the initial level after exercise and fails to return. E. D. Walter

The effects of formalin on the hormones of human pregnancy urine. Leo Loeb and S. J. Hayward. *Am. J. Physiol.* **128**, 425–32(1940); cf. *C. A.* **33**, 9415[3].—Formalin inhibits the luteinizing effects of human pregnancy urine and if used in stronger concn. it destroys the follicular maturation effects. The action of formalin on both these hormones differs merely in a quant. manner. Different pregnancy urines differ in the concn. of formalin

needed to accomplish these effects. This is probably due to differences in the concns. of these hormones in pregnancy urine. It is possible to preserve for a long time pregnancy urine modified by formalin in such a way that it produces mainly maturation and estrogenic effects in the ovary of the guinea pig. Formalin acts in an identical manner on the hormones of cattle pituitary glands and of pregnancy urine. E. D. Walter

Effect of age and diet on electrolyte changes in rat muscle during stimulation. Leon A. Heppel. *Am. J. Physiol.* **128**, 440–8(1940).—The loss of K on stimulation of rat muscles is progressively greater as the duration of contraction is increased. After 30 min. there is no further change. The changes in chloride and water are almost maximal after 5 min. of stimulation. After 1 hr. the changes are very much reduced in magnitude. Young rats of about 6 weeks of age are able to lose more K from their muscles on stimulation than adult rats. Feeding diets low in K and poisoning with monoiodoacetic acid have little or no effect on the K changes during stimulation. E. D. Walter

The metabolism of rabbit bone marrow in serum. Charles O. Warren, Jr. *Am. J. Physiol.* **128**, 455–62 (1940).—A comparison between the metabolism of slices of rabbit bone marrow suspended in serum and in Ringer solns. E. D. Walter

The relation of renin to the adrenal gland. Ben Friedman, Eugene Somkin and Enid T. Oppenheimer. *Am. J. Physiol.* **128**, 481–7(1940).—The concn. of renin in the kidneys of cats was not reduced by adrenalectomy. After adrenalectomy in dogs there was a gradual diminution in response to renin. This was restored in part by substitution of adrenal cortical hormone. The results lend support to the hypothesis that renin is intimately concerned in the mechanism of the hypertension due to renal injuries. E. D. Walter

Evidence of pituitary involvement in the experimental control of water diuresis. Hans O. Haterius. *Am. J. Physiol.* **128**, 506–13(1940). E. D. Walter

The effect of heat on the gonadotropic pituitary antagonist. H. Jensen, Sibylle Tolksdorf and J. F. Grattan. *Am. J. Physiol.* **128**, 532–6(1940); cf. *C. A.* **33**, 6931⁹.—Various gonadotropic prepns. from sheep pituitary were subjected to heat-treatment and their gonadotropic responses studied in normal and hypophysectomized immature female rats. The follicle-stimulating hormone apparently is less stable against heating than the interstitial-cell-stimulating hormone fraction. The multiple physiol. properties of the latter fraction are destroyed by heating at approx. the same rate. E. D. Walter

The utilization of parenterally administered horse serum by the rat. T. Addis, D. D. Lee, W. Lew and L. J. Poo. *Am. J. Physiol.* **128**, 544–6(1940).—Horse serum proteins injected into the peritoneal cavity of the rat are utilized in the maintenance of the proteins of the organs and tissues of the body. E. D. Walter

Radioactive iodine as an indicator in thyroid physiology. S. Hertz, A. Roberts, J. H. Means and R. D. Evans. *Am. J. Physiol.* **128**, 568–76(1940).—By use of radioactive I as an indicator, the quantity of I taken up by the thyroid of the rabbit under various circumstances was studied. After intravenous injections, the percentage collection from any given dose reached a max. within 10 min. The normal thyroid collected up to 80 times the quantity to be expected from uniform diffusion into the general body tissues. The hyperplastic thyroid collected up to several hundred times the quantity expected from uniform diffusion. The strength of samples of radioactive I was detd., with which it will be possible to administer internal irradiation of the thyroid for therapeutic purposes. E. D. W.

The relationship between the adrenal and parathyroid glands. Charles M. Blumenfeld and Fred W. Clausen. *Am. J. Physiol.* **128**, 577–82(1940).—Changes in serum-Ca level and parathyroid vol. after adrenalectomy were studied in male albino rats 10 weeks old. The data show that adrenalectomy did not lead to hyperactivity of the parathyroids; that either there is no functional relationship or that adrenalectomy led to hypoactivity of the parathyroids, possibly because of the effect on Na metabolism. E. D. Walter

The amount of ascorbic acid excreted at each urination during twenty-four-hour periods. Jessie E. Richardson and Helen L. Mayfield. *Am. J. Physiol.* **128**, 583–7 (1940).—Two women, engaged in similar occupations, served as expt. subjects. The vol. of urine and the amt. of ascorbic acid excreted at each urination varied widely throughout the 24-hr. period. There is no correlation between the vol. of each urination and its ascorbic acid content. A wide variation is noted in the values obtained for the 6-hr. period from 7 a. m. to 1 p. m. The use of this period for detg. "resting level" is questioned. E. D. Walter

Secretion of urine in the chicken (Gallus domesticus). Harold R. Hester, Hiram E. Essex and Frank C. Mann. *Am. J. Physiol.* **128**, 592–602(1940). E. D. Walter

Absorption of chloride against concentration gradients from small intestines of rats and of rabbits. Nathan Lifson. *Am. J. Physiol.* **128**, 603–7(1940).—Chloride is absorbed against a concn. gradient from a soln. contg. approx. one-half isotonic NaCl and one-half isotonic Na_2SO_4 placed in the small intestines of albino rats and of rabbits. Blood-gut chloride concn. ratios reached are much lower than those reported for dogs under comparable conditions. E. D. Walter

Metabolism of some methylated dicarboxylic acids of low molecular weight. Rolf Emmrich. *Z. physiol. Chem.* **261**, 61–70(1939). Dogs were fed Me-substituted dicarboxylic acids and the urines analyzed. After the acid indicated the first figure gives the dose in g. per day, the second the total dose in g. and the third the percentage excreted unchanged: β-methyladipic acid, 0.49, 16, 62; *dl*-α-methylsuccinic acid (I), 0.62, 20, 44; mesaconic acid (II), 0.41, 20, 64; citraconic acid, 0.62, 20, 44; itaconic acid, 0.63, 20, 24. I also gave 1.2% of II in the urine. Milton Levy

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Lucas, Miriam S.: Elements of Human Physiology. Philadelphia: Lea & Febiger. 400 pp. $4.50.

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G—PATHOLOGY

Acid-fast granules of different tumor tissues. II. Malignant tissues. Y. Hamazaki. *Gann* **32**, 214–17 (1938).—The acid-fast granules are rare in young rapidly growing tumors, but common in older cells. The purine content of tumors is higher than that of the parent tissues. B. C. P. A.

Serological relations between the lecithinase A of pancreas and that of animal poisons. V. Bronchi. *Sperimentale* **92**, 349–60(1938).—The lecithinase of mammalian pancreas, as well as that of bee venom, injected into rabbits or horses, acts as an antigen, in the same way as the lecithinase of snake venom. A serum immunized against any of the 3 lecithinases inactivates the other 2 *in vitro* to a considerable extent; this indicates a close chem. relation between the 3. B. C. P. A.

The sensitivity of the skin to bee venom in allergic diseases. Clinical testing of the dynamics of the course of allergic reactions. Erich Traub. *Acta Paediat.* **27**, 177–208(1939)(in German).—Bee venom is not an ordinary irritant. Because of its content of histamine and other decompn. products, as tryptophan and peptoses, bee venom is intimately connected with the chemistry of antigen-antibody reaction. Ruth Berggren

Second series of researches on the chemism of the marrow fluid obtained by sternal puncture: the marrow sugar in anemia. R. Benda and J. Nicolas. *Bull. mém. soc. méd. hôp. Paris* **55**, 1229–36(1939); cf. *C. A.* **33**, 5479¹,².—In all the anemia patients studied the marrow sugar tended, in general, to be higher than the blood sugar. The differences between the 2 values were usually

most evident in the 2nd, 3rd or 4th fractions of the marrow fluid, i. e., in the 6th, 10th or 12th cc. taken for analysis. The sugar content of different fractions of the marrow fluid obtained by successive aspirations also showed more or less marked differences. In anemia this tendency to a high marrow glucose was often accompanied by a lowering of the blood sugar toward the lower physiol. limits or even below these limits. The above findings were most distinct in the 5 cases of Biermer's anemia. The marrow glucose was normal in 3 patients in whom the cell count did not fall below 3,000,000. This was not true in Biermer's anemia, where the cell count often fluctuated during treatment. But with this reservation it appeared that with less than 3,000,000 red cells and regardless of the type of anemia the magnitude of the high marrow glucose was independent of the degree of anemia. The role of the variations in the red cell count was difficult to est. since (1) a lowering appeared in itself capable of affecting the marrow glucose and (2) the increase in the cell count did not prevent the appearance of modifications in the sugar content. The tendency to a high marrow glucose in anemia or chlorosis was apparently not related to the predominance of any of the elements ordinarily composing the medullogram (erythroblasts, myelocytes, eosinophiles, etc.). Moreover, it was evidently not affected by treatment. These observations do not permit a physicochem. classification of the anemias based on the ideas of "active" high marrow glucose and low marrow Fe. R. Berggren

Purpura hemorrhagica due to ingestion of sedormid (allylisopropylacetylcarbamide). Ernest H. Falconer and Irwin C. Schumacher. *Arch. Internal Med.* **65**, 122–37(1940).—Neither oral (nor parenteral) administration of vitamin C diminished the intensity of the purpuric lesions and hemorrhagic manifestations in purpura hemorrhagica. J. B. Brown

Allergy. Francis M. Rackemann. *Arch. Internal Med.* **65**, 185–212(1940).—A review of the literature of 1939. J. B. Brown

The magnesium content of the erythrocytes in pernicious and some other anemias. Ole Bang and Søren L. Ørskov. *J. Clin. Investigation* **18**, 497–500(1939).—In anemia from various causes there is often, but not always, an increased Mg content of the red cells, an indication of a preponderance of young cells. In pernicious anemia high Mg values are found during relapse, and they decrease during remission. These findings support the view that a short lifetime of the red cells, with a concomitantly increased rate of destruction, is a decisive factor in the development of the anemia. J. B. Brown

Clinical studies on the blood volume. VII. Changes in blood volume in Bright's disease with or without edema, renal insufficiency, or congestive heart failure, and in hypertension. Alfred W. Harris and John G. Gibson, 2nd. *J. Clin. Investigation* **18**, 527–36(1939); cf. *C. A.* **32**, 7941[1].—In Bright's disease blood vol. tends to vary directly with the serum albumin concn. and blood nonprotein N concn. and indirectly with the degree of anemia. Hypoproteinemia diminishes in the edematous stage. Anemia, if present, augments the plasma vol. The plasma vol. tends to increase during diuresis, especially the albumin fraction of the serum protein. J. B. B.

Inability to demonstrate a platelet-reducing substance in an acetone extract of the spleen from patients with idiopathic thrombocytopenic purpura. Frederick J. Pohle and Ovid O. Meyer. *J. Clin. Investigation* **18**, 537–41 (1939).—An acetone ext. of the spleen of patients with chronic idiopathic thrombocytopenic purpura does not contain a substance capable of reducing the no. of blood platelets in rabbits. J. B. Brown

The blood-V factor (coenzyme) level in normal and pathological subjects. Henry I. Kohn, Frederick Bernheim and Anton V. Felsovanyi. *J. Clin. Investigation* **18**, 585–91(1939).—The V-factor (coenzymes one and two, plus possible unknown related substances) was detd. in a large group of normal subjects and hospital patients. Activity was expressed in d. e. (gamma of coenzyme one per cc. of corpuscles). Eighty-one % of the normal and 65% of the pathol. cases fell in the range 50–80 d. e. Diabetic patients showed low values and patients with pulmonary disease high. J. B. Brown

Ultrafiltrable magnesium in hyperthyroidism. Louis J. Soffer, D. Alfred Dantes, Edward B. Grossman, Harry Sobotka and Mildred D. Jacobs. *J. Clin. Investigation* **18**, 597–601(1939).—Total serum and ultrafiltrate Mg were detd. in a group of normal and pathol. patients. Normal bound Mg varied from 3.1 to 22.1%. Normal values were found in neurocirculatory asthenia and various types of muscular dystrophy; high values occurred in hyperthyroidism, with a decrease after lugolization. In 2 patients with myxedema there was no bound Mg. J. B. Brown

The coagulation defect in hemophilia: the clot-promoting activity in hemophilia of Berkefelded normal human plasma free from fibrinogen and prothrombin. Eugene L. Lozner, Robert Kark and F. H. L. Taylor. *J. Clin. Investigation* **18**, 603–8(1939).—Methods for the removal of prothrombin and both prothrombin and fibrinogen from plasma are described. When either one or both are so removed, the residual plasma is still capable of reducing the coagulation time of hemophilic blood *in vitro*, and in patients with hemophilia. J. B. Brown

The occurrence of abnormal dark adaptation and its relation to vitamin A metabolism in patients with cirrhosis of the liver. Arthur J. Patek, Jr., and Charles Haig. *J. Clin. Investigation* **18**, 609–16(1939).—Abnormal dark adaptation, observed in 19 of 24 patients with cirrhosis of the liver, persists on a diet rich in vitamin A and is explained as an alteration in the metabolism of vitamin A in such patients. J. B. Brown

Influence of an acetaldehyde derivative and diformaldehyde peroxide on anaphylactic shock in guinea pigs. J. Maisin and Yu Han Tang. *Compt. rend. soc. biol.* **132**, 313–15(1939); cf. *C. A.* **32**, 6321[4]; **33**, 650[9].—AcH was dehydrated with concd. H_2SO_4 and a product obtained which in extremely small doses (1–3 injections of 2 cc. of a $1/10^{18}$ soln.) desensitized for several months guinea pigs sensitized to egg white. Similar doses of cryst. diformaldehyde peroxide, m. 64–5°, desensitized for a few days after which the animals became hypersensitive. L. E. Gilson

Prophylaxis of cancer caused by *o*-aminoazotoluene and dimethylaminoazobenzene. Presence of antiblastic substance in whole rye meal. J. Maisin, Y. Pourbaix and E. Cuvelier. *Compt. rend. soc. biol.* **132**, 315–18(1939).—Rats were fed 10 mg. per day of one of the above compds. with their diet. If the diet consisted principally of polished rice they all developed hepatomas and died, but if fed ground whole rye they remained healthy. The presence of an antiblastic substance in rye is suggested. L. E. Gilson

Bilirubin, urobilin and the "yellow diazo reaction" of the serum in pneumonia and bronchopneumonia. B. Varela Fuentes, R. Canzani and A. Graña. *Compt. rend. soc. biol.* **132**, 507–9(1939).—See *C. A.* **33**, 8767[2]. L. E. Gilson

The pH of systemic blood in normal and hypertensive dogs, determined by means of a syringe-type electrode. Otto H. Müller and Wm. F. Nickel. *Proc. Soc. Exptl. Biol. Med.* **43**, 89–92(1940).—No relation was found between variations in blood pressure and pH. Apparently the buffering capacity of the systemic blood is sufficient to offset the introduction of an alk. or acid substance if such is produced during exptl. ischemia of the kidney. L. E. Gilson

Induction of lymphomatosis in mice following painting with 9,10-dimethyl-1,2-benzanthracene. L. W. Law and Marjorie Lewisohn. *Proc. Soc. Exptl. Biol. Med.* **43**, 143–6(1940).—A 0.3% soln. of 9,10-dimethyl-1,2-benzanthracene (cf. *C. A.* **32**, 4978[3]) was applied twice a week to the skin of mice of the dilute brown strain. After 65–90 days many of the mice showed a general lymphomatosis with bilateral lymphadenopathy of the axillary, inguinal and cervical lymph nodes. L. E. Gilson

Free and combined silica in silicotic lungs. Guy E. Youngburg and Mamie V. Youngburg. *Proc. Soc. Exptl. Biol. Med.* **43**, 146–8(1940).—Analyses of 14

silicotic human lungs are given. Total silica ranged from 0.086 to 1.296% of the dry tissue. Free silica ranged from 3.25 to 91% of the total. L. E. Gilson

Prothrombin levels and synthetic vitamin K in obstructive jaundice of rats. Joseph E. Flynn and E. D. Warner. *Proc. Soc. Exptl. Biol. Med.* **43**, 190–4(1940).—Rats were kept on a diet low in vitamin K. Three days after ligation of the bile duct the blood prothrombin decreased to 10–25% of the normal. At this point a single intraperitoneal dose of 20 γ of 2-methyl-1,4-naphthoquinone raised the prothrombin level to 81% of the normal in 24 hrs. The 2-methyl-1,4-naphthoquinone was approx. 500 times as active as phthiocol. Rats are able to store considerable vitamin K. L. E. Gilson

Composition of bone in extreme osteoporosis associated with hepatoma. Arild E. Hansen, L. S. Palmer and J. Wesley Nelson. *Proc. Soc. Exptl. Biol. Med.* **43**, 206–7 (1940).—The dry, lipide-free rib bones of a hepatoma patient had 31.4% less Ca, 33.8% less P, 39.0% less Mg and 37.9% less CO_2 than those of the control. L. E. Gilson

An agglutinable factor in human blood recognized by immune serums for Rhesus blood. Karl Landsteiner and Alexander S. Wiener. *Proc. Soc. Exptl. Biol. Med.* **43**, 223(1940). L. E. Gilson

Proteolysis of diphtheria antiserum by pepsin. Fernando Modern and Guillermo Ruff. *Rev. inst. bacteriol. dept. nacl. hig.* (Buenos Aires) **9**, 197–215(1939); cf. *C. A.* **33**, 2583[1], 8769[3].—Diphtheria antiserum was digested with pepsin under a variety of conditions. In all cases 30–60% of the antitoxic activity was destroyed. L. E. Gilson

Clinico-experimental studies on the fate of exogenous sugar which is not polymerized to glycogen during spontaneous or provoked creatinuria. Leonardo Mazzoleni. *Arch. studio fisiopatol. clin. ricambio* **7**, 237–59(1939).—During creatinuria, exogenous sugar was not eliminated, synthesized to glycogen, oxidized or esterified with P_2O_5. Its fate was considered open to hypothesis. H. L. G.

Insulo-pancreatic influence on the synthesis of hippuric acid. Studies on normal and diabetic persons and those with liver diseases. Fabio Tronchetti. *Arch. studio fisiopatol. clin. ricambio* **7**, 261–85(1939).—In diabetic individuals there was a deficient synthesis and elimination 6 of hippuric acid. Insulin increased the synthesis and elimination in all 3 groups and indicated the importance of the pancreas in the regulation of hepatic processes. Helen Lee Gruehl

Urobilinemia and hemoglobin metabolism. Hemoglobin metabolism in nephritis and diabetes. G. Sotgiù and F. Volpe. *Atti soc. med. chir. Padova* **17**, 219–23 (1939).—In nephritis and diabetes there occurred a retention of blood urobilin, low fecal bilin and relative increase of urinary bilin. Helen Lee Gruehl

Anaphylactogenic properties of the products of papain digestion of seroproteins and egg albumin. Mario Calcinai. *Boll. ist. sieroterap. milan.* **18**, 594–613(1939).—The dialyzate of the digestive products could sensitize but not produce shock. The residual products after dialysis maintained both sensitizing and shocking properties. Papain itself was anaphylactogenic. H. L. G.

Commercial papain as an anaphylactogen. Mario Calcinai. *Boll. ist. sieroterap. milan.* **18**, 677–82(1939). Helen Lee Gruehl

Pathogenesis and therapy of progressive muscular dystrophy. Giulio Camerini. *Minerva med.* **1939, II**, 293–7.—After prolonged treatment with active pancreatic exts. in 5 persons with muscular dystrophy there were practically no modifications in the elimination of N and creatine bodies and no improvement in the clinical symptoms. Helen Lee Gruehl

Blood cholesterol in chronic articular diseases. Giuseppe Michetti. *Minerva med.* **1939, II**, 501–5.—In a study of 84 cases the majority showed a cholesterol titer within high normal limits. In cases of definite infective character there was a slight diminution of blood cholesterol. The cholesterol values were of no diagnostic importance in these diseases. Helen Lee Gruehl

chlorides in H. D. Barnes. *S. African J. Me* 7–110(1939).—The chloride content of the uid is lower in severe than in mild meningitis. The likelihood of death does not appear to be greater in the cases with lower chloride content of the fluid obtained at 1st puncture. The chloride curve in pneumococcal meningitis shows no tendency to rise. When chloride values are within normal limits or, if initially low, the curve rises during subsequent days, the 2 disease is likely to run a mild course and conversely. The likelihood of death is not significantly greater if the curve falls during the first few days. Two references are given. W. R. Henn

Study of the renal factor in cardiac patients by measurement of Van Slyke's coefficient. Jean F. Porge. *Arch. maladies coeur vaisseaux* **32**, 469–77(1939).—Van Slyke's coeff. of urea clearance was normal (92–104%) 3 in 4 patients with compensated cardiac valve lesions, low (41–62%) in 9 out of 10 patients with decompensated valvular lesions, and rather low in most of 10 patients with hypertension. Data are also given on the blood N and on Ambard's const. in the same patients. Marion Horn

Origin of induced pulmonary tumors in strain A mice. Hugh G. Grady and Harold L. Stewart. *U. S. Pub. Health Repts.* **55**, 169–70(1940).—Pulmonary tumors 4 induced in strain A mice arise from alveolar cells and begin to appear 5 weeks after subcutaneous injection of carcinogenic hydrocarbons. The development of these tumors in the lung is not assocd. with any demonstrable inflammatory action. J. A. Kennedy

Chemistry of lipoidosis. III. Niemann-Pick's disease and amaurotic idiocy. E. Klenk. *Z. physiol. Chem.* **262**, 128–43(1939); cf. *C. A.* **29**, 6942[3].—The lipoids from the brain in various lipoidoses were fractionated. Compared to the lipoids from Niemann-Pick's disease (3 cases) the lipoids from infantile amaurotic idiocy (Tay-Sachs) contain considerably less sphingomyelin and much more of a new glycolipide (substance X). The latter is extd. chiefly by hot $CHCl_3$-MeOH (1–3) from the organ powder after acetone- and ether-sol. constituents have been removed. X contains much more sugar than normal cerebrosides. It contains fat acids, a N base very like or identical with sphingosine, besides the reducing sugar. There is no cerebronic acid present in it. In 5 cases of juvenile amaurotic idiocy the changes were not so marked, probably because of localization of the lesions to certain centers. Milton Levy

Electrophoretic separation of the antibody from human allergic serum. John M. Newell, Alexander Sterling, Morris F. Oxman, Samuel S. Burden and Laura E. Krejci. *J. Allergy* **10**, 513–20(1939).—The Tiselius app. 7 (*C. A.* **31**, 4353[9]) was used to fractionate serums. The serums were dialyzed 2 days in the refrigerator against a physiol. saline soln. contg. as a buffer 0.02 *M* of phosphates at pH 8.10 and were then subjected to electrophoresis with a current of 20 ma. No electrophoretic sepn. bands in human serums were found denoting fractions other than albumin and 3 globulins, α, β and γ. The anomalous band called δ globulin was frequently found in concd. 8 serums, but this was considered merely an effect of concn. No distinction could be found between allergic and normal serums. When the solns. in the different sections of the app. were tested, the skin-sensitizing antibody of allergic serum and the antitoxin against staphylococcus hemolysin in human serum were found only in those contg. γ globulin. The antibody for ragweed in rabbit serum was found in the same fraction. Julian H. Lewis

The total water and sodium exchanges in asthmatic 9 **patients.** John Sheldon, Homer Howes and Geo. Stuart. *J. Allergy* **11**, 1–13(1939).—During an attack of asthma there was a definite loss of body H_2O for at least 24 hrs. and a corresponding increase of urinary Na. Since the heat production during asthma was not elevated the observed loss in body wt. was due to loss of body water. Julian H. Lewis

The thermolability of ragweed pollen extract and its corresponding reagin. Carl E. Arbesman and Harry

Eahle. *J. Allergy* **11**, 18–27(1939).—Ragweed pollen exts. have been found to be highly thermolabile. Approx. 75% of their reagin-neutralizing activity is destroyed within 15 min. at 56°, 90% within 1 hr. and over 95% in 4 hrs. The reagin-neutralizing activities of 4 similar ragweed pollen exts. prepd. in 1939, 1937, 1933 and 1929 and since stored at 4°–8° were found to be 100, 16, 4.5 and 1.2., resp., indicative of a fairly rapid deterioration. Despite the widely differing biol. activities of these 4 exts., their N contents and the ratio of protein N/total N were of the same order of magnitude, a fact which does not exclude the possibility that the reactive constituent is a protein. Short ragweed pollen reagin has also been found to be highly thermolabile. On heating at 56° approx. 50% of the skin-sensitizing activity was destroyed within ½ hr., approx. 90% within 2 hrs. and approx. 99% within 4 hrs. Julian H. Lewis 1

A micro blood esterase determination applied to studies of rats bearing adenocarcinoma. E. Elizabeth Troescher and Earl R. Norris. *J. Biol. Chem.* **132**, 553–7(1940).—In rats with implanted adenocarcinomas the esterase activity of the blood during the growth of the tumor fell far below the range of fluctuation of values for normal rats. In animals exhibiting receding tumors, the esterase activity rose toward normal values with recession of the tumor. A micromethod is described for *the detn. of blood esterase* in 0.05 cc. of blood which gives results usually checking to within 0.02 pH for the amt. of acid liberated from Et butyrate. A. P. Lothrop 2

The metabolism of pyruvic acid. Hans von Euler and Bertil Högberg. *Arkiv Kemi, Mineral. Geol.* **13B**, No. 16, 5 pp.(1939)(in German); cf. *C. A.* **33**, 9424[9].—After implantation of Jensen sarcoma the blood $AcCO_3H$ (I) (detd. by method of Lu, *C. A.* **33**, 6896[2]) was increased 2–4 times over that of normal rats (12 γ/cc.). The higher values were associated with the older tumors. No increase followed implantation of muscle tissue. A comparable rise accompanied the fever caused by infection with colon organisms, but the tumorous rats did not have fever. Injection of 100–200 γ of aneurin lowered the blood I markedly. Similar high values were found in a rabbit implanted with Brown-Pearce sarcoma. Two human cancer patients showed only a slight increase in the blood I. H. L. Mason 3

The significance of circulation in the pathogenesis of extrarenal azotemias. P. Gömöri, L. Podhradszky and J. Kring. *Acta Med. Scand.* **102**, 591–610(1939).—Cases of N retention are described resulting from loss of salt. A diminished filtration pressure and decreased blood flow are considered the actual factors occasioning the retention. The N retention occurring after hemorrhage is explained on the same basis of circulatory changes. The favorable effect of hypertonic salt soln. is attributed not only to the restoration of the salt concn. but also to the improvement of the circulation. S. Morgulis 4

Hematopoiesis and endogenous uric acid. Roald Opsahl. *Acta Med. Scand.* **102**, 611–28(1939).—An increased elimination of uric acid, chiefly of endogenous origin, was observed during the reticulocyte crisis in 5 cases of pernicious anemia and 2 cases of hemorrhagic anemia. It is suggested that there is a connection between endogenous uric acid and blood regeneration. During active blood regeneration increased amts. of purines are liberated and cause an attack of gout in persons of such a constitutional disposition. Two severe anemia patients are described in whom this condition was observed when the blood regeneration was at its max. S. Morgulis 5

The comparative iodine content of blood and cerebrospinal fluid. Karl P. Klassen, Ruth L. Bierbaum and Geo. M. Curtis. *J. Lab. Clin. Med.* **25**, 383–7(1940).—Iodine detns. by the method of Matthews, Curtis and Brode (*C. A.* **32**, 9138[9]) were made on whole blood and cerebrospinal fluid of 2 groups of patients. In group 1 (10 patients without thyroid disease, fever or meningeal disease, and on a relatively low I intake for at least one month) the av. blood I was 3.6 γ %, the range 2.9 to 5.1; in group 2 (10 patients with hyperthyroidism, who had not received I for one month) the av. blood I was 8.8 γ %, the range 5.1 to 15.7. The increase in blood I was most marked in those patients with a more recent onset of the disease. The av. cerebrospinal fluid I in both groups was 0.5 γ %. Conclusion: Iodine is a normal constituent of the cerebrospinal fluid and its concn. is not increased in patients with hyperthyroidism without meningeal involvement, fever and I therapy. Howard W. Robinson 6

The effect of alkalosis on the blood picture in chronic splenomyelogenous leucemia. Robert D. Barnard and Perry W. Ross. *J. Lab. Clin. Med.* **25**, 345–8(1940).—The induction of a period of alkalosis by the administration of large doses of $NaHCO_3$ to 2 adult male patients did not stimulate myeloblastic activity and during this period there seemed to be a tendency toward inhibition of leucopoiesis. The alkalosis was judged from the clinical symptoms. Conclusion: The study furnishes evidence against the relationship of alkalosis to neoplasia. Howard W. Robinson 7

The sources of the enzymes of normal and pathologic cerebrospinal fluid. Irving Kaplan, David J. Cohn, Abraham Levinson and Beatrice Stern. *J. Lab. Clin. Med.* **25**, 495–505(1940); cf. *C. A.* **33**, 8782[7].—A discussion is given of the 2 possible sources of the enzymes in normal fluid (blood plasma and neural tissue fluid). Tryptic and phosphatase activities of the fluid of purulent meningitis are due mostly to the desmotrypsin and the desmophosphatase, resp., of the polymorphonuclear cells; the lipase, tributyrinase and esterase activities are due in part (about 50%) to the desmolipolytic enzymes and the amylase activity is due, in a lesser degree, to the desmoamylases of these cells; the remainder of the enzymic activity in this disease is probably due to lyoenzymes of the same cells and to plasma enzymes which enter the fluid because of increased permeability. The antitryptic power of the fluid of tuberculous meningitis varies with pH in the same manner as serum antitrypsin; this suggests that the antitrypsin enters from the blood plasma because of increased meningeal permeability. The enzymic activity of the fluid in tuberculous meningitis which is not due to the polymorphonuclear cells or to the passage of plasma enzymes across the meningeal barriers is due to the presence of lymphocytes which are particularly rich in lipolytic enzymes. The sources of the enzymes in the fluids in hydrocephalus and brain tumor are discussed. Howard W. Robinson 8

The histidine content ("diazo value") of the blood in peptic ulcer. E. G. Schmidt. *J. Lab. Clin. Med.* **25**, 512–14(1940).—The blood from patients and controls shows no differences in the values given by various diazotization procedures (methods of Schmidt, *et al.*, *C. A.* **31**, 8646[4], and Theis and Benedict, *C. A.* **18**, 3398). The data do not confirm the theory that a histidine deficiency exists in the blood of patients with peptic ulcer. Howard W. Robinson 9

The Lange test. II. The influence of particle size and hydrogen-ion concentration of gold sols upon Lange test readings on syphilitic and tabetic spinal fluids. P. K. Glasoe and C. H. Sorum. *J. Lab. Clin. Med.* **25**, 534–7 (1940); cf. *C. A.* **34**, 512[3].—The sensitivity of the test in syphilitic and tabetic spinal fluids, as in that of paresis, increases with increase in particle size of the Au sol and decreases with increase in pH. Howard W. Robinson 10

Histological changes and transplantation of tissue surrounding methylcholanthrene pellets during the latent period of tumor development in female C_3H mice. Harold L. Stewart. *Am. J. Path.* **15**, 707–22(1939).—C_3H mice injected subcutaneously with 5% methylcholanthrene-cholesterol pellets yielded tumor-producing transplants when sacrificed at 42 and 49 days and at 77, 82, 91 and 98 days. Plain cholesterol pellets caused only a chronic foreign-body reaction. Numerous atypical cells were observed also in histological sections from mice sacrificed earlier than the 42nd day and also later, even when the transplant failed to yield tumors, a suggestion that other unknown factors are necessary for the development of tumors upon transplantation. F. B. Seibert 11

The effect of Korean ginseng on serum anaphylaxis. Heiki Lee. *J. Chosen Med. Assoc.* **29**, 2431–6(English abstr. 149–51)(1939).—The daily administration of 0.5 g. of Kaijo (Song-do) ginseng to the guinea pigs during the initial and reinjection periods reduces the symptoms of serum anaphylactic shock and prolongs the survival time. It also reinforces the effect of vagotomy on the shock. S. Tashiro

Electrophoresis of animal viruses and their neutralizing antibodies in low concentrations. Alfred Polson. *Nature* **145**, 27(1940).—An app. is illustrated and described for study of the mobility of animal viruses and their neutralizing antibodies in an elec. field. It is a simplified modification of the Tiselius moving boundary method. Cf. *C. A.* **31**, 8310[4]. E. D. Walter

The time factor in solubility of [antigen-antibody] precipitates in excess of antigen. Wm. C. Boyd. *J. Immunol.* **38**, 143–6(1940).—Ppts. were obtained by mixing ovalbumin and rabbit antiovalbumin serum in optimal proportions. The soly. of these ppts. in varying amts. of ovalbumin was tested immediately and after an interval of 10 months. In both cases the ease and completeness of solution was similar: 2.144 mg. of antigen-N (32 times the amt. used in making the ppt.) was sufficient to dissolve almost completely a ppt. contg. 0.633 mg. of N. Smaller amts. of antigen gave correspondingly less soln. It is suggested that the soln. of such ppts. represents a reversal of all or some of the reactions involved in their formation. The combination between ovalbumin and antiovalbumin, at least, has not become any less reversible with time. Charles A. Zittle

The construction of graphs and tables for evaluation of the quantitative complement-fixation reactions and reaction ratios. Wm. R. Thompson and Frank Maltaner. *J. Immunol.* **38**, 147–57(1940).- Mathematical. Charles A. Zittle

Quantitative relations in complement-deviation reactions. Adolph L. Kappus and Annelise Winkler. *Z. Immunitäts.* **95**, 1–8(1939).—The range of error in the hemolytic system increases with the amt. of amboceptor used. It is least with an active complement and the smallest quantity of amboceptor that is necessary. It is independent of the titer of amboceptor in an antiserum. The relation between the amt. of hemolysin and the concn. of red cells is a linear function. The quantity of red cells and the quantity of amboceptor used up are also proportional. Julian H. Lewis

H—PHARMACOLOGY

CARL F. SCHMIDT

Pathways of absorption of sodium ferrocyanide from the subarachnoid space into the venous system. R. O. Scholz and E. M. Ralston. *Anat. Record* **75**, 365–71 (1939). Philip D. Adams

Permeability and absorptivity of the skin. Joseph J. Eller and Shirley Wolff. *Arch. Dermatol. Syphilol.* **40**, 900–23(1939).—Fats permeate the skin and do so in a large measure along the hair shafts and into the oil-gland ducts. Liquid fats permeate more rapidly than solid fats. Animal fats show the greatest depth of penetration, with vegetable fats next and mineral fats least. Most of the fats show optimum penetration in 4 to 6 hrs. after application. After 6 hrs. the quantity of fat in the deeper tissues appears to diminish. Philip D. Adams

Treatment of fungous infections with ethyl iodide inhalations. Jacob H. Swartz. *Arch. Dermatol. Syphilol.* **40**, 962–73(1939).—An improved inhalation device is described. The excretion of EtI from the body is discussed. Philip D. Adams

Action of sympathomimetic drugs on the fall of blood pressure produced by quinine. H. Konzett. *Wien. klin. Wochschr.* **52**, 48–9(1939).—The fall of arterial blood pressure, produced by intravenous or intra-aortal injection of 3 mg. of quinine into cats under urethan-chloralose anesthesia, can be prevented by simultaneous injection of 60 γ of adrenaline, 0.6 mg. of *m*-synephrine, or 6–9 mg. of synephrine. B. C. P. A.

Effectiveness of intravenous hypertonic sucrose and adrenaline in the treatment of status asthmaticus. E. L. Keeney. *J. Allergy* **9**, 497–502(1938); cf. *C. A.* **32**, 8559[1].—In status asthmaticus 4 out of 6 patients experienced immediate relief after intravenous injection of 100 cc. of 50% sucrose with 0.5 cc. of $^1/_{1000}$ adrenaline. B. C. P. A.

Thiocyanate dermatitis. Mervin E. Green and James S. Snow. *Arch. Internal Med.* **64**, 579–85(1939).—An allergic reaction to KCNS is described, along with blood thiocyanate findings. J. B. Brown

Effect of the reticulocytogenic principle in urine in the treatment of pernicious anemia. G. E. Wakerlin. *Arch. Internal Med.* **65**, 21–5(1940).—The reticulocytogenic principle in urine is not effective orally in the treatment of pernicious anemia. The antipernicious anemia principle of the liver is not excreted in demonstrable quantities in normal human urine. The kidney principle which is reticulocytogenic for the pigeon is without effect in pernicious anemia. J. B. Brown

The rate of attainment of diffusion equilibrium for thiocyanate between plasma and transudates following the intravenous injection of sodium thiocyanate in patients with edema. D. Rourke Gilligan and Mark D. Altschule. *J. Clin. Investigation* **18**, 501–6(1939).—Although diffusion equil. for CNS^- following injection of NaCNS in normal subjects obtains in 1 hr., in patients with accumulations of edema fluid this equil. between plasma and the transudates is not complete until 6–10 hrs. after the injection. The time required is proportional to the vol. of transudate. At equil. the CNS^- concns. were 0–20% higher in the sera. J. B. Brown

The formation of methemoglobin and sulfhemoglobin during sulfanilamide therapy. J. S. Harris and H. O. Michel. *J. Clin. Investigation* **18**, 507–19(1939).—Blood samples (960) from 476 patients receiving sulfanilamide (*S*) were examd. for *S*, methemoglobin (*MH*) and sulfhemoglobin (*SH*), either by the hand spectroscope or quantitatively by the spectrophotometer. The bloods showing *MH* were highest in the group of high content of *S*. The av. *MH* content was proportional to the *S* concn. After a single dose of *S*, the max. *MH* occurred several hrs. after max. blood *S* peak. *SH* was more frequent after long courses of *S* but bore no relationship to age, sex or concn. of *S* or *MH* in the blood. It seems that an active substance is normally produced in the course of *S* metabolism which causes the production of *MH* and *SH*. Methemoglobinemia depends upon: formation of the active agent, oxidation of hemoglobin under the influence of the active agent, and reduction of *MH* by the body. J. B. Brown

The formation in vitro of an oxidizing agent by surviving tissues and sulfanilamide. J. S. Harris. *J. Clin. Investigation* **18**, 521–6(1939).—Sulfanilamide does not function as an oxidizing agent on hemoglobin, but upon reaction of certain tissues (liver, kidney, etc.) with sulfanilamide, an oxidizing agent results which does form methemoglobin. J. B. Brown

The treatment of acute alcoholism with glucose and insulin. Walter Goldfarb, Karl M. Bowman, Sam Parker and B. Krautman. *J. Clin. Investigation* **18**, 581–4(1939).—Injection of 15 units of insulin had no effect on blood alc. in intoxicated patients; intravenous glucose slightly lowered blood alc. only in the severely intoxicated. Injection of both glucose and insulin accelerated disappearance of blood alc. in all patients, suggesting that oxidation of glucose catalyzes oxidation of alc. J. B. Brown

Coal-tar-pitch poisoning in pigs. Robert Graham, H. R. Hester and J. A. Henderson. *J. Am. Vet. Med. Assoc.* **96**, 135–40(1940).—Coal-tar-pitch poisoning may be responsible for spontaneous outbreaks of liver degeneration in pigs. Rachel Brown

Comparative glycogen formation in the livers and muscles of rats fed different sugars under normal and pathological conditions. II. Experiments on phosphorus-poisoned starving rats. Ya. Z. Spektor. *Méd. exptl.* (Ukraine) **1939**, No. 4, 38–43.—Expts. were performed on 170 rats which received 2 subcutaneous injections (with a

1-day interval between the 2 injections) of a 0.5% soln. of yellow P in sunflower-seed oil, each dose being calcd. on the basis of 0.1 cc. of the soln. for each 100 g. of body wt. The glycogen expts. were performed 1 day after the last injection. In normal and P-poisoned rats after sugar feeding the percentage increase in liver glycogen was greater than that of muscle glycogen. In both kinds of rats fructose and invert sugar were most effective in producing liver glycogen, while sucrose, galactose and invert sugar were most effective in muscle glycogen formation. In P-poisoned rats the glycogen content of the livers after a 20-hr. period of hunger or after sugar feeding (with the exception of galactose) was markedly lower than in the normal rats, while the glycogen content of muscle was similar to that of normal rats under the same conditions. All the sugars were almost completely absorbed from the intestine 4 hrs. after feeding, both in the normal and P-poisoned rats. S. A. Corson

The detoxication mechanism. I. The ability of the apple or its constituents to counteract the toxic effects of lead and arsenic. Ira A. Manville, Francis J. Reithel, Paul M. Yamada, T. W. Spencer and John R. Richardson. *J. Ind. Hyg. Toxicol.* **22**, 36–47(1940).—Rats, guinea pigs and rabbits were fed on diets low in uronic acid. With the exception of the rat diet, the food mixts. were low in Ca and P. The animals were fed Pb, sep. from the diet, in amts. of 47, 19.6 and 6.4 mg. per kg. of body wt. Apple supplements were fed to the group-A animals to the extent of 35, 49, and 18.3 g. per kg. of body wt. The ratio of Pb to apple was 0.74 for the rats, 2.5 for the guinea pigs and 3.0 for the rabbits. In no instance did the duration of the feeding extend over 33 days for the rats, 8 days for the guinea pigs or 26 days for the rabbits. The animals receiving the highest proportion of apple (rabbits) showed no signs of toxicity, and there was 100% survival. As the amt. of apple decreased, the protection afforded was still evident, but less marked. A. L. E.

Comparative physiological effects of pure, commercial and crude benzenes. H. H. Schrenk, W. P. Yant, S. J. Pearce and R. R. Sayers. *J. Ind. Hyg. Toxicol.* **22**, 53–63(1940).—Dogs and guinea pigs were exposed to the same concns. of the vapors. Physiol. effect is apparently due primarily to the C_6H_6 content of the benzenes and not to impurities. A. L. Elder

The acute vapor toxicity of allyl chloride. E. M. Adams, H. C. Spencer and D. D. Irish. *J. Ind. Hyg. Toxicol.* **22**, 79–86(1940).—It is among the most toxic of the halogenated aliphatic hydrocarbons. Rats and guinea pigs exposed to 100 mg. per liter died in a short time. A. L. Elder

Sanocrysin treatment from 1923 to 1938. Knud Secher. *Acta Tuberc. Scand.* **13**, 193–220(1939).—The toxic symptoms from sanocrysin treatment are to be regarded as a systemic tuberculin reaction called forth by the drug. The small dose precludes drug intoxication. Vitamin supplements (A, B_1, B_2 (lactoflavin) and C) given 8 days before treatment mitigate or largely eliminate the undesirable reactions. Polyarthritis cases are reported to be benefited by sanocrysin therapy. H. R. Getz

Inhibiting action of amyl nitrite and caffeine on adrenaline-chloroform and adrenaline-benzene syncopes. L. Dautrebande and R. Charlier. *Compt. rend. soc. biol.* **132**, 292–6(1939).—In dogs the inhalation of a small amt. of amyl nitrite or the intravenous injection of a large dose of caffeine simultaneously with the adrenaline prevented the syncope. The mechanism of the action is uncertain. L. E. Gilson

Comparative action of chemically pure benzene and commercial crystallizable benzene on the volume of the dog heart. J. Barzin and R. Charlier. *Compt. rend. soc. biol.* **132**, 296–9(1939); cf. *C. A.* **33**, 4673[8], 5496[1].—Inhalation of sufficient C_6H_6 vapor caused the heart to increase in size and eventually go into fibrillation. The com. C_6H_6 was the more toxic. L. E. Gilson

Sensitization to the hyperthermic action of dinitro compounds by metabolites. H. Handovsky, H. Casier and A. L. Delaunois. *Compt. rend. soc. biol.* **132**, 300–3 (1939).—In pigeons the hyperthermic action of dinitrocresol was increased by intramuscular injections of small amts. of AcH, AcOH, glycine, creatine or methylguanidine. EtOH had no effect. In guinea pigs AcOH had the same effect as in pigeons but creatine had no effect. **Production of strongly reducing substances, especially ascorbic acid, in the muscles of pigeons and guinea pigs after administration of dinitrocresol and metabolites.** *Ibid.* 303–7.—In all the above expts. whenever the hyperthermic action of dinitrocresol was increased by the substance injected the ascorbic acid and total reducing power of the muscles were increased. Ascorbic acid itself sensitizes pigeons to the action of dinitrocresol. L. E. G.

Chemosensitivity of the hypertensive reflexes of the auricles to various toxic compounds. Henri de Waele and Jean VandeVelde. *Compt. rend. soc. biol.* **132**, 310–11(1939).—In rabbits with the carotid sinus isolated from the circulation the intravenous injection of small doses of nicotine, ephedrine or coniine produced a rise in blood pressure, with slight bradycardia and increase in respiration, by stimulation of the reflex centers of the auricles. Cutting certain spinal nerve roots abolished the reflexes. **Reaction of the auricle reflexes to breathing excess oxygen and compressed air.** *Ibid.* 312.—In the above rabbits an increase in O supply caused a decrease in rate of respiration through stimulation of the auricle reflexes. L. E. Gilson

Does alcohol stimulate gastric secretion by liberating histamine? Carl A. Dragstedt, John S. Gray, Alfred H. Lawton and Max Ramirez de Arellano. *Proc. Soc. Exptl. Biol. Med.* **43**, 26–8(1940).—Yes. L. E. Gilson

Toxic and therapeutic response of blood and bone marrow to sulfanilamide. J. T. Paul and L. R. Limarzi. *Proc. Soc. Exptl. Biol. Med.* **43**, 29–32(1940).—Therapeutic doses of sulfanilamide commonly produce a mild macrocytic anemia and a normoblastic bone-marrow reaction. Occasionally an acute hemolytic anemia is produced which may be fatal. L. E. Gilson

Effects of atropine and fat on gastric secretion stimulated by alcohol. John S. Gray and Wm. H. Bachrach. *Proc. Soc. Exptl. Biol. Med.* **43**, 36–8(1940).—In dogs with Pavlov pouches the gastric secretory response to dil. EtOH is resistant to the inhibitory effects of atropine or olive oil. L. E. Gilson

Inhibition of experimental dental caries by fluorine in the absence of saliva. Virgil D. Cheyne. *Proc. Soc. Exptl. Biol. Med.* **43**, 58–61(1940); cf. *C. A.* **34**, 809[7].—Removal of the salivary glands from rats 22 days old caused a large increase in dental caries during the next 7 months. Daily administration of 3 mg. F (as KF) by mouth decreased the incidence of caries in the treated group 80–85%. L. E. Gilson

Effect of metrazole on recent learning. Eugene Ziskind, Robert Loken and J. A. Gengerelli. *Proc. Soc. Exptl. Biol. Med.* **43**, 64–5(1940).—Preliminary expts. indicate that metrazole impairs the memory of recently acquired learning. L. E. Gilson

Immediate reactions, to anhydrides, of wheal-and-erythema type. J. L. Jacobs, T. S. Golden and J. J. Kelley. *Proc. Soc. Exptl. Biol. Med.* **43**, 74–7(1940).—Guinea pigs are readily sensitized to citraconic, phthalic, 3-nitrophthalic and *n*-caproic anhydrides. The sensitization is specific for the anhydride used. Citraconic anhydride is the most active. L. E. Gilson

Effect of exercise on growth and cataract development of rats fed galactose. Helen S. Mitchell and Gladys M. Cook. *Proc. Soc. Exptl. Biol. Med.* **43**, 85–6(1940); cf. *C. A.* **32**, 6331[1].—Rats fed rations contg. 25% galactose always show galactosuria and high blood galactose and develop cataract. Exercise in revolving cages delayed cataract but did not affect growth rate or the blood and urine levels of galactose. L. E. Gilson

Oral and parenteral toxicity of vitamin K_1, phthiocol and 2-methyl-1,4-naphthoquinone. Hans Molitor and Harry J. Robinson. *Proc. Soc. Exptl. Biol. Med.* **43**, 125–8(1940).—The oral median lethal dose for mice is about 0.2 g./kg. for phthiocol and 0.5 g./kg. for 2-methyl-1,4-naphthoquinone. Single doses of vitamin K_1 up to 25 g./kg. produced no toxic symptoms. In chronic expts.

on young rats daily feeding of 0.35 g./kg. of phthiocol or 0.5 g./kg. of the methylnaphthoquinone caused death in less than 30 days, while smaller doses produced a marked fall in erythrocyte count. The growth curve was not affected. K_1, 0.35–2.0 g./kg. daily, had no injurious effect. When K_1 was injected intraperitoneally in oil soln. absorption was extremely slow. L. E. Gilson

Plasma electrolytes as affected by insulin and by varying partial pressures of atmospheric gases. Mildred R. Ziegler. *Proc. Soc. Exptl. Biol. Med.* **43**, 165–7(1940); cf. *C. A.* **33**, 7385[5], 8790[8].—Effects of breathing an atm. contg. 5% O and 95% N and one contg. 15% CO_2, 20% O and 65% N, with and without previous injection of insulin, on the blood glucose, proteins, CO_2, P, Cl, Na, K, Ca and Mg of dogs were detd. No definite relation between changes in the electrolyte pattern and the occurrence of insulin convulsions was found. L. E. Gilson

Influence of specific serum therapy on plasma lipides in pneumonia. Albert V. Stoesser. *Proc. Soc. Exptl. Biol. Med.* **43**, 168–70(1940). **Influence of sulfapyridine therapy on plasma lipides in pneumonia.** *Ibid.* 201–3.—Preliminary notes. L. E. Gilson

Experimental evaluation of sulfanilamide derivatives. Hans Molitor. *Merck Rept.* **48**, No. 3, 24–7(1939).—The various factors to be considered are discussed and interpreted in the light of results obtained with sulfanilamide, benzylsulfanilamide and sulfapyridine. S. W. Goldstein

Calcium cyanamide poisoning. E. Mellinghoff and D. Thomas. *Deut. med. Wochschr.* **65**, 1636–7(1939).—A detailed description of a case with clinical history and speculation as to the mechanism of the toxicology. A. G.

Poisoning with lead tetraethyl and its treatment. W. Laves. *Deut. med. Wochschr.* **65**, 1746–8(1939).—The disappearance of the vitamin B complex from the organism in lead poisoning suggested the therapeutic use of these vitamins. The symptoms in dogs poisoned by $Pb(C_2H_5)_4$ were ameliorated or prevented by the use of a liver concentrate rich in the vitamin B complex. Arthur Grollman

Effect of ethyl ether on cholesterol metabolism. G. Pennetta. *Boll. soc. ital. biol. sper.* **14**, 597(1939).—After a tolerance test with cholesterol, the titer in the blood increased during the first $1/2$ hr. with subsequent rapid fall. After injection of Et_2O there were practically the same alterations for the first $1/2$ hr. Subsequent values in general remained high for a longer period. H. L. G.

Pharmacological actions of the venom of Latrodectus indistinctus. H. A. Shapiro, N. Sapeika and M. H. Finlayson. *S. African J. Med. Sci.* **4**, No. 1–2, 10–17 (1939).—Expts. with the venom of *Latrodectus indistinctus* were performed on frogs, rabbits and cats. A perfusion of the isolated heart of *Xenopus laevis* with varying concns. of the venom produced a gradual diminution in the heart beat. With a concn. of the venom of 1:6000 the beats generally became smaller and slower and the heart stopped in mid-diastole. In the intact animal death occurred after 24–30 hrs., with the heart in systolic arrest similar to the effect produced by digitalis. In these expts. 1.0–3.0 mg. of venom was injected into the ventral lymph sac of frogs weighing 21–25 g. each. The effects observed with 26 rabbits and 29 cats were similar in both species, but they appeared to be more const. and pronounced in rabbits. The venom depressed the respiration and the heart and its conducting tissues. It produced a rise in blood pressure with an increase in intestinal and skin vol. The plain muscle of the small intestine and of the pregnant uterus was stimulated. The possibility that the venom produces its effects by the release of a histamine-like substance in the tissues of the injected animal is discussed. The venom itself was not found to contain any detectable traces of histamine or histamine-like substances as tested on the virgin uterus of the immature guinea pig. Five references. W. R. Henn

Changes in the speed of circulation after paralysis of the vagus by large doses of atropine and the relation to neurovegetative tonus in man. Čedomil Plavsic. *Arch. maladies coeur vaisseaux* **32**, 163–74(1939).—Of 26 human subjects given 2.5–3 mg. atropine intravenously, 16 showed an acceleration and 10 a retardation of circulation. Various hypotheses explaining these results are discussed. M. Horn

Action of acids, especially carbonic acid, on the coronary circulation. G. Berthier and P. Gley. *Arch. maladies coeur vaisseaux* **32**, 379–85, 411–18(1939).—Coronary vasodilatation in the isolated rabbit heart was produced by addn. of acids to Locke's perfusing soln. in concns. sufficient to bring the pH to 6.5. The acids used in descending order of vasodilator effectiveness were: carbonic, phosphoric, tartaric and citric. The results explain the beneficial effect of CO_2-yielding baths in patients with coronary disease. Marion Horn

The action of theophylline-ethylenediamine on the intra-arterial pressure of man. Jean Lequime and Jean van Heerswynghels. *Arch. maladies coeur vaisseaux* **32**, 879–86(1939).—In normal and hypertensive human subjects, intravenous injection of 0.480 g. theophylline-ethylenediamine in 20 cc. physiol. saline during 1 min. led to a hypertensive and then a hypotensive phase. The return to the initial pressure occurred in 3 min. in the normal subjects, but was much slower in the hypertensive subjects. Marion Horn

Increasing the rate of excretion of selenium from selenized animals by the administration of *p*-bromobenzene. Alvin L. Moxon, A. E. Schaefer, H. A. Lardy, K. P. DuBois and O. E. Olson. *J. Biol. Chem.* **132**, 785–6 (1940).—Expts. conducted on dogs fed a diet contg. 10 p. p. m. of Se in the form of seleniferous corn and on steers grazing on a seleniferous range indicate that the rate of Se excretion is greatly increased by administration of *p*-bromobenzene. After administering the compd. for 14 days to steers showing typical symptoms of Se poisoning, no Se could be detected in protein-free filtrates of blood and the total Se content of the blood was accounted for by analysis of the blood protein ppt. The *p*-bromobenzene appears to aid the organism in excreting the Se by taking it from the proteins of the blood and tissues possibly as Se-cystine and methionine which are conjugated with it and excreted as the mercapturic acid. The compd. has recently been used with excellent results in the treatment of a human case of Se poisoning. A. P. Lothrop

The modes of lymphogogic action of histamine on the thoracic duct lymph. Hidemasa Yamasaki. *Folia Pharmacol. Japon.* **27** (Opera Orig. 35–56)(1939).—In dogs histamine injected into a systemic vein caused a max. flow of lymph in 10 min. and return to normal in about 1 hr. The protein concn. increased more or less parallel with the flow; blood serum protein decreased. Blood pressure fell rapidly, but portal blood pressure rose; the latter continued high for about 15 min. and then fell gradually. The increase in femoral blood pressure was much less. Injection into the portal vein caused a much more rapid increase in portal blood pressure and less fall in arterial pressure. Little histamine effect on lymph flow was observed when the portal lymphatics were ligatured before injection. Mech. obstruction of hepatic veins, together with the inferior vena cava produced much the same effect as injection of histamine. It appears that under histamine the increased flow from the thoracic duct was due to the production of liver lymph due to an increased blood pressure in liver capillaries and rapid filtration through the endothelium. G. H. W. Lucas

The actions of some new nonalkaloidal antispasmodics on the plain and leech muscle described and compared with those of atropine and papaverine. III. The actions on rabbit intestine in situ and on bronchial spasm. Tadamitu Yosida. *Folia Pharmacol. Japon.* **27**, 294–303 (Breviaria 57)(1939); cf. *C. A.* **33**, 8808[8]; **34**, 819[4].—The effects of octinum, trasentin, B-Tr and B-O were much the same as on excised tissue. Respiration was increased slightly but only in large doses. Trasentin, in acetylcholine spasm of the bronchus, in a limited dose exhibited some antispasmodic effect, but atropine and papaverine regularly produced inhibitory effects. G. H. W. Lucas

The central action of adrenaline on intestinal movement. Hisahumi Hukuhara. *Folia Pharmacol. Japon.*

27, 304–14 (Breviaria 58) (1939).—Various expts. pointed to a central control of intestinal movement when adrenaline was injected. The injection of 0.01 mg. into the 4th ventricle, which produced similar reactions in intestinal movements, demonstrated that the primary action of adrenaline is central. G. H. W. Lucas

Experimental studies on the narcotic action of optical isomers. Kotobuki Hano. *Folia Pharmacol. Japon.* 27, 315–23 (Breviaria 58–9) (1939).—Expts. with secondary butyl alcs. showed that the anesthetic effect of the *l*-isomer was much stronger than that of the *d*-isomer on tadpoles, while the oil-water partition coeff. was the same for both. G. H. W. Lucas

A preliminary study of the anthelmintic activity in vitro of fresh pineapple juice. Conrado F. Asenjo. *J. Am. Pharm. Assoc.* 29, 8–10 (1940).—Fresh pineapple juice digests parasites *in vitro*. The time required for visible signs of digestion to take place is from 3 to 4 hrs. Digestion takes place on the live parasite. The juice maintains its digestive activity on *Ascaris* at a concn. of 15%. A temp. of 65° or over inactivates the enzyme present in the juice. Juice from Cuban, Puerto Rican and Mexican pineapples exhibits the same digestive activity on parasites *in vitro*. Canned juice has no digestive activity on parasites.
A. Papineau-Couture

The transient antidiabetogenic effect of synthetic adrenal cortical hormone: cortate. Preliminary observations. E. B. Winnett, John W. Caldwell and James E. Kahler. *J. Iowa State Med. Soc.* 30, 45–8 (1940).—In daily doses of 15–30 mg., desoxycorticosterone acetate (cortate) was markedly but only transiently hypoglucemic in 2 cases of severe diabetes, necessitating reduction in the amt. of insulin tolerated. This result is directly opposite to that obtained in diabetic animals (cf. Long and Lukens, *C. A.* 30, 3511[2]; Lukens and Dohan, *C. A.* 32, 1782[6]).
J. Pinchack

Prevention of recurrence of urinary stone; chemical analysis; tests for solubility in various hydrotropic and solvent solutions. Walter M. Kearns. *Urologic and Cutaneous Rev.* 44, 86–9 (1940).—A comparison is made of the solubilizing action of 0.5–1% lactic, phosphoric, acetic, succinic and hippuric (0.2%) acids, and of 0.5% Mg or Na salicylate, Na mandelate, Na citrate and Na benzoate on various urinary stones. These compds. were tested alone, dissolved in water or in various combinations with each other. Because of its strong affinity for Ca with which it forms the readily sol. Ca lactate, lactic acid is recommended in urinary lithiasis, especially where there is preponderance of Ca and satn. with phosphoric radical. Where Ca pptn. does not predominate, phosphoric and acetic acids have superior solvent action to lactic acid.
J. Pinchack

Influence of anticoagulants on the different elements of the blood. V. Chorine. *Ann. inst. Pasteur* 63, 367–99 (1939); cf. *C. A.* 34, 1371[1].—Anticoagulants such as oxalate, citrate, fluoride, heparin and hirudin cause a diminution of protein and glucose in the blood plasma of the human subjects and different animals used. This diminution is not due to a pptn. of the proteins by the anticoagulants, but to the diln. of the plasma by the H_2O from the erythrocytes. It is the scpn. of H_2CO_3 from the blood which controls the passage of globular H_2O into the medium at the moment of coagulation. Benjamin Prescott

Research on some synthetic bases antagonistic to histamine. Anne-Marie Staub. *Ann. inst. Pasteur* 63, 485–524 (1939).—2-Isopropyl-5-methylphenoxyethyldiethylamine (F 929) and *N'*-phenyl-*N'*-ethyl-*N*,*N*-diethylethylenediamine (1571 F) antagonize the action of 3 to 5 lethal doses of histamine. Addn. products of these compds. with methylphenyl, dimethylphenyl and isopropylmethylphenyl added on have the same action. The antagonistic action of these compds. is not only on histamine shock but also on the excitations provoked by histamine on the smooth muscles of the intestine, stomach, uterus and bronchioles. This antihistamine action is due to a spasmolytic action and not to a parasympathetic action. Benjamin Prescott

Experiences with Pervitin. Erich Neumann. *Münch. med. Wochschr.* 86, 1266–7 (1939).—Pervitin, 1-phenyl-2-methylaminopropane, has an analeptic action (cf. Füllen, *C. A.* 34, 170[3]). Unfavorable side reactions occurring after administration of large doses of this drug included constipation, increased secretion of sweat, palpitation of the heart and insomnia. Maurice M. Rath

Effect of infusion with gum arabic solutions and blood transfusion on glomerular filtration and tubular reabsorption in healthy and cantharidin-treated rabbits. Makoto Koiwa. *Tôhoku J. Exptl. Med.* 37, 139–62 (1939).—Physiol. salt soln., isotonic (6%) and hypertonic (12%) gum arabic solns. and blood (20 cc. of each substance per kg. body wt.) were intravenously infused into healthy rabbits as well as rabbits whose kidneys had been injured by cantharidin. Glomerular filtration and tubular reabsorption were studied by the method of Nakazawa and Kusakari (cf. *C. A.* 25, 1555). In healthy rabbits, NaCl caused an appreciable diuresis (quantity of urine in 1st hr. increased 49% on the av.) due to increase in the rate of glomerular filtration; 6% gum soln. caused a greater diuresis (59% on the av.) due mostly to an increased rate of glomerular filtration and, partly, to a relative decrease in tubular reabsorption; 12% gum soln. caused a marked increase in diuresis due to a marked increase in filtration (74.9% on the av.) and definite inhibition of reabsorption. In cantharidin-injured animals, the quantity of urine excreted in the 1st hr. decreased 57% on the av. The amt. of glomerular filtration decreased 63.9%. In these rabbits infusion with the various substances, except blood, produced diuresis and an increase in filtration. Compared with healthy animals, this effect was considerably less intense. NaCl, 6% gum soln. and 12% gum soln. caused, on the av., an increased urine excretion of 26, 24 and 63%, resp., in the 1st hr. Blood transfusion had a slight diuretic effect (increase of 21% on the av.) in healthy rabbits which was due mostly to increased glomerular filtration. In cantharidin-treated rabbits, blood transfusion inhibited diuresis, due to a decrease in filtration. Forty-nine references. Maurice M. Rath

Effect of hypnotics and several centrally acting drugs (naphthylamine, picrotoxin) on glomerular filtration and tubular reabsorption. Makoto Koiwa. *Tôhoku J. Exptl. Med.* 37, 163–78 (1939).—Chloral hydrate, 0.15 g. per kg. body wt., subcutaneously injected, increased glomerular filtration 18% on the av. in the 1st hr. after administration, with resultant diuresis. Larger doses (0.3 g. per kg. body wt.) decreased urinary excretion about 58 and 62% on the av. in the 1st and 2nd hrs., resp., and decreased the rate of glomerular filtration 62 and 66.7% on the av. in the 1st and 2nd hrs., resp. Barbital (2 cc. of a 10% soln. of the Na salt per kg.) decreased the quantity of urine excreted on the av. 48 and 56% in the 1st and 2nd hrs., resp.; this amt. correspondingly decreased the rate of filtration 51.2 and 56%. Phenobarbital (Na salt) in doses of 0.1 g. per kg. body wt. inhibited diuresis 54 and 66% on the av. in the 1st and 2nd hrs., resp. These hypnotics act to reduce the blood pressure and slow up the general circulation. Consequently the blood flow through the kidneys is diminished and glomerular filtration reduced. Picrotoxin (1 cc. of a 1% soln. per kg. body wt.) diminished the urine output 40–70% in the 1st hr. and 28–70% in the 2nd hr. Tetrahydro-β-naphthylamine (0.2 cc. of a 5% aq. soln. per kg. body wt.) generally diminished urine excretion. These 2 drugs stimulate the sympathetic nervous system centrally and effect constriction of the renal blood vessels. Forty-six references. M. M. R.

Comparison of different preparations of amorphous and zinc crystalline insulin. Frederick M. Allen. *Endocrinology* 26, 208–17 (1940).—The duration of the effect of any kind of insulin and the differences between different kinds are not abs. but are proportionate to the size of the dose. Testing for duration differs from the usual method of testing potency, in that the clearest results require large rather than small doses. Differences between different brands of amorphous insulin, heretofore supposed to be identical, are clearly revealed by the convulsive method. No consistent differences were shown between different brands of cryst. insulin. The method of blood-

sugar curves in normal and diabetic animals and patients is more delicate, in that it confirms the above-mentioned differences and also reveals others. Different durations of action are thus demonstrated for the amorphous and cryst. insulin prepns. of the same and different manufacturers. The cryst. insulin prepns. as a group have a more prolonged action than the amorphous prepns. The prolonged action of cryst. Zn insulin appears sometimes to be a retarded action, especially with small doses, but more commonly and typically the fall of blood sugar is as rapid and early as with amorphous insulin. The prolonged action thus results in a greater total effect. Protamine Zn insulin is characterized by a long delay in the beginning of its effect in addn. to the extremely long continuance. F. S.

Sojourn of insulin in the blood of rabbits after the administration of massive doses of insulin. Leonard F. Jourdonais and Maurice Bruger. *Endocrinology* **26**, 250–4(1940).—Insulin injected intravenously in massive doses (1000 units) into rabbits was recovered from the blood stream 60–90 min. after the injection. After this time insulin cannot be recovered from the blood by the procedure used, although the insulin effect as demonstrated by hypoglucemia persists for as long as 9 hrs. The largest recoveries of insulin are secured within the first 15 min. after injection. Blood exts. prepd. 75 min. after injection of massive doses of insulin frequently give a hyperglucemic response. In 4 rabbits this massive dose of insulin causes a gradual and persistent rise of blood sugar. The usual hypoglucemic effect of insulin is not evident. These animals die in convulsive seizures not unlike those seen in insulin shock in spite of very high blood sugars. Five rabbits showed only a transient hyperglucemia lasting approx. 1 hr. Evidence is presented to indicate that massive doses may so disturb carbohydrate metabolism as to result in ketosis. Felix Saunders

Toxicology of the linseed plant (Linum usitatissimum Linn). K. N. Bagchi and H. D. Ganguly. *Indian J. Vet. Sci.* **9**, 61–6(1939).—Linseed flowers with immature seeds contain much more HCN than any other parts of the plant, as high as 0.69%. The max. amt. of HCN is liberated in a neutral medium in 4 hrs. Liberation is retarded by dil. and stopped by *N* acids and alkalies. One-half lb. of the flowers will cause death in a bullock, a common occurrence in some parts of India. Na_2CO_3 is recommended as an antidote. J. T. Sullivan

Therapeutic value of wet dressings as tested by hydrogen-ion concentration of inflammatory tissues. Renzo Masuda. *J. Chosen Med. Assoc.* **29**, 1907–18(German abstr., 123)(1939).—Both hot and cold wet dressings have the power to reduce H-ion concn. of inflammatory skin of rabbits (caused by *Staphylococcus pyogenes aureus* or by turpentine oil) to the normal level if the H-ion concn. of the tissue is greater than that of the normal tissue. The cold dressing brings it down to normal faster than the hot, and ice dressing often reduces it below normal. S. T.

Reflex cardiac acceleration and liberation of sympathomimetic substances in unanesthetized dogs during acetylcholine hypotension. W. B. Youmans, K. W. Aumann, H. F. Hancy and F. Wynia. *Am. J. Physiol.* **128**, 467–74(1940). E. D. Walter

Sodium salt of 2-methyl-1,4-naphthohydroquinone diphosphoric acid ester. R. H. K. Foster, John Lee and Ulrich V. Solmssen. *J. Am. Chem. Soc.* **62**, 453–4(1940); cf. Fieser and Fry, *C. A.* **34**, 1649[8].—The Na salt of 2-methyl-1,4-naphthohydroquinonediphosphoric acid ester in doses of 0.6 to 0.8 γ per chick administered subcutaneously reduces the clotting time to below 10 min.; intravenously, it shows similar activity, while the dose for oral effectiveness lies below 2 γ. The lethal dose in mice by both subcutaneous and intravenous administration is approx. 450 mg./kg. C. J. West

The stimulating action of quinine [on smooth muscle] caused by the suppression of inhibition. E. Starkenstein. *Arch. intern. pharmacodynamie* **62**, 146–67(1939).—A theoretical discussion. M. L. C. Bernheim

Histo-biological investigations on the toxic action and elimination of gelsemium. Antonio Risi. *Z. Biol.* **99**, 446–56(1939).—A hypodermic dose of 0.51 mg. gelsemium-HCl killed a rabbit in 16 hrs., paralyzing respiration and reducing heart action and body temp. Introduced into the conjunctival sac, gelsemium caused dilation of the pupils. In the kidneys, it caused microvacuolization and swelling of the tubule epithelium. Injury to the liver resulted primarily in damage to the nuclei and plasma. Gelsemium is excreted partly as such and partly as gelsemic acid. Frances Krasnow

A new preanesthetic, "preanest," and a new anesthetic, "novanest." The Dogliotti-Giordanengo apparatus for general anesthesia. Guglielmo Giordanengo. *Anesthesia and Analgesia* **18**, 251–8(1939).—Preanest is a mixt. of scopolamine bromide, bromides of the total alkaloids of opium and a hypertonic soln. of NaBr. It is administered intravenously about ¾ hr. before operative procedures begin. Novanest is a mixt. contg. Et_2O, chloromethyl ethyl ether, methyl and ethyl chlorides. It boils at 40°. It produces anesthesia rapidly when inhaled in small amt.; recovery is rapid; after-effects are stated to be negligible. G. H. W. Lucas

Anticoagulating power in vivo of sodium polyacetylenedihydroxysulfonate. E. Ferrarini. *Boll. soc. ital. biol. sper.* **14**, 414–16(1939).—Doses of 20–25 mg./kg. acted as good anticoagulating agents for about 2 hrs. after intravenous injection. Helen Lee Gruehl

Occurrence of As in soils and waters in the Waiotapu Valley and its relation to stock health (Grimmett, McIntosh) **15**.

Steyn, D. G.: Fluorine Poisoning in Man and Animal. Cape Town: Cape Times Ltd. 47 pp.

I—ZOÖLOGY

R. A. GORTNER

Flavin (vitamin B_2) of the chrysalis of the domestic silkworm. I. Flavin content. Mizuho Sumi and Ziro Tuzuki. *Bull. Inst. Phys. Chem. Research* (Tokyo) **17**, 864–70(1938).—Chem. and biol. tests indicate a very high flavin content, the biol. effect being the same as that of lactoflavin. B. C. P. A.

Structure and function of the excretion system of paramecium. Gábor v. Gelei. *Arch. Protistenk.* **92**, 384–400(1939).—The excretion app. is stained as effectively with sublimate-trichloroacetic acid-2,3,4-trihydroxybenzoic acid and complex org. Ag compds. as by the ascorbic acid-Ag method of J. v. Gelei (*Ibid.* **64**, 479–94 (1928)). The individual sections of the organs are clearly differentiated by these methods. The change in the sol-gel state in the walls of the vacuoles and ampullae has been confirmed and explained on the basis of the staining with Ag. Ruth Berggren

Comparative actions of potassium and acetylcholine on the muscles of the toad. V. H. Cicardo. *Compt. rend. soc. biol.* **132**, 505–7(1939).—See *C. A.* **33**, 7903[7]. L. E. Gilson

Influence of light and darkness on the melanophore-dilating activity of the hypophysis [of toads]. Julio N. Masselin. *Compt. rend. soc. biol.* **132**, 511–13(1939).—See *C. A.* **33**, 7903[9]. L. E. Gilson

Effect of carbon dioxide on glucose metabolism of trypanosomes. D. S. Searle and L. Reiner. *Proc. Soc. Exptl. Biol. Med.* **43**, 80–2(1940).—Preliminary. L. E. Gilson

The reproduction of Xenopus laevis. II. The histological changes in the accessory sex organs of female Xenopus induced by the administration of endocrine preparations. L. Berk and H. A. Shapiro. *S. African J. Med. Sci.*, Feb., Suppl. to Vol. 4, 13–17(1939); cf. *C. A.* **33**, 8828[8].—All expts. were performed on females recently brought in from ponds and whose lab. age did not exceed 2 weeks. The skin and the oviducts of *Xenopus laevis* are described and the presence of saccular glands in the skin is confirmed. The cloacal labia characteristics of the female are a modification of the skin. The activation of the labia and of the oviducts by gonadotropic substances consists in the production of a capillary congestion. This hyperemia of the cloacal labia was used as a test for the detection of gonado-

tropic substances. The gonadotropic activity was demonstrated in exts. of human pregnancy urine and of bovine and sheep anterior pituitary. Implanted *Xenopus* anterior lobes and injected steroids (methyltestosterone, testosterone propionate and progesterone) also exhibited gonadotropic properties. Implanted dogfish anterior pituitaries (in the doses given) did not appear to be gonadotropic in *Xenopus laevis*. Eleven references. III. **The secondary sex characters of the male Xenopus: the pads.** Lionel Berk. *Ibid.*, 4, No. 3, 47–60.—The cyclical development of pads on the forelimbs of *Xenopus* males appears to be under the control of the anterior pituitary acting through the testis. Pad development can be induced at all times of the year in *Xenopus* males by the injection of anterior pituitary prepns. There is no species or sex specificity in this action of the anterior pituitary. The distinctive manner in which the pads develop is described both macroscopically and histologically. Captivity in *Xenopus laevis* prevents the release of anterior pituitary gonadotropic principles into the circulation. Methyl testosterone and testosterone propionate are inactive in *Xenopus* males. The *Xenopus* testis hormone probably differs from the mammalian testis hormone. The pads of *Xenopus* males have at the most only a minor functional significance. Twenty-four references. W. R. Henn

Ovulation in Xenopus laevis induced by certain steroids. H. A. Shapiro. *S. African J. Med. Sci.*, Feb., Suppl. to Vol. 4, 21-31(1939).—The 10 substances which stimulated ovulation in *Xenopus laevis* (S. African clawed toad) fall into 2 distinct but chemically related steroid groups: members of the androstane series and members of the pregnane series. No substance showed activity if the side-chain at C_{17} was longer than that occurring in the pregnane series; if the compd. was unsatd. saturation destroyed gonadotropic activity, ethylation destroyed activity, the methylated form of the hormone possessed increased gonadotropic activity and esterification diminished, destroyed or delayed activity; compds. having a hydroxyl group at C_3 were active whereas their isomers were inactive and the trans position of H at C_5 can confer gonadotropic activity. None of these active steroids was of pituitary origin. There was no specific configuration of the steroid mol. which can be associated with its gonadotropic properties in *Xenopus laevis*. The long side-chains at C_{17} appeared to destroy gonadotropic activity; the most active compds. were associated with a Δ^4-3 keto constitution, the steroids were also active in the hypophysectomized animals and the gonadotropic properties of these steroids did not appear to have a general application to the amphibia. Eight references. W. R. Henn

The influence of the electrolyte content of the water on water animals at higher temperatures. E. Merker. *Naturwissenschaften* 27, 786–7(1939).—Whereas at 20° the salt content (especially Ca) of water protects soft-skinned animals against short-wave light (*C. A.* 33, 8317[8]) this effect disappears at 1–5°; resistance to the light is then afforded by both salt-free and salt-contg. water. Similarly it was found that increased salt concn. protects these animals against the effect of heat to some extent. Freshwater crabs which died at 29° in salt-free water, lived for less than 15 min. at 32° in water of 7 mg. Ca per l., lived 15 min. at 33° in water of 50 mg. Ca per l. In salt-free water Na and Ca from the body of the animal appears in the water after 1 hr. Animals pretreated in cold salt-free water show even less resistance at high temp.
B. J. C. van der Hoeven

Effect of vitamin D on the growth and propagation of Gambusia aff. holbrookii. G. V. Samokhvalova. *Compt. rend. acad. sci. U. R. S. S.* 24, 609–12(1939)(in English).—*Gambusia* (a fish destroying mosquito larvae) reared under aquarium conditions are undeveloped. Sunlight is one of the basic factors detg. normal growth and propagation. Ultraviolet light produces vitamin D in the organism. By supplementing the food with vitamin D, growth, sexual maturity and propagation of the fish are promoted. A. H. K.

The metabolism of the egg and embryo in amphibians. III. The absorption of oxygen in the primary organ center of Bufo vulgaris and Rana esculenta. Alberto Stefanelli. *Arch. fisiol.* 39, 176–209(1939); cf. *C. A.* 34, 175[8].
A. E. Meyer

A hormone which induces pupation in the common housefly, Musca domestica Linn. Paul DeBach. *Ann. Entomol. Soc. Am.* 32, 743–6(1939).—True hormones are found in insects and a new field of insect endocrinology is developing. Expts. showed that pupation of the housefly is initiated by a hormone secreted in the region of the "ganglion" of Hewitt (cf. The House-fly, Cambridge Univ. Press, 1914). The chem. nature of the hormone was not detd. The literature of the subject is reviewed.
C. H. Richardson

The nature of the secretory activity of the isolated Ringer-perfused frog liver. I. The differential secretion of pairs of dyestuffs. Rudolf Höber. *J. Gen. Physiol.* 32, 185–90(1939).—The perfused liver of *Rana temporaria* and *R. pipiens* is able to conc. in its secretion a large no. of dyes. The concn. attained may range from several hundred- to a thousandfold. When 2 dyes are perfused simultaneously, the liver seps. them, sometimes to such an extent that one compd. is suppressed entirely by the other. Secretion, under these conditions, depends upon the adsorbability of the dye rather than upon its diffusibility or lipoid soly. This is concluded from unpublished studies on perfused frog kidney which show that only dyes with a polar-nonpolar mol. configuration can pass through the kidney tubule wall. At the interface between cell and its surroundings, the dye is probably first anchored to one medium by the hydrophilic polar part of the mol., and to the other medium by the organophilic nonpolar part of the mol. While expts. of this nature have not yet been made on the liver, the operation of a similar mechanism is suggested by the failure of the perfused liver to secrete dyes having a large no. (4–5) of hydrophilic sulfonic acid groups. II. **The inhibitory and the promoting influence of organic electrolytes and nonelectrolytes on the secretion of dyestuffs.** Rudolf Höber and Elinor Moore. *Ibid.* 191–202.—The ability of the perfused frog liver to conc. dyes can be abolished entirely and reversibly by replacing about 1/8 of the NaCl in the Ringer soln. by an isosmotic amt. of a surface-inactive nonelectrolyte(disaccharide, hexose, pentose, polyhydric alc., amino acid, acid amide) or electrolyte; the effect is not dependent on changes in the diffusion rate. The opposite effect, i. e., promotion of secretory activity, is produced by polar-nonpolar electrolytes (bile salts, aromatic sulfonic acids) and by surface-active nonelectrolytes (anesthetics, alkaloids). Reversibility of this effect cannot regularly be observed on account of frequent cytolysis. Suitable concns. of inhibitory and promoting substances applied simultaneously counteract each other; inhibitory and promoting substances exhibit opposite effects on the dispersion of colloids. Since the promoting substances show a polar-nonpolar mol. configuration, the hydrophobic part of the mol. can adhere to org. substances, the hydrophilic part pulling toward water and exerting a loosening and swelling effect. However, among promoting substances are also found more or less apolar compds. which, because of their organophilic character, penetrate lipoidal structures, changing the intermol. adhesive forces and counteracting the close mol. packing with disintegration as the final result. Between these two groups are intermediate substances with slight hydroaffinity(ethylene glycol, glycerol) or slight organotropy(acetamide, urea). C. H. Richardson

Rod and cone electroretinograms in relation to pigment migration in normal and adrenalized frogs. P. O. Therman. *J. Cellular Comp. Physiol.* 14, 253–9(1939).—The elec. response of the frog retina (*b*-wave) to a standard red and a standard blue stimulus was measured. Adrenaline acts the same as light adaptation in that it expands the pigment and causes cone contraction. These changes were confirmed histologically and occur without any equiv. changes in the retinal elec. response or in the blue/red ratio. The protective role of the pigment epithelium must be negligible. Felix Saunders

Effects of calcium and magnesium on metabolic processes in Chilomonas paramecium. S. O. Mast and D. M. Pace. *J. Cellular Comp. Physiol.* **14**, 261–79(1939).—*Ch. paramecium* grows and reproduces indefinitely in isolation cultures in a soln. which consists of NaOAc, NH_4Cl, K_2HPO_4, $MgSO_4$ and water if the soln. is changed daily. If Mg is omitted from the soln. the culture dies out in a few days. If Ca is substituted for Mg and the soln. changed daily, growth and reproduction continue indefinitely, but the optimum concn. for Ca is lower than that for Mg. If both Mg and Ca are present and the concn. of the Ca is 0.001 *M*, the optimum concn. for Mg is 0.0001 *M* instead of 0.001 *M* and the rate of reproduction at the optimum is considerably higher than it is when either of the 2 is present without the other and the cultures live longer. Absence of Ca and Mg inhibits division of the cytoplasm but it does not inhibit synthesis of starch and fat and it does not prevent division of the nucleus. As a result, multinucleate monsters are formed which die in a few days. If these monsters are not too complicated they divide and become normal if Mg or Ca is added to the culture soln. Felix Saunders 1

Oxidative control of "spontaneous" activity in the nervous system of the crayfish. C. Ladd Prosser and Clara C. Buehl. *J. Cellular Comp. Physiol.* **14**, 287–97 (1939).—The spontaneous activity of isolated groups of abdominal ganglia of the crayfish requires an adequate O supply. NaCN in low concns. initially stimulates and later depresses the spontaneous activity. As the cyanide concn. increases, the depressing effect comes earlier. The effect of cyanide is greater upon isolated ganglia than upon those ganglia when the nerve cord is intact. A mixt. of CO and O (9:1) reversibly inhibits the spontaneous activity. The inhibition is partly reversed by illumination. Dinitrophenol in very low concns. stimulates, and in higher concns. initially stimulates and then depresses, the spontaneous activity. Na iodoacetate has no effect on spontaneous activity in crayfish ganglia isolated in air. Cyanide and CO exert their effects by altering the no. of spontaneously discharging neurones. Whether or not a neurone fires spontaneously depends on intraganglionic oxidations catalyzed by well-known enzyme systems. Felix Saunders 4

Physiological effects of nitro- and halo-substituted phenols on Arbacia eggs in the presence of ammonia. John O. Hutchens, M. E. Krahl and G. H. A. Clowes. *J. Cellular Comp. Physiol.* **14**, 313–25(1939).—The effects of 2,4-dinitrophenol, 4,6-dinitro-*o*-cresol, 2,4,5-trichlorophenol, 2,4-dichlorophenol and *m*-nitrophenol on the respiration and cell division of fertilized eggs of *A. punctulata* were detd. at const. extracellular pH in presence and absence of a concn. of NH_3 sufficient to increase the cytoplasmic pH from 6.8 to 7.2. The relative and abs. stimulation of O consumption produced by suboptimum concns. of each phenol is greater in the presence than in the absence of NH_3. The relative inhibition of cell division by each concn. of each phenol is the same in the presence and absence of NH_3. The extracellular concn. of total substituted phenol producing the optimum respiratory stimulation is the same for each phenol in the presence and absence of NH_3. Felix Saunders 6

Organic and inorganic electrolytes in lobster nerves. Francis O. Schmitt, Richard S. Bear and Robert H. Silber. *J. Cellular Comp. Physiol.* **14**, 351–6(1939); cf. *C. A.* **34**, 530[3].—Electrolyte analyses of lobster nerves indicate the presence of relatively large quantities of org. anions. After allowing for chloride and other inorg. anions the concn. of org. anions in an aq. ext. is approx. 0.3 milliequiv. per g. of water in the nerves extd. Removal of protein by Cl_3CCO_2H reduces this figure but slightly. Approx. 70% of the N is nonprotein N, amounting on the av. to 5 mg. per g. of nerve extd. Half of this is amino N. The unidentified anion may be an amino acid. F. S. 7

Excretion of phenol red in the dogfish, Squalus acanthias. Willie W. Smith. *J. Cellular Comp. Physiol.* **14**, 357–63(1939); cf. *C. A.* **33**, 7906[4].—Phenol red is copiously secreted by the tubules of the dogfish, the mean clearance of phenol red at plasma levels below 1 mg. percent being 1750 cc. per kg. per day with a phenol red/inulin clearance ratio of 22.6. Max. tubular secretion is reached when the concn. of phenol red in the plasma is about 2 mg. percent. The mean rate of max. tubular secretion is 18 mg. per kg. of fish per day, or 4.8 mg. per g. of kidney per day. Hippuran depresses the rate of tubular secretion of phenol red, but creatinine has no effect. Felix Saunders 8

Electrolytes in squid blood and muscle. Jeanne F. Manery. *J. Cellular Comp. Physiol.* **14**, 365–9(1939).—Squid blood and muscle were analyzed for Na, Cl, K and water, and mantle nerve was analyzed for K and water. The Na/Cl ratio in the muscle is the same as that in blood indicating the presence of a phase similar in compn. to blood. The "chloride space" is 16%. The sum of the Na and K concns. in muscle is equiv. to 0.5 of that of blood. Felix Saunders 2

Secretion of oxygen at high pressure from the blood of fish. Laurence Irving and Stuart W. Grinnell. *J. Cellular Comp. Physiol.* **14**, 409–10(1939).—CO_2 produces a pO_2 which is adequate to inflate the swim bladder of a trout with pure O at a depth of 15 ft. under water. Felix Saunders 3

The birefringent inclusions of the ciliates and cryptomonads. G. Deflandre. *Bull. soc. franç. microscop.* **7**, 110–29(1938).—The literature is reviewed and D's. observations are discussed. The inclusions may be either endogenous or exogenous. Their chem. compn. and physiol. significance seem to be very variable, some may be reserve materials while others are apparently waste products. 22 references. W. C. Tobie

Excretion by cephalopods. Pasquale Bruni. *Pub. staz. zool. Napoli* **16**, 16–27(1937).—Diffusible dyes injected into the musculature of the mantle of *Sepia officinalis* are eliminated by diffusion through the renal app. with the production of polyuria. The elimination of injected colloidal dyes through the renal app. is largely due to phagocytosis by the amebocytes which carry the dye through the epithelium. Elimination continues for 40 hrs. or more. The intensity of the diuresis produced by dyes diminishes in the order: eosin, toluidine, methylene blue. Trypan blue and sepia black produce oliguria. 24 references. W. C. Tobie 5

The relation of the liver to sexual maturity and gestation in selachians. Margarete Falkenheim. *Pub. staz. zool. Napoli* **16**, 212–20(1937)(in Italian).—The relative wt. of the liver and its histological condition were detd. in the females of *Mustelus vulgaris*, *M. laevis*, *Acanthias vulgaris*, *A. blainvillei*, *Centrophorus granulosus* and *Scymnus lichia* at various stages of the sexual cycle. Changes in liver vol. and wt. are due to accumulation or mobilization of lipoids and squalene by the liver cells. In *Mustelus laevis* mobilization occurs at the beginning of gestation and accumulation at its close. 7 references. W. C. Tobie

The dependence of size and shell-thickness of marine molluscs on the temperature and salt content of the water. Chen Ya-Shih. *Sitzber. Ges. naturforsch. Freunde Berlin* 1937, 238–87.—The size and thickness of shell (and to some extent body size) were detd. on 10,952 specimens representing 24 species of prosobranchiate gastropods and mussels from arctic, temperate and tropical seas of varying degrees of salinity. For most species there is an optimum av. annual temp. for max. size. Large fluctuations above and below the av. temp. cause a reduction in size. In many species the prolongation of the growth period caused by lower temps. produces an increase in size of the body, although the shell is lighter and thinner owing to a reduced excretion of $CaCO_3$. Slight changes in salinity usually have no effect on the size of the shell and the body. A reduction of the salinity below 3% inhibits growth of the body and shell, because of metabolic changes. In less saline water *Nucella lapillus* develops a larger kidney which serves to eliminate excess water. The quant. data are tabulated in detail. A tabulation of data from the previous literature is given on the relative sizes of shells of 194 species from the Mediterranean, English and Finnish coasts. 46 references. W. C. Tobie 9

Curtis, Winterton C., and Guthrie, Mary J.: Laboratory Directions in General Zoölogy. London: Chapman and Hall, Ltd. 195 pp. 9s.

Reed, H. D., and Young, B. P.: Laboratory Studies in Zoölogy. 2nd ed. London: McGraw-Hill Publishing Co. Ltd. 207 pp. 9s.

12—FOODS

H. A. LEPPER

Preserving the dietetic value of frozen foods. E. M. Chace. *J. Am. Dietet. Assoc.* **16**, 34–8(1940).—A discussion. E. Curzon

Uses of aluminum in the food industries. Antonio Montefredine. *Ind. ital. conserve* **14**, 142–6(1939).—In Italy, where a systematic promotion campaign has been carried on, Al for containers has gained most headway in the dairy industry, as cans for milk, as dairy equipment (pasteurizers, cheese vats, etc.), and as foil wrappers for butter and cheese. Considerable progress has also been made in developing Al containers for oils and fats, fish products and canned vegetables; also in Al foil wrappers for candy and other products. Light wt. and corrosion resistance are major advantages, with ease of recovery favoring economy. 50 references. Julian F. Smith

Aluminum as packing material for the canning industry. G. Lunde. *Aluminium* **21**, 843–5(1939).—Al of 99.5% purity was used in Norway with perfect success for cans for fish products, sardines, shrimps, etc. In general, the Al sheet does not need a treatment (coating) except when acid corrosion is present, as in berries or tomatoes. Neutral fish products and fish in jelly can be kept for years. As Al is much softer than tinplate, the deep-drawability is greater and cans can be drawn better in one process; but because of the softness of the material greater care has to be exerted in sterilizing and pasteurizing that the inner pressure during heating does not crack the cans. Tests to see how much Al had been dissolved in different preserves showed after 24–36 months between 0.5 and 8.6 mg. per 100 g. content, about as much as the amts. found in foods cooked in Al vessels, and perfectly harmless. Products which cannot be canned in 99.5% Al require "eloxated" Al or Al alloys; expts. in this direction are still being made. Six references. M. Hartenheim

Internal lacquering of tinplate containers for foods. I. Determination of tin in foods and a survey of the tin content of some canned foods. L. J. Lynch and J. F. Kefford. *J. Council Sci. Ind. Research* **12**, 303–10(1939).—The Sn content of a series of canned foods marketed in Australia is reported. The results show the need for lacquered containers, particularly for fruit and vegetable juices. Several com. lacquers were shown to be suitable. Spray-lacquering into the made-up can is the most satisfactory method of application. Philip D. Adams

Germicidal properties of paraffin. F. W. Tanner and H. F. Lewis. *Oil and Soap* **17**, 26–30(1940).—The effect of hot paraffin wax on bacteria on food containers under conditions which exist in actual practice was studied. Half-pint milk containers were heavily inoculated with *Escherichia coli* and an aerobic spore-forming species by filling with a heavy suspension of pure cultures and then emptying. It was estd. that each container received over 200,000 bacteria. After drying at 90°F. the paper bottles were paraffined at 74° and 79.5°, drained and cooled at 10–15°. The bottles were examd. by dissecting under aseptic conditions, also by filling with milk and broth and storing at room temp. and at 4.5°. The disintegration tests showed that the bacteria did not survive the treatment. Milk and plain broth from bottles stored at 4.5 and 21° did not yield any *Escherichia coli* and only a few from bottles paraffined at 76.6°. Bottles contg. plain broth were entirely free from the organism. The aerobic spore-forming bacterium was used because it should have survived the treatment and was used as a control, but it was also destroyed. To sterilize paperboard by high pressure steam and then paraffin it gives results of questionable value because the steam changes the nature of the board so that it accepts paraffin in a much different manner. Bibliography. E. Scherubel

Determination of citric acid in food products. K. Rundell. *Soc. Chem. Ind. Victoria, Proc.* **39**, 183–8(1939).—In detg. the citric acid content of food products it is necessary first to ext. the citric acid. The materials which have to be removed are proteins, fats and sugars and this is usually accomplished with the aid of clarifying agents such as phosphotungstic acid. With milk or other samples low in citrate and relatively high in sugars, it is customary to remove the fat and protein by pptn. with phosphotungstic acid and then ppt. the citric acid in the clear filtrate as insol. Pb citrate. Attempts to titrate fairly pure solns. of citric acid potentiometrically with a neutral soln. of $CaCl_2$ proved unsuccessful. The pentabromoacetate method, which depends on the oxidation of citric acid to acetonedicarboxylic acid with $KMnO_4$ in the presence of KBr + H_2SO_4, was next tried. Considerable difficulty was encountered in getting a const. wt. of the final product but by adopting a somewhat modified procedure good results were obtained. To 75 ml. of dil. citric acid soln. add 10 ml. of 18 *N* H_2SO_4 and 5 ml. of KBr, heat to about 50° and after 5 min. at this temp. add 50 ml. of 5% $KMnO_4$ soln. dropwise from a buret. After all the $KMnO_4$ has been added, allow to stand 3 min. and dissolve all MnO_2 from the ppt. by adding about 20 ml. of 20% $FeSO_4$ soln. and shaking. Cool for 4 hrs., filter the soln. through a tared Gooch crucible and use the filtrate for transferring all the ppt. to the filter. Wash with 50 ml. of cold water. Dry in a stream of clean dry air in a vacuum of 20–25 in. and weigh. W. T. H.

Nicotinic acid content of some foods. F. Del Regno. *Quaderni nutris.* **6**, 368–73(1939).—Nicotinic acid occurs very diffusely in nature. Values are high in meats and lowest in vegetables. Actual results of a long list of foods are charted. Helen Lee Gruehl

Vitamins. Paul W. Allen. *Natl. Butter Cheese J.* **31**, No. 1, 16–18(1940).—A review of vitamins in relation to dairy products. A. H. Johnson

The vitamin B_1 content of foods in terms of crystalline thiamin. Lela E. Booher and Eva R. Hartzler. *U. S. Dept. Agr., Tech. Bull.* **707**, 20 pp.(1939).—The most important natural food sources of vitamin B_1 for human dietaries are whole-grain cereals, legumes, nuts, and lean pork, both fresh and cured. Although as much as 50–60% of the vitamin B_1 value in lean pork is ordinarily destroyed as a result of cooking processes, the cooked product is still an excellent source of this vitamin. Fruits in general are not important sources of vitamin B_1. For the most part vegetables other than legumes are fair or unimportant sources of vitamin B_1. 29 references. W. H. Ross

Distribution of vitamin B_1 in foods as determined by chemical analysis. Magnus Pyke. *J. Soc. Chem. Ind.* **58**, 338–40(1939).—A survey of the distribution of vitamin B_1 (I) in 190 samples of food has been carried out by a rapid chem. technique using a modification of Jansen's thiochrome method in which the complete extn. of I is ensured by digestion of the sample with pepsin followed by hydrolysis of the pyrophosphate fraction with takadiastase. The amt. of thiochrome is measured by estg. the intensity of its fluorescence by the visual method of Wang and Harris (*C. A.* 33, 9388[1]). Details of the method are given. The values found are tabulated with 50 values collected by Cowgill and 45 values assembled by Fixsen and Roscoe as detd. by Baker and Wright (*C. A.* 29, 6965[6]) using the rat bradycardia method. I is a dietary constituent of such importance that knowledge of its distribution in foodstuffs is a matter of immediate practical importance. C. R. Addinall

Minerals and vitamins of grains. G. Quaglariello.

Quaderni nutriz. **6**, 276–89(1939).—A discussion summarizing data from the literature. Helen Lee Gruehl

Vitamin content of wheat germ. Darline Knowles. *N. Dakota Agr. Expt. Sta., Bimonthly Bull.* **2**, No. 2, 11–12(1939).—Wheat germ is credited with 1200 Sherman units of vitamin B (undifferentiated) per g. and 300 Sherman-Bourquin units of vitamin G per g. The food is a good source of vitamin E. C. R. Fellers

Quality in rice. III. Digestibilities in vitro of different varieties of rice. A. Sreenivasan and K. Vankata Giri. *Indian J. Agr. Sci.* **9**, 193–207(1939); cf. *C. A.* **33**, 3476[2].—The digestibility of raw or parboiled rice by pancreatic and salivary amylases increases with the degree of polishing. Parboiled rice, especially when unpolished, is more easily digested than raw rice. There is, however, a large amt. of individual variation between varieties. With increase in the degree of polishing there is an increase in the viscosity of the cooked flour and a slight diminution in the extent of hydrolysis of the starch. When the whole grains are cooked the starch is hydrolyzed less easily than raw starch by pancreatic amylase; the rate of hydrolysis is detd. by the extent of penetration of the digestive enzymes into the grain. Rice bran has a definite inhibitory action on amylases which is greatest with the first layer of polishings and decreases steadily with the subsequent layers. Ether-sol. substances and proteins of the bran exercise definite, though small, inhibitory action on starch hydrolysis. IV. **Storage changes in rice after harvest.** A. Sreenivasan. *Ibid.* 208–22.—Stored rice grains swell on cooking to 4 times their original vol. but freshly harvested grains swell to only twice the vol. Increased temp. and reduced air supply during storage improve the cooking quality. A moderate degree of polishing improves the swelling capacity and cooking quality of both unstored and stored rice but a high degree of polishing decreases the swelling capacity of the latter. Expts. *in vitro* indicate that when rice is cooked to a paste it does not digest as much as when cooked to a fluffy consistency. The growth rate of rats fed on cooked powd. rice was less than when fed on cooked whole rice. Starch from well-stored rice is slightly but definitely more easily hydrolyzed than that from freshly harvested rice. During the ripening of the grain there is a steady decrease in reducing and nonreducing sugars and dextrin and a rapid increase in the starch content. During storage there is no change in the various constituents. The resting seed contains both a liquefying (α) and a saccharifying (β) amylase; their activities are greatest at the milk stage and decreases with ripening and during storage of the grain. In the well-stored grain the amylases are dormant and cannot be extd. with water. There is a close parallelism between the decreased activity of the α-amylase during storage and the improvement in swelling capacity on cooking. It is concluded that the pastiness on cooking of unstored rice may be due to the α-amylase; the inactivation of this during storage is followed by increased swelling capacity on cooking. J. T. Sullivan

Quality tests on soft red winter wheats of Kansas. R. K. Larmour, Earl B. Working and C. W. Ofelt. *Cereal Chem.* **17**, 18–28(1940); cf. *C. A.* **34**, 530[8].—Kawvale, a semihard variety, appears to be distinctly differentiated from the typical soft varieties Clarkan, Harvest Queen and Michigan Wonder. These latter 3 varieties were lower in baking quality than either Kawvale or Turkey of comparable protein levels. Baking tests of the soft wheat varieties did not give a linear relation between loaf vol. and protein content; the loaf vol. tends to fall off at about 10% flour protein. Somewhat better relationship of these variables was obtained with 3 mg. $KBrO_3$ and 6% dry milk solids than with 1 mg. $KBrO_3$ and 4% dry milk solids. This would indicate the need for testing the higher-protein soft-wheat flours with greater dosages of bromate. L. H. Bailey

Influence of variety and treatment on phytin content of wheat. Silas M. Young and J. E. Greaves. *Food Research* **5**, 103–8(1940).—Twenty-one samples of wheat grown under different fertilizer treatments were examd. for phytin content by the method of Heubner and Stadler (*C. A.* **8**, 3569). Some of the varieties had twice as much phytin P as others. The lowest content was found in Newturk variety with 0.152%, and the highest in Dicklow with 0.328%. The percentage of phytin P of the total P varied from 56.7% in Regal to 94.3% in Federation. C. R. Fellers

Gluten. C. O. Swanson. *Northwestern Miller* **199**, (4), Sect. 1, 7a(1939).—Gluten and protein are closely related but not synonymous. Not all the protein in flour goes into gluten, nor is gluten as ordinarily obtained, all protein. Dry crude gluten will analyze about 85% protein; the other 15% will be made up of crude fiber, ash, starch, fat and some other substances. Some of the protein of flour is of such nature that it does not form gluten, and the amt. is about the same as other substances in crude gluten; therefore, the amts. of dry crude gluten and protein in flour are about the same. L. H. Bailey

Control dough temperature during fermentation. J. G. Malloch. *Cereal Chem.* **17**, 73–8(1940); cf. *C. A.* **33**, 2597[4].—It was shown that the dough temp. within the fermentation cabinet was not const. When a water bath was substituted for the fermentation cabinet there was some improvement in uniformity. Other features tending to favor uniformity are a water-jacketed mixer, changes in the wiring of the oven, and alterations in the air-conditioning app. to give improved control of temp. L. H. Bailey

Plasticity in doughs. Olof E. Stamberg and C. H Bailey. *Cereal Chem.* **17**, 37–44(1940).—A plastometer of the extrusion type was designed and constructed for use in the study of the plasticity of bread doughs. The app. was so constructed that doughs maintained at a const. temp. were extruded through a 6-mm. aperture from a cylinder by means of air pressure equiv. to 500 mm. of Hg. Rate of flow per min. was used as an index of the relative plasticity of the doughs. It was found that small temp. variations may affect the rate of flow to a greater extent than any probable variation in pressure, thus emphasizing the necessity of precise temp control in making such measurements. The log of the rate of flow was a linear function of the proportion of H_2O to flour used in mixing the dough. L. H. Bailey

Prediction of baking value from measurements of plasticity and extensibility of dough. I. Influence of mixing and molding treatments upon physical dough properties of typical American wheat varieties. Emil Munz and C. W. Brabender. *Cereal Chem.* **17**, 78–100(1940).—It appears important to study the rate and direction of change in dough properties, rather than to measure the dough properties at one stage only. Dough plasticity as a function of mixing treatment is a significant characteristic, but it fails to disclose other important actua or potential properties such as are affected, e. g., by certain chem. treatments. It is not always possible to predict from such measurements made during the initial mixing how far a dough may recover its properties after severe overmixing. Vigorous treatments such as are accorded by mixing, molding and punching effect an "excited condition" in a dough in which condition it exhibits different phys. properties from those shown in a state of relaxation. These induced effects do not remain const., and the dough tends to return to its original state if allowed to stand undisturbed for a time, and the rate and degree of change depend upon the properties of the flour and the treatments to which it, or the dough, has been previously submitted. On extended overmixing, doughs tend to lose extensibility and to increase in resistance to extension on standing. "Optimal mixing time" must be regarded as a relative term, depending upon such factors as the type of mixer employed, nature of fermentation, and chem. treatment accorded the dough. It is not a definite or abs. value, except as thus qualified. L. H. Bailey

The pressuremeter in the study of yeast. J. M. Doty and W. R. Urban. *Cereal Chem.* **17**, 44–54(1940).—A com. pressuremeter (Sandstedt and Blish, *C. A.* **28**, 6490[1]) was used on an unmalted flour to det. the characteristics and uniformity of various com. yeasts. The data obtained under various conditions correlated very well with data ob-

tained by actual test baking both on straight-dough and sponge methods. The pressuremeter shows very marked differences between various com. yeasts, and by proper manipulation it will show certain yeasts more adaptable to certain conditions. If the conditions under which a yeast is to be used are known, the pressuremeter will assist in detg. yeast characteristics that will best be suited to this set of conditions. L. H. Bailey

Effect of storage temperatures upon the viability and baking properties of compressed yeast. Lorin H. Bailey, M. T. Bartram and S. C. Rowe. *Cereal Chem.* **17**, 55–66 (1940).—Compressed yeast packed with dry ice for 2 days was stored along with fresh compressed yeast at 0°, 20°, 30° and 45°F. for 3 months. Microscopical, pH and baking tests were made at the beginning and at the end of one month, 2 months and 3 months, resp., at the temps. indicated above. The yeast that had been packed in dry ice deteriorated more rapidly than the fresh yeast stored for the same length of time and at the same temps The frozen yeast became mushy after it was thawed, making it more difficult to handle. Of the different storage temps. used, 30°F. is considered the most suitable since the yeast did not freeze at that temp., nor lose its normal consistency, and bread made from this yeast was fully equal to that made with yeast stored at any other temp. The temp. of evapg. dry ice (−109°F.) injures yeast in 24 hrs. and subsequent storage below freezing increases the amt. of deterioration. L. H. Bailey

Viscosity measurement in judging the baking quality of flour. Hugo Kühl. *Chem.-Ztg.* **64**, 49–50(1940).—A review with 16 references. E. H.

Bread (analyses). E. M. Bailey. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **426**, 10–11(1939); *43rd Rept. Food Products.*—Fresh white and whole wheat breads (8 samples of each) showed the following av. percentage compn., resp.: moisture 35.92, 36.39; ash 2.28, 2.49; protein 10.58, 11.12; fiber 47.46, 46.34; fat 3.33, 2.65; milk solids 7.31, 7.44. C. R. Fellers

Determination of sugars in bread. M. W. Fuhri Snethlage. *Chem. Weekblad* **37**, 16–19(1940).—Bread prepd. with the addn. of malt or malt ext. must by the present food law in the Netherlands be designated as "maltbread." To det. if malt or malt ext. was used in the baking process, a series of expts. was carried out with different kinds of yeast to sep. the maltose formed from the other sugars normally present in bread or added to it. By using *Saccharomyces fragilis* maltose was left intact in presence of glucose, fructose, lactose, galactose and sucrose. In milkbread *Torula monosa* was used; this leaves maltose and lactose intact. Results are given and tabulated showing maltose and lactose values for different kinds of bread as sold, and of bread prepd. specially with known amts. of ingredients. J. C. Jurrjens

Review of progress in research on bread staling. Wm. H. Cathcart. *Cereal Chem.* **17**, 100–21(1940).—This review attempts to explain what happens when bread stales; it discusses methods of measuring staleness and summarizes methods of preventing staleness. The inadequacy of our present knowledge of what happens when bread stales, the disagreement between phys. or mech. methods and the results of personal judgment as to the rate of bread staling, the lack of much scientific research on the effect of certain processes, ingredients, etc., in preventing bread staling, and the disagreement of existing data make definite conclusions difficult and point to the need for further strictly controlled scientific researches. Some processes, ingredients, etc., have an effect on delaying staleness, while others have little effect, if any at all, and in some cases even decrease bread quality. Many methods recommended for delaying crust staling increase crumb staling and *vice versa*. The two most effective methods for delaying crumb staling are heat and cold, yet these are not entirely practical at the present time. L. H. Bailey

The effect of milk on the bromate requirements of flours. C. W. Ofelt and R. K. Larmour. *Cereal Chem.* **17**, 1–13 (1940).—In general the inclusion of 6% dry-milk solids creates a tolerance toward bromate which tends to prevent damage to loaf vol. and to grain and texture when large dosages of this reagent are used. Even when the effect is small for loaf vol. it remains marked for grain and texture. This buffering effect toward bromate has important com. significance because it provides a safeguard against the possibility of damaging flours that have already been brought close to their optimum "oxidation" condition by bleaching or by the addn. of other oxidizing agents. Examn. of 2 of the flours which had been thoroughly extd. with ether indicated that this buffering effect was not assocd. with the ether-sol. components of the flours. Treatment of 2 flours that responded quite differently to both bromate and milk, with cysteine-HCl, a protease activator, resulted in no increased differentiation of the flours. This was interpreted to mean that the protease content of the flours was not responsible for the differences noted. Dry-milk solids, together with the appropriate amts. of $KBrO_3$, produced increases in loaf vols. and improvements in texture beyond what could be obtained with optimum amts. of bromate alone. The extent of this response appeared to be inversely related to bromate response in most cases. Exceptions were noted in the durum and the unbleached hard red spring clear flours. In certain flours greater improvements were obtained with milk alone than with the optimum dosage of bromate. This was particularly applicable to the low-strength flours. In all cases, however, milk gave some improvement in both loaf vol. and texture over what could be obtained with bromate alone. L. H. Bailey

Determining maximum and minimum percentage of constituent substances by control analysis in milks used for food; establishing standard types and differentiating between adulteration and low quality. José Luis Andrade. *Bol. ministerio sanidad y asistencia social* (Venezuela) **4**, No. 5, 82–96(1939).—Of the 4200 cows supplying milk to Caracas 85% are a mixed (Holstein-Criolla) breed; the rest are Criolla and other native breeds. From numerous analyses the following standards of quality have been established (min. and max. limits are stated in succession): d_{15} 1.028, 1.0345; total solids 11.5, —; solids not fat 8.5, —; fat 3.00, —; total protein 2.75, 4.10; lactose 4.2, —; ash 0.7, 0.9; Cl 0.07, 0.15; acidity (cc. 0.1 *N* NaOH) 15, 19; acidity (percentage of lactic acid) 0.135, 0.17; serum density 1.026, —; f. p. 0.59, 0.53 (Beckmann cryoscope); refraction (cupric method) 36.0, 39.0; pH 6.5, 6.9. It is recognized that these properties may be somewhat subject to seasonal variations. It is believed that the stated limits will serve as a guide (not to be too rigidly interpreted) for judging whether or not a given sample of milk is adulterated. The analyses were made with raw milk. Julian F. Smith

Preventing development of oxidized flavor in milk through the addition of small amounts of pancreatic enzyme. E. O. Anderson. *Milk Dealer* **29**, No. 3, 32, 82(1939).—The pancreatic enzyme powder is mixed with a small amt. of water in the ratio of 1 g. for 10 to 40 gal. of milk. This is added to cold raw milk and the milk pasteurized in the usual way. This procedure prevents the development of oxidized flavor in milk whether the off-flavor is due to metal contamination or to naturally high susceptibility of the milk to the development of oxidized flavor. A. H. Johnson

Milk peroxidase. W. Grimmer and W. Kleinau. *Milchw. Forsch.* **20**, 131–8(1939).—Milk peroxidase can be extd. from milk or whey by silicates or by pure silicic acid hydrate. An elution with NH_4Cl soln. is possible only as long as adequate quantities of sol. protein are present in the adsorbate. After repeated adsorption, an elution without addn. of a soln. of protein or peptone is unsuccessful. On dialysis of the protein-contg. eluates, the peroxidase seps. with the pptg. globulin. From peptone-contg. eluates, it adsorbs on the collodion membrane with a definite quantity of peptone. From the protein ppts. the peroxidase can be sepd. as an insol. substance by pancreatic digestion. It then gives no protein reaction. Dialyzed solns. of the enzyme give the peroxidase reaction with guaiac tincture, guaiacol and benzidine, but not with *p*-phenylenediamine and Rothenfusser's reagent. This

last is colored green. A violet color is produced if the reaction mixt. contains added alkali, protein, peptone, amino acids or dialyzer liquid, histidine-HCl being particularly active. Peroxidase solns. contg. peptone are stable for a long time; adsorbates dried over H_2SO_4 lose their activity very quickly. E. O. Whittier

Lipase action in mixtures of raw and pasteurized homogenized milk. I. A. Gould and G. M. Trout. *Mich. Agr. Expt. Sta., Quart. Bull.* **22**, 101–5(1939); cf. *C. A.* **29**, 5526⁷.—When homogenized pasteurized milk is mixed with homogenized raw milk and the mixed milk stored, the increases in acidity obtained are greater than the calcd. values if only the raw product undergoes lipolysis. This indicated that the fat of the pasteurized milk is also split to some extent by the lipase action. The titration of pure fat obtained by churning a mixt. of homogenized raw and unhomogenized pasteurized milk stored for various periods shows that such fat has undergone appreciable lipolysis. The fat comes from both the homogenized and unhomogenized portions of the milk. C. R. Fellers

The vitamin C content of milk. R. G. Washburn and W. E. Krauss. *Ohio Agr. Expt. Sta., 56th Ann. Rept.* (in *Bull.* **592**), 85–6(1938).—Ordinary raw milk was held in cool storage for 6 and for 24 hrs. over a 56-day period. The samples were titrated each day for ascorbic acid content and some was fed to guinea pigs for a biol. estn. of vitamin C content. Although the titration values indicated losses of 12.9 and 29.4%, resp., after 6 and 24 hrs.' storage, the biol. values of all the milks were much alike. From 9.7 to 14.6% of the ascorbic acid in the stored samples was reversibly oxidized. This fact had not been considered in the previously reported comparison of chem. and biol. methods for the estn. of ascorbic acid in milk. In a second expt. covering this point, much better checks were obtained between the chem. (including reversibly oxidized ascorbic acid) method and the biol. assay for vitamin C. C. R. Fellers

Producing vitamin D milk. M. J. Dorcas. *Milk Dealer* **29**, No. 4, 64–8(1940).—The photochem. principles involved in the irradiation of milk to increase the vitamin D content are discussed. A. H. Johnson

Some factors affecting certain milk properties. III. Effect of roughages on ascorbic acid. O. F. Garrett, R B. Arnold and G. H. Hartman. *J. Dairy Sci.* **23**, 47–52 (1940); cf. *C. A.* **34**, 533⁷.—Whether beet pulp, corn silage or grass silage was fed had no significant effect on the amt. of ascorbic acid secreted into the milk. Factors assocd. with the individual cow had a marked influence on the stability of the ascorbic acid while the milk is in storage. If the milk is pasteurized in such a manner that it is protected from violent agitation, sunlight, and metal contaminations, the loss of ascorbic acid during storage is not significantly greater than that of the corresponding raw milk. The feeding of properly ensiled molasses grass silage had a greater stabilizing effect on ascorbic acid of milks in storage than did corn silage or beet pulp. The grass silage was also superior to the other 2 roughages in producing milk with yellow color and good flavor. A. H. Johnson

Effect of heat on milk with special reference to the cooked flavor. I. A. Gould and H. H. Sommer. *Mich. Agr. Expt. Sta., Tech. Bull.* **164**, 48 pp.(1939).—The cooked flavor of milk is caused by the formation of sulfides which occurs when milk is subjected to sufficiently high temps. or to other changes occurring simultaneously with this formation. The liberation of sulfides is responsible for the heat lowering of the oxidation-reduction potential of milk. The sulfides also serve to explain the heat retardation and prevention of the oxidized flavor. The sulfides of milk are contributed by the milk serum. However, the more intense liberation found in milk and cream was due to the presence of a substance closely assocd. with the fat phase. This substance is sepd. from the cream by churning and passes into the buttermilk. The cooked flavor was closely related to the heat prevention of oxidized flavor, when Cu was added before heating at the rate of 1.4 p. p. m. Temps. sufficiently high to cause a cooked flavor also largely inhibited the development of the oxidized flavor. When the addn. of Cu followed the heating process, there was no relation between the cooked and oxidized flavors. 86 references. C. R. Fellers

Compounds of phosphorus in milk. B. N. Acharya and S. C. Devadatta. *Proc. Indian Acad. Sci.* **10B**, 221–8 (1939).—A review and discussion. The existence of 5 independent types of P was established, namely: ortho, pyro, org. P compds. insol. in $Ba(OH)_2$ at pH 9 and hydrolyzable and nonhydrolyzable org. P compds. sol. at pH 9. The acid-sol. P consists of casein P and lipoid P. The amts. of P present in these 7 varieties were estd. directly and results tabulated. J. C. Jurrjens

Phosphorus, calcium and magnesium in milk. B. N. Acharya and S. C. Devadatta. *Proc. Indian Acad. Sci.* **10B**, 229–35(1939).—The portion of milk insol. in trichloroacetic acid is mostly casein which had adsorbed some ions of Ca and Mg, while the acid-sol. but H_2O-insol. portion consists of tri-Ca and Mg phosphates and org. P. Scum, which collects after heating the milk, is derived both from the acid-sol. and insol. portions. On dialysis the acid-insol. portion becomes partly H_2O-sol. The H_2O-sol. portion of milk consists of acid phosphates of Ca and Mg. Results of analysis of 100 cc. of milk are tabulated. J. C. Jurrjens

Curd tension of chocolate milk drinks. G. Hadary and H. H. Sommer. *Milk Dealer* **29**, No. 3, 42(1939).—The curd tensions of 7 different chocolate milks were 3, 2, 2, 1, 14, 2, and 4, resp. These low curd tensions were due in part to the higher pasteurizing temp. to which chocolate milks are subjected but chiefly to the cocoa itself. The effects of sugar and such suspending agents as starch and locust bean gum were negligible. A. H. Johnson

Experiments on the suitability of corn silage in the production of milk for buttermaking. E. Crasemann and F. Christen. *Landw. Jahrb. Schweiz* **54**, 27–54(1940).—If corn silage is fed to cows before or during milking, abnormal taste and odor appear in butter derived from the milk. Chem. and bacteriol. investigations have given no evidence as to the substance responsible for these abnormalities. E. O. Whittier

Resazurin test for detecting mastitis. R. R. Russell, T. Palmer-Jones and G. M. Moir. *New Zealand J. Sci. Tech.* **21A**, 161–7(1939).—Results obtained from analysis of 814 individual quarter samples show good agreement between the resazurin test and cultural microscopic methods of diagnosing mastitis. The test is sensitive to the presence of streptococci, staphylococci or leucocytes, but is comparatively insensitive to micrococci in milk drawn aseptically from the udder. The test is simple, rapid and economical. C. R. Fellers

Chemical and bacteriological analyses of some samples of soda water, ice cream and sherbet from Lima. Alfonso del Castillo. *Bol. soc. quím. Peru* **5**, 134–45(1939). —Soda water, ice cream and sherbet were chemically analyzed for total solids, reducing sugars and acidity. Total bacteria as well as *Bacillus coli* were detd. Chem. analyses showed considerable variation among the different samples. Sterilized drinks were free from *Bacillus coli* but they were present in unsterilized drinks, being introduced by the water used. Similar conditions held for pasteurized and unpasteurized ice cream. It is recommended also that manufg. equipment be sterilized. Large quantities of *Bacillus coli* were found in sherbets owing to carelessness in manuf. and handling. L. Rosenstein

The quality of the Indian and the Western table butters. Zal R. Kothavalla and Noshir S. Doctor. *Indian J. Vet. Sci.* **6**, 151–64(1939).—Butter samples were prepd. from selected Jersey (English), Sindhi and Surti buffalo (Indian) herds. English butter scored slightly higher in flavor on opening the tins, but this lasted only a short time. Indian butter scored higher as to body, firmness and standing up quality. The differences might be attributed to component fatty acids as well as carotene content, and these in turn to differences in breed. 21 references. J. C. Jurrjens

Influence of neutralizers on the acidity of butter and butterfat. I. A. Gould and R. C. Townley. *Mich. Agr. Expt. Sta., Quart. Bull.* **22**, 96–101(1939).—Pro-

gressive lowering of the acidity of cream by the use of different neutralizers results in a corresponding lowering of the acidity of the butter and butterfat obtained from this cream. All neutralizers were not equally efficient in lowering the acidity, the limes being less efficient than the soda neutralizers. The acidity of the butterfat was lower than the acidity of the butter. It is necessary to consider the type of neutralizer and the degree of neutralization in connection with acid values of the butter and butterfat. C. R. Fellers 1

Estimation of butter losses in churning. W. J. Wiley. *J. Council Sci. Ind. Research* **12**, 391–6(1939).—The methods proposed by Udy (*C. A.* **24**, 1678) and by Bird and Derby (*C. A.* **32**, 5520[2]) are reasonably accurate, judged by direct detn. of butter fat in the buttermilk and wash water. Philip D. Adams 2

Bacteriology of butter. VII. Effect of reworking butter on growth of bacteria. H. F. Long and B. W. Hammer. *Iowa Agr. Expt. Sta., Research Bull.* No. **263**, 185–200 (1939); cf. *C. A.* **33**, 6974[7].—The reworking of butter often accelerated various microbiol. changes. When butter culture was added to the cream, the pH values of the butter serum decreased more rapidly after reworking. When lipolytic organisms were added to the cream, the acidities of the fat increased more rapidly. The time required for development of defects was usually decreased. 3

VIII. Relationship of Achromobacter putrefaciens to the putrid defect of butter. *Ibid.* No. **267**, 341–72.—Of 58 com. samples of butter having the typical putrid defect, 41 or 70% yielded *Ach. putrefaciens* and 6 yielded an apparent variant form of this organism. The origin of this organism is sometimes the dairy water supply. The bacteria developed in unsalted butter at pH values 5.8–6.8 but not when the pH of the cream was 4.5. Salt contents in the butter from 1.08 2.41% did not inhibit growth of the organism. In storage, the nos. of bacteria greatly declined. C. R. Fellers 4

Slow acid production by butter cultures. F. E. Nelson, L. A. Harriman and B. W. Hammer. *Iowa Agr. Expt. Sta., Research Bull.* **256**, 219–87(1939).—The inhibitory principle active against *Streptococcus lactis* in slow acid production possesses the general characteristics of a bacteriophage. No method was found to eliminate it from butter cultures. C. R. Fellers 5

Blending and processing. Practical suggestions in the making of process cheese. C. R. Barker. *Natl. Butter Cheese J.* **30**, No. 12, 14, 39(1939); cf. *C. A.* **34**, 535[7].—Characteristics of cheese such as acidity, age, texture and flavor are discussed in relation to the manuf. of process cheese. A. H. Johnson 6

The use of colloid mill in the production of margarine. N. Kozin and S. Bessonov. *Maslobo˘ino Zhirovoe Delo* **15**, No. 5, 23–5(1939).—Promising lab. results are reported. Chas. Blanc 7

Storage of margarine in the atmosphere of combustion gases. M. Ravich and E. Shmidt. *Maslobo˘ino Zhirovoe Delo* **15**, No. 4, 20–3(1939).—Comparative tests on the effect of storage of margarine in air and in a current of combustion gases (CO_2 85.8, N 14.1 and O 0.1%) at room temp. are described. After storage for 100 days in the atm. of combustion gases, the margarine samples showed no changes in their phys. appearance. The samples held in the air atm. became moldy after 13 days of storage and were thoroughly infected with green and brown molds after 28 days. The acidity of margarine showed no change after 45 days of storage in a current of combustion gases, while that of samples held in air increased six-fold. Chas. Blanc 8

Changes taking place in fats during cooking. V. R. Chertok and Ts. L. Baskovich. *Voprosy Pitaniya* **7**, No. 4–5, 217–21(1938); *Khim. Referat. Zhur.* **2**, No. 4, 139(1939).—In frying with butter at 150–200° hydrolysis and oxidation produce some low-mol. acids; sapon. no. increases from 224–44 to 247–50, free acids, peroxides and hydroxy acids increase, and I no. decreases from 40 to 29. Very little change in fats was observed in boiling. The acidity remained unchanged; evidently the acids formed from hydrolysis were lixiviated. Only formation of low-mol. acids was observed (the sapon. no. increased from 225 to 234). W. R. Henn 9

Physical and chemical characteristics of lards and other fats in relation to their culinary value. II. Use in plain cake. Belle Lowe and P. Mabel Nelson. *Iowa Agr. Expt. Sta., Research Bull.* **255**, 146–216(1939); cf. *C. A.* **32**, 2236[5,7]; **33**, 5929[2].—The cakes studied contained about 40 parts of fat to 100 parts of flour. Data are given for 42 samples of lard. For each fat there is an optimum temp. at which it creams best, this temp. being lower for softer fats of higher I_2 no. and higher for firmer fats. Smooth lard creamed to a larger vol. than grainy lard at both 25 and 30° when both textures of lard were obtained from the same original lard. The effect of phys. factors of the fat on cooking and cake quality are discussed. Fat distribution in cake was affected as follows: As the temp. of the ingredients at time of mixing was elevated the proportion of fat distributed within the crumb, i. e. as an oil-in-water emulsion and as pools, increased, but the quality of the cakes decreased. Cake vols. became smaller with larger creamed-fat vols. Bibliography. C. R. Fellers

Adulteration of lard. E. Renaux. *J. pharm. Belg.* **21**, 549–50(1939).—Three samples which appeared to be hydrogenated fish oils gave tests which corresponded fairly well with those given by lard except their microscopic appearance under polarized light (brilliant needles observed only in the true lard) and their response to the Tortelli and Jaffe color reaction (cf. *C. A.* **8**, 3723; **9**, 1255) (true lard gives no color; samples gave yellow to blue colors). S. W. Goldstein

Meat from the point of view of inspection. Rubem Pecego. *Rev. alimentar* **3**, 165–71(1939).—The compn. of different com. meats and phys. and chem. methods of inspection for disease and spoilage are discussed. L. E. Gilson

Meat products. W. J. Mathis, C. E. Shepard and E. M. Bailey. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **426**, 14–18(1939); *43rd Rept. Food Products.*—Soybean flour or meal is not prohibited in meat products in Conn. Its presence can be detected by means of the urease test and confirmed microscopically by the detection of cells characteristic of soybean. A neg. urease test does not necessarily mean that soybean flour is absent; the microscopic examn. should be made in all cases. Quant. methods of estn. are lacking. In approximating skim-milk powder from the lactose found, the factor 1.8 has been used to allow for such powders as may contain somewhat more than 50% lactose. An allowance of 0.5% is made for starch that may be due to seasoning rather than to starchy fillers. Analysis of 30 samples of frankfurts for lactose by the yeast method (*C. A.* **32**, 7150[1]) showed that filler was present and not declared, in 8 samples. C. R. F.

Ripening of sausage in casings. M. Guastalla. *Ind. ital. conserve* **14**, 115–17(1939).—Analyses of Felino type sausage, in paste form and in pig intestine casings, show progressive desiccation with moisture content falling from 55% to 24% (4 months) and finally 20% (8 months). Aside from the corresponding percentage decrease in N, fat, ash and NaCl there are certain chem. changes in the sausage. Sol. matter (total or on the ash-free basis) first increases, then decreases; sol. N follows a like course. Acidity first increases, then drops off slightly, but the medium remains distinctly acid. Ammonia N increases slightly in the first stage, then remains approx. const. Nitrate content is high at first but progressively decreases while nitrite, initially present only in traces, rapidly increases but later falls off again, sometimes disappearing entirely in the oldest samples. The rise in sol. matter and sol. N confirms the opinion that ripening is accompanied by slight peptonization. The decrease which then follows indicates a slow progressive insolubilization, probably because of phenomena involved in desiccation. The const. level reached by ammonia N shows that protein degradation tends to stop after a time. Julian F. Smith

Effect of benzoated brine dips on keeping quality of fish fillets. C. R. Fellers and E. W. Harvey. *Food Research* **5**, 1–12(1940).—NaOBz and MgOBz, and mixts. of these salts with BzOH, gave best results in extending the

storage and shipping life of strictly fresh haddock, cod and red perch fillets. CaOBz and NH_4OBz were least effective. The benzoate salts were used in a 5% NaCl brine in concns. of 0.15–0.40%, with an av. of 0.30% benzoate. Acidification to a pH value of 4–5 increased the effectiveness of the treatments. The benzoated brine dip for 2–3 min. has a cleansing and firming effect on the fillets. The action of the dipping solns. seems to be limited largely to the surface layers of fish except where the tissues are sepd. or broken. The period of acceptability of the fish was extended for several days at low temps. over untreated controls. Frozen fillets, which have been previously treated with benzoated brine, also keep longer after defrosting. The retention of benzoates in brine-dipped fillets is very small, averaging about 0.01% for a 2-min. dip in a brine contg. 0.3% NaOBz. The treatment imparts no off-flavor to the fish. Ice contg. 0.2–0.5% NaOBz was successfully prepd. Such ice possesses definite antiseptic action on fish packed in it, but the application to fish fillets is believed to be limited. C. R. Fellers

Influence of various types of rind injury on the incidence of water spot of navel oranges. L. J. Klotz and A. J. Basinger. *Bull. Dept. Agr., Calif.* **27**, 232–41(1938).—Water spot is a nonparasitic breakdown of the rind of citrus fruits, the most important factor of its origin being the inhibition of external water by the albedo or white portion of the rind. Invasion of the water-affected areas by decay-producing fungi causes rapid decline in the fruit. There may be a possibility of preventing water spot losses by means of a protective spray of paraffin wax. C. R. Fellers

Distribution of soluble solids in citrus juices. E. T. Bartholomew and W. B. Sinclair. *Calif. Citrograph* **24**, 352, 362–3 and 382–4(1939).—Excessive accumulation of sol. solids in the stylar ends of citrus fruits (valencias, navels and Thompson seedless grapefruits) does not occur until they are approaching maturity. A given segment as a whole may contain from 0 to 3.5% less total sol. solids than another segment in the same fruit. In the fruit on the outside of the tree, the 3 north (north side as it hung on the tree) segments have a higher sol.-solids content, in general, than the 3 south segments. The occurrence of a single frozen segment in a fruit appears to be positively correlated with the fact that this particular segment contains a considerable lower concn. of sol. solids than other segments in the same fruit. The color of the juice in one half of a segment is lighter or darker than that in the other half and the juice in a fruit having a south exposure is lighter than that of a shaded fruit. The total sol. solids and solid-acid ratio of navels are highest in the south-side fruit while with 1 exception the greatest percentage of titratable acid is in the north fruit. In the case of valencias the highest sol.-solid contents are in the south fruit and with 1 exception the acid is highest in the fruit from the south. A comparison of naval oranges on the basis of size (large, medium and small) shows that the total sol. solids, pH, reducing and total sugars increase from the large size oranges through the medium to the small sizes. The citric acid content is lowest in the large size oranges and is max. in the medium ones. The solids-acid ratio is highest in the small oranges and the same in the other 2 sizes. In the case of valencias the highest values for percentage of total sol. solids and citric acid and the reducing and total sugars are found in the small sizes and the lowest values in the large oranges. Both the pH and solids-acid ratio decrease from the large to the small size. J. R. Adams

Orange beverages. E. M. Bailey. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **426**, 9–10(1939); *43rd Rept. Food Products;* cf. *C. A.* **33**, 7664.—Three orangeades sold in Conn. contained 12–20% orange juice. Tests conducted to det. the stability of the ascorbic acid in fresh orange juice and in dild. orange juice showed that there is very little loss after storage for a day at room temp. C. R. Fellers

Chemical composition of important Hungarian plums. Jenő Becker. *Z. Untersuch. Lebensm.* **78**, 403–7(1939).—Analysis of 95 plum samples yielded total solids 13.31–24.02, sugar 8.8–13.96 (dry basis 56.6–77.1) acids 0.44–1.59% (dry basis 2.4–10.3%). M. M. Piskur

Blackberries do not contain tartaric acid. John R. Eoff, Jr., and W. J. McVeigh. *Fruit Products J.* **19**, 104, 111(1939).—Eleven samples of blackberry juice, representing canned, fresh, wild and cultivated fruit grown in various localities, were analyzed for the tartrate radical. No tartaric acid, nor tartrates, were found in any of the samples. The Kling method, capable of detecting 2–3 mg. % of tartrates, was used. P. L. H.

The sulfuric acid oil digestion method for avocados. Hamilton P. Traub, Cloyde H. Russell, Charles T. O'Rork, Jr., J. M. Tubbs and R. E. Caldwell. *Proc. Am. Soc. Hort. Sci.* **36**, 429–31(1939).—The ground sample is digested by H_2SO_4 for 30 min. at 55° and the amt. of oil detd. in a Babcock bottle. The error is less than 2.5%. Lawrence P. Miller

Spray-residue control on California fruits. Alvin J. Cox. *Bull. Dept. Agr., Calif.* **27**, 633–44(1938).—In general, 1% HCl was effective in removing Pb and As spray residues from fruit. Wash solns. can be increased in effectiveness by adding 10–15 lb. NaCl per 100 gal. of water and raising the temp. to 105°F. This temp. is more effective than an increase in HCl concn. for Pb removal. C. R. Fellers

Effect of some varietal, cultural, harvesting, and storage conditions upon the content of certain mineral salts and vitamins in tomato fruits. I. C. Hoffman, W. E. Krauss and R. G. Washburn. *Ohio Agr. Expt. Sta., 56th Ann. Rept.* (in *Bull.* **592**), 66–7, 92(1938); cf. *C. A.* **32**, 5559⁶. —Rather wide differences were found in the ascorbic acid content of varieties. There was no correlation between ascorbic acid content and color of flesh. Stage of maturity and acidity were both closely correlated with ascorbic acid. Ascorbic acid content increases progressively in the fruits to maturity. Moist soil conditions are also conducive to higher ascorbic acid content. Similarly high fertility favored high ascorbic acid in tomato fruits. Different pH levels in the soil tended to reduce ascorbic acid slightly from alk. to acid conditions when nitrates were supplied, but where ammoniates were used, the slight changes did not appear significant. Seventy-five varieties of tomatoes were examd. The acidity, calcd. as citric, of the dry pulp ranged from 3.88 to 4.44, and the ascorbic acid content, from 0.114 to 0.464 mg. per cc. Total pigment concn. (lycopene + carotene) on 56 varieties was 0.0018–0.0970 mg. per g. Only 4 varieties, white or yellow, contained carotene by this method. The small amt. of carotene in the pigment is masked by the lycopene. The spectrophotometer cannot detect up to 4% carotene in mixts. contg. large amts. of lycopene. C. R. Fellers

Quality and yield in tomato products. D. J. Tilgner and R. Schillak. *Polish Agr. Forest Ann.* **39**, 361–93(in English, 393–4)(1937).—The manuf. of tomato products in Poland is criticized. The fundamental errors in processing procedures are: inadequate sorting and washing, loss of juice contg. nutritive salts, sugars and other dissolved solids and lack of standardization procedures and constants for the various products. The authors suggest the following specifications for the tomato products: for purée, extract and paste not less than 12%, 20% and 35% total solids, resp.; no less than 35% reducing sugars, acidity (as citric acid) not greater than 12%, salt content 5% (based on total solids), Cu not to exceed 0.003% and no added artificial coloring or chem. preservative. Mold and bacteriol. examn.: not to exceed 66% mold filaments per examd. field, 100 million bacteria per cc. and 125 spores per 1/60 cc. according to the Howard method). Adequate labeling is to be provided. C. T. Ichniowski

Vitamin A content of some commercially canned tomato juice. Charles F. Poe, Ola K. Gant and Eloise Griffin. *Fruit Products J.* **19**, 73–4, 88(1939).—Expts. performed on male albino rats showed that whole tomato juice is a good source of vitamin A. The min. amount of the vitamin found in this juice was 5.00 units per cc.; the max. vitamin A content was 8.74 units per cc. There was no marked difference in the vitamin A content of any of the 15 brands of tomato juice tested. The general average of

vitamin A in whole tomato juice was 7.12 units per cc. Filtered tomato juice proved to be a poorer source of vitamin A than the whole juice; a min. of 0.10 units per cc. and a max. of 0.14 units per cc. were found. According to the results recorded in the article, the whole tomato juice contains 59 times as much vitamin A as the filtered juice. 13 references. Edward A. Ackermann

The vitamin C content of some fruits of the Dutch East Indies. IV. J. P. Spruyt. *Geneeskund. Tijdschr. Nederland.-Indië* **79**, 2912–17(1939); cf. *C. A.* **30**, 4223[8]; **32**, 5453[4]; **33**, 6464[3].—Results are given of the examn. of 48 Indian fruits as to their vitamin C content. The same methods were used as for those previously examd. The high vitamin C content of malaka fruit (*Phyllanthus Emblica, L*) namely 30–40 mg. of ascorbic acid per g. of powder, suggests a cheap vitamin C source for native use. A noticeable reduction in acid medium was found, as in about 3 weeks time all vitamin C was destroyed, this fact being of importance for the medical practitioner in prescribing vitamin C-contg. medicine. J. C. Jurrjens

The vitamin C (ascorbic acid) content of ten varieties of watermelons. R. E. Clegg and G. Howard Satterfield. *J. Am. Dietet. Assoc.* **16**, 39–42(1940).—In the heart of 10 varieties of watermelon the vitamin C content varied from 5.04 to 13.70 mg. %. The red tissue immediately under the rind contained 4.22 to 7.37 mg. %. There is no relation between the size and shape of the watermelon and its vitamin C content. The Stone Mountain variety was highest and the Cuban Queen lowest in vitamin C content. Preserved and pickled rind contained little vitamin C. E. Curzon

Determination of carotene in fresh and frozen vegetables. I. Carotene content of green snap beans and sweet corn. Wm. I. Zimmerman, Donald K. Tressler and Leonard A. Maynard. *Food Research* **5**, 93–101(1940).—The method of Russell, Taylor and Chichester for the detn. of carotene (*C. A.* **29**, 5473[6]), slightly modified, gave good results for carotene estn. in vegetables. Biol. assay showed that much of the pigment in Golden Cross Bantam sweet corn is not carotene. The sweet corn contained 0.6–1.2 γ carotene per g. by bioassay; snap beans 2.4–4.1 γ. No appreciable losses of carotene occurred during the storage of vegetables at either −17.8 or at −40.0°. C. R. F.

Vitamin content of green string beans when cooked or canned and stored. Helen L. Mayfield and Jessie E. Richardson. *Montana Agr. Expt. Sta., Bull.* **373**, 3–13 (1939).—Canned green string beans, taken from storage and reheated, are nearly as rich in vitamin A as the freshly cooked beans; but lost about 40% of their vitamin B_1 content. The loss in vitamin C was 80–85% of that originally present in the raw beans. During cooking, losses of 30–40% in vitamin C were found. Typical values expressed in mg. per g. of ascorbic acid are: raw Burpee Stringless beans, 0.27; fresh cooked, 0.18; home or commercially canned 0.03–0.06. C. R. Fellers

Chromatographic identification and biological evaluation of carotene from mature soybeans. Wm. C. Sherman. *Food Research* **5**, 13–22(1940); cf. *C. A.* **33**, 8849[1].—The biologically active carotenoid pigments extd. from 5 varieties of mature soybeans consist of 80–88.8% β-carotene and 2.5–11.8% α-carotene. *Cryptoxanthin* was not found in any of the soybean seeds examd. Similar exts. of yellow corn contained 66% cryptoxanthin. The results from the chem. analyses were substantiated by biol. assays. C. R. Fellers

Vitamin F (linoleic acid) in sesame oil. A. A. Hoover. *Ceylon J. Sci.* **D5**, 55–7(1939).—A sample of com. oil contained 14.2% linoleic acid, entirely the α modification, and very little linolenic acid. In 4 samples of com. oil the I values were 90–105 and sapon. values 185–187. K. D. Jacob

Changes in vitamin C during the boiling of turnip greens. W. W. Floyd and G. S. Fraps. *Food Research* **5**, 33–41 (1940).—Turnip greens contain 67–422 mg. of ascorbic acid per 100 g. Losses of total vitamin C content by ordinary cooking methods ranged from 16 to 37%. Slow cooking caused somewhat greater losses than rapid cooking. The losses were the same whether or not the pans were covered during the cooking process. C. R. Fellers

Fat acidity in relation to heating of corn in storage. Lawrence Zeleny. *Cereal Chem.* **17**, 29–37(1940).—The rate at which heat is developed depends upon the moisture content of the grain, the temp., the available O_2 supply and upon certain characteristics of the grain itself, which are not completely understood. The acidity of grain, particularly of corn, is a more reliable measure of its degree of soundness than other available chem. or phys. tests. Fat acidity is expressed in terms of mg. of KOH required to neutralize the free fatty acids extd. from 100 g. of corn, calcd. to a dry matter basis. The rate of spontaneous heating of grain can be predicted much more accurately when moisture and fat acidity are considered together than with moisture alone. It was shown that corn with a moisture content of 17% and a fat acidity of 100 can be expected to heat in storage as rapidly as corn with a moisture content of 21% and a fat acidity value of 20. L. H. Bailey

Comparative study of the chemical composition of five varieties of soybeans. R. C. Burrell and Alvin C Wolfe. *Food Research* **5**, 109–13(1940).—Chem. analyses, including carbohydrate fractions, are given for Illini and Peking varieties as well as for the 3 edible varieties, Bansei, Jogun and Kura. No clear cut chem. differences were found which would serve to differentiate edible and field varieties of soybeans. In general, crude fiber content was lower in the edible varieties. Considerable quantities of galactans are present. C. R. Fellers

Behavior of microörganisms at subfreezing temperatures. I. Freezing redistribution studies. Vernon H. McFarlane. *Food Research* **5**, 43–57(1940).—The effects of solutes on distribution patterns in ice were studied. The yeast-cell distribution pattern differed for sugar, NaCl and HCl. The presence of H ions in a medium hastened the destruction of yeast cells and sometimes markedly altered the distribution patterns of these cells in the frozen mass. **II. Distribution and survival of microörganisms in frozen cider, frozen sirup-packed raspberries, and frozen brine-packed peas.** *Ibid.* 59–68.—In 750-cc. containers of cider frozen and stored at −20°, microbial forms, sol. solids and total titratable acids were concd. in central cone-shaped areas and in surface areas. There was no marked redistribution of microbial forms, sol. solids or H-ions in frozen sirup-packed raspberries or brine-packed peas. The microörganisms decreased most rapidly in those portions of the frozen mass contg. the highest sol. solids content. Large nos. of bacteria remained viable in frozen peas after storage for 24 weeks at −20°. C. R. F.

The alkaloid content of lupines. Victor Lukazewicz. *Polish Agr. Forest Ann.* **39**, 485–6(in French, 487)(1937).—The ordinary or "bitter" lupines with alkaloid contents ranging from 0.7 to 1.3% are unsuitable as cattle fodder. A "special" variety of *L. angustifolius* with an alkaloid content of 0.08% can be used for feeding without any treatment to decrease the content of the toxic principles. C. T. Ichniowski

Wax emulsions for vegetables. Hans Platenius. *N. Y.* (Cornell) *Agr. Expt. Sta., Bull.* **723**, 43 pp.(1939).—A wax coating inhibits the diffusion of water vapor and other gases. The rate of diffusion depends primarily on the soly. of the gases in the wax membrane. The thickness of the dried wax films are 1–2 μ. The coating caused a decrease in O_2 consumption but had no effect on CO_2 production by carrots. Waxing reduced sugar losses in carrots. The compn. of the com. wax prepns. Brogdex, Dowax and Brytene are given. Parsnips did not respond well to waxing. Leafy vegetables and also bunched vegetables always gave unfavorable results when waxed. C. R. Fellers

Some changes in marmalades: syneresis, molding, crystallization. Giuseppe Alesi. *Ind. ital. conserve* **14**, 138–41(1939).—Syneresis in fruit marmalades not only makes the product unsightly but also favors fermentation. A suitable citrate or tartrate concn. inhibits syneresis, but is likely to impair jelling properties. Citric acid may be used if the amt. is correctly calcd., with due allowance for differences between fresh and SO_2-preserved pulp and

for natural differences in pH. To avoid mold it is advisable not only to practice thorough sanitation but also to use a high sugar content (at least 60%) and to cook the product a little thicker than the customary consistency. With sufficiently high sugar content and low surface moisture content mold will not grow. These conditions are related to the osmotic pressure in the substrate. Crystn. is favored by high sugar content (about 70%), excessive or deficient ratio of invert sugar to sucrose, pectin deficiency and prolonged cold storage. Sugar inversion is an important process in making marmalades and close attention to acidity, temp. and other conditions is required. With pulp from low-acid fruits, for example, when fresh or preserved by sterilization (not with sulfite) all the sugar is added before cooking, but the pectin and the correct amt. of citric acid are withheld till near the end of the cooking. Julian F. Smith

Lead in maple-tree products. Elphège Bois, Maurice Lessard and Armand Roberge. *Trans. Roy. Soc. Can.* III, **33**, 107–12(1939).—A small amt. of Pb was found to be dissolved from tin plate and solder by maple sap during the process of sugaring. Painting and lacquering the app. was not sufficient protection against the corrosive action of the hot sap and a slight taste was imparted to the maple sugar. Boilers and evaporators of Al are recommended. J. W. Shipley

Determination of the water-soluble tannins in cocoa according to the cinchonine method. K. Kappeller. *Z. Untersuch. Lebensm.* **78**, 393–401(1939).—The effect of the amt. of sample, concn. of tannins (amt. of diln.), pH, and presence of milk and nuts on the detn. of the water-sol. tannins by pptn. with cinchonine was investigated. A modification of the method replaces filtering with centrifuging and decanting the supernatant liquid. It is reported that the results obtained are high because cocoa exts. contain nontannin materials which are also pptd. with cinchonine. The results are therefore not considered to be the true amt. of water-sol. tannins present. The method cannot be applied to chocolate contg. milk or nuts. M. M. Piskur

Determining paprika color components by means of the step-photometer. L. v. Cholnoky. *Z. Untersuch. Lebensm.* **78**, 401–3(1939).—Data are presented for applying the step photometer to the method previously described (*C. A.* **34**, 1090⁹). M. M. Piskur

Processing the macadamia (nut). R. H. Moltzau and J. C. Ripperton. *Hawaii Agr. Expt. Sta., Bull.* **83**, 31 pp.(1939); cf. *C. A.* **32**, 8177⁴.—The nut contains about 25% moisture when it falls to the ground. Least damage to the kernel results when cracking takes place at a moisture content of 3.5%. Air-, sun- or artificial drying methods are used. Mech. equipment for cracking the nuts is described. The kernels are reduced to a moisture content of 1.5% by very slow oven roasting, starting at 110°F. and ending at 170°F., the whole operation requiring about 8 hrs. The kernels are cooked either by (1) immersion in a vat of hot oil at 275°F. for 12–15 min. or (2) roasting at 275°F. for 40–50 min. Refined coconut oil is used for the oil bath during the oil cooking method. After cooking, the nuts are spread in thin layers to cool and are sprayed with an adhesive such as a 15% soln. of gum arabic followed by salting. Vacuum-packed salted nuts in sealed containers keep without deterioration for several years. The fresh kernels may be kept safely in cold storage under 40°F. for 12 months. At ordinary temps., deterioration in quality of the nuts takes place rapidly. C. R. Fellers

Compilation of information on kudzu, Pueraria thunbergiana. I. E. Miles and E. E. Cross. *Miss. Agr. Expt. Sta., Bull.* **326**, 3–14(1939).—This legume contains approx. 2.83% N and 0.27% P. The total digestible nutrients in the dry matter are 50.8%. The plant is a *prolific N fixer in the soil.* C. R. Fellers

Commercial feeding stuffs. E. M. Bailey. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **425**, 99 pp.(1939); *Rept. on Inspection*, 1938.—Of the 888 samples of animal feeds examd., 130 were deficient in 1 or more items. Of the 55 samples of vitamin D carriers for animal feeding, 18 samples fell below the guaranteed potencies of vitamin D. C. R. Fellers

Indigestible carbohydrates in feeds. V. G. Heller and Robert Wall. *J. Nutrition* **19**, 141–9(1940).—A modified method (cf. Williams and Olmsted, *C. A.* **29**, 3700⁷) of detg. lignin, hemicellulose and cellulose contents of feeds is given. Both the total content of and the ratio between the quantities of lignin, hemicellulose and cellulose of various cereal grains and grasses vary considerably. The indigestible residue detd. by the method is much greater than the analogous crude fiber value. The apparent utilization of cellulose in feeds is greater than that of lignin. The cellulose of certain mixts. of feeds is better utilized than that of others; the utilization is detd. to some extent by other ingredients of the mixt. C. R. Fellers

Fodders of note. M. Kling and A. Imhoff. *Prakt. Blätter Pflanzenbau Pflanzenschutz* **17**, 140–58(1939).—Results of chem. analyses to det. feeding values of weeds and many miscellaneous feeds are reported. Data cover the period from Jan. 1, 1938 to June 1, 1939. Edwin J. Sciferle

The food value of hay as affected by the process of curing. B. J. Senior and E. J. Sheehy. *J. Eire Dept. Agr.* **36**, 5–37(1939).—The results are given of an investigation extending over a period of yr. into the quant. and qual. changes taking place in grass herbage during the process of hay making and into the effect of exposure to weather influences on the nutritive value of hay. The rapid drying of green herbage in a current of air at 140°F. did not alter the digestibility to any appreciable extent. Exposure to weather influences, especially that of rain, altered the color, leached out the more sol. constituents, decreased the digestibility and, with respect to minerals, vitamins and energy content reduced the nutritive value. Under conditions of practical hay making on the farm the unavoidable loss of dry matter between the time of cutting the grass and the time of feeding the hay, 5–7 months later, ranged from about 22% in a season of favorable weather to 25% under adverse weather conditions. When the grass was allowed to lie out for 3–4 weeks before being put into cocks the corresponding figure for loss of dry matter was 36–42%. The difference in digestibility between fresh grass and hay made therefrom under favorable conditions was 2–3%. In unfavorable weather, even when the hay was saved as rapidly as possible, the loss in digestibility was as high as 8–10%. With prolonged exposure to weather the digestibility coeffs. of the dry matter were decreased nearly 30%. The total loss, comprising the quant. reduction and the qual. deterioration, which a unit wt. or the produce of a unit area of green herbage suffered between the time of cutting and the time of feeding the hay, expressed as total digestible nutrients, was in favorable hay-making weather not greater than 25%; in damp weather when the drying was protracted the total loss was about 28% and in very unfavorable wet weather it was as high as 33%. When the hay is exposed to weathering influences for an unduly long period during the hay-making process the loss, without taking into account heating in the stack or wastage in the haggard, may be as high as 58%. Not only was the mineral content of severely weathered hay reduced but there was an appreciable reduction in the assimilability of the remaining Ca and P as a result of weathering. Exposure rapidly reduced the carotene content of green herbage. Hay made up with all possible expedition in very adverse weather had about one-seventh the carotene potency of the original green herbage and similar hay, unduly weathered, contained only a trace of carotene. Feeding expts. demonstrated not only the superiority of good-quality hay overweathered material in respect to energy value, but also pointed to nutritive deficiencies in the weathered hay, which affected adversely the appearance of the skin and the general health of the animal. K. D. Jacob

Digestibility and nutrition value of artificially dried grass. E. Brouwer and N. D. Dijkstra. *Verslag. Landb. Onderzoek.* No. **45**, C, (5), 119–40, 143–7(in German, 140–2)(1939).—It was found that the av. digestible crude protein was 11.7%, digestible albumin 9.5% and the

starch value 57.8%. The difference in these respects with fresh grass is very small. Based on the quality of the dry matter, the feed value of the dried grass is higher than that of the best quality hay, but lower than other feed. J. C. Jurrjens

Pasture studies. XVI. Nutritive values of Kentucky blue grass, red top and brome grass with particular reference to the relation between the chemical composition of the herbages and the live weight gains made by the animals subsisting thereon. E. W. Crampton and Robert Forshaw. *J. Nutrition* 19,°161–72(1940); cf. *C. A.* 33, 8850².—Feeding value of pasture grasses varies considerably during the growing season; e. g., it is of greatest value for growth in the spring and fall. In midsummer, the availability of the carbohydrate fractions of herbages is materially reduced. Protein content of grasses is highly correlated with wt. gains in animals, yet there is no evidence that protein as such is a limiting factor in the growth-promoting value of immature pasture herbage, but rather that increases in protein probably represent merely increases in available energy. Et_2O-ext., fat and crude fiber have little effect on wt. gains. C. R. Fellers

Preparation of silage without butyric acid fermentation. J. van Beynum and J. W. Pette. *Verslag. Landb. Onderzoek.* No. 45, C, [6], 149–69(in English, 169–71)(1939). —From expts. conducted the conclusion is drawn that it is possible to obtain a butyric acid-free silage when the latter is prepd. in a water-tight silo and when, during the filling of the silo, a sufficient quantity of sugar or inorg. acid is added dissolved in so much water that the silage is covered by the juice. J. C. Jurrjens

Value of corn gluten meal for feeding poultry. R. C. Ringrose, L. C. Norris and G. F. Heuser. *N. Y.* (Cornell) *Agr. Expt. Sta., Bull.* 725, 18 pp.(1939).—Though lacking in vitamin G (riboflavin), corn gluten meal gave good results in poultry feeding and in egg production. The corn gluten furnished about 20% of the total protein in the ration which also included dry skimmilk and meat-scrap. C. R. Fellers

Soybean-oil meal a good protein feed for chicks. H. J. Sloan and L. E. Card. *Ill. Agr. Expt. Sta., 49th Ann. Rept.* 1937, 120–1.—When used as a protein supplement with dried skimmilk and meat scrap, soybean oil meal (solvent or expeller process) in percentages of 15–22% in the rations of chicks or laying hens gave very satisfactory results. C. R. Fellers

Soybeans as a source of fat in the dairy ration. L. A. Maynard, Karl E. Gardner and Adrian Hodson. *N. Y.* (Cornell) *Agr. Expt. Sta., Bull.* 722, 30 pp.(1939).—The use of ground soybeans was favorable for milk production and general health. From 15 to 18% of the beans were used in the rations. The rations contg. 5.3–6.3% fat gave increased milk and milk fat yields over rations contg. 3–3.3% fat. Certain levels of fat intake are important from the standpoint of max. milk and fat secretion. The use of ground soybeans is a satisfactory and practical method of providing the needed fat. C. R. Fellers

Carcass studies on some grain-fed and garbage-fed hogs. E. H. Hughes and N. R. Ittner. *Food Research* 5, 83–7(1940).—The water content of the muscle from cured and smoked muscle from grain-fed hogs was lower than for similar muscle of hogs given garbage. There was a loss of 15% in the moisture content of muscle during curing and smoking. The av. *n* values of the fat were the same before and after processing. C. R. Fellers

The composition and canning properties of loganberries and blackberries. W. B. Adam. *Univ. Bristol, Fruit Vegetable Preservation Research Sta., Campden, Ann. Rept.* 1938, 32–8.—There was very little difference in the chem. compn. (acidity, sol. solids, insol. solids and pH) of the fruits of the closely allied loganberry and Phenomenal berry. Treatment of loganberry canes with a spray contg. Cu oxychloride increased the Cu content of the canned fruit from 1.3–2.0 to 4.2–4.3 p. p. m. The pH and the total acidity of loganberry fruits did not change appreciably during the season, but the total sugar tended to increase. There was no difference in the chem. compn. or canning properties of Black Diamond and Himalayan Giant blackberries. Significant increases in sol. solids, total sugars and pH and decreases in insol. solids and total acidity occurred during the ripening of blackberries in the edible state. K. D. Jacob

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Characterizing soils [using app. for testing flour for baking quality] (Nitzsch) 15. Biochem. features of alpine fodder plants (Grebinskiĭ) 11D. Results of two years coöperative work on effects of fertilizers upon cabbage yields and quality (Vogel, *et al.*) 15. Method for detn. of carbonate [in baking powder] (Jones) 7. Preliminary study of anthelmintic activity in vitro of fresh pineapple juice (Asenjo) 11H. Effect of refining on digestibility of edible oils and fats (Menezes, Banerjee) 27. Condenser for solvent for extg. coffee (U. S. pat. 2,182,-183) 1. App. for irradiating foods (U. S. pat. 2,181,293) 4. Vitamin prepns. [for addn. to foods] (U. S. pat. 2,183,-053) 17.

Citrus Fruits and Health. Lakeland, Fla.: Florida Citrus Commission. 73 pp.

Descartes de G. Paula, Ruben: Alimentos—composição—valor nutritivo e dietético. Rio de Janeiro: Servico de estatística da previdencia e trabalho. 278 pp.

Deodorizing milk and cream with superheated steam. Elmer M. Davis (to Industrial Patents Corp.). U. S. 2,182,335, Dec. 5. App. is described, and a method which involves mixing preheated cream with superheated steam which is under substantial pressure and permitting the steam and volatile gases to escape in an open chamber.

Dried egg products. Roy C. Newton and Leon D. Mink (to Industrial Patents Corp.). U. S. 2,182,209, Dec. 5. A small proportion of glyceryl monostearate or other glyceryl ester of a higher fatty acid having a free glyceryl alc. group is used with dried egg material and facilitates mixing with water and various cake dough ingredients, etc.

Noncaking dried whey powder. David D. Peebles and Paul D. V. Manning (to Western Condensing Co.). U. S. 2,181,146, Nov. 28. An arrangement of app. is described, and a process for producing a dry noncaking whey powder in which moisture is removed from the raw whey and the lactose is caused to crystallize to form the final product, coagulation of the major part of the whey being effected before crystg. the lactose and the lactose crystn. being effected in the presence of the coagulated proteins.

Sausage casing. Leo A. Goodman (50% to Marcleph & Co.). U. S. 2,181,886, Dec. 5. A tube of knitted material is impregnated and coated with microporous vulcanized rubber. U. S. 2,181,887 relates to a method of making a sausage casing comprising the steps of coating a sheet of knitted fabric which is relatively stretchable in one direction with a rubber dispersion in which small amts. of compatible sol. bodies are uniformly distributed, coagulating and drying the coating, vulcanizing the coated fabric, treating with a solvent which does not affect the fabric or rubber but which dissolves the sol. particles to produce small pores in the rubber coating, and forming the coated fabric into a tube in which the relatively stretchable direction of the fabric is arranged circumferentially of the tube.

Laminated sausage casing. Charles T. Walter (to Industrial Patents Corp.). U. S. 2,182,188, Dec. 5. An inner layer of cotton cloth or the like and an outer layer of regenerated viscose cellulose or the like are used with an intermediate bonded layer of regenerated viscose cellulose. Cf. *C. A.* 33, 2242⁹.

Intensifying the color of fresh citrus fruits. John P. Ioannu. U. S. 2,182,965, Dec. 12. Fruits such as oranges are treated with SO_2 and then with an alk. compd. such as aq. NH_3 and then with an aldehyde compd. such as CH_2O.

Fruit concentrates. Norman M. Thomas (to Joe Lowe Corp.). U. S. 2,182,829, Dec. 12. A washed and seeded fresh fruit is reduced to a colloidal pulp in suspension in its own juice to form a sirupy mixt. which is mixed and heated with material such as an "intensified" juice of the

fruit and sucrose and the product may be used in frozen foods or as a sterilized purée, etc.

Food product from soybeans. Rupert G. Gates (50% to Charles L. Wickersham). U. S. 2,182,175, Dec. 5. Soybean flour is steamed to remove unpalatable constituents, mixed with water and minor proportions of edible adhesive and flavoring materials such as dextrin, sugar, salt, etc., to form a dough, the dough is cooked without completely dehydrating it, and the cooked dough is formed into pieces of desired size and shape, and these pieces are toasted.

Tea partially or wholly decaffeinized. Theodor Grethe. U. S. 2,181,549, Nov. 28. Leaf tea, from which the caffeine has been at least partially removed by a solvent such as methylene dichloride, but which still contains tannin set free from the caffeine-tannin complex initially present in the tea, is treated, as by soaking in an aq. soln. of gelatin, to form with the free tannin an odorless and tasteless compd. which does not unfavorably affect the taste or odor of the tea. Cf. *C. A.* **33**, 3020[1].

Supplemental feed for calves. James M. Coyner (to Armour and Co.). U. S. 2,182,171, Dec. 5. A mixt. is formed of bone meal about 30–50, $CaCO_3$ 10–30, Ca lactate 10–20, and Ca gluconate 10–20%.

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

Organization for detection of war poisons. P. Degand. *J. pharm. Belg.* **21**, 895–902(1939).—A discussion of the administrative and tech. organization, including materials, for identification of poisonous substances. S. W. G.

Medical experience of the Americans with chemical warfare gases in the World War. Max Gerchik. *Protar* **5**, 3–6(1939); cf. *C. A.* **34**, 1093[2]. A. L. Kibler

Alarm devices for indicating the presence of dangerous gases and vapors. Chemisch-technische Reichsanstalt. *Z. ges. Schiess- u. Sprengstoffw.* **34**, 337–9(1939).—Upper and lower explosive limits are given for 18 combustible gases in mixtures with air, and dangerous and lethal concns. are given for 16 poisonous gases. The requirements which a satisfactory alarm device should meet are listed. All com. devices tested by the Chemisch-technische Reichsanstalt and by certain other testing stations are named and the principle upon which they operate are described briefly. A. L. Kibler

Collective protection. Louis Maricq. *J. pharm. Belg.* **21**, 731–6(1939).—A discussion of the treatment of air for poison-gas shelters. S. W. Goldstein

Combustion of phosphorus. Ernst Graf. *Gasschutz u. Luftschutz* **11**, 314(1939). This is a discussion of the use of P in war for producing screening smoke, as an incendiary and poison. Some exptl. work is also reported. In finely divided form P will spontaneously ignite at 10–20°, in larger pieces and with an impure surface at about 60° or over. The temp. of burning P was detd. by means of thermoelements to be 700–800°. The ignition temp. of wood is about 350° and the temp. of burning wood is about 1000°. It is difficult to kindle wood from a P flame because it becomes coated with phosphoric acid which affords some protection against fire. A. L. Kibler

Incendiary and bacteriological bombs. L. Millard. *J. pharm. Belg.* **21**, 913–18(1939).—A discussion of the effects of the bombs and means of combating them. S. W. Goldstein

Physiotoxicology of poison gases. L. Herlant. *J. pharm. Belg.* **21**, 815–24(1939).—The gases are classified and tabulated according to their toxicity. Symptoms produced by the gases of the different classes are given. S. W. Goldstein

Aerosols. G. Batta. *J. pharm. Belg.* **21**, 833–6(1939).—A discussion, based upon Stoke's law, of the behavior of toxic substances in liquid or solid phases when explosions of shells disperse them in the air. S. W. G.

Past and future development of some problems in the field of organic chemistry in the U. S. S. R. N. D. Zelinskiĭ. *Uspekhi Khim.* **8**, 949–55(1939); cf. *C. A.* **34**, 1093[6].—Z. discusses chiefly contact catalytic processes, hydrocarbons, alcs., acetone, petroleum, synthetic fibers and wood products. F. H. Rathmann

Studies on the production of artificial plastic masses from soybean protein. Nobuaki Wada and Yositaka Takaki. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 317–18(1939)(in German).—Oil-free soybean meal was extd. with 30-fold quantities of 0.3% Na_2SO_3 soln. and the protein, after pptn. from the clear soln. with dil. H_2SO_3, was washed, dried, powd. and mixed well with water (15–20% of the press-powder) and 10–30% of formalin (35% CH_2O), after which it was pressed at approx. 120° and at least 200 kg./sq. cm. pressure into transparent tan horn-like masses. Both H_2O and urea are suitable plasticizing agents; addn. of inorg. acids, bases and salts is not recommended. Phenol to some extent increases plasticity and in small amts. increases the imperviousness to water. George Ayers

Casting of thermoreactive plastic materials under pressure. A. A. Peshekhonov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 207–14(1939).—The casting of resinol, novolac and carbamide molding compds. under pressure was studied and the tentative results are tabulated and discussed. The best results were obtained by casting of compds. with 150 mm. fluidity (Raschig) at 140–50° and 1500 kg./sq. cm. The phys. and mech. properties of the castings appeared to improve with greater section of the casting forms, though excessively large dimensions produced inferior results and rendered the operations difficult. As compared with pressed articles the cast products showed greater resistance to heat, lower permeability to water and inferior dynamic and static flexibility. Chas. Blanc

Plasticization of cellulose esters. S. P. Papkov. *Org. Chem. Ind.* (U. S. S. R.) **7**, 240–3(1939).—Most plasticizers can be broadly considered as solvents, whose solubilities obey the laws previously developed for the solns. of cellulose and its esters in liquid solvents (cf. Papkov, *et al.*, *C. A.* **32**, 765[3], 5682[4]). Chas. Blanc

Raw materials and technology of molded plastics. P. V. Kurytsin. *Org. Chem. Ind.* (U. S. S. R.) **6**, 201–2(1939).—A discussion. Chas. Blanc

Colored molding materials. E. M. Efimova. *Org. Chem. Ind.* (U. S. S. R.) **6**, 214–17(1939).—Colored pressed articles were made from the condensation product of PhOH and 12% hexamethylenetetramine. The resin was mixed with wood flour and 0.2–1% dye and 0–40% of mineral filler and the mixt. was pressed at 130–70° to give a disk 100 mm. in diam. and 2 mm. thick. The dyes used were Rhodamine B, Acid Orange 2 B, Auramine, Brilliant Green, Safranine and Formyl Violet, and the fillers were lithopone, MgO, ZnO and CaO. The stability of colors was tested by exposing the molded disks to daylight for 5 months and to the action of boiling water for 5 hrs. The most intense coloring was produced by Rhodamine and Safranine. The color effect depends more on the nature and proportion of mineral filler than on the coloring matter. Disks pressed at below 150° are poorly resistant to boiling water regardless of the compn. of molding powders. Independent of the coloring matter used all molded disks show dark discoloration in the sunlight. Chas. Blanc

New ways of obtaining resinous and film-forming materials from organosilicon compounds. K. A. Andrianov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 203–7(1939).—Previously it was shown that the combined reaction of hydrolysis and dehydration of alkyltriethoxymonosilicanes affords com-

plex mixts. of high-mol. products formed by the siloxane bonds (*C. A.* **33**, 4193[4]). The glass-like resinous products are sol. in org. solvents. The solns. form films, which become infusible and insol. at room temp. Their elastic properties can be modified by the addn. of common plasticizers. The resin, when mixed with asbestos or wood flour, can be molded at about 200° to an infusible product. In their dielec. strength and resistance to heat and atm. elements these products are superior to the com. condensation products of PhOH, $PhNH_2$ and $CO(NH_2)_2$ with CH_2O and to Glyptal resins. This study of $EtSi(OEt)_3$ and iso-$BuSi(OEt)_3$ is being continued with other alkyl- and arylsubstituted esters of silicic acid. Extensive bibliography is given. Chas. Blanc

Measurement of electric conductivity in the control of drying of Neoleucorite. E. S. Medvedkov and V. B. Khaĭtser. *Org. Chem. Ind.* (U. S. S. R.) **6**, 218–23 (1939).—A modified Philippoff app. (*C. A.* **28**, 4633[4]) is described for measuring viscosity and elec. cond. of a Neoleucorite sample in the process of alk. condensation of PhOH and CH_2O and vacuum dehydration of resin. In the initial stages of cooking the sp. cond. and viscosity increase most rapidly and then the consts. change very little. During the vacuum drying at 78° the resistance rises from 100 to 2000–5000 ohms. The viscosity const. also rises rapidly. Resins with equal viscosities can have unlike conductivities. The possible explanation is that the processes of polycondensation and elimination of water proceed independently of each other. The relative velocities of the 2 processes dets. substantially the properties of final product. Chas. Blanc

Measurement of the cross section of rubber on insulated wires. E. F. Richter. *Elektrizitätswirtschaft* **38**, 767–8 (1939).—The av. cross-sectional area of insulation on insulated wires is calcd. from the vol. of EtOH displaced in a calibrated tube by a 20 cm. long section of the insulated wire (or shorter sections if the longer section is not available.) A special form of tube and buret is shown which permits successive detns. with high accuracy and slight time requirement. This method has the advantage over the microscopic method of giving the av. cross section rather than the cross section at one point.
R. W. Ryan

Benzine- and oil-resistant air-drying Glyptal enamels for electrical insulation. V. S. Kiselev, R. S. Kholodovskaya and M. I. Shabanova. *Org. Chem. Ind.* (U. S. S. R.) **6**, 232–5(1939).—Glyptal bases were prepd. from phthalic anhydride 37, glycerol 17.7, oil 45.25 and litharge 0.05% by heating the mixt. at 240–5° for 1.5 hrs. The oils used were raw linseed oil and cottonseed, sunflower and castor oils previously treated with an air current at 290° for 4 hrs. The insulating enamels were prepd. from 40–50% soln. of the base mixed with BuOAc, EtOAc and Fe pigment with and without the addn. of 10% nitrocellulose. The tabulated tests show that in their resistance to benzene at 25° and to transformer oil at 105° and the dielec. strength, the lacquers and enamels obtained from treated cottonseed oil are equal to the products derived from linseed-oil fatty acids. The best results gave enamels contg. nitrocellulose. All the prepns. from semidrying oils require the addn. of Pb-Mn linoleate dryer. Chas. Blanc

Synthetic materials as wire insulation. Winton Patnode, E. J. Flynn and J. A. Weh. *Elec. Eng.* **58**, 379–88 (1939); cf. *C. A.* **33**, 8329[9].—A review. 75 references.
C. G. F.

Temperature aging characteristics of class A insulation. J. J. Smith and J. A. Scott. *Elec. Eng.* **58**, T43–4(1939).—A review. Class A insulation lasts indefinitely if temp. does not exceed 90°. 16 references. C. G. F.

Measurement of dielectric loss at ultra high frequencies. K. Morita. *Electrotech. J.* (Japan) **3**, 267–71(1939).—A new method is described using parallel Lecher wires. In principle it is a reactance variation method.
C. G. F.

High-frequency dielectric-loss measurement by the varying gap method. T. Sakamoto and H. Uno. *Electrotech. J.* (Japan) **3**, 276–9(1939).—Dielec.-const. measurements by the pasted tinfoil method were not reliable in cases in which the capacity of the sample was fairly large or when the loss angle of the sample was exceedingly small. Here the varying gap method gave reliable data. The values for the dielec. const. by this method are 3.84 for quartz; 3.77 for bakelite; 4.70 for borosilicate glass; 6.38 for mica; and 120.5 TiO_2 for porcelain. C. G. F.

Elasticity of phenolic compounds. A. F. Shepard and L. A. Sontag. *Modern Plastics* **17**, 48, 78, 80(1940).—The effect of various fillers and moisture on the elastic properties of molded phenolic compds. is discussed.
A. F. Shepard

Wetting agents. H. K. Dean. *Wetting and Detergency Symposium*, Feb. 19–20, **1937**, *Brit. Sect. Intern. Soc. Leather Trades' Chem.* 25–39. **Wetting and deflocculation.** A. de Waele. *Ibid.* 57–66. **The mechanism of detergent action.** Conmar Robinson. *Ibid.* 137–51. **The solvent action of detergent solutions.** G. S. Hartley. *Ibid.* 153–62. **Some aspects of the action of the newer detergents.** E. T. Williams, C. B. Brown and H. B. Oakley. *Ibid.* 163–74.—A series of reviews.
M. M. Piskur

Determination of wetting coefficients. Allan Ferguson. *Wetting and Detergency Symposium*, Feb. 19–20, **1937**, *Brit. Sect. Intern. Soc. Leather Trades' Chem.* 11–17. **The Bartell cell technique.** S. H. Bell, J. O. Cutter and C. W. Price. *Ibid.* 19–24. **Apparatus for measurement of contact angles by the plate method.** C. G. Summer. *Ibid.* 41–52. **The determination of contact angles on thin wires or single textile fibers.** N. K. Adam and H. L. Shute. *Ibid.* 53–6. **Some factors in detergency.** Eric K. Rideal. *Ibid.* 197–202.—Reviews. M. M. P.

The significance of suspending power in detergent processes. J. Powney and R. W. Noad. *J. Textile Inst.* **30**, T157–71(1939).—The influence of various alkalies and long-chain detergents on the degree of deposition of suspended ilmenite particles on to cotton fabric was studied under various conditions. Simple alkalies such as Na_2CO_3 and NaOH cause an increase of deposition which can be attributed to a Na-ion effect rather than to a pH effect. In contrast, certain Na silicates and phosphates exhibit a very considerable protective action, which is attributed to selective adsorption of the anion. With Na hexametaphosphate and Na pyrophosphate the protective action was still appreciable at concns. as low as 5–10 parts per million. With Na laurate, Na stearate and Na oleate, the optimum protective action is reached at concns. which decrease rapidly with increasing chain length. The effect of added alkalies on the behavior of soap solns. was considered. Detergents of the long-chain alkyl sulfate type possess relatively low protective action. Ruby K. Worner

Polymerization and the production of new synthetics. B. A. Harold. *Am. Dyestuff Reptr.* **29**, 53–7(1940).—A review indicating the similarity in build up of the synthetic polymers developed in the textile, rubber and plastic industries. Corn, soybean and milk have been the sources of proteins from which fibers may be made. Methods of prepg. zein fiber from corn and casein fiber from milk are outlined. W. H. Boynton

Industrial minerals. Samuel H. Bolbear. *Eng. Mining J.* **141**, 95–6(1940).—Economic considerations are given to andalusite, sillimanite, asbestos, barite, bentonite, borax, chromite, diamonds, feldspar, lime, magnesite, mica, portland cement, potash, Sm bauxite and fluorspar. W. H. Boynton

Media for cutting of quartz and agate. A. P. Brestkin. *Trudy Tsentral. Nauch.-Issledovatel. Lab. Kamneĭ Samotsvetov Tr. "Russkie Samotsvety"* **1938**, No. 5, 3–16; *Khim. Referat. Zhur.* 2, No. 5, 33(1939).—A noninflammable substitute for kerosene was sought as a medium for cutting quartz and agate. Nonaq. media were more effective than aq.; this is attributed to the hydrophobic properties of these minerals, which facilitate the formation in nonaq. media of an adsorption layer (lowering the hardness). Addn. of surface-active substances to mineral oils had little effect on cutting. Spindle oil and transformer oil (possessing a small volatility and having no odor) can be used

as substitutes for kerosene. In polishing polycryst. quartz addn. of surface-active substances to aq. media increased the effectiveness 2–3 times. A similar addn. to nonaq. media had no effect on polishing. A considerable increase of the polishing effect was obtained by addn. to water of caustics, owing to the chem. sorption which destroyed the surface layer of the mineral.
W. R. Henn

Recent progress in the nonmetallics. Oliver Bowles. *Mining and Met.* **21**, 95–100(1940).—Important progress has been made in the introduction of cement-clinker coolers. There is a trend toward increased fineness of final product partly because of lower costs possible through the use of grinding aids. Thus 1 part of a mixt. of triethanolamine salts and highly purified sol. Ca salts of modified lignin-sulfonic acid with 3000 of clinker increases mill capacity 20–40%. New deposits, new plants and new technologic developments in the following are discussed: clay, feldspar, nephelite-syenite, lime, gypsum, fertilizer materials, refractories, bentonite, fluorspar, mica and S. A. H. E.

Japanese lacquer mixed with phenolic and alkyd resins. S. Simizu and T. Inai. *Electrotech. J.* (Japan) **3**, 230–4(1939).—Japanese lacquer has the formula: 3-$C_{15}H_{27}$-1,2-$(HO)_2C_6H_3$ (cf. Majima and Chō, *C. A.* **2**, 541).—As an insulation coating it lacks flexibility, is unstable electrically in the presence of moisture or water, and is susceptible to "lacquer pox." To overcome these defects, various plastics were added (see following abstrs.). When the lacquer (urushiol) was combined with phenolic resin (formanol 720 D) and alkyd resin (alkydal T) with the aid of toluene, the best proportion was found to be 3:4:3. The best baking temp. was 180° for 1 hr.; breakdown temp. was 186° for flexibility; 210° for HNO_3 (sp. gr. 1.38) resistance; 230° for 10 *N* NaOH; 290° for hardness; 327° for resistance to transformer oil; 327° to water; 365° to toluene; 365° for serious drop in dielec. strength. The coatings were applied to Cu plates 3 cm. × 8 cm. × 0.2 mm. C. G. F.

Japanese lacquer mixed with alkyd resin and asphalt. S. Simizu and T. Inai. *Electrotech. J.* (Japan) **3**, 234–6 (1939).—The best combination was found to be 3 of urushiol, 4 of alkydal "T" and 3 of asphalt; baked for 1 hr. at 150°. At about 200° the compd. lost its flexibility, resistance to acid and alkali, and insulating properties.
C. G. F.

Japanese lacquer mixed with phenolic and coumarone resins. S. Simizu and T. Inai. *Electrotech. J.* (Japan) **3**, 254–6(1939); cf. preceding abstr.—The best compn. was found to be 4 of Japanese lacquer, 1 of phenolic resin and 5 of coumarone. The best baking temp. was 160° for 1 hr. The breakdown temps. for the various properties were: insulating strength 270°; flexibility 183°; resistance to 10 *N* HCl 177°; to 10 *N* NaOH 195°; to oil 305°; to water 300°; to solvents 296°. C. G. F.

Japanese lacquer mixed with phenolic resin and amber. S. Simizu and T. Inai. *Electrotech. J.* (Japan) **3**, 280–2 (1939).—Samples of insulating varnishes were made by combining phenolic resin, amber and Japanese lacquer and the phys. and chem. properties of thin films studied. The amber was heated under reduced pressure and only the stable residue was used for the expts. The samples were baked at 150° for 1 hr. before testing. The best compn. was Japanese lacquer 5, phenol resin 4 and amber 1. A sharp drop in the breakdown voltage occurred upon heating to 320°; in flexibility at 170°; resistance to 10 *N* HCl at 213°; resistance to 10 *N* NaOH at 235°; to oil at 296°; to water at 315°; and to solvents at 342°.
C. G. F.

Methyl bromide as a rodenticide. C. E. Berry. *Bull. Dept. Agr., Calif.* **27**, 172–80(1938).—MeBr is effective in the control of rodents and of the insects harbored by them. There is no danger from fire. It can be used around buildings where poisoned baits cannot be used. The Mackie-Carter applicator is recommended for treating ground-squirrel burrows. C. R. Fellers

A methyl bromide dispenser for use in the fumigation of quarantined products. Charles A. Cain. *U. S. Dept. Agr., Bur. Entomol. Plant Quarantine* **ET-156**, 2 pp. (Feb., 1940). K. D. Jacob

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Acetylation of wood cellulose and prepn. of cellulose acetate plastics (Davankov, Berlin) **23.** Silico-calcium [for smoke screens] (Bergeret) **4.** Industrial wastes from equipment manufacturers' viewpoint (Knowles) **14.** Derivs. of phenol obtained from cashew-nutshell oil [as plasticizers for lacquer materials] (U. S. pat. 2,181,119) **10.** Mixed triaryl phosphates [as plasticizers with cellulose esters or ethers] (U. S. pat. 2,182,309) **10.** Triaryl phosphates [as plasticizing agents for cellulose ether compns.] (U. S. pat. 2,182,817) **10.**

Chemical Industries. 13th ed. Edited by **D. M. Newitt.** New York: Chemical Publishing Co. 379 pp. $4.00. Reviewed in *J. Chem. Education* **17**, 98(1940).

Fourth Saranac Laboratory Symposium on Silicosis: An Official Transcript of the Fourth Laboratory Silicosis Symposium Held in Connection with the Trudeau School of Tuberculosis at Saranac Lake, N. Y. Edited by **B. E. Kuechle.** Wausau, Wis.: Employers Mutual Liability Insurance Co. 379 pp. $3.00.

Molding material. Carroll A. Hochwalt and Mark Plunguian (to Mead Corp.). Can. 386,619, Jan. 30, 1940. Concd. sulfite waste liquor is treated directly with caustic at boiling temps. and above at predetd. pressures, to remove objectionable sulfonic compds. and to provide a lignin product of alk. reaction having controllable m. p. characteristics.

Molding products such as steering-wheel rim coatings. Harry R. Husted (to Standard Products Co.). U. S. 2,182,400, Dec. 5. Various details of app. and operation, with differential temp. regulation for flow control of materials within a mold cavity.

Molding and polishing products such as automobile steering wheels. James S. Reid (to Standard Products Co.). U. S. 2,182,388–9, Dec. 5. Various details of app. and operation.

Dies or molds suitable for use with various materials. Paul C. Abouchar. U. S. 2,182,775, Dec. 12. Dies or molds are formed comprising at least 2 parts with an impression or mold chamber formed between adjacent surfaces of the parts, each of the opposed walls of the mold chamber being female exact reproductions for the surfaces of the articles to be produced, and the walls of the impression or mold chamber of the die parts consisting of electrodeposited iron having finished hardened surfaces.

Synthetic resins. Horace H. Hopkins and Frank A. McDermott (to E. I. du Pont de Nemours & Co.). U. S. 2,181,893, Dec. 5. A process of producing modified polyhydric alc.-polybasic acid resins that are clear and homogeneous and form rapid and hard drying films comprises heating glycerol, phthalic anhydride, linseed oil acids and China wood oil, the China wood oil constituting between 10–60% of the combined linseed oil acids and China wood oil content.

Synthetic resinous product. Winton I. Patnode (to General Elec. Co.). U. S. 2,181,739, Nov. 28. A hard, rigid, solid, resinous product suitable for elec. insulation is obtained by the copolymerization of styrene and 1–10% of allyl methacrylate (suitably by heating for 24 hrs. at 70–80°).

Synthetic thermoplastic resins. Philip H. Groggins, John T. Stearn and Benjamin Makower. U. S. 2,181,231, Nov. 28. Resinous products are obtained by esterifying a polyhydric alc. such as glycerol with an aliphatic hydroxycarboxylic acid such as lactic acid to give an ester which contains at least as many hydroxyl groups as were originally available in the alc. and then further treating this ester with stoichiometric quantities of a polycarboxylic acid such as sebacic acid to combine with all free hydroxyl groups.

Silicon-modified phenolic resins. Howard K. Nason (to Anderson-Stolz Corp.). U. S. 2,182,208, Dec. 5. Products suitable for molded articles or coatings, etc., are

obtained by treating *p-tert*-butylphenol, *p*-isoamylphenol or *p*-cresol with an alkyl orthosilicate, a Si tetrahalide, an alkyl-substituted Si halide or an aryl-substituted Si halide, and a vegetable oil such as castor oil (suitably by heating for 20 hrs. at 165–170°). Various examples are given.

Vinyl resin compositions. Kermith K. Fligor (to Carbide and Carbon Chemicals Corp.). U. S. 2,181,478, Nov. 28. A heat-stable compn. comprises a vinyl resin which contains a vinyl halide, and, as dispersed stabilizing material, about 1.2% of a metal stearate such as that of Cd, Ca or Pb and an alkali metal salt of a monobasic, monocarboxylic acid having not more than 2 C atoms to the mol. such as NaOAc about 0.3%.

Polyvinyl acetal resin. James G. McNally and Russell H. Van Dyke (to Canadian Kodak Co., Ltd.). Can. 386,580, Jan. 30, 1940. A polyvinyl compd. having a substantial content of acetate group is treated in the presence of a deësterifying medium and a strong acid, with butyraldehyde together with formaldehyde, acetaldehyde or propionaldehyde, added either simultaneously or successively. Cf. *C. A.* **33**, 3025[5].

Polyvinyl acetal resin sheets. Henry B. Smith and Donald R. Swan (to Eastman Kodak Co.). U. S. 2,182,359, Dec. 5. Transparent, rubbery sheets are formed of a polyvinyl acetal resin 100 parts together with at least about 40 parts of an "elasticizer" consisting of butyl or isoamyl carbamate 30–70 and dibutyl phthalate 70–30%. U. S. 2,182,360 relates to generally similar sheets contg. a polyvinyl acetal resin in which a predominating proportion of the acetal groups are butyraldehyde acetal groups, together with sufficient *o*-cresyl toluenesulfonate to give the sheet a rubbery character without substantially impairing its transparency. U. S. 2,182,361 relates to generally similar sheets of a resin contg. CH_2O acetal groups, together with benzyl H succinate. U. S. 2,182,362 relates to like sheets of a resin the acetal groups of which are acetaldehyde acetal or butyraldehyde groups, together with bis(2-(β-ethoxyethoxy)ethyl) formal; and U. S. 2,182,363 relates to like compns. in sheet form contg. bis(2-(β-butoxyethoxy)ethyl) formal with similar polyvinyl acetal resins. Cf. *C. A.* **33**, 2247[3] and following abstr.

Polyvinyl acetal resin sheets. Emmett K. Carver and Bruce E. Gramkee (to Eastman Kodak Co.). U. S. 2,182,371, Dec. 5. Transparent, rubbery sheets are formed of a polyvinyl acetal resin and tripropionin (suitably about 40% or more of the wt. of the resin). Cf. preceding abstr.

Hollow articles or vessels such as bottles from artificial resins. Heinrich Hoenig (to Richard Collins, John J. Sheridan and Philip M. Scher). U. S. 2,181,786, Nov. 28. A method of making open hollow articles or vessels having at least one constriction from artificial resins by molding under the action of heat and pressure involves spraying moldable artificial resin powder into a hollow mold through a constriction therein so as to line the interior thereof and then admitting fluid under pressure to the interior of the mold under the requisite temp. conditions, the fluid being in direct contact with the moldable compn.

Insulated electric conductor. Herbert A. Winkelmann (to Marbon Corp.). U. S. 2,181,632, Nov. 28. See Fr. 837,354 (*C. A.* **33**, 7437[1]).

Insulated submarine cable. Archie R. Kemp and Frank S. Malm (to Bell Telephone Laboratories, Inc.). U. S. 2,181,188, Nov. 28. A metal conductor such as one of Cu strands is surrounded by a highly magnetic metal such as a ribbon of Ni-Fe alloy with an overlying pressure-equalizing material of viscous or semiliquid polymerized isobutylene or the like, and a surrounding thermoplastic insulation such as rubber or gutta-percha.

Electric cable insulation. Fred R. Kaimer (to General Elec. Co.). U. S. 2,182,667, Dec. 5. A flexible, flame and moisture-resisting electrical cable of high-dielectric strength comprises a metallic conductor and insulation therefor comprising, in direct combination one with the other, at least one layer of vulcanized rubber compn. contg. halogenated aromatic C ring compd., the rubber compn. having a tensile strength of at least 1200 lb. per sq. in. and a min. stretch before rupture of a 2-inch section on a 6-inch test specimen of at least 400% and at least one layer of felted asbestos thereover and which is coated and impregnated with a compn. comprising halogenated aromatic C ring compd., such as chlorinated naphthalene. U. S. 2,182,668, relates to the use of an insulation comprising varnished fabric and inorg. fibrous insulating material such as felted asbestos with an intervening relatively thin sheet of material such as cellulose acetate or regenerated cellulose protecting the varnished fabric from abrasive action of the inorg. fibrous material.

Electric cables. Standard Telephones and Cables Ltd. Thomas R. Scott, Raymond C. Mildner and Thomas Edward David Menzies. Brit. 508,036, June 26, 1939. A barrier joint or termination is prepd. in an impregnated power cable by building up the insulation with fibrous tapes impregnated with polymerized material, e. g., polystryene, which may be admixed with plasticizers, e. g., rubber, or other polymers, e. g., polyisobutylene, polyethylene, basting the impregnated tapes with polymerizable material, e. g., monomeric or partially polymerized styrene, at intervals during the building up operation to cause them to adhere to one another and causing the impregnated tapes to overlap the protective sleeve of the cable.

Interpolymerization of fumaric esters and isobutylene. Heinrich Hopff and Gustav Steinbrunn (to I. G. Farbenind. A.-G.). U. S. 2,182,316, Dec. 5. Products of rubber-like or hard and elastic character suitable for use in making *lacquers* or *cable insulation*, etc., are obtained by the interpolymerization of isobutylene with fumaric diethyl ester or other fumaric ester in an aq. emulsion in the presence of O-yielding substances such as K persulfate and H_2O_2 which serve as polymerization catalysts.

Cyclohexylated chlorodiphenyl ethers. Frank B. Smith (to Dow Chemical Co.). U. S. 2,182,827, Dec. 12. Cyclohexylated chlorodiphenyl ethers varying in character from high-boiling liquids to hard, brittle resins, and suitable *for elec. insulation*, use as *plasticizers* with cellulose ethers or polystyrene, etc., are prepd. by the reaction of a cyclohexylating agent such as cyclohexene, cyclohexyl chloride, cyclohexyl bromide or cyclohexanol with a mono-, di-, or trichlorodiphenyl ether or a mixt. of such compds. in the presence of a condensing agent such as $AlCl_3$, BF_3, $FeCl_3$, $AlBr_3$, or an activated bleaching earth such as "Retrol" or "Tonsil." Various examples with details of procedure are given.

Adhesive. Albert J. Heberer (to Glidden Co.). U. S. 2,181,129, Nov. 28. An adhesive which is suitable for use on decalcomania transfers contains glue admixed with about 5–20% of a phosphatide such as lecithin, a plasticizer such as the mono-Bu ether of ethylene glycol and a water-sol. blending solvent such as glycerol. Cf. *C. A.* **33**, 3030[1].

Adhesives from dextrin. Philip D. Coppock. U. S. 2,181,782, Nov. 28. For rendering com. dry-roasted dextrin nonlump-forming when mixed with water, it is heated in a dry state for about 3–15 min. to about 70–130° between heated plates under a pressure of about 1 lb. per sq. in. and then ground to a powder.

Adhesive suitable for use on the edges of paper sheets. Walter P. Hilbourn. U. S. 2,182,399, Dec. 5. A mixt. contg. glycerol 5, Venice turpentine 5, white flake glue 32, and HOAc about 57 parts is subjected to gentle heating.

Adhesives suitable for use in making corrugated boxboard. Robert W. Maxwell (to E. I. du Pont de Nemours & Co.). U. S. 2,182,524, Dec. 5. An adhesive is prepd. contg. about 15–30% of unhydrolyzed starch such as corn starch, and a salt of deacetylated chitin in an amt. equiv. in its effect on the adhesive's viscosity to that of about 1.5–4.0% of an acetate of a typical deacetylated chitin a 5% aq. HOAc soln. contg. 5% of which typical deacetylated chitin has a viscosity of 880 poises.

Assistants for use in leather and textile treatments. Albert F. Bowles and Saul Kaplan (to Richards Chemical Works, Inc.). U. S. 2,181,476, Nov. 28. In various processes, use is made of an assistant which is a sulfuric acid deriv. of a hydroxy-ether ketone of the general

formula $R'CO(R''O)_nH$ in which R' is an alkyl radical having 3–20 C atoms, R'' is an alkylene radical and *n* is a number between 2 and 10.

Derivatives of substituted succinic acids. Walter Pinkernelle (to I. G. Farbenind. A.-G.). U. S. 2,182,178, Dec. 5. Succinic acids substituted in at least one of their methylene groups by at least one satd. or unsatd. hydrocarbon radical contg. at least 5 C atoms (suitably 8 or more C atoms) are converted into derivs. in which at least one acid hydroxyl group is substituted by an amino radical, to form derivs. of high capillary activity suitable for use as *wetting, washing, emulsifying, dispersing* or *permeating agents*, as by the reaction of isoamyl-, hexyl-, cyclohexyl-, heptyl-, octyl-, isododecyl- or pentadecyl-, or isononylenesuccinic acid anhydrides with NH_3 or amines such as monomethylamine, dibutylamine, diisopropylamine, octylamine, cetylamine, hydroxyethylamine, primary and secondary aromatic amines, such as aniline, toluidine, xylidine, chloroaniline, nitroaniline, ethylaniline, diphenylamine, α-naphthylamine, benzylamine, amines of the alicyclic series, such as cyclohexylamine, amino carboxylic acids, such as glycocoll and anthranilic acid, and also amino sulfonic acids, such as taurine, aminobenzenesulfonic acids, naphthylaminesulfonic acids, etc. NH_3 and the anhydride of isononylenesuccinic acid at 40–60° form a monoamide of dough-like character which gives off water when heated to 150–160° and forms an imide b_9 202–5°. Aniline and isododecylenesuccinic acid anhydride form a monoanilide which when heated to about 160° is converted into a phenylimide, $C_{22}H_{31}O_2N$, b_8 133–7°. Isononylenesuccinic acid monobutylamide is converted to an imide, $C_{17}H_{29}O_2N$, b_8 187 192°. Isononylenesuccinic acid β-hydroxyethylimide, b_7 200–212°. Isononylenesuccinic acid *m*-aminophenylimide b_9 268–275°. The dicarboxylic acid monoamide from isododecylenesuccinic acid anhydride and glycocoll, $C_{18}H_{31}O_5N$, is a yellow viscous mass which on heating to 150 200° is converted into isododecylenesuccinic acid-imidoacetic acid, b_{12} 260–5°. *p*-Aminophenol and isododecylenesuccinic acid anhydride form isododecylenesuccinic acid *p*-hydroxyphenylimide, $C_{22}H_{31}O_3N$, a dark brown, viscous resin. Isododecylenesuccinic acid anhydride heated with the Na salt of sulfanilic acid form a bright brown "glass," $C_{22}H_{30}SO_5NNa$. Isododecylenesuccinic acid anhydride and the Na salt of β-aminoethanesulfonic acid form a dark yellow "glass," $C_{18}H_{30}O_6NSNa$. Isononylenesuccinic acid anhydride and *N*-ethylaniline form the Na salt of isononylenesuccinic acid mono-*N*-phenyl-*N*-ethylamide, $C_{21}H_{30}O_3NNa$, a bright brown "glass." Isononylenesuccinic acid anhydride and diethylamine form isononylenesuccinic acid bisdiethylamide, $C_{21}H_{40}O_2N_2$, a dark yellow viscous oil b_{10} 195–205°. The Na salt of isotetradecylenesuccinic acid monobutylamide, $C_{22}H_{40}O_3NNa$, is a white powder.

Maltosamines. James H. Werntz (to E. I. du Pont de Nemours & Co.). U. S. 2,181,929, Dec. 5. By reaction of a mixt. contg. H, maltose, and NH_3 or an aliphatic primary or secondary amine, at a temp. of 20 50° and under a pressure of at least 15 atm., in the presence of a base-metal hydrogenation catalyst such as a Ni catalyst, products are formed such as: methylmaltosamine, a viscous liquid; octadecylmethylmaltosamine, a cryst. powder; 1-dodecylamino-1-hydroxymaltose; dodecylmaltosamine, m. (decompn.) 110–15°; 1-hexadecylamino-1-hydroxymaltose, m. 100–105°; hexadecylmaltosamine, m. 124–7°; mixed octadecyl- and octadecenylmaltosamines; mixed hexadecyl- and octadecylmaltosamines; maltosamine, a viscous sirup; 1-(*N*-methyl-*N*-heptylamino-1-hydroxymaltose, a sirupy product; and similar compds., those products having an aliphatic radical with 6 or more C atoms being suitable for use as *wetting, penetrating, deterging, dispersing, emulsifying, frothing* or *foaming agents*, alone or in various compds. and mixts. Numerous examples with details are given.

Oxidized chlorinated olefin polymers. Wm. J. Sparks and Clifford W. Muessig (to Standard Oil Development Co.). U. S. 2,181,158, Nov. 28. Products suitable for thermoplastic molding, either alone or mixed with fillers, dyes, pigments, etc., or for use with varnish gums, resins, solvents, etc., are produced by polymerizing an isoölefin such as isobutylene to a high mol. wt., oxidizing the polymer, as with O_3, and treating the oxidized polymer in soln. with Cl. Various details and modifications of procedure are described.

Polymeric esters. Wilbur A. Lazier (to E. I. du Pont de Nemours & Co.). U. S. 2,182,991, Dec. 12. Polymeric esters suitable for use in *making fibers, sheets, molded articles, etc.*, are prepd. by heating, in the presence of a dehydrogenation catalyst such as Cu chromite, a polymethylene glycol such as hexamethylene glycol, having at least 2 primary hydroxyl groups and at least 6 methylene groups interposed between the hydroxyl groups.

Polymerizing olefins such as isobutylene, from still gases. John A. Anderson (to Standard Oil Co. of Ind.). U. S. 2,182,512, Dec. 5. In a process of producing plastic hydrocarbon polymers, having a mol. wt. above about 1000 and suitable *for addn. to lubricating oils*, by the polymerization of isobutylene contained in hydrocarbon mixts. from cracking-still gases, which also contain a small amt. of diolefins, wherein the hydrocarbon mixt. is subjected to the action of an active metal halide catalyst such as BF_3 at a low temp. of about −40° to −70°, a method of increasing the mol. wt. and plasticity of the polymers involves removing the diolefins from the hydrocarbon mixt. before subjecting it to the polymerizing action of the catalyst by treating the mixt. with a reagent, such as Na, a peroxide, or maleic anhydride, which reacts with the diolefins but leaves the isobutylene and other hydrocarbons present substantially unaffected.

Polymerizing 1,2-dihydronaphthalene. Norman D. Scott (to E. I. du Pont de Nemours & Co.). U. S. 2,181,770, Nov. 28. A substantially infusible solid polymer is obtained by bringing 1,2-dihydronaphthalene into contact with an addn. compd. of an alkali metal such as Na in the proportion of 2 atoms with 1 mol. of a polycyclic aromatic hydrocarbon such as naphthalene (suitably at a temp. of −30°). U. S. 2,181,771 relates to a like polymerization of styrene. Cf. *C. A.* **33**, 9496[8].

Interface-modifying agents for detergent purposes, etc. Benjamin R. Harris. U. S. 2,181,890, Dec. 5. A method of converting a salt of an org. interface-modifying agent, having a lipophile group with at least 6 C atoms and a hydrophile group, such as lauryl K sulfoacetate, having relatively poor cold-water soly., into a different salt of greater soly. in cold water, involves prepg. a hot soln. contg. at least several percent of the initial material and passing the soln. in contact with a base-exchange material such as "Cristallite." Various examples with details are given.

Casein compositions. Charles Schwartz (to Hall Laboratories, Inc.). U. S. 2,182,357, Dec. 5. Casein and an alkali metal tripolyphosphate are used together in forming plastic setting compns. adapted for use as coatings, sizings, adhesives, etc.

Coating nails, tacks or the like with cellulose derivatives. James R. Thompson (to American Steel and Wire Co. of N. J.). U. S. 2,181,352, Nov. 28. A metal fastening for frictional insertion in wood or the like is provided with a hard, smooth coating comprising a base of ethyl-cellulose, nitrocellulose or cellulose acetate and contg. a resin effecting microscopic bonding of the coating to the fastening and to the material in which the latter is inserted, the coating being sterilized when applied to the fastening by a nontoxic alc. solvent, the base and resin of the coating both being nontoxic and the fastening being fit for holding in the mouth of the user, the coating being nongumming when the fastening is stored in warm or damp places. Cf. *C. A.* **33**, 7270[6].

Coating articles such as tin cans with resin compositions. Clifford J. Rolle (to Interchemical Corp.). U. S. 2,182,304, Dec. 5. An emulsion contg. a resin plasticizer such as "butyl cellosolve stearate" and a vaporizable liquid such as water is applied to the surface of an article such as a can and the article is bent while heated to vaporize the liquid, and a resin compn. is applied to the surface on which the plasticizer remains.

Composition for brush-coating belt pulleys. Joseph

Birnbaum (to Manhattan Lubricants Co.). U. S. 2,182,774, Dec. 12. A compn. for coating pulleys or the like to give increased traction between the coated surface and a belt contains nitrocellulose, a volatile solvent for the nitrocellulose, wood flour and iron filings.

Use of cellophane or the like as a wrapping material. Wilhelm B. Bronander. U. S. 2,182,113, Dec. 5. App. is described, and a method of sealing the wrapping material which may involve rendering it tacky and adhesive with a solvent such as ethylene glycol monomethyl ether and pressing the tacky surfaces together.

Diurethandiamine polymeric materials. Elmore L. Martin (to E. I. du Pont de Nemours & Co.). U. S. 2,181,663, Nov. 28. Products suitable for the *manuf. of continuous filaments*, etc., are produced from a diurethan of the general formula $(R'OOCNR'')_2R$ and a diamine of the general formul $(HNR'')_2R'''$ in which R and R''' are bivalent org. radicals having a chain length of at least 4 atoms of which the 2 terminal atoms are C atoms, R' is a univalent hydrocarbon radical and R'' is a univalent hydrocarbon radical or H, such as hexamethylenediamine and diethyl hexamethylenediurethan or the like (suitably by heating at 150-300°). Various examples with details are given.

Noncorroding "antifreeze" mixtures. Cyrus D. Eaton (to American Distilling Co.). U. S. 2,182,612, Dec. 5. Denatured alc. 100 cc. is used with a light mineral oil 1.0-4.2 cc., sulfonated castor oil 0.03-0.3 cc. and Na salicylate 0.1-0.4 g.

Magnesium oxychloride binders and compositions. Pierre J. Rougard. Brit. 507,982, June 23, 1939. A Th compd., e. g., $Th(SO_4)_2$, is incorporated as a substantial component of pigmentless Mg oxychloride binders, etc.

Restoring faded ink documents. Alexander Lowy and Clyde H. Campbell. U. S. 2,182,672, Dec. 5. For revivifying Fe-contg. faded characters on documents, they are treated with an acid soln. of $K_4Fe(CN)_6$, and the document is washed, and treated with a pptg. soln. such as one of a metal salt and subsequently washed again. A dye also may be used.

Etched intaglio printing plates. Charles L. Henderson (to Paper Patents Co.). U. S. 2,182,559, Dec. 5. An etched intaglio printing surface having in its printing surface ink-receiving recesses of substantially uniform depth and of area varying in accordance with the tone depth in the subject to be reproduced. The recesses are substantially rectangular in outline and substantially corresponding in location and arrangement to both the black and the white squares of a black and white checkerboard. The printing surface has continuous, solid, unetched portions sepg. all of the recesses and providing a continuous surface over which a doctor blade may ride, the unetched portions being in the form of two perpendicularly intersecting sets of spaced, parallel, continuous lines of material of sufficient width in the portions of the surface corresponding to the deepest tones of the subject to support a doctor blade and varying in width in the other portions of the surface substantially inversely proportional to the tone depth of corresponding portions of the subject, so that the full range of tones in the subject may be reproduced.

Hectograph carbon and copy sheet assembly. Richard V. Bowman (to Kee-Lox Mfg. Co.). U. S. 2,181,363, Nov. 28. With a sheet for use in making hectograph reproductions having a C coating on one side, there is used a copy sheet sep. from the C sheet and positioned against its coated surface, and the sheets are held in removable relation.

Hectograph blanket. Johan Bjorksten and Wm. Hoskins, Jr. (to Ditto, Inc.). U. S. 2,181,864, Dec. 5. The duplicating surface of a hectograph blanket is covered with a removable nonadhesive film comprising an algin or pectin such as a mixt. of starch or chlorinated starch and pectin.

Preserving textiles, rubber, paper, hydrocarbon oils, glyceride oils, essential oils, etc., from oxidative deterioration. Sidney Musher (to Musher Foundation Inc.). U. S. 2,181,765, Nov. 28. As a preservative treating agent, use is made of water-sol. antioxygenic material which may be prepd. from unbleached and unleached finely divided oats, maize or barley by mixing with water having a pH of between about 5 and 6.7 and at a temp. of about 52–74°, removing the undissolved residue, and concg. the resulting starch- and fiber-free liquor.

Cold-bonding waxy surfaces such as those of paraffined paper. Wm. I. Buckeridge (to Standard Oil Co. of Ind.). U. S. 2,182,513, Dec. 5. A method of cold bonding waxy surfaces comprises applying to one of the surfaces as a bond therebetween a coating of hydrocarbon plastic from the class consisting of isobutylene polymers having a mol. wt. of about 2000 to 15,000 and hydrogenated rubber, and pressing the surfaces together at ordinary temp.

Laminated material suitable for oil containers, etc. Everett G. Hughes (to Standard Oil Co. of Ohio). U. S. 2,181,811, Nov. 28. Laminated material comprises fibrous layers of sheet cellulose such as chip board or rag stock and, conforming accurately to the cellulose and having substantially the same rate of expansion and contraction, an oil-proof amorphous surface layer of Na silicate whose $SiO_2:Na_2O$ ratio is such as resultant from 5-40% of a 2:1 Na silicate, and 70–35% of a 3.25:1 Na silicate, and smaller amts. of gum arabic, glycerol and soap. Cf. *C. A.* **34**, 1475[5].

Wood composition suitable for use as a core with veneers. Charles Roman. U. S. 2,181,439, Nov. 28. Comminuted wood fibers are used with a binder consisting of a soln. prepd. from water 5 gallons, animal glue 8 oz., starch 4 lb., a mixt. of paraformaldehyde one oz., and 3 oz. of a mixt. formed of NaCl 19 and $NaHSO_4$ 75 parts.

Liners for cans, bottle caps, etc. Daniel M. Gray (to Hazel-Atlas Glass Co.). U. S. 2,181,481, Nov. 28. A flexible, nontacky compn. is used contg. a polymerized vinyl ester resin 14–17, tritolyl phosphate 4–6, and petrolatum jelly 0.35–0.6 parts (suitably with ethylene dichloride as a solvent).

Device for use in permanent waving of hair. Daniel Lakenbach. U. S. 2,182,636, Dec. 5. A sachet for permanent waving without the use of electricity comprises an envelope of soft, pliable, absorbent material such as paper contg. a mixt. of chemicals adapted to enter into exothermic reaction with a soln. which may be applied in drop form through an opening in a backing sheet with which the envelope is provided.

Smoke filter for cigarets. Robert S. Striefling. U. S. 2,181,614, Nov. 28. Within the mouthpiece end of a cigaret there is placed a smoke filter of fibrous material such as porous paper impregnated with an oxide or hydroxide of Ca, Mg, Al or Si.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Analysis of the sulfur-bearing waters of Carobbio (Parma). Giuseppe Illari and Maria Zucchetti. *Ann. chim. applicata* **29**, 467–74(1939).—These waters contain 2.5 cc. H_2S and 18.4 cc. of CO_2 per l. in soln. They also contain high Na and Ca and traces of Fe, Al, Sr and Ba. They are alk. bicarbonate sulfur-bearing waters.

A. W. Contieri

The fluorine content of Chengtu well water. Libin T. Cheng and Tung-Pi Chou. *J. Chinese Chem. Soc.* **7**, 36–9(1939).—Twenty-three samples of well water from different districts of Chengtu city (Szechuan) are analyzed and show a range of F content from 0.095 to 3.600 p. p. m. Only 4 samples show more than 1 p. p. m. of F.

Wm. H. Adolph

Simple dissolved-oxygen sampling device. Francis E. Daniels. *Public Works* **70**, No. 2, 20(1939); *U. S. Pub.*

Health Eng. Abstracts 20, S, 5(Jan., 1940).—Two methods for using single dissolved-O_2 bottles, in the absence of more complicated devices, for the collection of samples of water for dissolved O_2 are described. The first method consists of 1 glass tube within another and the 2nd method has the rubber stopper with 2 glass tubes with the seal outside of the neck. C. R. Fellers

Metropolitan Boston's new water-supply system. W. R. Brend. *Can. Engr.* 77, No. 20, 9(1939).—A review. Ann Nicholson Hird

Water purification progress during 1939. Norman J. Howard. *Eng. Contract Record* 52, No. 52, 49–51(1939).—A review. Interest was focussed chiefly on water pollution, higher standards of bacterial quality for finished waters, accelerated methods of treatment, and superchlorination for taste control. R. E. Thompson

New method of filtration. Anon. *Tech. sanit. munic.* 34, 40–1(1939).—Filtration of water after the addn. of an inexpensive colloid at the proper pH is proposed as a simple, effective and low cost treatment. The colloidal film of $Al(OH)_3$ or $Fe(OH)_3$ acts as a good bacterial filter. C. R. Fellers

Use of activated carbon to deliver a palatable unfiltered drinking water. Melvin H. Diven. *Taste and Odor Control* 4, No. 2, 1–2(1937); *U. S. Pub. Health Eng. Abstracts* 18, W, 15(Feb. 5, 1938).—Powd. activated C applied to a reservoir following treatment with $CuSO_4$ for algae control, effectively removed offensive odors and tastes from the water supply. While the $CuSO_4$ destroyed the algae, the C was required to remove the taste and odor. C. R. Fellers

Activated carbon and its use in water treatment. H. Descroix. *Tech. sanit. munic.* 34, 42–7(1938); cf. Helbig, *C. A.* 32, 8051[1]. C. R. Fellers

How to make certain that you can control tastes and odors in your plant, and how to obtain the greatest efficiency from your applied activated carbon. John P. Harris. *Taste and Odor Control* 4, No. 1, 1–3(1937); *U. S. Pub. Health Eng. Abstracts* 18, W, 14(Feb. 5, 1938); cf. *C. A.* 31, 4063[8].—Activated C makes possible a palatable, safe water which makes certain that the consuming community will not seek palatable water from unsafe sources. The use of activated C for odor and taste control is the most important development in water works practice since the use of Cl was introduced. C. R. Fellers

Ozone for water treatment. J. B. Klumpp. *Eng. News-Record* 124, 168–70(1940).—The lack of suitable equipment and the high cost of operation have retarded adoption of O_3 treatment in America. More efficient app. is now available. O_3 is generated by passing thoroughly filtered and dried air through the silent blue corona discharge created between dielectric plates at high voltage. The ozonized air, contg. approx. 0.5% by vol., is applied to the water under pressure and mixed with it by electrically driven agitators. The over-all power consumption is 9–14 kw.-hrs. per lb. of O_3 generated, depending on atm. conditions. At Whiting, Ind., a pilot plant of 3600-gallons per day capacity succeeded in producing a palatable water where all other chem. methods had failed to remove medicinal tastes caused by industrial wastes. A 4-million gallon per day plant is now under construction. The peak O_3 demand is estd. at 15 lb. per million gallons and the av. at less than 10 lb. With a max. energy demand of 14 kw.-hrs. per lb. and elec. energy at 2¢ per kw-hr., the cost would be $2.80 per million gallons. Older types of plants have been in continuous operation at Long Beach and Hobart, Ind., since 1930 and 1932, resp. R. E. T.

Application of experimental methods to the design of clarifiers for water works. Robert Walton and Thomas Dow Key. *J. Inst. Civil Engrs.* (London) 1939–40, No. 1, 21–48. Ann Nicholson Hird

Problems of sterilizing and clarifying water supplies. George B. Prindle. *Taste and Odor Control* 4, No. 1, 3–5(1937); *U. S. Pub. Health Eng. Abstracts* 18, W, 14 (Feb. 5, 1938); cf. *C. A.* 32, 1825[9].—Aeration is of very little value in removing org. odors. Superchlorination of raw water, followed by dechlorination of the filtered water, is effective only with relatively low odor intensities. The use of even small amts. of Cl in the raw water may at times seriously interfere with odor removal. Chloramines are less likely to interfere than Cl. C may be depended upon to remove any odor, providing enough can be fed. The point of C application should be either before or immediately after the water enters the mixing basin. Applying the C at the same point as the alum gives improved coagulation. C. R. Fellers

The use of sodium hexametaphosphate for softening of hard water. F. Nevolin and R. Shtern. *Maslobойno Zhirovoe Delo* 15, No. 5, 18(1939).—A method of prepn. of $(NaPO_3)_6$ is described and its effectiveness as a softening agent for water is confirmed. Chas. Blanc

Conditioning water for vapor heating boilers on Diesel-powered trains. Ray McBrian, *et al. Am. Ry. Eng. Assoc., Bull.* No. 414, 219–24(1939).—Vapor boilers as used for heating Diesel-powered trains, require water conditioning to prevent scale formation, pitting and corrosion. Steam at 200 lb. pressure is produced rapidly in continuous coils of steel tubing several hundred feet in length with no satisfactory means for mech. cleaning. Where proprietary compds. are used for water conditioning, frequent blowdown is necessary and also coils are cleaned every 30 days with passive acid. Condensate suitably conditioned by anti-corrosion treatment, is satisfactory but expensive. Exchange filters consisting of two filter beds of processed synthetic resins, for removal, resp., of both the cations and anions in the dissolved solids, are being used successfully at an operating cost of $0.34 per 1000 gal. for H_2SO_4, NaOH and wash water, to condition a water contg. 395 p. p. m. dissolved solids. Where raw water is low in Cl and SO_4, the use of H-zeolite in combination with Na-zeolite affords another means of securing a feed water low in dissolved solids. R. C. Bardwell

Use and application of chemicals for preventing deposit in pipe lines. R. M. Stimmel, *et al. Am. Ry. Eng. Assoc., Bull.* No. 414, 240–2(1939).—The pptn. of $CaCO_3$ in water lines as well as heaters, cooling coils, etc., can be prevented by the use of tannins or molecularly dehydrated phosphates such as Na hexametaphosphate. The optimum dose of tannins will vary from one pound of tannin to from 4000 to 15,000 gallons of water. Good results have been obtained with the hexametaphosphate using a treatment of one lb. to 60,000 gal., and in some cases as high as 120,000 gal., of water. R. C. B.

Comparative resistance of Bacillus coli and Bacillus typhosus to water treated with chloramines. Francis S. Smith. *N. Dakota Water and Sewage Works Conf., Official Bull.* 7, No. 1, 6–8(1939); *U. S. Pub. Health Eng. Abstracts* 19, W, 114(Dec. 16, 1939).—This article refers particularly to length of life of the organisms, methods of detection and treatment with chloramine to disinfect the water. Some strains of *B. typhosum* are even more resistant to Cl and chloramine than members of the coli-aerogenes group of bacteria. The effect of pH is discussed. C. R. Fellers

Sanitary aspects of the San Francisco water system. G. E. Arnold. *Civil Eng.* 9, 722–3(1939).—The watershed sanitation, storage, disinfection and lab. control are discussed. Ann Nicholson Hird

Progress report on the chemical treatment of lakes and streams with special reference to the origin and control of swimmers itch. *State of Wis., Comm. on Water Pollution,* July, 1939; *U. S. Pub. Health Eng. Abstracts* 20, SW, 1(Jan., 1940).—Schistosome dermatitis is known as "swimmers itch." The use of $CuCO_3$ for eliminating snails harboring cercariae from recreational bathing areas is described. The control of algal growths which cause offensive odors and tastes is largely by means of $CuSO_4$ in amts. so small that fish life is unaffected. Cf. *C. A.* 33, 8799[8]. C. R. Fellers

Water supply and sewage systems for Heron Bay Townsite. A. W. Lash. *Eng. Contract Record* 53, No. 1, 7–10(1940).—The water supply of the village of Heron Bay South, Ont., drawn from the Pic River, is purified by hypochlorination and pressure filtration. The sewage-treatment system consists of a septic tank and tile drains to a gravel percolation bed. R. E. Thompson

Sewage-disposal project of Buffalo, New York. Samuel A. Greeley. *Proc. Am. Soc. Civil Engrs.* **65**, 1341–65 (1939).—The engineering data accumulated during the design and construction of the intercepting sewers and the treatment plant are reported. The treatment consists of primary sedimentation, chlorination, sludge digestion and sludge incineration. W. D. Hatfield 1

Ontario sewerage plans for 1940. A. E. Berry. *Can. Engr.* **77**, No. 20, 7–8(1939). Ann Nicholson Hird

Sewage treatment coupled with irrigation. F. M. Veatch. *Eng. News-Record* **124**, 24–6(1940).—The recently completed sewage-treatment plant of Pueblo, Colo., is described. The effluent is discharged into the Arkansas River, the entire flow of which is appropriated for irrigation, and the principal objective of the plant is to prevent deposition of suspended matter in the river and irrigation canals. The plant, which has a capacity of 20 million gallons per day, consists of screens, grit chambers, pre-aeration tanks for grease sepn. and for mixing when a coagulant is employed, clarifiers of the center-feed, peripheral overflow type, heated sludge-digestion tanks equipped for gas collection and sludge drying beds. The sludge gas is utilized in gas engines, butane being used as a standby fuel. The digestion tanks are heated by circulation of the engine jacket water. The cost of the plant was $465,300, of which $68,300 was for connecting sewers. R. E. Thompson 2 3 4

Problems and trends in activated sludge practice. Robert T. Regester. *Proc. Am. Soc. Civil Engrs.* **65**, 1501–25(1939).—Pertinent data relating to the basic design and principal characteristics of 30 plants are included for comparative study. Operation results and techniques are discussed and the need for further research on the process is noted. W. D. Hatfield

How the moisture content of sludge affects digestion. Walter A. Sperry. *Public Works* **70**, No. 4, 14–15(1939).—Improvement in digester operation was obtained by reducing the pumping schedule to the min. needed to keep the tanks clean. This resulted in the thickening of the raw sludge and a reduction in vol. of the wet sludge. Data are given on the amt. and analysis of gases produced. Improved fuel gas was produced by adding used greases from plant units to the digester. George Papps

Sanitary engineering. Edward J. Cleary. *Eng. News-Record* **124**, 226–8(1940).—Developments in water purification, sewage treatment and refuse destruction are reviewed. R. E. Thompson 6

The history of sanitation in Chicago. Robert I. Randolph. *J. Western Soc. Engrs.* **44**, 227–40(1939). W. H. Boynton

Modern sanitation in Great Britain. David M. Watson. *J. Inst. Civil Engrs.* (London) **1939–40**, No. 2, 125–46.—A discussion. Ann Nicholson Hird 7

Typical problem in industrial sanitation. J. J. Bloomfield. *Proc. Am. Soc. Civil Engrs.* **65**, 1484–99(1939).—After a preliminary survey of the 36 plants in the U. S. engaged in the prepn. of hatter's fur, 5 were selected for careful studies. The major industrial hazards were found to be *dust* from the furs and *Hg vapors*. Suggested remedies are (1) by segregating those operations which handle untreated skins, 23% of the workers may be removed from the Hg-vapor hazard, (2) exhaust ventilation for cutting, brushing and blowing, (3) good natural or mech. ventilation decreased the Hg vapor assocd. with piling and shipping, (4) considerable exposure is attributed to handling Hg compds. in bulk and the storage of large quantities of Hg-treated furs, both of which should be stored in well-ventilated rooms away from the workrooms, (5) good housekeeping and general sanitation. W. D. Hatfield 8

Household fumigation with hydrogen cyanide discoids and with sulfur. Arnold Mallis. *The Sanitarian* **2**, No. 3, 11–12(1939); *U. S. Pub. Health Eng. Abstracts* **20**, PHA, 4(Jan., 1940).—Zyklon discoids, widely used for house fumigation purposes, are composed of diatomaceous earth impregnated with liquid HCN. Methods of fumigation and a discussion of safety factors are given. C. R. Fellers 9

Report on an experiment converting municipal wastes into organic fertilizer. J. C. Carter and Kamal El-Din Fahmy. *Ministry Pub. Health, Egypt, Sanit. Eng. Sect.* **1937**, 19 pp., Cairo Govt. Press; *U. S. Pub. Health Eng. Abstracts* **18**, GR, 6(Apr. 9, 1938).—House refuse was successfully composted with sewage or sewage sludge. The addn. of partially digested refuse to new composts materially accelerated digestion. The completely digested material was useful as fertilizer and was safe to handle from a public-health standpoint. C. R. Fellers

Industrial wastes from the equipment-manufacturers' viewpoint. C. L. Knowles. *Ind. Eng. Chem.* **31**, 1338–45(1939).—A review. Foster Dee Snell

Industrial water for textile industry (Schwabe) **25**. Toxicity of basic fuchsin for certain bacteria (Ritter) **11C**. Chemistry of waters beneath the Dnepr-Don depression and their connection with the size of oil deposits (Makov) **8**. Tube and header heat-exchange app. for use with H_2O, etc. (U. S. pat. 2,181,602) **1**. App. for cleaning filter beds (U. S. pats. 2,182,094–5) **1**.

Gainey, Percy L.: An Introduction to the Microbiology of Water and Sewage for Engineering Students. Minneapolis: Burgess Publishing Co. 283 pp.

Hastings, Anna B.: Biology of Water Supply. London: Trustees of the British Museum. 48 pp.

Meyer, Aug. F.: Der Wassermeister. Munich: R. Oldenbourg. 40 pp. M. 1.20.

Purification of water. Otto Liebknecht (to Permutit Co.). Can. 386,731, Feb. 6, 1940. Saline water is brought into contact with carbonaceous H zeolite to remove bases, then with a keratin material, such as wool, to remove free acids. The carbonaceous and keratin materials are regenerated periodically by treating with acid and with base, resp. Cf. *C. A.* **33**, 5959[8].

Treating water supplies by carbonation. Henry W. Doennecke, Emory W. Douglass and Carl O. Anderson (to Ozark Chemical Co.). U. S. 2,182,286, Dec. 5. A method of carbonating a large volume of water without appreciably raising its temp. involves effecting combustion of a gaseous carboniferous fuel beneath the surface of the water and discharging the combustion products directly into the water while causing relative movement between it and the point of discharge to effect suitable admixture.

Valve operating system (with a variable period time control) for water filtration plants and similar apparatus. Walter J. Hughes (to Infilco Inc.). U. S. 2,183,075, Dec. 12. Various structural, elec. and operative details.

Apparatus for preventing corrosion in water-heating equipments. Julia C. MacDougall and Leonard V. Sutton, Executors of the Estate of Archibald J. MacDougall. Can. 386,772, Feb. 6, 1940. An Al rod having insulating collars is suspended in the equipment, a Cu tube is mounted between the collars with openings at its ends to allow free circulation of water and gases, and a Zn tube closely embraces the Cu tube. This device establishes internal electrolysis with the heating equipment as the cathode.

Rotary distributor for sewage-treatment apparatus. Hubert Beddoes (to Pacific Flush Tank Co.). U. S. 2,181,932, Dec. 5. Various structural and operative details.

Apparatus for separation of grease from drainage, etc. Geo. J. Dehn. U. S. 2,181,263, Nov. 28. Various structural details.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Chemical studies of four soil types in the Louisiana sugar district. Nelson McKaig, Jr., and L. A. Hurst. *Proc. Intern. Soc. Sugar-Cane Tech.* **6**, 296–303(1938).—Correction. The first author's name is incorrectly given in the abstr. in *C. A.* **33**, 6503⁶. E. J. C.

Stabilized soil mixtures. E. A. Willis. *Roads and Streets* **83**, No. 2, 37–44(1940).—A summary of the results of tests on circular tracks obtained by the Public Road Administration on stabilized soil mixts. from studies of sand-clay, sand-clay gravel and crusher-run materials. W. also discusses the use of NaCl and $CaCl_2$ as water-retentive chemicals. Henri Marc 2

The physical, chemical and biological nature of soils in the olive groves of Ospedaletti and Alassio. M. Duggeli. *Vierteljahrsschr. naturforsch. Ges. Zurich* **84**, 119–36(1939).—Results of the examn. of 48 samples of soil from olive groves in different localities and under different cover crops are tabulated with respect to pH and content of H_2O, $CaCO_3$ and bacteria. The quant. estn. of soil bacteria was made by means of proliferation in 3 different nutrient media viz., gelatin, agar, and sugar and agar. John O. Hardesty 3

Local conditions of tropical West Africa, with special reference to the Cameruns. Wilhelm Grosskopf. *Kolonialforstl. Mitt.* **1**, 4–37(1938); *Neues Jahrb. Mineral., Geol., Ref.* II, **1939**, 135–8.—A detailed account of the formation of the red loam, of soil bleaching (podzolization), and of laterite formation is followed by a sketch of the chief soil types of Africa. C. A. Silberrad 4

Soil genesis from andesite in Grenada, British West Indies. F. Hardy and G. Rodrigues. *Soil Sci.* **48**, 361–84(1939).—Extensive chem. analyses and chem. and mineralogical examns. were made of representative materials obtained from a deep red earth profile overlying augite andesite as developed in Grenada, British West Indies. Bulk chem. analyses of various materials including parent rock and surface soil show that the combined SiO_2, Al_2O_3 and Fe_2O_3 vary widely in different products. SiO_2 was characteristically low in the laterite. Mineralogical examns. and dehydration curves were used to differentiate the various natural clay minerals. Typical clay minerals were used also for comparison. Three of the materials showed dehydration curves with remarkable similarity to the one for halloysite, although in these there is also some resemblance to kaolinite. The laterite curve is obviously modified by the content of gibbsite. The red earth may be regarded as the parent material of the surface soil. A theory is presented to account for gibbsite silication as an essential process in the transformation of primary gibbsitic laterite into secondary kaolinic red earth. This is based on colloid chem. interactions between descending acidic H_2O and alk. silica solns. comprising ground water, the level of which fluctuates with intermittent satn. An alizarin dye test is used for gibbsite, hydrous Fe oxides and clay minerals. The magnitude of dye absorption varied widely for different materials. Phosphate fixation tests showed that the surface soil, although the least active of the materials, is capable of fixing about 0.163% of its wt. of P_2O_5 or 1630 p. p. m. of P_2O_5. M. S. Anderson 5 6 7 8

New methods for the determination of the fertility of soils on the basis of their physicochemical characteristics. G. K. Davydov. *Doklady Vsesoyuz. Akad. Sel'sko-Khoz. Nauk im. V. I. Lenina* **1938**, No. 13–14 (22–23), 38–47; *Khim. Referat. Zhur.* **2**, No. 5, 54(1939).—In the soils investigated (ordinary chernozem, leached chernozem, rich chernozem and gray forest soil) the following relationships were found: (1) The greater the N content of the fraction < 1 μ the smaller is the need for N fertilizers. (2) This rule holds to a smaller degree in regard to P_2O_5. (3) Prolonged addns. of manure to the soils enrich the soil with N in the fraction < 1 μ. Attempts were made to prep. the soil for the sepn. of the fraction < 1 μ by treatment with ultrasonic vibrations of frequency 425,000/sec. This method is not as effective as the chem. method, but D. considers that it can be used successfully. W. R. Henn

Characterizing soils. W. v. Nitzsch. *Bodenkunde u. Pflanzenernähr.* **15**, 127–30(1939).—Because the colloids of soils vary widely in absorptive properties, tests such as hygroscopicity or heat of wetting are unsatisfactory in characterizing samples. The pycnometric detn. of "colloidal shrinkage" on a fresh sample by a procedure outlined (cf. N., *Pore Size in Soil and its Relation to Soil Treatment and Water Economy*, RKTL-Schr., H. 85, Paul Parey, Berlin), with the estn. of dispersable constituents, is recommended for the rapid examn. of soils necessary in advising farmers as to treatment. The former procedure is well adapted to serial investigations, the latter might be modified to use the special app. employed in *testing flour* for baking quality by washing out the starch, and so be made very rapid. Four references. C. J. S. 9

Annual report of the agricultural chemist to the government of Bengal for the year 1936–37. Gostabehari Pal. *Dept. Agr., Bengal, Ann. Rept.* **1936–37**, Pt. 2, 85–137 (1937); cf. *C. A.* **31**, 1927⁸.—The *germination of sugar-cane cuttings* was improved by soaking the cuttings in water for 8–24 hrs.; further improvement in germination was not obtained by adding ground limestone (1 lb.) to the water (25 gal.). *Soils* from the cinchona plantation at Mungpoo, Kalimpong to a depth of 18 in. were rich in N (0.179–0.412) and HCl-sol. P_2O_5 (0.10–0.32) and K_2O (0.89–1.51) but were low in HCl-sol. CaO (0.07–0.39%). Most of the coastal areas of the Chittagong district are going out of cultivation because of the gradual appearance in the soil of a condition known locally as "kasch," which adversely affects the growth of paddy. The top soil which usually extends to a depth of 3–12 in. is gray and friable. The next layer, usually 2–3 ft. deep, is full of chocolate-brown, semidecompd. vegetable matter spotted with sulfur-yellow, crumbly deposits. These yellow deposits, which occur mostly among the roots, are probably responsible for the poisonous effect. Samples of *mustard oil* available on the Bengal market showed sapon. values of 171.09–172.84 and I values of 98.74–99.86, as compared to values of 166.86–171.67 and 99.83–108.10, resp., for oils extd. locally from pure seeds. **Annual report of the agricultural chemist to the government of Bengal for the year 1937–38.** *Ibid.* **1937–38**, Pt. 2, 77–143(1938).—*Soil work.* "Kasch" soils from the Chittagong district were usually much higher in total N, org. matter and org. C than were the good soils in the same areas. In lab. expts., decompn. of the org. matter was not hastened by treating "kasch" soils under aerobic conditions with either saline or fresh water, with or without the addn. of $CaCO_3$; this was apparently because of the absence of aerobic bacteria from the natural soils. In lab. expts., the amt. of water-sol. K extd. from Dacca red soil was slightly increased by addn. of lime at the rate of 500–6000 lb./acre. *Mustard oil* extd. from different varieties of seeds tended to show characteristic I values and it was possible to calc. beforehand the I and sapon. values of oil prepd. from mixts. of known quantities of pure seeds. At vapor pressures above 4 mm., the *equil. moisture content* (*m*) *of wheat grain* corresponds to the equation $\log m = 0.18 + 0.7 \log pv$, where *pv* is the vapor pressure. K. D. J. 10

Method and procedure of soil analysis used in the Division of Soil Chemistry and Physics. W. O. Robinson. *U. S. Dept. Agr., Circ.* **139**, 21 pp.(1939).—A revision of U. S. Dept. Agr., *Circ.* **139**, issued Oct., 1930, in which methods are given for the detn. of Se and As in soils in addn. to the methods described in the earlier publication (*C. A.* **25**, 2504). W. H. Ross 11

The determination of lime requirements of soils. I. L. Skorik. *Doklady Vsesoyuz. Akad. Sel'sko-Khoz. Nauk im. V. I. Lenina* **1938**, No. 13–14 (22–23), 48–50; *Khim. Referat. Zhur.* **2**, No. 5, 53(1939).—Shake 20 g. of soil + 50 cc. of water + 5 g. of $CaCO_3$ in a mixer and collect the

liberated CO_2 in a buret (eudiometer) filled with a 0.05 N H_2SO_4 soln. About 20–30 min. is required for completion of the reaction. One cc. of CO_2 corresponds to about 1 ton of lime required per hectare. The accuracy of the detns. was ± 2 quintals/hectare. W. R. Henn

Estimation of potash in soils by the cobaltinitrite method. T. Rajagopalan. *Indian J. Agr. Sci.* 9, 745–53 (1939).—The cobaltinitrite method of estg. potash both volumetrically and gravimetrically was tested with reference to simple salts, artificial mixts. of various bases, acids, and HCl and citric acid exts. of soils. It was found reliable and quick within the ranges tried (3–53 mg. K_2O). The volumetric procedure especially may be very useful in detg. small quantities of potash, even below 1 mg., as are usually found in citric acid and NH_4Cl exts. of soils. The method is cheap and applicable in the presence of sulfates, phosphates and other bases and has thus distinct advantages over the platinichloride and perchlorate methods. A simple modified volumetric procedure for direct estn. of potash without removal of the bases in the HCl exts. of soils is also outlined. A. H. Krappe

An indirect method for determining the moisture content of soils at the "sticky point." Chao-Lin Feng. *J. Chem. Eng. China* 5, 74–8(1938); cf. *C. A.* 34, 1433[5].—A rapid and economical method for the detn. of the "sticky point" of soils, suitable for soils contg. not too large an amt. of sol. salts and giving results comparable with those obtained by methods hitherto used, is developed. The detn. is carried out as follows: About 50 g. or more of soil is first passed through a 2-mm. sieve and then placed in a shallow container contg. a small wire basket with holes about 1 cm. in diam. The surface of the soil is made smooth and plain by scraping it with a plate. Then, in the course of about 0.5 min., 1.0 cc. of distd. H_2O is dropped from a buret, the tip of which being 1.5 in. above the soil surface. After being allowed to stand for another 0.5 min., the mass is immediately removed from the wire basket by first lifting the basket from the container with a gentle tipping of the basket in order to let the dry soil filter through the bottom of the basket. It is then picked up with a pair of glass rods and weighed immediately. C. L. Tseng

Reliability of the proposed suction method of determining the moisture equivalent of soils. R. M. Pinckney and F. J. Alway. *Soil Sci.* 48, 403–11(1939); cf. *C. A.* 23, 3530.—The suction method for the detn. of moisture equiv. of soils is compared with the older centrifuge method on 113 Minnesota soils. These ranged in moisture equiv. from 1.5 to 90.6, in N content from 0.001 to 2.03%, and in pH from 4.7 to 8.1. The relations found are in general agreement with those reported by Bouyoucos, cf. *C. A.* 29, 6992[6], but they do not fully support his conclusion as to their reliability. Soils of loam or finer texture averaged about $^1/_{10}$ higher in moisture equiv. by the suction method than with the centrifuge, while sands were about twice as high by the former method. Soils intermediate between sands and loams showed variable concordance. Duplicate detns. by the suction method were much less concordant than those by the centrifuge procedure. The suction method may prove to be very satisfactory for comparing soils in 1 area, but for comparing soils of different areas the centrifuge method is preferable. M. S. Anderson

pH of soils in relation to moisture. M. R. Huberty and A. R. C. Haas. *Calif. Citrograph* 25, 6, 26–9(1939).—The data were obtained for soils of orange orchards under different irrigation practices. Preliminary work showed that the pH values for air-dry samples were consistently higher than those for oven-dry samples but in both cases the variation in pH values were uniform. Storage after oven-drying of soil samples increased the pH of the soil. Increasing the size of sample on which the pH detns. were made caused a slight drop in the pH value of 3 out of 4 soil samples tested. pH detns. in this work were made on 30 g. of oven-dry samples. Detns. on a 1–5 soil-water ratio showed that there was a progressive increase in pH with depth. With the probable exception of an Aiken clay loam there were marked increases in pH with increases in moisture content when the soil-water ratio was low, but at ratios of 1–10 the pH value might be lower than at the 1–5 ratio. pH values may undergo considerable change at moisture contents below the H_2O-holding capacity of the soil. Several soils were slightly basic at high dilns. but quite acid at low soil-moisture content. Direct soil pH measurements in the field gave lower values than those obtained from the 1–5 soil-water suspension. Marked changes were noted in the pH of calcareous soils at low and high dilns. Irrigation on a 2-week schedule gave lower soil pH values than a schedule calling for an irrigation every month. Dead algae tended to lower the pH of irrigation water, whereas when the algae were minute green forms exposed to light they tended to increase the pH. The pH of rainfall varied from 6.59 to 6.93. J. R. Adams

Three years' experiments on the water economy of the soil. L. Pozdena. *Bodenkunde u. Pflanzenernähr.* 15, 255–68(1939).—Plots on productive brown loamy sand only moderately supplied with humus, about 1% org. C and 1% $CaCO_3$, were variously fertilized with chemicals, specially fermented manure (Edelmist) and several humus fertilizers (cf. *C. A.* 31, 7576[1]). The connection between rainfall, H_2O in the soil at different depths, fertilization and yields of potatoes, oats and corn was studied. In so far as ground water did not supply the needs of the crops, there was a direct relation between rainfall, modified by seasonal distribution, and yields. The soil under potatoes tended to be more moist than under corn, from prevention of evapn. by the denser cover of the former. Fertilization tended to dry out the soil, but only as it caused a greater production of plant substance and better utilization of the available H_2O. The effects of the org. fertilizers and manure were the same as those of mineral fertilizers in this respect. Thirty references.
C. J. Schollenberger

Investigation of soils by the bio-indicator method. O. Pogrebnoĭ. *Visti Akad. Nauk Ukraïn. Sotsialist. Radyans'koĭ Respub.* 1938, No. 8–9, 61–5; *Khim. Referat. Zhur.* 2, No. 5, 53(1939).—The bio-indicator method does not replace the field, vegetation and chem. methods, but, being a mass method, it simplifies soil analyses in conjunction with them. W. R. Henn

Nonexchange ionic reactions in soils. S. G. Rydkiĭ. *Doklady Vsesoyuz. Akad. Sel'sko-Khoz. Nauk im. V. I. Lenina* 1938, No. 13–14 (22–23), 32–7; *Khim. Referat. Zhur.* 2, No. 5, 54(1939).—The object of the investigation was to study the hydrolysis reactions in soils. These reactions, when adapted to saline soils, can be regarded as a partial expulsion by H^+ of the exchange cations of the soil (Ca^{++}, Mg^{++}, Na^+) during the interaction with water, and an increase of pH which leads to an increase of their nonexchange adsorption by the soil. A dispersion of the soil mass is a result of this reaction. This conclusion was verified by the detn. of pH at different degrees of dilu. of the soil suspensions and by the potentiometric titration of soils with HCl and NaOH in the presence of NaCl. The increase or decrease of pH in the first expts. did not exceed the 0.5 limit in any soils except red soils, in which a dilu. of the suspension from 1:5 to 1:400 (1 g. of soil/400 g. of water) caused an increase of pH from 5.00 to 6.65. Thus, hydrolysis has an effect in the phenomena of dispersion of the soils, for practical purposes, in red soils only. In the potentiometric method of titration the suspension was first treated with a base, then titrated with acid and back-titrated with a base. The difference in the titration curves is regarded as a result of the preferential adsorption of OH^- or of H^+ by the soil. The magnitude of the difference of the curves can be regarded as an indicator of the character of the hydrolytic splitting of the soil colloidal complex. W. R. Henn

Agronomic evaluation of the "precipitate" from phosphorite. M. Kurakhtanov. *Trans. Sci. Inst. Fertilizers Insectofungicides* (U. S. S. R.) (*Sbornik Fosf. Udobr. i ikh Kach.*) 1938, No. 141, 156–66; *Khim. Referat. Zhur.* 1, No. 11–12, 73(1938).—Expts. with oats, peas and sugar beets on a no. of soils of different acidities show that the action of the "precipitate" from bone meal did not differ from the action of superphosphate from floated apatite. The "precipitates" from phosphorite contg. sesquioxides

had a smaller effect than had the superphosphate. A still smaller effect was obtained from the "residues" after the treatment of the "precipitates" with weak acids. Peterson's reagent cannot be used to det. the assimilation of P_2O_5 from "precipitates" rich in sesquioxides.
W. R. Henn

The effect of free iron oxide removal on some properties of soil colloids. S. J. Toth. *Soil Sci.* **48**, 385–401(1939). —Free Fe oxide was removed from soil colloids by the method of Drosdoff (*C. A.* **29**, 4865[4]). Various properties of the deferrated colloids were compared with the untreated materials. Deferrated colloids lost more SiO_2 and sesquioxides during electrodialysis than did the untreated colloids. The compn. of the sesquioxides varied, but more Al was always electrolyzed from the deferrated residues than from the untreated colloids. The Colts Neck colloid lost 4 times as much SiO_2 on electrodialysis after being deferrated as before, while the Sassafras colloid showed only a slight increase in loss. The SiO_2/Al_2O_3 ratio of the catholyte sediment varied between the limits 0.77 and 1.62. The sediments of the Cecil and Sassafras colloids had a higher ratio in the untreated sample while in the case of the Colts Neck and Penn colloids the higher SiO_2/Al_2O_3 ratios were obtained with untreated colloids. The removal of free oxides lowered the ultimate pH of the colloids without materially affecting the cation exchange capacity at pH 7. Removal of Fe oxide greatly decreased the capacity of the colloids to adsorb chloride and phosphate ions. However, the completely deferrated residue is capable of adsorbing approx. $1/2$ as much phosphate as the untreated colloid. In some cases the adsorption of phosphate ions increased the cation exchange capacity but in other colloids there was but little change. Neutralization curves of deferrated colloids were similar to the curves for original colloids but the residues possessed a somewhat lower buffer capacity. In general only slight changes were observed in the acidoid nature of soil colloids on removal of the free iron oxide. M. S. Anderson

The relationship between type of soil and the absorption of plant nutrients, based on results of pot experiments. F. Keller. *Landw. Jahrb. Schweiz* **53**, 786–92(1939).—Light soils are especially likely to be deficient in N; heavy soils are deficient in P. It is not correct to assume that in general heavy loam or clay soils are adequately supplied with K. In such soils the movement of the soil soln. is frequently slow and the K firmly held by the soil colloids is difficult for plants to acquire. Consequently, soils relatively rich in K may appear poor in this element and actually need fertilizers contg. K. E. O. Whittier

Partial sterilization of soils. M. Bogopol'skiĭ and O. Bershova. *Mikrobiol. Zhur. Akad. Nauk U. R. S. R.* **5**, No. 4, 119–60(1938); *Khim. Referat. Zhur.* **2**, No. 5, 55(1939).—Cl, $CaSO_4$, C_6H_5OH, etc., in amts. of 0.05–0.1% were investigated for the sterilization of soils. The effect of partial sterilization on the microflora of the soils was detd. by the change in the activity of the basic groups of bacteria. The activities of the ammonifying bacteria, the N-fixing bacteria and the bacteria that destroy cellulose are increased while the activity of the nitrifiers is decreased. The acidity (hydrolytic and exchange) and the soly. in water of mineral and partly org. substances (in particular of NH_4 salts and salts of H_3PO_4) are increased, while the amt. of nitrates in the soil soln. is decreased. The partial sterilization of soils increases the yield of tomatoes, oats and potatoes. W. R. Henn

The influence of cropping practices on some physical and chemical properties of soil. Frank Moser. *Soil Sci.* **48**, 421–31(1939).—Org.-matter content appears to be either directly or indirectly assocd. with the phys. properties that are important in soil structure. In a series of field expts. org. matter increased with legume and green manure crops and decreased with cotton-corn rotations. Cropping practices also had an influence upon dispersion ratio, suspension percentage and porosity. The suspension percentage and the dispersion ratio showed sufficient correlation with erosional behavior of soils under field conditions to be good indexes for predicting soil and water losses by lab. methods. M. S. Anderson

Pedology of Freiberg mining dumps. Gottfried Horn. *Mitt. Naturw. Ver. Freiberg* **3**, 30–3(1938). **Plants of the Freiberg dumps.** E. Lange. *Ibid.* 20–9, 45–6. **Old mining pools rich in plant life.** K. A. Jurasky. *Ibid.* 34–40; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 120–1.—The Freiberg dumps are mainly derived from gray biotite gneiss, which readily weathers to form a fertile mellow loam contg. up to 3% chalk, 4% potash and 0.1% phosphates. The dumps from the Zn and Pb ores contain much sulfide and arsenide, and the decompn. products are very harmful to vegetation; as also are the dumps from the sericitized vein walls which are often impregnated with pyrite and arsenopyrite, and weather to an As- and S-contg. clay. Dumps from dolomite formations contain much less As and S, and produce generally satisfactory soils. C. A. Silberrad

The influence of overliming on boron deficiency. E. R. Purvis and W. J. Hanna. *Am. Fertilizer* **91**, No. 8, 5–7, 24, 26(1939).—The addn. of B alone to soln. cultures made alk. with lime water did not prevent overliming injury, but the injury was greatly reduced when the B was supplemented with the addn. of Mn. An overlimed Norfolk fine sandy loam soil retained more applied B after leaching than did the same soil in an unlimed state, and this retained B remained available to plants as evidenced by injury to subsequent crops. The evidence obtained indicates that overliming is not a primary cause of B deficiency. W. H. Ross

Occurrence of arsenic in soils and waters in the Waiotapu Valley, and its relation to stock health. I. R. E. R. Grimmett and I. G. McIntosh. *New Zealand J. Sci. Tech.* **21A**, 137–45(1939).—Sickness and death of cattle on drained swamp areas was assocd. with high As content in the soil and water. Co deficiency, called "bush" sickness, was excluded as a cause of death. Muds varied in As content from 0.0068–1.9% As; waters, from traces to 2.6 grains of As_2O_3 per gal.; and soils 0.0008–0.525% As. **II. Feeding experiments at Wallaceville.** L. W. N. Fitch, R. E. R. Grimmett and E. M. Wall. *Ibid.* 146–9.—The feeding of 0.342 g. As to a cow showed no increase in As in the milk. The feeding of about 1.36 g. of As over a period of several days resulted in death. As poisoning was obtained in cows fed limonitic and ferruginous muds contg. As from the Reporoa district. **III. Experiments, observations and analytical results on farm animals at Reporoa.** R. E. R. Grimmett, I. G. McIntosh, E. M. Wall and G. B. Jones. *Ibid.* 150–60.—The As content of clean pasture grasses from arsenical areas ranged from 0.6 to 23 mg. As_2O_3 per kg. of dry substance. The av. was 7.3 mg. This is not considered a likely source of cattle poisoning. Prolonged Co drenching in sick cattle was of no benefit, indicating that "bush" sickness was not involved. The As is derived by the cattle largely from water and mud in wet areas where As is concd. C. R. Fellers

Wilting coefficient and wilting percentage of three forest soils of the Duke Forest. Wilbur H. Duncan. *Soil Sci.* **48**, 413–20(1939).—Profile samples of Congaree clay loam, Georgeville clay and Orange loam soils gave ratios of moisture equiv. to wilting percentage varying from 1.57 to 5.65. Wilting coeff. is not a good measure of the lower limit of available H_2O in these 3 soils. M. S. A.

Seasonal water and nitrate leachings in relation to soil and source of fertilizer nitrogen. A second report on Windsor lysimeter Series "A". M. F. Morgan and O. E. Street. *Conn. Agr. Expt. Sta. (New Haven), Bull.* **429**, 43 pp.(1939); cf. *C. A.* **30**, 8472[2].—Particular attention was paid to the distribution of leaching during the several seasons, both as to vol. of drainage water and quantities of N lost from the soil. Nitrates are leached in direct proportion to the amt. of drainage water passing through the soil. Fifty % of the nitrate N residue was leached by 0.95 acre-in. of drainage water from the sandy soils and by 1.4 acre-in. from the loamy soils. NH_4 salts pass through the process of nitrification before being appreciably leached. In light sandy soils NH_4 salts may be leached to some extent before nitrification occurs. Urea is more readily leached from soils than either cottonseed meal or $(NH_4)_2SO_4$. Less than 66% of the N from cotton-

seed meal became available in the form of nitrates in the course of a year. On the other hand, about 80% of the N in $(NH_4)_2SO_4$ and urea is transformed to nitrates. The use of 200 lb. of N per acre, supplying 40 lb. immediately available as nitrates and the remainder as org. N, is good fertilizer practice in the Conn. Valley. Nitrate N applied to these soils before planting may often be leached away before the plant can utilize it. A summer rain of 1 in. or less rarely causes leaching of soil nutrients. On loam soils which have not received water for a week or more, a 2-in. rain causes no leaching. C. R. Fellers

Applicability of the Schuhknecht-Waibel apparatus for determining potash and phosphoric acid to the flame photometric and colorimetric estimation of potash and phosphoric acid in soil extracts and plant ashes. L. Schmitt and W. Breitweiser. *Bodenkunde u. Pflanzenernähr.* 15, 268–77(1939); cf. *C. A.* 33, 2436[6].—The app. has been improved by substituting a more compact galvanometer which requires no special support but magnifies its reading by projection to give as great sensitivity as with the mirror galvanometer formerly used. K_2O is detd. by atomizing the HCl soln. of ash, etc., into a C_2H_2 flame, and focussing through a light filter the characteristic double line of the K spectrum upon a photocell, the current from which is read upon the galvanometer scale. P_2O_5 is detd. by interposing a cell contg. the sample soln. with color developed according to Zinzadze into the path of the light beam and noting the decrease in the reading. In each case, the app. is standardized with samples of known compn. Several hundred detns. by either method can be made in a working day, with 98% of the K_2O and 95% of the P_2O_5 detns. agreeing within 2 mg. with the indications of standard chem. methods. The procedures are described in detail. C. J. Schollenberger

Comparison of Goy's single titration with results for hydrolytic or exchange acidity. H. Lacour. *Bodenkunde u. Pflanzenernähr.* 15, 246–50(1939).—A comparison on 325 soils of Goy's method I for CaO requirement, a single titration to pH 6.5 (cf. *C. A.* 31, 4033[3]), with the indications for hydrolytic or exchange acidity by Lemmermann's method (*Methoden für die Untersuchung des Bodens, C. A.* 28, 5916[9]) showed great variations and little consistency of either in relation to the pH values of the soils. Neither method has much basis in reason for the assumption that it will correctly indicate the optimum application of $CaCO_3$, and no consts. to fit all cases can be selected. Four references. C. J. Schollenberger

Microbiological investigation of the long-period experiment field of the University Farm at Mydlniki. J. Kleczkowska. *Polish Agr. Forest Ann.* 39, 322–39(in English, 339–40)(1937).—Examn. of the whole exptl. field revealed the presence of azotobacter when the pH of the soil was above 6.0; soils pos. with azotobacter gave 100% results in defining lack of P. Soils of pH less than 6.0 showed absence of the azotobacter which when inoculated into these soils gave 100% in showing lack of P and only 50% correct results when the P content was sufficient for good growth. Liming low pH soils did not cause a rapid appearance of the organism previously not present. C. T. Ichniowski

The adsorption of bacteriophages by the adsorbing complexes of soils. O. Bershova. *Mikrobiol. Zhur. Akad. Nauk U. R. S. R.* 5, No. 4, 161–80(1938); *Khim. Referat. Zhur.* 2, No. 5, 55(1939).—The adsorption of bacteriophages by 7 samples of soils (1 sample of peat) was investigated. The samples of one of the soils were satd. with different cations (H^+, NH_4^+, Na^+, K^+, Mg^{++}, Ca^{++}, Al^{+++} and Fe^{+++}). The adsorption of the soils is proportional to the amt. of humus in the soil. Heavy soils (chernozem) adsorb more bacteriophages than do the clay soils and, especially, more than the sand soils. Lowland peat adsorbs little bacteriophage. The adsorption increases in soils with cations H^+, NH_4^+, Al^{+++} and Fe^{+++} and decreases with Ca^{++}, Mg^{++}, K^+ and Na^+. The adsorption of bacteriophage depends on the org. part of the adsorbing complex of the soil. W. R. Henn

Oxidation of free ammonia by nitrifying bacteria. M. Kholodnil', V. Smalil' and R. Pikovs'ka. *Mikrobiol. Zhur. Akad. Nauk U. R. S. R.* 5, No. 4, 103–17(1938); *Khim. Referat. Zhur.* 2, No. 5, 54–5(1939).—Soil bacteria that are able to oxidize free NH_3 to HNO_2 and HNO_3 are not identical with the ordinary nitrifying bacteria, which oxidize NH_4 salts. However, in some cases the representatives of both groups of bacteria can use as sources of energy from the same substance, free NH_3 or NH_4 salts. Bacteria that oxidize free NH_3 can be cultivated on a solid substrate (silica gel satd. with a soln. of mineral salts without $(NH_4)_2SO_4$ with an addn. of chalk) as well as on a liquid substrate. When they are cultivated on silica gel, small yellowish brownish colonies are formed that can be easily detected at small magnification. W. R. Henn

Nitrogen fixation in rice soils. B. N. Uppal, M. K. Patel and J. A. Daji. *Indian J. Agr. Sci.* 9, 689–702 (1939).—Expts. with rice plants collected during the rainy season, isolations from soil samples by Ashby's method, and inoculation showed that *Azotobacter* plays an important part in the N recuperation of rice soils at Karjat. The organism is stimulated to greater activity when assocd. with the growing roots of rice plants, which seem to cause an increase in its efficiency of N fixation by bringing about a change in the reaction of the medium in the vicinity of living roots. The organism shows a marked periodicity probably because of external climatic influences in the soil, as it is very abundant during the monsoon but suffers a sharp decline in nos. in the dry period until it almost disappears from the soil in the cold season and during hot months. The microbial activity during the monsoon is reflected in an increased N content of rice soils. 15 references. A. H. Krappe

The influence of water and nitrogen supply upon the protein contents of barley varieties. (Experiments with second generation seed.) K. Nehring. *Bodenkunde u. Pflanzenernähr.* 15, 336–45(1939).—Barley grown in a previous expt. (*C. A.* 33, 1860[7]) was used as seed in a continuation of the work to det. the effects of differences in the N contents of the seed from the previous treatment upon the crop. The 6 times replicated plots of 25 sq. m. were fertilized at rates of 0, 27 and 45 lb. N/acre. Germination varied inversely with N in the seed, but otherwise there were no differences attributable to fertilization of the seed crop; the influence of the current fertilization was preponderant. The effects of N were similar to those previously noted; yields and crude protein contents were increased. The most pronounced effect was obtained with the normally high-N Abyssinian naked barley, which showed nearly as great increase in protein production as the high-yielding low-N variety Hado-Streng; the differences between the 2 high- and 2 low-protein varieties were less than in the previous crop. Control of the water supply by varying the width of drill rows had effects similar to those previously noted; planting in 15-cm. rows produced larger yields and showed greater effects from N fertilizer than were obtained from the same varieties in rows 20 cm. apart. Five references. L. Schmitt and W. Schineis. *Ibid.* 345–76; cf. *C. A.* 33, 1861[4].—The results of expts. similar to the foregoing are summarized: Only 1 variety of summer barley, normally high-N, showed any increase in ability in the second generation to produce more protein from increased N fertilization. The crops from high-N seed of 2 other varieties, one normally high-N and the other low-N, showed an inverse relation between N in seed stock and ability to utilize N fertilizer during growth. The latter seems to be a varietal characteristic; in varieties possessing it, the same is strengthened when the seed is rich in N, but otherwise the seed is weakened by high-N fertilization. In other respects, the effects of increased N supply for the seed crop were uncertain. High-N seed produced heavy grain; this quality in the second crop showed an inverse relation to yields of grain and straw and N contents. The greater water supply with 20-cm. rows was less favorable to increased yield of protein than the limited supply with 15-cm. rows; seed of some varieties grown in 15-cm. rows was weakened. As in the previous expt., with seed of normal compn. increase in available N increased yields and protein contents; 36

lb. N/acre seemed to be the optimum. Low-N varieties produced more protein to the acre because yields were greater. With 45 lb. N/acre applied, utilization was better with 20-cm. rows, because there was more water available. The crop from high-N seed showed less ability to utilize N supplied in fertilizer, but this difference tended to disappear as the N offered was increased. Differences in the seed caused by varied fertilization of the plants producing it were evident in differences in vol. wt. of the second crop with uniform treatment, but the limited water supply with 15-cm. rows was a more important factor for the second crop. Two references. C. Pfaff. *Ibid.* 377–82; cf. *C. A.* **33**, 1861[2].—Yields and compn. of barley varieties grown in pot tests to study the foregoing problem showed with uniform fertilization no significant differences attributable to effects of previous fertilization upon the seed stock. All lots of seed produced normal yields, with insignificant variations; that is to say, the 4 varieties tested showed their characteristic differences in yield and protein contents, independent of seed compn. The same indications as to the influence of water supply were obtained with the second generation crop as with the first. Two references. C. J. Schollenberger

Concerning the effect of several trace elements, boron in particular, on the growth of various cotton varieties. W. Schropp and B. Arenz. *Phytopath. Z.* **12**, 366–404 (1939).—Four varieties of Egyptian cotton were used in testing the effects on plant growth of B, Mn, Cu and Zn in Hoagland's A-Z nutrient solns. Expti. content of B ranged from 0.1–0.66 mg., Mn was 0.1 mg. and Cu and Zn each 0.01 mg., per l. of soln. Clear-cut effects of Cu and Zn were not obtained, although in the absence of these elements the shoot yield was higher, the root wt. lower, the chlorophyll content lower and the N uptake greater. The protein N portion of total N was greater in Zn deficiency than in Cu deficiency. Mn deficiency had assocd. with it chlorosis, depression of shoot wt., and a strong reduction of N uptake. Chlorophyll content reached its lowest level with Mn deficiency. It is uncertain whether Mn is indispensable for cotton. B is indispensable for cotton, its deficiency resulting in a lessened chlorophyll content and a general growth check and destruction of the shoot tip, with a strong thickening and watch-glass bending of the leaf blade. The N content of the shoot was not materially changed, the N uptake and protein production standing in close relation to the nutrient level and the duration of the expt. Injury symptoms of B deficiency are more marked with high nutrient level and long growth and likewise the action of higher B concn. is dependent on the level of the nutrient supply. Injury due to B deficiency is explained as NH_3 poisoning due to carbohydrate deficiency. The effect of B upon CO_2 assimilation and protein formation is indirect, as B prevents an undue swelling of plasma colloids, thereby favorably influencing the water relations. B brought in with Chile saltpeter completely prevented the appearance of deficiency symptoms. Of the cotton varieties studied Ashmouni was most tolerant, followed by Giza 12, Giza 7, with Sakel least tolerant to B deficiency. These variety differences are probably related to the climatic conditions of the typical culture regions of the 4 varieties. Merritt N. Pope

Borax for alfalfa in northern Idaho. W. E. Colwell and G. O. Baker. *Better Crops with Plant Food* **23**, No. 3, 9–11, 37–8(1939); cf. *C. A.* **33**, 7022[1].—Many of the soils in northern Idaho are deficient in B for alfalfa, and substantial increases in yields can be obtained by the addn. of borax either in the spring or in the fall, preferably at the latter time. Indications are that the protein content of B-deficient alfalfa is somewhat less than that of healthy plants receiving sufficient B for normal growth. J. R. Adams

Effect of the trace element vanadium on plant growth. S. Gericke and E. v. Rennenkampff. *Prakt. Blätter Pflanzenbau Pflanzenschutz* **17**, 17–22(1939); cf. Scharrer and Schropp, *C. A.* **29**, 6624–7.—VCl_3 at a concn. of 0.01% V in sand culture produced injury to barley growth whereas NH_4VO_3 gave favorable results at this concn. in sand and at 0.125% concn. in a soil rich in lime. In water-culture expts. 1 mg. V as $Ca(VO_3)_2$ gave better results than 0.1 mg., and 2 mg. further increased root growth, while 10 mg. was injurious to root and top; an increase from 0.1 to 1 mg. V as VCl_3 damaged growth. Water-culture expts. were made comparing the effects of $Ca(VO_3)_2$ and a com. fertilizer, Thomas phosphate, (I), contg. 0.6% V as $Ca(VO_3)_2$. One mg. V as I was much more favorable than as $Ca(VO_3)_2$, owing to the other constituents in I. However, the addn. of 1 mg. V as $Ca(VO_3)_2$ to 1 mg. V as I further increased growth, but the addn. of 10 and 20 mg. produced increasingly unfavorable results. E. J. S.

The action of trace elements in the border regions of the south Bavarian moors. J. Weigert and F. Fürst. *Prakt. Blatter Pflanzenbau Pflanzenschutz* **17**, 117–40 (1939).—Preliminary expts. (1935) indicated that the poor yields and partial crop losses of oats, barley, summer wheat and rye, potatoes, corn, hemp, beets and less of clover and other legumes in this area were due, not to deficiencies of the chief nutrients, N, P and K, but to the lack of B and Mn. Field expts. in 1936 showed that $CuSO_4$ dusted at 75 and 150 kg./ha., and sprayed in 3% soln. produced no appreciable effect on yield of oats, corn, hemp and potatoes. Addn. of 75 kg./ha., 150 kg./ha. and 10% soln. of $MnSO_4$ produced yields, resp., of 2, 3, 4 times the untreated in oats; 1.3, 1.7, 2 in oat straw; 1.3, 1.4, 1.4 in corn; 1, 0.9, 0.6 in hemp; and 1.3, 1.5 and 1.5 in potatoes. In beets, the yield was approx. doubled by addn. of 20 kg. borax, 10 kg. boric acid or B-contg. superphosphate. Lab. expts. showed that oats grown on local soil + $MnSO_4$ gave increased yields and were free of dry spot disease while plants on this soil + $CuSO_4$ or com. N-P-K fertilizer were diseased. Mn and Cu were not effective on potatoes in these lab. expts. Large and repeated field expts. in 1938 showed that the highest yield of potatoes was obtained by addn. of $MnSO_4$ at 60 kg./ha + com. fertilizer contg. N 45–50, P 60 and K 120. Addn. of $MnSO_4$ at 80 kg./ha. generally decreased the yield and $CuSO_4$ was inactive. The use of B as B-contg. superphosphate gave a less increased yield of potatoes but gave the highest yield of beets. Edwin J. Sciferle

Investigation of the individual action of calcium and phosphoric acid on plants. A. T. Kirsanov. *Doklady Vsesoyuz. Akad. Sel'sko-Khoz. Nauk im. V. I. Lenina* **1938**, No. 13–14 (22–23), 23–31; *Khim. Referat. Zhur.* **2**, No. 5, 56(1939); cf. *C. A.* **32**, 2891. The individual actions on barley of superphosphate, phosphorite and CaO were compared on podzol soils. In the first year superphosphate acted in the same manner as an equiv. amt. of Ca in lime. In order to verify the role of phosphorite as a Ca fertilizer vegetation expts. were performed with phosphorite + $Ca(OH)_2$ and with phosphorite separately. The action of superphosphate was considerably greater than that of phosphorite. Phosphorite in podzol soils acted at first like a lime fertilizer. With an increase of the degree of cultivation of the podzol soils the effectiveness of phosphorite as a source of P_2O_5 must decrease. The easily sol. phosphates are much needed for fertilizers. W. R. Henn

The effect of phosphorus and magnesium on the crop yield and on the quality of sunflower seeds, depending on the time of their addition. I. V. Mosolov. *Chemisation Socialistic Agr.* (U. S. S. R.) **1938**, No. 12, 92–4; *Khim. Referat. Zhur.* **2**, No. 5, 56(1939).—Sand-culture expts. showed that (1) P increased the yield of sunflower seeds (application at the beginning of the growth of sunflowers was more effective than during blossoming); (2) addn. of K before blossoming increased the yield of seeds and of oil (a max. yield of seeds was obtained by addn. of P during planting and of K during blossoming); (3) application of Mg together with P at the beginning of the growth of the sunflowers increased the content of oil in the seeds and its total yield. W. R. Henn

The effect of iron and aluminum oxides on the quality of Ammophos. Soil cultivation. L. I. Obolenskaya. *Trans. Sci. Inst. Fertilizers Insectofungicides* (U. S. S. R.) (*Sbornik Fosf. Udobr. i ikh Kach.*) **1938**, No. 141, 104–17; *Khim. Referat. Zhur.* **1**, No. 11–12, 72(1938).—Expts. with oats on an ordinary chernozem, on leached cherno-

zem, and on leached clay soils showed that effectiveness of fertilizers in decreasing order is Ammophos with small amts. of R_2O_3, Ammophos with large amts. of R_2O_3 and superphosphate, complex NH_4 phosphates of Fe and Al, phosphates of Al, and phosphates of Fe. The slightly sol. phosphates can be better evaluated on the second year after the fertilization. W. R. Henn 1

The effect of the composition and structure of iron and aluminum phosphates on the growth of plants. D. M. Khelfets. *Trans. Sci. Inst. Fertilizers Insectofungicides* (U. S. S. R.) (*Sbornik Fosf. Udobr. i ikh Kach.*) **1938**, No. 141, 76–87; *Khim. Referat. Zhur.* **1**, No. 11–12, 73 (1938); cf. *C. A.* **31**, 1717[6].—Cryst. $FePO_4.2H_2O$ and $AlPO_4.2H_2O$ are obtained by pptn. from soln. with $CaCO_3$ and by lime water at pH 2.8. Their soly. in Peterman's soln. is less than 50%. Similar phosphates are obtained at pH 3.6–4.2, by longer action of the reagents. Amorphous ppts. are first obtained, which are completely dissolved in Peterman's reagent. In expts. with oats on acid clay soils the amorphous RPO_4 was equiv. to "precipitate" and to double superphosphates. The effect of cryst. RPO_4 is only half that of amorphous RPO_4. By the action of NH_3 on solns. of Fe phosphate the following complex salts can be formed: (1) yellow-green $NH_3.2FePO_4.4H_2O$ formed at pH about 4.5, (2) colorless $NH_4H_2[Fe(PO_4)_2]$, (3) pink $NH_3[Fe(PO_4)_2].7H_2O$ formed at pH 3.8 and lower. (1) is slightly sol. in Peterman's soln., and is little available to the plants (according to the expts. with oats on acid clay soils); (2) and (3) are almost completely dissolved in the Peterman's soln. and, are more available than (1) in podzol, but are also comparatively little available in chernozem. W. R. Henn 2

The effect of ammonium humates on the availability of phosphates of the sesquioxides [iron and aluminum] to plants. D. L. Askinazi. *Trans. Sci. Inst. Fertilizers Insectofungicides* (U. S. S. R.) (*Sbornik Fosf. Udobr. i ikh Kach.*) **1938**, No. 141, 230–8; *Khim. Referat. Zhur.* **1**, No. 11–12, 75(1938).—The NH_4 humates increased the soly. and the availability for the plants of P_2O_5 from RPO_4 in the presence of $CaHPO_4$. This effect is attributed to a rupture in the bond between RPO_4 and $CaHPO_4$, with increase of soly. of $CaHPO_4$. W. R. H. 3

The effect of magnesium on the behavior of phosphoric acid in the soil. F. van der Paauw and Th. B. van Itallie. *Verslag. Landb. Onderzoek.* No. **45**, **A**, [7], 173–89(summary in German 189–90)(1939).—The addn. of MgO has no decided effect on the amt. of P taken up by the plant or its soly. in the soil. The addn. of Mg as phosphate to the soil shows after a short time the same soly. proportion as other H_2O-sol. phosphates. Pot and field expts. showed, that even with the addn. of a great variety of Mg salts, the amt. of P taken up by the plants was almost the same. J. C. Jurrjens 4

Manganese studies: California soils and citrus leaf symptoms of deficiency. H. D. Chapman, George F. Liebig, Jr., and E. R. Parker. *Calif. Citrograph* **24**, 427, 454; **25**, 11, 15(1939).—Pot tests showed that certain crops on certain California soils may be benefited by Mn applications. Mn-deficiency symptoms in the leaves of citrus cuttings were detd. Soil alky. often induced Mn deficiency. Despite the regular addn. of Mn to exptl. outdoor navel orange sand cultures, Mn deficiency developed when the pH of the nutrient soln. was maintained at 7.0 or above and disappeared when the pH was lowered. Analyses of leaves showing Mn-deficiency symptoms showed a Mn content of 2.7 to 4.9 p. p. m. while healthy leaves had 14 to 26 p. p. m. of Mn. J. R. Adams 5

Foliar diagnosis: Nutritional differences affecting the yields of potatoes from similarly treated plots. Walter Thomas and Warren B. Mack. *Proc. Am. Soc. Hort. Sci.* **36**, 573–89(1939); cf. *C. A.* **33**, 4728[9], 9514[3].—There was no direct relationship between the N content of the leaves and yield; the effect of N on the yield was governed by the presence of P and K. A relationship existed between the P and K in the leaves and yields. A low intensity of nutrition (sum of N, P_2O_5 and K_2O content of leaf as percentage of dry wt.) was always assocd. with low yields; but, owing to luxury consumption of K, high intensities were not always assocd. with high yields, although high yields were always assocd. with adequate intensity. The course of nutrition with respect to N, P and K during the growth cycle is described with the aid of graphs which show in trilinear coördinates the equil. between N-P_2O_5-K_2O in the chosen leaf at each sampling date for the different fertilizer treatments. Lawrence P. Miller 6

Losses caused by mineral phosphates in mixtures with sulfate of ammonia. P. A. Keiller. *Trop. Agr.* (Ceylon) **93**, 205–9(1939).—Mixts. of Ephos and $(NH_4)_2SO_4$ in ratios of 1:1 and 3:2 lost 1.7 and 3.4% of their total N, resp., when 0.5 lb. was spread in open pans for 15 days; 6.4 and 8.7% in 63 days. Mixts. contg. $(NH_4)_2SO_4$, Saphos and KCl in the ratio of 2.4:4 lost 4.8% of their total N in 9 weeks. Results were about the same when bone meal was substituted for Saphos. Two-ton lots of similar mixts. stored in bags gave negligible losses of N over a period of 2 months. **A note on the loss of ammonia from fertilizer mixtures.** Reginald Child, T. Eden and M. L. M. Salgado. *Ibid.* 210–12.—The above results were confirmed by similar expts. and it is concluded that the greater loss of N from the small samples used in the previous expts. (*C. A.* **33**, 7470[8]) was due to the more rapid uptake of H_2O in the very early stages of storage. John O. Hardesty 7

The influence of fertilizers upon the development of sweet clover (Melilotus albus). K. Nehring. *Bodenkunde u. Pflanzenernähr.* **15**, 130–3(1939).—Pot expts. with increasing applications of P_2O_5 and K_2O carriers to det. the effects upon yields, crude protein and coumarin contents (*C*) of sweet clover are described. Yields increased with fertilizer supplied, protein was increased by P_2O_5 but not by K_2O. The effects upon *C* were variable, permitting no very definite conclusions; generally, *C* in the first cutting was somewhat increased by the fertilizers, with little or no difference in the second cutting. Extreme values for protein in the dry sample were 14.0% in the first crop and 21.2% in the second; *C* varied 0.5–1.0 and 0.3–0.5%, resp. C. J. Schollenberger 8

Results of two years coöperative work on the effects of fertilizers upon cabbage yields and quality. F. Vogel. *Bodenkunde u. Pflanzenernahr.* **15**, 134–6(1939); cf. *C. A.* **33**, 7468[3].—An outline of the background and plan of the work described in the following abstrs.: **Cabbage experiments.** H. K. Möhring. *Ibid.* 136–9.—Tests on a fertile neutral loam garden soil indicated a slight but not significant increase in yield from chem. fertilizers alone, and a similar decrease from the same used with solid manure. The latter alone caused significant increases, and with liquid manure in addn. there was further improvement in yields; market quality declined as yields increased, and was adversely affected by com. fertilizers, alone and with solid manure, but the complete manure was worst in this respect. This neg. correlation between yields and quality is attributed to the prevalence of false mildew and bursted heads. **Experiments with cabbage for storage.** K. Reichelt and Fr. Weber. *Ibid.* 139–45.—Stable manure produced heavier yields, attributed largely to a specific effect in aiding the plants to recover from maggot injury. Com. fertilizers produced the largest percentage of full-sized heads, perhaps because the stand was thinner. There was no disease or pest injury the second year, and manure was again superior in effects, but yields were smaller because a less well-adapted variety was grown. **Fertilizer experiments with cabbage.** J. Reinhold. *Ibid.* 145–55.—Yields increased with length of growing season of the variety. Late varieties benefitted more from com. fertilizers, but the latter were not as good as manure, which seemed to enable plants better to survive adversities at an early stage, although manure was apparently injurious in one early variety. Since fertilizers alone noticeably improved survival from attacks by maggots, etc., the effect is attributed to improved nutrition in general. Data on decrease in dry matter and relative increase in ash contents with time of chopped cabbage allowed to rot in Petri dishes (Vogel's lab. test), to det. the effects of fertilization thereon, are shown graphically. The curves are similar and of the common log type with the former, 9

but manure had a specific influence to increase the slope with the latter. Rotting proceeded fastest with the unfertilized cabbage, and least rapidly with that receiving complete com. fertilizer; the influence of the latter was evident when used in addn. to manure. **Influence of fertilization upon yields and quality of cabbage.** F. Vogel. *Ibid.* 156–73.—In almost all respects, a combination of com. fertilizers and manure was preferable to either alone or no fertilizer; an exception was noted in tendency for heads to burst, and fertilizers alone produced the whitest cabbage. The unfertilized crop was highest in dry substance, 9.23%, that with manure and chemicals lowest, 8.52%, and with either alone, 8.9%. There are numerous illustrations of rotting tests and the growth of molds in juice from the crops, with discussion. **Cabbage quality tests.** J. Reinhold. *Ibid.* 173–9.—Samples grown in 6 localities, including those discussed above, were examd. for storing and cooking qualities (odor and flavor), both in Nov. and in Apr., after storage, to det. the effects of fertilization. Differences in culinary quality increased after storage, and were quite marked, but when averaged there was no consistent indication that quality had been influenced by fertilization. **The effect of fertilization upon the flavor quality of cabbage kept over winter.** J. Reinhold and A. Vogelmann. *Ibid.* 179–87.—Many factors enter into a judgment of culinary quality, and all must be considered. Tests on cabbage grown in 3 localities gave no consistent indication that fertilization had affected quality, when averaged. **Tests of the storage properties of cabbage.** K. Reichelt and Fr. Weber. *Ibid.* 187–90.—Cabbage grown in fertilizer expts. at several localities was stored in Nov. at the same place for comparisons of keeping qualities. In Apr., differences in color had disappeared. Some lots heavily fertilized with solid manure, and the same with liquid manure, showed a greater tendency to rot in storage, and it is concluded that this treatment may not be advisable for cabbage to be stored. **The dependence of sauerkraut quality upon fertilization of the cabbage.** F. Vogel, H. Rademacher and R. v. Hösslin. *Ibid.* 191–221; cf. *C. A.* 33, 2269⁷.—The cabbage grown in these fertilizer tests, at 6 and 3 places in the 2 years, was made into kraut by 2 firms, for tests under com. conditions. Notes on the behavior in fermentation and quality of the products are given. Considering all factors, it is concluded that fertilization of the cabbage with both manure and com. fertilizers is practically necessary to assure a good product. Cabbage grown without fertilization fermented "dead," that with manure alone was slightly superior to minerals alone, but not equal to the combination. **Chemical investigations on cabbage variously fertilized.** R. Balks and E. Pommer. *Ibid.* 222–33.—Detns. of ascorbic acid (*C*), total C, Na, Cl and other ash elements, crude and digestible protein, fat, fiber, N-free ext., etc., were made on samples of the cabbage grown in the fertilizer expts. at 3 places in 2 years, and the data are tabulated and discussed. There are wide and contradictory differences, and no very definite conclusions can be drawn. Manure seems to have increased *C* over the unfertilized crop, but the effect of fertilizer in this respect was scarcely inferior. N in complete fertilizer nearly always increased protein, but the effect of N in manure was uncertain. C. J. Schollenberger

Fertilizer experiments with tulip bulbs. J. Reinhold. *Bodenkunde u. Pflanzenernähr.* 15, 233–46(1939).—Plot and pot expts. are described to det. the value of standard com. and various "humus" fertilizers, stable manure and lime in propagating tulip bulbs. Mineral fertilization is in general advisable. N does not usually increase the crop of bulbs, but up to 10 g./sq. m. during the period of bulb growth has value in hastening the blooming when the same bulbs are forced. A part may be applied in Sept., when the bulbs are planted, a larger part in March and the remainder late in May. Nitrates are preferable to NH_4 salts, and if the soil is not very fertile, P_2O_5 and K_2O also are necessary. Fifteen g. K_2O/sq. m. as 40% manure salts is recommended; the tulip is not Cl-sensitive. The effect is on yield of bulbs rather than on forcing qualities. Superphosphate was the best P_2O_5 carrier in expts. on peaty soil, but in greenhouse culture others were as good; the effects of P_2O_5 were quickly evident in the better development of leaves; up to 12 g. P_2O_5/sq. m. is recommended. Two hundred g. $CaCO_3$/sq. m. had practically no effect on 2 soils at pH 6.5, nor were any differences seen in the forcing house. With more acid soils, liming is generally advisable, but not to exceed pH 6. The pH of the topsoil is important; in sandy soil at pH 5.5, many stalks broke down. Manure is not effective in increasing yields of bulbs, and is detrimental to forcing qualities; its only place in tulip culture is in application to a preceding crop. The com. humus fertilizers Huminal B and Stercoral with peat mull showed some value in tests on a light soil. Pot tests seem of no value in work with tulips; the bulbs require more room. The effects of fertilizers were more noticeable when the bulbs planted were small; large bulbs carry a stock of plant food sufficient for good growth even on poor soil. C. J. Schollenberger

Contribution to the study of the improvement of native tobaccos. Influence of fertilizer on their chemical composition. J. Stalé. *Landw. Jahrb. Schweiz* 54, 55–94(1940).—In acid soils, K_2SO_4 is particularly effective in improving the quality of tobacco; in lime soils, a complete fertilizer is most effective. E. O. Whittier

The action of deep-stall manure as affected by method, time and depth of covering, upon two different soils on one farm. H. Schurig. *Bodenkunde u. Pflanzenernähr.* 15, 284–335(1939).— The manure from 32 1200-lb. steers in a deep stall, fed 206 lb. beet tops and 6.2 lb. hay with 29 lb. wheat straw for bedding/head/day, was in part removed after 5–16 weeks. Samples showed 26–31% dry substance contg. 1.7–2.0% N, 26–30% thereof NH_3 and 73–69% protein. It was applied at 2 rates, 13.5 and 27 tons/acre, and at various times, plowed under deeply or shallow, promptly or after lying on the surface over winter, to plots on calcareous peaty sand and higher sandy loam. The plots were generously fertilized with P_2O_5 and K_2O, and some with N also to equal that supplied in manure. Potatoes and sugar beets were grown the first year; unfertilized barley was grown the second. There were also expts. with manure held between wire netting, buried deep or shallow in the soil and subsequently recovered for examn. Yields indicated that prompt covering after spreading manure is most important. Losses of N were less, with correspondingly more beets produced, when manure was spread on frozen ground in Feb. than on unfrozen ground in Nov., in each case plowed under in Apr. The loss in effect of manure lying uncovered over winter seemed relatively greater in the second year, as indicated by barley yields. Manuring in spring was always better than in fall; this is attributed not so much to the greater losses in the latter case as to the greater bacterial activity and sol. N content of manure after fermenting in storage over winter; after exposure over winter, the sol. constituents had been so far leached out that the remaining org. substance did not decomp. readily. With spring application, more NH_3 is available to the crop at a crit. period; spring plowing is more favorable, in that the soil is thereby more warmed and aerated than after lying plowed over winter. Prompt covering is most important with manure applied in spring, because drying by wind is then more rapid and causes greater losses of NH_3. Cultivation with spring manuring caused more of the N to be utilized the first yr., with a corresponding reduction in the second crop. The starch content of potatoes was reduced more by manure applied in spring, owing to the greater amts. of available N and Cl in the soil during the growing season; this effect was reduced by using a low-Cl K_2O carrier. The expts. intended to show differences in decompn. of manure buried in the soil were inconclusive, because these sandy soils were well aerated at all depths; they did show that a layer of manure can cut off capillary connection with the subsoil. Analyses of samples buried in Apr. and taken up in July showed that 15–23% of the org. substance and 8–10% of the total N had been removed; other samples buried since Dec. showed removals of 56–60 and 47–51%, resp. Disappearance of N was relatively greater in winter, of org. matter in summer. Manure was essential for max.

yields on these soils; plots with equiv. chemicals were less productive. 25 references. C. J. Schollenberger

Granulating phosphate fertilizers. J. N. Mackall and Mark Shoeld. *Chem. & Met. Eng.* **47**, 102–5(1940). E. H.

Disposal of orange waste as fertilizer. Sam J. Walker and Charles D. Samuels. *Calif. Citrograph* **24**, 350(1939).—The fluctuations in nitrate-N, P_2O_5 and K_2O were detd. on 3 different types of soil during a period of 60 days for both orange waste and dairy manure. During the first 20 days on a sandy loam soil and the first 30 days on a clay soil, the amt. of N that was made available was insufficient to satisfy the needs of the soil bacteria and there was a reduction in soil nitrates. Following these initial periods the nitrate-N was above the initial amts. and there was no fear of nitrate-N deficiency. The P_2O_5 and K_2O concns. showed a continued increase throughout the 60-day test period. Heavy use of orange waste on very sandy soils resulted in a 20 to 30% increased retentiveness of water. From these tests it is evident that orange waste is of equal value in all respects to dairy manure except for use in the spring of the year when addnl. N applications will be required. J. R. Adams

The composition of Ammophos obtained from raw materials rich in R_2O_3; methods of analysis. V. N. Panfilov. *Trans. Sci. Inst. Fertilizers Insectofungicides* (U. S. S. R.) (*Shornik Fosf. Udobr. i ikh Kach.*) **1938**, No. 141, 96–8; *Khim. Referat. Zhur.* 1, No. 11–12, 72(1938).—Ammophos contg. total P_2O_5 33, N 10.9, SO_3 15.0, and R_2O_3 18.3% was repeatedly leached with water, and the residue leached with a 2% soln. of citric acid or treated with a 10% HCl soln. Of the N 25.4% was insol. in water. Half the water-insol. N dissolved in 2% citric acid soln, all of it in 10% HCl soln. The water-insoly. of the N is attributed to the presence of complex salts of Fe and Al. It is proposed to det. total N according to the soly. of its compds. in a H_2SO_4 ext. A sample examd. contained 5.25% N in the form of $(NH_4)_2SO_4$, 3.8% in the form of the mono- and the di-phosphates of NH_4, and 2% in the form of $NH_4H_2[Fe(PO_4)_2]$. W. R. Henn

Effect of chloropicrin fumigation on nitrification and ammonification in soil. Frank L. Stark, John B. Smith and Frank L. Howard. *Soil Sci.* **48**, 433–42(1939).—In many respects chloropicrin behaves similarly to other so-called volatile antiseptics which have been tried for soil fumigation. Low dosages had but little effect on nitrate formation but applications as large as 9 cc. per cu. ft. greatly inhibited nitrification. In no case was ammonification inhibited. The data indicate that the increases in plant growth often reported to result from soil sterilization cannot be accounted for solely by the hypothesis that more N was made available. M. S. Anderson

Summary of work done under agricultural chemist and soil physicist, Agricultural Research Station, Sakrand, during the year 1935–36. Anon. *Dept. Agr., Sind, Ann. Rept.* **1935–36**, 118–33(Pub. 1937).—Paris green (applied at the rate of 40 lb. per acre, mixed with 10 times its wt. of sawdust), spread near the stems of the plants before the 1st irrigation, gave no control of *white ant attack on cotton plants*. *Effect of presence of NaCl at different stages of growth of wheat plants*. In pot expts., addn. of 0.3% NaCl to the soil before sowing had a very adverse effect on the growth of wheat. Comparatively little adverse effect was produced by adding NaCl after the seedling stage. K. D. Jacob

Detergents and wetting-out agents as assistants in plant pest control. H. Martin. *Wetting and Detergency Symposium*, Feb. 19–20, 1937, *Brit. Sect. Intern. Soc. Leather Trades' Chem.* 117–35.—A review. M. M. Piskur

Peach borer control with ethylene dichloride emulsion. Byrley F. Driggers. *N. Jersey Agr. Expt. Sta., Circ.* **396**, 1–2(1939).—The common peach tree borer, *Conopia exitiosa* Say, is well controlled by a 50% soln. of $CH_3.CHCl_2$ made up as follows: Prep. a stock soln. by adding with const. stirring 1 part by vol. of good grade fish-oil soap to 9 parts of $CH_3.CHCl_2$. When the emulsion is complete add 8 parts of water to bring the final stock emulsion to 50%. For trees 3 or more years old use 3–5 gal. of the stock emulsion with 5–7 gal. of water per tree. C. R. Fellers

Control of Japanese beetle on ornamental plants. Clyde C. Hamilton. *N. Jersey Agr. Expt. Sta., Circ.* **387**, 1–4(1939).—A mixt. of Pb arsenate and fish oil used as a spray is an effective spray material if used about July 1st when the beetles first appear in considerable nos. To prep. the spray, add 6 lb. powd. Pb arsenate and 1 pint of menhaden fish oil to 100 gal. of water and stir into a good emulsion. Powd. derris and cubé roots also contain toxic substances which are very repellent to the beetles. These powd. roots should contain not less than 4% rotenone and 16% total extractives. A satisfactory emulsion consists of 4 lb. derris or cubé powder, 4 lb. rosin residue emulsion and 100 gal. of water. C. R. Fellers

The grasshopper outbreak of 1939. Stewart Lockwood. *Bull. Dept. Agr., Calif.* **28**, 393–411(1939).—The most satisfactory bait for the 4 species of grasshoppers most commonly found in Calif. is composed of 1 quart of Na arsenite dild. with 12–16 gal. of water and then mixed with 100 lb. bran or equiv. of bran and sawdust. Beet pulp can also be used as an absorbent substance. C. R. Fellers

Destruction of alfalfa weevil (Hypera variabilis) by fumigation and other means. D. B. Mackie and W. B. Carter. *Bull. Dept. Agr., Calif.* **28**, 466–70(1939).—When fumigated under tarpaulins the weevils in baled alfalfa hay were killed by MeBr used at the rate of 1–2 lb. per 1000 cu. ft. of space with an exposure of 6–12 hrs. C. R. Fellers

Hypera brunneipennis and its destruction in baled hay by fumigation. D. B. Mackie and W. B. Carter. *Bull. Dept. Agr., Calif.* **28**, 387–92(1939).—This alfalfa weevil is destroyed in baled hay by a fumigation with MeBr in concns. of 1 lb. to 1000 cu. ft. of space. The residual Br in the hay is about 10 p. p. m. C. R. Fellers

A new method of combating chrysomelids on rice in Madagascar. C. Frappa. *Riz et rizic.* **12**, 33–9(1938); *Rev. Applied Entomol.* **27A**, 664–5.—Crude oil, to which 5% cresyl had been added as a spreader, was distributed over the water of rice fields at the rate of 22 pints/acre. The injurious beetles, *Hispa gestroi* Chap. and *Trichispa sericea* Guér., were beaten down to the oil by dragging a rope across the rice. Edwin J. Seiferle

Further studies on the control of bean rust, with some reference to the prevention of chocolate spot of beans. A. F. El-Helaly. *Ministry Agr., Egypt, Tech. Sci. Service, Bull.* No. **236**, 24 pp.(1939); cf. *C. A.* **33**, 7030⁴.—Spraying with 0.5% Bordeaux mixt. was the most satisfactory method for controlling both chocolate spot (caused by *Botrytis fabae*) and rust of beans. The effectiveness of the spray was not greatly affected by variations in the ratio of $CuSO_4$ to lime. Bouisol, a proprietary Cu fungicide, also gave good results. The plants should be sprayed at the first appearance of disease and further applications should be made at intervals of 4–8 weeks. Lime-S was not so effective as the Cu sprays. Wettable S and Kolofog S sprays and a S dust (Kolodust) were ineffective. K. D. Jacob

Further spraying experiments for the control of apple scab [Venturia inaequalis] in 1937 and 1938, with some observations on the disease. Robert McKay. *J. Éire Dept. Agr.* **36**, 42–72(1939); cf. *C. A.* **32**, 5987¹.—Three to 4 applications of lime-S or of Bordeaux mixt. applied pre- and postblossom gave very satisfactory control of scab. The superiority of Bordeaux mixt. over lime-S in giving more lasting protection to the foliage appeared to be due in part to its direct effect on the foliage, as distinguished from obvious injury such as brown dead spots or purple blotches; the leaves became hard in texture and took on a mature appearance soon after applications of Bordeaux mixt. following petal-fall. Sch. 1132 (a proprietary Cu fungicide) caused considerable injury to the foliage and fruit of Allington Pippin and Newton Wonder apples. Although the results from micronized S for scab control were inconclusive, the material seemed to be safe for postblossom application on a no. of varieties which will not stand lime-S after flowering. K. D. Jacob

Weed control in tulips. J. Hargrave and F. C. Thompson. *Agr. Inst. Expil. Sta., Kirton, Rept. Bulb Expts.* **1936**, 45–7.—The best control of weeds was obtained by spraying the plots in Jan. or March with a soln. of 10–20 lb. $NaClO_3$ per acre applied in 150 gal. water. The larger application of $NaClO_3$ caused some slight damage to the tulips. Weed growth was reasonably well controlled by a dry application of com. $CaCN_2$ (5 cwt. per acre) made in Jan.; there was no apparent damage to the foliage. K. D. Jacob

Manganese deficiency as the cause of marsh spot of peas. Helena L. G. de Bruyn. *Tijdschr. Plantenziekten* **45**, 106–20(1939); *Rev. Applied Mycol.* **18**, 777.—Pathological symptoms of marsh spot of peas due to Mn deficiency developed less rapidly in acid solns. where the Mn is more readily available than in alk. solns. but pH of the soil is of secondary importance as the disease develops under both conditions. Under field conditions the highest incidence of marsh spot occurs among the heaviest peas, but in cultures the lightest (under 400 mg.) suffered most (41.5%) and the heaviest (over 500 mg.) least (19.5%). Oden E. Sheppard

Stem-black disease of apple in Kumaun. P. K. Dey and U. B. Singh. *Indian J. Agr. Sci.* **9**, 703–10(1939).—A description of the stem-black disease of apple by *Coniothecium chomatosporum* Corda, a fungus which can enter the stem only through wounds, is followed by a detailed cultural study of the fungus. The latter is slow in growing and does not produce conidia in any of the media tried; only chlamydospores are formed. Painting of the pruned surfaces with a paste of 2 oz. each of red lead and copper carbonate and 100 cc. of raw linseed oil effectively controlled the spread of the disease. 6 references. A. H. K.

Studies on the conditions essential for life of the fungus Monilia fimicola Cast. et Matt. and its relations to mushrooms. K. Flachs and M. Walter. *Prakt. Blatter Pflanzenbau Pflanzenschutz* **17**, 98–114(1939).—Expts. were made to det. the optimum growth conditions of *M. fimicola*, "white plaster mold," parasitic on cultivated mushrooms, and to compare them with those of the host. A series of artificial media was prepd. by mixing 1 kg. of nutrient medium with 2 l. H_2O, heating to 50–60°, decanting after standing overnight, and adding to 1 l. of this ext. 1 l. H_2O and 40 g. agar-agar. The nutrient media were: well-rotted horse manure (I), carrot (II), sugar beet (III) and beans (IV). These prepd. media were further varied by addn. of a "complete fertilizer" (V), i. e., 0.1% $(NH_4)_2SO_4$, 0.1% K_2HPO_4, 0.05% $MgSO_4$, 0.2% NaCl and 0.04% $FeSO_4$. Growth of *M. fimicola* on the artificial media alone decreased in the order: II III, I, IV. Addn. of V increased growth on II but caused earlier degeneration and spore formation. Growth was impaired by addn. of V to III or by addn. of V or 0.1% K_2HPO_4 to I and was increased by addn. of 0.1% $(NH_4)_2SO_4$ to I. Growth was good on the undild. aq. ext. of III and was poor on the undild. aq. ext. of I and on exts. of wheat- (VI) and oat-straw (VII) prepd. from 500 g. straw + 2 l. H_2O as above: Addn. of V to the aq. exts. was detrimental. The growth of cultivated mushroom on the artificial media was best on I, poorer on II and IV, very poor on III; addn. of V was disadvantageous in all cases. Growth was good on VI and VII, poor on the undild. aq. exts. of I and III; addn. of V again was detrimental. The growth min. of *M. fimicola* on bean-agar is at pH 4, the optimum at 6.44–7.0, the max. at 8. Optimum temp. is 18–20°. The growth of mushroom is best at pH 6.6–7.0, and poorer at lower and higher values. The effect of temp. varies with the source of the culture. Expts. show that *M. fimicola* can assimilate N only as nitrate, while mushroom can assimilate N as nitrate or amide. Neither utilizes ammonia N. *M. fimicola* growing on bean-agar was treated with various *fungicides*, including 0.1% $HgCl_2$, 1 and 2% Bordeaux and lime-S mixts., the seed disinfectant Ceresan, and formalin. A 2% soln. of formalin was most effective. Difficulties encountered in the use of fungicides are discussed. Edwin J. Seiferle

The root-rot disease of cotton in the Punjab. VI. Chemical composition of healthy and diseased cotton plants. R. Sahai Vasudeva and Mohammad Rafique. *Indian J. Agr. Sci.* **9**, 331–42(1939).—Diseased cotton plants which have wilted as a result of root-rot attack are higher in reducing sugars and sucrose in all parts, i. e., root, stem and leaf, than the corresponding parts of healthy plants. Total N, NH_3, Fe and the Ca:K ratio are higher in diseased than in healthy roots. The ratios of (Fe in leaf):(Fe in root) and (Ca in leaf):(Ca in root) are lower in diseased plants but the ratio (K in leaf):(K in root) is higher in diseased than in healthy plants. J. T. Sullivan

Hot-water treatment [of narcissus bulbs] with the addition of chemical disinfectants. E. R. Wallace. *Agr. Inst. Expil. Sta., Kirton, Rept. Bulb Expts.* **1936**, 38–41.—Treatment of healthy bulbs at 110°F. for 3 hrs. with solns. of either formalin (1:400) or Me Hg phosphate (1:400) had no adverse effect on yields of flowers and bulbs from the subsequent crop. A cold dip of formalin (1:100) for 8 hrs. was very injurious to the bulbs. K. D. J.

The hot water treatment of narcissus bulbs, 1935–36. J. Wood. *Agr. Inst. Expil. Sta., Kirton, Rept. Bulb Expts.* **1936**, 25–37.—Bulbs were severely injured when they were plunged into cold water immediately after they were subjected to the standard hot-water treatment (100°F. for 3 hrs.). Bulbs that were stored at 80°F. prior to the hot-water treatment subsequently produced more flowers than did those stored at 60°F. There seemed to be some advantage in storing bulbs at 80°F. before the hot-water treatment and then storing them at 60°F. after the treatment, as compared to the opposite procedure. K. D. Jacob

Determination of pyrethin I. Linearity of results by the mercury-reduction method. D. A. Holaday and J. J. T. Graham. *Ind. Eng. Chem., Anal. Ed.* **12**, 80–1(1940).—Wilcoxon (*C. A.* **30**, 8076[3]) proposed a method for detg. pyrethin I which was based on the reduction of the $HgSO_4$ in Denigès reagent to the mercurous condition followed by pptn. as Hg_2Cl_2 but found the method limited to detg. 50–70 mg. of the substance. Martin (*C. A.* **33**, 3036) and Holaday (*C. A.* **32**, 3078[7]) showed that the results were not directly proportional to the actual content. H. showed that the errors were caused by the presence of unsatd. org. compds. which titrate with the iodate soln. along with the $HgCl_2$. He proposed a modification which has been adopted by the Assoc. Off. Agr. Chemists. The work here described was undertaken to det. whether this modification gives results linear with respect to the quantity present and such was found to be the case. W. T. H.

Basicop as a cherry spray in 1938. Colin W. Robertson and Donald Cation. *Mich. Agr. Expt. Sta., Quart. Bull.* **21**, 291–5(1939).—Liquid lime-S used at a concn. of 2.5:100 and used 4 times during the season did not give adequate control of cherry leaf spot caused by *Coccomyces hiemalis*. The tendency to dwarf the fruit and to injure foliage renders Bordeaux mixt. 6:8:100 unsatisfactory. Cupro K gave good control of leaf spot but severely injured the foliage. Basicop-lime concns. of 3:8:100 or 3:6:100 gave good control of the disease without significant foliage injury. $ZnSO_4$ may be used in place of the lime to prevent leaf injury. Four sprays are used at proper intervals. C. R. Fellers

Entomological Section. Annual Report. H. Wilkinson. *Rept. Dept. Agr. Kenya 1937*, **2**, 86–101(1939); *Rev. Applied Entomol.* **27A**, 666–7.—Lime-S sprays (1:80) gave complete control of *Thrips tabaci* Lind. on pyrethrum plants. Expts. showed that 5 g. of locally produced pyrethrum powder per tree gave a high percentage kill of *Antestia* on coffee trees. Tobacco powder was only slightly toxic, and a 1:1 mixt. of pyrethrum and tobacco gave variable results. Coffee seed treated with CS_2 or heated to 120°F. for control of *Stephanoderes* [*hampei* Ferr.] showed no differences in germinative capacity attributable to the treatments. Edwin J. Seiferle

Emulsions. N. I. Timokhina. *Trudy Sredneaziat. Sta. Zashchite Rastenii* No. 2, 65–71(1937); *Rev. Applied Entomol.* **27A**, 626–7.—In lab. investigations on the prepn. of stock emulsions, it was found that certain combinations of various distillates of petroleum, Na soap and H_2O pro-

duced H_2O-in-oil emulsions which were not suitable for large-scale use in insecticides. "Instantaneous" emulsions were substituted. The instantaneous stock emulsions tested contained, besides H_2O, 1.3% NaOH, 10–12% acidol (naphthene acids from the alkali residue obtained in refining solar oil and kerosene) and 50–72% mineral oil. Edwin J. Seiferle 1

Relative solubility of the lead arsenates and calcium arsenates. R. P. Tucker. *Bull. Dept. Agr., Calif.* **28**, 276–83(1939).—The possible effect of CO_2 in concns. such as the atm. provides; of sol. chlorides; of hydrolysis; and of the components present as very sol. impurities upon the soly. of the As_2O_5 component of the Pb and Ca arsenates is discussed. Basic Pb arsenate in field practice should be very resistant to the effect of hydrolysis, to CO_2 and to sol. chlorides so far as the soly. of the As_2O_5 is concerned. Lab. studies further showed that dilead arsenate should not be seriously affected by either hydrolysis or by CO_2 but that it is very susceptible to the action of sol. chlorides. Basic Ca arsenate is not seriously affected by hydrolysis nor by sol. chlorides, but it is susceptible to the action of atm. CO_2. The As_2O_5 component, if present in small amts. as a very sol. impurity in the com. materials, may have a decided influence upon the toxicity of basic Pb arsenate, of dilead arsenate and of basic Ca arsenate to foliage. Manufacturers of these arsenicals should exercise the greatest possible care that sol. impurities contg. the As_2O_5 component be kept down to the very min. that industrial practice will allow. C. R. Fellers 2 3

Evaluation of the comparative toxicity of preparations of fluorine and arsenic. T. I. Bezrukova. *Trudy Srednеaziat. Sta. Zashchite Rastenii* No. 2, 72–85(1937); *Rev. Applied Entomol.* **27A**, 627.—Lab. expts. were made in Uzbekistan to det. whether F compds. could be substituted for As compds. in combating phytophagous insects. The poisons were tested by feeding dusted leaves, the rates of application being the same against a given species of insect. Na and Ca arsenites were most effective, but as they scorch plants severely, they can only be used in baits or on weeds. Ca arsenate was next most effective against *Calliptamus italicus* L., but against other insects (larvae and adults of *Hypera* (*Phytonomus*) *variabilis* Hbst., adults of *Rhynchites auratus ferganensis* Nevsk., and larvae of *Agrotis* (*Feltia*) *segetum* Schiff., *Lymantria* (*Porthetria*) *dispar* L., and *Bombyx mori* L.), it was inferior to Paris green, $BaSiF_6$, NaF or Na_2SiF_6. The latter was most effective of the F compds., but Na_3AlF_6 and BaF_2 also gave promising results. Pb arsenate, tested only on *R. auratus ferganensis*, was less effective than NaF, Na_2SiF_6 or $BaSiF_6$, apparently owing to repellence. Edwin J. Seiferle 4 5

Tests on new dust and liquid fungicides in 1938 for control of celery leaf blights. Ray Nelson. *Mich. Agr. Expt. Sta., Quart. Bull.* **21**, 295–307(1939).—Cuprocide-S-talc dusts gave superior control of leaf blights and possessed excellent coverage and flowage properties. Basicop-S-talc and Bordow-S-talc dusts were less satisfactory than Cuprocide but about equal in effectiveness to $CuSO_4$-lime and $CuSO_4$-lime-talc prepns. Bordeaux 8-12-100 and 8-6-100 controlled leaf diseases without perceptible injury to the foliage more effectively than the Cu fungicides of low soly., all of which caused sufficient injury to reduce yields. Grasselli Copper A was an effective fungicide but it caused injury to the foliage. $Ca(OH)_2$ and $ZnSO_4$ failed to prevent injury to the foliage by Basicop sprays. C. R. Fellers 6 7

The production of barium polysulfide. M. Gabrielova. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 10, 38–9(1939).—BaS_x for *insecticides* is prepd. by fusing a 3:1 mixt. of $BaSO_4$ and coke or coal at 1100–1250° for 3–7 hrs., cooling, grinding and mixing in a ball mill with S. H. M. L. 8

Report of the North East of Scotland Sheep Tick Committee—1938, 55 pp. *Appendix* No. 4 (Pub. 1939); *Rev. Applied Entomol.* **27B**, 242–3. **Investigations on tick control.** Walter Moore. In expts. on serial dipping for control of *Ixodes ricinus*, L., on sheep, 100% kill of all stages of the tick was attained by a dip consisting of 1 part *Derris elliptica* root (contg. 5% rotenone) and 500 parts H_2O. Sheep immersed 30 sec. were protected from reinfestation for 9–10 days. A mixt. of mineral oil, wool grease and pyrethrum ext. protected lambs for 30 days, but the smearing was too laborious a process. Expts. are being carried out with a portable power sprayer capable of treating small nos. of sheep on the spot, either in a spray chamber or by hand with power sprayers. Edwin J. Seiferle 9

Compilation of information on kudzu, *Pueraria thunbergiana* [as N fixer] (Miles, Cross) **12**. Complex process for treating Fe ore contg. P and phosphorite [slag used for fertilizer] (Malets) **9**.

MacEwan, J. W. G., and Ewen, A. H.: General Agriculture. Toronto: T. Nelson and Sons, Ltd. 345 pp. Reviewed in *Sci. Agr.* **20**, 254 (1940).

Superphosphate. Leroy H. Facer. Can. 386,798, Feb. 13, 1940. A mixt. of phosphate rock and acid is poured in a box-like enclosure in successive batches each in sufficient depth to increase the temp. and the pressure by confining within its intercellular structure the heat and pressure due to the chemical reaction. The block is left intact and untreated until the curing is complete. An app. is described. Cf. *C. A.* **33**, 1084[7].

Fungicidal and insecticidal material. Wm. P. Ter Horst (to United States Rubber Products, Inc.). U. S. 2,181,217, Nov. 28. Foliage sprays, etc., are used contg. a reaction product of acetonyl acetone and NH_4 thiocyanate (suitably in an aq. suspension).

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Researches on fermentation for the production of gallic acid. III. Effect of adding yeast. Chi-Liang Kuo. *Hwang-Hai* **1**, No. 2, 11–19(1939).—The rate of fermentation of a gallnut ext. increases with its concn. Yeast accelerates this fermentation, since its addn. to the fermentation mixt. causes the fermentation to proceed more rapidly than when bacteria alone are used. Moreover, the yield of gallic acid is also increased. If yeast is added first and then the bacteria are added there is a slightly more rapid fermentation than when both cultures are added simultaneously. **IV. Optimum concentration of gallnut extract and rate of fermentation.** Kwang-Chu Hsieh. *Ibid.* No. 3, 1–3.—The optimum concn. of gallnut ext. for fermentation to gallic acid is 10–13°Bé. With an 11°Bé ext., the fermentation requires 15–20 days and the yield is 70%. Addn. of 2% sucrose has apparently no favorable effect. **V. Changes in tannin content, gallic acid content and total acidity in the fermentation liquor [during the fermentation].** Wen-Teh Wei. *Ibid.* 4–5.—When a gallnut ext. of sp. gr. 1.14 is allowed to ferment at 20°, the gallic acid content increases in 16 days to about 0.09 g./cc. and then remains substantially const. on further standing. When this condition is reached, the decompn. of tannin proceeds more slowly. The total acidity remains substantially const. throughout the process. C. L. Tseng 9

Distilled vinegar. H. J. Fisher. *Conn. Agr. Expt. Sta.* (New Haven), *Bull.* **426**, 21–3(1939); *43rd Rept. Food Products.*—The O_2 value method of Schmidt (*C. A.* **29**, 7574[4]) was used to detect the presence of distd. vinegar (AcOH) in cider vinegar. None was found in the 14 samples examd. C. R. Fellers

Report on the fermentation industries for 1939. Prepared for the Society of Chemical Industry and the In-

stitute of Brewing. Alan A. D. Comrie. *J. Inst. Brewing* **45**, Suppl. 29 pp.(1939).—One hundred and seventy-eight references. Quick Landis

Black-ended barley grains. S. K. Thorpe. *J. Inst. Brewing* **46**, 34–7(1940). Quick Landis

Pentosans and related products in malting and brewing. I. A. Preece. *J. Inst. Brewing* **46**, 38–48(1940).—Malting produces a large increase in furfurogenic substances of which 12–20% appears in the wort. This is further decreased upon fermentation to 8–15%. The probable nature of wort and beer pentosans is discussed. 28 references. Quick Landis

Laboratory malting. III. Steeping equipment and method. J. A. Anderson and W. O. S. Meredith. *Cereal Chem.* **17**, 66–72(1940); cf. *C. A.* **31**, 6405[1].—A nearly automatic laboratory steep tank is illustrated and described. Details of the construction of the tank and of its operation are given. L. H. Bailey

Determination of amino nitrogen in malt extracts. S. R. Snider. *Cereal Chem.* **17**, 121–9(1940).—Practically pure neutral HCHO should be used in preference to a cloudy liquid that sediments on standing. Inferior grades are objectionable as they interfere with the continuity of procedure and the technique of the analyst. The blank for the HCHO is useless unless detd. in the presence of the reagents used in the test. The use of a standard com. set of pH color standards is more convenient than the use of buffer solns. used in conjunction with indicators. The pH of the buffer solns. is subject to change from day to day owing to handling and exposure to CO_2 in the atm. The prepn. of the buffer solns. is time-consuming and tedious. The use of phenol red and thymol blue indicators is preferable to neutral red and phenolphthalein indicators, resp. The amt. of indicator in the test soln. must be equal to the amt. in the color standard. Greater accuracy is possible by the use of a daylight lamp and comparator combination, than by daylight. The modified method, simplifying Pawlowski's method, is convenient, consistent, and adaptable to routine purposes. L. H. Bailey

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Production of active AmOH from fusel oil (Birun) 10.

Hwang-Hai (Yellow Sea) (*New journal*). Deals with fermentation and bacteriology. Published bimonthly by the Golden Sea Research Institute of Chemistry. Wu-Tung-Chiao, Szechuan, China. Vol. 1, No. 1 appeared in June, 1939. Mex. $1.00 per yr. (domestic).

Baeta Neves, Luiz M.: Technologia da fabricacao do alcool. S. Paulo: Editado pela "Revista brasileira de chimica." 314 pp.

Fermentation process for the production of alcohol, etc. Leo M. Christensen (to Chemical Foundation, Inc.). U. S. 2,182,550, Dec. 5. An arrangement of app. is described, and a method of producing alc. and other products from amylaceous starting material which comprises fermenting a saccharified amylaceous mash in a fermenter with *Saccharomyces cerevisiae* to produce EtOH; the products of fermentation are distd. in a distn. zone to recover a concd. aq. alc.; the residue from the distn. zone is passed to a second fermenter and there is added to the residue in such fermenter an amylaceous mash. The material in the second fermenter is inoculated with *Clostridium acetobutylicum* to produce EtOH, BuOH and acetone. The products of conversion from the second fermenter, together with the products of conversion from the first fermenter, are passed to the distn. zone for co-distn. therein and the distd. vapors are fractionated to recover a concd. aq. EtOH substantially free from higher alcs. and acetone. The concd. aq. EtOH is then subjected to dehydration to produce anhyd. alc.

Butyric acid production by fermentation. Rafael Arroyo (to Borinquen Associates, Inc.). U. S. 2,181,310, Nov. 28. A process of prepg. butyric acid includes the steps of prepg. a mash from molasses and having a sugar concn. of about 4.6–8.5% and a pH of substantially 6.8 to 7.0, inoculating with *Clostridium saccharobutyricum* and fermenting by the action thereof at a temp. of about 30–32° in the continued presence of an excess of $CaCO_3$ over that required for neutralization of the butyric acid, and sepg. a butyric acid compd. from the spent mash. U. S. 2,181,311 relates to a butyric acid fermentation mash of *Clostridium saccharobutyricum* and an aq. substrate having a concn. of about 6.5% by way of sucrose and invert sugars.

Centrifugal rectification and distillation of materials such as alcohol. Juan Loumiet et Lavigne. U. S. 2,182,566, Dec. 5. See Brit. 507,435 (*C. A.* **34**, 291[4]).

Fermentative production of solvents from garbage. James W. Jean. U. S. 2,182,989, Dec. 12. A process of manufg. BuOH, acetone and EtOH from garbage waste involves reducing the waste to a mash, admixing a fermentable mash prepd. from grains, cooking for about 2 hrs. and adding water to produce substantially a 5% carbohydrate mass, adding about 10% of a culture of *Clostridium felsinae* and fermenting at a temp. not substantially above 37°.

Wine. Donald K. Tressler (to Cornell Research Foundation). U. S. 2,181,838, Nov. 28. An arrangement of app. is described, and a wine-making process which consists in taking wine stock including wine made from grapes of Labrusca blood, having a bright red color and foxy flavor, heating it substantially above room temp. but below 65°, simultaneously passing through the heated stock large quantities of minute bubbles contg. O, and regulating the combined effect of time and temp. so that the O treatment is terminated before the stock develops a sherry flavor, whereby the foxiness is eliminated and the color changed from red to tawny. U. S. 2,181,839 relates to a process for making sherry wine, which consists in taking wine stock including wine made from grapes of Labrusca blood, heating it to about 57°, and maintaining it at that temp. for several weeks, and simultaneously passing large quantities of minute bubbles contg. O through the heated stock, whereby a sherry flavor is produced in a few weeks.

Extracting the essential principles of hops. Lyndon D. Wood (to National Hops Laboratories, Inc.). U. S. 2,181,931, Dec. 5. A process is employed which involves finely pulverizing and crushing the entire mass of hops, simultaneously liberating the hop-seed oil content of the seeds and the hop oil from the hop-blossom leaves, and commingling the hop oil with the hop-seed oil to retard or stop evapn. of the hop oil and aroma, recovering a large percentage of hop oil, and subjecting the pulverized hops to the action of acetone in a closed chamber.

Apparatus for cleansing pipes by use of soda solutions, etc. Fred Buchhorn. U. S. 2,183,007, Dec. 12. Various structural and operative details of app. adapted for cleansing pipes such as those used for beer.

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Determination of the apparent specific volume of official powders and its analytical and technical utility. Romolo Mazzucco. *Boll. chim. farm.* **78**, 517–19(1939). —On many occasions the apparent sp. vol. of a powder or pulverized drug is a magnitude of some importance. This is simply detd. by introducing 25 g. of powder into a 50 cc. or 100 cc. graduated cylinder, allowing the cylinder to drop about 5 cm. onto the palm of the hand 10 times (slight compression) and rapping 50 times on a hard surface (medium compression), reading the level and dividing by 25. A tabulation of the apparent sp. vol. of some 30 slightly and medium compressed powders is given. C. R. Addinall

Essential oils from the Queensland flora. XVII.

Evodia littoralis and the occurrence of a new phenolic ketone. F. N. Lahey and T. G. H. Jones. *Univ. Queensland Papers, Dept. Chem.* 1, No. 13, 4 pp.(1939).—Steam-distn. of 180 lb. of leaves from *Evodia littoralis* gave 182 cc. of oil, $d_{15.5}$ 0.8487, $[\alpha]_D$ +16.5, n^{20}_D 1.4860, ester value 0, Ac value 36. Extn. of the oil with NaOH soln. yielded 9 g. of a phenol, *evodionol* (I), $C_{13}H_{18}O_4$, yellow crystals from petr. ether, m. 84°; the *Me* (II) and *Ac derivs.* of I are white solids, m. 78° and 66°, resp. Treatment of I with alc. $FeCl_3$ gives a green color which turns red upon addn. of $NaHCO_3$. The *2,4-dinitrophenylhydrazones* of I and II are amorphous and red, resp., and m. 217 and 157°, resp. The residual oil yielded the following fractions on distn. at 2 mm., the b. p., $d_{15.5}$, $[\alpha]_D$ and n^{20}_D being, resp.: (III), 32–3°, 0.8555, +41.7, 1.4662; (IV), 36.5–7°, 0.8039, +3, 1.4822; (V), 60–70°, 0.9232, +7, —; (VI), 82–5°, 0.9100, −2, 1.4950; (VII), 92–5°, 0.9286, +17, 1.4982; (VIII), 108–12°, 0.9765, −5, 1.4970. After removal of ocimene from III by $(:CHCO)_2O$, the remaining oil was identified as *d*-α-pinene. V contained a sesquiterpene and an alc. resembling linaloöl. VI and VII consisted of sesquiterpenes which yielded a small amt. of azulene but neither cadalene, nor eudalene on treatment with Se at 280°. VIII probably contained the same sesquiterpene as VII. David E. Adelson

Some varieties of Ephedra from Sardinia. Maria Mulas and Edina Salis. *Arch. ist. biochim. ital.* 11, 315–34(1939).—*E. vulgaris* from Sardinia contained from 0.75 to 1.83% of *d*-pseudoephedrine; *E. nebrodensis* contained 3.4%. E. S. G. Barron

A new method of detection of pharmaceutical substances: carotenoids, glycosides, alkaloids, vitamins, by chromatographic analysis. Elsior Coutinho. *Pub. farm.* (São Paulo) 5, 5–11(1939).—A review. E. S. G. B.

Determination of the adsorptive power of medicinal charcoal. C. H. Liberalli and Olavo Fontoura. *Rev. quím. farm.* (Rio de Janeiro) 4, 101–6(1939).—A discussion of the methods used by the Brazilian Pharm. Detn. of the adsorptive power of medicinal charcoal with methylene blue, strychnine sulfate and H_2S is recommended. E. S. G. Barron

Preserving properties of essential oils and synthetic odoriferous substances used in cosmetics. E. Shevlyagina and R. Rutkovskaya. *Maslobo˘no Zhirovoe Delo* 15, No. 4, 31–2(1939).—Comparative tests showed that the addns. of common natural and synthetic aromatic substances to cosmetic creams retard or inhibit the growth of molds. A complete inhibition of molding was effected on the addn. of these aromatic substances to beer wort infected with cultures of *Aspergillus glaucus* and *Penicillium glaucum*. Several tables are given, showing the comparative effectiveness of various essential oils and synthetic aromatics in the suppression of mold growths in emulsified creams and beer wort. Chas. Blanc

Determination of odoriferous substances in alcohol-water solutions. M. Elderman. *Maslobo˘no Zhirovoe Delo* 15, No. 4, 33(1939).—A polemic with A. I. Naĭmark and N. A. Suvorova, *C. A.* 33, 807[5]. Chas. Blanc

A comparative study of liquor carmini and liquor cocci. Elmer H. Wirth, Frank T. Maker and Victor Lindblade. *Bull. Natl. Formulary Comm.* 8, 10–15(1939).—Color, formulas and names for these solns. have been postulated in accordance with the Munsell system. The behavior of each to various concns. of acid and base is studied. Chem. standard matching solns. are prepd. and a method of colorimetric standardization of the solns. is developed. The color qualities of liquor cocci tend toward a purple; in intensity the color of liquor carmini is 6 times stronger. On the basis of results the authors see no valid reason for deleting either of the solns. from the National Formulary. H. M. Burlage

Foot preparations. M. A. Lesser. *Drug Cosmetic Ind.* 46, 165–7, 171(1940).—The foot ailment, *epidermiphytosis*, and its treatment are discussed. Eleven formulas are offered. 13 references. H. M. Burlage

Cosmetic manual. Liquid creams. Joseph Kalish. *Drug Cosmetic Ind.* 46, 168–9(1940).—These creams include cleansing, skin, hand and foundation lotions and they may be applied easily and uniformly over a large skin area. An outline of their formulation including 33 formulas is offered. H. M. Burlage

Improved assay for areca. *Repts. Am. Pharm. Assoc. Lab., Bull. Natl. Formulary Comm.* 8, 6–8(1939).—The following method based on the German and Swiss pharmacopoeial procedures is recommended: Place 8 g. of areca in moderately coarse powder and accurately weigh into a suitable flask, add 80 cc. of Et_2O, shake well, add 4 cc. ammonia test soln., and shake (preferably in a mech. shaker) during 10 min. Allow to settle and decant the ethereal soln. into another flask. Add 0.5 g. talc to the decanted Et_2O soln. and shake for 3 min., then add 2.5 cc. H_2O and shake for 3 min. more. Let stand until clear, decant 50 cc. of the ethereal soln. equiv. to 5 g. of areca and distil off about ⅔ of the Et_2O. Ext. the remaining Et_2O in a separatory funnel, with 15 cc. 0.02 *N* H_2SO_4 and then with 3 portions of H_2O, using 5 cc. each time. To the combined acid soln. and washings, add methyl red test soln. and titrate the excess acid with 0.02 *N* NaOH. Each cc. 0.02 *N* acid is equiv. to 0.0031 g. arecoline. H. M. Burlage

Oil of rose geranium. *Repts. Am. Pharm. Assoc. Lab., Bull. Natl. Formulary Comm.* 8, 30–2(1939).—Three types of oil (7 samples of Bourbon, 4 of Algerian, and 3 French) were studied. Color, sp. gr., $(\alpha)_D$, and ester no. are reported. The oils differ only in sp. gr. and odor. H. M. Burlage

Sodium glycerophosphate. The free phosphate test. *Repts. Am. Pharm. Assoc. Lab., Bull. Natl. Formulary Comm.* 8, 38–40(1939).—A turbidimetric test for free phosphate ion in Na, Ca, Fe and Mn glycerophosphates is described. H. M. Burlage

Volatile oil content of Salvia. *Repts. Am. Pharm. Assoc. Lab., Bull. Natl. Formulary Comm.* 8, 93–6(1939).—By use of Clevenger's method (cf. *C. A.* 33, 8918[3]) 3 samples of official sage were found to yield 1.2, 1.1 and 1.3% volatile oil and the following consts. were reported: d_{25} 0.918, 0.925, 0.925; optical rotation (25°, 100 mm. tube) 9.2, 6.7, 7.5; n_{20} 1.4616, 1.4645, 1.4640; acid no. 1.8, 2.0, 1.8; ester no. 4.9, 6.8, 4.5. Fifteen references. H. M. Burlage

The acid numbers of the official tinctures of the Pharm. Hung. IV. II. István Novák. *Magyar Gyógyszerésztud. Társaság Értesítője* 16, 11–15(1940); cf. *C. A.* 33, 7486[1].—On storage for 12 months, the acid nos. generally decreased, probably owing to the soln. of alkalies from the green-glass containers. The numerical results are tabulated. S. S. de Finály

The ash contents of the official drugs of the Pharm. Hung. IV. Károly Kodrik. *Magyar Gyógyszerésztud. Társaság Értesítője* 16, 16–51(1940).—The ash was detd. in 10-cc. quartz crucibles by ignition of 0.5 g. powd. drug over a Barthal lamp heated by alc. The following values are recommended as max. percentage total and acid-insol. ash contents. Bitter-orange peel 6, 0.5; cinchona 4, 1; cassia bark 5, 1; condurango 12, 1; frangula 7, 0.5; pomegranate bark 16.5, 2.5; althaea leaves 17, 3; belladonna leaf 16.5, 3; digitalis 12, 3; hyoscyamus 24, 8; mallow leaves 17, 3.5; peppermint 12, 1.5; salvia 12, 1; senna 12, 2–3; stramonium 21, 5; trifolium 10.5, 2; uva ursi 4, 0.5; althaea root 7, 0.5; angelica root 12, 4; gentian 5, 1; hydrastis 3, —; ipecac 5.5, 2.5; jalap 6.5, 1.5; glycyrrhiza 6.5, 1.5; ononis 7, 2.5; krameria 4.5, 1; *Saponaria hungarica* root 9, 1; senega 5, 2; taraxacum 9, 3; valerian 13, 6.5; calamus 6, 1; aspidium 4, 1; triticum 5, 2.5; orris 4, 0.5; rhubarb 14, 1; zedoaria 7, 2; ginger 7, 2; salep 3.5, 1. The values prescribed by the pharmacopeias of various countries are compared. S. S. de Finály

A new type of percolator "Nera" with a dropping tap. Imre Némedy and János Ragettli. *Magyar Gyógyszerésztud. Társaság Értesítője* 16, 52–5(1940).—The dropping tap has an opening of continuously decreasing size. It gives drops as prescribed by the pharmacopeias at a rate that can be kept const. for 4 days. The structure of the tap is shown by figures. S. S. de Finály

The determination of aneurin (vitamin B_1) in drug preparations. Gábor Vastagh. *Magyar Gyógyszerésztud. Társaság Értesítője* **16**, 56–68(1940).—A modification of the methods of Jansen (*C. A.* **31**, 1443[8]) and Karrer and Kubli (*C. A.* **31**, 6275[8]) is described. Best results were obtained if the sample contained about 5 γ of aneurin hydrochloride in 10 cc. water. To 150 cc. soln. in a separatory funnel add 5 cc. of 1% $K_3Fe(CN)_6$ soln., mix, add 10 cc. 10% NaOH soln., shake, and let stand for 2 min. Add 20 cc. isobutyl alc., shake for 1 min., filter through fat-free cotton into a 25-cc. measuring flask. Repeat the extn. with 5–6 cc. isobutyl alc. and fill the flask to the mark with the filtrate. If the soln. opalesces (an indication of water in the isobutyl alc.) add 1 g. anhyd. Na_2SO_4, let stand overnight and filter. Measure the fluorescence of the thiochrome soln. by means of a Hanau analyzing lamp and a Pulfrich step photometer, and compare with that of a standard soln. prepd. from cryst. aneurin hydrochloride. If the sample contains other fluorescing substances, aneurin is adsorbed by fuller's earth preps. The method gave results with errors of not more than plus 8 or minus 16%. S. S. de Finály

Isolation of α-amyrin and ursolic acid from yerba maté. Jorge R. Mendive. *Rev. inst. bacteriol. dept. nacl. hig.* (Buenos Aires) **9**, 190–6(1939).—Dried yerba maté yielded over 0.43% of α-amyrin, m. 183 5°, and a very small amt. of ursolic acid, m. 285°. The substance found by Hauschild in 1935 (cf. *C. A.* **30**, 3537[7]) and named matesterol by him is ursolic acid. L. E. Gilson

Isolation of aspidospermine from Vallesia glabra (family Apocynaceae). V. Deulofeu, J. de Langhe and R. Labriola. *Rev. inst. bacteriol. dept. nacl. hig.* (Buenos Aires) **9**, 224–6(1939).—Dried leaves yielded about 4% and stems 2%. The amt. in the roots is small and uncertain. L. E. Gilson

Identification of exalgine (methylacetanilide) and its detection in antineuralgic mixtures. A. Denoël. *J. pharm. Belg.* **21**, 691 5, 709–11(1939).—Exalgine can be identified by its pptn. reactions with $K_4Fe(CN)_6$ in acid medium, $AuCl_3$ I in AcOH and KIO_3 in strong HCl soln. *Detection in exalgine-antipyrine mixt.* Remove the antipyrine by pptn. with Lugol's soln. or with 40% NH_4SCN in slightly acid medium and ext. the exalgine from the filtrate with ether. *Exalgine-antipyrine-pyramidone mixt.* Remove the antipyrine and pyramidone by pptn. with Lugol's soln. and ext. the exalgine from the filtrate with ether. S. W. Goldstein

Isolation and purification of the active principles of Acocanthera abyssinica. G. Menta. *Ateneo parmense* **11**, 169 75(1939).—A pure active glucoside fraction was isolated by the method of Braga (cf. *C. A.* **28**, 5595[9]). Helen Lee Gruehl

Glycol as an injectable solvent in pharmaceutical practice. Antonio Mossini. *Ateneo parmense* **11**, 242–6 (1939).— Glycol was shown to be efficacious as an injectable solvent especially in the case of camphor and folliculin. The necessity of previously testing the behavior of such solns. was stressed. Helen Lee Gruehl

Preparation of an injectable solution of quinine iodobismuthate. Antonio Mossini. *Ateneo parmense* **11**, 386–8(1939).—Ten g. quinine iodobismuthate were dissolved in a mixt. of 290 cc. ethylene glycol and 10 cc. 50% KI soln. The resulting soln. was not very viscous, could be sterilized below 60° and was easily injectable. Helen Lee Gruehl

Estimation of traces of lead and thallium in pharmaceutical chemicals. A simple dithizone limit test. Karl Bambach. *Ind. Eng. Chem., Anal. Ed.* **12**, 63–6(1940). —The dithizone test described here is simple, rapid and sensitive. It is much better than the "heavy-metals test" prescribed in the U. S. Pharmacopoeia which does not distinguish between toxic and relatively nontoxic metals. Dissolve a little of the sample in 6 *N* HNO_3, boil and cool. Transfer the soln. to a graduated sepg. funnel and add suitable quantities of NH_4 citrate, KCN and $NH_2OH.HCl$. Make the soln. basic to phenol red with freshly distd. NH_4OH and then shake with 5 ml. of dithizone soln. contg. 12 mg. of the reagent per l. of $CHCl_3$. Ext. the soln. with repeated portions of the reagent until finally the latter retains its green color. Shake the combined $CHCl_3$ exts. with 20 ml. of 1% HNO_3 and discard the $CHCl_3$ layer. Treat an aliquot part with NH_4OH and KCN as before and compare the color of the resulting dithizone ext. with standards. The test was applied to over 50 substances and in a few cases, particularly when Bi was present, a modification of the procedure was necessary. W. T. H.

Qualitative test for ethylvanillin in vanilla extract. Howard W. Chenoweth. *Ind. Eng. Chem., Anal. Ed.* **12**, 98 9(1940).—The undeclared addn. of ethylvanillin to pure vanilla exts. constitutes an adulteration which is not easily detected. The method here described will serve to detect 0.5 g. of the ethyl compd. in 3.78 l. of vanilla ext. Take a 50-ml. portion of the ext., remove the alc. by evapn., treat with $Pb(OAc)_2$ and ext. with ether by the standard method of the A. O. A. C. Place the ether ext. in a beaker and allow the ether to evap. overnight in a desiccator. Add to the residue 1 ml. of 8 *N* HCl and heat at 55° until all is dissolved. Transfer to a test tube without washing, add 1 ml. of 3% H_2O_2 and shake frequently while the color is changing to yellow, brown and then red with the final formation of a blue ppt. Allow to stand 15 min., add 15 ml. of benzene and keep at 55° with frequent shaking until the lower aq. layer becomes a dirty yellowish brown. Carefully pour off, or pipet off, most of the benzene layer into a dry test tube. If the benzene is colored violet, ethylvanillin is present; otherwise the benzene is colored a light or dirty yellow. W. T. H.

Titration of euquinine and aristochin. N. Schoorl. *Pharm. Weekblad* **76**, 1513 16(1939).—Euquinine was found to have dissocn. consts. $pK_1 = 7.15$, $pK_2 = 10.5$ (quinine has 6.0 and 9.7). On the basis of these values a titration method for euquinine is as follows: Dissolve 198 mg. (0.5 millimole) euquinine in 10 cc. 0.1 *N* HCl in the cold. Dil. the soln. with 200 cc. neutral water and 5 drops of neutralized methyl red indicator soln. In another flask place 10 cc. acetate buffer soln. (normal) of pH 5.2, dil. with 200 cc. water and add indicator. Titrate the euquinine soln. with 0.1 *N* NaOH with shaking until the color of the buffer soln. is obtained. Theory requires 5.0 cc. 0.1 *N* alkali. For aristochin dissolved with 3 mols. of HCl the pK_2 is 9.3; the pK_1 value could not be detd. even in 0.001 *N* soln. without turbidity. Direct titration of aristochin hence is impractical and the detn. is made by heating the substance with HCl to decompose the carbonic acid ester and titrating back the quinine formed. B. J. C. van der Hoeven

Fermentation of Roumanian tobaccos. I. Nitrogenous substances. I. Zaporojanu. *Bul. cultivării fermentării Tutunului* **28**, 379–453(in French, 454–62)(1939).— Expts. on the N metabolism of 18 Roumanian tobacco varieties show that the albuminoid substances in general undergo no abs. quant. modification in the course of fermentation. Nitrogenous substances undergo changes in such of their constituents as are sol. in boiling H_2O; this is shown by the accumulation of NH_3 originating in the amino acids and amides. The decompn. of nicotine is very much reduced, owing probably to the previous processes of searing and drying and to the feeble activity of the sp. oxidizing enzymes. Migrations of sol. N from the margin to the center nerve were observed, especially for nicotine. The dry substance is generally enriched in all forms of N, but, with the exception of NH_3 and albuminoid substances, these increases are too small to be of practical importance. A. H. Krappe

A photoreducing substance contained in commercial candiolin. Motomasa Tawara. *J. Biochem.* (Japan) **30**, 459–64(1939).—Candiolin (Na hexosediphosphate) contains a substance which, under the influence of light, exerts a strong reducing action on methylene blue. This effect is not assocd. with any catalytically active substance, nor was any evidence obtained that ascorbic acid was present in the candiolin. Hexosediphosphoric acid itself does not manifest this property. The substance in ques-

tion bears a close resemblance to Euler's reductone, which is thought to be an impurity in the com. prepn. S. Morgulis

Trilaurin as a substitute for coconut oil for pharmaceutical preparations. Tatuo Kariyone and Saburo Mizutani. *J. Pharm. Soc. Japan* **59**, 570-1(1939).—Trilaurin is prepd. commercially from laurin and glycerol and is a mixt. of α-monolaurin (m. 59°), β-monolaurin (m. 60.5°), α,α'-dilaurin (m. 55°) and trilaurin (m. 46°). The prepn. m. 29–38°. F. I. Nakamura

Application of capillary luminescence in pharmaceutical analysis. Hanziro Ito. *J. Pharm. Soc. Japan* **59**, 742–55(1939).—A theoretical and practical consideration. F. I. Nakamura

Officinal cinnamon bark, oil of cinnamon, and their preparations in filtered ultraviolet light. K. Leupin and J. Steiner. *Mitt. Lebensm. Hyg.* **30**, 217–19(1939).—The 2 cinnamon barks, cortex cinnamomi cassiae (I) and cortex cinnamomi ceylanici (II) show no differences under a fluorescent microscope. If, however, their powders are treated with 2 to 3 drops of 10% $Ba(OH)_2$, differences in fluorescence appear which make identification easy. As low as 10% of I in II can be detected. The oil of II (III) in Me_2CO shows no fluorescence, while the oil of I (IV) in Me_2CO fluoresces blue-green. By setting up proper standards it is possible to detect 1% of IV in III. W. J. Peterson

Ethyl chloride. Horace M. Miller. *Bull. Am. Assoc. Nurse Anesthetists* **8**, 18–22(1940). A discussion of the chem. and physiol. properties of EtCl and its anesthetic use in extg. teeth in children. J. Pinchack

Pectin. Raphael M. Nacca. *Druggists' Circ.* **84**, 22–3, 72(Feb., 1940).—Two pectin pastes have been tentatively accepted for inclusion in the National Formulary VII. These are Dense Pectin Paste composed of 2 g. benzoic acid, 150 g. No. 100 grade citrus pectin, 185 g. glycerol and soln. of physiol. salts to make 1000 g., and Thin Pectin Paste which differs from the former in having 60 g. pectin and 75 g. of glycerol in it. Both pastes deteriorate after a few months, even when stored in closed containers. The soln of physiol. salts called for in these pastes will also become official under the title liquor physiologicalis salinis. It is a modification of Ringer's soln. and consists of 8.6 g. NaCl, 0.3 g. KCl, 0.33 g. $CaCl_2$ and distd. water to make 1000 cc. J. Pinchack

Tobacco investigations. III. Successively precipitating aqueous extracts of tobacco with uranyl sulfate and copper acetate. Adolf Wenusch. *Z. Untersuch. Lebensm.* **78**, 407–14(1939); cf. *C. A.* **34**, 1130⁹.—With tobaccos there are 5 important conditions which affect quality: (1) genotype of plant, (2) phenotype of plant, (3) vitality at the time of harvest, (4) type of drying and (5) treatment of the dried tobacco (ripening, fermentation, etc.). Water-poor soil yields low chlorophyll and protein content, as well as quick loss of vitality. N-rich soil increases the nicotine content; this also depends on conditions No. 1 and 2. Effect of time of harvest and drying were discussed in the previous reports. Uranyl value (*A*) and $Cu(OAc)_2$ value (*B*) were detd. as follows: Treat 2 g. of dry finely powd. tobacco with 100 cc. distd. H_2O and allow to stand 4 hrs. at room temp. Filter, wash with 50 cc. distd. H_2O, add 15 cc. of a 10% aq. soln. of uranyl sulfate, filter, dry the ppt. in a desiccator and weigh. Treat the filtrate with 20 cc. of cold satd. $Cu(OAc)_2$, let stand 12 hrs., filter, dry in a drying oven and weigh. The weights of each of the above ppts. are designated, resp., as *A* and *B*. Tobaccos of the acid group give small *A* and high *B*. The more the loss of vitality of dried tobaccos, the lower is the *A*. The reverse is true of the *B*. Bright Virginia tobacco had an *A* equiv. to that of the acid group, while the *B* is higher than any of those of the acid group. This is due to a vital harvest and a type of drying which preserves the Cu-precipitable bodies. To obtain a typical tobacco of the alkali group, i. e., one that yields alkali-reacting N compds. in the smoke, the leaves must be vital harvested to contain a large amt. of protein, dried slowly to remove materials (sugar) giving acid smoke and they must be suitably fermented. Chemical investigations to det. these conditions of tobacco products should be most important for the hygiene of smoking. **IV. Determining the protein in tobacco.** *Ibid.* 477–80.—Results of W.'s investigations are discussed. The results of the tests yield an insight to the harvest, treatment and hygienic effect of the tobacco on the smoker. M. M. Piskur

Fungicidal testing: A comparison of methods. Adelia McCrea. *J. Lab. Clin. Med.* **25**, 538–41(1940).—The method of the author (*Ibid.* **17**, 72(1931)) with slight modifications that have been introduced later is described and its advantages are discussed. Comments are made on the methods advocated by Reddish, by Klarmann and by Taft (*Drug Trade News* **13**, 27(1938)). H. W. R.

Datura arborea (floripondio). Fernando Montesinos A. *Bol. soc. quím. Peru* **5**, 99–123(1939).—In the Solanaceae, there are 3 species of the genus *Datura* which are at present studied in Peru, namely, *D. tatula*, *D. sanguinea* and *D. arborea*. *D. arborea* is an atropine plant, 3 varieties of which exist in Peru. It has the same active principles as belladonna, hyoscyamus and stramonium, namely, the daturine alkaloids, atropine, duboisine and scopolamine. The action of daturine is shown to be superior to that produced by an equal quantity of atropine. Roots and leaves contain the most alkaloids. Galenical prepns. can be prepd. which can be used to replace prepns. of other atropine plants whenever an action of a parasympathetic nature is required. Since the alkaloidal content of *D. arborea* is less than belladonna and almost equal or less than stramonium and hyoscyamus, proportionately larger doses can be employed. Lewis Rosenstein

Coconut oil soap solutions. Charles Spain. *Chem. Products* **3**, 31–2(1940).—The Brit. Pharm. Codex soln. of coconut oil soap becomes cloudy; filtration yields only temporary clarity, and this at the expense of the soap content. The difficulty is due to the use of NaOH in the Codex formula. The following formula gives a soln. that remains sufficiently clear to filter bright, without undue loss of soap: Coconut oil 5 lb., KOH 1 lb., oil of lavender q. s., distd. water to 18 pints. Melt the oil, add 35 oz. of KOH soln. (contg. 1 lb. KOH), mix thoroughly, keep warm for a week, add the rest of the distd. water, dissolve by heating without boiling and place the warm soln. in separators. When the sepn. is completed 24 hrs. later, draw off the clear soap soln., filter through white filter paper, add the preservative and bottle the soln. for storage. Leopold Scheflan

The absorption of cosmetic materials by the skin. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1939**, 122–3.—Suitable for use in cosmetics that are not to be absorbed are petrolatum, mineral oils, some waxes and gums, kaolin, talcum, etc. In a cosmetic intended to be absorbed by the skin the ingredients should be similar in nature to those present in the skin and have a m. p. not much higher than body temp. Examples are animal and vegetable oils, lecithin, cholesterol and their derivs. Leopold Scheflan

Body deodorants. I. R. Hollenberg. *Progressive Perfumery & Cosmetics* **1939**, 155–6, 162–3. The formulating of a body deodorant is discussed. L. Scheflan

Coal-tar and natural dyes [for use in drugs and cosmetics]. J. W. Orelup. *Progressive Perfumery & Cosmetics* **1939**, 177–81.—Dyes permitted by the Federal Food, Drug and Cosmetic Act are discussed. The chem. structures of indigo, Tyrian purple, henna (2-hydroxy-1,4-naphthoquinone), cochineal, Indian yellow (euxanthone), dyes derived from flowers, etc., are discussed and the significance of their similarity to those of the coal-tar dyes is pointed out. Leopold Scheflan

Musk. I. The natural product. Ernst Ohlsson. *Progressive Perfumery & Cosmetics* **1939**, 182–4.—A discussion of early history, the place of musk in medicine, the occurrence of musk in animals and plants and its production from natural sources. Leopold Scheflan

Iron hematoxylins containing ferric and ferrous iron. R. D. Lillie and W. R. Earle. *Am. J. Path.* **15**, 765–70 (1939).—**The stability of Fe alum hematoxylin solns. may**

be greatly increased by the addn. of $Fe(NH_4)_2(SO_4)_2.6H_2O$ and especially of $FeSO_4.7H_2O$. F. B. Seibert

Distribution of chem. substances in tobacco (Vladescu, Dimofte) 11D. Dissocn. constants and titration exponents of alkaloids (Schoorl) 2. Effect of substitutents on germicidal activity of phenols (Chien, Yin) 10. Derivs. of phenol obtained from cashew-nutshell oil [as fixatives for perfumes] (U. S. pat. 2,181,119) 10. Benzenecarboxylic acid fluorides contg. trifluoromethyl groups [as intermediates in making pharmaceutical compds.] (U. S. pat. 2,181,554) 10.

Sivadjian, J.: La chimie des produits pharmaceutiques. Paris: Gauthier-Villars et Cie. 163 pp. Fr. 40.

Medicinal compositions suitable for application to the nasal mucous membrane. Gordon A. Alles. U. S. 3 2,181,845, Nov. 28. A medicinal compn. for stimulating peripheral neuromuscular mechanisms under control of the sympathetic nervous system comprises a stable, nontoxic, sol., acid addn. salt of 1-(parahydroxyphenyl)-2-aminopropane such as the hydrobromide together with an excipient.

Carbocyclic alcohol esters of *N*-alkylpiperidinecarboxylic acids. Otto Dalmer and Claus Diehl (to Merck & Co. Inc.). U. S. 2,182,791, Dec. 12. Esters are prepd. 4 which are nonirritating to delicate mucous membranes and which inhibit the development of staphylococci, coli and gonococci. The *N*-methyl-3-piperidinecarboxylic acid thymol ester is especially effective. It b_5 177–8° and its hydrobromide m. about 168°. Its methosulfate m. about 127°. The chloro-*m*-cresol ester b_5 174–6° and its hydrochloride m. about 120°. The eugenol ester b_4 about 174–5°. The 2-carbomethoxyphenyl ester forms 5 a hydrochloride m. about 104–5°. The menthol ester of *N*-methyl-3-piperidinecarboxylic acid b_6 about 165–6° and is a slightly yellow oil. Its hydrobromide m. about 185°. *N*-Methyl-3-piperidinecarboxylic acid menthol ester methosulfate m. 110–12° and by hydration yields *N*-methyl-3-piperidinecarboxylic acid menthol ester methosulfate. *N*-Methyl-2-piperidinecarboxylic acid borneol ester is a light oil b_5 161–2° and forms a cryst. hydrochloride. *N*-Methyl-3-piperidinecarboxylic acid 6 Ph ester is a thick oil and its hydrochloride m. about 60–5°. The 4-phenoxyphenyl ester forms a hydrochloride which m. 167°. The decahydro-2-naphthyl ester b_5 about 183–5° and its hydrochloride m. about 120°. The tetrahydro-2-naphthyl ester b_5 199–200° and its hydrochloride m. about 197°. *N*-Ethyl-2-pyridinecarboxylic acid thymol ester ethylsulfate m. about 130°. *N*-Ethyl-2-pyridinecarboxylic acid thymol ester b_{10} about 186 7°. 7 4-Pyridinecarboxylic acid thymol ester b_5 178–9°. *N*-Methyl-4-pyridinecarboxylic acid methosulfate m. about 166°. *N*-Methyl-4-piperidinecarboxylic acid thymol ester is a slightly colored oil and its hydrochloride m. about 198°. U. S. 2,182,792 relates to compds. such as the thymol ester of *N*-methyl-3-piperidinecarboxylic acid and the corresponding chloro-*m*-cresol and eugenol esters, b_5 and b_4 about 175°.

Thiobarbituric acids. Arthur W. Dox (to Parke Davis 8 & Co.). U. S. 2,182,518, Dec. 5. Therapeutic compds. are produced, of the general formula $PhRC.CO.NH.CS.NM.CO$, where R is an alkyl radical having not more than 7 C atoms and M is H or a salt-forming basic group capable of replacing the H of the imino group, or metal such as K, Na, Rb, Cs or an alk. earth metal or Mg or NH_4 or the radical of an amine. Details are given of the 9 production of ethylphenylthiobarbituric acid, m. 218°, and general mention is made of the production of allyl-, propyl-, isopropyl-, butyl-, amyl- and isoamyl-phenylthiobarbituric acids and their salts. Cf. *C. A.* **33**, 5599[2].

3-Ketopolyhydrocyclopentanophenanthrenes. Max Hartmann and Albert Wettstein (to Soc. pour l'ind. chim. à Bâle). U. S. 2,182,920, Dec. 12. *Therapeutic compds.* forming freely water-sol. salts are produced by treating a hydroxy ketone such as $\Delta^{4,5}$-androsten-17-ol-3-one or the like with esterifying reagents such as succinic anhydride, maleic anhydride, phthalic anhydride, chlorosulfonic acid or P oxychloride. The succinic ester of the $\Delta^{4,5}$-compd. has dimorphous forms which m., resp., 182–4° and 191–3°. Abs. pyridine, quinoline or a dialkylaniline may be used (although not necessary) as a condensing agent in the esterification reaction. Cf. *C. A.* **33**, 3812[1].

Diaminoarsenobenzenemonosulfoxylate derivatives. Frieda Streitwolf (nee Weiss), Administratrix of the Estate of Karl Streitwolf, deceased, Alfred Fehrle and Paul Fritzsche (to Winthrop Chemical Co. Inc.). Can. 386,659, Jan. 30, 1940. Two hydroxyalkyl radicals are introduced by reaction with an alkylene oxide into one of the amino groups of a diaminoarsenobenzene which may contain further substituents in the benzene nuclei, and an alkyl radical is introduced by treatment with an alkylating agent, or a hydroxyalkyl radical, by means of alkylene oxide, and the formaldehydesulfoxylate radical are introduced into the other amino group.

Theobromine alkaline earth metal gluconates. Russel J. Fosbinder (to Maltbie Chemical Co.). U. S. 2,182,-314, Dec. 5. By reaction of CaO, theobromine and Ca gluconate, etc., a double salt of theobromine and Ca with gluconic acid is obtained, which is suitable for use in the treatment of cardiovascular diseases.

Water-soluble derivatives of *p*-aminobenzenesulfonamide. Joseph Ebert (to Farastan Co.). U. S. 2,182,-075, Dec. 5. Salts of *p*-aminobenzenesulfonamide with phenolsulfonic acid, benzenesulfonic acid and sulfosalicylic acid are produced, suitable *for therapeutic use* in treating infections caused by cocci. Details are given of the production of the salt of *p*-aminobenzenesulfonamide with benzenesulfonic acid, m. 213–17° (decompn.), the salt of *p*-aminobenzenesulfonamide with phenolsulfonic acid, m. 216–20° (decompn.), and the salt of *p*-aminobenzenesulfonamide with sulfosalicylic acid, m. 214–20° (decompn.).

Device and operative details for expressing oil from fruit skin. Melville D. Truesdale. U. S. 2,181,674, Nov. 28. Various structural and operative details.

Vitamin preparations. Harden F. Taylor (to Atlantic Coast Fisheries Co.). U. S. 2,183,053, Dec. 12. See Brit. 490,001 (*C. A.* **33**, 814[8]).

Compositions of gelatin with vitamin A, etc. Stanton Reynolds (to Atlantic Coast Fisheries Co.). U. S. 2,183,084, Dec. 12. In making an "activated" gelatin product, in finely divided form, a polyphase dispersion is produced in which liquid droplets of gelatin contg. a vitamin A concentrate or the like dispersed therein, constitute the dispersed phase and a vegetable oil, such as castor oil, constitutes the continuous phase, the droplets are caused to solidify (as by cooling to about 8°), oil is removed by use of an oil solvent such as "industrial methylated spirit," and at least part of the water is removed, as by use of alc. Various details are given.

Derivatives of androstenols. Arthur Serini, Lothar Strassberger and Willy Logemann (to Schering A.-G.). U. S. 2,182,825, Dec. 12. A method for the production of halogenated androstenol compds. involves subjecting androstenolone compds., where the hydroxy group is replaced by a group that, upon hydrolysis, is reconvertible into the hydroxy group, to the action of reducing agents capable of reducing the carbonyl group of the androstenol compds. to the secondary alc. group, substantially without affecting the double bond present in said androstenolone compds. and replacing the secondary alc. group of the androstenediol compd. obtained by halogen. The reduction may be effected with H in the presence of a Ni catalyst or by nascent H produced with use of Al amalgam, and details are given of the production of an acetate of androstenol, m. 144°, a 3-acetoxy-17-chloroandrostene, m. 170°, and a 3-acetoxy-17-bromoandrostene. The products may be used as *therapeutic agents* or as intermediates for the production of other products of the male sex hormone class.

Extractions, such as the extraction of sex hormones

from urine by use of chloroform, etc. Samuel L. Leiboff. U. S. 2,182,564, Dec. 5. App. is described, and an extn. process in which a liquid contg. a substance to be extd. is treated by placing in a first vessel a quantity of the liquid and a quantity of a liquid solvent for the substance, which solvent is immiscible with the liquid and has a higher sp. gr. and a lower b. p. than the latter. A quantity of the liquid solvent is placed in another vessel, the solvents in both vessels are heated whereby the solvents are vaporized and the vaporized solvent in the first vessel passes upwardly through the liquid contg. the substance to be extd. The vapor from the other vessel is passed into the first vessel above the liquid therein, the vapors in the first vessel are condensed above the liquid therein whereby the solvent thus condensed passes by gravity through the liquid and forms a soln. of the substance, and the soln. of the extd. substance is withdrawn from the first vessel into the other vessel.

Sexual hormone. Wilhelm Dirscherl (to Rare Chemicals, Inc.). U. S. 2,182,073, Dec. 5. A male-acting sexual hormone material comprises an ext. such as may be obtained by treating with benzene a wax-like material obtained from a tree bark such as China wax contg. a sterol-type alc. of the group consisting of cinchol, cupreol, quebrachol and rhamnol, the ext. having specific activity on the seminal vesicle of the mouse equal to one M. U. in not more than 100 γ when tested according to Loewe and Voss, but having substantially no activity upon a capon's comb. Cf. *C. A.* **33**, 5132[8]. U. S. 2,182,074 (Wilhelm Dirscherl and Josef Kraus, joint inventors; to the same assignee) relates to an ext. of isocholesterol such as may be obtained from wool fat and which has specific activity on the seminal vesicle of the mouse equal to one M. U. is not more than 100 γ when tested according to Loewe and Voss, but having substantially no activity on a capon's comb.

Germicidal detergent suitable for general use. Milward Bayliss, John L. Wilson and Erling J. Ordal (to Economics Laboratory Inc.). U. S. 2,183,037, Dec. 12. A major proportion of buffer salts such as Na_2CO_3, NaH_2PO_4 or Na silicate is used with a relatively small proportion of a mixt. of active sulfonated wetting agents including a sulfonated alc. wetting agent such as Na lauryl sulfate to form a compn. adapted when dissolved in water in amts. of 0.5–3% to form a *germicidal soln.* contg. a small fraction of 1% of the wetting agents with a sufficient amt. of the alk. salts to give a pH above 11.5. Cf. *C. A.* **33**, 2251[7].

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

E. M. SYMMES

The stability of alkali peroxide solutions. J. M. Martrémont. *Tiba* **17**, 531 7(1939).—A brief discussion of the influence of alky. or acidity, of temp. and of protective agents (soap, pyrophosphoric esters, alk. earth salts of certain alkyl sulfates, alkali stannates). A. Papineau-Couture

Distribution of boron between liquid and solid phases of the Inder Lake (Western Kazakhstan) brines during isothermal evaporation. I. N. Lepeshkov and A. I. Shpikel'man. *Compt. rend. acad. sci. U. R. S. S.* **24**, 707-8(1939)(in English).—A discussion of the problems assocd. with the development and utilization of the Inder Lake brines contg. Ca, Mg, K, Na, B and Br. F. G.

Fundamental mechanics of calcination and hydration of lime and methods of control. Victor J. Azbe. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 88-102 (1940); cf. *C. A.* **33**, 9556[9].—A discussion from the chem. engineering point of view, including both theory and practical points in design and operation of kilns. The value of lime for many purposes and the smooth operation of the kiln depend largely upon burning conditions, which can be controlled. Most lime is overburned; the first remedy is to reduce the size of stone charged but avoid fines, draw more frequently and provide better trimming facilities. Temp. control by recirculation of hot gases is practically necessary to avoid major difficulties. Errors in burning cannot be corrected completely by modifications of the hydration process; overburned lime is too dense for best results in hydration. C. J. S.

Factors affecting milk of lime employed in industry. D. E. Washburn. *Am. Soc. Testing Materials, Symposium on Lime* **1939**, 36–9(1940).—Chem. lime for prepg. milk of lime should contain at least 90% CaO, 1–3% $CaCO_3$, be mild burned, preferably in a rotary kiln, and slaked rapidly at a low temp. for satisfactory soly. and slow settling. C. J. Schollenberger

How efficient is the lime kiln? Victor J. Azbe. *Rock Products* **42**, No. 12, 43–4(1939).—Methods of calcn. are described. E. H.

Developing methods for the preparation of red lead from galena answering the requirements of the storage-battery industry. L. V. Sakharova and B. E. Levitina. *Trudy Inst. Lakov i Krasok* **2**, 7–22(1939).—The velocity of interaction of $(NH_4)_2SO_4$ with storage-battery red lead in the prepn. of paste depends primarily upon the cryst. structure of the original galena and the degree of uniform fractional oxidation. Only if there has been uniform fractional oxidation will the velocity of setting be a function of the dispersion of the red lead. With red lead obtained from polydispersed galena, the process of setting will be concd. in the coarse, little-oxidized fraction. Red lead for storage batteries must be made by uniform oxidation of galena of the tetragonal system. For uniform fractional oxidation, the galena should be preliminarily sepd. into a fraction consisting of particles smaller than 10 μ and a fraction consisting of particles larger than 10 μ, and these fractions should be oxidized separately and the products mixed in suitable proportion. French red lead is best suited for the storage-battery industry. A. A. Boehtlingk

Magnesia from Canadian brucite. M. F. Goudge. *Can. Chem. Process Inds.* **24**, 3–5, 8(1940).—A brief review of a preliminary report on brucite deposits in Ontario and Quebec and their com. possibilities. Brucitic limestone of suitable grade for com. exploitation is available in the Rutherglen and Wakefield Canadian areas to supply a large part of the present and prospective Canadian market for Mg and its products for many years. Means of identification and recovery of brucite and the cost of production are noted. W. H. Boynton

The technology of titanium dioxide. I. Properties and structure of titanium dioxide and its hydrates. A. M. Brusilovskiĭ, B. E. Boguslavskaya and E. G. Nosovich. *Trudy Inst. Lakov i Krasok* **2**, 23–35(1939).—Dehydration of Ti hydroxides by the van Bemmelen, the Bolte and the thermal methods proceeds without interruptions or breaks, i. e., the Ti hydroxides are not crystal hydrates of a definite structure. These compds. retain water by adsorption (capillary) forces. TiO_2, heated to incandescence, becomes cryst. and is then composed of a mixt. of anatase and brucite; above 1100° there is a transition of anatase and brucite into rutile. **II. Investigation of the adsorptive power of titanic acids.** A. M. Brusilovskiĭ and M. M. Poshvina. *Ibid.* 36–41.—The specific surface of titanic acids can be measured by the method of adsorption with phosphoric acid. At pH 3.83 the amt. of adsorbed phosphoric acid is greater than at pH 2.7 and 1.76; this indicates a smaller particle size of the metatitanic acid obtained at pH 3.83. The proposed method, because of its simplicity, may find practical application in the detn. of the dispersion obtained under manufg. conditions for titanic acid, for the control of the product. A. A. Boehtlingk

The functions of the flotation reagents in the soap flotation of fluorite. Kazuo Kanazawa and Genzo Komparu. *Suiyokwai-Shi* **10**, 79–96(1939).—Flotation expts.

with fluorite ore contg. 7.64% CaF_2 from Hangchow, China, were made. The −65 + 200-mesh fluorite was more floatable than the −200-mesh with small quantities of oleic acid or Na oleate, but the −200-mesh fluorite was floated with larger quantities, about 1000 g./ton of oleic acid or 600 g./ton of Na oleate. This tendency may be due to the fact that the rate of flocculation of the −200-mesh was increased by the addn. of oleic acid or Na oleate. Oleic acid with Na oleate floated more fluorite than oleic acid alone. Small quantities, e. g., about 100 g./ton, of another frother, such as camphor white oil, oleic acid or Na oleate, increased the floatability of fluorite. With 180 g./ton oleic acid, fluorite was most floatable at −150 + 200-mesh and the −100 + 150-mesh fluorite was most floatable at a pH of 9 of the tailing soln., a pH obtained by the addn. of CaO. Na silicate, $CuSO_4$, citric acid or Cr nitrate depressed the flotation of fluorite. Citric acid and Cr nitrate were the most effective depressors. The depressing action of $CuSO_4$ with oleic acid was more marked than with Na oleate. Na_2CO_3, $K_2Cr_2O_7$ or $MnSO_4$ did not depress, but slightly activated, the flotation of fluorite. In the flotation of the ore contg. 48.2% CaF_2 and 35.9% SiO_2 from Zimmu Mine, Hirosima, the max. extn. was obtained with 400 g./ton $K_2Cr_2O_7$, 250 g./ton Na silicate and 200 g./ton oleic acid.

Hideo Nishimura

Decomposition of titanite minerals with hydrochloric acid. A. M. Brusilovskiĭ and N. N. Starosel'skiĭ. *Trudy Inst. Lakov i Krasok* 2, 86-94(1939).- By HCl treatment of titanite minerals a pigment contg. TiO_2, together with filler, is obtained; the product has good com. properties. A 1.2 ratio of HCl to titanite or a max. $1^1/_4$ 2 of the theoretically required amt. is best. The duration of treatment is of minor importance. The titanite concentrate used contained TiO_2 32.3, CaO 22.1, SiO_2 31.2, Fe_2O_3 6.28, and Al_2O_3 6.2%; 20% HCl was used in the decompn. The covering power and other properties of the pigment are discussed and the results described.

A. A. Boehtlingk

Decomposition of titanite in the presence of sodium chloride. A. M. Brusilovskiĭ, M. A. Shtern and I. I. Pankova. *Trudy Inst. Lakov i Krasok* 2, 229-36(1939). —Titanite concentrate can be completely decompd. by the action of the products of decompn. of NaCl with superheated steam. The process can be improved by the introduction of catalysts. The app. should be modified to prevent the carrying off of NaCl. The expts. are described.

A. A. Boehtlingk

Decolorizing carbon and sodium silicate from Philippine carbonaceous rice-hull ash. Aurelio O. Cruz and Augustus P. West. *Philippine J. Sci.* 70, 143-56(1939). —A method of making in one process both decolorizing C and sodium silicate from carbonaceous ash obtained by burning rice hulls is described. This C gave, for saccharine liquids, a C efficiency greater than that of standard C, in one case even greater than suchar C. Treatment of this C only once with NaOH (12°Bé.) gave a very siliceous rice-hull C, which, for ordinary com. purposes, satisfactorily reduced the color of coconut oil. Crude sodium silicate, made in this manner, contained about 2% more alkali than imported silicate, and is good for making soaps, the excess alkali saponifying the fat. By treating the crude silicate with C-free rice-hull ash, the excess alkali is neutralized, and the product had about the same compn. as an imported sodium silicate.

R. K. Carleton

Primary stages in formation of platinum black. D. L. Berdichevskaya and P. D. Dankov. *Compt. rend. acad. sci. U. R. S. S.* 24, 545-8(1939)(in English); cf. *C. A.* 28, 5323[1].—Metallic Pt is formed from Na_2PtCl_6 and CH_2O in 2 stages: (1) the slow formation of nuclei (induction period) and (2) the quick pptn. of metal in the presence of the nuclei already formed. The induction period is increased by previous removal of dust from the soln., by decrease in temp., and by decrease in the concn. of the reagents, the process being checked at low temps. in the absence of dust. With decrease in concn. of the reagents, a concn. is reached below which the induction period increases sharply.

George Ayers

Evaluation of C black by rate of cure and extrusion (Johnson) 30. Lime in base-metal flotation (Rose) 9.

Flow Carbon; the Story of Pellet Black, Its Development, Perfection and Use. New York: Columbian Carbon Co. 82 pp.

Silica in Industry; Microsil Ground Silica, Blackhawk Silica Sand. Chicago: Standard Silica Corp. 27 pp.

Double fluorides of alkali metals and aluminum. Harold W. Heiser (to Aluminum Co. of America). U. S. 2,182,509, Dec. 5. See Fr. 838,351 (*C. A.* 33, 7969[3]). U. S. 2,182,510 relates to a method in which a soln. of a hydrofluoboric acid compd. is treated with materials dissocg. to form Al and alkali metal ions in the soln., in proportions effecting the pptn. of a double fluoride.

Nitrates such as sodium nitrate. Herman A. Beekhuis, Jr. U. S. 2,181,559, Nov. 28. An arrangement of app. is described, and a process for the production of a nitrate by heating a reaction mixt. of HNO_3, water and metal chloride to its b. p. to cause the acid and chloride to react to form metal nitrate and evolve a moist gaseous mixt. substantially consisting of water vapor, NOCl and Cl; this involves passing the evolved NOCl and Cl with accompanying water vapor in direct contact with aq. HNO_3 contg. 40% or more HNO_3, all of which aq. HNO_3 is introduced into contact with the moist gaseous mixt. at a temp. of 30° or lower, bringing the HNO_3 into contact with the moist gaseous mixt. without extraneously heating the HNO_3, thereby cooling the gaseous mixt. and condensing therefrom most of the water vapor contained therein, withdrawing from contact with the acid a gaseous mixt. substantially consisting of NOCl and Cl, then incorporating the resulting HNO_3 soln., contg. the water condensed from the gases, in a reaction mixt. of HNO_3, water and metal chloride which is heated to its b. p. to form addnl. metal nitrate, NOCl and Cl. Cf. *C. A.* 33, 39777.

Alumina from bauxite, etc. Rudolf Scholder. U. S. 2,181,669, Nov. 28. An aluminiferous material such as calcined bauxite is decompd. with a liquor contg. an alkali metal oxide and a halide such as NaCl, NaBr, KCl or KBr, the halide and oxide being in about the ratio of 1:3, resp., to form an aluminate liquor, in which the alkali metal oxide is present in such proportion as to maintain a ratio between it and the Al_2O_3 of between approx. 1.5:1 and 1.1:1. The decompn. may be effected by heating for several hrs. at 180°.

Aluminum silicate compositions suitable for use with glue, rubber, clay, etc. Charles E. Kraus. U. S. 2,182,086, Dec. 5. There is formed a jelly-like oil and water colloidal suspension of Al silicate, produced by agitating together naturally occurring colloidal amorphous Al silicate naturally impregnated with mineral oil, in which the colloidal properties of the Al silicate are masked and the mass cannot be deflocculated by mech. grinding in water, with an aq. soln. of an electrolyte such as a dil. NH_4OH soln. at a temp. of about 88°, and cooling the resulting modified mixt.

Ammonia production from ammonium sulfate. Edward P. Fleming and Melville F. Perkins (to American Smelting and Refining Co.). U. S. 2,182,078, Dec. 5. A process for obtaining pure, concd. aq. NH_3 involves grinding NH_4 sulfate crystals with lime and water in a gas-tight closure, the water being in an amt. insufficient to dissolve the bulk of the crystals, continuously passing steam into direct contact with the reacting materials and withdrawing ammoniacal vapors, rectifying the vapors, and condensing the enriched vapors. App. is described.

Mono-calcium phosphate. Louis Block and Charles S. King (to Blockson Chemical Co.). U. S. 2,181,933, Dec. 5. A process of making mono-Ca phosphate monohydrate involves subjecting di-Ca phosphate dihydrate of the granulation characteristics desired for the resulting

mono-Ca phosphate within the range of 60 to 250 mesh, to the converting action of a liquid medium contg. essentially an inert liquid diluent such as acetone and H_3PO_4 at least in sufficient quantity to react with the material to form the mono-Ca phosphate monohydrate and without dissolving the treated material or product. 1

Granular calcium phosphate. Augustus H. Fiske (to Rumford Chemical Works). U. S. 2,182,613, Dec. 5. A method of forming, from a "commercially pure" H_3PO_4 which is free of metallic compds., a mono-Ca phosphate contg. a relatively large proportion of granular nonfriable product to soft pulverulent product involves treating a sol. phosphate of Fe, Al or Cr with H_3PO_4, lime and water in suitable proportions to furnish approx. 1.25% of the Fe, Al or Cr in the final product. 2

Silicon carbide grains. Abraham A. Klein (to Norton Co.). U. S. 2,183,044, Dec. 12. Silicon carbide grains have their strength improved by heating them to 1000–1400° and holding them at such temp. for a considerable time (suitably several hrs.) while oxidation is limited (as by use of an inert atm.) so as to produce substantially smooth, nonpitted, lustrous surfaces, followed by cooling slowly to anneal the grains and prevent detrimental strains being set up in them. 3

Separating carbon dioxide from gaseous hydrocarbons. Ludwig Rosenstein (to Shell Development Co.). U. S. 2,182,305, Dec. 5. For recovering CO_2 from normally gaseous hydrocarbons of less than 5 C atoms, such as propane mixts., by treatment with an aq. soln. of K phosphate, the hydrocarbons, while in the liquid state, are brought into contact with an aq. K_3PO_4 soln. under conditions maintaining the materials in the liquid state, and CO_2 is recovered from the resulting soln. by steaming. 4

Extracting fluorine values from fluorspar ores. Harold W. Heiser (to Aluminum Co. of America). U. S. 2,182,511, Dec. 5. A fluorspar ore is digested with an aq. soln. of H_2SO_4 (suitably of about 10–20% strength and at a temp. of about 70–100°) contg. boric acid or a borate.

Hydrogen production by reaction of water with a metal such as iron. Walton H. Marshall, Jr. (to M. W. Kellogg Co.). U. S. 2,182,747, Dec. 5. An arrangement of app. is described, and a method of continuously generating H by the reaction of water in the liquid phase and a finely divided metal such as Fe at temps. of about 230–370° in a reaction zone wherein a pressure is maintained above the vapor pressure of water at the reaction temp., gaseous products being continuously removed from the reaction zone, metal oxide formed being removed and fresh finely divided metal being supplied and water being continuously supplied to the reaction zone (H being recovered from the gaseous products).

Ore concentration. Benjamin R. Harris. U. S. 2,182,845, Dec. 12. An ore pulp, such as one of sylvite and halite, contg. KCl and NaCl is subjected, in a substantially satd. brine, to a froth flotation treatment in the presence of octyl sulfate or its sol. salts.

Apparatus for agglomeration of carbon black. Howard W. Price. Can. 386,813, Feb. 13, 1940.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

The internal binding energy and constitution of glass. I. The viscosity of glass at temperatures near the transformation point. Taro Moriya. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 357(1939).—Measurements of viscosity, carried out by detg. the elongation rate of glass fiber subjected to longitudinal tension, show that the relation between log η and $1/T$ is represented closely by two straight lines that break at a temp. called the transformation temp. (near transformation temp. obtained from thermal expansion measurements), where the coeff. of viscosity is approx. 2.4×10^{14}. **II. The viscosity and internal binding energy of soda-silica glasses.** *Ibid.* 357–8.—Based on data obtained for several soda-silica glasses, the binding energy (derived from the slope of the straight lines of the curve log η *vs.* $1/T$) above the transformation temp. is different from that below the transformation temp. At temps. above the transformation point, the binding energy decreases with increasing SiO_2 content, while at temps. below the transformation point, it increases with increasing SiO_2 content. **III. The viscosity and internal binding energy of Na_2O-B_2O_3-SiO_2 glasses.** *Ibid.* 367.—The binding energy increases with increasing B_2O_3 content both above and below the transformation temp. **IV. The internal binding energy of glass and the glassy state.** *Ibid.* 367.—From the exptl. data of previous reports, as well as of other workers, the probable internal binding energy-temp. curves for a series of soda-silica glasses have been examd. for a wide temp. range. From considerations of the "glassy state," the compd. Na_2O.SiO_2 may exist at high temp. in soda-silica glass. George Ayers 7 8

The influence of silica on the gas content of glass melts (displacement of SO_3 by SiO_2). H. Jebsen-Marwedel. *Glastech. Ber.* **17**, 325–7(1939).—Analysis of a series of soda-lime-silica glasses with 2% of the Na_2O introduced as sulfate shows that, with increasing SiO_2 content, there is a proportionate drop in SO_3 content. This displacement of SO_3 as soln. of SiO_2 progresses is an important factor in gas evolution and fining. J. F. Hyde 9

A glass containing cadmium sulfide. I. K. Huwa and H. Inuzuka. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 296(1939).—Glass contg. added CdS and analyzing 1.20% Cd, 0.35% total S and 0.30% "sulfide" S, when heated approx. 1 hr. at 750°, acquires a slightly yellowish milky appearance; increase in temp. increases the yellowish milky opaqueness until at 1000° a transparent greenish yellow glass is obtained. X-ray photographs of the glass samples which were heated at temps. from 550° to 1000° show the same lines as those of α-CdS, while those of the glass samples heated at 1000° or above do not contain these lines. George Ayers

Propane and acetylene in lamp-working shops. Theo. Ziener. *Glastech. Ber.* **17**, 329–35(1939). J. F. Hyde 6

Further developments in the testing of materials and properties. Heinz Mields. *Ber. deut. keram. Ges.* **20**, 508–17(1939).—A review of 10 years of ceramic testing. 259 references. P. S. Roller

Special bricks that are necessary in war time. (chromite refractories). Josef Robitschek and Felix Singer. *Brit. Clayworker* **48**, 310–14(1940).—A review of data concerning silica, fireclay, high Al_2O_3, chromite, forsterite, magnesite and dolomite refractories. E. C. Petrie

Thermal tests and calculations on drying in the brick industry. Heinz Roth. *Ber. deut. keram. Ges.* **20**, 427–47, 457–76(1939).—The thermal efficiencies for a large room, a chamber and a tunnel dryer were, resp., 62, 48 and 21%, while the air efficiencies were 93.5, 97.8 and 78%. P. S. Roller

Beryllium and beryl in the ceramic industry. L. Guimin. *Rev. matériaux construction trav. publics* **1939**, 85–7B. P. S. Roller

The recrystallization of alumina. Eugen Ryschkewitsch. *Ber. deut. keram. Ges.* **20**, 477–84(1939); cf. *ibid.* **16**, 111(1935).—Calcined Al_2O_3 occurs as small flaky grains. In a cast slip, the grains nearest the wall are oriented parallel to it, and even in pressed articles an orientation is observed. Recrystn. occurs rapidly above 1800°, sometimes along the *c* axis, so that the original platy material takes on a prismatic structure. However, usually the recrystn. is regular. Mineralizers facilitate recrystn., but as a fine-grain structure is desired in ceramics, mineralizers are to be avoided, especially TiO_2 and ZrO_2. In tech. ware, gas inclusions are frequently present in the crystallites, but as these are sealed, impermeability is high. Because of the tendency for crystn. to take place

around an air space, a capillary hole as for a spinning die, retains its original dimensions after firing. P. S. R.

The reaction between burnt kaolin and lime in aqueous solution. W. Strätling. *Ber. deut. keram. Ges.* **20**, 522–7 (1939).—Total heat of reaction of Zettlitzer kaolin and $Ca(OH)_2$ consists of heat of wetting and heat of adsorption or reaction. The latter, as well as total heat, showed a max. for kaolin burnt at 500°, while the heat of wetting decreased continuously. The surface area, calcd. from size analysis, also decreased from 34,000 sq. cm./g. at 110° to 9200 at 500° and 5800 at 1100°. The amt. of CaO taken up in 111 hrs. and subsequently forming satd. soln., was greatest for the product burned at 700°. On evapn. of the mother liquor of the reaction with the 500° to 800° product, spherulitic crystals with n equal to 1.53 and of compn. 3 $CaO.Al_2O_3.12H_2O$, and in one case $3CaO.Al_2O_3.18H_2O$, were obtained. The solid phase was a new quaternary hydrate of CaO, Al_2O_3 and SiO_2, probably in the ratio of 2:1:1. This compd. according to x-ray, was also obtained in the reaction of $3CaO.Al_2O_3$, SiO_2 sol and $Ca(OH)_2$, but not when $3CaO.Al_2O_3.6H_2O$ was used, owing to the slowness of the reaction. P. S. Roller

California pottery manufacturers now use local china clays. Howard R. Erwin. *Ceram. Ind.* **34**, 56, 58(February, 1940).—Compn. and properties are compared with English type VC No. 1. Herbert S. Willson

Increase of the stability of unburned clay in the firing of porcelain articles. G. K. Tereshchenko. *Stroitel. Materialy* **1938**, No. 8-9, 50-3; *Khim. Referat. Zhur.* **2**, No. 4, 104-5(1939).—Conditions for increasing the bending strength of dry clay were investigated by the addn. of different admixts. to the porcelain mass: mineral acids, liquid glass, tanning ext., joiners' glue, bentonite, etc. Masses contg. sulfite-cellulose ext., molasses, dextrin and starch were found to yield dry clay which was fairly strong and which absorbed very little water. As a result of these investigations a conclusion was reached that dry clay can be glazed by the immersion method. The use of admixts. to improve the mech. properties of dry porcelain clay is recommended for articles which require firing.
W. R. Henn

The relative behaviors of porous and densely burned porcelain insulators in high-frequency electric fields. Werner Endres. *Keram. Rundschau* **47**, 443–5, 465–6, 483–5, 501-3, 519–21, 527-8(1939).—The presence of pores and small cracks results in a decrease in dielectric loss and dielectric const. As a result, when dry, the porous product is less heated in a condensor field by a high-frequency voltage. However, in the presence even of traces of moisture, the reverse is true. P. S. Roller

Control of soluble metallic salts results in uniform colors. John H. Grady. *Brick & Clay Record* **96**, No. 2, 31(1940).—These sol. salts have several advantages over colored glazes for polychrome decoration. Aqueous solns. of most of the sol. salts have a pH lower than 7.0 and metal parts cannot be used in painting or spraying. When exposed to the atm. these salts, being deliquescent, condense a film of moisture on their surface and the film soon becomes a satd. soln. by dissolving the solid. The process will continue until all the salt has dissolved. Watering of the various salts greatly increases the difficulty of prepg. uniform solns. E. C. Petrie

Choosing refractories. Bernard Thomas. *Proc. Staffordshire Iron Steel Inst.* **54**, 16–29(1938–39); cf. *C. A.* **33**, 1116[2].—Typical refractories found to give the most economic service are: (*a*) For low-temp. solid-fuel furnaces, various grades of Stourbridge firebrick with 53–70 SiO_2 and 25–39% Al_2O_3; (*b*) for high-temp. solid-fuel furnaces, aluminous series contg. 51–53 SiO_2 and 42–44% Al_2O_3; (*c*) siliceous type refractory for high-temp. stoker-fired furnace contg. 89.50 SiO_2 and 8.10% Al_2O_3 and having a refractoriness of 1670° and a porosity of 26.4%. (*d*) Chrome Spinel type of refractory contg. 35–39 MgO, 24–25 Cr_2O_3, 16–17 Al_2O_3, 14 FeO, 5–7% SiO_2, and a refractoriness under load, of 1560–1650° with a porosity of 19–22%. G. T. Motok

Soaking-pit refractories. Everett C. Hite and Gilbert Soler. *Brick & Clay Record* **96**, No. 1, 62–3; No. 2, 60, 62(1940).—A discussion. E. C. Petrie

The fluidity of low-melting mixtures of some oxides of importance in the slagging of refractories. K. Endell and G. Brinkman. *Ber. deut. keram. Ges.* **20**, 493–507(1939); cf. *Ibid.* **19**, 49(1938).—In the systems CaO or MgO–Al_2O_3–SiO_2 and CaO–FeO(Fe_2O_3)–SiO_2, the viscosity increased with increase in SiO_2 and in Al_2O_3. The FeO system was by far the most fluid. At 1500° the viscosity was related to the ratio $CaO/SiO_2 + Al_2O_3$, and the viscosity of basic and acid slags at 1400° was found to be given in terms of this ratio. Mg, Fe and Ti formed exceptions to the rule that with decrease in ion radius the fluidity increases; this was explained by a stiffening effect caused by replacement of Al in the lattice by these ions. On the other hand, they can split up SiO_2 tetrahedra and thereby exert a contrary liquefying effect. P. S. Roller

The application of lead- and boron-free whiteware glazes. W. Funk. *Ber. deut. keram. Ges.* **20**, 484–9 (1939).—A lecture. P. S. Roller

The characteristic nature of the glaze of Japanese earthen wares and porcelains. Eiiti Koizumi. *J. Chem. Soc. Japan* **60**, 1242–6(1939); cf. Koizumi, *C. A.* **33**, 7509[7].—Analyses of porcelain glazes from the Kyushu district are given. T. Katsurai

Chemistry and vitreous enamels. Emerson P. Poste. *Ind. Eng. Chem.* **32**, 9-15(1940).—The sheet iron must contain less than 0.20% C. Six % H_2SO_4 is used for pickling and is discarded when the concn. of solids reaches 6%. Ware is neutralized with a 0.3% hot soln. of Na_2CO_3 or mixts. of Na_2CO_3 and borax. Nickel dip (pH control between 5.5 and 6.0, very essential at a temp. of 150–180°F. for 5 min.) after pickling (3 oz. of $NiSO_4.6H_2O$ plus 0.25 oz. of boric acid per gal.) prevents many enameling troubles. Four % water vapor in the furnace atm. may cause defects. As little as 0.5% acid gas may also produce trouble. A. W. King

Basis of European enamels. Gruenwald's formulas. Helen Hirsch. *Ceram. Ind.* **34**, 60, 62 (February, 1940).—Enamels for iron and steel. Herbert S. Willson

Use of white arsenic in the enameling industry. M. Dechigi. *Arch. Gewerbepath. Gewerbehyg.* **7**, 468–76 (1936); *U. S. Pub. Health Eng. Abstracts* **18**, IHS, 5 (Feb. 19, 1938).—Originally in Italian majolica a mixt. of ZnO and PbO was used for white glazes. In recent years, because of lower cost, oxides of As and Sb have been used. The danger of As poisoning is noted. C. R. F.

Influence of climatic conditions on enamelling. Berthold Deutsch. *Foundry Trade J.* **62**, 12–5(1940).—The processes mainly affected by climatic conditions are pickling, milling, aging, the application of the enamel slip, drying and firing. I. Hartmann

Eliminate tearing, aid enamel set by plant control of mill liquor. T. D. Hartshorn. *Ceram. Ind.* **34**, 50, 62 (February, 1940). Herbert S. Willson

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App. for detg. chem. attack on glasses (Nagaoka) 1. Sprung-arch roofs of high-temp. furnaces (McDowell) 9. Al silicate compns. for use with clay (U. S. pat. 2,182,086) 18.

Thiene, Hermann: Glas. Bd. II. Jena: G. Fischer. 755 pp. M. 50.

Apparatus for bending glass sheets. Ormond H. Paddock (to Libbey-Owens-Ford Glass Co.). U. S. 2,182,448, Dec. 5. Various structural, mech. and operative details.

Lehr for annealing glassware. Francis E. Dorsey (to Hartford-Empire Co.). U. S. 2,182,173, Dec. 5. Various structural and operative details.

Heating and pressing apparatus for manufacture of safety glass with use of a finely divided plasticized resin composition and glass plates. James H. Sherts and Brook J. Dennison (to Pittsburgh Plate Glass Co.). U. S. 2,182,358, Dec. 5. Various structural, mech. and operative details.

Recovery of wastes from glass grinding and polishing.

Rob R. McGregor (to Norbert S. Garbisch). U. S. 2,182,384, Dec. 5. A process of producing relatively pure, substantially Fe-free, mixts. of intimately assocd. and very finely divided silica and glass suitable for use as a combined source of silica and cullet in a glass batch, as a substitute for both ground flint and feldspar in a ceramic body and similar purposes, from waste sand produced in the grinding of the surface of glass plates with sand of glass-batch purity, the waste sand contg. substantial amts. of iron added by the grinding operations and being of a particle size such that at least about 90% of it will pass through a screen of about 325 mesh, comprises treating the sand sludge while fresh from the grinding operation by means of a magnetic separator to take out metallic iron particles, then treating it with a soln. consisting of a strong mineral acid and water, the acid being of a concn. of not substantially greater than 10% and being in an amt. sufficient to take out substantially all of the free Fe and Fe compds. remaining in the wastes, then washing out the dissolved iron and freeing the wastes of excess water.

Apparatus for forming pyrometric cones. Geo. A. Bole and Harry E. Co Van (to Standard Pyrometric Cone Co.). U. S. 2,181,618 and U. S. 2,181,619, Nov. 28. Various structural, mech. and operative details.

Transferring photographic designs to ceramic ware. Walter D. Ford. U. S. 2,181,452, Nov. 28. A method of transferring a relief or intaglio design carried on a substantially flat surface to a curved or irregular surface involves distributing a moldable thermoplastic material such as a wax in a heated fluid state on a substantially flat design-contg. surface of a primary mold, allowing the moldable thermoplastic material to cool and solidify to form a flexible matrix bearing in one surface thereof the design of the primary mold, removing the matrix from the primary mold following such cooling and solidification and placing it on a shaping form which possesses the cross-sectional configuration of a final design-receiving surface, the design-contg. surface of the matrix being arranged in direct contact with the shaping form, producing an intermediate mold from the shaping form with the matrix inlaid in one surface of the intermediate mold and with the design-contg. surface of the matrix exposed to the outside of the intermediate mold, and molding a final pattern mold from the matrix-contg. surface of the intermediate mold. Cf. *C. A.* **33**, 3988[5].

Flexible abrasive sheet. Donald E. Edgar and Harry G. Stauffer (to E. I. du Pont de Nemours & Co.). Can. 386,601, Jan. 30, 1940. The abrasive material is bound to the base sheet by a coating consisting of urea-formaldehyde-alc. resin 30–50 and castor oil modified alkyd resin 35–50 parts. The resin contains aliphatic monohydric alc. in combined form in amt. of about 0.5 mol. of alc./mol. of urea.

Coating sheets such as those of iron or steel with vitreous enamel. Archer L. Matthes. U. S. 2,182,132, Dec. 5. A sheet of metal having a smooth surface on one side and a relatively rougher surface on the other side is coated on both sides with a ground coat of fusible enamel, which is fused, and a second coat of enamel is applied and fused onto the coat adjacent the smooth surface.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Ferrari cement and the actual trend of the industry of hydraulic cements. F. Ferrari. *Atti X° congr. intern. chim.* 4, 216–21(1939)(in Italian).—Ferrari cement, because it contains Al_2O_3 and Fe_2O_3 in related equivalents, possesses high mech. resistance, low heat of hydration, min. coeff. of expansion, high chem. resistance and rapid setting. It answers all the needs for modern construction and, because of its low SiO_2 content, offers distinct manufg. advantages. It should replace portland and special cements in all countries. Henri Marc

Cements with blast-furnace slag base. E. L. Dupuy. *Atti X° congr. intern. chim.* 4, 642–9(1939)(in French).—D. reviews the compn. of blast-furnace slag ($Al_2O_3.5CaO.3.5SiO_2$), discusses the addn. of CaO and of $CaSO_4$ and gives data on the effect of these 2 ingredients. $CaCl_2$ satn. takes place when fixed $CaCl_2$ is 0.92 times the wt. of Al_2O_3, giving $CaCl_2.Al_2O_3.3CaO.nH_2O$; with $Ca(NO_3)_2$, $Ca(NO_3)_2.Al_2O_3.3CaO$ is obtained. All the slag can react completely, giving complex aluminates of 2 types, with either 1 mol. or 3 mols. of Ca salts. Henri Marc

Remarks on lime-pozzuolana mortar. F. Parissi and A. Cereseto. *Atti X° congr. intern. chim.* 4, 670–5(1939)(in Italian).—A study of the effects, on the strength of lime-pozzuolana mortars, of the origin of the pozzuolana and its fineness, of the fineness, chem. compn. and formation of the lime, of the amt. of H_2O used in the mortar and of the ratio of CaO to pozzuolana. Data given show that the greatest strength in the range of proper workability is developed when a ratio of lime to pozzuolana is 1 to 3, and for that mix when the ratio of H_2O to dry mortar is 3 to 10. Henri Marc

Lime-pozzuolana mortars in maritime works. C. Vittori. *Atti X° congr. intern. chim.* 4, 676–86(1939) (in Italian).—Mortar made from lime and natural pozzuolana can be improved in physical properties by grinding the pozzuolana. Even better setting properties and uniformity are obtained when 100 to 200 kg. of cement per cu. m. is added to the pozzuolana-lime mixt. Compression tests on samples of concrete made from this "bastard mortar" show that the resistance to compression is still increasing after 5 years in fresh and in salt H_2O. This mortar should be very suitable for maritime construction. Henri Marc

Mechanical strength of mortars stored in sulfate solutions. G. Baire. *Rev. matériaux construction trav. publics* **1939**, 177–9.—The strength of all mortars continued to increase during 2 yrs. but frequently was less than in pure water. $MgSO_4$ was most harmful, and the more so the greater the content of lime in the cement. The effect of $CaSO_4$ was not always related to the lime content. Gaize and slag cements were little affected. P. S. Roller

Vacuum concrete. Jacob J. Creskoff. *Can. Engr.* **77**, No. 23, 4–8(1939).—This process removes a large part of the excess water from the mix after it has been placed in the forms and simultaneously compacts the concrete. The concrete at the wearing surface is the strongest and toughest. The technique of the process is described. Ann Nicholson Hird

Review of road-tar uses in 1939. G. E. Martin. *Roads and Streets* **83**, No. 1, 63–4, 66(1940); cf. *C. A.* **33**, 9577[4].—M. gives the standard designations of road tars and reviews their uses in skid-resistance surfacing, tar-base stabilization, tar-shoulder maintenance and residence-street pavements. Henri Marc

Stabilized base construction on Mississippi's route 15. An outline of construction problems and their solution. A. B. Covell. *Roads and Streets* **82**, No. 9, 23–9(1939).—A detailed description of the construction of 2 sections of asphalt-stabilized base; particular emphasis is placed on the control of moisture on the windrowed material before rolling. Henri Marc

Method of testing the toxicity of wood preservatives to fungi. *Brit. Eng. Standards Assoc.*, Comm. Rept. **838**, 1–17(1939); *Rev. Applied Mycol.* **18**, 829–30.—Detailed directions are given for testing the toxicity of timber preservatives by the standard block method. In a test cited as an example of the evaluation of results, the toxic limits (toxic points), i. e., the interval between the concn. just permitting decay and that next highest in the series completely inhibiting it, for creosote are given as 4 to 6, 4 to 8, about 12, and about 5 kg. per cu. m. for *C. puteana*, *Poria vaporaria*, *L. lepideus*, and *Polystictus versicolor*,

resp., the corresponding figures for NaF (excluding *P. versicolor*) being 0.5 to 0.7, 0.2 to 0.4, and about 0.1, resp. Tested against *C. puteana*, 0.06 and 0.08% NaF preserved pine sapwood in a sound condition for 4 months at 22° (the former concn. allowing slight superficial growth), at 0.04 incipient decay set in (4.7% loss of dry wt.), while the blocks in the 0.02 and control series were completely rotted (42 and 49.5% loss of wt., resp.). O. E. S.

Determination of fluorine in wood-preservation technique. II. Determination of fluorine in wood. B. Ikert. *Chem.-Ztg.* **63**, 754, 755(1939); cf. *C. A.* **33**, 5624[1].—An approx. detn. of F in wood can be obtained by the usual zirconium-alizarin test but for accurate results the following procedure is recommended: Take 50 g. or less of the wood, cut into pieces of about the size of a match and moisten well with a soln. contg. 6% $Ca(OAc)_2$ and 30% $Cr(OAc)_3$. Keep about 15 min. under a vacuum. Then dry at 120-140° and transfer to a quartz dish whose bottom is covered with a uniform layer of about 2 g. pulverized quartz. Heat the mixt. until the wood is entirely decompd. leaving an ash of black charcoal. Transfer to a small distg. flask, of which the side tube has 2 downward bends and the neck is provided with a ground-glass stopper. Add 25 ml. of water and 15 ml. of concd. H_2SO_4, stopper the flask tightly and heat the contents. Catch the distillate, which contains the F as H_2SiF_6, in a flask contg. 5 ml. of 30% NaOH and sufficient water to seal the exit tube from the condenser. Continue the distn. until finally H_2SO_4 fumes are evolved copiously and the charcoal is all oxidized. The distillate should remain basic. To the distillate add 10 ml. of 30% H_2O_2 and evap. to 30 ml. This oxidizes all H_2SO_3. Cool, make acidic to phenolphthalein with HCl, add 1 ml. of Na silicate soln. contg. about 0.03 g. of silicate and then proceed with the F detn. as described in the previous paper, but increasing the vol. of EtOH from 30 to 40 ml. in pptg. the K_2SiF_6. Good results were obtained in test analyses. The method of Willard and Winter (*C. A.* **27**, 681) was found to be nearly as accurate and appreciably shorter than the gravimetric method. The method is applicable not only to wood but to all F compds.

W. T. H.

Chemical seasoning of overcup oak. W. K. Loughborough. *Southern Lumberman*, Christmas issue, **159**, 137-40(1939).—The mechanism of chem. seasoning of wood as applied to overcup oak is described. Lumber is soaked in a concd. or satd. soln. of a chemical capable of appreciably depressing the vapor pressure of water. Diffusion of the chemical occurs into the outer zone of the wood. Because of the effect of the chemical on the vapor-pressure gradient, the wood upon subsequent drying "dries from the inside out instead of from the outside in." Data are given for the diffusion of NaCl into the green wood and the effect of various subsequent drying schedules on the quality of the product. This seasoning method is shown to decrease seasoning times and greatly to improve the quality of the seasoned product. A. J. S.

Asphalt rock from Dubrovnik [for road-making] (Schwarz) 8. Corrosion of Al in mortar (Tronstad, Veimo) 9.

Rader, L. F.: Mills' Materials of Construction. 5th ed. New York: J. Wiley & Sons. 564 pp. $4.00.

Withey, M. O., and Aston, J.: Johnson's Materials of Construction. 8th ed. New York: J. Wiley & Sons. 867 pp. $6.00. Reviewed in *Mech. Eng.* **62**, 79(1940).

Felted asbestos-cement products. Ernest W. Rembert and Dominic Bertogliat (to Johns-Manville Corp.). U. S. 2,182,353, Dec. 5. App. is described, and a method of manufg. a felted product suitable for use in sheet or pipe form which involves forming a dry mixt. of asbestos fibers and portland cement, adding to the dry mixt. a sufficient quantity of water to form a dil. aq. suspension of asbestos fibers and portland cement contg. 20–50 parts of water to 1 part of asbestos and cement, forming a thin felt from the dil. suspension thus formed within ten min. of the time of addn. of the water to the dry mixt., and compositing the felt upon itself to produce a laminated composite asbestos-cement tube.

Cement mixture suitable for molded products or coatings. André M. Fleuret (to Établissements Rouzaud & Fils). U. S. 2,182,291, Dec. 5. A Th compd. such as Th sulfate is used in mixt. with a magnesia cement, and serves to improve setting and stability.

Lining and coating metal pipes with bituminous material. Oscar G. Goldman. U. S. 2,182,227, Dec. 5. A method of applying protective coatings to metal pipes such as large water pipes comprises rotating a pipe on a horizontal axis while applying heat to bring the temp. of the pipe to about 93–205°, then while the hot pipe is revolving at a speed insufficient to throw off the material applying a thin quick setting coat of hot molten bituminous material to the exterior wall of the pipe, then when sufficiently set speeding up the rotation and applying a thick layer of molten bituminous material to the interior of the pipe for smoothing out by centrifugal action, setting the internal layer by the application thereto of a cooling fluid, slowing down the rotary speed of the pipe and building up the thickness of the external layer of bituminous material by further application of the hot molten material while the pipe is slowly revolving.

Coating pipes such as underground pipe lines. Albert C. Bean and Joseph B. Ray. U. S. 2,181,361, Nov. 28. A method of coating underground metallic pipes involves the steps of applying a coating of portland cement incorporated in boiled linseed oil by the aid of a water-insol. metallic soap of an org. acid directly to the metal of the pipe, permitting the coating to set and then applying thereover a second coating comprising pitch contg. a minor proportion of a fibrous binding.

Cement suitable for lining pipes, etc. Joshua C. Witt. U. S. 2,182,714, Dec. 5. A cement clinker of approx. the compn., SiO_2 15.17, Al_2O_3 8.72, Fe_2O_3 12.73, CaO 61.39 and MgO 1.29%, is used with blast-furnace slag and gypsum.

Paving. Raymond F. Bacon and Isaac Bencowitz (to Texas Gulf Sulphur Co.). U. S. 2,182,837, Dec. 12. A plastic compn. comprising S and asphalt is applied as a surface coating and the exposed surface of the coating thus formed is burned to effect reaction between the S and asphalt in the surface portion of the coating, so that a hardened and nonskid surface is produced.

Cold glazing preparations. Stanley R. Lane. Brit. 507,911, June 20, 1939. A prepn. for application to wall surfaces, etc., consists of a substance contg. or capable of forming a sulfate, e. g., Fe alum, $CaCl_2$, cement or a cement and aggregate mixt. and a waterproofing agent, e. g., a metallic soap, with or without pigment. The mixt. is mixed with H_2O for use.

Sound-absorbent composition suitable for use on walls. John G. Britton. U. S. 2,182,535, Dec. 5. A rigid, flameproof and infusible, sound-absorbent product is formed from 8 parts each of an oxide and chloride of the same metal such as those of Mg, together with comminuted bagasse fiber 5, glue 1.5 and water 20 parts, with voids formed by occluded air constituting about 50% of its volume.

Wood-preserving compositions. Ira Hatfield (to Monsanto Chemical Co.). U. S. 2,182,080, Dec. 5. A non-blooming liquid coating and impregnating compn. for treating wood or other cellulosic materials, to protect them from mold and decay, comprises a chlorinated phenol dissolved in a solvent such as a petroleum fuel oil together with a resinous material (such as rosin 5%) in sufficient concn. to prevent blooming. U. S. 2,182,081 relates to generally similar compns. contg. a rosin ester (such as ester gum 5%) to prevent blooming.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

Suggested nomenclature for fuels, combustion phenomena, and engine fouling in internal-combustion engines. G. D. Boerlage and K. C. A. Bauman. *IIme Congr. mondial pétrole* **4**, Sect. 5, 281–91(1937).—Engine terms commonly used are set up according to subject matter and the equiv. terms in French and German are 2 given in parallel columns. E. J. Mahler

Availability and characteristics of aviation safety fuels. Robert E. Ellis and Wm. J. Sweeney. *Natl. Petroleum News* **32**, R-18–19(1940).—Ten million bbl. per year of aromatic-type aviation fuels with a min. flash point of 100°F. are potentially available. Little is definitely known about the paraffinic type. C. H. Brooks

Fuel injection and pulverization. Plessis. *Bull. assoc.* 3 *franç. techniriens pétrole* No. **50**, 75–82(1939).—General considerations on the problem of injection, types of injectors and their disadvantages are briefly reviewed. E. J. Mahler

High-speed Diesel engine and its fuel. Hirosi Ōigawa. *J. Fuel Soc. Japan* **18**, 1022–1108(1939).—A lecture. F. I. Nakamura

Combustion in the Diesel engine. de Sermoise. *Bull.* 4 *assoc. franç. techniciens pétrole* No. **47**, 117–56(1939).—The results obtained in recent years in the study of the relationship between complete combustion and the utilization of the latent heat of combustion contained in the injected Diesel fuel as dependent upon fuel properties and engine design are reviewed. The subject is considered in 3 sections: the general characteristics of combustion proper, special study of the influence of fuel characteristics, and the effect of the nature of the com- 5 bustion chamber. E. J. Mahler

Can the hydroxylation theory of combustion be applied to modern furnaces? J. R. Darnell. *Refiner Natural Gasoline Mfr.* **19**, 53–4(1940).—Owing to the high temps. in the com. furnace, lab. combustion data are not applicable. From an analysis of published work, the hydroxylation theory does not apply strictly. C. H. Brooks

Fuel economy in a large British metallurgical plant: The Normanby Park (Scunthorpe, Yorkshire). Ch. 6 Berthelot. *Rev. mét.* **36**, 357–72(1939).—A comparatively detailed description of the equipment of the plant is given from the standpoint of a fuel technologist. All possible efforts are directed here toward the greatest possible utilization of the heat value of fuel, by treating the process as a whole instead of trying to reach max. economy in individual stages of the manufg. practice disregarding the rest. The plant is able to produce steel from ore with 7 a total expenditure of 1506 kg. of good bituminous coal per ton of rolled steel. J. D. Gat

By-product fuels in the steel industry. Gordon Fox and W. B. Clemmitt. *Iron Steel Engr.* **16**, No. 11, 44–55 (1939).—Characteristics of coke-oven gas and blast-furnace gas and their application in the melting, refining, and heat-treatment of steel are discussed. The principles of mixed gas application are developed. C. B. Jenni

The use of coke breeze in producers. S. Quarfort. 8 *Gas World* **112**, 63–5(1940).—See *C. A.* **33**, 9592[5]. P. J. Wilson, Jr.

Exhaust smoke control in automotive Diesels. W. W. Manville, G. H. Cloud, A. J. Blackwood and W. J. Sweeney. *Natl. Petroleum News* **32**, R-26–30(1940).—The smoking tendency of a fuel is best correlated with the 50% b. p. It is also closely related to the viscosity and gravity. It is more economical slightly to reduce the power than to use a lighter fuel. C. H. Brooks 9

Smoke-consumption in hand-fired furnaces and the use of soft coal. H. Guillon *Chaleur et ind.* **20**, 544–8 (1939).—Preheating the secondary air is suggested and should be more effective with soft than with hard coals, to obtain complete combustion. H. A. Beatty

Indian coals. IV. K. L. Roy, D. Lahiri and B. C. Guha. *Ind. and News Ed. J. Indian Chem. Soc.* **2**, 145–58 (1939); cf. *C. A.* **33**, 5154[8].—Tables give the proximate compn. and decompn. temps. of 16 Indian coals, and classify them as caking, semicaking and noncaking. Values range as follows: moisture 0.46–4.50, volatile matter 16.81–34.60, fixed C 47.09–70.80, ash 8.11–20.97%, B. t. u. per lb. 10,581–12,755, primary decompn. temps. 330–395°. Other data tabulated for some of these coals include elec. cond. of cokes from coals and from coal-pitch mixts., fractionation of pitches by solvent extraction (Cockram and Wheeler, *C. A.* **21**, 2780), coking characteristics of the pitch fractions and of several blends of caking and noncaking coals, effect of pressure during carbonization upon the resulting coke, swelling indexes and heat cond. of powd. coals during carbonization. Coke from noncaking coals has good elec. cond., that from caking coals poor. Coke-pitch blends carbonized at 900° show improved elec. cond. Quality of coke is improved by suitable blending of caking and noncaking coals, by blending noncaking coals with pitch, and by carbonizing under pressure. Heat transmission is more rapid through noncaking than through caking coals. Noncaking coal failed to produce satisfactory coke when carbonized in the presence of volatile matter from caking coal being heated simultaneously. The swelling and caking properties of several coals were completely destroyed by heating 3 hrs. in air at 200–210°; heating 24 hrs. in O-free coal gas, CO_2, H_2, N_2, H_2S, C_2H_2 and at reduced pressure did not change these properties. G. R. Yohe

Hydrogenation of a Pittsburgh seam coal. Kinetics of hydrogen consumption, oxygen removal and liquefaction. H. H. Storch, C. H. Fisher, Abner Eisner and Loyal Clarke. *Ind. Eng. Chem.* **32**, 346–53(1940); cf. *C. A.* **33**, 7074[8].—Coal from the Bureau of Mines exptl. mine at Bruceton, Penna. was hydrogenated in a 1.2-l. bomb. The H consumption *vs.* time curves are straight lines whose slope shows a temp. coeff. of 1.2 per 10°. The diffusion of H through a liquid film surrounding the catalyst surfaces is the factor controlling the rate of H consumption. This is supported by the low-temp. coeff., the approx. const. rate of consumption with varying time and by the lack of dependence of the H consumption rate on the rate of O removal and rate of liquefaction. A study of the O-elimination rates at various temps. shows that the main reaction is a thermal decompn. of the coal substance that results in a rapid elimination of about 60% of the O. This reaction has a high activation energy. The remaining 40% of the O is slowly eliminated by a contact catalytic process with a lower activation energy. At temps. above 400°, the condensation of the liquefied coal substance to form more stable mols. results in apparent neg. temp. coeff. for the second O-elimination reaction. From a study of the rates of liquefaction of the coal at various temps., at least 4 processes are involved: (1) the soln. or extn. of the coal substance which occurs below 370°, (2) a thermal decompn. of the coal substance above 370°, (3) the production of hydrocarbon gases probably by destructive catalytic hydrogenation of the dissolved coal in the range 370–415° and mainly by thermal decompn. of dissolved coal above 415° and (4) the condensation of dissolved coal substance to form mols. more stable than the original coal. These mols. subsequently lose H largely by CH_4 formation. Above 440°, this process results in coke formation even in the presence of 180 atm. of H. Joseph H. Wells

Coal carbonization. Gas pressures within the uncarbonized part of a charge. D. A. Reynolds and G. W. Birge. *Ind. Eng. Chem.* **32**, 363–7(1940).—The gas pressures which develop within the uncarbonized part of a charge of coal carbonized in cylindrical steel retorts increase irregularly as the plastic coal layer moves to the middle of the retort and reach a max. at the time the innermost coal attains the plastic state. For the coals investigated, max. pressures vary according to the rank of the coal, increasing with decrease in the volatile content. The max. pressure obtainable in carbonization of low-

volatile coals is not greatly modified by the temp. of carbonization, provided the heating rate is rapid enough to ensure a continuous plastic layer. Max. pressures developed on carbonizing medium and low-volatile coals decrease as the temp. of carbonization is increased.
Joseph H. Wells

Report of the association on low-temperature carbonization of coal. H. Weittenhiller. *Glückauf* **75**, 741–50(1939).—The association began, in 1935, to investigate various processes for low-temp. carbonization of Ruhr coals in an attempt to increase the yield of Diesel fuel at a lower cost. Numerous ovens were set up but discarded as too expensive to operate. The Berg process carbonized the coal in trays and produced excellent coke and high yield of tar acid from the tar but too low a content of fuel oil. A new Lurgi oven was built, based on studies in the lab., but is not yet in operation. To produce ideal low-temp. coke it was found necessary partially to destroy the swelling property and reduce the coking tendency by means of controlled thermal treatment of the coal. The coal was heated to about 260° for 2 or 3 hrs. depending upon its characteristics before carbonization.
L. P. Rockenbach

The expansion of coal [during carbonization]. Karl Bunte and Hans Imhof. *Gas- u. Wasserfach* **82**, 805–12 (1939).—*Swelling* (Blähen) of coal is defined as the phenomena observed when a molten coking coal is allowed to expand without restriction, as in a crucible or horizontal retort, while *expansion* (Treiben) refers to the phenomena occurring in a completely filled chamber—pressure is exerted on the walls of the carbonizing chamber. A special apparatus, somewhat similar to the Körten-Damm, (*C. A.* **23**, 1495[1]) was devised to follow *expansion pressure* and swelling. A steel plunger with a cross-sectional area of 10 sq. mm. rested on 5 g. of powdered coal in a steel cylinder surrounded by a copper cylinder to insure uniform temperature. Weights were adjusted on a lever arm to keep the plunger level constant within ±0.025 mm. The heating rate was 3° per minute. Swelling tests were made in the same apparatus, with the piston unloaded and free to move. Tests were made on 14 German coals, grouped as follows: (1) noncoking sintering (agglomerating?) coals; (2) nonexpanding coking coals; (3) expanding, coking coals; and (4) two coals intermediate between (1) and (2). Analyses, swelling curves, expansion pressure curves, Foxwell softening curves, and gasification curves are given for each of the coals. The expansion pressure curve is only slightly influenced by particle size but the swelling is much greater with larger particle size, presumably because of oxidation of the fine coal. All coking coals showed appreciable pressures between about 100° and 400°, the pressure required for constant depth varying from 1.5 to 5 kg. over the whole plunger surface; maximum values were given at around 320 to 350°. A second weaker pressure rise occurred at the moment when the Foxwell softening curve began and extended for about 20°; this is apparently due to gas evolution. A few coals also showed a relatively weak third pressure rise, owing to solidification of the melt. Nonexpanding and expanding coals give similar curves, except that pressures are higher for the latter and nonexpanding coals show only slight pressures above 400°. Swelling is attributed to the coal fraction extractible by pyridine, chloroform, or benzene, and swelling and expansion pressure curves are given for the pyridine and chloroform extract from three coals. When a coal is allowed to swell for ten days in an atmosphere of pyridine, it completely loses its expansion pressure. The addition of inert material reduces the expansion pressure greatly; 15% of powdered coke reduces the expansion pressure to 1/3. The addition of 1% boric acid increased both expansion pressure and swelling, contrary to statements in the literature (*C. A.* **27**, 1735). Preheating in a nitrogen atmosphere up to 400° had no appreciable effect on the expansion pressure, and heating to temperatures above 400° had a much stronger influence on swelling than on expansion pressure. On heating in air, the expansion pressure was strongly reduced at 150°, while heating at 250° was required to reduce swelling appreciably. Whether a coal swells or not during plant-scale carbonization depends in part on how much the coal is compressed prior to carbonization and also on whether the coke shrinks enough to offset the swelling encountered with all coking coals. This test is not intended to distinguish between expanding and nonexpanding coals or to replace the usual test apparatus, but is intended to give a clear picture of the phenomena involved. The expression "expansion" should be used to refer to the final end product of volume increase due to swelling, volume decrease due to packing of coal and volume decrease due to coke shrinkage—any practical expansion test apparatus should give this final value.
R. W. Ryan

Recent anthracite research. D. J. W. Kreulen. *Chem. Weekblad* **36**, 870–81(1939).—Anthracite research on the relation between combustion phenomena and certain phys. and chem. consts., undertaken from 1926 to 1932, is reviewed, and the results of chem. analysis, heat of combustion, sp. gr., etc., of wood, peat, soft coal and anthracite are given in a table. The classification of coal on the basis of its content of volatile substances and caloric value is discussed, as is its activity, which in turn depends on its constitution (Fischer). Oxidation of the humus substances into humic acids ($KMnO_4$ method) is outlined, with a detailed reproduction of the calcns. leading to the conclusion that the combustion heat runs parallel with Q, i. e., the sum of the activation energy of the reaction anthracite + O_2 → intermediate stage and the activation energy of the reaction intermediate stage + O_2 → humic acids. This explains the success of American and British anthracite classifications on the basis of combustion heat.
A. H. Krappe

Coal metamorphism in the Anthracite and Crested Butte quadrangles, Colorado. E. C. Dapples. *Econ. Geol.* **35**, 109(1940); cf. *C. A.* **33**, 6023[6].—A correction. M. F.

The assessment of coals liable to damage oven walls. R. A. Mott and C. E. Spooner. *Fuel* **18**, 329–44, 371–9 (1939).—Recent investigations are reviewed. According to M. and S. the shrinkage of coke varies in proportion to the volatile content of the coal; shrinkage is therefore a greater factor in the development of unsafe pressures during carbonization than is the swelling of the plastic coal. They disagree with Auvil, *et al.* (*C. A.* **33**, 9598[3]) who hold that cokes from coals of different rank shrink approx. equally and therefore that the magnitude of swelling depends largely upon the swelling of the plastic coal. The Sheffield lab. coking test (*C. A.* **31**, 2787[7]) and the Koppers small-scale swelling test were used to measure the swelling of 40 coals. The latter test was modified to increase: (1) the heating rate at the bottom of the charge from 6.7 to 33.0° per min., (2) the max. temp. at the bottom from 600 to 940° and at the top from 400 to 750°. As this rapid heating caused excessive swelling of very fluid coals unless fine sizes were excluded, only the 10–20-mesh size was tested. The bulk d. of the 80-g. charges was 750 kg. per cu. m. (46.8 lb. per cu. ft.); pressures of 0.5 and 1.16 kg. per sq. cm. were maintained. Three of the coals were known to swell dangerously in com. ovens. Nine were also tested by the Nedilmann app. (*C. A.* **25**, 1656), 11 by the Baum-Heuser test (*C. A.* **25**, 2833), and 5 by the Koppers large-scale test (*C. A.* **25**, 5752). Results for the Bureau of Mines sole-heated and slot oven test methods were available for 4 coals. The use of fine sizes of coal gives incorrect results with the Nedilmann test but not with the Baum-Heuser. Conclusions: (1) Small-scale lab. tests afford a satisfactory measure of the liability of coals to damage oven walls. (2) In all tests the app. and procedure must be standardized. (3) A min. temp. of 900° must be reached. (4) Unsafe coals can be assessed either by detg. the swelling pressure or the percentage swelling. The latter should be supplemented by the percentage contraction. The modified Koppers test permits the detn. of contraction under standard load and is therefore the most serviceable. (5) In lab. tests contraction of the coke is more significant than swelling of the coal. (6) Tests of each coal should be made with charge d. of 700, 750 and 800 kg. per cu. m. and the 3 contractions should fall on a straight line of

specified slope. (7) Coals of 25% volatile content (Parr basis) are unlikely to be unsafe at a charge d. of 750 kg. cu. m. (46.8 lb. per cu. ft.) calcd. to dry coal. For higher bulk d. the limiting volatile matter at which coal ceases to be unsafe is higher. (8) Dangerous coals which cannot be coked alone have 17.0 to 25.5% volatile matter and a calorific value above 15,750 B. t. u. per lb. D. A. R.

Practical results in the choice of coal and coal mixtures for improving high-temperature coke. F. L. Kühlwein and C. Abramski. *Glückauf* 75, 865–74, 881–90(1939).—A very thorough review of the improvements in the high-temp. coking of coal in Germany. Modern practice is selective washing, then mixing instead of the old method of first mixing coals and then cleaning them. Blending substances employed to reduce the volatile content of high-volatile coals and improve the coke strength are: (1) low-volatile coals from other fields, (2) storage coal whose coking properties have been reduced by oxidation, (3) thermally treated or preoxidized coal, (4) noncoking gas coal, (5) durain, (6) fusain, (7) coke breeze. Expts. have shown that low-volatile coals ground to 2-mm. fineness produce the strongest cokes. Larger-size particles reduce the coke strength in the tumbler tests. The addn. of 5% coal dust to 65% high-volatile coal and 30% low-volatile coal produces a coke of 83% hardness (tumbler test) as compared to 71% for a coke made from high-volatile coal alone. L. P. Rockenbach

Recovery of sulfur in coal-carbonization plants and petroleum refineries. Ch. Berthelot. *Génie civil* 116, 6–7(1940); cf. *C. A.* 33, 8188.—Current methods of obtaining S from gas from cracking plants and coke ovens are described, particularly the Shell and Kopper processes and that used at Renory. Germany might obtain 1/4 of her normal S requirements in that way. A. N. H.

Fusibility of coal ash. IX. Fluxing effects of lime, silica and some basic constituents upon coal ash. Y. Kosaka and H. Toda. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 332–4(1939); cf. *C. A.* 31, 6850³.—CaO, added to coal ash, rapidly lowers the softening point of the ash when present in amts. up to 10–12%; further addn. of CaO has little or no effect. Increase of the SiO_2/Al_2O_3 ratio above 2.5 (for definite CaO contents) has little effect on the softening point. In order to flux a refractive Japanese coal ash, it is desirable to build the compn. of the ash to a ratio such as $SiO_2:Al_2O_3:CaO = 42:20:38$ (which represents one of the eutectic mixts.), by adding CaO and (or) SiO_2. $CaSO_4$ as a flux is only approx. as efficient as its equiv. in CaO. MgO is a more effective flux than CaO, while alkalies, calcd. upon the basis of K_2O or Na_2O, have an extremely high fluxing power, the effect being large for the first 5% present. However, alkalies are not recommended on account of their corrosive action upon the furnace brick. **X. Relation between the chemical composition and the fusibility of coal ashes.** *Ibid.* 334–6.—By use of the equation $S = S_0 - nb$, where S = softening point of the ash, S_0 = fusion temp. of a pure SiO_2–Al_2O_3 system (Bowen and Greig, *C. A.* 18, 2587) of the same ratio as in the ash, n = fluxing index of the ash, and b = percentage of CaO, MgO, Fe_2O_3, and alkalies (the percentage of Fe_2O_3 should be low), the softening point of Japanese coal ashes can be calcd. usually within ±50°. The value of n decreases with increase in b; for each value of SiO_2/Al_2O_3 n can be plotted against b, giving a smooth curve except when a considerable amt. of Fe_2O_3 is present. The value of b increases with increase in the SiO_2/Al_2O_3 ratio. George Ayers

Reconnaissance at Alloa gas works. Athol W. Brown. *Gas J.* 229, 247–8(1940).—The *electro-detarrer* installed on the plant is designed for tar-fog removal from a max. of two million cu. ft. of gas per day. The av. of the tests during a month's operation showed 0.4 grain of tar per 100 cu. ft. in the outlet gas, equiv. to a removal efficiency of 99.7%. The *org. S* in the gas is reduced from 8.3 grains per 100 cu. ft. down to 4.07 grains by scrubbing with 4 gal. of wash oil per 1000 cu. ft. of gas. P. J. Wilson, Jr.

Fuel gas. Vehicles for compressed gas. P. Larivière. *Chaleur et ind.* 20, 541–2(1939); cf. *C. A.* 33, 8958⁸.—Vehicular gas holders are described. H. A. Beatty

Substituting butane and propane for manufactured gas. A. C. Rathkey. *Gas Age* 85, No. 3, 22–4(1940).—The successful changeover from small gas plants to the use of compressed butane or propane is outlined. Such plants cost $10,000 to $25,000, may operate without reserve equipment, effect savings of 5% to 30% in gas production costs, diminish meter and regulator troubles, decrease naphthalene and tar stoppages, and eliminate pilot difficulties. The liquid is stenched with EtSH at the refinery. The changeover costs about $5 per customer. Leaks with the new gas are harder to locate than when carburetted water gas is used. Relative merits of C_4H_{10} and C_3H_8, of gas mixts. whose B. t. u. values vary from about 900 to 500, of dew points and seasonal variations in gas compn., etc., are discussed. W. C. Ebaugh

Effects of cyanogen on manufactured gas. E. J. Murphy. *Gas Age* 84, No. 11, 23–7(1939); *Am. Gas J.* 151, No. 6, 9–13, 41(1940).—Prussian blue is an end product of corrosion of Fe by HCN. A ferrous condition and H_2O are required before HCN is fixed. Stoppages of Cu needle valves are caused by a corrosion product composed of Cu, mercaptans and HCN. Fe produced similar results but slower. Al gave no deposits. Various forms of org. S were bubbled with HCN through Cu tubing and the following relative reaction rates obtained: Et mercaptan 100, diethyl sulfide 40, phenyl mercaptan 11.1, diphenyl sulfide 4.7 and CS_2 3.9. In all cases, the reaction product gave a pos. reaction with Griess reagent. Liquid purification systems remove more than 90% of the cyanogen and the remainder is removed by dry purifiers as catch boxes. Dry purification systems can be made to absorb cyanogen by controlling the moisture, O and alky. of the boxes. Two grains of HCN per 100 cu. ft. may be present in the gas provided there are no mercaptans present but in the presence of mercaptans gas with 0.4 grain of HCN is sufficient to create corrosion stoppages on brass needle valves. A modified isopurpuric acid method for detg. HCN in gas is described. J. H. W.

Improvement in the calorific value of town gas or coke-oven gas with reference to utilization as a fuel for motor vehicles. J. Ivon Graham and D. G. Skinner. *J. Inst. Fuel* 13, 39–43(1939); *Gas World* 112, No. 2896 Coking Sect., 13–19; *Gas. J.* 229, 39–41(1940).—By use of active charcoal the hydrocarbons in town gas were increased from about 20% by vol. up to 44.5%, expressed as CH_4. The CO was also concd. from 16 up to 27%. Since increase in the CO limited the concn. of hydrocarbons which could be attained, the catalytic conversion of CO to CH_4 in accordance with the equation, $CO + 3H_2 = CH_4 + 2H_2O$, was studied. Ni supported on charcoal made from sugar with the addn. of 1% Ce nitrate as promoter proved to be the most efficient catalyst tested. Gas contg. 17% CO and 20% CH_4 was passed at the rate of 6.6 l. per hr. through 1.5 cm. diam. tubes contg. 20 g. of catalyst (6 g. Ni). After 20 days continuous operation CO in the gas from the tubes was 1.6% and the CH_4 was 63%. Road tests of the product as fuel in a 12 h. p., 4-cylinder, Austin truck showed a consumption of 13.2 cu. ft. per mile. The waste gases contained practically no CO. Enrichment of town gas for use in motor vehicles will not easily show a saving unless consideration is taken of the increased mileage to be obtained for a given storage cylinder wt. By mixing blue water gas with town gas in the proportion of 1:5 the cost of the fuel should be much reduced. P. J. Wilson, Jr.

Locating (natural gas) pipe-line leaks with odorant. L. Millis. *Gas* 16, No. 2, 30–1(1940).—A by-pass odor was used to introduce Pentalarm odorant into the natural gas system at the rate of 15 lb. per million cu. ft. This permitted the pipe-line walker to identify leaks along the line without using bar holes or uncovering an excessive amt. of pipe. Recently, good results have been secured with half this amt. of odorant. The odor diminishes on long lines so that more than one odorizer may be required. R. W. Ryan

Thermal alkylation and neohexane. I. G. Oberfell

and F. E. Frey. *Oil Gas J.* **38**, No. 28, 50, 51; No. 29, 70, 73, 74, 76(1939).—See *C. A.* **34**, 1151[9]. W. A. W.

Investigation of the procedure in the distillation of benzene. C. Koeppel. *Glückauf* **75**, 465–74(1939).—The customary dephlegmator used in recovering benzene from wash oil has been replaced by a simple arrangement of 2 stills connected by means of a reflux pump. Curves showing the influence of oil temp. and quantity and quality of the steam used on the benzene content of the distillate are given. Dry superheated steam at 330° and 8 atm. is superior to satd. steam. Lab. studies with vacuum distn. of wash oil show that above 190° considerable cracking of the wash oil results with the formation of lower-boiling hydrocarbons. Strong preheating of the wash oil increases the H_2S content in the crude benzene with a resp. decrease in the wash oil. L. P. Rockenbach

Blaw-Knox cleaner installation at Rutland, Vt. S. F. McCallister. *Gas Age* **84**, No. 11, 21–2, 34, 36(1939).—The Blaw-Knox cleaner is a liquid scrubber in which the gas is washed with oil. It is a satisfactory device for the removal of tar fog, oil vapors, excess H_2O and $C_{10}H_8$. It is believed that it will remove practically all of the liquid-phase gum formers. Joseph H. Wells

Burnt oxide for hydrogen sulfide removal. G. E. Thompson. *Gas J.* **229**, 190(1940).—Burnt oxide from a H_2SO_4 plant was used for removal of H_2S from town gas with reasonably satisfactory results. The gas was passed through oxide equiv. to a column about 18 ft. high at the rate of 17,000 cu. ft. per day per sq. ft. of initial surface, and gave a clean test from the final box. The oxide was worked to 40 to 50% S before returning to the acid plant. Analyses of oxide before and after fouling are given. P. J. Wilson, Jr.

Determination of naphthalene in (bituminous) gas oil. N. F. Alekseev. *Zavodskaya Lab.* **8**, 1073–8(1939).—The detn. of naphthalene in the oil from bituminous coal as picrate gives good results. Difficulties arise when the oil contains constituents which form nonvolatile picrates. The volatile unsatd. compds. and the homologs of $C_{10}H_8$ can be removed by polymerizing with H_3PO_4 or by oxidizing with $KMnO_4$, since the volatile compds. are oxidized in the cold and the $C_{10}H_8$ is oxidized when heated. The accurate addn. of the $KMnO_4$ is difficult. Hence, 3–5 detns. are made with $KMnO_4$ addns. varying from 3 to 10 ml. The results are plotted showing no. of cc. $KMnO_4$ *vs.* percentage of $C_{10}H_8$. The curve has a distinct break at a point which corresponds to the actual $C_{10}H_8$. The sample is treated with various adsorbents to remove the volatile compds. after which the $C_{10}H_8$ can be detd. as a picrate. Best adsorbents were found to be alumina and sugar. B. Z. Kamich

Solvent action of liquid propane on the pentane-soluble fraction of a high-temperature bituminous coal tar. C. S. Kuhn, Jr. *Ind. Eng. Chem., Anal. Ed.* **12**, 86–9(1940).—The liquid phases formed by the action of liquid C_4H_{10} on the C_5H_{12}-sol. fraction of a high-temp. bituminous coal tar were studied. The ext. increases in d., n and mol. wt. and decreases in H/C ratio as the ratio of C_4H_{10} to tar is increased. The sepn. is largely on the basis of mol. wt. In general there is a tendency for O, N and S compds. to concentrate in the residue. Henri Marc

Tar carpets. G. H. Fuidge. *Gas J.* **229**, 187–9(1940).—The tar carpets that have been manufd. and laid commercially can be divided into types, designated as open carpets, coarse- and medium-texture carpets, fine-texture carpets, and hot-process carpets, resp. Compns. and characteristics of the types are given. Methods for control of tar-carpet manuf. are described. P. J. W., Jr.

Materials for the production of exhaust pipes for gases from coke ovens. V. P. Ivanov and B. M. Idel'chik. *Korroziya* **4**, No. 3, 241–7(1938); *Khim. Referat. Zhur.* **2**, No. 4, 142(1939).—The stability in coke gas of the following alloys was investigated: "commercial" latten, Ni latten, bronze "bazhm," 5 and 10% Al bronze, various steels, sheet Al and rolled Pb. Exposure to coke gas, purified from the tar, for 720 hrs. at 50–160°, caused all samples to be covered with films, but their loss of wt. was insignificant. Latten was found to be the most suitable material. W. R. Henn

The coke "content" and volatile matter in solid combustibles. Henri Cassan. *Chaleur et ind.* **20**, 526(1939).—Radmacher's use (*C. A.* **33**, 6019[8]) of the term, "content," is criticized. H. A. Beatty

Corrosion survey—a field study of the corrosion resulting from the combustion of fuel gases. John H. Bosbyshell and Jesse S. Yeaw. *Am. Gas J.* **151**, No. 6, 28–33(1939).—A survey has been conducted in several territories to evaluate the relative effects of the fuel gases distributed in those territories. The combustion chambers and flue conduits on domestic equipment, particularly Electrolux refrigerators, house-heating units, and water heaters, were inspected, and the effects of corrosion were evaluated by means of a prearranged corrosion scale. The results indicated that condensation of the products of combustion of gas contg. S resulted in corrosion of the combustion chambers and flue pipes. S must be reduced considerably below 2 grains per 100 cu. ft. to eliminate corrosion problems. Other constituents of the gas did not appear to be significant with respect to corrosion. The problem of a proper material for either flue pipes or chimney linings, except where the chimney was correctly tile-lined when constructed, has not been solved. P. J. Wilson, Jr.

Corrosion at coke plants. Hans Bockshammer. *Glückauf* **75**, 786–7(1939).—A deposit of tar on the walls of the pipe is usually sufficient protection against corrosion. Recent use of Zn has replaced Pb in plating iron in the ammonia plants. Hard rubber is also used effectively for coating iron wherever H_2SO_4 is present. L. P. R.

Complex process for treating Fe ore contg. P and phosphorite [gases from process can be used for fuel] (Malets) 9. Flue-gas explosions (Matthews) **24**. Causes of tar-distn. explosion (Riehm) **24**. Device for removing paraffin from gas wells (U. S. pat. 2,182,931) 22.

Eavenson, Howard N.: Coal through the Ages. 2nd ed. New York: American Institute of Mining and Metallurgical Engineers. 123 pp.

Fuel. Hubert Williams and Norman Frederick Bette-Bennett. Brit 508,000, June 26, 1939. Coal, coke breeze or anthracite is pulverized to a fine powder, oil and then H_2O and NaCl are mixed therewith and shellac or asphalt in a liquid or powder form is sprayed on the mixt. which is then thoroughly mixed and compressed to form logs or blocks. In Brit. 508,053, June 26, 1939, the blocks, etc., are wrapped in a covering of waxed paper, glacé paper, etc.

Motor fuel. Ernest M. Marks (to Atlantic Refining Co.). U. S. 2,181,143, Nov. 28. A method of increasing the antidetonation characteristics of gasoline comprises adding to the gasoline an oxidation product of triisobutylene boiling within the boiling range of gasoline and resulting from the oxidation of triisobutylene under conditions such that the ratio of O to triisobutylene is at least mol for mol.

Retort suitable for destructive distillation of wood, coal, etc. Frederick Pope (to American Cyanamid Co.). U. S. 2,182,750, Dec. 5. Various structural and operative details.

Apparatus for carbonizing fuel briquets, etc. Eric C. Mengel (to Humphreys & Glasgow Ltd.). U. S. 2,181,789, Nov. 28. Various structural and operative details of app. for carbonizing by a circulated heated gas.

Apparatus for producing fuel gas by vaporizing volatile hydrocarbons. W. M. Venable (to Blaw-Knox Co.). U. S. 2,182,684, Dec. 5. There are used together: a container with its outer surface in heat-exchange contact with the earth, a reservoir for liquid within the container, a connection between the reservoir and container permitting the passage of liquid from the reservoir but preventing its return, a gas outlet, and an elec. heater within the reservoir adapted to establish a higher temp. and conse-

quent higher gas pressure within the reservoir than in the container.

Use of iron oxide in gas purification. Claude W. Jordan (to United Gas Improvement Co.). U. S. 2,181,433, Nov. 28. Fe oxide which has become dehydrated in a dry purification as a result of passing dry manufd. gas through it is brought into contact with water in the presence of an org. wetting agent such as a "Gardinol," "Avirol" or "Igepon A."

Apparatus for operating coke-oven doors. Paul H. Lavely (to Koppers Co.). U. S. 2,182,494, Dec. 5. Various structural, mech. and operative details.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

Annual Reviews of Petroleum Technology, Vol. 4, covering 1938. F. H. Garner, General Editor. Published by Inst. of Petroleum (1939). Price 11s. 0d. 478 pp.—A series of reviews, as follows: **Petroleum geology.** A. I. Levorsen. **Regional geology and development in the U. S.** W. A. Ver Wiebe. **Regional geology—all countries other than the U. S. A.** G. D. Hobson. **Geophysics.** H. Shaw. **Drilling.** H. W. Hole. **Production engineering.** G. H. Scott. **Production.** L. W. Storms, Jr., and T. A. Huber. **Transportation and storage.** A. C. Hartley. **Refinery plant and engineering.** W. J. Sweeney and E. D. Reeves. **Cracking.** P. C. Keith, Jr., C. W. Nofsinger and J. V. Hightower. **Pyrolysis and polymerization.** D. A. Howes. **Natural gas, natural gasoline and liquefied petroleum gases.** Thelma Hoffman. **Gasoline, white spirit and kerosene (light distillates).** G. R. Nixon. **Diesel and gas oils.** R. Stansfield. **Fuel oils.** I. Lubbock and P. H. Herring. **Automobile engines.** M. Platt. **Aero engines.** H. S. Glyde. **Oil engines.** L. J. Le Mesurier. **Lubricants and lubrication.** J. L. Taylor. **Special products.** W. E. J. Broom and T. C. G. Thorpe. **Asphaltic bitumen and road materials.** W. W. Goulston. **Analysis and testing.** A. R. Stark. **Chemistry and physics of petroleum hydrocarbons.** F. B. Thole. **Motor benzene.** G. Claxton. **Fuels produced by hydrogenation and synthetic processes.** C. M. Cawley and L. A. Woodward. **Alternative fuels. Low- and medium-temperature carbonization.** D. MacDougall and H. Bardgett. **Petroleum literature.** Winifred S. E. Clarke. **Petroleum statistics.** S. J. Astbury. D. F. Brown

Chemistry of petroleum of Murinsel (Drave-Banat). S. Jenčič. *Rudarski Zbornik* [2], **1**, 12 27(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1938**, 728.—The crude oil from Selnica is a light (d. 0.851) paraffin-naphthene-aromatic oil with predominant paraffin-naphthene characteristics: fractionation gives (by vol.): below 200° 24%, 200-300° 39.5%, 300-360° 23.5%, paraffin 4.8%, hard asphalt 0.03%, petroleum resin 3.5%. That from Peklenica is a heavy (d. 0.927) naphthene-aromatic oil giving (by vol.): below 200° 0.5%, 200-300° 23%, 300-360° 15%, paraffin 1.6%, hard asphalt 0.3%, petroleum resin about 14%. 6 C. A. Silberrad

Goldsmith field, Ector County, Texas. Addison Young, Max David and E. A. Wahlstrom. *Bull. Am. Assoc. Petroleum Geol.* **23**, 1525-52(1939).—The oil and gas reservoir is a porous zone. Porosity has been developed by subaerial erosion and soln. Oil, gas and water analyses are given. Alden H. Emery

The use of density-increasing substances and of reagents in the preparation of drilling mud. E. A. Yaichnikova. *Azerbaĭdzhanskoe Neftyanoe Khoz.* **1938**, No. 10, 30-3; *Khim. Referat. Zhur.* 2, No. 4, 116(1939).—To replace $BaSO_4$ for increasing the d. of drilling muds the residues of H_2SO_4 production of the Baku and the Konstantinov plants and hematite from Krivoĭ Rog were used. Pos. results were obtained in both cases. The residues, having a sp. gr. of 3.83, increased the d. of the muds only to 1.8. A large amt. of the reagents and of water was needed which increased the vol. of the mud by almost 100%. An increase of the d. of the muds with hematite was most effective. The results obtained must be verified under production conditions. W. R. Henn

Crude oil found in Romny and other petroleum-bearing districts of the Russian Ukraine. A. G. Shlikhter. *Trudy Neftyanoĭ Konf. Kiev, 1938, Akad. Nauk U. S. S. R. (Inst. Geol. Nauk)* **1939**, 7-12.—Crude oil was found at a depth of 256.79-276.12, 328.05-348.15 and 367.0-378.0 m. The third layer was the richest in oil, which contained gasoline 2, kerosene 28, oils 60 and residue 10%. A. A. Boehtlingk

New way of determining the porosity of oil-bearing strata. E. J. A. Cosijn. *Bohrtech.-Ztg.* **56**, 1-3(1938); *Neues Jahrb. Mineral. Geol.*, Ref. II, **1938**, 709-10.—The new "gas-expansion" method is described in which the porosity is detd. by deducting the volume of solid matter in a known vol. of the material as detd. in a pressure chamber. C. A. Silberrad

Equipment inspection for greater refinery safety. P. N. Gammelgard. *Refiner Natural Gasoline Mfr.* **19**, 8-15 (1940).—The several causes of equipment failures of properly operated units are discussed, with specific examples. Proper inspection technique and inspection records, both of which are outlined, will do much to prevent such failures. C. H. Brooks

Seals for air-tight connections in oil refineries. J. Colson. *Bull. assoc. franç. techniciens pétrole* No. **47**, 88-105(1939).—The advantages and disadvantages of synthetic rubbers of the chloroprene and butadiene type in making air-tight seals in refinery connections are discussed as well as the merits of vinyl and amyl resins, cellulose ethers, and phenolic and aminated resins. E. J. M.

Field lining of refinery vessels with stainless steel sheets or strips. K. E. Luger. *Refiner Natural Gasoline Mfr.* **19**, 41-6(1940).—A thorough discussion of the technique of installing thin stainless steel, as linings, in the field. C. H. Brooks

Electrical engineering and the petroleum refiner. G. R. Weeks, H. W. Giesecke and C. M. Lathrop. *Elec. Eng.* **59**, Tr. 106-10(1940).—Oil-refinery design and operation have been affected by recent developments in elec. engineering. The subject is discussed under the following topics: safety precautions, steam and compressed air, motor control, instruments, welding and lighting. C. G. F.

Significance of viscosity in the use of petroleum oils. W. L. Nelson. *Oil Gas J.* **38**, No. 28, 46(1939).—A review concerning viscosity effects in the automotive engine, such as pumpability, power consumption and wear. W. Andrew Wright

Alkylation and its influence on the unitization of natural gasoline. Earle W. Gard, A. L. Blount and Karl Korpi. *Oil Gas J.* **38**, No. 31, 42, 43, 51, 65, 67; No. 32, 46-8; *Refiner Natural Gasoline Mfr.* **18**, 525-32(1939).—Graphical data on the effects of temp. and isobutane concn. on yields with the H_2SO_4 process for alkylation to natural gasoline. Typical fractionation data for the product and flowsheets are given. W. Andrew Wright

Catalytic cracking. Arch L. Foster. *Refiner Natural Gasoline Mfr.* **18**, 412-18(1939).—A lengthy discussion of the present state of the art. C. H. Brooks

Vapor-phase purification of cracked gasoline with clay. P. T. Sverbil. *Rabochiĭ Neftyanik* **1938**, No. 6, 15-18; *Khim. Referat. Zhur.* 2, No. 4, 117(1939).—Expts. performed in the Odessa cracking plant showed that the vapor-phase purification of cracked gasolines with Zikeev clay according to the method of Gray was much more profitable than the purification with H_2SO_4. Losses of gasoline were reduced and the technology of the method was much simpler. Instead of alkali for washing the gasoline (to improve the Cu strip test) the Odessa plant successfully used sea water. More stable gasolines for storing were obtained. W. R. Henn

Chemical composition of synthetic gasolines. A. N. Sachanen. *Refiner Natural Gasoline Mfr.* **18**, 521–4 (1939).—The available methods of chem. analysis of gasolines are discussed. Data on the content of aromatic compds., unsatd. compds., naphthenes and paraffins in 19 synthetic gasolines are presented. 13 references. C. H. Brooks 1

Surge-voltage breakdown characteristics for electrical gaps in oil. Royal W. Sorensen. *Elec. Eng.* **59**, Tr. 78–84 (1940).—Surge breakdown voltage readings were made for different gap spacings with 0.25, 0.5 and 1.0 in. round rod electrodes immersed in transformer oil. The values are a function of "time to breakdown." Details are given of a special type of test barrel used, requiring a relatively small sample of oil. The lead-in bushings are made of insulation material having about the same dielec. const. as the oil to be tested. C. G. F. 2

Fuel-oil combustion diagrams. Brunet. *Bull. assoc. franç. techniciens pétrole* No. 50, 37–71(1939).—Fuel-oil combustion diagrams based on the fuel diagrams of Grebel and the combustion diagrams of Ostwald were detd. for the following cases of combustion: complete neutral combustion, complete oxidizing combustion, incomplete combustion without excess air, combustion with a const. excess or deficiency of air, combustion with const. percentage of CO, incomplete combustion in a reducing atm. of CO alone, and, incomplete combustion in a reducing atm. of CO and H_2. E. J. M. 3

Evolution of selective solvent extraction process. Rene Navarre. *Bull. assoc. franç. techniciens pétrole* No. 46, 19–55(1938).—See *C. A.* **33**, 3648. E. J. M. 4

Catalytic dehydrogenation process (gaseous paraffins to olefins). A. V. Grosse, V. N. Ipatieff, Gustav Egloff and J. C. Morrell. *Oil Gas J.* **38**, No. 28, 53, 55(1939).—The production of isoöctane from *n*-butane by catalytic cracking followed by polymerization and hydrogenation is discussed. Operating data and flowsheets are given. W. Andrew Wright 5

New method of examining lubricating oils. P. Lecomte du Noüy. *Compt. rend.* **210**, 101–2(1939).—A H_2O surface is touched with a glass rod smeared with the oil to be examd. and the consequent fall in surface tension (S. T.)—usually 6–12 dynes—noted. It remains practically const. The oily surface is then touched with another rod similarly carrying a trace of oleic acid. This causes a much larger (15–20 dynes) fall in S. T., which, however, slowly disappears in 2–3 hrs., to an extent depending on the nature and quality of the oil. With an oil such as paraffin oil contg. no polar groups (a poor lubricator) the recovery is only 3–5 dynes, but with a good lubricating motor oil it amounts to 15–20 dynes. If tallow is used in place of oleic acid the recovery takes 11–12 hrs. The effect is probably due to adsorption of the polar mols. of oleic acid by the oil. If the motor oil be filtered through 4 sheets of filter paper the recovery is reduced to 3–4 dynes like the paraffin oil (cf. *C. A.* **30**, 6544[6]), which the oil then resembles in other respects. C. A. Silberrad 6

Some remarks regarding the testing of engine lubricants. C. A. Bouman. *J. Inst. Petroleum* **25**, 771–8(1939).—Oxidation tests do not represent the various processes of deterioration taking place in the engine. Deterioration of engine oil is often a matter of contamination with combustion products. C tests are only of value with regard to C formation in the combuston space but not with regard to C formation in piston-ring grooves or to the tendency to stick rings. Engine tests are necessary but a large no. of tests are required to reach a conclusion. The test conditions must be chosen so as to give a good correlation with those conditions in practice for which an oil is intended. Joseph H. Wells 7

Extreme-pressure lubricant tests with pretreated test-pieces. J. P. Baxter, C. I. Snow and I. T. Pierce. *J. Inst. Petroleum* **25**, 761–70(1939).—Expts. with the Timken and Four-Ball lubricant testing machines are described in which considerable increases in the breakdown loads of doped and undoped oils were obtained by pretreatment of the test pieces with chlorinated or sulfurized dope or with HCl. Running-in tests showed that the layer so formed was not removed by running under loads below the breakdown load. The pretreatment of the Cornell test pieces had no apparent effect, but when these were hardened to a value comparable with that of the other machines, the breakdown loads become too high for the machine to measure. Joseph H. Wells 8

Electrophysical properties of transformer oils at low temperatures. A. A. Vorob'ev and N. A. Prikhod'ko. *J. Tech. Phys.* (U. S. S. R.) **9**, 1369–76(1939).—The sp. gr. of several transformer oils is a linear function of temp. Their viscosity below −20° is mainly structure viscosity. Below −20° elec. field of 4 kv./cm. increases the η. On cooling from room temp. the breakdown voltage sharply rises at 0° owing to sepn. of ice; it gradually rises again below −25°. J. J. Bikerman 9

An analytical method used in the study of the composition of asphalts and cracked fuels. E. S. Hillman and B. Barnett. *Refiner Natural Gasoline Mfr.* **18**, 533–8(1939).—From 10 to 20 g. of sample is dild. 40-fold with isopentane. The insol. material is successively extd. in a Soxhlet with iso-C_6H_{12}, C_6H_{14}, mixts. of C_6H_{14}-CCl_4, pure CCl_4, C_6H_6, CS_2 and pyridine. Mixts. of C_6H_{14}-CCl_4 are necessary to remove dispersing agents from the more refractory materials. Reproducibility is within ±5%. The proportions of cracked and straight-run fuels in a blend can be calcd. within ±6%. C. H. Brooks 10

Asphaltic rocks and the Italian production of liquid fuels. E. Salerni. *Chim. ind. agr. biol.* **15**, 588–97(1939).—The asphaltic or bituminous rocks obtained from deposits occurring in Abruzzi and in Sicily show the following characters, resp.: d_{15} 0.959–0.980, 0.835–0.940; bitumen 2.8–9.2, 6.5–8.0%; oil yield 60–74, 74–75%. The industrial methods and the plants for extn. of the oil, the products of the fractional distn., and the yields and costs are illustrated. G. A. Bravo 11

Naval stores in the Dutch East Indies. Development of a new industry. T. Hedley Barry. *Ind. Chemist* **15**, 409–10, 423(1939). E. H. 12

New solvents from waste products [of wood distillation]. A. N. Revazov. *Lesokhim. Prom.* **1938**, No. 5, 33–4; *Khim. Referat. Zhur.* **2**, No. 4, 131–2(1939).—The waste products of the rectification of crude CH_3OH are dild. with water (1:1) and rectified. The fraction boiling up to 86° (40–50% of the charge) is treated with alkali and rectified. The solvent "M" boils between 76 and 77° and its yield is 20–30% of the initial crude material. It is clear, colorless, sp. gr. 0.841, soly. in water 58% for 1:1 and 85% for 1:4, content of ketones (calcd. to acetone) 41.7%, acidity 0.019% (calcd. to HCOOH) and 95% of the solvent boils at 69–81°. Solvent "M" can also be obtained from the floating alc. oils. W. R. Henn 13

Extraction of methyl alcohol from the products of gasification of wood material. V. I. Kropotov. *Lesokhim. Prom.* **1938**, No. 5, 32–3; *Khim. Referat. Zhur.* **2**, No. 4, 131(1939).—When AcOH is extd. from the generator gases in the form of solns. of Ca acetate powder, the powder condenses a part of the CH_3OH vapors contained in the gas. A further concn. of the solns. in the 3-still evapg. app. liberates the CH_3OH vapors together with water vapors. The concn. of CH_3OH in the condensate of the first still of the evaporator reaches 0.5%. From a further rectification in the lab. a 96.2% CH_3OH was obtained. W. R. Henn 14

Losses of methyl alcohol in the gas-purifying systems of wood-gasifying plants. N. V. Chalov. *Lesokhim. Prom.* **1938**, No. 3 4, 7–11; *Khim. Referat. Zhur.* **2**, No. 4, 131(1939).—The yield of CH_3OH from gasification of wood is 0.6–1.6% of the dry wt. of wood, depending on the kind of wood and on the method of production. The losses of CH_3OH in the elec. purification of the gases depend on the moisture content of the tar, which in turn is a function of the temp. of the gas after the purification. With a normal moisture content of 25% the losses of CH_3OH are 2–2.5% of its content in the gas before the elec. filtration. The losses found in scrubbers on cooling the solns. vary widely (from 3.9 to 56.6%) depending on the temp. of the gas after the scrubber and on the amt. of water 15

which is condensed from cooling. The losses can be reduced to 15–20% by changing the adjustment of the scrubber. If the moisture content of the gas before the salt scrubbers does not exceed 300–20 g./cu. m. the losses can be reduced to 8–15%. A method has been proposed in which AcOH is absorbed from the gas and the losses of alc. reach a max. of 10%, but can be reduced to 4–8% of the content of alc. before the scrubbers. W. R. H.

Geochem. and geol. factors of formation of crude oil (Porfir'ev) 8. Recovery of S in petroleum refineries (Berthelot) 21. Practical considerations on temp. control [in cracking oil] (De Florez) 1. Metals in deep-well drilling (Nelson) 9. Chemistry of waters beneath the Dnepr-Don depression and their connection with size of oil deposits (Makov) 8. Greases in every steel mill (Kolb) 9. Tubes, etc., for use at high temps. in heating fluids such as in cracking oils (U. S. pat. 2,182,177) 9. Polymerizing olefins such as isobutylene from still gases (U. S. pat. 2,182,512) 13. Laminated material for oil containers (U. S. pat. 2,181,811) 13.

Finding and Producing Oil. Dallas, Tex.: Division of Production, American Petroleum Institute. 338 pp.

Lubrication of Diesel Engines. Chicago: The Pure Oil Co. 66 pp.

Petroleum Products. New York: The Texas Co. 87 pp.

Conversion of petroleum oil. Gerald L. Eaton (to Gulf Oil Corp.). U. S. 2,182,536, Dec. 5. An arrangement of app. is described, and a process of obtaining gasoline of high antiknock value from petroleum oil; it comprises subjecting a mixt. of petroleum oil and hydrocarbons contg. 3 and 4 C atoms per mol. to cracking in a heated conversion zone, fractionating the vaporous products of conversion to recover gasoline, tar and intermediate condensate, bringing the remaining gases in a first absorber into contact with the petroleum oil, prior to cracking the latter, to recover from the gases the bulk of the hydrocarbons contg. 3 and 4 C atoms per mol. and cracking the resultant mixt. of oil and absorbed hydrocarbons. The gases leaving the first absorber are brought into contact with a portion of the intermediate condensate in a second absorber to absorb substantially all of the propane contained therein, together with some ethane; a second flow of hydrocarbon gases in a third absorber is brought into contact with a further portion of the intermediate condensate to remove hydrocarbons contg. 3 and 4 C atoms per mol. therefrom, the enriched condensate from the second absorber is introduced into the third absorber and ethane is vaporized from the enriched condensate by the heat of absorption in the third absorber. The condensate enriched with hydrocarbons contg. 3 and 4 C atoms per mol. but substantially free of hydrocarbons contg. one or two C atoms per mol. is withdrawn from the third absorber, and recirculated into the cycle at a point intermediate the heated conversion zone and the point of recovery of the intermediate condensate from the products of conversion.

Furnace and tube system suitable for hydrocarbon-oil conversion. Jacob B. Heid (to Universal Oil Products Co.). U. S. 2,182,586, Dec. 5. Various structural and operative details.

Converting hydrocarbon gases (such as olefins from oil cracking) into liquid hydrocarbons. Cary R. Wagner (to Pure Oil Co.). U. S. 2,181,749, Nov. 28. An arrangement of app. is described, and a process of converting hydrocarbon gases contg. approx. 40–60% of olefins into liquid hydrocarbons rich in toluene; the process comprises subjecting the gases in the substantial absence of nonhydrocarbon gas to temps. within the limits of approx. 605–635° and under superatm. pressure below that at which C formation is actively promoted for a time ranging from 5 to 30 sec., cooling the reaction products below reaction temp. and sepg. the liquid from the gaseous reaction products. Cf. *C. A.* 34, 1144.

Converting normally gaseous hydrocarbons such as natural or oil-cracking gases to normally liquid hydrocarbons. Percival C. Keith, Jr., Geo. W. Robinson and Geo. Roberts, Jr. (to Polymerization Process Corp.). U. S. 2,181,302, Nov. 28. A portion of a stream of normally gaseous hydrocarbons is liquefied and sepd. from the unliquefied gases. The gases are scrubbed with a liquid absorbent comprising a substantial proportion of hydrocarbons in the gasoline boiling range. The gases are again scrubbed, in a 2nd zone, with an absorbent consisting essentially of gas oil. The liquefied portion of the stream is heated to effect conversion to normally liquid hydrocarbons. The products of conversion are brought into contact with enriched absorbent media from the 2 scrubbing zones. Normally gaseous hydrocarbons are sepd. from this mixt. and at least a portion of the normally liquid constituents, including a substantial proportion of gasoline constituents, is introduced into the primary scrubbing zone.

Cracking and coking hydrocarbon oils such as crude oils. Jean D. Seguy (to Universal Oil Products Co.). U. S. 2,182,599, Dec. 5. An arrangement of app. is described, and a conversion process which comprises partially vaporizing a hydrocarbon charging oil of relatively wide-boiling range, thereby forming vapors and unvaporized oil, subjecting the latter to cracking conditions of temp. and pressure in a heating coil and sepg. the resultant products into vapors and residual liquid in a sepg. chamber. The residual liquid from the chamber is heated to conversion temp. in a second heating coil and reduced to coke in a coking chamber apart from the sepg. chamber. The vaporous products from the coking chamber are introduced into the sepg. chamber and the vaporous products are sepd. from the heavy pitch-like and tarry materials contained therein as a result of the coking operation, such materials are returned to the second coil in the residual liquid supplied to this coil from the sepg. chamber. The vapors evolved from the charging oil by the partial vaporization are combined with the vapors sepd. in the sepg. chamber; the commingled vapors are fractionated to condense heavier fractions thereof, separate portions of the resultant reflux condensate are supplied to the heating coils, and the fractionated vapors are condensed.

Purifying mineral oils such as refinery charging stocks. Harold C. Eddy (to Petrolite Corp. Ltd.). U. S. 2,182,145, Dec. 5. An arrangement of app. is described, and a process for treating a mineral oil contg. no more than a few percent of water to remove impurities dissolved or dispersed in the oil phase or the water phase, which process includes the steps of: mixing the mineral oil and a relatively fresh water, the mixing being of such a character as to form a mixt. of the relatively fresh water and oil but insufficient to cause a predominant portion of the impurities to become assocd. with the relatively fresh water; subjecting the mixt. to the action of an elec. field to coalesce the water and cause impurities to become assocd. therewith; and sepg. the coalesced water contg. impurities from the oil.

Dewaxing mineral oils. Leon W. Cook (to The Texas Co.). U. S. 2,181,638, Nov. 28. A method of dewaxing a mixt. of wax-bearing oil and dewaxing solvent such as Me Et ketone and benzene contg. a small amt. of water involves incorporating in the mixt. a small proportion of a Cr soap of a higher fatty acid, chilling the mixt. to ppt. wax, and sepg. the pptd. wax; the Cr soap modifies the wax crystals.

Fractionating liquid mixtures such as mineral oils. Merrell R. Fenske and Wilbert B. McCluer (to Pennsylvania Petroleum Research Corp.). U. S. 2,183,094, Dec. 12. Various details of app. and operation.

Stabilizing products such as cracked gasoline against oxidation in the presence of copper or copper compounds. Frederick B. Downing and Charles J. Pedersen (to E. I. du Pont de Nemours & Co.). U. S. 2,181,121, Nov. 28. Catalytic oxidation is inhibited by the addn. (generally of 0.01% or less) of *p*-benzylaminophenol or other compd. of the general formula, HOACH:NRN:CHAOH, where A represents a member of the group consisting of aromatic

rings and unsatd. heterocyclic rings of 5 to 6 atoms in which the hetero atom is N, the OH radical being attached directly to a ring C atom ortho to the —CH=N— group, and R represents an aliphatic radical having the two N atoms attached directly to different C atoms of the same open chain of R. Numerous examples are given. U. S. 2,181,122 relates to the like use of di-(2-hydroxylbenzal)-1,2-diaminobenzene or other oxidation inhibitors of the general formula HOACH:NRN:CHAOH, where A represents a member of the group consisting of aromatic rings and unsatd. heterocyclic rings of 5 to 6 atoms in which the hetero atom is N, the OH radical being attached directly to a ring C atom ortho to the —CH N— group, and R represents a group of the class consisting of aromatic groups, cycloaliphatic groups contg. 6 C atoms in the ring, and heterocyclic groups contg. heterocyclic rings of 6 atoms, the hetero atom being N, and in which the two N atoms are attached directly to adjacent ring C atoms or to the most closely positioned ring C atoms of different rings other than C atoms forming part of the linkage between the two rings of the R group.

Recovering casinghead gasoline. Arthur J. L. Hutchinson (to The Fluor Corp., Ltd.). U. S. 2,181,633, Nov. 28. An arrangement of app. is described, and a process of treating natural gas which comprises, flowing a stream of natural gas contg. hydrocarbons of the methane series, such as pentane and lighter and pentane and heavier, through absorption oil under such conditions of temp. and pressure that the greater part of the hydrocarbons lighter than butane are unabsorbed, removing such unabsorbed hydrocarbons from the system, decreasing the pressure and increasing the temp. on the absorption oil completely to remove all absorbed hydrocarbons, condensing and stabilizing the removed hydrocarbons to recover a liquid fraction contg. some isobutane and a relatively large percentage of hydrocarbons heavier than isobutane also a gaseous fraction contg. some isobutane and a relatively large percentage of hydrocarbons lighter than isobutane, passing the gaseous fraction through absorption oil under lower-pressure conditions than the first-mentioned absorption oil to absorb substantially all propane and heavier hydrocarbons while methane and ethane are substantially unabsorbed, then stepping up the pressure on the last absorption oil to come into contact with the original stream of gas and complete the cycle.

Polymerizing butylene to form gasoline hydrocarbons. Vladimir N. Ipatieff and Herman Pines (to Universal Oil Products Co.). U. S. 2,181,942, Dec. 5. A process for producing gasoline-boiling hydrocarbons from butylene comprises forming a mixt. of propylene and butylene in which the molal ratio of propylene to butylene is less than 3 to 1, and subjecting the mixt. at subatm. temp. to the action of H_2SO_4 of over 90% concn.

Hydrocarbon motor fuels. Harry E. Drennan (to Phillips Petroleum Co.). U. S. 2,181,877, Dec. 5. An arrangement of app. is described, and a process for improving the antiknock characteristics of hydrocarbon motor fuels boiling within the gasoline range, which comprises vaporizing the fuels, superheating the vapors to a temp. of about 260 650°, passing the hydrocarbons while at a temp. within the range into contact with a body of brucite, at a pressure of atm. or higher and at a flow rate sufficient that substantially only a min. of cracking occurs.

Separating oil, gas and water from oil well emulsions or the like. Jay P. Walker (40% to Guy O. Marchant and 6% to C. G. Wells). U. S. 2,181,683 4-5 6-7-8, Nov. 28. Various details of app. and operation.

Device for removing paraffin deposits from gas and oil wells. Geo. F. Penrod. U. S. 2,182,931, Dec. 12. Various structural details.

Lubricating oils. Joseph Cole (to Sinclair Refining Co.). U. S. 2,183,009, Dec. 12. A pour-point depressor for lubricating oils is made by treating chlorinated paraffin wax with stearic acid in the presence of anhyd. $AlCl_3$ (suitably by heating to about 300°) and removing the solid constituents from the liquid product of the reaction (as by filtering).

Hydrocarbon lubricating oils containing metal compounds. Raphael Rosen (to Standard Oil Development Co.). U. S. 2,181,913, Dec. 5. In order to inhibit or reduce sludging, a hydrocarbon oil with a b. p. above that of kerosene is mixed with a metal compd. such as ditolyl-Hg, triphenyl-Bi, triphenylstibine or the like. U. S. 2,181,914 relates to the similar use of metal compds. such as triphenyl Sn iodide, triphenyl butyl Sn, etc., and U. S. 2,181,915 relates to the like use of metal compds. such as various alkyl compds. of Hg, Tl, Sb, Bi or As.

Sulfurized mineral lubricating oil. Martin B. Chittick (to Pure Oil Co.). U. S. 2,181,964, Dec. 5. To form a cutting oil, a mineral oil is used with a minor proportion (suitably about 20%) of sulfopolymers produced from S and unsatd. polymers extd. from gasoline produced by cracking mineral oil.

Device for electric heating of used lubricating oil in a still. Wm. D. Harris (to Refinoil Mfg. Corp.). U. S. 2,181,484, Nov. 28. A device is used which comprises a tubular sleeve closed at one end, and elec. heating unit formed of resistance wire having a porcelain support mounted in the sleeve spaced from the walls thereof, the outer surface of the sleeve being machined smooth and highly polished, a layer of Ni deposited on the outer surface of the sleeve and a layer of Cr deposited on the nickel, a layer of Cr deposited on the interior of the sleeve, and means to mount the opposite end of the sleeve in a still so that its interior is closed to the oil under treatment.

Grease. Vernon L. Ricketts (to Shell Development Co.). U. S. 2,182,137, Dec. 5. See Can. 386,507 (*C. A.* 34, 1844[6]).

Dispersing agent suitable for use with lubricants, detergents, etc. Arthur E. Catanach and Eric Kolthoff (to Gulf Oil Corp.). U. S. 2,181,449, Nov. 28. By the reaction of black sulfuric acid and spent alk. material from the refining of petroleum with use of NaOH or Na_2CO_3, a dispersing and emulsifying material is obtained which is highly sol. in water but sparingly sol. in mineral oils.

Halogen compounds of high molecular weight. Arnold J. Morway and Floyd L. Miller (to Standard Oil Development Co.). U. S. 2,181,144, Nov. 28. Halogenated org. compds. of high mol. wt. contg. more than 1% of halogen such as Cl and suitable for use in *extreme-pressure lubricants* are obtained by halogenation of a substantially satd. linear hydrocarbon polymer of the aliphatic series having a mol. wt. in excess of about 1000 and having a plurality of short alkyl side chains, such as an isobutylene polymer.

Refining liquids such as crank-case oil in engines. John K. Russell, Wm. B. Collins and Walter W. Boggs. U. S. 2,181,608, Nov. 28. App. is described, with use of a refining material such as activated clay in the form of finely divided particles interspersed with lumps of material which serve to restrict settling or packing of the finely divided particles.

Viscometer suitable for testing asphalt, etc. Harold P. Hayden and Herbert E. Schweyer (to Barber Asphalt Corp.). U. S. 2,182,082, Dec. 5. Various structural, mech. and operative details.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Utilization of bagasse for the extraction of cellulose by the Pomilio process in the Philippine Islands. E. Salvatore. *Atti X° congr. intern. chim.* **4**, 173–80(1939)(in Italian).—After a general discussion of the cellulose content of bagasse and of its availability, S. describes briefly a manufg. plant now in construction on Negro Island, P. I., which will produce α-cellulose from bagasse by the Pomilio process. Henri Marc

Composition of some vegetable substances. Yields and chemical and physical characteristics of cellulose produced by the Pomilio process. A. Cittadini. *Atti X° congr. intern. chim.* **4**, 145–55(1939)(in Italian).—A comprehensive study of the yield of cellulose produced by the Pomilio process from the most important plants and trees (short and long vegetable cycles). The results indicate that a white cellulose with good chem. and mech. characteristics can be obtained cheaply by this process. H. M. 1

Micellar structure of cellulose fiber. G. Centola. *Atti X° congr. intern. chim.* **4**, 129–37(1939)(in Italian.)—After investigating the acetylation of natural and mercerized ramie fibers, C. concludes: about 40% of the cellulose is in the amorphous state and acetylates rapidly without altering the dimensions of the cryst. portion of the fiber; under partial acetylation the amorphous portion can be recrystd. and proves to be cellulose triacetate; the mercerizing process increases the content of amorphous cellulose; the amorphous and the cryst. portions of cellulose are so intimately intermixed that not only a sepn. is impossible but not even a deformation of the partially acetylated cellulose can be noticed by the action of liquids which dissolve or swell cellulose acetate. The exptl. results confirm the "fringe micelle" hypothesis of structure for cellulose fiber. 15 references. Henri Marc 2

The use of cellulose from the stalks of sweet sorghum. C. Levi and E. Debenedetti. *Atti X° congr. intern. chim.* **4**, 155–6(1939)(in Italian).—L. and D. report that by treating on an industrial scale sweet sorghum stalks by the monosulfite method following the regular procedure, the raw paste is easily bleached with a quantity of hypochlorite corresponding to 3 to 4% of active Cl_2. The yield in bleached cellulose after the elimination of medular substance and short fiber is around 35%; by mech. improvements the yield on dry material should be increased from the present 10–12% to about 50%. H. M. 3

History of the application of a laboratory method for cellulose determination to industrial production. U. Pomilio. *Atti X° congr. intern. chim.* **4**, 168–72(1939)(in Italian).—After a historical sketch of his industrial method for the extn. of cellulose, P. gives data showing that, of the 4 available methods of chlorination, Cl_2 gas is the most efficient and safest ingredient in liberating cellulose from moist vegetable fibers. Henri Marc 4

Recrystallization of cellulose and of some of its derivatives. G. Centola. *Atti X° congr. intern. chim.* **4**, 117–23 (1939)(in Italian).—After a polarized light and x-ray study of recrystd. cellulose, viscose, cellophane, cellulose acetate and cellulose nitrate, C. concludes that the various factors which can influence the more or less amorphous state of cellulosic materials regenerated from solns. depend on the initial concn. of the soln. and on the conditions under which coagulation takes place (temp., pptn. velocity, nature of solvent and of coagulant and mech. agitation). C. asserts that from exptl. observations it is logical to state that the cellulose mol. does not retain a rectilinear configuration. 8 references. Henri Marc 5

A note on the liquefaction of cellulose. Heou-Fco Tseou and Jen-Shon Sun. *J. Chinese Chem. Soc.* **7**, 33–5 (1939).—Cellulose is impregnated with a strong soln. of NaOH; the mixt. is then dried and fractionally distd. from a Cu retort. The fractions obtained resemble the light oil, kerosene and lubricating oil of petroleum distillate. Wm. H. Adolph 6

Mixed esters of cellulose. I. Nitroacetylcellulose. G. Centola. *Atti X° congr. intern. chim.* **4**, 123–9(1939) (in Italian).—After investigating the prepn. of nitroacetylcellulose by (1) the simultaneous acetylation and nitration of cellulose, (2) the nitration of cellulose acetate and (3) the acetylation of nitrocellulose, C. concludes that its prepn. by a single operation is improbable but that homogeneous products can be obtained by either the nitration of special types of cellulose acetate or by the careful acetylation of nitrocellulose. 11 references. H. M. 7

Acetylation of wood cellulose and preparation of cellulose acetate plastics. A. B. Davankov and A. A. Berlin. *Org. Chem. Ind.* (U. S. S. R.) **6**, 244–9(1939).—A discussion based on literature and some lab. expts. Twenty references. Chas. Blanc 8

Formation of thick cellulose acetate films by the method of continuous pouring. A. A. Moiseev. *Org. Chem. Ind.* (U. S. S. R.) **6**, 319–21(1939).—Films 0.5 ± 0.025 mm. thick and 28 m. long were formed by the method of single and continuous pouring of 28% cellulose acetate in Me_2CO-alc. over a gelatin base at a speed of 0.2 m./min. and air temp. of 50–5°. The solns. were plasticized with 20–30% of triphenyl, tritolyl and tributyl phosphates. The dried films showed mirror-like surface and were free from blisters and other mech. imperfections. In their transparency and colorlessness they are superior to celluloid and cellon and in the mech. properties are equal to cellon but somewhat inferior to celluloid. Numerous tables are given to show the effect of viscosity, plasticizers and other factors on the mech. and optical properties of the resulting films. Chas. Blanc 9

The function of ammonia in cuprammonium cellulose solution. M. I. Arkhipov and A. B. Pakshver. *Org. Chem. Ind.* (U. S. S. R.) **6**, 322–3(1939).—Some addnl. exptl. evidence is presented to show that the viscosity of cuprammonium spinning solns. of cellulose decreases with NH_4OH concn. This effect is more pronounced with stronger cellulose solns. (cf. Pakshver, *et al.*, *C. A.* **31**, 7644[9]; **32**, 1929[1]). Chas. Blanc 10

The trend of progress in the cellulose textile industry. III. Chemical modification of acetate rayon. H. A. Thomas. *Silk and Rayon* **14**, No. 2, 90–2(1940); cf. *C. A.* **34**, 1179[4].—Acetate rayon is "basified" by adding synthetic resins contg. basic groups to the spinning mass, treatment before or after spinning, with polymers of amino derivs. of acrylic acid, or treatment with org. and sulfonic acids or sulfonamides to which a synthetic resin can be added. Stretch spinning can be applied to acetate fibers if they are first swollen with org. liquids or the vapors of these solvents. An important trend is the production of colored yarn by incorporation in the spinning mass of finely dispersed insol. pigments, dyestuffs, or dyestuff coupling components which are rendered insol. after extrusion. This process gives very fast shades. Azoic shades are produced on acetate by applying base and naphthol. Dyeing is done at 60–65° by addn. of HCOOH followed by rinsing in soap and hyposulfite. M. Harris 11

Degree of grinding and chemical decomposition of wood and cellulose fibers. Kurt Hess, Karl Ph. Jung and Karl E. Heumann. *Naturwissenschaften* **27**, 770–1(1939).—The influence of the fiber structure on the course of chem. reactions of vegetable materials was studied. Beechwood disintegrated in a lab. "Vibratom" mill gives a fine powder of 1 to 2 μ size (dry grinding) which is sepd. by a brief treatment with water, alc. and ether. As compared with coarsely pulverized wood such as obtained from a crusher with 270 $\mu \times 1.5$ mm. pieces, the reactivity is greatly increased. The fine powder under normal methylation conditions takes up 36% OMe (98% yield) in one step, the coarse grind only 24–27%. The methylated wood in the first instance is almost completely sol. in BzOH. The fine powder is readily acetylated with Ac_2O-pyridine, giving wood acetate of 40% COMe. Similar improvement in reactivity is found when cellulose fibers are treated. B. J. C. van der Hoeven 12

Production and world consumption of wood pulp. Paul Razous. *Génie civil* **115**, 417–21(1939). A. N. H. 13

National cellulosic resources for paper pulp. C. Levi and M. Marini. *Atti X° congr. intern. chim.* **4**, 157–68 (1939)(in Italian).—A discussion of the chem. and phys. properties of 3 plants available to Italian industry as possible sources of cellulose: (1) *Ampedolesmos tenax*, occurring in Sicily and Calabria, with a cellulose content of about 47.3%, (2) papyrus plant growing near Lake Tana and along the Blue Nile, with a cellulose content of 50.2% and (3) asphadel or silver rod, or king's spear growing profusely in Sardinia, with a 55% cellulose content. Henri Marc 14

Pulp manufacturing from Manchurian "Sirakanba" birch. I. General analysis and cooking by soda process. Hötin Den. *J. Soc. Chem. Ind., Japan* **42**, Suppl. bind-

ing 356–7(1939).—Pulp was made by heating 90-g. samples of air-dried chipped wood from Manchurian "Sirakanba" birches in an autoclave with 280 cc. of cooking soln. (which in different expts. varied from 1.19 to 3.41 *N* NaOH soln.) to 160° during 1.5 hrs., and holding at 160° for 4 hrs. Analyses of the wood (before cooking) and of the pulp (after cooking) are shown for each strength of NaOH soln. used in the cooking operation. A large part of the lignin and pentosan is easily sol. in 1% NaOH soln. The soln. of pentosans increases with increase in NaOH concn., but it is difficult to lower the pentosan content below 3.12%. Cellulose is very easily destroyed by cooking solns. having an NaOH normality above 2.2. The NaOH consumption reaches approx. a max. when 2.8 *N* NaOH soln. is used in the cooking operation.
George Ayers

Limestone in the pulp and paper industry. H. J. Rowley. *Trans. Can. Inst. Mining Met.* 42 (in *Can. Mining Met. Bull.* No. 332), 599–607(1939).—Limestone is used chiefly in the sulfite process; strong acids, formed during digestion, are neutralized in towers. The stone should contain at least 95% $CaCO_3$ and be free of graphite, mica, pyrite and carbonaceous material. Lime has a wider field of use: (1) in the sulfite process, (2) in causticizing in the kraft and soda pulping processes, (3) supply of alky. in rag, rope and straw pulping, (4) in fillers and coatings, (5) in water treatment and (6) in bleach liquor prepn.
Alden H. Emery

Arc welding in pulp and paper mills. H. S. Card. *Paper Ind. Paper World* 21, 753-9(1939).—A brief discussion of the techniques and procedures for welding special alloys and metals used in pulp- and paper-mill equipment.
A. Papineau-Couture

Studies on Japanese papers. I. Physical properties of Japanese papers. Sutezo Oguri and Muneo Takei. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 300–2(1939).—The thickness, wt., bursting strain, tensile strength and folding no. were detd. (and vol. wt., sp. bursting strain and breaking strength calcd.) for 42 samples of Japanese papers. Papers from Gampi fiber have the best phys. properties except for folding no., those from Kōzo fiber (bast fiber of *Broussonetia kajinoki*) are next best, but superior in folding no., while those contg. admixed sulfite pulp are poorest.
George Ayers

Absorption of SO_2 in water (Jenness, Caulfield) 1. Dialysis through cellulose membranes [permeability of viscose cellulose membranes] (Nowatke) 2. App. with conical devices for sepg. suspended solids from liquids such as waste lye from sulfate cellulose production (U. S. pat. 2,181,456) 1. Waterproofing fibrous materials such as paper (U. S. pat. 2,182,045) 25. Molding material [from sulfite waste liquor] (Can. pat. 386,619) 13.

Chemipulp Sulphite Mill Operation. Watertown, N. Y.: Chemipulp Process, Inc. 191 pp.

Post's Paper Mill Directory. New York: L. D. Post, Inc. 602 pp. $2.00. Reviewed in *Chem. Met. Eng.* 47, 139 (1940).

Cellulose pellets suitable for esterification, etc. Louis S. Baker and Geo. L. Schwartz (to E. I. du Pont de Nemours & Co.). U. S. 2,182,274, Dec. 5. An arrangement of app. is described, and a process of prepg. directly from a cellulose-contg. fibrous pulp slurry, such as one of lint or wood pulp, small pellets of cellulose of uniform size and d.; the process comprises feeding a pulp slurry of papermaking consistency onto a forming screen in the form of uniformly sized platelets or patches, removing free liquid from the pulp slurry by suction through the forming screen, removing the platelets or patches from the forming screen by a rubbing and rolling action exerted by a surface moving in a direction directly opposed to that of the screen whereby the platelets or patches are rolled into pellets, and drying the pellets.

Liberating cellulose from bagasse. John P. Foster and Herman L. Joachim (to Maui Agricultural Co., Ltd.). 1 U. S. 2,181,785, Nov. 28. An arrangement of app. is described, and a process which involves digesting sugarcane bagasse with fiber-liberating chemicals, such as NaOH soln., after a preliminary treatment with a solvent or emulsifying agent to remove cane wax from the fiber bundles of the bagasse.

Cellulose ethers. Henry Dreyfus. U. S. 2,181,264, Nov. 28. A cellulose material such as cotton linters or regenerated cellulose is treated with an etherifying agent 2 such as ethylene oxide or ethylene chlorohydrin in the presence of dimethylaminocyclohexane or the like which serves as an acid neutralizer.

Cellulose esters. Clemmy O. Miller and Arthur E. Siehrs (to North American Rayon Corp.). U. S. 2,181,906, Dec. 5. In prepg. a cellulose ester such as cellulose acetate, an anhyd. alkali metal cellulosate is caused to react with an esterifying agent such as AcCl.

Cellulose ester compositions. Robert P. Russell (to Standard Oil Development Co.). U. S. 2,181,609, Nov. 28. A clear homogeneous compn. suitable for coating various materials comprises a cellulose org. acid 3 ester such as cellulose acetate together with about 0.1% or more of a substantially satd., linear, aliphatic isoölefin polymer such as polyisobutylene having an av. mol. wt. above 800 as detd. by the viscosity method.

Alkali metal cellulosates. Philip C. Scherer, Jr. (to North American Rayon Corp.). U. S. 2,181,919, Dec. 4 5. A cellulose material such as cotton or wood pulp is treated with a soln. of an alkali metal in liquid NH_3, at about the temp. of the b. p. of liquid NH_3 at atm. pressure. U. S. 2,181,920 relates to the production of a product such as cellulose xanthate by treating an anhyd. alkali metal cellulosate with a compd. such as CS_2 under substantially anhyd. conditions (suitably in liquid NH_3).

Moistureproofing sheets of regenerated cellulose. Charles F. Silsby (to Solvay Process Co.). U. S. 2,182,765, Dec. 5. The sheets are treated with a liquid such 5 as acetone which is miscible with the liquids contained in the sheets substantially completely to replace the latter in the surface layers only of the sheets, and the sheets are then impregnated with a soln. of a moistureproofing agent such as a succinic acid-glycerol resin in a solvent such as acetone which is miscible with the liquid first 6 applied, and the solvent is evapd. from the sheets.

Nitrating cellulose. Geo. A. Richter (to Brown Co.). U. S. 2,181,911, Dec. 5. A process of prepg. nitrocellulose from cellulose fiber in the form of paper of a basis wt. ranging from about 30 to about 100 lb. comprises cutting the paper into fragments of a min. span of about $\frac{1}{8}$ to $\frac{1}{4}$ in., treating a mass of such fragments with a mercerizing soln. for at least about 15 min., washing the 7 fragments substantially free from mercerizing soln., drying them, and nitrating the dried, mercerized fragments.

Apparatus for making rayon. Joseph L. Hutchings (to Brosites Machine Co.). U. S. 2,182,540, Dec. 5. Various structural, mech. and operative details.

Stretch-spinning rayon threads from cuprammonium cellulose solutions. Kurt Frowein, Gotthard Bauriedel and Viktor Elsaesser (to American Bemberg Corp.). 8 U. S. 2,182,429, Dec. 5. Various details of app. and operation.

Apparatus for the manufacture of rayon yarns. Ernst Mengeringhausen and Franz Berndt (to North American Rayon Corp.). U. S. 2,182,762, Dec. 5. Various structural, mech. and operative details of an app. with an extrusion spinnerette, etc.

Digestion of fibrous materials. Albert D. Merrill (to Chemipulp Process Inc.). Can. 386,593, Jan. 30, 1940. 9 Relatively cool acid is withdrawn from the acid-storage tank and forced directly into the digester, side relief fluids are sepd. into liquid and gaseous components, and the flowing stream of acid is used to withdraw hot gas from the sepg. zone. An app. is described.

Pulp from highly resinous woods. Kurt Schwabe (to Kübler & Niethammer and Chemische Fabrik Coswig-Anhalt Hans Schraube). U. S. 2,182,520, Dec. 5. In grinding wood pulp from highly resinous woods, there is

added to the pulp, during the grinding operation, Ba(OH)$_2$ which ppts. out the resin as an insol. Ba resin soap, the addn. being limited so that the pH of the pulp water does not exceed 7. Cf. *C. A.* **34**, 625[5].

Apparatus for refining straw pulp, etc. Max Skolnik (to National Fibre Corp.). U. S. 2,182,391, Dec. 5. Various structural, mech. and operative details.

Recovering the solids from pulp mill waste liquors. Erling Fladmark. U. S. 2,182,428, Dec. 5. An arrangement of app. is described, and a method which involves continuously spraying the liquor against the surface of a body of heated liquid heat-transfer medium such as an oil or tar within an evaporator at such a rate of flow that the water of the waste liquor is evapd. upon contact with the surface before the waste liquor and liquid heat-transfer medium can mix while the solid residue of the waste liquor is being continuously absorbed in dry condition by the liquid heat-transfer medium and continuously removed from the evaporator with it. 2 3

Recovering chemicals from cellulose waste liquor. Erkki J. Janhunen. U. S. 2,181,330, Nov. 28. See Swed. 95,611 (*C. A.* **33**, 7114[3]).

Concentrating liquors such as sulfate black liquor in multiple-effect apparatus. William T. Hinckley (to Whiting Corp.). U. S. 2,181,731, Nov. 28. Various details of app. are described and a method of reducing the tendency toward foaming of thin "Black Liquor," in the initial concn. thereof in a multiple-effect evaporator of the long tube vertical type in which liquor flows upwardly through tubes from a low-elevation inlet to a higher-elevation outlet, which consists in introducing such thin "Black Liquor" from a common source simultaneously into a plurality of sub-effects in parallel independent streams, and subjecting the independent streams of liquor in the sub-effects to different temps. and to different degrees of vacuum, and in mixing the treated liquor from both the sub-effects after treatment therein for subsequent treatment in the system. 4 5

Papermaking apparatus. James B. Mehaffey (to Black-Clawson Co.). U. S. 2,182,928, Dec. 12. Various structural, mech. and operative details.

Papermaking machine. William H. Millspaugh (to Sandusky Foundry & Machine Co.). Can. 386,741, Feb. 6, 1940. Structural details. 1

Recovering cellulose ethers from coated paper. Richard D. Freeman (to Dow Chemical Co.). U. S. 2,183,039, Dec. 12. Paper with a coating contg. a cellulose ether such as cellulose ethyl ether is digested with a dil. aq. soln. of an alkali such as Na_2CO_3 while agitating, at a temp. (suitably about 40–100°) at which the cellulose ether is insol. in the dil. alk. soln., until the paper is disintegrated into discrete fibers, and the cellulose ether is sepd. from the slurry of fibers, as by a vibrating screen. 2

Removal of water-insoluble materials from a paper stock. Otto Kress (to Institute of Paper Chemistry). Can. 386,719, Feb. 6, 1940. Shredded paper stock is placed in a container partially filled with water, the water heated by live steam above the m. p. of the waxy materials, the stock agitated, the fibers are sepd. from the melted waxy materials, and the residual waxy materials not removed by hot water removed by addnl. agitation of the stock in an aq. medium contg. a soap-emulsifying agent and an alkali soln. of a water-insol., alkali-sol., acid-precipitable protein. 3

Calcium carbonate for coating paper, etc. Howard Roderick (to Michigan Alkali Co.). U. S. 2,182,096, Dec. 5. A method of making a $CaCO_3$ coating pigment for paper, etc., involves pptg. $CaCO_3$ from reacting solns. of Na_2CO_3, $NaHCO_3$ and $CaCl_2$, in which the relative concn. of Na_2CO_3 to $NaHCO_3$ is in the range of $2^1/_2$–$3^1/_2$ to 1, in the presence of an excess of $CaCl_2$, and agitating and heating such reacting solns. during pptn. in a temp. range of 65–105°. Cf. *C. A.* **33**, 8367[6]. 4

Moistureproofed glassine paper suitable for use as a wrapping material. Fred K. Shankweiler (to Hercules Powder Co.). U. S. 2,181,160, Nov. 28. Glassine paper is coated with a substantially transparent thin film of a compn. contg. chlorinated rubber and a wax such as beeswax or montan wax or paraffin. 5

Paper suitable for cartons for packing fragile glassware, etc. Sidney D. Wells (50% to Gerald D. Muggleton). U. S. 2,181,556, Nov. 28. A paper of good density and strength is formed from 85–50% waste paper stock and 15–50% of nonfibrous pithy material from which the fibrous portions have been substantially removed.

24—EXPLOSIVES AND EXPLOSIONS

C. G. STORM

Production of explosives in the United States during the calendar year 1938. W. W. Adams, V. E. Wrenn and L. S. Horton. *U. S. Bur. Mines, Tech. Paper* **606**, 28 pp.(1939); cf. *C. A.* **33**, 3855[8]. Alden H. Emery 7

Ammonium nitrate as a military explosive. M. Ovchinnikov. *Tekh. i Vooruzhenie* **1938**, No. 12, 77–8; *Khim. Referat. Zhur.* 2, No. 4, 135(1939).—The phys. properties of NH_4NO_3 are described. Notwithstanding its hygroscopisity and tendency to pack, it is recommended for use as an explosive. W. R. Henn

Ignition of firedamp by explosives. Étienne Audibert. *Rev. ind. minérale* No. **448**, 1–7(1940).—The explosives used consisted of varying proportions of gelatinized nitroglycerin (1/40), NH_4NO_3, wood flour and (KCl + NaCl), in such amts. that on explosion all C and H are completely oxidized. It was made up into cartridges of 30 mm. diam. and varying length. They were fired in a steel mortar 35 mm. diam. and of varying length, either undamped or damped by means of a steel plate at the top of the mortar, offering varying resistance to its removal by the explosion, which was started from either the bottom or top of the cartridge; the expts. were conducted in an atm. contg. CH_4. Results showed that (1) damping is only effective in restraining ignition of the firedamp when the velocity of decompn. of the explosive is sufficiently great e. g., when with the above explosives the amt. of nitroglycerin is not above 20%; accordingly tamping must be more complete with a slow burning powder, such as those with NH_4NO_3 as basis; (2) as regards increased risk on increasing the charge, provided the ratio (length of charge)/(length of mortar) is const. the risk decreases with increased length of charge; (3) provided tamping is sufficient to ensure complete decompn. before emergence of the gases produced, it makes no difference from which end of the cartridge it is fired. From the above safe limits for the compn. of powders are: gelatinized nitroglycerin (1/40) 14, 20 and 25%, NH_4NO_3 42.02, 34.72 and 28.77%, wood flour 5.98, 5.28 and 4.23%, (KCl + NaCl) 38, 40 and 42%, giving per 100 g., 64.30, 67.50 and 68.10 cal., resp. C. A. Silberrad 8

Determination of pressure in the air compression wave resulting from explosions. Wilhelm Schneider. *Z. ges. Schiess- u. Sprengstoffw.* **34**, 230–4, 263–6, 284–6, 304–6, 329–31(1939).—The differences between the air compression wave from explosions and sound waves are discussed theoretically and mathematically. An app. with vibrating membrane was developed, which showed the max. pressure from a charge of 1 kg. of TNT to be 2.7 g./sq. cm. at a distance of 160 m. and 1.7 g./sq. cm. at 240 m. C. G. Storm 9

The causes of a [tar-] distillation explosion. Paul Riehm. *Teer u. Bitumen* **37**, 305–6, 348–9(1939).—Explanations are offered for an explosion with fatalities which occurred with the draining of a distn. vessel when a tar fire was being extinguished. F. W. Jung

Explosion limits of industrially important gases and vapors of solvents. Freitag. *Oberflächentech.* **17**, 7 (1940).—The lower and upper explosion limits in percent-

age by vol. in air are CO 12.5, 74; H 4.1, 74; ethylene 4.0, 14.2; CH_4 5.3, 14.0; C_2H_2 2.5, 80.0; NH_3 16.0, 27.0; illuminating gas 7.0, 21.0; benzene 1.4, 8.0; EtOH 3.0, 19.0; ether 1.7, —; benzine 1.4, 6.0; acetone 3.0, 9.0; CS_2 2.0, 32.0; MeOH 6.0, —; MeCl 8.1, 17.2. M. Hartenheim

Flue-gas explosions. F. J. Matthews. *Colliery Eng.* **16**, 395–6(1939).—Every boiler fire is capable of giving off a mixt. of hydrocarbons and other gases which can explode with a small amt. of air under the right conditions. Gas pockets in flues should be avoided and draughts maintained in good conditions. Air should flow through the furnace and flues for 10 min. before breaking up a banked fire. Firing of waste fuels, such as sawdust, should be avoided. Ann Nicholson Hird

Chemical fire fighting in U. S. S. R. F. Mikhailov. *Pozharnaya Tekh.* **1938**, No. 5, 14–16; *Khim. Referat. Zhur.* **2**, No. 4, 143–4(1939).—Aq. solns. most effective for fire extinguishing were $CaCl_2$, NaOH, KNO_3, H_3PO_4, and water glass. Other suitable fire-extinguishing substances were CCl_4 (methods for removal of the phosgene formed during the decompn. of CCl_4 from the action of fire must be devised), CO_2 snow (for hard objects and combustible liquids) and dry powders in combination with CO_2 and steam. W. R. Henn

A method for fighting underground fires. D. V. Ermuzevich. *Ugol* **1938**, No. 11, 36–8; *Khim. Referat. Zhur.* **2**, No. 4, 144(1939).—Causes for underground fires in coal mines and methods for fighting them are described. W. R. Henn

Research work in the [fire] department. Anthony J. Mullaney. *Fire Eng.* **93**, 52–4(1940).—A survey of new developments in the methods of fire control and prevention. Leopold Scheflan

An electron-metal fire. Braukmann. *Oberflachentech.* **17**, 4–6(1940).—In an investigation of the causes of a fire in an electron (Mg-Al alloy) factory it was established that the use of acid oils in grinding is a source of grave danger, as they develop H and can be ignited at temps. as low as 110°, which temp. is easily reached in the grinding processes. The ignition point of the oil is lowered considerably by admixts. of Mg dust, as is the case in grinding. To avoid danger of fire in such plants (1) a neutral oil must be employed, (2) all machines and accessories must be of incombustible material, (3) grinding machines should be at least 3 m. apart, (4) used emery paper and other inflammable material must not be permitted to accumulate and machines must be cleaned 3–4 times during a shift. M. Hartenheim

The laws of combustion of (colloidal) powders. J. Dupuis. *Mém. artillerie franç.* **17**, 799–830(1938).—The law of combustion for powders, generally adopted after the works of Charbonnier, is $dz/dt = A\phi(z)f(P)$, where z is the fraction of the powder burned at instant t, A is const. for given conditions, $\phi(z)$ and $f(P)$ are functions of z and P, resp. (both independent of Δ, d. of loading). Closed-bomb exptl. results give the relation of dz/dt and P, thus detg. $f(P)$. ($\phi(z)$ is calcd. in the interval $z = 0.1$ to $z = 0.8$, on the assumption that burning is in layers.) Except at low-pressure levels, $f(P)$ appears to take forms such as $P^{0.85}$, $P + 200$ kg., $P^{2/3}$, with equal accuracy. This indicates that expts. of others were conducted at too low a Δ, permitting natural variations in the powder to affect the results. $f(P)$ detd. by Muraour takes the form $K(P + A)$, which is very close to that proposed by D. It is concluded that the theory of combustion in parallel layers is valid, contradictory phenomena being attributed to heterogeneity of the powder; and that the linear velocity of combustion is not proportional to the pressure. H. Muraour. *Ibid.* 831–3.—Various references are given on work of M., with brief comments on each phase. Burning of powder grains in parallel layers is reaffirmed as the proper basis for the laws of combustion. The law $V = a + bP$, deduced previously from exptl. results, is in perfect agreement with the conclusion of Dupuis (above). V represents linear rate of burning, P is the pressure at the corresponding instant, a and b are consts. for particular conditions. At higher values of P, a becomes negligible. B. E. Anderson

Silico-calcium [as thermite in explosives] (Bergeret) 4.

Weingart, George W.: Pyrotechny. Revised ed. New York: Chemical Publishing Co. $5.00. Reviewed in *Pacific Chem. Met. Inds.* **4**, No. 2, 8(1940).

Extinguishing burning light metals and preventing their ignition. Fritz Kotz and Armin Bergmann (to Junkers Flugzeug- und Motorenwerke A.-G.). U. S. 2,182,440, Dec. 5. The metal is wetted with a dil. aq. soln. of a silicate such as Na silicate, contg. particles of a saponifiable oil such as lard oil dispersed in the soln. Cf. *C. A.* **33**, 2340[6].

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Some recent advances in fluorescence analysis as an aid to the textile colorist. Julius Grant. *Textile Colorist* **62**, 9–11(1940); cf. *C. A.* **30**, 6569[7].—A review of advances during the past four years. Certain dyestuffs, which when in soln. do not normally fluoresce in filtered ultraviolet light, can fluoresce in a characteristic manner when dyed onto certain textile fibers. The same dye may fluoresce differently on different fibers. Improvements in ultraviolet lamps are cited. The application of the "ultrachromatographic adsorption" method to mixts. of dyes is described. Ruby K. Worner

Preparation of azo dyes from dimethoxyanthranilic acids. A. S. Chernyshev and B. M. Bogoslovskiĭ. *Org. Chem. Ind.* (U. S. S. R.) **7**, 254–6(1939).—2-Amino-3,4- and 6-amino-2,3-dimethoxybenzoic acid, obtained from hemipinimide by Rodionov and Fedorova (*C. A.* **33**, 5827[7]), when diazotized and coupled with PhOH, R acid, H acid and naphthionic acid, gave bright dyes and orange to violet dyeings fairly stable to light and soap. C. B.

Some new azo derivatives of sulfanilamide. Antonio Mossini. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., **1939**, 47–53.—At 0° in aq. soln. diazotized sulfanilamide (I) reacts with Na barbiturate to form *p*-sulfonamidobenzeneazo-5-barbituric acid (II), a red dye decompg. without melting at 204°. I with Et acetoacetate and NaOH in aq. alc. forms *p*-sulfonamidobenzeneazo-3-acetoacetic acid, pptd. by acids as a yellow powder, decompg. without melting at 182°. Aminobenzene-4-sulfonamidobenzene-4′-sulfondimethylamide (III), $Me_2NSO_2C_6H_4NHSO_2C_6H_4NH_2$, after diazotization of the free NH_2 group, reacts with barbituric acid to form 4″-sulfondimethylamidobenzene - 4′ - sulfonamidobenzeneazo-5-barbituric acid (IV), an orange dye melting with decompn. at 258°. Diazotized III reacts with Et acetoacetate to form 4″-sulfondimethylamidobenzene-4′-sulfonamidobenzeneazo - 3 - acetoacetic acid, an orange dye, m. 200°. All 4 of the above dyes are insol. in cold water, C_6H_6 and petr. ether, sol. in EtOH, Me_2CO and aq. alkalies. Reduction of II and IV with Sn and HCl gives 5-aminobarbituric acid and other products. L. E. G.

Dyes and tans in the species of statice. C. D. Mell. *Textile Colorist* **62**, 59–60(1940). Ruby K. Worner

Vat dyes of the benzanthrone series. XXI. Synthesis of benzanthroneacridone and constitution of indanthrene-olive green B. Tosio Maki and Arumi Kikuti. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 310–17(1939)(in German); cf. *C. A.* **30**, 2009[2].—Br (11.2 g.) in 57.5 g. AcOH was added dropwise to a stirred soln. of 11.5 g. benzanthrone and 0.35 g. I in 173 g. AcOH maintained at 80°; after heating 5 hrs. at 100°, the crystals were filtered

off, washed with AcOH and then with H_2O; yield, 12.9 g. of 3-bromo-7-benz[*de*]anthren-7-one (I), yellow needles (after recrystn. from AcOH), m. 173.5° (corr.), and colors H_2SO_4 carmine red (no fluorescence). I (3.09 g.), 2.50 g. of 1-aminoanthraquinone, 0.2 g. anhyd. NaOAc and 0.3 g. of Cu_2Cl_2 were finely ground and refluxed 15 hrs. in 50 g. $PhNO_2$; subsequently at approx. 70° 50 cc. alc. was added and the yield of ppt. after washing with very dil. HCl was 86.48%. After recrystn. from *o*-$C_6H_4Cl_2$, 2 *N*-(7-oxo-7-benz[*de*]anthren-3-yl)-1-aminoanthraquinone (II) was obtained as a dark brown cryst. powder giving a violet-brown mark, a dark-brown nonfluorescent color in H_2SO_4 (violet-brown ppt. on diln.) and having slight soly. (0.45 g./100 cc.) in PhCl, but sol. in *o*-$C_6H_4Cl_2$ and $PhNO_2$ with a brown-red color (nonfluorescent). With alk. hyposulfite at 60–70°, II is inferior as a dyestuff. II (1 g.) was added at 110° to a mixt. of 20 g. of 83% KOH, 16 g. PhOH and 4 g. of 98% alc. which had previously been melted together at 135°, then the material was heated 2 hrs. at 135°. After digestion with 1 l. of water, the insol. product was filtered off and treated with dil. HCl; the crude product (0.98 g.) was refluxed with 300 times its quantity of PhCl for 2 hrs., then the residue, after washing and drying (0.85 g.), formed a dark-green powder difficultly sol. in PhCl and somewhat sol. in *o*-$C_6H_4Cl_2$ and $PhNO_2$ and gave a green soln. (no fluorescence) on heating. The powder (0.5 g.) was dissolved in 50 cc. concd. H_2SO_4 and set aside for 2 hrs., then poured into water, yielding 0.5 g. of "benzanthroneacridone" ($C_{41}H_{15}O_3N$) (III) which when recrystd. from $PhNO_2$ forms blue-green scales. When used in a hyposulfite vat at 55–60°, III dyes cotton olive-green; under the same conditions III if not purified by H_2SO_4 treatment gives a more gray shade. Com. Indanthrene-olive Green B contains about 50% of actual dyestuff and is impure III as shown by tests. George Ayers

An interesting chapter in vat-dye progress. A. J. Hall. *Am. Dyestuff Reptr.* 29, 58–60, 68–71(1940).—The Indigosol and Soledon dyes are simply dissolved in water, applied to yarn or fabric by padding or by much the same easy method of dyeing cotton with direct dyes or wool with acid dyes and the textile material is then treated with an acid oxidizing liquor. Methods of producing these dyes are outlined, also their chem. constitution. Patented expedients to prevent overoxidation in the development process are discussed. Hydroquinone substances should be of much assistance to dyers and printers of vegetable and animal fiber materials with Indigosols and Soledons. Other buffers include thiocyanates of Cu and NH_4, thiodiglycol, thiourea, *o*- or *p*-dihydroxy- and *o*- or *p*-hydroxyamino-aromatic compds. Overoxidation can be prevented where the dyed material is developed in 7 an oxidizing bath and not by steaming treatment. Suitable reducing agents are $SnCl_2$ and $TiCl_2$. Although present with the oxidant (HNO_3) in the developing bath, they do not immediately attack and reduce this before it has the opportunity to oxidize the dye. W. H. Boynton

Bright fast pinks. Raffaele Sansone. *Textile Colorist* 61, 817–19(1939).—Formulas and dyeing procedures are given for printing bright, fast, pink colors on cotton and acetate rayon. Ruby K. Worner

The technique of breaking down dyes. Joseph Rière. *Teintex* 4, 660–8(1939).—R. reviews the use of the following substances used for breaking down dyes: oxidizing agents HNO_3, $Na_2Cr_2O_7$, Cl_2-H_2O, $KMnO_4$; reducing agents hyposulfites and sulfoxylates; alk. agents soaps, NH_3, NH_4OAc, Na_2CO_3, NaOH; acid agents HCOOH, HOAc and H_2SO_4. Sample baths are given for use with cotton fabrics contg. basic dyes, S dyes, vat dyes and insol. azo dyes. Bath formulas for viscose rayon, acetate rayon and wool fabrics are also included. S. Z.

Superior fast umbrella fabrics. Raffaele Sansone. *Textile Colorist* 62, 20–4(1940).—Dyes and dyeing procedures are given for producing fast colors on different types of umbrella fabrics at reasonable costs. R. K. W.

Oxidizing agents in dyeing with aniline black. R. Viart. *Teintex* 4, 659–60(1939).—Methods are outlined 1 for the analysis of chlorates and dichromates that are used as oxidizing agents with aniline black. S. Z.

Dyeing wool and cotton materials for the services. T. E. Thompson. *Dyer* 82, 325, 330(1939).—Suggestions are given for dyeing textiles to meet the requirements of the military services. The use of vat, chrome, sulfur and direct dyes is considered. Ruby K. Worner

Continuous dyeing of wool and half-wool: Method based on the theory of turgescence. E. Justin-Mueller. *Teintex* 4, 656–9(1939).—Important factors considered 2 are: (1) the fabric must be clean and dry and the dye bath kept at 80°, 90° or 95° depending on the dye used, (2) the concn. of the dye bath must be such as to give the max. desired intensity in 20 sec., (3) the dye must be well dissolved, (4) in a mixt. of dyes all must have the same soly., (5) on entering the dye bath, the dry cloth must be completely wetted. A schematic drawing of the con- 3 tinuous process is included. Saverio Zuffanti

The black dyeing of mixed woven fabrics containing acetate rayon. R. Langer. *Farber u. Chemischreiniger* 1939, 122–3; *Chem. Zentr.* 1939, II, 4357.—Directions are given for the dyeing of various com. mixtures and suitable dyes are named. Leopold Scheflan

The dyeing of clothing and the dye and textile-assistant industries. H. Collé. *Färber u. Chemischreiniger* 1939, 104–7, 116–18; *Chem. Zentr.* 1939, II, 3752.—A general 4 review of the various types of dyes with fastness requirements. Leopold Scheflan

The dyeing and finishing of heavy clothing fabrics from staple rayon and German shoddy. L. Jackel. *Klepzig's Textil-Z.* 42, 771–2, 774, 789–91(1939).—An address. Leopold Scheflan

The examination of dyeings in textiles of vegetable and animal origin and in mixed woven fabrics. Carl Blau, Jr. *Farber u. Chemischreiniger* 1939, 43–6; *Chem. Zentr.* 1939, II, 1383.—A summary of known methods of testing 5 for all types of dyes. Leopold Scheflan

The dyeing of staple-rayon woven fabric mixtures according to the semiwool metachrome process. Pusch. *Farber u. Chemischreiniger* 1939, 32–3; *Chem. Zentr.* 1939, II, 1171.—Descriptive. Leopold Scheflan

The dyeing of cotton. Frische. *Färber u. Chemischreiniger* 1939, 20–2; *Chem. Zentr.* 1939, I, 3962.—A 6 discussion of the structure of cotton and phenomena occurring during dyeing operations. Leopold Scheflan

Dyeing casein fibers. C. H. S. Tupholme. *Textile Colorist* 61, 803–6, 852(1939).—The manuf., properties, and dyeing of casein fiber are described. R. K. W.

The dyeing of jute. D. Carter. *J. Textile Inst.* 30, P328–39(1939); cf. *C. A.* 34, 6302.—A brief survey is given of the literature on the subject, followed by descriptions of methods of dyeing jute using basic, acid, direct 7 cotton, sulfur, vat, and azoic dyestuffs. R. K. W.

Dyeing pale shades on jute with neutral acid colors. C. Wouble. *Textile Colorist* 62, 58(1940).—Practical. Ruby K. Worner

Technique of dyeing and printing on combed ribbon. Louis Bonnet. *Teintex* 4, 566–71(1939).—Considerable detail is given regarding the washing of wools, their degreasing, and bleaching. Dyeing and printing details 8 with several bath formulas are included. S. Z.

New ideas in rayon printing and characteristics of that technique. P. Baffroy. *Teintex* 4, 571–6(1939).—Details of a cleaning process for rayon pieces are given. To minimize swelling of the fibers the pieces are treated with 8–12°Bé $Al(OAc)_3$ and dried at a moderate temp. The pH must be carefully watched to prevent $Al(OH)_3$ from forming and also to prevent too much free acid. In rayon printing substantive dyes, basic dyes, mordant 9 dyes, vat dyes, the indigosols, the Rapidogens and aniline black are used. On pure rayon, vat dyes are used chiefly because of simplicity of application. Thickening agents mixed with the vat dyes are starch, tragacanth, and gum arabic. Much detail regarding the use of the above dyes is given. Sample dye-bath formulas are included. Saverio Zuffanti

Screen printing on nontextile surfaces. G. S. Ranshaw. *Dyer* 82, 255–6(1939).—Modifications and precautions

are given for applying screen printing procedures to such materials as oilcloth, leathercloth, rubberized fabrics and plastic materials, including Pliofilm and cellophane. Ruby K. Worner

Embellishing printed goods through spray printing. Raffaele Sansone. *Textile Colorist* **61**, 768–72(1939).—Applications and advantages of spray printing are cited. Formulas are given. Ruby K. Worner

Mordanting of silk with chromium salts. IX. K. Hisiyama. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 352–5(1939); cf. *C. A.* **31**, 6887[9].—From an inspection of absorption curves for $Cr_2(SO_4)_3$ and Cr_2Cl_6 solns. for wave lengths between approx. 3700 and 6500 A., $Cr_2(SO_4)_3$, which has greater mordanting efficiency than Cr_2Cl_6, is more bathochromic and hyperchromic. Both hyperchromic and bathochromic effects are produced either (1) by raising the temp. of the solns. or (2) by increasing the basicity of the salts, thus indicating that with increase of temp. hydrolysis increases, producing basic Cr salt and free acid. NaCl has little or no effect on absorption by Cr_2Cl_6 soln., but Na_2SO_4, especially at 96°, added to Cr_2Cl_6 soln. shows the hyperchromic and bathochromic effects of $Cr_2(SO_4)_3$. If it is assumed that light absorption by the Cr salts is due not to the salts themselves but to the semicolloidal basic Cr salts (Cr hydroxide adsorbing acid radical), then there exists a close relationship between mordanting efficiency and absorption curve of the mordanting liquor. George Ayers

Intermittent coloration of cotton, rayon, wool, and silk threads used to produce spotted and striped effects on weaving. P. Merey. *Teintex* **4**, 588–91(1939); cf. *C. A.* **33**, 3592[6].—A discussion of the equipment used for this process. Drawings of the equipment are included. Saverio Zuffanti

Tone-in-tone style. H. P. Baumann. *Textile Colorist* **62**, 49–50, 60(1940).—Formulas are given for tinting white discharge prints after processing. Since the 2nd dyeing covers the original dyeing as well as the white discharge, the style is called "tone-in-tone." R. K. W.

The use of fuller's teasel among the dyers and cloth manufacturers. C. D. Mell. *Textile Colorist* **61**, 777 (1939).—Fuller's teasel (*Dipsicus fullerum*) yields a yellow dye and tannin. Its chief importance in the textile industry, however, is the use of its globular flowering head for raising the nap on cloth. Ruby K. Worner

The early days of the (British) Textile Institute. Geo. Moores. *J. Textile Inst.* **30**, P400–3(1939). R. K. W.

Textile progress. E. W. K. Schwarz. *Textile Colorist* **62**, 25–9(1940).—An address. Among the developments reviewed are the use of phthalocyanine pigments in textile printing and dyeing (Aridye process), the role of resins in textile processing and for water softening, rubberizing treatment for wool fibers, wool carpet with rubber latex base, use of quarternary-ammonium compounds in finishing, Velan waterproofing process, and the new textile fibers, notably casein, glass, nylon, and vinyon. Ruby K. Worner

Toward the simplification of textile-chemical processes. J. Wakelin. *Textile Colorist* **61**, 731–5, 780(1939).—Short cuts in bleaching cotton, simplified procedures in dyeing with azoic dyes and aniline black, and merging of operations for producing crease resistance and water-repellency are cited as examples of simplification in textile processing. Ruby K. Worner

Important chemical developments in the textile industry. E. W. K. Schwarz. *Textile Bull.* **57**, No. 11, 12, 16–17; No. 12, 19, 47, 50–1, 54–5(1940).—Sec *C. A.* **34**, 1490[3]. Leopold Scheflan

Vinyon—a new textile fiber. F. Bonnet. *Textile Bull.* **57**, No. 11, 18–19, 31(1940); *Can. Textile J.* **57**, No. 4, 38, 40–1(1940); cf. *C. A.* **34**, 1490[6].—A discussion of vinyl chloride and acetate, the blending of resins prepd. from them, industrial uses, the manuf. of vinyon, tenacity and elongation control, high chem. resistance of vinyon yarns and fabrics to acids and alkalies, methods of dyeing and com. applications. L. S.

Protein artificial fiber. I. Spinning of casein alkali solution. H. Z. Utaka, K. Nasu and S. Oriu. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 397–8(1939).—The dispersion of casein alkali solns. was markedly improved by addn. of small quantities of Cu, Ni, Co, Fe or Zn hydroxides, resulting ultimately, after processing, in beautiful wool-like casein fibers. A change in the degree of dispersion of the casein soln. does not appreciably affect the tensile strength or elongation of casein fiber, but a change in spinning velocity or addn. of a large quantity of metallic hydroxide gels does exert a marked effect. Data on the ripening time of casein alkali soln. are given. Mg salts, formalin, acids, etc., were used as coagulating media; for permanent coagulation in a properly concd. soln., 48–72 hrs. or more is required. Casein fiber thus obtained had a max. tensile strength of 1.3 g. per denier and the elongation was 14.0%. **II. Manufacture of soybean-protein fiber.** H. Z. Utaka and K. Nasu. *Ibid.* 398.—Soybean protein was softened in water and dispersed in a soln. of NaOH, KOH or NH_4OH. A mixt. of equal parts of this alkali soln. and casein soln. was forced through spinnerets (of the rayon type) into a coagulation bath contg. an inorg. or an org. acid and Mg salts. The fiber, which was wool-like and faintly yellow, had an av. tensile strength of 0.71 g. per denier and elongation of 5.2%. George Ayers

Effect of climatic exposure on textile fibers and fabrics. A. C. Thaysen, H. J. Bunker, K. R. Butlin and L. H. Williams. *Ann. Applied Biol.* **26**, 750–81(1939).—Fabrics were exposed to bacterial attack under a variety of climatic conditions. Exposure of cellulose fibers in sun and shade caused a lowering of viscosity; but from soil exposure, with more extensive microbiol. destruction, there was no effect on viscosity. Viscosity measurements on Indian, Egyptian and American cotton are shown in graphs. All sun- and shade-exposed fabrics, including silk and wool, increased in acidity during the first 3 months of exposure but showed little increase on further exposure. In microbiologically active soil, cellulose acetate rayon was completely resistant while cellulose, wool, silk and cellulose rayon fabrics disintegrated. C. H. R.

Reserve effect on artificial fiber cloths. Louis Denis. *Teintex* **4**, 669–70(1939).—D. explains the treatment and dyeing of mixed acetate and viscose rayon cloths where it is desired to dye one and not the other and vice versa. Saverio Zuffanti

Mongolian sheep wool. VI. Behavior of Mongolian sheep wool toward dyes. Mitio Saito and Tadasige Tinzei. *Rept. Inst. Sci. Research Manchoukuo* **3**, 276–82 (1939)(Abstracts in English); cf. *C. A.* **33**, 7577[7].—A comparison of the dye-absorbing ability of Mongolian sheep wool with that of merino wool indicated that the former generally absorbed more dye, especially basic or direct dyes. This is in accord with previously reported findings that the former is also more susceptible to chem. reagents, and is interpreted to mean that Mongolian wool is either composed of more loosely combined materials or more labile compds. **VII. Difference of the length, the fineness, the composition and the general quality of Mongolian sheep wools obtained from different parts of the sheep body.** *Ibid.* 283–301.—The av. semi-annual yield of wool from Mongolian sheep was 944 g. per head. The fiber varied in grease and suint contents from 2.6 to 10% and 4.5 to 12%, resp., depending on the part of the sheep body from which they were taken. The relative amts. of coarse and fine wool in the fleece also varied with location on the sheep body, the back, side and shoulder parts contg. 15 to 38% of coarse fibers, compared with 60% in the top and arm piece parts. The longest fibers were found in the fleece, back and neck parts. The data indicate that the best quality of wool is obtained from the back, fleece, side and shoulder parts of the sheep body. Milton Harris

Problems of wool research for science and industry. E. Elöd. *Klepzig's Textil-Z.* **43**, 105–6(1940).—An address. Leopold Scheflan

Felting-fulling of wool cloth. Louis Bonnet. *Teintex* **4**, 620–31(1939).—A detailed review of felting-fulling is developed historically. References. Saverio Zuffanti

Manufacture and properties of lanital, artificial wool.

derived from the casein of milk. Lo Duca. *Génie civil* 115, 317–20(1939).—Recent improvements in Ferretti's method as carried out in Italy are discussed. The toughness and elasticity of lanital have been greatly increased. Chem. and microscopic tests for distinguishing between natural wool and lanital are given. Production in Italy has fallen off about 50% since 1938 owing to lack of milk. Ann Nicholson Hird 1

Note on lanital—its determination in wool mixtures. Eliseo T. Huergo. *Industria y quim.* 2, 177–81(1939).—The method proposed for the detn. of the lanital content of wool mixts. is based on the fact that wool contains only traces of P, while lanital, being a casein, contains considerable fixed amts. of P. An analysis of the ashes of a burned sample, yielding their content of P_2O_5, therefore throws light on the compn. of the sample. The advantages of this method over those used heretofore are pointed out in conclusion. 7 references. A. H. Krappe 2

Effect of water vapor on wool fibers. J. M. Gaudit. *Teintex* 4, 618–19(1939).—The important spinning mills that prep. skein wool steam the cops in an autoclave under reduced pressure for a few min. This operation gives the skeins a very regular and flexible quality but it does not eliminate the sponging prior to dyeing. S. Z. 3

The action of alkalies on wool. E. Schmidt. *Teintex* 4, 563–6(1939).—Treating wool with alk. solns. produces 3 effects: (*a*) the wool absorbs a certain amt. of the alkali, (*b*) more or less swelling occurs, (*c*) the keratin mol. is hydrolyzed. Hydrolysis occurs more readily in alk. than in acid soln. Swelling of wool increases with the pH. The action of the following substances is discussed: caustic alkali, alk. earths, NH_3, Schweitzer's soln., org. bases, alk. carbonates, borax, Na_3PO_4, silicates and soaps. Saverio Zuffanti 4

Effects of concentrated aqueous and certain nonaqueous solutions of alkali upon wool. Martin R. Freney and M. Lipson. *Nature* 145, 25–6(1940).—The S and N contents of merino wool are scarcely altered by immersion in 52% NaOH up to 30 min. The surface structure of the fiber is unaltered by similar treatment up to 5–10 min. Wool treated with concd. NaOH absorbs acid dyes evenly and a woven fabric treated with 52% NaOH soln. shows a decrease in shrinkage on washing. E. D. Walter 5

Some detergent problems of the woolen and worsted industries. H. Phillips. *Wetting and Detergency Symposium*, Feb. 19–20, 1937, *Brit. Sect. Intern. Soc. Leather Trades' Chem.* 175–83. **The penetration of fabrics by detergent solutions.** J. Powney. *Ibid.* 185–96.—Reviews. M. M. Piskur 6

The influence of science on the cotton industry. F. C. Toy. *J. Textile Inst.* 30, P387–99(1939).—An address. Ruby K. Worner 7

The reactions of cellulose fibers and their materials during bleaching. P. Merey. *Teintex* 4, 531–7(1939).—Na_2CO_3 is better than NaOH for removing grease from cotton. Petroleum hydrocarbons, turpentine and tetralin are added more easily to liquefy the waxes. Waxes, which consist of unsaponifiable substances, alcs. of high mol. wt., and unsaponifiable esters and acids such as cerotic, and carnaubic acids which form insol. soaps are difficult to remove. The glycerides of palmitic, stearic and oleic acids become sapond. easily. From the alk. ext. can be formed alk. salts and amino acids such as dihydroxy- or dimethoxyphenyl-α-aminopropionic acid, which sep. from the stable pectins along with galacturic acid and similar compds. Hydrolysis of the ext. and decompn. of the pectins give acids and sugars (pentoses, hexoses). M. discusses the boiling and bleaching of linen and gives the conditions of operation. Chlorination makes the lignopectins sol. in alk. solns. The hypochlorites used for bleaching act as chlorinating agents as well as oxidants. Chloropropionic acid was identified in the alk. ext. Saverio Zuffanti 8

The science of jute. S. G. Barker. *J. Textile Inst.* 30, P273–304(1939).—The formation of jute fiber in the plant; the chem. nature of jute; the measurement of color and luster of jute fibers; strength; the influence of strength of atm. conditions, constituents (wax, pectin, and lignin), and various chem. treatments; and the moisture relations are discussed. A note on the nature of crude jute fiber is included. Cf. following abstrs. R. K. W. 9

The production of jute. R. S. Finlow. *J. Textile Inst.* 30, P352–73(1939).—Deals chiefly with its cultivation in India. Ruby K. Worner

Some economic problems of the jute industry. J. K. Eastham. *J. Textile Inst.* 30, P374–8(1939). Ruby K. Worner

Chemistry in the processing of jute. Herbert L. Parsons. *J. Textile Inst.* 30, P311–7(1939).—The phys. and chem. properties of jute are described and compared with those of cotton and flax. The prepn. of jute for spinning, including retting and batching, warp dressing, bleaching, assessing chem. attack, mercerizing and woolenizing, dyeing, rotproofing, waterproofing and fireproofing are described. Ruby K. Worner

The swelling of jute fibers. W. G. Macmillan. *J. Textile Inst.* 30, P305–10(1939); cf. *C. A.* 33, 7575[8].—A discussion of the swelling properties of jute, including descriptions of methods for measuring swelling. Direct methods include measurement of the fiber diam. using a microscope and micrometer, or the diffraction method; and measurement of the vol. of the fibers before and after swelling. Indirect methods are by weighing and by sp.-gr. detn. (M. and Sen, *C. A.* 33, 7575[8]). Studies of swelling-diam. relationships indicate that swelling diminishes with increase of diam., at first very rapidly, and then more slowly. Ruby K. Worner

Notes on the interpretation of jute preservation experiments with special reference to naphthenic acid derivatives, especially the copper soap. H. Courtney Bryson. *J. Textile Inst.* 30, P346–9, P349–51, P429–30(1939).—Better results were obtained with copper naphthenate than with mercury or zinc naphthenates. R. K. W.

Rotproofing of jute. H. A. Elkin and W. A. S. White. *J. Textile Inst.* 30, P340–6(1939).—See *C. A.* 34, 270[6]. Ruby K. Worner

The emulsification of [jute] batching oils. Alexander King. *J. Textile Inst.* 30, P379–86(1939).—See *C. A.* 34, 890[9]. Ruby K. Worner

Application of chlorinated rubber-tar products to jute fabrics. David D. Pratt and Roy Handley. *Bull. Rubber Growers' Assoc.* 21, 521–6(1939).—Blends of chlorinated rubber and tars (cf. *C. A.* 31, 1182[8]) can be readily emulsified, and products thus formed are suitable for impregnating jute cloth as a means of protection against water penetration and rotting. Woven jute soles impregnated by dipping in chlorinated rubber-tar blends at 80–90° become more flexible, stronger and more resistant to penetration by water. Jute thread can be satisfactorily impregnated by immersion in chlorinated rubber-tar emulsions, with formation of flexible, nonstaining yarn having good tensile strength. Jute fabrics coated with chlorinated rubber-tar blends can be used as bonding and reënforcing agents in multilayer cardboard or paper board. In this case the technique is to press the laminated materials at 50–70° for several min. under light pressure. C. C. Davis

The rinsing, brightening and oiling of flake bast. M. Münch. *Wollen- & Leinen-Ind.* 59, 305–7(1939); *Chem. Zentr.* 1939, II, 3761.—Rinsing with washing is a necessary addn. to the processing treatment for the purpose of the removal of noncelluloses from the fiber. High wetting action, emulsifying power and good adsorption of the emulsified contaminants are the prerequisites of a good washing agent. Suitable com. products are the Verapols, fat-solvent soaps (Verapol soap, Verapol N extra, Tallosan 34N) for the brightening and softening of the flake bast and Stoko oil HFP for the oiling. L. Scheflan

What is hydrophobing? Carl-Heinz Fischer. *Färber u. Chemischreiniger* 1939, 46–7; *Chem. Zentr.* 1939, II, 561–2.—Hydrophobing is the elimination in the cellulose mol. of the OH groups which produce swelling. Well-hydrophobed textiles should be stable to wet and chem. washing and dyeing. The Persistol process of the I. G. Farbenind. is described. Leopold Scheflan

Alginic acid and alginates. P. Colomb. *Teintex* 4,

653–6(1939).—Alginic acid (I), found in large quantities in brown algae, is classified among the pectic compds. I has a configuration similar to that of cellulose and pectic acid. I is insol. in all ordinary solvents but its salts are sol. in H_2O, forming very viscous solns. The viscosity of the Na and Mg salts varies with pH, having a max. viscosity at pH 7. The Al and Zn alginates dissolve in NH_4OH, forming complexes. The Ag, Hg and Pb alginates are insol. Viscometric detns. of the mol. wt. of I indicate the presence of a glucoside chain and methoxylic detns. can be used to det. the length of the chain. The alginates are used in sizing fibers and fabrics. Triethanolamine alginate aids the emulsification of linseed oil, cottonseed oil and paraffin. The pptn. of the insol. Al and Cu alginates on fibers can be used for waterproofing. S. Z.

The snares of pH control. E. Kornreich. *Dyer* **82**, 359–60(1939).—In textile processing, not only pH, but also other circumstances must be considered; e. g., the titration alky. or acidity, the influence of the treated fiber, and the method of procedure. Ruby K. Worner

Industrial water for the textile industry. L. Schwabe. *Klepzig's Textil-Z.* **43**, 50, 52, 75–6(1940).—A discussion of the compn. and properties of the water for washing, cleaning and dyeing, methods of purification, and the use of wetting, emulsifying and chem. washing agents in place of soap. Leopold Scheflan

An improved abrasion-testing apparatus. W. Davis. *J. Textile Inst.* **30**, T133–6, T172(1939).—Results of tests on knitted fabrics are given to show the effect of a shrinkproofing process and of mixing casein fiber with wool on the resistance to abrasion. Ruby K. Worner

A low-cost water-seal fumigator. A. C. Johnson. *U. S. Dept. Agr., Bur. Entomol. Plant Quarantine* **ET-154**, 2 pp.(Jan., 1940).—The fumigator is designed for fumigating small lots of cotton samples and other commodities with either CS_2 or MeBr. K. D. Jacob

Thorough cleaning in the finishing of textiles. W. Pfluumm. *Klepzig's Textil-Z.* **43**, 90–1(1940).—The following stages in the cleaning operation are discussed: removal of sweat, grease and waxes, etc., from wool and cotton by means of soda, NH_4OH, NaOH, soap or synthetic washing agents; removal of chem. textile treating assistants, fats and sizes by means of soap, fatty alcohol sulfonates or fatty acid condensation products; dry cleaning with chem. solvents; the use of fat solvents in wet-washing operations. The recently developed com. product Lanaclarin 205 contains an alcohol sulfonate and several fat solvents differing in properties and solvent power; its use is described. Leopold Scheflan

Recent developments in textile cleaning and finishing. N. C. Cooper. *Textile Colorist* **61**, 811–13(1939).—An address. Ruby K. Worner

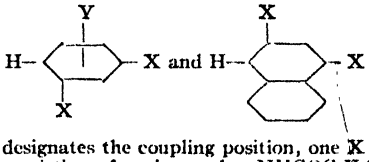
Aluminum triformate as a waterproofing agent. Marcel Burnand. *Teintex* **4**, 585–8(1939).—The prepn. and soly. of $(HCOO)_3Al$ at various temps. (20–70.6°) are reviewed and methods of applying it to fabrics discussed. Saverio Zuffanti

The fireproofing of fabrics. Louis Diserens. *Teintex* **4**, 671–7(1939).—D. discusses the use of NaCl, KCl, $AlBr_3$, AlF_3, $CaSO_4$, $MgSO_4$, $(NH_4)_2SO_4$, $ZnSO_4$, KNO_3, $Ca(NO_3)_2$, Na_3PO_4, K_3PO_4, $Ca_3(PO_4)_2$, $Mg_3(PO_4)_2$, Na_2HPO_4, $(NH_4)_2HPO_4$, $(NH_4)_3PO_4$, $MgNH_4PO_4$, Na_2CO_3, Na Zn and Al borates, silicates, $Al(OH)_3$ and Na stannate. Details are furnished for the use of sol. salts, insol. salts formed in the fibers, use of chlorinated rubber, and the use of cellulose esters and synthetic resins. S. Z.

Polymerization and production of new synthetics [in textile industry] (Harold) **13**. Disposition of soap in detergent operations (Colt, Snell) **27**. Catalytic action of clays and other silicate minerals and compds. on aromatic amines and phenols [adsorbents for dyes] (Eisenack) **10**. Prepn. and utilization of nitrosoamines [dyes from] (Voznesenskiĭ, Izrail'son) **10**. Benzenecarboxylic acid fluorides contg. trifluoromethyl groups [as intermediates in making dyes] (U. S. pat. 2,181,554) **10**. Assistants for use in leather and textile treatments (U. S. pat. 2,181,476) **13**.

Cotton Year Book, 1939. New York: New York Cotton Exchange. 249 pp. $2.50. Reviewed in *Rayon Textile Monthly* **21**, 130(1940).

Azo dyes. Arthur R. Murphy and Henry Jordan (to E. I. du Pont de Nemours & Co.). U. S. 2,182,347, Dec. 5. Dyes are produced which dye cotton and regenerated cellulose yellow and brown shades, etc., and which in the acid form have the general formula $Aryl—N{=}N—(Aryl_1—N{=}N—)_{n-1}—(Aryl_2—N{=}N—)_{n-1}—R$ in which Aryl is the residue after diazotization of one of a group consisting of naphthylaminemono- and -di-sulfonic acids, aminonaphtholdisulfonic acids and aminobenzenemonosulfonic acids; $Aryl_1$ and $Aryl_2$ are each from the group consisting of the residues of aminobenzene, aminobenzene substituted not more than twice by at least one of a group consisting of alkyl and alkoxy, aminobenzenemonosulfonic acids, aminobenzoylaminotoluidines, naphthylamine and naphthylaminemonosulfonic acids; each n is an integer not greater than 2; R is one of a group consisting of



where H designates the coupling position, one X is one of a group consisting of amino and $—NHCOC_6H_4Z$, where Z is one of a group consisting of amino and aminobenzoylamino and the amino groups are in one of the positions meta and para to —CO—, and the other X is $—NHCOC_6H_4Z$, Y is H or methyl; said compound having at least 2 solubilizing groups. U. S. 2,182,348 relates to products which have similar use and which comprise a plurality of mols. of the residue of an azo dye coupling component which is devoid of solubilizing groups, the residue after azotization of the Na salt of a compd. having at least two primary amine groups and azo bridges connecting the residue of the coupling component and the residue of the azotized compd., the azotizable compd. being of the formula $Aryl—N{=}N-(Aryl_1—N{=}N—)_{n-1}-(Aryl_2—N{=}N—)_{n-1}C_6H_3X_2$—2,4 in which aryl is one of a group consisting of the residue after diazotization of a naphthylaminedisulfonic acid, an aminonaphtholdisulfonic acid, a naphthylaminesulfonic acid and an aminobenzenemonosulfonic acid; the radicals $Aryl_1$ and $Aryl_2$ are each from the group consisting of the residues after diazotization and coupling of aminobenzene, aminobenzenemonosulfonic acids, aminobenzoylaminotoluene, naphthylamine, naphthylaminemonosulfonic acids, and aminobenzene substituted not more than twice by at least one of a group consisting of alkyl and alkoxy; n is an integer not greater than 2; one X is one of a group consisting of amino and $—NHCOC_6H_4Z$, where Z is one of a group consisting of amino and aminobenzoylamino and the amino groups are in one of the positions meta and para to —CO—, and the other X is $—NHCOC_6H_4Z$, the compd. having at least two solubilizing groups.

Azo dyes. Achille Conzetti (to J. R. Geigy A.-G.). U. S. 2,182,721, Dec. 5. From components such as 2′-methyl-2-aminodiphenyl ether-4-sulfonic acid, 2,8-aminonaphthol-3,6-disulfonic acid and *p*-toluenesulfonylchloride, etc., dyes are produced, of the general formula AN:NBN:NC, where A means an aromatic radical contg. at least two benzene nuclei connected by an O bridge. B means a bivalent radical from the group consisting of radicals of the benzene and naphthalene series, A and B contg. at least two sulfonic acid groups, and C means the radical of a phenol coupled in the *p*-position, bearing at the O atom the radical $—SO_2D$, where D represents an aromatic radical of the benzene series, being orange to bright red to yellowish and reddish brown dyes whose dyeings are characterized by a pure color shade, an excellent fastness to light, a good fastness to alk. and acid fulling and a very good fastness to sea water. Several examples are given.

Colloidized azo dye compositions. Moses L. Crossley, Roy H. Kienle and Alfred L. Peiker (to Calco Chemical Co.). U. S. 2,181,800, Nov. 28. A powder is prepd., suitable for use as a pigment and having as its major coloring component a water-insol. azo color, a sufficient portion of the individual color particles being coated with an autodispersibility producing "protective agent" in an amt. sufficient so that the powder as a whole possesses an autodispersibility of not less than 75% and a total dispersibility of not less than 90% with a substantial freedom from aggregates in the total dispersion visible as discrete particles by the naked eye.

Metal compounds of azo dyes. Hugo Schweitzer (to General Aniline Works). U. S. 2,182,055, Dec. 5. Numerous examples are given of dyes, giving brown and other shades, for coloring wool, *lacquers*, etc., and which include Cr or Fe compds. of azo dyes such as those formed from 1-methyl-3,4-diaminobenzene and 1-(3'-sulfophenyl)-3-methyl-5-pyrazolone and other components of generally similar character.

Sulfur dyes. Robert L. Perkins (to National Aniline & Chemical Co.). U. S. 2,182,350, Dec. 5. S dyes dyeing unmordanted cotton brown shades are obtained by the reaction of a 1,8-aminonaphthol disulfonate, an alkali metal polysulfide contg. at least 2 atoms of S for each atom of alkali metal, and an aldehyde such as formaldehyde. U. S. 2,182,351 relates to S dyes of generally like character in the production of which the aldehyde used is a furanaldehyde.

Phthalocyanine dyes. Fritz Mühlbauer (to General Aniline Works). U. S. 2,182,763, Dec. 5. By admixing phthalonitrile with sodamide dimethylaniline and adding to the mixt. thus obtained, while heating (suitably to about 70–80°) an aliphatic alc. such as amyl alc., a dye is obtained which is of greenish blue color. Several examples are given.

Reserve effects under dyeings of ester salts of leuco vat dyes. Ernst Tschan (to Durand & Huguenin A.-G.). U. S. 2,182,140, Dec. 5. A process of producing reserve effects under dyeings obtained with the use of ester salts of leuco vat dyes involves producing upon the textile material local resists against the ester salts by applying to the material locally an alk. printing paste contg. a thickening agent and dimethylbenzylphenylammonium chloride or other water-sol. compd. of the general formula $R_1R_2R_3R_4NX$, where R_1, R_2, R_3 and R_4 designate alkyl, aralkyl or aryl radicals having no sulfo or carboxy substituents, while X stands for the anion of a water-sol. salt.

Dyeing artificial fibers produced from casein. Marino Fortunato (to "Montecatini" Società, generale per l'industria mineraria e chimica). U. S. 2,182,553, Dec. 5. Artificial fibers produced from casein are prepd. for dyeing with chrome dyes by treating them with a dil. aq. mono-Na phosphate soln. (suitably at 40–50°). Cf. *C. A.* **33**, 3608[9].

Coloring materials of cellulose acetate or the like. Henry Dreyfus and Robert W. Moncrieff (to Celanese Corp. of America). U. S. 2,182,963, Dec. 12. A dyeing soln. is used formed by dissolving a vat dye such as Ciba Blue 2B in an org. base such as pyridine and reducing the vat dye in the substantial absence of water to form a leuco compd., and dilg. the resulting compn. with a neutral org. liquid such as gasoline and, after the resulting liquid is applied to the material to be dyed, the leuco compd. of the dye is oxidized on the material. U. S. 2,182,964 relates to the like use of a bath contg. an acid such as HOAc, a salt of an ester of a leuco vat dye, and an org. liquid medium such as gasoline contg. at most only a small proportion of water, with subsequent treatment of the material with an acid oxidizing agent such as an acidified aq. $K_2Cr_2O_7$ soln. to convert the dye deriv. to the parent dye.

Random dyeing apparatus for movable strands of material such as yarn. Ralph R. Janes. U. S. 2,182,752, Dec. 5. Various structural, mech. and operative details of a dye-spraying app., etc.

Condensation products. Soc. pour l'ind. chim. à Bâle, Fr. 839,529, Apr. 5, 1939. Products which are *dyes* are prepd. by causing condensing agents to act on compds. of the formula $(RNH)_nR'$, where n is 1 or more, R is a radical contg. groups by means of which the corresponding compd. may be vatted, R' is a chrysene radical, at least 1 of the C atoms of at least 1 of the R radicals and of the R', which are next to the imino group joined to the R and R', carry a H atom. The products may be treated with amines contg. groups by means of which they may be vatted, and then treated with condensing agents. Thus, di(1'-anthraquinonyl)-2,8-diaminochrysene (from dibromochrysene and 1-aminoanthraquinone) is heated in concd. H_2SO_4. The dye dyes cotton fast red shades. Other compds. which may be treated in the same way to produce dyes are described in Fr. 839,137.

Condensation products suitable for use as auxiliary agents in dyeing, or for rendering textile fibers repellent to water, or as fungicides or insecticides. Arnold Brunner (to I. G. Farbenind. A.-G.). U. S. 2,180,791, Nov. 21. By reactions such as those of paraformaldehyde and HCl with isooctylphenol or the like and further reaction of the product by heating with pyridine, compds. are obtained such as those of the general formula $C_5H_5N(Cl)CH_2C_6H_3(OH)R$ in which R represents an alkyl radical contg. at least 4 C atoms. Numerous examples with details are given.

Wetting agents for use in mercerizing, dyeing or other textile treatments, etc. Jerome Martin (to Commercial Solvents Corp.). U. S. 2,181,534, Nov. 28. Wetting agents are prepd. such as the oleic acid salts of 2-amino-2-propyl-1,3-propanediol and 2-amino-2-methyl-1,3-propanediol or other higher fatty acid salt of an aminohydroxy compd. of the structural formula: $HOCH_2C(X)(NH_2)CH(OH)Y$, where X represents H, or an alkylol or alkyl group contg. less than 4 C atoms, and Y represents H or an alkyl group, and in which the number of C atoms in X plus Y is less than 6.

Polymerization of ethyleneimines. Heinrich Ulrich and Walter Harz (to I. G. Farbenind. A.-G.). U. S. 2,182,306, Dec. 5. See Ger. 665,791 (*C. A.* **33**, 1160[7]).

Treating fibrous materials. International Latex Processes Ltd. Brit. 508,136, June 27, 1939. See Fr. 839,511 (*C. A.* **33**, 8034[2]). Brit. 508,137, June 27, 1939. See Fr. 839,512 (*C. A.* **33**, 8034[3]).

Yarn-conditioning apparatus. David E. Mills and George N. Taylor (to Universal Winding Co.). Can. 386,762, Feb. 6, 1940. Structural details.

Conditioning textile materials such as those containing cellulose acetate. Geo. W. Seymour (to Celanese Corp. of America). U. S. 2,182,323, Dec. 5. In order to give improved flexibility, etc., a conditioning fluid is used contg. a mineral oil, a softening agent such as a sulfonated oil, an aryl phosphate such as tritolyl phosphate, a higher fatty acid such as oleic acid, and an alkylolamine such as triethanolamine. Various examples are given.

Effect fabrics. Georges Rivat (to Henry Dreyfus). U. S. 2,182,321, Dec. 5. See Brit. 490,144 (*C. A.* **33**, 880[5]).

Multi-ply fabrics for making collars, etc. Thomas L. Shepherd. U. S. 2,182,882, Dec. 12. A process of making multi-ply woven fabric adapted for the manuf. of collars, cuffs, shirts, tablecloths, napkins and millinery involves immersing the plies of the fabric in a preformed cuprammonium soln. of cellulose, pressing the plies thus treated together, and treating the multi-ply woven fabric obtained in a coagulating bath to ppt. the dissolved cellulose which becomes intimately associated with the fibers of the woven fabric, and unites the plies together.

Warp sizing for rayon and other yarns. James T. Power and Ernest G. Almy. Brit. 508,068, June 22, 1939. See U. S. 2,142,801 (*C. A.* **33**, 3177[8]). Other softening agents, e. g., sulfonated or sapond. oils, may be used in addn.

Sizing rayon threads, etc. Ernst von Lippmann (to Böhme Fettchemie-G. m. b. H.). U. S. 2,182,887, Dec. 12. Treatment of rayon threads, yarns, skeins, etc., such as those of viscose rayon to effect binding in prepn. for weaving involves coating with a stable water-insol. highly acetylated saccharide having not more than 2 monosaccharide radicals in the mol. After weaving this sizing

is removed, as by treatment with water at 80–90° for an hr.

Cleaning fabrics containing a cellulose ether. Edmond H. Bucy (to Atlas Powder Co.). U. S. 2,181,691, Nov. 28. A process of cleaning and renovating a fabric having an impregnation of a water-insol. cellulose ether to protect it against water-spotting and adherence of dirt without substantially altering the flexibility, feel and appearance of the fabric and without appreciably increasing the stiffness of the fabric comprises dry-cleaning the fabric by subjecting it to the action of dry-cleaning solvents, thereby removing from the fabric the protective water-insol. cellulose ether impregnation together with adhered and imbedded dirt, then immersing the fabric in a dil. soln. of a water-insol. cellulose ether in a volatile org. solvent therefor, and allowing the volatile org. solvent to evaporate from the fabric, whereby the fibers of the fabric are impregnated with a quantity of the cellulose ether such that the fabric is protected against water-spotting and adherence of dirt, while its flexibility, feel and appearance are not substantially altered and its stiffness is not appreciably increased.

Waterproofing fibrous materials such as leather, paper or textile materials. Edward B. Bell (to Hall Laboratories, Inc.). U. S. 2,182,045, Dec. 5. The material is treated with a soln. of a salt of an amphoteric metal such as alum, a water-sol. soap such as Na oleate, an alk. solvent for the metallic soap, such as aq. NH_3, which evaps. at a temp. not harmful to the material being treated, and a mol. of dehydrated alkali metal phosphate, and the solvent is evapd. to deposit the metallic soap.

Rubberizing regenerated-cellulose rayon. Joseph I. Taylor (to North American Rayon Corp.). U. S. 2,181,538, Nov. 28. Regenerated-cellulose fibers are coated with rubber contg. a small proportion (suitably about 4–5%) of an hydroxyalkylamine such as triethanolamine to increase the adhesion of the rubber to the fibers.

Carroting animal fur fibers for felting. Anthony P. Giuliano. U. S. 2,181,884, Dec. 5. Fibers such as those of furs are treated with a soln. contg. phosphotungstic or phosphomolybdic acid, and an alkali such as NaOH to give the soln. a pH above 13 or an acid such as HNO_3 to give a pH below 3.

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

Wetting as a factor in the application of paints and varnishes. W. Esmond Wornum. *Wetting and Detergency Symposium, Feb. 19-20, 1937, Brit. Sect. Intern. Soc. Leather Trades' Chem.* 97–105. **The wetting of pigments.** Geo. A. Campbell. *Ibid.* 107 16.—Reviews.
M. M. Piskur

Measurement of the resistance to corrosion of varnish and paint films on iron by the method of electrode potentials. A. M. Lazarev and E. V. Iskra. *Trudy Inst. Lakov i Krasok* 2, 191–207(1939). —The resistance to corrosion was measured on iron rods covered with two layers of the protecting agents: zinc oxide, white lead, lithopone, iron oxide, lead oxide, green lead, lead chromate, ocher, and naphthenates (all in natural drying oil). The electrolytes investigated were NaCl 3%, KCl 3%, H_3PO_4 3%, CH_3COOH 3%, Tilquist soln. (HCl 5.9% and NH_4Cl 10%) and dil. Tilquist soln. (HCl 3%, NH_4Cl 10%). The potential was measured first after 5 min., and then every hour the first day and then twice a day. The expts. are described in detail. The corrosion is greater in a flowing electrolyte than in a stationary one. A. A. B.

A new method for the determination of the adhesion of varnish and paint films. S. V. Yakubovich and E. V. Iskra. *Trudy Inst. Lakov i Krasok* 2, 156–67(1939).—A strip of film is removed by means of a sloping knife which permits obtaining a quant. characteristic of the adhesion of the nitro films to the surface of any material. This "adhesiometer" produces results which can be duplicated. The adhesion can be characterized by the effort needed to remove the film from a unit of surface. Various formulas are deduced. A. A. Boehtlingk

The shrinking of varnish and paint films. S. V. Yakubovich, E. V. Iskra and L. A. Kolosova. *Trudy Inst. Lakov i Krasok* 2, 149–56(1939).—The shrinkage of varnish and pigment films after drying was measured on a specially constructed apparatus after the removal of the films from the carrying surfaces. Films of artists oil paints and nitro films have a very extended shrinkage period after practical drying. The value of the shrinkage depends upon the material and the compn. of the films. In oil paints a max. shrinkage was observed for a definite amt. of oil. A. A. Boehtlingk

Water-miscible emulsions of paints and lacquers. K. Popov. *Maslobo˘no Zhirovoe Delo* 15, No. 5, 28–30 (1939).—Preliminary expts. in the prepn. and testing of oil-in-water paint pastes are discussed. The pastes were prepd. from dehydrated castor oil (acid no. 22, I no. 81.7, viscosity 10.2) and sardine oil boiled with 10% Mn-Ca drier to acid no. 13.7, I no. 92.6 and viscosity 1.2 (ball viscometer). The best product was obtained with oil 33.41, lithopone 39.81, dry casein 3.31, phenol 0.06 and 1.5% NH_4OH 23.41%. The pastes, when dild. with water, can be brushed but not sprayed on wood or metal surface. The coating dries in 48 hrs. In the hardness, elasticity and resistance to water the resulting films are inferior to those formed by common oil paints.
Chas. Blanc

Mural paintings in the cave temple at Sittannavasál—investigation into the method. S. Paramasivan. *Tech. Studies Field Fine Arts* 8, 82–9(1939).—A first coat of rough plaster, about 2.5 mm. thick, had the following compn.: moisture 2.14, CO_2 18.07, loss on ignition (excluding moisture and CO_2) 0.65, SiO_2 48.91, Al_2O_3 + Fe_2O_3 3.98, CaO 24.37, MgO 0.35, SO_3 0.11, undetd. (mostly alkalies) 1.39%. It received, while still wet, a lime wash to a thickness of about 0.5 mm. The pigments are identified as follows: white: lime; black: wood charcoal or lamp black; yellow and red: ochers; blue: ultramarine; green: terreverte; bluish green: mixt. of ultramarine and terre verte. A. H. Krappe

Effect of the method used in cleaning iron on the stability of the varnish-pigment film. S. V. Yakubovich and E. V. Iskra. *Trudy Inst. Lakov i Krasok* 2, 114–40(1939).—The chem. methods of cleaning metal surfaces facilitate the corrosion of surfaces subsequently covered with varnish-pigment films. The corrosion sets in with the appearance of small centers that destroy the paint, thereby creating conditions favorable for a rapid spread of the corrosion. Mechanical cleaning with brushes is considered the best method. Many expts. are described and 30 photomicrographs are reproduced. A. A. B.

An investigation into the resistance of various paints with special reference to the footing resistance of transmission poles. G. Limebeer, H. Plen and V. L. Webb. *Trans. S. African Inst. Elec. Engrs.* 30, 160(1939).—The elec. resistance of aluminum, Bitumastic, Nitrose Coal Tar, red lead and Ferrodor paints depended on the method of application and subsequent handling. Resistances of 10^3 megohms per sq. inch of surface were obtained until a breakdown voltage was reached. This was high for all paints as long as the coating remained continuous. George Papps

Luminescent pigments and paints. H. Courtney Bryson. *Oil Colour Trades J.* 96, 1181, 1183, 1235, 1237, 1239, 1242, 1285–6, 1393, 1395, 1397, 1451–3, 1502–3(1939); 97, 33–5, 82–3, 135, 137, 139(1940).—A review and discussion of theories of luminescence, properties of ZnS as regards phosphorescence and fluorescence, the manuf. of alk. earth phosphors, their heat-treatment, grinding, activators and activation, the nature

of emitted light, and the color of this light, decay rates of pigments, the influence of temp. on fluorescence and the rapid extinction of visible light known as quenching, sulfide phosphors used in luminous paints, the storage, physiol. effects, undercoatings with formulas, picking up of the undercoat, the proportion of fluorescent powder, luminous pigment pastes and finishing coats and protecting coats, the durability of luminescent paint, paint systems and their application, reflectors, ultraviolet filters and overrun lamps, used and applications of fluorescent substances, discharge and tube lighting with fluorescent pigments, screens used at the end of television cathode ray tubes, laundry inks, fluorescent glasses, visible light and the relationship of ethereal vibrations to other vibrations of longer or shorter wave length. W. H. Boynton

The relative merits of some of the more common yellow pigments in tints with white. John Lang. *Paint Varnish Production Mgr.* **19**, 328–30(1939). George Ayers

Red basic lead chromate pigments. B. A. Tsarev and A. M. Brusilovskiĭ. *Trudy Inst. Lakov i Krasok* **2**, 75–85(1939).—Pigments contg. various proportions of $PbCrO_4$, $PbSO_4$ and $PbMoO_4$ were prepd. from $PbCl_2$, K_2CrO_7, $(NH_4)_2MoO_4$, concd. H_2SO_4 and HNO_3 (80%). The following formulas are recommended: $PbCl_2$ 1000 kg., $K_2Cr_2O_7$ 363, H_2SO_4 32, $(NH_4)_2MoO_4$ 53; $PbCl_2$ 1000 kg., $K_2Cr_2O_7$ 320, Na_2SO_4 93, $(NH_4)_2MoO_4$ 53; $PbCl_2$ 1000 kg., K_2CrO_4 450, Na_2SO_4 3, $(NH_4)_2MoO_4$ 43. A wooden keg with a mechanical agitator is charged with 100 kg. $PbCl_2$, 6.3 cu. m. water is added and the mixt. is agitated for 1 hr. In another keg are dissolved 36.3 kg. $K_2Cr_2O_7$, 5.3 $(NH_4)_2MoO_4$, 3.2. H_2SO_4 (calcd. on monohydrate) and 3.2 cu. m. water, and the soln is poured during one hr. into the reactor. The mixt. is then agitated for an other hr. and the pigment obtained is washed, filter-pressed and dried. The pigment prepd. with Mo was more light stable than cinnabar and the basic pigment. Its light stability is the same as that of cadmium red, while its covering ability is 2.8 higher than that of the basic Cr pigments. The expts. are described.
A. A. Boehtlingk

The position of white lead in paint films (the "white lead phenomenon"). G. Zeidler and H. Hesse. *Paint Varnish Production Mgr.* **20**, 32, 34–6, 38–43, 54(1940).—The term "white lead phenomenon" is applied to the slightly cracked, mottled appearance of the paint film which represents a stage of weathering beyond which there is very little loss of substance for years. Both carbonate white lead and sulfate white lead paints show this phenomenon, which is largely independent of climatic conditions and of inert pigments present in the film. Paint films, contg. basic lead carbonate, after drying one week were extd. successively with petr. ether, Et_2O, C_6H_6 and tetralin. Water-sol. Pb compds., which made up 25–33% of the total Pb present, probably are in large part responsible for the "white lead phenomenon." Not all of the Pb extd. by the solvents is in the form of Pb soaps. Swelling water from paint films contg. white lead and white lead-zinc white, resp., had pH values of 5.3–5.5 and 5.4–5.65, resp., depending on the method of detn.
George Ayers

A practical hiding-power comparison of lithopone and titanium–calcium pigments in commercial flat wall paint. J. C. Thompson, Jr. *Paint Varnish Production Mgr.* **20**, 20–6(1940).—See *C. A.* **34**, 1198[3]. George Ayers

The darkening of lithopone. A. M. Brusilovskiĭ and B. A. Golynkin. *Trudy Inst. Lakov i Krasok* **2**, 251–61 (1939).—Lithopones contg. small amts. of indium darken rapidly; the presence of eosin prevents the darkening. The presence of In does not promote the appearance of yellow coloration; eosin inhibits the appearance of the yellow color. The exptl. results are plotted and tabulated.
A. A. Boehtlingk

Development of the lithopone industry in Italy. M. Sègre. *Atti X° congr. intern. chim.* **4**, 257–67(1939).
E. H.

Chalking of titanium dioxide pigmented exterior finishes. Outside house paints. R. E. Troutman and W. G. Vannoy. *Ind. Eng. Chem.* **32**, 232–7(1940).—It was found, in general agreement with the literature, that accelerated tests show poorer correlation with practical exposure conditions the greater the degree of acceleration. Increasing amts. of TiO_2 are being used in white outside house paints to obtain improved whiteness, cleanness, hiding power and durability. A newly developed type of pigment makes possible the use of TiO_2 in tinted outside house paints where the danger of excess chalking and fading have prevented any wide use of the usual TiO_2 pigments. Data and illustrations showing exposure results when this pigment is used are given.
Henry J. Wing

Gelation rates of tung and oiticica oils. D. Cannegieter. *Paint Varnish Production Mgr.* **19**, 366–8(1939); cf. *C. A.* **32**, 2766[3].—Gelation times are given for tung and oiticica oils for certain temps. between 261° and 359°, a min. occurring at approx. 350° for tung oil and at approx. 295° for oiticica oil. Increase in acid no. increases gelation time. Decompn. of tung oil starts at 350°; for oiticica oil it is evident at 295°. George Ayers

Semidrying oils in the manufacture of oil paints. A. A. Ivanova. *Trudy Inst. Lakov i Krasok* **2**, 261–5(1939).—The drying of natural drying oil after addn. of some semidrying oil plus 1% oil drier in soln. in white spirit proceeds normally if the original drying oil has normal drying properties. In the mixing of drying oils the drying of the original drying oil must be tested first and the dry residue of the oil drier must also be detd. The liquid oil drier must be taken with semidrying oils on the basis of the solid residue. The quality of films prepd. in the cold is slightly inferior to those prepared by cooking.
A. A. Boehtlingk

Semidrying oils in the manufacture of drying oils and lacquers. A. A. Ivanova. *Trudy Inst. Lakov i Krasok* **2**, 236–51(1939).—Thirty % corn oil, 20% rape-seed oil, 10% mustard-seed oil or 20% cottonseed oil can be combined with linseed oil to give mixts. of about the same drying speeds as those of natural drying oils; the hardness, elasticity, water resistance and heat stability of the films are satisfactory. Drying oils prepd. from polymerized oil mixts. dry more slowly than the unpolymerized oils, while a drying oil composed of a mixt. of oils which were individually polymerized dries still more slowly. The heat resistance is higher with the unpolymerized drying oils, and the polymerized oils are more water-stable and coagulate more rapidly. A great variety of expts. is described.
A. A. Boehtlingk

Polymerization of wood oil. R. M. Erastova, M. Oleshkovich and G. Aelanov. *Trudy Inst. Lakov i Krasok* **2**, 94–103(1939).—The manuf. of varnish can be simplified by effecting in one operation the polymerization of the wood oil and production of rosin ester, followed by evapn. of the mixt. The oil can be heat-treated only when pure to produce a standard product. The painting and technical properties of the oil are a function of the polymerization temp. The expts. are described.
A. A. Boehtlingk

The use of the oil of Oenothera biennis as a drying oil. V. Varlamov and G. Oyat'eva. *Maslobo˘no Zhirovoe Delo* **15**, No. 4, 30–1(1939).—The seeds of the plant contain 6.88% H_2O and 27.36% oil based on oven-dry seeds (extd. with petr. ether). The oil has d_{20}^{20} 0.9291, n_D^{20} 1.4801, acid no. 0.99, sapon. no. 185.7, I no. 147.68 and unsaponifiable matter 1.84%. The compn. of fat acids is: palmitic 5.6–5.7, oleic 26.4–7.6, linoleic 58.1–64.5 and linolenic acid 2.3–9.7%. Heated 2 hrs. at 150° and then treated with 3% $CaMnO_4$ drier (contg. 0.06% of active Mn), the oil dries in 24 hrs. to a sufficiently hard film. In the permeability to water and protective properties it is inferior to linseed oil films. Chas. Blanc

Production of saline drying oils from castor oil of high acidity. G. Shuraev and A. Vasil'eva. *Maslobo˘no Zhirovoe Delo* **15**, No. 5, 33(1939).—Raw castor oil is treated with 0.5% of concd. H_2SO_4 and heated at 280° for 4–5 hrs. to a required viscosity. The oil is sapond. with NaOH and the Na soap is decompd. with 10% $CaCl_2$. The Ca salts are washed free from Cl and dissolved in turpentine at 110–20°. The films become dust dry in 3 hrs.

and completely dry in 24 hrs. In their elasticity and resistance to 0.5% NaOH and H_2O they compare favorably with the coatings obtained from castor oil of low acidity. Chas. Blanc

Drying oils from polymerized raw and refined linseed oil. V. Varlamov, G. Premet and Z. Bodyazhina. *Maslobo˘no Zhirovoe Delo* **15**, No. 5, 30-2(1939).—Comparative tests indicate that polymerized raw linseed oil gives considerably stronger coating films than polymerized refined oil. Chas. Blanc

Measurement of the elasticity of varnish films by the method of residual deformation. E. Ya. Gol'denshteĭn and A. M. Lazarev. *Trudy Inst. Lakov i Krasok* **2**, 167-91(1939); cf. *C. A.* **31**, 6906[8].—A mathematical treatment of the effect of the duration of the application of a load on the value of the residual deformation, the effect of the initial deformation on the residual deformation, kinetics of the elasticity, detn. of the elasticity of various materials and a simplified testing method. A. A. B.

Pendulum method for the determination of the hardness of varnish films and the kinetics of the drying processes. A. M. Lazarev, S. Z. Ostrin and L. Matulionis. *Trudy Inst. Lakov i Krasok* **2**, 41-53(1939).—Various ball methods for the detn. of the hardness of films are described. A. A. Boehtlingk

Application of Zapon lacquers to metallic surfaces. G. Zeidler and F. Wilborn. *Paint Varnish Production Mgr.* **19**, 358-63, 373(1939); **20**, 13(1940).—A discussion of lacquers contg. highly viscous nitrocotton, which upon application to metallic surfaces are either almost invisible or have decorative effect. George Ayers

Removing agents for lacquer coatings. Freitag. *Oberflachentech.* **16**, 222(1939).- The removal of lacquer with alkalies, benzene or oil of turpentine is often costly and requires some time and mech. scraping. A new agent is recommended, methylene chloride in which paraffin is dissolved to retard evapn.; a thickener is added so that the too-liquid soln. will not run off the lacquer layer, e. g., a methylcellulose dissolved in ethyl alc. or methanol. Such remover adheres even on vertical faces, is not inflammable and acts quickly; the layers softened by it can readily be removed and the surface easily cleaned again for a firmly adhering new coat of lacquer. Also dichloroethyl ether is a good remover and does not need paraffin as addn., as it does not evap. so quickly and has a high ignition point, 131°. When mixed with alc. it can be used also as solvent for cellulose ester. M. Hartenheim

Preparation of alkyd lacquers from sunflower oil. A. Ya. Drinberg, A. S. Konoplev and E. Nosovich. *Maslobo˘no Zhirovoe Delo* **15**, No. 5, 26-8(1939). -Promising results are reported in the production of alkyd lacquers with raw sunflower oil instead of linseed oil. To glycerol, dehydrated at 140-50°, are added raw sunflower oil and 0.03% CaO catalyst and the mixt. is heated at 240° until it becomes sol. in alc. After the addn. of phthalic anhydride the heating under a current of CO_2 is continued until the "hot plate test" indicates a sufficient degree of polymerization. The alkyd resin is treated at 80-100° with the oxidized sunflower oil. The latter is prepd. by passing an air current into raw oil at 150° until the viscosity (Ostwald) increases 30 times and the oil has I no. 70, d. 0.9774 and 2.08% of HO groups. The alkyd. mixt. is then treated with Ca-Mn drier and turpentine or naphtha. Chas. Blanc

Further results of a study of primer vehicles. G. F. Beal and J. C. Konen. *Am. Paint J.* **24**, 50-5(Jan. 15, 1940); cf. *C. A.* **33**, 9019[6].—Supplemental results after 18 and 24 months exposure are given. Definite conclusions drawn from the complete investigation are: (1) In general the special primer paints show no particular advantages over 3 coats of the top paints self-primed (as regards durability). (2) Increasing the amt. of processed oil, particularly heat-bodied oils in the primer vehicle, very definitely improves the durability of the 2-coat special primer painting system. (3) The best combination seemed to be Pigment C (Ti-Ba pigment 37.5, basic carbonate white lead 37.5 and asbestine 25.0%) with Oil No. 18 used with Topcoat No. 1 (pigment 64%, vehicle 34%, with the pigment consisting of basic carbonate white lead 34.4, 35% leaded ZnO 45.6, TiO_2 10 and asbestine 10% and the vehicle consisting of linseed oil 90% and thinner and drier 10%). (4) Topcoat No. 1 is definitely superior to the other topcoats over all of the primers studied. (5) A. D. M. No. 631 or Pol-Mer-Ik refined oils give added durability to any of the primers and when used in the topcoat help to minimize the failure due to improper primer formulation. (6) A special topcoat should be designed for each special primer to obtain the best results. W. H. Boynton

Petroleum naphthas and thinners. R. D. Armsbury. *Paint Varnish Production Mgr.* **20**, 50-3(1940).—See *C. A.* **34**, 275[5]. George Ayers

Developments in lac research. H. K. Sen. *Paint Varnish Production Mgr.* **19**, 336-45(1939); cf. *C. A.* **33**, 1972[2].—Forty-nine references. George Ayers

Synthetic copals and their use in oil lacquers. A. Gamazov and M. Vostrikova. *Trudy Inst. Lakov i Krasok* **2**, 103-14(1939); cf. *C. A.* **34**, 898[9]. —Expts. in the prepn. of lacquers from albertol and rosin ester in linseed oil, with albertol and wood oil and a mixt. of wood and linseed oils, and the prepn. of a high-melting resin from a glycerol rosin ester are discussed. The physical properties of the products are tabulated. It is concluded that all synthetic copals give a harder and slightly more water-resistant film than those prepd. from rosin ester. 16 references. A. A. Boehtlingk

The preparation of alkyds and their application in nitro lacquers. P. M. Romanova and A. Chuchupal. *Trudy Inst. Lakov i Krasok* **2**, 65-75(1939). —Resins are prepd. by heating to 200-20° the mixt. and testing the gelatination by pouring the viscous mass on a plate and detg. the acid no. The products used were phthalic anhydride, glycerol and fat acids of the castor oil. In the heating of the mixt. the acidity and the duration of coagulation decrease with time, the hardness, solv. and viscosity of the soln. increase, the complete soln. of the resin in toluene takes place in not less than 1.5-2.0 hrs. from the time the temp. was raised to 210-15°. The softest resins were obtained from 65% of the fat acids, 22% phthalic anhydride, the hardness increasing with the decrease in the proportion of the fat acids. The alkyd films are more elastic than resin ester films in nitro lacquers. Nitro lacquers prepd. from resins contg. fat acids did not differ from those contg. triglycerides. Thus fat acids may be substituted by crude castor oil. The expts are described in detail. A. A. Boehtlingk

Newer uses for shellac. Wm. Howlett Gardner. *Chem. Industries* **45**, 685-8(1939); cf. *C. A.* **33**, 6071[7]; **34**, 191[1]. E. H.

Dowtherm for heating and cooling resin kettles. D. K. Dean. *Paint Varnish Production Mgr.* **19**, 352, 354-6, 373(1939). -See *C. A.* **33**, 5543[6]. George Ayers

Reagent-resistance tests on finishes. G. G. Sward and H. S. Klund. *Natl. Paint, Varnish Lacquer Assoc., Sci. Sect., Circ.* **570**, 7-13(1939). —Coatings were exam'd. for their resistance to lemon juice, 50% EtOH, whiskey, whiskey of highball strength, beer, 3% aq. NaOH, 50% aq. HCl and toluene. The reagent was applied as a paste mixed with $BaSO_4$. Reduction in gloss of the finish after standing in contact with the paste was measured. Resistance to HCl was best in reduced phenolics and alkyds and was improved by baking. Resistance to NaOH was best in straight phenolics and in 25-gal. tung oil-V-resin varnish. Air-dried finishes and baked alkyds were badly affected. Lemon juice and beer were almost without effect. Baked alkyds resisted toluene and baked natural-resin varnishes resisted alc. beverages. H. M. Stark

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Extn. of oil from *Lallemantia* seeds (Lesyuis) **27**. Detection of radioactivity in works of art (Evans, *et al.*) **3**. Corrosion of steels and protection by means of oily paints (Bancelin) **9**. Tobacco-seed oils [in prepn. of varnishes] (Curelici) **27**. Japanese lacquer mixed with phenolic and alkyd resins (Simizu, Inai) **13**. Decompn. of titanite minerals with HCl [to get pigment] (Brusilovskiĭ, Staro-

sel'skiĭ) 18. Internal lacquering of tinplate containers for foods (Lynch, Kefford) 12. Sepn. of satd. acids from vegetable oils by freezing [solid fraction used in alkyd lacquers] (Drinberg, Zhebrovskiĭ) 27. Japanese lacquer mixed with alkyd resin and asphalt (Simizu, Inai) 13. Interpolymerization of fumaric esters and isobutylene [products for making lacquers] (U. S. pat. 2,182,316) 13. Terpene ethers [as solvents or plasticizers in printing inks] (U. S. pat. 2,182,826) 10.

Heaton, Noël: Outlines of Paint Technology. 2nd ed. London: C. Griffin and Co., Ltd. 400 pp. 25s.

Stewart, Jeffrey R.: The National Paint Dictionary. Alexandria, Va.: Stewart Research Laboratories. 154 pp. $5.00. Reviewed in *Chem. Met. Eng.* **47**, 139 (1940).

Paint for ship bottoms, etc. Giuseppe Capurro. U. S. 2,182,840, Dec. 12. An anticorrosive, nonfouling compn. is prepd. from coal tar 36, S 28, resin 14, Paris green 3, and benzene 19%, mixed and boiled not over 2 hrs.

Red lead. James O. Johnstone (to Glidden Co.). U. S. 2,182,436, Dec. 5. A livering red lead is rendered substantially nonlivering with acid paint vehicles by subjection to the action of CO_2 (suitably at room temp.) to convert active PbO present into nonreactive Pb carbonates.

Titanium dioxide. Benjamin W. Allan and L'Roche G. Bousquet (to American Zirconium Corp.). U. S. 2,182,420, Dec. 5. A method of making TiO_2 comprises digesting ilmenite with H_2SO_4, treating the reaction mass to obtain a clarified soln. contg. more than 100 grams per l. of TiO_2 and a factor of acidity above 70%, and contg. all the sulfate derived from the ilmenite, adjusting the factor of acidity to from 20 70% by adding a substantial amt. of a basic compd. which forms a sol. sulfate, then hydrolyzing the so-prepd. hydrolysis soln., washing and calcining the ppt.

Titanium dioxide pigments. Robert W. Ancrum and Assur G. Oppegaard (to National Lead Co.). Can. 386,-623, Jan. 30, 1940. To a mineral acid soln. of Ti is added an Sb oxide (or a compd. that yields Sb oxide on calcination) in an amt. equiv. to 0.1–55.0% of Sb based on the Ti content of the soln., calcd. as TiO_2, the soln. is subjected to hydrolytic decompn., the ppt. is filtered, washed and calcined in the absence of amts. of alkali metal compds. exceeding about 2% at 900–1100° for sufficient time to develop the TiO_2 pigment properties.

Zinc sulfide pigment. John H. Calbeck (to American Zinc, Lead & Smelting Co.). U. S. 2,181,651, Nov. 28. A pptd. ZnS pigment is washed with water to remove some of the impurities, the ppt. and remaining impurities are then treated with a base such as CaO or $Mg(OH)_2$ and resulting reaction products are washed from the ppt. with water, and the washed ppt. is then calcined.

Metal containers suitable for shipping and storing white lead and similar materials. Harry G. Mann and Wm. F. Kinney (to American Can Co.). U. S. 2,182,-813, Dec. 12. Various structural details.

Purifying wood rosin. Robert E. Price (to Crosby Naval Stores, Inc.). U. S. 2,181,791, Nov. 28. A process for purifying wood rosin involves dissolving it in a solvent such as petroleum naphtha and bringing the resulting soln. into contact with a Mg silicate having a mol. ratio of MgO SiO_2 between 1:1.25 and 1.1.60, sepg. the soln. from the Mg silicate, recovering the purified rosin from the soln. by distn., washing the Mg silicate after the sepn., first with petroleum naphtha, then with alc., finally with the rosin solvent, and then again bringing the washed Mg silicate into contact with a further soln. of impure rosin.

27— FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The fat of land crabs. (Seychelles Islands.) T. P. Hilditch and K. S. Murti. *J. Soc. Chem. Ind.* **58**, 351–3(1939). - The depot fat of the land crabs of the Seychelles Islands contains the following acids: octoic 1.5, decoic 5.3, lauric 47.5, myristic 19.0, palmitic 13.1, stearic 1.7, tetradecenoic 0.7, hexadecenoic 2.3, oleic 5.3, linoleic 1.5, and unsatd. C_{20-22} acids 2.2%. It contains 66.3% of fully satd. glycerides, the component acids of which include octoic 3.2, decoic 7.1, lauric 54.8, myristic 20.5, palmitic 12.7 and stearic 1.7%. This unusual compn. is explicable since *Birgus latro*, L., the coconut crab, is known to feed on coconuts. The depot fat is thus composed largely of glycerides from ingested coconut fat while the remaining part of the fat includes the acids typical of a marine animal fat, unsatd. C_{18} acids and unsatd. C_{20-22} acids. E. Scherubel

Component fatty acids and glycerides of some Myristica fats. D. Atherton and M. L. Meara. *J. Soc. Chem. Ind.* **58**, 353–7(1939).—The component fat acids and glycerides of *Virola* and *Pycnanthus kombo* kernel fats were detd. as follows: *Virola:* decoic 0.5, lauric 14.8, myristic 72.5, palmitic 4.9, oleic 6.3 and unsaponifiable 1.0%. *Pycnanthus kombo:* lauric 5.4, myristic 60.8, palmitic 3.6, tetradecenoic 23.4, oleic 5.6 and unsaponifiable 1.2%. The corresponding component glycerides for *Virola* fat are: myristin 43.0, laurodimyristin 31.0, oleolauromyristin 12.0 and lauromyristopalmitin 10.0%. The component glycerides for *P. kombo* fat are: tetradecenodimyristin 33.0, trimyristin 24.0 and laurodimyristin 17% with smaller amts. of myristoditetradecenoin, laurotetradecenomyristin and oleotetradecenomyristin. The presence of tetradecenoic acid in this fat has been previously found only in fish and whale oils and in small amts. in butterfat. E. Scherubel

Dilatometer measurement method as a useful tool in fat study. C. A. Coffey and H. T. Spannuth. *Oil and Soap* **17**, 41–2(1940).—The app. used consists of a 25-ml. glass cylinder to one end of which there was fused a 50-cm. calibrated capillary with bore capacity of 280 mm./cc. H_2O. A metric scale is attached to the capillary arm; and a glass stopcock is fused to the other end. It was sought to det. if fat differences, as reflected in component fat acid differences, could be correlated with he differences in vol. expansion experienced by the correspondng glycerides for a definite temp. range. Data are tabulated showing that dilatometer readings for a hydrogenated fat are reproducible within ±0.1 cc. Other tabulated data show that the more satd. fats have greater vol. changes with temp. than unsatd. fats. In general the fat acid types having the greatest vol. change with temp. are first, satd.; 2nd "iso-oleic;" 3rd, oleic; and least in effect is linoleic acid. E. Scherubel

Fatty acids and glycerides of the seed fats of Allanblackia floribunda and Allanblackia parviflora. M. L. Meara and Y. A. H. Zaky. *J. Soc. Chem. Ind.* **59**, 25–6 (1940).—*Allanblackia floribunda* is a member of the Guttiferae family and occurs in Nigeria while *A. parviflora* also of the same family occurs in the Gold Coast. The component fat acids of the former have been found to be palmitic 3.2, stearic 56.8, arachidic 0.2, oleic 39.4 and linoleic 0.4% (mol.); the component glycerides are chiefly oleodistearin approx. 76, with stearodiolein 15.5 and about 5% of oleopalmitostearin. The component fat acids of *Allanblackia parviflora* were found to be myristic 1.8, palmitic 2.5, stearic 51.6, arachidic 0.2 and oleic 43.9% (mol.). In comparison the total amt. of C_{18} acids is almost the same, but with *A. parviflora* the larger amt. of oleic acid is accompanied by less stearic acid. This is further reflected in the major component glycerides which consist of approx. 60 oleodistearin, 26–9 stearodiolein and 6–9% of oleopalmitostearin. E. Scherubel

Hardening of fatty oil with quincuncial component

catalyzers. Sei-iti Ueno and Takehide Suzukawa. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 350–1(1939); cf. *C. A.* **33**, 1529[9].—Five-component catalytic mixts. (in the proportions 40:30:15:10:5), formed by co-pptn. of 5 metallic salts in the presence of kieselguhr and reduction by H in the usual manner, were added to soybean oil in the proportion of 0.3 g. metal to 100 g. of oil, and the oil-catalyst mixt. was heated to 180° under 10 atm. H pressure, after which the H pressure was raised to 30–50 atm. for ½ to 1 hr. In the catalytic system Ni–Cu–Co–Mn the addn. of Cr, Mg, Zn or Pb as the fifth metal markedly increases catalytic activity, Fe retards it, while Ca or Ba has no pronounced influence. In the catalytic system Ni–Cu–Co–Zn the addn. of Pb, Ca or Fe as a fifth metal promoted catalytic activity, while Mn retarded it. Catalysts contg. Ni-Cu-Co-Mn and a fifth element are more active, in general, than those contg. Ni-Cu-Co-Zn and the fifth element. Ni-Cu-Mg-Co catalysts contg. Mn, Cr, Pb, Ba, Ca, Zn or Fe as a fifth metal were not as active as the 4-component catalyst system. George Ayers

Regeneration of spent (nickel) catalyst by the alkaline method. N. Kaminskiĭ and E. Chufarovskaya. *Maslobo˘ino Zhirovoe Delo* **15**, No. 4, 10–13(1939).—In the modified method of Etinburg, Vengerova and Gol'dstein (*C. A.* **30**, 3950[8]), after the removal of fat, the catalyst mixt. is treated with dil. H_2SO_4 instead of a NaClO soln. and then reactivated by the usual method. Chas. Blanc

Determination of hydrogen number of hardened oil. G. Zhabrova. *Maslobo˘ino Zhirovoe Delo* **15**, No. 5, 34–7 (1939).—In the detn. of the degree of unsatn. in hardened fat mixts. by the method of Kaufmann and Baltes (*C. A.* **32**, 1958[6]), more consistent results are obtained with the use of Pt pptd. on $BaSO_4$. Detailed procedure and diagrams of app. are given. Chas. Blanc

Wijs iodine numbers for conjugated double bonds—influence of sample—reagent ratio. Wm. C. Forbes and Harvey A. Neville. *Ind. Eng. Chem., Anal. Ed.* **12**, 72–4(1940).—Iodine nos. obtained by the Wijs method for systems contg. conjugated double bonds are strongly influenced by the excess amt. of reagent present. Data are presented to show this effect for the conjugated systems 9,11-linoleic acid, tung oil and dehydrated castor oil. Contrasting data show that the excess of reagent is of slight importance for the isolated systems 9, 12-linoleic acid and 9, 12, 15-linolenic acid and for raw castor oil. E. Scherubel

Relation between the iodine values and refractive indexes. III. Hardened safflower oil. R. V. Joglekar and S. K. K. Jatkar. *J. Indian Inst. Sci.* **22A**, 219–23 (1939).—The relationship between the I no. and n of safflower oil hardened by the continuous process is given by the expression $n^{25°} = 1.4463 + 1.03 \times 10^{-4} \times (\text{I no.}) + 7.3 \times 10^{-8}$ (I no.). E. Scherubel

Separation of saturated acids from vegetable oils by freezing. A. Ya. Drinberg and V. V. Zhebrovskiĭ. *Org. Chem. Ind.* (U. S. S. R.) **6**, 327(1939).—Free acids are sepd. from cottonseed, sunflower and soybean oils by freezing at −20° to −38° for 1.5–24 hrs. The mixed acids are then dissolved in naphtha and chilled at −20° to sep. of solid (satd.) acids and liquid (unsatd.) acids. The solid fraction can be used in *soap making* and the liquid fraction in the production of *alkyd lacquers*. The work is being continued. Chas. Blanc

Expression of vegetable oils. IV. Expression of rapeseed oil. Eugene C. Koo. *J. Chem. Eng. China* **5**, 69–73(1938).—Rapeseed from Szechuan, contg. originally 2.32% moisture and 41.20% oil, was ground to 20–40 mesh and its moisture content brought up to 6.9% by cooking and steaming. Four hundred g. of this meal was used for each run in the form of 2 cakes pressed to form in a lab. hydraulic press. The effects of pressure, temp. and duration of pressing are investigated, keeping 2 of these 3 variables const. and varying the third one in each series of expts. The pressure used varies from 1500 to 3500 lb./sq. in., temp. from 25° to 70° and time from 1 to 5 hrs. From the results of these expts., the following equation is deduced to represent the expression of rapeseed oil quantitatively: $\overline{W}^2 = 0.0523\ (\sqrt[3]{\theta}/\sqrt[3]{\mu/\rho})$ where W is the wt. % (wet basis) of the rapeseed oil expressed; P, pressure in lbs. per sq. in.; θ, duration of pressing in hrs. and μ/ρ, kinematic viscosity of the oil corresponding to the press temp. in strokes. C. L. Tseng

Effect of refining on the digestibility of edible oils and fats. F. G. T. Menezes and B. N. Banerjee. *J. Indian Inst. Sci.* **22A**, 203–17(1939).—The rates of digestion of different oils are different after refining. Clarification, neutralization and decolorization do not affect the digestibility of coconut oil, but peanut and cottonseed are affected. Gingli oil improves on refining; and the deodorized oil, when activated, gave the best results. Refining processes retard the digestibility of oils more or less as the natural activator is generally lost. The vitamin potency of oils in India does not hold well. Generally, the retardation of digestion and instability or loss of vitamin A in oils or fats on refining treatment run parallel. Graphs and tables are given. E. Scherubel

Specific behavior of olive and olive-seed oils. G. Karagunis and D. Solmos. *Chim. Chronika* **10–12**, 218–23(1938)(in Greek).—By means of a combination of absorption and fluorescence methods a color reaction is obtained which permits detections with sesame or cottonseed oils up to 10%. Lucien Y. Dyrenforth

A chronology of cottonseed technology. Lawrence W. Bass and H. S. Olcott. *News Ed. (Am. Chem. Soc.)* **18**, 139–42(1940).—A record of development covering the time span from 1607 through 1939. E. J. C.

Cottonseed chemistry. John R. Erwin. *Wisconsin Engr.* **44**, 55–6(1940).—The extn. of vegetable oils by solvents is discussed. Ann Nicholson Hird

Forepressing of cottonseed. I. Morozov. *Maslobo˘ino Zhirovoe Delo* **15**, No. 5, 7–11(1939).—A method of expelling oil from whole and crushed cottonseed with subsequent extn. of the press cake is discussed chiefly in the light of American practice. The procedure is described in detail and diagrams are given. Chas. Blanc

The effect of processing methods on the quality of linseed oil. A. M. Goldovskiĭ. *Maslobo˘ino Zhirovoe Delo* **15**, No. 4, 4–5(1939).—Tentative lab. tests showed that the ash content and color intensity of linseed oil increase with greater temps. of pressing and extg. with benzine. Under all comparable conditions whole seeds give a better product than crushed seeds. C. Blanc

Utilization of the by-products in the dehydration of castor oil. I. T. Osnos and I. I. Golovistikov. *Maslobo˘ino Zhirovoe Delo* **15**, No. 4, 27–30(1939); cf. *C. A.* **33**, 5681[2].—The dehydration of castor oil at 280° and 100 mm. for 12–13 hrs. in the presence of 0.5% catalyst (0.19% MnO_2 + 0.31% PbO) gave 88.2–89.2% of dry oil and 10.7% of a condensate. The latter on distn. with steam gave 73.7% *enanthaldehyde* and 20.4% of a distillate contg. 40% of *undecylinic acid*, or 3.37% and 0.5%, resp., on the wt. of raw castor oil. Chas. Blanc

New process for the extraction of castor seed or cakes with industrial alcohol. Nitya Gopal Chatterjee. *Ind. & News Ed., J. Indian Chem. Soc.* **2**, 171–7(1939). The advantages of extg. castor seed with alc. instead of expressing the seed in a hydraulic press are: completely decorticated seed can be used and all of the oil obtained as No. 1 oil; the yield is 4% greater; the N content of the cake is 25% higher; the cost of manuf. is less; the recurring expenses such as replacement of press bags or machinery parts are eliminated. E. Scherubel

Reworking of crushed castor beans on the worm-screw press. A. I. Skipin, M. Zhdan-Pushkin, A. Zarabyan and I. Engel. *Maslobo˘ino Zhirovoe Delo* **15**, No. 4, 6–9 (1939).—Certain advantages of final expression of oil from forepan castor-bean oil meal with the aid of worm-screw press are discussed. The procedure is described and diagrams of app. are given. Chas. Blanc

Technology of drying of sunflower seeds. S. Kucherov and E. Plyushkina. *Maslobo˘ino Zhirovoe Delo* **15**, No. 5, 11–14(1939).—The experience of the Poltava mill shows

that the best results are obtained by drying the seeds to 6.5–7.5% of moisture content. Chas. Blanc

Pressing sunflower-seed meal without the use of filter cloth. M. Pitkevich. *Maslobolno Zhirovoe Delo* 15, No. 5, 11–14(1939).—Construction and operation details. Chas. Blanc

Smoke, flash and fire points of soybean and other vegetable oils. S. B. Detwiler, Jr., and K. S. Markley. *Oil and Soap* 17, 39–40(1940).—The av. values of representative soybean oils with respect to smoke, flash and fire points as detd. by the Cleveland open-cup method were as follows:

Type of oil	No. of detns. averaged	Av. flash point	Av. fire point
Crude expeller	4	300°	351°
Crude solvent extd.	5	316°	355°
Refined	11	329°	361°

E. Scherubel

Extraction of oil from Lallemantia seeds with the aid of worm-screw press. A. A. Lesyuis. *Maslobolno Zhirovoe Delo* 15, No. 4, 9–10(1939); cf. *C. A.* 33, 5689⁹.—A good grade of stand oil can be obtained from the whole seeds or roasted seedmeal of *Lallemantia iberica* by extn. in the worm-screw press and refining with 20% excess of 10°Bé. NaOH. The oil can be decolorized with charcoal or by heating at 200–50°. Chas. Blanc

Tobacco-seed oils. Gheorghe Curelici. *Bul. cultivării fermentării Tutunului* 28, 469–500(1939).—Botanical and chem. data, are given, with 7 lab. analyses of tobacco seed, data on the technology of seed-oil extn. with special reference to the prepn. of *varnishes*, a survey of the secondary products and a summary of the methods of phys. and chem. analysis of tobacco-seed oil. The installation of a plant for the hydrogenation of the oil, with a capacity of 5000 l. per hr., is described. 15 references. A. H. Krappe

Chinese turtle oils. Tyūta Hata and Masaiti Huzikawa. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 329(1939); cf. *C. A.* 33, 6028¹.—Yields of Chinese turtle oil (from *Ocadia sinensis* Gray, the most common turtle in Formosa) from the body, liver and ovary were 6.4%, 19.5% and 2.5%, resp. Tests on these respective oils gave: d_4^{25} 0.9114, 0.9035, (d_4^{40}) 0.9418; n_D 1.4648, 1.4618, (n_D^{40}) 1.4722; acid value 0.52, 10.12, 7.58; sapon. value 202.10, 203.32, 198.88; I value 93.27, 78.98, 102.53; unsaponifiable matter 2.8%, 10.7%, 6.2%. Only the liver oil gave the color reaction for vitamin A. Myristic, palmitic, stearic, zoomaric and oleic acids and a small quant. of highly unsatd. acid and eicosadienic acid were identified in the oils. The unsapon. matter consists chiefly of cholesterol, hexadecenol and octadecenol. George Ayers

Bamboo leaf waxes. I. The leaf wax of "nemagari-daké," Sasa paniculata. Mitumaru Tuzimoto. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 396(1939).—The leaves of "nemagari-daké," *Sasa paniculata* Makino et Shibata (a variety of bamboo which grows abundantly in the mountainous districts of Central Japan), upon extn. with petr. ether, yields approx. 1% of crude wax which, after treatment with animal charcoal in EtOAc, gave a brownish yellow hard brittle wax having the following properties: d_4^{25} 0.961; m. 79–80°; acid value 14.5; sapon. value 43.4; Wijs I value 7.8; and unsaponifiable matter approx. 65%. The fat acids sepd. from the wax made up a brownish yellow, hard solid, m. 81–2° and had a neutralization value of 121.8 and I value of 4.7. The unsaponifiable matter was a brownish yellow solid, m. approx. 87–8° and had an I value of 12.7 and an Ac value of 58.9 and contained no appreciable amt. of sterols. Melissic acid and myricyl alc. were identified in the wax: satd. acids such as montanic and cerotic acids are possibly also present. The wax, in general, resembles carnauba wax. George Ayers

Esters in distilled glycerol. V. Loginov and G. Kuznetsova. *Maslobolno Zhirovoe Delo* 15, No. 5, 15–17(1939).—The source of formation of esters in glycerol is the presence of nonvolatile org. residues in the sapon. mixt. The method of adding an excess of $Ca(OH)_2$ to raw glycerol or the sapon. mixt. reduces but little the content of esters. The best results were obtained with the addn. of 2–3% Fe filings at 80° and a slight excess of $Ca(OH)_2$ at 95–100°. The filtered soln. is freed from excess $Ca(OH)_2$ by passing CO_2 or air and filtering. The method is based on the sapon. of esters and greater adsorptive power of $Fe(OH)_3$ formed in the reaction. Chas. Blanc

Formation of esters and acrolein in the distillation of glycerol. A. A. Bag, T. P. Egupov, Yu. Orlova and L. Yurkov. *Maslobolno Zhirovoe Delo* 15, No. 4, 13–16 (1939).—The redistn. of neutral glycerol fails to decrease the contents of esters and acrolein in the finished product. The simultaneous formation of esters and acrolein is favored by high temps. and to a certain extent by a prolonged duration of heating in the process of vacuum distn. with steam. The addn. of excess $Ca(OH)_2$ in the neutralization of the sapon. mixt. reduces the side reactions during the distn. The addn. of alkalies to raw glycerol before the distn. does not retard the formation of esters and acrolein. Redistn. with the addn. of alkali produces the desired effect. Chas. Blanc

The solubility of organic substances in aqueous soap solutions. A. S. C. Lawrence. *Wetting and Detergency Symposium*, Feb. 19–20, 1937, *Brit. Sect. Intern. Soc. Leather Trades' Chem.* 203–7; cf. *C. A.* 31, 6496⁴.—A review. M. M. Piskur

Volumetric determination of unsaponified fat in soap by the Spasskiĭ method. M. Smolina. *Maslobolno Zhirovoe Delo* 15, No. 5, 37(1939).—It is shown that the Spasskiĭ method (*C. A.* 30, 1250⁶) gives low values as compared with the Spitz-Hönig method. Chas. Blanc

The use of electrolytes in soaps. F. Nevolin. *Maslobolno Zhirovoe Delo* 15, No. 4, 18–19(1939).—The advantages of addns. of various electrolytes (alkali carbonates, silicates and phosphates) to laundry soaps are discussed in the light of American and German practices. Chas. Blanc

Disposition of soap in detergent operations. E. W. Colt and C. V. Snell. *Oil and Soap* 17, 33–8(1940).—Tests made show that the adsorption of soap from 0.100% soap soln. is 19.5, 7.6, 11.1 and 60.0% for cotton, rayon, silk and wool, resp. To det. what effect the normal CO_2 content of the air might have on the pH of soap solns. air was passed through a NaOH soln. to remove CO_2, then through H_2O to sat. the air and then through 150 ml. of a 0.100% soap soln. The pH, concn. of soap in soln. and in the foam were detd. after each test. A similar test was made with air not scrubbed free from CO_2. The data reveals that the CO_2 present the pH value of the foam but not of the soln. was diminished. With no CO_2 present in the air no change in pH occurred in soln. or foam. When the foam was evapd. to dryness at 110° and redissolved in CO_2-free H_2O to the same concn. the same pH as in the original soln. was observed. To det. the effect of a fabric load a similar expt. was made with 15 g. of cotton sheeting using CO_2-free air. The pH value was lowered in the soln. proper and the interface of the foam. The adsorption of soap by cotton from a soln. of detergent comprising 70% soap and 30% alk. salt is shown in the following table:

Solution	% of total detergent adsorbed	% of initial soap adsorbed
0.07% soap	21.2	21.2
0.07% soap + 0.03% Na_3PO_4	15.0	21.4
0.07% soap + 0.03% Na_2CO_3	15.0	21.8
0.07% soap + 0.03% tetra Na pyrophosphate	15.5	23.3
0.07% soap + 0.03% buffered Na hexametaphosphate	16.1	23.0
0.07% soap + 0.03% Na silicate-N	16.8	23.8
0.07% soap + 0.03% Neutral soda	16.6	24.0
0.07% soap + 0.03% Na metasilicate	17.0	24.4

No alk. salt was adsorbed. It was also found that at 0.04% soap concn. the presence of 30% Na_2CO_3 in the detergent formula increases the percentage of soap adsorbed compared to pure soap. The presence of 60%

Na_2CO_3 decreases the percentage of soap adsorbed compared to pure soap. At 0.08% soap concn. the presence of 30% Na_2CO_3 in the detergent formula increases the percentage of actual soap adsorbed. At 0.12% soap concn. the presence of 30% Na_2CO_3 decreases the percentage of actual soap adsorbed. The fact that addns. of Na_2CO_3 in increasing amts. to a fixed concn. of soap impairs detergency would indicate that the effect of this must be due, not to the prevention of hydrolysis, but to the shifting of the form of the soap in the direction of undissocd. crystalloid or to the micelle form, but since a fabric load results in selective alkali adsorption in amts. greater than the adsorption of fat acid radicals, and detergency with a substantial load is benefited by Na_2CO_3, the indications would be that acid soap, in substantial amts. at least, is objectionable. E. Scherubel

The necessity of revising the standards of washing materials. D. Rozhdestvenskii. *Maslobo'no Zhirovoe Delo* **15**, No. 4, 16–18(1939).—A discussion with recommendations for the improved production and standardization of toilet and laundry bar and powd. soaps in accord with the best American and English practices. Chas. Blanc

Report of agricultural chemist to govt. of Bengal [mustard oil] (Pal) **15**. Wax emulsions for vegetables (Platenius) **12**.

Wittka, F.: Moderne fettchemische Technologie. Heft 1. Verderben der Seifen. Leipzig: J. A. Barth. 148 pp. M. 10.

Refining animal or vegetable oils such as soybean oil, peanut oil, or cocoa butter. Olof E. Fröding (to De Laval Separator Co.). U. S. 2,181,563, Nov. 28. An arrangement of app. is described, and a process, which comprises refining vegetable and animal oils wherein the oil is mixed with a saponifying agent to effect saponification of fatty acids contained in the oil and heated through a considerable range of temp. and the oil then sepd. from undissolved soaps, and interposing between the mixing and heating procedure and the sepn. of the oil from the soaps a cooling step in which the mixt. is cooled through the major part of the temp. range through which it was heated to increase the proportion of undissolved soaps before sepn. and substantially reduce the proportion of soaps in the subsequently sepd. oil.

Refining animal and vegetable oils. Benjamin Clayton, Walter B. Kerrick, Henry M. Stadt and Benjamin H. Thurman (to Refining, Inc.). U. S. 2,182,755, Dec. 5. An arrangement of app. is described, and a method for quick and continuous refining of animal and vegetable oils contg. free fatty acids which involves mixing the oil with a refining reagent such as NaOH soln. capable of acting upon the impurities in the oil to form foots, sepg. the foots substantially as quickly as they are formed by centrifugal action assisted by heating effected by the preheating of at least one of the materials before admixt. with each other (any prolonged contact of the oil and refining agent being avoided). Cf. *C. A.* **33**, 4808[4].

Reconstructing glyceride oils. Geo. Barsky (to Wecoline Products, Inc.). U. S. 2,182,332, Dec. 5. A method adapted for obtaining products of higher m. p. involves treating crude bleached cocoanut oil, butter or castor oil or other glyceride oils having in combination lower and higher fatty acids of from 6 to 18 C atoms to alter the phys. and chem. characteristics of the oils and comprises providing a mixt. of the oil and a free fatty acid having at least 2 more C atoms than the lowest fatty acid to be displaced but not over 18 C atoms, and heating the mixt. to a sufficiently high temp. whereby a reaction takes place freeing the lower fatty acids which are replaced by the added fatty acid and removing the fatty acids so freed. Several examples with details are given.

Recovery of glycerol from soap lyes. Ralph H. Potts and Edwin W. Colt (to Armour and Co.). U. S. 2,182,179, Dec. 5. An arrangement of app. is described, and a process which involves acidifying a soap lye with HCl to give it a pH of about 3–4, extg. the acidified lye with a water-insol. triglyceride or fatty acid having a higher mol. wt than that of fatty acids on the acidified material, neutralizing the acidified extd. lye, and recovering glycerol from it.

Obtaining phosphatides from soap stock. Benjamin H. Thurman (to Refining, Inc.). U. S. 2,182,767, Dec. 5. Soap stock resulting from the alkali refining of phosphatide-contg. vegetable oils such as cottonseed oil, etc., and contg. phosphatides and soap, is treated with a selective solvent such as "petroleum ether," ethyl ether, benzene, ethylene dichloride, trichloroethylene, CCl_4, acetone or MeOAc for dissolving one or the other of the assocd. materials to effect their sepn. from each other. Several examples with details are given.

28—SUGAR, STARCH AND GUMS

J. K. DALE

History of the yield formula (for the sugar industry). W. Paar. *Deut. Zuckerind.* **64**, 989–90, 1001–2, 1014–16, 1025–6(1939). W. W. Binkley

Simple derivation of the formula for finding the saving of sugar by concentrating, for finding the apparent purification effect, and for finding the efficiency of carbonic acid in the saturation (gases). W. Paar. *Deut. Zuckerind.* **64**, 1053–4(1939); cf. *C. A.* **33**, 6635[4]. W. W. B.

Sugar in Puerto Rico, a record of progress in efficiency. Anon. *Facts About Sugar* **35**, No. 2, 33–4(1940). **Forty years of industrial growth.** Guillermo Cabrera. *Ibid.* 40–1. **Modernization of milling equipment.** Arturo Romaguera. *Ibid.* 46–7. **Refining in Puerto Rico.** Anon. *Ibid.* 61. **Fertilizers in the sugar industry.** E. D. Colón. *Ibid.* 62–3, 65. **By-products of the sugar industry.** Rafael Arroyo. *Ibid.* 64–5. **The operation of the Serallés rum and alcohol distillery.** J. E. Mayoral. *Ibid.* 70–4. F. W. Zerban

Deliming of thin sugar juices by chemical means and its economy. G. Radbruch. *Deut. Zuckerind.* **64**, 953–4, 965–6, 977–8(1939); cf. *C. A.* **33**, 9027[8].—Dusarit (zeolite) completely delimed and partially decolorized thin juices. W. W. Binkley

Speed of carbonation. M. K. Smolenski and M. T. Pietrzykowski. *Sucr. belge* **59**, 101–8, 122–32, 141–6 (1939).—The speed of carbonation of solns. of NaOH and of $Ca(OH)_2$ is increased by raising the temp., vigorous stirring, and increasing the depth of the solns. Rapid introduction of CO_2 and its increase in concn. decrease its effectiveness. There is an optimum concn. of sugar (0.5 mol./l.) for max. speed of carbonation of $Ca(OH)_2$ solns. Liming with cold, dry lime causes a slight increase in speed of carbonation as compared with the use of hot milk of lime. CO does not affect the speed. W. W. B.

Review of the reworking of different sugar-factory waste waters and the processes concerned. Gottfried Mück. *Deut. Zuckerind.* **64**, 1041–2(1939). W. W. B.

Removal of lead in maple sirup by means of base-exchange material. C. O. Willits and C. J. Tressler, Jr. *Food Research* **4**, 461–8(1939); cf. *C. A.* **33**, 7916[9].—Ca Zeo-Karb (a com. zeolite) will remove Pb from maple sap through base exchange. Between 5 and 60° the amt. of Pb removed is independent of the temp. The amt. of Pb removed is dependent on the contact time. Using a contact time of 1 min. the Pb concns. in maple sirup can be reduced from 36 p. p. m. to less than 1 p. p. m. The percolating of maple sap through the zeolite does not alter the ash values of maple sirup prepd. from the sap. C. R. Fellers

How to remove lead from maple sirup. Augustus Conlin. *Food Ind.* **12**, 52–3(1940).—The Pb in soln. is pptd. by Na_2HPO_4. Normally 0.05% of this salt

sufficient to lower the Pb content to less than 1 p. p. m. The sirup is heated to 72–80° before adding the Na_2HPO_4 with const. agitation. After 30 min. the sirup can be filtered with the help of a good filter aid. Cf. *C. A.* **33**, 7916⁹. C. R. Fellers

Annual report of agricultural chemist to govt. of Bengal [germination of sugar-cane cuttings] (Pal) **15**. Chem. studies of 4 soil types in Louisiana sugar district (McKaig, Jr., Hurst) **15**. Utilization of bagasse for extn. of cellulose (Salvatore) **23**.

29—LEATHER AND GLUE

HENRY B. MERRILL

Studies on the tannin materials in Taiwan. I-II. The chemical composition of the barks from Acacia cofusa, Merr. and preparation of their tannin extracts. Saiti Tasaki. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 321–2(1939).—Fourteen samples of bark from 4 localities were analyzed to det. the water content, reducing and nonreducing sugar contents, pH value and the percentages (dried-sample basis) of tannins, nontannins and insol. matter. The tannins belong to the catecholtannin group. Analyses of a no. of bark exts. are also included. George Ayers

Characteristics that determine tanning power. A. Deforge. *Halle aux cuirs* **1939**, 169–74; cf. *C. A.* **33**, 4074⁴.—For both Cr and vegetable tanning compds., tanning power (i. e., astringence) passes through a max. with increasing mol. size, with degree of dehydration, and with ease of pptn. Vegetable nontannins decrease astringence of vegetable tannins because they have a dispersing action and inhibit pptn. Acid plays a similar role with Cr tanning compds. The apparently simple mols. that have tanning properties (e. g., HCHO, quinone) are believed to polymerize during tanning. The fundamental reaction of tanning is a mutual dehydration of protein and tanning agent. Complex mols. form stable compds. with collagen, while their simple parent substances do not, because each mol. of the former is combined with many protein groups. Although OH groups nearly always are present in tanning compds., it is questionable whether this is a functional group responsible for all tanning action. H. B. Merrill

Penetration of tannin into leather. A. Deforge. *Halle aux cuirs* **1939**, 193–7; cf. preceding abstr.—Tannin mols. must penetrate between the micelles as well as between the fibrilles. Penetration decreases with increasing astringence, partly because the large mols. cannot penetrate the intermicellary spaces, and partly because they block the interfibrillary spaces (case-hardening). Acid swelling causes expansion of intermicellary spaces but contraction of interfibrillary spaces. Moderate plumping is desirable, but excessive plumping greatly retards penetration. The author questions whether Cr tanning compds. penetrate between the micelles, and suggests that one function of the hot drying of Cr leather may be to dehydrate the untanned interior of the fibrilles. H. B. Merrill

Chrome liquors. XI. The effect of excess sugar during reduction upon the basicity. Edwin R. Theis and Jerome Ganz. *J. Am. Leather Chem. Assoc.* **34**, 705–9(1939); cf. *C. A.* **33**, 9705⁷.—In liquors prepd. by adding H_2SO_4 to sugar-dichromate solns. contg. variable sugar, and boiling under reflux, the observed basicity was always lower than that calcd. from the dichromate–acid ratio, owing to formation of org. acids. The basicity decreased with increasing excess of sugar. The min. excess of sugar for complete reduction increased with increasing basicity. Oxalic acid in the finished liquor increased with sugar content up to about 30% excess sugar, and was thereafter const. **XII. Comparison of the chemical characteristics of basic chromium sulfate liquors made with and without reflux.** *Ibid.* **34**, 709–11(1939).—The lowering of the basicity caused by org. acids formed from incomplete oxidation of sugar was almost as great when reduction was done in an open vessel (simulating com. practice) as when done under reflux. Prolonged boiling raised the basicity slightly by partial expulsion of volatile acids. H. B. Merrill

Determination of chromic oxide in leather. I. Comparison of wet and dry oxidation methods. J. C. Mertz. *J. Am. Leather Chem. Assoc.* **35**, 36–44(1940).—Six com. Cr leathers were analyzed by: (I) the A. L. C. A. method (alk. fusion of ash, iodometric titration) (**a**) without and (**b**) with removal of Fe; (II) the Smith-Sullivan H_2SO_4-HNO_3-$HClO_4$ wet oxidation method (*C. A.* **29**, 6793⁸) with iodometric titration, (**a**) without and (**b**) with removal of Fe; (III) oxidation as in II and titration with $FeSO_4$ and Na diphenylamine sulfonate. **Ib** and **III** gave results that were in excellent agreement; **IIb** gave lower results; **Ia** and **IIa** gave results up to 0.2% higher than **Ib** and **IIb**, owing to the presence of Fe in com. Cr leathers. **III** is preferred. H. B. Merrill

A further study of the collagen-formaldehyde reaction. J. H. Highberger and I. S. Salcedo. *J. Am. Leather Chem. Assoc.* **35**, 11–24(1940); cf. *C. A.* **33**, 3199⁵.—To test the hypothesis that the increased HCHO fixation at pH values higher than 7 is due to combination with the basic group of arginine, hide powder was tanned in 1% HCHO solns. at pH values from 4 to 11 after having been partially freed from arginine by Sakaguchi's alk. hypochlorite method (*C. A.* **20**, 925). This treatment reduced the arginine content by about 43%. The wt. of HCHO fixed was lower for the dearginated material than for untreated collagen at all pH values above 4; the difference increased with increasing pH value; and at pH = 11 it was roughly equiv. to the amt. of arginine removed. The effect of concn. of HCHO was studied by tanning untreated collagen at pH values from 4 to 10 in solns. contg. 3 to 25% HCHO. Fixation increased with concn. at all pH values, and the pH-fixation curves were alike for all concns. Each curve had a flat portion near pH = 7, shifted slightly to the acid side for the higher concns. For tannage at pH = 7, the fixation-concn. curve was initially steep, and flattened out for higher concns. This is contrary to expectation if the enhanced fixation at higher concns. is due to formation of HCHO polymers, since these form most abundantly in the most concd. solns. It is thought that increased HCHO concn. causes more than one HCHO mol. to be fixed by one lysine NH_2 group—the apparent limit being 2. H. B. Merrill

Formaldehyde tannage in relation to the structure of collagen. J. H. Highberger and Fred O'Flaherty. *J. Intern. Soc. Leather Trades' Chem.* **23**, 549–56(1939); cf. preceding abstr.—A summary of the work of Highberger, *et al.* H. B. Merrill

Behavior of reticular tissue of animal skin. W. T. Roddy and Fred O'Flaherty. *J. Am. Leather Chem. Assoc.* **34**, 671–87(1939).—This tissue supposedly surrounds the collagen fiber bundles. Its staining reactions are almost identical with those of collagen. On the assumption that the connective tissue of the adipose tissue is similar in compn., a material was prepd. by extg. the lipides with petr. ether, and its properties were compared with collagen and elastin. This defatted adipose tissue was readily digested by pepsin, digested with difficulty by trypsin, lost N in the form of albumins, globulins and mucoids when digested with 10% NaCl soln., and possessed an acid-alkali swelling capacity slightly greater than that of elastin but much below that of collagen. When a skin is plumped in lime liquor, the reticular tissue probably is ruptured; this explains why over-plumping may result in loose leather, while moderate plumping is desirable in promoting tannage. H. B. Merrill

Foot and mouth disease. III. An analytical method for determining fluorides in [tannery] soak waters. E. E. Doherty and Walter Retzsch. *J. Am. Leather Chem.*

Assoc. **35**, 132-7(1940); cf. *C. A.* **33**, 5696⁹.—F is titrated with $Th(NO_3)_4$ with Zr-alizarin indicator (cf. Willard and Winter, *C. A.* **27**, 681) after distn. from H_2SO_4 into NaOH. As variation in NaCl affects the result, the filtered soak water is made to 5% NaCl. A correction chart is given. Soaks contg. more than 125 p. p. m. F are dild. before distn. Analysis of used soaks contg. $NaHF_2$ show that about half the initial F remains in the liquor. H. B. Merrill

Sampling butt bends. Committee report. L. M. Whitmore, *et al. J. Am. Leather Chem. Assoc.* **34**, 699-705(1939).—Comparative analytical results are given for samples cut from 3 positions: (I) composite samples from 5 positions (present provisional method), (II) one position at the shoulder end near the backbone line, and (III) a strip extending completely across the shoulder end. Results from II are not widely different from those obtained from I, while III is much higher in oil content. II is recommended for economy. H. B. Merrill

Effect of finish on the deterioration of vegetable-tanned upholstery leather. H. B. Walker. *J. Am. Leather Chem. Assoc.* **34**, 687-98(1939).—Leather samples, variously finished with nitrocellulose, were exposed repeatedly to (1) SO_2, (2) ozone, (3) H_2O vapor. Deterioration was measured by detg. the decrease in bursting strength after 1 and 3 months. The standard leather with grain completely sealed by the finish showed negligible deterioration, and deterioration increased with increasing openness of grain, to a max. of 70% loss in initial strength for unfinished leather. pH values of aq. leather exts. after 3 mo. exposure were all low (2.0 to 2.5). It is suggested that all or part of the absorbed acid may be retained by the nitrocellulose film. H. B. Merrill

Air-burn control in drying heavy leather. J. W. Moore and Frank C. Vilbrandt *Bull. Virginia Polytech. Inst., Eng. Expt. Sta. Series Bull.* No. **41**, 3-26(1939).—Small pieces of sole leather were dried at low temp. and high humidity after washing for various periods. "Air burn" (darkening) was produced in pieces inadequately washed even when they were dried at 32°F. and 90% relative humidity, and regardless of rate of air flow. After the surface H_2O was evapd., rate of drying increased owing to exposure of fiber surfaces, but this was partially offset by deposition of tanning material on and between the fibers. H. B. Merrill

Influence of natural nontannin on the deterioration of chestnut and quebracho leathers by sulfuric acid. R. C. Bowker and R. B. Hobbs. *J. Am. Leather Chem. Assoc.* **35**, 4-11(1940); cf. *C. A.* **27**, 2334.—Addn. of excess nontannin has been found to give considerable protection against deterioration by acid gases absorbed from the atm. (Innes, *C. A.* **28**, 1215⁶; Frey and Beebe, *C. A.* **29**, 7112³). This work deals with the effect of nontannin in preventing deterioration by acid present initially. Nontannin (and several times as much tannin) was added to quebracho or chestnut leathers by soaking each of them in solns. of quebracho and chestnut exts. The treatment with chestnut about doubled the sol. nontannin content, while the quebracho treatment added very little nontannin. These leathers, and controls not loaded with nontannin, were treated with varying wts. of H_2SO_4, so that the aq. exts. of the leathers had pH values from 5.2 to 2.3. After aging 12 and 24 months, all leathers whose aq. exts. had pH values below 3 showed marked loss in tensile strength, indicating that addn. of a small amt. of these particular nontannins had no effect on the pH value at which rapid deterioration occurs. H. B. Merrill

Quality of leather. IV. Influence of method of tanning on composition, strength and resistance to wear of the different layers of leather. Fritz Stather and Hans Herfeld. *Collegium* **1939**, 609-30; cf. *C. A.* **33**, 3627⁵.—Ten vegetable-tanned leathers, 5 tanned by the old, pit method (I) and 5 by the modern method (II) were split into 3 layers (grain, middle, flesh) of approx. equal thickness and each layer was analyzed. For all leathers ash, sol. org. matter, degree of tannage yield and pH were highest in the outer layers. The ranges in percentage of ash in the grain, middle and flesh layers of I were 0.6-1.2, 0.2-0.6 and 0.5-0.9, resp., and for II 1.6-3.6, 0.9-2.4 and 1.4-2.8, resp. Ranges in percentage of sol. matter in these layers were for I 7.0-9.5, 6.0-7.2 and 6.5-7.9, and for II 14.6-27.6, 10.9-19.5 and 13.8-24.9. The pH range for both I and II was 3.9-4.4 for the middle and 4.1-4.6 for the grain and flesh layers. To det. why the middle layer was tanned less than the outer layers comparable pieces were tanned in the lab. by 7 methods, one set before and another after splitting the skin into 3 layers. The tannages were dil. vegetable liquor at pH 5, vegetable liquors of increasing concn. at pH 5 and pH 3.5, a dil. Cr liquor and a concd. Cr liquor each made basic near the end of the tannage and a concd. Cr liquor made basic before the tannage started. One piece of skin was dehydrated with alc., dried and tested in the untanned condition. Fixation of tannin was greatest from concd. liquors or those of high basicity or low pH. The outer layers contained more fixed tannin or Cr than the middle layer if the leather was split after tannage. The difference was greater the more astringent the tannin, whether this astringency increase was caused by increase in concn., basicity or acidity. The difference in fixed tannin in the 3 layers of leather split before tanning was negligible. The protein of the middle layer therefore does not have a lower ability to fix tannin but is tanned to a lower degree because the outer layers absorb the more astringent tannins, and the tannin reaching the interior is of lowered astringency. Sol. matter in the outer layers is somewhat higher than that in the middle layer even when the skin was split before tanning. This is not caused by astringency of the tannin, by blood vessels or hair holes in the skin, but seems to be connected with the fine structure of the skin. A similar effect was found with salt brine (*C. A.* **29**, 7110¹). Tensile strength was lowered by tanning and the greater the intensity of tanning the lower the strength. The middle layer was therefore stronger than the outer layers. For good strength a leather should have a uniform tannage of moderate intensity. Cr leather was stronger and wore better than vegetable leather. The wear resistance of tanned skin was better than that of untanned, alc.-dehydrated skin. But above a certain intensity of tanning the wear resistance was lowered so that tannage to satn. is not desirable. I. D. Clarke

The waterproofness of vegetable-tanned sole leather. R. S. Edwards. *Wetting and Detergency Symposium, Feb. 19-20*, **1937**, *Brit. Sect. Intern. Soc Leather Trades' Chem.* 67-75. **The wetting of skin and leather.** R. H. Marriott. *Ibid.* 85-95.- Review. M. M. Piskur

Food for leather belts. J. A. Webb. *Southern Power and Ind.* **58**, No. 2, 76-8(1940).—After a belt is placed in service the oils present in the belt tend to oxidize; this increases the pulling power of the belt. In future, belts will probably be impregnated with preoxidized oils to decrease the breaking-in period. However, this pulling power is decreased by loss of oils from the belt, amounting to about 30% the 1st year, 15% the 2nd year and somewhat lesser amts. in later years. The belt should be lubricated with beef tallow or neatsfoot oil to preserve its pulling power and prevent dry rot. R. W. Ryan

Dyes and tans in species of statice (Mell) **25**. Derivs. of phenol obtained from cashew-nutshell oil [for odorizing leathers] (U. S. pat. 2,181,119) **10**. Waterproofing fibrous materials such as leather (U. S. pat. 2,182,045) **25**. Aluminum silicate compns. for use with glue (U. S. pat. 2,182,086) **18**. Assistants for use in leather and textile treatments (U. S. pat. 2,181,476) **13**.

Trisazo dyes. Emil Senn (to J. R. Geigy A.-G.). U. S. 2,183,087, Dec 12. See Brit. 500,415 (*C. A.* **33**, 6061⁵).

Glue. Walter M. Urbain and Lloyd B. Jensen (to Industrial Patents Corp.). U. S. 2,182,186, Dec. 5. See Can. 384,588 (*C. A.* **34**, 1510⁸).

Glue. Charles N. Cone (to M and M Wood Working Co.). U. S. 2,182,425, Dec. 5. A water-resistant glue for gluing wood is formed of animal glue, about 4-8 times as much water as glue, and Na silicate (suitably about 50%

as much as glue) in sufficient proportion to maintain adhesive properties of the glue when viscous at room temp. suitable for gluing wood veneers with formation of a water-resistant bond.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

T-50 test as a control for inner tubes. Wm. B. Dunlap, Jr. *India Rubber World* **101**, No. 2, 47–8(1939).—The applicability of the T-50 test to control of factory production of inner tubes was investigated. Under otherwise the same conditions, the T-50 values of factory cures were consistently lower than those of lab. cures, but although, according to the T-50 test, factory-processed mixts. vulcanized more rapidly than the same mixts. not processed but lab. cured, combined-S detns. showed equal rates of vulcanization. Lack of uniformity of conditions in factory curing results in varying T-50 values in different sections of an inner tube. The direction of elongation in the T-50 test with respect to grain in the rubber has practically no influence on T-50 values. Judged both by the T-50 test and by combined-S detns., remilling of a factory mixt. retards its rate of vulcanization, and with alternating short periods of remilling and rest, this retardation increases rapidly to an approx. const. T-50 value. C. C. Davis [1]

The natural aging of rubber-sulfur compounds. I. Changes during the first four months. T. R. Dawson and J. R. Scott. *J. Rubber Research* **8**, 87–103, 104–23(1939). A rubber–S (95.5) mixt. was vulcanized in a press at 153° to coeffs. of vulcanization of 1.88, 3.90, 4.79 and 4.99, resp., the products were stored in darkness for 4 months, and periodically the changes in tensile strength, elongation at fixed loads, resilient energy, permanent set, hardness, scleroscope resilience, wt., vol., d., swelling in C_6H_6, acetone ext. and vulcanization coeff. were measured. Special attention was paid to the unstable condition during the first 2 days after vulcanization and the progress of the subsequent "settling down" phenomena before deterioration became appreciable. The results, which are recorded in graphical form, give evidence of various significant changes, including slowly increasing tensile strengths throughout the 4 months; decreasingly rapid declines in elongation at rupture; decreasingly rapid increases in stretch modulus; initially rapid increases, then gradual decreases in resilient energy at const. load; initially rapid, then slow increases in resilient energy at const. elongaton; erratic values of permanent set after rupture; initially rapid decreases, then insignificant changes in permanent set after 400% elongation; initially rapid increases in hardness (plastometer); initially rapid decreases in scleroscope resilience followed by uncertain changes; initially rapid increases, then in appreciable changes in d.; slow decreases in max. swelling; gradual increases in sp. swelling increment; initial decreases and subsequent increases in standard swelling time; and insignificant changes in acetone-sol. substances and in coeff. of vulcanization. These results are discussed critically, and an attempt is made to correlate, with the aid of graphs, the various properties mentioned above. Among the significant deductions are that: (1) permanent set at const. elongation, plastometer hardness, scleroscope resilience and max. swelling and elongation at const. load were linear functions of one another; (2) permanent set at rupture was a linear function of the tensile strength and permanent set at const. elongation; (3) standard swelling time and specific swelling increment were linear functions of max. swelling; (4) the swelling properties bore no simple relation to the vulcanization coeff.; (5) changes in max. swelling by aging did not depend merely on changes in vol. and in resin content; (6) rigidity and elongation at rupture were related by a simple inverse curvilinear function; (7) resilient energy was a linear function of stress modulus and tensile strength; (8) the energy absorbed in stressing to a certain degree was independent of the state of cure or age (cf. Gurney and Tavener, *C. A.* **16**, 1337). Probably many of these linear relations would have no longer been true after prolonged aging. Many, if not all, the relations may represent practically rectilinear portions of aging curves, and probably these linear relations would have no longer been true after more extended aging. C. C. Davis [2]

Tube mold for making Schopper tensile test rings. E. B. Johnson. *J. Rubber Research* **8**, 131–4(1939). C. C. Davis

Evaluation of carbon black by rate of cure and extrusion. C. R. Johnson. *India Rubber World* **101**, No. 2, 39–40 (1939).—A statistical comparison of various types of C black by the percentages of volatile matter, adsorption of diphenylguanidine, pH values, plasticities (Firestone-Dillon method) and T-50 test shows that, in general, blacks with high percentages of volatile matter are characterized by high diphenylguanidine adsorption values, low pH values, high temps. in the T-50 test, difficult processing and retarding effects on vulcanization. The plasticities did not show such well-defined relations, but the blacks which gave the most plastic rubber-black mixts. showed low diphenylguanidine adsorption values. C. C. D. [3]

Carbon black estimation in vulcanized rubber. H. A. Curran. *India-Rubber J.* **98**, 747–8(1939).—In detg. C black in rubber or rubber mixts., kieselguhr on the asbestos in the Gooch crucible is unnecessary, and C black is retained much better if an underbed of finely chopped asbestos and then alternating beds of finely carded and finely chopped asbestos are built up to a thickness of $^{3}/_{16}$ in. The asbestos should first be digested for 4 hrs. in boiling concd. HCl (frequently renewed). Also, washing successively with CCl_4 and water after the concd. HNO_3 treatment is recommended. **Comments.** Charles Avons. *Ibid.* **99**, 41(1940).—A simpler technique (without kieselguhr) is merely to keep the asbestos pad and its contents always covered with a small vol. of the last wash liquor, disconnecting the suction if necessary (cf. Oldham and Harrison, *C. A.* **31**, 5617[1]). C. C. Davis [4]

Effect of vulcanization on rubber structure. Warren F. Busse. *Ind. Eng. Chem.* **31**, 1391–7(1939).—A crit. review and discussion of present knowledge, with particular attention to the structure of crude rubber, the limitations of the classic theory of vulcanization, vulcanization in soln. and the effects of compounding ingredients on the vulcanization of rubber in the solid state. Stress is laid on the fact that, since rubber mols. are extremely large and flexible, chem. reactions of too small a magnitude even to be identified can have an enormous effect on its phys. properties. Products are formed according to the laws of probability, but if they cannot be identified or even detected, it should be possible, by proper interpretation of accumulated phys. and chem. data, and more sensitive phys. and chem. tests, to obtain definite information on the various structures formed by vulcanization. A systematic study of the part played by accelerators should be particularly valuable. C. C. Davis [5]

Physical changes induced by vulcanization. W. W. Vogt. *Ind. Eng. Chem.* **31**, 1389–90(1939).—A review and discussion of present knowledge. C. C. Davis [6]

Relations between vulcanization and reënforcement. C. R. Park. *Ind. Eng. Chem.* **31**, 1402–6(1939).—Four questions are considered: (1) the relative effects of vulcanization and of powder reënforcement on the phys. properties of rubber; (2) whether rubber hydrocarbon is permanently modified by powders and if so, whether the change is like that by vulcanization; (3) whether small proportions of ZnO and larger proportions of certain other powders on the stress-strain curve of vulcanized rubber have similar effects, and (4) the effects of reënforcing powders on the rate of vulcanization. These subjects are discussed critically in the light of various investigations (45 references), in some cases with the inclusion of new data in support of the arguments. In summary, it is [7]

unlikely that the phys. effects of vulcanization are the result of reënforcement by rubber sulfide particles in a state of great fineness and high dispersion. There is evidence that changes in rubber brought about by finely divided powders may be attributable to oxidation of rubber hydrocarbon. The products are analogous, both physically and chemically, to rubber S compds. The peculiar effect of ZnO on rubber-S mixts. indicates that it plays an active part in vulcanization and that it has a reënforcing effect which is independent of org. accelerators and which is disproportionately great for its particle size. Differences in the effects of powders on rate of vulcanization can be explained by differences in the nature of their surfaces, which governs the adsorptive power, and results in preferential adsorption of certain components of the system.
C. C. Davis

Qual. variations of rubber in roots of kok-sagyz at second year (Mashtakov) **11D**. Measurement of cross-section of rubber on insulated wires (Richter) **13**. Application of chlorinated rubber-tar products to jute fabrics (Pratt, Handley) **25**. Polymerization and production of new synthetics [in rubber industry] (Harold) **13**. Al silicate compns. for use with rubber (U. S. pat. 2,182,086) **18**. Microporous diaphragms [contg. rubber] for storage-battery separators (U. S. pat. 2,181,299) **4**. Rubberizing regenerated-cellulose rayon (U. S. pat. 2,181,538) **25**. Microporous battery separators of hard rubber (U. S. pat. 2,181,891) **4**. Sausage casing [rubber-coated] (U. S. pat. 2,181,886) **12**.

Fischer, Karl: Blutgummi; Roman eines Rohstoffes. Berlin: Kommodore-Verlag. 176 pp.

Rubber compositions suitable for use as dielectrics, for films, etc. Anderson W. Ralston and William M. Selby (to Armour and Co.). U. S. 2,182,180, Dec. 5. Unvulcanized rubber is dissolved in a solvent such as $C_2H_2Cl_4$ and mixed with stearic acid or other fatty acid contg. a least 6 C atoms, $AlCl_3$ is added, the reaction mixt. is heated to about 140° for 6 hrs. and after the reaction is complete is hydrolyzed, as by heating in the presence of HCl to liberate an Al-free product.

Rubber mixtures suitable for various purposes. Georg Goll and Ernst Helft (to Deutsche Hydrierwerke A.-G.). U. S. 2,181,426, Nov. 28. Raw rubber is used with an emulsion of water and a higher mol. fatty alc. contg. 12 to 18 C atoms in the mol., such as stearic or oleyl alc.

Treating rubber, etc. United States Rubber Products, Inc. Brit. 508,129, June 27, 1939. This corresponds to Fr. 837,635 (*C. A.* **33**, 6654[1]), R, R^1 and R^2 representing C atoms of nonaryl hydrocarbon groups.

Chlorinating rubber. Wm. H. Stevenson (to Hercules Powder Co.). U. S. 2,182,456, Dec. 5. A method for the manuf. of a chlorinated deriv. of rubber involves treating rubber in soln. in CCl_4 with Cl at a temp. of about 40–60° until the Cl content is about 52–63%, then treating the partially chlorinated material for about 2–5 hrs. at a temp. of about 30–40° with a mixt. of Cl and an O-contg. gas such as air and thereafter continuing the addn. of such gas mixt. until a chlorinated deriv. of rubber is obtained having a viscosity greater than about 20 centipoises and contg. at least 64% Cl.

Chlorinated rubber. Walter E. Gloor (to Hercules Powder Co.). U. S. 2,182,473, Dec. 5. A method for increasing the apparent d. of chlorinated rubber comprises crushing, by the application of pressure, wet, fluffy, porous particles of chlorinated rubber of low apparent d., while wet with not less than about 45% by wt. thereof of water, producing thereby small, thin, chip-like, discrete flakes of chlorinated rubber having an apparent d. of at least 15 lb. per cu. ft. when dry. Cf. *C. A.* **33**, 8445[7].

Apparatus for continuously extruding materials such as chlorinated rubber that under treatment at elevated temperature undergo expansion on release of the pressure. R. P. R. Association, Cyril A. Redfarn and Philip Schidrowitz. Brit. 507,926, June 23, 1939.

Preserving rubber. Wm. Baird and Maldwyn Jones (to Imperial Chemical Industries Ltd.). U. S. 2,181,719, Nov. 28. As an inhibitor of oxidation, there is incorporated with rubber (suitably about 1%) of a 2,6-xylenol (OH = 1) substituted in the 5-position by a methyl group having one H replaced by a piperidino, morpholino or dialkylamino radical (each alkyl group contg. 1–4 C atoms).

Rubber-coating gloves. Edward E. Montgomery (to Edmont Mfg. Co.). U. S. 2,181,247, Nov. 28. A glove of canvas or other material is submerged in liquid latex, and while the latex surface is wet or tacky dry ground rubber is sprayed onto it by a compressed air spray gun.

Laminated rubber shoe soles and heels suitable for repair purposes. Albert L. Murray. U. S. 2,181,379, Nov. 28. A mfg. process involves forming a layer of relatively thin raw rubber derived from rubber cement substantially free from surface skin and evapg. the liquid therefrom, forming a layer of relatively unweakened, relatively tough rubber free from vulcanizing agents and having skin-forming tendencies and derived from rubber latex and evapg. the liquid therefrom, the rubber latex comprising coned. milk of latex in an amt. sufficient to prevent migration of vulcanization therethrough, forming a layer of vulcanizable tread stock, the unweakened latex rubber layer being between the other cement rubber and tread stock layers, and then permanently consolidating the layers by heat and pressure, the heat vulcanizing the tread layer and vulcanizing the intermediate layer thereto, the latter preventing migration of vulcanization to the thin, cement-derived raw rubber layer.

Fabrics comprising rubber threads. Thomas L. Shepherd. U. S. 2,182,996, Dec. 12. A fabric is made by a method involving coating elastic rubber thread with a sol. material such as gelatin and allowing or causing it to dry, whereby the thread can no longer be substantially stretched, then leading the thread into a machine for mfg. the fabric, and subsequently removing the coating material, as by washing, to leave the threads in stretchable condition.

Rubber mill with adjustable spaced rolls. Edwin J. Mellvried and Norman H. Nye (to Vaughn Machinery Co.). U. S. 2,182,900, Dec. 12. Various structural and mech. details.

Rubber covered platens for typewriters, etc. Alfred E. Vickery (to Remington Rand, Inc.). U. S. 2,182,141, Dec. 5. A platen is provided with a covering of the usual vulcanized natural rubber compn. having a degree of hardness and resiliency to afford proper typing by the force of the types thereagainst, and a protective coating applied over the natural rubber compn. covering in a sufficiently thin layer to provide a platen having substantially the hardness and resiliency of the underlying compn. covering, the protective coating comprising a rubber-like material having the properties of resisting oxidation and deterioration by rubber solvents, such as a polymerized chloroprene compn.

Continuous vulcanizing apparatus, suitable for strip material. Thomas M. Knowland (to Boston Woven Hose & Rubber Co.). U. S. 2,182,317, Dec. 5. Various structural, mech. and operative details.

Continuous vulcanizing apparatus suitable for belting or matting. John M. Bierer (to Boston Woven Hose & Rubber Co.). U. S. 2,182,168, Dec. 5. Various details of an app. having a heated vulcanizing drum and assocd. pressure band, etc.

Apparatus for continuous vulcanizing of belting, etc. Walter J. Baker and Cecil J. H. Perry (to Boston Woven Hose & Rubber Co.). U. S. 2,181,859, Dec. 5. Various structural, mech. and operative details.

Vulcanizing press suitable for floor mats, etc. Edmund M. Winegar (to Ohio Rubber Co.). U. S. 2,182,833, Dec. 12. Various structural, mech. and operative details.

Vulcanizing press suitable for rubber tires and tubes, etc. Cato Iverson (to National Rubber Machinery Co.). U. S. 2,181,273, Nov. 28. Various structural, mech. and operative details.

CHEMICAL ABSTRACTS

Vol. 34 APRIL 20, 1940 No. 8

1—APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

Containers for the transport of brittle and solid chemicals. N. F. Ermakov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 8–11(1939). H. M. Leicester

A pump for moving sulfuric acid at 130–150°. P. A. Vasil'ev. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 48 (1939).—Pb rings replace asbestos as packing. H. M. Leicester

Addition to the article "Use of Hempel's four-bulb gas pipet." Leopold Wolf. *J. prakt. Chem.* **154**, 284 (1940); cf. *C. A.* **33**, 9050⁸.—The pipet construction described by W. has been previously reported by Fleissner (*C. A.* **2**, 2749). C. J. West

A new stirring machine. Josef Bitskei. *Z. anal. Chem.* **118**, 170–1(1939).—A stirrer is described which is suitable for use during titrations. The app. is provided with a 'stirring plate' which is beneath the beaker contg. the soln. to be titrated. The plate is set in motion by means of 2 eccentrics, of the same dimensions, connected in such a way they both work uniformly and in the same direction. All parts of the table and all parts of the beaker are kept in circular motion so that the soln. is given a steady swirling effect without fear of loss by spattering. W. T. H.

Sampling apparatus. P. I. Bozhenov. *Tsement* **6**, No. 4–5, 48–50(1939).—The material is poured in a funnel, from which it falls over a dividing cone into a dividing funnel partitioned into 4 equal sections; the material from each pair of opposite sections is combined and forms the "mean sample." The device can be used for any finely crushed materials. E. E. Stefanowsky

Bottom-sampling apparatus. Jack L. Hough. *Recent Marine Sediments: a symposium, Am. Assoc. Petroleum Geol.* **1939**, 631–64.—A description of app. for sampling of deposited sedimentary material, for collecting material in suspension in water and for studying ripple-marks. Fifty-two references. George Ayers

An apparatus for continuous filtration. Walter Frost. *Chem.-Ztg.* **64**, 60(1940).—A practical app. that eliminates the tedium of hand filtration consists of an Erlenmeyer flask fitted at the bottom with a roomy discharge buret stop-cock, which, when open acts like a siphon. The liquid to be filtered is put in this flask, which is sealed with a rubber stopper through which extends a glass tube that reaches the bottom of the flask. The position of this tube dets. the level at which the liquid is maintained in the filtering funnel. The operation is entirely automatic. Since the filtering funnel is always kept filled to the rim, the optimum filtering speed is insured. A. W. K.

Fractional distillation apparatus. E. Wertyporoch. *Acta Polon. Pharm.* **2**, 299–301(1938); *Chimie & industrie* **42**, 272.—The app. is an improvement on the Golodetz double-rectifier (cf. *C. A.* **7**, 1). Its features consist in the distn. tube which has an inner bulb tube terminating at the bottom in a capillary tube through which the undistd. portions reflux. The fraction to be sepd. is condensed in a condenser at the side of the app. The double rectifier is insulated by means of cotton; it is surrounded with a heating jacket for high-temp. distn. of substances which crystallize easily at medium temps. A. P.-C.

A new apparatus for microdeterminations of molecular weights according to Pregl-Beckmann. Karl Bürger. *Chem. Fabrik* **1940**, 54–5.—The app. can be used only in connection with the Hoeppler ultrathermostat. It is described in detail with 1 cut; exact operating directions are given, and results compared with calcd. mol. wts. J. H. Moore

Sealable absorption microtube. Arthur N. Prater. *Ind. Eng. Chem., Anal. Ed.* **12**, 184(1940).—This modified Friedrich tube (*C. A.* **30**, 2⁹) has larger capacity, weighs less than 15 g. when full and contains sufficient absorbent for 25 analyses. The gain in wt. on standing is only about 1/4 that of the regular Pregl tube. The tube is available commercially. T. H. Dunkelberger

An electrostatic ultramicroscope of high resolution. H. Mahl. *Z. tech. Physik* **20**, 316–17(1939).—A purely electrostatic app. using two electric lenses is described. The resolution is under 15 mμ. Photomicrographs of MgO (16,000 x), of a film of vaporized Ag (90,000 x) and of three bacilli (9000 x) are given. J. B. Austin

A new simple ultramicroscope and its use in bacteriology. E. Brüche and E. Haagen. *Naturwissenschaften* **27**, 809–11(1939).—A review of work done with the Mahl electron microscope using an elec. (instead of magnetic) field as lens (*Ibid.* 417; and preceding abstract). A no. of photomicrographs of bacteria with 7500–9700 magnification are reproduced. Inner structures of the bacteria and their flagellas are plainly visible. B. J. C. v. d. H.

An electron shadow-microscope. I. Geometric and optical studies. H. Boersch. *Z. tech. Physik* **20**, 347–50(1939); cf. *C. A.* **33**, 8102⁹.—The resolution is better than 10^{-6} cm. and approaches that of other ultramicroscopes. Shadow pictures are given for a wire, kieselguhr, diatoms, MgO and an infusion of hay. J. B. Austin

A new method of gas analysis. W. J. Gooderham. *J. Soc. Chem. Ind.* **59**, 1–8(1940); cf. *C. A.* **33**, 1472¹.—The mixt. of gases to be analyzed, adjusted to a const. pressure, is allowed to flow though a control capillary and the app. out to the air without any appreciable change in pressure. The individual constituents of the gas are removed by suitable reagents in special scrubbers and (or) furnaces. The decrease or increase in vol. causes a change in rate of flow of the gas. This rate is measured by timing the travel of a soap, or soaplike film, pushed by the gas through a calibrated vessel. As there is no Hg in the app. activated nitrating mixt. can be used for detg. unsatd. hydrocarbons. A new form of gas holder made of corrugated metal rings and a special type of governor is described. Joseph H. Wells

Oxygen and carbon dioxide analyser and an oxygen flowmeter for use in aircraft compartments at high altitudes. J. W. Heim. *J. Aviation Med.* **9**, 144–9(1938).—A Wheatstone-bridge method for gas analysis giving continuous readings is described. B. C. P. A.

Compact gas saturator. Aaron E. Markham. *Ind. Eng. Chem., Anal. Ed.* **12**, 112(1940).—A gas-washing bottle is described. The principal feature is a spiral tube using the airlift system of stirring. W. F. Bruce

An absorption bulb for detecting various gases. Wilbur Simon and J. H. Reedy. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 128–9(1939).—A trap, patterned after the Liebig bulb, is used to absorb such gases as CO_2, SO_2, H_2S, I_2, Br_2, H_3BO_3 and AsH_3, given off in microqual. tests. High sensitivities are reported in most cases. J. H. Reedy

Dialysis apparatus. Saburo Kamei, Saiti Nisida and Yatuka Ikeda. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 431–4(1939).—Two- and three-compartment cells with parchment membranes were used to dialyze NaOH

recovered from sodium cellulose manuf. Hydrostatic head was found to be the only pressure of importance acting upon the membranes. H. G. Bowlus

An apparatus for the supply of liquid into a reaction chamber with constant flow, and an apparatus for the catalytic dehydration of alcohol. Masaharu Katuno. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 424–6 (1939).—A const. discharge from a capillary tip at the bottom of a tube is obtained by using a separatory funnel to maintain a const. head in the tube. Pressure-equalizing lines are provided. This app. is used to feed alc. to the usual type of elevated-temp. catalytic equipment. H. G. Bowlus

Continuous extraction of aqueous solutions by acetone-petroleum ether. M. Wayman and G. F. Wright. *Ind. Eng. Chem., Anal. Ed.* **12**, 91(1940).—An extractor is described in detail for extg. satd. NaCl solns. with Me_2CO—60–90° petroleum ether (3:1). The latter prevents accumulation of H_2O in the boiler. W. F. Bruce

Distribution of argon in oxygen-argon separating apparatus. I. P. Ishkin and P. Z. Burbo. *J. Tech. Phys.* (U. S. S. R.) **9**, 1677–82(1939).—The concn. of A at various stages of rectification was detd. by absorption of O_2 by Cu and measurement of the sp. gr. of the remaining N_2-A mixt. The sepn. of A from O_2 in rectifiers gives best results when the mixt. contains 90% of O_2 in the liquid and 88% of O_2 in the gas phase. J. J. Bikerman

Sedimentation and flocculation. M. B. Donald. *Chemistry & Industry* **1940**, 105–9; *Trans. Inst. Chem. Engrs.* (London), Advance copy, Feb. 13, 1940, 7 pp.—Review with 32 references. Also in *Engineering* **149**, 248–9(1940). E. H.

On the collection and separation of dust. Zyuniti Isobe. *J. Japan. Ceram. Assoc.* **47**, 17–19, 196–200 (1939).—The motion of particles in falling through horizontal steady flow is mathematically treated. Efficiency of dust chamber or separator depends mainly on the height and length of the chamber and on the velocity of flow. A dust chamber must be built as low and long as possible while a separator must be built adequately high and short. S. Kondo

The practice of separating minerals in accordance with their specific gravities by centrifuging in heavy liquids. V. N. Dominikovskiĭ. *Razvedka Nedr* **8**, No. 4–5, 44–9 (1938); *Chem. Zentr.* **1938, II**, 3428.—Heavy liquids (e. g. "Tule," d. 2.8–3.1) as well as such mixts. as $CHBr_3$-alc., $CHBr_3$-toluene, $CHBr_3$-oil and MeI-toluene are used in the centrifuging of minerals. The grain size of the minerals is a decisive factor, as failure is unavoidable if the grain size is not reasonably uniform. The liquid mixts. named above can be sepd. by freezing out. M. G. M.

Granular materials. Particle-size distribution. Walter H. Dumke. *Mines Mag.* (Colo. School of Mines) **30**, 61–4, 74(1940).—An address. Leopold Scheflan

Disperse hysteretic differential wetting and flotation of quartzite of the hematite variety from Krivoi Rog. I. R. Klyachko and V. I. Trushlevich. *Gornyĭ Zhur.* **114**, No. 7, 46–50(1938); *Chem. Zentr.* **1938, II**, 3445–6; cf. *C. A.* **31**, 3338[5].—The mineral surface often becomes hydrophilic as a result of the adsorption of the flotation-reagents, in case their total concn. does not exceed 0.1–0.5 g./l. With the Krivoi Rog hematite as an example it was demonstrated that a good sepn. by flotation can be obtained with the use of a combination of reagents such that the wettability of the surface of the ore concentrate and tailings is increased. Sepn. by flotation is conditioned by the differential wettability. M. G. Moore

Apparatus for packing poisonous powders. V. N. Serov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 46–7(1939). H. M. Leicester

An improved iodine apparatus. F. X. Gassner. *Ind. Eng. Chem., Anal. Ed.* **12**, 120(1940).—The metal torch described by v. Kolnitz and Remington (*C. A.* **27**, 681–2) is modified by shortening it, replacing the 4 O connections by a single inlet tube, and constructing it throughout of stainless steel. A simple trap is attached to eliminate the danger of explosion due to clogging by cinders of the constricted tip in the first wash bottle. The upper part of the torch is best covered by a 1-l. widemouth extn. flask with vial-type neck. Discoloration of this part of the torch is remedied by immersing it for 5 min. in a soln. contg. concd. HNO_3 (25%), HF (3%) and H_2O (72%) at 70°. T. H. Dunkelberger

Precision cryostat for the range −35° to +25°. Edwin E. Roper. *Ind. Eng. Chem., Anal. Ed.* **12**, 113–17 (1940).—A 7-l. cryostat with a mean bath temp. variation of ±0.0012° at −28.11° is described in detail. A household refrigerator unit operated continuously and a heating coil, both connected to an elec. control circuit, are described, and the operation is very fully given. W. F. Bruce

A simple quartz-fiber manometer of high accuracy. G. Wetterer. *Z. tech. Physik* **20**, 281–3(1939).—The damping of vibrations of a small disk attached to two thin quartz fibers gives a sensitive indication of the pressure over the range 10^{-1} to 10^{-5} tor. J. B. Austin

The luximeter. W. L. Carson. *Gen. Elec. Rev.* **43**, 91–2(1940).—This is a photoelectric instrument for measuring light transmission through a liquid; it consists of a lamp maintained at const. light intensity, a test-tube holder and light meter, all mounted in a small case. Light from the lamp passes through the liquid (in the test tube) to be measured, then to the photoelec. cell which actuates a sensitive indicating instrument. A rheostat in the lamp circuit controls the amt. of light required for a given test. Among the applications cited is the detn. of the degree of pasteurization of *milk*. The blue color intensity of the sample of milk is proportional to the amt. of phosphatase still present. The lighter the blue the more complete the pasteurization. The luximeter will measure turbidity quite well over the range 100 to 3500 p. p. m. on the silica scale. C. G. F.

Calculation of the loss of product in a vacuum evaporation system with a water barometer condenser. D. E. Zil'berman and E. Ya. Margulis. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 36–7(1939). H. M. Leicester

Evaporative index. Geo. S. Gardner. *Ind. Eng. Chem.* **32**, 226–31(1940).—A simplified approx. form of the Maxwell-Stefan equation is given for evapn. from a liquid surface: $E = (KD_1Mp_{a1})$, where E is evapn. rate, g./hr./sq. cm., D_1 is diffusivity, sq. cm./sec., M is mol. wt., p_{a1} is vapor pressure, mm. Hg. $K = \alpha/RTPx$, where P is total pressure, x is equiv. film thickness, and α is a proportionality const. E was detd. under const. conditions, with artificial convection, at 50°, for 18 org. liquids boiling from 62° to 193°, and plotted against the index (D_1Mp_{a1}). E, varying from 0.0143 to 1.197, is closely given empirically by $0.00258\ (D_1MP_{a1})^{0.87}$. Doolittle's values, using natural convection (*C. A.* **30**, 307[2]), are similarly analyzed, and show direct proportionality, with fair agreement. *Vapor pressures* from room temp. to the b. p. were detd. on all liquids. Cox curves (*C. A.* **17**, 2359) are given for those for which satisfactory values do not exist in the literature. From these charts, the vapor pressures in mm. Hg at 20° and the normal b. p. are: *isooctane*, 36, 100°; *butyl acetate*, 9.0, 126°; *isodecane*, 28, 160°; *diacetone alc.*, 1.05, 170°; *diisobutylene*, 35, 101°; *diisoamylene*, 26, 159°; *ethylene glycol monoethyl ether*, 39, 130°; *amyl acetate*, 29, 147°. Thirteen references. R. W. H.

Apparatus for drying small quantities of heat-sensitive solids. W. G. Whittleston. *New Zealand J. Sci. Tech.* **21B**, 162–3(1939).—A moist solid on a Büchner funnel was dried *in vacuo* by passing a stream of air through heated H_2SO_4 and thence by an inverted funnel to the Büchner. At 25° the solid was dried 3 to 4 times as rapidly as in a vacuum desiccator at room temp. The rate of air flow was 0.25 to 0.5 l. per min. The large tube connecting the acid and funnel was insulated and provided with a thermometer. W. F. Bruce

Temperature-measuring instruments. W. Bowen. *J. Inst. Fuel* **12**, 75–81S(1939).—Modern developments in resistance, thermoelec., radiation, and optical pyrometers are reviewed, special reference being made to the combined color-brightness pyrometer. A comprehensive bibliography is included. B. C. P. A.

A precision multiple-point thermometer outfit. G. M.

Dreosti and P. Wissing. *Union S. Africa, Dept. Agr. Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 176–202(1939).—A 240-point outfit, having extreme reliability, robustness and rapidity in use, was developed for precision work in cold-storage spaces. The thermocouple heads are only 0.25 in. diam. by 2.125 in. long and are provided with a short length of connecting cable—which also acts as balancing coil—and waterproofed flexible connectors of low contact resistance. K. D. Jacob 1

Heating effect and lag of small resistance thermometers. G. M. Dreosti. *Union S. Africa, Dept. Agr. Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 203–32 (1939).—The heating effect can be reduced considerably by making the coil former large and filling the free space in the thermometer with wax. Theoretical considerations of the choice of wire are indicated. The flow of heat is considered along theoretical lines and is shown to agree very well with the exptl. facts. K. D. Jacob 2

Metallic materials for thermocouples. A. Schulze. *J. Inst. Fuel* **12**, 41–8S(1939); cf. *C. A.* **33**, 6092⁶.—A review is given of the progress made in the use of thermocouples for temp. measurement, particularly for temp. greater than 1500°, and of the principles governing the choice of material for thermocouples. Data on the thermoelec. force and useful temp. range of a large no. of noble- and base-metal couples are included. B. C. P. A. 3

Modified aspirating thermocouple for [measurement of] gas temperatures. B. M. Larsen, G. Siddall and K. Heindlhofer. *J. Inst. Fuel* **12**, 55–6S(1939).—Constructional details are given for a suction pyrometer for gas temps. up to 1400° for which almost perfect radiation-shielding and negligible lag in following rapid temp. change are claimed. The radiation shield consists of a thick-walled cylinder of very porous insulating refractory into one end of which a no. of small gas channels are drilled. The pyrometer has been successfully employed in open-hearth checker chambers. B. C. P. A. 4

Theory and application of the suction pyrometer. A. Schack. *J. Inst. Fuel* **12**, 30–8S(1939).—A math. theory is developed for suction pyrometers of normal design, with 2 concentric suction tubes, and with several concentric rings of small suction tubes. Practical measurements in a flame-tube boiler showed that the results arrived at mathematically are borne out in practice, and that the theory may be used for the calcn. of corrections for high-temp. measurements. B. C. P. A. 5

Wall effect in gas-temperature measurements. C. H. Bosanquet. *J. Inst. Fuel* **12**, 14–17S(1939).—Errors in gas-temp. measurement due to radiation from the walls and to conduction along leads or sheaths are discussed and calcd. An estn. is made of the effect of shields and fins on the accuracy of measurement, and recommendations are made as to the best way of making these improvements. It is concluded that a bare fine-wire couple is the most satisfactory when conditions permit its use. B. C. P. A. 6

Application of temperature-measuring equipment to measurement of gas temperatures. S. Matthews. *J. Inst. Fuel* **12**, 72–5S(1939).—Recent developments in the field of industrial gas-temp. measurement are considered. Special attention is paid to problems relating to the use of radiation pyrometers. B. C. P. A. 7

Measurement of gas temperature in the chemical industry. J. C. Swallow. *J. Inst. Fuel* **12**, 68–72S(1939).—It is considered that the problem is one of maintenance rather than accuracy of measurement of temp. The relative merits of the various types of pyrometers are briefly reviewed. Attention is paid to problems of measuring gas temps. greater than 1200° and to the effects of sensitivity and lag on automatic temp. control. The relative durabilities of various refractory and metal protective sheaths are discussed. B. C. P. A. 8

Measurement of temperature of producer gas. M. W. Thring. *J. Inst. Fuel* **12**, 58–61S(1939).—Tests made on a brick-lined producer-gas main of 4 ft. diam., using 3 couples of diam. range 15:1 and a suction pyrometer, are described. Using a producer-gas temp. of 600°, the 3 couples gave readings within 12° of one another. Placing one of the couples in the shadow of another resulted in a considerable lengthening of the time to reach equil. Attention is drawn to the importance when measuring the temp. drop along a hot gas main of using a "control" couple to allow for fluctuations in the overall gas temp. with time. A fine-wire thermocouple, i. e., about 0.01 in. diameter, is considered to read about 6° less than the true temp. of producer gas in mains of the characteristics described. B. C. P. A. 9

Gas-temperature measurement in boilers. W. R. Hawthorne. *J. Inst. Fuel* **12**, 64–8S(1939).—Tests made in the gas passages of a H_2O-tube boiler on a rod-type sheathed couple, 3 bare-wire chromel/alumel couples of different wire sizes, a simple suction couple for temps. up to 1000°, a H_2O-cooled high-suction couple for higher temps., and a special "banjo" multiple Pt fine-wire couple with wire sizes varying from 0.02 to 0.004 in. diam. are described. It is considered that for practical purposes suction pyrometers combined with efficient ejectors are eminently suitably. B. C. P. A. 10

Errors in gas-temperature measurement. A. F. Webber. *J. Inst. Fuel* **12**, 56–8S(1939).—Two widely-different cases where a sheathed thermocouple failed to give correct temp. are quoted. In one of them, a hot-blast main at an ironworks, a substantial error was shown in conditions which should have favored accuracy, while in the other, a narrow H_2O-cooled flue, the error, though expected, was of unforeseen magnitude, viz., 540°. B. C. P. A. 11

Errors in gas-temperature measurement. R. I. Brown. *J. Inst. Fuel* **12**, 84–6S(1939).—A method of approximation for calcg. the correction to be applied to the reading of a thermocouple or suction pyrometer inserted in a gas stream is outlined. B. C. P. A. 12

Errors in gas-temperature measurement and their calculation. M. Fishenden and O. A. Saunders. *J. Inst. Fuel* **12**, 5–14S(1939).—Errors in measuring gas temp. by thermocouple or other inserted instrument are discussed. Simplified curves are given for estg. the error due to radiation between a thermocouple and surrounding walls, for shielded and unshielded couples of different size and emissivities. A table of emissivities is given, with numerical examples showing the use of the curves. Comparisons are made with actual practice. Curves are also given for estg. the errors due to time lag when measuring fluctuating gas temp., and for calcg. the error due to conduction of heat along the thermocouple leads. Some less common methods of gas-temp. measurement are briefly referred to. B. C. P. A. 13

Measurement of flame temperature. G. Ribaud, Y. Laure and H. Gaudry. *J. Inst. Fuel* **12**, 18–30S(1939).—The principles of the different methods of flame-temp. measurement are discussed. The suction pyrometer, extrapolation to zero-size method and the heated-wire methods are described. Optical methods for partly opaque luminous flames are considered (e. g., the Kurlbaum methods and its improvements), and also a photographic method. Nonluminous flames are discussed, particular attention being given to Féry's method of the inversion of the Na line, its errors and improvements. The problems of measuring fluctuating flame temp. and temp. in an internal-combustion engine are dealt with. Brief descriptions are given of a chemical and a thermal-cond. method. Féry's method is considered to be the most likely to lead to reliable results if proper precautions (described) are taken. B. C. P. A. 14

Optical temperature measurement of luminous hydrocarbon flames. G. Naeser. *J. Inst. Fuel* **12**, 38–41S (1939).—The principles of the color pyrometer are briefly discussed. A detailed description is given of the color-brightness pyrometer which by means of a simultaneous detn. of brightness in the sum of two colors (usually red and green) and the color from the ratio of the same two colors enables the true temp. of luminous flames having a continuous heat spectrum to be measured with a high degree of accuracy. A summary of various flame-temp. detns. made with this pyrometer is included. B. C. P. A. 15

Measurement of temperature in high-pressure con-

tainers. A. Michels and B. Blaisse. *J. Inst. Fuel* **12**, 49–54S(1939).—The effect of pressure on heat transfer is discussed. The various methods employed in practice are briefly described; they include; the thimble method, the use of expansion thermometers and of thermocouples and resistance thermometers, and the optical method. B. C. P. A. 1

Temperature measurements on liquid steel in the basic open-hearth process. Sven Fornander and Ture Omberg. *Jernkontorets Ann.* **123**, 527–44(1939).—A W-Mo thermocouple was constructed and enclosed in a water-cooled pipe with a large enough flow to keep the water temp. rise below 35°. To permit easy replacement the hot junction was inserted in a socket connecting with the cold junction. The hot junction was inserted in Pythagoras tubes and covered with a graphite-clay mixt. to prevent attack by slag and steel, and the whole junction protected against breakage by enclosure in a graphite tube. Temp. equil. was attained in 2.5–3 min. The junction was effective for about 6 measurements. The measured temps. varied considerably from the heat of the charge as estd. by the operators. The authors therefore believe that temp. control by such thermocouples should insure greater uniformity of production. H. C. Duus 2 3

Production of low temperatures—simplified and inexpensive laboratory procedure. Helen L. Wikoff, Benjamin R. Cohen and Morton I. Grossman. *Ind. Eng. Chem., Anal. Ed.* **12**, 92–4(1940).—The use of solid CO_2 and various solvents for producing low temps. was studied. By addn. of 115 to 170 g. of dry ice to 500 cc. of each of the following in a thermos bottle, the temp. indicated was held within 1 or 2° for 4 hrs.: $(CH_2OH)_2$ (I) −15°; dimethoxytetraethylene glycol (II) −31°; diethylcarbitol −52° (III); carbitol acetate (IV) −67°; cellosolve (V), cellosolve acetate (VI), diacetone alc. (VII), Bu cellosolve (VIII) −73 to −77°. Of these I–IV crystd. at the temps. indicated but V–VIII did not. III and VII were considered the most useful because they remain more fluid at low temps. W. F. Bruce 4 5

Calculation of heat exchangers and the use of adimensional characteristics in some thermal problems connected with chemical plants. B. Finzi-Contini. *Atti X° congr. intern. chim.* **4**, 304-12(1939).—The calcn. of heat exchanges between permanent currents, carried out by means of some adimensional parameters characteristic of the heat exchanger and its functioning, is described and compared with other methods. It is based on general graphs, two of which are reproduced in new suitable scales. This new method is considered particularly applicable in the field of chem. plants, partly because of the rapidity of the calcn. made possible and partly because it is suited to cases where the factors involved differ in various parts of the app. A. H. Krappe 6 7

Simply constructed vacuum oven. W. G. Whittleston. *New Zealand J. Sci. Tech.* **21B**, 165–7(1939).—A Cu vessel with a lid fitted with a gasket is heated by 2 nichrome spirals embedded in asbestos and paraffin wax. A Hg thermoregulator, thermometer and exhaust tube are admitted to the vessel through a rubber stopper. A modified Bunsen valve and a condenser are attached between the exhaust and a H_2O pump. The oven was found entirely reliable. W. F. Bruce 8

High-speed centrifugals (Hoyt, Smith) **28**. Distn. and distn. technique in perfume industry (Herold) **17**. Glass as chem. engineering material—filters (Quarendon) **19**. App. for use of solvents in extg. oils, fats and other sol. constituents from solid materials (U. S. pat. 2,184,248) **27**. Centrifuge for acetylating cellulose or for other chem. reactions (U. S. pat. 2,184,033) **23**. App. for destroying froth developed in yeast manuf. or other processes (U. S. pat. 2,184,195) **16**. 9

Allen, Roy M.: The Microscope. New York: D. Van Nostrand Co. 283 pp. $3.00. Reviewed in *Bakers Digest* **14**, 179(1940).

Eucken, A., and Jakob, M.: Der Chemie-Ingenieur. Bd. III. Chemische Operationen. Tl. 3. Operationen bei normalen Druck und normalen Temperatur. Leipzig: Akademische Verlagsgesellschaft m. b. H. 332 pp. M. 33; bound M. 35. Cf. *C. A.* **32**, 5263[3]; **33**, 4471[6].

MacLean, Allen D.: The Orifice Meter for Measurement of Flow of Gases and Liquids. Pittsburgh: Equitable Meter Co. 146 pp.

Shank, W. Bradford: Filters and Their Uses. New York: Ziff-Davis Publishing Co. 95 pp.

Tenot, André: Mécanique des fluides appliquée (exercices numériques en vue des applications industrielles). Paris: H. Dunod.

Adsorption apparatus. Pittsburgh Lectrodryer Corp. Brit. 508,372, June 22, 1939. App. for the treatment of gaseous fluids comprises a bed or beds of adsorptive materials subdivided into sectors or zones, chambers disposed above and below the bed(s), and a rotary cylindrical circumferentially ported valve extending through the bed (s) and adapted for supplying and delivering sep. streams of treatment and reactivation fluid to such chambers for their passage through the different zones or sectors in predetd. sequence and from the upper to the lower chambers and *vice versa*, so that the streams pass through the bed(s) in opposite directions.

Apparatus for carrying out endothermic reactions in the vapor and gas phases. M. A. Nechaev. Russ. 52,047, Oct. 31, 1937. Addn. to Russ. 45,709. Construction details.

pH meter. Donald K. Allison (to National Technical Laboratories). U. S. 2,183,531, Dec. 19. Various structural and operative details are described of a pH meter which includes: a housing and a head assocd. together and rotatable with respect to each other, the housing carrying one relative movable part of a potentiometer and the head carrying the other relatively movable part of the potentiometer so that rotation of the housing and head with respect to each other will vary the output of the potentiometer; a pair of terminals adapted to be connected to a pair of electrodes; a galvanometer; an electrical circuit connecting the potentiometer, galvanometer and terminals in such a manner that the output of the potentiometer can be balanced against the e. m. f. generated by the electrodes when they are in contact with a soln. whose pH is to be measured; and means for detg. the pH values as a function of the balanced output of the potentiometer. Cf. *C. A.* **34**, 5[6].

Siphon apparatus. Kenneth S. Smith and Ernest V. Casburn (to Eastman Kodak Co.). U. S. 2,184,025, Dec. 19. Various structural details.

Extensometer device suitable for testing various materials. Quintin M. Henderson (to United States Steel Corp.). U. S. 2,183,909, Dec. 19. Various structural, mech. and operative details.

Fractional distillation of liquid mixtures, especially petroleum. Antoine J. Brugma. Dutch 46,919, Oct. 16, 1939. A distn. column provided with one or more side streams is operated in a cycle: first a feeding period without any take-off, then a refluxing period without feeding or take-off, finally a take-off period during which products are removed from the column. Several variations are discussed. Less overlap of fractions is claimed.

Valve for controlling the flow of liquids or solids or their mixtures through pipe lines. Willing B. Foulke (to E. I. du Pont de Nemours & Co.). U. S. 2,183,835, Dec. 19. Various structural details, involving use of a flexible tube such as one of rubber and devices for its constriction.

Filters. Arthur H. Stevens. Brit. 508,514, July 3, 1939. A fluid-penetratable filter element comprises a relatively thin body consisting predominantly of fibers, the body being impregnated over the filtering area with a hardened resin having irreversible thermohardening characteristics similar to a $PhOH\text{-}CH_2O$ resin, the pores of the body being open for the passage of filtrate therethrough. An aldehyde resin may be applied to the fibers of the body in an unhardened condition and then hardened by polymerization. The body may consist of porous paper, asbestos fibers, cellulose fibers, etc.

Filtering apparatus. Henry C. A. Meyer (to United States Hoffman Machinery Corp.). U. S. 2,183,368, Dec. 12. Various structural, mech. and operative details. 1

Gas filters or cleaners. Hans Wittemeier. Brit. 508,475, June 28, 1939. In app. wherein a filter layer or layers, through which the gas is passed, is immersed in or arranged above a liquid bath and wherein the liquid under the influence of the gas flow is caused to irrigate the filter layer(s) to cleanse the same, the liquid is contained in 2 sep. chambers or in 1 chamber divided by a depending filter layer arranged between 2 nonpermeable walls into 2 compartments, the 2 chambers or compartments communicating below the level of the liquid, and the liquid in 1 chamber or compartment is subject to the pressure of the gas entering the filter and that in the other is subject to the pressure of the gas on the outlet side of the filter or to atm. pressure, whereby the greater the pressure difference, the greater the difference in level of the liquid in the chambers or compartments so that the tendency of the gas to entrain an increasing amt. of liquid with increasing gas velocities is reduced. 2

Apparatus suitable for filtering pulps and slurries. Theodore L. Genter (to Oliver United Filters Inc.). U. S. 2,184,451, Dec. 26. Various structural, mech. and operative details of filters of the disk type. 3

Strainer of the back-washing type for water, sewage, oil, gas, air, etc. Benjamin S. Burrell. U. S. 2,184,177, Dec. 19. Various structural, mech. and operative details. 4

Rotary apparatus for straining liquids. Daniel R. McNeal (to Andale Co.). U. S. 2,183,577-8, Dec. 19. Various structural, mech. and operative details.

Electromagnetic separators of the rotary drum type. Herbert H. Thompson, Alfred E. Davies and Henry E. Hutter. Brit. 508,300, June 23, 1939.

Gravity separation. Simon-Carves Ltd. and Geo. G. M. Carbert. Brit. 508,324, June 29, 1939. A mixt. of finely ground burnt pyrites and H_2O, with or without other substances, is used as a heavy sepg. medium for coal washing. The turbulence or rate of settlement may be regulated by an agitator running on a horizontal shaft. A portion of the liquid may be allowed to overflow with the products. Lime or soda may be added to the H_2O to neutralize any acid present in the burnt pyrites. 5

Separating gaseous mixtures. Isaac H. Levin. Brit. 508,685, June 28, 1939. A stream of the gaseous mixt. is subjected to cooling and expansion in an expansion engine, a further stream thereof is subjected to cooling and expansion by passage through an expansion valve, the 2 streams are then combined and the single stream formed is introduced into a rectifying column for distn. and rectification, the cooling, expansion and combining being effected in such manner that the unsatd. gaseous mixt. from the engine is satd. by the evapn. of some of the liquefied constituents of the stream issuing from the valve and the stream introduced into the column being composed of a satd. gaseous mixt. with particles of liquefied constituents of the gaseous mixt. The combined stream may be passed through a coil arranged about the base of the column prior to actual introduction into the column. The stream introduced into the column may be deflected to remove the liquid particles from the gaseous constituents before the latter pass into the distn. units of the column. 6 7 8

Separation of minerals, coal, etc. Leon Hoyois. U. S. 2,184,594, Dec. 26. App. is described, and various operative details of a process for treating materials in grains or pieces with currents of liquid such as water.

Apparatus for pneumatic separation of materials (such as coal and impurities) of different specific gravities and sizes. Frank F. Ridley (to Colliery Engineering Ltd.). U. S. 2,183,281, Dec. 12. Various structural, mech. and operative details. 9

Apparatus (with a rotary screening drum) for separating solid particles of different sizes, as in starch manufacture. Georg Jahn. U. S. 2,184,598, Dec. 26. Various structural, mech. and operative details.

Treating liquids containing suspended particles. Egon Hiedemann and Otto Brandt. Brit. 508,675, June 26, 1939. Solid or liquid suspended particles are removed from melts and liquids contg. them, or such melts and liquids are demixed into turbid and clarified liquids, by exciting the melt or liquid into short-wave vibrations by transmission through an elongated body thereof, and over the whole or substantially the whole of the cross section, of sound waves of about 8–100 kilocycles per sec. the wave form of which lies in or substantially in the longitudinal direction of the body of liquid, the length of the body being a multiple of its cross section so that any cavitation that may occur near the actual vibration generator does not hinder the coagulating effect of the vibrations. Cf. *C. A.* **33**, 10^8.

Apparatus suitable for taking samples of liquids such as crude oil from pipe lines. Ralph M. Slough (to Illinois Pipe Line Co.). U. S. 2,183,338, Dec. 12. Various structural and operative details.

Liquid dispensing valve suitable for use with various containers. Harry J. Meyer. U. S. 2,184,194, Dec. 19. Various structural details.

Apparatus for regulated feed of liquids, such as fuel charges for diesel engines. Merton J. Smith (30% to Paul B. Shannon, and 20% each to John P. Geiger and Robert W. Wilson). U. S. 2,183,875, Dec. 19. Various structural and operative details.

Electrical indicator and control apparatus for impurities in tank liquors of paper mills, dye works, water and sewerage plants, etc. Bjarne Pedersen. U. S. 2,183,584, Dec. 19. App. used comprises the combination of a coupling adapted to be attached to a tank contg. liquid, and into which coupling the liquid from the tank flows, and an elec. contact assembly including an insulating tube having a fluid-tight connection with the coupling at an angle which will permit the liquid to freely enter the end of the tube attached to the coupling, a conducting element fitted in the tube and extending throughout a part only of the length of the latter whereby an open space is left at one end of the tube to receive liquid from the coupling, an outwardly extending projection, and a cap having a hole therein through which the projection extends, said cap embracing the projection and attached to the tube for holding the conducting element and projection in elec. contact.

Vacuumizing containers such as jars by steam condensation. Edward M. Enkur and Louis L. Lauve (to Crown Cork & Seal Co.). U. S. 2,184,490, Dec. 26. Various details of app. and operation.

Method and apparatus for diffusion control. Lewis D. Drake. Brit. 508,385, June 30, 1939. A diffusion or *flotation* app. includes a vertically disposed deep tank, having an inlet and an outlet, for the reception of a liquid having solid matter suspended therein, the tank having impelling means therein for maintaining the liquid in continuous circulation with the solid matter in substantially uniform suspension, means for maintaining the level of the liquid in the tank above the impelling means, the latter being adjacent the surface of the liquid and above the major portion of the liquid, means coöperating with the impelling means for introducing a fluid, preferably a gas, to be diffused throughout the liquid, an elongated passage extending from the impelling means downwardly to a point adjacent the bottom of the tank to form a top diffusion zone above the liquid-impelling means, a small elongated zone of upward fast liquid movement in the passage and a larger zone of substantially uniform downward pulp movement outside of the passage, the larger zone contg. the major portion of the liquid and permitting small froth-forming gas bubbles held in the downwardly flowing column to assert their buoyancy to rise through the column and gather with the primary froth, the lower portion of the tank being formed to provide a lower pick-up zone of progressively increasing velocity to the tank bottom, from which the small zone of upward fast liquid movement returns the liquid to the impelling means for recirculation.

Mineral classifier machines. Clifton W. Livingston. Brit. 508,339, June 29, 1939. These comprise a tank, open at its top and provided with an inclined bottom, transverse partitions in the deeper part of the tank for the

division thereof into sorting zones and a washing and sorting column, an endless conveyor operating within the tank, 1 part of the conveyor being movable vertically in 1 sorting zone and another part movable parallel to the tank bottom, means for delivering material downwardly into the column, means for directing a current of liquid horizontally across the column and the material feed, a deflector to deflect the current upwardly, means to deflect the upwardly rising current from the column into the sorting zones and transverse overflow launders arranged at the open top of the tank in 1 of the sorting zones.

Gyratory crusher suitable for sand lumps, etc. Russell S. Ellis. U. S. 2,184,214, Dec. 19. Various structural, mech. and operative details.

Method and apparatus for briquetting fine-grained, pulverulent or dust-fine material. Fuel Improvement Co. Ltd. Brit. 508,343, June 29, 1939.

Bunsen burner. Roy C. Underwood. U. S. 2,184,203, Dec. 19. Various structural details.

Gas burner for producing temperatures above 1000°, as in chemical furnaces. Willibald Trinks (to Eastman Kodak Co.). U. S. 2,183,596, Dec. 19. Various structural details.

Mud guns for closing furnace tap-holes. Alfred Osolin and Jay Wesley Ferree. Brit. 508,655, July 4, 1939.

Shell-and-tube heat-exchange apparatus. Clarence D. Coulter and Edwin R. Cox (to Southwestern Engineering Co.). U. S. 2,183,160, Dec. 12. Various structural details.

Heat-exchange apparatus suitable for use with various kilns, blast furnaces, etc. Frank O. Campbell and Geo. W. Nigh. U. S. 2,183,956, Dec. 19. Various structural details.

Use of impact vibrations for cleaning coils of heat-exchanger tubes. Heinrich Peters (to La Mont Corp.). U. S. 2,183,496, Dec. 12. Various details of app. and operation for effecting dirt removal.

Belt pulley. Wm. B. Collier (to B. F. Goodrich Co.). U. S. 2,184,545, Dec. 26. To minimize belt-squeaking, a pulley having a supporting body of nonvitreous material such as steel, with a concentric portion of approx. belt-supporting size is provided with a thin, belt-contacting facing of vitreous material fused in place on this portion.

Pressure gage suitable for use with oils, acids, alkalies, etc. Frederick A. Barnes (to Bailey Meter Co.). U. S. 2,184,163, Dec. 19. Various structural, mech. and operative details.

Refrigerating apparatus suitable for use with ammonia. Clarence T. Sorensen. U. S. 2,184,322, Dec. 26. Various structural and operative details.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Ossian Aschan. K. Myrbäck. *Svensk Kem. Tid.* **51**, 246–8(1939).—Eulogy with portrait. A. R. Rose

Søren P. L. Sørensen. Hans v. Euler. *Svensk Kem. Tid.* **51**, 248–51(1939).—Eulogy with portrait. A. R. Rose

V. I. Sihvonen. K. Myrbäck. *Svensk Kem. Tid.* **51**, 252(1939).—Obituary. A. R. Rose

Professor L. Ruzicka. J. N. Ray. *Current Sci.* **9**, 5–8(1940).—An account of his work. G. G.

In memory of Julius Schaal. Anon. *Seifensieder-Ztg.* **67**, 51(1940).—Obituary of well-known soap maker. A. Guillaudeu

Gustav Tammann, 1861–1938. G. Masing. *Ber.* **73A**, 25–8(1940).—Obituary with portrait. G. G.

Professor Dr. Alexander Tschirch (1856–1939). Anon. *Schweiz. Apoth.-Ztg.* **77**, 717–21(1939).—Obituary with portrait. S. Waldbott

A hitherto unexplained phenomenon in the burial chamber of Tut-ench-amon. A. Tschirch. *Schweiz. Apoth.-Ztg.* **77**, 565(1939).—All objects in the tomb chamber including the stone sarcophagus were uniformly covered with a fine gray bloom. It has been shown (*C. A.* **6**, 2089; **22**, 4840) that upon autoxidation of oil of turpentine, 2 terpinoresenes are formed, both solid; *A* m. 106–7°, *B* m. 272°. In the chamber, these form the coating, caused by terpenes which are always present in essential oils. They had been added to the balsams that were used in the burial. The hot air of the chamber aided in volatilizing the terpenes, which then underwent autoxidation. S. Waldbott

Copper and bronze pieces in prehistoric collections. Wilhelm Witter. *Nachrichtenbl. deut. Vorzeit.* **13**, 237–8 (1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 731–2.—Analyses of pieces of broken needles found in the excavations at Gezer (Palestine) of 1000–1400 B. C. average, according as they are of the 1st, 2nd, 3rd or 4th Semitic period, resp., 77.90, 63.5, 66.4 and 90.0% Cu; 2.89, 3.7, 23.4 and 1.86% Zn; and 11.2, 33.7, 10.17 and 7.73% Sn. C. A. Silberrad

Physics for the year 1939. Alpheus W. Smith. *Ohio State Univ., Eng. Expt. Sta. News* **12**, No. 1, 22–4(1940). E. J. C.

Safety training of undergraduate chemical students. A. S. Zoerb. *Can. Chem. Process Inds.* **24**, 90(1940). W. H. Boynton

Development of the chemical laboratories, London County Council. D. C. Garratt. *Pharm. J.* **142**, 274–5 (1939). Historical, illustrated. Research on analytical methods and malt and oil tests are among special work taken up. S. Waldbott

A new approach to first-year chemistry. G. M. Schmeing. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 127–8 (1939).—A precis of the newer theory of at. structure. J. H. Reedy

Techniques for large-group demonstrations. Nicholas D. Cheronis and Henrietta Freud. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 100–1(1939).—The following app. for demonstrations before large groups are described: (1) A rack for large test tubes, illuminated by elec. lights and reflectors; (2) a flask equipped with Cu electrodes to show union of N and O at high temps.; (3) a model geyser, consisting of a 5-ft. vertical tube of sheet iron, heated at the bottom; (4) a long wire app. to illustrate the magnetic forces acting on a wire carrying an elec. current. A no. of simple expts. to be performed individually by nonprofessional students have been devised. J. H. Reedy

Quantitative estimations in the qualitative course. Elijah Swift, Jr. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 130–1(1939).—Known solns. contg. 50 mg. of each ion of the group are analyzed, and the final tests retained as standards. Then the unknown is analyzed, and the amt. of each ion is estd. by comparison with the known standard. Fifty-six of the results fell within an error of 50%. The pedagogical advantages of this approach are pointed out. J. H. Reedy

Distribution of organic matter in marine sediments and its availability to further decomposition. D. Q. Anderson. *J. Marine Research, Sears Foundation Marine Research* **2**, 225–35(1939); cf. *C. A.* **28**, 6599[3]; **32**, 5438[3].—C and N contents and values for O consumed (per 1 g. C) during 15 days' exposure to aged O-satd. sea water were obtained for marine muds taken near the Massachusetts coast. The org. C varied from 4.5% in muds collected from Hadley Harbor to 0.10% at a considerable distance from land; the O consumption in 15 days varied from 1000 cc. to 0 cc., and the C/N ratio varied from 16.2 to 5.6. There is no correlation between the amt. of O consumed and the amt. of org. C present in the sediments except when the C is low. Generally the C became less available to oxidation at greater depths and greater distances from land. George Ayers

Practical photocolorimetry. I. Sorgato. *Chimica e industria* (Italy) **22**, 1–4(1940).—A summary with 49 references. A. W. Contieri

Methods and apparatus of the Physicochemical Bureau of Standards. XI. Purification and criteria of purity of organic standards. L. Gillo. *Bull. soc. chim. Belg.* 48, 341–443(1939); cf. *C. A.* **34**, 1530⁹.—A detailed, exptl. study of the literature of Et_2O (I), alc. (II), AcOEt (III) and CS_2 (IV) was made so that these compds. might be used as org. standards. Qual. and quant. methods are given for the detn. and removal of impurities in these compds. Two methods of purification of I are recommended: I is shaken with 50% H_2SO_4, distd., dried 8–15 days over $CaCl_2$ and 1 month over Na wire and distd., b_{760} 34.58–4.59°, d_0 0.73626; the second method requires washing with satd. $KMnO_4$ soln. contg. 5% NaOH prior to the above treatment and 2 months over Na in the absence of light and air. I purified by these 2 methods shows a b.-p. variation of 0.006–0.014° and a H_2O and AcH content of 0.0008–0.0010%; the amt. of $C_4H_{10}O_2$ per 100 cc. I is 10^{-3} g. and 5×10^{-5} to 10^{-4}%, resp. H_2O and AcH can be completely removed only by chem. means. I is best preserved by purification by the second method followed by storage in sealed containers contg. no air and light; P_2O_5 is a good preservative for I. By distg. 500 cc. II in a current of N with 75 cc. IV in all-glass app., 300 cc. of II is obtained b_{760} 78.30°, d_0 0.80624; this sample contains less than 0.0005–0.001% H_2O, 0.001% EtCOMe, 0.0005% MeOH, 0.0003% III, 0.004% AcH and 0.0001–0.0002% IV. II is freed from III by simple distn., from H_2O by azeotropic distn. with IV; AcH and especially MeOH are difficult to remove completely. III is dried over anhyd. K_2CO_3 for 2 months, filtered, distd. and the initial and final fractions are discarded; the product is redistd. in all-glass app. over P_2O_5 (10–20 g. per kg. of III) and after 10 cc. has distd., a product b_{760} 77.15 ± 0.01°, d_0 0.92451, is obtained. This contains less than 0.004% each of AcOH, alc. and H_2O. Data are given showing the instability and decompn. of III stored in darkness in the absence of air for 4, 6 and 13 yrs. IV is suitably purified by 3 distns. in all-glass app., b_{760} 46.25°, d_0 1.29268; it possesses a very weak odor, < 0.001% H_2O, < 5×10^{-6}% H_2S and S. IV is preserved well in darkness. 272 references. David E. Adelson

The atomic weight of holmium. O. Hönigschmid. *Naturwissenschaften* **27**, 855(1939).—By mass spectrography Ho was found free of isotopes and of mass 165, the chem. at. wt. being 164.94. With a Ho prepn. of high purity, having 0.013 at. % Y, 0.04 at. % Er, 0.03 at. % Dy analysis of the trichloride gave a corrected value for the at. wt. of 164.944. B. J. C. van der Hoeven

The atomic parameters of γ-silver-cadmium. Harald Perlitz and Rolf Aavakivi. *Acta Commentationes Univ. Tartu.* **1939**, No. 2, 13 pp.—See *C. A.* **34**, 1221¹. F. C. Nachod

The dielectric constants of ammonia, nitrogen and carbon dioxide at ultrahigh frequencies. Gerald W. Fox and Alden H. Ryan. *Phys. Rev.* **56**, 1132–6(1940).—The heterodyne beat method has been used to det. the dielec. consts. of N_2, CO_2 and NH_3 at a frequency of 56 megacycles in the temp. range of 22° to 45°. The consts. of N_2 and NH_3 at 56 megacycles agree well with the values found at low frequencies. For CO_2 an anomaly was observed, the value of the const. rising from its normal value to a max. at about 39° and then decreasing. This latter effect is discussed. Bernard Lewis

The elastic, dielectric and piezoelectric constants of heavy-water Rochelle salt. A. N. Holden and W. P. Mason. *Phys. Rev.* **57**, 54–6(1940); cf. *C. A.* **33**, 8073⁴.—Crystn. of Rochelle salt from heavy water raises the upper Curie point of the material by 11° and lowers the lower point by 5°, but leaves the other properties substantially unchanged. Bernard Lewis

Magnetism and molecular constitution of some manganese compounds. S. S. Bhatnagar, Brahm Prakash and Jai Chand Maheshwari. *Proc. Indian Acad. Sci.* **10A**, 150–5(1939).—In order to clarify certain questions relative to structure the susceptibilities of several complex Mn compds. were detd. by the Gouy method. The details of the prepn. of the compds. are given and the various formulas which have been suggested for them are discussed. The results of the magnetic measurements and the formulas that these results indicate are:

Name	Formula	Specific susceptibility	Temp.
Pink manganous chloride of pyridine	$C_5H_5NH.MnCl_3.H_2O$	55.80×10^{-6}	21°
Green manganous chloride of pyridine	$2C_5H_5NH.MnCl_4$	41.29	21°
K manganic chloride	$2KCl\ MnCl_4$	18.05	20°
Ag permanganate	$AgMnO_4$	− 0.28	27°
K manganic cyanide	$K_4[Mn(CN)_6]$	4.0 ± 1.0	20°

W. W. Stifler

Further measurements of the magnetic properties of some salts of the iron group at low temperatures. W. J. de Haas, B. H. Schultz and J. Koolhaas. *Physica* **7**, 57–69(1940)(in English); cf. *C. A.* **33**, 6670¹.—By use of the methods previously described, the susceptibilities of several Mn, Ni, Cr and Cu salts were measured at temps. down to 14°K. $MnSO_4$ follows the Curie-Weiss law with $\theta = -24°$ and the const. = 4.28. For MnI_2 the deviations from the Curie law are small down to 60° but at H temps. the $1/\chi - T$ graph is curved and the susceptibility is much smaller than that calcd. for the free Mn^{++} ion. The behavior of MnF_2 is similar to that of MnO. Its susceptibility is much less than that of the free Mn^{++} ion and it has a max. at about 70°K. The susceptibility is slightly dependent on field strength at H temps. The susceptibility of $MnBr_2$ is only a few % less than the theoretical value for the free Mn^{++} ion but apparently it follows neither the simple Curie nor the Curie-Weiss law. At H temps. the susceptibility depends slightly on the field strength and there is some evidence of remanence. The behavior of $NiCl_2$ is similar to that of $CoCl_2$ previously reported. It shows thermomagnetic remanence and a coercive force of 3500 to 5300 gausses. The susceptibility of NiF_2 at H temps. does not depend on the field strength. At H temps. and field strengths up to 5200 gausses the susceptibility of $Cr_2(SO_4)_3$ shows no anomalies. The susceptibility of $CrCl_3$ at the lower H temps. depends markedly on the field strength, and a complete hysteresis loop is given for this salt at 14.8°K. Between 53° and 360°K. the susceptibility of CuF_2 can be represented by $\chi = (0.0629/T) + 6.55 \times 10^{-4}$. At H temps. χ depends upon the field strength and is much smaller than for the free Cu^{++} ion. In $CuSO_4$ the susceptibility at H temps. depends upon the field strength for fields greater than 800 gausses. The paper includes tabulated results, graphs and details of prepn. of the salts. W. W. Stifler

Hall effect in ferromagnetic substances. V. Rudnitskiĭ. *J. Phys.* (U. S. S. R.) **1**, 247–50(1939).—See *C. A.* **33**, 7632⁴. A. D.

Crystal diamagnetism of tellurium. S. Ramachandra Rao and S. R. Govindarajan. *Proc. Indian Acad. Sci.* **10A**, 235–52(1939).—The principal diamagnetic susceptibilities of single crystals of Te, and of well-annealed polycryst. rods, were detd. by the Gouy method for various orientations throughout the temp. range 30° to 500°. At room temp. the susceptibility of the single crystal is −0.329 (× 10^{-6}) parallel to the trigonal axis and −0.296 perpendicular to it, which gives 1.11 as the magnetic anisotropy. The susceptibility of the annealed material is −0.307. Increase in temp. does not affect the susceptibility perpendicular to the trigonal axis but decreases the susceptibility parallel to it. At 220° the 2 become equal. On melting, the vol. susceptibility decreases from −1.7 to −0.3. The addn. of small amts. of Sn, Cd, Bi or Pb produces a decrease in both principal susceptibilities and in the magnetic anisotropy, which approaches unity. The diamagnetic susceptibility of polycryst. Te is also decreased by the presence of small amts. of these metals. The no. of valence electrons in the added metal does not seem to influence the magnitude of this effect, but the decrease in susceptibility is greater for elements of greater at. radius. Since the at. susceptibility of polycryst. Te is −39.2, whereas Kido gives −4.5 as the susceptibility of a g. ion of Te^{+6}, the 6 valence electrons must contribute −34.7 to the susceptibility. This is interpreted as indicating that Te behaves as a nonmetal, a conclusion which is confirmed by its large elec. resistance. The elec. and

thermal conductivities and the coeff. of linear expansion have different values parallel and perpendicular to the trigonal axis. W. W. Stifler

Paramagnetic relaxation in iron ammonium alum and in chromium potassium alum. F. K. du Pré. *Physica* **7**, 79–91(1940)(in English).—The mutual inductance bridge method, previously used for $GdSO_4$ (*C. A.* **34**, 10[7]), was applied to the study of $FeNH_4$ alum and CrK alum at liquid-He temps. This method consists essentially in measuring the differential susceptibility when a small oscillating field is superimposed upon a strong const. field in which the substance is placed. From the detailed results given, the relaxation time in a field of 1350 gausses for the $FeNH_4$ alum is calcd. as 0.0025 sec. at 4.218°K. and 0.0035 sec. at 3 490°K., while for the CrK alum it is 0.007 sec. at 3.50°K. and 0.018 sec. at 2.006°K. As these values are calcd. from small differences, they are accurate to within about 20%. W. W. Stifler

The paramagnetic susceptibility of copper-nickel and zinc-nickel alloys. Mary A. Wheeler. *Phys. Rev.* **56**, 1137–45(1939).—Alloys of Ni were prepd. with 0 to 60% Cu or 0 to 30% Zn. Their susceptibilities above their Curie temps. were measured as a function of the temps. with a Weiss-Foëx magnetic balance at a field of 11,000. The Weiss-Curie law holds only in restricted ranges of temp., the curve becoming concave toward the T axis at high temps., especially for the alloys of low Ni content. The susceptibility at a given temp. decreases less rapidly than linearly with percentage Cu or Zn added. B. Lewis

Further researches on paramagnetic dispersion. P. Teunissen and C. J. Gorter. *Physica* **7**, 33–44(1940)(in English); cf. *C. A.* **34**, 1526[4].—Detailed results of expts. on paramagnetic dispersion, similar to those already reported, are given for measurements on $Cr(NO_3)_3.9H_2O$ at 77.4° and 90.2°K., $Mn(NH_4)_2(SO_4)_2.6H_2O$ and $MnSO_4.4H_2O$ at 77.4, 90.2 and 290°K., $MnCl_2.4H_2O$ at 64.4°, 77.4°, 90.2° and 290°K. and $Fe(NO_3)_3.9H_2O$ at 64.4, 77.4 and 90.2°K. The hydrated manganous salts show a pos. effect even at room temp., but a concd. aq. soln. of $MnSO_4$ gave neg. results. In addn. to the tabulated data, 13 sets of curves and an energy-level diagram are given. In general, only the hydrated vanadous, chromic, manganous and ferric salts contg. either 21 or 23 electrons per ion show a pos. effect. W. W. Stifler

The antiferromagnetic transition point of vanadium dioxide. H. Dressnandt and W. Schottky. *Naturwissenschaften* **27**, 840(1939).—A discussion of factors involved in the magnetic transition point from weak to strong paramagnetism of VO_2 (Klemm and Grimm, *C. A.* **34**, 1889[9]). It is assumed that only 2 V atoms are involved in the spin adjustment. B. J. C. van der Hoeven

Dipole moment of cedrene. Syu Kanbara. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 314–15(1939).—Cedrene, prepd. from cedar oil, b_{760} 262° (corr.), and has n_α^{15} 1.5042 and d_5^{15} 0.94458. The dielec. consts., ns and ds. for the temps. noted are: 3.263, 1.5042, 0.94458, 15°; 3.272, 1.5022, 0.94104, 20°; 3.273, 1.5006, 0.93744, 25°; 3.273, 1.4985, 0.93384, 30°; and 3.267, 1.4965, 0.93026, 35°. The dipole moment is 0.38×10^{-18} e. s. u. Cedrene is a suitable solvent for the study of the dielec. properties of vulcanized rubber. George Ayers

The torsional flexibility of aliphatic chain molecules. Alex Müller. *Proc. Roy. Soc.* (London) **A174**, 137–44(1940).—A series of measurements is made of the dielec. polarization of 2 di-ketones: (I) $C_{10}H_{18}O_2$, m. 63.5° and (II) $C_{11}H_{20}O_2$, m. 67.5°; they consist of aliphatic chain mols., each carrying 2 C-O dipoles differently situated in the mol. In I the 2 dipoles are antiparallel and tend to neutralize each other; in II they are on the same side of the chain axis and therefore reinforce each other. From the behavior of I and II in the neighborhood of their m. ps. M. concludes that even comparatively short chains suffer considerable distortion under the influence of temp., which suggests a modification of the view that the increase of the apparent symmetry of chain substances near their m. p. is due to the rotation of the mol. as a whole, as this increase may just as likely be due to internal distortion of the chains. Frank Gonet

Nomograms for calculating the conversion of carbon monoxide. N. M. Zhavoronkov and S. N. Tikhmenev. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 35–6(1939). H. M. Leicester

Measurements of the absorption of sound in oxygen and in carbon dioxide containing small quantities of water, deuterium oxide and neon—relaxation times for the vibrational energy. A. van Itterbeek and P. Mariëns. *Physica* **7**, 125–30(1940)(in English).—Previously reported measurements (cf. *C. A.* **33**, 6671[8]) are expanded to det. them as a function of temp. It was found that β-CO_2-D_2O/β-CO_2-H_2O is equal to about 1.5 and that this ratio is nearly independent of the temp. Measurements were also made on CO_2 gas to which a small amt. of Ne was added. A small excitation of CO_2 by Ne was observed. Measurements were made on the absorption of sound in O_2 between 50° and 150°. The relaxation times are computed. M. McMahon

The determination of the heat capacity of gases at high pressure. A. A. Matveenko. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 23–6(1939).—Equations are derived for calcg. the coeff. of compressibility of H, N, CH_4 and H-N mixts. by extrapolation to high temp., and from these, equations for detg. C_p are derived. H. M. Leicester

Viscosity of hydrogen vapor. W. H. Keesom and P. H. Keesom. *Physica* **7**, 29–32(1940)(in English).—From 14 to 20.5°K. the viscosity follows the equations: $\eta = (0.584\ T - 0.55) \times 10^{-6}$ poise. Gregg M. Evans

Effusion phenomena in relativistic quantum statistics. D. V. Gogate. *Phil. Mag.* **29**, 85–92(1940).—Recently Srivastava derived expressions for the no. and mass of particles effusing through a narrow orifice, for an ideal gas, taking account of quantum statistics (*Proc. Roy. Soc.* (London) **A167**, 516–26(1938)). In the present paper expressions are derived for the amt. of energy effusing through an orifice for various cases of nondegeneracy and of degeneracy. The passage of an ideal gas through an orifice is treated, account being taken of relativistic mechanics. In nondegenerate matter the amt. of energy effusing per sec. per unit of area is calcd. The effusion energy is also calcd. for a gas completely degenerate in the sense of the Fermi-Dirac statistics. In complete degeneracy the same expression holds for the rate of effusion of mass throughout the whole region from completely relativistic to completely nonrelativistic. Results are given graphically to illustrate the phys. significance of the equations that are derived. S. Tolansky

Free discharge of fluids through small circular orifices. Hira Lal Roy and Nirmal K. Sen-Gupta. *Ind Eng. Chem.* **32**, 288–90(1940).—In the standard orifice equation, $u = C\sqrt{2gh}$ (Badger and McCabe, "*Elements of Chemical Engineering*," 49 (1936)), values of C (0.080 to 0.938) are detd. for water and 4 oils of viscosities from 60 to 700 centipoises, through sharp-edged orifices from $^3/_8$ to $^1/_{16}$ in. diam. (heads of 2 to 6 ft. are used). Temp., d., surface tensions, viscosities, velocities and Reynolds nos. (0.6 to 51,000) are also tabulated, and C is plotted against Reynolds no. for each diam. For every liquid there is a crit. diam. and a crit. head, below which C decreases with decreasing head and diam., and above which it increases. For water, C increases with these; for the other liquids, C decreases with decreasing diam. Nine references. R. W. Higbie

Experimental investigations on the flow of liquids in tubes of very small diameter. J. M. L. Poiseuille. *Rheol. Mem.* **1**, No. 1, 1–101(1940).—This work, done 100 years ago, was reported *in extenso* in the *Mém. savants étrangers* in 2 papers. Since the 2nd of these papers is fundamental in the development of rheology it is given in full, with biographical and critical notes. E. C. Bingham

Effect of temperature and specific volume on the viscosity of liquids. III. W. R. van Wijk, J. H. van der Veen, H. C. Brinkman and W. A. Seeder. *Physica* **7**, 45–6(1940)(in English); cf. *C. A.* **33**, 3648[9].—Results of measurements at 1500 atm. and from 0 to 150° are shown tabularly and graphically for C_3H_8, $C(CH_3)_4$, CCl_4 and n-$C_{15}H_{37}OH$. Gregg M. Evans

Outgassing of water by use of ultrasonics. P. G. Paunov. *Ann. univ. Sofia. II. Faculté phys.-math.*, Livre 1, **35**, 179–202(in German, 203–5)(1938–39).—Under the influence of ultrasonic frequencies the amts. of absorbed gas decrease to approx. 50% of the original amt. This is explained by the assumption of standing waves in the water, undergoing no change in gas concn. in the nodes, but with the antinodes completely outgassed. 1

Gregg M. Evans

The measurement of the frequency of formation of crystal nuclei in undercooled melts. I. N. Stranski. *Ann. univ. Sofia. II. Faculté phys.-math.*, Livre 2, **34**, 303–4(in German, 305)(1937–38).—The method of observation is described. The melt is subjected to high pressure, while the walls of the vessel are heated to avoid formation of nuclei on the walls. Since the rise in temp. of the melt can be exactly calcd. thermodynamically as a result of the adiabatic compression, the existing undercooling can be detd. 2 3

A. H. Krappe

Vapor tension and grain size. D. Balarev and N. Kolarov. *Ann. univ. Sofia. II. Faculté phys.-math.*, Livre 2, **34**, 231–6(in German, 237)(1937–38).—Detn. of the quantity of NaCl and KBr crystal powders evapd. during grinding at a given temp. for varying lengths of time led to conclusions about the vapor tension of the powders at the temp. in question. In spite of the increase in no. of the very small crystals, with a corresponding increase in surface, the curve vapor tension *vs.* dimensions of the particles reaches a min. between 2 and 4 μ. 4

A. H. Krappe

Vapor pressure of hydrated crystals of oxalic acid and sodium formate. Sotozi Takagi and Seisi Oomi. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 302–4(1939).—By using a modification of Chadwick and Palkin's manometer (*C. A.* **32**, 6508[2]) and di-Bu phthalate, the vapor pressures of $H_2C_2O_4.2H_2O$ were detd. as follows (mm., °C.): 0.35, 0°; 0.91, 10.0°; 1.84, 20.0°; 3.78, 30.0°; 7.79, 40.0°; and 15.58, 50.0°. These may be represented by the equation $\log p = -(2765.64)(1/T) + 9.7130$. Addnl. equations of the Baxter-Antoine and Kirchhoff types are also given. For $HCO_2Na.3H_2O$, the vapor pressures are: 3.12, 0.1°; 4.48, 4.9°; 6.02, 9.8°; 6.10, 10.0°; and 7.92, 15.0°. These are represented by the equation $p = 3.125 + 0.2488t + 0.0047t^2$ and less well by an equation of the Clausius type. For $HCO_2Na.2H_2O$, the vapor pressures are: 1.60, 0.0°; 2.69, 4.9°; 3.17, 7.0°; 3.95, 9.8°; 5.90, 15.0°; 8.71, 20.0°; 11.74, 24.1°; and 14.60, 27.2°. These are represented by $\log p = -(2840.35)(1/T) + 10.6294$. The accuracy of the vapor pressure measurements was ±0.02 mm. Transition points for the hydrates of HCO_2Na occur at 15.3° and 27.9°. Values of $\Delta F°$ (cal.), $\Delta H_{298}°$ (cal.) and $\Delta S_{298}°$ (E. U.) for the resp. dissocn. reactions are: $H_2C_2O_4.2H_2O = H_2C_2O_4 + 2H_2O(g)$, 4940, 25,299 and 68.32 (values derived from the Baxter-Antoine and Kirchhoff formulas are less reliable); $HCO_2Na.3H_2O = HCO_2Na.2H_2O + H_2O(g)$, 2345.4, 9853.5 and 25.20; $HCO_2Na.2H_2O = HCO_2Na + 2H_2O(g)$, 4852.77, 25,982.10 and 70.88. 5 6 7

G. A.

Measurement of reflecting power with the aid of a microscope. L. Capdecomme. *Bull. soc. franç. minéral.* **61**, 5–118(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 175–8; cf. *C. A.* **32**, 4850[8].—A detailed investigation of the reflecting powers of solids, the methods of measuring them and their phys. explanation. 8

C. A. Silberrad

Conductivity measurements on potassium halides. Cornelius J. Brennecke. *J. Applied Phys.* **11**, 202–7 (1940).—Measurements were made on flat crystal plates of KBr and KCl, at 25–600° and under stresses of 0.05–0.90 kv./cm. The resistivities fell from about 10^{17} ohm-cm. at room temp. to less than 10^7 for KBr and less than 10^8 for KCl at the highest temp. Ohm's law held for cold cond. measured after preliminary heating. The current decayed exponentially with time at low temps., but remained almost const. at high temps. Cond. and temp. are exponentially related for both KBr and KCl, but for KCl an abrupt change in the slope of the curve was found between 200 and 250°. 9

S. L. Gerhard

Studies on the role of mode of formation and preliminary treatment in the estimation of the chemical activity of some technically important preparations. I. Hahn's emanation method as an aid in the study of the structural synthesis and transformation of solid substances. Robert Jagitsch. *Iva* **1939**, 170–7; cf. H., *C. A.* **23**, 5381.—A review with 36 references. **II. Discontinuous changes of faulty structural condition or of particle mobility and their influence on the reactivity of copper sulfide.** J. Arvid Hedvall, E. Brazee and R. Jagitsch. *Ibid.* 177–82.—X-ray studies of Cu_2S (I) with a Heiz camera show that between 100 and 400° no crystallographic change takes place. At 370° I in a current of O suddenly oxidizes with development of heat; a violent reaction also occurs at 460°. Studies by the emanation method (cf. Hahn, *C. A.* **29**, 396[7]) reveal that both temp. regions are characterized by changes in the arrangement state of I. Emanation power-temp. curves are given to show the changes at the 2 temps.

W. J. Peterson

The structure of real crystal systems and the problem of thermo-, tribo- and crystalloluminescence. D. Balarev, N. Kolarov, G. Georgiev and V. Ivanov. *Ann. univ. Sofia. II. Faculté phys.-math.*, Livre 2, **34**, 355–68(in German, 369–71)(1937–38).—The 2 fundamental assumptions in the author's theory of the structure of real crystal systems were tested experimentally, viz., (1) the thermodynamic bases of the disperse structure of the system and (2) the possibility that certain surface disturbances make themselves felt far in the interior of the system. (1) By detg. the initial temp. of gray heat (I) of $CaCO_3$ heated for various durations it was found that the temp. is lower after a short heating of the prepn. and higher at longer heating than in the original non-heated prepn. The curve: decompn. temp.-duration of heating of the pptd. $CaCO_3$ agrees with this result. (2) The 2nd assumption was confirmed by the detn. of I of the mixts. of $CaCO_3$-MoO_3 and $CaCO_3$-WO_3 and by the fact that I of the former mixts. falls below I of the individual components, whereas there are mixts. of $CaCO_3$ and WO_3 whose I is lower than those of $CaCO_3$ and WO_3. The expts. also brought out the fact that the curve of duration of grinding *vs.* I of all crystal powders examd. has a min. On the basis of the 2 assumptions the tribo- and the crystalloluminescence are explained by aging of the freshly ground crystal powders or of the freshly split-off surfaces or by the aging of the freshly pptd. systems. Thermoluminescence is explained by the approach of a crystal system which at ordinary temp. is in equil. with its surroundings to a crystal system in an equil. corresponding to the higher temp.

A. H. Krappe

Inner adsorption in salt crystals. VII. The upper limit of the quantity of salt adsorbed internally. D. Balarev. *Z. anal. Chem.* **118**, 411–15(1940); cf. *C. A.* **33**, 2012[5].—Expts. with solns. contg. H_2SO_4, KCl, NH_4Cl, $FeCl_3$ and sometimes $Ce(SO_4)_2$ showed that the adsorbed salt inside crystals of $BaSO_4$ can reach as high as 37 mol. % but the high content of foreign salt within a crystal is no proof that the two components form solid solns.

W. T. H.

Surface diffusion on polycrystals and the processes of staining of minerals. E. A. Nikiforov. *Trudy Tsentral. Nauch.-Issledovatel. Lab. Kamneĭ Samotsvetov Tr. "Russkie Samotsvety"* **1938**, No. 4, 18–30; *Khim. Referat. Zhur.* **2**, No. 5, 29–30(1939); cf. *C. A.* **33**, 4845[8].—Methods are given for accelerated staining of agate and polycryst. quartz ("belorechit"). The different adsorption processes on polycryst. surfaces are: (1) Adsorption of ions from solns. of salts retained on the mineral surfaces by electrostatic forces (the edges and the corners of the grains are the most active parts). (2) Adsorption caused by attraction of the dipoles. The peripheric dipoles (water, alcs., phenols) are most active. (3) Adsorption caused by the electrostatic polarization and by van der Waals forces (active in crevices and in re-entering angles). The usual process of staining of agate and of "belorechit" to a yellow color with a $Fe(NO_3)_3.9H_2O$ soln. takes place as follows: From the surface diffusion on quartz grains a film of water dipoles is formed which rapidly sats. the mineral. The

$Fe(NO_3)_3$ mols. penetrate the pores slowly, and the fixing of the polarized mols. on the surfaces can take place only by the replacement of the water dipoles previously adsorbed. A considerably faster method for the penetration of the stain is proposed by N. (the "topodiffusion method"). Sat. the sample of agate or of "belorechit" in water, fuse a layer of anhyd. $Fe(NO_3)_3$ on the surface of the sample and immerse it in benzene. The hydration process taking place on the contact surface of the melt with dipoles of water formed on the grain surfaces causes a "neg." diffusion (extn. of water from the pores of the mineral) and a "pos." diffusion of the $Fe(NO_3)_3$ mols. to dipoles of water adsorbed on the grain surfaces. This accelerates the process of vol. staining of "belorechit" to several hrs. instead of a month. Methylene blue was introduced by the same method in 1–2 hrs. "Belorechit" stained with methylene blue did not change its color even in hot concd. acids. The black color of agate (satd. with water) was obtained in several hrs. by the introduction of phenol by means of the dehydrating action of H_2SO_4.
W. R. Henn

Effect of dyes on the crystal habit and optics of NaF, LiF, NaCl, KCl, KBr and KI. Clifford Frondel. *Am. Mineral.* **25**, 91–110(1940).—These salts were crystd from solns. contg. various dyes (112 were tried with NaF); in most cases the dye, if adsorbed at all, is adsorbed on (100) and thus does not alter the normal cubic crystal habit. In a few cases adsorption occurs on (111) and the resulting crystal habit is octahedral. 107 references.
C. H. H.

The sintering of magnesia. Giovanni Malquori and Vittorio Cirilli. *Ricerca sci.* **10**, 905–14(1939).—The effect exerted by various closely related oxides on the thermal sintering of MgO was examd. The behavior of the following substances and systems was studied: Fe_2O_3, Al_2O_3, SiO_2, CaO, Fe_2O_3–CaO, Fe_2O_3–SiO_2, SiO_2–CaO, Al_2O_3–CaO, Fe_2O_3–CaO–SiO_2, since these substances are most frequently present as impurities in oxides that result from the thermal decompn. of natural magnesites. The conclusions are based on x-ray diagrams obtained with the Laue method and Cu-*K* radiation. F. C. N.

A study of oxide films on light metals by electron diffraction—magnesium, aluminum and beryllium. Sigeto Yamaguti. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 463–70(1939).—Pure Mg was polished with a coarse sandpaper ("Riken Corundum") and exposed for one day in the open air at room temp. The electron-diffraction pattern obtained corresponds exactly with that for the hexagonal system, showing the existence of pure Mg. A 2nd specimen was heated for 10 hrs. in the open air in an elec. furnace at 100°, a 3rd one for 4 hrs. at 200°, a 4th one for 2 hrs. at 300° and a 5th one for 1 hr. at 400°. After these samples were cooled, diffraction photographs were taken. The pattern of the 2nd sample corresponded with that of pure Mg, while those of the 3rd and 4th showed a mixt. of MgO and Mg to be present. The pattern of the last specimen corresponded with that of MgO. The rings observed further indicated the formation at ordinary temps. of a film of MgO of thickness about 10 A. Electron-diffraction photographs were taken of Al trenched with a glass cutter and left in the air for 10 days, and of 2 samples treated at 400° and 500°, resp. In the range between room temp. and 400° the existence of γ-Al_2O_3 (cubic system) could be shown. Between 400 and 500° there is a transition point for γ- and α-Al_2O_3 (hexagonal system). It was not directly possible to verify whether Be exposed to the air at ordinary temp. was covered with its oxide. At 400° a Be film was found. At 800° its thickness was greater than at 400°. Robert Simha

Hydration of tricalcium silicate. O. E. Radczewski, H. O. Müller and W. Eitel. *Naturwissenschaften* **27**, 807 (1939).—The hydration of $3CaO.SiO_2$ was followed in a Siemens supermicroscope (electron microscope) and photographs are reproduced (31,000 and 100,000:1). After shaking air-dry $3CaO.SiO_2$ for 2 hrs. with water, $Ca(OH)_2$ spherolites 0.2–1 μ in size appeared. If the hydration took place in an iso-BuOH-H_2O mixt. contg. 18% H_2O, the $Ca(OH)_2$ hemispheres 0.1–0.2 μ in size appeared and disk-shaped $Ca(OH)_2$ particles, 70–100 mμ, were also visible. Needles and spindle-like crystals of Ca hydrosilicate, with typically frayed ends of the spindles, were also found. B. J. C. van der Hoeven

The hydration of tricalcium aluminate. O. E. Radczewski, H. O. Müller and W. Eitel. *Naturwissenschaften* **27**, 837–8(1939).—The hydration of $3CaO.Al_2O_3$ was followed in an electron microscope. The fine-grained, air-dry powder shaken in water for 16 hrs. showed relatively large hexagonal plates of $3CaO.Al_2O_3.12H_2O$, 1.3×0.9 μ, 0.05–0.1 μ thick. In an iso-BuOH-H_2O mixt. contg. 18% H_2O the hydration at room temp. produced spherical structures, icositetrahedra of the more stable $3CaO.Al_2O_3.6H_2O$, 60–130 mμ in diam., sometimes only 30 mμ; occasional sharp-edged plates were formed. B. J. C. v. d. H.

The nature of certain intermetallic lattices. A. L. Norbury. *J. Inst. Metals* **65**, Advance copy, No. 858, 24 pp.(1939).—The theory is developed of "basic" body-centered cubic, close-packed hexagonal, and NiAs-type intermetallic lattices forming subsidiary lattices by the replacement of electrons by atoms or atoms by electrons. The electron-atom ratios of *3e*:*2a* for body-centered cubic, *7e*:*4a* close-packed hexagonal and *5e*:*2a* for NiAs-type lattices are enlarged upon to explain ratios such as γ-brass *83e*:*52a*, which is broken down to 27 (*3e*:*2a*) + *2e*−*2a* with 52 atoms to the unit cell. This operation is similarly performed for γ_1- and γ_2-brass, ζ_2- and η_2-CuAl and $CuAl_2$, all of the body-centered cubic lattice type. A similar procedure is followed with ζ-AgZn and Co_2Al_5, subsidiaries of ϵ-brass (*7e*:*4a*) close-packed hexagonal; and γ'-CoSn, PtPb, η-CuSn and FeS subsidiaries of the basic NiAs type (*5e*:*2a*) lattice. 29 references. J. N. Lynn

X-ray investigation of the transformation of γ-aluminum oxide into α-aluminum oxide. O. E. Gorbunova and L. I. Vaganova. *Trudy Tsentral. Nauch.-Issledovatel. Lab. Kamnei Samotsvetov Tr.* "*Russkie Samotsvety*" **1938**, No. 4, 66–7; *Khim. Referat. Zhur.* **2**, No. 5, 31–2(1939).—It was detd. from Debye diagrams that the powder obtained by roasting the NH_4 alums at 1100° consists exclusively of the γ-modification of Al_2O_3 and the powder obtained by roasting at 1200° consists exclusively of the α-modification. The Debye diagrams of the powder roasted at 1150° show lines of both modifications. The transformation of the γ-modification of Al_2O_3 into the α-modification takes place at 1150–1200°. W. R. Henn

Crystalline modification of alumina. I. Inversion of crystalline form of aluminum hydroxide by heating. Kei-iti Akiyama. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 394–5(1939).—X-ray analysis studies indicate that Al_2O_3, prepd. by heating $Al(OH)_3$ (obtained from $AlCl_3$ and NH_4OH) to temps. below 1100°, has the γ-form, and that Al_2O_3 heated above 1200° has the α-form. **II. Influence of CaO, MgO, Li_2O, Na_2O and K_2O on crystal inversion of alumina.** *Ibid.* 395–6.—Portions of γ-Al_2O_3 were heated 2 hrs. at 1700° with each of the following: 3, 5 and 7% of CaO; 3, 5 and 7% of MgO; 1.2, 2 and 4% of Li_2CO_3, calcd. as Li_2O; 3% of Na_2CO_3, calcd. as Na_2O; and 3% of K_2CO_3, calcd. as K_2O. X-ray data indicate that Al_2O_3 heated with more than 5% of CaO had the β-form and that Al_2O_3 heated with more than 3% of MgO and 2% of Li_2O had the ζ-form. This shows that β- and ζ-Al_2O_3 are actual modifications of Al_2O_3 and not alkali aluminate and Li aluminate, resp. G. A.

Crystallographic modification of aluminum oxide. A. S. Ivanov. *Trudy Tsentral. Nauch.-Issledovatel. Lab. Kamnei Samotsvetov Tr.* "*Russkie Samotsvety*" **1938**, No. 4, 44–58; *Khim. Referat. Zhur.* **2**, No. 5, 31(1939).—A review of literature useful for the synthesis of corundum. Data are given for all known modifications of Al_2O_3 with references for each modification separately.
W. R. Henn

Comparative x-ray studies of arsenates and selenates. P. Kokkoros. *Praktika Akad. Athenon* **13**, 337–44(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 252–3.—Scorodite ($FeAsO_4.2H_2O$) has *a* 8.92, *b* 10.30, *c* 10.01 A.; strengite ($FePO_4.2H_2O$) *a* 8.65, *b* 10.06, *c* 9.84 A.; both have 8 mols. in the unit cell, space group V^{15}_h. $CdSeO_4.2H_2O$ has *a* 10.42, *b* 10.71, *c* 9.36 A.; $MnSeO_4.2H_2O$ *a*

10.47, *b* 10.51, *c* 9.24 A.; both also have 8 mols. in the unit cell. C. A. Silberrad

The nature of the anomalies of some properties of Rochelle salt and its relation to polymorphism. R. D. Shul'vas-Sorokina. *J. Phys.* (U. S. S. R.) **1**, 299–307 (1939).—See *C. A.* **33**, 5255[5]. E. H.

Crystal structure of sodium glycerophosphates. Carlo Minguzzi. *Periodico mineral.* (Rome) **9**, 347–57(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 428.—The α and β forms of the Na glycerophosphates, $CH_2OHCHOH\text{-}CH_2OPO_3Na_2.6H_2O$ (α) and $CH_2OHCHOPO_3Na_2CH_2OH$ (β) have (α) $a:b:c$ = 1.0980:1:1.09522, β 106° 15′, n_α 1.444, n_β 1.455, n_γ 1.468, d_{20} 1.634; and (β) $a:b:c$ = 0.66559:1:0.51618, β 106° 50′, n_α 1.474, n_β 1.489, n_γ 1.499 d_{20} 1.718. Both are colorless and monoclinic. Cf. Bailly, *C. A.* **32**, 7018[8]. C. A. Silberrad

Crystal structure of the dioxime of 1,3-dibenzoylpropane. Edoardo Sanero and Mario Fornaseri. *Periodico mineral.* (Rome) **9**, 213–22(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 432.—$PhC(:NOH)(CH_2)_2C(:NOH)Ph$ is tetragonal with *a* 9.46, *c* 32.26, and 8 mols. in the unit cell, space group $D_{4h}^1 - P\ 4/mmm$ or $D_{4h}^4 - P\ 4/nmm$, n_ω 1.698, n_ϵ 1.597. C. A. Silberrad

The unit cell and space group of β-octamethylcellobiose and β-hendecamethylcellotriose. Tatuo Ohasi. *Bull. Chem. Soc. Japan* **14**, 517–20(1939).—The dimensions of the rhombic unit cells of β-octamethylcellobiose and β-hendecamethylcellotriose detd. by x-ray analysis are: *a* 12.0, *b* 43.7, *c* 4.50 and *a* 21.3, *b* 34.5, *c* 4.50 A., resp. Both substances have a rhombic crystal lattice and possess the corresponding space group $D_2^1 - P\ 2_12_12_1$, with 4 mols. in one unit. The reported results do not agree with the work of Trogus and Hess (*C. A.* **26**, 5257; **29**, 6813[6]). Frederick C. Nachod

Measurements of the adsorption of different gases on copper at liquid oxygen and hydrogen temperatures, with low pressures. J. Borghs and A. van Itterbeek. *Physica* **7**, 17–28(1940)(in English).—Interpretation of results could be made on the basis of Polanyi's theory, the ratio of any two potential functions being proportional to the square roots of the van der Waals const. The cc. of gas adsorbed per sq. m. of surface exceeds 7 for N, 11 for Ne and 14 for H. The adsorption of H is non-reversible. Gregg M. Evans

The adsorption of potential-determining ions. III. Adsorption of acids, neutral salts and bases on highly activated carbon in absence and presence of hydrogen and oxygen. Albin Kellermann and Erich Lange. *Kolloid-Z.* **90**, 89–104(1940); cf. *C. A.* **34**, 28[2].—A review with 94 references. G. G.

Adsorption of electrolytes on silicic acid on sesquioxides, and on their mixtures. V. A. Kargin. *Uspekhi Khim.* **8**, 908–1019(1939).—Data are given on the adsorption of $AgNO_3$, $Ca(OH)_2$, NaOH, KOH, NH_4OH, HCl, H_2SO_4, H_3PO_4 and various salts on SiO_2, Fe_2O_3, Al_2O_3 and various SiO_2-M_2O_3 mixts. Adsorption of Al_2O_3 and H_2SO_4 proceeds in a 2:1 ratio; of Ag^+ and SO_4^{--} in equiv. ratios. The *absorption spectra* of adsorbed colored salts are discussed. F. H. Rathmann

Adsorptive power of coagulates obtained from aqueous tannin solutions. G. Rossi. *Atti X° congr. intern. chim.* **4**, 890–4(1939).—Great variations are shown in the adsorption of various coloring substances resulting from changes in the tannin concn., the quantity of the coagulation and even from changes in the coagulants. In 100 cc. of gelatin + K alum soln., the mg. of methylene blue adsorbed varied from 7.046 with 4 mg. tannin to 17.598 for 48 mg. tannin. In 100 cc. of Pb acetate soln., the mg. of methylene blue, phenosafranine and fuchsin absorbed varied from 5.183, 8.849 and 6.000, resp., for 20 mg. tannin to 9.901, 17.792 and 15.334, resp., for 240 mg. tannin. A. H. Krappe

Adsorption of ions on polar adsorbents as a function of the reaction medium. II. Adsorption from mixtures of multivalent anions on ferric hydroxide as a function of the concentration of alkali. Gr. Bălănescu and Vintilă T. Ionescu. *Bul. Soc. Chim. Romania* **20A**, 139–83(1938); cf. *C. A.* **33**, 219.—Adsorption on polar $Fe(OH)_3$ and in the presence of various amts. of NH_3 was studied with mixts. contg. different ratios of two anions. The mixts. used contained: phosphate ions with arsenate, citrate, sulfate or oxalate ions; arsenate with sulfate or oxalate; oxalate with citrate or sulfate. III. **Discussion and interpretation of the results.** *Ibid.*[3] 185–95.—The observed phenomena are complex and detd. by the nature of the reaction medium. If the latter is acidic, neutral or basic compds. are formed. For a basic medium, adsorption is governed by a surface reaction. Anions are replaced by OH ions in the decreasing order: sulfate, oxalate, citrate, arsenate, phosphate. G. M. Murphy

Physical chemistry of surface phenomena and of dispersed systems, and their application in U. S. S. R. P. A. Rebinder. *Sbornik "Matematika i Estestvozn. v S. S. S. R."* **1938**, 431–64; *Khim. Referat. Zhur.* **2**, No. 5, 16 (1939).—The importance of the properties of the phase surfaces, suspensions, foams, fogs, emulsions, etc., as well as numerous technical applications of these phenomena in the fields of flotation, lubricants, fillers and pigments, dispersion of solid bodies, mech. treatment of metals, etc., are discussed. W. R. Henn

The scientific and technical significance of aerosols. Friedrich Müller. *Kolloid-Z.* **90**, 1–10(1940).—A brief review of the field of aerosols with special reference to the progress made in recent years, and confined chiefly to methods of dispersion, properties and methods of investigation. There are 131 references. A. L. Kibler

Gelatinated (foamy) emulsions. III. Effect of aliphatic monatomic alcohols on the emulsion-forming properties of sodium oleate. L. Ya. Kremnev and Yu. G. Khazina. *Trudy LKKhTI (Lab. Kolloïdnoï Khim.)* **1939**, No. 7, 93–102; *Khim. Referat. Zhur.* **2**, No. 5, 17(1039); cf. *C. A.* **30**, 2075[8].—Ethyl, Pr, amyl, octyl and cetyl alcs. were added in different amts. to solns. of Na oleate which was used to emulsify benzene. An addn. of alc. in small concns. increased the amts. of emulsified benzene, but the emulsifying ability of benzene decreased with an increase in the concn. of alc. The increase in the emulsifying ability of alc. is explained by the increase in the degree of dispersion of the emulsifier, by the suppression of its hydrolysis and by the increase in the hydrophobic properties of the components of the soap soln. The decrease in the emulsifying ability at large concns. of the alcs. in any phase (as shown by measuring the surface tension and the mech. stability of the adsorption layers) is caused by the expulsion of Na oleate by the alcs. from the interface surface, thus lowering the stability of the adsorption layers. W. R. Henn

The electrical double layer. General introduction. Eric K. Rideal. *Trans. Faraday Soc.* **36**, 1–4(1940).—The two general views of the origin and structure of the elec. double layer in colloidal systems are discussed: one based upon adsorption phenomena, and the other regarding the colloidal particle, an ionogenic one, as a large multivalent ion, the surface ionic linkages completely dissocg. in the soln. Data are desirable for interphases in non-aq. media. Victor R. Deitz

Use of thin layers in electrophoretic separation. J. St. L. Philpot. *Trans. Faraday Soc.* **36**, 38–46(1940).—A large-scale electrophoretic separator is described in which the substance to be sepd. flows in a thin layer between layers of dil. electrolyte. The conditions for successful sepn. are discussed. C electrodes in 5 *M* NH_4Br can carry 6 amps. without gassing. It is concluded that in some favorable cases the app. has its advantages, whereas in unfavorable cases difficulties arise to interfere with practical applications. Victor R. Deitz

Properties of detergent solutions. IX. Electrophoretic mobility of oil drops in detergent solutions. J. Powney and L. J. Wood. *Trans. Faraday Soc.* **36**, 57–63(1940); cf. *C. A.* **32**, 5279[1].—Detns. of the electrophoretic mobility of highly refined mineral oil (Nujol) dispersed in cond. water are described. A value of 4.35 μ/sec./cm. at 25° was obtained as the mean of 900 detns. on 6 different Nujol dispersions. The effect of alkalies on the mobilities are plotted for the pH range 8–12. The mobilities of oil drops in the presence of Na dodecyl sulfate, dodecyl

pyridinium chloride, Na laurate and Na oleate were detd. over a range of concns. and the results correlated with the constitution of colloidal electrolyte solns.
Victor R. Deitz

Electrokinetics. XXIII. Electrokinetics as a tool for the study of the molecular structure of organic compounds. Ross Aiken Gortner. *Trans. Faraday Soc.* **36**, 63–8(1940); cf. *C. A.* **33**, 6114[9].—Previous studies are reviewed on homologous series of the aliphatic alcs., aliphatic acids, Et esters of the aliphatic acids, the acetates of the aliphatic alcs. and a series of the derivs. of benzene; most of the compds. have been studied at both a cellulose-org. liquid and an Al_2O_3-org. liquid interface (cf. *C. A.* **32**, 6127[6]; **33**, 6114[9]). The technique consists in detg. the streaming potential with an app. in which the solid to be studied is packed in the central portion of the cell and the org. liquid is then streamed through the diaphragm from one reservoir to the other under a known and controlled hydrostatic pressure. A quadrant electrometer is used as a null instrument.
Victor R. Deitz

Streaming potentials and surface conductance. A. J. Rutgers. *Trans. Faraday Soc.* **36**, 69–80(1940); cf. *C. A.* **33**, 1194[4], 3230[4].—The anomalous behavior of the electrokinetic potential *vs.* concn. graph for solns. of KCl (0 to 80 × 10^{-6} mol./l.) is attributed to surface conductance. Data with a new app. are given for solns. of KCl (0–400 × 10^{-6} mol./l.), HCl (0–200 × 10^{-6} mol./l.), $CaCl_2$ (0–100 × 10^{-6} mol./l.) and of $Al(NO_3)_3$ (0–0.30 × 10^{-6} mol./l.). It is concluded that forces other than purely electrostatic ones must play the main role in the neighborhood of the wall, since great nos. of pos. and neg. ions are found in that region.
Victor R. Deitz

Examination of electrokinetic charge density as a function of the thickness of the double layer. A. J. Ham and E. D. M. Dean. *Trans. Faraday Soc.* **36**, 52–7(1940).—The electrophoretic mobility was measured macroscopically by the moving-boundary method on dispersions of octadecane in salt solns. at 25° and at pH 5. The mobilities and potentials decrease regularly and tend to limiting values, depending on the particular cation added; the charge density, as calcd. on the basis of the theory of Gouy (*C. A.* **4**, 2231), rises throughout in the cases of NaCl and $BaCl_2$ and irregularly in the case of $LaCl_3$. Both electrophoretic charge d. and potential fall as higher-valency cations are added to a 0.01 *M* NaCl soln., the latter having already fixed the thickness of the double layer. The possible limitations of the Gouy theory are discussed.
Victor R. Deitz

Ionic concentrations at interfaces. G. S. Hartley and J. W. Roe. *Trans. Faraday Soc.* **36**, 101–9(1940).—The zeta-potential is considered determinant of the local ionic concns. near the surface of a particle owing to consequent alterations in the apparent dissocn. consts. The problem is treated theoretically and some applications are discussed. As an example of an acid-base equil. present in the system almost entirely adsorbed at an interphase, the case of an aq. paraffin-chain (cetane sulfonate and cetylpyridinium) salt soln. is investigated. Diphenylazo-*o*-nitrophenol (I) was used as the indicator for the pH range studied, 6 to 8.5. Measurements were made by means of light absorption by use of a photoelec. photometer calibrated by standard solns. The bulk H^+ concn. was measured similarly with a "nonadsorbed" indicator in place of the amphipathic one, viz., *p*-nitrophenol. The limitations of the measurements are discussed.
Victor R. Deitz

Graph for the determination of the size distribution of pulverized materials. A. Giannone. *Atti X° congr. intern. chim.* **4**, 650–6(1939)(in Italian).—G. advocates the use of a graph based on a series of Wagner turbidometer results, which permits the detn. of the frequency of a particle of a size below a certain value in each sieve fraction. This graph extends and generalizes that of Haegerman (*C. A.* **30**, 4291[2]).
Henri Marc

Surface migration of ions and contact exchange. H. Jenny and R. Overstreet. *J. Phys. Chem.* **43**, 1185–96 (1939); cf. *C. A.* **30**, 4739[4].—A theory of ionic migration on surfaces and contact exchange of ions in colloidal systems through the medium of overlapping ionic "oscillation volumes" is advanced. Expts. on the migration of ferrous ions in gels and sols of bentonite clays are explained by use of the theory. It suggests a new mode of mineral nutrition of plants with interpenetrating root and soil colloids. Such roots are shown to gain as well as lose nutrient cations.
H. E. Phipps

Constitution of the alleged "thiessen hydrates." Harry B. Weiser, W. O. Milligan and W. J. Coppoc. *J. Phys. Chem.* **43**, 1109–20(1939); cf. *C. A.* **29**, 2816[3].—Dehydration isotherms were made for the hydrous gels prepd. by slow hydrolysis at 15° of ferric, stannic and silicon ethylates. But one point of inflection was found and that one (hydrous silica) varied. The gels of Fe and Sn were oxides with adsorbed or entrained water. There was no indication of the existence of the series of "thiessen hydrates."
H. E. Phipps

Some inorganic gels prepared by the trituration of hydrated solid salts. Tominosuke Katsurai and Masao Huda. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 458–62(1939).—Gels of various hydroxides were obtained by triturating hydrated solid salts with globules of NaOH. The materials used were: (*a*) $MnSO_4.5H_2O$; $MnSO_4$:NaOH = 1:4 (molar ratio). A viscous gel is formed. (b) $FeCl_3.6H_2O$; $FeCl_3$:NaOH = 1:6. A sand-like ppt. is formed. The gel does not dissolve in H_2O. (c) $FeSO_4.7H_2O$ and $FeCl_3.6H_2O$; $FeSO_4$:$FeCl_3$:NaOH = 1.2:12. The gel does not dissolve in H_2O. The ppt. is distinctly attracted by an ordinary horse-shoe magnet. (d) $CoSO_4.7H_2O$; $CoSO_4$:NaOH = 1:4. (e) $NiSO_4.7H_2O$; $NiSO_4$:NaOH = 1:4. A very viscous gel is formed. (f) $CuSO_4.5H_2O$; $CuSO_4$:NaOH = 1:4. A very viscous gel is formed. The ratios of the respective sedimentation vols. of the ppt. prepd. in the wet way and by trituration are in their respective order 2.9, 5.7, 2.9, 1.7, 5.5, 6.9.
R. S.

Analysis of curves of birefringence due to shape. A. Frey-Wyssling. *Kolloid-Z.* **90**, 33–40(1940).—The curves of birefringence (n_3^2-n_2^2 *vs.* n_2^2, with n_a,n_b, n_2 refractive indexes of the mixt. and of the imbibing fluid, resp.) in Wiener's theory [*Abh. Sächs. Ges. Wiss.* (*Math. Phys. Kl.*) **32**, 507(1912)] are hyperbolas. Their axes are strongly inclined with respect to the resp. coördinate system. For systems contg. rod-like particles the angle ϑ between the *y*-axis and the axis of the hyperbola varies between 45° and 40° 07′ if the relative vol. δ_1 of the one component decreases from unity to zero. In the case of particles of laminar form ϑ is neg. and varies from −45° to −22°30′ with $1 \geqq \delta_1 \geqq 0$. The exptly. detd. curves do not show any obvious inclination of the hyperbolic axis. This fact is due to the geom. transformation given by the hundredfold heightening of the scale in plotting the values of the double refraction. Inclinations occurring in these cases indicate deviations from Wiener's theory. F.-W. undertakes to correlate these deviations with the polarity of the constituents and of the imbibing liquid. Homopolar substances combined with homopolar liquids should give values in agreement with the theory. In a mixt. of heteropolar materials the exptl. degree of birefringence seems to be lower than the theoretical one, whereas in a mixt. of components of different polarity the exptl. value is found to be greater.
Robert Simha

Solvation of compounds of high molecular weight. Z. A. Rogovin. *Uspekhi Khim.* **8**, 687–703(1939).—Review. 58 references. **Properties of cellulose esters.** *Ibid.* 704–18.—Review and theoretical, especially of R.'s own works. 39 references.
F. H. Rathmann

Anisotropy of cellulose sheet. D. G. Drummond. *Nature* **145**, 67(1940).—Cellophane sheet is birefringent in a way that might be expected from an extrapolation of Spence's results (*C. A.* **33**, 9073[9]) for sheets made from cellulose esters. The relative unimportance of side-chain orientation in cellulose itself results in a generally greater birefringence and a change in the "slow-ray direction" from 90° to the direction of extrusion usually found by Spence for ester films to values of 43–72°. θ, n_α, β, γ and $n_{\alpha-\gamma}$ are tabulated for the acid- and water-washed sheet, wetted and air-dry, and for sheets undried during manuf., wet, dried free, and dried stretched.
G. M. Petty

Contributions to the knowledge of the mechanism of deformation of cellulose hydrate. VI. (2). Viscosity determinations on stretched and unstretched filaments. J. de Booys, H. L. Brédee and P. H. Hermans. *Rec. trav. chim.* 59, 73–6(1940); cf. *C. A.* 33, 2701⁹.—Detns. in two different solvents show the same viscosity for solns. of unstretched and stretched cellulose filaments. Since a drop in viscosity would be expected for the stretched filaments had the energy of stretching to rupture been used to break primary valency bonds, it is concluded that in the process of stretching cellulose filaments no mol. chains are broken to any appreciable extent. John E. Vance

The mechanism of water adsorption in gelatin gel. A. Weidinger and H. Pelser. *Rec. trav. chim.* 59, 64–72 (1940).—The different colors of gelatin gels contg. $CoCl_2$ were observed. The colors are typical of different amts. of adsorbed water and allow a distinction to be made between bound (intramicellar) and free (intermicellar) water. X-ray spectrograms showing the magnitude of the side-chain spacing gave a sep. measure of the intramicellar water. The conclusions are that bound water is to be thought of as intramicellar water, free water as intermicellar. In the course of water adsorption the micelles first become filled with water, the intermicellar water adsorption beginning only after satn. of the micelles has been completed. Small amts. of $CoCl_2$ do not interfere with intramicellar adsorption of water, but with high salt content the salt seems to intrude into the micelles. John E. Vance

Liesegang's diffusion histology. K. Zeiger. *Kolloid-Z.* 89, 115–23(1939).—Discussion of L's. contributions to colloid chemistry with a list of his publications. F. S.

Studies of sulfonates. VI. Effect of sodium chloride on the solubility of sodium dodecyl sulfonate and sodium tetradecyl sulfonate. The solubility at 50° of calcium dodecyl sulfonate and calcium dodecyl sulfate in aqueous solution of the corresponding sodium salts. H. V. Tartar and Richard D. Cadle. *J. Phys. Chem.* 43, 1173–9(1939); cf. *C. A.* 33, 8084⁴.—NaCl decreases the soly. of the Na salts and also increases the temp. and decreases the concn. at which micelles begin to form. The soly. of Ca dodecyl sulfonate and dodecyl sulfate in solns. of the corresponding Na salts was detd. The reversal of the soly. curve of the former is attributed to the formation of the complex ionic micelles with both Ca and Na "gegen ions." The Ca laurate soly. was too small to be detd. H. E. Phipps

An empirical relation between solubility of slightly soluble electrolytes and dielectric constant of the solvent. J. E. Ricci and T. W. Davis. *J. Am. Chem. Soc.* 62, 407–13(1940).—Soly. data of a no. of salts indicate that the activity coeff. of a salt in satd. soln. is, in many cases, practically const. and independent of the dielec. const. This observation leads to an empirical relation between the soly. of a slightly sol. electrolyte and the dielec. const. of the solvent which makes it possible to predict the soly. of a salt in other media from the soly. in H_2O without knowledge of ionic diams.; this relation is $\log S_2 = \log (2K^2/\nu z_+z_-) + \log D_2 + \log T - \frac{2}{3}\log [(1.8123 \times 10^6 z_+z_-/DT) - 50.288\ Ka]$, where K is the neg. log. of the activity coeff. in the first medium. Calcd. and observed solubilities (cf. *C. A.* 34, 925⁹) are compared. The agreement is, in general, satisfactory, at least as to the order of magnitude, and is as good as that obtained by the Born equation where ionic diams. are estd. A. B. G.

Hygroscopicity of mixtures. N. Schoorl. *Pharm. Weekblad* 76, 1541–3(1939).—The vapor pressure of a soln. contg. 2 solutes is lower than the pressure of separate solns. of the solutes. Therefore the hygroscopicity of the mixt. is greater than that of either of the components taken separately. Felix Saunders

The partial pressure of ammonia, carbon dioxide and water over copper ammonium solutions. N. M. Zhavoronkov. *J. Chem. Ind.* (U. S. S. R.) 16, No. 10, 36–7(1939).—Partial pressures are detd. from 20 to 80° over solns. of Cu NH_4 formate. Satn. of the solns. with CO at lower temps. has almost no effect on the partial pressures. At the higher temps., the total pressure is almost unchanged, but the partial pressure of NH_3 is lower and that of CO_2 is higher than over solns. contg. no CO. Calcn. of the differential heat of soln. gives the following values: for NH_3, 8980 cal./mole in solns. contg. 125–75 g./l., for CO_2, 15,000 cal./mole in solns. contg. 58.5–85 g./l. and for H_2O, 11,900 cal./mole in solns. contg. 730–803 g./l. H. M. Leicester

Kinetic interpretation of osmotic pressure. W. V. Metcalf. *Kolloid-Z.* 90, 11–16(1940).—The usual theories of osmotic pressure are criticized. A pressure-equil. theory is proposed. Its main features are as follows: The force that makes the liquid rise in the tube is the diffusion pressure of the solute which together with the excess diffusion pressure of the solvent acts on the side of the membrane where the pure solvent is found. The force that makes the solvent pass through the membrane into the soln. is given by the excess of the diffusion pressure of the solvent on the side of the pure solvent. This excess is caused by the diffusion of the solute in the soln. The pressure acting on the membrane is the diffusion pressure of the solute. This pressure maintains the hydrostatic excess pressure on the side of the soln. because the increased diffusion pressure of the solvent on the other side ceases to exist as soon as equil. is reached. This theory should furnish a satisfying interpretation of related phenomena such as the lowering of vapor pressure and the lowering of the f. p. Robert Simha

Effects of certain salt mixtures on the dissociation of glycine and alanine. A. C. Batchelder and Carl L. A. Schmidt. *J. Phys. Chem.* 43, 1121–32(1939); cf. Simms, *C. A.* 23, 5388.—Some of Simms' expts. on the effect of mixtures of $CaCl_2$, $MgCl_2$ and NaCl on the pH of glycine solns. were repeated but his results were not verified. Theoretical and exptl. investigations were made on the effect of salt mixts. of $MgCl_2$, $CaCl_2$, $BaCl_2$ and NaCl on the ionization of alanine in both acidic and alk. solns. H. E. Phipps

Outline of an activity theory of nonelectrolytes. I. A. Musil. *Österr. Chem.-Ztg.* 42, 371–81(1939); cf. *C. A.* 31, 8288⁹.—The Margules integrated form of the Duhem-Margules differential equation is related through the definition of activity to the changes in partial molal heat content and entropy which occur on mixing liquids to form non-electrolytic solns. For a binary mixt. the equation derived for the activity of component 1 is $\ln (a_1/N_1) = (\Delta\bar{H}_1 - T\Delta\bar{S}_1)/RT - \ln N_1 = \alpha_2 N_2^2/2 + \alpha_2 N_2^2/3$ in which a is activity, $\bar{H}$ and $\bar{S}$ are partial molal heat content and entropy, N_1 and N_2 are the mole fractions of components 1 and 2, and α_2 and α_3 are the Margules interaction consts. A similar equation holds for component 2. The data and method of Zawidski (*C. A.* 4, 702) are used to obtain numerical values of the Margules consts. for 12 pairs of liquids. About 60 references. **II. Energy of interaction and entropy of mixing.** *Ibid.* 395–406.—The causes and relations of forces between mols. in binary mixts. are discussed. An attempt is made to survey and improve the theory of solns. of nonelectrolytes, with due recognition of the contributions of others. The treatment is partly theoretical and partly empirical and leads to the calcn. of activities, partial molal heat contents, free energies and entropies of mixing, differential heats of soln. and diln. and partial sp. heats of the components. E. R. Smith

The application of electromotive-force measurements to binary metal systems. Harry Seltz. *Trans. Electrochem. Soc.* 77, 25 pp.(preprint)(1940).—E. m. f. studies of aq. electrolytes have contributed to some of the most important advances in the understanding of the nature of such solns. Today in the Debye-Hückel theory there is a better theoretical basis for the treatment of electrolytes than for any other type of soln. On the other hand, binary liquid metal solns., which at first sight might be thought to be relatively simple in nature, have received little attention. The thermodynamic properties of only a few such systems have been investigated previously. The thermodynamic properties of the soln. can be evaluated from the e. m. f. measurements. These thermodynamic data are then applied to the calcn. of phase equil. and to the calcn. of the entropies, free energies and heats of formation of any intermetallic compds. that may occur. C. G. F.

Electrochemistry of simple interphases, with special reference to that between mercury and solutions of electrolytes. S. R. Craxford. *Trans. Faraday Soc.* **36**, 85–101(1940).—A theoretical discussion is presented (1) for the completely non-polarizable interphase whose potential is independent of the amt. of charge flowing across it, and (2) for the completely polarizable interphase which behaves as if it contained a boundary that no charged particle can cross. Exptl. data for case (2) are given for the interface between Hg and a soln. contg. no mercurous ions over the potential range $E_{N.Cal.} = 0.0$ to -1.3 volt, viz.: KNO_3, NaCl, KI and $CaBr_2$ from M to 0.001 M. The capacity of the interface for all pos. ions is the same, namely, 19 microfarads/sq. cm. The capacity for anions varies, being larger for the more deformable ion: SO_4^{--}, 40.3 mF./sq. cm.; NO_3^-, 24; ClO_4^-, 26; Cl^-, 43; CNS^-, 53; Br^-, 93; I^-, 157. V. R. D. 1

The contact difference of potential between barium and zinc. The external work function of zinc. Paul A. Anderson. *Phys. Rev.* **57**, 122–7(1940).—The methods of contact-potential measurements (cf. A., *Ibid.* **49**, 320 (1936); *C. A.* **29**, 7173[4]; **33**, 1207[1]) are extended to Zn, using the retarding potential method with variable anode, in tubes sealed from the pumps and gettered with vaporized Ba. Observations made on three tubes and 15 pairs of Ba-Zn surfaces gave a mean value of 1.76 v. for the contact p. d., reproducible and const. to ±0.02 v., which gave a value of 4.28 ± 0.02 for the work function of pure Zn at room temp. Frank Gonet 2

Oxidation-reduction potentials and their applications. A review. Samuel Glasstone. *Trans. Electrochem. Soc.* **77**, 13 pp.(preprint)(1940).—A brief review is presented of the various directions in which oxidation-reduction potential measurements have been applied in recent years by the chemist and the biologist. Among the applications discussed are potentiometric titrations, indicator action, indicators for biol. reactions, and irreversible potentials. C. G. F. 3

Preparation of metallic magnesium with calcium carbide as reducing agent. I. Thermodynamical investigation on the reactions between MgO and CaC_2. Ryosaku Matuura, Masao Utino and Hidcaki Tuda. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 294(1939).—As predicted from thermodynamic calcns., powd. lightly calcined magnesite and com. CaC_2 when heated at 1200° under 1–2 mm. pressure in an iron tube react quantitatively according to $MgO + CaC_2 = Mg + CaO + 2C$. **II. The conditions for the reaction $MgO + CaC_2 = Mg + CaO + 2C$.** *Ibid.* —From results obtained at 1100°, 1200° and 1300°, the highest yields of Mg were obtained with (1) pressures maintained below 10 and preferably below 1–2 mm., (2) equiv. proportions of reactants, (3) use of magnesite burned at 700° and (4) use of finely powd. materials. **III. The influences of impurities and fluxes on the reaction $MgO + CaC_2 = Mg + CaO + 2C$.** *Ibid.* 294–5.—Impurities such as CaO, C and $MgCO_3$ have practically no effect on the reaction; SiO_2, Fe_2O_3 and Al_2O_3 react with CaC_2 but the products are not volatilized with the Mg. Of CaF_2, $CaCl_2$, NaCl, $AlF_3.3NaF$, Fe_2S_3, CuS, CoS and $Ca(BO_2)_2$, only CaF_2 accelerated the reaction. G. A. 4

Thermal polymerization of styrene and its inhibition. Stanley G. Foord. *J. Chem. Soc.* **1940**, 48–56; cf. *C. A.* **33**, 3629[9], 7932[8].—The kinetics of the polymerization of $PhCH:CH_2$ (I) at 60, 90 and 120° were calcd. from expts. with various inhibitors and retarders. The degree of polymerization at any time t was measured in sealed, evacuated viscometers. The relative viscosity, n_r, for a concn., C, was measured with pure I equal to unity, and rates were derived from the relation $\log n_r = kC$, where the const. k is proportional to the mol. wt. of a given polymer. The curves $\log n_r$-time are of the same form as the time-concn. curves. A conversion factor to derive the latter was obtained by a single measurement of the degree of polymerization by the independent method of the pptn. of the polymer from C_6H_6 with EtOH. Classified on the basis of inhibition or retardation of the polymerization, 130 org. substances fall into 4 groups, 50% of which lie in 2 groups of chief interest. An "inhibitor" is defined as having the property of causing a more or less protracted induction period, whereas a "retarder" reduces the rate of the subsequent reaction. Effective groups for stabilization are quinoid, nitro, phenolic hydroxy, amino and nitroso. The data for the representative inhibitor, quinone, for 90 and 120° were used to calc. max. polymerization rates and the energy of activation (28,000). The mechanism that was assumed required each mol. of inhibitor to deactivate n mols. of I. It is possible to calc. n and nM, the mean mol. wt. of the polymer, from the data of various inhibitors. The mechanism is consistent with the fact that the several inhibitors give approx. the same values of n and nM. On this basis the nM for the 120° polymer ranges from 20,540 to 24,800. N. T. Farinacci 5

Kinetics of the reaction between potassium persulfate and the alkyl iodides. I. Influence of solvents, acids and salts. M. S. Telang and V. V. Nadkarny. *J. Indian Chem. Soc.* **16**, 536–42(1939).—Detns. were made of the I formed in 2 hrs. at 50° from EtI-$K_2S_2O_8$ solns. in 10% aq. alc., 0.02 N in each reactant. Addns. of 5 vol. % of the lower aliphatic alcs., acids and esters had a strong effect, usually depressing, on the reaction rate; on ascending each homologous series, marked alternations in the effect were shown. Acids and salts, added in 0.8 N concn., catalyzed the reaction in the order: $HNO_3 > HCl > H_2SO_4 > Fe(NO_3)_3 > KCl > NH_4Cl > NaCl > CuSO_4 > H_3PO_4 > NaNO_3$, K_2SO_4, Na_2SO_4. HNO_3 does not oxidize EtI under these conditions. A. O. Allen 6

Concerning reactions of the type $A_{solid} + B_{gas} \rightarrow C_{solid}$ and the kinetics of the neutralization of solid benzoic acid by gaseous ammonia. Dora Markowska and Gabriel Valensi. *Bull. soc. chim.* **6**, 1522–41(1939).—At a given temp. and pressure, the fraction m of benzoic acid reacting in t minutes is given by the equation $F(m) = (4.167 + m)\log(1 + 0.24\,m) + (1 - m)\log(1 - m) = Kt/d_0^2$ in which d_0 is the most probable diam. in cm. of the needle-shaped crystal. At 760 mm. the values of K ($\times 10^{-6}$) for several temps. are: 0°, 2.1; 22.5°, 3.7; 30°, 6.5; 40°, 6.5; 50°, 2.5. For 25° K varies according to the expression $K = 3.7 \times 10^{-6}\,p^{0.5}$ where p is expressed in atms. The complex nature of the variation of reaction rate with temp. is discussed. A. A. Vernon 7

The electrostatic influence of substituents on reaction rates. I. F. H. Westheimer and Martin W. Shookhoff. *J. Am. Chem. Soc.* **62**, 269–75(1940).—The electrostatic theory was applied to the problem of the effect of polar substituents on reaction velocities (cf. *C. A.* **29**, 7763[8]). The rates of alk. hydrolysis of the following pairs of compds. were measured by an elec. cond. method: oxamide and Na oxamate, *tert*-BuOAc and *tert*-Bu chloroacetate, the *tert*-Bu ester of dimethylglycine and the chloride of the *tert*-Bu ester of betaine. It is shown, by equations of Kirkwood and Westheimer (cf. *C. A.* **32**, 8244[8]), that the ratio of the rates for each pair is quantitatively in accord with the hypothesis that the effect of a polar substituent on the velocity of the hydrolyses is primarily electrostatic in origin. A. B. Garrett 8

Kinetics of the reaction between ethylene glycol and lead tetraacetate. R. P. Bell, J. G. R. Sturrock and R. L. St. D. Whitehead. *J. Chem. Soc.* **1940**, 82–4.—$(CH_2OH)_2$ was treated with $Pb(OAc)_4$ in HOAc at temps. between 18 and 45°. The rates were followed by adding measured samples to KI soln. and titrating the liberated I. The reaction was found to be first order with respect to each reactant and the energy of activation was calcd. as 20,900 with a probable error of 1000 cals. In the reaction the steric factor in $k = PZ\,e^{-E/RT}$ is approx. unity. A reaction between 2 uncharged mols. with such a high steric factor suggests a mechanism involving free radicals rather than ions (cf. Waters, *C. A.* **34**, 1000[3]). N. T. F. 9

Kinetics of the thermal decomposition of fully deuterated diethyl ether. J. G. Davoud and C. N. Hinshelwood. *Proc. Roy. Soc.* (London) **A174**, 50–6(1940); cf. *C. A.* **33**, 6126[9].—The kinetics of the decompn. of $(C_2D_5)_2O$ was studied in detail. It was found that the presence of increasingly small quantities of NO caused the rate of decompn. of ether to fall to a well-defined limit because of its suppression of reaction chains. The ratio of $\rho_0(p)$/

$\rho_0(D)$ was found to have a mean value of 2.14 while the ratio of $\rho_\infty(H)/\rho_\infty(D)$ had a value of only 1.78, where ρ_0 is the normal rate of decompn. and ρ_∞ of the fully inhibited reaction (using a NO inhibitor). The apparent chain length (ratio of ρ_0/ρ_∞) was found to be 3.7 and 3.0 for the light and heavy ether, resp. One of the chain steps involves a complete rupture of a C–H or C–D bond. Activation energies (E) were calcd. and show that there is little change in E with initial pressure of ether and that the value of E for the D compd. is several thousand cals. greater than that for the H compd., which is believed to mean that the decompn. probability of the activated D compd. is somewhat greater than that of the H compd. The effect of D on ordinary ether at low pressures (520–5°) was investigated with the conclusion that D increases the rate of reaction, which seems to point to an unknown factor influencing the energy exchange. Frank Gonet

Organic-reaction catalysts. Recent developments. L. Light. *Chem. Products* **3**, 29(1940).—A review covering the use of BF_3, colloidal Rh, Ni and Ni alloys, Pd, etc. 9 references. Leopold Schefian

Catalytic isotopic exchange of gaseous oxygen. V. Sorption of oxygen by manganese oxide and the exchange reaction of oxygen atom between oxygen gas and manganese oxide. I. Sorption experiment. Noriyosi Morita. *Bull. Chem. Soc. Japan* **14**, 520–9(1939); cf. *C. A.* **33**, 4500[8].—Adsorption of O was studied with Mn oxide at various temps. and const. pressure of 2/3 atm. From room temp. up to 275°, adsorption is very slight but a sudden increase in rate is noted at 325° which is about 15 times greater than at 275°. This increase continues up to 530° but after that temp., desorption occurs. If oxide which has lost O above 530° is cooled to a lower temp. it will again adsorb. G. M. Murphy

Catalyst for producing acetic acid from acetaldehyde. Tadahumi Yano. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 297–8(1939); cf. following abstr.—When air was passed at the rate of 3 l./hr. through mixts. of 5 cc. AcH soln. (sp. gr. 0.837 at 12°), 30 g. of 89.9% HOAc and 0.5 g. of $CoSO_4.7H_2O$, $K_2Cr_2O_7$, $KMnO_4$, K_2CrO_4, $Fe_2(SO_4)_3$, $Cu(OAc)_2$ or MnO_2, resp., the yields of AcOH from the AcH present were (% yield, l. air passed through the soln.): 56.6, 8.0; 21.6, 8.5; 15.6, 5.5; 9.6, 4.5; 1.6, 3.0; 0, 3.0; and 0, 3.0. MnO_2 is a catalyst only when the H_2O content of the mixt. is low. Based on expts. made at 25–60° in the presence of MnO_2, air is most effective at 30° in converting AcH to AcOH in AcOH soln. (best results with 5–10% soln. of AcH in AcOH). With $CoSO_4.7H_2O$ as the catalyst, best results were obtained at 40°. The catalytic effect of $CoSO_4.7H_2O$ is not decreased by the presence of H_2O. George Ayers

Catalyst for producing acetaldehyde from acetylene. Tadahumi Yano. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 299–300(1939); cf. preceding abstr.—For the formation of AcH by passage of C_2H_2 into 25% H_2SO_4 contg. 1 g. HgO catalyst at 55°, practically the same results were obtained when metallic Hg and MnO_2 were substituted for the HgO. When C_2H_2 was passed at 55° through 300 cc. of catalyst contg. 2 g. Hg, 50 g. of 66°Bé. H_2SO_4 and 6 g. MnO_2, 191.3 l. was absorbed and 283 g. AcH obtained (yield, approx. 78.45%). Based on expts. at 55–65°, the life of the catalyst is shortened at the higher temps. An increase in the concn. of the H_2SO_4 or addn. of $Fe_2(SO_4)_3$, $Fe(OAc)_3$ or MnO_2 has little effect on the yield of AcH, but the life of the catalyst is prolonged. Agitation of the acid soln. increases the rate of reaction. G. A.

Hydrogenation of a higher ketone with catalysts consisting mainly of copper, cobalt and cerium under atmospheric pressure. Kiitiro Kino and Syunziro Kato. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 362(1939).—A higher ketone, prepd. from com. stearic acid and having a m. p. of 75.5–78° and zero hydroxyl value, was hydrogenated best at 150° during 8 hrs. by Cu-Co, Co-Ni and Ni-Ca(OH)$_2$ catalysts to yield the secondary alc. Cu, Cu-Zn, Cu-Ag, Cu-Cr, Cu-Ce, Cu-Ba, Co, Ce and Ni-KOH were unsuitable as catalysts. George Ayers

The preparation of a higher secondary alcohol from a higher ketone by hydrogenation under pressures of five and twenty atmospheres. Kiitiro Kino and Syunziro Kato. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 363 (1939); cf. preceding abstract.—The higher ketone prepd. from com. stearic acid, when hydrogenated under 5 atm. pressure in the presence of Co-Ni catalyst, gave a practically quant. yield of the secondary alc., the product having a hydroxyl value of 101.3 (hydroxyl value of the product formed by reducing the ketone with Na and BuOH was 104.5). Under the same conditions, with Cu-Co and Ni-Ca catalysts the yields were good and the hydroxyl values of the products were 90.5 and 92.7, resp. Use of Cu-Zn, Co-Cu, Cu-Ce, Cu-Ba and Ni-Ca as catalysts resulted in products having rather low hydroxyl values. Hydrogenation of the ketone under 20 atm. pressure in the presence of Cu-Zn, Cu-Co, Cu-Ce, Cu-Ni, Co-Cu or Ni-Ca catalyst gave quant. yields of the secondary alc., the products having hydroxyl values between 100 and 103.7. George Ayers

The retardation of reactions and its connection with negative catalysis. Ch. Dufraisse and P. Chovin. *Rev. chim. ind.* (Paris) **48**, 258–64, 286–97(1939).—Discussion of various inhibition expts. that have been reported in the literature and a summary of the theories of antioxidants. Very complete literature references are given. A. A. V.

Pressure-volume-temperature relations for butane. W. B. Kay. *Ind. Eng. Chem.* **32**, 358–60(1940).—The vapor pressure of butane was detd. at a series of temps. from room temp. to the crit. point with various ratios of liquid vol. to vapor vol. In each case there was an increase in pressure with an increase in the value of the ratio amounting to 0.20–0.70 lb./sq. in. between the dew point and the b. p. at const. temp., indicating the presence of small traces of an impurity, probably isobutane. The exptl. data are plotted and a smooth curve drawn through the points. Temp. values at equal intervals of pressure are given in a table. Crit. temp. and pressure were found to be 306.0°F., and 550.1 lbs./sq. in., resp. By extrapolation of the mean d. line to the crit. temp., a value of 14.24 lbs./cu. ft. was obtained for the crit. d. In compressibility expts. 15 isotherms in both the high (1200 lbs./sq. in.) and the low (35 lbs./sq. in.) pressure regions, covering the temp. range from 100° to 536°F., were obtained for butane. These temp.-pressure data were plotted to give the isochors or curves of const. vol. from which the values of the pressure, vol., and temp. are taken and tabulated. The data are in excellent agreement with the data of Beattie, *et al.* (*C. A.* **33**, 1562[4]). E. J. M.

Liquid-vapor equilibrium relations in binary systems. The ethane–butane system. W. B. Kay. *Ind. Eng. Chem.* **32**, 353–7(1940).—Pressure-vol.-temp.-compn. (P-V-T-x) relations for the ethane–butane system at the liquid- and vapor-phase boundaries were detd. from the border curves of 5 different mixts. of known compn. and the vols. of their satd. liquid and vapor calcd. The mixts. contained 17.49, 45.10, 65.77, 82.18, and 94.72 mole % ethane, resp. The app. and exptl. technique were the same as those used in the ethane–heptane study (*C. A.* **32**, 4055[9]). The T-x diagrams of the coexisting liquid and vapor phases at const. pressure were constructed, and compared with those computed by means of the soln. laws. The results indicate definitely that the latter are inadequate for calcg. these relations at high pressures. The combination of the border curves of the mixts. and the vapor pressure curves of the pure constituents form a space diagram similar to that for the ethane–heptane and other binary systems studied. As compared to the ethane–heptane system the effect of compn. on the crit. consts. of the mixts. is not so marked. The temp.-d. curves of the satd. liquid and vapor of the 5 mixts. exhibit 2 points of inflection, barely noticeable for mixts. contg. small amts. of ethane, but quite apparent for mixts. rich in ethane. The exptl. data from several hundred equil. measurements and data for ethane and butane are plotted and summarized in a table. E. J. Mahler

Structure of the intermetallic phases in the systems W–Co and Mo–Co. III. M. M. Babich, E. N. Kislyakova and Ya. S. Umanskiĭ. *J. Phys.* (U. S. S. R.) **1**, 309–13 (1939).—See *C. A.* **33**, 7655[4]. E. H.

The systems Al–Pb–Cu and Al–Pb. W. Claus and Ingeborg Herrmann. *Metallwirtschaft* **18**, 957–60(1939).—In the ternary system, the fluid melts are found in the Pb-rich corner on the one hand and the Pb-poor Cu-Al melts on the other hand. The equil. diagram is shown. A series of frozen melts on the Al-Cu side of the ternary system shows that the miscibility gap experiences a widening at lower temps. on this side. In the Pb corner of the system, the melts exhibit analogous behavior. In the binary system Al–Pb, to det. the limits of the miscibility gap, alloys with 7, 3 and 2% Al were prepd. and examd. in the temp. range of 1200 to 1020°. With 7% Al, there is still layer formation at 1160 and 1020°. With 3% Al there is still layer formation at 1190 and 1020°. With 2% Al the alloy is in the zone of homogeneous soln. at 1200° but at 1020° there is marked layer formation. The shrinkage phenomena observed in the Al–Pb–Cu system are discussed. H. Stoertz

Note on the system SiO_2–CaO–H_2O. Vittorio Cirilli. *Ricerca sci.* **10**, 1042-3(1939).—Bessey (*Proc. of the Symposium on the Chemistry of Cements*, Stockholm, 1939) reported an isotherm of the system SiO_2–$Ca(OH)_2$–H_2O at 17°. In agreement with Bessey's results, C. found that at compns. CaO/SiO_2 between 2 and 1.5 in the ppt. the concn. in the equil. soln. has a value sufficiently close to that corresponding to the soly. of $Ca(OH)_2$ but nevertheless slightly lower, at the same temp. Bessey explains this behavior by assuming that there are two solid phases present in the ppt.: $2CaO.SiO_2.xH_2O$ and $3CaO.2SiO_2.xH_2O$. This interpretation disagrees with results of an x-ray investigation of the ppt. that can be sepd. from the equil. soln. As previously discussed (cf. *C. A.* **34**, 19[6]) it seems possible that in the range mentioned there are present $Ca(OH)_2$ and $3CaO.2SiO_2.xH_2O$. R. S.

The system trisodium phosphate-sodium carbonate–water. Kenneth A. Kobe and Alexander Leipper. *Ind. Eng. Chem.* **32**, 198–203(1940).—Study of the system Na_2O–P_2O_5–H_2O at 25° showed that the compn. of trisodium phosphate (I) varies with the compn. of the soln. from which it is crystd. Com. I corresponds approx. to $Na_3PO_4.{}^1/_7NaOH.12H_2O$. Its soly. in H_2O was detd. at 0, 25, 40, 60, 80 and 100°. The results disagree markedly with other detns. in the literature, probably because the salts used were of different compns. Soly. detns. in the system I–Na_2CO_3–H_2O at the above temps. showed that no double salts are formed and that Na_2CO_3 can be sepd. easily from I by crystn. Michael Fleischer

Determination of the thermodynamic scale of temperature below 1°K. by means of magnetic measurements. H. B. G. Casimir and W. J. de Haas. *Physica* **7**, 70–8(1940).—The errors involved in the method of de Haas and Wiersma (*C. A.* **30**, 5845[2]) for obtaining the thermodynamic scale of temp. below 1°K. are analyzed. These errors may be estd. from a rough detn. of adiabatic *M,H* curves. A few measurements on Fe NH_4 alum are discussed. John W. Knowlton

The radiation correction in calorimetry. F. E. Hoare. *Phil. Mag.* **29**, 52–65(1940).—The methods of using radiation corrections in calorimetry that were proposed by Regnault, Rowland, Dickinson and Nernst-Eucken are examd. The relative merits of the different methods are investigated generally. In each case the limits of error are considered. A mistake in sign is discovered in Rowland's original equations and it is shown that this has led to an erroneous graphic construction. The error has been repeated in the literature quoting Rowland. Formulas are derived for the error limits, expts. upon a cooling calorimeter being made also. The observed cooling measurements are treated by the various methods given above and the results compared. Calcns. are also made for the allowance for energy expenditure needed in realizing the initial and final parts of the curve in the Eucken-Nernst method. The radiation correction method proposed by Ferry is not considered as suitable for giving the true correction in the general case. S. Tolansky

Analytical calculations of thermodynamic properties. H. M. Robinson and Harding Bliss. *Ind. Eng. Chem.* **32**, 396–8(1940).—Equations for calcg. entropy, enthalpy, and energy changes in terms of vol. are derived for the Van der Waals, Wohl, and Beattie-Bridgeman equations of state. They were tested for entropy and enthalpy calcns. by comparisons with published values for propane, N_2 and CH_4, that were detd. graphically. The ranges of comparison included values near the crit. Except for occasional scattered points, the Beattie-Bridgeman equation was found satisfactory to 5–7% for entropy and 12% for enthalpy. The others were almost as good for entropy, but definitely worse for enthalpy. The advantage of the analytical method with vol. as the independent variable over the graphic method is discussed. H. W.

Total-heat entropy diagram for biphenyl. Sidney John Ellis. *J. Inst. Civil Eng.* **1938–39**, 227–40.—From the sp.-heat data of Findlay, the value of the entropy was integrated for the superheat region up to a total heat of 540 b. t. u. The efficiency of the biphenyl engine and a steam engine are compared between 400°–800°F. 3 graphs, 11 tables. Ann Nicholson Hird

Heat conductivity of rubber at low temperatures. Adolf Schallamach. *Nature* **145**, 67(1940).—The heat cond. of North British tire rubber, in cal./sec. cm. °K., is 0.00055 at 293°K., and 0.000010–0.000018 at 83°K., depending on the method used. Other specimens of rubber showed a comparable behavior. G. M. Petty

The new specific heats. Robert C. Heck. *Mech. Eng.* **62**, 9–12(1940).—Existing data on N, O, CO, H, CO_2 and H_2O are recalcd. by the use of engineering units. John W. Knowlton

Critical and coöperative phenomena. V. Specific heats of solids and liquids. A. F. Devonshire. *Proc. Roy. Soc.* (London) **A174**, 102–9(1940).—Theoretical. The sp. heats of simple substances in the liquid and solid phase were calcd. in terms of the intermol. forces, and were found in fair agreement with the experimentally detd. C_v values for Kr and A. The calcd. values were found to vary less rapidly with the temp., being too small at low temp. and too large at high temp. The calcd. coeff. of thermal expansion α and the cubic compressibility χ as functions of λ/kT are also given. Frank Gonet

Specific heat ratios for hydrocarbons. W. C. Edmister. *Ind. Eng. Chem.* **32**, 373–5(1940); cf. *C. A.* **32**, 3251[6].—The methods of the previous paper are extended to give $\gamma = C_p/C_v$ as a function of reduced temps. up to 2.5 and reduced pressures up to 1.2 for 17 hydrocarbons. The use of the correlation to calc. the power for adiabatic compression is discussed. Hood Worthington

The thermal capacity of pure iron. J. H. Awbery and Ezer Griffiths. *Proc. Roy. Soc.* (London) **A174**, 1–15(1940).—The sp. heat was detd. on a cylindrical specimen of Fe, weighing 1200 g., of purity higher than 99.99%, over the range 50–950°. The energy changes assocd. with the Curie point of Fe are not concd. closely around that point, but affect the sp.-heat curve over a wide range. In the range from 50° to the Curie point (755°) the sp. heat rises fairly regularly, except for a broad band centered around 200°, amounting to 2% at its max. Above the magnetic point, the sp. heat falls rapidly but the thermal effect of the magnetic transformation is still visible when the α-γ (body- to face-centered) transformation sets in. The transformation was found at least in part a true phase-change involving a latent heat, which was found to be 3.9 cal./g. This transformation is double, as the main peak occurs at 903°, but after the sp. heat fell to 0.37 cal./g., it rose again to a smaller but definite peak at 908° before falling to the value for γ-iron, which was found to be 0.14 cal./g. The app. is described in detail. F. G.

Liesegang zone formation as model for org. rhythms (Kuster) **11A**. Rheological properties of asphaltic bitumens (Saal, Labout) **22**. Methods of application of pH detn. in butter sera (Parsons) **12**. Asphaltic bitumen as colloid system (Pfeiffer, Saal) **22**. X-ray analysis of corrosion products from galvanized sheets (Morral) **9**. Human nervous and related tissue by Röntgen-ray diffraction method and petrographic microscope (Reynolds, *et al.*) **11A**. Microscopic method of electrophoresis and its application to study of ionogenic and nonionogenic sur-

faces (Abramson) **11A.** Membrane potentials, valences and theoretical and observed mobilities of hemoglobin and egg albumin (Adair, Adair) **11A.** Electrophoretic moving boundary with Lamm's scale method (Kekwick) **11A.** Scattering of x-rays by crystals (Laval) **3.** Influence of electrolytes on electrophoretic mobility of serum albumin and hemocyanin (Putzeys, van de Walle) **11A.** Influence of electrolyte concn. on electrophoretic mobility of egg albumin (Tiselius, Svensson) **11A.** Colloid structure of gallstones (Aschoff) **11G.** Foaming (Ostwald, Mischke) **16.** Lattice of rubber (Mŭsch, van der Wyk) **30.** 1

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F. DUNCAN

The quantum-mechanical basis of statistical mechanics. Edwin C. Kemble. *Phys. Rev.* **56**, 1146–64(1939).—Theoretical and math. Bernard Lewis

Infrasonic and ultrasonic waves. Michel Adam. *Génie civil* **115**, 433–5(1939).—A discussion of their mech., phys., chem. and physiol. effects. A. N. Hird

Multiple scattering of electrons. S. Goudsmit and J. L. Saunderson. *Phys. Rev.* **57**, 24–9(1939); cf. *C. A.* **33**, 6135[1].—Theoretical, math. Bernard Lewis

The interaction potential in the scattering of protons by protons. A. S. Eddington and H. M. Thaxton. *Physica* **7**, 122–4(1940)(in English). W. F. Meggers

Scattering of mesons and the magnetic moments of proton and neutron. W. Heitler. *Nature* **145**, 29–30 (1940).—Math. A no. of theoretical difficulties, such as the diverging magnetic moment of the proton, and the large scattering cross sections for mesons, are due to an inadequate treatment of the spin and charge. "Higher proton states" with charges $2e$ and $-e$, and those with spin 3/2 might exist with a rest mass of 25–50 electron masses higher than that of the proton. The cross section for the scattering of mesons is then of the right order of magnitude and the magnetic moment of the proton diverges only logarithmically. G. M. Petty

Landau diamagnetism and the Fermi-Dirac energy distribution of the metallic electrons in graphite. K. S. Krishnan. *Nature* **145**, 31–2(1940).—The abnormal diamagnetism of graphite, which is confined to the direction of its hexagonal axis, conforms to the Landau diamagnetism of the Fermi free-electron gas contg. one electron per C atom and with a degeneracy temp. of about 520°K. 9
G. M. Petty

Does the mesotron obey Bose-Einstein or Fermi-Dirac statistics? P. L. Kapur. *Nature* **145**, 69(1940).—

Whether the mesotron obeys Bose-Einstein or Fermi-Dirac statistics depends on assumptions regarding the nature of the field, emission and absorption of which by the heavy particle is responsible for the interaction between elementary nuclear particles. Assuming a 2-particle field, so that a mesotron is always emitted or absorbed in conjunction with a neutrino or antineutrino, it is possible to explain the forces between the particles and to explain the phenomenon of β-disintegration. G. M. Petty

The photodisintegration of the deuteron in the meson theory. H. Fröhlich, W. Heitler and B. Kahn. *Proc. Roy. Soc.* (London) **A174**, 85–102(1940).—Math. A theoretical calcn. is given of the photoelec. effect of the deuteron on grounds of the meson theory of nuclear forces. Frank Gonet

The derivation of the quadratic equation for the masses of the proton and electron. Arthur S. Eddington. *Proc. Roy. Soc.* (London) **A174**, 16–41(1940).—Math. The derivation of the fundamental quadratic $10\,m^2 - 136\,m\,m_0 + m_0^2 = 0$ and the simplification of many phys. problems resulting from this are given in full. Frank Gonet

The masses of the neutron and mesotron. Arthur S. Eddington. *Proc. Roy. Soc.* (London) **A174**, 41–9 (1940).—Theoretical. E. concludes that the mesotrons have no connection with the so-called Yukawa particles, which are neutral spinless particles of mass $m_0 = 136\,m_e$. The elementary matter to be combined in the nucleus consists of protons (p), electrons (e), ordinary comparison (Yukawa) particles (c) and spin-comparison particles (s), which yield 4 possible kinds of bi-particles p_c, e_c, p_s, e_s. E. believes that owing to the large rest-energy (2.36 m_p) of the heavy mesotron p_s, the tendency will be to form p_c and e_s rather than p_s and e_c. Hence in its normal state the nucleus is taken to consist of protons and neutrons each with a comparison (Yukawa) particle (p_c, n_c). When a transition is about to occur the neutron is regarded as a combination of p_c and e_s. If the transition is spontaneous, the available energy is insufficient to provide for the emission of a mesotron e_s, and e_s is transformed into e_c before emission, by emitting an anti-neutrino, and the ordinary β-ray disintegration is obtained. If the transition is a consequence of the entry into the nucleus of a large quantity of energy, direct emission of e_s becomes possible and the 2nd transition $e_s \rightarrow e_c$ is deferred until the end of the natural lifetime of the mesotron in free space. Frank Gonet

The proton-deuteron transformation as a source of energy in dense stars. W. A. Wildhack. *Phys. Rev.* **57**, 81–6(1940).—Math. The rates of energy evolution due to the transformation to He ($H + H = D + e^+$ and $D + H = {}_2He^3 + \gamma$) in H, at d. of 10^4 to 10^8 g./cc. were calcd. on the basis of complete degeneracy (assuming a crystal-like spacing of the protons). The results indicate that any considerable quantity of H in white dwarf stars would lead to greater luminosities than those observed. W. concludes that the low effective mol. wt. (1.5) calcd. for some of these stars, using the white dwarf model, cannot be due to a high H content. This might be explained by a very large content (100%) of He^3, but is difficult to see how such great quantities could be present in these stars. The authors believe that this difficulty can be overcome by the revision of the observational data of the white-dwarf radii. Frank Gonet

The production of radioactive substances and neutron rays. Franz N. D. Kurie. *Am. J. Roentgenol. Radium Therapy* **43**, 107–12(1940).—An outline of the present concept of the structure of the atom is followed by a discussion of the fundamental principles of at. disintegration by particle bombardment, with several equations of typical disintegrations. The cyclotron is described in some detail. E. H. Quimby

Stable atomic nuclei and the present status of their classification. H. Jensen. *Naturwissenschaften* **27**, 793–803(1939).—A review dealing with requirements for nuclear stability, especially the application of Mattauch's rule, Harkins' rule, etc. The frequency of odd- and even-no. masses is discussed. The structure of nuclei with different Mattauch zones is used to systematize the possible structures. B. J. C. van der Hoeven

Recent progress in our knowledge of the structure and disintegration of atoms. A. Boutaric. *Génie civil* **115**, 383–6, 401–4(1939).—A review of nuclear chemistry. Ann Nicholson Hird

A simple rule for evaluating atomic constants. Po-Leon Woo. *Nature* **145**, 30–1(1940).—Math. Observed and calcd. values are compared for h, e, m_e, M_H, e/m and h/e. G. M. Petty

Electron liberation at the cathode of the glow discharge. Heinz Fischer. *Naturwissenschaften* **27**, 838–9(1939).—Recent work on electron liberation from the cathode as a function of cathode heating (Güntherschulze and Bär, *C. A.* **32**, 8911[7]) showed that $\gamma = i^-/i^+$ is of the order 0.1 to 1 and for const. total i = 0.5 ma. per sq. cm. γ increases linearly with the cathode drop. This work was repeated with H_2 in the range 0.2 to 2 or with glow discharge as well as with hollow-cathode discharge, c. d. from 1 to 10 ma. per sq. cm.; a brass cathode was used. The values found all lie on the same curve in agreement with previous work and γ is only a function of the cathode drop. B. J. C. van der Hoeven

A mechanical analogy to the motions of electrons in gases. G. D. Yarnold. *Phil. Mag.* **29**, 47–51(1940).—A simple demonstration model is described. S. Tolansky

The transition from glow to arc discharge. E. L. E. Wheatcroft and H. Barker. *Phil. Mag.* **29**, 1–15 (1940).—Cathode ray oscillographic observations are made upon the initial stages of the transition from the glow to the arc discharge. The abnormal glow for Cu electrodes in air at pressures of 0.2 to 1.2 mm. of Hg is studied. Direct evidence is obtained establishing the existence of intermittent voltage collapse. The transient breakdowns are initiated by a sudden drop in the interelectrode potential corresponding to a partial discharge of the self capacity of the electrodes. The previous history of the gas in the discharge tube affects the results obtained. The theory and origin of the observed effects are discussed. The thermal effects, field effects and cathodic bombardment influences are examd. It is not considered that the thermal or field theories can suffice to explain the observations. It is suggested that the ionic bombardment and resulting cathodic disintegration are the most promising avenues to be examd. for an explanation. S. Tolansky

The cause of multiple discharges in a Geiger-Müller counter. C. H. Collie and F. Morgan. *J. Sci. Instruments* **16**, 369-72(1939).—A demountable counter permitting controlled transition from simple to multiple type discharges was used to investigate the formation of double kicks. These were produced by the presence of small quantities of xylene vapor in the counter, the double kick being due to the release of an electron from the cathode when the xylene ions were discharged 10^{-3} sec. after the first discharge. Higher proportions of xylene gave rise to a larger and longer series of multiple discharges. M. McMahon

Emission of ionizing radiations by the salts of ordinary metals. Émile Thibaud. *Compt. rend.* **210**, 174–5 (1939); cf. *C. A.* **33**, 3254[5].—The state of the metal (Al, Mg, Cr, Mn and Sb were examd.), whether in thick or thin plates, or powder, or in various compds., e. g., oxide, sulfate, phosphate, sulfide, has no effect on the coeff. of absorption in air, or on the wave length of the radiations emitted. The phenomenon is therefore specific for the metal atom. C. A. Silberrad

A note on the Schottky effect. E. L. E. Wheatcroft. *Phil. Mag.* **29**, 16–17(1940).—The Schottky formula for the dependence of the total thermionic emission in the case of zero accelerating field is $\log I = \log I_0 + b\sqrt{V}$. According to Schottky this expression is derived by extrapolation from high fields, in which the acceleration is such that the distortions produced by space-charge effects are negligible. Gill (*C. A.* **32**, 3690[4]) considers the formula $I = I_0(1 + b\sqrt{V})$ to be better than that of Schottky.

An exptl. test is carried out in this paper in order to discriminate between the 2 suggested formulas. The results favor the expression proposed by Schottky.
S. Tolansky

Radius of the electron and calculation of photoelectric constant of metals. Theodore Ionescu. *Compt. rend.* 210, 170–2(1940); cf. *ibid.* 203, 537(1936), and Thomson, *C. A.* 33, 2793[8].—The radius of the electron, $\rho = h/2\pi mv$, where m is its mass and v its velocity, is verified by calcg. therefrom the photoelec. const. of Li, Na, K, Rb, Cs, Al, Cu, Ag and Au and comparing the results with those of expt. Fair to good agreement was obtained except for Au. C. A. Silberrad

Photoelectric effect in incandescent metals. V. Ricca and M. Della Corte. *Atti accad. Lincei, Classe sci. fis. mat. nat.* 29, 685–91(1939); *Nuovo cimento* 16, 410–16.—Math. The theory of Fowler (Du Bridge, *C. A.* 26, 2644; 27, 3663) concerning the photoelec. properties of metals is confirmed. At 2400°K. even radiation having wave lengths above 3600 A. produces a photoelec. effect on W, whose photoelec. "threshold" is at about 2660 A. A. W. Contieri

Examination of colored alkali halides for photoelectric Hall effect. Julian Evans. *Phys. Rev.* 57, 47–53(1939).—Five additively colored alkali halides were examd. for photoelec. Hall effect. From the upper limit assigned to the Hall effect it was computed that the mean free path of photoelectrons in rock salt is not much greater than the dimensions of a lattice cell. Bernard Lewis

Internuclear distances in Se_2, Te_2 and HgCl by electron diffraction. Louis R. Maxwell and V. M. Mosley. *Phys. Rev.* 57, 21–3(1939).—Electron-diffraction photographs have been obtained from the gas mols. Se_2, Te_2 and HgCl. The internuclear distances found for Se_2 and Te_2 were 2.19 ± 0.03 A. and 2.59 ± 0.02 A., resp., while for HgCl a sepn. of 2.23 ± 0.03 A. was obtained. Bernard Lewis

The scattering of mesotrons in metal plates. J. G. Wilson. *Proc. Roy. Soc.* (London) **A174**, 73–85(1940).—An extended series of accurate measurements of the scattering of mesotrons, using an expansion chamber, is described. The results are in general agreement with earlier (cf. *C. A.* 34, 228) measurements and confirm to within 4% the theoretical values given by Williams (cf. *C. A.* 33, 8492[1]) for multiple Coulomb scattering. The evidence for the existence of large-angle scattering due to short range forces between mesotrons and nuclear heavy particles (protons and neutrons) is discussed, where the cross section for this type of scattering is estd. to be of the order of 10^{-28} cm.^{2}, which is in agreement with Bhabha's value for a "classical" mesotron theory. On the other hand, no exptl. evidence was found for the large increase of scattering due to short range forces at low mesotron energies given in Heitler's quantum-mechanical treatment. Here, the cross section was found to be less than 10^{-27} sq. cm., and is explained as indicating a failure in the treatment of the charge-exchange which leads to the interaction between charged mesotrons and heavy particles. Frank Gonet

The instability of the meson. Martin A. Pomerantz. *Phys. Rev.* 57, 3–12(1940).—Values of the proper lifetime of the meson have been deduced from a comparison of the intensity of mesons in an inclined direction under air with that in a vertical direction under a superposed Pb shield equiv. in absorbing power to the difference between the masses of the air traversed by the mesons before reaching the app. in the 2 directions. From the exptl. data it is calcd. that the av. proper lifetime of all mesons having energies exceeding 6.1×10^8 e. v. upon reaching the app. is 3.9 ± 0.3 microsec., and the av. for mesons with energies exceeding 11.9×10^8 e. v. is 3.8 ± 0.4 microsec. The lifetime of only those mesons having about 9×10^8 e. v. energy is 2.6 ± 0.8 microsec. A value of roughly 6 microsec. is calcd. from measurements of the no. of disintegration electrons and their secondaries in equil. with the mesons in air. Bernard Lewis

Instability of the mesotron. Mario Ageno, Gilberto Bernardini, Bernardo Nestore Cacciapuoti, Bruno Ferretti and Giancarlo Wick. *Ricerca sci.* 10, 1073–81 (1939).—A counter arrangement was used to measure triple coincidences in cosmic rays at elevations of 500 m. and 3460 m. above sea level, in the vertical direction and at an inclination of 45°. The results are independent of any hypothesis concerning the isotropy of cosmic radiation and confirm the instability of the mesotron. The av. life of this particle is 3–4 microsec. G. M. M.

Spontaneous disintegration of the mesotron. Bruno Ferretti. *Ricerca sci.* 10, 1144–8(1939).—A tentative theory is presented which is based upon the suggestion of Maier-Leibnitz (cf. *C. A.* 33, 2028[4]) that the mesotron disintegrates into an electron, a neutrino and a neutretto. G. M. Murphy

Evidence for the transformation of mesotrons into electrons. E. J. Williams and G. E. Roberts. *Nature* 145, 102–3, 151(1940).—A cloud-chamber photograph is reproduced which shows the transformation of a mesotron of mass 250 ± 70 into an electron. This shows that the mesotron is identical with the particle assumed by Yukawa in his theory of nuclear forces and β-disintegration. G. M. Petty

The equilibrium conditions of the electronic and mesotronic components in different media and at various altitudes. Gilberto Bernardini, Bernardo Nestore Cacciapuoti, Bruno Ferretti, Oreste Piccioni and Giancarlo Wick. *Ricerca sci.* 10, 1010–17(1939).—From expts. the conclusion is drawn that one cannot assume, as is generally done, that the soft component of the cosmic radiation at sea level is due to electrons produced by a spontaneous disintegration of mesotrons with a mean life time of the order of magnitude of 10^{-6} sec. Instead a great part of the soft electronic component at sea level is due to a residue of the primary electronic component of extraterrestrial origin. The same component that produces the mesotrons in the upper atm. also penetrates by a cascade to the lower regions. Robert Simha

The production of soft secondaries by mesotrons. J. R. Oppenheimer, H. Snyder and R. Serber. *Phys. Rev.* 57, 75–81(1940).—I. Cosmic ray evidence shows that the soft component (I), which persists even under great thicknesses of matter, consists primarily of electrons and γ-rays. The observations of the magnitude and variation with depth of I and showers, and of the size and material dependence of bursts lead the authors to believe that mesotrons can transfer a considerable fraction of their energy to I. This probability is roughly independent of the mesotron energy, while under 10^{10} v. the probability of large transfers is much greater (roughly 20 × the former). II. The production of secondaries of energy < 10^{10} v. can be accounted for by the Lorentz contracted Coulomb field of the mesotron, in sweeping over an atom, ejecting a high energy electron, which, however, does not explain the transfers > 10^{10} v. involved in bursts. The authors have developed a theory to show that the mesotron of spin one assocs. with transitions in which the direction of the mesotron spin changes in intrinsic dipole moment; and this dipole field favors high energy transfer (which accounts for bursts). Such a dipole field was found, however, to give probabilities of high energy bremsstrahlung, > 10^{10} v., much too large to be compatible with the observations. III. The authors found it possible to calc. the cross sections for the production of electron secondaries and bremsstrahlung by the intrinsic mesotron dipole field when they made the assumption that coupling of mesotron and the electromagnetic field is small. This assumption should be valid to mesotron energies of ~ 10^{13} v. and hence applicable to bursts. The bremsstrahlung formula, however, fails at 10^{10} v. and cannot be used for bursts, while for energies $10^9 < E < 10^{10}$ v., it does not contradict exptl. evidence. Further, the authors show that it is the largeness of the coupling, and not the occurrence of lengths < $\hbar/\mu c \sim 2 \times 10^{-13}$ cm. that limits the applicability of the quantum mechanics. Frank Gonet

Nature of the electronic components of cosmic radiation. Bernardo Nestore Cacciapuoti. *Ricerca sci.* 10, 1082–9 (1939).—Absorption of cosmic rays was measured at

elevations of 50, 1050, 2050 and 3500 m. above sea level. An anomaly in the curve at the highest elevation seems to be due to the electronic components. The latter at sea level are mostly composed of residues of the primary electronic components. This conclusion is not reconcilable with current theories of the mesotron. G. M. M.

Simultaneous groups of penetrating particles in cosmic radiation. Gleb Wataghin, D. de Souza Santos and P. A. Pompeia. *Ricerca sci.* **10**, 1150(1939); cf. *C. A.* **34**, 1551[6].—Four counters were arranged to measure coincidences in cosmic radiation. At an elevation of 800 m. above sea level in 3 expts., 29, 25 and 6.4 × 10^{-4} coincidences per min. were detected. G. M. Murphy

Large cosmic-ray showers and mesons. A. H. Wilson and F. Booth. *Nature* **145**, 103–4(1940).—The probability of the emission of a very energetic γ-ray when a fast meson collides with a nucleus is calcd. The cross section is proportional to the energy of the meson; for very high energies the energy loss is mainly due to the emission of γ-rays. The bearing of these calcns. on cascade showers in the atm. is discussed. G. M. Petty

Variations of the hard component of cosmic radiation. E. Regener and W. Rau. *Naturwissenschaften* **27**, 803–5 (1939).—Measurements of cosmic radiation 40 m. below water level in Lake Constance for 14 months with 2 ionization chambers, 7.2 and 29.6 atm. CO_2 pressure, resp., spaced 4 m. apart, allow several general observations on hard cosmic radiation. The intensity of the hard component has a double daily period with 2 maxima and 2 minima, equally high, the maxima being at 9–11 a. m. and 10–11 p. m. This daily variation is attributed to a daily variation in the conditions obtaining near the altitude at which the mesotrons causing the radiation are formed (about 16 km. high, 80 mm. Hg pressure). Daily up and down movements in the ionosphere as found from radio echo and aurora borealis are possibly involved in the phenomenon. B. J. C. van der Hoeven

An experimental test of Schremp's theory of cosmic-ray fine structure. H. S. Ribner. *Phys. Rev.* **56**, 1069–73 (1939).—An east-west directional intensity survey was carried out to test Schremp's theory of cosmic-ray fine structure (*Rev. Modern Phys.* **11**, 149–52(1939)) which was expected to yield information concerning the identity of the primary cosmic rays, their energy spectra at infinity, and their interaction with absorbing matter. An app. of high angular resolution was used. In the curve of directional intensity *vs.* zenith angle z, the present results indicate the existence of symmetrical prominences at $z = \pm 20°$ and further suggest that other symmetrically disposed prominences may exist in the neighborhood of $z = \pm 10°$ and $z = \pm 40°$. Bernard Lewis

The binding energy of H^3. Frederick W. Brown. *Phys. Rev.* **56**, 1107–10(1939).—The consts. in the meson type of potential were calcd. by fitting the scattering data for the scattering of slow electrons by protons and the binding energies of H^2 and H^3. Bernard Lewis

Search for a short-range group of protons in the deuteron-deuteron reaction. F. E. Myers, R. D. Huntoon, C. G. Shull and C. M. Crenshaw. *Phys. Rev.* **56**, 1104–6 (1939).—No evidence is found for short-range protons in the D-D reaction with bombarding energies up to 300 e. kv. at angles of 36°, 97° and 142° to the incident deuteron beam. Bernard Lewis

The scattering of protons by protons. III. N. P. Heydenberg, L. R. Hafstad and M. A. Tuve. *Phys. Rev.* **56**, 1078–91(1939); cf. *C. A.* **31**, 28[8]; **32**, 3256[9].—The anomalous scattering of protons by protons carried out earlier by the authors was repeated in the energy region 600 to 900 kv. with a new scattering app. designed for better angular measurements. Bernard Lewis

Deuteron-deuteron, proton-helium, deuteron-helium scattering. N. P. Heydenberg and R. B. Roberts. *Phys. Rev.* **56**, 1092–5(1939).—Measurements were made on deuteron-deuteron scattering at angles between 20° and 45° for incident deuteron energies of 832, 720 and 614 kv. In this range of angles and energies the ratio of the observed scattering to that predicted by classical theory is always greater than unity. At 832 kv. the ratio increases from 1.28 to 15° to 3.98 at 45°. This anomaly could be due to the presence of a short-range repulsive force between the particles in addn. to the Coulomb force. The scattering of protons in He was in agreement with the Rutherford-Darwin scattering formula for 994-kv. protons in the angular range from 20° to 45°. The scattering of deuterons in He showed an anomaly which increased from about unity at 20° to 4.4 at 75°. Bernard Lewis

Low-energy neutrons emitted by beryllium bombarded by α-particles. M. Benini. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 590 6(1939).—By means of the counter devised by G. Bernardini and D. Bocciarelli (*C. A.* **33**, 4201[5]) the energy of neutrons emitted by Be bombarded by α-particles is found to be 130,000 e. v. < E < 160,000 e. v. A. W. Contieri

The quantitative determination of the neutron moment in absolute nuclear magnetons. Luis W. Alvarez and F. Bloch. *Phys. Rev.* **57**, 111–22(1940).—The authors have extended the magnetic resonance method of detg. nuclear magnetic moments in mol. beams (cf. Rabi, *C. A.* **31**, 4887[1]) to det. the neutron moment, using magnetic scattering to produce and analyze the polarized beam of neutrons. A new method of evaluating magnetic moments in all expts. using the resonance method is described, where the magnetic moment of any nucleus can be detd. directly in abs. nuclear magnetons merely by a measurement of the ratio of 2 magnetic fields: (*a*) that at which resonance occurs in a Rabi-type expt. for a certain frequency and (*b*) that at which protons are accelerated in a cyclotron operated on the nth harmonic of that frequency. The magnetic moment then becomes $\mu = H_b/nH_a$, where n is an integer. The expt. result, based on 2 million counts, is given as $\mu = 1.93_5 \pm 0.02$ abs. nuclear magnetons. The theory of the expt. is developed in some detail, and a description of the app. is given. Frank Gonet

Total and specific ionization of polonium α-particles and their statistical fluctuations. II. J. M. W. Milatz and G. A. W. Rutgers. *Physica* **7**, 131–2(1940)(in English).—Note and correction of p. 536 and p. 547 of previous article (cf. *C. A.* **33**, 9116[2]). Additional measurements on the straggling in range of α-particles emitted by sources of different strength, with sources prepd. by placing Ag foils in a soln. of Po salt during different periods, show that (1) the strength of the source is proportional to the time of exposure of the foil in the soln. and (2) the straggling parameter α increases with increasing strength and finally seems to reach a const. value. Extrapolating the values measured to thickness zero, $\alpha_0 = 0.53$ mm. M. McMahon

Intermediate ions of the atmosphere. A. R. Hogg. *Proc. Phys. Soc.* (London) **51**, 1014–27(1939).—It is shown that (*a*) the smaller nucleated ions in city air exist in sep. groups with distinct mobilities; (*b*) the variation of the mobility of these ions with humidity is such as to lead to the conclusion that the ions are composed of droplets of H_2SO_4; (3) it appears that the ions result from the aggregation of particles contg. about 2200 mols. of H_2SO_4 or multiples thereof. The acid, before and after aggregation, is hydrated to an extent dependent on the temp. and the humidity of the atm. and on the radius of the droplet. M. Farnsworth

Some features of an electrostatic generator and ion source for high-voltage research. I. A. Getting, J. B. Fisk and H. G. Vogt. *Phys. Rev.* **56**, 1098–1104(1939).—A compact generator of the Van de Graaff type is described in which several new features have been incorporated. Bernard Lewis

γ-Rays from beryllium and nitrogen bombarded with deuterons. H. R. Crane, J. Halpern and N. L. Oleson. *Phys. Rev.* **57**, 13–15(1940).—Measurements were made on the Compton electrons ejected from a thin lamina of C by the γ-rays from Be + D and N + D. Lines at 3.45 and 1.0 m. e. v. were found with Be + D and lines at 8.2, 6.6 and 5.1 m. e. v. were found with N + D with a slight indication of 2 other lines at 4.1 and 2.5 m. e. v. Possible ways in which these can be correlated with the

energies of the heavy particles emitted are discussed. Bernard Lewis

Series in nuclear energy levels. K. M. Guggenheimer. *Nature*, **145**, 104–5(1940).—The known nuclear energy levels of B^{10}, Mg^{24} and X^{223} are interpreted as proper values of the rigid rotator, which can thus be applied to nuclei. The moments of inertia are in accordance with the assumption of equal nuclear d. G. M. Petty

Nuclear isomerism in zinc. J. W. Kennedy, G. T. Seaborg and E. Segrè. *Phys. Rev.* **56**, 1095–7(1939).—Zn^{69} has two isomeric states differing in energy by 0.47 m. e. v. The upper state decays into the lower with a half life of 13.8 hrs., emitting a γ-ray which has an internal conversion coeff. of less than 0.1. The lower isomeric state decays into Ga^{69} with a half-life of 57 min. The most probable value for the spin difference between the isomeric states is 5. Bernard Lewis

Nuclear isomerism in selenium and krypton. Alexander Langsdorf, Jr., and Emilio Segrè. *Phys. Rev.* **57**, 105–10 (1940).—The authors have studied the radioactive chain $Se^{83} \rightarrow Br^{83} \rightarrow Kr^{*83}$, and have identified the last as an excited state (Kr^{*83}) of the stable Kr^{83}, have shown the presence of an isomeric pair in $Se^{78 \text{ or } 81}$, and have chemically sepd. the 2 genetically related nuclear isomers and confirmed and identified Se^{83} (cf. Snell, *C. A.* **32**, 1569[6]). Further, they have shown that Kr^{83} and Br^{83} are produced by the fission of U and Th as well as by the bombardment of Se with deuterons and slow neutrons. F. Gonet

The production of radium E and polonium by deuteron bombardment of bismuth. D. G. Hurst, R. Latham and W. B. Lewis. *Proc. Roy. Soc.* (London) **A174**, 126–36(1940).—By use of the Cambridge cyclotron, the reactions occurring when Bi is bombarded by deuterons of energies up to 8.7 m. e. v. have been investigated. The α-particles observed are believed to be emitted by Po, and the reactions taking place are given as: (I) $_{83}Bi^{209}(d,p)_{84}Ra\ E^{210} \rightarrow {}_{84}Po^{210} + \beta$. (II) $_{83}Bi^{209}(d,n)_{84}Po^{210}$, and $_{84}Po^{210} \rightarrow {}_{82}Pb^{206} + \alpha$, as the specimens showed both an initial α-particle activity and a rise of activity with the 5 days' half-life expected from the decay of Ra E. By detg. the amts. of Po formed directly, and indirectly after the decay of Ra E, the authors were able to measure the relative yields of the (d,p) and (d,n) reactions at various energies of the deuteron. The excitation functions for the two reactions have been compared with the values to be expected on theoretical grounds. F. G.

Erratum: The radioactivity of Mn^{56}. R. H. Bacon, E. N. Grisewood and C. W. Van der Merwe. *Phys. Rev.* **57**, 240(1940); cf. *C. A.* **34**, 1555[6]. G. M. Petty

The β- and γ-rays of thorium active deposit. Roger Arnoult. *Ann. phys.* **12**, 241–388(1939).—The phys. properties of the β- and γ-rays of the active deposit of Th were measured. The results are summarized under: (1) the detn. of the abs. energy of a standard ray (ray F of the transformation Th $B \rightarrow C$); (2) a quant. study of the intensity of the conversion groups; (3) a study of the continuous β spectrum emitted in the transformation Th $B \xrightarrow{\beta} C$; (4) a detn. of nuclear energy levels. γ M. Farnsworth

The radioactivity of the thermal waters and gases of the fumarole of the Island of Ischia. Oscar Scarpa. *Ricerca sci.* **10**, 988–91(1939). Robert Simha

A radiometric experiment at Lake Ameno (Island of Ischia). Giuseppe Imbò. *Ricerca sci.* **10**, 936–40(1939). F. C. Nachod

Further measurements on the radioactivity of the waters of the Lake Ameno and of Cetaro. Giuseppe Imbò. *Ricerca sci.* **10**, 992–7(1939); cf. preceding abstr. Robert Simha

γ-Ray measurement of radium. T. H. Oddie. *Proc. Phys. Soc.* (London) **51**, 905–31(1939).—In preference to calcn. exptl. methods have been used for the detn. of the obliquity and absorption corrections that must be applied to the measured content of a rectilinear radioactive source to find the true content. The effect on the correction of variations of the following factors has been studied: (*a*) the distance between the source and the measuring instrument (from 10 to 60 cm.); (*b*) the active length of the container (0 to 10 cm.); (*c*) the equiv. Pb wall-thickness of the cylindrical ionization chamber of vol. 1 l. (6 to 12 mm.); (*d*) the wall-material (Pt, Au or Ag) thickness (0 to 2 mm.) and diam. of the Ra container; and (*e*) the thickness of the wooden source-holder. The effect of scattered and secondary radiation upon the measurements has been found to be small. Percentage corrections derived from the exptl. results are given in tabular form. M. Farnsworth

Quantitative and model data on the classification of isotopes. H. Jensen. *Naturwissenschaften* **27**, 841–50 (1939).—Quant. data on nuclear structure are correlated with the models previously classified. B. J. C. van der Hoeven

The concentration of carbon 13 by thermal diffusion. Alfred O. Nier. *Phys. Rev.* **57**, 30–4(1939).—A thermal-diffusion column employing CH_4 gas has been constructed for the purpose of concg. C^{13}. A detn. of the sepn. factor of the column for various pressures indicated a quant. agreement between expt. and theory. When a reservoir was attached to the top of the column it was possible to produce CH_4 contg. over 4 times the normal amt. of $C^{13}H_4$. Bernard Lewis

Concentration of isotopes by thermal diffusion: rate of approach to equilibrium. J. Bardeen. *Phys. Rev.* **57**, 35–41(1939).—The time-dependent partial differential equation involved in the theory of the operation of a Clusius thermal-diffusion column is discussed. Solns. presented give the concn. of a given isotope at any point in the column as a function of time. Bernard Lewis

The directional relations of the field emission as sign of Bragg interferences in the metallic lattice. Erwin W. Muller. *Naturwissenschaften* **27**, 820–1(1939).—The field emission from monocryst. metal points with spherical tip shows a distinctive spatial pattern. In the center around the (110) direction there is no emission (W monocrystal); likewise the emission around the 4 (211) directions and the (100) directions is of low intensity. Some of the areas of low intensity are sharply delimited, the (100) dark spots within an angle of 2°. If the internal energy for electrons is in a narrow band (about 0.5 e. v. wide) at 7.5 e. v., corresponding to a Broglie wave length of 4.5 A., it follows from the lattice constant (a = 3.18 A.) that the electron wave in 110 direction is extinguished by Bragg interference. For emission of incandescent metal the sum of internal energy and exit work totals about 12 e. v. with Broglie wave length 3.50 A. and consequently a different emission pattern. The emission possibilities along different directions checked by Bragg interference requirements agree well with the observed pattern. B. J. C. van der Hoeven

Experimental study of the scattering of x-rays by crystals. Jean Laval. *Bull. soc. franç. minéral.* **62**, No. 4, 5, 6, 137–253(1939); cf. *C. A.* **33**, 5286[9].—Crystallographic and math. D. W. Pearce

Absorption spectra and characteristic levels of uranium, platinum and tungsten. Yvette Cauchois and Ioana Menescu. *Compt. rend.* **210**, 172–4(1940); cf. *C. A.* **30**, 20[5].—The L_I, L_{II} and L_{III} absorption edges of U, Pt and W were redetd., the results agreeing with those of Sandström (*C. A.* **24**, 1155); thence are deduced the energy levels of the same elements. The results are discussed. C. A. Silberrad

Sources of stellar energy. I. N. Golovin. *Astron. J. Soviet Union* **16**, No. 3, 81–99(1939).—On the basis of the energy derived from atomic nuclear reactions, G. calcs. the possible ages and temps. of the sun and stars. F. H. Rathmann

The theory of the solar corona. A. B. Severnyĭ. *Astron. J. Soviet Union* **16**, No. 4, 1–16 (in English, 16–17) (1939). F. H. Rathmann

Spectrophotometry of the continuous spectrum of Nova Herculis 1934. B. Vorontsov-Vel'yaminov, E. Krinov and O. Cramer. *Astron. J. Soviet Union* **16**, No. 3, 9–17

(1939).—Photographic plates for the period Dec., 1934–April, 1935 are shown. F. H. Rathmann

Determination of the Rydberg constants, e/m and the fine structures of H_α and D_α by means of a reflection echelon. J. W. Drinkwater, Owen Richardson and W. Ewart Williams. *Proc. Roy. Soc.* (London) **A174**, 164–88(1940).—A 40-plate reflection echelon was used to resolve the fine structure of the H_α and D_α emitted by a discharge through a cooled tube contg. He and a trace of H or D. The measurements were made against the red ray of Cd as standard. The wave nos. of the intensity max. of H_α and D_α, measured *in vacuo*, were 15233.067 and 15237.211 cm.$^{-1}$, resp., leading to the values R_H = 109677.58 and R_D = 109707.42 for the Rydberg const. Further derived consts. are 5.48646 × 10^{-4} for the mass of the electron; 1.7591 × 10^7 e. m. u./g. for e/m; 1837.4 for M_H/m; and 109737.27 for R_∞. The observed fine structures of H_α and D_α are blended patterns of the theoretical components, and in the present observations the 4th component is measured in position and intensity for the first time, being 0.04 cm.$^{-1}$ from component 1. C. C. Kiess

Absorption of hydrogen Lyman radiation by atmospheric gases. S. E. Williams. *Nature* **145**, 68(1940).—The absorption by gases of the H resonance line 1215.7 A. was investigated. N is transparent. H_2O vapor absorbs strongly. O and air absorb more strongly than was previously believed. No absorption occurs until the partial pressure of O is about 0.04 mm., and the absorption coeff. varies in the lower part of the absorption range. G. M. Petty

Doppler effect in resonance lines. L. G. Henyey. *Proc. Natl. Acad. Sci. U. S.* **26**, 50–4(1940).—It has generally been supposed in astrophys. applications that the condition of monochromatic radiative equil. is present in the formation of resonance lines. That this is not the case, under conditions when Doppler broadening is present, follows from the fact that the projected velocity and hence the Doppler shift of an atom are not the same along the direction of the scattered ray as along the primary ray. A math. discussion is given of the contribution of scattered light to Doppler broadening. W. F. M.

Intensity measurements of helium absorption lines. H. C. Burger and H. P. van Cittert. *Physica* **7**, 13–16 (1940) (in English).—Transition probabilities in He, derived theoretically by Hylleraas (*C. A.* **31**, 8317[4]), are tested by measuring the intensity ratio of He lines in absorption. Light from a water-cooled He tube is passed through an electrically excited absorption tube contg. He at 1.5 mm. Hg pressure, then through a Lummer-Gehrcke interferometer and finally focused on the slit of a prism spectrograph. For two lines, $2'S - 3'P$ (5016 A.) and $2'S - 4'P$ (3964 A.), having a low metastable level in common, the ratio of the absorption coeffs. is 3.4 ± 0.2. The accordance of this exptl. value with the theoretical one (3.87) is regarded as satisfactory. W. F. M.

The problem of the natural width and the displacement of spectral rays. J. Serpe. *Physica* **7**, 133–44(1940)(in French). W. F. Meggers

The breadth of spectral lines at large densities of a homogeneous gas. V. Fursov and A. Vlasov. *J. Phys.* (U. S. S. R.) **1**, 335–40(1939).—The broadening of the resonance level, caused by dipolar interaction between similar atoms at large densities of the gas, is calcd. The influence of this broadening upon the breadth of spectral lines is discussed and satisfactory agreement between calcd. and observed breadths of Hg lines is reported for vapor pressures of 20 to 80 atms. W. F. Meggers

Infrared arc spectrum of germanium. C. C. Kiess. *J. Research Natl. Bur. Standards* **24**, 1–5(1940)(Research Paper No. 1266); cf. *C. A.* **33**, 5279[6].—The more intense lines of Ge I, which for theoretical reasons are known to exist in the infrared, have now been photographed in the region from 8000 to 12,000 A. and their wave lengths measured. Most of them have been classified as combinations between the previously known terms, $5s^3P^\circ$ and $5s^1P^\circ$ and new triplet and singlet terms of the $5p$ electron configuration. The yellow lines between 5260 and 5800 A., previously observed by Lunt (*C. A.* **19**, 3220) in spark and discharge tube sources, are found to belong to Ge I and probably owe their origin to the $5s - 6p$ transition. The wave lengths of some yellow and red Ge II lines are also given. C. C. Kiess

Magnesium-like spectra of chlorine, potassium, calcium and scandium. W. L. Parker and L. W. Phillips. *Phys. Rev.* **57**, 140–1(1940).—About 80 lines belonging to the triplet system of the Mg-like ions, Cl VI, K VIII, Ca IX and Sc X have been identified and term values for each ion have been reported with respect to the $3s3p^1P_0$ level. Frank Gonet

The spectra of yttrium V and zirconium VI. F. W. Paul and W. A. Rense. *Phys. Rev.* **56**, 1110–13(1939).—Spectrograms covering the region from 150 A. to 1000 A. were obtained with a 3-meter grazing incidence vacuum spectrograph having a dispersion of 1.0 A./mm. at 500 A. Bernard Lewis

Isotope shift in magnesium. John P. Vinti. *Phys. Rev.* **56**, 1120–32(1939).—A theoretical investigation to det. whether nuclear motion alone can account for the observed fine structure in Mg. It is concluded that the quantum-mech. theory of nuclear motion, without the assumption of non-Coulomb nuclear fields or of nuclear spins, gives a good qual. explanation of fine structure in Mg. Bernard Lewis

Zeeman effects in complex spectra at fields up to 100,000 gausses. George R. Harrison and Francis Bitter. *Phys. Rev.* **57**, 15–20(1940).—A newly constructed electromagnet of the Bitter type has been arranged to give fields up to 100,000 gausses, uniformly to 1% over a vol. of 25 cc. A special type of horizontal arc, with electrodes of salts compressed in Ag powder, is operated at 4 amps. and furnishes light transversely to the field to 3 grating spectrographs which can cover the range 2000 to 8000 A. U. in a single exposure. Plane-polarized components of the light are sepd. with a 2-inch quartz Rochon prism, and exposures of 5 to 30 min. give dense spectrograms at resolutions of 100,000 and greater. Plates in the ultraviolet region have been obtained for Ce, Cb, Er, Eu, Gd, Fe, Nd, Pr, Rh, Ru, Th, W, and Yb. On most of the plates lines of the second and third spectra are more in evidence than those of the first, and air lines are prominent. Typical portions of a Rh plate at 90,500 and 70,000 gausses are shown and data are given for a no. of Ce, Rh and Ru lines. Bernard Lewis

An interpretation of the spectral sequence for the late-type stars. Yosio Huzita. *Japan. J. Astron. Geophys.* **17**, 17–57(1939).—The spectra of stars belonging to the main sequence, i. e., to classes O, B, A, F, and G, are adequately explained on the basis of temp. alone. The spectra of late-type stars, from class G through the R—N, K—M, and K—S branches, exhibit prominently the bands of either TiO, ZrO, C_2 or CN. These spectra are here interpreted not only on the basis of temp., but also on the relative abundance of O, N, and C. C. C. Kiess

The fundamental rotation-vibration band of nitric oxide. R. H. Gillette and Eugene H. Eyster. *Phys. Rev.* **56**, 1113–19(1939).—The fundamental rotation-vibration band of NO was measured with the high dispersion of an echellette grating spectrometer, and was given a complete analysis. The resulting consts. are combined with those derived from the existing electronic data to yield the following mol. consts. for the normal state of the mol.: ω_e = 1904.03 ($^2\Pi_{1/2}$) cm.$^{-1}$; $\omega_e x_e$ = 13.97 cm.$^{-1}$; $\omega_e y_e$ = −1.20 × 10^{-3} cm.$^{-1}$; B_e = 1.7046 cm.$^{-1}$; I_e = 16.423 × 10^{-40} g. cm.^{2}; r_e = 1.1508 A. Bernard Lewis

Two new electron levels of the molecule of carbon monoxide. V. M. Chulanovskiĭ. *J. Phys.* (U. S. S. R.) **1**, 341–6(1939).—About 30 bands in the CO spectrum observed from 1300 to 1000 A. are analyzed and interpreted. A system of bands of the type $^1\Sigma \rightarrow {}^1\Sigma_i$ with electron level ν_{00} = 90,866 cm.$^{-1}$ is established and a 2nd system of the type $^1\Pi \rightarrow {}^1\Sigma$ with ν_{00} = 98,791 cm.$^{-1}$ is described. W. F. Meggers

The spectrum of rubidium hydride, RbH. I. Analysis. A. G. Gaydon and R. W. B. Pearse. *Proc. Roy. Soc.* (London) **A173**, 28–37(1939).—A discharge through the

mixed vapors of Rb and H at a few mm. pressure evoked emission of an open, many-lined spectrum which is attributed to the RbH mol. Nearly 2000 lines have been measured in the interval from 4600 to 6600 A., the max. intensity occurring in the yellow. A close study of the apparently confused mass of lines reveals that many of them belong to the P and R branches, all shaded toward the red, of a $^1\Sigma \rightarrow {}^1\Sigma$ transition, the branches being well represented by the usual type of formula for rotational structure. The wave nos. of the origins of the strong bands are accurately given by the vibrational formula: $\nu = 18906.4 + (244.6u' + 4.1u'^2 - 0.169u'^3 - 0.000838u'^4 + 0.000116u'^5) - (936.77u'' - 14.15u''^2 + 0.075u''^3)$. The excited state exhibits anomalies similar to those observed for the other alk. hydrides. **II. Potential curves, wave functions and intensity distribution.** *Ibid.* 37–47.—The potential curves for the initial and ground states have been constructed with the aid of the mol. consts. found above. For the vibrational levels of each state the appropriate wave functions have been calcd. These in turn have been used to calc. the theoretical band intensities which are in good agreement with the observed. The strongest bands fall on an open parabola of the Franck-Condon type. Two subordinate parabolas mark the loci of secondary and tertiary distributions of fairly strong bands. C. C. Kiess

The molecular spectrum of iodine excited by fluorescence (in the presence of nitrogen) and by active nitrogen. A. Elliott. *Proc. Roy. Soc.* (London) **A174**, 273–85 (1940).—The vapor of I was excited to fluorescence by exposing the quartz tube contg. it mixed with N to the light of a condensed spark between Al electrodes. The light was analyzed with quartz and glass prism spectrographs. Between 2520 and 2730 A. a compact system of bands, shaded toward the red, was observed. The band heads are given by $\nu = 39709 + 96.5\,(v' + 1/2) - 0.3\,(v' + 1/2)^2 - 158\,(v'' + 1/2) + 1.1\,(v'' + 1/2)^2$. The previously known continuum with max. at 3425 A. is now resolved into a system of bands extending from 3040 to 3450 A., likewise shaded toward the red, and given by $\nu = 33744 + 104\,(v' + 1/2) - 0.2\,(v' + 1/2)^2 - 214.26\,(v'' + 1/2) + 0.592\,(v'' + 1/2)^2$. This system is analogous to the 2580-A. continuum of Cl_2 and represents a $^1\Sigma_u^+ \rightarrow {}^1\Sigma_g^+$ transition. A similar but fainter system of bands between 4041 and 4321 A. makes up the previously known 4300-A. continuum. A fourth system extends from 4440 to 4630 A. and consists of bands shaded toward the violet. The emitter of these is probably not the I mol. C. C. Kiess

Ultraviolet absorption spectra of acridine, ethyl-, pentadecyl-, and phenylacridine. G. A. Dima and P. Pogăngeanu. *Bull. sect. sci. acad. roumaine* **21**, 38–40 (1938–39).—Absorption of acridine and its derivs., ethyl-, pentadecyl-, and phenylacridine in alc. soln. is studied in the range 2500–3880 A. by means of an underwater spark and a quartz spectrograph. The general aspect of the spectrum is the same in all cases, but in the derivs. the bands are displaced toward longer waves. This is illustrated by measured wave lengths of 8 bands. W. F. Meggers

The ultraviolet absorption spectra of vapors of monohalogenic derivatives of toluene. I. H. Tintea. *Bull. sect. sci. acad. roumaine* **21**, 219–22 (1938–39).—By use of a quartz spectrograph, a 1-m. absorption tube with quartz windows, and an underwater spark, the ultraviolet absorption of certain derivs. of toluene in the vapor state is investigated for the first time. In the spectrum of *p*-fluorotoluene 173 bands were measured, in *p*-chloro- 116, and in *p*-bromotoluene 91 bands. Formulas are adjusted to give a satisfactory representation of the majority of observed bands. W. F. Meggers

The water-vapor molecule. Byron T. Darling and David M. Dennison. *Phys. Rev.* **57**, 128–39 (1940).—Math. The problem of the vibration-rotation spectrum of water vapor is treated by means of the theory of semi-rigid polyatomic mols. developed by Wilson and Howard (cf. *C. A.* **30**, 3288[4]). The agreement between the calcd. and exptl. values of the interaction const. was found to be remarkably good (4%). The calcd. valence angle is 104°31′ and the O—H distance 0.9580 A. F. G.

Investigations of infrared spectra (2.5–7.5 μ). Absorption of water. J. J. Fox and A. E. Martin. *Proc. Roy. Soc.* (London) **A174**, 234–62 (1940).—A grating spectrometer was used to observe the infrared absorption spectrum of H_2O in the gaseous, liquid, and solid state and also in soln. in CCl_4. A study of the bands at 3, 4.7 and 6 μ at various temps. shows that the 3-μ band shifts toward shorter wave lengths and the other two toward longer wave lengths with increasing temp. This effect is attributed to a reduction of the OH valency frequencies by the H bonds between the mols. and to an increase of the angular deformation frequency owing to the constraints imposed by surrounding mols. The 2 bands at 2.7 μ, reported by others for solns. in CCl_4, have been re-observed and are found to exhibit no rotational structure, but are shifted 40 to 50 $cm.^{-1}$ toward lower frequencies from their position in the vapor state. They are weakest in the vapor state and increase in intensity with mol. assocn. and reach their max. for ice. C. C. Kiess

An investigation of the complex structure of the O-H harmonic bands of substituted alcohols, and of the effect of temperature on the relative intensities of the multiplet components. Lloyd R. Zumwalt and Richard M. Badger. *J. Am. Chem. Soc.* **62**, 305–11 (1940).—An investigation has been made of the complex structure of the third harmonic O-H bands of ethylene chlorohydrin and bromohydrin, methylcellosolve, trimethylene chlorohydrin and bromohydrin, propylene chlorohydrin and *sym*-glycerol dichlorohydrin. These substances were all studied in the vapor state. In all cases except trimethylene chlorohydrin and bromohydrin the substitution of a halogen or a methoxy group in the alc. has given rise to one or more new O-H bands. Photometric studies have been made of the effect of temp. on the relative intensities of the components of the O-H bands in *o*-chlorophenol, propyl alc. and ethylene chlorohydrin. It is found that in the vapor state at 180° the energy and free energy of the trans form of *o*-chlorophenol exceed those of the cis form by 3.9 ± 0.7 and 2.8 ± 0.5 kg.-cal., resp. A. B. Garrett

The infrared absorption spectrum of methylamine vapor. C. R. Bailey, S. C. Carson and E. F. Daly. *Proc. Roy. Soc.* (London) **A173**, 339–48 (1939).—The absorption spectrum of CH_3NH_2 vapor was observed in the infrared from 1 to 26.5 μ with a prism spectrometer. The wave lengths, frequencies and profiles of the observed bands are presented in the tables and graphs. A close representation of the spectrum is found in a mol. model in which there are 2 parallel and 2 perpendicular vibrations assocd. with the CH_3 group, 3 approx. perpendicular vibrations with the NH_2 group, and the remaining vibrational modes arising from the translations and rotations of the 2 groups relative to one another and of the mol. as a whole. The frequency corresponding to the torsional mode of the mol. lies too far in the infrared for observation, but 3 of its harmonics lie in the observed range and lead to a value of 11.52 cal./g. mol. for the sp. heat of CH_3NH_2, in good agreement with Felsing and Jessen's value (*C. A.* **28**, 30[4]). C. C. Kiess

Infrared absorption spectra of drying oils. D. L. Gamble and C. E. Barnett. *Ind. Eng. Chem.* **32**, 375–8 (1940).—Results are given indicative of the possibilities of the method of infrared absorption spectra as applied to a study of phys. and chem. changes which take place during the formation and decompn. of films of drying oils. Advantages of this method are that it entails no chem. action on the paint film and permits study of the effects of infrared-transparent pigments on the changes occurring in the vehicle during drying and aging. Absorption spectra from 2 to 12 μ are shown for linseed, China wood and oiticica oils, and for 4 glyceryl esters. Changes in the infrared absorption spectra caused by exposure of the esters to ultraviolet light and oxygen are discussed. They are believed to be due to polymerization of the ester to large mol. aggregates which effectively scatter the infrared radiation. W. F. Meggers

The partial and total emissive power of various sub-

stances. IV. A. Carelli. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 664–71(1939).—The emissivity of various substances in the infrared region (1 μ–7 μ) for temps. of 500°–1200°K. is detd. and the results are plotted. Among the substances measured were: $CaSO_4$, $SrSO_4$, CaO, MgO, BeO, ZnO, FeO, Cu_2O and CuO.
A. W. Contieri

What has the Raman effect accomplished in the ascertainment of constitution? K. W. F. Kohlrausch. *Österr. Chem.-Ztg.* **42**, 345–50(1939).—A review of the uses of Raman spectra in the detn. of chem. constitution, mol. configuration, rotational isomerism, characteristic frequency shifts and symmetry. J. H. Hibben

Recent developments and applications of the Raman effect. James H. Hibben. *Pubs. Am. Assoc. Advancement Sci.* No. 7, *Recent Advances in Surface Chemistry and Physics* 117–25(1938).—The applications of Raman spectrum methods to the detn. of the constitution of org. and inorg. compds. is discussed. Coupling between H_2O mols. which exist normally in a quasi-cryst. arrangement is shown to be affected by solutes and temp. Different forms of nitric, sulfuric and pyrosulfuric acids are present in solns. of different concns. J. H. Hibben

The α-β transformation of quartz. C. V. Raman and T. M. K. Nedungadi. *Nature* **145**, 147(1940).—The scattering of the Hg line 4358 A. by quartz was observed at −192°, 25°, 100°, 200°, 300°, 420° and 530°. The behavior of the 200 cm.$^{-1}$ line shows that the binding forces which det. the frequency of the corresponding mode of vibration of the crystal lattices diminish rapidly with rising temp. The increasing excitation of this particular mode of vibration with rising temp. and the deformations of the at. arrangement resulting therefrom are in a special measure responsible for changes in the thermal expansion, Young's moduli, and the piezoelec. activity between 200° and 575°, as well as for the α-β transformation at 575°.
G. M. Petty

Raman spectra of fused nitrates. P. A. Moses. *Proc. Indian Acad. Sci.* **10A**, 71–6(1939).—Raman shifts observed from fused KNO_3 and $NaNO_3$ occurred at $\Delta\nu$ 700, 1050, 1400 and 1670 cm.$^{-1}$, the first and third corresponding to the 2 degenerate vibrations and the second to the sym. one. The 4th frequency at $\Delta\nu$ 1670 is the first overtone of the forbidden Raman frequency at $\Delta\nu$ 835. Fused $Al_2(NO_3)_3.9H_2O$ gives rise to the same lines as the alkali nitrates with the exception of $\Delta\nu$ 1670, which was unobserved because of the interference from the water bands. The depolarization factors for the sym. vibrations are near 0.2 and for the degenerate vibrations near 0.9 and for the overtone near 0.5. Wings were reported for all 3 nitrates at $\Delta\nu$ 7, 14, 21, 28, 35, 42, 49 and 56; for KNO_3 and $NaNO_3$ there was also observed 63, 70, 77, and for $NaNO_3$ alone the additional frequencies at 84, 91, 98, 105, 112 and 119 cm.$^{-1}$ were found. The intensity of $\Delta\nu$ 14 is much greater than that of any other wing. Different portions of the wings in the nitrates were found to be depolarized to the extent of 86%, in agreement with the theory. J. H. Hibben

Raman effect in relation to crystal structure. I. Calcite and sodium nitrate. B. Sundara Rama Rao. *Proc. Indian Acad. Sci.* **10A**, 167–75(1939).—Molten and cryst. $NaNO_3$ yielded, resp., the following Raman frequencies and intensities in wave no. cm.$^{-1}$: 718 (2), 1052 (10), 1365 (2), 1658 (1/2); 94 (3), 185 (7), 718 (7), 1068 (10), 1381 (8) and 1672 (5). Cryst. calcite yielded $\Delta\nu$ 155 (5), 282 (10), 709 (3), 1084 (8), 1434 (1) and 1754 (1/2). There is a diminution of all internal frequencies of $NaNO_3$ except $\Delta\nu$ 718 in the molten state as compared with the cryst. one and a corresponding decrease in the relative intensities of $\Delta\nu$ 1382 and 1672. Two lattice vibrations were observed in cryst. $NaNO_3$ and $CaCO_3$. These correspond to the longitudinal motions of the RO_3 groups in a direction traverse to the trigonal axis and to a rotary type of motion of these same groups. The lowest Raman shifts are assigned to the longitudinal mode of oscillation and the next higher Raman frequency to the rotary mode. The intensity of the Raman line arising from this type will be governed by the optical anisotropy of the CO_3 or NO_3 groups. The higher frequencies in calcite indicate that the cryst. forces are stronger in it than in $NaNO_3$.
J. H. Hibben

Raman spectrum of neutral tungstates, crystalline or in aqueous solution. Marie Theodoresco. *Compt. rend.* **210**, 175–7(1940); cf. *C. A.* **31**, 35[5]; **33**, 4873[5].—In similar fashion the Raman spectra of $Na_2WO_4.2H_2O$ solid or in soln., and of $SrWO_4$ were detd. Whether anhyd., hydrated or in soln. the WO_4^{--} ion is probably a tetrahedron but more or less deformed. C. A. Silberrad

Polarization of Raman lines in relation to molecular structure: $SOCl_2$, CH_3Cl and BCl_3. K. Venkateswarlu. *Proc. Indian Acad. Sci.* **10A**, 156–66(1939).—The Raman shifts in wave no. cm.$^{-1}$, intensities and degrees of depolarization for $SOCl_2$ are, resp., 194 (10) (0.78), 283 (8) (0.90), 344 (10) (0.21), 439 (8) (1.0), 489 (8) (0.14), 1231 (10) (0.26). If the pyramidal model for the structure is assumed, the spectrum should contain 6 lines, 4 of which should be polarized and 2 completely depolarized. If the mol. has a plane structure, there should be 3 polarized and 3 depolarized lines, which is in accordance with the observation. The frequencies observed in wave no. cm.$^{-1}$ from CH_3Cl were 714 (4) (0.28), 1097 (1) (*P*), 1379 (2) (*P*), 1428 (0) (*D*), 2957 (5) (0.18) and 3028 (1) (0.80). If CH_3Cl resembles $CHCl_3$ there should be 3 polarized and 3 depolarized lines corresponding to a pyramidal structure coming under the point group C_{3v}. V. regards $\Delta\nu$ 2957 (5) as an overtone of 1428 (0) because it is polarized and rejects 1428 as an overtone of 714 because it is depolarized. The 6 fundamentals of the pyramidal CH_3Cl mol. are considered to be $\Delta\nu$ 714, 1097, 1379, 1428, 2815 (unobserved) and 3028. The abnormal intensity as an overtone of $\Delta\nu$ 2957 is explained on the basis of its proximity to another fundamental at 2880 cm.$^{-1}$. BCl_3 is considered as having a configuration corresponding to a plane equilateral triangle with sym. D_{3h} and should have 1 polarized and 2 depolarized Raman lines. Two lines were observed, $\Delta\nu$ 253 and 471 having polarization values of 0.80, 0.30, resp. An addnl. line at 950 cm.$^{-1}$ observed by others was not obtained. J. H. Hibben

Studies on the Raman effect. CII. Benzene derivatives. 14. E. Pendl and G. Radinger. *Monatsh.* **72**, 378–84; *Sitzber. Akad. Wiss. Wien, Math.-naturw. Klasse*, Abt. IIb, **148**, 76–82(1939); cf. *C. A.* **33**, 6719[1].—The intensities and the Raman spectra in cm.$^{-1}$ were reported for the following compds. *n*-, *sec*-, and *tert*-butylbenzene, *p*-fluorobenzoyl chloride, *m*-difluorobenzene, *m*-phenylenediamine, trifluorophenylmethane, 1-chloro-4-methoxy-5-fluorobenzene and 1-methyl-2-chloro-4-fluorobenzene. The spectra obtained from these substances and other di- and tri-substituted derivs. of benzene are compared. All the benzoyl chlorides have a doublet carbonyl frequency near $\Delta\nu$ 1730 and 1775 increasing in magnitude if the substituents in the *p*-positions to the carbonyl group are a halogen of increasing mol. wt. J. H. Hibben

Experimental contributions to the problem of chelation VIII. Raman spectrum of some carbonylic derivatives of naphthalene. R. Manzoni Ansidei. *Boll sci. facoltà chim. ind., Bologna* **1940**, No. 1 2, 23–8.—In continuation of previous investigations (cf. *C. A.* **33**, 9138[3]) Raman spectra of Me α-naphthyl ketone (I), Me β-naphthyl ketone (II), Ph α-naphthyl ketone (III), Me 2-hydroxy-1-naphthyl ketone (IV), Me 2-hydroxy-3-naphthoate (V), and α-naphthyl acetate (VI) were detd. and the chelation (H bond, i. e., ring formation between CO groups and H atoms of neighboring groups) was studied. As could be expected, lines characteristic for chelation between neighboring CO and OH groups were clearly established in the compds. IV and V. Observations in I III and VI indicate chelation in these compds. between the CO group and the H of the naphthalene nucleus in *o*-position to the CO group. Dora Stern

Constitution of peptides. II. Raman spectra and structure of amides. Charles Sannié and V. Poremski. *Bull. soc. chim.* **6**, 1629–49(1939); cf. *C. A.* **31**, 6111[9].—The Raman spectra of acetamide, Et and diethyl acetamide, and acetamide imino ether were obtained in a pure state and in solns. of diverse solvents under diverse condi-

tions. In the spectral region below 1500 cm.$^{-1}$ the spectra are not very sensitive to environmental conditions, but between 1500 and 1750 cm.$^{-1}$ there are several bands which vary in no., intensity and position with the nature of the amide, substituted or not, and the exptl. conditions. Several forms of amides are assumed: imino alc., resonance, excited, and true amide forms together with a complex in aq. solns. The spectra indicate a C=N linkage in all forms except that of the true amide which is present in small quantities only in dioxan solns. of acetamide and propionamide. J. H. Hibben

Band spectra of cathodoluminescence. S. T. Henderson. *Proc. Roy. Soc.* (London) **A173**, 323-38(1939).—ZnS phosphors contg. small amts. of Cu, Ag, Au, Pb or Mn as activators, were excited to fluorescence by exposure to cathode rays, and also to the ultraviolet rays from a Hg arc. The emission bands were recorded photographically and were found to exhibit intensity distributions similar to Gaussian error curves. When excited by ultraviolet light the fluorescent max. are shifted to higher frequencies as compared with cathode-ray excitation. Similar shifts are noted when the phosphor is cooled. C. C. K.

Luminescence and absorption of zinc and cadmium sulfides and their solid solutions. F. A. Kröger. *Physica* 7, 1-12(1940) (in English).—At −180° a new emission has been found from CdS-ZnS solid solns. This consists of at least 5 equidistant bands, the short limit of which coincides with the long limit of the fundamental absorption band. ZnO shows a similar emission in the ultraviolet. **Luminescence and absorption of solid solutions in the ternary system ZnS CdS MnS.** *Ibid.* 92-100(1940) (in English).—A phase diagram of the system is given. The colors of the powders range from yellow for pure CdS to orange for the max. amt. of MnS. The fundamental absorption region shows 2 bands, one in ZnS and CdS, the other in MnS. An emission band at room temp. varies in frequency with the compn. of the solid solns. ranging from blue to infrared. This is ascribed to the crystal lattice itself. Gregg M. Evans

Significance of nonhomogeneities of crystals for the photochemistry of the solid phase. S. M. Moskovich. *Uspekhi Khim.* 8, 719-30(1939).—M. discusses exptl. data on the alkali halide crystals. F. H. Rathmann

The photochemical oxidation of hydrogen. Hilton A. Smith and A. Napravnik. *J. Am. Chem. Soc.* 62, 385-93 (1940); cf. *C. A.* 29, 4675[8].—Data are presented on the quantum yields of the individual products at elevated temp. and at room temp. The wave length of light used was 1719-1725 A. and the total pressure of the reaction mixt. was varied from 1140 to 95 mm. In general, with increasing O content, the quantum yields of ozone increase while those of H_2O_2 and H_2O decrease. Lowering of the total pressure tends to increase the H_2O_2 and H_2O yields, apparently at the expense of the ozone. At pressure of 190 mm. and less, the formation of H_2O shows chain characteristics. The temp. coeff. for the formation of the individual products was also studied over the range 25 to 280°. The formation of ozone has a neg. temp. coeff. while those of H_2O_2 and H_2O are pos. At total pressure of 190 mm. and in a 10% 90% O-H mixt., the temp. coeff. of H_2O_2 and H_2O formation increases with great rapidity at temps. above 230°. The primary reaction is the rupture of an O mol. to form 2 O atoms (cf. *C. A.* 23, 4855). This is followed by interaction of the atoms formed with mols. of O and H. The O atom will react with O mols. to form ozone on triple collisions only (cf. *C. A.* 24, 4224). It is necessary to assume that the third body is an O mol. rather than a H mol. The result of the action of H atoms on a mixt. of H and O at room temp. and ordinary pressures is the formation of H_2O_2 (cf. *C. A.* 27, 926). The relation of the direct photochem. reaction to the Hg-sensitized and the explosive reactions is discussed.
A. B. Garrett

Photosynthesis of the esters of cholesterol. Augusto Banchetti. *Ricerca sci.* 10, 1045(1939).—A soln. contg. 38.6 g. cholesterol and 13.6 g. phenylacetic acid in 200 cc. benzene was exposed for 5 months to solar radiation. The different products were sepd. by fractional crystn. Phenylacetate of cholesterol not yet known could be isolated. It crystallizes from an alc.-ether mixt. in small rectangular prisms which are transparent and colorless, without water of crystn. The crystals m. 119-120° and have an optical rotatory power $[\alpha]_D^{15°} = -28.5°$ (2% in chloroform). About 10% of the cholesterol is esterified. One also obtains a very small amt. of an oily substance with fruit odor which could not be identified. Robert Simha

The emission spectrum of hydrocarbon flames. E. C. W. Smith. *Proc. Roy. Soc.* (London) **A174**, 110-25 (1940).—The emission of stationary and explosion flames of ethylene in air, enriched air and O, and of the explosion flames of propane in air, was examd. and the explosion limits of these mixts. were detd. The chem. analysis, carried out by dilg. the condensate caught in a trap, showed that the formation of both acid and aldehyde passed through a min. in the region of the "theoretical" $C_2H_4:3O_2$ mixt. The amt. of acid formed rose regularly as the mixt. was progressively weakened or enriched; the total aldehyde formation, on the other hand, increased very rapidly with the richer mixts., and with weaker mixts. the aldehyde also increased, but to a much smaller extent. S. suggests that the C deposit observed at pressures in excess of some crit. value with ethylene mixt. might be due to the polymerization of the C_2 mol., formed from $C_2O_2 \rightarrow C_2 + CO_2$. It is also suggested that the "ethylene flame bands" which also occur in the spectra of propane and other hydrocarbon flames are emitted by an isomeric formaldehyde mol., HC.OH. A detailed description of app. and procedure is given. Frank Gonet

Chemical activation by isomeric radioactive transition; the reaction of bromine 80 (18 minute half-life) with carbon tetrachloride. John E. Willard. *J. Am. Chem. Soc.* 62, 256-61(1940).—The radioactive transition from Br^{80} (4.4 hrs.) to Br^{80} (18 min.) activates Br in such a way as to enable it to react with CCl_4. Decay and growth curves of the activities involved give consistent proof of the existence of the reaction. The reaction is independent of temp. and has an efficiency about one-third as great in the solid phase as in the liquid phase. Only those Br^{80} (18 min.) atoms react which are produced as a result of the emission of a conversion electron. These data indicate that the recoil energies, previously thought to account for chem. activation by the isomeric radioactive trausition of Br, are found to be too small to do so (cf. *C. A.* 33, 2799[9]).
A. B. Garrett

Raman effect of hydrocarbons and analysis of liquid fuels (Vol'kenshtein) 22. Spectral analytical investigations and luminescence of fluorite and apatite (Haberlandt) 8. Adsorption of electrolytes on silicic acid, on sesquioxides, and on their mixts. [absorption spectra of adsorbed colored salts] (Kargin) 2. Photochemistry of azides of heavy metals (Moskovich) 5. Ra, U and Po in Canada (Kohl) 8. Action of Rn on polymethylenes—cyclobutane and cyclobutene (Heisig) 10.

Liechti, Adolf, and Minder, Walter: Röntgenphysik. Vienna: J. Springer. 308 pp. M. 30; bound M. 31.80.

Rice, Oscar K.: Electronic Structure and Chemical Binding. New York: McGraw-Hill Book Co. 511 pp. $5.00.

Fluorescent material suitable for electric discharge devices. Gorton R. Fonda (to General Elec. Co.). U. S. 2,184,274, Dec. 26. Ca tungstate or molybdate is used in a mixt. also contg. Sa about 0.5-3% and Pb about 1% as activators of fluorescence.

Opaque materials for x-ray and radium work or the like. Edward R. Dillehay and Geo. M. McFedries (to Richardson Co.). U. S. 2,183,790, Dec. 19. A layer of Pb is used with a decorative panel of condensation resinous compn., the Pb being coated with an adhesion-promoting metal such as Zn, Cu or brass and bonded to the panel by a bonding substance such as a latex or rubber cement.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electrochemistry and chemical industry. J. G. Hoogland. *Chem. Weekblad* **37**, 66–9(1940).—An address. E. H.

Electrometallurgy. Arthur A. Center. *Eng. Mining J.* **141**, 85–7(1940).—Al production expanded during 1939; the anodic oxidation of its alloys was studied. 2 Progress in 1939 of the electrometallurgy of Sb, Be, Cu, Fe, Pb, Mg, Mn, Ni, Sn and Zn is noted briefly. W. H. Boynton

The electric furnace in the steel foundry. Frederick A. Melmoth. *Trans. Electrochem. Soc.* **77**, 6 pp.(preprint) (1940).—Elec. melting of steel for castings is a rapidly expanding industry. Elec. furnace operation is now closely regulated and duplication of product is easily attained. 3 In spite of the very low S and P specifications for metal to be melted in the acid-lined furnace, lower costs and other outstanding advantages of the acid-lined furnace have led to a wide-spread use of this furnace. However, castings from basic-lined elec. furnaces are readily duplicated. They are very responsive to heat-treatment, developing the max. possible combination of strength and ductility. C. G. F.

The development of the electric-arc steel furnace during the last ten years. A. Driller. *A E G Mitt.* **1939**, 422–9. —A review. C. G. F. 4

Plural compositions from a new melting process. Vere Browne and Harry S. Blumberg. *Metal Progress* **37**, 163–8(1940).—Single ingots of two or more compns., called "Pluramelts," integrally bonded together, are produced by a new elec.-furnace melting technique. Thus Cr-Fe and Cr-Ni-Fe stainless alloys are bonded to soft or medium steel, and hard tool-steel types are bonded to soft 5 steel bases. Metallurgical details are not given. W. A. Mudge

Rate of oxidation in the high-frequency induction furnace. H. Weitzer. *Stahl u. Eisen* **59**, 1353–8(1939).—Data on oxidation losses for C, Mn, Cr, Ni, Co, W, Mo, Ta, Cb, Zr, and Ti are given for induction furnace and elec. arc furnace melts. The rates of oxidation loss are greater for the elec. arc furnace. S. Epstein 6

A furnace for micro-Carius determinations. Julius A. Kuck and Maurice Griffel. *Ind. Eng. Chem., Anal. Ed.* **12**, 125–6(1940).—Details of construction are given for an elec. furnace which heats up to 250° in 15 min. and cools down from 300° to room temp. in the same time. T. H. Dunkelberger

Making magnetite electrodes. G. A. Volin and D. D. Kaganov. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 37–40 (1939).—Fe_2O_3 ore is fused with Fe powder to produce 7 Fe_3O_4. The melt is poured into molds and kept above 850° for 2–3 hrs. and then cooled slowly. This treatment prevents cracking of the electrodes. If the ore contains more than 95% Fe_2O_3, C can be used instead of Fe. Presence of Al_2O_3 or SiO_2 weakens the electrodes. H. M. L.

When and why is electric heat-treatment preferred. K. Mitlehner. *A E G Mitt.* **1939**, 389–92.—Gas- or coal-heated furnaces have atms. that may have a deleterious 8 effect on the metal being heat-treated. For high-quality metal products, elec. heating is recommended. C. G. F.

Calculating the heat-energy requirements of electric-resistor furnaces. K. A. Lohausen and G. Schumann. *A E G Mitt.* **1939**, 392–6.—Mathematical relations and many curves are given. C. G. F.

Conveyer equipment for low-temperature electric furnaces. K. A. Lohausen. *A E G Mitt.* **1939**, 396–402. C. G. F. 9

Metallic conveyer belts for low-temperature electric furnaces. W. Kugler. *A E G Mitt.* **1939**, 402–6. C. G. F.

Protective atmospheres for low-temperature electric furnaces. G. Simon. *A E G Mitt.* **1939**, 407–13.—Elec. bright annealing practice has rapidly increased. The gases used comprise H, dissocd. NH_3, partially oxidized NH_3, partially burnt propane, partially burnt illuminating gas and water gas. Heat-treatment in a gas atm. not only prevents oxidation but can be employed for cementation or nitriding. Detailed data are appended. C. G. F.

Small low-temperature electric furnaces for hard soldering. K. A. Lohausen. *A E G Mitt.* **1939**, 414–15.—The protective atm. is dissocd. NH_3. C. G. F. 2

Temperature regulators for electric ovens. K. A. Lohausen and G. Schumann. *A E G Mitt.* **1939**, 415–19. —A review. C. G. F.

Low-frequency induction furnaces. M. Krueger. *A E G Mitt.* **1939**, 419–22.—A review. C. G. F.

High-temperature resistance-type electric laboratory furnaces. Wallace M. Hazel and Wm. J. O'Leary. *Ind. Eng. Chem., Anal. Ed.* **12**, 109–12(1940).—For high temp. fusions, ignitions and combustions internally wound Al_2O_3-core furnaces with exposed coiled-wire winding running parallel to the axis of the furnace attain temps. up to 1500° depending on the resistance wire (NiCr, Pt, Mo, etc.) used. Details of construction, valuable hints on operation and operating data are given. D. Margolis

New electroplating products and processes developed in 1939. Walter R. Meyer. *Metal Ind.* (N. Y.) **38**, 3–11(1940). C. B. Jenni 4

A review of technical developments in electroplating during the year 1939. Joseph B. Kushner. *Metal Ind* (N. Y.) **38**, 20–1(1940).—Complete résumé of developments during 1939. 179 references. C. B. Jenni

Developments in electrotinning of strip steel. D. C. Bakewell. *Iron Steel Engr.* **16**, No. 12, 37–43(1939).—Present acid-bath practice has the following advantages over the alk. bath: (1) no heating is required for the bath; (2) a lower voltage may be used; (3) speed of deposition of Sn on the strip is more than double for the same cathode c. d. The desirable characteristics of the electrolyte are: (1) no sludge is formed owing to the oxidation of stannous salts to stannic form; (2) efficient operation at c. d. up to 300 amp./sq. ft.; (3) no polarization or passivity of the anodes during operation; (4) practically 100% anodic and cathodic efficiency even at high c. d. Operating procedure is described. C. B. Jenni 5 6

Electrodeposition of nickel from nickel chloride solutions. I. W. A. Wesley and J. W. Carey. *Products Finishing* **4**, No. 5, 9–12, 14, 16, 18, 20(1940); cf. *C. A.* **33**, 2813[6].—An address dealing with the historical development of the use of $NiCl_2$ as the principal ingredient of Ni-plating solns., soln. compn. of the chloride and sulfate baths, the plating range of the chloride bath and the characteristics of the deposits. Leopold Scheflan 7

Recent history of certain cobalt-nickel alloy plating solutions. Louis Weisberg. *Trans. Electrochem. Soc.* **77**, 6 pp. (preprint)(1940).—Developments in the com. electrodeposition of Co-Ni alloys during the past 2 years are described. Improvements in methods of removing impurities have made it possible to reduce the Co content of the deposit, for some purposes, as low as 1%. Substitution of Ni formate and formic acid for Na formate and 8 use of less NH_4 sulfate resulted in deposits that are more ductile and easier to buff than those formerly obtained. W. recommends: $NiSO_4$ 240 g./l., $NiCl_2$ 37, Ni formate 45, H_3BO_3 30, $CoSO_4$ 9, $(NH_4)_2SO_4$ 1.7, formaldehyde 1, pH 2–4 and temp. 65°. C. G. F.

A suggested basis for specifications of plated coatings of nickel and chromium. Arthur W. Hothersall. *Metal Ind.* (N. Y.) **38**, 27–30(1940).—See *C. A.* **34**, 1255[2]. C. B. Jenni 9

Chrome plating instead of nickel plating. N. P. Lapin. *Korroziya* **4**, No. 4, 306–8(1938); *Khim. Referat. Zhur.* **2**, No. 4, 142–3(1939).—A no. of expts. were performed with Cr plating using an electrolyte contg. HBF_4. The soln. contd. Cr_2O_3 400 g., $Cr(SO_4)_3$ 3 g., Zn dust 18 g., 50% soln. of HBF_4 2 cc., water 1 l. The soln. was very stable at low c. d. (1–3 amp./sq. dm.), a temp. of about 25° and with Pb anodes. This cold Cr bath, with an addn. of

a protective liquid, makes possible Cr plating under conditions close to those of Ni plating. W. R. Henn

Chromium plating of motor cylinders. Hendrik van der Horst. *Metal Ind.* (N. Y.) **38**, 76–8(1940).—A description of plating of large pistons and cylinders of Diesel engines and of application of a porous deposit of Cr which holds lubricating oil and which can be readily honed. C. B. Jenni

Overvoltage during the electrodeposition of mercury on tantalum. I. M. Malkin. *Ber. Inst. physik. Chem., Akad. Wiss. Ukr. S. S. R.* **11**, 109–19(1938); *Khim. Referat. Zhur.* **2**, No. 5, 14–15(1939); cf. *C. A.* **34**, 3284.—Overvoltage during the deposition of Hg on Ta electrode from satd. AcOH solns. of Hg_2O was investigated in water, in water with an addn. of 3% butyric acid, in satd. soln. of isoamyl alc. and in a 50% mixt. of water and CH_3OH. All solns. contained 1 *N* AcOH. Pt amalgam served as a control electrode. The cathodic c. d. varied between 10^{-6} and 10^{-4} amp./sq. cm. Ta was treated with HNO_3 before the measurements. The equil. potential varied between 0.1 and 0.3 v. An approx. linear relationship was found between the overvoltage η and the log of the c. d., *D*, with the angular coeff. varying from 0.09 (in the presence of butyric acid) to 0.37 (in the mixt. of water and CH_3OH). By linear extrapolation of the η-*D* curve the zero values of overvoltage were detd. They varied between 0.3 and 0.6 v. The preliminary treatment of the electrode surface greatly affected the overvoltage values. Anodic polarization increased the overvoltage considerably; cathodic polarization decreased it so that the deposition of Hg began at very low voltages. Evidently, the presence of the oxide film on the surface of the electrode hindered the deposition of Hg. No direct relationship was found between the overvoltage and the magnitude of the surface tension at the boundary, Hg-soln. W. R. H.

Construction of a dropping mercury electrode. B. A. Heller. *Ber. Inst. physik. Chem., Akad. Wiss. Ukr. S. S. R.* **11**, 131–4(1938); *Khim. Referat. Zhur.* **2**, No. 5, 13(1939).—Two types of Hg electrodes are described in which Hg does not come in contact with the rubber. This prevents its contamination as well as the contamination of the capillary. The change of pressure of the flowing Hg is obtained either by the immersion into Hg of the glass tube (increasing its level) or by means of a rising pressure ball. The Hg of the pressure ball is sepd. from the dropping Hg by an air interface. The dropping electrode can be used for a considerable time in both types without replacing the capillary. W. R. Henn

Plating on baby shoes. Andrew V. Re. *Metal Ind.* (N. Y.) **38**, 82–3(1940).—The method for plating on leather and other nonconducting surfaces is described. Information is given regarding cleaning and prepn. of the surface to make it conductive, and formulas of plating solns. are given. C. B. Jenni

The value of the microscope to the electroplater. B. Egeberg and N. E. Promisel. *Metal Ind.* (N. Y.) **37**, 255–8, 325–7, 355–7(1939).—The microscope is used to study thickness of plate, nature of basis metal, no. and nature of plates, alloying action of metals, color characteristics, and effectiveness of cleaning and dipping operations. Technique for mounting and polishing for microscopic study is fully discussed. Complete information is given for compn. of etching reagents for various metals and alloys. C. B. Jenni

The electrolytic etching of brass. G. C. Williams and G. Rieger. *Trans. Electrochem. Soc.* **77**, 4 pp.(preprint) (1940).—An easy and effective method of electrolytically etching brass specimens for metallographic examn. The procedure may be extended to numerous Cu alloys. The etching soln. is an ammoniacal NH_4 acetate, Na sulfite soln. The specimen is made anode at a c. d. of 31 amp./sq. dm. C. G. F.

Electrolytic stripping of copper from zinc-base die castings. W. B. Stoddard, Jr. *Trans. Electrochem. Soc.* **77**, 3 pp.(preprint)(1940).—Cu can be stripped from Zn-base die castings in a Cr plating soln. with 50–60 cycle a. c., CrO_3 200–500 g./l., ratio CrO_3:SO_4 100:1, temp. 20°–25°, c. d. 7–14 amp./sq. dm. After stripping, the Zn surface is activated by dipping the articles into cold, dil. HCl (10 cc./l. of HCl, sp. gr. 1.19). C. G. F.

Bleaching-liquor by electrolytic process. N. A. Ranade. *Indian Textile J.* **50**, 119(1940).—The standard electrolyzer of 17–23 plates is designed for 100–110 v. A 5–15% NaCl soln. is electrolyzed with graphite or Pt electrodes at temp. limits of 22–32°. With proper precautions 11 g. of available Cl per l. is obtained. The NaClO soln. is tested for strength by titration with 0.1 *N* $Na_2S_2O_3$ soln. W. H. Boynton

Anodic polishing of metals. Carl Schaefer. *Metal Ind.* (N. Y.) **38**, 22–6(1940).—Anodic polishing is essentially an electrolytic pickling process and is best suited for pure metals or alloys of homogeneous structures. The high c. ds. used necessitate special care in racking. Methods for anodic polishing of Cu, brass, bronze, Al, iron and steel, Sn, Pb, Ni, Zn and Co are given with proper etching solns. and procedures. A mechanism for the anodic etching process is suggested. Thirteen references. C. B. Jenni

Anodic coating of aluminum. Junius D. Edwards. *Metal Ind.* (N. Y.) **38**, 513–19, 522(1939).—See *C. A.* **33**, 7207[1]. C. B. Jenni

Anodic treatment of aluminum. Survey of modern practice. Henry A. Smith. *Metal Ind.* (London) **56**, 113–15(1940).—See *C. A.* **34**, 1256[2]. A. D.

Anodic finishes for sheet aluminum products. E. G. West. *Sheet Metal Ind.* **13**, 1259–61(1939).—A review. Iver Igelsrud

Electrolytic oxidation of white ferrous ferrocyanide in the production of Prussian blue. E. F. Belen'kiĭ and M. K. Vorontsov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 313–17 (1939).—A modification of the method of Stender and Semenov (*C. A.* **28**, 3667[3]) is discussed. Chas. Blanc

The protection of silver by the electrolytic deposition of beryllia. L. E. Price and G. J. Thomas. *Metal Ind.* (N. Y.) **37**, 507–10(1939).—See *C. A.* **33**, 9151[8]. C. B. Jenni

Overvoltage of hydrogen in water-alcohol and ether-alcohol mixtures. I. S. Novosel'skiĭ. *Ber. Inst. physik. Chem., Akad. Wiss. Ukr. S. S. R.* **11**, 125–9(1938); *Khim. Referat. Zhur.* **2**, No. 5, 14(1939); cf. *C. A.* **33**, 4136[1].—The overvoltage of H_2 on Hg in acid solns., in mixts. of water and EtOH (0–100% EtOH) and of EtOH and Et_2O [0.56% of Et_2O] were investigated. For all mixts. the dependence of the overvoltage on the c. d. (10^{-2}–10^{-2} amp./sq. cm.) obeys Tafel's equation. The value of the angle coeff. was 0.11–0.12. An addn. of water or of ether to alc. caused a lowering of the overvoltage. Its max. value occurred upon the addn. of small amts. (1–3%) of the 2nd component. The magnitude of this effect was about 70 mv. W. R. Henn

Nitration of benzene by oxides of nitrogen in the glow discharge. D. Avanesov and I. Vyatskin. *Trudy LKKhTI* **1939**, No. 7, 60–4; *Khim. Referat. Zhur.* **2**, No. 5, 43(1939).—Nitration of vapors of C_6H_6 was performed by gaseous N_2O_4 in a glow discharge in a Siemens type of tube. Rate of flow of the gases and intensity of discharge could be regulated at will. The products of the reaction comprised: nitrobenzene, *m*-dinitro- and trinitrophenols. W. R. Henn

The electrochemical oxidation of 1-hexanol. Wm. R. Lowstuter and Alexander Lowy. *Trans. Electrochem. Soc.* **77**, 8 pp.(preprint)(1940).—1-Hexanol was oxidized electrochemically, giving caproic acid and hexyl caproate. Besides these main products, small amts. of CO_2, CO and a high-boiling residue were obtained. Hexaldehyde and decane were not found to be present in the products of the electrolysis. A study was made of the various factors influencing the oxidation, such as anode material, temp., c. d., solvent and alc. concn. of the anolyte for the electrolytic oxidation of 1-hexanol. The best results were obtained with: (*a*) 5% H_2SO_4 as electrolyte; (*b*) c. d., 1.1 amp./sq. dm.; (*c*) temp. 12°; (*d*) electrolytically prepd. PbO_2 anode; (*e*) anolyte concn., 82 g. 1-hexanol in 800 cc. of electrolyte; current efficiency, 59.9% calcd. only as oxidation to caproic acid. C. G. F.

Selenium rectifier for electrolysis. S. Sinkai and T.

Nakagawa. *J. Soc. Chem. Ind. Japan* **42**, Suppl. binding 396–7(1939).—A hook-up is described for rectification of an a. c. for use in the electroanalysis of Cu. Results using the rectified current and d. c. from a battery are identical. George Ayers

Arcs—their operation and light output. W. E. Forsythe. *Illum. Eng.* **35**, 127–41(1940).—An exhaustive review with 15 illustrations. Main stress is laid on the C and the Hg arcs for illuminating purposes. C. G. F.

The photoelectric cell. C. L. Wrenshall. *Pulp Paper Mag. Can.* **40**, 685–7(1939).—An explanation of the principle of its operation, with examples of its use in industry. A. Papineau-Couture

Apply thin, uniform ground coats by electric deposition. A. E. Badger and Burnham W. King, Jr. *Ceram. Ind.* **34**, 41(Feb., 1940).—A preliminary expt. shows the possibility of applying enamel compn. to Fe by means of electrophoresis. A series of samples so prepd. is shown. Herbert S. Willson

Progress in engineering knowledge during 1939. P. L. Alger. *Gen. Elec. Rev.* **43**, 60–88(1940).—An annual review, with chapters on electron emission, gaseous dielectrics, lamps, luminescence, metallurgy, proteins, radiation, welding, etc. C. G. F.

Electrodialysis of skim milk (Katō) **12**. Fluorescent material for elec. discharge devices (U. S. pat. 2,184,274) **3**. Coating steel wire to prevent corrosion [electrodeposited Cu coating] (U. S. pat. 2,184,179) **9**. Electrically heated double tunnel furnaces (Brit. pat. 508,738) **19**.

Krämer, Oskar: Schleifen und Polieren in galvanotechnischen Betrieben. Leipzig: Steiger. 109 pp. M. 2.50.

Lange, Bruno: Die Photoelemente und ihre Anwendung. Tl. 2. Technische Anwendung. 2nd ed. Leipzig: J. A. Barth. 110 pp. M. 6.75. Cf. *C. A.* **32**, 2847[6].

Plating and Finishing Guidebook (formerly Platers' Guidebook). 8th ed. Edited by **Walter R. Meyer**. New York: Metal Industry Publishing Co. 92 pp.

Storage battery. Leland R. Adams. U. S. 2,184,373, Dec. 26. Various details of a battery having porous insulation such as a rubber compn. molded around and extending between the plates.

Apparatus for supplying electrolyte to electrolytic cells such as alkali chloride cells. Kenneth E. Stuart (to Hooker Electrochemical Co.). U. S. 2,183,299, Dec. 12. Various structural and operative details.

Electrolytic condenser. Preston Robinson and Joseph L. Collins (to Sprague Specialties Co.). U. S. 2,183,776, Dec. 19. Various details of a condenser comprising an electrolyte such as one contg. Na or NH_4 borate in which is immersed an Al electrode carrying a layer of substantially unhydrated Al oxide and an adjacent layer of hydrated Al oxide.

Electrodeposition of nickel. Eugene D. Viers and Bernard C. Case (to Eaton Mfg. Co.). U. S. 2,183,384, Dec. 12. A sol. anode for the electrodeposition of Ni from an acid bath comprises a relatively large percentage of Ni together with another metal such as Co 0.69–3.0, Cd 0.37–1.6, Pb 0.1–0.7, Zn 0.22–1.21 or Sn 0.15–0.9%, and its use produces a pit-free gray plate with a thickness over 0.0006 in. and having a grain size above that of bright Ni, but below that at which pitting, due to grain size, occurs.

Coating light metals. Magnesium Elektron Ltd. Brit. 508,723, July 5, 1939. Compact, adherent fluoride coatings of uniform thickness are produced on Mg, Al and Mg or Al alloys by anodic treatment, without the application of heat, a satd. or almost satd. aq. soln. of a single neutral fluoride or fluosilicate the soly. of which in H_2O is at least about 30% at 20° being used as electrolyte; or a satd. aq. soln. of a mixt. of neutral fluorides and (or) fluosilicate, the soly. of which mixt. is at least about 30% at 20° may be used. Specified compds. are KF, NH_4F, mixts. or double salts of ZnF_2 with alkali metal (including NH_4) fluorides, $MgSiF_6$ and (or) $ZnSiF_6$. Voltages that maintain a c. d. of 2 amp. per sq. dcm. are preferred.

Melting magnesium and magnesium base alloys. Magnesium Elektron Ltd. Brit. 508,670, July 4, 1939. In melting Mg, etc., in an induction furnace originally provided with a siliceous lining consisting of pure oxides such as Al_2O_3 or MgO mixed with SiO_2, reaction of Mg with the SiO_2 is avoided by subjecting the portions of the lining that are liable to come into contact with the molten metal to a treatment with molten Al or Al-base alloy to remove SiO_2 therefrom and thereafter melting the Mg, etc., in the thus conditioned furnace. The melting of the Al or Al base alloy may be effected by induction heating.

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Nakagawa. *J. Soc. Chem. Ind. Japan* **42**, Suppl. binding 396–7(1939).—A hook-up is described for rectification of an a. c. for use in the electroanalysis of Cu. Results using the rectified current and d. c. from a battery are identical. George Ayers

Arcs—their operation and light output. W. E. Forsythe. *Illum. Eng.* **35**, 127–41(1940).—An exhaustive review with 15 illustrations. Main stress is laid on the C and the Hg arcs for illuminating purposes. C. G. F.

The photoelectric cell. C. L. Wrenshall. *Pulp Paper Mag. Can.* **40**, 685–7(1939).—An explanation of the principle of its operation, with examples of its use in industry. A. Papineau-Couture

Apply thin, uniform ground coats by electric deposition. A. E. Badger and Burnham W. King, Jr. *Ceram. Ind.* **34**, 41(Feb., 1940).—A preliminary expt. shows the possibility of applying enamel compn. to Fe by means of electrophoresis. A series of samples so prepd. is shown. Herbert S. Willson

Progress in engineering knowledge during 1939. P. L. Alger. *Gen. Elec. Rev.* **43**, 60–88(1940).—An annual review, with chapters on electron emission, gaseous dielectrics, lamps, luminescence, metallurgy, proteins, radiation, welding, etc. C. G. F.

Electrodialysis of skim milk (Katō) **12**. Fluorescent material for elec. discharge devices (U. S. pat. 2,184,274) **3**. Coating steel wire to prevent corrosion [electrodeposited Cu coating] (U. S. pat. 2,184,179) **9**. Electrically heated double tunnel furnaces (Brit. pat. 508,738) **19**.

Krämer, Oskar: Schleifen und Polieren in galvanotechnischen Betrieben. Leipzig: Steiger. 109 pp. M. 2.50.

Lange, Bruno: Die Photoelemente und ihre Anwendung. Tl. 2. Technische Anwendung. 2nd ed. Leipzig: J. A. Barth. 110 pp. M. 6.75. Cf. *C. A.* **32**, 2847[6].

Plating and Finishing Guidebook (formerly Platers' Guidebook). 8th ed. Edited by **Walter R. Meyer**. New York: Metal Industry Publishing Co. 92 pp.

Storage battery. Leland R. Adams. U. S. 2,184,373, Dec. 26. Various details of a battery having porous insulation such as a rubber compn. molded around and extending between the plates.

Apparatus for supplying electrolyte to electrolytic cells such as alkali chloride cells. Kenneth E. Stuart (to Hooker Electrochemical Co.). U. S. 2,183,299, Dec. 12. Various structural and operative details.

Electrolytic condenser. Preston Robinson and Joseph L. Collins (to Sprague Specialties Co.). U. S. 2,183,776, Dec. 19. Various details of a condenser comprising an electrolyte such as one contg. Na or NH_4 borate in which is immersed an Al electrode carrying a layer of substantially unhydrated Al oxide and an adjacent layer of hydrated Al oxide.

Electrodeposition of nickel. Eugene D. Viers and Bernard C. Case (to Eaton Mfg. Co.). U. S. 2,183,384, Dec. 12. A sol. anode for the electrodeposition of Ni from an acid bath comprises a relatively large percentage of Ni together with another metal such as Co 0.69–3.0, Cd 0.37–1.6, Pb 0.1–0.7, Zn 0.22–1.21 or Sn 0.15–0.9%, and its use produces a pit-free gray plate with a thickness over 0.0006 in. and having a grain size above that of bright Ni, but below that at which pitting, due to grain size, occurs.

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Fog-producing fluorescence of pyro developers. W. A. Benton. *Brit. J. Phot.* **86**, 223–4(1939). H. H. Goodchild, H. W. Greenwood and O. F. Bloch. *Ibid.* 239–40; J. H. Coote. *Ibid.* 256.—Observations are described of a chemiluminescence on the aerial oxidation of developers contg. pyrogallol. The luminescence was sufficient to fog panchromatic plates. A. Marriage

Fatal poisoning from photographic developer containing hydroquinone. Santo Busatto. *Deut. Z. ges. gerichtl. Med.* **31**, 285–97(1939).—Fatal poisoning in man is unknown. Experimentally, hydroquinone is rapidly decompd. by the organism but pathol. changes may be produced in the parenchymatous tissue of the liver and kidney. Frances Krasnow

Permanence of Agfacolor. W. H. D. Yule. *Brit. J. Phot.* **86**, 663–4(1939).—To test the permanence of (triple-layer) Agfacolor transparencies under exposure to atm. conditions strips of film were loosely mounted in a partially bound-up glass sandwich which was left outdoors from Nov. to Feb. in a position in which it was protected only from direct rain. Marked fading was shown to occur except where the film was masked by black tape, but the color rendering was not seriously falsified. Fading of the masked portion was only detectable by direct comparison with a control. The blue component showed most fading, but the behavior of the red component was not tested by the sample selected. T. L. J. Bentley

Tone rendering by transparent screen negatives and positives. F. J. Tritton and E. T. Wilson. *Phot. J.* **79**, 396–406, 412(1939).—The theoretically ideal curves of screen positive and negative for halftone reproduction of a continuous-tone original are derived and their relation to present-day practice is discussed. An attempt is described to prep. a screen negative and positive that when used in combination will show accurate tone rendering of the original. R. F. W. Selman

Toning and intensification with dithioöxamide. G. Nilsson. *Brit. J. Phot.* **86**, 329–30(1939); cf. *C. A.* **33**, 6755[3].—Methods of toning or intensifying are described in which a Ag image is converted to one of the Cu, Ni or Co salts of dithioöxamide (rubeanic acid). The Ag image is 1st treated with a bath contg. a ferricyanide, a salt of 1 of the above metals and a citrate. The ferrocyanide of the metal thus obtained is treated with an alk. soln. of dithiooxamide. The Cu salt then gives a strong dark-green image (useful for toning or intensification), the Ni salt, a bluish-violet tone, and the Co, a brownish-yellow tone. Details of solns. required are given. A. Marriage

Photochemistry of azides of heavy metals. S. M. Moskovich. *Ber. Inst. physik. Chem., Akad. Wiss. Ukr. S. S. R.* **9**, 77–86(in Russian, 86–7; in German, 87–8)(1938).—See *C. A.* **33**, 4892[3]. B. Z. Kamich

Amidol for miniature films. David Charles. *Amateur Photographer* **88**, 445(1939).—To test the suitability of amidol, with miniature films, as a developer conveniently made up from dry constituents when traveling, contrasty subjects were given minimum exposures and developed in the following soln.: Na_2SO_3 60, amidol 15, KBr 3 grains and H_2O 20 oz. Prints of satisfactory contrast were obtained and a 25 times enlargement from a high-speed film showed little graininess. M. D. G.

The recovery of silver from acid fixing baths. G. R. Namias. *Il progresso foto.* **46**, 272–4(1939); *Brit. J. Phot.* **86**, 667.—In a review of chem. and elec. methods of recovering Ag from acid fixing baths, the use of Cu, Fe carbonyl powder and other precipitants is considered. The influence of electrode material and c. d. upon the electrolytically obtained deposit is discussed. M. D. G.

Increase of sensitivity of photographic plates by treatment with mercury vapor. D. V. Pyaskovskiĭ. *Astron. J. Soviet Union* **16**, No. 3, 75–80(1939).—Plates prepd. from emulsions treated with Hg vapor attain their max. sensitivity (about 2.8 times that of an untreated plate) within 1 day; after that the sensitivity decreases, and after 1 month is the same as that of untreated plates. The fog increases very slightly, while spectral sensitivity and contrast remain unchanged. Data are given for various Soviet and German ortho-, iso- and pan-chromatic plates. F. H. Rathmann

Industrial x-ray negatives, prints and transparencies. G. W. C. Taylor. *Brit. J. Phot.* **86**, 388–9(1939).—Advice is given in making industrial x-ray radiographs. W. F. Berg

Home processing of cine[matograph] film. Percy W. Harris. *Phot. J.* **79**, 139–43(1939).—Practical hints for processing motion picture films in the home by the neg.-pos. process and by reversal. E. D. Eyles

Photographer's dermatitis and its treatment. U. F. Alstead. *Photography* **7**, No. 83, 23(1939).—Discussion. T. L. J. Bentley

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Allergy and photographer (Greenwood) **11H.** Polyvinyl acetal resin sheets [photographic film base] (U. S. pat. 2,184,155) **13.** Polyvinyl acetal resin sheets [for photographic films] (U. S. pat. 2,184,423) **13.** Transparent, rubbery sheets of polyvinyl acetal resin [for photographic films] (U. S. pat. 2,184,442) **13.**

Fink, Leopold: Photographische Messtechnik. Munich: R. Oldenbourg. 200 pp. M. 9.60.

Innescoe, George: The Secrets of Filters for Photography. New York: Galleon Publishers, Inc. 48 pp.

Neiberger, John V.: The How and Why of Enlarging and Darkroom Technique. New York: Galleon Publishers. 93 pp.

Sayre, Irene H.: Photography and Platemaking for Photo-Lithography. Chicago: Lithographic Textbook Publishing Co. 280 pp.

Timmon, Walter R.: The How and Why of Fine Grain Development. New York: Galleon Publishers. 96 pp.

West, Levon: Color in Photography. New York: Ziff-Davis Publishing Co. 94 pp.

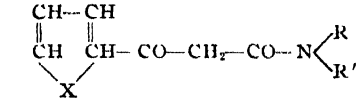
Foto in Farben. Edited by **Hans A. Kluge.** Zwickau: Forster & Borries. 111 pp.

Color photography. Béla Gáspár. U. S. 2,183,393, Dec. 12. Various details are given of the manuf. and use of a light-sensitive material for producing multicolor images comprising a transparent support and three light-sensitive Ag halide layers, the two outer layers being of the same predominant sensitivity, the middle layer being predominantly sensitive for another part of the spectrum, each of the outer layers allowing transmission of the light rays for which the layer is sensitized, and at least one of the outer layers being insensitive to and allowing transmission of light rays for which the middle layer is sensitized, the middle layer being colored by a dye which is not removable by ordinary photographic treating baths but which is selectively removable under the influence of the Ag image and which transmits light rays for which the layer itself is sensitized but absorbs the light rays for which both the outer films are sensitized. U. S. 2,183,394 relates to a method of producing a subtractive multicolor picture from a multilayer light-sensitive Ag halide material, having on a common support a colorless surface layer of Ag halide emulsion and a differently sensitized Ag halide layer which is uniformly pre-dyed by a reducible dye resistant to the ordinary photographic treating solns. but capable of being locally destroyed under the control of a metallic Ag image, which comprises exposing each of the layers to light to form latent images in the Ag halide layers, developing the latent images to form Ag images, coloring the colorless surface layer uniformly with a reducible dye which transmits blue light and thereafter destroying the dye in the surface layer and the pre-dyed layer at the points of metallic Ag. U. S. 2,183,395 relates to use of a light-sensitive multilayer material comprising several Ag halide emulsion layers on a common support, one Ag halide layer contg. both a dye that is resistant to ordinary developers but capable of being locally bleached by reduction in the presence of a metallic Ag image, and a catalyst for dye reduction, at least one other layer comprising a dye of different shade and of a higher inherent bleaching speed, the amt. of catalyst being such as to render the

bleaching speed of the first dye substantially equal to that of the other dye.

Color photography. Merrill W. Seymour (to Eastman Kodak Co.). U. S. 2,184,022, Dec. 19. A process of producing a colored photographic image in a gelatin layer involves forming a Ag image in a gelatin layer contg. a vat dye and bleaching the dye in an alk. $SnCl_2$ soln. in the region of the Ag image, and removing the Ag from the layer. Triethanolamine may be used with the $SnCl_2$.

Color photography. Andrew B. Jennings and Edmund B. Middleton (to Du Pont Film Mfg. Corp.). U. S. 2,184,303, Dec. 26. A color-forming photographic emulsion is used contg. a compd. such as furoylacetyl-*p*-chloro-*o*-phenetidine, which dyes yellow, or various compds. of the general formula



where X represents O or S, R is an aryl or azole group, and R′ is H or a hydrocarbon radical.

Buffered photographic emulsions. Samuel E. Sheppard and Raymond H. Lambert (to Eastman Kodak Co.). U. S. 2,184,023, Dec. 19. A method of making a buffered gelatino-silver halide emulsion having a substantially const. pH within an appreciable portion of the region pH 5.5 to pH 9.5 comprises adjusting the pH of the emulsion to the region pH 5.5 to pH 9.5, and adding to it an org. polybasic or heterocyclic acid, inert with respect to Ag halides, sol. in gelatin contg. at least 12% of water, and having pK values affording a buffering action in the region pH 5.5 to pH 9.5, the org. acid being present in sufficient amt. to buffer the emulsion in the region pH 5.5 to pH 9.5.

Direct positive photographic emulsion. John A. Leermakers (to Eastman Kodak Co.). U. S. 2,184,013, Dec. 19. A method of making a direct positive emulsion comprises incorporating in a gelatino-silver halide emulsion a nonacid optically sensitizing dye for the visible region in an amt. approx. 1½ to 4 times that necessary to give the optimum sensitizing for a normal negative emulsion, and coating the emulsion on a support without fogging it prior to exposure. A thiocarbocyanine dye may be used.

Sheets or films for carrying gelatin emulsions. Henry E. Van Derhoef (to Eastman Kodak Co.). U. S. 2,183,520, Dec. 19. App. is described, and a process of making sheets or films having a surface to which a gelatin emulsion may be made to adhere without the use of substrata which involves depositing an extremely thin discontinuous layer of finely divided water-sol. or water-swellable material such as gelatin on the surface of one of 2 parallel bands disposed in close proximity to one another and moving in the same direction (which may be formed of flexible steel), depositing over the first layer a layer of thermoplastic cellulose deriv. material such as a cellulose acetate compn. in finely divided form and colloidizing the material into a sheet by applying a progressively increasing pressure for a certain length of travel of the bands and at a temp. sufficient for colloidizing the cellulose deriv.

Photographic antihalation layers. Samuel E. Sheppard and Robert C. Houck (to Eastman Kodak Co.). U. S. 2,184,024, Dec. 19. Antihalation layers are formed of unsensitized gelatin contg. an alloxan, an alloxantin or triketohydrindenehydrate. Cf. *C. A.* **33**, 2054[8].

Light-sensitive and printing layers. Charles Dangelmajer (to E. I. du Pont de Nemours & Co.). U. S. 2,184,288, Dec. 26. A printing device is obtained by use of a light-sensitive layer comprising polyvinyl alc., an agent such as a dichromate adapted to promote photochem. hardening of the polyvinyl alc., and 0.1–20% of a monobasic carboxylic acid contg. at least 5 C atoms, such as linoleic acid or a salt of such an acid. U. S. 2,184,289 relates to the like use of polyvinyl alc. with 0.3–20% of an org. sulfonyl compd. such as 1,5-naphthalenedisulfonic acid.

Light-sensitive material suitable for obtaining contrasts. Cornelis J. Dippel, Roelof J. H. Alink and Klaas J. Keuning (to N.-V. Philips' Gloeilampenfabrieken). U. S. 2,183,447, Dec. 12. A light-sensitive material adapted to be physically developed after exposure comprises a support of a transparent lyophile colloid such as regenerated cellulose, a light-sensitive system within a portion of the support and comprising a diazonium compd. and a metal salt such as $HgNO_3$ which is reducible to a metal in an aq. soln., and means such as basic Bi nitrate within this portion for producing local variations in the concn. of the diazonium compd. and for reducing the gradation value of the light-sensitive system.

Photographic images on light-weight metals such as aluminum or its alloys. Alexander Jenny, Nikolai Budiloff, Hans Becker and Kurt Anton. U. S. 2,184,599, Dec. 26. A thin sheet of metal is provided with a chem. coating consisting substantially of a compd. of the metal, such as the oxide, and the coating is impregnated with a photochem. active material such as one contg. active Ag salts and the latter is converted into a photographic image of variable d.; the photographic image is then reproduced by interposing the sheet between a source of x-rays and a receiving surface sensitive to such rays (the photographic image being composed of a material substantially less permeable to x-rays than the light-weight metal).

Automatic developing and finishing apparatus for photographic sheet materials. Samuel Hershberg. U. S. 2,183,742, Dec. 19. Various structural and operative details.

Supplying formaldehyde to photographic developing baths. Lowell E. Muehler (to Eastman Kodak Co.). U. S. 2,184,053, Dec. 19. A solid compn. comprising paraformaldehyde, an alk. salt such as Na_2CO_3 and a neutralizing or buffering agent is for use with developing baths contg. a developing agent and Na_2SO_3. Numerous examples are given.

Light filters. Earl M. Lowry (to Kodak Ltd.). Brit. 508,447, June 30, 1939. A filter that absorbs red and infrared light and is useful in handling photographic material sensitive to such light, e. g., in spooling and packaging the film, comprises a colloidal medium, e. g., gelatin, having dispersed therein an acetate of a metal, e. g., Cu or Ni, and an alkanolamine, e. g., an ethanolamine such as triethanolamine. Cf. *C. A.* **34**, 38[8].

Photographic and printing media. Frederick M. Meigs and Charles Dangelmajer (to E. I. du Pont de Nemours & Co.). U. S. 2,184,310, Dec. 26. A light-sensitive layer is used comprising polyvinyl alc., together with sufficient of a polybasic carboxylic acid such as maleic acid to give the layer a high ink-receptivity, and a light-sensitizing agent. U. S. 2,184,311 (Frederick M. Meigs, sole inventor; to same assignee) relates to compns. of generally like character except that dispersed rubber is used for giving high ink-receptivity.

Coloring photographic images Prussian blue. Lyne S. Trimble (to Cinecolor, Inc.). U. S. 2,183,661, Dec. 19. A process of producing a Prussian blue image from a Ag image involves treating it with a soln. contg. ferric and halide ions, such as an acid soln. of $FeCl_3$ in alc., and treating the resultant image with a soln. of sol. ferrocyanide converting the image thus formed to ferrous ferrocyanide, oxidizing this to ferric ferrocyanide, and removing the Ag salt present, as by use of a strong $Na_2S_2O_3$ soln.

Color-printing plates. Walter S. Marx, Jr. (to Printing Arts Research Laboratories, Inc.). U. S. 2,183,143, Dec. 12. A method of prepg. printing plates for multicolor printing of matter contg. black lines involves photographically printing a black and white positive of the matter on a sheet of transparent material while photographically printing the black lines on the positive more lightly than the black lines in the original matter, and representing the color scheme with the exception of black color, upon the sheet.

Color photographs. Anne H. J. de Lassus Saint Genies. U. S. 2,183,305, Dec. 12. A method of obtaining a photograph in color consists in first obtaining by the lenticular process of photography a primary image in black and white composed of a plurality of monochrome components, and then subjecting without fixing of the sensitive salts

each monochrome component of the primary image successively to treatment including an exposure made selective by the lenticular support and a development assocd. with a diffusive coloring operation producing a color complementary to that which is finally to be obtained in the particular monochrome component treated, the coloration extending over the microscopic elements adjacent the elements of each monochrome component treated and giving a dye substantially proportional to the quantity of silver reduced in each partial development, and finally removing the reduced silver from the photograph.

Color pictures. Eastman A. Weaver (to Comstock & Wescott, Inc.). U. S. 2,183,598, Dec. 19. A method of making an accurate reproduction of an object field with the aid of color aspect records, by using several coloring-matters, at least one coloring-matter being deficient because having an improper absorptivity for light of a color which should properly only be absorbed by a second coloring-matter corresponding to another color aspect, comprises the steps of producing positive and negative prints of different color aspects including those corresponding to the coloring-matters, the contrast values of the positive and negative prints, respectively, being made proportionate to the proper and improper absorptivities of the coloring-matter, and producing a composite record from one of the positive prints of one color aspect and one of the negative prints of another color aspect, thereby subtracting at each point of the reproduction as much of the second coloring-matter as corresponds to the improper absorption at that point by the first coloring-matter.

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

A new purification process for mercury. Alfred Dobrowsky. *Chem.-Ztg.* **64**, 32(1940).—Hg, enclosed in a thick-walled bottle, is covered with a cold-satd. soln. of $KMnO_4$ and shaken vigorously. After a short time the color changes to green or brown and the Hg is emulsified in the form of a heavy sludge. The purification may be considered complete if after 30 sec. of shaking the permanganate color remains. Otherwise, H_2O is added, the contents are again shaken, and decanted, and the treatment is repeated. After repeated filling and decanting, some dil. HNO_3 is added; this dissolves the MnO_2 and breaks the emulsion. Various known purification processes are compared. A. H. Krappe

The chemistry of europium. W. A. Taebel and B. S. Hopkins. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 132–3(1939).—A review. J. H. Reedy

The separation of cerium from monazite earths. I. A. Atanasiu and M. Babor. *Bull. sect. sci. acad. roumaine* **20**, No. 1–3, 27–31(1938)(in German).—The method of Neckers and Kremers (*C. A.* **22**, 1919) is modified in that the electrolytic oxidation is effected in a soln. obtained by cold-water extn. of the mass obtained by treating monazite with concd. H_2SO_4 and evapg. to fumes. For concns. of $Ce_2(SO_4)_3$ up to 5.8% the soln. must contain 12% free H_2SO_4; for concns. of 5.8–11.5%, 20%; and for concns. of 11.5–29.3%, 25%. The most concd. soln. obtainable had, aside from the H_2SO_4, the compn.: $Ce_2(SO_4)_3$ 29.3, $Th(SO_4)_2$ 20.5, $(La, Di, Yb)_2(SO_4)_3$ 27.7%. Solubilities of Ce^{IV} and Th^{IV} phosphates in 10% H_2SO_4 are 0.15 and 24%, resp. The anode, of large area, was gauze of Pt or of peroxided Pb; the very small cathode, of Pt. The best oxidation conditions and corresponding results were: soln. 29.3% $Ce_2(SO_4)_3$, 25% H_2SO_4, 8 hrs. at 3 v., 1.2 amp., anode c. d. 1 amp. per sq. dm.; 98.9% of the Ce was pptd. as phosphate by diln. to 10% H_2SO_4 content; Th and other rare earths remained in soln. The gelatinous ppt. carried out large amts. of other materials but these were largely removed by thorough decantation and washing with hot water or hot 2% sulfuric acid. D. W. P.

Ceric phosphate. I. A. Atanasiu and M. Babor. *Bull. sect. sci. acad. roumaine* **20**, No. 1–3, 32–4(1938)(in German).—Ceric phosphate pptd. from soln. (preceding abstract) and heated to various temps. was analyzed for Ce, PO_4^{---} and H_2O; at 110° it was $Ce_3(PO_4)_4.11H_2O$ (gelatinous, white to pale greenish), at 200° the pentahydrate (bright-yellow powder) and at 500° the anhyd. compd. (white powder). The percentage solubilities at 100° of the materials freshly pptd., dried at 110° and ignited, resp., were H_2O 0, 0, 0; 5% H_2SO_4 0.083, 0.08, 0; 10% H_2SO_4, 0.14, 0.15, 0; 5% HCl, 0.02, 0.2, 0; 10% HCl, 0.05, 0.3, 0; 5% HNO_3, 0.12, 0.1, 0; 10% HNO_3, 0.18, 0.15, 0; 60% HNO_3, sol., sol., 0.1; 10% AcOH, 0, 0, 0. D. W. Pearce

The chemistry of germanium. Arakel Tchakirian. *Ann. chim.* **12**, 415–99(1939).—Compds. of Ge are compared with compds. of the elements of the same group, principally, C, Si, Pb and Sn. A new method of isolation of Ge is based on the lack of reactivity of GeO_2 with H_2S in presence of $(NH_4)_2C_2O_4$. Reduction of GeO_2 with H_3PO_2 in presence of 3 *N* HCl gives bivalent Ge, which can be sepd. as the dihydrate with NH_3. Reduction of GeO_2 with H_3PO_2 in 2–3% HCl ppts. a black powder, some of which deposits on the side of the flask. This powder may be pure Ge or one of its suboxides, which appear to have similar properties. GeI_4 was prepd. by the direct action of HI on GeO_2. With $H_2C_2O_4$, GeO_2 gives $H_2[Ge(C_2O_4)_3]$ (I), which forms 1.2quinine (II) and 1.2strychnine (III). Solubilities in H_2O at room temp. are II 0.5%, III 0.7%. II and III have coördination nos. of 6 in contrast to Zr oxalate salts of quinine and strychnine, which have coordination nos. of 8. Two mols. NaOH neutralize 5 mols. of GeO_2 but in presence of mannitol, glycerol or sugar 1 mol. of NaOH is equiv. to 1 mol. of GeO_2. Germanic acid forms complex salts with strong electrolytes. Temp. affects the formation of these complexes and since they are not formed instantaneously the mol. may undergo hydration and give a salt different from the original

$$2\left[\begin{matrix} & O_3 \\ Ge & \\ & A_n \end{matrix}\right]\begin{matrix} H_2 \\ \\ C_n \end{matrix} + H_2O \rightarrow \left[\begin{matrix} & O_7 \\ Ge & \\ & A_n \end{matrix}\right]\begin{matrix} H_8 \\ \\ C_n \end{matrix}$$

(where A is an anion, C is a cation and *n* a whole number). Complex salts were formed with LiCl, $LiNO_3$, NaCl, KCl, $MgCl_2$, $Mg(NO_3)_2$, $CaCl_2$, $Ca(NO_3)_2$, $SrCl_2$, $BaCl_2$ and $MgSO_4$ at room temp. and 65°, and the pH of the solns. was measured. Germanoformic acid is similar to formic acid. $CsGeCl_3$ is formed by the addn. of HCl soln. of $GeCl_2$ to CsCl. $C_2H_5I + CsGeCl_3 \rightarrow C_2H_5GeCl_3$, b_{18} 60° (yield 60%); $C_6H_5I + CsGeCl_3 \rightarrow C_6H_5GeCl_3$, b_{19} 115° (yield 80%); $CH_2I_2 + 2CsGeCl_3 \rightarrow CH_2(GeCl_3)_2$, b_{18} 110° (yield 80%); $C_2H_5GeCl_3 + 2H_2O \rightarrow C_2H_5GeOOH + 3HCl$; $CH_2(GeCl_3)_2 + 4H_2O \rightarrow CH_2(GeOOH)_2 + 6HCl$. 183 references. R. F. D.

Reclaiming iodine residues. IV. F. Th. van Voorst. *Chem. Weekblad* **36**, 754(1939); cf. *C. A.* **25**, 2816, 5636.—Waste titration solns. are made acid, and CuI is pptd. by addn. of $CuSO_4$ and $NaHSO_3$. The ppt. is decanted, filtered, and dried in a Büchner funnel. To 50 g. CuI are added 35 g. $K_2Cr_2O_7$, 500 cc. H_2O and 100 cc. 96% H_2SO_4; this mixt. is placed in a distg. flask provided with an air-cooled condenser. Distn. liberates the I, which collects on the walls of the condenser. This procedure produces I free from Cl_2 and Br_2. N. Bekkedahl

The reduction of titanium oxide with solid carbon and with carbon containing iron. W. Baukloh and R. Durrer. *Stahl u. Eisen* **60**, 12–13(1940).—Curves of loss of O *vs.* time in hrs. are shown for the reduction of TiO_2 with graphite at various temps. with no Fe present and in the presence of Fe. With Fe present the rate of reduction at 1200° is increased about 10-fold. S. Epstein

The chemistry and morphology of the basic salts of bivalent metals. IX. Basic nickel nitrates. W. Feitknecht and A. Collet. *Helv. Chim. Acta* **23**, 180–97

(1940).—Expts. dealing with the reaction of $Ni(NO_3)_2$ with NaOH are described. As in the case of $NiCl_2$ (cf. *C. A.* **34**, 1267[9]), a basic salt is obtained that gradually changes into the hydroxide. Expts. on the aging reaction at various concns. and at temps. ranging from room temp. to 100° lead to 5 basic salts of different structures. The following "ideal formulas" are proposed: (I) $Ni(NO_3)_2.Ni(OH)_2.6H_2O$, (II) $Ni(NO_3)_2.3Ni(OH)_2$, (III) $Ni(NO_3)_2.3.8$–$7.4Ni(OH)_2.1.3$–$9.0H_2O$, (IV) $Ni(NO_3)_2.4Ni(OH)_2.7H_2O$, (V) $Ni(NO_3)_2.7.8Ni(OH)_2.xH_2O$. I has a lattice of complex ions and its constitution is given by $[Ni(H_2O)_6][Ni(NO_3)_2(OH)_2]$. The respective crystallographic structures are discussed. Robert Simha

Derivatives of calcium cyanamide. VI. The formation of guanidine from dicyanodiamide. 2. Reactions between dicyanodiamide and ammonium salts. Kiitiro Sugino. *J. Chem. Soc. Japan* **60**, 267–75(1939); cf. *ibid.* **60**, 111–21(1939).—The reaction between dicyanodiamide and NH_4 salts was studied both in molten state and in aq. soln. with the purpose of finding the best conditions for the prepn. of guanidine. Heat production is greatest on reaction with NH_4NO_3; NH_4Cl, NH_4Br and NH_4I produce approx. equal quantities of heat; with $(NH_4)_2SO_4$ and NH_4ClO_4 melting occurs, resp., at 175° and 167° with simultaneous heat production due to guanidine formation; $(NH_4)_2HPO_4$ decomposes to $NH_4H_2PO_4$ and NH_3 at high temp. and heat production is not observable. Yields of guanidine are with NH_4NO_3 73%, NH_4Cl 88%, NH_4Br 87%, NH_4I 83%, $(NH_4)_2SO_4$ 62%, NH_4ClO_4 67%, and $(NH_4)_2HPO_4$ 46%. The optimum conditions for the prepn. of guanidine are: Heat a mixt. of dicyanodiamide and NH_4NO_3 at 180–200° for less than 5 min. A special cooling system should be used. Mixts. with NH_4Cl, NH_4Br and NH_4I require heating for 30 min. at 180–200° with special cooling system. Heating 0.037 mol. of dicyanodiamide with 0.0407 mol. of NH_4NO_3 or NH_4Cl and either 3 or 10 cc. water in a sealed tube at 150–80° for 1–2 hrs. gives guanidine. Similarly $(NH_4)_2SO_4$ and dicyanodiamide with 3 cc. water at 160–80° gave a yield of 77%. With a greater amt. of H_2O the yield decreased, owing to hydrolysis of the product and other side-reactions. A low yield from $(NH_4)_2HPO_4$ in the presence of water is attributed to the alky. of the soln. resulting from the hydrolysis of the phosphate. K. Shinohara

Aluminum fluoride and double salts derived therefrom. V. Caglioti. *Chimica e industria* (Italy) **20**, 274(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 628.—The structure and chem. behavior of AlF_3 were investigated, including the formation of artificial cryolite, and especially of pseudocryolite, $NaAlF_4.nH_2O$, the structure of which is identical with that of cryolite, save for a slight widening perpendicular to the *c*-axis. C. A. Silberrad

The absorption of carbon monoxide by copper ammonium solution. K. Ya. Markevich. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 10, 31–5(1939).—CO is absorbed by cuprous ammonium formate solns. and forms a complex which breaks down to give CO_2 and Cu_2O or Cu. When absorption begins, some time elapses before the complex begins to break down. The induction period varies with temp. Absorption of CO is independent of CO pressure, and depends on concn. of the ammoniacal cuprous ion. Each mol. of Cu_2O absorbs 0.85 mols. of CO. Below 20°, CO is oxidized chiefly by Cu_2O and above 20°, by CuO. Formation of Cu decreases the absorbing power of the soln. This can be prevented by addn. of 20% by vol. of O_2 to the CO to maintain the CuO concn. When O_2 is not added, oxidation is directly proportional to temp. and Cu_2O concn. In the presence of O_2, oxidation is inversely proportional to temp. and O_2 concn. H. M. L.

Reaction of ethers with chromous halides [complex produced] (Hein, Kraft) **10**.

Latimer, Wendell M., and Hildebrand, Joel H.: Reference Book of Inorganic Chemistry. Revised ed. New York: Macmillan Co. 563 pp. $4.00.

Gmelins Handbuch der anorganischen Chemie. Edited by E. Pietsch. Erganzungsband 1, Tl. 3. Aluminium Legierungen Patentsammlung. By G. Apel. 387 pp. M. 31.50. System-Nr. 68: Platin. Tl. C, Lfg. 1. Verbindungen bis Platin und Wismut. 140 pp. M. 16.50. System-Nr. 68: Platin. Tl. A, Lfg. 3. Darstellung der Platinmetalle. Berlin: Verlag Chemie, G. m. b. H. 119 pp. M. 14.25. Cf. *C. A.* **34**, 1584[8].

7—ANALYTICAL CHEMISTRY

W. T. HALL

New evaluation of analytical methods. A. Schleicher. *Z. anal. Chem.* **118**, 82–9(1939).—A discussion of the changes accomplished by the use of microchemical methods and various types of phys. instruments such as the spectroscope. Methods of evaluation are discussed and a mathematical expression is prepd. for expressing the usefulness of a procedure. W. T. H.

Complete gravimetric analysis by direct precipitation in a Jena filtering crucible. G. G. Longinescu and I. I. Prundeanu. *Bull. sect. sci. acad. roumâne* **19**, 132–40 (1937–38); *Bul. Chim., Soc. Române Chim.* **39**, 19–25 (1937–38).—The necessary technique is illustrated by the detn. of Pb as $PbSO_4$, Pb as PbS, sepn. of $PbSO_4$ from $BaSO_4$, detn. of HCl or HBr as Ag salts and sepn. of Ca, Ba and Sr by means of EtOH. The advantages claimed for this technique (*C. A.* **30**, 7479[8]) appear to have been substantiated. W. T. H.

Octyl alcohol in volumetric analysis. L. J. Sheps and L. A. Breault. *Can. Chem. Process Inds.* **23**, 530(1939).—Exptl. data show that a 1% soln. of phenolphthalein in a 50-50 mixt. of EtOH and octanol (2-ethylhexanol) is suitable for: (1) detg. the free alky. of aq. solns. of fatty alc. sulfates; (2) titration to the phenolphthalein end point in aq. soln. of alk. soap-like products and (3) titration of AcOH in water. W. H. Boynton

Some essential corrections in gas analyses. J. J. Leendertse and F. E. C. Scheffer. *Rec. trav. chim.* **59**, 3–13(1940); cf. *C. A.* **26**, 1873.—It is emphasized that analyses of gases made at const. vol. require corrections for nonideality. Two corrections are calcd.: the Dalton correction, which takes into account the fact that the resultant pressure after mixing two gases is not the sum of their original pressures, and the Avogadro correction, which is applied to the pressure-vol. product, since equal vols. of gases do not contain equal nos. of mols. Numerical corrections are calcd. for various simple hydrocarbons and their mixts. The corrections are particularly important in mixts. involving propane and butane, less important in mixts. involving methane and ethane. J. E. V.

Copper sulfate as a standard for thiosulfate titrations. N. Schoorl. *Pharm. Weekblad* **76**, 1441–6(1939).—A review with discussion of the literature. J. C. J.

Potentiometric analysis of the metals of the ammonium sulfide group. H. Steuer. *Z. anal. Chem.* **118**, 386–98 (1940).—*To det. Cr*, the acid soln. can be oxidized by $(NH_4)_2S_2O_8$ in the presence of Ag^+ and, after the excess persulfate is destroyed by boiling, the soln. can be titrated with $SnCl_2$ in an atm. of CO_2 provided Mn, Hg, Fe and V in the higher valence states are absent. Sexivalent U does no harm. The titration also succeeds with $FeSO_4$ if septavalent Mn and quinquevalent V are absent. In the presence of a little Tl salt as catalyzer, trivalent Cr can be titrated with $K_4Fe(CN)_6$ soln. if the soln. is strongly basic, and contains KCl in an atm. of CO_2. *To det. Al*, the only useful potentiometric method depends upon the formation of $[AlF_6]^{---}$. To carry out the analysis, first neutralize the soln. to phenolphthalein, sat. with NaCl and add an equal vol. of EtOH. Add a drop of 20% $FeCl_3$ soln. and titrate with 0.1 *N* NaF soln. in a closed vessel contg. CO_2. The reaction is slow and it is

necessary to wait a definite time after each addn. of the reagent and to shake uniformly. *The detn. of Ti* is best accomplished by reducing with Zn under a Contat-Göckel valve and finally titrating with $K_2Cr_2O_7$ in an atm. of CO_2. *For the detn. of U*, a strong reducing agent must be used to obtain all the U in the bivalent state. $SnCl_2$ is not adequate but in a soln. strongly acid with HCl, $TiCl_3$ will accomplish complete reduction at 60° in the presence of tartrate. The reduction can be followed with the potentiometer. Another method consists in reducing the UO_2^{++} with Zn and HCl to the quadrivalent state and titrating with $K_2Cr_2O_7$ at 80° but too much time is required. The *detn. of Fe* can be followed potentiometrically when the reduction with $SnCl_2$ or with $TiCl_3$ is measured or when the Fe^{+++} is first reduced in a Jones' reductor and the resulting Fe^{++} is titrated with dichromate. By a combination of these methods it is possible to det. all the above-mentioned ions in the presence of one another. The potentiometric *detn. of Mn* can be based upon (*a*) oxidation of the Mn^{++} to the valence of 7 and titration of the MnO_4^- with oxalic acid at 70–80°, (*b*) titration with $K_3Fe(CN)_6$ soln. in an ammoniacal soln. contg. citric acid or (*c*) direct oxidation of the Mn^{++} to Mn^{+++} by $KMnO_4$ in the presence of fluoride. The *detn. of Co* can be based on the titration with KCN soln. whereby Co unites with 5 CN but the presence of NH_3, Ag, Hg, Cu, Zn or Cd salts interferes; the Co can also be detd. by oxidation in an alk. citrate soln. by means of $K_3Fe(CN)_6$ soln. The *detn. of Ni* can be accomplished with KCN and, unlike the case of Co, the presence of NH_3, Ag, Hg, Cu and Cd does no harm. An excellent potentiometric method for *titrating Zn* is based on the reaction with Na_2S. With a suitable combination of these methods a systematic procedure for detg. Mn, Co, Ni and Zn by potentiometric titrations is described. Excellent results were obtained for all the titrations described in this paper. W. T. H.

Determination of aluminum with 8-hydroxyquinoline in the presence of iron and phosphoric acid. Gr. Bălănescu and Maria D. Motzoc. *Z. anal. Chem.* **118**, 18–26(1940).—The various methods of detg. Al in the presence of Fe are reviewed and the conclusion is drawn that the sepn. by means of an excess of NaOH is the simplest procedure. The results, however, are almost invariably low as a result of absorption of Al by the hydrated iron ppt. In expts. with the equiv. of 0.1–0.35 g. of Al_2O_3 and 0.04–0.125 g. Fe_2O_3, the sepn. of Fe and Al by means of NaOH was much better when sufficient Na_2HPO_4 was first added so that the ratio wt. Fe/wt. P_2O_5 = 2. The procedure recommended is the following: From an aliquot part of a soln. contg. Fe^{+++}, Al^{+++} and H_3PO_4, det. the Fe volumetrically. In a 2nd aliquot det. the H_3PO_4 by a suitable molybdate method. Then to a 3rd aliquot add Na_2HPO_4 soln. until the desired ratio is obtained, make the soln. basic with NaOH and, when all Fe^{+++} is pptd., add 5 ml. of 2 *N* NaOH in excess. Heat slowly to boiling, filter, wash with dil. NaOH and use the filtrate for the Al detn. Make the soln. slightly acid to phenolphthalein, heat till the last of the turbidity due to $Al(OH)_3$ disappears, add 3% oxine soln. and filter off the Al hydroxyquinoline deriv. Dissolve this in 3 *N* HCl and base the Al detn. on the Br required to react with the soln. on treatment with KBr + $KBrO_3$. One mole of Al_2O_3 is equiv. to 8 atoms of Br. In 10 analyses without the addn. of Na_2HPO_4 the av. error was −3.6% of the actual quantity of Al present, but after the addn. of phosphate the av. error was only −0.02%. With no Na_2HPO_4 the greatest error was −6.66% but after the addn. of phosphate the greatest error was +0.95% of the actual Al_2O_3 content. W. T. H.

A simple method for the determination of aluminum in ferrotungsten and tungsten steels. S. Sinkai and T. Nagata. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 397(1939).—Dissolve 2 g. of sample in HNO_3-HF in a Pt dish, add H_2SO_4 and evap. the mixt. to dense white fumes. Dil. to exactly 500 cc., filter and take 250 cc. of the filtrate. Neutralize with NaOH soln., and add sufficient excess 0.5 *N* NaOH soln. to dissolve the $Al(OH)_3$. Heat the mixt. on a water bath. Cool, again dil. to exactly 500 cc., filter and evap. 250 cc. of the filtrate to approx. 100 cc., add NH_4Cl and boil the mixt. Make slightly alk. with NH_4OH and again boil. Filter, wash the ppt. with hot water contg. a little NH_3 and some NH_4NO_3, ignite to Al_2O_3 and weigh. George Ayers

Spectral-analytical determination of low aluminum contents in steel and iron. Gerhard Hartleif. *Arch. Eisenhüttenw.* **13**, 295–7(1940).—Small samples taken in small chill molds are most suitable as they solidify very quickly. Forge into rods of about 15 × 30 sq. mm. Rapid solidification prevents segregation of the Al_2O_3 and uniform samples for producing spark spectra are obtained. The lines selected for the analysis are the line Al$_\alpha$ 3961.5 in combination with line Fe$_\alpha$ 3903.1. The electrode is a Cu rod 4 mm. in diam. with weak curvature at the end. The spark is produced by an inductor of 3000 cm. capacity and 800,000 cm. self-induction. The error in this method is of about the same order as in the chem detn. for uniform, quickly solidified samples. With slowly cooled steel a greater error results if Al_2O_3 veins have formed in the steel. M. Hartenheim

Gravimetric determination of antimony with 8-hydroxyquinoline. Th. I. Pirtea. *Z. anal. Chem.* **118**, 26–30 (1939).—By means of oxine, 12 γ of Sb can be detected in 5 ml. of a soln. of $SbCl_3$ or of tartar emetic. The pptn. is quantitative at pH 6–7.5. For the pptn., prep. the reagent by dissolving 7–8 g. of oxine in as little glacial AcOH as possible, dil. with 200 ml. of water, add 6 *N* NH_4OH until a slight turbidity remains and clear this with a drop of AcOH. To the Sb soln. contg. 0.5–1.5 g. Sb and an excess of HCl, add 30 ml. of the oxine reagent, heat to 60–70° and neutralize slowly with 10% NH_3 soln. At pH 1.5 a yellow ppt. begins to form and pptn. is complete near the neutral point when the soln. is strongly yellow. Heat a little longer and give the contents of the beaker a rotary motion so that the ppt. will collect on the bottom. If the soln. still smells of AcOH, add enough NH_3 to remove the acid and leave a faint odor of NH_3. Allow to cool for 2 hrs., filter through a filtering crucible, wash the ppt. with a cold soln. contg. 0.2–0.4 g. oxine and a few drops of AcOH per l. until the filtrate will give no test for halogen with $AgNO_3$ + HNO_3. Dry to const. wt. at 105–110°. The ppt. is yellow and contains 21.97% Sb. The test analyses were within 1 mg. Sb of the true value. W. T. H.

Detection of cadmium and magnesium. Edwin Ecgriwe. *Z. anal. Chem.* **118**, 98–100(1939). To test for Cd, take 1 drop of the neutral soln., add 0.5 ml. of 15% $Na_2CO_3.2H_2O$ soln., 0.25 ml. of a soln. of 0.5 g. diazoaminobenzene in 100 ml. of acetone and a few drops of $CHCl_3$. If Cd is present an orange-yellow color will be imparted to the $CHCl_3$ on shaking. As little as 0.2 γ of Cd suffices to give the test. Cu gives a greenish coloration and Ag a brownish yellow one. Both metals interfere as do Co and Ni. The test can be obtained with 3 γ Cd and 100 times as much Pb, Mn, Zn and Mg. A test for Mg, of approx. the same sensitivity, can be obtained with a little *p*-aminophenol hydrochloride. The test can be applied to 1 drop of a neutral soln. contg. no NH_4 salts in the residue obtained from the soln. of the Group V ppt. To one drop of soln. add a few drops of concd. NH_3 soln. and a little of the solid reagent. Shake a few times and wait a little. An oxidation of the org. reagent begins to take place soon, the soln. gradually becomes a pale yellow, then a light yellowish brown. If the ppt. of $Mg(OH)_2$ is present it adsorbs the dyestuff and the brownish color soon becomes blue. Cations which yield ppts. with NH_4OH interfere. W. T. H.

Estimation of submicroquantities of calcium. Albert E. Sobel and I. Allan Kaye. *Ind. Eng. Chem., Anal. Ed.* **12**, 118–20(1940); cf. *C. A.* **33**, 7835³.—Ca can be detd. iodometrically in amts. of 0.004–0.04 mg. with an av. deviation of ±1.2% with the aid of an ordinary 5- to 10-ml. microburet and a special centrifuge tube. The method is directly applicable to the *detn. of Ca in* as little as 0.2 ml. of fresh *blood serum*. The Ca is pptd. as oxalate, the washed ppt. is dissolved in a measured vol. of 0.01 *N* HCl and the excess H^+ is detd. iodometrically.

T. H. Dunkelberger

Determination of cerium with 8-hydroxyquinoline. Th. I. Pirtea. *Bul. Chim., Soc. Române Chim.* **39**, 83–5 (1937–8)(in German).—To 20–40 ml. of a neutral soln. contg. up to 0.10 g. of Ce^{+++}, add 5 ml. of 2 *N* AcOH and a slight excess of a 3% soln. of oxine in EtOH. No ppt. will form. Now add from a pipet 10% NH_3 soln. until the Ce is pptd. The ppt. has a yellow-orange color which slowly becomes brownish purple. The latter compd. has the more definite constitution. After the change in color is complete, heat to boiling, filter through a glass filtering crucible, wash with hot water, dry and weigh. The ppt. has the formula $Ce(C_9H_6ON)_4.2H_2O$. Obviously an oxidation of the Ce^{+++} has taken place. The ppt. contains only 18.73% Ce. The results obtained in 14 expts. in which the ppt. was weighed were excellent, but it takes so long to complete the transformation to ceric salt that it is more practicable to ignite the ppt. and weigh the residual CeO_2. Good results were obtained in 10 analyses. W. T. H. [1] [2] [3]

Separation of copper from nickel with sodium thiosulfate in the analysis of German silver. Imre Sarudi (nee Stetina). *Z. anal. Chem.* **118**, 13–17(1939).—To analyze German silver dissolve 0.4 g. of alloy in 8 ml. of 7.5 *N* HNO_3. Add 1 ml. of concd. H_2SO_4 to the resulting soln. and evap. to fumes. Dil. with water to make 100 ml. of soln., make neutral with 10% NH_4OH, add 50 ml. of 10% $Na_2S_2O_3$ and 20 ml. of 6 *N* H_2SO_4 and boil 15 min. to ppt. all Cu as CuS. Filter and reserve the filtrate for the detn. of Fe, Ni and Zn. Ignite the ppt. of CuS to CuO, fuse with $K_2S_2O_7$, dissolve the melt in water, add a little AcOH and det. the Cu iodometrically. Take the filtrate from the CuS pptn. and evap. to dryness to remove the greater part of the H_2SO_4. This leaves most of the S in the filtrable condition but on addn. of water a little colloidal S is obtained. Remove this by heating with Br water. Filter and det. the Ni with dimethylglyoxime. In the filtrate destroy the excess reagent by boiling with Br water and det. the Zn as $ZnNH_4PO_4$. Use sep. samples of the alloy for the detn. of Sn as SnO_2 and Pb as $PbSO_4$. Test results show that the method is satisfactory. W. T. H. [4] [5]

New method for the detection of gold in qualitative analysis. Lawrence S. Malowan. *Z. anal. Chem.* **118**, 100–102(1939).—Zn, Cd and Cu solns. can be neutralized by morpholine and insol. ppts. are formed. But beside this neutralizing and pptg. effect of the amine, it is characterized by being readily oxidizable. I_2 is reduced by it to HI and noble metals are pptd. from solns. This applies in particular to the detection of Au. Take 2–3 ml. of soln. to be tested, add 0.3 ml. of pure morpholine, or enough to impart a distinctly basic reaction to the soln. and filter to remove any Cu or Fe ppts. Heat the filtrate to boiling. If Au ions are present the soln. will be yellow and will gradually assume a bluish violet tint and bluish violet flocks will ppt. From the appearance of the test an approx. estn. of the Au content can be made. W. T. H. [6] [7]

Determination of lead, thorium and uranium in zircon with respect to the geological estimation of time. F. Hecht and F. Korkisch. *Mikrochemie* **28**, 30–63(1939).—It is important, if the contents of Pb, Th and U are to be used as a basis for measurement of geologic time, that the detns. should be as accurate as possible. The procedure described in this paper represents a combination of macro- and micro-methods. Only 1 g. of material is required and the 3 elements are detd. in a single weighed sample. Good results were obtained in the analysis of synthetic mixts. The sample of mineral is weighed into a crucible of chemically pure Ag whose Pb content has been detd. accurately. It is mixed with 10 g. of pure Na_2O_2 and covered with a layer of Na_2CO_3. The Ag crucible is then placed within a larger porcelain one and slowly heated until the contents melt. After 30 min. at the m. p., the fused product is treated with water and after removal of the crucible, dissolved in dil. HNO_3. The soln. is evapd. to dryness 3 times with concd. HNO_3. The residue is taken up in HNO_3 and hot water and the SiO_2 filtered off. The SiO_2 ppt. is examd. by removing the Si with HF, fusing with $K_2S_2O_7$, digesting with HNO_3, examg. the residue for $PbSO_4$ and the soln. for Th and U. The $UO_2(NO_3)_2$ is sepd. from Pb and Th by evapg. the HNO_3 soln. to dryness and then after the addn. of a little HNO_3 extd. by means of ether in a Soxhlet app. Eventually, after a lengthy treatment, the UO_2 is detd. by pptn. with 8-hydroxyquinoline and finally weighed as U_3O_8. The Pb is detd. after pptn. with H_2S and conversion of the PbS into $PbSO_4$, in which form it is finally weighed. The Th is eventually pptd. by treatment with fluoride and finally weighed as ThO_2. In order to obtain accurate results, great attention was paid to the purity of all the ppts. Some of the recorded weighings are to 7 significant figures and the final results in all cases appear to be satisfactory, although very great precautions had to be taken to get results accurate within a few % of the truth when the content was low. W. T. H. [8]

Improvement in the determination of lithium in mineral waters and a new method for determining lithium in silicates. Oskar Hackl. *Z. anal. Chem.* **118**, 1–9(1939).—One of the best methods for detg. Li in mineral waters is Winkler's procedure of dissolving out LiCl from a mixt. of alkali metal chlorides by means of iso-BuOH and eventually weighing the Li as $LiSO_4$. An arbitrary correction of 0.5 mg. is usually subtracted for each 10 ml. of the alc. used to allow for other chloride dissolved, but this procedure is not altogether satisfactory when accurate results are required. The treatment with iso-BuOH, however, does provide for the sepn. of all the LiCl from most of the NaCl and KCl, but instead of converting this directly to sulfate it is better to remove any Mg present by neutralization with NaOH, then evap. to dryness with HCl, heat until all acid is removed, dissolve the residue in 3 ml. of strong NH_3 soln. and ppt. the Li as $LiPO_4$ in the presence of EtOH. In the analysis of minerals, it is recommended to get the alkali metal chloride mixt. in the usual way, ppt. the K as K_2PtCl_6, remove the Pt from the soln. with H and then treat with NaOH or with oxine to remove Mg and finally det. the Na as phosphate. No analytical results are given but the various possibilities are discussed. W. T. H. [9]

Modification of Rauscher's method for determining mercury. Anthony Shukis, Jr., and Ralph C. Tallman. *Ind. Eng. Chem., Anal. Ed.* **12**, 123(1940); cf. Rauscher, *C. A.* **32**, 6174[1].—To eliminate retention of particles of Hg on the surface of the mono- or diethanolamine after reduction, the digestion is carried out in a centrifuge tube. The mixt. is centrifuged for 5 min. at 2800 r. p. m. after digesting. Subsequent soln. and titration of the Hg are carried out in the same tube. The changes do not apply to the gravimetric procedure. T. H. D. [10]

Detection of silver in very dilute solutions by physical development. Aurel I. Velculescu. *Bul. Chim., Soc. Române Chim.* **39**, 141–3(1937–38)(in German).—In a previous paper (*C. A.* **27**, 42) it was shown that a test for Ag in dil. soln. could be obtained by moistening filter paper with a drop of the soln., adding KBr soln. and finally adding a metol developing soln. Later developments of the method showed that both the fixation of the Ag in the paper fibers and also the Ag deposition itself could be facilitated by the presence of a trace of Ag already pptd. A further improvement consists in placing the paper, after it has been moistened with the soln. to be tested, and dried, in an atm. of H_2S for 30 sec. and then washing 6 times by half-min. movement in the water each time. The small quantity of Ag_2S cannot usually be recognized by the eye but the H_2S excess is easier to remove than bromide and the paper now responds well to treatment with metol developer. Instead of the metol soln. previously recommended, a developer contg. 2 g. pyrogallol and 2 g. of citric acid in 500 ml. of soln. gives good results. Just before the developer is used, 60 ml. of it should be treated with 2 ml. of 0.1 *N* $AgNO_3$ soln. The manipulation of the paper is practically the same as in developing films or prints in photographic work. W. T. H. [11]

Determination of titanium in aluminum and light alloys by the method of absolute colorimetry. Marcella Mon-

ticelli and Fabio Sinigaglia. *Alluminio* **8**, 259–64(1939). —The applicability of the Leifo photometer made by Leitz, to the colorimetric detn. of Ti in Al alloys is detd. In the range of Ti up to 0.3% (the amts. likely to be present in Al alloys) Baer's law is applicable. Fe interferes unless H_3PO_4 is added. Up to 2% Ni does not interfere. If Cr is present, it must first be removed.
A. W. Contieri

Determination of fluorine in cryolite by the method of A. Greeff. H. Spielhaczek. *Z. anal. Chem.* **118**, 161–4 (1938).—G.'s method (*C. A.* **7**, 354) depends upon the titration of F^- with $FeCl_3$ soln. in the presence of KCNS, which indicates the presence of excess Fe^{+++}. Each Fe^{+++} used in the titration is converted into $[FeF_6]^{---}$. With insol. F compds. the sample is fused with K_2CO_3 + SiO_2 as recommended in 1824 by Berzelius. Regarding the effect of the SiO_2, G. stated that the theory was not clear but a study of G.'s analytical data shows quite clearly that a water-insol. silicate, such as $Na_3Al(SiO_3)_3$, is formed. After this has been removed from the aq. soln. of the melt, it is customary to make the soln. neutral to phenolphthalein which causes pptn. of hydrated SiO_2 that is usually left in contact with the soln. during the subsequent titration of the F^-. This ppt. adsorbs some of the soln. and thereby causes error. If in the preliminary fusion, the quantity of SiO_2 is kept low (e. g., 1 g. SiO_2:1 g. cryolite) the error is not large and the procedure can be used in tech. analysis but the results of the titration are more consistent and nearer the truth if the SiO_2 is removed by filtration. W. T. H.

The work of the oxygen panel. Review of methods available for estimating oxygen and hydrogen. T. Swinden. *Iron & Coal Trades Rev.* **140**, 5–6, 41–2(1940).—Review of work done by a committee of the British Iron and Steel Institute on detg. O and H in steel.
I. Hartmann

Determination of oxygen in zinc oxide. Max Schutze. *Z. anal. Chem.* **118**, 241–5(1939).—In connection with the evaluation of Zn dust it is often desirable to know the O content. The basis of the method now proposed consists in reducing with C in a stream of N_2, passing the CO formed over I_2O_5 and then detg. either the liberated I_2 or the CO_2. When all the described precautions were taken, the procedure gave for the analysis of very pure ZnO results which were all within about 0.1% of the truth and the average of 5 expts. was 19.63% O (theory = 19.66%).
W. T. H.

Direct oxygen determination in metal oxides and organic substances. Max Schütze. *Naturwissenschaften* **27**, 822(1939).—An accurate method for detg. O in oxides and org. substances is described and typical results are given. The O is converted into CO by heating the C and the CO is oxidized to CO_2, which is detd. Cf. preceding abstr. B. J. C. van der Hoeven

Gravimetric determination of carbon in carboniferous lead concentrates. Wilhelm Enning. *Z. anal. Chem* **118**, 93–4(1939).—Digest 1 g. of sample with 350 ml. of hot *N* HCl. This will dissolve most of the Pb as $PbCl_2$ and leave the C behind. Filter, boil the residue with 220 ml. of 1.2 *N* HCl, filter, wash with hot 0.2 *N* HCl, dry at 110° and weigh the silicious residue + C. Ignite to burn off C and weigh again. W. T. H.

The detection of sulfur adsorbed by activated carbon. J. J. van Eck. *Pharm. Weekblad* **76**, 1569–71(1939).—The following rapid method for the detection of S adsorbed by activated C is useful especially for detecting the presence of mustard gas. Heat in a small combustion tube a few lumps of the C with 5–10 times its wt. of Castellana mixt. after the reaction is over, plunge the hot bottom in 5 cc. of water when it usually cracks. Filter into a short test tube, acidify with dil. H_2SO_4 and sweep out with a current of air any H_2S formed and identify with $Pb(OAc)_2$ paper. A blank must be run on all chemicals used as well as glassware. As activated C often contains S, and prolonged heating in a current of H proved ineffective, the following method is recommended; boil twice with a 10% NaOH soln., evap. to dryness on the waterbath, transfer to a Ni crucible and heat for 30 min. with a blast; boil twice with dil. HCl until Pb acetate paper shows no more H_2S. J. C. Jurrjens

Determination of aluminum oxide in metallic aluminum with cupric ammonium chloride. T. Nakamura and S. Yamazaki. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 296–7(1939).—Add a soln. of 240 g. of $CuCl_2.2NH_4Cl.2H_2O$, in small portions, to 10 g. of the sample; after the reaction is ended, heat and filter the mixt. Wash the ppt. with 1% HCl, dry, fuse the ppt. with $KHSO_4$, then boil the mass with water. Add 10 cc. of 1:1 H_2SO_4, evap. to dryness and, after adding H_2O, filter off the SiO_2. Remove Cu from the soln. with H_2S, then add Br water to the filtrate and remove Fe with NaOH. Finally det. Al in the soln. with 8-hydroxyquinoline and calc. to Al_2O_3. $CuNH_4$ chloride soln. dissolves considerable amts. of $Al(OH)_3$, but very little Al_2O_3; it even dissolves Al-Si alloys. George Ayers

Precipitation of aluminum hydrous oxide and its solubility in ammonia. E. B. R. Prideaux. *Analyst* **65**, 83–7(1940).—Ten ml. of soln. contg. 9 mg. of Al as potash alum was mixed with 5 ml. of 4 *N* NH_4Cl and treated with varying amts. of NH_3 soln. The soln. was heated quickly to boiling and filtered promptly. The Al in the filtrate was detd. with aluminon. The quantity of Al remaining in the filtrate increased up to 1.5 *N* NH_3 but this quantity was not strictly proportional to the excess NH_3 present. Above this concn. the quantity dissolved falls but shows irregularity. The ratio of Al/NH_3 is about the same in 0.75 *N* NH_3 soln. as in the strongest NH_3 soln. The variability in the results is not due to exptl. error, nor to the loss of NH_3 from hot solns. but rather to the fact that alumina pptd. in this way is the most colloidal of all the forms whose properties vary with the speed of coagulation. Pieces of very pure Al were amalgamated with excess Hg and placed in NH_3 solns. of varying strengths. After a day the NH_3 soln. was filtered and it was found that the Al in soln. per ml. was 1.08, 0.36, 0.12 and 0.12 mg. in solns. which were, resp., 5.0, 0.75, 0.50 and 0.25 *N* in NH_3. On standing, alumina was gradually pptd. from the solns. When Al dissolves from an amalgam with evolution of H_2 from solns. which are well on the basic side of the isoelec. point, it is probable that NH_4AlO_2 is formed first. This can then decompose in 2 ways. (1) NH_3 may be lost by evapn. and a coherent skin will form on the surface of the liquid, (2) the NH_4AlO_2 can hydrolyze and thus colloidal alumina is formed which gradually gives a turbidity throughout the entire soln. Based on the expts. described it is recommended in pptg. alumina to add *N* to 2 *N* NH_3 to the soln. contg. the usual quantity of NH_4 salt and then digest the soln. in a closed vessel on the water bath and finally drive off excess NH_3 and filter. W. T. H.

Chemical analysis of aluminum hydrosilicates. Ugo Passarini. *Boll. sci. facolta chim. ind., Bologna* **1940**, Nos. 1–2, 55–7.—A systematic method is given for the detn. in crude and purified Al hydrosilicates of humidity, loss on ignition, H_2O of constitution, SiO_2, Al_2O_3, Fe_2O_3, TiO_2, CaO, MgO, alkali metal oxides, chlorides, sulfides, sulfates, carbonates and org. substances in order to obtain comparable data for working out a catalog of the national (Italian) feldspars and kaolins. Dora Stern

Determination of free magnesia in magnesitic limes. R. Meurice and P. Martens. *Ann. chim. anal. chim. appl.* **22**, 33–40(1940).—When the quantities of silicate and sulfate are small, a rapid method for estg. the MgO content of a sample of lime consists in detg. how much acid is required to dissolve it, how much CaO is dissolved by an ammoniacal soln. of NH_4NO_3 and how much CO_2 is evolved on treatment with acid. Some 18 samples of lime were examd. A longer procedure consists in making a complete analysis of the lime but in many cases the results are not any better. W. T. H.

Routine examination of magnesium trisilicate. J. L. Pinder. *Analyst* **65**, 90–6(1940).—As a result of considerable experimentation undertaken (1) to devise suitable tests for this pharmaceutical including chem. analysis and an adsorption test and (2) to det. whether or not the adsorptive capacity depends in any way on the phys.

condition of the trisilicate, the following conclusions were drawn: (1) The analytical examn. of Mg trisilicate to be used in *medicine* should include detns. of SiO_2, Mg, free and combined H_2O and acid adsorption. Suitable procedures are given for making such an analysis and the analytical results of 5 samples are tabulated. (2) From a study of the time and temp. for a methylene blue adsorption test, it is thought that a 2-day test at room temp. is of value. (3) The wet and dry bulks should be detd. for apparently the ratio of the dry to the wet bulk has some relation to the results of the adsorption test. W. T. H.

Analysis of cadmium-plating solutions. G. Stanley Smith. *Analyst* **65**, 87–90(1940).—Directions for detg. free cyanide, total cyanide, Cd, Cu and Fe are given and some analytical results are shown. W. T. H.

Indirect determination of hydrochloric and hydrobromic acids by transformation of the silver chloride into silver bromide. G. G. Longinescu and Ecaterina I. Prundeanu. *Bul. Chim., Soc. Române Chim.* **39**, 15–16(1937–38)(in French).—In the method now proposed, AgCl and AgBr are pptd. directly in a weighed Jena filtering crucible. Then pressure is produced below the filter so that no more liquid will pass through the filter, a little NH_3 soln. is added and then, after stirring with a rod, some KBr soln. is introduced into the crucible and a little HNO_3 added. The transformation of the AgCl into AgBr is complete by this treatment. The entire treatment takes place in the crucible. If the AgCl and AgBr mixt. is weighed and then the wt. detd. after conversion of all Ag to bromide, the content of both HCl and HBr can be calcd. W. T. H.

Volumetric determination of sulfuric acid in permanganate solutions containing sulfuric acid. Hans Becker. *Z. anal. Chem.* **118**, 263–4(1939).—In the *paper* and *cellulose industry* a soln. of 0.02 *N* $KMnO_4$ is prescribed which is supposed to contain 0.16% H_2SO_4. The free H_2SO_4 can be detd. as follows: Take 20.00 ml. of 0.02 *N* oxalic acid and add 19.00 ml. of the 0.02 *N* $KMnO_4$ + 50 ml. of water. Heat to boiling and when the pink MnO_4^- color has disappeared, add 1.00 ml. more of the $KMnO_4$. If necessary discharge any MnO_4 color with a drop or two more of the oxalic acid. Now add methyl red indicator soln. and titrate with 0.1 *N* NaOH. In calcg. the H_2SO_4, allowance must be made for the fact that during the reduction of the 20 ml. of 0.02 *N* $KMnO_4$, 0.24 milliequiv. of H_2SO_4 is neutralized in addn. to the H^+ ions of the oxalic acid soln. W. T. H.

Determination of the chloride ion by the Volhard method and gravimetrically. Josef Bitskei. *Z. anal. Chem.* **118**, 164–9(1939).—It has been known for some time that the presence of considerable AgCl ppt. can cause appreciable error in the titration of Ag^+ with CNS^- by the method of Volhard. To avoid adsorption effects it has been recommended to filter off the ppt. before titrating the excess Ag^+. It is possible, however, to prevent the error by adding a protective colloid. Thus the addn. of 10 ml. of a 4% soln. of thymol in ether or amyl alc. proved satisfactory in titrating about 1 milliequiv. of Cl^- in approx. 30 ml. of soln. Good stirring is essential during the titration. The adsorption of Ag ions can also be prevented by titrating in the presence of HNO_3 and NH_4NO_3. This also helps in the gravimetric detn. of Cl^-. W. T. H.

Argentometric titration of the cyanide ion with diphenylcarbazone as indicator. Raluca Ripan-Tilici. *Z. anal. Chem.* **118**, 305–7(1939).—Diphenylcarbazone gives a violet compd. with Ag^+ and when a titration is carried out at pH = 4–4.4, the org. compd. can be used to indicate the presence of excess Ag^+ when the end point is reached. In some cases, as with AgCN and AgSeCN, the violet color appears too soon in acid solns. If the titration is carried out at pH = 9–12, the ppt. is colored blue and the violet color of the soln. disappears as soon as the end point is reached. The pseudohalides, CN^-, SCN^-, $SeCN^-$ and also SeO_3^{--}, can, with the exception of $SeCN^-$, be titrated with the blue color of the ppt. taken as the end point. With $SeCN^-$ the blue color of the ppt. is obtained continuously in a basic soln. To titrate CN^- the following procedure is recommended: To the soln. at pH = 9–10 add 4 drops of 0.3% diphenylcarbazone soln. in EtOH. The indicator will show a reddish brown color. Add $AgNO_3$ soln. and shake to help make the ppt. redissolve in the excess CN^-. As soon as all CN^- has been converted into $[Ag(CN)_2]^-$ the next drop of Ag^+ causes pptn. of a little AgCN and the indicator changes to violet. Then, when just as much more Ag^+ ion has been added and all the Ag is pptd. as AgCN, the ppt. suddenly turns blue and coagulates. To obtain good results the alkali cyanide soln. to be titrated should be 0.1–0.5 *M* and the Ag^+ soln. used should be of similar strength. The diphenylcarbazone shows the violet color when the ratio 2 CN:1 Ag prevails and the blue color of the ppt. is obtained at 1 CN:1 Ag. The results of 9 titrations showed excellent concordance at both end points. W. T. H.

Sensitivity of the test for lead and sulfide ions by means of the formation of $[(PbBr)_2S]$. Z. Karaoglanov. *Z. anal. Chem.* **118**, 311–22(1939).—If sep. solns. of Pb^{++}, HCl or HBr and H_2S are mixed, a ppt. results which may be black, red or yellow. The red compd. $PbS.PbBr_2$ is quite stable. The formula can also be written $[(PbBr)_2S]$. Its intense color can be used for the detection of Pb or H_2S and when the red color is used there is less danger of interference from other metal ions than when the test for Pb or H_2S is based on the formation of PbS. The sensitivity of the test depends largely upon the concns. of HBr and of H_2S. Carried out in a test tube with 10 ml. of soln. the sensitivity varies from 59.2 to 592 γ of Pb in 10 ml. The test will serve to detect 8–12 γ of Pb if the soln. is treated with HBr soln., evapd. to dryness and the residue is moistened with HBr soln. and treated dropwise with H_2S water. Another method which permits the detection of even less Pb consists in moistening filter paper with the soln., then with HBr soln. and finally with drops of H_2S water. Cu, Bi, Cd, Sb and Sn interfere. W. T. H.

Volumetric determination of the nickel ion with potassium cyanide in the presence of diphenylcarbazone as indicator. Raluca Ripan-Tilici. *Z. anal. Chem.* **118**, 308–10(1939).—A freshly prepd. soln. of KCN to which 3–4 drops of 0.3% diphenylcarbazone in EtOH has been added can be titrated with a neutral soln. of Ni^{++}. The procedure can be used for detg. Ni^{++} or conversely for detg. CN^-. As long as the soln. contains free CN^- anions, the Ni is present as $[Ni(CN)_4]_2^{--}$ anion but when more Ni is present $Ni(CN)_2$ is formed and an intense pink color results. An appreciable quantity of the $Ni(CN)_2$ remains in soln. as $[Ni(CN)_2]$ but the end point is accurate. The titration should take place fairly rapidly and the KCN soln. should be 0.05–0.01 *M* and freshly prepd. W. T. H.

Potentiometric titration of the stannous ion with potassium iodate. G. Spacu and C. Drăgulescu. *Bull. sect. sci. acad. roumaine* **20**, No. 1–3, 1–16(1938).—Solns. of $SnCl_2$ in 1.21 *N* HCl were titrated successfully under N_2 with 0.01 *M* KIO_3. About 25 mg. was present and the total vol. was about 40 ml. at the end of the titration. The values agreed within 0–0.6% of the truth which is satisfactory in detg. small quantities of Sn. The method was good in the presence of other elements likely to be found in alloys. W. T. H.

Potentiometric titration of the stannous ion with alkali hypoiodite. G. Spacu and C. Drăgulescu. *Bull. sect. sci. acad. roumaine* **20**, No. 8–10, 1–10(1938).—The titrations described were made with approx. 0.03 *M* $SnCl_2$ in 1–1.2 *N* HCl and one of I_2 in KI which was 0.01 *N* in I_2 and 6 *M* in KI. A measured vol. of the $SnCl_2$ soln. (1.0–10.0 ml.) was run into an excess of *M* NaOH and titrated in an atm. of N_2 with the I_2 soln. The titration was followed potentiometrically in the usual way. Under the above conditions, Na_2SnO_2 is formed which reacts with the NaIO (formed by the action of I_2 on NaOH) and the products are Na_2SnO_3 and NaI. The equivs. of Sn and I_2 are the same as if the reaction took place in an acid soln. The max. error in 13 titrations, for which all the potentiometer readings are given, was

4.624 ml. used in place of 4.654 ml. calcd. About 30 min. was required for a titration. W. T. H.

Lead poisoning. Precision method for extremely small amounts of lead. Frederick L. Smith, 2nd. *Penna. Dept. Labor Ind. Safe Practice Bull.* No. 52, 8 pp.(1939). —A lecture in which the literature of methods for detg. traces of Pb is reviewed and the method in use at the Jefferson Medical College Hospital at Philadelphia is described. The method is the colorimetric detn. of Pb with dithizone. 78 references. W. T. H.

Current review of the literature of microchemical work. Edith Nadler. *Mikrochemie* 28, 82–112(1939); cf. *C. A.* 33, 5771[4]. W. T. H.

Survey of methods and apparatus for micro gas analysis. H. Hartridge. *J. Sci. Instruments* 16, 317–24(1939).—A review of the following chem. and phys. methods: dry gas, variable vol.; moist gas, variable vol.; diver method; mica-plate method; spectroscopy; thermal cond.; dielec. const. 18 references. W. F. Bruce

Microchemical elementary analysis (determination of carbon, hydrogen and nitrogen). C. Tiedcke. *Mikrochemie* 28, 64–81(1939)(in German).—Several innovations in the detn. of C, H and N are described. The use of ascarite and drierite for the absorption of CO_2 and H_2O, resp., is regarded as the greatest improvement since the adoption of the technique described by Pregl. The use of a furnace heated electrically is also a marked improvement over the gas-fired furnace. For the detn. of C and H, the use of a com. cylinder of O_2, with the aid of a suitable reduction valve, makes the use of a tank of O_2 under 1 atm. pressure unnecessary. The preheating of the O_2, for the purpose of purification, is advised strongly. For the combustion a temp. of 600–700° is advised. For heating the PbO_2 a glass vessel contg. boiling decalin is preferred. Full directions are given for carrying out the detns. of C, H and N and although personal preferences are indicated the different tastes of different operators are taken into consideration. W. T. H.

Colorimetric microdetermination of copper. Isamu Numata and Danzi Matukawa. *J. Biochem.* (Japan) 30, 395–9(1939).—Measure 1 cc. of soln. contg. less than 6 γ Cu into a small separatory funnel, dil. to 5 cc. with H_2O and add 1 cc. of 10% H_2SO_4 and 3 cc. of dithizone reagent and shake for 5 min. (The dithizone reagent is prepd. in the following manner: Dissolve 10 mg. dithizone in 50 cc. CCl_4, transfer to a separatory funnel, add an equal vol. of dil. NH_4OH (1:200) and shake vigorously. The dithizone passes into the aq. phase. Add 50 cc. CCl_4 to the water soln., then 25 cc. 1% H_2SO_4 and shake again. The CCl_4 phase becomes colored a beautiful green. Wash the CCl_4 soln. several times with water, and place in a brown bottle under a layer of 25 cc. of a 12% soln. of $Na_2SO_3.7H_2O$ in *N* H_2SO_4. In this condition the reagent can be kept almost indefinitely in the refrigerator.) With amts. of Cu less than 4 γ, the CCl_4 becomes dark green, with 6 γ dark violet, but when the color is red-violet it indicates that the Cu is in excess of reagent. Transfer the CCl_4 soln. quantitatively to a new separatory funnel and shake 2 min. with 4 cc. of the dil. NH_4OH, and discard the latter. These washings are repeated 7 times. Finally, add 5 cc. 1% H_2SO_4 to the CCl_4 soln. and shake for 1 min. In the presence of Cu this will be colored violet, while the blank will be water-clear. Filter the CCl_4 soln. into a test tube and make up to 5 cc. with CCl_4. The reading in the photometer (using a 5-mm. cell and filter S55) must be made within 10 min. The calcn. is made by means of the equation $16 \times E/a = x$ in γ per cc., where E is the extinction coeff. and a the quantity of original soln. employed. S. Morgulis

New microchemical test for lead as cesium lead iodide, $CsPbI_3$. H. Jurány. *Mikrochemie* 28, 14–22(1939)(in German).—The test is best accomplished by adding KI crystals until any yellow PbI_2 formed is redissolved to $KPbI_3$. Then a little CsCl is added and a greenish yellow cluster of needles is formed. Unfortunately the ions of Sb, Bi, Sn and Cu interfere but it is easy to isolate the Pb as sulfate before applying the test. As little as 0.01 γ Pb can be identified. W. T. H.

Microdetermination of organic carbon in the wet way. Ed. F. Degering and T. Z. Ball. *Ind. Eng. Chem., Anal. Ed.* 12, 124–5(1940).—A Hg-bead dilatometer is used to measure the CO_2 evolved during oxidation by CrO_3 in H_2SO_4. A sample of 2.5–3.0 mg is weighed in a glass capsule and inserted in a two-leg reaction vessel, the other leg of which contains the oxidizing mixt. After 10-min. allowance for temp. equil., the materials are mixed and heated at 85° for 2 hrs. and allowed to cool. The percentage of C is calcd. directly from the change in vol.
Wm. E. Trout, Jr.

Ash in organic compounds. Determination by microtechnique with automatic combustion. A. R. Norton, G. L. Royer and R. Koegel. *Ind. Eng. Chem., Anal. Ed.* 12, 121–3(1940).—The Pregl method of combustion is adapted for the detn. of ash. Samples of about 150 mg. are weighed in Pt boats in Coomgs-Alber Pt cylinders. O_2 is passed over the sample in a quartz tube which is moved slowly through an elec. furnace by means of a phonograph motor and gear. The max. temp. is about 800°. Two samples can be ashed simultaneously in parallel tubes. The method is as accurate as the macro method using a muffle furnace and requires 1/5 to 1/14 the time. Wm. E. Trout, Jr.

Colorimetric microdetermination of formaldehyde. Danzi Matukawa. *J. Biochem.* (Japan) 30, 385–94 (1939).—Add to 2.0 cc. of a H_2CO soln. (0.02 to 1.0 mg. % concn.) 1 cc. of 8% NaCl and 1 cc. of a 0.5% phenylhydrazine-HCl in 50% alc. Mix well and leave in a water bath at 40° for 5–10 min. Add 0.5 cc. of the $K_3Fe(CN)_6$ reagent and mix. (The latter is prepd. by dissolving 2.5 g. $K_3Fe(CN)_6$ in 50 cc. H_2O, adding 40 cc. abs. alc. and dilg. to 100 cc. It should be kept in a dark bottle). Follow up the reagent immediately with 0.75 cc. HCl and place in water at 15° for 10 min., when a red color will develop. Examine the color in the step photometer, with light filter S53 and the 5 mm. cell. The extinction coeff. remains unchanged for about 40 min. The reaction is highly specific. The alteration of the H_2CO content of toxin solns. transformed to toxoid has been detd. and the results were compared with the detn. by preliminary pptn. with starch. S. Morgulis

Simultaneous microdetermination of various fractions of lipides (phospholipide, cholesterol and fat) together with the determination of their iodine number. Morio Yasuda and Korenori Ono. *J. Biochem.* (Japan) 30, 401–21(1939). Each lipide fraction is separately pptd. for the detn., each new fraction being obtained from the residue. This procedure permits working with small quantities. The following scheme of sepn. is used: Evap. the alc.-ether ext. (100–150 cc.) to dryness, and ext. the residue several times with 10 cc. petroleum ether. Conc. the latter to about 15 cc. and centrifuge for 5 min. Evap. the supernatant ether in a centrifuge tube to 2 cc., add 7 cc. acetone and a drop of a satd. alc. soln. of $MgCl_2$. Sep. the pptd. phospholipide by centrifuging, wash with 5 cc. acetone and transfer the acetone soln. to a 100-cc. flask (I). In the latter ppt. the cholesterol with 0.5% alc. digitonin, the amt. of reagent being adjusted to the expected quantity of free cholesterol. Evap. the contents of flask I. Add to the dry residue about 10 cc. of acetone-H_2O (1:1) and heat a few min. on the water bath to dissolve the excess digitonin. Pour through a glass filter to collect the digitonide, and wash with acetone and ether. Collect the filtrate and washings in flask II and evap. to dryness. Add 1–2 cc. glacial AcH and heat until dissolved, and ppt. the digitonin with a ten-fold amt. of ether. Filter off the pptd. digitonin after 30 min., evap. the filtrate, dissolve the residue in 15 cc. alc., add 0.2 cc. satd. KOH and saponify for 20 min. on a water bath. Cool, neutralize with dil. HCl (1:4), ppt. the liberated cholesterol with an alc. digitonin soln. and evap. to dryness. Again dissolve the excess digitonin with dil. acetone, filter off the cholesterol digitonide and wash with acetone and ether. Collect the combined filtrate and washings consisting of fatty acids in flask III and evap. to dryness. Treat the residue with

1 cc. glacial AcOH and ten-fold the amt. ether to ppt. excess digitonin. Evap. the filtrate again to dryness on the water bath, dissolve in about 5 cc. alc. and make alk. with a few drops satd. KOH. Boil off the alc. and heat the residue with 10–15 cc. H_2O to dissolve the soaps. Cool, ppt. the fatty acids by addg. 0.5–1 cc. H_2SO_4 (1:1) and leave in ice box for 1 hr. Collect the fatty acids on a glass filter and wash with small amts. of ice-cold H_2O until free from acid. Detailed instructions are given for the detn. of each of the sepd. fractions (phospholipide, free and bound cholesterol, and fatty acids). The neutral fat content is calcd. from the fatty acids corrected for the amt. bound to cholesterol. The detn. of the I no. of fatty acids is also discussed. S. Morgulis

Scheme for the microchemical separation of some toxicologically important alkaloids. W. F. Whitmore and C. A. Wood. *Mikrochimie* **28**, 1–13(1939)(in English); cf. *C. A.* **34**, 53[1].– The scheme is useful for detecting about 20 of the most important narcotic alkaloids when the total quantity present ranges from 0.5 to 3 mg. in 1 ml. If only one alkaloid is present, less than 0.5 mg. can be isolated and identified and in some cases, e. g., morphine, it is possible to sep. less than 0.5 mg. from a mixt. of several bases. The alkaloids are divided into 4 groups. Group I consists of weak bases of which the salts are hydrolyzed considerably. The group includes narcotine, caffeine, papaverine and theobromine. A little water and a drop of 30% H_2SO_4 are added to an unknown mixt. and Group I is removed by extg. 3 times with 0.5-ml. portions of $CHCl_3$. The ext. is evapd. in a 2-ml. centrifuge cone and tested with a drop of dil. H_2SO_4 and Br_2 in KBr soln. If only 1 alkaloid of the group is present, the appearance of the turbidity produced will often serve to identify it. Treatment with satd. borax soln. serves to sep. caffeine and theobromine which are sol. in borax soln. and narcotine or papaverine is not. Both caffeine and theobromine are identified eventually by the test with Br_2 in KBr soln. By heating with addnl. borax soln. narcotine can be dissolved and identified by the crystals which sep. on adding acid. Papaverine is undissolved by borax soln. and identified by dissolving in dil. HCl and pptg. with CdI_2. Group II contains brucine, strychnine and quinidine. They are pptd. by adding NaI to a dil. aq. soln. of the salts after the removal of Group I. Quinidine is isolated by adding dil. NaOH to the iodides and by extg. with ether. The HCl soln. is treated with K anthraquinone sulfonate and the crystals are studied. Extn. of bases with $CHCl_3$ and treatment with HCl and Na chlorosmate serve for the identification of strychnine and brucine. The strychnine and brucine are sepd. by treatment with dil. HCl and $K_4Fe(CN)_6$ and strychnine is found in the centrifuged ppt. by the $HSbCl_4$ test. Brucine is identified by the reaction with $BiCl_3$. Group III consists of quinine, cinchonidine, cinchonine, morphine, cocaine and stovaine which are pptd. after the removal of Groups I and II as free bases from aq. soln. by the addn. of satd. $NaHCO_3$ soln. The ppt. is dissolved by a little 0.1 *N* HCl and the quinine and cinchonidine are pptd. by means of 20% Na tartrate soln. After treatment with NaOH, extn. with ether and evapn., the residue is dissolved in dil. H_2SO_4 and the quinine is pptd. and identified by its appearance or by dissolving in dil. HCl and treating with H_2PtCl_6. The cinchonidine is detected by the Na_2SnI_4 test. After the above removal of quinine and cinchonidine, an excess of NaOH soln. is added and an extn. made with petr. ether. Cocaine and stovaine dissolve; the former is detected by means of Na_2PtBr_6 and the latter by the $HAuBr_4$ reaction. Cinchonine is eventually identified by the test with K_2PtI_6 and morphine by the K_2HgBr_4 reaction. Group IV contains heroine, procaine, β-eucaine, nicotine, dionine, codeine and atropine. After the removal of Group III, an extn. is made with $CHCl_3$ and then codeine, dionine, β-eucaine and procaine are pptd. with NaBr and the heroine, nicotine and atropine left in soln. After suitable sepns. procaine is identified as its Br substitution product, β-eucaine by the reaction with Na_2PtBr_6 and so is dionine. Codeine is identified by means of CdI_2, heroine by H_2PtCl_6 in 5% HBr, and atropine by treating with Br_2 in NaBr soln. Nicotine is identified by the test with $Co(NO_3)_2$ and NH_4SCN. W. T. H. 1

The physical chemistry of alcohol distillation for forensic determinations. S. Wehrli. *Deut. Z. ges. gerichtl. Med.* **31**, 233–8(1939).—A constant "*K*" varying for each impurity, was found to be directly proportional to the ease with which it may be detected in and sepd. from the alc. Frances Krasnow

New method for the direct determination of oxygen in organic substances. Max Schütze. *Z. anal. Chem.* **118**, 245–58(1939).—The method consists in decompg. the substance thermically, leading the "cracked" products over C which is heated to 1000° in a stream of pure N_2. Then, at room temp., the CO_2 is oxidized with I_2O_5 and the CO_2 is collected in an absorption tube contg. P_2O_5, pumice and soda-asbestos. The app. and the procedure are described in detail, and, although no actual results are given, the statement is made that the method has been in use since 1936 and found satisfactory. W. T. H. 2

Microanalytical procedure for the direct determination of oxygen in organic substances. Wilhelm Zimmermann. *Z. anal. Chem.* **118**, 258–63(1939).—The procedure of Schütze (cf. preceding abstr.) was designed for semimicro work. An adaptation of the method with microchem. app. shows that with about 5 mg. of benzoic acid, salicylic acid, nitraniline, chloranil or sulfanilic acid, results can be obtained which are within 1% of the truth, e. g., 26.40 instead of 26.21% O. W. T. H. 3 4

Volumetric and colorimetric methods for the determination of acetylene in air. M. V. Nifontova. *Org. Chem. Ind.* (U. S. S. R.) **6**, 457–9(1939).—The volumetric detn. is based on the reaction in the presence of excess NH_4OH: $2AgNO_3 + C_2H_2 + 2NH_4OH = Ag_2C_2 + 2NH_4NO_3 + 2H_2O$ and depends on the titration of excess $AgNO_3$ in the filtrate. To 2 ml. of 0.01 *N* $AgNO_3$ add 3 drops of concd. NH_4OH and a measured vol. of the C_2H_2 in H_2O; shake well until the soln. becomes clear, filter and wash the ppt. with H_2O. Make the soln. acid with HNO_3, add 1 ml. of ferric alum soln. as indicator and titrate from a microburet with 0.01 *N* NH_4SCN. Make a blank test. The difference between the 2 detns. gives C_2H_2. The colorimetric detn. of very small quantities of C_2H_2 (a few thousandths of 1 mg.) is based on the reaction in a neutral soln.: $C_2H_2 + 3AgNO_3 = Ag_2C_2 \cdot AgNO_3 + 2HNO_3$). The HNO_3 in the filtrate is detd. by making up the soln. to a definite vol., adding 1 drop of 0.2% methyl red and comparing with standard HNO_3 solns. similarly treated. Chas. Blanc 5 6

Determination of dichloroethane vapors in air. F. F. Mel'nikov and B. V. Senilov. *Lab. Prakt.* (U. S. S. R.) **14**, No. 9–10, 18–20(1939).—A soln. of $Hg(NO_3)_2$ was added (1 ml. of which was equiv. to 0.5 mg. of Cl^-) until an intensive Tyndall cone was obtained. A correction table prepd. on the basis of titration data with $HgCl_2$ at different concns. was used. Take the air sample according to the method of Ginzburg (cf. *C A.* **33**, 4909[1]) by absorption with alc. Transfer the contents of the 3 absorbents into a flask, wash with 15 ml. of alc., add the wash liquid to the flask, add 20 ml. of satd. Na alcoholate soln. or a corresponding amt. of metallic Na (according to Stepanov), heat the mixt. for 2 hrs. under a reflux condenser (a parallel control expt. is performed under the same conditions with 50 ml. of alc. and 20 ml. of satd. Na alcoholate soln. or a corresponding amt. of metallic Na); after having removed the reflux condenser distil off the alc., dissolve the dry residue in 20 ml. of water, neutralize with concd. HNO_3 (free from Cl^-) until a definite acid reaction is obtained with litmus paper, filter through a glass filter into a cone-shaped 100-cc. graduated flask, wash the filter several times with small portions of distd. water, bring the filtrate to 100 ml., add 1 ml. of HNO_3 (1:5) + 1 ml. of 10% $Na_2[Fe(CN)_5NO]$ soln. and titrate the sample and the control soln. with a $Hg(NO_3)_2$ soln. from a microburet. The Cl^- content is recalcd. to dichloroethane. From samples contg. 0.071, 0.142, 0.214, 0.286 and 0.409 the following results were obtained, resp.: 0.069, 0.144, 0.220, 0.279 and 0.411 mg. of Cl^-/100 ml. of soln. Seven references. W. R. Henn 7 8 9

Determination of formaldehyde. II. New method with ammonia. Arnaldo Foschini and Mario Talenti. *Z. anal. Chem.* **118**, 94–7(1939); cf. *C. A.* **33**, 7238³.—The following modified procedure has been found satisfactory. Place 8 ml. of the soln. (accurately measured) in a 150-ml. Erlenmeyer flask, add 35 ml. of 2 *N* NH_3 soln., shake and after standing a little while, distil off the excess NH_3, under reduced pressure, into 15 ml. of *N* H_2SO_4. Titrate the excess acid and from this calc. how much NH_3 was taken up by the aldehyde to form $(CH_2)_6N_4$. The results agree well with those obtained by the H_2O_2 method but are higher than the values obtained by direct titration of the excess NH_3 (without distn.), to a rosolic acid end point. W. T. H. 1 2

Detection of diazotizable amino groups by the drop method. S. I. Burmistrov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 328(1939).—Place 1–2 drops of an Et_2O or Me_2CO soln. of the compd. to be tested on a strip of filter paper (3 cm. wide), allow to dry and insert the paper into a flask above a layer of concd. HCl for 5 min. Expose the paper strip to the fumes of freshly prepd. $EtNO_2$ (EtOH + HCl and a few $NaNO_2$ crystals) for 5 min. Cross the drop spot with a streak of an Et_2O soln. of *N*-phenyl-2-naphthylamine, 2-naphthol (I) or resorcinol (II). If I or II is used, expose the paper to NH_3 fumes. Wet the paper by breathing or exposing to water vapors. Orange, red or violet color indicates the presence of a diazotizable NH_2 group in the compd. The method cannot be applied to tertiary aryl amines because their diazonium salts and azo compds. give nearly identical color reactions. Chas. Blanc 3 4

Quantitative drop analysis. XI. Determination of lactic acid. R. M. McCready, H. K. Mitchell and P. L. Kirk. *Mikrochemie* **28**, 23–9(1939)(in English); cf. *C. A.* **32**, 3291⁷.—The procedure described is an adaptation of a method which has been used for detg. larger quantities of lactic acid. The basic techniques necessary for titrating, distg., deproteinization, etc., have been developed for this analysis so that samples contg. 1.22 to 28.75 γ of lactic acid can be tested with satisfactory precision. The lactic acid is oxidized to AcH by boiling with an acid soln. of $KMnO_4$ in the presence of Mn^{++}. The aldehyde is aerated and distd. through a reflux condenser into $NaHSO_3$ soln. The excess bisulfite is removed with I_2 and the bisulfite compd. of the aldehyde detd. by titration with I_2 after treatment with $NaHCO_3$. W. T. H. 5 6

Identification of sugars and of mannitol. E. A. Beloruchev. *Lab. Prakt.* (U. S. S. R.) **14**, No. 9–10, 10–11 (1939).—On the basis of the characteristic properties of glucose, fructose, arabinose, sucrose, lactose, maltose and mannitol a table has been prepd. by means of which any of these substances can be identified. The properties which are considered are the reaction to Fehling's soln., the reaction to Barfod's reagent (13.3 g. of Cu acetate dissolved in 200 cc. of a 1% soln. of AcOH), the reaction to Fehling's soln. after inversion, the characteristics of the obtained osazones and the polarization of the substances. Three references are given. W. R. Henn 7

Color reactions between sodium nitroprusside and cyclic hydrocarbons. Gino Scagliarini and Elio Lucchi. *Boll. sci. facoltà chim. ind., Bologna* **1940**, No. 1–2, 58–9.—In continuation of previous investigations (cf. *C. A.* **31**, 7421⁷) color reactions of Na nitroprusside with indene (I), cyclopentadiene (II), propenylbenzene (III), allylbenzene 3,4- (IV) and 1,4-dihydronaphthalene, dihydroanthracene (V), anthracene, phenanthrene, fluorene, acenaphthene, cyclohexene, biphenyl, naphthalene and retene were studied, generally in MeOH soln. made slightly basic with KOH or NaOH. I and II gave an intense red coloration and a red ppt. III, IV and V gave a very weak reaction. The other compds. gave no particular coloration. The difference in the behavior of the compds., which are all able to add alkali metals, is discussed. The analytical results of the complex with I correspond with the formula $K_3[Fe^{II}(CN)_5NOC_9H_7]$. Dora Stern 8

Detection and determination of picrolonic acid. Sinogu Hukuda. *J. Biochem.* (Japan) **30**, 465–71(1939).—When picrolonic acid is heated slowly it undergoes a condensation, 2 mols. uniting with the loss of 2 NO and H_2O, giving a cryst. substance $C_{20}H_{14}N_6O_7$, with sharp m. p. at 170°. Treated with NaOH it yields a deep red color, proportional to the amt. of picrolonic acid. The reaction is sensitive to a dilu. 1:1,000,000 and is very specific. To carry out the test, first free the picrolonic acid from picrolonates by acidifying with H_2SO_4 and extg. with ether. Evap. the ether ext. to dryness and gradually heat the residue to 125° and keep at this temp. for 1 hr. Dissolve the residue in *N* NaOH and dil. to 10 cc. Prepare the standard soln. for matching the color by dissolving a weighed portion of the substance in $CHCl_3$. Evap. aliquots of this soln. to dryness and take up in 10 cc. *N* NaOH. Always use a standard which nearly matches that of the unknown sample. S. Morgulis 9

Analysis of benzyl chloride. G. S. Tsypin and A. I. Chekalina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 504–6 (1939).—If com. $PhCH_2Cl$ (I), contaminated by higher Cl derivs., is boiled 2 5–3 hrs. in H_2O, I is quantitatively hydrolyzed to $PhCH_2OH$, $PhCHCl_2$ (II) to BzH and $PhCCl_3$ (III) to BzOH. BzOH and the HCl formed in the reaction are detd. in the soln. by titration with KOH in EtOH and phenolphthalein or methyl blue. The partial oxidation of the BzH during the hydrolysis is completely prevented in the presence of a little hydroquinone. Place 0.5 g. of I in a Schimmel flask (having a conical bottom and connected by a ground-in joint with an upright air condenser), neutralize with aq. 0.03 *N* KOH to phenolphthalein, add 1 ml. of 0.05% hydroquinone and 20 ml. H_2O and boil 2.45 hrs. in the elec. air bath. Flush the condenser with 20 ml. of neutralized EtOH (free from CO_2) and det. the total acidity by titration with 0.1 *N* KOH in EtOH and the indicator. Add to the soln. a few drops of $K_2Cr_2O_7$ soln. and titrate with 0.1 *N* $AgNO_3$ to a faint coloration. Det. BzH by the method of Stewart and Donnally (*C. A.* **26**, 5479) by iodometric titration of the excess of $NaHSO_3$ added to the soln. to form the bisulfite compd. Formulas are given for calcg. I, II and III from the results of analysis. Chas. Blanc 10

Rapid determination of bornyl chloride in pinene saturated with hydrogen chloride. V. I. Lyubomilov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 326–7(1939).—In the production of bornyl chloride (I) from pinene and HCl, I can be roughly detd. by alternate cooling at 12° and filtering of the reaction mixt. until the filtrate forms no ppt. The wt. of ppt. gives I. Chas. Blanc 11

Determination of some war gases in samples of soil. C. J. de Wolff. *Pharm. Weekblad* **76**, 1612(1939).—Chloroacetophenone: Heat 10 g. sample of soil with 5 cc. EtOH and filter. To 1 cc. of the filtrate add 5 drops of water and 0.5 g. KI. Add 1 cc. of 10% NH_4OH and then add 0.1 *N* I until the yellow color persists. Other aliphatic ketone tests can be used. Adamsite (Ph_2AsCl): To the filtrate add an equal vol. of a 1% soln. of NaCl in 1% HNO_3. Filter if necessary. Add concd. H_2SO_4 (ring test). The appearance of a blue ring indicates Ph_2NH. Felix Saunders 12

A simple and rapid method for determining nicotine. A. Verda and E. Herzfeld. *Z. anal. Chem.* **118**, 9–13 (1939).—Take 5 g. of tobacco and distil with steam into a receiver contg. 3 g. of gum arabic. Stop distg. after obtaining 300 ml. of distillate. Mix and take two 5-ml. portions in sep. tubes. To each add 5 ml. of 1% gum arabic soln. From the 2nd tube pipet off 5 ml. of soln. and to this add 5 ml. of gum arabic soln and continue in this way until a series of tubes is obtained, each representing half as much of the sample as the previous one. To each tube add 0.5 ml. of silicotungstic acid reagent and see when the appearance of opalescence stops. As little as 0.31 mg. of nicotine suffices to give the test. By comparing with standards good results can be obtained. W. T. H. 13

Furnace for micro-Carius detn. (Kuck, Griffel) **4**. Examn. of lactose content of normal milk (Jørgensen) **12**. Quant. estn. in the qual. course (Swift) **2**.

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Directions for Quantitative Spectrographic Analysis of Solid Alloys by the Spark Method. Jena: C. Zeiss. 34 pp.

Analysis of gas mixtures. M. S. Gershenovich, G. F. Daletskiĭ and N. Z. Kotelkov. Russ. 52,083, Oct. 31, 1937. The gases are selectively oxidized over a catalyst prepd. according to Russ. 50,659 by pptg. a Pt salt on an oxidized surface of a Ni-Cr alloy and reducing.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Brilliancy of transparent precious stones. W. Fr. Eppler. *Fortschr. Mineral. Krist. Petrog.* **23**, 1-40(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 285-6.—The relative importance for brilliancy of absorption, luster, refraction, total reflection, dispersion and scintillation is discussed with reference to the best method of cutting various stones. Refraction is shown to be the most important. Ideal methods of cutting 22 varieties are given. C. A. Silberrad

White gem-stones with bluish opalescence. Marie Therese Mackowsky. *Deut. Goldschmiede-Ztg.* **41**, 335 6 (1937); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 579.—Some amethysts on heating above 560° turn white with an opalescent shimmer. They are then termed commercially "white topaz." The more correct name "white amethyst" is suggested. The means of distinguishing them from other similar stones, e. g., milky quartz, by means of d., *n* and H are detailed. C. A. Silberrad

Röntgenographic study of $MgHPO_4.7H_2O$ (phosphorrösslerite). G. Hägele and F. Machatschki. *Zentr. Mineral., Geol.* **1939A**, 297-300; cf. Friedrich and Robitsch, *C. A.* **33**, 5777[4].—Weissenberg photographs give $a = 11.35$, $b = 25.36$, $c = 6.60$ A., β approx. 95°, with 8 mols. of $MgHPO_4.7H_2O$ in the unit cell. $a:b:c = 0.4475:1:0.2605$. The space group is probably C_{2h}^5, but the structure is not identical, as might have been supposed, with that of $FeSO_4.7H_2O$. Michael Fleischer

The distribution of indium in Finnish minerals and its separation from other metals. Olavi Erametsä. *Ann. Acad. Sci. Fennicae* **A51**, No. 1, 92 pp.(1938)(in German).—The In content of 32 important Finnish minerals was detd. with a Zeiss three-prism-glass spectrograph with the use of the Cu arc. The procedure is given in detail, as well as a discussion of the effects of interfering elements. Flotation expts. with ore from the Pitkäranta region showed that the In was present both in zinc blende and in another In-bearing mineral. Spectral analysis was used to follow the concn. of In in the residues and to identify the In in the ppts. The prepn. of In oxide is described in detail. George Ayers

Oriented inclusions of staurolite, zircon and garnet in muscovite. Skating crystals and their significance. Clifford Frondel. *Am. Mineral.* **25**, 69-87(1940).—Staurolite, zircon and garnet were deposited on the (001) of the mica from suspension; statistically, preferred orientations occur at crystallographic positions in which directions of relatively low index in the planes of contact of the inclusions and the muscovite coincide. C. H. H.

Spectral analytical investigations and luminescence observations on fluorite and apatite. Herbert Haberlandt. *Mitt. Inst. Radiumforsch.* No. 414, in *Sitzber. Akad. Wiss. Wien, Math. naturw. Klasse*, Abt. IIa, **147**, 137-50 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 241-2; cf. *C. A.* **31**, 8452[6].—Further spectral analytical examn. of various fluorites and apatites exhibiting marked fluorescence or thermoluminescence and comparison with the spectra of artificial prepns. contg. Mn, Yb and Y show that the central portion of crystals of Spitzkoppe fluorite is a yttrofluorite contg. about 10% of Y, while the green outer portion contains at most 1% Y and 0.1% Yb. (The method used, however, is somewhat insensitive to Sm, Tb, Dy and V.) In similar fashion in various samples of apatite amts. of Y, Yb and Mn of the orders, resp., of 0.1, 0.01 and 0.001-1.0% were proved and frequently also Fe, and occasionally Ce, As and (or) V. In apatite from Juanilla As (up to 0.22%) and V were found. C. A. S.

Synthetic stibnite and bismuthinite. E. Abbolito. *Periodico mineral.* (Rome) **9**, 77-83(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 80.—The optical properties (color, pleochroism, reflecting power, etc.) of synthetic stibnite and bismuthinite are identical with those of the natural crystals; only the anisotropic effects are stronger than in the natural crystals. C. A. Silberrad

Crystallographic examination of Hungarian pyrite. L. Tokody. *Math. és természettudományi Közlemények* **38**, No. 2, 1-55(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 525-8.—The various crystal forms (many new) of pyrite occurring at 20 different Hungarian localities are described, with in many cases the minerals with which the pyrite is assocd. C. A. Silberrad

Miargyrite crystals from Randsburg, California. Joseph Murdoch. *Am. Mineral.* **24**, 772-81(1939).—A total of 47 forms was observed; 313 and 322 were new, forms 233 and 205 were confirmed. C. H. Hale

Specularite -alunite mineralization at Hickeys Pond, Newfoundland. Arthur L. Howland. *Am. Mineral.* **25**, 34-45(1940).—Quartz, alunite and specularite occur together in a silicified schist; alunite may average nearly 20% of the rock; the Fe content is about 3%. Mineralization took place along shear zones which paralleled the contact of granodiorite intrusive into greenstone. C. H. Hale

The lamellar structure of potash-soda feldspars. S. H. Chao and W. H. Taylor. *Proc. Roy. Soc.* (London) **A174**, 57-72(1940).—See *C. A.* **33**, 8531[9]. F. Gonet

Feldspars from crystalline spessartites. Rudolf Mosebach. *Senckbergiana* **20**, 346-63(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 566.—Analyses and optical properties of 6 potash feldspars from various pegmatites, kersantite and augen-gneiss, and of one plagioclase from pegmatite are compared, and their probable relations and origins discussed. C. A. Silberrad

Nephrite, carcaro and asbestos in the East Thuringian Vogtland schistose hills. Eberhard Rimann. *S. B. u. Abh. naturw. Ges. Isis* (Dresden) **1936/37**, 9(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 565; cf. *C. A.* **31**, 1325[4].—New occurrences of nephrite, cellular nephrite and carcaro in paleopicrite are described. Their formation has followed serpentinization of the ultrabasic magma by carbonate-contg. residual solns. C. A. S.

Green hornblende, asbestos, phlogopite, zircon and apatite from Lojane near Kumanovo. M. Tajder. *Bull. soc. sci. Skoplje* **18**, *Sect. sci. nat.* **6**, 193-200(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 135-6.—In the

chromite of the Lojane mine there occurs together with phlogopite, asbestos, zircon and apatite an emerald-green amphibole, which has n_α 1.6188, n_γ 1.6465, pleochroism light greenish brown and green, d. 3.042. Analysis of material sepd. from chromite by a soln. of d. 4.2: SiO_2 49.63, TiO_2 0.43, Al_2O_3 8.02, Fe_2O_3 0.10, Cr_2O_3 2.28, FeO 2.77, MgO 21.20, CaO 11.73, Na_2O 1.74, K_2O 0.16, H_2O+ 2.28%, corresponding with an isomorphous mixt. of 45% hornblende, 45% tremolite and 10% kupfferite. Complete analyses of the asbestos and phlogopite are also given. The apatite forms clear-green prisms up to 5 × 1 mm. C. A. Silberrad

Garnets and their role in nature. Lewis L. Fermor. *Indian Assoc. Cultivation Sci., Spec. Pub.* No. 6, 105 pp. (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 684–6; cf. *C. A.* **32**, 7373[5].—The view is put forward that in addn. to the 6 usually recognized garnets there are 10 others, of which 4 are khoharite, $Mg_3Fe_2^{++}(SiO_4)_3$, skiagite Fe_3^{++}-$Fe_2^{+++}(SiO_4)_3$, calderite $Mn_3^{++}Fe_2^{+++}(SiO_4)_3$, and blythite $Mn_3^{++}Mn_2^{+++}(SiO_4)_3$, examples of which are described. A system of nomenclature is described, e. g., spandite (= spessartite + andradite). Possible methods of formation are discussed. C. A. Silberrad

A review of mineralogical investigations of tourmaline. T. N. Agafonova. *Trudy Tsentral. Nauch.-Issledovatel. Lab. Kamneĭ Samotsvetov Tr. "Russkie Samotsvety"* **1938**, No. 5, 62–70; *Khim. Referat. Zhur.* **2**, No. 5, 32 (1939).—A chronological review of all investigations of the crystallography, optic properties, pyroelectricity and chem. compn. of tourmalines from the 18th century to 1937. W. R. Henn

Stilbite in tonalite in Val Nambrone (Adamello group). Edoardo Sancro. *Periodico mineral.* (Rome) **9**, 205–12 (1938); *Neues Jahrb. Mineral., Geol.* Ref. I, **1939**, 266.—Yellow and yellowish white crystals of stilbite occur in druses in the tonalite of the Val Nambrone. They have d. 2.159, n_α 1.492, n_γ 1.501. Analysis: SiO_2 55.21, Al_2O_3 16.91, Fe_2O_3 trace, CaO 8.10, MgO 0.25, Na_2O 1.16, K_2O 0.45, H_2O 18.27%. A discussion as to the probable origin follows. C. A. Silberrad

Some zeolites from Erythrea. Antonio Scherillo. *Periodico mineral.* (Rome) **9**, 61–9 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 110–11.—Intergrown chabasite and thomsonite from Asmara, and stilbite (d. 2.14, n_α 1.499, n_γ 1.488), and scolecite (d. 2.275, n_α 1.510, n_β 1.516, n_γ 1.517) from Alomatà are described with complete analyses and dehydration curves. C. A. S.

Chlorites from a vein of auriferous quartz from Erythrea. Antonio Scherillo. *Periodico mineral.* (Rome) **9**, 71–6 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 102.—Analyses of 2 practically identical samples of chlorite from the auriferous quartz veins of Ugaro and Gola-Gul are given; they consist of amesite, strigovite and serpentine in the proportions 17:10.4. C. A. S.

Celadonite in an eruptive rock in Erythrea. Antonio Scherillo. *Periodico mineral.* (Rome) **9**, 253–64 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 105–6.—Celadonite occurs in druses in basaltic lava near Asmara. The druses are coated with zeolites, chiefly thomsonite and chabasite. The celadonite, pseudomorphous after olivine, is of a greenish yellow to greenish color and forms cryst. aggregates whose compn. indicates the formula $KMg_3Fe_2^{+++}Si_9O_{26}.nH_2O$. The dehydration curve shows the main loss of H_2O to occur at about 450°. C. A. S.

Synopsis of glauconitization. Zyun-iti Takahasi. *Recent Marine Sediments: a symposium, Am. Assoc. Petroleum Geol.* **1939**, 503–12.—A summary of work on the chem. compn., dehydration and origin of glauconite. George Ayers

Biotite-glauconite transformation and associated minerals. E. Wayne Galliher. *Recent Marine Sediments: a symposium, Am. Assoc. Petroleum Geol.* **1939**, 513–15. George Ayers

Some new mineral finds (dumortierite, scapolite) from the Kor Alps region, Styria and Carinthia. Heinz Meixner. *Zentr. Mineral., Geol.* **1940A**, 19–24.—Descriptive. Dumortierite was found as needles in scapolite crystals at Schwanberg, Styria. Scapolite, assocd. with tremolite, phlogopite and muscovite, occurs at Waldenstein, Carinthia. It is partly altered to montomorillonite. Michael Fleischer

A green zircon. J. Bolman. *Chem. Weekblad* **36**, 752–3 (1939).—An unusual variety of Ceylon zircon has phys. properties quite different from the other color varieties. In daylight its color is yellowish green, transparency is excellent, sp. gr. is 4.182 and n_ω 1.925, n_ϵ 1.984. N. B.

Heterogenetic polymorphism. Percy Quensel. *Geol. Foren. Forh.* **60**, 676–7 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 355–6.—Heterosite and Na purpurite, both $(Mn^{+++}, Fe^{+++})PO_4$, differ only in the proportions of Mn^{+++} and Fe^{+++}, and are produced by complete removal of alkalies from, and oxidation of the Mn^{++} and Fe^{++} in, triphylite and varulite, resp. The complicated structure of Na purpurite is probably to be explained as due to rearrangement consequent on removal of the large Na atom, removal of the smaller Li atom causing nothing of the sort. Such varying lattice structure due to differing chem. compn. of the original material is termed *heterogenetic polymorphism.* C. A. Silberrad

Chinglusuite. A new mineral. V. I. Gerasimovskiĭ. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. géol.* **1938**, No. 1, 153–6 (in English, 156–7); *Khim. Referat. Zhur.* **1**, No. 11–12, 66–7.—The mineral is found in the form of 0.5 cm. black opaque grains with a hardness of 2–3, a sp. gr. 2.151 and n = 1.582. It is easily dissolved in concd. HCl and in hot concd. HNO_3. A complete chem. analysis is given. According to G. the empirical formula of chinglusuite is $2(Na,K)_2O.5(Mn,Ca)O.3(Ti,Zr)O_2.14$-$SiO_2.9H_2O$. In its chem. compn. the mineral differs from all known titanosilicates but resembles neptunite and astrophillite. Al, Be, Sr, Sn and the rare earths were found spectroscopically. W. R. Henn

Stiepelmannite, a new mineral of the hamlinite group containing yttrium and rare earths. Paul Ramdohr and E. Thilo. *Zentr. Mineral., Geol.* **1940A**, 1–8; cf. *C. A.* **30**, 8082.—Small, highly lustrous crystals, observed in a pegmatite at Klein-Spitzkopje, German S. W. Africa, assocd. with beryl, topaz, phenakite, albite, quartz, microcline and yttrofluorite, were found to be a new mineral. Analysis gave SiO_2 0.29, rare earths (mol. wt. 326) 29.25, ZrO_2 1.12, CaO 0.50, Al_2O_3 30.83, H_2O 11.07, F probably present in small amt., P_2O_5 (by difference) 26.94. This gives the formula $(Y, Yb, etc.)PO_4.AlPO_4.2Al(OH)_3$, similar to the Ce mineral florencite. The mineral is rhombohedral, with α = 88°32′ and $a:c$ = 1.1.272. X-ray study gives a = 9.54 A. for the rhombohedral unit cell, which contains 4 mols. In the hexagonal setting a = 6.75, c = 16.52 A. The sp. gr. is 3.671 – 3.713; the hardness is approx. 6. Optically, stiepelmannite is pos., with n_0 = 1.695$_4$, n_ϵ 1.705$_4$. The basal cleavage is much less perfect than that of other minerals of this group, and the fracture is conchoidal. Michael Fleischer

Barite and stilpnosiderite from Rudabánya. E. Brummer. *Földtani Közlony* **68**, 68–71 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 135.—Two varieties of barite crystals are described. They occur on Cu-cuprite-malachite crystals, on limonite and with calcite in the heavy spar veins of the spathic Fe ore. Small quantities of stilpnosiderite were also observed, embedded in marcasite. C. A. Silberrad

Minerals newly reported from West Australia. Edward S. Simpson. *Ann. Rept. Chem. Branch, Mines Dept., West. Australia* **1937**, 12 pp. (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 593; cf. *C. A.* **33**, 4915[4].—These include simpsonite and its weathering product metasimpsonite, beudantite, bindheimite, beidellite, triphylite, carminite and calciosamarskite. Analyses of 8 minerals and 4 rocks are given. C. A. Silberrad

Meteoritic iron phosphide. John D. Buddhue. *Popular Astron.* **46**, 282–5 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 293–4.—Examn. of some 70 analyses of schreibersite and rhabdite in most cases showed they had the compn. Fe_3NiP; in others there is probably solid soln. Lamellar intercalations are considered; thus in Fe from the Canyon Diablo a piece of schreibersite occurs in

kamacite with definite orientation. Such occurrences are called *Shepard-lamellae*. C. A. Silberrad

A test of the abundance of the heavy isotope of carbon in a graphite meteorite. F. A. Jenkins and Arthur S. King. *Publ. Astron. Soc. Pacific* **48**, 323–5(1936); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 293.—Spectroscopic examn. of the Edlen (Arizona) meteor (cf. Brady, *C. A.* **25**, 1462) shows the C contains the same proportion of the C^{13} isotope as Acheson graphite, i. e., 1% ± 0.1. The spectrum of many stars shows a greater abundance of it. C. A. S.

Meteoric iron of Agua Blanca. Enrique Herrero Ducloux and Ramón G. Loyarte. *Inst. museo univ. nacl. La Plata, Notas museo La Plata* **4**, Geol., 339–51(1939).—Analysis of 2 fragments of a meteorite fallen at an unknown date, in the Province of Rioja, gave d. 7.660, 7.860; Si residue 0.034, 0.048; Fe 95.354, 92.220; Ni 4.512, 7.420; Co 0.189, 0.378; graphitic C 0.032, 0.021; S 0.015, 0.012; P 0.216, 0.219; Mn 0.006, 0.007; Sn 0.032, 0.032%; Cr traces; Mo traces; Cu traces. A. H. Krappe

Note on the meteorite of Aguila Blanca. Enrique Herrero Ducloux. *Inst. museo univ. nacl. La Plata, Notas museo La Plata* **4**, Geol. 353–60(1939).—An analysis of a meteorite, fallen in 1921 in the Province of Cordoba, gave d. 3.531, SiO_2 39.215, Al_2O_3 3.214, Fe_2O_3 trace, FeO 10.319, MnO 0.178, TiO_2 trace, Cr_2O_3 0.610, CaO 1.724, MgO 22.611, NiO 1.900, CoO trace, K_2O 0.213, Na_2O 1.386, SO_3 trace, P_2O_5 0.213, S 1.064, Fe 15.576, Ni 1.985, Co 0.034, Mn 0.011 and P 0.035%. A. H. Krappe

German ore deposits and the chemistry of ore deposit formation. K. Keller. *Metallwirtschaft* **18**, 985–90(1939). —A review. Michael Fleischer

Mineralogy of the Esaul polymetallic deposits in the Nagol'nyĭ Kryazh region. P. K. Belik. *Zapiski Vserossiĭskogo Mineral. Obshchestva* **1938**(2nd Ser.), Pt. 67, No. 1, 67–73; *Khim. Referat. Zhur.* **2**, No. 5, 31(1939).—The gang minerals are quartz and ankerite. Most veins contain no ores. Among the ore-contg. deposits are found galena, zinc blende, bournonite, tetrahedrite, boulangerite and jamesonite. The last 2 minerals are described in detail and analyses are given. The deposits are considered to belong to the upper mesothermal zone. W. R. Henn

Magmatic metallogenesis. Cornelio L. Sagui. *Pub. inst. fisiograf. y geol., Univ. nacl. Rosario* **3**, 5–15(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 188–90; cf. Holmes, *C. A.* **20**, 3414.—Radioactive evidence and other evidence in favor of the magmatic origin of Pb and some other ores, as opposed to its origin through segregation from the surrounding rocks, are discussed, and the suggestion is made that under the enormous pressures on a deep-seated magma some of the lighter atoms might unite to form Pb, etc. C. A. Silberrad

Bismuth deposits in the Ural mountains. F. I. Rukavishnikov. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. géol.* **1938**, No. 1, 147–51; *Khim. Referat. Zhur.* **1**, No. 11–12, 68(1938).—The Karabutakskiĭ deposits consist of 6 quartz veins 0.15–0.60 m. cutting through granite. The paragenesis of the minerals is muscovite, bismuthite, chalcopyrite, molybdenite, pyrite, beryl, covellite, Bi ocher, Mo ocher, limonite and Cu green. A geochem. diagram of the Karabutakskiĭ vein is given. W. R. H.

Zoned ores of zinc blende and galena. Pierre Evrard. *Ann. soc. géol. Belg., Bull.* **63**, 104–7(1939–40).—Polished surfaces, etched with hot *N* HCl, indicated the brown blende (which surrounded cream-colored blende itself enclosing galena crystals) owed its color and lesser etching to the presence of minute inclusions of galena, often less than 5 μ in size. D. W. Pearce

Rutile in Goyaz (Brazil). O. H. Leonardos. *S. F. P. M. Rio de Janeiro, Bol.* No. **30**(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 186.—The rutile occurs almost pure (averaging 97% TiO_2 and 3% Fe_2O_3) in porphyroblastic masses often weighing several kg., in Algonkian metamorphic schists. So far only alluvial deposits have been worked; the yield was some 400 tons in 1937. C. A. Silberrad

Ilmenite deposits in the region of Egersund and Bjerkreim (Norway). P. Michot. *Ann. soc. géol. Belg., Bull.* **63**, 80–3(1939–40).—The anorthosite-leuconorite can be subdivided by the ilmenite content; the older intrusion has only rare, small grains but the younger is rich in ilmenite. It was concd. in residual liquors after the crystn. of the main mass of the intrusions. D. W. Pearce

The wolframite occurrence at Rothau. J. Frieser. *Z. prakt. Geol.* **47**, 188–92, 205–8(1939).—Veins of ferberite in granite and phyllite are being prospected. An analysis of ore concentrates (WO_3 65%) is given. M. F.

Chromite at Piui (Minas Geraes, Brazil). G. B. Guimarães and J. M. de Oliveira. *Mineração e metallurgia* **3**, No. 14(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 220.—This recently discovered deposit of chromite is characterized by its high content (57%) of Cr_2O_3. C. A. Silberrad

Radium, uranium and polonium in Canada. E. Kohl. *Z. prakt. Geol.* **46**, 188(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 187.—The various deposits, yielding one or more of Ra, U, Ag, Au, Ni and Co in the neighborhood of the Great Bear and Athabasca lakes, are briefly described. C. A. Silberrad

The Yamagata bentonite and its origin. VII. Relation between bentonite and acid-clay. Mune Utida. *J. Japan. Ceram. Assoc.* **47**, 63–7(1939); cf. *C. A.* **33**, 1113⁶.—U. concludes that bentonite and acid-clay or fuller's earth is the same clay substance and they must contain at least montmorillonite and beidellite as 2 common principal minerals. Av. compn. is tabulated. S. Kondo

Ceramic clay in Hawaii. C. K. Wentworth, R. C. Wells and V. T. Allen. *Am. Mineral.* **25**, 1–33(1940).—Ceramic clay occurs in the summit swamps of Molokai, Maui and Kauai and along the crest of the Koolau range on Oahu. Only the Koolau clay has been used and tested in substantial amts. Three complete analyses show marked variation of compn. TiO_2 may reach 15%, probably present as leucoxene and ilmenite. Illite is the chief mineral; kaolinite from plagioclase is present in small amt. The clay has apparently formed by the weathering of basalt. C. H. Hale

The diatomite deposit of Hateg Dobroudja, Rumania. Christache V. Oprea. *Bull. sect. sci. acad. roumaine* **20**, No. 8–10, 49–60(1938)(in French).—From the surface downward is arable soil (0.3 m. thick), altered loess (0.5 m.), fine powdery limestone (0.3 m.), diatomite (2–2.5 m.), red calcareous clay (0.1–0.2 cm.) and limestone. The diatomite, sp. gr. 2.14, when dry has an absorbing power of 97–138 per 100 g. Analysis gave SiO_2 73.29, Al_2O_3 9.12, Fe_2O_3 3.71, CaO 0.53, MgO 0.14, H_2O 11.48, CO_2 + org. 1.73%. Comparison is made with 6 analyses of similar materials (cf. Filipescu, *Inst. geol. Românieĭ, Compt. rend.* **18** (1929–30); Preda, *Ibid.* **20**, 67–78(1931–32)). D. W. Pearce

The coal deposits of northern Hungary and Carpatho-Russia. István Vitális. *Bányász. Kohász. Lapok* **73**, 21–6(1940); cf. *C. A.* **34**, 1152⁹.—A general description. S. S. de Finály

Salt content of the Raselm seas. V. Grimalschi and Vl. Hohor. *Bull. sect. sci. acad. roumaine* **20**, No. 1–3, 17–26(1938)(in German).—The influences of the various canals, etc., upon the NaCl content of the Raselm and Babadag seas were established by monthly detns. of salt content. D. W. Pearce

Annual review of Swedish geological literature for 1938. R. Sandegren. *Geol. Fören. Förh.* **61**, 463–89(1939); cf. *C. A.* **33**, 3304³.—Twenty-five out of the 139 titles are chem. Some are accompanied by short abstracts in English. Wilhelm Segerblom

Isodielectric lines and geologic structure. H. Löwy. *Phil. Mag.* **29**, 32–5(1940); cf. *Ibid.* **27**, 576(1939).—Formulas have been previously given for the dielec. consts. of rocks not satd. by water vapor. Special applications of the formulas are considered here. A formula is derived for the relationship between the dielec. consts. and the infiltration depth of rain. The water content of rocks can be calcd. Data are given for observations carried out in part of the Egyptian Western Desert. Isodielec. lines

are defined. These reveal the hydrologic and hydrographic structure, being lines of max. water content. Applications of the isodielec. lines are illustrated.
S. Tolansky

Propylitization and related types of alteration of the Comstock Lode. Robert Coats. *Econ. Geol.* **35**, 1 16 (1940).—Review of the literature shows that the term propylitization has been used to describe a variety of different types of alteration, which may have been produced in different ways. Re-study of the propylites of the Comstock Lode, the type locality, leads to the suggestion that the term propylite be restricted to rocks which are altered andesites contg. epidote, chlorites, albite and calcite, the ferromagnesians having been altered as well as the plagioclase. In the Comstock Lode, propylitization is the result of hydrothermal metamorphism. M. Fleischer

A case of lateritization in the Belgian Congo. M. Legraye. *Ann. soc. géol. Belg., Bull.* **63**, 76-9(1939-40).— "Dolerites," with ophitic texture, contg. plagioclase, augite and hornblende as essential and biotite, chlorite, sericite and quartz as accessory constituents have become lateritized (see Lacroix, *Publ. bur. études géol. et minières coloniales*, **1934**; Agovnoff, *et al.*, *Ibid.* No. **12**, 1939); they yield a yellow earth, dotted with white and brown patches which have come from decompn. of feldspar, augite and hornblende in place. D. W. Pearce

Granitization near Killarney, Ontario. Terence T. Quirke. *Bull. Geol. Soc. Am.* **51**, 237 54(1940); cf. *C. A.* **24**, 4248; Jones, *C. A.* **25**, 2671.—Q. reiterates, on further study, his previous opinion that the so-called Killarney stony porphyry is an ultra-metamorphosed (migmatized) quartzite. Michael Fleischer

Glaucophanic hornblende in Bohemia. Michael Stark. *Vestnik Královské České Společnosti Nauk* **1936**, 11, 7 pp.(1937); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 263.—This occurs in the cryst. schists of Bohemia and originates from rocks of the calc-alkali and alkali series. Secondary hornblendes of this tract, not essentially glaucophanic, are also described. C. A. Silberrad

Pegmatites and their minerals. Rudolf Mosebach. *Senckenbergiana* **20**, 443-62(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 548-9.—Complete analyses are given of muscovite, biotite, black tourmaline, barite and garnets (8 from pegmatites, and 2 from other rocks). The pegmatitic garnets are all spessartite contg. up to 40% almandite, some grossularite and occasionally pyrope.
C. A. Silberrad

The rapakivi of Head Harbor Island, Maine. Ruth D. Terzaghi. *Am. Mineral.* **25**, 111 22(1940).—Large rounded K-feldspar phenocrysts are mantled by oligoclase; the rapakivi is a facies of the normal granite of Jonesboro. The origin of this structure appears to have been igneous; alternate pptn. of perthite and oligoclase is perhaps due to change of phase boundary rather than change of magma compn. Analyses of the perthite ovoids and of the oligoclase are given. C. H. Hale

The chemistry of the lamprophyre and mondhaldeit dike rocks of the Kaiserstuhl. J. Soellner. *Zentr. Mineral., Geol.* **1939A**, 300-19, 321-38(1939).—The course of differentiation of the Kaiserstuhl rocks has been assumed to be anomalous. Three new analyses of monchiquite show that it is a typical lamprophyre rock, but 2 new analyses of mondhaldeit rock indicate that it is not a lamprophyre, but is related to monzonite-syenite. The previous analyses were in error, and the course of differentiation was quite normal. Michael Fleischer

The change from greywacke to schist near Blenheim, Marlborough. W. J. Branch and J. A. Bartrum. *New Zealand J. Sci. Tech.* **21B**, 157-61(1939).—Petrographic study shows that the change is abrupt, not gradational, as previously supposed. Michael Fleischer

The weathering of the Nordingrå Gabbro. Harry v. Eckermann. *Geol. Foren. Forh.* **61**, 490-6(1939)(in English); cf. *C. A.* **32**, 6987[7], 6988[6].—Analyses of fresh pegmatitic gabbro and arkose gabbro are given. The pyroxene was most strongly attacked by weathering, the plagioclase next and the orthoclase least; the apatite was unaffected. On the assumption that Al_2O_3 is the least sol. component and const., the arkose analysis recalcd. to the gabbro Al_2O_3 percentage shows a loss in SiO_2 (8.4%), CaO (6.4%) and Na_2O (1.1%) and a gain in Fe_2O_3 (4.9%), K_2O (1.0%) and H_2O (0.8%); also a gain in the ferric-ferrous ratio. A similar comparison is given for the arkose and rapakivi ratio. The causes for the changes are discussed, the different compns. of the feldspars seeming the most likely cause. Wilhelm Segerblom

Geological foundation of the hot springs of Johannisbad. II. The rocks. A. Watznauer. *Firgenwald* **11**, 101-11 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 86-9.—A fairly detailed description of these rocks and their mutual relations, with suggestions as to their probable origins. They are classified as rocks of the quartzite series; of the calcareo-red shale series, including dolomitic limestone; calcsilicate rocks and green schists; rocks contg. well-developed albite crystals, the albite constituting up to 90% of the rock; rocks contg. glaucophane or glaucophenitic hornblende; rocks contg. much tourmaline (these are usually connected with the last 2 classes) and dikes of hornblende and mica porphyrites.
C. A Silberrad

Organic content of recent marine sediments. Parker D. Trask. *Recent Marine Sediments: a symposium*, *Am. Assoc. Petroleum Geol.* **1939**, 428-53.—A review of the nature and amt. and source of the org. matter in sediments. 67 references. George Ayers

Mineral analysis of sediments. F. J. Pettijohn. *Recent Marine Sediments: a symposium*, *Am. Assoc. Petroleum Geol.* **1939**, 592-615.—A review and detailed procedure for the detn. of mineral frequency in sediments. 57 references. George Ayers

Base exchange in relation to sediments. W. P. Kelley. *Recent Marine Sediments: a symposium*, *Am. Assoc. Petroleum Geol.* **1939**, 454-65.—Sediments relatively high in clay are especially susceptible to base exchange, with modification of their properties. A discussion of base exchange in relation to crystal structure and to sea water is included. 19 references. George Ayers

Application of x-ray methods to the investigation of recent sediments. Martin Mehmel. *Recent Marine Sediments: a symposium*, *Am. Assoc. Petroleum Geol.* **1939**, 616-30.—After mech. analysis of the sediment, the particles larger than 1 micron are analyzed optically, while those less than 1 micron in radius, if cryst., are detd. by x-ray methods. A detailed procedure is given for identification of calcite, aragonite, quartz, mica, kaolinite, halloysite, montmorillonite, dolomite, feldspar, augite, hornblende, muscovite, biotite, glauconite, diaspore, bauxite, hydrargillite or limonite in sediments by x-ray methods, provided it makes up 5% or more of the sample. 49 references. George Ayers

Aeolian deposits in marine sediments. O. E. Radczewski. *Recent Marine Sediments: a symposium*, *Am. Assoc. Petroleum Geol.* **1939**, 496-502.—Sediments probably due mostly to regular dust falls off the west coast of Africa, in the vicinity of Cape Verde, contain many rounded quartz grains that are coated with red-brown iron oxide. The no. of these desert quartz grains in a sediment gives an indication of the extent to which the deposit is of aeolian origin. 17 references. George Ayers

General procedure in studies of recent sediments. W. H. Twenhofel. *Recent Marine Sediments: a symposium*, *Am. Assoc. Petroleum Geol.* **1939**, 525-31.—Procedures for field studies, sampling and lab. analyses are given in detail. George Ayers

Mechanical analysis [of sediments]. Stina Gripenberg. *Recent Marine Sediments: a symposium*, *Am. Assoc. Petroleum Geol.* **1939**, 532-57.—A review of methods for the detn. of the particle size-distribution relationships of sediments. 64 references. George Ayers

Magnetite content of the sands at the mouth of the Simeto River. Barbara Tanteri. *Ann. chim. applicata* **29**, 474-9(1939).—These sands contain 23¼% magnetite which is similar in compn. to the magnetite in the lava and sands of the nearby Monte Rossi. A. W. Contieri

Recent loess, mode of formation and origin in Upper Normandy and Picardy. Constant P. Nicolesco. *Bull. sect. sci. acad. roumaine* **20**, No. 1-3, 48-58(1938)(in French).—Review and discussion. D. W. Pearce 1

Nature of soil parent materials in Southern Brit. Columbia (Kelley) **15**. Surface diffusion on polycrystals and processes of staining of minerals (Nikiforov) **2**. Comparative x-ray studies of arsenates and selenates (Kokkoros) **2**. Dental enamel and F (Klement) **11F**. Raw material of prehistoric and early Fe (Hundt) **9**.

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Contributions to a Knowledge of the Lead and Zinc Deposits of the Mississippi Valley Region. Edited by **Edson S. Bastin**. New York: Geological Society of America. 156 pp. 2

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Developments in metallurgical engineering and metallurgical teaching in the last ten years. D. J. Demorest. *Ohio State Univ., Eng. Expt. Sta. News* **12**, No. 1, 11-13 (1940). E. J. C. 3

Single crystals in metallurgy; their production and utilization in the study of deformations. Léon Guillet, Jr. *Rev. gén. sci.* **50**, 424-32(1939).—A review with 12 references. G. G.

Raw material of prehistoric and early iron. Rudolf Hundt. *S.-A. Geraer Ztg.* **1938**, 2 pp.; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 735.—From the sites of bloomery hearths and places of finding blooms (weighing up to 100 lb.), it is concluded that the first ores smelted were clay ironstone nodules from the Upper Zechstein of E. Thuringia. C. A. Silberrad 4

Whence came tin in the early bronze age? Wilhelm Witter. *Mannus* **28**, 446-56(1936); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 733 4.—Possible sources and probable dates of earliest working are discussed. C. A. Silberrad 5

Progress in milling practice and equipment. A. W. Fahrenwald. *Mining Congr. J.* **26**, No. 1, 17-22(1940).—A survey of progress in mineral dressing and technology including mech. advances, gravity concn., stratification, thickening, filtration, flotation and the use of the new wetting agents as frothers. Leopold Scheflan

Concentrating Tri-State ores by differential-density cone. Elmer Isern. *Mining Congr. J.* **26**, No. 2, 16-19 (1940).—The ores of the district in Oklahoma, Kansas and Missouri consist principally of galena and sphalerite in a silicate gang of chert or flint. Fine-ground galena in water is used as a concg. medium; it has the same d. and viscosity as has acetylene tetrabromide soln. The differential-density cone process being used by the Eagle-Picher Mining & Smelting Company and by the American Zinc Company of Tennessee is now treating at the rate of approx. 3,500,000 to 4,000,000 tons of Zn ores annually. Leopold Scheflan 6

Domestic sources of deficient minerals. D. F. Hewett. *Mining Congr. J.* **26**, No. 1, 26-9(1940).—This survey deals with the occurrence in the U. S. of Sn, Ni in basic rocks, Mn, chromite, W from disseminated scheelite, Hg, Sb and bauxite. Leopold Scheflan 7

Mining and milling at the Cherokee mine. Phil Burch. *Mining J.* (Phoenix, Ariz.) **23**, No. 18, 2-3(1940).—Au mining in California is described. Because of drainage into a public reservoir the problem of tailing disposal was solved by thickening the pulp and pumping it to a dam while the thickener overflow is utilized as addnl. mill supply. Leopold Scheflan 8

Utilization of lean tungsten ores. O. A. Deminova. *Tsvetnye Metal.* **1939**, No. 7, 48-50.—Large deposits of low-grade W ores (0.1-0.2% W) of Siberia and central Asia have not been exploited commercially chiefly because the technology has not been developed. Expts. showed that concentrates can be obtained from ores contg. as little as 0.1-0.12% WO_3 by a comparatively simple process. Expts. were made on a sheelite-chalcopyrite ore contg. 0.12% WO_3. The gang minerals are mainly feldspars, calcite and sphalerite. A process was developed whereby a table concentrate of Cu-W is obtained first, and then the Cu concentrates are sepd. by flotation from the W concentrates. For table concn. the ore is crushed to less than 1 mm., and for selective flotation to −60 mesh. Cu is floated without difficulty by butyl xanthate and pine tar. For flotation of W concentrates, oleic acid, sodium oleate and water glass are used. It was found that the chief impurity retarding the process of flotation of sheelite is calcite. Calcite, however, can be removed by treatment with 10% HCl. By this method concentrates contg. 32% WO_3 can be obtained with up to 78% extn. B. N. Daniloff 9

Beneficiation of tailings at Zyryanov ore-dressing plant. A. S. Sladkov. *Tsvetnye Metal.* **1939**, No. 7, 66-71.—Old tailing dumps at Zyryanov Works contain approx. Pb 0.85, Zn 3.25, Cu 0.20, Fe 6.20% and some Au and Ag. S. worked out a concn. scheme whereby extn. into the concentrates and intermediate products of approx. Pb 75, Zn 63, Cu 100, Fe 75, Au 90 and Ag 80% is possible. This scheme was recommended for installation. The Zn, pyrite and Au-pyrite concentrates are sufficiently rich in metals to be used in industry. B. N. Daniloff

Treatment of the tailings of amalgamating plants. G. S. Kasatkin. *Zolotaya Prom.* **1938**, No. 11, 28-30; *Khim. Referat. Zhur.* **2**, No. 5, 83(1939).—Tailings of the amalgamating plant were treated by the cyanide process, the Au was adsorbed on wood charcoal and the charcoal treated by flotation. By 24-hr. agitation in NaCN soln., 91.5% of the total Au in the tailings was dissolved with an expenditure of NaCN of 150 g./ton. Max. adsorption of Au was obtained by a 4-hr. contact of the soln. with charcoal. About 13.3 kg. of charcoal was added to the pulp for each ton of tailings used. The extn. of Au was 98%. The soln. must be neutral or slightly acid. The charcoal pulp was floated with a ratio solid:liquid = 1:4 for 25 min. The reaction was either neutral or slightly acid. The Au extn. was 90% of the amt. in the starting materials. Desorption of Au from the charcoal by boiling in NaCN solns. consumes large amts. of cyanide and requires a prolonged boiling. W. R. Henn 10

Oxidation of chalcopyrite under conditions of pulverization and flotation. S. I. Mitrofanov and V. D. Benenson. *Tsvetnye Metal.* **1938**, No. 11, 53-5; *Khim. Referat. Zhur.* **2**, No. 5, 81(1939).—The effects of pH, temp., time of pulverization and aeration and the percentage of the liquid in the pulp on the oxidation of chalcopyrite during pulverization and flotation were investigated. Cu^{++} and Fe^{++} and a no. of S oxides were the sol. products of oxidation. The amt. of S which enters soln. can serve to det. the decompn. of chalcopyrite, and the power to reduce $KMnO_4$ shows the relative amts. of the lower oxides of S. The oxidation of chalcopyrite increases with increase of alky. of the pulp. It is more energetic in a lime medium than in a soda medium. Oxidation increases with temp., time of pulverization, percentage of liquid in the pulp. The floatability of Zn blende on addn. of chalcopyrite increases as a result of activation by Cu^{++} (produced by oxidation of chalcopyrite after the pulverization) and of the adsorption of CN^- by chalcopyrite, which lowers the concn. of cyanide in the soln. and, thus, lowers the degree of depression by the cyanide. W. R. Henn 11

The reactions of iron sulfide with oxides, carbonates,

silicates and phosphates in presence of carbon on heating the mixed powdered material. W. Oelsen and H. Maetz. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* 21, 335–51(1939).—The reactions in the desulfurization of Fe in the blast furnace at high temp. are well known; the reactions at low temp. are little known. A study was made, therefore, of the temp. of the beginning of the reactions. The fundamental reactions FeS + MO → MS + FeO and FeO + C → Fe + CO can take place at a temp. below the m. p. of the reactants. These reactions were more closely investigated for a series of metal oxides by intimately mixing and heating them with FeS and charcoal and detg. the loss in wt. CaO, SrO and BaO react exothermally with FeS at temps. considerably lower than the temps. (900–1050°) of rapid reduction of FeO by charcoal. Therefore, the total reaction is practically finished with these oxides below 1050°. MnO reacts in the range 900–1050° with FeO and C to form MnS; MnO is reduced to Mn at 1320–1450°. MgO gives MgS + Fe + CO strongly only above 1350–1500°. Cr_2O_3 reacts with FeS and charcoal at about the same temps. at which Cr_2O_3 alone is reduced by charcoal, i. e., at 1100–1250°; the reaction is almost complete at 1350–1400°. The reaction of finely divided SiO_2 with FeS and charcoal is so strong in the range 1460–1480° that thick clouds of gaseous SiS are formed and the heating curves show a recalescence point. Reaction of Al_2O_3, FeS and C is very active only beyond 1600°. $CaCO_3$, $SrCO_3$, Na_2CO_3, K_2CO_3 and $CaNa_2(CO_3)_2$ begin to react with FeS and charcoal at lower temps. than do the oxides, and also at considerably lower temps. than the dissocn. temps. of the carbonates in presence of charcoal. The silicates, aluminates and phosphates show in general less reactivity than the oxides and carbonates. Twenty-three references. M. Hartenheim

Experiments in manganese-ore dressing. A. L. Engel and S. M. Shelton. *Mining J.* (Phoenix, Ariz.) 23, No. 19, 2–3(1940).—Extensive tests in concg. Mn ores have led to the conclusion that the texture of the ore, as regards the assocn. of Mn minerals with gang, is far more important from an ore-dressing standpoint than the grade of ore as represented by the Mn assay. Leopold Scheflan

Introduction of solid fuel into bauxite charge in sintering. K. E. Manoilov and A. A. Benglyants. *Tsvetnye Metal.* 1939, No. 2, 114–18.—Lab. expts. made to investigate effect of solid fuel, such as anthracite, coal and peat, into the charge of bauxite-lime-soda for sintering. Solid fuels were added in such quantities as to generate 10 to 50% of the heat required for sintering by the ordinary process without the addns. It was found that (1) solid fuel does not decrease the quantity of sol. Al_2O_3 in the cakes, and (2) porosity increases from the usual 5–8 to 22% on material of one smelter and to 55% on that of another. Most complete combustion was obtained with anthracite. Introduction of solid fuel on a com. scale is to be tried. It is claimed that by this method liquid fuel can be partly substituted by a solid, and that longer service of furnace refractories at the hot end is expected. B. N. Daniloff

Working up oxidized nickel ores of low nickel content. M. H. Caron. *De Ing.* 54, No. 2, 15–27; *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 750.—After a brief account of methods of dealing with such ores, C. describes his own, which depends on a selective reduction of the free or combined NiO in the ore with selective extn. of the reduced Ni, whereby the liquor, an ammoniacal NH_4 carbonate soln., is completely recovered by distn.; this leaves only a very small amt. of NH_3 in the residue after washing. From the $NiCO_3$ a very pure metal is obtained. C. A. Silberrad

The smelting of titanium-containing sandy iron ore. Huzio Kakiuti. *Tetsu-to-Hagane* 23, 947–53(1937); *Chem. Zentr.* 1938, I, 4372.—By the usual procedure it is not possible to sep. the TiO_2 from sandy Japanese Fe ore because the grains are too small. The Fe sponge obtained from this ore by reduction at 1100° still contains so much TiO_2 as greatly to impair the quality of the Fe. A process is developed which eliminates this disadvantage. From ore contg. about 58% Fe and 13% Ti it gives an Fe yield of about 82% bloom with an av. total content of Fe 94 and O 2.5–3, S <0.02, SiO_2 <1.00, CaO <0.25 and TiO_2 <1.80%. M. G. Moore

The treatment of poor Kopotin schists. B. N. Lebedev. *Zolotaya Prom.* 1938, No. 11, 27–8; *Khim. Referat. Zhur.* 2, No. 5, 83(1939).—For recovery of Au from these schists, amalgamation (when the ore was ground to 40–60 mesh) gave a 60–5% extn. The cyanide process gave a fairly complete extn., but the method is economically unsound. Flotation is the best method: the extn. of Au amounted to 87–92% with a 6–15% yield of the concentrate. W. R. Henn

The choice of the most rational composition of blast-furnace slag for the Magnitogorsk blast furnaces. G. S. Korobova. *Sovet. Met.* 9, No. 9, 23–7(1937); *Chem. Zentr.* 1938, II, 3446.—A comparison of data reported in the literature with K.'s expts. leads to the conclusion that slag contg. 35–7% SiO_2 is most satisfactory. Under such conditions crude Fe was obtained having a Si content of 1% together with a low S content and a m. p. between 1265 and 1400°. The slag had a proportionately high viscosity, which, however, did not exceed the permissible limits, and stabilized the fusion temp. quite well, the fluctuation being ± 50° for a SiO_2 variation of ± 2%. M. G. Moore

Obtaining slag wool from blast-furnace slags. A. Z. Azovskiĭ. *Stroitel. Prom.* 17, No. 7, 58–60(1939).—Semiplant investigations demonstrated that it is possible to obtain standard-quality slag wool from liquid slag directly from the blast furnace by means of a steam blast at 9–10 atm. E. E. Stefanowsky

Effect of the surface layer of slag on the losses of copper and of precious metals in the residual slag of reverberatory furnaces. M. E. Balykin. *Tsvetnye Metal.* 13, No. 10, 71–4(1938); *Chimie & industrie* 42, 285.—The enrichment of residual slag in Cu is due to a large extent to the presence in the slag of unfused cupriferous charge which is evacuated at the same time as the slag owing to the high level of the latter and the insufficiently high temp. of the furnace. As the level of the slag rises, the rate of advancement of the surface layer during removal increases and entrains particles of the charge. A. Papineau-Couture

The influence of silica, titania and alumina on the viscosity of acid synthetic slags and the calculation of the viscosity of acid and basic blast-furnace slags from their chemical composition. K. Endell and G. Brinkmann. *Stahl u. Eisen* 59, 1319–21(1939).—Original research supplementing previous work. Acid synthetic slags become increasingly viscous as the SiO_2 content is increased; at 50.4% SiO_2 the value for the viscosity becomes greater than the max. attainable viscosity of blast-furnace slag of η = 75 CGS. TiO_2 lowers the viscosity at least up to 17.3% TiO_2, so that in smelting Ti-contg. ores no difficulties should be met because of slag viscosity. Increasing Al_2O_3 raises the viscosity, and also the temp. at which crystals sep. out, the results here being in agreement with those obtained at Corby. A hyperbolic curve is shown giving the relation between the viscosity a 1400° and the chem. compn. S. Epstein

Composition of the stock in the slag-forming region of blast furnace No. 1 at Magnitogorsk. M. M. Leĭbovich. *Trans. Leningrad Ind. Inst.* 1938, No. 6, Sect. Met. 89–110(in English, 110–11).—The primary slags in the top part of the bosh and in the lower inwall contain all the component parts contained in the final slag and suspended particles of the fuel. Mostly the slags formed are of the low-iron type. By increasing the blast the FeO and MnO in the initial slags decrease but an increase of magnesia therein should counteract this decrease and make the slag sufficiently fluid. By adding $MgCO_3$ to the charge the content in the initial slags is increased to the same extent as in the final slags. The initial slags under investigation had less alumina than the final slags, a higher ratio of SiO_2/Al_2O_3, and a higher basicity. The MnO in the primary slag was about twice that in the final slag, the S content was 3/4 that of the final S content in the slag. Tests showed the presence of all types of metal from sponge iron to eutectic white iron at the same furnace

level. Iron of the same compn. but lower Si content than the final hot metal is found in the bosh. About ⅔ of the metal samples contained more than 1.7% C and the rest were steel and pure iron. In the lower inwall steel was mostly found but iron was also present. B. Z. Kamich

Methods of measuring high temperatures in blast furnaces. N. M. Yakubtsiner and M. M. Vorovich. *Trans. Leningrad Ind. Inst.* **1938**, No. 6, Sect. Met. 3–21(in English, 21–2).—The e. m. f. of W-graphite thermocouple was detd. experimentally for the interval 1600–1900° and graduated in a W furnace with an optical pyrometer. The graduation was checked by temp. measurements of liquid metal and slag with Pt-Rh and W-graphite thermocouples. The readings are not affected by reducing or oxidizing atm. More accurate results are obtained with thin graphite rods but these are not mechanically strong and for measurements in the tuyère region thick rods are preferable. With this couple it is possible to obtain an accurate temp. curve along the entire furnace radius including the "focus of combustion." A method is described for measuring the temp. of the iron and slag during tapping. These readings are more accurate than those obtained with an optical pyrometer. It is shown that there is a relation between the temp. of the metal and the Si and S content. B. Z. Kamich

The technological-economic basis for the use of oxygen-enriched air in blast furnaces. M. A. Shapovalov. *Teoriya i Praktika Metallurgii* **1938**, No. 7–8, 3–6; *Khim. Referat. Zhur.* 2, No. 5, 76(1939).—In the production of ferrosilicon, blowing with O yields high-alumina, low-silica slags which are suitable for the production of Al_2O_3 and of cements of high quality. The blast-furnace gas produced can be used for the manuf. of NH_3. A layout is described. In order to increase the Al_2O_3 content in the slag bauxite is added to the mixt. This process for each ton of ferrosilicon and slag used with a blast contg. 60% of O produces a blast-furnace gas contg. CO 73.4, CO_2 5.45 and N 20.70%. A similar process with a blast contg. 45% of O produces CO 62.3, CO_2 5.7 and N 31.6%. It is recommended to use a 40% O blast for ordinary grades of cast iron and ferromanganese. The O blast in smelting ordinary grades of cast iron increases considerably the productivity of the furnace without increasing the blast, and it lowers the required height of the blast furnace. W. R. Henn

Investigation of the reducing process in blast furnace No. 1 at the Magnitogorsk steel plant. I. Z. Kozlovich. *Trans. Leningrad Ind. Inst.* **1938**, No. 6, Sect. Met. 112–44 (in English, 144–6).—An investigation of the reducing process in blast furnace No. 1 of the Magnitogorsk steel plant indicates that the reductions are nearly completed in the lower part of the inwall and in the bosh. Therefore, the boshes and the hearth could carry an addnl. load and thus reduce the stay of the charge in the furnace from 8 to 5 hrs. The use of agglomerate instead of raw ore would also improve operations. B. Z. Kamich

Regulating the operation of a McKee charge distributor in a large blast furnace. I. A. Gorelik. *Trans. Leningrad Ind. Inst.* **1938**, No. 6, Sect. Met. 23–47(in English, 47–8).—Expts. are described on the regulation of a McKee charge distributor in a large blast furnace of the Magnitogorsk plant. The expts. have shown that by modifying the operation of the McKee top to charge more ore over the iron and cinder notches results in uniform gas compn. and uniform gas distribution through the furnace cross-section. The amt. of extra ore to be charged should be detd. experimentally on the basis of gas analyses. B. Z. K.

Movement of the charge in a large blast furnace. D. V. Efremov. *Trans. Leningrad Ind. Inst.* **1938**, No. 6, Sect. Met. 49–87(in English, 87–8).—Exptl. data are given on the factors influencing the speed of the downward movement of the charge material in various points of No. 3 blast furnace at Magnitogorsk. B. Z. Kamich

Analysis of the operation of blast furnaces in iron-bauxite smelting. N. N. Kruglov. *Ural. Met.* **1937**, No. 8, 3–11; *Chem. Zentr.* **1938**, II, 3446–7.—Calcn. of the blast-furnace mixt. and heat balance resulted in a 44–72% increase in the crude iron and slag yields and a reduction in the fuel required for the smelting of Fe ores contg. 55.21% Fe, 1.6% MnO, 0.78% MgO, 1.67% CaO, 4.28% Al_2O_3 + TiO_2 and 6.67% SiO_2 with roasted bauxite (2.38% SiO_2, 64.19% Al_2O_3 + TiO_2, 0.68% CaO, 0.44% MgO, 0.25% MnO and 22% Fe). The addn. of burnt lime still further reduced the fuel consumption and increased the furnace output by 22%. The slag obtained could be used in the Al industry. M. G. Moore

The capacity of the VKhZ furnace and methods for its rationalization. N. L. Arkin. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 30–1(1939).—Mech. details of this Russian pyrite furnace are discussed. H. M. Leicester

Absorption and desorption of hydrogen in the manufacture of steel. Sven von Hofsten, Bo Kalling, Folke Johansson and Oof Knös. *Jernkontorets Ann.* **123**, 485–526(1939).—A series of measurements were carried out in full-scale furnaces on gas compn. and the H content of the molten metal during the steel-making process. An inverted graphite crucible fitted to a water-cooled delivery tube was used for drawing off gas samples about 50 mm. below the surface. The graphite crucible remained intact for 0.5–3 hrs. depending on the condition of the slag and the C content of the steel. Samples of the molten metal were analyzed for H by vacuum melting, and for C. The H content of the gas dropped as the C was burned out. This was attributed to the diffusion of dissolved H into bubbles of CO formed during the decarbonization process. On this assumption it was possible to derive an equation, $1/\sqrt{H} = 32\,(C_1 - C) + 1$, where H = partial pressure of H in atms. and $C_1 - C$ = decrease in C content, which approx. reproduced the relation between dehydrogenation and decarbonization. If the furnace gas contains H or any of its compds., the dehydrogenation is incomplete and reaches an equil. value. A reduction of 0.3% in the C seems to be sufficient to reach equil. even with high H content. The absorption of H is promoted by a high partial pressure in the gas and partly hindered by a protective surface slag, but the rate of decarbonization seems to have no influence. Appreciable quantities of H may be absorbed through the use of partly slaked lime, moist ore or leaking doors. There was also some indication that too much tar in the chilled tappings might increase the H. In the comparison of various furnaces the elec. furnace melts showed lower H because of the absence of H in the gases. The acid slags seemed more resistant to absorption than the basic open-hearth slags, and the end gas compns. were 1 and 2% H, resp. In Bessemer and Thomas processes the H content reaches an equil. value dependent on the moisture content of the air used for blowing. H. C. Duus

New methods for controlling the quality of steel during fusion. V. M. Zamoruev. *Metallurg* **13**, No. 6, 51–3 (1938); *Chimie & industrie* **42**, 54.—Control of the quality of steel in the course of fusion is based on the detn. of the degree of deoxidation and of degassing of the bath. In practice, FeO and gas are detd. This may be done either by Herti's method or by a less accurate but more rapid method consisting in deoxidizing the sample with progressively increasing amts. of Al until the metal becomes still; the quantity of Al required corresponds to the O content of the bath. A. Papineau-Couture

Specific properties of molten steel baths. S. M. Baranov. *Metallurg* **13**, No. 6, 56–66(1938); *Chimie & industrie* **42**, 54.—The deoxidizing process applied to the molten steel is the main factor governing the specific properties of the metal. It is necessary to take this into account in the examn. of steels and in studying the relations between chem. compn. and heat-treatment. A. Papineau-Couture

Production and annealing of ingot steel. Emanuel Starck. *Schlägel u. Eisen* **36**, 127–36, 153–7(1938); *Chem. Zentr.* **1938**, II, 3448.—A general review. An explanation is given of the Fe-C diagrams, the types of structures, processes occurring during recrystn. and other factors, a knowledge of which is necessary for proper annealing. M. G. Moore

Smelting of chrome-copper steel for the Soviet Palace and the Moscow Bridge. T. M. Klimov. *Teoriya Prakt.*

Met. 9, No. 8, 61–4(1937); *Chem. Zentr.* 1938, II, 3451.—Directions are given for the smelting, deoxidation and casting of the steel whose compn. is C 0.12–0.2, Mn 0.7–1.1, Si 0.25–0.4, Cr 0.4–0.6 and Cu 0.3–0.7%. M. G. Moore

The influence of temperature and acidity on the form and content of copper in slags. M. E. Balykin. *Tsvetnye Metal.* 1939, No. 4–5, 129–31.—The influence of temp. on the form and content of Cu in slags in reverberatory furnace smelting was investigated. Slags and Au-bearing copper quartz ore were charged into crucibles, melted and held at temps. from 1170 to 1503°. (The compns. of slag and ore are not given.) It was found that the soly. of SiO_2 varies from 36.5% at 1210° to 61.2% at 1503°. At temps. up to 1200° lumps of ore remain unmelted. At higher temps. the quantity of undissolved free SiO_2 in slag decreases and the soly. of Au-bearing ore increases. By settling 30 min., which time was considered sufficient, the total Cu content in slag decreased from 0.39 to 0.23%, and the sulfide Cu from 86.6 to 30.3% of the total as the temp. was raised from 1170 to 1503°. At the same time the Cu in the form of oxide (Cu_2O), silicate and ferrite increased from 25.6% of total Cu at 1170° to 93.3% at 1480°. This increase is due to the formation of Cu_2O as the result of reaction between Cu_2S with Fe_2O_3. The increase of Cu in slag in the form of oxide, silicate and ferrite is counteracted by the decrease in sulfide Cu; the net result of increased temp. is the lower loss of Cu in the slag, and therefore increased recovery of the metal. B. N. Daniloff

Water-jacket fusion of slags and the objectivity of experimental data. V. S. Sokolov. *Tsvetnye Metal.* 1939, No. 4–5, 117–25.—S. discusses the problem of treatment of slags at the Molotov Copper Smelters which has not yet been solved satisfactorily. Largely polemical with reference to I. M. Dubrovin's data (*Tsvetnye Metal* No. 11 (1938)). B. N. Daniloff

Accident prevention in the foundry. H. Mabson. *Can. Metals Met. Inds.* 3, 42–3, 56(1940).—Some of the major problems in accident prevention are briefly discussed. Emphasis is given to the minimizing of the amt. of fine dust suspended in the foundry atm. The following substitutions will help in this direction: metallic abrasive to replace SiO_2 sand for blasting purposes, artificial grinding wheels in place of sandstones, and low-SiO_2 content parting compds. in place of SiO_2 flour. General ventilation may often prove the most economical method of fine-dust removal. The judicial use of water or oil on foundry floors and gangways will go a long way toward reducing the dust hazard incidental to foundry operations. W. H. Boynton

Plastic flow in metals. H. W. Swift. *Metal Ind.* (London) 56, 127–30, 149–52, 173–5(1940).—Review. E. H.

Glycerol in metal processing. Georgia Leffingwell and Milton A. Lesser. *Metal Ind.* (N. Y.) 38, 79–81, 83 (1940).—A correlated abstract on the uses of glycerol in plating solns., electrochem. processes, soldering and hot galvanizing fluxes, quenching solns., polishes and rust removers. 32 references. C. B. Jenni

Austempering and hardenability. J. M. Robertson. *Iron & Coal Trades Rev* 140, 94–7(1940).—The process of austempering, its limitations, advantages and practical significance are described in the light of the present state of knowledge of the subject. I. Hartmann

Structural mechanics of metals at elevated temperatures. Georges A. Homès. *Rev. mét.* 36, 373–87(1939).—An extensive x-ray and metallographic study of the changes taking place in metals at elevated temps. indicated that it occurs spontaneously at all temps. at which the metal is used. The changes occur at grain boundaries among crystals (such as coalescence) and in the dimensions of the crystals, tending to restore the original structure and effect recrystn. Introduction of stabilizing elements under rigidly controlled conditions may effect a pronounced stabilization, but their use is quite difficult. Quenched and annealed steels behave differently in this respect even when heated below the temps. used in their heat treatment. Constituents of drawn metals, such as troostite, etc., respond to heating differently and in a selective manner so as to produce an occasional rapid drop in impact strength. Special elements sometimes increase, sometimes decrease these structural changes. Their effect can be detd. by combined x-ray and metallographic study. J. D. Gat

The heat conductivity of metals and its influence on heat exchange. R. v. Linde. *Metallwirtschaft* 18, 1053–5 (1939).—Although the heat cond. of Cu is very high compared with Al and other light metals, the cond. of alloys of the latter metals is higher than for Cu alloys. Cu with traces of As has only one-third the cond. of pure Cu; brass approx. one-quarter; bronze with 8% Zn, less than one-sixth; constantan (30% Ni) approx. one-seventeenth that of Cu. On the other hand, most important Al alloys have approx. 70% the cond. of pure Al, and Fe alloys are similar in this respect. The heat-transfer characteristics of ribbed or laminated and of smooth-surfaced vessels is exam'd. In the former about one-half the temp. drop is due to restriction on the air flow at the narrowed sections. Poorly conducting metals definitely reduce the heat transfer, but by changing the design to facilitate smooth fluid flow, the effect of poor cond. can be minimized, especially if the heat transfer is not too great. In vessels with smooth walls the cond. of the wall is of minor importance, compared with other influencing factors, as the properties of the boundary layers of the fluids on both sides, dust or oil deposits on the walls, fluid speed, etc. I. Hartmann

Some factors affecting carburization. T. A. Friselman. *Heat Treating Forging* 26, 65–7(1940).—Tests were made to det. the C concn. of 4 steels (S. A. E. 2315, Cr-Ni-V, Cr-V, S. A. E. 1015) carburized simultaneously in the same pot. Total time of carburizing was 15 hrs. and the temp. 939°. The tests showed that the Cr-V steel carburized fastest and S. A. E. 2315 steel slowest. In another test made in a different furnace S. A. E. 1015, S. A. E. 2315 and S. A. E. 3115 steels were used. The time of carburizing was somewhat shorter; the results showed that S. A. E. 3115 steel carburized fastest. The effect of screenings on carburization was investigated and it was found that as far as C concn. is concerned, coarser screenings ($^1/_{16}$ to $^1/_8$-in. in diam.) can be used as effectively as finer dust. Too many fines in the compd. have an adverse influence on the case depth. The effect of Na carbonate (in carburizing pots) on the C concn. of steel was detd. Compds. contg. 2 to 3% Na carbonate have a slight tendency to cause decarburization; lower Na carbonate concn. has little effect on the steel. I. H.

New ways of obtaining and of employing thallium. E. Drescher. *Schlagel u. Eisen* 36, 181–5(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 188.—The methods of production of Tl from lead-chamber slimes, in the purification of Cd, etc. are briefly described. Addn. of Tl improves many alloys, especially those of Pb. An alloy of Pb and Tl contg. 20–65% Tl is very resistant to corrosion, and the Ag-Tl alloy with 10–22% Tl does not blacken on exposure as pure Ag does. Tl is also used as a catalyst. C. A. Silberrad

A metallographic study of internal oxidation in the α-solid solutions of copper. Frederick N. Rhines. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1162, 41 pp.(1940).—A group of 40 binary Cu α-solid-soln. alloys was subjected to oxidation at elevated temps. both in the air and in a closed container packed with a mixt. of Cu metal powder and Cu_2O. Internal oxidation was found in the binary combinations contg. Al, Sb, As, Ba, Be, B, Cd, Ca, Ce, Cr, Co, Cb, Ga, Ge, In, Fe, Pb, Li, Mg, Mn, Ni, P, Se, Si, Na, Sr, Ta, Sn, Ti, W, V, Zn and Zr. External oxidation alone was found in alloys with Ag, Pt and Pd. The behavior of alloys contg. Bi, S, Te and Tl was uncertain. The particle size of the pptd. oxides depends on the chem. nature of the alloying element, the concn. of the alloy and the temp. of oxidation. Very stable oxides tend to form fine ppts. while the less stable ones form coarse particles. High temps. of oxidation and high concns. of the alloying element both favor a large particle size. Extensive agglomeration is rarely found. Occasionally Widmanstätten

figures occur. The distribution of the ppt. varies from system to system and with the temp. of oxidation. In some alloys the particle count increases inward and in others the opposite occurs. A more or less uniform distribution of the oxides, which seems to be characteristic of high-temp. oxidation, gradually changes to pptn., predominantly at grain boundaries, as the temp. of oxidation is lowered. The rate of growth of the subscale decreases with time, with an increasing concn. of the alloy, with lower temps. and with lower O pressure; the time to form a given thickness of subscale is almost directly proportional to the concn. of the alloy; the log of the thickness squared is a linear function of the reciprocal of the abs. temp. Ternary alloys contg. Cu with Sn or Zn and Al, Be or Si all exhibited double zones of internal oxidation, the outer band contg. the oxides of both metals and the inner band the oxide of only one metal. The relative widths of the bands can be varied by changing the alloy compn. and the pptn. of one of the oxides may be suppressed by sufficiently lowering the O pressure. Under certain conditions liquation may accompany internal oxidation. An extensive discussion of the application of phase diagrams to the rationalization of oxidation behavior is included. C. L. Mantell

Effect of cold work on hardness and recrystallizing behavior of pure platinum. E. M. Wise and R. F. Vines. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. **1167**, 8 pp.(1940).—The Pt used in the expts. had a probable Pt content of 99.99+%, and had the following mech. properties in the completely softened condition: Vickers hardness no. 39.4, ultimate tensile strength 19,340 lb. per sq. in., proportional limit very low, elongation 37.5% in 2 in. The effect of cold-rolling is such that the hardness increases rapidly up to 10–15% reduction and more slowly up to about 75% reduction, beyond which it increases more rapidly. The recrystn. temps. for a 15-min. anneal, after cold-rolling 19, 39.5, 50.8, 66, 80.5 and 89.5% reduction in thickness, are approx. 765°, 700°, 635°, 600°, 545° and 425°, resp. The recrystd. grain size of this Pt is a function of the percentage of cold reduction, being larger the lower the percentage of cold-work. Little or no grain growth resulted from subjecting recrystd. samples to higher temps. or annealing for longer times. C. L. Mantell

Research in relation to steel metallurgy. W. H. Hatfield. *Iron & Coal Trades Rev.* **139**, 723-5(1939); cf. *C. A.* **33**, 6205[8].—A plea is made for the continuation of research during the war, and developments during the past twenty years are reviewed briefly. I. Hartmann

Progress in steel metallurgy during the last ten years. W. H. Hatfield. *Heat Treating Forging* **26**, 78–80(1940). —See *C. A.* **34**, 1600[6].—A review. I. Hartmann

Albert Sauveur questionnaire and American work dealing with the constitution of steel. N. T. Belaiew. *Rev. mét.* **36**, 313–15(1939).—The advantages and disadvantages of changing metallographic terminology, particularly abolition of troostite and sorbite and introduction of bainite, are discussed. An apparent solution lies in an international meeting settling the point. J. D. Gat

Problems in the manufacture and use of steel products in the U. S. James E. Lose. *Blast Furnace Steel Plant* **27**, 577-81, 586, 680–5, 705–6(1939).—Problems in *tin plate* are: increased uniformity in gage, wt. and flatness; continued improvement of the mech. properties; and improvement both of the base metal and of the Sn coating for continued improvement in corrosion resistance. Uniformity and maintenance involves extreme precaution as to hot-rolling conditions and finishing temps. in the manuf. of strip. Surface must be free from mech. defects and rolled-in scale. Ductility and phys. properties of sheets have changed owing to the introduction of cold-reduced material. Consumption has been increased by applications in automotive fields, furniture, refrigeration, washing machines and railway passenger cars. Improvements have resulted from better grain structure, improvement in steel quality through improved melting practices, and through an understanding of surface texture. Coating-adherence requirements are severe for galvanizing sheets. 1 In *enameling sheets* flatness of stock, drawing quality and surface texture are essential. Machinability and close tolerance are the major problems in the *cold-drawn trade.* Uniformity of chem. analysis, straightness, flatness, are problems in *structural steels.* Freedom from surface imperfections, reduction of crown and overweight, flatness, and elimination of pipe and lamination are problems in *plate manuf.* Chem. compn. of rail is controlled so that each size of rail shall have a hardness appropriate to its size. 2 Interior quality as well as wear resistance of *rails* are now being investigated. Slow cooling of rails minimizes the presence of shatter cracks. The Brunorizing treatment minimizes shatter cracks and improves toughness. "End batter" of rails is being combated by heat treatment and by the use of rails welded into very long lengths. Problems in *railroad wheels* include internal soundness, surface quality and the liability toward internal fissures analogous to shatter cracks in rails. 3 The problem of close tolerance arises in wheels for streamliners as the wheels must approach a dynamic balanced condition. Because of increased braking pressures owing to high operating speeds, the surface of the wheel tread is often heated above its hardening temp. and on cooling develops thin but hard and brittle case on the wheel. Another wheel problem is "shelling" or spalling of the tread surface under heavy loads. Special milling practices and precise heat treatments are necessary in order to meet cleanliness and grain 4 structure requirements for *railroad axles.* Magnaflux testing is useful for inspection of axles for incipient cracks after having been in service. *Wire and wire products* are required to meet closer size tolerances which requires more frequent replacement and reconditioning of wire dies. Surface smoothness and decarburization have definite influence upon the life of springs. *Springs* of unusual combination of strength and hardness are now produced 5 by austempering. Seamless-tubing manuf. and elec. welding processes have introduced many problems in *pipe manuf.* C. B. Jenni

Phenolic plastic applications in the steel industry. H. F. Horne. *Iron Steel Engr.* **16**, No. 9, 66–9(1939).—Laminated materials have low moisture absorption and are light. Certain grades can be used in non-oxidizing acids up to 10% concn. at elevated temps. They will not 6 cut, hammer out, or gall when properly applied for thermal washers, guides or bearings. Oil or grease have no effect on these materials. They are stronger, less porous, harder, and machine better than wood and they do not soften under the effect of water. Applications discussed include: pickling-tank hold-down rolls, up-coiler roll covering, back tension roll and coil spreader, guide boxes and bearings. C. B. Jenni

Progress of lubrication in the steel industry. C. C. Peeu. *Iron Steel Engr.* **17**, No. 1, 45–51(1940).—Progress 7 and development of lubrication engineering in the steel plant. Steps taken to eliminate lost time, excessive repairs, and high power losses included enclosing of moving parts of equipment, improvement in the methods of applying lubricants, and improvement in the lubricants. The design of plant equipment has undergone a refinement resulting in greater ease of effective lubrication. Results 8 have shown increased efficiency and economy resulting from longer life and lower repairs of plant equipment. A list of lubricants is given showing specific applications and types and characteristics of the lubricant for each application. C. B. Jenni

Types of lubricants essential to steel mills. W. H. Mandy. *Iron Steel Engr.* **16**, No. 8, 20–9(1939).—Recommendations for proper lubricants are influenced by such factors as: variations in climatic conditions, proximity to 9 source of cooling water, proximity to industries having contaminating effect on the atm., type and age of equipment, plans for future replacement of machinery, possibility of lubricant contamination, use of salt as scale remover, methods employed in cleaning equipment, heat conditions, and time allowed for lubrication and repairs. In addn. to a few specialty lubricants, the following types of oils and greases are usually found in most steel mills: black oils, journal oils, red engine oils, pale oils, turbine

oils, steam cylinder oils, cup greases, low m. p. pressure-gun greases, high m. p. pressure-gun greases, extreme-pressure grease, extreme-pressure gear lubricants, heavy gear compounds, hard tallow or cold neck greases, hot neck grease. Application of each of these types is discussed. C. B. Jenni

The effect of hydrogen in steels of different composition. W. Eilender, Yü Chih Chiu and F. Willems. *Arch. Eisenhüttenw.* **13**, 309–16(1940); cf. *C. A.* **33**, 5338⁴.— Plain and alloy steels were melted with different methods of deoxidation, the H content was artificially increased, and structure, H content and H escape were detd. The H escape became more difficult in unalloyed steels with increasing C content, and also in low-C steels by addn. of alloying elements, except in Cb steels, in which the velocity of the escape of gas increased with increasing Cb content. Austentic and ferritic steels did not give off gas when stored. From steels with ferritic-pearlitic and martensitic structure gas escaped with the exception of Ti steels. The failure of H to escape in ferritic and austenitic steels is ascribed to the missing A_3 and A_1 transformation, resp., and the reforming of the lattice connected with the transformation; the escape of H in oversatd. steels is very likely connected with the phase transformation. Under certain conditions, Cb can be used as dehydrogenation agent. As most of the alloys used as addns. contained much H it is assumed that they can be a source of H if added only after deoxidizing. Twenty-one references. M. Hartenheim

Improved process for integrally bonding steels of different compositions. Hiland G. Batcheller. *Heat Treating Forging* **26**, 68–71(1940).—The process described is named "Pluramelt," indicating plural or simultaneous melting of the steels to be bonded. A special elec.-arc melting furnace was so designed that both steels to be bonded are melted simultaneously and the final product can be intermelted with any other part and allowed to solidify as an inseparable portion of the unit mass. Exptl. work so far has been limited to Pluramelts of stainless alloys on soft or medium steel, and tool steel types on soft steel bases, but equal success is anticipated with any other alloy that can be melted in an arc furnace. Pluramelt products are available in some com. forms. I. H.

Mechanical properties of alloy steels at low temperatures. A. Krisch and G. Haupt. *Arch. Eisenhüttenw.* **13**, 299–308(1940).—A very exhaustive investigation was made with 62 materials of which notch-impact strength, hardness, ultimate strength and elastic limit, elongation and reduction of area was detd. at +20°, 0, −100, −183 and −253°C. Some Ni, Cr-Ni and Cr-Mn steels, especially those with austentic structure, and Ni, Cu and Pb show a considerable plastic deformability in the notch-impact tests even for temps. down to −183°C. Low-alloy martensitic steels show without exception a reduction of the notch-impact strength down to −183°, whereby alloys with Ni addn. have the highest values of notch-toughness. Some Cr-Mo steels, with or without low Ni content, had even at −183° a notch-impact strength of 5 kg.-m./sq. cm. A hardened steel has, in general, lower notch-impact strength at low temp. Soft Fe becomes brittle at low temp., while the notch-impact strengths of Cu and Pb increase with decreasing temp. Pb and soft Fe show greatest change of hardness on cooling. Cr-Mo, Cr-Ni-V and Cr-Ni-Mo steels showed an increase of the ratio tensile strength to hardness at −183°. The tests are given in full with tables and curves. Thirteen references. M. Hartenheim

Properties, heat-treatment and finishing of stainless steels. E. F. Ingersoll. *Metal Ind.* (N. Y.) **37**, 503–6 (1939).—A review of the compn. of stainless steels with a discussion of the effects of alloying elements. Heat treatment, pickling, passivation and working qualities of stainless steels as well as spinning, shearing, punching, welding, soldering and finishing of stainless steels are considered. A list of finishes of com. sheet is given. C. B. Jenni

Tensile elastic properties of 18:8 chromium-nickel steel as affected by plastic deformation. D. J. McAdam, Jr., and R. W. Mebs. *Natl. Advisory Comm. Aeronaut., Rept.* No. 670, 42 pp.(1939).—The relations between stress and strain and between stress and permanent set for 18:8 alloy as affected by prior plastic deformation are discussed. Hysteresis and creep and their effects on the stress-strain and stress-set curves are also considered, as well as the influence of duration of the rest interval after cold-work and the influence of plastic deformation on proof stresses, on the modulus of elasticity at zero stress and on the curvature of the stress-strain line. Curves of variation of proof stress with prior plastic deformation often have many oscillations between high and low values. Causes of the most abrupt of these oscillations are: variation in the duration of the rest interval and variation in the distribution of the exptl. points throughout the range of extension. These oscillations probably are due in part to variations of internal stress. Variations in the rest interval generally have opposite effects on the slopes of the stress-set and the stress-strain curves. Slight pre-stretching, to the extent of a small fraction of 1%, generally causes considerable improvement in elastic strength. C. B. Jenni

Nickel alloy steels. Characteristics and properties required for tractor parts. H. L. Geiger. *Product Eng.* **11**, 67–70(1940).—A table indicates the particular steels which have the properties required by a given part of crawler or wheel type tractor. Torsion and tension data are given with chem. analysis and phys. properties of some tractor gear steels. A case of eutectoid compn. or slightly higher at the surface is preferred for rolling contact or extremely high unit loads. A case depth of 0.045–0.055 in. is necessary. Ann Nicholson Hird

Structures of very slowly cooled nickel steels. A. Portevin. *Rev. mét.* **36**, 316–21(1939).—To show that phenomena leading to new developments were observed actually long ago, P. presents as a historic curiosity a set of photomicrographs made by him before 1911 which clearly demonstrate the structure presently known as *bainite*. J. D. Gat

Effect of vanadium on grain-boundary precipitation of austenitic chromium-nickel steels. G. Riedrich and G. Hoch. *Stahl u. Eisen* **60**, 30–1(1940).—Addns. of from 0.76 to 3.01% V were made to steels with 18% Cr and with from 9 to 14% Ni. The steels were air-cooled from 1050° and then reheated for 1 hr. at from 500 to 700°. The most damaging grain-boundary pptn. occurred at about 600° and this even in the steels with the highest V content. It was concluded that V does not form a stabilizing carbide even when 25 times as much V as C is present. The slight benefit noted because of the presence of V in diminishing grain boundary carbide pptn. was attributed to the influence of V in increasing the amt. of ferrite. S. E.

The importance of thermal analysis for studying the process of crystallization of commercial alloys. W. Patterson. *Giesserei* **26**, 461–6(1939); cf. *C. A.* **33**, 9248⁸.—Cooling curves of Al-Si alloys (11–14% Si) were obtained by a modification of Kurnakow's method. The curves show the degree of undercooling, the purity of the alloy, the amt. of segregation and the fineness of the structure. A Le Chatelier thermocouple energizes a mirror galvanometer. The light beam registers the cooling curve on a rotating drum fitted with AgBr paper. Hypereutectic alloys undercooled about 2.5°; and hypoeutectic alloys showed negligible undercooling, for cooling rates in the molten bath of approx. 150°/min. Primary crystals of the higher-melting component (Si) had negligible influence on the start of eutectic crystn. For hypoeutectic alloys the 1st-formed primary crystals of the lower-melting component (Al) probably inoculated the remaining melt of eutectic compn. F. W. Fink

General principles of alloy making by fusion. A. Portevin. *Rev. mét.* **36**, 429–45(1939); cf. *C. A.* **33**, 8549³.— Alloy prepn. is reviewed from a broad standpoint embracing the equipment employed, means of protection from oxidation, losses involved, heat reaction taking place and the selection of optimum compns. The article does not give details. J. D. Gat

Elastic modulus of metallic alloys. L. Guillet, Jr. *Rev. mét.* **36**, 497–521(1939); *Génie civil* **116** 29–32

(1940).—Variations in the elastic modulus of several alloys were studied by means of a LeRolland-Sorin app. Elastic modulus of pure metals is connected with their at. vol., high limits to be found in elements having small at. vols. and high m. ps. When elastic modulus is detd. in solid-soln. alloys close to the pure metals, it varies linearly with the compn. In case of intermetallic compds. 2 possibilities are encountered; they behave either as pure metals or have a much higher modulus of elasticity indicating a strong chem. bond. A study of compn. does not permit the detn. of its probable modulus of elasticity. The subject is treated in considerable detail both from the scientific side and in description of app. used in detns.
J. D. Gat

Magnetic detection of flaws in metallic alloys. J. Fluvot. *Génie civil* **115**, 333–7, 355–7(1939).—A discussion with 1 drawing, 11 photographs and 6 spectrographs.
Ann Nicholson Hird 3

Influence of heat treatment and deformation upon the properties of a few hardenable aluminum alloys. H. Unckel. *Metallwirtschaft* **19**, 37–44(1940).—Hardenable Al alloys contg. Cu, Mg, Mn, Fe and Si were investigated. With about 3.9–4.2% Cu, 1.55–1.57% Mg, 0.27–0.31% Fe, 0.26–0.27% Si the most favorable temp. for homogenizing is between 490 and 500°, with a time range of 10 to 60 min. depending upon the thickness of the specimens. Longer heat-treatment is without further effect, even upon grain size. Reduction to a given thickness by 2 heavy rollings gave a product of about the same properties as reduction to the same thickness by 12 light rollings. In alloys of the duralumin type, plastic deformation between quenching and hardening increased the limit of stretch and lowered the ultimate strength. Photomicrographs and x-ray diagrams are shown. H. Stoertz 4

The influence of alloying elements on the crystallization of copper. II. Large additions and the part played by the constitution. L. Northcott. *J. Inst. Metals* **65**, Advance copy, No. 857, 32 pp.(1939); cf. *C. A.* **32**, 3317⁹.—The binary systems of Cu with Al, Mg, Mn, Ni, P, Pb, Sn and Zn were studied. The length to which crystals grew after being cast against a water-cooled chill was measured and this length was plotted on the constitution diagram. In general, the amt. of superheat of the melt before casting had little effect on the contour of this line representing crystal length. This line was influenced by absorption of the alloying elements, freezing range and the 2nd phase (solid soln. or eutectic). In the Cu-Al system longest crystals occurred at 0% Al, 8% Al (eutectic) and 12% Al (with the max. m. p. of an intermediate solid soln.). The Cu-Mg and Cu-P diagrams were similar with respect to the crystal length curves, pure Cu giving the max. length crystals, with another high point occurring at the max. soly. of Cu in the 2nd phase (3% Mg, 2% P) and a steep max. at the eutectic (10% Mg, 9% P). Cu-Mn had max. crystal length at 0% and 33% Mn (with a min. m. p.). The Cu-Ni crystals were uniformly small. A peak occurred in the Cu-Pb curve at 50% Pb for which no explanation was offered, although segregation was noted particularly in this 50:50 compn. The plot of the crystal lengths in the Cu–Sn system showed the max. for 0% Sn, with a min. at 0.5% Sn and irregular increasing to 25% Sn. In the Cu–Zn system maxima were at 0, 38–50, 60, 87 and 100% Zn. Every max. was sepd. from the next by a sharp drop to a min. 6 references. J. N. Lynn 5 6

The cobalt-nickel-silicon system between 0 and 20 per cent silicon. Arthur C. Forsyth and R. L. Dowdell. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. 1170, 15 pp.(1940).—A partial Co-Ni-Si constitution diagram below 19.3% Si is presented. The method used in drawing this diagram shows clearly the liquidus, solidus and solid transformations for the temp. ranges investigated. Ni and Co seem to replace each other in these alloys, producing only 2 phases in stable equil. The α-solid soln. alloys are all capable of being wrought and may find industrial application. Their properties are now being investigated. Alloys above 10% Si are brittle but have excellent corrosion resistance and other properties that are being exploited. Alloys contg. α-solid soln. are ferromagnetic. C. L. Mantell 7

Changes in damping capacity during annealing of α-brass. John T. Norton. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. **1168**, 10. pp(1940).—The present expts. confirm the fact that when metals are tested at comparatively low frequencies, the principal cause of energy dissipation is local or general plastic deformation. In cold-worked metals, the internal stress system is an important factor in the production of localized plastic flow. The relief of internal stresses by annealing reduces the damping to a low value and the value is low over a considerable range of applied stress. At the recrystn. temp., the damping capacity shows little change, provided the applied stress is well within the so-called elastic range of the material. Considered from the point of view of a metallurgical tool, the damping capacity is a sensitive indicator of internal stresses but is relatively insensitive to changes in grain size. C. L. Mantell 8

Recovery and recrystallization in long-time annealing of 70-30 brass. S. E. Maddigan and A. I. Blank. *Am. Inst. Mining Met. Engrs., Inst. Metals Div., Tech. Pub.* No. **1166**, 21 pp.(1940).—An investigation has been made of the processes of recovery and recrystn. during low-temp. annealing of cold-worked 70-30 brass. Two annealing temps. were used, one slightly above and the other slightly below the accepted recrystn. temp. After various annealing times up to 2740 hrs., microscopic studies were made in addn. to tensile-strength measurements and very sensitive cond. measurements. The process of softening seems to be divided into 2 parts: a stage of pure recovery preceding any microscopic evidence of recrystn. and a 2nd state in which recrystn. can be seen under the microscope and softening is probably a combination of recovery and recrystn. The boundary between these stages was fixed at almost identical times by all the methods of investigation; i. e., microscopic, tensile strength and cond. Just previous to the 2nd stage, an anomalous drop in cond. sometimes occurs, which may be due to nucleation. A 2nd cond. anomaly is also observed, which may be explained by grain growth of new crystals in a softened but not completely recrystd. matrix. For lower degrees of reduction, evidence is advanced to show that grain growth can occur before recrystn. The temps. used here are well below those used for strain-annealing and also below those at which so-called "abnormal" grain sizes are generally observed. C. L. Mantell 9

Some recent studies of thin oxide films on metals. W. H. J. Vernon. *Chemistry & Industry* **1940**, 87–9.
E. H.

Metal spraying process in maintenance work. J. G. Magrath. *Iron Steel Engr.* **16**, No. 12, 22–7(1939).
C. B. Jenni

Protective coatings for iron and steel. J. C. Hudson. *Iron & Coal Trades Rev.* **139**, 751–2(1939).—The work of the Corrosion Committee (British) is reviewed briefly and the prepn. of surfaces and the best methods of painting iron and steel as a protection against corrosion are described. I. Hartmann

Corrosive effect of "heavy gasoline" on the white metals of carburetors. Gilbert Juge-Boirard. *IIme Congr. mondial pétrole* **3**, Sect. 4, 712–20(1937)(in French).—The components of "heavy gasoline," a French mixt. of gasoline and alc., were tested for their corrosive effects on the white metals usually employed in carburetors. Usually the mixt. separates into two layers; an upper layer contg. almost all the gasoline, traces of alc., and traces of water. This layer has no action on the metal. The lower layer consists of most of the alc., all the coloring material, traces of gasoline and almost all of any water that may be present. This layer attacks the metal. The corrosive factors are the water carried by the alc., and impure coloring matter. Denaturants for the alc. may also cause corrosion. Tests on metal-strip samples are shown in diagrams. E. J. Mahler

Corrosion of iron in water. Effect of small concentrations of sodium silicate. Dante J. E. Veronelli. *Industria y quim.* **2**, 182–91(1939).—A review of the essential

facts and decisive factors operative in the corrosion of Fe in H_2O is followed by the description of original expts. with H_2O contg. small concns. of Na_2SiO_3. Such addns. lead to an increased pH and an even greater reduction of corrosion; the Fe is given a protective $FeSiO_3$ film, even after the metal has been taken out of the soln. and placed in pure H_2O. With increasing temp. Fe corrosion increases at a slower rate in the soln. than in pure H_2O. The effect of Na_2SiO_3 is more pronounced in H_2O contg. large amts. of dissolved O and in distd. H_2O than in ordinary H_2O. 38 references. A. H. Krappe

High lead-low tin alloys as coating materials. Joseph B. Kushner. *Metal Ind.* (N. Y.) **37**, 511–12(1939).—A series of Pb-Sn alloys in which Sn ranges from 0.5–10% are used for coating materials and as a lubricant for wire drawing. C. B. Jenni

Hardness testing of light-gage sheet steel by scratch resistance. James A. Townsend. *Iron Steel Engr.* **16**, No. 9, 22–7(1939).—A scratch method for measuring the hardness of sheet metal was used. Test results showed a definite trend toward lower torque-resistance values for higher hardness numbers, B-90 to B-100 Rockwell, as compared with a greater resistance to scratch penetration in the softer samples using a const. wt. This trend points toward a definite relation between the scratch penetration and direct indentation methods of comparative hardness measurements. A scratching point with a wider, more rounded shape was recommended for trial before rejecting the project as unworkable. C. B. Jenni

X-ray analysis of corrosion products from galvanized sheets. F. R. Morral. *Trans. Electrochem. Soc.* **77**, 8 pp. (preprint)(1940).—X-ray diffraction analysis of corrosion products shows the presence of ZnO, $ZnCO_3$, $2ZnCO_3 \cdot 3Zn(OH)_2$ and other basic Zn salts. The compn. of the corrosion products depends on the compn. of the Zn coatings and on the environment to which they have been exposed. C. G. F.

Corrosion by the products of combustion of town gas. Frank Taylor and James W. Wood. *Engineering* **149**, 58–9(1940).—The corrosion of several metals was investigated. Each material was in the form of a 1-in. tube, fitted at the top with a water jacket and insulated along the rest of its length. The water vapor produced from the gas burned at the bottom of each was partially condensed on the water-cooled section of the tube. This condensate, which with dissolved S and N acids, formed the corroding medium, ran down the tube to hotter regions where reëvapn. and concn. occurred. The corrosion deposits were allowed to accumulate for 32 days and then the tubes were examd. Solder-coated and tinned Cu withstood the conditions best, but even they do not afford permanent protection against corrosion. Te-Pb and chem. Pb also proved very resistant to attack, the formation of a protective coating of Pb sulfate being an important factor. If S compounds were removed from the gas, Pb would be rapidly corroded. Al was investigated in three different purities, 99.95%, 99.5% and 98.5%. With each specimen heavy corrosion deposits formed locally in the tubes, but the purest specimen gave only half the corrosion of the other two. Cu and brass behaved similarly to Al in giving voluminous deposits. With the S content of the gas reduced from 22 to 5 gm. per 100 cu. ft., however, the time taken for a deposit sufficient to block up the tubes increased threefold. With mild steel, reduction of the S content reduced corrosion by half. With Monel metal it was found that the Ni had been removed preferentially from the metal, very little of the Cu having been removed; Ni must be classed as poorly resistant to corrosion under these conditions of attack. I. Hartmann

The protection of the Bakman apparatus from corrosion. E. M. Khanin. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 10, 40–2(1939).—The use of acid-resisting cement and various protective coverings in preventing corrosion of *app. for chlorinating lime* is discussed. H. M. Leicester

The protection of condensers from corrosion. V. V. Samokhin. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 10, 43–5 (1939).—The condensers are painted with a mixt. of 1000 g. Bakelite lacquer, 200 g. kaolin, 50 g. Al powder, 150 g. EtOH and 50–60 g. of a covering pigment. From 4 to 6 coats are applied, the tubes being heated at 120–50° between each application to polymerize the Bakelite. The coeff. of heat transfer is hardly changed by this treatment, though if the Al powder is omitted from the mixt., this coeff. is greatly decreased. The surface is stable to 250°, withstands a blow of 50–60 kg./sq. cm. and has a Brinell no. of 35–40. Details of applying the coats are given. H. M. Leicester

Corrosion-resistance properties of chromium-manganese steels. Albert L. de Sy. *Rev. mét.* **36**, 389–99(1939).—Acid corrosion study of a number of Cr-Mn steels with or without Ni addns. up to 2% and with C around 0.1% indicated their susceptibility to intercryst. corrosion on heating at moderate temps. which result in the formation of a ferritic phase. This phase is rapidly attacked by the boiling 10% H_2SO_4 + 10% $CuSO_4$ soln. Transformation of austenite into ferrite on drawing can be clearly shown by electrolytic etching in 10% CrO_3. The 18-8 type of this steel is more corrosion resisting than the 15–12 or 15-9 with Ni addns. J. D. Gat

The corrosion resistance of welded light alloys. I. Brenner. *Aluminum and Non-Ferrous Rev.* **4**, 334(1939).—The samples were immersed in a 3% NaCl soln. contg. 0.1% H_2O_2 and were extended for two years. Pure Al and alloys which were not supersatd. with compds. forming mixed crystals were about as resistant to corrosion as the nonwelded metals. This was also true of Al-Mn and Al-Mg-Mn alloys contg. an amt. of Mn greater than the soly. limit at room temp. Hardened alloys of Al-Mg-Si and Al-Cu-Mg showed electrochem. corrosion at a certain distance from the welding line. If they were hardened again the electrochem. corrosion did not take place. Plated Al-Cu-Mg and Al-Mg alloy sheets showed superior resistance to corrosion after welding. Iver Igelsrud

First progress report—joint investigation of continuous welded rail. Herbert F. Moore, Howard R. Thomas and Ralph E. Cramer. *Am. Ry. Eng. Assoc., Bull.* No. 411 (1939); *Univ., Illinois Bull., Eng. Expt. Sta., Reprint Ser.* No. 13, 29 pp.(1939).—Lab. investigation in progress includes: Etch tests to see whether any "flakes," laps, holes, burns, inclusions, cracks or any other type of defect have resulted during welding and subsequent cooling, and if so, where these defects are located in the joint. Hardness surveys of the metal in the weld, in the adjacent rail and in the transition zone between weld metal and rail metal. Survey of typical cryst. structure in weld, rail and transition zone by means of the metallurgical microscope. Chem. analysis of the steel in the rail, in the weld and in the transition zone. Mech. tests of specimens cut from weld metal, rail metal and transition zone; the tests include tension tests, impact tests and fatigue tests. Rolling-load fatigue tests of full-sized specimens of welded rail to det. the possibility of internal-fissure development in welded joints, the fatigue strength on flexure of welded joints and the likelihood of damage to the web of the rail near the weld. Drop tests and bend tests of full-sized rail joints. Up to the present time 104 test rails (welded by 2 types of fusion gas welding, thermite welding, elec. flash welding and gas-heated pressure welding) have been supplied. Results to date of the various tests are discussed. 52 references. C. B. Jenni

Atomic-hydrogen arc welding solves difficult problems. W. E. Wilson. *Gen. Elec. Rev.* **42**, 427–31(1939).—Atomic-H arc welding differs from ordinary arc welding: The H arc is maintained between 2 electrodes (rather than between one electrode and the work); the H arc is made to occur entirely in an atm. of H_2 to produce atomic H which with the arc is directed on the work to perform the welding operation. The recombination, $2H = H_2$, results in a high temp. arc fan and especially good heat transfer. Since H arc is independent of the work, it can be moved instantly at will. Welded joints are ductile, strong, dense and free from pinholes. Many applications are cited, among these Cr steels, Al, hard surfacing, fine wire mesh. C. G. F.

Automatic atomic-hydrogen welding of steel. J. T. Catlett. *Iron Steel Engr.* **17**, No. 1, 25–32(1940).—A brief

history of the development of welding. An explanation is given of the atomic-H welding process, including hand welding and the variables controlled by the operator, the single-arc automatic welding equipment and the methods used to control the variables; and the multiple-arc equipment and the methods of application to the tube welding problem. The use of dissocd. NH_3 as a substitute for H is discussed. Charts of welding data are developed for the single-arc, the 3-arc, the 6-arc, the 10-arc and the 15-arc equipment, giving welding speeds in ft. per hr. and in tons per hr., and welding costs per ft. and per ton using either H or dissocd. NH_3. C. B. Jenni

Use of the weld-bend test for structural steel. Eduard Houdremont, Karl Schönrock and Hans J. Wiester. *Stahl u. Eisen* **59**, 1241–8, 1268–73(1939).—In the weld-bend test a longitudinal seam is welded in the center of a 700 × 200 × 50-mm. plate, which is then bent longitudinally so that the welded seam is on the outside of the bend. Cracks form through the weld as the angle of bend is increased; the angle of bend at which a crack extends across the whole width of the specimen is taken as a measure of the weld sensitivity of the structural steel. Thinner plates may also be tested in this way. Weld sensitivity was decreased (larger angle of bend) by preheating the plate before welding and, of course, by annealing after welding. Fine-grained steels were less weld-sensitive, but this was attributed more to the effect of the finely distributed inclusions in obstructing notch propagation than to the effect of the fine grain *per se* as revealed by the McQuaid-Ehn test. The angle of bend was increased by raising the temp. a rise to 100° having a very decided effect. The test is highly recommended for testing weld sensitivity. S. Epstein

Steels in sugar industry (Graham) **28**. Synthetic materials as mill bearings—application to steelworks practice (Phillipe) **13**. Temp. measurements on liquid steel in basic open-hearth process (Fornander, Omberg) **1**. Nature of intermetallic lattices (Norbury) **2**. Oxide films on light metals—Mg, Al and Be (Yamaguti) **2**. Joining chromium-iron parts with glass (Schad) **19**. Hydrogen swells in canned fruits (Hoar) **12**. Stainless steel in freezing plant (Gavrilova) **12**. Application of light-wt. and ultra-light-wt. alloys in textile industry (Nau-Touron) **25**. Reduction of TiO_2 with C and with C contg. Fe (Durrer) **6**. Attack on steel in high-capacity boilers as result of overheating due to steam blanketing (Partridge, Hall) **14**. Refractories for metal-melting furnaces (Isikawa) **19**. Metallic materials for thermocouples (Schulze) **1**. Electrolytic etching of brass (Williams, Rieger) **4**. Corrosion in distillery (Rao) **16**. Corrosion in gas systems and consequent disturbances (Kaatz) **21**. Blast-furnace slags (Elagin) **20**. Wood coke for use in Fe-ore reduction (U. S. pat. 2,184,317) **21**.

Du Rietz, Dag, and Koch, Helmut: Praktisches Handbuch der Lichtbogenschweisung. Braunschweig: F. Vieweg & Sohn. 251 pp. M. 9.40; bound M. 11.

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Plummer, Robert L.: Sixty-Five Years of Iron and Steel in Wheeling. Personal Reminiscences of Alexander Glass. Wheeling: Wheeling Steel Corp. 72 pp.

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Le leghe leggere. Duralluminio, liburnal, inalteral, lega R. E. 2, resistal, telalco, decoral. 3rd ed. Milan: Societa metallurgica italiana. 208 pp.

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Year Book of the American Bureau of Metal Statistics, 1938. New York: American Bureau of Metal Statistics. 120 pp. $2.00.

Apparatus for flotation concentration of ores. Hugh W. Coke. U. S. 2,184,115, Dec. 19. A flotation app. includes a plurality of cleaner cells, a feeder for feeding a selective flotation reagent to one or more of the cleaner cells, an elec. motor for driving the feeder, means for delivering air to aerate the cells, a valve for each cell to control the delivery of air thereto, means for opening the circuit through the motor intermittently to stop the feed of the reagent to the cells, and means for closing the air-controlling valves during the feeding of the reagent and for opening the valves when the motor circuit is open.

Ore-concentrating apparatus (with a plurality of sluice boxes). Wm. L. Opie (to Sierra Leone Development Co. Ltd.). U. S. 2,184,226, Dec. 19. Various structural, mech. and operative details.

Trough for concentrating metals from gang. Bianca A. Miller. U. S. 2,183,971, Dec. 19. Various structural details.

Treatment of ores or the like containing tantalum and columbium. Joseph P. Leemans (to Soc. générale métallurgique de Hoboken). U. S. 2,183,517, Dec. 12. A process for the treatment of primary materials contg. Ta and Cb involves a reduction of the primary material by means of at least one of the metals Al, Ca, Mg alloyed with at least one of the metals whose alloying reaction with the reducing elements develops heat so that the metallicthermic power of a given quantity of the reducing elements is smaller in the obtained alloy than in the same quantity in the elementary state, thereby selectively reducing the Cb and obtaining an alloy in which the ratio Cb:Ta is higher than in the primary material, and a slag in which the ratio Ta:Cb is higher than in the primary material.

Titanium concentrates from ores. James E. Booge (to E. I. du Pont de Nemours & Co.). U. S. 2,183,365, Dec. 12. For producing a substantially Fe-free TiO_2 concentrate, a titaniferous ore is heated in the presence of a gaseous oxidizing medium such as air to about 500–1000° and the resultant oxidized ore is then subjected to the action of gaseous HCl at 600–800° in order to convert Fe present to $FeCl_3$.

Reducing ores such as those of iron. Frank Hodson and Paul A. Hirsch. U. S. 2,184,300, Dec. 26. App. is described, and a process which involves introducing pulverulent ore into a violently turbulent and upwardly flowing column of reducing gases, regulating the velocity of the gases so as to carry the ore upwardly and maintain it in suspension until it is reduced to metal, maintaining the temp. of the gases below the fusion temp. of the metal, and sepg. the metal from the gases.

Apparatus (with tilting buckets) for use in mining and amalgamating gold. Joseph H. Thornton. U. S. 2,184,447, Dec. 26. Various structural, mech. and operative details.

Apparatus, with a rotary furnace, suitable for melting iron or steel, etc. Aubrey J. Grindle (to Alwin F. Pitzner). U. S. 2,184,297, Dec. 26. Various structural, mech. and operative details.

Furnace and tube still apparatus suitable for oil heat-treatments. Cecilio L. Ocon. U. S. 2,184,465, Dec. 26. Various structural and operative details.

Apparatus for washing gases from metallurgical furnaces, etc. Charles M. Gerhold (to Louise H. Gerhold). U. S. 2,184,185, Dec. 19. Various structural and operative details.

Smelting zinc-containing material in shaft furnaces. Hüttenwerke Siegerland A.-G. Brit. 508,606, July 4, 1939. See Fr. 834,408 (*C. A.* **33**, 3745[5]). The gas conduit from the blast furnace up to the gas purifier consists of vertical pipes only, or pipes steeply inclined to the horizontal. Between the furnace and the fine purifying plant dry separators or "whirlers" are disposed, the size and no. of which are such that in the same the gas is cooled

and the heavy Fe-contg. dust is almost completely sepd. and in the subsequent "fine purification" a dust rich in Zn and poor in Fe may be obtained. 1

Simultaneous production of alumina cement and pig iron in a blast furnace. Stevan Ruzicka. U. S. 2,184,318, Dec. 26. A process is employed which involves subjecting a blast-furnace charge contg. Fe, bauxite, a carbonaceous material selected from a class consisting of petroleum coke produced at high-coking temp. and an artificial charcoal resulting from subjecting pulverized charcoal and a cokable binder to the action of a coking-oven retort at temps. between 500° and 1200°, to a blast-furnace reduction for producing molten iron and alumina cement. 2

Radiation pyrometer suitable for use with molten metal baths. Louis O. Sordahl (to United States Steel Corp.). U. S. 2,184,169, Dec. 19. Various structural details.

Magnesium. Magnesium Elektron Ltd. Brit. 508,647, July 4, 1939. In reducing oxidic Mg compds., e. g., calcined magnesite or dolomite, at a high temp., preferably *in vacuo*, by CaC_2 in stationary retorts, rotary furnaces, shaft furnaces, etc., to produce Mg vapors and a more or less pulverulent reaction residue consisting mainly of CaO and C, the solid reaction residues are caused to agglomerate or sinter together in the course of the reaction by insuring the presence in the reaction mixt. of a substance or mixt. adapted to produce such agglomeration. SiO_2, e. g., powd. quartz, and (or) Al_2O_3 are preferable addns. The SiO_2 and Al_2O_3 may be calcined clay. SiO_2 may be added in amt. sufficient to form di- or tri-Ca silicate or a substance of intermediate compn. and Al_2O_3 in amt. sufficient to form mono- or tri-Ca aluminate or a substance of intermediate compn. The SiO_2 may be added as Mg silicate. The Mg silicate and CaC_2 may be in proportion to yield di-Ca silicate. Cf. *C. A.* **33**, 2473[9]. 3

Converting magnesium dust into compact metal. Konrad Erdmann (to American Magnesium Metals Corp.). U. S. 2,183,392, Dec. 12. An arrangement of app. is described, and a process which involves vaporizing Mg from magnesium dust after admixt. with the ground residue of a previous similar operation and, briquetting the mixt. under high pressure, and condensing the vapor evolved. 4

Recovery of lead from waste sludge obtained in tetraethyl lead manufacture. Robert B. Erickson. U. S. 2,184,520, Dec. 26. Sludge contg. Pb oxide and NaCl is leached to reduce the NaCl content to below about 2.5%, and the treated sludge, together with coke, is charged into a continuously operated blast furnace in which molten Pb accumulates in the furnace pot with an overlying zone of molten slag, the slag being tapped off and the reduced molten Pb being withdrawn from the bottom of the furnace pot. 5

Removing zinc from lead and lead alloys. Gustave E. Behr (to National Lead Co.). U. S. 2,183,420, Dec. 12. The metal to be purified is melted and agitated with added NH_4Cl, without addn. of Cl, and the $ZnCl_2$ skim formed is removed. 6

Zinc recovery from zinc oxide. Jesse O. Betterton and Melville F. Perkins (to American Smelting and Refining Co.). U. S. 2,183,535, Dec. 19. A charge comprising ZnO and a carbonaceous reducing agent such as coke is subjected to a flash reduction and the resulting gaseous products contg. Zn vapor are intermixed with a cold stream of CO without prior conditioning, to quench the Zn vapor to a temp. at which reactions conducive to Zn reoxidation proceed only at "harmless" rates, and Zn is recovered from the quenched vapor. App. is described. 7

Extrusion press suitable for use in making metal products. Charles W. Krause (to Forging and Casting Corp.). U. S. 2,184,048, Dec. 19. Various structural details and details of special alloy steels used. 8

Cutting metals such as steel plates with an oxidizing jet. Harry E. Rockefeller and John H. Rountree (to Linde Air Products Co.). U. S. 2,184,562, Dec. 26. A process of cutting metal, where an oxidizing jet is advanced relatively to the metal to be cut at such a speed that the resulting kerf walls are left irregular and rough, involves concurrently advancing a smoothing jet of oxidizing gas along and substantially aligned with the central plane of the kerf at a point behind the first jet to trim a thin layer from one of the walls, the smoothing jet having a cross section substantially equal to the max. deviation of the irregular wall from a plane surface. 9

Cutting metal bodies such as thick steel slabs at high speed. Roger S. Babcock and John M. Gaines, Jr. (to Linde Air Products Co.). U. S. 2,184,561, Dec. 26. App. is described, and a method of cutting metallic bodies at high speed, which comprises heating the metal to the kindling temp., and progressively applying oxidizing gas upon the heated surface in such a manner that a portion of the oxidizing gas produces a deseaming puddle on the surface of the metallic body so as to preheat the metal effectively for complete severing, and the remainder of the oxidizing gas progressively penetrates through the parts of the metallic body at the rear of the puddle to produce a kerf therein.

Use of oxygen jets for forming shaped edges on steel plates or the like. Herbert H. Moss (to Union Carbide and Carbon Corp.). U. S. 2,184,560, Dec. 26. A low-velocity O machining jet is applied, and behind this there is also applied, simultaneously and progressively, a high-velocity O cutting jet.

Presses for extruding metal. Geo. A. V. Russell and Imperial Chemical Industries Ltd. Brit. 508,557, June 30, 1939.

Manufacture of chilled hollow balls such as those of steel by centrifugal force. Sinsaku Nakagawa (to Toyo Tokushu Imono K. K.). U. S. 2,184,257, Dec. 19. Various details of app. and operation.

Rolls for rolling mills. Metal Carbides Corp. Brit. 508,674, July 3, 1939. Divided on 506,728 (*C. A.* **34**, 3623). At least the working surface of a rolling-mill roll is made of a cemented compn. consisting of hard metal carbide particles and metallic cementing medium therefor W carbide is preferred but carbides of Ta, Ti, Cr, Mo or V may be used in place of or in addn. thereto, while Co or Ni is the preferred cementing medium though Fe, Mn, Cr, Mo, Cu, Al, Be, etc., may be used.

Ferrous metal piston ring. Walter J. Six. U. S. 2,183,358, Dec. 12. The rings are heated to above the crit. temp., and after partially quenching the hardened rings they are expanded and their shape is changed to the desired permanent form below the crit. temp. and before the quenching is completed. App. is described.

Apparatus for heat-treating and shaping metal clutch disks, etc. Reinhold C. Zeidler (to Borg-Warner Corp.). U. S. 2,183,300, Dec. 12. Various structural, mech. and operative details.

Heat-treatment of light metals and alloys. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Brit. 508,541, June 29, 1939. In a process for regulating and maintaining the activity of alkali nitrate- and (or) alkali nitrite-contg. melt baths for the heat-treatment of the metals, especially Al and its alloys, the formation or accumulation of disturbing quantities of alk. compds. is counteracted by the periodic or gradual addn. of acid salts, acid-yielding compds. or other alkali-fixing compds. in quantities sufficient to render the alk. compds. nondetrimental. The addns. may be alkali or NH_4 metaphosphates, acid phosphates or pyrophosphates, neutral NH_4 salts that are decompd. by the alk. compds. formed, the NH_4 radical combining with the acid radical of the compds. added, or alkali dichromates, which are introduced in admixt. with other bath constituents, e. g., alkali nitrate, for the mixt., which preferably contains at least 5 parts of the other salts, e. g., alkali nitrate, for each part of alkali dichromate. The salt mixt. is introduced preferably at not more than 100° above the m. p. of the bath.

Surface-hardening shafts, axles and like long lengths of material. Adolf Messer. Brit. 508,680, June 29, 1939. A blowpipe having a simple nozzle for heating the shaft, etc., with a quenching device in close lateral spaced relation thereto, i. e., as close as mechanically practicable, for applying quenching liquid, e. g., as a spray, to the shaft, etc., is traversed along the shaft, etc., in a longi-

tudinal direction relatively thereto and during rotation thereof. 1

Cover suitable for use in annealing metal sheets or coils. Carleton C. Clark (to American Rolling Mill Co.). U. S. 2,183,785, Dec. 19. Various structural details.

Metallic product containing tungsten, nickel and copper. Colin J. Smithells (to General Elec. Co. Ltd.). U. S. 2,183,359, Dec. 12. See Can. 384,709 (*C. A.* **34**, 1302[8]).

Desulfuring pig iron. Heinrich Koppers G. m. b. H. (to Heinrich Koppers' Industrieele Maatschappij N. V.). Brit. 508,539, June 28, 1939. C and soda are added in a liquid fused state to the molten Fe while it is being poured or transferred from 1 vessel to another during processing. The soda is preferably fused in a vessel the walls of which consist of C or a C-contg. material. A trough with a discharge opening may be used for mixing the Fe with the C-soda mixt. The alk. silicate formed and into which the S impurities are withdrawn may be completely removed from the surface of the fused metal by means of a pistonlike body covered with fireproof material that is lowered into the vessel from above until the surface of the Fe bath is in the same plane as the outlet of the vessel, whereupon the slag, or so much thereof as does not flow off unaided, can be removed by scraping or blowing off, e. g., by means of superheated steam. Cf. *C. A.* **33**, 2470[7]. 2

Cast iron. Wm. J. Priestley (to Electro Metallurgical Co.). Brit. 508,540, June 29, 1939. Cast Fe of increased strength is made by adding 1–16 oz. of an unbonded intimate mixt. contg. 25–75% C, the remainder consisting of 1 or more of Si, Zr, Fe-Si or Si-Zr, to each 100 lb. of the cast Fe and casting the melt. The C may be graphite. Cf. *C. A.* **33**, 1651[9]. 3

Steel. Maximilian von Schwarz. Brit. 508,465, June 26, 1939. Divided on 508,375 (see below). Constructional parts liable to the destructive effects of water-hammer from wet steam or similar erosion are made of a steel alloy contg. C 0.2–2, Cr 6–30 and Mn 2–12%. One or more of the carbide-formers, Mo, W, Ti and V, may be added in the proportions usual for such purpose. In Brit. 508,375, June 26, 1939, the parts are made of steel of eutectoid structure. An erosion-resistant layer may be formed on the parts by carbonizing a hypoeutectoid steel to produce the aforesaid structure. Cf. *C. A.* **33**, 1650[9]. 4

Casting steel ingots. Lewis B. Lindemuth. U. S. 2,183,576, Dec. 19. A layer of ground cork impregnated with Na silicate is applied to the top of metal in a mold to retard cooling. 5

Alloy steels. Wm. H. Hatfield and Joseph F. Bridge. Brit. 508,710, July 5, 1939. A low-C austenitic Cr-Ni-Mo steel comprises C up to 0.20, preferably below 0.10, Ni 10–30, Cr 15–35 and Mo 5–15%. Si and Mn may be present in the usual amts. The steels have very high tensile strength at high temps. and are resistant to the action of corrosive gases. 6

Steel alloys. Fried. Krupp A.-G. Brit. 508,619, July 4, 1939. Articles that, after being welded, are subjected without subsequent high-temp. heat-treatment to attacks by corrosive agents are made from corrosion-resistant austenitic or austenitic-ferritic Cr-Mn steel alloys contg. 0.05–1.5% N. The alloys preferably contain C 0.01–0.3, Cr 9–25, Mn 6–25 and N 0.07–0.35%. 7

Corrosion-resistant steel alloys. Russell Franks (to Electro Metallurgical Co.). U. S. 2,183,715, Dec. 19. Alloy ferritic steels suitable for lamination with other steels, etc., contain Fe together with Cr 15–35, Mo 1–5, Mn 0.01–3, Si 0.01–3, C 0.01–0.35, N 0.01–0.5% and Cb in an amt. at least 4 times the C content but not exceeding 8 times the C content by more than 1.5%. 8

Steel-alloy tubing suitable for machining. Harry W. Hudson (to National Tube Co.). U. S. 2,184,498, Dec. 26. A method for use in the manuf. of cold-drawn Ni-alloy steel tubing contg. C less than 0.25, Ni 2–5 and Mn 0.3–0.6%, together with Fe, involves heating the tubular blank to a temp. substantially above the upper crit. point, holding the blank at the temp. for approx. an hr., pptg. the carbides along the cleavage planes of the austenitic crystals by rapidly cooling the blank in the atm., and finally elongating the constituents of the steel structure axially of the tubular blank by cold-drawing the same, thereby producing a tubular steel blank which is freely machineable. 9

Forming pens from stock metals such as chrome steel. David Kahn (to David Kahn, Inc.). U. S. 2,183,572–3, Dec. 19. Various details of manuf. of ball point pens.

Alloys. Hall & Pickles Ltd., John H. Russell and Alexander M. C. Murphy. Brit. 508,319, June 29, 1939. A high heat-resisting alloy for an elec. resistance element of the high Ni-high Cr type without Fe or with Fe not in excess of 30% contains 1–10% Cb together with the usual deoxidant(s), e. g., Ca, Al, Ti, Zr, Ce. The Cb may be added as a ferro alloy contg. 50–60% Cb. A typical alloy contains Ni above 50, Cr 10–30, Fe to not more than 30 and Cb up to 10%.

Hard alloys. Tool Metal Manufacturing Co. Ltd. Brit. 508,662, July 4, 1939. A mixt. more than 50% of which consists of W carbide (I) and Ta carbide (II), and the remainder (more than 5%) of 1 or more carbides of Ti, Mo, V, Cb, Zr and Th, is pressed and sintered at 1400–1700° to form a hard alloy of high m. p. without auxiliary metal. The carbides of Ti, etc., preferably amount to 10–20%. Examples are (1) I 70, II 15 and Ti carbide 15, and (2) I 50, II 30, Mo carbide 10 and V carbide 10%, pressed and sintered at 1550 and 1450°, resp.

Alloys for jewelry, rings, etc. W. C. Heraeus G. m. b. H. Brit. 508,669, July 4, 1939. These contain Au 25–55, Pd 2–6, Ag 10–30 and Zn 9–25%, the remainder being at least 5% of Cu. Alloys in which the Cu:Zn ratio is approx. 2:1 are preferable. Specified alloys are Au 33.3, 41.7, 37.5; Pd 3.0, 3.0, 4.0; Ag 17.0, 21.0, 18.0; Cu 30.0, 21.3, 27.0, and Zn 16.7, 13.0, 13.5%.

Dental alloy. Wilhelm Krezdorn. Ger. 684,982, Dec. 9, 1939 (Cl. 40*b*. 17). The composition of the alloy is Cr 51–70, Pd or Pt 1–10, of one or more of the metals W, V, Ta, Re 0–6%, the remainder Ni.

Aluminum alloys suitable for floats of measuring instruments. Otto Dahl and Herbert Dallmann (to General Elec. Co.). U. S. 2,183,391, Dec. 12. An alloy subject to oxidizing conditions and contact with Hg is formed of Al together with Cu 0.3–1.5, Mn over 0.3 and Mg 0.5–4% (the total of Cu and Mn being not over 5% of the alloy).

Copper-zirconium alloys. N. V. Philips' Gloeilampenfabrieken. Brit. 508,330, June 29, 1939. A wire-shaped conductor, e. g., a high-voltage conductor, telephone or telegraph wire, trolley wire or enameled wire, having a tensile strength at least 1.5 times that of pure Cu and a sp. resistance approx. that of Cu consists of a Cu-Zr alloy contg. 0.02–5% Zr.

Lead alloys. Pirelli-General Cable Works Ltd. and Giuseppi Martinez. Brit. 508,394, June 30, 1939. Alloys suitable for continuous extrusion contain Sb 0.5–1%, a small quantity of Fe, with or without a small quantity of Cu up to 0.05%, the Fe being 0.001–0.05% when Cu is present and 0.001–0.02% when Cu is absent, and Pb the remainder.

Lead alloys. Pirelli-General Cable Works Ltd. and Giuseppe Martinez. Brit. 508,604, July 4, 1939. Alloys suitable for continuous extrusion, e. g., for the production of Pb pipes or elec. cable sheaths, comprise Cd 0.2–2, with Sb 0.25–1 or Sn 0.5–2, and Fe 0.001–0.05, with or without Cu not exceeding 0.08%, the remainder being Pb.

Treating lead alloys. Herman L. Smith (to American Smelting and Refining Co.). U. S. 2,184,535, Dec. 26. For increasing their resistance to drossing under repeated meltings and castings, Pb-base alloys, such as type metal, are treated while molten with a carbohydrate, a reducing gas such as H, and a metallic deoxidizing agent.

Corrosion-resistant chromium-manganese-iron alloys. Alfred Kropf. U. S. 2,184,305, Dec. 26. Alloys suitable for use as substitutes for German silver contain Fe together with Mn 7–50, Cr 6–25, Cu 0.5–10 and C up to 0.4% (the Mn content being in excess of the Cr content).

Coating steel wire to prevent corrosion. Elgin C. Domm (to National-Standard Co.). U. S. 2,184,179, Dec. 19. Steel wire is coated with a Pb-Sb alloy, drawn to reduce its cross section while leaving a continuous coat-

ing of the alloy and then provided with an electrodeposited Cu coating thin enough to alloy throughout with the Pb-Sb alloy at atm. temp. or the temp. of vulcanization, and further provided with a vulcanized-on rubber coating. Cf. *C. A.* **34**, 947[5].

Pipe welding and heat-treatment. Harry B. Smith and Geo. A. Dolan. U. S. 2,184,534, Dec. 26. Elec. app. is described, and a process of butt-welding metallic members together which consists in applying windings around the adjacent parts of the members, passing a. c. through the windings to establish alternating electromagnetic fields uniformly around the parts to induce preheating currents in the parts, then arc-welding the joint between the members while the windings are still in place, and when the welding is completed immediately applying the current again to the windings, and controlling it so as to normalize the weld.

Welding rod and hard overlays produced with it. John T. Eash and Thomas J. Wood (to International Nickel Co.). U. S. 2,184,518, Dec. 26. A welding rod for producing hard overlays by welding contains Fe together with C about 2–4, Si about 0.25–2, Ni about 2–5, Cr about 0.25–3, Mn about 0.1–1.5, S not over 0.2, P not over 0.3, a deoxidizer such as Al or Ca-Li about 0.5, and B about 0.5%. Such a welding rod is suitable for producing hard overlays on cast iron, etc.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Production of organic compounds from the waste products of pyrolysis and cracking of petroleum. M. A. Dalin. *Org. Chem. Ind.* (U. S. S. R.) **6**, 485–9(1939).—A discussion of the production of EtOH, Et_2O, Me_2CO, chlorinated solvents and other products from the waste satd. and unsatd. hydrocarbons as based chiefly on American practice. Chas. Blanc

Inhibition of the hydrogenation of ethylene by nitric oxide. H. D. Burnham and R. N. Pease. *J. Am. Chem. Soc.* **62**, 453(1940).—The ratio of the times required for 16% conversion of the C_2H_4 in mixts. of 180 mm. C_2H_4 and 540 mm. H without and with 20 mm. NO, resp., is 0.79 at 500° and 0.46 at 550°; the effect of the NO tends to fade out after about 20% reaction. While the ratios are not a true measure of the max. inhibition, there is little doubt that the NO is more effective at the higher temp. This is believed to be the first case in which forward and reverse reactions have been shown to be equally subject to inhibition (cf. Stavely, *C. A.* **32**, 1170[1], for effect of NO on C_2H_6). C. J. West

Inhibition of ethylene polymerization by nitric oxide. H. D. Burnham and R. N. Pease. *J. Am. Chem. Soc.* **62**, 453(1940).—C_2H_4 (720 mm.) at 500° shows a time of 24 min. to 20% reaction; addn. of 20 mm. NO increases this to 73 min., the ratio of times being 0.33. The effect of the NO fades out as the reaction proceeds. The reaction is probably of the radical chain type. C. J. West

Preparation and structure of high-molecular-weight polybutenes. R. M. Thomas, W. J. Sparks, Per K. Frolich, M. Otto and M. Mueller-Cunradi. *J. Am. Chem. Soc.* **62**, 276–80(1940).—The polymerization of isobutylene (I) at low temps. with catalysts of acidic nature takes place with almost explosive violence and is among the most rapidly completed of org. reactions; under suitable conditions it is possible to obtain an almost quant. yield of rubber-like solid from liquid I within a fraction of a sec. A sample of I maintained at its b. p. and treated with a slow stream of BF_3 will show a considerable induction period, followed by a vigorous reaction to produce an oil, whereas a sunilar sample precooled to −80° will react immediately on introduction of the BF_3 to produce a polymer of much higher mol. wt. The presence of C_2H_4 and C_3H_6 in the I is apparently without effect; butenes are more reactive and cause a lowering in the mol. wt. of the polymer; 10% decreases the mol. wt. from about 250,000 to 75,000. Very small quantities of diisobutylene or triisobutylene greatly decrease both the yield and mol. wt. of the polymer; whereas dimers or trimers of I are capable of slow polymerization at room temp. to give oily products, high polymers have not been obtained by the use of the low-temp. technique. Other poisons are S compds. (H_2S or mercaptans) and H halides (HF, HCl); the latter have a marked depressing effect on the mol. wt. of the polymer in spite of their well-known promoter action in certain metallic halide-catalyzed alkylation or dimerization reactions. The poisoning effect of HCl may result from the formation of diisobutylene. The suitability of a catalyst for the low-temp. polymerization of I cannot be predicted. Temp. control is of great importance in the polymerization process since the reaction is rapid and exothermic; the heat of reaction is about 10,000 cals. per mole at about −78°; under 1 set of conditions the mol. wt. increases from 10,000 to about 200,000 on decreasing the temp. from −10 to about −100°. The mol. wt. of the product increases according to an exponential function with increasing proportion of diluent until a limiting concn. of approx. 80% by vol. is reached, at which point there occurs a precipitous drop in the mol. wt. The influence of catalyst concn. is discussed; the catalyst efficiency is highest at the greatest dilu. presumably because of a lower loss due to mech. occlusion of unreacted catalyst in the polymer. The polymerization of I to high-mol.-wt.-products can be carried out with yields of 90% or better. It is believed that the polymers are linear and probably have the head-to-tail structure. A polymer of about 20,000 mol. wt. on decompn. at 350° gave degradation products consisting of about 50% of monomol. and about 20% hydrocarbons boiling in the octene range. Heating 2,4,4-trimethyl-1-pentene at 350° for 1 hr. causes cracking and polymerization but no noticeable degree of isomerization. C. J. West

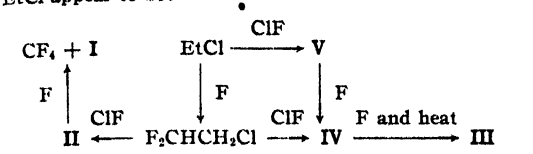
Solvolytic reactions of organic halides. Michael P. Balfe and Joseph Kenyon. *J. Am. Chem. Soc.* **62**, 445–6 (1940).—Comments are made on the mode of formulation of the solvated cation which is assumed as an intermediate by Winstein (*C. A.* **33**, 7181[3]). It is concluded that it is undesirable to assume that there is solvation of carbonium cations by covalency formation between solvent and cation in the hydrolysis of halides. C. J. West

Hydrogen fluoride as a condensing agent. IX. Reactions of di- and triisobutylene with phenol. J. H. Simons and S. Archer. *J. Am. Chem. Soc.* **62**, 451(1940); cf. *C. A.* **33**, 6814[1].—Addn. of 94 g. PhOH in 300 cc. CCl_4 to 121 g. HF in a Cu flask, followed by 1 mole of diisobutylene (added dropwise at 0°) gives 88 g. *tert*-BuC_6H_4OH; a mixt. of 20 g. 70% HF, 56 g. of olefin and 47 g. PhOH, kept at 0° for 48 hrs., gives 35 g. *p-tert*-octylphenol. Under the same conditions triisobutylene gave only *tert*-BuC_6H_4OH; dodecylphenol was not isolated, even with the 70% HF, although this might be accomplished by milder conditions. C. J. West

The preparation of trimethylene bromide. Yuoh-Fong Chi and Gia-Chien Liu. *J. Chem. Eng. China* **5**, 82 (1938).—Pure $Br(CH_2)_3Br$ is obtained by satg. 170.5 g. $CH_2{:}CHCH_2Br$ with dry HBr gas in the cold (cooling in a freezing mixt.), then closing the flask tightly with a rubber stopper and heating it at 35–40° for 4 hrs. It is purified by heating with 20 cc. abs. alc. and 3 g. Zn dust. The yield is 153 g. C. L. Tseng

Action of elementary fluorine upon organic compounds. VII. The vapor-phase fluorination of ethyl chloride. John D. Calfee, Nobukazu Fukuhara, DeWalt S. Young and Lucius A. Bigelow. *J. Am. Chem. Soc.* **62**, 267–9 (1940); cf. *C. A.* **34**, 977[5].—EtCl is fluorinated smoothly in a metal app. over Cu gauze, under conditions described in part VI; the Cu gauze was protected at all times from air and moisture, which decreased its efficiency greatly (not observed in reaction with C_2H_6). The fol-

lowing products were obtained on using gas vol. ratios of F:EtCl:N of 2:2:0, 3:2:0, 4:2:0 and 4:2:4; the yields are in liquid vol. % (rounded off to the nearest 5%): CF_4 10, 10, 10, trace; CF_3Cl (I) 5, 10, 15, trace; CF_3CCl_3F (II) trace, 5, 10, 5; $CF_2{:}CCl_2$ (III) 0, 5, 5, trace; EtCl 70, 40, 10, 20; residue, b. above 12° 5, 15, 20, 40; transition fractions, 15, 20, 30, 40. I–III have not been obtained before by the action of F on an org. compd. In addn. small amts. of CHF_2CHCl_2 (IV) and $MeCHCl_2$ (V) are also formed. The reactions involved in the action of F on EtCl appear to be:



A precise *anal. procedure for detg. F and Cl in stable org. gases* is described. C. J. West

Action of fluorine upon some simple aliphatic chlorinated hydrocarbons. Wm. T. Miller. *J. Am. Chem. Soc.* 62, 341-4(1940).—The phys. as well as chem. properties of F must be taken into account in considering actual reaction conditions. It has been found to be insol. in CCl_4 within the limit of measurement and, in general, a slight soly. for F in compds. of this type may be expected from its low b. p. Consequently, the reactions observed in this work occur principally in the gas phase and at the liquid surface under essentially "non-ionic" conditions, and radical-type mechanisms in which the F mol. is split sym. are considered to be of greatest importance. It is suggested that some of the observed differences of kind between the reaction of F with org. compds. and the reactions of the other halogens may be found in this direction. In addn. to the expected substitution products which were obtained from $CHCl_3$ and C_2HCl_5, C_2Cl_6 and C_4Cl_{10} were isolated in small amts. This converse of the Wurtz-Fittig type of reaction has also been observed to occur when CHF_3 reacts by sparking with F (Ruff and Bretschneider, *C. A.* 30, 2869[7]). $CHCl_3$ (150 g.), caused to react for 3 hrs. at 0°, gives 8.5 g. of $CFCl_3$ and some C_2Cl_6. C_2HCl_5 (350 g.), caused to react for 10 hrs. at 90 ± 3°, gives 297 g. of partially cryst. product; the following were isolated: 5 g. *sym*-$C_2Cl_4F_2$, 15.6 g. C_2Cl_4, 83.1 g. CCl_3F, 95.4 g. C_2HCl_5, 28.5 g. C_2Cl_6 and 0.1 g. *decachlorobutane*, m. 80 1°; in another expt. 365 g. C_2HCl_5 gave 343 g. crude material. $C_2H_2Cl_4$ (327 g.) at 50 ± 2° for 14 hrs. gave 310 g. of product which yielded a mixt. of C_2Cl_3H and *sym*-$C_2Cl_4F_2$ (which could not be sepd. by distn.), 67.8 g. of $Cl_2CHCFCl_2$, 11.2 g. C_2HCl_5 and about 168 g. of unreacted $C_2H_2Cl_4$. With olefins the dimerization observed by Bockemüller (*C. A.* 28, 118[4]) in the case of C_2Cl_4 was confirmed and also established for C_2Cl_3H; the products obtained may be termed *dimer addn. products;* it is assumed that in compds. of this type the F atoms are in the 1,4-positions. ClF was formed in the reaction mixts. and substitution and addn. products resulting from its action were isolated. ClF seems to add normally to ethylenic compds. without the formation of dimers since no monofluorobutane derivs. were found. C_2Cl_4 (335 g.) at 0° for 12 hrs. gives 354 g. of product; distn. gives 55 g. *sym*-$C_2Cl_4F_2$, 49.7 g. C_2Cl_6F and 66 g. of *difluorooctachlorobutane* (I), b_{20} 152.5°, m. 4·5°, n_D^{25} 1.5256, d_4^{20} 1.9272. C_2Cl_4 (65 g.) in 150 cc. $C_2Cl_3F_3$ with a slight excess of F at 0° gives (from 2 such reactions) 46.9 g. of $C_2Cl_4F_2$, 10.1 g. C_2Cl_5F, 49.5 g. I and a trace of C_2Cl_6. C_2Cl_3 (340 g.) for 10 hrs. at 0° gives 347 g. of product, yielding 14.9 g. of a mixt. of $CHClFCCl_3F$ and $CFCl{:}CCl_2$, 18.7 g. of a mixt. of $CHFClCCl_3$ and $CHCl_2CFCl_2$, 6 g. of *hexachlorobutene*, b_{25} 125.5°, m. 9.5–11°, n_D^{25} 1.5442, d_4^{20} 1.6880, and 1.2 g. of *octachlorobutane*, m. 75–6°. C_2Cl_3 in $C_2Cl_3F_3$ gives 14.6 g. of *difluorohexachlorobutane*, m. 55–6°. C. J. West

Substituted acetylenes and their derivatives. XXXVI. Halogenation in reactive solvents. 5. Chlorination of 1-hexyne in reactive solvents. 2. R. O. Norris and G. F. Hennion. *J. Am. Chem. Soc.* 62, 449–50(1940); cf. *C. A.* 33, 6235[7].—Yields are reported (in g.) for *cis*-BuCCl:CHCl, *trans*-BuCCl:CHCl, BuCCl:CCl_2, $BuCCl_2CHCl_2$ and $BuCCl_2CCl_3$ (values given in this order) for the chlorination of 1 mole of 1-hexyne (I) at 40–50° in the following solvents: 35% HCl in H_2O 23, 26, 25, 11, 14; 30% H_2SO_4 in H_2O 25, 25, 30, 8, 14; 30% H_3PO_4 in H_2O 24, 30, 36, 10, 17; 22% HCl in MeOH 45, 16, 65, 18, 6. The trichloride previously formulated as 1,2,2-trichlorohexane (II) is now found to be 1,1,2-trichloro-1-hexene; attempts to prep. II from I failed. Chlorination of 2-chloro-1-hexene in CCl_4 did not give II but *cis*-BuCCl:CHCl and $BuCCl_2CHCl_2$. C. J. West

Allylic rearrangements. X. The reproducibility of the standard methods for the preparation of butenyl bromide mixtures. Wm. G. Young and Kenzie Nozaki. *J. Am. Chem. Soc.* 62, 311–13(1940); cf. *C. A.* 34, 370[2].—The standard methods developed by Y. and Lane (*C. A.* 32, 108[9]) for prepg. butenyl bromide (I) mixts. from butenols under controlled conditions have been tested with both crotyl alc. and methylvinylcarbinol; the compns. of the bromide mixts. are in good agreement with those previously reported. The thermal rearrangement of pure primary and secondary I in glacial AcOH satd. with HBr produces equil. mixts. which possess values of *n* qual. in agreement with the calcd. value of n_r (*C. A.* 32, 4518[8]). When attempts were made to rearrange the I at room temp. it was found that addn. of HBr occurred faster than rearrangement; at 15° in the presence of a trace of Bz_2O_2 it was possible to obtain a thermal equil. of the I before too large a quantity of dibromobutanes had been formed. C. J. West

Preparation of 1,3-diiodo-2-propanol. G. Lusignani. *Boll. chim. farm.* 78, 557–8(1939).—A mixt. of 1 kg. $HOCH_2CH(OH)CH_2OH$ and 20 g. AcOH at 100–10° is satd. with a stream of dry HCl to const. wt., cooled, neutralized with Na_2CO_3 and purified by distn. at reduced pressure, yielding the dichlorohydrin (I), b_{14} 68–75°. A mixt. of 500 g. I and 1.160 g. NaI moistened with H_2O is heated at 130–40° with frequent stirring for 2 hrs. The crude reddish brown product is washed with $Na_2S_2O_3$ and filtered, yielding 1,3-diiodo-2-propanol contg. 78% I, used in oil for external application in iodine therapy. C. R. Addinall

Macromolecular compounds. CCXXXI. Polyvinyl chlorides. H. Staudinger and J. Schneiders. *Ann.* 541, 151–95(1939); cf. *C. A.* 34, 1480[6].—Data are given for osmotic and viscosity measurements and cryoscopic behavior in various solvents of polyvinyl chlorides, chlorinated polyvinyl chlorides and of mixed polymers of vinyl chloride and vinyl acetate. C. J. West

Some relationships between polyvinyl acetate and polyvinyl alcohol. W. H. McDowell and W. O. Kenyon. *J. Am. Chem. Soc.* 62, 415–17(1940).—This study was made to det. whether polyvinyl acetates (I) could be transformed into polyvinyl alcs. (II) and whether the alcs. could be reacetylated to produce I which are similar to the original I. Because of the polymeric nature of the I and II, comparisons are made on the basis of the degree of polymerization (*P. D.*) as detd. by viscosity measurements. Four samples of I were prepd., using 2, 1, 0.75 and 0.3% of Bz_2O_2 by wt.; their sp. viscosities in Me_2CO were 0.050, 0.090, 0.115 and 0.209, corresponding to *P. D.* of 192, 346, 442 and 804. MeOH solns. of I (6 cc. per g. I) and 4% of the theoretical amt. of EtOH-KOH necessary to react with the Ac groups, on standing overnight, give II with η of 0.043, 0.056, 0.063 and 0.080, corresponding to *P. D.* of 165, 216, 242 and 308; reacetylation, by boiling 1 part II for 4 hrs. with 10 parts of a 2:1 (vol.) C_5H_5N-Ac_2O mixt., gives I with η 0.042, 0.056, 0.060, 0.080, corresponding to *P. D.* of 162, 216, 230 and 308. The repetition of the sapon. and reacetylation gave values for the *P. D.* very similar to the 1st series: I 1135, II 672, I 330, II 691, I 346, showing that the decrease in the *P. D.* occurred in the 1st cycle but not in the 2nd. Expts. with com. I (7 samples) yielded opposite results. The change in the *P. D.* occurred principally during reacetylation and the *P. D.* of the resulting I were about

0.5 those of the corresponding II. There appeared to be some decrease during deacetylation, especially with the I of higher viscosities, though the decrease was slight when compared with that which occurred during reacetylation. It is suggested that this decrease of the av. chain lengths may be due to rupture of unstable linkages present in the linear mol. C. J. West

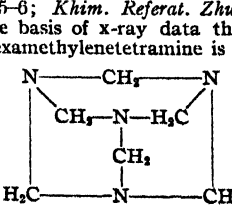
Decomposition of alkyl peroxides: propyl peroxide, ethyl hydrogen peroxide and propyl hydrogen peroxide. E. J. Harris. *Proc. Roy. Soc.* (London) **A173**, 126–46 (1939); cf. Harris and Edgerton, *C. A.* **32**, 7805⁸.—To 120 cc. of 100 vol. % H_2O_2 at −20° was added 56 g. KOH in 60 cc. of H_2O, followed at 0° by 184 g. of Pr_2SO_4. The liquid was stirred 8 hrs. and sepd. The aq. layer was made just acid to methyl red. The upper layer was used in 5 or 6 repetitions of the expt. The combined lower layers were distd. to half vol. *in vacuo* and extd. exhaustively with ether after salting out with $(NH_4)_2SO_4$. The ether ext., dried over Na_2SO_4, concd. under diminished pressure and dried over $CuSO_4$, gave 1 g. of Pr_2O_2 (I), b_{20} 35°, $n_D^{19.5}$ 1.3911, n_D^{15} 1.3940, d_4^{20} 0.8254. An addnl. 0.5 g. was obtained by distg. the aq. layer *in vacuo*. By the technique of H. and E. in a study of the decompn. kinetics, the activation energy was detd. to be 36.5 kg.-cal./mol. The velocity consts. (k min.$^{-1}$) ranged from 0.015 at 146.5° to 0.246 at 175.4°. Since packed vessels gave the same result, the reaction is both homogeneous and unimol. Explosive decompn. began at 0.67 to 0.69 cm. at 199°, and 0.31 to 0.30 cm. at 210°. A blue flash was emitted at 0.007 cm. with 3.5 cm. air and at 0.01 cm. with 35 cm. of air at 271°; at 201°, 0.058 cm. with 11 cm. air, by the technique used by H. and E. The explosion of I therefore occurs at slightly lower pressures than that at Et_2O_2 (II). Decompn. of I at 180° gave a nearly equal wt. of liquid product, composed of EtCHO and CH_2O, together with a gaseous product composed of 5% CO_2, 42% CO, 6.1% H_2 and 36.5% mixed hydrocarbons. By explosion at 240°, 0.294 g. of I gave 0.199 g. or 36.7 cc. of 97% butane (3% CO) and 10.9 cc. of gas contg. 26.5% CO and 73.5% hydrocarbon C_nH_{2n+2}, n = 2.1. Hence the relative amts. of products are cstd.: 3.5×10^{-4} mols. of HCO_2H, 40 of CH_2O, 16 of C_4H_{10}, 1.8 of CO, 4 of EtOH, and 3.6 of C_2H_6. This reaction is therefore like the decompn. of II. An improved prepn. of EtO_2H (III) (cf. Baeyer and Villiger, *Ber.* **34**, 748(1901)) gave a product with d_4^{20} 0.9332, $n_D^{19.5}$ 1.3800, glassy at −100°. The analysis indicates 90% III and 10% MeCHO. The decompn. of III was studied at 100° (3–12 min.) and at 138° (1 min.). Since packing modified the rate, the reaction is heterogeneous (7 graphs). Luminous explosion proved possible between 195° at 8.9 mm. and 252.5° at 0.56 mm. For PrO_2H (IV) the explosion pressure at 233° was 1.5 mm., somewhat higher than for III at the same temp. These observations vary with the size of vessel; those above were made in a flask 4.2 cm. in diam.; no flash was seen in a 1.1-cm. vessel. Slow decompn. of III gave little gas, but explosion gave much. From 1 mol. of III at 170° and 320°, resp., the following no. of mols. of products were isolated: ?, 0.02 III; 0.0062, 0.033 CO_2; 0.0086, 0.364 CO; 0.0633, — O_2; 0.0298, 0.411 C_nH_{2n+2} (n = 1.18 and 1.32, resp.); — 0.03 H; 0.113, 0.115 CH_2O; 0.182, 0.195 AcH; 0.486, 0.125 EtOH. As an intermediate, EtO_2CH_2OH appears probable because its decompn. gave similar amts. of these products with the exception that the amt. of H was much larger. Study of the decompn. of IV between 180° and 300° with and without glass wool showed that the reaction is heterogeneous and that surface decompn. favors the formation of aldehyde and alc. The results were similar to those for III (table). Unchanged IV formed an *ester* with 3,5-$(NO_2)_2$-C_6H_3COCl, m. 62°. Heats of combustion detd. for III and IV were 5.4 and 6.3 kg.-cal./g. The relation of this work to a study of the combustion of hydrocarbons is discussed. New properties of IV (cf. Medvedeef and Alexeeva, *C. A.* **26**, 2412) (98.5% pure, 1.5% H_2O by analysis) are n_D^{15} 1.3890, d_4^{20} 0.9040, b_{20} 35°, b_{20} 38°, becoming glassy at −90°. 8 references. W. F. Bruce

The action of ethyl azide and phenyl azide on fuming sulfuric acid. K. W. Sherk, A. G. Houpt and A. W. Browne. *J. Am. Chem. Soc.* **62**, 329–31(1940).—The mechanism of the reaction between PhN_3 and fuming H_2SO_4 consists of the coördination of a H^+ ion to the α-N of the azide group resulting in the removal of 2 N atoms as N gas and permitting sulfonation to occur in the *m*-position. The unstable residue unites with a bisulfate ion to form *m*-sulfophenylaminomonopersulfuric acid which probably also exists in an isomeric form. The probable mechanism of the reaction between EtN_3 and fuming H_2SO_4 consists of the union of a H^+ ion with the EtN_3 and a subsequent loss of 2 N atoms which causes a shift of a H or a Me group from the α-C to the adjacent N. This gives products which, on hydrolysis, yield H_2SO_4 and a mixt. of AcH, HCHO, NH_3 and $MeNH_2$. No compds. contg. N linked to N were obtained as products of either reaction. A method for the sepn. of HCHO and AcH is described.

A. B. Garrett

Unsaturated arsono carboxylic acids. H. J. Backer and R. P. van Oosten. *Rec. trav. chim.* **59**, 41–63(1940); cf. *C. A.* **30**, 7541¹.—A study of the prepn. and rates of reaction of the halogen-substituted acrylic, crotonic and isocrotonic acids with K arsenite. The dissocn. consts. $K_1 = 1.23 \times 10^{-3}$, $K_2 = 5.95 \times 10^{-5}$ and $K_3 = 2.49 \times 10^{-9}$ hold for α-arsonoacrylic acid (I); 4.37×10^{-4}, 2.42×10^{-5}, 1.77×10^{-9} for α-arsonocrotonic acid (II); and 2.58×10^{-3}, 9.42×10^{-6} and 1.56×10^{-9} for β-arsonocrotonic acid (III). III with HCl gives β-chloroisocrotonic acid. I is obtained from K arsenite on K 1,2-dibromopropionate or α-bromoacrylate. II (cis?) (trans?) is obtained similarly from α-bromocrotonic or α-bromoisocrotonic acid. III (cis?) (trans?) is obtained similarly from β-chlorocrotonic or β-chloroisocrotonic acid. The disappearance of cis-trans isomerism in the arsonic acids is not due to interconversion of the original crotonic acids before reaction with K arsenite. I m. 160° (decompn.). *Salts:* Pb (tertiary), insol. in hot water; Ba (tertiary + 12 H_2O); aniline (primary), decomp. 148°; strychnine (secondary + 6 H_2O), decomp. 155°. *Esters:* (a) spirocyclic with 2 mol. pinacol, m. 173–4° from acetone; (b) spirocyclic with 2 mols. cyclopentanonepinacol, m. 208–10° from acetone; (c) spirocyclic with 2 mols. pyrocatechol, m. 168–170° from $CHCl_3$ + petr. ether. I does not give the corresponding dichloroarsine with SO_2 + HCl but *trans*-β-chloroacrylic acid. II m. 158°–60° from alc. *Salts:* strychnine (secondary + 5 H_2O), decomp. 237°; quinine (secondary + 6 H_2O). III m. 151–2° from acetone + $CHCl_3$. *Salts:* Ba (tertiary + 8 H_2O), Ba (secondary + 3 H_2O); Ag (tertiary); aniline (primary) (IV), m. 140–1°. *Esters* of III: (a) 2 mols. pinacol, spirocyclic, m. 198–200° from $CHCl_3$; (b) 2 mols. cyclopentanonepinacol (+ 2 $CHCl_3$), m. 162–2.5° from $CHCl_3$; (c) 2 mols. cyclohexanonepinacol (+ 1 Me_2CO) (V), m. 233–4° (decompn.), from acetone; (d) 2 mols. pyrocatechol, spirocyclic, m. 175–6° from $CHCl_3$ + petr. ether; (e) 1 mol. tartaric acid, cyclic, decomp. 240° from acetone + $CHCl_3$. The dichloroarsine from III, by SO_2 + HCl, m. 88.5–9.5° from 20% HCl. H_2O_2 on the dichloride regenerates III. β-Arsenodicrotonic acid, from III with H_2SO_4 + Na hypophosphite, decomp. 193°. Crystallographic data are given for I, III, IV and V. G. Powell

Structure of urotropine. A. F. Oskerko. *Farm. Zhur.* 1938, No. 3, 35–6; *Khim. Referat. Zhur.* **2**, No. 5, 46 (1939).—On the basis of x-ray data the following ring structure for hexamethylenetetramine is most probable:



W. R. Henn

Methods of preparation and uses of butyraldehyde. S. M. Slavina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 521–5 (1939).—A discussion of the literature and patents with 80 references. Chas. Blanc

Stable and labile semicarbazones from methyl amyl ketone. W. S. Rapson and R. G. Shuttleworth. *J. Chem. Soc.* 1940, 99.—AcAm yields a *semicarbazone*, m. 96–7°, which changes on standing overnight to 121–3°; the change occurs in the dark or in cold EtOH soln. Later it was impossible to obtain this labile form. The stable form could not be converted into the labile form by exposure of the EtOH soln. to ultraviolet light. AcBu gives a semicarbazone, m. 123.5–4.5°, which may not be identical with that of Michael (*C. A.* **13**, 1855), who gives the m. p. as 118°. C. J. West

Production of acetone by catalytic dehydrogenation of isopropyl alcohol. M. Ya. Kagan, D. I. Kodner and G. D. Lyubarskiĭ. *Org. Chem. Ind.* (U. S. S. R.) **6**, 494–7 (1939).—Tentative results showed that in the dehydrogenation of 2-propanol at 300–400° in the presence of ZnO the side reaction of dehydration to olefins can be considerably retarded by the addn. of MgO, Na_2CO_3 and water glass to the catalyst. Contrary to Sabatier and Senderens (*Ann. chim.* [8], **4**, 467(1905)), pure Cu catalyst gives up to 2% C_3H_6. The addn. of water glass to Cu inhibits the dehydration reaction but gives some mesityl oxide. Better results are obtained with Cu treated with Na_2CO_3. A yield of 92.6% Me_2CO and pure H was obtained at 260° in the 1st run in the presence of the skeleton catalyst, the nature which is not given. 30 references. Chas. Blanc

Tertiary oxonium salts. II. Hans Meerwein, Ernst Battenberg, Heinrich Gold, Emanuel Pfeil and Georg Willfang. *J. prakt. Chem.* **154**, 83–156(1939); cf. *C. A.* **31**, 1760⁹.—Addn. of 14 g. of $ClCH_2\underset{\frown}{CH}.O.CH_2$ (I) to 19 g. $BF_3.Et_2O$ in 50 cc. ether at a rate such that the ether constantly boils, followed by stirring for 2 hrs., gives 100% of $(Et_2O).BF_4$ (II), m. 92°; similarly 6.4 g. $BF_3.Pr_2O$ in 40 cc. Pr_2O, treated with 4.6 g. I, gives 30% of *tripropyloxonium borofluoride*, m. 73–4° (decompn.). $SbCl_5$ (75 g.), added to 100 cc. Me_2O with cooling in Et_2O-CO_2, followed by slow addn. of 11.6 g. I, gives 95.5% of *trimethyloxonium hexachloroantimoniate* (III), $(Me_2O).SbCl_6$, m. 158° (decompn.), which is stable for months in a closed vessel. Evapn. of the mother liquor from III gives 48.1 g. of a brown oil; to show that this contains $ClCH_2(MeOCH_2)CHOSbCl_4$ (IV), it was decompd. with Rochelle salt and KOH (the soln. being kept neutral to litmus), giving 8.7 g. of *γ-chloropropylene glycol Me ether* (V), b. 170–4°; $SbCl_5$ and Et_2O, followed by I, give 95% of the *Et analog* (VI) of III, m. 135–7° (decompn.); it is considerably more sol. than III in org. solvents; heating causes decompn. with formation of EtCl; 109 g. of VI with 30% aq. alkali gives 16.9 g. Et_2O, 6.5 g. EtOH and 3.6 g. EtCl; the filtrate from VI gives the *Et analog* of IV, red-brown, m. 91°; aq. alkali give 82.5% of the Et analog of V, b. 178–84°. $SbCl_5$, Et_2O and $(C_2H_4)_2O$ give 79% of $(Et_2O).SbCl_5$, m. 132°; the mother liquor yields $EtOCH_2CH_2OSbCl_4$. $AlCl_3$, Et_2O and I give 82% of *triethyloxonium tetrachloroaluminate*, $(Et_2O).AlCl_4$, m. 72° (decompn.); the ether filtrate contains 86.4% of the *Al chloroalcoholate* of γ-chloropropenyl glycol Et ether, m. 114–15°; 5 g. of the salt gives 2.6 g. of $ClCH_2CH(OH)CH_2OEt$, b_{12} 71–3°; heating the salt gives EtCl and $AlCl_3.Et_2O$; decompn. of 19 g. of the salt with 2 *N* NaOH gives 0.5 g. EtOH, EtCl and Et_2O; with H_2O alone 16 g. of the salt gives 4 g. EtCl and 3.5 g. Et_2O. $FeCl_3.Et_2O$ and I give 100% of *trimethyloxonium tetrachloroferriate*, $(Et_2O).FeCl_4$, m. 74° (decompn.); the filtrate gives 89% of the *ferric chloroalcoholate* of $ClCH_2CH(OH)CH_2OEt$, yellow, m. 103–5°; decompn. with H_2O gives 82% of EtOH. $BF_3.Me_2O$ (1.7 moles) and 1 mole MeF, allowed to stand 3 months in a sealed tube, give 38% of $(Me_2O).BF_4$, m. 148° (decompn.) (previously reported 124.5°); careful heating gives the 2 components. $BF_3.Et_2O$ and MeF, after standing 4 months, give 52% of *methyldiethyloxonium borofluoride*, m. 99–100° (decompn.). $BF_3.Me_2O$ and PrF give $(Me_2O).BF_4$ and not the expected $(PrMe_2O).BF_4$. $SbCl_5.Et_2O$ (1 mole) and 7 moles EtCl, allowed to stand 14 days at room temp., give a small yield of VI. Neg. results were obtained in attempting to add MeCl or EtCl to the etherates of $AlCl_3$, $FeCl_3$, BCl_3 or $SnCl_4$; $SbCl_5.Et_2O$ does not add $ClCH_2OMe$, $PhCH_2Cl$ or AcCl; $ClCH_2OMe$ is decompd. into HCHO and MeCl; $PhCH_2Cl$ gives a resin with loss of HCl; AcCl is transformed into AcOEt and EtCl. If the reaction of $SbCl_5.Et_2O$ and I, including the filtration and washing, is carried out at the temp. of Et_2O-CO_2, there results 98.5% of the internal *salt* $ClCH_2CH(CH_2OEt)\overset{+}{O}\overset{-}{SbCl_5}$ (VII), decomps. 58°; it is not pptd. by ether from solns. in org. solvents; decompn. with alk. Rochelle salt soln. gives 90% of EtOH and 96.3% of the Et analog of V, b_{15} 74.5–5.5°; the latter on shaking with 0.1*N* NaOH loses HCl and yields glycide ether; decompn. of VII with H_2O also did not yield EtCl. Slowly heating VII to 90° gives 85% of EtCl and the Et analog of IV. Similarly $SbCl_5.Et_2O$ and $(C_2H_4)_2O$ give 97.5% of the *salt* $Et_2O\overset{+}{C}H_2CH_2O\overset{-}{SbCl_5}$ (VIII), decomps. 58°. On standing at room temp. VII and VIII decomp. into EtCl and the $SbCl_4$ compds.; in 20 hrs. the m. p. of VIII decreases from 58 to 23°; VII shows the same change in 10 hrs.; after 18 hrs. VII loses 16.2% EtCl, whereas VIII gives 6.5% EtCl in 24 hrs.; after 70 hrs. the reaction is practically complete in each case. VII and $SbCl_5.Et_2O$ in Et_2O at room temp. give 100% of VI and 97.5% of the Et analog of IV; VIII gives 100% of VI and 87% of the *$SbCl_4$ compd.* of $HOCH_2CH_2OEt$, m. 107°. $BF_3.Me_2O$ in Me_2O, cooled with Et_2O-CO_2 and treated with I, gives 81.3% of the *salt* $ClCH_2CH(CH_2OMe_2)\overset{+}{O}\overset{-}{BF_3}$, with 1 mol. Me_2O, m. 75–80° (decompn.); it is very unstable and decomps. in 2-3 hrs. to a yellow-brown oil with liberation of BF_3. $BF_3.Et_2O$ reacts similarly but on warming to room temp. the ppt. from 57.7 g. $BF_3.Et_2O$ and 44.4 g. of I reacts with the Et_2O which adheres to it to give 7.1 g. EtF, 7 g. Et_2O, 31.5 g. $BF_3.Et_2O$, 26.5 g. $ClCH_2CH(OEt)CH_2OEt$ (b_{14} 72–3°, d_4^{23} 1.017), 1.2 g. of $ClCH_2CH(OBF_2)CH_2OEt$, b_{14} 80–90° and 4.9 g. $[ClCH_2CH(CH_2OEt)O]_3B$ (**IX**?), $b_{0.05}$ 145–50°. If the inner oxonium salt from 50 g. $BF_3.Et_2O$ and 35 g. I is treated with $BF_3.Et_2O$ at the temp. of Et_2O-CO_2 there results 61 g. (91%) of II and 40.2 g. of **IX**. It is probable that $SnCl_4.Et_2O$ forms an inner oxonium salt with I but it is so unstable that it cannot be isolated; on standing for some time the soln. contg. 26.1 g. of $SnCl_4$ gives 8.6–9.6 g. of the *$SnCl_4$ compd.* (**X**) of $(ClCH_2)_2CHOH$ (**XI**), which may be isolated by extg. the $SnCl_4.Et_2O$ with CCl_4 and may be crystd. from $C_6H_4Cl_2$; on decompn. with Rochelle salt and $NaHCO_3$ 61 g. **X** gives 14.4 g. **XI**. $BF_3.C_5H_5N$ (**XII**) and $(C_2H_4)_2O$ in C_5H_5N with ice cooling give 100% of the *salt* $C_5H_5N\overset{+}{O}CH_2CH_2O\overset{-}{BF_3}$ (**XIII**), m. 131–2°; it is hydrolyzed by H_2O; with aq. $NaI.HgI_2$ **XIII** gives yellow needles, m. 39°, of the *salt* $(HOCH_2CH_2NC_5H_5)HgI_2$ and with $NaCl.HgCl_2$ $(HOCH_2CH_2NC_5H_5)Cl.6HgCl_2$. **XII** and I in C_5H_5N give 62.8% of the *salt* $ClCH_2CH(O\overset{-}{BF_3})CH_2\overset{+}{N}C_5H_5$, which, recrystd. from SO_2 by addn. of $PhNO_2$, m. 164–5°. $BF_3.NMe_3$ and $(C_2H_4)_2O$, heated and shaken in a sealed tube at 40–5° for 2 hrs. and at 60–70° for 2 hrs., give 100% of the *salt* $Me_3\overset{+}{N}CH_2CH_2O\overset{-}{BF_3}$, m. 296–8° after pptn. from $MeNO_2$ by $PhNO_2$. $BeCl_2$ (8 g.) in 80 cc. ether forms an oil which reacts with 9.3 g. I to give 97.5% of the *Be chloroalcoholate* of $(ClCH_2)_2CHOH$, with 1 mole Et_2O, m. 114–15°. $BeCl_2.Et_2O$ and $(C_2H_4)_2O$ give 96% of the *Be chloroalcoholate* of $ClCH_2CH_2OH$, with 1 mole of Et_2O, m. 199–200°. $BiCl_3$ and I in ether or C_6H_6 give 100% of the *compd.* $(ClCH_2)_2CHOBiCl_2$, m. 145–50°. Cryst. compds. were not obtained from I and the etherates of $ZnCl_2$, $SbCl_3$, BCl_3, $TiCl_4$ and $AlBr_3$. That $(Et_2O).BF_4$, $(Me_2O).BF_4$, $(Et_2O).SbCl_6$ and $(Et_2S)BF_4$ are salts is shown by their elec. cond. in SO_2 (data given for various dilns.). The equiv. cond. of $(Et_2O)OH$ at 20° is 187, 192 and 197 for *v* 10, 100 and 400. $(Et_2O).BF_4$ (9.5 g.) and 5.8 g. Me_2O in 30 cc. CH_2Cl_2, on standing 5 days, give 92% of $(Me_2O).BF_4$. VI (5.4 g.) and $(CH_2)_4O$ (1.5 cc.) give 6.2 g. of *ethylidenetetramethyleneoxonium hexachloroantimoniate*, $[Et.O(CH_2)_4]$.-

$SbCl_5$ (XIV), m. 132° (decompn.); decompn. of 46 g. of the salt with 200 cc. 2 *N* NaOH with stirring for 5 hrs. gives 0.8 g. of $(CH_2)_4O$ and EtOH, 2.8 g. of $EtO(CH_2)_4OH$, $b_{19.5}$ 87°, d_4^{19} 0.9073 and 3.2 g. of the *ether* $EtO(CH_2)_4O(CH_2)_4OEt$, $b_{18.5}$ 140°. VI and $(CH_2CHMe)_2O$ at room temp. for a few hrs. give the *α,α-di-Me deriv.* of XIV, m. 142° (decompn.). IV and $(CH_2)_5O$ give 52% of *ethylpentamethyleneoxonium borofluoride*, very hygroscopic, m. 45°. VI and $(CH_2)_5O$ in 2 hrs. give 92% of *ethylpentamethyleneoxonium hexachloroantimoniate*, m. 154–5° (decompn.); dioxane gives the *compd.* $[O(CH_2CH_2)_2O.Et].SbCl_5$, m. 156° (decompn.). Solid $(Me_3O).BF_4$ added to 10% of H_2AuCl_5 gives *trimethyloxonium chloroaurate*, $(Me_3O).AuCl_4$, yellow, m. 133° (decompn.); *Et analog*, yellow, m. 92° (decompn.); *ethylpentamethylene analog*, yellow powder. *Triethyloxonium chloroplatinate*, decomps. above 120°; it is stable only for a short time. II and a soln. of 1 cc. $SbCl_5$ in 50 cc. of a satd. NaCl soln. give $(Et_3O)SbCl_6$; $SnCl_4$ in NaCl give *triethyloxonium hexachlorostannate*, needles, which slowly decomp. at room temp. into $SnCl_4.Et_2O$ and EtCl; at 45° the decompn. is complete in 5 min. II and BiI_3.NaI in ice-cold H_2O give the *compd.* $(Et_3O).Bi_2I_7$, dark red, which slowly decomps. with liberation of EtI; working at low temps. a salt with the composition $(Et_3O)BiI_4$, brick-red, can be obtained which in the dry state splits off EtI and Et_2O, giving $(Et_3O).Bi_2I_7$; $BiCl_3$ in concd. NaCl gives the *compd.* $(Et_3O).Bi_2Cl_7$, m. 84° (decompn.). II and NaI.HgI_2 give the *compd.* $(Et_3O).HgI_3$, yellow, which is completely decompd. in 24 hrs. at room temp. and much more quickly at 50 60°; this compd. ppts. from 2 l. of a soln. contg. 0.1 g. II. $HgCl_2$ in NaCl gives the very unstable *salt*, $(Et_3O).HgCl_3$. II and an acidified soln. of $Na_4Fe(CN)_6$ give the pale yellow-green *salt* $(Et_3O)_2.H_2Fe(CN)_6.2H_2O$, which is stable for only a short time. Et_2SO (8.3 g.) and 13.5 g. II give *diethyloxyethylsulfonium borofluoride*, $(Et_2SOEt).BF_4$, which decomps. quickly in the air; VI gives the very unstable $(Et_2SOEt).SbCl_6$, m. 159° (decompn.); it begins to decomp. within 1 hr. Me_3NO and II in CH_2Cl_2 give $(Me_3NOEt).BF_4$, which is very hygroscopic; VI gives $(Me_3NOEt).SbCl_6$. II and $CO(NH_2)_2$, mixed in the dry state, soon liquefy, forming $[(H_2N)_2COEt]BF_4$, which forms a *picrate*, m. 184–5° (decompn.); alkali decomps. the salt, giving *O*-ethylisourea. II and $AcNH_2$ give the *compd.* $[MeC(:NH)OEt]BF_4$, very hygroscopic. $(Et_3O).AlCl_4$ and PhCN, on standing 14 days, give *Ph-CN.AlCl*$_3$, m. 96–8°, and PhCCl NEt, identified as PhCONHEt, m. 70 1°. Similar results were obtained with *p*-$MeOC_6H_4CN$, $PhCH_2CONH_2$ and PhCH.CH-$CONH_2$. C. J. West

Formic acid as a solvent for ozonization investigations. Rodger M. Dorland and Harold Hibbert. *Can. J. Research* **18, B**, 30–4 (1940).—Because of the insoly. of birch formic acid lignin in the usual ozonization solvents (anhyd. EtOAc or $CHCl_3$) 95% HCO_2H (I) was tried as solvent for the ozonolysis of maleic acid (II), vanillin (III) and veratraldehyde (IV) as test substances for the new solvent. The ozonizations were conducted at 0°, the solvent removed under reduced pressure, the residue dissolved in water, made up to a definite vol. and aliquots used for the estn. of the reaction products. Ozonization of II in EtOAc gave 15% glyoxylic acid and 80% oxalic acid; in I the product was 98% glyoxylic acid. Ozonization of III in EtOAc gave 21% vanillic acid; in I 45% of unchanged III was recovered. Ozonolysis of IV in EtOAc gave 45% veratric acid; in I, 62% unchanged IV was recovered. It thus appears that I protects the aldehyde group during ozonolysis and that the degradation of the aromatic nucleus is diminished by the presence of this solvent. It is proposed that the protection of the aldehyde group may be due to the reaction of H_2O_2 (formed during decompn. of the ozonide) with I. W. Gordon Rose

Gradual decomposition by oxidation of fatty acids into their next lower homologs. H. Mendel and J. Coops. *Rec. trav. chim.* **58**, 1133–43 (1939) (in English).—The method involved the following steps: bromination in the α-position, conversion to the α-HO acid (formation of the Me ester, reaction with AcOK in AcOH and hydrolysis), oxidation to the aldehyde with $Pb(OAc)_4$ and immediate oxidation of the aldehyde with air and excess of $Pb(OAc)_4$; the total yield of the next lower acid was approx. 84%. Br (225.3 g.) was slowly added to a mixt. of 100 g. palmitic acid and 12.1 g. red P at 80° during 10 hrs.; MeOH (77.8 g.) was added with stirring during 3 hrs. (15° for the 1st, 40° for the 2nd and 80° for the 3rd hr.), giving 136.6 g. of Me ester; this was heated with 136 g. AcOK in 272 g. AcOH (prepd. by heating the soln. of AcOK in 99.6% AcOH until the b. p. was 118°) for 8 hrs. at 160°; the acetate was then heated with 270 g. MeOH contg. 2.5% HCl for 20 hrs. and the Me ester sapond. with MeOH-KOH, giving α-hydroxypalmitic acid (I). A soln. of 14 g. $Pb(OAc)_4$ in 250 cc. C_6H_6, stirred while a vigorous stream of air is being passed through it, is treated with 25 g. I during 8 hrs. (0.2 g. every 4 min.); at the end of each hr. 10 g. $Pb(OAc)_4$ is added; after an addnl. 4 hrs., the excess $Pb(OAc)_4$ is destroyed with $C_2H_4(OH)_2$; evapn. of the C_6H_6 and purification through the K salt give 20.45 g. $C_{14}H_{29}CO_2H$. The details are also given for the similar reactions starting with stearic acid. C. J. West

Comparative investigations of the hydrotropic activity of corresponding and isomeric members of the C_7 and C_8 series. Carl Neuberg and Hans Armin Fischer. *Rec. trav. chim.* **59**, 77–86 (1940) (in German).—Hydrotropy is the capacity of aq. salt solns. to dissolve compds. insol. in H_2O. Alkali salts of the acids of the C_7 and C_8 series possess this property and comparative expts. are reported for the Na salts of $C_6H_{11}CO_2H$ (I), BzOH (II), hexahydrobenzoic acid (III) and methylcyclopentanecarboxylic acid (IV). The soly. capacity of I is in general greater than that of the cyclic compds.; of these the true hydroaromatic members (III and especially IV) are more reactive than the pure aromatic compd. (II). Obvious differences are also to be observed between $C_7H_{15}CO_2H$, $PhCH_2CO_2H$ and *o*-, *m*- and *p*-$MeC_6H_4CO_2H$. Hydrotropy has also been observed with the isomeric Na salts of *p*-$MeC_6H_4SO_3H$ and $PhCH_2SO_3H$. Many of the observations support the view that addn. occurs with the formation of unstable derivs. of ortho acids, as $RC(OH)_3$ or $RSO(OH)_3$. Data are given for $PhNO_2$, $PhNH_2$, AcOEt, AmOH, $PhCH_2OH$ and lecithin. C. J. West

Remarks on "A new method for the cleavage of unsaturated aliphatic acids." Donald Price and Richard Griffith. *J. Am. Chem. Soc.* **62**, 450–1 (1940).—It is pointed out that the paper by Hsing and Chang (*C. A.* **34**, 983[4]) has been anticipated by Nunn and Smedley-MacLean (*C. A.* **30**, 3406[3]) and others. C. J. West

Addition of hydrogen bromide to non-terminal double bonds. The isopropylidene group. Crotonic acid. D. C. Grimshaw, J. B. Guy and J. C. Smith. *J. Chem. Soc.* **1940**, 68–71.—The effect of O or of peroxides in reversing the normal addn. of HBr, well established in the case of terminal double bonds ($CH_2.CHCH_2 + HBr + O \rightarrow CH_2BrCH_2CH_2$—), has been detected also in olefins with sufficiently polar non-terminal double bonds ($Me_2{:}CH$— + HBr + O → $Me_2CHCHBr$—); but where there is conjugation with a CO group as in crotonic acid (I), no reversal is observed, I in C_6H_6 (with Bz_2O_2, BzO_3H or ascaridole) and HBr, with or without O, give only β-bromobutyric acid. 13-Ketotetradecanoic acid (II) (m. 75°) gives an *Et ester*, $b_{0.5}$ 153°, m. 36°; reaction with MeMgI gives a mixt. of II and *13-methyl-13-hydroxytetradecanoic acid* (sepd. by removal of II as the semicarbazone), m. 61°; the overall yield is poor. Dimethylheptadecylcarbinol (III) (m. 45.5°) with $(CO_2H)_2$ at 180–200° for 1 hr. gives 80% of 2-methyl-2-nonadecene (IV), b_{25} 212–15°, m. 12.5°; O_3 gives margaric acid. III and HBr at 120° for 4 hrs. or PBr_3 at 20–30° give *2-bromo-2-methylnonadecane* (V), m. 19.5°. IV by normal addn. of HBr gives V; in the presence of peroxides addn. of HBr yields the *1-Br isomer* (VI) of V, f. p. 14°, m. p. 14.1° and 16.5°. Et heptadecylmalonate and Na in PhMe, heated 1 hr. at 90° and then refluxed 1 day with MeI, give *Et methylheptadecylmalonate*, $b_{0.5}$ 195–7°, m. 11° (transparent) and 25° (opaque); the free *acid* m. 100–1°; heating at 180–210° *in vacuo* for 1 hr. gives *2-methylnonadecanoic acid*, m. 57.5° (capillary), 56.4° (thermometer in liquid) (the yield is

79% on the $C_{17}H_{33}I$ used); the *Et ester* ($b_{0.12}$ 170°) on reduction gives 75% of *2-methylnonadecan-1-ol*, $b_{0.2}$ 167°, m. 39–40°; HBr at 130–40° gives VI. The m.-p. curve of IV and VI is given. C. J. West

Long-chain acids. I. Extension of the isoprene rule. P. C. Mitter and Phanindra Nath Bagchi. *J. Indian Chem. Soc.* **16**, 402–4 (1939).—By assuming that larger mols. can be formed from isoprene by head-to-tail union followed by addn. of H_2O at a conjugated double bond at 1 end of a chain, partial or complete hydrogenation and removal of side-chain Me groups by oxidation, and partial or complete oxidation of the terminal groups, the formation of a large no. of long-chain aliphatic mono- and dibasic acids can be explained. The close connection of farnesol with sabininic acid suggests that juniperic acid and thapsic acid are similarly related to a diterpene, $C_{20}H_{32}$. Incomplete hydrogenation of the unsatd. system of the intermediate alc. and suitable oxidation would lead to ambrettolic acid and epiambrettolic acid (closely related to aleuritic acid, present in shellac resin). C. R. Addinall

The constitution of the linoleic acid of seed fats. T. P. Hilditch and H. Jasperson. *J. Soc. Chem. Ind.* **58**, 233–41 (1939).—Study of the linoleic acid from cottonseed oil supports the view that natural and regenerated α-linoleic acids are identical, probably *cis*-Δ^9-*cis*-Δ^{12}-octadecadienoic acid, while β-linoleic acid is believed to be a mixt. of approx. equal parts of α- and *cis*-Δ^9-*trans*-Δ^{12}- acids. With 0.3% Se at 220° for 3 hrs. in a current of CO_2 α- and β-linoleic acids are isomerized, and upon alk. $KMnO_4$ oxidation yield 2 tetrahydroxystearic acids, m. 144° and 135°, identical with those produced from natural linoleic acid by AcO_2H or HOCl followed by alkali. H. and J. believe that these tetra-HO acids are derived from *trans*-Δ^9-*trans*-Δ^{12}- acid which may have been formed during the isomerization. The yields of cryst. tetrabromostearic acid, m. 114°, from each of the linoleic acids were: natural, 50.3% theory; regenerated α-, 45.4%; regenerated β-, 21.4–25.8%; isomerized α-, 2%; isomerized β-, nil. R. E. Reeves

Polyethenoid acids of the C_{18} series in butterfat. T. P. Hilditch and H. Jasperson. *J. Soc. Chem. Ind.* **58**, 241–3 (1939).—The structures of the octadecadienoic acids from butterfat remain unknown. From 1.5 kg. of fat 72 g. unsatd. C_{18} acids, I no. 115.0, was obtained; 8.9 g. gave no cryst. tetrabromostearic acid. Oxidation with alk. $KMnO_4$ under controlled conditions gave only a trace of tetrahydroxystearic acid. Low maleic anhydride addn. values (2.1, 2.6) indicate little conjugated unsatn. After isomerization with Se (cf. preceding abstr.) and sepn. of the solid (elaidic) acids the remaining liquid acids, I no. 115.6, gave no cryst. tetrahydroxystearic acid on alk. $KMnO_4$ oxidation. R. E. Reeves

The fatty oil of the seeds of Ongokea klaineana Pierre. A. Castille. *Ann.* **543**, 104–10 (1939).—The oil of the seed of *Ongokea klaineana* Pierre, extd. with Me_2CO and Et_2O, is a thick yellow liquid, d_4^{20} 0.9826, n_D^{25} 1.5079, sapon. no. 191.4, Ac no. 67, Wijs no. 148, SCN no. 64, acid no. 3.8, unsaponifiable 3.27%. The satd. fatty acids of the oil consist of caproic, caprylic, lauric, palmitic, stearic and arachidic acids. The ether-sol. Pb salts yield *erythrogenic acid* (I), $C_{18}H_{26}O_2$, m. 39.5°, d^{45} 0.9309, d^{60} 0.91966, n_D^{60} 1.49148; the absorption spectrum of I shows 5 characteristic max., at 2275, 2400, 2666, 2530, 2824 A., ε 1167, 870, 870, 700 and 700; the Raman spectrum of the Et ester shows characteristic lines at ω 281, 462, 676, 1252, 1390, 1608, 1730, 2261 and 2914. The irradiated Li salt is rose, the Ca salt is orange-yellow and the Ba salt purple. Catalytic reduction of I yields stearic acid and shows the presence of 5 double bonds. O_3 gives 1 mol. each of HCHO, $(CO_2H)_2$, adipic acid (II) and Et azelate. Irradiation gives an isomeric red compd. Oxidation of the Na salt with $KMnO_4$ gives a *dihydroxy acid* (*cyanogenic acid*) (III) m. 92°; irradiation gives a blue compd., isomeric with III. I may be $CH_3{:}CHC{:}C(CH_2)_4C{:}C(CH_2)_7CO_2H$ or $CH_2{:}CH(CH_2)_4C{:}CC{:}C(CH_2)_7CO_2H$. The unsaponifiable portion contains an alc., m. 328° (insol. in Me_2CO; acetate, m. 192.5°), phytosterol, stigmasterol and an unstable oil, b_{760} 209°, d^{20} 0.8438, n_D^{20} 1.49999; catalytic reduction gives decane (absorption of 5 mols. of H_2). Nessler reagent gives the *Hg deriv.*, $(C_{10}H_{11})_2Hg$. The oil in $CHCl_3$ shows max. in the absorption spectrum at 2980, 2813, 2644, 2536, 2507, 2473, 2336 and 2231 A.: the ω-values of the Raman spectrum are at 470, 480, 1629, 1638, 2033, 2135, 2169, 2197, 2262, 2292. With O_3 the oil yields HCHO, HCO_2H, $(CO_2H)_2$ and II. HNO_3 oxidation gives almost entirely II. The oil must therefore be $HC{:}C(CH_2)_4C{:}CCH{:}CH_2$ or $HC{:}CC{:}C(CH_2)_4CH{:}CH_2$. It appears to be a degradation product of I but the method of its formation is not clear. C. J. West

Physical properties of the aliphatic acid anhydrides. David T. Lewis. *J. Chem. Soc.* **1940**, 32–6.—The anhydrides were fractionated through a glass-bead column, then twice over the fused Na salt of the fatty acid and twice through a similar column under reduced pressure; the higher anhydrides slowly decomp. on distn. at atm. pressure, becoming light brown. The following b. ps. of the anhydrides are cor.: acetic (I), b_{770} 139.4–9.5°; propionic (II), $b_{771.9}$ 168.1–8.4°, b_{16} 66–7°; butyric (III), $b_{770.4}$ 198.1–9.7°, b_{18} 85–6°; hexanoic (IV), b_{766} 246–8°, b_{18} 143–4°. Values are given for d_4, γ and *P* for I and II at 5° intervals from 15 to 50° and for III and IV from 20 to 50°; I, d_4^{20} 1.0810, γ 32.56, *P* 225.6 (mean *P* 225.9, calcd. 225.0); II, d_4^{20} 1.0110, γ 30.30, *P* 301.8 (mean *P* 302.2, calcd. 303); III, d_4^{20} 0.96677, γ 28.93, *P* 379.2 (mean *P* 379.7, calcd. 381.0); IV, d_4^{20} 0.92016, γ 28.26, *P* 536.8 (mean *P* 537.6, calcd. 537.0). Values are also given for the viscosities at 5° intervals from 20 to 50°; they increase regularly as the series is ascended. The values from the equation $\log P^{2/3}\eta = (785 \log M)/T - 5.951$, where *P* is the parachor and *M* is the mol. wt., agree well except for I, the anomaly in this case undoubtedly being due to the singular properties of the Me group. The higher anhydrides were analyzed by refluxing 1 g. with excess of NaOH and titrating with acid. The values of *P* reveal that the anhydrides exhibit a typical ester anomaly, the other parts of the mols. making a normal vol. contribution. C. J. West

Reaction of ethers with chromous halides. Fr. Hein and H. Kraft. *J. prakt. Chem.* **154**, 285–308 (1940); cf. *C. A.* **24**, 4256.—$CrCl_2$ or $CrBr_2$ in dioxane (I), allowed to react at room temp. in N, gives an olive-green or reddish brown soln.; after filtration of the excess of Cr salt (absence of air and moisture in an app. which is illustrated), dry NH_3 is passed into the filtrate, the unstable complex is filtered, washed with ether and dried over H_2SO_4 for at least 1 week. The principal *product* is $[(NH_3)_3CrCl_2O{-}CH_2CH_2CrCl_2(NH_3)_3].^1/_3$ I; other *compds.* analyzed are $[(NH_3)_3CrCl_2OCH_2CH_2OCrCl_2(NH_3)_3]$ + 0.23$[Cr(O{-}CH_2CH_2O)_3Cr.0.5Et_2O$ and $[(NH_3)_3CrCl_2OCH_2CH_2OCr{-}Cl_2(NH_3)_3]$ + 0.27$[Cr(OCH_2CH_2O)_3Cr].Et_2O$; conditions for the prepn. of these compds. are not clearly stated. With $CrBr_2$ the following *compds.* were analyzed: $[(NH_3)_3{-}CrBr_2OCH_2CH_2OCrBr_2(NH_3)_3].NH_3.4/3Et_2O$, $[(NH_3)_3Cr{-}Br_2OCH_2CH_2OCrBr_2(NH_3)_3].NH_3.I$, and $[(NH_3)_3CrBr_2{-}OCH_2CH_2OCrBr_2(NH_3)_3].0.5Et_2O$ + 0.29$[Cr(OCH_2CH_2{-}O)_3Cr].0.5Et_2O$. These compds. are decompd. by MeOH, giving $Cr(OMe)_3$. That $C_2H_4(OH)_2$ is formed in these reactions is proved by its isolation from the NH_3 complex after heating with H_2O on the water bath. The filtered soln. from I and $CrBr_2$, treated with *p*-$C_6H_4(NH_2)_2$ (II) in ether, gives a light olive-green ppt., somewhat sol. in the I-Et_2O mixt., 2 analyses of which gave $[II.CrBr_2OCH_2{-}CH_2OCrBr_2.II].1.5Et_2O$ + 0.53 $[II.Cr(OCH_2CH_2O)_3Cr.{-}II].1.5Et_2O$ and $[II.CrBr_2OCH_2CH_2OCrBr_2.II].0.25Et_2O$ + 0.9$[II.Cr(OCH_2CH_2O)_3Cr.II].0.25Et_2O$. $PhCH_2OEt$ and $CrBr_2$ react to give principally the lilac-colored $[Br_2CrOEt(NH_3)_3].0.5Et_2O$ (or $0.25Et_2O$); in some instances there was formed a *complex* $[Br_2CrOEt(NH_3)_3].{-}NH_3$ + 0.25$[Cr(OEt)_3]0.5Et_2O$; with $CrCl_3$ there resulted only the *complexes* $[Cl_2CrOEt(NH_3)_3].0.25Et_2O$ + 0.15$[Cr(OEt)_3].0.25Et_2O$ or $[Cl_2CrOEt(NH_3)_3]$ + 0.29-$[Cr(OEt)_3]0.5Et_2O$. Reaction with Me_2O at a low temp. gives the *complexes* $[Cl_2CrOMe(NH_3)_3]0.33Me_2O$ and $[Br_2CrOMe(NH_3)_3]$ (also with $0.25Me_2O$). Various prop-

erties and reactions of these complexes are discussed. C. J. West

Aliphatic polyamines. IX. J. van Alphen. *Rec. trav. chim.* **58**, 1105–8(1939) (in English); cf. *C. A.* **33**, 6242[6].—$Br(CH_2)_4Br$ (74 g.) in 150 cc. EtOH, slowly added to 125 cc. $C_2H_4(NH_2)_2.H_2O$, refluxed 1 hr., excess solid KOH added and the heating continued for 1 hr., gives *1-(2'-aminoethyl)pyrrolidine* (I), $(CH_2CH_2)_2NCH_2CH_2NH_2$, b. 166–7°, strongly basic liquid with a fishy smell (*picrate*, yellow, decomps. 219°). I and PhNCO in Et_2O give *1-[2'-(2''-phenylureido)ethyl]pyrrolidine*, an oil, analyzed as the *picrate*, yellow, m. 193°; the *2''-phenylthioureido deriv.* m. 95°. I and BzH give the *benzylideneamino deriv.*, yellow oil, b_{17} 176°, which is reduced by Na in EtOH to the *2'-benzylamino deriv.*, pale yellow, b_{20} 172° (*picrate*, yellow, m. about 147°); PhNCO gives *1-[2'-(3''-phenyl-1''-benzylthioureido)ethyl]pyrrolidine*, m. 133°. **X.** *Ibid.* **59**, 31–40(1940) (in English).—$(CH_2)_6Br_2$ (10 g.) in 250 cc. abs. EtOH and 100 cc. $C_2H_4(NH_2)_2.H_2O$, boiled 1 hr., 150 g. solid KOH added, the mixt. refluxed for some time, the KBr filtered, the filtrate distd. until the temp. is 105°, 50 g. KOH added and after boiling a few min. allowed to stand overnight, give 2 layers, distn. of the upper layer of which gives 3 fractions, b_{25} below 150° (I), 150–250° (II) and 250–350° (III). Redistn. of II gives 25 g. (?) of *1,6-bis(2'-aminoethylamino)hexane* (IV), b_{16} 212°, with an amine-like odor; it gives a violet-blue biuret reaction; *picrate*, IV.$4C_6H_2(NO_2)_3OH$, m. 213°; *nitrate*, IV.$4HNO_3.H_2O$. IV and PhNCO in Et_2O give *1,6-bis(3'-phenyl 1'-(2''-(3'''-phenylureido) ethyl) ureido)-hexane*, m. 216°; the *3'''-phenylthioureido analog*, prepd. in EtOH, m. 125–35°, was not obtained pure; it appears to sep. with 2 mols. of EtOH; prepd. in Et_2O it m. 90–110°. IV and CS_2 give a light yellow thiocarbamate which, heated at 140°, gives *1,6-bis(2'-thioletrahydro-1'-imidazolyl)-hexane*, yellow, m. 216°. The *benzyl deriv.* of IV, isolated as the *HCl salt*, decomps. 255°; the free amine and BzH in Et_2O give *1,6-bis(2'-phenyl-3'-benzyletrahydro-1'-imidazolyl)hexane*, m. 128°. III contains *1,22-diamino-3,10,13,20-tetraazadocosane*, $[CH_2NH(CH_2)_6NH(CH_2)_2NH_2]_2$, yellow liquid, b_{23} 314–23°, m. 32°, faint tobacco-like odor; it does not yield a solid picrate; PhNCS gives *1,22 - bis(2' - phenylthioureido) - 3,10,13,20 - tetraphenylthiocarbamido-3,10,13,20-tetraazadocosane*, m. 90 120°; the corresponding *phenylureido deriv.* m. 100–20°. The prepn. of these compds. proves that the hexamine is a straight-chain compd., otherwise 6 PhNCS groups could not be added. I contains a very small quantity of *1-(2'-aminoethyl)-1-azacycloheptane* (V), b. 212°, which results in somewhat larger yield from 43 g. $(CH_2)_6Br_2$ and 21 cc. $C_2H_4(NH_2)_2.H_2O$ in 1 l. EtOH on standing 3 months; the filtrate from the $C_2H_4(NH_2)_2.2HBr$ is evapd. to about 50 cc., excess solid KOH is added, the mixt. heated 0.25 hr., filtered and further evapd. until 2 layers appeared. *Picrate* of V, yellow, m. 200°. The *2''-phenylthioureido deriv.* m. 93°; the *2''-phenylureido deriv.* did not cryst. but was isolated as the yellow *picrate*, m. 183°. A survey is given of the reactions between an excess of $C_2H_4(NH_2)_2$ and various α,ω-dibromo paraffins. C. J. West

Preparation, properties and thiocyanogen absorption of triolein and trilinolein. D. H. Wheeler, R. W. Riemenschneider and Chas. E. Sando. *J. Biol. Chem.* **132**, 687–99(1940); cf. *C. A.* **33**, 2484[9]; **34**, 278[9].—The triglycerides of oleic and linoleic acids were prepd. by direct esterification with glycerol in a N atm. with *p*-$MeC_6H_4SO_3H$ as catalyst. Both compds. exhibit polymorphism, the 3 forms of triolein melting at 4.7–5.0°, −12° and −32° and the 2 forms of trilinolein at −13.1 to −12.8°. A 4-hr. reaction time is most suitable for thiocyanogen absorption by these glycerides. A no. of Br addn. products are formed by the bromination of trilinolein. A 9.1% yield of cryst. bromides was obtained which is about ¾ of the 12.5% theoretical yield of tetrabromostearic acid. *Triolein*, n_D^{25} 1.4621, n_D^{40} 1.4586, d_{40} 0.8988, free oleic acid 0.05%. *Trilinolein*, n_D^{25} 1.4719, n_D^{40} 1.4683, d_{40} 0.9184, free linoleic acid 0.03%. A. P. Lothrop

The increase of rotation of *d*-lactic acid. Sinogu Hukuda. *J. Biochem.* (Japan) **30**, 473–7(1939)(in German); cf. *C. A.* **33**, 1362[1].—The addn. of a 5% H_3BO_4 soln. to a lactic acid soln. increases [α] from 2.14° to 5.12° with increasing acid concn. The most marked increase was obtained with the addn. of NH_4 molybdate, the greatest change taking place (about a 50-fold increase) when the mixt. contains 5 mols. lactic acid to 1 mol. molybdate. S. Morgulis

Occurrence of an isomer of ricinoleic acid in the fatty oil from the seeds of Vernonia anthelmintica. N. L. Vidyarthi and M. Venkatesh Mallya. *J. Indian Chem. Soc.* **16**, 479–80(1939).—The fatty oil from *V. anthelmintica* (*C. A.* **7**, 2775) has $[\alpha]_D^{25}$ −10.7°; Ac value, 135.1. The mixed fat acids of the oil have $[\alpha]_D^{25}$ −7.2°, Ac value, 118.2, and contain about 60% of a *HO acid* (I), $C_{18}H_{34}O_3$, sapon. equiv. 299.0 (calcd., 298.2), $[\alpha]_D^{25}$ −7.8°, 1 value, 108.4 (I value of Ac deriv., 73.8 (calcd. for $C_{20}H_{36}O_4$, 74.4)). I differs from quince oil acid in that it does not form a dibromide. It is isomeric with ricinoleic acid but contains a OH group in a different position. C. R. Addinall

Preparation of butyl acetoricinoleate. B. N. Rutovskiĭ and L. E. Ostroumova. *Org. Chem. Ind.* (U. S. S. R.) **6**, 238–40(1939).—Bu acetoricinoleate (I) was prepd. in good yields (1) by alcoholysis of castor oil and acetylation of the resulting Bu ricinoleate (II) and (2) by interaction of BuOAc and the oil with the H_2SO_4 catalyst. (1) Castor oil and excess of BuOH is refluxed until the alcoholysis is completed and the reaction mixt. is treated with excess of 98.76% AcOH and 1% H_3PO_4 at 135° for 4 hrs. The presence of BuOH retards the hydrolysis of II to BuOAc. The reaction mixt. is neutralized with 5% alc. NaOH and distd. with steam or *in vacuo* to free it from volatile matter, giving 64.7% I (82.4% based on castor oil). (2) A mixt. of 100 g. castor oil, 149.2 g. BuOAc and 1% H_2SO_4 (based on the wt. of oil) is refluxed 6 hrs. at 113–18°, yielding 60.5% I (77.3% based on oil). Redistn. of I at a pressure above 10 mm. results in a higher acid value and a lower ester value. I, b_{18} 240 5°, b_{25} 249–58°, has an acid no. 34.7 and ester no. 211.7. Chas. Blanc

The chemical constitution of agar-agar. E. G. V. Percival. *Pharm. J.* **142**, 189(1939).—A review of recent work, with 12 references; cf. *C. A.* **32**, 1214, 8372[3], 8374[5]. S. Waldbott

Constitution of arabic acid. III. Isolation of methyl heptamethylaldobionate from methylated degraded arabic acid. J. Jackson and F. Smith. *J. Chem. Soc.* **1940**, 74–8; cf. *C. A.* **34**, 989[6].—The Ba salt of degraded arabic acid yields a Me ester (I) of a methylated degraded arabic acid, $[\alpha]_D^{18}$ −56° ($CHCl_3$, *c* 1.3), $\eta_{sp.}^{20}$ 0.035 in *m*-cresol. On hydrolysis with 14 *N* H_2SO_4 the rotation changes from −14° to 103° in 112 hrs. Hydrolysis of 10.4 g. I with 100 cc. 14 *N* H_2SO_4 at room temp. for 51 hrs., dilu. to 500 cc. with ice-water and neutralization with $BaCO_3$ give 7.1 g. of a mixt. of methylated sugar and the Ba salts of methylated uronic acids, which readily reduces Fehling soln. Addn. of dry Et_2O to this mixt. in 15 cc. MeOH gives 3.45 g. fraction I (II), 0.445 g. of fraction II (III) and from the mother liquors 0.608 g. fraction III (IV); the residue (2.44 g.) consists of methylated sugars. Fractions II–IV were combined and freed of Ba with *N* H_2SO_4, giving 2.43 g. of a sirup; this was fractionated from EtOH by addn. of petr. ether. The fractions contg. the hexamethylaldobionic acid were dissolved in 1% MeOH-HCl and kept at room temp. for 140 hrs.; removal of the HCl with Ag_2CO_3 and distn. give the Me ester of 2,3,4-trimethylmethylglucuronoside (V), $b_{0.03}$ 120° (bath temp.), n_D^{15} 1.4490, $[\alpha]_D^{15}$ 80° (H_2O, *c* 1.2), and the Me ester of hexamethyl-6-β-glucuronosidomethylgalactoside (VI), $b_{0.03}$ 220°, n_D^{15} 1.4685–90, $[\alpha]_D^{15}$ 42° (H_2O, *c* 1.7). Hydrolysis of VI by refluxing in 3% MeOH-HCl for 8 hrs., removal of the HCl with Ag_2CO, and heating the sirup with 0.3 *N* $Ba(OH)_2$ for 2 hrs. at 60°, give 2,3,4-trimethylmethylgalactoside (VII) and the Ba salt of 2,3,4-trimethylmethylglucuronoside; the VII was characterized by its transformation to the anilide of 2,3,4-trimethylgalactose, m. 166°. V was identified as the amide of 2,3,4-trimethyl-α-methylglucuronoside, m. 183°.

The Me ester of hexamethyl-6-β-glucuronosido-β-methyl-galactoside, m. 94°, $[\alpha]_D^{25}$ −21° (H_2O, *c* 1.6), yields an *amide*, m. 196°, $[\alpha]_D^{25}$ −18° (H_2O, *c* 3.7). These facts indicate that the side chains in degraded arabic acid do not consist of a single unit of glucuronic acid but rather that each side chain is composed of a terminal or "end" glucuronic acid group, which is linked through at least 1 galactose residue with the main galactose chain. IV. The formation of 3-galactosidogalactose by hydrolysis of degraded arabic acid. *Ibid.* 79–82.—Degraded arabic acid (100 g.) in 750 cc. H_2O was heated on the boiling water bath for 95 hrs., giving 75 g. of the Ba salts of the uronic acids and 28 g. of a mixt. of reducing sugars. Methylation of 15 g. of the sugar mixt. with Me_2SO_4 and 30% aq. NaOH and then with Purdie's reagents gives 5.5 g. of 2,3,4,6-tetramethylmethylgalactoside (I) and 0.67 g. of *octamethyl-3-galactosidogalactose* (II), $b_{0.08}$ 215–30° (bath temp.), n_D^{25} 1.4660, $[\alpha]_D^{25}$ about 0.5° (H_2O, *c* 2.2). Hydrolysis of II with 4% MeOH-HCl (boiling 8 hrs.) gives I and 2,4,6-trimethylmethylgalactoside (III). Hydrolysis of I with *N* H_2SO_4 gives 2,3,4,6-tetramethylgalactose, whose anilide m. 192°; III gives 2,4,6-trimethylgalactose, whose anilide m. 178°. Thus the identification of these derivs. of galactose shows that both the 1,6- and the 1,3-type of linkage are present in degraded arabic acid. Some of the galactose units are mutually joined by 1,6-links and the formation of II by prolonged autohydrolysis of the acid has now proved that some of the galactose units are also joined by 1,3-units. A tentative structure is suggested for degraded arabic acid. C. J. West

dl-Threonic acid from 3-hydroxycrotonic acid. J. W. E. Glattfeld and E. C. Lee. *J. Am. Chem. Soc.* 62, 354–6(1940).—Acrolein (I) has been transformed in 5 steps into *dl*-threonic acid (II) with an over-all yield of 4.1% of the theory. HCN is added to I and converted to Et vinylglycolate (III) in 61% yield; PBr_3 and C_5H_5N at 20°, treated dropwise with III in C_5H_5N, give 51% of Et 3-bromocrotonate; stirring the ester with aq. K_2CO_3 for 4 hrs. gives 27.8% of 3-hydroxycrotonic acid (8.6% from I); oxidation with $AgClO_3$ and OsO_4 gives 48% of II. Details are given for carrying out each step. C. J. W.

1,4-Dibromo-1,4-dipivalylbutane. Reynold C. Fuson and John W. Robinson, Jr. *J. Am. Chem. Soc.* 62, 358–60(1940).—$(CH_2CH_2COCl)_2$ (0.136 mole) and 0.30 mole of Me_3CMgCl in ether, on decompn. with NH_4Cl at 0°, washing the ether soln. with Na_2CO_3 and crystn. from low-boiling petr. ether, give about 25% of *1,4-dipivalylbutane* (I), m. 52–2.5°; *di-2,4-dinitrophenylhydrazone*, m. 251–2°. Distn. of the filtrate from the crystn. of I gives 5 g. of impure *2,2,9,9-tetramethyl-3,8-decanediol* (II), $b_{3.5}$ 119–24°. The Na_2CO_3 washing liquor yields 5 g. of *δ-pivalylvaleric acid*, b_2 151–3°, m. 45–7°. Oxidation of II with CrO_3 gives only a small yield of I. I in CCl_4 gives 90% of the *1,4-di-Br deriv.* (III), m. 119.5–20°; cleavage by the action of 5% NaOH upon the C_5H_5N salt of III gives I. Refluxing 4 g. III and 20 g. Et_2NH in C_6H_6 for 14 hrs. gives 21% of *1,4-dipivalyl-1,3-butadiene* (IV), m. 145–6°; *di-2,4-dinitrophenylhydrazone*, m. 280–2°. Reduction of IV with $NaHSO_3$ gives a compd. m. 70–2°; Raney Ni and H give I. IV does not condense with maleic anhydride but reacts with PhMgBr to give 1,4-dipivalyl-2,3-diphenylbutane. III and NaCN in EtOH-AcOEt, refluxed 40 hrs., give *1,4-dicyano-1,4-dipivalylbutane* (V), m. 92–3°, and a neutral oil (VI) (cyanocyclobutane deriv. or a dihydro-1,4-pyran deriv.), b_6 163–8°, n_D^{25} 1.4722; VI forms a *2,4-dinitrophenylhydrazone*, $C_{21}H_{27}N_5O_5$, m. 225–7°; 2 *oximes* were prepd., m. 183–5° (with AcOK) or 146–8° (with NaOH). Heating V with concd. HCl for 2 hrs. at 140–50° gives a *compd.* $C_{16}H_{26}Cl_2N_2O_2$, m. 198–200°; this may be $[CH_2C(CONH_2):CCl\text{-}CMe_2]_2$. V gives 2 moles of gas in the Grignard reagent but attempts to alkylate it and to effect ring closure through the di-Na deriv. were fruitless. C. J. W.

A form of urinary glucuronic acid. M. Rangier and P. M. de Traverse. *Bull. soc. chim. biol.* 21, 1327–9 (1939).—Glucuronic acid is a constituent of urochrome. Cf. *C. A.* 33, 5846⁴. L. E. Gilson

Introduction of substituted vinyl groups. IV. Primary 1-alkenylalkylmalonic esters. Arthur C. Cope, Walter H. Hartung, Evelyn M. Hancock and Frank S. Crossley. *J. Am. Chem. Soc.* 62, 314–16(1940); cf. *C. A.* 33, 1273⁸.—Alkylidenemalonic esters may be transformed into Na derivs. by the use of EtONa in EtOH at −5° or with powd. Na in Et_2O or C_6H_6; in the latter case some of the ester is reduced. The use of $NaNH_2$ in liquid NH_3 or in inert solvents is inadvisable, since partial decompn. occurs during the reaction and subsequent alkylation gives rather impure products in poor yield. The alkyl halide is added in 1 portion and the soln. immediately heated to the b. p. The synthesis of vinyl esters is not very satisfactory, all of the $MeCH{:}C(CO_2Et)_2$ being transformed into a high-boiling polymer. The yield depends upon the size of the alkylidene group and reaches a max. of 86–93% with the isopentylidene esters; the alkylations occur more rapidly with the higher members of the series and there is less opportunity for their destruction by alcoholysis. Yields were higher in 2 cases when the reaction was carried out in iso-PrOH, showing that alcoholysis is an important factor influencing the yields in this system. *Di-Et alkylpropenylmalonates: Pr*, b_{20} 138–40°, n_D^{25} 1.4371, d_{25}^{25} 0.9774, 51% on 4 hrs.' refluxing (other values of *n* and d. as for this ester); *iso-Pr*, b_{19} 135–5.5°, *n* 1.4404, d. 0.9842, 35% in 4.5 hrs.; *Bu*, b_{20} 148–51°, *n* 1.4390, d. 0.9687, 50% in 5.5 hrs. *Di-Et alkyl-1-butenylmalonates: Et*, b_{18} 134–5°, *n* 1.4367, d. 0.9745, 75% in 5 hrs.; *Pr*, b_{19} 142–5°, *n* 1.4375, d. 0.9637, 55% in 5 hrs.; *iso-Pr*, b_{19} 141–3°, *n* 1.4400, d. 0.9710, 67% in 6 hrs.; *allyl*, b_{17} 144–5°, *n* 1.4470, d. 0.9776, 79% in 1 hr.; *Bu*, b_{19} 152–6°, *n* 1.4390, d. 0.9561, 59% in 5 hrs.; *sec-Bu*, b_{28} 159–60°, *n* 1.4425, d. 0.9689, 21% in 7 hrs. *Di-Et isobutenylethylmalonate*, b_{24} 140–1°, *n* 1.4395, d. 0.9837, 40% in 0.5 hr. *Di-Et alkyl-1-pentenylmalonates: Et*, b_{27} 154–7°, *n* 1.4374, d. 0.9656, 60% in 3.5 hrs.; *Pr*, b_{26} 161–3°, *n* 1.4381, d. 0.9551, 65% in 3 hrs.; *iso-Pr*, b_{28} 160–3°, *n* 1.4410, d. 0.9627, 70% in 3.5 hrs.; *di-Et alkyl-1-isopentenylmalonates: Me*, b_9 119–22°, *n* 1.4348, d. 0.9647, 93% in 0.1 hr.; *Et*, b_{19} 141–2°, *n* 1.4350, d. 0.9568, 88% in 0.3 hr.; *Pr*, b_{26} 154–6°, *n* 1.4349, d. 0.9487, 86% in 1 hr.; *iso-Pr*, b_{26} 152–3.5°, *n* 1.4372, d. 0.9545, 86% in 0.5 hr. *Di-Et alkyl-1-hexenylmalonates: Me*, b_{27} 164–6°, *n* 1.4407, d. 0.9647, 82% in 0.8 hr.; *Et*, b_{28} 168–9.5°, *n* 1.4410, d. 0.9612, 58% in 3 hrs. V. A rearrangement involving the migration of an allyl group in a three-carbon system. Arthur C. Cope and Elizabeth M. Hardy. *Ibid.* 441–4.—EtMeC:C(CN)CO_2Et and $CH_2{:}CHCH_2Br$ with EtONa give 34% of *Et (1-methylpropenyl)allylcyanoacetate* (I), b_1 94.5–6°, n_D^{25} 1.4609, d_{25}^{25} 0.9735; $CH_2{:}CHCH_2Cl$ gives 17% of I. Distn. of I at 15–20 mm. causes partial rearrangement; repeated refluxing at 18–60 mm. gives *Et (1,2-dimethyl-4-pentenylidene)cyanoacetate* (II), $CH_2{:}CHCH_2CHMeCMe{:}C(CN)\text{-}CO_2Et$, b_{16} 147–8°, n_D^{25} 1.4780, d_{25}^{25} 0.9816; rearrangement is practically complete after refluxing 4 hrs. at 18 mm. (150–60°) or after 20 min. at atm. pressure (260°). $MeCH{:}CMeCR(CN)CO_2Et$, in which R is Me, Pr or Bu, is completely stable at much higher temps. than are required to rearrange I; consequently a cyclic mechanism is regarded as probable. This appears to be the 1st case in which an allyl group has been observed to undergo a thermally induced α,γ-shift in a 3-C system; it appears probable that this rearrangement occurs for reasons similar to those responsible for the Claisen rearrangement of enol, phenol and vinyl ethers and that the 2 types of rearrangement follow similar mechanisms. Catalytic reduction of I gives *Et sec-butylpropylcyanoacetate* (III), b_{11} 122.5–3.5°, n_D^{25} 1.4356, d_{25}^{25} 0.9378. Reduction of Et (1-methylpropylidene)cyanoacetate gives 74% of Et (*sec*-butyl)-cyanoacetate, b_{11} 105–6°, n_D^{25} 1.4273, d_{25}^{25}, 0.9617; reaction with PrBr and EtONa gives 73% of III. III and $CO(NH_2)_2$ with EtONa give 10% of 5-propyl-5-*sec*-butylbarbituric acid, m. 135–7°. Catalytic reduction of 5.8 g. of II yields 3 g. of *Et 1,2-dimethylpentylcyanoacetate*, b_{12} 134–6°, n_D^{25} 1.4389; *5-(1,2-dimethylpentyl)barbituric acid*, m. 219.5–20.5°. Shaking 7 g. II with 50 cc. concd. NH_4OH for 30 hrs. gives 54% of $NCCH_2CONH_2$ and 60% of $CH_2{:}CHCH_2CHMeAc$ (IV), b. 137–8°, n_D^{25} 1.4215;

semicarbazone, m. 84.5°; *2,4-dinitrophenylhydrazone*, m. 41–2°. The structure of II also follows from its synthesis in 29% yield by refluxing 9.3 g. of IV, 9.5 g. $NCCH_2$-CO_2Et, 0.89 g. $AcONH_4$, 1.2 g. AcOH and 25 cc. C_6H_6 for 1 hr. C. J. West

Action of nitrosyl chloride on monobromomalonamides. M. P. Shah and V. B. Thosar. *J. Indian Chem. Soc.* **16**, 556(1939).—Treatment of $H_2C(CONHR)_2$ with NOCl (I) gives $HON{:}C(CONHR)_2$ and it was expected that I would react with $HCBr(CONHR)_2$ to yield the corresponding nitroso compds., $NOCBr(CONHR)_2$. A suspension of 5 g. of $HCBr(CONHC_6H_4Me)_2$ in 150 cc. benzene was satd. with dry gaseous I at 0° and, after 1 hr., the mixt. was refluxed until the condensed vapor was colorless. The reaction mixt. was filtered hot and concd. The product was washed with petr. ether and, on recrystn. from alc., yielded *bromochloromalonodi-p-toluide*, $ClBrC(CO$-$NHC_6H_4Me)_2$, m. 135°. Similarly, chlorination of $HCBr$-$(CONHCH_2Ph)_2$ gave the corresponding *chlorobromo compd.*, $C_{17}H_{16}BrClN_2O_2$, m. 153°. The same compds. are obtained by the action of SO_2Cl_2. C. R. A.

Condensation and reduction experiments with acetonedicarboxylic acid. Gust. Komppa. *Ann. Acad. Sci. Fennicae* **A51**, No. 3, 15 pp.(1938)(in German).—On sapon. of 14.7 g. of $OC(CH_2CH_2CO_2Et)_2$ (I), prepd. in 80% yield by a modification of the procedure of Marckwald (*Ber.* **20**, 2813(1887)), by passage of HCl into the mixt. with 10 g. H_2O for 1 hr., $OC(CH_2CH_2CO_2H)_2$ (II), m. 141.5°, was obtained in 83% yield. From the distillate obtained by dry distn. of 100 g. of the Pb salt of II there was prepd. 0.68 g. of the disemicarbazone (III) of 1,4-cyclohexanedione (IV); when prepd. directly from IV, III m. 231°. Dry distn. of the Ca, Ba, Sn, Mn or Th salt of II gave no IV. II gives with AcCl or Ac_2O a dilactone, m. 63° (Vollhard, *Ann.* **253**, 221(1889)), which was different from IV, as shown by a mixed m. p. detn. H_2SO_4 treatment of the product formed by condensation of I by means of NaOEt or powd. Na gave no IV as expected from the literature. The semicarbazone of I, fine needles, m. 89°, when treated with Na, first in ether, then, after removal of the ether by distn., at 130° for 3 hrs., gave no IV. Ten g. of $OC(CH_2CH_2CO_2Me)_2$ (V) in 30 cc. $CHCl_3$ was treated in sunlight with 4 cc. of a mixt. of 1 part Br in 2 parts $CHCl_3$; after the Br was decolorized, a further 14 cc. of the Br soln. was added, resulting in a 75% yield (after vacuum distn., addn. of MeOH and powerful cooling) of the di-Br deriv. (VI), m. 50°. VI heated with an equal wt. of quinoline at 50–60° gave 75% of $OC(CH{:}CHCO_2$-$Me)_2$ (VII), m. 177°. VII hydrolyzed by 75% H_2SO_4 or HCl (passage into a hot HOAc soln. of VII) gave OC-$(CH{:}CHCO_2H)_2$ (VIII), m. 230°. Dry distn. of the Ba or Th salt of VIII, or treatment of the Na salt of VIII with Ac_2O on the water bath, gave no *p*-quinone. Treatment of the semicarbazone of II with NaOEt in EtOH (1) in a sealed tube for 15 hrs. at 170–180° or (2) by refluxing in an oil bath for 8 hrs. gave impure II and no pimelic acid. Likewise, the hydrazone of II treated with NaOEt (in an oil bath) gave no pimelic acid. Passage of HCl for 24 hrs. into 3 g. of II in 30 g. HOAc in the presence of Zn-Hg gave only unchanged II. Passage of HCl for 19 hrs. into 4.3 g. of V in 50 g. abs. MeOH in the presence of 23 g. Zn-Hg gave only V and II. V treated with H under 3 atm. pressure in the presence of Pt or Pt-Pd catalysts gave only II; I passed with H over clay impregnated with Ni gave either unchanged I or low-mol. wt.-decompn. products, depending upon the velocity. II (8 g.) was treated with 200 cc. H_2O, the calcd. amt. of Na_2CO_3 and 517 g. of 3.3% Na-Hg (in small portions) and allowed to stand 1.5 days; the mixt. was acidified and extd. with Et_2O, neutralized with soda soln., evapd. to dryness and extd. repeatedly with alc. and Et_2O. After removal of the solvent, the oil was distd. *in vacuo*, giving 69% γ-hydroxypimelic lactone, b_{10} 230–1°, m. 81.5° (after crystn. from C_6H_6). $HOCH(CH_2CH_2CO_2Ag)_2$ was prepd. and analyzed. George Ayers

The nitrogenous constituents of jack bean. D. Ackermann and W. Appel. *Z. physiol. Chem.* **262**, 103–10 (1939).—The ext. of defatted jack-bean meal made with hot 50% EtOH contains canavanine, arginine, desaminocanavanine, choline, trigonelline, betonicine and two new bases, *canoine*, $C_{12}H_{24}O_3N_2$ (I), m. 188–9°, and *kilogine*, $C_7H_7O_3N$ (II), m. 240–2°. I is pptd. by phosphotungstic acid and by $CuCO_3$, is sol. in H_2O to the extent of 0.6% at 18.5°, is optically inactive, gives a ninhydrin test and is pptd. by $Hg(NO_3)_2$, aq. $HgCl_2$, $HgSO_4$, picric acid (picrate m. 120–1°) and picrolonic acid. It does not react with $KMnO_4$ in the cold. Tests with $Me_2NC_6H_4CHO$, Hopkins-Cole reagent, Millon reagent and the xanthoproteic reaction are neg. One N reacts with HNO_2 according to Van Slyke. *N*-Me is absent. *Desaminocanavanine* forms a *seminitrate*, m. 215.5°. Water dissolves 0.55% of II at 20.5°, giving an acid soln. which is optically inactive. The ninhydrin, Jaffé and pyridine tests are neg. as are the Millon and xanthoproteic reactions. No N is given by HNO_2. II gives a monohydrate. It is thought that II may be *o*-$HONHC_6H_4CO_2H$. It gives a red color with $FeCl_3$. Milton Levy

New chemical proof of the cyclic structure of glucosaminides. Albert Neuberger. *J. Chem. Soc.* **1940**, 29–32.—*N*-Acetyl-α-methylglucosaminide (I) and Me_2SO_4 in 40% NaOH (mixed during 6 hrs., 30° for the 1st hr. and 50° thereafter) give 70% of the 3,4,6-tri-Me deriv., m. 151°, $[\alpha]_D$ 151° (H_2O) (cf. Cutler, Haworth and Peat, *C. A.* **32**, 1661[1]); refluxing with 3.5 *N* HCl for 2 hrs. gives 70% of 3,4,6-trimethylglucosamine-HCl (II), m. 215° (decompn.), the structure of which as a 3,4,6-tri-Me compd. has been established by synthesis (Haworth, Lake and Peat, *C. A.* **33**, 3337[2]), whence it follows that I also must be a pyranoside. Since α- and β-Me glucosaminide-HCl can be converted into the corresponding *N*-Ac compds. under conditions which exclude change of the ring structure (N. and Pitt Rivers, *C. A.* **33**, 2491[2]), the 4 known Me glucosaminides all possess pyranoside structures. II, BzCl and $NaHCO_3$ give 75% of *N-benzoyl-3,4,6-trimethylglucosamine*, m. 213°, $[\alpha]_D$ 124° (initial), 105° (after 48 hrs.) in wet C_6H_6N; it is unchanged after standing 6 days in 1:1 dioxane-H_2O contg. excess Br or on treatment with $KMnO_4$ in Me_2CO. II (2.5 g.) in 50 ml. H_2O contg. 0.75 g. $NaHCO_3$, treated with 2 equivs. $1\text{-}C_{10}H_7SO_2NNaCl$ in 250 ml. H_2O (added in 20 portions during 5 hrs.), gives *2,3,5-trimethyl-d-arabofuranose*, $b_{0.01}$ 80–3° (bath temp.), $[\alpha]_D$ 38° (MeOH), characterized by oxidation to the lactone, m. 33°. If 3 equivs. of oxidizing agent are added at once and the reaction is carried out at pH 5, the product consists mainly of 2,3,5-trimethyl-*d*-arabononitrile, m. about 2°; a by-product, m. 86.5°, $[\alpha]_D$ −40° ($CHCl_3$), is considered to be an *imino acid lactone;* the N is liberated quantitatively as NH_3 on heating with 2 *N* acid; alkali liberates NH_3 much more slowly. C. J. West

β-Methyl fructofuranoside. Hans Heinrich Schlubach and Heinz Eike Bartels. *Ann.* **541**, 76–85(1939); cf. S. and Rauchalles, *C. A.* **20**, 377.—Candiolin (15.41% H_2O, 17.05% Ca, 13.21% org. P) is treated with $(CO_2H)_2$, filtered from the Ca oxalate and then treated with brucine; crystn. of the ppt. from 7–8 parts boiling 70% EtOH (5 times) gives 75% of the brucine salt (I), $[\alpha]_D$ −23.6°, practically free of aldose components. I (80 g.) in 1100 cc. 20% EtOH and 23.1 g. $Ba(OAc)_2.H_2O$, shaken 10 min., 2250 cc. EtOH added, the ppt. removed with a centrifuge and dissolved in 300 cc. 1% ice-cold H_2O, EtOH and KOH added until the soln. is neutral, gives 90–5% of the Ba fructosediphosphate. Shaking the Ba salt (50 g.) in 1 l. 1.688% MeOH-HCl at 25° gives a mixt. of the 2 Me fructosides, which is sepd. into about equal wts. of 2 fractions, $[\alpha]_D$ 2.8–4.8° and −2 to −3°, by crystn. from a 1% aq. soln. Transformation into the brucine salt and crystn. from 96% (α-form) or 50% (β-form) EtOH finally yielded Ba salts with $[\alpha]_D$ 8.5° (H_2O, *c* 1) and $[\alpha]_D$ −8.75°, $[\alpha]_{5461}$ −10.4° (H_2O, *c* 1); the P was removed by kidney phosphatase at a pH of 9, giving 80–90% of Me fructofuranoside (II), which was purified through the Ac deriv. α-II has $[\alpha]_D$ 56.9° (MeOH, *c* 1.4); β-II, $[\alpha]_D$ −49.95°, $[\alpha]_{5461}$ −58.92° (H_2O, *c* 1). β-II is split to the extent of 95.1% by invertin in 36 hrs.; that 100% is not reached is probably due to the presence of some tetra-Ac

deriv.; α-II, 21.65% in 24 hrs. *N* HCl gives 97.2% splitting of the β-II in 36 hrs.; half-period, 52.5 min. The diphosphoric acids are not attacked to a noticeable degree by invertin in 17 hrs. C. J. West

Highly arylated compounds. IX. Highly arylated fulvenes. W. Dilthey and P. Huchtemann. *J. prakt. Chem.* **154**, 238–65(1940); cf. *C. A.* **32**, 1724³.—Tetracyclone (7 g.) and MeMgBr in ether, boiled 4 hrs., give 5.2 g. of *2,3,4,5-tetraphenyl-1-methylcyclopentadien-1-ol* (I), m. 195°; concd. H_2SO_4 gives a deep orange-red color. Passing a rapid stream of HCl into 30 g. of I in 300 cc. boiling AcOH for 1 hr. gives 26.4 g. of *2,3,4,5-tetraphenylfulvene* (II), fiery orange-red, m. 211–12°; it is pptd. unchanged from the deep orange-red H_2SO_4 soln.; it is unchanged on heating at 400° and is not rearranged to 1,2,3,4-$Ph_4C_5H_2$ on distn. *in vacuo*. II is also formed from I by concd. H_2SO_4 or $KHSO_4$ in AcOH, on melting with $KHSO_4$ or with P_2O_5 in C_6H_6. II is also formed in 0.9-g. yield from 1 g. of tetraphenylcyclopentadiene (III) and 25 cc. 40% HCHO with 25 cc. MeOH and 50 cc. 4% MeOK on boiling 2 hrs.; this is a convenient method of prepn. of fulvenes when the ketone is not easily accessible. When HCl is passed into 1 g. I in 20 cc. cold AcOH there results *2,3,4,5-tetraphenyl-1-chloro-1-methylcyclopentadiene*, amorphous, yellow-orange, m. 166–7°; this could not be converted to II. II and Br in $CHCl_3$ give a *dibromide*, citron-yellow, m. 147–8°; concd. H_2SO_4 gives a violet-red soln. II and Cl in ether give a *tetrachloride*, m. 149°; H_2SO_4 gives a blue soln., changing to red-violet. I could not be added to II. II and *p*-$ONC_6H_4NMe_2$ in C_5H_5N or C_5H_5N-EtOH with piperidine give the *dimethylaminophenylimine* of II, deep black-violet, m. 217–18°; the concd. H_2SO_4 soln. is deep violet, changing to a greenish yellow; the violet ether soln. is completely decolorized by Cl. II (10 g.) in 100 cc. dioxane, 1 g. KOH and 50 cc. 30% H_2O_2, boiled 2 hrs., give 9.5 g. of the *oxido deriv.* (IV), $C_{30}H_{22}O$, m. 227° (decompn.); concd. H_2SO_4 gives a violet and then a brown-red color. IV does not react with $NH_2OH.HCl$ or $H_2NNHCONH_2$; $PhMgBr$ gives II. The *1-Et analog* of I (prepd. from EtMgBr) m. 188°; the H_2SO_4 soln. is yellow-red with an orange fluorescence; the crystals turn yellow in the light; HCl in boiling AcOH gives the *6-Me deriv.* of II, orange-brown, m. 194–5°; the deep yellow-red H_2SO_4 soln. has an orange fluorescence; this fulvene adds H_2O. The 1-benzyl analog of I, greenish yellow, m. 156–7°; the concd. H_2SO_4 soln. is orange-red; it is light sensitive. MeONa in C_5H_5N gives an orange ppt.; heating with MeOH-KOH gives a green to blue soln. Loss of H_2O gives 2,3,4,5,6-pentaphenylfulvene, red, m. 200–1°, which also results from III and BzH with MeOK in MeOH (boiling 4 hrs.). III (1 g.) and 2 g. of *p*-$MeOC_6H_4CHO$ with MeOK give 1.1 g. of the *6-(p-anisyl) deriv.* of II, violet-brown, m. 197–8°, sol. in concd. H_2SO_4 with a violet-red color and brown-red fluorescence. III (1 g.) and 1.5 g. of *p*-$Me_2NC_6H_4CHO$ give 1 g. of the *6-(p-dimethylaminophenyl) deriv.* of II, red, m. 207–10°; the H_2SO_4 soln. is orange-red. III (1 g.) and 10 g. of Ph_2CCl_2, heated 15–20 min. at 190–5°, give 0.95 g. of *2,3,4,5,6,6-hexaphenylfulvene*, nearly black, m. 301–2°, sol. in concd. H_2SO_4 with a greenish blue or violet-red color. Triphenylcyclopentadiene (V) (1 g.) and HCHO with MeOK, boiled 2 hrs., give 0.97 g. of *2,4,5-triphenylfulvene*, yellow-red, m. 148° and sol. in concd. H_2SO_4 with a brown-yellow color. V and BzH give 2,4,5,6-tetraphenylfulvene, brown-red, m. 156°; H_2SO_4 gives a violet-brown color, gradually developing a green fluorescence. V and Ph_2CCl_2 (15 min. at 190–5°) give *2,4,5,6,6-pentaphenylfulvene*, brown-violet, m. 181°, sol. in concd. H_2SO_4 with a green to deep red color; org. solvents give deep red solns. Phenylcyclone (7 g.) and excess MeMgBr in ether give 3.9 g. of *2,5-diphenyl-3,4-(o,o'-biphenylene)-1-methylcyclopentadien-1-ol* (VI), yellow, m. 231–2°; concd. H_2SO_4 gives a violet-red color, changing to brown; heating 4 g. VI in AcOH and treatment with dry HCl for several hrs. give 1.8 g. of *2,5-diphenyl-3,4-(o,o'-biphenylene)fulvene*, orange-red, m. 239–40°; the concd. H_2SO_4 soln. is violet-red, changing to brownish red; Cl quickly decolorizes the red ether soln. Acecyclone (VII) (20 g.) and MeMgBr give 10.6 g. of *2,5-diphenyl-3,4-(1,8-naphthylene)-1-methylcyclopentadien-1-ol* (VIII), golden yellow, m. 197° (decompn.); the concd. H_2SO_4 soln. is violet; AcOH-HCl gives *2,5-diphenyl-3,4-(1,8-naphthylene)fulvene*, red-violet, m. 225–6°; the concd. H_2SO_4 soln. is orange-red. The color of VIII in ether is discharged by Cl and that in alk. dioxane by H_2O_2! VII (10 g.) and EtMgBr give 5 g. of the *1-Et analog* of VIII, yellow, m. 146°; $PhCH_2MgCl$ gives the *1-benzyl analog* of VIII, yellow, m. 234–5°. The relation between color and the structure of these compds. is discussed. C. J. West

Action of radon on polymethylenes—cyclobutane and cyclobutene. G. B. Heisig. *J. Phys. Chem.* **43**, 1207–12 (1939); cf. *C. A.* **30**, 384⁹.—Cyclobutane and cyclobutene polymerize to liquids which increase in color and viscosity with time of bombardment by α-particles. $-M/N$ was 2.3 for cyclobutane and 7.4 for cyclobutene, with a heat of formation of 16.8 and −6 cal., resp. In the prepn. of the hydrocarbons, cyclobutylamine is made directly from cyclobutanecarboxylic acid. This increases the final yield of hydrocarbons threefold. H. E. Phipps

Spiro compounds. I. Preparation of cyclopentane-*spiro*-cyclopentanone and cyclohexane-*spiro*-cycloheptanone. Muhammad Qudrat-i-Khuda and Amalendu Kumar Ray. *J. Indian Chem. Soc.* **16**, 525–31(1939).—The reduction of cyclopentanone (I) and cyclohexanone (II) with Mg and Al amalgams gives diols which undergo pinacolone rearrangement to spiro ketones, easily transformed into hydrocarbons required for heat of combustion studies into the nature of spiro compounds. A suspension of 13.5 g. $HgCl_2$ in 90 cc. I was added to 100 cc. of boiling benzene contg. 12 g. of Mg powder. The mixt. was refluxed for 1 hr., dild. with 30 cc. H_2O and refluxed for 1 more hr. The filtered soln. and benzene washings were evapd. down, cooled and treated with petr. ether, yielding 14–15 g. of colorless needles of bicyclopentane-1,1′-diol (III), $C_{10}H_{18}O_2$, m. 109°, and a secondary product, oily cyclopentylidenecyclopentanone (IV), b_5 108–10°; semicarbazone, m. 224°. By substituting Al for Mg powder the yield from 90 cc. I is increased to about 19 g. III, together with some IV. Rearrangement of 20 g. III by heating with 150 cc. of 20% H_2SO_4 at 120–5° for 2 hrs. and extg. the distn. product with ether gave 16 g. of cyclopentane-*spiro*-cyclohexan-2-one (V), b_{45} 120°; semicarbazone, m. 189–90°; *monobenzylidene deriv.*, $C_{17}H_{20}O$, m. 75°. Oxidation of 18 g. V by heating with 45 cc. HNO_3 and 12 cc. H_2O gave 19 g. of *1-carboxycyclopentane-1-butyric acid* (VI), m. 192°; *di-Et ester* (VII), $C_{14}H_{24}O_4$, b_6 140–2°, $d_4^{22.1}$ 1.017, $n_D^{22.1}$ 1.449, M. R. 67.59 (calcd. 67.96). A mixt. of 20 g. VII and 50 cc. abs. alc. contg. 1.8 g. Na was refluxed for 6 hrs., concd., dild. and neutralized with HCl. The oily layer was extd. with ether, yielding 11 g. of *Et cyclopentane-spiro-cyclopentan-2-one-3-carboxylate* (VIII), $C_{12}H_{18}O_3$, b_5 127°, $d_4^{24.8}$ 1.033, $n_D^{23.8}$ 1.451, M. R. 54.75 (calcd. 54.88). VIII was heated with 10% HCl for 4 hrs. and the product was extd. with ether and distd., giving *cyclopentane-spiro-cyclopentanone* (IX), $C_9H_{14}O$, b_{32} 115°, $d_4^{22.1}$ 0.9891, $n_D^{22.1}$ 1.471, M. R. 39.1 (calcd. 39.4); *semicarbazone*, m. 214°; *benzylidene deriv.*, m. 64°. Reduction of 200 g. of cyclohexanone with Al-Hg gave some cyclohexylidenecyclohexanone (X) and 58 g. of bicyclohexane-1,1′-diol, m. 130°, transformed by heating with H_2SO_4 to a mixt. of bicyclohexenyl and the pinacolone, b_6 110–14°. Treatment with $H_2NNHCONH_2.AcOH$, filtration and extn. with ether gave 1,1′-bicyclohexenyl, b_6 111°, and *cyclohexane-spiro-cycloheptanone semicarbazone*, m. 216–17°, regenerating the *ketone* (XI), $C_{12}H_{20}O$, b_8 120°, $d_4^{22.8}$ 0.9795, $n_D^{23.8}$ 1.483, M. R. 52.64 (calcd. 53.22); *benzylidene deriv.*, m. 123°. A mixt. of 4.2 g. $NCCH_2CONH_2$ and 1.14 g. Na in alc. and 7.5 g. IV was refluxed for 3 hrs., distd., dild. and acidified with HCl. Recrystn. of the ppt. from dil. alc. yielded 6 g. of a *condensation product*, $C_{13}H_{18}N_2O_2$, m. 215.6°. A similar *condensation product*, $C_{16}H_{20}N_2O$ (*C. A.* **24**, 4767), was obtained from X. II. **Synthesis of cyclopentane-*spiro*-cyclopentanone.** Muhammad Qudrat-i-Khuda and Asutosh Mukherjee. *Ibid.* 532–5(1939).—The constitution of IX has been confirmed by an independent synthesis

from the anhydride of 1-carboxycyclopentane-1-acetic acid (XII). A mixt. of 100 g. XII, 75 cc. Ac_2O and 15 cc. AcCl was distd. under reduced pressure, yielding 80 g. of the *anhydride*, b_{18} 174°, reduced by Na in alc. to 55 g. of *lactone* (XIII), $C_8H_{12}O_2$, b_{40} 154°, $d_4^{20.1}$ $n_D^{20.1}$ 1.46345, M. R. 35.9 (calcd. 36.3). Treatment of 80 g. XIII with PBr_5 at 100° for 2 hrs. produced 62 g. of *Et 1-bromoethylcyclopentane-1-carboxylate* (XIV), b_5 118°, $d_4^{20.1}$ 1.2481, $n_D^{20.1}$ 1.46816, M. R. 55.46 (calcd. 55.48). Condensation of 55 g. XIV with $NaCH(CO_2Et)_2$ from 32 g. $CH_2(CO_2Et)_2$ and 4.6 g. Na gave the tricarboxylic ester, *Et 1-carbethoxycyclopentane-1-α-carbethoxybutyrate*, $C_{17}H_{28}O_6$, b_6 154°, $d_4^{21.1}$ 1.05401, $n_D^{21.1}$ 1.44486, M. R. 82.7 (calcd. 83.1), hydrolyzed by heating 25 g. with 100 cc. of concd. HCl for 14–16 hrs. to VI; *dianilide*, m. 163°. The ester, VII, was condensed to VIII and hydrolyzed to IX, which was also obtained by the dry distn. of VI in the presence of $Ba(OH)_2$. C. R. Addinall

High-pressure hydrogenation of benzene. I. Experiments carried out by employing a revolving autoclave. Singo Andō. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 391–3(1939).—Treatment of C_6H_6 and cyclohexane (300 g.) at 430–440° with H (80–90 atm. initial pressure at 0°) for 1–2 hrs. in the presence of a catalyst composed of 5 g. S and 30 g. MoO_3 (dried after HNO_3 pptn. from hot NH_4 molybdate soln. and water-washing) resulted in nearly quant. yields of oily products composed of 0.2–0.7% unsatd. hydrocarbons (sol. in 86% H_2SO_4), 0–80.8% aromatic hydrocarbons (sol. in 100% H_2SO_4) and 18.9–99.6% satd hydrocarbons. No CH_4 was produced, and the quantities of cyclopentane and hexane formed were almost negligible. The satd. hydrocarbons formed from C_6H_6 were preponderantly methylcyclopentane, with some cyclohexane; those found in the case of cyclohexane contained only 11.9–16.8% methylcyclopentane, the balance being unchanged cyclohexane. Thus the mechanism of hydrogenation of C_6H_6 does not consist wholly of the primary formation of cyclohexane, followed by isomerization of the latter, but probably is as follows: C_6H_6 → cyclohexene → (1) methylcyclopentane and (2) cyclohexane, followed by isomerization of the latter to methylcyclopentane. George Ayers

Isomerization of cyclohexane under high pressure of hydrogen. Singo Andō. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 322–4(1939); cf. *C. A.* **33**, 3564².—Cyclohexane was charged continuously in 2 runs, resp., into a vertical reaction chamber (contg. Mo sulfide catalyst, prepd. by adding H_2SO_4 to a soln. of MoO_3 in NH_4 sulfide, supported on 5 parts of granular Japanese acid clay which had been activated by mineral acids) at rates of 145 and 113 cc./hr. and at a pressure of 200 atm. at temps. of 379° and 411°, yielding products contg. 0.8% and 0.4% unsatd. hydrocarbons, 0.1% and 0.6% aromatic hydrocarbons and 99.1% and 99.0% satd. hydrocarbons, but no CH_4. The main fractions of the satd. hydrocarbon fractions were shown by elementary analysis, b. p., d, *n* and aniline point detns. to be composed almost wholly of cyclohexane and methylcyclopentane, there being 35.4% and 79.4% methylcyclopentane, resp., in the above main fractions. George Ayers

Enium. XXXV. Oxidation of ketones with perhydrol. W. Dilthey, Maryke Inckel and Horst Stephan. *J. prakt. Chem.* **154**, 219–37(1940); cf. *C. A.* **33**, 4257².—Previous work by D., Quint and Dierichs (*C. A.* **32**, 5781⁸) showed that carbenium salts of all kinds were easily and smoothly oxidized by H_2O_2. Ketones yield such salts with acids but they are relatively unstable and a relatively high acid concn. is necessary to keep them in soln. Dropwise addn. of 20 g. cyclohexanone (I) to a mixt. of 50 g. Ac_2O, 20 g. 96% H_2SO_4 and 25 g. 30% H_2O_2 at 15° and stirring an addnl. 2 hrs. give 9 g. (45%) of the *peroxide* (II) of I, m. 128–9°; II also results by addn. of 20 g. I in 20 g. AcOH to a mixt. of 30 g. 30% H_2O_2, 25 g. 96% H_2SO_4 and 25 g. Ac_2O at 20°; crystn. from benzine (40–60°) gives a II, m. 132–3°. II is relatively stable and detonates only on percussion; acids regenerate I and H_2O_2. Heating II does not give ω-hydroxycaproic acid (III). A mol.-wt. detn. indicates the formula $(C_6H_{10}O_3)_2$. If in the above expts. the Ac_2O is replaced by an equal wt. of concd. H_2SO_4 a very vigorous reaction occurs and there results a little II and a good yield of polymeric III, m. 51–3° (hydrazide, m. 117°). The 4-Me deriv. of I (20 g.) gives 7 g. of the *4-Me deriv.* of II, m. 71–2°. The *2-Me deriv.* of II m. 106–7° (yield, 1 g. from 20 g. of the 2-Me deriv. of I). Cyclopentanone, as above, gives 2.5 g. of a *peroxide*, m. 172° (decompn.), and after pouring the filtrate into H_2O 1 g. of a *peroxide*, m. 105°; the use of H_2SO_4 in place of Ac_2O causes a violent reaction without the formation of a peroxide; the 3-Me deriv. also gives a peroxide but in poor yield. Me_2CO gives a dimeric peroxide, m. 132°; pinacolone, mesityl oxide and camphor do not yield peroxides. $PhCH_2CH_2Ac$ gives a *peroxide*, $(C_{10}H_{12}O_3)_2$, m. 102–3°; *that* from Pr_2CO, $(C_7H_{14}O_2)_2$, m. 47–8°. PhAc gives $(C_8H_8O_2)_2$, m. 185–6°; Ph_2CO gives BzOPh, m. 70–1°. EtAc, (iso-Bu)$_2$CO, Et_2CO and PrAc give liquid peroxides. *p*-$MeOC_6H_4CHO$ and *p*-HOC_6H_4CHO give black-brown tars. *o*- and *m*-$O_2NC_6H_4$-CHO give the corresponding acids. *l*-Menthone (IV) does not yield a peroxide, the oxidation products being those observed by Baeyer and Villiger (*Ber.* **32**, 3619 (1899)). The lactone or Et ester of 2,6-dimethyl-3-hydroxyoctanoic acid (from IV) and PhMgBr give a nearly quant. yield of *1,1-diphenyl-3,7-dimethyl-1,6-dihydroxyoctane*, m. 91°; the H_2SO_4 soln. shows a yellow halochromy. *d*-Isomenthone also does not yield a peroxide. The mechanism of the oxidation of a CO compd. with H_2O_2 is discussed. C. J. West

Photochemical reactions of oxalyl chloride and phosgene with cyclohexane. M. S. Kharasch and Herbert C. Brown. *J. Am. Chem. Soc.* **62**, 454(1940).—A preliminary note reports that 25.2 g. cyclohexane and 9.6 g. $(COCl)_2$, illuminated by a 300-w. W lamp placed immediately below the flask (gentle refluxing is caused by the heat) for 24 hrs., give 4.1 g. of cyclohexanecarbonyl chloride (4.2 g. $(COCl)_2$ had reacted); calcd. yield, 4.8 g. $COCl_2$ behaves similarly. The gases evolved consist of an equal mixt. of CO and HCl. C. J. West

Synthesis of compounds related to the antirachitic vitamins. II. John B. Aldersley, G. Norman Burkhardt, Albert E. Gillam and Nathan C. Hindley. *J. Chem. Soc.* **1940**, 10–16; cf. *C. A.* **32**, 4959¹.—Quinitol diacetate (I) (50 g.) in 50% EtOH at 40–50°, treated with 11 g. KOH in 50% EtOH during 5 min. (vigorous stirring), the EtOH removed *in vacuo* and the aq. soln. extd. with $CHCl_3$, gives 60% of the *monoacetate* (II), b_{15} 136–7°, m. 68–72°; oxidation in the cold with CrO_3 in AcOH gives from 22 g. II 15 g. *4-acetoxycyclohexanone* (III), b_8 110°, b_{14} 124–6°, b_{760} 235° (*semicarbazone*, m. 182°; *2,4-dinitrophenylhydrazone*, m. 176°). Crude III (contg. 16% I) (50 g.) with 2 *N* NaOH at room temp. for 24 hrs. gives 28 g. of *4-hydroxycyclohexanone* (IV), $b_{0.6}$ 83–5°, and some quinitol (V); acetylation of IV gives III, b_{11} 112–14°. Oxidation of V with CrO_3 in Ac_2O at 10–15° (standing overnight) yields 67% III and some I and 1,4-cyclohexanedione. Passing HCl into III and BzH in AcOH gives *4-acetoxy-2,6-dibenzylidenecyclohexanone*, m. 165°; no monobenzylidene deriv. was formed. 1-Allylcyclohexanol in AcOH, treated with O_3 for 20 hrs. and the ozonide warmed with Zn dust, gives 35% of cyclohexylideneacetaldehyde (VI), b_9 85–7°, showing a single absorption band in EtOH at 2400 A., ϵ_{max} 15,900. IV (36.4 g.) in 0.086 *N* NaOH, shaken in N with 28.2 g. VI (added in 5 equal parts during 24 hrs. and the shaking continued for an addnl. 24 hrs.), the mixt. neutralized with H_2SO_4 and the yellow oil taken up in Et_2O, gives 21 g. of a thick yellow oil, $b_{0.01}$ 168–73°, from which crystd. *2-keto-5-hydroxy-α,β-dicyclohexylideneethane* (VII), m. 65–9°, absorption max. at 3090 A., ϵ_{max} 23,200 in EtOH; *2,4-dinitrophenylhydrazone*, m. 170–1°; *phenylurethan*, m. 180°. Refluxing VII with Ac_2O in N gives the *acetate*, m. 80–2°, absorption max. 3090 A., ϵ_{max} 23,300 (*2,4-dinitrophenylhydrazone*, deep red, m. 187–9°; the semicarbazone is pale yellow, m. 205–10° (decompn.) and is very sensitive to air, turning deep yellow; absorption max. at 3120 A., ϵ_{max} 22,030). VII (2 g.) and MeMgI give a product $b_{0.003}$ 140–50°, a viscous, pale yellow oil, with a

single absorption band at 2815 A., $\epsilon_{max.}$ 24,500; the phenylurethan (VIII), after repreated crystn. from dil. Me_2CO, m. 125–35°; after 2 crystns. (m. 105–27°), it showed 2 absorption bands, 2770 A. and 2390 A., $\epsilon_{max.}$ 38,150 and 20,900; exposure to air caused a broadening of the m.-p. range. Distn. of VIII in a high vacuum gives a sublimate, m. 123–32°, and showing 2 absorption bands at 2770 and 2390 A., $\epsilon_{max.}$ 40,780 and 23,000. The acetate of VII, treated with $BrCH_2CO_2Et$ and Zn, the product successively hydrolyzed with dil. alkali and dehydrated with Ac_2O, the Ac group removed and the unsatd. acid decarboxylated, gives a *hydroxytriene*, $b_{0.002}$ 140–55°, pale yellow and showing a single absorption band in EtOH at 2805 A., $\epsilon_{max.}$ 28,000; the phenylurethan, m. 123–32°, is apparently identical with VIII; it exhibits 2 bands at 2805 and 2380 A., $\epsilon_{max.}$ 40,440 and 24,260; the 3,5-dinitrobenzoate m. 70°. The triene showed no antirachitic activity. Heating VII with piperidine-AcOH for several hrs. gave no indication of cyclization to a hydroxyoctahydrophenanthrene. Reduction of VII with $(iso\text{-}PrO)_3Al$ in iso-PrOH (refluxing overnight) gives a *compd.*, $C_{14}H_{20}O$, m. 81–3°, with 0.96 active H atom, absorption max. at 2705 and 2820 A., $\epsilon_{max.}$ 42,100 and 40,900. C. J. W.

Cyclization of vitamin A_2. Norris D. Embree and Edgar M. Shantz. *J. Biol. Chem.* **132**, 619–26(1940); cf. *C. A.* **33**, 3969⁸.—Like vitamin A_1, vitamin A_2 is cyclized by treatment with dry alc. HCl and the cyclized product has the same ultraviolet absorption spectrum as cyclized vitamin A_1, with max. at 350, 368 and 390 mμ. The $SbCl_3$ reaction product of both the cyclized and uncyclized vitamin A_2 has a spectrum with a max. near 690 mμ. Cyclized A_2 is more strongly adsorbed by alumina than cyclized A_1. A method is described for *the estn. of the relative amts. of vitamins A_1 and A_2 by the sepn. of their cyclized derivs.* A. P. Lothrop

Action of aluminum chloride on aromatic hydrocarbons. II. The 1,3-dimethyl-4-propylbenzenes. Dorothy V. Nightingale and Benoist Carton, Jr. *J. Am. Chem. Soc.* **62**, 280–3(1940); cf. *C. A.* **33**, 1681⁷.—*m*-Xylene (I), EtCOCl and $AlCl_3$ in CS_2 give 80% of the 4-propionyl deriv., b_{10} 112°; Clemmensen reduction yields 50% of *1,3-dimethyl-4-propylbenzene* (II), b_{23} 95°, n_D^{25} 1.4995; II also results in 40% yield from I and cyclopropane with $AlCl_3$ at 0–15°. I (375 cc.) and 47 cc. iso-PrOH, cooled with ice and treated during 2 hrs. with stirring with a mixt. of 500 cc. concd. H_2SO_4 and 110 cc. H_2O, with stirring for 14 hrs. at room temp., give 75% of *1,3-dimethyl-4-isopropylbenzene* (III), b_{13} 77°, n_D^{25} 1.4998. I (53 g.) and 15 g. $AlCl_3$, treated during 1 hr. with 20 g. iso-PrCl and stirred for an addnl. 3 hrs., give 40% of *1,3-dimethyl-5-isopropylbenzene* (IV), b_{17} 83–5°, n_D^{25} 1.4930; PrCl gives 46% of impure IV and C_6H_6 and HCO_2Pr give 50% of IV. Addn. of 1363 cc. concd. H_2SO_4 to 1060 cc. AcPr and 1406 cc. Me_2CO at 0–10° gives 19 g. of *1,3-dimethyl-5-propylbenzene* (V), b_{18} 90–1°, n_D^{26} 1.4913. The Na deriv. of mesitylene (80 cc.) and 78 g. EtI give 5.5 g. V. The *diacetamido derivs.* m. as follows: II 284°, III 292°, IV 295°, V 239°. III undergoes rearrangement on warming with $AlCl_3$ at 55° for 3 hrs. to yield principally IV; II is largely rearranged by $AlCl_3$ at 100° for 4 hrs. to yield IV; at 85–90° the trialkyl fraction is a mixt. and at 55° II is largely unchanged. The formation of II from I and cyclopropane and of IV from HCO_2Pr supports the view of Smith and Perry (*C. A.* **33**, 6257⁷) that a 1,3,4-substituted hydrocarbon is the initial product of the reaction when I is alkylated in the presence of $AlCl_3$. C. J. West

Synthesis of styrene. A. G. Bulavskiĭ. *Org. Chem. Ind.* (U. S. S. R.) **6**, 434–7(1939).—Some addnl. data are given on the catalytic dehydrogenation of PhEt to styrene by the previous method (cf. Zal'kind and Bulavskiĭ, *C. A.* **30**, 1368⁵). Chas. Blanc

Styrene, iodine and organic disulfides. Bror Holmberg. *Arkiv Kemi, Mineral., Geol.* **13B**, No. 14, 6 pp.(1939)(in German); cf. *C. A.* **33**, 4155⁶.—As previously shown for $(SCH_2CO_2H)_2$ (I), its di-Et ester (II), Me_2S_2 (III), Et_2S_2 (IV) and Ph_2S_2 (V) add to PhCH:CH_2 (VI) under the catalytic influence of I. Tri- and tetrathiodiglycolic acids also react with the formation of tars. No reaction occurs between VI and $(AcS)_2$ or dixanthogen or between I and members of the series PhCH:$CHCH_2R$ (R = OH, Br, EtO, PhO, SCH_2CO_2H), PhCH:CHCHO and its mercaptalacetic acid, PhCH:$CHCO_2H$ and its Et ester, PhCH:CHCOMe or PhCOCH:CHPh. If a solvent is necessary abs. ether is best, then C_6H_6, ordinary ether, CS_2, Me_2CO and AcOH. *Styrene bis(methyl sulfide)*, prepd. in 17.2-g. yield by allowing 12 g. of VI, 12 g. of III, and 0.5 g. of I to stand 2 days at room temp., washing with *N* NaOH and distg. at low pressure, b_{10} 149–50°, d_4^{20} 1.096. Oxidation of 5 g. in 25 cc. of Me_2CO with 6 g. of 30% H_2O_2 gives *styrene bis(methyl sulfoxide)*, crystals from AcOEt, m. 122–4°; also, in small amt. another substance, m. 130–1°, possibly a diastereoisomer. Similarly, 18.5 g. of VI, 21 g. of IV and 0.5 g. of I give, after retreatment of 15 g. of the fore-run with I for 10 days, 25 g. of *styrene bis(ethyl sulfide)*, b_{11} 163–4°, d_4^{20} 1.046. *Styrene bis(thioglycolic Et ester)*, about 7 g. from 5.2 g. of VI, 12 g. of II and 0.5 g. of I, allowed to stand 1 week, b_3 210–12°. *Styrene bis(phenyl sulfide)*, 12 g. from 5.2 g. of VI, 11 g. of V and 1 g. of I in 25 cc. of abs. ether, allowed to stand 2 days, m. 57–8°. H. L. Mason

The association of the nitrotoluenes. Walter Hückel and Maria v. Schalscha-Ehrenfeld. *J. prakt. Chem.* **154**, 57–65(1939).—All 3 nitrotoluenes show (1) approx. the same mol.-wt. values (cryoscopic detn. in C_6H_6), (2) approx. the same increase in mol. wt. with increase in concn. (larger increase in mol. wt. with concn. in cyclohexane than in C_6H_6), and (3) approx. the same increase in mol. wt. for the different concns. of *p*-$O_2NC_6H_4Me$ in C_6H_6 or cyclohexane by both b.-p. and m.-p. methods. The degree of assocn. of the 3 nitrotoluenes is not detd. by the magnitude of the dipole moment. In comparison with $PhNO_2$, the 3 nitrotoluenes show a similar rise in mol. wt. with concn. in C_6H_6, but in cyclohexane the nitrotoluenes give the greater rise, showing greater assocn. α-$C_{10}H_7NO_2$ shows a greater increase of mol. wt. with concn. in C_6H_6 (f.-p. method) than does $PhNO_2$. In cyclohexane, α-$C_{10}H_7NO_2$ shows approx. the same mol.-wt. increase with concn. by both b.-p. and f.-p. methods. B.-p. detns. of the mol. wt. of *trans*-β-decalol were made in C_6H_6 and cyclohexane to find out the effect of volatility (negligible with C_6H_6; perceptible with cyclohexane) of alcs. b. above 200° on the detn. F.-p. detns. of mol. wt. of α-fenchol in C_6H_6 and cyclohexane show a considerable increase in assocn. with increase in concn. in cyclohexane, but only a small increase in assocn. in C_6H_6 (similar to that shown by isoborneol). George Ayers

Exchange reactions of nuclear hydrogen atoms of aniline hydrochloride in aqueous solution. I. The reaction in neutral and acid solution. Masao Koizumi. *Bull. Chem. Soc. Japan* **14**, 530–9(1939); cf. *C. A.* **31**, 97⁵.—The rate of the reaction was studied. On the assumption that the reaction is bimol., the rate const. is almost independent of the concn. of $PhNH_2.HCl$ and of acid. The proposed mechanism is: $PhNH_2 + H_3DO^+ = C_6H_4DNH_2 + H_3O^+$. G. M. Murphy

Halogen-metal interconversion with *m*- and *p*-bromodimethylanilines. Henry Gilman and Irving Banner. *J. Am. Chem. Soc.* **62**, 344–5(1940).—Details are given of the prepn. of *o*- (70%), *m*- (54%) and *p*-$BrC_6H_4NMe_2$. Refluxing 0.04 mole of the *m*-isomer with 0.055 mole of BuLi in Et_2O (N atm.) for 20 hrs. and carbonating give 26–32% of *m*-$Me_2NC_6H_4CO_2H$ and 1.1 g. of an oil b_{13} 90–115°. The *p*-isomer similarly gives 41–56% of *p*-$Me_2NC_6H_4CO_2H$. The yields could probably be increased by decreasing the time of refluxing. C. J. West

Industrial synthesis of arsines. Synthesis of benzenearsonic acid. Louis Blas. *Génie civil* **115**, 448–9(1939).—The reaction of Na_3HAsO_3 on PhN_2Cl is greatly influenced by the diln. of the arsenite, the speed of reaction, and especially by the pH of the soln. (which should remain const.). All compds., like Na_2CO_3, which play the role of buffer tend to increase the yield. A. N. Hird

***p,p'*-Diaminodiphenylarsinic acid.** G. Gilta. *Bull. soc. chim. Belg.* **48**, 444–6(1939); cf. *C. A.* **13**, 1858.—A mixt. of 80 g. *p*-arsanilic acid (I) and 500 g. $PhNH_2$ is

heated at 220°, extd. with 10% NaOH, and the ext. washed with Et_2O; acidification of the alk. soln. to methyl orange by concd. HCl pptd. a mixt. of unreacted I and *p,p'*-diaminodiphenylarsinic acid (II). Treatment of this mixt. with satd. NaOAc soln. removes I as the Na salt, and II is obtained as colorless, monoclinic needles; yield, 5 g. The crystallographic consts. and optical properties of II are described. David E. Adelson

Sulfonation and nitration reaction promoted by boron fluoride. R. J. Thomas, W. F. Anzilotti and G. F. Hennion. *Ind. Eng. Chem.* **32**, 408–10(1940).—BF_3 is an effective promoter and dehydrating agent for sulfonation and nitration reactions. When water is a product of the reaction BF_3 may drive the reaction to completion by combining with the water produced to form $BF_3.H_2O$. At completion of the reaction, enough water may be added to form $BF_3.2H_2O$, which can then be sepd. from the reaction products by distn. *in vacuo*. The BF_3 can be recovered in several ways, e. g., by forming $Ca(BF_4)_2$ and heating it to release BF_3. Directions are given for sulfonating benzene, toluene, naphthalene and phenol, for disulfonating carbazole and biphenyl, and for nitrating nitrobenzene, *p*-toluenesulfonic acid, benzoic acid, Me benzoate, and phthalic anhydride, and for successive sulfonation and nitration of benzene and toluene. F. L. Browne

Preparation of *m*-nitrobenzenesulfonyl chloride by nitration of benzenesulfonyl chloride. I. G. Gurdzhi. *Org. Chem. Ind.* (U. S. S. R.) **6**, 253–4(1939).—A yield of 89% $m\text{-}O_2NC_6H_4SO_2Cl$, m. 61–1.5°, was obtained from $PhSO_2Cl$ by treating it with 6 parts by wt. of 16% oleum and 30% excess of HNO_3, d. 1.38, at 0° and allowing the mixt. to stand for 3 days at room temp. The product, recrystd. from ether or alc., is free from *o*- and *p*-isomers. Chas. Blanc

Some new applications of magnesium in organic synthesis. III. Acylation of phenols in the presence of magnesium and preparation of phenolic esters. Aleksand'r Spasov. *Ann. univ. Sofia II. Faculté phys.-math.*, Livre 2, **35**, 289–93(in German, 294–5)(1938–39); cf. *C. A.* **32**, 1243⁹.—The reaction of phenols with acid chlorides takes place more smoothly in C_6H_6 soln. in the presence of Mg, which does not, however, react with all of the HCl formed as in the acylation of tertiary alcs. The phenol (0.1 mol.) in 20–25 g. C_6H_6, Mg turnings (1.2 g. for each HO group) and 0.1–0.12 mol. acyl chloride were heated 0.5–1.0 hr. at 90° in a round flask; the reaction product was dild. with ether and the ether soln. decanted from the unchanged Mg, which was then washed with ether. The residue in the flask was treated with H_2O and the mixt. filtered into the C_6H_6-Et_2O soln. through a wire gauze. After shaking successively with water, dil. caustic alkali and water, the soln. was dried over Na_2SO_4 and the ether removed by distn. The residue, if liquid, was distilled *in vacuo;* if solid, it was crystd. from a suitable solvent. Yields of esters were: AcOPh, 92%; $EtCO_2Ph$, 92%; $PrCO_2Ph$, 98%; $PhCH_2CO_2Ph$, 93%; BzOPh, 93%; *o*-$AcOC_6H_4Me$, 98%; *p*-$AcOC_6H_4Me$, 95%; *o*-iso-$PrCO_2C_6H_4Me$, 98%; 1,3,6-$AcOC_6H_3Me$-iso-Pr, 97%; 1,3,6-$PrCO_2C_6H_3Me$-iso-Pr, 97%; *p*-$AcOC_6H_4NO_2$, 96%; *m*-$C_6H_4(OAc)_2$, 92%; *p*-$C_6H_4(OAc)_2$, 95%; 1,3,5-$C_6H_3(OAc)_3$, 71%; α-$AcOC_{10}H_7$, 96%; β-$AcOC_{10}H_7$, 96%; and α-iso-$PrCO_2C_{10}H_7$, 93%. George Ayers

Alkaline fusion (in organic synthesis). N. N. Vorozhtsov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 299–300(1939).—A comprehensive discussion of the theory and practice of alk. fusion in the synthesis of org. compds., based on the literature. 60 references. **By-products of alkaline fusion of benzenesulfonic acid in the production of phenol; their separation and utilization.** M. V. Troitskiĭ. *Ibid.* 301–3.—A review of literature with 50 references. Chas. Blanc

Iodination of a few halogenated phenols. Phuldeo Sahay Varma and K. M. Yashoda. *J. Indian Chem. Soc.* **16**, 477–8(1939).—Iodination of halogenated phenols has been effected by means of I in KI in the presence of concd. NH_4OH (*C. A.* **11**, 1425). Addn. of 7.8 g. I in KI to *p*-ClC_6H_4OH (4 g.) in 20 cc. concd. NH_4OH, shaking and letting stand for 30 min., acidification and crystn. from $CHCl_3$ gave 7 g. of 4,2-$ClIC_6H_3OH$, m. 78°; *Ac deriv.*, m. 57°; *Bz deriv.*, m. 83–4°; *picrate*, m. 68°. A similar iodination, continued until the color of I persisted, gave 4,2,6-$Cl_2IC_6H_2OH$, m. 108°; *Ac deriv.*, m. 128°. Iodination of 2,4-BrMeC_6H_3OH and 4,2-Br-MeC_6H_3OH yielded *2-bromo-6-iodo-p-cresol*, m. 46° (*Bz deriv.*, m. 115°), and *4-bromo-6-iodo-o-cresol*, m. 49° (*Ac deriv.*, m. 40°; *Bz deriv.*, m. 85°). C. R. Addinall

Halogen displacement and removal from aromatic halogen compounds under the influence of catalysts. Hans Meerwein, Paul Hofmann and Friedrich Schill. *J. prakt. Chem.* **154**, 266–83(1940).—2,4-$(MeO)_2C_6H_3I$ (I) is transformed into a mixt. of 1,3,4,6-$(MeO)_2C_6H_2I_2$ (II) and *m*-$C_6H_4(OMe)_2$ under a variety of conditions. I (10 g.) and 20 cc. $BF_3.Et_2O$ on standing 18 hrs. at room temp. give 5.8 g. (80%) II and 2.9 g. III. $TiCl_4$ gives 50% II, $AlCl_3$ 61% II, HCO_2H at 96° for 20 min. 48% II, 10% EtOH-HCl (8 days) 42% II, chlorocymenesulfonic acid in AcOH (3 days at room temp.) 73% of II, and P_2O_5 in C_6H_6 (15 hrs.) 54% II. Heating 3 g. II and 10 g. III with 3 g Cl_3CCO_2H at 120° for 5 hrs. gives 88% I; in HCO_2H for 12 hrs. at 90–5° there results only 10% I. I does not result from III with elementary I. I (20 g.), 100 cc. PhOMe and 20.7 g. Cl_3CCO_2H, heated 9 hrs. at 120°, give 83.3 g. of PhOMe, 4.4 g. *p*-IC_6H_4OMe, 1.8 g. of an oil probably contg. *o*-IC_6H_4OMe, 4.6 g. III, 0.6 g. I and 1.5 g. II. This indicates that the reaction is intermol. I, PhOH, $CHCl_3$ and BF_3, 3 weeks at room temp., give a small quantity of *o*-IC_6H_4OH. 2,4-$(MeO)_2C_6H_3Br$ with $BF_3.Et_2O$ gives 73% of the di-Br deriv.; 2,3-$(MeO)_2C_6H_3Cl$ reacts less readily and the reaction mixt. with BF_3 must be heated at 132–9° for 55 min. 1,3,4-$C_6H_3(OMe)_3$ (168 g.) in 250 cc. MeOH, treated with 254 g. I and 210 g. HgO in portions, gives *2,4,5-trimethoxyphenyl iodide* (IV), m. 70–1°. Shaking 5.81 g. IV with 10 g. $BF_3.Et_2O$ for 5 min. gives a quant. yield of $[2,4,5\text{-}(MeO)_3C_6H_2]_2$ (V); the same reaction occurs on heating IV with HClO at 75° (96% I split off in 7 hrs.), with Cl_3CCO_2H in CCl_4 (complete in 45 min.), and to some extent on boiling IV in decalin for 3 hrs. (20% I removed). The I in IV may be replaced by Br in CCl_4 (93% of the Br compd. in 80 min.); Cl gives V. Expts. with 5,2,4-$Me(MeO)_2C_6H_2I$ have not led to pos. results. The mechanism of the halogen wandering is discussed. C. J. West

Steric hindrance in ketone-phenol condensations. The condensation of guaiacol with cyclic ketones. Joseph B. Niederl, Victor Niederl and Joseph Gruner. *J. Am. Chem. Soc.* **62**, 320–2(1940); cf. *C. A.* **33**, 6839¹.—Previous work showed that, while the usual condensation product is an alkylidenediphenol, this is not formed when a reaction system is selected which would lead to the formation of a cycloalkylidenediphenol in which there is a substituent group in the *o*-position to either 1 of the 2 reacting C atoms involved in the condensation. To test this hypothesis a phenolic compd. having an alkoxy group in the *o*-position to the free HO group was condensed with cyclic ketones. *o*-HOC_6H_4OMe (I) (1 mole) and cyclohexanone (II) (0.5 mole) in 100 cc. AcOH, treated with dry HCl for 6 hrs. at room temp. on 2 consecutive days and allowed to stand 4 weeks at room temp., give 31% of *1,1-bis(3'-methoxy-4'-hydroxyphenyl)cyclohexane* (III), m. 174°; *phenylurethan*, m. 153°; *acetate*, m. 157°; *benzoate*, m. 168°; refluxing III with 48% HBr gives I; HI (d. 1.7) gives catechol. I and the *p*-Me deriv. of II give 10% of the *4-methylcyclohexane analog* of III, m. 165°; *phenylurethan*, m. 192°; *acetate*, m. 136°; *benzoate*, m. 162°. I and the *m*-Me deriv. of II give 27% of the *3-methylcyclohexane analog* of III, m. 149°; *phenylurethan*, m. 187°; *acetate*, m. 118°; *benzoate*, m. 171°. I and the *o*-Me deriv. of II (0.5 mole of each), treated as above and also on the water bath for 12 hrs., give about 30% of I, about 20% of *1-(3'-methoxy-4'-hydroxyphenyl)-2-methylcyclohexene*, analyzed as the *aryloxyacetic acid*, m. 73°, and about 30% of the polymer, b_{14} 180°. C. J. W.

Polymerization processes produced by pyridine. III. Intermediate products in the polymerization of *p*-quinone.

Otto Diels and Horst Preiss. *Ann.* **543**, 94–103(1939); cf. *C. A.* **32**, 9078[8].—D. and Kassebart (*C. A.* **31**, 5338[2]) have shown that *p*-O:C_6H_4:O (I) and C_5H_5N (II) yield 2,5-bis(*p*-hydroxyphenyl)-1,4-benzoquinone (IIA), in which it is assumed that N-contg. intermediates play an essential role. To test this hypothesis the reactions of I with II, α-picoline (III) and quinoline (IV) have been reinvestigated. I (5 g.) in 30 cc. $CHCl_3$ and 5.5 g. IV in 7.7 cc. 1:1 HCl, heated on the water bath, give 1.5 g. of *hydroquinonequinolinium chloride*, dark yellow, m. 274–5°. Hydroquinone-α-picolinium chloride (V) and satd. Na_2CO_3 give a dark red oil which, crystd. from luke-warm satd. Na_2CO_3, yields *hydroquinone-α-picolinium betaine* with 3 mols. H_2O, lost at 160–70°, giving the black-violet betaine, m. 217°; HCl regenerates V. I (20 g.) and 70 cc. II at 0°, allowed to warm to room temp., filtered from excess I and allowed to crystallize for 6 days at 25°, give 4 g. of ocher-yellow *2,5-bis(p-hydroxyphenoxy)hydroquinonepyridinium betaine* (VI), m. 217° (decompn.); concn. of the filtrate over H_2SO_4 *in vacuo* gives an addnl. 6.1 g. of impure VI. VI may be recrystd. with great loss from luke-warm II. Concn. of the II filtrate from VI on the water bath gives IIA and warming VI in II gives IIa, which also results on repeated crystn. of VI from MeCN; 1 crystn. from MeCN gives yellow to yellow-red intermediate products, m. 220–45°. Heating 3.3 g. of VI in 8 cc. HCO_2H and 3 cc. $PhNO_2$ gives 0.9 g. IIA. VI in Ac_2O-H_2SO_4, boiled several min., yields the di Ac deriv. (VII) of IIA. Crystn. of IIA from C_5H_5N gives a product with II of crystn., yellow, m. 250–3°. I (30 g.) and 120 cc. III at 0° give, after 14 days at room temp., 11 g. of the *α-picolinium analog* (VIII) of VI, with 1 mol. of III of crystn., yellow-brown, m. 187° (decompn.); concn. of the filtrate gives 8 g. of less pure VIII; repeated crystn. of VIII from MeCN yields IIA; crystn. of VIII from boiling III gives a IIA with 2 mols. of III of crystn., yellow, m. 245° (decompn.); acetylation of VIII gives VII. I and IV, shaken at room temp. and allowed to stand 4 weeks, give a mixt. of IIA and the IV salt of I; the relative yields of the 2 compds. vary greatly according to the conditions of the expts.; thus, 20 g. I and 105 cc. IV give in 8–10 weeks 18.4 g. of the salt and no IIA. Thymoquinone (180 g.) and 480 cc. II, allowed to stand at room temp. for 1–2 weeks, give 17 g. of a carmine-red *compd.*, $C_{16}H_{13}O_4N$, which gives a black mass at 205°; crystn. from MeCN gives deep carmine-red prisms, sinters 245°; the structure of this compd. is under investigation.

C. J. West

Hydroxyquinone. I. Synthesis of the dye of the polyporic acid series. Mitizō Asano and Yukio Kameda. *J. Pharm. Soc. Japan* **59**, 768–73(in German, 291–3)(1939).—Condensation of 9.3 g. aniline with 10.8 g. *p*-benzoquinone by the diazotization reaction gave 8 g. phenyl-*p*-benzoquinone (I), m. 113–14°. Condensation of 90 g. benzene and 9 g. I by the Friedel and Crafts reaction gave 2,5-diphenyl-*p*-benzoquinone, $C_{18}H_{12}O_2$, m. 212–13°. Condensation of 10.7 g. *p*-toluidine and 10.8 g. *p*-benzoquinone by the diazotization reaction gave 2-*p*-tolyl-*p*-benzoquinone (II), $C_{13}H_{10}O_2$, m. 137–9°, the other product being tri-*p*-tolylquinone, $C_{27}H_{22}O_2$, m. 197–9°. Condensation of 25 g. II with benzene by the Friedel and Crafts reaction gave 2-phenyl-5-*p*-tolyl-*p*-benzoquinone, $C_{19}H_{14}O_2$, m. 171–3°. Reduction of the above quinone with Zn dust gave 2-phenyl-5-*p*-tolylhydroquinone, $C_{19}H_{16}O_2$ (III), m. 151–3°. Oxidation of III with Br gave 2-phenyl-5-*p*-tolyl-3,6-dihydroxy-*p*-benzoquinone, $C_{19}H_{14}O_4$, m. 195–7°. Condensation of 11.5 g. *p*-anisidine with 10 g. *p*-benzoquinone by the diazotization reaction gave 1 g. *p*-anisylquinone (IV), m. 112–13°. Condensation of 120 g. benzene with 17 g. IV by the Friedel and Crafts reaction gave 5 g. (crude) 2-phenyl-5-*p*-anisyl-*p*-benzoquinone (V), $C_{19}H_{14}O_3$, m. 177–8° (recrystd. from EtOAc). Reduction of V in AcOH with Zn dust gave 2-phenyl-5-*p*-anisylhydroquinone, $C_{19}H_{16}O_3$, m. 157–8°; 2-phenyl-5-*p*-anisyl-3,6-bis(ethylamino)-*p*-benzoquinone, $C_{23}H_{24}O_3N_2$, m. 256°; 2-phenyl-5-*p*-anisyl-3,6-dihydroxy-*p*-benzoquinone, $C_{19}H_{14}O_5$, m. 261–3°.

F. I. Nakamura

Constituents of Ligusticum acutilobum. VIII. Constitution of byakangelicol. Takami Noguti and Minoru Kawanami. *J. Pharm. Soc., Japan* **59**, 755–7(1939).—The N salt of 5-methoxy-8-hydroxypsoralene and isoprene-HBr gave 5-methoxy-8-(γ,γ-dimethylallyloxy)-psoralene (I), $C_{16}H_{12}O_4OMe$, m. 105°, which depressed the m. p. of *byakangelicol* to 82°. I (0.2 g.) in 2 cc. $CHCl_3$ when treated with a 10% $CHCl_3$ soln. of BzO_2H for 5 days in a warm room gave *dl-byakangelicol* (II), $C_{16}H_{12}O_4OMe$, m. 106, which did not depress the m. p. of the natural product. II when boiled with alc. KOH gave *isobyakangelicolic* acid, m. 220°. II when boiled with a 1% oxalic acid soln. for 1 hr. gave *dl-byakangelicin*, $C_{17}H_{18}O_7 \cdot H_2O$, m. 116–17°.

F. I. Nakamura

Constitution and synthesis of conglomerone. F. N. Lahey and T. G. H. Jones. *Univ. Queensland Papers, Dept. Chem.* **1**, No. 12, 4 pp.(1939); cf. *Proc. Roy. Soc. Queensland* **50**, 10–13(1939); *C. A.* **33**, 3075[2].—Steam distn. of 760 lb. of leaves and terminal branchlets of *Eucalyptus conglomerata* yielded 870 cc. of oil which deposited 98 g. *conglomerone* (I), $C_{13}H_{16}O_4$, crystals from petr. ether, m. 62–2.5°; *2,4-dinitrophenylhydrazone* of I, m. 164°. Oxidation of I by CrO_3 gave dimethoxyquinone, m. 252°, identical with a sample prepd. by similar oxidation of 1,3,5-$C_6H_3(OMe)_3$ (II). Cold $KMnO_4$ soln. did not affect I, but, on heating, oxidation to $(CO_2H)_2$ resulted. Heating a mixt. of 15 g. I and 8 g. NaOH in 90% alc. for 4 hrs. at 160° gave a neutral product, b_2 130°, which was not identified; 1,3,5-$C_6H_3(OH)_3$ (III), which was identified by methylation to II, and iso-$PrCO_2H$. II, prepd. from III, MeOH and HCl followed by treatment with Me_2SO_4 and NaOH, was heated with iso-PrCOCl in CS_2 contg. $FeCl_3$ to give I, which was identical with the natural product; the 2,4-dinitrophenylhydrazones were likewise identical. I is therefore *1,2,4,6-iso-PrCOC$_6$H$_2$(OMe)$_3$*.

David E. Adelson

Ephedrine. III. Bis(α-hydroxy-β-methylaminopropyl)benzenes. Stanley D. Wilson and Chen-ta Chang. *J. Am. Chem. Soc.* **62**, 287–8(1940); cf. *C. A.* **29**, 758[1].—1,4-$C_6H_4(COEt)_2$ and Br in AcOH, heated on the water bath until the HBr is nearly expelled, give 95% of *1,4-bis(α-bromopropionyl)benzene* (I), m. 109–10°; 7 g. I in 200 cc. C_6H_6, added dropwise to 3 g. $MeNH_2$ in 200 cc. C_6H_6 and allowed to stand 100 hrs. at room temp., give 3 g. (62%) of *1,4-bis(α-methylaminopropionyl)-benzene-di-HCl* (II), decomps. above 320°; catalytic reduction of 2 g. in 95% EtOH(Pt) gives 1.8 g. of *1,4-bis-(α-hydroxy-β-methylaminopropyl)benzene-di-HCl* (III), m. 285–7°; the free base from this salt is difficult to purify; that from the reduction of the free ketone is a slightly brownish, somewhat gummy amorphous product, decompg. on heating; sulfate, decomps. above 320°; mandelate, m. 214°; tartrate, m. 167–8°. The 1,3-isomers of I, II and III were similarly prepd. and found to be oils. The free base is also amorphous and yields oily products with H_2SO_4, H_3PO_4 and $(CO_2H)_2$; the picrate is amorphous and decomps. on heating.

C. J. West

Some reactions of 2-diethylaminoethyl *p*-aminobenzoate (procaine). Elisa Ghigi. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., 1939, 39–46.—At 100° in the presence of anhyd. NaOAc, without a solvent, procaine reacted slowly with 2,4-$(O_2N)_2C_6H_3Cl$ to form a new ester, *2-diethylaminoethyl 2',4'-dinitrodiphenylamine-4-carboxylate* (I), yellow plates from petr. ether, m. 85°. In boiling C_6H_6 as a solvent the reaction did not take place. When MeOH and EtOH were used as solvents in the reaction only the Me and Et esters of 2',4'-dinitrodiphenylamine-4-carboxylic acid (II) were formed, any I formed undergoing alcoholysis. The Me ester m. 163° and the Et ester m. 113°. Both were yellow needles. When Et_2NCH_2-CH_2OH (III) was used as a solvent some 2,4-dinitrophenol was formed. Treatment of I with 10% aq. NaOH gave III, 2,4-dinitrophenol and *p*-aminobenzoic acid. I with Na_2S in EtOH gave some II, m. 285–290°, and some 2'-amino-4'-nitrodiphenylamine-4-carboxylic acid (IV), m. 225° (decompn.). I with Na_2S in MeOH gave, among other products, the Me ester of IV, red needles, m. 218–19°.

L. E. Gilson

Synthesis of α-methyl-β-phenyl-β-methoxypropionic acid. Yuoh-Fong Chi, Chi-Chien Lueng and Wei-Yang Yu. *J. Chem. Eng. China* 5, 79–81(1938).—Ten g. $MeCHBzCO_2Et$ in 30 cc. AcOEt is catalytically hydrogenated at 80–90° in the presence of 0.3 g. Adams Pt oxide catalysts, giving after 4.5 hrs. Et α-methyl-β-phenyl-β-hydroxypropionate (I), an oil which solidifies on cooling, m. 120–1° (after recrystn. from petr. ether), $b_{5.4}$ 120–5°. One g. of I, refluxed for 1 hr. with 0.3 g. KOH in 10 cc. alc., gives the free acid (II), m. 116–18° after recrystn. from H_2O. II (35.5 g.) in dry ether is treated with 3.5 g. Na wire to form the Na salt. After removing the ether, this Na salt is dissolved in abs. alc. and heated with 26.4 g. MeI for 20 hrs., giving after purification and fractionation *in vacuo* 2 forms of Et α-methyl-β-phenyl-β-methoxypropionate (III), a liquid form b_{22} 104–6°, and a solid form m. 122–3° after recrystn. from petr. ether. The solid form of III (0.5 g.) is refluxed for 1 hr. with 0.15 g. KOH in 10 cc. alc., evapd. to dryness on a water bath, then redissolved in H_2O and acidified, yielding the β-form of α-methyl-β-phenyl-β-methoxypropionic acid (IV), m. 120.5–2.5° after recrystn. from H_2O. A similar hydrolysis of the liquid form of III yields the β-form of IV, m. 121–3° after recrystn. from H_2O. C. L. Tseng

Synthesis of 3,5-difluoro- and 3-fluoro-5-iodo-*dl*-tyrosine. James English, Jr., James F. Mead and Carl Niemann. *J. Am. Chem. Soc.* 62, 350–4(1940).—Through the diazonium fluoborate *o*-$MeOC_6H_4NH_2$ gives 30.8% of *o*-FC_6H_4OMe; this gives 40% of the 4-NO_2 deriv., which yields 75% of 2,4-$F(H_2N)C_6H_3OMe$; the diazo reaction with CuCN gives 46% of *2-fluoro-4-cyanoanisole*, $b_{1.5}$ 96–8°, m. 96.5°; $SnCl_2$-HCl gives 63% of 3,4-$F(MeO)C_6H_3CHO$ (I), $b_{4.5}$ 93°, m. 29–30°; this was also prepd. in 42% yield from *o*-FC_6H_4OMe with Zn-$(CN)_2$, $AlCl_3$ and HCN by heating 4 hrs. at 40–50°; I gives 95% of 4-(3′-fluoro-4′-methoxybenzylidene)-2-phenyloxazolo-5-one which, on reduction and hydrolysis, gives 49% (on basis of I) of 3-fluoro-*dl*-tyrosine, decomps. 275–8°; a soln. in 8 *N* NaOH with I-KI gives 47% of *3-fluoro-5-iodo-dl-tyrosine*, m. 192° (decompn.). *o*-FC_6H_4OMe (750 g.) in 2.4 l. CS_2, treated with cooling with 1.8 kg. $AlCl_3$ and 6.5 g. Ac_2O, gives 70–80% of *3-fluoro-4-methoxyacetophenone* (II), m. 92°; 90 g. I in 270 ml. H_2SO_4, treated at −10° with 22.5 ml. HNO_3 (d. 1.5) in 45 ml. concd. H_2SO_4, gives 44% of the *5-NO_2 deriv.* (III), b_4 144–7°; *phenylhydrazone*, m. 160–1° (decompn.). I gives 55% of the *5-NO_2 deriv.* (IV), m. 57–8° (*oxime*, m. 138–9°). Oxidation of II with $KMnO_4$ gives 70% of 3-fluoroanisic acid (V), m. 208–10°; the *5-NO_2 deriv.* m. 166° (57% yield); it also results in 62% yield from IV and in a poor yield by oxidation of III with $KMnO_4$ at 100°. V with MeOH and HCl gives 80% of *Me 3-fluoro-4-methoxy-5-nitrobenzoate*, b_3 128–31°, m. 50°; catalytic reduction with PtO_2 gives 90% of the *5-NH_2 deriv.*, m. 55°; through the diazonium fluoborate there results 28% of *3,5-difluoroanisic acid* (VA), m. 162°. Reduction of the acid chloride in xylene with Pd-$BaSO_4$ and quinoline S poison gives 3,5-difluoroanisaldehyde, which was not isolated but converted to *4-(3′,5′-difluoro-4′-methoxybenzylidene)-2-phenyl-5-oxazolone*, m. 165–9° (decompn.), in 52% yield; hydrolysis gives *α-N-benzoylamino-3,5-difluoro-4-methoxycinnamic acid*, m. 200–1°; refluxing with red P in III and Ac_2O for 5 hrs. gives 62% of *3,5-difluoro-dl-tyrosine*, m. 263–5° (decompn.); the over-all yield from *o*-$MeOC_6H_4NH_2$ is 0.73%. Reduction of 4 g. IV in 30 ml. EtOH with 50 mg. platinic oxide and 0.1 ml. of 0.1 *M* $FeCl_2$ under 3–4 atm. H for 30 min. gives 27% of *3-fluoro-4-methoxy-5-aminobenzyl alc.* (VI), b_2 141°, m. 55°. Reduction of IV with (iso-$PrO)_3Al$ in iso-PrOH gives 65% of 3-fluoro-4-methoxy-5-nitrobenzyl alc., b_3 155–9°, which is catalytically reduced in quant. yield to VI. The diazonium fluoborate could not be prepd. from VI. III is catalytically reduced to *3-fluoro-4-methoxy-5-aminoacetophenone*, $b_{2.5}$ 138°; *HCl salt*, decomps. 160–75°; this also did not form a diazonium fluoborate. Me 3,5-dinitroanisate gives a quant. yield of the diamine, m. 157°; this gives 55% of the cryst. tetrazonium fluoborate, which decomps. to give a quant. yield of VA. Passing H_2S into 75 g. picric acid in 14% NH_4OH gives 45% of *2,6-diamino-4-nitrophenol*, m. 169° (decompn.); di-Ac deriv., m. 235° (decompn.); CH_2N_2 gives 75% of the di-Ac deriv., m. 211°, of *2,6-diamino-4-nitroanisole*, m. 180–1°; the tetrazonium fluoborate is formed in 52% yield but decomps. explosively, giving a very small amt. of an oil. 2,4,6-$F(O_2N)(H_2N)C_6H_2OMe$ gives not more than 10% of *2,6-difluoro-4-nitroanisole*, m. 35°. C. J. West

Alkaline cleavage of β-hydroxy-substituted acids. V. Acids having an alkyl radical in the α-position. D. Ivanov. *Ann. univ. Sofia. II. Faculté phys.-math.*, Livre 2, 35, 337–9(in French, 340)(1938–39); cf. *C. A.* 33, 8175[6]; 32, 3356[9].—$PhCH(OH)CHEtCO_2H$, $PhCH(OH)CMe_2CO_2H$, $Me_2CHCH(OH)CHMeCO_2H$, $MeCH(OH)CMe_2CO_2H$, $Me_2C(OH)CHMeCO_2H$, $Me_2C(OH)CMe_2CO_2H$, $Me_2C(OH)CHEtCO_2H$, $Pr_2C(OH)CMe_2CO_2H$ or their esters are not cleaved by heating with 15–20% aq. KOH. Results with β-HO-substituted acids may be summarized as follows: (1) those acids having an aryl radical in the α-position are cleaved irrespective of the nature of the radical or radicals in the β-position; (2) cleavage also takes place when both PhCH:CH- and $PhCH:CHCH_2$- radicals occur in the α-position; (3) with acids contg. 1 or 2 alkyl radicals in the α-position, only those which have 2 radicals, at least 1 of which is aryl or both are aryl-aliphatic, in the β-position are cleaved; and (4) acids with 1 or 2 radicals in the α-position and with an aryl radical or 1 or 2 alkyl radicals in the β-position are not decompd. George Ayers

Urea mandelate. Antonio Mossini. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., 1939, 61–3.—One mol. urea unites with 1 mol. mandelic acid to form a stable cryst. compd., m. 93°, very sol. in water, EtOH and Me_2CO, slightly sol. in Et_2O, $CHCl_3$ and C_6H_6. Six g. taken orally renders human urine bactericidal provided the pH goes below 6. L. E. Gilson

Abnormal osmotic effects in chain molecules. II. Synthesis and cryoscopic behavior of polydepsides. Friedrich Klages, Fritz Kircher and Julius Fessler. *Ann.* 541, 17–53(1939); cf. *C. A.* 29, 7949[2].—*α-Trimethyl-β-diacetyldigalloyl chloride* (I), m. 166°, results in 37-g. yield from 40 g. acid and $SOCl_2$; *pentaacetyldigalloyl chloride* (IA), m. 173° (25 g. from 30 g. acid); *α-trimethyl-β,γ-tetraacetyltrigalloyl chloride* (II), m. 167° (18.5 g. from 25 g. acid). Diacetylgallic acid (III) (21.6 g.) and trimethylgalloyl chloride (IV) (18 g.) give 30 g. *α-trimethyl-β-diacetyldigallic acid*, m. 218°. III (10.9 g.) and 20 g. I give 15 g. of *α-trimethyl-β,γ-tetraacetyltrigallic acid*, m. 223–4°. III (6.7 g.) and 18.5 g. II give 8 g. of *α-trimethyl-β,γ,δ-hexaacetyltetragallic acid*, m. 235°. IV (10 g.) and 2.4 g. hydroquinone (V) give 3.5 g. *di(trimethylgalloyl)hydroquinone*, m. 224°. Triacetylgalloyl chloride (VI) (40 g.) and 14.5 g. V give 15 g. of *di(triacetylgalloyl)hydroquinone*, m. 250°. I (6 g.) and 0.7 g. V give 2.5 g. of *di(α-trimethyl-β-diacetyldigalloyl)hydroquinone*, m. 248°. VI (30 g.) and 5.5 g. phloroglucinol (VII) give 6 g. *tri(trimethylgalloyl)-phloroglucinol*, m. 180°. VI (29 g.) and 3.9 g. VII give 15 g. of *tri(triacetylgalloyl)phloroglucinol*, m. 210°. I (20 g.) and 1.8 g. VII give 5 g. of *tri(α-trimethyl-β-diacetyldigalloyl)phloroglucinol*, m. 150–75°. IA (27.8 g.) and 2.12 g. VII give 5 g. of *tri(pentaacetyldigalloyl)phloroglucinol*, m. 150–75°. Mol. wts. are given for these compds. in dioxane and AcOH and for some of them in $CHBr_3$. A lengthy discussion of the abnormal results is given and correlated with the work of Hess, Meyer and Staudinger. C. J. West

Synthesis of coumarins from *o*-hydroxyaryl alkyl ketones. II. Formation of *o*-coumaric acids from *o*-hydroxyaldehydes. Duhkhaharan Chakravarti and Brajeswar Majumdar. *J. Indian Chem. Soc.* 16, 389–92 (1939); cf. *C. A.* 32, 7026[9]; 33, 5494.—The Me ethers of the *o*-HO aldehydes condense with EtO_2CCH_2Br (I) and $EtO_2CCHBrMe$ (II) to form *trans*-cinnamic esters, which do not yield coumarins on heating with HI or on standing with cold H_2SO_4 as do the esters obtained from *o*-hydroxyaryl alkyl ketones. A mixt. of 11 g. *o*-$MeOC_6H_4CHO$ in

50 cc. anhyd. benzene, 6 g. Zn wool and 16 g. I was heated at 100° for 2 hrs. and poured into ice-cold dil. H_2SO_4. The washed and dried benzene layer was evapd. down and distd., yielding 11 g. of *o*-$MeOC_6H_4CH(OH)CH_2CO_2Et$, b_{10} 150–4°, which was converted by heating with 6 g. $SOCl_2$ and 9 g. pyridine in ether into 10 g. *Et 2-methoxy-trans-cinnamate*, $C_{12}H_{14}O_3$, b_8 150°, hydrolyzed to 2-methoxy-*trans*-cinnamic acid, m. 182°, identical with a specimen prepd. from *o*-coumaric acid by methylation with Me_2SO_4 and hydrolysis. Similarly, *o*-$MeOC_6H_4CHO$ was converted by Reformatskiĭ's reaction with Zn and II to *o*-$MeC_6H_4CH(OH)CHMeCO_2Et$, b_4 155°, transformed by $SOCl_2$ in the presence of pyridine to *Et 2-methoxy-α-methyl-trans-cinnamate*, $C_{13}H_{16}O_3$, b_4 150–5°, hydrolyzed by alc. KOH to the corresponding acid, m. 102°. Condensation of 2,4-$(MeO)_2C_6H_3CHO$ with I gave 2,4-$(MeO)_2C_6H_3CH(OH)CH_2CO_2Et$, b_8 180–4°, dehydrated to the *cinnamic ester*, b_8 180–4°, hydrolyzed to 2,4-dimethoxy-*trans*-cinnamic acid, m. 184°. To study the influence of a Ph substituent on the formation of *trans*-cinnamic esters, 8.5 g. of 5,2-Cl(MeO)C_6H_3CHO was condensed with 8.5 g. I to the propionate (8 g.) which, on dehydration with $SOCl_2$, gave 6 g. of *Et 2-methoxy-5-chloro-trans-cinnamate*, $C_{12}H_{13}ClO_3$, b_8 170°, hydrolyzed to the corresponding acid (III), m. 191°. A sample of authentic III was prepd. by treating 6-chlorocoumarin with HgO, methylating and hydrolyzing with alc. KOH. Thus it is shown that if there are no β-alkyl groups in the resulting cinnamic ester, the latter has the trans configuration. Otherwise the esters have the cis configuration and readily form coumarins. The 2-MeO aldehydes are useful starting materials for the prepn. of *o*-coumaric acid derivs. in satisfactory yields. Condensation of 10 g. of 2,4-$(MeO)_2C_6H_3Ac$ (IV) with 9 g. II and distn. of the product yielded 8.5 g. of *Et 2,4-dimethoxy-α,β-dimethyl-cinnamate* (V), b_8 180–2°, converted by standing overnight in cold H_2SO_4 (d. 1.84) to 3,4-dimethyl-7-methoxycoumarin, m. 140°. Heating V (1 g.) with 7 cc. HI (d. 1.7) at 140° for 2 hrs. gave colorless needles of 3,4-dimethyl-7-hydroxycoumarin, m. 256°, on recrystn. from alc. Similarly, condensation of 10 g. IV with I gave an unsatd. ester, b_6 174°, on vacuum distn. No ring closure was effected by heating with HI or on treatment with cold H_2SO_4. Hydrolysis gave the known 2,4-dimethoxy-β-methylcinnamic acid, m. 145°. C. R. Addinall

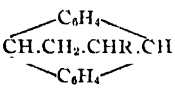
Hydrogenation of coumarin and related compounds. Peter L. De Benneville and Ralph Connor. *J. Am. Chem. Soc.* 62, 283–7(1940).—Coumarin (I) has been reduced under a variety of conditions, using a H pressure of 100–200 atm. Over Ni (in EtOH for 8 hrs. at 200°) there results 32% octahydrocoumarin (II), 31% *hexahydrochroman* (III), 7% Et β-cyclohexylpropionic acid (IV) and 27% of a polymer (V); at 250° for 4 hrs. the yields were 41% II, 27% III, 13% IV and 6% V; in methylcyclohexane (VI) (3 hrs. at 205°) there results 53% II, 13% III and 10% V; at 250° for 0.3 hr., 58% II, 9% III and 11% V; at 250° for 13.5 hrs., 19% II, 35% III and 27% V; in Et_2O (0.5 hr. at 100°) there is formed 90% of dihydrocoumarin (VII); with Cu chromite (VIII) (in EtOH for 0.7 hr. at 250°) there is formed 90% of γ-(*o*-hydroxyhenyl)propyl alc. (IX); without a solvent 0.7 mole I and 10 g. VIII at 250° for 1.5 hrs. give 83% IX; with Ni in VI (6 hrs. at 250°) there results from II 57% III; II in VI with VIII (4.5 hrs. at 250°) gives 50% γ-(*o*-hydroxycyclohexyl)propyl alc. (X) and 11% of γ-cyclohexylpropyl alc. (XI); IX in Et_2O with Ni (2 hrs. at 240°) gives 40% III and 37% X; chroman in EtOH with Ni (6 hrs. at 250°) gives 41% III; $Ph(CH_2)_3OH$ in EtOH with Ni (2 hrs. at 220°) gives 86% XI. Over VIII the formation of VII was shown by the pressure drop at 140–60°. V is a thick, slow-flowing non-distillable material remaining as a residue after the distn. The following phys. consts. are reported. II, b_{15} 144–6°, n_D^{25} 1.4970, d_4^{24} 1.0999; III, b_{760} 186–7°, n_D^{25} 1.4714, d_4^{25} 0.9536; IX, b_8 159–61° (benzoate, m. 98.5–9.5°); X, b_{25} 185–6°, n_D^{25} 1.4867, d_4^{25} 1.0294; IV, b_{17} 105–13°, n_D^{25} 1.4480; XI b_{10} 105–6° (α-naphthylurethan, m. 82–3°). Chroman, b_{760} 110–14°, n_D^{25} 1.5462, d_4^{25} 1.0575, was prepd. in 87% yield by reacting IX with PBr_3 (added during 0.5 hr. with cooling, stirring an addnl. 2 hrs., allowing to stand overnight and refluxing 0.5 hr.), decompg. with aq. NaOH, refluxing for 3 hrs., extg. with C_6H_6 and distg.; omission of the alkali treatment decreases the yield to 70–5%. The mechanism of the reduction of I is discussed. C. J. West

Walden rearrangement. IV. Method of reaction with phosphorus pentachloride. Walter Hückel and Hubertus Pietrzok. *Ann.* 540, 250–74(1939); cf. *C. A.* 33, 3359[1].—*l*-Menthol (I) (40 g.) with 60 g. com. PCl_5 in petr. ether gives 36.6 g. of a menthyl chloride (II) with $[\alpha]_D$ between −25 and −30°; a pure PCl_5 gives 84% of a II with $[\alpha]_D$ −9.1 to −12.5°; similar results were obtained with Et_2O, CCl_4 and $CHCl_3$, showing that the solvent has little effect on the reaction. The difference in behavior of the com. and the pure PCl_5 is due to impurities, of which $FeCl_3$ is the most likely. A mixt. of 1 mol. PCl_5 and 1 mol. $FeCl_3$ gives a II with $[\alpha]_D$ −37.3° or nearly pure 1[c]-methyl-3[c]-chloro-4[t]-isopropylcyclohexane; 1/15 mol. $FeCl_3$ gives as the principal product a II with $[\alpha]_D$ −27.75° and a little with −36.65°; $FeCl_3$ with H_2O of crystn. was not effective. $AlCl_3$ produced about the same results as $FeCl_3$. The $[\alpha]_D$ of a mixt. of II and *d*-neomenthyl chloride (III) is not changed by the action of $AlCl_3$ or $FeCl_3$ at room temp. or in the presence of PCl_5 at 0°; thus their action is not due to the change of III into II. Pure PCl_5 (68 g.) in 50 cc. petr. ether and 50 g. I in 110 cc. C_5H_5N, mixed at 0° during 0.5 hr. and stirred for an addnl. 0.5 hr., give 2.3 g. nearly pure III, $b_{0.06}$ 40–1°, $[\alpha]_D$ 42.21°, d_4^{20} 0.9457, n_D^{25} 1.46403; the principal part of the I is changed to esters of H_3PO_4 and Cl derivs. of these esters. The difference in the action of PCl_5 in C_5H_5N or in the presence of $FeCl_3$ or $AlCl_3$ is explained on the basis of the formation of complexes such as $[PCl_4]^+$ $[FeCl_4]^-$ or $[C_5H_5N{:}PCl_4]^+Cl^-$. I and concd. HCl, heated at 100°, give a product with $[\alpha]_D$ −26.2°, consisting of about 75% II and 25% III; passing HCl into a molten I and $ZnCl_2$ at 100° gives a II with $[\alpha]_D$ −13.5°; without $ZnCl_2$ there is no reaction; there is also no reaction between I and HCl in ether or C_6H_6 at room temp. for 8 weeks. II, $[\alpha]_D$ 25.12° (50 g.), and 60 g. $PhNH_2$, heated 4 hrs. at 160–70°, give 32.7 g. of menthene (IV) and 2.5 g. of II with $[\alpha]_D$ −45.4°; 240 g. of II with $[\alpha]_D$ −33.5° and 180 g. quinoline, heated 5.5 hrs. at 190–200° give 72.1 g. IV and 11.5 g. of a II with $[\alpha]_D$ −45.9°; in another expt. 40 g. of a II with $[\alpha]_D$ −26.2° and 30 g. quinoline give 6.3 g. IV and 17 g. of a II with $[\alpha]_D$ −45.4°. Thus quinoline is much more suitable for the prepn. of a pure *l*-II. II with $[\alpha]_D$ −25.85° is unchanged after shaking 3 days with 30% KOH, even with the addn. of dioxane to increase the soly. Distn. of the IV from II and $PhNH_2$ gives a IV with $[\alpha]_D$ 19.85°; treatment with *p*-$MeC_6H_4SO_3H$ in EtOH gives $[\alpha]_D$ 17.68°, indicating 18% of *trans*-2-menthene (V); the remaining IV is completely racemized 3-menthene. The IV from II and quinoline contains 15% V, 25% active and 60% of racemized 3-menthene. I (31 g.) and 87 g. pure PBr_3 in 200 cc. petr. ether (cooling) give 25 g. of menthyl bromide (VI), $b_{0.0005}$ 41°, $[\alpha]_D$ 8.87°, d_4^{20} 1.1599, n_D^{25} 1.48481; another expt. gave a product with $[\alpha]_D$ −5.98° and a 3rd with $[\alpha]_D$ −4.58°; the residue of the distn. is a *dibromomenthene*, $b_{0.05}$ 80°. I and PBr_3 with $AlBr_3$ give a VI, $b_{0.05}$ 44–6°, $[\alpha]_D$ −24.16°, d_4^{20} 1.1600, n_D^{25} 1.48549. *l*-Borneol (VII) ($[\alpha]_D$ −36.99°) with PCl_5 gives a chloride (VIII) m. 140–2°, $[\alpha]_D$ 4.8° (EtOH); PCl_5 (27 g.) and 3 g. $FeCl_3$ give a VIII m. 162°, $[\alpha]_D$ 4.3° (EtOH); the Cl removed with EtOH-KOH is 81 and 97.8%, resp.; thus the latter is nearly pure isobornyl chloride (IX). That the reaction proceeds through the intermediate formation of camphene hydrochloride (X) is shown by working in ether. Thus 15 g. VII and 22 g. PCl_5 in 15 cc. petr. ether and 15 cc. ether give a product with $[\alpha]_D$ 35.1°; the ratio of X to IX is about 2:1; with $FeCl_3$ the product in ether has $[\alpha]_D$ 8°; the ratio of X to IX is about 1 to 3. C. J. West

Optically pure *l*-α-phellandrene. N. C. Hancox and T. G. H. Jones. *Univ. Queensland Papers, Dept. Chem.* 1, No. 14, 4 pp.(1939); cf. *Proc. Roy. Soc. Qneensland* 50, 14–20(1939).—*l*-α-Phellandrene (I) was exhaustively

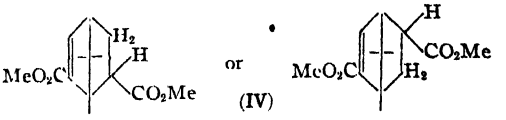
fractionated at 1–2 mm. to yield I of d_{20} 0.8324, n_D^{20} 1.4724, $[\alpha]_D^{20}$ −177.4°, diene no. (cf. *C. A.* **31**, 4837[6], 4839[2]) 186.3 (calcd. 186.6). The results indicated that I was 99.5–100% pure. The relation between $[\alpha]_D^{20}$ and I content of a sample as detd. by the diene no. is linear. *Eucalyptus dives* oil was found to contain 18.8% I. D. E. A. 1

Diene syntheses. XI. Diene syntheses with vinyl esters and halogenated ethylenes. Simple methods in the norcamphor series. Kurt Alder and Hans Ferdinand Rickert. *Ann.* **543**, 1–27(1939); cf. *C. A.* **33**, 1299[1]; **34**, 729[2].—Cyclopentadiene (I) and an excess of vinyl acetate (II), heated 10 hrs. at 185–90°, give 72 g. unchanged II and 3 fractions, b_{14} 73–7° (100 g.), 77–140° (10 g.) and 140–5° (48 g.). The 1st fraction is dehydronorbornyl acetate (III); catalytic reduction and hydrolysis gives α-norborneol (IV), m. 149–50° (phenylurethan, m. 159–60°; *acid phthalate*, m. 109–10° (*β-isomer*, m. 80–1°); *3,5-dinitrobenzoate* (V), pale yellow, m. 123° (*β-isomer*, m. 105°); the *compds.* of V with α-$C_{10}H_7NH_2$ m. 139–40° (α) and 126° (β)). Oxidation of IV gives norcamphor, m. 92°. Hydrolysis of III with MeOH-KOH gives *dehydro-α-norborneol* (VI), m. 108–9°; PhN_3 gives the *hydrotriazole*, $C_{15}H_{17}ON_3$, m. 147–8°; catalytic reduction gives IV. Oxidation of VI with $K_2Cr_2O_7$ in AcOH-H_2SO_4 for 0.5–1 hr. gives *dehydronorcamphor*, which solidifies between 0 and 2°; *semicarbazone*, m. 207–8°; *hydrotriazole*, $C_{13}H_{18}ON_3$, m. 140–1°. The 3rd fraction consists principally of the acetate of 1,4,5,8-bisendomethylene-Δ⁶-β-octalol (VII); catalytic reduction gives the dihydro deriv. (b_{12} 147–9°) which is sapond. to *1,4,5,8-bisendomethylene-β-decalol* (VIII), m. 90–2°; *phenylurethan*, m. 118° and 120–1°, sepd. by crystn. from ligroin. Oxidation of VIII gives the corresponding β-deculone, m. 207–8°. Addn. of I to vinyl formate (heating 14 hrs. at 180–90°) gives the formate of VI, b_{20} 80°, and the formate of VII, b_{20} 130–40°; hydrolysis and sapon. give VIII. Butadiene (IX) (100 g.) and 100 g. II (heated 12 hrs. at 180°) give 8–10 g. of 3-cyclohexen-1-ol acetate; the principal product is the dimer of IX. 2,3-Dimethylbutadiene and II, as above, give the acetate of 3,4-dimethyl-3-cyclohexen-1-ol, whose *phenylurethan* m. 112°. 1,3-Cyclohexadiene and II give the acetate of 2,5-endoethylene-3-cyclohexen-1-ol; the free alc. yields a *phenylurethan*, m. 125°. Anthracene and II in xylene, heated 14 hrs. at 220–30°, give 6 g. of the *adduct* 2



(X, R = OCOMe) m. 100–1°; the *alc.* m. 140–2°. I (80 g.) and 80 g. vinyl chloride, heated 15 hrs. at 170–80°, give 73 g. b_{12} 46–7° and 28 g. b_{12} 128–33°; the 1st fraction is *dehydronorbornyl chloride* (XI); this yields a *hydrotriazole*, $C_{13}H_{14}N_3Cl$, m. 113–16°; catalytic reduction gives norbornyl chloride, b_{11} 50–2°; EtMgBr, followed by CO_2, gives 2,5-endomethylenehexahydrobenzoic acid, b_{12} 128–30°. XI was also transformed into norbornylane and norbornylene. The 2nd fraction is *1,4,5,8-bisendomethylene-Δ⁶-β-chlorooctalin*, which yields a hydrotriazole, $C_{15}H_{20}N_3Cl$, m. 195°. I (125 g.) and 175 g. ClCH:CHCl, heated 15 hrs. at 180–90°, give 60 g. b. 70–6°, 15 g. b. 76–140° and 58 g. b. 140–50°; the *hydrotriazole* of the 1st fraction, $C_{13}H_{13}N_3Cl_2$, decomps. 148° and that of fraction 2, $C_{18}H_{19}N_3Cl_2$, m. 210° (decompn.). Cl_2C:CHCl and I give an oil, b_{11} 158–60°, which yields a *hydrotriazole*, $C_{14}H_{18}N_3Cl_3$, m. 225–6°. 3

XII. Syntheses in the camphor and epicamphor groups by the diene method. Diene syntheses of 1,5,5-trimethyl-1,3-cyclopentadiene and β-camphylic acid with vinyl acetate. Kurt Alder and Erwin Windemuth. *Ibid.* 41–56.—Vinyl acetate (I) (15 g.) and 12 g. of 1,5,5-trimethyl-1,3-cyclopentadiene, heated 20 hrs. at 235–40°, give 88% of a mixt. of dehydrobornyl acetate and dehydroepibornyl acetate, b_{12} 92–4°. Catalytic reduction gives a mixt. of the acetates, b_{12} 98–101°, of borneol and epiborneol, m. 183–4°; crystn. of the 3,5-dinitrobenzoates from MeCN and MeOH gives 31.6% of the *dl*-bornyl ester (II) and 41.8% of *dl*-epibornyl ester (III), with 26.6% of intermediate fractions. Hydrolysis of II and oxidation give *dl*-camphor; III gives *dl*-epicamphor. The trimethylcyclopentadiene (C_8H_{12}) of Damsky (*Ber.* **20**, 2966(1887)) and I, heated 12 hrs. at 170–80°, give an oil, b. 203–12°; hydrogenation and hydrolysis give an *alc.*, $C_{10}H_{18}O$, m. 98–9° (*phenylurethan*, m. 111–12°); oxidation with $K_2Cr_2O_7$ in AcOH-H_2SO_4 gives a ketone, whose *semicarbazone* m. 222°. Addn. of I to Me β-camphylate (heating 14 hrs. at 230°) gives 84.2% of the *adduct* (IV), 4



b_{12} 142–6°; esterification and oxidation give a ketone, whose *semicarbazone*, $C_{13}H_{19}O_3N_3$, m. 230° (decompn.); heating with EtONa in EtOH for 20 hrs. at 200–5° gives bornylene-2-carboxylic acid, which is oxidized to *dl*-camphoric acid, m. 203°. Hydrolysis of IV gives the *HO lactone*, $C_{11}H_{16}O_3$, m. 206°; *phenylurethan*, m. 177°; careful oxidation with CrO_3 in AcOH gives a ketone, whose *semicarbazone* m. 237°; less careful control of the oxidation gives a HO acid, $C_{11}H_{17}O_3$, m. 159°. 5

XIII. Diene syntheses of 1,5,5-trimethyl-1,3-cyclopentadiene, α- and β-camphylic acids with maleic anhydride and acetylenedicarboxylic acid. (Steric course of addition and substitution reactions. 10.) *Ibid.* 56–78.—1,5,5-Trimethyl-1,3-cyclopentadiene (I) and maleic anhydride (II) in Et_2O give *3,6-endomethylene-3,7,7-trimethyl-Δ⁴-tetrahydrophthalic anhydride* (III), m. 137°; soln. in Na_2CO_3 and pptn. with dil. H_2SO_4 give the free *acid* (IV), m. 173° (decompn.). Addn. of Br to the Na_2CO_3 soln. of IV gives the *bromolactonemonocarboxylic acid*, m. 215°; *Me ester*, m. 130°. III and PhN_3 in AcOEt do not form an addn. product after standing 3 months. Catalytic reduction of IV in AcOH with PtO_2 gives *cis-3,6-endomethylene-3,7,7-trimethylhexahydrophthalic acid* (V), m. 175° (decompn.); *anhydride*, m. 171°; heating V with MeONa in MeOH for 2.5 hrs. gives the trans acid, m. 236–7°. I (5.3 g.) and 10 g. $(CCO_2Me)_2$ in 3 cc. Et_2O give 9 g. of *Me 3,6-endomethylene-3,7,7-trimethyl-Δ¹,⁴-dihydrophthalate* (VI), b_{12} 142–3°; partial catalytic reduction yields the *Δ¹-tetrahydro deriv.*, b_{12} 143–4°; the free *acid* (VII) m. 172°; *anhydride*, m. 115–16°. Oxidation of VII with 43% HNO_3 (8 hrs. at 120–30°) gives *dl*-camphoric acid, m. 203°. I and $(CCO_2H)_2$ in Et_2O, heated 12 hrs. at 120–30°, give the free acid (VIII) corresponding to VI; partial reduction gives VII. Damsky's hydrocarbon (C_8H_{12}) and II in Et_2O give an *isomer* (X) of III, m. 95–6°; the free *acid* m. 158–9°; the *bromolactonemonocarboxylic acid* m. 193–4°; its *Me ester* m. 133–4°; catalytic reduction of X gives the *isomer* (XI) of V, m. 185–6°; oxidation with $KMnO_4$ gives the *compd.* $C_{12}H_{14}O_5$, m. 235–6°. IX and $(CCO_2H)_2$ give an *isomer* (XII) of VIII, m. 175–6°; catalytic reduction gives the isomer (XIII) of VII, m. 178–9°; further reduction of the acid gives X which with AcCl yields XI. IX and $(CCO_2Et)_2$, heated 1 hr. at 260–80°, give the *di-Et ester* of XII, b_{20} 174–5°; reduction yields the *di-Et ester* of the Δ¹-acid, b_{17} 182–3°; hydrolysis gives XIII, whose *anhydride* m. 61–2°. Me α-camphylate (XIV) and II in C_6H_6, refluxed 6 hrs., give *endo-cis-3,6-endomethylene-3,7,7-trimethyl-6-carbomethoxy-Δ⁴-tetrahydrophthalic anhydride* (XV), m. 115°; the free *acid* m. 195°; the *bromolactonemonocarboxylic acid* m. 185° (*Me ester*, m. 172°); catalytic reduction of XV gives the *hexahydro deriv.*, m. 94–5°. XIV (4.5 g.) and 5 g. $(CCO_2Me)_2$ in Et_2O, heated 10 hrs. at 110–15°, give 7.8 g. of the *tri-Me ester*, $C_{16}H_{20}O_6$, b_3 162–5°, m. 72°; partial reduction gives a Δ¹-compd., partially sapond. by 20% MeOH-KOH to a *mono-Me ester*, m. 204°. XIV and $(CCO_2H)_2$, heated 12 hrs. at 100° and reduced with Pd, give the Δ¹-acid, $C_{14}H_{18}O_6$, m. 210°; *anhydride*, m. 119°. The β-isomer of XIV and II, heated in C_6H_6 for 8 hrs. at 120°, give the *4-carbomethoxy isomer* of XV, m. 132–3°; the free *acid* m. 165°; *bromolactonemonocarboxylic acid*, m. 230°. 6

C. J. West

Cyclopentadiene series. II. α- and β-Camphylic acids and their decarboxylation products. 1,5,5-Trimethyl-1,3-cyclopentadiene. Kurt Alder and Erwin Windemuth. *Ann.* **543**, 28–40(1939); cf. *C. A.* **30**, 8177⁴.—Sulfocamphylic acid (Kachler, *Ann.* **169**, 179(1873)) (50 g.) and 130–50 g. solid KOH, heated at 210–15°, the melt dissolved in H_2O, acidified with concd. HCl, extd. with Et_2O and the oil crystd. from AcOH, give di-β-camphylic acid (I) and not the α-isomer as Perkin supposed (*J. Chem. Soc.* **1903**, 862). Distn. of the AcOH residues at 130–40°/12 mm. gives β-camphylic acid (II), m. 106°; distn. at 170–200° gives some of the α-isomer (III); thus, III is a transformation product of II. Distn. of I at atm. pressure gives III as the only product. The *di-Me ester* of I m. 64°; depolymerization at 350 mm. and 220–30° gives the Me ester of II. Distn. of the Ca salt of II or III according to Damsky (*Ber.* **20**, 2966(1887)) gives his hydrocarbon, b. 133–5°. Decarboxylation of II or III with Cu chromite in quinoline gives 73% of 1,5,5-trimethyl-1,3-cyclopentadiene, b. 99–105°. In the distn. of the Ca salt a wandering of the Me group occurs. C. J. West

Reduction of tagetone to tagetol. T. G. H. Jones. *Univ. Queensland Papers, Dept. Chem.* **1**, No. 11, 2 pp. (1939); cf. *C. A.* **29**, 4339⁸.—By refluxing 50 g. tagetone with a soln. of 50 g. Al in 1 l. iso-PrOH, 30 cc. of *tagetol* (I), $C_{10}H_{18}O$, b_3 55°, $d_{15.5}$ 0.8766, n_D^{19} 1.4760, was obtained; *Ac deriv.* of I, b_3 65°, $d_{15.5}$ 0.9154. Attempts to dehydrate I in petr. ether by $KHSO_4$ or P_2O_5 were unsuccessful, probably owing to the instability of the desired terpene. I reacted readily with $C_{10}H_7NCO$ and PhNCO, but no cryst. derivs. could be obtained. D. E. A.

Preparation of synthetic borneol by the acetic acid method. Minoru Imoto. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 314(1939); cf. *C. A.* **33**, 7766³; **34**, 744⁴.—The pinenecamphene fraction (136 g., contg. 46.7% camphene by the Bertram-Walbaum hydration method) from abies oil was stirred at 110–120° with 120 g. com. 99% AcOH in the presence of 20 g. Ac_2O and 1.9 g. B_2O_3. After 15 hrs. the ester content was 58.6%; after subsequent addn. of 20 g. 60% H_2SO_4 and heating for 7 hrs. at 50–60°, the yield of ester was 68.5%. From 131 g. of the reaction mixt., treated as described in previous reports, there were obtained (1) 60 g. crude borneol, m. 189–93°, $[\alpha]_D$ ±0° (in alc.), and contg. 56.1% isoborneol (Hesse's method), (2) 2 g. of a liquid alc., and (3) 42 g. of a terpene fraction with an ester content of 30.3%. White camphor oil may be used similarly for the prepn. of isoborneol. George Ayers

The products of autoxidation of several terpenes. R. Dupont. *Ind. chim. belge* **11**, 3–13(1940); cf. *C. A.* **34**, 4033.—Autoxidation of 250 g. citronellol (I) at 75° for 11 days in the app. (2.9 l. capacity) of Chavanne and Miller (*C. A.* **24**, 5027), absorbed 16 l. of O and gave a gaseous fraction contg. 25% CO_2, 8% CO and 27% H_2 and a liquid fraction (neutral, after extg. a small amt. of acids) consisting of unreacted I, I oxide and dihydroxycitronellol, the last 2 being identified by oxidation with $K_2Cr_2O_7$ to Me_2CO and β-methyladipic acid. Similarly, by autoxidation 165 g. camphene (II) at 70° for 16 days absorbed 8.5 l. of O, giving, after sepg. small amts. of acidic products, unreacted II, camphenilone, and a *compd.* $C_{10}H_{16}O_2$, b_{13} 142–5°, probably an unsatd. peroxide which decomps. upon redistn. Autoxidation of 160 g. cedrene (III) at 75° for 7 days absorbed 11.5 l. of O, giving a gaseous mixt. contg. 25.6% CO_2, 5.5% CO and 21.4% H_2O, and a liquid fraction (neutral) consisting of unreacted III, cedrone and its corresponding secondary alcohol. Autoxidation of 136 g. α-terpineol (IV) at 85° for 10 days absorbed 13 l. of O, giving a gaseous mixt. contg. 6.6% CO_2, 2.0% CO and 13.6% H_2, and, after sepg. small amts. of acids, a liquid fraction consisting of unreacted IV and inactive hydroxycarvone, which was also obtained by oxidizing IV with SeO_2. Autoxidation of 150 g. dihydrocarveol (V) in the presence of cobaltous acetylacetonate at 85° for 10 days absorbed 10 l. of O was accompanied by darkening and formation of H_2O, yielding unchanged V and tetrahydro-*p*-tolyl Me ketone (semicarbazone, m. 172°), which was oxidized to *p*-MeC_6H_4COMe and is assumed to have the double bond in the 1,2-position. Autoxidation of 127 and 160 g. of limonene at 65° for 9 days absorbed 18 and 22 l. of O, resp., giving a gaseous mixt. contg. 19.0% CO_2, 6.0% CO and 42.5% H_2, and a liquid fraction, after removal of small amts. of acids, consisting of carveol, carvone and *trans*-8-*p*-menthene-1,2-diol, m. 67–8°, $[\alpha]_D^{19}$ 39.0° ± 1.6°. Autoxidation of 1 g.-mol. wt. of α-phellandrene at 70° for 5 days absorbed 14.5 l. of O, giving a gaseous fraction contg. 18% CO_2, 6.5% CO and 53% H and a liquid mixt. consisting of *p*-cymene, an alc. oxide corresponding to $C_{10}H_{16}O_2$, which oxidizes to thymoquinone, and α-phellandrene glycol, likewise identified by oxidation with Bechmann's CrO_3 mixt. to a keto lactone of Henry and Paget (*C. A.* **22**, 1346) and thymoquinone. The above results agree with those obtained by others to which numerous references are given and it is concluded that, in regard to the action of mol. O, ethylenic hydrocarbons contain 2 points of attack, viz., the double bond and the Me group in the α-position to the double bond. J. F. L.

Asymmetrical catalysis. Asymmetry introduced by means of Grignard's reagent. Mario Betti and Elio Lucchi. *Boll. sci. facoltà chim. ind., Bologna* **1940**, No. 1–2, 2–5; cf. *C. A.* **33**, 7273¹.—The synthesis of compds. contg. an asym. C atom by means of Grignard's reagent is described. Dimethylbornylamine (I) is prepd. in satisfactory yields by heating for 5 hrs. at 220–30° HCO_2NH_4 with camphor in a sealed tube, using small amts. of the reagents, and treating the bornylamine formed with alc. MeI in the presence of NaOH. The reaction product from 12 g. I, 1.60 g. dry Mg filings and 9.45 g. MeI on condensation with BzH in dry benzene and subsequent hydrolysis with dil. HCl gives 6 g. PhCH(OH)Me, b. 205°, which is optically active, 0.30°, and after 24 hrs. 0.18°. The same compd. is obtained by condensing the reaction product from PhBr, Mg and I with AcH. The optical rotation of this compd. is 1.33°, and 0.33° after 24 hrs. Dora Stern

Crystal chemistry of camphor derivatives. I. Formation of mixed crystals or molecular compounds in the binary systems of several oxo derivatives of camphor. Atusi Watanabe. *Proc. Imp. Acad.* (Tokyo) **10**, 349–52(1939) (in German).—X-ray examn. of various camphor derivs. gave the following data for the double refraction, crystal system and *n*(D line): *o*-oxocamphor (I), biaxial, neg., rhombic, 1.52_0 (β), 1.57_5 (γ), needles; *p*-oxocamphor (II) uniaxial, neg., trigonal, 1.50_0, 1.50_3, plates; 6-oxocamphor (III), none, cubical, 1.50_5; *trans*-π-oxocamphor (IV), none, cubical, 1.49_6; α-10-oxocamphor (V), uniaxial, neg., trigonal, 1.50_0, 1.50_3; β-isomer, none, cubical, 1.49_6. The system IV–II forms 3 series of mixed crystals: up to 15% IV, isomorphic with II, from 15 to 25%, dimorphic, which are isomorphic with IV or II; from 25–100%, isomorphic with IV. These mixed crystals are more stable than IV and are not oxidized on standing several days at room temp., whereas IV is largely oxidized to isoketopinic acid in this time. The soln. of IV–V in Et_2O (15–40% IV) gives mixed crystals isomorphic with II, which on heating at 100° change to a 1:2 mol. compd. similar in crystal form to III; the mixed crystals from solns. contg. 50–100% IV are isomorphic with IV; the crystals from 20–40% IV are far more stable than either component. With the system IV–III, the mixed crystals from 0–70% IV are isomorphic with III; the mixt. from 60–80% IV in ether is similar to II, indicating a mol. compd., which changes to mixed crystals on heating. The system IV–I gives a 1:1 mol. compd. similar to the crystal form of II. The mixed crystals from the system V–III in Et_2O are isomorphic with II; on heating over 100° these form crystals isomorphic with IV; these mixed crystals are stable for weeks at room temp., whereas IV is largely oxidized in 1 week at 25°. The crystals from the system V–III are isomorphic with III; on heating those prepd. from 25–75% V at 100° for several hrs., the crystals become isomorphic with III. The system V–I forms a 1:1 mol. compd. similar in crystal form to III. I–II form mixed crystals (30–100% II) isomorphic with II. I–III

form a 1:1 compd., similar in crystal form to II. II–III form mixed crystals isomeric with II. C. J. West

Peroxidase-like action of π-oxocamphor. Morizo Isidate and Hukuko Sisido. *Proc. Imp. Acad.* (Tokyo) 15, 357–8(1939) (in German).—If a small quantity of *trans*-π-oxocamphor is added to a luminol test (*o*-aminophthalic hydrazide and H_2O_2) a blue chemiluminescence is observed at once, which may continue for several hrs., depending upon the amt. of H_2O_2 used. The reaction is strongly retarded by KCN, Na_2S, NH_2OH, N_2H_4, etc. This reaction is not produced by the *p*-, *o*-, 6- and 10-oxocamphors; HCHO, AcH, BzH, 2-furaldehyde, citral and other aldehydes are also inactive. C. J. West

Autoxidation of *trans*-π-oxocamphor and the influence of other oxocamphors. Morizo Isidate and Hidenobu Kawaffata. *Proc. Imp. Acad.* (Tokyo) 15, 353–6(1939) (in German).—Curves are given of the rate of absorption of O by *trans*-π-oxocamphor and the effect of various admixtures on this rate. *p*-Oxocamphor has little effect; 0.005 mol. of the *o*-isomer almost completely inhibits the absorption of O; the same effect is produced by 1.5 to 2 equivs. of the 6-isomer. $FeSO_4$ has little effect; KCN and $CuSO_4$ are anticatalysts. *o*-Oxocamphor may be considered as a true org. anticatalyst. C. J. West

Constituents of Didymocarpus pedicellata. III. Isolation of a sesquiterpene and two polyterpene products and examination of the fatty matter. Sharifuddin Warsi and Salimuzzaman Siddiqui. *J. Indian Chem. Soc.* 16, 423–6 (1939); cf. *C. A.* 33, 5824⁴.—In the isolation of pedicin, pedicellin and 2 other allied coloring matters from the ethereal ext. of the leaves of *D. pedicellata* (*C. A.* 32, 4171³), the steam distn. of the final filtrates from pedicellin gave a light greenish yellow oil (I). Fractional distn. of 69 g. of I at reduced pressure yielded 64 g. of a sesquiterpene, *didymocarpene* (II), $C_{15}H_{24}$, b_3 136–7°, b_{12} 147–8°, $[\alpha]_D^{35}$ −3.7° (in 1% abs. alc.), d_4^{24} 0.8957, n_D^{29} 1.4988; *nitroso hisnitrosite*, $C_{30}H_{47}N_5O_8$, sky-blue prismatic rods, m. 132–4°. Titration with Br indicated the presence of 2 double bonds and II is apparently a bicyclic sesquiterpene. The residue left after the steam distn. of II was subjected to direct heating in a vigorous current of steam and the thick reddish oily distillate was fractionally dist., yielding 16 g. of *didymocarpol* (III), $(C_{10}H_{20}O)_6$, m. 76°, in white silky needles, optically inactive, satd. to Br, inert and stable to alk. or oxidative degradation; and 8 g. of silky needles of *didymocarpenol* (IV), $C_{26}H_{42}O$, m. 137°, $[\alpha]_D^{29}$ −65.5° (in 1% abs. alc.), adsorbing 2 atoms of Br. Lignoceric, behenic, stearic (V) and palmitic acids in nearly equal proportions were obtained by sapon. of the fatty nonvolatile residue from the steam distn. V was also isolated from the acid fraction of the original ether ext. Calcd. on the wt. of dried leaves, yields of 1.6, 0.3 and 0.15% of II, III and IV were obtained. **IV. Isolation of two new coloring matters and their relationship to pedicin.** *Ibid.* 519–24.—Tentative structures have been suggested for pedicellin (I), pedicin (II), pedicinin (III) and isopedicin (IV). The ease with which the 5-membered ring in III is formed from the chalcone, II, suggests that IV should have a 5- and not a 6-membered ring. This has been investigated by a closer study of II and IV. The isolation of IV in quantity was undertaken. Coarsely powd. leaves (2 kg.) of *D. pedicellata* were successively extd. with petr. ether and ether. The crude coloring matter from the concd. ether ext. was washed with concd. Na_2CO_3 and the mother liquor was shaken out with Na_2CO_3 and with dil. NaOH. The combined Na_2CO_3 exts. were acidified and extd. with ether and then with $CHCl_3$, yielding III as the least sol. fraction and crude *pseudoisopedicin* (V) from the mother liquors. The residue insol. in Na_2CO_3 gave II and the dil. NaOH ext. also gave II on acidification. The ether mother liquor was washed with dil. acid and H_2O and on working up as previously described gave I and a 2nd new coloring matter, *pedicidin* (VI). The ether ext. yielded 5 g. III, 4 g. II, 6 g. I, 4.7 g. V and 2.5 g. VI. A similar sepn. of the petr. ether ext. gave 16 g. II, 14 g. I, 4.8 g. V, very little III and no VI, together with the entire essential oils and fatty material. Flow sheets for the method of sepn. are given. V, $C_{18}H_{18}O_6$, m. 126°, is satd. to Br and, like IV, is easily converted into II by treatment with dil. alkali at room temp. A mixt. of II (0.3 g.) in 5 cc. alc. and 2.5 cc. HCl (d. 1.16) was refluxed for 18 hrs., concd. and dild. with H_2O. The mixt. was extd. with ether, washed with Na_2CO_3 and concd., yielding V. V gives the same color reactions as IV with alkali, H_2SO_4 and $FeCl_3$. It is probable that IV, m. 105°, is racemized into V on long standing. VI, $C_{37}H_{36}O_{11}$, m. 190°, takes up Br, gives nearly the same color reactions as IV, and is converted into a *deep red cryst. compd.*, m. 163–6°, by the action of HNO_3. VI may be formed by the condensation of 2 mols. of simpler coloring matters since it has 7 OMe groups. C. R. Addinall

Ionene. Arno Müller. *J. prakt. Chem.* 154, 82(1939); cf. *C. A.* 33, 1713⁴.—Purified ionene (1,1,6-trimethyltetralin), prepd. from α-ionone (Bogert and Fourman, *C. A.* 28, 145²), is a mixt. of 2 isomers, only one of which gives the color reaction with p-$Me_2NC_6H_4CHO$ and approx. 10% H_3PO_4 in AcOH. The latter (α-ionene) has the accepted ionene structure, while β-ionene is given the structure expected from its formation from β-ionone.

George Ayers

Polymorphism of benzophenone. Karl Schaum. *Ann.* 542, 77–90(1939).—In a general discussion of the question of polymorphism, measurements are given of the dielec. consts. of liquid, metastable and stable forms of Ph_2NH, 2,4-$(O_2N)_2C_6H_3Me$, 2,4-$(O_2N)_2C_6H_3OH$, Ph_2CO at 20°, $AcNH_2$, o-$O_2NC_6H_4Cl$, 2,4-$(O_2N)_2C_6H_3Cl$ at 18°, menthol at 21° and β-$C_{10}H_7OH$ and of the sp. cond. of β-$C_{10}H_7OH$ at temps. from 25 to 130°. The configuration of the stable (rhombic) and the metastable (monoclinic) forms is discussed. C. J. West

α-ω-Di-*p*-hydroxyphenylalkanes. Edwin M. Richardson and E. Emmet Reid. *J. Am. Chem. Soc.* 62, 413–15(1940).—In the following work ethylenic double bonds were reduced catalytically with PtO_2 and ketones by the Clemmensen method or the Martius modification. Demethylation was accomplished by refluxing 0.1 mole with 130 g. glacial AcOH and 50 cc. const.-boiling HBr. (4-$MeOC_6H_4CH_2)_2$, m. 125.5–7°, 72%; (4-$HOC_6H_4CH_2)_2$ (I), m. 198–9°, 94%; (4-$MeOC_6H_4CH)_2$, m. 100–1°, 95%; *1,3-di-p-methoxyphenylpropane*, m. 45–6°, 81%; *1,3-di-p-hydroxyphenylpropane* (II), m. 107–8°; *1,4-di-p-methoxyphenylbutane*, from 4-$MeOC_6H_4(CH_2)_3COCl$ and PhOMe, followed by reduction, m. 78–9°, 53%; *1,4-di-p-hydroxyphenylbutane* (III), m. 158–9°, 62%. (4-$MeOC_6H_4CH{:}CH)_2CO$ (92% yield from Me_2CO and p-$MeOC_6H_4CHO$) gives (4-$MeOC_6H_4CH_2CH_2)_2CO$, m. 55–5.2°; Clemmensen reduction gives 63% of $(CH_2)_5(C_6H_4OMe\text{-}4)_2$, which yields 92% of $(CH_2)_5(C_6H_4OH\text{-}4)_2$ (IV), m. 104–5°. Adipoyl chloride (1 mole) and 2 moles of PhOMe with 2.25 moles $AlCl_3$ in 500 cc. CS_2 give 85% of *1,4-di-p-methoxybenzoylbutane*, m. 145–6°; reduction yields 62% of *1,6-di-p-methoxyphenylhexane*, m. 70–1°, which gives 90% of *1,6-di-p-hydroxyphenylhexane* (V), m. 144.5–5.5°. Sebacoyl chloride gives 90% of *1,8-di-p-methoxybenzoyloctane*, m. 119–19.5°, which is reduced to 58% of *1,10-di-p-methoxyphenyldecane*, m. 69–70°; demethylation yields 74% of *1,10-di-p-hydroxyphenyldecane* (VI), m. 138.5–9.5°. The following values are for the soly. (g./100 cc.) in H_2O and olive oil (temp. not given), partition coeff. and max. killing dilns. for *Staphylococcus aureus:* $CH_2(C_6H_4OH\text{-}4)_2$ 0.3950, –, –, 300; I 0.0116, 0.10, 8.62, 1000; II 0.0381, 6.88, 180, 2000; III 0.0024, 0.67, 280, 5000; IV 0.0044, 10.47, 2400, –; V insol., 0.62, –, –; VI insol. 0.09, –, –. The partition coeff. and the max. killing dilns. both increase rapidly with the length of the intervening C chain; the low soly. of these compds. made extensive testing impossible. C. J. West

Action of sodium nitrite on Michler's hydrol in hydrochloric acid. Alexander Cantlay Hutchison and Thomas Harold Reade. *J. Chem. Soc.* 1940, 93–6.—From $NaNO_2$ (4 mols.) and Michler's hydrol (I) (1 mol.) in excess of 4.8 *N* HCl at 0° there were isolated 4-$O_2NC_6H_4NMeNO$, p-$ONMeNC_6H_4CHO$, p-$O_2NC_6H_4NMe_2$, p-$ONC_6H_4NMe_2$ and 3,4-$O_2N(Me_2N)C_6H_3CHO$. In 1.2 *N* HCl the reaction was somewhat less vigorous; the yields of p-$O_2NC_6H_4NMe_2$ and p-$ONC_6H_4NMe_2$ were increased and those

of the nitrosoamines were diminished. To account for the production of these 5 substances, 2 modes of fission of the I are required as suggested by the following equations: $Me_2NC_6H_4CH(OH)C_6H_4NMe_2 \rightarrow Me_2NC_6H_4CHO + PhNMe_2$; I + $6HNO_2 \rightarrow Me_2NC_6H_4CHO + O_2NC_6H_4NMe_2 + 2NO + 2H_2O$. The products of these equations would then react further with the HNO_2 and give the final substances isolated. Although the expts. do not lend themselves to quant estn., it is evident from the yields obtained in both acid concns. fission according to the 1st equation accounts for about $^2/_3$ of the original I and is the main reaction but that fission according to the 2nd equation is governed by the *N* of the acid and accounts for about 0.25 of the I in 1.2 *N* acid and about $^1/_{40}$ in the 4.8 *N* HCl; thus $^2/_3$ of the original I is accounted for as fission products; non-fission products may not be entirely absent from the oils encountered. In the expts. in which nitrosoamines were isolated, HCHO was also present. C. J. West

Fluorene (and its derivatives). B. A. Porai-Koshits. *Org. Chem. Ind.* (U. S. S. R.) **6**, 448–54(1939).—A review of literature with 100 references. Chas. Blanc

Remarks on the structure of fluorene. Ernst Bergmann and T. Berlin. *J. Am. Chem. Soc.* **62**, 316–17(1940).—This work supplements that of Lothrop (*C. A.* **33**, 7769[5]). Heating 4.1 g. of 2-acetoxyfluorene (I) with 3.6 g. $AlCl_3$ in 30 cc. $PhNO_2$ for 3 hrs. at 80° gives 0.6 g. of *1-acetyl-2-hydroxyfluorene* (II), yellow, m. 159°; it does not form an oxime. 2-Acetoxyfluorenone gives *1-acetyl-2-hydroxyfluorenone* (III), red, m. 206°; heating with $N_2H_4.H_2O$ in EtOH for 3 hrs. gives the *pyridazine deriv.* of III, yellow, m. 197° (decompn.). Boiling 1-benzoylfluorenone with $N_2H_4.H_2O$ in EtOH for 2 hrs. gives the *compd.* $C_{20}H_{12}O_2$, yellow, m. 181°. Rearrangement of I at 115° does not give II but a *compd.* $C_{15}H_{12}O_3$, m. 249°. 2-Hydroxyfluorenone (4 g.), allyl bromide and KOH in EtOH, heated 10 hrs., give 2.2 g. of the *2-allyloxy deriv.* (IV), m. 84–5°. Heating 1 g. of IV at 200° for 3 hrs. gives 0.6 g. of a *mol. compd.* of 1-allyl-2-hydroxy- and 3-allyl-2-hydroxyfluorenone, orange-red, $b_{0.05}$ 186°, m. 125–6°; catalytic reduction in PrOH gives a mixt. of 2 isomers, yellow, m. 202°, and dark yellow, m. 155° (sepd. from 1:1 aq. EtOH), apparently the *1-* and *3-propyl-2-hydroxyfluorenones*. This indicates that in fluorenone the double bonds have no fixed position. C. J. West

Some condensation products of *m*-dialkylaminobenzaldehyde with compounds containing reactive methylene groups. Wesley Cocker and Denys G. Turner. *J. Chem. Soc.* **1940**, 57–9.—In this work dyeing expts. were made with ppts. obtained by pouring boiling EtOH solns. into a large excess of cold water; 0.25 g. of the dried ppt. was triturated with 2 cc. Turkey-red oil and introduced into 120 cc. H_2O contg. 0.25 g. Lux soap; the soln. was warmed to 40°, 4 g. of acetate silk introduced and the temp. maintained at 70–80° for 90 min. with periodical stirring; the fabric was washed with cold H_2O and dried or brightened by immersion into 0.5% lactic acid soln. for 30 min., rinsed and dried. 2,4-$(O_2N)_2C_6H_3Me$ (3 g.), 2.5 g. *m*-$Me_2NC_6H_4CHO$ (I) (cf. *C. A.* **33**, 7756[7]) and 0.25 cc. piperidine, heated on the water bath for 24 hrs., give 3.1 g. of *2,4-dinitro-3'-dimethylaminostilbene* (II), very dark red, m. 205°; it gives orange solns. and imparts a pale yellow shade to acetate silk, which is largely discharged by exposure to bright sunlight for 24 hrs. *3'-Diethyl analog* of II, very dark red, m. 153°; it gives pale pinkish yellow shades on the fabric but its light-fastness is poor (somewhat better than II). *3'-Dipropyl analog* of II, dark red, m. 132°; its shade on silk was brown-yellow but the discharge of the dye bath was not very good. I (5 g.), 3.8 g. of 2,4-$(O_2N)_2C_6H_3CH_2CO_2H$ and 0.25 cc. piperidine, heated 24 hrs. on the water bath, give 1.6 g. of *2,4-dinitro-3'-dibenzylaminostilbene*, orange-red, m. 163°; it gives pale champagne shades on silk. Similarly 2.5 g. I and 2.7 g. *p*-$O_2NC_6H_4CH_2CN$, heated for 3 hrs., give 3.7 g. of *3-dimethylamino-α-4'-nitrophenylcinnamonitrile* (III), dark red, m. 162.5°; the rich golden yellow shades on silk fade to primrose-yellow after 16 hrs. in bright sunlight. *3-Diethyl analog* of III, dark red, m. 136°; it gives orange-yellow shades on silk, rapidly fading in bright sunlight. *3-Dipropyl analog* of III, orange-red, m. 108° (max. yield, 65%); the bright yellow shades fade rapidly in sunlight. *3-Diallyl analog* of III, bright orange, m. 82° (90% yield); the bright yellow shades fade almost completely after 16 hrs. under the ultraviolet lamp. I (2.5 g.), 3 g. *p*-$O_2NC_6H_4CH_2CO_2H$ and piperidine, heated 16 hrs. on the water bath, give 1.7 g. of *3-dimethylamino-α-4'-nitrophenylcinnamic acid* (IV), orange-yellow, m. 215.5°; it has little affinity for acetate silk; from 3 *N* NaOH or Na_2CO_3 the Na salt seps. as bronze plates; heating 1 g. IV with 0.5 cc. piperidine for 0.5 hr. at 140–5° gives *4-nitro-3'-dimethylaminostilbene* (V), deep orange, m. 145–5.5°; it gives very bright lemon-yellow shades on acetate silk. *3-Diethyl analog* of IV, orange, m. 173°; of V, orange-red, m. 97°; the shade on silk resembles that of V. *3-Dipropyl analog* of IV, bright yellow, m. 180.5°; of V, orange-yellow, m. 79°; it gives a bright yellow shade on silk. I, 3 g. of 1-phenyl-3-methyl-5-pyrazolone and piperidine, heated on the water bath for 6 hrs., give 2.3 g. of *1-phenyl-4-(3'-dimethylamino)benzylidene-5-pyrazolone*, deep red, m. 117°; the very pale ivory shade on silk is stable for many hrs. under the ultraviolet lamp. I, 4 g. α-picoline-MeI and piperidine, heated 6 hrs. on the water bath, give 2.5 g. of *2-m-dimethylaminostyrylpyridine-MeI*, deep orange, m. 237°; the EtOH soln. is reddish yellow and it gives a vivid lemon-yellow shade on silk; *2-m-diethylamino analog*, orange-red, m. 208°; the EtOH soln. is orange and the shade in silk is rich orange-yellow; *2-m-dipropylamino analog*, deep red, m. 192°; it gives orange shades on silk. I and quinaldine-MeI give *2-m-dimethylaminostyrylquinoline-MeI*, purple or black, m. 261°; it dyes silk a pale mauve-pink shade. *2-m-Dimethylaminostyrylthiazole-MeI*, bright red, m. 218°; it gives golden-yellow shades on silk. *2-m-Dimethylaminostyrylbenzothiazole-MeI*, purple-brown, m. 205° (21% yield); it gives beige shades on silk; *2-m-diethylamino analog*, brown, m. 188°. C. J. West

Action of oxalyl chloride on phenolic ethers. P. C. Mitter and Hitendranath Mukherjee. *J. Indian Chem. Soc.* **16**, 393–5(1939).—Condensation of $(COCl)_2$ (I) with MeOPh (II) and *o*-$MeOC_6H_4Me$ (III) gives *o*-diketones but only the corresponding acids are obtained with *m*-$MeOC_6H_4Me$ (IV) and *p*-$MeOC_6H_4Me$ (V). With *o*-$MeOC_6H_4OMe$ (VI), 3,4-$(HO)_2C_6H_3CO_2H$ is produced. A mixt. of 10 g. II in 50 cc. CS_2 and 6.3 g. I was chilled and treated with 20 g. $AlCl_3$ in portions with stirring. After standing overnight, the CS_2 was decanted and the reddish solid was decompd. with iced HCl. The reaction mixt. was heated, filtered and the residue was digested with Na_2CO_3 and recrystd. from alc., yielding 90% of anisil, m. 132° (oxidized by H_2O_2 in AcOH at 70–80° for 4 hrs. to anisic acid) and a small amt. of salicylic acid. A similar condensation of I with III gave a *diketone* (VII), $C_{18}H_{18}O_4$, oxidized by H_2O_2 to 4-methoxy-*m*-toluic acid. Alkali fusion of 3 g. VII with 10 g. NaOH at 180° in a Ni basin and acidification of the melt gave 4,4'-dimethoxy-3,3'-dimethylbenzilic acid, $C_{18}H_{20}O_5$, m. 145–7°. Condensation of I with V gave only 5-methylsalicylic acid, m. 149°, and with IV, the corresponding 3-methylsalicylic acid, m. 167–8°. With VI only protocatechuic acid, m. 189°, was produced. C. R. Addinall

Ketocyclol tautomerism of 1,6-diketones. 1,4-Dibromo-1,4-dibenzoylbutane. Tsi-Yu Kao. *J. Am. Chem. Soc.* **62**, 356–8(1940).—Treatment with mol. Ag converts $(CH_2CHBrBz)_2$ into a mixt. of $(CH_2CH_2Bz)_2$, 13% of 1,2-dibenzoylcyclobutane and, as the principal product (37%), 1-phenyl-5-benzoyl-1-cyclopentene oxide (I). Refluxing 4.2 g. $(CH_2CHBrBz)_2$ and 17 g. Et_2NH in 30 cc. C_6H_6 for 30 min. gives 59% of 1-phenyl-5-bromo-5-benzoyl-1-cyclopentene oxide (II), m. 138–9°; poor yields were obtained with NaCN or AcONa. With $CHNa(CO_2Et)_2$ $(CH_2CHBrBz)_2$ gives 64% of II. Treatment of II with Zn dust and NaI in Me_2CO converts it into I. These transformations are interpreted on the assumption that the dibromide exists in tautomeric keto and cyclol forms. C. J. West

The 1,2,4-trimesityl 1,4-diketones and related com-

pounds, including the stereoisomeric mono- and dienols. Robert E. Lutz and Charles J. Kibler. *J. Am. Chem. Soc.* **62**, 360-72(1940).—The prepn. of the following series of compds. was undertaken to extend the study of the hindering effect of mesityl groups. $(RCOCH)_2$(R = $Me_3C_6H_2$) (5.7 g.), added in 0.5-g. portions to 4 equivs. of RMgBr in abs. Et_2O at 20°, gives a clear brown soln. of RCOCHRCH:C(OMgBr)R (I); decompn. with dil. HCl yields 5.3 g. of *1,2,4-trimesitylbutane-1,4-dione*, RCOCHRCH$_2$COR (II), m. 147-7.5° (all m. ps. cor.); Br in $CHCl_3$ did not give a cryst. product; reaction with MeMgI at room temp. indicates 1 active H atom; at 100°, 15 hrs. were required for 0.5 mol. more of CH_4 to form. Dehydration of II with Ac_2O and H_2SO_4 in the usual way failed; refluxing 0.5 g. II in 15 cc. concd. AcOH and 0.6 cc. H_2O for 30 hrs. with a continuous stream of dry HCl passing through at the rate of about 20 bubbles per min. gives 0.54 g. of *2,3,5-trimesitylfuran* (III), m. 106.5°; heating 0.2 g. II and 1 cc. HI at 160 70° for 1 hr gives 50% III; 0.2 g. II, 8 cc. AcOH, 6 drops HI and 0.1 g. each of red P and I, refluxed 1 hr., give 0.13 g. III. III and PBr_5 at 90° for 0.5 hr. give an amorphous *tetrabromide*, m. 120-50°. HNO_3 in AcOH at 15° gives the *4(?)-NO_2 deriv.* of III, m. 206.5-7°. The soln. of I from $(RCOCH)_2$ and 2 equivs. of RMgBr, decompd. by I in EtOH at 0-10°, gives 74-9% of *3-iodo-1,2,4-trimesitylbutane-1,4-dione A* (IV), m. 213° (decompn.); various methods of reduction yield II. Solns. of the Mg 4-monoenolate B from the action of MeMgBr, EtMgBr or PhMgBr upon II, poured into cooled EtOH-I, give the *B isomer* (V) of IV, m. 178°; V and EtMgBr at 20° give II, as does reduction with $NaHSO_3$ in boiling 60% EtOH; KOH in boiling EtOH gives VI. The *3-Br analog* of IV m. 192.5 3.5°; EtMgBr at 20° enolizes the Br compd. and decompn. with EtOH-I gives a good yield of IV; it is not affected by boiling with AcONa in EtOH but MeOH-KOH (30 min.) gives VI; reduction with $NaHSO_3$ in 60% EtOH (refluxing 4 hrs.) gives II. The *Br analog* of V m. 230 1° and is similarly prepd. except that EtOH-Br is used; EtMgBr reacts rapidly at 20° and decompn. with EtOH-I gives V; reduction with Zn and AcOH gives II; KOH in 95% EtOH gives a quant. yield of VI. Refluxing 4 g. V in 125 cc. EtOH with 3 g. KOH for 1 hr. gives 90% of *1,2,4-trimesityl-2-butene-1,4-dione* (VI), m. 142 4°; it does not react with Ac_2O-H_2SO_4 and is unchanged by sunlight in EtOH or $CHCl_3$ contg. I; reduction with Zn and AcOH gives III but $NaHSO_3$ in dil. EtOH did not reduce VI. The monoenolate, obtained by the 1,4-addn. of RMgBr to $(RCOCH)_2$ is designated 1,2,4-trimesitylbutane-1,4-dione-4-enolate A (VII); it is also obtained by the action of a Grignard reagent on IV or V or the Br compds.; reaction with I and Br gives IV or the Br deriv.; decompn. in an EtOH soln. of quinone or $K_3Fe(CN)_6$ produced only II but no VI; decompn. by dil. HCl gives only II; dropping the Et_2O soln. into boiling AcOH gives only II; RMgBr in $(iso\text{-}Pr)_2O$ with refluxing for 2 hrs. in a N atm. gives IX; in ether only IV is formed, showing that the higher temp. is necessary to produce IX; PhMgBr (refluxing 5 min. in Et_2O) gives X. VII results most conveniently from the reaction of IV and 3-4 equivs. of PhMgBr in Et_2O at 20° for 2-3 min. The 4-monoenolate B results from the action of Grignard reagents in Et_2O on II at room temp. VI (8 g.), 20 g. Zn and 125 cc. AcOH, refluxed 1 hr., give 60% of *1,2,4-trimesitylbutane-1,4-dione-1-monoenol. A* (VIII), m. 131-1.5°; it seps. from EtOH with H_2O of crystn.; heating with I, red P and AcOH gives III. Refluxing with KOH in 95% EtOH gives VI. 1,2,4-Trimesitylbutane-1,4-dionedienolate A (IX) results from VII as above or by refluxing VIII and PhMgBr in Et_2O for 30 min.; EtOH-I gives VI; boiling AcOH gives II; refluxing with AcOH gives VIII. The IX from VIII, treated with EtOH-AcOH and then H_2O gives the free *dienol*, m. 72-3°; on standing in the air for 1 week it gives VI in quant. yield; I in EtOH also gives VI; heating with AcOH contg. a little HCl gives II. The dienolate B (X) results by enolization of VII in ether or by the action of PhMgBr on IV in ether (refluxing 5 min.); it differs from IX by its soly. in ether; EtOH-I gives VI; boiling AcOH gives III. There is a long discussion of the various reactions and of the mechanism of furan-ring closure. C. J. West

Molecular compounds between naphthalene, its α- and β-derivatives and aromatic nitro compounds. IV. Binary molecular compounds of naphthalene and naphthols with mononitro derivatives of benzene. Tiro Sinomiya. *J. Chem. Soc. Japan* **60**, 170-82(1939).—Mol. combination of $PhNO_2$ and its substitution products with naphthalene and α- and β-naphthol has been investigated by making temp.-concn. diagrams. The results obtained are compared with those for the trinitro (*C. A.* **32**, 9075[9]) and dinitro (*C. A.* **32**, 9076[8]; **33**, 563[6]) compds. The nitro compds. examd. are *o*-, *m*- and *p*-$O_2NC_6H_4CO_2H$, *o*-, *m*- and *p*-$O_2NC_6H_4CHO$, *m*- and *p*-$O_2NC_6H_4Cl$, *o*-, *m*- and *p*-$O_2NC_6H_4OH$, *m*- and *p*-$O_2NC_6H_4Br$, *m*-$O_2NC_6H_4Me$ and *o*-, *m*- and *p*-$O_2NC_6H_4NH_2$. The results indicate that (1) α-naphthol has a greater tendency to form mol. compds. than β-naphthol. (2) The reactivity of nitro compds. decreases with the decrease in no. of nitro groups. Among mononitro compds. only *m*- and *p*-$O_2NC_6H_4CO_2H$, *m*- and *p*-$O_2NC_6H_4CHO$, and *p*-$O_2NC_6H_4Cl$ form mol. compds. The reactivity is in the order, $CO_2H > CHO > Cl$ with different groups and *p*- > *m*- > *o*- with the same group. Both orders correspond to those of the dinitro compds. The order of reactivity of naphthalene, α- and β-naphthol toward *m*- and *p*-$O_2NC_6H_4CO_2H$ is $C_{10}H_8 > \alpha\text{-} > \beta$-naphthol. In this case CO_2H combines with naphthalene nucleus. Formerly it has been considered that CO_2H, like NO_2, reacts with the double bond to form a mol. compd. and its reactivity increases when the NO_2 is present at the *m*- or *p*-position to CO_2H. When NO_2 is present at the *o*-position, however, CO_2H does not show reactivity, e. g., *o*-$O_2NC_6H_4CO_2H$ combines neither with $C_{10}H_8$ nor with α-naphthol. This ortho effect, however, varies as the difference in the natures of the 2 adjacent groups become greater, e. g., the 3 $O_2NC_6H_4CHO$ do not combine with $C_{10}H_8$ but combine with naphthol. Similarly *o*-$O_2NC_6H_4CO_2H$ has considerable affinity toward α- and β-naphthylamine. Isolation of mol. compds. from solns. of those mixts. has been unsuccessful, although the T-C diagrams indicate their formation. K. S.

Steric hindrance in ketone-naphthol condensation. The condensations of the naphthols with cyclohexanone. Joseph B. Niederl, Victor Niederl and Jesse Charney. *J. Am. Chem. Soc.* **62**, 322 3(1940).—Condensation of 0.5 mol. quantities of α-$C_{10}H_7OH$ (I) and cyclohexanone (II) by passing dry HCl through the system at 30° for 6 hrs. and allowing the soln. to stand 12 hrs. at room temp. gives 80% of *1-(4'-hydroxynaphthyl)cyclohexene*, m. 80°; it couples with *p*-$O_2NC_6H_4N_2Cl$; *acetate*, m. 94°; *dibromide*, m. 147° (20% yield). Condensation of I and II at 100° gives 50% of *1,1-di(4'-hydroxynaphthyl)cyclohexane*, m. 233°; it also couples with *p*-$O_2NC_6H_4N_2Cl$; *dibenzoate*, m. 223°. Condensation of β-$C_{10}H_7OH$ and II (as described for I but allowed to stand 2 weeks) gives 20% of *2,3-tetramethylene-4,5(or 5,6)-benzocoumaran*, m. 66-8°; it did not couple with *p*-$O_2NC_6H_4N_2Cl$ and did not yield an Ac deriv. C. J. West

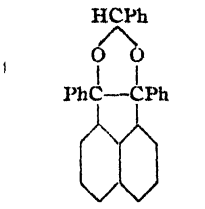
Preparation of 1,2-naphthalenediamine-5-sulfonic acid. I. I. Vorontsov, L. M. Ivanova and O. F. Avdeeva. *Org. Chem. Ind.* (U. S. S. R.) **6**, 441-5(1939).—A yield of 74% of com. 1,2,5-$(H_2N)_2C_{10}H_5SO_3H$ is obtained from 1,5-$H_2NC_{10}H_6SO_3H$, a by-product in the production of 1,8-acid, by coupling it with diazotized $PhNH_2$ and cleaving the azo dye by reduction with Fe turnings in a neutral medium at 95-8°. Equally good results can be obtained by reducing the azo compd. with $SnCl_2$ and HCl and with Zn dust in alk. medium. Chas. Blanc

Synthesis of analogs of Fast Black Base LB. B. M. Bogoslovskiĭ and L. M. Tsil'man. *Org. Chem. Ind.* (U. S. S. R.) **6**, 445-8(1939).—*Echtschwarzbase LB* (I), obtained from diazotized *o*-anisidine and 1-$C_{10}H_7NH_2$ (II) (Ger. pats. 383,903 and 403,931), gives excellent black ice dyeings on fiber impregnated with naphthols of the AS group. I analogs were prepd. by substituting 2-amino-4-nitroanisole (III) and 2-nitro-4-aminoanisole (IV) for the expensive *o*-anisidine. The required 2,4-dinitroanisole

(V), m. 86°, was prepd. in 93.3% yield by treating dropwise at room temp. 76.5 g. of 2,4-$(O_2N)_2C_6H_3Cl$ in 150 ml. MeOH with 22 g. KOH, stirring for 2 hrs., filtering and drying at 30–40°. III, m. 113°, resulted in 93% yield by reducing V in H_2O with $NaHSO_3$ and in 47.6% yield by satg. 10 g. V in 40 ml. alc. with NH_3 in the cold and then with H_2S on a water bath, adding 200 ml. H_2O, filtering and drying. IV, m. 46–7°, was prepd. in 72% yield by sapong. 6 g. 2-nitro-4-acetylaminoanisole (VI) in 100 ml. of 20% H_2SO_4 at 95–6° for 2 hrs. and neutralizing the cold soln. with 25% NH_4OH. VI, m. 144 5°, prepd. by nitrating acetyl-*p*-anisidine, m. 128° (Ger. pat. 101,778). *3-Nitro-4-methoxybenzeneazo-1-naphthylamine* (VII) resulted in 100% yield by dissolving 4.2 g. IV in 50 ml. H_2O and 13 ml. of concd. HCl at 80°, treating the soln. at 0° with 10% $NaNO_2$ and then dropwise with 3.75 g. II in 100% AcOH and continuing the stirring (22 hrs. in all). VII is filtered and dried at room temp. *5-Nitro-2-methoxybenzeneazo-1-naphthylamine* (VIII) was similarly prepd. in 95% yield from III and II. VII and VIII can also be obtained in 90% yield by coupling III and IV, resp., with II suspended at 70° in water with the addn. of green soap. The reaction requires 35 instead of the 22 hrs. of stirring. They form black powders with a bronze luster, insol. in water and Et_2O, poorly sol. in alc. and sol. in concd. H_2SO_4, AcOH and HCO_2H and hot MeOH. Coupling of diazotized III and IV with Cleve's acid in a slightly alk. medium gave 90% of the corresponding 6-sulfonic acids of VII and VIII. The dye bath is prepd. by dissolving 1 g. VII or VIII in 4 ml. of 85% HCO_2H, adding 30 ml. H_2O and 1 ml. of concd. HCl and treating the soln. with 0.26 g. $NaNO_2$ in 2 ml. H_2O. After the addn. of 1 g. NaOAc in 2 ml. H_2O, the soln. is applied to cloth impregnated with naphthols of the AS group, giving deep black dyeings fast to washing and insolation (2 months). The sulfonated VII and VIII gave brownish black dyeings with inferior stability. Chas. Blanc

Vitamin K activity of naphthoquinones. Erhard Fernholz, S. Ansbacher and H. B. MacPhillamy. *J. Am. Chem. Soc.* **62**, 430 2(1940); cf. *C. A.* **34**, 1650⁴.—Palmitoyl chloride and tetralin in CS_2 with $AlCl_3$ give 56% of *pentadecyl 5,6,7,8-tetrahydro-2-naphthyl ketone*, m. 44–5°; Clemmensen reduction gives 63% of *2-hexadecyl-5,6,7,8-tetrahydronaphthalene*, b_1 210–15°; heating with S at 200 10° for 5 hrs. gives 20% of 2-hexadecylnaphthalene, b_1 200°, m. 45–6°; CrO_3 in AcOH, heated at 60° for 1.5 hrs., gives 37% of *2-hexadecyl-1,4-naphthoquinone* (I), m. 80–1°. Similarly prepd., the *2-octadecyl deriv.* (II) m. 84–5° (23%). 2-Methyl-5,6,7,8-tetralin and stearoyl chloride give 36% of *heptadecyl 5,6,7,8-tetrahydro-3-methyl-2-naphthyl ketone*, m. 64–5°; *2-methyl-3-octadecyl-5,6,7,8-tetrahydronaphthalene*, m. 60 1°; S dehydrogenation yields 35% of *2-methyl-3-octadecylnaphthalene*, m. 47 8°, which gives 37% of *2-methyl-3-octadecyl-1,4-naphthoquanone* (III), m. 95–7°. The following assay results are reported: inactive, 1,2-naphthoquinone; weakly active in a dose of 1 mg., 2,6-di-Me, 2-allyl and 2,3-diallyl derivs. of 1,4-naphthoquinone, and I and II; 1 unit per mg., 1,4-naphthoquinone and its 2-Et and 2-Pr derivs., also III; 20 units per mg., 2,3-dimethyl-1,4-naphthoquinone; 70 units per mg., vitamin K_1. Because of these results it appears that the prepn. of other naphthoquinones would not lead to the discovery of a substance surpassing in activity 2-methyl-1,4-naphthoquinone. C. J. West

Autoxidation of benzaldehyde in the presence of 9,10-diphenylacenaphthylene. Georg Wittig and Konrad Henkel. *Ann.* **542**, 130 44(1939); cf. *C. A.* **33**, 9781.—Curves are given showing that 9,10-diphenylacenaphthylene (I) inhibits the autoxidation of BzH. Shaking 1 g. I with 30 cc. BzH until the original orange color becomes a light yellow gives 65% of the *cyclic acetal* (II) of *cis*-9,10-diphenylacenaphthylene glycol (III), m. 249–9.5°; II also results in 0.47 g. yield from 0.5 g. III or the trans isomer and BzH with gaseous HCl. II is sol. in concd. H_2SO_4 with an olive-green color. Heating II with HCl-AcOH gives diphenylacenaphthenone and BzH. The di-K or the di-Li complex of I and $PhCHCl_2$ in Et_2O, heated at 100° for 24 hrs., give 1,8-$C_{10}H_4Bz_2$ (IV). I does not react with BzO_2H in $CHCl_3$; the product from I, BzH and BzO_2H in $CHCl_3$ (7 hrs. at 25° in N) is IV; II was not observed. I is unchanged by stilbene or chlorostilbene ozonides.



(II)

These reactions were studied in an effort to ascertain the mechanism of the formation of II. The presence of I has little effect on the oxidation of BzH under the influence of light. C. J. West

Haloacenaphthenes. M. M. Dashevskiĭ and A. P. Karishin. *Org. Chem. Ind.* (U. S. S. R.) **6**, 507–11 (1939); cf. *C. A.* **32**, 2111⁹, 4974⁶.—Studies of *4,5-dichloroacenaphthene* (I) and its derivs. are continued by prepg. I from acenaphthene (II) and its 4-Cl deriv. (III) and $SOCl_2$ by the modified method of Morgan and Harrison (*C. A.* **25**, 3988). The sulfonic acids of I and 4,5-dibromoacenaphthene (IV) and their oxidation products are described for the 1st time. The chlorination was carried out in the presence and absence of the catalyst and solvents by allowing the reaction mixt. to stand at room temp. for 1–2 days, with occasional shaking, until the liberation of HCl had stopped. The filtered ppt., when washed with petr. ether and recrystd. from alc., gave I, m. 169–70°. The best results were obtained without a solvent in the presence of 0.3 g. I, *viz.*, 60% I from 63 g. III and 50 ml. $SOCl_2$ and 50% I from 50 g. II and 70 ml. $SOCl_2$. The reaction in solvents in the presence of I proceeds better in C_6H_6 than in CCl_4 and in the absence of I better in CCl_4. Other solvents ($CHCl_3$, AcOH and petr. ether) gave impure I in lower yields. Heating 1 hr. on a water bath I with 2 parts by wt. of concd. H_2SO_4 gave 100% *4,5-dichloroacenaphthene-2-sulfonic acid* (V), m. 192° (decompn.). V, treated with PCl_5, gave the *chloride* (VI), m. 175°. *Amide*, m. 270 2° (decompn.) (prepd. from VI and 10% alc. NH_3OH), when treated with Na-Hg in abs. alc., gave acenaphthene-2-sulfonamide, m. 199° (cf. Dziewonsky, *et al.*, *C. A.* **22**, 1154; **27**, 4534). Oxidation of V with $K_2Cr_2O_7$ in glacial AcOH gave *4,5-dichloro-2-sulfonaphthalic acid*, m. 229–30°; it forms the anhydride at 160°. Its *sulfonyl chloride* m. 219–20°, and *amide* does not m. 380–2° (decompn.). I with 4 parts by wt. of concd. H_2SO_4 gave a mixt. of V and *2,7-disulfonic acid* (VII), which were sepd. as Ba salts. VII, m. 265 6°, formed the *chloride*, m. 198–200°, and *diamide*, does not m. 400°. *4,5-Dichloro-2,7-disulfonaphthalic acid*, m. 176–7° (decompn.). IV, obtained by the method described in an earlier paper, gave compds. analogous to I. *2-Sulfonic acid*, colorless needles from AcOH, m. 240° (decompn.); *chloride*, m. 190–1°; *amide*, m. 260–2°. *4,5-Dibromo-2-sulfonaphthalic acid* m. 235–6° and forms the anhydride at 154°. *4,5-Dibromoacenaphthene-2,7-disulfonic acid*, colorless, m. 252° (decompn.); *chloride*, m. 197–8° (decompn.); *amide*, m. 274–5°. *4,5-Dibromo-2,7-disulfonaphthalic acid*, m. 159–60° (decompn.). Chas. Blanc

Polycyclic aromatic hydrocarbons. XXI. G. M. Badger, J. W. Cook and F. Goulden. *J. Chem. Soc.* **1940**, 16–18; cf. *C. A.* **33**, 33687.—6-Methyl-1,2-benzanthraquinone and MeMgI in C_6H_6-Et_2O, decompd. with NH_4Cl and the crude product triturated with C_6H_{12}-cyclohexane, give *9,10-dihydroxy-6,9,10-trimethyl-9,10-dihydro-1,2-benzanthracene* (I), m. 151–2°; if the crude product is treated with MeOH-HCl there results from 7.1 g. quinone 2.35 g. of the *9,10-di-Me ether* (II) of I, m. 232–3.5°. Shaking 2 g. II in Et_2O with 0.28 g. Na for 24 hrs. gives 1.5 g. of *6,9,10-trimethyl-1,2-benzanthracene*, yellow, m. 157–8°, purified through the *picrate*, lustrous purplish brown, m. 145–6°. The Grignard reagent (IIA) from 3-bromo-*o*-xylene and 1,2-$C_{10}H_6(CO)_2O$ in Et_2O-C_6H_6, boiled 2 hrs.,

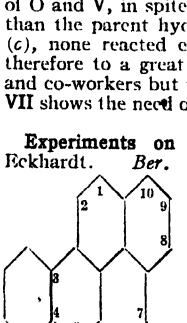
give *2-(2',3'-dimethylbenzoyl)-1-naphthoic acid* (III). Heating partially purified III with Ac_2O in C_5H_5N gives the *acetoxy lactone*, m. 189–91°, from which pure III, m. 168–9°, was obtained by hydrolysis with alc. KOH. III (5 g.) and 5 cc. BzCl with a few drops of concd. H_2SO_4, heated 1 hr. at 130°, give 95% of 5,6-dimethyl-1,2-benzanthraquinone which with MeMgI yields *9,10-dihydroxy-5,6,9,10-tetramethyl-9,10-dihydro-1,2-benzanthracene*, m. 217–19°; MeOH-HCl gives the *9,10-di-Me ether* (IV), m. 229–30°. Shaking IV with Na in ether gives *5,6,9,10-tetramethyl-1,2-benzanthracene*, pale yellow, m. 132–3°; *picrate*, purplish brown, m. 120–1°, the dissocn. of which is effected by passing its C_6H_6 soln. through Al_2O_3. IIA and 21 g. $C_6H_4(CO)_2O$ give 25 g. *2-(2',3'-dimethylbenzoyl)-benzoic acid*, m. 126–7°, which forms 80% of 1,2-dimethylanthraquinone (V), pale yellow, m. 154.5–5.5°; reduction gives 86% of *1,2-dimethylanthracene*, $b_{0.4}$ 180°, m. 85.5–6°; V and MeMgI give *9,10-dihydroxy-1,2,9,10-tetramethyl-9,10-dihydroanthracene*, m. 162 3°; *di-Me ether*, m. 140–1.5°; this ether is recovered unchanged after shaking with Na in Et_2O for 6 days. C. J. West

o-Halide synthesis of 10-methyl-1',9-methylene-1,2-benzanthracene. Louis F. Fieser and James Cason. *J. Am. Chem. Soc.* **62**, 432–6(1940).—Since attempts to introduce Me or HO groups into 1',9-methylene-1,2-benzanthracene by direct substitution offered little promise of success, a 2nd synthesis was investigated which affords a route not only to the parent hydrocarbon but to various 10-substituted derivs. The method embodies the general scheme of synthesis of anthracene derivs. of F. and Seligman (*C. A.* **33**, 1719[3]). This involves the prepn., through a Grignard reaction and reduction of a suitable *o*-halide of a diphenylmethane, conversion through the nitrile to the acid and ring closure. The halogen may be introduced in various sequences into either aromatic ring, giving considerable flexibility to the method. Com. 95% acenaphthene (I) (154 g.) in 1 l. AcOH at 60–70°, treated with 820 g. red lead (85–90%) (added in 50-g. portions over 40 min. with stirring), the reaction mixt. poured into 2 l. H_2O and the pptd. oil extd. with Et_2O, gives 170–5 g. of crude 7-acenaphthenyl acetate, b_6 166–8°; this yield is about that obtained with $Pb(OAc)_4$; hydrolysis with 40 g. NaOH in 400 cc. H_2O and 275 cc. MeOH (refluxing 2 hrs.) gives 70.5–4% of 7-acenaphthenol (II) (based on I), m. 144.5–5.5° (all m. ps. cor.). Oxidation of 100 g. II in 300 cc. AcOH with 43 g. CrO_3 in AcOH-H_2O, added during 50 min. at 28–32°, gives 65% of 7-acenaphthenone (III), m. 121–1.5°. III (45 g.) in 125 cc. C_6H_6 and 70 cc. Et_2O, added during 15 min. to *o*-ClC_6H_4MgBr (from 67.6 g. *o*-BrC_6H_4Cl), refluxed 15 min. and the reaction product decompd. with 55 cc. satd. NH_4Cl gives *7-(o-chlorophenyl)-acenaphthen-7-ol* (IV); crystn. from C_6H_6 gives only 15–20% of pure IV, m. 216–18°; the best over-all yield of *7-(o-chlorophenyl)acenaphthylene* (V), yellow-orange, m. 104–4.4°, results by the dehydration of the crude IV by refluxing with 225 cc. AcOH for 1 hr. and passing through a column of activated Al_2O_3 and Supercel (1:1); the yield of V suitable for hydrogenation is 33–6%. Catalytic reduction of 32 g. V in 155 cc. AcOH and 15 cc. Et_2O at room temp. (0.8 g. Adams catalyst) gives 95% of *7-(o-chlorophenyl)acenaphthene* (VI), b_2 190–2°, m. 81–2°. VI (35.6 g.), 11.5 g. CuCN, 3 cc. MeCN and 31 cc. C_5H_5N, heated in an autoclave under N (initial pressure 800 lb.) at 243–5° for 25 hrs. give 87% of *o-(7-acenaphthyl)benzonitrile* (VII), b_3 208–12°, m. 79.7–80.5°; longer heating decreases the yield of VII: 35 hrs., 74.5%; 48 hrs., 66.5%; 60 hrs., 20%. Refluxing 25.9 g. VII and 164 g. KOH in 1050 cc. EtOH and 590 cc. H_2O in a Cu flask for 25 hrs. gives 69% of *o-(7-acenaphthyl)benzoic acid* (VIII), m. 195–5.5°; if the hydrolysis is conducted at 120° (17 hrs.) the yield is only 5%; after 65 hrs. at 100° it is 40%; hydrolysis for 100 hrs. gives 32.5% of the *benzamide* (IX), m. 182–2.8°, and 40.5% of VIII. IX with $AmNO_2$ in AcOH gives only a nonacidic, amorphous, red material. Refluxing 0.5 g. VIII, 3 cc. AcOH, 2.5 cc. Ac_2O and a trace of $ZnCl_2$ for 1 hr. gives 83% of *10-acetoxy-1',9-methylene-1,2-benzanthracene* (X), straw-colored, m. 175–9°; boiling with AcOH causes decompn. but it may be recrystd. from boiling EtOH. Reduction of X with Zn and alkali gives 51.5% of 1',9-methylene-1,2-benzanthracene (XI) (overall yield in 10 steps from I, 3.8%). For the prepn. of XIII it is desirable to cyclize VIII under conditions most favorable for retaining the product in the anthrone form and avoiding enolization; the HF method was therefore used. VIII (5 g.) and 100 g. HF were allowed to stand for 15 min. and the crude dried product was added in 0.5-g. lots to 5 equivs. of MeMgCl in Et_2O; decompn. with dil. acid gives 43–54% of *1',9-methylene-1,2-benz-10-anthranol* (XII), pale yellow, m. 160–4° (decompn.); it turns red rapidly in boiling C_6H_6 or cold dioxane; XII is highly fluorescent in dil. EtOH soln. and $FeCl_3$ gives an orange-red color; extensive decompn. occurs on attempted acetylation. Reduction with Zn and alkali gives 35% of XI. Heating XII on a hot plate for a short time gives 0.8–1.2% of the *10-Me deriv.* (XIII) of XI, pale orange, m. 181–1.4°; the *trinitrobenzene deriv.*, bright orange, m. 182.5–3.2°, is not suitable for purifying XIII; the dark red picrate is too unstable to be useful as a deriv. LiMe in Et_2O gives the same yield of XIII as the Grignard reagent. The low yields seem to be due to extensive and rapid isomerization to the anthranol. XIII is of special interest because of its structural relationship to the potently carcinogenic 9,10-dimethyl-1,2-benzanthracene. C. J. West

Action of perbenzoic acid on aromatic hydrocarbons. Hans-Joachim Eckhardt. *Ber.* **73B**, 13–15(1940).—Fieser and co-workers (*C. A.* **33**, 574[9]) have shown that the carcinogenic hydrocarbons are to a certain extent characterized by special chem. reactivity. A large part, e.g., are oxidized by $Pb(OAc)_4$. Methylcholanthrene (I) and 3,4-benzopyrene (II) are attacked with special ease by this reagent and are followed, in order of decreasing reactivity, by the methyl-1,2-benzanthracenes, while 1,2,5,6-dibenzanthracene reacts only very weakly. A noteworthy fact is that the carcinogenic activity of these hydrocarbons decreases in the same order. It is therefore of interest to test other oxidizing agents for their reactivity toward aromatic hydrocarbons and E. has carried out expts. in which various compds. (0.625×10^{-3} mol. in $CHCl_3$) were treated with an excess of BzO_2H (100 cc. of 0.1 *N* soln., or 8 atoms active O per mol.), made up to 250 cc. with $CHCl_3$ and allowed to stand at 4°, and the amts. of BzO_2H used up were detd. at definite intervals of time. The substances studied were: (*a*) Carcinogenic hydrocarbons: I, II, 1,2-benzanthracene, 4- and 6-methyl-1,2-benzanthracene and III. (*b*) Derivs. of (*a*): 5-nitrobenzopyrene (IV), benzopyrene-5-aldehyde (V). (*c*) Noncarcinogenic hydrocarbons: fluorene, naphthalene, phenanthrene, anthracene (VI), chrysene and pyrene (VII). The carcinogenic hydrocarbons all reacted more or less (I and II most), while the physiologically inactive IV consumed only a trace of O and V, in spite of its CHO group, was attacked less than the parent hydrocarbon. Of the compds. of group (*c*), none reacted except VI and VII. The results are therefore to a great extent in harmony with those of F. and co-workers but the discrepancy in the case of VI and VII shows the need of caution in interpreting them.

C. A. R.

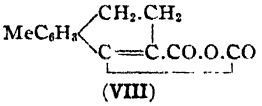
Experiments on 3,4-benzopyrene. Hans-Joachim Eckhardt. *Ber.* **73B**, 15–18(1940).—(The notation



is used in this paper.) Windaus and Raichle (*C. A.* **33**, 2133[9]) have shown that the Ac group in the acetyl-3,4-benzopyrene described by W. and Rennhak (*C. A.* **32**, 546[7]) is very probably on the 10-C atom, whereas in the nitrobenzopyrene (I) this position of the substituent is excluded. The work of Vollmann and colleagues (*C. A.* **32**, 145[9]) on pyrene and benzopyrene, who showed that the 3-, 5-, 8- and 10-C atoms are by far the most reactive, therefore made it probable that in I the

nitro group is at position 5 or 8. This working hypothesis was confirmed by oxidation expts. with CrO_3. On energetic oxidation (300 mg. I in 110 cc. boiling AcOH treated with 1.5 g. CrO_3 in 10 cc. AcOH-H_2O and refluxed 15 min.) I yielded benzanthrone-*peri*-dicarboxylic anhydride, m. 364–5° (decompn.), and hence the NO_2 group can have been only at position 5, 8, 9 or 10. Position 10 is excluded, as stated above, and so is 9, for Vollmann and co-workers have shown that in pyrene the 9-C atom is extraordinarily unreactive. Under milder conditions (1300 mg. I in 1300 cc. AcOH and 1.9 g. CrO_3 in 10 cc. AcOH-H_2O heated 15 min. at 90°) there was obtained a benzopyrenequinone mixt. contg. only traces of N and yielding on reductive acetylation benzopyrene-5,10- and 5,8-hydroquinone diacetates, m. 241° and 202–3°, resp. This eliminates position 8 for the nitro group in I, for an 8-nitrobenzopyrene on oxidation should give only pure benzopyrene-5,8-quinone or a mixt. of this with 5-nitrobenzopyrene-5,10-quinone. That I is the 5-nitro compd. has in the meantime been confirmed by Fieser and Hershberg (*C. A.* **33**, 6299[9]). C. A. R.

A novel natural quinone dye of a phenanthrofuran class. F. Wessely and Shiu Wang. *Ber.* **73B**, 19–24(1940).—Nakao and Fukushima (*C. A.* **29**, 788[5]) isolated from the Chinese drug *tanshen* (root of *Salvia miltiorrhizae*) 3 cryst. dyes, 1 of which, Tanshinone I Blue (I) is the subject of this paper. The empirical formula $C_{18}H_{12}O_3$ and the presence of 2 *o*-quinone O atoms have been confirmed. In oxidation expts. with either CrO_3 or H_2O_2 there was obtained, along with small amts. of other products not yet extensively investigated, a well-crystd. yellow *acid anhydride* $C_{13}H_6O_3$ (II), m. 196°, apparently identical with the degradation product described by N. and F. The corresponding *acid*, $C_{18}H_{10}O_4$ (III), m. 192° (decompn.), readily regenerates II. The compn. of II and the fact that 1 mol. AcOH is formed in its CrO_3 oxidation suggested that II is the anhydride of a methylnaphthalenedicarboxylic acid. Decarboxylation of III by heating the Na salt over a free flame yielded 1-$C_{10}H_7Me$, of which there are 6 possible dicarboxyl derivs. The 4,5-positions for the CO_2H groups (Me = 1) seemed improbable, for II, unlike naphthalic anhydride, is very easily esterified by alc. That II is the 5,6-compd. was established by its synthesis by the following reactions (R = *o*-MeC_6H_4): RCH_2CH_2Cl (IV) (+ $CH_2(CO_2Et)_2$) → $RCH_2CH_2CH(CO_2H)_2$ (V) (− CO_2) → $RCH_2CH_2CH_2CO_2Et$ (VI) (+ $(CO_2Et)_2$) → $RCH_2CH_2CH(CO_2Et)COCO_2Et$ (VII) (+ concd. H_2SO_4) → VIII (− H) → II. As 2 of the O atoms in I are present in the



(VIII)

form of an *o*-quinone, the presence of a 3rd condensed ring may be assumed in I, which could then be represented by the formula $C_{15}H_8O_2(:C_2H_4O)$ where $C_{18}H_8O_2$ is an 8-methyl-1,2-, 2,3- or 3,4-phenanthrenequinone (*C. A.* notation) residue. All efforts to characterize the O atom in the residue C_2H_4O failed and it can be present only in ether union. Since I on CrO_3 oxidation gives 2 mols. AcOH and 1 Me group attached to C is in the $C_{18}H_8O_2$ residue, the 2nd must be in the residue C_2H_4O. On catalytic hydrogenation I rapidly absorbs 1 mol. H and is decolorized, the quinone color being restored on shaking with air. Further absorption of H (between 3 and 4 mols. in all) is quite slow; there can therefore be no aliphatic double or even triple bond in the residue C_2H_4O. All the known facts are best explained by formulating this residue as —CMe:CH.O— or —CH:CMe.O— (forming part of a ring); its attachment to the rest of the mol. is possible only if the residue $C_{18}H_8O_2$ is a 3,4- or 1,2-phenanthrenequinone. I would then be 1 of 8 possible *methylphenanthrofuran-o-quinones*. The method of prepg. I, which differed materially from that of N. and F., will be described elsewhere. After repeated crystn. of the crude product from AcOH and xylene, I formed prisms with brown luster, m. 232–4°. Reductive acetylation (Zn dust, Ac_2O and NaOAc at 140–50°) gave a white cryst. *diacetate*, $C_{22}H_{16}O_6$, m. 209°, and reductive methylation (Zn dust and NaOH in hot alc., followed by treatment with Me_2SO_4) yielded a *di-Me ether*, $C_{20}H_{12}O_3$, faintly yellow, m. 93–4.5°. *Quinoxaline*, $C_{24}H_{16}ON_2$, obtained quantitatively from I and 2 mols. *o*-$C_6H_4(NH_2)_2$ in AcOH-EtOH on the water bath, brown crystals from ether, m. 221–2° and, after resolidification, m. 196°, but if the melt is seeded with the 222°-form it again m. 222°. *γ-o-Tolyl-α-carboxybutyric acid* (V), m. 139°, is obtained in 60–70% yield from 16.3 g. IV, 24.5 g. $CH_2(CO_2Et)_2$ and 3.7 g. Na boiled 18 hrs. in 55 cc. alc., followed by sapon. with KOH of the *di-Et ester*, b_9 185–7°. *Et γ-o-tolylbutyrate* (VI), b_9 140–50°; the free *acid*, m. 70.5°, was obtained quantitatively by heating V at 160°. *Di-Et α-oxalyl-γ-o-tolylbutyrate* (VII), from dry EtOK, $(CO_2Et)_2$ and III allowed to stand overnight, then decompd. with acid and taken up in ether, decomps. on distn. even *in vacuo* and was used without further purification. *1-Methyl-7,8-dihydronaphthalene-5,6-dicarboxylic anhydride* (VIII), from VII allowed to stand 1.5 hrs. at room temp. in 8 parts concd. H_2SO_4, faintly yellow, m. 161°, gave with S at 150–70° 80% of a yellow compd., m. 196.5°, which did not depress the m. p. of II and yielded the same *ethylimide*, faintly yellow, m. 181.5°, as did II. C. A. R.

Sugar-amino-acid compounds. Tosinori Iseki and Tukouru Sugiura. *J. Biochem.* (Japan) **30**, 119–23 (1939).—In connection with the proposed synthesis of derivs. of hydroxymethylfurfural (I) which would be both carbohydrate and amino acid derivs. (*C. A.* **27**, 2953), I has been condensed with a no. of N-contg. compds. to obtain information on its reaction possibilities with amino compds. *Bis(pyromucamidemethyl) ether* [*bis(5-carbamylfurfuryl) ether*], [O.C(CONH$_2$):CH.CH:C-CH_2]$_2$O (98% from the corresponding bis(5-carbonyl chloride) (II) and 5 cc. concd. aq. NH_3 allowed to stand 14 days in the ice chest), m. 204°, sol. in hot water, alc. and AcOH. *Bis(5-phenylcarbamyl) analog* (100% from II and aniline in benzene), m. 169°, reacts acid to litmus, is sol. in org. solvents. *Bis(5-o-hydroxyphenylcarbamyl) compd.*, from *o*-$HOC_6H_4NH_2$, m. 329°, insol. in water, very little sol. in org. solvents. *Bis(Et pyromucurate-methyl) ether* [*bis(carbethoxymethylcarbamylfurfuryl) ether*]. [O.C(CO-NHCH$_2$CO$_2$Et):CH.CH:CCH$_2$]$_2$O, m. 107°, is obtained in 1.22 g. yield by adding 1.4 g. freshly distd. $H_2NCH_2CO_2Et$ (III) dropwise to 1 g. II in ice-cold acetone, filtering off the III.HCl which at once seps., concg. the filtrate without heat to 8 cc., adding 20 cc. dry ether and rubbing with a glass rod; it is hardly sol. in cold water but easily sol. in hot water and in org. solvents. Free *acid* (0.22 g. from 0.31 g. of the ester in 50 cc. water refluxed 70 min. with 14 cc. of 0.1 *N* NaOH), m. 223°. *Bis[5-(cinchoninic acid) furan-2-methyl] ether* [*bis(5-(4-carboxy-2-quinolyl)-furfuryl) ether*], from 1 mol. bis(5-formylfurfuryl) ether and 2 mols. $AcCO_2H$ in abs. alc. slowly treated with 2 mols. alc. aniline and refluxed 3 hrs., m. 251°, easily sol. in dil. alkalies, Na_2CO_3 and pyridine, very little sol. in org. solvents. C. A. R.

Dibenzofuran. XIII. Orientation and substituted amines. Henry Gilman, Paul T. Parker, James C. Bailie and Geo. E. Brown. *J. Am. Chem. Soc.* **61**, 2836–45(1939); cf. *C. A.* **33**, 6302[7].—Incidental to the detn. of structure of substituted amines, it is now shown that the generalizations on orientation postulated previously are adequate for the predominant products which result from polysubstitution of the dibenzofuran nucleus. Bromination of 4-methoxydibenzofuran (I) gives the 1-Br deriv. (IA), the Grignard reagent from which reacts with CO_2 to give 62% of *4-methoxy-1-dibenzofurancarboxylic acid* (II), m. 279–80° (decompn.), and with $(C_2H_4)_2O$ to give 59% of *1-β-hydroxyethyl-4-methoxydibenzofuran* (III), b_2 195–206°, m. 96–6.5°; passing dry HBr through III at 100° for 2.5 hrs. gives the *β-bromoethyl deriv.*, m. 91–1.5°; Et_2NH in EtOH at 100° for 6 hrs. gives 68% of the *1-β-diethylaminoethyl deriv.*, whose

HCl salt m. 187° (decompn.). I and AcCl with $AlCl_3$ in CS_2 give 66% of the *1-Ac deriv.* (IV), m. 134–4.5°; oxidation gives II; *oxime* of IV, m. 176–7.5°; Beckmann rearrangement with PCl_5 in C_6H_6 gives 95% of *1-acetamino-4-methoxydibenzofuran*, m. 222–3°; HNO_3 in AcOH gives 74% of the *Ac deriv.* (IVA), m. 244°, of *1-amino-2-nitro-4-methoxydibenzofuran* (V), m. 206–7°; through addn. of V in C_5H_5N to HNO_2 ($NaNO_2$ and H_2SO_4) at 5–10° there results 35% of *2-nitro-4-methoxydibenzofuran*, light yellow, m. 185–6°; *2-NH_2 deriv.*, m. 127–7.5°. 3-Aminodibenzofuran (VI) and nitrourea in EtOH give 66.5% of *3-dibenzofurylurea*, m. 222–3° (Ni block). The Li deriv. of dibenzofuran and Br vapor give 40.5% of the *4-Br deriv.*, m. 70–1°; HNO_3 in AcOH gives the *7-NO_2 deriv.* (VII), m. 205°. 4-Iododibenzofuran gives 32.4% of the *7-NO_2 deriv.* (VIII), yellow, m. 223°. Reduction of VII with Pd catalyst (15 pounds H pressure) gives 40% of VI; VIII gives 32% of 3-nitrodibenzofuran. Me 4-dibenzofurancarboxylate and AcCl with $AlCl_3$ in CS_2 give 15.5% of *Me 2-acetyl-6-dibenzofurancarboxylate*, m. 174–5°; the free *acid*, m. 262–5°, is decarboxylated to 2-acetyldibenzofuran (IX). 3-Nitrodibenzofuran and AcCl with $AlCl_3$ in $PhNO_2$ give 93.5% of *2-acetyl-8-nitrodibenzofuran* (X), m. 212–13°; no reaction occurs in CS_2. Catalytic reduction of X gives the *7-NH_2 deriv.* (XI), m. 158–9°; *Ac deriv.*, m. 203° (*oxime*, m. 203°). Through the diazo reaction XI gives IX. Oxidation of X with CrO_3 in AcOH (heating 3 hrs.) gives 72% of *3-nitro-8-dibenzofurancarboxylic acid* (XII), decomps. 300°. Me 3-dibenzofurancarboxylate with HNO_3 gives 31.8% of *Me 2-nitro-7-dibenzofurancarboxylate* (XIII), m. 235.6°, and an ester, m. 202–3°, probably the Me ester of 3-nitro-7-dibenzofurancarboxylic acid. The free acid from XIII did not m. 330° and is decarboxylated to 2-nitrodibenzofuran VI and NH_4SCN in 95% AcOH at 1.3°, treated with Br in AcOH, give 43% of *3-amino-2-dibenzofuryl thiocyanate*, m. 175°; Pb tartrate gives a yellow color, refluxing with EtOH-HCl for 0.5 hr. gives *2-aminobenzofuro[2,3-f]benzothiazole*, m. 268.9° (*HCl salt*, decomps. above 300°). Dibenzofuran and AcCl with $AlCl_3$ in CS_2 give 46–57% of IX and 8% of the 2,8-di-Ac deriv. (XIV); with $PhNO_2$ the yield of IX is 40%; with Ac_2O there is a slightly higher yield of XV. IX and AcCl with $AlCl_3$ in CS_2 give 32% of XIV, m. 160°. Oxidation of XIV gives 2,8-dibenzofurandicarboxylic acid, which is also obtained in poor yield by carbonation of the di-Grignard reagent from 2,8-dibromofuran (XV) but is best prepd. from the di-Li compd. The *oxime* of IX m. 139–40°. XV and AcCl with $AlCl_3$ in CS_2 give 35% of the *3-Ac deriv.*, m. 157–7.5°; catalytic removal of the Br atoms gives 3-acetyldibenzofuran, m. 120–2°. Nitration of IX gives a NO_2 acid, m. 290°. Me 2-dibenzofurancarboxylate and HNO_3 give as 1 of the products the Me ester of XII, m. 239–40°. 2-Bromodibenzofuran and AcCl give 32% of the 8-Ac deriv., b. 205°, which is oxidized by NaOCl to 2-bromo-8-dibenzofurancarboxylic acid (XVI), m. 328°. Et 2-dibenzofurancarboxylate and Br in AcOH give 28% of the *Et ester* of XVI, m. 130°. IA and HNO_3 in AcOH at 90–5° (1.5 hrs.) give 47.5% of *1-bromo-3-nitro-4-methoxydibenzofuran*, m. 160–1°; *3-NH_2 deriv.*, m. 135–6° (*Ac deriv.*, m. 178–9°). Dibenzofuran and succinic anhydride with $AlCl_3$ in $C_2H_2Cl_4$ and $PhNO_2$ give 83% of *β-(2-dibenzofuroyl)propionic acid*, m. 185–6°; Clemmensen reduction in PhMe gives 83% of *β-(2-dibenzofuryl)-butyric acid*, m. 112–13°; 88% H_2SO_4 at room temp. for 15 min. gives 45% of *7-keto-7,8,9,10-tetrahydrobenzo[b]-naphtho[2,3-d]furan* (XVII), m. 137°; *oxime*, m. 212–13°; reduction of the oxime with 2% Na-Hg in abs. EtOH at 55–60° gives 54% of the *HCl salt*, m. 266–7°, of *7-amino-7,8,9,10-tetrahydrobenzo[b]naphtho[2,3-d]furan*. XVII, Me_2NH.HCl and trioxymethylene in AmOH, refluxed 5 min., give 14.3% of the *8-dimethylaminomethyl deriv.* of XVII; a longer reaction period did not improve the yield. IX and HCO_2NH_4 in AcOH give *2-α-aminoethyldibenzofuran-HCl*, m. 222–3°. The bromide from methyl-2-dibenzofurylcarbinol and Et_2NH give *2-α-diethylaminoethyldibenzofuran*, whose *picrate* m. 173–4°. IX, Me_2NH.HCl and trioxymethylene in abs. EtOH, heated 12 hrs. on the steam bath, give 74% of *2-β-dimethylaminopropionyldibenzofuran*, m. 88–9°; *HCl salt*, m. 194–5°. 3-Aminodibenzofuran and *p*-$MeC_6H_4SO_3Et$, heated 1 hr. at 175–85°, give 33% of *3-ethylaminodibenzofuran-HCl* (XVIII), m. 228–9° (decompn.); the free base m. 69–70°; HNO_2 gives *3-ethylnitrosoaminodibenzofuran*, bright orange, m. 136–7°; $SnCl_2$ and HCl give XVIII. VI with Ac_2O in a mixt. of 150 cc. AcOH and 200 cc. H_2O gives 97% of the mono-Ac deriv.; HNO_3 in AcOH gives 76% of the 2-NO_2 deriv.; reduction with $SnCl_2$ and HCl in AcOH gives 55% of 2-methyl-1-benzofuro[2,3-*f*]benzimidazole, m. 270°; HCl salt, m. above 335°. IVA with $SnCl_2$ in HCl-AcOH, refluxing 5.5 hrs., gives 72.5% of *2-methyl-5-methoxy-1-benzofuro[3,2-e]benzimidazole*, m. 222–2.5°; *HCl salt*, m. 306–7° (decompn.). 2-Acetyl-7-acetaminodibenzofuran and fuming HNO_3 in AcOH give 64% of the *8-NO_2 deriv.*, m. 270–1°; catalytic reduction with Raney Ni at 100° under a H pressure of 45 lbs. gives 55% of *2-methyl-8-acetyl-1-benzofuro[2,3-f]benzimidazole*, m. 298°; *HCl salt*, m. about 325° (decompn.). Dibenzofuran and BuLi in Et_2O, refluxed 4.5 hrs. in an atm. of N, cooled to 0–5° and treated with isoquinoline, give 11.3% of *1-(4-dibenzofuryl)isoquinoline*, m. 137–8°; the HCl salt is immediately hydrolyzed by H_2O. 4-Dibenzofurancarbonyl chloride and CH_2N_2 give a quant. yield of crude diazomethyl 4-dibenzofuryl ketone, m. 72–5°; 5 g. in 100 cc. dioxane, heated on the steam bath, treated with 25 cc. concd. NH_4OH and then with 5 cc. of 10% $AgNO_3$, gives 67% of *4-dibenzofurylacetamide*, m. 211–12°; refluxing with 15% NaOH for 5 hrs. gives 82% of *4-dibenzofurylacetic acid* (XIX), m. 213.5–14.5°. The acid chloride of XIX in Et_2O and an aq. soln. of 3,4-dimethoxy-α-aminoacetophenone-HCl with KOH give 57% of *3,4-Dimethoxy-α-(4-dibenzofurylacetamino)acetophenone*, m. 186.7°; 4-dibenzofurancarbonyl chloride gives *3,4-dimethoxy-α-(4-dibenzofuroylamino)acetophenone*, m. 178–9°. XIV. **Diazo coupling of 2-, 3- and 4-hydroxy compounds.** Henry Gilman and Marian Weston Van Ess. *Ibid.* 3146–8.—2-Hydroxydibenzofuran in KOH at 0°, treated dropwise with PhN_2Cl, gives the *1-benzeneazo deriv.* (I), red, m. 165.5–6°. *2-Benzeneazo-3-hydroxy analog* (II), golden brown, m. 177–8° (73% yield); *1-benzeneazo-4-hydroxy analog* (III), yellow-orange, m. 174–5°. The structures of these compds. follow from their conversion to the corresponding Br derivs. I in AcOH with $SnCl_2$ in HCl gives a quant. yield of the 1-NH_2 deriv. (IV); the HBr salt of IV in H_2O is gradually poured into a soln. of $NaNO_2$ and $CuSO_4$ in H_2O (both at 0°) and after 15 min. the diazo soln. is poured into CuBr and HBr is added, giving 1-bromo-2-hydroxydibenzofuran. In the same way II and III were converted to the known Br derivs. The non-isolation of any 4-benzeneazo deriv. in the prepn. of II indicates absence of any fixed bond structure in these simple types. XV. **1,4- and 1,4,6-Derivatives.** Henry Gilman and Lee C. Cheney. *Ibid.* 3149–56.—Incidental to studies concerned with the bridging of the 1- and 9-positions in dibenzofuran types, series of 1,4- and 1,4,6-derivs. have been synthesized. In these compds. the 4- and 4,6-substituents are strong *o,p*-directors. 4-Hydroxy-6-methoxydibenzofuran (I) with HBr in AcOH gives 91.6% of 4,6-dihydroxydibenzofuran (II), m. 200–2°. II (0.115 mole), 0.345 mole of Me_2SO_4, 39 ml. of 60% KOH and Me_2CO give a nearly quant. yield of *4,6-dimethoxydibenzofuran* (III), m. 128–9°; *picrate*, deep yellow, m. 161–2°. III and AcCl with $AlCl_3$ in $PhNO_2$ give 60% of the *1-Ac deriv.* (IV), m. 178.5–9.5°. The *oxime* of IV, m. 203–4°, with PCl_5 in C_6H_6 gives 76.4% of *1-acetamino-4,6-dimethoxydibenzofuran*, m. 244–5°; hydrolysis gives the HCl salt, m. 286–7°, of the 1-NH_2 deriv. (V) of III, m. 162–2.5°. I (4.28 g.) in 15 ml. 15% KOH and 385 ml. H_2O, treated with the PhN_2Cl from 0.02 mole $PhNH_2$ at 3°, gives 56.6% of *1-benzeneazo-4-hydroxy-6-methoxydibenzofuran*, rust-colored, m. 175°; Me_2SO_4 and KOH in Me_2CO give 88% of the *4,6-di-MeO deriv.*, deep orange, m. 170°; reduction gives 32.8% of V. 4-Methoxydibenzofuran (VI) and 10% excess of $(COCl)_2$ in $PhNO_2$, treated with 10% excess $AlCl_3$ at 0° and allowed to stand at room temp.

for 28 hrs., give a mixt. of 3 products; extn. of the amorphous product with 5% NaOH gives *4-methoxy-1-dibenzofurancarboxylic acid*, m. 276–7°; the alkali-insol. solid, extd. with AcOH, gives 18% of *bis(4-methoxy-1-dibenzofuryl) ketone*, m. 234°; the AcOH-insol. portion is *bi(4-methoxy-1-dibenzofuroyl)*, pale yellow, m. 329°, 34.6% yield. VI and $ClCH_2COCl$ with $AlCl_3$ in $PhNO_2$ give 53.2% of the *1-chloroacetyl deriv.*, m. 165–6°; $ClCOCO_2Et$ gives 43% of the *1-ethoxalyl deriv.*, m. 113°; hydrolysis with 15% NaOH gives *4-methoxy-1-dibenzofuryl-α-oxoacetic acid*, pale yellow, m. 187° (*semicarbazone*, m. 211.5–12° (decompn.)). III (4.86 g.) and $(COCl)_2$ with $AlCl_3$ in $PhNO_2$ give 0.37 g. 4,6-dimethoxy-1-dibenzofurancarboxylic acid, m. 297–8°; 10.4% of *bis(4,6-dimethoxy-1-benzofuryl) ketone*, m. 254–5°, sol. in AcOH, and 60.7% of *bi(4,6-dimethoxy-1-dibenzofuroyl)*, pale yellow, m. above 300°, insol. in AcOH. 3-Hydroxy-4-methoxydibenzofuran (VII) and HBr in AcOH give 88% of *3,4-dihydroxydibenzofuran* (VIII), m. 164–4.5°; *di-Ac deriv.*, m. 104–5°. VII and Me_2SO_4 with 10% NaOH give 81% of the *3,4-di-Me ether* (IX), m. 60–1°. IX and AcCl give 55.5% of the *1-Ac deriv.* (X), m. 90.5–1°. The *oxime* of X, m. 156–7°, is rearranged by PCl_5 in C_6H_6 to give 94% of *1-acetamino-3,4-dimethoxydibenzofuran*, m. 156–7°; hydrolysis gives *1-amino-3,4-dimethoxydibenzofuran*, m. 162.5–3°, which also results in 10% yield on heating the 1-Br deriv. of IX with concd. NH_4OH and CuBr for 14.5 hrs. at 220–30°. III (22.8 g.) in 600 ml. AcOH and 100 ml. of *M* Br soln. in AcOH give 73% of the *1-Br deriv.*, m. 152°, and 12% of a product m. 144–7°; III (3 g.) and 52.7 ml. of a 0.5 *M* Br-AcOH soln. give 74% of the *1,9-di-Br deriv.* (XI), m. 167–8°. II gives a nearly quant. yield of the *1,9-di-Br deriv.*, m. 239–40° (decompn.); Me_2SO_4 gives XI. I gives 58.6% of the *1,3-di-Br deriv.*, m. 177–8°; Me_2SO_4 gives the *1,3-di-Br deriv.* of III, m. 173.5–4°. IX forms 88.5% of the *1-Br deriv.*, m. 108°; VII yields 54.6% of the *1-Br deriv.*, m. 161–2°, which was also prepd. from 1-bromo-3-amino-4-methoxydibenzofuran through the diazo reaction in 21% yield. 4-Bromo-6-methoxydibenzofuran *(XII) and HI (d. 1.67) give 19% of the *6-HO analog*, m. 138–9°; $FeCl_3$ gives a green color. XII, CuBr and NH_4OH, heated in a steel bomb for 10 hrs. at 100° and for 8 hrs. at 215°, give 51% of the *IICl salt*, m. 235–6°, of *4-amino-6-methoxydibenzofuran*, m. 109°; HBr in AcOH gives the *6-HO analog*, m. 191.5–2.5°. II, $NaHSO_3$ and concd. NH_4OH, heated at 185–95° for 20 hrs., give 81% of *4,6-diaminodibenzofuran*, m. 152°; *IICl salt*, m. 298° (decompn.); *picrate*, red-brown, m. 213° (decompn.); *di-Ac deriv.*, m. 297–8°. *Di-Ac deriv.* of II, m. 177°. II and PhN_2Cl give a dark brown compd., m. 228° (decompn.), which is nearly pure *1,3,9-trisbenzeneazo deriv.*; Me_2SO_4 gives 77% of *1,3,9-trisbenzeneazo-4,6-dimethoxydibenzofuran*, red-orange, m. 191–3°. The 1-Ac deriv. of III, oxidized with I-KI in NaOH-dioxane, gives 55.2% of *4,6-dimethoxy-1-dibenzofurancarboxylic acid* (XIII), m. 297–8°; this also resulted from carbonation of the Grignard reagent of the 1-Br deriv. of II; *Me ester*, m. 163°. XIII gives an acid chloride, m. 147–50°; CH_2N_2 gives 21.2% of *diazomethyl 4,6-dimethoxy-1-dibenzofuryl ketone*, pale yellow, m. 151° (decompn.); heating the ketone with concd. NH_4OH and $AgNO_3$ in dioxane gives 52% of the *amide*, m. 210–11°, of *4,6-dimethoxy-1-dibenzofurylacetic acid*, m. 205.5–6.5°. 3-Aminodibenzofuran, diazotized and reduced with $SnCl_2$, gives 87.3% of the *IICl salt*, m. 242–3°, of *3-hydrazinodibenzofuran*, pale yellow, m. 174–5°, which turns orange in the atm. 4-Aminodibenzofuran in abs. EtOH, reduced by Na in a N atm., gives 62% of *1,2,3,4-tetrahydro-6-aminodibenzofuran*, which is an oil at 0°; *HCl salt*, pink, m. 228° (decompn.); the diazo soln. with β-$C_{10}H_7OH$ gives a quant. yield of a brilliant carmine red dye, m. 199–201°. C. J. West

Dibenzofuran. XVI. The two-stage metalation of 2-bromodibenzofuran. Henry Gilman, Wright Langham and H. B. Willis. *J. Am. Chem. Soc.* **62**, 346–8(1940); cf. preceding abstr.—Refluxing 0.0081 mole of 2-bromodibenzofuran (I) in 25 cc. C_6H_6 and 0.009 mole of BuLi in 25 cc. Et_2O for 30 min. and pouring upon dry-ice and ether give 87.3% of 2-dibenzofurancarboxylic acid (II); the Me ester m. 82–3°. If to the above reaction there is added after 15 min. 0.032 mole I and the product is carbonated after refluxing for 6 hrs. only 2-bromo-4-dibenzofurancarboxylic acid is isolated. With 3 equivs. of BuLi to 1 of I in a 1:1 Et_2O-C_6H_6 mixt. heated for 6 hrs. at 50°, the yield of II is 64%. First there is a halogen-metal interconversion and the organometallic compd. formed in this manner then metalates the original halogenated ether; the interconversion reaction is more rapid. *p*-BrC_6H_4OMe and BuLi, heated at 34° for 20 hrs. and then carbonated, give 10% of *p*-$MeOC_6H_4CO_2H$ and 10% of 5,2-$Br(MeO)C_6H_3CO_2H$ (III); with a more concd. soln. which permits refluxing at 50° the yield of III is 28%; with 2 equivs. of *p*-BrC_6H_4OMe the yield of III was about 50%; other expts. are reported. With *p*-IC_6H_4OMe BuLi gives *p*-$MeOC_6H_4CO_2H$ predominantly if not exclusively in 30 min., whereas after 6 hrs. only 5,2-$I(MeO)C_6H_3CO_2H$ is formed. **XVII. The reaction of bromo ethers with butyllithium.** Henry Gilman, Jack Swislowsky and George E. Brown. *Ibid.* 348–50.—1-Bromo-2-methoxydibenzofuran (I) and BuLi in Et_2O-C_6H_6 give 47% of 2-methoxy-1-dibenzofurancarboxylic acid (II); the 4-MeO isomer of I gives 68.5% of the 4-MeO isomer of II. 4-Bromo-1-dibenzofurancarboxylic acid and CH_2N_2 give a quant. yield of *Me 4-methoxy-1-dibenzofurancarboxylate*, m. 125°. 3-Bromo-2-methoxydibenzofuran and 3 moles of BuLi give 40.5% of 2-methoxy-3-dibenzofurancarboxylic acid; with 1.5 moles BuLi the yield of acid is 24.5%. 6-Bromo-4-methoxydibenzofuran and BuLi give 57.4% of 4-methoxy-6-dibenzofurancarboxylic acid. 1-Bromo-3,4-dimethoxydibenzofuran and BuLi give 54% of *3,4-dimethoxy-1-dibenzofurancarboxylic acid* (III), m. 236°, identical with that prepd. by oxidation of 1-acetyl-3,4-dimethoxydibenzofuran; the *Me ester* m. 78°. 1-Bromo-4,6-dimethoxydibenzofuran and BuLi give 60% of the 4,6-di-MeO isomer of III. 1,9-Dibromo-2,8-dimethoxydibenzofuran (IV) and BuLi give 66.6% of 2,8-dimethoxy-1,9-dibenzofurandicarboxylic acid, m. 270–1° (Me ester, m. 128–9°). The 3,7-di-Br isomer of IV gives 17.5% of *2,8-dimethoxy-3,7-dibenzofurandicarboxylic acid*, m. 290° (decompn.); *Me ester*, m. 183–4°. C. J. West

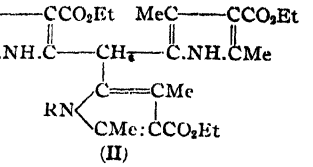
Synthesis of a high-molecular hydroxymethylfurfural derivative. Tosinori Iseki and Tukouru Sugiura. *J. Biochem.* (Japan) **30**, 113–18(1939).—According to modern conceptions, not all polyoses are made up of monose residues attached to each other in long chains but consist of relatively simple units, e. g., anhydrides. The synthesis of high-mol. compds. by the polymerization of such anhydrides of low mol. wt. should be of value in complementing the knowledge gained in this field by degradation expts. I. and S. have found that a carbohydrate of high mol. wt. can be prepd. with relative ease from hydroxymethylfurfural (I), a furanose anhydride. When bis(5-formylfurfuryl) ether, $[O.C(CHO):CH.CH.CCH_2]_2O$ (II), which is easily prepd. by heating I, is fed to animals, more than 50% is recovered in the urine as bis(5-carboxyfurfuryl) ether (III) (*C. A.* **27**, 2953). The same acid, m. 209–10°, is obtained synthetically in more than 85% yield from II with NH_3-$AgNO_3$ in the presence of NaOH (Einhorn, *Ber.* **26**, 454(1893)). When its dichloride in pyridine is poured into water there seps. a yellowish mass which becomes solid on washing. Analysis indicates the product (IV) is a condensed acid anhydride formed from 4 mols. of the chloride by elimination of HCl and it is assumed to be *tetra(pyromucic anhydride-5-methyl) ether*, $O(CO.R.CH_2.O.CH_2.R.CO.O.CO.R.CH_2.O.CH_2.R.CO)_2O$ (R = —C.O.C(CH)=CH—). *Mono-Me ester* of III, m. 144–6°, is obtained in 0.69 g. yield, together with 0.74 g. di-Me ester and 0.26 g. free III, from 2 g. III refluxed 4 hrs. in 25 cc. MeOH and 0.5 cc. concd. H_2SO_4. *Dichloride* (100% from III refluxed in $SOCl_2$), m. 98–9°. *Di-Me ester* (100% from the dichloride boiled 2–3 min. in 3–4 parts MeOH), m. 154°; *di-Et ester*, m. 71°; *bis(2-chloroethyl) ester* (3 g. from 3 g. dichloride heated 1.5 hrs. at 120–5° with 10 g.

$ClCH_2CH_2OH$), m. 78–9°. IV (0.52 g. from 0.909 g. dichloride in the suitable amt. of acetone treated dropwise with 0.48 cc. pyridine, poured with stirring into ice water and allowed to stand 1 day at 0°), m. 165–7°, mol. wt. (Rast) 960, 1033. C. A. R.

Decomposition of 2-furaldehyde in the presence of mineral acids. A. I. Lazarev. *Org. Chem. Ind.* (U. S. S. R.) 6, 258–9(1939).—The decompn. of 2-furaldehyde (I) by dil. acids and electrolytes was studied as a possible cause of the poor yields of I obtained in the com. production by hydrolysis of cellulosic materials, yielding about 50% I instead of the theoretically possible 72.7% based on the content of pentosans. The comparative tests consisted in refluxing 1–5 hrs. 10 ml. of 2% I with and without the addns. of 25 ml. of 5–15% HCl, 20–35% H_2SO_4, 20% NaCl and 5% $CaCl_2$. The max. rate of 30% decompn. is effected by 15% HCl and 35% H_2SO_4 in the 1st hr. The decompn. rate is then retarded, with a max. loss of 82.4% I in 5 hrs. NaCl and $CaCl_2$ decompd. 4.2% and 3.5% I in the 1st hr. and 5.2% and 4.5% in 5 hrs., resp. Since in the com. production I is removed from the reaction zone within a few min., it is evident that the low I yields are not caused chiefly by the destructive action of acids and electrolytes. The investigation is being continued. C. B.

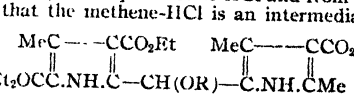
Exchange of hydrogen atoms between pyrrole, indole and their methylene derivatives and water. VI. Exchange of hydrogen atom between α-methyl-, β-methyl- and α,β-dimethylindole and water. Masao Koizumi. *Bull. Chem. Soc. Japan* 14, 453–61(1939); cf. *C. A.* 33, 2022⁸.—Exchange of H was studied between dil. D_2O and α-methyl- (I), β-methyl- (II) and α,β-dimethylindole (III) and at pH values from −0.5 to 7.0. With I, 2 H atoms exchange under all conditions. One of these is the H atom bound to N and the other is most probably the H atom bound to C in the β-position of the pyrrole ring. For II, exchange is difficult even in strongly acid soln. except for the H atom bound to N. Similar results are obtained for III, no further exchange being observed in 3 *N* HCl after 20 hrs. heating at 60°. The results are compared with those previously obtained for unsubstituted indoles. **VII. Exchange of hydrogen atom between indole, indene and water in alkaline solution.** *Ibid.* 491–500.—Both the H atom bound to N and that bound to C in the pyrrole ring exchange in indole in alk. soln. The rate of exchange is much slower than in acid soln. There is no evidence for step-wise exchange. The behavior of indene is similar. The exchange mechanism in alk. soln. is a simple acid-base catalytic reaction and is quite different from that in acid soln. G. M. Murphy

Pyrrole series. IV. A dipyrrylmethene which is a true intermediate in its own formation. Joseph H. Paden, Alsoph H. Corwin and Wm. A. Bailey, Jr. *J. Am. Chem. Soc.* 62, 418–24(1940); cf. *C. A.* 32, 1557.—In part III it was demonstrated that a step-wise synthesis of 3,5,4′-tricarbethoxy-4,3′,5′-trimethyldipyrrylmethane (I) could be achieved in which a tripyrrylmethane (II, R = H) was an intermediate if 2 moles of 2,4-dimethyl-3-carbethoxypyrrole (III) were used to 1 mole of 2-formyl-3,5-dicarbethoxy-4-methylpyrrole (IV) and the resulting tripyrrylmethane was cleaved subsequently by the addn. of another mole of IV: IV + 2 III → II; II + IV + 2HCl → 2 I. In previous communications on the mechanism of the aldehyde synthesis of dipyrrylmethenes, it has been assumed arbitrarily that dipyrrylcarbinols are intermediate in the various cleavages. While it still seems necessary to retain the assumption of a carbinol as the 1st reaction product of aldehyde and α-free pyrrole, it is now unnecessary to assume any chem. intermediate between tripyrrylmethanes and dipyrrylmethenes, either in cleavage or in recombination, since it can be demonstrated that the methenes themselves are capable of combining with α-free pyrroles to form tripyrrylmethanes. I (0.4 g.) in 20 cc. dioxane (V) (dried over 40% Na-Hg and distd. over Na) and 0.184 g. III, shaken for 50 sec. and then poured into 200 cc. ice and H_2O, give 0.54 g. (95%) of II, m. 190.5–1.5°. The distn. of V is important. Various other conditions for the formation of II are given. I and 1,2,4-trimethyl-3-carbethoxypyrrole (VI) in V contg. a little KHSO₄ for 3.5 min. give 91% of the *N*-Me deriv. of II (II, R = Me), m. 155–6°; after a reaction time of 1 min. the yield is only 40%; a reaction mixt. without $KHSO_4$ does not proceed appreciably after 100 min. Since the reaction of I and III is complete in 30 sec., the *N*-Me group on an α-free pyrrole decreases its speed of combination with a methene. A close scrutiny of the course of the reaction between a carbinol Me ether (VII, R = Me)



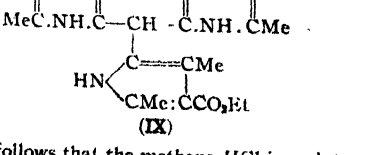
(II)

and an α-free pyrrole or alternatively between II and an α-free pyrrole, both reactions in the presence of HCl, leads to the conclusion that the reaction to form methene-HCl and that to form tripyrrylmethane are not competing reactions but are consecutive. I in abs. ether, treated with HCl for 1 min. at 0°, gives 96% of the HCl salt; VII (R = Me) in ether gives 93% of its HCl salt; the pptn. being instantaneous. I in 75 cc. ether and IV in ether satd. with HCl give a ppt. on mixing which dissolves in 5 sec.; shaking for 2 min. and pouring into 5% NaOH gives 91.5% of II (R = H); the same reaction occurs when II is added to I and HCl; the yield of II is 90% in V; the yield of II in ether may be increased to 97.5% by bubbling in HCl for only 5 sec. and then evapg. the ether on the steam bath. I (0.4 g.) in 100 cc. ether, treated with 0.181 g. VI, then with HCl for 2 min. and the mixt. shaken for 3 min. at room temp., give 1.1% of I.HCl and 88% of II (R = Me); in another expt. the reagents were dissolved in part of the ether and the other part was satd. with HCl and then added all at once; the yield of I.HCl is 11%; of II (R = Me), 72%. VII (R = Me) in hexane gives 73% of I.HCl in 2 min.; on drawing air through the filtrate for a few min., 24% of II (R = Me) is formed; the difference is probably due to the insoly. of the I.HCl in the hexane. These observations show that the methene-HCl is an intermediate in the formation of tripyrrylmethane from VII (R = Me) in the presence of HCl and from them it is inferred that the methene-HCl is an intermediate in the



(VII)

formation of the tripyrrylmethane from the free carbinol, a material which has so far resisted all attempts at isolation. IV and III in ether at 5°, treated with HCl for 3 min. and poured into cold 5% NaOH, give 44.5% IV and 47% of II (R = H); as the soln. of IV and III used for the synthesis of I in the presence of HCl becomes increasingly dil. the time of initial appearance of a ppt. of the methene is progressively delayed, as is the time required for obtaining the max. yield; the above facts demonstrate that the tripyrrylmethane is an intermediate in the formation of the methene-HCl; since the methene-HCl is an intermediate in the formation of tripyrrylmethane from the



(IX)

carbinol, it follows that the methene-HCl is an intermediate in its own formation. Using $KHSO_4$ as the catalyst in place of HCl, the reaction of I and III to give II (R = H) is complete in 15 sec., whereas that of IV is not complete in 1 hr.; under the same conditions no appreciable cleavage of II (R = H) by IV took place even when the mixt.

was refluxed for 0.5 hr. 3,5,3',5'-Tetramethyl-4,4'-dicarbethoxydipyrrylmethane (VIII) and III in V with $KHSO_4$ give after 155 min. 91% of IX; with dioxane and HCl only the HCl salt of VIII could be isolated. The 5-formyl deriv. of III and III do not condense in V with $KHSO_4$. II (R = H) in ether, treated with HCl for 10 min. and then allowed to stand for 1 yr., gives the HCl salt of VIII and probably 4-methyl-3,5-dicarbethoxypyrrole; the latter could not be isolated. C. J. West

The reduction potential of some pyrrole ketones. I. Methyl pyrryl ketones (acetylpyrroles). Giuseppe Scaranielli. *Boll. sci. facoltà chim. ind., Bologna* **1940**, No. 1-2, 49-54; cf. Bonino and S., *C. A.* **30**, 8208[2].—The reduction potential of the CO group was studied in 2-acetylpyrrole, *N*-acetylpyrrole, 2,3,5-trimethyl-4-acetylpyrrole and 2,4-dimethyl-5-carbethoxy-3-acetylpyrrole. The potentials were measured by the polarographic method with a Hg-drop cathode. The measurements were made with 0.1 *N* NH_4Cl and HCl. The exptl. results, which are tabulated and discussed, show that the CO group in the α-position is reduced easily whereas the CO group in the β-position is not reduced under the same exptl. conditions. **II. 2,5-Diacetylpyrrole.** *Ibid.* 59-60.—Expts. with 2,5-diacetylpyrrole similar to those described above for various acetylpyrroles showed that the diacetylpyrrole exhibited on reduction 2 polarographic waves, of which the 2nd corresponded to a reduction potential which was practically identical with that detd. for 2-acetylpyrrole, whereas the 1st wave corresponded to a lower reduction potential. This phenomenon indicates a difference in the structure of the Ac groups at positions 2 and 5, the possible reasons for which are discussed. Further studies are in progress to clarify the polarographic behavior of the diacetylpyrrole. Dora Stern

Naphthoylenediethoxybenzimidazole and the structure of Indanthrene Red-Brown 5 RF. I. V. Grachev. *Org. Chem. Ind.* (U. S. S. R.) **6**, 304 6(1939).—According to Fierz-David (*Kunstliche org. Farbstoffe, Ergänzungsband, C. A.* **30**, 2012[7]) and Jones (*C. A.* **30**, 7347[4]), *Indanthrene Red-Brown 5 RF* (I. G.) (I) is *naphthoylenediethoxybenzimidazole* (II) obtained from $1,4,5,8\text{-}C_{10}H_4(CO_2H)_4$ by condensation (1) with $4,1,2\text{-}EtOC_6H_3(NH_2)_2$ (Ger. pat. 457,980) and (2) with $3,4\text{-}O_2N(H_2N)C_6H_3OEt$ with subsequent reduction and ring-closure (Ger. pat. 456,236). Comparative tinctorial tests and spectrophotometric measurements of com. I and II, prepd. by the 2 methods, as well as their cis and trans isomers, showed that I and II are different compds. Study of the I structure is being continued. C. B.

Action of bromine on certain thioamides. David E. Worrall and Arthur W. Phillips. *J. Am. Chem. Soc.* **62**, 424-5(1940); cf. *C. A.* **34**, 766[2].—Addn. of 10 g. of PhN:C(SH)CH$(CO_2Et)_2$ in AcOH to a mol. equiv. of Br in AcOH gives approx. 5 g. of *di-Et benzothiazole-2-malonate* (I), m. 138-9°; I gives a salt with EtOH-KOH, which regenerates I with HCl; it acts as an enol with MeMgI; heating I with concd. HCl for 2 hrs. gives 2-methylbenzothiazole (II). PhNCS and CH_2Ac_2 give *2-benzothiazolylacetylacetone*, m. 155°; hot alkali rapidly gives II; acid reacts more slowly. C. J. West

Synthesis of 4,5'-bithiazolyl and 4-(5-imidazolyl)-thiazole derivatives. Eiji Ochiai, Yuzo Tamamusi and Huzio Nagasawa. *Ber.* **73B**, 28-32(1940).—2-Hydroxy-4-methyl-5-acetylthiazole (I) and *4-methyl-5-acetylimidazole* (II) are now readily available. I was prepd. as previously described (*C. A.* **33**, 7782[9]) and II by the O. and Ikuma method (*C. A.* **30**, 5218[6]) by the following series of reactions: $Ac_2C{:}NOH$ (+ H) → $Ac_2CHNH_2.HCl$ (+ KSCN) → MeC:CAc.NH.C(SH):N (III) (+ HNO_3) → II. I and II are converted by Br in $CHCl_3$ or AcOH into the bromoacetyl analogs which with thiourea, MeCSNH_2 or $HCSNH_2$ give the corresponding bithiazolyls or imidazolylthiazoles. In this condensation reaction the +M effect of the HO or NH in the hydroxythiazole or imidazole must result in a diminution of the activity of the C:O in the $COCH_2Br$ (Ingold, *C. A.* **29**, 1057[3]) group and the yields were by no means satisfactory, especially in the reactions with the unstable $HCSNH_2$. *2-Mercapto-4-methyl-5-acetylimidazole* (III) (10 g. from 10 g. $Ac_2C{:}NOH$ hydrogenated with Pd and H in *N* HCl, filtered from the catalyst, treated with 16 g. KSCN in concd. aq. soln., heated 10 min. on the water bath and allowed to stand overnight), decomps. 308°. Boiled a few min. in 10% HNO_3, III gives the *nitrate*, m. 200°, of II, m. 151°; *semicarbazone*, m. 212°. *4-Methyl-5-bromoacetylimidazole* (IV) was isolated as the *HBr salt*, decomps. 223°. *4-(4-Methyl-5-imidazolyl)thiazole*, from IV and $HCSNH_2$ hydrate in MeOH on the water bath, was isolated as the *picrate*, m. 178°; *2-amino deriv.*, from IV and thiourea, decomps. 210° (*di-HCl salt*, decomps. 253°; *Ac deriv.*, decomps. 315°); *2-Me deriv.* (0.5 g. from 1.3 g. IV and 0.5 g. $MeCSNH_2$), m. 183° (*HCl salt*, m. 225°; *picrate*, m. 205°). *2-Hydroxy-4-methyl-5-bromoacetylthiazole* (V), m. 167°. *2-Amino-2'-hydroxy-4'-methyl-4,5'-bithiazolyl*, decomps. 225°; *HCl salt*, m. 280-2°; *Ac deriv.*, decomps. above 335°. *2'-Hydroxy-4'-methyl-4,5'-bithiazolyl*, m. 184.5°; *2-Me deriv.* (0.3 g. from 0.4 g. V and 0.15 g. $MeCSNH_2$), m. 178°. C. A. R.

Resonance and the chemistry of histidine. Terrell L. Hill and Gerald E. K. Branch. *Science* **91**, 145-6(1940).—Certain chem. characteristics of histidine are explained by a consideration of its 15 principal forms in resonance, which can be classified into 4 groups. The chain N does not participate in the resonance of the ring and has the usual α-NH_2 group basicity (pK_b 4.85). The secondary amine N of the ring is not quite 0.25 double bonded on either side and is thus very weakly basic and abnormally acid. The third N is 0.3 double bonded on one side and 0.5 on the other; it is much more basic (pK_b 7.97) than the N of pyridine. D. S. Searle

An addition compound of histidine. W. W. Johnston and M. L. Johnston. *J. Fisheries Research Board Can.* **4**, 363-6(1939).—A histidine salt was obtained by extg. the minced muscle of tuna or mackerel with water at 80°, concg. the ext. to 0.1 its vol. at 80°, adding HCl to pH 3 and adding $HgCl_2$. NaOH was added to the filtrate to pH 8 and the resulting ppt. washed, suspended in water and treated with H_2S. The filtrate from this pptn. was freed of H_2S by aeration, $AgNO_3$ added, the ppt. removed and $Ba(OH)_2$ added to the filtrate until it was strongly alk., the soln. concd. and allowed to stand overnight. The resulting crystals, after recrystn. twice from water and once from alc., m. 276-7° (decompn.). Analyses for C, H, N, Ba and NO_3 indicate the salt to contain 2 mols. of histidine nitrate and 1 Ba atom. The same salt was also prepd. from histidine-2HCl. W. G. R.

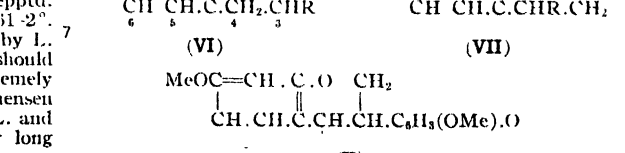
Rottlerin. IV. Derivatives of isorottlerin. Ravi Sarup Jalota, Kartar Singh Narang and Jnanendra Nath Rây. *J. Indian Chem. Soc.* **16**, 405-9(1939).—Narang, Rây and Roy (*C. A.* **32**, 1099[8]) showed the presence of a 2nd yellow coloring matter (I), m. 181°, in Kamala powder. The mother liquor from the recrystn. of rottlerin (II) from toluene was concd. and 15 g. of the residue was treated with 150 cc. ether. The insol. crude I was recrystd. from a mixt. of MeOH and EtOAc. I (85 g.) in 250 cc. ether was chromatographed on an Al_2O_3 column. Elution of the 2nd zone with alc. ether gave I, $C_{31}H_{30}O_8$. II (5 g.) in 250 cc. of 90% alc. was heated for 7 hrs. with 15 cc. of HCl (d. 1.15). After standing overnight and filtering, the filtrate was dild. The pale yellow product was crystd. from ether, yielding I, identical with the isorottlerin described by Brockmann and Maier (*C. A.* **32**, 8419[7]); *Me ether* (III), m. 135-8°. A mixt. of 0.15 g. of piperonal and 0.6 g. III in 8 cc. alc. was refluxed for 2 min. with 1 mol. of 10% NaOH, yielding a *piperonylidene deriv.* (IV), m. 147°, in rectangular plates from alc. Oxidation of 0.5 g. III in 90 cc. MeOH by warming at 50° for 30 min. with 3 cc. of 8% NaOH and 4 cc. of 30% H_2O_2 gave *isorottlerin Me ether oxide*, m. 120-2°, decompg. with evolution of BzH on heating above 120°. Catalytic reduction of I produced pale yellow needles of *dihydroisorottlerin*, m. 225-8°; *Me ether* (V), m. 209°. Addn. of 0.5 g. $NaNO_2$ to 0.5 g. III in 7.5 cc. AcOH at 30° gave yellow prisms of *isorottlerin Me ether nitrosite*, m. 194-7° (decompn.), unchanged on catalytic hydrogenation but giving off BzH

on heating or on treatment with alkali. Reduction of both III and V with Zn dust and AcOH produced a white *solid*, m. 162–4°, whereas a similar reduction of rottlerin Me ether gave a *substance*, by catalytic hydrogenation, pyridine, nor oxidized with group has been created in the process of reduction and the double bond in the group PhCH:CHCO has been affected. The results demonstrate the invalidity of the rottlerin formula proposed by B. and M. and by Robertson (*C. A.* **32**, 4555[8]). C. R. Addinall

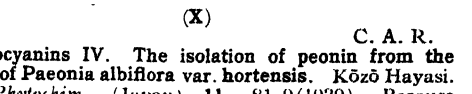
Spirochromans. Joseph B. Niederl and Richard H. Nagel. *J. Am. Chem. Soc.* **62**, 324–5(1940).—Condensation of 1 mole of *m*-EtC_6H_4OH and 1.5 moles of Me_2CO by passing dry HCl into the mixt. at room temp. for 6 hrs. and allowing it to stand 2 weeks gives about 80 g. of the *dimeric methovinylethylphenol*, b_{12} 200 7°, a viscous yellow liquid with a thymol-like odor; heating 10 g. with 5 drops conc'd. H_2SO_4 for 0.5 min. gives a nearly quant. yield of *4,4,4',4' - tetramethyl - 7,7' - diethylbis - 2,2'-spirochroman* (I), m. 114°; the yellow *tetra-NO_2 derv.* (II) m. 246 8°. Condensation of *m*-EtC_6H_4OH and phorone gives a I m. 146°; conc'd. HNO_3 gives II. It was possible to obtain crystn. by seeding a melt of the Me_2CO compd. crystals with a phorone compd. crystal and vice versa; this would seem to indicate a case of dimorphism. No depression in m. p. was observed with an equal mixt. of the 2 forms of I. C. J. West

The constituents of red sandalwood. I. Constitution of homopterocarpin. Ernst Spath and Josef Schlager. *Ber.* **73B**, 1–12(1940).—The finely grated wood (1870 g.) was extd. with ether and 1% aq. KOH was dropped through the ether ext. to remove the pigments and other compds. The concd. ether soln. on cautious addn. of petr. ether yielded crystals consisting chiefly of pterocarpin, m. 165°, the filtrate from which, on evapn. and alternate crystn. from MeOH and petr. ether, gave 11 g. of homopterocarpin (I), m. 88–9° and having the compn., $C_{17}H_{16}O_4$, assigned to it by earlier workers. In conc'd. H_2SO_4 I gives a red color and it cannot be recovered by dilu. with water. It is unchanged by distn. with Pd under 1 mm. Dehydrogenation with Se gives a red oil from which no homogeneous product can be isolated. It is quite stable toward $KMnO_4$ in acetone; only after standing several days can any reaction be observed. On hydrogenation with Pd sponge in AcOH it takes up 2 atoms H to form the dihydro compd. (II), m. 156–7°, $[\alpha]_D^{18.8}$ −6.0° ($CHCl_3$). As found by Leonhardt and Oechler (*C. A.* **30**, 1372[1]), in this hydrogenation no aliphatic double bond is satd. but an O bridge is ruptured. While I is insol. in dil. aq. alkalies, II is sol. and is repptd. by CO_2. With CH_2N_2 II gives a Me ether (III), m. 61–2°. That I does not contain a CO group, as assumed by L. and O., is indicated by some reactions of II, which should still contain any CO group present in I. II is extremely resistant to reduction by Na and alc. or by the Clemmensen method. It is likewise unchanged by MeMgBr. L. and O.'s dinitrophenylhydrazone is formed only after long boiling and is possibly the result of an oxidation process. In addn., further expts. completely excluded the presence of a CO group. PCl_5 with II gave an amorphous product. Oxidation of II with $KMnO_4$ in weakly alk. soln. and purification of the product through the Me ester, $b_{0.01}$ 160–70° (air bath temp.), gave 2,5-$HO_2C(MeO)C_6H_3O$-CH_2CO_2H (IV), $b_{0.02}$ 210–20° (air bath temp.), identical (mixed m. p.) with a synthetic product. $KMnO_4$ oxidation of III gave a little 2,5-$(MeO)_2C_6H_3CO_2H$ (V). These results show clearly that the 2 MeO groups in I are on different benzene nuclei, contrary to the conclusion of Dieterle and Leonhardt (*C. A.* **23**, 2245). The 2 oxidation products account for all of the C and O atoms of I. Two of the O atoms are present as MeO groups, 1 in the ether grouping of the OCH_2CO_2H residue found in IV, and the 4th, which after hydrogenation is present in II as a phenolic HO group, must be present in I in an O bridge union, leaving none for the CO group assumed by L. and O. Consideration of all the known facts leaves VI and VII (R = 2',4'-HO(MeO)C_6H_3) as the only possible formulas for II. The possibility that V is formed by elimination of CO_2 from IV and both products are therefore formed by oxidation of the same part of the mol. is ex-

between VI and VII the synthesis of the *Me ether* (VIII) of VI was undertaken for comparison with III. *2,4-Dihydroxyphenyl 2,4-dimethoxybenzyl ketone*, m. 155–6°, obtained in 0.75 g. yield by condensation of 8 g. 2,4-$(MeO)_2C_6H_3CH_2CN$ with *m*-$C_6H_4(OH)_2$ by means of anhyd. $ZnCl_2$ and HCl gas in boiling ether, was readily converted (yield, almost quant.) with CH_2N_2 into a *mono-Me ether*, m. 114 15°, 0.62 g. of which, condensed with HCO_2Me and Na at 20°, gave 0.25 g. *7-methoxy-2',4'-dimethoxyisoflavone*, $MeOC_6H_3.O.CH:CR'.CO$ (R' = 2,4-$(MeO)_2C_6H_3$) (IX), m. 148 9°. Catalytic hydrogenation of IX with Pd sponge in AcOH converted the CO group to CH_2 and satd. the double bond of the pyrone ring to give VIII, which m. 88–9°. That VIII has not the same m. p. as III is not proof that the 2 compds. do not have the same structure, however, for the III derived from natural I is optically active while the synthetic VIII is a racemate. Numerous attempts to racemize III by heating in evacuated tubes (e. g., 24 hrs. at 240°) were unsuccessful. However, III with CrO_3 gave a *ketone* which, after repeated distn. in a high vacuum, m. 111 12° and was optically inactive, and hydrogenation with Pd sponge in AcOH yielded a compd., m. 90°, identical (mixed m. p.) with VIII. Hence III indubitably has the same structure as VIII and II itself has the structure VI. That the free HO group is in the 2'-position has not been proved, to be sure, but if it were in the 4'-position it would be necessary to assume in I an O bridge extending to the 4'-position, for which there is no analogy. In deducing the structure of I itself from these facts it must be remembered that on catalytic hydrogenation under mild conditions an O ring in I is opened with formation of VI. Since in I there is no free phenolic HO group, 1 of the points of attachment of the O bridge must be at the 2'-position of the benzene residue R, and as the bridge is so readily ruptured by mild catalytic hydrogenation the other point of attachment can hardly be on an aromatic nucleus but is more likely on an aliphatic complex. Of the possible structures for I fulfilling these conditions preference given to X.



(VI) (VII)



(X)

C. A. R.

Anthocyanins IV. The isolation of peonin from the flowers of Paeonia albiflora var. hortensis. Kōzō Hayasi. *Acta Phytochim.* (Japan) **11**, 81–9(1939).—Because Willstätter had not designated the variety of peony from which he obtained peonin (I), H. isolated, separately, the pigment from 3 cultivated varieties; "Iko" (II) a dark red, "Hatu-garasu" (III) a red and "Deuda-no-Iro" (IV) a violet-spotted red. The cleaned fresh petals were extd. with 1% MeOH-HCl with cooling and the ext. and washings were conc'd. by a low-pressure distn. below 40°, with conc'd. H_2SO_4 in the receiver. Evapn. was so rapid that the soln. was cooled to below 10°. The concentrate was washed with ether and kept for some time, up to 2 weeks, at about 0°, whereupon the amorphous pigment which first sepd. became cryst. The percentages of I, found in all the varieties, were, in II, 0.115; III, 0.099; IV, 0.030. The crude I was crystd. from 2% aq. HCl. The air-dried sample (5 H_2O) m. 161–2°, a water-free

one at 177° (decompn.). The ax. distribution value between iso-AmOH and 0.05% HCl was 2.80. An absorption spectrum curve is given. The identity of the pigment as I was established by oxidation with H_2O_2, the formation of glucose phenylosazone (2 mols.) and the formation, on acid hydrolysis, of peonidin. The ether washings from III yielded crystals of kaempferol, identified by conversion to the tetraacetate, while II and IV yielded datiscetin. These flavone derivs. probably function as co-pigments. V. **The pigments of the berries of Fatsia japonica.** *Ibid.* 91–108.—Berries of *Fatsia japonica* gathered in Tokyo were pressed and the juice discarded. The skins were sepd. from the seeds and some resinous material by rubbing in H_2O. After partial drying by pressing, the skins (about 25% of the original berry material) were extd. with HOAc at room temp. for 3 days. The pigment was slowly pptd. as a thick sirup by addn. of 3 vols. of ether. The crude pigment was freed from some waxy material by soln. in 1% MeOH-HCl and repptn. by 3 vols. of ether. By repeating essentially the same process the ppt. finally adhered to the glass. Further purification was made difficult by the presence of resinous waxy matter. Ultimately a cryst. picrate was obtained by soln. of the ppt. in cold satd. aq. picric acid and subsequent standing at 0°. The yield of picrate was somewhat less than 5%. The air-dried substance contained 6.5 mols. of H_2O which it lost at 100°. By soln. in 3% MeOH-HCl and pptn. by 3 vols. of ether the picrate was converted into a crude chloride. The yield was about 0.18%. A pure sample was obtained by dissolving this material in 38% HCl and allowing it to stand at 0° overnight. Longer standing caused hydrolysis. Since 10% NaOH did not decomp. the pigment, no org. acid is attached to any part of the mol. The air-dried chloride, contg. 6.5 mols. H_2O, sintered at 185° and decompd. 191–2°. It gave no test for OMe. By standing a month it lost 4 mols. H_2O. The remaining H_2O was eliminated by drying at 100°. Qualitatively the pigment was shown to be identical with idein isolated from cranberries. Its distribution value between HCl and AmOH was 14.93. On acid hydrolysis it yielded cyanidin and galactose; the former, subjected briefly to alkali fusion, gave phloroglucinol and protocatechuic acid. After methylation with Me_2SO_4 in H the aglucon yielded veratric acid. The conclusions concerning the nature of the pigment, idein, 3-galactosidylcyanidin chloride, chemically arrived at, were confirmed by absorption spectra. A small amt. of the flavone deriv. quercetin was also present in the berries. This was isolated by extg. the fruit with 1% MeOH-HCl and by pptg. the flavone and anthocyanin as Pb salts. Ten % MeOH-HCl with these yielded a soln. of the pigments from which the red one was pptd. by 3 vols. ether. By alc. and H_2O the flavanol was finally obtained in a slightly impure state and yielded a penta-Ac deriv. which proved to be that of quercetin.

G. A. Hill

Pyridine series. I. Attempt to synthesize 2-methyl-4-ethylpyridine. Rafat Husain Siddiqui. *J. Indian Chem. Soc.* **16**, 410–14(1939).—An attempt has been made to synthesize 2-methyl-4-ethylpyridine, a basic product obtained from the alk. degradation of strychnine and brucine, by Hantzsch's general method for pyridines. Cooled piperidine (16 g.) was added to a chilled mixt. of $AcCH_2CO_2Et$ (115 g.) and EtCHO (25 g.) and, after 2 hrs. in the freezing mixt., the reaction mixt. was kept overnight at 0°. NH_3 (8 g.) was passed into the mixt. and, after the addn. of 5 cc. of NH_4OH (d. 0.880), the reaction mixt. was heated at 100° for 4 hrs. The cooled product was decompd. with H_2O and recrystn. from alc. gave 115 g. (89%) of pale yellow prisms of di-Et 2,6-dimethyl-4-ethyl-1,4-dihydropyridine-3,5-dicarboxylate (I), $C_{18}H_{29}NO_4$, m. 112°, oxidized in ether with nitrous fumes or in alc. with I to di-Et 2,6-dimethyl-4-ethylpyridine-3,5-dicarboxylate (II), $b_{0.8}$ 135–40°; picrate, m. 116°. The crude K salt, obtained by alc. KOH hydrolysis of II, was mixed with 2 parts of soda lime and distd., yielding 90% of 2,6-dimethyl-4-ethylpyridine (III), b. 184–6°; picrate, m. 121°; HCl salt, m. 97°. Condensation of 7 g. III with 6.5 g. BzH in the presence of $ZnCl_2$ by heating in a sealed tube for 4 hrs. at 140° and 180–5° for 4 hrs. more gave a viscous red liquid which was made alk. with NaOH and extd. with ether. The residue from the evapn. of the washed and dried ext. was steam-distd., taken up in petr. ether and treated with dry HCl, yielding 0.4 g. of 2,6-distyryl-4-ethylpyridine-HCl, $C_{23}H_{21}N.HCl$, m. 271–2° (decompn.); chloroplatinate, m. 263°(decompn.); chloroaurate, m. 200°. The filtrate was treated with picric acid and gave a *monostyryl deriv. picrate*, $C_{18}H_{17}N.C_6H_3N_3O_7$, m. 232–3°, which was not further characterized. The mother liquor from the picrate was evapd. to dryness, triturated with NaOH, dild. and extd. with ether. The dry ether ext. was treated with dry HCl and the insol. HCl salt was recrystd. from alc. ether, producing *α-phenyl-β-6-(2-methyl-4-ethylpyridyl)ethanol-HCl*, $C_{15}H_{15}NO.HCl$, m. 175°; *chloroplatinate*, m. 125°; *picrate*, prisms from MeOH. **II. New synthesis of 2-methyl-4-ethylpyridine.** Rafat Husain Siddiqui and Abdul Quddus Khan. *Ibid.* 415–18.—A mixt. of 12 g. of 2,6-dimethyl-4-ethylpyridine (I), 9.5 g. BzH, and 12 g. Ac_2O was refluxed for 14 hrs., acidified with dil. HCl and steam-distd. A cryst. distyryl deriv. HCl salt (II) sepd. in a pasty residue. The cooled aq. mother liquor was filtered, made alk. with NaOH and shaken out with petr. ether. Evapn. of the ext. gave a viscous oily base from which I was removed by distn., leaving *2-styryl-4-ethyl-6-methylpyridine* (III), $C_{16}H_{17}N$, b_2 205°; *HCl salt*, m. 208°; *HI salt*, m. 203°; *chloroplatinate*, m. 243°; *chloroaurate*, m. 145°; and *picrate*, m. 233°. II gave the free base, *2,6-distyryl-4-ethylpyridine* (IV), $C_{23}H_{21}N$, m. 85°; II, m. 271–2°; *picrate*, m. 255°. IV could not be condensed with BzH by heating with Ac_2O for 15 hrs. Oxidation of 10 g. III in 200 cc. acetone with 17 g. $KMnO_4$ gave oily 4-ethyl-6-methylpyridine-2-α-carboxylic acid, decarboxylated by heating with Cu powder to 2-methyl-4-ethylpyridine; *picrate* (V), m. 142°. A mixt. of V and the picrate of the base $C_8H_{11}N$ (VI), obtained by alk. degradation of strychnine and brucine, melts at 125°, proving the non-identity of VI and 2-methyl-4-ethylpyridine.

C. R. Addinall

Derivatives of pyridine and quinoline. XLIV. The reactivity of the bromine atoms in brominated pyridines; the formation of 1-methyl-6-bromo-2-pyridone from 1-methyl-2,6-dibromopyridinium salts. J. P. Wibaut, B. W. Speekman and H. M. van Wagtendonk. *Rec. trav. chim.* **58**, 1100–4(1939)(in English); cf. *C. A.* **34**, 1018[3].—2,6-Dibromopyridine (I) (8 g.) and 8.4 g. Me_2SO_4, heated 2 hrs. on the water bath and the product extd. with H_2O, give an aq. soln. of 1-methyl-2,6-dibromopyridinium methylsulfate (II); with alkali at room temp. this yields *1-methyl-6-bromo-2-pyridone* (III), m. 105–5.5° (35% on the I used). In this reaction it is assumed that the base is isomerized to the hypothetical pyridanol base which splits off HBr. III and PBr_5 give I, thus establishing its structure. II and KI give *1-methyl-2,6-dibromopyridinium iodide*, dark yellow, m. 170° (decompn.); this also results in low yield by heating I with MeI for 6 hrs. at 100°. The action of aq. alkali gives III and a compd. m. 177–8°, the nature of which is unknown. **XLV. The reactivity of the bromine atoms in brominated pyridines. The formation of 2,6-diamino-4-bromopyridine by the action of ammonia on 2,4,6-tribromopyridine.** J. P. Wibaut, A. F. Bickel and L. Brandon. *Ibid.* 1124–6.—2,4,6-Tribromopyridine (4 g.) and 20 cc. NH_4OH (d. 0.9), heated 11 hrs. at 200°, give 1.9 g. (crude) of *2,6-diamino-4-bromopyridine* (I), m. 126°; I also results in low yields by heating with liquid NH_3 at about 130° for 24 hrs. (pressure, 90 atm.); there also results a small quantity of an *aminodibromopyridine*, m. 155–8°. Catalytic reduction (Ni) of I gives 2,6-diaminopyridine.

C. J. West

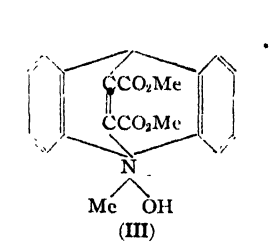
Organolithium compounds of pyridine and quinoline. Henry Gilman and S. M. Spatz. *J. Am. Chem. Soc.* **62**, 446(1940).—Reaction of 3-bromoquinoline and a slight excess of BuLi in Et_2O at −35° for 15 min., followed by carbonation, give 52% of 3-quinolinecarboxylic acid; similarly, 3-bromopyridine gives 70% of nicotinic acid. Details will be reported later. C. J. West

Sulfanilamide derivatives. V. Constitution and properties of 2-sulfanilamidopyridine. M. L. Crossley, E. H. Northey and Martin E. Hultquist. *J. Am. Chem. Soc.* 62, 372-4(1940); cf. *C. A.* **34**, 3928.—2-Aminopyridine (I) and *p*-AcNHC$_6$H$_4$SO$_2$Cl in dioxane, warmed at 95° for 15 min., give 92.8% of 2-(*N*^{4}-acetylsulfanilamido)-pyridine, m. 225.2-8.1°, 229° (Dennis block); on heating at 230° for 5 min., it m. 190-227.5°, indicating thermal decompn. The free base (II) m. 190.4-1.5°, 192° (Dennis block); soly. in H_2O (g./100 cc.): 1.05 g. at 100°, 0.11 g. at 40°, 0.05 g. at 20°. II is sol. in concd. HCl but the salt is highly dissocd. (potentiometric titration); the HCl soln. may be titrated quant. by diazotization with $NaNO_2$, the reaction involving only the NH_2 group of the sulfanilamide part of the mol. No hydrolysis of II occurs on boiling with 50% NaOH or weaker strength; with boiling 36% HCl a practically quant. yield of I and *p*-$H_2NC_6H_4SO_3H$ results. II forms a mono-Na salt which hydrolyzes in H_2O to give a pH of 10-11. These results justify the name of 2-sulfanilamidopyridine for II. C. J. West

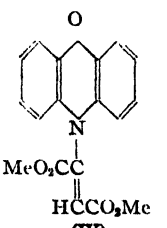
Acridine derivatives as antimalarials. IV. S. J. Das-Gupta. *J. Indian Chem. Soc.* **16**, 364-8(1939).—The sulfamyl(dialkylaminoalkylamino)acridine derivs. (*C. A.* **33**, 5852[5]) have been found to possess bacteriostatic action against certain hemolytic streptococci and to be toxic to paramecium. Since the range of activity of the sulfanilamides may be widened by substitution of the NH_2 grouping certain (sulfamylphenylsulfamyl)-5-dialkylaminoalkylaminoacridines and 5-acridylsulfanilylsulfanilamides have been prepd. Unlike other acridine derivs. they are comparatively tasteless, but possess, particularly in neutral solns., the characteristic fluorescence of the 5-aminoacridines. Trituration of a mixt. of 1 mol. of 2,5-Cl(ClO$_2$S)-C$_6$H$_3$CO$_2$H (I) and 2 mols. of *p*-$H_2NC_6H_4SO_2NH_2$ with a little H_2O for 2 hrs., addn. of Na_2SO_3, standing overnight, acidification with dil. HCl and crystn. of the product from dil. alc. gave colorless needles of *2-chloro-5-(p-sulfamylphenylsulfamyl)benzoic acid* (II), $C_{13}H_{11}ClN_2O_6S_2$, m. 240°. A mixt. of 15.6 g. II, 5 g. of *p*-MeOC$_6$H$_4$NH$_2$ and 5.5 g. anhyd. K_2CO_3 was refluxed in AmOH in the presence of Cu powder for 4 hrs. The reaction product was dild. and steam-distd. The filtered residue was acidified and the product was recrystd. from dil. alc., yielding colorless needles of *4-(p-sulfamylphenylsulfamyl)-4'-methoxydiphenylamine-2-carboxylic acid* (III), $C_{20}H_{19}N_3O_7S_2$, m. 246°. III was heated with excess $POCl_3$ on the steam bath for 2 hrs., the excess $POCl_3$ was removed *in vacuo* and the residue was decompd. with very dil. NH_4OH. Crystn. of the solid product from dil. acetone gave needles of *3-(p-sulfamylphenylsulfamyl)-7-methoxy-5-chloroacridine* (IV), $C_{20}H_{16}ClN_3O_5S_2$, m. 212-15°. A mixt. of 3 g. IV in 10 g. PhOH at 100° and 2 g. of $Et_2NCH_2CH_2CH_2CHMeNH_2$ (V) was kept at 100° for 2 hrs. and poured into 150 cc. of cold 5% NaOH. After extn. with ether and neutralization with HCl the semisolid mass was taken up in AcOH, filtered, extd. with ether and made alk. with cold NH_4OH. Crystn. of the ppt. from an acetone-petr. ether mixt. produces yellow crystals of *3-(p-sulfamylphenylsulfamyl)-7-methoxy-5-(4-diethylamino-1-methylbutylamino)acridine*, $C_{28}H_{37}N_6O_5S_2$, m. 254-6°, showing emerald-green fluorescence in alc. Similar condensation of III with $Et_2NCH_2CH_2CH_2NH_2$ (VI) gave the corresponding *4-diethylaminobutyl compd.*, $C_{28}H_{35}N_5O_5S_2$, m. 220-2°. Condensation of I with $H_2NC_6H_4SO_2NEt_2$ gave colorless needles of *2-chloro-5-(p-diethylsulfamylphenylsulfamyl)benzoic acid*, $C_{17}H_{19}ClN_2O_6S_2$, m. 194-5°, condensed with *p*-MeOC$_6$H$_4$NH$_2$ to the *diphenylamine acid*, $C_{24}H_{27}N_3O_7S_2$. Acridination with $POCl_3$ yielded the corresponding *chloroacridine* (VII), $C_{24}H_{24}ClN_3O_5S_2$, m. 187-9°, which was condensed in PhOH with V to give *3-(p-diethylsulfamylphenylsulfamyl)-7-methoxy-5-(4-diethylamino-1-methylbutylamino)acridine*, $C_{38}H_{48}N_6O_5S_2$, m. about 160°. Similar condensations of VII and VI and $Et_2NCH_2CH_2CH_2NH_2$ gave the corresponding *4-diethylaminobutyl-* and *3-diethylaminopropyl compds.*, $C_{32}H_{42}N_5O_5S_2$, m. about 130°, and $C_{31}H_{41}N_6O_5S_2$, m. about 200°. Trituration of $H_2NC_6H_4SO_2NEt_2$ (1 mol.) and *p*-AcNHC$_6$H$_4$SO$_2$Cl (1 mol.) with H_2O, addn. of Na_2CO_3, standing overnight and recrystn. from hot benzene gave an *Ac deriv.*, m. 238°, which was hydrolyzed by refluxing with excess 5% alc. HCl for 30 min. The ppt. formed on neutralization with cold NH_4OH was recrystd. from dil. alc. and gave colorless crystals of *4-(p-aminobenzenesulfonylamino)benzenesulfondiethylamide* (VIII), $C_{16}H_{21}N_3O_4S_2$, m. 176°. A mixt. of 2-chloro-7-methoxy-5-chloroacridine (1 mol.) and VIII (1 mol.) was heated in PhOH at 140° for 3 hrs. The reaction product was poured into cold NaOH. The solid product was taken up in AcOH and filtered. The residue was crystd. from acetone-petr. ether mixt. and gave bright yellow crystals of a *5-acridylsulfanilylsulfanilamide*, $C_{30}H_{29}ClN_4O_5S_2$, m. 160-1°. The corresponding *7-Me deriv.*, $C_{30}H_{29}ClN_4O_4S_2$, m. 133-4°, was prepd. by condensing VIII with 2-chloro-7-methyl-5-chloroacridine under similar conditions.

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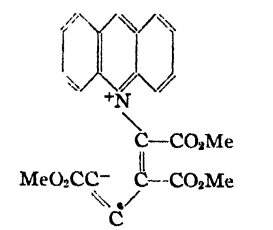
Diene syntheses. XXXIII. Acridine and acetylenedicarboxylic esters. Otto Diels and Wolfgang Ernst Thiele. *Ann.* **543**, 79-94(1939); cf. *C. A.* **32**, 7029[6].—Acridine (I) (17.9 g.) and 12.5 cc. (:CCO$_2$Me)$_2$ (II) in 80 cc. MeOH give in 2 days a blood-red soln. which on cooling gives 26-30 g. of the brick-red *MeOH adduct* (III), m. 104°, and on concn. of the mother liquor 0.3-0.6 g. of a light yellow *isomer*, m. 118°. A mixt. of 35.8 g. I and 48 cc. II in 200 cc. dioxane gives a dark red soln.; evapn. of the solvent gives a dark red oil which, crystd. from 200 cc. MeOH, gives 55-65 g. of red crystals; crystn. from MeCN gives 10-15 g. of a light yellow *adduct* (IV), m. 222-3°, and from the deep red mother liquor 40-50 g. of a ruby-red *adduct* (V), m. 164-5°. With ether as a solvent 66% of the product is IV; the yield of V is very small; there also results some VI. When III or its soln. in MeOH stands in the air for several weeks its color gradually



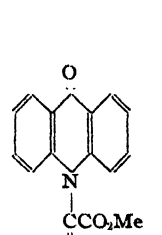
(III)



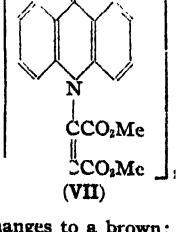
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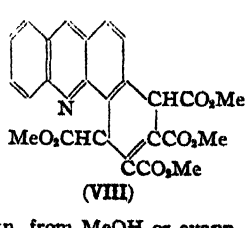
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(VI)



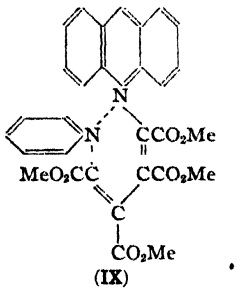
(VII)



(VIII)

changes to a brown; recrystn. from MeOH or evapn. of the brown soln. gives the bright orange *compd.* (VI), m. 142-3° (quick heating); on slow heating it gives a citron-yellow compd., m. 163°, which yields the lower-melting

compd. on crystn. from MeOH. When 17.9 g. of I and 12 cc. II in 120 cc. MeOH and 15 cc. perhydrol are allowed to stand several days, there results a small quantity of IV and a nearly quant. yield of VI. Crystn. of IV from a little hot C_5H_5N gives only VI. Heating 30 g. III in 200 cc. MeOH with 20 cc. perhydrol for 1 hr. on the water bath gives 1.6 g. of a dark red adduct (VII), m. 265–6°, and 90–5% of VI. Soln. of 5 g. V in 9 cc. concd. H_2SO_4 gives a brown soln. with a green-yellow fluorescence; on pouring into 200 cc. H_2O there ppts. a yellow oil; crystn. from MeCN gives the *adduct* (VIII), m. 189–90°. Heating 17.7 g. III in 75 cc. MeOH with 6 g. KOH in 75 cc. H_2O for 2 hrs. on the water bath gives a yellow-orange *compd.*, $C_{16}H_{11}O_3N$, m. 241-2°. I (5.4 g.) and II in 30 cc. EtOH give 5–6 g. of the *EtOH adduct* corresponding to III, m. 71°; in the air it gives VI somewhat more quickly than III; crystn. from MeOH gives III. V with excess HCO_2H gives a yellow soln. with a green fluorescence; crystn. of the red-yellow resin from MeOH gives an orange *compd.*, $C_{25}H_{21}O_8N$, m. 159–60°. Boiling V with $N_2H_4 \cdot H_2O$ in MeCN gives a light orange *compd.*, $C_{21}H_{21}O_4N_3 \cdot 1.5H_2O$, insol. in the usual solvents; C_5H_5N gives the orange *compd.* (IX), m. 123°; boiling with MeOH or EtOH gives V. Heating V with isoquinoline (nearly to boiling) gives an orange *compd.*, $C_{36}H_{31}O_8N_3$, m. 205°. V and *p*-quinone on melting give an orange-brown compd., $C_{31}H_{25}O_{10}N$, m. 232° (decompn.). $(:NCO_2Et)_2$ in PhMe, refluxed 6 hrs. (color change of soln. from red through green and blue to violet) gives the *compd.* $C_{37}H_{41}O_{16}N_3$, m. 203–4°. Heating V with maleic anhydride at 100° gives a blood-red smeary mass which, extd. with MeOH and crystd. from AcOH, gives an orange *compd.*, $C_{29}H_{23}O_{11}N$, m. 259° (decompn.). Heating III with a little concd. HCl gives *N-methylacridinium chloride*, $C_{14}H_{12}NCl.3H_2O$, m. 122° (decompn.). Hydrolysis of 10 g. VI with 4 g. KOH in 50 cc. H_2O and 60 cc. MeOH on the water bath and addn. of 100 cc. dil. HCl gives 9 g. of the *acid*, $C_{17}H_{11}O_5N$, yellow, m. 255° (decompn.); IV gives an isomeric acid, with 1.5 mols. H_2O, m. 225° (decompn.). Reduction of 5 g. VI with Zn and concd. HCl in MeOH gives 3.5-4 g. of the *compd.*, $C_{38}H_{34}O_8N_2$, yellow green with light green fluorescence, m. 260° (decompn.); IV gives the same compd.



(IX)

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3-Methyl-3,4-dihydroisoquinolines and 3-methyl-1,2,3-4-tetrahydroisoquinolines. Walter S. Ide and Johannes S. Buck. *J. Am. Chem. Soc.* 62, 425–8(1940).—Details are given of the prepn. of α-methyl-3,4-dimethoxycinnamic acid (I) by the Claisen method from veratraldehyde (II) and $EtCO_2Et$ with Na, followed by hydrolysis and by the Reformatsky reaction from II, $MeCHBrCO_2Et$ and Zn in C_6H_6, then by refluxing of the C_6H_6 soln. with $POCl_3$ and hydrolysis; fractionated from C_6H_6, I m. 232° (20% yield, probably trans isomer) and 144° (yield of this isomer not given); the 3,4-methylenedioxy analog m. 200°. *α-Methyl-3,4-dimethoxypropionamide*, m. 109°, results from heating the NH_4 salt in a stream of NH_3 for 2 hrs. at 220° or from the acid chloride with NH_4OH contg. NaOH; the *3,4-methylenedioxy analog* m. 122°. With NaOCl there results 53% of $3,4\text{-}(MeO)_2C_6H_3CH_2CHMeNH_2$, b_9 154°, n_D 1.5347, d_4^{25} 1.0624; $3,4\text{-}CH_2O_2C_6H_3CH_2CHMeNH_2$, b_{11} 143–5°, n_D 1.5394, d_4^{25} 1.1277, 40% yield. The isoquinolines were prepd. by cyclizing the formyl derivs. (*C. A.* 32, 8424[3]). *3-Methyl-6,7-dimethoxy-3,4-dihydroisoquinoline-HCl* (III), yellow, m. 189° (m. ps. cor.); *6,7-methylenedioxy analog* (IV), light ivory or tan, m. 198°; reduction of III with Zn in hot dil. H_2SO_4 gives the *1,2,3,4-tetrahydro deriv.*, m. 245°; the 1,2,3,4-tetrahydro deriv. from IV m. 238°; demethylation of III with HCl at 170° gives *3-methyl-6,7-dihydroxy-3,4-dihydroisoquinoline-HCl*, yellow, m. 297°; *1,2,3,4-tetrahydro deriv.*, m. 270°. The free base from III with MeI in cold C_6H_6 yields *2,3-dimethyl-6,7-dimethoxy-3,4-dihydroisoquinolinium iodide* (V), yellow, m. 156°; AgCl in cold aq. soln. gives the *chloride*, yellow, m. 125–8°; *6,7-methylenedioxy analog* of V, brown-yellow, m. 213°; *chloride*, light ivory, m. 212°; the *6,7-di-HO analog* of V, yellow, m. 199°; reduction of V gives *2,3-dimethyl-6,7-dimethoxy-1,2,3,4-tetrahydroisoquinoline-HCl* (VI), m. 232°; the free *base* (VII) m. 100°; the *6,7-methylenedioxy analog* of VI m. 228–9°; the free base m. 88°; *2,3-dimethyl-6,7-dihydroxy-1,2,3,4-tetrahydroisoquinoline-HCl* m. 266°. VII and MeI in cold C_6H_6 give *2,2,3-trimethyl-6,7-dimethoxy-1,2,3,4-tetrahydroisoquinolinium iodide*, m. 232°; the *chloride* m. 239°; the 6,7-methylenedioxy analogs m. 242 and 248–50°, resp. *2,2,3-Trimethyl-6,7-dihydroxy-1,2,3,4-tetrahydroisoquinolinium chloride* m. 258°. The yields are stated to be good at each stage.

C. J. West

Molecular associations of barbiturates and local anesthetics. G. Lusignani. *Ann. chim. farm.* (Suppl. to *Farm. ital.*) Dec., 1939, 64–9.—When cautiously fused together 1 mol. ethylphenylbarbituric acid (I) unites with 2 mols. Et *p*-aminobenzoate (II) to form a stable *compd.*, $C_{26}H_{26}N_4O_7$. In like manner 1 mol. diethylbarbituric acid (III) and 2 mols. II form a *compd.*, $C_{22}H_{26}N_4O_7$, m. 119°. I and 2 mols. procaine, form a *compd.*, $C_{38}H_{52}N_6O_7$, m. 155°, and III and 2 mols. procaine form a hygroscopic *compd.* m. 140°. All 4 of the new compds. are sol. in hot water, cold aq. alkalies, and in most org. solvents but are insol. in C_6H_6 and petr. ether.

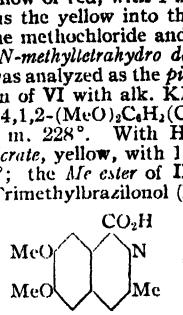
L. E. Gilson

Pyrimidines. CLXIV. Synthesis from uracil of pyrimidines related structurally to thiamine. Doris Riehl and Treat B. Johnson. *Rec. trav. chim.* 59, 87–95(1940) (in English); cf. *C. A.* 33, 8572[8].—This is a part of a study to det. whether pyrimidine constructions related to the reduced pyrimidine structure of thiamine (vitamin B_1) can be prepd. from compds. of the uracil (I) type by any synthetic process of practical utility. I (1.5 g.) and 2 g. $BzNHCH_2OG$ in 10 cc. concd. H_2SO_4, allowed to stand at room temp. 5–48 hrs. and dild. with 100 cc. H_2O, give methylenedibenzamide as a ppt. and a H_2SO_4 filtrate which, after removal of the acid with $BaSO_4$ and evapn. to dryness, gives after crystn. from H_2O and EtOH *benzoylthyminylamine*, $CO.NH.CO.NH.CH:CCH_3NHBz$, m. 209–11° (decompn.); this is hydrolyzed by warm HCl to I, NH_3 and BzOH; the compd. was never obtained in sufficient quantity for further synthetic work. I and $C_6H_4(CO)_2NCH_2OH$ in concd. H_2SO_4, allowed to stand 3–6 days and dild. with 10 times its vol. of H_2O, give a gummy ppt. (II) and after a few hrs. a cryst. ppt. (III); II and III are formed in about equal proportions; the crude combined yields after 2, 3, 4 and 6 days were 72, 75, 82 and 87%. II is sol. in dil. NaOH and is not pptd. by HCl; it is hydrolyzed only after prolonged digestion with HCl; derivs. could not be prepd. with Br or $POCl_3$. Extn. of III with C_6H_6 gives as a residue *5-phthalimidomethyluracil* or *phthaloylthyminylamine* (IV), $CO.NH.CO.NH.CH:C\text{-}CH_2N(CO_2)C_6H_4$, m. 254–5°; hydrolysis with HCl gives I, NH_3 and $C_6H_4(CO_2H)_2$. IV and Br in H_2O at room temp. give *4-hydroxy-5-bromo-5-phthalimidomethyluracil*, decomps. 278–82°; refluxing with concd. HCl for 1 hr. gives I and $C_6H_4(CO_2H)_2$. IV and $POCl_3$, refluxed for 1 hr. at 130–5° and 1.5 hrs. at 140–5°, give a product which finally yielded a compd. believed to be 2-chloro-6-hydroxy- or 2-hydroxy-6-chloro-5-phthalimidomethylpyrimidine, m. 150–5°, which may be formed by partial hydrolysis of the expected 2,6-di-Cl deriv. The IV apparently undergoes partial hydrolysis, giving I and $C_6H_4(CO)_2NCH_2Cl$, whereas

a part reacts normally to give the 2,6-di-Cl deriv. IV and $N_2H_4.H_2O$ do not give 5-phthalimidomethyluracil. C. J. West

Reactions of bis-β-chloroethyl ether with ethylenediamine. M. E. Hultquist and E. H. Northey. *J. Am. Chem. Soc.* **62**, 447–8(1940).—$C_2H_4(NH_2)_2$ (1.875 kg. of 57.5%, 18 moles anhydr.), treated with 863 g. (6 moles) of $(ClCH_2CH_2)_2O$ during 1 hr. and after 30 min. with 505 g. flake NaOH, gives 370 g. (47.5%) of 4-(β-aminoethyl)-morpholine (I). The residues give 50 g. b_{68} 123° to b_{30} 164°, 69 g. b_{30} 164–6° (mainly ethylenedi(4-morpholine), m. 70–3° (*di-HCl salt*, decomps. and sublimes above 250°)), 8.5 g. b_{30} 166–200°, 7.3 g. b_{30} 200 3° (mainly bis-[2-(*N*-β-aminoethylamino)ethyl] ether, light yellow oil, whose *tetra-HCl salt* m. 185–7°), and 5.5 g. b_{20} 203° to b_4 220°. With 6 moles of $C_2H_4(NH_2)_2$ to 1 of ether the yield of I is 58% (based on the ether). C. J. W.

Alkaloid-like compounds from brazilin and hematoxylin. P. Pfeiffer, J. Breitbach and W. Scholl. *J. prakt. Chem.* **154**, 157–208(1940).—Through a series of simple reactions brazilin and hematoxylin may be converted into alkaloid-like compds. which are closely related to papaverine and laudanosine. Hematoxylin is methylated and oxidized to tetramethylhematoxylone, which is reduced by Mg and AcOH to tetramethylhematoxylonol (I) (*C. A.* **32**, 4597[7]); oxime (II), $C_{20}H_{22}O_7N$, m. 223° (decompn.); the halochromy of II is wine-red, with a blue-lilac filtrate; HCl in MeOH gives I. Heating 20 g. I and 8 g. NH_2OH-HCl with 10 g. KOH in 100 cc. EtOH for 4 hrs. on the water bath, pouring into 400 cc. H_2O, neutralizing with AcOH and crystg. the crude product (20 g.) from EtOH or C_6H_6 gives *anhydrotetramethylhematoxylonol oxime* [*1-(2'-hydroxy-3',4'-dimethoxyphenyl)-3-methyl-6,7-dimethoxyisoquinoline oxide*] (III), $C_{20}H_{21}O_6N$, leaflets, m. 220°; III also results on heating II in EtOH with alkali; it also crystallizes as long needles, m. 191 2°, changing after several days to the stable form; the presence of a phenolic HO group is indicated by the soly. of III in cold dil. NaOH and its pptn. by CO_2; 4 of the O atoms are present as MeO groups; the 6th O atom is in the form of a N.O group, as shown by the formation of VI with SO_2 in AcOH. III (1 g.) and 1 g. MeI in 2.5 g. NaOH in 50 cc. H_2O, refluxed 6 hrs., give 0.4 g. of the *methiodide* (IV), $C_{22}H_{26}O_6NI$, yellow, m. 227–8°; IV results in a nearly quant. yield by heating 1 g. I and 5 cc. MeI with 25 cc. NaOH in 50 cc. H_2O and 40 cc. EtOH for 15 hrs. and then passing CO_2 through the boiling soln. for 3 hrs. In this reaction the phenolic HO group is methylated and the N.O group is transformed into NMeI. Heating III and Me_2SO_4 in C_6H_6, removing the C_6H_6, dissolving the residue in H_2O and adding satd. KI in H_2O, give the *methiodide* (V) of III, $C_{21}H_{24}O_6NI$, which seps. from a dil. MeOH soln. in the dark as light yellow crystals, m. 206–8°, sensitive to light; in this reaction the N.O group is changed to NO-MeI. The *picrate* of III, grayish yellow, m. 216–17° (decompn.). Addn. of 5 g. Zn in portions to 10 g. III in 50 cc. hot AcOH and allowing the mixt. to stand 12 hrs. at room temp. give the *desoxoanhydro compd.* [*1-(2'-hydroxy-3',4'-dimethoxyphenyl)-3-methyl-6,7-dimethoxyisoquinoline*] (VI), m. 174°; H_2SO_4 causes no halochromy; in this reaction the O of the N.O group is split off; $ClCH_2$-CH_2OH in MeOH gives a decided brown color in 30 min.; without the MeOH the color appears in 9 hrs. (test for an epichlorohydrin). VI in hot HCl or dry HCl in C_6H_6 gives the *HCl salt*, decomps. 230–5°; *picrate*, yellow, m. 210°. VI and Me_2SO_4 in C_6H_6 give the *methosulfate*, m. 168–70°; KI gives the *methiodide* (VII), pale yellow, m. 230–1°, which also results from VI and MeI in $CHCl_3$. Warming 1 g. VI and 1 g. AcONa in 15 cc. Ac_2O for 1 hr. on the water bath gives the *acetate*, m. 174° (*hydrate*, m. 86–8°; *picrate*, light yellow, m. 202–3°; *methiodide*, with 1 mol. H_2O, pale yellow, m. 118°). VI and Me_2SO_4 in 5% NaOH give the *Me ether* [*1-(2',3',4'-trimethoxyphenyl)-3-methyl-6,7-dimethoxyisoquinoline*] (VIII), m. 129–30°; *picrate*, golden yellow, m. 185–6°; the *methiodide*, yellow, m. 227 8°, results from VI and MeI in MeOH-NaOH, from MeI in $CHCl_3$, followed by MeI in NaOH, or from VIII and MeI in $CHCl_3$. Reduction of III or VI with Na in boiling EtOH gives *1-(2-hydroxy-3',4'-dimethoxyphenyl)-3-methyl-6,7-dimethoxytetrahydroisoquinoline*, $C_{20}H_{25}O_5N$, m. 181–4°; *picrate*, yellow or red, with 1 mol. H_2O, m. 175–8°; light transforms the yellow into the red form. VII, transformed into the methochloride and reduced with Zn in HCl, gives the *N-methyltetrahydro deriv.*, which could not be crystd. but was analyzed as the *picrate*, light yellow, m. 190°. Oxidation of VI with alk. $KMnO_4$ gives metahemipinic acid, 3,4,1,2-$(MeO)_2C_6H_2(CO_2H)_2$, identified as the ethylimide, m. 228°. With HNO_3 VI gives an *acid* (IX), whose *picrate*, yellow, with 1 mol. H_2O or MeOH, decomps. 240°; the *Me ester* of IX forms a *picrate*, yellow, m. 212°. Trimethylbrazilonol (X) oxime, warmed



(IX)

with KOH in C_5H_5N or EtOH for 0.5 hr., or X, NH_2OH.HCl, KOH and EtOH refluxed 4 hrs., give the *anhydro compd.* [*1-(2'-hydroxy-4'-methoxyphenyl)-3-methyl-6,7-dimethoxyisoquinoline oxide*] (XI), m. 243°; *HCl salt*, m. 131° (decompn.); *Bz compd.*, m. 176°; the *Me ether* could not be crystd.; its *picrate* m. 180 5°; *HCl salt*, decomps. 115°. Reduction of XI with Zn or SO_2 in hot AcOH gives the *desoxoanhydro compd.*, *1-(2'-hydroxy-4'-methoxyphenyl)-3-methyl-6,7-dimethoxyisoquinoline* (XII), m. 188 9°; *picrate*, orange-yellow, m. 224 5°; *methiodide*, with 1.33 mols. H_2O, m. 207 8°. The *Me ether* (XIIA) of XII m. 110°; it was purified through the *picrate*, m. 212 15°; *methosulfate*, m. 170°; *methiodide*, with 0.5 mol. H_2O, yellow, m. 170°. Dimethyl-β-resorcylic acid with PCl_5 or $SOCl_2$ gives the *chloride* (XIII), m. 54 6°; *amide*, m. 132°; *anilide*, m. 141°. *α-(3,4-Dimethoxyphenyl)-β-aminopropanol* (XIV), m. 128 9°, results from hydrolysis of the Ac deriv. (Bruckner, *C. A.* **29**, 5825[6]). Condensation of XIII and XIV in C_6H_6 gives 96% of the *acylamide*, 3,4-$(MeO)_2C_6H_3CH(OH)CHMe$-$NHCOC_6H_3(OMe)_2$-2,4, pale yellow resin; ring closure with $POCl_3$ in PhMe gives *1-(2',4'-dimethoxyphenyl)-3-methyl-7,8-dimethoxyisoquinoline*, m. 144 5° (crude yield, 76.8%); *picrate*, deep yellow, m. 232 5°; *methosulfate*, m. 239°; *methiodide*, yellow, m. 217–19° (decompn.); the *tetrahydro deriv.* yields a *picrate*, deep golden yellow, m. 203 5°. The isomeric XIIA could not be detected by fractional crystn. of the crude base or its picrate or by chromatographic fractionation from C_6H_6 on Al_2O_3. 2,4-$HO(MeO)C_6H_3CO_2H$ with $PhNMe_2$ and $ClCO_2Et$ in C_6H_6-Et_2O gives the *2-carbethoxy deriv.*, m. 111° (decompn.); the *chloride* (XV) is a yellow oil; *anilide*, m. 215°. Condensation of XV and XIV in C_5H_5N-C_6H_6 gives the *amide*, 3,4-$(MeO)_2C_6H_3CH(OH)CHMeNHCOC_6H_3(OCO_2Et)$-OMe-2,4, a yellow resin; ring closure yields *1-(2'-hydroxy-4'-methoxyphenyl)-3-methyl-7,8-dimethoxyisoquinoline*, whose yellow picrate decomps. 272–5°. XIV and 2,3,4-$(MeO)_3C_6H_2COCl$ give the *amide*, 3,4-$(MeO)_2C_6H_3CH$-$(OH)CHMeNHCOC_6H_2(OMe)_3$-2,3,4, m. 127 8°; ring closure gives 94% of *1-(2',3',4'-trimethoxyphenyl)-3-methyl-7,8-dimethoxyisoquinoline*, m. 110 12°; *picrate*, yellow, m. 183–4°; *methosulfate*, m. 225–7°; *methiodide*, pale yellow, m. 226 7° (decompn.). Thus, in no case was a synthetic product obtained which was identical with those prepd. from the natural compds. C. J. West

Alkaloids of Rauwolfia serpentina, Benth. Salimuzzaman Siddiqui. *J. Indian Chem. Soc.* **16**, 421–2(1939).—Roots of *R. serpentina* collected in the hot swampy districts of Bihar contain the white cryst. bases ajmaline (I), ajmalinine (II), ajmalicine, and the bright yellow cryst. bases serpentine (III) and serpentinine (*C. A.* **29**, 4016[7]). Roots from the climatically milder Dehra Dun Valley contain very little of the yellow group of bases, which are oxidation products of the white ajmaline series, an observation of therapeutic importance since the ajmaline group of alkaloids has valuable hypnotic and sedative properties. The Dehra Dun drug contained no I, and only traces of II and III. Isoajmaline (IV), m. 264–6°, and neoajmaline, m. 205–7°, which can be converted into IV on heating at

270° or with alc. KOH, were isolated in 0.1 and 1% yields from the root-bark, and 0.01 and 0.1% from the whole roots. Another new alkaloid of this group, m. 220°, and a white cryst. amphoteric alkaloid, m. 234°, have also been isolated in 0.02 and 0.1% yields, resp., from the root-bark and whole roots. C. R. Addinall

Erythrina alkaloids. VII. Isolation and characterization of the new alkaloids, erythraline and erythratine. Karl Folkers and Frank Koniuszy. *J. Am. Chem. Soc.* **62**, 436–41(1940); cf. *C. A.* **34**, 4367.—Seeds of *Erythrina fusea* Lour. (980 g.) were extd. with 1500 ml. petr. ether for 6 hrs., giving 7.8% of a yellow fat fraction; the extn. was continued for 36 hrs. with 2 1500-ml. portions of MeOH, giving 15.8% of gum-like material; soln. of the 150 g. in 700 ml. H_2O, addn. of 14 ml. concd. HCl, extn. with petr. ether and then with $CHCl_3$, neutralization with $NaHCO_3$ and extn. with 10 100-ml. portions of $CHCl_3$, gave 0.19% crude *erythraline* (I). Hypaphorine (IA) may be isolated by treating the alk. aq. soln. with HCl, etc., as described in *C. A.* **33**, 5404[5]. Recrystn. and sublimation of I gives 0.068% pure I, $C_{18}H_{19}NO_3$, m. 106–7°, $[\alpha]_D^{25}$ 211.8° (EtOH, *c* 0.944); *HI salt* (II), yellow, m. 252–3° (decompn.), $[\alpha]_D^{25}$ 177° (H_2O, *c* 0.322); *HBr salt*, m. 243°, $[\alpha]_D^{25}$ 216.6° (H_2O, *c* 0.5). *E. glauca* Willd., treated as above, yields 9.4% of fatty materials, 16.6% of MeOH ext. and 0.15% of crude $CHCl_3$ ext. from the alk. aq. soln. The crude bases were transformed into the HI salts and crystd. from 95% EtOH; erythramine (III) HI was isolated in 0.003% yield (based on seed powder); the yield of II was 0.03%. The 3rd fraction, recrystd. from H_2O, was *erythratine* (IV) *III*, m. 242 2.5°, $[\alpha]_D^{25}$ 113.3°. IV can also be isolated by crystg. the crude base mixt. from 95% EtOH; the yield of the *hemihydrate* (V) is 0.018%. V, $C_{18}H_{21}NO_4.0.5H_2O$, m. 170–70.5°, $[\alpha]_D^{25}$ 145.5° (EtOH, *c* 0.371); V also results from the HI salt of IV and $NaHCO_3$. V does not lose its H_2O of crystn. at 140° and 0.01 mm. in 4 hrs. The *HBr salt* of IV m. 241°, $[\alpha]_D^{25}$ 158.7° (H_2O, *c* 0.258). I was also isolated from the seeds of *E. folkersii* Kruk. and Mold., *E. variegata* L. var. *orientalis* (L.) Merr., *E. velutina* Willd., and *E. macrophylla* D. C. IA was isolated from all of the above mentioned species and all for the 1st time except from *E. variegate*. I and IA undoubtedly exist also in *E. velutina* forma *aurantiaca* (Ridl.) Kruk. and *E. grisebachii* Urb. I and III were of comparable activity (7–8 mg./kg.) in causing curare-like paralysis in frogs whereas IV had 0.1 of this activity. C. J. West

The Senecio alkaloids. I. The isolation of isatidine from Senecio retrorsus and Senecio isatideus. H. L. de Waal. *Onderstepoort J. Vet. Sci. Animal Ind.* **12**, 155–63(1939).—*Isatidine* (I) was isolated, for the first time, from *S. retrorsus* D. C. in quantity of approx. 0.3 g. per kg. of the dry plant. The yield of I from *S. isatideus* D. C. was approx. 50 g. per kg. The 2 products had identical properties. *S. retrorus* contained as its main alkaloid *retrorsine*, which was also present in very small quantity in *S. isatideus*. I *picrate*, fine yellowish needles, sol. hot water, hot acetone, hot alc., hot EtOAc. *Isatinecic acid*, (II), $C_{10}H_{16}O_6$, a dicarboxylic acid contg. 1 double bond; obtained by boiling a *N* alc. KOH soln. of I, hydrolyzing the dry residue with HCl, extg. the dry residue from the HCl treatment with hot EtOAc and pptg. the II from the hot, water-free ext. by addn. of petr. ether, prismatic needles, m. 178–80°, $[\alpha]_D^{25}$ 56°. Oxidation of I by $KMnO_4$ in Na_2CO_3 soln. yields oxalic acid as 1 of the products. K. D. Jacob

Alkaloids of Lycoris. XIV. Constitution of lycorine. 6. Heisaburo Kondo and Hirotaro Katura. *J. Pharm. Soc. Japan* **59**, 733–42(1939).—Acetylation of dihydrolycorine gave diacetyldihydrolycorine (I), $C_{16}H_{17}O_4NAc_2$, m. 175°. I in anhyd. benzene when heated on the water bath with BrCN for 1 hr. gave diacetyldihydrolycorine bromocyanide (II), m. 176, which depressed the m. p. of I. II failed to absorb H when reduced catalytically. II gave the following compds.: dihydronorlycorine anhydride (III), $C_{16}H_{19}O_4N.H_2O$, m. 204°; acetyldihydronorlycorine anhydride, m. 167–8°; methyldihydronorlycorine anhydride-MeI, decomp. 275°; Ac deriv., $C_{16}H_{17}O_4N$-MeAc, m. 263°, and dihydrocyanolycorine anhydride (IV), $C_{16}H_{18}NCN$, m. 217°, which gave III when boiled with 30% H_2SO_4 or alc. KOH; Ac deriv., $C_{16}H_{17}O_4N$-(CN)Ac, m. 236°. Oxidation of IV with CrO_3 gave oxodihydronorlycorine anhydride (V), $C_{16}H_{15}O_5N$, decomp. 341°; oxime, decomp. 293–5°. Methylation of V with Me_2SO_4 gave a *N*-Me deriv., $C_{16}H_{14}O_5NMe$, m. 258°; oxime, decomp. 266–8°. Cf. *C. A.* **32**, 7918[1]. F. I. Nakamura

Complete conversion of *l*-ecgonine methyl ester into *l*-cocaine. A. W. K. de Jong. *Rec. trav. chim.* **59**, 27–30(1940)(in English).—A complete conversion is obtained in 10 hrs. by boiling an anhyd. C_6H_6 soln. of *l*-ecgonine Me ester with BzCl in the presence of dry Na_2CO_3, CaO or a mixt. of CaO and $Ca(OH)_2$. In $CHCl_3$ about 20 hrs. are necessary and in Et_2O about 40 hrs., when a mixt. of CaO and $Ca(OH)_2$ is used. C. J. West

Strychnine and brucine. I. Alkaline degradation of strychnine. Rafat Husain Siddiqui. *J. Indian Chem. Soc.* **16**, 396–8(1939).—An intimate mixt. of 1 part of strychnine, 3 parts KOH and 1 part H_2O was distd. from a Cu flask over a free flame and the distillate was extd. with ether. The ext. was shaken out with 10% HCl and this acid ext. was neutralized with NaOH, extd. with ether and treated with picric acid. The crude picrate was decompd. with NaOH and extd. with ether. The residual oil from the dried ext. was fractionally distd. The lower-boiling fraction gave a *picrate* (I), $C_8H_{11}N.C_6H_3N_3O_7$, m. 141–2°, on recrystn. from alc. I is identical with Clemo's base A picrate, m. 143–4° (*C. A.* **31**, 6941). The mother liquors from the prepn. of the crude picrate gave another *picrate*, m. 195–6°, from MeOH. **II. Alkaline degradation of brucine.** Rafat Husain Siddiqui. *Ibid.* 399–401.—Brucine was distd. with 4 parts of KOH from a Cu flask and the distillate was shaken with ether. The ether ext. was extd. with 10% HCl, neutralized with NaOH and again extd. with ether, yielding 5% of residual brownish yellow oil. Fractional distn. gave 5 fractions which were converted into *picrates;* $C_7H_9N.C_6H_3N_3O_7$ (I), m. 143–4°; (II), m. 104–5°; (III), m. 135–6°; (IV), m. 141–2°; and $C_{11}H_{11-13}N.C_6H_3N_3O_7$ (V), m. 172°. II appears to be a mixt. of I and III whereas III gives no appreciable mixed m. p. depression with IV but has a mixed m. p. 105–12° with I. I is common to strychnine and brucine and is identical with Clemo's base A picrate. The solubilities and general behavior of the fractions suggest that they are pyridine derivs. C. R. Addinall

The identity of resin acids. I. Pinabietic acid of Finnish tallöl. Torsten Hasselstrom, John D. McPherson and Sam Hopkins, Jr. *Paper Trade J.* **110**, No. 4, 41–3 (1940).—Pinabietic acid, the terminal resin acid of Finnish tallöl, originally discovered by Aschan, was assumed to be structurally identical with and a stereoisomer of the Levy abietic acid, obtained by vacuum distn. of American rosin and subsequent fractional crystn. of the distillate. Evidence is presented showing that pinabietic acid is not a chem. individual, but a mixt. of at least 3 or 4 resin acids if the presence of *d*-pimaric acid is considered, and that these acids cannot be sepd. by fractional crystn. alone. Pinabietic acid is shown to be a mixt. of Steele's abietic acid, dehydroabietic acid and dihydroabietic acid. The variations in α of the different fractions of pinabietic acid obtained throughout the work are assumed to be due to varying amts. of dihydroabietic and dehydroabietic acids (both *d*-rotatory) which sep. as contaminations together with Steele's abietic acid, which is *l*-rotatory. Resin acids contg. Steele's abietic acid are highly unstable when exposed to O, in contrast to rosins rich in dehydroabietic acid but devoid of Steele's acid. A. Papineau-Couture

Saponins. XV. Constitution of the nitro derivatives of the oleanolic acid series. Satoru Kuwada and Keinosuke Takeda. *J. Pharm. Soc. Japan* **59**, 773–82(in German, 294–8)(1939).—Tri-Me nitroöleanoltrioate (2.5 g.) in 50 cc. glacial AcOH when heated with 5 g. Zn dust on the water bath for 3 hrs. gave 1.3 g. di-Me

ketoöleanollactonedioate (I), $C_{36}H_{42}(CO_2)(CO)(CO_2Me)_2$, m. 229–32°, $[\alpha]_D^{25}$ 98.5° (in $CHCl_3$). I (1 g.) when heated with 50 cc. 10% MeOH-KOH for 5 hrs. on the water bath gave diketolactone monoacid Me ester, $C_{36}H_{41}(CO_2Me)(CO)_2(COO)$, m. 315–18°, $[\alpha]_D^{25}$ −37.7° (in $CHCl_3$); oxime, decomp. 266–6.5°. The above reaction also gave a diketo carboxylic acid, $C_{36}H_{41}(CO_2H)(CO)_2$, m. 259–61°, $[\alpha]_D^{25}$ 73.4° (in $CHCl_3$). Me nitroöleanolketocarboxylate (4 g.) in 100 cc. glacial AcOH when heated on the water bath for 5 hrs. with 20 g. Zn dust gave 2.2 g. diketoöleanolcarboxylic lactone (III), $C_{36}H_{42}(CO_2)(CO)_2$, m. 306–8°, $[\alpha]_D^{25}$ 209.5° (in $CHCl_3$); oxime, decomp. 298–300°. II (1 g.) when treated with MeOH-KOH gave 0.4 g. diketoöleanolcarboxylic acid, $C_{29}H_{42}O_4$, m. 359–61°. Tri-Me nitroöleanintrioate when treated with Zn dust in glacial AcOH as described above gave di-Me ketoöleanin-lactonedioate, $C_{36}H_{40}(CO_2Me)_2(CO)(CO_2)$, m. 237–40°, $[\alpha]_D^{25}$ 97.7° (in $CHCl_3$). F. I. Nakamura

The bitter principle from Andrographis paniculata, Nees. I. A. Moktader and S. S. Guha-Sircar. *J. Indian Chem. Soc.* **16**, 333–8(1939).- Andrographolide (I), $C_{20}H_{30}O_5$ (Gorter, *C. A.* **9**, 442), the bitter principle from the Bengali drug Kalmegh (*A. paniculata*), was re-investigated. Extn. of sun-dried, fully mature leaves with $CHCl_3$ and recrystn. of the crude cryst. product from MeOH and EtOH yielded 0.8–2.5% of cryst. I, m. 220° (decompn.), $[\alpha]_D^{25}$ −123.5°, extremely bitter in very great dilns. I (3.5 g.) in 30 cc. of alc. KOH contg. 7 g. KOH was heated for 1 hr. on the steam bath and the clear yellow soln. was filtered, cooled and acidified with dil. HCl. Recrystn. of the product from hot H_2O gave *isoandrographolic acid* (II), $C_{20}H_{32}O_6$, forming an insol. cryst. *Ba salt* also obtained by boiling 1 g. I with 2.5 cc. of 2% $Ba(OH)_2$. Heating with a slight excess of NH_4OH for 10 min. and acidifying with dil. HCl converted II into an acid, m. 180°, presumably identical with Gortner's andrographolic acid, $C_{20}H_{32}O_6$. I was unchanged on heating for 5–10 min. with Ac_2O and fused AcONa, gave a solid product free from a CH_2O_2 group on treatment with $POCl_3$, and yielded a white amorphous solid, m. 90–5°, on heating with PhNCO, proving the presence of at least 1 OH group. Distn. of I with 33% H_2SO_4 gave HCHO, indicating a CH_2O_2 group in I. Catalytic reduction of 0.3026 g. I in the presence of Pd with 21.1 cc. H gave a *dihydroandrographolide*, $C_{20}H_{32}O_5$, m. 205° (decompn.), whereas reduction with $SnCl_2$ in concd. HCl produced an isomeric *dihydro compd.*, m. 200° (decompn.); mixed m. p. 183–5°. Bromination of I yielded an impure addn. compd.; addn. of HCl formed a *compd.*, $C_{20}H_{31}ClO_5$, m. 55–7°; but the addn. compd. with HBr could not be obtained in the pure state. Estn. with Wijs' soln. indicated the presence of a double bond in I. Gorter's finding that I reacts with anhyd. HCO_2H to form a compd., m. 215°, was not confirmed. C. R. Addinall

Preparation of ferric mesoporphyrin chloride. T. Harrison Davies. *J. Am. Chem. Soc.* **62**, 447(1940).— Ferric protoporphyrin chloride (I) (4 g.) in 450 ml. MeOH and 50 ml. of 0.5 *N* KOH, refluxed about 8 hrs. with Pd charcoal and H, filtered, the filtrate treated with *N* HCl to ppt. the metalloporphyrin, the dried ppt. dissolved in 100 ml. $CHCl_3$ contg. 4 g. quinine and added to 150 ml. glacial AcOH satd. with NaCl, the soln. heated above 90° on a water bath while air is bubbled through to aid in removal of the $CHCl_3$, gives on cooling 2.7–3.2 g. of cryst. ferric mesoporphyrin chloride (II). The absorption spectra of I and II are given. C. J. West

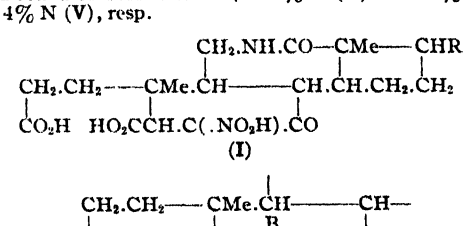
Constitution of the prosthetic group of cytochrome c. Karl Zeile and Hildegard Meyer. *Z. physiol. Chem.* **262**, 178–98(1939).—See *C. A.* **34**, 4402. Milton Levy

Chlorophyll. XCIII. γ-Formylpyrroporphyrin. Hans Fischer and Eberhard Stier. *Ann.* **542**, 224–40(1939); cf. *C. A.* **34**, 7694.—Phylloporphyrin Me ester (I) (500 mg.) in 150 cc. H_2O-free AcOH, treated with 3 g. AcONa in 100 cc. AcOH and then with 1 g. I and heated 7 hrs. on the boiling water bath, give, after removal of the AcOH from the ether soln. with H_2O and NaOH and the I with $Na_2S_2O_4$, 280–300 mg. of the *γ-formyl deriv.* (II) of I, m. 244°; this is extd. with 3.5% HCl; *Cu salt*, m. 203°; *oxime*, red-brown prisms or needles with a red-violet surface luster, m. 277°. Boiling 90 mg. II in 30 cc. Ac_2O and 300 mg. AcONa for 3 hrs. gives the *γ-CN deriv.* of I, needles with a violet surface luster, m. 261°; expts. on the sapon. of the CN group were unsuccessful. The Zn complex salt of II, catalytically reduced by PtO_2 for 4 days, gives a quant. yield of the *γ-hydroxymethyl deriv.* of I, m. 236°, which is extd. from Et_2O with 0.8% HCl. II (600 mg.) and excess HCN in C_5H_5N-Na_2CO_3, allowed to stand 24 hrs., give 450–500 mg. of the *cyanohydrin*, $C_{34}H_{37}O_3N_5$; it splits off HCN on shaking with NaOH or on warming with Me_2CO, MeOH, C_5H_5N or dioxane; on heating in the dry state it also splits off HCN, giving II; sapon. can be effected by satd. MeOH-HCl but a complicated porphyrin mixt. results, from which the γ-glycolic acid has not been insolated in pure form. Isochloroporphyrin e_4 di-Me ester (500 mg.) in 250 cc. glacial AcOH and 3 g. AcONa, treated with 1 g. I and heated 3.5 hrs. on the boiling water bath, give 300 mg. (60%) of *di-Me pyrroporphyrin-γ-glyoxylate*, $C_{36}H_{38}O_6N_4$, plates with a violet luster, m. 248°; catalytic reduction with Pd-$BaSO_4$ in 100% HCO_2H at 65° for 9 hrs. gives 55% of *di-Me pyrroporphyrin-γ-glycolate*, $C_{36}H_{40}O_4N_4$, dull green prisms, m. 278°. Catalytic reduction of II with Pd in 100% HCO_2H for 16 hrs. at 65° gives I. Reduction of 350 mg. of pheoporphyrin a_5 di-Me ester (III) in 100% HCO_2H with Pd at 55–60° for 16 hrs. gives 80 mg. of the *desoxo compd.*, with a steel-blue reflex, m. 289°; with Pd-$BaSO_4$ the yield is 100 mg. The 10-Ac deriv. of III under similar conditions appears to give 10-acetoxydesoxopheoporphyrin a_5; in cold 100% HCO_2H there results 9-hydroxy-desoxo-10-acetoxypheoporphyrin a_5. C. J. West

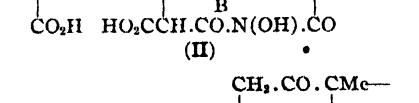
Chlorophyll. XCIV. Protochlorophyll and vinylporphyrins. The oxo reaction. Hans Fischer and August Oestreicher. *Z. physiol. Chem.* **262**, 243–69(1940); cf. preceding abstr.—*Protopheophytin* (I), m. 144–6°, was prepd. as a dark green amorphous substance by reaction of vinylpheoporphyrin a_5 Me ester and phytol in pyridine and $COCl_2$. It was also prepd. from pheophytin by the action of Fe powder in Me_2CO and HCO_2H as solvents. Mg was introduced by the use of EtMgBr and the product decompd. with PrOH and boiling with I. The resulting vinylpheoporphyrin a_5 phytol ester phyllin (protochlorophyll) differs in spectrum from a natural prepn. of protochlorophyll. This was shown to be due to the latter being a mixt., for on treatment with Mg as above the product was identical with that of the synthetic material. It is suggested that the material which is present in the rind of gourds from which the natural product was obtained is a mixt. of I and its phyllin. *Vinylpheoporphyrin-b_5-3-methanol di-Me ester*, m. 269°, was prepd. by the treatment of methyl pheophorbide b_5 oxime with Fe powder in 80% HCO_2H and esterification with CH_2N_2. Treatment of rhodine g_7 tri-Me ester oxime with Fe and HCO_2H similarly reduced the oxime group to a methanol and the product was *vinylrhodinporphyrin-3-methanol tri-Me ester*. Improved methods for prepn. of chlorine e_6, rhodine g_7 and phytol from pheophytin a + b are described. Treatment of vinylchloroporphyrin e_6 tri-Me ester (II) in HOAc with HI gave 2-α-hydroxychloroporphyrin e_6 tri-Me ester (III), m. 247°, the HI having added to the vinyl group and then hydrolyzed. Dehydration by heating of III gave II again. HBr also could be used instead of HI. Similar treatment of vinylphylloerythrin mono-Me ester gave *2-α-hydroxyphylloerythrin mono-Me ester* (IV), m. 284–6°. Oxidation of IV with I_2 in HOAc gave *oxophylloerythrin* which could be catalytically reduced to IV. Vinylpheoporphyrin a_5 di-Me ester is converted to *2-α-hydroxypheoporphyrin a_5 di-Me ester*, m. 285°, by HI. *Vinylchloroporphyrin e_4 di-Me ester* (V), m. 253°, was obtained from chlorine e_4 di-Me ester by treatment with Fe and HCO_2H. V was also obtained from II by long heating in HCO_2H. V was converted to *vinylchloroporphyrin e_5*, does not m. 320°, by treatment with I_2 and KOAc in HOAc. Vinylpheoporphyrin a_5 was obtained from pheophorbide a by treatment with oxalic acid and Fe in acetone instead of the usual HCO_2H and Fe treatment. The mechanisms of the

reactions are discussed. Cu complex salt from acetyl-chlorine C_6 tri-Me ester, m. 198°; Fe complex, m. 176–8°; Mn complex, m. 170–3°. Milton Levy

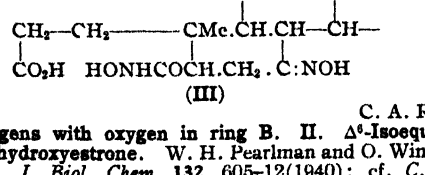
A reaction of hydroxamic acids. Martin Schenck and Leopold Wolf. *Ber.* **73B**, 25–8(1940).—It had been found (*C. A.* **34**, 1677[6]) that by a series of transformations there can be obtained from cholic acid a nitroketolactamtricarboxylic acid (α-acid) $C_{24}H_{34}N_2O_{10}$ which can be represented by formula I (R = $CHMeCH_2CH_2CO_2H$) (only the positions of the NH and CO groups of the lactam ring are uncertain; they may be the reverse of those shown). Hot 90% H_2SO_4 rearranges I into a β-isomer (II) (or possibly II with —C(:NOH).O.CO— instead of —CO.N(OH).CO— in ring B). Among other differences, I and II behave differently toward alk. $KMnO_4$; both are oxidized but I evolves no gas while II gives a considerable amt. of a colorless gas consisting chiefly of N. Hydrolytic cleavage of the lactam rings of I and II gives amino acids which on $KMnO_4$ oxidation behave like the parent I and II. To elucidate the mechanism of the gas formation a no. of N-contg. derivs. of bile acids, with the N in the form of amino, ketoxime, lactam and hydroxamic groups, were treated with alk. $KMnO_4$. Of these, all but the hydroxamic acids gave either no gas or only traces. Among the compds. studied were a hydroximinoketohydroxamic acid $C_{24}H_{36}N_2O_8$ (III) and a diketohydroxamic acid $C_{24}H_{35}NO_8$ (IV = III with C:O instead of C:NOH in ring B) (in these compds. the positions of the CO_2H and HONHCO groups may be the reverse of those shown). III gave in addn. to N a considerable amt. of a gas relatively quite sol. in water (presumably N_2O) while IV apparently gave only little N_2O along with the N. Under the same conditions aceto- and benzohydroxamic acid (V) gave chiefly N_2O with apparently only little N. The evolution of gas seems to be a general reaction of hydroxamic acids. That II also evolves gas although it contains no free hydroxamic group is easily explained, for in ring B there is an anhydride-like union of a hydroxamic with a carboxyl group which is opened by the alkali and the resulting hydroxamic acid then reacts with the $KMnO_4$. Hitherto the relative amts. of N_2O and N in the evolved gases had been detd. only roughly. In the present work the gases evolved by II and V were analyzed quantitatively and found to consist of N + 1.5% O (II) and 96% N_2O + 4% N (V), resp.



(I)



(II)



(III)

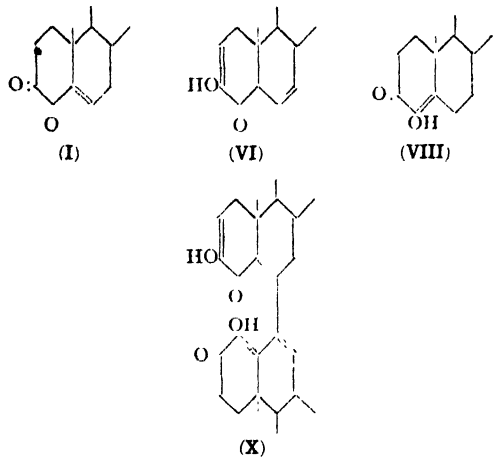
C. A. R.

Estrogens with oxygen in ring B. II. Δ⁶-Isoequilin from 7-hydroxyestrone. W. H. Pearlman and O. Wintersteiner. *J. Biol. Chem.* **132**, 605–12(1940); cf. *C. A.* **34**, 112[6].—7-Chloroestrone benzoate was obtained from 7-hydroxyestrone 3-benzoate by treating it with PCl_5 in $CHCl_3$ with $CaCO_3$ as acid-binding agent. Elimination of HCl from this Cl deriv. was effected by heating in C_5H_5N contg. NaI. Removal of the Bz group by alk. hydrolysis gave Δ⁶-isoequilin, a new isomer not identical with the isoequilin of Inhoffen (*C. A.* **31**, 4984[4]). Unlike equilin it yields estrone on catalytic reduction and possesses about 1/8 of the physiol. potency of estrone. Δ⁶-*Isoequilin* m. 265–6° (all m. ps. cor.), $[\alpha]_D^{25}$ 150° (0.98% in dioxane); *acetate*, m. 140–1°; *benzoate*, m. 202°.

A. P. Lothrop

Steroids and related compounds. V. Steroid diosphenols. V. A. Petrow and W. W. Starling. *J. Chem. Soc.* **1940**, 60–5; cf. *C. A.* **33**, 7812[1].—*cis*-Δ⁵-Cholestene-3,4-diol dibromide (Rosenheim and Starling, *C. A.* **31**, 3934[2]) (10 g.) in 60 ml. C_6H_6 is shaken with 2.5 g. CrO_3 in 30 ml. H_2O and 60 ml. AcOH for 3 hrs. at room temp. and the C_6H_6 layer treated with 5 g. NaI in 40 ml. EtOH; after the I is removed by 2 *N* Na_2SO_3, ether is added, the acid extd. with 5% aq. Na_2CO_3 and the C_6H_6-Et_2O layer shaken with 20% aq. KOH, giving the bright yellow K salt at the interface; the aq. layer is run off, the ether layer decanted and the K salt washed by decantation with Et_2O; the salt is then suspended in Et_2O and acidified with 2 *N* AcOH; crystn. of the residue from aq. Me_2CO gives 1 g. of pale yellow Δ⁵-*cholestene-3,4-dione* (*form A*) (I), with 0.5 mol. of H_2O of crystn., m. 135–6° (m. ps. cor.), $[\alpha]_D^{25}$ 30.5°, $[\alpha]_{5461}^{22}$ 41.3° (all rotations in $CHCl_3$); I gives a yellow color with $C(NO_2)_4$ in $CHCl_3$ and a purple color with $FeCl_3$. Refluxing I and *o*-$C_6H_4(NH_2)_2$ in abs. EtOH for 1.5 hrs. gives the *quinoxaline deriv.* (II), m. 175°; with Brady's reagent in EtOH there results the *mono-2,4-dinitrophenylhydrazone* (III), dark red, m. 255°. I and Ac_2O in C_5H_5N (12 hrs. at room temp.) give 4-acetoxy-Δ⁴,⁶-cholestadien-3-one (IIA), m. 160–1°, $[\alpha]_D^{25}$ 14°, $[\alpha]_{5461}^{25}$ 17.4° (*c* 1.10); this also results from debromination of 4,5,6-tribromocholestan-3-one (Inhoffen, *C. A.* **30**, 6386[6]). Oxidation of I with H_2O_2 in EtOH-KOH gives Diel's acid, $C_{27}H_{44}O_4$, m. 290°. *cis*-Δ⁵-Cholestene-3,4-diol (50 g.) and 13 ml. Ac_2O in C_5H_5N (12 hrs. at room temp.) give 37 g. of *cis-3-acetoxy*-Δ⁵-*cholesten-4-ol* (IV), m. 193–4°, $[\alpha]_D^{25}$ −64.5°, $[\alpha]_{5461}^{22}$ −75.3° (*c* 0.9260); shaking with CrO_3 in C_5H_5-AcOH-H_2O 6 hrs. at room temp. gives 9.5 g. (from 20 g. IV) of *3-acetoxycholestan-4-one 5,6-oxide* (V), m. 173–4°, $[\alpha]_D^{25}$ 3.8°, $[\alpha]_{5461}^{20}$ 4.5° (*c* 1.116); it does not show selective absorption in the ultraviolet region and gives no color with $C(NO_2)_4$; the corresponding *Bz deriv.* m. 185–6°, $[\alpha]_D^{25}$ 6.4°, $[\alpha]_{5461}^{22}$ 9.3° (*c* 1.186 in C_6H_5; inactive in $CHCl_3$). Refluxing 100 mg. V in 2 ml. AcOH contg. 200 mg. AcONa for 1 hr. gives 70 mg. of Δ⁵-*cholestene-3,4-dione* (*form B*) (VI), m. 162–3°, $[\alpha]_D^{25}$ 57.3°, $[\alpha]_{5461}^{22}$ 85.4° (*c* 0.726 in C_6H_6); it gives an intense orange-red color with $C(NO_2)_4$ in $CHCl_3$ and a violet color with EtOH-$FeCl_3$ and shows an intense ultraviolet absorption at 3200 A. VI also results in 0.5 g. yield by refluxing 1 g. V and 2 ml. concd. HCl in C_6H_5-EtOH for 1 hr. or by warming I with AcOH-HCl. The mono-2,4-dinitrophenylhydrazone (warming on the steam bath for 3 hrs.) is identical with III; the quinoxaline deriv. is identical with II but is formed by heating the components at 150° for 30 min. The K salt is obtained by shaking the ether soln. of VI with 20% KOH; AcOH regenerates VI. Oxidation of VI with H_2O_2 gives the 7-keto-"Diel's acid." VI is evidently identical with the compd. obtained by debromination of 4,4',5,6-tetrabromocholestan-3-one. VI does not yield an acetate with Ac_2O (with or without AcONa). IV (10 g.) with Br in AcOH-$CHCl_3$ gives 9.7 g. of the *dibromide*, m. 115°, which decomps. on keeping; shaking 5 g. in C_5H_5 with 3.3 g. CrO_3 in dil. AcOH for 6 hrs. at room temp. gives 2.5 g. of *3-acetoxy*-Δ⁵-*cholesten-4-one* (VII), m. 123–4°, $[\alpha]_D^{25}$ −76.7°, $[\alpha]_{5461}^{20}$ −93.8 (*c* 1.058); refluxing 500 mg. VII in 5 ml. Ac_2O for 1 hr. with 500 mg. AcONa gives 400 mg. of *3,4-diacetoxy*-Δ³,⁵-*cholestadiene*, m. 128°. VII shows an absorption band at 2800 A. VII with EtOH-HCl or with EtONa in EtOH gives cholestane-3,4-dione (VIII), m. 149–50°, $[\alpha]_D^{25}$ 79.7°, $[\alpha]_{5461}^{18}$ 94.5° (*c* 1.208); EtOH-$FeCl_3$ gives a violet color; quinoxaline deriv., m. 208–9°; *mono-2,4-dinitrophenylhydrazone*, dark red, m. 252–3°; Ac_2O-AcONa gives the enol-acetate (IX), m. 102–3°, $[\alpha]_D^{25}$ 92.5°, $[\alpha]_{5461}^{18}$ 100.5°. Oxidation of VIII with alk. H_2O_2 gives cholestane-$C_4\|C_4$-diacid (dihydro-Diel's acid), m. 247–8° (di-Me ester, m. 126–7°). An isomeric form of VIII could not be prepd.; regeneration from the phenolic K salt by AcOH and alk. hydrolysis of IX or of VII yield the same VIII; this suggests

that only 1 of the CO groups, presumably that at C_4, is able to undergo enolization and that VIII exists in the stable enolic form, Δ^4-cholesten-4-ol-3-one, only. V, refluxed with Ac_2O-AcONa for 1 hr., gives IIA. V (1 g.) in Et_2O-EtOH and 2.5 ml. *N* EtONa, acidified with *N* HCl after 1 min., gives *$\Delta^{2,6}$-cholestadien-3-ol-4-onyl-6,6'-($\Delta^{4',6'}$-cholestadien-4'-ol-3'-one* (X), m. 239–40°, $[\alpha]_D^{25}$ 23.7°, $[\alpha]_{546.1}^{20}$ 30.1° (*c* 1.12); it contains 1.96 atoms active H; the ultraviolet absorption spectrum shows max. at 2750 and 3100 A., log ϵ 3.9 and 3.8; *mono-2,4-dinitrophenylhydrazone*, m. 248° (decompn.); *diacetate*, m. 205–6°, $[\alpha]_D^{25}$ −52.4°, $[\alpha]_{546.1}^{20}$ 60.8°.



C. J. West

Brassicasterol. II. Degradation by ozone. Erhard Fernholz and Homer E. Stavely. *J. Am. Chem. Soc.* **62**, 428-30(1940); cf. *C. A.* **33**, 1747[3].—Whereas previous work did not decide between the C_{28} and C_{29} formulation for brassicasterol (I), expts. with O_3 favor the C_{28} formula. Brassicasteryl acetate (II), treated with 1 mole of Br and then with twice the theory of O_3, gives *β*-3-hydroxybisnorcholenic acid, $C_{22}H_{34}O_3$, m. 293° (decompn.); *Me ester*, m. 139-40° (*Ac deriv.*, m. 138°). The action of O_3 upon II in AcOH gives a slightly racemized 1-methylisopropylacetaldehyde, whose semicarbazone m. 119°, $[\alpha]_D^{25}$ −39.4 ± 2° (8.65 mg. in 2 cc. EtOH); the aldehyde from ergosterol m. 128°, $[\alpha]_D$ −52°. Thus I is 7,8-dihydroergosterol. The tetrabromide of II with NaI gives the *22,23-dibromide* of II, m. 236–8°. Ergostanol gives a *m-dinitrobenzoate*, m. 202-3°, $[\alpha]_D^{25}$ 14° (12.7 mg. in 2 cc. $CHCl_3$). C. J. West

Partial synthesis of corticosterone. I. Purnendu Nath Chakravorty and Everett S. Wallis. *J. Am. Chem. Soc.* **62**, 318–20(1940).—3-Hydroxy-12-ketocholanic acid forms a *Me ester*, m. 143°; the Ac deriv. (I) m. 197°. I in $CHCl_3$ or AcOH contg. a little HBr gives a bromide, a sticky red residue, which with boiling EtONa in abs. EtOH yields *3-hydroxy-12-keto-9,11-cholenic acid* (II), m. 172–3°; the absorption at 242.5 is characteristic of *α,β*-unsatd. ketones; the Ac deriv. of II m. 199°. Dehalogenation with Zn and AcOH gives 3-hydroxy-12-ketocholanic acid; AcONa and AcOH did not give II. II forms a *semicarbazone*, m. 221°, after 2 hrs.' boiling. Reduction by heating with EtONa at 180° for 15 hrs. gives *3-hydroxy-9,11-cholenic acid*, m. 183–4°, $[\alpha]_D^{25}$ 27° (63 mg. in 5 cc. abs. EtOH); the epimer is removed by crystn. from Me_2CO. C. J. West

Preparation of $\Delta^{4,6}$-cholestadien-3(β)-ol. Vladimir A. Petrow. *J. Chem. Soc.* **1940**, 66–7.—The prepn. of $\Delta^{4,6}$-cholestadien-3(*β*)-ol (I) has been claimed by Dane and Wang (*C. A.* **31**, 6668[9]) who obtained it by debromination of cholesteryl dibromide but it appears from the present work that their product was largely contaminated with cholesterol. Reduction of 20 g. of $\Delta^{4,6}$-cholestadien-3-one (II) (Dane, Wang and Schulte, *C. A.* **31**, 2606[6]) with (iso-PrO)$_3$Al in iso-PrOH (slow distn. for 10 hrs.) gives 11.5 g. of a pale yellow product which, recrystd. repeatedly from aq. Me_2CO, gives the *addn. compd.* of I and its epimer, $C_{27}H_{44}O$, m. 113°; a digitonin (III) estn. showed that it contained equimol. amts. of the 2 isomers. Refluxing 9 g. of the reduction product and 15 g. III in 1900 ml. EtOH for a few min. and allowing the soln. to stand overnight at 0°, washing the ppt. with ether, dissolving in 300 ml. C_5H_5N, adding a large vol. of ether, filtering the III, washing the ether with H_2O and crystg. the residue from aq. Me_2CO gives I, m. 126–7°, $[\alpha]_D^{25}$ −38°, $[\alpha]_{546.1}^{20}$ −38° ($CHCl_3$, *c* 0.954); the digitonide m. 224–7°; Ac_2O in C_5H_5N (12 hrs. at room temp.) gives the *acetate*, m. 78–9°, $[\alpha]_D^{25}$ −71.6°, $[\alpha]_{546.1}^{20}$ −61.2° ($CHCl_3$, *c* 0.960); the ultraviolet absorption spectrum in EtOH shows a broad band at 2390 A., $E_{1\,cm}^{1\%}$ 615; catalytic reduction yields cholestanyl acetate. I also shows a band at 2390 A., $E_{1\,cm}^{1\%}$ 563. Oxidation of I with Oppenauer reagent gives II, characterized by the *2,4-dinitrophenylhydrazone*, dark red, m. 231–2°. Irradiation of I did not yield a compd. with vitamin D activity. The "epi-fraction" forms a yellow oil, from which a cryst. product could not be isolated; as the ultraviolet absorption spectrum in cyclohexane shows a band at 2740 A., $E_{1\,cm}^{1\%}$ 157, and a subsidiary band at 2380 A., $E_{1\,cm}^{1\%}$ 130, dehydration has apparently occurred in the course of its isolation with the formation of a cholestatriene.

C. J. West

Physicochem. Bureau of Standards—purification and criteria of purity of org. standards (Gillo) **2**. Constitution of peptides (Sannié, Poremski) **3**. Thermal polymerization of styrene and its inhibition (Foord) **2**. Org. reaction catalysts (Light) **2**. Derivs. of $CaCN_2$—formation of guanidine from dicyanodiamide—reactions between dicyanodiamide and NH_4 salts (Sugino) **6**. Nitration of C_6H_6 by oxides of N in glow discharge (Avanesov, Vyatskin) **4**.

Bargellini, Guido: Elementi di chimica organica. Rome: Studium. 103 pp. L. 8.

Fuson, Reynold C., Connor, Ralph, Price, Charles C., and Snyder, Harold R.: A Brief Course in Organic Chemistry; a Combined Textbook and Laboratory Manual. 2nd ed. Ann Arbor, Mich.: Edwards Brothers, Inc. 164 pp.

Quayle, Osborne R.: Outline and Notes in Elementary Organic Chemistry. Atlanta: Emory University. 103 pp.

Rolla, Luigi: Lezioni di chimica organica. Genoa: E. Cioffi. 242 pp.

Sargent, Florence C.: Experiments in Organic and Physiological Chemistry. Boston: Simmons College. 174 pp.

Polymerizing ölefins. Ambrose McAlevy (to E. I. du Pont de Nemours & Co.). U. S. 2,183,503, Dec. 12. An olefin to be polymerized, such as C_2H_4, C_3H_6 or iso-C_4H_8 is brought into contact with a liquid catalyst contg. BF_3 1 and water 1.0–2.2 mols. (suitably under high pressure).

Polymerizing ethylene for the production of a viscous oil. Johann Sixt (to Consortium für elektrochemische Industrie G. m. b. H.). U. S. 2,183,154, Dec. 12. Polymerization of C_2H_4 is effected in the presence of dichloroethane or other solvent of the class of aliphatic liquid hydrocarbons or their chlorination products and of $AlCl_3$ and a quantity of water of 0.5–2.0 mols. per mol. of $AlCl_3$.

Effecting catalytic dehydrogenations, as in producing propylene from propane. Herbert P. A. Groll and James Burgin (to Shell Development Co.). U. S. 2,184,234, Dec. 19. A dehydrogenatable hydrocarbon contg. at least 2 C atoms is brought into contact with a catalyst contg. oxides of Al and Cr (with a preponderating proportion of the Al oxide) at a temp. (suitably about 575°)

favorable to dehydrogenation but below that at which substantial pyrolysis occurs (the dehydrogenation being effected in the initial presence of a substantial amt. of added H if desired). U. S. 2,184,235 relates to use of "activated alumina" in effecting similar dehydrogenations. Cf. *C. A.* **34**, 1991[6].

Decolorizing alkyl-substituted aromatic hydrocarbon compounds. John F. Olin (to Sharples Solvents Corp.). U. S. 2,183,405, Dec. 12. For decolorization, a compd. such as crude amylnaphthalene is subjected to a mild hydrogenation by admixt. with an aliphatic monohydric alc., adding a metal, such as Na, capable of replacing H in the alc., and is afterward washed with water.

Amines. Lee H. Clark, John F. Olin and Charles W. Deibel (to Sharples Solvents Corp.). U. S. 2,183,499, Dec. 12. An arrangement of app. is described, and a process of producing amino derivs. of alkanes and cycloalkanes contg. 4–8 C atoms by ammonolysis of a halogen deriv. of the hydrocarbon compd. corresponding to the desired amino deriv., such as amyl chlorides for the production of amyl amines, and sepg. NH_3, together with small quantities of other constituents of the reaction mixt., from the reaction products by distn. Sepd. NH_3 and the other constituents mentioned are absorbed in a lower aliphatic alc. such as MeOH or EtOH, which is a mutual solvent for NH_3 and the halogen deriv., mixing the solvent contg. the absorbed NH_3 and other constituents with a fresh quantity of the halogen deriv. and treating the latter with the NH_3 present in the resulting mixt.

Cyclohexylamine. Johann A. Bertsch (to Monsanto Chemical Co.). U. S. 2,184,070, Dec. 19. A method of prepg. cyclohexylamine by hydrogenation of aniline comprises heating aniline in the presence of a pretreating agent selected from the group consisting of Pb, Pb oxides and basic compds. of Pb at an elevated temp. below the decompn. point of aniline for a sufficient period to suppress the formation of high-boiling compds. that normally result during the hydrogenation of aniline, sepg. the aniline from the agent, and thereafter subjecting the aniline to hydrogenation by contact with H in the presence of a catalyst of hydrogenation.

Alcohol sulfonates. I. G. Farbenind. A.-G. Ger. 684,927, Dec. 8, 1939 (Cl. 12*o*. 23.02). The oxidation products of high-mol. aliphatic hydrocarbons or their mixts. with cycloaliphatic hydrocarbons are so hydrogenated that essentially only the compds. contg. carbonyl groups are converted to the corresponding alcs. while the carboxyl compds. are unchanged. The alcs. produced are sulfonated in known manner, neutralized and extd. with water-insol. solvent.

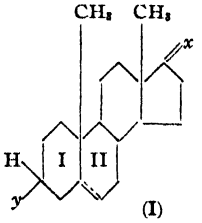
Alkylated polyisopropylhalobenzenes. Robert R. Dreisbach and Geo. B. Heusted (to Dow Chemical Co.). U. S. 2,183,552, Dec. 19. Solvent and dielec. compds. some of which are suitable for use in gasoline contg. Et_4Pb to increase its octane rating are prepd. by treating a benzenoid hydrocarbon or a halogenated deriv. contg. not more than 2 halogen atoms per mol. with propylene, etc., and details are given or mention is made of the production of: triisopropyltoluene, triisopropylxylene, triisopropylethyl benzene, triisopropyl diethyl benzene, tetraisopropyltoluene, triisopropylchlorotoluene, triisopropylbromotoluene, and a liquid mixt. of monomethyltriisopropylchlorobenzenes b_{755} about 283°.

Amino compounds of the anthraquinone series. Geoffrey Lord and George Reeves (to Celanese Corp. of America). U. S. 2,183,652, Dec. 19. A process for the manuf. of amino and aliphatically substituted amino derivs. of anthraquinone comprises the reaction with NH_3 or an aliphatic amine, in the presence of a salt, oxide or hydroxide of Mn or Cu, and in a reaction medium which consists apart from the reactants substantially entirely of a 0.5 to 5% aq. soln. of caustic alkali, an anthraquinone compd. which is at least slightly sol. in such a soln. of caustic alkali and which contains in one of the 1- and 4-positions a substituent hydroxy radical and in the other of such positions a hydroxy, amino or substituted amino radical, so as to replace a hydroxy radical by a residue of the agent employed, the proportion of the metal compd. present being 0.1 to 5% of the wt. of the anthraquinone compd. treated. The process is suitable for use with such compds. as quinizarin, 1,4,5-trihydroxyanthraquinone, 1,4,5,8-tetrahydroxyanthraquinone, 1-amino-4,5,8-trihydroxyanthraquinone, 1-hydroxy-4-aminoanthraquinone and 1-hydroxy-4-methylaminoanthraquinone. Various examples with details are given, involving the use of $CuSO_4$ and Mn chloride.

Selenylarylene thiazoles. Lawrence R. Sperberg (to Wingfoot Corp.). U. S. 2,184,170, Dec. 19. 2-Selenylarylenethiazoles such as 2-selenylbenzothiazole are prepd. by treating a selenide such as that of Na with a 2-halo-substituted arylenethiazole such as 2-chlorobenzothiazole (suitably with heating to 98°).

Compounds of the perhydrocyclopentanophenanthrene series. Max Bockmühl, Gustav Ehrhart, Heinrich Ruschig and Walter Aumuller (to Winthrop Chemical Co.). U. S. 2,183,851, Dec. 19. In prepg. a compd. of the perhydrocyclopentanophenanthrene series such as 3-oxoternorcholenylamine, an Al alcoholate such as (*tert*-Bu)Al is caused to react, in the presence of a ketone such as acetone, upon a compd. of the polyhydrocyclopentanophenanthrene series substituted in the 3-position by the hydroxyl group and in the 17-position by a basic group, such as 3-hydroxyternorcholenylamine.

Dimethylpolyhydroketocyclopentanophenanthrols. Friedrich Hildebrandt (to Schering Corp.). U. S. 2,184,299, Dec. 26. A method for producing dimethylpolyhydrocyclopentanophenanthrene compds. of the general formula $C_{19}H_n(x)(y)$, where n is an odd number from 27 to 29 inclusive, y represents a member of the group of substituents consisting of the hydroxyl group and groups which on hydrolysis are transformed into the hydroxyl group, and x is a member of the group consisting of the keto group =O and the secondary alc. group (OH)H the compn. of the compds. corresponding to the structural formula



(I)

the dotted line in the formula indicating the probable position of the double bond in the case of the unsatd. compds., comprises the reaction of pregnanolones of the general formula $C_{21}H_mO_2$, where m is 34 in the case of the satd. and 32 in the case of the unsatd. compds., and corresponding to the structural formula I with x = CH_3CO and y = OH, with an organometallic compd. of the Grignard type, splitting off water between the tertiary hydroxy group and the neighboring H atom of the secondary-tertiary dialc. obtained, thereby leaving a double bond in the side chain, oxidizing the unsatd. alc. obtained to split the mol. at the point of such double bond, and isolating the reaction product.

Reaction of alkali metals with aromatic hydrocarbons. Norman D. Scott (to E. I. du Pont de Nemours & Co.). U. S. 2,183,847, Dec. 19. A method of effecting the addn. of an alkali metal to a polycyclic aromatic hydrocarbon which will form addn. compds. therewith, the hydrocarbon being from the group consisting of anthracene, binaphthyl, acenaphthene, retene and their homologs, comprises causing the alkali metal and the hydrocarbon to react in a reaction medium which contains in sufficient amt. to promote the reaction a polyether from the group consisting of glycol formal, methylglycerol formal, and dimethylenepentaerythritol.

Alkaline earth salts of inositol tetraphosphate. Franz Fischler. Ger. 684,946, Dec. 8, 1939 (Cl. 12*o*. 25). The ext. obtained by lixiviation of bran with hot, dil. acids is filtered; the filtrate is treated with 8-fold the amt. of Na_2-

HPO_4 calcd. upon the dissolved inositol, and with an alk. earth salt; the reaction is adjusted to pH 5.0–5.4 by alkali hydroxide soln.; the ppt. resulting upon heating to 90° after addn. of a concd. acetate soln. is dissolved in hot 5% HCl. The pptn. of the inositol phosphate is repeated under the same conditions and subsequently the soln. prepd. by treatment of the ppt. with 5% HCl adjusted to a pH value that depends on the alk. earth tetraphosphate desired. From this soln. the alk. earth inositol tetraphosphate is pptd. by means of an alk. earth salt.

Vinyl halides. Karl Jung (to I. G. Farbenind. A.-G.). U. S. 2,183,240, Dec. 12. In the manuf. of a vinyl halide by the addn. of a H halide to C_2H_2 in the presence of a mercuric halide, the reaction is effected in the presence of glycol or other org. solvent of low mol. wt. selected from the polyhydric aliphatic alcs. or their halohydrins in which the mercuric halide is dissolved.

Alkene sulfides. Willem Coltof (to Shell Development Co.). U. S. 2,183,860, Dec. 19. A process for the dehydrochlorination of 1-chloroethane-2-thiol to ethylene sulfide while avoiding the substantial formation of ethylene sulfide polymers comprises treating the 1-chloroethane-2-thiol with an alkali metal bicarbonate in an aq. medium, the alkali metal bicarbonate being used in sufficient amt. to combine with the liberated HCl and maintain the pH of the reaction mixt. in the range of from 7.5 to 9.5. Similarly, other haloalkanethiols also may be treated.

Pure salts of acid esters of polybasic inorganic acids. N. V. de Bataafsche Petroleum Maatschappij (A. J. Tulleners, inventor). Dutch 47,009, Nov. 15, 1939. Alkali alkyl sulfates obtained by absorption of alkenes in sulfuric acid and neutralization are usually contaminated with alkali sulfate. Purification is effected by alcohols of 6 or more C atoms, 2-heptanol, benzyl alc., terpineol, etc., which dissolve the alkali alkyl sulfate. The extn. is preferably effected on the moist reaction product or soln. and can be continuous. The solvent is recovered by steam distn. A temp. of 100° is preferred during the extn. to promote sepn. of the mixt. into phases.

Aliphatic acid. Wm. O. Kenyon (to Eastman Kodak Co.). U. S. 2,184,555, Dec. 26. An aq. alc., such as EtOH for the production of HOAc, is caused to react with at least a molar proportion of water in the presence of a Cu-Zn-Mn alloy catalyst, at about 290–350°, and similar conversions may be effected with use of AcH or PrOH, etc., as initial material.

Unsaturated acids from aldehydes. Hanns P. Staudinger (to Distillers Co. Ltd.). U. S. 2,183,325, Dec. 12. An aldehyde, such as crotonaldehyde for the production of crotonic acid, is subjected to the action of O in the presence of a per compd. of an org. acid which is completely miscible with the aldehyde, such as peracetic acid (suitably at room temp.).

Concentrating acetic acid. Donald F. Othmer (to Eastman Kodak Co.). U. S. 2,184,563, Dec. 26. An arrangement of app. is described, and a process of concg. aq. HOAc which involves mixing with it not more than the right amt. of heptane or dioxane to form an azeotropic mixt. with the water present and distg. water together with the added treating agent.

2,4 - Dioxo - 3,3 - dialkyltetrahydropyridine - 6 - carboxylic acids. Otto Schnider (to Hoffmann-La Roche Inc.). U. S. 2,170,781, Aug. 22. See Ger. 668,489 (*C. A.* **33**, 2150⁴).

Purifying acetylene and producing acetaldehyde from it. Eger V. Murphree (to Standard Oil Development Co.). U. S. 2,183,148, Dec. 12. An arrangement of app. is described, and a process of making AcH from acetylene which involves bringing a gaseous mixt., contg. a substantial amt. of acetylene and a small amt. of impurities of the nature of diacetylene and gases inert in the aldehyde conversion process, with a solvent, at a temp. low enough, under the pressure conditions used, to effect soln. in the solvent of at least a major proportion of the impurities but high enough to effect soln. of not more than a relatively small proportion of the acetylene, passing the purified gases to a conversion zone to produce AcH and recycling the residual gases from the aldehyde conversion process to a stripping zone to remove dissolved gases from the charged solvent. Gas, oil, acetone or toluene may be used as the solvent.

Methyl methacrylate and related compounds. Patrick D. Ritchie, David T. Jones and Robert Burns (to Imperial Chemical Industries Ltd.). U. S. 2,183,357, Dec. 12. In producing Me methacrylate, Me α-hydroxyisobutyrate is acetylated to Me α-acetoxyisobutyrate, and the product is subsequently pyrolyzed at 400–600°. Likewise, various other lower alkyl esters or nitriles of α,β-unsatd. monocarboxylic aliphatic acids are produced by subjecting in the vapor form to temps. considerably in excess of their b. ps., esters, nitriles or amides of mono- or di-alkylglycolic acids in which the H atom of the α-hydroxyl group (i. e., alcoholic) has been replaced by the acidic radical of an acid which is volatile, or of which the decompn. products are volatile, at the temp., the substituted glycolic acids may be illustrated by the formula $RR_1C(OX)CO_2H$, where R is an alkyl radical, R_1 is H or an alkyl radical and X is an acyl radical of an acid which is volatile at the temp. of the reaction. In carrying out the process, atm. pressures may be used. The optimum temp. for the reaction varies somewhat according to the particular deriv. undergoing decompn.; but in general it is preferred to employ temps. between about 400 and 600°. The heat treatment is conveniently carried out by passing the vapor of the substance through a heated tube, if desired together with an inert diluent gas or vapor such as N or CO_2. The tube may be suitably packed, for example with quartz, to increase the heating surface, and catalytic packing materials such as silica gel or graphite may also be used. Numerous examples with details are given.

Chlorinating cyclohexane. Arthur A. Levine and Oliver W. Cass (to E. I. du Pont de Nemours & Co.). U. S. 2,183,574, Dec. 19. In order to produce cyclohexene, cyclohexane is caused to react with an amt. of Cl only sufficient to convert a minor proportion of the cyclohexane to monochlorocyclohexane, and the resulting mixt. is passed over a dehydrogenchlorination catalyst such as charcoal impregnated with $BaCl_2$ at a temp. of 400–500°. Cf. *C. A.* **33**, 5411⁶.

Isophorone. Thomas H. Vaughn and Donald R. Jackson (to Union Carbide and Carbon Research Laboratories, Inc.). U. S. 2,183,127, Dec. 12. Acetone vapors are brought into contact with a catalyst comprising CaO, $Ca(OH)_2$ or CaC_2 (suitably at a temp. of about 350°) and isophorone is isolated from the resulting vaporous reaction products (as by condensation and fractional distn. under superatm. pressure).

Mono-, di- and tri-nitrotoluenes. P. A. F. de Beule. Belg. 430,040, Oct. 31, 1938. Toluene is nitrated at −25° to +25° in a soln. contg. at all times above 85% HNO_3.

Butadiene production from 1,3-butylene glycol. Martin Müller-Cunradi and Heinz Krekeler (to I. G. Farbenind. A.-G.). U. S. 2,184,164, Dec. 19. App. is described, and a process which involves heating 1,3-butylene glycol in a still in the liquid phase in the presence of sulfonic acids of aromatic hydrocarbons, distg. off the reaction products formed including butadiene, water and intermediate products of the dehydration of 1,3-butylene glycol, cooling the distillate to sep. the butadiene from the water and intermediate products, sepg. the intermediate products from the water, and returning them to the still so that they enter into fractionating exchange with the reaction products distg. off.

1-Alkyl-1-aryl-1,3-butadiene. Erich Lehmann. Ger. 684,797, Dec. 5, 1939 (Cl. 12*o*. 19.01). 1-Alkyl-1-aryl-1-halo-3-butene is permitted to drop at a rate of 1–2 drops per sec. upon alk. earth under 40–60 mm. pressure at 220–60°.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

ARTHUR W. DOX

The specificity of sulfopeptidases. I. The adsorptive distribution of kidney peptidase. Tunehiro Kazama. *Acta Schol. Med. Univ. Imp. Kioto* **23**, 154-9(1939).—Kidney exts. contg. carboxypeptidases were shaken with alumina Cγ (120 cc. dild. with equal vol. of acetate buffer pH 5.1, plus 16 cc. of a suspension of alumina contg. 149.1 mg. Al_2O_3). The adsorbate was washed 3 times with H_2O and treated for 20–30 min. with 120 cc. of 0.04 *N* NH_4OH contg. 17% glycerol. The supernatant fluid split β-naphthylsulfonyldiglycine (I) 63%; benzoyldiglycine (II) 21.5%; and benzoylglycine (III) 15%. The adsorbate dried with filter paper and neutralized with 0.2 *N* HCl split I 19.7%, II 9.6% and III 81%. On further adsorption and elution, the eluate contained no enzyme; the adsorbate split II 6%, III 78% and did not split I. II. **Influence of acyl groups of substrate on the activity of carboxypeptidase.** *Ibid.* 160–8.—Exts. of pancreas contg. carboxypeptidase were subjected to adsorption and elution, the adsorbents being alumina Cγ, Fe_3O_4, kaolin, kieselguhr and acid clay "Adsol." It was possible to obtain a fraction which hydrolyzed benzoylglycine and *l*-leucine but not β-naphthylsulfonylglycyl-*l*-leucine or chloroacetyl-*l*-phenylalanine. E. S. G. Barron

Action of enzymes on polypeptides containing acyl derivatives of glycine. Tunehiro Kazama. *Acta Schol. Med. Univ. Imp. Kioto* **23**, 169-75(1939).—Numerous acyl derivs of polypeptides were prepd. with glycine exclusively: diglycine (I), triglycine (II), β-naphthylsulfonyldiglycine (III), β-naphthylsulfonyltriglycine (IV), benzoylglycine (V), benzoyldiglycine (VI), benzoyltriglycine (VII), chloroacetyldiglycine (VIII), chloroacetyltriglycine (IX). Polypeptidase prepd. from pig tissue (dry powder dehydrated with acetone and ether, extd. for 3 hrs. at 37° with 10 vols. of 87% glycerol, centrifuged, filtered, and dild. with H_2O, 1:4) was used for the hydrolysis. A titration value corresponding to 1.67 cc. of 0.2 *N* KOH was taken as 100%. With kidney ext. at pH 7.8 to 8.0 and 37°, I was split 67% in 60 min.; II, 21% in 67 min.; III, 37% in 48 min.; IV, 11% in 37 min.; V, 85% in 48 min.; VI, 8% in 85 min.; VII, 107% in 24 min.; VIII, 33% in 48 min. With pancreas ext. I was split 100%, II 62%, IV 75% and VI 39%, each in 24 min.; V 5% and VIII 1% in 48 min.; while III, VII and IX were not split. With intestinal ext. I was split 35% in 90 min.; II 38%, V 1%, VII 37% and VIII 3% in 48 min.; while III, IV and VI were not split. *Ibid.* 176-80.—Glycerol exts. of liver and spleen contg. carboxypolypeptidase were treated with 20% AcOH (to 220 cc. of ext., 1.6 cc. of AcOH) for 4 hrs. at 37°, and were incubated with the polypeptides at pH 4.2, 37°. Liver ext. hydrolyzed only the Bz derivs. Papain activated with HCN had no action on these polypeptides. E. S. G. Barron

Production of alcohol in cadavers. Folco Domenici. *Arch. ist. biochim. ital.* **11**, 161-204(1939); cf. *C. A.* **33**, 6515.—Dead rabbits left for 73 hrs. to 30 days at 0.4° to 19° formed volatile substances previous distns. of which gave, on titration with dichromate, amts. corresponding to 0.07 to 1.28 g. of alc. %. When the animals were buried 1 m. deep at 13° to 17° the amt. found was from 0.05 to 0.28 g. %. The amt. diminished when the thorax was left closed. E. S. G. Barron

Microscopic method of electrophoresis and its application to the study of ionogenic and nonionogenic surfaces. Harold A. Abramson. *Trans. Faraday Soc.* **36**, 5-15 (1940).—Optically flat electrophoresis cells alone are capable of giving sufficient precision (3 to 10% error) to give results comparable with those obtained in U-tubes. Some data are reviewed on proteins like horse serum albumin and egg albumin adsorbed on quartz and collodion particles and on amino acid crystals. Titration curves and elec. mobility of serum albumin and pseudoglobulin show that from pH 4 to 8 the elec. mobilities are proportional to the combining power of the proteins with H^+ and OH^- ions. Victor R. Dietz

Influence of electrolyte concentration on the electrophoretic mobility of egg albumin. Arne Tiselius and Harry Svensson. *Trans. Faraday Soc.* **36**, 16-22(1940).—The mobility of egg albumin at +0.5° in phosphate buffer of pH 7.10 and of varying ionic strength (0.20 to 0.0014) was detd. by the moving boundary method. As a limiting case at very low concns., the protein migrates as a free ion. The reduction in mobility caused by increasing ionic strengths, can be accounted for by the Debye-Hückel-Henry theory of electrophoresis. Some measurements were made in the isoelec. region (pH = 4.4–4.8) and at ionic strengths 0.10, 0.05, 0.02, 0.01 (acetate buffers) at 0.5°. The displacement of the isoelec. point by variation of the ionic strength may be explained partially by the combination of other ions than H^+ and OH^- with the protein. Victor R. Dietz

Membrane potentials, valences and theoretical and observed mobilities of hemoglobin and egg albumin. G. S. Adair and M. E. Adair. *Trans. Faraday Soc.* **36**, 23-32 (1940). Thrice-recrystd. egg albumin and CO-hemoglobin in the same activities of electrolytes (Na phosphate buffer mixts.) have been used both for the thermodynamic detns. of potential and charges and for electrokinetic measurements. The values of pH were between 6.8 and 7.6. The collodion membrane potentials, the valences and the excess of inorg. ions in the neighborhood of a protein ion are in correspondence with the cataphoretic expts. Calcns. of the mobilities of the ions of hemoglobin from the measurements of the charge and radius, Henry's formula (*C. A.* **26**, 17) being used, are in fairly close agreement with the observed mobilities. Victor R. Dietz

Influence of electrolytes on the electrophoretic mobility of serum albumin and hemocyanin. Paul Putzeys and Paul van de Walle. *Trans. Faraday Soc.* **36**, 32-8(1940); cf. *C. A.* **33**, 3897.—Serum albumin (horse) and hemocyanin (*Helix pomatia*) were investigated at 25° by the moving-boundary method. By the use of a solvent made of the same salt concns., but with ionic strength varying from 0.02 to 0.06, the isoelec. point of hemocyanin found is very nearly const.; that of serum albumin appears to shift 0.04 unit toward the alk. side for an increase of ionic strength from 0.03 to 0.06. Little success is obtained in correlating the electrophoretic mobility with the variation of acidity and the ionic strength of the soln. Victor R. Dietz

Observations at the electrophoretic moving boundary with Lamm's scale method. R. A. Kekwick. *Trans. Faraday Soc.* **36**, 47-52(1940); cf. *C. A.* **24**, 1261; **31**, 7722.—Use is made of the differences in the *n*s between the buffer and protein-buffer solns. The progress of electrophoresis of a 0.55% soln. of crystd. egg albumin at pH 7 is shown; the shapes of the curves differ in corresponding anode and cathode exposures, although the area under the curves remains appreciably const. Curves for a mixt. of egg albumin and lactoglobulin, for normal human serum and for the serum from a case of multiple myeloma show several max. in each case, some sharp and some flat. V. R. D.

Electroviscous effect in egg albumin solutions. Henry B. Bull. *Trans. Faraday Soc.* **36**, 80-4(1940).—Neither the Smoluchowski (*C. A.* **11**, 5) nor the Krasny-Ergen (*C. A.* **30**, 6621) equations, giving the increase in viscosity of a suspension of spherical particles as a result of the electrostatic potential on the particle, gives the right order of magnitude for the electroviscous effect with a purified egg albumin soln. (less than 1% concn.). The calcd. values are about 100 times those observed. Exptl. results indicate a pronounced electroviscous effect which is largely suppressed by electrolytes, namely, by 0.01 *N* NaCl on the basic side of the isoelec. point and by 0.02 *N* NaCl on the acid side. Victor R. Dietz

Effect of selenium on urease and arginase. C. I.

Wright. *J. Pharmacol.* **68**, 220–30(1940); cf. *C. A.* **32**, 9267[8].—Se in the form of selenite, selenate or diselenodiacetic acid inhibits the activity of urease, probably by oxidizing SH groups. Inhibition by selenite is immediate and increases rapidly with increase in concn., but does not go to completion. Inhibition by diselenodiacetic acid is progressive and goes to completion at very low concns. after sufficient time. Rat liver arginase activity is not affected by *in vitro* addn. of Se compds. The ingestion by the rats of Na selenite or seleniferous wheat does not decrease the liver arginase concn. The water content of livers taken from animals ingesting Se compds. is 5–10% greater than in controls. L. E. Gilson

Chemistry and physiology of glutenin. Emil Abderhalden. *Quaderni nutriz.* **6**, 248–55(1939).—A discussion. Helen Lee Gruehl

The origin and maintenance of optical activity in living matter. G. F. Gauze. *Biodynamica* No. **56**, 23 pp (1939); cf. *C. A.* **34**, 1039[8]. - A review. E. H.

Relationship of vitamins and enzymes. John Field, 2nd. *Contact Point* **17**, 172–80(1940). E. H.

Variations in energy conversion during cell partition (temperature measurements on live single cells). H. J. Trurnit. *Naturwissenschaften* **27**, 805–6(1939).—Thermocouples were constructed of 1–2 μ diam. and of "active mass" about 10^{-10} g. The thermoelectrically active part of these sounding elements is small relative to a red blood corpuscle. A standardization method was worked out to convert the readings from these couples to heat production in cal. per sec. Thus the course of mitosis could be followed quantitatively. Detns. were made with eggs of *Triton alp.* of 1 cu. mm. content and their parts after removal of the jelly shell. Other tests were made on sea-urchin eggs (*Psammechinus mil.*) of 0.0003 cu. mm. in a glass vessel of 0.4 cu. mm. content (5 to 100 per test). The sounding element was introduced centrally. The tests took place on a slide in a moist chamber, and a stereomicroscope, manipulator and thermostat were used. The sounding elements were 15 and 30 μ diam. The temp. variations in the cells are shown in curves *vs.* time, temp 20°. For sea urchin eggs a temp. rise of the order of $^1/_{50}$° commencing simultaneously with cell partition was observed, with a max. at about the time of finished partition, followed by a rapid decrease. Both rise and fall show minor maxima. Sepn. of plasma and nucleus therefore takes place with a more intensive energy conversion than the preceding development stage. This work is related to chemocytology. B. J. C. van der Hoeven

Activation and inhibition of alkaline phosphatases. R. Cloetens. *Naturwissenschaften* **27**, 806(1939).—Continuing previous work (*C. A.* **33**, 6366[6]; **34**, 1340[6]) C. studied the influence of Mn^{II} ions on alkali phosphatases in presence and absence of KF and KCN, 0.01 *M*. Intestinal phosphatase II, kidney phosphatase II and liver phosphatase I were used, Mn^{II} in concns. of 0.001 and 0.01 *M* activates both of these phosphatase species. With phosphatase I little or no (up to 20%) inhibition is found with 0.01 *M* KF or KCN at the lower Mn concn., no inhibition at all at the 0.01 *M* concn. With phosphatase II no inhibition is found with 0.01 *M* KF, 90% inhibition with 0.01 *M* KCN. B. J. C. van der Hoeven

Fluoride inhibition and metal activation of yeast phosphatase. L. Massart and R. Dufait. *Naturwissenschaften* **27**, 806–7(1939).—Yeast phosphatase which splits β-glycerophosphate at pH 6 to 7 optimally is sensitive to addn. of metals (Mg, Mn) like alk. phosphatases (cf. preceding abstr.). The yeast phosphatase is inhibited by fluoride and loses a large part of its activity on dialysis. Mg or Mn ions reactivate dialyzed enzyme. Fluoride affects the Mg reactivation more than that of Mn. Fluoride inhibition is considered due to complex formation, Mg is more likely to form metal complexes with F than Mn. Tabulated data are given. B. J. C. van der Hoeven

Aminopolypeptidases. Ernst Maschmann. *Naturwissenschaften* **27**, 819–20(1939).—The aminopolypeptidases of obligatory anaerobic bacteria (anaeropeptidases) are not of simple nature but contain several apoenzymes, changing in relative amts. depending on the origin of the enzyme. Bivalent Fe, sometimes Mn, functions as coenzyme. From bouillon cultures of *B. histolyticus* and *B. botulinus* were prepd. enzymes which after pretreatment with cysteine and 2 $FeSO_4$ decompd. leucylglycylglycine (LGG) and diglycylglycine (GGG) readily. $(NH_4)_2SO_4$ fractionation of these enzymes produced fractions which decompd. either LGG or GGG. Tabular data are given. The $(NH_4)_2SO_4$ solns. used varied in concn. from 50 to 75%. On treatment of the histolyticus enzyme pptd. with 75% $(NH_4)_2SO_4$ by MeOH at 0° and pH 7 there appears a ppt. at 75% MeOH concn. which splits only GGG readily and is inactive toward dipeptides and in proteolysis. The other fractions are inactive, hence MeOH irreversibly inactivates the LG and LGG apoenzymes. The pH optimum of the anaeroaminopolypeptidases is between 8.2 and 8.5. The aminopolypeptidases have no carboxyl group essential for their activity. B. J. C. van der H.

Mutability and physiological condition. Edgar Knapp. *Naturwissenschaften* **27**, 839–40(1939).—Differences in mutational behavior of the same genotype attributed to different physiol. conditions of the cell have been found repeatedly in the past, especially in the reaction of the cell to ionizing rays. It is suggested that the "physiological condition" causes differences in hydration stage of the genetic substance and thus brings about different stabilities. For the result of radiational influences a change in size of target due to more or less hydration is essential. Quant. work with x-rays of cells in different stages of swelling confirmed this view: in swollen cells the frequency of mutation due to radiation is larger than in normal cells. The change in sensitivity due to swelling is reversible as long as the swelling has not been continued too long. cf. Knapp, *Fortschr. Röntgenstr.* (Tagungsheft) **60** (1939); Kaplan, *Biol. Zentr.* and *Z. indukt. Abstammungslehre* in press. B. J. C. van der Hoeven

Interpretation of mitogenetic radiation as sensitized fluorescence. An experimental confirmation of Frankenburger's theory of mitogenetic radiation. A. G. Gurvich, L. D. Gurvich and A. A. Slyusarev. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 2, 101–7(1939).—See *C. A.* **33**, 7829[5]. S. A. Karjala

Steric specificity of the peptidases of normal and carcinoma serums. (Preliminary.) E. Waldschmidt-Leitz and K. Mayer. *Z. physiol. Chem.* **262**, IV–VI(1939).—The peptidases of carcinoma serums show no choice between *d*- and *l*-peptides, whereas normal serums do. With *dl*-leucylglycine, *dl*-glutamylglycine and *dl*-glutamylglycine Et ester as substrates, normal serums produce 50% hydrolysis whereas carcinoma serums produce more than 50% hydrolysis. Milton Levy

Specificity of amino acid decarboxylase. Peter Holtz, Karl Credner and Hedwig Walter. *Z. physiol. Chem.* **262**, 111–19(1939); cf. *C. A.* **34**, 1338[6].—The enzymes which decarboxylate histidine, tyrosine and dihydroxyphenylalanine in organ exts. are shown to be separate entities. Exts. of various organs and organs of various species differ in their relative activities on the 3 substrates. In mixts. the actions on the substrates are additive and not competitive. The enzymes active toward histidine and dihydroxyphenylalanine are not adsorbed by kaolin whereas the tyrosine decarboxylase is. Milton Levy

Animal fat acid dehydrogenases and their codehydrogenases. III. Nature of the codehydrogenase. O. St. A. Konrad Lang and Hermann Mayer. *Z. physiol. Chem.* **262**, 120–2(1939); cf. *C. A.* **34**, 1337[9].—The codehydrogenase for fat acid dehydrogenation in muscle exts. is shown to be muscle adenylic acid. Inosinic acid, adenosinetriphosphoric acid and muscle adenosine are equally effective in equimol. amts. Yeast adenylic acid is not effective except at much higher doses. Adenine is not effective. **IV. The reaction product of dehydrogenation of stearic acid and the supposed biological importance of fat acid dehydrogenase.** O. St. A. Konrad Lang and Franz Adickes. *Ibid.* 123–7.—O_2 treatment of the product of dehydrogenation of stearic acid by liver or muscle ext. indicates that oleic acid is formed and not an α-β-unsatd. octadecenic acid. Milton Levy

Carboligase. Belá Tankó and László Munk. *Z.*

physiol. Chem. **262**, 144–57(1939).—Expts. indicating that carboligase is not an independent entity in pea meal are described, supporting Discherl's position (*C. A.* **32**, 4182[8]) and contradicting Tomiyasu (*C. A.* **31**, 8566[8]). The pH optimum is the same for decarboxylation of pyruvic acid (carboxylase) and for acetoin formation (carboligase). In the absence of pyruvate and in the presence of AcH, formation of acetoin is limited by the rate at which pyruvate is formed from carbohydrate. If pyruvate is added the acetoin formation depends only on the rate of decarboxylation. The inhibitory action of $CHCl_3$ on carboxylase is not sufficiently different from that on carboligase to establish their independence. Inhibition of acetoin formation by F^- or ICH_2COOH is slight when pyruvate is present but is great when it is not. Since these inhibit pyruvate formation but not carboxylase, the acetoin formation depends on the carboxylase action. The acetoin formed in the presence of AcH and the poisons is adequately accounted for by the rate of pyruvic acid breakdown as indicated by the CO_2 production under these conditions. Milton Levy

Polarographic investigations of proteins. I. Polarography as a method. Caspar Tropp. *Z. physiol. Chem.* **262**, 199–209(1939).—The method is described. **II. Polarographic investigation of the changes of state of fibrinogen.** Liselotte Juhling, Caspar Tropp and Edgar Wohlisch. *Ibid.* 210–24.—Purified fibrin gives polarographs similar to those of other S-contg. proteins in a $CoCl_2$-NH_4Cl-NH_4OH soln. The typical double wave obtained from proteins is present. In 10% urea as a solvent heat denaturation increases the height of both waves. Fibrinogen treated with thrombin does not show this increase unless the urea is reduced to 3%. Trypsin digestion increases both steps and after long action the first step disappears and the second becomes flattened. The first step is related to the peptide bond, the second to the cystine of the protein. **III. Albumin, globulin, fibrinogen, plasma and serum.** Caspar Tropp, Liselotte Juhling and Fritz Geiger. *Ibid.* 225–42.—The two steps common to protein polarographs are demonstrated with serum albumin and globulin and, as with fibrinogen, both steps are increased, the first 10% and the second 50%, by heat denaturation in 10% urea. Curves obtained on geometrical series of dilns. of albumin, globulin, fibrinogen, plasma and serum are given. These show that each protein is characterized by a maximal concn. for which an analysis of the curve is possible: 3.2% in the case of globulin, and 0.48% in the case of fibrinogen and other values are intermediate. On diagrams of the heights of the first and second waves against concn., specific forms are shown for each material but each shows a characteristic crossing concn. where the second wave diminishes to the height of the first and then falls below it. The crossing concn. is 0.0094% for albumin, 0.002% for globulin, 0.02% for fibrinogen. The forms of these diagrams up to this point vary from protein to protein, both waves becoming higher as the concn. increases. The curves for plasma and serum show the same characteristic forms and are interpreted as summations of the curves of the individual constituents. M. L.

Pyrophosphate inhibition of succinodehydrogenase. L. Massart, R. Dufait and G. van Grembergen. *Z. physiol. Chem.* **262**, 270–4(1940). —That pyrophosphate inhibition of succinodehydrogenase is not analogous to malonate inhibition of this enzyme, as claimed by Lelour and Dixon (*C. A.* **31**, 6679[9]), and is analogous to F^- inhibition is supported by exptl. findings. Pyrophosphate and F^- inhibitions are increased as the reaction mixt. is made more acid, malonate inhibition is nearly const., perhaps slightly more as the soln. is made alk. Addn. of fumaric acid removes malonate inhibition; it has no effect on pyrophosphate inhibition. Both F^- and pyrophosphate inhibitions are due to formation of metal complexes. Succinodehydrogenase is probably a metalloprotein. M. L.

***N*-Acetylglucosamine and blood proteins.** Henri Bierry, Bernard Gouzon and Collette Magnan. *Compt. rend.* **210**, 120–2(1940).—See *C. A.* **33**, 3863[1]. D. A. M.

Biochemical studies on carbohydrates. LIII. Glucosamine as a glycogenetic substance in organisms. Masato Yositake. *J. Biochem.* (Japan) **30**, 423–37(1939); cf. *C. A.* **34**, 1046[1].—Feeding glucosamine to male rabbits treated with phlorizin caused a greater extra glucose excretion than was obtained with glucose, leading to the conclusion that the amino sugar is a glucose former. **LIV. Hyperglucemia and glucosamine injection and the mechanism of its occurrence.** *Ibid.* 439–49.—The hyperglucemic effect of subcutaneous injection of glucosamine is not due to stimulation of the nervous center for carbohydrate regulation because it is not affected by double splanchnectomy, nor is it due to a disturbance in carbohydrate metabolism, since the activity of various oxidase enzyme systems was also found to be unaffected. It is concluded, therefore, that the hyperglucemia is due to glucose derived from the amino sugar. **LV. Urinary mucoid.** Tadasi Kobayasi. *Ibid.* 451–8.—Urinomucoid obtained from urine contains an acetylglucosaminegalactose (1:1) complex as the prosthetic group. This substance represents both the acid-sol. and water-sol. mucoid fractions described by Morner, which K. finds to be identical with each other and, therefore, designates urinomucoid. S. Morgulis

The use of radioactive isotopes of the common elements in physiology. G. Hevesy. *Phys. Rev.* **57**, 240–1(1940); cf. *C. A.* **33**, 8646[7].—Objections to the use of radioactive indicators in detg. the movement of ions through cell membranes, particularly those based on the denaturation of proteins by the radiation, are not justified. G. M. Petty

Studies of human nervous and related tissue by the Röntgen-ray diffraction method and the petrographic microscope. Lawrence Reynolds, K. E. Corrigan and Henrietta Hayden. *Am. J. Roentgenol. Radium Therapy* **43**, 81–92(1940).—Standard methods of x-ray diffraction studies of non-cryst. substances were applied to nervous and related tissues; diffraction patterns obtained in 30 cases are reproduced. The diffraction work was supplemented by observations with a standard petrographic microscope and polarized light; 15 color reproductions of these slides are given. Orientation can be noted in nerve trunks, which have a highly specialized directional function, in dural tissue and in the periosteal layer. Extd. brain tissue gives a pattern similar to that of neuroproteins. Gray and white matter of the cerebrum give slightly different patterns, the differences being shown clearly after drying. E. H. Quimby

Chemical structure and its relation to growth and development. Frederick S. Hammett. *Am. J. Roentgenol. Radium Therapy* **43**, 266–70(1940).—Growth is an expression of reaction between chem. compds. The present discussion relates to the components of the cellular proteins, both cytoplasmic and nuclear, e. g., amino acids and the purine and pyrimidine compounds of nucleic acid, which comprise the bulk of living matter of all organisms. In growth, differentiation is a chem. specialization of the cell structure, especially in the proportion and arrangement of the constituent amino acids, which, with other nitrogenous compds., supply building substance and energy. Dynamic effects of the various acids are outlined. The effects of adding CH_2 and OH groups to mols. are stated, the former to increase energy, the latter to decrease toxicity. The replacement of a H of an amino acid by a sulfhydryl may give a compd. that acts as a stimulus to cell increase in no. When two such groupings unite with loss of H to form a disulfide, the compd. is no longer stimulating. When this normal oxidation continues to the point of a compd. in which the S carries an O, retardation of cell increase in no. occurs. E. H. Q.

Biological action of metals at a distance. A. E. Roffo, Jr. *Bol. inst. med. exptl. estud. cancer* **16**, 55–76(1939).—The action of metals at a distance on tissue cultures *in vitro* of fibroblasts from embryonic rat or chicken heart and of fibroblasts from spindle cell sarcomas is shown by growth inhibition, which is not related to the at. wt. of the metals used. The inhibitory action is greater on the neoplastic tissues than on normal fibroblasts. Al, Fe, Ni, Cu, Zn, Se, Cd, Sn, W, Au and Pb do not inhibit the growth of normal fibroblasts, but Hg, La, Mg and Be do.

Al, Ni, Cu, Zn, Se, Cd, Sn and Au slightly inhibit sarcomatous fibroblasts but Be, Mg, Fe, Sb, La, W, Hg and Pb show a strong inhibition. Felix Saunders

Photodynamically induced cation permeability and its relation to hemolysis. Hugh Davson and Eric Ponder. *J. Cellular Comp. Physiol.* **15**, 67–74(1940); cf. *C. A.* **33**, 6888⁶.— The photodynamic hemolysis produced by irradiating rabbit red cells in the presence of Rose Bengal is accompanied by an escape of K from the cells, both during the period of irradiation and during the period of "after-light hemolysis" which occurs after the irradiation is discontinued. During the period of illumination hemolysis and K escape are inhibited by the addn. of serum and Na_2SO_3, but neither serum nor sulfite has any inhibitory effect on the after-light hemolysis. The after-light hemolysis and K escape have a Q_{10} not greater than unity, which suggests that the phenomenon has a phys. rather than a chem. basis. The hemolysis may be due to a secondary swelling of the irradiated cells brought about by a permeability to K setting up an osmotic pressure difference Felix Saunders

Photodynamic hemolysis with monochromatic light: the reciprocity law. Harold F. Blum and Howard W. Gilbert. *J. Cellular Comp. Physiol.* **15**, 75–84(1940).— A method for study of photodynamic hemolysis by means of monochromatic radiation is described. Errors in the use of photometric methods for measuring percentage hemolysis are discussed. A method which uses delayed hemolysis as a criterion for estg. the photochem. process in photodynamic hemolysis is described. This fundamental photochem. reaction follows the reciprocity law. **Quantum requirements for photodynamic hemolysis.** *Ibid.* 85–93.— Photodynamic hemolysis is independent of dye concn. The same no. of quanta per red cell are required to produce delayed hemolysis after 24 hrs. The no. of quanta absorbed by a dye mol. in this process is inversely proportional to the concn. and ranges from a few to thousands of quanta. The dye must act in a cyclic process, probably transferring its energy to substrate which then reacts with O, the dye returning to its normal state. Felix Saunders

Liesegang zone formation as a model for organic rhythms. E. Kuster. *Kolloid Z.* **89**, 123–4(1939).— Banding in living tissues can result from both exogenous and endogenous forces Felix Saunders

Zone formation in the protoplasm of vegetable cells. Lisbeth Schorr. *Kolloid-Z.* **89**, 161–2(1939). F. S.

Double refraction of elastic fibers. W. J. Schmidt *Kolloid-Z.* **89**, 233–7(1939).— Methods for demonstrating the properties of yellow elastic fibers are described. Felix Saunders

Action of centrifugation on the viscosity of living protoplasm. Ernst Kuster. *Kolloid-Z.* **89**, 237–8(1939); cf. *C. A.* **33**, 8697². Felix Saunders

Crystalline salmon pepsin. Earl R. Norris and Daniel W. Elam. *Science* **90**, 399(1939).— A globulin-type protein of high proteolytic activity was isolated in cryst. form from the stomach mucosa of the king salmon (*Onchorhyncus tschawytscha*). The optimum pH for digestion of hemoglobin is 2.2. The isoelec. point is pH 1.9. Prepns. of identical potency were obtained either by direct acid extn. or by alk. extn. of the zymogen. Alk. extn. gives larger yields. Felix Saunders

Coenzyme concentration of tissues. Frederick Bernheim and Anton v. Felsovanyi. *Science* **91**, 76(1940).— By means of *Hemophilus parainfluenzae* the concn. of coenzymes in rat tumor was compared with the concn. in normal tissues. Tumors were tested 10–37 days after inoculation. All showed very low values as compared with normal tissue and there was no variation with the age of the tumor. Embryonic tissue also gives very low values for coenzymes. After birth the values rise rapidly and reach the normal adult range in about a week. F. S.

Sensitive crystallization. Ehrenfried Pfeiffer. *Chem. Products* **3**, 21–5(1940).— A study was made of the effect of small amts. of various substances on the crystn. of $CuCl_2$ from thin films of soln. The added substances include exts. of plants, animal organs, milk, yeast and blood. Different crystn. patterns were produced by exts. of a healthy plant from those produced by a fungus-diseased plant. In general, exts. of "normal" organs produce fewer centers and more long crystal rays, while the exts. of diseased organisms produce more centers, more incrustations and shorter rays. This may be due to a change in the colloidal nature of the added substance resulting from the change of metabolism in the diseased organism. Addn. of fresh milk produces a one-center sym. crystn., milk heated just to boiling produces a slightly disturbed picture, and milk boiled for 20 min. produces a many-centered asym. picture. The pattern produced by yeast depends on the nutritive broth on which it is grown and the kind of fertilizing applied to test plants can change the crystn. pattern made with exts. of these plants. Blood from patients having certain diseases produces const. and typical forms. Thus, blood from tuberculosis patients produces a type of cross formation of the centers, and blood of cancerous origin yields a one-sided double wing formation. 13 references and 18 crystn. pictures. Leopold Scheflan

Structural interpretation of the acidity of groups associated with the hemes of hemoglobin and hemoglobin derivatives Charles D. Coryell and Linus Pauling. *J. Biol. Chem* **132**, 769–79(1940).— Analysis of electrode potential and magnetic susceptibility data have established the existence of an acid group (pK 5.3) interacting with heme in ferrihemoglobin (methemoglobin). The magnetic susceptibility of ferrihemoglobin has been completely correlated with heme-linked acid group ionizations for the pH range 5–12. The spectroscopic and magnetic characteristics of the 3 heme-linked acid groups of ferrihemoglobin (pK 5.3, 6.65, 8.10), the 2 of ferrohemoglobin (pK 5.25, 7.81), and the 2 of oxyhemoglobin and carbonmonoxyhemoglobin (pK 5.75, 6.80 for both) for the range pH 4.5–9.5 are presented It is postulated that one acid group is a histidine imidazolium ion in poor position for electrostatic coordination of the basic form with the Fe atom. The second acid group is the imino group of a histidine residue whose 3-N atom is strongly coordinated by either an essentially ionic or an essentially covalent bond with the Fe atom. The third acid group of ferrihemoglobin is the Fe atom itself, which may add OH ion, or H_2O coordinated to the Fe atom, which may lose a proton. Changes in acidity caused by oxygenation or oxidation are thus given a structural interpretation. D. S. S.

Properties of viruses W. M. Stanley. *Medicine* **18**, 431–42(1939); cf. *C. A.* **34**, 808⁵.—The recent chem., phys., immunological and biol. work on viruses is reviewed with emphasis on the tobacco mosaic virus. Present data indicate the latter is a conjugated protein, contg. 95% protein, 5% nucleic and no lipoid. The amino acids found include arginine, aspartic acid, cysteine, *d*-glutamic acid, leucine, lysine, phenylalanine, proline, serine, tyrosine and tryptophan, but no measurable amt. of alanine, histidine or glycine. The nucleoprotein contains C 50, H 7, N 16, S 0.24, probably in sulfhydryl form, and P 0.6%. It is homogeneous in sedimentation and electrophoresis, and with an isoelec. point at pH 3.5, density of 1.37, S of 17.1×10^{-13} cm. sec.$^{-1}$ dyne^{-1}, D of 3×10^{-8} sq. cm. sec., and rotational diffusion const. of 25 sec.$^{-1}$ at 0°. It exhibits double refraction of flow, elec. double refraction and gives an x-ray diffraction pattern interpreted as being due to rods about 15 mμ in cross section. The mols. are estd. and found to be about 300–400 mμ in length and about 12 mμ in cross section. Specific precipitin and anaphylaxis reactions are obtained. The activity and properties given are const. regardless of the source of the starting material. Changes caused in the chem. or phys. properties cause changes in virus activity. Some other viruses are spherical in mol. shape. F. B. Seibert

Crystallizable virus proteins. J. Magrou. *Rev. path. vég.* **26**, 109–23(1939); *Rev. Applied Mycol.* **18**, 812.— This review discusses the recent investigations of Stanley, Bawden, Pirie and others on the nature of the cryst. proteins assocd. with virus diseases and their possible identity with the viruses themselves. Oden E. Sheppard

The chemical properties of ascorbic acid oxidase. III.

Tetutaro Tadokoro and Naomiki Takasugi. *J. Chem. Soc. Japan* **60**, 188–90(1939); cf. *C. A.* **33**, 2154⁷.—A substance having high *AAO* (*AAO* = ascorbic acid oxidase) activity is prepd. from pumpkin: Yellowish juice obtained from the edible part of pumpkin is filtered through a pulp layer and pptd. with acetone. Aq. soln. of the ppt. is satd. with $(NH_4)_2SO_4$ to obtain crystals having the albumin reactions and strong *AAO* activity. Its aq. soln. is then dialyzed for 10 days and repptd. with acetone. The dried ppt., like cucumber protein, has low C and high P content, indicating similarity to glucoproteid or lecithoglucoproteid. Contents of amino N and arginine N, however, indicate similarity to plant protein, but low humin N content is against the supposition. Analytical results: C 43.01, H 7.22, N 13.36, P 0.52%. Of N compds. amido N is 8.45%, humin N 8.32%, monoamino N 54.85%, diamino N 14.05%, arginine N 17.85%. Equal amts. of filtered pumpkin juice and citrate buffer of pH 7.4 are added to 0.125% *AA* (*AA* = ascorbic acid) soln. The soln. is aerated for 1 hr. to let the action of *AAO* be completed. After filtration the oxidized soln. is shaken with porcelain clay for 2 hrs. The clay is filtered off, washed with water and finally with acetone, yielding a dry white powder. 0.9 g. of the powder is added to 20 cc. buffer of pH 7.4. Six mixts. are made. Two (I) of such mixts. are kept at 37° for 2 hrs. The other two (II) are treated similarly after the addn. of 1 cc. rabbit meat ext. with 0.85% NaCl soln. (glutathione). The remaining 2 mixts. (III) are treated similarly after the addn. of 1 mg. com. pancreatin. Four cc. filtrate of each of these mixts. is titrated with Tillmann's indophenol soln. after the addn. of 1 cc. each of sulfosalicylic acid and metaphosphoric acid solns. A blank expt. is carried out for each of solns. II and III, and the results are corrected. The consumptions of the dye soln. for I, II and III are, resp., 0.62, 1.55 and 1.10 cc. The differences in consumption are due to the combination of *AA* with protein or to inactivation of *AAO* by protein digestion. *AAO* distribution in cauliflower was investigated by a similar method, and the inner leaves were found to contain the greatest and the outermost the smallest amts. IV. *Ibid.* **60**, 325–7(1939). —Protein having *AAO* activity is isolated from the aq. ext. of the leaves of cauliflower by the same method as has been used for pumpkin juice. Ppt. I appearing during dialysis is sepd. from the soln. The soln. is then treated with acetone to obtain ppt. II. Average analytical data for I and II are as follows: I C 43.412, H 6.085, N 8.771, P 0.91%; II C 44.479, H 6.390, N 7.706, P 1.207%. The P content of cauliflower protein is higher than those of cucumber and pumpkin and corresponds to that of nucleoalbumin. The low content of C suggests that the protein is a conjugated protein. The velocity const. of the *AA* oxidation by *AAO* is detd. as follows: 1 cc. 2.5% *AA* soln., 50 cc. citrate buffer of pH 5.8 and 4 cc. soln. of acetone ppt. of cauliflower juice are mixed and the total vol. is made up to 100 cc. Twenty-five cc. of the soln. is kept at 37°, 3 cc. of which is titrated with the indophenol soln. at 30 min. intervals. The results indicate that the oxidation is a unimolecular reaction with respect to *AA*, the value of the velocity const. being about 231×10^{-5}. Egg and rice globulins have been found to inhibit *AA* oxidation. The inhibition is due probably to glutathione or cystine rather than to adsorption by protein of *AA*.
K. Shinohara

Biochemical changes in irradiated tissues. I. The effect of x-rays on the metabolism of incubated hen eggs. Hideo Komoti. *J. Oriental Med.* **31**, 963–1005(German abstr. 57–60)(1939).—When hen eggs are irradiated with hard x-rays (600 r.) at the 5th day of incubation, 20% died, and those surviving show abnormal growth and development. The analysis of the white, yolk, amniotic fluid and embryo for total N, albumin, globulin, residual N, amino acid and uric acid for every 2 days after irradiation shows that protein metabolism is greatly disturbed. Data for detailed analysis are given. The results of irradiation with small amts. of the x-ray (200 r.) are also included. S. T.

Amine oxidase and benzedrine. Hermann Blaschko. *Nature* **145**, 26–7(1940); cf. *C. A.* **32**, 6275⁵.—Substances of the structure $RCH_2CHNH_2CH_3$, e. g., veritol and benzedrine, are much stronger inhibitors of amine oxidase than those of the structure $RCHOHCHNH_2CH_3$, e. g., ephedrine. A comparison with the awakening properties of these substances in the living animal shows that there is agreement between *in vitro* effect and pharmacol. action.
E. D. Walter

Dihydroxymaleic acid oxidase action of peroxidases. B. Swedin and H. Theorell. *Nature* **145**, 71-2(1940); cf. Banga and Szent-Györgyi, *C. A.* **32**, 9105⁴.—This enzyme is a hemin protein and it can act in a different manner with different substrates. There is not sufficient reason to assume that the dihydroxymaleic acid oxidase and the peroxidase are different enzymes. E. D♦W.

Wave-length effect in the reaction of human skin to x- and γ-radiation. Joseph S. Mitchell. *Nature* **145**, 105–6(1940).—In the production of moist desquamation of normal human skin, 0.7–0.8 roentgen unit of x-radiation of effective wave length 145 x. u. is equiv. to 1 roentgen unit of γ-radiation of effective wave length 15 x. u. Attempted phys. and chem. explanations of this fact are not entirely adequate. E. D. Walter

Mechanism of enzymic decarboxylation. H. Weil-Malherbe. *Nature* **145**, 106–7(1940).—A mechanism is proposed for the enzymic decarboxylation of pyruvic acid. It involves the formation of a Schiff base from cocarboxylase and pyruvic acid followed by an intramol. oxido-reduction leading to acetyldihydrococarboxylase. It is suggested that this compd. is oxidized in animal tissues and in certain bacteria by a specific carrier, whereas it undergoes a second intramol. oxido-reduction with yeast carboxylase resulting in the formation of the Schiff base of acetaldehyde. E. D. Walter

Courtois, Jean: Recherches sur les phosphatases végétales. Contributions à l'étude de "l'affinité" d'une diastase vis à vis de substrats différents. Lons-Le-Saunier: Imprimerie M. Declume. 206 pp.

Del Guerra, Giorgio: Lezioni di chimica biologica. Pisa: Tipografia Tornar.

Wells, Herbert G., Huxley, Julian S., and Wells, George P.: The Science of Life. New York: Garden City Publishing Co. 1514 pp.

British Encyclopaedia of Medical Practice. Vol. XII. London: Butterworth & Co., Ltd. 35s. Reviewed in *Analyst* **65**, 139–40(1940).

B—METHODS AND APPARATUS

Glenn E. Cullen

It is with deep regret that we announce the death on April 11 of Dr. Glenn E. Cullen, who has served faithfully and with high interest and devotion as assistant editor in charge of this section of *Chemical Abstracts* since early in 1937. Dr. Cullen was a careful editor and his untimely death at the age of 50 is a great loss. His work for *Chemical Abstracts* was only a small part of his useful activity in the interest of biochemical and pediatric research.

Imidazole buffer; its use in blood-clotting studies. Edwin T. Mertz and Charles A. Owen. *Proc. Soc. Exptl. Biol. Med.* **43**, 204–5(1940).—Stable solns. of imidazole and HCl covering the pH range 6.2–7.8 are described. They are useful buffers for reactions which require the presence of Ca ion. They have no effect on either the conversion of prothrombin into thrombin or on the action of thrombin on fibrinogen. L. E. Gilson

Chem. studies in connection with dosing of sheep with phenothiazine [analysis of feces for phenothiazine] (Lipson) **17**. Estn. of submicroquantities of Ca (Sobel, Kaye) **7**.

Tizzano, A.: Metodi di determinazione delle vitamine. Turin: Industrie tipografico editoriale riunite. 64 pp. L. 12. Reviewed in *Chimie & industrie* **43**, 111 (1940).

C—MICROBIOLOGY

LAWRENCE H. JAMES

The existence in the tubercle bacillus of complex phosphatidic acids constituted from glycerophosphoric acid joined by esterification to fat acids on the one hand and to nonnitrogenous polyalcohols on the other. Michel A. Macheboeuf and Marguerite Faure. *Compt. rend.* **209**, 700-2(1939).—The Me_2CO-insol. phosphatides of the tubercle bacillus on treatment with MeOH and Ac_2O yield H_2O-sol. Na, Ca and Mg salts of complex phosphatidic acids (I) having 0.15% N and about 2.8% P. These salts are insol. in Me_2CO and sol. in Et_2O. The free acids are insol. in H_2O and sol. in Me_2CO and Et_2O. Prolonged treatment of I with *N* H_2SO_4 liberates fat acids and H_2O-sol. organophosphoric acids (II). II are not precipitable by Pb(OH)OAc except in the presence of NH_3 or by Pb$(OAc)_2$. Titration shows II to have 4 acid groups to 3 atoms of P. Hydrolysis of I with 5% H_2SO_4 at 120° yields glycerophosphoric acid (III) which is precipitable by Pb(OH)OAc. Twenty-eight % of oses and inositol are set free by acid hydrolysis. Hydrolysis with hot baryta liberates nonreducing osides which on secondary acid hydrolysis yield oses. III is therefore united to the oses by esterification. The inositol may be similarly united with III or may be a constituent of the oside grouping. The fixation of complement is ascribed to the haptenic activity of the complex phosphatidic acids. Rachel Brown

Carbohydrate yeast fermentation balance. Fermentation of inulin without previous hydrolysis. Theoretical and practical deductions. Raymond Guillemet and Hélène Leroux. *Bull. soc. chim. biol.* **21**, 1217-41(1939); cf. *C. A.* **33**, 8351⁹.—Inulin was fermented slowly by Lala yeast although no hydrolysis of inulin to fructose could be detected. CO_2 and EtOH were formed in equimol. quantities. The yield of glycerol was 3.7-4.0% of the wt. of the inulin consumed. About 30% of the inulin was converted into unidentified products. L. E. Gilson

Relation between virulence and antigenic structure of Salmonella. A. Boivin. *Compt. rend. soc. biol* **132**, 370-4(1939). The glucide-lipide antigens from highly virulent (for mice) and slightly virulent strains of the smooth form of Aertryeke's bacillus were identical. The reason for the difference in virulence is unknown. L. E. Gilson

Chemical properties and physiological actions of Triturus embryonic toxin. D. B. Horsburgh, E. L. Tatum and V. E. Hall. *J. Pharmacol.* **68**, 284-91(1940).—The embryonic toxin of the newts *Triturus torosus*, *T. similans* and *T. rivularis* is sol. in water and EtOH but insol. in Et_2O, $CHCl_3$ and other org. solvents. It is relatively stable to heat in neutral or slightly acid solns. but readily inactivated if alk. It is neither an alkaloid nor a substance related to the toad cardiac poisons. The purest specimen prepd. had an activity of 75,000 mouse lethal doses per g. It acts through the central nervous system. A similarly acting toxin is found in certain skin glands of the adult *Triturus*. L. E. Gilson

Characteristics of cultures of the genus Pasteurella. E. Savino, A. Aldao and B. Anchezar. *Rev. inst. bacteriol. dept. nacl. hig.* (Buenos Aires) **9**, 110-21(1939).—Numerous strains of *Pasteurella pestis*, *Pasteurella pseudotuberculosis* and unidentified species of *Pasteurella* were studied. All reduced nitrates. All produced catalase, H_2S and NH_3. Some of the unidentified strains produced indole. No strain formed acetylmethylcarbinol. All fermented glucose, fructose, mannose, galactose, mannitol and sorbitol with formation of acids. None fermented lactose, raffinose, inulin, melezitose, dulcitol, erythritol, inositol or arabitol. Glycerol, sucrose, rhamnose, maltose, xylose, arabinol, adonitol, trehalose, salicin and starch were converted to acids by some strains and not attacked by others. Forty references. L. E. Gilson

Mycological study of the first Argentine case of black grain Madura foot. Pablo Negroni and Juan A. Tey. *Rev. inst. bacteriol. dept nacl. hig.* (Buenos Aires) **9**, 176-89(1939).—The causative organism, *Aspergillus* (*Eurotium*) *chevalieri* Mangin, does not ferment sugars but uses galactose, sucrose, maltose, dextrin, mannitol, sorbitol, glucose, mannose, fructose and, less readily, lactose and inulin, for growth purposes. It can also utilize EtOH as the sole source of C. It does not hydrolyze starch, cellulose or fats. As sources of N it utilizes peptone and asparagine more readily than urea, nitrates or $(NH_4)_2SO_4$. It does not reduce nitrates and has no bacteriolytic action. It does not produce indole, acetylmethylcarbinol or H_2S. It liquefies gelatin slowly. L. E. Gilson

Culture media from spinach leaves. A. M. Besredka and Eva Salomon. *Ann. inst. Pasteur* **1939**, No. 2, 144; *Lab. Prakt.* (U. S. S. R.) **14**, No. 9-10, 12(1939).—Grind the spinach leaves in a meat chopper, press out the liquid, bring it to boiling (the color of the liquid changes to dark brown with the formation of a ppt.), remove the ppt. by filtration, alkalize the liquid, keep it for 20 min. at 120°, remove the formed ppt. by filtration through paper and sterilize in an autoclave for 20 min. at 115°. In its chem. compn. (quant. data are given), its reaction (pH = 7.6-8.0) and its other properties the spinach juice was suitable for the growth of all investigated microbes (aerobes as well as anaerobes) and for the prepn. of tuberculin. W. R. Henn

A new method of culturing sputum on solid media using carbon dioxide for the isolation of pneumococci. W. J. Auger. *Brit. J. Exptl. Path.* **20**, 439-42(1939).—A "sputum plate" technique for the isolation of pneumococci is described in which sputum is cultured on blood agar plates in the presence of extra moisture and a high concn. of CO_2. In such conditions a max. growth of pneumococci is possible in 15 hrs. CO_2 has also a stimulating effect on the growth of other respiratory pathogens. H. F. H.

A reaction between the lethal toxin of Cl. welchii (type A) and human serum. F. P. O. Nagler. *Brit. J. Exptl. Path.* **20**, 473-85(1939).—A reaction is described between the lethal toxin of *Cl. welchii* (type A) and normal human serum in which the serum becomes opalescent. When the opalescent serum is centrifuged, a fatty material rises to the surface. The reaction is specifically inhibited by *Cl. welchii* antitoxin. The reaction can also be observed if *Cl. welchii* of any type (A, B, C or D) is grown in a mixt. of normal human serum or broth. This cultural reaction has been shown to be specific for *Cl. welchii*, and it is specifically inhibited by *Cl. welchii* antitoxin. The lethal action of *Cl. welchii* (type A) can be titrated by means of the reaction, the activity of the toxin in bringing about the change in human serum running parallel to its toxicity for mice. *Cl. welchii* (type A) antitoxin can likewise be titrated, the inhibiting action of the antitoxin *in vitro* running parallel to its neutralizing action *in vivo*. Harriet F. Holmes

Physical and chemical examination of vaccinia virus. A. S. McFarlane, M. G. MacFarlane, C. R. Ames and G. H. Eagles. *Brit. J. Exptl. Path.* **20**, 485-501(1939).—The degree of hydration of the particle in homogeneous suspensions of the elementary bodies of vaccinia virus has been measured by a partition method; the particle has large amts. of H_2O assocd. with it in the form of an atm. which is not penetrated by sucrose and egg albumin. Elementary bodies can be dried, extd. with ether or benzene and resuspended in an aq. medium to the same degree of dispersity as the original homogeneous suspension without detectable loss in infectivity. The residual particle, which must be considered to be the virus, contains lipoid material which can only be removed by alc., as well as protein, carbohydrate and nucleic acid. The weight of evidence is against the conception that the virus particle is limited by a semipermeable membrane functioning on osmotic principles, and it is more in keeping with the properties of the particle to postulate a rigid or semirigid structure akin to a giant protein mol. H. F. Holmes

Alum-precipitated diphtheria toxoid. F. V. Linggood. *Brit. J. Exptl. Path.* **20**, 502-11(1939).—The addn. of alum in varying amts. to diphtheria toxoids made from broths of high and low N content has been investigated with particular regard to the purities of the resulting ppts. Toxoids of low N content (2.0-2.4 mg. per cc. give alum ppts. of higher purity than toxoids having a higher N con-

tent (5.0-6.0 mg. per cc.); this is especially the case when the ppt. is eluted with ½% $Na_2HPO_4.12H_2O$. Treatment of toxoids of low N content with charcoal prior to alum pptn. results in a considerable increase in the purity of the alum ppts., and ppts. of a purity of 700-800 L_f units per mg. N have been made by this method. Ppts. of even higher purity can be made if the toxoid is purified more extensively before pptn. After charcoal treatment and ultrafiltration of toxoids made from broths of low N content, alum ppts. of a purity of 1300-1400 L_f units per mg. N have been produced, providing a base is added in a convenient form such as $NaHCO_3$ prior to pptn. Harriet F. Holmes 1

Actinomyces: their biochemical reactions as aids in their classification. I. Reduction of nitrates. L. M. Ghosh, S. Ghosh, N. R. Chatterjee and A. T. Dutt. *J. Indian Botan. Soc.* **17**, 279-86(1938).—The reduction of nitrate to nitrite by *Actinomyces* (including not only the ray-fungi but also those grouped under *Discomycetes*, *Streptothrix*, *Nocardia*, etc.) in Czapeck's synthetic liquid medium was studied. Max. reduction was usually obtained at the end of the 3rd week. On the basis of the no. of cc. of standard nitrite soln. (0.001642 mg. NO_2 per cc.) equiv. to 5 cc. of the samples tested the *Actinomyces* could be divided into 3 main groups, namely, those showing (1) little or no reduction, below 0.5 cc. at the end of the 3rd week, (2) moderate reduction, 0.6-20 cc., (3) strong, more than 20 cc. K. D. Jacob 2

Fermentation of carbohydrates by the microbes of the dysentery group. M. I. Kanevskaya. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 1, 36-44(in English, 44)(1939).—Microorganisms of the Flexner-Hiss-Strong group which do not ferment sucrose within 10 days do so readily when they are cultivated on peptone-water either in the presence or absence of sucrose. The same result is obtained in cultures in aq. solns. after a preliminary incubation for 5 days of the agar cultures in a thermostat. S. A. K. 3

The determination of small amounts of dysentery antitoxin. M. A. Zchkina and T. A. Gogoleva. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 1, 52-61(in English, 61)(1939).—A broth of Shiga toxin is dild. to contain 1-2 lethal doses/cc. and titrated with increasing dilns. of a standard serum. The antitoxin equiv. is defined as that amt. of antitoxin which causes 20-40% mortality in combination with 2 lethal doses of toxin. The titer of an unknown serum can then be detd. by comparison with the standard. Differences in the titration of 5 antitoxic dysentery serums by the ordinary and "mero" methods do not exceed 22%. Since the toxin weakens with time owing to toxoid formation its concn. must be checked with standard serum from time to time. S. A. Karjala 4

Reinfection in typhoid fever with strains of different antigenic structure. I. The invasion capacity of typhoid fever strains of different virulence. E. G. Mehnik. *Bull. biol. méd. exptl U. R. S. S.* **8**, 231-3(1939)(in English).—Guinea pigs injected with various strains of typhoid bacilli were sacrificed 1, 3, 7, 10, 14 and 24 days after injection. The survival time of the Ty_2 (Vi) strain was 24 days in the skin at the site of injection, in the nearest lymph gland and in the tracheobronchial gland, 15-24 days in the lungs, spleen and kidneys, 10-15 days in the liver and mesenteric glands, 3-10 days in the blood, urine and bile, and 0 days in the bone marrow. The O_{901} strain was found for 24 days only at the site of injection and the nearest lymph gland, for 10 days in the liver, and 3-10 days in the other organs. Cultures of the blood and bone marrow were always sterile. Strains 705 and 679 of medium virulence showed a slightly greater survival capacity than O_{901}. The virulence of a typhoid strain seems to coincide with its invasion capacity. **II. Reinfection experiments.** *Ibid.* 234-6(in English).—Reinfection of guinea pigs with the Ty_2 strain 2 months after a single injection of the same strain led to survival of the organisms only at the site of injection and in the nearest lymph gland. Less edema and hyperemia of the skin were observed on the 2nd injection. The same results were observed when the O_{901} strain was used for injection and reinjection, and when the Ty_2 strain was used for injection and O_{901} for reinjection. When the O_{901} strain was used for injection and Ty_2 for reinjection, however, a pronounced invasion capacity was observed, indicating that O_{901} does not produce immunity toward Ty_2. In all cases pos. cultures were obtained from the blood and the bile. Strains 705 and 679 of medium virulence produced immunity both to the homologous strain and to each other. S. A. Karjala 5 6 7 8 9

The carotenoids of Mycobacterium phlei. Yosiharu Takeda and Tatuo Ota. *Z. physiol. Chem.* **262**, 168-70 (1939); cf. *C. A.* **33**, 4642[8].—From 870 g. of dry *Mycobacterium phlei* 2.5 mg. of cryst. leprotin was obtained. This is probably the material said by Chargaff (*C. A.* **28**, 1071[3]) and by Ingraham and Steenbock (*C. A.* **30**, 3461[2]) to be β-carotene. Milton Levy 10

Polysaccharides from tubercle bacilli and from tuberculin. Yosiharu Takeda and Tatuo Ota. *Z. physiol. Chem.* **262**, 171-7(1939).—Polysaccharides isolated from aq. exts. of human tubercle bacilli and from tuberculin were purified by repeated pptn. by EtOH and HOAc. The final white amorphous hygroscopic powders were compared. They differ only slightly in $[\alpha]_D$, 138° and 134°, in acid equiv. (972 and 1162), are both N- and practically P-free. On acid hydrolysis the bacillary carbohydrate gives 5.8% of mannose (as phenylhydrazone) and 60% of glucose (as benzylphenylhydrazone), whereas the tuberculin polysaccharide gives 23% of mannose and 56% of glucose. After these sugars are removed the hydrolyzates gave no reactions for pentose or methylpentose. The bacillary carbohydrate has a much greater biol. activity (precipitin and skin reaction) than the tuberculin carbohydrate. Milton Levy 11

Analysis of the tubercle bacillus and its natural products by immune, allergic and anaphylactic tests. H. J. Corper. *J. Infectious Diseases* **66**, 23-9(1940).—On a simple synthetic nonprotein medium max. bacillary growth of human tubercle bacilli occurs within 2 to 3 months, while tuberculoprotein liberation into the medium takes place mainly after max. growth is attained. The bacillary body sensitizes primarily to tuberculo-allergy and serves to immunize against virulent infection, while the natural filtrate contg. tuberculoprotein sensitizes to anaphylaxis and provokes anaphylactic shock and allergic intoxication but does not sensitize to allergy nor specifically immunize against virulent infection. Tuberculo-anaphylaxis, tuberculo-allergy, and tuberculo-immunity show distinctive characteristics which lead to the conclusion that they are sep. and apparently unrelated biol. phenomena. Julian H. Lewis 12

Effect of indole-3-acetic acid on multiplication of Esch. coli and E. typhosa. T. D. Beckwith and E. M. Geary. *J. Infectious Diseases* **66**, 78-9(1940).—Indole-3-acetic acid added to media in which are cultivated either *Esch. coli* or *E. typhosa* stimulates growth of the organisms. The organisms thus treated were from cultures within the period of logarithmic death. In greater concn., this salt inhibits growth. Julian H. Lewis 13

Additional observations on positive and negative chemotaxis. (Experiments with a myxomycete.) Dale Rex Coman. *Arch. Path.* **29**, 220-8(1940); cf. McCutcheon, C. and Dixon, *C. A.* **33**, 2960[2].—Chemotactic growth of *Physarum polycephalum* (slime mold) plasmodia is pos. to dextrose, neg. to HCl, H_2SO_4, AcOH and NaOH at concns. of 0.1 *M* or above, indifferent to sucrose and 0.1 *M* NaCl. J. McAfee 14

Studies on the nutrition of fungi. IV. Factors influencing the growth of some thiamine fungi. Leon H. Leonian and Virgil Greene Lilly. *Am. J. Botany* **27**, 18-26(1940); cf. *C. A.* **33**, 8231[3].—Fungi were grown in 250-ml. flasks on 25 ml. of nutrient soln. to which various test materials were added. Addn. of 0.05 p. p. m. of thiamine increased the yield of *Phycomyces blakesleeanus* (I) by 85% above the control. No increase followed addn. of 0.002 p. p. m. of thiamine. Addn. of 0.05% agar or an equiv. amt. of agar ash doubled the yield of I compared with the control, an indication that the nutritive effect of agar is in its inorg. components. Tests with various combinations of "rare" elements showed that 0.2 p. p. m. Zn nearly doubled the 15

growth of I, 0.02 p. p. m. of Cu, Ga, Mn, Mo and 0.2 p. p. m. of Fe, singly or in combination, had no effect. Addn. of 0.1% succinic acid increased the availability of ammonium and arginine N to I, but not the availability of nitrate N. Aspartic acid or NH_4NO_3 alone was a poor source of N but their combination enhanced N assimilation. The combination of succinic and aspartic acids, with or without NH_4 salts, was no better than either acid alone. This synergic effect occurred only in the presence of 0.02% or more of thiamine. At lower thiamine concns., growth was decreased by NH_4NO_3 and succinic acid compared with controls contg. the same amt. (0.2%) of aspartic acid. The optimum ratio was 0.2% NH_4NO_3 and 0.3% succinic acid. Tests with 0.02 *M* concns. of other acids showed citric to be toxic to *Pythium ascophallon* and *Pythiomorpha gonapodioides* but not to I or *Mucor ramannianus* and fumaric generally superior to glutamic, acetic, lactic, succinic and tartaric for increasing fungus yields. The N from asparagine was superior to the same quantity of N from aspartic acid when used singly, but in mixts. with agar, succinic acid or NH_4 salts, aspartic acid was superior. The synergic effect may be due to the presence of the free carboxyl group. In tests to det. the optimum ratio of dextrose, amino acids and thiamine for I and *Phytophthora erythroseptica* (II), it was found their requirements differed, also that II is extremely sensitive to thiamine. Amino acids appear to be utilized primarily as N sources in the presence of even small amts. of dextrose, and excess amino acids are not used as long as the sugar is kept near the min. The effectiveness of thiamine is closely related to the amt. of food present in the medium. Comparison of various amino acids as nutrients showed arginine was poorest and *dl*-alanine and asparagine were inferior to *l* aspartic acid, glutamic acid and glycine. The mixt. of 5 amino acids was best, suggesting synergism. Nelson McKaig, Jr

Toxicity of allyl isothiocyanate vapor to certain fungi. Dean E. Pryor, J. C. Walker and Mark A. Stahmann. *Am. J. Botany* **27**, 30-8(1940); cf. *Phytopathology* **29**, 641-3(1939). The toxicity of allyl isothiocyanate (I) vapor in equil. with its aq. soln. is dependent upon the concn., the total amt. present in the soln. and the plant species. *Gibberella saubinetti* was more sensitive than *Aspergillus niger*, *A. alliaceus* and *Colletotrichum circinans*. Growth was inhibited in a closed system when sufficient I was available in the soln. to maintain a vapor pressure above a certain limit. If the vapor concn. was below this limit either by low initial concn. or by absorption in the plants, inhibition did not occur, indicating the effect is not cumulative. Resistance increased with greater age of thalli. Spores were more variable in tolerance than mycelia of any age. The quantity of material required to produce a toxic concn. was less as the no. of spores was decreased. Nelson McKaig, Jr.

The oxidation-reduction potential requirements of a nonspore-forming, obligate anaerobe. Birgit Vennesland and Martin E. Hanke. *J. Bact.* **39**, 139-69(1940).—The course of potential and pH changes in mixed cultures of *Bacteroides vulgatus* (I) and *Alcaligenes faecalis* (II) in glucose nutrient broth and on a synthetic medium were studied, but attempts to det. a potential which would limit the growth of I were unsuccessful by this method. When the potentials of cultures of I in glucose nutrient broth were controlled by means of a mixed stream of N and O the pos. potential which just limited growth was +0.150 v. at pH 6.6. CO_2 was essential for the growth of I. Glucose brain broth of I showed a marked O consumption. The following hypothesis of anaerobic growth is presented: The potential in a culture indicates the state of a reversible oxidation reduction system; O affects the potential by oxidizing this system (directly or indirectly); the oxidizing action of O is counteracted by reducing substances in the culture medium which tend to reduce the reversible system, and which are derived from substrate mols. of high energy content which have been activated by enzymes (the dehydrogenases) of the cell; the enzyme system is active only in the reduced form; it is maintained in this form by the reducing action of the activated substrate mediated by the particular reversible system which dets. the electrode potential. 27 references. John T. Myers

Respiratory enzyme systems in symbiotic nitrogen fixation. II. The respiration of Rhizobium from legume nodules and laboratory cultures. D. W. Thorne and R. H. Burris. *J. Bact.* **39**, 187-96(1940); cf. *C. A.* **32**, 6684⁷. —Substrate studies indicated no const. differences between nodular and cultured rhizobia. The max. rate of respiration by a strain of *R. leguminosarum* from pea and vetch nodules and by a strain of *R. japonicum* from soybean nodules was reached at a lower O tension than that required for the same strain of cultured organisms. The reverse was true with a strain from cowpeas. No distinct differences were noted between nodular and cultured organisms in their reactions to a no. of inhibitors including: cyanide, ethylurethan, iodoacetate, pyrophosphate, malonate and maleate. Azide stimulated O uptake of vetch and pea nodular prepns. in glucose but inhibited the corresponding cultured strain of organisms. Fluoride greatly inhibited the respiration of a cultured strain from cowpeas with glucose as a substrate but strongly stimulated the corresponding nodular prepns. J. T. M.

The growth of human tubercle bacilli, H37, in synthetic medium with and without agar. W. F. Dreaj. *J. Bact.* **39**, 197-205(1940).—Agar definitely inhibited the growth of these bacilli when amts. greater than 0.1 to 0.25% were added to the synthetic medium. Smaller amts. had less inhibiting action. Growth occurs first at the bottom of a synthetic medium and later at the top. Colonies can be grown at different levels when 0.1% agar is present. This will aid in the study of probable accessory growth factors for tubercle bacilli. 10 references. John T. Myers

The bactericidal effect of sulfathiazole and sulfamethylthiazole on bacteria found in urinary infections. H. F. Helmholz. *Proc. Staff Meetings Mayo Clinic* **15**, 65-8 (1940). Sulfathiazole (I) and sulfamethylthiazole (II) were definitely bactericidal on urinary *Streptococcus faecalis* and *Staphylococcus aureus* when given in the usual dosage by mouth. The latter organism was more susceptible to I than the former; II was more active on *Streptococcus faecalis* than I. Five strains of *Proteus ammoniae* were readily killed off by I and II at a pH of about 5.5. Higher urinary concns. of the drugs were required to kill Gram-neg. bacilli of which *Pseudomonas aeruginosa* appeared to be the most resistant. Concns. of 150 mg./100 cc. free II, which was practically completely bactericidal for all other organisms, allowed luxuriant growth of 6 different strains of *Pseudomonas aeruginosa*, but I in the same concn. rapidly killed them. No parallelism was seen in the action of sulfanilamide and I or II on resistant and nonresistant strains of bacteria. J. Pinchack

The biological production of gluconic acid. K. R. Butlin and W. H. D. Wince. *J. Soc. Chem. Ind.* **58**, 363-5(1939). A method for the production of gluconic acid (I) from glucose is described in which *Bacterium suboxydans* is employed with intense aeration of the medium. Best results were obtained with an initial glucose concn. of 15%, but it was found that glucose could be added during fermentation to make the total glucose up to 30-35%. Almost quant. conversion into I or its Ca salt was obtained if the pH (6.5) was controlled to allow good growth of the organism, and subsequently not allowed to fall below pH 3.5. The best medium for the growth of *Bacterium suboxydans* consisted of 0.5% Difco yeast and 0.5% KH_2PO_4 in H_2O. I was obtained as Ca gluconate by adding the required amt. of chalk for neutralization and warming. The Ca gluconate crystd. readily on evapn. and was purified by recrystn. from hot H_2O. The course of the fermentation was followed by the detn. of the glucose content by the titration method of Schaffer, Hartman and Somogyi (cf. Peters and Van Slyke, *Quant. Clinical Chemistry* p. 465; *C. A.* **26**, 3275). Maurice M. Rath

The formation of acetol from α,β-propylene glycol. K. R. Butlin and W. H. D. Wince. *J. Soc. Chem. Ind.* **58**, 365-6(1939).—Concns. of α,β-propylene glycol (I) up to 15% can be rapidly and almost quantitatively converted into acetol (II) by means of the acetic acid organism

Bacterium suboxydans. Expts. showed that for this biol. oxidation the best nutrient medium is one contg. an aq. soln. of 0.5% Difco yeast ext., 0.5% KH_2PO_4, and 0.5% glycerol or glucose. I was used in a concn. of 5–10%. When this medium was intensely aerated at 30° almost quant. production of II was obtained. Best results were obtained when inoculation of the fermentation liquid was carried out at pH 6.5, which is favorable to the growth of the organism, and the pH allowed to fall slowly to 4.5. Aeration for 18 hrs. effected an almost quant. conversion into II when a 5% soln. was used; the same resulted with a 10% soln. in less than 2 days while if a further 5% of I was added to the latter during fermentation the total 15 was converted into II in less than 3 days. The aeration was carried out by blowing air through a block of sandstone immersed in the liquid. The method of extn. of II from the fermentation liquid and the method of analyzing the amt. of II were based on those of Perkin (cf. *J. Chem. Soc.* **59**, 787(1891)). Maurice M. Rath

Studies on the metabolism and on the proteolytic enzymes of the strict anaerobes. J. C. Hoogerheide and L. Weil. *J. Franklin Inst.* **228**, 519-20(1939).—Proteins utilized by spore-forming anaerobes are broken down by a proteinase of pH optimum 7.0 which can be activated markedly by —SH compds. + traces of heavy metals. Proteinase from bacteria cultivated in the usual media readily attacked all protein substrates tested. Repeated transplants onto casein or gelatin media gave specific casein and gelatin proteinases. On cultivating casein-trained bacteria on gelatin, or gelatin-trained bacteria on casein, an enzyme attacking both proteins was produced. When the bacteria were cultivated in the presence of glucose the pH of the medium fell from 7.4 to 5.7 during the growth, and the proteinase obtained had a pH optimum of 6.0. Once amino acids are available they are used by the bacteria in energy-yielding processes such as fermentation of amino acids and Stickland reactions (between H donors and H acceptors). When the bacteria were cultivated at lower pH, the pH optima of several dehydrogenases became more acid. With glucose in the medium, bacteria were obtained which readily utilized glucose and its metabolites EtOH and H_2. The enzymic activity of the bacteria reflected the particular phase of growth, changing with age and with the compn. of the culture medium. The products of reactions between amino acids and gaseous H_2 brought about by suspensions of *Clostridium sporogenes* are given. Cf. *C. A.* **31**, 7910[1]; **32**, 209[2], 5437[6], 9160[7]; **33**, 2158[5], 2174[8], 2175[1], 8236[6]. Edward B. Sanigar

Rhythmic clumping of Proteus vulgaris. H. Knöll. *Kolloid-Z.* **89**, 135-44(1939).—The rhythmic banding of the growth of *P. vulgaris* is a function of the medium on which the organism is grown. The richer the medium, the less is the tendency for bands to form. Felix Saunders

Ring formation during bacterial growth. Hans Schmidt. *Kolloid-Z.* **89**, 145(1939).—Ring formation by *Proteus vulgaris* is a function of the kind of sugar used in the agar. Sucrose, lactose and maltose produce very marked rings, but with dextrose and levulose the ring formation is much less definite. Felix Saunders

Bacteriostatic action of sulfanilamide under anaerobic conditions. R. H. Broh-Kahn. *Science* **90**, 543-4(1939). —Sulfanilamide produces, under certain circumstances, marked bacteriostasis in cultures of *Esch. coli*. Thus, in ordinary meat broth, bacteriostasis is observed under aerobic but not under anaerobic conditions, but in broth contg. 1% glucose, sulfanilamide produces little effect. This protective action of glucose is not due to its reducing properties since both cysteine and ascorbic acid fail to protect against the sulfanilamide bacteriostasis. When sulfanilamide is added to cultures growing aerobically in a synthetic-lactate or a lactate-nitrate medium, very little bacteriostasis is evident. However, anaerobic cultures in the latter medium are markedly inhibited by the action of sulfanilamide, an example of a case in which sulfanilamide is bacteriostatic in anaerobic but not in aerobic environment. Bacteriostasis produced by sulfanilamide and allied compds. cannot be attributed to any general, non-specific mechanism. Felix Saunders

Effect of nicotinamide on respiration of dysentery bacilli. Albert Dorfman, Stewart A. Koser and Felix Saunders. *Science* **90**, 544-5(1939).—Dysentery bacilli (Strain D76) were grown 24 hrs. in a synthetic medium contg. 0.005 γ/cc. of nicotinamide. The cells were collected in the centrifuge, suspended in 0.05 *M* phosphate buffer and again centrifuged. A suspension of these cells was placed in Thunberg tubes contg. methylene blue and glucose. The time of reduction of the methylene blue is greatly increased not only by the addn. of cozymase but also by the addn. of nicotinamide or nicotinic acid. When the amt. of nicotinamide in the medium on which the cells are grown is increased to 0.020 γ, the addn. of nicotinamide, nicotinic acid or cozymase to the Thunberg tube does not decrease the time of reduction of methylene blue beyond that of the controls. Nicotinamide, nicotinic acid or cozymase did not reduce methylene blue in the absence of cells. The same stimulation of respiration by nicotinamide, etc., was found when O uptake was measured by the direct Warburg method. Felix Saunders

Vitamin B_6 as an accessory growth factor for Staphylococcus albus. S. P. Vilter and T. D. Spies. *Science* **91**, 200-1(1940).—Vitamin B_6 in amts. of 0.3-1.2 γ/cc. stimulates growth and acid production of *Staph. albus* when nicotinic acid and thiamine are present. F. Saunders

Anaerobic production of flavin in Eremothecium ashbyii. Anne Raffy. *Compt rend.* **209**, 900-2(1939).—The organisms produce flavin anaerobically. Walter H. Seegers

Buffering fermentation media. A. R. Kendall. *Proc. S. Dakota Acad. Sci.* **19**, 32-43(1939).—A brief review of buffer systems is given. A medium for *Aerobacter pectinovorum* fermentation, with an optimum initial pH of 6.0 and an av. mol. buffer value of 0.537 in the pH range 5.2-6.0, has the following compn.: $MgSO_4$ 0.100 g., NH_4Cl 0.250 g., sucrose 8.000 g., succinic acid 1.180 g., NaOH 0.725 g. and water up to 100 cc. W. H. S.

The biochemistry of microörganisms. VIII. The splitting of tyrosine by various bacteria. W. Grimmer and B. Wauschkuhn. *Milchw. Forsch.* **20**, 110-30(1939); cf. *C. A.* **30**, 6781[8].—*Oidium lactis* converts tyrosine into (*p*-hydroxyphenyl)lactic acid and tyrosol ((*p*-hydroxyphenyl)ethanol) (I); *Bacterium mesentericus* converts it into I and tyramine ((*p*-hydroxyphenyl)ethylamine) (II), and *Bacterium putrificus* to (*p*-hydroxyphenyl)-propionic acid (III); micrococci from Tilsiter cheese to II; *Bacillus coli* in alk. medium, to (*p*-hydroxyphenyl)-acetic acid (IV) and I, *Streptococcus casei* from Tilsiter cheese to III; *Bacillus lactis aerogenes* to I and IV. E. O. Whittier

Ultramicroscope and its use in bacteriology (Brüche, Haagen) **1**. Methane-producing bacteria (Heukelekian, Heinemann) **14**. Blowing of cheese [gas production by coli-aerogenes bacteria] (Schwarz, *et al.*) **12**. Production of lactic acid from substances other than sugar by *Lactobacillus casei* (Thiel) **12**.

D—BOTANY

THOMAS G. PHILLIPS

Chemical constituents observed in cellulose formation. T. Tadokoro and S. Kobayasi. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 324(1939).—In agreement with Voss, Bauer and Phrsolike (*C. A.* **32**, 8770[9]), a const. ratio was found for the cellulose and insol. xylan contents ($C_6H_{10}O_5$:$C_5H_8O_4$ = 3.1) of red beech, irrespective of the origin and age of the tree. In expts. on pine and cedar trees 5 to 15 yrs. old, an increase of α-cellulose and of lignin contents, as well as a decrease of alc.-benzene extractible materials, acetyl-group, pentosan and mannan contents was noted with the declining years of these trees. II. *Ibid.* 375.—From an examn. of the buds and terminal portions of pine and cedar trees 4–7 yrs. old, it was thought that the principal sources of α-cellulose were alc.-benzene extractible materials and mannan of the bud. George Ayers

Chemical analysis as an aid to botanical classification.

R. H. F. Manske. *Can. Chem. Process Inds.* **23**, 199–200, 210(1939). C. L. B.

The assimilation of carbon dioxide by green plants. I. The problems of assimilation. W. Noddack. *Z. physik. Chem.* **A185**, 207–21(1939).—A general review of the chem., kinetic and photochem. aspects of photosynthesis, with suggestions as to problems for further exptl. investigation. **II. Assimilation and light intensity.** W. Noddack and H. J. Eichhoff. *Ibid.* 222–37(1939).—A *monochromatic illuminator* giving intensities up to 42,000 lux is described. This app. gives, at 5000 A., 95% of the energy in a region 70 A. wide; at 8000 A. the corresponding width is 200 A. Suspensions of unicellular green algae (*Chlorella pyrenoidosa*) contg. 2.02×10^6 cells per cc. were illuminated with white light and the rate of O evolution at 20° was detd. as a function of the light intensity. Similar expts. were performed with red (6500 A.) and green (5675 A.) light of varying intensities and with algae suspensions of different cell-contens. The dil. suspensions illuminated with either white or red light approached their max. rate of assimilation at much lower intensities than did the dense suspensions. Below approx. 17,000 lux white light gives a higher fraction of the max. rate for a given suspension than does red light of corresponding intensity; above this value the situation is reversed. Green light gives a very low rate of assimilation in every case. T. H. Dunkelberger

Influence of certain hormone-like substances on the rooting of hardwood blueberry cuttings. Stanley Johnston. *Mich. Agr. Expt. Sta., Quart. Bull.* **21**, 255–8 (1939).—The com. prepns., Auxilin and Hormodin A, when used at several concns were ineffective in stimulating root formation in blueberry cuttings. C. R. F.

Starch reserves in the roots of pastured alfalfa when grown alone and in mixtures. H. C. Rather and C. M. Harrison. *Mich. Agr. Expt. Sta., Quart. Bull.* **21**, 281–91(1939).—When grown alone, alfalfa stored starch more readily in the roots than when grown in a mixt. with grass. Starch reserves in the alfalfa roots previous to killing frosts were necessary to prevent carbohydrate starvation of the plants and winter-killing. The roots were lowest in starch during the period of most active growth in the spring, and starch also becomes depleted with close grazing or cutting. C. R. Fellers

Acid tolerance of the highbush blueberry. T. A. Merrill *Mich. Agr. Expt. Sta., Quart. Bull.* **22**, 112–16(1939). The min. pH limit for *Vaccinium corymbosum* is 3.2. Symptoms assocd. with too great acidity are leaf scorch beginning at the margins and, finally, death to the plants. Of the several treatments, applications of lime sufficient to raise the pH to 3.4–3.8 prevented leaf scorch and resulted in normal growth. C. R. Fellers

Effect of soil moisture on acid content of tomatoes. Preliminary report. F. A. Lee and C. B. Sayre. *Food Research* **5**, 69–72(1940).—Immature tomato fruits are high in acidity. As the maturation process develops, the acidity decreases, and finally increases in the ripe fruit. Varieties vary in their titratable acidity. Percentage acidities, calcd. on a dry-wt. basis, follow: King Humbert 3.76; John Baer 5.32; Supreme Marglobe 6.22; and Golden Queen (yellow variety) 5.32. C. R. Fellers

Influence of variety, season and green manures on the composition of wheats. J. E. Greaves, Aaron F. Bracken and C. T. Hirst. *J. Nutrition* **19**, 179–86(1940); cf. *C. A.* **31**, 7466[2].—Spring wheat grown on low-moisture soils contained higher percentages of ash, Ca, Mg, K, Fe, P and S than winter wheat grown on the same soil. There were marked variations in Ca content in several varieties of wheat. The use of green manures materially increased the P content, probably because of its effect in stimulating bacteriol. activities which in turn increased the soil stores of available plant food. C. R. Fellers

Growth of isolated cells from Lupinus albus seedling tips. R. Gautheret. *Compt. rend. soc. biol.* **132**, 351–2 (1939).—In a suitable medium isolated cells from the growth zone increase in size but do not divide. 3-Indoleacetic acid in 10^{-6} diln. stimulates this growth, but only when a fragment of live lupine root is present in the medium. This indicates that the root liberates a substance into the medium which promotes the action of the heteroauxin. L. E. Gilson

The dependence of the ascorbic acid content of plants on internal and external factors. Heinz G. Moldtmann. *Planta* **30**, 297–342(1939).—Of the phanerogams, certain monocots (*Iris squalens, I. sambucina, Gladiolus communis*) have especially high ascorbic acid (I) contents. Plants without chlorophyll (*Lathraea, Orobanche* and fertile shoots of *Equisetum arvense*) contain no I. I is formed in germinating seeds even in darkness; the content rises considerably during the first days of germination, but later falls until chlorophyll appears. Subterranean plant parts contain little or no I; it increases up the stem to the mesophyll of the leaves, but M. found it higher in white or yellow petals than in leaves. Fruits rich in carotenoids increased in I during ripening, especially after the ripe colors appeared. A max. in I appeared during the day and a min. at night. Prolonged cloudiness reduced it. The max. in the leaves of *Fagus silvatica* came in July; in the needles of *Taxus baccata* in March. Ultraviolet irradiation had no effect. The I content rose with the intensity of CO_2 assimilation; it was unaffected by that of the respiration. The I content rose in each species as the glucose content increased, but not when this was accomplished by ringing. Some colorless leaf sectors had more, some less, I than normal green sectors. Detns. of I were by the method of Tillmans. Thirty-five references. E. L. Green

The use of the gas-metabolism recorder in carbon dioxide assimilation. Heinrich Auldemgarten. *Planta* **30**, 342–52(1939).—The app. (*C. A.* **33**, 7343[9]) is improved and in expts. with *Stichococcus bacillaris* it showed that the shape of the assimilation curve was independent of the supply of org. nutrients. The kind of mineral nutrients supplied had a considerable effect (comparison between Eiler's, Kolkwitz' and peptone glucose solns.). E. L. Green

Retardation of carbon dioxide assimilation by light and temperature. M. G. Stalfelt. *Planta* **30**, 384–421(1939). —The daily course of photosynthesis in oats under field conditions and in lichens under const. conditions was studied. Light intensities and temps. above certain limits reduced photosynthesis. This reduction was expressed as relative reduction, i. e., the comparison with the mean daily fall of photosynthesis under optimum conditions. It was found to be proportional to the light intensity and reversible if effected by light, but irreversible (in the dark) and independent of the light if by heat. The effect of heat is believed to be generally destructive, while that of light is photochem. and specific. Extensive bibliography. E. L. Green

Formation and distribution of resin in the larch (Larix europaea). Paul Jaccard, A. Bourquin and G. H. Bornand. *Eidgenoss. Materialprüfungs- u. Versuchsanstalt Ind., Bauw. Gewerbe, Zurich, Ber.* No. **97**, 18 pp (1939) (in French).—A morphological study reported under the following headings: anatomical structure and formation of resinous canals, distribution of resinous canals in the wood and pathological secretion of the resin, together with 11 sketches of microscopical structure. Numerical data for the distribution of resinous canals in *L. europaea* from 4 localities are tabulated. Data are also presented to show the relation between sp. gr., proportion of fiber wall and resistance to compression for larch and 14 other woods. L. Wilson Greene

The chemical composition of the leaves of Morus alba. S. Ya. Demyanovskiĭ. *Uchenye Zapiski Fakul'teta Estestvoznaniya, Moskov. Gosudarst. Pedagogicheskiĭ Inst., Lab. Org. i Biol. Khim.* **1938**, No. 3, 55–88; *Khim. Referat. Zhur.* **2**, No. 5, 51(1939).—For leaves collected in Mirgorod (May-August) and in Tashkent (April-June) are given, in relation to their degree of ripeness, shape of the tree and the character of irrigation, the contents of water, ash, P, total and protein N, sol. carbohydrates, cellulose, fat, titer value and active acidity. W. R. H.

The absorption of nutritive elements by the lupines. A. Wojtysiak. *Polish Agr. Forest Ann.* **39**, 133–88

(in French, 188–90)(1937).—*L. angustifolius* var. *roseus* subvar. *praecox pulaviensis* (I), *L. angustifolius* var. *coeruleus* (II), *L. luteus* (III) and *L. albus* (IV) were studied. Samples of 100 plants were taken every 5–10 days during the period of vegetation. During the pre-blossom and blossom stages III and IV showed, resp., the greatest and least increase in abs. dry wt. In the pre-blossom stage III showed the greatest uptake in N, P_2O_5, K_2O and CaO, IV the least. In the blossom period III took up more N, P_2O_5 and CaO than the other varieties; IV assimilated more K_2O. Conversely in the last or post-blossom stage IV showed greatest increase in all the nutritive factors studied. The P_2O_5:N ratio for the plants was as follows: in the pre-bloom period greatest for I and narrow for II; in the bloom stage greatest for IV and in the post-bloom period greatest for III and IV. As a consequence of this study W. points out that rational use of these plants as fodder or fertilizer depends on knowledge of the nutritional stage of a given species. C. T. J.

The role of leaf water-content, soil moisture and plant age on transpiration of crop plants. B. N. Singh and R. B. Singh. *J. Indian Botan. Soc.* **16**, 63–80(1937).—Expts. were made on cotton, rice and tobacco. For a given crop there was no appreciable difference in the daily rates of transpiration at a particular stage of development (seedling, vegetative or reproductive) despite the change in the evapg. power of the atm. The av. daily rate of transpiration for a particular crop varied in accordance with the metabolic need of the plant at different developmental stages in the life cycle of each crop. There was a high hourly rate of transpiration during the seedling stage and the stage prior to the initiation of reproductive primordia. Different crops seemed to have different physiol. resisting power for transpiration under similar conditions of environment and to possess varying daily rates of transpiration per unit area of leaf even under similar conditions of atm. variables. The greater the percentage of water in the leaf during the active period of growth, the greater was the difference between the max. and min. of the water content during the day. With the advent of age the water content of leaves during the day approximated to an av. min. from hr. to hr. on a clear day. The view is held that the water content of leaves represents the balance between absorption on the one hand and transpiration on the other. If transpiration is in advance of absorption, a deficit in the water content should follow, but when the reverse is the case the water content should increase. There were indications that the rate of transpiration is directly proportional to the rate of supply of water to the plant. K. D. Jacob

Unequal absorption of ions and their rate and order of entry from a three-salt nutrient. B. N. Singh and S. C. Chakravarti. *J. Indian Botan. Soc.* **16**, 81–93(1937).—Wheat, paddy and flax were grown in Shive's 3-salt culture soln. and the absorption of component ions of the different salts ($Ca(NO_3)_2$, $MgSO_4$ and K phosphate) constituting the medium was studied at successive stages of growth of the plants. Unequal absorption of ions was not restricted to single-salt solns. and to shorter durations of growth alone, but occurred with balanced solns. and for the whole, or a part of the life cycle of the plants. In the case of plants growing during long-range experimentation, the H and OH ions seemed to be mainly responsible for unequal absorption. During the early stages of growth (1st 2 weeks or less) the pH of the nutrient solns. decreased to min. values, then increased to max. values (considerably above that of the original soln.) at 6 weeks and subsequently decreased rapidly. At all stages of growth the nutrient solns. supporting paddy showed higher pH values than did those supporting flax. In the majority of cases K and N were absorbed in greater proportion, but the absorption of the other ions showed no regularity and seemed to be detd. by the specific requirements of the plants at successive stages of growth. The rate of entry of the ions decreased as the plants advanced in age during the vegetative period, but with the onset of the reproductive phase the rate increased to fall again toward the close of the life cycle. K. D. Jacob

The physiological and chemical changes accompanying viviparous germination in mango. B. N. Singh and B. N. Lal. *J. Indian Botan. Soc.* **16**, 129–36(1937).—A local variety of *Mangifera indica* was studied. As compared to that of normal fruit under controlled conditions of environment during germination, the mesocarp of viviparous fruit is characterized by lower respiration and pH values, smaller percentages of nonreducing sugars, starch, total N and moisture and a slightly higher percentage of reducing sugars. In contrast to the conditions existing in the normal fruit, the changes inside the seed of the viviparous fruit are characterized by higher rate of respiration, more so in the plumule and radicle than in the cotyledons; higher moisture content; lower pH, especially in the plumule and radicle; lower percentages of starch and non-reducing sugars; higher percentages of reducing sugars, especially in the plumule and radicle; and lower percentages of N in the cotyledons but higher percentages in the plumule and radicle. The general tendency seems to be toward a breakdown of reserve substances in the mesocarp of viviparous fruit, which usually does not occur in normal fruit. As compared to that of normal fruit, germination of viviparous fruit is accompanied by a much greater breakdown of starch in the cotyledons.

K. D. Jacob

The respiration of Eugenia jambolana leaves with respect to their sugar, acid and catalase contents. N. K. Chatterji. *J. Indian Botan. Soc.* **16**, 245–58(1937).—With advancing age the pH values of freshly detached leaves increased more or less regularly from 4.62 for those 2 days old to 7.10 for those 6 months or more of age; the catalase activity (expressed in terms of O_2 evolved from H_2O_2 per 10 g. leaves) decreased from 30 cc. to 18.0–18.5 cc; the monosaccharide content decreased from 1.43 to 0.53–0.63% of the fresh wt.; and the total acid content (expressed in terms of 0.01 *N* oxalic acid) decreased from 31.1 to 10.3–10.4 cc. Likewise, the total CO_2 output in 25 hrs. decreased from 8.45 to 4.13–4.95 cc. per g. fresh wt. With leaves of all ages the rates of respiration reached max. values in 20–25 hrs. after they were removed from the plants and then decreased with time. In general, there seemed to be a close relationship between the total CO_2 output per 25 hrs. and the initial glucose content of the leaves. The O_2 intake of the leaves decreased with advancing maturity and also with increase in the length of time that the detached leaves were kept under the exptl. conditions. Continuous conversion of sugars into oil globules occurs in the old yellow leaves and oxidation of the C compds. to CO_2 is effected in part by the O liberated during formation of the oil.

K. D. Jacob

Wounding of the leaves of Anacardium occidentale Linn. at different stages of their development and its effect on respiration. A. B. Saran. *J. Indian Botan. Soc.* **17**, 1–4(1938).—The respiration rate of young leaves of *A. occidentale* is higher than that of adult ones, but the rate becomes approx. const. at a lower level at 30–40 days of age. Such young leaves do not show any aftereffect when they are wounded, whereas a similar treatment of the older leaves enhances their respiratory activity considerably during the 1st 2–4 hrs. after wounding.

K. D. Jacob

Isoelectric point of the proteins of the tissues of the cotton plant in relation to the pH of the cell sap. R. H. Dastur and S. V. Mensinkai. *J. Indian Botan. Soc.* **17**, 149–60(1938).—The pH values of the cell sap of the tissues of the roots, stems, vegetative branches, fruiting branches and bolls fluctuate more or less irregularly during the life of the plant, but they reach max. values during the intense flowering period and then decrease to an approx. uniform min. value during the last stages of senescence. The pH of the cell sap of the leaves of the vegetative branches increases more or less steadily with a marked increase to nearly 7 during the period of intense flowering and a rapid decrease in the senescent stages. The apparent isoelec. points of the proteins of the roots, stems and leaves are at pH values below those of the corresponding tissue saps throughout the life of the plant. The proteins

are positively charged and the charge changes as the pH value of the sap changes during growth. At the termination of the plant's activity the proteins reach an isoelec. point which is very close to the pH (5.5) of the plant sap at that stage. K. D. Jacob

Respiration of amphibious plants. I. Scirpus articulatus Linn. B. Samantarai. *J. Indian Botan. Soc.* **17**, 195-204(1938).—The respiratory activity increases with increase of O_2 concn. in the water in which the plant respires and scapes that have low respiratory values under water have higher values when they become aerial. The respiration of the hollow submerged scapes is greater than that of submerged plants before scapes are formed, owing to the greater O_2 content of the hollow scapes. On the other hand, air-free scapes (scapes injected with water) show lower respiration than normal scapes. K. D. J.

The growth of rice seedlings in salt solutions of different hydrogen-ion concentrations. R. H. Dastur and Winifred John. *J. Indian Botan. Soc.* **17**, 255-68(1938). —The greatest growth was obtained in salt solns. having pH values of 6.0-7.0. pH values below 6 were detrimental to the growth of the seedlings and little or no increase in dry wt. was obtained when the salt solns. had pH values below 5. Culture with $FePO_4$ was superior to culture with $FeSO_4$ and to culture without Fe, but there was no difference between culture with $FeSO_4$ and culture without Fe. Culture with KNO_3 as the source of N was superior to culture with $(NH_4)_2SO_4$. Among the single-salt solns. $(NH_4)_2SO_4$ and NH_4 phosphate were superior to KNO_3. Growth was poor in solns. of NH_4Cl, $NaNO_3$ or $Mg(NO_3)_2$ In the 2-salt solns. those that contained NH_4 phosphate were better than other combinations. The best growth was obtained in the ordinary culture soln. (Tottingham's modification of Knops' culture). K. D. Jacob

The rate of respiration and respiratory quotient of starved leaves of Aralia sp. before and after a course in nitrogen. A. B. Saran. *J. Indian Botan. Soc.* **17**, 287-91 (1938).—There was no marked seasonal variation in the initial rate of respiration of leaves of *Aralia* sp. When N_2 was substituted for air at or beyond 44 hrs. of starvation (detached leaves) the rate of respiration was temporarily enhanced, but the same treatment given at an earlier stage (22 hrs. of starvation) caused a lowering of the respiration rate. In both cases, when air was again admitted the rate of respiration increased temporarily. After a course in N_2 the respiratory ratio dropped to a low value of 0.70-0.75 for a period of approx. 4 hrs., after which it returned to its normal value (unity). K. D. Jacob

A laboratory experience in testing wax mixtures for use in plant propagation. E. M. Shelton. *Northern Nut Growers Assoc., Rept. Ann. Meeting* **28**, 72-5(1937).— A wax to be used for coating nursery stock must prevent evapn. of water, inhibit mold growth and be nontoxic to the coated plant. The effectiveness of waxes in preventing evapn. of water and inhibiting mold growth can be detd. by the use of gelatin candles (composed of water 100, locust bean ext. 1, ground sizing glue 50 and sucrose 1.5 parts). Four candles are dipped in the wax to be tested. Two are scored with a safety razor blade just deeply enough to cut through the wax, to simulate breakage of the covering which might occur in practice. The candles are weighed, hung in dry air and reweighed at intervals. For the molding test, four candles are prepd. in a similar manner, suspended in a moisture-satd. atm. and observed for mold growth. For the toxicity test, dormant forsythia or white ash cuttings are dipped in the wax, leaving uncoated about 10 cm. at the base of each cutting, and are placed in jars with water covering the uncoated ends. The cuttings are observed for toxic symptoms over a period of several weeks. K. D. Jacob

Use of growth substances in bench grafting of walnuts and hickories (a progress report). C. C. Lounsberry. *Northern Nut Growers Assoc., Rept. Ann. Meeting* **29**, 63(1938).—A paste contg. 1 g. indoleacetic acid per 200 g. lanolin was spread thinly on the top of the scion and around the union of the graft and at the lower end of the seedling root where it was cut off. Satisfactory roots came from the lower end of the scion, as well as on the seedling-root grafted varieties of English walnut, Japanese butternut, hican, pecan and shagbark hickory. Similar results were obtained on scions that were immersed for 24 hrs. to a depth of 1 in. in a soln. contg. 20 units of indolebutyric acid and were then treated, as before, with a paste of lanolin and indolebutyric acid. Although no roots came from the scions of black walnut, roots came from both top and bottom of the seedling root used as stock. Indolebutyric acid appeared to be more rapid in its action than indoleacetic acid, but the lanolin paste of the latter seemed to last longer in an effective form. K. D. Jacob

Delinting and germination of cotton seeds as affected by $ZnCl_2.2HCl$ treatment. B. N. Singh, R. S. Choudhri and S. L. Kapoor. *Indian J. Agr. Sci.* **9**, 731-9(1939).— To est. the degree of delinting and germination effects in Indian and American cotton varieties following seed immersion, for various durations, in $ZnCl_2.2HCl$, expts. were conducted in sand culture and the inquiry enlarged so as to include also the detn. of seedling growth. The germination process was greatly activated by $ZnCl_2.2HCl$ treatment of seeds, doses of 5-15 min. duration being very satisfactory. Such treatments initiated early start, higher percentage and early completion of germination. Shorter or longer treatments induced gradual depletion in the germinating vigor of seeds from the optimal value, though in the majority of cases germination was still superior to the controls. The permanency of the effects of these treatments was well evidenced by the resulting seedlings which were taller and accumulated greater dry matter than their controls. 8 references. A. H. Krappe

The influence of various growth factors on the growth of green plants. David M. Bonner and James Bonner. *Am. J. Botany* **27**, 38-42(1940); cf. *C. A.* **33**, 9370⁸.— Adenine at below 1 γ per l. of nutrient soln. in sand cultures increased the dry wt. of *Cosmos sulphureus* 3-fold. Uric acid at 10 γ per l. increased leaf growth of *Cosmos* and mustard in a manner similar to adenine. Nicotinic acid at 50 γ per l. stimulated growth, particularly in the roots of *Cosmos* and cocklebur (*Xanthium pennsylvanicum*) and vitamin B_6 increased the dry wt., particularly of the roots, of mustard, cotton and *Cosmos*. Growth of *Cosmos*, mustard and cocklebur were stimulated in lesser degree by 2 γ of estrone per l. The effects of adenine (leaf growth factor) and vitamin B_1 (root growth factor) were not additive, possibly because treatment with adenine stimulates natural production of vitamin B_1 in the plant. Wheat and tomato plants did not respond to additions of vitamins B_1 or B_6, estrone, adenine, or their combinations. Nelson McKaig, Jr.

Influence of the size of the inoculum on the growth of Chlorella vulgaris in freshly prepared culture medium. Robertson Pratt. *Am. J. Botany* **27**, 52-6(1940).—The multiplication of *Chlorella vulgaris* furnished with 5% CO_2 and 95% air in the nutrient soln. conformed to the equation of an autocatalyzed unimolecular reaction during the greater portion of the growth period but was inadequate at early growth stages. The discrepancy increased with dilu. It is suggested that a growth-inhibiting factor, the amt. of which varies directly with the no. of cells, is released into the culture. When there are few cells, this toxic factor is dil. and multiplication is less retarded than in the presence of large nos. of cells and consequently greater concn. of the growth-retarding substance. Nelson McKaig, Jr.

The vitamins in plant physiology. Michelina Palazzo. *Ann. ist. super. agrar. Portici* **8**, 48-68(1936-37).—A review. A. R. Merz

Organic complexes of high molecular weight and their variation in plant cells and tissues. W. W. Lepeschkin. *Ber. deut. botan. Ges.* **57**, General Meeting No., 91-9 (1939); cf. *C. A.* **33**, 997⁶.—The longitudinal scattering of infrared rays produced by plant tissues and yeast suspensions is far greater than that produced by protein solns. It is concluded that this is caused by the presence of vitaids of high mol. wt. Killing the tissues with resultant breaking up of the vitaids reduces the amt. of infrared scattering. Young active tissues have a greater effect

initially than older material and killing such tissues results in a greater decrease than that ensuing from the killing of older tissues. Lawrence P. Miller

Notes on the effects of alcohol and acetic acid on spermatogenesis in Isoetes japonica Al. Br. Akira Yuasa. *Japan. J. Botany* **8**, 297–301(1938).—Spermatogenesis was accelerated by low concns. of C_2H_5OH and retarded by AcOH. Lawrence P. Miller

The developmental change of quantities of chlorophyll and carotenoid in the leaves of rice plants, barley and wheat. Hideo Nagasima. *Japan. J. Botany* **9**, 277–96 (1938).—The content of carotenoid pigments showed 2 maxima, one at the season of most active growth and the other during the reproductive phase. The quantity of chlorophyll showed similar variation with the reality of the 2nd max. somewhat uncertain. L. P. M

Studies on the formation of ascorbic acid in plants. I. The influence of light on the ascorbic acid contents of various etiolated seedlings. Tomota Sugawara. *Japan. J. Botany* **10**, 141–50(1939).—Seedlings germinated in the dark contain some ascorbic acid, but the amt. is increased if light is furnished. Lawrence P. Miller

Some associated factors in the development of watercore. C. P. Harley. *Proc. Am. Soc. Hort. Sci.* **36**, 435–9(1939). —Factors intimately assocd. with carbohydrate metabolism in the leaf seem to be instrumental in predisposing apples to watercore. If sufficient carbohydrate has been synthesized and transported to the fruit, it is probably rendered subject to the action of high temp., subsequent starch hydrolysis, and resultant watercore. L. P. M.

Symptoms of boron deficiency in the rose. O. W. Davidson and H. M. Biekart. *Proc. Am. Soc. Hort. Sci.* **36**, 841–4(1939).—Preliminary results (microchem. tests) showed increased amts. of starch and tannin in rose plants deficient in B. Lawrence P. Miller

Further investigations on the growth substance of potatoes suffering from disintegration disease. Hilde Lucas. *Phytopath. Z.* **12**, 334–50(1939).—A continuation of the work reported by Jahnel (*C. A.* **33**, 7346[1]) With the diffusion method, no tangible difference was observed in the distribution of growth substance between diseased and sound potato plants in the beginning of development. Only in later development could be clearly detected in the diseased plants a smaller amt. than was present in the healthy ones. Diseased young daughter buds do not have a growth-substance deficit until they have attained a considerable development. Max. growth-substance content was found in the base, middle and tip of the stem. The distribution is uniform throughout the buds. Polar conduction of growth substance in the buds is only slightly greater than the reverse. The leaf shaft of diseased plants exhibits graduated heteroauxin concn. less strongly than do the healthy ones. Extn. methods using ether, chloroform or alc. are, at the present time, not serviceable for potatoes. Merritt N. Pope

Vernalization and the growth-phase concept. H. H. McKinney. *Botan. Rev.* **6**, 25–47(1940). —A review. Felix Saunders

Problem of Golgi material in plant cells. Laura J. Nahm. *Botan. Rev.* **6**, 49–72(1940).—A review. Felix Saunders

Photosynthesis with radio-carbon. S. Ruben, M. D. Kamen, W. Z. Hassid and D. C. DeVault. *Science* **90**, 570–1(1939).—The rate of photosynthesis by *Chlorella pyrenoidosa* with radioactive CO_2 (C^*O_2) was detd. by the Warburg manometer method and by radioactive technique. C^*O_2 reduction is markedly affected by HCN and phenylurethan. The light and dark reduction is enormously decreased by 10^{-2}–10^{-3} *M* HCN. At these concns. of HCN photosynthesis is strongly inhibited but respiration is unchanged. *Chlorella* cells reversibly reduce C^*O_2 in the dark; 85–95% of the dark-reduced C* can be extd. by boiling 1 min. with water; 70–80% of the C* in this ext. is pptd. by Ba or Pb in 80% EtOH. The Ba ppt. from the light-reduction ext. contained a smaller fraction of the C*. Prolonged boiling with *N* HCl does not decrease the Ba-insol. radioactivity. The presence of a carboxyl group in the radioactive mols. is indicated. The water-sol. ext. from *Chlorella* exposed to C^*O_2 for short times in light or dark has a mol. wt. of at least 200, probably much greater. The reversible uptake of CO_2 in the dark may be written $CO_2 + RH \rightleftarrows RCO_2H$. The energetics of the reaction are discussed. Felix Saunders

Production and utilization of alcohol by plant tissues. C. A. Ludwig, Franklin E. Allison, Sam R. Hoover and Francis W. Minor. *Science* **91**, 170–1(1940).—Under anaerobic conditions alc. and CO_2 are produced by both nodules and roots in proportions which indicate that alc. is the chief unoxidized product. Under aerobic conditions increasing amts. of alc. in the medium reduce the R. Q. of both tissues from about 1.00 (lower for roots) without alc. to almost 0.67 (theoretical for alc.) with only a slight increase in O consumption, and part of the alc. disappears. Added glucose increases O consumption slightly. Under complete aerobiosis glucose does not affect the R. Q. if it is approx. 1.00 but increases it under O deficit or if it is already below 1.00. The effect of each substance occurs in the presence as well as in the absence of the other. In nodules, either without added source of C or with glucose, increasing the O concn. leads to increased carbohydrate breakdown, as shown by the CO_2 evolved and O consumed; while in roots, without added C source or with alc. and nodules with alc., increasing the O concn. leads to decreased carbohydrate breakdown. The results indicate that alc. may be an intermediate in normal plant respiration. Felix Saunders

Chlorophyll as the prosthetic group in the green leaf. Emil L. Smith. *Science* **91**, 199–200(1940).—In purified chloroplast material there is a const. relation of about 16 parts of chlorophyll to 100 parts of protein. This relation indicates a little over 3 mols. of chlorophyll per Svedberg unit of 17,000 mol. wt. The fraction over 3 may represent an extra chlorophyll b mol. The action of the detergent Na dodecyl sulfate (SDS) was studied. In addn. to clarifying completely the green pigment, SDS also quantitatively converts the chlorophyll into pheophytin. This conversion proceeds at a rate which is directly proportional to the pH and takes place even at pH 8–9. At const. pH, the rate is proportional to the SDS concn. Pheophytin formation does not occur in 4% digitonin or 10% bile salts at pH 4.5. At this pH in 0.05% SDS the reaction is complete in a few min. Mg probably does not play a part in binding chlorophyll to the protein but it may be concerned in the binding of larger units. Felix Saunders

A study of the green pigments in the lotus embryo. Robert Stewart and H. Clyde Eyster. *Proc. S. Dakota Acad. Sci.* **19**, 89–91(1939).—In the lotus embryo green pigments form in the absence of light. Analyses showed that only chlorophyll b and no chlorophyll a is present. Carotene and xanthophyll were present in normal amts. Walter H. Seegers

Histology of some physiological disorders of the apple fruit. Mary MacArthur. *Can. J. Research* **18, C**, 26–34 (1940).—The histological similarities and differences between the boron-amenable disorders, internal cork, corky core and drought spot, and the non-boron-amenable disorder bitter pit are presented. Blotchy pit is discussed as a borderline type, since one end of a graded series is similar to internal cork and the other is indistinguishable from bitter pit. On the basis of histology water core is not placed in either of the two groups. Starch retention, in localized or diffuse necrotic areas, is common to both groups of disorders. External papillations occur on the walls of cells in close proximity to the lesions. Abnormal meristematic activities coexist with boron deficiency. These are (1) a cork cambium partially or completely walling off a lesion, (2) massed linear cells, heavily papillated, and (3) reactivated individual cells or groups of cells. All three types of abnormal cells may be present in internal cork and drought spot, but no cork cambium occurs in corky core. J. W. Shipley

The composition of the macrospores and of the microspores of Selaginella. Antonio Sosa and Cécile Sosa-Bourdouil. *Compt. rend.* **210**, 59–61(1940); cf. *C. A.* **32**, 5868[8].—The microspores of *Selaginella spinulosa* A. Br.

are higher in percentages of ash and protein N and lower in crude fat than the macrospores. The fat of the microspores has a higher proportion of unsaponifiable matter and has a higher I no. There is no difference in total N. J. T. Sullivan

The modification of karyokinesis and cytodieresis in the plant by cyclic hydrocarbons and their derivatives. Pierre Gavaudan, Noelie Gavaudan and Joseph F. Durand. *Compt. rend.* **210**, 114–16(1940); cf. *C. A.* **33**, 2985[5,4], 3893[9], 5505[3], 6387[3], 8686[6].—The systematic study of hydrocarbons and their derivs. and a comparison of their phys. properties with their activity and toxicity are recommended as an approach to the problem of their selective effect on karyokinesis and cytodieresis. J. T. S.

A factor influencing nitrogen excretion from leguminous root nodules. Artturi I. Virtanen and Maila Torniainen. *Nature* **145**, 25(1940).—The authors suggest that the discrepancies in their results and those of others on the excretion of N compds. from leguminous roots may be ascribed to the quality of the containers, and especially to their porosity. The pots giving best results should be large and very porous. E. D. Walter

Utilization of nitrogen by Ophiobolus graminis. S. D. Garrett. *Nature* **145**, 108–9(1940).—Expts. show that a pure culture of *O. graminis* growing on sterilized wheat straw can utilize nitrate N. This supports the conclusions of Padwick (*C. A.* **30**, 6409[4]). E. D. Walter

Salt absorption of plants. H. Lundegårdh. *Nature* **145**, 114–15(1940).—Discussion, with a reply to Hoagland and Steward (*C. A.* **33**, 7846[6]). E. D. Walter

Salt absorption of plants. D. R. Hoagland and F. C. Steward. *Nature* **145**, 116–17(1940); cf. preceding abstr.—A discussion suggesting the complexity of the problem of salt absorption by living cells and also that the theory of Lundegårdh has not yet been established and generally accepted by plant physiologists. E. D. W.

Fats of marine algae (Takahasi, *et al.*) **27** Seasonal variation in Co content of North Island pastures (McNaught, Paul) **15**. Surface migration of ions and contact exchange [nutrition of plants] (Jenny, Overstreet) **2**

Hector, J. M.: Introduction to the Botany of Field Crops. Vol. I. Cereals. Vol. II. Non-cereals. London: Gordon and Gotch. £3 10s. for two volumes.

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E—NUTRITION

PHILIP B. HAWK

Biological value of the proteins of some species of Bengal fish by the nitrogen balance and growth methods. K. P. Basu and K. Gupta. *J. Indian Chem. Soc.* **16**, 543–8(1939).—The biol. value of the proteins of some common species of Bengal fish, viz., katla, mrigel, air, koi, singhi, sarputi, poa and koral, has been detd. by the N balance and by the growth methods previously used by Basu and De for the common varieties ruhee and hilsa (*C. A.* **33**, 4645[6]). The digestibility (83 97%) and biol value (70 88%) are both very high, and in young rats growth per g. of protein ingested varies from 1.48 to 1.83 per day. The different fishes contain a large percentage of proteins of very good quality and their consumption as a daily article of food by the Bengali is an excellent custom. C. R. Addinall

The prothrombin content [of the blood] in relation to early and late feedings of the newborn. A preliminary report. Leif Salomonsen and K. K. Nygaard. *Acta Paediat.* **27**, 209–18(1939)(in English); cf. *C. A.* **34**, 483[6].—Hypoprothrombinemia (I) occurred in 11 out of 12 infants who received regular breast feedings beginning 12–20 hrs. post partum, but was not found in infants who were given extra feedings beginning 2 hrs. post partum. Excessive I does not normally follow a moderate period (up to 34 hrs.) of "abs. diet" (as sterile water), but can appear after a longer period. The observed prothrombin variations can hardly be caused by variations in the intake of vitamin K, since milk contains little vitamin K. Early extra feedings of the newborn may hasten the bacterial metabolism in the intestines, thus creating a supply of vitamin K sufficient for the prevention of a relative transitory I. Ruth Berggren

Leprosy and nutrition in New Zealand. Emmo Gehr. *Arch. Schiffs- u. Tropen-Hyg.* **44**, 73–8(1940).—Central Europe and New Zealand furnish examples of the simultaneous disappearance of leprosy with the removal of a sapotoxin-contg. component of the diet. This confirms the theory of Oberdorffer (*C. A.* **33**, 5033[4]). Ruth Berggren

Effect of renal retention of vitamin C on saturation tests. A formula for compensation of this factor of error. John B. Ludden and Irving Wright. *Arch. Internal Med.* **65**, 151–62(1940).—Details of a vitamin C-satn. test are given. The patient after 12 hrs. on a low-vitamin C diet is given intravenously 1 g. ascorbic acid dissolved in 10 cc. saline soln. Blood ascorbic acid is detd., and also the urinary excretion. During the 1st 5 hrs. 54–99% of the 1st 24-hr. excretion appeared in the urine, the amt. depending on the state of satn. of the patient and the vitamin C renal function. The data showed a definite correlation between (1) the percentage of the 5-hr. output excreted in the 1st 1.5 hrs. and (2) the percentage of the 24-hr. output excreted during the 1st 5 hrs. Plotting these two sets of values gave a straight-line relation. The following working formula was developed: $C = ab/(1.26\,a - 0.27\,b)$, where C represents the amt. of vitamin C in mg. excreted in 24 hrs., a the amt. excreted in 1.5 hrs. and b the amt. excreted in 5 hrs. J. B. Brown

The vitamins. Introduction. Morris Fishbein. *The Vitamins: A Symposium, Am. Med. Assoc., Chicago* **1939**, 7–13. **The chemistry of vitamin A and substances having a vitamin A effect** L. S. Palmer. *Ibid.* 15–25. **Vitamin A—physiology and pathology.** Otto A. Bessey and S. B. Wolbach. *Ibid.* 27–54; cf. *C. A.* **33**, 7350[8]. **The pharmacology and therapeutics of vitamin A** S. W. Clausen. *Ibid.* 55–86. **Vitamin A—methods of assay and sources in food.** Hazel E. Munsell. *Ibid.* 87–109. **Vitamin A requirements and practical recommendations for vitamin A intake.** Lela F. Booher. *Ibid.* 111–25. **The components of the vitamin B complex.** F. M. Nelson. *Ibid.* 127–40. **The chemistry of thiamine (vitamin B_1).** Robert R. Williams. *Ibid.* 141–57. **The physiology of vitamin B_1.** Geo. R. Cowgill. *Ibid.* 159–78. **The pathology of beriberi.** E. B. Vedder. *Ibid.* 179–91. **The therapeutic use of vitamin B_1 in polyneuritis and cardiovascular conditions.** Maurice B. Strauss. *Ibid.* 193–202. **Vitamin B_2—methods of assay and food sources.** Hazel E. Munsell. *Ibid.* 203–27. **Human requirements for vitamin B_1.** Geo. R. Cowgill. *Ibid.* 229–48. **Chemical aspects of riboflavin.** Lela F. Booher. *Ibid.* 249–70. **Riboflavin—physiology and pathology.** A. G. Hogan. *Ibid.* 271–88. **Riboflavin dietary sources and requirements.** Henry C. Sherman and Caroline Sherman Lanford. *Ibid.* 289–95. **Vitamins in relation to the prevention and treatment of pellagra.** W. H. Sebrell. *Ibid.* 297–321. **The chemistry of vitamin C.** C. G. King. *Ibid.* 323–30. **The physiology of vitamin C.** *Ibid.* 331–8; cf. *C. A.* **33**, 1791[6]. **The pathology of vitamin C deficiency.** Gilbert Dalldorf. *Ibid.* 339–48; cf. *C. A.* **33**, 1791[6]. **Vitamin C—methods of assay and dietary sources.** Otto A. Bessey. *Ibid.* 349–76; cf. *C. A.* **33**, 1791[6]. **Human requirements of vitamin C.** Sybil L. Smith. *Ibid.* 377–410; cf. *C. A.* **33**, 1791[9]. **Vitamin C—pharmacology and therapeutics** Arthur F. Abt and Chester J. Farmer. *Ibid.* 411–42; cf. *C. A.* **33**, 1791[7]. **The chemistry of vitamin D.** Charles E. Bills. *Ibid.* 443–58. **Physiology and pathology of vitamin D.** Alfred T. Shohl. *Ibid.* 459–74. **The determination and sources of vitamin D.** E. M. Nelson. *Ibid.* 475–81. **The human requirement of vitamin D.** P. C. Jeans and Genevieve Stearns. *Ibid.* 483–512. **The use of vitamin D preparations in the prevention and treatment of disease.** Edwards A. Park. *Ibid.* 513–39. **Physical aspects of ultraviolet radiation in vitamin D therapy.** W. W. Coblentz. *Ibid.* 541–54. **Clinical aspects of ultraviolet therapy.** Ethel M. Luce-Clausen. *Ibid.* 555–73. **Vitamin E.** H. A. Mattill.

Ibid. 575–96. **Other factors—less well-known vitamins.** C. M. McCay. *Ibid.* 597–613.—A series of reviews. E. J. C.

Turkey poults need four times as much vitamin A as chicks. H. S. Wilgus, Jr. *Colo. Agr. Expt. Sta., Farm Bull. Quart.* 2, No. 1, 2–3(1940).—Max. growth and min. mortality with poults were obtained on 600 units vitamin A per 100 g. of ration. With 300 units per 100 g., 22% of the poults died. C. R. Fellers

Growth of rats on high-fat and low-fat diets, deficient in the essential unsaturated fat acids. R. G. Sinclair. *J. Nutrition* 19, 131–40(1940).—On a diet of casein, salt mixt., dried yeast and the fat elaidin, supplemented with vitamins A and D, rats cease growing when about 100 g. in wt., decline in health and finally die. Growth and health are immediately restored by feeding small amts. of corn oil. This indicates a deficiency in the 1st diet of essential unsatd. fat acids. Replacement of elaidin by sucrose also gives rapid wt. increase. A similar, though smaller, gain occurs when the elaidin diet is replaced by one rich in carbohydrate and very poor in fat. Conclusion: The better growth on the high-carbohydrate rather than on the high-fat diet is partially due to the synthesis of the fat acids necessary for growth. An increase in the requirements of essential fat acids by rats on a high-fat diet may also contribute to poor growth. C. R. Fellers

Influence of urea ingestion on the nitrogen balance and energy metabolism in rats. Max Kriss and Lawson F. Marcy. *J. Nutrition* 19, 151–60(1940).—When urea was fed to rats at the rate of 2 g. daily, 95.5% was recovered in the urine and 0.7% in the feces. Urea had no effect on either heat production or R. Q. Conclusion: Rats do not utilize urea to any significant degree and excretion of urea does not exert a sp. dynamic effect C. R. Fellers

Iron and copper versus liver in the treatment of hemorrhagic anemia in dogs on milk diets. D. V. Frost, V. R. Potter, C. A. Elvehjem and E. B. Hart. *J. Nutrition* 19, 207–11(1940); cf. *C. A.* 33, 6965. Cu in addn. to Fe is necessary for hemoglobin production in dogs. Whole milk, with addnl. Fe and Cu, can successfully meet the great increase in demand for blood-forming elements occasioned by severe blood losses. Milk-diet regeneration of hemoglobin was no more rapid with liver therapy than with Fe-Cu treatment. C. R. Fellers

Influence of different levels of fat in the ration upon milk and fat secretion. Gale Gibson and C. F. Huffman. *Mich. Agr. Expt. Sta., Quart. Bull.* 21, 258–64(1939).—The addn. of soybean oil meal in place of an isodynamic amt. of beet pulp to the basal ration resulted in temporary increase in butterfat percentage. The addn. of soybean oil to the basal ration low in fat gave an increase in milk production. An increase in production was also noted when corn replaced beet pulp, but the fat content remained unchanged. A low-fat ration resulted in an increase in the percentage of fat in milk. Conclusion: The basal ration is an important factor in detg. the effect of the addn. of fat on milk and fat secretion. C. R. Fellers

Salt requirement of growing pigs. R. D. Sinclair. *Sci. Agr.* 20, 109–19(1939).—In general, the addn. of NaCl to pig rations did not result in significant increases in the rate of gain. However, the addn. of 0.5% NaCl to grain rations should meet all requirements, though feeding up to 3% of the ration did not give rise to excessive retention of moisture in muscle samples and did not exert any significant effect on dressing percentage. Feeding NaCl up to 3% of the ration led to a marked increase in water consumption and excessive urination. C. R. F.

Digestibility studies with ruminants. V. Associative digestibility among roughages and succulent feeds. C. J. Watson, W. M. Davidson, J. C. Woodward, C. H. Robinson and G. W. Muir. *Sci. Agr.* 20, 175–92(1939); cf. *C. A.* 33, 8711⁴.—Associative digestibility is defined as a change in digestibility of a feed due to its incorporation in a ration with 1 or more other feeds. With Shorthorn steers, there was no associative effect as far as total digestibility and total digestible nutrients were concerned with hay, oat straw, corn silage and mangels. The digestibility of oat hulls, calcd. from a mixed ration with either hay, corn silage or mangels, was lower than the digestibility observed when oat hulls constituted the sole ration. The digestibility of the N did not generally follow the trend of total digestibility. In the case of the addns. of hay to silage and mangels, the digestibility of the N decreased, whereas in the case of the addn. of hulls to hay or silage, the digestibility of the N in the mixed ration increased.

VI. Associative digestibility of grains: barley, oats and oil cake. C. J. Watson, J. A. Campbell, W. M. Davidson, C. H. Robinson and G. W. Muir. *Ibid.* 238–53.—There was no associative effect between barley and oats. In the case of the barley-oats-oil cake combination, there was no associative effect as far as Et_2O ext. and protein were concerned. C. R. Fellers

Iron metabolism. I. Role of calcium in iron assimilation. S. W. Kletzien, K. W. Buchwald and L. Hudson. *J. Nutrition* 19, 187–97(1940).—Young rats were fed a milk diet productive of a severe anemia, and the effect of variation in the supply of Ca on the amt. of Fe in the various body organs and body itself was then studied. The addn. of 1 and 3% $CaCO_3$ to the basal diet resulted in lower tissue-Fe values. This was also true when Ca in the form of lactate equiv. to 2.5% and of chloride and tertiary phosphate equiv. to 3% of $CaCO_3$ were fed. This was not true for $CaSO_4$. The addn. of 1 and 3% $CaCO_3$ to a basal diet contg. 90% ground whole wheat resulted in lower tissue-Fe values. The possible bearing of these findings on the metabolism of minor elements is discussed. C. R. Fellers

Protein content of the organs and tissues at different levels of protein consumption. T. Addis, D. D. Lee, W. Lew and L. J. Poo. *J. Nutrition* 19, 199–205(1940); cf. *C. A.* 31, 743⁸.—In isocaloric diets contg. 6, 11, 16, 27 and 43% protein, greatest total gain in rats occurred on the diet contg. 27% protein. However, each organ and tissue had its own mode of reaction to an increasing supply of food protein. Some organs made their max. gain of protein at the 16% level, some at 27% and still others at 43%. Each level of protein intake was assocd. with its own characteristic pattern of distribution (organ protein per 100 g. of total protein). C. R. F.

Ascorbic acid metabolism of college students. E. Neige Todhunter, *et al. Wash. Agr. Expt. Sta., Mimeographed Progress Rept., Coop. Regional Project Northwest States* **1937–38**, 23 pp.—This is a report of a coöperative project of the Expt. Stas. of Mont., Ore., Utah and Wash. Tables of data and graphs show the excretion of ascorbic acid of college women while on their customary diets and following a single massive dose of 600 mg. of ascorbic acid. A satisfactory urine preservative consisted of 75 cc. 5 *N* H_2SO_4, 1 cc. 8-hydroxyquinoline (1.45 g. hydroxyquinoline in 100 cc. EtOH) and 5 cc. of toluene. If necessary, before titration the pH of the urine was adjusted so that it was not above pH 3.0. The 2,6-dichlorophenolindophenol titration method was used to det. the ascorbic acid present in the urine. The loss in ascorbic acid content of urine samples treated with the preservative and allowed to stand for 24 hrs. at room temp. was about 5%. The majority of subjects excreted 15 mg. or more of ascorbic acid daily. Only 7% showed less than 15 mg. In general upper-class women and graduate students showed higher excretion levels than undergraduates. Outgo of ascorbic acid is related directly to intake. Marked variation in percentage excreted occurred when a satn. dose of 600 mg. of ascorbic acid was taken in 1 dose. C. R. Fellers

Dietary protein and the toxicity of sodium selenite in the white rat. Howard B. Lewis, Julius Schultz and Ross A. Gortner, Jr. *J. Pharmacol.* 68, 292–9(1940).—Diets contg. 30% of casein afforded young rats much more protection against Se intoxication (Na_2SeO_3 at levels of 25–50 p. p. m. Se mixed with the food) than did diets of equal caloric value contg. 6% of casein. Methionine (0.45–0.89%) added as a supplement to the 6% casein diet afforded marked protection, whereas cystine afforded none. Supplementary methionine added to a diet contg. 15%

of arachin, a protein very low in methionine, as the only protein afforded protection against the toxic action of Se. L. E. Gilson

Vitamin A contents of liver oils of Argentine fish. Ascensión O. Castellanos. *Rev. inst. bacteriol. dept. nacl. hig.* (Buenos Aires) **9**, 227-37(1939).—Numerous species from the coastal waters were exaind. All the oils compared favorably with cod-liver oil. L. E. Gilson

Nicotinic acid deficiency encephalopathy. Norman Jolliffe, Karl M. Bowman, Louis A. Rosenblum and Harry D. Fein. *J. Am. Med. Assoc.* **114**, 307-12(1940). —Treatment of 22 patients having encephalopathic syndrome with 0.5-1.0 g. nicotinic acid daily resulted in the recovery of 15 individuals. Treatment with thiamine chloride was less effective. F. P. Griffiths

Cutaneous manifestations of vitamin A deficiency in children. Edward Lehman and Howard G. Rapaport. *J. Am. Med. Assoc.* **114**, 386-93(1940).—Skin lesions consisting of horny papules formed by keratotic plugs projecting from hair follicles are reported as signs of vitamin A deficiency in children. Improvement follows daily dosage with 100,000-300,000 units of vitamin A. Numerous references are cited. F. P. Griffiths

Vitamin A in the blood of normal adults. Grace Steininger, Lydia J. Roberts and Sadie Brenner. *J. Am. Med. Assoc.* **113**, 2381-7(1939).—The amt. of vitamin A and carotene was detd. in the blood of 1 control and 4 exptl. subjects during a four-month depletion study. The amt. of vitamin A in the blood was dependent on the amt. in the diet. There was no correlation between the vitamin A in the blood and the biophotometer readings. F. P. Griffiths

Nicotinic acid in the cure of pellagra. F. Mancini, M. Della Corte and V. Leone. *Quaderni nutriz.* **6**, 374-93 (1939).—A study was made of clinical cases. The intravenous or intramuscular injections were most favorable therapeutically. Helen Lee Gruehl

Biological activity of oxidized ascorbic acid (dehydroascorbic acid). Renzo Vendramini and Livio Olivetti. *Quaderni nutriz.* **6**, 394-406(1939).—Aq. solns. of ascorbic acid aerated for 24 hrs. diminish in titer chemically but retain their biol. antiscorbutic activity. H. L. G.

Method of introduction of ascorbic acid. Renzo Vendramini and Livio Olivetti. *Quaderni nutriz.* **6**, 407-24 (1939).—In guinea pigs intramuscular introduction of ascorbic acid proved best in combating exptl. scurvy. Helen Lee Gruehl

Plants and vitamins. I. Vitamin C and plant enzymes. M. A. Gudlet. *Botan. Zhur.* **23**, No. 3, 237-51(1938); *Khim. Referat. Zhur.* **2**, No. 5, 52(1939).—A summary of chem. properties and transformations of ascorbic acid. W. R. Henn

Vitamin E. F. Gstirner. *Chem.-Ztg.* **64**, 45-7(1940). —A review of occurrence, constitution, synthesis and therapeutic use. E. H.

The significance of the "trace elements" in nutrition. E. J. Underwood. *Nutrition Abstracts & Revs.* **9**, 515-34(1940).—A review. E. H.

Concentration of pyruvic acid in normal and avitaminotic blood. Hans v. Euler and Bertil Hogberg. *Naturwissenschaften* **27**, 769-70(1939).—Lack of vitamin B_1 causes an increase in pyruvic acid concn. of the blood and of the brain due to the normal decompn. of the acid by pyruvic acid apodehydrase with phosphorylated vitamin B_1 as coenzyme. Appreciable increases in pyruvic acid content for rats on a vitamin B_1-free diet follow: normal blood 12-13 γ per cc., after 12 days without vitamin B_1 25-7 γ, after 20 days 34 γ, in some cases as high as 43-5 γ. A similar increase in pyruvic acid content of blood also occurs in the presence of normally ample amts. of vitamin B_1 (30% fresh bakers' yeast in the diet) if vitamin A is absent. After 12 days of vitamin A-free diet there is 42 γ per cc. blood, after 20 days 60 γ per cc. Avitaminosis D does not affect the pyruvic acid content. Addn. of β-carotene to the diet again reduces the pyruvic acid concn. of the blood. Addn. of a daily addnl. dose of 1 g. fresh bakers' yeast to a normal rat diet low in vitamin A also reduces the pyruvic acid content. Hence in the absence of vitamin A more than the usual amt. of vitamin B_1 is required. It is suggested that besides the oxidation-reduction effects of vitamin A its effect on the condition of the mucous membranes may be significant as it affects the vitamin B_1 resorption rate. B. J. C. v. d. H.

Tissue changes in ascorbic acid-deficient guinea pigs. D. L. MacLean, M. Sheppard and E. W. McHenry. *Brit. J. Exptl. Path.* **20**, 451-7(1939).—Tissue changes resulting from an acute deficiency of ascorbic acid in guinea pigs, studied by the paired feeding technique so that the variable factor of inanition may be controlled, show that the principal abnormalities are in the bones and teeth. In both these cases the vitamin deficiency causes a failure in those sp. cells which are concerned with the formation of calcific tissue. There is no evidence to support the view that the changes are the result of the failure of specialized cells to secrete some substance which normally produces jellying of collagenous material. Characteristic changes in other tissues have not been obtained. The inanition coincident with the development of ascorbic acid deficiency is not responsible for any of the observed histological changes. Harriet F. Holmes

The glutathione content of the blood and certain organs in experimental scurvy. L. D. Kashevnik, S. A. Eidman and I. B. Fridlyand. *Voprosy Pitaniya* **8**, No. 4, 44-9 (1939).—Experimental scurvy in guinea pigs results in a decrease from 40 to 33 mg. % in reduced glutathione (I) and an increase from 5 to 11 mg. % in oxidized I in the blood. There is an increase in reduced I in the liver and kidneys, with occasional slight increases in oxidized I. There is a decrease in both reduced and oxidized I in the adrenals. S. A. Karjala

Ocular manifestations of ariboflavinosis. H. D. Kruse, V. P. Sydenstricker, W. H. Sebrell and H. M. Clecklev. *U. S. Pub. Health Repts.* **55**, 157-69(1940).—Seven references. J. A. Kennedy

Nature of vitamin B and its components with special reference to nerve deafness. Clarence A. Veasey, Jr. *Arch. Otolaryngol.* **31**, 74-93(1940).—The literature on vitamin B is reviewed up to Jan., 1938, including a discussion of the chem. nature and physiol. effects of the various fractions, the clinical symptoms of deficiency, the various units employed, the natural sources and the human requirements. V. found it impossible to formulate a definite clinical syndrome for mild vitamin B deficiency and found no lab. procedure for the detn. of vitamin B applicable to ordinary clinical practice. Seven cases of deafness were treated by vitamin B. The results vary, but suggest that there is a possibility that vitamin B therapy may help some deaf persons. D. A. Meyer

Behavior of glycogen and lipides under various nutritional states. Korenori Ono. *J. Biochem.* (Japan) **30**, 351-75(1939).—Male albino rats were fed a basal diet of unpolished rice and vegetables. A synthetic vitamin B-free diet was also fed, and various animal groups were either on high-protein, high-fat, high-carbohydrate or high-cholesterol addns. Liver, muscles and adrenals were analyzed for glycogen, neutral fat, phosphatide and cholesterol. The liver made up 3.5-4.0% of the total body wt. The liver glycogen of the non-fasting rat was, on the av., 3.53% (2.83-4.17%), phosphatide 3.58% (3.53-3.65%), free cholesterol 215 mg. % and bound cholesterol 38 mg. % (av.). For muscles the av. values were: glycogen 0.739, phosphatide 0.92, total cholesterol 0.066, of which 0.063% was free. Vitamin B deficiency causes a large decrease in liver glycogen and lipides, but the muscle glycogen remains unaffected. The muscle cholesterol increases but the neutral fat content is considerably diminished. The high-protein diet causes a decrease in liver glycogen and neutral fat, but affects the muscles to a negligible extent. On the high-fat diet there is a striking increase in the neutral fat and cholesterol (free and bound) content of the liver. The increase in the muscles is not as large. A high-carbohydrate diet results in a slight increase in glycogen and total lipides of both liver and muscles. The changes in the adrenals are not appreciable. The addn. of cholesterol to the diet does not seem to influence the glycogen but causes an increase

in total lipide content which, in the liver, is very large, including both the cholesterol (chiefly bound) and neutral fat but not the phosphatide. In the muscles the changes are not very significant. In the adrenals cholesterol feeding occasions only a marked rise in the bound cholesterol. S. Morgulis

Mode of action of calciferol in the nephrectomized rat. W. R. Tweedy, R. D. Templeton, Mary C. Patras and F. A. McJunkin. *Endocrinology* **26**, 481–4(1940); cf. *C. A.* **33**, 5037[6].—The subcutaneous administration of massive doses of calciferol prevents the fall in serum Ca which usually occurs after thyroparathyroidectomy in the nephrectomized rat. Calciferol produces no effect on the serum Ca of the nephrectomized rat that is thyroparathyroidectomized 1 week prior to nephrectomy. The action of calciferol is on the bowel where it decreases the fecal excretion of Ca. Felix Saunders 2

Relationship of vitamin E (tocopherols) to the endocrine system. J. C. Drummond, R. L. Noble and Margaret D. Wright. *J. Endocrinol.* **1**, 275–86(1939).—Vitamin E when administered to immature or hypophysectomized adult rats does not exert any effect on the ovaries, uterus or vagina. The pituitary glands of E-deficient male rats contain an increased amt. of gonadotropic hormone. Glands from E-deficient female rats show a decreased amt. of luteinizing hormone when tested on hypophysectomized rats. The ovaries of E-deficient female rats respond normally to exts. of pregnant mare serum. In E-deficient male rats such exts. produce only stimulation of the interstitial cells of the testes and do not affect the degenerated tubules. Hypophysectomy of E-deficient male animals is followed by a further decline in wt. of the testes. In such animals pregnant mare serum stimulates only the interstitial elements of the testes. The suggestion that the effects of vitamin E deficiency are produced by hormonal imbalance is not supported by the exptl. evidence. Felix Saunders 3 4

On "**a new color reaction for vitamin B_1 (thiamine, aneurin).**" Guy E. Youngburg. *Science* **90**, 566 (1939); cf. *C. A.* **33**, 8664[9]. —Thiamine does not give a blue color by the Fiske and Subbarow method (*C. A.* **20**, 1092) nor by the $SnCl_2$ reduction. Thiamine does not interfere in P detns. Felix Saunders

Availability of the iron in dried peas and beans. Leah Ascham, Mary Spiers and Dorothy Maddox. *Science* **90**, 596–7(1939); cf. *C. A.* **33**, 1015[4].—Fe in black-eyed peas, green and yellow split peas, navy beans, pinto beans and butter beans is completely available to the nutritionally anemic rat for the regeneration of hemoglobin. Felix Saunders 6

Defect in the metabolism of aromatic amino acids in premature infants: the role of vitamin C. S. Z. Levine, Eleanor Marples and H. H. Gordon. *Science* **90**, 620–1 (1939).—A no. of premature infants were found to excrete in the urine substances giving a pos. Millon reaction. *l,p*-Hydroxyphenyllactic acid was isolated and the presence of *p*-hydroxyphenylpyruvic acid strongly indicated. These substances are absent from the urine of premature infants receiving human milk, while their excretion is increased by feeding phenylalanine or tyrosine. When vitamin C is added to the diet there is a prompt decline almost to 0 of the excretion of these compds. F. S. 7

Theory of protein metabolism: transformation of proteins. Carl L. A. Schmidt, Frank Worthington Allen and Harold Traver. *Science* **91**, 18–19(1940).—Synthesis of proteins can take place in the body by the transformation of existing proteins into others without first being broken down into amino acids. Felix Saunders 8

Vitamin K. E. A. Doisy, S. B. Binkley, S. A. Thayer and R. W. McKee. *Science* **91**, 58–62(1940).—A historical review of the work on vitamin K of the last decade. The distribution, methods of assay, isolation, structure and physiol. properties are discussed. Felix Saunders 9

Effects of a beef-liver fraction on fat synthesis in rats. E. W. McHenry and Gertrude Gavin. *Science* **91**, 171 (1940).—Beef liver contains a substance that markedly stimulates fat synthesis when fed to vitamin B-deficient rats. The total cholesterol of the liver is also increased. The fatty liver thus produced is highly resistant to the lipotropic action of choline but readily responds to lipocaic. A rapid means of assaying the potency of prepns. of *lipocaic* is thus available. Felix Saunders 1

The physicochemical state of calcium in the serum of the ruminant. Santosh Chandra Ray. *Biochem. J.* **33**, 1599–1605(1939).—Sheep fed a P-deficient diet showed an increase in serum Ca and a decrease in inorg. P. This condition was reversed when P was restored to the diet, the fall in the Ca being due chiefly to a decrease in the Ca ion and protein-bound Ca. Addn. of $CaCO_3$ at this point caused a marked reduction in the serum inorg. P. Starvation reduced the total serum Ca, chiefly the Ca ion and protein-bound Ca, and increased the inorg. P. Sheep and goats showed this response to a greater extent than cows. The unreliability of the const. relating serum Ca and serum protein derived by application of the McLean-Hastings mass law equation (*C. A.* **29**, 2217[1]) was pointed out. E. W. Scott

Criticism of Shute's serum test for vitamin E deficiency. W. F. J. Cuthbertson and J. C. Drummond. *Biochem. J.* **33**, 1621–5(1939); cf. Shute, *C. A.* **33**, 6891[2].—Contrary to S.'s results, it was not possible to differentiate between the serum of normal and vitamin E-deficient rats by measuring the rate of proteolysis since there was no difference in rate. Theelin when added to normal serum did not affect the rate of proteolysis. E. W. Scott

Thyroxine and hypervitaminosis A. Carl A. Baumann and Thomas Moore. *Biochem. J.* **33**, 1639–44(1939).—Thyroxine failed to counteract the effects of feeding rats excess vitamin A. Animals receiving both thyroxine and an excess of vitamin A ate less, lost wt. rapidly and died earlier than those receiving either compd. alone. The injection of thyroxine produced a temporary decrease in food intake, followed by a marked increase. No evidence was obtained for a sp. antagonism between thyroxine and vitamin A. E. W. Scott 5

The retention of calcium by the rat in the presence and absence of vitamin C. Kathleen M. Henry and Stanislaw K. Kon. *Biochem. J.* **33**, 1652–4(1939); cf. *C. A.* **33**, 5905[2]. —The addn. of 2 mg. daily of ascorbic acid had no effect on the retention of Ca by rats receiving a diet low in Ca, adequate in P and devoid of vitamin C. The Ca was mainly derived from $CaHPO_4.2H_2O$. E. W. S.

Phytic acid and the rickets-producing action of cereals. Douglas C. Harrison and Edward Mellanby. *Biochem. J.* **33**, 1660–79(1939). —In expts. designed to det. the constituent of oatmeal responsible for its rickets-producing effect, it was found that phytic acid (I) and neutral Na phytate (II) prepd. from com. phytin were very active in producing rickets when they were added to a non-rachitogenic or slightly rachitogenic diet; the degree of activity was roughly comparable to that shown by oatmeal when fed in an amt. equiv. as regards phytic acid P; the phytic acid P fraction extd. from the oatmeal itself had the same activity and purified II from this ext. was equally potent; the rachitogenic activity of II, as of cereals, was counteracted by adding extra Ca to the diet and com. phytin (Ca Mg phytate) was slightly antirachitic. The results suggest that the rachitogenic action of cereals is normally due to the action of the cereal I in inhibiting the absorption of Ca and not to the unavailability of the cereal P. The amt. of I in oatmeal was approx. twice that required to ppt. the Ca of the cereal at neutrality and it is likely that I inhibits the absorption of Ca from other sources in addn. to the cereal Ca. E. W. Scott

Sex variation in the utilization of iron by anemic rats. Louise Otis and Margaret C. Smith. *Science* **91**, 146–7 (1940); cf. *C. A.* **31**, 7494[8].—At the end of an Fe-depletion period the total Fe contents of male and female rats were 0.7065 and 0.8073 mg. Fe, resp., or 0.015 mg. per g. of rat for both. After feeding $FeCl_3$ supplements to anemic rats the mg. Fe per g. of rat was higher for females than for males comparably fed. At the lowest levels of Fe fed (50 γ daily for 6 weeks) the females retained more total Fe (3.3083 mg.) than the males (2.3666 mg.) in spite of their smaller size. D. S. Searle

The concentration of vitamin D in the blood of dairy

cattle as compared with the potency of the milk produced. G. C. Wallis. *Proc. S. Dakota Acad. Sci.* **19**, 55-60 (1939).—Holstein and Jersey cattle were compared. Both breeds were given 7500 international units of vitamin D daily during the lactation period. The amts. of vitamin D in blood samples were the same for the 2 breeds and so were the concns. in butterfat. However, the Jersey breed produces more butterfat and consequently the total amt. of vitamin D produced by that breed is also high. Walter H. Seegers

Comparative studies between Kaschin-Beck disease produced by excess feeding of iron and osteopathia acidosa produced by excess feeding of sucrose. Kuninosuke Hotta. *J. Oriental Med.* **31**, 1191-7(German abstr. 78) (1939).—Young rabbits fed a normal diet plus 1 cc. daily of water contg. 0.4 g. Fe per 100 cc. for 2 weeks grow normally, but gradually blood acidosis is produced and their blood contains excess Fe and extremital bones show osteopathia acidosa. Those fed a normal diet plus excessive sucrose show the same pathol. symptoms. The excessive intake of Fe *per se* cannot be the cause of Kaschin-Beck disease, since the similar feeding plus $CaCl_2$ that produces blood alkalosis lessens pathol. symptoms, in spite of the fact that the blood Fe is high. S. Tashiro

Effects of changes in dietary calcium on neuromuscular transmission. G. L. Brown and A. M. Harvey. *J. Physiol.* **97**, 330-7(1940). A kid, kept on a diet deficient in Ca, showed a defect in neuromuscular transmission, such that a single max. motor nerve volley failed to elicit a max. response from the muscle. With repeated stimulation, at a sufficiently high frequency, each successive response of the muscle became greater until transmission was fully restored at the 5th or 6th response. Chicks on a similar diet reacted in the same way. A diet rich in Ca did not eliminate the normal peculiarity in neuromuscular transmission in the fowl. E. D. Walter

Calcium and synaptic transmission in a sympathetic ganglion. A. M. Harvey and F. C. MacIntosh. *J. Physiol.* **97**, 408-16(1940); cf. preceding abstr. The effects of changes in ionic equil. on synaptic transmission and the activity of ganglion cells were studied in the perfused superior cervical ganglion of the cat. When Ca is absent, there is no release of acetylcholine from the preganglionic nerve endings, either during stimulation of the sympathetic trunk or following the injection of K salts. E. D. Walter

Effects of increased metabolism on ketosis of depancreatized dogs. S. B. Barker. *J. Physiol.* **97**, 394-407 (1940).—The depancreatized dog in the early stages of fasting was used in a study of the production of ketone bodies from fat, in order to eliminate antiketogenic factors. In a series of 3-hr. basal periods with 17 depancreatized dogs, the excretion of acetone bodies was about 10% of the amt. calcd. on the basis of one 4-C residue from each fat acid oxidized. In 80% of the expts., the ketone excretion was less than that which could be derived theoretically from the protein being broken down. In 18 exercise expts. the excretion of acetone bodies decreased in 4, despite the increased oxidation of fat shown by the respiratory exchange. In the rest, the increased excretion of ketone bodies could not be correlated with calcd. yields. In 8 of 11 expts. in which dinitrophenol was used, the excretion of ketone bodies either decreased or was unchanged. The extra acetone obtained in the other 3 was but a small fraction of the calcd. amt. E. D. Walter

Seasonal variation in Co content of North Island pastures (McNaught, Paul) **15**. Cyclization of vitamin A_2 (Embree, Shantz) **10**.

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F—PHYSIOLOGY

HOMER W. SMITH

Normal and pathologic muscle fat. Attilio Basile. *Arch. ist. biochim. ital.* **11**, 207-28(1939).—Fat deposition in muscles was studied under a variety of conditions. Lipoid was deposited in the disks of sarcolema, and sometimes caused disappearance of the normal structure, especially after infections produced by *B. diphtheria, B. typhosus, B. coli* and P and As intoxications. E. S. G. Barron

Crystallization of prolan. Pablo Heredia. *Rev. med. cienc. afines* (Buenos Aires) **1**, No. 8, 39-40(1939).—Preliminary observations. E. S. G. Barron

Mammogenic hormones of the anterior pituitary. I. The duct growth factor. A. A. Lewis and C. W. Turner. *Missouri Agr. Expt. Sta., Research Bull.* **310**, 3-72 (1939).—The anterior pituitary secretes (1) a duct-stimulating hormone, and (2) a lobule-alveolar system growth hormone. The former is called *mammogen*. An assay technique involving the use of male mice is described. Pituitaries from 545 cattle were used in this study. A low level of mammogen was found in the anterior pituitaries of fetuses, growing males and steers. The mammogen content of beef and dairy anterior pituitaries was low in early and in late pregnancy rising to a peak about the 150th day. Dairy cow pituitaries contained considerably more mammogen than did beef cattle. During the estrus cycle the mammogen content was highest in the luteal stage. Male rabbits given estrone responded with an increase of mammogen to double the content found in pregnant rabbits. When the estrone dosage was excessive, however, no mammogen was secured. Concn. of mammogen to $^1/_{100}$ of the fresh condition was obtained. Exts. of anterior pituitary developed complete mammary duct systems in male and spayed female mice, spayed female rabbits and hypophysectomized ground squirrels. 83 references. C. R. Fellers

Composition of different skeletal parts of experimental animals. C. E. Weakley, Jr., and R. B. Dustman. *W. Virginia Agr. Expt. Sta., Bull.* **294**, 40 pp.(1939); cf. *C. A.* **33**, 7368[3].—The study includes the rat, chick, pig and calf. In general, the deficient feeding resulted in lighter bones of higher moisture and lower ash content. The pig was an exception, though there were ample physiol. evidences of nutritional deficiencies. The moisture to ash ratio is a sensitive measure of change from normal to abnormal in deficiency studies. There is a natural pairing of the leg bones as to moisture and ash content in relation to skeletal position. The femur and humerus are higher in moisture and lower in ash than the tibia and ulna-radius, while these in turn are higher in moisture and lower in ash than the metatarsus and metacarpus. Bones from the Berkshire breed are lower in fat-extractable substance than those of Poland China or Duroc Jersey breeds. Comparisons of ash on a green basis as compared with a fat-free, moisture-free basis show certain advantages for the former, especially when ash is considered in relation to moisture as moisture to ash ratio. The feeding of rachitic rations to chicks and dairy calves resulted in the production of bone and bone marrow fats of a more highly unsatd. nature than those produced on normal rations. The different rations fed to pigs had little effect upon the percentage of Ca, Mg and P in the bones. A study of bilateral variation in the green wt. of the long bones shows a tendency toward heavier bones on the left side in the chick and pig. Moisture and org. non-fat fraction are highest, as a rule, in bones taken from the left side of the body. 21 references. C. R. Fellers

The copper contents of some bovine organs (fetuses, calves and full-grown animals). Jenő Sárosdi. *Közlemények Összehasonlító Élet. Kórtan Köréből* **27**, 225-32 (1940).—Cu was detd. by the method of Schönheimer

id Oshima (cf. *C. A.* **23**, 2477). The Cu content of the arious organs varies between wide limits; liver contains ost and the male sexual glands the least. The av. Cu con- nt of liver of the grown animal was 4.83 mg., of calves .07 mg. and of the fetus 33.45 mg. per 100 g. dry matter.
S. S. de Finály

The cystine content of the proteins of horse blood erum. Gyula Papp. *Közlemények Összehasonlító Élet. órtan Köréből* **27**, 232-9(1940).—Total protein was etd. both gravimetrically and refractometrically; cystine as detd. according to Rimington (*C. A.* **25**, 309). The v. cystine content of the total protein of horse serum was .86% of the dry matter. The av. total protein content of he serum was 7.86%. The protein ratio decreased during mmunization to diphtheria; this is attributed to the in- rease of globulins. The cystine content varied in proteins epd. by $(NH_4)_2SO_4$ from 1.96 to 2.78; in those sepd. by oiling, from 2.86 to 4.35%. No definite connection could e found between cystine content of the single protein ractions and the immunization against diphtheria.
S. S. de Finály

The cystine contents of the hair and skin of some do- nestic animals. Elek Kovács. *Közlemények Összehasonlító Élet. Körtan Köréből* **27**, 239-44(1940). —For the detn. of ystine Rimington's modification (*C. A.* **25**, 309) of the olm-Looney method is well suited. The mean cystine ontents of the skin and hair, resp., are (calcd. to 100 g. lry matter): horse 0.73, 7.58; ox 0.71, 5.17; pig 0.76, 3.53; dog 0.61, 9.03 g. The cystine contents of skin and air vary according to the part of the body. In the same ype of animal no significant differences were observed n the cystine contents of the hair or skin of the same part.
S. S. de Finály

The ascorbic acid of the adrenal medulla and its sup- osed variation with excitation. A. Giroud and N. Santa. *Bull. soc. chim. biol.* **21**, 1312-17(1939).—See *C. A.* **33**, 9903[1]. L. E. Gilson

Potency evaluations of the human chorionic gonado- ropic preparations. Bernard L. Cinberg and Stanley F. Goldman. *Proc. Soc. Exptl. Biol. Med.* **43**, 208-10 (1940).—Numerous samples of com. prepns. of the gonado- ropic principle of human pregnancy urine were tested The relative activity varied greatly. Some brands were nactive. L. E. Gilson

Androgenic effects from percutaneous administration castrate rats. Birdie L. Scott. *Proc. Soc. Exptl. Biol. ed.* **43**, 216-19(1940).—When administered percutane- sly the effectiveness decreased in the order, methyl- stosterone, testosterone, testosterone propionate. Tegin se cream was a more effective vehicle than lanolin.
L. E. Gilson

Pathways of enzymes into the blood in acute damage of e pancreas. H. L. Popper and H. Necheles. *Proc. Soc. xptl. Biol. Med.* **43**, 220-2(1940).—The concns. of ylase and lipase in peripheral venous blood, portal ood and thoracic duct lymph are equal in fasting anes- etized dogs. An increase in amylase in the blood often pears 5 10 min. after damage of the pancreas by in- tion of dog bile into the pancreatic duct and ligation. his increase is due mainly to inflow of pancreatic enzymes to the general circulation by way of the portal vein and a smaller extent by way of the lymph of the thoracic ct. L. E. Gilson

The present status of lipocaic. Lester R. Dragstedt. *Am. Med. Assoc.* **114**, 29-32(1940).—The demonstra- on that lipocaic is an internal secretion of the pancreas pends on the recognition that the depancreatized dog is restored to a normal state when fed an adequate diet insulin and pancreatic juice unless raw pancreas is fed. Exts. of pancreas have been prepd. which are ive in doses of 60 to 100 mg. Certain types of fatty eration of the liver may be relieved by lipocaic but by insulin. F. P. Griffiths

study of false Friedman tests for pregnancy. Law- M. Randall, Thomas B. Magath and F. Norman ch. *J. Am. Med. Assoc.* **114**, 471-4(1940).—Re- of the clinical conditions which may lead to a false result from the use of this test. Cf. *Am. J. Abstet. Gyne- col.* **21**, 405-10(1931). F. P. Griffiths

The antihormones. J. B. Collip, H. Selye and D. L. Thomson. *Biol. Rev. Cambridge Phil. Soc.* **15**, 1-34 (1940).—A review. E. H.

The quantity of water circulating in the blood plasma. Julien Fliederbaum. *Arch. maladies coeur vaisseaux* **32**, 893-9(1939).—The amt. of water circulating in the blood plasma in dogs is not affected by anemia or ingestion of Na_2CO_3; it is not uniformly affected by injection of digitalis; it is increased by ingestion of water or intrave- nous injection of hypertonic glucose soln., camphor in Na salicylate soln., coramine, corpuline, stiminol, cardiasol or mercurial diuretics (novasurnol and salyrgan); it is de- creased by ingestion of NH_4Cl, subcutaneous injection of morphine with or without ether anesthesia, or intravenous injection of distd. water, chloralose, strophanthin or urea; and it is decreased and then increased by hemorrhage or intravenous injection of euphylline Marion Horn

The bile-secreting function of the liver. S. M. Gorsh- kova. *Arch. sci. biol.* (U. S. S. R.) **54**, No. 2, 22-36 (in English, 36)(1939). —Fistulas were inserted in the gall bladders of dogs in such a way as to keep the bile-secreting system of the liver intact. The latent period of bile secre- tion was found to be considerably shorter than previous expts. had indicated, being 8, 12, 3 and 5 min., resp., for meat, bread, milk and egg yolk. It was also found to be inversely proportional to the hydrostatic condition of the bile-secreting app. of the liver. When the bladder was artificially filled the latent period of secretion was shortened. A division of this period is suggested into a true latent period of excitation and a period of latent activity of the bile-secreting app. Evacuation is also de- pendent upon the hydrostatic condition of the entire sys- tem, and discharge of bile into the intestine can be com- pletely inhibited by the use of an open gall bladder fistula. Food stimulates evacuation and also the secretion of bile- expelling stimulants. S. A. Karjala

Motor function of the gall bladder in man. I. T. Kurt- sin. *Arch. sci. biol.* (U. S. S. R.) **54**, No. 2, 37-52(in English, 52)(1939).—The administration of meat, bread, milk, egg yolk, butter, cranberry juice, HCl and $MgSO_4$ to human beings with gall bladder fistulas produces energetic contraction of the gall bladder. The length of the latent period of passage of bile into the duodenum in man after food consumption is exceedingly short. It is suggested that the mechanism regulating the motor activity of the gall bladder in man involves, besides the vagus and sympathetics, a specific hormone which stimulates the activity of the gall bladder and which is the principal "evacuation motor" of the bile. S. A. Karjala

Bile formation in man. V. M. Shaverin. *Arch. sci. biol.* (U. S. S. R.) **54**, No. 2, 53-64(in English, 64)(1939). —Bile secretion was studied in a patient with a gall bladder fistula. Studies during the course of a day showed a gradual bleaching in the color of the bile to the crest of digestion, at which point the bladder contents were color- less. Administration of H_2O and physiol. saline soln. caused a large increase in bile secretion, with tea, coffee, bouillon and cabbage juice giving a less pronounced effect. Meat, butter, egg yolk and milk caused decolorization of the bile. Bile and HCl did not cause an increase in bile secretion, but the intravenous injection of Na glyco- cholate caused a strong increase. S. A. Karjala

The nature of "mechanical" secretion of the stomach in man. I. T. Kurtsin. *Arch. sci. biol.* (U. S. S. R.) **54**, No. 3, 74-88(in English, 88)(1939).—The action of a mech. stimulus (distended rubber balloon) upon the re- ceptors of the gastric walls produces an increased gastric secretion at first in the minor and later in the major curva- ture of the stomach. The Heidenhain pouch does not respond when isolated. Secretion is stopped by administra- tion of atropine. Mech. stimulation is assocd. with an inhibition of the conditioned-reflex secretion of saliva and an increase in nonconditioned-reflex secretion.
S. A. Karjala

The effect of lung ventilation on gaseous exchange in the quiescent state. V. B. Liberman, R. P. Ol'nyanskaya,

A. D. Slonim and V. N. Gus'kova. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 2, 32–43(in English, 43)(1939).—The amt. of O uptake per l. of excessive ventilation during voluntary hyperventilation varies from 3.3 to 11.3 cc. depending upon the amt. of hyperventilation and rhythm. The max. is obtained at 16 l. and 5 inhalations/min. The ratio of exhaled CO_2 to O consumption showed wide variations, but no regularities were noted. In involuntary hyperventilation (inclusion of a tube in front of the respiratory valve) this ratio remained const. at various hyperventilation values while the O consumption per l. of excessive ventilation decreased slightly. S. A. K. 1

The morphology of distribution and transformation of glycogen. V. Gradient of glycogen accumulation as an index of the histochemical architectonics of the sensory ganglia. A. L. Shabadash. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 146–50(1939)(in English); cf. *C. A.* **34**, 4949.—Cells are divided into 3 classes with regard to glycogen (I) content: A cells (those that have large amts. of I and stain a dark crimson-violet), B cells (those that have medium amts. of I and stain a transparent pink-lilac) and C cells (contg. little or no I). A count of the cells of the ganglion of a kitten showed that of 2886 cells, 654 were A, 877 B and 1335 C cells; so 53.49% of the cells contained I. In the same ganglion the cell sizes were divided into type I (large cells of 45–65 μ and larger), type II (medium cells of 25–40 μ) and type III (small cells of 13–20 μ). The 3 types represented 38.35, 50.31 and 11.34%, resp., of the total. The no. of cells in each type which contained I were 89.35, 35.03 and 17.53% for types I, II and III, resp. Thus the capacity to synthesize and accumulate I is limited to a definite category of the unipolar cells, or the ratio of assimilation to glycogenolysis in the different types of cells varies considerably. S. A. Karjala 2 3 4

The influence of the adrenal hormones on the glutathione content of muscle. V. S. Il'in. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 154–6(1939)(in German).—The contents of total and reduced glutathione (I) in the blood, liver, kidney and muscles of normal cats are 31.1 and 35.5, 242 and 265, 122 and 139, and 31.1 and 33.1 mg.%, resp. In adrenalectomized cats the values are 34.5 and 40.5, 258 and 281, 139 and 168 and 40.5 and 43.0 mg. %, resp., and in cats in which one gland is removed with the adrenal medulla of the other the values are 32.1 and 35.4, 262 and 302, 133 and 178 and 20.8 and 22.2 mg. %, resp. The injection of adrenaline (II) into normal cats does not increase the I content of the muscles, but in the case of cats in which the adrenal medulla is removed the reduced and total I values of 22.7 and 23.6 mg. %, resp., increase to 28.3 and 30.3 mg. %, resp., after injection of II. Conclusion: The I content of muscles is regulated by the adrenal hormones, the cortex hormone decreasing I and the medullary hormone increasing I in the muscles. S. A. Karjala 5 6 7

The effect of age on the passage of bile into the intestine. A. Vorob'ev. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 251–4(1939)(in French).—Bile secretion in young dogs reaches a max. 1 hr. after intake of foods and then decreases slowly. The duration of secretion is much longer in young dogs than in old ones, while the latent period is considerably shorter. S. A. Karjala 8

The dynamics of increase in the gonadotropic activity of the anterior pituitary in pig embryos L. N. Daineko. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 301–4(1939)(in English); cf. *C. A.* **34**, 4956. The amts. of gonadotropic hormone in mouse units in 1 g. of the anterior pituitary gland of pig embryos aged 2.5–3, 3, 3.5 and 4 months and in adult pigs were 29, 50–91, 80–140, 200 and 200 units, resp. S. A. Karjala 9

Change in current fluctuation of the pancreas. Bun-iti Hasama. *Z. Biol.* **99**, 541–50(1939).—Rabbits show 2 kinds of current fluctuation corresponding to the 2 functions of the pancreas: (1) The action current of the excretory cells which accompanies increased secretion of pancreatic juice and fails when secretion is stopped by ligature of the duct; (2) that which accompanies increased blood sugar is independent of secretion of pancreatic juice and is an indication of the action current of the island of Reil. The former is produced by stimulation of the vagus, stimulation of the splanchnic or injection of secretin; the latter results from increased blood sugar. Both types of current fluctuation appear simultaneously when the right vagus is stimulated or adrenaline injected. Frances Krasnow

The comparative behavior of mammalian eggs in vivo and in vitro. V. Effects of mitosis-inhibiting treatments on normally fertilized pre-cleavage rabbit eggs. Gregory Pincus and C. H. Waddington. *J. Heredity* **30**, 515–18(1939); cf. *C. A.* **32**, 3002⁹.—Dil. solns. of alc., ether and colchicine, or brief exposures to subnormal temp. inhibit the normal cleavage rate of fertilized rabbit ova *in vitro*. *Colchicine* not only prevents spindle formation and cytoplasmic cleavage but also inhibits the normal movements of the pronuclei. T. Laanes

The dephosphorylation of 2,3-diphosphoglyceric acid in hemolyzed red blood corpuscles of the horse. Åke Lennerstrand and Margit Lennerstrand. *Arkiv Kemi, Mineral. Geol.* **13B**, No. 15, 5 pp.(1939)(in English).—A small part of the diphosphoglyceric acid (I) of the hemolyzate was broken down in 22 hrs., but it was practically unchanged during that time when phosphate buffer, pH 7.4, was present. Mg and adenylic acid accelerate the breakdown. In the presence of fluoride the breakdown is inhibited and I increases, probably as the result of phosphorylation and transformation of carbohydrates since iodoacetate prevents this increase. Iodoacetate partially inhibits the dephosphorylation. The following scheme is suggested: I → monophosphoglyceric acid (II); II → phosphopyruvic acid (III); III + adenylic acid → pyruvic acid + adenosinediphosphoric acid. The neg. results of Rapoport and Guest (*C. A.* **33**, 7868¹) with hemolyzed corpuscles can be explained by the destruction of adenylic acid by the adenylic acid phosphatase of the blood. H. L. Mason

Recent work on the physiology of the liver. H. Roger. *Presse méd.* **47**, 1104–6(1939).—A review dealing with the metabolism of glycogen and sugar in relation to the endocrine and nervous system and with the mechanism of urea formation. A. E. Meyer

The liver of the rabbit. León Binet, Claude Rouvillois and Daniel Bargeton. *Presse méd.* **47**, 1157–9(1939).—Ligation of the branches of the portal vein supplying some of the lobes is usually tolerated. The lobes deprived of portal blood undergo atrophy whereas the others show compensatory hypertrophy. The blood sugar remains unaffected, but the degenerating lobes show an immediate loss in glycogen and glutathione. A. E. Meyer

Chemical transmission of impulses and excitability. Paul Chauchard. *Presse méd.* **47**, 1494–5(1939).—A discussion. A. E. Meyer

Prothrombin studies, especially in the newborn. W. E. Bray and Orville R. Kelley. *Am. J. Clin. Path.* **10**, 154–67(1940).—The prothrombin (*P*) time in the newborn is not significantly related to the platelet count. The *P* of cord blood is usually low and it is somewhat lower than that of the infant's blood taken within 24 hrs. after birth. *P* is very variable in the newborn, tending to be within the normal adult range for the 1st day and rising to a peak definitely higher between the 2nd and 5th days, usually becoming normal again after the 5th day. *P* is very high in hemorrhagic disease of the newborn, and it may be high without any tendency to bleeding. There was no tendency to bleeding in cases with a low *P*. John T. Myers

Blood cytology of the normal dog. M. L. Morris, James B. Allison and David F. Green. *J. Lab. Clin. Med.* **25**, 353–60(1940).—From a group of 1000 dogs under routine hospital conditions, 66 dogs of different ages, breeds and sexes were selected for the study. The no. of red blood cells (RBC) and the concn. of hemoglobin (Hb) increase from 2 months of age to puberty (8 months) in a majority of the breeds. The av. values of the RBC count and the Hb concn. of 35 young dogs within this age range are 5.3 millions per cu. mm. and 12.6 g. per 100 cc., resp.; for 31 older dogs the av. values of these constituents are 6 million and 15.1 g. The av. corpuscular Hb (Hb concn./no. of RBC) is equal to approx. 24×10^{-12} g. and there is no

marked effect of age, breed or sex upon this value. The Hb concn. in the adult dogs was not influenced by the breed or sex. The av. white cell count in the young dogs is slightly higher than that in the adult dogs (12,165 and 11,467 per cu. mm., resp.). The av. differential counts for both groups are given. Howard W. Robinson

Aneurin excretion after injection of cocarboxylase. H. G. K. Westenbrink and J. Goudsmit. *Arch. néerland. physiol.* **24**, 305–9(1939).—The rat kidney does not excrete cocarboxylase. Even when 250 γ of cocarboxylase is injected into a 150-g. rat all the vitamin B_1 excreted is in the form of free thiamine. The same type of excretion probably holds for all mammals. Felix Saunders

Antigonadotropic hormones in normal human blood serum. Marvel-Dare Fellows. *Endocrinology* **26**, 369–76 (1940).—Normal human blood serum taken during various stages of the menstrual cycle and injected into immature female white rats failed to produce any activation or inhibition of the growth of the ovaries. An aq. ext. of human anterior lobe powder exerted a marked gonadotropic effect when given in small doses over a period of several days. The best response was obtained with 0.8 cc. of the ext. when given in 8 equal doses injected twice daily. There is no evidence that human blood serum normally contains a substance which exerts an inhibitory effect on human anterior pituitary ext. when both are injected simultaneously. Felix Saunders

Effects of testosterone propionate on epiphyseal closure, sodium and chloride balance and on sperm counts. E. Perry McCullagh and F. J. McGurl. *Endocrinology* **26**, 377–84(1940).—The findings of Kenyon, *et al.* (*C. A.* **32**, 7987[6]) were confirmed. The demonstration of an increase in the rate of epiphyseal maturity beyond normal suggests that dwarfing might be produced by large doses of testosterone. Sperm production decreased. Felix Saunders

Effect of testosterone on the monkey uterus and the administration of steroidal hormones in the form of Deansly-Parkes pellets. Carl G. Hartman. *Endocrinology* **26**, 449–71(1940).—The absorption of a properly made pellet can be regulated so as to approach the physiol. The method is especially applicable where small amts. of hormone over long periods of time are desired. In monkeys a progestational endometrium was never attained with testosterone alone or in combination with estrogens. No evidence was found for any antagonistic action of testosterone either to estrogen or progesterone when concomitantly injected with one or both of these ovarian hormones. The action of testosterone on the sex skin is distinctly estrogenic, i. e., antagonistic to progesterone. Testosterone is able to maintain an endometrium already built up by estrogen. Felix Saunders

Effect of the thyrotropic principle of the anterior pituitary on the thyroid of the undernourished guinea pig. D. J. Stephens. *Endocrinology* **26**, 485–92(1940).—The use of the undernourished guinea pig may increase the sensitivity of present methods for the detection and estn. of small amts. of the thyrotropic hypophyseal principle. Felix Saunders

Effect of normal male urine extract on immature female cats. W. F. Starkey and J. H. Leathem. *Endocrinology* **26**, 499–502(1940).—Injection of an ext. of male urine into immature female cats increases ovarian wt. as much as 8-fold. After treatment for 11 days only follicle stimulation is observed but extended treatment results in the formation of corpora lutea atretica. An estrus or pseudopregnant endometrium develops in assocn. with the state of the ovary. Felix Saunders

Liver growth in rats treated with anterior pituitary growth hormone. Milton Lee and Wm. Freeman. *Endocrinology* **26**, 493–8(1940).—The av. liver wt., ratio of liver wt. to body wt. and total no. of hepatic cells were significantly greater in rats treated with anterior pituitary growth ext. as compared with controls. The no. of cells per g. of fresh liver was the same in the 2 groups. Under the influence of the growth hormone the liver responds with a true hyperplasia with all the structural elements participating equally. Felix Saunders

Spermatogenesis in rats. Eugene Cutuly and Elizabeth C. Cutuly. *Endocrinology* **26**, 503–7(1940).—Spermatogenesis was induced in 34-day-old hypophysectomized rats but not in 29-day-old hypophysectomized animals injected with testosterone propionate. F. S.

Effect of male sex hormone on the developing ovaries of young fowls. E. H. Herrick and Charles H. Lockhart. *Endocrinology* **26**, 508–10(1940).—Young female chicks that receive small doses of testosterone propionate (2.5 mg.) have ovaries slightly smaller than the controls and follicular development is somewhat less than in the controls. Felix Saunders

Precocious copulatory activity induced in male rats by subcutaneous injections of testosterone propionate. Calvin P. Stone. *Endocrinology* **26**, 511–15(1940); cf. *C. A.* **33**, 2575[9].—By daily injections of 0.62 mg. of testosterone propionate into rats on and after the ages of 22–26 days the median age of first copulation was set ahead of that of controls by about 20 days. F. S.

Recovery of testes after androgen-induced inhibition. R. R. Greene and M. W. Burrill. *Endocrinology* **26**, 516–18(1940).—Low doses of testosterone propionate (0.1 mg. daily for 20 days) inhibits testicular growth in young rats. Seven to 10 months after treatment the testes are normal. Felix Saunders

Preparation of the gonadotropic hormone from the anterior pituitary of the sow. C. Arthur Elden and M.-D. Fellows Nutting. *Endocrinology* **26**, 526–7(1940).—A method of prepg. a purified gonadotropic hormone from the anterior lobe of the pituitary of the sow by pptn. with dioxane at pH 7.1–7.3 is described. One unit of the hormone thus prepd. weighs 0.56 mg. F. S.

Hormone content of human tissues in pregnancy. Frederic Parker, Jr., and Benjamin Tenney, Jr. *Endocrinology* **26**, 527–9(1940).—Prolan is found in placenta, maternal blood and urine in approx. equal amts. It is not found in fetal organs, fetal blood or amniotic fluid in normal pregnancy. It is not found in maternal organs during pregnancy except in the uterus. Felix Saunders

Estrogens of the fowl. H. W. Marlow and Dan Richert. *Endocrinology* **26**, 531–4(1940).—The yolk from freshly laid eggs contains 5 rat units of estrogenic material per kg. of yolk. Contents of immature ova greater than 10 mm. in diam. contain 44 units per kg. The follicular membranes contain 6 units per kg. of whole immature ova. Whole ovaries contg. follicles less than 6 mm. in diam. contain 37 units per kg. Felix Saunders

Relative effects of progesterone and testosterone propionate upon ovipositor lengthening in the female bitterling. Israel S. Kleiner. *Endocrinology* **26**, 534–5(1940).—Although progesterone causes lengthening of the ovipositor of the female bitterling in greater diln. than does testosterone propionate, this effect is relatively slight as compared with that of the male hormone. Moreover, the max. progesterone action takes place during the first 6–8 hrs. while that of testosterone is observed only in 24–72 hrs. Felix Saunders

Emptying time of the human stomach after administration of progestin. Clark K. Sleeth and Edward J. Van Liere. *Endocrinology* **26**, 535–6(1940).—One Corner unit of progestin (injected intramuscularly) had no effect on the gastric emptying time as detd. fluoroscopically in 4 healthy young males. Felix Saunders

Pituitary mitotic changes after the administration of estrogen and after ovariectomy. W. C. Kuzell and W. C. Cutting. *Endocrinology* **26**, 537–8(1940).—Ovariectomized rats show no consistent evidence of pituitary growth, as indicated by practically unchanged mitotic reactions to colchicine. On the other hand, estrogen-injected rats show a considerable and prolonged pituitary growth. Felix Saunders

Isometric length-tension diagram of isolated skeletal muscle fibers of the frog. Robert W. Ramsey and Sibyl F. Street. *J. Cellular Comp. Physiol.* **15**, 11–34(1940).—The equil. resting tension of stretched single striated muscle fibers of the frog is due to the sarcolemma but the muscle substance itself behaves plastically. F. S.

Conditions determining the selective secretion of dyes

by the isolated frog kidney. Rudolf Höber and Pristilla M. Briscoe-Woolley. *J. Cellular Comp. Physiol.* **15**, 35–46(1940).—The relation between configuration of dye mols. and selective secretion by the proximal tubules of isolated Ringer-perfused frog kidney was detd. Three main groups of dyes were investigated: monoazo, disazo and triphenylmethane. The triphenylmethane dyes, in general, fail to undergo the secretory transport, whereas the azo dyes reappear in the secretion in a concn. higher than the initial one, provided the sulfonate groups of the mol. are arranged in the proper way. Location of the sulfonates on one-half of the elongated, bilateral mols. enables the dye to pass, whereas secretion is prevented if the sulfonic groups are located at the 2 ends of the mol. The formation of a sort of Langmuir film on the cell surface may be the first step in the complex process of secretory transport, the organophilic end of the mol. being attached to the cell surface, the hydrophilic end anchoring at the aq. surroundings. Lipoid soly. favors secretion but is not indispensable. Felix Saunders

Swelling of sexual skin in Rhesus monkeys. A. G Ogston, J. St. L. Philipot and S. Zuckerman. *J. Endocrinol.* **1**, 231–8(1939).—The serum protein, mucoprotein, nonprotein N and chloride content of sexual skin exudate and of serum were compared at different stages of swelling Sexual skin exudate can be regarded as the tissue fluid of the skin when it is swollen. The compn. of the exudate does not vary much with the phase of swelling. The most marked differences from serum are the presence of mucoprotein, the lower concn. of serum-like proteins, higher nonprotein N and higher total chloride. F. S.

Species variation in thyrotropic, gonadotropic and prolactin activities of the anterior hypophyseal tissue. M. R. A. Chance, I. W. Rowlands and F. G. Young. *J. Endocrinol.* **1**, 239 60(1939).—The amts. of thyrotropin, gonadotropin and prolactin in Me_2CO-desiccated anterior pituitary tissue from man, horse, sheep, pig and ox were detd. The greatest amts. of all 3 activities are in pituitaries from pig, man and sheep. Gonadotropic activity, assayed by ability to induce ovulation in the estrus rabbit, is present to a substantial extent in the pituitary tissue from all 5 species examd., but when assayed by capacity to cause ovarian growth in the immature rat, the pituitary glands of man and horse are found to contain large amts., whereas those of the other animals have only slight activity. The van Dyke acid-buffer method (van Dyke and Wallen-Lawrence, *C. A.* **26**, 1968) and the Bates-Riddle alk. aq. alc. method (*C. A.* **30**, 3490[9]) are both satisfactory for the prepn. of exts. with thyrotropic activity. The B.-R. method is satisfactory for the prepn. and purification of prolactin. Aq. alk. extn. or extn. with acid buffer is a satisfactory procedure for the prepn. of exts. with gonadotropic activity. Alk. aq. alc. is greatly inferior to simple aq. alkali for the extn. of gonadotropic substance (ovarian growth assay) from horse pituitary tissue. Felix Saunders

Effects of estrogen and androgen injections on reproductive organs in male rats and mice. Ralph Harsh, M. D. Overholser and L. J. Wells. *J. Endocrinol.* **1**, 261 7 (1939).—Estrogen induces stratified squamous epithelium in ducts of Cowper's glands and seminal vesicles, and in anterior prostates and ducts of immature rats and in seminal vesicle ducts of adult rats. In mice, estrogen administration causes penis extrusion, bladder dilatation, thickening of the submucosa of the intraprostatic part of the vasa deferentia, metaplastic stratification of epithelium in seminal vesicle ducts and anterior prostate and ducts. Testosterone prevents metaplasia in anterior prostates but does not completely suppress other pathol. changes. Felix Saunders

Inadequacy of the vaginal smear in the rat as an index of ovarian dysfunction caused by diet. S. C. Freed, O. Hechter and Samuel Soskin. *J. Endocrinol.* **1**, 268–74 (1939); cf. *Am. J. Physiol.* **123**, 70(1938).—The vaginal mucosa in the rat is not an accurate indicator of complete ovarian function. Under certain dietary conditions normal rats develop vaginal estrus in the presence of uterine diestrus and ovarian atrophy. The rat ovary may elaborate several distinct factors or partial estrogens. The effects of these partial estrogens differ qualitatively and the complete estrus phenomenon is a composite of the several partial effects. Felix Saunders

Uterus masculinus of the rabbit and its reactions to androgens and estrogens. Ruth Deanesly. *J. Endocrinol.* **1**, 300–6(1939).—Small or large quantities of estrogens cause conspicuous growth of the uterus masculinus but the epithelium can only be restored to normal by the administration of Me testosterone or testosterone in relatively large amts. (25–70 mg. in 40 days) transplanted subcutaneously. Felix Saunders

Modification of the effectiveness of gonadotropic extracts. Ruth Deanesly. *J. Endocrinol.* **1**, 307–22(1939).—Groups of immature female rats were used for testing various gonadotropic exts. A study was made of the extent to which the effectiveness of given amts. can be modified by varying the no. of injections, delaying absorption by addn. of inert substances and combining 2 different exts. Felix Saunders

Effect of route of administration on the multiple activities of testosterone and methyltestosterone in different species. C. W. Emmens and A. S. Parkes. *J. Endocrinol.* **1**, 323–31(1939).—Testosterone is much less active by mouth than by injection in tests for androgenic activity in the capon and castrated male rat, in metrotropic tests on spayed rats or immature rabbits and in tests for progesterone-like activity in rabbits. Methyltestosterone, however, is almost as active by mouth as by injection in causing progestational proliferation in rabbits and has a relatively greater activity by mouth in the other tests than has testosterone. When given orally instead of by injection to rats its androgenic activity decreases much less than its power of causing an increase in uterine wt. Methyltestosterone is more potent than testosterone as an androgen in rats, but less potent in capons; it is more potent in the progestational tests whichever route of administration is considered. The 2 substances are about equally active in causing uterine growth in spayed rats and immature rabbits. Felix Saunders

Biological properties of anhydrohydroxyprogesterone (ethinyltestosterone). C. W. Emmens and A. S. Parkes *J. Endocrinol.* **1**, 332–8(1939); cf. *C. A.* **33**, 6938[8]. In the capon comb-growth test, anhydrohydroxyprogesterone (I) shows weak androgenic activity but is equally active by mouth and by injection, having about $^1/_{600}$ the activity of injected testosterone. I, when given in propylene glycol, is equally active by mouth and injection in producing progestational proliferation in rabbits, having about 0.1 the potency of injected progesterone. I produces growth of the uterus of the spayed rat, without previous treatment with estrogen. The effects are very similar to those produced by progesterone in the uterus already primed with estrone. It appears to be more effectively progestational when given orally, although of equal potency by mouth and by injection in increasing uterine wt. I is more active by injection than by mouth in causing cornification of the vagina of the spayed rat or mouse and vaginal opening in the spayed rat. In addn. to its high oral activity in the different tests, I seems to be the only compd. so far described which has progesterone-like, metrotropic, androgenic and estrogenic properties. Felix Saunders

Anterior pituitary fractions and carbohydrate metabolism. I. The preparation and properties of diabetogenic extracts. F. G. Young. *J. Endocrinol.* **1**, 339–55(1939); cf. *C. A.* **34**, 2041[2].—By fractionation at 0° with $(NH_4)_2SO_4$, globulin, pseudoglobulin, euglobulin and albumin fractions were prepd. from ox anterior pituitary tissue. Only the globulin and pseudoglobulin fractions are diabetogenic when injected into normal dogs. The diabetogenic fractions possess thyrotropic, gonadotropic and glucotropic activities, but prepns. with such activities are not necessarily diabetogenic. The gonadotropic, thyrotropic and glucotropic substances are not diabetogenic per se in the intact dog. Exts. with diabetogenic activity possess greater growth-promoting activity than nondiabetogenic fractions. Some chem. properties

of active fractions are described. Dogs made temporarily diabetic by treatment with anterior lobe exts. have less muscle glycogen, about the same amt. of liver glycogen and more liver fat than do normal dogs under similar conditions. An *app.* for continuous filtration is described. F. S.

Rhythmic processes in the living world. A. Jores. *Kolloid-Z.* **89**, 163–4(1939).—The activity of the heart, peristalsis of the intestine, motion of cilia, etc., are examples of rhythmic processes in living organisms. These processes are influenced by many factors such as time, light, temp., barometric pressure or aeration. F. S.

Argument for chemical mediation of nerve impulses. Walter B. Cannon. *Science* **90**, 521–7(1939).—Chem. *vs.* elec. mediation is discussed. Felix Saunders

Mechanism of the biological citric acid synthesis. Nnlo Hallman and P. E. Simola. *Science* **90**, 594–5 (1939).—When 15 mg. of Na pyruvate is incubated with 20 g. minced heart muscle 1.2 mg. citrate is formed, when 30 mg. of Na malate is used 3.1 mg. of citrate is formed, but when the pyruvate and malate are incubated together 25.0 mg. of citrate is formed. The effects of oxaloacetic acid and fumaric acid in heart muscle are equal and distinctly less than that of malic acid. In other tissues oxaloacetic acid produces the best effects. When boiled tissue is used no synthesis of citric acid can be demonstrated. The effect of phosphopyruvic acid is distinctly less than that of pyruvic acid. In heart muscle pyruvic acid is transformed *via* citric acid to a large extent. F. S.

Pseudomethemoglobin and its reaction with carbon monoxide reduction. Georg Barkan and Otto Schales. *Science* **90**, 616(1939); cf. *C. A.* **32**, 5499⁷.—Other workers have found that in normal blood and in oxyhemoglobin solns there are hemoglobin-like compds. which combine with CO only after previous reduction. F. S.

Electrophoretic study of pituitary lactogenic hormone. Choh Hao Li, Wm. R. Lyons and Herbert M. Evans. *Science* **90**, 622–3(1939). A prepn. which caused lactation in normal, virgin, postestrus guinea pigs showed little or no signs of a contaminant when submitted to electrophoresis. The isoelec. point is at pH 5.70. F. S.

Fate of plasma prothrombin. Wm. DeW. Andrus, Jere W. Lord, Jr. and Joseph T. Kauer. *Science* **91**, 18–50(1940). The level of plasma prothrombin in the circulating blood is decreased during its passage through the pulmonary capillaries. The difference is about 10%. In samples of blood taken from the arterial and venous supply of the head, liver, spleen, intestine, kidney and hind limbs, no significant difference in plasma prothrombin levels was found. The loss is not concerned with oxygenation. The prothrombin may be assocd. with the formation of blood platelets. Felix Saunders

State of the inorganic components of human red blood cells. Rebecca Z. Solomon, Pauline M. Hald and John P. Peters. *J. Biol. Chem.* **132**, 723–38(1940).—Hemolysis of blood by repeated freezing or by addn. of saponin decreases the rate of glycolysis and hydrolysis of phosphate esters. When hemolyzed blood was ultrafiltered through cellophane, Na, K and phosphates were not distributed between the H_2O of substrate and ultrafiltrate as if they were restrained only by the Gibbs-Donnan equil. The concn. of inorg. phosphate was higher in the substrate. K was distributed according to the Gibbs-Donnan equil., but Na was more uniformly distributed. In blood hemolyzed by freezing the acid-sol. org. P remained unchanged and nonfiltrable after 18 hrs. at 7°, but was largely changed to inorg. phosphate at 37° and the residual org. P was evenly distributed. In saponin-hemolyzed blood at 7° the org. P was unchanged and evenly distributed. In intact blood at 7° the org. P remained unchanged and nonfiltrable, and at 37° it was largely changed to inorg. phosphate, the residual org. P being nonfiltrable. The implications with respect to the state of these solutes in red blood cells are discussed. D. S. Searle

Origin of urogastrone. C. U. Culmer, J. S. Gray, J. L. Adkison and A. C. Ivy. *Science* **91**, 147–8(1940).—The ingestion of a high-fat diet by dogs augments the urinary excretion of urogastrone (I). The urine of fasting dogs contains I. I disappears from the urine after surgical removal of the pyloric antrum and small intestine. I may represent excreted enterogastrone. D. S. Searle

Dental enamel and fluorine. Robert Klement. *Umschau* **42**, 488–9(1938); *Neues Jahrb. Mineral., Geol.*, Ref. I, **1939**, 299.—The hardness of dental enamel is attributed, not to the F (0.03%) it contains, but to hydroxyapatite. The high content (3%) of F in fossil teeth and bone is due to replacement of (OH) by F from the ground water; this forms fluorapatite. C. A. Silberrad

Study of uterine movements through abdominal windows. III. Castrated and young rabbits, and the effect of the ovarian hormone on uterine movements. Tadatake Yazima (Iino). *J. Chosen Med. Assoc.* **29**, 2221–55 (German abstr., 142–3)(1939).—The uterus of castrated animals loses its characteristic movements—peristaltic, anti-peristaltic, pendular and general contractile. When 100 units of ova-hormone are given twice, the characteristic movements return, lasting 5–6 days. The uterus of 2-month-old rabbits whose ovaries contain no follicles shows no characteristic movement, but an injection of 100 units of the hormone produce peristaltic and anti-peristaltic movements, but no pendular or general contractile motions. S. Tashiro

Adrenal cortex and phosphorylation of vitamin B_1. S. Ochoa and R. J. Rossiter. *J. Physiol.* **97**, 1–2P(1940); cf. *C. A.* **32**, 9204⁴.—Even in extreme adrenal cortical insufficiency, direct detns. of cocarboxylase offer no evidence for the theory that the adrenal cortical hormone is necessary for the phosphorylation of vitamin B_1. E. D. Walter

The primary acidity of the gastric juice. Torsten Teorell. *J. Physiol* **97**, 308–15(1940).—A new method is outlined for a direct detn. of the primary acidity. It is based on observations that the rate of acidity reduction is proportional to the H-ion concn. of the stomach contents. The essential part of the technique is the utilization of the acid buffering power of glycocoll. On cats stimulated with histamine, reliable values of the primary acidity were obtained only at high rates of secretion. The av. value was 208 ± 6 millinormal, but there are reasons for believing that this value is slightly too high. Possibilities of an "intraglandular" acidity regulation are discussed. E. D. Walter

The oxygen supply of the fetal brain of the sheep and the effect of asphyxia on fetal respiratory movement. J. Barcroft, D. H. Barron, A. T. Cowie and P. H. Forsham. *J. Physiol.* **97**, 338–46(1940); cf. *C. A.* **33**, 4626⁷. E. D. Walter

Oxygen in the blood of the umbilical vessels of the sheep. J. Barcroft, J. A. Kennedy and M. F. Mason. *J. Physiol.* **97**, 347–56(1940); cf. preceding abstr. E. D. Walter

Cozymase in adrenalectomized rats. John Runnström, Erik Sperber and Ernst Bárány. *Nature* **145**, 106(1940). —Expts. failed to show any difference between adrenalectomized and control rats in the cozymase contents of heart, liver, muscle and kidney. E. D. Walter

Estrogens with O in ring *B* (Pearlman, Wintersteiner) **10**.

Bachmann, Jean G., and Bliss, Andrew R.: The Essentials of Physiology and Pharmacodynamics. 3rd ed. Philadelphia: Blakiston Co. 508 pp.

Ring, Gordon C.: Stiles' Human Physiology; a Textbook for High Schools and Colleges. 8th ed. Philadelphia: W. B. Saunders Co. 450 pp.

Steinach, Eugen: Sex and Life: Forty Years of Biological and Medical Experiments. New York: Viking Press. 252 pp. $3.75.

Wiggers, Carl J.: Physiology in Health and Disease. 3rd ed. Philadelphia: Lea & Febiger. 1144 pp. $9.50. Reviewed in *J. Am. Med. Assoc.* **114**, 917 (1940).

G - PATHOLOGY

Blood changes in pain. M. M. Gubergrits. *Acta med. U. R. S. S.* **1**, 136–46(1938).—In 81 patients suffering from paroxysmal pain, and in 100 women in labor, the blood ketones (mainly β-hydroxybutyric acid) were con-

siderably increased during the paroxysms. In patients suffering from headache due to concussions such changes were not found. In 30 of these patients no changes were found in blood Ca, K, Na, O or CO_2. The ratio K:Ca was low in every case. In expts. on 2 cats and 12 dogs in which the sciatic nerve was stimulated, similar results were obtained. B. C. P. A. 1

Value of the "oxidation-reduction potential" [in schizophrenia]. M. Serezhskiĭ. *Acta med. U. R. S. S.* 2, 375–94(1938); cf. *C. A.* **33**, 9429[6]. —The oxidation-reduction potential is of great value in differential diagnosis of organic and functional diseases. Over 1000 cases of schizophrenia were examd.; the results are given in diagrams. B. C. P. A. 2

Hyperemesis gravidarum. E. Schjott-Rivers. *Acta Obstet. Gynecol. Scand.* **18**, Suppl. 1, 1–218(1938).—The history and theories of etiology of hyperemesis gravidarum are extensively reviewed. Addnl. clinical observations have been recorded. Urinary Cl concn. in untreated cases was very low and was related partly to inanition and partly to Cl loss from vomiting. Blood Cl varied greatly, but hypochloremia when present was considered secondary to the vomiting, and was not assigned any particular pathogenetic importance. An increase in nonprotein N was rarely found and was assocd. with signs of kidney lesion. There was no relationship between nonprotein-N values and symptoms of intoxication. 80% of patients with hyperemesis had urobilinuria. As an indication of liver damage the urobilinuria was not as reliable as bilirubinemia. Following a test meal most cases had achlorhydria; this was thought not to be related to the hypochloremia. The clinical observations include 6 patients where visual disturbances were encountered and 3 patients who developed nerve lesions. Detailed case reports and post-mortem findings in 5 cases are described. B. C. P. A. 3

Creatinuria in dementia precox. R. Stora and P. Tcherneakofsky. *Ann. méd.-psychol.* **2**, 726–37(1938). Of 20 patients with dementia precox, 8 of which were catatonic, 14 showed hypercreatinuria with no close relationship to the catatonic state or to endocrine function. B. C. P. A. 4

Dermatomyositis with scleroderma and calcinosis. J. H. Talbott, E. A. Gall, W. V. Consolazio and F. S. Coombs. *Arch. Internal Med.* **63**, 476–96(1939). Metabolic and pathol. studies in a case are reported. B. C. P. A. 5

Hyperthyroidism and hypertension. J. D. Bisgard. *Arch. Internal Med.* **63**, 497–503(1939).—8% of 265 patients with hyperthyroidism had also essential hypertension, some being pre-established, others provoked by the hyperthyroidism. B. C. P. A. 6

Pharmacological study of myotonia. Alfredo Lanari. *Arch. intern. pharmacodynamie* **61**, 360–9(1939); cf. *C. A.* **33**, 1032[2], 1039[9]. Subcutaneous intravenous and brachial intra-arterial injection of drugs was practised in human subjects with myotonia and progressive muscular atrophy. Acetylcholine caused contracture in myotonia. Prostigmine aggravated myotonia. Adrenaline, with which precautions were taken to prevent its rapid passage to veins, improved the myotonic condition without affecting atrophied muscles. Atropine had no effect. $MgSO_4$ and quinine caused temporary improvement. Alcohol and Na lactate were inactive. B. C. P. A. 7

Ketosis in circulatory insufficiency. I. B. Shur. *Conf. Insuff. Circ.* **1938**, 207–21.—Ketosis appears in advanced circulatory insufficiency, the concn. of ketone compds. in blood and urine being proportional to the severity of the condition; this relationship does not hold in cases presenting severe liver or lung disabilities, or in the dystrophic stage. No parallelism exists between ketonemia and ketonuria. Ketonuria is due chiefly to acetoacetic and β-hydroxybutyric acids, acetone being excreted chiefly by the lungs. A fall in the acetone content of expired air and of the urine is an unfavorable prognostic sign. Exercise causes prolonged ketonemia in cardiac insufficiency. Injections of glucose and insulin may be beneficial in the early, but are harmful in the late stages of circulatory insufficiency. B. C. P. A. 8

Gastric disorders in renal disease. W. Henning. *Deut. Z. VerdauKr. Stoffw.* **1**, 250–7(1939).—21% of patients with renal disease showed gastric symptoms. Patients with raised blood urea and nonprotein N developed anacidity; hyperacidity was seen in ten patients with normal blood urea. B. C. P. A. 9

Chronic superficial gastritis. J. Bank and J. F. Renshaw. *J. Am. Med. Assoc.* **112**, 214–17(1939).—In 50 patients with chronic superficial gastritis diagnosed by means of the gastroscope abnormal secretion of acid was present in 80%. Hyperacidity was present in 50% and anacidity in 26%. A delay in the emptying time of the stomach was also observed, but in 65 patients with peptic ulcer the incidence of gastritis was not dependent on the presence of gastric retention. B. C. P. A. 10

Pathogenesis of paroxysmal paralysis of the extremities. K. Tuzi. *Klin. Wochschr.* **18**, 320–4(1939).—8 of 11 cases were complicated by thyrotoxicosis. Carbohydrate meals or thyroid medication caused attacks; prolonged insulin treatment was beneficial. Biochem. examn. of 3 patients showed a sudden decrease in O consumption in the early and a rise in the later stages of the paralysis. Serum lactic acid was raised. B. C. P. A. 11

Mechanism of renal excretion of glucose. P. Govaerto *Bull. acad. roy. méd. belg.* **3**, 491–509(1938). A review. C. L. B. 12

Poultry diseases, their prevention and control. L. D. Bushnell and M. J. Twichaus. *Kansas Agr. Expt. Sta., Bull.* **284**, 125 pp. (1939).—General. Chem. and biol. control methods are outlined for each disease. Dosage tables for chickens are included. C. R. Fellers 13

Quantitative study of tumor growth in mice treated with extracts of adrenal cortex. N. Dobrovolskaia-Zavadskaia and P. Zephiroff. *Compt. rend. soc. biol.* **132**, 352–5 (1939).—Repeated injections of aq. ext. of adrenal cortex retarded the growth of various types of cancer. L. E. Gilson 14

Rapid production of [Vipera aspis] antiserum in rabbits by means of anavenom. F. Cesari and Paul Boquet. *Compt. rend. soc. biol.* **132**, 363–5(1939). L. E. G. 15

Spindle cell sarcomas observed in mice given injections of various substances over a long period. A. Lacassagne. *Compt. rend. soc. biol.* **132**, 365–8(1939). In mice of both sexes repeated subcutaneous injections of various male and female sex hormone prepns. sometimes produced subcutaneous spindle cell sarcomas after 300 days or more. The repeated traumatism may have been partly responsible. L. E. Gilson 16

[Increase in] alexin during leucemia. M. L. Chevrel and J. Ranque. *Compt. rend. soc. biol.* **132**, 526–8(1939). L. E. Gilson 17

Demonstration of the toxin of botulism in blood and tissues. Harry J. Schneider and Roy Fisk. *J. Am. Med. Assoc.* **113**, 2299–300(1939). Toxin was demonstrated, by mouse injection, in the saline liver ext. from 4 fatal cases of botulism and in the blood of 1 patient. F. P. Griffiths 18

Preliminary studies on the preparation of tetanus toxoid and antitetanic serum. Juan D. Generoso. *Philippine J. Animal Ind.* **5**, 229–46(1938). Tetanus toxin treated with 0.3 to 0.4% formalin and incubated at 37.5° for 1 month was converted into toxoid. The antigenic efficiency of the toxoid was increased by the addn. of 0.2 to 0.4% Al K sulfate. Toxoid dissolved in 0.5% Na citrate soln. was less potent than the simple broth toxoid with 0.2 to 0.4% Al K sulfate. One injection of a potent toxoid may give sufficient protection against natural tetanus infection, but 2 injections with an interval of 3 weeks to 1 month or more give much higher protection. Large Filipino horses were used for the production of antitetanic serum. A potent toxoid can be used for the 1st 2 injections instead of a toxin-antitoxin mixt. **Studies on the preparation of tetanus toxoid and antitetanic serum.** *Ibid.* **6**, 209–12(1939). A potent toxoid can be prepd. from toxin with a titer of 1 cc. of 1–5000 diln. as the M. F. D. (the least amt. of toxin required to kill a 340–360-g. guinea pig of tetanus within 96 hrs. after injection). Toxoid contg. 2% Al K sulfate produced higher immunity 19

than that contg. only 0.2%. One injection of 10 cc. of the former produced an immunity equiv. to 0.1 American unit per cc. of the serum of a horse injected, and a 2nd injection given 20 to 39 days later increased this titer by ten times. John O. Hardesty

Systemic disturbances in severe burns and their treatment. J. Russell Elkinton. *Bull. Ayer Clin. Lab. Penna. Hosp.* **3**, 279–91(1939).—Four cases of severe burns in man were characterized by hemoconcn. and loss of plasma protein which were overcome by plasma transfusion; 3 cases also showed a definite toxic period unassocd. with these changes. 26 references. J. S. Hepburn

Inhibitory power of human serum against digitonin (saponin) hemolysis. David L. Earley. *Bull. Ayer Clin. Lab. Penna. Hosp.* **3**, 331–4(1939).—The power of the serum to inhibit hemolysis by digitonin was distinctly greater in normal persons than in diseased persons. This inhibition did not depend upon the cholesterol content of the serum. Joseph S. Hepburn

Role of sugar in the etiology of dental caries. Philip Jay. *J. Am. Dental Assoc.* **27**, 393–6(1940).—Control of carbohydrate consumption is the only dietary procedure thus far demonstrated by which dental caries can be controlled; 12 references. Joseph S. Hepburn

Experimental dental caries. IV. Fluorine and its relation to dental caries. Gerald J. Cox, Margaret C. Matuschak, Sara F. Dixon, Mary L. Dodds and W. E. Walker. *J. Dental Research* **18**, 481–90(1939); cf. *C. A.* **34**, 1072[3].—The presence, in the ration of rats, of an optimum amt. of fluoride during tooth formation lowers the incidence of dental caries. 33 references.

Joseph S. Hepburn

Factors influencing the infectivity of fowl tumors. F. R. Selbie and J. McIntosh. *Brit. J. Exptl. Path.* **20**, 443–51(1939).—The filterability of chemically induced fowl tumors depends to a great extent on the virulence of the tumors, and, conversely, the virulence of such a tumor depends on the activity of the virus. The virulence of such a tumor, and therefore the activity of the virus, can be increased by methods designed to discourage cellular transmission. Suspensions of filterable and most nonfilterable fowl tumors can be increased in infectivity by proteolytic digestion. Repeated freezing and thawing by the technique described increases the infectivity of suspensions of the filterable fowl tumors, but annuls the infectivity of the nonfilterable tumors. H. F. Holmes

Neutralizing and complement-fixing properties of antiserums produced by fractionated extracts of a nonfilterable dibenzanthracene fowl sarcoma. L. Foulds and L. Dmochowski. *Brit. J. Exptl. Path.* **20**, 458–65(1939).—The serum of a rabbit, which received injections of sand and paper pulp and Berkefeld filtrates of the nonfilterable dibenzanthracene fowl sarcoma RFD 2, neutralized filtrates of Rous sarcoma No. 1; the neutralizing power was not abolished by absorption with normal fowl tissues. The serums of rabbits which received filtrates of the same tumor prepd. by means of collodion membranes having av. pore diams. of 0.8 μ or 0.14 μ, resp., had weak neutralizing properties which were abolished by absorption with normal fowl tissues. The antigen which elicited neutralizing antibodies, other than "fowl" antibodies, was apparently larger than the infective agent of Rous sarcoma. Complement-fixation tests indicated that RFD 2 and Rous sarcoma contained 2 antigens which were not demonstrated in normal fowl tissues; one antigen was comparable in size with the infective agent of Rous sarcoma and the other was smaller. The relationship between the neutralizing and the complement-fixing antibodies was not established. Harriet F. Holmes

A complement-fixing antigen common to filterable and nonfilterable tumors of fowls. L. Dmochowski and R. Knox. *Brit. J. Exptl. Path.* **20**, 466–72(1939).—Serum prepd. by immunizing a rabbit with 0.8 μ-membrane filtrates of the nonfilterable tumor RFD 2 gives complement fixation with active filtrates of Rous and Mill Hill 2 tumors and of fowl- and duck-grown Fujinami tumors. The reaction has a practical value in making it possible to predict the relative activities of different filtrates before the results of activity tests are available. Since RFD 2 filtrates and heat-inactivated Rous filtrates also give a complement-fixation reaction, it is evident that both filterable and nonfilterable tumors share a common antigenic factor which is not species-specific. Harriet F. Holmes

Cellular absorption of carcinogenic hydrocarbons (preliminary report). A. Graffi. *Z. Krebsforsch.* **49**, 477–95(1939).—Glycerol solns. were made of several cancerogenic and noncancerogenic hydrocarbons by adding the dry or melted hydrocarbon to water-free glycerol and heating. Serum was added to the hot soln., at first drop by drop. Any desired dilns. can be made later without pptn. of the hydrocarbons. All the solns. used showed fluorescence under ultraviolet light. These solns. were mixed with ascitic fluid from mouse carcinoma contg. living carcinoma cells and exam'd. with a fluorescent microscope. With benzopyrene, methylcholanthrene and dibenzanthracene there was a marked dark-blue fluorescence of the lipoid granules in the cells and a slighter fluorescence of the protoplasm. The nucleus showed no fluorescence except occasionally a faint shimmer in the nucleolus. Dibenzanthracene gave less fluorescence than either benzopyrene or methylcholanthrene. The noncancerogenic pyrene gave similar results, though the fluorescence was green. With the noncarcinogenic anthracene the fluorescence was blue but much less extensive and appeared only after an hr. or more and some cells failed to show any fluorescence. 2,3-Benzanthracene which is noncarcinogenic gave a yellowish fluorescence and only slightly affected the cells with a yellow or yellow-green fluorescence. Expts. were made with various other living cells, and also expts. *in vivo* by intraperitoneal injection in tumor mice with ascites with similar results. It would seem that only those substances are carcinogenic that are taken up by living cells in a relatively high concn. and show a blue fluorescence when so absorbed.

Harriet F. Holmes

Experimental production of tumors of the salivary glands. E. Benecke and J. Schröder. *Z. Krebsforsch.* **49**, 505–14(1939).—Injections were made of 3,4-benzopyrene in varying amts. into the parotid gland of rats and mice. Up to date 2 polymorphic spindle or round cell sarcomas have been formed in the rats and 4 in the mice. One mouse dying the 4th month after the injection had no macroscopic tumor, but histologic examn. showed a keratinizing squamous carcinoma. In neither rats nor mice were there found any mixed tumors analogous to the mixed tumors of the human parotid gland. H. F. H.

Some compounds chemotherapeutically active on implanted tumors. C. Dittmar. *Z. Krebsforsch.* **49**, 515–24(1939). Bromo- and iodo-acetic acids and their derivs. markedly inhibit tumor glucolysis and have a slight effect on the growth of tumors in mice, but are not available for therapeutic use on account of their great toxicity. The halo dicarboxylic acids, bromosuccinic acid and bromomalonic acid, are less toxic and more suitable for use. Some chaulmoogra compds. have therapeutic value, especially chaulmoogrylzephirol. Colchicine inhibits tumor growth but is very toxic. Less toxic derivs. as colchicein and oxycolcheine are without effect. Garlic contains a volatile substance that injures tumor cells and bacteria and which seems to be diallyl sulfide. The active group is the allyl group, for diethyl sulfide is without effect on tumor growth. Some bactericidal compds. such as *p,p'*-diamidodiphenyl sulfoxide and algamidol inhibit tumor growth. Heptylaldehyde liquefies spontaneous tumors (carcinoma of the mammary gland) in mice. This is probably the result of the capillary injury that it produces. It also inhibits the growth of implanted tumors and the unsatd. aldehyde citral is even more effective. Harriet F. Holmes

Polarographic cancer reactions and the measurement of the sulfhydryl activity of serums toward methylglyoxalase. VII. P. Meyer-Heck. *Z. Krebsforsch.* **49**, 560–72(1939).—The most important polarographic cancer reactions were studied and tested on 242 serums. The method of Waldschmidt-Leitz (*C. A.* **32**, 6725[8]) seemed to be the most reliable but it was far from specific. Thirteen or 17% of the 77 carcinoma cases were neg. and these were mainly squa-

mous and scirrhous carcinomas and carcinoma of the rectum. The serums of healthy individuals all gave a normal reaction. Control cases with diseases without marked inflammation gave a pos. reaction of 11% and cases with inflammatory diseases a pos. reaction of 65%. The entire group of 164 controls gave a false reaction of 36.4%. The albumin content of the serum was always detd. and a relation between the polarographic values and the albumin content could not always be demonstrated, nor did the speed of sedimentation of the red blood corpuscles always agree with the polarographic findings. A new method of Waldschmidt-Leitz and K. Mayer is at present under trial and gives hope of an increase in specificity. The SH-activity of the serum toward methylglyoxalase was tried on 70 serums, but the method proved to be too involved and unreliable for a cancer reaction. H. F. H.

Carcinogenic benzopyrene obtained from tobacco tar. A. H. Roffo. *Bol. inst. med. exptl. estud. cancer* **16**, 1-38; *Z. Krebsforsch.* **49**, 588-97(1939); cf. *C. A.* **33**, 5906[8].—A product was obtained from a cancer-producing tobacco tar by distn. that has the spectrographic qualities and fluorescence of 1,2-benzopyrene. This product is strongly carcinogenic; it causes the formation in rabbits of malignant tumors that by their extensive invasive and destructive growth develop like carcinomas. The animals die usually in 1-2 years after the start of the expt. The first lesions appear earlier than when the whole tobacco tar is used. As a result of these expts. it seems justifiable to attribute the carcinogenic action of whole tobacco tar to the tobacco benzopyrene it contains among countless other substances. Harriet F. Holmes

The fat morphology of carcinoma with particular reference to the disjunction of the tumor cells. B. Kellner. *Z. Krebsforsch.* **49**, 633-56(1939).—A study was made of the fat content of 150 cancers and fat was found abundantly in all with the exception of 2 cases of ulcus rodens cutis. Fat is seldom deposited in uninjured cancer cells, only if from a tissue, the cells of which normally contain fat. Half of the tumors do not show areas of necrosis. Areas of necrosis when present always show a fat-contg. margin and scattered masses of fat. The greater part of the fat of the cancers is in small foci of degeneration, the localization and structure of which are quite regular and depend on the type of tumor. The cells of these small foci often show disjunction and such cells break through the connective tissue and make their way to the lymph vessels. In carcinoma without metastasis the disjoined cells are injured and break down in the stroma, and in carcinoma with metastasis the disjoined cells divide and are to be found both in the stroma and in the lymph vessels. By histochem. methods it is possible to find an increase of doubly refractive lipoids as well as neutral fats in the foci of degeneration and the areas of necrosis. The metastases show the same type and localization of foci of degeneration as the primary growth. The stroma always contains fat, mostly in the fibroblasts. The lipoids arise mostly from tumor particles that have undergone degeneration. The nuclei of the cancer cells do not contain fat. There is no relation between the fat content of the cancer and the state of nutrition of the organism. H. F. H.

The specific action of dysentery serums of the Shiga and Flexner types. E. T. Pavlova and L. S. Bazilevskaya. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 1, 45-51 (in English, 51)(1939). Rabbit serums of the Shiga and Flexner-Hiss types of dysentery are sp., and one cannot be used as a substitute for the other in serotherapeutic practice. S. A. Karjala

The dysentery antitoxin content of the blood of healthy persons, dysentery patients and dysentery bacillus carriers. M. A. Zelikina, T. A. Gogoleva and B. L. Itskson. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 1, 75-83(in English, 83)(1939).—The equivs. of Shiga antitoxin in the blood of healthy persons, dysentery patients during the acute period of the disease or during convalescence, and chronic Shiga dysentery patients were 0.12, 0.96-3.8 and 56 units/cc., resp. S. A. Karjala

Passive immunity in bacillary dysentery. O. O. Gartokh and M. A. Zelikina. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 1, 62-74(in English, 74)(1939).—The amt. of antitoxin required to prevent intoxication by 2 lethal doses of dysentery toxin is 10 times as great in prophylaxis expts. as in neutralization expts. *in vitro*. The mortality values obtained when Shiga antiserum is given to mice 0.5 min., 3 and 5.5 hrs. after injection of 2 lethal doses of toxin are 0, 80 and 90%, resp. The mortality values when 20, 200 and 2000 antitoxin equivs. are given 3 hrs. after injection of 2 lethal doses are 50, 70 and 60%, resp. S. A. Karjala

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The phagocytizing capacity of blood in human brucellosis. B. P. Pervushin. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 2, 17-25(in English, 25)(1939). The whole blood of patients who have recovered from brucellosis possesses a high phagocytizing capacity. This capacity increases progressively from the onset of the disease and may be used as one of the criteria in the diagnosis of brucellosis. S. A. Karjala

Changes in the nuclei of the flat stratified epithelium as a result of acute inflammation. A. K. Sofoterov. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 2, 69-81(in English, 80-1)(1939).—Turpentine and Ammargen (ammoniacal soln. of Ag) in 1.25% soln. cause a diminution in the nuclear size of the cells of the flat stratified epithelium directly affected by the solns. and an increase in the cells adjacent to the inflammatory focus, while weak solns. of 1:10,000-1:20,000 cause an increase in the nuclei of the cells directly affected. Methylcholanthrene (1:2000-1:3000) and progynon (a cryst. follicular hormone contg. 250,000 I. U./cc.) caused a stable increase in the nuclei at the site of application. A 1% procaine soln. causes little change in nuclear size, but 0.25% solns. cause a distinct decrease. A 1.25% soln. of Ammargen causes a diminution in the nuclear size of cells in cancer tissue. S. A. Karjala

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Comparative glycogen deposit in the liver and muscles of rats after administration of different sugars in physiological and pathological conditions. I. Experiments on healthy rats. I. Z. Spector. *Bull. biol. méd. expti. U. R. S. S.* **8**, 151-3(1939)(in English).—The glycogen (I) deposit in the liver and muscles of white male rats reaches a max. 90 min. after sugar administration, maintains this level for 3 hrs. and then falls off. The av. contents of I in the livers of rats starved for 20 hrs. and then given 200 mg./100 g. body wt. of glucose, fructose, sucrose, invert sugar and galactose were 0.913, 1.605, 1.110, 1.477 and 0.730 g. %, resp. The liver and muscles of control rats (killed after starvation for 20 hrs.) contained an av. of 0.154 and 0.083 g. %, resp., of I. The muscles

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Acid-base equilibrium in blood serum in cardiac insufficiency. L. M. Georgievskaya, E. A. Kozlova and N. A. Tolubeeva. *Klin. Med.* (U. S. S. R.) **17**, No. 11, 46–62 (1939).—Cardiosclerosis without cardiac insufficiency is characterized by an increase in mineral salts in the blood. With cardiac insufficiency a decrease in CO_2 and an occasional decrease in protein are observed. In severe cases of cardiac insufficiency there is a decrease in pH, protein and CO_2, with an increase in P, K and Mg. S. A. Karjala

Acid-base equilibrium in blood serum in arteriosclerosis and essential hypertonia. L. M. Georgievskaya, E. A. Kozlova and N. A. Tolubeeva. *Klin. Med.* (U. S. S. R.) **17**, No. 11, 63–70 (1939).—Arteriosclerosis and essential hypertonia without cardiac insufficiency show no deviations from the normal in pH, CO_2, org. acids, P, K, Ca, Mg or protein. Slight increases in Na and Cl are sometimes observed. S. A. Karjala

Hippuric acid elimination in urine after loading with benzoic acid in surgical kidney ailments. Iso Suzuki. *Tôhoku J. Exptl. Med.* **37**, 346–59 (1939).—Patients were given 2.4 g. of Na benzoate (I) in 100 cc. of water. Hippuric acid (II) in the urine was detd. by Quick's method *Am. J. Med. Sci.* **185**, 630–5 (1933)). In patients with bilateral kidney tuberculosis the excretion of II after loading with I was restricted, in contrast to those with sound kidneys. The procedure could be applied in the testing of kidney function, but it has no advantages over the conventional methods. T. Laanes

The fate of dry substance, ash and total nitrogen in liver injury. Tsi-Tsao Chen. *Tôhoku J. Exptl. Med.* **37**, 360–6 (1939).—After 4 daily injections of 0.5 cc. per kg. of body wt. of 0.4% soln. of P in olive oil, or ligature of bile ducts the liver of rabbits showed an increase in weight (water), a decrease in dry substance, ash and N in relation to normal fresh liver. The amt. fluctuates according to the stage of poisoning. **Nitrogen distribution in phosphorus liver.** *Ibid.* 367–72.—In hydrolyzates of rabbit liver tissue, poisoned by P injections, the amt. of total N and amino acid N is increased in relation to dried liver, and decreased in relation to the fresh liver of control animals. T. Laanes

Variations in the carbon dioxide content of the blood in epilepsy. E. L. Gibbs, W. G. Lennox and F. A. Gibbs *Arch. Neurol. Psychiat.* **42**, 223–9 (1940).—The blood of epileptic individuals showed normal O_2, Na and K between seizures and in time relation to clinical and subclinical seizures. In patients subject to petit mal seizures CO_2 values in most cases were abnormally low, whereas in grand mal the CO_2 values were abnormally high. Spontaneous seizures were always preceded by abnormal fluctuations in the CO_2 content of arterial and internal jugular blood. There appears to be a causal linkage between the CO_2 content of the blood and seizures. G. H. W. Lucas

Adjustment of acid-base balance of patients with petit mal epilepsy to overventilation. L. F. Nims, E. L. Gibbs, W. G. Lennox, F. A. Gibbs and Denis Williams. *Arch. Neurol. Psychiat.* **42**, 262–9 (1940).—Overventilation usually produced a greater drop in the CO_2 content of internal jugular blood in patients with petit mal epilepsy than in control subjects. The low level reached also persists for a longer time than in normal subjects. The epileptic individual appears to have an acid-base loop of greater area than normal subjects. G. H. W. Lucas

Dental caries among Eskimos of the Kuskokwim area of Alaska. I. Clinical and bacteriologic findings. Theodor Rosebury and L. M. Waugh. *Am. J. Diseases Children* **57**, 871–93 (1939). **II. Biochemical characteristics of stimulated saliva correlated with dental caries and occurrence of salivary calculus.** Maxwell Karshan, Theodor Rosebury and L. M. Waugh. *Ibid.* 1026–34. The total Ca and inorg. P contents and the CO_2 capacity of saliva were higher in a group free from caries than in a group with active caries. The percentage of Ca removed by shaking a specimen of saliva with $Ca_3(PO_4)_2$ was higher and that of P lower in the group free from caries. **III. A dietary study of three Eskimo settlements.** Theodor Rosebury and Maxwell Karshan. *Ibid.* 1343–62.—The use of pilot bread or ship biscuit appeared to be responsible for dental caries in the settlements. This bread was capable of replacing coarse raw rice or corn in exptl. diets which produce fissure caries in rats (cf. *C. A.* **28**, 7314[2]). Other dietary constituents, Ca, P, fat, protein, carbohydrate, vitamin D, and cereal and grain foods appeared to have no influence on the incidence of caries. E. R. M.

The interchangeability of the elements chlorine and iodine in culture media for human thyroid fibroblasts. Johannes P. M. Vogelaar and Eleanor Erlichman. *Am. J. Cancer* **37**, 242–51 (1939). The replacement of approx. 80% of the chlorides of the culture media with an equiv. amt. of the corresponding iodides had little effect on the growth of explants of human thyroid fibroblasts. Good growth of the fibroblasts was obtained in media contg. 0.075 *M* NaI, while growth was normal or less than normal in media contg. 0.126 *M* NaI. The literature dealing with the effect of I and I compds. on growth of tissues *in vitro* is discussed. E. R. Main

Investigations on the serological specificity of experimental tumors. The serological specificity of benzopyrene tumors of rats. L. Dmochowski. *Am. J. Cancer* **37**, 252–64 (1939).—Serums from rabbits and rats which had been given intravenous injections of exts. of benzopyrene tumors, Jensen sarcomas and Walker carcinomas gave pos. complement-fixation reactions with heated saline exts. of the tumors and weaker pos. reactions with heated saline exts. of some normal rat tissues. The antigenic properties which distinguish tumor tissue from normal tissue are the same as those which characterize rapidly dying tissue. E. R. Main

Chemical carcinogenic agents. Geo. T. Caldwell. *J. Urol* **42**, 651–68 (1939).—A lecture. E. R. Main

The effect of surgical operations on the level of cevitamic acid in the blood. Charles C. Lund. *New Engl. J. Med.* **221**, 123–7 (1939).—The cevitamic acid content of the plasma is often lowered after operations, the extent of the

mous and scirrhous carcinomas and carcinoma of the rectum. The serums of healthy individuals all gave a normal reaction. Control cases with diseases without marked inflammation gave a pos. reaction of 11% and cases with inflammatory diseases a pos. reaction of 65%. The entire group of 164 controls gave a false reaction of 36.4%. The albumin content of the serum was always detd. and a relation between the polarographic values and the albumin content could not always be demonstrated, nor did the speed of sedimentation of the red blood corpuscles always agree with the polarographic findings. A new method of Waldschmidt-Leitz and K. Mayer is at present under trial and gives hope of an increase in specificity. The SH-activity of the serum toward methylglyoxalase was tried on 70 serums, but the method proved to be too involved and unreliable for a cancer reaction. H. F. H.

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The hemato-encephalic barrier and some physicochemical properties of the cerebrospinal fluid and the serum. V. V. Efimov and E. S. Lokshina. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 287-90 (1939) (in French).—The differences in the interfacial tension and the cond. between the cerebrospinal fluid and the blood in patients with schizophrenia, progressive paralysis, brain syphilis, epilepsy and arteriosclerosis of the brain show wide variations from the normal with no regularities and cannot be used for diagnostic purposes. These wide differences are attributed to variations in electrolyte concn. rather than concn. of capillary active substances at the interface. S. A. K.

Acid-base equilibrium in blood serum in cardiac insufficiency. L. M. Georgievskaya, E. A. Kozlova and N. A. Tolubeeva. *Klin. Med.* (U. S. S. R.) **17**, No. 11, 46-62 (1939). Cardiosclerosis without cardiac insufficiency is characterized by an increase in mineral salts in the blood. With cardiac insufficiency a decrease in CO_2 and an occasional decrease in protein are observed. In severe cases of cardiac insufficiency there is a decrease in pH, protein and CO_2, with an increase in P, K and Mg. S. A. Karjala

Acid-base equilibrium in blood serum in arteriosclerosis and essential hypertonia. L. M. Georgievskaya, E. A. Kozlova and N. A. Tolubeeva. *Klin. Med.* (U. S. S. R.) **17**, No. 11, 63-70 (1939).—Arteriosclerosis and essential hypertonia without cardiac insufficiency show no deviations from the normal in pH, CO_2, org. acids, P, K, Ca, Mg or protein. Slight increases in Na and Cl are sometimes observed. S. A. Karjala

Hippuric acid elimination in urine after loading with benzoic acid in surgical kidney ailments. Iso Suzuki. *Tôhoku J. Exptl. Med.* **37**, 346-59 (1939).—Patients were given 2.4 g. of Na benzoate (I) in 100 cc. of water. Hippuric acid (II) in the urine was detd. by Quick's method *Am. J. Med. Sci.* **185**, 630-5 (1933). In patients with bilateral kidney tuberculosis the excretion of II after loading with I was restricted, in contrast to those with sound kidneys. The procedure could be applied in the testing of kidney function, but it has no advantages over the conventional methods. T. Laanes

The fate of dry substance, ash and total nitrogen in liver injury. Tsi-Tsao Chen. *Tôhoku J. Exptl. Med.* **37**, 360-6 (1939).—After 4 daily injections of 0.5 cc. per kg. of body wt. of 0.4% soln. of P in olive oil, or ligature of bile ducts the liver of rabbits showed an increase in weight (water), a decrease in dry substance, ash and N in relation to normal fresh liver. The amt. fluctuates according to the stage of poisoning. **Nitrogen distribution in phosphorus liver.** *Ibid.* 367-72.—In hydrolyzates of rabbit liver tissue, poisoned by P injections, the amt. of total N and amino acid N is increased in relation to dried liver, and decreased in relation to the fresh liver of control animals. T. Laanes

Variations in the carbon dioxide content of the blood in epilepsy. E. L. Gibbs, W. G. Lennox and F. A. Gibbs. *Arch. Neurol. Psychiat.* **42**, 223-9 (1940).—The blood of epileptic individuals showed normal O_2, Na and K between seizures and in time relation to clinical and subclinical seizures. In patients subject to petit mal seizures CO_2 values in most cases were abnormally low, whereas in grand mal the CO_2 values were abnormally high. Spontaneous seizures were always preceded by abnormal fluctuations in the CO_2 content of arterial and internal jugular blood. There appears to be a causal linkage between the CO_2 content of the blood and seizures. G. H. W. Lucas

Adjustment of acid-base balance of patients with petit mal epilepsy to overventilation. L. F. Nims, E. L. Gibbs, W. G. Lennox, F. A. Gibbs and Denis Williams. *Arch. Neurol. Psychiat.* **42**, 262-9 (1940).—Overventilation usually produced a greater drop in the CO_2 content of internal jugular blood in patients with petit mal epilepsy than in control subjects. The low level reached also persists for a longer time than in normal subjects. The epileptic individual appears to have an acid-base loop of greater area than normal subjects. G. H. W. Lucas

Dental caries among Eskimos of the Kuskokwim area of Alaska. I. Clinical and bacteriologic findings. Theodor Rosebury and L. M. Waugh. *Am. J. Diseases Children* **57**, 871-93 (1939). II. **Biochemical characteristics of stimulated saliva correlated with dental caries and occurrence of salivary calculus.** Maxwell Karshan, Theodor Rosebury and L. M. Waugh. *Ibid.* 1026-34.—The total Ca and inorg. P contents and the CO_2 capacity of saliva were higher in a group free from caries than in a group with active caries. The percentage of Ca removed by shaking a specimen of saliva with $Ca_3(PO_4)_2$ was higher and that of P lower in the group free from caries. III. **A dietary study of three Eskimo settlements.** Theodor Rosebury and Maxwell Karshan. *Ibid.* 1343-62.—The use of pilot bread or ship biscuit appeared to be responsible for dental caries in the settlements. This bread was capable of replacing coarse raw rice or corn in exptl. diets which produce fissure caries in rats (cf. *C. A.* **28**, 7314²). Other dietary constituents, Ca, P, fat, protein, carbohydrate, vitamin D, and cereal and grain foods appeared to have no influence on the incidence of caries. E. R. M.

The interchangeability of the elements chlorine and iodine in culture media for human thyroid fibroblasts. Johannes P. M. Vogelaar and Eleanor Erlichman. *Am. J. Cancer* **37**, 242-51 (1939).—The replacement of approx. 80% of the chlorides of the culture media with an equiv. amt. of the corresponding iodides had little effect on the growth of explants of human thyroid fibroblasts. Good growth of the fibroblasts was obtained in media contg. 0.075 *M* NaI, while growth was normal or less than normal in media contg. 0.126 *M* NaI. The literature dealing with the effect of I and I compds. on growth of tissues *in vitro* is discussed. E. R. Main

Investigations on the serological specificity of experimental tumors. The serological specificity of benzopyrene tumors of rats. L. Dmochowski. *Am. J. Cancer* **37**, 252-64 (1939).—Serums from rabbits and rats which had been given intravenous injections of exts. of benzopyrene tumors, Jensen sarcomas and Walker carcinomas gave pos. complement-fixation reactions with heated saline exts. of the tumors and weaker pos. reactions with heated saline exts. of some normal rat tissues. The antigenic properties which distinguish tumor tissue from normal tissue are the same as those which characterize rapidly dying tissue. E. R. Main

Chemical carcinogenic agents. Geo. T. Caldwell. *J. Urol.* **42**, 651-68 (1939).—A lecture. E. R. Main

The effect of surgical operations on the level of cevitamic acid in the blood. Charles C. Lund. *New Engl. J. Med.* **221**, 123-7 (1939).—The cevitamic acid content of the plasma is often lowered after operations, the extent of the

reduction depending on the initial content. Reductions of 30–50% may be found when the preoperative level is 0.8 mg. % or more. E. R. Main

The chemical and clinical diagnosis of acute alcoholism. Walter W. Jetter. *New Engl. J. Med.* **221**, 1019-24 (1939); cf. *C. A.* **33**, 8763[8].—A discussion of the correlation of chem. data with acute alc. intoxication and of the advantages of the use of chem. methods. E. R. Main

Some observations on the plasmalipides in acute schizophrenia. Erkki Jokivartio and Tauro Kalaja. *Acta Psychiat. Neurol.* **13**, 667–75(1939).—The plasma total cholesterol and ether-sol. phosphatide P of 40 acute, relatively young male and female schizophrenic patients are compared with those of normal persons on the same diet. Residue of an ether ext. from a Bloor EtOH-ether residue is ashed with H_2SO_4 and HNO_3, neutralized and detd. by the Fiske-Subbarow method (*C. A.* **20**, 1092). An aliquot of Bloor ext., evapd. and taken up in chloroform, is used for Liebermann-Burchardt's reaction. The cholesterol of schizophrenic patients varies more than that of normal subjects, though the means are identical. Insulin and cardiazole treatment are followed by both fall and rise. Mean phosphatide P is lower in schizophrenic patients, and does not rise after cardiazole or insulin administration, even though the patients recover. J. McAfee

Ether-soluble plasma phosphatides in schizophrenia. Erkki Jokivartio. *Acta Psychiat. Neurol.*, Suppl. **21**, 98 pp. (1939) (in English).—P values of ether-sol. phosphatides of plasma are detd. photocolorimetrically by a modified Bloor method, with an error of ±2%. Patients are selected for similarity in age, phys. health, diet and typical psychic symptoms. Twenty-eight are women, 32 men. Ten nurses and 10 male attendants of the same age range and on the same diet are used as controls. No menstruating or pregnant women are included. Samples are taken after fasting 12 hrs., after a breakfast of gruel and unbuttered bread, at noon and the following morning. Fasting values do not differ from the others. Normal values vary from 8.72 to 12.87 mg. %, mean 10.22, women being slightly higher than men. Body build does not correlate with values. Of 40 acute cases (153 samples) 97.5% are below the normal av., 92.5% below the lower limit for normal. The av. equals 5.79 mg. %, range 2.72–12.87, women being higher. No definite connection is found between P values and duration of illness. Chronic cases showing change in state ("process") in 18 tests on 6 patients vary from 4.92 to 7.02 mg. %, av. 5.76. Changes at the end of a year are slight, with no relation to psychic state. Unchanging (defect-state) cases in 40 tests on 14 patients range from 6.86 to 9.69, av. 8.30. Women tend to show lower values. Psychotic daily curves may fluctuate more than normal. Though consistent relation between P values and changes in psychic condition as a result of insulin or cardiazole treatment is not apparent, prognosis for patients with lower values is better. No increase is seen in patients unimproved by shock treatment. J. McAfee

Endogenous carbon monoxide in the blood. M. Loeper and E. Gilbrin. *Presse méd.* **47**, 1649–50(1939); cf. *C. A.* **34**, 1493.—A relatively high CO content of the blood was observed in various types of anemia, gastric cancer, some polycythemias, alc. cirrhosis, intoxications and some metabolic diseases such as diabetes and oxalemia. The theory is presented that CO is a product of sugar metabolism. A. E. Meyer

Chemistry of the brain under the conditions of worm intoxication of animals. V. D. Semenov. *Bull. biol. méd. exptl. U. R. S. S.* **4**, 169–71(1937); *Chem. Zentr.* **1938, II**, 3420.—After subcutaneous injection of the body fluids of *Ascaris suum* the chem. compn. of the brain, especially its P metabolism, underwent essential changes. M. G. Moore

The action of worm poisons on the chemical composition of animal blood. Residual nitrogen in the blood of cats. V. D. Semenov. *Bull. biol. méd. exptl. U. R. S. S.* **4**, 172–5(1937); *Chem. Zentr.* **1938, II**, 3420.—The residual N content of the blood of cats decreased under the influence of alc. exts. of *Ascaris suum*, *Toxocara mystax*, *Dipilidium caninum* and *Hydatigera taeniaeformis*. M. G. Moore

Renal changes in alkalosis. B. M. Nicol. *Quart. J. Med.* **9**, 91–105(1940).—Renal damage was indicated by the presence of albumin and casts in the urine if dehydration was present. All of such cases showed alkalemia, hypochloremia and azotemia. Some were dehydrated, others not. Damaged renal tubules fail to secrete alk. radicals and hence aggravate an alkalemia. 29 references. John T. Myers

The serum cholinesterase in jaundice and diseases of the liver. Brian McArdle. *Quart. J. Med.* **9**, 107–27 (1940).—In 40 normal adults the cholinesterase ranged from 51 to 121 units with a mean of 78. For children (7–15 yrs.) the range was 71–166 with a mean of 105. In diseases of the liver the values were much lower, 76% of the cases studied being below 50. The range was 10–70 with a mean of 36 units. In 82 patients with miscellaneous diseases the values were between 13 and 138 with a mean of 71; of these cases 20 had values below 50, in many of which there was evidence of liver damage. In 21 cases of obstructive jaundice the value was 50 or above in 87% of the cases. In jaundice of hepatic origin it was below 50 in 87% of the cases. 45 references. J. T. Myers

Weltmann's serum-coagulation test. Simplified technique. Robert Teufl. *J. Med.* **21**, 27–30(1940).—The test is based on heat coagulation of serum in the presence of crystd. $CaCl_2$. J. Pinchack

Vi antigen of B. typhosum. I. Complement fixation test with Vi antigen and its resistance to heat and chemicals. Hiroshi Ogonuki. *Kitasato Arch. Exptl. Med.* **15**, 1–6(1938).—Vi antigen is not destroyed by heat (60 or 100° for 1 hr.) or phenol (0.5%), but only dissociated. This explains the discrepancy between the loss of Vi agglutinability of Vi bacilli and their effectiveness in active immunization of mice. However, some degree of modification in the nature of Vi antigen by heat or phenol is probable. J. Pinchack

A filtrable virus isolated from rabbit. S. Kasahara, K. Doi, M. Ueda, Y. Okamoto, R. Hamano, R. Yamada and S. Tubaki. *Kitasato Arch. Expt. Med.* **15**, 31–9(1938). Five strains of a filtrable virus ("rabbit virus") immunologically similar to variola vaccinia virus were isolated during virus passages through rabbit testicles. J. P

Complement-fixation reaction in Weil's disease. Mainly on the improvement of the antigen. Gakuzi Numata. *Kitasato Arch. Expt. Med.* **15**, 45–66(1938). The antigen for the suggested complement-fixation reaction is prepd. by centrifugal pptn. of *Spirocheta uterohemorrhagica* and addn. of 0.2–0.3 cc. (optimum amt.) of a 2% alc. ext. of guaiacum resin per 10 cc. of antigen. The guaiacum resin ext. markedly enhances antigenicity. The protein-free antigen, which is more simply prepd. from autolyzed spirochetes, is antigenically equal to the pptd. spirochetal antigen, and is likewise potentiated by guaiacum resin ext. It remains unchanged for at least 3 months. J. Pinchack

The role of histamine in hypersensitiveness to human placental extract and tryptic digest placental broth. Sigetugu Nisiyama. *Kitasato Arch. Exptl. Med.* **15**, 67–79(1938).—The human placenta contains approx. 1 mg. % histamine, to the crude fraction of which hypersensitive individuals are just as reactive as to the C. P. compd. Test materials added to the histamine fraction reduce or inhibit the local reaction in the decreasing order: arginine > histidine > cysteine > adrenaline; CH_2O is inactive. Tryptic digestion does not destroy placental histamine. Acetone, tannic acid, Pb subacetate, Pb acetate, $HgCl_2$, $(NH_4)_2SO_4$, phosphomolybdic acid and phosphotungstic acid ppt. it, but not alum, iron alum, uranyl acetate, CCl_3CO_2H, HPO_3 or AmOH. Histamine or histaminoid substances are best removed from placental broth by dialysis or alc. pptn.; alc. is preferable to acetone. J. Pinchack

The optimum pH and the action of some enzymes on epidemic encephalitis virus. Norimasa Hirano and Tiyo Koyama. *Kitasato Arch. Exptl. Med.* **16**, 306–13 (1939).—Encephalitis virus was unaffected by 5 hrs.' incubation at 37° with diastase (I), trypsin (II) or lipase

(III). The incubated mixt. of virus and I, even when dild. 50 times, was destroyed after 12–18 hrs. on ice. Virus + II was similarly destroyed, even when dild. 50-100 times, but virus + III was only partially inactivated when dild. 800 times and unaffected when dild. 400 times. J. Pinchack

An evaluation of the spirochete complement-fixation reaction in comparison with the Eagle flocculation and Wassermann procedures. Paul T. Erickson and Harry Eagle. *Venereal Disease Information* 21, 31-7(1940); cf. Gachtgens, *C. A.* 24, 5847.—Phenolized suspensions of the Reiter strain of cultured spirochetes (palligen) react with syphilitic serum to give pos. complement fixation. The results compare favorably in both sensitivity and specificity with standard Wassermann and flocculation procedures. J. Pinchack

Porphyrins and diseases of the blood. Cecil James Watson. *Symposium on the Blood and Blood-Forming Organs*, Univ. Wisconsin 1939, 14-30.—A review. Fifty-four references. Maurice M. Rath

Aplastic anemia. C. P. Rhoads. *Symposium on the Blood and Blood-Forming Organs*, Univ. Wisconsin 1939, 31-40. In 15 of 30 cases studied for bile metabolism, there was a distinct rise in the total amt. of pigment excreted, the daily amt. varying from 172 to 570 mg., the av. being 308 mg. There was no evidence that the increase in pigment excretion was due to any cause other than hemolysis. Pigment metabolism indicated toxic origin of the disorder. In 6 cases definite exacerbations followed exposure to sunlight. This may be due to the presence of type III porphyrin. Patients who had been exposed to benzene poisoning presented no clin. or pathol. difference from those in which the origin was unknown. In 3 patients given amidopyrine to test the power to conjugate that substance serious exacerbations followed. The Na benzoate conversion test of Quick (cf. *C. A.* 30, 3393[8]), the bilirubin retention test and the rate of urobilinogen excretion in the urine were used to study liver function. Only 4 cases showed evidence of hepatic dysfunction on all 3 tests and in 14 of 26 other patients, one or another of tests gave abnormal results. The value of these tests is considered doubtful. Marrow studies led to the supposition that the various types of refractory anemia of unknown etiology were manifestations of poisoning due either to an increased susceptibility to the effects of the exceedingly small amts. of benzene-like compds. to which nearly all individuals are exposed unknowingly in the course of their daily occupation, or to the effect of some improper formation or metabolism of compds. similar in chem. structure but formed endogenously, such as the sex hormones or the products of breakdown of the cyclic amino acids. Maurice M. Rath

Colloid-osmotic pressure of the plasma and composition of the blood after acute hemorrhage and after hemorrhage followed by intravenous injection of a 0.9% sodium chloride solution. A. W. J. H. Hoitink. *Arch. neerland. physiol.* 24, 169-93(1939)(in English).—The colloid-osmotic pressure (c. o. p.) changes and specific c. o. p. changes on dilu. of gum acacia-NaCl solns. and blood plasma *in vitro* were examd. On dilu. of plasma *in vitro* the specific c. o. p. (the c. o. p. per unit of protein per 100 cc. of plasma) generally becomes smaller. Changes in amt. of some blood constituents were detd. after acute hemorrhage and after acute hemorrhage followed by an intravenous injection of a 0.9% NaCl soln. The plasma proteins are restored more quickly than the hemoglobin, especially after hemorrhage and subsequent injection of a NaCl soln. The nonprotein N in the plasma shows in both cases a relative or an abs. increase. After a hemorrhage and subsequent injection of a 0.9% NaCl soln., the hemoglobin and plasma proteins show for some time a greater decrease than after hemorrhage without subsequent injection. After hemorrhage, with or without subsequent intravenous injection of a NaCl soln., there is a relative increase in c. o. p. of the plasma. The specific c. o. p. remains the same or sometimes increases in spite of a simultaneous decrease of plasma proteins. This relative increase is not due to changes in concn. of salt, lactic acid or nonprotein N of the plasma, nor to pH changes or changes in the albumin/globulin ratio. **Colloid-osmotic pressure of the plasma and composition of the blood after intravenous injection of gum-salt-solution in hemorrhage.** *Ibid.* 194-205.—The c. o. p. of a gum-salt-soln. the day after sterilization by heat is greater than the c. o. p. of a nonsterilized soln. Later the c. o. p. of the sterilized soln. decreases to the value of the nonsterilized soln. The value then remains const. *In vitro* the c. o. p. of a mixt. of equal parts of serum and gum-salt-soln. equals one-half the c. o. p. of the undild. serum plus one-half the c. o. p. of the undild. gum-salt-soln. After intravenous injection of a gum-salt-soln. the c. o. p. of the plasma is greater than would be expected from a mixt. of serum and gum-salt-soln. *in vitro*. The specific c. o. p. is considerably increased after the intravenous injection of a gum-salt-soln. The intravenous injection of a gum-salt-soln. has an unfavorable influence on the restoration of plasma proteins. **Colloid-osmotic pressure and lipoids of blood plasma in connection with the spleen after acute hemorrhage and after injection of saline in hemorrhage.** *Ibid.* 206-15.—Plasma lipoids have no significance for the magnitude of the specific c. o. p. and c. o. p. of the blood plasma. The spleen plays an important part in the development of the relative increase in c. o. p. after a hemorrhage with or without subsequent intravenous injection of saline soln. Felix Saunders

Carcinomas produced in the lung of the rat subjected to the gases of combustion of petroleum. A. H. Roffo. *Bol. inst. med. exptl. estud. cancer* 16, 77-87(1939).—Preliminary note. Felix Saunders

Masculinizing and nonmasculinizing carcinomata of the cortex of the adrenal glands. Thomas H. McGavack. *Endocrinology* 26, 396-408(1940).—A report of 6 cases. Estns. of estrin, gonadotropic factor of the pituitary and androgens in the urine of 18 patients is recorded. High estrin values were obtained only in carcinoma of the adrenal, and increased bitterling responses in hyperplasia of the adrenal cortex. Felix Saunders

Estrogen metabolism in cancerous and noncancerous women. Gregory Pincus and Mark Graubard. *Endocrinology* 26, 427-32(1940).—Urinary estrogen was detd. before and after the administration of estrone and estrone plus progesterone in 5 noncancerous women and in 7 women with cancer of the cervix or fundus. Two noncancerous women with normal functional ovaries and uterus convert injected estrone in part into estriol and this conversion is enhanced by progesterone injection. Two noncancerous women with nonfunctional uteri and a hysterectomized woman did not effect this conversion but did excrete more estrogen after estrone plus progesterone than after estrone alone. The cancerous women cannot effect the conversion of estrone to estriol even with progesterone injection and in spite of the fact that their total estrogen output before injection is higher than the control group. A possible estrogenic urinary pigment is described. Felix Saunders

Urinary gonadotropic extracts and anaphylaxis in vitro. M. Van den Ende. *J. Endocrinol.* 1, 356-65(1939).—Expts. in which antibodies were demonstrated by anaphylactic sensitization confirm those of precipitin tests on antigonadotropic serum. The isolated uteri of sensitized guinea pigs react specifically to contact with urinary exts. irrespective of their hormone content. Sensitivity to human serum is also induced but anaphylactic reaction to urinary ext. is present even after specific desensitization to serum. By active sensitization to urinary exts. a higher degree of sensitivity to species (serum) antigen is induced than by passive sensitization, probably because of the occurrence of traces of serum proteins in the urinary exts. The demonstrable antibodies evoked by urinary gonadotropin are not hormone-specific. Felix Saunders

Colloid structure of gallstones. L. Aschoff. *Kolloid-Z.* 89, 107-9(1939).—The Liesegang theory can be used to explain the formation of gallstones, urinary calculi and other concretions. Felix Saunders

Etiology of tumor formation and the nature of malignancy. B. Fischer-Wasels. *Kolloid-Z.* 89, 302-6(1939).

—Tumor formation and malignancy are chem. problems. Felix Saunders

Immunity to experimental pneumococcal infection with an artificial antigen containing a saccharide of synthetic origin. Walther F. Goebel. *Science* **91**, 20–1; *J. Bact.* **39**, 33(1940).—Passive immunity to types III and VIII pneumococcal infection can be conferred on mice by the serums of rabbits immunized with an artificial antigen contg. azobenzyl glycoside of cellobiuronic acid. It is possible to confer passive immunity to type II pneumococcal infection on mice with the serums of rabbits injected with artificial antigens contg. the corresponding gentiobiuronic acid. These effects are not produced by the disaccharides cellobiose and gentiobiose. The immunity appears to be attributable to an antibody directed toward glucuronic acid. If the mol configuration of but 1 of the C atoms of the hexuronic acid constituent of the antigen is altered, its capacity to evoke immunity to type II pneumococcal infection is lost. Felix Saunders

Particulate components of normal and tumor cells. Albert Claude. *Science* **91**, 77–8(1940). Particles with a diam. of 50–150 mμ were sepd. from embryonic and tumor tissues in the high-speed centrifuge. No differences were found in the solv. of materials from different sources. The purified substance forms opalescent solns. at pH 7. In slightly acid solns. a point of min. solv. is found near pH 3.5, whereas the normal opalescence of the soln. is appreciably decreased in solns. more alk. than pH 11. The material is not pptd. from neutral solns. by heating nor by 80% alc. There is an absorption max. at λ 2600. The substance has the general compn. of a phospholipide-ribonucleoprotein complex. It may represent isolated mitochondria or fragments of mitochondria. F. S.

Histamine release from blood cells in anaphylaxis in vitro. Gerhard Katz. *Science* **91**, 221(1940). Rabbits were sensitized by several intravenous injections of egg albumin. From 10 to 30 days after the last injection, blood was taken by heart puncture, heparinized and divided into 2 samples. To 1 sample egg albumin (in Locke soln.) was added so as to make it 1:1000 egg albumin in blood. The other sample served as an untreated control. Both samples were incubated at 37° for 10 min. The plasmas were sepd. by rapid centrifugation, filtered and their histamine was extd. (cf. Code, *C. A.* **31**, 4359[6]). The assay was carried out on isolated atropinized guinea-pig ileum. In all instances in which "sensitized" blood had thus undergone "shock" *in vitro*, its plasma contained more histamine than the control samples. The differences ranged from 100 to 600% in rabbits and were also very distinct but somewhat smaller in a few expts. on sensitized dogs and guinea pigs. No differences in plasma histamine were found when blood from unsensitized animals was incubated with egg albumin and compared with untreated samples, or when cell-free plasmas from sensitized animals were incubated with antigen and compared with controls. Conclusion: Blood cells from sensitized animals release histamine into the plasma when they are in contact with the antigen. Felix Saunders

Alcoholemia and glucemia in fatigue. Vittorio Mauro. *Rass. med. ind.* **10**, 712–24(1939).—The variation of the blood EtOH (I) of normal and diabetic persons was studied at rest and after exercising with an ergostat. Samples of blood were taken at intervals from the elbow vein, and analyzed for I by the method of Widmark modified by Baglioni, Bracalon and Galanini (cf. *C. A.* **21**, 2031). In normal persons the blood I increases and then falls back to its normal value of about 0.04%. In diabetic patients the curves are irregular, sometimes increasing as a result of exercise, and sometimes falling and then increasing in repose after the exercise. M. Schubert

3,4-Benzopyrene, paramecium and the production of tumors. J. C. Mottram. *Nature* **145**, 184–5(1940).—Long exposure of paramecium to the tumor-producing hydrocarbon 3,4-benzopyrene results in the production of a few abnormal individuals. If these are cultured in normal medium, populations of cells result, presenting wide morphological variation from normal through varying degrees of abnormality to multicellular monsters. These resemble the assemblage of cells forming a cancerous tumor. E. D. Walter

Influence of nitrogen retention upon the regeneration of plasma proteins. Russell L. Holman and J. Gilmer Mebane. *J. Exptl. Med.* **71**, 299–304(1940).—Because of the clinical observation that the capacity to form new plasma proteins is sometimes impaired in cases of nephritis, expts. were carried out to det. whether the impaired function in the nephritic person is related to N retention; the expts. consisted in producing renal injury by injecting $UO_2(NO_3)_2.6H_2O$ into standard hypoproteinemic dogs and comparing the rate of formation of blood-plasma protein under these conditions of N retention with that in the uninjured dog. Despite elevations in blood nonprotein N to more than 10 times normal, no interference with plasma protein formation was observed. These elevations in nonprotein N affected principally the urea and undetd. fractions. Neither elevation in nonprotein N nor proteinuria *per se* appears to have any effect on plasma protein production. Possibly the deficient production of plasma proteins in the nephritic person is related to a more general disturbance in metabolism in which the elevation in nonprotein N is secondary. C. J. West

Distinctive substance associated with the Brown-Pearce rabbit carcinoma. I. Presence and specificity of the substance as determined by serum reactions. John G. Kidd. *J. Exptl. Med.* **71**, 335–50(1940).—A substance is regularly present in saline exts. of the Brown-Pearce rabbit carcinoma growth that is capable of fixing complement specifically in mixts. with the serums of certain rabbits which bear the tumor or in which it has recently retrogressed. **II. Properties of the substance: Discussion.** *Ibid.* 351–71.—The serologically active substance of the Brown-Pearce tumor, a complement-fixing antigen, differs notably from certain other tissue antigens in the fact that it is not effective after EtOH extn. of the tissue contg. it. Like many of the proteins and viruses it is inactivated on heating to 65° for 30 min.; and like them as well, its activity is lost on treatment with acid (to pH 4.5 or lower) or alkali (to pH 11.5 or higher). Filtration and centrifugation expts. disclosed the fact that the antigen of the tumor passed readily through collodion membranes with av. pore diams. of 383 mμ and more but was retained completely by those with av. pore diams. of 348 mμ and less. It was thrown down completely or almost completely on centrifugation at 20,000 r. p. m. for 1 hr. The findings indicate that the tumor antigen has a large and nearly uniform particle size and wt. as large as that of many of the viruses. They differentiate it sharply from the generality of "sol. antigens." C. J. West

Some constituents of elementary bodies of vaccinia. Joseph E. Smadel, George I. Lavin and Rene J. Dubos. *J. Exptl. Med.* **71**, 373–89(1940).—Nucleoprotein and S antigen were recovered in soln. after extn. of prepns. of dry elementary bodies of vaccinia with dil. NaOH; the ext. amounted to about half of the dry wt. of the virus. Elementary bodies contained about 0.4% inorg. P, practically all of which occurred in the form of a nucleoprotein contg. thymus nucleic acid. It is thought that S antigen, as ordinarily encountered, is a protein which is not in combination with nucleic acid. Qual. reactions suggesting the presence of small amts. of glucosamine were obtained in all cases. C. J. West

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H—PHARMACOLOGY

CARL F. SCHMIDT

Ammonium bicarbonate secreted by surgical maggots stimulates healing in purulent wounds. Wm. Robinson. *Am. J. Surg.* **47**, 111–15(1940).—NH_4HCO_3 is present in comparatively large amts. in the secretions of the maggot of the blowfly, *Phormia regina*. Clinical tests have shown that NH_4HCO_3, applied to purulent wounds as a 1 or 2% sterile soln. or gauze packs, has marked healing properties similar to those of the 2 other maggot secretion

products, allantoin and urea. The occurrence of NH_4-HCO_3 in maggot secretions is assocd. with the presence of the enzyme urease in maggot tissues. C. R. A. 1

Histochemical study of gold diffusion in the skeleton. Natale Di Malfetta. *Arch. ist. biochim. ital.* **11**, 285–94(1939).—Gold thioglucose (20%) suspended in oil and contg. 50% Au was injected into rabbits. On necropsy gold was found in the skeleton. E. S. G. Barron

Toxicity of mercury vapors. Mario Adamo. *Rass. med. ind.* **10**, 684–90(1939). With guinea pigs subjected to inhalations of mercury vapor under a variety of conditions, the greatest toxic action was found when the degree of humidity and the CO_2 content of the air were high. Mercury mines must be kept thoroughly oxygenated and with low humidity. E. S. G. Barron 2

Thallium intoxication. José F. Marquez, Ismael Lami and Luis Krauss. *Rev. med. cienc. afines* (Buenos Aires) **1**, No. 8, 8–15(1939). Description of 3 cases of thallium intoxication. They were treated by intravenous injections of NaI (10 to 20% solns., 0.30 to 1 g. per day). E. S. G. Barron 3

Clinical experience in the treatment of Addison's disease with desoxycorticosterone acetate. G. A. K. von dem Borne and F. Lopes Cardozo. *Nederland. Tijdschr. Geneeskunde* **84**, 231–43(1940).— Desoxycorticosterone acetate, synthesized by T. Reichstein (*C. A.* **32**, 5778) and found to be very active in animal expts., was found to be a very potent drug in Addison's disease. On a diet low in K and 10 g. of NaCl, 2.5 mg. of the sterone a day was sufficient to maintain a clinically normal blood pressure and mineral balance. This dose had a stronger action than 10 cc. of "cortin." With 10 mg. of the sterone a day, it was possible to keep the patient in balance even with a low NaCl and a high KCl intake, but this was not possible on a diet high in NaCl and low in KCl. Retention of K on a diet high in K, was prevented by this sterone in spite of a low NaCl intake. Undesirable side effects of the sterone, such as high fever, or hypoglycemia, can be prevented. In view of the potent action overdosage is not without danger, particularly with a high salt intake. R. Beutner 4

Treatment of the disease of Heine-Medin by means of potassium chlorate. H. J. Kolk. *Nederland. Tijdschr. Geneeskunde* **84**, 3888–94(1940). Doses up to 6 g. of $KClO_3$ are given, in general 100 mg., per kg. of body wt. divided into 12 doses. K reports there was no case of poisoning in the 52 cases treated and reports a marked improvement in all the cases of acute anterior poliomyelitis treated. $KClO_3$ is supposed to act by oxidation. Methemoglobin is usually found in the urine. R. Beutner 5

Effects of continued feeding of diphenylene oxide. John O. Thomas, Robert H. Wilson and C. W. Eddy. *Food Research* **5**, 23–30(1940). Albino rats fed a balanced diet contg. from 0.025 to 0.4% diphenylene oxide for 200 days showed normal wt. gains and blood picture. Urine output was increased somewhat and tissue damage was evident in the kidney but not in the liver, spleen, heart or adrenals. The use of diphenylene oxide in spray materials is thought to be free from public health danger. C. R. Fellers 6

Toxic action of glycerol in healthy and tuberculous guinea pigs. J. S. Solomidès. *Compt. rend. soc. biol.* **132**, 359–61(1939); cf. *C. A.* **33**, 8209[9].—When injected intravenously or intraperitoneally the lethal dose of undild. glycerol is 2.5 g./kg. for guinea pigs and 1 g./kg. for rabbits. Preliminary dilu. with physiol. NaCl soln. greatly decreases the toxicity. The alleged activation of the tubercle bacillus *in vivo* by glycerol may be the result of lowering the resistance of the tuberculous guinea pig. L. E. Gilson 7

Pharmacological properties of certain saturated fluorocarbons. H. C. Struck and F. B. Plattner. *J. Pharmacol.* **68**, 217–19(1940).—Breathing air contg. high concns. of decafluorobutane, C_4F_{10}, b. −4.5° and decafluorocyclopentane, C_5F_{10}, b. 23°, profoundly depressed mice but did not produce true anesthesia, the mice responding to stimuli at all times. Death followed from congestion of the lungs due to irritation. L. E. Gilson 8

Pharmacology of certain furfuryl and tetrahydrofurfuryl ammonium iodides. Edwin J. Fellows and A. E. Livingston. *J. Pharmacol.* **68**, 231–46(1940).— In animals furfuryltrimethyl-, furfuryldimethylethyl-, tetrahydrofurfuryltrimethyl- and tetrahydrofurfuryldimethylethylammonium iodides were stable in the blood and produced a marked fall in blood pressure, cardiac inhibition and depression, an increased flow of saliva, an increased tone of intestine and bladder and sometimes catharsis. These effects were prevented by atropine. The effective doses of the 4 compds. varied greatly with the mode of administration and with the species of animal used. Satn. of the furan ring decreased the parasympathetic potency but not the toxicity. Furfuryldimethylisopropyl-, furfuryldimethylpropyl-, furfuryldimethylbutyl- and furfuryldimethylamylammonium iodides had a complex and variable vascular action. L. E. Gilson 9

Influence of adrenaline on shivering and on metabolism in the cold. V. E. Hall and P. B. Goldstone. *J. Pharmacol.* **68**, 247–51(1940).— In chilled pentobarbitalized cats, adrenaline, in doses just in excess of the physiol. rate of secretion, suppresses shivering and consequently reduces the total metabolism by decreasing the amt. of O consumed by this activity. The adrenaline depresses the central motor mechanism involved in shivering. L. E. Gilson 10

Administration of drugs in food for chemotherapy studies in mouse pneumococcus infections. Raymond N. Bieter, W. P. Larson, Elizabeth M. Cranston and Milton Levine. *J. Pharmacol.* **68**, 252–8(1940); cf. *C. A.* **33**, 8300[6].—The administration of sulfanilamide and related compds. by mixing them with the food is discussed. L. E. G. 11

Experimental studies in chemotherapy of pneumococcic infections, including hydroxyethylapocupreine, sulfapyridine and certain other related compounds. M. M. Bracken, John M. Johnston, George E. Crum, David R. Patrick, H. H. Permar and W. W. G. Maclachlan. *J. Pharmacol.* **68**, 259–66(1940); cf. *C. A.* **32**, 1785[2].—All of 61 quinine and quinoline derivs. related to hydroxyethylapocupreine (I) were inferior to I in the treatment of pneumococcic infections in mice. *In vitro*, I is bacteriostatic for pneumococcus in much greater dilu. than are sulfapyridine (II) and sulfanilamide. Equal doses of I and II had the same protective power in mice infected with virulent pneumococci. The effectiveness of either I or II was increased by use of homologous antipneumococcic serum, and I and II given together enhanced the effectiveness of each other. L. E. Gilson 12

Effects of digitoxin and potassium on striated muscle. S. A. Guttman and McKeen Cattell. *J. Pharmacol.* **68**, 267–77(1940); cf. *C. A.* **32**, 4658[8].—In *Rana pipiens* sartorius muscles maintained in O_2 or air after treatment with ouabain or digitoxin there is first an increase in twitch tension and then a loss in excitability. Recovery occurs within a few min. after returning to the glucoside soln. or to unmodified Ringer soln. These effects are indistinguishable from those following treatment with Ringer soln. contg. an excess of KCl, except that in the latter case recovery occurs only in Ringer soln. contg. the normal amt. of K. Ouabain and digitoxin are equally effective and in 1:1,000,000 concn. their effects are like that of Ringer soln. contg. 5 times the usual amt. of KCl. The fall in efficiency after treatment with the digitalis glucosides is not due to increased extracellular K. L. E. Gilson 13

The metabolic fate of *N*-substituted derivatives of barbital. Milton T. Bush and Thomas C. Butler. *J. Pharmacol.* **68**, 278–83(1940); cf. *C. A.* **33**, 2986[8].—A method and app. for extg. barbital from urine are described. By isolation of the barbital from the urine of dogs it was shown that *N*-dealkylation of the Et and Me derivs. is extensive, but that of the Pr, iso-Pr, allyl, Bu and Ph *N*-substituted derivs. is slight. The effects on mice of the above compds. and 2 new compds., the iso-Bu and sec-Bu derivs., are described. L. E. Gilson 14

Protecting action of procaine against ventricular fibrillation induced by adrenaline during cyclopropane anesthesia. Charles L. Burstein and Bruno A. Marangoni. *Proc.*

Soc. Exptl. Biol. Med. **43**, 210–12(1940).—In dogs anesthetized with cyclopropane 60% developed ventricular fibrillation after injection of one test dose of adrenaline. This was prevented by injection of 5 mg./kg. of procaine. L. E. Gilson

A biological assay method for strychnine in a case of parricidal poisoning. Romulo Guevara, Patrocinio Valenzuela and Guillermo Quibilan. *Rev. filipina med. farm.* **30**, 505–13(1939).—The amt. of strychnine in the contents of a human stomach was estd. by detg. the smallest quantity that would produce convulsions when injected into the ventral lymph sac of a Philippine frog (*Rana vittigera* Wiegmann). This dose corresponds to 0.001–0.0015 mg. strychnine sulfate per g. of frog. L. E. Gilson

Subacute yellow atrophy of the liver due to solvent. Leo E. Braunstein. *J. Am. Med. Assoc.* **114**, 136–8 (1940).—A case of liver damage due to continual exposure to a petroleum distillate, b. 152–78°, is reported. F. P. Griffiths

The use of 2-methyl-1,4-naphthoquinone (a synthetic vitamin K substitute). Jonathan E. Rhoads and Maurice T. Fliegelman. *J. Am. Med. Assoc.* **114**, 400–1(1940).—The use of 2-methyl-1,4-naphthoquinone in doses of 1–4 mg. daily was effective in the treatment of prothrombin deficiency. F. P. Griffiths

Ascorbic acid in experimental chronic poisoning with vanadium. Francesco Cavalli. *Arch. farmacol. sper.* **68**, 211–13(1939).—Ascorbic acid exerted no demonstrable antidotal effect in chronic vanadium poisoning in guinea pigs. Helen Lee Gruehl

Pharmacological studies on calcium guaiacolglycolate (guaiacolcalcium); therapeutic possibilities. Italo Simon. *Arch. farmacol. sper.* **68**, 214–34(1939).—The m. l. d. of Ca guaiacolglycolate, administered intravenously to rabbits, was 0.0060 g. equiv./kg. It was less toxic to the organism as a whole than guaiacol and about equiv. in toxicity, with respect to Ca salts, to Ca lactate. It was water-sol. and could be sterilized without alteration. The indications were that it was a safe therapeutic agent to replace Ca salts or guaiacol. Helen Lee Gruehl

Effect of zinc bromide on blood sugar of normal and diabetic persons with and without insulin. Antonio Delia and Edgardo Rucci. *Arch. studio fisiopatol. clin. ricambio* **7**, 317–30(1939).—$ZnBr_2$ caused hypoglucemia in diabetic but not in normal individuals. It caused a loss of the hypoglucemic power of insulin when injected into diabetic persons receiving insulin. It favorably influenced blood and urine sugar in diabetic persons on a const. diet. Helen Lee Gruehl

Succinic acid and work in diabetic persons. Carmine Antonio Vesce. *Arch. studio fisiopatol. clin. ricambio* **7**, 331–50(1939).—In 4 diabetic persons the administration of succinic acid during controlled work caused slight and insignificant changes in glucemia and glucosuria and a const. diminution of ketonemia and ketonuria. Helen Lee Gruehl

Some effects of nicotinic acid. G. Sotgiù and L. Romaro. *Atti soc. med. chir. Padova* **17**, 214–18(1939).—Nicotinic acid had no effect on blood sugar or glutathione and moderately increased oxalemia and oxaluria. It diminished chloremia and moderately increased chloruria, increased the alk. reserve and diuresis with practically no effect on porphyrinuria. It caused vasodilation, stimulated gastric secretion and in some instances produced gastric upsets and loss of appetite. Helen Lee Gruehl

Effects of eserine, acetylcholine and atropine on the electrocorticogram. Frederick R. Miller, G. W. Stavraky and G. A. Woonton. *J. Neurophysiol.* **3**, 131–8 (1940).—In the cat and rabbit, application to the cortex of min. amts. of 1% eserine (I) caused a reduction in amplitude of the slow waves and the large fast waves of the electrocorticogram; these changes indicated cortical stimulation, since they were assocd. with motor effects. Application to the cortex of $1:10^6$–1% acetylcholine (II) without previous I treatment evoked potential changes comparable with, though weaker than, those due to I. Application of 0.1–1% II after I evoked the I-II spikes; assocd. motor effects showed that the spikes indicated cortical stimulation; I after II was ineffective. Atropinization of the animal precluded induction of the I-II spikes and motor effects. Pilocarpine locally was inert toward the electrocorticogram; and did not sensitize the cortex to II. The drug effects were not due to pH changes. I and II are believed to stimulate or facilitate synapses; I is a synaptic sensitizer for II. The synaptic action of I may be partly direct and partly due to its inhibition of cholinesterase. Potential changes from I are believed due to unequal stimulation of synapses with consequent asynchronous firing of neurons. The I-II spikes are believed due to powerful synaptic stimulation with synchronization of many neurons. It is postulated that, in consequence of stimulation of synapses by I and II, repetitive impulses are initiated or accelerated across these junctions. Marion Horn

The evolution of the vascular system. IV. I. Hel'man and S. Braun. *Arch. sci. biol.* (U. S. S. R.) **44**, No. 3, 87–102(in English, 102)(1936).—The effect of the inhalation of amyl nitrite was studied in children (4–15 yrs.), adults (22–35 yrs.) and old people (61–93 yrs.) with the aid of an electrocardiograph. In the 1st 2 cases an increase in the amplitude of the P waves was found in 37 and 50% (resp.) of the cases, a decrease and a smoothing out of the *T* wave in 86 and 92%, and changes in the direction of the *ST* interval (which falls below the base line) in 52 and 43%. In the 3rd group these changes were less frequent and considerably less pronounced. The changes were of extremely short duration. Histamine in doses of 0.5 cc. of 1 mg. % solns. given subcutaneously to children and old people caused hyperemia of identical intensity, but in the latter group it began somewhat later and lasted longer. S. A. K.

The influence of capillary-active substances on the effect of vagus stimulation. G. I. Tsobkallo. *Arch. sci. biol.* (U. S. S. R.) **46**, No. 1, 88–105(in English, 105)(1937). Some correlation was observed between the effect of vagus stimulation and the capacity to lower the interfacial tension of paraffin oil-aq. solns. No correlation was found in the case of the surface tension of the solns. The ability of vagomimetic drugs to lower the tension of the paraffin oil-aq. soln. interface increases in the order acetylcholine (I), arecoline, pilocarpine, scopolamine, atropine and physostigmine. Choline and I do not change the surface tension at the air-aq. soln. interface, while the other drugs have only a slight lowering effect. S. A. Karjala

The effect of procaine blockade on the biochemical indexes in ulcerous patients. S. V. Zakharov. *Arch. sci. biol.* (U. S. S. R.) **53**, No. 2–3, 23–31(in English, 31)(1939).—The glutathione content of the blood of patients with stomach and duodenal ulcers increases by 2–7 mg. % in 1–3 days after novocaine blockade. Catalase activity is increased, and the amt. of incompletely oxidized org. substances (detd. by titration of the urine with $KMnO_4$) excreted with urea decreases by 2–3 times. S. A. K.

The effect of intravenous injections of arginine on urea formation. L. S. Shvarts and M. I. Krynskiĭ. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 2, 44–9(in English, 49)(1939).—The intravenous injection of 1 g. of arginine or glycine into acute or chronic hepatitis patients causes an increase in blood urea that is slight compared with that seen in subjects with normal livers and this may be used as a diagnostic measure. S. A. Karjala

The distribution of bromine in the organism after the administration of bromides. I. The distribution of bromine between the brain and blood in the quiescent organism and after excitation with camphor. Ya. A. Epshteĭn. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 2, 50–6 (in English, 56)(1939).—The ratio of blood Cl to brain Cl in white mice is 2.33. The injection of 136 mg./kg. body wt. of NaBr yielded a blood Br to brain Br ratio of 3.91 within 1.5 hrs. This remained almost const. for 10 days, during which 4 addnl. doses of NaBr were given. Brain excitation by the hypodermal injection of 0.2 cc. of 20% camphor/25 g. body wt. simultaneously with NaBr did not change this ratio. **II. Changes in the chemical**

composition of the gastric juice caused by the administration of bromides. *Ibid.* **56**, No. 1, 59–68(in English, 68).—The administration of 5 g./day of NaBr to dogs for 8–9 days caused an increase in gastric juice secretion, and an increase in the free and total acidity, total halogen and liberated K. The concn. of liberated K was higher in the more acid juices. The results suggest that gastric juice secretion is a phenomenon of membrane equil., and that the increases observed are due to the lower hydration and greater mobility of Br^- and K^+. S. A. Karjala 1

Toxic enteritis (changes in the intestinal mucosa caused by arsenic poisoning). T. A. Sinitsina. *Arch. sci. biol.* (U. S. S. R.) **56**, No. 1, 34–42(in English, 42) (1939).—The disintegration of the cells of the intestinal mucosa as a result of As poisoning shows no relation to the lesion of the epithelium. An appreciable disintegration of the lymphoid elements of the intestinal mucosa is not accompanied by appreciable emergence of leucocytes from the vessels. S. A. Karjala 2

The biochemistry of the adrenal system and of adrenaline. I. The "binding" of adrenaline by substances with aldehyde and ketone functions and by biocolloids. A. M. Utevskiĭ and N. S. Levantseva. *Bull. biol. méd. exptl. U. S. S. R.* **5**, 75–8(1938)(in English).—To a $1\cdot10^{-4}$ soln. of adrenaline (I) at 37° were added varying proportions of HCHO, AcH, pyruvic acid and Me_2CO at pH 7.0. After 60 min. the presence of free I was detd. by the Bailly and Vulpian (colorimetric) reactions. HCHO in concns. of $1\cdot10^{-2}$ to $1\cdot10^{-4}$ "bound" I completely, but in $1\cdot10^{-5}$ no binding occurred. All the others as well as glyceraldehyde failed to show a binding action at any concn. There is no direct action of lactic acid (II) on I, but II favors the binding of I by proteins to some extent. **II. Restitution of the "tissue concentration" of adrenaline in adrenal glands poisoned by cyanides and monoiodoacetate.** A. M. Utevskiĭ and V. O. Osinskaya. *Ibid.* 78–81. The "tissue concns." of I (the amt. in 1 g. of adrenal medullary substance) in the right and left glands of a single animal are almost identical as detd. by colorimetric methods. With 1 of a pair of glands as a control, the other was isolated and allowed to "work" (perfusion) for 3 hrs., during which it liberated 0.64–2.32 mg. of I into the perfusion soln. and left a tissue concn. in the gland of −0.42 to +1.41 mg. as compared with the control. The generation of I then was 0.42–2.38 mg. The addn. of cyanides to the perfusion liquid causes an increase in secreted I to 1.12–4.39 mg., but with a considerably decreased tissue concn., yielding 0.94–2.40 mg. of generated I. The addn. of CH_2ICOOH (III) causes an increase in secreted I to 1.56–5.28 mg. with practically complete restitution of the tissue concn., resulting in 2.26–4.72 mg. of generated I. It is suggested that the action of III results in a decrease in the concn. of II in the glands, thus facilitating the liberation of I bound to protein. The addn. of II (as Na salt) to the perfusion liquid leads to a diminution of I secretion by the gland and to a simultaneous decrease in the tissue concn. of I in the gland itself. No check on the colorimetric analysis of I by physiological analyses was made. S. A. Karjala 3

The influence of external temperature, diet and emotion on the pharmacological action of thallium. L. I. Levkovich. *Bull. biol. méd. exptl. U. S. S. R.* **5**, 271–3(1938) (in English).—Sheep and Angora rabbits were given sublethal doses of TlOAc and $TlAl(SO_4)_2.12H_2O$. Variations of temp. as well as local warming and cooling of sep. parts of the skin did not affect the process of exptl. moulting induced by Tl compds. In animals kept at −3° mortality was reduced, no toxic diarrhea was observed and the progress of the toxic process was much slower than at 11 or 24°, but the loss in wt. was greater. A hunger diet begun 1 day after administration of Tl and continued for 5 days caused loss of hair in 46.7%, diarrhea in 96.7 and death in 10.0% of the cases, as contrasted with loss of hair in 3.3% of the cases, with no diarrhea or deaths occurring in the controls on a normal diet. Confinement in pens with dry food led to loss of hair in 66.7%, with strong toxic effects and 15.1% av. loss in wt. Under pasture conditions on the same Tl dosage no loss of hair or deaths were observed in sheep and the wt. loss was only 1.7%. Sheep kept in larger stalls with freedom of movement showed greater resistance to Tl. S. A. Karjala 4

The oxidation-reduction potential of biological fluids under the influence of various gases. V. V. Efimov and L. B. Utevskaya. *Bull. biol. méd. exptl. U. S. S. R.* **5**, 222–5(1938)(in French).—The decrease of E_H, from the value obtained under aerobic conditions, of the blood, serum and cerebrospinal fluid under the influence of N_2, H_2, NH_3 and illuminating gas is 27, 23 and 60; 275, 235 and 110; 88, 35 and 43; and 151, 29 and 34 mv., resp. Thus the O concn. is of importance in studying the deviations of E_H from the normal. S. A. Karjala 5

The treatment of acute hydrogen sulfide poisoning. I. D. Meshenin. *Bull. biol. méd. exptl. U. S. S. R.* **6**, 439–41(1938)(in English).—The injection of a soln. of 0.50% H_2O_2 and 1% $NaHCO_3$ in physiol. saline into dogs in a paralytic state as a result of the injection of lethal doses of Na_2S soln. (4.0–4.6 mg. H_2S/kg. body wt.) led to complete recovery in all 9 cases in which it was tried. S. A. Karjala 6

The mechanism of hydrogen sulfide action. II. Catalase changes in acute hydrogen sulfide intoxication. I. D. Meshenin. *Bull. biol. méd. exptl. U. S. S. R.* **6**, 442–4(1938)(in English); cf. *C. A.* **33**, 2991⁹. —The intravenous injection of H_2S solns. (1.5–3.2 mg./kg. body wt.) into dogs caused cessation of respiration for 1–2 min. with recovery; there was a reduction of the catalase index in the blood and organs in 2, and an increase in 3, cases. Subcutaneous injection caused a decrease in all 5 cases of 9.1–35.5%. Expts. with rats indicated that acute H_2S intoxication is accompanied by a reversible inhibition of blood and tissue catalase. S. A. Karjala 7

The effect of curare on the chemical processes involved in muscular activity. O. I. Fainshmidt and M. T. Dmitrenko. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 157–9 (1939)(in English).—The intraperitoneal injection of 0.5–1.0 cc./kg. body wt. of 1% curare into rabbits causes little variation from the normal in glycogen (I), creatinephosphoric acid (II) and adenosinephosphoric acid (III) in the muscles of resting rabbits. Fatigue in normal muscles causes a decrease in I, II and III to 30, 39 and 70%, resp., of the value before fatigue, with large increases in lactic acid (IV) and H_3PO_4, while in the case of curarized muscles fatigue causes a decrease in I, II and III to 84, 31 and 95%, resp., of the value before fatigue, with smaller increases in IV and H_3PO_4 than in the controls. The working capacity of the curarized muscle is not reduced. The introduction of curare seems to inhibit the energy-producing processes now known by blocking the breakdown of I, II and III. It is suggested that the work of the curarized muscle involves the transformation of other compds. S. A. Karjala 8

The urinary ratio during aniline poisoning (carbon, nitrogen and the carbon-nitrogen ratio). S. N. Sinitsyn. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 160–3(1939)(in German); cf. *C. A.* **34**, 4958.—The C/N ratio of the urine of normal dogs is 0.78, while that of the urine of dogs receiving 0.03–0.14 g./kg. body wt. of $PhNH_2$ was 0.80–1.06. In healthy human beings the av. C/N ratio of the urine is 0.86, but in cases of $PhNH_2$ poisoning it reaches 1 or over. S. A. Karjala 9

The action of adrenaline and morphine on gastric secretion in hogs. F. S. Medyakov. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 170–1(1939)(in German).—The injection of 1–2 mg. of adrenaline into hogs results in a strong inhibition of gastric secretion during the 1st hr., with slightly less inhibition during the 2nd hr. after injection. The injection of 0.06 g. of morphine (I) completely inhibits secretion for 1–2 hrs., while 0.01–0.02 g. causes strong but not complete inhibition. After injection of I the juice has an alk. reaction and has a digestive power (Mett) of 0. S. A. Karjala 10

The effect of atropine, adrenaline and morphine on the activity of the parotid glands of the pig. F. S. Medyakov and S. B. Gurak. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 172–4(1939)(in English).—Hypodermal injection of 1 cc. of 1% atropine into pigs caused inhibition of parotid

secretion for 4–4.5 hrs. Adrenaline in doses of 1–3 mg. had no effect. Morphine in doses of 6 cc. of 1% soln. caused a diminution in salivary secretion, possibly as a result of the over-excitation of the central nervous system. S. A. Karjala

The effect of tetrahydro-β-naphthylamine on the salivary glands. I. I. S. Aleksandrov. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 255-7(1939)(in English).—The injection of 5 mg./kg. body wt. of tetrahydro-β-naphthylamine (I) in 0.05% soln. in vegetable oil caused an immediate increase in salivary secretion from the submaxillary and sublingual glands which reached a max. in 70 min. No increase in the secretion of the parotid gland was observed, although the feeding of meal and biscuit powder after I injection caused normal secretion by this gland. The injection of pilocarpine (II) caused approx. equal salivation from all 3 glands. Simultaneous injection of I and II gave less total secretion than I alone. II. *Ibid.* 258-63(in English).—The *per rectum* administration of 0.2 g./kg. body wt. of chloral hydrate to dogs causes a marked reduction in salivary secretion. Severance of the superior cervical ganglion after injection of I does not decrease secretion, but a marked decrease was observed after severance of the tympanic cords. I seems to affect the central part of the secretory app. of the submaxillary and sublingual glands, the impulses being transmitted through the chorda tympani. The percentages of solid, inorg. and org. residues in the saliva before, and 60, 120 and 180 min. after I injection were 1.003, 0.737 and 0.271; 1.124, 0.914 and 0.201; 1.231, 0.966 and 0.265; and 0.774, 0.571 and 0.203%, resp. S. A. Karjala

The rate of penetration and diffusion of acetylcholine in the tissues. I. A. Edel'shtein. *Bull. biol. méd. exptl. U. R. S. S.* **8**, 266–8(1939)(in English). -The application of 1:1000 solns. of acetylcholine (I) to the exposed bifurcation of the common carotid artery and to its trunk at the clavicular level causes a drop in blood pressure within 12 sec. Upon application of I to the fascia lata and the fascia propria of the anterior femoral muscles the reaction is observed in 21 sec. These periods are taken as the time necessary for I to penetrate and diffuse through the tissues. S. A. Karjala

The sensitivity of the heart to cardiac glucosides in anoxemia. A. I. Cherkes and E. S. Rosovskaya. *J. Physiol.* (U. S. S. R.) **25**, 556–68(in English, 568)(1938). -Anoxia in dogs results in an increased sensitivity to strophanthin G (I) and a considerably less marked sensitivity to digitoxin (II), when administered intravenously. The elimination of I is delayed, its curve resembling that of II, the elimination of which is unaltered as compared with normal animals. S. A. Karjala

The control of respiratory movements. II. Alterations in respiration through the action of calcium, potassium, pilocarpine, atropine and morphine. M. Sergievskiĭ, N. Ostroumov and A. Golovin. *J. Physiol.* (U. S. S. R.) **25**, 685–94(in English, 694)(1938). -The suboccipital injection of KCl into cats increases pulmonary ventilation and reduces the inhibitory effect of stimulation of the centripetal superior laryngeal and vagal fibers, while $CaCl_2$, atropine and morphine by the same method of injection have the reverse effect in each case. S. A. Karjala

Distribution of alcohol in the organs. F. Kunkele. *Deut. Z. ges. gerichtl. Med.* **31**, 253–5(1939).—Studies on blood, cerebrospinal fluid, urine, bile and prostate, seminal vesicle and testes secretions showed generally that the alc. content varied directly with the amt. of liquid in the tissue. Frances Krasnow

Relation of blood alcohol, degree of drunkenness, and age. W. Deckert. *Deut. Z. ges. gerichtl. Med.* **32**, 51–62(1939).—People below 30 years of age possess a greater tolerance than older individuals. Blood alc., which is usually low in the younger group, increases as the age of the subject increases. Frances Krasnow

Herpes simplex encephalitis in rabbits. I. The therapeutic effect of vitamin C, sulfanilamide and pitressin. James Flexner, Maurice Chassin and Irving S. Wright. *J. Infectious Diseases* **66**, 30–2(1940).—The data obtained point to the inefficacy of vitamin C, pitressin and sulfanilamide as therapeutic agents in herpes simplex encephalitis in rabbits. The incidence of paralysis in these rabbits was not decreased by these agents. J. H. Lewis

On the expectorant action of resyl and other guaiacols. W. Ford Connell, Grant M. Johnston and Eldon M. Boyd. *Can. Med. Assoc. J.* **42**, 220–3(1940). -A review. G. H. W. Lucas

Reaction of mouse skin to various reduced and partially oxidized sulfur compounds. Stanley P. Reimann and Gerrit Toennies. *Arch. Path.* **29**, 175–81(1940).—Normal cell proliferation and differentiation are notably stimulated (cf. *C. A.* **26**, 1349, 1657; **28**, 5874[9]) in mouse skin rubbed with thiocresol; cystine disulfoxide and cysteine sulfinic acid act similarly though to a less extent. *dl*-Methionine, methionine sulfoxide and cystine are ineffective (cf. *C. A.* **30**, 3842[3], Toennies and Kolb, *C. A.* **33**, 5350[9]). This is interpreted on the basis of —SH liberation. Cystine being ineffective it is believed methionine is not converted to the effective (cf. Brunsting and Simonsen, *J. Am. Med. Assoc.* **101**, 1937(1933)) cysteine by skin. Failure of cystine disulfoxide, cysteine sulfinic acid and methionine sulfoxide to inhibit proliferation (cf. *C. A.* **25**, 977) is laid to their reaction with sulfhydryl groups already present to form —SS—. J. McAfee

Effect of *dl*-methionine and *l*-cysteine on the cleavage rate of mammalian eggs. Bernard J. Miller and Stanley P. Reimann. *Arch. Path.* **29**, 181–8(1940). -As detd. by measurement of the diam. of the cell mass and by the no. of blastomeres of rabbit ova *dl*-methionine and *l*-cysteine stimulate proliferative growth. 0.25 mg./ml. cysteine is more effective than 0.5 mg./ml. J. McAfee

The use of acaprin in the treatment of splenomegaly in chronic malaria. I. Radvan. *Presse méd.* **47**, 1143–6(1939). -Acaprin is a deriv. of 6-aminoquinoline. It is used in solns. of 5 and 0.5% and in doses of 1 and 5 cc. The max. dose is 1 mg. per kg. given subcutaneously; 2–5 injections are given with 2 to 3 days intervals. Beneficial effects in man are limited to cases of splenomegaly. By-effects are feeling of cold, sweating, salivation, inability to retain urine and feces, contraction of the pupils, increase of arterial pressure and hyperglycemia, but all these symptoms are of benign character. The therapeutic effects are rapid reduction of the spleen, subsidence of pain and anemia and increase in wt. A. E. Meyer

Bee venom. Leon Binet and M. Burstein. *Presse méd.* **47**, 1177–8(1939). -Bee venom is hemolytic, delays blood coagulation and causes an increase in blood sugar. It reduces the arterial pressure. In the guinea pig it causes bronchial spasm. Glutathione and Na thiolactate decrease the toxicity of the venom at pH values higher than 7. A. E. Meyer

Treatment of carbon monoxide poisoning. Leon Binet. *Presse méd.* **47**, 1500–1(1939). Inhalation of O_2 is the most efficacious method. Methylene blue is a valuable adjuvant. Glutathione is without effect. $Na_2S_2O_4$ proved to be of some value in the intoxication of fishes with illuminating gas, but it seemed that the HCN contained in the gas was the chief toxic agent. A. E. Meyer

Parenteral sulfapyridine; the intravenous use of sodium sulfapyridine and report of clinical and laboratory observations on the use of glucose-sulfapyridine solutions. Maxwell Finland, Francis C. Lowell, Wm. Spring, Jr., and F. H. Laskey Taylor. *Ann. Internal Med.* **13**, 1105–20(1940). -A highly concd. soln. of sulfapyridine in 50% glucose was nontoxic when given parenterally, but was practically inert. When given orally such a soln. behaved like sulfapyridine except that its absorption was delayed. Na sulfapyridine given intravenously has therapeutic value but may produce serious toxic reactions. 12 references. John T. Myers

The treatment of lobar pneumonia with sulfapyridine and sodium sulfapyridine, with observations on effective blood levels. Theodore J. Abernethy, Harry F. Dowling and Clarence R. Hartman. *Ann. Internal Med.* **13**, 1121–37(1940).—Patients in whom a blood level of 6 mg. % or more was maintained gave a better clinical response. Intravenous injection of Na sulfapyridine is

useful in severe cases, as the blood level can be raised quickly. The mortality in 135 cases was 11.1%. 18 references. John T. Myers

Thromboangiitis obliterans. Treatment with sodium tetrathionate and sodium thiosulfate. Frank V. Theis and M. R. Freeland. *Arch. Surg.* **40**, 190–207(1940); cf. *C. A.* **33**, 2976⁶. Intravenous injections of $Na_2S_4O_6$ and $Na_2S_2O_3$ were usually followed by increased peripheral temps., decreased pulse rate and reduction in blood pressure. These responses were assocd. with changes in O satn. of the arterial and venous bloods. 27 references. John T. Myers

Hexamine insulin. Juvenile type of diabetes treated with hexamethylenetetramine-insulin compound giving rapid and sustained action. Henry M. Feinblatt, Edgar A. Ferguson and Barnett Alpert. *Endocrinology* **26**, 137–43(1940). A new clear insulin compd. with both immediate and sustained effects is described. A single dose can be substituted for 2–4 divided doses of standard insulin. One dose of this new insulin compd. produces a curve similar to the one produced by 4 divided doses of standard insulin but with a decided constriction in the range fluctuation of blood sugar. The shock experienced with this prepn. is comparable with that of standard insulin and responds promptly to the ingestion of carbohydrates. Felix Saunders

Increased duration of insulin action by the use of protamine zinc insulin in pellet form. Jerome Mark and Gerson R. Biskind. *Endocrinology* **26**, 444–8(1940).—Pellets prepd. by compressing a mixt. of 4 parts of cryst. Zn insulin and 1 part of protamine, contg. the equiv. of 13.88 units of insulin, were administered subcutaneously to depancreatized dogs. These pellets produced a marked lowering of blood sugar for from 11 to 100 hrs. Two larger pellets of this mixt., contg. 261 and 1012 units, resp., caused a rapid fall in blood sugar and hypoglucemic shock within 24 hrs. Pellets of cryst. Zn insulin did not show a prolongation of hypoglucemic action. Pellets prepd. from a mixt. of equal parts of cryst. Zn insulin and protamine were not as effective in lowering blood sugar as the pellets prepd. from the 4:1 mixt. The ppt. from com. protamine Zn insulin was centrifuged, dried and compressed into a pellet, which was inactive. When this type of pellet was redissolved, the soln. showed hypoglucemic activity. The active pellets of the 4:1 mixt. produced a marked local edema at the site of implantation. The 2 larger pellets fragmented as they were absorbed. Felix Saunders

Work performance of adrenalectomized rats treated with corticosterone and chemically related compounds. D. J. Ingle. *Endocrinology* **26**, 172–7(1940). Corticosterone, desoxycorticosterone, 17-hydroxy-11-dehydrocorticosterone, 11-dehydrocorticosterone and 17-hydroxycorticosterone will maintain the work capacity of adrenalectomized rats. Little or no effect is obtained by the administration of desoxycorticosterone. A wide discrepancy was noted between the apparent activities of these compds. as judged by the effect on work and the maintenance of life in adrenalectomized animals. This discrepancy may be due either to a qual. difference in the biol. effects or to differences in their rates of utilization. Reduction of the ethylene bond ($C_{1,2}$) in 17-hydroxy-11-dehydrocorticosterone destroys its activity. The property of maintaining the work capacity of adrenalectomized rats is not shown by progesterone, ethinyltestosterone, testosterone, testosterone propionate, estradiol benzoate and stilbestrol. Felix Saunders

Pharmacodynamic effects of testosterone propionate on tubal contractions (oviduct of rabbit) determined by carbon dioxide insufflation. I. C. Rubin and A. M. Davids. *Endocrinology* **26**, 523–5(1940). Testosterone propionate has an inhibitory effect on the tubal muscle, diminishing its general tonicity and the amplitude of the contractions. Felix Saunders

Mechanism and treatment of premenstrual distress with ammonium chloride. J. P. Greenhill and S. C. Freed. *Endocrinology* **26**, 529–31(1940). It is postulated that the symptoms which occur in many women premenstrually result from the increase in extracellular fluid following Na retention in the various tissues of the body. Therapy with NH_4Cl for the purpose of removing extracellular fluid thus formed is effective in relieving the premenstrual distress or tension. Felix Saunders

"Degree of saturation" as a factor affecting the inhibition of cell respiration by cyanide or carbon monoxide. Kenneth C. Fisher. *J. Cellular Comp. Physiol.* **15**, 122–4 (1940).—F. discusses the fallacy in certain math. equations used in detg. the effect of inhibitors on cell respiration. Felix Saunders

Effect of subcutaneous implantation of adrenaline tablets on blood sugar and milk composition in lactating ruminants. A. C. Bottomley, S. J. Folley, F. H. A. Walker and H. M. Scott Watson. *J. Endocrinol.* **1**, 287–99(1939).—Subcutaneous implantation of adrenaline tablets into goats and a cow maintains hyperglucemia for several hrs. (at least 42 in 2 cases). Blood lactic acid and lactose increase during the same period. In no case was the milk yield increased, while in 3 expts. it fell, evidently because of trauma assocd. with the implantation. No uniform effects on milk fat were found. The arterial blood lactic acid in the normal lactating goat ranges from 5.4 to 15.0 mg. %. Felix Saunders

Silver and the organism. Wolfgang Heubner. *Kolloid-Z.* **89**, 110–15(1939).—Metallic Ag was implanted in the epidermis or subcutaneous tissue of the ear of rabbits. After several weeks or months 2 kinds of crystals could be observed on the surface of the metal, AgCl and Ag_2S. In the course of time (several years) Ag_2S was found distributed in the tissues around the site of implantation. Felix Saunders

Theory of the potential action of poisons in pharmacology. W. Laubender. *Kolloid-Z.* **89**, 287–90(1939). A discussion. Felix Saunders

The basal radioactivity of human blood and its significance in the problem of radium poisoning. Adolf Krebs. *Kolloid-Z.* **89**, 309–10(1939).—Radioactive material is taken into the body in air, water and food so that the blood has a const. radioactivity equiv. to 10^{-12}–10^{-14} g Ra per cc. This const. amt. should be taken into consideration in Ra therapy and Ra poisoning. F. Saunders

Cortin-like effects of steroid glucosides on potassium. Raymund L. Zwemer and Bertrand E. Lowenstein. *Science* **91**, 75–6(1940).—Cardiac glucosides protect normal animals against K poisoning and lower plasma K level, and prolong life in adrenalectomized animals. Felix Saunders

The effect of glutathione on selenium toxicity. Kenneth P. DuBois, Morris Rhian and Alvin L. Moxon. *Proc. S. Dakota Acad. Sci.* **19**, 71–4(1939). -SH-glutathione protected rats against death from a min. lethal dose of Se given as Na selenite. Walter H. Seegers

A comparative study of liver glycogen values of control, selenium and selenium-arsenic rats. Richard L. Potter, Kenneth P. DuBois and Alvin L. Moxon. *Proc. S. Dakota Acad. Sci.* **19**, 99–106(1939). The livers of rats fed Se contain less glycogen than those of control animals. The effect of Se is abolished by As. Walter H. Seegers

Effect of yeast on the incidence of cirrhosis produced by lead arsenate. Wm. C. Von Glahn and Frederick B. Flinn. *Am. J. Path.* **15**, 771–81(1939).—The incidence in rabbits of hepatic cirrhosis produced by the ingestion of $PbHAsO_4$ was reduced when powd. brewer's yeast was added to the diet. There was no apparent relation between the amt. of hepatic glycogen and the quantity of As in the liver or the incidence of cirrhosis. F. B. S.

Allergy and the photographer. H. W. Greenwood. *Brit. J. Phot.* **86**, 578–80(1939).—"Metol poisoning" is caused by impurities in the metol, of which sym. *N,N*-dimethyl-*p*-phenylenediamine is most usual. The commonest symptoms are those of a weeping eczema, and treatment consists in the application of an ointment contg. ichthyol and H_3BO_3, and the wearing of gloves day and night. *p*-Phenylenediamine and its derivs. are known, by the experience of the fur and hair-dyeing trades, to be toxic to many persons. Chrome sores are due to the

handling of Cr compds. and take the form of ulcers around the finger nails and on the knuckles. C. H. Smith

The influence of prontosil injection on the blood sugar and the morphological changes of liver, spleen, kidney and suprarenal gland of rabbits. Nitizen In and Syobun Kin. *J. Chosen Med. Assoc.* **29**, 2437–42(English abstr. 151)(1939).—Intravenous injections of 0.2–0.8 cc. per kg. body wt. of prontosil decreased the blood sugar of rabbits and the extent and duration of hypoglucemia depending on the amt. of the injection. Daily injections for 6 days produce marked degenerative changes in liver and lesser changes in the other organs. S. Tashiro

The sympathomimetic action of local anesthetics. Jean Tripod. *J. Physiol.* **97**, 289–300(1940). The local anesthetics, butyn, percaine and stovaine, have the following direct sympathomimetic effects: (1) They inhibit the isolated intestine of the rabbit. (2) They inhibit the isolated uterus of the cat. (3) They augment the contractions of the isolated auricles of the rabbit. In addn. they either augment or depress the action of adrenaline on the isolated heart of the cat, on the blood pressure of the spinal cat, on the nictitating membrane of the cat or on the spleen vol. of the cat. E. D. W.

The inhibition of adrenaline oxidation by local anesthetics. Flora J. Philpot. *J. Physiol.* **97**, 301–7(1940); cf. preceding abstr.—Cocaine, procaine, stovaine, butyn and percaine inhibit the amine oxidase of rat and guinea-pig liver by 60–100%. Cocaine, procaine, percaine and ephedrine inhibit cytochrome oxidase and catechol oxidase by 10–25%. Cocaine and procaine do not inhibit xanthine oxidase or the malic and succinic dehydrogenases of heart muscle. Adrenochrome has no physiol. activity on the blood pressure of the spinal cat, the nictitating membrane, virgin cat uterus or isolated cat heart. E. D. Walter

The action in the perfused liver of acetylcholine, sympathomimetic substances and local anesthetics. M. Chakravarti and J. Tripod. *J. Physiol.* **97**, 316–29 (1940). In the perfused liver of the dog evidence was found for 3 effects of adrenaline: (1) opening of the hepatic veins with increased portal inflow and diminished liver vol.; (2) increase of resistance due to constriction of the small vessels from the hepatic artery and portal vein; (3) in the presence of preexisting adrenaline, an increased resistance on the outflow side. When adrenaline is present in the blood, acetylcholine injected into the hepatic artery causes an expansion of liver vol., probably because of increased arterial inflow. Expansion of the liver diminishes the portal flow and the net effect on outflow is a diminution. Tyramine, ephedrine, veritol, synephrine and benzedrine all act like adrenaline, though their effects are more prolonged. Stovaine and cocaine both have a typical adrenaline-like action. Butyn, percaine and procaine have little or no direct action of their own, but all of them enhance the action of adrenaline. E. D. Walter

Effect of acetylcholine, prostigmine, potassium and fatigue on the crossed extensor reflex and on its reflex inhibition in the toad. Clara Torda. *J. Physiol.* **97**, 357–62(1940). E. D. Walter

The influence of diuretics on the osmotic work done and on the efficiency of the isolated kidney of the dog. M. Grace Eggleton, J. R. Pappenheimer and F. R. Winton. *J. Physiol.* **97**, 363–82(1940). E. D. Walter

The production of exophthalmos in the dog by acetylcholine. Charles E. Brunton. *J. Physiol.* **97**, 383–93 (1940).—The main action of acetylcholine in the intact animal is a relaxation of blood vessels. The relaxed vessels are then distended with blood and push the eyeball forwards. E. D. Walter

The disappearance from the blood of intravenously injected insulin. H. K. Goadby and J. S. Richardson. *J. Physiol.* **97**, 417–28(1940).—After the intravenous injection of 40 units of insulin into rabbits, it is possible to show that the circulating blood has a blood sugar-depressing action. By transfusing it into other fasted rabbits, this action is shown to be due to the injected insulin. This action gradually diminishes and disappears at the end of about 90 min. The rate of disappearance is not affected by excluding the liver from the circulation, or by the previous injection of glycotropic hormone of the pituitary gland. Exclusion of the kidneys from the circulation results in a persistence of the insulin action. The liver, therefore, is not responsible for the inactivation or removal of large doses of exogenous insulin from the blood stream; the kidneys are concerned in such a mechanism. E. D. Walter

Chemistry and toxicology of vapors of solvents (Flury) 13 Urea mandelate [renders urine bactericidal] (Mossini) 10.

Ghosh, B. N.: Pharmacology, Materia Medica and Therapeutics. 15th ed. Calcutta: Hilton and Co. 763 pp. Rs. 8-8 or 15s. Reviewed in *Indian Med. Gaz.* **75**, 51–2(1940).

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I ZOÖLOGY

F. A. GORTNER

Presence of phenoloxidases in certain mucous glands of Nereis irrorata and Nereis pelagica. R. Defretin. *Compt. rend. soc. biol.* **132**, 501–3(1939). L. B. Gilson

Effect of phytohormones on Euglena in relation to light. Alfred M. Elliott. *Trans. Am. Microscop. Soc.* **58**, 385–90(1939); cf. *C. A.* **32**, 5515[1]. A bacteria-free strain of *Euglena gracilis* was treated with the following plant hormones (Merck): γ-3-*N*-indolebutyric acid, 3-indoleacetic acid and α-naphthaleneacetic acid. The cryst. phytohormones were dissolved in glass-distd. H_2O shortly before use to insure max. activity. Two media were employed, (I) a 0.5% soln. of Difco "tryptone" in glass-distd. H_2O, and (II) the same % of org. matter in artificial tap H_2O contg. the following substances: NaCl 0.003, KNO_3 0.002, $CaSO_4$ 0.020, $MgSO_4$ 0.005 g., $FeSO_4$ trace and distd. H_2O 1.0 l. NaOAc (0.2% soln.) was added to increase the available C for more rapid growth. The basic medium was tubed (8.0 cc. to each tube) and sterilized in an autoclave at 15 lbs. pressure for 20 min. The indole compds. were sterilized at 12 lbs. for 30 min. and then added to the exptl. cultures. Control tubes received 1.0 cc. each of sterile distd. water. Both exptl. and control tubes were then inoculated with a well-washed, actively growing suspension of *E. gracilis*. Initial and final pH detns. were made colorimetrically. The numbers of organisms initially present were estd. with a Sedgwick-Rafter counting chamber and a Whipple ocular micrometer. The final count in cultures from I was made with a counting chamber while that from II, where growth was abundant, was made with the protozoöcrit (*C. A.* **32**, 5515[3]). Half the tubes were illuminated by a 100-watt lamp placed 14 in. from the tubes in a const. temp. bath (temp. not given). The other tubes were protected from light by placing them in a light-proof metal container immersed in the same bath. One-third of the tubes were incubated for 3–5 days, 1/3 for 6–10 days and 1/3 for 9–15 days. All were fixed by adding 0.5 cc. of a satd. soln. of trinitrophenol in *N* HCl to each tube. Growth in I exposed to light was not abundant but was sufficient to show moderate acceleration caused by the hormones. Very little growth occurred in the dark. In II there was a pronounced acceleration in growth resulting from hormone addition, the acceleration being particularly marked in the tubes contg. indolebutyric acid and naphthaleneacetic acid. There was a complete absence of stimulating effect of the hormones in the dark. There appears to be a relationship between the presence of *chlorophyll* and phytohormone stimulation of growth in this organism. L. Wilson Greene

The change of proteolytic activity during the embryogeny of Bombyx mori L. N. V. Bromlei. *Uchenye Zap-*

iski Fakul'teta Estestvoznaniya, Moskov. Gosudarst. Pedagogicheskiĭ Inst., Lab. Org. i Biol. Khim. **1938**, No. 3, 3–15; *Khim. Referat. Zhur.* **2**, No. 5, 50(1939).—From the first days of incubation to the moment of the final formation of the embryo the egg contained only proteinase of the cathepsin type which was activated by cysteine with a max. pH of 3.4–4.0. Several days before the breaking of the shell the embryo contained tryptic proteinase, which functions in the intestines of the larva. A comparison of the curves of the hydrolytic activity of cathepsin in the presence of SH groups and of the curves without the SH groups showed that the total amt. of cathepsin did not change during the time of development of the embryo. However, the ability to split the proteins (connected with the activation by the sulfhydryl compds.) was lower in the initial and the final moments of incubation than in the remaining days of the development. W. R. Henn

Changes in histidine taking place in Bombyx mori L. N. S. Demyanovskaya. *Uchenye Zapiski Fakul'teta Estestvoznaniya, Moskov. Gosudarst. Pedagogicheskiĭ Inst., Lab. Org. i Biol. Khim.* **1938**, No. 3, 41–51; *Khim. Referat. Zhur.* **2**, No. 5, 50(1939). A review of literature with references in regard to the biol. transformations of histidine and the enzyme histidase as of 1937. W. R Henn

Tryptophan in Bombyx mori L. S. Ya. Demyanovskiĭ. *Uchenye Zapiski Fakul'teta Estestvoznaniya, Moskov. Gosudarst. Pedagogicheskiĭ Inst., Lab. Org. i Biol. Khim.* **1938**, No. 3, 89–112; *Khim. Referat Zhur.* **2**, No. 5, 50 (1939).—D. detd. the amt. of tryptophan in *Bombyx mori* L. in all stages of development as well as in proteins obtained from it. Tryptophan was detd. colorimetrically according to Furth (*C. A.* **15**, 377) and to May and Rose (*C. A.* **17**, 116), and was sepd. and identified according to Dakin. Tryptophan was present in *Bombyx mori* L. in all stages of development. About 0.3 g. of tryptophan was found in 100 g. of the worms. The amt. present in female *Bombyx mori* L. was always greater than in male, in the body as a whole as well as in the proteins. W. R. Henn

Copper in the organisms and its content in silk worms. M. F. Liozin. *Uchenye Zapiski Fakul'teta Estestvoznaniya, Moskov. Gosudarst. Pedagogicheskiĭ Inst., Lab. Org. i Biol. Khim.* **1938**, No. 3, 131–51; *Khim. Referat. Zhur.* **2**, No. 5, 50(1939). A continuation of the investigations of L. on the mineral compn. of *Bombyx mori* L. and *Morus alba*. The Cu content in silk worms of different ages, in their excretions and in the leaves was detd. by the sulfide colorimetric method. The worms contained 0.0013–0.0022% and the leaves 0.0022–0.0029% of Cu. The constancy of the Cu content in the larvae was due to its continuous supply from the leaves and to the removal of the excess with the excrements. The relative amts. of Cu in the excrements increased with the growth of the larvae. When the larvae were ready to spin the cocoons this increase of Cu was at a max. (increased from 0.0015 to 0.0081%). The amt. of Cu in the summer silk worms was greater than in the autumn silk worms. W. R. H.

The effect of additional feeding with carbohydrates and proteins on the vitality of silk worms. V. A. Rozhdestvenskaya. *Uchenye Zapiski Fakul'teta Estestvoznaniya, Moskov. Gosudarst. Pedagogicheskiĭ Inst., Lab. Org. i Biol. Khim.* **1938**, No. 3, 153–81; *Khim. Referat. Zhur.* **2**, No. 5, 49–50(1939).—Glucose, sucrose and flour from sprouting peas were added in the investigation of the influence of addnl. feeding with carbohydrates and proteins on the vitality of silk worms and on the quality of the silk thread. The addn. of sprouting pea flour in amts. of 1% of the wt. of the fresh leaves consumed daily increased the amt. of the eggs but did not influence the yield of silk. An addn. of 2% of powdered sucrose lowered the vitality of the larvae and increased the wt. of the raw silk cocoon. Powd. glucose gave neg. results in both cases. W. R. Henn

Fate of 3,6-diketoallocholanic acid and of β-3-hydroxy-6-ketoallocholanic acid in the turtle organism. Morihisa Tukamoto. *J. Biochem.* (Japan) **30**, 377–83(1939); cf. *C. A.* **33**, 8747[8].—About 15.5 g. of 3,6-diketoallocholanic acid was administered subcutaneously to turtles and 0.25 g. β-3-hydroxy-6-ketoallocholanic acid (I) was obtained from the urine. When 9.8 g. of I was administered subcutaneously only 0.12 g. of this acid was obtained from the urines. It is concluded that in the turtle a change of the allocholanic to the cholanic acid series does not occur and that there is no transformation of the *trans*-decalin into the *cis*-decalin form. S. Morgulis

Chemistry of snakes. I. The nitrogenous extractives of the snake muscles. Hiroyuki Imamura. *J. Biochem.* (Japan) **30**, 479–90(1939).—The distribution is recorded of taurine, creatinine, methylguanidine, cadaverine, trimethylamine, carnosine, etc. in muscle extractives from 3 different species of snakes. S. Morgulis

Electrolytes in Thyone muscles. H. Burr Steinbach. *J. Cellular Comp. Physiol.* **15**, 1–9(1940).—By using the chloride space as a measure of the extracellular fraction of the tissue, it is shown that Na of *Thyone* muscles is largely extracellular, K is concd. about 17 times, mostly in the cells, and Ca is present in the cells in concn. lower than that of the normal medium. K can be further concd. in cells as the concn. of the medium is increased up to a satn. point when both cells and medium contain about 35 milliequiv. % K. No more K enters the cells if the concn. in the medium is increased above this point. If concns. are calcd. on the basis of water instead of total wt. the cell water concn. is always higher than that of the medium, being 58 milliequiv. % at the satn. point. Ca can leave the cells and can be taken up by them in spite of the fact that the concn. of cell Ca is always lower than that of the medium. At high external concns. there is less Ca in the cells than there is when the medium contains less Ca. The calcd. cell space is remarkably const. even though the tissues are treated with very toxic concns. of Ca or K and even though the chloride space can undergo marked changes, particularly a decrease when the tissue is treated with excess Ca. Felix Saunders

The effect of adrenaline and choline on the heart rate in Daphnia pulex Geer Paavo Suomalainen. *Ann. Zool. Soc. Zool.-Botan. Fennicae Vanamo* **7**, No. 3, 6 pp. (1939).—Adrenaline stimulated the heart rate of the water flea, *Daphnia pulex* Geer. Choline had a contrary effect. The same results are observed in vertebrates. E. W. S.

The effect of adrenaline on the blood-sugar content in Helix pomatia L. Paavo Suomalainen. *Ann. Zool. Soc. Zool.-Botan. Fennicae Vanamo* **7**, No. 4, 1–3(1939).—Adrenaline increased the blood sugar content in *Helix pomatia* as in vertebrates. E. W. Scott

Contraction and action current of toad heart. I. The effect of calcium chloride and potassium chloride in the perfusion fluid. Sei Syuei. *J. Chosen Med. Assoc.* **29**, 2489–500(German abstr. 154–5)(1939).—The effect of variation in $CaCl_2$ and KCl concns. of the perfusion fluid on the contraction and action currents of the toad heart shows that there is no perfect relationship between the two, although when the former stops, the latter disappears. In the cardiogram, the *T* curve suffers more pronounced changes than the *R*. S. Tashiro

The cholinergic nature of the nervous supply to the electrical organ of the torpedo (Torpedo marmorata). W. Feldberg, A. Fessard and D. Nachmansohn. *J. Physiol.* **97**, 3–5P(1940). E. D. Walter

New experiments with the plankton tower. Helga Schulz and Fritz Koczy. *Naturwissenschaften* **27**, 819 (1939).—Expts. are described with a "plankton tower," 12 m. deep, 2 m. diam. Sterilized sea water (quartz lamp) is fed into this as well as culture medium. By use of Biscaya and Goteborg water mixed with 15 l. soil ext. and addn. of 90 g. $NaH_2PO_4 + 12\ H_2O$, 500 g. $NaNO_3$, 100 g. Na_2SiO_3 all sterilized at a 600 l. per hr. rate, a 2.80-m. high culture layer was established, carried on a 30-cm. high fresh-water layer and this in turn floating on a layer of high salt content. The temp. was maintained at 9°. A *Calamydomonas* culture multiplied from 62 cells per cc. to 10.5 times this value, mostly in the upper layers of the culture. The pH was continuously 8.6. The silicate content decreased, mostly because of pptn. of Fe. No trend in phosphate or nitrate fluctuations was found. The

Chlamydomonas culture was preceded by an unsuccessful *Skeletonema* culture which became overgrown by flagellates in 2 weeks time. B. J. C. van der Hoeven

Distribution of free and total ascorbic acid in liver and muscle of Bengal fresh-water fish (Saha) **12**. Proximate analysis of Brit. Columbia herring (Hart, *et al.*) **12**.

12—FOODS

H. A. LEPPER

In memory of Adolf Juckenack. E. Bames, B. Bleyer and J. Grossfeld. *Z. Untersuch. Lebensm.* **79**, 1(1940). **Legal conception, particularly with foods.** Hugo Holthofer. *Ibid.* 1-9. **Position and development of food control.** Hugo Bottger. *Ibid.* 10-13. **Color of foods.** A. Beythien. *Ibid.* 13-18. **Juckenack's service for food investigation.** J. Grossfeld. *Ibid.* 18-23.—Juckenack's contributions to food investigation are reviewed and discussed under the above titles. M. M. Piskur

"Unsaponifiable matter" in food analysis. J. Grossfeld. *Chem.-Ztg.* **63**, 749-52(1939); cf. *C. A.* **33**, 3012⁴. —G. describes a new method for examn. of unsaponifiable substances, a method which is very quick and requires small quantities of the fat examd. and of the solvent (benzine). Besides the total unsaponifiable matter, this method also gives the content of hydrocarbons. The new procedure is based on treatment of the alc.-aq. soap solns., obtained from the fat or oil, with a small quantity of benzine on one hand, and with a larger quantity of this solvent on the other; on the basis of the yields thereby obtained, the total unsaponifiable matter of the examd. product is calcd. By dissolving the above-mentioned soaps in dil. alc., such mixts. acquire a greatly increased dissolving capacity for sterols and fatty alcs., a capacity which can greatly exceed even that of benzine; at the same time the hydrocarbons go over into the benzine layer. This difference permits the detn. of sterols and fatty alcs. by a simple calcn. G. also discusses the application of the method to detection of addns. of paraffin to fats, detection of olive oil on the basis of the content of squalene, detection of extn.-cocoa-fat and the distinguishing of unsaponifiable substances. 15 references. Edward A. Ackermann

An oxidimetric method for the determination of the calorific content of meals and of foods. D. I. Nandus. *Voprosy Pitaniya* **5**, No. 2, 117-24(1936); *Chem. Zentr* **1938, I**, 4246.—The basis of the method is the detn. of the amt. of O required for the oxidation of the total product investigated and the calcn. from this value of the calorific value with the use of certain coeffs. These coeffs. are 3.52 for carbohydrates, 3.14 for proteins and 3.28 for fats. After the removal of nonedible portions, the food is ground and 2 g. in the case of homogeneous material or 10 g. in the case of nonhomogeneous material is boiled 10-15 min. with 25 cc. 20% KOH. This is then dild. with water to 100 cc. (for the 2-g. sample) or 500 cc. (for the 10-g.). Ten cc. of the mixt. is boiled 10 min. with 50 cc. $KMnO_4$ and H_2SO_4, cooled to 70°, treated with 50 cc. K oxalate and titrated with $KMnO_4$. When the wt. of food is 850 g. and the $KMnO_4$ consumption 6 cc. then the calorific content is calcd. as $6 \times 850 \times 0.01 \times 3.4/0.2 = 867$ cal.
W. A. Moore

Combined ascorbic acid in plant foodstuffs. I. Jatindra Chandra Pal and B. C. Guha. *J. Indian Chem. Soc.* **16**, 481-95(1939).—A 10-g. sample of finely minced cabbage (I) was ground up with sand under 20% Cl_3CCO_2H, dild., centrifuged, made up to 100 cc. and its ascorbic acid (II) content was estd. by titration with indophenol. Another 10-g. sample was boiled in H_2O in air for 5 min. previous to extn. and estn. A similar estn. was made on a sample boiled in H_2O in N for 5 min. The av. percentage increases in II are 26.5 in air and 40.6 in N. Similar samples were estd. by titration, by titration after addn. of 1 cc. of *M* HCHO to the dye, and by titration after treating the ext. with $Hg(OAc)_2$. Samples were then heated in H_2O in N for 4 min. prior to making up and estg. by the 3 methods indicated. The av. percentage increases on heating for 4 min. in N are 201.4, 204.1 and 153.9, showing that, whatever method of estn. is employed, there is a remarkable increase in the II value after boiling in an atm. of N. The II content of a Cl_3CCO_2H ext. of I does not increase on heating in N; this indicates that the acid does not extract much of the bound II of that it destroys it. A mixt. of 50 g. I and 200 g. Na_2SO_4 was ground and shaken out with abs. alc. Samples were titrated before and after heating for different periods, at different temps., in air and in N. The av. percentage increases, on heating at 100° for 4 min. in air, 4 min. in N, and 10 min. in N (at 40°) are 48.6, 83.3 and 35.0. A mixt of 50 g. I and 200 g. Na_2SO_4 was ground and extd. with ether. The evapd. ext. gave a cream-like residue which was taken up in H_2O and filtered. Aliquot parts were titrated before and after heating in N. No II is extd. from I by ether but the ext. contains *ascorbigen* (III) which invariably produced free II on heating in N at 100° and occasionally on heating at 40°. The ether ext. is free from *ascorbic acid oxidase* (IV) which is present in the aq. ext. Similar expts. with alc. and ether exts. of *Phaseolus mungo* and *Aegle marmelos* demonstrate that the increase of II value which these exts. show on heating is not due to the destruction of IV but is to be ascribed to the presence of II in a combined form, III, sol. in ether, which cleaves in 0.2% HCl at room temp. Ripe and green mangoes are free from III. II Pratul Nath Sen-Gupta and B. C. Guha *Ibid.* 496-504.—Attempts were made to find the most suitable solvent for the extn. of III from dried I. Samples (10 g.) of I were ground with sand, dried at 40° and extd. with ether and benzene, benzene and acetone, benzene and $CHCl_3$ and with $CHCl_3$ and petr. ether. The exts. were evapd. down, taken up in H_2O and heated for 10 min. at 100° in an atm. of N. The reducing substances were estd. by titration with 2,6-dichlorophenol-indophenol. $CHCl_3$ seems to be the best solvent though it does not ext. III completely. It does not dissolve free II. The $CHCl_3$ ext., when heated in N, gives a dye-reducing value, of which 60-70% disappears on treatment with IV. Thus although III is present in the ext., other nonspecific reducing substances are also present in the combined state. The fact that treatment of the $CHCl_3$ ext. with H_2S in the cold does not produce any dye-reducing value shows the absence of dehydroascorbic acid. Biol. estns., in which the curative technique with guinea pigs was used and in which equiv. amts. of an ascorbigen prepn. and pure II were fed, gave comparable results. By extg. I with $CHCl_3$, evapg. and extg. with H_2O, some concn. of II can be effected. C. R. Addinall

Concentration of ascorbigen from cabbage. Baidya Nath Ghosh and B. C. Guha. *J. Indian Chem. Soc.* **16**, 505-10(1939); cf. preceding abstr.—Improved methods for the concn. of ascorbigen (I), combined ascorbic acid, have been devised. Minced cabbage (1 kg.) was pressed and the press juice (II) (600 cc.) was centrifuged and treated with glacial metaphosphoric acid. Only a fraction of the total I was pptd. and the main bulk remained in the filtrate. Other protein-pptg. agents such as CCl_3CO_2H, $(NH_4)_2SO_4$, 50% alc. and 5% HCl were employed without success. $Pb(OAc)_2$ and $Pb(OH)OAc$ were also ineffective. Norit and active charcoal ("carboactive" Schering Kahlbaum) adsorbed 60% of I from fresh II and the main part of I was eluted with alc. $CHCl_3$. The crude I from 1 kg. of fresh cabbage contained 7.43 mg. of reducing substances in a combined state of which 3 mg. consisted of nonsp. reducing material. The crude III gave a strong Molisch reaction and reduced Fehling soln. It contains N and S but no P. It gives glyoxylic acid and Pauly reactions but no xanthoproteic, biuret or Millon's tests. Treatment of crude III with 5% Na_2WO_4 and H_2SO_4 pptd. inert material and all the III originally present appeared in the filtrate. Evapn. *in vacuo* gave a highly hygroscopic brown mass. C. R. A.

Distribution of free and total ascorbic acid in the liver and muscle of Bengal fresh-water fish. K. C. Saha. *J. Indian Chem. Soc.* **16**, 511–14(1939).—Of the edible parts of an animal, the liver is the richest and the muscle the poorest in ascorbic acid (I) (Rudra, *C. A.* **30**, 5313[8]). Guha *et al.* (cf. preceding abstrs.) showed the presence of ascorbigen (II) in many plant foodstuffs. The total I contents of the liver and muscle tissues of 34 kinds of Bengal fish were detd. by hot H_2S treatment followed by oxidation with ascorbic acid oxidase (III). These values were compared with those obtained by the usual CCl_3CO_2H treatment. Samples (10 g.) were minced, suspended in 50 cc. H_2O, satd. with H_2S under reflux for 15 min. and freed from H_2S by a current of CO_2. The suspension (IV) was treated with 2.5 cc. of 20% CCl_3CO_2H, centrifuged and made up to 100 cc. The soln. was titrated against 0.5 cc. of 0.1 *M* 2,6-dichlorophenol-indophenol contg. 1 cc. of glacial AcOH. To est. reducing substances other than I, IV was centrifuged and made up to 100 cc. Aliquots (10 cc.) were incubated with 10 cc. of III (prepd. from 400 g. of white gourd and dissolved in 250 cc. H_2O) for 30 min. at pH 5.6 (2 cc. of acetate buffer). The soln. was then titrated and the total I was estd. from the difference of the 2 readings (with and without oxidase action). From the tabulated results *Anabas testudineus* has the highest I content (30 mg. %) in the muscle, followed by *Pangasius pangasius* and *Labeo rohita*. The concn. of I is highest in the livers of *L. rohita* and *Silonia silundia* (171.1 and 127.4 mg. %, resp.). The difference between total and free I is greater in liver than in muscle. In both tissues the concn. of I decreases as the size of the fish increases. C. R. Addinall

Estimation of vitamin C in foodstuffs. Pratul Nath Sen-Gupta and B. C. Guha. *J. Indian Chem. Soc.* **16**, 549–55(1939); cf. *C. A.* **31**, 5051[4]. The estn. of total ascorbic acid in foodstuffs should include the free ascorbic acid (I), the dehydroascorbic acid (II), which may be formed by the action of ascorbic acid oxidase (III), and ascorbigen (IV), if any. A 10-g. sample of disintegrated plant foodstuff (cabbage, patol (*Trichosanthes dioica*) and onion) was suspended in 50 cc. H_2O, treated with H_2S for 15 min. in the cold and then heated for 15 min. in H_2S on the steam bath. After removal of H_2S by a current of CO_2 or N, the mixt. was treated with 2.5 cc. of 20% CCl_3CO_2H, centrifuged and made up to 100 cc. Aliquots were titrated with 2,6-dichlorophenol-indophenol before and after oxidase treatment at pH 5.6 at 40° for 30 min. with cucumber or white-gourd III. The total ascorbic acid values obtained were higher than those given by the usual method of CCl_3CO_2H extn. Since III progressively deteriorates, dry and aq. prepns. should not be used after 7 and 3 days, resp. Storage in colored bottles does not check deterioration. C. R. Addinall

Effect of cooking on the thiamine content of foods. Elizabeth Aughey and Esther Peterson Daniel. *J. Nutrition* **19**, 285–96(1940).—Thiamine destruction amounted to as much as 22% in some vegetables boiled in water and addnl. amts. up to 15% dissolved in the cooking water. In cases where the cooking water is discarded the total thiamine losses in vegetables may run 20–35%. The addn. of $NaHCO_3$ materially increases the cooking losses. Roasting causes a 43% loss of the thiamine in pork loin, nearly 3 times the loss occasioned by braising. Double-boiler cooking of whole-grain cereals did not destroy thiamine; baking bread caused a 15% loss. The relative values of the different cooked foods in meeting the daily human requirements for thiamine are discussed. C. R. Fellers

Electrolytic determination of tin in food products. N. D. Podobed and F. A. Chigirinskaya. *Voprosy Pitaniya* **7**, No. 6, 142–7(1938); *Khim. Referat. Zhur.* **2**, No. 5, 67(1939).—Destroy org. matter by heating with a mixt. of H_2SO_4 (1:1) and H_2O_2. Det. Sn by electrolysis in a H_2SO_4 soln. in the presence of $H_2C_2O_4$ and NH_4OH with a current strength of 3–4 amp. at 70°. The presence of Cu interferes with the Sn detn. About 3–5 hrs. is required for the complete analysis. The error of the detn. is about ±0.1 mg. W. R. Henn

Effects of naringin and hesperidin on albino rats. Robert H. Wilson and Floyd DeEds. *Food Research* **5**, 89–92(1940).—The continued feeding for 200 days in concns. as high as 1% by wt. in standard diets, gave no evidence of cumulative injury as judged by growth curves, blood-sugar levels, wts. of important viscera and histol. examn. of these tissues. C. R. Fellers

Ripening processes of bread cereals (wheat). Karl Schmorl. *Naturwissenschaften* **27**, 834–7(1939).—A review of the phys. development stages of the wheat grain, including the chem. changes taking place, such as starch formation and protein conversion. B. J. C. v. d. H.

Flour illnesses. H. A. E. v. Hishoeck and D. J. Roux. *Acta Otolaryngol.* **27**, 680–90(1939) (in English).—The incidence of sensitivity to pure proteins obtained from grains is shown by the skin-scratch method to be high in bakers or millers suffering from rhinitis vasomotoria, asthma and eczema. One hundred and fifty normal subjects, 35 allergic patients and 20 eczema patients showed a 1-pos. reaction to flour. Some flour workers are sensitive to proteins from flours with which they do not come in contact. Of 199 persons (50 normal, 50 allergic, 10 eczema cases, 89 flour workers) only 11 (bakers with active eczema) were sensitive by the skin-patch method to NH_4 persulfate improver. The latter sensitivity probably does not persist after healing the eczema, and passive transference tests indicated it to be a toxic reaction distinct from flour sensitization. Conditions resulting from flour illness can be prevented by change of trade or improved working conditions (ventilation, masks, avoidance of contact). Desensitization procedures with active flour proteoses are being investigated and some amelioration has been noted with passage of time. J. McAfee

The antioxidative action of finely milled oat flour on milk. O. F. Garrett. *Milk Plant Monthly* **29**, No. 2, 41–2, 80(1940).—Oat flour exhibited definite antioxidative properties in retarding the development of oxidized flavor in milk induced by contamination with Cu or by exposure to sunlight. The presence of oat flour on the paper from which milk containers were made had an inhibiting effect on the development of sunlight flavor in the milk. Treatment of the paper with oat flour prior to fabricating and paraffining seemed to be the most satisfactory and feasible method of obtaining results. A. H. Johnson

Information on and determination of the antioxidant of oat flour. W. Diemair, R. Strohecker and K. Reuland. *Z. Untersuch. Lebensm.* **79**, 23–42(1940).—Reactions of Strohecker, *et al.* (*C. A.* **32**, 816[9]), v. Fellenberg (*C. A.* **18**, 3731), Kreis (cf. Taufel, *et al.*, *C. A.* **26**, 863) and the peroxide value were used as criteria for progress of oxidation. Addn. of 10 g. of oat flour yielded some protection to olive oil. Distinct protection to peanut, corn, olive, sesame, almond, poppy-seed, soybean and hardened train oils was obtained on addn. of 1–2.25% solvent-extd. oat oil; no retarding of rancidity was obtained on linseed, train-liver and certain soybean-oil samples. Partly rancid oils were not perceptibly influenced. In chromatographic adsorption investigations, with animal charcoal, Spanish earth and clarite as adsorbents and petr. ether and C_6H_6 as solvents, no characteristic zone formation was observed. The active constituent was not adsorbed from the oil. A high P content of the oat oil extd. with petr. ether at first suggested that the antioxidant may be a phosphatide-like material, but tests did not bear this out. Boiling the oil with acid yielded a ppt. and destroyed the antioxidant. Treatment of the petr. ether or the alc.-C_6H_6 ext. of oat flour with EtOH or MeOH or ice-cooled acetone yielded a ppt. contg. an antioxidant substance. The ppt. from this petr. ether ext. gave a much greater antioxidant effect than that from the alc.-C_6H_6 ext. The former contained a 1:17.5 and the latter 1:1.5 P:N ratio. Such a high N content in the most active ppt. suggested the presence of a protein. It gave pos. protein reactions and reduced Fehling soln. The vacuum-dried ppt. was insol. in C_6H_6, ether, $CHCl_3$, MeOH, EtOH, BuOH, AmOH, PrOH, $C_6H_5CH_3$, pentane, H_2O and dil. acids. It was sol. in pyridine and alk. water of pH 12.2. Pepsin

digestion destroyed the antioxidant capacity and split off a fatty material. M. M. Piskur

Colloid chemistry and dietetics. W. Heupke. *Kolloid-Z.* **89**, 291–3(1939).—The colloid chemistry of baking is discussed. Fresh bread is often unsuitable for use for persons with digestive disturbances because it is much more elastic than stale bread and cannot be broken into such fine particles. Fresh bread is therefore more resistant to digestion. In zwiebach the starch is much more broken down to sugars than is the starch in ordinary bread. Felix Saunders

Biochemical transformation of gluten in bread dough. Ugo Pratolongo and Luigi Salto. *Ricerca sci.* **10**, 941–7 (1939).—Preliminary results are given of investigation of the biochem. transformation of gluten in the "ripening" of dough in relation to different chemical, enzymic and technological effects. F. C. Nachod

Microscopic examination of dairy products and their calculations. Hans Edel. *Milk Dealer* **29**, No. 5, 34–5 (1940). A. H. Johnson

Flavors and odors of milk. C. J. Babcock. *13th Ann. Rept. N. Y. State Assoc. Dairy & Milk Inspectors* **1939**, 239–50.—A review. A. H. Johnson

Goat milk and its supervision. J. C. Marquardt. *13th Ann. Rept. N. Y. State Assoc. Dairy & Milk Inspectors* **1939**, 153–66.—Mixed goat milk contains 3 to 5% of fat and 12.7% of solids. The av. lactose content is 3.8%. The chloride content averages 0.21%. This accounts for its salty flavor. The feed requirements to produce a pound of goat milk or cow milk are comparable. A. H. Johnson

Vitamin A in sterilized and irradiated milk. A. Fleisch and A. Schmeper. *Z. Vitaminforsch.* **9**, 330–8(1939). Vitamin A was detd. by means of a spectrophotometer. The vitamin A content of milk was not affected by its antirachitic irradiation. Sweetened condensed milk and milk powder contained more vitamin A than sterile evapd. milk. Sterilization in the presence of the residual air in the can or in an atm. of N had no effect on the content of vitamins A and C in the milk. 13 references. J. S. H.

Preliminary report on the deaeration of market milk. Paul F. Sharp, David B. Hand and E. S. Guthrie. *13th Ann. Rept. N. Y. State Assoc. Dairy & Milk Inspectors* **1939**, 95–104.—A method of detg. the O_2 content of milk is described. It consists in adding an excess of ascorbic acid to the milk and detg. by titration with 2,6-dichlorophenol-indophenol the decrease in ascorbic acid when the rate of oxidation of ascorbic acid is accelerated in the dark and cold by the action of 1 mg. of Cu per l. or by agitating the sample in a closed full tube exposed to Hg-vapor light. It appears that market milk can be deaerated cheaply and easily by a continuous process. Deaerated milk has greatly increased resistance to the development of oxidized flavor and the ascorbic acid remains stable. A. H. J.

Examination of lactose content of normal milk. I. Analytical-chemical examinations. H. C. Jørgensen. *Kgl. Veterinær- og Landbohøjskole, Aarsskr.* **1939**, 130–3 (in English). **II. Statistical treatment of the data.** P. S. Østergaard. *Ibid.* 133–8. The lactose content of 48 samples of milk taken at intervals throughout the year 1938 from the mixed milk of a large number of herds was detd. by Gohr's $K_4Fe(CN)_6$ titration method and by Scheibe's polarimetric method. Two detns. were made by each method, the mean lactose hydrate content by Gohr's method was 4.969% and by Scheibe's method 4.943, the difference being significant. No definite seasonal trend was found. The titration method gave better agreement between duplicates than the polarimetric method, the standard errors being 0.0109 and 0.0185, resp. By combining the results of the two methods the following figures were obtained: lactose hydrate content 4.96%, standard deviation 0.0769, standard error of the mean 0.0111, and coeff. of variation 1.6. Through *Dairy Sci. Abstracts* **1**, No. 1, 86(1939). C. L. B.

Oxygen in milk and its relation to destruction of vitamin C and the development of oxidized flavor. E. S. Guthrie, David B. Hand and Paul F. Sharp. *12th Ann. Rept. N. Y. State Assoc. Dairy & Milk Inspectors* **1938**, 101–5; cf. *C. A.* **33**, 4334[6]. A. H. Johnson

The digestibility of processed milks. Leslie Chambers. *13th Ann. Rept. N. Y. State Dairy & Milk Inspectors* **1939**, 179–94.—Methods of measuring the probable digestibility of milks are discussed. Among such methods are curd tension, curd size and rate of digestion *in vitro*. Data are not yet available by which the true digestibility in the human digestive systems can be detd. by phys., chem. or biol. methods. A. H. Johnson

Losses on boiling milk. Mary Andross. *J. Soc. Chem. Ind.* **58**, 252–4(1939).—By discarding the insol. curd from boiled milk about 10% of the nourishment and 13.29% of the solids are lost. This loss includes 5.75% of the ash; Ca, 13.73%; P, 5.4%; protein, 13.5%; fat, 23.5%; lactose, 1.9%; albumin, 74.13%. R. E. R.

Electrodialysis of skim milk. I. Manufacture of casein. Zirō Katō. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 376(1939). Fresh skim milk (600–650 g.) was electrodialyzed in the middle chamber of a 3-compartment cell, sepd. by thick parchment-paper membranes (0.12 mm.), with Pt electrodes (5 × 10 sq. cm.) suspended in water contained in the outer chambers. Best working conditions were: current, 1 amp./70 sq. cm. of membrane; temp., 30–40°; pptn. at pH 4.3–4.6; and mech. stirring. During electrodialysis the pH falls; when the pH was approx. 5.6–5.7, the particles migrated toward the anode and deposited on the anodic membrane, then when it fell below 4.9–5.0, they migrated toward the cathode and deposited on the cathodic membrane. Approx. 4 hrs. are required for complete pptn. of the casein, the product (yield, 15–17 g.; power consumption, 300 w.-hrs. per kg. skim milk) having 1.8% ash (dry basis) and greater joint strength than most com. caseins. From the results of examn. of 10 different types of membranes, it was found that membranes with neg. charge, such as parchment paper or cellophane, are most suitable. Electrodialysis of 28 g. lactose and 5 g. KCl in 700 cc. of water results in decrease of pH value even with chrome-gelatin-silk as anodic membrane, a result opposite to that obtained with skim milk. **II. Manufacture of lactose.** *Ibid.* 376–7.—The whey remaining after removal of the casein was heated nearly to boiling and filtered to remove a part of the remaining protein. The clear filtrate (600–650 cc.) was electrodialyzed as above, with thick parchment paper or cellophane (0.06 mm.) as the membrane. After 2–3 hrs. the pH was approx. 9; the mixt. was filtered and the clear filtrate concd. under reduced pressure to a solid content of 30–40%. The yield of lactose, which was pptd. from the concd. filtrate by alc., was 22–25 g. (power consumption, 150 w.-hrs. per 600–650 cc. of acidic whey). A sample of lactose obtained on the other hand by addn. of $Ca(OH)_2$ or NaOH soln. to the whey, filtration concn., and pptn. with alc. was yellowish and of poor quality. George Ayers

Phosphatase test for controlling pasteurization of milk. A. Alessandri. *Ann. igiene (sper.)* **48**, 405–17(1938); *Dairy Sci. Abstracts* **1**, No. 1, 107(1939). A. describes various methods of pasteurization adopted in Italy and certain advantages of the Stassano method as used in Rome and Parma and the results of an application of the Kay and Graham qual. test (cf. *C. A.* **29**, 6657[6]) for control of holder pasteurization. Three series of expts. were made with 20 samples each of pasteurized, raw and mixed pasteurized and raw milk. With the first, the test made it possible to see that effective pasteurization had been carried out at 63° for 30 min. With the second the test was satisfactory, but in 6 samples there was a slight blue coloring and lower phosphatase content. With the third, the test showed whether more than 5% of raw milk had been added to pasteurized milk. The method is considered to be rapid, simple and economical and useful also for small farms, and the results important if not yet sensitive enough. C. L. B.

Precision in reading the results of the phosphatase test. F. W. Gilcreas and W. S. Davis. *13th Ann. Rept. N. Y. State Assoc. Dairy & Milk Inspectors* **1939**, 67–78; cf. *C. A.* **34**, 1405[9].—The various methods for making the colorimetric detn. required by the phosphatase test were

studied. The use of permanent standards prepd. from inorg. colored soln. yielded accurate results when the essential conditions of the depth of color soln. and a blue glass plate for reading the colors were observed. Variations from these conditions and lack of sensitivity of the eye to detect color differences led to errors in the results. The use of a photoelec. colorimeter for reading the results eliminated error due to the human element and to fading and other changes in color standards. A simple photoelec. colorimeter known as the "Luximeter" has been developed in which calibration has been made in terms of mg. of phenol per 0.5 ml. of milk and also in terms of enzyme units and for reporting the results of the phosphatase test modified by the New York City Department of Health. This instrument has been found to give results with the official and modified tests that agree closely with those obtained with the permanent color standards.
A. H. Johnson

The effect of pasteurization on the vitamin C content of winter milk. Carl G. Holmberg. *Kgl. Fysiograf. Sallskap. Lund, Forh.* **7**, 105–10(1937)(Pub., 1938); cf. *C. A.* **31**, 5048⁴.—Ascorbic acid (I) in cow milk was detd. by the method of Martini and Bonsignore (*C. A.* **29**, 1121⁶); dehydroascorbic acid (II) in the milk was estd. by subtracting the amt. of I from the value obtained by titration with methylene blue of milk treated with H_2S. In 4 samples of milk kept in black-lacquered bottles the I content about 1 hr. after milking varied from 10.3 to 15.6 mg./l. and the II content from 0.2 to 2.7 mg./l. In 5 samples of milk kept in dark-green bottles the I content varied from 3.4 to 14.4 mg./l. and the II content from 3.0 to 8.4 mg./l. Apparently milk must be completely protected from all light in order to prevent the conversion of I into II. If milk is heated to 70° in total darkness either in air or in light in the absence of O, I remains nearly unchanged while II is almost completely destroyed. Milk should be protected from light during pasteurization to avoid the destruction of vitamin C. Ruth Berggren

The discoloration of methylene blue by Streptococcus thermophilus and Bacterium coli in sterilized milk. T. Matuszewski. *Polish Agr. Forest. Ann.* **39**, 191–218(in English, 218–20)(1937).—The procedure in this study consisted in inoculating definite vols. of sterilized milk with known vols. of active bacterial cultures, adding the dye in the ratio 1:200,000 and detg. the initial and final no. of cells for a definite time of discoloration at a const. temp. of 37–39°. Previous studies in this series include the math. relationship involved in this study (cf. *C. A.* **29**, 6620⁹; **30**, 2273¹, 3105⁸). Two strains of *S. thermophilus* and *B. coli*, resp., were analyzed. It was observed in both species that the moment of discoloration took place at a phase later than the logarithmic one, i. e., at that near the max. stationary phase. This finding was supported both by a high acidity and a distinct decrease of the rate of growth at the end of the discoloration period. The rate of discoloration of methylene blue in the case of *B. coli* proved to be very susceptible to the access of O_2 in such a way that the discoloration only took place when the surface of milk was covered with a layer of paraffin oil. In the tests without the oil the discoloration occurred only in the lowest parts of the milk. Otherwise the O_2 demand of *B. coli* was illustrated by the fact that the organisms gathered in preponderance in the upper parts of the unprotected milk (their motility permitting such migration), and also by a gradual decrease of the rate of activating H, so that the greater the content of O_2 in milk the easier was it activated by the microorganisms. Math. analysis of the data gave curves of *B. coli* with steeper slopes than those of streptococci; this indicates that with greater initial nos. of cells the discoloration is caused sooner by the streptococci, while with smaller initial nos. of cells *B. coli* effects decolorization sooner than streptococci. Av. characteristics of one cell, as computed on the basis of the initial and final no. of cells, times of discoloration, O_2 content in the milk and the increases of lactic acid, have shown that there is a pos. correlation between the particular functions of one cell, i. e., that a greater rate of growth is always followed by more intensive activation of H_2 and a stronger acidification of milk. Especially peculiar was the fact that in the earlier phases of bacterial growth the ratio of the intensity of the H_2 activation to the rate of development of cells was always higher than in the later phase of growth of the bacteria in question. C. T. Ichniowski

The Bacterium coli test in the routine analysis of raw milk. Jan Smit, B. M. Krol and A. J. van Wijk. *A. van Leeuwenhoek J. Microbiol. Serol.* **6**, 1–10(1939–40).—It is important that the test for *Esch. coli* in the routine examn. of milk should be completed in 24 hrs. A large no. of the coliforms found are true *Esch. coli* which have lost their power to form indole. The broth recommended is prepd. from 10 g. peptone (Witte or Difco), 10 g. glutamic acid, 10 g. lactose, 5 g. NaCl, 1 g. K_2HPO_4, 4 g. Na_2CO_3 (anhyd.), 0.26 g. fuchsin and 1.9 g. $Na_2SO_3.7H_2O$ made up to 1 l. with distd. H_2O. Rachel Brown

Mastitis. VII. Relation of bovine mastitis to milk production. G. J. Hucker, Marion S. Reed and E. S. Savage. *N. Y. Agr. Expt. Sta., Tech. Bull.* **244**, 3–97 (1937); cf. *C. A.* **32**, 3840⁴.—The percentage of milk fat was not affected independently of the total production. Total and milk-fat production trends responded similarly to the effects of infection. Conclusion: Streptococcic infections of the udder must be sufficiently advanced that the milk be alk. to bromothymol blue or show evidences of infection by changes in its phys. appearance before a material effect can be noted on production. C. R. Fellers

Infectious bovine mastitis. VII. Characteristics of udder staphylococci. W. N. Plastridge, E. O. Anderson, L. F. Williams and F. J. Weirether. *Conn. (Storrs) Agr. Expt. Sta., Bull.* **231**, 5–60(1939); cf. *C. A.* **31**, 8592⁵.—Av. leucocyte count of 2135 normal samples of milk was 73,000 per cc. with an av. chloride content of 0.121%; comparative figures for 398 samples yielding hemolytic staphylococci are 1,361,000 and 0.151%, resp. While 99.6% of the hemolytic cultures produced acid, or acid and coagulation in litmus milk, 67.7% of the nonhemolytic cultures also possessed this property. The ability of recently isolated udder staphylococci to coagulate human plasma (or rabbit) was more closely related to irritating ability than any other property. 84 references. C. R. Fellers

The hygienic control of acid fermented milk. J. Pisu and M. Guarnacci. *Igiene mod.* **8**, 337–50(1938); *Dairy Sci. Abstracts* **1**, No. 1, 69(1939).—For the hygienic control of yoghurt it is sufficient to test organoleptically, to examine chemically for fixing acidity, to make a direct microscopical examn. with Gram-stained specimens for controlling the acidying flora, and to examine the culture for *B. coli* and possible pathogenic intestinal bacteria. Yoghurt should be a white compact mass, of homogenous appearance, gelatinous consistency, aromatic smell and acid flavor. Its lactic acid content may vary from 0.40 to 1.50% with a normal range of 0.80 to 1.0%.
C. L. B.

Adulteration and constants of ghee. N. S. Doctor and B. N. Banerjee. *J. Univ. Bombay* **8**, Pt. 3, 247–54(1939).—To det. the quality and the purity of ghee, a clarified Indian butter fat, it is necessary to take into consideration the cumulative effect of the phys., chem. and physiol. consts. and the history of the origin of the sample. A no. of these consts. for various kinds of ghee are given in 4 tables. F. E. Brauns

A rapid multiple-color test for the approximation of available chlorine. Harry Scharer. *13th Ann. Rept. N. Y. State Assoc. Dairy & Milk Inspectors* **1939**, 55–66.—A colorimetric test for the approximation of available Cl is presented based on the formation of a meriquinone and a holoquinone of *o*-tolidine dihydrochloride and their intermediate products. Depending on the level of Cl concn., the method yields 4 distinct colors which can be readily distinguished. The method is simple and inexpensive and will distinguish between a hypochlorite and a chloramine.
A. H. Johnson

Factors influencing the physical characteristics of chocolate milk. J. G. Brereton, W. B. Combs and H. Macy. *Milk Dealer* **29**, No. 5, 38, 62–8(1940).—With com. nonsettling chocolate milk prepns. the temp. of the milk at

the time of adding the powder or sirup does not affect the stability provided the agitation is satisfactory and the product does not contain alginate stabilizers. Increasing the temp. of pasteurization decreases the amt. of stabilizer needed to produce a stable chocolate milk. The phys. state of certain stabilizers in water suspension is greatly affected by the presence of relatively low concn. of certain salts. The addn. of small amts. of $CaCl_2$ to milk causes the gelation of purified alginate stabilizers in that milk. Chocolate milks contg. alginate stabilizers tend to thicken on holding at 40°F. When stabilizers are used in the prepn. of chocolate milk, the cacao fat content and the relative fineness of the av. com. cacao did not appear to have any appreciable effect on the stability of the product. A. H. Johnson

Examinations of cream ripening. Søncke Knudsen, S. Nielsen and H. V. Knudsen. *Kgl. Veterinaer- og Landbohøjskole, Aarsskr.* **1939**, 7 20(in Danish with English summary); *Dairy Sci. Abstracts* **1**, No. 1, 61.—The progressive change in pH value during the ripening of cream by starters and the prepn. of starters, under normal conditions of practice in Danish creameries is shown. The effect of variations in ripening temps., the proportion of starter used and the age of the starter are given. Starters show max. activity about 1 hr. after coagulation but the loss in activity after 19 hrs. is not great. The pH values of creams just before churning and their corresponding buttermilks are identical; but titratable acidities, based on creams less fat, show varying and marked falls in the buttermilk owing to loss of CO_2 in churning. Rates of ripening in creams, based on creams less fat, are slightly slower than in the corresponding buttermilks. In starter ripening, bacterial increase and fall in pH value accompany one another fairly closely, but the titratable acidity continues to rise after the bacterial count and pH value have both become stationary. C. L. B.

Thiocyanogen numbers of Danish butter fat. A. Sørensen. *Kgl. Veterinaer- og Landbohøjskole, Aarsskr.* **1939**, 1-6(in German); *Dairy Sci. Abstracts* **1**, No. 1, 94.—Av. figures for 20 samples of Danish butter produced in September, 1937, were thiocyanogen no. 35.7, I no. 39.3, satd. acids 58.6%, oleic acid 37.3% and linoleic 4.2%. Corresponding figures for 10 samples produced in January, 1938, were 26.6, 30.6, 69.2, 26.2 and 4.6, resp. Oiliness and tallowiness induced by storage did not markedly affect these values. C. L. B.

The manufacture of ice cream. Arthur Henry White. *Can. Dept. Agr., Tech. Bull.* **26**, 31 pp (1940).—Review, including compn. and tests. G. G.

Influence of some mix components on the texture of ice cream. W. C. Cole and J. H. Boulware. *J. Dairy Sci.* **23**, 149-57(1940).—The organoleptic test, the microscopic examn., ice-crystal size and dilatometer measurements of the rate of freezing were used as a basis for evaluating the factors contributing to ice-cream texture. An increase in the percentage of milk solids as a result of increasing either the fat or the milk-solids-not-fat improved the smoothness of ice-cream texture, as judged organoleptically, and tended to decrease the size of the ice crystals formed in ice cream. When the milk-solids contents of the samples were maintained essentially the same but the ratio of fat to milk-solid-not-fat varied significantly, the milk-solids-not-fat were more effective than the milk fat in causing the formation of small ice crystals. Under the same conditions the dilatometer data show that the milk-solids-not-fat had a greater influence than did fat in retarding freezing. It is suggested that smaller ice crystals formed in samples with a higher proportion of milk-solids-not-fat may be due to a retarding action of the latter in the growth of ice crystals. An increase in the proportion of fat in ice cream was found to have a greater effect on texture judged organoleptically than it did in reducing the ice-crystal size judged microscopically or in retarding the growth of ice crystals as measured by the dilatometer. When variations in compn. are not too great, in a series of samples, one can expect good correlation between ice-crystal size measured microscopically and smoothness of ice cream judged organoleptically. This relation does not necessarily hold, however, if the proportion of fat to milk-solids-not-fat is very high or very low, possibly because fat in ice cream has a lubricating effect in the mouth, whereas its effect is not nearly so pronounced with milk-solids-not-fat. A. H. J.

The study of methods of application of pH determination in butter sera. C. H. Parsons. *Rept. Res. Comm. Am. Butter Inst.*, **1938**, 1; *Dairy Sci. Abstracts* **1**, No. 1, 95.—The quinhydrone electrode is stated to be more satisfactory than the glass electrode for detg. the pH of butter serum owing to the fragility of the glass electrode and the difficulty of keeping it free from fat. 5000 samples of butter kept at 70°F. for 8 days lost an average of 1 point in score when the pH of the fresh butter was 6.6 to 7.0, and 0.5 point when the pH was 6.7. Salt contents greater than 2% tended to increase the loss of score. C. L. B.

Borated butter. L. Delavelle. *Presse méd.* **47**, 1201 (1939).—The use of boric acid as a preservative of butter is not free from possible danger. The daily consumption of 40 g. of butter would lead to the ingestion of 0.2 g. of boric acid, which approaches the max. dose used in reducing cures. A. E. Meyer

Relationship of acid-number variations to the qualities and flavor defects of commercial butter. E. L. Fouts. *J. Dairy Sci.* **23**, 173-9(1940).—Most samples of unsalted butter increased in acid no. of the fat during holding for 6 days at 21°. When samples of com. unsalted butter were held at 21°, approx. 25% became rancid within 6 days. No close correlation existed between the acid no. of the fat and the quality of com. unsalted butter; butter of good quality often had relatively high acid no., while some rancid samples had relatively low acid no. When samples of com. salted butter were held at 21°, comparatively few samples became rancid in 6 days. A. H. J.

Changes in biacetyl and acetylmethylcarbinol contents of butter at various temperatures. E. A. Prill and B. W. Hammer. *J. Dairy Sci.* **23**, 159-68(1940); cf. *C. A.* **33**, 3905. In general, salted butter contg. about 2.25% salt made with different manufg. procedures showed only relatively slight changes in biacetyl and acetylmethylcarbinol plus biacetyl contents when held frozen or at 36 to 45°F. Even at 70° F. at which temp. chem. deterioration is especially rapid in butter, the contents of these substances were largely retained for considerable periods. With unsalted butter the changes at −10 to 0° F. were relatively slight, but at 36 to 45° F. significant changes occurred, both increases and decreases being involved A. H. Johnson

The blowing of cheese. G. Schwarz, O. Fischer, A. Lembke and H. Jensen. *Vorratspflege u. Lebensmittelforsch* **1**, 399-412(1938); *Dairy Sci. Abstracts* **1**, No. 1, 67(1939). KNO_3 inhibits gas production by coli-aerogenes bacteria in cheese but methylene blue, metol, hydroquinone, and milk-fat globule "membrane substances" increase it. Data are given for the effect of specific substances on the production of CO_2 and H_2 by coli-aerogenes strains in various media, and the results discussed in relation to the fermentation scheme of Tikka. Lactoflavin appears to increase the production of H by aerogenes strains and to decrease that by true coli types. Among other factors favoring H production are the amino acids in a casein digest. C. L. B.

The production of lactic acid from substances other than sugar by Lactobacillus casei. C. C. Thiel. *Proc. Soc. Agr. Bact.* (Nat. Inst. Research Dairying, Shinfield, Reading) **1938**, 38-40; *Dairy Sci. Abstracts* **1**, No. 1, 54.—A strain of *Lactobacillus casei* isolated from Cheddar cheese in New Zealand produced more lactic acid in peptic milk digest and pancreatic and peptic casein digest mediums than could be accounted for by the sugar utilized. Appreciable amts. of lactic acid were produced in casein digest mediums free from sugar. C. L. B.

Removal of markings on eggs. Guglielmo DeSalvo. *Ann. chim. applicata* **29**, 481-4(1939).—Dates, country of origin and other markings stamped on eggs to meet requirements of the laws of various countries are often fraudulently removed. HCl or NaClO solns. remove stamping inks without leaving telltale marks. To detect this fraud a drop of 0.001 *N* soln. of picric acid is allowed

to stand on the eggshell for 10–20 seconds and then washed off with water. A yellow stain remains on unwashed eggs, but no stain is left on eggs treated as above, as the acid or hypochlorite removes the protein film from the surface of the egg. A. W. Contieri

Change in nitrite during storage of nitrite pickle salts. Georg Stamm. *Z. Untersuch. Lebensm.* **78**, 464–70(1939).—Tabulated data show the loss of nitrite occurring in (meat) pickel salts on storage. The losses occurred during dry storage, humid storage and storage in glass bottles, but to a different degree. Results of detns. of nitrite and total N show that the loss could not be attributed to oxidation of nitrite to nitrate by atm. O. S. suggests that the loss is due to volatilization of N oxides and that this may be influenced by impurities in the NaCl used in the mixt. $MgCl_2$ may react with moisture to yield MgO and HCl and N_2O_3 may develop as follows: $2NaNO_2 + 2HCl = 2NaCl + H_2O + N_2O_3$. M. M. Piskur

Fresh fish. I. The role of pH in the preservation of fish. Aristide Nadeau. *J. Fisheries Research Board Can.* **4**, 355–62(1939)(in French).—The effect of pH on the rate of increase of microorganisms in fish was studied in expts. designed to lengthen the period of time during which fresh fish can be stored. The amt. of Me_3N present was used as an index of decompn. (cf. Beatty and Gibbons, *C. A.* **31**, 3581[9]). Fresh fish were cut into fillets, ground and the juice was expressed. Equal amts. of this expressed juice were mixed with lactate, citrate and phosphate buffers and stored at 0° for periods up to 60 days. At intervals during this storage period, Me_3N was detd. in the buffered expressed juice. With lactate buffer, the formation of Me_3N was very rapid above pH 6.6; at pH 6.0 the formation of Me_3N was decreased, and was practically stopped in the range 5.2 to 3.7. Expressed juice buffered in this range developed no disagreeable odor during the 60-day storage period. With phosphate and citrate buffers the pH must be below 5.0 to preserve the expressed juice. Whole fillets cut from fresh fish were also preserved, by immersing the fillets in the buffer solns. until test samples showed that the flesh had attained the desired pH. The fillets were then removed from the buffered solns., placed in parchment paper and stored at 0°. At suitable intervals, samples of the flesh were ground and centrifuged to obtain muscle juice for the Me_3N detn. Phosphate buffers in the pH range 6.2 to 6.4 promoted the decompn. of the fillet. With citrate buffer at pH 4.6 there was but little decompn. during 40 days. Lactate buffers gave the best preservation of the fish fillets; at pH 4.7 there was slightly less decompn. than with a citrate buffer at pH 4.6. From the practical standpoint, however, it is easier to use citrate buffers, since the lactate buffers require longer immersion to bring the fillets to the desired pH. W. Gordon Rose

Proximate analysis of British Columbia herring in relation to season and condition factor. John L. Hart, Albert L. Tester, Desmond Beall and John P. Tully. *J. Fisheries Research Board Can.* **4**, 478–90(1940); cf. *C. A.* **33**, 764[7]. —Analysis of samples of *Clupea pallasii* from different seasons showed the following compn: H_2O 64.2 to 80.2, oil 4.1 to 19.1, protein 10.1 to 16.8% and ash 1.9 to 2.8%. The contents of cans contg. random samples of herring were ground, thoroughly mixed and sampled. Dry wt. was detd. as the residue after 24 hrs. at 98°. The dried samples were ground, redried, and the fat was detd. as the loss of wt. after 4 hrs. of extn. in a Soxhlet app. with CCl_4. The extd. sample was ground to pass an 80-mesh sieve, re-dried, and total N detd. by the Kjeldahl-Gunning-Arnold method. Oil content was highest in the summer, declined during the fall and winter, and fell to a min. after spawning time in early spring. Calorific value of herring varied between 0.94 and 2.41 Cal. per g. From analytical data, the authors conclude that 50% of the energy in lean fish is available when the herring are used on the table and 80% when reduced and used for feeding stock. In fat fish, 59% of the energy is used when fish are eaten fresh or canned and 84% as food for stock. In fish reduced and used for fertilizer, it is likely that all the nitrogenous matter is ultimately in a condition to be used as plant food, i. e., 100%. There was a reciprocal relationship between oil and H_2O content but this is considered due to the method of calcn. A pos. relationship exists between condition factors and oil content, but is considered too loose to be of value for calcg. oil yields. Analysis show that yields of less than 7.4 U. S. gal. per ton are rare and may reach 30 gal. per ton. Maurice M. Rath

Penetrometers for fruit. G. M. Dreosti and P. Wissing. *Union S. Africa Dept. Agr. Forestry, Rept. Low-Temp. Research Lab.* **1937 38**, 271–5(1939).—A preliminary investigation of the limitations of this type of instrument was made. The readings are not proportional to the cross-sectional area of the plunger and the force is not uniformly distributed over the face of the plunger. The exact shape of the plunger face does not affect the readings to any appreciable extent. K. D. Jacob

Control of rots of apples. F. D. Heald. *Wash. Agr. Expt. Sta., Popular Bull.* **158**, 3–8(1939).—The spraying of apple boxes with a NaOCl soln. contg. at least 0.4% available Cl effectively prevents spread of blue mold from the containers. Steam sterilization is also effective. Cleaning solns. to remove Pb and As residues are likewise effective in removing mold spores from the fruit and thus lessening the likelihood of later spoilage. Of these cleansers, Na silicate is most toxic to mold spores, followed by 1% HCl and Na_2CO_3. Apparently field sprays have no effect on the incidence of storage rots in apples. C. R. Fellers

Effects of calcium salts in canning tomatoes. Maurice Siegel. *Canner* **90**, No. 2, 12–13(1939).—The firming action of certain Ca salts on canned tomatoes previously reported by Kertesz (*C. A.* **33**, 9472[7]) is confirmed. Ca lactate and $Ca(OAc)_2$ do not produce a satisfactory firming effect. The presence of NaCl has no effect on the action of sol. Ca salts such as $CaCl_2$. C. R. Fellers

Hydrogen swells in canned fruits. T. P. Hoar. *Canner* **90**, No. 3, 18(1939); cf. *C. A.* **33**, 8549[1], 9245[3].—With the types of steel base tested and fruits packed, the use of Sn plate with a relatively high Cu and low P content will ordinarily double the usual life of the canned foods. The comparative tendency of a can to form H swells may be assessed roughly by a corrosion test of the steel base with a pure citric acid soln. Steel base with high Cu content, up to 0.2%, and also with less than 0.045% P, gave the lowest rate of H swell formation in lacquered-can packs of black currants, gooseberries, loganberries, pluums, raspberries and strawberries. S content within the limits investigated (0.02–0.09%) was without influence. The pack of white cherries was not influenced by the Cu, P or S content of the steel base. C. R. Fellers

Standards for frozen-pack fruits. Paul M. Williams. *Canner* **90**, No. 9, 16–18(1940). C. R. Fellers

Stainless steel in the freezing plant. Claudia Gavrilova. *Canner* **90**, No. 6, 22–3, 26(1940). C. R. Fellers

Application of calcium in the commercial canning of whole tomatoes. Z. I. Kertesz, T. G. Tolman, J. D. Loconti and E. H. Ruyle. *Canner* **90**, No. 12, Pt. 2, 52(1940); cf. *C. A.* **33**, 9472[7].—Peeled tomatoes are dipped in a soln. contg. 2% $CaCl_2$ for 2 min. for obtaining greater firmness. Such tomatoes absorb 150–200 p. p. m. of Ca, with a min. of 76 p. p. m. for best results. The av. Ca content of tomatoes canned under com. conditions with added Ca was 62.2 p. p. m. C. R. Fellers

Effect of added calcium on tomatoes. D. Godfrey. *Canner* **90**, No. 12, Pt. 2, 52–8(1940).—The addn. of Ca to whole canned tomatoes increases their firmness, improves their texture and decreases the loss between put-in to drained wt. NaCl has little effect on the Ca effectiveness. $CaCl_2$ gives good results but cannot be made up readily into tablets because of its hygroscopic nature. The $CaCl_2$ should be added directly to tomato juice used for filling the cans. C. R. Fellers

Application of calcium to canned tomatoes. E. H. Ruyle. *Canner* **90**, No. 12, Pt. 2, 58(1940).—Commercially, the use of NaCl tablets contg. Ca salts is the most convenient procedure for adding Ca compds. to canned tomatoes for the purpose of firming the flesh. C. R. Fellers

Heat penetration in canned tomato juice. H. P.

Stevens. *Canner* **90**, No. 12, Pt. 2, 45–6(1940).—Viscosity of the juice markedly affected heat transfer. Agitation of cans during thermal treatment materially decreased the time required to sterilize tomato juice. Use was made of a Stormer viscometer for viscosity detns. C. R. Fellers

Rate of heat penetration in canned tomato juice. L. J. Frost. *Canner* **90**, No. 12, Pt. 2, 46 8(1940).—Tomato juice is a much slower-heating product than was formerly believed. The Stormer viscometer readings did not correlate well with heat-penetration data on canned tomato juice. Heat-penetration data for different-sized cans are given. C. R. Fellers

Chemical constituents of some fruits grown in British Columbia. F. E. Atkinson and C. C. Strachan. *Sci. Agr.* **20**, 321–8(1940).—The percentages of total sugars were: in apples 10.7–14.7, apricots 9.0, peaches 7 11, Royal Ann, Bing, Lambert and Deacon cherries 14.5, 14.5, 15.0 and 12, resp., prunes 10.0 27.5, grapes 12 25, black, white and red currants 5.3–6, strawberries 5.5 8.5 and red raspberries 9.4 14.2. Data are given on acidity, reducing sugar, sucrose, ash, pectin, pH, tannin and insol. solids. Flotation in brines of different strengths proved an effective means of sepg. the dried fruit on the basis of sugar content. Prunes left on the tree to ripen showed a progressive decrease in acid for several weeks after they had attained max. sugar content. Black currants contained about 1.6% pectin as compared to 0.61% for red or white currants. The sol.-solids content of cherries can be used as a means of detg. the suitability of the fruit for glacéing. Good-quality medium-sweet wines were produced by the following grape varieties: Burgunder, Campbell Early, Muscat Ferdinand de Lesseps, Muscat Ottonel, Portland, Rauschling, Reisling-Sylvaner, Seiber 2838 and Seibel 5279. C. R. Fellers

Prevention of curd in grapefruit juice. Clarence T. Parks. *Canner* **90**, No. 12, Pt. 2, 71–2(1940).—Fruit variety, maturity and sweetening agents had no effect on curd formation. Methods of juice extn. and inclusion of pulp in the juice were likewise without effect. Curd formation and abnormal sepn. of the insol. solids were prevented by adequate heat treatment in canning. Such treatments were (1) flash pasteurization at 190°F., (2) heating to a min. of 185°F. in a kettle and (3) vacuum sterilization by heating to 180°F. for 15 min. The pH values of the grapefruit juice varied from 3.2 to 3.4, with total acidities (citric) of 1.3–1.5%. Time is an essential factor in the development of curd in inadequately pasteurized juice; hence short storage samples may give deceptive results. C. R. Fellers

Physiological studies of lemons in storage. Erston V. Miller and Harold A. Schomer. *J. Agr. Research* **59**, 601–7(1939).—See *C. A.* **33**, 8842[9]. W. H. Ross

Diplodia stem-end rot of lemons controlled with sodium ethyl mercurithiosalicylate. G. H. Godfrey and W. H. Friend. *Science* **91**, 94–5(1940).—Merthiolate in the regular 1:1000 tincture applied as a local stem-end treatment on lemons gives practically perfect stem-end rot control after 2 weeks incubation. During this time the controls rotted to the extent of 60 72%. F. S.

The ascorbic acid (vitamin C) content of six varieties of cantaloupes. M. A. Moseley, Jr., and G. Howard Satterfield. *J. Home Econ.* **32**, 104–7(1940).—Titration expts. on the ascorbic acid content of cantaloupes showed that it decreases with ripeness but has no relation to size. Though there are wide variations in the content of each variety, one variety averaged 49% higher than another. All varieties contained from 20 to more than 30 mg. per 100 g. sample. Amy LeVesconte

Investigation of the vitamin C content of Florida fruits and vegetables. I. Effects of maturation and of cold storage on the vitamin C potency of oranges and grapefruit. R. B. French and O. D. Abbott. *J. Nutrition* **19**, 223–32(1940).—Individual trees produce citrus fruits of fairly uniform ascorbic acid content. However, there is a wide variation in ascorbic acid content among varieties and even in the same variety. There is but little effect on ascorbic acid content due to maturation of oranges. Variations in ascorbic acid content among oranges did not correlate with the different geographical locations in which they were grown. There may be an increase in ascorbic acid during the 1st few weeks of cold storage; after this, the concn. slowly decreases. C. R. Fellers

Color changes in green vegetables—frozen-pack peas and string beans. G. Mackinney and C. A. Weast. *Ind. Eng. Chem.* **32**, 392–5(1940)—Much of the chlorophyll in frozen vegetables changes to pheophytin. This is detd. by the spectroscope and by the sapon. products. Blanching reduces the amt. of color change by removing air and volatile and water-sol. constituents that would react with the chlorophyll. The effect of blanching is less with beans than with peas. Amy LeVesconte

Treatment of corn-canning wastes. H. O. Halvorson, Dale W. Johnson and Henry Tsuchiya. *Canner* **90**, No. 7, 12–24; No. 8, 12–14(1940).—A lagoon, together with a trickling filter, will provide an economical and effective treatment for canning-corn wastes. The B. O. D. of corn-canning wastes ranges from 1200 to 4000 p. p. m., the total solids from 1500 to 8000 p. p. m., total volatile solids from 1400 to 7000 p. p. m. and suspended solids from 300 to 4000 p. p. m. Fresh corn wastes are neutral but they rapidly become acid on standing, developing a pH as low as 3.5. Various expts. are described. C. R. Fellers

Cooking quality of the potato as measured by specific gravity. C. F. Clark, P. M. Lombard and Elizabeth F. Whiteman. *Am. Potato J.* **17**, 38 45(1940).—The use of salt solns. of known densities was found to be a practical method for detg. the d. of potatoes for the purpose of making a preliminary selection for mealiness and cooking quality. Tests on potatoes grown in a single season did not give a sufficiently adequate basis for rating the mealiness of a variety. The mealiness of potatoes depends to a considerable extent on their starch content. K. D. Jacob

Potato growing in Ireland with particular reference to production for industrial purposes. J. P. Drew and D. Deasy. *J. Éire Dept. Agr.* **36**, 205–29(1939).—Data are given on the starch contents of numerous varieties of potatoes grown in Ireland in different yrs. The results indicate that where potatoes are grown for human consumption as well as for industrial purposes the Arran Banner, Arran Consul, Kerr's Pink and Up-to-Date varieties are the most suitable, but when grown solely for industrial purposes the Hellena and the 1934 strain of Parnassia are the best. K. D. Jacob

Methods of canning pumpkin. H. R. Smith. *Canner* **90**, No. 12, Pt. 2, 72–5(1940).—Starch contents are for Conn. field pumpkin 0.5, Boston Marrow squash 1.5 and Golden Delicious squash 6.5%. These variations in starch content greatly influence consistency in the canned product. Penetrometer methods for detg. consistency of canned squash or pumpkin are described. Details of the recommended canning process are given. C. R. F.

The storage of pecans. F. R. Brison. *Texas Pecan Growers' Assoc., Proc. Ann. Meeting* **17**, 21–4(1937).—A discussion of the chem. changes occurring in pecans during storage. K. D. Jacob

Deterioration of catsup and its prevention. C. C. Fowler. *Glass Packer* **19**, 30–2(1940). –Advantages of deaeration are improved color, elimination of "black neck" and greater retention of vitamins. Deaeration equipment is described. C. R. Fellers

Dextrose in the preserving industry. E. H. Wiegand. *Canner* **90**, No. 11, 26–7, 32(1940).—The substitution of 20–35% dextrose in the sugar added to preserves and jams normally improved the natural fruit flavor and decreased the final sweetness of the product. The texture, color and shelf life of the fruits are likewise improved by using about 20% dextrose in the preserves. About 20% of the sugar can be used in frozen-pack fruits to be used later by preservers. C. R. Fellers

A study of the chemistry of coffee. Oscar Ribeiro. *Rev. alimentar* **3**, 193–5(1939).—Fifteen analyses are reported. The figures show nothing that can explain differences in "cup yield" or flavor. O. W. Willcox

Vitamin A and its source, carotene, as a vitally im-

portant factor in artificially dried feeds. Max Nitzsche. *Deut. Zuckerind.* **65**, 59–63(1940).—The carotene loss of artificially dried green fodder is 10–30%. These dried materials are valuable as a vitamin food even after long periods of storage. Carotene losses are much greater by other processes. W. W. Binkley 1

The comparative feeding value for pigs of cereals prepared in the flaked and ground forms. E. J. Sheehy and B. J. Senior. *J. Eire Dept. Agr.* **36**, 230–45(1939).—The digestibility coeffs. for dry matter, org. matter, crude protein and N-free ext. were practically the same in flaked barley as in barley meal. The coeffs. for ash and fat were of little significance and the coeffs. for crude fiber were unexplainably inconsistent. K. D. Jacob 2

Production of firm pork from peanut-fed pigs. Earl H. Hostetler, J. O. Halverson and F. W. Sherwood. *N. Carolina Agr. Expt. Sta., Tech. Bull.* **61**, 44 pp.(1939).—The degree of firmness of fat in pork can be reliably estd. by the I no. of the back or leaf fat. The m. p. of the back fat is also a reliable index of firmness. Both m. p. and I no. are better correlated with fat grade than n of the fat. The addn. of cottonseed meal to the ration results in an increase in fat firmness in the carcass. There is a high correlation between the degree of firmness of the carcass and the amt. of peanut or other softening oil eaten by the pig. As little as 10 lb. of peanut oil may produce soft pork. Rations high in starch and low in oil produce firm carcasses. Brewers' rice produces firmer carcasses than corn. The highly unsatd. oil in corn exerts an appreciable softening effect. Milo and corn are about equal in hardening effect. Pigs weighing as much as 100 lb. should not be fed peanuts if firm carcasses are desired. There is no particular advantage in adding cottonseed meal to peanuts for the purpose of producing firm carcasses. C. R. F. 3

The nutritive values of Indian cattle foods and the feeding of animals. K. C. Sen. *Imp. Council Agr. Research, Bull.* No. **25**, 39 pp.(1938).—Analyses are recorded of 150 native grasses and other green feeds, 108 hays, 11 legume hays, 30 straws and 41 concentrates. Digestibility coeffs are given for the constituents of 105 feeds and nutritive values are calcd. for 152. E. O. Whittier 4

Drying hay in the barn and testing its feeding value. J. W. Weaver, Jr., and C. E. Wylie. *Tenn. Agr. Expt. Sta., Bull.* **170**, 5–24(1939). In order to operate barn driers economically, about 75% of the water should be removed in the field and the hay then dried to about 20% moisture in the barn drier. The barn-dried hay averaged 2.3% more leaves and 19% more carotene than field-cured hay. Feeding trials indicate a superior feeding quality in the barn-cured hay. Mech. driers are described. C. R. Fellers 5

Nutritional deficiencies in southern livestock production. R. H. Lush. *Proc. Assoc. Southern Agr. Workers* **40**, 75–6(1939). P and Ca deficiencies are rather widespread in Louisiana pastures except those on alluvial or other good land. Grass hay cut from fertilized plots of flatwoods land averaged 0.573% CaO and 0.311% P_2O_5, 6.9% and 29.6% more, resp., than hay cut from unfertilized plots. Spring-cut hays averaged 76% more Ca and 24.4% more P than fall-cut hays. Samples collected from farms where no pasture improvement had been made averaged much less Ca and P. Early pasture hays cut from alluvial lands averaged 0.986% CaO and 0.891% P_2O_5, while summer composites from the same plots averaged 0.576% CaO and 0.764% P_2O_5. When differences in fertility and yield per acre are considered, the best Louisiana pastures are producing more than 5 times as much Ca and 12 times as much P as untreated flat-woods pasture. K. D. Jacob 6

Time and rate of seeding soybeans and effect of time of harvesting on composition and acre yield. S. V. Stacy, O. E. Sell and S. J. Hadden. *Proc. Assoc. Southern Agr. Workers* **40**, 62–3(1939).—Detns. of crude fiber, crude protein, ether-ext. and N-free ext. on 4 varieties of soybean plants cut at various stages of growth in 3 successive yrs., indicated that in yrs. of normal or above normal rainfall the highest yields of feed nutrients are obtained when harvesting is delayed until the beans are well-filled but not ripe and not many leaves have fallen. In dry yrs. leaves are lost in such quantities that harvesting should not be delayed much beyond the full-blossom stage. K. D. J. 7

Eleven years of soybean investigations. W. L. Burlison, C. A. Van Doren and J. C. Hackleman. *Illinois Agr. Expt. Sta., Bull.* **462**, 123–67(1940).—Soybean plants of 16 varieties in the best stage of growth for hay averaged after drying 1/3 each of leaves, stems and pods. During the process of field curing and harvesting 24 varieties for hay, approx. 74% of the oven-dry wt. of the leaves, 77% of the stems and 89% of the pods were saved. Straw yields per acre averaged about 1.15 tons. Moisture content of the crib-dried beans varied from 10 to 15%., being most variable at the surface. Germination was low in seeds which had been subjected to variations in moisture content. Greater acidity was also found in the beans at the surface or upper levels after 3 years' storage. I no., n, oil content, total N, sol. N and carbohydrate content were not affected by depth of storage in the bins. C. R. F. 8

The phytic acid content of some poultry feeding stuffs. R. H. Common. *Analyst* **65**, 79–83(1940); cf. *C. A.* **33**, 4651[1].—The method used for the analysis was essentially that of Young (*C. A.* **30**, 3362[2]). The analysis of about 30 cereals that are likely to be present in the feeding stuff shows that about 3/4 of the P present derived from cereals will be in the form of phytic acid. The phytic acid is probably of significance with respect to the Ca-P metabolism of the fowl. W. T. H. 9

Partition of the less easily digested carbohydrate complex of forages. Russell E. Davis and Charles O. Miller. *Ind. Eng. Chem., Anal. Ed.* **11**, 651–2(1939).—A method is described for the detn. of lignin in grasses and legumes ground to pass through a 0.5-mm. screen and treated with enzymes to remove N. Directions: Ext. a 1-g. sample for 16 hrs. with anhyd. ether, dry and place in a 100-ml., wide-mouth, glass-stoppered bottle and moisten with distd. H_2O. Autoclave 1 hr. at 18 lb. to prevent mold growth. Cool, add 50 ml. 0.1 N HCl and 0.1 g. pepsin (1–3000) and incubate 48 hrs. at 40° with occasional shaking. Neutralize with NaOH and adjust to pH 4.5 with HCl. Add 0.1 g. clarase and incubate 48 hrs. Filter and wash residue with H_2O. Return it to the bottle and add 60 ml. of an aq. ext. of trypsin powder. Make alk. with NaOH and incubate 96 hrs. Filter and wash the residue with H_2O, alc. and ether. Dry at 110° and weigh. Report as undigested residue. Make all filtrations through 200-mesh bolting silk. Transfer the residue to Al moisture dishes for drying and weighing. Hydrolyze the undigested residue with 5% (by wt.) H_2SO_4 for 1 hr., filter and wash residue with hot H_2O and alc. Dry, transfer to a 100-ml. beaker, place in a freezing bath and add slowly 20 ml. of 72% (by wt.) H_2SO_4. Remove from bath after 15 min. and allow the reaction to continue for 45–60 min. at room temp. Stir during the entire reaction period. Transfer to a 1-l. Erlenmeyer flask, dil. to 3% acid by wt. and reflux for 2 hrs. Filter within 30 min. and wash the residue with hot H_2O. Dry at 110°, weigh and reweigh. The loss is lignin. The sum of lignin and cellulose is usually considerably less than the undigested residue obtained by enzymic digestion. Excess formaldehyde used in the Crampton and Maynard method (*C. A.* **32**, 7527[5]) resulted in a quicker soln. of the sample, improved the rate of filtration and increased the yield of lignin. The increase in the apparent lignin content of grass is probably due to the formation of a resin by the action of formaldehyde on some compd. in the grass. F. W. Marsh 10

Pasture studies. XV. The intraseasonal changes in the nutritive value of pasture herbage. E. W. Crampton and R. P. Forshaw. *Sci. Agr.* **19**, 701–11(1939); cf. *C. A.* **33**, 8850[2]; **34**, 2093[1].—The limitations of the standard feeding-stuffs analysis as an indication of the feeding value of pasture herbage as measured by the growth of rabbits are shown. The modified feeding-stuffs analysis of Crampton and Maynard (*C. A.* **32**, 7527[5]) is used in an attempt to explain the observed seasonal changes in nutritive value. A progressive decline in growth-promoting value and digestibility of herbage from spring to midsummer and a complete recovery in both respects in the

fall grown herbage was shown. The nutritive value of herbage may change appreciably in a 10-day period in summer. Both amt. and mode of deposition of the lignin affect digestibility and nutritive value of herbage.
C. R. Fellers

Determination of fat in fish meal. G. B. van Kampen and L. Westenberg. *Verslag. Landb. Onderzoek.* No. **45**, E, 419-25(1939).—As a result of their expts. with several brands of fish meal using a no. of fat solvents, the authors recommend the plain petr. ether extn. instead of the Berntrop method. J. C. Jurrjens

The analysis of the fibrous and carbohydrate constituents of feeding stuffs. I. The furfuraldehyde-yielding constituents. E. G. Hallsworth. *J. Soc. Chem. Ind.* **58**, 357-63(1939).—The rate of evolution and the quantities of furfuraldehyde (I) obtained by digesting various mixts. of plant materials and pentose sugars were studied (cf. Marshall and Norris, *C. A.* **31**, 7941[5]). To ascertain whether the standard distn. procedure insured distn. of all the I, a variety of substances, from xylose to the indigestible residue from cow excreta, was used. I in each fraction was detd. by adding a known excess of bromide-bromate soln. (3 g. $KBrO_3$ and 50 g. KBr per l.) and setting aside for 1 hr. The excess Br not absorbed by I was then detd. by an excess of solid finely divided powd. KI, and detg. the I released by titration with thiosulfate. The iodide was added immediately before detn. to prevent errors from oxidation of the KI by the air. Results showed a distinct difference between the rates of formation of I from xylose and from arabinose. The standard method of collecting 360 cc. distd. at the rate of 30 cc. in 10 min. was found to be considerably in error for arabinose if more than 0.03 g. of the sugar was present. To investigate whether the admixt. of other materials with the pentose sugar adversely affects the recovery of the sugar as I, known amts. of pentose sugar in HCl soln. were added to relatively much greater wts. of plant materials, such as dried grass, pectin, etc., and I-yield of the mixt. was detd. The excess Br-iodometric titration was satisfactory for the detn. of small quantities of I-yielding material even in the presence of relatively large amts. of extraneous org. matter. Factors are suggested for the use of this method with xylose, arabinose and material of uncertain compn. Expts. showed that the factors to convert I to the appropriate sugar are: xylose = I × 1.71; arabinose = I × 1.96. With materials which may contain both arabinose and xylose, to convert I to pentosan the average of the 2 figures should be used, i. e., pentosan = I × 1.835 which will introduce a max. error of 6% if the pentosan consists entirely of either xylan or araban. Fourteen references. **II. The determination of cellulose.** *Ibid.* **59**, 9-17(1940). —The cellulose content of alfalfa meal, bran and decorticated cotton cake was detd. by 7 different methods for comparison purposes. The methods used were those of Simon and Lohrisch (cf. *Z. physiol. Chem.* **42**, 55(1904)), Waksman and Stevens (cf. *C. A.* **24**, 2965), Norman and Jenkins (cf. *C. A.* **28**, 3157), Hoffmeister (cf. *Landw. Jahr.* **17**, 239(1888)), Konig (cf. *Landw. Vers.-Sta.* **65**, 55(1907)), Honig (cf. *Chem. Ztg.* **14**, 868(1890)) and Williams and Olmstead (cf. *C. A.* **29**, 3700[7]). The cellulose obtained by any one method varied widely in compn. with the material from which it is obtained. Thus, although the pentosan was highest in the case of Norman cellulose, it varied from 26.24% in alfalfa to 51.17% in cotton cake. Variation in the compn. obtained by different methods on the same material, however, was much greater. The variation in the amt. and compn. by the different methods supports, according to H., the conclusion that the most satisfactory method to use in animal-feeding studies is that which gives the greatest recovery 1 of nonstarchy hexosan. To det. nonstarchy hexosan, the most satisfactory procedure is as follows: The fiber is first freed as completely as possible from the starch, protein and fat by the enzymic digestion of Williams and Olmstead. On the resulting fiber, the lignin, protein, pentosan and ash must be detd., after which "true cellulose" or more correctly "nonstarchy hexosan" can be detd. by difference. However, very labile nonstarch 2 hexosan may escape detn. by this method. M. M. R.

Seasonal variation in Co content of North Island pastures (McNaught, Paul) **15**. Absorption of nutritive elements by lupines [use of plants as fodder] (Wojtysiak) **11D** Luximeter [for detn. of degree of pasteurization of milk] (Carson) **1**. Moisture-vapor proofness of wrapping materials used on frozen foods (DuBois, Tressler) **23**. Utilization of seed of *Plantago psyllium* [as feed] (Bottini) 3 **27**. Grease-proof paper [for packaging foods] (U. S. pat. 2,184,312) **23**. Marking cellulosic products such as sausage casings (U. S. pat. 2,183,948) **23**. Grease-proof paper for wrapping foods (U. S. pat. 2,184,307) **23**.

Teichert, Kurt: Chemisches Hilfsbuch für den Molkereipraktiker. 4th ed. Hildesheim: Molkerei-Zeitung. 187 pp. M. 2.50.

4 **Tjaden, Hermann**: Coffein als Genussstoff. Eine volksgesundheitliche Studie. Berlin: J. F. Lehmanns Verlag. 112 pp. M. 2.50.

Historic Tinned Foods. Greenford, Middlesex, England: International Tin Research Council. 70 pp.

Apparatus for mixing a current of air with a volatile substance evolved from a liquid as a result of the continual addition thereto of definite quantities of a reagent. Adrianus Kleijn. Brit. 508,773, July 5, 1939. The app., of use for the *bleaching of flour* and *milling products* with halogenated N compds., especially NCl_3, consists of a container, a cover thereon, a partition extending from the cover to a certain distance from the bottom of the container and dividing it into 2 parts which, when liquid is contained therein at the normal level, are completely sepd., an aperture in the cover above 1 of these parts, a 6 charging device for adding the agent to the liquid connected with this part, an air conduit connected with another aperture in the cover of this part of the container, a blower having its suction side connected with the air conduit, a conduit connected with the blowing side of the blower and extending through the cover of the other part of the container to below the normal level of the liquid therein and there provided with distributing apertures, and a discharge air conduit connected with an aperture in 7 the cover of this other part of the container.

Reconstitution of dried egg material. Leon D. Mink (to Industrial Patents Corp.). U. S. 2,183,515, Dec. 12. Dried egg material is mixed with water in the proportion normally found in fresh egg material, and with a "surface-active" agent such as Na stearyl sulfate or Na lauryl sulfate, and the mixt. is whipped. U. S. 2,183,516 relates to drying egg material after the addn. of a "surface-active" 8 agent of like character, such as 0.1-0.3% of Na lauryl, palmityl or stearyl sulfate.

Coloring fruits such as oranges. Kenneth H. Klipstein (to American Cyanamid Co.). U. S. 2,184,237, Dec. 19. The whole fruit is subjected to the coloring action of an aq. soap dispersion of a xylene azo β-naphthol dye contg. less than 30% of the meta isomer (suitably at a temp. of about 38-52°).

Preserving juices of fruits, vegetables, etc. Felix 9 Trzoska. Brit. 508,333, June 29, 1939. See Fr. 836,661 (*C. A.* **33**, 5537[3]).

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

HERMAN A. BRUSON

Recent achievements of chemical engineering and chemical industry. James R. Withrow. *Ohio State Univ., Eng. Expt. Sta. News* **12**, No. 1, 7–10(1940). E. J. C.

Chemical foreign trade in 1939. Effect of war conditions. Otto Wilson. *Ind. Eng. Chem.* **32**, 421–3(1940); cf. *C. A.* **33**, 3481⁷. G. G.

Research in the Nation's business. Harrison E. Howe. *Proc. 4th Ind. Research Conf., Ohio State Univ. Research Foundation* **1939**, 25–45.—An address. E. J. C.

The administrator looks at research. Henry P. Kendall. *Proc. 4th Ind. Research Conf, Ohio State Univ. Research Foundation* **1939**, 13–20.—An address. E. J. C. 3

The executive and the technologist. A proper understanding between them. Wm. B. Bell. *News Ed. (Am. Chem. Soc.)* **18**, 185–90(1940).—An address. E. J. C.

The executive and the technologist. E. C. Williams. *News Ed. (Am. Chem. Soc.)* **18**, 191–4(1940).—An address. E. J. C. 4

War gases. Lucien Dautrebande. *Presse méd.* **47**, 1489–90(1939). A. E. Meyer

War gases and other toxic substances. Louis Diserens. *Teintex* **5**, 2 9(1940).—The importance of the following factors in war gases and related materials is reported: stability, d., volatility, height of vaporization, m. p., ease of atomization, soly., action on metals, odor, color and toxicity. A list of some gases is given, classified as asphyxiants, vesicants, respiratory irritants, lachrymators and general poisons. The specific use, phys. and chem. properties, prepn., and physiol. action of the following gases are discussed: Cl_2, $COCl_2$, $ClCOOCH_3$, $ClCOOCH_2Cl$, $ClCOOCHCl_2$, $ClCOOCCl_3$, CCl_3NO_2, $S(CH_2CH_2Cl)_2$, $ClCH.CHAsCl_2$, $(ClCH\ CH)_2AsCl$, $(ClCH\ CH)_3As$. Saverio Zuffanti

Antigas preparations and war-time antiseptics. F. V. Wells. *Soap, Perfumery & Cosmetics* **12**, 830–4, 854 (1939).—A review. M. M. Piskur 6

Use of mercurochrome for mustard gas burns. Anon. *Pharm. Weekblad* **77**, 22 8(1940).—Mercurochrome is not effective in the treatment of mustard gas burns. Felix Saunders

The reaction between 2,2′-dichlorodiethyl sulfide (mustard gas) and bleaching powder. A. G. Lipscomb. *Analyst* **65**, 100(1940).—The reaction between mustard gas and bleaching powder is violently exothermic and the mixt. often takes fire. Sometimes, however, a given sample will inflame with one sample of bleaching powder and will not with another. Thus a sample of specially good bleaching powder from a freshly opened tin gave no sign of reaction with mustard gas. When a few drops of water was added, however, the whole mass burst into flame. This would seem to indicate that lack of reactivity between mustard gas and bleaching powder may be caused by the dryness of the latter. W. T. H. 7

The fundamental properties of poisonous substances when applied to water supply. E. A. Dianov. *Vodosnabzhenie Sanit. Tekh.* **1939**, No. 2, 32–6; *Khim. Referat. Zhur.* **2**, No. 5, 96(1939).—Open water reservoirs are most vulnerable to contamination by poisonous substances from airplanes. The usual contaminants are stable poisons (yperite, lewisite). The properties of poisonous substances, their behavior in water and methods for decontaminating the poisoned water are described briefly. Methods for detection of poisons are given. The water reservoirs can also be poisoned by strophanthin, capsaicin, etc. Data on the penetration depth of the poisons into building materials are also given. W. R. Heun 9

Methods of recovery of volatile solvents and its importance in national economy. A. P. Okatov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 424–30(1939).—A discussion of the Soviet and foreign practices. Twenty-five references. Chas. Blanc

Chemistry and toxicology of [vapors of] solvents. F. Flury. *Chem. Fabrik* **12**, 3 6(1939).—Narcotic action, which is often related to the phys. properties of the solvent, is not parallel with toxicity, which depends rather on chem reactivity. Such specific poisons may be classified according to the organs which they mainly attack. The risk of injury depends partly on the volatility of the solvent. B. C. P. A.

Water spray as a means of fighting respiratory poisons. Möbius. *Feuerschutz* **20**, 2–4(1940).—A spray of water made with a nozzle can be used to decrease the hazard to life from industrially used toxic gases that have escaped from their containers (Cl, NH_3, SO_2, HCl, H_2S, etc.) and to counteract the effects from war gases. The efficiency of this "atomized" water depends on the soly. of the chemicals, adsorption, increased reactivity, etc. The application of the method is described. Leopold Scheflan

A unified presentation of results from grain size and falling-velocity determinations in dust studies. Torsten Widell. *Iva* **1939**, 163–70.—Mostly math. W. J. Peterson

Antimony in professional pathology. André Feil. *Presse méd.* **47**, 1133–4(1939).—The symptoms of industrial poisoning with Sb are described. A. E. Meyer

Occupational arsenic poisoning and its detection by chemical methods. F. Kunkele. *Chem.-Ztg.* **64**, 29–32, 37–8(1940).—The chief causes of occupational As poisoning are reviewed and the colorimetric method for the detn. of As in the human body is described. The effects of occupational (chronic) As poisoning are discussed on the basis of clin. cases both of agricultural (vineyard) and industrial workers. Arsenic contents higher than 10 γ per 100 cc. of urine and 3 γ per g. of the hair of the head indicate As poisoning. Pubic hair may contain 3–8 times as much As as hair of the head. As much as 150 γ per 100 cc. of urine and 120 γ per g. of hair of the head have been observed. A. H. Krappe 5

Further studies on the absorption, mobilization and excretion of lead. S. L. Tompsett. *Brit. J. Exptl. Path.* **20**, 512–16(1939); cf. *C. A.* **34**, 1055³.—The addn. of HCl to the diet increases the absorption of Pb from the alimentary tract. NH_4Cl, $NaHCO_3$ and KI produce mobilization of Pb on both a low and a high Ca intake. Recently absorbed Pb may be excreted very rapidly after removal from exposure. In all the expts. in which mice were used, the administration of relatively large amts. of Pb appeared to have little effect upon the general bodily health of the animals. Harriet F. Holmes

Air hygiene in the mining industry. Leroy U. Gardner. *Mining Congr. J.* **26**, No. 1, 34–6(1940).—A discussion of methods of controlling silicosis. Leopold Scheflan 8

Proper and safe handling of chlorine and caustic soda in tank cars. Brian L. Shera. *Pacific Pulp Paper Ind.* **13**, No. 10, 32–5(1939). A. Papineau-Couture

New research on the use of hardening plastics for aircraft construction. Wilhelm Küch. *J. Roy. Aeronaut. Soc.* **44**, 44–73(1940).—Translated from *Jahrb. Deut. Luftfahrt-Forsch.* **1938**. M. W. Schwarz

Synthetic plastics and the gas industry. Albin Marty. *J. usines gaz* **56**, 442–5(1939); cf. *C. A.* **34**, 608⁶.—A brief review of plastics made with phenol, cresols and xylenols. B. J. C. van der Hoeven

Albuminous plastics from soybean press cake. E. N. Volkov, P. G. Grigor'ev and V. Gulyaev. *Org. Chem. Ind.* (U. S. S. R.) **6**, 517–18(1939); cf. *C. A.* **33**, 8854².—The inferior qualities (discoloration, swelling and permeability to water) of pressed articles from soybean casein and resinol were traced to the presence of decompn.

products of albumins. The phys. and mech. properties of the moldings can be greatly improved by the use of casein or press cake freed from the decompn. products by preliminary washing with dil. NaOH and neutralizing with 4% HCl. Chas. Blanc

Cellulose acetate plastics. B. Righi. *Atti X° congr. intern. chim.* **4**, 186–9(1939).—A historical outline of the development of cellulose acetate, with brief mention of all recent improvements, leading to the production of a substitute for glass, and to other applications. A. H. Krappe

Behavior of polyvinyl chloride plastics under stress. J. J. Russell. *Ind. Eng. Chem.* **32**, 509–12(1940).—Tensile stress-strain diagrams at −50° to 80° are given for various polyvinyl chloride plastics contg. 40% plasticizer. The stress-strain curves change in shape as the temp. is lowered, ultimately reducing to a "brittle point" characteristic of the compn. Heats of activation for these plastics are 4.8–6.2 kg.-cal., similar to those of pure metals; Poisson's ratio is about 0.5 A. F. Shepard

Esters of cativic acid. Nicholas L. Kalman. *Paint Manuf.* **10**, 33(1940).—Cativic acid has the formula $C_{20}H_{34}O_2$ and is a monobasic acid obtained from the exudate of the semitropical tree *Prioria copaifera*, Griseb. The formula closely resembles the formula of abietic acid. Constitutional dissimilarity is evidenced by the fact that cativic acid esterifies with great ease and, it and its derivs., are very stable to ultraviolet light. Suitably treated, cativic acid decarboxylates easily, forming a hydrocarbon "cativene" which boils at about 160° at 3 mm. The esters of cativic acid are practically tasteless, colorless and odorless and are sol. in all the ordinary org. solvents, but not in water The esters may be used as *plasticizers*, as modifiers in conjunction with various resins with which they may be compatible, with adhesive compns. of several kinds and as agents to improve water resistance of many materials. Cativic acid or certain of its esters may be used as an agent for modifying, plasticizing or otherwise affecting the properties of various synthetic resins. Al cativate forms a clean, transparent film which is brittle and relatively inflexible. By the use of suitable esters of cativic acid the film may be plasticized as desired. W. H Boynton

Properties of products obtained from mixtures of natural and synthetic high-molecular compounds. Z A. Rogovin and L. A. Zaplina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 455–6(1939).—A preliminary communication. The addn. of 5–20% Novolac to 10% cellulose acetate in Me_2CO resulted in 35–50% increase of the mech. strength of films dried at 65–140° for 5 hrs The elasticity, elongation and hygroscopicity decreased. The intense coloring of the films limits their use in com. practice. Chas. Blanc

Relation between the degree of fineness of molding powders and the mechanical strength of the resulting pressed articles. M. I. Gurter and E. N. Freidberg. *Org. Chem. Ind.* (U. S. S. R.) **6**, 456–7(1939).—Comparative tests showed that the mech. and phys. properties of pressed articles considerably improve with greater fineness and uniformity of powd. molding compds. For com. use sifting to 35 mesh/sq. cm. is recommended. C. B.

Colored molding materials. E. M. Efimova. *Org. Chem. Ind.* (U. S. S. R.) **6**, 498 500(1939); cf. *C. A.* **34**, 2096⁷.—Some addnl. expt. data are given. C. B.

Phenol-formaldehyde resins. VII. A note on viscosity and density of solutions in organic solvents. O. Sugita and S. Turuta. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 327–8(1939); cf. *C. A.* **33**, 3021².—Based on solns. (25 g./100 cc. of solvent) of resin, prepd. from 1 mol. PhOH, 1 mol. CH_2O and NH_3, in solvents such as MeOH, EtOH, PrOH, Me_2CO, McCOEt, MeOAc, AcOH, C_5H_5N or $ClCH_2.CH_2OH$, no relation exists between the relative viscosities of solns. and abs. viscosities of solvents. AcOH and C_5H_5N gave solns. having higher viscosity for the same resin concn. than did the other solvents. The formula, $\log \eta_r = KC^a$, applies to AcOH and Me_2CO solns. of resin at 25°, where η_r = relative viscosity of the soln., $K = 244 \times 10^{-4}$ (AcOH) or 116.5×10^{-4} (Me_2CO), C = g. resin per 100 cc. of soln., and a = 1 (AcOH) or 1.18 (Me_2CO). A straight-line relation exists between concn. and d. of resin solns., whereby $d = d_o + mc$, and $m = [1 - (d_o/d_s)]/100$, d_o = d. of solvent, d = d. of soln., c = concn., and d_s = d. of the solute. Values of d_o, d_s and $m \times 10^5$ for resin solns. in the solvents mentioned are (25°): AcOH, 1.053, 1.26, 167; PhOH-formalin-EtOH mixt. (1:1:0.5 mol.), 1.015, 1.22, 170; C_5H_5N, 0.9810, 1.17, 216; Me_2CO, 0.7826, 1.30, 397; 0.5 *N* NaOH, 1.019, 1.17, 132; 1 *N* NaOH, 1.039, 1.17, 115; 1.5 *N* NaOH, 1.060, 1.18, 101; 2 *N* NaOH, 1.079, 1.20, 88. George Ayers

Kinetics of the formation of phenol-aldehyde resins. Z. V. Veldenbaum and E. S. Medvedkov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 437–41(1939).—In the preliminary communication the proposed methods of lab. control in the condensation of PhOH and CH_2O are critically discussed. More satisfactory results were obtained by vacuum distn. with steam of the reaction mixt., dissolving the residue in alc. to give a 20% soln. of resin and detg. the degree of polymerization from its viscosity. C Blanc

Phenol-formaldehyde rods and tubes for electrical purposes. E. E. Halls. *Plastics* (Brit.) **4**, 13–14(1940). Heat loss and H_2O-absorption values are given for various grades and sizes. A. S. Shepard

The composition and formation of technical coumarone resins. Richard S. Hilpert and Seigfried Osborg. *Brennstoff-Chem.* **20**, 81–3(1939).—Resins obtained in H_2SO_4 treatment of crude benzene from the Ruhr and Upper Silesian districts were examd. in a comparative study of coumarone and indene resins and their reaction products. The O contents varied from 2 to 3% in comparison with 13% for the polymerized coumarone and were unrelated to color and consistency. One was nearly pure hydrocarbon. Hygroscopic compds. contg. 3.76, 2.30 and 1.58% S were obtained by treating a coumarone resin distg. 171–72° (picrate m. 101–2°) with 90, 80 and 70% H_2SO_4 in the cold, several days being required with the last concn. to obtain the solid mass from the suspension. Not quite all of the acid was removable in the regeneration of the resin with H_2O treatment of the acid products. Acid treatment of indene, b. 181° (picrate m. 97–98.5°), was accompanied by SO_2 liberation; products contg. 1.18 and 0.23% S were obtained readily with 90 and 80% acid and were similar in compn. and m. p. (79–84°) to tech. resins. Distns. of coumarone resins from a metal bath at 300°, repeated until distillates were colorless, gave material which reacted only slowly with concd. H_2SO_4. Color reactions with H_2SO_4 in Ac_2O of a no. of related resins show the predominance of the red-violet coloration. F. W. Jung

Synthetic materials as mill bearings. Successful application to steelworks practice. C. D. Phillipe. *Iron & Coal Trades Rev.* **139**, 797–8(1939).—The manuf. and constitution of thermoplastic and thermo-hardening plastics of the phenol-formaldehyde resin group is discussed and their main properties, advantages and disadvantages in rolling-mill and other steel-mill applications are described. I. Hartmann

Hydrocolloidal [dental] impression materials: physical properties and a specification. George C. Paffenbarger. *J. Am. Dental Assoc.* **27**, 373–88(1940).—The essential and important ingredient usually is agar-agar. Detailed specifications are proposed. Joseph S. Hepburn

Soybean-protein dispersions in formaldehyde solutions. Preparation and application. Allan K. Smith and Herbert J. Max. *Ind. Eng. Chem.* **32**, 411–15(1940).—Dispersions of soybean protein in concns. as high as 10% were prepd. in the presence of 2–10% CH_2O. The dispersions were most stable at the neutral point but can be prepd. with pH values as low as 5.7. Salts, such as borax and Na_3PO_4, and low temp. delayed gelation. Higher concns. of the protein-CH_2O dispersions were made possible by a mild hydrolysis with dil. alkali or by the action of souring bacteria or yeast on the water dispersion of the protein. Com. applications were found in the fields of *surface-sizing glassine paper, laminated plastics* and *leather dressing.* David B. Sabine

Manufacture of uniform casein. W. E. Stringer. *Paper Trade J.* **110**, No. 11, 46–8(1940).—A description of progress made in the manuf. of casein, showing how the elimination of various technical and mech. difficulties has resulted in a continuous process of casein manuf. 1
A. Papineau-Couture

Glass as an electrical insulator. C. J. Phillips. *J. Applied Phys.* **11**, 173-81(1940).—A review of the phys. properties of different types of glasses, including those of fiberglass. 2
S. L. Gerhard

Experimental investigation of Australian-made dielectrics. Arthur W. Martin. *Trans. Inst. Engrs., Australia* **20**, 411–16(1939).—A detailed study of the mechanism of dielec. failure of bakelized paper bushings and bakelized canvas bushings. It was found that the capacity of a given sample and hence its dielec. const. increase with temp. at const. frequency. The loss angle and power factor of the material increase with temp. at const. frequency. At const. temp. the dielec. const. and loss angle decrease with increasing frequency over the range 100 to 10,000 cycles and between the temp. 15° and 40°. 3
C. G. F.

Paste for cellophane. I. R. Morozov and G. P Petrov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 462–3(1939).—Analysis of an imported paste for cellophane showed that it contains erythrodextrin + glycerol 36, PrOH 15, H_2O 47 and ash 2%. An equally good product was obtained from 33 g. dextrin in 45 ml. H_2O contg. 15 ml. alc. and 5 g. glycerol. The filtrate is decolorized with 2 ml. of 2% $Ca(OH)_2$. 4
Chas. Blanc

Glue-top on zinc. Addison G. Brooks. *Process Engraver's Monthly* **46**, 221, 223(1939).—The use of the conventional "ink-top" etching resist, i. e., albumin reinforced with etching ink, has been improved by the addn. of glue to the albumin and the properties of the resist can be still further improved by leaving out albumin entirely. The resulting "glue-ink-top" or "glue-cold-top" keeps longer in soln., prints a little faster, develops more easily, has a fine etching resist and is less affected by atm. conditions. A 1% soln. of CrO_3 is recommended to increase the HNO_3 resistance of the glue, but care must be taken not to overharden. 5
R. F. W. Selman

The stability of emulsions. I. Soap-stabilized emulsions. A. King and L. N. Mukherjee. *J. Soc. Chem. Ind.* **58**, 243–9(1939).—By means of the size-frequency technique the total area of interface per g. of emulsified oil has been detd. for kerosene-water and olive oil-water emulsions stabilized by various soaps. The rate of change of interfacial area is the best measure of unstability of an emulsion. Na and K soaps are better emulsifying agents than NH_3 soaps; the fatty acids in order of increasing efficiency are palmitic, stearic, and oleic. The mech. method of emulsification influences both degree of dispersion and stability. $CaCl_2$, HCl and heat increase globule size and decrease the stability. 6
R. E. R.

(Testing methods for) emulsion floor waxes. Melvin Fuld. *Soap (Sanitary Products Sect.)* **16**, No. 1, 111, 113, 123(1940); cf. *C. A.* **33**, 7430⁹.—A uniform film for testing purposes was obtained by use of a highly polished metal roller which was undercut from its shoulders 0.001″ The wax should be reduced to approx. 10–12% nonvolatile solids for the test. Tests for detg. nonvolatile solids must be run very carefully by essentially the method described in Federal Specification PW-151. A desiccated balance must be used. Other aspects of the method are described. 7
Henry H. Richardson

Shear markings in asbestos fibers. A. Frey-Wyssling. *Z. wiss. Mikroskop.* **56**, 309–16(1939).—"Nodes" analogous to those in some cellulose fibers, are formed by working, with an opening-up of the structure, yielding microscopic fibrillae and lower strength. 8
C. W. Mason

Basebond Litho Sheet. A. V. Mackenzie. *Process Engraver's Monthly* **46**, 231(1939).—A new type of lithographic printing plate, the Basebond Litho Sheet (developed in Canada), uses a sheet steel base on which Zn and a relatively small amt. of Al are deposited electrolytically. It is claimed to be less susceptible to oxidation and to be stronger than Zn or Al. 9
R. F. W. Selman

The use of boron carbide in the cutting of semiprecious stones. W. Dawihl and O. Fritsch. *Schlief- u. Poliertech.*, **15**, 175–6(1938); *Chem. Zentr.* **1938, II**, 3441–2.—Grinding and polishing tests showed B_4C to be about 70% as effective as diamond powder in the cutting of semiprecious stones (rubies). It can be used as a substitute for diamond in these operations. Further tests led to the conclusion that the greater attack of the abrasive on multicryst. Al_2O_3 is conditioned by the attack along the boundaries of the grains. 10
W. A. Mobre

Lithographing the tin can. George E. Monroe, Jr. *Products Finishing* **4**, No. 6, 9–10, 12(1940).—A description of chem. and mech. treatments at the American Can Company's Englewood plant in Chicago. 11
L. S.

Use of protective films of insecticide in control of indoor insects, especially Plodia interpunctella and Ephestia elutella. C. Potter. *Ann. Applied Biol.* **25**, 836–54 (1938).—Provided stored goods are sterilized, spraying the interior of warehouses and the packing cases repeatedly with a soln. of 0.8% of pyrethrins in white oil gives protection against infestation. The oil has little part in the toxic action, β′-Thiocyano-β-butoxydiethyl ether, used similarly, gave promising results. 12
B. C. P. A.

Comparison of mosquito repellency tests under laboratory and field conditions. Philip Granett. *New Jersey Mosquito Extermination Assoc., Proc. Ann. Meeting* **25**, 51–7(1938).—Caged mosquitoes (*Aedes aegypti*) were shown to be more easily repelled by various chemicals (not specified) than were field (salt-marsh) mosquitoes principally *A. sollicitans* and *A. cantator*. The better repellents were approx. 70% as effective outdoors as in the cage, whereas the poorer repellents (those repellent for less than 0.5 hr.) were only about 25% as effective. 13
K. D. Jacob

Progress in mosquito control in Delaware County, Pennsylvania. R. L. Mentzer. *New Jersey Mosquito Extermination Assoc., Proc. Ann. Meeting* **26**, 148–51 (1939).—Addn. of 10 drops of a stock soln. of *pyrethrum larvicide* to the water consumed by a cow in 24 hrs. produced no unusual taste in the milk. The cow refused to drink water that contained larger quantities of the larvicide. 14
K. D. Jacob

Mosquito-suppression work in Canada in 1937. Arthur Gibson. *New Jersey Mosquito Extermination Assoc., Proc. Ann. Meeting* **25**, 176–85(1938); cf *C. A.* **32**, 1354⁴.—In practical expts. under different conditions a mixt. of equal parts of olive oil and pyrethrum ext. (Penick's Pyrefume Super 30) gave effective protection against blackflies and mosquitoes for periods of 1.5–4.0 hrs. In tests on carriers of pyrethrum ext., castor oil was the most lasting, followed in order by glycerol, olive oil and petrolatum. Various forms of essences of thyme and geranium had definite promise as repellents. Cinnamaldehyde and cresol were comparatively effective but were too severe on the skin. Phenyl salicylate, bay laurel, pine oil, clove and citronella had definite repellent properties. Citral, oil of cedar, bitter orange and geranyl acetate gave protection over somewhat shorter periods of time. The distn. fractions of oil of tar appeared to be fairly efficient repellents, without possessing the undesirable properties of the original material. **Mosquito-suppression work in Canada in 1938.** *Ibid.* **26**, 109–16(1939).—A mixt. of oil of thyme 0.5, concd. ext. of pyrethrum in mineral oil (Penick's Pyrefume Super 30) 1 and castor oil 2–3 fluidoz. gave protection against mosquitoes for 3–5 hrs. Ext. of pyrethrum incorporated in ointments composed of various combinations of paraffin, lanolin, tallow and beeswax was an effective repellent, but the ointments were not so satisfactory as liquid prepns. contg. pyrethrum and they were somewhat oppressive and irritating to the skin. Promising results were obtained with a mixt. of coconut oil 6, pennyroyal oil 1, oil of lavender 1 and spirits of camphor 0.5 part. 15
K. D. Jacob

Automatic destruction of mosquitoes in airplanes and the vector of yellow fever in aerial travel in Africa. G. A. P. Ross. *Bull. office intern. hyg. publ.* **30**, 2002–31 (1938); *Rev. Applied Entomol.* **27B**, 48–9.—Tests showed that an aq.-base ext. of pyrethrum at a dilu. of 1:14 was as

inflammable as an ext. of pyrethrum in CCl_4 (1:4) but both are noninflammable from a practical point of view. A 1:5 CCl_4 diln. gives ample margin of safety from fire. A small pressure sprayer placed in each compartment of a hydroplane distributed its charge of insecticide in a few min. and dosages per compartment of 30 cc. of the 1 5 CCl_4-base ext. and 50 cc. of a 1.10 aq.-base ext. killed all the mosquitoes in 10 and 16–18 min., resp. The mosquitoes used were *Anopheles gambiae* Giles.
Edwin J. Seiferle

The action of insecticidal powders on anopheline larvae in relation to the degree of dispersion of the poison and the concentration of added substances. N. K. Shiputsma. *Med. Parasitol.* (U. S. S. R.) **7**, 346–71(1938) (in Russian); *Rev. Applied Entomol.* **27B**, 68. —Expts. were carried out in the lab. at 25° with larvae of *Anopheles maculipennis* Mg., race *messae* Flni. taken near Moscow. The larvicides tested were Paris green (I) contg. 50% As_2O_3, and a Cu arsenite prepn., Arsmal (II), with Acidol and contg. 8.6% As_2O_3 and 7.3% CuO. They were applied alone or mixed with talc in the proportion of 1 10 or 1 100, the rates of application being 7 oz. of the undild larvicide and 4.7 and 43.2 lb. of the mixts., resp., per acre. The periods for 50% mortality for first instar larvae were, resp., 50 min., 60 min. and 3.5 hrs. for I and 32 min., 36 min. and 19 hrs. for II; on fourth instar larvae the corresponding periods were 70 min., 80 min. and 2.75 hrs. for I and 80 min., 140 min. and 24 hrs. for II. Edwin J. Seiferle

Employment of the distillate of coke filters for the destruction of the larvae of Anopheles maculipennis. Preliminary communication S. F. Afanas'ev. *Med. Parasit. & Parasitic Diseases* (U. S. S. R.) **7**, 694–700(1938). *U. S. Pub. Health Eng. Abstracts* **20**, Ma, 6(Feb., 1940). —The author employed the distillate of coke filters obtained in the final stages of fractional distn. of Russian petroleum The distillate is composed of heavy oils, including solar oil, and represents a mixt. of hydrocarbons, mainly aromatic compds. In a lab. expt. the distillate was sprayed over the surface of the water in a vessel contg. 60 larvae of *A. maculipennis*. All were killed within 60 min. When applied to natural reservoirs contg. mosquito larvae the distillate caused the destruction of all the larvae and other aquatic animals except Crustacea and *Gambusia*, in 24 hrs. Conclusion: The distillate provides a satisfactory substitute for petroleum and can be used for oiling in the same doses, i. e., about 25–50 g. per sq. m., according to the amt. of vegetation present. C. R. Fellers

Report for 1936 and 1937 of the Malaria Commission of the Health Council of Holland. W. A. P. Schuffner and N. H. Swellengrebel. *Verslag. Mededeel, Volksgezondh.* July, **1938**, 26 pp.; *Rev. Applied Entomol.* **27B**, 51–2 (1939).—Houses were sprayed against *Anopheles maculipennis* Mg., race *atroparvus* van Thiel, with Shelltox, a pyrethrum-kerosene insecticide, at 14–17 fl. oz./house. All the mosquitoes were killed and the houses remained less liable to reinfestation for a fortnight Larvae of the above anophelines were found to be 12 times as numerous in water with a Cl content of 1500 mg./l. as in water with a content under 500 mg./l. Edwin J. Seiferle

The disinfecting action of calcium cyanamide against the housefly shown experimentally. R. Grandori. *Boll. zool. agrar. bachicoltura* **8**, 233–50(1938); *Rev. Applied Entomol.* **27B**, 84(1939). —Eggs and larvae of blowflies reared on putrefying meat were killed by solns. of $CaCN_2$ sprayed on the meat or by a dust of equal parts of $CaCN_2$ and wood ash. A series of expts. on cowshed manure contg. many fly larvae showed that manure can be practically disinfected by $CaCN_2$, the best method being application of a dust of equal parts of $CaCN_2$ and an inert carrier to successive layers of manure 6–8 in. thick and soaking with H_2O. The amt. of $CaCN_2$ applied should be 1 to 1.5% of the wt. of the manure. Adult flies in lab. expts. were killed by feeding on figs wetted with a 5% soln. of $CaCN_2$; a 10% soln. was repellent. Complete mortality was also given by a bait contg. 1 part molasses and 9 parts water, and 1, 2 or 3% $CaCN_2$. Edwin J. Seiferle

Can Paris green kill fish? Sen Purneddu. *Bengal Pub. Health J.* **1**, No. 1, 9–12(June, 1939); *U. S. Pub. Health Eng. Abstracts* **20**, Ma, 4(Feb., 1940).—Extensive experience and observation show that Paris green in the amts. used for mosquito control, does not kill fish or birds. The As contents of fish from treated areas are no higher than from untreated areas. C. R. Fellers

The problem of wallpaper staining by insecticides and insecticide bases. Werner R. Husen. *Pests* **8**, No. 1, 14–16(1940).—Highly refined petroleum distillates (*A*) such as are used as bases for household sprays, and various insecticides dissolved in *A* will stain wallpaper. The more moist the wallpaper the more pronounced the stain. Recently laid wallpaper is thus more susceptible to staining. Stain intensity is highest in starch-sizing wallpapers, less in protein type and rotogravure type papers.
Henry H. Richardson

Insect-control work in Canada. Arthur Gibson. *Pests* **8**, No. 1, 12–13(1940).—Invasion of houses by clover mites is controlled by spraying a kerosene ext. of *pyrethrum*. Carpenter ants are effectively controlled by the use of *derris powder* (4% rotenone). H. H. Richardson

Prolonging toxicity of pyrethrum insect sprays. R. B. Trusler. *Soap (Sanit. Products Sect.)* **16**, No. 1, 115, 117, 119(1940). —To a prepn. contg. 0.2% pyrethrins in a highly refined petroleum base various compds. were added; the mixt. was stored for 3 yrs. at 32° and then tested on houseflies by the Peet-Grady method (*C. A.* **31**, 2315[1]). Benzaldehyde, 0.2%, appeared to prolong toxicity Results with eugenol and β-naphthol confirmed previous work. Other effective antioxidants may be found in aromatic aldehydes. Low-titer oleic acid and a nonvolatile olefin seemed to prolong toxicity. A 70° storage temp. used to increase speed of results seemed too high. A new series testing herbaceous insecticides at 50° storage temp. is being made. Three references. H. H. R.

Thermal polymerization of styrene and its inhibition (Foord) 2. Production of petroleum resins (Fulton, Gleason) 22. Ethers and ether-esters of lac and their polymerization (Gidvani) 26. Dielec loss of glass at high frequencies (Thurnauer, Badger) 19 Characteristics of textile casein (Pijanowski) 25. Subacute yellow atrophy of liver due to solvent (Braunstein) 11H. Polymers (Aleksandrov, Lazurkin) 30. Catalytic dehydrogenation of monoolefins to diolefins; source materials for synthetic resins (Grosse, *et al.*) 30. Fabrics impermeable to warfare chemicals (Dutch pat 47,200) 25. Aliphatic acid esters of alkylol ethers of β-hydroxyalkyl- and β-hydroxycycloalkyl ethers of dibenzanthrone and isodibenzanthrone series [for coloring plastic masses] (U. S. pat. 2,183,629) 27.

Brownlee Raymond B., Fuller, Robert W., Hancock, William J., and Whitsit, Jesse E.: Chemistry in Use. New York: Allyn and Bacon. 662 pp.

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Chemisch-technische Untersuchungsmethoden. Ergänzungswerk, Tl. 2. Untersuchungsmethoden der allgemeinen und anorganischchemischen Technologie und der Metallurgie. 8th ed. Edited by Jean d'Ans. Berlin: J. Springer. 879 pp. M. 84. Cf. *C. A.* **33**, 8331[6].

Kemiske Kampstoffer. Copenhagen: Dansk Farmaceutforening. 200 pp. Kr. 4.00.

Plasticizer for mixed cellulose ethers. I. A. Arbuzov and E. N. Rostovskiĭ. Russ. 50,992, April 30, 1937. Addn. to Russ, 48,303. A terpene hydrochloride, e. g., dipentene hydrochloride is heated with a phenol, e. g., cresol to form a plasticizer.

Molding plastic materials under heat and pressure, as in forming gears, from a urea-aldehyde resinoid. Victor H. Turkington (to Bakelite Corp.). U. S. 2,183,857, Dec. 19. App. is described, and a method of molding plastic materials under heat and pressure which comprises forming a material which can be rendered plastic by heat and then hardened, incorporating with the material an added ingredient which expands at the temp. at which the material becomes plastic to produce pores in the plastic material, molding the mixt. under such heat and pressure as to expand the added ingredient while the mixt. is plastic to produce pores and surrounding the plastic mixt. while being molded with a medium capable of minimizing the dissipation of the ingredient from the material, and hardening the material.

Shaping vinylidene chloride polymers. Ralph M. Wiley (to Dow Chemical Co.). U. S. 2,183,602, Dec. 19. In forming products such as films or various molded articles, a material formed at least in large proportion of polymeric vinylidene chloride is heated to a temp. between its softening point and its decompn. temp., rapidly chilled to effect supercooling, and then subjected to shaping, as by rolling or extrusion.

Compositions for making products by molding or extrusion. Henry S. Colton (to H. Seymour Colton, M. J. Rentschler and James A. Weeks, as Trustees). U. S. 2,181,271, Dec. 26. A joint ppt. of $CaSO_4$ and Fe hydroxide and another insol. hydroxide such as that of Al or Mg is used, the wt. of the sulfate being about 1.5 times that of the hydroxides. Cf. *C. A.* **33**, 8331[6].

Soluble artificial resins. Max Kaufmann. Dutch 47,206, Nov. 16, 1939. Resins useful for lacquer manuf. are made by treating condensation products of phenol and formaldehyde at temps. below 150° with polybasic org. acids, avoiding esterification, then esterifying the strongly acid resins with polyhydric alcs. Care is taken to maintain conditions such that only sol. resins are formed.

Olefin-sulfur dioxide resins. Frederick E. Frey and Robert D. Snow (to Phillips Petroleum Co.). U. S. 2,181,295, Dec. 26. An arrangement of app. is described, and a continuous process of producing heteropolymeric resin products which involves charging to a reaction zone olefinic material such as butene, pentene or hexene and SO_2 in liquid phase in such proportions, together with a catalyst, that a soln. of resin product will sep. from the reactants, the soln. being continuously withdrawn from the reaction zone for vaporization of volatile materials from it.

Resinous derivatives from hydroformed naphthas. Wm. J. Sweeney and Kenneth C. Laughlin (to Standard Oil Development Co.). U. S. 2,184,325, Dec. 26. A resinous product is prepd. by a process which involves bringing a naphtha fraction b. about 50–260° and having an aniline point below about −8°, and prepd. by destructive hydrogenation of a SO_2 ext. of a petroleum distillate with a limited proportion of H under conditions suitable for forming antiknock motor fuels, into reaction with ethylene dichloride by boiling the mixt. under reflux in the presence of $AlCl_3$ until the viscosity of the mixt. increases substantially, diluting the mixt. with alc., decomposing the $AlCl_3$ complex with steam, washing the remaining ethylene dichloride soln. with water, and removing solvent and untreated material from the washed soln. by distn. under vacuum.

Decolorizing coumarone-indene resin recovered from still residues. Samuel G. Burroughs (to Pennsylvania Industrial Chemical Corp.). U. S. 2,183,830, Dec. 19. A method of reducing the color intensity of a coumarone-indene resin recovered from a still residue resultant from fractionation and purification of light oil derived in the by-product coking of coal, involves treating the resin in soln. in a solvent, such as solvent naphtha and in the presence of water, simultaneously with a weak acid such as oxalic acid and a finely divided metal such as Zn, while heating to a temp. of about 135°.

Polyvinyl acetal resin sheets. Henry B. Smith (to Eastman Kodak Co.). U. S. 2,184,155, Dec. 19. A transparent, rubbery sheet suitable for use in laminating glass or for a photographic film base is formed with a predominating proportion of a polyvinyl acetal resin the acetal groups of which are largely butyraldehyde acetal groups, together with a sufficient proportion of tetrahydrofurfuryl maleate to give the sheet a rubbery character without substantially impairing its transparency. Cf. *C. A.* **34**, 2101[3,5] and following 4 abstracts.

Polyvinyl acetal resin sheets. Bruce E. Gramkee (to Eastman Kodak Co.). U. S. 2,184,423, Dec. 26. Polyvinyl acetal resin is used with sufficient tributyrin to impart a rubbery character to sheets without substantially impairing their transparency.

Polyvinyl acetal resin sheets. Neil S. Kocher and Henry B. Smith (to Eastman Kodak Co.). U. S. 2,184,426, Dec. 26. A transparent, rubbery sheet comprises a polyvinyl acetal resin in which a predominating proportion of the acetal groups are formaldehyde acetal or butyraldehyde acetal groups and an amount of an alkyl phthalyl ethyl glycolate, in which the alkyl group contains less than 3 C atoms, sufficient to impart to the sheet a rubbery character without substantially impairing its transparency. Such sheets are suitable for *photographic films*.

Transparent, rubbery sheets of polyvinyl acetal resin. Henry B. Smith (to Eastman Kodak Co.). U. S. 2,184,442, Dec. 26. A polyvinyl acetal resin in which a predominating proportion of the acetal groups are acetaldehyde acetal or butyraldehyde acetal groups or both is used with an amt. of triamyl phosphate sufficient to give sheets (suitable for *photographic films* or *laminated glass manuf.*) of a rubbery character without substantially impairing their transparency. U. S. 2,184,443 relates to the like use of triethylene glycol diacetate with a polyvinyl formaldehyde acetal resin. U. S. 2,184,445 relates to a like use of tetrahydrofurfuryl succinate with a polyvinyl acetal resin in which a predominating proportion of the acetal groups are formaldehyde acetal or acetaldehyde acetal groups or both.

Transparent, rubbery sheets of polyvinyl acetal resin. Henry B. Smith and Donald R. Swan (to Eastman Kodak Co.). U. S. 2,184,444, Dec. 26. Triethyl citrate is used as an elastizer with a polyvinyl acetal resin in which a predominating proportion of the acetal groups are butyraldehyde acetal groups.

Condensation products from urea and formaldehyde. Lucien Segond and Paul Michaut. Ger. 684,944, Dec. 8, 1939 (Cl. 12*o*. 17.05). The condensation is carried out in the presence of sulfamides and of Zn.

Insulator. Bruno Neuhof. Ger. 650,652, Jan. 20, 1940 (Cl. 80*b*. 9.02). Mineral wool pulp is treated with materials such as sulfite or sulfate cellulose waste liquors or resin soaps, and also bitumen emulsions and the mass is worked up in the hollander and shaped upon sieves into plates, cardboards, etc.

Electric insulator. Steatit-Magnesia Akt.-Ges. Ger. 684,932, Dec. 8, 1939 (Cl. 21*c*. 2.01). See U. S. 2,165,819 (*C. A.* **33**, 8332[2]).

Laminated heat and sound insulating material. George R. Cunnington (to Woodall Industries Inc.). U. S. 2,184,139, Dec. 19. A supporting layer such as sheet metal is used with a layer of asphaltic mastic and an interposed layer of cellulosic material such as crepe wadding pervious to the flow of fused asphalt, the layer of asphaltic mastic being adhered to the supporting layer by asphalt spewed from the mastic layer through the interposed layer of cellulosic material. U. S. 2,184,140 also relates to manufg. and structural details of laminated insulating material.

Electrical insulation. Edward C. Homan (to Irvington Varnish & Insulator Co.). U. S. 2,183,811, Dec. 19. Bus-bar insulation is made comprising an enveloping sheet of fabric coated with waterproofing material and faced on

its external side with an adhered layer of flexible thermoplastic elec. insulating compn. of high fire and water proof characteristics comprising copolymerized vinyl chloride and vinyl acetate 40, tritolyl phosphate 26, chlorinated diphenyl 13, filler material 19 and Pb oxide as a stabilizing agent 2%, these ingredients in such proportions being adapted to become adhesively tacky under applied pressure and above 120° but which will remain set and nondripping under bus-bar operating temp., the sheet having overlapped meeting marginal portions bonded together by such compn.

Bodies of fibrous glass suitable for use in heat insulation, etc. Donald C. Simpson (to Owens-Corning Fiberglas Corp.). U. S. 2,184,320, Dec. 26. A fabricated body of fibrous glass composed in part of an alkali ingredient is treated, throughout, with a strong inorg. acid capable of neutralizing free alkali on the surface of the glass fibers.

Binding glass fibers in loose formation as for use in heat or sound insulation. Jesse H. Plummer (to Owens-Corning Fiberglas Corp.). U. S. 2,184,316, Dec. 26. Use is made of clay, bentonite, Al powder, or diatomaceous earth as a stiffening material, together with a solid bituminous material such as a tar or asphalt capable of pyrolytic reaction, and the mass is heated to a temp. below the ignition temp. of the bituminous material to cause a breakdown and resinification of the latter with production of a hard tough product.

Apparatus for breaking and splitting up insulating material such as rock wool. Richard B. Patterson (to Patterson Mfg. Co.). U. S. 2,183,583, Dec. 19. Various structural, mech. and operative details.

Vibration absorbing material, suitable for deadening sound. Harry M. Austin and James A. Muir (to Crown Cork & Seal Co.). U. S. 2,184,182, Dec. 26. A vibration absorbing material includes a resilient lamina comprising a mass of rubber-like material having cork particles of greater resiliency than the mass interspersed therein, the resilient lamina having at least one aperture therethrough extending substantially at right angles to the plane thereof, and a relatively stiff lamina directly secured to the resilient lamina and substantially coextensive therewith, the stiff lamina comprising a synthetic resinous sound-deadening material and being sufficiently rigid to distribute load throughout the resilient lamina.

Adhesives containing amylaceous substances such as starch. Hans F. Bauer (to Stein, Hall Mfg. Co.). U. S. 2,183,736, Dec. 19. A remoistening adhesive compn. is formed from a dispersed amylaceous substance, urea and an alkali metal acetate, the urea and alkali metal acetate each being present in amts. in excess of about 5% of the total solids, the proportions of the ingredients in the compn. being such as to produce flexible, clear, dried films thereof having re-tack properties when moistened. Numerous examples are given.

Adhesive wrapping material of gelatinized cellulosic materials and derivatives, etc. Richard G. Drew (to Minnesota Mining & Mfg. Co.). U. S. 2,183,330, Dec. 12. Numerous examples are given of the production of wrappings for foods, etc., which may comprise a transparent sheet of regenerated cellulose or a cellulose ester or ether the joints of which may be sealed (suitably by use of an applied overlying separate sealing tape if desired) by use of rubber compns., etc.

Polyoxyalkylene ether acid compounds containing a higher aliphatic group (washing, wetting, emulsifying and softening agents, etc.). Hans Haussmann, Walter Scheufler and Josef Kaupp (to I. G. Farbenind. A.-G.). U. S. 2,183,853, Dec. 19. Various examples with details are given of the production of compds. such as the triethylene-glycol-α-dodecyl ether-ω-acetic acid, the bis-ethylene glycolic acid mono-oleyl amide and the diethylene glycol-α-dodecylether-ω-monomaleic acid ester, and similar compds., suitable for use as wetting agents and assistants in dyeing processes, etc.

Condensation products of hydrolyzed protein material suitable for use as wetting agents, etc. Georg Meyer (to General Aniline Works). U. S. 2,183,856, Dec. 19. Products comprising a mixt. of aminocarboxylic acids obtainable by totally hydrolyzing protein materials such as skin waste and acylated with high mol. aliphatic sulfonic or sulfaminic radicals, are suitable for use in various textile treatments, etc.

Producing carbohydrate fatty acid esters from starch-factory by-products. Sidney M. Cantor (to Corn Products Refining Co.). U. S. reissue 21,291, Dec. 12. A reissue of original patent No. 2,147,241 (*C. A.* **33**, 3930[2]).

Synthetic leather-resinous composition suitable for lacquer manufacture or molded products. Willett C. Pierson (to National Products Corp.). U. S. 2,184,467, Dec. 26. Vegetable tanned leather is heated at about 88–93° with H_3PO_4 to form an emulsion; the stuffings are removed from the emulsion; triethanolamine is added at a temp. of about 93°; an aq. mixt. of phenol and $(CH_2)_6N_4$ is heated to about 115°, and the leather residue is added to the aq. phenolic mixt. while maintaining the temp. at about 100° to form a homogeneous mass.

Halogenated ethylene polymers. Eric W. Fawcett (to Imperial Chemical Industries Ltd.). U. S. 2,183,556, Dec. 19. By a reaction such as that of Cl or Br on polymerized C_2H_4 in CCl_4, a product is obtained which is suitable for use in elec. insulation, etc.

Polymerizing vinyl esters such as vinyl acetate. Alfred W. Downes (to Carbide and Carbon Chemicals Corp.). U. S. 2,183,642, Dec. 19. A vinyl ester of a lower satd. aliphatic acid is polymerized when dissolved in MeOAc, which facilitates a high degree of polymerization of a high proportion of the ester. The polymerization may be effected by heating to 60–65° for 12 hrs. in the presence of diacetyl peroxide as a catalyst.

Washing composition. Kurt Sponsel and Karl Daimler (to Kalle & Co. A.-G.). U. S. 2,184,171, Dec. 19. A compn. suitable for use in washing processes comprises an alkali metal salt of a naphthalene sulfonic acid or a substitution product together with a water-sol. cellulose ethyl ether β-sulfonate.

Casein. Lawrence C. Pagel. U. S. 2,184,002, Dec. 19. App. is described, and a process of mfg. casein which consists in intimately and continuously mixing an atomized spray of warm skim milk with an atomized spray of a mineral acid, to obtain a fast and substantially complete curd pptn., suspending the curd in its whey in a defined path of gravitational flow to obtain a curd of substantially uniform acid concn., immediately sepg. the curd from its whey, washing the curd substantially free of all sol. salts, whey and excess acid in three sep. wash waters and then dewatering the curd and drying it.

Oil-resistant compositions for coating paper or cloth, etc., for making cartons or other purposes. William H. Butler (to Bakelite Corp.). U. S. 2,183,234, Dec. 12. A compn. resistant to oils and greases comprises about 2 parts of an oil such as a blown fish oil processed to a Saybolt viscosity at 93° of 75 to 600 having dispersed therein about 1–4 parts of a resinous mixt. comprising 1.5–5 parts of a thermoplastic oxidized resin acid, a coumarone resin or a "novolak" to 1 part of a heat-convertible resin prepd. from a phenol having a hydrocarbon substituent in the ortho or para position, such as "tar acids" and treated with an aldehyde such as CH_2O in the presence of an alk. catalyst, such a compn. softening at a temp. of about 80–93° to a condition suitable for coating. Several examples with details are given.

Coating for skis. James E. Flint. U. S. 2,184,182, Dec. 19. A liquid ski dressing is formed of celluloid 0.5 oz., acetone 1/3 pint, shellac 1/6 pint and powd. graphite 1/12 oz.

Panels of materials such as wood veneers. Arthur R. Welch. U. S. 2,183,599, Dec. 19. App. is described, and a process of mfg. panels from materials incorporating a binder setting under heat and pressure, such as a resin, which involves disposing such materials in side-by-side relation, interposing between certain panels a cool, loose plate of heat-conducting metal such as Al, iron or steel, which is independent of all other such plates, subjecting the panels and plates to pressure and surrounding them with a heated fluid such as hot air or steam to heat the plates, and hence the panels, from the edges inwardly

for a time sufficient to set the binder in the center of each panel, and then surrounding the plates and panels with a cooling fluid and subsequently releasing the pressure on the cooled panels at a temp. below that of steam formation.

Strip-form packing material suitable for use with rotating shafts, etc. Gustav E. Schwarz. U. S. 2,184,087, Dec. 19. Various structural and mfg. details of a packing which may be formed of synthetic rubber, etc.

Decalcomania. Ferdinand W. Humphner (to Mid-States Gummed Paper Co.). U. S. 2,183,315, Dec. 12. A paper base carries a water-sol. adhesive, an overlying transfer body and a partially water-sol. imprint on the latter, the imprint being unaffected by the normal contact with water necessary for releasing the transfer but being substantially impaired by prolonged contact with water beyond such period.

Decalcomania transfer. Frank Hart. U. S. 2,184,077, Dec. 19. A transfer is made comprising a decalcomania paper carrying a water sol. film on a surface thereof, a water insol. adhesive film upon the water sol. film, a sealer film on the surface of the water insol. film opposite the water sol. film, the sealer film adapted to have applied thereon a transfer design, and whereby when the decalcomania transfer is wetted, the water sol. film is released from the water insol. adhesive film for application of the adhesive film to an object.

Sound-record blanks. Harry E. Hofmann (to Union Carbide and Carbon Corp.). U. S. 2,184,524, Dec. 26. A record blank adapted to have sound recorded thereon contains a substantial proportion of a resinous constituent consisting of a vinyl resin at least in the surface of the record upon or in which surface the sound is to be recorded, the vinyl resin being from the group consisting of polymerized vinyl esters of aliphatic acids, polymerized vinyl halides, polymerized vinyl benzene, and products of the conjoint polymerization of a plurality of vinyl compounds of at least two different members within the foregoing group.

Material suitable for use in valves. Julian A. Campbell and Samuel C. Carter. U. S. 2,183,547, Dec. 12. A mixt. of flattened Pb shot 40, ground Pb 40 and ground graphite 20% is used with rosin and oil.

Antifreeze solution suitable for use in engine-cooling systems. Ollie M. Williams, James W. Baker and Benjamin F. Butler. U. S. 2,183,178, Dec. 12. $CaCl_2$ 20 lb., water 5 gal., glycerol 5 pints, KI 1 oz. and the juice of 4 lemons are used together.

Detoxication of plant juices such as cashew nutshell liquid. Martha B. Cayo (to Durite Plastics, Inc.). U. S. 2,183,957, Dec. 19. To decrease or eliminate the "poison-ivy effect" of a material such as cashew nutshell liquid, it is treated with a protein material such as egg or blood albumin, fibroin, keratin or gelatin (suitably with heating after the protein material has been moistened with a hydrolyzing agent) or with aminoacetic acid or other amino acid. U. S. 2,183,958 relates to similar detoxication by heating the material with acetamide, benzamide, carbamide, biuret, formamide, oxamide or succinamide.

Luting composition. Ernst Schnabel. Ger. 684,836, Dec. 6, 1939 (Cl. 47*f*. 22.10). To polyvinyl alc. is added a softener, especially water adsorbing agents, e. g., glycerol; strengthening fillers or binding materials may be added.

Exothermic mixtures suitable for use in hair-waving heating pads or the like. Ferdinand Racen and Walter M. Bruner (to W. G. Shelton Co.). U. S. 2,183,587, Dec. 19. There are used together a primary metal such as Al and a secondary metal such as brass (the primary metal being from the group of stable metals positioned above the secondary metal in the electromotive series of metals, and the secondary metal being from the group of stable metals no more active than Zn and its active alloys), a substance, such as salicylic acid, giving an acid soln., and an oxidizing agent such as $KClO_3$ in sufficient quantity to oxidize both metals. Various examples are given.

Cold permanent waving of hair. David J Pye. U. S. 2,183,894, Dec. 19. A method of waving hair upon the human head involves dividing the hair into compact strands, wetting it with an aq. soln. of an alkali metal sulfide at a pH of 8–11, winding the hair strands and securing the wound strands to impart a permanent wave in about 5 min. to the hair, and finally removing any residual aq. soln. from the hair.

Pest exterminator. N. V. de Bataafsche Petroleum Maatschappij (Henricus Jacobus Charles Tendeloo and Siegfried Leonard Langedijk, inventors). Ger. 684,988, Dec. 9, 1939 (Cl. 45*l*. 3.01). Sulfides contg. the group C.S.C and derived from unsatd. aliphatic or alicyclic hydrocarbons or their derivs. are employed alone or together with other materials.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Water poisoning in man and animal, together with a discussion on urinary calculi. Douw G. Steyn and Norman Reinach. *Onderstepoort J. Vet. Sci. Animal Ind.* **12**, 167–230(1939).—From the results of expts. conducted by various workers and the analysis of specimens of water and observations made by S. and R., it appears that the extreme limit of the total salt content of drinking water, especially for human beings, should be 570 p. p. m. This limit depends to a large extent on the nature and quantity of the respective salts present and the suitability of each mineralized water for drinking purposes should be considered on its own merits (analysis). The most poisonous ingredients of mineralized waters are nitrates, sulfides and fluorides, while Mg, Ca and sulfates tend to upset the normal processes of mineral metabolism. The carbonates and bicarbonates of Na and K render the gastrointestinal juices abnormally alk., disturb digestive processes and cause the deposition of urates in the kidneys. Methods of preventing poisoning by water are discussed. Numerous references. K. D. Jacob

Hot springs near Freiberg. Rudolf Schreiter. *Mitt. Naturw. Ver. Freiberg* **3**, 17–19(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 86.—The temp. of the waters and the depths and rocks from which that water comes, of 6 mineral springs are compared and discussed. C. A. Silberrad

Physicochemical and biological studies on some Bulgarian mineral waters. M. Andreïcheva Vankova and D. Kalcheva. *Ann. univ. Sofia*, II. *Faculte phys.-math.*, Livre 2, **34**, 411–44 (in French, 445–6)(1937–38).—The mineral waters of the region around Sofia (Sofia, Gorna, Bania, Kniajevo, Ovtcha-Koupel and Bankia) are weakly alk. Boiled, they become more alk., depending on the amt. of H_2CO_3 dissolved in the H_2O and on the alk. reserve. All these waters have a weak elec. cond.; all, except those of Kniajevo, affect the action of the blood and liver catalases. Those of Ovtcha-Koupel affect the activity of all enzymes except saliva. All have a catalytic action decompg. H_2O_2. After boiling, this catalytic action is more pronounced but of less duration. They also have an action similar to that of oxidases but unlike that of peroxidases. They exercise an influence on the spontaneous oxidation of hydroquinone and of pyrogallol. This effect is stronger after the waters have been heated or boiled. 31 references. A. H. Krappe

The effect of time and temperature of storage on the results obtained in the bacteriological analysis of water. Theodore W. Keiper and John S. Flinn. *Am. J. Med. Tech.* **6**, 11–14(1940).—One hundred samples of water were tested by standard methods at 1 hr. (control), 24 hrs. and 48 hrs. after collection, being stored at room temp. The results show a definite increase in plate counts and in *E. coli* as compared with the control. According to the standards of the Amer. Public Health Assoc., K. found

that water after 24 hrs.' storage was "unsafe for human consumption," and after 48 hrs. it is "bad water." These results indicate that storing water samples at room temp. for any length of time before the beginning of the analysis is not a reliable procedure for judging the character of the water supply. Dorothy A. Meyer

Determination of fluorine in the potable waters of Valsugano in Trentino. Dino Eccher Dall'Eco. *Ann. chim. applicata* **29**, 340–4(1939).—Using a micromethod developed by von-Fellenberg (*C. A.* **33**, 2631[9]), E. has detd. the F content of the drinking waters in the Trentino district. The amts. varied from 0.06 to 1.70 mg./l. A total of 122 samples from as many sources was examd. A. W. Contieri

Water-treatment problems. J. B. Baty. *Can. Engr.* (*Water and Sewage*) **78**, No. 1, 12, 56(1940).—A review. Ann Nicholson Hird

Economies effected by water conditioning. A. H. Ullrich. *Proc. 9th Ann. Arkansas Water & Sewage Conf., Fayetteville*, **1939**, 23–9. E. H.

The use of aluminum sulfate and ferric chloride in the clarification of water. Mario Franco. *Atti soc. med. chir. Padova* **17**, 164–210(1939). Helen Lee Gruehl

Coagulation [in water treatment]. Otto M. Smith. *Proc. 9th Ann. Arkansas Water & Sewage Conf., Fayetteville*, **1939**, 45–54.— A review. E. H.

Chlorination of condenser-cooling water. R. B. Martin. *Trans. Am. Soc. Mech. Engrs.* **61**, 651–6(1939); cf. *C. A.* **32**, 8647[8].—Chlorination is used for the control of algae. C. B. Jenni

Rapid sand filters—today. G. W. Paulette. *Proc. 9th Ann. Arkansas Water & Sewage Conf., Fayetteville*, **1939**, 15–23. E. H.

Recirculation of boiler water to hot-process softeners. John J. Maguire and W. J. Tomlinson. *Combustion* **11**, No. 3, 26–32(1939).—Recirculation of boiler blowdown water to hot-process softeners, either of lime-soda or phosphate types, is discussed. Return to coagulation tanks is used for alky. adjustment prior to filtration. Recirculation of boiler water may be substituted for soda ash used in conjunction with alum in condensate oil removal systems. Operating conditions and equipment available det. the necessary blowdown equipment and control. C. B. Jenni

Rigid and elastic base-exchange materials. H. Pallmann. *Soil Research* **6**, 21–48(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 126–7.—Base-exchange materials are divided into 2 classes: The first includes compact materials of rigid structure with less exchange capacity, less power to retain the adsorbed ions, and greater reaction velocity; this class includes feldspar, mica, kaolinite, aged and much dehydrated gels of SiO_2, Al_2O_3, Fe_2O_3, etc. In the second class are internally dispersed exchange materials with rigid or elastic structure, of greater exchange capacity and greater power of retaining adsorbed ions. Those of rigid structure include permutites and zeolites, those of elastic structure clays of the types of montmorillonite, beidellite and nontronite. C. A. Silberrad

The development of the exchange softening (of water) on the basis of ten years' operating experience in Leuna. E. Seyb. *Chem. Fabrik* **1940**, 30–4.—Saale river H_2O, high in salts and hardness, is reduced to at least 0.1° hardness to use in boilers at 45 atms. pressure. Experiences with silicate, C and synthetic resin softeners are reviewed in respect to efficiency, filter capacity, and effect of temp., pH and mech. abrasion on the material. The synthetic material (cf. *C. A.* **33**, 1746[6], 8417[3,5]) has given the best results. J. H. Moore

The formation of scale and methods of prevention in water heaters. J. M. Krappe. *Gas* **16**, No. 2, 19–22 (1940).—In ordinary domestic hot-water service, scale forms slowly when the water temp. is maintained by means of a thermostat at 140°F. or below. At 180°F. scale formation was found to be 7 times as great in one instance. Hence, furnace coils and side-arm heaters are more prone to scale formation than automatic water heaters. When water at 180°F. or higher is required, scale formation can be prevented by adding hexametaphosphate to the water at the rate of about 2 parts per million, by means of a wick or by-pass feeder, a feeder using a porous cup, or some similar device. A metaphosphate of low soly. is commercially available which can be placed directly in an enlarged portion of the supply line provided with suitable corrosion-resistant screens, and will dissolve at such a rate as to give suitable metaphosphate concns. R. W. R.

Attack on steel in high-capacity boilers as a result of overheating due to steam blanketing. Everett P. Partridge and R. E. Hall. *Trans. Am. Soc. Mech. Engrs.* **61**, 597–622(1939).—A no. of failures in boilers operating in the pressure range near 1400 lb. per sq. in. have occurred under conditions such that O corrosion or scale could not be considered as the cause. The tubes have shown internal attack along the top, generally with definite grooving and the production of black magnetic iron oxide. The fundamental cause of this type of failure is steam blanketing. In a tube slightly inclined to the horizontal, the steam tends to rise to the top and move along it. This introduces a resistance to the flow of heat from the tube wall to the fluid, and causes the top of the tube to become more or less seriously overheated. Boiler water of normal alky. passing through the tube and touching the overheated surface is concd. to an excessive degree, with resultant attack on the steel. It has been shown that the rate of oxidation by H_2O at high boiler temps. is greatly accelerated by increase in concn. of NaOH. Elimination of caustic alky. from the boiler water retards the action but does not affect the fundamental cause, and may merely postpone the trouble. The best chance of obviating the difficulties which may result from steam blanketing is to design the surface exposed to high rates of heat input so that steam blanketing cannot occur, or where slightly inclined tubes must be used, to protect them so that the rate of heat input will be sufficiently low to avoid excessive overheating of the metal. C. B. Jenni

Feedwater-treatment problems with high-pressure boilers. E. A. Sitter and W. J. Massey. *Natl Engr.* **44**, 102–5(1940).—Feedwater for 700-lb. pressure boilers must be completely deaerated, zero hardness must be maintained at all times together with accurate control of alky. and total solids. To maintain zero hardness phosphate is fed directly to the boilers through feeding equipment installed along with the deaerating heater. A. N. H.

Present-day boiler-water treatment. H. Richter. *Atti V° congr. intern. chem.* **4**, 320–9(1939).—The recent improvements in boiler-water treatment include a new phosphate treatment process devised by Chem. Fabrik Budenheim A.-G. (cf. *C. A.* **33**, 5559[6]) and new exchangers for bases. The problem of SiO_2 removal and recent elec. processes for the prevention of deposits on boiler walls are also discussed. A. H. Krappe

The joint meeting for sewage disposal of certain municipalities in Essex and Union counties, New Jersey. Leslie E. West. *Sewage Works J.* **11**, 1067–74(1939).—Data are summarized from the annual report for 1938. W. D. Hatfield

Operating problems in starting the southwest plant of the sanitary district of Chicago. A. H. Goodman, C. T. Mickle, G. G. Poindexter and Roy C. Hageman. *Sewage Works J.* **11**, 1020–37(1939). The paper is divided into sections on treatment problems, chem. control and mech. organization. Of particular interest are the low air requirements and short aeration periods which have been possible. Chem. control consists of detg. dissolved O, sludge index, sludge return concns. and suspended solids in the mixed liquor. The plant is unique in that it is operated on a const.-flow basis, the excess flow being treated in the West Side Plant. W. D. Hatfield

Sewage disposal in Canada. Albert E. Berry. *Can. Engr.* (*Water and Sewage*) **78**, No. 1, 11–15, 46–50(1940). Ann Nicholson Hird

Sewage disposal works for Barrie, Ontario. G. Graham Reid. *Can. Engr.* (*Water and Sewage*) **78**, No. 1, 13, 56–7(1940). Ann Nicholson Hird

Treatment of septic-tank effluent from a small community by means of an enclosed biological filter at Bloemsfontein, South Africa. Hugh Vaughan Davies. *J. Inst.*

Civil Engrs. (London) **1939–40**, No. 2, 155–8; cf. *C. A.* **33**, 3504⁹.—Reply to correspondence. A. N. H.

High-capacity trickling [sewage] filters. L. E. Livingston. *Proc. 9th Ann. Arkansas Water & Sewage Conf., Fayetteville*, **1939**, 30–3.—A review. E. H

Filtration and incineration at Buffalo. C. R. Velzy. *Sewage Works J.* **11**, 988–93(1939).—The primary sludge is stored in digestion tanks of 20-day retentive capacity. The filters are operated at a rate of 5 lb. of dry solids per sq. foot per hr. Difficulties are reported from grease depositing in the 10″ sludge force main. Grit as well as sludge is incinerated. Fouling of sludge-conveyer belts is reported. W. D. Hatfield

Studies in the methane-producing bacteria. IV. Growth of methane-producing organisms in supernatant sludge liquors. H. Heukelekian and Bernard Heinemann. *Sewage Works J.* **11**, 965–70(1939); cf. *C. A.* **33**, 9505⁸.—The supernatant liquors from fresh and ripe 3 sludges, when used as culture media, allowed the max growth of methane-producing bacteria, and septicization for even 2 days limited the growth of these organisms owing to the production of inhibitory substances. Complete digestion either destroys these inhibitory substances or overcomes their activity with growth-promoting substances. W. D. Hatfield

Fine screening of sewage. Joseph A. Muldoon. *Sewage Works J.* **11**, 1054–66(1939).—The design, operation 4 and maintenance of mech. fine screens of the Reinsch-Wurl type are fully discussed with particular emphasis on the maintenance of screens, brushes, thrust bearings, sleeves and proper lubrication. W. D. H.

Sludge-gas-engine operation at Michigan City, Indiana H. H. Jones. *Sewage Works J.* **11**, 1074(1939).—A preliminary report. W. D Hatfield

Activated-sludge oxidations. IV The influence of temperature upon the rate of oxygen utilization by activated sludges Clair N. Sawyer and Gerard A. Rohlich. *Sewage Works J.* **11**, 946–64(1939); cf. *C. A.* **33**, 9505⁸.—For 5 activated sludge alone, the av. rates at 20, 15 and 10° were found to be 71.2, 45.2 and 25.5% of that at 25°. The equation, $y = 0.71x^{1.54}$ in which y is the relative activity in percentage based on the value at 25° = 100% and x is °C., has been found to apply. The rate of O utilization was independent of nitrification. Winter sludges used more O at given temps. than summer sludges. Fourteen graphs are given showing the temp. effect on O utilization of sludges from different sources and seasons. W. D. Hatfield

Sludge disposal at the Minneapolis-St Paul plant. George J. Schroepfer. *Sewage Works J.* **11**, 971–87 (1939).—This part of the plant consists of sludge-concen tanks, bucket elevators, chem.-treatment tanks, vacuum filters and multiple-hearth incinerators. The initial operation difficulties are described. Sludge of more than 8–10% solids does not flow easily. Production of thick cakes was found inadvisable. Auxiliary fuel oil was not found necessary for operation of the incinerators; in fact excess heat had to be dissipated to keep furnace temps. down. The total cost per dry ton of sewage solids during the last 6 months was $3.30 for operation and maintenance. W. D. Hatfield

Sewage treatment at Gary. L. R. Howson. *Sewage Works J.* **11**, 994–1005(1939).—This new plant consists of primary sedimentation, activated sludge, sludge digestion, gas engines for pumping sewage, electrically driven blowers and sludge-drying beds. W. D. Hatfield

Development of flash drying system of sewage sludge at the sanitary district of Chicago Wm. A. Dundas. *Sewage Works J.* **11**, 1006–19(1939).—The theory and development of the flash drying system are described. Either dried fertilizer or complete incineration is possible. No operation or cost data are given. W. D. Hatfield

Studies on activated-sludge bulking. I. Bulking of sludge by means of carbohydrates. R. S. Ingols and H. Heukelekian. *Sewage Works J.* **11**, 927–45(1939).—With a deficient amt. of N the development of zoögleal organisms is limited to the amt. of N present. The development of *Sphaerotilus* is favored by the excess of carbohydrate left in soln. Bulking due to sugar in soln. is partially caused by a deficiency in N and also by the much greater rate of growth of *Sphaerotilus*. Peptone produced a heavy growth of zoögleal organisms but did not favor *Sphaerotilus*. Bulking is the result of the successful invasion of the facultative anaerobic (*Sphaerotilus*), over an aerobic organism (zoöglea), so that the smaller the quantity of O present the more rapid the bulking. W. D. Hatfield

Excerpts from "Minneapolis-St. Paul sanitary district report for 1938." Geo. J. Schroepfer. *Sewage Works J.* **11**, 1078–83(1939). W. D. Hatfield

Extracts from first annual report of the Buffalo sewer authority 1938–1939. Charles R. Velzy and G. E. Symons. *Sewage Works J.* **11**, 1085–8(1939). W. D. Hatfield

Studies on the digestion and distillation of organic wastes. VII. Characters of the fuel oils derived from the distillation of egg albumin and egg yellow. Saburo Sibata. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 336–7(1939); cf. *C. A.* **33**, 7940³.—Boiled egg albumin dried at 100°, with 40% Japanese acid clay, on distn. gave NH_4 salts but no tarry matter. Egg yolk similarly treated gave a brownish grease. The first is like that from digested sludge, the second like that from undigested sludge Yields of 10 and 48% of "fuel oil" of given elementary analyses were fractionated. They contained 72.8 and 36.4% unsatd. compds., 19.7 and 35.6% aromatic compds., and 7.5 and 28.0% naphthenes and paraffins. The results confirm a prior assumption that "fuel oil" from raw settled sludge may be due to raw fatty matter content **VIII. Digestion of garbage, soybean and starch (former two materials are digested so as to prevent the evolution of combustible gases) and the distillation of digested residues thereby obtained.** *Ibid.* 338–41.—Mixed garbage 5 with 14.4% digested sludge when digested with or without acid clay anaerobically gave no H or CH_4 and the pH remained below 7.0 except for a brief time when dosed with lime to above that level at 50–60 days. Volatile solids were liquefied rather than gasified. Boiled soybean with acid clay and starch with acid clay similarly seeded and treated gave no CH_4 but H from the latter in a ratio of 2:1 to the CO_2 evolved. "Fuel oil" yields on distn. of the residues were 22.9, 16.0, 23.3 and 2.8%, resp. The first 6 2 are double the theoretical from Et_2O-sol. substances present in the material retorted. Therefore much must have come from "Kerogen." Reduction of combustible gas thus increases liquid-fuel yield. The "fuel oil" from soybean residues was smaller than the theoretical value; anaerobic digestion may reduce rather than increase yields from it. The digested starch residue gave 3% of light oil and 9% of "fuel oil" when distd. with 10% reduced iron 7 powder. Foster Dee Snell

Packinghouse wastes and sewage treatment at Austin, Minnesota. Paul Hansen and K. V. Hill. *Sewage Works J.* **11**, 1045–53(1939).—The problem at Austin is the treatment of sewage from a human population of 18,000 and a waste population equiv. of 195,000. The latter waste is to be pretreated by the industry with sedimentation and high-rate filters to reduce it to a population 8 equiv. of 62,000 and thus make the total strength entering the city plant 80,000. The city plant consists of chem. treatment, flocculation, sedimentation, high-rate filters, intermediate sedimentation, final filters and final sedimentation. The design is very flexible so that various steps in the treatment can be eliminated when river stages require less complete treatment. An interesting feature is an equalizing tank which will allow the plant to be operated at an av. daily const. rate of flow. W. D. Hatfield

Treatment of sulfur-dye waste by the activated-sludge process. III. Dewatering of activated sludge obtained by treatment of a sulfur dye-sewage mixture. Ralph Porges and Henry J. Miles. *Sewage Works J.* **11**, 1038–44(1939); cf. *C. A.* **33**, 1848².—Approx. twice as much (8·4%) $FeCl_3$ was required to condition activated sludge from sewage and dye mixts. as was required with activated sludge from sewage alone. Fresh activated sludge filtered better than sludge stored overnight. W. D. Hatfield

Pulp mills and fisheries (Vallin) **23**. Rubber as construction material [for mains, conduit pipes, taps, etc.] (van Wijk, Jr.) **30**. Geol. foundations of hot springs of Johannisbad (Watznauer) **8**. Oxidation-reduction potentials in water-logged soils, natural waters and muds (Pearsall, Mortimer) **15**. Improvement in detn. of Li in mineral waters (Hackl) **7**. Contamination of water by waste liquors of sulfate pulp mills (Bergström, Vallin) **23**. Report for 1936 and 1937 of Malaria Commission of Health Council of Holland [anopheline larvae in Cl-contg. water] (Schüffner, Swellengrebel) **13**. Strainer of back-washing type for water (U. S. pat. 2,184,177) **1**. Elec. indicator and control app. for impurities in tank liquors of water and sewerage plants (U. S. pat. 2,183,584) **1**.

Mineral Water Trade Year Book. Birmingham, England: National Union of Mineral Water Manufacturers, Ltd. 194 pp. Reviewed in *Analyst* **65**, 142 (1940). 1

Apparatus for treating water flowing through pipes with reagents. Walter H. Hinsch (to Dearborn Chemical Co.). U. S. 2,184,346, Dec. 26. Various structural and operative details.

Device for treating water, as fed to boilers, with various compounds or solutions. Joseph W. Riley and Matthew Turton. U. S. 2,183,125, Dec. 12. Various structural and operative details. 2

Trickling filter for purifying sewage water by aerobic bacterial action. Arthur A. Page. U. S. 2,183,057, Dec. 19. Various structural details of a filter open to the atm.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Soils of Musselshell County, Montana. L. F. Gieseker. *Montana Agr. Expt. Sta., Bull.* **374**, 3–50(1939).—Soil survey data are given. C. R. Fellers

Boone County soils. Herman Wascher, R. S. Smith and L. H. Smith. *Illinois Agr. Expt. Sta., Soil Rept.* **65**, 35 pp. (1939).—In most soils of the County, N is the most important limiting factor for plant growth; this is especially true for the lighter soils developed under forest vegetation. Available P is also low in many soil types. Productivity indexes for the several types are given. C. R. Fellers

Shelby County soils. Herman Wascher, Guy D. Smith and L. H. Smith. *Illinois Agr. Expt. Sta., Soil Rept.* **66**, 48 pp. (1939).—Chem. deficiencies are principally Ca, N and P. Productivity indexes for the several soil types are given. C. R. Fellers 5

Soil surveys of Saskatchewan irrigation projects. H. C. Moss. *Sci. Agr.* **20**, 170–4(1939).—Detns. of exchangeable bases, vol. wt., moisture-holding capacity and wilting coeff. are of direct value in the study of irrigation problems. C. R. Fellers

Nature of soil parent materials in southern British Columbia. C. C. Kelley. *Sci. Agr.* **20**, 301–7(1940).—Geol. C. R. Fellers 6

Composition, rating, and conservation of Willamette Valley soils. W. L. Powers, J. S. Jones and C. V. Ruzek. *Ore. Agr. Expt. Sta., Bull.* **365**, 38 pp. (1939).—There is a deficiency of S in many of the basaltic soils. Most of the soils respond to N fertilization. The ratio of K to Ca increases with soil age, i. e., soils lose Ca faster than K. The Mg content is normally 50% that of the Ca. A productivity rating of the soils is given. C. R. Fellers 7

Some Bulgarian soils. II. K. Woynoff. *Bodenkunde u. Pflanzenernahr.* **16**, 12–16(1939); cf. *C. A.* **33**, 2259⁶.—Partial analyses of 33 samples are tabulated. Only one contained acid humus, as indicated by the color of an NH_4OH ext.; the same and one other soil were acid to litmus paper. Extremes of compn. were represented by total C, N and humus contents of 0.06, 0.06 and 0.10, and 3.05, 0.36 and 5.25%, resp. The max. $CaCO_3$ content was 31.3%; several samples contained none. C. J. Schollenberger 8

Soil moisture studies. I. Some factors affecting the moisture-holding capacity and its determination. J. C. Wilcox. *Sci. Agr.* **20**, 140–9(1939).—The moisture-holding capacity was affected by the type of soil, time after irrigation, depth of sampling and type of subsoil. Great variability existed in water-holding capacity in a single soil type. A lab. method was developed that approximated field results closely. The soil was tamped in 2 × 3 in. tubes with a standard degree of packing, satd. with H_2O, and drained for 30 min. over air-dry soil of the same kind packed in a similar manner. C. R. Fellers 9

Method of taking soil monoliths. R. H. Spilsbury. *Sci. Agr.* **20**, 297–300(1940).—A trough with galvanized Fe sides, open at 1 end, is forced into the exposed soil section by means of a jack, thus preserving the soil monolith in its natural state without the use of cementing materials. C. R. Fellers

Dispersion of lateritic soils and the effect of organic matter on mechanical analysis. O. W. Beale. *Proc Assoc. Southern Agr. Workers* **40**, 59–60(1939).—Suspensions of certain lateritic soil dispersed with Na oxalate were frequently unstable. A study of suspensions dispersed with Na oxalate and NaOH, separately and in various combinations, showed that best results are obtained by using 5 ml. 0.5 *N* Na oxalate and 3 ml. *N* NaOH per l. The H_2O_2 pretreatment can be omitted on most lateritic soils. Also in *Soil Sci.* **48**, 475–81(1939). K. D. J. 4

Mineral composition of soils and forage crops in Eastern Canada. I. Timothy hay and oat straw. L. E. Wright, J. C. Woodward and C. H. Robinson. *Sci. Agr.* **19**, 673–86 (1939).—Paired samples of timothy hay, oat straw and soil showed that there was no relationship between Ca and P content of timothy hay or oat straw and the exchangeable Ca and sol. P of the soil. There was a pos. correlation of the N of timothy hay with the N of the soil. The relationships between exchangeable Ca and pH of soil were pos. and were significant at the 1% point. The Ca content of both hay and straw was significantly greater when the crops were grown on sandy loams than when grown on clay loams. The clay loam soils were higher in total Ca, exchangeable Ca and sol. P than the sandy soils. There was some evidence that P fertilizers increased the P content of hay and straw when soil P was low. Reported instances of mineral deficiences in livestock were not related to Ca or P content of hay or straw. C. R. F.

The heats of reaction of some humic acids. Erhard Jung. *Bodenkunde u. Pflanzenernahr.* **16**, 129–37(1940).—The results of calorimetric detns. by a technique similar to that of Wust and Lange (*C. A.* **19**, 3412) on solns. of Na humate extd. from high-moor peat with NaOH and NaF (cf. *C. A.* **32**, 9359⁷) and Merck's "humic acid" were irregular and inconclusive, exceeding the values for total heat of neutralization calcd. from the acidity. No measurable heat of dissocn. could be demonstrated with any of these substances. Fifteen references. C. J. Schollenberger 8

Pycnometric determination of water content and specific gravity of soil. Alexius Jung. *Bodenkunde u. Pflanzenernähr.* **16**, 137–40(1940).—The use of a special pycnometer with accurately ground-on neck graduated 53–56 ml. over a 16-cm. length is described. To a 10.00–11.00-g. sample weighed into the wide-necked body is added about ½ of 50.00 ml. H_2O at room temp. and a vacuum briefly applied with gentle agitation to remove air bubbles. The pycnometer is then assembled and the remainder of the H_2O added. The vol. of soil + H_2O observed is calcd. graphically to 20° standard temp.; this figure $-50 = v$. Then from the sp. gr. of the dry soil (s) and the wt. of the damp sample (g), the percentage of H_2O in the sample (y) is calcd., $y = (v - (g - v)/(s - 1))$ 10. Similarly, the 9

vol. of dry soil (x) is calcd., $x = (g - v)/(s - 1)$. With a table and by always using a 10.00-g. sample, the results can be read without calcn., or by constructing a nomogram the necessity of using exactly a 10.00-g. sample can be avoided; the sample may be any known wt. of 10–11 g. Comparisons with the standard oven-drying method on numerous soils showed agreement within less than 0.1% in every case; the pycnometric method generally indicated a slightly higher H_2O content. C. J. Schollenberger

Oxidation-reduction potentials in water-logged soils, natural waters and muds. W. H. Pearsall and C. H Mortimer. *J. Ecol.* 27, 483–501(1939).—In wet soils and muds, the diphenylamine reaction for nitrates is pos. and replaceable ferrous Fe disappears above a potential of 350 mv. at pH 5. In natural waters, ferrous Fe is detectable only below this potential, while below the same point NH_3 tends to replace nitrate and sulfides to replace sulfates. This potential is found in these waters at low O concns., equiv. to about 8% of satn. or less. The apparent potentials estd. with various oxidation-reduction indicators agree with the electrode potentials in the crit. range. Data are given for the effects of O on the drifts of potential. J. R. Adams

Standardization of rapid soil-testing technique. C. P. Rivaz and G. C. McLaren. *Sci. Agr.* 20, 120–30(1939).—A shaking device and a rotator for minimizing variations in manipulation are described. Permanent standards, used in conjunction with a suitable illuminator, simplify the reading of the tests and assist in eliminating errors in matching colors caused by the personal factor. Rapid soil tests can be made with a fair degree of accuracy if simple precautions are observed. C. R. Fellers

California practice in obtaining undisturbed soil samples. T. E. Stanton, Jr. *ASTM Bull.* No. 101, 9–12(1939).—Two types of soil samplers are used, a heavy power-operated sampler for depths ranging up to 300 ft. and a hand-operated sampler for depths up to 50 ft. The salient feature of the drill consists of a bit which plugs the sampler and which may be retracted through the sampler leaving the open end to be driven into the undisturbed soil to the desired depth. John O. Hardesty

A method for rapid titrimetric determination of ferric oxide and alumina following precipitation by 8-hydroxyquinoline from soil extracts and its application to the recognition of horizons of enrichment. P. Pfeffer. *Bodenkunde u. Pflanzenernahr.* 16, 50–8(1939).—To 5–30 g. soil in a 200-ml. Erlenmeyer flask add 25 ml. HCl, sp. gr. 1.15, with 1 ml. 30% H_2O_2 and boil ½ hr. Dil. and filter into a 100-ml. volumetric flask, washing with dil. HCl to recover Fe; add NH_4OH just short of permanent pptn., cool and dil. to 100 ml. To a 25-ml. aliquot add 30 ml. aq. soln. contg. 13% NH_4 tartrate and 10% NH_4OAc, some filter pulp and 30 ml. 65% AcOH and heat to 80°; next add from a buret with shaking a 4% soln. of 8-hydroxyquinoline (**B**) in 10% AcOH, testing drops with $FeCl_3$ to ensure an excess. Record the exact vol. of **B** added; its titer vs. 0.1 N $KBrO_3$ must be known. Let stand 24 hrs., dil. to 150 ml. and filter with dry glassware (**A**). The filtrate should be yellow with little green; if deep green, return to the flask and let stand another day with frequent shaking before filtering. Det. excess **B** in a 20-ml. aliquot of **A** plus 20 ml. 25% HCl, by titrating first with 0.1 N $KBrO_3$ in excess, then titrating back with 0.1 N $Na_2S_2O_3$ after adding 2–3 g. KI and starch indicator. One ml. 0.1 N $KBrO_3$ = 0.665 mg. Fe_2O_3. To a 50-ml. aliquot of **A** add 5–10 g. NH_4Cl, heat to 80° and neutralize with NH_4OH, when a part of the Al_2O_3 will be pptd. by the excess of **B** added for the Fe detn.; to complete, add a 2% soln. of **B** in an equal wt. of glacial AcOH, neutralized with NH_4OH and made to vol., testing drops as before to ensure excess of **B**. Add a little NH_4OH to this mixt. and heat on water bath for 5 min., filter and wash with hot water. Dissolve from the filter back into the flask with a 1:1 mixt. of 25% HCl and 96% EtOH, add 20 ml. 25% HCl and titrate **B** in the ppt. as before. One ml. 0.1 N $KBrO_3$ = 0.428 mg. Al_2O_3. Tests on numerous soils showed satisfactory agreement with the detns. by standard methods. Seven references. C. J. Schollenberger

Chemical investigations of a number of soil profiles. Aasulv Løddesøl and O. Braadlie. *Norsk Geol. Tids.* 18, 305–69, 371–3 (in English, 369–71)(1939).—Numerous Norwegian soil samples were analyzed and the results of podzolized profiles prepd. as follows: The relation between the quantity of each oxide in the various horizons and in horizon *A* was calcd. The quotients thus found were arranged along straight lines, one for each horizon. Al_2O_3 is the reference oxide and its place on the line is the zero point. The position of the other oxides indicates the loss (left) or increase (right) in percentages. The loss or increase percentage is traced graphically. In typical saline profiles the content of oxides in the various horizons in proportion to horizon *C* is given. Raw humus on sand (rainfall 400 mm.) is richest in exchangeable ions. Below horizon *A* there is horizon A_2 poor in nutrients and rich in silica; it is followed by horizon *B*, where Fe compds. are pptd., while the monatomic and to a great extent also the diatomic cations are washed out. In profiles of fine sandy soils (rainfall 700 mm.) the soil is poor in plant nutrients, though leaching is not very pronounced. There is formed a horizon enriched in salts, which in addn. to Al_2O_3 and Fe_2O_3 also contains MgO, whereas Ca is pptd. as phosphate in horizon *C*. In saline profiles (rainfall 300 mm.) the contents of easily mobile oxides were lowest in horizon *C*, increasing upwards. They were most abundant in horizon *A*, the readily sol. salts moving up because of the slight rainfall. As for org. soils (rainfall 1800 mm.) it appears that in bog soils a leached profile corresponding to the podzol profiles for mineral soils is formed. Immediately below horizon *A* is the leached horizon *B* with a lower electrolyte content. In the lowest horizon, of greater plasticity, the pH is higher, and the pptd. complexes in the overlying horizon are dissolved and removed with the $CaSO_4$. The increase in the pH, especially in the lowest horizon, is believed to be due to the K content which is not pptd. but proceeds downwards. In surface samples electrodialysis shows that more sulfates and chlorides of monatomic and diatomic cations were given off by the fertilized than by the unfertilized soil, the latter giving off mostly phosphates of Al and Fe. 40 references. A. H. Krappe

The influence of subsoiling and organic matter on eroded Lufkin soils. D. W. Thorne. *Proc. Assoc. Southern Agr. Workers* 40, 59(1939).—Expts. were carried out with the topsoil, 1st 6 in. of the subsoil and various mixts. thereof, to which were added various treatments of lime, vetch and oat straw. The treated soils were maintained at about 50% of their water-holding capacity for 4 months. The low productivity of the subsoil seemed to be due to a deficiency of N and available P, as well as to its undesirable phys. properties. Treatment with vetch greatly increased the content of N and available P and increased the nitrifying power of the various soils. Oat straw had no significant effect on available P in the soils but depressed their content of nitrate and the nitrifying power as expressed by nitrate accumulation from the biol. oxidation of $(NH_4)_2SO_4$. Lime hastened decompn. of the org. matter as shown by an increased accumulation of nitrate. In greenhouse expts. the yields of oats from the treated soils were in agreement with the results secured for available P, nitrate and nitrifying power. K. D. Jacob

The boron content of some Okanagan soils. C. G. Woodbridge. *Sci. Agr.* 20, 257–65(1940).—The observations of McLarty (*C. A.* 30, 8490⁷) that corky core and drought spot in apple trees were due to B deficiency are confirmed. Addns. of B to the soil about the trees is a convenient way of providing B. Approx. 50 lb. of borax per acre is used. Soils should contain 0.5 p. p. m. of B for normal crop requirements. There was fairly rapid diffusion of B in the sandy soils to a depth of 30 in. Various extg. solns. for B in soil were compared. For the extn. of B no difference exists between water alone and water satd. with CO_2. A 1% HCl soln. extd. 1.5–2.5 times as much B as did the others. C. R. Fellers

Recent studies on the nature of soil organic phosphorus. C. L. Wrenshall, W. J. Dyer and G. R. Smith. *Sci. Agr.* 20, 266–71(1940); cf. *C. A.* 33, 8880².—Although

org. soil P bears a chem. similarity to nucleic acids, it differs greatly from such compds. in its susceptibility to decompn. in the soil. The soil compds. are very resistant to decompn. by soil organisms. A definite fraction of the soil org. P is highly resistant to decompn. by alk. hydrolysis. It is very difficult to split off all the phosphate by acid hydrolysis. An improved procedure, by which higher yields of the soil "nucleic acid" fraction are obtained, is described. C. R. Fellers

Arrangements for testing soils for available phosphoric acid by Egnér's lactate method. H. Rheinwald and G. Constantin. *Bodenkunde u. Pflanzenernahr.* **16**, 1–12 (1939).—A detailed description of procedures and app. in a lab. testing 400 samples of soil daily for assimilable P_2O_5 by Egnér's Ca lactate-HCl extn. method (cf. *C. A.* **27**, 3278). C. J. Schollenberger

Phosphorus in the economy of the soil. Ennio Luiz Leitão. *Bol. ministerio agr.* (Brazil) **28**, No. 1–6, 9–14(1939).—Didactic. O. W. Willcox

Cobalt status of soils and pastures in the Sherry and Wangapeka districts, Nelson. D. J. Stanton and E. B. Kidson. *New Zealand J. Sci. Tech.* **21B**, 65–76(1939).—A Co survey of soils and pasture plants indicates that the geological formations considerably influence the Co contents of the derived soils. Soils from Kaiteriteri granite are low in Co and in certain cases stock ailment is definitely assocd. with their grazing on these soils. Low soil Co content is usually reflected in pasture plants growing thereon but there is not always a correlation between Co figures for the 2 Soil contamination of pasture plants interfered seriously with analytical accuracy. The detn of Fe, sol. in HCl, in such plants made calcns. of, and correction for, such contaminations possible. Soils low in Co are often low in other plant elements and addns. of Co will not produce satisfactory results unless the lime and phosphate resources of the soils are also increased F. W. Marsh

Seasonal variation in cobalt content of North Island pastures. K. J. McNaught and G. W. Paul. *New Zealand J. Sci. Tech.* **21B**, 95–101(1939).—Analytical results on monthly samples taken over a 12-month period indicate the Co content of pasture plants increases in late autumn and winter when plant growth is retarded and decreases in spring and summer when growth is at a max. There is also an increase under drought conditions. Tall and mature growth and hay have lower Co contents than closely grazed plants. Plants from bush-sickness areas have a Co content of 0.005–0.17 p. p. m. on dry matter and healthy plants 0.04–0.37 p. p. m. In areas where sheep are affected by Co deficiency the content of closely grazed pasture plants, especially in late spring and summer, falls below 0.08 p. p. m. and remains low for several months. Soil contamination of plant samples complicates the interpretation of results. Although sheep and cattle may benefit from the ingestion of soil on plants it is impossible to est. the amt. of Co in the soil that is made available by digestive juices. F. W. M.

Nitrogen fixation in soil not wholly a bacterial process. N. R. Dhar and E. V. Seshacharyulu. *J. Indian Chem. Soc.* **16**, 557–62(1939).—When glucose is mixed with SiO_2, ZnO, Al_2O_3 and Fe_2O_3 and exposed to air and light, there is appreciable N fixation. Under comparable conditions the N fixation in light is greater than in the dark. When energy materials such as inulin, arabinose, fructose, lactose, glucose, mannitol, glycerol, galactose, maltose, dextrin and starch are mixed with sterile soil in either quartz or Pyrex glass vessels there is appreciable fixation of N even under completely sterile conditions, which is greater in light than in dark and in quartz than in glass vessels under identical conditions. It is concluded that the energy available from the oxidation of glucose or other energy materials can lead to N fixation even in the absence of microörganisms. John O. Hardesty

Potassium and potassium fixation in Louisiana soils. M. B. Sturgis and J. R. Moore. *Proc. Assoc. Southern Agr. Workers* **40**, 56–7(1939).—There is a wide variation in the exchangeable K content of the soils of the Coastal Plain, particularly those of the Kirvin series. Tentatively, Coastal Plain soils would be expected to respond to K fertilizer applied to cotton if the exchangeable K is less than 85–100 p. p. m. The Mississippi, Red and Ouachita terrace soils should respond to K fertilizer if the exchangeable K is not over 100–115 p. p. m. K applied as KCl to the surface soil of Lintonia silt loam and Teller very fine sandy loam could be largely removed from the soil by the base-exchange reactions. Almost half the K added to the soil was sol. in water after a period of 4 months. Addns. of phosphate and lime had no definite influence on the fixation of K. Addn. of org. matter and its subsequent decompn. prevented any fixation of the added K and showed a marked effect on the liberation of native soil K The relatively low absorptive capacities of the soils for K and the ease with which water and H_2CO_3 may remove K through leaching contribute to make the maintenance of available K difficult in soils that leach easily. K. D. Jacob

Fertilizer response and requirements for profitable crop production in the Yazoo-Mississippi delta. Roy Kuykendall. *Miss. Agr. Expt. Sta., Bull.* **333**, 3–11 (1939).—Soils on the west side of the delta respond to N only Most soils on the east side respond to P and K applications as well as N. The N can be added to the soils up to within 10 days of planting time without affecting crop yields. From 30 to 40 lb. per acre gave most economical results. Little differences in yield resulted from the several placement expts. Good mixing of fertilizers in the seed bed is very important. C. R. Fellers

Progress report of phosphate and other fertilizer investigations at the Aberdeen Branch Experiment Station, University of Idaho. John L. Toevs and G. Orien Baker. *Idaho Agr. Expt. Sta., Bull.* **230**, 3–27(1939).—$CaSO_4$ or S gave no yield increases for alfalfa. The amt. of active lime in the soil influences crop response to P fertilization. Phosphates should be applied at the time of seeding clover or alfalfa. Av. yields of red clover seed were trebled by the use of treble superphosphate at 300 lb. per acre. If the soil contains well-balanced amts. of N, P and K, P fertilization for potatoes is not desirable. However, when potatoes follow legumes which are heavy P feeders, and the P has not been replaced, the further addns. are profitable. Sugar beets respond well to P fertilization. From 60 to 120 lb. per acre is recommended C. R. Fellers

Fertilizer and liming practices recommended for South Carolina. H. P. Cooper. *S. Carolina Agr. Expt Sta., Circ.* **60**, 3–23(1939).—The min. total plant nutrient content of mixed fertilizer should be about 20%. The soil acidity problem of S. Car. is a limiting factor in crop production. About 40% of the samples had pH values of less than 5.5, and another 40% was between 5.5 and 6.0 From 0.5 to 1.5 tons of ground limestone per acre distinctly benefits most crops. Common plants are classified as to their tolerance of soil acidity. C. R. Fellers

Crop response to chemical oxidizers. C. R. Harihara Iyer and R. Rajagopalan. *Quart. J. Indian Inst. Sci.* **2**, 171–8(1939); *cf. J. Indian Inst. Sci.* **22A**, 171–8(1939); cf. *C. A.* **29**, 7399[2].—Pot and field expts. with ragi (*Eleusine coracana*) showed that oxidizers such as $KMnO_4$, MnO_2 and Fe_2O_3 have a residual effect on the soil and that succeeding crops derive benefit from the treatments. Mn applied as $KMnO_4$ remained in the acid-sol. state for a long time. The fertilizing action of the oxidizing agents is mainly due to the greater evolution of CO_2 which increases photosynthesis and plant growth. These tests indicate that the loss of org. matter from the soil, owing to increased decompn., is offset by the production of larger crops and the return of more plant residues to the soil. Ragi and tomatoes were benefited by top dressings of Fe_2O_3 and MnO_2. The extent of response to oxidizers depends on the type of org. manure present in the soil. Basal dressings of Fe_2O_3 to soil which was fertilized with hongay cake presumably caused the release of large amts. of plant nutrients before the plants were able to profit therefrom. Compost and stable manure under the same conditions gave better crop response. J. O. H.

Influence of manganese and iron salts on the oxidation

of organic matter and release of plant nutrients. C. R. Harihara Iyer and R. Rajagopalan. *Quart. J. Indian Inst. Sci.* 2, 179–202(1939); or *J. Indian Inst. Sci.* 22A, 179–202(1939); cf. preceding abstr.—Basal dressings of $MnSO_4$ and $KMnO_4$ increased the yields of tomatoes, ragi and French beans. The same was true of sol. Fe salts to a lesser extent. A small part of the sol. Mn salts remained acid-sol. in the soil while the rest was quickly converted to acid-insol. MnO_2 which was responsible for hastening the decompn. of org. matter. The extent of the decompn. of org. matter depends on its chem. compn. Decompn. of org. matter increased with increasing org. matter content of the soil receiving Mn salts. There was a lag in oxidation of humus when heavy dressings of Mn salts were applied; however, after the concn. of sol. Mn had decreased, the decompn. proceeded rapidly. Small applications of Mn salts gave the best crop response. John O. Hardesty

Factors affecting the vegetative cover of Delaware marshes. F. C. Daigh, Donald MacCreary and L. A. Stearns. *New Jersey Mosquito Extermination Assoc., Proc. Ann. Meeting* 25, 209–15(1938).—The approx. optimum salinities for growth in the Delaware marshes were for *Typha angustifolia* 2950, *Scirpus olneyi* 5441, *Spartina alterniflora* 9477, *Spartina patens* 12,112 and *Distichlis spicata* 16,360 p. p. m. The recorded ranges of salinities for the plants were 48–18,150, 1485–10,120, 1012–25,575, 2464–30,800 and 5500–37,400 p. p. m., resp. The max. pH values for the plants ranged from 6.11 to 6.64 and the min. values from 2.96 to 3.90, but the differences between the av. values (4.75–5.10) for each plant were not significant. K. D. Jacob

Effect of ditching for mosquito control on the pH of marsh soils. F. C. Daigh and L. A. Stearns. *New Jersey Mosquito Extermination Assoc., Proc. Ann. Meeting* 26, 39–43(1939); cf. preceding abstr.—In Delaware marshes the pH values of the soil at the ditches averaged 5.93, as compared to 5.49 midway between the ditches. It appears that changes in the pH of the soil have not been sufficient to account for certain changes in the types of vegetation growing thereon. The water-requirement of the plant seems to be the detg. factor. K. D. Jacob

A quantitative study of true-prairie vegetation after three years of extreme drought. J. H. Robertson. *Ecol. Monographs* 9, 431–92(1939).—In a study of Nebraska prairies, there was no consistent relationship between any kind of alterne and the chloride or carbonate content or the pH of the underlying soil. K. D. Jacob

Growth of millet in quartz sand and in sand-soil mixtures. P. L. Gile. *J. Agr. Research* 59, 619–33(1939).—In 66 cases involving 46 soil samples, millet yielded 56% more on an av. in sand-soil mixts. contg. 1% of soil colloids than in pure quartz sand. Wheat in 4 comparisons gave about the same yield in both media The beneficial effect of soil admixts. on the yield of millet did not increase as the quantity of soil added was increased above that supplying 1% of soil colloids. The beneficial effect of soil admixts. did not seem to be due to supplying the trace elements Cu, Mn, Zn, B or F. Small quantities of peat, activated charcoal, Fe gel and freshly pptd. silica gel, in mixt. with quartz sand, produced an increase in yield and a modification in root growth, similar to those produced by soil. When a physiologically acid fertilizer is used, an injurious acidity may be developed in sand cultures in films contiguous to the roots. In sand-soil mixts. the films are doubtless less acid owing to the buffering effect of soil and the yield is consequently greater. Sand-soil mixts. should likewise yield more than pure sand when a physiologically neutral fertilizer is used owing to the effect of soil colloids in maintaining the availability of Fe. W. H. Ross

Fertilizers in relation to incidence of wilt as affecting a resistant and a susceptible variety [of cotton]. James B. Dick. *Proc. Assoc. Southern Agr. Workers* 40, 68 (1939).—The incidence of wilt was greatest, with correspondingly lower yield, when no K was applied. Increasing amts. of K lowered the incidence of wilt, but excessive amts. (600 lb. of 6–8–16 fertilizer per acre) greatly reduced yields in the resistant variety of cotton, while not appreciably reducing the yield in the susceptible variety. Application of N and K alone and in certain combinations effectively reduced wilt and increased yields. There was a differential response of the varieties used to fertilizer under conditions of severe wilt. The use of phosphate materially increased the incidence of wilt, particularly in the absence of adequate amts. of N and K; even when the latter were present the increase in wilt largely nullified the beneficial effects of K on yield. K. D. Jacob

Relation of unbalanced fertilization to the fusarium wilt of cotton. V. H. Young and W. H. Tharp. *Proc. Assoc. Southern Agr. Workers* 40, 190(1939).—Cotton that received high applications of K showed significantly less wilt than did cotton receiving low K and high P applications. Applications of unbalanced fertilizers, high in P but lacking in K, gave significant increases in wilt. K. D. Jacob

The effects of nitrogen source, nitrogen level and relative acidity on fusarium wilt of cotton. W. H Tharp and C. H. Wadleigh. *Proc. Assoc. Southern Agr Workers* 40, 190–1(1939).—Greenhouse sand-nutrient expts. were used to study the effects of variations in level of nitrate and ammonia N (20 and 100 p. p. m.) and variations in pH of the solns. (4, 6 and 8). A highly significant increase in wilt severity was assocd. with increase in N level and a significantly greater severity with the ammonia source. The variance of wilt severity resultant from change in pH was not consistently significant as a main effect, but susceptible plants supplied with the high nitrate soln. at pH 8 were less severely diseased than at either pH 6 or 4, while susceptible plants supplied with high ammonia solns. at pH 8 were more severely diseased than at either pH 6 or 4. K. D. Jacob

Loss of biologically fixed nitrogen from soils and its bearing on crop production. T. R. Bhaskaran and S. C. Pillai. *Science* 90, 595–6(1939).—When sugars (as molasses) are added to soils, the fixation of N is almost immediately followed by loss. Both processes proceed simultaneously till about 3 weeks, when the period of max. fixation is reached. The loss continues steadily even after this period so that, within the following 3–4 weeks, more than 60% of the fixed N disappears. In the presence of rice straw the loss is prevented. Felix Saunders

Urea as a source of nitrogen for potatoes in the Hastings area. R. V. Allison. *Am. Fertilizer* 92, No. 2, 8–9 (1940).—About 50% of the N in a mixed fertilizer for potatoes may be derived from urea instead of from natural org. sources without appreciably affecting the yield when the remainder is supplied by a combination of $NaNO_3$ and $(NH_4)_2SO_4$. The use of natural org. materials as 20% of the N source when the balance of this element is supplied by a mixt. of equal parts of urea and $(NH_4)_2SO_4$ did not affect the yield of tubers as compared either with the check treatment or the all-urea mixts. No stimulation in growth of vine or consistent increase in yield of tubers could be attributed to the use of a mineral supplement consisting of Mn, Zn and B. W. H. Ross

Effects of nitrogen, phosphorus and potassium nutrition on the fusarium wilt of cotton. W. H. Tharp and C. H. Wadleigh. *Proc. Assoc. Southern Agr. Workers* 40, 191 (1939).—Increase of N (4–100 p. p. m.) and P (0.1–30 p. p. m.) levels was assocd. with significant increases in wilt severity, while increase in the K level (2–40 p. p. m.) was accompanied by a significant reduction in severity, in plants grown in sand-nutrient cultures. The effect of many of the nutrient combinations was not the same for all 3 varieties of cotton tested. The disease severity in resistant and susceptible varieties was nearly proportionally affected by the treatment, while severity in the tolerant cotton was, in many treatments, affected disproportionally with the other 2 varieties. Similarly, the disease severity assocd. with variations in level of 1 element was not always proportionally the same at all variations in level of the other 2 elements. K. D. J.

The effects of nitrogen fertilizers upon the growth of spruce trees in forest nurseries. Antonin Němec.

Bodenkunde u. Pflanzenernähr. **16**, 98–112(1939).—The N requirement of spruce seedlings and transplants in forest nurseries is relatively the most important; although the removal of N from the soil is only at the rate of about 6 lb. N/acre the first yr. and 23 lb. the second yr., the later requirements of transplants in nursery beds are comparable to those of crops like wheat, around 70 lb. In tests of Chilean $NaNO_3$, $Ca(NO_3)_2$ and $(NH_4)_2SO_4$ at rates of 0.9 kg. N/100 sq. m. bed, applied half 3 weeks before planting and half at the peak of the growing season, and at 1/3 that rate the next yr., it was found that soil pH and fertility and C/N of the soil are important factors in growth response and tree losses following N fertilization. The physiol. acid NH_4 sulfate is best on soils not more acid than pH 5, the physiol. alk. nitrates on soils more acid. Besides unsatisfactory growth, losses of trees were excessive with N fertilizers unsuited to the soil; applications of all these fertilizers less than 3 weeks before planting caused losses of trees, which were less with suitable fertilizers. In general, N fertilizers were ineffective on soils with low C/N, except when total N was low. Six references. C. J. Schollenberger

Chemistry and growth of the cotton plant as affected by sorghum residues and nitrogen supplements. J. E. Adams, L. E. Hessler and D. R. Ergle. *Proc. Assoc. Southern Agr. Workers* **40**, 30(1939).—Progressively delayed and suppressed growth and yields of cotton plants were observed following the turning under of sorghum residues during Sept., Oct. and Jan. on Houston black clay soil. Growth and yields were restored by the application of 60 lb. N per acre, as $(NH_4)_2SO_4$. The bark of the roots of stunted plants was increasingly deficient in dialyzable N, both anode and cathode, as the date of turning under the residues was delayed. The carbohydrate components were not affected markedly. The proportion of total N to total P in the root stele was smaller for the last 2 dates than for the early date of turning. Supplemental N restored the dialyzable N of the bark to or above the level for roots from soils subjected to continuous growth of cotton; the proportion of total N to total P in the root stele was increased as a result of increase in the concn. of N and decrease in the concn. of P. K. D. Jacob

The action of bionitrified peat on plant growth and nitrogen enrichment. I. A. Makrinov. *Priroda* **26**, No 8, 51–7(1937); *Chem. Zentr.* **1938**, I, 4368–9; cf. *C. A.* **33**, 8881⁶.—Bionitrified peat, even in small doses (3% on the basis of loam used), is as satisfactory as saltpeter as a source of N. It increases the total N in the plant. Because of its high content in *Azotobacter* and nitrifying organisms it can be used instead of an inoculation of the soil. M. G. Moore

Water-culture studies with apple trees. II. The absorption of nitrogen and potassium by Cox's Orange Pippin on Malling rootstocks Nos. 9 and 12. H. L. Pearse. *J. Pomology Hort. Sci.* **17**, 344–61(1940); cf. *East Malling Research Sta., Ann. Rept.* **1936**, 131(1937).—Trees on No. 9 rootstock absorbed more H_2O per unit increase in fresh wt. than trees on No. 12. There was little qual. difference in the course of N and K absorption for the 2 types. Trees on No. 12 absorbed considerably more K per unit wt. of tree in the early part of the growing season than those on No. 9. While the trees on No. 12 absorbed nearly one-third as much again of both N and K during the course of the expt., the ratio of total growth made to the amt. of each of these nutrients absorbed did not differ significantly for the trees on the 2 rootstocks. Thirty references. John O. Hardesty

The sphere of activity of boron. Friedrich Herzinger. *Bodenkunde u. Pflanzenernähr.* **16**, 141–68(1940).—Boric acid added at rates of 0.27–27 lb./acre to plots of 1 sq. m. in a field of gravelly soil seeded to red clover had a striking optimum effect upon growth at 0.91 lb./acre; 0.45 lb. had slight effect and 6.3 lb. was distinctly toxic. *Sonchus oleraceus* growing with the clover showed similar responses. Germination expts. with seeds of *Sonchus* and *Crepis biennis* in dishes showed strong stimulation and no harmful aftereffects with 10^{-6} *M*, but toxicity was evident with 5×10^{-5} *M* H_3BO_3. In expts. with potato tubers cut into sections and poisoned with quinine cacodylate to blacken in simulation of heart-rot, 10^{-4}–10^{-6} *M* H_3BO_3 repressed the activity of tyrosinase and prevented melanin formation; at these concns., H_3BO_3 limits oxidation. Expts. with beets led to similar conclusions; incidentally, it was noted that *Phoma betae*, usually assocd. with heart-rot of beets, can grow in 0.1 *M* H_3BO_3. Expts. on reduction of methylene blue by pieces of potato indicated that 5×10^{-3}–10^{-6} *M* H_3BO_3 promotes the reducing action, with the optimum concn. in the region 10^{-4}–10^{-5} *M*. H_3BO_3 appears to have no action upon catalase, at least sections of potato treated up to 24 hrs. with 0.5 *M* H_3BO_3 showed practically no diminution in activity toward H_2O_2. These expts. continued with several varieties of potatoes for 1 yr. indicated a steady increase in catalase contents with age of tubers and lack of significant action of H_3BO_3 in all cases. Expts. with algae indicated that 1.6×10^{-4}–2.5×10^{-3} *M* H_3BO_3 stimulates filamentous green forms especially, but 2.5×10^{-5} *M* is toxic to some blue-green forms and diatoms; in these expts., toxicity was greatest in presence of a sandy soil, and was reduced by calcareous and peat soils. In presence of peat, one alga grew well in 0.001 *M* H_3BO_3. The growth of *Azotobacter chroococcum* in soil + culture soln. at pH 6.8 was noticeably better with 10^{-5} *M* and reached an optimum at 5×10^{-6} *M* H_3BO_3; the optimum for *Clostridium pasteurianum* and for nitrifiers was in the same region. Nitrifiers were still noticeably active with 0.01 *M*. H_3BO_3 is active toward flowering plants and many groups of soil microorganisms, and the concn. of greatest activity varies widely with species. Fourteen references. C. J. Schollenberger

The aftereffects of fertilization with boron. W. Schropp and B. Arenz. *Bodenkunde u. Pflanzenernähr.* **16**, 205–9(1940).—Sand cultures used the previous yr. for an expt. with beets (N-P-K fertilized with addn. of $MgSO_4$, Duggar's Fe mixt. and B equiv. to 8.1 lb. borax/acre) were again given N-P-K only and seeded to a variety of crops to det. the effects of residual B. In general, the latter were apparent only in yields, which were barely significantly increased with rye, barley, oats, vetch and soybeans, practically unchanged with field beans and rape, and barely significantly decreased with peas and hemp. Barley eared 2 days earlier and the grain:straw ratio of all the cereals was considerably improved in the crops grown on B-treated sand, as compared with similar sand not previously receiving B. The increase in dry-matter production by soybeans was also notable. C. J. S.

Oregon beets and celery need boron. A. G. B. Bouquet. *Better Crops with Plant Food* **24**, No. 1, 15–18, 33(1940).—The use of B on Oregon soils prevented the occurrence of beet canker and celery crack. Addns. of 10-30 lb. of borax per acre were sufficient. Liming increased canker or decreased the B availability. J. R. Adams

Manganese deficiency for citrus in California. E. R. Parker, H. D. Chapman and R. W. Southwick. *Science* **91**, 169–70(1940).—Spraying or injection of lemon trees with Mn salts resulted in greening of the leaves within 15 days. Felix Saunders

Effect of alkali salts on plant growth. J. L. Doughty and A. E. Stalwick. *Sci. Agr.* **20**, 272–6(1940).—The effects of several concns. of H_2O-sol. salts on the growth of wheat, oats and alfalfa are described. Six soils contg. 0.157–1.096% H_2O-sol. solids were used. There was a gradual loss in crop yield with increased salt concn. Approx. 0.4% sol. salts was the upper limit of fair crop growth. At a concn. of 1.096% of sol. salts, there was a reduction in crop yield of 33–77%. Alfalfa was more resistant than either oats or wheat. C. R. Fellers

The response of vetch and cotton to sodium. W. B. Andrews and Russell Coleman. *Proc. Assoc. Southern Agr. Workers* **40**, 61(1939).—The addn. of NaCl equiv. to 8% K_2O to 600 lb. per acre of 6–8–0 fertilizer increased the yield of seed cotton 195 lb. per acre, as compared to an increase of 93 lb. with half NaCl and half KCl and 69 lb. with all KCl. On a soil on which cotton gave no re-

sponse to K, Ca, lime, dolomite or Na, vetch gave an excellent response to $NaHCO_3$, Ca, lime and dolomite but not to K_2SO_4. Na doubled the yield of vetch where no response to K_2SO_4 was given. K. D. Jacob

Potash for cotton. N. J. Volk. *Proc. Assoc. Southern Agr. Workers* **40**, 32(1939).—The leaching of applied K to depths below the feeding zone of cotton is apparently a factor of importance in the more sandy soils of Alabama. The percentages of applied K that have been leached below the feeding zone during the last 9 yrs. at the Wiregrass Substation (Norfolk fine sandy loam), Sand Mountain Substation (Hartsells fine sandy loam) and the Tennessee Valley Substation (Decatur clay) are approx. 25, 15 and 7, resp. K. D. Jacob

The effect of low concentration of selenium upon the growth of grain. Geo. W. Stanford and Oscar E. Olson. *Proc. S. Dakota Acad. Sci.* **19**, 25–31(1939).—Relative growth values and comparative dry wt. of tops and roots were used as criteria. The concn. of Se in culture media was 0.001–0.05 p. p. m. Se stimulates growth of wheat and root elongation. The leaves of corn receiving Se increase in length less rapidly than those of controls. The wt. of the roots indicated stimulation by Se. With oats only an increase in the rate of change of height was found. Sorghum apparently is stimulated to some extent. Walter H. Seegers

Experiments with mixtures of Rhenania phosphate and ammonium sulfate. Werner Selke. *Bodenkunde u. Pflanzenernähr.* **16**, 112–28(1939).—The invariable correctness of the old opinion that fertilizers should not contain both $CaCO_3$ and an NH_4 salt, because of danger of loss of NH_3, is in doubt, since several com. mixts. of that kind are on the German market (*Kalkammonsalpeter* and *Kalkammoniak*), and experience has shown that their N content is effective; this indicates no losses in practice. Rhenania is a silicophosphate giving a strongly alk. suspension in H_2O; lab. expts. show that from mixts. with $(NH_4)_2SO_4$ and 10–25% H_2O, about 5% of the total N is readily removed by aeration. Basic slag contains more active CaO, around 31% as compared with 18% in Rhenania, and mixts. of $(NH_4)_2SO_4$ therewith lose NH_3 in about the same proportion. Extensive pot and field expts. with these and similar mixts. indicated that they can be made a day or so in advance of use, and if promptly covered with soil after application the N is fully effective, but if left on the surface uncovered, slight moistening by dew can cause considerable losses. C. J. Schollenberger

An example of correlation of soil type, manure requirement and the composition of the juice in sugar cane. J. Brink and T. H. van den Honert. *Sugar News* **21**, 53–6(1940); cf. *C. A.* **27**, 1694.—Relatively rich silty soil gave a high production of cane with low sucrose content. Soils fertilized with N and P gave increased cane production, increased N and P contents and decreased sugar content of the juices. W. W. Binkley

Nutrient solutions for sugar beets in sand and water cultures. F. Ya. Ukradyga and A. Oleksiyuk. *Compt. rend. acad. sci. U. R. S. S.* **17**, 491–4(1937); *Chem. Zentr.* 1938, I, 4223.—A new nutrient soln. especially suited to the requirements of sugar beets contains the following wts. in g. of the elements per 16 kg. of sand: N 3.39, P 0.85, K 4.15, Na 1.35, Ca 10 and Mg 0.76. M. G. Moore

(Lime and) beet/leaf ratio in sugar beets. Berkner. *Zuckerrübenbau* **21**, 139–51(1939).—Application of CaO to an acid soil reduced the ratio of leaves to roots from 1:1.328 to 1:10.96; the abs. yield of beets rose 12.6% and the abs. yield of leaves fell 22.1%. Sugar percentage of the beets was not affected. Excess of N in the soil raises the proportion of leaves; kainite is more favorable to leaf production than K_2SO_4. Varietal differences in leaf/root ratio are fairly const. whatever the circumstances under which the varieties are compared. O. W. W.

The effects of a deficiency of certain essential elements in the development and yield of carrots, onions and radishes grown in sand cultures under glass. R. M. Woodman. *J. Pomology Hort. Sci.* **17**, 297–307(1940); cf. *C. A.* **33**, 9520⁷.—Deficiency symptoms with respect to N, P, K, Ca, Mg, Fe, S and Na are described and quant. data as to yields and wt. ratios of the different parts of the plants are tabulated and statistically examd. Lack of K produced a tendency to scorch and wilt of portions of the tops of plants. Lack of N resulted in onion tops of a very pale-green color, and in a characteristic outlining in red of the cotyledons of the radish plant. With the solns. used and under the conditions of the expts., the deficiency of N and P greatly decreased the yields. The reduction in yields with solns. contg. only small amts. of K, Ca and Mg, however, were much smaller. J. O. H.

Potato research at Cornell University. Ora Smith *Am. Potato J.* **17**, 27–37(1940).—*Soil reaction and green-manure expts.* Total yields of potatoes were lower in plots of high pH than in the more acid soils and yields of scabby potatoes were lower at both low and high pH values than at intermediate values. At every range of reaction, yields were much higher following green-manure crops than those following potatoes. Yields of nonscabby tubers were higher at each pH value following green manure than following potatoes, whereas the percentage of scabby tubers at each pH value following green manure was lower than that following potatoes. In general, the pH of the soil in which the green manure was incorporated was lower in July, 1939 than in soil that had grown potatoes every yr. *Controlling dormancy in the potato.* Tubers were immersed in 0.01% solns. of growth substances for 43 hrs. and then planted in the greenhouse at 70–80°F., with subsequent transplanting to the field. Indoleacetic acid treatment had practically no inhibiting effect on growth of the plants in the greenhouse, whereas tubers treated with naphthaleneacetic acid remained dormant about 6 weeks at 70°F. The largest yields of potatoes were obtained from tubers treated with indoleacetic acid and the smallest from those treated with tap water. Growth substances penetrated cut tubers more readily than whole tubers and had a greater inhibiting effect in the 1st case; the results were not affected by treating the tubers with wax. The subsequent rooting of potato sprouts was considerably increased by immersing the cut ends for 18 hrs. in 0.01% solns. of either indoleacetic or naphthaleneacetic acid. *Potato cooking quality.* Potatoes of a more mealy texture were produced in a soil of pH 7.88 than in soils of lower pH. More blackening of tubers during cooking was observed in potatoes grown in soils of pH 4.92 and 6.36 than at pH 7.88. K. D. J.

Temperature and other factors in relation to germination of potato sets and tubers. H. B. Cordner. *Proc. Assoc. Southern Agr. Workers* **40**, 151–2(1939).—Ordinary fungicides and disinfectants were ineffective in preventing decay of potato tubers planted in soil at temps. above 90°F. Tubers or sets under the stimulating influence of ethylene chlorohydrin treatment decayed more when planted at high temps. than did untreated tubers and sets. Also, storage of tubers at high temps. (90–95°F.) following harvest and especially after treatment with ethylene chlorohydrin lowered the seed value considerably. Any treatments or conditions which tend to minimize respiration and to increase the access of O to the internal tissues of the tuber or set should be helpful in preventing seed-piece breakdown. K. D. Jacob

Raspberry nutrition. IV. Can the Cuthbert raspberry be saved in British Columbia? G. Howell Harris. *Sci. Agr.* **20**, 344–54(1940); cf. *C. A.* **32**, 2270⁸,⁹.—In many cases decline has been due to soil deficiencies of N, P, K and sulfate. The raspberry responds to the luxury feeding of P in particular. Foliar diagnosis readily detects deficiencies in N, P, K and sulfate in soils. The limited water supplies of many of the upland soils limit raspberry growth. The addn. of peat to these soils improves the water-holding capacity and, indirectly, raspberry nutrition. The addn. of lime was either of no benefit or even injurious. C. R. Fellers

Sweet lupine cultivation. E. Miège. *Compt. rend. acad. agr. France* **25**, 1031–4(1939).—Data are given for the agricultural characteristics and chem. compn. of lupines from Morocco and the alkaloid content of their grain, of the plants at flowering and of the plants 3 months

after drying. These lupines can be considered sweet and inoffensive. The starch value of the green plants is equal to the starch values of lucerne and clover and their grain is similar to those of the cereals. J. R. Adams

Results with the transplanting solution. Jackson B. Hester. *Am. Fertilizer* **91**, No. 13, 11–13(1939).—The addn. of 4–6 lb. of a nutrient mixt. consisting of 4 parts of superphosphate, 1 part of Calnitro and 1 part of KNO_3 to 50 gal. of the transplanting water not only increases the yield of tomatoes, but also results in an earlier harvesting time. W. H. Ross

Fertilization of apple and prune orchards in Idaho. Lowell R. Tucker. *Idaho Agr. Expt. Sta., Bull.* **226**, 2–12(1938).—A 5-yr. expt. in S. Idaho showed that applications of $(NH_4)_2SO_4$ at the rate of 1 lb. per tree increased yields of Italian prunes about 52% in 1 case and 18% in another locality. There was little or no effect on the quality of either apples or prunes. Neither P nor K gave yield increases with these fruits. C. R. F.

Effect of moisture, fertility and fertilizer placement on root rot of canning peas in Wisconsin. J. C. Walker and F. L. Musbach. *J. Agr. Research* **59**, 579–90(1939). Readily available nutrients applied at rates of 200–300 lb. per acre in the furrow with the seed increase the resistance of canning peas to root rot. Much greater increases in yield and reduction of root rot were secured when 2% of readily available N was included in the fertilizer than when it was omitted. W. H. Ross

The fertilizer action of bone meal and basic slag. L. Gisiger. *Bodenkunde u. Pflanzenernahr.* **16**, 210–29 (1940).—From a review of the literature, G. concludes that the P_2O_5 of bone meal is most effective on acid soils, and its availability is depressed by $CaCO_3$; basic slag is an effective P_2O_5 carrier on all soils. His lab. expts. on the soly. of P_2O_5 in these fertilizers in citric acid solns from 2% down, final pH 3.1–6.3, and that sol. by repeated extn. with CO_2-satd. and partially satd. H_2O showed no correlation with the accepted conditions for max. activity of these fertilizers. However, when the repeated extn. with $H_2O + CO_2$ was applied to mixts. of the fertilizers and pptd. $CaCO_3$ or gound limestone, total P_2O_5 extd. from bonemeal was but 0.1–0.2 that from basic slag and similar differences were shown in mixts. with calcareous soils; from similar mixts. with strongly acid soils, without $CaCO_3$, similar amts. of P_2O_5 were extd. from both carriers. These results, bringing lab. tests into harmony with field indications, are explained on the basis of equil. pH and Ca^{++} concns. and their effects on the soly. of Ca phosphates. Seven references. C. J. S.

Artificial manure compared with horse manure for biological heating of hot beds. E. Mantel. *Bodenkunde u. Pflanzenernahr.* **16**, 59–89(1939). –Practical scale expts. with hot beds heated by fresh horse manure and artificial manure, wheat straw presoaked for 24 hrs., then mixed with 0.7% its dry wt. of N as $CaCN_2$ or $CO(NH_2)_2$, etc., and chem. and phys. tests during the course of the work, are described. Conclusions: the hot beds themselves are the most suitable containers for the artificial manure in the earlier stages of fermentation; even in midwinter no other containers are necessary. Heaping in the open will not serve the purpose. The onset of heating is slower with $CaCN_2$ because some $(H_2CN_2)_2$ is formed and limits bacterial development. With urea, heating begins quickly and is more vigorous, so that this is the better N carrier for use in midwinter, but artificial manures prepd. with either heat satisfactorily when trodden down in the beds at the proper stage of fermentation. It has been the practice to allow manure to heat to the max. before treading down, but these straw mixts. should be allowed to heat to 15–20° only for best results, otherwise the heating will be of short duration; this is the explanation of the unsatisfactory results previously reported (*C. A.* **33**, 2270[3,6]). Measurements of CO_2 in the soil air by a technique described indicated up to 9.6%, and a corresponding max. of 0.36% in the air about the plants, with horse manure as standard packing; values with the straw mixts. were about ⅔ as high. Yields of lettuce and cucumbers were less in beds with the straw mixts., attributed to insufficient P_2O_5 and K_2O addns. to equalize with horse manure, but otherwise growth was similar. Analyses of the spent packing showed that the straw mixts. invariably lost more org. substances in fermentation than the horse manure and contained similar amts. of N, around 2% in dry sample, but only about 0.4% P_2O_5 and 0.9% K_2O, compared with 1.5 and 3.8%, resp., in spent horse manure. All the spent materials had C/N near 20, corresponding to good farm manure, except 26 and 22 for 2 lots prepd. with $CaCO_3$ + urea as the N carrier, which heated less vigorously. Humus insol. in AcBr was rather variable, 18–24%, but there were no significant differences. The satisfactory and uniform course of heating with straw-urea mixts. makes them a better standard material than the variable horse manure for exptl. work; the practical utility of the former as substitutes for horse manure is merely a matter of comparative costs. Twenty references. C. J. Schollenberger

Greenhouse fertilizer studies of celery. L. F. Ounsworth. *Sci. Agr.* **20**, 329–43(1940).— Sand cultures indicated that the equiv. of 1 ton per acre of a 4-8-16 fertilizer mixt. gave best results. Root systems were affected by the deficiencies of N, P and K. K deficiency produced poorly developed root systems with few rootlets. P was the limiting factor on muck soil, while addns. of N and K to mineral soils adversely affected growth. By increasing P addns beyond certain limits, growth was decreased. In some of the expts. K did not increase growth or quality, but it had no harmful effect except in the mineral soil plots. There must be an optimum balance of the elements for optimum growth. C. R. Fellers

Fertilizing value of beet greens. J. Garola. *Compt rend. acad. agr. France* **25**, 1083–8(1939), cf. *C. A.* **33**, 8893[7].—The yield of forage beet greens per hectare contains 31.5–67.0 kg. N, 5.8–16.4 kg. P_2O_5 and 30.6–105.0 kg. K_2O. There is considerable fluctuation in the compn. and quantity of greens and these are greatly influenced by nitrogenous fertilizers. Before incorporating beet greens in the soil their compn. should be detd. In respect to N availability, beet leaves and collars are comparable to manure. The use of beet greens is of economic importance in the cultivation of wheat, principally in respect to N and K_2O. J. R. Adams

Commercial fertilizers. H. R. Kraybill. *Purdue* (Ind.) *Agr. Expt. Sta., Circ.* **250**, 80 pp.(1939). In 1938 in Ind. an av. of 1 inspection sample was drawn from each 156 tons of fertilizer. Of these samples 1396 were equal to or above the guarantee in value, 97 were within 10% of the guaranteed value and 8 were 10% or more below the guarantees. The av. analysis of all fertilizers sold was 1.9% N, 12.9% H_2O-sol. and reverted P_2O_5 and 9.0% H_2O-sol. K_2O. C. R. Fellers

Methods for the continuous production of superphosphates. E. N. Ginzburg. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 26–30(1939).—App. is described. H. M. Leicester

Methods for determining magnesium and calcium in fertilizers. John B. Smith and E. J. Deszyck. *Am. Fertilizer* **91**, No. 13, 5–9, 22, 24(1939); cf. *C. A.* **33**, 7018[8].—Data from various sources showing the rate of decompn. of dolomite in av. soils have been summarized, and an acid NH_4 citrate soln. is described that gives results that correlate in general with the av. rate of decompn. of dolomite in soil. The Bartlett-Tobey (*J. Assoc. Official Agr. Chem.* **20**, 252–63(1937)) method for Mg is more rapid than the official method and is sufficiently accurate for control work. The gravimetric modification of this method gives results that are slightly higher and rather more consistent with the official method than the acidimetric titration procedure. Ca should be detd. simultaneously with Mg and this can be done more easily by using the oxalate sepn. of the Bartlett-Tobey method than by sepn. of $CaSO_4$ in alc. W. H. Ross

Compilation of experimental data on cotton fertilizers. E. E. Gross. *Miss. Agr. Expt. Sta., Bull.* **321**, 94 pp. (1938). C. R. Fellers

Molasses as fertilizer and soil reclaimant in agriculture. B. T. Narayanan. *Proc. Soc. Biol. Chem. India* **2**, 31–2

87). Molasses applied to alk. tracts of land has effected great improvement, but not less than 10 weeks elapse between treatment and planting. Unconfined expts. on N-fixing and fertilizer effects reveal practical difficulties of transport and application.
B. C. P. A.

Magnesium oxide as an ingredient of mixed fertilizers. W. Whittaker, L. F. Rader, Jr., and K. V. Zahn. *Am. Fertilizer* **91**, No. 12, 5–8, 24, 26(1939).—The greater part of the Mg in active MgO becomes water-sol. when included in fertilizer mixts. of the ordinary type. Active MgO can be mixed with superphosphate at rates up to 1 lb. per ton without serious reversion if the storage temp. is kept below 60°. The upper limit for ammoniated superphosphate mixts. under the same conditions is about 2 lb. per ton. Elevated storage temps. greatly increase the amt. of P_2O_5 reversion in mixts. contg. MgO. Loss of NH_3 begins to occur from an ammoniated superphosphate contg. 80–100 lb. of MgO per ton and from an ammoniated 6–8–6 mixt. contg. 40–80 lb. of MgO per ton. In NH₄ phosphate mixts. contg. MgO and an NH_4 salt, a small proportion of the water-sol. N changes to the insol. form. The addn. of MgO to a mixed fertilizer tends to dry out and condition the mixt. MgO may be used for complete neutralization of physiol. acidity in mixts. that do not have the equiv. acidity in excess of 100 lb. of $CaCO_3$.
W. H. Ross

Entomological review, 1936. E. P. Jones. *Brit. S. Africa Co. Pub.* No. **6**, 3–18(1937); *Rev. Applied Entomol.* **A**, 14–15(1939); cf. *C. A.* **31**, 7582².—Damage by *Heliothrips aurantii* Faure to the 1936 crop of citrus on estates in Southern Rhodesia was considered to be due in part to the fact that the lime-S spray used against the pest contained only 25 instead of 31–3% polysulfides. Fumigation with HCN from Cyanofumers against the red scale, *Aonidiella aurantii* Mask., caused severe scorching and pitting of the fruit in parts of some groves. This damage appeared to be correlated with areas of high temp. and humidity. Attempts to control larvae of *Prothis armigera* Hubn. (*obsoleta* Fabr.) with various dusts and sprays are described, and it is concluded that no efficient insecticide has yet been found against this noctuid on citrus.
Edwin J. Seiferle

Tests of insecticides. P. A. van der Laan. *Mededeel. v. het Proefsta.* [2], No. **100**, 20–5(1938).—In comparative field tests in Sumatra in 1937, derris dusts contg. 1.5 and 3% rotenone were inferior to 5% Pb arsenate dust in protecting tobacco against lepidopterous larvae. In other tests no distinct difference in injury by the larvae was observed when tobacco was dusted with 5% $BaSiF_6$ or sprayed or dusted with 5% Pb arsenate. In expts. against the larvae in seed beds a derris dust mixt. (3% rotenone) gave better results than a spray of derris powder mixed with water to a 1:10,000 rotenone content, but was less effective than a 1.5% Pb arsenate spray. In lab. expts. *Spodoptera litura* F. was almost insensitive to derris dust but *Heliothis assulta* Gn. was only slightly affected. 1% rotenone-contg. dust gave 80% mortality of *Plusia nata* F. in 2 days. Capsid bugs were very sensitive and crickets were not. A dust contg. 5% phenothiazine proved ineffective against *P. signata*.
E. J. S.

Composition and length of action of rotenone powders. Feytaud and P. de Lapparent. *Compt. rend. acad. agr. France* **25**, 1039–44(1939).—The efficiency against Syphora larvae of good mixts. contg. 15% of cubé or derris root is practically as great as the efficiency of pure cubé powder and there is no advantage in exceeding this figure. $CaCO_3$, carbonated talc, S, plaster and even kaolin are better carriers of the powder than silica, bentonite and especially CaO. Rotenone powder, pure or mixed with a carrier, retains its insecticidal power almost fully for more than a yr. not only in a closed container but even after exposure to air, light, moisture and inclement weather.
J. R. Adams

Cyclohexylamine, an attractant for Lathyrophthalmus arvorum Fabr. Donald Starr and Kam Hu Lau. *Proc. Hawaiian Entomol. Soc.* **10**, No. 1, 61(1938).—Lures contg. cyclohexylamine were found to be attractive to *Lathyrophthalmus arvorum* Fabr. and repellant to the Mediterranean fruit fly (*Ceratitis capitata* Wied). The lures contained casein 9.4, NaOH 5.0, slaked lime 12.9 and cyclohexylamine 3.7 g. per l.
J. R. Adams

Field experiments with a new contact poison against the nun moth (Lymantria monacha L.). Christoph Hofmann and Karl Dauberschmidt. *Forstwiss. Centr.* **61**, 605–16(1939). **A new contact dust medium (Nemotan) against nun and pine moths.** Christoph Hofmann. *Forstarchiv* **16**, 8–11(1940); cf. *C. A.* **33**, 2645³.—"Nemotan," or "2172," whose active ingredient is similar to that in "2152," showed in field tests against *Lymantria monacha* L. and *Bupalus piniarius* L. that it is as effective as dinitrocresol prepns. It has advantages over the latter in possessing no toxic properties toward warm-blooded animals and in not causing any appreciable burning of young shoots, needles or leaves of the trees. It should be applied at the rate of 70–80 kg./ha. "Nemotan" is somewhat slower in its action than the dinitrocresol product "Detal," but its effectiveness is more enduring.
C. K. Horner

Apple and pear fire blight. C. D. Sherbakoff and J. O. Andes. *Tenn. Agr. Expt. Sta., Circ.* **64**, 1–4(1939).—The spraying of apple and pear trees in full bloom with 1-3 50 Bordeaux mixt. gives sufficient reduction of blossom blight to assure a fruit crop. To control fire blight, trees should be sprayed twice preferably in the middle and late stage of bloom. In addn., infected areas should be pruned out and painted with a $Co(NO_3)_2$ soln. prepd. by mixing 2 oz. of glycerol, 4 oz. oil of wintergreen, 2 oz. AcOH and 1 quart of MeOH. To this soln. add 4 oz. of $Co(NO_3)_2$ crystals, stir until dissolved and keep in stoppered bottles. A $ZnCl_2$ soln. can also be used.
C. R. Fellers

The physiological effects of mineral oils on citrus. L. W. Ziegler. *Florida Entomologist* **22**, 21–30(1939).—Applications of high concns. (1.67%) of mineral oil (70 sec. viscosity, 83% unsulfonated residue) exert a direct effect on Valencia trees, which is most pronounced in the droppage of tree-ripe fruit and mature leaves owing to the greater penetration of oil because of their lowered surface tension. Drop of immature leaves and fruit is much smaller. The loss of large nos. of leaves following heavy applications of oil adversely affects the size of the immature fruit, except where the reduction of the crop is approx. proportional to the reduction in leaf area. The quantity of fruit borne in the succeeding crop is reduced and the subsequent flush of growth is accelerated. Killing of the wood is sometimes brought about either directly as a result of oil penetration or as a secondary effect should new growth fail to appear after drop of leaves. These adverse effects are brought about by applications of oil at periods of the yr. which are normally considered untimely for such applications.
K. D. Jacob

Commercial control of citrus scab in Florida. George D. Ruehle and W. L. Thompson. *Fla. Agr. Expt. Sta., Bull.* **337**, 47 pp.(1939); cf. *C. A.* **31**, 1544⁷.—Homemade Bordeaux mixt. made from pulverized $CuSO_4$ and superfine lime will give consistently good results in the control of citrus scab, *Sphaceloma fawcetti*. For ordinary infection a concn. of 3-3-100 is satisfactory; for severe infections, 6-6-100. Several of the com. Cu prepns. also gave good control. Lime-S soln., 4-100 with added wettable S, gave only partial control. Hg-oil emulsions were unreliable. In older trees infected with both scab and melanose 2 sprayings with Cu fungicides are necessary for effective control of both diseases.
C. R. Fellers

Mexican bean beetle in South Carolina. Franklin Sherman and J. N. Todd. *S. Carolina Agr. Expt. Sta., Bull.* **322**, 5–24(1939).—Rotenone gave the most promising results in combating the Mexican bean beetle. A suitable formula consists of 5% powd. derris or cubé 15 lb. and talc 85 lb. If used as a spray, the proper proportions can be obtained by using 1.75 lb. of 5% derris or cubé root in 50 gal. of water. While both Mg arsenate and cryolite give fair control of the beetle, they leave toxic residues of As and F on the vegetables and should not be applied after the pods have formed.
C. R. Fellers

Control of shade-tree borers. F. A. Fenton. *Okla. Agr. Expt. Sta., Circ.* **84**, 28 pp.(1939).—General. C. R. Fellers

Fruit pests and their control. P. O. Richter, W. D. Valleau and W. W. Magill. *Kentucky Agr. Expt. Sta., Bull.* **393**, 121–79(1939).—Formulas and methods of prepn. of spray and dust materials are given together with a description of common insect diseases and their control. C. R. Fellers

Spraying apples for the prevention of fruit set. Paul H. Shepard. *Missouri Agr. Expt. Sta., Circ.* **28**, 3–27 (1939).—Highest percentage of spur injury resulted from the use of cresylic acid and tar oils, particularly on Champion variety. The 5-year field trial shows that 0.5–2.0% cresylic acid or tar oil No. 1 at 3% was the most effective agent in the destruction of bloom. These agents prevent fruit set by killing the pedicels. C. R. Fellers

Dormant and delayed dormant sprays for the control of rosy apple aphids and scale insects. W. S. Hough. *Virginia Agr. Expt. Sta., Bull.* **322**, 3–31(1939); cf. *C. A.* **33**, 4733[1], 7474[8].—There were no consistent differences in insecticidal efficiency of the petroleum oils used so long as the viscosities were above 100 sec. Saybolt. A paraffin-base oil having a viscosity of 81–4 sec. Saybolt and a higher evapn. rate than heavier oils was usually the least effective of the oils used against San Jose and cherry scales. Dormant sprays contg. 3% of petroleum oil + 2.5% of tar oil were effective in controlling rosy apple aphids and San Jose, cherry and scurfy scales. Dinitro-*o*-cyclohexylphenol used alone at the rate of 7.5 8.0 oz. per 100 gal. dild. spray were less effective in controlling rosy apple aphids, San Jose and cherry scales. Mixts. of lauryl thiocyanate and petroleum oil were also effective insecticides, but at concns. of 0.2–0.8% the thiocyanate was caustic to fruit buds. Dinitro-*o*-cresol used at the rate of 2.5 lb. per 100 gal. in a 3.6% dormant spray oil was effective in controlling rosy apple aphids (*Anuraphis roseus* Baker). The most effective delayed dormant spray against the rosy aphids consisted of a mixt. of 3% oil + 0.4% tar oil. C. R. Fellers

Role of surface tension and contact angle in the performance of spray liquids. Walter Ebeling. *Hilgardia* **12**, 665–98(1939).—The static contact angle indicates the spreading and penetrating properties of the liquid after it has been deposited on the plant surface. The nature of the substratum had a marked influence on the contact angle liquid/solid. Various solutes were tested with reference to their effect in lowering the contact angle of water and oil on various solids. A reduction in surface tension and of the contact angle of the liquid may increase its penetrativity into capillary tubes on the inner surface of which it has a high contact angle, but reduces its penetrativity in tubes on the inner surface of which it has a very low or zero contact angle. The practical application of the principle is that by a reduction of surface tension the rate of penetration of aq. solns. into porous solids such as bark, on which solns. have a very low contact angle, may be decreased and their rate of penetration through waxy insect threads or bodies may be increased. C. R. Fellers

Experience with the pecan nut casebearer in Texas in 1938. C. B. Nickels and W. C. Pierce. *Texas Pecan Growers' Assoc., Proc. Ann. Meeting* **18**, 36–9(1938); cf. *C. A.* **32**, 2274[6].—Satisfactory control of the insect (*Acrobasis caryae* Grote) was obtained by a single spray application of Pb arsenate 6, Zn sulfate 2 lb. and summer oil 1 gal. per 100 gal. water, made on April 23–25. Control was somewhat less satisfactory with a single application of Pb arsenate 6 and Zn sulfate 2 lb. per 100 gal. water, with or without soybean flour 1 lb. The newly hatched larvae are susceptible to poisoning with arsenicals, but it is difficult to poison nearly full-grown larvae. K. D. Jacob

Results of three years' spraying with low-lime Bordeaux mixture for the control of pecan scab. John R. Cole and John R. Large. *Southeastern Pecan Growers' Assoc., Proc. Ann. Convention* **32**, 28, 30, 32–4(1938); cf. *C. A.* **33**, 302[1]. **Résumé of four years' spraying of Schley pecans with Bordeaux mixture to control the scab disease.** *Ibid.* **33**, 24, 26, 28, 30, 32, 34–5(1939).—A prepollination spray application of 4:1:100 Bordeaux mixt. followed by 3 applications of 6:2:100 mixt. at intervals of 3–4 weeks gives 85–95% control of scab caused by *Cladosporium effusum* (Wint.) Demaree. K. D. Jacob

Control of Cercospora leafspots of peanut with various dusts and sprays. Luther Shaw. *Proc. Assoc. Southern Agr. Workers* **40**, 181(1939).—In a 2-yr. test, 3 applications of S dust (approx. 16 lb./acre/application) made about July 25, Aug. 14 and Sept. 1 reduced the prevalence of leafspot lesions on peanut leaflets approx. 75%, reduced defoliation about 70% and increased the yield of peanuts 217–343 lb./acre. Three applications of 4:4:50 Bordeaux mixt. or Cuprocide 54 (1.5:50) also gave excellent control of leafspot and substantial increases in yields of peanuts and hay. Liquid lime-S (1:40) gave good control of the disease but injured the foliage. Pyrethrum dust had no fungicidal value. K. D. Jacob

Leafhopper and weed control [in cranberry bogs]. Charles S. Beckwith. *Am. Cranberry Growers' Assoc., Proc. Ann. Convention* **70**, 7–11(1939).—Kerosene sprayed at the rate of 400 gal./acre on grassy bogs in May killed 90% of the grass without affecting the cranberry vines. Applications of kerosene in June controlled red root but seriously injured the cranberry vines. There was evidence that fern growth can be controlled by spraying with $CuSO_4$ (20 lb. per 100 gal.) without injury to the vines. A soln. of NaCl (1 lb./gal.) sprayed on wild sweet potato vines when they were well up over the cranberry vine killed the vegetative portion of the weed without damaging the cranberries. Ca arsenite was toxic to cranberry vines as well as to poison ivy. K. D. Jacob

Bordeaux injury to cucumbers. A. G. Plakidas. *Proc. Assoc. Southern Agr. Workers* **40**, 181(1939).—In field tests, satisfactory control of downy mildew of cucumbers (*Pseudoperonospora cubensis*) was obtained with either 4-4-50 Bordeaux mixt. or Copper Spray 34; Copox dust was less effective. Bordeaux mixt. caused 3 types of severe injury: (1) severe stunting of vine growth, (2) marginal burning of the young leaves and (3) burning ("scorching") of the localized, irregular areas on the older leaves. In 3 replications, the plots sprayed with Copper Spray 34 gave 27.7, 31.6 and 93.4% higher yield of cucumbers than did those sprayed with Bordeaux mixt. K. D. Jacob

Weed control in tulip and narcissus bulbs. J. Hargrave and F. C. Thompson. *Agr. Inst. Exptl. Sta., Kirton, Rept. on Bulb Expts.* No. 6, 6–18(1939), cf. *C. A.* **34**, 2127[1].—Satisfactory control of weeds, without adverse effect on yield of tulip bulbs, was obtained by the application of $CaCN_2$ (5 cwt./acre) to the beds in January or some time before the foliage appeared above the ground. $NaClO_3$ (20 lb./acre applied as a wet spray) and late applications of $CaCN_2$ depressed the yield. Neither $NaClO_3$ nor $CaCN_2$ had a significant effect on the forcing qualities of the bulbs or the date of cropping. Expts. to det. the effect of $NaClO_3$ and $CaCN_2$ on the yield of narcissus bulbs gave inconclusive results, but applications of $CaCN_2$ (3–5 cwt./acre) hastened flowering. K. D. Jacob

The hot-water treatment injury of narcissus bulbs J. Wood. *Agr. Inst. Exptl. Sta., Kirton, Rept. on Bulb Expts.* No. 6, 48–58(1939); cf. *C. A.* **34**, 2128[3]. Susceptibility to injury was decreased by storing the bulbs at 80°F. for 4 weeks prior to subjecting them to hot-water treatment (110°F. for 3 hrs.). K. D. Jacob

Seed-treatment tests with cotton in 1938. D. C. Neal. *Proc. Assoc. Southern Agr. Workers* **40**, 187(1939).—Results of seed treatments with Ceresan, Improved Ceresan, Cuprocide and Barbak C, for control of anthracnose, *Rhizoctonia* and *Fusarium* spp., were inconclusive. K. D. Jacob

Treatment of cottonseed with organic mercury dust and sulfuric acid. George J. Harrison. *Proc. Assoc. Southern Agr. Workers* **40**, 191(1939).—Treatment of the seed with org. Hg dust aided materially in obtaining stands of cotton when temps. were unfavorable for germination, but no benefit resulted from delinting the seed with H_2SO_4.

Neither treatment gave significant increase in yields of cotton and, after seedling emergence was complete, neither gave any control over seedling diseases such as *Rhizoctonia*. K. D. Jacob

Seedling survival as affected by certain mercury, copper and zinc preparations not included in the regional cotton-seed treatment tests for 1938. S. G. Lehman. *Proc. Assoc. Southern Agr. Workers* **40**, 188(1939).—Significant increases in seedling survival were obtained by treating either 1- or 4-yr. old cottonseed with either Ceresan (2% Et Hg chloride), Sanoseed (2% ethanol Hg chloride) or Sterocide (4% Hg furfuramide dild. to 2% with talc). The best results were obtained with Ceresan. Ceresan gave approx. equal results with 1- and 4-yr. old seed, whereas Sanoseed and Sterocide gave larger increases with 1-yr. old seed. In other tests with AAZ Special ZnO, Cuprocide, Cu oxychloride and Cu_2O only the ZnO increased the seedling survival significantly. K. D. J.

Sterilization of lettuce seed. H. L. White. *Ann. Applied Biol.* **25**, 767-80(1938).—Treatment with $CuSO_4$ or CH_2O does not produce satisfactory sterilization without seed injury. Org. Hg compds. are highly toxic to the seed. Effective sterilization was obtained with aq. $CaOCl_2$ (2% Cl); germination was accelerated. B. C. P. A.

Seed and soil treatments for combating damping-off of tomatoes, eggplants and peppers. L. H. Person. *Proc. Assoc. Southern Agr. Workers* **40**, 180(1939).—Over a 4-yr. period Cu_2O was the most effective seed-treatment material for controlling damping-off of tomatoes and peppers, caused by *Rhizoctonia* and *Pythium*, principally the first. For eggplant, Cu_2O seed-treatment supplemented with a ZnO soil-treatment (20 g./sq. ft., applied at the time of seedling emergence) was the most effective treatment. Treatment of the soil with concd. CH_2O was effective if precautions were taken against recontamination. Results with CH_2O dusts applied to the soil at the rate of 1.5 oz./sq. ft. were inconsistent. In some tests, Semesan used as a seed treatment caused a marked reduction in germination. K. D. Jacob

The fungi that cause root rot and the possibilities of their control through soil treatment with chemicals. R. F. Poole. *Proc. Assoc. Southern Agr. Workers* **40**, 182(1939). —Changes in the soil pH offer very limited possibilities in the control of the most prevalent parasitic organisms in the soils of North Carolina. Wide changes in the soil reactions maintained over a period of 5 yrs. have been ineffective in bringing about controls by biol. means. Most of the soils in N. C. are sufficiently acid to inhibit the parasitism of *Thielaviopis basicola* and *Actinomyces scabies*. K. D. Jacob

Further studies on control of soil rot of sweet potatoes. L. H. Person. *Proc. Assoc. Southern Agr. Workers* **40**, 179-80(1939). Applications of 600-800 lb. S per acre lowered the pH of the soil from 5.8-6.0 to 4.8-5.0. In the sulfured plots growth of potatoes was apparently normal, while in the control plots the plants remained small, became chlorotic and many of them died. Yields in heavily infested soils were increased from almost nothing in the control plots to 75-115 crates of U. S. 1 and 2 grades, field run, in the sulfured plots. K. D. J.

Control of oat sickness by addition of chemicals to soil infected with Heterodera schachtii, Schmidt. E. E. Edwards. *Ann. Applied Biol.* **25**, 855-66(1938).—Among a no. of substances examd., $CaCN_2$ significantly improved growth of oats and lowered infestation by the nematode. Applied at the rate of 5 tons/acre, $CaCN_2$ completely protected oats from sickness over a 2-year period and eradicated the nematode from the soil. B. C. P. A.

Carbon dioxide evolution from certain soils in relation to black root-rot of flue-cured tobacco. J. A. Pinckard and Luben Bozovaisky. *Proc. Assoc. Southern Agr. Workers* **40**, 182(1939).—The evolution of CO_2 from Granville sandy loam and Cecil sandy loam was detd. on 600-g. samples adjusted to ²/₃ of their moisture-holding capacities and incubated in respiration chambers for various periods of time and at different temps. Detns. were made almost daily on samples following field transplanting of tobacco and until 2 months after harvest. *Thielaviopsis basicola* was a limiting factor of growth in the Cecil sandy loam (pH 6.2) but not in the Granville soil (pH 5.7). CO_2 production, per sample per day, ranged from 2 to 8 mg. Triplicate samples from around the roots of plants in field plots receiving 800 lb. of a 3-10-6 fertilizer mixt. and from adjacent unfertilized check plots showed little difference in 7 samplings made through the season. After harvest, 3 g. chopped Italian rye grass plants or tobacco plants, incorporated in the soil samples, showed practically complete decompn. in 30 days. The low yields of CO_2 in these soils indicate a min. total microbial population and a min. of decomposable org. matter regardless of the presence of *T. basicola*. K. D. Jacob

The selenium content of grasshoppers found feeding on seleniferous vegetation. Alvin L. Moxon. *Proc. S. Dakota Acad. Sci.* **19**, 69-70(1939).—There is a direct correlation between the Se content of the insects and the vegetation upon which they feed. As much as 20 p. p. m. was found in *Melanoplus bivittatus*. Se is therefore not considered an effective poison for these insects. Walter H. Seegers

Recovery of copper from grape leaves treated with fungicides. Ettore Garino-Canina. *Ricerca sci.* **10**, 1140(1939).—The Italian wine industry consumes annually 80,000 tons of imported $CuSO_4$. The dried leaves of vines sprayed 10 times with a 1% Bordeaux mixt. yield 18-20% ash contg. 3.1-3.9% Cu. The yield of dry leaves from 1 hectare is about 1300 kg. from which Cu equiv. to 30 kg. of $CuSO_4$ might be recovered. O. W. Willcox

A discussion of official methods for the determination of pyrethrins and rotenone. J. J. T. Graham. *Soap (Sanit. Products Sect.)* **16**, No. 2, 99, 101, 103(1940).—The Holaday modification (*C. A.* **32**, 3078[7]) of the Wilcoxon method (*C. A.* **30**, 8076[3]) has been officially adopted by the Assoc. of Official Agr. Chemists for pyrethrin I analyses of pyrethrum powders. None of the methods for pyrethrin II analyses is considered entirely reliable but the Seil method (*C. A.* **28**, 4531[1] and 6935[2]) is probably the best so far proposed. The Wilcoxon method has been tentatively adopted for analysis of oil exts. of pyrethrum. The Jones-Graham method for detg. rotenone in derris has been officially adopted. Aspects of the methods are discussed. Eight references. Henry H. Richardson

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Detn. of fat in fish meal (Kampen, Westenberg) **12**. Absorption of nutritive elements by lupines [use of plants as fertilizer] (Wojtysiak) **11D**. Installations for manuf. of N fertilizers and fuming sulfuric acid at San Guiseppe di Cairo (Italy) (Berthelot) **18**. Disinfecting action of $CaCN_2$ against housefly [larvae in manure] (Grandori) **13**. Iodine from seaweed [residue as fertilizer] (Brit. pat. 508,715) **18**. SO_2 and phosphate fertilizer (Ger. pat. 684,735) **18**.

Lemmermann, O.: Die Agrikulturchemie und ihre Bedeutung. Braunschweig: F. Vieweg & Sohn. M. 5.20.

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Soil disinfectant. N. V. Chemische Fabrieken en Handelmaatschappij voorheen firma Jan E. de Boer. Dutch 46,874, Oct. 16, 1939. Forty % formaldehyde 200, CS_2 37 and highly sulfonated castor oil (Avirol KM) 1.4 g. are mixed vigorously at low temp. for ½ hr. to a thin emulsion. Per sq. m. soil 1.42 kg. emulsion is used. Other insecticides can be added.

Citrate-soluble fertilizer from crude phosphate rock. Hans H. Franck and Franz J. Kaess (to Bayerische Stickstoff-Werke A.-G.). U. S. 2,183,379, Dec. 12. See Ger. 676,016 (*C. A.* **33**, 6516[8]).

Spray oil suitable for control of citrus pests. Ulric B. Bray (to Union Oil Co. of Calif.). U. S. 2,183,781, Dec. 19. Use is made of an extd. petroleum fraction having an A. P. I. gravity of about 23-27, an overall Sligh oxidation no. above 20, of which approx. 80% possesses

a Sligh oxidation no. between 15 and 25 and averaging about 20, the oil having a de Ong no. less than about 80.

Mineral oil mixtures for treating citrus fruits, etc. Wm. W. Bennett. U. S. 2,183,981, Dec. 19. Mixts. used are prepd. by combining approx. 4.5 parts of an acidulated animal fat such as acidulated tallow and 25 parts of acidulated vegetable fat such as acidulated coconut oil and heating the resulting mixt. for about 4 hrs. to about 180° at the end of the heating period, while agitating at intervals, and mixing the product with about twice its vol. of a mineral oil, etc.

Testing potatoes and the like for virus infection. Franz E. Eidmann. U. S. 2,183,553, Dec. 19. A method of testing and segregating diseased from sound tuber-seedlings comprises the steps of steeping longitudinal slices from the body of the tuber, immersing it in an aq solution of a salt of selenious acid for from 20 to 36 hrs. until a max. red coloration is attained, keeping the temp. at 30°, noting the difference in coloration of the different specimens, further subjecting the slicings to the action of the soln. to note further differentiation in color reaction, and then identifying and sepg. the specimens showing a gray discoloration from those retaining the original red coloration.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Melle process of alcoholic fermentation. F. Boinot. *Intern. Sugar J.* **41**, 466-7(1939).—By recovering the yeast and reusing it in subsequent fermentations a process has been developed which increases the yield of alc. as much as 28%. This is possible since only a little sugar is needed for the maintenance of the yeast and very little new yeast has to be produced. D. P. Langlois

Increased production of fusel oil in alcoholic fermentation. Yosinori Tomoda. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 379-80(1939).—Upon fermenting molasses, sweet potatoes or a synthetic medium composed of 10 g. of sucrose, 0.1 g. $CaCl_2$, 0.08 g. of KH_2PO_4 and 0.04 g. of K_2CO_3 by means of saké yeast in the presence (0.05-4.0 g./100 cc.) of $(NH_4)_2SO_4$, soybean cake, dry yeast, gelatin, casein, corn gluten meal, fish cake, wheat protein, *d*-alanine or *dl*-valine, the yields of fusel oil varied from 0.005 to 0.180 g./100 cc. of fermented liquor. Nitrogenous substances in general increase the yield of fusel oil, *dl*-valine having the greatest effect. $(NH_4)_2SO_4$ retards the effect of the nitrogenous substances on the yield of fusel oil. Previous elimination of NH_3 from the hydrolyzed product of nitrogenous materials favors the production of fusel oil, as does the use of activated carbon or wood charcoal in the sugar mash. George Ayers

The alcoholic-fermentation balance must logically be revised; aeration of the wort in industrial fermentation is not to be recommended. J. Pérard. *Bull. assoc. chim.* **56**, 724-7(1939).—Reply to Savary (*C. A.* **33**, 6518[8]). F. W. Zerban

The Pasteur coefficient. F. Boinot. *Bull. assoc chim.* **56**, 728-32(1939); cf. preceding abstr.—Reply to Savary (*C. A.* **33**, 6518[8]). F. W. Zerban

Investigations on foaming, with special reference to problems of applied chemistry. I. Wo. Ostwald and W. Mischke. *Kolloid-Z.* **90**, 17-25(1940); cf. *C. A.* **30**, 6620[1].—A new app. for the analysis of foam and sepn. of its component parts is described. An aq. soln. contg. 0.1% "Patent Blue" and "New Cocein" was used in these expts. The "Patent Blue" is a surface-active material while the "New Cocein" is not surface-active. The surface-active dye is sepd. in the form of foam (with a current of N_2) from the other material and water. A min. concn. of the surface-active material is necessary to cause foam formation. The completeness of sepn. of the two dyes is dependent on the ratio of their concns. in the soln., and on the velocity of foam formation. II. W. Mischke. *Ibid.* 77-89.—The foam problem of beer was studied. Model expts. were carried out with gelatin for studying the most important variables of foam formation, such as concn., foam pressure, foam permanence, width of the gas jet openings, and addn. of acid and alkali. A method for detg. the "dynamic foaming capacity" was worked out and used for comparing various beers. This method gave results similar to those obtained with the Schuster and Mischke (*C. A.* **32**, 1396[3]) method. By means of foam analysis those beer components responsible for foam formation could be distinguished and concd. The albumoses are the protein components mainly responsible for foaming, while of the other materials present in beer, the dextrins and hop resins are the main foaming constituents. The hop resins concentrate to the greatest extent in the foam, being removed practically quantitatively from the beer by this means. A systematic investigation of a large no. of beers showed a definite relationship between the albumose content and foaming value (dynamic foaming capacity). This foam analysis method can be used to det. the foaming capacity of particularly effective albumoses during the manuf. of beer. Fifty-eight references. S. I. Aronovsky

The effect of selenium and arsenic at various ratios on the fermentation of glucose by bakers' yeast. Henry A Lardy and Alvin L. Moxon. *Proc. S. Dakota Acad. Sci.* **19**, 109-11(1939).—The prevention of Se toxicity by means of As is not as specific in fermentation as it is in the case of feeding trials with animals. Arsenite does prevent selenite toxicity to some extent. Walter H. Seegers

Titrimetric determination of alcohol in malt liquors. T. Voitila. *Suomen Kemistilehti* **12A**, 33-5(1939); cf. *C. A.* **33**, 8352[3].—Pycnometric and titrimetric methods of detg. EtOH in beer give values agreeing to within 0.2%. App. is described. B. C. P. A.

Use of the Dujardin-Salleron ebulliometer for the determination of the alcoholic strength of wines. C. R. Churchward and B. G. Johns. *Australian Chem. Inst. J. & Proc.* **7**, 18-30(1940).—The instrument gives concordant results if obvious sources of error are avoided. A new table for distillates and for standardization of thermometers is given. O. W. Willcox

The wines of Ciró. I. Study of the chemical composition of typical wines of southern Italy. F. Sallusto and L. Scuteo. *Ann. ist. super. agrar. Portici* **9**, 121-54(1937-38).—The max., av. and min. values are given for 26 wines of d. at 15°, alc. in vol. per 100 cc., dry ext., reducing sugars, glycerol, total acids (as tartaric acid), tartaric acid, K bitartrate, lactic acid, AcOH, tannic acid (coloring matter excluded), succinic acid, fixed acidity, ash, phosphates, and Halphen ratio. A. R. Merz

The composition of some natural wines of southern Italy. Federico Sallusto. *Ann. ist. super. agrar. Portici* **8**, 3-33(1936-37).—The total acids (as tartaric acid) and sugar in 77 varieties of grapes and the d. at 15°, alc., dry ext., glucose, glycerol, total acid (as tartaric acid), fixed acid, ash, P_2O_5, tannin, etc., of the wines prepd. therefrom are reported in tables. A. R. Merz

Ferric casse and curative remedies. Federico Sallusto. *Ann. ist. super. agrar. Portici* **9**, 248-56(1937-38).—Al(OH)$_3$ 0.50, kaolin 1.5 or animal charcoal 1 g. per l. serves well to cure blue casse in wines. They do not modify the chem. and organoleptic characteristics. A. R. Merz

Varietal differences in barleys and malts. VIII. Correlations between enzymic activities and malt extract, malting loss, and steeping time. Henry R. Sallans and J. Ansel Anderson. *Can. J. Research* **18, C**, 35-41(1940); cf. *C. A.* **32**, 7655[9]; **34**, 215[2].—Significant neg. intervarietal correlation coeffs. between steeping time and barley - saccharifying (−0.706), malt - saccharifying (−0.814), starch-liquefying (−0.954), autolytic diastatic (−0.937), and proteolytic (−0.822) activities are shown to be dependent on the same fundamental barley properties as similar pos. coeffs. between these activities and

salt-sol. barley N. Barley- and malt-saccharifying and proteolytic activities are equally assocd. with both salt-sol. N and steeping time, but starch-liquefying and autolytic diastatic activities are more closely assocd. with the latter property. Significant intervarietal correlation coeff. were obtained between liquefying, autolytic, and proteolytic activities and malt ext. and malting loss. Partial correlation studies indicate that only the simple coeff. between malting loss and proteolytic activity (0.915) represents a real relation independent of salt-sol. N and steeping time. With the exception of autolytic diastatic activity, highly significant intravarietal correlation coeffs. were obtained between malt ext. and enzymic activities. Partial coeffs., independent of total N, show that proteolytic, liquefying and autolytic activities are assocd. with malt ext. Simple intravarietal correlations of malting with barley-saccharifying (0.671), malt-saccharifying (0.702), and proteolytic (0.701) activities reflect mainly the effects of total N. Enzymic activities are negatively correlated with steeping time within as well as between varieties, and partial correlation coeffs. suggest a real relation between liquefying activity and steeping time. J. W. Shipley 1

The quality of Slovak must of the 1937 season. Stan Kopal. *Winzer* **4**, 4-6(Jan., 1938); *Chem. Zentr.* **1938, I**, 1241; cf. *C. A.* **33**, 3060⁸. The white must of the 1937 vintage had an av. sugar content of 19.6% and an acid content of 7.6%. These values for the red must were 19.4% and 9.1%. M. G. Moore 2

Technological, chemical and regulatory study of Argentine grape "chicas." José Testa. *Univ. Buenos Aires, Facultad agron. y vet., Inst. ind. agr.* **1**, No. 2, 32 pp. (1939).—Chichas are prepd. in various grades of alc. and sugar content by partial fermentation of natural or boiled and concd. grape juice which has been previously detartratized by chilling. Alc. ranges from 2 to 13.6%. The chichas are champagnized with CO_2 to pressures of 2-4 atms. Analyses of typical Chilean and Argentine chichas are given. O. W. Willcox 3

The nature of bitter principles. E. Wagner. *Deut. Destillateur-Ztg.* **59**, 174(1938); *Chem. Zentr.* **1938, I**, 4546.—Tabular. A review of the drugs used as bitters in the manuf. of spirits with suggestions for the substitution of domestic (German) for foreign products. In addn. to taste and odor, the medicinal action is noted. M. G. M. 4

The possibility of the manufacture of light caoutchoucin in the U[nited] P[rovinces] and detection of adulteration in commercial samples. S. N. Ghatak and K. C. Mukherji. *J. Sci. Tech., India* **4**, 33-8(1938).—Light caoutchoucin (I), used for denaturating spirit, is obtained by the distn. of *waste rubber* in 15% yield by wt. A cost sheet indicates the practicability of manufg. I on a local scale (1330 gal in 4 months). From the analysis for excise purposes of I and suspected adulterants, it is recommended that material showing optical activity be rejected. A liquid of the turpentine class is presumably the adulterant. Specifications for I are listed as well as sp. gr., specific rotation, n_D^{15} and I-value detns. on I and adulterants. A. J. S. 5

A case of corrosion in the distillery. Y. K. Raghunatha Rao. *Intern. Sugar J.* **41**, 438-9(1939).—When sulfitation cane molasses is used as a raw material corrosion occurs in the mild-steel fermentation tanks especially around the rivets. The distg. plant being of copper does not corrode except on the top plate of the rectifier. The corrosion deposit on this plate was a basic copper sulfate indicating that the SO_2 liberated from the molasses by the added H_2SO_4 had mixed with air admitted by the vent pipe and thus corroded the top plate. This corrosion was found to be proportional to the SO_2 content of the molasses. It can be diminished by vigorous aeration of the soln. but since the SO_2 is very sol. it cannot be completely removed from the fermentation wash. D. P. Langlois 6

Manufacture of yeast from molasses. S. Rajagopal. *Proc. Soc. Biol. Chemists, India* **2**, 41(1937).—Some preliminary expts., not described, have been made to study conditions. B. C. P. A. 7

Digesting sulfite pulp and getting high yield of alc. (Johansson) **23**. Yield of alc. from waste liquor from sulfite digesting and retention of strength of pulp (Bergson) **23**. 8

Frey, Alfred, and Sichert, Karl: Leitfaden fur die Obst- und Beerenweinherstellung. Braunschweig: Serger & Hempel. 71 pp. M. 1.

Fermenting whey for alcohol production. Willem Kauffmann and Pieter J. van der Lee. U. S. 2,183,141, Dec. 12. A method of treating whey comprises adding to pasteurized whey a pure culture of yeast of the kind traceable in Gervais cheese, the culture being selected from a series of similar cultures, which were obtained from starting materials which contain yeast microörganisms capable of fermenting lactose, and having been found capable of converting more than about 65% of the lactose present in the whey into EtOH within not more than three days. A temp. of 10-45° and a pH of 4.5-7.0 are suitable for the fermentation of the whey.

Denatured alcohol. Louis J. Figg, Jr., and James W. Rhea (to Eastman Kodak Co.). U. S. 2,184,010, Dec. 19. As a denaturant, use is made of 0.5-5% of methyl or ethyl amyl ether, alone or together with other denaturants such as mixed ketones. Cf. *C. A.* **34**, 1810⁸.

Yeast. Robert R. Irvin and Morris W. Mead, Jr. U. S. 2,183,570, Dec. 19. A process of making yeast by the aeration method comprises setting a fermenter with a soln. of yeast nutrients, seeding the wort with seed yeast in an amt. of 3.5-15% of the total nutrients used, commencing propagation of yeast by aerating at a comparatively low rate while adding a further quantity of nutrients in an amt. such that 20-45% of the total nutrients are in the fermenter when 35-50% of the total time of the process has elapsed, then adding water to the fermenter, and thereafter continuing propagation by aerating more rapidly and by adding the remainder of the nutrients during the remaining period of time. Examples are given involving use of a soln. of molasses, NH_4 salts and aq. NH_3 soln. as nutrients for the yeast.

Apparatus for destroying froth developed in yeast manufacture or other processes. Johan O. Naucler. U. S. 2,184,195, Dec. 19. Various structural and operative details of an app. adapted for projecting the froth into an atm. in the form of a rapidly rotating, spreading layer of froth which is permitted to spread for breakage and coalescence of the froth bubble material.

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Chemical studies in connection with the dosing of sheep with phenothiazine. M. Lipson. *J. Council Sci. Ind. Research* **12**, 342-4(1939).—Com. phenothiazine is purified by dissolving in boiling benzene and then sucking the soln. through a benzene-wetted alumina column. Evapn. of the red soln. coming from the column leaves a residue which consists of phenothiazine contaminated with a small amt. of a red impurity. This impurity is removed by powdering the residue and washing with hot petroleum ether. This leaves pure phenothiazine as a residue. In spite of the extreme soly. of phenothiazine in acetone, this solvent does not remove it quantitatively from feces. The routine *analysis of feces for phenothiazine* is accomplished by drying the sample at 100° for 2 hrs. and then extg. with alc. in a Soxhlet app. for 4 hrs. On cooling, the ext. is made up to vol., an aliquot is taken, and the phenothiazine is estd. colorimetrically (cf. Eddy and DeEds, *C. A.* **32**, 1004⁹). J. R. Adams 9

Reineckate and silicotungstate of narcotine and a contribution to the estimation of that alkaloid. P. Duquénois

and M. Ellert. *Bull. soc. chim.* **6**, 1582–6(1939).—Treatment of acidulated aq. narcotine-HCl with a satd. soln. of Reinecke salt gave an amorphous rose powder, $C_{22}H_{23}NO_7 \cdot Cr(NH_3)_2(SCN)_4$, sol. in H_2O to the extent of 0.003 g. and 0.02 g. in 100 cc. at 3 and 20°, resp. The soly. in H_2O contg. 1% HCl is slightly greater. In 100 cc. of 95% alc. at 20° the soly. reaches 3.4 g. The reineckate can be used for the quant. estn. of narcotine provided that a close-grained sintered-glass filter is used and allowance is made for the soly. of the salt in cold H_2O. Narcotine-HCl in 1% HCl was treated with a slight excess of 5% silicotungstic acid and the mixt. was heated to boiling. After 24 hrs. the ppt. was filtered off, washed and dried to const. wt. Narcotine silicotungstate, $4C_{22}H_{23}NO_7.SiO_2.12WO_3.2H_2O$, when dried over $CaCl_2$ in a desiccator contains $7H_2O$, which is lost on drying at 105°. The soly. is a few mg. in 100 cc. H_2O at 20°, very slight in dil. HCl, 5 g. in 100 cc. acetone at 20°, slight in alc., and practically nil in ether. Although the reineckate gives good results, estn. by the silicotungstate is the best, provided that pptn takes place in dil. HCl (contg. 1 part of official HCl per 100 parts of H_2O), the ppt. is washed with 0.01 *N* HCl and is dried at 105°. C. R. Addinall

Organic sulfur compounds in antibacterial chemotherapy. Angelo Ferraris. *Boll. chim. farm.* **78**, 597–604 (1939).—Review of recent work on sulfanilamides. C. R. Addinall

Vitamin A and D potencies of liver and intestinal oils of red, black and ling cod. L. I. Pugsley. *J. Fisheries Research Board Can.* **4**, 472–7(1940); cf. *C. A.* **34**, 1127[6]. —The vitamin A (I) potency of the liver and intestines and the oils derived therefrom tends to increase with the size of the fish in the red cod (II) (*Sebastodes* sp.), black cod (III) (*Anoplopoma fimbria*) and ling cod (IV) (*Ophiodon elongatus*), none of which belongs to the true cods of the Gadidae. Pooled samples of liver and of intestinal oils of II, III, and IV show 54,250, 75,000; 101,750, 14,350; and 245,000, 55,500 blue units of I per g. and —, 100; 4000, 500; and 6000, 100 international units per g. of vitamin D. The liver oils are good sources of I but the intestinal oil has a lower I content than halibut. This is due to diln. of the I in the tunica propria by the relatively large amt. of I-poor oil from the mesentery. The scanty information regarding vitamin D indicates that the liver oils of II and IV are poor. Tabulations of data on seasonal variations and yields from organs in relation to wt. of fish are given. C. R. Addinall

Bitter constituents of the sap of Lactuca virosa, L. VI. Preparation of lactucin. E. Späth, G. Schenck and W. Schreiber. *Arch. Pharm.* **277**, 203–6(1939); cf. *C. A.* **33**, 7041[7]. —The yield of lactucin (I) from the dried powder is increased to 7.2% by treating the aq. soln. with HCl, neutralizing with $NaHCO_3$, and extg. with Et_2O. The acid coagulates a colloid, which retains I in aq. soln. B. C. P. A.

Distillation and distillation technique in the perfume industry. I. Herold. *Deut. Parfum.-Ztg.* **25**, 106–8 (1939).—An account is given of elementary principles involved in distn. practice and the application of the process in the prepn. of perfumery products (essential oils and isolates). B. C. P. A.

Chemical and biological assays of the tertiary alkaloids, quaternary bases and galenical preparations of Phaeanthus ebracteolatus (Presl) Merrill. Faustino Garcia and Araceli A. Ylagan. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 233–43(1939).—See *C. A.* **34**, 1442[9]. A. D.

Studies on the essential oil from the rhizome of Acorus calamus. I. Isolation and examination of calamol. Muhammad Qudrat-i-Khuda, Asutosh Mukherjee and Subash Kumar Ghosh. *J. Indian Chem. Soc.* **16**, 583–8 (1939).—The rhizome from Ghore Bacha was cut into small pieces and crushed as fine as possible. The finely divided material (200 g.) was mixed with 400 cc. of H_2O and then distd. in steam for 6 hrs. The total distillate amounted to 7 l. This was satd. with NaCl, extd. twice with Et_2O, the ext. dried over fused $CaCl_2$, and the solvent removed. The residual oil was fractionally distd. under reduced pressure to produce calamol ($C_{12}H_{16}O_3$ or $C_9H_{11}O_2$-$CH_2CH{=}CH_2$) (I). The yield was 7.88%. The oil was a colorless, mobile liquid with a strong and rather pleasant aromatic odor. It had b_5 153–4°, $d_4^{30.1}$ 1.07021 and $n_D^{30.1}$ 1.55012. I was converted to *isocalamol* ($C_9H_{11}O_2$-$CH{=}CHCH_3$) (II) by heating it under reflux for 10 hrs. with alc. KOH. II had: b_2 133°, $d_4^{21.8}$ 1.07261 and $n_D^{21.8}$ 1.55229. The *Br deriv.* of I was prepd. by adding a soln. of Br in petr. ether to a soln. of I in the same solvent. The purified deriv. decompd. rapidly on distn. and its identity with $C_{12}H_{14}O_3Br_4$ could not be definitely established. Catalytic hydrogenation of I gave *dihydrocalamol* ($C_{12}H_{18}O_3$), b_2 124°, $d_4^{21.2}$ 1.03109, $n_D^{21.2}$ 1.51219. Demethylation of I with $AlCl_3$ yielded $C_{11}H_{14}O_3$ (b_2 115°), this indicates that only 1 methoxyl group was lost. Demethylation with HI followed by benzoylation gave $C_{26}H_{22}O_6$, m. 96°. Oxidation of I by alk. $KMnO_4$ produced *calamonic acid* or *trimethoxybenzoic acid* ($C_{10}H_{12}O_5$) (III), colorless needles, m. 143°. Oxidation of II under the same conditions also yielded III. *Trihydroxybenzoic acid* (colorless crystals, m. 97°) was formed when III was demethylated by treatment with HI. 12 references. L. Wilson Greene

Swedish pine-needle oil and its components. Wilhelm Sandermann. *Seifensieder-Ztg.* **66**, 803, 833–4, 863–4 (1939); **67**, 15–16, 45(1940).—The yield of oil from pine (*Pinus sylvestris* L.) needles differs according to season (Dec. 0.22%; Apr. 0.25%; June 0.34%). Heating of small branches with the needles has little effect on the oil. Sp. gr. of the oil increases slightly with increasing pressure during distn. At pressures above 2 atm., a scorched odor becomes evident. Distn. with injected dry steam carries over the terpenes in large part before the heavier portions. When boiling with water, terpenes and heavier bodies distil together. Ten kg. oil was distd. under vacuum and collected in 43 fractions and a residue. Density, *n*, b. p., as well as ketone values and alc. solv., and proportions of esters, ketones plus aldehydes, and alcs. are tabulated for all fractions. The typical odor is carried by only a few fractions. The com. "terpene- and sesquiterpene free" oil is obtained in about 2.5% yield but does not carry all of the odor value. Terpenes and sesquiterpenes can be pptd. from alc. soln. by diln. with water. This method may be combined with fractional distn. A table gives for 16 typical components, the limiting dilns. with water for clear solns. in EtOH and MeOH. Increasing proportions of water are permitted, in order, for instance, by sesquiterpene, pinene, bornyl acetate, terpineol. Over 60% of the oil consists of terpenes, including α-pinene, β-pinene, Δ³-carene, dipentene, α-phellandrene, limonene, β-phellandrene. A sesquiterpene, cadalene, is present. Numerous aldehydes, have, together, odors of cuminaldehyde and anisaldehyde. An acid was found b_7 190–208°, m. (recrystd. from methanol) 56–60°; calcd. for $C_{13}H_{20}$-COOH: C = 74.3; H = 11.5; found C = 74.20; H 11.64%. With $FeCl_3$ the first phenolic fraction (130–145° at 5 mm.) is violet, later fractions (to 190° at 5 mm.) colorless. Borneol was found combined, but not free. A. Guillaudeu

Action of formic esters in perfumes. Th. Ruemele. *Seifensieder-Ztg.* **67**, 56, 65(1940).—Me, Et, Pr, iso-Pr, Bu, iso-Bu, Am, iso-Am, hexyl, heptyl, octyl, nonyl, decyl, linalyl, geranyl, citronellyl, bornyl and menthyl formates are discussed. A. Guillaudeu

Advantages of a physically balanced alcosaline compound over rubbing alcohol. Hyman Lischner. *J. Am. Inst. Homeopathy* **33**, 87–93(1940).—A soln. with the percentage compn. H_2O 77.00, alc. 20.00, NaCl 2.40, KCl 0.06, $CaCl_2$ 0.06, $MgCl_2$ 0.03, $NaHCO_3$ 0.01, Na_2HPO_4 0.01, $MgSO_4$ 0.25, tinct. I 0.02, pine oil 0.50 is superior to rubbing alc., which has a hardening, drying effect on the skin, and is an irritant. The soln. has stimulating, antiseptic, deodorant, and solvent properties. 52 references. Joseph S. Hepburn

Quantitative colorimetric assay of adrenaline and morphine by the iodoxybenzoate reaction. C. Robert Moodey and G. A. Emerson. *Univ. Calif., Pub. Pharmacol.* **1**, 235–47(1939).—*o*-Iodoxybenzoates react with

phenolic compds., including adrenaline and morphine, and with aromatic amines to yield colored compds. In assays for morphine and adrenaline by this reaction, the reaction time, iodoxybenzoate concn. and pH must be controlled to obtain accurate results. Since the colored products of the reaction are unstable, a calibrated Pulfrich photometer should be used in routine analyses. 22 references.
Joseph S. Hepburn

Stability of ichthyol preparations. H. Parts. *Pharmacia* (Estonia) **20**, 2(1940).—When kept under proper conditions the prepns. do not lose appreciable amts. of sulfide S. T. Laanes

Modern principles of biological assay methods. J. Rimments. *Pharmacia* (Estonia) **20**, 6–11(1940).—A review, chiefly of *digitalis* prepns. and their standardization. T. Laanes

Assay of magnesium peroxide tablets. August Siim. *Pharmacia* (Estonia) **20**, 17–19(in German, 19)(1940); cf. C. *A.* **33**, 7958⁴.—The tablets lose some of their MgO_2 content on standing. It is advisable to det. the MgO_2 before their prepn. and avoid prolonged storage. Manganometric titration is a simple and rapid method for detn. of MgO_2. A crushed tablet is placed in a 100-cc. measuring flask, covered with dil. (1.4) H_2SO_4, dissolved and water added up to the mark. After the starch is filtered off 20 cc. of the fluid is titrated with 0.1 *N* KMnO₄ permanganate until there is a stable rose coloring. Twenty cc., contg. 0.025 g. MgO_2, should require at least 8.8 cc. of the standard soln., corresponding to 0.1235 g. (or 25%) of MgO_2 in a 0.5-g. tablet. T. Laanes

Bioassay of the antianemic potency of liver. Maria T. Capsoni. *Biochim. terap. sper.* **26**, 449–60(1939).—Daily intravenous injections of increasing doses of basic Pb acetate up to a total of 40–41 mg. Pb produce in the rabbit a severe anemia that lasts for a month and then is followed by gradual recovery. If a total of 15 mg. only is given, the anemia is intense but quite unstable. Injections of potent liver ext. lead to prompt remissions. This method lends itself to bioassay on a comparative basis.
A. E. Meyer

Metallic pectin compounds in therapy. A. Ravina. *Presse méd.* **47**, 1223–4(1939). A. E. Meyer

Injectable solutions of barbiturates. Haydee N. Berasain and Hector Vitali. *Rev. farm.* (Buenos Aires) **81**, 63–73(1939). Phenobarbital-Na is unstable in solns. The stability is improved at a lower *p*H but aq. solns. are still unsatisfactory. A soln. of 10 g. phenobarbital in 40 cc. propylene glycol and 100 cc. H_2O can be sterilized by heat (15 min.) and remains unchanged on storage.
A. E. Meyer

Pharmaceutical chemistry and the art of healing. O. F. P. Otzen. *Pharm. Tidjschr. Nederland.-Indie* **15**, 65–70 (1938); *Chem. Zentr.* **1938**, I, 4494.—A report concerned with the cooperation of chemist and physician in the discovery of medicinal prepns. M. G. Moore

Naphthalan petroleum. V. I. Feldman. *Sovet. Vestnik Venerol. i. Dermatol.* **1936**, 1035–41; *Chem. Zentr.* **1938**, I, 4355.—A preliminary report. The use of naphthan petroleum (I) in the form of salves with talcum and vaseline gave good results in the treatment of a series of skin disorders. No undesirable effects were observed. Naphthalan is to be distinguished from I. It is produced from I by heating to 200° with fresh, neutral stearin soap. I is an oily, black-brown liquid with a faint odor; d. 0.953–0.963, flash point 140–70°. It is insol. in water and glycerol, sol. in $CHCl_3$, in ether, and partially so in 95% alc. It mixes well with fats. It is distinguished from tech. petroleum in that it contains neither benzine nor kerosene and gives no paraffin on distn. On the other hand, it does contain olefins and saponifiable O compds., phenols, vaseline and slight amts. of S combined in org. radicals.
M. G. Moore

The effect of the conditions of storage on the quality of finished products (tobacco products). V. S. Kushlyu and A. V. Shageyeva. *Tabak S. S. S. R.* **8**, No. 3, 24–8 (1938); *Chem. Zentr.* **1938**, II, 3477.—Maintenance of a relative humidity of 60% and hermetic sealing were found to be the best conditions for the storage of finished tobacco products. Cigarets stored under these conditions lost relatively large amts. of reducing substances; the Leningrad no. became smaller; however, the crude resins increased so that the consts. became smaller than when the cigarets were stored at a relative humidity of 40%. With long storage of cigarets a slow decrease in the nicotine content occurred. A loss of strength was first detected after 10-months' storage. The total alky. decreased up to the 5th month, then increased again during further storage. Also, the total N was higher in the 8th month than at the beginning of storage. On the other hand, the polyphenol content increased during the first 5 months of storage and later decreased. Thus, 8 months is to be regarded as a max. period of storage. The aroma, strength and taste are all impaired when storage is longer than this.
M. G. Moore

The bactericidal power of the six isomeric xylenols and their monochloro and monobromo derivatives. G. Lockemann and K. Heicken. *Zentr. Bakt., Parasitenk.*, I Abt., Orig. **145**, 61–71(1939).—Little is known of the bactericidal power of the xylenols because of their insoly. in water. When the monochloro derivs. of the 6 isomers were tested against *B. coli*, 4-chloro-2,3-xylenol (I), 4-chloro-3,5-xylenol (II) and 4-chloro-2,5-xylenol (III) were 4 times as strong as 6-chloro-3,4-xylenol (IV) and 6-chloro-2,4-xylenol (V). Against *Staphylococcus aureus* I, II and III were 15 times as strong as V. The Br derivs. corresponding to I, II and III were 6 times as strong as IV and V against *B. coli* and 33 times as strong against *S. aureus*. John T. Myers

The disinfection of instruments with Zephirol. Annelise Winkler and Kurt Redecker. *Zentr. Bakt., Parasitenk.*, I Abt., Orig. **145**, 72–80(1939).—Zephirol (0.5–1.0% aq. soln.) sterilized dental instruments in 10–15 min. The addn. of $NaNO_2$ did not decrease the disinfecting power but prevented corrosion for as long as 8 weeks.
John T. Myers

The biological assay of thyroid activity. Frank E. Hamilton. *Ohio State Med. J.* **36**, 286–9(1940).—Review with 29 references. J. Pinchack

Indian flower perfumes. III. Indian jasmine. Sadgopal. *Soap, Perfumery & Cosmetics.* **12**, 589–92, 618(1939).—Monograph. M. M. Piskur

Sports creams. Karl Pfaff. *Soap, Perfumery & Cosmetics* **12**, 601–4(1939).—Equipment is illustrated. Methods of prepn. and formulas are given. M. M. Piskur

The rarer essential oils and their application in perfumery. I. Alfred Wagner. *Soap, Perfumery & Cosmetics* **12**, 685–8(1939).—Source, and phys. and chem. characteristics of acolanthus, aframomum, ageratum, angelica, basil, araucaria, calamus, calythrix tetragona and cardamom oils are given. M. M. Piskur

Manicure preparations. Hugo Janistyn. *Soap, Perfumery & Cosmetics* **12**, 756–61(1939).—Formulas for lotions, creams, nail varnishes, nail-varnish removers, bath salts, cuticle removers, cuticle oil, nail polishes, nail polishing cream, polishing stick, nail white, moon white, stain removers and cuticle salve are given. M. M. P.

Effect of cigaret holders filled with extraction materials on the smoke. Constantin Pyriki. *Z. Untersuch. Lebensm.* **78**, 470–6(1939).—Com. cigaret holders contg. silica gel, C or a clay-like substance removed 10.3–16.2% of the nicotine and about the same amt. of tarry material from cigaret smoke. P. concludes that the smoke stream is too rapid for satisfactory filtering by the absorbent.
M. M. Piskur

Petroleum cresylic acids, their composition, manufacture and use in disinfectants. D. B. Luten, F. A. Bent and M. L. Griffin. *Soap (Sanitary Products Sect.)* **16**, No. 1, 97, 99, 101, 103, 105, 107, 119(1940).—In the lower-boiling ranges, alkyl phenols derived from cracked petroleum distillates are identical in many cases with those derived from coal tar. The compds. are closely related in higher-boiling ranges. The higher-boiling fractions of petroleum alkyl phenols are satisfactory as saponified phenolic disinfectants. Formulas are given. The finished products did not change significantly on 6-months' aging. Toxic effects from skin application of these disinfectants

are less severe than those made from lower-boiling alkyl phenols. Henry H. Richardson

Athlete's foot prophylaxis. Clarence L. Weirich. *Soap (Sanitary Products Sect.)* **16**, No. 2, 88, 89, 103(1940).—Five-25% solns. of $Na_2S_2O_3$ had no fungicidal effect against *Trichophyton rosaceum* and other fungi (1 min. exposure at 20°). One hr. exposure to a 15% soln. gave no kill. Coal-tar and pine-oil disinfectants (coeff. 6) showed little efficiency. A skin patch test should be made for detecting irritating or unsafe chemicals. A soln. of Na *p*-bromophenylphenate was found irritating. Hypochlorite solns. retain their efficiency over a period of days but solns. of higher phenols are seriously affected by air oxidation. Henry H. Richardson

Alkyl phenolic disinfectants from petroleum and the commercial standards. Emil Klarmann. *Soap (Sanitary Products Sect.)* **16**, No. 2, 90–2(1940).—Changes in the disinfectant standard specifications are recommended so as to include alkyl phenolic products from petroleum. Henry H. Richardson

Significance of capillary analysis for physical therapy. H. Lampert and H. Röhlinger. *Kolloid-Z.* **89**, 271–86 (1939).—The compn. of different kinds of mucks can be examd. by the addn. of 96% alc. In this way the amt. of org. matter present can be detd., and also whether the compn. has been changed artificially. Felix Saunders

Alkaloid content of extractum hyoscyami. J. A. C. van Pinxteren. *Pharm. Weekblad* **76**, 1629–31(1939). The alkaloid content of hyoscyamus ext. varies from 0.65 to 0.20%. Felix Saunders

Precipitation of alkaloids by cuprous chloride. J. J. L. Zwikker and A. Kruysse. *Pharm. Weekblad* **77**, 18–22 (1940).—Prepn. of reagent: Dissolve 200 mg. $CuCl_2$ in a few cc. of water and add to the soln. 250 mg. Na_2SO_3 dissolved in 5 cc. of water. Add 2 cc. of 1 *N* HCl and make up to 10 cc. Test: Dissolve a little of the alkaloid in water (1:20) with a little HCl. The following alkaloids give a pos. test: aconitine, apomorphine, berberine, brucine, cevadine, cinchonidine, cinchonine, cocaine, codeine, caffeine, cotarnine, dionine, emetine, heroine, hydrastine, quinidine, quinine, narceine, narcotine, papaverine, strychnine, thebaine, theophylline, veratrine and yohimbine. A neg. test is given by: adrenaline, atropine, colchicine, coniine, cytisine, ephedrine, homatropine, morphine, nicotine, novocaine, physostigmine, pilocarpine, piperine, scopolamine, solanine, sparteine and tropine. Felix Saunders

Refining of Mayur Pankhi oil (Thuja orientalis). S N. Ghatak and K. C. Mukherji. *J. Sci. Tech., India* **4**, 39–41(1938).—Distn. of a mixt. of H_2O and the sawdust of the wood of the Mayur Pankhi tree yields an orange-colored oil, used to scent tobacco. It is insol. in 70% EtOH and quite different from the ordinary oils of *Thuja*. Neither norite char, Torneo earth nor acid solns. of permanganate or persulfate improved the color, but an acid soln. of perborate was partially successful. The yield, color and odor are satisfactory when steam- or vacuum-distn. methods are used, but steam distn. is expensive and time-consuming. The properties of the original and the vacuum-distd. oils (b_{10-39} 160–205°) are, resp.: d_{30}: 0.9774, 0.9598; $[\alpha]_D^{25}$: −12.9, −20.9; n_D^{25}: 1.5030, 1.5000; acid value: 21.0, 19.8; ester value in terms of MeOAc: 2.96, 2.96; color (detd. with the Lovibond tintometer): yellow 3.5, red 0.6 and yellow 0.5, red 0.0. A. J. Stirton

Analytical results on the seasonal variations of the juice of cherry laurel leaves. A. Leulier and L. Tuarze. *J. pharm. chim.* **29**, 544–9(1939); cf. *C. A.* **34**, 4663.—Monthly records (Feb. 1937–Feb. 1938) are tabulated for reducing sugars before and after hydrolysis, total N, S after removal of phosphates, P, Na, K, Mg, d., f. p., dry ext. and ash detd. in the expressed juice of the leaves. The results are discussed and compared with other records (cf. Canals, *C. A.* **23**, 3003, 4967). S. Waldbott

Evaluation of pentamethylenetetrazole preparations; cardiazole, tetrachor. Gyula Miko. *Pharm. Acta Helv.* **14**, 31–4(1939).—This drug (*A*), a heart stimulant, m. 56–58°, is injected in the form of a 10% soln., or given in tablets each contg. 0.10 g. *A*. To identify *A* in soln., evap. 5 cc. to 0.6 g., then *in vacuo* over H_2SO_4 to 0.5 g.; take up with 5 cc. H_2O and add 25 cc. of 5% aq. $HgCl_2$. After 10 min. filter and wash the ppt. with two 5-cc. portions of ice water, then recrystallize from hot water; det. m. p. (176°). This compd. contains 48.6% Hg. Det. this in 0.3 g. of the Hg salt. Add 50 cc. H_2O, 1 g. KI, 3 cc. 35% CH_2O and 15 cc. 5 *N* NaOH; shake for 2 min., add 20 cc. 33% AcOH and 30 cc. 0.1 *N* I. Shake well until the Hg is dissolved (10 min.) and titrate the excess of I with 0.1 *N* $Na_2S_2O_3$ soln. Each cc. of I soln. = 0.01003 g. Hg To det. *A* in tablets, ext. 5 tablets with alc., evap. and proceed as above. S. Waldbott

Double cyanide gauze, Brit. Pharm. Codex. R. Maxwell Savage. *Pharm. J.* **142**, 614(1939).—Black edges and longitudinally running discolored strips were probably caused by HgS. S. Waldbott

Iodine and ash of sponge. A. Tschirch. *Schweiz. Apoth.-Ztg.* **77**, 85–6, 313–14(1939).—J. C. Straub, Coindet and Fyfe (Edinburgh) in 1819 simultaneously found I (discovered 1812 by Courtois) in *Carbo spongiae* (*Spongia usta*), long reputed to be a remedy for goiter This medicinal use probably dates back to the Salernian School (13th century) and not merely to the plant-ash therapy of *Salva Tacheniana* (Otto Tache, *Hippocrates chymicus*, 1666; cf. *Tsch., Handbuch*, Vol. I, p. 1697). Sponge ash was official in pharmacopeias of the 18th and 19th centuries, last in Pharm. Helv. I (1865). The external and internal uses of KI ("Kropfsalbe"; iodized salt) are referred to. S. Waldbott

The luminescence (fluorescence) of essential oils in filtered ultraviolet light. Arno Muller. *J. prakt. Chem* **154**, 209–18(1940). Of 252 compds. 160 showed a more or less violet luminescence, 37 a bright violet, 22 a pale greenish, 10 a bright white-green, and 10 a bright yellow-green color. Groups examd. are ales., aldehydes, ketones, esters, ethers, acetals, lactones, phenols, N compds., hydrocarbons, acids and 2 halogen compds. The various groups are classified according to the nature of the luminescence. C. J. West

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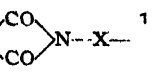
Distribution of free and total ascorbic acid in liver and muscle of Bengal fresh-water fish (Saha) **12**. Routine examn. of Mg trisilicate (Finder) **7**. Chem. compn. of Ordyn gypsums [for medicinal purposes] (Gertakovskii) **18**. Antigas prepns. and war-time antiseptics (Wells) **13**. Resistant high colloids for soaps, creams (Zakarias **27**. Explosion during com. extn. of cacao shells (Kattenstroth) **24**. Fatty acids and their application in soap and cosmetics (Rayner) **27**. Polyhydroxyfuchsone derivs etherified with aliphatic groups [therapeutic or bacteri cidal compds.] (U. S. pat. 2,184,491) **25**.

Calcium therapeutic composition. Rudolf Seiden U. S. 2,183,268, Dec. 12. Ca gluconate 10 and Ca hypophosphite 3.8 parts are used together in water.

Therapeutically active amidine. Gesellschaft fur chemische Industrie. Ger. 684,945, Dec. 9, 1939 (Cl 12*o*, 22). Phenoxy aliphatic acid nitrile, amide or thioamide, substituted in the phenyl nucleus, is converted to amidine by known methods.

Trituration of fresh plants and fresh animal organs Madaus & Co. Ger. 684,976, Dec. 8, 1939 (Cl. 30*h*, 2). Trituration is carried out in the presence of crude fibrous plant parts as straw, hulls or husks of grains. Sugar and (or) neutralizing or alkalizing or acidifying agents may be incorporated. Cf. *C. A.* **33**, 3208.

Amino aliphatic sulfonamides. Walter G. Christiansen (to E. R. Squibb & Sons). U. S. 2,184,279, Dec. 26 Compds. suitable for combating invasions of streptococci, etc., and which have the general formula $R^3R^4NXSO_2NR^1R^2$, where X is an aliphatic hydrocarbon group having no more than 6 C atoms, R^1 and R^2 represent each a H, lower alkyl or hydroxy-lower-alkyl, and R^3 and R^4 represent each a H or lower alkyl; and acid addn. salts thereof are prepd. by a process, in the case of compds. of the general formula $NH_2XSO_2NR^1R^2$ which comprises treat-

ing a compd. of the general formula  halogen with an alkali metal sulfite, converting the resulting sulfonate into the corresponding sulfonyl halide, treating the sulfonyl halide with NH_3 or an alkylamine or hydroxyalkylamine, and converting the resulting phthalimido aliphatic sulfonamide into the corresponding amino aliphatic sulfonamide by hydrolysis. Details are given of the production of: the Na salt of 2-phthalimidoethanesulfonic acid; 2-phthalimidoethanesulfonyl chloride; 2-phthalimidoethanesulfonamide, m. about 201–6°; 2-aminoethanesulfonamide-HCl, m. about 133°; 3-amino-1-propanesulfonamide; 1-amino-2-butenesulfonamide; 4-aminocyclohexanesulfonamide; and general mention is made of the production of other compds., e. g., by using $MeNH_2$, Et_2NH, diethanolamine or propanolamine, the compds. obtained are, respectively, 2-aminoethane-*N*-methylsulfonamide, 2-aminoethane-*N*,*N*-dimethylsulfonamide, 2-aminoethyl-*N*,*N*-bis(hydroxyethyl)-sulfonamide, and 2-aminoethyl-*N*-hydroxypropylsulfonamide. Compds. wherein either or both of $R^{3,4}$ and $R^{5,6}$ are alkyl groups instead of H may be prepd. from the corresponding nonalkylated compds. by alkylating in the conventional manner; e. g., *N*,*N*-dimethyl-2-aminoethylanesulfonamide may be prepd. by treating 2-aminoethanesulfonamide with Me_2SO_4.

Ampoules suitable for holding arsphenamine and solvent liquid in separate compartments. Jacob A. Saffa U. S. 2,184,152, Dec. 19. A multicellular ampoule is formed of nonmagnetic material such as glass, and is provided with a plurality of sealed cells sepd. by partitions of frangible material such as glass one at least of which partitions is assocd. with a ferromagnetic member such as a steel ball upon which a magnetic pull may be exerted for destroying at least part of the partition so that the contents of the cells may mix with each other.

Stable solutions of phenylazodiaminopyridine or derivatives for injection. Wander Gyógyszer- és Tápszergyár R. T. (Dionys Beke, inventor). Ger. 684,977, Dec. 8, 1939 (Cl. 30*h*. 3). The material is dissolved in ethylene glycol or its homologs at a temp. of about 40–50°. The ampoules are filled at this temp., sealed off, heated for an hr. in boiling H_2O or steam, and quickly cooled.

Drying ointments. Reinhard Beutner (to Parke, Davis & Co.). U. S. 2,184,575, Dec. 26. A drying, substantially nonsepg. ointment base capable of being spread as a continuous film upon the skin, comprises a soln., in a volatile solvent, of a film-forming material and a substantially stable suspension, in such soln., of a material insol. therein, one of the materials being a condensation product of a phenol and a member of the group consisting of aldehydes and ketones capable of forming resinous condensates with the phenol, and the other being a condensation product of a urea and an aldehyde, the proportion of solvent and of solid material being such that the prepn. is of plastic, nonflowing consistency.

Use of ozone in preparing antirachitic products. James K. Elderkin and Emil Hofman (to Chemical Products Co. of N. J.). U. S. 2,183,933, Dec. 19. Sprayed milk or other food or food ingredient in which vitamin D potency is to be developed is subjected to the action of ozone as an antirachitic activating agent.

Ascorbic acid. E. Merck Chemische Fabrik (Otto Zima, inventor). Ger. 684,725, Dec. 4, 1939 (Cl. 12*o*. 21). Addn. to 676,011 (*C. A.* **33**, 6530[4]). In place of diacetone-2-keto-1-gulonic acid, as in Ger. 676,011, other methylene ether derivatives of 2-keto-1-gulonic acid are treated with concd. HCl and the resulting ascorbic acid is sepd. from the reaction mixt.

Vacuum distillation of oils containing fat-soluble vitamins. Kenneth Claude Devereux Hickman (to Kodak Ltd.). Brit. 508,469, June 27, 1939. See U. S. 2,180,356 (*C. A.* **34**, 1823[6]).

Vitamin B_6-protein preparation. I. G. Farbenindustrie Akt.-Ges. (Richard Kuhn and Gerhard Wendt, inventors). Ger. 684,975, Dec. 8, 1939 (Cl. 30*h*. 2). Plant or animal substances contg. vitamin B_6 are extd. at a temp. not exceeding approx. 50° and the ext. is treated in known manner for the sepn. or concn. of protein.

Unsaturated dimethylpolyhydrocyclopentanophenanthrenecarboxylic acids or their derivatives. N. V. Organon. Dutch 47,316, Dec. 15, 1939. Unsatd. α-(dimethylpolyhydrocyclopentanophenanthrene)propionic acid or its derivs. are treated with Grignard reagent, acylated, treated with halogen or hydrogen halide, oxidized preferably by CrO_3, freed from halogen or halide and saponified. E. g., to the Grignard soln. from 8 g. Mg and 45 g. PhBr in ether there is added 10 g. 3-acetoxy-$\Delta^{5,6}$-bisnorcholenic acid (m. 235°). Toluene is substituted for ether and heated for 2 7 hrs. on a water bath, the Mg compd. decomposed with ice-cold acid and the liquid treated with steam. The residue is taken up in ether, evapd. to a clear yellow sirup, taken up in 40 cc. dry pyridine and allowed to stand for a day at 20° with 10 g. Ac_2O, then poured in water and freed from pyridine and Ac_2O. The remaining oil is crystd. by rubbing with petr. ether and recrystd. from EtOH, 7 g. needles first m. 176°, second m. p. 186–188.5°. To 7 g. of this acylated diol in ether is added 2.12 g. Br_2, the ether evapd. and the residue dissolved in 500 cc. AcOH; to the soln. at 45–55° is added with stirring a soln. of 15 g. CrO_3 in 15 cc. water + 100 cc. AcOH dropwise then kept for 2–3 hrs. at this temp. After cooling the reaction product is taken up in ether, 5 g. Zn powder and 50 cc. AcOH are added. After ether evapn. the product is shaken for some time on a water bath; after cooling the Zn and bromide are filtered off and the product is taken up in ether. After repeated washing with H_2O, the ether soln. of 3 acetoxy-$\Delta^{5,6}$-etiocholenic acid is shaken out with 10% NaOH and the Na salt pptd. This is centrifuged, acidified and dissolved in ether. After drying with Na_2SO_4 the ether is evapd. and the residue crystd. from AcOH. The 3-acetoxy-$\Delta^{5,6}$-etiocholenic acid, needles or leaflets, m. 243.5° (Me ester, 153–4°) is obtained in 0.5 to 1 g. yield. With alc. alkali the product can be saponified to 3-hydroxy-$\Delta^{5,6}$-etiocholenic acid, m. 280–8°; methyl ester m. 181–3°. It is an important intermediary in hormone synthesis.

Dihydrofollicle hormones and analogs and their derivatives. Walter Schoeller (to Schering Corp.). U. S. 2,184,167, Dec. 19. A process for the manuf. of dihydrofollicle hormone and its unsatd. analogs, dihydroequilin and dihydroequilenin, and their derivs. comprises gradually introducing a soln. of follicle hormone, equilin, equilenin or their 3-derivs. into an aq. suspension of sugar and yeast, allowing the mixt. to ferment, thereafter extg. the mixt. by means of an org. solvent wherein the partially hydrogenated hormone is sol., and isolating the hormone from the ext.

Saturated and unsaturated derivatives of pregnan-3-ol-20-one. N. V. Organon. Dutch 47,451, Dec. 15, 1939. Derivs. of pregnan-3-ol-20-one substituted in position 21 by OH, acyloxyl, alkoxyl or halogen and possibly substituted in the ring by one or more such groups as hydroxyl, acyloxyl, alkoxyl, halogen, ether or oxide O are prepd. from a satd. or an unsatd. substituted etiocholanic acid by converting it to the acid chloride while protecting free OH groups by acylation or etherification, converting this with diazomethane and treating the reaction product with acids or salts. The protected OH groups are subsequently liberated by saponification. By using excess diazomethane the 21-diazo compd. can be caused to react with aq. inorg. O acids or org. sulfonic or carboxylic acids. Also the 21-diazo compd. can react with anhyd. org. carboxylic acids at temps. between 40° and 120°, or with hydrogen halides, and this in turn with salts of org. carboxylic acids. Other details are discussed.

Derivatives of corticosterone, etc. Tadeus Reichstein and Emil Schlittler (to Roche-Organon Inc.). U. S. 2,183,589, Dec. 19. Therapeutic compds. are produced by esterifying suprarenal cortical hormones such as corticosterone with reagents such as Ac_2O, butyryl chloride, palmitic acid chloride, Na and Me butyrates, benzoyl chloride, succinic anhydride, phthalic anhydride, chloro-

sulfonic acid, bromopropionic acid, nitrobenzoic acid, etc. (various examples with details being given). Cf. *C. A.* **33**, 8925[7].

Perfume compositions. Walter C. Meuly (to E. I. du Pont de Nemours & Co.). U. S. 2,184,526, Dec. 26. Perfumes are prepd. contg. the hemiacetal of *p*-isopropyl-α-methylhydrocinnamaldehyde together with an aromatic or terpene alc. such as *p*-isopropyl-α-methylhydrocinnamyl alc.

Germicidal and antiseptic compositions. Mahlon J. Rentschler and Donald B. Bradner (to Hamilton Laboratories, Inc.). U. S. 2,183,493, Dec. 12. A soln. of a phenylmercuric salt such as a soln. of phenylmercuric borate in dil. alc. is used with a tribasic inorg. acid such as boric acid in a greater proportion as a stabilizing agent to inhibit deterioration by age.

Depilatory. E. Didier. Belg. 429,447, Aug. 31, 1938 A mixt. of ZnO (17%), sol. ketone (60%) and insol ketone (23%) is spread in the plastic state on a flexible support such as paper, film or fabric.

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

SYMMES

Manufacture of nitric acid by the Fauser process, with the use of stainless steel turbocompressors. Ch. Berthelot. *Génie civil* **115**, 381-3(1939). -A review. Recent progress in Cr-Ni steels has permitted the removal of important quantities of the water vapor after leaving the combustion chamber. Ann Nicholson Hird

Contact sulfuric acid manufacture. XX. The vanadium oxide catalyst prepared in Japan. Raisaku Kiyoura. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 315(1939), cf. *C. A.* **34**, 5919.—Matui's catalyst, prepd. for industrial use, gives conversion yields similar to those obtained with imported contact masses. **XXI. Accumulation of iron sulfate on the catalytic mass.** *Ibid.* 315.—During prolonged use, the V catalyst becomes choked with Fe sulfate powder and the resistance to gas flow increases, but the conversion efficiency of the catalyst, after removal of most of the Fe sulfate, is only slightly reduced, this slight reduction probably being due to clogging of the pores of the catalyst. **XXII.** Mototaro Matui, Raisaku Kiyoura, Hirosi Morita and Teiti Sawai. *Ibid.* 329.—The activity of pptd. Cr_2O_3-SnO_2 catalysts (cf. Neumann, *C. A.* **23**, 934; Adadurov, *C. A.* **29**, 1945[3]) depends, to a great extent, on the method of prepn. SiO_2 gel and diatomaceous earth, when used as carriers, decreased the activity of the catalyst. **XXIII. The crystalline state of potassium sulfate in the V_2O_5-K_2O-SiO_2 catalyst.** Raisaku Kiyoura. *Ibid.* 377-8.—Catalyst prepd. by soaking calcined diatomaceous earth (in tablet form) with aq. K_3VO_4 and treating at 450-500° with gas contg. SO_2 contains cryst. K_2SO_4. The crystals become larger when the catalyst is used at higher temps. and for long periods; for example, at 600° after 7000 hrs. they formed large needles, while the crystals of V_2O_5 or $VOSO_4$ remained in a very finely divided state. **XXIV. Relation between the catalytic activity and the crystal growth of potassium sulfate in the V_2O_5-K_2O-SiO_2 catalyst** *Ibid.* 378-9.—The crystal size of the K_2SO_4 present in the catalyst has extremely little effect on the activity of the catalyst. This is not in accordance with Neumann's explanation of the promoting action of Na_2SO_4 on V_2O_5-SiO_2 catalyst. George Ayers

The use of waste calcium sulfide for producing sulfuric acid. S. N. Ganz. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 42-4(1939). -When CaS is heated to 500° in an air stream, SO_2 is formed. H. M. Leicester

Installations for the manufacture of nitrogen fertilizers and fuming sulfuric acid at San Guiseppe di Cairo (Italy). Ch. Berthelot. *Génie civil* **113**, 29-34(1938).—This assemblage of plants is described with a graph, 3 diagrams and 4 photographs. It is one of the most important installations of the Fauser process in the world. The group comprises not only the coke ovens, but all the plants needed to produce the finished by-product. A. N. Hird

The replacement of lead by iron condensers. G. S. Grigor'ev. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 44-6 (1939).—Details of the use of Fe condensers in H_2SO_4 factories are discussed. H. M. Leicester

Recovery and utilization of magnesium compounds in magnesium mud precipitated from brine liquor. I. Manufacture of anhydrous magnesium chloride. T. Nisikawa, T. Okuno and N. Nakao. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 318-19(1939); cf. *C. A.* **33**, 6003[8].—Cl gas is passed at the rate of 0.56 l./min. through a mixt. of 80 g. MgO (prepd. from the magnesium mud in a salt field), 115 g. NaCl, 147 g. KCl and 22 g. coke maintained at 700°, with production of $MgCl_2$ (and CO_2). The addn. of Fe_2O_3 to the mixt. increases the yield. George Ayers

Potassium, sodium and magnesium salts in the European part of the U. S. S. R. S. I. Vol'fkovich. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 1-2(1939). H. M. L.

Preparation of pure alumina from Manchurian clay VII. Preparation of aluminum hydroxide by the treatment of ammonium alum with ammonia under ordinary pressure. Tuyosi Arimori. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 355(1939); cf. *C. A.* **33**, 4385[8]. -In continuation of a previous paper (cf. *C. A.* **33**, 3537[9]), $Al(OH)_3$ ppt. from cryst. alum with NH_4OH under ordinary pressure contains less sulfate than ppts. obtained by treatment of the same alum with ammoniacal solns. satd. with $(NH_4)_2SO_4$. Dehydration of the alum before this treatment is unnecessary. The $Al(OH)_3$ obtained with concd. NH_4OH (more than 5 *N*) is cryst.; its purity and properties are definitely influenced by the amt. of NH_4OH used and by duration of treatment. **VIII Preparation of aluminum hydroxide by the treatment of ammonium alum with ammonia under pressure.** *Ibid* 355-6.—Small crystals of alum, spread over concd. NH_4OH, are neutralized quickly in the hot state under pressure before the alum dissolves in aq. NH_4OH. Pure, large cryst. $Al(OH)_3$ is obtained. With weak NH_4OH (under 3 *N*), the $Al(OH)_3$ obtained is granular. To prep. the cryst. form, the amt. of NH_4OH used must be 1.5 times or more the chem. equiv. and NH_4OH must be more than 1 *N*. Reaction temp., time and fineness of the alum are important. The so-called cryst. $Al(OH)_3$ obtained may be the pseudo-cryst. form, whose single crystal is very small, but whose aggregation has the same size as that of single crystal of the original alum. M. McMahon

Methods of manufacturing alumina from highly aluminous materials of Korea, Manchuria, and North China Syoitiro Nagai. *Japan. Ceram. Assoc.* **47**, No. 559, Suppl. 37-48(1939).—Various methods, mostly patented by N., of extg. Al_2O_3 from highly aluminous materials produced in Korea, Manchuria and North China are given. These clays consist of kaolinite and diaspore. A linear relation exists between their Al_2O_3 content and sp. gr. Al_2O_3 as diaspore can be extd. almost completely by treatment with NaOH soln. in an autoclave. Clays contg. over 60% Al_2O_3 are melted with CaO in an elec. furnace to give a melt rich in tricalcium aluminate, then treated with a mixed soln. of alkali carbonate and caustic alkali. The same clays, and those less rich in Al_2O_3, are fired, together with Na_2CO_3 and limestone, in a rotary kiln. About 95% of Al_2O_3 can be obtained by treating the powd. product with H_2O and dil. alkali soln. Korean nephelite is best treated with concd. H_2SO_4, or may be calcined with Na_2CO_3 and limestone, and the pulverized product treated with H_2O and alkali carbonate soln. S. K.

Dehydration of ammonium sulfate. A. Thau. *Glückauf* **75**, 768-71(1939).—An English belt drier is described. L. P. Rockenbach

The lime-chlorine system in the preparation of calcium hypochlorite. F. W. O'Neil and J. D. Rue. *Paper Trade J.* **109**, No. 23, 39-42(1939).—Potentiometric

studies were made during progressive chlorination of soln. contg. 16, 32 and 52 g. per l. of $Ca(OH)_2$ at 0-40°. During chlorination, pH decreased rather slowly at first, with a very rapid increase in available Cl; further chlorination beyond a pH of 11.2 caused a very rapid decrease in pH and only a slight increase in available Cl; when the $Ca(OH)_2$ was chlorinated below pH 8, the loss of available Cl was very rapid, and above 10° the loss was greater than that which could be maintained by addn. of Cl, and on standing the soln. lost practically all of its available Cl. $Ca(OH)_2$ chlorinated to the "3-sec. flash" of phenolphthalein (corresponding to pH 11.2) produced a bleach liquor that was stable for at least 48 hrs. A. P.-C. 1

The influence of the method of hydration on the properties of hydrated lime. A. Ceresetо and A. Rio. *Atti. X° congr. intern. chim.* **4**, 635-42(1939)(in Italian). -The hydration of CaO, under varying conditions of atm. of H_2O, fineness of CaO and temp. of hydration, and the resultant plasticity, adhesion and stability were studied. The most favorable conditions were low temp., slight excess of H_2O over the theoretical amt., and max. surface. Five tables and 2 references are given. Henri Marc 2

Lowering the loss of (sodium) sulfite in the process of its recovery from waste products of the organic chemical industry. V. S. Kaminskiĭ and V. S. Seredkina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 518-19(1939).- The loss of Na_2SO_3 by oxidation in the process of concn. can be reduced from 15-20% to 3-4% by adding 2.5-5 g. of crude hydroquinone to 1 ton of the soln. Na_2SO_3 is not oxidized in the process of crystn. from the treated concentrates. Chas. Blanc 3

The work of the mechanical salt-cake furnace. A. M. Gmelling. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 31-4 (1939). App. for prepg. Na_2SO_4 from NaCl and H_2SO_4 is criticized. H. M. Leicester 4

Conversion of methane into hydrogen and carbon monoxide Process of the Société Belge de l'Azote at Renory. Ch. Berthelot. *Genie civil* **115**, 461-4(1939); cf. *C. A.* **33**, 8562⁶.—A continuous catalytic process recently developed, which works under atm. pressure, is reviewed with 2 diagrams. Ann Nicholson Hird 5

Conditions for the simultaneous preparation of technically pure oxygen and nitrogen from air. M. B. Kal'manovich and I. P. Ishkin. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 12-15(1939).—The operation of an app. with 2 rectifying columns is described, and the points at which fractions rich in A must be withdrawn, to give almost complete sepn. of O and N, are discussed. H. M. Leicester 6

Properties of clay. Ralph E. Grim. *Recent Marine Sediments: a symposium, Am. Assoc. Petroleum Geol.* 1939, 466-95; cf. *C. A.* **33**, 5615³.—An extensive review of the clay minerals, including optical, chem. and dehydration properties, base exchange capacities, lattice structures, distribution, origin, compn. and the relation of phys. properties to mineral compn. One hundred and sixty-one references. George Ayers 7

The chemical composition of the Ordyn gypsums. A. V. Gertakovskiĭ *Trudy Tsentral. Nauch.-Issledovatel. Lab. Kamneĭ Samotsvetov Tr. "Russkie Samotsvety"* **1938**, No. 5, 37; *Khim. Referat. Zhur.* **2**, No. 5, 32(1939).—The dehydrated waste products of the Ordyn gypsums, with a content of foreign elements (mainly Fe) not over 2.5%, are suitable for *medicinal purposes*. W. R. Henn 8

Products of various types of carbon black from natural gases. G. Bruni und T. G. Levi. *Atti X° congr. intern. chim.* **4**, 79-82(1939).—A series of expts. based on an impingement process of producing C blacks is discussed. Flames obtained from burning mixts. of naphthalene or anthracene with coal gas and other combustible gases were used. The influence of various exptl. conditions, such as type and dimensions of the burners and of the gas jets used, height of the flame, ratio of the quantities of vapors of the hydrocarbons and of the combustible gases, resp., was studied. The properties of the different types of C blacks obtained and of the *rubber* samples prepd. therefrom were investigated. The quality of the material was very high. The production of C black from C_2H_2 by a process of impingement was studied. The rubber sample prepd. from this C shows a very high degree of resistance to abrasive action. The tech. problem of prepg. high-grade C black from natural gases may be regarded as solved. Robert Simha 9

System Na_3PO_4-Na_2CO_3-H_2O (Kobe, Leipper) **2**. New ways of obtaining and of employing Tl (Drescher) **9**. Protection of Bakman app. from corrosion [app. for chlorinating CaO] (Khanin) **9**. Electrothermal decompn. of carbonaceous liquids [manuf. of C black] (Brit. pat. 508,509) **4**.

Hydrocyanic acid. Charles R. Harris (to E. I. du Pont de Nemours & Co.). U. S. 2,184,062, Dec. 19. HNO_3 is treated with an excess of a hydrocarbon, such as CH_4 or C_2H_4, in the absence of a catalyst at 800-1400°, in the presence initially of at least one vol. of water vapor and 2-10 vols. of an inert gas per vol. of NO.

Hypochlorous acid. Solvay & Cie. Belg. 423,470, Oct. 31, 1937. Cl and H_2O are introduced simultaneously at the base of a tower filled with limestone. The liquor passes systematically through the limestone filling of the tower and is discharged through an overflow.

Sulfuric acid. K. M. Malin and I. N. Kuz'minykh. Russ. 51,895, Oct. 31, 1937. Addn. to Russ. 38,626. In the manuf. of H_2SO_4 by the nitrose method, the oxidizing space for nitrogen oxides is connected as a shunt in the path of the gas before the first Gay-Lussac tower.

Sulfur dioxide and phosphate fertilizer. Chemische Werke Albert (Ferdinand Bornemann und Hans Huber, inventors). Ger. 684,735, Dec. 4, 1939 (Cl. 16, 5). Addn. to 681,644. In the simultaneous prepn. of SO_2 and phosphate fertilizer according to patent 681,644, the crude phosphate employed is partially pretreated with H_2SO_4.

Alkaline earth cyanamide. Bayerische Stickstoff-Werke Akt.-Ges. Ger. 684,942, Dec. 8, 1939 (Cl. 12*h*, 9). Addn. to 654,235 (*C. A.* **33**, 2299⁷). In the action of NH_3-CO_2 mixt. upon alk. earth oxides, the flow of the CO_2 and NH_3 is so regulated, that the ratio of the reaction gas added to CO_2 amounts to at least 2 and at most 35%, preferably 5-20%, and that upon an increase of the cyanamide content in the nitrogenized product above 40-50% cyanamide, the CO_2 content of the reaction gas increases to about 50% CO_2.

Salts in large crystals. Soc. belge de l'azote et des produits chimiques du Marly, Soc. anon. Belg. 429,512, Sept. 30, 1938. In the process of Belg. 428,872 for pptn. of impurities as arsenates, any H_3AsO_3 present is oxidized by means of O-N in the presence of I or iodides as catalyst.

Aluminum magnesium silicate. Herbert Witzenmann (Ludwig Stuckert, inventor). Ger. 684,941, Dec. 8, 1939 (Cl. 12*i*, 38). Addn. to 458,475. Instead of $MgCl_2$ in the fusion with quartz, Al_2O_3, feldspar and fluorspar, other similar Mg salts are employed, such as $MgCO_3$, $MgSO_4$, MgC_2O_4, which (if necessary under the application of reducing agents) easily yield magnesium oxide.

Inhibiting dusting of arsenious oxide. Melville F. Perkins (to American Smelting and Refining Co.). U. S. 2,183,337, Dec. 12. As_2O_5 is mixed with As_2O_3 (suitably in a proportion of about 0.06-0.1% of the As_2O_5) to absorb moisture so as to inhibit dusting but insufficient to impart any substantial sensible dampness.

Purifying boron carbide. I. G. Shafran. Russ. 52,084, Oct. 31, 1937. Addn. to Russ 50,979 (*C. A.* **33**, 3979⁷). The boron carbide is heated at a temp. below redness with molten caustic until NH_3 is no longer evolved. The melt is then washed to remove the caustic, boiled in HCl, and dried.

Calcium metaphosphate. Harry A. Curtis. U. S. 2,184,287, Dec. 26. A continuous process of making Ca metaphosphate involves mixing rock phosphate and liquid metaphosphoric acid, heating the mixt. to effect reaction with formation of fused Ca metaphosphate, and recovering and returning to the reaction zone that part of the metaphosphoric acid which does not initially react

with the rock phosphate and is volatilized. Cf. *C. A.* **34**, 5828.

Cupric hydroxide. New Process Rayon, Inc. Brit. 508,495, June 30, 1939. A suspension of CuS in a soln. of an inorg. alk. material other than NH_3, e. g., the hydroxide or carbonate of an alkali metal, is aerated to form $Cu(OH)_2$, the sol. alkali being present, preferably, in excess of that required to form a thiosulfate with the S content of the CuS employed. The CuS may be an ore or that recovered by addn. of a suitable sulfide to an alk. pptn. liquor obtained in the production of regenerated cellulose by the cuprammonium process. Cf. *C. A.* **33**, 8367.

Ferric sulfate. Theodore V. Fowler and Henry F. Merriam (to General Chemical Co.). U. S. 2,184,419, Dec. 26. For making anhyd. $Fe_2(SO_4)_3$, solid $FeSO_4$ is furnaced with H_2SO_4 in amt. not less than 30 and not more than 60% in excess of that theoretically required to oxidize the $FeSO_4$ to $Fe_2(SO_4)_3$, at temps. of 275-450°, and furnacing and agitation are continued to effect such oxidation and to form a substantially dry anhyd. product.

Recovery of sodium tetraborate from borate ores. Plato Malozemoff, Merrill W. MacAtee and Miles W. Kirk (to Pacific Coast Borax Co.). U. S. 2,184,558, Dec. 26. A borate ore contg. Na tetraborate and minerals insol. in water, such as Baker ore, is mixed in finely divided condition with a satd. soln. of Na tetraborate, and the pulp is then subjected to a froth-flotation treatment in the presence of a reagent, comprising $BaCl_2$ and a fatty acid, such as oleic acid, having a preferential affinity for the Na tetraborate.

Reactive thorium oxide. Chemische Fabrik von Heyden Akt.-Ges. (Richard Muller and Harry Lee, inventors). Ger. 684,723, Dec. 4, 1939 (Cl. 12*m*, 9). See Fr. 828,334 (*C. A.* **33**, 3304).

Recovery of carbon dioxide from gases. Gustave T. Reich. U. S. 2,183,324, Dec. 12. Gases contg. CO_2 are brought into contact with a soln. of alkali carbonate satd. with alkali bicarbonate, whereby a suspension of alkali bicarbonate is formed; this suspension is heated to dissoc. not more than the alkali bicarbonate in suspension to alkali carbonate and CO_2, while maintaining the alkali carbonate in soln., and the soln. contg. alkali carbonate satd. with bicarbonate is returned for treating gases contg. CO_2. Cf. *C. A.* **33**, 3120.

Mixture of hydrogen and carbon monoxide. Soc. internationale des carburants "Brevetés Consalvo" S. A. Holding. Belg. 426,221, March 31, 1938. ZnO, CO_2 and H_2O are treated with excess of CaC_2. The CaC_2 is subsequently regenerated in the same chamber.

Iodine from seaweed. Thomas Dillon, Donal T. Flood, Vincent C. Barry and Pádraig O'Muineacáin. Brit. 508,715, July 5, 1939. I and other substances are removed by digesting seaweed with a weak aq. soln. of acid, sepg. the acid ext. liquor after the digestion and treating it, preferably hot, with insol. Cu compds., e. g., CuCl, Cu_2O, that combine to form I-Cu compds., which are sepd. by filtration or sedimentation. The remaining liquor may have a further quantity of acid added as and when required and be used again repeatedly. K and other salts and org. substances, e. g., mannitol, may be recovered by any suitable means from the remaining liquor after such repeated use. The remaining liquor may be neutralized and evapd., the residue being used as a *fertilizer*.

Preventing salt from hardening or caking. Marnell Segura (to Jefferson Island Salt Mining Co.). U. S. 2,183,173, Dec. 12. The salt is treated with an aq. soln. of sorbitol in an amt. of 0.02-5.0% the wt. of the salt.

Sintering fluorspar. Reed W. Hyde. U. S. 2,184,078, Dec. 19. Finely divided fluorspar is mixed with a moistened inorg. plastic cementing material and the mixt. is formed into pellets which are sintered in a shallow bed with a down blast of air.

Carbon black. I. G. Farbenindustrie A.-G. Brit. 508,594, July 4, 1939. C black, with or without HCN, is sepd. from gases obtained in the production of C_2H_2 by the thermal splitting of hydrocarbons by quenching the gases with H_2O and then washing the moist gases with H_2O at an elevated temp., e. g., 50-80°. The washing is preferably conducted at a temp. such that, apart from HCN, as little as possible of other gas constituents, in particular C_2H_2, is dissolved, e. g., at 80°.

Improving carbon black. Walther H. Grote (to United Carbon Co.). U. S. reissue 21,302, Dec. 19. A reissue of original patent No. 2,066,274 (*C. A.* **31**, 1171).

Activated carbon. I. A. C. Società per l'Industria applicata del caoutchouc e per materiali protettivi ed antigas. Ger. 684,774, Dec. 5, 1939 (Cl. 12*i*, 33). Powd. peat, sawdust or similar materials are impregnated with a soln. of $ZnCl_2$ and rapidly heated to 180°; simultaneously $ZnCl_2$ in about 2.5-3.0 times this amt. is dissolved in the least possible amt. of H_2O and brought to boiling. As soon as the soln. temp. reaches 200-210°, the powd. peat is added and the entire mass is quickly brought to about 240°. During the mixing the reaction mass is heated to 300° and at this temp. no further heat is applied but the influence of the air causes a self-generation of heat to 400°. The mass is allowed to cool.

19 GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Glass as a chemical engineering material. II. Filters and insulation. R. Quarendon. *Ind. Chemist* **16**, 61-2 (1940); cf. *C. A.* **34**, 1827. E. H.

Organic glass. F. H. Zschacke. *Glashutte* **69**, 810-11 (1939).—The outstanding properties of org. glass afford wide fields for its application. The org. "Plexi-glas" is superior to silicate glass in transparency, permeability to ultraviolet rays, transverse strength, ease of working, shatterproofness and lightness; it has superseded silicate glass in airplanes and vehicles though it has not yet been sufficiently developed for use for kitchen and household ware. M. V. Condoide

Significance of the mineralogical composition of quartz sand when glass is melted. M. A. Bezborodov, A. C. Zaporozhtzwa and I. G. Moiseeva. *Stekol'naya Prom.* **15**, No. 7, 26-9 (1939). (1) When quartz sands are evaluated it is necessary to know not only their chem. and granulometric compn., but also their mineralogical compn. (2) Because of the difficulty of dissolving sep. minerals, particularly zircon and cyanite, it is of the greatest importance to observe the melting of the glass so that incompletely melted components will not penetrate into the working zone, and will not be dissolved later by the glass mass. (3) Besides the minerals mentioned, experience shows the difficult assimilation of small lumps of kaolin. (4) Iron inclusions in the form of particles which are introduced into the melt in one way or another are also difficult to digest. (5) It is necessary to use a polarization microscope for a thorough study of stones present in glass and their mineralogical compn. M. V. Condoide

Use of sandstone with a high alumina content in the production of pane glass by the Fourcault method. Yu. Ts. Vinogradov and S. V. Rodin. *Stekol'naya Prom.* **15**, No. 7, 8-13 (1939).—The compn. of sandstone and problems confronting its use for glass manufd. according to the Fourcault method are dealt with. M. V. Condoide

Zinc oxide in the glass industry. L. Springer. *Sprechsaal* **73**, 16-17 (1940).—Two grades of com. ZnO, contg., resp., 8.4 and 4.7% PbO and 0.06 and 0.02% FeO, were used in expts. to replace CaO, BaO and PbO in part or completely. ZnO had little or no effect on the fusibility of the glass. If oxidizers, e. g., nitrates or arsenic, were used no difference in color was produced by ZnO. Up to 9% ZnO in lead glass and 8% ZnO in lead-free glass did not cause devitrification. The resistance to chem. corrosion was improved by ZnO. J. M. Noy

Glasses containing cobalt oxide. Kiuzo Huwa. *J. Japan. Ceram. Assoc.* **47**, 189, 228-30(1939).—In 3 series of glasses, consisting of 72% silica, 12% lime, and 16% alkali, whose contents of lime were substituted by 0.01 to 12% of Co oxide the density of each series of the glasses increased with an increase of CoO content. Obtained values of density agreed well with those calcd. when d. of CoO in glass was assumed to be 6.4 for 2 series and 8.6 for another. Coeff. of thermal expansion decreased with an increase of CoO content. Numerical values of the coeff. agreed well with those calcd. when 2.4 was used as const. for CoO in 2 series and 4.0 in the other. The softening temp. was lowered with an increase of CoO. The temp. at which the specific resistance of glass becomes 1500 ohms./cm. tended to be lower with an increase of CoO. The soly. of alkali in water increased slightly on the introduction of CoO; this shows a max. when the contents of lime and CoO were equal. The soly. in the acid was not affected by the substitution. The soly. in sodium carbonate soln. was similar to that in water but the effect was far lighter. The soly. in NaOH soda soln. was slightly increased by an increase of CoO. S. Kondo

Sodium fluosilicate in the glass batch. F. H. Zschacke. *Glashutte* **69**, 785 6(1939).— Na fluosilicate is excellent for the fining of brown glass colored with sulfide, green glass fused with sulfate, and certain colored glasses fused without sulfate or saltpeter, white hollow glass and certain "tube" glasses which must not contain As. Na fluosilicate is a salt obtained in the prepn. of superphosphate and is relatively pure and free from iron and does not vary in compn. Because of its high F content it is a more effective fining agent than fluorspar and its decompn. into the volatile SiF_4 (the fining agent in the batch) and NaF (which is destroyed at higher temps. and does not cause opacification) takes place at lower temps. than that of fluorspar. The decolorizing action of the fluorides is derived from the formation of iron fluoride which is volatile at fusion temps. (1000°), and also from the formation of the colorless complex and double salts. The amt. of silicic acid which volatilizes lies within the weight error for the batch. Na fluosilicate cannot be used in place of borax. M. V. Condoide

Grog masses for glass pots and tanks. Oskar Lecher. *Glashutte* **69**, 529 30(1939).—The compn. of masses for pots and tank block and practical experience in meeting the action of the fused glass on grog linings in the past few years in Germany are discussed. In tanks grog with high alumina content was found to resist the molten glass better than block with a high silicic acid content because the protective layer formed between the glass and the block is more viscous and adheres better and is therefore not as easily absorbed by the glass in the form of streaks and stones. Special care in the working and firing of masses is required to prevent the formation of cracks in the block because they facilitate the penetration of the glass into the block and hasten disintegration. The compns. of German tank block and pot clays are given. M. V. Condoide

Action of arsenic on the coloring and decolorizing of glass. I. L. Springer. *Glashutte* **69**, 497–9(1939).—Arsenic acts on color oxides sometimes as oxidizer and sometimes as reducer: (1) Arsenic oxidizes iron oxide. (2) Mn oxide is weakened by As. (3) S. found that As caused a brown-violet color produced by Ni oxide in a soda lime glass to disappear. No action was observed on a Co blue glass. (4) Arsenic displaces the yellow coloring of Cr compds. toward green. (5) Arsenic has a reducing action on Cu oxide. Arsenic decolorizes Ag in a lime crystal glass, but has no effect on a lead glass; it deepens the yellow color when introduced into another glass. (6) Arsenic weakens, for the most part, the effect of Se according to S. and others. (7) S and C compds. are oxidized and become colorless through the effect of As. (8) No As is used with rare earths. The question of the effect of As on the fading of colored glasses in light is complex and depends on the amt. contained and on the other constituents, but the presence of Pb oxide tends to counteract fading. **II.** *Ibid.* 633–4.—Special studies were made of the action of As on pyrolusite (MnO_2) and iron oxide, because it is here that the two-sided nature of As, viz., sometimes reducing and sometimes oxidizing, appears. The tests are described and results are given as follows: (1) Pyrolusite with As, but without saltpeter gave varying colors, often directly opposite, in an oil furnace. In an elec. furnace small or large amts. of As always weakened the color. The addn. of saltpeter (also in an oil furnace) gave great stability to the coloring but at the same time the As weakened the color tone in proportion to the amt. added. (2) Pyrolusite with the addn. of As and sulfate: In an oil furnace 2 parts sulfate completely destroyed the coloring with small or large addns. of As. In an elec. furnace sulfate alone did not weaken the color, but with the addn. of As the color was weakened. (3) Fundamentally, As acts as a reducer. But if large quantities of As are added to a batch contg. Se compds. and either iron oxide or pyrolusite, the As may also act as reducer in the first stage of fusion. On the other hand, it can also take up O, especially when saltpeter is also present (formation of As_2O_5 oxide) and in the fining of glass it becomes an oxidizer. Whether this explanation of the oxidizing action of As should be accepted, or the formation of colorless iron compds. is the cause, remains uncertain. M. V. C.

Effect of the chemical composition and of the coloring agents on the properties of selenium ruby glass. S. M. Berekhovskikh. *Stekol'naya Prom.* **1938**, No. 12, 25–9; *Khim. Referat. Zhur.* **2**, No. 5, 86–7(1939). -Increase of the ZnO content in glass intensifies the red color; with an increase of ZnO, the content of alkalies should be increased. The content of ZnO in glass should not be lower than 3% for pressed articles. An addn. of up to 10% of B_2O_3 increases the red color of glass. B_2O_3 also increases the clearness of glass; it is best introduced as cryst. borax. Replacement of K_2O by Na_2O diminishes the red color. Na glass "fades" more at high temps. than does K glass. The content of alkalies should not exceed 15 20%. Decreasing order of the intensification of the color produced by the oxides of Se and Cd is ZnO, B_2O_3, P_2O_5, K_2O, Na_2O, Al_2O_3, SiO_2, BaO, CaO and MgO. Tartaric acid and SrO should be introduced in amts. of 0.5 0.8% of the wt. of glass. The introduction of Sb should be avoided. W. R. Henn

Variations in absorption of selenium colored glass as a function of temperature. Jean Escher-Desrivières and Yves Godron. *Compt. rend.* **210**, 215–17(1940).—The variation in absorption by an orange Se glass was examd. between 10° and 360° for light of λλ 5700 to 6500 A. Transmission decreases with temp.; thus for light of λ 6200 it is 80% at 10°, 39% at 267° and 2% at 360°. For light of λ 5900 the corresponding figures are 63, 47 and 13%. The curves of transmission against λ for various temps. are approx. parallel. (Cf. Luckiesh, *C. A.* **13**, 3291.) C. A. Silberrad

Melting glass of different compositions in a pot furnace. K. V. Manzhurnet and V. E. Stepanov. *Stekol'naya Prom.* **15**, No. 7, 14(1939).—Four kinds of glass for glass pipes and glass rods were melted simultaneously in a 12-pot furnace fired with unpurified gas. M. V. Condoide

Tank furnace with circulation for the production of chemical glass. M. A. Bezborodov. *Stekol'naya Prom.* **14**, Nos. 8-9, 25–7(1938); *Chimie & industrie* **41**, 1122.—The furnace provides for heat regeneration, with transverse movement of the flame, and is heated by means of 2 pairs of burners. The tank is shallow (0.8 m.) which permits reduction of the inert layer to a min. For a given quality of product, this furnace is more advantageous than pot furnaces. A. Papineau-Couture

Heat flow in a glass furnace. Otto Th. Koritnig. *Glashutte* **69**, 548–51(1939).—The detn. of the quantity of heat transferred to the melt in pot furnaces and also in tank furnaces is difficult because 3 different temps. exert an influence on the melt: (1) the variable heat from the fuel source, (2) the reflection from the furnace walls and ceiling and (3) the heat of the melt itself. Temp. measurements with a pyrometer may not be correct because numerous factors as the position of the instrument with reference to the gas flow, the conditions at the beginning

and ending of temp. measurement, and the duration of temp. measurements condition the accuracy of measurements. Equations are given for the theoretical calcn. of heat loss by absorption of heat by furnace masonry and radiation; heat-transference (3 types); emissive power of walls and charge; and the heat-penetration figure. Since these factors depend on the type of fuel, excess of air for firing, temp. of the heating gases, type of furnace masonry and size of the furnace, the difficulty of accurately detg. the total heat transference is understood. The theoretical calcns. do have a practical value, however, for the study of improving furnace construction and the comparison of furnaces fired with different types of fuel. M. V. C.

Annealing muffle for hollow glass. Otto Ehinger. *Glashutte* **69**, 822-4(1939).—A gas-heated well-insulated muffle in "channel" form for annealing gold borders, markings and printing which can be built inexpensively in any plant is described. Gas firing is very economical and can be regulated; it gives more uniform heat and the charge is not coated. The burner in the furnace is arranged over the muffle. In order to anneal 5 6000 glasses in 8 hrs., the muffle (7500 mm. long) is divided into 3 zones: preheating (2500 mm.), annealing (3000 mm.), cooling (2000). The annealing muffle is divided into 6 parts of 500 mm. length. The interior width of the channel is 600 mm. M. V. Condoide

Dielectric loss of glass at high frequencies. H. Thurnauer and A. E. Badger. *J. Am. Ceram. Soc.* **23**, 9-12 (1940).—Power-factor measurements at frequencies of 100, 500, 1500 and 5000 kilocycles were made on a series of Na_2O-CaO-SiO_2 glasses and on another series starting with a base glass contg. Na_2O 17.4, CaO 10.1 and SiO_2 72.5%, to which 0.030 gram-atom of various elements, in the form of oxide, was added. In the 1st series the power factor for all glasses decreased with increasing frequency and increased markedly with increase in Na_2O content. In the 2nd series the power factor decreased with increasing frequency; it increased with addns. of Zr, Na and Al oxides, and decreased with addns. of the oxides of Si, V, Zn, Mg, B, Ti, Co, Ca, Ce, Ni, Mn, Fe, Ba, Pb, Li and K. C. H. Kerr

Optical constants of glasses. Hans Schulz. *Glashutte* **69**, 620-30, 653-5(1939). The optical consts. of glasses are better for characterizing their type than other values such as the mech. properties of tensile strength, resistance to pressure, density, etc., because they can be detd. with greater accuracy by simple means and permit certain conclusions to be drawn regarding the compn. of the glass. The problem of the relationship between the optical consts. and the compn. of glass is dealt with in detail and the work of other investigators on this subject is summarized. A table gives values for optical consts. for glasses of the new Schott catalog No. 5858. The work of E. Zschimmer, F. E. Wright, H. Mees and H. Karmaus and others and expts. on the effect of increasing addns. of certain constituents in the glass (PbO), and a comparison of calcd. and measured values for the index of refraction and the effect of the infrared and ultraviolet absorption fields are discussed. Conclusion: A simple relationship between optical consts. and compn. can be found only after more exact values of a greater no. of glasses of known composition can be detd. in one larger wave-length interval; the measurements so far obtained are insufficient. M. V. Condoide

Effect of time and temperature on accelerated chemical durability tests made on commercial glass bottles. Frank R. Bacon and O. G. Burch. *J. Am. Ceram. Soc.* **23**, 1-9(1940).—Tests made of chem. durability on both crushed samples and bottle surfaces of a variety of com. glass-bottle compns. show the difficulties in attempting to correlate accelerated tests with the actual performance toward various solns. under service conditions. Results thus far indicate that the value of accelerated tests conducted with distilled H_2O as a leaching medium is questionable as an aid in predicting resistance of various glass compns. to neutral solns. at room temp. C. H. K.

The specific gravity of the ternary glasses CaO-Na_2O-SiO_2 at high temperatures. VI-VIII. Ikutaro Sawai and Syukiti Inoue. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 331-2(1939); cf. *C. A.* **33**, 8371[1].—Sp. gravities of glasses in the region SiO_2 70%, CaO 8-13%; SiO_2 71%, CaO 8-12%; and SiO_2 72% and CaO 10-13% were detd. at temps. ranging from 25 to 1200°. The graph shows the interrelationships of temp. and sp. gr. are not straight lines as was stated in the previous paper. With a const. SiO_2 the sp. gr. generally increases at the various temps. with increasing proportions of CaO. **IX. Measurement of the specific gravity according to Badger and Harman as well as the specific gravity at 1300°.** *Ibid.* Suppl. binding 407-9.—The relations between sp. gr. and temp. for the 3 glasses studied cannot be expressed by straight-line curves as was reported by Badger and Harman (*C. A.* **32**, 8716[7]), but take the form obtained by Haenlein. The sp. gr. at 1300° as reported by B. and H., who used the "bubble-pressure-method," is higher than that reported by the authors, who used Haenlein's method (an arm balance from which is suspended a platinum bead that is immersed in the molten glass, the temp. of which is measured by Pt-Pt + Rh thermoelements). A. W. K.

Surface-tension measurements on molten glass by a modified dipping-cylinder method. C. L. Babcock. *J. Am. Ceram. Soc.* **23**, 12-17(1940). Measurements were made on a series of both calcite and dolomite lime glasses. The temp. range covered was 1100-1400° and the viscosity range was logarithm viscosity 1.65-3.30 (45-2000 poises). The results agree with published data obtained by the max. bubble-pressure method. The temp. coeff. of surface tension is approx. −0.02 dyne per cm. per C°. The surface tension of glass at a particular temp. can be represented as a linear function of compn. on a mol. fraction basis. C. H. Kerr

Joining chromium-iron parts to glass. Schad. *Sprechsaal* **73**, 23-4(1940).—Cr-Fe alloys with more than 15% Cr do not change from the α-structure between room temp. and the m. p. The coeff. of expansion is close to 100 × 10⁻⁷/°C., similar to that of alkali-lime glasses. The thin surface oxide reacts with the glass, forming a stable silicate. A special lathe with two synchronous chucks is used, one holding the metal part, the other the glass part. Some glass is applied first to the heated metal by means of a rod and then the 2 parts are united. Frequently Cu is joined to Cr-Fe parts instead of directly to the glass. J. M. N.

Developments in the field of ceramic engineering during the past ten years. Arthur S. Watts. *Ohio State Univ., Eng. Expt. Sta. News* **12**, No. 1, 19-20(1940). E. J. C.

Notes on clays. IV-V. Mune Utida. *J. Japan Ceram. Assoc.* **47**, 27-33(1939).—Thermal dehydration of Kochite, Otoge pyrophyllite, acid clays (fuller's earths), bentonites, zeolites, a diaspore and a bauxite are reported. Their origin, chem. compn., and phys. properties are discussed. **VI-VII.** *Ibid.* 89-94.—Thermal dehydration curves are given for binary systems, kaolin-bentonite, silica gel-bentonite, silica gel-pyrophyllite, and bentonite-pyrophyllite. Theories regarding clay substance are discussed and the classification of clay minerals based on lattice structure. S. Kondo

Physical and colloidal chemistry of clays. C. G. Albert. *J. Am. Leather Chem. Assoc.* **35**, 25-36(1940).—The surface activity of kaolin particles is discussed. Particle size data are given for some com. kaolins. Penetration of kaolin into sheep leather is illustrated by photomicrographs. H. B. Merrill

Some characteristics of Illinois pottery clay. C. G. Harman. *J. Am. Ceram. Soc.* **23**, 26-9(1940).—Four Illinois pottery clays were studied. They approach ball clay in characteristics. Permeability of the raw clays was detd. by timing the rate of passage of H_2O through a definite layer of clay under standardized conditions; a definite relation was found between permeability thus detd. and the ratio of pore H_2O to shrinkage H_2O. The temp. of inversion of low to high cristobalite in these clays is much lower than is usually accepted for the lower limit of this inversion, because cristobalite is formed at low temps. C. H. Kerr

Present condition of Fukushu clays in Manchuria.

Takehito Sibata. *J. Japan. Ceram. Assoc.* **47**, 141–5(1939). — These clays are produced at Gokoshi in Fukuken of Hotensho. They comprise a stratum of 4 common clays and a stratum of 5 hard clays. Refractoriness of the common clays is cone 34–35. They are very plastic: Al_2O_3, SiO_2 and P. C. E., resp., of the hard clays are: common hard clay, 45%, 35%, cone 35; superior hard clay, over 60%, under 20%, cone 37; special hard clay, over 70%, under 10%, cone 38. S. Kondo 1

The origin, mineralogy and distribution of the refractory clays of the United States. Arthur F. Greaves-Walker. *N. Carolina State Coll. Agr. Eng., Univ. N. Carolina, Eng. Expt. Sta. Bull.* No. **19**, 87 pp.(1939). E. H. 2

Determination of quartz (free silica) in refractory clays. L. J. Trostel and D. J. Wynne. *J. Am. Ceram. Soc.* **23**, 18–22(1940).—A rapid procedure is as follows: Weigh a 0.5-g. sample of dried material ground to pass 150-mesh, 3 in a vitreous SiO_2 crucible. Fuse with 10–15 g. $K_2S_2O_7$ starting at low temp. to prevent loss of SO_3. Dissolve the cooled fusion in 150–200 cc. of hot H_2O in a 400-cc. beaker. To the warm soln. add cautiously about 12 g. of NaOH pellets, one or 2 at a time, to dissolve the pptd. SiO_2. Digest on a hot plate for 1/2 hr. at 85–90°, then filter off the quartz quickly, using a paper of close texture. Wash 10 times with hot H_2O, then 5–10 times with hot 1:1 HCl to dissolve the Fe and other compds. from the quartz 4 not entirely removed by filtering; wash again 5 times with hot H_2O. Ignite and weigh in a tared Pt crucible. The residue is free quartz. To the residue add 2 drops of 1:1 H_2SO_4 and 10 cc. 48% HF; evap. to dryness, ignite and weigh. If this residue exceeds 0.001 g. discard the detn. and repeat. The procedure has proved useful on the more common unfired refractory clays; its value for high-temp. forms of cryst. SiO_2 and fired fireclay products remains to 5 be studied. C. H. Kerr

Manufacture of high-grade firebrick of highly aluminous clays (Preliminary report). Kozo Kawai and Syuzo Siowaki. *J. Japan. Ceram. Assoc.* **47**, 136–40(1939).—In Japan, most highly aluminous bricks are made from fire clays of Manchuria and North China. Their P. C. E. is cone 37 or 38. They are not satisfactory, since their softening temp. under a load of 2 kg. per sq. cm. never exceeds 1400°. To obtain fire brick contg. corundum and 6 mullite but no free SiO_2, Al_2O_3 or diaspore and mineralizers were added to highly aluminous Chinese clays and the brick fired to cone 18 or higher. Two of the resulting bricks had the following properties, resp.: true sp. gr. 3.09, 3.10; absorption 9.72, 8.33%; softening temp. under load of 2 kg. per sq. cm. 1535°, 1555°. S. Kondo

How to increase the corrosion resistance of bricks for chemical tanks. Adolf Moser. *Sprechsaal* **73**, 2–3 7 (1940).—Increased temp. and time for firing improved porosity, permeability, and corrosion resistance. Firing at cone 26 rather than at cone 14 improved all these properties. J. M. Noy

Low-fire glazes for roofing tiles. Yosio Mizuno. *J. Japan. Ceram. Assoc.* **47**, 294–7(1939).—A popular bluish green glaze for roofing tile in the Province of Mikawa is made of frit 55, feldspar 47, quartz 10 and cupric oxide 4.5; the frit batch being borax 38, feldspar 5, soda ash 8 12, limestone 14, kaolin 4 and quartz 27. Various glazes were prepd. of raw borax for a firing temp. of 1000–1050°. Satisfactory bluish green glazes were made contg. raw borax 50–40, soda ash 10, feldspar 20, quartz 15, limestone 5 and CuO 3–4 parts. S. Kondo

Titanium compounds. IV. Siniti Suzuki. *J. Japan. Ceram. Assoc.* **47**, 8–12(1939).—Phys. and elec. properties were detd. of 17 bodies contg. 0.007–0.047 KNaO, 0.088–0.095 CaO, 0.057–0.072 MgO, 1.00 Al_2O_3, 0.007–0.035 Fe_2O_3, 2.410–5.842 SiO_2 and 0.449–3.475 TiO_2. Results: The min. value of tan δ is shown with a body contg. 2.6 mol. TiO_2. For bodies rich in alkalies, it occurs at 0.5–0.6 mol. TiO_2; hence the effect of the TiO_2 is reduced by the change of the oxide into a basic substance. Tan δ and dielec. const. decrease with a rise in firing temp. until overfiring occurs. A body contg. 0.007 KNaO, 0.088 CaO, 0.069 MgO, 1.000 Al_2O_3, 0.007 Fe_2O_3, 2.731 SiO_2 and 2.612 mol. TiO_2 had a tan δ of 9.1 × 10^{-4}, when fired to cone 10. V–VI. *Ibid.* 123–30(1939).—To obtain satisfactory insulator for high-frequency current, firing and elec. examns. were made of 150 bodies in systems (*A*) kaolin–feldspar–quartz–TiO_2, (*B*) kaolin–feldspar–quartz–$CaCO_3$–Al_2O_3–TiO_2, (*C*) talc-feldspar–kaolin–TiO_2 and (*D*) kaolin–feldspar–quartz–$CaCO_3$–TiO_2. Thermochem. considerations are given for the reduction of TiO_2 to Ti_2O_3. Five bodies were obtained in system (*D*) that were superior to steatitic. The mol. compns. of these 5 were:

No	Na_2O	K_2O	CaO	MgO	Al_2O_3	SiO_2	TiO_2
IP 1	0.030	0.027	0.479	0.071	1.000	3.020	0.243
IP 2	0.029	0.026	0.669	0.069	1.000	2.700	0.243
IP 3	0.029	0.029	0.864	0.070	1.000	2.373	0.281
IP11	0.058	0.042	0.525	0.069	1.000	3.060	0.272
IP12	0.056	0.041	0.723	0.071	1.000	3.260	0.270

The absorptions (cone 14 burning) of the 5 bodies were 0.49, 0.22, 0.00, 0.00 and 0.00%, resp. The dielec. consts. were 5.11, 5.28, 4.40, 7.46 and 7.11, resp. The dielec. losses (× 10^{-4}) were 6.0, 7.9, 9.8, 13.9 and 10.6, resp. **VII.** *Ibid.* 243–8.—To aid in obtaining insulators of high dielec. const. the bodies now used were classified into vitrified rutile and titanate bodies. Forty-eight new bodies contg. $(NH_4)_2HPO_4$ as a mineralizer were prepd. and fired to cones 10 and 12, and tested for dielec. const. and tan δ. The effects of admixts. and firing temp. also were studied. S. Kondo 4

The diatomaceous earths of the Noto Peninsula. I. Their occurrence and quality. Masami Ono and Seizi Kondo. *J. Japan Ceram. Assoc.* **47**, 3–7(1939).—Diatomaceous earth produced near Wakura hot spring is typical. Its analysis is: loss on ignition 10.22, SiO_2 74.28, Al_2O_3 11.79, Fe_2O_3 1.59, CaO 0.56, MgO 0.82%. S. K.

Agalmatolite of Gahoku Hill in Korea. Takahiko Ukisu. *J. Japan. Ceram. Assoc.* **47**, 201(1939).—Descriptions are given on the production and quality of agalmatolite (Roseki) of Gahoku hill near Mituyo town in Keisho-nando, Korea. The hill is a solid mass of agalmatolite. Its refractoriness varies from cone 36 to 32. It is particularly useful in improving the load-bearing behavior of medium and superior fire brick. S. Kondo

Magnesia spinel. Siniti Suzuki. *J. Japan. Ceram. Assoc.* **47**, 302–9(1939).—A study was made of the refractoriness, load-bearing behavior, soly. in *N* soln. of mineral acids, linear expansion, and microstructure of magnesio-aluminous bodies made of Manchurian magnesites, Al_2O_3, and inland diaspores. The spinel bodies were sufficiently matured at cone 18. Formation of spinel was favored by the introduction of B_2O_3 and SiO_2. S. K.

Viscosity of transparent fused silica. Hideo Inuzuka. *J. Japan. Ceram. Assoc.* **47**, 292–4(1939).—The viscosity of transparent fused SiO_2 was detd. by English's method. The elongation Δl caused by a wt. suspended from the end of the specimen was measured by a cathetometer. The viscosity was calcd. from the formula $\eta = P.l.T/a^2\Delta l$ where P = wt. in dynes, l = length of specimen, T = time, a^2 = sectional area of specimen, and Δl = elongation. The softening temp. of the specimen was about 1150°. When a specimen was used for each temp., the relation between log η and temp. was rectilinear for temps. 1130–1430°. However when a specimen was used for several temps., the line was a little curved for 1100–1200°, probably from devitrification. S. Kondo 8

Inversion of dicalcium silicate. Seizi Kondo, Tosiyosi Yamauti and Mititane Oki. *J. Japan. Ceram. Assoc.* **47**, 76–81(1939).—Specimens were prepd. by heating mixts. of pure $2CaCO_3 + SiO_2$ for 2–8 hrs. at 1400–1700°. They were quenched in ice-cold Hg and examd. for microstructure, x-ray diffraction, thermal changes, etc. Specimens made at 1500° or over dusted less than those prepd. at lower temps. All specimens quenched in an ice-cold Pt crucible or in a similar way were mixts. of α- and β-$2CaO.SiO_2$. When the temp. was raised gradually to above 1500°, the products quenched as above were poorer in the γ modification and richer in the α one, almost pure α-$2CaO.SiO_2$ being obtained at about 1700°. On cooling naturally, the products always 9

contained the α form. Pure γ-$2CaO.SiO_2$ can be obtained from its mixt. with the α form by sieving, collecting the fine powder, reheating for a long time at temps. at which the α form is stable (e. g., 300 hrs. at 550°), and also by dissolving the α form in water. In thermal analysis, γ-$2CaO.SiO_2$ showed a strong endothermic reaction at 720 ± 5° in heating up and a strong exothermic one at 690 ± 5° in cooling. These changes are probably due to γ-β inversion. Slight exothermal changes were noted in α-$2CaO.SiO_2$ and in $3CaO.2SiO_2$ at temps. of 600 700°; they are due probably to γ-β inversion of γ-$2CaO.SiO_2$ contamination in the specimens. S. Kondo

Mineralizers effective in the crystallization of mullite. Tosio Nakai and Yosio Hukami. *J. Japan. Ceram. Assoc.* **47**, 225 7(1939).– An x-ray study was made of the effect, on the formation of mullite, of the addn. of 0.5, 2 and 5% of mineralizers to (*A*) a Korean kaolin, (*B*) a mixt. of the kaolin and Al_2O_3, and (*C*) a mixt. of quartz and Al_2O_3. Eleven compds. (CaO, Li_2O, Na tungstate, CdO, MgO, Bi subnitrate, PbO, NH_4 molybdate, B_2O_3, MnO_2 and CuO) were effective. In every case, the temp. at which mullite crystals were formed was lowered 50 200°. Each mineralizer has it's own most effective temp. The compds. of Mo and B are most effective at relatively low temps. CuO is effective at both lower and higher temps. MnO_2 is most effective at higher temps., although moderately effective at lower temps. Na_2WO_4 is moderately effective through a wide range of temp. CaO, Li_2O and MgO are similar to MnO_2 in regard to temp. though less effective. CdO, Bi subnitrate and PbO are least effective for all temps. The temps. in the expts were 950 1100° in (*A*), 1250 1400° in (*B*) and 1300-1450° in (*C*). S. Kondo

Properties of ceramic diaphragms. M. Sanada. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 314(1939). By use of the methods of Stender (*C. A.* **29**, 2856[7]) and of Encken and Jakob (*C. A.* **29**, 6327[2]), the chem. compn., acid- and alkali-resistance, true and apparent sp. gr., total porosity, pore size, elec. resistance, permeability and diffusion of ceramic diaphragms were investigated.
George Ayers

Manufacture of Seger cones. I. Tosio Nakai and Yosio Hukami. *J. Japan. Ceram. Assoc.* **47**, 233 7 (1939). –Expts. on feldspars are reported. Diffraction patterns of orthoclase, anorthoclase, albite, oligoclase, andesine, labradorite and anorthite are given and discussed. True sp. gr. of 7 specimens in the cryst. and the glassy states are 2.575 2.785 and 2.371 2.703, resp. The change in true sp. gr. on heating the specimens at 1050 1300° is given. Results indicate the existence of a eutectic between orthoclase and albite. The effects of MgO, CaO, borax, PbO, quartz and kaolin on the m. p. of orthoclase and albite are shown graphically. S. Kondo

Internal structure of Japanese potteries. Tosio Nakai and Yosio Hukami. *J. Japan. Ceram. Assoc.* **47**, 347 51 (1939).– Tableware of 7 chief porcelain-producing districts, those of 2 porcelain plants, a tableware of a china plant, and an elec. insulator product were examd. for chem. compn., x-ray diffraction and sp. gr. Results: Chem. compn., SiO_2 68 80, Al_2O_3 16 26 and alkalies 3.5 6%; crystals present, quartz, mullite and cristobalite; sp. gr. 2.41 2.56. S. Kondo

Magnesian porcelain steatitic. VIII. Syoitiro Nagai and Akira Naruse. *J. Japan. Ceram. Assoc.* **47**, 238 43(1939); cf. *C. A.* **30**, 2338[8]. –It was found from a preceding study that an addn. of 5 10% ZnO (Jap pat. 120,960, July 1, 1937), 3 15% Al_2O_3, or some pulverized Zn, Al or Mg (Jap. pat. 124,041, March 7, 1938) to talc improves the products. The present article relates mainly to the effects of various oxides. Talcs of Korea, Manchukuo and Shantung peninsula of North China are very pure. An addn. of 5% Al_2O_3, 10 15% ZnO, 5% BaO or 5% PbO to pulverized Manchurian talc was beneficial, while TiO_2 and Cr_2O_3 were not. S. Kondo

A study of heat-insulating materials. I. Tosio Nakai and Yosio Hukami. *J. Japan. Ceram. Assoc.* **47**, 283 7 (1939).—The plate method of detg. thermal cond. proposed by Nukiyama was introduced (cf. *C. A.* **30**, 7021[1]). 1 The detns. were made on a glass wool, a diatomaceous earth, and a diatomaceous-earth brick. The relations between cond. and bulk d. are discussed. Detns. of x-ray diffraction and true sp. gr. of insulating brick proved that a change in lattice structure greatly affects the thermal cond. of the brick. S. Kondo

Deformation of insulating firebrick under load. C. L. Norton, Jr., and V. J. Duplin, Jr. *J. Am. Ceram. Soc.* **23**, 22 5(1940).—In an electrically heated furnace load 2 was applied to full-size insulating firebrick. Sixteen com. brands were tested under various loads and over a considerable range of temp. No apparent relation was found between cold strength and deformation under load. A dense, strong brick did not necessarily carry more load at high temp. than a light, fragile brick. Some of the brands with best load-carrying capacity were also among the lightest tested. Bulk d. and cold strength, in general, did 3 not indicate ability to withstand hot-load conditions. Some brands of light-weight insulating firebrick actually carried more wt. at the same temp. than 2 samples of dense firebrick tested. It is surprising that a refractory which consists of 80% solid matter may not stand as much load at high temp. as another contg. only 20% solid matter.
C. H. Kerr

Fire resistance of ceramic building materials. H. D. Foster. *Ohio State Univ., Eng. Expt. Sta. News* **11**, No 4 5, 11 13(1939). J. M. Noy

Coal-fired kilns of Matumura. Zirokiti Kumazawa. *J. Japan. Ceram. Assoc.* **47**, 34(1939). S. Kondo

The third symposium of the Special Committee for Refractories. Anon. *J. Japan. Ceram. Assoc.* **47**, 35 41, 95 105(1939).– Third symposium of the special committee of the Japan Ceram. Assoc. and the Japan Refractories Assoc. The method of detg. P. C. E. and indicating the result, the reliability of cones, the methods of 5 testing for spalling tendency, expansion or contraction, load-bearing behavior at high temp., porosity, absorption, sp. gr., chem. analysis, sampling, corrosion, abrasion, specifications for silica, clay, agalmatolite, high Al_2O_3 and rotary kiln refractories were discussed. S. Kondo

Practical problems on the refractories for metal-melting furnaces. Tokizi Isikawa. *J. Japan. Ceram. Assoc.* **47**, No. 558, Suppl. 11 14(1939). Silica brick for open-6 hearth furnaces must have refractoriness of cone 33 or over, allowable deviation in dimensions being ±2% in length and width and ±2.5% in thickness. S. Kondo

Raw materials of refractories. I. Takeo Ao. *J. Japan. Ceram. Assoc.* **47**, 351 5(1939). The mineralogical and chem. compn., refractoriness, and sp. gr. of Roseki clay or agalmatolite are discussed. Three grades are recognized: the higher grade or diaspore-agalmatolite consists of diaspore and a small proportion of kaolinite, 7 the medium grade or kaolinite-agalmatolite is a mixt. of kaolinite and pyrophyllite; the lower grade or pyrophyllite-agalmatolite is composed of pyrophyllite and accessory minerals as quartz, sericite, alunite. S. Kondo

A proposal for the revision of the specification for the refractories of rotary cement kilns. Committee on Special Refractories. *J. Japan. Ceram. Assoc.* **47**, No. 558, Suppl. 3 10(1939).—The refractories are classified into 8 *A*, *B*, *C*, *D*, *E* and *F*. Allowable deviations in size, ±1.5% in length and width, and ±2.5% in thickness. Min. content of Al_2O_3: *A* 45, *B* 40, *C* 35, *D* 30 and *E* and *F* 25%. Min. P. C. E.: *A* 34, *B* and *C* 32, *D* and *E* 30, and *F* 26. Absorption: *A* to *E* 12 and *F* 11%. Max linear shrinkage on reheating for 4 hrs. at 1410°: −0.7% for *A* and *B*. Same for 4 hrs. at 1200°: ±0.2% for *C* to *F*. S. Kondo

Chemical analysis of refractories and their raw materials. 9 Syoitiro Nagai and Keiiti Akiyama. *J. Japan. Ceram. Assoc.* **47**, No. 556, Suppl. 1–4(1939).—The method recommended by a committee is given. S. K.

A proposal for the revision of the standard method of determining refractoriness. Committee for Refractoriness of the Japanese Ceramic Association. *J. Japan. Ceram. Assoc.* **47**, No. 558, Suppl. 1–2(1939).—The following revisions are proposed. The specimen is ground to pass a wire gauze sieve with 0.30 mm. openings. The

ground material is formed into truncated equilateral cones whose upper side, lower side and height are 3, 7 and 30 mm., resp. Standard and test cones are set in a refractory plaque, a face making an angle of 80° with the plaque and 4 mm. of its lower end being in the plaque. Intermediate cone equiv. is shown thus: cone 34–35. S. Kondo 1

A study on the manufacture of forsterite refractories. I. Tosio Ikeda and Tutau Hurukawa. *J. Japan. Ceram. Assoc.* **47**, 287–92 (1939).—A light-burned magnesite from Daisekkyo and a calcined talc from Kaijo were mixed in the proportions $MgO.SiO_2$, $2MgO.SiO_2$, $3MgO.SiO_2$, $4MgO.SiO_2$, $5MgO.SiO_2$, MgO and $3MgO.4SiO_2$. Small plates were formed under a pressure of 500 kg. per sq. cm.; they were fired at 1250°, 1350° and 1450° for 2 hrs. Then they were examd. for shrinkage, absorption, bulk d., sp. gr., and compressive strength. The $2MgO.SiO_2$ mixt. produced forsterite easily at lower temp. X-ray observation showed that fired talc consisted of clino-enstatite and SiO_2; $2MgO.SiO_2$ fired at 1250° contained clino-enstatite, but when fired at 1450° was composed almost entirely of forsterite. S. Kondo 2

The modulus of elasticity of magnesite refractories. XIII A method of improving mechanical strength of unfired magnesite refractories at ordinary and high temperatures. Seizi Kondo and Hiroşi Yosida. *J. Japan. Ceram. Assoc.* **47**, 15–17 (1939).—Mixts. of 80 or 100 parts of a pulverized clinker and 20 or 0 parts of a pulverized caustic burned magnesite were mixed with aq. soln. of dextrin, $MgCl_2$ and $MgSO_4$ and formed into test pieces under a pressure of 1000 kg. per sq. cm. Compressive strength was detd. after 1 week, that on drying, that on heating at 100 1160°, and that on firing to cone 16. The temp. producing the least compressive strength of each mixt. was lowest with dextrin, medium with $MgCl_2$ and highest with $MgSO_4$. The range of temp. at which the $MgSO_4$ specimens showed the lowest or like strengths was narrow. Test pieces which were made of the pulverized clinker and a soln. of $MgSO_4$ showed a min. hot compressive strength of 294 kg. per sq. cm. They can probably be used without firing. Their linear firing shrinkage was about 5%. However, the shrinkage can be reduced 50% by introducing coarse grains of clinker up to about 50%. **XIV. Chemical composition versus spalling character.** *Ibid.* 131 5 (1939).—Adding 5 parts of Al_2O_3 to 95 parts of pulverized magnesite clinker was remarkably effective in reducing spalling. The aluminous test pieces were fired to cones 12–28; they were vitrified at cone 16 and over. The spalling tendency of test pieces made with varying amts. of coarse clinker grain and fine aluminous powder was detd. Also the spalling tendency and the lowering of the modulus of elasticity of 5 other Manchurian magnesites were examd. Finally specimens made of a pulverized clinker with addns. of SiO_2, Al_2O_3, Fe_2O_3 and CaO were tested for spalling. Conclusions: The addn. of SiO_2 or CaO is detrimental, if some remains in the free state. The addn. of Fe_2O_3, MnO_2, TiO_2, $SrSO_4$, BaF_2 or $BaSO_4$ increases the spalling tendency. When Al_2O_3 or Cr_2O_3 exceeds a certain amt. the elasticity is abruptly increased and the spalling tendency suddenly lowered. The spalling tendency of specimens contg. effective amts. of Al_2O_3 or Cr_2O_3 decreases with a rise in firing temp. The effect of Cr_2O_3 is greater than that of Al_2O_3 at higher firing temps. The effective amt. of Al_2O_3 is not affected by introducing 10% Fe_2O_3 or SiO_2, while it varies if small amts. of CaO are added. When coarse grains of clinker are bonded with its own fine powder plus Al_2O_3, specimens contg. about 35% or less of the fine powder are inferior to those made with fine powder only. Specimens with 5% Al_2O_3 and also 1.5% CaO added vitrify better, are more resistant to thermal shock and are better in load-bearing capacity than specimens with 5% CaO and 10% Fe_2O_3 added. S. Kondo 3 4 5 6 7

Considerations on the modulus of elasticity and spalling. I. Siniti Suzuki. *J. Japan. Ceram. Assoc.* **47**, 230–3 (1939).—Difficulties in the detn. of the modulus of elasticity are discussed. Plastic deformation is closely related to the modulus. S. Kondo

Stannic oxide in ceramic glazes. Ludwig Stuckert. *Sprechsaal* **73**, 13–15, 21–3, 29–31, 37–9, 45–6 (1940).—The soly. of SnO_2 in the frits normally in use was investigated. Slow cooling reduces soly. due to supersatd. soln. With PbO the soln. reverses almost completely during the cooling, while frits rich in alkali metal oxides dissolve the SnO_2 irreversibly. It is advisable not to introduce the SnO_2 entirely with the frit (in the latter case) but to add it also to the mill. In general, SnO_2 increases the ease of melting, and the resistance to acids. The results with B_2O_3 are similar to those with PbO, in combination with SnO_2. Al_2O_3 is more favorable than SiO_2 and should not be eliminated entirely. ZrO_2 can replace SiO_2 in combination with SnO_2 or even replace SnO_2. To replace PbO with alkali metal oxides is always detrimental. In cases where 3 components are used certain ranges are defined as applicable. Other means of rendering glazes opaque are not advisable, except fluorspar, which combines with SnO_2 increasing its effect. J. M. Noy 8

Protecting metals by vitreous enamels. A. E. R. Westman. *Can. Metals Met. Inds.* **3**, 38 41 (1940).—A general review of vitreous enamels and their use for the protection of metals. Points considered are: the nature and compn., the enameling process, some of the more interesting developments in the last decade and the use of vitreous enamels for protecting metals against atm. corrosion. The vitreous-enameled products used most extensively to combat atm. corrosion are enameled sign and architectural units. W. H. Boynton 9

Enameling zinc-alloy die-castings; the necessity of chemical pretreatment. E. E. Halls. *Ind. Chemist* **15**, 433–6, 443 (1939).—The compn. and mech. properties of the principal Mazak Zn alloys (similar to Zamak series in U. S.) are tabulated. Chem. pretreatments are indispensable for sound, durable finishes. The Zn surface must be converted into an inert compd. which exerts no chem. action on the org. film coating. The 2 most widely used treatments are phosphatizing (Parker PZ and Granodine processes) and the chromate process. Test results show practically all types of industrial finishes as satisfactory with phosphate or chromate pretreatment. Special types of Al powder media also reduce the rate of failure somewhat. Failure is attributed primarily to interaction between Zn and moisture passing through the covering film of paint or enamel. M. McMahon 10

Effect of enamel on the strength of enameling iron. A. I. Andrews and E. W. Dietterle. *J. Am. Ceram. Soc.* **23**, 29 32 (1940).—Ground-coat enamel was applied on one side and on both sides of 26, 20, 18, 10 and 6-gage enameling stock and the strengths were detd. in cross bending. The enameled specimens showed a decided increase in strength over that of the stock before enameling. Increase in enamel thickness increased the strength within limits. The effect on the lighter gages was greater than on heavy gages. The strength was greater when the enamel was under compression than when under tension. C. H. Kerr 11

Apply thin, uniform ground coats by electric deposition (Badger, King, Jr.) **4**. Acidproof masonry in the sulfite industry (Björnstad) **23**. Transparent, rubbery sheets of polyvinyl acetal resin [for laminated-glass manuf.] (U. S. pat. 2,184,442) **13**.

Method and apparatus for casting vitreous articles. The British Thomson-Houston Co. Ltd. Brit. 508,295, June 28, 1939. In casting fused vitreous material, e. g., glass, in contact with a surface to which the fluid material normally adheres, adhesion is prevented by interposition of a layer of B nitride. Molds for use in casting glass may have their receiving surface coated with a layer of the B nitride.

Copper linings for mirrors, etc. Paolo Misciattelli. U. S. 2,183,202, Dec. 12. See Brit. 490,159 (*C. A.* **33**, 1118[2]).

Seals between ceramic and metal parts of potheads and like electrical fittings. Standard Telephones and Cables

Ltd., Thomas R. Scott and Leonard A. C. Pooley. Brit. 508,693, July 4, 1939. A filling of a cementing material consisting of styrene (I) or an insulating compn. contg. I is provided between the parts, the cementing material then being polymerized *in situ*. The cementing material may be plasticized as in Brit. 490,814 (*C. A.* **33**, 1062[7]) and may be blended with rubber, etc., with or without the addn. of rubber plasticizers, e. g., ceresin wax; it may be I admixed with an olefin, e. g., polyethylene, polyisobutylene.

Forming sealed joints between an outer metal body and an inner ceramic body. Otto Bormann (sole responsible partner of Julius Pintsch Kommanditgesellschaft). Brit. 508,542, June 29, 1939.

Electrically heated double tunnel furnaces. Aktiengesellschaft Brown, Boveri & Cie. Brit. 508,738, July 5, 1939. In furnaces for firing ceramic articles, these are conveyed through the furnace in counterflow, 1 tunnel serving for biscuit firing and the other for glaze firing, a longitudinal wall completely sepg. the tunnels over the whole length of the furnace so that the 2 processes can be accomplished simultaneously at different const. temps.

Apparatus for deaerating clay slips for making ceramic ware. Davis Brown. U. S. 2,183,763, Dec. 19. Various structural, mech. and operative details.

Pottery. Wm. Salisbury. U. S. 2,183,944, Dec. 19. App. is described, and a process for producing pottery, comprising pugging clay to a degree of stiffness beyond that suitable normally for jiggering thereof, simultaneously forming a portion of the pugged clay into a pair of gobs of approx. equal mass, shaping the gobs in sep. molds into complemental elements of a container with rim portions on the elements, drying the elements equally to a stage where they are mutually nonadhesive, coating the rim portion with a slip, abutting the coated rim portions for effecting assembly into a container, and firing the assembly to unite the complemental elements to form a container, such as a teapot.

Abrasive compositions. The Carborundum Co. Brit. 508,486, June 30, 1939. An abrasive or hard-wearing compn. is formed from a fusion contg. B carbide (I) and 1 or more addnl. hard carbides, e. g., of Zr, W, Mo, Cr, Ti or Si, having the hardness of Mo carbide or greater hardness and present as a sep. cryst. phase that has solidified from the fused mass. The I is preferably the major constituent. The addnl. carbide may occur, at least in part, as a eutectic in the form of finely divided particles distributed through a matrix in which the I forms a basic ingredient, or partly as eutectic and partly as cryst. plates or, with further increasing proportions thereof, as a cryst. skeleton extending through a hard tough matrix of I, the skeleton dividing the matrix into vols. that are bounded by substantially plane surfaces and (or) sharp corners or edges.

Abrasive sheets. Donald E. Edgar and Harry G. Stauffer (to E. I. du Pont de Nemours & Co.). U. S. 2,184,293, Dec. 26. Abrasive material is bound to sheet material such as paper or cloth by a resinous reaction product such as may be formed of urea, CH_2O and an alc. such as iso-Bu alc. in specified proportions, which on treatment with $ZnCl_2$ and Ac_2O yields the acetate of the alc. Cf. *C. A.* **33**, 7513[2]; **34**, 2150[2].

Magnetic apparatus suitable for coating paper or cloth with abrasive material. Henry P. Kirchner and Raymond C. Benner (to Carborundum Co.). U. S. 2,184,348, Dec. 26. Various structural and operative details.

Emery boards. Marshall T. Brekke (to Northam Warren Corp.). U. S. 2,183,930, Dec. 19. Various mfg. details.

Apparatus for separation of air from slip. Japan. 128,727, March, 1939. Atuzi Terasaki. Slip is introduced at the top of a vacuum chamber, and flows in a thin layer over inclined zigzag plates.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

The fineness of cement. Kimbe Tyuzyo. *J. Japan. Ceram. Assoc.* **47**, 248–53, 297–302, 361–5(1939).—The application of air analysis to the study of the fineness of cement was investigated. Two groups of limit particles for 2 velocities were collected with a Gonell's analyzer. Then 400 particles of the groups were examd. by means of ocular micrometers for plane area f, height t and other dimensions. The frequency curves of these dimensions indicated that diam. of each particle is best represented by $\sqrt{ft}$. The Goldstein or the Oseen formula holds for the relation between vol. and velocity of flow in the cross section of the tube. The air analyzers of the Petersen type, English and American standard types, Gary and Lindner type, Gonell type, and Reller type are discussed, and results are given of tests of T.'s analyzer (Jap. pat. No. 114,750, March, 1936). The error due to the time of analysis is discussed. To find a rational method of calcg. the sp. surface of cement, T. examd. the outer shape of grain and the grain distribution. The statistical shapes of the grain are similar regardless of its size and brand of the cement. S. Kondo

Researches on the mechanism of cement formation in rotary kiln. III. X-ray analysis of cement raw meal in the rotary kiln. T. Yosii. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 304–5(1939); cf. *C. A.* **33**, 7069[1,2].—X-ray studies were made on cement samples from the drying (wet process), preheating, calcining, sintering and cooling zones of a cement kiln. The diffraction line of limestone was present in samples for 70% of the length of the kiln. Following this region the lines of free lime appeared, and finally those of alite and belite and possibly some of celite. Limestone, free lime and a small amt. of belite were detected in the flue dust. **IV. General description of the microscopical examination of the raw meal in the rotary cement kiln.** *Ibid.* 305–8.—Pulverized limestone gave a n below 1.68, birefringence of about 0.17, clay aggregates gave a n 1.540–1.552 and a strong birefringence (cericite or pyrophyllite series). Purple ore, a by-product from H_2SO_4 contained small amts. of limestone, quartz and clay. The clinker contained alite ($3CaO.SiO_2$), belite (α-$2CaO.SiO_2$) and celite ($4CaO.Al_2O_3.Fe_2O_3$). **V. Microscopical examination of raw meal in the rotary kiln.** *Ibid.* 308–13.—In both wet and dry processes samples from the first 70% of the length of the kiln gave predominantly $CaCO_3$ diffraction patterns. In the dry process at about the 70% point $CaCO_3$ dissocn. begins and continues over approx. 15% of the kiln length. At the 85% point the first belite and celite formation occurs. At the 90% point the transformation of belite to alite is quite rapid and clinker is forming. Finished clinker consists of alite, belite and celite. In the wet process $CaCO_3$ dissocn. takes place from 70–85% kiln distance from the feed end. At 80–85% distance belite and celite are formed first, at about 93% distance transformation of belite to alite is rapid, and celite crystals are becoming well developed. The finished clinker consists of alite, belite and celite with no free lime. H. E. Messmore

Fluxes in cement mixes. S. E. Hutton. *Rock Products* **42**, No. 11, 51–2(1939).—A general, inconclusive discussion of the effectiveness of Fe_2O_3 and Al_2O_3 as fluxing agents in the manuf. of portland cement clinker based on analyses as reported in the periodical literature by Blank (*C. A.* **22**, 4219), and others. A. W. King

Shrinkage [of cement]. Vieri Sevieri. *Tonind.-Ztg.* **63**, 288–90(1939).—So many factors in mixing concrete influence shrinkage that the results of expts. on its avoidance by adjustment of the chem. constitution of cement may be entirely obscured. Most improvement in shrinkage, as in strength, comes from improvement of the phys. character of the cement and mode of prepg. the concrete,

rather than from changes in compn. of the cement. B. C. P. A.

Properties of cements and limes subjected to high pressures. F. Jager. *Cement Lime Manuf.* **12**, 1–3(1939).—Pressures up to 18,000 kg./sq. cm. exerted on dry powders showed that subsequent reaction with water at first was accelerated then retarded and finally close to zero, depending on the pressure. Above a certain pressure the cement powders coalesced to give extremely low reactivity. A. W. King

Blended cements. Kozaburo Watanabe. *J. Japan. Ceram. Assoc.* **47**, 355–7, 358–60(1939).—The blending materials were calcined clay, raw clay, siliceous white clay, diatomaceous earth, sol. white clay ("Kayoha-kudo") and volcanic ash. The best blended cement was obtained with sol. white clay, contg. SiO_2 85.00, Al_2O_3 6.40, Fe_2O_3 1.10, CaO 2.50, SO_3 1.03, and insol. residue 22.04%; loss on ignition was 5.6%; the sol. constituents cond. 69.04 SiO_2 and 5.40 Al_2O_3 and Fe_2O_3. The higher the sol. silica the better was the material. Materials rich in sol. alumina improved early strengths, especially compressive strength. Bending strength was favored by the materials rich in sol. silica. The strengths of wet mortars composed of 1 part cement, 1 part fine sand and 2 parts standard sand after immersion in water, $MgSO_4$ soln., Na_2SO_4 soln. and $(NH_4)_2SO_4$ soln. were compared. The higher the sol. silica in the blending materials, the better was the chem. resistance. Materials rich in sol. alumina gave blended cements that had poor resistance to Na_2SO_4 soln. S. Kondo

Investigations on the properties of portland cement made with sand. V. A. Kind, V. F. Zhuravlev and Kh. P. Kotlyar. *Tsement* **5**, No. 12, 6–9(1937); *Chimie & industrie* **40**, 506.—Portland cement made with sand is slightly less resistant to air than ordinary portland cement, but its air-hardening is not interrupted but merely proceeds at a slower rate. Deformations by contraction and swelling of sand portland cement kept under water are slightly smaller than the corresponding properties of ordinary portland cement; contraction in air is slightly greater, but still remains within permissible limits. Generally speaking, from the double standpoint of mech. strength and the principal technological qualities, sand portland cement is practically equal to standard portland cement. The incorporation of fine sand accelerates hydration of the cement, which explains the good mech. properties of sand portland cement. A. P.-C.

Colored portland cements. II. M. Ya. Bychkov and K. S. Zatsepin. *Tsement* **5**, No. 12, 10–12(1937); *Chimie & industrie* **40**, 506; cf. *C. A.* **32**, 1423[1], 1891[7].—Study of the use of different Mn compds. in the prepn. of colored cements. The color obtained depends on both the nature and the proportion of the compd. used, e. g., 1% pyrolusite gives a brownish gray cement, and 5% pyrolusite gives a black cement with a slight brownish tinge; 1% Mn chloride gives a light-gray cement and 5% a yellowish gray. The mech. strengths of the cements are also different. A. Papineau-Couture

Mixed portland cement. Seizi Kondo and Aitaro Miyagawa. *J. Japan. Ceram. Assoc.* **47**, 191–6(1939).—Kaolin, quartz sand, pyrophyllite, potter's rock, bentonites of Aomori, liparite, and decomposed granite as 30% admixts. to portland cement were compared with the white earth of Beppu, which is widely used in the commercial production of mixed cement. The results of the expt. indicate that the bentonites are as good as the white earth. S. Kondo

Constitution of portland cement clinker. R. H. Bogue. *Proc. Symposium on the Chemistry of Cements, Stockholm,* 1938; *Cement Lime Manuf.* **12**, 205–13, 230–40, 250–6(1939); **13**, 3–11(1940).—A comprehensive presentation on the pos. identification of the various phases present in com. portland cement clinker by means of the most refined microscopic technique. Com. clinkers vary widely in glass content, which is profoundly affected by the rate at which clinker is cooled. Clinkers prepd. in a lab. furnace contg. 3% MgO, when cooled slowly (no glass), gave cements that expanded seriously when tested in the autoclave, whereas the same compns. when cooled quickly (high glass) had a very low expansion. A. W. King

Determination of the constitution of portland cement clinker by the metallographic method. Taro Tanaka and Ryuiti Naito. *Cement Lime Manuf.* **12**, 64–8(1939).—The metallographic method using polished and etched specimens, when combined with the petrographic method, aids considerably in studying the compn. of clinker; 7 photomicrographs. A. W. King

Limit values of the lime-saturation coefficient of high-grade portland cements. V. S. Chernitskiĭ. *Tsement* **6**, No. 8, 38–40(1939).—Max., mean and min. satn. coeffs. are, resp., 102–3.96 *C*, 100–3.7 *C*, and 98–3.5 *C* (*C* = silicate modulus). E. E. Stefanowsky

Effect of temperature on high-alumina cement. F. M. Lea. *J. Soc. Chem. Ind.* **59**, 18–21(1940).—An investigation made of the falling off in strength of set high-Al_2O_3 cement at temps. above normal, supports the hypothesis that a transformation of the metastable, less basic, hydrated calcium aluminates into the tricalcium aluminate hexahydrate is a major factor in this loss of strength. Tests of pure calcium mono-aluminate mortars also show a similar slump in strength. A. W. King

Aluminate-silicate cement. O. A. Gershberg and E. E. Gaĭsinovich. *Stroitel. Prom.* **17**, No. 7, 69–73(1939).—Aluminate silicate cement deteriorates on storage. Small addns. of portland cement or lime considerably accelerate its setting and decrease its strength. The accelerating effect of $CaCl_2$ is less. In moist conditions the strength of the concrete is 25% less than that of air-hardened concrete. E. E. S.

Construction with sulfur cement. C. R. Payne and W. W. Duecker. *Chem. & Met. Eng.* **47**, 20–1(1940); cf. *C. A.* **34**, 1455[1].—Acidproof cements for use in chem. plants should be of as low porosity as possible to prevent absorption of corrosive material. Concrete tanks are lined with a plastic S cement and then lined with acid-proof brick jointed with S cement. Steel tanks for continuous pickling of steel are frequently constructed as follows: the tank is first lined with rubber and this is protected by a lining of acidproof brick jointed with S cement. Pickling tanks lined in this manner have been in successful operation in plants for several years. H. E. Messmore

Some experiments with blast-furnace slags. N. I. Elagin. *Stroitel. Prom.* **17**, No. 4–5, 79–80(1939).—Slag powder was more active than granulated slag; it produces a strong cement with 1/6 the quantity of lime necessary for granulated slag. A lever press for the testing of samples is described. E. E. Stefanowsky

Experimental chromite-alumina linings at the Brjansk cement works. N. I. Khvostenkov and A. A. Tararin. *Tsement* **6**, No. 7, 1–3(1939).—Rammed chromite linings have twice the stability of chromite-brick linings owing to a greater homogeneity of the material and the absence seams. Chromite linings based on alumina cement are more stable for the sintering zones of rotatory kilns than are clinker concrete and talc linings. E. E. S.

A cement with hydraulic admixtures for filling (petroleum-well) crevices. N. A. Lutsenko. *Azerbaĭdzhanskoe Neftyanoe Khoz.* **1938**, No. 12, 25–9; *Khim. Referat. Zhur.* **2**, No. 5, 92–3(1939); cf. *C. A.* **31**, 8164[8].—Addns. of 10–20% of pumice to cement gave best results. The addn. of pumice lowered the temp. of the hardening of the cement. W. R. Henn

Method of determining the effective water-cement ratio in cement mortars. M. Cattaneo. *Strade* **21**, No. 2, 23–7(1939).—The amt. of H_2O absorbed varies with the type of sand used in the mortar; this H_2O is not available for hydration of the cement. Different cements also require different H_2O addns. to develop the optimum properties. These two amts. should be detd. separately to obtain the best conditions, but in practice still further addns. of H_2O are necessary to improve workability. B. C. P. A.

The bleeding of portland cement paste mortar and concrete. T. C. Powers. *J. Am. Concrete Inst.* **10**, No. 6, Proc. **35**, 593–608(1939).—A method is given for measuring bleeding which is treated as if it were subsidence or

sedimentation. The study shows that the adsorption and the immobile water factors open a new field of study as to the influence of salts on the bleeding characteristics. Air bubbles stabilized during the mixing period by certain foaming agents are very effective in reducing the rate and amt. of bleeding. Certain types of sealing are explained in terms of bleeding and the utility of delayed finishing is proved. A. W. King

The binding properties of compounds of the calcium aluminate and calcium silicate types. II. Binding properties of calcium chromites. V. F. Zhuravlev. *Trudy LKKhTI* **1939**, No. 7, 211–16; *Khim. Referat. Zhur.* **2**, No. 5, 90(1939); cf. *C. A.* **33**, 6017[1].—Mixts. of CaO and Cr_2O_3 in the ratios 1:1, 2:1, 3:1 and 4:1 were fired at 1350° for 2 hrs. in an elec. furnace and then rapidly cooled. Homogeneous products were obtained only from mixts. 1:1 and 3:1; this indicates the existence of only 2 binary compds., $CaO.Cr_2O_3$ and $3CaO.Cr_2O_3$. The $CaO.Cr_2O_3$ samples showed no binding properties while definite binding properties were observed in the $3CaO.Cr_2O_3$ samples. W. R. Henn

Sealing the lagoon lining at Treasure Island with salt. Charles H. Lee. *Proc. Am. Soc. Civil Engrs.* **66**, 247–63 (1940).—The clay lining was sealed successfully by salt water treatment (sea water), thus deflocculating the clay. The initial seepage in a test pool was 1.00 in. per day. This was reduced to 0.1 in. per day by the salt water treatment. The fresh water, used subsequently in the lagoon, did not increase in salinity. This method of sealing would appear to have a wide field of usefulness in constructing impervious membranes for water-works structures. W. D. Hatfield

Tests of concrete curing materials. F. H. Jackson and W. F. Kellermann. *J. Am. Concrete Inst.* **10**, No. 6, Proc. **35**, 481–500(1939).—Extensive tests involving the use of burlap, $CaCl_2$, Na silicate, 6 waterproof papers, mats, an asphalt emulsion, a cut-back, a lacquer-like liquid and a rubber-latex emulsion showed that the important factor in developing an adequately cured concrete is the continuous presence of enough water within the concrete to effect optimum hydration and crystn. Intermittent sprinkling is far from being as effective as concrete continuously satd. with water. A. W. King

Factors affecting the resistance to freezing and thawing of vibrated concrete made of crushed dolomite. M. O. Withey. *J. Am. Concrete Inst.* **10**, No. 6, Proc. **35**, 553–60(1939).—Flexure tests of 100 concrete prisms 6 in. by 6 in. by 18 in. subjected up to 150 freezing-thawing cycles show that very little damage is suffered by concrete with 0.54 water-cement ratio (6.1 gal. of H_2O per sack of cement), 0.25 in. slump and 4.75 sacks of cement per cu yd. Leaner mixes and wetter mixes with higher cement content are less durable. The flexural test is far more sensitive than any other used in this study for measuring the resistance to freezing and thawing. A. W. King

What components of sea water damage concrete? F. W. Freise. *Concrete Constr. Eng.* **33**, No. 11, 535–40 (1938); *Bldg. Sci. Abstracts* **11**, No. 12, 408–9(1938). Concrete specimens (1 2:4 mixture) were matured for 90 days and submitted to the action of salt solns. prepd. in the concns. found along the south coast of the State of Rio. Filtered rain water or distd. water was used with the salts, such as Na, K and Mg chlorides and $MgSO_4$ and raw salt manufd. locally. The raw salt contd. 93.5% NaCl, 1.1 to 1.35% $MgCl_2$, 0.07 to 0.12% $MgSO_4$ and 0.01 to 0.012% $CaSO_4$. The concrete specimens were kept in the solns. for 2 years, one series at the uniform temp. of 22° in a cellar, another at the open-air temps. varying from 15.8° to 42.2° under a dust-free shed. Evapn. was counteracted by the periodic addn. of the same kind of water in accordance with the results of titrimetric analyses made of the contents of the vessels. Some of the specimens were kept at rest, others were rotated slowly around a horizontal axis. The final wt. of the specimens after immersion was obtained by washing in warm water and drying to the moisture contents verified before beginning the expt. The wash water was analyzed. The results obtained are tabulated. The aggressive effect of the "common" salts present in sea water is practically nil, whether the salts be single or mixed to the oceanic concn. The slightly greater deterioration of the specimens kept in rain-water solns. is noteworthy. A parallel series of expts. was carried out on identical specimens exposed to natural sea water; the sp. gr., and compn., showing the amts. of both common and rarer components, are given. The results obtained are tabulated, and compared with those above. The damaging agents are the rarer components and the damaging action after a certain time becomes smaller and finally ceases. The latter effect is not due to the formation of a protective cover on the exposed surface but to the disappearance of some ingredient previously present in the sea water. To det. the effect of the rarer components several grades of mother lyes from the crystn. of "raw salt" were prepd., wherein concrete specimens made and cured as before were exposed for 2 years. No appreciable damage was noticed. Thus no ingredient in the mother lye is responsible for any damage to concrete. A typical lye used lacks a certain no. of constituents present in the sea water, namely, $CaCO_3$, NH_4HCO_3, NH_4 phosphate, SiO_2, Fe oxide and org. matter. When the last is subjected to an increase of salinity it decays; the dead matter reduces Fe oxide and the H_2CO_3 present in excess dissolves the FeO as bicarbonate of iron. This is deposited at the bottom of the salt bed as hydrate of Fe_2O_3, owing to the action of atm. O. In the same sequence of transformations the existing SiO_2, the traces of phosphates, and the greater part of the $CaCO_3$ are deposited in the bottom. Every missing ion is thus accounted for, with the sole exception of the NH_4HCO_3 present in the original sea water to the extent of 0.013 g./l. which seems to have totally disappeared. An NH_4HCO_3 complex is intimately connected with animal life in the ocean which builds a protective shell, and clams, for example, produce liberal quantities of this compd. The production increases with the growth of the mollusc, and amounts to many times the weight of the latter. By yet unknown forms of combination the complex is tenaciously secured in the water, but easily freed from it when the water salinity surpasses the grade proper for animal life. Wave movements or breaking surf have no influence on the complex. The damaging effect of sea water on concrete can therefore be traced exclusively to the presence of NH_4HCO_3 complex and as a proof thereof an expt. was undertaken in a wooden tank stocked with clams which were to live on the sea water filling the tank. Although the org. matter in the clams did not increase appreciably owing to the scarceness of food, $(NH_4)_2CO_3$ was liberally produced to increase their shells. Specimens, not directly in contact with the clams, began to show signs of damage after 10 weeks' suspension in the water; a cover of slime developed on all surfaces, and after 40 to 42 weeks a layer 0.01 in. thick could be removed easily by agitating the surrounding water. The slime is a carbonate of lime, that is, a substituted carbonate in which the radical NH_2 is present; the amt. of Ca is from 8 to 8.8%. The slightest currents on the open water are sufficient to bring the substance into the reach of the molluscs, by which it is readily assimilable for shell-building purposes, while diffusion brings the NH_4HCO_3 complex into contact with lime-yielding material. The action on concrete is strictly proportional to the amt. of this substance in the water, where it plays a merely transitory part. Losses of wt. in slabs in sea water with varying amts. of $(NH_4)_2CO_3$ complex at 3, 6, 12 and 24 months are recorded. Expts. with any com. NH_4 carbonates are quite neg., because the specific constitution of the substance produced by the clams cannot be reproduced artificially. Chem. damage to concrete from sea water is connected with a component intimately assocd. with molluscs. Remedies against the damage must be based on the removal of living molluscs from the neighborhood of immersed concrete by frequent dredging along the water front to remove the mollusc colonies, by using stone blocks rich in Fe granites rich in magnetite, and (or) pyrites because the sea water dissolves enough Fe to keep the molluscs away or by introducing fresh water

at the temp. of the surroundings or heated to between 60° and 80°. C. L. B. 1

Durability of concrete pavement—experiences in New York State. E. C. Lawton. *J. Am. Concrete Inst.* **10**, No. 6, Proc. **35**, 561–78(1939).—Case histories beginning in 1925 together with 50 odd exptl. projects have led to standard construction employing 1 bag of natural cement to 6 bags of portland cement in all pavement mixes, a tricalcium aluminate limit of 9% and a tricalcium silicate limit of 55%. A. W. King 2

Blast-furnace slag, road tar and tar macadam. P. Herrmann. *Asphalt Teer Strassenbautech.* **39**, 619–21 (1939).—A description of prepn. and uses of slag and tar for road building. F. W. Jung

Properties of binders and their adhesivity to road-construction stone. H. Suida, O. Jekel and K. Haller. *Asphalt Teer Strassenbautech.* **39**, 253–8, 267–72, 283–6, 295–300(1939).—The relation of increased addns. of C_6H_6-insol. to mixing time; the penetration, softening temp., drop point of Mexican and Rumanian asphalt and petroleum pitch to filler addns.; action of pH of water on adhesivity of binder films to stone; and adhesivity in still and flowing water have been investigated. From the adhesivity tests it is concluded: Properties of a binder are influenced little by finely pulverized filler if a high degree of dispersion is attained. A dispersible filler as free C or "hard asphalt" when added to tar or bitumen in the absence of air and evapn. will reach stability in properties. Free C will elevate viscosity in nearly geometric relation to the amt. added. Effects also vary with origin and method of prepn. and can alter the viscosity-temp. relation favorably. Adhesivity of tar to stone in presence of H_2O is improved proportionally by added free C; that of binder films depends largely upon properties of binder and stone, and pH of the H_2O, the last becoming more important as desirable properties of the binder and stone diminish. The pH of the H_2O influences the limiting surface tension between binder and stone surfaces. Soln pressure of stone at const. pH has little or no effect on adhesivity of binder film; influence is seen when pH is altered through soln. processes. Asphalt and tar generally behave similarly toward the same stone but the same binder will adhere differently to different stones. Each binder-stone combination has its characteristic degree of adhesivity-pH dependence; this is shown in min. adhesivity at or near neutralty or in a decrease with rising pH. Binders unlike stone do not alter H_2O pH at or near neutrality. Within the practical range pH 5.8–8 this dependence may be pronounced; for tests pH 6–7 should be maintained. Natural conditions call for little water in the tests, usual pH range, and tests in slowly flowing water at const. pH. Repeated colorimetric tests during tests are recommended. F. W. Jung 3 4 5 6 7

Bituminous emulsions. E. Vellinger. *Bull. assoc. franç. techniciens pétrole* No. **46**, 149–65(1938).—Bituminous emulsions of the proper viscosity for *road-building* can be obtained by increasing the bitumen content of the emulsion, by adding stearic acid pitch to the emulsion in addn. to the emulsifying agent, or better by adding sulfonic acid extd. from refinery acid residues. Stearic acid partially inverts the emulsion, i. e., disperses part of the water in the bitumen, but produces a highly thixotropic emulsion with a very high temp. coeff. Emulsions contg. sulfonic acids are not thixotropic and possess a satisfactory temp. coeff. The formula of Einstein is useless in explaining the viscosity of emulsions. It is necessary to consider the interface. To explain adherence V. admits the theory of the interfacial binder, i. e., for one substance to adhere to another, the presence of another intermediate substance having an affinity for both is necessary. This binder may be an adhesiphore, i. e., a unimol. layer of a substance having an affinity for both the bitumen and the coarse gravel to which it is to be bound. The adhesiphore thus acts as a wetting agent. Justification of this theory is explained. It is impossible to predict the constitution which an adhesiphore must possess. The following are also explained: the effect of the size of the bitumen particle on the emulsion, the stability of the bituminous emulsion as a function of the pH of the aq. phase, breaking of the emulsion, viscosity, and storage stability of the emulsion. E. J. Mahler 8 9

Further studies in the acid resinification of molasses. Results of tests of molasses tar according to the British Standard specification. Road tests on the construction of molasses road without premetalling. H. D. Sen. *J. Sci. Tech., India* **4**, 65–72(1938); cf. *C. A.* **32**, 8735⁴.—Improvements effected in the process of resinification of molasses with a mixt. of coal tar and asphalt consist of dehydration of molasses to 135°, acidification of dehydrated molasses until the soly. is a min., and resinification with coal tar and asphalt in the presence of acid. Samples of road compn. from molasses of varying consistencies by acid resinification very nearly conform to specifications for road tar from coal tar and petroleum products. Molasses tar macadam roads constructed on hard soils without metalled foundation were satisfactory except under heavy loads. Hard granite stone chips gave the best sustaining power. A. J. Stirton

New wood-impregnating agents. C. Humperdinck. *Arbeitsschutz* **1939**, No. 1, 44–5; *Chimie & industrie* **42**, 271.—A brief discussion of the dangers of intoxication by arsenicals, dinitrophenol, $K_2Cr_2O_7$ and F compds., and of the precautions which should be taken to avoid or minimize them. A. Papineau-Couture

Termite damage: Preventives and remedies. W. J. Baerg. *Arkansas Agr. Expt. Sta., Bull.* **385**, 3–27(1940).—Soil insecticides for the extermination of termites are still in the exptl. stage. Coal-tar creosote mixed with petroleum oil and *o*-dichlorobenzene are recommended as temporarily effective. Lumber treated with coal-tar creosote or $ZnCl_2$ is termite-resistant under some conditions. Termite shields of galvanized sheet Fe or Cu, if properly made and installed, will prevent termites from entering a building. C. R. Fellers

Preservation of timber by the steeping process. R. M. Witka. *U. S. Forest Products Lab.*, Mimeographed Rept. **R621**(1939).—Treatment of wood by long soaking in water solns. of preservative salts in open tanks is described. C. E. Curran

Studies of the osmose process of wood preservation with the use of the disk method. H. Wicht and Bruno Schulze. *Holz Roh u. Werkstoff* **2**, 384–6(1939).—Tests of treated disks show that green wood is more readily treated when colloid pastes are used than with steeping, so that the treating time may be shortened. R. H. Baechler

The preservative treatment of fire-killed mountain ash (E. regnans) and alpine ash (E. gigantea). J. E. Cummins and R. F. Turnbull. *J. Council Sci. Ind. Research* **12**, 294–302(1939).—Details are given of the causes of deterioration of fire-killed timber from a study of two areas contg. mountain ash killed in the 1926 and 1932 fires, and of the conditions favoring the degradation from phys. causes, pin-hole borers and decay. Recommendations are made for the preservative treatment of the felled timber, including end painting of the logs with a mixt. of 8 parts of petroleum jelly and 9 parts of creosote, removal of bark, spraying with creosote, piling for storage either in the open or under cover or by immersion in shallow fresh water. Alfred L. Kammerer

Exposure tests on plywood. Don Brouse. *Mech. Eng.* **60**, 852–6(1938); cf. *C. A.* **32**, 5103⁶.—Joints made with different artificial-resin glues have satisfactorily withstood four years of exposure to severe test conditions. The glues did not appear to soften or hydrolyze on continuous soaking in H_2O, and the joints were unaffected by molds although the presence of the mold-resistant glue line did not protect the wood itself from the action of wood-destroying fungi. After four years of soaking and drying, the specimens still developed a high percentage of wood failure in test. The one vinyl ester included was sufficiently resistant to hydrolysis and mold attack, but lacked the strength required to withstand stresses caused by repeated wetting and drying. Results of previous expts. with older wood-working glues were confirmed, viz., that blood blue contg. pure paraformaldehyde was sufficiently resistant to molds and hydrolysis, but lacked

the strength to withstand indefinitely the mech. stresses set up by repeated wetting and drying, and that casein glues were readily subject to failure from hydrolysis, mold action and mech. stresses when the glue was softened by absorption of H_2O. B. C. P. A.

Proposal for revision of specification for refractories of cement rotary kilns (Committee on Special Refractories) 19. Expts. on protection of wood against fire by use of asbestos cement (Drögsler) 24. Simultaneous production of alumina cement and pig iron in blast furnace (U. S. pat. 2,184,318) 9.

Hoepfner, K. A.: Stand und Aufgaben der Forschung im Teerstrassenbau unter Zusammenwirken von Wissenschaft, Behörden, Industrie und Unternehmertum. Berlin: Allgemeiner Industrie-Verlag Knorre und Co. 38 pp. Reviewed in *Chimie & industrie* **43**, 136(1940).

Cement. Soc. anon. des ciments de Thieu and Leon Blondiau. Brit. 508,736, July 5, 1939. Addn. to 437,855 (*C. A.* **30**, 1971[4]). Cements, particularly slag cement, are obtained in which the constituents of the cement are mixed or ground with gypsum that has been calcined in a slightly reducing atm. at 900–1200°. When rock gypsum is used, the reaction can be made slightly reducing by addn. of 0.5–1% of coal. A rotary tubular kiln is particularly suitable for the calcination of the gypsum and a short period of calcination, e. g., 5–15 min., is preferable to avoid decompn. of the $CaSO_4$. Cf. *C. A.* **32**, 8738[8].

Apparatus for cooling cement clinker, lime, etc. Johan S. Fasting. Brit. 508,500, June 30, 1939. The hot material is supplied to 1 end of, and is distributed from there over the whole length of the mouth of, at least 1 elongated shaft down which it moves under the influence of gravity, and in which at least 1 wall of each shaft is air-permeable, and air is forced through the wall and into the material to cool it. The shafts may be vertical or inclined. The app. may form part of a rotary-kiln plant.

Solidifying and compacting sand, soil, etc. Tiefbau- und Kaltemdustrie-Akt.-Ges. vorm. Gebhardt & Koenig and Hugo Joosten. Ger. 684,769, Dec. 5, 1939 (Cl. 84*c*. 6). A labile ammonia-contg. SiO_2 soln. and a gas that will expel the ammonia from this soln., as air or CO_2 or a mixt. of these, is injected into the mass to be solidified either during or after the introduction of SiO_2 soln.

Road construction. Allison R. Chambers. U. S. 2,183,253, Dec. 12. On a sub-base comprising the subsoil and a water-sol. electrolyte such as NaCl incorporated with it, there is placed a waterproof coating such as tar or asphalt to retain the electrolyte in the sub-base, and a wearing course is placed over this waterproof coating.

Paving. Vincent V. Malcom (to Philip Carey Mfg. Co.). U. S. 2,184,148, Dec. 19. Sections of pavement such as concrete are spaced apart and recesses are provided in adjacent section ends. Compressible material such as cork in granules is used to fill the space between the ends of the sections below the recesses, and waterproofing filling material such as asphalt is poured in place to fill the recesses and remaining space between the sections.

Markings on highway surfaces. James D. French (5% to Vernon Lowrey and John M. Mason). U. S. 2,184,192, Dec. 26. Stripes or the like are formed on the surface of highways by treating a portion of the surface, after laying and while still plastic, with a coloring material comprising an oxide of Fe.

Flooring or pavement comprising rubber. Charles W. Leguillon (to B. F. Goodrich Co.). U. S. 2,184,146, Dec. 19. Paving is formed comprising a pressed body of resilient, slightly flowable, self-healing, permanently unvulcanized rubber compn. contg. a comminuted material, a rigid frame member enclosing the compn., and an open-work metallic reinforcement embedded in the compn. and unattached to the frame member, the frame member having inwardly projecting means overlying the margins of the reinforcement limiting upward movement of the margins.

Forming shingles of laminations of fiber-portland cement composition. John W. Ledeboer (to Keasbey & Mattison Co.). U. S. 2,183,965, Dec. 19. Various mfg details.

Gypsum plasters. National Gypsum Co. Brit. 508,433, June 30, 1939. A set stabilized plaster comprises calcined gypsum, a suitable retarder and inter cake of $NaHSO_4$ in quantity sufficient to stabilize the time of setting when the plaster is gaged with H_2O.

Heat insulation for use in building construction. Richard L. Parish. U. S. 2,183,406, Dec. 12. Sheet units for walls and ceilings are coated on at least one surface with terneplate and on the opposite surface are provided with a closely adherent coating highly reflective to infrared radiation such as bronze, Al or gold leaf. Various structural details are described.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

Motor fuels over the world. Gustav Egloff. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 103–13(1939).—A review of the technology of modern motor fuels. The use of alc. as a substitute for gasoline was declared economically and mechanically troublesome. NH_3, H_2, C_2H_2 and coal dust were also considered as motor fuels.
J. H. Reedy

Native liquid motor fuels. Erik Hägglund. *Svensk Papperstidn.* **42**, 488–90(1939).—Benzine and motor alc. (from waste sulfite liquor) are compared as to prepn., and use as motor fuels separately and in mixts. with each other. Wilhelm Segerblom

Relation of Diesel fuel properties to their engine performance. W. S. Mount and G. A. Hope. *S. A. E. Journal* **46**, 100–5, 136T(1940).—Performance tests of 12 Diesel fuels of 20–80 cetane no. under a variety of operating conditions were made. Only slight gain is obtained from use of cetane nos. higher than needed to prevent misfiring.
H. A. Beatty

Vegetable oils as Diesel motor fuel. B. Ilev. *Ann. univ. Sofia, V. Faculté agron. sylvicult.*, Livre **1**, 15, 146–84(1937); *Chem. Zentr.* **1938, II**, 3494.—Tests made with sunflower oil and castor oil as fuels in a one-cylinder Diesel motor (Wichterle Kovarik, Czechoslovakia) are reported. The fuel consumption was about the same for sunflower oil as for petroleum fuels. The motor could not be started with a hand crank. Either a petroleum fuel or a mixt. of the sunflower oil and such fuel must be used to start the motor. Since sunflower oil belongs to the semi-drying oils, it is necessary to introduce a mineral oil fuel again before shutting off the motor. A slight addn. of alc. (3–5%) also has a beneficial effect. Castor oil was tested only in mixts. with alc. For such mixts. the fuel consumption was greater than that for sunflower oil. No essential change in the fuel consumption resulted from increasing the alc. content from 5 to 30%. The annual production of sunflower oil is 190 kg./ha.; that of castor oil 400–500 kg./ha. of field area. M. G. Moore

The use of selective solvents for improving the quality of lignite motor fuels for use in Diesel motors. M. Marder. *Mitt. Ges. Brankohlen- u. Mineralolforsch. Tech Hochschule Berlin* No. **12**, 46–8(1936); *Chem. Zentr.* **1938, I**, 4559.—Oils of excellent quality are obtained by the treatment of lignite tar oils with selective solvents. With Diesel motor fuels especially, ease of starting (the motor), stability during storage, odor and color are improved. Through the removal of resinous and asphaltic compds. as well as corrosive S and O compds. in the ext., the corrosive action of the fuel and the tendency to carbonize are reduced. The efficiency of phenol, alc., furfural,

liquid SO_2, benzene, nitrobenzene, cresol, pentane, acetone, crotonaldehyde and Chlorex as selective solvents for the refining of lignite tar oils was tested. The improvement in quality was measured by a comparison of analytical data and data from motor operation for the original oils with the same data for the refined product. By altering the amts. of the solvents used, oils of the desired quality and properties can be obtained. M. G. Moore

Gas as a [motor] fuel. J. S. Clarke. *Automobile Engr.* **30**, 8–10(1940).—An exptl. spark-ignition engine run on city gas at 1.5 : 1 compression ratio compared favorably with Diesel engines in economy and power developed. A. O. Allen

Liquid ammonia as a substitute motor fuel. G. Benoist. *Rev. carburants franç.* **1**, 349–54(1938).—H obtained by decompn. of liquid NH_3 by means of a special catalyst is used with gaseous NH_3 and employed as a motor fuel. The fuel wt. carried, including tank, is 1.3 lb./h. p.-hr. as compared with 0.65 lb./h. p.-hr. for gasoline. B. C. P. A.

Composition of Italian bituminous rocks and their utilization for production of liquid fuels. F. Roma. *Il Calore* **10**, 265–86(1937).—Italy's oil-shale resources are reviewed. A new oven designed by the author for extg. oil from bituminous rocks is diagrammatically described. A stream of gas heated to 500° is continuously circulated past the heated material in the oven and the extd. oil is condensed. The following yields per ton were obtained by treating Abruzzo rock contg. 11.7% of bitumen: oil extn. 80%, residual combustible material 0.9%, heat consumption 130,000 kg.-cal., current consumption 10.8 kw. B. C. P. A.

Calculation of heat of combustion of solid and liquid fuels from calorific values of their constituents. R. Michel. *Feuerungstech.* **26**, 273–8(1938).—The heat of combustion of C atoms in compds. is less than that of C in the free state. A method of calcn. is developed whereby the calorific value of the constituents of an org. substance can be deduced from its ultimate analysis. The method is applied to the calcn. of the calorific value of the C atom in coal. The energy of the C atom not combined with O in bituminous and brown coals is greater than the heat of combustion of elementary C in the solid phase. There is no universal formula for calcg. the heat of combustion of all qualities of coal. The appropriate formula is detd. for C calorific values from 95 to 100 kg.-cal., and a nomogram is given for constructing corresponding formulas for other pertinent calorific values. B. C. P. A.

Failure of the producer-gas vehicle on the continent. Ernest W. Steinitz. *Petroleum Times* **42**, 485–6(1939).—If charcoal is used for fuel for the producer-gas generator and if by means of a steam generator the gas is enriched with H_2, its calorific value is still no more than 130–138 B. t. u. per cu. ft. The starting operation is complicated and difficult; and a truck cannot be driven with the accelerator pedal alone because the compn. of the gas is constantly changing with engine speed and load. Operation with anthracite, low-temp. coke or, especially, lignite coke is still more troublesome. Emma E. Crandal

Some chemical changes in coal samples during storage. O. W. Rees and M. L. Kalinowski. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 120–1(1939).—Samples of coal stored 4½ yrs. at 30 32°F. showed an av. loss in B. t. us. of 2.29% and a gain in sulfate S of 330%. The loss in fuel value during storage seems to decrease as the ratio of fixed C to volatile matter increases. J. H. Reedy

A formula for calculating the calorific value of Japanese coals. Takasi Arai. *J. Japan. Ceram. Assoc.* **47**, 343–6(1939).—The calorific power Q is calcd. approx. from $Q = F[100 - (A + M)]$, where A and M are percentages of ash and moisture, resp., in the coal and F is a variable factor. For bituminous coal whose fuel ratio or fixed carbon/volatile matter is 1 to 4, when moisture content of coal is 0 to 2%, 2 to 4%, and 4 to 6%, F is 89 − 2.5 M, 88–2.0 M, and 86–1.5 M, resp. For brown coal whose fuel ratio is less than 1, when moisture content is 0 to 4% and 4 to 6%, F is 87–2.0 M and 81–1.5 M, resp. The calcd. values agree within 5% of those obtained by Mahler's bomb calorimeter. S. Kondo

Coal-washing processes employing suspensions of dense media. Henry Verdinne. *Colliery Guardian* **159**, 667–70, 711–15, 747–50, 787–8(1939).—In these processes the raw coal is divided up in accordance with the sp. gr. without the help of dynamic means. In general, a bath of one shape or another is employed which is equipped with the necessary handling gear for removing the 2 or 3 sepd. products. The suspensions used in coal washing are composed of a liquid suspending medium (as water) and of a finely divided solid which does not react with the liquid. An essential characteristic of the system is that it possesses stability. If the solids are ground sufficiently finely the suspension becomes more or less stable and remains so for some time. This has the practical drawback that after use the recovery of the suspension is very slow and costly. For this reason it is generally preferable to use more coarsely divided medium and to resort to some other method to obtain the desired degree of stability. In the Chance process particles of sand (0.2 to 0.5 mm.) are kept in suspension by means of an upward current, which in practice is augmented by the action of a system of slowly rotating paddles. In the de Vooys process which employs barites the diam. of the particles is approx. 0.05 mm. The stability of the suspension is effected by the addn. of a protective colloid, in this case clay. The presence of the colloid increases the viscosity of the suspension and slows down the sepn. of the constituent particles of the raw coal. In practice it is necessary to control both the viscosity and d. of the suspension between fairly narrow limits; this is done by limiting the percentage of solid material in the suspension and by heating the medium to about 35°. The Loess washing method developed at the Dutch State Mines resembles the de Vooys process because clay is present in the natural material; the particles are about 0.5 mm. in size; this suspension has a uniform d. which is maintained without the use of upward currents. The suspensions in all 3 of the above processes have a uniform d. from top to bottom of the bath. The Tromp process employs a suspension of magnetite (sp. gr. 4–8) which is ground to pass 0.1 mm. The suspension is not stable and no attempt is made to prevent the natural sedimentation of the particles of magnetite, the d. increasing from top to bottom of the bath. The d. selected for the sepn. between the clean coal and the middlings on the one hand, and between the middlings and the shale on the other are maintained at const. values by the return and remixing of the heavy medium withdrawn from the bath at various levels. I. Hartmann

Specific-gravity coal washing with special reference to the Tromp process. C. W. H. Holmes. *Colliery Guardian* **159**, 861–4, 899–902(1939).—The sp.-gr. processes can be divided into those that employ a high-density liquid and those in which a suspension of heavy, finely divided material in water is employed. This paper is concerned only with latter processes. The suspensions that can be used are grouped into stable and unstable types. Stability can be obtained in the following ways: (1) by the selection of a solid medium which is naturally stable over a useful range of sp. gr. (as in the Loess and Wuench processes); (2) by means of rising currents (Chance process); (3) by mech. agitation; (4) by the addn. of some stabilizing agent that will procure the desired stability without at the same time raising the viscosity to such an extent as to prohibit its use (clay in the de Vooys process). The Tromp process is the only one that purposely employs an unstable suspension; the solid media that have been used are magnetite and burnt pyrites, chiefly the former. The instability of the medium must be controlled and the initial control consists in first deciding on the approx. densities that are required at the top and bottom layers of the suspension, and prepg. the magnetite by regulating the grinding time for each batch of raw material to give the necessary degree of fineness that will in turn give the required rate of settlement. In this process the raw coal is fed to a bath and falls beneath the surface of the suspension, the clean coal floats up to the

surface and is continuously removed by a scraper over an inclined slot screen; the refuse sinks through the suspension and is extd. through a drain. Particles of intermediate d. are continuously moved across the bath by means of slow horizontal currents of suspension and are finally extd. with another scraper, together with a certain amt. of suspension. The circulation of the streams of heavy medium is effected by means of air lifts, and arrangements are made for mixing the circulations to obtain the desired densities at various levels. The process is claimed to have the following advantages over the use of jigs: higher yield of washed coal for an equiv. ash content; ash content of washed product is more uniform; increased yield of screened sizes owing to decreased breakage during washing; absence of degradation. I. Hartmann

Preparation of humic acids from Illinois coals. G. R. Yohe and C. A. Harman. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 134–6(1939). Humic acids were prepd. from the banded ingredients (durain, clarain and vitrain) of Illinois coal by dry-air oxidation at 150° for 3 weeks. The humic acids were extd. by 5% NaOH and repptd. by HCl. They were also prepd. by bubbling air through an NaOH suspension of coal at about 95°, and repptg. as before. The dry-air oxidation gave better yields, was more convenient, and the results were more reproducible. Vitrain (obtained by a float-sink separation) can be converted almost completely into humic acid (yields of 96%), while durain and clarain (prepd. by hand picking at the mine) gave yields of 60–80%. J. H. Reedy

Pyrite from bituminous German coal. F. Kolbe. *Brennstoff-Chem.* **19**, 373(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 276. By a suitable modification of the washing process (described), which however, requires considerable space and much water, slimes contg. up to 85% pyrite are obtained. A dry method involving wind-sifting, and electrostatic and magnetic methods also deserve consideration. C. A. Silberrad

The influence of benzene-pressure-soluble bitumens on the carbonization and gasification behavior of bituminous coal. Otto Rossow. *Braunkohlenarch.* No. **51**, 3–32 (1939).—Extn. app. is shown and procedure described wherein a series of 5 coking (*A*), 3 gas (*B*), and 4 free-burning (*C*) coals were repeatedly extd. with C_6H_6 by the method of Fischer. Cokes prepd. from extd. coals, unlike those made from the original coals, could not be classified according to properties which differed little. Examn. of gas fractions obtained in the gasification test of Dolch showed that the original coals yielded more gas to 550°, contg. more hydrocarbons, more CH_4, of higher calorific value and total gas B. t. u. than did the same fractions from the extd. coals. The 550–1100° fractions likewise were larger from the original coals but the results of compn. comparisons and the influence of bitumens were not entirely clear. Less cracking is indicated by compn. of the gas from the extd. coals. With coals *A* and *B*, gas B. t. u. decreased 20%, with *C* coals 15%. Study of the bitumens extd. showed their coking residue and tar increase with decreasing volatile matter while gas increased with increasing volatile matter. Properties as fixed C and volatile matter paralleled those of the original coals; gasification balances also confirmed this. Further examn. included detn. of the solid and oily fractions, flow and drop points, all without characteristic relation to either coke, tar or gas formation. Mixts. of residual coal with added bitumen exhibited 50–60% recovery of caking and swelling properties with the *A* and *B* coals in Schroth cakability tests and in swelling tests at 700–1100°. With the *C* coals, these tests were neg. as before. Residual coals mixed with petroleum pitches and resins gave results similar to those produced by bitumens, caking and swelling increasing with increasing admixt. but not attaining the values for the original *A* and *B* coals. With *C* coals the values for swelling exceeded those of the original coals. Conclusions: Bitumens favor melting processes of the coal substance and support the hypothesis of coke formation. The principal portion of the bitumen, without regard to origin, but in its distribution in the coal together with the specific nature of the residual coal, dets. the nature of the coke formed. 29 references. F. W. J.

Viscosity of coal-ash slags. P. Nicholls and W. T. Reid. *Trans. Am. Soc. Mech. Engrs.* **62**, 141–53(1940).—Relatively few coal-ash slags have the melting characteristics of glasses; for most ash compns. there is a distinct liquidus point. Preliminary viscosity-compn. diagrams for coal-ash slags melted in air are given at temps. of 1538, 1427, 1316, and 1204°; the liquidus lines are indicated at each temp. It is suggested that when complete diagrams become available accurate predictions can be made on the effect of mixing the ash of 2 coals or of the addn. of the main constituents. The authors emphasize that predictions of the relative fusion and clinkering characteristics of coals from the cone softening temps. may give erroneous comparisons, but that the initial and fluid temps. can be some addnl. guide. I. Hartmann

Swelling behavior of brown coals. Weather stability of brown-coal briquets. Karl Fritzsche. *Braunkohlenarch.* No. **52**, 3–44(1939).—The literature is reviewed in its bearings on the problem; causes and possibilities of lessening weather instability were investigated. Lab. app. and the procedure used for the rapid detn. of stability by H_2O uptake are described. Data for briquets originating in 4 districts are presented. The effect of pretreatment of the highly swellable Upper Geiseltal brown coal with 10% HCl, H_2SO_4 and H_2SO_3, drying and steam treatment on the briquets was detd. Likewise, effects of drying, heating, and moistening were correlated with factors as time, particle size, bitumen content and position in the coal seam. Tech. app. for these treatments is described together with effects of factors encountered in industrial application. It is concluded that causes of weather stability are not in org. admixts. or bitumen content but in coal compn. which is dependent upon genesis of the coal in Ca-rich localities. 41 references. F. W. J.

How is the degree of decomposition and of processing of crude peat to be determined? S. I. Sidyakin. *Za Torfyanuyu Ind.* **1937**, No. 12, 20; *Chem. Zentr.* **1938**, I, 4257.—The degree of turbidity that remains when an aq. peat suspension is allowed to stand can be used for estg. the degree of decompn. of the peat and the extent to which it is influenced by the processes employed in working up the material. The water content and viscosity of the sediment are also of value in this connection. M. G. Moore

The gas industry in Switzerland. W. Tobler. *Schweiz. Ver. Gas- u. Wasserfach., Monats-Bull.* **19**, 217–23(1939); cf. *C. A.* **33**, 6560⁸.—A review of nearly 100 years of Swiss gas industry. B. J. C. van der Hoeven

Natural gas and petroleum in the Languedoc. V. Charrin. *J. usines gaz* **56**, 499–501(1939).—The only source of natural gas in quantities sufficient for use is in the Buisin valley (Ain). Besides these the presence of natural gas in other parts is suspected, such as in the Languedoc range. At Gabian (Herault) little hydrocarbon gas was found, but CO_2 instead, borings at Castelnau were dry down to 1000 m., likewise at Bauquinies. So far a boring at Pic Saint Loup down to 1000 m. has not shown any sign of gas or oil. B. J. C. van der Hoeven

Experiences in gas purification. W. L. Ashdown and C. K. Cornilsen. *Water Works & Sewerage* **86**, 250–2 (1939).—An Fe oxide scrubber is used to remove the H_2S. W. A. Moore

Gasification of Italian fuels by means of oxygen. G. Natta and R. Rigamonti. *Atti X° congr. intern. chim.* **4**, 312–19(1939).—The results of continuous retorting on a semi-industrial scale of coal, lignite, etc., contg. volatile matter by means of mixts. of O_2 and steam, according to a process first applied to coal poor in volatile substances, are summarized. The process in one case led to the production of a very pure water gas most suitable for chem. syntheses (methanol, higher alcs., Fischer gasoline, etc.), for conversion and for the production of H_2, and synthetic NH_3. A. H. Krappe

Autothermal conversion of water gas. I. Lavrent'ev. *J. Chem. Ind.* (U. S. S. R.) **16**, No. 9, 16–23(1939).—Equations are derived for calcg. and controlling the heat

relations of the H_2O-heating tower and the gas-satn. tower. The calcns. of Usyukin (*C. A.* **33**, 1471[8]) are criticized. H. M. Leicester

Generation of water gas and synthesis gas from brown coal, peat, and bituminous coal in the Pintsch-Hillebrand plant at the Hamburg gas works. Friedrich Stief. *Gas- u. Wasserfach* **83**, 1–6(1940).—Present German endeavors are to increase the quantity of gas by dilg. coal gas with water gas. The cheapest source of this gas is the Pintsch-Hillebrand continuous water-gas generator, using brown coal (*C. A.* **30**, 6937[8]). Improvements were made in this generator so that it has been possible to operate continuously and shut down the regular (coke) water-gas plant. One advantage of this process is the reduced content of org. S and H_2S in the gas, owing to the reforming of the carbonization products by passage through the generator fuel bed. The most important change has been to use producer gas for heating the regenerators, with the burners at the top of the regenerators. The length of time that the regenerators are used for heating the circulating gas has also been increased. Tar yields are about $^2/_3$ of that indicated by the Fischer retort test. The best fuel is brown coal, preferably in briquet form. This coal should not have too high an ash content, too low an ash m. p., and the ash should not react with the refractories. Good results were also secured with peat (*C. A.* **34**, 609[2]). Bituminous coal (high volatile) was also tested, but its low reactivity did not permit complete gasification. If certain changes in construction were made, it should be possible to use this coal but it would be necessary to use the resultant high-ash coke in gas producers. R. W. Ryan

Propane and butane as domestic fuel gases. G. Dall'Ara. *Atti X° congr. intern. chim.* **4**, 697–704(1939).—The practical and economic aspect of the use of propane and butane as domestic fuel gases is stressed, with special reference to Italian rural households. A. H. Krappe

The reaction between methane and steam. Toyoziro Ogura and Tosio Huzimura. *J. Chem. Soc. Japan* **60**, 139–48(1939); cf. *C. A.* **30**, 1542[8].—The reaction $CH_4 + 2H_2O = CO_2 + 4H_2 - 38.5$ cal. was studied with natural gas contg. CH_4 95.2, C_2H_6 1.9, CO_2 1.6, C_nH_m 0.3, air 1.0%. For this reaction a catalyst is necessary. With an effective catalyst the reaction is completed at 550–600°. $H_2O:CH_4 = 7$ to 10 is the best ratio. Ni is the best catalyst: However, if it is used alone its catalytic activity decreases at higher temp. (700°) owing to its melting. Addn. of a promotor prevents this inactivation. With Al_2O_3 as promotor, $Ni:Al_2O_3 = 1:0.025$ in mols. gives the greatest activity. Addn. of a minute amt. of alkali does not affect the catalytic activity but decreases the durability of the catalyst. Concn. of the catalyst 10%, particle size 3–4 mm., contact period 25–30 sec. are recommended. Temps. below 700° for the roasting and below 300° for the reduction give the best catalyst. A Ni-Al_2O_3-kaolin catalyst prepd. according to these observations gave good results in an expt. lasting 150 hrs. K. Shinohara

The yield of gas during coking depending on the content of volatile substances in coal and in coal mixtures. S. G. Aronov and B. I. Kustov. *Coke and Chem.* (U. S. S. R.) **1938**, No. 2, 17–20; *Khim. Referat. Zhur.* **2**, No. 5, 97 (1939).—The compn. of gas obtained from different coals varied widely The heat content of gases varied directly with the content of volatile substances in coal. The yield of gas from coals contg. 22–4% of volatile substances varied between 300 and 315 cu. m. (with a standard heating value of 4000 cal./cu. m.). An increase of the volatile substances by 1.6–3.8% caused an 8–10% increase of the yield of gas. W. R. Henn

Drying and cleaning [coke-oven] gas by refrigeration. W. Niebergall. *Z. Ver. deut. Ing.* **82**, 1423–8(1938).—Recent developments in the sepn. of H_2O and $C_{10}H_8$ by refrigeration are reviewed. B. C. P. A.

Corrosion in gas systems and consequent disturbances. Leopold Kaatz. *Gas- u. Wasserfach* **83**, 17–21(1940).—A questionnaire relative to causes of, and consequences from, corrosion was submitted to 3 large German gas companies. The compn. of the mixed coal-water gas and that of the water gas was given for each of the companies. Variations of the gas compn. during the day or month were as high as 3%. The heating value of the mixed gas was 440 to 450 B. t. u. per cu. ft. Carbonizing equipment included horizontal, inclined and vertical retorts (and ovens?), and a wide variety of coal was used. Only one company removed HCN, and none dried the gas. All of the plants used dry S purification and oil absorption for light oil recovery, except that one company had a small active C plant. The residual light oil content varied from 1 to 5 g. per 100 cu. m. and the org.-S content after oil scrubbing was 6 to 8 grains per 100 cu. ft. Difficulties were encountered with stopcocks and valves due to (1) rust, plus fatty constituents, (2) condensate and (3) gum. These difficulties were minimized by the use of special lubricants. One company had trouble with sluggish diaphragms and sticking valves in house governors, another vent-line stoppages, fouled valves and deterioration of rubber. Still another had naphthalene stoppages. Gas-meter difficulties were attributed to rust, tar, sticking of valves and condensate; provision was made for oiling valves. Corrosion was encountered with wet-drum meters. Practice in covering service pipes was reviewed. The larger part of the distribution systems were steel. Tar and gum deposits were found near the works by one company and in drips, governors and pilots by another. Naphthalene content of the gas varied from 1.2 to 5 grains per 100 cu. ft. and but little difficulty was encountered with naphthalene stoppages. Rust deposits varied in color in the 3 systems (this was due in part to cyanide content). Tar deposits generally occurred at the same point as rust, and were largely sol. in benzene. Internal asphalt coatings of mains were frequently dissolved. Internal corrosion of the mains coincided with condensate formation in both cast iron and steel mains. R. W. Ryan

The bases of dry removal of hydrogen sulfide from coal gas. H. Brückner. *Atti X° congr. intern. chim.* **4**, 289–304(1939).—Of the purification methods for the crude gas, the dry process with $Fe_2O_3.xH_2O$ is still the most widely used. Its efficiency depends on the H_2O content of the material, the reaction temp., and the structure of the hydrate. Most suitable are cryst. hydrates, especially bauxite residue. The reaction velocity of the natural hydrates is much smaller, partly owing to the effect of humic acids. A rational arrangement of the process also permits complete removal of NO compds. from the gas; thus prevents the occurrence of resinous deposits. A. H. Krappe

Clarifying gas-holder waters. J. J. O'Loughlin. *Gas Age* **84**, No. 12, 19–20(1939).—When a water-sealed water-gas holder contained some coal gas, and steam was injected into the sealing water to prevent freezing, a white, milky ppt. formed. After some time a white resinous coating appeared on the tank surfaces which were in contact with the water. This white deposit, at places 0.25 in. in thickness, was a pptd. emulsion of naphthalene. The milky condition can be successfully treated by addn. of 100 p. p. m. of neutralizing alkali, changing the pH from 6.1 to 8.9. The addn. of 830 p. p. m. of $FeCl_3.6H_2O$ (pH 2.8) and 670 p. p. m. of an alkali precipitant resulted in a final pH of 10.2. The milky material was adsorbed and settled out by the ferric ppt. During the addn. of these reagents the aq. soln. was well mixed by mech. or gas agitation. H. E. Messmore

Production of two grades of benzene by the method of fractional condensation. M. Z. Litvin and M. B. Khvat. *Coke and Chem.* (U. S. S. R.) **1938**, No. 12, 23–7; *Khim. Referat. Zhur.* **2**, No. 5, 97(1939).—Light benzene leaving the dephlegmator at 85–90° contained 94–7% of the fraction b. up to 160° and 4% of the fraction b. up to 180°. The yield of the heavy benzene was 6–18% of the wt. of the crude benzene remaining after distilling off the fraction up to 180°. The coumarone resin was of high quality, clear, of amber color and softened at 82°. It amounted to 7.5–11% of the heavy benzene. The equipment for the process is described. Refluxing produced only a slight improvement in the quality of benzene. W. R. Henn

Tentative equilibrium constants for light hydrocarbons. B. H. Sage, B. L. Hicks and W. N. Lacey. *Refiner Natural Gasoline Mfr.* **17**, 350-8(1938).—Available data relating to the equilibrium consts. of light hydrocarbons (CH_4, C_2H_6, C_3H_8, etc.) under the conditions of temp. and pressure encountered in the production of petroleum from underground reservoirs are correlated. B. C. P. A.

The determination of the carbon dioxide content of ammoniacal liquors. F. N. Astley and H. D. Greenwood. *J. Soc. Chem. Ind.* **58**, 251-2(1939).—Of a concd. gas liquor, take 25 cc. dil. to exactly 250 cc. and add 5 cc. of NH_4OH. Titrate 10 ml. of this soln. with *N* HCl to a methyl orange end point. Transfer another 10 cc. of the soln. to a 250-cc. flask contg. some distd. water, add 25 cc. of 10% $BaCl_2$ soln. while shaking, and make up to the mark. If a clear soln. does not result in 10 min. add 1 g. of NH_4Cl to accelerate coagulation of $BaCO_3$. Filter and titrate 200 cc. of the filtrate with *N* HCl. Satisfactory detns. can be carried out on liquors contg. 2 27% CO_2. R. E. Reeves

Methods of working up coal-tar pitch. L. D. Gluzman, S. M. Grigor'ev and V. N. Khavlzhnov. *Coke and Chem.* (U. S. S. R.) **7**, No. 11, 50-5(1937); *Chem. Zentr.* **1938, II**, 3492. A general review of the possibilities of recovery and use of compds. occurring in coal-tar pitch. M. G. Moore

The hydrogenation cracking of tars. V. The operation of a semitechnical-scale plant. C. M. Cawley and J. G. King. *Dept. Sci. Ind. Research* (Brit.), *Fuel Research, Tech. Paper* No. **51**, 36 pp.(1939); cf. *C. A.* **29**, 6024[2,8]; **32**, 1074[7], 9448[8]. The design, operation and control of the plant and the phys. and chem. results obtained are described. The purpose of the work was to det. whether and in what manner the results obtained in the small-scale expts. would be influenced by expansion to large-scale operation. The plant was erected for the treatment of 200 to 400 gal. of raw material per day at 200 atm. pressure or of considerably higher throughput at 400 atm. pressure. The ratio of H to tar or oil is 200-500 cu. ft. per gallon and of this about 100 cu. ft. per gallon takes part in the reaction while the remainder is recirculated. Low-temp. tar (sp. gr. 1.061 to 1.068), made in narrow brick retorts, was used for making up the various raw materials; the tar is mixed with "recycle oil." The raw material received no treatment before use except filtration and the soln. of 0.5% S in a recycle oil which was to be used alone; the presence of S was essential to obtain the full activity of the Mo catalyst. The products obtained in the plant indicate that results similar to those in the exptl. scale plants can be obtained when certain known differences in the raw materials used are taken into consideration. 10 references. I. Hartmann

Combustion of coke. M. K. Venstrem. *J. Tech. Phys.* (U. S. S. R.) **9**, 1592-603(1939). It is shown by calcn. that in the reduction zone the surface of coke is cooled down by the reaction $CO_2 + C = 2CO$; the temp. of chemically active coke may be several hundred degrees below that of the combustion gases. Water cools coke like CO_2. In another layer of coke the oxidation of CO by O_2 is the preponderant reaction. In this layer O_2 is consumed before it reaches the surface of coke, and the temp. of the gas adjacent to coke is higher than those of coke and of gases further from its surface. The gasification of coke in this layer is faster than in the reduction zone since the gases contain more CO_2 and the rate of diffusion of CO_2 to the surface of coke is higher. J. J. Bikerman

The British by-product coking industry. G. E. Foxwell. *Iron & Coal Trades Rev.* **140**, 115-16(1940).—The present economic position of the industry is examd., possible future developments in connection with by-products discussed, and closer coöperation urged between this industry and the gas industry. New oven construction during the past year is referred to and the question of modernization is treated. I. Hartmann

Development of the by-product coke oven. T. A. Long. *Iron & Coal Trades Rev.* **140**, 120, 161(1940).—Brief review of developments taking place since the by-product coke oven was introduced in Great Britain. I. Hartmann

Improved operation of oven producers. G. Alliata. *Schweiz. Ver. Gas- u. Wasserfach., Monats-Bull.* **19**, 223-4 (1939).—Regulation of the operating conditions in a built-in producer is brought about by using forced draft instead of natural draft. Variations in resistance of the firebed no longer affect the primary air vol. appreciably. B. J. C. van der Hoeven

Coal deposits of northern Hungary and Carpatho-Russia (Vitális) 8. Synthetic plastics and gas industry (Marty) 13. Measurement of temp. of producer gas (Thring) 1. Employment of distillate of coke filters for destruction of larvae of *Anopheles maculipennis* (Afanassiev) 13. App. for regulated feed of liquids, such as fuel charges for Diesel engines (U. S. pat. 2,183,875) 1. App. for pneumatic sepn. of materials such as coal and impurities (U. S. pat. 2,183,281) 1. Treatment of hydrocarbon oils and gases [distillate of gasoline boiling range] (U. S. pat. 2,184,096) 22. Sepn. of coal (U. S. pat. 2,184,594) 1.

Handbuch der Gasindustrie. Bd. III. Gasreinigung und Nebenproduktengewinnung. Edited by **Horst Brückner**. Munich: R. Oldenbourg. 635 pp. M. 48. Cf. *C. A.* **33**, 1174[9].

Fuels. I. G. Farbenindustrie A.-G. Brit. 508,482, June 30, 1939. Pulverulent fuels that do not melt or have high m. ps. are produced from oleiferous substances contg. high-boiling substances rich in H along with high-boiling asphaltic constituents poor in H (e. g., the products obtainable from coals rich in bitumen such as brown coals from central Germany, or from Brazilian or South African oil shales, by pressure hydrogenation with small amts. of H, or by extn. in known manner, or also tars, such as brown coal product tar, or asphalt-basic petroleums) by sepg. from the initial materials by treatment with selective solvents, e. g., propane, butane, pentane, hexane, the asphaltic substances and allowing oxides of N, or compds. yielding the same, e. g., HNO_3, to act on the asphaltic substances, preferably in ground state. Wax-like substances practically free from asphalt are obtained as a by-product. Treatment of the asphatic substances with the oxides of N may be conducted simultaneously with their communition in a grinding app.

Apparatus for the destructive distillation or partial carbonization of materials carbonizable at low temperatures David Kainscop. Brit. 508,782, July 3, 1939. The app. comprises a continuous oven with 2 hearths arranged 1 above the other and heated in countercurrent, the carbonizable material, which enters the oven with its natural humidity, traveling first on the upper hearth, which serves for heating and drying, and then on the lower which serves for distn., as a relatively thick layer (approx. 50 mm.) that is constantly turned over by a means comprising endless chains guided laterally and supporting cross members on which oscillate freely independent shovels, which tilt in opposite directions on the 2 hearths so that their shafts take, of their own accord, opposite inclinations on the hearths and which are completely embedded in and always rake the material that collects in heaps against the bank formed by the blades of the shovels. The steam freed from the fresh material during drying mixes with the distd. hydrocarbons to prevent decompn. of the latter.

Apparatus for carbonizing material. Humphreys & Glasgow Ltd. and Eric C. Mengel. Brit. 508,780, July 4, 1939. Divided on 506,994 (*C. A.* **34**, 2457). App. wherein heated gases are circulated through the material to effect carbonization, is provided, in a circuit through which gases leaving the vessel contg. the material pass, with a baffle box or dust catcher so situated in the off-take pipe from the carbonizing chamber that pitch and tarry vapors are not deposited and trapped therein but are left for subsequent removal in the system. A heavy tar trapping-vessel or seal pot, a condensing unit, e. g.,

primary and secondary condensers, and a cyclone separator intermediate of the baffle box or dust catcher and a gas-circulating fan, the arrangement being such that the pitch and tarry vapors are gradually eliminated, are also provided.

Hydrocarbons from carbon monoxide and hydrogen. Wilhelm Michael and Wolfgang Jaeckh (to I. G. Farbenind. A.-G.). U. S. 2,183,145, Dec. 12. Conversion is effected (suitably at a temp. of about 280-360° under 12 atm. pressure) with use of a catalyst prepd. by a thermal treatment of an Fe compd. such as pptd. Fe hydroxide at a temp. above 600° and in the presence of a reducing gas such as H but below the m. p. of the Fe compd. or that of the Fe produced in the treatment, the temp. employed being sufficiently high to effect at least partial sintering of the product. U. S. 2,183,146 relates to a like process in which the catalyst used is prepd. by heating a carbonyl compd. such as that of Fe to such a temp. above 500° as to effect decompn. and at least partial sintering.

Operations such as dewatering coal. Geo. H. Rupp and Philip M. Frantz (to Colorado Fuel and Iron Corp.). U. S. 2,183,896, Dec. 19. App. is described, and a method of sepg. particles of coal, etc., from a liquid with which they are mixed, which comprises the introduction of such a mixt. into a suspended pool confined at its sides and supported on its bottom by an inclined filtering medium, producing an ungraded settling of particles in the pool by the discharge of the liquid content through the filtering medium by subjecting the pool to differential vibratory impulses directed in opposition to the inertia of such pool at approximately 45° to the inclined bottom, compacting the settled solids on the filtering medium in ungraded condition by a continuance of such vibratory impulses, and entrapping solids, inclusive of fines, in the compacted body during its movement along the inclination of the filtering medium upwardly out of the pool induced by repetitions of the vibratory impulses.

Dehydrating lignite. Eugene P. Schoch. U. S. 2,183,924, Dec. 19. A process of dehydrating lignite comprises submerging raw lignite as obtained from a mine under a hydrocarbon oil of which a substantial fraction has distn. temps. higher than water, within a closed vessel capable of standing the resulting high vapor pressure; heating this closed vessel and its contents to a temp. above the vaporization point of the water in the lignite while allowing no substantial amt. of water vapor to escape but retaining it until a desired max. temp. is attained; then allowing any desired portion of the moisture from the lignite to be blown off while the charge is at such a high temp. and while it is still submerged under and is being heated by the oil; and draining off the remaining liquid oil from the lignite.

Treating gaseous hydrocarbon mixtures such as natural or still gases. Arthur J. L. Hutchinson (to Fluor Corp., Ltd.). U. S. 2,184,596, Dec. 26. An arrangement of app. is described, and a process which involves flowing a stream of relatively light and heavy gaseous hydrocarbons through an absorption medium to ext. therefrom hydrocarbons liquefiable at the operating temps. and pressures, distg. the mixt. to remove the absorbed hydrocarbons, condensing removed hydrocarbons, stabilizing the condensed hydrocarbons, and adding a portion of the stabilized hydrocarbons in cooled and liquid form to the hydrocarbons undergoing condensation to increase the ratio of the liquefied heavier constituents to the liquefiable lighter constituents with respect to their ratio in the absorption medium prior to distn.

Water gas. Humphreys & Glasgow Ltd. and Joseph H. Smith. Brit. 508,617, July 4, 1939. In a cyclic process wherein an ignited fuel bed is alternately blasted with air and steamed, purging of the set after blasting of the fuel bed with air is effected by first admitting steam for a very short period at the base of the generator and burning the resulting water gas and expelled blast products in the regenerator or recuperator and waste-heat boiler and thereafter, as soon as the gas leaving the generator is sufficiently low in N, steam is admitted between the generator and regenerator or recuperator so that the waste gases in the set beyond the point of steam admission are expelled to atm. by steam alone without waste of water gas. To avoid contamination of water gas left in the plant by blast gases being used to displace the water gas into the gas holder, the operating cycle is arranged so that the gas-making period is terminated by a backrun, which leaves the spaces in the plant beyond the generator filled with steam, and thereafter steam is admitted to the generator base for just so long as to displace the water gas beneath the grate, any water gas then remaining in the generator being at the commencement of the blow burned in the regenerator or recuperator to store its heat, and the displaced steam and the small quantity of products of combustion of the water gas that are left in the generator are discharged to atm. App. is described. Brit. 508,618, July 4, 1939, describes a cyclic process in which an ignited fuel bed is alternately blasted with air and steamed, the gas-making or run period comprising 2 or more short down- or back-runs sepd. from each other by an interposed up-run to reduce the temp. of the gases leaving the plant during the up-runs and to maintain the lower ash and clinker above the temp. of steam condensation.

Carbureted water gas of high British thermal unit. Leon E. Osmer and Wm. Tiddy (to Semet-Solvay Engineering Corp.). U. S. 2,183,845, Dec. 19. An arrangement of app. is described, and a process of making high B. t. u. carbureted water gas suitable for use as a substitute for natural gas in a set comprising a generator contg. a bed of fuel therein, a carburetor connected with the generator, and a superheater contg. checkerbrick and connected with the carburetor, which comprises the following steps: (*a*) blasting the fuel bed with air and burning the resultant blast gases in the carburetor and superheater to heat these chambers; (*b*) discontinuing the blasting cycle, passing steam up through the fuel bed and passing the resultant water gas into the base portion of the carburetor up therethrough, while simultaneously introducing hydrocarbon oil into the water gas to carburet the water gas, passing the mixt. of oil gas and water gas through the superheater to fix the carbureted water gas and to produce a gas of a B. t. u. content approx. equal to that of natural gas; (*c*) discontinuing the carbureted water-gas-making step and passing steam down through the fuel bed, introducing the resultant water gas into the carburetor, adding secondary air to the water gas to support combustion thereof, and burning the water gas as it passes through the carburetor and superheater to heat these chambers to a temp. suitable for effectively cracking gas oil; (*d*) discontinuing step (*c*) and passing steam down through the fuel bed, introducing the resultant water gas into the base of the carburetor, introducing gas oil into the water gas stream flowing through the carburetor and passing the resultant mixt. of oil gas and water gas through the superheater to fix the gas and to produce a carbureted water gas having a B. t. u. content approx. equal to that of natural gas, and mingling the gas thus produced with that produced in step (*b*).

Rotary-grate gas producers. Karl Koller. Brit. 508,584, July 4, 1939. These, having a rotatable ashpan provided with milling cutters and a submerged ring extending into the ashpan which carries a scraper member and a plurality of stemming shearing members, have the milling cutters arranged only at the periphery of the middle part of the ashpan bottom, which has the form of a steep surface of revolution, each cutter being provided with a vertical shield.

Apparatus suitable for the recovery of carbon dioxide from flue gases, etc., by use of an absorbing liquid. Gustave T. Reich. U. S. 2,183,943, Dec. 19. Various structural, mech. and operative details.

"Depoisoning" gases containing carbon monoxide. Franz Bössner and Carl Marischka. U. S. 2,183,301, Dec. 12. App. is described, and a continuous process for "depoisoning" gases contg. CO by converting the CO into a mixt. of CO_2 and H in the presence of steam and of ankerite, the latter being regenerated as soon as it becomes in-

active as regards the absorption of CO_2, by heating in a regeneration chamber and by being circulated between the gas-treating and regenerating chambers at a temp. of 400–800°.

Wood coke suitable for use in iron-ore reduction. Stevan Ruzicka. U. S. 2,184,317, Dec. 26. A wood coke is made consisting of a structure substantially entirely of cell walls corresponding to those of the wood from which the charcoal was made, formed of high-molecular C compds. and C and graphite, resulting from the conversion by cracking of constituents of the charcoal used in the making of the structure in a coking process, above temps. above the lowest-cracking temp. of the volatile constituents of the charcoal and at the highest temps. employed in the manuf. of artificial graphite.

Plug type coke-oven door. Louis Wilputte. U. S. 2,183,704, Dec. 19. Various structural details.

Operating end doors of horizontal coke-oven chambers. Joel S. Potter (to Louis Wilputte). U. S. 2,183,753, Dec. 19. Various details of app. and operation.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

Posterity and petroleum. A. E. Dunstan. *Bull. assoc. franç. techniciens pétrole* No. 46, 235-43(1938). E. J. Mahler

Hydrogenation of Boldesti petroleum in relation to its chemical composition. C. Cândea and J. Kuhn. *Mon. pétrole roumain* **41**, 73-6(1940).—The aim of the work was to study the effect of hydrogenation upon different groups of hydrocarbons, either alone or mixed with Boldesti kerosene. Hydrogenation was conducted in a rotating autoclave at 450° and 1 atm. for 1 hr. The kerosene alone was hydrogenated with and without MoO_3. Less unsatd. hydrocarbons formed when the catalyst was used. A com. paraffin m. 51 56° hydrogenated at 420-450° in the presence of MoS_3 showed a remarkable change in yield of gasoline fractions with temp. rise, from 14% at 420 to 71% at 450°. The gasolines contained no unsatd. and very little aromatic hydrocarbons. Naphthenic acids from a Rumanian gas oil were easily converted to simple naphthenes in presence of MoO_3, CO_2 being found in the gaseous by-products. When 20% of C_5H_{10} was added to kerosene for treatment the product contained only 2% of unsatd. hydrocarbons. It appeared that under the conditions there had been no condensations, polymerizations or other more pronounced secondary reactions. In tests upon kerosene alone, (1) without initial pressure and (2) with 60 atm. initial N_2 pressure, the yields of gasoline were the same in both. E. E. Crandal

Refining of petroleum products by solvents. III. Selectivity of acetone at different temperatures. R. Verona and C. Fostiropol. *Bul. Chim. Soc. Române Chim.* **39**, 167–83(1937-38)(in French).—See *C. A.* **33**, 8411. A. D.

Utilization of petrolum gases. A. E. Dunstan. *Bull. assoc. franç. techniciens pétrole* No. 46, 191-9(1938). The uses of petroleum gases in the following processes are briefly outlined with charts: high-temp. pyrolysis, pyrolysis for production of aromatic gasoline, pyrolysis for production of olefin hydrocarbons, olefin polymerization and combined pyrolysis and polymerization. E. J. M.

Production of petroleum resins. S. C. Fulton and A. H. Gleason. *Ind. Eng. Chem.* **32**, 304-9(1940). Two general processes are outlined for the recovery of resins from cracking-coil tar. The first method consists in sepg. the resins by the aid of distn. and a selective solvent followed by acid treatment. In the second method the tar is distd. to a pitch of low m. p., which is treated with anhyd. $AlCl_3$ under condensing and polymerizing conditions without diln. The latter treatment, besides forming addnl. resins, causes the highly dispersed asphaltenes (defined as petr.-ether insol.) to coalesce, in which form they can be readily filtered from the oily hydrocarbons. Light petroleum distillates on solvent extn. yield highly aromatic concentrates which may be condensed with formaldehyde to form useful resins. This method of production is discussed from the viewpoint of feed stocks, catalysts (H_2SO_4, H_3PO_4, $ZnCl_2$), solvents for the reaction (AcOH, etc.), aldehydes used, and resin properties. With high-boiling distillates it is more difficult to obtain light-colored resins, regardless of whether cracked or virgin distillates are the starting materials. Heavy distillates, e. g., cracked oils, tars, and tar distillates, in addn. to formaldehyde condensation, may also be resinified by chlorination and thermal dehydrochlorination, or by chlorination and condensation with metallic halides. Charts are reproduced showing the formation of resins from 10° Am. Petroleum Inst. and 3° Am. Petroleum Inst cracking-coil tar, and from the light and heavy distillates. 27 references. Edward J. Mahler

Propane precipitation of petroleum resins. P. T. Graff and H. O. Forrest. *Ind. Eng. Chem.* **32**, 294-8 (1940).—Propane pptn. of petroleum resins is used commercially to reduce the duty of clay decolorizing lubricating oil stocks. Because of the high mol. wt. and high b. p. of these resins, it has been difficult to sep. them successfully from petroleum on an industrial scale. The pptn. is carried out at moderate temps., and therefore no injury results to the natural properties of the resin components of the crude oil. The essential operations of pptg. resins by liquid propane are indicated in a flow sheet showing the proportions of propane used, settling temps., and products realized from two-stage operations on mid-continent crude residuum. The first stage removes the asphalt, the second ppts. the resin material. Properties of the asphalt, resin and treated residua are given. Color bodies, C-forming material and asphaltenes are found in the depropanizing products. In addn., high-viscosity oil fractions settle out with the resin material, the oil consisting of naphthenes and paraffins of high mol. wt. The quantity and, to some extent, the nature of the oil so included may be controlled by the temp., and propane soln. ratio, and thus a means is available of making narrow cuts of high-viscosity products. One or more addnl. stages of settling in propane soln. will further subdivide the product into oils and a resinous residue. Process diagrams are also shown for deresining a Santa Fe Springs vacuum-still distillate, a Texas crude residuum, and a dewaxed Penn. cylinder stock. Treating data and properties of the products are also included. Edward J. Mahler

Polybutenes—properties and uses in petroleum products. R. M. Thomas, J. C. Zimmer, L. B. Turner, R. Rosen and P. K. Frolich. *Ind. Eng. Chem.* **32**, 299-304 (1940).—Polybutenes are prepd. commercially by low-temp. catalytic polymerization of isobutene contg. varying amts. of the butenes. The polymers vary in appearance from viscous, clear liquids to white, tough, elastic solids. The polybutenes are classified as polymers of low, medium, or high mol. wt., and are known commercially as Vistanex Polybutene LM, MM, and HM accordingly. The various grades of the polymers can be classified according to their apparent mol. wt. as detd. by the Staudinger method (*Der. Aufbau der hochmolekularen org. Verbindungen*, *C. A.* **26**, 3513) based on the change on viscosity of a solvent to which mols. of a threadlike nature have been added. Higher polymers dissolved in heptane suffer mol. breakdown when subjected to violent shaking. A table is given showing the mol. wts. of polybutenes as detd. by the Staudinger method and by the cryoscopic method. The general properties of these substances and their use in various petroleum products, such as lubricating oils, greases, asphalt and wax, are described. At ordinary temps. the polymers are chemically inert and stable. They dissolve in liquid aliphatic hydrocarbons and in certain chlorinated hydrocarbons. A concentrate of the polymers of low mol. wt. dissolved in a light and well-

refined lubricating oil when added to mineral oils improves their viscosity index characteristics. The higher polymers, owing to their rubber-like properties, produce highly viscous solns. having a stringy consistency. They are used to impart string to grease and special oils, in which rubber was formerly employed. The effect of polybutenes on the phys. properties of asphalts of varying softening points is shown in a table contg. characteristics of such blends. Viscosity, low-temp. flexibility, sealing strength, etc., of waxes are improved by the addn. of polybutenes. E. J. Mahler

The fractionation of Turner Valley (Canada) crude oils using Stedman columns. R. M. Donald. *Can. J. Research* **18, B,** 12–29(1940).—A Sterling Pacific no. 3 crude oil (33.2 I.), Royalite Oil Co., Alberta, Canada, was sepd. into 6 fractions in a Stedman gauze-packed column (cf. *C. A.* **31,** 8259[5]) 2 ft. long and 3 in. in diam. These cuts were then carefully fractionated in a 5-ft. Stedman column 3 in. in diam. The compn. of the fractions thereby obtained, based on the b.-p. curve and on the *n* of the fractions, after removal of the aromatic constituents by carefully controlled nitration (Bruun, Leslie and Schicktanz, *C. A.* **25,** 2551) gave the following vol. percentage compns. of the crude oil boiling below 81° (the second figure represents the percentage of this constituent in a mid-continent crude oil investigated at the U. S. National Bureau of Standards (cf. Bruun and Hicks-Bruun, *C. A.* 25, 2551)): isopentane 0.38, —; pentane 0.79, —; cyclopentane 0.09, —; 2,2-dimethylbutane 0.11, —; 2,3-dimethylbutane 0.27, 0.04; 2-methylpentane 0.94, 0.09; 3-methylpentane 0.56, 0.18; hexane 2.40, 0.33; methylcyclopentane 0.82, 0.20; benzene 0.32, 0.08; cyclohexane 0.76, 0.33. The compn. of the fractions boiling above 80° has not been detd. with the same accuracy as was possible with the lower-boiling constituents, but the following is a preliminary estimate of the higher-boiling constituents in the crude oil (the second figure represents the percentage of this constituent reported in a mid-continent crude oil): dimethylcyclopentane 0.75, 0.4; 2-methylhexane 1.0, 0.3; 3-methylhexane 0.7, 0.2; heptane 1.6, 0.9; methylcyclohexane and ethylcyclohexane 0.6, 0.1; three xylenes and ethylbenzene 2.5, 3.1; nonane 0.8, 1.0; trimethylbenzenes 1.6, 0.28. The higher-boiling constituents could not be estd. with the data at hand, but the presence of decane, hendecane, the diethylbenzenes, butylbenzene, tetramethylbenzenes and *n*-, *sec*-, and *tert*-butylcyclohexanes was indicated in the fractions boiling from 174 to 200°. Ultraviolet absorption studies made on the higher-boiling fractions failed to identify completely the aromatic compds. in this range. W. Gordon Rose

Selective refining of some Rumanian mineral oils by means of nitrobenzene and phenol. I. L. Blum and N. Popescu. *Bul. Chim. Soc. Române Chim.* **39,** 153–4 (1937–38)(in German). See *C. A.* **33,** 841[6]. A. D.

Catalytic alkylation of isobutane with gaseous olefins. F. H. Blunck and D. R. Carmody. *Ind. Eng. Chem.* **32,** 328–30(1940).—At 1000 lb./sq. in. and about 400°F., isobutane reacts with gaseous olefins under the influence of double chlorides of Al and alkali metals, particularly $NaCl.AlCl_3$ and $LiCl.AlCl_3$. The alkylation reaction must compete with the polymerization reaction under these conditions, so the olefin concn. should be kept low. It would be advantageous to bleed in the olefin gradually to the paraffin, either in a static or a flow system; this was not followed in the expts. herein described. The mixt. of olefin and excess paraffin was simply passed over the catalyst. The catalyst was prepd. by heating the alkali chloride and anhyd. $AlCl_3$ to 500°F. in a sealed glass tube placed inside a sealed steel bomb, remelting the complex salt to sublime off any unchanged $AlCl_3$, and pouring the molten double salt onto an equal wt. of pumice carrier. $NH_4Cl.AlCl_3$ is somewhat less reactive than the above salts and the KCl complex is almost inactive. The alkylation reaction is accompanied by a varying but considerable amt. of polymerization in all cases, and by extensive rearrangements, which lead to the production of products with all possible nos. of C atoms in the gasoline range. The life of the catalyst is short, and the alkylation reaction declines more rapidly than the polymerization. The optimum temp. for the production of liquid hydrocarbon products is around 440°F. When the feed vol./catalyst vol./hr. exceeds 4.0 the yield falls off rapidly. Tabular results are given for the alkylation of isobutane with propylene over $LiCl.AlCl_3$, and for the alkylation of isobutane with isobutylene, propylene and ethylene over $NaCl.AlCl_3$. Edward J. Mahler

Production of high-octane gasoline in American refineries. E. Vellinger. *Bull. assoc. franç. techniciens pétrole* No. **47,** 61–85(1939).—As a member of the French official committee sent to America to study the methods of manuf. of high-octane-no. gasoline, V. reports on the following refinery operations: the Dominguez polymerization unit of Shell for the transformation of butylene to isooctane; the U. O. P. catalytic polymerization plant in which solid H_3PO_4 on a porcelain carrier is employed for the polymerization of olefins, at 175° and 40 kg. pressure; the low-pressure hydrogenation unit at Dominguez, Calif., operating at 180° and 4 kg. using a $NiNO_3$-porcelain catalyst; the high-pressure hydrogenation unit of the S. O. Co. of La. at Baton Rouge; the Shell Chem. Co. alc. and chem. plant at Dominguez; and the Socony-Vacuum plants at Marcus Hook and Paulsboro employing the Houdry cracking process. The results of the Bureau of Standards on fractionation of crude oil are commented on. Five flow diagrams are given. E. J. Mahler

Cracked gasoline as aviation fuel. E. Vellinger and G. Radulesco. *IIme Congr. mondial pétrole* **3,** Sect. 4, 820–1 (1937)(in French).—Cracked gasoline can be used as an aviation motor fuel provided proper antioxidants are incorporated therein. Certain antioxidants are active at high temps. and their period of stabilizing activity is long enough to prevent gum formation during the passage of gasoline vapors from the tank through the lines to the carburetor. Antioxidants are also useful in stored cracked gasolines and the activity may be periodically checked by means of a special app. for recording stability changes due to O absorption. E. J. Mahler

Manufacture of synthetic gasoline in Germany. A visit to the Leuna works. Michel N. Constantinescu. *Mon. pétrole roumain* **41,** 133–8(1940).—The works at Leuna producing NH_3, MeOH, gasoline and oils use air, water and lignite as raw materials. The site of the works was chosen close to lignite deposits of probably a billion and a quarter tons; and 25,000 tons of lignite is mined daily. Winkler gas producers burning lignite and coke make the CO and H_2. By liquefying the air the N_2 is sepd. from the O_2. The H_2 for the NH_3 synthesis is completely freed of the oxides of C. The lignite must have its water content reduced to 4% before it, with the catalyst, is made into a paste with a heavy oil and subjected to the action of H_2 under 200 atm. pressure. Operation is conducted first in liquid phase and then in vapor phase. Up to 97% of the lignite is converted to gasoline, gas and oil. The gasoline differs in no respect from that made from petroleum. Emma E. Crandal

Influence of antidetonation admixtures on the octane number of shale gasoline. N. V. Ershov. *J. Applied Chem.* (U. S. S. R.) **12,** 871–3 (in French, 874)(1939).—The effects of EtOH, aniline and tetraethyl lead and their mixts., on the octane no. of shale gasoline (cf. *C. A.* **34,** 611[9]) were investigated and data are plotted. Each 10% addn. of EtOH increased the octane no. approx. by 3 points, each 1% of aniline increased it by 1–3 points and 2 cc. per 1 kg. of gasoline increased the octane no. by 6 points and 3 cc. by 9 points. The greatest effect in increasing the octane no. was obtained by adding alc.-tetraethyl lead or alc.-aniline mixt. An addn. of the tetraethyl lead-aniline mixt. caused pptn. and decreased the octane no. A. A. Podgorny

New blending agents for aviation gasoline of 100 octane number. E. Hofman, M. Lapeyrouse and W. Sweeney. *IIme Congr. mondial pétrole* **3,** Sect. 4, 812–19(1937)(in English).—Recent developments in aviation gasoline addn. agents are reviewed. The properties of iso-Pr_2O as a blending agent are discussed together with actual engine tests and successful storage stability tests on fuels

contg. it. Octane blending values of mixed ethers are also tabulated. E. J. Mahler

Correlation of octane numbers with road performance. C. B. Kuss, A. J. Blackwood and G. H. B. Davis. *IIme Congr. mondial pétrole* **3**, Sect. 4, 780–9(1937)(in English).—A dual system of octane rating is proposed for gasolines, one for high-atm.-temp. performance and the other for low-temp. performance. This is necessary because the C. F. R. Motor Method, while adequate for high-atm.-temp. ratings (100–110°F.), shows a poor degree of correlation at lower temps., reaching a min. at about 40°F. Correlation test results from runs at San Bernardino, Tulsa and Detroit are reported in graphs. In these tests the av. road rating was 3.05 octane no. higher than the av. C. F. R. Motor Method values. Road ratings made at 30–50°F. correlate well with the Research Method values and the degree of correlation becomes poorer for higher temps., the av. road rating being 2.92 octane no. lower than the av. Research rating in the Tulsa tests at 100°F. On the basis of a dual rating system for high and low temps. an octane no. index for gasolines corresponding to the detn. of 2 viscosities of an oil at 2 temps. for viscosity index calcn. could be developed serving a similar purpose. E. J. Mahler

Laws regulating the oxidation of fuel mixtures in combustion motors and the possible connection with knock. M. Prettre. *IIme Congr. mondial pétrole* **3**, Sect. 4, 732–7(1937)(in French).—A close relationship exists between the spontaneous oxidation of fuel mixts. and the tendency to knock. P. contends that a quant. study of the oxidation together with a kinetic study of the process should reveal all the factors entering into the phenomenon of knock, and permit the detn. of the law governing the oxidation reaction, combustion and flame ignition. The accelerating effect of chemically inert gases, e. g., N_2 and A, on combustion and the interference of the walls of the combustion chamber should be taken into account when knock tendency is measured. 21 references. E. J. Mahler

Classification of gasolines based on knock tendency. Max Serruys. *IIme Congr. mondial pétrole* **3**, Sect. 4, 721–6(1937)(in French).—Gasolines can be classified according to their knock tendency by a known detn. and the "synthetic index," which represents the power output ratio of a certain fuel to the reference fuel. This index serves at the same time as a key to the "knock index" and the "consumption index." Knock index represents supercharging and supercompression possibilities compared with the reference fuel, and the "consumption index" is indicative of the consumption rate under the above circumstances. Practically the "synthetic index" furnishes a simple method for obtaining for each fuel representative figures for specific consumption power and rate of feed. The index value may replace to a certain extent the pressure limit of detonation in theoretical studies. E. J. Mahler

Knock ratings of gasolines and their chemical composition. E. B. Evans and F. H. Garner. *IIme Congr. mondial pétrole* **3**, Sect. 4, 753–9(1937)(in English).—A no. of gasolines of which 50% distils at 100° were prepd. from crude oils of various sources, and their phys. properties, hydrocarbon contents and octane nos. at 212°F. and 300°F. jacket temp. on the S-30 engine were detd. both before and after removal of aromatic constituents. The octane blending values of aromatic hydrocarbons and naphthenes are 115 and 51 at 212° and 106 and 45, resp., at 300°F. No similar value can be ascertained for paraffins because the normal and isoparaffins differ greatly in octane no. and cannot be differentiated by chem. analysis. If the aniline points and the octane nos of the various hydrocarbons and of the nonaromatic gasolines are plotted, the engine results indicate very clearly the approx. compns. of the nonaromatic gasolines in terms of the normal and isoparaffins and naphthenes. Thus, it is shown that Mexican and Persian gasolines contain considerable amts. of straight-chain paraffins; Miri gasoline is highly naphthenic and California gasoline, usually considered naphthenic, contains large amts. of isoparaffins. Other properties, such as d_4 and n of the aromatic residue, support these conclusions. E. J. Mahler

Supercharged knock testing. S. D. Heron and F. Gillig. *IIme Congr. mondial pétrole* **3**, Sect. 4, 769–79(1937)(in English).—Representative motor fuels were studied in a supercharged C. F. R. engine with systematically varied engine conditions to det. the sensitivity of knock measurements to supercharging. Com. isoöctane and a low-octane Michigan straight-run gasoline were employed as reference fuels. Blends of the 2 fuels were used for ratings below 100 octane no. and isoöctane plus $PbEt_4$ for antiknock values above 100. The permissible indicated mean effective pressure for the reference fuel blends increases sharply with increase of engine speed, while for benzene, toluene, methanol and its blends, and diisobutylene it decreases with increase in engine speed. This results in a pronounced effect of engine speed on the relative ratings of aromatic compds., aromatic blends, methanol, etc., in terms of the reference fuels. Increase of jacket temp. decreases the permissible boost and the indicated mean effective pressure for both the test and the reference fuels, the former being more sharply reduced. Engine speed and jacket temp. have only a slight effect on the relative ratings of diisopropyl ether and isooctane-isopentane blends. The sensitivity of detn. of octane no. increments in the range from 100 octane no. to isoöctane plus 3 cc. $PbEt_4$/gal. is much greater with supercharging than with existing test methods. The effect of high jacket temp. on increase of the charge temp. is almost directly proportional to the duration of the intake period. Supercharging in conjunction with changes in engine speed and cylinder temp. gives rise to large variations of the relative ratings of the pregnitum group of fuels in terms of the reference fuels. Latent heat of evapn. has but little effect on vol. efficiency (indicated mean effective pressure). Because of the insufficient range of present reference fuels the supercharged engine will have to be resorted to for octane measurements. E. J. Mahler

Effect of fuel richness on detonation. L. A. Peletier. *IIme Congr. mondial pétrole* **3**, Sect. 4, 744–52(1937)(in French).—Curves are given for a C. F. R. engine and for an air-cooled aircraft test engine expressing the effect of mixt. strength in terms of the allowable power output at incipient detonation. The effect of mixt. strength on the ratio of sp. heats, mixt. temp., flame speed, and on combustion wall temp. has been considered and an attempt has been made to gage the effect of these factors on knock tendency. From tests on the C. F. R. engine in which mixts. were compressed without spark until ignition occurred (to imitate the conditions of the end gas) it might be concluded that the tendency to self-ignite is a max. at a very rich mixt. ratio (about 70%). The tendency to detonate is a max. at a much leaner mixt. strength (about 5–10%). From this it may be concluded that the mixt. strength, by influencing the conditions to which the end gas is subjected, has an indirect effect on the self-ignition of this end gas, which appears to predominate over the direct effect of mixt. strength on the self-ignition tendency of the end gas as such. E. J. Mahler

Stationary gas waves in the detonation zone of gasoline motors. J. J. Broeze, H. van Driel and L. A. Peletier. *IIme Congr. mondial pétrole* **3**, Sect. 4, 727–31(1937)(in French).—Recordings were made of the combustion taking place within the cylinder head and the features accompanying it, such as pressure changes, heat evolution, vibrations and luminosity. Av. wall temp. was observed by means of temp. plugs. When detonation occurred a stationary gas wave could be observed accompanied by pressure vibrations caused by more rapid combustion of the end gas. Three different zones can be distinguished: the detonation zone, where the end gas burns rapidly; the zone of greatest pressure and vibration; and the zone in which the greatest amt. of heat is transmitted to the cylinder walls. E. J. Mahler

Detection [and determination] of lead tetraethyl in fuels. K. E. Schulze. *Chem.-Ztg.* **64**, 47(1940).—To 1–2 cg. $KClO_3$ in a test tube add about 5 cc. of gasoline to be tested, then 3–5 drops of HCl (d. 1.19). Cl formed

converts the $PbEt_4$ to $PbCl_2$, recognized by the turbidity produced in the gasoline. The method is sensitive to 1 part in 5000. After a time the $PbCl_2$ settles out of the gasoline and is redissolved in the KCl soln. formed. The method can be made quant. by pouring off the clear gasoline, neutralizing the aq. soln. with NaOH, adding $Na_2S_2O_3$, and pptg. PbS by means of H_2S. E. H. 1

The purification and separation of hydrocarbons. A. Foulon. *Teer u. Bitumen* **37**, 325–7(1939).—A brief description of several patented processes for the refining of hydrocarbons. F. W. Jung 2

Raman effect of hydrocarbons and the analysis of liquid fuels. M. V. Vol'kenshtein. *Uspekhi Khim.* **8**, 970–97 (1939).—Data are given on the Raman spectra of numerous hydrocarbons and the qual. and approx. quant. analysis of motor fuels by means of their Raman spectra are discussed for various fractions. A complete analysis is possible in solns. F. H. Rathmann 3

Polymerization of unsaturated hydrocarbons. H. I. Waterman. *Bull. assoc. franç. techniciens pétrole* No. **46**, 183–9(1938); cf. *C. A.* **32**, 4318³.—The production of hydrocarbon mixts. by polymerization of unsatd. compds. has led to methods of detg. the compn. of the resulting products. The properties of the products can be ascertained by studying the structure of the compds. contained therein. The methods advanced by W., Vlugter and van Westen, using sp. refraction and the sp. parachor, are reviewed. E. J. Mahler 4

Construction of large reservoirs for hydrocarbons. Ch. Berthelot. *Génie civil* **115**, 301–5, 322–3(1939).—The advantages of the various types of reservoirs (metallic and concrete) for storing hydrocarbons are discussed. Losses by evapn. are compared, also costs. A. N. H.

Isomorphism of paraffins. Mathieu. *Bull. assoc. franç. techniciens pétrole* No. **46**, 71–91(1938).—The relationship existing between mol. structure and chem. properties of paraffinic substances is considered an important basis for the detn. of the properties of paraffinic oil mixts. that are difficult to analyze when the components are of diverse origin. The work of Piper, Francis and Chibnall, etc., is reviewed, and it is concluded that the dissymmetry of the mols. is responsible for the properties of paraffin hydrocarbons, such as viscosity, wetting power, soly. and solvent power. Numerous graphs and diagrams are given. E. J. Mahler 5

Paraffin wax, ozocerite and ceresin—the Russian standards reviewed and criticized. I. Leo Ivanoszky. *Oil Colour Trades J.* **97**, 241, 243(1940).—The Russian standards for the wax-like solid hydrocarbons have much more the character of standards for trade in the material than of standards for their testing and evaluation. The Russian standards are given for these types of waxes. **II. Testing methods.** *Ibid.* 297–9.—Color, solidifying and drop point, penetration, sp. gr., mech. impurities, water estn., test for soly. and for absence of water and of mech. impurities, mineral acids or alkali, org. acids, saponifiable matter, flash point and ceresin content are considered. W. H. Boynton 6

New solvent dewaxing processes. P. M. Edmond Schmitz. *Bull. assoc. franç. techniciens pétrole* No. **47**, 39–59(1939).—Dewaxing processes employed since 1835 are reviewed. Diagrams are given showing the dewaxing processes employing all the known solvents. Special attention is given to propane deasphalting and deresining. Properties of a suitable solvent for the dewaxing process are outlined. 47 references. E. J. Mahler 7

Synthesis of lubricating oils. G. Hugel. *Bull. assoc. franç. techniciens pétrole* No. **46**, 57–60(1938); cf. *C. A.* **33**, 7542¹.—Besides viscosity there are other properties of synthetic lubricants that must approach those of the natural product, e. g., thermal stability, age resistance and oiliness. The reason for the poor viscosity curve of naphthenic oils is the phenomenon of mol. assocn. brought about largely by temp. If it were possible to ascertain the nature of the mol. aggregation it would be possible to modify it by changing the structure of the mols. When the problem of the viscosity index of cyclic oils is cleared up the synthesis of lubricants will be greatly advanced. E. J. M. 8

Bearing corrosion and Diesel-engine lubrication. C. J. Copley. *Southern Power and Ind.* **58**, No. 2, 58–62(1940).—Modern Diesel engines operate at higher speeds, higher temps. and higher compression ratios than in the past and as a result new bearing metals have been required. The new operating conditions tend to cause more rapid oxidation of the lubricating oil, with acid formation, and corrosion of the bearings. This has been eliminated by the use of addn. agents to the oil. Other desired characteristics of the Diesel-engine lubricating oil are also secured by compounding. A straight mineral oil is unsuited for lubricating such engines. R. W. Ryan 9

A new simple method of recovery of used lubricating oil. Syozi Hamagami. *J. Fuel Soc. Japan* **18**, 995–1000(English abstr. a83–4)(1939).—The sample (1 kg.: 0.14% of ash, 17% of petr. ether-insol. residue and 15% of residue separable by a centrifuge) was warmed to 80° and 200 cc. of 1% NaOH was added. The mixt. was stirred quietly for 10 min.; the color on the surface changed from black to transparent brown. The liquid was then allowed to stand for about 20 min. and the clarified oil was extd. by a siphon. The yield of the recovered oil was about 75%. The recovered oil was transparent reddish brown and contained practically no mineral matter; flash point 178°; viscosity (Redwood) 1030 and 297 at 30 and 25°, resp. F. I. Nakamura 10

Stability of crankcase oils. W. F. Weiland. *Trans. Am. Soc. Mech. Engrs.* **62**, 125–32(1940).—W. attempts to answer 2 questions concerning lubricating oils: (1) performance and (2) useful life. Oxidation and corrosion tendencies constitute the major elements in the deterioration of crankcase oils. W. outlines the requirements for conducting oxidation tests and also includes the results of tests. Behavior of oils in service offers a means of predicting oil performance. Acid-vapor tests to det. oil breakdown are discussed and the results of corrosion studies are detailed. Saverio Zuffanti 11

A primer in oils. Harry D. Kolb. *Blast Furnace Steel Plant* **27**, 587–91(1939).—Characteristics and properties of lubricating oils are discussed. C. B. Jenni 12

Rheological properties of asphaltic bitumens. R. N. J. Saal and J. W. A. Labout. *J. Phys. Chem.* **44**, 149–65(1940).—After an extensive study of the rheological properties of 2 quite different bitumens made by measuring the deformation under const. shearing stress, the elastic recovery and different combinations of these by means of a conicylindrical viscometer, S. and L. conclude that asphaltic bitumens must be considered mixed gel-sol systems and that the degrees of structure exhibited can vary widely with compn. These conclusions were reached previously by Pfeiffer and van Doormaal (*C. A.* **30**, 6545⁷). 6 references. Henri Marc 13

Asphaltic bitumen as colloid system. J. Ph. Pfeiffer and R. N. J. Saal. *J. Phys. Chem.* **44**, 139–49(1940).—P. and S. found little difference between the C/H ratios of the asphaltenes of most steam-refined and blown products examd.; they varied in most cases from 0.8 to 0.9. The asphaltenes from cracked residues showed ratios up to about 1.3. By studying the rheological properties of synthetic bitumens prepd. in the lab. with a conicylindrical rotation viscometer P. and S. also found that the tendency of asphaltic bitumens to form gel structures is absent in the presence of a certain excess of aromatic malthenes and increases as the aromatic content of the malthenes is lowered. By a "sweating" process not described in detail P. and S. studied 3 asphalts of the same penetration index but differing in asphaltene content and were able to sep. the intermicellar liquid from the micelles and intramicellar liquid and to show that this "sweated" oil is practically free from asphaltenes. They concluded that at normal temp. the micelles in asphaltic bitumen consist of asphaltenes to which a substantial portion of the malthenes may be bound and that since the quant. ratio between the vol. of the micelles and that of the asphaltenes is not const., the quantity of asphaltenes is to be considered only as a very approx. indication of the micelle content. 6 references. Henri Marc 14

The destructive distillation of coconut shells. Reginald

Child. *Trop. Agr.* (Ceylon) **93**, 195–204(1939).—About 40,000 tons of coconut shells is burned annually in Ceylon to produce about 13,600 tons of charcoal, without attempts to recover by-products. The destructive distn. of coconut shells yields charcoal 34, pyroligneous acid 40, tar 6 and gas 20%. The economics connected with the distn. process and the production of chemicals from the by-products are discussed. Thirteen references. J. O. H.

Production of org. compds. from waste products of pyrolysis and cracking of petroleum (Dalin) **10**. Alkylphenolic disinfectants from petroleum (Klarmann) **17**. Types of lubricants essential to steel mills (Mandy) **9**. Cement with hydraulic admixts. for filling petroleum-well crevices (Lutsenko) **20**. Progress of lubrication in steel industry (Pecu) **9**. Lubrication, with special reference to paper-mill machinery (McHutchison) **23**. Bituminous emulsions (Vellinger) **20**. Natural gas and petroleum in Languedoc (Charrin) **21**. Reduction products of bz-2, bz-2′-dihydroxydibenzanthrone [for coloring oils, gasoline] (U. S. pat. 2,183,625 6 7) **25**. App. suitable for taking samples of liquids such as crude oil from pipe lines (U. S. pat. 2,183,338) **1**. Fractional distn. of liquid mixts., especially petroleum (Dutch pat. 46,919) **1**.

Stephens, Maynard M.: Petroleum Refining. State College, Pa.: Division of Mineral Industries Extension, Pennsylvania State College. 419 pp.

Breaking emulsions such as natural petroleum oil and brine emulsions. Ivor M. Colbeth (to Baker Castor Oil Co.). U. S. 2,183,487, Dec. 12. Emulsified liquids have mixed with them castor oil, that has been bleached by oxidation at a temp. of about 160° and then oxidized by blowing air through it at a temp. of about 140°, the oxidation continuing until compds. are obtained including both aldehydes and acids, and the bleached and oxidized oil is modified by treating it with an aldehyde reactive reagent such as $NaHSO_3$, NH_3 or an aromatic amine, etc.

Agitating and mixing apparatus suitable for mixing petroleum oil with refining reagents, etc. Warren O. Chace. U. S. 2,183,859, Dec. 19. Various structural and operative details.

Heat-exchange apparatus suitable for use in petroleum-oil refining. Charles H. Leach. U. S. 2,181,308, Dec. 26. Various structural details.

Conversion of hydrocarbon oil. Charles H. Angell (to Universal Oil Products Co.). U. S. 2,184,069, Dec. 19. An arrangement of app. is described, and a process which involves distg. an oil such as a crude petroleum contg. poor antiknock gasoline and essentially paraffinic gases to recover a gasolinic distillate and lighter fractions comprising at least a major portion of the paraffinic gases, subjecting the distillate to conversion conditions regulated to effect the production therefrom of high yields of good antiknock gasoline and substantial quantities of readily polymerizable, normally gaseous olefins, recovering the good antiknock gasoline from the resulting conversion products in the form of a distillate substantially free of dissolved normally gaseous olefins, adding to the last named distillate substantial quantities of the heavy paraffinic gases resulting from the distillation step to form a gasoline product of materially increased vapor pressure, and separately recovering from the conversion products a mixt. of normally gaseous hydrocarbons contg. a high concn. of readily polymerizable olefins.

Treatment of hydrocarbon oils and gases. Clarence G. Gerhold (to Universal Oil Products Co.). U. S. 2,184,096, Dec. 19. An arrangement of app. is described, and a process of obtaining polymerizer charging stock from the sepd. pressure distillate of substantially gasoline boiling range and normally incondensable gases produced in the cracking of hydrocarbon oil, which comprises stabilizing the distillate of substantially gasoline-boiling range to liberate dissolved normally gaseous hydrocarbons therefrom, sepg. the stabilized distillate into relatively light and heavy fractions, scrubbing the incondensable gases with at least a portion of the heavy fraction to absorb in the latter heavier polymerizable components of the gases and to sep. these components from lighter unpolymerizable components of the gases, isolating the unabsorbed gases from the process, supplying the enriched portion of the heavy fraction to the stabilizing step to free the same of the absorbed heavier components of the gases and to combine these components with the normally gaseous hydrocarbons liberated from the distillate, and recovering, as the polymerizer stock, independently of the unabsorbed gases, the overhead product of the stabilization.

Extraction and separation of hydrocarbon mixtures by use of solvents. James H. Boyd, Jr. (to E. I. du Pont de Nemours & Co.). U. S. 2,183,852, Dec. 19. Normally liquid hydrocarbon mixts. are treated, as for effecting fractional sepn. of paraffin and naphthene constituents from mixts. such as petroleum oils, by use of a solvent contg. dimethylformamide or other substituted aliphatic amide of an acid of from 1 to 4 C atoms together with MeOH or other compd. of the general formula ROH in which R represents H or an alkyl or a methylol group.

Removing acid components from hydrocarbon distillates. David L. Yabroff (to Shell Development Co.). U. S. 2,183,801, Dec. 19. A process of sepg. org. acid-reacting substances contained in a water-insol. neutral or basic liquid such as a west-Texas straight-run gasoline, involves treating the liquid with an aq. soln. of a strong base such as NaOH contg. a substantial amt. of dissolved propylene glycol and contg. 15 70% of water, under conditions (suitably at 0 60°) to absorb at least a portion of the acid-reacting substances in the aq. soln. and to form 2 liquid layers, one comprising the aq. soln. contg. absorbed acid-reacting substances and the other consisting essentially of the treated org. liquid, and the layers are sepd. Cf. *C. A.* **33**, 4011².

Recovering mercaptans from hydrocarbon distillates. Thomas F. McCormick and Arthur Lazar (to Tide Water Associated Oil Co.). U. S. 2,183,968, Dec. 19. A process of recovering mercaptans from hydrocarbon distillates comprises treating a hydrocarbon distillate contg. mercaptans, H_2S, and other acidic compds. with a NaOH soln. at a temp. between the freezing point of the soln. and 150° sufficiently high to remove selectively substantially all the acidic compds. of a greater acidity than the mercaptans so that the mercaptans remain dissolved in the distillate, treating the distillate with further NaOH soln. while at a lower temp. between the freezing point of the soln. and about 15° sufficiently low for the soln. to absorb the greater portion of the mercaptans, then freeing the mercaptans from the soln.

Decolorizing oils. Ernest W. Rembert (to Johns Manville Corp.). U. S. 2,183,590, Dec. 19. A method of decolorizing an oil such as Penna. petroleum oil, comprises mixing therewith a hydrous, pptd., absorbent Mg silicate, heating the mixt., and sepg. the silicate and adsorbed decolorizing constituents from the oil; the moisture content of the silicate is adjusted to a quantity predetd. in accordance with the temp. to which the mixt. is treated, the moisture content is adjusted to a min. of 18% by wt. of the silicate for treatments at temps. in excess of 205°, and to a content of 12–18% for treatments at 105 205°, and 6 12% for treatments at temps. of 38–105°.

Device for removing paraffin from well tubing. John C. Lucceus (to Herbert C. Otis). U. S. 2,184,393, Dec. 26. Various details of a device with scraping blades.

Locating water leakages into oil wells. Geo. H. Enns (50% to Robert V. Funk). U. S. 2,184,338, Dec. 26. App. is described, and a method of operation which involves testing the electrochem. qualities of the residual material in the well at different levels in the well without the addn. of any substance to the material in the well, causing an ingress of connate fluid into the well, and again testing the electrochem. qualities of the material in the well at different levels to determine the point of entrance of the connate fluid.

Recovery of solvents from crude paraffin. Texaco Development Corp. (Herbert L. Duffy, inventor). Ger.

684,966, Dec. 9, 1939 (Cl. 23*b*. 2.01). Crude paraffin is sepd. by treatment of a mineral oil with a solvent mixt. contg. a water-sol. or water-miscible component, (e. g., acetone) and cooling. The paraffin is heated to a temp. (e. g., 31°) at which it dissolves in the solvent contained therein. This soln. is let stand at this temp. until an aq. layer seps. The solvent is recovered from the aq. layer by distn.

Desulfurizing light petroleum distillates such as gasoline and kerosene. Ulric B. Bray (to Union Oil Co. of Calif.). U. S. 2,183,782, Dec. 19. Vapors of a distillate contg. objectionable org. S compds. are brought into contact with a porous oxide of Zn at a temp. (suitably about 205–340°) to cause some of the oxide to react with the org. S compds. to produce a catalytic metal sulfide, and the contact is continued at temps. of about 200–330° to convert the org. S compds. into org. sulfides, and the distillate is sepd. from the metal oxides and sulfides. 2

Stabilizing gasoline. Paul D. Barton, Karl Finsterbusch and Nathaniel M. Floyd (to American Locomotive Co.). U. S. 2,183,604, Dec. 19. An arrangement of app. is described, and a process wherein a hydrocarbon mixt. including gasoline-like hydrocarbons is fractionated in a first fractionating zone to sep. the heavier from the lighter hydrocarbons of the mixt., and wherein certain of the lighter hydrocarbons are then fractionated in a higher-pressure fractionating zone to recover a stabilized light motor fuel. The process comprises removing such a portion of the lighter hydrocarbons from the mixt. before the first fractionating step is performed that hydrocarbons uncondensed by the first fractionating operation are substantially completely condensable under a pressure no higher than exists in the first fractionating zone and at normal atm. temp., then performing the first fractionating operation on the balance only of the mixt. and, subjecting the initially removed portion of lighter hydrocarbons to fractionation in the higher-pressure fractionating zone with the lighter hydrocarbons from the first fractionating zone. 3 4 5

Increasing the octane number of gasoline stock. Walter A. Schulze (to Phillips Petroleum Co.). U. S. 2,183,591, Dec. 19. An arrangement of app. is described, and a process of treating a gasoline stock to increase its octane number, which comprises bringing the gasoline stock in the vapor form at pressures in the range of atmospheric to 100 lb. per sq. in. into contact with a bauxite catalyst impregnated with a soln. of a Cr compd. subsequently converted to the oxide; the catalyst contg. a major proportion of bauxite and a minor proportion of Cr oxide, at a temp. of 425–600° and a flow rate of about 1 to 10 liquid vols. of gasoline stock per hr. per vol. of catalyst. The decomposed impurities and the light gas fraction contg. a substantial proportion of H are sepd. from the hydrocarbons boiling within the gasoline range, and a gasoline stock with a higher octane number than the untreated gasoline stock boiling within the same temp. range is obtained. 6

Purifying raw gasoline distillates. Rudolph C. Osterstrom (to Pure Oil Co.). U. S. reissue 21,299, Dec. 12. A reissue of original patent No. 1,891,109 (*C. A.* **27**, 2026).

Filter suitable for use with gasoline as fed to engines. Alfred C. Korte (to Carter Carburetor Corp.). U. S. 2,183,616, Dec. 19. Various structural details. 7

Diesel-engine fuel oils. Bernard H. Shoemaker and Howard R. Batchelder (to Standard Oil Co.). U. S. 2,184,440, Dec. 26. A method of obtaining Diesel-engine fuel oils having good ignition characteristics and substantially free from corrosive S involves treating a stove distillate obtained from a crude oil of the Winkler type with Na plumbite in the presence of S amounting to about 7 times the theoretical amt. of S required normally to sweeten such a distillate, distg. the treated stove distillate to produce an overhead amounting to about 30% of the original stock and a bottom stock amounting to about 70% of the original stock, further reducing the bottom stock by suitable means to produce a reduced bottoms amounting to about 1% to about 6% of the original stove distillate and adding 0.5–5% of the reduced bottoms to distillate fuel oils having undesirable ignition characteristics. 8

Lubricating oil. Ulric B. Bray (to Union Oil Co. of Calif.). U. S. 2,183,783, Dec. 19. A lubricating oil of low pour point is prepd. contg. a large proportion of a highly refined mineral spray oil having a high de Ong no. and low viscosity and a highly refined paraffinic viscous lubricating-oil fraction of relatively greater viscosity.

Lubricating oils. N. V. de Bataafsche Petroleum Maatschappij. Dutch 47,379, Dec. 15, 1939. Aviation lubricating oils are prepd. by mixing natural lubricating oils made by ordinary refining methods with synthetic lubricating oils made by polymerization of alkenes, which may contain aromatic compds., at 20° by means of $AlCl_3$. The former oil has a viscosity index above +80 and a viscosity of more than 10° Engler at 50°; the synthetic oil has a viscosity between 25° and 75° Engler at 50°. The synthetic oil contains substances of high film-forming temp. little tendency to carbonize, etc. The mixt. of natural oil with synthetic bright stock has higher Conradson carbon no. and oxidation test than has a mixt. of natural oil with natural bright stock.

Mineral lubricating oil. Standard Oil Development Co. Ger. 684,967, Dec. 8, 1939 (Cl. 23*c*. 1). The oil, of a viscosity index above 60, which has been subjected to a suitable mild oxidation, contains dissolved Pb soaps and corrosive S combined with mineral, plant or animal oil in an amt. calcd. not to exceed the stoichiometric ratio of Pb:S but at least equal to 0.2%.

Lubricating oil composition suitable for use under extreme pressures. Bert H. Lincoln and Alfred Henriksen (to Lubri-Zol Development Corp.). U. S. 2,183,294, Dec. 12. A mineral lubricating oil is used with about 0.1–20% of a halogenated oxidation product of a hydrocarbon oil in which alcs. and acids present have been esterified.

Filter for engine lubricating oil or other liquids or gases. Paul Belyavin (to Flexofiltration Ltd.). U. S. 2,184,243, Dec. 19. Various structural details.

Lubricant. Standard Oil Development Company. Ger. 684,821, Dec. 6, 1939 (Cl. 23*c*. 1). The lubricant contains as an added material some 0.25–5.5% of an ester, b. 150°, acid of an aliphatic monocarboxylic acid contg. at least 6 C atoms with a monohydric aliphatic alc. contg. not more than 5 C atoms.

Lubricants. N. V. de Bataafsche Petroleum Maatschappij (F. R. Moser and J. M. Hoeffelman, inventors). Dutch 47,234, Dec. 15, 1939. Lubricants are improved by addn. of ternary sulfonium compds. of the general formula RR′R″SX, in which R, R′ and R″ are aliphatic cyclic or alicyclic groups. Preferably one of the groups has more than 5 C atoms (aromatic ring) to promote soly. in the oil; another one of the groups should be a straight C_{10} or more aliphatic chain to improve the capillary qualities. X represens a negative group: OH, NO_3, SO_4, alkyl sulfate, sulfonate, palmitate, oleate, naphthenate, etc. The amt. of sulfonium compd. used is up to 5%.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Purified wood cellulose. Geo. A. Richter. *Ind. Eng. Chem.* **32**, 324–8(1940).—Specific details regarding the prepn. and properties of purified wood cellulose are given. F. A. Simmonds

The mechanism of deformation and the fine structure of hydrated cellulose. XV. Optical polarization analysis of the process of deformation of fibers of isotropic hydrated cellulose. 1. Double refraction in the unswollen condition. P. H. Hermans and P. Platzek. *Z. physik. Chem.* **A185**, 200–8(1939); cf. *C. A.* **32**, 9482[1]; **33**, 7174[4].—Fibers of hydrated cellulose were prepd. from 4 and 8% viscose, stretched, and treated in various ways.

They were then dried, cut wedge-shaped and examd. under a polarizing microscope with Na light. The sp. double refraction increases with increase in the degree of swelling to which the fiber was subjected before drying. As a function of the degree of extension to which the fiber was initially subjected, the optical anisotropy measured in the dried condition behaves qualitatively in the same way as does the anisotropy in the swollen condition. T. H. D. 1

Transition of hydrate cellulose into native cellulose. III. Through molecular compounds of cellulose. Teruitiro Kubo. *Cellulose Ind.* (Tokyo) **15**, 99–104(in English, 13–19)(1939); cf. *C. A.* **33**, 7558⁹.—Hydrazine-cellulose II and ethylenediamine-cellulose II, prepd. from viscose rayon by immersion in a soln. of the appropriate base, are completely converted into native cellulose by immersion in glycerol for 3 hrs. at room temp., followed by heating at 250° for 3 min. The direct conversion of hydrate into native cellulose is more difficult, and the difference is ascribed to the solvation of the mols. of the diamine-celluloses, which permits freer relative movement. 2

B. C. P. A.

Method for estimating the internal surface of cellulose by means of thallous ethylate. Chapin A. Harris and C. B. Purves. *Paper Trade J.* **110**, No. 6, 29–33(1940).—EtOTl, in dil. Et_2O or C_6H_6 soln., and dry mercerized ramie gave a Tl cellulose deriv. in which the Tl replaced hydroxyl H; more Tl was occluded in varying amts., and in an undetd. state. The reagent failed to penetrate into the interior of the cellulose micelles, its action being restricted to the more amorphous regions or to the effective internal surfaces of the fiber. Methylation of the Tl cellulose deriv. gave a product contg. 1.45 ± 0.3% of OMe; the H in 1 OH in every 40 had thus been replaced by Tl and the effective internal surface of the mercerized ramie was accordingly about 4×10^6 sq. cm. per g. Semiquant. data suggested that each OH group on the internal surface was capable of attaching 1 mol. of H_2O or Et_2O; the formation of the resulting fairly stable unimol. adsorption films was thus explained. Preliminary results with purified but unmercerized ramie and with a drastically mercerized specimen gave 0.24 and 18.4% as superficial OH, with corresponding internal areas of 3.7×10^4 and 2.9×10^6 sq. cm., resp.; these data were not comparable because the 1st sample contained more β- and γ-cellulose. A cotton regenerated from cuprammonium had an area of about 4×10^6 sq. cm. per g. The new estn. of the internal surface of cellulosic materials was not unduly long or difficult; it gave reasonable results reproducible to ±20% and was sensitive to the pretreatment of the sample. A. P.-C. 3 4

Experiments to make visible the inner structure of cellulose fibers by depositing extraneous materials. Ernst Kulnel. *Kunstseide u. Zellwolle* **22**, 3–7(1940).—Freshly prepd. ammoniacal colloidal Au soln. was impregnated into fibers in the presence of NaOH soln. Care was taken to exclude light to prevent the Au from pptg. After rapidly filtering the Au was deposited in the fiber by reduction with acidified CH_2O. The fibers were dried at 105°, covered with oil of cloves as the embedding agent at 100° and allowed to cool. Photomicrographs are reproduced showing 4 possible ways of deposition: on fiber surface, just under the surface, throughout the fiber and in the center only. *Ibid.* 35–8.—The treatment with Au salts previously described was repeated with Ag salts. For reduction, photographic developers can be used, such as Amidol, in the presence of a protective colloid. Photomicrographic cross sections of treated fibers showed that deposition had taken place throughout the fiber. Also $BaSO_4$ and colloidal S were thus deposited in the fiber. The first treatment in every case must be in the presence of NaOH both to swell the fiber and to dissolve out some component that makes room for the particles. K. believes that the method will lead to a better understanding of the orientation of fiber elements and the presence of short- or long-chain mol. groups. It may also be possible to use this method as an analytical tool in the estn. of the degree of polymerization. • M. P. 7

Cellulose acetate production in U. S. A. Herbert Chase. *Brit. Plastics* **11**, 381–4(1940). G. G.

Increasing the resistance to light of cellulose acetate films. M. M. Moiseev and M. S. Sverdlin. *Org. Chem Ind.* (U. S. S. R.) **7**, 519–21(1939).—The yellow discoloration of cellulose acetate films on exposure to light was traced to the impurities of Fe and Ca in tap water used in washing of cellulose acetate. The transparency and resistance to light were considerably increased by the use of distd. water in washing. Excessive washing under all conditions gives inferior films. Chas. Blanc

Yield and viscosity of holocellulose and some of its cellulosic fractions. Wm. G. Van Beckum and Geo. J. Ritter. *Paper Trade J.* **109**, No. 22, 107–9(1939); cf. *C. A.* **33**, 4017⁸.—Holocellulose gives high viscosities in spite of the fact that it contains appreciable amts. of hemicelluloses. Its high viscosity indicates that it contains longer cellulose chains than does either the Cross and Bevan cellulose or raw hydrolyzed holocellulose on the basis of the wood. The alk. treatment employed for the isolation of the α-cellulose suggests that an alk. treatment dissolves the short-chain material and leaves as a residue the long-chain material. An acid treatment, on the other hand, dissolves short-chain material and also degrades the residue as is shown from the viscosity data on the hydrolyzed holocellulose and its α-cellulose. Cross and Bevan cellulose and its α-cellulose have viscosities between those of the holocellulose and the hydrolyzed holocellulose, which fact indicates that the action of aq. 2.0% Na_2SO_3 is less drastic than that of aq. 1.3% acid on cellulosic material. High hemicellulosic content of a cellulosic material is not an indication of a material of low viscosity, nor is approx. the same hemicellulosic content of 2 cellulosic materials from the same wood an indication of similar viscosities. A. Papineau-Couture 8

Macromolecular compounds. CCXXXVII. The destruction of cellulose by microörganisms. H. Staudinger, M. Staudinger and H. Schmidt. *Zellwolle, Kunstseide Seide* **45**, 2–4(1940).—Microscopic examns. of decaying wood show that the cell walls disintegrate. Although the lignin is destroyed, the av. degree of polymerization of the wood may still be such that useful fibers can be produced from it. Leopold Scheflan 9

Chemistry of the plant cell wall. IX. Further studies on the location of lignin, cellulose and other components in woody cell walls. W. M. Harlow. *Paper Trade J.* **109**, No. 18, 38–42(1939); cf. *C. A.* **33**, 2939⁸.—The investigation was carried out by observing the effect of various solvents applied to cell walls. Wood sections delignified by standard methods do not macerate in the sense that each cell seps. from those touching it, even though the intercellular material is, apparently, all removed; the slightest agitation of such immersed delignified sections is sufficient to cause their dissocn. into large or small cell aggregates depending on the species in question. Treatment of delignified sections with solvents for polyuronides and hemicelluloses had no further macerating action on the woods studied. In delignifying wood, the layer most retentive of lignin seems to be the primary wall. This is shown by its presence as a network in 72% H_2SO_4 (and at a later stage in Schweizer's reagent), after the intercellular substance has been removed, while at the same time the secondary walls are completely sol. in these reagents. Primary walls may be delignified to a point where they are completely sol. in 72% H_2SO_4, but are insol. in Schweizer's reagent; they may then be made sol. in the latter reagent by further delignification, treatment with hemicellulose solvents, or, in some cases, by treatments with solvents for polyuronides. Secondary walls, delignified to the point where they are sol. in 72% H_2SO_4 but insol. in Schweizer's reagent, may be rendered sol. in the latter by further delignification. Soly. of cell walls in Schweizer's reagent is probably a better test for the complete removal of "encrusting substances" (particularly lignin) than is soly. in 72% H_2SO_4. Treatment of wood sections of several dicotyledons with vanillin failed to cause the secondary wall of fiber tracheids to give a coherent structural pattern when subjected to 72% H_2SO_4, even though untreated sections had a strong Maüle color test. 10

A. Papineau-Couture

Chemistry of lignin. I. The existence of a chemical bond between lignin and cellulose. A. J. Bailey. *Paper Trade J.* **110**, No. 1, 29–34(1940).—Digestion of aspen and jack pine wood in BuOH-H_2O mixts., buffered to prevent hydrolysis, removed all of the lignin from aspen and 80% of the lignin from jack pine. The remaining jack pine lignin was easily removed in the same solvent made 2% in NaOH. The lignin fractions appeared to be similar or identical, the difference being that one was in chem. combination with cellulose, the other uncombined. Yields under various conditions of digestion were detd., and changes in the wood caused by digestion were followed by detg. the analytical consts. of the residues from digestion. All tests indicated that lignin may exist partly in true chem. combination with cellulose and partly free, or entirely uncombined with cellulose, the detg. factor being the species of the wood. **II. Butanolysis of wood.** *Ibid.* No. 2, 29–32.—Addn. of 2% NaOH to the BuOH-H_2O mixts. accelerated the delignification 5–16 times. With this type of liquor, almost white pulps contg. only 0.33% lignin were obtained in yields of 43–50%, by cooking aspen for 15 min. and jack pine for 1 hr. Time-yield-alkali-lignin content curves are shown for the entire practicable range for the pressures used. The alkali functions as a catalyst in the lignin-BuOH condensation rather than as a reactant. It is suggested that the mechanism of the pulping consists in one minor reaction, the splitting of the combined lignin from the cellulose, and 2 major reactions: the condensation of BuOH and lignin, and the hydrolysis of the cellulose, the latter destructive, the former essential, and both increasing with alkali concn. Exptl. evidence is adduced in support of this hypothesis. BuOH was easily recovered from the final liquor, 95% being recovered by sepg. the immiscible layer and several % more by distg. only 10% of the total liquor. A. Papineau-Couture

Hydrogenation of lignin in aqueous solutions. Elwin E. Harris, Jerome Saeman and E. C. Sherrard. *Ind. Eng. Chem.* **32**, 440–1(1940); cf. *C. A.* **33**, 854[8].—Methanol-lignin (cf. *C. A.* **32**, 5794[4]), alkali lignin from aspen, H_2SO_4-lignin and cellosolve lignin obtained by heating extd. sawdust with cellosolve contg. 3% HCl for 24 hrs. are hydrogenated in aq. or 1% alk. solns. or suspensions with Raney Ni as catalyst. At 1500–2500-lb. pressure and 225–50° the hydrogenation is completed in 6–10 hrs., approx. 35 mols. H being taken up by each equiv. wt. of lignin (900 g.). The hydrogenation products found are identical with those obtained in the earlier work. F. E. Brauns

Viscose. IV. Compression of mercerized pulp in the steeping press. Mituo Huzii. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 406–7(1939); cf. *C. A.* **33**, 1493[7].—The relation is studied between the compn. of alkali cellulose (I), the ratio of I to original pulp and the thickness of the mercerized pulp under pressure. The compn. of I depends more or less on all of these factors. To obtain a uniform I, it is very important that the wt. of cellulose in pulp and the thickness of the mercerized pulp in the steeping press are always const. regardless of the moisture content of the pulp. F. E. Brauns

Coagulating and chemical action of precipitating baths on the formation of viscose filaments. S. N. Danilov, N. F. Gintse, O. F. Plyushch and I. S. Samarskiĭ. *Org. Chem. Ind.* (U. S. S. R.) **7**, 511–17(1939); cf. *C. A.* **29**, 8325[7]; **33**, 5179[7].—The results of previous investigation are reviewed and some addnl. exptl. data are given. Chas. Blanc

A case of occupational asthma from rayon. Vico Liverani. *Rass. med. ind.* **10**, 735–41(1939).—A worker in a factory making rayon from poplar wood became ill and subject to violent fits of coughing characteristic of asthma. The waste from the pulp was investigated and the various proteins found were tested by the patch test. When the one responsible for the asthma was found, the man was desensitized and thereafter no longer suffered from the attacks. M. Schubert

The literature of wood and wood technology. A. J. Bailey. *Paper Trade J.* **109**, No. 22, 97–104(1939).—The necessity of keeping abreast of all current scientific developments through indexes is pointed out. In the absence of a comprehensive bibliography under a single cover and with proper subject and author indexes to make all past information available, notes are given pointing out the bibliographies, abstract journals, indexes and other forms of literature, the devices for keeping informed on new publications as they appear, and the means of obtaining information by using the various services provided by the large libraries. 87 references. A. P.-C.

Existence and nature of fiber membranes. H. F. Lewis, F. E. Brauns and M. A. Buchanan. *Paper Trade J.* **110**, No. 5, 36–8(1940); cf. *C. A.* **33**, 855[8].—A method was developed for isolating the skin-like bodies left behind as a result of careful swelling of pulp fibers with cuprammonium soln. The cellulose fraction of the fiber is peptized with cuprammonium, and the action of pectic solvents (with the exception of dil. acids) has little or no effect on the viscosity of a soln. of such treated pulps in this solvent. Raw kraft pulps contg. up to 22% lignin have middle lamellar lignin on the outer walls; when the lignin content is reduced to 8.6%, this has largely disappeared. The residual lignin in a kraft pulp contg. 8.6% lignin appears to be assocd. with the amorphous materials sepg. the cambial layer from the secondary wall and sepg. the various layers of cellulose in this secondary wall. It seems improbable that these membranes represent a continuous skin having a physiol. function; rather it would appear that they have resulted from a different chem. activity at the time of their deposition or have reached their location by infiltration. The residues isolated from unbleached sulfite pulps are more than half lignosulfonic acid, with much smaller amts. of carbohydrates; the hydrolyzed residues from the sepn. of the lignosulfonic acid are in part reducing and in part nonreducing sugars. The residues isolated from bleached sulfite pulps are Cu compds. of carbohydrate derivs. One-third of the residue is Cu; 97% of the remainder can be detd. after hydrolysis as reducing sugar. The carbohydrate after removal of the Cu forms a white gel, which on drying yields a white starch-like powder contg. 44.2% C and 6.25% H. Purification of the bleached pulp with hot 1% alkali reduces the amt. of this residue from 1% to 0.1%; the viscosities of the pulps before and after this extn. are much the same. A very highly purified wood pulp with 0.70% pentosan, 0.049 Cu no. and 99.1% α-cellulose swells as though there was no cementing substance between the cellulose layers in the secondary wall; this pulp contains practically no cuprammonium-insol. material, nor can it be made to yield paper after beater treatment. A. P.-C.

Arrangement of the cellulose crystallites in ray cells of white oak as determined by x-rays. S. T. Gross, G. L. Clark and G. J. Ritter. *Paper Trade J.* **109**, No. 23, 37–8(1939).—By means of thin sections of white oak ray cells, a specimen was built that enabled the detn. of the arrangement of the cellulose crystallites by x-rays. The cellulose crystallites deviate about 30° from the vertical crosswise direction in the ray cells of white oak, which arrangement is in general agreement with that found by microscopical means. This finding indicates that the ray cells of white oak will shrink and swell considerably in their longitudinal and tangential directions; this is also in general agreement with the findings obtained by microscopical means. A. P.-C.

The preparation of a wood sample for chemical analysis. W. E. Cohen and A. W. Mackney. *J. Council Sci. Ind. Research* **12**, 365–77(1939).—Wood samples prepd. by using a mill with a cutting action (Wiley mill) and a mill with an impact action (Christy and Norris mill) were examd. Conclusions: The effect of very fine comminution permits some degradation of Cross and Bevan cellulose in subsequent analysis; it is possible to accept for analysis either the 60–80-mesh fraction or a sample of particle size passing through a 60-mesh sieve. The former is preferable because of the more uniform particle size, but in case of doubt, where woods may contain considerable amts. of extraneous material, like jarrah, it would be safer to use the 60-mesh sample. Alfred L. Kammerer

Effect of mechanical gelatinization on the solubility of wood in cuprammonium solution. John Levy and Edwin C. Jahn. *Paper Trade J.* **109**, No. 23, 45–9(1939).—The percentage solubilities of northern white pine mech. pulp in cuprammonium soln. of standard strength for TAPPI viscosity measurements were as follows after various treatments: no treatment, 15.8; hot 4% NaOH soln., 21.8; hot 4% NaOH soln., followed by beating in a rod mill in 2% NaOH soln. for 40 hrs., 32.2; beating in a rod mill in water for 40 hrs., 27.15. The great increase in soly. caused by mech. gelatinization, which greatly increases the surface area of the wood, increases the soly. of the cellulose fraction of the wood. Alk. treatment increases soly. presumably as a result of the softening and swelling of the wood particles and the slight removal of lignin and hemicellulose. Cuprammonium soln. exerts a selective solvent action on the constituents of both gelatinized and ungelatinized wood. The sol. fractions are over 90% cellulose; about 50% of the original cellulose, 5.5% of the original lignin and 13% of the original pentosans are dissolved from northern white pine groundwood which has been mechanically gelatinized in dil. alkali. A. Papineau-Couture 1 2

The determination of water in wood. R. Darnley Gibbs. *Pulp Paper Mag. Can.* **41**, 31–4(1940).—A brief review of methods for the detn. of moisture with a discussion of their suitability for wood. 17 references. A. P.-C. 3

University of Washington completes new pulp laboratory. K. A. Kobe. *Paper Ind. Paper World* **21**, 865–7, 872(1939).—A description of the lab. and its equipment. A. Papineau-Couture 4

Methods used at the Forest Products Laboratory for chemical analysis of pulps and pulpwoods. M. W. Bray. *U. S. Forest Products Lab.*, Mimeographed Rept. R19 (1939).—A revision of methods. Cf. *C. A.* **23**, 976. C. E. Curran 5

The determination of methoxyl groups in pulp and plant materials. Quinton P. Peniston and Harold Hibbert. *Paper Trade J.* **109**, No. 17, 46–8(1939).—A detailed description is given of the technique of a modification of the Vieböck and Schwappach method (*C. A.* **25**, 474, 896), which is particularly well adapted to the detn. of OMe in paper pulp A. Papineau-Couture

The use of the ultraviolet quartz lamp for the analysis of pulp and paper. V. Gruenman. *Papier* **42**, 889–91 (1939).—A brief description of the use of filtered ultraviolet light for the detn. by fluorescence of TiO_2 and of rosin spots in paper. A. Papineau-Couture 6

Pulp woods and pulps. II. Manufacture of pulps from Manchurian spruce, fir and aspen. Nobuhiko Migita. *Cellulose Ind.* (Tokyo) **15**, 54–8(1939); cf. *C. A.* **32**, 8133⁷.—The sulfite cooking of *Picea obovata*, Ledeb. (I), *Abies nepheroleþis*, Max. (II), and *Populus maximowiczii*, A. Henry (III), was investigated. Seven different samples of each were digested with a liquor contg. 4.3–6.2% of total SO_2, at a max. temp. of 145–55°, max. pressure of 4.5–6.5 kg./sq. cm. for 9–15 hrs. In the case of the unbleached pulps I gave the highest % yield (46.7–52.4) and also the highest lignin content (1.04–6.98%), while III, which yielded only slightly less than that of I, gave a pulp with the highest α-cellulose content (86.8–89.4%). On bleaching, III shows the least loss and the highest α-cellulose content in the pulp (85.2–89.0%), while in these respects I is only slightly inferior to III III has the highest and II the lowest pentosan content. All three woods, however, are easily digested, III being the most amenable to pulping by the sulfite process. B. C. P. A. 7

Average yields of wood pulp from various species of wood. *U. S. Forest Products Lab.*, Tech. Note **191**, (Dec., 1939). C. E. Curran 8

Wood pulp. X. Results of cooking experiments with lauan woods. Eisio Hu. *Cellulose Ind.* (Tokyo) **15**, 52–3(in German, 7–8)(1939); cf. *C. A.* **33**, 6044².—Red and white lauan woods were digested with $Ca(HSO_3)_2$ at a max. digester pressure of 8 atm. and max. temp. of 140° for 8 to about 9½ hrs. The liquor contained 6% of total SO_2 and 1.1% of CaO. The woods yielded 44–47% of unbleached pulp, having 1.9–2.7% of lignin, about 94% of α-cellulose, and R20 no. 2.8–3.3. As with all deciduous woods, the max. pressure reached during the cooking plays a very important part in the extent to which the pulps are liberated. B. C. P. A. 9

Pine pulpwood from logging tops. E. O. Siecke. *Paper Trade J.* **109**, No. 26, 28–9(1939).—The tops of pine saw logs can be and are successfully used commercially for pulping by the sulfate process. A. Papineau-Couture

Groundwood pulp control. C. G. Malcolm. *Pulp Paper Mag. Can.* **40**, 635–7(1939).—A discussion dealing briefly with stone burr, temp., consistency, dirt, slivers and oil. A. Papineau-Couture

Effect of wood-stone contact area in the groundwood process. E. R. Schafer and J. C. Pew. *Paper Trade J.* **109**, No. 20, 39–42(1939); cf. *C. A.* **33**, 9630⁴.—The effects of changing the area of the wood-stone contact were studied in the exptl. grinder of the U. S. Forest Products Lab., by varying both the width of the wood in the pockets and the no. of pockets in operation. Increasing the zone length (around the periphery of the stone) up to a certain extent improved results, but too large a zone proved a detriment. Exact formulation of the relationships is difficult on account of the numerous factors involved. The increase in consistency and temp. along the contact zone appears to be of importance. These factors in turn depend on many of the fixed conditions of the expt., such as stone surface, consistency and grinding rate. Aside from these factors the results suggest that the intimacy of contact between the wood and stone is affected by the magnitude of the contact area even when the unit pressure remains the same. A. Papineau-Couture

Cellulose. Preparation of pulp from rice straw by cooking with alkali, and by the sulfite process. T. Kimura. *Cellulose Ind.* (Tokyo), **15**, 105–7 (1939).—**XI.** The most satisfactory cooking conditions for prepg. pulp from rice straw are 2 hrs. at 140° with 10 vols. of 1% aq. NaOH, preceded by a cook at the same temp. with the spent liquor from a previous prepn. **XII.** *Ibid.* 108–110.—The ash and lignin contents of pulp precooked with spent alkali are less than those of pulp precooked with H_2O, and at 140° are less than at 100°. The breaking load and extensibility of precooked pulp are less than those of single-process pulp. **XIII.** *Ibid.* 111–12.—The sulfite process gives pulps with higher ash and lignin contents, but less pentosan, than the alkali process. Their strengths are low, and prolonged treatment causes darkening. B. C. P. A.

Multistage alkali digestion of straw. K. Akagi. *Cellulose Ind.* (Tokyo) **15**, 59–60(in German, 11)(1939).—Rice straw was digested in two stages with NaOH. The yield was 23%, and the pulp light in color but with a relatively high content of ash (60–62.5% of SiO_2). On account of the large no. of parenchyma cells and silicous matter present, however, rice straw is unsuitable for viscose, and as a fibrous material it is stated to be almost valueless. Wheat straw is considered to yield superior pulp to rice straw, but it is available in Japan in much smaller quantity. B. C. P. A.

Chlorination pulping of spruce wood. Carl T. Welte and C. E. Libby. *Paper Ind. Paper World* **21**, 1075–81 (1940).—It was possible to produce a satisfactory white pulp from spruce wood by a chlorination process. The min. alkali treatment that could be used to prep. spruce for defibering prior to chlorination on a lab. scale was 10% of NaOH. It was impossible to obtain a good white pulp by single-stage treatments of the half stock with either gaseous or aq. Cl if only the min. alkali pretreatment was employed. Two-stage and triple-stage chlorinations produced a good white pulp from the min.-alkali half stock The optimum consistency of half stock for gaseous Cl treatment was 25% oven-dry. Treatment with gaseous Cl gave a higher pulp yield than treatment with aq. Cl. There was no pronounced difference in the strength characteristics of pulp prepd. by either gaseous or aq. Cl for the 1- and 2-stage processes; 3-stage chlorination gave much stronger pulps by the gaseous-Cl than by the aq.-Cl process. Bleach consumption of pulps prepd. with aq. Cl

is lower than that of similar pulps prepd. with gaseous Cl. Cellulose degradation occurs to very nearly the same extent in the pulps prepd. by the single-stage treatment with either gaseous Cl or aq. Cl; in multi-stage chlorination, aq. Cl causes much more cellulose degradation than gaseous Cl. A. Papineau-Couture

Bleaching-procedure design for high-white high-strength kraft pulps. Warren A. Chilson. *Paper Trade J.* **109**, No. 25, 29–31(1939).—The following is suggested as a suitable procedure for the production of high-white high-strength kraft pulp: (1) combined chlorination and hypochlorite treatment, wash; (2) hypochlorite treatment, wash; (3) caustic extn., wash; (4) water soak, wash; (5) hypochlorite treatment, wash; (6) acid adjustment and final wash. The advantages and disadvantages of combining chlorination and hypochlorite reactions are discussed, and the relative merits of batch and continuous operations are briefly considered. A. P.-C.

New methods of continuous causticizing [for kraft-pulp manufacture]. J. R. Lientz. *Paper Mill* **61**, 18–20 (Dec. 24, 1938).—The Swenson continuous causticizing system is described and its advantages are pointed out. B. C. P. A.

Comparison of kraft and sulfite [pulps] on paper machines. E. W. G. Cooper. *Pacific Pulp and Paper Ind.* 12, 20–2(Dec., 1938).—The characteristics and paper-making behavior of bleached and unbleached kraft and sulfite fibers are contrasted. B. C. P. A.

New ideas on the use of salt cake in kraft pulp mills. Walter L. Savell. *Paper Trade J.* **109**, No. 24, 18–22 1939).—What appear to be opportunities for improvement in the chem. end of the kraft pulping process are pointed out, more particularly SO_2 recovery from stack gases and the use of a new "synthetic salt cake" (a manufd. product based on a standard alkali and S sintered together in proportions to make the chem. equiv. of salt cake in Na_2O and S). A. Papineau-Couture

Weight factors of beaten pulps. John H. Graff. *Paper Trade J.* **110**, No. 2, 37–40(1940).—Beating has little or no effect on the relative wt. factor of a pulp, but the species of wood, especially in respect to its geographical location, is a factor of great importance. The tentatively proposed wt. factors used by the Institute of Paper Chemistry (Appleton, Wis.) require very little modification except that western hemlock and southern pine pulps must be considered separately. A. Papineau-Couture

Microdissection of paper-pulp fibers. Charles W. Hock and Wm. Seifriz. *Paper Trade J.* **110**, No. 5, 31–2 (1940).—After boiling in water and subsequently treating with H_3PO_3, the fibers of 7 kinds of paper pulp were examd. microscopically and handled with microdissection needles. A typical fiber consists of many fine fibrils running parallel with the axis of the fiber; these fibrils are wrapped by an outer winding encircling the fiber as a whole, and bordered by an inner winding which subtends the lumen of the fiber. Balloon formation is the result of an uneven weakening of the interfibrillar forces of the outer winding, thereby allowing the longitudinal fibrils to push through. The breaking strength of paper pulp is detd., in part, by fiber structure. The strength of wood fibers is due primarily to many longitudinal fibrils; this is augmented by an outer and inner fibrillar winding. A. Papineau-Couture

The drainage resistance of papermaking pulps. W. O. Hisey and C. H. Heigl. *Paper Trade J.* **110**, No. 6, 34–40 (1940).—The flow of water through a forming mat of fibers is analyzed on the basis of Poiseuille's law. An equation is derived for the detn. of the resistance to flow of water under conditions of const. rate of flow, and this equation is tested on pulp samples beaten to various degrees. The equation was valid for the conditions of testing, and the test method described could be used to det. the sp. resistance of pulp fibers to fluid flow and also to det. the compressibility of pulps. The test method described would appear to have considerable value as a routine or research method of detn. of pulp properties. A. Papineau-Couture

Water retention of beaten and gelatinized pulp. Arthur Sedoff, C. V. Holmberg and Edwin C. Jahn. *Paper Trade J.* **109**, No. 26, 42–9(1939).—The percentage of water retained by wet pulp increases with increased beating. Increased pressures up to 3000 lb./sq. in. decrease the percentage of water retained for any const. time of pressing; above 3000 lb., variation in pressure has little effect on the percentage of water retained. Increased time of pressing at any const. pressure decreases the water content; in general, the shorter the time pressed, the greater the differentiation in water content due to beating. Beating has no effect on the water retained if the pulp is subjected to pressure for 4 hrs. or longer. The percentage of linear shrinkage of pressed pulp cakes increases with beating; it correlates with the percentage of water retention to give an approx. straight-line relationship for pressures above 3000 lb. The stiffness of the fibers or their resistance to crushing and deformation in unbeaten pulp is overcome at about 3000 lb.; beating decreases the pressure required to deform the fibers. Pressures up to 3000 lb. cause fiber deformation and the flow of free water; at approx. 3000 lb. both of these resistances are overcome and higher pressures force out capillary water. Detg. the percentage of water retained by pulp pressed at 4000 lb. for 10 min. gives a good measure of beating changes for drastically beaten or gelatinized pulp. Detg. the percentage of water retained in a sheet couched from a standard sheet machine gives a good index of its degree of beating. A. P.-C.

Application of a quantitative technique to the evaluation of color stability of bleached pulps. Influence of machine drying and natural aging on this evaluation. James W. McIntyre. *Paper Trade J.* **109**, No. 24, 29–37(1939). —The effect of temp. and humidity on the rate of discoloration of bleached sulfite pulp was studied by means of specially constructed equipment. Discoloration rates were detd. by the method of Tongren (*C. A.* **32**, 9492[6]). A min. point in the rate of discoloration was found at about 20% relative humidity at 85° and 95°, resp.; other temps. were not investigated thoroughly. Extension of the humidity-rate of discoloration study at 95° to include other types of pulp showed that the position of the min. rate of discoloration was variable, a soda pulp showing no min. rate down to 2.0% relative humidity; hence, the relative values of accelerated discoloration rates of various pulps are dependent on the humidity of the aging atm. On the theory that rates of discoloration detd. at a humidity which would maintain a normal moisture content in the sheets at the aging temp. should parallel most closely the results of natural aging, 55.4% relative humidity at 95° was arbitrarily adopted as a standard aging condition; under these conditions, a moisture content of about 5.7% was maintained in the sheets during aging. A study of some of the variables of pulp handling prior to accelerated aging tests revealed that heat-drying of bleached sulfite pulp prior to hand-sheet prepn. caused a marked increase in subsequent color stability. The increase in color permanency is not due to the reduction in reflectance which occurs during the machine-drying of pulp. When dry sheets are heated, although they may undergo a loss in reflectance comparable to that occasioned by machine-drying, their rate of accelerated discoloration is unchanged. It would therefore seem that in the presence of heat and moisture, some reaction occurs in sulfite pulp which, although reducing the reflectance somewhat, tends to stabilize this property to a marked extent. In an evaluation of the effect of wet storage of pulp on subsequent accelerated aging behavior, 30 days' storage of a bleached sulfite pulp as wet laps reduced the accelerated discoloration rate of air-dried hand sheets prepd. therefrom to 73.0% of the value for hand sheets prepd. from the freshly bleached pulp. Dry storage of air-dried hand sheets made from a slush pulp, although causing a marked reduction in reflectivity, caused no change in subsequent accelerated discoloration rate. A slight increase in aging rate, after similar storage, was observed for air-dried hand sheets prepd. from machine-dried pulp. Natural aging studies carried out on the various pulps showed that the results of the accelerated tests at 95° and 55.4% relative humidity paralleled the rates of naturally occurring discoloration

better than did the results of the accelerated tests at 2.0% relative humidity. The relation of natural discoloration rate to accelerated discoloration rate as detd. was not const., since the natural aging rate was subject to greater percentage change by reason of prior pulp treatment than was the accelerated rate. A. Papineau-Couture

Sulfate pulping of silver fir. Effect of chemical concentration and of wood selection on yield and pulp quality. Mark W. Bray, J. S. Martin and S. L. Schwartz. *Paper Trade J.* **109**, No. 18, 29–36(1939).—Decreasing the concn. of chemicals in the cooking liquors from 80 to 20 g. per l. resulted in a kraft pulp of max. yield and strength properties at approx. 50 g. per l. total initial concn. when the digester was heated with indirect steam. Cooking to equal yield by increasing the time of digestion for lower chem. concns. did not result in pulps of equal strength and bleach requirement to those made at this particular concn. For the production of kraft pulps of high strength characteristics, wood taken from the upper portion of the trunk gave somewhat better pulps than that taken from the butt logs. Slab wood, consisting of all sapwood, gave better pulps than wood in which a greater proportion of heartwood was present. A. Papineau-Couture

Sulfidity effect in the sulfate pulping of Douglas fir. Mark W. Bray, J. Stanley Martin and S. L. Schwartz. *Tech. Assoc. Papers* **22**, 382–7(1939); *Paper Trade J.* **109**, No. 17, 40–5(1939).—The sulfidity of liquor with a 20% free alkali (as NaOH) content was varied from 0 to 100% under 1 set of cooking conditions. Liquors of 100% sulfidity (Na_2S only) can be satisfactorily used for pulping Douglas fir, provided sufficient chemical is present to effect delignification. Na_2S has a sp. effect in pulping in addn. to its caustic content made available through hydrolysis. While this chemical may act to some extent as a buffering agent, the sulfide or the hydrosulfide ion appears to act mainly as a substance of high reactivity toward lignin or encrusting substances in wood. Replacement of NaOH, therefore, with Na_2S at const. initial alky. results in a progressive decrease in yield and bleach requirements of the resulting pulps from Douglas fir up to sulfidities of 34%; further increases in sulfidity up to 100% result in only slight changes in yield and pulp quality. A. P.-C.

Use of swamp black gum sulfate pulps for high-grade papers. Charles Carpenter and G. A. Ritter. *Paper Trade J.* **110**, No. 3, 29–31(1940).—Swamp black gum sulfate pulps suitable for bond papers were made with 16% of active alkali in cooking times of 2–3.5 hrs. Yields were 48–50%. Bleaching consumed 3–6% Cl in 3 or 4 stages. Bleached swamp black gum sulfate pulps were made into bond papers of excellent formation and high strength characteristics; 20 substance sheets (54-lb. 25 × 40–500), (46-lb. 24 × 36–500) tested approx. 35–45 pts. Mullen, 65–95 g. tear and 400–1500 double folds. A. P.-C.

Recovery in sulfate pulp mills. G. Edling. *Pulp Paper Mag. Can.* **40**, 681–5, 734–8(1939).—A description of the Tomlinson system, with a discussion of the results obtained with it in Sweden during the last 2 or 3 yrs. A. P.-C.

The suitability of red pine for the manufacture of sulfite pulp. John Studeny and C. E. Libby. *Paper Trade J.* **109**, No. 20, 29–35(1939).—In the belief that pitch troubles encountered by previous investigators could be avoided by using young trees, 5 series of sulfite cooks were made by using a liquor contg. 6.3% total and 5.0% free SO_2 and a liquor-wood ratio of 6:1. Young red pine wood was readily delignified at low temps. (135–40°) following a 2-hr. penetration period; total cooking time of 10 hrs. was sufficient and gave 45% yields, while 8-hr. cooks gave up to 50% yields. Ca-base cooks of 10-hr. duration at 135–40° gave the strongest, most easily bleached pulps in the best yields; these pulps contained 80–85% α-cellulose, with very little residual lignin, and a fairly low pitch content. Dolomitic liquors gave "soft" pulps, which were not as strong as those made with Ca base, while Na-base cooks gave very dark-colored pulps which were hard to bleach. The best pulps obtained from young red pine wood in these expts. compared very well with one of the higher grades of com. sulfites. With the same liquor under similar conditions, more mature red pine wood gave an excessive amt. of screenings owing to incomplete penetration of the liquor, caused by the high pitch content of the old wood. A. Papineau-Couture

Digesting sulfite pulp and getting a high yield of alcohol. David Johansson. *Svensk Papperstidn.* **42**, 582–8(1939); cf. *C. A.* **18**, 3113; **23**, 2569; **29**, 1628[6].—Emergency production of alc. by simple sugar formation from spruce chips in a sulfite digester with dil. H_2SO_3 has little advantage because the same yield of alc. (60–70 l. of 100% alc. per ton of absolutely dry wood) can be obtained from the wood by modified sulfite digestion. The alc. yield from *sulfite waste liquor* increases with the lowering of the Ca content of the digesting acid and with the use of a pulp with a low Cl no. For the highest yield of alc. per digesting unit easily bleached pulp must be made by one-step digestion, with lowest possible Ca content, and in the shortest possible digesting time. The resulting pulp is of second quality but fully suitable for certain kinds of paper. Long-continued digestion produces a pulp of low viscosity which because of the character of the fiber should be suitable as "fodder-cellulose." Long-continued digestion lowers the yield of alc. per digesting unit. Exptl. conditions are described and numerical data are given in detail. Wilhelm Segerblom

Yield of alcohol from waste liquor from sulfite digesting and retention of the strength of the pulp. Carl R. Bergson. *Svensk Papperstidn.* **43**, 2–4(1940).—B. discusses the results of D. Johansson (cf. preceding abstr.) and H. Nihlén (cf. following abstr.). W. S.

Investigation of two-step sulfite digesting according to the NAF-Hägglund method. Hugo Nihlén. *Svensk Papperstidn.* **42**, 593–9(1939).—The simplified app. used in the NAF-Hägglund multiple-step method for producing sulfite pulp was tested on a lab. scale. This gave the same yield of pulp and pulp of the same strength as was obtained in 1-step digesting with the usual tech. Ca content. The acid concn. needed for the 2-step digesting depends on how far down the pulp is to be cooked. A very low Ca content in both steps may be used in making easily bleached pulp; a doubling of the alc. yield may thus be expected. A higher Ca content must be used to get a harder and stronger pulp, but under these conditions the alc. yield decreases. In general twice as large a yield of alc. may be expected from multiple-step digesting as from 1-step digesting without washing, based on pulp of the same strength in each case. Ten tables of numerical data and 3 graphs give the quant. results from the exptl. comparison of the 2 methods. Wilhelm Segerblom

Acidproof masonry in the sulfite industry. I. Björnstad. *Svensk Papperstidn.* **42**, 609–11(1939).—The formation of cracks in the lining of digesters is discussed. The grading of the raw materials, as well as their chem. compn., is essential for a lining that will not allow the digesting acid to reach the metal shell of the digester. A new mixt. (compn. not given), termed AX-III, has been prepd. which is claimed to give good results W. S.

Degree of efficiency of sulfite acid towers. O. E. Sylwan. *Svensk Papperstidn.* **43**, 6(1940).—Polemic. Nihlén's criticisms (cf. *C. A.* **34**, 1171[7]) of S.'s article (cf. *C. A.* **33**, 8988[8]) are deemed not justified. Wilhelm Segerblom

Pulp mills and fisheries. Sten Vallin. *Medd. Statens Undersökn.-Forsoksanst. Sötvattensfisket, Kgl. Lantbruksstyrelsen* No. 5, 39 pp.(1935); *Chem. Zentr.* **1938**, II, 3438.—Different kinds of fish were used for these expts. and the sewage was dild. with filtered sea water. Acid sulfite waste liquors were much more injurious than alc. wastes. The latter show an instantaneous O demand, which, however, declines much more rapidly than that of the acid wastes. Fiber mixts. showed only a low O demand. In agreement with earlier findings, expts. with strong aeration showed that the fermentable carbohydrates promoted the development of sewage fungi. No injury to the fish gills by the cellulose fibers could be detected. The poisonous effects of the sulfate waste liquors (black liquors) were much greater than those of the sulfite wastes. This has been attributed by Ebeling and by Klingstedt to the presence of resin acids. Of the fish

tested the salmon was the most sensitive to such wastes. Tables and bibliography are given. W. A. Moore

The contamination of water by the waste liquors of sulfate pulp mills. Hilding Bergström and Sten Vallin. *Medd. Statens Undersökn.-Försöksanst. Sötvattensfisket, Kgl. Lantbruksstyrelsen* No. 13, 17 pp.(1937); *Chem. Zentr.* **1938, II,** 3438–9; cf. *C. A.* **33,** 6591[4].—A "poison unit" is introduced for comparison of results. The no. of poison units per l. is the degree of diln. (or diln. factor) required in order that young salmon can live in the resulting mixt. of sewage or waste and pure sea water for at least 5 days. The wash water from the green sludge was least poisonous; the condensates from boilers and diffusers most so, even after sepn. of the crude turpentine. The various S compds. in the condensate from the boiling, which even in small amts. imparts a disagreeable odor to the water and causes fish living in it to have an unpleasant taste, can be removed by effective sepn. of the condensates (during distn.). The greatest poisonous action was shown by the diffuser liquors and was due to the resin acids, fat acids and oleic acid contained in these wastes. The poisonous effects of the diffuser liquors can be essentially reduced by flocculation with acids. Tables and bibliography are given. W. A. Moore

Pressure-molded fiber products from cellulosic materials. L. K. Arnold. *Paper Ind. Paper World* **21,** 760–4 (1939).—Strong, practical cellar window sashes and fiber tubes were produced experimentally from waste newsprint and cornstalk and sulfite pulps. The sashes were waterproofed satisfactorily with paraffin. Warping was avoided by proper conditioning. Further tests in serviceability and practicability are being carried out. A. Papineau-Couture

A new trend in disk refiners. Bruce Armstrong. *Paper Trade J.* **109,** No. 25, 17(1939).—Attention is drawn to the present-day trend away from the double-disk type refiner (two rotating heads operating in opposite directions) toward the single-disk type refiner (one rotating head fitted with removable disks that operate against stationary removable disks attached to the refiner shell). The merits of the latter type are briefly outlined. A. Papineau-Couture

How to win the war on dirt. F. K. Becker. *Paper Trade J.* **109,** No. 18, 18–21(1939).—A brief discussion of the importance of the removal of dirt in pulp, showing the merits of the Bird screens, the Bird centrifiner and the Bird purifiner. A. Papineau-Couture

Activated decantation. Victor Perlmann. *Papier* **42,** 879–86(1939).—An explanation and discussion of activated decantation, which consists essentially in adding to the mixt. to be decanted an ingredient that accelerates sedimentation of the constituents to be sepd. A. Papineau-Couture

The wood-gas producer in the wood industry. H. List and J. Franzl. *Holz Roh u. Werkstoff* 2, 392–4(1939).—Results are given of the analysis of gas from a sawdust gas generator under different loads. R. H. Baechler

United States patents on papermaking. Third quarter, 1939. C. J. West. *Paper Trade J.* **109,** No. 17, 35–8 (1939). **Fourth quarter, 1939.** *Ibid.* **110,** No. 5, 27–30 (1940).—A list in numerical sequence of patents relating to pulp and paper making. A. Papineau-Couture

Utilization of farm wastes for paper and board making. E. C. Dryden, S. I. Aronovsky and T. D. Jarrell. *Paper Ind. Paper World* **21,** 972–7(1939).—A brief discussion and review of the use of cornstalks, straw, flax straw, bagasse, cotton by-products, oat hulls, peanut hulls, hemp and other agricultural wastes for the manuf. of paper and board. 94 references. A. Papineau-Couture

The uses of air in the paper industry. A. B. Davies. *Proc. Tech. Sect., Paper Makers' Assoc. Gt. Brit. & Ireland* **20,** Pt. 1, 159–71(1939).—See *C. A.* **34,** 1847[9]. C. E. Curran

pH value and acidity; their significance in the paper industry. J. Grant. *Proc. Tech. Sect., Paper Makers' Assoc. Gt. Brit. & Ireland* **20,** Pt. 1, 53–70(1939).—See *C. A.* **33,** 9635[1]. C. E. Curran

Applied statistics as an aid to paper investigations. P. H. Prior. *Proc. Tech. Sect., Paper Makers' Assoc. Gt. Brit. & Ireland* **20,** Pt. 1, 81–98(1939).—See *C. A.* **33,** 9634[9]. C. E. Curran

PATRA and the paper industry. G. L. Riddell. *Proc. Tech. Sect., Paper Makers' Assoc. Gt. Brit. & Ireland* **20,** Pt. 1, 109–37(1939).—See *C. A.* **33,** 9635[2]. C. E. C.

Plastics in papermaking. H. W. Rowell. *Proc. Tech. Sect., Paper Makers' Assoc. Gt. Brit. & Ireland* **20,** Pt. 1, 143–51(1939); cf. *C. A.* **33,** 9636[5].—Use of plastics in papermaking equipment is discussed. C. E. Curran

Investigations on the calendering of paper. W. Brecht. *Proc. Tech. Sect., Paper Makers' Assoc. Gt. Brit. & Ireland* **20,** Pt. 1, 11–39; *Paper-Maker* **97,** TS41–52(1939).—A résumé of calendering expts. previously reported by Brecht and Steinbock, *C. A.* **33,** 6591[9]. C. E. Curran

Proposed apparatus for determining the "wet-strength" of paper. O. E. Sylwan. *Svensk Papperstidn.* **42,** 507–8 (1939).—A satisfactory instrument for detg. the "wet-strength" of paper must be simple, easily taken care of, reliable, sensitive, and give a sharp reading. S. has devised an electrometric app. consisting of a bath with const. level of a 0.25% NaCl soln., appropriate elec. contacts and instruments to measure and record the wetting of the paper. The time required for complete penetration of the paper sample by water as measured by a chronometer included in the elec. circuit is a measure of the "wet-strength" of the sample. Wilhelm Segerblom

Papermaking properties of holocellulose. Harold H. Houtz and Ervin F. Kurth. *Paper Trade J.* **109,** No. 24, 38–41(1939).—Material approximating holocellulose (**A**) was prepd. by a method adapted from the quant. procedure developed by Van Beckum and Ritter (*C. A.* **31,** 6458[8]). A 2nd fraction (**B**) was obtained by extg. part of **A** with 0.5% $(NH_4)_2C_2O_4$ soln. at 90°; chem. analysis indicated that a small amt. of the pentosans and polyuronides had been removed. A 3rd fraction (**C**) was obtained by overchlorination and hydrolysis during the prepn.; analysis showed that more than half the pentosans had been removed and that the β-cellulose content had been considerably increased. A 4th fraction (**D**) was obtained by extg. part of **C** with 17.5% NaOH, resulting in a pulp with α-cellulose content comparable to that of com. alpha pulp and low in hemicellulosic materials. The rate of change of freeness when these materials were processed in a lab. beater indicated that the less-resistant forms of cellulose (β- and γ-celluloses), pentosans and polyuronides have an important influence on hydration. The phys. tests indicated that good fiber-fiber bonding and high initial individual fiber strength were obtained with **A** and **B**; good bonding was also obtained with **C**, but the fiber strength had been decreased by degradation of the cellulose or by breaking up of the fiber bundles; **D**, which was low in hemicellulose, was very resistant to beating and developed very poor strength characteristics. **A, B** and **C** aged much more rapidly than **D**, the aging of **C** being the most rapid. The results are believed definitely to substantiate the chem. theory of beating with the formation of gelatinous hydrate. It is evident that hemicellulosic materials play an important part in the development of this gelatinous hydrate, although it would be difficult to deduce just which constituent is definitely responsible for this action. The less-resistant cellulosic materials seem to play a very important part in this respect, while the polyuronides and the pentosans also exert a considerable effect. Aging appears to be accelerated by the presence of hemicellulosic materials, the degraded cellulose having the greatest effect. Probably the most important result of the work was the production of a pulp which not only could be beaten to a glassine stock in a very short time, but also developed some remarkable strength characteristics. The data show the desirability of conducting the cooking process, in the production of pulps to be used for highly hydrated papers, in such a manner that as much as possible of the hemicellulosic material is retained. A. Papineau-Couture

Instrumentation studies. XXXIV. Penetration of papers by liquids and solutions. 1. General discussion of the phenomena. Staff of the Institute of Paper Chem-

istry. *Paper Trade J.* **110**, No. 4, 44–50(1940); cf. *C. A.* **33**, 9638⁹.—Current theoretical descriptions of the flow of liquids and solns. through such porous and fibrous materials as paper are summarized. Tests employed to evaluate paper for various uses involving penetration by liquids and solns. are discussed in the light of these theories. A. Papineau-Couture

The fluorescence size test, an improved method and a new instrument for measuring the water resistance of paper. J. A. Van den Akker, Philip Nolan, A. C. Dreshfield and H. F. Heller. *Paper Trade J.* **109**, No. 21, 33–42(1939).—Expts. leading to the development of a new method for measuring the water resistance of paper are described. The transudation of water is detected by a fluorescent indicator which exhibits strongly a so-called "concn. effect." This characteristic of the fluorescent indicator distinguishes it from other indicators of transudation of water, mainly as regards error due to water vapor permeability of the paper under test. Data and observations are given which indicate that transudation times obtained with the fluorescent indicator are subject to negligible error due to water vapor. The development of an objective method involving photoelec. recording of the fluorescence intensity is given, and data on the influence of a no. of variables are presented. With the photoelec. equipment, it was found that the typical probable error in the mean of 10 observations was 1.5%. A. Papineau-Couture

The Neenah expansimeter. A method for measuring the expansion or contraction of papers caused by change in relative humidity. J. A. Van den Akker. *Paper Trade J.* **109**, No. 22, 105–6(1939).—A sensitive spirit level vial is supported at one end from the lower end of the test specimen (cut in the form of a long strip) and at the other end by a pair of sharply pointed wire feet. The test specimen is supported at its upper end by a simple micrometer arrangement; the lower end of the strip is maintained at const. elevation by means of the spirit level vial, and changes in length are measured at the upper end by means of the micrometer. The pitch of the micrometer screw and the length of specimen are chosen so that the percentage change in length may be read directly from the micrometer dial. A. Papineau-Couture

The Meyers consistency controller and volumetric stock meter. S. E. Meyers. *Paper Trade J.* **110**, No. 5, 13–16(1940).—A description of the latest model of this instrument, which is an improvement on earlier models, together with a discussion of its merits. A. P.-C.

Lubrication, with special reference to paper-mill machinery. D. T. McHutchison. *Proc. Tech. Sect., Paper Makers' Assoc. Gt. Brit. & Ireland* **20**, Pt. 1, 173–82 (1939). C. E. Curran

A practical alum test. L. H. Donnally. *Paper Ind. Paper World* **21**, 1083–4(1940).—Prep. a 0.1% soln. of papermakers' alum ($Al_2(SO_4)_3.18H_2O$); to 2 drops of this soln. on a spot plate add 2 drops of a soln. contg. 100 g. $AcONa.3H_2O$ and 30 cc. glacial AcOH per l., and then 1 drop of 0.05% soln. of hematein in 95% alc., and note the deep purplish coloration. Dil. the standard alum soln. with an equal vol. of mill water and repeat the test; continue making the test after successive dilns. till no purplish coloration appears in 1 min. Run the same test on white water or any other alum-contg. soln. to be tested, and from the resp. dilns. at which no coloration appears in 1 min. in the standard and sample, calc. the alum content of the latter. A. Papineau-Couture

Colorimetry for paper. W. E. Rand. *Pulp Paper Mag. Can.* **41**, 13–18(1940).—A discussion explaining and emphasizing the advantages of numerical over visual measurements of color. A. Papineau-Couture

Some of the paper problems in multicolor offset printing. Charles G. Weber. *Paper Trade J.* **109**, No. 16, 29–33 (1939).—A discussion of the causes of register troubles. The soln. of the problem lies in the prepn. and conditioning of papers. To be properly prepd. for multicolor printing, paper must be in equil., with relative humidity about 5–8% above the pressroom condition. A. Papineau-Couture

The fundamental scattering and absorption coefficients of dyed hand sheets. Wm. J. Foote. *Paper Trade J.* **109**, No. 25, 31[c]–8(1939); cf. *C. A.* **33**, 4029⁸.—The direct proportionality of the concn. of dye solns. to the log of their light transmission holds accurately for the range within which it was used to det. dye retention, but does not hold for high concns. An equation was developed for calcg. the retention of each dye component in a hand sheet dyed with 2 dyes of the same class. For basic dyes, the exptl. data obtained indicated that, in most cases, neither component interfered with the absorption of the other in the range studied; differences in retention due to this interference were less than 4%. The fundamental assumptions made in extending the theory of Kubelka and Munk concerning the diffuse reflection of light from homogeneous media to the more complex systems contg. pulp plus 1 or more dye components were investigated with the following results: (1) Pulp and dye do not in general absorb light independently of each other, since the absorption coeff. per g. of retained dye varies with different pulps. (2) The scattering coeff. of a dyed hand sheet is practically independent of the dye for dyeings up to 1 lb. per 1000 lb. of stock, but it decreases appreciably for heavier dyeings. (3) The absorption coeff. of a mixt. is generally less than the sum of the resp. coeffs. of the components and may be taken as equal to the sum only for purposes of approximation. The assumption that the absorption coeff. of dye in a hand sheet is directly proportional to the amt. of dye present on the fiber is in error; the proportionality is approx. a straight-line function in the range up to 3-lb. dyeings, but deviates strongly with heavier-wt. dyeings. The empirical relationship is presented in graphic and tabular forms. A. Papineau-Couture

Coating paper on the paper machine. G. K. Dickerman. *Paper Mill* **61**, 15–19(Dec. 31, 1938).—The Massey process is described. B. C. P. A.

Paper-machine coating processes. Peter J. Massey. *Tech. Assoc. Papers* **22**, 213–16(1939); *Paper Trade J.* **109**, No. 16, 34–7(1939).—A review of the existing processes relating to coating of printing papers on the paper machine, commenting on the principle involved and mentioning printing developments. Consideration is given to costs involved and the nature of the coating mix. A. Papineau-Couture

The Ortho-Krome process of coating paper. Albert B Hurley. *Tech. Assoc. Papers* **22**, 216–19(1939); *Paper Trade J.* **109**, No. 16, 37–40(1939).—A description of a coating process utilizing the printing principle to reduce glare from the paper surface. A. Papineau-Couture

Antitarnish paper. Herbert W. Rowe and Otto Kress. *Paper Trade J.* **110**, No. 2, 33–6(1940).—The presence of H_2S is the most important factor in the tarnishing of Ag. Cu acetate and Cd acetate are the most effective in protecting Ag from tarnishing. Furthermore, these salts impregnated in paper absorb H_2S preferentially to Ag wrapped in plain paper. Cu acetate is preferable to Cd acetate because of the high cost of the latter. Antitarnish kraft papers impregnated with 2.3% Cu acetate are at least 10–20 times more effective in preventing the tarnishing of silverware by H_2S than are the unimpregnated antitarnish kraft papers. Paper contg. 1.4% CuO (added as $Cu(OH)_2$ to the beater furnish) is at least 10 times more effective than the same paper without CuO, from the standpoint of its ability to prevent the tarnishing of Ag in an atm. of H_2S. Impregnation does not impair the phys. characteristics of the paper. A. Papineau-Couture

Fundamentals of glassine transparency. III. Sheet properties. Dan B. Wicker. *Paper Trade J.* **110**, No. 1, 36–42(1940); cf. *C. A.* **33**, 859⁹.—Surface characteristics of a sheet are important factors in detg. transparency, but not necessarily the limiting factors so far as the results of current com. practice are concerned. The presence of air voids within the sheet is the single factor which has the greatest deleterious effect on transparent qualities. The presence of mineral constituents in proportions of less than 1% has a definite but minor effect on quality. There is a lack of evidence to indicate that the max. attainable transparency of glassine paper is seriously limited by the birefringent properties of cellulose fibers. The addn. of a small

amt. of dye to the furnish for glassine paper seems to have a rather marked beneficial effect on transparency. A photomicrographic study indicated that the residual effect of the contour of the paper machine wire on the properties of the glassine sheet is the greatest contributory factor toward producing undesirable air voids. The practical interpretation of the exptl. results is discussed.
A. Papineau-Couture

Moisture-vapor proofness of wrapping materials used on frozen foods. Clarence W. DuBois and Donald K. Tressler. *Paper Trade J.* **109**, No. 20, 15–18(1939).—On the assumption that a paper or other wrapping material adequately protects meat and other foods from dessication if, at 5°F., it transmits not more than 3 g. of moisture vapor per sq. m. per 24 hrs., and if in addn. the material is not stained by blood or by grease and does not become brittle at low temp. or impart a flavor to the food, 13 of 25 materials tested were considered satisfactory for use in packaging foods for storage in refrigeration lockers.
A. Papineau-Couture

Effect of filler brightness on lined board brightness. W. R. Willets, R. T. Bingham and L. H. Eriksen. *Paper Trade J.* **109**, No. 23, 42–4(1939); cf. *C. A.* **33**, 9638[1].—The brightness of a lined board is shown experimentally to be dependent on the opacity and brightness of the liner, and on the brightness of the underlying filler. If the opacity and brightness of the liner are const., the brightness of the filler dets. the brightness of the board. If the brightness of the filler is const., the opacity and brightness of the liner dets. the brightness of the board. It is probably more feasible to increase board brightness by increasing the opacity and brightness of the liner than by increasing the brightness of the filler. It is possible to cover a filler of low brightness and secure good ultimate board brightness, even with light-weight liners, if the liner is pigmented with TiO_2.
A. Papineau-Couture

Native liquid motor fuels [alc. from sulfite liquor] (Hagglund) **21**. Solvation of compds. of high mol. wt. [properties of cellulose esters] (Rogovin) **2**. Rayon for tires (Yerkes, Jr.) **30**. Volumetric detn. of H_2SO_4 in permanganate solns. contg. H_2SO_4 [in paper and cellulose industry] (Becker) **7**. Soybean protein dispersions in formaldehyde solns. [for surface-sizing glassine paper] (Smith, Max) **13**. Elec. indicator and control app. for impurities in tank liquors of paper mills (U. S. pat. 2,183,584) **1**. Anisotrophy of cellulose sheet (Drummond) **2**. Mechanism of deformation of cellulose hydrate (de Booys, *et al.*) **2**.

Hunter, Dard: Papermaking by Hand in India. New York: Pynson Printers. 129 pp.

The Dictionary of Paper. Edited by **C. J. West**. New York: American Paper and Pulp Assoc. 365 pp.

History and Description of Paper Making. San Francisco: Crown Zellerbach Corp. 20 pp.

Making Paper. Edited by **A. G. Natwick, E. H. Nunn** and **M. K. Rawlings**. San Francisco: Crown Willamette Paper School of the Crown Zellerbach Corp. 519 pp.

Obtaining cellulose from wood, etc. Henry Dreyfus. U. S. 2,183,643, Dec. 19. In obtaining cellulose, suitable for manuf. of paper or cellulose derivs., from wood or other lignin-contg. cellulosic materials by heating with HNO_3 in amt. sufficient to convert all the lignin into alkali-sol. oxidation products and subsequently washing the material with alkali to dissolve the alkali-sol. products, the HNO_3 is used in admixt. with at least 10 times the wt. of the materials of an aq. lower aliphatic acid such as aq. HOAc of a concn. between 15% and 75%.

Centrifuge for acetylating cellulose or for other chemical reactions. Henri Argant, Henry Chanay and Georges Robatel (to Ateliers Robatel & Buffaud and Compagnie nationale de matières colorantes et manufactures de produits chimiques du Nord réunies, établissements Kuhlmann). U. S. 2,184,038, Dec. 19. Various structural, mech. and operative details.

Cellulose ethers. Horace F. Oxley, Edward B. Thomas and John Downing (to Celanese Corp. of America). U. S. 2,184,564, Dec. 26. A process of the manuf. of cellulose ethers contg. hydroxyalkyl or carboxyalkyl groups, such as cellulose hydroxyethyl ethers, involves impregnating cellulosic material such as wood pulp with an aq. soln. of a base such as NaOH in a concn. of 10–16%, subjecting the impregnated material to treatment under reduced pressure to remove water until the concn. of the base in the aq. soln. present is about 25–35%, and then etherifying with a reagent such as ethylene oxide.

Mixed esters of cellulose. Loring W. Blanchard, Jr., and Carlton L. Crane (to Eastman Kodak Co.). U. S. 2,183,982, Dec. 19. A mixed cellulose ester contg. dicarboxylic acid radicals such as those of phthalic or succinic acid and lower aliphatic acid radicals such as those of HOAc is prepd. by the reaction upon a lower aliphatic acid ester of cellulose of a bath contg. a dicarboxylic acid such as phthalic or succinic acid or its anhydride, an inert solvent for the mixed ester produced, such as Me Et ketone and 2–50% of water based on the wt. of cellulose ester initially present and addnl. to the 2–7% of moisture usually present in a lower aliphatic ester of cellulose (the bath being free from esterification catalysts and tertiary org. bases). Cf. *C. A.* **34**, 623[1].

Compositions of cellulose derivatives such as cellulose acetate. Harold A. Auden, Hanns P. Staudinger and Henry M. Hutchinson (to Distillers Co. Ltd.). U. S. 2,183,317, Dec. 12. A compn. suitable for films is formed of a cellulose ester of an org. acid, such as cellulose acetate, and an acetal contg. 2 O atoms and at least 7 C atoms and resulting from the condensation of an aldehyde with a monohydric alc. contg. a single O atom or a halogen substitution product of such an alc. Several examples are given.

Converting waste regenerated cellulose to cellulose xanthate. Giuseppe Donagemma and Piero Donagemma (to "Snia-Viscosa" (Società nazionale industria applicazioni viscosa)). U. S. 2,184,586, Dec. 26. A process of mfg. artificial textile fibers involves washing in running water and drying waste threads collected in the manuf. of rayon, treating the waste rayon threads in a NaOH bath at 16 to 17.5% for about 1.0–1.5 hr., wringing the waste threads to expel the excess of NaOH, disintegrating the alk. cellulose for about 2 hrs. at a temp. of 18 to 29°, allowing the cellulose to ripen for 25 to 35 hrs. at the temp., treating the ripened cellulose in a bath contg. about 7 l. CS_2 to 100 kg. alk. cellulose for about 1.5–2 hrs. while increasing the temp. to 22–24°, and treating the resulting xanthogenate for about 3 hrs. in mixing machines contg. 0.40 to 0.50% NaOH per 130 l. of water to 100 kg. alk. sulfuretted cellulose to obtain a cellulose suitable for spinning.

Marking cellulosic products such as sausage casings. Roger N. Wallach and Willard L. Morgan (to Sylvania Industrial Corp.). U. S. 2,183,948, Dec. 19. A process of mfg. a marked cellulosic material comprises applying an ink in the form of an indicium to a body, such as a sausage casing, composed of a cellulose deriv., such as viscose in the gel state (the ink having a water-miscible vehicle such as "Cellosolve" which is a solvent for the cellulose deriv.), and converting the deriv. into a cellulose hydrate.

Apparatus for the production of film or foil webs from solutions of cellulose or cellulose derivatives. Emil Czapek (to Guaranty Trust Co. of N. Y.). U. S. 2,183,255, Dec. 12. Various structural, mech. and operative details.

Spinning centrifuge suitable for use in rayon manufacture. Otto Bochmann (to American Bemberg Corp.). U. S. reissue 21,290, Dec. 12. A reissue of original patent No. 1,992,602.

Apparatus for making articles of die-molded and die-dried fibrous pulps. Walter H. Randall and Fred C. Harper (to Canal National Bank of Portland, Me., as trustee). U. S. 2,183,869, Dec. 19. Various structural, mech. and operative details.

Papermaking apparatus. Charles W. Howard (to

Black-Clawson Co.). U. S. 2,184,189, Dec. 19. Various structural, mech. and operative details.

Softening agents for paper, textile fabrics and leather. Herbert A. Lubs and Luther B. Arnold, Jr. (to E. I. du Pont de Nemours & Co.). U. S. 2,183,721, Dec. 19. An aq. treating medium is used contg. Na sulfamate or other sulfamate of the general formula H_2NSO_2X in which X represents H or a salt-forming radical, together with a long-chain alc. sulfate ester salt contg. 8 or more C atoms such as Na cetyl sulfate.

Rendering paper soft and flexible. Francis De Witt (to Pervel Corp.). U. S. 2,183,711, Dec. 19. App. is described, and a process of treating paper to render it soft and flexible which involves applying to the paper a soln. contg. water about 72–80 fl. oz. and about 28 fl. oz. of glycesol or other water-sol., stable polyhydroxy alc. or an ether or ester of such alc. having a b. p. above that of water, together with about 14–16 oz. of finely divided water-insol. inorg. filler such as Mg silicate capable of adsorbing the paper-softening agent, and removing the water from the paper.

Sized paper. Joseph A. Warren (to S. D. Warren Co.). U. S. 2,183,858, Dec. 19. An alk.-filled, uncoated paper is surface-sized with a size consisting essentially of soybean protein.

Basic sulfamate of quadrivalent titanium. Charles W. J. Wende (to E. I. du Pont de Nemours & Co.). U. S. 2,184,538, Dec. 26. A basic salt of quadrivalent Ti and sulfamic acid suitable for use in *treating paper* or *leather* or in *prepg. pigments* is formed by the reaction in aq. soln. of $TiCl_4$ and a sulfamate such as that of Pb the cation of which forms an insol. chloride.

Grease-proof paper. Warner J. Merrill (to E. I. du Pont de Nemours & Co.). U. S. 2,184,312, Dec. 26. A process for prepg. grease-proof paper suitable for use in packaging foods, etc., comprises mixing paper pulp before sheet formation with size contg. deacetylated chitin in an aq. medium, pptg. the deacetylated chitin on the paper pulp, forming the pulp into a sheet, drying and then swelling the pptd. deacetylated chitin by surface sizing the paper with size soln. contg. deacetylated chitin in an aq. medium.

Grease-proof paper suitable for wrapping foods, etc. Louis L. Larson (to E. I. du Pont de Nemours & Co.). U. S. 2,184,307, Dec. 26. A paper-manufg. process is employed which involves mixing paper pulp with size soln. contg. deacetylated chitin as the film-former, pptg the film-former on the paper pulp, applying to the sized fibers within the primary papermaking operation before drying the sheet formed from the sized fibers an aq. soln. of an acid swelling agent which swells the pptd. film-former without parchmentizing the fibers, allowing the swelling agent to react until the film-former is in a highly swollen condition, and before drying the sheet stopping the action of the swelling agent while the pptd. film-former is in a highly swollen state but before it has been dissolved to the sol state.

Carbon paper. Josef Burgmer. U. S. 2,183,474, Dec. 12. Various details of app. and operation.

Carbon manifolding paper. Allan K. Ohashi. U. S. 2,183,580, Dec. 19. A process for making manifold sheets comprises coating and impregnating a sheet of paper on and through one of its surfaces with a suitable normally solid carbon-contg. color compn. and then impregnating the sheet through its other surface with a plasticized cellulose nitrate compn. which solidifies on standing, to form a highly flexible impregnation.

Reclaiming constituents of waxed paper "broke." Arnold M. Hill (to National Oil Products Co.). U. S. 2,183,259, Dec. 12. The "broke" is disintegrated in water heated to a temp. sufficiently high to melt the wax constituent and the wax is emulsified with a mineral oil sulfonate and a sulfonated animal or vegetable oil, fat or wax, such as sulfonated sperm oil.

24—EXPLOSIVES AND EXPLOSIONS

C. G. STORM

Detonation limits of gaseous mixtures. P. Laffitte. *IIme Congr. mondial pétrole* **3**, Sect. 4, 738–43(1937)(in French).—L. defines the limit of detonation so as to include the limits of explosivity but to exclude therefrom the limits of inflammability. After a brief review of the work of various authors on the speed of propagation of the explosive wave a method of photographic recording is outlined which is used not only to mark off sharply the limits of detonation but to measure the speed of progagation of the explosive wave in regions where the explosive phenomenon is very little or not at all photogenic. Detonation limits have been studied for the following mixts.: H_2–O_2, H_2-air, CO–O_2, NH_3–O_2, C_3H_8–O_2, iso-C_4H_{10}–O_2, C_2H_2–O_2 and C_2H_2-air, Et_2O–O_2 and Et_2O-air. All the mixts. produced explosive waves propagating in a helicoidal trajectory. 17 references. E. J. Mahler

Explosion limits of gaseous mixtures. VI. Influence of the temperature on the limits of explosion of hydrogen-air mixtures. A. S. Sokolik. *Acta Physicochim. U.R.S.S.* **11**, 239–50(1939)(in French); cf. *C. A.* **32**, 5630⁸.—The lower explosion limit for H_2-air mixts. is 21% H_2 at 20–150°, decreasing to 18% at 400°. The water formed as a product of reaction retards the formation of the explosive wave and the ignition of the mixt. The force of the explosion wave is decreased to approx. half by passage through a region of temp. drop from 300 to 20°. F. H. Rathmann

The inflammable ranges of ethylene-air mixtures. J. S. Forsyth and D. T. A. Townend. *Engineering* **149**, 127(1940).—At atm. pressure, the inflammability range of C_2H_4-air mixts. extended from 3.1 to 15.5%. Between 27 and 40 cm. of Hg, a range of mixts. was found through which flame could not be propagated, although mixts. of higher or lower C_2H_4 content were inflammable. This range is assocd. with a mechanism giving rise to C deposition. Between 11.2 and 13 cm. of Hg a similar but smaller range was found. The mixts. ignitable at the lowest pressures are those exhibiting the greatest flame speed. Joseph H. Wells

A method for the analysis of technical trinitroxylene (xylyl). Ya. I. Leĭtman. *Trudy LKKhTI* **1939**, No. 7, 127–41; *Khim. Referat. Zhur.* **2**, No. 5, 66–7(1939).—A review of existing methods for the analysis of trinitro-*p*-xylene and nitro derivs. of ethylbenzene. For the detn of "xylyl oil," consisting mainly of the di- and the trinitro derivs. of *o*-xylene and ethylbenzene, dry at 80°, wash 10 g. on a Gooch filter first with hot water (0.75–1 l.), then with alc. to remove the oil drops. The decrease in wt. of the sample gives the content of "xylyl oil." In the product (freed from oil) det. the temp. of the beginning of the crystn. and the eutectic temp. The contents of trinitro-*p*-xylene and trinitro-*m*-xylene are found from the fusion diagram of the binary mixts. of these substances. The content of the nitro derivs. of ethylbenzene is detd by the sulfite method. Heat 10 g. of sample on a water bath with 120–30 cc. of a 5% soln. of Na_2SO_3, filter the insol. residue consisting mainly of a mixt. of the nitro derivs. of ethylbenzene and trinitro-*m*-xylene, dry the residue and det. the content of the nitro derivs. of ethylbenzene from the loss of wt. W. R. Henn

Explosion during the commercial extraction of cacao shells. Kattenstroth. *Feuerschutz* **20**, 6–8(1940).—The explosion occurred when, because of improper manipulation of the extn. app., the pressure of the extg. medium, C_2HCl_3, increased to 6–8 atm. in a machine which had been fitted with a defective cover. Leopold Scheflan

Liquid fires and how to fight them. H. H. Dierksen. *Marine News* **26**, No. 9, 49–50(1940).—A description of methods of extinguishing fires on shipboard. L. S.

Experiments on the protection of wood against fire by

the use of asbestos cement. Otto Drögsler. *Feuerschutz* **19**, 158–9(1939); **20**, 9–10(1940).—Fire tests in a four-room building are described. The resistance to fires of wood is increased by the use of asbestos-cement plates of a thickness of 4–5 mm. Leopold Scheflan

Waterproof package for explosives such as those for blasting. Floyd J. Rape (to American Cyanamid & Chemical Corp.). U. S. 2,184,166, Dec. 19. A container is used formed of at least 2 layers of material such as paper laminated with an intervening layer of moisture-impervious material such as a thermoplastic compn. contg. rubber and paraffin wax.

Apparatus for producing fire-extinguishing foam. Clyde M. Hamblin. U. S. 2,183,561, Dec. 19. Various structural, mech. and operative details.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Preparation of Indigosol Orange HR. M. K. Bezzubets and V. S. Rozina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 500–3(1939).—The theory and practice of the synthesis of the dye by the methods of Ger. pats. 424,981 and 563,958 (cf. Brit. pat. 247,787, *C. A.* **21**, 654) are discussed and a modified procedure of prepn. is suggested. C. B. 3

Attempts to prepare sulfur dyes from rosin. R. Kishore and K. C. Mukherji. *J. Sci. Tech., India* **4**, 23–6(1938). – Abietic acid, m. 154–5°, was nitrated by 3 different methods (Dubourg, *C. A.* **22**, 593; Goldblatt, Lowy and Burnett, *C. A.* **24**, 3019) with HNO_3 of sp. gr. 1.42 and as a third component CCl_4, H_2SO_4 sp. gr. 1.84, and 94% EtOH, resp. The products were not cryst. and decomp. at about 142°, 170° and 130°. Analysis for N showed 6.87% and 7.20% for the products from the first 2 nitration methods. They were apparently dinitro compds. Brown dyes differing only in shade were obtained from 10 g. nitro compd., 15 g. S, 42 g. Na_2S (cryst.), 50 cc. H_2O by refluxing 15 hrs. The dye was pptd. by blowing in air. Previously scoured cotton twill was dyed in a bath contg. 0.31 g. dye, 0.62 g. Na_2S (cryst.), 0.08 g. Na_2CO_3 and 20 cc. H_2O. The dyed cloth was treated with 25 cc. of soln. contg. 1% $K_2Cr_2O_7$, 1% $CuSO_4$ and 1.5% AcOH for 0.5 hr. at 50–5°. The light brownish shades obtained were not deep enough to be satisfactory but may prove useful for hand-spun yarn. Amino compds. were prepd. by reduction of the nitro compds. with Zn and HCl and used to make S dyes. The dyes were not very different from those obtained from the nitro compds. 4

A. J. Stirton

Analysis of naphthols of the AS group. K. D. Shcherbachev. *Org. Chem. Ind.* (U. S. S. R.) **6**, 249–52(1939). – The volumetric detn. is based on the soly. of arylides of 2-hydroxy-3-naphthoic acid (I) in pyridine (II) and the easy diazotization of the solns. with PhN_2Cl. In the presence of excess II the pptn. of the azo dye and naphthol during the titration is prevented. The usual admixts. of free I in com. azo colors can be extd. with aq. $NaHCO_3$ and the insol. arylides of I are then detd. in the filter cake. More accurate results can be obtained by titrating an arylide in 2 sep. weighings with and without the preliminary sepn. of I. If desired, I can be detd. in the $NaHCO_3$ filtrate by titration with PhN_2Cl. Moisten a 0.3–0.4-g. sample with 1–2 ml. alc. and dissolve in 5–7 ml. of hot *N* NaOH. Dil. to 50 ml. with water, add 1–2 drops of phenolphthalein and pass CO_2 until the soln. is decolorized. Filter on a Büchner funnel, wash the ppt. with water, transfer it with the filter into a beaker, dissolve in about 50 ml. II (b. 120–40°) (depending on the soly. of the I arylide) and titrate at 5° with 0.05 *N* PhN_2Cl until the drop test with H acid gives a permanent color reaction (5 min.). Dissolve a 0.3–0.4-g. sample in 50 ml. II and titrate directly with PhN_2Cl as above. Calc. the I arylide from the difference of the 2 detns. To det. the primary amines in I arylides, triturate a 5-g. sample with 5 ml. of concd. HCl and 50 ml. H_2O, add 1 g. KBr and titrate with 0.1 *N* $NaNO_2$ at 15–20°. Chas. Blanc 5 6

The use of sodium hyposulfite in the quantitative splitting of azo dyes. Victor I. Zaraus. *Bol. soc. quim. Peru* **5**, 124–33(1939).—A quant. method for the splitting of azo dyes based on the following reactions is presented: $4NaHSO_3 + Zn \rightarrow ZnSO_3 + Na_2SO_3 + 2H_2O + 2Na_2S_2O_4$; $2Na_2S_2O_4 + 8H_2O + RN{=}NR' \rightarrow 4NaHSO_4 + 3RNH_2 + 3R'NH_2$. 0.1 to 0.5 g. of the dye is shaken up with 10 cc. of a standard $NaHSO_3$ soln. and 3 g. of Zn. After standing 5 min. 1 cc. of glacial acetic acid is added and after 10 min. more 5 g. of $NaHCO_3$ and the soln. titrated with standard iodine soln. Results using methyl red and Congo red are given and a total of 6 dyes have been tried using this method. Oden E. Sheppard 7

Investigation of mordants on fibers as a means of identifying the dyes used. P. Baffroy. *Teintex* **5**, 9–14 (1940).—Animal fibers are burned and then heated with HNO_3 or NH_4NO_3 to complete the oxidation. A white residue indicates presence of Al, Ca, Sn, Sb, Si, Ba, clay, W or Ti. A brown or yellow-brown ash shows the presence of Fe alone or mixed with some white ash. A brown or brown-black residue indicates Cu, Mn, Ni, Co or Cr. A gray-green ash indicates Cr. Methods of testing for these elements are included. Saverio Zuffanti 8

Fast greens on woolen cloth. Raffaele Sansone. *Textile Colorist* **61**, 674–6, 708(1939).—Procedures and formulas are given for dyeing with Indigosol Green 1B, Alizarinecyanine greens, Erio Green B, Palatine Green GN, Anthranlan Green GG and Metachrome Green WL; and for printing with Fast Palatine Green BGN, Alizarinecyanine GT, and the Indigosols. R. K. W. 9

Use of continuous processes in dye industry. N. N. Vorozhtsov, Jr. *Org. Chem. Ind.* (U. S. S. R.) **6**, 422–3 (1939).—The review of known processes for the continuous production of dye intermediates includes the production of phenols, naphthols and their derivs. from the corresponding chlorides and sulfonic acids by decompn. with aq. alkalies, obtaining of amines from PhCl and $C_{10}H_7Cl$ with NH_4OH and reduction of nitro compds. with H in the presence of catalysts. Ten references. Chas. Blanc 10

Note on the absorption of substantive dyes by oxycelluloses of the acidic type. S. M. Neale and W. A. Stringfellow. *J. Soc. Dyers Colourists* **56**, 17–18(1940).—The reduction of affinity consequent upon oxidation of cellulose has been examd. quantitatively and a possible mechanism is suggested. The remarkable effect of relatively mild oxidation on the dye absorption is shown in a curve in which the amt. of Sky Blue FF absorbed at equil. under the same conditions by various oxycelluloses is plotted against the COOH-group content. In the acidic type of oxycellulose COOH anions form an integral part of the solid structure and retain them near their corresponding cations. The greater the no. of sulfonic groups in the dye, the greater is the decrease in absorption for a given oxycellulose compared with the absorption for unoxidized cotton. The supposition is confirmed by recorded results on dyeings of alk. hypobromite oxycelluloses by 2 groups of dyes contg. 2- and 4-sulfonic groups, resp. The actual values of absorption on standard cotton are lower for the group of dyes contg. sulfonic groups in the mol. W. H. Boynton 11

Indanthrene dyeing of cotton in the "Proletarkaja Pobeda." Ryabtsev and Drushinin. *Sherstyanoe Delo* **17**, No. 5, 51–6(1938); *Chem. Zentr.* **1938**, II, 3462.—Cotton was uniformly dyed by use of a bath of the following compn.: Indanthrene Blue BO in paste 9.0%, Sulfur Black Tsch F 5.5%, hyposulfite (85%) 13.0%, NaOH (40°Bé.) 18.0%, alizarin oil 5.5% and glue 2.7%. Incomplete washing out of the alizarin oil is suggested as the cause of large amts. of waste during the spinning of dyed cotton. W. A. Moore 12

Equalizing and penetration in the dyeing of textiles.

G. Schwen. *Melliand-Textilber.* **21**, 17–28(1940).—Improper prepn. of the goods is inimical to even dyeing as is shown by colored pictures illustrating dyeing defects caused by the local action (1) of alkali, acid, light and pptd. lime soaps on wool and (2) of uneven bucking, acids and oxidation agents (bleaches) on cotton and (3) of oil residues on rayon. Other colored pictures show the beneficial effects, on evenness of dyeing, of dyeing at higher temps., prolonged boiling in the dye bath, choice of proper pH depending on the dyestuff being used, use of surface-active agents to ensure even wetting of the goods and use of agents to prevent the dyestuff being taken up too rapidly by the fiber. The latter agents are (*a*) those having affinity for the fiber (e. g., Igepon T or Gardinol with wool) and (*b*) those having affinity for the dyestuff (e. g., certain highly oxygenated compds. such as Palatine Fast Salt O with Palatine Fast Blue GGN or Peregal O with Chicago Blue 6B). J. W. Perry

The dyeing of buttons. Oskar Giessler. *Klepzig's Textil-Z.* **43**, 142(1940).—Artificial horn buttons (manufd. from casein, HCHO and fillers) are dyed usually without any preliminary prepn. in a soln. highly acid with H_2SO_4 in the absence of Glauber's salt; in some cases AcOH may be used. Sp. directions are given. Leopold Scheflan

Fading of dyed textiles by radiant energy. Matthew Luckiesh and A. Hadley Taylor. *Illum. Eng.* **35**, 169–72 (1940).—Forty specimens of dyed cotton, wool and silk of grades 0 to 4 (appreciable fading in sunlight after 6, 12, 24, 48 and 96 hrs.) were exposed to fluorescent "daylight" lamps and to 75-watt W lamps. In general, W lamps cause more rapid fading of blue, violet and purple specimens; and the fluorescent lamps, slightly more rapid fading of pink, yellow, orange and red specimens, regardless of whether the cloth is cotton, wool or silk. No dyed synthetic textiles were tested. Expts. are still in progress. C. G. F.

Newer ideas in textile chemistry. T. W. Whattam. *Can. Textile J.* **57**, No. 4, 34, 36(1940).—A discussion of the properties of surface-active agents designed for more efficient textile processing with particular reference to faster wetting-out, adsorption and wetting-out by orientation. Leopold Scheflan

Textiles from central Africa. Jos. Franz. *Klepzig's Textil-Z.* **43**, 133–7(1940).—An illustrated description of antiquated and modern methods of the manuf. and chem. treatment of textiles. Leopold Scheflan

Researches on hemp. Giuseppe Cotroneo. *Rend. accad. sci.* (Napoli) **8**, 63–75(1938).—In Acerra (Naples) 4 parcels of ground were seeded on April 11 in 4 different ways and fertilized with 3 different fertilizing compns. On May 25, June 4, June 25, July 20 and Sept. 9, samples were taken from 7700 plants that were sufficiently mature for industrial use. Cellulose, lignin and ash contents, resp., were: May 25, 43.3, 1.7, 15.4; July 20, 65.7, 2.2, 4.4; and Sept. 9, 67.3, 3.2 and 4.1%. The fibers were macerated by Rossi's method (biological maceration) (*C. A.* **22**, 1241) and the av. cellulose content increased from 65 to 85%, the lignin decreased from 2.3 to 2% and the ash decreased from 4.7 to 0.9%. The different fertilizing mixtures had little effect. The male hemp shows a less advanced state of ripening. V. S. de Marchi

The new synthetic polyamide fibers. Maria Broggi. *Chimica e industria* (Italy) **22**, 10–13(1940).—The story of nylon. Nylon will soon be produced in Italy under license. A. W. Contieri

X-ray study of the orientation of artificial fiber. I. V. A. Kargin and N. V. Mikhailov. *Acta Physicochim. U. R. S. S.* **11**, 343–60(1939) (in English).—Exptl. data on the strength and percentage elongation of wet and dry samples of cuprammonium rayon and viscose rayon variously prepd. and treated are given. In contrast to the theory of Mark and Meyer (cf. *C. A.* **23**, 1263), K. and M. hold, on the basis of these data, that the true equil. state is one in which the chain aggregates are in a more or less disordered arrangement, and that the elongation-approach to a true crystal is an unstable state. Highly swollen gelatin contg. only 2% α-cellulose shows 2 to 3-fold elongation and, like rubber, almost instantaneous shrinking. F. H. Rathmann

Linen threads and their manufacture. Clifford Carter. *Ind. Fibres Rev.* **4**, 104–8, 126, 128–9, 145–8(1939).—A detailed discussion of chem. and mech. treatments. Leopold Scheflan

The breaking strength of sized and unsized yarn. Edward Wood. *Cotton* (Atlanta) **104**, 45(Jan., 1940).—It has been found that 15% increased wt. in the warp yarn should give about 23% to 25% increased breaking strength. Properly cooked size mix in the size box will produce fairly consistent results. In some instances a decrease in twist will increase the breaking strength of the warp yarns in the cloth. If the yarn is spun with a little less twist than that giving the best skein breaks, when this twisting action takes place in the cloth the increase in the effective twist will bring each thread to its max. strength in the cloth where the ultimate test is anyway. W. H. Boynton

The microstructure of wool. II. Relationships between the curliness of Merino wool and refractive index. Kametaro Ohara. *Melliand-Textilber.* **20**, 326–8(1939); cf. *C. A.* **32**, 5633⁷.—Merino wool used in previous expts. was extd. with petroleum ether and dried and the Becke method used to det. the n_D^{23} of fibers embedded for various periods in mixts. of α-bromonaphthalene and oil of cloves. Tabulated data show (1) that after 2 days the outer side of the curly segments of the fibers had a lower n_D^{23} than the inner side and (2) that, as the period of contact with the embedding agent was increased, n_D^{23} for both outer and inner sides increased at different rates and approached the same upper limiting value after 6 and 20 days for inner and outer sides, resp. This suggests that the micellar structure of the outer side of the curly segments is less dense and requires longer for complete imbibition with the embedding medium. Perhaps the previously observed greater affinity for dyes of the outer side of the curly segments is due to the fact that the more open micellar structure is more favorable to fixation of larger dye particles. **III. Analysis of the swelling of curly wool.** *Ibid.* **21**, 1–3 (1940).—When curly wool fibers were mounted on microscope slides and treated either (1) with strong mineral acids (e. g., 62% H_2SO_4) or (2) at 75° with satd. aq. solns. of salts, e. g., $Ca(CNS)_2$, NaI, $Ba(ClO_3)_2$ or (3) with strong concd. org. acids, e. g., 80% AcOH, 85% HCO_2H, but not with weak concd. org. acids, e. g., 90% satd. citric acid or (4) with alc. NaOH, the swelling started at the outer side of the curve of the fiber and progressed continually across the fiber until the whole fiber was uniformly swollen. Fibrillar structure became clearly visible during the swelling process. The swollen parts appeared darker under crossed nicols. Swelling in aq. NaOH began both from the outer and inner sides of the curved fiber segments. J. W. Perry

The influence of moisture on the strength of cotton fabrics. M. V. Sadov. *Legkaya Prom.* **16**, No. 5, 84–8 (1937); *Chem. Zentr.* **1938, I**, 4398.—As a result of the change in its properties under the influence of atm. moisture, a yarn shows greater strength sometime after removal from the spinning machine (30 min.) than immediately thereafter. A rational schedule of operations is described for the collecting of the cops and testing of the yarn to det. such properties as tensile strength, fineness no. and extensibility. The procedure described should shorten to a min. the time (4–5 hrs.) between the first and last tests made on yarn of the same type and fineness and in this way eliminate differences in the measurements due to the effects of atm. moisture. M. G. Moore

Electrostatic charges on staple rayon when working in connection with spinning. R. Stoll. *Melliand-Textilber.* **21**, 3–6(1940).—Analysis of data on the intensity, in v., of electrostatic charge on staple rayon during spinning shows that the important factors are (1) the character of the rayon fiber, its moisture content and type of surface coating, if any, and (2) the intensity of the rubbing action as detd. by the coeff. of friction of the fiber surfaces, the area of rubbing, pressure on the rubbing surfaces and the speed of their relative displacement. Avoidance of card-

ing and spinning difficulties due to electrostatic charge is discussed. J. W. Perry

The German rayon and staple fibers in photomicrographs. B. Hauptmann. *Kunstseide u. Zellwolle* 22, 51-2(1940); cf. *C. A.* 34, 1181⁶.—Photomicrographs of 4 com. Cu rayon fibers are reproduced. M. P.

Funori: a new sizing agent for rayon. S. H. Kotak. *Indian Textile J.* 50, 119(1940).—Funori is a kind of seaweed growing in Japan and in Korea. It is dark pink in color and so must be bleached for use with textiles. $NaHSO_3$ is used and the bleached funori is then spread on a long wooden plank and sprinkled with hot water. It sticks together and is shipped in sheet form. Its compn. is: water 12.3, alginic acid 61.0, cellulose 26.0 and ash 0.7%. Advantages claimed for funori are: (1) increased elongation, pliability and strength of the sized rayon warp, (2) its neutral reaction rendering the addn. of alk. substances unnecessary, (3) no necessity for a desizing agent, (4) funori is not brittle in dry form, (5) the soln. does not putrefy even if stocked for several days and (6) the binding power of funori is less than that of starch but the viscosity is higher and less is needed, and (7) its emulsifying properties are good. W. H. Boynton

New advances in chemistry and processes for bleaching linen. R. Kuchinka. *Melliand-Textilber.* 20, 643-4, 706-9, 759-61, 804-6(1939).—Modern ideas as to the chemistry of the components of unbleached linen fibers are reviewed at length. Removal of undesirable lignin, pectin, protein, wax and fat and colored components with min. damage to the cellulose (I) can be accomplished only by careful process control. For this reason it is necessary to use dil. alk. solns. for bucking, to control the pH of the hypochlorite bleach so as to avoid a pH of 6-8 and extremes of high or low pH and to avoid the presence in H_2O_2 bleaches of catalysts, e. g., metals such as Fe, which catalyze conversion of the ions, O_2H^- or O_2^{--}, which bleach with min. damage to I, into atomic O having a strong degrading action on I. J. W. Perry

A method of bleaching semilinen fabrics. N. K. Semenov. *L'no-Pen'ko-Dzhutovaya Prom.* 8, No. 5, 46 (1938); *Chem. Zentr.* 1938, II, 3483.—Semilinen fabrics are woven from cotton yarn and linen yarn which has previously been semibleached by boiling twice and bleaching with Cl. In this process the linen yarn loses 18–20% of its strength. By the addn. of emulsifiers (kerosene and soap) during the boiling, boiling only once and bleaching are sufficient. The bleaching action is as effective, the strength of the yarn is increased, and the cost reduced. M. G. Moore

Modern mercerizing. I. Lewis Thompson. *Textile Recorder* 57, 33-5(Jan., 1940).—The year 1940 marks the 50th anniversary of the discovery of mercerizing cotton under tension for the production of luster. John Mercer patented a method of swelling cellulose by solns. of NaOH at room temps. and lower temps., also of producing the effect by means of certain concns. of H_2SO_4 at room temp. and concd. solns. of $ZnCl_2$ at a moderately high temp. The discovery of the conditions under which a high degree of luster can be obtained in the mercerizing process was made by Horace Lowe. **II.** *Ibid.* 31-3(Feb., 1940).—Long staple cottons give good results in mercerizing. The hairs in the yarn should be as parallel as possible and the NaOH must penetrate the fibers evenly and rapidly; both properties require a soft spun yarn. The temp. of the mercerizing liquor should not exceed 18°. Most modern mercerizing processes allow the material to shrink in the alkali, in order to assist thorough penetration, and then apply the tension later, immediately before or during the removal of the alkali. Max. luster and max. affinity for dyestuffs are not obtainable simultaneously. W. H. Boynton

Characteristics of textile casein. E. Pijanowski. *Poradnik Mleczarski i Fajczarski*, No. 23, pp. 19-22 (1938)(in Polish with English summary); *Dairy Sci. Abstracts* 1, No. 1, 24.—The general uses and properties of casein are given and a method for the prepn. of textile casein is outlined. Two samples of Italian manuf., 2 made by the Dutch method, 2 made locally and 1 sample of casein pptd. with lactic acid were fully analyzed chemically and physically and on this basis a standard is suggested for the compn. of textile casein. The Dutch method of manuf. dispenses with filters and is economical. C. L. B.

Deposition of artificial resins in textiles. Fritz Ohl. *Kunstseide u. Zellwolle* 22, 32-4(1940).—Cellulose fibers were impregnated with a soln. of 100 g. urea, 50 g. phthalic acid and 110 cc. H_2O, dissolved hot, and cooled; then 250 cc. of CH_2O soln. and some sucrose were added to prevent premature sepn. of resin with the subsequent pressure treatment. This resulted only in surface coating of the fibers, which was not very effective. Deposition of resin throughout the fiber was obtained by impregnating first with the urea-phthalic acid soln. and then adding the CH_2O during the pressure treatment. This treatment makes the fibers water- and wrinkle-proof and "animalizes" them with regard to their dyeing properties. Mark Plunguian

Damage done by alkalies. T. F. Heyes. *Textile Recorder* 57, 30–31, 33(Jan., 1940).—Faults often occurring in textiles, particularly in the case of wool and mixts. contg. wool, which are ascribable to the use of alkalies. W. H. Boynton

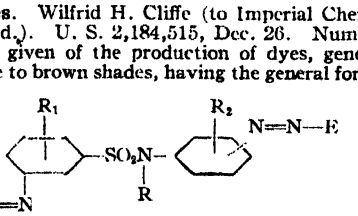
Application of light-weight and ultra-light-weight alloys in the textile industry. Albert Nau-Touron. *Bull. soc. ind. Rouen* 67, 61-76(1939).—A discussion. C. R. P.

Removing forty-one kinds of stains. Joseph F. Krawiec and Pauline B. Mack. *Laundryman* 6, No. 1, 5–7, 18–19; No. 2, 7-8, 18(1940).—Sp. instructions are given for removing 26 medicinal and 15 miscellaneous stains commonly met with in institutional laundering. In general the use of boiling soap baths and the repetition of multiple suds treatments is recommended as being less harmful to the fabric than increasing the amt. of bleaching agent. Many stains require special treatment. C. R. P.

Utilization of seed of *Plantago psyllium* [for dye printing] (Bottini) **27**. Ethers and ether-esters of lac and their polymerization [impregnating and coating agents for textiles] (Gidvani) **26**. Treatment of S dye waste for activated sludge process (Porges, Miles) **14**. Synthesis of analogs of Fast Black Base LB (Bogoslovskiĭ, Tsil'man) **10**. Naphthoylenediethoxybenzimidazole and structure of Indanthrene Red-Brown 5 RF. (Grachev) **10**. Condensation products of *m*-dialkylaminobenzaldehyde with compds. contg. reactive methylene groups [dyes] (Cocker, Turner) **10**. Elec. indicator and control app. for impurities in tank liquors of dye works (U. S. pat. 2,183,584) **1**. Softening agents for textile fabrics (U. S. pat. 2,183,721) **23**.

Monoazo dyes. Richard Fleischhauer (to General Aniline Works). U. S. 2,183,489, Dec. 12. From components such as 2-aminobenzenesulfonic acid and 5-acetylamino-2-naphthol-8-sulfonic acid, dyes are produced of the general formula 1-(HO_3S-aryl-N:N)-2-HO-5-acylamino-8-$HO_3SC_{10}H_4$, where aryl means a radical of the benzene series, the —SO_3H group being attached thereto in ortho position to the azo group and no halogen atom standing in the other ortho position to the azo group, which dyes dye wool and silk clear orange shades of good fastness to light.

Disazo dyes. Wilfrid H. Cliffe (to Imperial Chemical Industries Ltd.). U. S. 2,184,515, Dec. 26. Numerous examples are given of the production of dyes, generally dyeing orange to brown shades, having the general formula

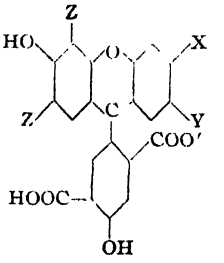


in which the group —N=N—E is in one of the positions meta and para to —NR—; R is one of a group consisting of alkyl having 1–4 carbons and aralkyl; R_1 and R_2 are

from the group consisting of H, alkyl, alkoxy and halogen; and E is the residue after coupling in basic medium of an azo dye coupling component of a group consisting of naphtholsulfonic acids, aminonaphtholsulfonic acids, alkylaminonaphtholsulfonic acids, hydroxyalkylaminonaphtholsulfonic acids, aralkylaminonaphtholsulfonic acids, acylaminonaphtholsulfonic acids, arylpyrazolonesulfonic acids and *N*-substituted amino derivs. of naphtholsulfonic acids, the *N*-substituted amino group being —NHC_6H_3XY, where X is not more than two members of the group consisting of H and methyl, and Y is one of a group consisting of H, Cl and sulfonic acid.

Copper compounds of primary resorcinol trisazo dyes. Fritz Dobler and Hans Buess (to J. R. Geigy A.-G.). U. S. 2,183,673, Dec. 19. A process for the production of Cu compds. of primary resorcinol trisazo dyes involves treating a water-sol. Cu salt with a trisazo dye of the general formula, 1,3-$(HO)_2C_6H(N:NR_1)(N:NR_2)(N:NR_3)$, where R_1 means the radical of the first coupled diazo compd. made from a negatively substituted *o*-aminophenol, R_2 means the radical of the secondly coupled diazo compd. made from any desired aromatic amine and R_3 means the radical of the finally coupled diazo compd. made from an aminodiphenylaminesulfonic acid, the trisazo dye being made in this order of coupling in alk. soln. The resulting Cu compds. give clear brown dyeings on silk and *leather*.

Chromable dyes of the triarylmethane series. Wilhelm Eckert and Karl Schilling (to General Aniline Works). U. S. 2,183,237, Dec. 12. Several examples are given of the production of dyes, dyeing wool orange-yellow to red tints, made darker and faster by after-chroming, having the general formula



where X represents an ethyl-substituted amino group, Y H or methyl, Z H or Br. Cf. *C. A.* **34**, 1191[7].

Dyes of the naphthalene series. Rudolf Robl (to General Aniline Works). U. S. 2,183,870, Dec. 19. Dyes suitable for dyeing acetate rayon greenish blue shades are produced by causing a naphthazarin intermediate product in the presence of a reducing agent such as Na hyposulfite to react with a *p*-aminophenol benzyl ether and oxidizing the leuco compd. thus formed. U. S. 2,183,871 relates to dyes for cellulose esters and ethers prepd. by condensation of a naphthazarin intermediate product with an alkylamine, aralkylamine or cycloalkylamine in the presence of a reducing agent and oxidizing the leuco compds. formed.

Vat dyes of the anthraquinone series. Otto Schlichting and Karl Koeberle (to General Aniline Works). U. S. 2,183,873, Dec. 19. By various reactions, vat dyes are obtained which dye fibers such as cotton generally yellow to brown shades and which have the general formula $A(NHCORCH_2N(X)Y)_n$, where A stands for a radical of the anthraquinone series, R for a benzene radical, X for H or alkyl, Y for H or an amino, alkyl, aralkyl, cycloalkyl, aryl or heterocyclic radical and *n* for an integer less than 3. Numerous examples are given.

Reduction products of *Bz*-2,*Bz*-2′-dihydroxydibenzanthrone (dyes and intermediates). Otto Stallmann (to E. I. du Pont de Nemours & Co.). U. S. 2,183,625, Dec. 19. Various examples with details are given, among which is the production of a stable reduction product of *Bz*-2,*Bz*-2′-dihydroxydibenzanthrone in the free hydroxy form which on isolation is a brownish black cryst. solid stable to air oxidation under ordinary atm. conditions, which dyes cotton from a blue alk. hyposulfite vat in olive shades; the compd. is sol. in concd. H_2SO_4 with a blue color from which it may be pptd. without decompn.; it is obtainable by heating an alk. hyposulfite vat of *Bz*-2,*Bz*-2′-dihydroxydibenzanthrone, the alky. of which has been reduced to a pH value of from 9 to 12 at from 60–90° until the mono alkali metal salt has been completely pptd., filtering off the alkali metal salt and heating the same with acids at a temp. of about 60°. The products may be brominated if desired and the brominated products may be used in prepg. compds. for *coloring oils, gasoline*, etc., generally giving olive shades. Cf. *C. A.* **33**, 4053[8]. U. S. 2,183,626 gives numerous examples involving treating leuco dibenzanthrones or their stable reduction derivs. with an alkylene oxide such as ethylene oxide at temps. of about 100–190° for the production of hydroxyalkyl leuco ethers which are generally of red color, relatively insol. in water but highly sol. in org. solvents such as benzene and which may be further esterified with inorg acids to form water-sol. esters. U. S. 2,183,627 relates to prepg. alkylol and cycloalkylol ethers of *Bz*-2,*Bz*-2′-dihydroxydibenzanthrone by heating *Bz*-2,*Bz*-2′-dihydroxydibenzanthrone with an α,β-alkylene oxide until one alkylol group has been introduced into the mol., further treating the monoalkylol ether of the *Bz*-2,*Bz*-2′-dihydroxydibenzanthrone with an alkylating agent substantially completely to etherify the remaining *Bz*-2′ hydroxy group and sulfonating the free OH group of the alkyol ether radical by subjecting the resulting compd. to the action of a sulfonating agent of the class consisting of concd. H_2SO_4, SO_3 and SO_3-liberating agents, at temps. below 100°. *Bz*-2,*Bz*-2′-Dihydroxyisodibenzanthrone may also be used as initial material, and products are obtained which dye fast green or blue shades. Various examples with details are given. U. S. 2,183,628 relates to prepg. long-chain aliphatic acid leuco esters of dibenzanthrone compds., such as the dilaurate of *Bz*-2,*Bz*-2′-dimethoxydibenzanthrone, by treating a leuco dibenzanthrone compd. or stable reduction deriv. with an aliphatic acid chloride or anhydride. Products are obtained suitable for coloring oils, etc., and numerous examples with details are given.

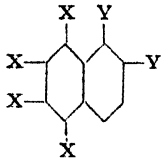
Mordant. Harold E. Bode (to Corn Products Refining Co.). U. S. 2,183,390, Dec. 12. See Can. 383,688 (*C. A.* **33**, 9008[4]).

Dyeing materials such as acetate rayon containing polyvinylchloroacetate. Paul Schlack (to I. G. Farbenind. A.-G.). U. S. 2,183,754, Dec. 19. In dyeing a fibrous textile material contg. nonbasic radicals capable of being converted into basic condition or contg. basic radicals capable of being converted into more strongly basic condition, by treatment with a medium contg. a dye having an acid group, there is added to such medium a substance, such as ethylenethiourea, which will produce such a conversion of such radicals in the textile material. Numerous examples are given.

Dyeing cellulose derivatives such as cellulose acetate. James G. McNally and Joseph B. Dickey (to Eastman Kodak Co.). U. S. 2,183,997, Dec. 19. Dyeing, generally yellow shades, is effected by use of nuclear nonsulfonated aryl azo derivs. of a 1,3-cyclohexanedione having an alkyl group in its 5-position. U. S. 2,183,998 relates to azo dye compds. suitable for like use and contg. an aryl nucleus of the benzene or naphthalene series the aryl nucleus of which carries a phosphoric acid ester group or a thiophosphoric acid ester group attached to an aliphatic radical contg. at least 2 C atoms which is joined to the aryl nucleus through an O atom which is a nuclear substituent of the aryl nucleus. Numerous examples are given. U. S. 2,183,999 relates to azo dyes suitable for like use which have the general formula R—N=N—R′ in which R represents the residue of a nucleus of the benzene series or benzothiazole series and R′ represents the residue of a 1-amino-5-hydroxynaphthalene or a 1-amino-5-alkoxynaphthalene nucleus in which the component from which R is derived contains a tetrahydrofuryl group attached to the N atom of the amino group in the

1-position through the C atom in the 2-position by a said. straight chain hydrocarbon radical.

Dyeing furs such as white rabbit fur. Mordecai Mendoza and Geo. S. J. White (to Imperial Chemical Industries Ltd.). U. S. 2,183,752, Dec. 19. A process of dyeing fur comprises pretreating the fur by the chrome-tannage process, giving the fur a pH between 6 and 7, immersing the pretreated fur in an approx. neutral soln. of a dye heated to about 40–90°, the dyes being made by coupling diazotized 4,6-dinitro-2-aminophenol and a coupling component represented by the formula



in which one X is hydroxy and the other X's are H and one Y is H and the other Y is amino, NH-alkyl, NH-aryl, NH-hydroxyalkyl, dialkylamino or NH-acyl; and continuing the immersion with periodic addns. of small amts. of org. acids until the dyeing of the fur is completed.

Color printing compositions for use on vegetable and animal fibers. Charles Graenacher and Max Matter (to Soc. pour l'ind. chim. à Bâle). U. S. 2,184,495, Dec. 26. Printing compns. are used contg. a dye such as Helindon Violet BB, which is fixed in insol. form on the fiber, a thickening agent such as "potash thickening" and ethylthioglycolic acid amide or other acid amide of the general formula $R_1SR_2CONR_3R_4$, where R_1 stands for a lower alkyl, hydroxyalkyl or alkoxyalkyl radical, R_2 stands for methylene, and R_3 and R_4 stand for H or an alkyl radical, which serves as an assistant.

Fixing coloring agents on cellulose derivatives such as cellulose acetate. Albert Mellor and Wm. Pool (to Celanese Corp. of America). U. S. 2,184,559, Dec. 26. App. is described, and a process of fixing org. coloring matter such as a direct dye on materials such as fabrics of cellulose acetate by subjecting the material, carrying the coloring matter, to the action of the satd. vapor of an org. liquid such as dichloroethylene which is chemically inert to the coloring matter.

Polyhydroxyfuchsone derivatives etherified with aliphatic groups. Zoltan Foldi (to Chinoin Gyógyszer és Vegyészeti Termékek Gyára R. T. (Kereszty és Wolf). U. S. 2,184,491, Dec. 26. *Dyeing, therapeutic* or *bactericidal compds.* are produced by a process which comprises oxidizing leuco triphenylmethane derivs. the benzene rings of which are substituted by substituents from the group consisting of H, alkyl, hydroxy, alkoxy, carboxy, sulfo, halogen and nitro; the total number of hydroxy and alkoxy substituents being at least 4 but not more than 6, while the no. of alkoxy substituents present is at least 1 and the number of hydroxy substituents present is also at least 1, one of the hydroxy substituents being in para position to the methane C atom; the hydroxy and alkoxy groups being distributed among the benzene rings in such manner that no benzene ring contains more than 2 members of the class consisting of these groups; 2 members of the group consisting of hydroxy and alkoxy being in mutual ortho position on one benzene ring. Details are given of the production of compds. such as: 3,3'-dimethoxy-4'-hydroxyfuchsone, m. about 186° and forming a cryst. hydrochloride; *m*-dimethoxy-*p*-dihydroxyfuchsone, decompg. about 248° and forming a hydrochloride decompg. about 203°; *m*-nitro-*m*-dimethoxy-*p*-hydroxyfuchsone, forming a hydrochloride decompg. about 152°; *m*-nitro-*m*-dimethoxy-*p*-dihydroxyfuchsone hydrochloride, decompg. about 192°; the corresponding free fuchsone, m. (decompn.) about 179°; *o*-diisopropyl-*m*-dimethyl-*m*-methoxy-*p*-dihydroxyfuchsone, m. about 230° and forming a hydrochloride in cryst. needles of metallic luster; *m*-methoxy-*p*-dihydroxyfuchsone, m. about 275° and forming a hydrochloride m. about 206°; *o*-dimethoxy-*p*-dihydroxyfuchsone hydrochloride, not m. up to 280°; *m*-amino-*m*-dimethoxy-*p*-dihydroxyfuchsone; *m*-amino-*m*-dimethoxy-*p*-hydroxyfuchsone; the Ca salt of *m*-methoxy-*p*-dihydroxyfuchsonesulfonic acid; and *m*-dimethoxy-*p*-dihydroxyfuchsone-*m*-carboxylic acid. Cf. *C. A.* **33**, 6346[1].

Apparatus for bleaching bast fibers with chlorine. Philipp Siedler, Erich Kayser, Helmuth Korte and Wilhelm Waibel (to I. G. Farbenind. A.-G.). U. S. 2,184,477, Dec. 26. An app. for chlorinating and bleaching bast fibers, for instance linen, hemp or the like by satd. or supersatd. Cl water comprises a bleaching vessel which is provided with devices for placing the material to be treated on cross wound bobbins, a device for producing the Cl water, a system of tubes and a pump to provide a continuous circulation of the Cl water through the bleaching vessel and the device for producing the Cl water and means for adjusting and maintaining the concn. desired of the Cl water. Cf. *C. A.* **33**, 4799[1].

Textile products. Joseph F. X. Harold. U. S. 2,184,041, Dec. 19. A vegetable textile material in natural form such as cotton is treated, as by nitration, to render it sol. without destroying its form, and is used together with one or more relatively insol. materials such as unnitrated cotton from which the solubilized material may be subsequently removed by use of a selective solvent.

Oil for treating textile materials. Walter Garner. U. S. 2,184,040, Dec. 19. A nonstaining oil not darker than a medium color is prepd. by incorporating in a textile oil, such as arachis oil, contg. unsatd. substances about 0.1–0.25% of solid S and heating the mixt. at the lowest temp. which will render the oil nonstaining (suitably about 180–200°).

Cleaning wool. Franklin H. Mackenzie (to American Chemical Paint Co.). U. S. 2,183,142, Dec. 12. See Brit. 495,193 (*C. A.* **33**, 2736[3]).

Treating wool-scouring and other liquors coataining grease and soaps. Gwynfred Jones and J. W. McGregor and Sons Ltd. Brit 508,371, June 29, 1939. The oxide or hydroxide, or normal or basic salt, of a metal, e. g., Ca, capable of forming (*a*) insol. soaps, (*b*) an insol. hydroxide of the metal or an insol. normal or basic salt by combination with a polybasic acid, and (*c*) a sol. acid salt by combination with the polybasic acid, is added to the effluent, which is then subjected to the action of the acid or its anhydride, which may be in gaseous form, e. g., CO_2 or a gas contg. CO_2, under suitable conditions and in sufficient amt. to form sol. acid salts with the alk. carbonates in the scouring effluent and also to form the sol. acid salt of the aforesaid metal, which salt reacts with the soaps and grease to cause a pptn. thereof, the ppt. being then removed. The sol. acid salt (*c*) may be added directly to the liquors instead of being formed therein. The pptn. may be made more complete by the addn., preferably after the acid or gas treatment, of $Al_2(SO_4)_3$, $CaCl_2$, $CaSO_4$, $MgCl_2$, $MgSO_4$, $FeSO_4$, etc., which either form insol. soaps themselves or cause them to be formed by reaction with other compds. added to or already present in the liquor. An absorbent or coagulant such as Californian bentonite may be added, preferably after the acid or gas treatment. The crude grease may be extd. from the ppt. (without previous drying) by a solvent that forms an azeotropic min.-boiling mixt. with H_2O, e. g., C_6H_6, toluene or an appropriate aliphatic alc. or a mixt. of these. The crude grease may be purified by extn. with a mixt. of Me_2CO and AcOEt or AcOMe, which leaves undissolved a residue of impure metallic soaps.

Combination yarn. Fred C. Werber. U. S. 2,183,703, Dec. 19. A method of making a combination yarn consists in helically assembling a covering yarn which has been colored with a permanent dye with a core yarn, the latter being an undyed hard-twisted crepe yarn and having a size, the twist of the covering yarn being lower than the twist of the core yarn, the turns of the covering yarn being spaced from each other, and then desizing the core yarn so as to diminish the length thereof and to bring the turns of the covering yarn close to each other

so that the turns substantially cover the core yarn, the coloring of the covering yarn being substantially unaffected by the desizing step.

Production of packages of yarns or similar textile materials. Henry Dreyfus. Brit. 508,700, July 5, 1939. The necessity for unwinding and rewinding packages of yarns, etc., having a basis of cellulose acetate or other org. deriv. of cellulose, during treatment thereof is avoided by coating the barrels of the bobbins on which the packages are to be wound with a solid substance that is sol. or readily dispersible in H_2O and can therefore be readily removed subsequently without affecting the material wound thereon. A H_2O-sol. carbohydrate, e. g., glucose, dextrin, cane sugar, or a carbohydrate deriv. sol. or dispersible in aq. media as a result of degradation or of the presence of a hydrophile group in a substituent radical, e. g., hydroxyalkyl ethers of cellulose produced as in Brit. 166,767 (*C. A.* **16**, 830) and 277,721 (*C. A.* **22**, 2663) and carboxyalkyl ethers of cellulose produced as in Brit. 343,521 (*C. A.* **25**, 5557), cellulose esters produced as in Brit. 344,775 (*C. A.* **26**, 318), H_2O-sol. synthetic resins such as polymerized acrylic acid or partially sapond. polyvinyl ester resins, or proteins sol. or dispersible in aq. media may be used for the coating.

Rayon thread. Charles A. Huttinger (to Acme Rayon Corp.). U. S. 2,184,144, Dec. 19. Various operative and structural details are described, of an app. for imparting uniform properties to the thread during stretching consisting of a support, a pair of spaced idlers mounted on the support for cooperative action and whose axes are nonparallel, one of the idlers having a smooth thread-engaging surface, and a paddle-wheel secured to the idler and having blades extended outwardly beyond the thread-engaging surface, the other idler being formed with a thread-engaging groove.

Sizing textile materials such as viscose rayon. Herbert Rein (to I. G. Farbenind. A.-G.). U. S. 2,183,226, Dec. 12. A process is employed which involves impregnating textile materials with an aq. soln. of a water-insol. resin contg. carboxylic acid groups made sol. in water by treatment with an excess of a concd. soln. of urea, thiourea or methylurea, the ratio of the resin by wt. to the concd. soln. by vol. being about 1:about 6 to 12 and the ratio by wt. of the resin to the urea in the concd. soln. being about 1:about $1/2$ to 2

Treating cotton yarn to give it luster. Wm. H. Furness (to American Rayon Co.). U. S. 2,183,477, Dec. 12. A process for treating cotton yarn involves subjecting it to a NaOH soln. of approx. mercerizing strength and subsequently, while still contg. the combined NaOH, to a soln. consisting essentially of 2 portions, one a soln. of Cu sulfate-ammonia and NaOH and the other tetrammonium Cu sulfate, and allowing the yarn to remain in the soln. just long enough to remove NaOH from the fuzz and thereby bring about the soln. of the fuzz, the soln of Cu sulfate-ammonia and NaOH comprising about 50–70% of the soln. and having a mol. ratio of one mol. of $CuSO_4$ to 2 mols. of NaOH and having sufficient NH_3 to have stability in the range of working temp. Cf. *C. A.* **33**, 2737[2].

Ornamenting textile materials. Fridolin Hefti (to Akt.-Ges. Cilander). U. S. 2,184,593, Dec. 26. Loose ornamenting material such as a powd. or flaked metal or pigment is applied to a face of a web of textile material in a substantially continuous layer, the textile material is printed with an adhesive on the back face in conformity with a pattern to be produced by deposits of the added material on the front face of the web, and the textile material is then immediately wound in a tight coil so as to transfer part of the deposited material to its back face, and the adhesive is dried to fix permanently the ornamenting material in position on both faces of the textile material, and surplus ornamenting material is mechanically removed where it has not adhered. App. is described.

Lightweight, air-transmissive fabrics for garments. Emil Knup and Franz Naef (to Textilwerk Horn A.-G.). U. S. 2,184,600, Dec. 26. A method of producing lightweight, air-transmissive, waterproof fabric for garments having high resistivity to impairment of its waterproof property from the effects of washing, involves impregnating a textile fabric having small pores substantially of the size of the pores of a fabric of the type 70/70, 40/40 with liquid paraffin in a quantity insufficient, when dry, to close the pores of the fabric, drying the paraffin to solid state, then impregnating the fabric with from about 10 to 20 g. per sq. m. of vinyl acetate artificial resin, then impregnating the fabric with paraffin in liquid state, and then calendering the fabric at a temp. of about 25°, at which temp. the paraffin and resin jointly will not become viscous so as to prevent spreading of the impregnants and closing the pores of the fabric from the effect of calendering.

Porous elastic fabrics. Fernand F. Schwartz (to American Ecla Corp.). U. S. 2,184,158, Dec. 19. A process for the manuf. of a porous elastic fabric comprises applying by spraying to the projecting portions of an extensible fabric a series of coatings of latex in the form of a spray the droplets whereof having a diam. of 0.1 to 0.3 mm. and a rate of coagulation between $1/2$ and 1 sec. the spraying means being situated between 30 and 40 cms. from the surface of the fabric and the latex being forced under an air pressure of 2 to 3 atm., and coagulating and drying the coatings before applying the succeeding coating. Cf. *C. A.* **34**, 895[2].

Fabrics impermeable to warfare chemicals. G. van der Veen, G. Beins and H. J. Smidt. Dutch 47,200, Nov. 15, 1939. Cotton fabric is coated on one side with latex and vulcanized. The material is then impregnated from the other side with a 35% aq. soln. of gum arabic to which 10% glycerol is added. Excess soln. is removed, the material slightly dried over a warm roll, the treated side covered with pulverized wood and coated over with latex. This is vulcanized or treated with alc. shellac. The material resists mustard gas. Several other combinations for the same general purpose are discussed.

Sulfonated product for use as a textile- and leather-processing assistant. Albert F. Bowles and Saul Kaplan (to Richards Chemical Works, Inc.). U. S. 2,183,929, Dec. 19. Use is made of a neutralized sulfonated product of the material obtained by condensing an amino compd. such as urea or NH_3 with a condensation product derived from malonic acid and oleic aldehyde or other aldehyde contg. 2–18 C atoms per mol. Cf. *C. A.* **34**, 2102[9].

Mothproofing wool, felt, furs, feathers, etc. Wilfrid Lowe. U. S. 2,184,147, Dec. 19. Protection from moth larvae is effected by immersing materials in a warm aq. soln. of Cr fluoride of about 0.8% strength, followed by hydro-extn., as by squeezing, and air drying at a temp. of about 65° or higher.

Waterproof apparel. Annelies Othmer and Karl Flaig. Brit. 508,423, June 30, 1939. The apparel is made of natural or synthetic rubber, films of artificial rubber-like substances, textile material coated on 1 side with such a film or acryl, vinyl or butyl resins producing latex-like emulsions, or a double layer of textile material in between which is provided a film of this kind, textile material rendered H_2O-proof or H_2O-repellent by impregnation, e. g., with Al oxides, salts or soaps, if desired in the presence of paraffin, etc., or American cloth. The film may be sprinkled with powder, e. g., talcum, to decrease its adhesivity, before impregnation. The apparel may be made of rayon in the form of continuous or staple fibers treated with a crease-resisting agent, e. g., a CH_2O or urea synthetic resin.

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

The paint and varnish industry. Robert J. Moore. *Am. Paint J.* **24**, 18–20, 22, 64–7, 69, 71(Feb. 12, 1940). W. H. Boynton

Emulsified bituminous paints. A. S. Korzhuev and V. V. Gridchina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 259–61 (1939).—A discussion of the methods of prepn. and phys. properties of bituminous paints based on the literature and some exptl. evidence. Chas. Blanc 2

Formation and deterioration of paint films—changes in films of methyl esters of several unsaturated fat acids under exposure to ultraviolet light. J. L. Overholt and A. C. Elm. *Ind. Eng. Chem.* **32**, 378–83(1940).—Films of the Me esters of oleic, linoleic, linolenic and eleostearic acids were exposed to ultraviolet light in a const.-temp. room at 65% relative humidity and 25°. At intervals samples of the exposed esters were analyzed for change in wt., degree and type of unsatn., degree and type of oxidation, ultimate analysis, mol. wt., viscosity, d. and *n*. Changes in the above properties during the 1st 1000 hrs. are shown by a series of graphs. The esters gain wt. during the 1st stages of exposure proportional to their unsatn. and later lose wt. owing to decompn. The I addn. values give indications of a 3-stage drying process: an induction stage, a stage of rapid decrease in unsatn. which corresponds to the max. in peroxide content and a less definite stage with uncertain results. The highest peroxide concn. present at any time even in Me linoleate is equiv. to only a fraction, of one double linkage. OH reaches its max. after the peroxides have started to decompose. Mol. wts. measured in C_6H_6 and *tert*-BuOH show that the eleostearate passes through a max. shortly before its max. peroxide concn. is observed. There is little change in mol. wts. of the others although viscosity increases to 100 times the original value. H. M. Stark 3 4 5

Silver (aluminum paint) in the South. S. H. Coleman. *Southern Power and Ind.* **58**, No. 2, 40–5(1940).—Aluminum paint has the advantage of reducing the effect of light on the vehicle, reducing moisture penetration, high resistance to corrosion and high reflectivity for light and radiant heat. The characteristics of varnish and lacquer vehicles are briefly reviewed. Details of mixing and applying are given. R. W. Ryan 6

Adhesion of paint films to plaster. H. M. Llewellyn and H. J. Eldredge. *Oil Colour Trades J.* **97**, 294, 296 (1940).—A discussion of blistering, peeling and flaking, which affect decorations on plastered surfaces, and of means of preventing their occurrence. Conclusions are: (1) a linseed oil primer applied to Keene's cement following the trowel is capable of giving satisfactory adhesion, but higher values are obtained if the priming is deferred, (2) the residual adhesion is greater for a Keene's cement primed wet than when primed dry, (3) it is essential with anhyd. plasters that any primer applied after the trowel should not contain too much oil, (4) it seems that the chief justification for applying a coat of primer at an early stage is that such a coat retards the evapn. of water from the plaster surface and (5) it is important to avoid any possibility of sealing in moisture permanently. Investigation of cases involving defective paint work on Keene's cement often showed that the further coats of oil paint had been applied too soon after the priming coat. W. H. Boynton 7

An apparatus for the accelerated evaluation of heat-resisting paints. G. W. Ashman and S. Werthan. *Paint Ind. Mag.* **55**, 47–9(1940).—The app. consists of an electrically heated cylindrical unit that is operated outdoors, replaceable test sections 3 in. in diam. by 32 in. in length (7.6 cm. × 81.3 cm.) of sheet metal pipes that entirely cover the heater, and suitable racks for unheated outdoor exposure of the tests. The app. is mounted outdoors in an upright tilted position that affords an exposure of about 70° from the south. The paints to be tested are applied in bands on the replaceable test cylinders; several paints and a standard finish of known value may be painted on a single tube. W. H. Boynton 8

The Pallava paintings at Conjeevaram—an investigation into the methods. S. Paramasivan. *Proc. Indian Acad. Sci.* **10A**, 77–84(1939).—The painted stuccoes in the Kailasanatha and Vaikunthaperumal temples were done in a lime medium on a carrier of sandstone. The ground was a rough plaster of lime and sand, 1.5–4.1 mm. thick, over which was a 0.3-mm. lime wash and a 0.3-mm. lime-pigment layer contg. yellow ocher, red ocher, terre-verte, C and lime. The lime contained no gypsum and was evidently well purified and not hydraulic. Org. binder was found only in the black, where it was required to aid wetting of the pigment. Wm. E. Trout, Jr. 9

Paint baking with near infrared. H. J. Bennett and Howard Haynes. *Chem. & Met. Eng.* **47**, 106–8(1940).—Advantages of, and equipment for, drying lacquers and enamels by means of incandescent lamps are described. E. H.

Indirect-fired baked-enamel oven. Hugh R. Lamberth. *Gas* **16**, No. 2, 34–5(1940).—Enameled wall board is baked at 250°F. for the surface coat and at 300°F. for the final coat in a special oven insulated with 3-in. granulated rock wool. Combustion products do not reach the wall board directly but are mixed with furnace atm. and recirculated through the oven by means of a blower. A max. temp. difference of 5°F. is realized throughout the oven, and this oven is also applicable to other enameling processes at temps. up to 500°F. R. W. Ryan 10

Urea-formaldehyde film-forming compositions—enamel formulation, properties and durability. T. S. Hodgins, A. G. Hovey and P. J. Ryan. *Ind. Eng. Chem.* **32**, 334–45(1940).—Urea-resin coating solns., both by themselves and in combination with alkyd resins and plasticizers, are discussed as to reactivity, stability, solvent tolerances and durability on exterior exposure. Recommendations are made for baking schedules and pigmentation. A. F. Shepard 11

Luminescent pigments and paints—a bibliography. H. Courtney Bryson. *Oil Colour Trades J.* **97**, 245–7 (1940); cf. *C. A.* **34**, 2188⁹.—A list of 320 references. W. H. Boynton 12

New developments in the grinding of paint products. Richard L. Cawood. *Am. Paint J.* **24**, 55–8, 60, 62(Feb. 26, 1940).—The high-speed Cr-Mn ball mill saves time in grinding, saves floor space and provides highest economy in the use of power, labor, etc. Jacketed mills provide close temp. control. W. H. Boynton 13

Machines for grinding pigments in paint and lacquer industry. N. A. Kozulin. *Org. Chem. Ind.* (U. S. S. R.) **6**, 223–7(1939).—Various types of foreign grinding machines are described. Chas. Blanc 14

Vacuum filter for pigment colors. N. A. Kozulin, D. G. Khazin and V. M. Gokhberg. *Org. Chem. Ind.* (U. S. S. R.) **6**, 317–18(1939).—A stoneware conical vessel is fitted with a stirrer and porous porcelain tubes, through which the liquid and water are sucked during vacuum filtration and washing. Construction and operation details are given. Chas. Blanc 15

The properties of white pigments. Harley A. Nelson. *Am. Paint J.* **24**, 7–9, 24–6, 28(Feb. 19, 1940).—A discussion of the white opaque pigments and the low-*n* pigments. Optical properties and phys. and chem. characteristics are outlined, and the pigments are classed as (*A*) high-*n* group, which is subdivided into primary and composite pigments and (*B*) low-*n* pigments. W. H. Boynton 16

Production of lithopone. Ch. A. Sobolevskil. *Org. Chem. Ind.* (U. S. S. R.) **6**, 324(1939).—The quality of Soviet lithopone is criticized and possible improvements in the methods of production are suggested. C. Blanc 17

Preparation of ferriferous red ocher with lower oil capacity. V. E. Tartakovskaya and Yu. G. Khazina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 256(1939).—The cover- 18

ing and brushing properties of oil paints were considerably improved and the contents of oil reduced by the use of Fe ocher calcined at 800° for 30 min. The optimum results were obtained with an ore contg. Fe_2O_3 72.5, SiO_2 17.5, Al_2O_3 3.45, sol. salts 0.84 H_2O 0.5 and volatile matter 3.6%. Chas. Blanc

Some notes on zinc oxide in an alkyd vehicle. A. C. Eide and Harlan A. Depew. *Am. Paint J.* **24**, 49–54 (Feb. 26, 1940); cf. *C. A.* **33**, 4802[8].—ZnO is especially desirable when used with tinting pigments that are sensitive to light. The outstanding factor in the choice of a desirable ZnO is the absence of colloidal material, since the fine particles in ZnO cause very bad fading. A slight acicularity reduces the fading but too much holds back the initial gloss. Cofumed leaded ZnO and a blended high quality leaded ZnO weathered very well. Absence of colloidal fines in the ZnO produces the following advantages: (1) better maintenance of luster, (2) less chalking and fading and (3) a better luster on polishing. Also in *Paint Ind. Mag.* **55**, 85–6. W. H. Boynton

An ancient Egyptian marking ink. C. Ainsworth Mitchell. *Analyst* **65**, 100–1(1940).—Three small pieces of linen fabric were found in the rubble filling of the shaft of a tomb dating from the Second Dynasty at Saggara, near Cairo (the ancient capitol of Memphis). The dynasty ended in 2980 B.C. and the tomb is probably much earlier than this. The pigment dissolved with difficulty in hot HCl and gave the usual reactions for Fe. The markings were probably made with Fe oxide. The unintentional production of an Fe "mold" by laundries on modern linen suggests the way in which the Fe oxide may have been fixed. The markings behave like Fe oxide pigments under ultraviolet light and give a black "fluorescence."
W. T. H.

Synthetic resins for printing inks. H. C. Cheetham. *Am. Ink Maker* **18**, No. 2, 29, 31, 33(1940).—The wide variety of resins now available are considered with respect to the properties that they impart to inks. Particular attention is paid to the types of drying encountered (oxidation, gelation, penetration, evapn. and curing).
L. Wilson Greene

Developments in domestic oils. Louis J. Reizenstein. *Am. Paint J.* **24**, 56, 58, 60, 62–4(Mar. 4, 1940).—Examples are given of certain oil combinations for specific applications such as gloss finishes, flat finishes, furniture and household enamels, finishes for porous surfaces, interior varnish finishes, resins for use in place of varnishes, exterior finishes, paints for metal surfaces, etc. Imported oils are not needed since the advent of a no. of American synthetic resins which may be compounded to produce satisfactory results. Performance tests are briefly reviewed. W. H. Boynton

Chemical constitution of thickened linseed oil. A. Paleni. *Chimica e industria* (Italy) **22**, 5–7(1940).—The mol. refraction of linseed oil before and after thickening by boiling out of contact with air, as well as of the acids obtained by its sapon., is practically const. This indicates that the thickening is due not to polymerization, but rather to some other form of mol. assocn. which does not affect the glyceride constituents of the oil. The explanation may be based on the theory of colloids. Changes in the I no., etc., are not considered to be of sufficient importance to be used as a basis for upholding the theory of polymerization. A. W. Contieri

Use of castor oil in place of linseed oil in lacquer and paint industry. V. O. Solienko. *Org. Chem. Ind.* (U. S. S. R.) **6**, 310–13(1939).—The satisfactory results in the production of alkyd lacquers and paints at the Krasnopresnenskiĭ plant from oxidized castor oil are reviewed and further tech. improvements are suggested. C. Blanc

Tung-oil conservation. C. F. Pickett. *Official Digest Federation Paint & Varnish Production Clubs* No. **189**, 354–66(1939).—A discussion of possible methods of conserving tung oil by substitution of other oils such as oiticica or Cicoil, dehydrated castor oil and perilla. Some formulations are given to indicate the use of these oils to overcome deficiencies in viscosity, drying and water and chem. resistance due to omission of tung oil from formulations. H. M. Stark

Tall oil as a raw material in lacquer and paint industry. P. M. Romanova and A. K. Kotlyar. *Org. Chem. Ind.* (U. S. S. R.) **6**, 257–8(1939).—Excellent results are tentatively reported in the production of alkyd lacquers from tall oil and semidrying oils (cottonseed, sunflower and soybean oils). The lacquers and the resulting paints contg. ZnO and lampblack in their drying and weathering properties and in resistance to water and oil proved to be superior to the products obtained with linseed oil. The best results were obtained from the resin contg. tall oil 36.36, semidrying oil 11.23, phthalic anhydride 33.1 and glycerol 19.31%. Cf. Schlenkert, *C. A.* **32**, 8800[8].
Chas. Blanc

Petroleum naphthas and thinners. R. D. Armsbury. *Official Digest Federation Paint & Varnish Production Clubs* No. **189**, 366 71(1939).—A discussion of petroleum naphthas in the 3 classifications which are available for use in paints: (1) aliphatic (2) high aromatic and (3) synthetic. Tests for volatility and solvent power are reviewed. H. M. Stark

Ethers and ether-esters of lac and their polymerization. B. S. Gidvani. *London Shellac Research Bur., Tech. Paper* No. **17**, 23 pp.(1939); cf. *C. A.* **33**, 2740[9], 2742[7], 9686[3].—Lac-ethylene glycol ether (I) was prepd. by heating 62 g. of ethylene glycol to 130–140° and gradually dissolving 100 g. of lac in it (10 1 mol. ratio). After a reaction period of 15 min., 0.5% of *p*-toluenesulfonic acid was added as a catalyst. After heating for 1 hr. the end of the reaction was indicated by a tendency to gelation. Analysis of the final product indicated that 4 mols. of ethylene glycol had reacted with 4 OH groups contained in 1 mol. of lac, forming a monoether (theoretical mol. wt 1176, mol. wt. calcd. from the observed acid value 1233). The product was a sticky material which became brittle in storage. In its unpolymerized state it was sol. in all common solvents but films produced from the solns. were unsatisfactory. I was prepd. at a higher temp. by heating 500 g. of lac and 186 g. of ethylene glycol (1.6 mol. ratio) at 120° until the former dissolved, cooling to 80° and then adding 1 cc. of concd. H_2SO_4 as a catalyst. Vigorous reaction took place with much frothing and some carbonization. The mixt. was then heated at 180–190° in a flask equipped with a long air condenser. The acid value became const. after heating for 2.5 hrs. The mixt. was poured into H_2O and the excess glycol was removed by repeated washing with boiling H_2O. The product was dried under vacuum on a water bath. It had the following characteristics: acid value 22.8, sapon. value 182.4, ester no. 159.6, OH no. 202.4, I no. (Wijs) 43.4 and mol. wt. calcd. from acid value 2461 (theoretical 2422). Apparently 5 mols. of ethylene glycol had combined with 1 mol. of lac to form I, which is considered to be a dimer. By drying the washed reaction product at atm. pressure instead of under vacuum a trimer was obtained. This had acid value 13.4, sapon. value 199.9, ester no. 186.5, OH no. 199.9 and mol. wt. 4186 (theoretical 3624). All products of I were sticky balsams which did not change consistency in storage. They were completely sol. in MeOH, BuOH, BuOAc, Me_2CO, MeCOEt, methylcyclohexanone and cyclohexanone, but were insol. in cyclohexane, white spirit, solvent naphtha and drying oils. They could be polymerized by heat to tough, flexible rubber-like materials which lost their solv. in the above solvents but swelled in methylcyclohexanone. The solns. possessed lower viscosities than corresponding solns. of lac and they could be incorporated into nitrocellulose lacquers. As much as 7 parts of I was added to 1 part of nitrocellulose and produced a clear hard film. The viscosities, drying time and film properties of 4 typical solns are tabulated. I was esterified with crotonic acid (II) and with cinnamic acid (III) by refluxing the dimer with 5 different ratios of the individual acids at 170–180°, with and without catalysts. A greater degree of esterification was obtained when catalysts were used. High acid values and low mol. wts. of some of these compds. indicated that monomers were formed with II and dimers with III. The

characteristics of 11 of these products are given. In the unpolymerized state the products from II and III were sol. in most solvents. Films on glass, Sn and Cu prepd. from PhMe soln. had excellent adhesion and flexibility when air-dried or baked. Detached films were prepd. on Sn amalgam and had good flexibility, high tensile strength and the silkiness of tung oil varnish. An excess of Co drier produced a wrinkle effect. The films from II and III behaved like those produced from oil varnishes. The polymerization of I, II and III is discussed from a theoretical standpoint and the following applications are suggested: *elec. insulating materials* which withstand the action of O_3; *rubber-like products; impregnating and coating agents for textiles*, including antigas and parachute fabrics; *paints* for elastic surfaces; *plasticizers;* and special *adhesives*. 18 references. L. Wilson Greene

Iodine values of lac. Reaction between halogen and lac. B. S. Gidvani and R. Bhattacharya. *London Shellac Research Bur., Bull.* No. 3, 13 pp.(1939); cf. Karim and Cook, *C. A.* **33**, 2742[3]. I nos. of lac and lac esters were detd. by using the Langmuir modification of the Wijs procedure (I) (*J. Soc. Chem. Ind.* **24**, 12(1905); *C. A.* **5**, 3629) and the standard Hübl method (II). An addn. of halogen and simultaneous oxidation take place with I but only an addn. occurs with II. The increased I no. obtained on prolonged contact in both methods is not caused by deterioration of the reagents. The accepted I nos. of shellac (Wijs 14–18, Hubl 7–9) do not give a quant. measure of unsatn. but are arbitrary values detd. by certain specified conditions. Consistent results can be obtained as long as the conditions are kept const. II gives fairly reliable results since it is practically independent of time of contact, concn. of available halogen and temp. In I these factors have to be controlled accurately to give dependable results. A slight variation in any of these factors (e. g., use of glacial HOAc instead of 99%, or a higher temp. than 22 ± 1°) leads to inconsistent values. 25 references. L. Wilson Greene

Methods of preparation of alkyd lacquers. R. D. Samyslov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 236–7(1939). A general discussion. Chas. Blanc

Cellulose derivatives in lacquers. C. Maters. *Official Digest Federation Paint & Varnish Production Clubs* No. 190, 390–8(1939).—See *C. A.* **34**, 648[3]. H. M. S.

The rate of lacquer aging. V. S. Kiselev, K. F. Efimova and V. Ya. Solonina. *Org. Chem. Ind.* (U. S. S. R.) **6**, 490–4(1939).—From a review of literature and exptl. evidence it is concluded that the basic processes of aging and settling of oil paints made with resinates and Albertol and Glyptal resins are completed in the 1st month of storage. In most cases the sediments of suitably prepd. lacquers can be removed by filtering or centrifuging without the dangers of new sedimentation in the next 20–30 days and impairment of the coating and tech. properties of lacquers. The aging properties of resinate and alkyd lacquers are compared with paints made with copals in relation to the various factors of temp. of prepn. and storing, compn., degree of oil polymerization, etc., which influence the aging process and quality of paints and lacquers. Thirty references. Chas. Blanc

Water as a component part in simple nitrocellulose varnishes. N. V. Aleksandrov and G. S. Plotnikova. *Org. Chem. Ind.* (U. S. S. R.) **6**, 325–6(1939).—It is shown that the content of water in nitrocellulose varnishes can be increased to 10% on the vol. of the volatile ingredients (100% on the wt. of nitrocellulose) in the presence of EtOH without the use of cellosolve or mixts. of AcMe and MeOH. The resulting films compare favorably with anhydrous lacquers. The varnishes were prepd. from colloxylin 5, dibutyl phthalate 0–0.9, AcOBu (b. 116–35°) 29.45–40.37, BuOH (b. 110–22°) 7.2–10.45, EtOH 26.12–28.23, aviation gasoline (d_4^{17} 0.735, b. 62–134°) 9.5–24.1 and water 4.75–9.5%. Chas. Blanc

Determination of the tackiness of oil and lacquer films. I. I. Golovistikov. *Org. Chem. Ind.* (U. S. S. R.) **6**, 461–2 (1939).—The stickiness of dry oil films is a function of the relative gliding friction which is derived from the angle at which a cloth-covered metal plate slides from a glass plate coated with the oil or lacquer to be tested and dried at room temp. for 5 days. The procedure is described in detail. Chas. Blanc

Electrical method of measuring the thickness of thick cellulose films with special application to the "hot lacquer" process. G. H. Stephenson. *J. Sci. Instruments* **16**, 378–9(1939).—Properties of the films as the dielectric of a condenser are sufficiently stable and suitable to permit detg. their thickness from the measured capacity over a given surface area. A direct-reading arrangement using a special-type valve voltmeter is described and illustrated. M. McMahon

New zinc resinates in protective coatings. Edwin Edelstein. *Official Digest Federation Paint & Varnish Production Clubs* No. 190, 398–408(1939); cf. *C. A.* **33**, 8427[7].—A review of the uses and advantages of zinc resinates (Zitro and Zirex) in ester gum and phenolic varnishes, in thixotropic enamels, in alkyd blends and in blends with ethylcellulose. H. M. Stark

Mold discoloration. W. P. K. Findlay. *Paint Manuf.* **10**, 37–8(1940).—A summary. A paper dealing with mold growth on oil-painted surfaces. White lead and lithopone are quite susceptible to mold growth. Linseed oil or other drying oil is a good food for molds and the presence of foots or traces of nitrogenous matter increases the tendency to growth. Stand oils are superior to raw or boiled oils. Materials which have an inhibiting effect in agar medium do not necessarily function in oil. Infection takes place during the "tacky" period of paint-film drying. Two methods of testing the efficiency of antiseptic materials were: (1) small blocks of wood are dipped in the paint and allowed to drain and before they are hard dry the surfaces are infected and the blocks held at 22° for 2–3 months and (2) disks of mech. wood pulp soaked in 2% malt soln. are infected and the paints applied over the damp surface. The effect of an added antiseptic in paint is important. It must not affect the drying and any alk. reaction must be avoided. Field tests are necessary to det. definitely the usefulness of fungicidal paints. W. H. Boynton

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Utilization of seed of *Plantago psyllium* [oil for prepn. of varnishes] (Bottini) **27**. Comparative evaluation of qualities of white pigments for coating leather (Zel'din, Chumakova) **29**. Electrolytic oxidation of white ferrous ferrocyanide in production of Prussian blue (Belen'kiĭ, Vorontsov) **4**. Infrared absorption spectra of drying oils (Gamble, Barnett) **3**. Synthetic leather-resinous compn. for lacquer manuf. (U. S. pat. 2,184,467) **13**. Basic sulfamate of quadrivalent Ti [for pigments] (U. S. pat. 2,184,538) **23**.

Paint suitable for use without a primer. Frank A. Strauss (to Wailes Dove-Hermiston Corp.). U. S. 2,184,324, Dec. 26. A mixt. is used contg. a liquid vehicle, such as one of drying oils, etc., which forms a relatively hard permanent film, flakes of metal such as Al coated with a leafing agent that float from a film of the freshly applied paint to form a substantially continuous layer of oriented overlapping flakes, and a nonmetallic corrosion-inhibiting pigment such as Pb_3O_4 or ZnO, which remains dispersed in the film from which the metal flakes float (the proportion of such pigment being about 15% or less of the wt. of the metal flakes).

Oil paint suitable for use on wet surfaces. Herman A. Scholz (to United States Gypsum Co.). U. S. 2,183,227, Dec. 12. A water-in-oil stable homogeneous paint emulsion contains a minor amt. of water, a major amt. of a drying oil, a pigment such as lithopone or an Fe oxide, and a Zn compd. such as ZnO, leaded ZnO, $Zn(OH)_2$ or $ZnCO_3$ to maintain the ingredients in stable condition.

Water colors. I. G. Farbenindustrie Akt.-Ges. Ger. 684,820 Dec. 6, 1939 (Cl. 22g. 2.01). The binding material of a water-color paint is a water-sol. polyvinyl ether or water-sol. mixed polymers from vinyl ethers together with water-insol. vinyl ethers or other water-insoluble vinyl compds.

Titanium pigments. E. I. du Pont de Nemours & Co.

Brit. 508,530, July 3, 1939. The wet grinding process for the production of TiO_2 pigments is improved to produce pigments of fine texture, readily incorporable in paint and enamel vehicles and of low sensitivity to H_2O, by grinding the calcined pigment in the presence of a relatively small proportion, e. g., 0.05–2%, of 1 or more aluminates of an alkali metal, e. g., of Na, Li or K, which may be added dry before the addn. of H_2O or added as a soln. The grinding may take place in a closed circuit with 0.1–0.7% of the aluminate(s).

Pigment chip compositions. David R. Wiggam (to Hercules Powder Co.). U. S. 2,184,539, Dec. 26. A mixt. that is substantially nonvolatile at normal room temps., that requires a milling temp. above about 100° to effect colloiding and contains, ethylcellulose and a pigment within the range of about 40–90%, of the max. amt. that can be dispersed in the ethylcellulose as detd. by a shortness of bead is milled at the temp. at which the ethylcellulose is colloided, about 100–150°, to effect uniform dispersion of the pigment throughout the ethylcellulose colloid.

Drying oils. Koninklijke Industrieele Maatschappij voorheen Noury & van der Lande N. V. Brit. 508,516, July 3, 1939. Drying oils are manufd. from oils having 1 or more OH groups in the fatty acid radical, e. g., castor oil, by heating the oils substantially above 150°, e. g., to 180–240°, to split off H_2O from the fatty acid radical, in the presence of a small proportion, e. g., 0.1–1%, of a catalyst consisting of 1 or more H_2SO_4 derivs. having oxidizing properties, e. g., SO_3, fuming H_2SO_4, $H_2S_2O_7$, $H_2S_2O_8$ or monopersulfuric acid or such salts derived from these acids as have oxidizing properties, e. g., K, Na or NH_4 persulfate, or such reaction products of these acids on oils with OH groups in the fatty acid radicals as have oxidizing properties. Cf. *C. A.* **33**, 1974[5].

Drying oil from castor oil. Koninklijke Industrieele Maatschappij voorheen Noury & van der Lande N. V. Dutch 47,417, Dec. 15, 1939. Sulfonated lower aliphatic hydrocarbons added to castor oil in the amt. of 0.01–0.001% produce a drying oil of negligible color. The water is liberated at a temp. of 170°; the reaction takes place readily at 180–200° and is finished at 250°. Particularly valuable catalyzers are mono-, di-, tri- and polysulfonic acids of methane, especially methionic acid. The oil obtained has a high acid no. especially if the oil is finished to stand oil by heating above 250°. This tendency can be corrected by adding sufficient polyhydric alc. prior to heating.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The fats of marine algae. V. Nonvolatile fat acids of Alaria crassifolia Kjellm. Eizi Takahasi, Kiyosi Sirahama and Nobuhisa Togasawa. *J. Chem. Soc. Japan* **60**, 56–60(1939); cf. *C. A.* **32**, 8809[4]; **33**, 4201.—The thallus (I) contains 23.22% solid and 76.78% liquid fat acids. Of the solid acids 80% is $C_{16}H_{32}O_2$ and 20% $C_{14}H_{28}O_2$. From the liquid acids were obtained 4% $C_{16}H_{30}O_2$, 12% $C_{16}H_{28}O_2$, 11% $C_{18}H_{32}O_2$, 3% $C_{18}H_{30}O_2$, 19% $C_{18}H_{28}O_2$. The fructification (II) contains 51.02% solid and 48.98% liquid fat acids. Of solid acid 80% is $C_{16}H_{32}O_2$ and 20% $C_{14}H_{28}O_2$. From the liquid acids were obtained 5% $C_{16}H_{30}O_2$, 12% $C_{16}H_{28}O_2$, 17% $C_{18}H_{42}O_2$, 3% $C_{18}H_{30}O_2$, and 5% $C_{18}H_{28}O_2$ I, in which assimilation takes place, contains more unsatd. acids and II, which functions as storage, contains more satd. acids. As in other marine sea algae, palmitic and myristic acids are found, but not stearic acid. I and II were sepd., dried first in the sun then at 70–80°, extd. with 80–90% alc., mannitol and other impurities pptd. on cooling were removed, the alc. soln. was extd. with ether, the ether soln. dried, and extd. with acetone, the acetone ext. shaken with petr. ether after addn. of water. Evapn. gave 1.06% crude fat for I and 0.97% for II. The fat is sapond. with 10% alc. KOH, the fat acid dissolved in hot 95% alc. and treated with hot 95% alc. soln. of lead acetate, let stand overnight, and filtered. Solid fat acid was obtained from the ppt. by decompn. in water with HCl and extn. with ether. Liquid fat acid was obtained from the soln. by a similar method after evapn. of the alc. The solid acid was fractionated by recrystn. from MeOH. The liquid fatty acid was decolorized by norite, brominated in ice-cooled ether, the ppt. sepd., the soln. treated with petr. ether to sep. the sol. (dibromo) and insol. (tetrabromo) portions. The ppt. was treated with benzene to sep. the sol. (hexabromo) and insol. (polybromo) portions. The acids were identified by debromination with glacial AcOH and Zn powder, and detn. of neutralization nos., mol. wts., iodine nos., n^{25}_D, hydrogenation, and acetone-soly. of the Li salts.
K. Shinohara

Chemical investigation on Callistemon (Myrtaceae). I. Fat extracted from the berries. Federico Sallusto. *Ann. ist. super. agrar. Portici* **8**, 41–7(1936–37).—Berries from *Callistemon lanceolatum* contained H_2O (at 100–105°) 51.49, fat (Et_2O ext.) 5.39, nitrogenous matter (N × 6.25) 2.97, crude fiber 14.63, ash 5.58, nonnitrogenous ext. (by difference) 19.94, reducing sugars 0.84, tannic substances 13.47, sol. matter (ext.) 16.55, ash of the ext. 1.95 and alc.-sol. matter 28.15%. The oil, freed from resin, gave d_{15} 0.9475, d_{98-100} 0.8640, refractometric degree at 40°, 47–53°, m. p. of fat 40–52°, m. p. of fatty acids 61–67°, solidification point of fat 37–43°, solidification point of fatty acids 56–63°, acidity as oleic acid 23.70%, Kottstorfer no. 186.12, ether no. 99.10, Hehner no. 79.71, Reichert-Meissl no. 8.20, acetyl no. 23.26, relative I no. 34.18, abs. I no. 97.98, fat 96.30%, nonfat 3.70%, unsaponifiable 15.55% and Polenske no. 6.17. The solid fatty acids consisted of palmitic 15.58 and stearic 84.42% and the liquid fatty acids of oleic 54.25, linolic 3.87 and linolenic 41.88%.
A. R. Merz

Some color reactions for the detection of extracted cacao-waste fats. K. H. Bauer and L. Seber. *Kazett* **27**, 340–2(1938); *Chem. Zentr.* **1938, II**, 3481–2; cf. *C. A* **33**, 5212[8], 5213[2].—Color reactions investigated were those of concd. H_2SO_4 on a soln. of the fat in $CHCl_3$, of fuming HCl and HNO_3 on the heated fat, of 50% H_2SO_4 on the fat after it has been heated with Ac_2O, and of glacial HOAc on the melted fat (on the boiling water bath). Definite colors which would indicate with certainty the presence of extd. fat were observed only in the case of extd. fats having a content of 1.2–2.0% unsaponifiable matter. In the case of mixts. of extd. waste fat with press butter in which the content of the mixt. in unsaponifiable matter was 0.6–0.7% it was not possible to detect with certainty the presence of the extd. fat by the use of the color reactions tested.
M. G. Moore

Determination of fat by the Grossfield method. W. H. Kitto. *Analyst* **65**, 07(1940).—Grossfield's method has received considerable attention in recent German literature. A comparison of the results with those obtained by Soxhlet extn. shows very serious discrepancies. The values obtained by G.'s method were much higher and the dried fats were much darker. Thus with 2 samples of corn meal, Soxhlet extn. gave values 1.2 and 4.2, whereas G.'s method showed 2.2 and 6.2, resp. The question arises as to whether rubber stoppers are not affected by trichloroethylene more than has been supposed.
W. T. H.

The changes in the coefficients of refraction during the process of hydrogenation of vegetable oils. G. B. Ravich. *J. Tech. Phys.* (U. S. S. R.) **7**, 2249–54 (1937); *Chem. Zentr.* **1938, II**, 3480.—Changes in n^{25}_D, the viscosity, d. and solidification temp. of the fat acids with the degree of hydrogenation of cottonseed oil and of sunflower-seed oil were followed. Hydrogenation increased the viscosity but decreased the d. and n^{25}_D. For a series of oils the I no. showed a linear relation to n^{25}_D. For cot-

tonseed oil the relation is expressed by $n_D^{25} = 1.4551 + 0.00012$ (I no.) and for sunflower seed oil by $n_D^{25} = 1.4491 + 0.00016$ (I no.). The relation between the viscosity and I no. for these oils is practically linear. M. G. M.

The quality of the oils in relation to the maturation of the olives. Federico Sallusto. *Ann. ist. super. agrar. Portici* 8, 34–40(1936–37).—Olives gathered at various stages from the green immature to completely mature states showed a progressive decrease in H_2O content of the pulp from 68.5 to 46.8–48.2% and an increase in ethereal ext. from 24.75 to 33.58% and in reducing sugars (on the dry basis of the pulp) from 1.97 to 3.80%. Reducing sugars after inversion totaled 5.45, 5.19, 6.05, 5.82, 4.90, 6.24 and 5.77% at the different states of maturity. Sp. gr., free acid (as oleic), sapon. no., relative I no., abs. I no., liquid fatty acids, solid fatty acids, index of refraction, thermosulfuric index and viscosity at 15° values are tabulated for the oils. Not only is the oil obtained from completely mature olives not inferior than that obtained from immature olives but the chem. compn. of the oils vary but little in the course of maturation. A. R. Merz

The oils of Gargano. F. Sallusto and A. Centulio. *Ann. ist. super. agrar. Portici* 8, 69–94(1936–37).—The sp. gr., refractometric index, viscosity, acidity, sapon. no. and I no. are given in tables for 46 olive oils from the Gargano promontory. A. R. Merz

Hull control in the production of mustard oil. A. Katsman and S. Elchenko. *Maslobo'no Zhirovoe Delo* 13, No. 5, 22–3(1937); *Chem. Zentr.* 1938, I, 4249.—The difference in d. between the hulls and kernels of mustard seeds is not great enough to serve for the detn. of the hull content of such a mixt. The crude-fiber content of the hulls is 23–7.6%, that of the kernels only 2.79–2.89%. This difference is sufficient to permit the detn. of the hull content of a mixt. with an accuracy of 1.5%. The method however, is cumbersome. Jeltschenko gives a method for the direct sepn. of the hulls. After removal of the fat, the kernels consist predominantly of proteins partially sol. in water, salt solns. and weak alkalies. The hulls, freed from the kernels, sink to the bottom in such solns. After removal of fat, the powder, oil cake, etc., are ground to meal and screened. Then 0.8–1.0 g. of the meal is allowed to stand 1 hr. in 25 cc. alc., 800–50 cc. of water is added and the whole well stirred. After 3–5 min. the particles of hull sink to the bottom while the emulsion of the kernel proteins remains suspended. The operation is repeated 5 times. Then the hulls are shaken for 15 min. with 100 cc. 2% NaOH. The NaOH soln. is poured off, the hulls washed with 800–50 cc. of water, filtered, washed on the filter with water, alc. and ether and dried at 150°. M. G. Moore

Seed oils of Formosan plants. XVI. Seed oil of Litsea cubeba Pers. Tyuta Hata. *J. Chem. Soc. Japan* 60, 122–5(1939); cf. *C. A.* 33, 1977[5].—Ether extn. gave 44% of fatty substance, solid below 30°, the seeds of *Litsea cubeba* Pers. Steam-distn. of this ext. gave 3.1% of almost colorless volatile oil, consisting mainly of a mixt. of about equal amts. of citral and methylheptenone. The fatty substance from which volatile oil had been removed contained 1.3% unsaponifiable matter, from which 3.5% sitosterol was isolated as digitonide. Other constituents of the unsaponifiable matter are unknown. The fat acid mixt. was methylated and fractionally distd. The constituents of the acid mixt. are lauric 53.2, capric 22.9, myristic 4.5, unsatd. acids 19.6%. Linderic, tetradecenic, oleic and linolic acids were the main unsatd. constituents. A minute amt. of hexadecenic acid is probably present. K. Shinohara

Utilization of the seed of Plantago psyllium L. Ottaviano Bottini. *Ann. ist. super. agrar. Portici* 9, 75–82 (1937–38).—The seed contained H_2O 13.20, mucilage 10.34, crude fat 6.14, crude protein 7.68, nonnitrogenous ext. (less mucilage) 52.08, cellulose 7.64 and crude ash 2.92%. The mucilage may in some cases be used in place of gum arabic, especially for *dye printing*. The oil, extd. from the mucilage-freed seed, had d_{15} 0.924, solidification point −17°, n_{25} 73.2°, thermosulfuric acid test 78, free acids (as oleic acid) 5.04%, sapon. no. 191 and ether no. 181, sol. acids (as butyric acid) 0.82%, insol. acids 94%, R. M. W. no. 1.94, Polenske no. 7.67, I no. 124 and unsaponifiable 1.21%. It may be used for the prepn. of *varnishes* in mixt. with linseed oil. The residue from the oil extn. may be used as a *feed*. A. R. Merz

Constituents of bonito oil. IV. Liquid acids (2). Sumio Matuda and Sei-iti Ueno. *J. Chem. Soc. Japan.* 60, 49–55(1939); cf. *C. A.* 33, 1978[2].—A mixt. of fat acid esters obtained from bonito oil was fractionated by distn. at 5 mm. Hg. Sapon. of the fraction b. 205–13° gave a mixt. of C_{20} acids; these were sepd. by treatment of the Na salts with acetone, the Li salts with alc., and the Pb salts with alc. into gadoleic, eicosatetraenic and eicosapentaenic acids. From distillates described in the previous report was obtained by further fractional distn., sapon. repeated distn. of remethylated acid, and resapon. a mixt. of C_{22} acids. From this mixt. were isolated cetoleic acid, $C_{22}H_{42}O_2$, docosapentaenic acid, $C_{22}H_{34}O_2$, and docosahexaenic acid, $C_{22}H_{32}O_2$. From the Me ester fraction b_1 212–16° was obtained a mixt. of C_{24} acids; this mixt. fractionated by the Li salt-acetone method yielded a new acid, *bonitonic acid*, not obtained pure, corresponding in acid no. and I no. to $C_{24}H_{34}O_2$. K. Shinohara

The composition of the antarctic seal oil. Sei-iti Ueno and Masayosi Iwai. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 371–3(1939).—Antarctic seal oil (from the skin) is a pale yellow liquid having: d_4^{15} 0.9286; n_D^{25} 1.4814; acid value 0.41; Wijs I value 164.7; sapon. value 194.3; and unsaponifiable matter 0.25%. Tests on the mixed fatty acids were: d_4^{15} 0.9099; n_D^{25} 1.4698; Et_2O-insol. polybromide 37.90%; neutralization value 197.8; I value 166.8; percentage of Br in polybromide 70.70; liquid acids (Pb salt-alc. method) 90%. Fractionation of the Me esters of the mixed fatty acids showed that (1) the solid acids were chiefly palmitic acid, with small amts. of stearic and myristic acids, and (2) besides the ordinary unsatd. acids ($C_{16}H_{30}O_2$, oleic acid, $C_{20}H_{38}O_2$, etc.), large quantities of highly unsatd. acids were present, such as clupanodonic acid ($C_{22}H_{34}O_2$) and possibly scoliodonic acid ($C_{24}H_{36}O_2$) and nisinic acid ($C_{24}H_{36}O_2$). Cholesterol was isolated from the unsaponifiable matter. G. Ayers

The Twitchell process. J. H. Wigner. *Soap, Perfumery & Cosmetics* 12, 979–84,992(1939).—Small plant equipment, method of operation and operating results on several oils are presented. M. M. Piskur

Steam distillation of glycerol under reduced pressure. I. Distilled quantity and quality of glycerol prepared from saponification crude glycerol, soap lye crude glycerol and recovered glycerol. Sei-iti Ueno and Tiduo Yonese. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 342–5(1939). —By use of the app. of Iwai and Ueno (*C. A.* 32, 1962[8]), sapon. crude glycerol, soap lye crude glycerol and recovered crude glycerol (analyses, resp., were: percentages of glycerol, 86.94, 83.19, 81.09–74.17; d_4^{15} 1.229, 1.298, 1.320–1.317; n_D^{15} 1.4570, 1.4718, 1.4729–1.4747; percentages of evapn. residue at 160°, —, 10.7, 14.9–24.2; percentages of NaCl, 1.3, 8.0, 6.6–6.2; color, pale yellowish brown, reddish brown, brownish black) when distd. at 6.0–8.3 kg./sq. cm. steam pressure (steam temp. 200–280° and under 45.5–88.5 mm. at 156–166° yielded, resp., 857, 701 and 536 kg. of product having the following properties: percentages of glycerol, 95–98, 94–97, 92–95; color, none, pale yellow, pale yellow. **II. Steam requirements in the saturated steam and superheated steam distillations of saponification crude glycerol and soap-lye crude glycerol.** *Ibid.* 346–50.—For the production of 100 kg. of glycerol by steam distn. of sapon. crude glycerol and soap-lye crude glycerol, the av. steam consumption was, resp., (kg.): superheated steam distn., 530, 650; satd. steam distn., 948, 1410. George Ayers

History of the manufacture of soap. F. W. Gibbs. *Ann. Sci.* 4, 169–90(1939). C. L. B.

The Japanese soap industry. N. N. Godbole. *Soap, Perfumery & Cosmetics* 12, 663–5(1939).—Import duties on soap and soap raw materials, and production, exports and imports from 1911 to 1937 are given. M. M. P.

Milk and protein soaps. Josef Augustin. *Soap, Per-*

fumery & Cosmetics **12**, 586–8, 618(1939).—Formulas. M. M. Piskur

Fatty acids and their application in soaps and cosmetics. Archibald Rayner. *Soap, Perfumery & Cosmetics* **12**, 898–900, 902(1939). M. M. Piskur

Resistant high colloids for soaps, creams, greases and finishes. L. Zakarias. *Soap, Perfumery & Cosmetics* **12**, 850–2(1939).—The advantages of using "collectons" in soaps and cosmetics are discussed. "Collectons" are said to be manufd. from colloids having a polysaccharide base. Method of manuf. is not given. M. M. P.

Tetrasodium pyrophosphate and its application in the soap and allied industries. Joseph M. Vallance. *Soap, Perfumery & Cosmetics* **12**, 765–6(1939). M. M. P.

Analysis of soap stock. M. Z. Klyachko. *Maslobo˘ino Zhirovœ Delo* **13**, No. 5, 21(1937); *Chem. Zentr.* **1938, I**, 4251.—In a porcelain dish 10 cm. in diam. 3–4 g. of the soap stock is treated dropwise with H_2SO_4 (1:4) or HCl (1:1) in the presence of methyl orange until the reaction is faintly acid. The mass is then well stirred and Na_2SO_4 added at 60–70°. The powdery mass so formed is then extd. with ether or petroleum ether and the oil titrated in the usual manner. W. A. Moore

The presence of air in soap. J. H. Wigner. *Soap, Perfumery & Cosmetics* **12**, 751–2, 780(1939).—Apart from floating soaps, com. soaps are generally assumed to be free from air. Air may have an undesirable effect on texture. Its effect on sp. gr. requires continual readjustment of the cutting wires and it may cause trouble in packing. The increase in viscosity due to air will cause soap to flow slowly through chutes and conduits. If this happens a test for air should be made. Retention of air may occur in faulty treatment of liquid soap. Pumps may be the cause or the trouble may occur in the crutcher. The later can be obviated by adjusting the mixing blades to prevent splashing. M. M. Piskur

Choice of soap for emulsified creosote disinfectants. R. L. Datta, S. C. Sen and N. N. Bose. *Soap, Perfumery & Cosmetics* **12**, 583–5(1939).—Highest activity is displayed for emulsion formation when the hardness no. of the soap is between 125 and 140. With soaps contg. rosin the optimum hardness no. appears to lie near 125. The best results are obtained with a blended soap made from oil stock contg. 50% castor oil. This is possibly due to the presence of the hydroxy fat acid. Some addn. of rosin (10 to 15%) in making the soap is important as it favors emulsion formation at high dilns. M. M. Piskur

Outline of methods for preventing spoilage. E. Pannewitz. *Seifensieder-Ztg.* **67**, 18, 28, 47–8(1940).—References are given to patents covering methods of combatting attacks by bacteria, molds, insects, etc. Brief lists of pests are included. A. Guillaudeu

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Testing wax mixts. for use in plant propagation (Shelton) **11D**. Swedish pine needle oil and its components (Sandermann) **17**. Proximate analysis of Brit. Columbia herring in relation to season and condition factor [oil from] (Hart, *et al.*) **12**. Eleven years of soybean investigations [oil content] (Van Doren, Hackleman) **12**.

Apparatus for use of solvents in extracting oils, fats and other soluble constituents from solid materials. Michele Bonotto (to Extractol Process, Ltd.). U. S. 2,184,248, Dec. 19. Various structural and operative details.

Distillation of mixtures of high boiling point such as fatty acids of vegetable and animal oils and fats. Otto Brücke (to American Lurgi Corp.). U. S. 2,184,579, Dec. 26. An arrangement of app. is described and a method for the continuous distn. of mixts. of a plurality of substances which have different b. ps., in at least two serially arranged vaporization stages, which comprises forcing up the mixt. to be distd. from the liquid space into the vapor space of the distg. vessel in every stage, constantly diverting a portion of the forced-up liquid without intermingling with the liquid remaining in the liquid space into the next still, separately condensing the distillate vapors obtained in each still, and adjusting the vaporization temps. in the various vaporization stages to different values for the purpose of continuously extg. the distillates in two or more fractions. Cf. *C. A.* **34**, 1519⁵.

Purifying oils containing fatty acids. Ivor M. Colbeth (to Baker Castor Oil Co.). U. S. 2,183,486, Dec. 12. App. is described, and a process of purifying an oil such as castor oil contg. fatty acids, which involves passing an aq. alk. soln. such as a NaOH soln. downwardly through a confined space at a rate slower than drops of the oil will rise through it, introducing the oil into the lower portion of the space and dividing it into droplets without agitating it or causing it to form a stable emulsion while dissolving the resulting soap in the liquid phase of the soln. for removal.

Aliphatic acid esters of alkylol ethers of β-hydroxyalkyl- and β-hydroxycyclo-alkyl ethers of the dibenzanthrone and isodibenzanthrone series. Otto Stallmann (to E. I. du Pont de Nemours & Co.). U. S. 2,183,629, Dec. 19. Dibenzanthrone and isodibenzanthrone alkylene oxide ether derivs. are esterified with aliphatic acid chlorides or anhydrides to give aliphatic ester ether derivs. which are very sol. in oils, fats, waxes and inert org. solvents, such as benzene, toluene, xylene, etc., and which are suitable *for the coloring of oils, fats, waxes, plastic masses, cellulose compds.*, etc., for which purpose the original vat dyes as such are not suitable and for which the unesterified alkylol ethers do not give the desirable strong coloration. All of these ester-ether derivs. of the dibenzanthrone and isodibenzanthrone series are insol. in water and stable under ordinary conditions. They are unstable in concd. H_2SO_4 and are sapond. when treated with alc. caustic or strong alk. hydrosulfite solns. at high temps. When dissolved in org. solvents and other materials, they all show a very strong and desirable fluorescence ranging from a bright greenish yellow through orange and red to brown. Various examples with details are given. U. S. 2,183,630 relates to production of compds. such as the laurate of the mono-(β-hydroxycyclohexyl) ether of *Bz*-2, *Bz*-2′-dihydroxydibenzanthrone, a blue colored solid which is highly sol. in oil, gasoline, acetone, cellulose acetate and many plastic masses and artificial resins, imparting to these materials a very strong and bright blue coloration in transmitted light, exhibiting a strong reddish fluorescence in reflected light.

Extraction of oils such as soybean, castor, whale, cod-liver and halibut oils. Alan G. Hamilton and Ezra C. Perkins (to E. I. du Pont de Nemours & Co.). U. S. 2,183,837, Dec. 19. App. is described, and a continuous process for extg. extractable material from solids wherein a solvent for the extractable material flows countercurrent to the direction of travel of the solids through the solvent, which comprises continuously passing the solid through a countercurrent stream of the solvent under conditions wherein extn. is carried out under pulsating pressures.

Improvement of soaps or fatty acids. I. G. Farbenindustrie Akt.-Ges. (Max Harder, inventor). Ger. 684,968, Dec. 8, 1939 (Cl 23*e*. 1). The soaps formed from oxidation products of high-mol. nonaromatic hydrocarbons are heated under pressure with an equal wt. of H_2O or more. Then the pressure is released in stages.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Raw-sugar clarification. J. G. Davies. *Intern. Sugar J.* **41**, 463–5(1939); cf. *C. A.* **33**, 7139⁸.—High- and low-clarifiability juices were examd. for (1) org. colloids, (2) ash phosphates, and (3) silica. The only significant difference was in the silica content, and evidence shows this to be a contributing factor in clarifiability. The

fractional liming and double heating process (*C. A.* **31**, 567[8]) is recommended. D. P. Langlois

Storage of sugar. E. R. Behne. *Intern. Sugar J.* **42**, 15(1940).—In Java large quantities of sugar were successfully stored for protracted periods. Investigation of the factors governing the hygroscopicity of sugar-house products and of raw sugars shows that for a sugar with a given diln. indicator there is a corresponding value of the relative humidity of the air which will be in equil. with this sugar. The limiting factor for the diln. indicator is 50 for abs. safety, the range from 50 to 100 being doubtful; with values above 100 deterioration is almost certain. General observations on deterioration and its prevention are: The sugar should be bagged with as low a moisture content as possible and not too hot. The bottom and top of the stack should be well insulated with waterproof material and the stacks should be large, leaving as little surface exposed as possible. Fine grain should also be avoided. D. P. Langlois

Possibility of reducing the lime salts in sugar juices, with a rise in the purity. J. Zamaron. *Bull. assoc. chim.* **56**, 709-23(1939).—Lab. and factory expts. during 4 campaigns have shown that as much as 79% of the Ca salts can be removed by treating 2nd carbonatation juice at 90° first with $(NH_4)_2HPO_4$ or Na_2HPO_4 and then with $BaAlO_4$ or Na "phosphoaluminate" (compn. not given), and filtering after each treatment. The phosphate and aluminate may also be added at one time. The reagents remove other impurities also by chem. action or adsorption, and increase the purity from 0.5 to over 2 points. More and better sugar is obtained, the molasses production is reduced, there is less scale in evaporators and pans, and the color of the products is improved. The detailed results are shown in tables and graphs. F. W. Z.

Automatic-optimum deliming of sugar juices. W. Reischauer. *Centr. Zuckerind.* **47**, 1110-11(1939).—Optimum alky. and the best possible deliming were obtained in an automatic air-stirred satn. vessel. W. W. Binkley

Juice discoloration during evaporation. Fr. Janák. *Deut. Zuckerind.* **64**, 1101(1939); cf. *C. A.* **33**, 5217[8].—Discoloration of juices can usually be traced to too high evapn. temp., but long heating below 100° has the same effect. At a fixed pH there exists a math. relation between discoloration and the product of temp. and time. Discoloration is impeded by electrolytes, e. g., H_2SO_3. Color formation is reduced about 80% when active C is used under its isoelec.-point conditions. W. W. B.

Comparative chemical compositions of juices of different varieties of Louisiana sugar cane. C. A. Fort and Nelson McKaig, Jr. *U. S. Dept. Agr., Tech. Bull.* 688, 68 pp.(1939).—Apparent and true solids, apparent and true sucrose, acidity, pH value, reducing sugars, ash, Si, Ca, K, Na, Mg, Al, Fe, Mn, S, Cl, P, total and protein N and gums were detd. in the crusher juices of 8 varieties of sugar cane grown on different soils in La. Calcd. values are given for total nonsucrose, true and apparent purity, approx. org. acids, nonprotein N and salts. A variety of sugar cane grown under identical conditions always shows the same relative content of the various nonsugar substances. Different varieties under uniform conditions not only produce definite comparative tonnages of cane and percentages of sugar and fiber, but also definite comparative quantities of other constituents such as acids, CaO, K_2O, P_2O_5 and N. The actual quantities may be large at one location and small at another but the comparison between the varieties will be much the same. On account of the differing nonsugar characteristics of the various sugar-cane varieties, all studies to det. the effect of soil, climate or other factors should use the same varieties. 64 references. W. H. Ross

Experiences with the refining of cane sugar. Felix Langen. *Centr. Zuckerind.* **47**, 1107-10(1939).—The cooking period of 70% clarified juices was shortened by approx. one half and the yield of (sugar) press cake almost doubled when the treatment with boneblack was omitted. W. W. Binkley

Evaporator control [for cane sugar mills]. G. W. Tompkin. *Repts. Hawaiian Sugar Tech.* **2**, 51-5(1939).—The necessary app. is described and illustrated. J. C. Jurrjens

Evaporator automatic control [for cane-sugar mills]. A. K. Kinney and J. Eldon. *Repts. Hawaiian Sugar Tech.* **2**, 56-7(1939).—Various structural, elec. and operative details are given including illustrations. J. C. Jurrjens

The methoxyl and uronic acid content of the sugar cane. C. A. Browne and Max Phillips. *Intern. Sugar J.* **41**, 430-2(1939).—Perceptible amts. of methoxyl and uronic acid compds. occur in the filtered sugar-cane juice and these percentages are considerably affected by different methods of treatment. Hot maceration increases both the methoxyl and uronic acid compds. Liming the filtered juice decreased the uronic acid compds. but did not affect the methoxyl. Liming the unfiltered juice increased both the constituents considerably, probably because the action of the lime on the finely divided cane fiber liberated these compds. D. P. Langlois

A report on the uses of the by-products of the cane-sugar factory. Carlos L. Locsin. *Sugar News* **20**, 467-70, 517-21(1939); **21**, 557-60(1940); cf. *C. A.* **33**, 7139[3].—Known and possible uses of cane-sugar factory by-products are: from bagasse, fuel, bagasse board, cellulose and dry-distn. products; from filter cake, fertilizer, wax and fuel; from molasses, compressed yeast, glycerol, dry ice, cattle feed, fertilizer, road material, plastics, ethanol, butanol, acetone, acetic, lactic, citric, butyric and gluconic acids; electrolytic caustic, Cl, bleach and H. W. W. Binkley

The keeping quality of cane-sugar molasses. H. C. Prinsen Geerligs. *Intern. Sugar J.* **42**, 25-7(1940).—See *C. A.* **33**, 7142[4]. D. P. Langlois

Harmful nonsugars and sugar beets. H. Claassen. *Centr. Zuckerind.* **47**, 1029(1939).—An increase of the harmful N content of sugar beets and juices reduces their purity and ease of workability. Harmful N is not the sole measure of quality, since the purity of defecated and carbonated juices must be considered also. References to suitable methods and app. are given. W. W. B.

New viewpoints on the purification of sugar-beet extract. Fritz Tödt. *Chem. App.* **26**, 370-2(1939).—A lecture. G. W. Stroebe

Behavior of topped beets remaining in the ground. H. Claassen. *Centr. Zuckerind.* **47**, 1013-14(1939); cf. *C. A.* **33**, 9034[1] and 2 following abstrs.—Sugar losses by the Pommritz process are no greater than in the usual harvesting methods. They contained only 0.02-0.03% more invert sugar than untopped beets. W. W. Binkley

Sugar content of and yield from Pommritz beets after they remained in the ground different lengths of time. K. Sammet and W. Lesch. *Centr. Zuckerind.* **47**, 1065-7 (1939); cf. preceding and following abstrs.—Pommritz process beets after 4 or 8 days in the ground showed a decrease in sugar content up to 1.5%. This decrease depends on exptl. conditions, H_2O absorption, the time the beets are left in the ground, and damage inflicted by topping. An increase in nonsugar content accompanies the decrease in sugar content. W. W. Binkley

Pommritz process in 1939. Fritz Schneider. *Centr. Zuckerind.* **47**, 1095-6(1939); cf. 2 preceding abstrs.—Pommritz process beets soon after topping show 0.8-1.6% less polarization. The beets lost 1.1% sugar after 4 days in the ground; 1.7% after 8 days. No deterioration in juice quality was detected. Sugar losses can be reduced by shortening the period between topping and plowing up of the beets. W. W. Binkley

Influence of beet chips on diffusion work. Bielitzer-Gronau. *Centr. Zuckerind.* **47**, 980-2, 1000-1(1939).—Most of the leaching occurs in the first 2 units of a battery with 7 diffusers and in the first 3 units in a battery of 8. The decrease in sugar concn. in the last 3 diffusers is the same for batteries of 7 or 8 units. Small chips do not distribute uniformly throughout the diffusers while even smaller chips cause foam. A combination of the smaller

chips and solns. of greater vol. does not shorten the diffusion time. Dead spaces between the diffusers has no favorable influence. W. W. Binkley

Solubility of sucrose. R. Hrubý and V. Kasjanov. *Intern Sugar J.* 42, 21–4(1940).—The nonsugars greatly affect the soly. of sucrose in water. The compn. of these nonsugars has been shown to differ considerably not only with products from different countries but also with sirups of the same factory and even with the same product throughout the campaign. Because of this it is useless to expect to calc. true values from apparent figures, e. g., purity coeffs., or the total salts from the sulfated ash. A simple and rapid method of detg. the soly. of cane sugar is not now available but is badly needed, since all existing data appear to be in considerable error. D. P. Langlois

Grut's experiments on the solubility of sucrose in the presence of nonsugars. Ph. Orth. *Bull. assoc. chim.* 56, 705–8(1939); cf. *C. A.* 8, 2632; 31, 7311⁴.- Grut's expts. (*C. A.* 32, 3185[6,7,8,9]) show that the soly. of sucrose is influenced by impurities in or on the crystals. The results accord with the equation $e = a(b - t)$, where e is the percentage ratio of H_2O to sugar in the satd. soln., t is the temp., and a and b are consts. For pure sucrose $a = 0.3901$, $b = 147.47$. As the purity of the sugar decreases, a increases, while b decreases. At 60 purity $a = 0.5062$, $b = 113.24$. At $e = 0$ the sugar concn. = ∞, and b indicates the m. p. of the sugar, falling with decreasing purity as would be expected. The product ab, indicating e at $t = 0$, is practically const., irrespective of purity. As the temp. decreases the effect of the purity on the soly. becomes less, and at 60 purity and $t = 0$ the satn. coeff. is only a little above unity. These relations have been confirmed by practical experience. F. W. Z.

Mannan. VIII. Preparation of mannan and the effect of temperature. Torao Otuki. *J. Chem. Soc. Japan* 60, 76–87(1939); cf. *C. A.* 31, 8610⁶.—Decrease in soly. of mannan is attributed to absorption of water; on preservation in a glass bottle for 5 yrs. it was unchanged. Decrease of soly. on heating, reported by various observers, was not confirmed. The viscosity of mannan soln. decreases on heating; the higher the temp. and the longer the time of heating, the greater is the decrease. This change is due to neither hydrolysis nor oxidation, but probably to a decrease of force necessary to build up colloidal micelles, such as the van der Waals force. Purification of mannan by (1) pptn. of cold aq. soln. with alc., (2) digestion of the colloidal soln. with pancreatin and pptn. with alc., and (3) pptn. of the Cu compd. of mannan by addn. of Fehling soln. and subsequent removal of Cu gives, resp., a prepn. most closely approximating the natural product, mannin-A, which differs from mannan only in that it is slightly less viscous, and a prepn. that swells in water but does not dissolve. Purified acetylated mannan was obtained from the dried powder. Mannan prepd. from this by deacetylation was insol. in water. K. Shinohara

Developments in high-speed centrifugals. Simes T. Hoyt and Walter E. Smith. *Repts. Hawaiian Sugar Tech.* 2, 41–7(1939). -Various structural, mech. and operative details. J. C. Jurrjens

Steels in the sugar industry. G. A. Graham. *Repts. Hawaiian Sugar Tech.* 2, 49–50(1939).—A general discussion of modern steels as recommended for sugar mills. J. C. Jurrjens

Bagasse weighing. S. S. Peck. *Repts. Hawaiian Sugar Tech.* 2, 85–7(1939).—Several methods are given and described in detail in order to arrive at more accurate figures than the ones used at present. J. C. J.

Researches on the thermal conductivity of massecuite and application to the cooling in an Adant mold. E. A. Marie and P. B. Naeĉache. *Sucr. belge* 59, 161–70 (1940).—The quality of the grain has little influence on the thermal cond. of massecuite. Thermal cond. of refined massecuite (Brix 90–95°) is a function of the wt. of crystals in 1 kg. of massecuite. W. W. Binkley

New views on starch. Karl Freudenberg, Ernst Schaaf, Gertrud Dumpert and Theodor Ploetz. *Naturwissenschaften* 27, 850–3(1939).—Recently the structure of the cryst. dextrins (Schardinger) of which starch is built up was detd. (*C. A.* 32, 8373⁶); it was assumed (*C. A.* 33, 6806⁸) that these compds. are present as such in starch. A model was built of the ring-shaped α-dextrin (pentosan) with the glucose units perpendicular to the plane of the ring. No fewer than 5 glucose units are required to produce such a ring without tension. The ring of the pentosan has the 5 O atoms of the 1–4 bonds arranged in an equilateral pentagon; C atoms 1 and 4 lie in one plane and the other C atoms in a 2nd plane. In β-dextrin, with 6 units, the corner O atoms are in 2 planes. With these dextrin structures the Hanes screw model of starch (*C. A.* 31, 8611⁹) becomes most acceptable; the dextrin structures are preformed in this as single coils of different sizes. The model explains hydrolysis by α-amylase as well as formation of nonreducing dextrins by the amylase of *Bacillus macerans*. The screw-shaped starch mol. is 15–20 A. thick and the rods are arranged radially in the concentric layers of the starch grain. Several other details, including the effect of I, are discussed. B. J. C. van der H.

Sirup from sweet potato starch. Lawrence E. Stout. *Mfrs. Record* 109, No. 2, 33, 48(1940). - The hydrolysis of a slurry of the starch in water (about 25 Be.) with HCl at a pressure of 30–50 lbs. for 20 min. followed by neutralization, purification and concn. yields a clear faintly colored sirup (35–42 Be.) which in every respect is comparable with corn sirup. Leopold Scheiban

Correlation between soil type, manure requirement and compn. of juice in sugar cane (Brink, van den Honert) 15. Nutrient solns. for sugar beets in sand and water cultures (Ukradyga, Oleksyuk) 15. (Lime and) beet leaf ratio in sugar beets (Berkner) 15. App. for sepg. solid particles of different sizes in starch manuf. (U. S. pat 2,184,598) 1.

Purifying sugar-factory and refinery juices. Dario Teatini. U. S. 2,184,570, Dec. 26. Sec Brit. 501,754 (*C. A.* 33, 7711[1]).

Desiccating molasses. David D. Peebles, (to Golden State Co., Ltd.). U. S. 2,184,314, Dec. 26. App. is described, and a process which involves causing a continual flow of the molasses under pressure to a discharge orifice, heating the molasses during its flow to an elevated temp. to initiate degradation of its sugar content, causing the molasses discharging from the orifice to be atomized with simultaneous release of water vapor and gases incident to partial degradation of sugar, causing the atomized particles to come into contact with a heated drying gas, and then arresting further degradation of sugar by rapidly cooling the particles.

29—LEATHER AND GLUE

HENRY B. MERRILL

Acid-binding power of collagen. G. D. McLaughlin and R. S. Adams. *J. Am. Leather Chem. Assoc.* 35, 44–50(1940). Collagen was prepd. from unhaired and bated calf skin by deliming with small increments of HCl at pH = 5, and washing free from electrolytes. The product was cut into strips, dehydrated with acetone and air-dried. Samples were treated 24 hrs. with solns. contg. varying wts. of H_2SO_4. The acid-treated collagen was pressed at 5000 lb./sq. in. and air-dried. It was assumed that all the H_2SO_4 in the pressed collagen was combined. Analysis of the air-dried collagen showed that H_2SO_4 content increased as the logarithm of the total wt. of H_2SO_4 present in the system, up to 7 g. H_2SO_4 combined with 100 g. collagen when the total H_2SO_4

present was 19 g. per 100 g. collagen. For higher wts. of total H_2SO_4, the acid present in the pressed collagen was greater than the wt. predicted by the logarithmic relation. H. B. Merrill

Report of the committee on qualitative tannin analysis of the I. S. L. T. C. A. Jamet, *et al.* *J. Intern. Soc. Leather Trades Chem.* **23**, 576–83(1939); cf. *C. A.* **31**, 6918⁶.—The tests previously recommended were applied by different labs. to samples of quebracho, sulfited quebracho, chestnut, mimosa and myrobalans exts., either pure or admixed with other exts. Results show (1) hydrolyzable tannin (I) can always be detected in condensed tannin (II); (2) II can always be detected in I, but sometimes the presence of II is indicated falsely; (3) admixt. with chestnut of hydrolyzable tannins of a different subgroup generally can be detected; (4) admixt. of II with another example of II cannot be detected (e. g., 20% urunday in quebracho, and 10% mangrove in mimosa escaped detection by half the collaborators). H. B Merrill

Report of the [A. L. C. A.] committee on color values of tanning materials. J. C. Robinson. *J. Am. Leather Chem. Assoc.* **35**, 213–15(1940).—The solns. prepd. for detg. sol. solids were examd. by different labs. with either Blackadder's modification of the Schmidt and Haensch colorimeter or a photoelec cell colorimeter. With neither instrument have concordant results been obtained. The differences are blamed on variations in turbidity of the sol. solids soln. as prepd. in different labs. H. B. Merrill

A method for the analysis of sulfited extracts (sulfited quebracho). III The determination of (8) hydrogen sulfide and (9) true sulfonic acids of the nontans. H. G. Turley, I. C. Somerville and F. P. Cronin. *J. Am. Leather Chem. Assoc.* **35**, 208–13(1940); cf. *C. A.* **33**, 2754⁶. The 7 detns previously described accounted for nearly all the S of the quebracho exts. originally investigated, but when the methods were applied to other samples, particularly of British and French manuf., up to 20% of the S was not accounted for. The gas evolved in detg. hydroxysulfonic acids contains H_2S. This was detd. by absorption in 2 tubes contg. 2% $CdCl_2$, placed ahead of the tubes contg. H_2O_2, and detg. the absorbed H S iodometrically. It was found further that the nontannin filtrate, after pptg. sulfates, contained S that could be recovered as $BaSO_4$ after oxidation. As sulfites and hydroxysulfonic acids had been removed before sepg. the nontannin, it was concluded that the nontannin filtrate contained true sulfonic acids of nontannins. These were detd. by evapn. with fuming HNO_3 and pptn. as $BaSO_4$. When all the methods were applied to 10 sulfited quebracho exts. of diverse origins, contg. from 1.7 to 5.9% S as SO_3, the percentage recovery of the S varied from 96 to 103%. The wide variations between different exts. in distribution of S are shown by the following figures (as percentage of the total S) free SO_2, 0.0 to 5.0; bisulfite, 0.0 to 24.8; sulfite esters, 9.6 to 18.4; hydroxysulfonic acids, 21.0 to 58.3; true sulfonic acids (*a*) of tannins, 2.3 to 15.1; (*b*) of nontannins, 0.0 to 9.7, H_2S, 2.3 to 19.8; sulfate, 7.6 to 37.3. H. B. Merrill

Action of microörganisms on vegetable tanning materials. X. The effect of sodium bisulfite on lactic acid fermentation of various tanning materials. Paul C. Chang. *J. Am. Leather Chem. Assoc.* **35**, 193–205 (1940); cf. *C. A.* **33**, 4077⁶. Lactic acid formation was measured in tan liquors contg. variable wts. of $NaHSO_3$ by the methods previously employed. In ellagitannins (myrobalans, valonia, California oak) fermentation was inhibited by 0.5% $NaHSO_3$ at pH = 5, and by smaller amts. at lower pH values. With condensed tannins (hemlock, mangrove), the effect of 0.5% $NaHSO_3$ was about the same, but 0.1% had no effect, probably because it combined with the tannin. Calcn. showed that the SO_2 content of the sulfited quebracho commonly used in a com. blend probably inhibits fermentation in the head liquors, but not in the tail liquors. H. B. M.

Study of accelerated tannage. Fernand Pothier. *J. Intern. Soc. Leather Trades' Chem.* **24**, 34–48(1940).—P. means a tannage in which exts. are used along with decoctions of bark, instead of the bark decoction only. Tanning expts. were performed with pieces from the bend of a selected, unhaired, delimed cow hide. The process included (1) "coloring" (1 week) in oak bark liquor, 0.5° Baumé; (2) tannage in "rocker" liquors (4 weeks), with liquors made by strengthening the color liquor with an ext., initially to 1° Baumé and increasing by 1° each week; (3) "retanning" (4 weeks) in oak bark decoction (2.5° Baumé) plus added bark; (4) "layaway" (3 months) in ext. liquor (3° Baumé) plus added oak bark. The exts. used were: oak wood (I), chestnut (II) (3 samples, variously processed), sulfited quebracho (III), mimosa (IV), "Swedish" spruce (V), myrobalans (VI), valonia (VII), gambier (VIII). *Results:* Yield (ratio of dry leather wt. to dry hide wt.) was highest for I, slightly less for II, III, IV and VII, and much lower for V, VI and VIII. This agreed with degree of tannage detd. by analysis. Coeff. of turgidity (*C. A.* **30**, 320⁹) was highest for I, II, IV, V and VII, slightly lower for III and VI, and lowest for VIII. Permeability to H_2O was least for I (24 min. per mm.), moderate for II to VII (7 to 14 min. per mm.) and very high for VIII (1.5 min. per mm.). Absorption of melted tallow agreed with permeability to H_2O; absorption of oil from a water emulsion contg. moellon, fish oil and tallow followed a slightly different order. Microscopic examn. confirmed the findings as to solidity. It is concluded that I, II, VII and IV are best adapted to sole-leather manuf., in the order given; the other exts. are better adapted to the manuf. of upper and fancy leathers. The characteristics of the leather are detd. by the exts. used in the rockers, and are modified only slightly by subsequent retannage. H. B. M.

Aging and reversibility of basic chrome sulfate tannage. G. D. McLaughlin and R. S. Adams. *J. Am. Leather Chem. Assoc.* **35**, 130–2(1940).—The aging expts. previously described (*C. A.* **32**, 9547⁶) were extended to 1 yr.; the same technique was used. For leathers of 18% and 22% basicity, resp., the percentages of reversal decreased from 61 and 80 to 38 and 61 after 26 weeks, and to 35 and 59 after 52 weeks. H. B. Merrill

The influence of organic compounds in chrome tanning. I Quinone, quinhydrone, hydroquinone and sucrose. H. C. Holland. *J. Intern. Soc. Leather Trades Chem.* **23**, 571–5(1939).—In 0.01 *M* chrome alum soln., addn. of no one of the above compds. has any effect on pH value or ionic sulfate, as detd. by electrometric titration and by pptn. with benzidine. This indicates that none of these compds. displaces coördinately bound sulfate in such dil. soln. H. B. Merrill

The present status of tanning by means of polymeric anhydrous phosphates. K. Lindner. *Atti X° congr. intern. chim.* **4**, 877–89(1939).—A review with 11 references. A. H. Krappe

A proposed standard gas chamber for accelerated aging of leather. R. W. Frey and C. W. Beebe. *J. Am. Leather Chem. Assoc.* **35**, 180–92(1940); cf. *C. A.* **28**, 6339⁶.—SO_2 is supplied by burning MeOH contg. a fixed wt. of amyl sulfite in a const.-level lamp. Temp. is regulated electrically. Details of construction are given. Data are presented which show that SO_2 content of the chamber is very uniform over several months, and that percentage of deterioration of a leather is not affected by its position in the chamber. H. B. Merrill

A comparative examination of various methods for estimating buffer capacity and decay in leather. W. R. Atkin and S. G. Shuttleworth. *J. Intern. Soc. Leather Trades Chem.* **23**, 564–70(1939); cf. *C. A.* **33**, 9709⁸.—Buffer capacity (as percentage of H_2SO_4) was detd. for 3 leathers by: I, Shuttleworth's cond. titration method; II, the Atkin-Thompson method; III, the Procter-Searle method. I and II were in agreement when extn. in I was done with 0.04 *N* KCl as in II. III gave widely divergent results; e. g., in one leather III indicated 1.0% free H_2SO_4 while I and II indicated the presence of compds. capable of neutralizing 0.7% H_2SO_4. It is shown how the arbitrary crit. pH values of II can be found from the cond. curves of I. In further analyses of 11 leathers, sound and decayed,

the results obtained by **I, II, the Kohn-Crede method** (cf. *C. A.* **17**, 2201) and the Innes diln. method led generally to the same conclusions. I is considered most precise, rapid and convenient. Decayed leathers contain $(NH_4)_2SO_4$ which is returned as H_2SO_4 by **III**. When the $(NH_4)_2SO_4$ contents of the leathers were subtracted from the acid contents found by **III**, the corrected results were in much better agreement with the strong acid found by **I**.

H. B. Merrill

Comparative evaluation of the qualities of various white pigments for coating leather. S. P. Zel'din and E. A. Chumakova. *Org. Chem. Ind.* (U. S. S. R.) **6**, 459–61(1939).—The tested white pigments can be arranged in the following decreasing order of their properties. Elasticity: white lead, ZnS, raw and calcined ZnO, lithopone and TiO_2. Covering power: ZnS, TiO_2, ZnO and white lead. Whiteness: ZnS, TiO_2, noncalcined ZnO, lithopone (29%), calcined ZnO and white lead.

Chas. Blanc

Products for use on leather. Friedrich von Artus. *Farben-Chem.* **10**, 164–70, 177–83, 203–8(1939); cf. *C. A.* **33**, 7145⁸.—This is a review of formulas and methods for making leather dressings, finishes, polishes, etc.

J. W. Perry

"Velan" treatment of light leathers. H. C. Holland. *J. Intern. Soc. Leather Trades' Chem.* **23**, 598–601(1939). —This finishing material is made by coupling pyridine and a higher alc. through HCHO. The hydrochloride, sol. in H_2O, is applied to fibers or fabrics. On brief heating at 100°, the compd. dissocs., and pyridine and HCHO are expelled; a waxy alc. coating is left on the fibers. This coating, being nonwetting, makes the fabric water-repellent without impairing its ventilating properties. Tests show that Velan treatment makes light leathers more water-repellent.

H. B. Merrill

The role of the chemical constituents of sulfated oils in the fat liquoring of chrome leather. Robert M. Koppenhoefer and Clinton E. Retzsch. *J. Am. Leather Chem. Assoc.* **35**, 78–129(1940); cf. *C. A.* **34**, 1970⁶. - The object of this work was (1) to compare 3 com. sulfated oils often used in leather making: neatsfoot (**I**), cod (**II**) and castor (**III**); (2) to study the effect of varying the constituents of each of these sulfated oils: sulfo compds. (**A**), free fatty acids (**B**), neutral oil (**C**) and raw oil (**D**) **A, B** and **C** were obtained by fractionating the sulfated oil by Hart's method (*C. A.* **31**, 4012⁹). Eleven series were run. In each series, one of the sulfated oils was mixed with one of the components of the same sulfated oil (or with the corresponding raw oil) to give 6 liquors of const. total oil content, varying from 100% sulfated oil to 100% added component by steps of 20%. E. g., in Series **IA** the different members of the series contained varying proportions of sulfated neatsfoot oil and the sulfo compds. isolated from sulfated neatsfoot oil. The leather was the bend portion of com. Cr-tanned calf skin, cut into strips after tanning, washed and neutralized with Na_2CO_3. Fat-liquoring conditions were: 300 g. wet Cr leather, 600 cc. liquor, 6 g. total oil, 48°, pH = 5 to 6, 1 hr. at 30 r. p. m. The fat-liquored leather was stored wet for about 16 hrs. at 15° and then air-dried. Representative strips were conditioned and exam'd. for (**a**) tear resistance and (**b**) tensile strength. The broken strips were analyzed either immediately or after aging 2 weeks. Free oil (**c**) was detd. by extg. successively with petr. ether and Me_2CO. Combined oil (**d**) was detd. by hydrolyzing the extd. leather with 20% KOH and extg. the lipides from the acidified hydrolyzate with Et_2O. Total oil (**e**) = **c** + **d**. Other strips were split into "grain" (upper 20%), "corium base" (lowest 20%) and "corium" (middle 60%), each of which was analyzed separately. Results are given in 33 graphs. Results showed: (1) in whole skin **e** was independent of the compn. of the fat liquor except in **IC, IIIB, IIIC** and **IIID**, where takeup was very incomplete for expts. with 100% **C** or **D**. **d** was directly proportional to **A**. **d** increased slightly on aging. There was no evidence that **B** contributed at all to **d**. (2) In the grain layer, **c, d** and **e** increased with **A** and decreased with **B, C** and **D**. This means that penetration through the grain surface is detd. by the fineness of the emulsion. In the corium base, in **IA, IIA** and **IIIA, e** was const, **d** increased and **c** decreased with increasing proportion of **A**. In **IB, IC, IIC, IIIC** and **IIID, d** decreased and **c** and **e** passed through max. with increasing proportion of **B, C** or **D**. In **IIB** and **IIIB, c** and **e** increased with increasing **B**, and in **IID c** and **e** passed through min. with increasing **D**. In the corium proper, the percentage of total oil was only about 1/10 that of the grain or corium base and **d** was always very small. In poor emulsions most of the oil penetrated through the open structure of the flesh side, and subsequent penetration of **c** into the corium proper occurred by flow of oil along the fiber surfaces. The amt. of **c** and **e** found in the corium was largely a function of the amt. found in the corium base. In general, penetration was better for **II** than for **I** and **III**. (3) **a** and **b** decreased with increasing percentage of **A** in **IA, IIA** and **IIIA**. The sulfo compds. are incapable of lubricating leather and serve merely as dispersing agents. Generally, but not always, the results of **a** and **b** were in accord. **b** depends largely on the **c** content of the corium proper. With increasing proportion of **B, C** or **D, a** and **b** usually passed through max., but in **IIB** and **IIC a** and **b** were max. at 100% **B** or **C**, because **B** and **C** from **II** have fair emulsifying properties. In **III B, a** decreased and **b** increased with increasing proportion of **B**. As between the different oils, **a** and **b** decreased in the order **I, II, III**. **I** gave outstandingly high values, and appears to be a superior lubricant regardless of distribution. The effectiveness of the different components declined in the order **D, C, B**. The differences were not great. **C** differs from **D** in containing a high proportion of mono- and diglycerides.

H. B. Merrill

Phys. and colloidal chemistry of clays [penetration of kaolin into sheep leather] (Albert) **19**. Adsorptive power of coagulates from aq. tannin solns. (Rossi) **2**. Soybean protein dispersions in formaldehyde solns. [for leather dressing] (Smith, Max) **13**. Softening agents for leather (U. S. pat. 2,183,721) **23**. Sulfonated product for use as leather-processing assistant (U. S. pat. 2,183,929) **25**. Cu compds. of primary resorcinol trisazo dyes [for dyeing leather] (U. S. pat. 2,183,673) **25**. Basic sulfamate of quadrivalent Ti [for treating leather] (U. S. pat. 2,181,538) **23**.

Tanning. Chemische Fabrik Grünau Akt.-Ges. Ger. 684,972, Dec. 8, 1939 (Cl. 28*a*, 3). The tanning is carried out with compds. of trivalent Cr in the presence of high-mol. albumin-cleavage products of the type of protalbic acid and lysalbic acid.

Fibrous material from animal skin. Firma Carl Freudenberg. Ger. 684,783, Dec. 5, 1939 (Cl. 39*b*, 26.01). The hide material, already more or less extensively comminuted with careful preservation of the fibers, is treated with an acid swelling medium different from that employed initially, preferably HCl, preferably until the material has absorbed at least 85% of H_2O.

Gelatin. John V. S. Glass (to Imperial Chemical Industries Ltd.). U. S. 2,184,494, Dec. 26. In making gelatin from gelatin-forming materials such as ossein by treatment with a lime suspension, a nontertiary amine contg. no neg. group, such as methylamine, dimethylamine or piperidine, is added to the lime suspension and serves to accelerate the process.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

One-hundred years of rubber compounding. Werner Esch. *Gummi-Ztg.* **54**, 68–9(1940).—Historical, with the inclusion of recipes used in 1856 and 1858. C. C. D.

Contribution to the history of latex. Leo Eck. *Rubber Chem. Tech.* **12**, 908(1939).—A bibliography for an article by E. (cf. *C. A.* **33**, 5697[9]). C. C. Davis

Testing and control of latex supplies. E. A. Murphy. *Rubber Chem. Tech.* **12**, 885–99(1939).—See *C. A.* **32**, 8188[9]. C. C. Davis

Ficus elastica and Castilla latexes. Henry P. Stevens. *Rubber Chem. Tech.* **12**, 688–94(1939).—See *C. A.* **33**, 8439[8]. C. C. Davis

Composition and colloidal properties of balata latex. A. R. Kemp. *Rubber Chem. Tech.* **12**, 470–81(1939).—See *C. A.* **32**, 7765[8]. C. C. Davis 3

Variation in the composition and properties of fresh latex, and subsequent changes on ammoniation. Edgar Rhodes. *Rubber Chem. Tech.* **12**, 646–54(1939).—See *C. A.* **33**, 9711[8]. C. C. Davis

The composition and characteristics of the rubber in Hevea latex. D. F. Twiss and A. S. Carpenter. *Rubber Chem. Tech.* **12**, 448–64(1939).—See *C. A.* **32**, 8187[9]. C. C. Davis 4

X-ray diffraction patterns of Hevea, Manihot and other rubbers. Geo. L. Clark, Siegfried T. Gross and W. Harold Smith. *J. Research Natl. Bur. Standards* **23**, 1–5(1939) (Research Paper No. 1219); cf. *C. A.* **33**, 5227[9].—Rubber from *Manihot glaziovii*, like that from *Hevea*, can be sepd. into sol and gel fractions, stretched, and exand. by x-rays. With stretched *Manihot* sol, a few interferences were obtained, but many more resulted with the stretched gel. When crystd. by freezing at low temps. for 24 hrs., the interferences from the gel again outnumbered those from the sol. The x-ray measurements are in all cases identical to those of *Hevea* rubber and indicate that the same structure exists in each. The same is also true of rubber from latexes from *Funtumia elastica*, *Cryptostegia grandiflora* and *Castilla elastica*. A long spacing, previously observed in unstretched *Hevea* gel rubber, is verified, together with a 2nd spacing approx. twice as large. G. L. C. 5 6

Spontaneous coagulation of rubber latex. Paul Stamberger. *Rubber Chem. Tech.* **12**, 469(1939).—See *C. A.* **33**, 4816[8]. C. C. Davis

The viscosity of preserved and concentrated latex. I. Relationship between dry-rubber content and viscosity. Edgar Rhodes. *Rubber Chem. Tech.* **12**, 655–64(1939).—See *C. A.* **33**, 3203[4]. **II. Viscosity-temperature relationship of latex.** *Ibid.* 665–71.—See *C. A.* **33**, 3203[7]. C. C. Davis 7

The potassium hydroxide-number test and its application to the compounding of zinc oxide in rubber latex. H. F. Jordan. *Rubber Chem. Tech.* **12**, 590–603(1939).—See *C. A.* **32**, 8192[1]. C. C. Davis

Koroseal, a raw material for the rubber industry. S. L. Brous. *India Rubber World* **101**, No. 3, 53–4(1939).—A brief, illustrated review (cf. *C. A.* **33**, 9044[6]). C. C. Davis 8

Purified latex and rubber. R. J. Noble. *Rubber Chem. Tech.* **12**, 672–87(1939).—See *C. A.* **32**, 7767[3]. The bibliography is revised. C. C. Davis

Rubber terminology. T. R. Dawson. *Rubber Chem. Tech.* **12**, 441–7(1939).—See *C. A.* **32**, 7768[2]. C. C. Davis

The chemistry of natural rubber. J. W. Haefele and E. M. McColm. *Rubber Chem. Tech.* **12**, 760–1(1939).—See *C. A.* **33**, 6645[4]. **III. The effect of ammoniation on the latex of Hevea brasiliensis.** Kenneth C. Roberts. *Ibid.* 465–8.—See *C. A.* **33**, 2757[4]. C. C. Davis 9

Extraction of raw rubber with acetone. H. P. Stevens and J. W. Rowe. *Rubber Chem. Tech.* **12**, 604–8(1939).—See *C. A.* **33**, 7768[8]. C. C. Davis

Some causes of variation in the quality of raw rubber and latex. The sol:gel ratio in relation to the ultimate physical properties of rubber. D. Spence and John D. Ferry. *J. Soc. Chem. Ind.* **58**, 345–51(1939).—A continuation of previous work (*C. A.* **31**, 8247[4]). Evidence is presented to show that changes from sol rubber (I) to gel rubber (II) (increase in the state of polymerization) and conversely from II to I (depolymerization) take place in the prepn. of raw rubber to an extent that makes the phenomena of practical importance. The percentage of II in NH_3-preserved latex increases progressively during storage, whereas that of sterile latex remains const. Rubber prepd. by coagulation with an acid contains a higher proportion of I than does rubber coagulated by natural exposure of the latex, and if an excess of acid is used, the percentage of I is still higher. Rubber prepd. from latex treated with a pure culture of Actinomycetes contains an abnormally high percentage of II, and it is harder and tougher than ordinary rubber. When latex is coagulated by smoking, the I:II ratio of the resulting rubber depends on whether the process is carried out in light or in darkness, i. e., smoked rubber prepd. in darkness contains a much higher percentage of I than does rubber prepd. in the same way except with exposure to sunlight during coagulation. Exposure of dry rubber to sunlight and to benzoquinone (III) vapor and also exposure in darkness to III and then to sunlight increase the II content, whereas exposure to III in darkness alone does not substantially increase it. Exposure of latex contg. 1,4-naphthoquinone (IV) to sunlight increases the II content, but if NaOH also is added, the II content decreases. Likewise the tendency of III and sunlight to increase the II content of neutral latex can be nullified by the addn. of sufficient NaOH or NH_4OH. The longer that latex contg. IV is exposed to sunlight the lower are the percentage of I and the swelling index, and the higher is the tensile strength of the rubber prepd. from the latex. Thus rubber prepd. from latex (34.5% rubber) contg. 1.2 g. of IV per 350 cc. and exposed for 10 hrs. was 5 times as strong as the corresponding rubber not so treated, and the elongation at rupture was the same. After vulcanization, products from latex treated in this way are stiffer and reach their optimum cure (judged by tensile strength) sooner than do products from normal latex. In general, these products differ in mech. properties in the same way as do the I and II vulcanizates described by Smith and Holt (*C. A.* **29**, 1679[3]). In Diesel oil the vulcanizates from the treated latex swell less than the corresponding ones from untreated latex. When latex contg. BzH (2.5% on the rubber) is exposed to sunlight: (1) in N; (2) in air; (3) in N and then in air; S and Zn butylxanthate are then added to each sample, and the samples are coagulated, the rubber from (1) is very tough and resilient before and after vulcanization; sample (2) is soft and plastic before, and short and weak after vulcanization, and sample (3) is much less plastic than (2) before vulcanization and short and tough after vulcanization. After vulcanization, the samples prepd. from rubber treated with BzH swell much less in Diesel oil than do the corresponding samples from untreated rubber. In general, changes in the I·II ratio of rubber by the combined action of sunlight and IV or BzH are manifest before vulcanization by diminished soly. and swelling and increased tensile strength. These differences are, however, masked to some extent after vulcanization by the mech. treatment undergone by the rubber. But the expts. show the changes in structure and improvements in phys. properties that are retained after vulcanization and, by the use of BzH and light, as a "bridge builder" in the absence of air and as a "chain breaker" in the presence of air, products with various degrees of soly. and swelling properties can be obtained. A method is thus made available for the prepn. of modified rubbers, as suggested by Rideal (*C. A.* **32**, 8195[8]), whereby the phys. structure of natural rubber may be so changed that vulcanizates can be obtained which are more nearly like the best synthetic rubbers in their resistance to various org. liquids to which ordinary rubber is

so much less resistant. The dependence of the I:II ratio in com. rubber on methods of storage and coagulation of the latex, on bacterial action, on the action of light and heat during the smoking process, on the presence of alkalies, etc., and in turn the influence of this I:II ratio on the properties of the vulcanized rubber throws further light on the variability of com. rubbers. C. C. D.

Preparation and properties of halogen derivatives of rubber from latex. H. C. Baker. *Rubber Chem. Tech.* **12**, 545–55(1939).—See *C. A.* **32**, 8193[3]. C. C. D.

The properties of rubber prepared from dialyzed latex. H. P. Stevens and J. W. Rowe. *Rubber Chem. Tech.* **12**, 695–705(1939).—See *C. A.* **33**, 5225[7]. C. C. D.

The crystallization of crude rubber. Chullchai Park. *Rubber Chem. Tech.* **12**, 778–88(1939).—See *C. A.* **33**, 7616[7]. C. C. Davis

An x-ray investigation of crystallinity in rubber. S. D. Gehman and J. E. Field. *Rubber Chem. Tech.* **12**, 706–18(1939).—See *C. A.* **33**, 9041[9]. C. C. Davis

X-ray diffraction patterns of crystalline sol rubber prepared from ethereal solution. Geo. L. Clark, Siegfried T. Gross and W. Harold Smith. *Rubber Chem. Tech.* **12**, 482–4(1939).—See *C. A.* **33**, 5227[9]. C. C. Davis

The crystal structures of cellulose and of rubber. H. Mark and Kurt H. Meyer. *Rubber Chem. Tech.* **12**, 734–5(1939). English version of *C. A.* **32**, 4327[5], with omission of Part II on cellulose. C. C. Davis

Structure and mechanical properties of rubber. K. H. Meyer. *Atti X° congr. intern. chim.* **4**, 100–1(1939).—Owing to the fact that a rubber-like substance is built up from very long primary-valence chains, it exhibits microscopically the behavior of a liquid in 2 directions (viscosity smaller than 10^8 c. g. s. units) and that of a solid in the direction of extension (viscosity larger than 10^{12} c. g. s. units). The kinetic theory of the elasticity of rubber is discussed. The viscosity of rubber increases considerably with increasing deformation. R. Simha

Lattice of rubber. Lore C. Misch and A. J. A. van der Wyk. *J. Chem. Phys.* **8**, 127(1940).—The unit cell of rubber suggested by several authors gives an x-ray d 8–10% higher than the measured d. The equator reflection A_2 is not a single reflection, and the angle between A_1 and A_2 is 39.2°. The rubber lattice is pseudorhombic with a = 8.97 A., b = 8.20 A., c = 25.2 A. The same cell in monoclinic parameters gives a = 8.97 A., b = 8.20 A., c = 26.7 A., β = 70.4°. The cell contains 16 isoprene units (8 chains); the calcd. d. is 0.97 (0.965 is the highest measured d. of stretched rubber). Certain difficulties connected with this interpretation are discussed. A smaller unit cell can exist only if several structures are present simultaneously (dimorphism). One must be monoclinic, the other may be triclinic. The monoclinic cell: a = 8.97 A., b = 8.20 A., c = 6.68 A., β = 70.4°, contains 2 chains. The triclinic cell: a = 6.12 A., b = 8.20 A., c = 6.99 A., α = 73.2°, β = 64.1°, γ = 47.1°, contains 1 chain. G. M. Petty

Highly polymeric compounds. CLXIV. Unit-cell diagrams and the microstructure of "single crystals" of rubber. Determination of the lattice of macromolecules of rubber according to new x-ray methods. Erwin Sauter. *Rubber Chem. Tech.* **12**, 719–33(1939).—See *C. A.* **31**, 8990[1]. C. C. Davis

Inhibition of crystallization of rubber by high pressure. R. B. Dow. *Rubber Chem. Tech.* **12**, 496–7(1939).—See *C. A.* **33**, 3629[7]. C. C. Davis

Examination of thin rubber films by electron diffraction. Kenzo Tanaka. *Rubber Chem. Tech.* **12**, 485–7(1939).—See *C. A.* **33**, 2758[6]. C. C. Davis

Improvements in methods for the rapid analysis of rubber. A. Marty. *Rubber Chem. Tech.* **12**, 609–10(1939).—See *C. A.* **33**, 4817[9]. C. C. Davis

Mechanical properties of "two-dimensional" rubber. The micellar structure of rubber. A. A. Trapeznikov. *Rubber Chem. Tech.* **12**, 755–9(1939).—See *C. A.* **33**, 6647[1]. C. C. Davis

A few corrections of statistical theories of the high elasticity of rubber. R. Houwink. *Rubber Chem. Tech.* **12**, 498–503(1939).—See *C. A.* **33**, 4075[7]. C. C. Davis

Fatigue in rubber. III. Fatigue and reënforcement. W. J. S. Naunton and J. R. S. Waring. *Rubber Chem. Tech.* **12**, 845–60(1939).—See *C. A.* **33**, 8441[6]. C. C. Davis

A machine for the systematic testing of rubber subjected to repeated flexings. Lucien Graffe. *Rubber Chem. Tech.* **12**, 582–9(1939).—See *C. A.* **33**, 4076[7]. C. C. Davis

The dependence of the stress on the temperature of rubber elongated to a constant degree. V. Hauk and W. Neumann. *Rubber Chem. Tech.* **12**, 520–8(1939).—See *C. A.* **33**, 1537[2]. C. C. Davis

A time effect on the rapid elongation of rubber. V. Hauk and W. Neumann. *Rubber Chem. Tech.* **12**, 518–19(1939).—See *C. A.* **33**, 1537[9]. C. C. Davis

Forced and spontaneous changes in the arrangement of the molecules in stretched rubber. Crystals and fused phase in stretched rubber. P. A. Thiessen and W. Wittstadt. *Rubber Chem. Tech.* **12**, 736–54(1939).—See *C. A.* **33**, 24[9]. C. C. Davis

The softening of rubber. I. The addition of soaps and softeners to latex. V. H. Wentworth. *J. Rubber Research Inst. Malaya* **9**, Commun. 236, 90–100(1939).—The work was prompted by a realization of the potential advantages of softening rubber during its prepn. on the plantations, thereby avoiding the combination of heat, mastication and addn. of softening agents, with the resultant expenditure of power, now current in the rubber industry. Both older softening agents and new peptizing agents were tested as possibilities to add to latex and to soften rubber during smoking or drying. Fatty acids and soaps were added to latex, either as solns. or as C_6H_6-dil. NH_4OH emulsions. Stearic acid and its NH_4, Na, K, Mg, Ca, Zn, Al and Pb salts; oleic acid and its NH_4, Na, K, Cu, Mg, Ca, Zn, Ba, Al, Sn, Pb, Fe and Ni salts; palmitic acid and its Na, K and Al salts, and linoleic acid and its NH_4 and trihydroxytriethylamine salts were tested, and in each case 3% (on the dry rubber) was added. The effects on plasticity before and after mastication are tabulated. The free acids did not have any pronounced softening effects, but the soaps were more effective. Na soaps were slightly the best of the sol. ones, but were relatively ineffective. Cu oleate had an extreme effect, but obviously is still of no practical interest. Ni oleate had the greatest initial effect, followed by Zn oleate and Zn stearate and Fe oleate; however, the effects of the 3 were nearly the same after mastication. Sn oleate showed a hardening effect. Because of their proved safety in rubber, and their pronounced softening effects, particularly after mastication of the rubber, Zn stearate and Zn oleate were the most promising softening agents. Pine tar had relatively little softening effect, even in high proportions (up to 10%, based on the rubber, was added in the form of aq. emulsions to the latex). Rubber contg. low percentages of pine tar (added as an emulsion to the latex) and air-dried had the appearance of smoked sheet, and since large proportions of pine tar can be incorporated in latex, it might be economical for rubber-pine tar master batches to be prepd. on the plantations and the more cumbersome and costly process of prepg. such master batches in the rubber industry thus be avoided. Comparative tests of the softening action on rubber of pine tar, Tackol, Rubberine Gel, rosin oil, stearic acid, lanolin, petrolatum and coal tar, when added to latex, showed no outstanding effects. All gave practically the same plasticities after mastication. **II. The preparation of soft rubber by precoagulation treatment of latex.** J. D. Hastings. *Ibid.* Commun. 237, 101–25.—Four peptizing agents, viz., $PhHNNH_2.ZnCl_2$ (I), naphthyl-β-mercaptan (II) and xylylmercaptan (III), were incorporated, as emulsions, in latex and their ability to soften the resulting rubber while hot during the smoking and drying operations was detd. The peptizing agents had no significant effect on the coagulation, sheeting and smoking processes. Softness of the rubber was judged by plasticity and mastication values, obtained by the Mooney shearing disk plastometer. Because of the poisonous properties of I, the details of the exptl. results are not reported. II

had a pronounced softening effect, and the higher percentage, the greater was this effect. However, with 0.076% of II, the rubber was less plastic than without any II, but only before mastication. This apparent hardening is also manifest in the first stages of masticating ordinary crude rubber (cf. Hockstra, *C. A.* **32**, 8200[7]), although the explanation of H. seems invalid for rubber contg. II. When added to latex, II slightly accelerated the vulcanization of rubber-S mixts., but not of rubber-S mixts. accelerated by mercaptobenzothiazole-ZnO (Crude Rubber Comm. Am. Chem. Soc., recipe). There were no significant effects of II on aging, at least in the proportions likely to be used in practice. When II is added to latex, the plasticity of the resulting rubber depends on the temp. on drying of the wet sheets, e. g., a much softer rubber was obtained at 140° than at 120°. Moreover, the higher the percentage of II, the greater was this temp. coeff. Continued heating after rubber was dry did not increase its softness, and the temp. effect on softness was greatest in the early stages of drying. Hence high temps. are necessary only during the early stages of drying, and max softness is obtained by maintaining wet sheet at a high temp. in the early stages of drying and completing the drying at a lower temp. Greater softness of rubber contg. II (added to latex) and also normal rubber was obtained by milling it at 20° than at 80°. When stored, rubber contg. I, II and III, resp., hardened progressively, and the higher the percentage of peptizing agent, the greater was the hardening, and more hardening occurred in rubber dried at 140° than in that dried at 120°. Differences in plasticity of rubbers caused by inherent differences in latex were still evident when II was added to the latexes. The effects of III were in general similar to those of II, but III was not so effective as II in the same percentage. Emulsions of peptizing agents can be readily prepd. with a homogenizer, but this is not always feasible on plantations. However, the so-called "two-soln." method of agriculture can be utilized to prep. stable emulsions of II without a homogenizer. The best emulsions obtained were prepd. by adding a soln. of II and Agral WBS (Imperial Chem. Industries) in kerosene to an equal vol. of water contg. a little NaOH, e. g., 10 g. of II and 1 g. of Agral WBS in 100 cc. of water are added to 100 cc. of water contg. 0.5 g. of NaOH. This is added to latex dild. to 1.5 lb. dry rubber per gal. (0.72% II based on the rubber). II can also be handled in the same way. From the factory point of view this type of modified rubber is much more easily "broken down," and its economy warrants further study. C. C. Davis

Some practical aspects of the theory of diffusion of water through rubber. H. A. Daynes. *Rubber Chem. Tech.* **12**, 535–40(1939).—See *C. A.* **32**, 8197[8]. C. C. Davis

Note on the theory of water adsorption by rubber. H. A. Daynes. *Rubber Chem. Tech.* **12**, 532–4(1939).—See *C. A.* **33**, 3204[6]. C. C. Davis

The chromatography of rubber solutions. Giampietro Cajelli. *Rubber Chem. Tech.* **12**, 762–73(1939).—See *C. A.* **33**, 9043[6]. C. C. Davis

Heat of dilution in the system: rubber-toluene. Kurt H. Meyer, Eberhard Wolff and Ch. G. Boissonnas. *Rubber Chem. Tech.* **12**, 504–8(1939).—See *C. A.* **33**, 4456[9]. C. C. Davis

Color measurement and its application in the rubber industry. W. H. Willott. *Rubber Chem. Tech.* **12**, 611–17(1939).—See *C. A.* **32**, 7771[7]. C. C. Davis

External influence and the internal state of rubber. W. Wittstadt. *Rubber Chem. Tech.* **12**, 488–95(1939).—See *C. A.* **33**, 5226[9]. C. C. Davis

Behavior of rubber hydrocarbon in a molecular still. W. Harold Smith and Henry J. Wing. *Rubber Chem. Tech.* **12**, 789–93(1939).—See *C. A.* **33**, 5700[4]. C. C. Davis

Cyclized rubber, particularly halide transformations. H. P. Stevens and C. J. Miller. *Rubber Chem. Tech.* **12**, 556–67(1939).—See *C. A.* **32**, 7771[3]. C. C. Davis

The effect of silent electric discharges on rubber solutions. Lothar Hock and Heinrich Leber. *Kolloid-Z.* **90**, 65–77(1940).—Solns. of several concns. (mostly in C_6H_6) of natural rubber (I) and of Buna-85 (II) were subjected to a silent elec. discharge in an app. which was a modified form of that of Fromandi (*C. A.* **23**, 1009). This app. and the technique of the expts. are described and illustrated in detail. Under these conditions, both I and II undergo polymerization, with formation of products of various degrees of higher polymerization, some of which are sol., others insol. in benzene. The polymers insol. in benzene form, after purification and drying, a nonelastic, nonplastic mass which is soft and weak enough to be readily crumbled to a flaky material. On the contrary, the benzene-sol. products retain all of the plasticity and elasticity of the original rubbers, and from a technical point of view behave essentially like ordinary raw rubber. Some of the products were vulcanized, and it is particularly worthy of note that the properties of vulcanizates from the higher polymers of II are more nearly like the properties of vulcanizates from untreated natural rubber than they are like the properties of vulcanizates from the original II. Only by tests with various percentages of S, various accelerators and fillers, and other conventional methods of compounding, can it be ascertained whether these more highly polymerized products from I and II are of technical importance, either for general use or for special purposes. A significant fact in this connection is that these more highly polymerized products from I and II have considerably higher softening temps., without any loss of plasticity, tackiness and soly.; so perhaps even the products prepd. in the present work may be of technical importance. From the theoretical point of view, the formation of higher-mol. types of rubber is characterized by polymerization by forced activation of the mols. The progress of this polymerization is therefore governed by the elec. conditions, and this in turn explains why polymerization progresses in practically the same way through the temp. range of −25° to 50°. Analyses of the various polymerized products showed that all those from I had the empirical formula of isoprene, and all those from II had the empirical formula of butadiene. Both in chem. and physicochem. respects, the more highly polymerized forms of I and II are characterized by their degrees of unsatn. and accordingly by their I nos., which decrease with increase in mol. wt., i. e., with degree of polymerization. Furthermore thermochem. measurements, including detns. of the heats of combustion in a microcalorimeter, proved that the polymerization brought about by a silent elec. discharge is an exothermic reaction, for the higher the degree of polymerization the smaller is the heat of combustion of the polymerizate. It was found possible to follow, by measurements of the internal friction, i. e., changes in viscosity, the progress of polymerization to the point where a gel separates. C. C. D.

Ultraviolet irradiation of rubber. P. S. Srinivasan. *Proc. Indian Acad. Sci.* **10A**, 186–96(1939).—The effect of ultraviolet light on the absorptive capacities for light of rubber in polar and in nonpolar solvents was studied. Rubber highly purified from pale crepe was dissolved in the absence of air in menthol, ethylene chloride, cyclohexane and heptane and the solns., all of the same concn. (5 g. per l.), were exposed in the absence of air to radiation from a quartz-Hg lamp for 3 and 6 hrs. The absorptions before and after such treatment were measured with a Hilger Spekker photometer, a quartz spectrograph, isozenith plates and a condensed spark discharge between W-steel electrodes from a high-tension induction as the source of illumination. Compensation was made for absorption by the pure solvents, and the temp. was maintained const. The measurements, recorded in tables and graphs, confirm earlier observations that absorption of light by rubber is very small in the visible region, is greater below 2700 A., reaches a max. at approx. 2000 A. and is general rather than selective throughout. The most important result of the expts. is that irradiation with ultraviolet light increases the absorption of light by rubber in polar solvents and reduces it in nonpolar solvents, i. e., rubber becomes more nearly transparent in polar solvents and less transparent in nonpolar solvents. A review of work by

Staudinger, Pummerer, etc., leads to the conclusion that rubber in soln. is composed of true mols. and not micelles. If this is so, then polar solvents disrupt the mols., perhaps at points where the bonds are angular rather than linear. In nonpolar solvents, rubber is probably in a highly polymerized state; in polar solvents the degree of polymerization is much lower. Since ultraviolet light causes both polymerization and depolymerization (cf. Asano, *C. A.* **19**, 3616), a low degree of polymerization as in polar solvents should be increased by ultraviolet radiation and a high degree as in nonpolar solvents should be decreased. Furthermore before irradiation, light absorption by rubber is greater in nonpolar solvents than in polar solvents, and this indicates that the higher the degree of polymerization of rubber the greater is its absorption of light. Therefore ultraviolet light must increase the degree of polymerization in polar solvents and reduce it in nonpolar solvents. To confirm these views, the effects of ultraviolet radiation on the viscosities and surface tensions of solns. of rubber in heptane, cyclohexane, ethylene chloride and cyclohexanone were detd. Here too the operations were carried out in the absence of air, and irradiation was continued for 1 week. Prolonged irradiation reduced the viscosity in nonpolar solvents, originally 100 times that of the solvent, almost to that of the solvent. In contrast to this, the viscosity in polar solvents, originally 4–5 times that of the solvents, decreased only about 25%. Irradiation changed the surface tension inappreciably. These facts indicate that ultraviolet radiation breaks down the rubber mol. in nonpolar solvents, but relatively little in polar solvents, as would be expected if the mols. are already broken down and relatively small in polar solvents. This does not, however, prove whether polymerization takes place in polar solvents by irradiation with ultraviolet light. Further evidence on the mol. dimensions under various conditions might be obtained by a study of the depolarization of scattered light by the method used by Krishnan (*C. A.* **29**, 1301[7]) for colloids and mixts. of liquids. C. C. Davis

Aging of rubber-sole materials. I. U. Mishustin. *Kozhevenno-Obuvnaya Prom. S. S. S. R.* **1939**, No. 7, 33–6.—The effects of various commonly used ingredients are shown. B. Z. Kamich

Methods for determining the colloidal-chemical characteristics of sodium-bivinyl rubber. I. I. Zhukov and V. A. Komarov. *Sbornik Trudov Opytnogo Zavoda im. S. V. Lebedeva* **1938**, 3–11; *Khim. Referat. Zhur.* **2**, No. 5, 19(1939); cf. *C. A.* **33**, 4109[1].—The colloidal-chem. properties of Na-bivinyl rubber were detd. from the soly. of the rubber, from its fractional compn. and from the η of its dil. solns. A detailed description of the methods of these detns. is given. Measurements of the η were performed in an Ostwald viscometer for volatile substances (the vol. of the upper ball was 1 cc. and the diam. of the capillary 0.2 mm.). 0.25% solns. of the polymers in C_6H_6 were used for the detns. The soly. detns. were made by shaking the samples of the polymers in little batiste bags in C_6H_6 and by detg. the soly. of the polymer from the concn. of the soln. The soly. of the coreless rubber increased from milling (after 45 min.'s milling the rubber dissolved in 24 hrs.). The rate of soln. was increased 10-fold by heating the rubber on a water bath. The ratio solvent sample, can vary between wide limits without important changes in the soly. The soly. of rubber decreased when the rubber was kept in storage. The sepn. of the polymers was performed by fractional pptn. with alc. from C_6H_6 solns. of the polymers. To 3 portions of 25 cc. of 1% soln. of the polymer add 7.6, 17.4 and 34.7 cc. of alc., resp., let stand overnight and det. the wt. of the ppt. by drying to const. wt. at 75–85°. These amts. of alc. correspond in general to the pptn. of the 1st and the 2nd fractions. The 3rd fraction is pptd. by an excess of alc. and the 4th fraction remains in soln. and is detd. from the difference. W. R. Henn

New transformation products of rubber. H. Mark and K. Posnansky. *Atti X° congr. intern. chim.* **4**, 98–9(1939).—An acetone-water soln. of $AgNO_3$ was applied to films of latex. According to the duration of treatment, enclosures up to 18% of Ag, corresponding to about 37% of nitrate, were obtained. The final product was a solid, dry film with leather-like properties and a d. of 1.25 (18% Ag; d. of the initial product 0.923). The x-ray diagram showed a series of sharp rings. These rings, however, can neither be attributed to a Ag compd. nor can they be compared with those obtained from ordinary cryst. rubber. Also, the diagram obtained from a stretched sample differed from the corresponding normal sample. After being treated, the sample had a tensile strength of about 15–20 times that of the original film. At room temp., the extension was to a greater part irreversible. It was impossible to obtain an analogous product by applying other metallic salts such as $AuCl_3$, $AgClO_4$ or $NaNO_3$. The min. amt. of enclosed $AgNO_3$ necessary to obtain the above effects could not be detd. Robert Simha

Rubber as antivibration material. C. W. Kosten. *Mededeel. Rubber-Stichting, Amsterdam* No. **16**, 5–16 (1940); *Ingenieur* **54**, W, 128(1939).—The advantages of rubber over various other materials for foundations, supports, etc., are shown by calcns. of its elastic behavior under compression, tension and shearing forces. C. C. Davis

Modern antiseptics for the rubber industry. Robert A. Engel. *Rubber Age* (N. Y.) **46**, 163–4, 171(1939).—A review and discussion. Attention is called to 2 compds., both derivs. of Ph_3CH_2, which are particularly effective against *Staphylococcus aureus* and which are therefore recommended as suitable for use in rubber products. C. C. Davis

Effect of the physical and chemical properties of carbon black on its electrical resistivity. G. L. Roberts and E. G. Emmert. *Rubber Age* (N. Y.) **46**, 159–62(1939).—An *app.* is described and illustrated for measuring the elec. resistivity of C blacks. In this app., the C black is subjected to controlled pressure during the measurements, a condition found to be necessary to obtain comparable results. Five channel C blacks of differing particle sizes and percentages of moisture and occluded gases were tested. Before removal of moisture and occluded gases, the resistivities differed considerably, but no simple relations between particle size, moisture content and occluded gases on the one hand and resistivity on the other hand were established. Nevertheless, in general the smaller the particle size of a C black, the greater was its resistivity. After removal of moisture and occluded gases, the resistivities were lower in all cases. Furthermore, as a result of progressive flocculation or agglomeration, the coloring powers were reduced by the heat treatment. C. C. D.

Effect of particle size on processing properties and abrasion resistance of carbon black in tread stocks. G. L. Roberts. *India Rubber World* **101**, No. 5, 39–42, 48(1940); cf. *C. A.* **33**, 9714[1].—Four grades of channel C black, ranging from one with relatively large particle size to one with the smallest particle size used for tire treads, were tested in rubber alone and in a tire-tread recipe to det. the relations between particle size on the one hand and ease of processing and resistance to abrasion, resp., on the other hand. The processing effects were judged by 2 types (Dillon and Housatonic) of plastometer, the effects on quality after vulcanization by resistance to abrasion (Grasselli-du Pont machine) before and after artificial aging. Under these conditions the effect of C black on the ease of processing of the rubber or rubber mixt. contg. it and the effect of the black on the quality of the vulcanizate are functions of particle size, *i. e.*, the larger the particle size, the more plastic were the rubber and rubber mixt. contg. the black, and the lower was the resistance to abrasion of the vulcanizate. Conversely C blacks of relatively small particle size make rubber difficult to process but impart relatively high resistance to abrasion. These relations remained unchanged after aging. C. C. Davis

Practical evaluation of commercial rubber carbon blacks by x-ray diffraction. Geo. L. Clark and Herbert D. Rhodes. *Ind. Eng. Chem., Anal. Ed.* **12**, 66–71(1940).—The particle sizes and shapes of 18 com. C blacks were evaluated with the greatest possible precision, from the

widths of the diffraction interferences at points of half-max. intensity. Cylindrical samples were used for calcns. by the von Laue equation, and wedge-shaped samples for calcns. by the Scherrer equation. Very satisfactory checks were obtained by both methods. Most of the samples were found to be essentially equiaxed in the dimension of the altitude of a hexagonal right prism and the base dimension between 2 diametrically opposed apices. The x-ray results indicate far smaller dimensions than evaluated by microscopic observation, indicating aggregate formation. The method is extended to C blacks in rubber mixes and also those extd. from rubber mixes, with satisfactory agreement. The x-ray results are correlated with apparent d., particle area, surface, active surface from methylene blue adsorption and diphenylguanidine adsorption for the C blacks themselves; and tensile strength, 4% modulus, and Shore durometer data for C blacks in conventional tire-tread compds. G. L. C.

Polymers. I. Highly elastic deformation of polymers. A. P. Aleksandrov and Yu. S. Lazurkin. *J. Tech. Phys.* (U. S. S. R.) **9**, 1249-60(1939).—The deformation of a rubber-like substance consists of an ordinary deformation which is independent of time and a "highly elastic deformation" D having a relaxation time t. If the specimen is subject to a periodic force, then $D = D_0/(1-i\omega t)$ where i is $\sqrt{-1}$, and ω the frequency. In agreement with this equation, the D-temp. curves are shifted to higher temps. when ω increases; the max. value of D_0 is almost reached at a temp. which is the higher the greater is ω. The time t rapidly diminishes with rising temp., e. g., for polymerized chloroprene, from 10 sec. at $-40°$ to 0.1 sec. at $-25°$. ω varied from 1 to 1000 min.$^{-1}$. D-temp. curves are also given for vulcanized rubber, half-vulcanized ebonite, and methyl-*m*-acrylate resin; the curves for the latter are shifted by plasticizers to lower temps. For each of these substances there is an interval of temps. (about 20 or 40° wide) in which they are hard at high, and rubber-like at low, values of ω. **II. Dynamic method of studying elastic materials.** Yu. S. Lazurkin. *Ibid.* 1261 6.—Cylinders about 1 cm. wide and 0.4 cm. high were periodically compressed 1 2000 times per min. The max. deformation was 0.015 cm. The temp. was varied between -180 and 200°. Results for *rubber* + 3% S are given. The sharp increase of the deformation with rising temp. took place at a temp. which increased with frequency ω. The temp. at which the deformation was 0.5 of the max. deformation was $-55°$ for static forces and $-25°$ for ω = 1000 min.$^{-1}$; it increased by 5-9° for a 10-fold increase of ω. **III. Technique of mechanical tests of vulcanizates of rubber and plastics.** G. Gurevich and P. Kobeko. *Ibid.* 1267-79; cf. *C. A.* **32**, 1995[6]. The correct way of detg. the mech. properties of rubber, etc., is to measure the rate of increase of deformation at a const. force and various temps. Detn. of the deformation produced in, say, 5 sec. at various temps. may also be sufficient. The torsion of butadiene rubber plotted against temp. gives S-shaped curves. In the course of vulcanization these curves become lower and are shifted to higher temps.; when continued heating with S ceases to affect the curves, the vulcanization is complete. Torsion at room temp. alone is not a sufficient test for the degree of vulcanization. Ebonite is not plastic; the residual deformation observed by Church and Daynes (*C. A.* **30**, 6607) is a part of the highly elastic deformation, depends on the condition of the expt., and is explained by the effect of temp. on the rate of deformation. Polystyrene has also almost no plasticity; polystyrene samples deformed at a high temp. conserve their form, since the rate of deformation at room temp. is negligible, but they regain their initial shape on a 2nd heating. Ordinary heat resistance and brittleness tests of polymers are unreliable. J. J. Bikerman

The properties of polymers in solution. X. Ultrafiltrations of rubber solutions. Kurt H. Meyer and Jean Jeannerat. *Rubber Chem. Tech.* **12**, 774-7(1939).—See *C. A.* **33**, 3233[9]. C. C. Davis

Catalytic dehydrogenation of monoölefins to diolefins. Source materials for synthetic rubber and resins. Aristid V. Grosse, Jacque C. Morrell and Julian M. Mavity. *Ind. Eng. Chem.* **32**, 309-11(1940).—The following hydrocarbons were catalytically dehydrogenated to give conjugated diolefins of the same C framework: *n*-butenes, 3-Me-1-butene, 2-Me-1-butene + 2-Me-2-butene, 2-pentene, and cyclopentane. The reaction was carried out over alumina impregnated with 4% Cr_2O_3, at 190 mm. and at 600° with 0.34 to 0.75 sec. contact time. With cyclopentane, the temp. was 500° and contact time 1.85 sec. The diolefins formed were 1,3-butadiene from *n*-butenes, isoprene from the branched-chain pentenes and piperylene from 2-pentene. The once-through yields varied from 11 to 30%, and the ultimate yields of 1,3-butadiene up to 79%. Cyclopentane yielded about 9% cyclopentadiene. The diolefins were identified by the prepn. of cryst. derivs., either the maleic anhydride addn. compds., the tetrabromides or both. C formation in the dehydrogenation of olefins is considerably higher than in paraffins, and represents over 10% of the charge in some cases. Other expts. proved that C formation is favored by keeping the reaction products too long in contact with the catalyst and, conversely, can be minimized by short contact times. Edward J. Mahler

Gutta-percha and balata. IV. Its part in life, sport and industry. H. J. Stern. *Rubber Age* (London) **20**, 339-40 (1940); cf. *C. A.* **34**, 1513[9].—A general discourse on the properties of gutta-percha and balata which make them applicable to various products. C. C. Davis

Permeability of Neoprene to gases. Theron P. Sager and Max Sucher. *Rubber Chem. Tech.* **12**, 875-84(1939).—See *C. A.* **33**, 3205[2]. C. C. Davis

The development of the synthesis of rubber in Germany. E. Konrad. *Atti X° congr. intern. chim.* **4**, 82-97(1939).—A review. Robert Simha

Synthetic rubber. Benjamin Weil. *Wisconsin Engr.* **44**, 36-7, 46(1939).—A review. Ann Nicholson Hird

An apparatus for measuring compressibility and permanent set of rubber and rubber-like materials at various temperatures. H. A. Hoekstra and J. Hoekstra. *Rubber Chem. Tech.* **12**, 861-6(1939).—See *C. A.* **33**, 9041[8]. C. C. Davis

Properties of hard rubber. VII. Measurement of plastic flow as affected by temperature. H. F. Church and H. A. Daynes. *Rubber Chem. Tech.* **12**, 826-35(1939).—See *C. A.* **33**, 6649[2]. C. C. Davis

Hard-rubber reactions. VI. Liberation of so-called free sulfur and changes in the acetone extract of vulcanized rubber by repeated extraction and heating. Seiiti Numaziri. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 319-21 (1939); cf. *C. A.* **32**, 2779[2].—Mixts. of rubber 100, diphenylguanidine 2, stearic acid 1, ZnO 10 and S 5, 25, 100 and 150, resp., were vulcanized for 60, 180 and 300 min. at 141°; the vulcanizates were extd. by acetone for 20 hrs. in N; the residues were heated in N at 141° for 2 hrs., and the extn. and heating were repeated 10 times. The acetone exts. and free-S values are plotted as functions of the times of extn. and heating. In general the free-S values descended to min. values, increased to higher values and again descended to values lower than the original values. This trend is ascribed to depolymerization which occurs during certain stages of vulcanization and which becomes active again after the accelerator is removed by the acetone extn. The location of the maxima depended therefore on the original degree of vulcanization. The course of the acetone-ext. curves was in general similar to that of the free-S curves, but, the probable formation of acetone-sol. substances by the repeated heat-treatment made this similarity less well defined in some respects. The mixt. contg. 50 parts of S was also extd. repeatedly without intermediate heatings. The trends of the free S and acetone ext. curves were similar to the corresponding curves for extn. and heating cycles, although the percentages of generated or liberated S of the samples which were extd. and heated were greater than those of the samples only extd. The results indicate that the idea that free S is always present in vulcanized rubber and can be completely extd. by acetone may be based on the false premise of ignoring the depolymerization which takes place during hot acetone extn.

VII. **True free sulfur from pure rubber-sulfur compound and changes in the acetone extract during repeated extraction and heating.** *Ibid.* 369–70.—A mixt. of deproteinized, deresinated rubber 100, S 50, was vulcanized for 120 and 300 min. at 141°; the vulcanizates were alternately extd. by acetone and heated, as in the previous expts. (cf. preceding abstr.), and the true free-S values were detd. by a modified form of the method of Kelly (*C. A.* **14**, 3167). The corrected acetone exts. were calcd. by the differences between total ext. and acetone-sol. S and S compds. After a given no. of cycles of extn. and heating, the percentage of true free S was less in the vulcanizate cured for 120 min. than in that cured for 300 min. With continued extn. and heating, the true free S decreased to a very low min., then increased. In the 300-min. vulcanizate, it returned to its original value. These facts indicate that continued extn. of free S cannot be explained by incomplete previous extn., but probably is attributable to depolymerization of the vulcanizates or some analogous phenomenon. Although purified rubber was used, the corrected acetone exts. representing the formation of resins from depolymerized or otherwise deteriorated hard rubber were relatively high at the beginning of the extn. and heating process. The changes in acetone ext. with continued extns. and heating were roughly the same as those in the true free S values, but with less sharp minima in the former case. C. C. Davis

Ebonite as an acid- and alkali-resisting material in industry. H. van der Meijden. *Rubber* (Amsterdam) **2**, No. 6, 5–7(1939).—The construction of tanks for holding acids, alkalies, latex, etc., is described. N. B.

Rayon for tires. L. A. Yerkes, Jr. *India Rubber World* **101**, No. 3, 41–5, 49(1939).—An illustrated description of present developments. Cordura rayon has been developed especially for tire cords and is much stronger than standard rayon, i. e., 3.2 and 1.8 g., resp., per denier dry capacity. Also the stress-strain curves are different, e. g., Cordura yarn shows no point at which it commences to elongate rapidly with increase in load. The chief advantages of Cordura rayon over cotton are continuous filaments, uniformity, high strength when hot, very high resistance to fatigue, high tensile strength and price stability. C. C. Davis

Rubber as a construction material. Application in the water-works industry. D. J. van Wijk, Jr. *Rubber* (Amsterdam) **2**, No. 6, 8–10(1939).—The use of rubber for mains, conduit pipes, taps, etc., is described. N. Bekkedahl

Vulcanization of rubber. Harry L. Fisher. *Ind. Eng. Chem.* **31**, 1381–9(1939).—The chemistry of vulcanization and the various classes of vulcanizing agents are reviewed and discussed, and some hitherto unrecorded vulcanizing agents contg. no S and their effects in rubber under various conditions are described. Rubber is vulcanized by [ClN:C(NH$_2$)N:]$_2$ and by yellow HgO, and is changed to products approaching vulcanizates by PbO_2, SeO_2, $K_3Fe(CN)_6$, $HgCl_2$, $FeCl_3$ and pentammino carbonatocobaltic nitrate. On the basis of investigations by F. and others, several important generalizations about non-S vulcanization can be made: (1) most agents are in a broad sense oxidizing agents; (2) nonoxidizing agents are active only with oxidizing agents; (3) all agents combine in some unknown form with rubber hydrocarbon; (4) the unsatn. of rubber hydrocarbon decreases with increase in the quantity which combines with the agent; (5) all groups which combine with rubber hydrocarbon apparently are, or contain, polar groups; (6) a vulcanizing agent need not contain either S or O; and (7) the fundamental phenomenon common to vulcanization by every agent is oxidation-reduction. If the vulcanizing agent is in the reduced state, vulcanization does not take place unless an oxidizing agent is present, and in almost every case an oxidizing agent improves the quality with non-S reagents. The reduced compd. probably unites with rubber hydrocarbon and the addn. compd. is oxidized to a vulcanizate. By analogy a new *H_2S theory of the mechanism of vulcanization* is advanced. H_2S, formed by the action of S on the nonrubber components or on rubber hydrocarbon, adds to a double bond of the latter, with formation of rubber mercaptan. The latter is then oxidized by S to a disulfide, and H_2S is regenerated as a by-product. If the oxidized mercaptan groups are in the same mols., the disulfide structure unites 2 parts of the same mol.; if in different mols., the disulfide structure forms a bridge connecting 2 mols. Regenerated H_2S may react with another double bond and thus continue the reaction. S may catalyze the addn. of H_2S to a double bond. The reaction may be a chain reaction in which case only relatively little H_2S finally remains. An org. accelerator acts in 2 ways: (1) to catalyze the addn. of H_2S to a double bond and possibly catalyze the oxidizing action of S, and (2) in many cases to give H_2S by reacting with S. An inorg. accelerator acts directly as its corresponding sulfide; however, it does not furnish H_2S. The theory postulates that there should be a loss of 1 double bond per at. equiv. of combined S. This is in accord with known facts. Also the theory indicates that phenols and thiophenols in the presence of oxidizing agents vulcanize rubber, and this was confirmed by expts. Since H_2O is analogous to H_2S, it seemed possible that H_2O and an oxidizing agent would vulcanize rubber. This could not, however, be accomplished in several expts. Also in *Rubber Chem. Tech.* **13**, 50(1940). C. C. Davis

Vulcanization of oxidized rubber. H. P. Stevens and F. J. W. Popham. *Rubber Chem. Tech.* **12**, 541–4(1939). See *C. A.* **32**, 8210[1]. C. C. Davis

The T-50 test for state of vulcanization. II. W. A. Gibbons, R. H. Gerke and G. R. Cuthbertson. *Rubber Chem. Tech.* **12**, 576–81(1939).—See *C. A.* **32**, 8212[2]. C. C. Davis

Oil-resisting rubber. XII. Vulcanized rubbers containing organic accelerators. J. R. Scott. *Rubber Chem Tech.* **12**, 842–4(1939).—See *C. A.* **33**, 4821[1]. C. C. Davis

Strength of vulcanized rubber. B. L. Davies. *Rubber Chem. Tech.* **12**, 509–17(1939).—See *C. A.* **33**, 4821[9]. C. C. Davis

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Products of various types of C black from natural gases (Bruni, Levi) **18**. Possibility of manuf. of light caoutchoucin in the United Provinces and detection of adulteration in com. samples [from distn. of waste rubber] (Ghatak, Mukherji) **16**. Dipole moment of cedrene [solvent for study of dielec. properties of vulcanized rubber] (Kanbara) **2**. Heat cond. of rubber at low temps. (Schallamach) **2**. Ethers and ether-esters of lac and their polymerization [rubber-like products] (Gidvani) **26**. [Rubber] coating steel wire to prevent corrosion (U. S. pat. 2,184,179) **9**. Porous elastic fabrics [sprayed with latex] (U. S. pat. 2,184,153) **25**. Strip-form packing material (U. S. pat. 2,184,087) **13**. Flooring or pavement comprising rubber (U. S. pat. 2,184,146) **20**. Fabrics impermeable to warfare chemicals [coated with latex and vulcanized] (Dutch pat. 47,200) **25**.

Preserving rubber. Louis H. Howland (to United States Rubber Products, Inc.). U. S. 2,183,567, Dec. 19. A process of preserving rubber comprises incorporating therein an age-resister comprising a preponderant proportion of the product of reaction of an aliphatic ketone with an arylamine and in addn. thereto an activating amt. of an aromatic diamino compd. selected from the class consisting of *N,N'*-diaryl-*p*-phenylenediamines and quinonoid diimine oxidation products thereof, and *N*-aryl-*N'*-acidyl-*p*-phenylenediamines. The preponderant treating agent may be a reaction product of acetone and diphenylamine.

Preserving rubber. Wm. Baird and Maldwyn Jones (to Imperial Chemical Industries Ltd.). U. S. 2,184,512, Dec. 26. To preserve rubber from oxidation, there is incorporated with it about 1% of 4,4'-dialkoxy-*N*-alkyldiarylamine in which the aryl groups are of the benzene series and each alkyl radical contains from 1 to 6 C atoms. Cf. *C. A.* **34**, 2208[1].

CHEMICAL ABSTRACTS

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1—APPARATUS, PLANT EQUIPMENT AND UNIT OPERATIONS

W. L. BADGER

Work carried out at the National Physical Laboratory. Ezer Griffiths, J. H. Awbery and R. W. Powell. *Dept. Sci. Ind. Research* (Brit.), Rept. Food Invest. Board, 265–74(1939).—The rate of evapn. from surfaces of 17 and 31 cm. length can be increased by about 55 and 60% by the use of ridges, resp., 1 5 and 2.5 cm. in height. Latent heat values in g.-cal. per g. by direct measurement were found to be 7.8 for dichlorodifluoromethane, 17.0 for EtCl and 31.0 for MeCl. The thermal conductivities for these refrigerants were measured over a temp. range of 5 to 25°
J. S. Hicks

New laboratory devices. G. Kapsenberg. *Fette u. Seifen* **46**, 352–5(1939).—Numerous variations are described of a device consisting of a filter, e. g., a Buchner funnel, a stopcock attached to regulate the flow of filtrate from the device, an air-tight cover for the filter and a tube through the cover. During operation, the stopcock regulating the flow of filtrate also regulates the flow of liquid fed into the device as the air or other gas, e. g., N_2, trapped by the cover and the filter prevents flooding of the latter. Set-ups suitable for continuously and automatically washing ppts., filtering liquids or extg. solid substances are described. By making slight changes, suction can be used to speed up the process or for taking filtrate samples for testing. J. W. Perry

The production of parts for chemical apparatus from asbestos bakelite masses. V. Kikut. *Khim. Mashinostroenie* **1938**, No. 6, 42 3; *Khim. Referat. Zhur.* **2**, No. 5, 129(1939).—A mixt. of equal amts. of phenol and 40% formalin with NaOH as catalyst (0.2% of the wt. of phenol) was boiled until a resin sepd.; this was dried at 35–40° and then heated at 90° until the required viscosity was acquired. The resin was mixed with an equal quantity of asbestos to form "faolite." Fans for Cl ventilators were prepd. by shaping the mass in wooden molds, drying at 75–80° for 7–8 hrs., smoothing with a rasp, and coating with bakelite lacquer. The wt. of these fans was 5 5 kg. against 12 kg. for ceramic fans. They are stable to an atm. of moist Cl, less expensive, lighter and stronger and can be rotated at greater speeds than the ceramic fans. A large assortment of anticorrosive articles can be prepd. from the faolite mass, which can successfully replace the ceramic ware, metal, etc. W. R. Henn

Clad and lined equipment. F. P. Huston *Chem. Met. Eng.* **46**, 298–300(1939).—Vessels capable of withstanding corrosion and having ample mech. strength are constructed either by using thin sheets of the relatively expensive corrosion-resisting metal to form a lining attached to an already fabricated steel shell, or by fabricating it in a clad metal in which 5, 10, 15 or 20% of Ni, Monel, stainless steel, etc., is first attached to the mild-steel backing, and the whole then rolled down to form a composite sheet.
B. C. P. A.

Aluminum in the chemical industry. F. Sinigaglia. *Alluminio* **8**, 5–17(1939).—The advantages of Al as a material for chem. app. and containers are described and illustrated by examples of practical applications. The behavior of Al toward solns. of many inorg. and org. substances is summarized in tabular form. B. C. P. A.

Useful laboratory motor. J. H. Pickett. *Chemist-Analyst* **29**, 17(1940).—Directions are given for making a synchronous motor out of the motor of an elec. fan in which the rotor winding or the commutator has been damaged.
W. T. H.

Simple breakable seal. Philip I. Bowman. *Chemist-Analyst* **29**, 17–18(1940).—Directions are given for constructing a sealed tube in a U-tube so that after a vacuum has been established the seal can be broken by freezing a little liquid in it by means of a CO_2-toluene bath.
W. T. H.

Self-filling buret for alkaline solutions. Albert C. Nuessle. *Chemist-Analyst* **29**, 16(1940).—In the app. described, the alkali hydroxide soln. is contained in a large, wide-mouthed bottle. The bottle carries a rubber stopper with 3 holes. Through 1 hole a rubber tube extends to just below the bottom of the stopper and the outside end is attached to a rubber pressure bulb, such as is used in atomizers. The middle hole carries a narrow tube extending to the bottom of the bottle. Above the stopper there is connection to the side of a buret, a little below the lowest graduation, and a pinchcock prevents the back flow of liquid after the buret has been filled. The buret itself is inserted into the third hole in the stopper but the bottom of the buret is sealed so that liquid from the buret can drain by gravity only into the bottle when the intervening pinchcock is open, or into the titrating vessel through another side arm attached to the buret a little below the tubing through which the buret is filled. A hole in the glass tubing attached to the pressure bulb permits excess pressure to escape. W. T. H.

Field and laboratory microanalysis by means of a portable drop reaction kit. Philip W. West and Lothrop Smith. *J. Chem. Education* **17**, 139–45(1940).—See *C. A.* **33**, 7623[1]. J. E. D.

Weighing bottle. W. A. Taebel. *Ind. Eng. Chem., Anal. Ed.* **12**, 141(1940).—The bottle facilitates the transfer of finely divided, fluffy and liquid materials to volumetric flasks without loss, by combining a funnel with a bottle to form one compact unit. A. W. King

Ten-liter volumetric flask. Francis J. Reithel. *Ind. Eng. Chem., Anal. Ed.* **12**, 159(1940).—The flask consists of a 12-liter Pyrex bottle with a graduated pipet inserted through the stopper to measure large quantities of standard solns. to ±5 ml. A. W. King

All-glass ball-valve stirrer. Silvester Liotta. *Ind. Eng. Chem., Anal. Ed.* **12**, 173(1940).—A description of a construction suitable for all solns. that require a slow-motion (5 strokes per min.) having a pos. flow from bottom to top. A. W. King

Adjustable support for crucibles. H. C. Lockwood. *Analyst* **65**, 160(1940).—The support is made from small retort bosses which are cut in halves; 3 of these halves are used. The crucible or dish is supported on 3 points which can be removed cleaned or renewed The crucible or dish is held rigidly and the ring stand can be moved or tilted. There is a saving of gas for less heat is lost by radiation than when a clay or silica triangle is used.
W. T. H.

All-glass still with automatic float feed. Geo. F. Liebig, Jr. *Ind. Eng. Chem., Anal. Ed.* **12**, 174(1940).—A Cenco 500-w. giant elec. heater makes possible the production of 500 ml. of redistd. water per hr.; the process is continuous over long periods. It can also be used for redistg. nonaqueous liquids. A. W. King

Still for producing metal-free distilled water. J. S. McHargue and E. B. Offutt. *Ind. Eng. Chem., Anal. Ed.* **12**, 157–9(1940).—The authors use a thin-walled quartz condenser tube and steam from the central heating

plant to give 11 l. of metal-free distd. water per hr. at temps. of tap water, or 13 to 15 l. per hr. with condensate at 80 to 90°; the distillate contains 150 parts per billion of ignited total solids, mostly SiO_2 from the condenser tube and the Pyrex concg. flask. A. W. King

Plate-type distillation columns. James S. Carey. *Chem. Met. Eng.* **46**, 314–17, 336(1939).—The effect of plate spacing and the depth of the liquid seal on the permissible vapor velocities, and the shape and spacing of the bubble caps for various operating conditions, are discussed. The advantages of plate spacings of not less than 24 in. are stressed. B. C. P. A.

A valve accessory for control of frothing in vacuum distillations. Martin Burger. *Chemist-Analyst* **29**, 20–1 (1940).—In biochem. work, solns. or suspensions contg. proteins, carbohydrates and liquids are usually viscous and likely to entrap air when transferred to a distg. flask. The entrapped air often causes frothing during distn. This can be prevented by providing an extra piece of tubing which enters the distg. flask and extends about as far down as the distg. arm. When frothing takes place, a very little air introduced into the flask through a capillary will serve to stop it. W. T. H.

An easily controlled Johnson extractor. Laurence Griffith. *Chemist-Analyst* **29**, 23(1940).—A small vessel contg. the thimble is connected to the bottom of a 12-in. water-cooled condenser. The vessel is made from an ordinary test tube. The bottom has tubing sealed to it and leads to a weighing tube. Fifteen ml. of solvent is sufficient. W. T. H.

Diatomaceous silica as applied to filtration problems. F. G. Salmon. *Chem. Eng. Group, Proc. Soc. Chem Ind.* **20**, 20–30(1938).—The selection and use of diatomaceous filter aids are considered generally. B. C. P. A.

New construction methods for filters and centrifuges. Hans H. Hülsen. *Z. Ver. deut. Ing., Beiheft Folge* **1939**, No. 6, 187–95.—A variety of filters and centrifuges is described. Karl Kammermeyer

Directly air-driven transparent ultracentrifuges. J. W. McBain and A. H. Lewis. *J. Phys. Chem.* **43**, 1197–1205 (1939); cf. *C. A.* **29**, 3198[6].—The details of two ultracentrifuges are described. One has a stationary periscope and the other has built-in mirrors It is pointed out that there is no theoretical difference between cells of different dimensions provided that the resolving power is kept const. H. E. Phipps

Apparatus for the determination of small amounts of hydrocarbons in air. M. V. Aristarkhova. *Azerbaidzhanskoe Neftyanoe Khoz.* **1939**, No. 7, 15–18.—Translated in *Foreign Petroleum Tech.* **7**, 383–90(1939).—Description of an app. operated by combustion, absorption with C and cooling with liquid O. The app. is suitable for soil-gas analysis after a few modifications. A. A. B.

Introduction to liquid mixing. A. Brothman and H. Kaplan. *Chem. & Met. Eng.* **46**, 633–6, 639(1939).—By test procedures described, the work necessary to achieve a given level of mixing can be divided into the mech. work that must be supplied by the mixer and the "latent work" of the system. "Latent work" is described as the counteraction of the forces of cohesion within the various components of a mixing system, or it may consist of an establishment of a bond between dissimilar particles comprising the mixing system. Various mixing systems differ in proportion of these 2 kinds of work for a given case. Curves are given to predict the power requirements for mixing by the use of an indirect and a direct shear ratio. R. M. Boarts

Magnetic shaking device. S. Kiyomizu. *Ind. Eng. Chem., Anal. Ed.* **12**, 174(1940).—The device consists of an iron rod pulled in and out of the coil of an electromagnet, operated by 50 v. d. c. and an elec. flasher button. The agitator holds six 250-cc. glass-stoppered Erlenmeyer flasks on a swinging platform. A. W. King

Apparatus for reduction-oxidation determinations. H. Eggers and Hans Mohr. *Biochem. Z.* **302**, 211–19(1939). —Description of the app. S. Morgulis

An apparatus for making reduction-oxidation measurements in vacuo. Holger Jørgensen. *Biochem. Z.* **302**, 226–31(1939).—Description of an app. which is supposed to offer certain advantages over other types together with some exptl. data on such detns. in fruit and plant juices. S. Morgulis

Flow divider for gases. Johannes H. Bruun. *Ind. Eng. Chem., Anal. Ed.* **12**, 172(1940).—A satisfactory device for lab. purposes is described. It is based on the principle used in the adjustable orifice flowmeter in which the resistance of a capillary tube to gaseous flow is varied by inserting wire. Calibration curves are shown for gas rates varying from 1 to 5 l. per min. A. W. King

Acceleration of the sedimentation of industrial suspensions. V. R. Terashkevich, R. I. Baranova and L. Ya. Anikeeva. *J. Applied Chem.* (U. S. S. R.) **12**, 1022–31 (in French, 1031)(1939).—The velocity of sedimentation depends on the form and dimensions of the sedimentation vessels. Math. relations are derived that show that the effectiveness of the suspension vessel, in general, is proportional to the sum of the areas of horizontal projections of all interfaces between suspension and wall of the vessel and suspension and air. These math. deductions were experimentally confirmed. The effectiveness of cylindrical sedimentation tanks can be increased by installing addnl. slanted wood surfaces. A. A. Podgorny

Separation of mixtures of gases by adsorption. V. N. Alekseev. *J. Applied Chem.* (U. S. S. R.) **12**, 995–1005 (in French, 1005)(1939).—The binary mixts. O_2-N_2, CH_4-N_2 and N_2-H_2 were studied at 14–20°; the adsorbent was activated carbon "KU-8." The components which had nearly the same sorption coeffs. were the hardest to sep., and those which had very different sorption coeffs. were the easiest to sep. A. A. Podgorny

A modified Kendall tube for purifying nitrogen. G. M. Savage and Z. John Ordal. *Science* **91**, 222–3(1940). The improved tube is packed with a roll of Cu gauze tightly wrapped around a Calrod heating unit. Earl H. Brown

Generator for air-free carbon dioxide (or hydrogen S. Horwood Tucker. *Analyst* **64**, 410–15(1939).—The construction of the app., the prepn. of air-free reagents and the manipulation and testing of the generator are described. B. C. P. A.

An improved rotary viscometer. A. H. Nissan, L. V. W. Clark and A. W. Nash. *J. Sci. Instruments* **17**, 33–8 (1940).—A rotary viscometer with provision for cylinder alignment, control of end effects and speed and temp control is described and illustrated. Results are reported Earl H. Brown

Vacuum cooling installations. Theoretical principles and installations for heat exchange. Ernst Bergener *Z. Ver. deut. Ing., Beiheft Folge* **1939**, No. 5, 140–8. A summary of the principles with sample calcns. of installations in a KCl plant. Diagrams and data are given. Karl Kammermeyer

Recovery of the volatile solvents by means of solid sorbents. IV. Sorption and desorption of chlorine-containing organic solvents by active carbon. E. V. Alekseevskiĭ and Ya. D. Musin. *J. Applied Chem.* (U. S. S. R.) **12**, 704–18(in German, 719)(1939); cf. *C. A.* **31**, 2047[8]. The adsorption isobars for $(CH_2Cl)_2$, $CHCl{:}CCl_2$, $CHCl_3$ and CCl_4 by granulated active carbon "AG," birch charcoal (steam-activated) and fruit-pit charcoal (activated by $ZnCl_2$), were obtained and their adsorption isotherms were calcd. for 20°. The first and last adsorbent produced the best results. An investigation of dynamics of adsorption and catalytic action of carbon on the decompn. of the Cl-contg. org. compds. showed that it is practicable to recover the above solvents by adsorption with active carbon and desorption with superheated steam. 26 references. A. A. Podgorny

Solvent extraction and absorption. Werner Matz. *Z. Ver. deut. Ing., Beiheft Folge* **1939**, No. 6, 198.—A correction (cf. *C. A.* **34**, 4[3]). Karl Kammermeyer

Basic principles of mass transfer in rectification, extraction and absorption. Werner Matz. *Z. Ver. deut Ing., Beiheft Folge* **1939**, No. 5, 155–62.—A discussion of the thermodynamic principles and their application to the various processes as well as of the problems involved in

the carrying out of continuous processing. Diagrams and 27 references. Karl Kammermeyer

Cold-extraction apparatus. Joseph Benotti. *Science* 91, 223–4(1940).—By means of a system of valves and a lever the extractant is caused to circulate between soln. and solvent. Earl H. Brown

Fractionating apparatus of light construction. J. N. Belsen. *Oel, Kohle, Erdoel, Teer* 15, 363–6(1939).—The use of Al or enameled Fe in place of cast Fe for columns for C_6H_6 hydrocarbons is described. B. C. P. A.

High-temperature camera for Debye-Scherrer photographs. W. Borchert and K. Fishbeck. *Z. Physik* 114, 515–18(1939).—Details are given and general applicability is claimed. E. J. Rosenbaum

Method of estimation of air distribution in flotation machines. V. I. Klassen. *Tsvetnye Metal.* 1939, No. 7, 76–9.—An apparatus is described whereby a sample of pulp can be taken at any point in the flotation machine and the air content detd. automatically. Graphs are given illustrating results of tests. B. N. Daniloff

Wetting and flotation in connection with the problem of the transition layer. P. A. Rebinder. *Trans. Faraday Soc.* 36, 295–305(1940).—The influence of flotation reagents was studied by employing a method which is based on measuring the changes in the wettability produced. The wetting isotherms are given for oxidized and polished Ag, Pt and Cu surfaces in aq. solns. of Na oleate and for Au surfaces in aq. solns. of K Bu xanthate. The adhesion of air bubbles to covellite in an aq. soln. of K Bu xanthate is presented, as well as the kinetics of the adsorption and the role of the elec. double layer in flotation. V. R. D.

Bumping of solutions. J. E. Edwards. *Chemistry & Industry* 1940, 152.—Bumping can be prevented by holding a piece of Whatman No. 531 filter paper against the bottom of the beaker by means of a glass rod, the other end of which rests against the side of the beaker. G. G.

Corrosion in water-heating apparatus. Fritz Gunewig and Karl Trapp. *Gesundh.-Ing.* 61, 687–90(1938).—Corrosion in high-pressure app. can be avoided by installing air- and O-absorbing devices and using paints contg. cement and water glass. B. C. P. A.

Pipe-line calculations. H. Vernon Smith, Clifford H. Brady and I. W. Donnell. *Oil Gas J.* 38, No. 40, 44, 45, 47(1940).—An extensive discussion of fluid flow problems encountered in pipe-line design. Charts and examples given. W. Andrew Wright

Storage and reaction vessels. Charles O. Brown. *Chem. & Met. Eng.* 46, 310–13(1939).—Points to be considered in the design of welded steel vessels with or without covers and jackets are discussed. B. C. P. A.

Packed and spray-type contactors. Z. G. Deutsch. *Chem. & Met. Eng.* 46, 318–21, 336(1939).—It is pointed out that large gas-liquid interface area may be provided by means of sprays or bubbling, wetted-wall or packed towers, the choice depending on the presence or absence of impurities in the gas and liquid, the speed of reaction, etc. B. C. P. A.

Designing heavy rotary equipment. W. S. Dickie. *Chem. & Met. Eng.* 46, 326–9, 333(1939). It is suggested that since the local stresses occurring in rotary kilns and dryers are unpredictable, the shells cannot be designed as beams, etc., but must be based on previous experience with such app. B. C. P. A.

The optimum heat arrangement and a general method of the layout of evaporators. N. A. Ushatinskii. *Khim. Mashinostroenie* 1938, No. 4, 3–10; No. 5, 3–12; *Khim. Referat. Zhur.* 2, No. 5, 127–8(1939).—A general method for the layout of evaporators is given in a full and in a simplified form. The arrangement is detd. by the physical and chem. properties of the evapd. soln. The conditions for detg. the no. of stills and of the pressure of the steam are described. A no. of examples are given. The information is of value for the layout of multistill evaporators. W. R. Henn

How a long-tube evaporator works. W. L. Badger. *Chem. & Met. Eng.* 46, 10, 640–1(1939).—Five stages of operation with increasing ΔT can be distinguished. They are: Simple sensible heat exchange, slow simmering, ejection of slugs of liquid and puffs of steam, emission of a crown of slow-moving drops of liquid with a jet of steam contg. entrained liquid occupying the core of the tube, and production of a stream of steam contg. a suspension of fine particles of liquid traveling at high speed. Everything else being equal, the heat-transfer coeff. in the boiling section of the tube is greater at smaller temp. drops. It would appear more important to drown the heating surface with relatively large amts. of liquid than to depend on high velocity to wipe off the steam bubbles. The relationships between length of tube, ΔT, length of boiling section and coeff. of heat transfer are still not adequately detd., and exact statements as to the ranges in which the important last 3 stages occur cannot yet be made. R. M. Boarts

Development of drum drier with an air exhaust and of quick drier. B. Sägebarth. *Centr. Zuckerind.* 48, 51–2(1940).—Mech. features. W. W. Binkley

Calculation of the time of cooling and heating of apparatus. I. G. Malkiel. *Khim. Mashinostroenie* 1938, No. 5, 32–4; *Khim. Referat. Zhur.* 1939, No. 5, 131–2.—The amt. of heat (Q' in cal./hr.) given off or absorbed by a metal wall from contact with liquid or gas of a const. temp. in the first τ hrs. is $Q' = gc(t_0 - t_M)f(a\tau/x^2, ax/\lambda)$, where g is the wt. of the metal in kg., c the heat capacity in cal./kg., t_M the initial temp. of the metal, t_0 the temp. of the liquid, $f(a\tau/x^2, ax/\lambda) = Q'/Q$ the function of the criteria of Biot (B) and of Fourier (F). Values of $1/F$ are plotted against the log of the function f. With the help of this diagram it is possible to solve problems on heating and cooling of substances for values of B from 0.1 to 0.003 for unlimited values of F construction of the diagram is explained and examples for the calcns. of the time of cooling are given. W. R. Henn

Automatic control of temperature at Convent Garden Laboratory. J. K. Hardy. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* 1938, 264–5(1939).—Thermostatic control of heat alone has the disadvantage that the relative humidity fluctuates. Direct and automatic controls regulate the temp. of the brine in the cooler-circuit of each chamber; this results in an increase in relative humidity to between 85 and 90%. Each chamber has a sep. circulating pump which maintains a full flow of brine through the cooler. The temp. is const. within ±0.1 deg. F. J. S. Hicks

Automatic control of furnace atmospheres. H. M. Webber. *Instruments* 13, 73–6(1940).—A review. E. H.

The measurement of temperature and flow in furnace systems. A. H. Leckie. *Fuel* 19, 20–3(1940).—A new suction pyrometer and water-cooled Pitot tube that permits measurement of temp. and velocity in furnace passages, is described; temps. to 1550° may be detd. Although waste-gas temps. in flues below the checkers may be detd. by an exposed thermocouple without serious error, that method will not give true temps. of affluent air. The partition and stratification of flow in open-hearth furnace uptakes was measured. D. A. Reynolds

Inexpensive immersion heater. Karl S. Willson. *Chemist-Analyst* 29, 18–19(1940).—The heating element consists of coiled resistance wire inserted in glass tubing. W. T. H.

Heat problems in the rectification of binary mixtures. B. I. Bondarenko. *Neftyanoe Khoz.* 1939, No. 9, 43–5.—Calculations. A. A. Boehthingk

Expansion of liquids by heat. Wilhelm Bahrdt. *Z. physik. chem. Unterricht* 52, 223–6(1939).—A 500-ml. flask, and a three-hole rubber stopper fitted with a thermometer, a graduated capillary tube to measure expansion, and a closed tube or rod which may be moved to adjust the initial reading constitute the app. Data in tables and graphs, and equations for the expansion of H_2O in its various temp. ranges are presented, and also a paragraph on other liquids. F. E. Brown

The effect of air in heating steam upon the heat transfer in heat exchangers. K. Jaroschek. *Z. Ver. deut. Ing., Beiheft Folge* 1939 No. 5, 135–40.—Expts. on a water preheater showed that with an air content of 2 to 7.4% in the

steam fairly high heat-transfer coeffs. could still be obtained. Satisfactory coeffs. were observed up to 46% air, which, however, necessitated high steam losses by venting. The reported values hold for the exptl. conditions only and the decrease of the coeffs. will be more or less for higher or lower mean water temps., resp. The results cannot be applied to vaporizing conditions where the effect of air is much more pronounced. 7 references.

Karl Kammermeyer

Cost relations of heat exchangers. E. N. Sieder. *Chem. Met. Eng.* **46**, 322-5(1939).—The effects on the cost of heat exchangers of tube diameter, tube length, working pressure, no. of floating heads, and area exposed are stated, and it is pointed out that repair and maintenance charges may make higher capital outlay desirable.

B. C. P. A.

Sample computations of natural gasoline absorber data (Turner) **22**. Mech. oscillograph for routine tests of rubber and rubber-like materials (Yerzley) **30**. Device for taking samples of milk, etc. (U. S. pat. 2,185,651) **12**.

Zietemann, Constantin: Aufgabensammlung aus der Warmetechnik. 3rd ed. Leipzig: M. Jaenecke. 250 pp. M. 4.30.

A. S. T. M. Specifications for Pipe and Piping Materials for High-Temperature and High-Pressure Services. Philadelphia: Am. Soc. for Testing Materials. 143 pp $1.25. Reviewed in *Can. Metals Met. Inds.* **3**, 84(1940).

Heating, Ventilating, Air Conditioning Guide for 1940. Vol. XVIII. New York. Am. Soc. of Heating and Ventilating Engineers. 1,088 pp. $5.00. Reviewed in *Brewers Digest* **15**, No. 4, 41 2(1940).

Extraction apparatus. R. N. Litvinov and P. A. Florenskiĭ. Russ. 51,929, Nov. 30, 1937. Construction details of an app. for the extn. of solids with liquid.

Deaerator mixer. S. S. Kutateladze and V. A. Zysin. Russ. 55,977, Oct. 31, 1939. Construction details.

Apparatus for distilling sea water or concentrating various solutions by evaporation. Robert V. Kleinschmidt (to Arthur D. Little, Inc.). U. S. 2,185,595-6, Jan. 2. Various details of app. and operation.

Apparatus for continuous distillation of camphor. B. N. Stadnikov. Russ. 55,841, Oct. 31, 1939. Construction details.

Low-temperature distilling and carbonizing apparatus suitable for treating wood, bones, etc. Paul Hadamovsky. U. S. 2,186,169, Jan. 9. Various structural details.

Vacuum crystallizing or cooling by forced boiling. John W. Dudley, Jr. U. S. 2,185,940, Jan. 2. Various details of app. and operation.

Pressure-reducing apparatus suitable for use with high pressures. Paulsen Spence. U. S. 2,185,713, Jan. 2. Various structural, mech. and operative details.

Apparatus (with a flexible-diaphragm-controlled valve) for pressure regulation, such as that of steam, etc. James L. Kimball (to Ruggles-Klingemann Mfg. Co.). U. S. 2,185,671, Jan. 2. Various structural and operative details.

Dephlegmator with horizontal tubes. A. L. Malchenko and A. F. Berenshtein. Russ. 56,014, Nov. 30, 1939. Construction details.

Tube for introduction of oxygen into liquid metal. N. S. Fortunatov and E. B. Gitman. Russ. 56,111, Nov. 30, 1939. The outer refractory cover of the tube consists of a mass of magnesite, alumina and C.

Filtering apparatus. V. P. Sabbatovskiĭ. Russ. 55,848, Oct. 31, 1939. Mechanical features.

Filler block for filter presses. Thomas E. Raymond. U. S. 2,185,314, Jan. 2. Various structural and operative details.

Automatic control apparatus for backwashing water filters, etc. Joseph P. Lawlor. U. S. 2,184,618, Dec. 26. Various structural and operative details.

Elastic belt for vacuum filters. A. F. Fogt, I. I. Karataev, P. F. Derevitskiĭ and I. A. Ish. Russ. 55,887, Oct. 31, 1939. Construction details.

Self-cleaning apparatus for atomizing liquids such as water for humidification. Herman F. Simon (to Parks-Cramer Co.). U. S. 2,186,214, Jan. 9. Various structural, mech. and operative details.

Centrifugal separator suitable for separating solids from liquids. Geo. J. Strezynski (to De Laval Separator Co.). U. S. 2,185,279, Jan. 2. Various structural details.

Trough for the separation of coarse from fine suspension. L. P. Safronyuk. Russ. 55,907, Oct. 31, 1939. Construction details.

Water-spray apparatus for removing dust from air in a treating conduit. Samuel B. Roberts (to Celanese Corp. of America). U. S. 2,186,125, Jan. 9. Various structural and operative details.

Device suitable for indicating the density of the air. Guy E. Beardsley, Jr., and John S. Hasbrouck (to United Aircraft Corp.). U. S. 2,185,578, Jan. 2. Various structural, mech. and operative details.

Rotary impeller pump for air or other gases, etc. Ernest C. Hassler (to Roots-Connersville Blower Corp.). U. S. 2,185,338, Jan. 2. Various structural, mech. and operative details.

Apparatus for gas analysis. E. M. Korolev. Russ. 55,958, Oct. 31, 1939. An app. for elec. detn. of gases in air is described.

Apparatus for the automatic control and regulation of the composition of gas. A. B. Ut'yan. Russ. 56,011, Nov. 30, 1939. The app. contains 2 chambers, one filled with a standard gas and the other with the gas to be tested. Elec. discharges are passed through each chamber and the intensities of sparks are compared by means of a photocell and recording devices.

Gas container suitable for use with carbon dioxide, etc. Daniel K. McInnis and Robert B. Aldrich. U. S. 2,185,796, Jan. 2. App. is used having a main compartment and a reserve compartment, a tube having ports communicating with the reserve and main compartments, a conduit communicating with the tube, and a valve in the tube, the valve having ports adapted to register with the tube ports to connect the main compartment with the conduit in one position and the reserve compartment with the conduit in another position while disconnecting the main compartment from the conduit.

Reducing valve, suitable for controlling the flow of fluids. Ferris T. Harrington (to Vickers, Inc.). U. S. 2,184,670, Dec. 26. Various structural and operative details.

Device for sampling powders such as face powders. Joseph E. Valentine. U. S. 2,185,586, Jan. 2. Various details of a device formed with use of a thermoplastic material which is adhesive when heated.

Mixing powders with liquids, as in preparing "regenerated milk," dispersing barytes in latex or paint vehicles. John L. Milton. U. S. 2,186,033, Jan. 9. Various details of a centrifugal mixing app. and its operation.

Apparatus for agitating materials such as light, fluffy carbon black. Howard W. Price (to J. M. Huber Corp.). U. S. 2,185,158, Dec. 26. Various details are described of a rotary drum app. with a plurality of compartments in each of which a single weighted roller is placed.

Apparatus for measuring diffusion speeds. Haardt & Co. A.-G. Brit. 508,837, July 6, 1939. The speed of diffusion of fluids, e. g., H_2O, in viscous or solid substances, e. g., bitumen or lacquer, is measured by means of dielec. properties, the substance being introduced between the electrodes of a condenser in which the intermediate spaces between the electrodes are closely covered on the side(s) to be exposed to the fluid with porous, preferably ceramic material, the covering advantageously being extended to form a hollow body for reception of the condenser electrodes with the substance to be measured or the fluid to be diffused therein. The results are of value in considering the question of corrosion, e. g., the resistance of constructional materials to weather and moisture.

Hydraulic classifiers. Rupert O. Stokes and Wm. D.

J. Thomas. Brit. 509,020, July 10, 1939. Classifiers of the hindered settling type provided with a valve for continuous discharge of the larger or heavier solids have an arrangement for adjusting the degree of opening of the valve in dependence on the effective head of the column of tectering solids comprising a chamber subjected to hydraulic pressure, an operating connection between the valve and a part of the wall of the chamber movable in response to a change of pressure therein, means for retarding any movement of the wall part by any force acting on the valve and means for varying the hydraulic pressure in dependence on the effective head of tectering solids.

Apparatus for cooling the air by evaporation of water sprays. Everett B. Evleth (to Minneapolis-Honeywell Regulator Co.). U. S. 2,184,613, Dec. 26. Various details of an app. with thermostatic and humidity-actuated controls.

Dehydrating screen. P. G. Dremailo. Russ. 52,244, Dec. 31, 1937. Mechanical features.

Evaporative condenser suitable for air-conditioning apparatus. Lee W. Melcher (to Waukesha Motor Co.). U. S. 2,185,035, Dec. 26. Various structural and operative details.

Drying laminated sheets of vulcanized fiber. Norman G. Jones (to Continental-Diamond Fibre Co.). U. S. 2,185,087, Dec. 26. A method of preventing cracking and delamination involves preliminarily drying the interior of the sheet while contg. an aq. moistening agent at the side edges.

Grinding mills. H. J. & A. Coulthurst Ltd. and H. Coulthurst. Brit. 508,877, July 7, 1939. Mills of the edge-runner type for the grinding of paint, etc., have the runner driven by bevel gears from a driven sleeve rotatable about and movable vertically upon a stationary shaft disposed centrally of the pan.

Crushing, grinding and amalgamating mills. Taymer Mill Pty. Ltd. Brit. 509,091, July 11, 1939. A roller is set at an angle to the vertical in a horizontal pan whereby the circular spherically convex face on the bottom of the roller comes into contact with the inside bottom face of the pan at a point just outside its true axial center giving a circle of contact concentric with its axis during rotation, and whereby the peripheral face parallel with the axis of the roller touches the inside upwardly extending face of the pan.

Gyratory crushing mill suitable for ores, etc. John W. Stevens (to Fuller Corp.). U. S. 2,185,528, Jan. 2. Various structural, mech. and operative details.

Charging device for sintering apparatus. Metallgesellschaft A.-G. Brit. 508,930, July 7, 1939. The device consists of an endless box band in which the boxes consist only of 3 walls, the wall transverse to the endless band being secured to the band.

Apparatus for breaking bulk material, e. g., coke, coal, into smaller pieces. Fried. Krupp A.-G. Brit. 508,922, July 7, 1939. The constantly moved support for the material is constituted by a bar or roller grate or by a shaking screen, the material thereon being exposed to a regulatable impact action by means of a plurality of impact members arranged in series and arranged to fall freely onto the material under gravity.

Effecting heat transfer. Arthur A. Levine and Oliver W. Cass (to E. I. du Pont de Nemours & Co.). U. S. 2,185,639, Jan. 2. Nuclear chlorinated ethylbenzene contg. at least 3 atoms of Cl per mol. of ethylbenzene is heated (suitably to 100–310°) and then used for heating materials such as oils or steam, by indirect heat transfer.

Heat-exchange apparatus. Bennet C. Shipman (to Servel, Inc.). U. S. 2,184,759, Dec. 26. Various structural details.

Heat-exchange apparatus suitable for air-blast heating or cooling. Fred M. Young. U. S. 2,184,657–8, Dec. 26. Various structural details.

Heat-exchange apparatus suitable for condensing refrigerants by water cooling. Edward R. Wolfert (to Westinghouse Elec. & Mfg. Co.). U. S. 2,186,224, Jan. 9. Various structural details.

Heat-exchange apparatus suitable for continuous absorption refrigerating systems. Rudolph S. Nelson (to Hoover Co.). U. S. 2,185,001, Dec. 26. App. used comprises a plurality of nested cup elements, conduit elements projecting from each side of each of the cups, means connecting the conduit element projecting inwardly of each cup with a conduit element projecting outwardly of another cup, the conduit elements of each cup being spaced 90° from the corresponding conduit elements on adjacent cups, and a baffle plate positioned within each of the nested cups.

Float hydrometer with an indicator-corrective device for temperature variations. Charles E. Linebarger (to Chaslyn Co.). U. S. 2,185,205, Jan. 2. A thermostatic bellows and an indicator within the hydrometer are connected together.

High-temperature thermostatic devices suitable for controlling flow of heating fluids. Carl F. Prutton and John T. Marvin (to Patrol Valve Co.). U. S. 2,185,421–2, Jan. 2. Liquids such as a chlorinated biphenyl or chlorinated diphenyl oxide are used for filling devices such as valve-control bellows for operating by their expansion when heated.

Air-conditioning system utilizing calcium chloride or the like for dehumidification. Hiram J. Kaufman. U. S. 2,184,998, Dec. 26. Various details of app. and operation are described.

Absorption refrigerating system suitable for use with ammonia solution and hydrogen. Hugo M. Ullstrand (to Servel, Inc.). U. S. 2,184,726, Dec. 26. Various structural and operative details.

Refrigerating process suitable for use with ammonia, etc. Harry F. Smith and Charles E. Waring (to General Motors Corp.). U. S. 2,185,040, Dec. 26. A process is used which involves absorbing a gas such as NH_3 into a liquid such as triethanolamine and chemically absorbing the gas from the liquid into a solid, such as $SrCl_2$, colloidally suspended in the liquid and then driving the gas from the solid into the liquid and then out of the liquid (the solid and liquid used being chemically inert to each other, and the liquid remaining unvaporized throughout the absorbing and generating cycles).

Air-cooled rectifier for absorption refrigerators. Curtis C. Coons (to Hoover Co.). U. S. 2,184,991, Dec. 26. Various details of thermostatic control, etc., are involved in this patent and U. S. 2,184,992. U. S. 2,184,993 relates to the use together in a refrigerating system of NH_3 and methylamine, a solvent comprising monoethanolamine, and a gaseous substance such as H or N which is inert to NH_3 and methylamine and which has a common chem. constituent therewith and with the solvent.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Charles Goodyear, the persistent researcher. H. E. Simmons. *India Rubber World* **101**, No. 1, 48–9(1939).—Historical, with portrait. C. C. Davis

Alwin Mittasch's 70th birthday. E. Pietsch. *Angew. Chem.* **52**, 719–20(1939).—A biographical sketch. Karl Kammermeyer

Georges Urbain. Georges Champetier and Charlotte H. Boatner. *J. Chem. Education* **17**, 103–9(1940). E. H.

Friedrich Emich. A. A. Benedetti-Pichler. *Ind. Eng. Chem., Anal. Ed.* **12**, 226–9(1940).—Obituary with portrait. G. G.

Radim Uzel. O. Tomíček. *Chem. Listy* **33**, 417–18 (1939).—Obituary note and bibliography. F. Maresh

N. A. Golubitskiĭ. S. N. Danilov. *J. Applied Chem.* (U. S. S. R.) **12**, 1032–33(1939).—An obituary with a portrait. A. A. Podgorny

Otto Lagercrantz and the history of chemistry. Joseph Bidez. *Archeion* **21**, 379–82(1938)(in English). **Biographical notes: list of works.** *Ibid.* 383–5. G. W. King

Catalog of Latin and vernacular alchemical manuscripts in the United States and Canada. W. T. Wilson. *Osiris* **5**, 1–836(1938).—Each manuscript is described, also its contents, with notes are given. A useful table of alchemical symbols is appended. G. W. King

A collection of technical recipes from the sixteenth century. W. Ganzenmuller. *Angew. Chem.* **53**, 88–9 (1940).—A discussion of the collection prepd. by the medieval monk Wolfgang Sedelius (1510–1558). Karl Kammermeyer

Liebig's experimental chemistry in Kekulé's college note book. G. Bugge. *Angew. Chem.* **53**, 17–19(1940). —A biographical, historical sketch. K. Kammermeyer

Science teaching at the Liverpool Institute, 1835 1852. Charles Foster. *J. Chem. Education* **17**, 136–8(1940). E. H.

Chemistry in English schools. John C. Hogg. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 107–10(1940).—Descriptive. Leopold Scheflan

Teaching the organic chemistry unit in the general chemistry course Saverio Zuffanti. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 134–9(1940).—An address. Leopold Scheflan

The college entrance examinations in science. Stuart R. Brinkley. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 128–33(1940). Leopold Scheflan

The development of fluorine chemistry in Germany. In memory of Otto Ruff. W. Klemm. *Angew. Chem.* **53**, 25–7(1940).—A historical summary with 12 references. Karl Kammermeyer

Historical studies on the phlogiston theory. IV. Last phases of the theory. J. R. Partington and D. McKie. *Ann. Sci.* **4**, 113–49(1939); cf. *C. A.* **33**, 9059⁸. C. L. B.

Oceanographic observations from the surface in the Atlantic and Pacific Oceans. J. Rouch. *Bull. inst. oceanograph.* No. **781**, 16 pp.(1939).—The d. of ocean water as detd. by R. is recorded as $(\Sigma_t - 1)1000$, in which Σ_t is the d. at $t°$. The salinity is recorded as salinity per 1000 parts, and was detd. from the d. The pH was observed with the aid of cresol red indicator. Water samples and tests were taken at intervals between Havre and San Francisco via the Panama Canal. At 50° N. lat. the Atlantic water temp. was 15°, at 35° N. lat. 24°, at 22.5° N. lat. 28.5°, and at 9° N. lat. nearly 31°. South of 22.5° N. lat. the Atlantic water temps. were lower than the temps. at corresponding Pacific N. lats. At 22.5° N. lat. the Pacific water temp. was 28.5° near the coast of Salvador. In the Atlantic the salinity reached a max. of nearly 37.5 parts per thousand at 26.5° N. lat., whereas in the Pacific the max. was 35 parts per thousand at 22° N. lat. The water pH was a max. of 8.25 at 39° N. lat. in the Atlantic and 8.26 at 20° N. lat. in the Pacific. The Atlantic water temp. is consistantly higher than the corresponding air temp. Relative humidity in both oceans averaged approx. 80%, varying from 67 to 88% in the Atlantic Ocean and from 86 to approx. 70% with values of 54 and 60% in rare locations, in the Pacific Ocean portions of the voyage. At Curacao (S.A.) the humidity was recorded as 94%. H. E. M.

Contribution of diatoms to the sediments of Crystal Lake, Vilas County, Wisconsin. Paul S. Conger. *Am. J. Sci.* **237**, 324–40(1939).—This soft-water lake exhibits an unexpected diversity both in biol. stratification and in horizontal distribution of diatoms in its sediments. Diatoms, of which 23 genera and 85 species are tabulated, and pine pollen are the chief constituents of the sediments. Chem. analyses of the lake water at different depths are recorded. B. C. P. A.

Tenth report of the committee on atomic weights of the International Union of Chemistry. J. P. Baxter, M. Guichard, O. Hönigschmid and R. Whytlaw-Gray. *J. Am. Chem. Soc.* **62**, 609–72(1940).—The report covers the twelve-month period September 30, 1938, to September 30, 1939. Three changes in the table of at. weights were adopted; they are H, from 1.0081 to 1.0080, Fe from 55.84 to 55.85 and Lu, from 175.0 to 174.99. Data are presented on the completeness of sepn. of the isotopes of Cl in HCl samples subjected to isotopic sepn. by the thermal diffusion method. The relative abundances of the Mo, Eu and Pb isotopes are discussed. Also in *Ber.* **73A**, 39–43. A. B. Garrett

The second virial coefficient of ethane. Edwin E. Roper. *J. Chem. Phys.* **8**, 290(1940).—Eucken and Parts (*C. A.* **27**, 2359) have not used the formula which they presented for the value of *B* for the calcns. in their table. The formula that they did use is deduced. There are differences of 2.6–8% between the 2 formulas. G. M. Petty

The structure of phosphine and related hydrides. D. P. Stevenson. *J. Chem. Phys.* **8**, 285–7(1940).—Badger's rule (*C. A.* **28**, 2996⁶) when applied to the frequencies of some hydrides gives values for the interat. distances that agree well with values deduced from the moments of inertia of the hydrides and with values predicted from the covalent radius of H, 0.315 A. With the value 1.415 A for the P-H distance in PH_3 and a reliable spectroscopic value for one of the moments of inertia of the mol. the bond angle is found to be 93°. Bond angles and at. distances are estd. for SiH_4, GeH_4, AsH_3, SeH_2, SnH_4, SbH_3 and TeH_2. G. M. Petty

Partition functions and energy levels of molecules with internal torsional motions. Bryce L. Crawford, Jr. *J. Chem. Phys.* **8**, 273–81(1940).—Math. The complete energy matrix is set up for external and (hindered) internal rotations of "pseudo-rigid" mols., i. e., mols. consisting of a rigid framework to which symmetric hindered rotators are attached. G. M. Petty

Theory of the Senftleben effect. F. Zernike and C. van Lier. *Physica* **6**, 961–71(1939)(in English).—By means of a new formulation of the probability of collision a quant. elaboration is presented of Gorter's (*C. A.* **32**, 6119⁹) explanation of the S. effect, namely the shortening of the mean free path by magnetic precession between collisions. The calcns. for the heat cond., with the magnetic field oriented in different ways to the temp. gradient, are in good agreement with expt. Viscosity calcns., on the basis of the elementary theory, are 50% too low. G. W. King

Color and magnetic properties of manganous sulfide Shanti S. Bhatnagar, Brahm Prakash and Jarnail Singh *J. Indian Chem. Soc.* **16**, 313–20(1939).—Samples of the pink MnS were prepd. by 2 different methods, and specimens of the green variety were produced by 3 independent processes. The susceptibility of each sample was detd. by the Gouy magnetic balance at 6 temps. from 34° to approx. 240°. For the pink MnS the susceptibility ($\times 10^6$) is 41.85 at 34° and 35.85 at 245°. The Curie-Weiss law is followed in this temp. interval with $\theta = -910°$. The magnetic moment is 5.95–6.02 Bohr magnetons. The specimens of the green variety also follow the Curie-Weiss law, with the Bohr magneton no. = 5.99–6.01. However, $\theta = -495°$ and the susceptibility ($\times 10^6$ is 64.15 at 34°, decreasing to 50.96 at 237°. Since the 2 types of lattice—cubic B_3 and hexagonal B_4—which occur in the pink variety have essentially the same susceptibility, it is suggested that the differences in color and susceptibility are probably due to differences in the types of linkage involved. W. W. Stifler

Measurement of the magnetic permeability of iron and permalloy by a new method in very weak fields of a high frequency. L. N. Loshakov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1540–7(1939).—The magnitude of the skin effect depends on the magnetic permeability μ of the material. If the skin effect is detd. by measuring the resistance of a metal in a high-frequency field, it is possible to calc. μ. The μ of Fe wire is almost independent of its diam. (0.1 to 0.5 mm.) and the frequency (7×10^6 to 23×10^6 cycles). The μ of permalloy band is smaller than that of Fe and also

independent of the frequency. After annealing the μ of permalloy increases about tenfold and rises with rising wave length. J. J. Bikerman

Active iron. XIII. Measurements on complex iron cyanides in solution. Arthur Simon and H. Knauer. *Z. Elektrochem.* **46**, 13-25(1940); cf. *C. A.* **34**, 1269[1].—The magnetic properties of solns. of $K_3Fe(CN)_6$, $K_4Fe(CN)_6$, and $Na_4[Fe(CN)_5AsO_2]$ in dil. *perchloric acid*, degassed H_2O, and neutral H_2O were detd. The *susceptibility* of the paramagnetic salts is less in soln., whereas *diamagnetism* increases. The *ferricyanides* in particular show marked recession of mol. susceptibility. After a few days, there is a deposit of what is probably $Fe(OH)_3$, which does not increase beyond a certain quantity and is believed to be due to the presence of small quantities of simple Fe^{+++} salts in the complex. Const. magnetic values are obtained only after 60 days. The results show that the secondary dissocn. of $K_3Fe(CN)_6$ leads to a Fe^{+++} 3 concn. which does not reach the ion and soly. product of $Fe(OH)_3$. The authors believe that the change in the *paramagnetism* of $K_3Fe(CN)_6$ is predominantly chem. rather than phys. $K_4Fe(CN)_6$ solns. undergo many and complex changes, difficult to explain. One of these is indicated by the equation $K_4[Fe(CN)_6] + 2H_2O \rightarrow K_3[Fe(CN)_5.H_2O] + KOH + HCN$. The change in diamagnetism of complex cyanides on soln. attains values as high as 20%. It is very improbable that the "*Stark-Effekt*" is responsible for this, but it is more likely due to such chem. changes as are produced by hydrolysis, dissocn., hydration, polymerization, action of light. In any case, detn. of fine differences in secondary dissocn. of complexes by magnetic methods is not possible without knowledge of the various chem. changes that take place on soln. and ageing of these complexes. H. Stoertz

Ferromagnetic domains and the magnetization curve. Wm. Fuller Brown, Jr. *J. Applied Phys.* **11**, 160-72 (1940).—A review describing the basic ideas of the domain theory. S. L. Gerhard

Influence of elastic and residual deformations on the galvanomagnetic effect in ferromagnetic bodies. K. P. Belov and D. I. Volkov. *J. Tech. Phys. (U. S. S. R.)* **9**, 1289-99(1939).—The galvanomagnetic effect (i. e., the change ΔR of the elec. resistance produced by a magnetization I) in Ni wires is intensified by stretching the wires. At medium tensions ΔR is large and proportional to I^2; at high tensions it diminishes again, owing to a non uniform distribution of internal strains. Plastic stretching of Ni wires lowers their ΔR, in the point of magnetic satn. it is 5% less than for annealed Ni. J. J. Bikerman

An absolute method for the dielectric constant and the loss in liquids based upon decimeter waves. M. A. Duvalkovskii. *Compt. rend. acad. sci. U. R. S. S.* **24**, 433 (1939) (in French).—The dielec. const. of a liquid can be measured by placing a thermometer filled with the liquid in an alternating elec. or magnetic field. EtOH and PrOH show dispersion between wave lengths of 18.4 cm. and 414 cm. No dispersion was observed with MeOH or 0.05% NaCl. M. Bradford Stone

Dielectric constant of water vapor at a frequency of forty-two megacycles. Angus C. Tregidga. *Phys. Rev.* **57**, 294-7(1940).—A heterodyne between a crystal-controlled oscillator and a tuned circuit, in the condenser of which the H_2O vapor was held, was used for measurements. Values were: at 71.9°, 1.0071; 99.8°, 1.0060; 147°, 1.00475. Gregg M. Evans

The dielectric constants of some pairs of diastereomers. Saul Winstein and Reuben E. Wood. *J. Am. Chem. Soc.* **62**, 548-51 (1940).—The dielec. consts. of the 2,3-diacetoxybutanes, 2,3-diacetoxypentanes, 3,4-diacetoxyheptanes, 2,3-dibromobutanes, 2,3-dibromopentanes, 3,4-dibromohexanes and 2-acetoxy-3-bromobutanes were measured; a table of these values and the values of d_4^{25} and n_D^{25} is given. The dipole moments were estd. by means of the Onsager equation (cf. *C. A.* **30**, 7002[7]); the values of dielec. consts. and dipole moments for the *meso* and *erythro* compds. are compared with those for the corresponding *dl* and *threo* isomers. It is concluded that, in general, the members of a pair of diastereomers differ 7 sufficiently in their dielec. consts. for these values to be useful for analytical purposes. A. B. Garrett

Dielectric properties of glycerides.* II. B. V. Bhide and R. D. Bhide. *J. Univ. Bombay* **8**, Pt. 3, 220-34 (1939); cf. *C. A.* **33**, 4482[2].—The dielec. consts. (D) of monomyristin (I) and monostearin (II) at 1000 and 5700 kilocycles are detd. at various temps. For a mixt. of the α and β forms of I (III) D is 2.43 at 25°, which is considerably smaller than that for the liquid (6.2 at 58°). When 2 III is kept for 4 days, D decreases to 2.3 at 25° because of the transformation of the α-form into the stable β-form, indicated by the increase of the m. p. (70.5°). When III is chilled, forming a glass-like product (IV) D (4.38 at 25°) is much higher than that of the β-form; this indicates a condition similar to a supercooled liquid. Raising of the temp. to 27° causes a sudden drop of D to 2.95 (32°). On further heating it m. 67.5°, the m. p. of the α-form. The temp. of 27° seems to be the transition temp. of IV into the α-form. When the melted III is allowed to stand in a freezing mixt. for several hrs. the transformation takes place at 39°. This shift in the transition temp. is due to complete transformation into IV, since D is nearer to the value for the liquid. D of II is higher at 70.8° than that of the liquid and remains practically const. until a temp. of 47° is reached after which it rapidly begins to fall. On chilling of II the α-form is obtained and 2 distinct breaks in 4 D are found, one at 47°, the other at 30°. The α-form above 47° has the highest D. It gradually changes into the β-form. After 15 hrs. it m. at 74.5°; this indicates no transformation; after 6 days it partially m. at 74.5° and completely at 81°, and the fact that there is no further change after 1 month indicates that even then no complete transformation takes place. D of this form is much lower than in any other form, i. e., the stable form has the 5 lowest D. F. E. Brauns

Electrification by boiling and dipole moments. G. Lovera and A. Pochettino. *Nuovo cimento* **16**, 337-47 (1939).—Tests were made on a series of disubstituted derivs. of aromatic hydrocarbons of different dipole moment dissolved in inactive solvents. Solns. of compds. of zero moment remained inactive but those of compds. with a moment became active. The charge produced increases with the dipole moment of the solute. The solvents were: C_6H_6 (I), $C_6H_5CH_3$ (II), $C_6H_4(CH_3)_2$ (III), dioxane (IV). Data are given for *o*-, *m*- and *p*-$C_6H_4(NO_2)NH_2$ in I and IV, *o*-, *m*- and *p*-$C_6H_4(NO_2)OH$ in IV, *o*-, *m*- and *p*-$C_6H_4NO_2Cl$ in III, *o*-, *m*- and *p*-$C_6H_4(NO_2)_2$ in II, *m*- and *p*-$C_6H_4(NO_2)_2$ in III, biphenyl in III and IV, *o,o'*-dinitrobiphenyl in III and IV, *p,p'*-dinitrobiphenyl in III and IV, naphthalene in IV, 1,5-dinitronaphthalene in IV, 1,8-dinitronaphthalene in IV, bibenzyl in III, Et benzoate in III, crystal violet in II and IV, malachite green in II and 7 IV, diazoamidobenzene in III, amidoazobenzene in III. J. B. Austin

Aftereffects in solid dielectrics. B. Gross. *Phys. Rev.* **57**, 57-9(1939).—The discharge and residual-charge curves observed in anomalous dielectrics are discussed and 2 general relations between them are established. B. L.

The dispersion curve of hydrogen and deuterium, and of hydrogen sulfide and deuterium sulfide in the visible region. O. E. Frivold, O. Hassel and E. Hetland. *Physica* 8 **6**, 972-6(1939) (in German).—The difference in the ns ($\times 10^6$ between H_2 and D_2 varies from 1.691 at 7000 A. to 1.790 at 4200 A., and between H_2S and D_2S, it varies from 2.875 at 7000 to 3.171 at 4200 A. The difference in mol. refraction between H_2 and D_2 is 0.027 + 0.002 at all wave lengths. G. W. King

The density of gaseous chlorine. A. S. Ross and O. Maass. *Can. J. Research* **18, B**, 55-65(1940).—The d. of 9 gaseous Cl was detd. over the temp. range 15° to 75° and up to 2 atm. The values obtained are compared with those extant in the literature, and excellent agreement is found with the very precise measurements of Jaquerod and Tourpaian (*C. A.* **8**, 277) at 15° and 725 mm. pressure. There is also good agreement, over the temp. range investigated, with the measurements of Pier (*C. A.* **2**, 2183) at a pressure of one atm. The equation of state proposed by Maass and Mennie (*C. A.* **20**, 3600) fits the exptl.

results over the whole range and gives, for temps. and pressures outside the region investigated, values of the d. of gaseous Cl that afe in good agreement with the results obtained by Jaquerod and Tourpaian, and by Pier. Tables of calcd. and exptly. detd. ds. and apparent mol. wts. show the deviations of gaseous Cl from ideality. The equation of state is given in a convenient form for the calcn. of the d. of the gas in industrial applications. J. W. S.

Possibilities of breaking down gas mixtures by centrifuging. H. Hausen and R. Schlatterer. *Z. Ver. deut. Ing., Verfahrenstech.* **1939**, No. 1, 15–21; *Chimie & industrie* **42**, 303.—The rate of sepn. of gas mixts. by centrifuging is very low; similarly, the degree of enrichment produced by this method is generally low. A higher degree of sepn. can be expected only when there is a great difference in the mol. wts. of the constituents (CO_2 and H_2, C_6H_6 and air). With max. rotary speed, air can be enriched from 1% to 16% C_6H_6. A. Papineau-Couture

Temperature of gas. Its meaning and measurement. J. G. Bennett and M. Pirani. *J. Inst. Fuel* **12**, 1–4S (1939).—The meaning of gas temp. is discussed in the light of modern phys. theory. B. C. P. A.

Viscosity of gases and gaseous mixtures at high pressures. I. Golubev. *J. Phys.* (U. S. S. R.) **1**, 207–12 (1939).—See *C. A.* **33**, 6672[1]. A. D.

The Joule effect. W. B. Wiegand and J. W. Snyder. *Rubber Chem. Tech.* **13**, 49 (1940).—See *C. A.* **33**, 4097[3]. C. C. Davis

Resonance method for measuring the ratio of the specific heats of a gas, C_p/C_v. I. Arthur Lewis Clark and L. Katz. *Can. J. Research* **18, A**, 23–38 (1940).—This paper contains the description with theory of a modification of Assmann's method for detg. $\gamma = C_p/C_v$, the ratio of the sp. heats of a gas. The gas is enclosed in two chambers formed by the ends of a cylinder and a steel piston in the middle of the cylinder. This piston is caused to oscillate by an a. c. applied in coils outside the cylinder; thus the gas is subjected to alternate compression and rarefaction. The system has a natural frequency depending on the consts. of the app and the value of γ peculiar to the gas. The frequency of the a. c. is varied, the amplitude of the motion of the piston observed, and the frequency for resonance measured. From this frequency and the consts. of the app. the value of γ is detd. The method yields results of great accuracy and reproducibility. J. W. Shipley

Specific heat, enthalpy, entropy and dissociation of technical gases. E. Justi. *Feuerungstech.* **26**, 313–22 (1938).—Sp. heats calcd. for ideal gases from spectroscopic data are converted by means of various equations of state to the actual condition at a pressure of 1 atm. The difference between the mean and true sp. heats for ideal and practical conditions (1 atm.) are tabulated from 0° to 1000° for N, H, O, NO, CO, CO_2, N_2O, SO_2, H_2O, air, CH_4, C_2H_2, C_2H_4, C_2H_6 and C_6H_6. B. C. P. A.

Isothermal changes in enthalpy for some gases. Robert York and Harold C. Weber. *Ind. Eng. Chem.* **32**, 388–92 (1940).—The isothermal changes of enthalpy with pressure as evaluated from the P-V-T data for the gases ethane, propane, butane, heptane and steam were correlated by the equation $(H^* - H)_T = \Delta_1 T_c(T_r/370)^n$ where H is the molal enthalpy at the pressure, P, H^* is the molal enthalpy at zero pressure, T_c is the crit. temp. in degrees K., n is a function of the reduced temp., $T_R = T/T_c$ and Δ_1 is a function of the reduced temp. and the reduced pressure, $P_R = P/P_c$. The values of n and Δ_1 at any value of P_R and T_R are read from graphs. The calcns. were extended to CO_2, CH_4 and C_6H_6. The correlations are believed reliable between values of P_R from 0 to 8 and of T_R from 1.00 to 1.80 for hydrocarbons with crit. temps. between 300° and 600°K. L. E. Steiner

The general equation of state. Equations for ammonia and steam. J. L. Finck. *J. Franklin Inst.* **229**, 201–21 (1940); cf. *C. A.* **32**, 4862[1].—For a system in 1 or 2 phases in which only a single type of transformation occurs, the assemblage of thermodynamic states is enlarged by inclusion of the so-called metastable states. An 8-const. equation of state of the form $\eta = a + bv + cp + dpv + (e + fv + gp + hpv)\ln T$ is derived where η, v, p and T are the entropy, vol., pressure and temp., resp., and a, b, c, etc., are consts. Entropies calcd. with this equation when compared with the exptl. values show agreement to about 0.3% for satd. NH_3 and to about 2% for satd. steam. In the superheated region the agreement is not so close. L. E. Steiner

The equations of state and thermodynamics. N. Vasilesco-Karpen. *Bull. sect. sci. acad. roumaine* **21**, 199–205 (1938–39).—The relation of Maxwell-Clausius, equating the work of expansion of a liquid to gas at the pressure of the satd. vapor with that of the transition in a single phase as given by the van der Waals equation, is derived without recourse to the Carnot principle. L. E. Steiner

Some remarks concerning the theory of screening. J. Zernike. *Chem. Weekblad* **36**, 748–50 (1939).—The theory of the effect of screening (in at. arrangement) on the b. p. of a compd. is critically reviewed. Several sample calcns., based on van Laar's theorem (*C. A.* **10**, 2059) on the additivity of $\sqrt{a}$ of van der Waals equation, prove that Kossel's explanation (*C. A.* **14**, 2883) of the large fall in b. p. between the fluorides and chlorides of certain metals cannot be correct. Neither does Kossel make clear why this fall always occurs between fluorides and chlorides and never between chlorides and iodides or between hydrides and methides as his theory would predict. All elements having high-boiling fluorides and low-boiling chlorides form bases and also complex fluorides. N. Bekkedahl

The vapor pressures, heats of vaporization and melting points of N^{14} and N^{15} ammonias. Harry G. Thode *J. Am. Chem. Soc.* **62**, 581–3 (1940).—The vapor pressure difference between 70.6% $N^{15}H_3$ and ordinary NH_3 was measured for the liquids over a temp. range of 197.7–239.5°K. by means of a differential oil manometer. The vapor pressure data for the liquids can be represented by the equation: $\log_{10}(P_1/P_2) = (0.9593/T) - 0.00325$, where P_1 is the vapor pressure of ordinary NH_3 and P_2 is that of the 70.6% $N^{15}H_3$ material. The vapor pressure of ordinary NH_3 is 0.371 which is 0.174% higher than that of the $N^{15}H_3$ sample at 195°K. and 239.68°K. The $N^{15}H_3$ sample has a heat of vaporization 4.39 cal. per mol. higher than NH_3. The triple points of the 2 samples differ by 0.081°, that of $N^{15}H_3$ being higher. A. B. Garrett

Parachors of binary mixtures. Husao Isikawa and Tetuzo Atoda. *Bull. Inst. Phys. Chem. Research* (Tokyo) **18**, 150–61 (1939).—Parachors, $[P]$, for the systems C_6H_6–EtOH (I), PCl_3–C_6H_6 (II), and $POCl_3$–C_6H_6, measured at 25°, agree with those calcd. from values for solute and solvent by $[P] = (1 - x)[P]_1 + x[P]_2$ where x is the mol. fraction of solute. The max. deviation from the calcd. value is −1 obtained with I. $[P]$ for I and II is expressed more accurately by $[P] = a + bx$. B. C. P. A.

Determination of parachors of liquids and of dissolved crystalline substances. N. F. Komshilov. *J. Gen Chem.* (U. S. S. R.) **9**, 1539–45 (1939).—It was found possible to det. the parachors for cryst. substances in soln. The capillary method for raising the column of liquid was used in the expts. Chloroform (d_4^{20} 1.4868 and γ_4^{20} 27.29) and benzene (d_4^{20} 0.8797 and γ_4^{20} 29.07) were both found suitable, but benzene gave slightly lower values of the parachors. The exptl. values of the parachor can be detd. according to Hammick and Andrew (cf. *C. A.* **23**, 3435), but better results are obtained by using the calcn. method proposed by K. if the surface tension of the dissolved substance is detd. from the equation $\gamma_m v_m^{2/3} = \gamma_a v_a^{2/3} x + \gamma_b v_b^{2/3}(1 - x)$ where γ_a, γ_b and γ_m are the surface tensions of the solute, the solvent and the soln., resp., and v_a, v_b and v_m are the mol. vols. of the solute, the solvent and the soln., resp. The following exptl. and calcd. values, resp., of the parachors were obtained for: xylene in chloroform 290.25 and 285.10, *p*-cymene in chloroform 368.75 and 363.1, naphthalene (recrystd. before the detn.) 307.02 and 312.0, naphthalene

in the molten state at 90° 312.97 and 312.0, phenanthrene (recrystd.) 413.76 and 418.9, retene (recrystd.) 570.33 and 579.4, abietic acid (m. 163–6°, $[\alpha]_D \cong -90°$ in alc.) 725.19 and 727.9, abietic acid in the molten state 712.12 and 727.9, *d*-pimaric acid (m. 211–12°, $[\alpha]_D$ 58.8° in alc.) 712.85 and 727.9, *l*-pimaric acid (m. 148–52°, $[\alpha]_D$ 278° in alc.) 707.75 and 727.9, camphor (in benzene) 374.41 and 381.8, camphor (in chloroform) 381.4 and 381.8, fenchone 378.0 and 381.8, thyone 386.0 and 387.1, pulegone 388.41 and 392.5, camphoranil (m. 13°) 559.19 and 564.3, fenchyanil (m. 32°) 559.3 and 564.3, borneol (in chloroform) 393.73 and 387.0, camphenehydrate (in benzene) 380.79 and 387.0, camphene (in chloroform) 361.79 and 361.8. Bayer's tension did not affect the exptl. values of the parachors. Seven references and 2 tables are given. W. R. Henn 1

Reduction of specific gravity at 25°/25° to density at any temperature from 0° to 40°. R. R. Dreisbach. *Ind. Eng. Chem., Anal. Ed.* **12**, 160–1(1940).—A useful method for carrying out such computations is given. Henry J. Wing 3

Sound velocity and intermolecular forces. M. Rama Rao. *Current Sci.* **8**, 510–11(1939).—The velocity of sound v in a liquid and the molar vol. of the liquid V are connected by the equations $vV^{3.03} = R_1$, $v^{0.33}V = R$. The value of R for C_6H_6 is 951–3 (10–50°); for PhMe is 1140 1 (0–50°). Values of R and of the mol. crit. vol. V_c are tabulated for these and for C_7H_{16}, C_8H_{18}, CCl_4, PhCl, PrOAc and EtCOOEt: R/V_c varies from 3.35 to 3.71 for these compds. The velocity of sound in a liquid varies inversely as the ninth power of the intermol. distance. G. M. Petty 4

Critical opalescence of complex liquids. P. Mondain-Monval and J. Quiquerez. *Compt. rend.* **210**, 246–8 (1940); cf. *C. A.* **33**, 7636⁹.—The relation between the appearance of opalescence near the critical point of liquid mixts. and the difference (Δn) in the ns of the constituent liquids and the fact that no opalescence appears when Δn does not exceed 0.04, were confirmed and extended to cases where Δn of the pure liquids does exceed 0.04, but the Δn of the conjugate solns. does not do so. C. A. Silberrad 5

Study of the capillary properties of the free surface of a liquid with a new method for measuring the surface tension. E. Skylakakis. *Chim. Chronika* (Greece) **1938**, No. 10–12, 221–6(in Greek).—Description of a capillary phenomenon which is produced with constancy and uniformity by the impact of a drop falling on the free surface of a liquid. During the impact there appears periodically a characteristic air bubble for certain detd. heights. The period of this phenomenon is equal to the period of vibration of the drop. The method is applicable not only to water, but to other liquids such as EtOH, xylene, aniline, BzOH, AcOH, glycerol, Et_2O, olive oil and CS_2, measurements for which are tabulated. The simple app. is described. Lucien Y. Dyrenforth 6

Isotherms of helium at liquid-helium temperatures. W. H. Keesom and W. K. Walstra, *Physica* **6**, 1146 (1939)(in English).—Measurements of isotherms of He yielded the following values referred to the equation $pv = RT(1 + Bd_A + Cd_A^2 + Dd_A^4)$

	Virial coeff. of helium			
T	$B \times 10^6$	$C \times 10^9$	$D \times 10^{12}$	B cc./mol.
4.240	−3 366	− 0.260	+0.14	− 75.48
3.723	−3 918	− 1 55		− 87.8
3.105	−4.77	−10.5		−107
2.647	−5.70			−128
2.050	−8 0			−180

Amagat units are used except in the last column. Earl H. Brown 7

The flow and viscosity of liquid helium. H. E. Jones, J. O. Wilhelm and H. Grayson Smith. *Can. J. Research* **17, A**, 149–63(1939); *Univ. Toronto Studies, Phys. Ser.* No. **101**(1938–39).—Helium I has a viscosity of about 10^{-6} poises. The viscosity decreases as the temp. falls from 4.25°K. to 2.22°K. The flow of He II is the sum of a normal laminar flow plus a flow that is independent of pressure. The laminar flow corresponds to a viscosity of about 10^{-6} poises. One portion of the pressure-independent flow appears to be due to creep, and another portion depends on the intensity of illumination. The anomalous flow can be attributed to the degeneracy of the Bose-Einstein statistics. S. Bradford Stone 8

Viscosity of the systems ketones–organic acids. II. V. V. Udovenko. *J. Gen. Chem.* (U. S. S. R.) **9**, 1512–14 (1939); cf. *C. A.* **34**, 1231³.—The viscosity and d. were detd. for binary systems of MeCOEt and MeCOPr and HCO_2H and AcOH at 25°, 35° and 45°. A chem. reaction occurs between the ketones and acids studied. **III.** *Ibid.* 1564–7.—On the basis of previous data and elec. cond. studies of binary systems of ketones and acids by Kendall and Gross (*C. A.* **16**, 187), it is concluded that ds. and viscosities of the systems are functions of the chem. interaction of the components. The extent of the chem. reactions is detd. by the degree of assocn. of the acids (HCO_2H, AcOH and $PrCO_2H$) and the basicity of the ketones (Me_2CO, MeCOEt and MeCOPr), which increases with greater mol. wt. Chas. Blanc 2

Viscosity of the system boron oxide–silica and the calculation of the activation energy for some vitreous systems. A. A. Leont'eva. *Acta Physicochim. U. R. S. S.* **11**, 257–64(1939)(in English).—Data are given on the viscosity η of $Na_2B_4O_7$–B_2O_3 (*a*) and $K_2B_4O_7$–B_2O_3 (*b*) melts at 600–800°. The values of the "viscosity activation energy" B in the equation $\eta = Ae^{B/T}$ are detd. For the pure compds. $B \cong 10^{-3}$ cals./mol. and decreases slightly as the temp. increases; for (*a*) at 700°, $B = 7.2 \times 10^{-4}$ for 0% B_2O_3, 7.8 for 26%, then decreases linearly to 1.8 for 100%; for (*b*) at 670°, $B = 8.2$ for 0, 10.2 for 25, 4.0 for 60.0 and 1.8 for 100% B_2O_3. For the B_2O_3–SiO_2 system, the viscosity at 530° is a strong min. for 5% SiO_2, at 630°, two weak min. occur at 5 and 12%, whereas the 800° curve shows no min. For 12% and more SiO_2 the $\eta - 1/T$ curves are practically linear, $B \cong 2.2 \times 10^{-4}$ cals./mol. from 500 to 800°. For the 5% SiO_2 melt, B *increases* with the temp., whereas for higher SiO_2 content B decreases. L. concludes that in the 5% melt, increasing dissocn. causes interaction of the mols. leading to decrease of the coördination no. and increase of B. F. H. Rathmann 4

The velocity of fall of liquid drops in melts. M. P. Volarovich and A. A. Leont'eva. *Acta Physicochim. U. R. S. S.* **11**, 251–56(1939)(in English).—Exptl. data on the rate of fall of molten Pb drops in molten B_2O_3 at temps. of 500–700°, and of cast-iron drops in molten slag agree with values calcd. by the Hadamard-Rybczynski equation, butane 1.5 times as great as calcd. by Stokes' equation. For the rise of slag drops in metal, the Stokes' formula is, however, applicable (since η_{slag} is large relative to η_{metal}). F. H. Rathmann 5

Formation of an amorphous (vitreous) modification of water by condensation of vapor at low temperature. Leszek Staronka. *Roczniki Chem.* **19**, 201–12(1939).—A transparent coating forms in a glass tube at less than −175° (liquid N) through which a slow current of damp air is passed. The deposit becomes opaque at about −130°, and this change is assocd. with evolution of not less than 5.7 cal. per g. of the ice. The internal energy of the condensate formed at less than −170° is about 100 cal. per g. higher than that of the condensate formed at higher than −170°. The new product is considered to be a vitreous modification of H_2O. B. C. P. A. 6

X-ray and optical properties of built-up films. Seymour Bernstein. *J. Am. Chem. Soc.* **62**, 374–8(1940).—The discrepancy of about 3.6% between x-ray and optical measurements of the thickness per layer of barium-copper stearate films (Holley, *C. A.* **32**, 4074³) cannot be accounted for on the basis of x-ray refraction corrections and possible optical phase-change corrections. The results indicate that the discrepancy must be explained in terms of film structure. X-ray-measured thicknesses of Ba-Cu stearate and Ba stearate films are greater than the corresponding optical measurements; those of the Cu stearate films are less than the corresponding optically measured thicknesses. Measurements of a set of Ba-Cu 7

stearate films of varying proportions of Ba stearate and Cu stearate show that the film thickness varies greatly with film compn. and that a change in the x-ray-measured thickness is not accompanied by a change in optically measured thickness of the same magnitude. Skeletonized and unskeletonized films of the same original compn. have the same x-ray grating-space. Metal stearate films give only zero layer-line reflections while an Et stearate film showed other reflections in addn. The following film structure is suggested: The film consists of many small crystals of metal stearate embedded in a matrix of amorphous stearic acid or stearic acid crystals. These crystals of metal stearate all have the same, or nearly the same, orientation in a direction perpendicular to the slide on which the film is built but have a random arrangement in planes parallel to the foundation surface. The x-ray measurements are a measure of the grating-space of the metal stearate crystals. The optical measurements are a statistical av. of the thickness per layer. This suggested film structure is also consistent with Langmuir's interpretation (*C. A.* **32**, 6526[9]) of contact potential measurements (*C. A.* **32**, 5680[5]). A. B. Garrett

Conductivity and mobility of thin lead films. M. G. Foster. *Phys. Rev.* **57**, 42–6 (1939).—The elec. cond. of thin Pb films was measured, and the results are discussed from the standpoint of the thermodynamic stability of such films. Bernard Lewis

Structure of chromium films deposited on rock salt. Syunzi Siraj. *Proc. Phys.-Math. Soc. Japan* **21**, 800–7 (1939) (in English); cf. *C. A.* **33**, 1191[9].—The films were deposited by sublimation in a vacuum on cleavage planes of the rock salt, and their structure was studied by electron diffraction. Various orientations were obtained, depending on the temp. of the salt and the length of time it had been heated before the film was deposited. A. O. A.

Crystal growth. D. Balarev and N. Kolarov. *Ann. univ. Sofia, II. Faculté phys.-math.*, Livre 2, **35**, 143–7 (in German, 148) (1938–39); cf. *C. A.* **33**, 8475[4].—With fresh crystals, the soly. by soln. and by pptn. are the same, but with old crystals, the values may differ by as much as 1% of the gypsum content of the soln. In accordance with previous views, the thermodynamic equil. between the crystal and its surroundings depends in general on the disperse structure of the crystal, and the crystal grows or dissolves in a stepwise fashion. II. *Ibid.* 429–33 (in German, 434).—At 23° the max. difference between the soly. of gypsum crystals at the bottom and at the top may amount to approx. 2% of the $CaSO_4$ content of the soln. The direction of stirring has little or no effect on the equil. concn. of a system in which only old gypsum crystals are present; but in a system in which fresh crystals are present, the soly. changes with change in the direction of stirring, and the soly. obtained by soln. (at the bottom) may be greater than the soly. obtained by pptn. (at the top). George Ayers

Chemistry of deuterium compounds. The optically active sodium ammonium salt of 1,2-dihydroxyethane-d_2-1,2-dicarboxylic acid. H. Erlenmeyer and O. Bitterlin. *Helv. Chim. Acta* **23**, 207–9 (1940); cf. *C. A.* **33**, 6800[4].—*dl*-1,2-Dihydroxyethane-d_2-1,2-dicarboxylic acid was converted to the Na NH_4 salt and crystd. at 15° over concd. H_2SO_4 and the crystals were mechanically sepd. as in Pasteur's sepn. of racemic acid. $C_4H_2D_2O_6NaNH_4$, $[M]_D^{20} = 60.33°$; $C_4H_4O_6NaNH_4$, $[M]_D^{20} = 62.14°$; this indicates that substituting the CD group for the CH group in the Na NH_4 salt of tartaric acid affects the optical activity appreciably. A. P. Sachs

Thermal conductance of metallic contacts. R. B. Jacobs and C. Starr. *Rev. Sci. Instruments* **10**, 140–1 (1939).—The thermal cond. across optically polished contacts of Ag, Au and Cu was measured at 25° and −195° and under pressures of 0.2 to 2.5 kg. per sq. cm. The cond. of Cu varies linearly with pressure. Ag is the most suitable for contact work at low temp. B. C. P. A.

Relation between the temperature coefficients of cuprous oxide rectifiers and loading. M. I. Vitenberg. *J. Tech. Phys.* (U. S. S. R.) **9**, 1671–6 (1939); cf. *C. A.* **34**, 1893[4].—For the elec. resistance r of Cu_2O the equation $\log r = \text{const.} - \beta \log T$ holds. The value of β slowly increases when the applied potential changes from −7 to +0.1 v. and then rapidly falls when the potential rises to +0.35 v. J. J. Bikerman

The variation of the electrical conductivity of some hydrous crystals with temperature. Hikoo Saegusa and Tutomu Matumoto. *Science Repts. Tohoku Imp. Univ.*, First Ser. **28**, 235–44 (1939).—The elec. cond. of hydrates of $CuSO_4$, $CaSO_4$, $FeSO_4$, $CrNH_3(SO_4)_2$ and $K_4Fe(CN)_6$ was studied at temps. up to 450°. The cond. increases with temp. and then decreases anomalously at the dehydration temp. The water of crystn. plays an important part in elec. cond. S. Bradford Stone

Properties of some superconductors. D. Shoenberg. *Proc. Cambridge Phil. Soc.* **36**, 84–93 (1940).—The crit. field curves of pure Al, Ga, Th and Zn were measured by a magnetic induction method. The values of the transition temps., T_0, in °K. and of dH_c/dT in gausses per °K. are, resp.: Al, 1.150 ± 0.005°, 140 ± 5; Ga, 1.056 ± 0.010°, 88 ± 5; Th, 1.368 ± 0.002, 191 ± 2; Zn, 0.84 ± 0.05, 100 (± 10% approx.). A marked supercooling effect was found in Al and a smaller effect in Ga. A table is given for the degree of supercooling, $s = 1 - H_s/H_c$, of Al. H_s is the value of the magnetic field ($< H_c$) above which the specimen remains in its normal state after the temp. has been increased through T_0 and returned to its initial value at const. H. Only on reducing the field below H_s does the diamagnetic moment appear. For Al, s ranges from 0.15 to 0.63. In expts. on Ti no superconducting state was found; the failure to find the effect is discussed. Mo did not become superconducting above about 0.3°K.; U did not above 0.98°K. H. C. Thomas

X-ray investigation of the plastic deformation of crystals. III. Yu. S. Temmasov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1740–4 (1939); cf. *C. A.* **33**, 7638[8].—Cylinders of NaCl, 30 cm. long and 8 mm. wide, were extended up to 4%. This did not affect the Laue pattern of the middle of the cylinder, but the parts of the cylinder distant 1 cm. or more from the middle showed double spots, and the deformation increased from the inner to the outer layers of the cylinder. Measurements of the thickness proved that the middle part was also extended but in it a pure translation took place. No "twinning of a special kind" could be detected. J. J. Bikerman

Growth on alkali halide crystals. H. Morgenstern. *Z. Krist.* **100**, 221–27 (1938); cf. Ernst, *C. A.* **31**, 4177[8].—The development of the surface morphology of single-crystal spheres of LiF, NaCl, KCl, KBr and KI immersed in aq. soln. at 29°, and prepd. by grinding crystals obtained from the melt by Kyropoulos' method, is described. B. C. P. A.

Electron-microscope study of the beginning of precipitation of calcium carbonate from aqueous solutions. O. E. Radczewski, H. O. Muller and W. Eitel. *Zentr. Mineral., Geol.* **1940A**, 8–19; cf. *C. A.* **33**, 5615[8]. $CaCO_3$, pptd. from a satd. $Ca(HCO_3)_2$ soln. by boiling in the vacuum of a water pump, was in the form of calcite crystals 120 to 270 mμ in size. The self-evapn. of a satd. $Ca(HCO_3)_2$ soln. under the objective of the microscope gave a bubbly film of exceedingly fine amorphous $CaCO_3$ which crystd. as calcite if warmed. Aragonite and vaterite were not observed. A no. of photomicrographs at extremely high magnifications are given. M. F.

Solid solutions of hydrogen peroxide and water. P. A. Giguere and O. Maass. *Can. J. Research* **18, B**, 66–75 (1940).—An attempt was made to det. the exact compn. of the first crystals that sep. out on freezing solns. of H_2O_2 and H_2O of various concns. Special care was taken to ensure complete removal of any liquid wetting the solid phase. In all cases the crystals were found to contain both components and in proportions usually different from those in the mother-liquor. Because of the limitations of the exptl. method used, the results are only approx., but they afford ample evidence for the existence of solid solns. The possibility of H_2O_3 forming solid

solns. with H_2O is discussed from the standpoint of the crystal structure of both components. J. W. Shipley

Smits' theory of complexity and allotropy. J. L. Meijering. *Chem. Weekblad* **37**, 57–60(1940).—A review. H. S. v. Klooster

Significance of crystal habit. J. D. H. Donnay. *Am. Mineral.* **23**, 168–9(1938).—A discussion. B. C. P. A.

Identity between the Laue equation and the Bragg relation. A. Cavinato. *Z. Krist.* **100**, 439–40(1939).—See *C. A.* **34**, 1532[3]. B. C. P. A.

The microscopic forms of iron rust. Adolf Ackermann. *Kolloid-Z.* **90**, 26–8(1940); cf. *C. A.* **26**, 3466.—By means of an electron microscope the structure of rust particles, 15 min. and 15 hrs. old, was studied. Some of the younger rust particles were round and some were fiber-like, whereas the older rust particles were cryst. The young rust particles could be dyed with an aniline dye, whereas the older particles could not be dyed in this manner. The possibility of iron rust being the link between org. and inorg. matter is mentioned. S. I. A.

Orientation of the phases obtained in the course of reduction of magnetite by hydrogen. N. Buĭnov, A. Komar, M. Zhuravleva and G. Chufarov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1649–55(1939); cf. *C. A.* **33**, 5255[2].—The orientation was detd. by x-rays using the methods of Laue and of rotating crystal. Reduction of Fe_3O_4 by H_2 at 500° yields Fe the crystals of which have the orientation of the original magnetite. The same holds for FeO produced by reduction of Fe_3O_4 by H_2 at 900°. The α-Fe crystals obtained by reduction of this FeO have their (001) faces parallel to (001) of FeO and their [110] edges parallel to [100] of FeO. J. J. B.

Crystal structure of phosphorus pentachloride. Herbert M. Powell, D. Clark and A. F. Wells. *Nature* **145**, 149 (1940).—PCl_5 has a tetragonal crystal system; a_0 = 9.2 A., c_0 = 7.4 A.; d = 2.0; 4 mols. per unit cell; space group $P4_2/n$. The structure is $[PCl_4]^+ + [PCl_6]^-$. The geometry is described. G. M. Petty

The crystal structure of sodium sulfate III. Ludo K. Frevel. *J. Chem. Phys.* **8**, 290(1940).—Na_2SO_4 III has the orthorhombic space group D_{2h}^{10} *nn*; the unit cell contains $4Na_2SO_4$; at room temps. a = 5.59 ± 0.02 A., b = 8.93 ± 0.02 A., c = 6.98 ± 0.02 A. The positions of the SO_4 and Na ions and of the O atoms are given. G. M. Petty

Chlorogermanic acid and the chlorogermanates. Properties and crystal structure of cesium hexachlorogermanate. A. W. Laubengayer, O. B. Billings and A. E. Newkirk. *J. Am. Chem. Soc.* **62**, 546–8(1940).—Various attempts to prep. hexachlorogermanates from water solns. of HCl, NH_3 + HCl, NaCl, LiCl, KCl, CsCl and $CaCl_2$ failed; Cs_2GeCl_6 was prepd. from CsCl and $GeCl_4$ in a solvent of 1 vol. of alc. to 2 vols. of 12 *N* HCl. Cs_2GeCl_6 dissolves readily in water, and undergoes rapid hydrolysis; it is insol. in 12 *N* HCl and in abs. ethyl alc. but may be recrystd. from this mixed solvent; it is stable in dry air, has a d. of 3.45 ± 0.01 and forms isotropic crystals that are, for the most part, octahedral. The powder x-ray diffraction pattern for the compd. was obtained by means of Cu $K\alpha$ radiation. The data fitted a face-centered cubic lattice. Tables are included of data giving the migration of Ge during electrolysis of solns. of $GeCl_4$ in 6 *N* HCl and of the observed and calcd. intensities of the lines of the x-ray diffraction pattern. A. B. Garrett

The crystals of quartz glass. N. A. Shishakov. *Compt. rend. acad. sci. U. R. S. S.* **23**, 788–91(1939)(in English).—Charlasen (cf. *C. A.* **26**, 5800) and others because of x-ray diagrams concluded that quartz glasses, SiO_2 or many-component glasses, are amorphous. S. using the electronographical method, believes quartz glasses to be cryst. The x-ray and the electronographical methods are discussed critically. The developed theory of two-dimensional or "scaly" crystals, consisting of sheets of SiO_4 with a periodicity of 7–8 A. is in agreement with Hartleif's value 8.33 A. (cf. *C. A.* **32**, 9417[4]). F. C. N.

The mosaic blocks of crystalline quartz. N. A. Shishakov. *Compt. rend. acad. sci. U. R. S. S.* **23**, 792–3 (1939)(in English).—The paper deals with expts. and calcns. of the d. and the peptization effects of quartz powder in water. Cryst. quartz has a d. of 2.649. The lattice parameters are a = 4.89 A., c = 5.38 A.; the crystal cell vol. is: $v = (\sqrt{3}/2)a^2c$. The formula wt. being M = 60.06, the no. of mols. in the unit cell N = 3 and the mass of the hydrogen atom $m_H = 1.662 \times 10^{24}$, S. calcs. the d. ζ according to the formula: $\zeta = 2NMm_H/\sqrt{3}\,a^2c$ and obtains a value ζ = 2.688, i. e., 1.5% higher than the measured d. The cavities or pores in the quartz responsible for this effect seem to be regularly distributed cracks and lead to the conclusion of a "mosaic structure" for quartz. From sedimentation expts., the thickness of the cracks d is calcd. (The mean value λ for a particle is ≈1300 A.) $d = (v/3V)\lambda$ = 6.5 A., where v/V is the pore vol. equal to 1.5%. Several properties of quartz, such as the ability to retain many regularly distributed inclusions (e. g., amethyst) and the penetration of cations through the mineral in an elec. field, help to establish the suggested theory. Frederic C. Nachod

X-ray studies of lime. Kei-iti Akiyama. *Waseda Applied Chem. Soc. Bull.* **17**, 26–7, *Abstracts* (in English) 39(1940).—The samples of lime obtained by heating $CaCO_3$ at various temps. were analyzed by the x-ray powder method. The crystal structure of lime does not change on heating to high temps. C. L. B.

Equilibrium diagram of the copper-antimony system. IV. X-ray investigation of the copper-antimony alloys. Atomi Ōsawa and Nisaku Sibata. *Science Repts. Tohoku Imp. Univ.*, First Ser. **28**, 1–19(1939); cf. *C. A.* **33**, 6773[9].—There are 5 intermetallic compds. in the system: β, γ, δ, η and θ. Of these γ, δ and θ exist at room temp. The sp. gr. of the system was recorded. The following crystal systems and the no. of atoms to the unit cell were recorded for alloys in the annealed condition: α, Cu, face-centered cubic, 4; β, Cu_3Sb_2, body-centered tetragonal, 2*n*; γ, Cu_2Sb, simple tetragonal, 12; δ, Cu_9Sb_2, hexagonal, 2; η, $Cu_{11}Sb_2$, orthorhombic, 49; θ, $Cu_{11}Sb_4$, hexagonal, 15; ε, Sb, hexagonal, 6. J. N. L

Crystal structure of potassium sulfamate. C. J. Brown and E. G. Cox. *J. Chem. Soc.* **1940**, 1–10.—Relative intensities were measured on oscillation photographs for 309 reflections and corrected to abs. values by comparison with rock salt. Unit-cell dimensions, including 4 mols. of NH_2SO_3K, are a = 8.32, b = 8.28 and c = 5.90. The space group $D_{2h}^{11} - Pbma$ was adopted and later confirmed. Three-dimensional Patterson syntheses and the above data gave rough coördinates, which were refined by three-dimensional Bragg syntheses. The $NH_2SO_3^-$ group is tetrahedral with bond lengths S—O = 1.44 A. and S—N = 1.57 A. (both ± 0.03). The structure is ionic with 4K in 4 (*c*), z = 0.663, and 4S in 4 (*d*), x = 0.137 and z = 0.180. No hydrogen bonds are postulated, and from the above bond lengths it is concluded that both hydrogens are attached to N. W. F. Bradley

X-ray study of the phthalocyanines. IV. Direct quantitative analysis of the platinum compound. J. Monteath Robertson and Ida Woodward. *J. Chem. Soc.* **1940**, 36–48; cf. *C. A.* **31**, 3358[8].—Advantages and limitations are discussed for the direct method of analysis which is available for this (and many others) complex org. structure because of the presence of an atom so heavy that the total structure amplitudes are always +. Quant. intensity measurements were made for 302 *hol* reflections, registered photographically, scaled to abs. values by selected measurements, and corrected for absorption. The double Fourier series yielded a contour map of the b axis projection from which the positions of all atoms were detd. with an av. accuracy of ±0.05 A. Corrections were made for diffraction effects from the Pt. The mol. structure is similar to that of other members of the phthalocyanine series, but the crystal structure differs because mols. are inclined to 010 at angles of 26.5° rather than 44.2°. The space group is $C_{2h}^5 - P2_1/a$; a = 23.9, b = 3.81, c = 16.9 A. and β = 129.6°; there are 2 mols.

per unit cell. The crystal employed weighed 0.0095 mg. W. F. Bradley

The bromine-bromine distance in the dibromides of *cis* and *trans*-stilbene. James D. McCullough. *J. Am. Chem. Soc.* **62**, 480–2(1940).—The Br-Br sepns. in the mols. of the cryst. stilbene dibromides were measured by means of the radial distribution treatment of x-ray powder photographs. The sepn. was found to be 4.50 A. in the *meso* dibromide and 3.85 A. in the *dl* dibromide. In the former all groups are *trans* to one another, whereas in the latter the Br atoms are as close to one another as the van der Waals radius for Br permits. The results support the postulate of Young and Pressman (unpublished) that there is a restriction of the rotation about the single bond between the two C atoms carrying the Br; the results agree also with the elec. dipole moments found by Weissberger. A. B. Garrett

Structure of oxamide. Lore C. Misch and A. J. A. van der Wyk. *Compt. rend. soc. phys. nat. Genève* **55**, 96–8(in *Arch. sci. phys. nat.* **20**, Nov.-Dec. (1938)).—Larger crystals of $(CONH_2)_2$ than those ordinarily obtained were prepd. by boiling for long periods a suspension in H_2O or $HCONH_2$. X-ray examn. of the crystals gives *a* 5.18, *b* 3.63, *c* 5.65 A., α 66° 5′, β 81°, γ 64°; one mol. in the unit cell. The atoms are arranged chiefly in a plane parallel to *ac*. The crystals were also examd. by the method of Patterson. There is mutual attraction of NH_2 and O in the plane *ac*, which causes an increase in the C—C distance. This is estd. at 1.65 A. instead of the normal 1.53 A. B. C. P. A.

Diffraction of electrons by anthracene. A. Charlesby, G. I. Finch and H. Wilman. *Proc. Phys. Soc.* (London) **51**, 479–528(1939).—Diffraction gives results in agreement with structure as detd. by x-rays. In addn. to the normal characteristic multispot pattern, another pattern consisting of areas or islands of diffuse scattering appears superimposed, and this pattern is shown to be due to mols. which, although oriented with respect to the beam, have no definite phase relation with one another. The diffuse-area pattern is thus virtually equiv. to that which would be given by a gaseous stream of oriented mols. flowing past the electron beam. Methods for detg. the crystal orientation from a consideration of the normal electron-diffraction pattern features are developed, and it is shown that the diffuse-area pattern is due to mols. which, although in or near their normal positions and orientations, are acting as independent scattering groups. An extension of the Debye theory to mol. lattices shows that the new patterns can be explained on the supposition that the mols. vibrate thermally, as almost rigid units, about their mean positions in the lattice. B. C. P. A.

Isotherms of adsorption and surface tension. A. K. Skryabin. *Colloid J.* (U. S. S. R.) **5**, 831–42(1939).—For complicated adsorption isotherms an equation is suggested which contains 4 consts. to be deduced from expts. From this equation and the Gibbs adsorption theorem an equation for the relation between surface tension and concn. is derived. J. J. Bikerman

The adsorption of dipoles. A. R. Miller. *Proc. Cambridge Phil. Soc.* **36**, 69–78(1940).—A statistical treatment is given of the adsorption of dipoles considering electrostatic forces alone and electrostatic and van der Waals' forces jointly. It is shown that the electrostatic and van der Waals' forces give contributions of opposite sign, which almost counter-balance, to the variation of heat of adsorption with surface covered. The distribution of particles on the surface, taken into account in the treatment, has considerable effect on the variation of the heat of adsorption. H. C. Thomas

The theory of the structure and formation of a certain type of immobile adsorbed film with an application to the adsorption of oxygen on tungsten. J. K. Roberts. *Proc. Cambridge Phil. Soc.* **36**, 53–68(1940).—The structure and behavior of immobile adsorbed films on a simple quadratic lattice is discussed for the case in which each particle is so large that it is impossible for adsorption to occur on neighboring sites. The process of building up the film results in an inhomogeneous structure with gaps. 1 The sites on the surface can be divided into two groups, the gaps occurring where the regions of the surface occupied by particles adsorbed on one group and those adsorbed on another group meet. The no. of these groups is detd. and the possible configurations of particles in the boundary regions are discussed in detail. In the case of the adsorption of O_2 on W a second layer is formed over the boundary sites; the no. of second-layer sites to which the boundary sites give rise is obtained. It is shown that the exptl. 2 results are better explained on the view that the first very stable layer is mol. rather than at. H. C. Thomas

A new method for studying the adsorption of gases at very low pressures and the properties of adsorbed films of oxygen on tungsten. J. L. Morrison and J. K. Roberts. *Proc. Roy. Soc.* (London) **A173**, 1–13(1939).—A previously described method (cf. *C. A.* **30**, 1630) for detecting the adsorption of O_2 on a W filament by the change 3 produced in the accommodation coeff. of the carrying gas, argon, was so modified as to permit the calcn. of the partial pressure of O_2 in contact with the filament. Adsorption of O_2 on W at room temp. was studied at O_2 pressures ranging from 2×10^{-9} to 7.5×10^{-6} mm. of Hg. Results indicate that a film of O_2 forms on the W filament at lowest pressures and remains stable to temps. above 1100°K.; part of it appears to evaporate only at 1700°K. On top of this film O_2 is adsorbed to an extent 4 that increases with pressure, much as in the usual adsorption isotherm. **The kinetics of the formation of oxygen films on tungsten.** *Ibid.* 13–27.—The method described above was applied to the study of the kinetics of formation of oxygen films. A detailed math. analysis of the various factors influencing the rate of adsorption is included. P. H. Emmett

Mixed adsorption. A. Magnus and F. Teller. *Z. Ver. deut. Ing., Verfahrenstech.* **1939**, No. 1, 1–9; *Chimie & industrie* **42**, 303.—Mixed adsorption of different gases 5 on silica gel and activated C was studied. Silica gel adsorbs preferentially substances that contain a bridge O atom. The adsorption of pure substances by charcoal increases with the length of the C chain. As regards mixed adsorption on activated C, it has not been possible to establish a definite relation between the laws that govern it and the results of adsorption of pure substances 6 or the structure. A. Papineau-Couture

The equilibrium pressures of oxygen adsorbed on activated charcoal. Melville J. Marshall and Robert A. Findlay. *Can. J. Research* **18, B**, 35–43(1940).—Oxygen chemisorbed on activated coconut charcoal at 20° was found to exert no measurable equil. pressure. The small residual pressures obtained under exptl. conditions were due to the presence of slight impurities in the O employed. The impurities responsible for these residual pressures 7 were largely N and accompanying rare gases. The velocity of chemisorption of O decreased rapidly with increase in its concn. on the charcoal, approaching a limiting zero velocity at a concn. of 84×10^{-6} moles per g. This coincides with the concn. at which the heat of adsorption drops rapidly to the limiting value obtained for phys adsorption. After this limiting concn. was reached, adsorbed O showed true equil. with the gas phase. For small addnl. increases in concn., the equil. pressure was 8 found to increase as a linear function of the concn., with a proportionality const. of 0.276 mm. per micromole. This represents phys. adsorption as compared to chemisorption for lower O concns. J. W. Shipley

Measurements of the adsorption of helium gas on active charcoal between 4.22°K. and 1.78°K. A. van Itterbeek, W. van Dingenen and J. Borghs. *Physica* **6**, 951–60(1939)(in English).—The adsorption isotherms are 9 closely represented by the formula of William's theory. The application of the Clausius-Clapeyron equation gives the heat of adsorption, which passes through a min. of 22 cal./mol. at the λ-point, which value is close to the heat of condensation of liquid helium. Measurements of the velocity of adsorption show there is an analogy between the λ-point and crit. points. G. W. King

Chromic oxide as an adsorbent. E. H. Harbard and A. King. *J. Chem. Soc.* **1940**, 19–29.—Measurements

were made of the adsorption of CCl_4 on Cr_2O_3 prepd. by the ignition of (1) $(NH_4)_2Cr_2O_7$, (2) $Cr(OH)_3$ in a vacuum at 400°, (3) $Cr(OH)_3$ at atm. pressure, (4) a mixt. of NH_4Cl and $K_2Cr_2O_7$, (5) CrO_3, (6) Hg_2CrO_4 in a vacuum, (7) Hg_2CrO_4 at atm. pressure. The CCl_4 isotherms for the range 0–60 mm. lie in the order given for the prepns., Cr_2O_3 from $(NH_4)_2Cr_2O_7$ being the best adsorbent. The isotherms indicate the presence of unimol. adsorption and capillary condensation; the greater the amt. of unimol. adsorption, the lower is the pressure at which capillary condensation takes place. On the assumption of a capillary-condensation mechanism a relation is worked out between the surface area and the mass of vapor adsorbed at a given pressure. The adsorptions of $CHCl_3$, CH_2Cl_2 and H_2O on Cr_2O_3 are compared. A decrease in the amt. of adsorption with dipole moment is found. On successive adsorptions and desorptions of $CHCl_3$ on Cr_2O_3 the slope of the isotherm changes and the amt. of adsorption becomes progressively smaller; this is accompanied by increasingly higher pressures for capillary condensation. This appears to be due to the destruction of the smaller capillaries by the adsorption of the vapor. The fine structure of the adsorption isotherm of $CHCl_3$ on Cr_2O_3 was measured by a new type of static app. The isotherm is discontinuous both in the unimol. and the Langmuir portions of the curve. H. C. Thomas

Some recent advances in colloids. James W. McBain. *J. Chem. Education* **17**, 109–11(1940). E. H.

The acidity of Japanese acid clay. I. Various theories concerning the mechanism of the acidity of Japanese acid clay. Ken-iti Yamamoto. *Waseda Applied Chem. Soc. Bull.* **17**, 13–20, *Abstracts* (in English) 38(1940).—Japanese acid clay is generally acid to indicators such as litmus, methyl orange and phenolphthalein when brought into contact with them. A clear soln. which is filtered from a suspension of Japanese acid clay treated with distd. water contains no perceptible H ion, and the similar clear soln. obtained from suspension of Japanese acid clay which is treated with neutral salt solns. such as NaCl soln. contains distinctly free H ion. Theories which have been published in Japan for these phenomena are discussed. C. L. B.

A method for the separation of aerosols from snow and hail. O. Gabrian. *Meteorol. Z.* **55**, No. 3, 112–13(1938); *Chem. Zentr.* **1938, I**, 4158.—Petroleum at a temp. below 0° is poured over the freshly fallen snow in a glass vessel to cover it. After the snow or hail has melted, the dust particles collect at the petroleum-water interface from which they can be removed with a cotton pad and examd. M. G. Moore

Problems of equilibrium in aerosols. I. D. Gurevich and V. I. Kapustina. *Colloid J.* (U. S. S. R.) **5**, 781–95 (1939).—Aerosols were prepd. in vessels contg. various amts. of water vapor, then collected on sintered glass filters (Cottrell app. was found less satisfactory) and analyzed. Mist of vitriol oil gave aq. H_2SO_4 of the concn. corresponding to the vapor pressure p of H_2O in the vessel. Burning red or yellow P produced H_3PO_4.aq. contg. less water than solns. in equil. with the vapor pressure p. In both these cases the steady state was reached instantaneously. NH_4Cl smoke absorbs water slowly, and the concn. of the aerosol (if it contains no free HCl) tends to that in equil. with p. No indication of the effect of the particle size on the equil. vapor pressure was found. J. J. Bikerman

A new method for determining the mobilities and radii of smoke particles. L. Radushkevich. *Acta Physicochim. U. R. S. S.* **11**, 265–76(1939)(in English).—The mobilities and radii of smoke particles are detd. by means of ultramicroscopic observations on the diffusion of the aerosols through narrow slits. For polydisperse systems this method gives smaller dimensions than those obtained by the counting-weight method; for homogeneous smokes such as those of stearic acid, the results of the 2 methods show good agreement. F. H. Rathmann

Hydrous lanthanum hydroxide as an emulsifying agent. Therald Moeller. *J. Phys. Chem.* **44**, 259–63(1940); cf. *C. A.* **33**, 3658⁴.—Hydrous $La(OH)_3$, whether colloidally dispersed, flocculated from a sol by certain electrolytes, or pptd. from La salt solns., stabilizes oil-in-water emulsions. The dispersed phase may be benzene, toluene, xylene, mesitylene, kerosene, gasoline or turpentine. An emulsion of water with toluene was obtained in the presence of $K_4Fe(CN)_6$, $K_3Fe(CN)_6$, K_3AsO_4, KH_2PO_4, K_2HPO_4, K_3PO_4, $K_2Cr_2O_7$, K_2CrO_4, K_2SO_4, KF, KCl, KBr, KI, KCNS, Na_2SO_4, $Na_2S_2O_3$, $Na_2B_4O_7$, $MgSO_4$ and LiCl; whereas no emulsions were obtained with Na_2CO_3 or Na_2SO_3. No emulsion was obtained below a min. $La(OH)_3$ concn. The addn. of a gold sol to the $La(OH)_3$ had no apparent effect on the emulsifying power of the latter. No emulsions were produced when Et_2O, iso-AmOH, CCl_4 or $CHCl_3$ was used in place of the hydrocarbons. S. I. Aronovsky

Experimental investigations on laminar systems. Formation of thin layers of zinc sulfide and arsenic trisulfide on the surface of solutions of zinc and arsenic salts. S. G. Mokrushin and R. B. Ginzburg. *Colloid J.* (U. S. S. R.) **5**, 817–22(1939); cf. *C. A.* **33**, 8080³; **34**, 922².—ZnS films produced by diffusion of H_2S gas to a surface of $Zn(OAc)_2$ soln. reach a const. thickness of 30–100 A. within a few min. As_2S_3 films are thicker (up to 3000 A.) and grow for a longer time. J. J. Bikerman

The specific surface of fine powders. F. M. Lea and R. W. Nurse. *J. Soc. Chem. Ind.* **58**, 277–83(1939).—An air-permeability method for the detn. of the specific surface of fine powders was developed. The app. consists of a calibrated cylinder into which a known wt. of the powder is packed. Air or other gas is passed through this layer, and the pressure gradient is measured by flow meters. A formula for the surface per unit vol. was derived from the nature of the powder, the dimensions of the layer, and the pressure gradient. The method is satisfactory for powd. cements with specific surfaces up to 4000 sq. cm. per g.; it agrees well with sedimentation procedures. It has the advantage over permeability methods using liquids of being faster and giving reproducible results. Other methods are necessary if particle size distribution curves are required. J. H. Reedy

Effect of the granulometric composition of powders on their liquid-binding capacity. I. Ya. M. Gurevich and M. T. Berezhinskaya. *Colloid J.* (U. S. S. R.) **5**, 807–16 (1939).—Powders of ultramarine (**I**), chromic oxide (**II**), and an iron oxide contg. red lead (**III**) were sepd. in fractions having diams., d, between 20 and 10, 10 and 5, 5 and 2, and 2 and 1 μ. The sedimentation vol. of **I** and **II** in water and linseed oil increases with d, and that of **III** in H_2O and linseed oil and of **I**, **II** and **III** in xylene diminishes when d rises. The amt. of water, linseed oil or xylene necessary to produce a paste rises with d for **I** and **II** and falls for **III**. The viscosity of pastes of **I** and **II** in linseed oil increases, and that of **III** in linseed oil and of **I**, **II** and **III** in mineral oil decreases, with rising d. The systems giving unstable suspensions show a liquid-binding capacity which increases with dispersity, and other systems show an opposite behavior. **II.** *Ibid.* 823–9.—Mixts. in various proportions of large and small particles of **I**, **II** and **III** were prepd. Their capacity to bind linseed oil was additive for **III** and nonadditive for **I** and **II**. J. J. Bikerman

Influence of sorbed vapor on the static hysteresis of wetting. M. V. Chapek and N. B. Krechun. *Colloid J.* (U. S. S. R.) **5**, 763–6(1939).—The *contact angles* between minerals, water and mineral oil are for air-dry quartz 52°, calcite 60°, limonite 135°, and hornblende 45°, and for the same minerals after drying *in vacuo* 135°, 100°, 180° and 92°, resp. Obviously the low angles observed before drying are caused by adsorbed H_2O vapor. The values of the angles between graphite, water and mineral oil strongly depend on whether the dried graphite was first immersed in H_2O or in the oil. J. J. Bikerman

The nature of adhesion. N. A. De Bruyne. *Aircraft Engineer* (Supplement to *Flight*) **18**, No. 12, 51–4(1939); *Paper-Maker* **99**, TS12–15(1940).—A review of the theory according to which strong joints can never be made to polar surfaces with nonpolar adhesives or to nonpolar surfaces with polar adhesives. Subjecting *cellulosic*

materials including *wood* to excessive heat irreversibly converts them from polar to nonpolar substances. A. Papineau-Couture

Theoretical treatment of the double layer and its implications. Introductory paper. H. R. Kruyt and J. Th. G. Overbeek. *Trans. Faraday Soc.* **36**, 110–16 (1940).—Knowledge of the mechanism of the double layer is still very incomplete. There is no electrophoresis equation that takes all factors into account. The total charge on a colloid can be detd. by direct conductometric titration with NaOH; in other cases it is possible to det. directly the quantity of peptizing ions; a third method is the detn. of the max. exchange capacity of the double layer. However, the location and the distribution of the charge is a great uncertainty. The problem of colloid stability, as detd. by the protection of the double layer, is still more complicated and uncertain. Victor R. Deitz

Observations on the double-layer capacity at mercury electrodes. I. M. Barclay and J. A. V. Butler. *Trans. Faraday Soc.* **36**, 128–33(1940).—Cathode-ray oscillograms, suitably amplified, of the neg. polarization of freshly made Hg surfaces show 2 stages: (1) The more pos. region (E_H more than −0.3) in which the capacity is of the order of 50 μF/sq. cm.; (2) the more neg. region in which the capacity is about 22 μF/sq. cm. Stage (1) was observed in direct charging curves which now agree with the results of the electrocapillary calcns. and expts. with expanding Hg surfaces. The charging process took times of the order of 10^{-2} to 10^{-3} seconds; NH_4Cl and $(NH_4)_2SO_4$ were used. No appreciable differences were found in the behavior of (1) new surfaces and (2) old surfaces, at which H had been liberated and the overvoltage then allowed to decay. Hence there is no evidence that the deposition of adsorbed H occurs at any potential below that at which H_2 is continuously evolved. Victor R. Deitz

Relaxation effects in the double layer. Cataphoresis; dielectric constant. J. J. Hermans. *Trans. Faraday Soc.* **36**, 133–9(1940).—A survey, without the math. details, is given of the theory of double-layer distortion for charged spherical particles moving in an external elec. field. An attempt is made to state explicitly all assumptions that underlie the theory. The formula obtained for the cataphoretic velocity is given (cf. *C. A.* **33**, 1569[8]). The effect of the double-layer distortion on the dielec. const. of the systems considered may account for certain properties found experimentally. Victor R. Deitz

The Helmholtz. E. A. Guggenheim. *Trans. Faraday Soc.* **36**, 139–44(1940). It is suggested that a suitable unit of the moment of an elec. double layer is the "Helmholtz" defined as 1 Debye/Å^2. The p. d. across a double layer, ζ (v.) is equal to $D/12\pi \times \zeta$ (Helmholtz), where D is the dielec. const. The distinction between the moment τ of an elec. double layer and the p. d. ϕ across an elec. double layer is emphasized. Victor R. Deitz

Application of the Debye-Hückel theory to disperse systems. René Audubert. *Trans. Faraday Soc.* **36**, 144–53 (1940).—The Debye-Huckel theory, in its classical form, is applicable to dispersed systems when the ionic strength of the soln. is very small. In its limited form, nevertheless, it describes the processes by which the dispersed particle becomes charged and it permits an estn. of the surface electrochem. phenomena, as compared with selective adsorption and chem. reactions which may occur on the surface. As examples the mean radius of particles of a mastic resin, gamboge, As_2S_3 and $Fe(OH)_3$ are calcd. from the theory to be 0.8×10^{-6}, 0.67×10^{-6}, 1.43×10^{-6} and 0.65×10^{-6} cm., resp. The variation of the charge of mastic resin sols with the acidity of the liquid is calcd., as well as the surface dissocn. const. of the substance which, in certain cases, gives rise to the charge at the phase boundary. Victor R. Deitz

Electrokinetic equations and surface conductance. Survey of the diffuse double layer theory of colloidal solutions. J. J. Bikerman. *Trans. Faraday Soc.* **36**, 154–60(1940).—Theoretical. The new electrokinetic equations, which include corrections for the surface cond. of capillary and colloidal systems, give definite values for ζ, the electrokinetic potential, and account for many well-known observations such as the max. in ζ, the high dielec. const. of some sols, the charge on a colloidal particle, etc. The complete formula is $\zeta = (4\pi\eta l/DV)[(K(L-r)+2\chi)/K(L-r)]\mu$, where l is the distance between the electrodes, η the viscosity of the liquid, D the dielec. const., V the potential difference, K the specific cond. of the soln. far from the walls, χ the surface cond., r the radius of the cylindrical rod with half-spherical ends and of length L, and μ the velocity. Victor R. Deitz

Adsorption potentials. I. General theory. R. B. Dean, O. Gatty and E. K. Rideal. *Trans. Faraday Soc.* **36**, 161–6(1940).—Theoretical. Thin layers of insol. substances, permeable to at least one ionic species, cannot affect the elec. p. d. between 2 phases in equil., but affect diffusion potentials between the 2 phases only when they offer sufficient change in resistance to passage to at least one ionic species. The diffusion potential through a thin and permeable membrane is discussed in terms of the resistance to passage through it of different ions. **II. Oil-water potentials.** R. B. Dean. *Ibid* 166–73. Expts. on interfacial potentials between oils and water are described. The p. ds. were measured between a hanging drop of water and the surface of water in an overflow vessel submerged in an oil lighter than water such as ales., ethers and estes. Two egg albumin monolayers spread at these interfaces have a resistance of less than 1 ohm/cm. The spreading of a monolayer produces a temporary surge of potential which disappears with a time const. proportional to the cond. of the oil phase. The diffusion potentials of oil-water systems, though unaffected by monolayers, are considerable and were investigated as a function of the sepn. of 2 water drops in the oil with the results indicating a larger phase boundary potential and a smaller diffusion potential through the oil. For thinner layers of oil the diffusion potential gets smaller in accordance with the theory in part I and ultimately vanishes as the layer gets very thin. **III. Air-water potenials.** R. B. Dean and O. Gatty. *Ibid.* 173–9.—Ionized gas particles produced from 2 sources of Ra D plus Po are attracted to the interface between air and a monolayer on an aq. soln. Any hitting the surface condense and are discharged before returning to the gas phase. Hence no compensating double layer is built up in the gas phase to compensate for the field set up by an oriented layer of dipoles. Partial compensation of the p. d. due to the dipole field takes place in the aq. phase when the potential is measured through air ionized by a radioactive source; this also occurs when the interface is completely polarizable because the air has practically no ions in it. Victor R. Deitz

Influence of particle size on the physical behavior of colloidal systems. H. C. Hamaker. *Trans. Faraday Soc.* **36**, 186–92(1940). The manner in which the following types of forces vary with particle size is discussed (1) mutual forces between the particles; (2) force of gravity and centrifugal forces; (3) force exerted by an elec. field; (4) forces due to friction or inertia. It is suggested that moderate centrifuging will produce a concd. sol near the bottom of the vessel which by its greater d. will behave as a sep. fluid, but which is readily redispersed by shaking. At greater centrifugal speeds, this concd. sol gradually passes over into a solid deposit. If left alone after centrifuging, diffusion back into the original homogeneous state will occur, providing sintering does not occur. Victor R. Deitz

Electrical double layer and stability of emulsions. E. J. W. Verwey. *Trans. Faraday Soc.* **36**, 192–203(1940); cf. *C. A.* **34**, 1223[7].—The requirements for "stability" of an emulsion toward coagulation or sticking together of the liquid drops is investigated and the role of the emulsifier considered. The latter has the action of restoring some of the conditions existing in a double layer at the interface of a solid and a liquid. The initial ζ-potential for primary stability may be limited by 3 factors: (1) the concn. of a potential-detg. electrolyte cannot be altered in one phase only; (2) the double layer has 2 diffuse layers and the potential is divided into 2 parts on either side of

the interface; (3) development of the double layer is restricted by the dimensions of the liquid phases. Victor R. Deitz 1

Repulsive forces between charged colloid particles and the theory of slow coagulation and stability of lyophobe sols. B. V. Deryagin. *Trans. Faraday Soc.* **36**, 203–15 (1940).—Both electrostatic repulsive forces and those of a different origin, which are also observed in absence of electrolytes, are considered in deriving expressions for the force, energy and the free energy of charged spherical conductors in electrolytes and also for the velocity of slow coagulation and stability of lyophobe sols and suspensions as functions of their ζ-potential. Measurement of the forces of repulsion (pressure) exerted by thin polymol. liquid films show that the pressure decreases to zero only when the thickness is of the order of 0.2–0.3 μ. For glass and other hydrophile surfaces great deviations exist with theory based on the equation of Debye-Hückel at av. and high concns. The pressure of thin layers depends to a great extent upon the concn. of dissolved mols., among them nonelectrolytes. Victor R. Deitz 2

Stability properties in hydrophobic sols; application of the mutual energy of two particles. S. Levine and G. P. Dube. *Trans. Faraday Soc.* **36**, 215–29(1940).—Theoretical. No particular upper range of values is assigned to the particle size in stable sols. Other subjects discussed are stepwise coagulation and peptization, and coagulation at high concns. of electrolytes with corresponding high crit. ζ potential. The method of detg. ζ as a function of the particle radius, electrolyte concn. and van der Waal's energy of attraction is illustrated with known data on the AgI sol. Victor R. Deitz 3

Significance of the phenomenon of the electrical charge on the stability of hydrophobic dispersions. H. Eilers and J. Korff. *Trans. Faraday Soc.* **36**, 229–41(1940).—A criticism is made of the data on which the relation between the ζ potential and the stability of lyophobic colloidal systems is based. The proper factor which dominates the stability is the energy required to bring together 2 particles of the dispersion against the action of their elec. field. The following formula is derived from a dimensional analysis and applied to the data on the stability of oil-in-water emulsions collected by Limburg (*C. A.* **21**, 684, 1391) and Powis (*C. A.* **9**, 737; **10**, 2825). The factors, ζ, the electrokinetic potential, the concn. (c) and the valency (z) of the ions present in the water phase are contained in the formula: $A = C\zeta^2/K$, where A is the elec. repulsion energy and $K = 10^{7.864}\sqrt{\Sigma(cz)^2}$. Victor R. Deitz

Electrical double layer in relation to the stabilization of emulsions with electrolytes. D. F. Cheesman and A. King. *Trans. Faraday Soc.* **36**, 241–7(1940); cf. *C. A.* **32**, 6924[2].—Systematic search has shown that 19 electrolytes are capable of stabilizing emulsions of water in polar org. liquids or vice versa; 13 electrolytes yield no emulsion. The stabilizing effect of electrolytes is evident over a limited optimum concn. range. The sequence in order of decreasing stability imparted to an emulsion of water in amyl alc. for K salts is: CNS, I, NO_3, Br, ClO_3, SO_4; similarly for cations of different chlorides: Sr, Cu, K, Li. Globules of water-in-oil emulsions with electrolytes are positively charged; those of opposite type are negatively charged. Victor R. Deitz 8

Electrochemistry of platinum sols. IV. The particle charge of hydrogen-platinum sols. A. V. Zimin and N. A. Bakh. *Acta Physicochim. U. R. S. S.* **11**, 1–20 (1939) (in English).—Exptl. data on the cond. and its change on coagulation and the properties of various H_2-Pt sols are given in 15 figs. and tables. The sols are acidoid, the av. radius of particles is 2–2.5 $\mu\mu$, the total charge is 1.73×10^9 e. s. u. for 100 mg. per l., the charge d. 3.1×10^4 e. s. u./sq. cm.; cond. is due to the individual sol particles, the cataphoretic velocity is 3.4 μ/sec. per v./cm. at the min. in the $Ba(OH)_2$ curve and 6.7 μ in the NaOH min., 5.0 μ in pure sols independent of their concn. The values of r calcd. from ultramicroscopic counts (= 14.7 $\mu\mu$) is much too large. Complete replacement of H^+ by Na^+ takes place at pH = 8.8. F. H. Rathmann 9

Changes brought about in colloids by dialysis. B. N. Desai and P. M. Barve. *Trans. Natl. Inst. Sci. India* **2**, No. 2, 39–68(1939).—A review. Cf. *C. A.* **28**, 2244[1,3]; **31**, 1274[7], 2063[9]; **33**, 6680[3,5]. Donald C. Bond

Ultrafiltration. IV. M. Amat and J. Duclaux. *J. chim. phys.* **36**, 256–62(1939); cf. *C. A.* **33**, 3655[6].—With carborundum filters colloidal particles can be sepd. and the diam. of the particles and amt. of each size can be estd. The diams. are detd. by the grain size of the carborundum used for the filters. Suspensions of As sulfide, $Fe(OH)_3$, Au, Cu ferrocyanide, Cu cobalticyanide and Prussian blue were studied. Biol. colloids, such as gelatin, milk, gums and soaps, were found to be heterogeneous in size. L. P. Hall

pH change in gold-sol formation. C. L. Throckmartin and C. H. Sorum. *J. Phys. Chem.* **44**, 247–55(1940).—The Au sols were prepd. by the reduction, with HCHO, of a soln. of $AuCl_3$ made alk. with K_2CO_3, and a small amt. of resorcinol was added to aid in the formation of nuclei. The temp. and the concns. of the K_2CO_3, HCHO and resorcinol were varied. The changes in pH during the formation of the gold sols were measured with a glass electrode, and typical pH-time curves (consisting of 4 parts) were obtained. The exptl. results appear to verify the fact that the reduction of $KAuO_2$ by HCHO is an autocatalytic reaction. S. I. Aronovsky

Preparation of rhenium in a colloidal state and its catalytic properties. C. Zenghelis and Catherina Stathis. *Kolloid-Z.* **90**, 129–31(1940).—See *C. A.* **33**, 8081[2]. J. E. D.

Electrochemical properties of stearic acid hydrosol. I. S. Mukherjee and N. P. Datta. *J. Indian Chem. Soc.* **16**, 563–72(1939).—Reproducible pH values for stearic acid hydrosols were secured with the H electrode by weak platinization and washing with cond. water in a current of H. Titration curves obtained with $Ba(OH)_2$ and $Ca(OH)_2$ show a well-defined inflection at pH 6.5–7.0. With NaOH, there is a weak inflection at pH 9.0–9.5, resembling a weak acid-strong base curve. With NH_4OH the curve rises steeply, flattens after pH 9.0, and the particles dissolve. The total acidity calcd. from the inflection points agrees with the stoichiometric concn. of acid. The max. buffer index calcd. from the NaOH curve corresponds to more alkali than half-neutralization. The strong buffering at pH 6.5–7.0 in the $Ba(OH)_2$ curves is explained on the basis of a two-phase system with a double solid phase of the Ba or Ca salt and the solid acid. In the presence of neutral salts the titratable acidity corresponds to the stoichiometric concn. of the sol. Ultrafiltrates with and without salt mixts. show little or no total acidity. II. N. P. Datta. *Ibid.* 573–82.—The dissocn. const. of stearic acid is calcd. from soly. and cond. data of the hydrosol. The soly. of stearic acid at 35° and 50° is 1.17×10^{-5} N and 5.77×10^{-5} N, resp. K values are 1.7×10^{-6} at 35° and 2.6×10^{-6} at 50°. Addn. of $BaCl_2$ or $CaCl_2$ rapidly reduces the pH of the sol to a const. level at pH ~ 4.0; KCl causes a slower and smaller decrease near pH 5.2. The ion-product ratio for salt/acid reaches a const. level for Ba and Ca, indicating formation of solid stearates. For KCl this ratio varies continuously with the salt concn. and indicates no solid phase. The soly. of Ba and Ca stearates is 9.02×10^{-6} N and 6.15×10^{-6} N, resp., at 35°, and 2.21×10^{-5} N and 2.33×10^{-5} N, resp., at 50°. Addn. of AcONa to stearic acid sol increases the pH continuously to pH 7.0. With Ba and Ca acetates, there is a low max. followed by a much slower rise to pH 7.0 owing to the formation of AcOH, accompanied by buffer action of added salt. The pH of stearic acid hydrosol is lower at 50° than at 35°, owing to an increase of acid in soln. S. R. Korman

Electrochemical properties of colloidal silicic acid. I. Interaction with bases. B. Chatterjee. *J. Indian Chem. Soc.* **16**, 589–606(1939).—Potentiometric titration of silicic acid sols with $Ca(OH)_2$, $Ba(OH)_2$ and NaOH reveals an initial inflection in the curves at pH values ranging from 4.5 to 5.5, resp. There is no other inflection below 11.0–11.7, obtained with concd. NaOH. This order conforms to the relative insolubilities of the corre-

sponding silicates. The total acidity of the sols ranged from 3.8 to 14.5 × 10^{-5}, with SiO_2 concns. of 0.026 to 0.33 g. mols per l. The total acidity of the ultrafiltrates went from 0.75 to 1.2 × 10^{-5}. Silicic acid sols possess an intrinsic acid character independent of the presence of dissolved acids, and the acidity is attributed to no acid other than silicic acid in soln. The total acidity at the second inflection corresponds to the silica concn. The value of the ratio $Na_2O:SiO_2$ is 1 2, and the compn. corresponds to half-neutralization, or $NaHSiO_3$. The inflection points lie at pH slightly lower than those of acids in soln. As the range of SiO_2 concn. decreases, the pK values drop from 11.0 to 10.41. The max. buffer capacity varies from 0.54 to 0.035, although the corresponding theoretical value in a true soln. would be 0.20 to 0.015. The colloidal particles are deemed to act as a reservoir for generating fresh acid. II. **Interaction with neutral salts.** *Ibid.* 607-15.—Progressive addn. of $BaCl_2$ or $CaCl_2$ to silicic acid sols lowers the pH, at first rapidly and then slowly, from pH 3.8-4.0 to values between 3.2-3.4. Although Ca silicate is less sol. than Ba silicate, the lowering of pH is greater when the Ba salt is used. This is accounted for by the greater energy of elec. adsorption of Ba ions with larger displacement of H ions in the double layer assocd. with the colloidal silicic acid particles. The total acid liberated by exhaustive leaching of silicic acid sols with neutral salt solns. follows the sequence Ba > Ca > Na > Li. If the acetates are substituted for the chlorides the differences are more pronounced. The reaction is represented as a displacement of "mobile" and "bound" H ions. The relative cation mobilities and energies of adsorption det. the efficiency of total displacement. The action of univalent cations is limited almost exclusively to the displacement of "mobile" H ions in the double layer. This is demonstrated by the observation that the total acidity of the sol + salt ultrafiltrates is the same as that of the sol, whereas the pH of the sol + salt mixt. is about equal to that of the sol alone. S. R. Korman

Electrical conductivity of deformed sand. A. I. Aref'ev. *J. Tech. Phys.* (U. S. S. R.) 9, 1662-7(1939).—The resistance of sand kept between bright metal electrodes increases when it is continuously stirred. J. J. B.

The specific-volume factor in ultracentrifuge analysis. E. O. Kraemer. *J. Franklin Inst.* 229, 393-7(1940).—A brief math. treatment of the effect of combination between a macromol. material and other components of the soln. on the detn. of the mol. wt. of the macromol. by means of the ultracentrifuge. Equations for the estn. of the error due to combination or to solvation are given; it is shown, however, that solvation leads to no appreciable error in mol. wts. of proteins for the types of solns. normally used in the Upsala labs. The modification of the frictional resistance of a mol. by solvation is also discussed, and it is pointed out that from ultracentrifugal data alone it is impossible to distinguish between solvation and nonsphericity of the particle as the cause for frictional ratios greater than 1. Edward B. Sanigar

Sedimentation investigation of coarsely disperse systems. Influence of the concentration of the disperse phase on the distribution function of the particles in aqueous suspensions of barium sulfate in the presence of electrolytes. N. A. Figurovskiĭ and V. N. Rozanova. *Acta Physicochim. U. R. S. S.* 11, 361-78(1939)(in German).—The size distribution of aq. 0.05-3.0% $BaSO_4$ suspensions as a function of concn. was dtd. by means of a glass sedimentation balance. For suspensions free of all other ions, a 0.05 to 2% increase in the coarse fraction was noted in concd. suspensions, ascribed to self-coagulation. Foreign ions, such as Na^+, Cl^-, H^+, SO_4^{--}, OH^-, greatly accelerate coagulation in the more concd. suspensions. For low ratios of electrolyte to suspended phase, the effect of the former is reduced owing to its adsorption. F. H. Rathmann

Sedimentation and diffusion measurements on pectic substances. Sigurd Saverborn. *Kolloid-Z.* 90, 41-50 (1940).—An attempt was made to characterize various pectic materials by measuring the sedimentation velocity in the ultracentrifuge, as well as by diffusion and viscosity measurements. Free, extd., hydrolyzed and nitrated pectins from apples, currants and citrus fruits were used in these expts. The prepn. of the various pectins is described. The data indicate definite differences between the free pectic substances (obtained directly from the expressed juice) and those obtained by acid or neutral extn. at higher temps. Sedimentation velocity measurements showed that the free pectic materials were not uniform in mol. size. A 2-hr. hydrolysis with 0.05 *N* H_2SO_4 tended to bring these pectin mols. to a more uniform size. Nitration of the pectic substances resulted in nitropectin products similar to nitrocellulose, giving sedimentation consts. of the same order as those obtained with some nitrocelluloses in the identical solvents. S. I. A.

Elasticity of organo-gels in relation to hysteresis in sorption. Kittur Subba Rao. *Current Sci.* 9, 19-21 (1940).—The prepn. of Ca arabate is described. This material was taken through 4 cycles of sorption and desorption of water. On a weight-of-water *vs.* pressure diagram, a hysteresis occurs, which decreases and eventually disappears on the fourth cycle. The cavities in the Ca arabate have rigid walls which "trap" and retain water during desorption. With repeated cycles the gum swells and the walls of the cavities become more elastic. After sufficient use they no longer "trap" water, and the hysteresis effect disappears. Some of the cavities have necks of mol. dimensions. Similar results were obtained with rice and with the grain of *Cajanus indicus*. When the cycle is carried out with rice, with CCl_4, the hysteresis loop is permanent, as there is no swelling, and the porous gel retains its rigidity indefinitely. G. M. Petty

Structure of gelatin sols and gels. VI. Adsorption of water vapor and the electrical conductivity. S. E. Sheppard, R. C. Houck and C. Dittmar. *J. Phys Chem.* 44, 185-207(1940); cf. *C. A.* 27, 2031.—The sorption of water vapor by dry gelatin and its elec. cond. were detd. at various degrees of relative humidity. Two types of gelatin were used, i. e., ash-free, "lime-processed" calfskin gelatin (isoelec. point at pH 4.8) and ash-free "acid-processed" pigskin gelatin (isoelec. point at pH 8.2). The samples were used in the form of skins or films obtained by coating cellulose nitrate surfaces with the gelatin soln. and then stripping off the gelatin skins. The pH and concn. of the gelatin sol, the thickness of the gelatin layer, and conditions of drying the layer were varied. Little difference in adsorption was observed until the vapor pressure approached satn., when the lime-processed material showed greater adsorption. The sorption isotherms are curves of double flexure, resembling those obtained with cotton, cellulose wool, silk and other fibrous materials. The moisture regain decreases with the pH of the gelatin sol (at coating), but no min. was found at the isoelec. point. The elec. cond. increases with the moisture content, and the logarithm of the cond. is a linear function of the moisture content. The elec. cond. shows a decided min. at the isoelec. point. The results are discussed in connection with x-ray studies of the structure of gelatin. The sorption of water vapor appears to be largely conditioned by the fine structure of the xerogel, but this again is conditioned by chem. interactions of the protein mols. S. I. Aronovsky

The colloidal chemical properties of thermolyzed gelatin and the potentiometric titration of the products of its acid decomposition. M. A. Khenokh. *J. Gen. Chem.* (U. S. S. R.) 9, 1479-88(1939).—Treatment of 1% gelatin soln. in an autoclave at 120° for 20 hrs. decompd. the gelatin to high-mol. compds. (polypetides) which resemble in their reactions the initial gelatin. A decrease in viscosity of gelatin solns. was especially pronounced after thermolysis of 5 and 10% gelatin solns.; this is attributed to the destruction of the structural viscosity of gelatin. The hydrolysis of gelatin to polypeptides had no effect on the change in viscosity of the soln. The chem. solvation of gelatin increased in the thermolysis, which was accompanied by a partial destruction of the polypeptide linkage. The potentiometric titration of the products of thermolyzed (at 150°) gelatin soln. in 2% HCl or 2% H_2SO_4 disclosed

the formation of cyclic compds. In this case the potentiometric titration curves were practically the same for 1 and 3 hrs.' treatment. The hydrolysis of gelatin at 180° for 1 hr. completely destroyed the peptide linkage, whereas that at 150° even for 3 hrs. did not destroy the biuret complex. An increase in the protective action of thermolyzed gelatin soln. pointed to the preservation of colloidal properties of gelatin even after 20 hrs. of autoclaving at 120°. A. A. Podgorny 1

Solvatation of proteins in aqueous solutions of weak acids and bases. I. Interaction of casein with aqueous solutions of acetic, lactic and citric acids. V. A. Vilenskiĭ and A. Ya. Korolev. *Colloid J.* (U. S. S. R.) **5**, 843-9; *Compt. rend. acad. sci. U. R. S. S.* **24**, 52-5 (in German) (1939); cf. *C. A.* **30**, 7420⁷.—Casein sols sepd. from an acid soln. by a collodion membrane contain in the equil. state more acid than the Donnan theory requires. Presumably undissocd. acids are adsorbed by casein. The amt. expected by the theory was calcd. assuming that the activity coeffs. of H ion in casein soln. and in acid soln. were equal. J. J. Bikerman 2

Solubility of sulfur dioxide in water. W. L. Beuschlein and Louis O. Simenson. *J. Am. Chem. Soc.* **62**, 610-12 (1940).—Data are given for densities of SO_2 solns. and partial vapor pressure of the system SO_2-H_2O over the temp. range 20-110° and total pressure range of 10 to 150 cm. of Hg for concns. of 0.51, 1.09, 4.36 and 7.45 g. of SO_2 in 100 g. of H_2O. A. B. Garrett 3

Solubility of alkali sulfates and carbonates in ammonia-water mixtures. A. Guyer, A. Bieler and E. v. Orelli. *Helv. Chim. Acta* **23**, 28-33 (1940).—The solubilities at −30, −10, 0 and about 23° in aq. solns. varying from 0 to 100% NH_3 were detd. for Na, K and NH_4 sulfates and carbonates. The curves are given. W. E. Vaughan 4

Mutual solubility of aluminum, sodium, potassium and iron nitrates in water in the presence of nitric acid. III. A. I. Zaslavskiĭ and Ya. A. Ravdin. *J. Gen. Chem.* (U. S. S. R.) **9**, 1473-8 (1939); cf. *C. A.* **30**, 1644⁴.—The soly. isotherms of the system $Al(NO_3)_3$-$Fe(NO_3)_3$-H_2O at 0°, 20° and 40° were studied. The true equil. between the solid and liquid phases was effected by soln. of the salts at higher temps. and crystn., with vigorous stirring, at the given temps. The compn. of the solid phase was studied by Schreinemakers' method and by detn. of ds., *n* and m ps. of the mixed crystals. The tabulated and plotted results show the formation of continuous series of mixed crystals of $Al(NO_3)_3.9H_2O$ and $Fe(NO_3)_3.9H_2O$ with unlimited soly. at all the temps. investigated. Chas. Blanc 5

The vapor pressures of saturated salt solutions. O. W. Rees and G. W. Land. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 119 (1939).—Vapor pressures were detd. for the following satd. solns., with a Rayleigh or "rocker arm" type of manometer: $KClO_3$, K_2SO_4, $BaCl_2$, KCl, NaCl, NH_4NO_3, $Ca(NO_3)_2$, $KC_2H_3O_2$ and LiCl. The values obtained agree well with the values usually accepted in the literature. J. H. Reedy 6

Generalized theory of diffusion. I, II. E. J. Hellund. *Phys. Rev.* **57**, 319-28, 328-33 (1940).—Math. G. M. E. 7

The conductance of some salts in chlorobenzene at 25°. Robert L. McIntosh, Darwin J. Mead and Raymond M. Fuoss. *J. Am. Chem. Soc.* **62**, 506-8 (1940).—The conductances of tributylammonium picrate, tetrabutylammonium picrate and tetrabutylammonium bromide were detd. in chlorobenzene at 25°. From these data the values of the ion size, *a*, and the consts. for the ion pair and triple ion equilibria are evaluated. Specific interaction can appear between solvent and solute even in strong electrolytes, and forces other than coulomb interaction between ions must be considered in a general quant. description of electrolytic behavior. A. B. G. 8

The specific electric conductivity of the binary and the ternary systems containing the chlorides and the sulfates of sodium and magnesium. V. I. Nikolaev and I. S. Katyk. *J. Gen. Chem.* (U. S. S. R.) **9**, 1611-18 (1939).—The sp. elec. conductivities at 25° in the regions of unsatd. aq. solns. (up to the satn. state) were investigated in the binary and ternary systems contg. Na and Mg chlorides and sulfates. The results of the investigations are compared with the data of the heat capacities of the same systems at 25° as given in the literature. The max. on the isotherms of the sp. elec. conductivities in the binary systems correspond in their compns. to the transition points or to the min. of the heat capacities. In the ternary systems NaCl + $MgCl_2$ + H_2O (25°) and $MgSO_4$ + $MgCl_2$ + H_2O (25°) "special points" were observed which divided the isotherms-isoconcentrates of the sp. elec. conductivities (and heat capacities) into two distinct branches. Transition points were observed on the polytherms of the elec. conductivities of the isoconcentrates of Na_2SO_4. Theoretical considerations and exptl. data showed an analogy between the structure and the properties of the solid and the liquid (aq.) solns. The "liquid hydrates" correspond to the solid chem. compds. The observed "special points" correspond to the transformation of one type of the water-salt complexes into complexes of another kind. They are points of coexistence of different types of complexes. Ten diagrams, 3 tables and 3 references are given. W. R. Henn 9

Determination of the specific electric conductivities of very dilute solutions of some electrolytes. B. P. Tatarinov and M. V. Levitskiĭ. *J. Gen. Chem.* (U. S. S. R.) **9**, 1619-21 (1939).—The little known sp. elec. conductivities of the solns. of Na_2CO_3, NaCl, $CaCl_2$, Na_2SO_4 and $MgSO_4$ in concns. of 0.001-0.000067 *N* were detd. The results are given in 6 curves of diln. *vs.* sp. elec. cond. A Wheatstone bridge was used for the measurements. All measurements were made in a thermostat at 25°. The solns. of the salts investigated were not freed from the aggressive gases to avoid any complications arising during the expts. A correction was made for the elec. cond. of water by additional detns. of the elec. cond. of the bidistillate and of a part of the investigated solns. The accuracy of the measurements was checked by available calcd. values, which gave the same results. W. R. Henn 10

The determination of mobilities and dissociation constants by means of conductivity titrations. Joan P. Philpot, Edwin C. Rhodes and Cecil W. Davies. *J. Chem. Soc.* **1940**, 84-7.—The methods are not suited to work of highest accuracy but are rapid and useful where only small quantities of material are available. Titrations of propylamine, of ethylenediamine, of *p*-chloroaniline-HCl and of *m*-chloroaniline-HCl are reported and discussed. The general effect of a substituent amino group is to increase, and not to decrease, the acidic properties of a mol., although at the same time it provides a new center of basic properties. H. C. Thomas 11

The extent of dissociation of salts in water. IX. Calcium and barium salts of dicarboxylic acids. Norman E. Topp and Cecil W. Davies. *J. Chem. Soc.* **1940**, 87-93; cf. *C. A.* **33**, 3236⁷.—By means of cond. titrations the dissocn. consts. of the Ca and Ba salts of succinic (K = 0.010 and 0.027, resp.), adipic (0.0064, 0.014), fumaric (0.010, 0.026), maleic (0.0037, 0.0055), malic (0.0022, 0.0064), tartaric (0.0016, 0.0029), *o*-phthalic (0.0037, 0.0047), and isophthalic (0.010, 0.028) acids were detd. A wide diversity of behavior is shown. The Ba salts are all stronger than the corresponding Ca salts. If the salts of the above cations are arranged in order of decreasing dissocn. const. the disposition of the anions is not the same in the 2 series; this shows that the order is not governed solely by the diam. of the anion. The ratio of the mobility of the intermediate ion HA^- to that of the bivalent ion A^{--} is high for all those acids with weak Ca and Ba salts. H. C. Thomas 12

Degeneracy and dissociation constants. H. O. Jenkins. *Nature* **145**, 149-50 (1940).—Linear relations exist between the complexity of degeneracy, defined in terms of the no. of possible resonating structures, and the dissocn. consts. of series of related acids and bases. G. M. Petty 13

The anomalous strength of butyric acid. H. O. Jenkins and J. F. J. Dippy. *J. Am. Chem. Soc.* **62**, 483-4 (1940).—The abnormality in the magnitude of the dissocn. const. of butyric acid as compared with the dissocn. consts. of formic, acetic and propionic acids is attributed to a

restricting potential in the mol.; this agrees with conclusions reached in studies of infrared absorption, Raman spectra, heat capacity and dipole moment. This interpretation has resulted from the discovery of a linear relation between the logarithms of the dissocn. consts. of formic, acetic and propionic acids and the inverse of the sixth power or γ, the distance sepg. the carbon of the carboxyl and the terminal group of the acid. This relation predicts a limiting value for the dissocn. consts. of the higher acids. The slope of the line agrees well with a theoretical expression. A. B. Garrett

The temperature dependence of the dissociation constant of deuterioacetic acid. Frank Brescia, Victor K. La Mer and Frederick C. Nachod. *J. Am. Chem. Soc.* **62**, 614–17(1940).—The equiv. conds. of NaCl, NaOAc, HCl and HOAc were measured at 14.36°, 25°, 35° and 44.86° in a solvent whose deuterium fraction was 0.925. From these data the dissocn. const. of DOAc at $F_D = 1$ is calcd. at corresponding temps. The dissocn. const. of DOAc follows the Harned-Embree equation (cf. *C. A.* **28**, 6611[6]) and passes through a max at 31°; that of HOAc passes through a max. at 22°. The ratio K_H/K_D decreases with increasing temp. The differences in the heats, free energies and entropies of ionization of the deutero and proto acids were calcd. The value of ΔC_p for the exchange process $HOAc(H_2O) + D^+(D_2O) + OAc^-(D_2O) = DOAc(D_2O) + H^+(H_2O) + OAc^-(H_2O)$ is sensibly zero; the value of ΔS is sensibly const. and equal to -1.3 cal. deg.$^{-1}$ mol^{-1}. The almost zero value of ΔC_p in these exchange processes results from the fact that ions of the same valence type and almost identical chem. properties are involved in these equilibria. A. B. Garrett

Electrostatic effects on ionization constants. Victor K. LaMer and Frank Brescia. *J. Am. Chem. Soc.* **62**, 617–20 (1940).—Data on the dissocn. consts. of deuterioacetic acid (cf. preceding abstr.), together with data by Harned (cf. *C. A.* **31**, 6536[1]) on protoacetic acid serve as good tests for the equation $\Delta H_I = \Delta H_I + c(1/D_T)[1 + T(\partial \ln D/\partial T)]$, derived by Baughan (cf. *C. A.* **33**, 9096[2]) for the heat of ionization, ΔH_I, of a weak acid of the elec. charge type $HA + H_2O = H_3O^+ + A^-$ as a function of the temp., T. The data indicate that this equation represents the value of ΔH with high precision when $\Delta H_I = 2260$ cal. and $c = 4.410 \times 10^5$ for deuterioacetic acid. The values of protoacetic acid are 2030 cal. and 4.714×10^5, corresponding to γ values of 0.75 and 0.70 A., resp. The difference in the heats of ionization of deuterio- and protoacetic acids appears to be a function only of the characteristic temp., θ, at which the max. value of the dissocn. consts. occurs. The empirical const. $p = 4.5 \times 10^{-5}$ in the Harned-Embree equation (cf. *C. A.* **28**, 6611[6]) is shown on theoretical grounds to be equal to $p = (\epsilon^2/2.3RT D^3)(\partial D/\partial T)^2(1/2\theta)$. A. B. Garrett

The electrolytic dissociation of dicarboxylic acids in water and in aqueous solutions of alkali chlorides. Birger Adell. *Z. physik. Chem.* **A185**, 161–206(1939).—The following acids were studied electrometrically in solns. of NaCl and KCl of ionic strengths (μ) up to 3.0: $COOH(CH_2)_nCOOH$ ($n = 1, 2 \ldots 7$), COOHCH=CHCOOH (*cis* and *trans*), $COOH(CH_2)_nS(CH_2)_nCOOH$ ($n = 1, 2, 3$), $COOHCH_2S(CH_2)_nSCH_2COOH$ ($n = 0, 1, 2 \ldots 5$). The primary and secondary dissocn. consts. (expressed in the logarithmic form as pK'_c and pK''_c) were evaluated and by extrapolation to $\mu = 0$, the corresponding thermodynamic dissocn. consts. (pK'_a, pK''_a) were found. For the normal paraffin dicarboxylic acids and for the polymethylenebisthioglycolic acids the equation of Greenstein (*C. A.* **30**, 5859[2]) gives the variation of pK'_a with the distance between the carboxyl groups. $pK''_a - pK'_a$ expresses (Ingold, *C. A.* **25**, 5824) the distance, r_I, between the charges on the bivalent anion; r_I decreases with increase in the no. of S atoms and this decrease is greater the larger the no. of terms between the carboxyl groups. For the normal paraffin acids the values of r_I are compatible with the assumption of a rigid zigzag chain model of the mol.; this is not true, however, for the S-contg. acids. If the Cl-ion concn. is increased, the quantity $p\phi' = pK'_a - pK'_c$ goes through a max. at $\mu = 0.5$ and then decreases; for $p\phi''$ the max. is at $\mu = 1.0$. For a given medium $p\phi''$ is always appreciably larger than $p\phi'$; both are larger in NaCl soln. than in a KCl soln. of the same value of μ. Differences in the values of $p\phi'$ and of $p\phi''$ for different solns. are described and correlated with differences in the structures of the acids. Calcns. of the activity function pf_A/f_{H_2A} in NaCl solns. by the method of Scatchard and Kirkwood (*C. A.* **26**, 3716) give values in good agreement with expt. For KCl solns. the agreement is poor; the NaCl and KCl values differ by a const. amt. which is independent of the nature of the acid. T. H. Dunkelberger

Probable solvation of aniline hydrochloride, aniline hydriodide and α-naphthylamine hydriodide in aniline solution—simple mathematical treatment. Herbert H. Hodgson and Ewart Marsden. *J. Soc. Chem. Ind.* **59**, 23–4(1940).—Equations are offered expressing the relation between the components of soln. where an aniline soln. of aniline-HCl, aniline-HI or α-naphthylamine-HI is used. They are based on the assumption that only part of the solute is ionizable and the remainder forms a solvated complex with the aniline and that the ionizable part obeys Kohlrausch's law. From data calcd. for aniline and α-naphthylamine-HI it is deduced that only about 10% of the α-naphthylamine-HI does not form a solvated complex. Ionization is about 1% at a concn. of 300×10^{-4} g. mols. and 1.8% at a concn. of 100.8×10^{-4} g. mols. R. F. Deese

Activity coefficient of strong electrolytes in concentrated solutions. II. S. Abe. *Bull. Inst. Phys. Chem. Research* (Tokyo) **18**, 260–74(1939); cf. *C. A.* **32**, 3239[9].—Activity coeffs. calcd. according to a previously published theory are compared with exptl. results in the cases of NaCl, HCl, $ZnSO_4$ and $CaCl_2$. B. C. P. A.

Thermodynamics of concentrated aqueous solutions of sodium hydroxide. Gösta Åkerlof and Gerson Kegeles. *J. Am. Chem. Soc.* **62**, 620–40(1940).—The thermodynamic data were obtained from e. m. f. measurements of the cell: Pt, H_2|NaOH (m_1)|Na_xHg|NaOH (m_2)H_2, Pt over a temp. range 0 to 70° and concn. range 0.1 to 17 molal. Tables are given of corrected e. m. f. data least squared with respect to temp., water-transfer potentials, consts. for the calcns. of activity coeffs. of NaOH, calcd. values for the activity coeffs. of NaOH, calcd. values for the activity and the vapor pressure of the solvent in aq. solns. of NaOH, relative partial molal free energy, relative partial molal heat content, relative partial molal entropy, and relative partial molal heat capacity for both solute and solvent in aq. solns. of NaOH, total heat capacity, sp. heat, and total relative heat content of aq. solns. of NaOH at 20°, and the differential heat of vaporization of the solvent from aq. solns. of NaOH. The activity coeff. of the hydroxide for the concn. range 0.1 to 12 molal was found to be expressed adequately by the equation $\log \gamma = \frac{-u\sqrt{m}}{(1+\sqrt{2m})} + Bm + Cm^2 + Dm^3 + Em^4$ where u is the universal const. of the limiting law, m the molality of the hydroxide, B, C, D and E are empirical consts. varying according to second-order equations with the temp. At higher concns., a second-order equation was used for the calcn. of $\log \gamma$. The effect of pressure upon the thermodynamic properties of NaOH is discussed. A. B. Garrett

Definitions of the conceptions of "acid" and "base." A. I. Shatenshtein. *J. Gen. Chem.* (U. S. S. R.) **9**, 1603–10(1939); cf. *C. A.* **33**, 7664[3].—A discussion based on the literature. Forty references. Chas. Blanc

The G. N. Lewis theory of acids and bases. W. F. Luder. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 111–18(1940).—Lewis' theory relates acids and bases to each other in a more logical and much more fundamental way than have other theories and provides a completely general and exact definition, which attributes the distinctive properties of acids and bases to the mols. themselves, independently of the solvent. The H ion-OH ion-water theory, the Brönsted-Lowry theory and the Franklin-Germann theory are merely limited aspects of Lewis'

theory. The general adoption of Lewis' theory should lead to a correlation of a large no. of hitherto unrelated chem. phenomena. Leopold Scheflan

Measurement of pH by means of the glass electrode and the hydrolysis of copper sulfate. H. Hagisawa. *Bull. Inst. Phys. Chem. Research* (Tokyo) **18**, 275–84(1939).—A standard buffer soln. and a given soln. are placed resp. in the inner and outer parts of the glass bulb, and then reversed; thus the asymmetric potential of the glass electrode is eliminated. The relation between pH and diln. (V) of the $CuSO_4$ is given by pH = 3.5200 + 0.6717 log V. B. C. P. A.

A pH experiment for the first course in chemistry. G. W. Thiessen. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 131–2(1939).—Simple salts (cations = Na^+, K^+; anions = SO_4^{--}, HSO_4^-, SO_3^{--}, HSO_3^-, PO_4^{---}, HPO_4^{--}, $H_2PO_4^-$, CO_3^{--} and HCO_3^-) were analyzed as follows: The cations were identified by flame tests, hydrates by ignition tests and the anions by the usual reactions with $BaCl_2$, $CdCl_2$, $AgNO_3$ and acidified $KMnO_4$. Acid salts were distinguished from normal salts by pH measurements. Calcns. of pH, ionization consts. and hydrolytic consts. were found too difficult for first-year students, and a table of pH values of molar solns. was used to distinguish between primary, secondary and tertiary anions. J. H. Reedy

The pH of sodium dichromate solutions. H. J. Kaufmann, W. B. Lauder and R. K. Kepner. *Ind. Eng. Chem.* **32**, 423–6(1940).—The pH of $Na_2Cr_2O_7$ solns. varied widely as the solns. were dild. from about 4.5 0.05 mol. per l. The curves so obtained were but little affected by the distd. H_2O used, but were affected more by the container in which the solns. were prepd. and tested. Small temp. changes had a negligible effect. Concg., rather than dilg., the solns. had no effect in the weaker ranges, but gave more acidic values in the stronger. Additns. of Na_2SO_4 and NaCl, normal impurities of $Na_2Cr_2O_7$, had but little effect on the pH of the solns. E. M. Symmes

Definition of oxidation and reduction phenomena. H. G. Bos. *Chem. Weekblad* **37**, 567(1940); cf. *C. A.* **34**, 2954. H. S. v. Klooster

Passivity of iron and steel in nitric acid solution. XXVI. Y. Yamamoto. *Bull. Inst. Phys. Chem. Research* (Tokyo) **18**, 162–70(1939); cf. *C. A.* **33**, 9098[2].—The extent of attack of Fe and steel in the passive state by HNO_3 increases with concn., being very rapid when the concn. of HNO_3 is greater than 94% owing to the low concn. of H_2O failing to render Fe completely passive. B. C. P. A.

The gas equilibria $C_2 \rightleftarrows 2C$, $S_2 \rightleftarrows 2S$, $Se_2 \rightleftarrows 2Se$ and $Te_2 \rightleftarrows 2Te$. H. Zeise. *Z. Elektrochem.* **46**, 38–41(1940).—For the gas equil. $C_2 \rightleftarrows 2C$ and $S_2 \rightleftarrows 2S$, the equil. consts. previously calcd. between 2000° and 6000°K. and between 298.1° and 3000°K. were corrected on the basis of new values for cleavage energy and in the 2nd case upon a new value for nuclear distance. The new figures show considerable deviation from the earlier results. The equil. $Se_2 \rightleftarrows 2Se$ and $Te_2 \rightleftarrows 2Te$ were calcd. on the basis of thermodynamic-statistical data in the temp. range from 1000° to 2500°K. The results agree approx. with older measurements if the basic state of the mols. Se_2 and Te_2 is assumed to be of the type $^3\Sigma$. H. Stoertz

Equilibrium in hydrofluoric acid solutions. W. A. Roth. *Ann.* **542**, 35–43(1939). The cond. and the H-ion concn. (indicator method) were measured at several temps. and in a wide range of concns. and also the heats of neutralization. Under the assumption that only H^+, F^-, HF_2^- and HF are present in the soln., the equil. const. $[H^+][F^-]/[HF]$ is 0.00032 and that of $[F^-][HF]/[HF_2^-]$ is 0.0335 at 20°. The heat effect of the 1st reaction is about 3.05 kg.-cal., of the 2nd is 5.07 kg.-cal. The strong hydration of the F^- ions is the cause of the relatively large heat evolution in the dissocn. of HF and HF_2^-. C. J. W.

X-ray study of products obtained during reduction of titanium dioxide. E. Belyakova, A. Komar and V. Mikhailov. *Metallurg* **14**, No. 4-5, 23–5(1939).—H reduction of TiO_2 at 1200–1500° yields primarily Ti_3O_5. At 1500° some TiO may be present. Reduction with charcoal at 1100–1500° produces a solid soln. of TiC and TiO varying from 33 to 60% TiC. H. W. Rathmann

Active oxides and reactions of solid substances. CXVII. The transition of anatase into rutile and the effect of gaseous hydrogen chloride on this transition. Gustav F. Hüttig and Kurt Kosterhon. *Kolloid-Z.* **89**, 202–8(1939); cf. *C. A.* **34**, 1225[2].—Various portions of a gel of $TiO_2.xH_2O$ (prepd. by hydrolysis of $TiCl_4$) were heated to different temps. between 750° and 1000°. On shaking with H_2SO_4 a part of each of these prepns. goes into soln.; the quantity dissolved is approx. proportional to the wt. of the portion subjected to the soly. test. All prepns. were examd. with regard to their loss on ignition, x-ray picture, soly., hygroscopicity, etc. Some of the results obtained can be attributed to the rearrangement of the surface mols. (max. at a preliminary heating to about 820°), whereas others can be considered as a consequence of a general rearrangement of the anatase lattice into that of rutile (the latter phenomenon was observed on prepns. that were heated preliminarily to 850–920°). A series of prepns. was made by heating of the TiO_2 gel in a dry stream of gaseous HCl. The soly. of prepns. heated preliminarily in HCl, at about 820–950°, is essentially greater than that of prepns. preheated in air. These differences reach a high max. in prepns. heated preliminarily to about 850°. Since an increased soly. must correspond to an intensified "loosening" (at least of the surface), the presence of gaseous HCl must promote the formation of loosened (activated) conditions. Edward A. Ackermann

The fluorination of thionyl chloride. Harold S. Booth and Francis C. Mericola. *J. Am. Chem. Soc.* **62**, 640–2(1940).—The fluorination of $SOCl_2$ with SbF_3 in the presence of $SbCl_5$ yields SOF_2 and SOClF. The reactions of these compds. with water, metals, sulfides and chlorine are discussed. Vapor pressures of SOF_2 and SOClF are tabulated, and crit. data for SOF_2 are given. The following physical consts. are given for $SOCl_2$, SOClF and SOF_2, resp.: b. p. 75.7°, 12.2° and −43.8°; f. p. −99.5° to −104.5°, —, −129.5°; m. p. —, −139.5°, —; liquid d. 1.675, 1.580, —; heat of vaporization (cal.) 7682, 5937 and 5202; Trouton's const. 21.4, 20.7 and 22.7. A. B. Garrett

The mechanism of oxidation of carbon. V. Sihvonen. *Ann. Acad. Sci. Fennicae* **A51**, No. 4, 40 pp. (1938)(in German); cf. *C. A.* **32**, 8895[3].—A review of the work of S. and coworkers since 1930 on (1) the mechanism of the electrolytic oxidation of C at room temp., (2) action of pressure, temp. and porosity on the combustion of carbon and (3) reaction order and temp. increment of various processes for C oxidation in O, CO_2 and steam. Thirty-two references. George Ayers

Velocity of solution of comminuted substances. X. Solution of tartaric acid and sugar in water. Wawrzyniec Jacek. *Roczniki Chem.* **19**, 243–8(1939).—The velocity of solution of tartaric acid and sucrose in H_2O at 17.5–21° was detd. B. C. P. A.

The heterogeneous ortho-para conversion on paramagnetic crystals. L. Farkas and L. Sandler. *J. Chem. Phys.* **8**, 248–51(1940).—The rate of conversion of para-H and ortho-D was measured on paramagnetic crystals: $CuSO_4$, $NiCl_2$ and Nd oxalate. In the last case the conversion rate has a max. at 0°. Below 0° the desorption rate of the H and the D is rate-determining. Hence, the ratio of the rates for H and D is near unity. The rate of desorption increases with increasing temp. and at higher temps. the rate of conversion on the surface becomes the slow process. The ratio of the rates for H and D approaches 1 in this region. The heat of adsorption of H on Nd oxalate is about 2.4 kg.-cal./mol. G. M. Petty

Surface conditions of silver halides and rate of reaction. I. Rate of reduction of precipitated silver chloride. T. H. James. *J. Am. Chem. Soc.* **62**, 536–40(1940).—The reduction of pptd. AgCl by N_2H_5OH was studied with particular reference to the effects of aging of the ppt., dye adsorption, gelatin adsorption and Cl^- ion concn. upon the initial reaction rate. Gelatin markedly inhibits the reaction and gives a min. rate. The reaction rate closely parallels the change in surface with aging. The reaction

is strongly inhibited by adsorption of 3,3'-diethyl-9-methylthiocarbocyanine to the AgCl; the reaction rate is approx. proportional to the free surface when the ppt. is only partly covered with dye. The probable mechanism of the reaction involves the reduction of the unprotected Ag^+ ions of the solid rather than the Ag^+ ions in soln. An excess of Cl^- ion affects the reaction rate in such a manner that it indicates that further adsorption, after the AgCl surface is largely covered with Cl^- ions, follows the Langmuir isotherm. A. B. Garrett

Stabilization velocity of glassy selenium. Husao Isikawa and Hatiro Sato. *Bull. Inst. Phys. Chem. Research* (Tokyo) **18**, 143-9(1939).—The stabilization velocity of glassy Se, measured by a differential gas dilatometer, is very low at 60° and increases with temp., 60% transformation into metallic Se occurring in 33 hrs. at 75°. B. C. P. A.

The extrathermal action of ultra-high-frequency electric fields. II. The effect of ultra-high-frequency fields on the polymerization of chloroprene. E. I. Yakubovich and E. I. Evdokimova. *Arch. sci. biol.* (U. S. S. R.) **55**, No. 3, 93-100(in English, 100)(1939); cf. *C. A.* **33**, 6128².—A higher rate of polymerization of chloroprene occurs under the influence of ultra-high-frequency elec. fields than under equiv. heating periods on a water bath. An x-ray analysis indicated that only the degree of polymerization is affected. The structure and particle size are not changed. The evidence is used to show the presence of an extrathermal component in the ultra-high-frequency field. S. A. Katjala

The kinetics of the reaction of amalgamated aluminum with water vapor and oxygen. M. A. Blumental. *Atti X° congr. intern. chim.* **2**, 118-32(1938).—The equation $2Al(Hg)_x + 3/2O_2 + 3H_2O = 2Al(OH)_3 + 2xHg$ represents a diffusion reaction, the Al_2O_3 formed interrupting the reaction. In the absence of O_2 the amalgamated Al reacts with H_2O vapor thus: $2Al(Hg)_x + 6H_2O = 2Al(OH)_3 + 3H_2 + 2xHg$, the reaction velocity being const. in time and proportionate to the nth power of the H_2O vapor pressure: $J = kp^n$, $2>n>1$. The temp. coeff. is neg., the adsorption decreasing with temp. The amt. of adsorption heat is indicated by Arrhenius' equation. The results thus computed agree with those computed on the basis of the kinetic gas theory. A. H. Krappe

Kinetics of the slow oxidation of carbon monoxide. A. V. Korneeva and M. V. Polyakov. *Acta Physicochim. U. R. S. S.* **11**, 427-42(1939).—Data on the kinetics of the $CO + O_2$ reaction on a Pt wire at 450-800° and at pressures of 30 mm. (below the ignition limit) are summarized. The kinetic equation $W = Ae^{\phi t}$ is applicable; the values of ϕ obtained from the linear relation $\log \Delta p - t$ show a max. value for a 5-mm. Pt wire, 1.6 at 800°, 1.25 at 700°, 0.57 at 450°. The reaction shows a limit at all temps. and is a homogeneous-heterogeneous reaction proceeding by a chain mechanism. F. H. Rathmann

Kinetics of the slow oxidation of ethylene. M. V. Polyakov and F. M. Vaĭnshtein. *Acta Physicochim. U. R. S. S.* **11**, 415-26(1939)(in English).—Exptl. data are given in 20 plotted curves for the reaction $C_2H_4 + 3O_2$ on Pt wires at 700-800°, 100 300 mm. pressure, in glass and quartz vessels of 20 30 mm. diam. The reaction reaches a limit at about 30% of gases reacted, the limit being lower the shorter the Pt wire used. The Pt wire becomes more active with use. The results show that the reaction is a case of heterogeneous-homogeneous catalysis, both proceeding by a chain mechanism. F. H. Rathmann

Kinetics of oxidation of methane. I. Intermediate products. Wilhelm Staronka and Lucjan Czerski. *Roczniki Chem.* **19**, 259-76(1939).—2.2:1 and 1:1 CH_4-O_2 mixts. were heated at 400-83°. The yield of CH_2O is max. (0.5-0.8 ml. per 100 ml. of gas mixt.) after 0.5-1 min., varying little thereafter. That of MeOH is max. (0.7-1.4 ml.) after 0.8-1.8 min., thereafter falling more or less abruptly. The highest yields of MeOH are obtained by low-temp. oxidation of CH_4-rich mixts. CH_2O is not initially produced by oxidation of MeOH. The results support the view that oxidation of CH_4 in absence of contact substances is a chain reaction, preponderatingly homogeneous, although stoichiometrically heterogeneous. B. C. P. A.

Kinetics of the decomposition of benzoyl peroxide and its *p*- and *m*-nitro derivatives. F. I. Berezovskaya, O. N. Semikhatova and G. D. Ostrer. *Ber. Inst. physik. Chem., Akad. Wiss. Ukr. S. S. R.* **9**, 3-16(in Russian, 17; in German, 18-19)(1938); cf. *C. A.* **31**, 4207⁷.—In the decompn. of BzO_2 and its *m*- and *p*-nitro derivs. in acetone of various concns. the order of the reaction is not clear and the values of K did not agree. The values of Q were 10,000, 6000 and 9000 cals. for the BzO_2, the *m*-, and *p*-nitro derivs., resp. Decompn. in 80% HOAc in the presence of NaOAc is of the first order. The values of K were close for all the peroxides and the energy of activation of BzO_2 was 1000 cal. more than for the nitro derivs. The position of the nitro group has no effect upon the energy of activation. The values of K were considerably greater during decompn. on Pt in NaOAc than without Pt. B. Z. K.

The alkaline saponification of polyvinyl acetates. A. Skrabal. *Z. physik. Chem.* **A185**, 389-92(1939).—The observations of Lee and Sakurada (*C. A.* **33**, 7652⁸) are discussed. It is suggested that the sapon. may be a 2-stage reaction. In the first, a very rapid reaction, the acetate reacts with the MeOH under the catalytic influence of NaOAc. In the second, a measurably slow reaction, the MeOAc produced in the first reaction is sapond. L. and S. apparently measured the rate of the second reaction; this is independent of the nature of the original ester. T. H. Dunkelberger

Hydrolysis and alcoholysis. Walter Hückel. *Ann.* **540**, 274-84(1939).—A theoretical discussion of the hydrolysis of chlorides such as CCl_4, $SiCl_4$, PCl_5, SF_6, BCl_3, PCl_3, SO_2Cl_2, $ClSO_3H$, $POCl_3$ and AcCl. C. J. West

The energy and entropy of activation of the hydrolysis of ethyl orthoformate in deuterium oxide. Frank Brescia and Victor K. La Mer. *J. Am. Chem. Soc.* **62**, 612-14 (1940).—The rate of hydrolysis of Et orthoformate was measured at 14.977 and 35.008° in H_2O and in D_2O. An increase of three-fold is observed in the reaction rate, whereas, the observed difference in the energy of activation predicts a nine-fold increase. It is concluded, therefore, that the energy of activation is an important factor in detg. the ratio of the 2 rates. A. B. Garrett

Velocity of formation of ammonium cinnamate. Dora Markowska. *Compt. rend.* **210**, 291-3(1940); cf. *C. A.* **33**, 5732²,³.—The cinnamic acid was pulverized and sifted so that the diam. of its grains was 15-65μ, most being 40-45μ. NH_3 dried over KOH was passed over it. The results, shown by curves, give Valensi's equation (*C. A.* **31**, 6087⁷) as $F(m) = 7.289 - (1 - m)^{2/3} - 6.289(1 + 0.150m)^{2/3} = Kt/c_0$, the symbols having the same meaning as before. The d^{15}_{15} of NH_4 cinnamate is 1.2006. C. A. Silberrad

The replacement of aromatic chlorine by the amino group. VI. Kinetics of the interaction of *m*-nitrochlorobenzene with aqueous ammonia. N. N. Vorozhtsov, Jr., and V. A. Kobelev. *J. Gen. Chem.* (U. S. S. R.) **9**, 1465-7 (1939); cf. *C. A.* **33**, 8580⁹.—Unlike *o*- and *p*-$O_2NC_6H_4Cl$ the *m*-isomer (I) does not react at all with aq. NH_3 at 200° and but slightly (3%) at 230°. In the presence of $CuCl_2.2H_2O$ the rate of ammonolysis is directly proportional to the concn. of I and the catalyst and is independent of the NH_4OH concn. The energy of activation of the reaction is 13,700. The const. of the reaction velocity can be represented by the equation: $\log K = 5.387 - (2933/T)$. **VII. Kinetics of the interaction of β-chloroanthraquinone with aqueous ammonia.** *Ibid.* 1515-16.—The rate of reaction of β-chloroanthraquinone with aq. NH_3 is directly proportional to the concn. of both reactants. The energy of activation of the reaction is 20,500. The const. of the reaction velocity is: $\log K = 6.26 - (4467/T)$. At 210° the velocity const. is 10.37×10^{-4}. The reaction is best effected in the presence of the $Cu(NO_3)_2$ catalyst (cf. Vorozhtsov and Nikitin, *C. A.* **32**, 539⁵). **VIII. Kinetics of the interaction of *p*-chloroaniline, 1-chloronaphthalene and sodium 1,4-chloronaphthalenesul-**

fonate with aqueous ammonia in the presence of copper chloride. *Ibid.* 1569–76.—The rate of reaction of *p*-$ClC_6H_4NH_2$ (I), 1-$C_{10}H_7Cl$ (II) and 1,4-$ClC_{10}H_6SO_3Na$ (III) with aq. NH_3 in the presence of $CuCl_2$ is directly proportional to the concn. of the org. chlorides and the catalyst and is independent of the NH_4OH concn. The cumulative evidence of this investigation series shows that in the catalytic interaction with NH_4OH the org. Cl derivs. form the intermediate complex $RCl.Cu(NH_3)_2$ which then reacts with excess NH_4OH to give aromatic amines. The energy of activation of the reaction of I, II and III, resp., are: 12,500, 12,000 and 12,200. The corresponding consts. of the reaction velocity can be represented by the equations: $\log K = 4.95 - (2732/T)$; $\log K = 3.98 - (2632/T)$, and $\log K = 4.314 - (2677/T) \pm 0.005$. The soly. of II in NH_4OH is greater than in H_2O and increases with NH_4OH concn. Chas. Blanc 1

The heterogeneous catalytic decomposition of hydrogen peroxide in heavy water. P. A. Giguere and O. Maass. *Can. J. Research* **18, B**, 84–9(1940).—The catalytic decompn. of H_2O_2 dissolved in heavy water, both on the surface of glass in alk. medium and on metallic gold, was measured at 35°. The results, compared with those obtained under similar conditions for H_2O_2 in ordinary water, indicate that D_2O_2 is much more stable than ordinary H_2O_2 toward such catalysts. The exptl. results in both cases are of interest chiefly for comparison, and further investigations will be necessary before any sound conclusion can be drawn regarding the mechanism of the reactions involved. J. W. Shipley 2

Catalysis by metallized bentonites. Geoffrey Broughton. *J. Phys. Chem.* **44**, 180–4(1940).—The relative activities of a no. of metallized bentonites were detd. for the catalytic decompn. of H_2O_2 and of isopropyl alc., and the polymerization of pinene. P. H. Emmett 3

High-temperature oxidation of carbon monoxide catalyzed by quartz surface. Yukio Kondo and Osamu Toyama. *Rev. Phys. Chem Japan* **13**, 166–75(1939).—The reaction between CO and O_2 was studied by a static method in the region above the upper explosion limit in a quartz vessel. CO_2 has a retarding effect unless its pressure is low, whereas O_2 favors the reaction. Water is a powerful inhibitor, though its effect falls off with increase in pressure of water vapor. The energy of activation in the absence of water is about 7000 cal. per mole. The results, which differ considerably from those of Hinshelwood and his coworkers, are explained on the assumption of a heterogeneous mechanism. The rate-detg. process is assumed to be a bimol. reaction between CO and O_2 adsorbed on the SiO_2 wall. The retarding effects of CO_2 and water are due to their strong adsorption. J. H. Reedy 4

Decomposition of ammonia by iron catalyst. (Preliminary report.) Katumi Seya. *Rev. Phys. Chem. Japan* **13**, 137–44(1939).—The decompn. velocity of NH_3 in the presence of reduced Fe was measured at 390°–430° by a static method. The K-v curve is complex and seems to indicate a retarded form at the initial stage, followed by a zero order and another retarded form. It is suggested that the retarding action is due to a coating of Fe_xN over the active catalyst. J. H. Reedy 5

Decomposition of ammonia by iron catalyst mixed with alumina and potassium oxide. Ryo Kiyama. *Rev. Phys. Chem. Japan* **13**, 125–36(1939).—The decompn. of NH_3 on various compns. of Fe_3O_4, Al_2O_3 and K_2O in glass vessels was measured at 300°–500° by means of a spring manometer. The reduction velocity of the catalyst was measured by weighing the water formed when H_2 was passed at a given rate through the reaction vessel. The results were interpreted by applying Langmuir's formula to the assumed reactants, and it was found that the reaction consists of (1) a retarded form, followed by (2) a first-order reaction and then (3) a zero or fractional order. The compn. of the catalyst was varied, and the effects were noted on the velocity of the reaction, the adsorption of H_2 and N_2, the relation between activity and adsorption coeffs., the influence of velocity of decompn. by H_2 and N_2, and poisoning by CO. J. H. Reedy 6

Phase diagram of a mixture of natural gas and natural gasoline near the critical conditions. D. L. Katz, D. J. Vink and R. A. David. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1114**, 11 pp.(1939).—A phase diagram showing boundary curve and quantity of liquid in the 2-phase region was detd. for a mixt. of natural gas and natural gasoline at 85–212°F. and 1300–2600 lb. per sq. in. Crit. conditions were observed at 169.5°F. and 2615 lb. per sq. in. abs. Color phenomena were observed in the region of the boundary curve for 102° to 192°F. Approx. ds. of the single-phase and 2-phase regions and analysis of the system are included. Alden H. Emery 7

The system benzene–nitrogen. Liquid-vapor phase equilibria at elevated pressures. Philip Miller and Barnett F. Dodge. *Ind. Eng. Chem.* **32**, 434–8(1940).—At 30–150° N was bubbled through liquid benzene at pressures up to 300 atms. and samples of the liquid and gas phases were analyzed. The soly. of N in benzene increases with temp., the effect increasing at higher pressures. The data agree more closely with Henry's law at the higher temps., but only approx. in any case. When the mol. fraction of benzene in the gas phase is plotted against the pressure, a min. appears which occurs at higher pressures as the temp. increases. The "cricondentherm" pressure is relatively low compared to the crit. pressures. W. B. Keighton 8

Equilibria in liquid iron with carbon and silicon. L. S. Darken. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1163**, 18 pp. (1940). If it is assumed that Fe_3C and Fe_3Si are present in molten Fe contg. C and Si, it is possible to express exptl. data satisfactorily by a simple equil. expression and to bring into harmony data referring to different reactions in liquid Fe. These data include soly. of graphite in liquid Fe and in Fe-Al and Fe-Si melts; vapor pressure of the Fe-C system at high temps. and the CO-CO_2 ratio in equil. with them; heat of formation of FeC; equil. between Si and Mn in low-C molten steels and the resp. oxides in the slag phase, and the deoxidizing characteristics of Si. The consistency of the results of the calcns. indicates that the use of the simple form of the law of mass action is justified in the treatment of data on solns. in liquid Fe provided that compd. formation in the liquid is taken into account. The interpretation proposed not valid over 15% Si, probably because of the presence of compds. other than Fe_3Si. Alden H. Emery 9

Investigation in the field of basic chlorides. I. G. B. Fridman. *J. Gen. Chem.* (U. S. S. R.) **9**, 1598–1602 (1939); cf. *C. A.* **29**, 6667⁴.—The system ZnO–$ZnCl_2$–H_2O was studied at 30°. The solid phases were examd. by the Schreinemakers' "rest" method. The usual method of diagram analysis "compn.-property" of the system can be used, because it does not form solid phases of colloidal structure. The data obtained do not confirm the existence of any of the Zn oxychlorides cited in the literature. At the state of equil. the system forms only 1 oxychloride, $5ZnCl_2.5ZnO.8H_2O$, with stability limits from 57.7 to 71% $ZnCl_2$ in the liquid phase. The 2nd solid phase forms a solid soln. with stability limits from 9.28 to 55% $ZnCl_2$ in the liquid phase. At lower $ZnCl_2$ concns. the solid soln. is decompd. to form continuous series of solid solns. The hardening products of Zn cements from $ZnCl_2$ are the solid solns. of limit concn. Chas. Blanc 10

The system calcium oxide–silica–water at 30°. The association of silicate ion in dilute alkaline solution. Paul S. Roller and Guy Ervin, Jr. *J. Am. Chem. Soc.* **62**, 461–71(1940).—Measurements are made of the ratio of CaO to SiO_2 in the solid phase, and of the concn. of CaO and SiO_2 in soln. at 30.2°. The data indicate 4 phase ranges; in 2 of these the concns. are invariant. Adsorption of CaO by solid phase occurred throughout. The compns. of the hydrated compds. were (1) $CaO.SiO_2$-($CaH_2Si_2O_4$), (2) $3CaO.4SiO_2(Ca_3(HSi_2O_6)_2)$, (3) $CaO.2SiO_2$ and $CaH_2Si_2O_6$ or $Ca(HSiO_3)_2$). The invariant concns. for the mixt. of (1) and (2) were: 3.09 millimoles CaO/l. and 0.090 millimoles SiO_2/l., and for the mixt. of (2) and (3), 0.900 millimoles CaO/l. and 0.931 millimole SiO_2/l. It is necessary to assume that assocn. takes place in the dil. alk. solns.; the ion species present are $H_3SiO_4^-$ and $H_3Si_2O_6^{--}$. The assocn. const., soly.

product const. and one of the ionization consts., were calcd.; the assocn. const. indicates a high tendency toward assocn. A. B. Garrett

The ternary system: isopropyl alcohol, toluene and water at 25°. E. Roger Washburn and Albert E. Beguin. *J. Am. Chem. Soc.* **62**, 579–81(1940).—The soly. relations and the *n*s of the satd. solns. were detd. Tables are given of solubilities and *n*s and concns. of alc. in conjugate solns. at 25°. A comparison is made of the soly. curve of this system with those of systems contg. CH_3OH and C_2H_5OH (cf. *C. A.* **32**, 4165; **33**, 7656[7]); isopropyl alc. is the most efficient and CH_3OH is the least efficient in bringing about miscibility in toluene–water systems; this is in accord with what is to be expected as detd. by the internal pressures, dielec. consts. and dipole moments of the resp. alcs. A. B. G.

The quaternary system calcium hypochlorite, calcium chloride, calcium hydroxide and water. J. Ourisson. *Atti X° congr. intern. chim.* **4**, 40–51(1939).—Measurements made at 10°, 20°, 30° and 40° are given in graphs. At 10° a new, solid phase appears, tribasic hypochlorite (I), existing between $Ca(OH)_2$ and dibasic hypochlorite. The domain of existence of $Ca(OH)_2$ is appreciably diminished by the appearance of I. The other solid phases are the same as at 20°, but their domain of existence is very different; that of tribasic chloride is increased at the expense of $Ca(OH)_2$, and that of monobasic chloride and 2/3 basic hypochlorite diminished. The 30° diagram is like that at 20°, the domain of existence of tribasic chloride diminishing in favor of $Ca(OH)_2$ and monobasic chloride increasing at the expense of tribasic chloride. The band of 2/3 basic hypochlorite extends farther into the domain of $CaCl_2$ at low concn. At 40° the tribasic chloride disappears, in favor of hydroxide and monobasic chloride. The 2/3 basic hypochlorite is already stable in solns. free from $CaCl_2$. E. M. Symmes

The reciprocal salt pair, $CoSO_4 + (KCl)_2 \rightleftarrows CoCl_2 + K_2SO_4$. II. A. Benrath and G. Ritter. *J. prakt. Chem.* **154**, 40–56(1939); cf. *C. A.* **33**, 5272[6]. The polytherms of the system were detd. from the polytherms of the following component systems: (I) $(KCl)_2$–K_2SO_4–H_2O, (II) $(KCl)_2$–$CoCl_2$–H_2O, (III) $CoCl_2$–$CoSO_4$–H_2O, (IV) $CoSO_4$–K_2SO_4–H_2O. I has already been worked out by Cornec and Hering (*Caliche* **8**, 58(1926)). The isotherms for II were detd. for 0°, 38°, 50°, 51°, 75° and 100°. Below 38° the solid phase is a mixt. of $CoCl_2.6H_2O$ and KCl. At about 45° $CoCl_2.4H_2O$ begins to sep., and above 50° the mixed crystal $CoCl_2.KCl.2H_2O$. At higher temps. the $CoCl_2$ content of the solid phase increases, just as if $CoCl_2$ was dispersed in the mixed salt as a dispersion medium. At 100° a blue salt appears, in which KCl acts as the dispersion medium. The isotherms for III as worked out by Benrath (cf. *C. A.* **33**, 5272[6]) have been modified. Equil. is reached with difficulty in systems contg. $CoSO_4.H_2O$, since this monohydrate forms slowly. It is better to use freshly prepd. $CoSO_4.H_2O$. In IV the schonite form, $CoSO_4.K_2SO_4.H_2O$, seps. slowly at 94°, owing to the slow dehydration of the higher hydrates. The leonite form, $CoSO_4.K_2SO_4.4H_2O$, appears first at 97° as ruby-red rod-like crystals. At 100° this goes over into the schonite form. From the data for these 4 salt pairs, polytherms for the over-all system were constructed as 3-dimensional curves, compns. being plotted on the quadrilateral base, and the temps. as vertical ordinates. J. H. Reedy

The specific heats of some solid aromatic acids and their ammonium salts and the atomic heat of nitrogen. Syuniti Satō and Tatuyosi Sogabe. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 449–57(1939); cf. *C. A.* **33**, 8099[1].—Mol. heat capacity measurements were extended to the aromatic acids, benzoic, cinnamic, *o*-phthalic and *m*-phthalic, and to their NH_4 salts. The at. heat of N deduced from the difference in the mol. heat capacities of corresponding acid NH_4 and neutral NH_4 salts is smallest (1.7) for the aromatic and largest (6.4) for the aliphatic compds.; that deduced from the corresponding acids and acid NH_4 salts is largest (5.3) for the aromatic and smallest (1.8) for the aliphatic compds. The intermediate values obtained from the acids and the neutral NH_4 salts (aromatic, 3.3, and aliphatic, 4.2), are near the provisional value, 3.5, obtained from the various nitrides. L. E. Steiner

The use of the method of thermal analysis. V. A. Kind, S. D. Okorokov and E. P. Khodikel. *Tsement* **6**, No. 7, 32–7(1939).—Dehydration curves were obtained with the aid of a device, suggested by N. S. Kurnakov, photographically registering galvanometer readings. The differential method of detg. temp. intervals in which definite chem. processes take place in thermally treated matter was used. Observations were made with hydrated tricalcium silicate, β-dicalcium silicate, tricalcium aluminate, dicalcium ferrite, brownmillerite, and Ca hydrosilicate and hydroaluminate obtained synthetically in aq. medium, and dehydration curves are shown graphically. The method is a good means for the investigation of dehydration processes. E. E. Stefanowsky

Variation at constant temperature as a function of concentration of the differential heat of solution of normal organic substances in dilute aqueous solution. Jean Perrin. *Compt. rend.* **210**, 293–5(1940).—If p_A g. of a normal org. substance, A, of mol. wt. m_A, is dissolved in 100 g. H_2O the mol. concn. $c_A = (p_A/m_A)/(100/18) = 18p_A/100m_A$. If q_{c_A} is the differential mol. heat of soln. of A in a soln. of concn. c_1 at T, q_{c_1} is a function of T and of c_1; and if Δq_{c_A} is the variation of q_{c_A} when the concn. increases from 0 to c_A, then $\Delta q_{c_A}/m_A = 18kp_1/100m_1$. Putting $\Delta q_{c_A}/m_A = \delta q_{c_1}$, and $K = 18k$, then $\delta q_{c_A} = Kp_A/100m_A$. The relation is proved to hold for dil. solns. ($p = 0$ 10%) of urea, acetamide, mannitol, glucose, sucrose, glycol and glycerol, K being sensibly = the cryoscopic const. of H_2O. These results provide a means of detg. the mol. wt. of the dissolved substance, as $m_A = Kp_1/100\delta q_{c_A}$. Better results are obtained by using an org. solvent in place of H_2O, as K is then higher. C. A. Silberrad

The heats of solution, heats of formation, specific heats and equilibrium diagrams of certain molecular compounds. A. N. Campbell and A. J. R. Campbell. *J. Am. Chem. Soc.* **62**, 291–7(1940). The thermal values were detd. in order to obtain some measure of the energy change involved in the formation of org. addn. compds. Expt. detns. were made, for reactants and products, of heat of soln., specific heat and soly.-equilibria (in the case of salicylic acid–acetamide–H_2O) were made for the systems phenol urea, phenol-*p*-toluidine, β-naphthylamine-*p*-nitrosodimethylaniline, and salicylic acid–acetamide. The heats of formation of addn. compds. are calcd. at room temp. and at abs. zero. The equil. diagrams for the systems phenol urea–H_2O and salicylic acid–acetamide–H_2O indicate that the addn. compd. is stable at room temp. A. B. Garrett

The heat of dilution of aqueous hydrochloric acid at 25°. Julian M. Sturtevant. *J. Am. Chem. Soc.* **62**, 584–7(1940).—The heat of dilu. was measured up to a concn. of 3.3 molal. From these data the apparent and partial relative molal heat content of the solute, and the partial relative molal heat content of the solvent were calcd.; tables of their values and of the integral heats of dilu. of HCl solns. at 25° are given. A. B. Garrett

Salt hydrates and deuterates. II. Correlation of heats of dissociation and structure. James Bell. *J. Chem. Soc.* **1940**, 72–4; cf. *C. A.* **31**, 4508[4].—Dissocn. pressures of the following compds. were measured between 20° and 40°: $NiSO_4.7D_2O$, $NiSO_4.7H_2O$, $CoSO_4.7D_2O$, $ZnSO_4.7D_2O$, $ZnSO_4.7H_2O$, $CuCl_2.2D_2O$, $BaCl_2.2D_2O$, $KF.2D_2O$, $KF.2H_2O$. A table of the consts. A and B of the relation $\log p = A - B/T$ together with the heats of dissocn. ($L = 4.575\,B$) is given for all salts thus far examd. In all cases the heat of dissocn. of the deuterate is greater than that of the hydrate by an amt. more than can be accounted for on the basis of the difference between the heats of vaporization of H_2O and D_2O. This may be regarded as evidence that water in a normal hydrate is bound by ordinary covalent or van der Waals forces and

not by special resonance linkages such as hydrogen bonds. Measurements are given of the dissocn. pressures of $D_2C_2O_4.2D_2O$ and of $H_2C_2O_4.2H_2O$. The corresponding vapor-pressure equations are: $\log p = 10.27 - 2910/T$ and $\log p = 10.45 - 2983/T$. The mean value of the ratio p_{D_2O}/p_{H_2O} is 1.09. This indicates a weakening of the hydrogen bond between H_2O and carbonyl O on introduction of D. A table is given of the mol. vols. of $H_2C_2O_4.2H_2O$, $D_2C_2O_4.2D_2O$, KH_2PO_4 and KD_2PO_4, and of the hydrates and deuterates of $CuSO_4$, Li_2SO_4, $CoSO_4$, $CoCl_2$ and $SrCl_2$. It is suggested that the expansion of mol. vol. on substitution of H by D may indicate the presence of hydrogen bonds, but that the reverse is not necessarily true. H. C. Thomas 1

Colloidal structure of rubber in soln.; colloidal aspects of vulcanization (Gehman, Field) **30**. $(NH_4)_2C_2O_4$ for use as fertilizer—hygroscopicity of $(NH_4)_2C_2O_4.H_2O$ (Uno) **18**. Effect of phosphate buffers on elec. mobility of hemoglobin (Gorin, *et al.*) **11A**. Energetics of germinating seeds (Sołodkowska) **11D**. Colloid reaction in diagnosis of cerebrospinal fluid (Herrmann) **11B**. Basic principles of mass transfer in rectification, extn., and absorption [thermodynamic principles] (Matz) **1**. α,γ-Transformation Fe at high pressures, and problem of earth's magnetism (Birch) **9**. Does quinhydrone procedure yield false pH values for fruit juices, silage, etc. (Jørgensen) **12**. Optical superposition (Rupe, Hafliger) **10**. Elements promoting graphitization and those retarding graphitization according to their position in the periodic system (Tonin) **9**. 2

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

A. B. F. DUNCAN

The origin of great nebulae. G. Gamow and E. Teller. *Phys. Rev.* **55**, 654–7(1939). G. M. Petty

The evolution of red giants. G. Gamow. *Phys. Rev.* **55**, 796–7(1939); cf. preceding abstr.—The distribution of red giant stars on the *R-L* diagram is discussed. G. M. Petty

Physical possibilities of stellar evolution. G. Gamow. *Phys. Rev.* **55**, 718–25(1939).—The evolution of gaseous

bodies, caused by different phys. processes happening in their interior and serving as energy sources, is considered qualitatively and, partially quantitatively in view of possible applications for the explanation of various observed states of known stars. G. M. Petty

Energy production in red giants. G. Gamow and E. Teller. *Phys. Rev.* **55**, 791(1939); cf. preceding abstr.—The energy release and capture probability for some of the reactions between light elements are tabulated. These data are plotted on a log L/L —log R/R diagram (L = luminosity, R = radius) together with data for some pulsating variable stars. G. M. Petty

Calculation of the energy of repulsion. M. F. Maimotenko. *Acta Physicochim.* U. R. S. S. **11**, 225–38; *J. Exptl. Theoret. Phys.* (U. S. S. R.) **9**, 775–82(1939) (in English); cf. *C. A.* **33**, 7631[4].—By the method of orthogonalization, the many-electron problem reduces to several one-electron problems. The method gives essentially the same results as that of Heitler-London; the lattice and lattice-energy consts. of Ne and A so calcd. agree well with exptl. data. F. H. Rathmann

Production of bursts and the spin of the meson. H. J. Bhabha, H. Carmichael and C. N. Chou. *Proc. Indian Acad. Sci.* **10A**, 221–3(1939); cf. *C. A.* **32**, 3691[7]; **33**, 3675[7].—Since it is now generally considered that the meson has a spin of one unit, the older calcns. are revised. A table of the probability that a meson of given energy will emerge from air or Pb accompanied by a shower of more than N particles (N = 10, 100 or 1000) is calcd. for spins of $^1/_2$ and 1. The new theory (spin = 1) agrees much better with expt. than the old theory. G. M. P.

Determination of h/e by the method of isochromats. Per Ohlin. *Nature* **145**, 223(1940).—Detns. of h/e from the short-wave-length limit of the continuous x-ray spectrum give results which disagree with the value of h measured by other methods. The shape of the isochromats changes with the pressure in the x-ray tube: at 5×10^{-4} mm. the usual shape is obtained; at 1.5×10^{-5} mm. the isochromat runs straight to zero, giving a sharp short-wave-length limit. For an accurate detn. of h/e by this method, the pressure must be carefully controlled. G. M. Petty

Scattering and polarization of electrons. M. E. Rose. *Phys. Rev.* **57**, 280–8(1940).—An attempt is made to account for the small polarization of electrons and the anomalously small scattering of fast electrons in double scattering in heavy materials by assuming non-Coulombian forces near the nucleus. Very special forces would be required such as: only the $p_{1/2}$ wave at high energies or both waves scattered at all energies with large interaction and special dependence. The anomalous scattering and asymmetry must be explained on grounds other than non-Coulombian forces. F. E. Brown

Energy states of the valence electrons in some metals. I. 11. The nature of the anomalies of zinc and its electronic structure in condensed states. Mituru Satô. *Science Repts. Tôhoku Imp. Univ.*, First Series., **28**, 143–96(1939); cf. *C. A.* **33**, 1131[8].—The abs. temp. of a solid is a measure of the energy of thermal vibration. The temps. at which Zn shows anomalous phys. properties are related to the crystal energy levels of the solid. S. Bradford Stone

Splitting of heavy atom nuclei by neutrons. C. J. Bakker. *Nederland. Tijdschr. Natuurkunde* **6**, 333–45 (1939).—A review of the work of Hahn and Strassmann on U disintegration, references. B. J. C. v. d. H.

Properties common to hydrogen-containing molecules. Henri Deslandres. *Compt. rend.* **210**, 277–81(1940); cf. *C. A.* **34**, 1250[3].—D.'s views are further elaborated. C. A. Silberrad

Modern quantum mechanics and the benzene problem. V. G. Elsen. *Chem. Weekblad* **37**, 39–48(1940); cf. *C. A.* **34**, 935[9].—A continuation of previous discussions on the nature of single and double bonds. H. S. v. K.

Variation with temperature of the maximum of the emissive power of nickel. F. Cennamo. *Nuovo cimento* **16**, 294–8(1939); cf. *C. A.* **33**, 9132[9].—The variation of emissive power is calcd. as $e_{\lambda m} = k\ T^{5.85}$, which is confirmed by expt. J. B. Austin

Thermionic constants of tungsten as a function of crystallographic direction. M. H. Nichols. *Phys. Rev.* **57**, 297–306(1940).—Recrystn. of W wire into single crystals with a face-diagonal parallel to the wire axis is described. The emission is fitted to an empirical equation and the values therein are discussed. Gregg M. Evans

Fluctuation of thermionic current and the "flicker" effect. M. Surdin. *J. phys. radium* **10**, 188–9(1939).—Math. The fluctuation of the thermionic current of the "flicker" effect can be attributed to the fluctuation in the no. of free electrons in the metal. B. C. P. A.

Threshold potentials and reactivity under electric discharge. S. S. Joshi. *Current Sci.* **8**, 548–9(1940).—A sudden change (generally increase) in current and wattage indicates arrival at a threshold potential (Vm) necessary for the initiation of a reaction in an ozonizer. Variations of Vm with time may be used to trace the progress of a series of reactions. Gregg M. Evans

The distribution of electrons over the section of a gas discharge. V. A. Fabrikant. *Compt. rend. acad. sci. U. R. S. S.* **24**, 531–3(1939)(in English).—Theoretical. A soln. of the differential equation occurring in Schottsky's diffusion theory (cf. *C. A.* **19**, 1091) is given and the theoretical results are analyzed with respect to cumulative ionization, direct ionization and recombination during triple collisions. Frank Gonet

Theoretical and experimental investigations on the influence of electron partial pressures in low-pressure columns. Max Steenbeck. *Wiss. Veroffentl. Siemens-Werken* **18**, No. 3, 91–112(1939).—Electron gas in a low-pressure discharge column exerts a mech. pressure corresponding to that for an ordinary gas at the electron temp. and concn. Because of the small ion temp., ion gas pressures are negligible compared with the electron and the neutral gas pressures. Over the cross section of a low-pressure discharge column the sum of the partial pressures of the electron, ion and neutral gases is const. Since the electron and ion gas pressures in the center of the column are greater than at the edge, the pressure of the neutral gas in the center is correspondingly smaller. The electron gas pressure must always remain smaller than the total pressure as measured with an external manometer. The law of the constancy of the sum of the partial pressures is confirmed experimentally, so that the effect of the electron gas can be shown with ordinary manometers. L. E. Steiner

First Benedicks effect in gas-free mercury, as influenced by the mean temperature. C. Benedicks and P. Sederholm. *Nature* **145**, 148(1940); cf. *C. A.* **32**, 6942[4].—The first Benedicks effect in gas-free Hg increases rapidly with increase of the mean temp. The law of increase is similar to Richardson's law for the emission of electrons into a vacuum. G. M. Petty

An experimental determination of the electron affinity of chlorine. J. J. Mitchell and Joseph E. Mayer. *J. Chem. Phys.* **8**, 282–5(1940).—The electron affinity of Cl was detd. to be about 92.7 kg.-cal. by measuring the ratio of ions to electrons and atoms leaving a hot W surface (~2000°K.). Owing to the reactivity of the Cl an erratic behavior leads to skepticism as to the accuracy of the result. G. M. Petty

Single scattering of fast β-particles in argon. II. E. Stepanova. *J. Phys.* (U. S. S. R.) **1**, 203–6(1939). See *C. A* **33**, 5281[9]. A. D.

Multiple scattering of fast electrons. C. W. Sheppard and W. A. Fowler. *Phys. Rev.* **57**, 273–80(1940); cf. *C. A.* **33**, 466[9], 8492[1].—The scattering of electrons and positrons of energy 5–17 m. e. v. was measured in foils of Pb 0.15 and 0.38 mm., of Al 1.18 mm. and laminae of C 1.32 and 3.81 mm. in thickness. The scattering is in agreement with the multiple scattering theory of Williams (*C. A.* **33**, 8492[1]) except in the magnitude of the scattering in Al and Pb, in which the exptl. results are only 85% and 60% of the theoretical predictions. Eight figures and 3 tables summarize data from 52,000 cloud-chamber pictures. F. E. Brown

Scattering of fast electrons through large angles. A. I. Alikhanov, A. I. Alikhan'yan and M. S. Kozodaev. *Compt. rend. acad. sci. U. R. S. S.* **24**, 525–7(1939) (in English).—The single scattering of electrons, through an angle of 90°, with energies from 600 to 2000 e. kv. was investigated with an aim of verifying Mott's formula. A homogeneous beam of electrons from a magnetic spectrograph was caused to impinge on a thin foil of various thicknesses of celluloid, Al, Cu and Au placed at an angle of 45° to the beam, and the scattered electrons were registered by the coincidence of simultaneous discharge in 2 Geiger-Muller counters placed at an angle of 90° with respect to the beam. The authors found $\sigma_{exptl.}$ to be equal to 0.31, 0.0, 5.6 and 78 ($\sigma_{theor.}$ = 0.29, 1, 6, 178) for celluloid, Al, Cu and Au, resp., and they conclude that with the exception of Au the large-angle scattering of electrons with energies of the order of 1000 e. kv. is in good agreement with quantum-mech. considerations. F. G. 1

Production of positive electrons by β-particles. G. J. Sizoo and F. Barendregt. *Physica* **6**, 1085–1100(1939) (in English).—Cloud-chamber expts. detg. the intensity and energy distribution of positrons emitted by Ra(B + C) agree with values given by Chadwick, Blackett and Occhialini (cf. *C. A.* **28**, 2991[8]). The calcd. no. of positrons excited by internal pair production by the theory of Jaeger and Hulme (cf. *C. A.* **32**, 8914[7]) was one ninetieth of the observed. Most of the positrons have energies 2 less than 300 kv. The positrons excited in lead by the β and γ radiation of Ra(B + C) were investigated with a Wilson cloud chamber. In this way it is shown that only a small fraction of the positrons observed can be due to external pair production. G. W. King

Total secondary electron emission from polycrystalline nickel, sodium chloride and potassium chloride. Hikoo Saegusa and Tutomu Matumoto. *Science Repts. Tôhoku Imp. Univ.*, First Ser. **28**, 215–60(1939).—Ni has several peaks at low voltages. NaCl has peaks at 11 and at 23 v. KCl has a peak at 7 v. S. Bradford Stone 3

Secondary emission of electrons. N. L. Yasnopol'skiĭ and G. A. Tyagunov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1573–82(1939). Theoretical. Secondary electrons are produced in metals by Coulomb interaction between primary electrons and free electrons, and in dielectrics by ionization. A general consideration of these mechanisms allows an estn. of the relation between the no. of secondary electrons and their energy. The results are in a qual. agreement with expts. J. J. Bikerman 4

Distribution of velocities of secondary electrons emitted by sodium chloride. M. M. Vudynskiĭ. *J. Tech. Phys.* (U. S. S. R.) **9**, 1583–8(1939); cf. *C. A.* **33**, 7660[9]. The relation between the no. *N* of secondary electrons and their energy is for hot NaCl practically identical with that for metals; the max. of *N* is observed at 0.5 –1 e. v. and its position is independent of the energy of the primary electrons (300–1500 e. v.). When the temp. of NaCl decreases the no. of slow electrons increases and the max. of *N* is less pronounced. J. J. Bikerman 5

Secondary emission of electrons from mercury. Yu. M. Kushnir, V. I. Milyutin and V. P. Goncharov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1589–91(1939).—The secondary emission of liquid Hg at 5° is identical with that of solid Hg at −80 and −196°. Air shifts the max. of emission from 700 to 400 e. v. J. J. Bikerman 6

The secondary emission factor for insulators irradiated with electrons. H. Salow. *Z. tech. Physik* **21**, 8–15 (1940).—The variation of secondary emission with the velocity of the primary electrons is detd. for *mica*, *quartz* and *glass*. The characteristics of insulators are very similar to those of a metal. The treatment and purity of the surface have a great influence. J. B. Austin 7

Secondary electron emission. VI. Influence of externally adsorbed ions and atoms on the secondary electron emission of metals. J. H. de Boer and H. Bruining. *Physica* **6**, 941–50(1939) (in English); cf. *C. A.* **34**, 319[2]. G. W. King 8

β-Rays from radioactive isotopes, Ni^{63}, Zn^{63}, Zn^{65}, Zn^{69}, Zn^{69*}, Ga^{68}, Ga^{70}, Ga^{72}, Ge^{71}, Ge^{75} and Ge^{77}. R. Sagane, S. Kozima and G. Miyamoto. *Proc. Phys.-Math. Soc. Japan* **21**, 728–42(1939) (in English).—The β-ray (electron or positron) spectra of the above listed elements were studied by measuring curvatures of cloud-chamber tracks in a magnetic field. A. O. Allen 9

Further applications of the photographic method in nuclear physics. C. F. Powell *Nature* **145**, 155–7 (1940); cf. *C. A.* **34**, 1243[7].—The method is useful for measuring the energy and direction of neutrons, protons and γ-rays. It gives a permanent record in a thick photographic emulsion of the length and direction of each track. The technique is described in detail. To show applications of the method, data are given for the distribution of 1700 forward neutrons from F + D at 900 kv., for the range-angle distribution of 500 proton tracks scattered by B + D neutrons and for the energy distribution of all tracks projected within 40° of the direction of the incident neutrons. G. M. Petty 10

Cloud chamber with electric automatic control. F. Barendregt and G. J. Sizoo. *Physica* **6**, 1077–84(1939) (in English). G. W. King 11

Radiation measurements in the short-wave ultraviolet by means of the selenium blocking-layer cell. Fritz Rössler. *Z. tech. Physik* **20**, 291–3(1939).—Several methods are described for making such measurements. The most useful is to det. the difference between a filtered and an unfiltered cell. J. B. Austin 12

Influence of metastable atoms on the inertia of gas-filled photocells. N. A. Penn. *J. Tech. Phys.* (U. S. S. R.) **9**, 1712–8(1939).—The amplitude *a* of the intermittent current produced by an intermittent illumination of a K_2S-K cathode in Ne decreases when the frequency increases. At a const. frequency (1500–12,000 cycles) *a* diminishes when the applied voltage rises. Addn. of 0.1% of A lowers *a* at all frequencies, while 0.5 or 1% of A increases *a* at lower frequencies (e. g., 1000 cycles) and lowers it at high frequencies (e. g., 10,000 cycles). The increase of *a* on addn. of A is due to collisions between A and metastable Ne atoms; and the decrease of *a* is explained by the reduction of the ignition voltages by A. J. J. Bikerman 13

The soft component of cosmic rays at sea level. Ig. Tamm and S. Belenky. *J. Phys.* (U. S. S. R.) **1**, 177–98 (1939). S. L. Gerhard 14

An ultrasoft component of cosmic radiation. I. G. P. S. Occhialini and Mario Schönberg. *Ann. acad. brasil. sci.* **11**, 351–5(1939); cf. *C. A.* **33**, 9122[6].—From a study of the ionizing part of cosmic radiation by means of a system of 2 Geiger-Muller counters, it is concluded that the corpuscles of the ultrasoft radiation have energies lower than 5×10^6 e. v., that the ultrasoft radiation has no zenithal effect, and that it constitutes 12% of the total ionizing radiation, within an error of 50%. A. H. K. 15

Shallow tracks [produced] by cosmic rays. A. Zhdanov. *Compt. rend. acad. sci. U. R. S. S.* **22**, 163–5(1939).—At. disintegrations produced by cosmic rays have been studied by the photographic technique previously employed (*C. A.* **33**, 3679[9]). By measuring the lengths of the proton tracks and the curvature of the mesotron tracks the momenta of the various particles have been detd. and the conservation of momentum has been established for a no. of collisions. It is suggested that in addn. to Bohr's liquid drop theory of nuclear disintegration other processes play a part in the interaction of cosmic rays and matter. B. C. P. A. 16

Decay of the penetrating cosmic rays. II. E. M. Bruins. *Proc. Acad. Sci. Amsterdam* **42**, 740–4(1939) (in English); cf. *C. A.* **33**, 6141[6].—The absorption of penetrating cosmic rays and the effect of barometric pressure are calcd. E. O. Wiig 17

The secondary radiation of cosmic rays. Giuseppe Cocconi and Vanna Tongiorgi. *Nuovo cimento* **16**, 447–55 (1939).—The divergence of sheaves is detd. as a function of angular aperture by means of a triple counter. For soft rays the results were as expected. For hard rays the effects observed by Bothe and Schmeiser (*C. A.* **32**, 4872[7]) at small angles were not confirmed. The production of secondary rays from hard rays increases as the at. no. of the producing material decreases. J. B. Austin 18

The secondary γ-radiation ("Bremsstrahlung") excited by the β-Particles of $_{15}P^{32}$. G. J. Sizoo, C. Eijkman and P. Groen. *Physica* **6**, 1057–76(1939)(in English). G. W. King

Production of neutrons by cosmic rays. G. Cocconi and V. Tongiorgi. *Naturwissenschaften* **27**, 211(1939); cf. *C. A.* **34**, 1909[8].—The expts. of Froman, *et al.*, have been repeated, but the occurrence of neutrons to the extent of 30% of the hard component of cosmic rays could not be confirmed. If the effect is real it is much less than this. B. C. P. A.

Further investigation of the γ-rays from cadmium under slow-neutron bombardment. W. H. Jordan *Proc. S Dakota Acad. Sci.* **19**, 75–6(1939); cf. *C. A.* **33**, 1209[5]. — In an attempt to increase the amt. of radiation from Cd, the exptl. procedure previously used was changed so that (1) the paraffin blocks were replaced by a large tank of water in which the neutron source was immersed, (2) small tanks of aq $CdSO_4$ instead of Cd strips were placed near the cloud chamber and (3) $CuSO_4$ soln. was used in control expts. From the results of 20,000 photographs, yielding 60 measurable electron pairs, it was found that (1) the no. of electron pairs was not appreciably increased by the new arrangement, (2) nearly as many pairs were obtained from the $CuSO_4$ soln. as from the Cd and (3) the distribution of the pairs on a graph on which the no. of pairs in a given energy interval is plotted against the energy, is much the same as that observed from Be bombarded by α-particles. It is concluded that any radiation coming from the Cd was completely masked by the radiation from the neutron source and that in measuring γ-rays from Cd, a stronger neutron source (from a high-voltage tube or cyclotron) and one without the intense γ-ray background should be used. George Ayers

Salts of radium mixed with beryllium as a source of neutrons. Z. Ollano. *Nuovo cimento* **16**, 456–8(1939); cf. *C. A.* **33**, 5282[4], 5284[8].—Comparison of the no. of neutrons emitted per sec. per millicurie by two sources composed of mixts. of Ra salts with Be revealed a significant difference which was traced to faulty mixing in one case. J. B. Austin

Measurements of the neutron-proton scattering cross section. Lennart Simons. *Kgl. Danske Videnskab. Selskab, Math.-fys. Medd.* **17**, No. 7, 16 pp.(1940)(in English); cf. *C. A.* **33**, 6142[4].—The cross section for scattering of thermal neutrons by protons in paraffin wax was detd. by using both Ag and I detectors, a Geiger-Muller counter and a Ra + Be neutron source. Results, obtained for different detectors, water layer thicknesses and distances of the detector from the paraffin block, agree within the statistical error. The most probable value of the mean free path of the resonance neutrons in water at room temp was found to be 0.91 cm. If the chem. binding forces were considered this gave a value of 11×10^{-24} sq. cm. for the scattering cross section (σ) of free protons relative to slow neutrons (energies less than 10,000 v.). The cross section for protons in paraffin for neutron energies well above the binding energies of the protons was also measured directly by using the activity produced in various elements as a detector for such neutrons, where the activation was effected through a shield of Cd. The mean free path in paraffin of the "resonance" neutrons of these elements was found to be 1.1 cm., which corresponds to a value of about 11.5×10^{-24} cm. Use of the exptl. value of σ in Wigner's formula (*C. A.* **31**, 4581[7]) gave 99360 e. v for the proper energy of the singlet state of the deuteron. The app. and procedure used are described. Frank Gonet

Angular distribution of neutrons scattered by protons. Tosinosuke Muto. *Proc. Phys.-Math. Soc. Japan* **21**, 808–9(1939)(in English).—Math. A. O. Allen

Note on *p*-wave anomalies in proton-proton scattering. G. Breit, C. Kittel and H. M. Thaxton. *Phys. Rev.* **57**, 255–9(1940); cf. *C. A.* **33**, 6135[5,6], 6142[6].—A comparison of calcd. and observed angular distributions for proton energies of 2.0, 2.4 and 3 m. e. v. indicates that *p*-wave effects predicted by Bethe's neutral form of meson theory with a mass of 180 are too large, since they give too much small-angle scattering. F. E. B.

Inner-shell ionization of atoms by electron impact. E. H. S. Burhop. *Proc. Cambridge Phil. Soc.* **36**, 43–52 (1940).—Calcns. with the Born approximation are made of the ionization by electron impacts of the *K*-shells of Ni, Ag and Hg and of the three *L*-shells of Ag and Hg. Relativistic effects and the exchange between scattered and ejected electrons are neglected. The calcns. are carried out with screened hydrogenic wave functions. The effects of the approximations are discussed. For *K*-shell ionization the agreement with exptl. data is reasonably good. In the case of the *L*-shell the agreement is only fair. H. C. Thomas

An ion-probe of great sharpness. Manfred von Ardenne. *Z. tech. Physik* **20**, 344–6(1939).—An app. for sampling a bundle of canal rays of small cross-section It uses a new electrostatic lens. It has application to the electron microscope and to the study of chem. reactions at a point. J. B. Austin

The interpretation of ionization measurements in gases at high pressures. Elizabeth Kara-Michailova and D. E Lea. *Proc. Cambridge Phil. Soc.* **36**, 101–26(1940). — A theory is described which enables the calcn. of the proportion of ions, as a function of gas pressure and collecting field, escaping recombination in the clusters resulting from ionization by γ-radiation in gases at high pressures The predictions of the cluster recombination theory are shown to be in satisfactory agreement with exptl. data It is shown that the extension of Jaffe's theory of columnar recombination to the case of ionization produced by fast electrons or γ-rays is incorrect. H. C. Thomas

The nuclear mass and radioactivity of $_1H^3$. S. C Sirkar and K. C. Mukherji. *Science and Culture* **5**, 143(1940).—The data of Alvarez and Cornog (*C. A.* **33**, 3196[6]) and of Livingston and Bethe (*C. A.* **31**, 8340[9]) are recalcd. and shown to be compatible. $_1H^3$ emits one electron with small kinetic energy and is transformed into $_2He^3$. The radiation from $_1H^3$ is β-radiation G. M. P.

Bombardment of nitrogen and oxygen with protons. S. C. Curran and J. E Strothers. *Nature* **145**, 224 (1940) —In the reaction $N^{14} + H^1 \rightarrow O^{15} + h\nu$, the yield is 1.5×10^{-11} positrons per proton of energy 0.90×10^6 e. v. The reaction $N^{15} + H^1 \rightarrow O^{16} + h\nu$ could not be detected. In the reaction $O^{16} + H^1 \rightarrow F^{17} + h\nu$, the yield is 8.0×10^{-12} positrons per proton of energy 0.95×10^6 e. v. The relative intensities for the 2 reactions are plotted against proton energies of 550–960 kv. G. M. Petty

Products of the fission of uranium and thorium under neutron bombardment. Lise Meitner and O. R. Frisch *Kgl. Danske Videnskab. Selskab, Math. fys. Medd.* **17**, No. 5, 14 pp.(1939)(in English); cf. *C. A.* **33**, 4869[5]. F. O. Wiig

Fission of uranium nuclei. N. F. Volkov. *Compt. rend. acad. sci. U. R. S. S.* **24**, 528–30(1939)(in English). — Introductory expts. were carried out in an approach to the problem of the existence of transuraniums, based on Bohr's theoretical concepts explaining the fission of Th and U nuclei (*C. A.* **32**, 3253[6]; **33**, 3685[4]). The following expts. were carried out to ascertain whether the process of nuclear fission takes place not only at the very moment of bombardment of U with neutrons, but also somewhat after the bombardment has ceased: (1) 62 g. of Na uranate was bombarded for 24 hrs. by neutrons from the Radium Inst. of the Acad. of Sci. cyclotron, the reaction being $_1D^2 + _1D^2 \rightarrow _2H^3 + _0n^1$. The neutron intensity was approx. that of 20 curies Rn + Be. After bombardment the Na uranate was scattered over an area of 3500 sq. cm., and 2 layers of tissue paper were placed at a distance of 7–10 cm. from the surface of the U. Five hrs. later the paper was removed and burned and the ash measured for activity with a Geiger-Muller counter. The recoil atoms were collected 5 times at 5-hr. intervals and each time the ash showed an activity that gradually decreased with a half-life equal to 6.5 hrs (2) One g. of green U oxide was spread over a surface of 700 sq. cm., surrounded with paraffin and bombarded for 24 hrs. Glass plates were kept 3 mm. from the surface for 4 hrs., then were

removed. Filter paper soaked in 7% HCl was used to wipe the surface facing the U and was dried; it always proved active, showing the same 6.5-hr. half-life period. A control expt., with ordinary U, showed no activity in glass or paper after several days. (3) Fission products of U nuclei bombarded (24 hrs.) by neutrons (20 curies Rn + Be) were collected on glass, by the method of radioactive recoil (cf. Khlopin, Pasvik-Khlopina and V., *C. A.* **34**, 1556[1]). The glass was removed and covered with 2 layers of paper for 2 hrs. The papers touching the glass and the 2nd layer were burned separately and gave 2 half-lives of 4 and 19 hrs., resp. Further work is reported in progress on the examn. of the tracks of subsequent fission of U nuclei and of its heavier products by the method of differential counters, the Wilson cloud chamber and thick-layered photoplates. Also an attempt at discovering the gaseous decay product and detg. its chem. nature is planned. Frank Gonet

Preparation of thin films of uranium and thorium by cathode sputtering. C. C. Van Voorhis *Rev. Sci Instruments* **11**, 77(1940).—Very thin Al foil, which was to be sputtered, was shellacked to a geometrically perforated Al plate 0.05 mm. thick and covered with a similar Al plate 1 mm. thick. This assembly was screwed to a water-cooled Cu plate Square and round rods of U and Th, resp., were used as cathodes instead of thin ribbons, which warped and localized the discharge at one spot on the foil The sputtering was done in an A atm. at 0.1 mm. With a half-wave rectified current of 16–30 ma. at 3000 v. a film of 0.1 mg. U per sq. cm. was deposited in 100 min. H. G Bowlus

Electrocapillary theory of the splitting of heavy elements by slow neutrons. Ya. I. Frenkel. *J. Phys. (U. S. S. R.)* **1**, 125–36(1939).—See *C. A.* **33**, 9115[7]. A. D.

Energies of β-particles from uranium X_2. D. Roaf. *Nature* **145**, 223(1940); cf. *J. Sci. Instruments* **17**, 19 (1940).—When the end-point energy of UX_2 is detd. from the curvature of β ray tracks in a Wilson chamber, the value 1.6 m. e. v. is obtained, in agreement with the value in the "*Tables annuelles de constantes*" **26**, 13(1938). When the energy spectrum of a very thin film of UX_2 is measured with a magnetic spectrometer and coincidence counter, the end point 2.3 m. e. v. is obtained, in agreement with the absorption and magnetic focusing values. G. M. Petty

Radium quantity meter. Robert B. Taft. *Am. J. Roentgenol.* **42**, 900–2(1939).—The Ra is placed between 2 large ionization chambers, and current, amplified by a 6J7 tube, is read on a microammeter. All the parts are assembled in a cabinet for convenient routine use. R. B. Wilsey

Applications of x-ray technique to industrial laboratory problems. H. P. Rooksby. *J. Roy. Soc. Arts* **88**, 308–38(1940).—A review. G. G.

Precision measurement of lattice constants by a compensation method. H. van Bergen. *Ann. Physik* **33**, 737–52(1938); cf. *C. A.* **31**, 7717[8].—The method of Kossel (*C. A.* **30**, 7028[8]) is developed for use with external radiation. B. C. P. A.

Auger and secondary x-ray electrons from gold. R. L. Mayo and H. R. Robinson. *Proc Roy Soc.* (London) **A173**, 192–200(1939).—The energies and approx. relative intensities of the Auger electrons emitted by Au atoms which have been ionized in their *L*-levels are detd. in the magnetic spectrograph. Since more powerful methods than those used here are found to be required to elucidate the complete Auger spectrum, only an incomplete comparison is given of the Auger energies and the energies of the x-ray electrons expelled by primary Au *L*-radiations from normal Au atoms. A new value of $h/e = 1.380_6 \times 10^{-17}$ is deduced from the results of the measurements on the x-ray electron groups. This value is in excellent agreement with that deduced from the Rydberg const. with Bohr's formula. E. O. Wiig

Diffraction of x-rays and electron rays in crystals. I. Theory of structure determination. J. M. Bijvoet and C. H. MacGillavry. *Nederland. Tijdschr. Natuurkunde* **6**, 261–74(1939).—The kinematic theory is dealt with in some detail, including the Fourier and Patterson analysis **II. Results of x-ray analysis. Scattering power of atoms. Diffraction of electron rays.** *Ibid.* 281–99.—A review of miscellaneous results. **III. Dynamic theory. Kossel and Kikuchi lines.** *Ibid.* 301–14. B. J. C. van der Hoeven

Simple photoelectric microdensitometer. M. Spiegel-Adolf and R. H. Peckham. *Ind. Eng. Chem., Anal. Ed.* **12**, 182–4(1940).—The app. makes it possible to give a graphical description of an *x*-ray diffraction pattern. A photoelec. cell mounted on the rack of a microscope stand is illuminated by light passed through the photographic plate. The plate is moved by means of a delicate mech. stage and a position *vs.* relative transmission curve is detd. Measurements can be duplicated to within 2%. T. H. Dunkelberger

The northern lights and the ionosphere. L. Vegard. *Scientia* **67**, 37–43(1940).—The origin of the spectral lines of the aurora borealis is discussed. L. E. Gilson

The β-ray spectrum of radiochlorine. Yuzuru Watase and Zyunkiti Ito. *Proc., Phys.-Math. Soc. Japan* **21**, 626–32(1939).—The β-ray spectrum of radiochlorine (37.3 min.) was investigated with a magnetic spectrometer and found to be composed of 2 clearly resolved groups with excitation levels at 4.99 ± 0.06 m. e. v. and 1.08 ± 0.06 m. e. v. The results are discussed from the point of view of the Fermi and K.-U. (Konopinski-Uhlenbeck) plots. From 2.6 m. e. v. to the end-point of the spectrum, the Fermi plots lay on a straight line; while the K.-U. plots lay on a straight line except near the end-point. Using the absorption method the authors found the max. range of the electrons to be 2.37 g./sq. cm. and conclude that Feather's rule must be revised for higher energies (5 m. e. v.). The authors also show that the radiation is due to a single isotope of radiochlorine and not to 2 sep. isotopes, Cl^{36} and Cl^{38}, having nearly the same periods. Frank Gonet

Emission nebulae in Messier 101. Carl K. Seyfert. *Astrophys. J.* **91**, 261–3(1940).—Ten nebulous objects emitting the Balmer radiations of H and other radiations, such as the 3727 A. line of O II, have been detected in the large late-type spiral nebula *M* 101. C. C. Kiess

A meteor spectrum of high excitation. A. N. Vyssotsky *Astrophys. J.* **91**, 264–6(1940).—Lines of neutral and ionized Fe, Mg, Mn, Cr, Ca and Si have been identified in the spectrum of a high-velocity meteor that flashed in the field of a prismatic camera on Oct. 20, 1939. C. C. Kiess

Double reversal of the *H* and *K* lines in the spectrum of α Bootis. Peter Wellmann. *Z. Astrophys.* **19**, 236–48 (1940).—The *H* and *K* lines of Ca II in the spectrum of this star consist of narrow central absorptions superposed on emission lines which, in turn, are superposed on broad absorptions. The data derived from photometric measurements of these lines suggest the presence in the star's atm. of a layer of Ca vapor of small optical depth but at a temp. about 1000° higher than the surrounding atm. C. C. Kiess

The variable spectrum of α^2 Canum Venaticorum. W. S. Tai. *Monthly Notices Roy. Astron. Soc* **100**, 94–127(1939).—A reinvestigation of the spectrum of this star confirms the previous findings of others that many of its fainter spectrum lines are of variable intensity and belong mainly to 2 groups, the one group being visible when the other is very faint or absent. To group *A* belong lines of Eu II, Dy II, Gd II, Ce II, Ca II, many lines of Ti II, Sr II, Sm II, Y II and Zr II. To group *B* belong the lines of H, Si II, Mg II, Fe II, Cr II. In general the group *B* lines have higher excitation potentials than those of group *A*, indicating that excitation conditions in the star's atm. are variable. C. C. Kiess

Spectral energy curve of the sun in the ultraviolet. Edison Pettit. *Astrophys. J.* **91**, 159–85(1940).—Spectral energy measurements of solar radiation were made both with integrated sunlight and with light only from the center of the sun's disk. The tabulated results reduced to no atm. and giving the no. of w. per sq. m per

100 A. show that from wave length 0.40 to 0.38 μ there is sudden drop of 48% in the solar energy, a nearly const. value from 0.38 to 0.325 μ, followed by a linear fall from 0.325 to 0.292 μ. The atm. transmission coeffs. have been detd. and from them the O_3 content of the earth's atm. has been found to be 0.10 cm. at normal temp. and pressure. Wave lengths and intensities of lines in the O_3 band between 3090 and 3440 A. have also been measured. C. C. Kiess

The hypothesis of the existence of contraterrene matter. V. Rojansky. *Astrophys. J.* **91**, 257–60(1940).—At. theory has led to the conjecture that in some parts of space there may exist atoms whose nuclei are charged negatively and whose extranuclear members are positrons. Such atoms and their constituents and aggregations are designated as contraterrene, while ordinary matter is called terrene. From sym. considerations it is concluded that the spectra of an atom and of its contraterrene counterpart would be identical and that on collision they would annihilate each other with conversion of mass into energy. Expts. are suggested for detecting this energy should it be released in the earth's atm. or in nearby space through encounters of terrene matter with meteoric or cometary bodies composed of contraterrene matter C. C. Kiess

The continuous absorption of light by negative hydrogen ions. II. S. W. Massey and D. R. Bates. *Astrophys. J.* **91**, 202–14(1940).—An accurate theory of the continuous absorption of light by H ions is presented in which various effects not previously considered are included in the calcn. of the absorption coeffs. H ions provide a source of continuous absorption of long-wave radiation which, as shown by Wildt (*C. A.* **34**, 6748), is of importance in the detn. of stellar absorption coeffs. C. C. Kiess

Metastability of hydrogen and helium levels. G. Breit and E. Teller. *Astrophys. J.* **91**, 215–38(1940). The manner in which the mean life-times of H atoms in the 2*s* state and of He in the $1s2s\ ^1S$ state are influenced by the static and dynamic effects of electrons under the pressure conditions of interstellar space is investigated. It is found that the collisional effect is more important than the static leading to a transition probability of the order of $^1/_{600}$ per sec. for electron temps. of about 10,000° and a density of about 30 electrons per cc. C. C. K.

Note on the surface temperature of Venus. Rupert Wildt. *Astrophys. J.* **91**, 266–8(1940).—The amt. of CO_2 in the atm. of Venus has been variously estd. as equiv. to a layer 200 and 400 m. thick under standard conditions of temp. and pressure. An approx. temp. of 408°K. has been found for the planet on the assumption that the CO_2 acts like a perfect reflector for its characteristic radiation, and that the planet's surface behaves like a gray radiator with absorption coeff. $(1-\epsilon)$ for infrared radiation, ϵ being the ratio of the total radiation of CO_2 to that of a black surface of equal temp. C. C. K.

Interaction of atomic energy levels. T. S. Subbaraya, K. Seshadri and N. A. Narayana Rao. *Current Sci.* **8**, 508–10(1939).—Spectrograms of Hg and Zn and of their mixts. were obtained. Three portions of the spectrogram are reproduced, and the effect on each frequency is discussed. II. *Ibid.* **9**, 14–18(1940).—The spectra of Hg, Cd and of their mixts. were studied by the method described previously. At. energy level diagrams are developed, and the weakening or strengthening of the individual lines is discussed. G. M. Petty

The normal electron configuration of singly ionized gadolinium. W. E. Albertson, Hendrik Bruynes and Richard Hanau. *Phys. Rev.* **57**, 292–3(1940).—The normal electron configuration of Gd II is established as $4f^75d6s$. Electrodes composed of a Ag–Gd mixt. were prepd. by pressing and then sintering a Ag powder–Gd salt mixt. With these electrodes, Zeeman-effect photographs were obtained with a field of 81,500 gausses at a dispersion of 0.8 A./mm. throughout the range of λλ 2400–3900 A. Although the Gd lines were fairly faint, several lines were completely resolved, with all of their Zeeman-effect components showing; this enables the unique detn. of both the *J* values and *g* values of the levels involved. Excellent agreement is shown between calcd. and observed Landé *g* values. The fact that all of the fundamental lines of the spectrum are now classified casts serious doubt on the proposition that levels lower than those of the ^{10}D exist. Energy levels and multiplets are given in tables. Edward J. Mahler

Zeeman effect from liquids, solutions of salts of europium. Simon Freed, S. I. Weissman and G. J. Rotariu. *J. Chem. Phys.* **8**, 291(1940).—Zeeman splitting of the absorption lines of aq. solns. of $Eu(NO_3)_3$ near 4650 A. is reported. At 33,000 gausses a sepn. of 7 ± 1.5 cm.$^{-1}$ was obtained. Altogether different results were obtained with solns. of $EuCl_3$. G. M. Petty

Intensities of electronic transitions in molecular spectra. IX. Calculations on the long-wave-length halogen spectra. Robert S. Mulliken. *J. Chem. Phys.* **8**, 234–43(1940); cf. *C. A.* **33**, 8114[2].—Math. The dipole strength D_{NQ} for the perpendicular-type $N \rightarrow Q$ transitions in the long-wave spectra of halogen mols. is computed theoretically according to each of 2 approximations. The atomic orbitals and exptl. values are in good agreement. G. M. Petty

Conditions influencing the intensity of the $^4\Pi-1\ ^1\Sigma$ Cameron bands of CO. Geo. E. Hansche. *Phys. Rev.* **57**, 289–91(1940).—Conditions influencing the intensity in emission in the electrodeless ring discharge have been studied in some 50 exposures planned so as to distinguish between the effects of pressure, power input and frequency. The bands are intense in a large discharge tube at a pressure of about 0.005 mm. or less. Under these conditions the mean free time between collisions of CO mols is 2.5×10^{-5} sec., from which the lifetime of the $^3\Pi$ state is estd. as about 10 microseconds. Marked increases of intensity relative to that of other band systems in the same spectral region are produced by increasing the energy of discharge and by lowering the pressure. This indicates that the excitation function of the Cameron system differs significantly from those of the systems with which it is compared. To illustrate the results, the region 2150–2190 A., cont'g. the Cameron bands, the fourth pos. and the first neg. systems has been chosen, since the quartz spectrograph has good dispersion in this region, and the bands included respond to changes of pressure and power input in a way which is typical of the systems to which they belong. Microphotometer traces of this region photographed under a variety of conditions are shown in 5 figures, for which exposure data are tabulated E. J. Mahler

The predissociation of several diatomic molecules. G. Herzberg and L. G. Mundie. *J. Chem. Phys.* **8**, 263–73(1940).—From the observed anomalous intensity distribution in the S_2 bands it is concluded that the dissocn limit for the first predissocn. of S_2 lies appreciably below the predissocn. limit (4.4 e. v.). The anomalous intensity and the diffuseness persist even at very low pressures (0.01 mm.); this is a case of genuine predissocn. and not pressure broadening, as assumed by Lochte-Holtgreven (*C. A.* **31**, 2096[3]). The second predissocn. of S_2 starting with the 18–0 band leads to an upper limit of 3.6 e. v. for the heat of dissocn. of S_2. An anomalous intensity distribution similar to that of S_2 is found for NO if it is assumed that the ϵ absorption bands are a continuation of the γ bands. This indicates a predissocn. of NO in the upper $^2\Sigma$ state of the γ bands into normal atoms with a limit 1.3 e. v. above the dissocn. limit. The remarkable intensity distribution found by Schüler, *et al.* (*C. A.* **33**, 6153[9]) in the CuH emission band λ4280 at low pressure is due to a predissocn. into the $^2\Sigma^+$ state derived from normal $Cu(^2S)$ and normal $H(^2S)$. Such a state cannot cause the predissocn. of the level $J' = 0$ in agreement with observations. The heat of dissocn. of CuH is less than 23,325 cm.$^{-1}$ (i. e., less than 2.892 e. v.). The method previously suggested (*C. A.* **27**, 1572; **29**, 2446[7]) for the detection of maxima of potential curves is applied to AlD (AlH) and BH. From the breaking off points observed in the visible bands of these mols. it is established that their $^1\Pi$ states have potential curves with maxima. Therefore, the dissocn. energies are appreciably lower than the energies

of the observed breaking-off points, i. e., D_0(AlH) less than 24,775 cm.$^{-1}$, D_0(AlD) less than 25,010 cm.$^{-1}$, and D_0(BH) less than 28,350 cm.$^{-1}$. G. M. Petty

The absorption of iodine in some of its principal solvents. Francesco Cennamo. *Nuovo cimento* **16**, 355–9(1939).—The spectrum of I dissolved in C_6H_6, CCl_4, CS_2, $CHCl_3$, CH_3OH and acetone is detd. in the visible and ultraviolet. In solvents with no dipole moment the spectrum resembles that of I vapor. If the solvent has a dipole moment, the spectrum differs for each soln. J. B. Austin

Flame and arc spectra of some calcium and strontium salts. R. K. Asundi and B. K. Vaidya. *Nature* **145**, 224(1940).—The flame and arc spectra of $SrCl_2$ and $CaCl_2$ are usually contaminated with O: the anomalous doublet sepn. of ~600 cm.$^{-1}$ is due to this contamination. When the oxide bands are eliminated, the remaining bands can be arranged in a system with a doublet sepn. of about 260 cm.$^{-1}$, in reasonable agreement with theory. The bright continuous bands which start at 18,005 cm.$^{-1}$ in Ca and at 16,352 cm.$^{-1}$ in Sr are due to metal mols. of the van der Waals type. G. M. Petty

Change of the ultraviolet absorption spectrum of acrolein with time. A. M. Buswell, E. C. Dunlop, W. H. Rodebush and J. B. Swartz. *J. Am. Chem. Soc.* **62**, 325–8 (1940).—The change in the absorption spectrum of acrolein in H_2O and alc. solns. was detd. over a period of time. The absorption due to the carbonyl of the acrolein changes with time, and the change is slowed down in the presence of an antioxidant. A new band that appears at 2670 A. is probably due to the carbonyl of a mol. formed by the polycondensation of the acrolein, since the product described by Gilbert and Donleavey (cf. *C. A.* **32**, 7410[8]) gives the same absorption band. The effect of hydroquinone and tannic acid on the spectrum of acrolein was detd. Curves for propionaldehyde in H_2O and 50% alc. solns., for acetal in H_2O, paraldehyde in 50% alc. and aldol in 50% alc. are given. A. B. Garrett

The relation between the energy of a hydrogen bond and the frequencies of the O-H bands. Richard M. Badger. *J. Chem. Phys.* **8**, 288–90(1940); cf. *C. A.* **32**, 463[3].—A relation has previously been shown between the energy of a H bond and the shift in frequency of the O-H bands which accompanies the formation of the bond. When the shift (0–600 cm.$^{-1}$) in frequency of the third harmonic O-H band (in the region 9500–11,000 A.) which accompanies this change is plotted against bond energy (0–7500 cal.) the points for CH_2ClCH_2OH, PhOH in C_6H_6, *o*-$Cl_2C_6H_4$, H_2O and MeOH lie on a flat curve. The carboxylic acids do not lie on this curve. G. M. Petty

Vibration spectra and molecular structure. IX. Further studies of the vapors of the fatty acid series. Robert C. Herman. *J. Chem. Phys.* **8**, 252–8(1940); cf. *C. A.* **33**, 8115[6].—The monomer spectra of the vapors of PrCOOH, PrCOOD and BuCOOH were obtained from 1 to 12 μ at about 150° and pressures of 6–23 mm. The assocn. of HCOOH, HCOOD and PrCOOD was studied in the vapor phase: the bond strengths are 6.2, 6.1 and 6.9 kg.-cal./mole/bond, resp. The fact that the bond strengths for HCOOH and HCOOD agree within the exptl. error, although the detns. were made with different bands, is further evidence that the spectroscopic method is satisfactory. The lower value obtained for HCOOH compared to the vapor d. value is discussed. It is not possible to claim the existence of a simple linear relationship between the bond strength and $\Delta\nu/\nu$. Some results concerning ν(CH) absorption in the first 5 members of the fatty acid series are given. G. M. Petty

Infrared and Raman spectra of molecules. Anna Ciccone. *Nuovo cimento* **15**, 482–521(1938).—A comprehensive review of the theory of infrared and Raman spectra and of their application in investigating the structure of di- and poly-at. mols. B. C. P. A.

Spectroscopic evidence for hydrogen bonds: SH, NH and NH_2 compounds. Walter Gordy and Spencer C. Stanford. *J. Am. Chem. Soc.* **62**, 497–505(1940); cf. *C. A.* **34**, 1562[4].—Infrared-spectrum methods were used to study assocn. of mercaptans and amines with certain electron donner solvents. In ethyl-*o*-toluidine the SH band of thiophenol was virtually unaffected; in isopropyl ether and in aniline only a slight perturbation of the band occurred; in pyridine, α-picoline and dibenzylamine there was a shift of approx. 0.18 μ to the longer wave lengths, together with a broadening and a marked increase in intensity. These effects are believed to indicate H bonding between the latter solvents and thiophenol, with the SH group donating the proton. Similar but less pronounced effects were observed for butyl mercaptan, benzyl mercaptan and thioacetic acid with some of these solvents. Evidence that thiophenol is not polymerized in the liquid state was obtained when it was observed that the SH band appears in the same position in a 0.1 *M* soln. of thiophenol in benzene as it does in the pure liquid. The amines studied have basicity consts. about the same as, or lower than, that of aniline. All were found to be assocd. through H bonds except those for which steric hindrance would be expected to prevent the assocn. The absorption spectrum of the NH or NH_2 group of the unassocd. amine in dil. soln. of CCl_4 was obtained and compared with the absorption of the same group of the pure liquid or a concd. soln. when the compd. was a solid. Each of the compds. was studied in an oxygenated solvent, butyl ether, in order to detect complex formation through NH → O bonds with the ether. The results indicate that the following compds. are polymerized in the pure state and form complexes with the ether: pyrrole, diphenylamine, *o*- and *p*-toluidine, α-naphthylamine, *o*- and *m*-chloroaniline. Indole does not polymerize but it does appear to form a compd. with butyl ether. Ethyl-*o*-toluidine apparently neither polymerizes nor forms complexes; its lack of assocn. can be attributed to steric hindrance. Evidence for chelation was obtained for Me anthranilate and *o*-nitroaniline; chelation probably prevents appreciable polymerization or complex formation. The compd. α-naphthol was found to be more strongly assocd. than the NH or NH_2 compds. of similar structure. Tables of the position of the SH band of the mercaptans studied and for the minima in the transmission curves for the NH and NH_2 compds. studied are included. A. B. Garrett

The infrared absorption spectrum of methylamine. Ralph G. Owens and E. F. Barker. *J. Chem. Phys.* **8**, 229–32(1940).—The parallel type $MeNH_2$ band at 10 μ was resolved. The center is at 1045.27 cm.$^{-1}$. It closely approximates axial symmetry. The mean of the 2 largest moments of inertia is 37.43×10^{-40} g. sq. cm. The C-N distance is 1.48×10^{-8} cm. There may be a superposed perpendicular band. The 13-μ band is assigned to a motion corresponding to ν_3 in NH_3. Other bands were examd. but could not be resolved. G. M. Petty

Special transmission of glucose glass in the near infrared. Willi M. Cohn. *J. Chem. Phys.* **8**, 232–3(1940); cf. *C. A.* **32**, 2429[4].—Transmission data are given from 4400 A. to 9800 A. for 7 glucose glasses with various thermal histories. No limit of absorption was found up to 12,000 A. (the photographic limit). G. M. Petty

Effect of crystal orientation on the Raman spectrum of sodium nitrate. T. M. K. Nedungadi. *Proc. Indian Acad. Sci.* **10A**, 197–210(1939); cf. *C. A.* **33**, 4873[9].—The Raman spectrum of cryst. $NaNO_3$ was obtained at different orientations of the crystal relative to the directions of incidence and observation and different states of polarization of the incident and scattered radiations. The principal observation is that the 98 and 185 cm.$^{-1}$ lattice vibrations disappear when the lines corresponding to the internal oscillations, 720, 1065 and 1385 appear and vice versa when the incident light is polarized and the scattered light analyzed. The 2 lattice lines also disappear in the longitudinal scattering of unpolarized light incident along the optic axis. This indicates that these oscillations are in the nature of a torsional movement or tilt of the NO_3^- ions in the cryst. lattice. The strong birefringence of the crystal causes the internal oscillations to appear more strongly when the incident light vector is in the plane of the NO_3^- group than when it is perpendicular to it. The induced moment does not coincide in direction with the incident light vector for the sym. oscillation of the

NO_3^- ion excited by light vibrations in the plane of the ion. The incidence of a linear elec. oscillation probably either gives rise to elliptical polarization in the plane of the ion or the individual NO_3^- ion does not possess trigonal symmetry in its own plane. J. H. Hibben

Effect of crystal orientation on the Raman spectrum of calcite. S. Bhagavantam. *Current Sci.* **8**, 507–8(1939); cf. *C. A.* **33**, 4873[1].—A cube of calcite was cut so that its optic axis was parallel to one edge. The intensities of the Raman lines 155, 282, and 1084 were estd., both parallel and perpendicular to the direction of the incident light *OX*, with the optic axis in the *OX*, *OY* and *OZ* orientations and (separately) for light vibrating in the *OZ* and *OY* directions. The data of Nedungadi for $NaNO_3$ (preceding abstr.) are discussed, and are compared with these data. G. M. Petty

Raman spectra of some metatungstates, both crystalline and in aqueous solution. Marie Théodoresco *Compt. rend.* **210**, 297–8(1940); cf. *C. A.* **34**, 2256[1]. The Raman spectrum of Na metatungstate, $Na_2O.4WO_3.10H_2O$, prepd. as directed by Copaux (*C. A.* **3**, 2008[1]), both crystd. and in soln., and that of solid $BaO.4WO_3.nH_2O$ were detd. In all cases the spectra are characteristic; this indicates that the metatungstates are well-defined compds. differing from the neutral tungstates, and showing the presence of H_2O of crystn. in both the solid and dissolved states. C. A. Silberrad

Raman effect of symmetric difluorotetrachloroethane. Geo. Glockler and C. G. Sage. *J. Chem. Phys.* **8**, 291 (1940); cf. *C. A.* **34**, 1561[9]. The $\Delta\nu$, intensity, and mean deviation are reported for 22 Raman shifts in FCl_2CCCl_2F. G. M. Petty

Raman effect and chemical constitution. Influence of constitutive and other factors on the double bonds in organic compounds. II. Effect of the phenyl group or the carbonyl bond in esters. G. V. L. N. Murty and P. R. Seshadri. *Proc. Indian Acad. Sci.* **10A**, 307–16(1939); cf. *C. A.* **33**, 4874[7].—The Raman spectra of Ph benzoate, Ph acetate, Ph cinnamate and Me and Et benzoates were detd. in detail. The C=O frequency is 20 wave nos. $cm.^{-1}$ higher in the Ph ester than in the Me or the Et ester. The C=O frequency for the aromatic esters is lower than for the corresponding aliphatic esters. If the Ph group is not directly attached to the C of the carbonyl group but is attached through an O atom the C=O frequency is increased. These facts are explained from considerations of electrometric polarization and resonance. J. H. Hibben

Raman effect and dipole moment in relation to free rotation. XI. Raman spectra of deuterio 1,2-dibromoethanes. San-itiro Mizushima, Yonezo Morino and Akira Suzuki. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 281–5(1939); cf. *C. A.* **33**, 3222[4].—The Raman spectra of liquid and solid $1,2\text{-}C_2D_4Br_2$, $1,2\text{-}C_2H_3Br_2$ and liquid $1,2\text{-}C_2D_3HBr_2$ were detd. The totally sym. frequencies (C_{2h}) of solid *trans*-$1,2\text{-}C_2D_4Br_2$ were 188, 605, 907, 991, 1154 and 2183 wave nos. $cm.^{-1}$ and for $1,2\text{-}C_2H_4Br_2$ were 190, 660, 1053, 1255, 1440 and 2972 $cm.^{-1}$. The large increase in the no. of lines in the liquid as compared with the solid state is explained by supposing the mean internal configuration shows a considerable deviation from the transposition owing to the intermol. rotation around the C–C axis, the spectra from the liquid being that of the solid superposed on frequencies which are different from the trans form. Another explanation of the increase in the no. of lines is in the supposition that there is an oscillatory motion of small amplitude about the trans position which would alter the selection rules for the mol. sym. C_{2h} so that the normal vibrations antisym. to the center of the trans form are allowed in the Raman effect, the lines corresponding to the sym. vibrations remaining practically unchanged. Conclusion: there is no free rotation, in its literal meaning, around the C—C axis, the mol. tending to assume its most stable configuration. J. H. Hibben

Occurrence of overtone lines in the Raman effect. S. Bhagavantam. *Proc. Indian Acad. Sci.* **10A**, 224–8 (1939).—The intensities of fundamental and overtone frequencies of harmonic and anharmonic diatomic oscillators are calcd. Results are given for HCl, HBr, H_2, N_2 and O_2 which show that the intensity of the fundamental may be 150–500 times that of the overtone. J. H. H.

Continuous wings occurring in the Raman effect. K. Bapayya. *Proc. Indian Acad. Sci.* **10A**, 253–61(1939).—The intensity of rotational Raman scattering in gases is directly related to the optical anisotropy of the mol., but with liquids other phys. properties, such as viscosity and dipole assocn., as well as optical anisotropy influence the characteristics of the continuous wings scattered in the liquid state. The wing intensity of C_6H_6 was found to be large in comparison to cyclohexane even when the horizontal components, alone, of the scattered radiation are compared and in spite of the fact that the mols. have similar structures and moments of inertia. The intensity of the cyclohexane wing is, in turn, greater than that of AcOH although its optical anisotropy is less. C_6H_6 and AcOH exhibit the same depolarization factor and possess nearly the same optical anisotropy but AcOH exhibits a wing much less intense than C_6H_6. No sepd. maxima in the liquid wing were observed at 30 or 200°. There is an increase in the central portion of the wing with increased temp. The origin of the wing is considered to be in the rotary or oscillatory motion that occurs in solids but less sharply quantized, i. e., hindered rotation. J. H. H.

Dipolar absorption bands of capryl alcohol. Leo Cavallaro. *Ricerca sci.* **8**, I, 424–6(1937); *Chem. Zentr.* **1938**, I, 1309; cf. *C. A.* **31**, 8377[6]; **32**, 3268[1].—With capryl alc. the absorption maxima for the frequencies 5, 10.5, 18 and 26 m. lie between about + 30 and about −10°, the temp. decreasing with increasing frequency. Upon slowly cooling to about −43° the alc. is transformed into a white, glassy mass; at the same time the absorption bands for the frequencies investigated suddenly disappear. When the temp. is raised again, the glassy condition can be preserved up to about −35°; there the absorption suddenly appears again, but with 2 maxima. Obviously, the phenomenon is the result of viscosity changes and mol. assocn. M. G. Moore

Dipolar absorption bands of cetyl alcohol. Leo Cavallaro. *Ricerca sci.* **8**, II, 124–6(1937); *Chem. Zentr.* **1938**, I, 4309; cf. preceding abstract.—The dipolar absorption bands of cetyl alc. were detd. in the temp. interval 50–100° for the wave lengths 5, 10.5, 18 and 26 m. The shorter the wave length the more the absorption max. is displaced toward the higher temp. By use of the formula of Debye, the mol. radius of cetyl alc. was calcd. to be 9 A. If the absorption bands of cetyl alc. are compared with those of other alcs. it is apparent that with increasing no. of C atoms the absorption max. is displaced toward higher temp. M. G. Moore

The influence of quasi-crystalline structure on the molecular rotation and relaxation in dipole liquids. F. Fischer and G. Klages. *Physik. Z.* **40**, 721–8(1939).—The dispersions between 150 and 10 cm. are detd. for pure *acetone*, *PhCl*, *$PhNO_2$*, *o-$C_6H_4Cl_2$*, *decyl chloride*, *lauryl chloride* and *cetyl chloride* and are compared with data for dil. solns. in C_6H_{6}. The liquids with normal dipole interaction follow the Debye theory, but the alcs. deviate from it. J. B. Austin

The proportionality of the luminescence of zinc sulfide phosphors to [the] irradiation at low intensities. J. H. Gisolf and F. A. Kröger. *Physica* **6**, 1101–11(1939) (in English).—ZnS-Cu phosphors show a green and a blue band, ZnS-Ag show the same, with different relative intensities, probably due to Cu as an impurity, while ZnS-Mn show blue and yellow bands. Several expts. show that the relative intensity of these pairs of bands depends on the intensity of the radiation. An explanation is given based on known properties of phosphors. G. W. King

Dielectric losses of irradiated zinc sulfide phosphors. J. H. Gisolf. *Physica* **6**, 918–28(1939) (in English).—The dielectric losses of ZnS films in alternating fields varying from 1 to 15,000 kc. under the influence of radiation varying in wave length from 2500 to 5000 A. were measured. There was no loss in the region of the absorption bands of Mn ion, but at other wave lengths there was always some dielec. loss, showing that in the absorption of

light an electron is excited to a conducting energy level. When this electron drops back to its original level light is evolved as fluorescence; but when it drops back via metastable levels, phosphorescence results. The latter occurs in the tail absorption, more than 3400 A. G. W. King

The decay of alkali-halide phosphors activated by thallium. V. Antonov-Romanovskiĭ and G. Kochergin. *Compt. rend. acad. sci. U. R. S. S.* **24**, 430-2(1939)(in English).—A hyperbolic decay curve indicates a bimol. mechanism. An exponential decay curves does not necessarily mean a unimol. reaction. S. Bradford Stone

The catalytic oxidation of hydrogen on platinum. A search for chemiluminescence and ionization. R. Potvin and C. Ouellet. *J. Phys. Chem.* **44**, 235-46(1940).—A search for the ultraviolet chemiluminescence accompanying the reaction $H_2 + {}^1/_2 O_2 \rightarrow H_2O$ on a Pt filament at a total pressure of 10 mm. between 80° and 170° has shown that such radiation must be smaller than 1 photon per 10^8 mols. reacting. Neg. electricity emitted from the filament during reaction is attributed to a localized thermionic effect. Emission of pos. electricity seems to be independent of the reaction and sets in at about 310°. P. H. Emmett

New methods in spectroscopy. Geo. R. Harrison. *Science* **91**, 225-8(1940). E. H.

Investigation of the structure of the fluorescence spectrum of aniline vapor. A. Vartanyan. *J. Phys.* (U. S. S. R.) **1**, 213-28(1939).—See *C. A.* **33**, 4523[2]. A. D.

Fluorescence and absorption spectra of complex molecules. D. Blokhintsev. *J. Phys.* (U. S. S. R.) **1**, 117-24 (1939). See *C. A.* **33**, 7664[9]. A. D.

The spark as the source of light for spectral analysis. I. Spectra of various regions of spark. S. M. Raĭskiĭ. *J. Tech. Phys.* (U. S. S. R.) **9**, 1719-26(1939).—The spark between flat electrodes of Mg, Zn, Hg, Al, etc., has the shape of a spindle; near the electrodes it is 0.1-0.2 mm. and in the middle between the electrodes 3-4 mm. wide. Consequently the density of the energy is higher near the electrodes than in the middle. In agreement with this, spectral lines requiring high energies of excitation are emitted near, and those requiring less energy, far from the electrodes. J. J. Bikerman

Excitation of active nitrogen. Harold P. Knauss and Allen E. Murray. *Rev. Sci. Instruments* **11**, 78(1940).—The vacuum in a tube was reduced to obtain the green NO-O_2 discharge with a 700-v.-output transformer. The air discharge was continued for 6-8 hrs. This procedure was repeated several times to condition the tube. A strong yellow Lewis-Rayleigh afterglow then was produced with a flow of dry tank N. The favorable condition of the tube was retained indefinitely unless air was admitted. H. G. Bowlus

Mean life of electronically activated nitrogen. René Audubert and Charles Racz. *Compt. rend.* **210**, 217-19 (1940); cf. *C. A.* **34**, 30[2].—Slow thermolysis, or electrolysis of aq. solns., of azides (e. g., NaN_3, KN_3, HN_3) is accompanied by ultraviolet radiation, which is independent of the cation, and is due to deactivation of the N. By electrolysis of an aq. soln. of NaN_3 with a special arrangement by which the circuit is periodically opened and closed the av. life of the activated N is detd. as $2.5 \pm 0.2 \times 10^{-3}$ sec. This N therefore passes through a metastable state, which spectral analysis shows to be different from that of Strutt's active N. C. A. Silberrad

Magneto-optical anomaly of ordinary and heavy water. Atuyosi Okazaki. *Proc. Phys.-Math. Soc. Japan* **21**, 753-8(1939)(in English); cf. *C. A.* **31**, 4875[6].—The earlier calcns. are extended to cover ultraviolet wave lengths and higher temps. A. O. Allen

Magnetic anisotropy of diphenyldiacetylene. Kathleen Lonsdale. *Nature* **145**, 148-9(1940).—The principal crystal susceptibilities of PhC:C.C:CPh are: χ_1, -93.8×10^{-6} (± 0.5); χ_2, -188.0×10^{-6}; χ_3, -109.6×10^{-6}; ψ, $-88.5°$; $\chi_{av.}$, -130.5×10^{-6}. The principal susceptibilities of a single mol.: K_L, -109.4; K_M, -75.3; K_N, -206.7×10^{-6}. By comparison with the corresponding values for tolane, it is shown that there is an abnormal increase of susceptibility along the C chain axis, indicating a concn. of electron d. normal to that axis. G. M. Petty

Hydrogen isotope exchange reaction. J. O. Halford. *J. Chem. Phys.* **8**, 243-7(1940).—Math. The possibility of deriving the equil. consts. for the higher D substitutions from the isotope exchange coeff. is examd.; calcns. on the NH_3 and CH_4 reactions with water are used. If the expt. is carried to solns. at equil. with water contg. as much as 25% D_2O and if the error in a single measurement does not exceed 1.0% the second const. is detd. to within 10% of the correct value. An equation is developed for the relation between the equil. const. for the first substitution and the exchange factor at higher D fractions; it is assumed that each successive substitution of D for H produces the same frequency shift. The evaluation of frequency shifts from exchange data is considered. G. M. Petty

Scattering screens. S. Pieńkowski and I. Mrozowska. *Ann. acad. sci. tech. Varsovie* **2**, 15-70(1935); *Chem. Zentr.* **1938, I**, 4358.—After a discussion of the work of others, a series of expts. is reported on the reflection of diffuse light by plates of various materials. An effort was made to discover a surface giving off diffuse radiation which would meet the requirements of an international standard. Frosted opal glass, frosted opal glass covered with a layer of gypsum, porcelain, gypsum and white filter paper were examd. Measurements were made for angles of incidence of 0, 15, 35 and 55° and curves constructed showing the relation of the relative brilliance to the angle of observation and the angle of incidence. Opal glasses of different manuf. were compared and the influence of the thickness and the material with which the frosted glass had been treated was detd. The surface conditions of frosted opal glasses treated with carborundum of varying grain size (0.1 mm. to less than 0.01 mm.) or frosted by chem. methods were investigated and their optical behavior was measured. From a consideration of all measurements and the tech. questions of production, permanence and reproducibility it is concluded that chemically frosted opal glass of at least 3 mm. thickness offers the most satisfactory surface for the supplying of diffuse light for photometric measurements. Curves and tables of all measurements are given. M. G. M.

Photochemical oxidation of hydrogen. I. A. B. Nalbandyan. *Acta Physicochim. U. R. S. S.* **11**, 453-74 (1939)(in English).—The velocity of the photochem. oxidation of H at pressures of 1-50 mm. irradiated by light of 1300-1750 A. is given by $w = (\pi J/\beta)^{1}/_{4} d^{2} (1 - e^{-k_0 l}) [1 - (-i)^{1}/_{2} apd) (J_1(ix)/J_0(ix))]$, where J = intensity of illumination, β = probability of chain d = diam. and l = length of reaction vessel, k = absorption coeff. for O, $a = \sqrt{(3\beta_{11}/4\lambda_0 q)}$, $x = apd$, q = no. of collisions undergone by O_1 before reaction with H, and $J_0(ix)$, $J_1(ix)$ are Bessel functions of 0 and 1st order. The mechanism of the zone formation process is: $O_2 + h\nu = O' + O$; $O + H_2 + M = H_2O + M$ (M = any mol.); $O + O_2 + O_2 = O_3 + O_2$; O + wall = ${}^1/_2 O_2$. The probability of the reaction $O + H$ is 10^{-6}. The quantum yield is 2 mols. of $H_2O + O_3$ per quantum absorbed. N. believes that no chains are formed, but that both excited and normal atoms act as active centers. F. H. Rathmann

Reactions of free radicals with organic compounds containing atoms with unshared electron pairs. Francis O. Rice, W. D. Walters and P. M. Ruoff. *J. Chem. Phys.* **8**, 259-62(1940); cf. *C. A.* **32**, 7405[6].—An exptl. test for the reaction Me + MeOEt → Me_2O + Et was made by decompg. MeOEt both alone and in the presence of MeN:NMe and examg. the products for Me_2O. None was detected, and if this reaction occurs at all it is to only a small extent. A similar test for the reaction Me + $PrNH_2$ → $MeNH_2$ + Pr was made by decompg. pure $PrNH_2$ in a flowing system, with a neg. result. The products formed in the promoted decompn. of Me_2O were essentially the same as those formed in the normal decompn. G. M. P.

Free radicals in the pyrolysis of acetaldehyde. Milton

Burton, John E. Ricci and Thomas W. Davis *J. Am. Chem. Soc.* **62**, 265–7(1940).—The method of Leighton and Mortensen (*C. A.* **30**, 3327[4]) employing Rd-Pb in Paneth mirrors has been modified and used to detect the existence of free radicals in the pyrolysis of AcH at 500°. Data are given on the transport of Rd-Pb in the pyrolysis of AcH. A. B. Garrett

Splitting the CONH linkage by means of ultraviolet light. D. C. Carpenter. *J. Am. Chem. Soc.* **62**, 289–91 (1940).—The observations of Rideal and Mitchell with respect to the photolysis of stearic anilide (*C. A.* **31**, 7760[2]) were confirmed. Benzylstearylamine and β-phenylethylstearylamine undergo photolysis when irradiated as monolayers with light of λ = 2483 – 2537 A. It is expected that peptides and proteins having side chains bearing chromophore groups will behave similarly; the CONH groups adjacent to the side chain should undergo photolysis and the light-absorbing amino acid should be liberated from the peptide or the protein mol. The mol. areas of stearic anilide, benzylstearylamine, and β-phenylethylstearylamine were measured. A. B. G.

The quenching of mercury resonance radiation by ethylene. E. W. R. Steacie. *Can. J. Research* **18**, B, 44–6(1940).—An investigation at λ2537 shows a quenching cross section of 48 ± 5 × 10^{-16} sq. cm. J. W. S.

Cadmium-photosensitized reactions of ethylene. E. W. R. Steacie and Roger Potvin. *Can. J. Research* **18**, B, 47–54(1940); cf. *C. A.* **33**, 483[1], 8502[5]. The Cd-photosensitized reactions of C_2H_4 and of C_2H_4-H mixts. were studied. With C_2H_4 alone the quantum yield of the reaction is very low, viz., about 0.01. With C_2H_4-H mixts. the quantum yield is about 0.5–0.7 depending on the conditions. The products of the reaction are CH_4, C_2H_6, C_2H_8, C_4H_{10}, C_3H_6 and higher hydrocarbons. The mechanism of the reaction is discussed and compared with that of the Hg-photosensitized reaction. Conclusion: The main steps of the reaction in the presence of H are $H + C_2H_4 \rightarrow C_2H_5$; $H + C_2H_5 \rightarrow C_2H_6$; $H + C_2H_5 \rightarrow 2CH_3$; together with radical recombination reactions and reactions of the type $C_2H_3 + C_2H_5 \rightarrow C_4H_9$. J. W. S.

Photoreactions sensitized by the halogens. J. W. T. Spinks. *Chem. Rev.* **26**, 129–39(1940). All of the halogen-sensitized photoreactions known can be explained by chem. mechanisms involving halogen atoms. L. K.

Joachimstal, birthplace of Ra (Schneiderhöhn) **8**. Ish River mineral springs [radioactivity of] (Blumshtein) **14**. Ultraviolet spectrum of paraffins and petrolatums (Vellinger, Thomas) **22**. Detection of radioactive cement in cased wells (Howell, Frosch) **22**. Investigations in at. physics by means of photographic layer (Schopper) **5**. Well logging by radioactivity (Westby, Scherbatskoy) **22**. Denaturation and mol. splitting of ovalbumin by ultraviolet radiant energy (Bernhart) **11A**. Spectral sensitivity of photographic layers (Eggert, Biltz) **5**. Djalmaíta, radioactive mineral (Cuimaraens) **8**. Photooxidizability of 1,2-cyclo-substituted diphenylanthracenes (Velluz) **10**. Linear coeff. of thermal expansion of ambroid (Yetter) **13**. Cathodes for electron-emitting devices (U. S. pat. 2,185,410) **4**.

Bomke, Hans: Erzeugung von Atom- und Ionenstrahlen. Braunschweig: F. Vieweg und Sohn. 147 pp. M. 9.40.

Mann, W. B.: The Cyclotron. New York: Chemical Publishing Co. $1.50.

Saunders, Vivian T.: Light. 3rd ed. New York: Chemical Publishing Co. 328 pp. $2.50. Reviewed in *J. Documentary Reproduction* **2**, 162(1939).

Ergebnisse der kosmischen Physik. Revised ed. Edited by V. Conrad. Bd. IV. Physik der Hydro- und Lithosphäre. By **V. W. Ekman, H. Jeffreys, Ch. Tsuboi, B. Gutenberg** and **V. Fritsch**. Leipzig: Akademische Verlagsgesellschaft m. b. H. 293 pp. M. 29; bound M. 31. Cf. *C. A.* **32**, 8911[6].

Photosensitive surfaces for television tubes. Joseph T. Tykocmer, Jakob Kunz and Lloyd P. Garner (to Board of Trustees of the Univ. of Ill.). U. S. 2,185,531, Jan. 2. A photosensitive surface is formed by bubbling molecular H through molten alkali metal, expanding the resulting vapor and applying the expanded vapor to a suitable cathode surface. Apparatus is described.

4—ELECTROCHEMISTRY

COLIN G. FINK

New method for the manufacture of magnesium metal. Freitag. *Oberflächentech.* **17**, 190(1940).—While Mg is now almost entirely produced by electrolysis of fused $MgCl_2$, a new process just developed is said to be much cheaper. It consists in reducing MgO by coke to metal in an elec furnace at 2000°. Mg metal vapor and CO are formed; this mixt. is quenched by cold H_2, and Mg metal is pptd. as dust with impurities of C and MgO. The ppt. is distd. *in vacuo* and the Mg collected under hydrocarbon oils in which it solidifies in grains of 10–20 mm. diam. consisting of Mg metal of 99.97% purity. No information as to energy consumption and details of the process is given (cf. Landis, *C. A.* **31**, 5277[4]). M. Hartenheim

Calcium manufacture. V. P. Mashovets. *Tsvetnye Metal.* **1938**, No. 6, 92–8; *Khim. Referat. Zhur.* **2**, No. 5, 82(1939).—The main disadvantage in the production of Ca is its soly. in the electrolyte. This soly. is overcome by the use of a contact cathode. In the small single-cathode baths (using water cooling) the cathodic c. d. is high and the cell amperage small. Owing to the large amt. of energy consumed (up to 60 kw.-hr./kg. Ca) and to the difficulties encountered in handling, the cost of Ca production increases. It is proposed to construct a multicathodic bath without any artificial cooling which would permit the production of 1 kg. Ca per 26.5 kw.-hr. consumed. W. R. Henn

Modern electric heat-treatment furnaces. F. W. Haywood. *Foundry Trade J.* **62**, 124, 135–6(1940).—A review. I. Hartmann

Reduction of silicon and aluminum. M. S. Maksimenko. *Metallurg* **14**, No. 4–5, 26–34(1939).—In the electrothermal production of Al-Si alloys, SiO_2 is first reduced to Si or SiC and the Al_2O_3 is subsequently reduced by SiC. The amt. of coke in the charge must be carefully regulated, as an excess will cause the formation of Al_4C_3 in the lower part of the reaction zone, while insufficient coke will cause the formation of mullite slag which is refractory and difficultly tapped. The presence of a small amt. of Fe in the charge accelerates the formation of SiC and thus promotes the reduction of Al_2O_3. A 2-electrode single-phase furnace is better than a single-electrode furnace with bottom return owing to decreased heat loss, greater elec efficiency and longer life of the C bottom. H. W. Rathmann

Overcoming thermocouple errors in high-temperature induction furnaces. Frank Day, Jr., and Hurd W. Safford. *Ind. Eng. Chem.* **32**, 445–6(1940).—In a graphite-core tube-type induction furnace temp. readings obtained with a thermocouple were erratic and lower with the induced current on than when it was off. The effect is perhaps due to thermionic emission from the graphite core. Enclosure of the thermocouple in a grounded shield of Pt foil completely eliminated the difficulty. Cf. the following abstr. W. B. Keighton

Electrical phenomena in a high-temperature laboratory furnace. H. E. Stauss. *Ind. Eng. Chem.* **32**, 446 (1940).—A d. c. potential is set up in resistance coils under test at 1200–1400° within an alundum tube furnace with Pt alloy resistor. The effect is present with either a. c. or d. c. in the furnace resistor and is shown to be caused

by thermionic emission from the alundum. These stray currents are eliminated by a grounded shield of Pt wire wound on a ceramic tube between the furnace tube and resistance coil. The shield is connected to the resistance coil and to the ground side of the furnace winding.
W. B. Keighton

Method of preparation of anodes made of iron with surface layer of magnetic oxide. II. Oxidation by gaseous oxygen. Naoto Kameyama and Atusi Naka. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 427(1939); cf. *C. A.* **33**, 9148[5].—A firmly adhering coat of Fe oxide could not be obtained by heating Fe rods in an atm. of O.
H. G. Bowlus

The behavior of cathodically polarized iron in nitric acid. M. Karschulin. *Atti X° congr. intern. chim.* **4**, 371-80 (1939) (in German).—See *C. A.* **33**, 8505[9].
O. H. Müller

Progress in electrolytic refining of metals, with special reference to the last decade. Max F. W. Heberlein. *Trans. Electrochem. Soc.* **77**, 12 pp. (preprint)(1940).—A review.
C. G. F.

The influence of current density on the quantity of silver in the electrolyte during the electrolytic refining of copper A. Glazunov and E. Bernard. *Chem. Listy* **33**, 418-20 (1939).—Exptl. procedures confirmed the hypothesis that the formation of the Ag sediment on the anode during the refining of Cu is a secondary process. An increase in the c. d. increased the no. of Ag ions per unit area and increased the transport of Ag away from the anode.
Frank Maresh

Decreasing the losses of precious metals in the refining of copper A. I. Levin. *Tsvetnye Metal.* **13**, No. 12, 37-45(1938); *Chimie & industrie* **42**, 287.—The greater part of the losses of Au and Ag in the electrolytic refining of Cu is due to the migration of these precious metals to the cathode. To decrease losses, the viscosity of the electrolyte must be lowered, by raising the temp., and the concn. in Cu and Ni salts (upper limit of 35-36 g./l. for Cu and 6-8 g./l. for Ni) must be decreased. The anodes must contain at least 99.4-99.5% Cu.
A. Papineau-Couture

Modern chlorine practice. C. L. Mantell. *Chem. & Met. Eng.* **47**, 166-8, 170(1940).—A review on the electrolytic production of Cl.
G. G.

The recovery of metals from wastes. Richard Springer. *Z. Metall- u. Schmuckwaren-Fabrik. Verchrom.* **19**, No. 7, 11-12; No. 9, 11-12(1938); *Chem. Zentr.* **1938**, II, 3151.—The electrolytic recovery has not been given sufficient attention. The electrolytic recovery of Ni, Cu, brass, Cr, Zn and Ag is critically discussed.
M. G. Moore

Cottrell dust precipitation during the treatment of electrolytic slimes. A. I. Levin. *Tsvetnye Metall.* **14**, No. 1, 63-73(1939); *Khim. Referat. Zhur.* **2**, No. 5, 80-1(1939).—In working up Se-contg. slimes from Cu electrolysis, SeO_2 must be removed to prevent corrosion of the elec. dust precipitators. The construction and operation of the dust collectors and of the app. for pptn. of SeO_2 from soln. at the Kyshtym electrolytic plant are described.
W. R. Henn

The electrochemical behavior of selenium. Giuseppe Sella. *Ricerca sci.* **10**, 1143-4(1939).—A polished Pt electrode immersed in a 0.5-mol. soln. of H_2SeO_3 acquires coatings of allotropic forms of Se in this succession: red pulverulent (0-50°), dark red-brown (50-60°), lead gray (60-70°), metallic gray (70-100°). The latter itself has 2 allotropic modifications differing in elec. cond. with a transition point at 140°. At 25° the reversible potential referred to the H electrode is +0.655 v. The definite transition point from the pulverulent to the vitreous-metallic form is about 62°. The calcd. entropy of the electrolytic reduction of H_2SeO_3 is 70.
O. W. Willcox

Electrodeposition of nickel from nickel chloride solutions. W. A. Wesley and J. W. Carey. *Products Finishing* **4**, No. 6, 18-20, 22, 24, 26-7, 30, 32, 34(1940); cf. *C. A.* **34**, 2260[6].—A discussion of the phys. properties of deposits (hardness and tensile tests, and Erichsen ductility), protective value (ferricyanide tests, salt spray, atm. exposure and porosity), characteristics of the plating soln. (tank voltage, cond. and cathode efficiency), advantages of the chloride bath (low tank voltage, ease of buffing, heavy deposits, ease of control, freedom from pitting, cathode efficiency and the heating of soln.) and the disadvantages of the chloride bath. It is quite possible that further study of electrolytes contg. both sulfate and chloride will disclose an intermediate compn. which would be less corrosive than the chloride bath and productive of more ductile deposits, yet would retain to a large extent the advantages of the sulfate-free electrolyte. The results of tests indicate that the modern trend to the use of higher chloride contents in the Watts-type soln. is sound and should be encouraged.
Leopold Scheflan

Medical supervision of nickel-chromium plating shops. Bek and Fournier. *Méd. d'usine* **1**, No. 6, 8-17(1938); *Chimie & industrie* **42**, 269.—A discussion of the precautions which should be taken in connection with each of the dangerous operations effected in this industry.
A. Papineau-Couture

The electrolytic preparation of copper-zinc-nickel alloy. N. A. Izgaryshev and Kh. M. Ravikiovich. *J. Gen. Chem.* (U. S. S. R.) **9**, 1443-55(1939).—The electrolytic prepn. of the Cu-Zn-Ni alloy by the Faust and Montillon method (*C. A.* **28**, 3003[7] and **29**, 2858[1]) was not applicable for the theoretical investigation of the cathode process nor for the applied purposes because of poor reproducibility of the exptl. data and instability of the cyanide solns. The deposition simultaneously of 2 or 3 metals was carried out in the presence of colloids. The added substances caused the approximation of the potential of metal depositions. This method of "approximation of the deposition potential" was used in the simultaneous deposition of Cu-Zn, Cu-Ni, Ni-Zn and Cu-Zn-Ni from their sulfate solns. in the presence of 1% H_3BO_3 and with the addn. of gum arabic or cresolsulfonic acid. The Cu-Zn-Ni alloy prepd. by this method was of high durability and of a fine-grain structure. All polarization curves of the above systems can be represented by the equation $\Delta\epsilon = AD^n$, where $\Delta\epsilon$ is the difference between the potential at certain c. d., D, and the equil. potential. A is a const. corresponding to the initial conditions of the process and n is a const.
A. A. Podgorny

Electrolytic processes for metal finishing. E. J. Dobbs. *J. Inst. Production Engrs.* **18**, 343-9(1939).—A brief review of anodic oxidation of Al, chromating of Mg and its alloys, and hard Cr-plating of steel tools and surfaces subject to abrasion. Mg alloys are also finished by immersion in a soln. of H_2SeO_3 or an acid soln. of a selenite. The reddish brown film of Se makes an excellent base for painting. $ZnCrO_4$ in a tung-oil paint, followed by a cellulose coating pigmented with Al leaf, is recommended.
M. W. Schwarz

Metal coloring, theory and practice. III. Joseph B. Kushner. *Products Finishing* **4**, No. 6, 46-8, 50(1940); cf. *C. A.* **34**, 1954[3].—Tested formulas for precious-metal plating solns. are given including Rh, Pt, Pd and Ag. All the common finishes with the white precious metals are described.
Leopold Scheflan

The theory of the potential and the technical practice of electrodeposition. I. The general problem and the cases of uniform flow. Charles Kasper. *Trans. Electrochem. Soc.* **77**, 11 pp. (preprint)(1940).—There is no field of technology which so involves and so well illustrates the theory of potential as that of electrodeposition. A detailed exposition and discussion are presented of the flow of current through the electrolyte when the electrodes are: (*a*) parallel planes, (*b*) concentric cylinders, and (*c*) concentric spheres.
C. G. F.

Effect of alternating current on the cell Pb|H_2SO_4|Pt. Julian Kamecki and Mieczysław Wierzbicki. *Roczniki Chem.* **19**, 249-58(1939).—The strength of the current in the cell Pb|aq. H_2SO_4|Pt rises, while time elapsing before discharge of the cell falls, as the concn. of the H_2SO_4 is raised from 0.2 to 5 *N*. During and after passage of an a. c. a d. c. arises; this is due to depassivation of the Pb, by removal of the $PbSO_4$ coating, in the case of 0.2-0.5 *N* H_2SO_4, and to a rectifying effect in that of 5 *N* H_2SO_4.
B. C. P. A.

The polishing, plating and anodizing of the aluminum

light alloys. E. E. Halls. *Metallurgia* **21**, 123–6(1940). —Some practical pointers are given. J. L. Gregg

The mercury cathode in metallurgical analysis. A. E. Pavlish and John D. Sullivan. *Metals & Alloys* **11**, 56–9 (1940).—The effects of kinds of acids, different degrees of acidity and of varying concns. of Fe on the operation of the Hg cathode in electrolytic sepn. of elements were investigated. The results showed that for pptn. of Fe in H_2SO_4 soln. the normality of the acid may be as high as 10. The over-all rate of Fe removal is greatest when the concn. is between 10 and 30 g. per l. With a soln. contg. 1 g. Fe, electrolysis is complete in about 45 min.; with 5 g. in about 3 hrs. Solns. of $HClO_4$, H_3PO_4 and H_2SO_4–H_3PO_4 can be used as electrolytes. A simple air-agitator, water-leaching method for regeneration of the Hg is described. 6 references. I. Hartmann

Electrolytic processes in magnetic fields. N. P. Fedot'ev and A. I. Evstyukhin. *Trudy LKKhTI* **1939**, No. 7, 32–41; *Khim. Referat. Zhur.* 2, No. 5, 83–4(1939). —The action of the magnetic field on the electrolytic cell causes a transfer of ions (Holl's effect). To verify this supposition expts. were performed with an acid $CuSO_4$ soln. with Cu electrodes. The direction of the magnetic field was perpendicular to the liquid layer and to the direction of the current. A 7000-gauss strength in the zone of the greatly concd. magnetic field caused a 12.1% deviation of the equipotential lines with respect to the potential gradients. The current lines are deviated by the magnetic field and are perpendicular to the equipotential lines. This was verified by the distribution of the metal on the cathode to which the magnetic field was directed. A considerable overweight of the metal was observed in the region of the cathode with denser current lines as compared with regions with rarefied current lines. An intensive mixing of the liquid was observed in all electrolysis expts. with the magnetic field. Two circular motions of the liquid were formed if the magnetic field was directed to the center of the cell. When the magnetic field was directed to one of the electrodes, a mixing was observed which was in the form of a circular motion of the liquid along the whole length of the bath. The influence of the magnetic field on the elec. cond. of the system is of interest. When an electromagnet was included in the system the total potential of the cell first decreased, then increased, but did not reach the initial value without the magnetic field. The observed phenomena can hardly be of practical importance, since a very strong magnetic field is required to obtain small deviations of the current lines. W. R. Henn

Role of the forces between the particles in electrodepositions and other phenomena. H. C. Hamaker and E. J. W. Verwey. *Trans. Faraday Soc.* **36**, 180–5(1940) —The mech. aspects of deposition by electrophoresis for suspensions in org. media are discussed. A voltage of 50 to 100 v. applied to electrodes immersed in a suspension of $BaCO_3$ in C_2H_5OH caused the cathode to coat rapidly with a layer of $BaCO_3$. Details are discussed. V. R. D.

Electro-organic chemical preparations. II. Sherlock Swann, Jr. *Trans. Electrochem. Soc.* **77**, 40 pp. (preprint) (1940); cf. *C. A.* **30**, 3727[9]. —This review is an extension of an earlier list of syntheses which includes literature published before Jan., 1940. C. G. F.

The overvoltage of hydrogen in liquid ammonia. V. A. Pleskov. *Acta Physicochim. U. R. S. S.* **11**, 305–14 (1939).—Measurements were made in liquid ammonia in the presence of 0.1 *N* NH_4Cl at −50° and at c. d. of 10^{-7} – 10^{-2} amp./cm.^{2}. For solid Hg Δ V increases quickly to 0.2 and then slowly up to 0.8–0.9 v. above its value in an aq. soln., but, due to diffusion of the NH_4-amalgam film, exact measurements are impossible. For a Ni electrode, the overvoltage obeys Tafel's equation with b = 0.09 as given by Volmer's theory; Δ V above that in aq. soln. is only 0.1–0.2 v. For a Pb electrode Δ V = approx. 1.1–1.2 v. For the electrochem. series in liquid NH_3, Ni should probably be placed directly above H. F. H. R.

Electrolysis by discharge in gases. Fr. Fichter and Kurt Kestenholz. *Helv. Chim. Acta* **23**, 209–11(1940).—By means of elec. discharge from electrodes above a soln. contg. KH_2PO_4, KOH, KF and K_2CrO_4, the authors produced $K_4P_2O_8$ (tetrapotassium peroxydiphosphate). The process was rather inefficient. The app. is described. William E. Vaughan

Electrochemical potential and the Volta effect. O. Scarpa. *Nuovo Cimento* **16**, 281–93(1939); cf. *C. A.* **34**, 1257[2].—The potentials for the elements should be corrected for the contact potential of the metals comprising the circuit used in making the measurement. When such a correction is made the electrode potentials have values significantly different from those now accepted, although the order of increasing potential is about the same. The contact potential between Pt and hydrogenated Pt, obtained indirectly, is of the order of 0.5 v. J. B. A.

Method for manuf. of low-cost Al (Drossbach) 9. Soln. potential of cemented Fe in acidulated water (Procopiu) 9. Purification of brine intended for electrolysis (Salvatore) 18. Production of electrolytic white lead (Sachet) 26. Metallurgy of Zn [electrolytic] (Hanley) 9. Measuring metallic luster [electroplating practice] (Springer) 9. Thermal conductance of metallic contacts (Jacobs, Starr) 2. Electrolytic corrosion of metal objects in soil using d. c. (Borquin) 9. Furnaces [elec.] for heating glass, etc. (Brit. pat. 509,008) 19.

Bilfinger, Robert: Das Hartverchromungs-Verfahren. Die elektrolytische Abscheidung von Hartchrom, Arbeitstechnik und Anwendungsgebiete. Leipzig: M. Beyer. 118 pp. M 9.

Küpfmüller, Karl: Einführung in die theoretische Elektrotechnik. 2nd ed. Berlin: J. Springer. 313 pp. M 18; bound M. 19.80.

Roberti's Appunti di elettrochimica. Collected and compiled by **Luigi Savi**. Rome. Tipografia V. Ferri. 121 pp.

Cover for storage-battery cells. Henry J. Hikkie (to B. F. Goodrich Co.). Can. 387,276, Mar. 5, 1940. Structural details.

Electric resistors. Gerald L. Pearson (to Bell Telephone Laboratories, Inc.). U. S. 2,184,847, Dec. 26. A method of joining a metallic conductor such as a Pt wire to a body of B to form an elec. resistor involves bringing the conductor into contact with the B body, applying heat at the point of contact to raise the temp. thereat to a value substantially less than the m. p. of the conductor to form at the point a joint comprising a compd. of B and of the metal of the conductor, and controlling the temp. at the point of contact to det. the size of the joint formed and the resistance of the element.

High-voltage rectifier or inverter. Joseph Slepian (to Westinghouse Elec. & Mfg. Co.). U. S. 2,186,215, Jan. 9. Various structural details of an app. having a Hg cathode.

Selenium rectifier films. Samuel Wein (to B-L Electric Mfg. Co.). U. S. 2,186,085, Jan. 9. For producing a Se coating on a cond. plate such as one of Fe, it is sprayed with a soln. of selenious acid and the latter is reduced to Se with a reducing agent.

Rectifier tube for alternating voltages of a peak value of at least 250 v. Johannes Bruijnes, Daniel M. Dunker and Johannes G. W. Mulder (to N. V. Philips' Gloeilampenfabrieken). U. S. 2,184,709, Dec. 26. Various details of a tube contg. Hg and an inert gas such as Ne.

Electrical contacts. James M. Kelly (to Westinghouse Elec. & Mfg. Co.). U. S. 2,186,245, Jan. 9. Contacts such as those of make and break devices for heavy currents are formed contg. 45–75% of refractory metal powders such as Mo and 55–25% of a bonding alloy contg. Ag together with Cu 1–10 and Sb 1–10%.

Gas-blast switches. The British Thomson-Houston Co. Ltd. Brit. 509,000, July 10, 1939. Addn. to 501,241 (*C. A.* **33**, 6481[4]). An extinguishing chamber for a self-generating gas-blast switch as claimed in 501,241 has an addn. of an oxidizing substance, e. g., MgO_2, to prevent tracking upon the extinguishing process. Cf. *C. A.* **33**, 7891[4].

Contacts for electric switches. Robert A. Miller and Harry C. Rubly (to Standard Telephones and Cables Ltd.). Brit. 508,991, July 10, 1939. A switching device comprising stationary and movable contacts is made of metallic materials having substantially the same electrothermal but unlike phys. characteristics that are so matched that substantially no thermocouple effect is produced when the contacts are brought into engagement. One material may be pure Cu and the other hardened Be Cu. 1

Electric condenser. V. T. Renne. Russ. 55,955, Oct. 31, 1939. The dielec. of a condenser is made from paper impregnated with chlorinated naphthalene preliminarily fused with 2–5% benzylcellulose. 2

Electrolytic condenser. Arnold Deutschmann (to Tobe Deutschmann Corp.). U. S. 2,184,686, Dec. 26. Various structural details.

Cell for electrolysis of aqueous solutions of alkali metal chlorides. S. N. Shoikhet and A. A. Fomenko. Russ. 55,931, Oct. 31, 1939. Construction details. 3

Apparatus for treating surfaces by electrolysis. V. F. Kurto. Russ. 55,905, Oct. 31, 1939. Construction details.

Smooth surfaces on metals. V. F. Kurto. Russ. 56,009, Nov. 30, 1939. Cavities in the objects to be treated are filled with a dielectric and the surfaces are then etched anodically to eliminate projections.

Removing coatings such as gold from copper composition bases such as transmitter electrode cups. Sumner R. Mason (to Western Electric Co.). U. S. 2,185,858, Jan. 2. The coated base is electrolyzed in an aq. soln. contg. sufficient H_2SO_4 to give a sp. gr. of 1.65, thus ptg. the coating metal. App. is described. 4

Anodic oxidation of aluminum, copper or copper-aluminum alloys. A. S. Tsitrinovich and V. D. Ivanov. Russ. 55,966, Oct. 31, 1939. The metals are oxidized in H_3BO_3 soln. with the addition of $Na_2B_4O_7$ or NaOH.

Carbides of boron, silicon and titanium. A. V. Tikhonov. Russ. 55,959, Oct. 31, 1939. The carbides are formed by heating the elements with C in a high-frequency furnace.

Purification of aluminate solutions. V. M. Mukhachev. Russ. 52,201, Nov. 30, 1937. Aluminate solns. are purified by electrolysis with permeable cathodes and anodes.

Introducing iron alloys into steel in electric furnaces. V. D. Oshchepkov, V. I. Butin, P. A. Peretrukhin and N. D. Zaboya. Russ. 56,092, Nov. 30, 1939. The melting of iron alloys is accelerated by thickening the slag before their introduction to such an extent as to float the Fe alloys on the surface of the slag when exposed to the direct action of the elec. arc. 6

High-frequency smelting furnace. Fritz Hartmann (to Kohle- und Eisenforschung G. m. b. H.). U. S. 2,184,741, Dec. 26. Various structural, elec. and operative details, including an automatic elec. cut out operative on excessive rise in temp. of cooling water use.

Vapor electric converter. Ernest G. Bangratz (to Westinghouse Elec. & Mfg. Co.). U. S. 2,186,189, Jan. 9. A make-alive electrode for a converter having a pool-type cathode comprising a body of graphite, the body having a very hard semiconduction surface secured by treating the graphite with B at high temp., the semiconducting surface being in contact with the pool-type cathode during normal operation of the converter, a stem secured to the graphite body, a collar on the stem adjacent the graphite body and an insulating covering on the stem. Cf. *C. A.* **33**, 9161[2].

Apparatus for the electric sublimation of phosphorus and the preparation of phosphorous anhydride. P. F. Zhdan. Russ. 55,830, Oct. 31, 1939. Construction details.

Cathodes for electron-emitting devices. Ernest A. Lederer (to Radio Corp. of America). U. S. 2,185,410, Jan. 2. A cathode comprises a core consisting essentially of a metal (such as W-Ni alloy) that reacts with a Ba-O compd., Be (to reduce the compd. and liberate free Ba at a temp. below the m. p. of the core), an O compd. of Ba and Be (such as Ba beryllate 5%) dispersed throughout the core, a matrix capable of holding the metallic Ba (comprising an adherent alk. earth coating such as CaO, BaO, SrO or MgO) on the core, such coating being cryst., chemically inert to the Ba and having a m. p. above the activating temp. of the core.

Arc-lamp cathodes. Jean Parisot (to Le Carbone-Lorraine). U. S. 2,185,679, Jan. 2. See Brit. 509,291 (*C. A.* **34**, 5343).

Electric discharge devices. Ernest E. Charlton (to General Elec. Co.). U. S. 2,185,832, Jan. 2. A method of prepg. elec. discharge devices having metal parts inclosed within an envelope consists in inductively heating the metal parts to remov. the gases therefrom and later vaporizing a getter previously affixed to one of the metal parts in such a position as to be substantially without the field of inductive effect employed in previously heating the metal parts whereby the metal parts may be first inductively heated and the getter may be later inductively vaporized by the effect of a subsequently applied inductive field displaced from the first inductive field, removing the residual gas from the envelope and sealing the envelope. 5

Electric incandescent lamp. Willem Elenbaas, Eduard G. Dorgelo and Hendricus J. Lemmens (to General Elec. Co.). U. S. 2,185,025, Dec. 26. Various details of a filament lamp contg. a fixed gas such as mixed A and N under superatm. pressure together with Hg. 6

5—PHOTOGRAPHY

E. R. BULLOCK

Photography goes forward- a review of a decade of progress. Glenn E. Matthews. *Am. Ann. Phot.* **54**, 7–26(1940); cf. *C. A.* **33**, 5303[3].

New developments of the diazotype process and screen reflectography in documentation. P. C. P. Huysers. *F. I. D. Commun.* **6**, 20–3(1939). The history of the diazotype and also of reflectography (reflex process) is given. The latter culminates in the Retocee process (*C. A.* **29**, 5366[7]; **30**, 976[9]) which uses a line screen and diazotype paper. R. P. Loveland 8

New photographic tracing processes. Heinz Falta. *Gebrauchsfotografie* **46**, 249–53(1939).—The nature of diazotype papers and their historical development are reviewed in some detail. Modern papers are of 2 types: those developed by NH_3 vapor ("dry process") and those developed by momentary immersion in aq. solns. of the couplers ("damp process"). The first type contains both the diazo compd. and an azo coupling component, and the 2nd type contains only the diazo compd.; both yield a positive as only those areas develop which were exposed to light. These methods possess the following advantages over those using Ag halides: lower cost, rapid processing (no fixing or washing and only momentary drying) and bright-light manipulation. The disadvantages lie in the low speed and more expensive app. required. The diazo layer is coated on transparent cellulose and on film base as well as on paper. The new processes permit the copying of opaque materials and intensification of originals. R. W. Henn 9

Ozaphane and its application to microcopy. J. Holloway. *F. I. D. Commun.* **6**, 40–2(1939).—A nontech. description of the ozaphane process is given in which the dye image is incorporated in a single substratum such as cellophane or cellulose acetate. Arguments for the superior stability of cellophane over cellulose acetate are given. R. P. Loveland

Application of microfilm to photography by luminescence. L. de Saint-Rat. *F. I. D. Commun.* **6**, 42–5(1939).—The principles of photography by luminescence to decipher faded or altered documents are discussed. R. P. L.

Report on DK-20. Walter Petermann. *Photofreund* **19**, 264(1939).—A modified formula for the Eastman

Kodak DK-20 fine-grain developer is: H_2O 400 cc., $Na_3PO_4.12H_2O$ 0.25 g., metol (elon) 2.5 g., Na_2SO_3 50 g., KSCN 0.5 g., KBr 0.5 g. and H_2O to 500 cc. To prep. the developer, either add the Na_3PO_4 with the other chemicals as given in the formula or dissolve it in boiled H_2O before adding and then allow the soln. to stand and pour off from the ppt. The use of the Na_3PO_4 avoids possible formation of Ca scum on the negatives and permits more rapid soln. of the developing agent, so that cool H_2O can be used for mixing. L. E. Muehler

Theory of the Schwarzschild effect. Kienle. *Z. wiss. Phot.* **37**, 282–3(1938). A. Narath. *Ibid.* 283.—Reply. Cf. *C. A.* **33**, 8129[4]. B. C. P. A.

Constant development in the tank. Helmuth Dehio. *Veröffentl. wiss. Zentral-Lab. phot. Abt. AGFA* **6**, 214–24 (1939).—Through proper replenishment the original activity of a developer soln. can be maintained essentially const. over long periods of use. Negatives of uniform quality and degree of development can be assured and a marked economy in materials and labor costs can be effected by controlled replenishment. The method of replenishment is illustrated for 2 Agfa developers, the Roentgen Rapid developer and the Final Fine Grain Tank developer. Accompanying curves depict the behavior of contrast and d. upon exhaustion with and without proper replenishment. Tables are included showing the av. developing times for normal and high contrasts at various temps. between 15° and 25°. H. A. Miller

Direct toning with sodium sulfide (hyposelenosulfate mixture). Martin Götz. *Phot. Chronik* **47**, 5(1940).—Direct toning of developed prints in about 2 min. is accomplished by the use of the following soln.: $Na_2S_2O_3$ 5-H_2O 100 g., Na sulfide 20 g., selenosulfate soln. 10 cc. and H_2O 1000 cc. The selenosulfate soln. is prepd. by dissolving 20 g. of Na_2SO_3 in 100 cc. of hot H_2O, adding 3 g. of Se and heating until the Se is dissolved. One l. of the direct toner tones about 80 postcards before becoming too slow. Another addn. of 10 cc. of the selenosulfate soln. acts as a replenisher. L. E. Muehler

Advances in motion-picture negative film emulsions. Andreas Schilling. *Veroffentl. wiss. Zentral-Lab. phot. Abt. AGFA* **6**, 65–75(1939).—Two new motion-picture neg. materials for the general trade and industry, Agfa Super Pan film and Agfa Ultra Rapid film, are described. A cross section is given of an improved Fino Pan film. The different layers of this film from the underside up are: (1) an antistatic backing, (2) a support, (3) a blue-gray dye layer, (4) a subbing, (5) an emulsion undercoat, (6) an emulsion topcoat and (7) a protective gelatin layer. Tables are given showing the relative development rates and speed of the film compared with Pankine-H and DIN, Weston and General Electric material ratings. There are illustrations showing grain sizes and spectrograms and tables giving speeds to primary colors and factors with various filters. Spectrogram absorption curves and the discussion that follows indicate that the Ultra Rapid is similar to Pankine-H in color sensitivity, while the Super Pan and Fino Pan are less red-sensitive. The Super Pan, Ultra Rapid and Fino Pan have, resp., 2, 4 and 0.75 times the total speed of Pankine-H. R. M. Corbin

Spectral sensitivity of photographic layers. I. John Eggert and Martin Biltz. *Veroffentl. wiss. Zentral-Lab. phot. Abt. AGFA* **6**, 23–36(1939); cf. *C. A.* **32**, 8927[6]. —Measurements were made of the spectral sensitivity distribution of a no. of emulsions for print-out and developing-out images. A pure AgBr emulsion showed a sharp break in the curve at about 500 mμ; an explanation is given for this based on a consideration of the impurity centers in the crystals. A series of emulsions of varying AgI contents was made and studied; it was found that the wave length at which the break in the distribution curve took place progresses toward longer wave lengths as the AgI content increases. Ripening of an emulsion was found to have no effect on the curve. For optically sensitized emulsions, it was found that the break in the distribution curve depends on the dye used, and that the effect of the dye on print-out sensitivity is small. The effect of concn. of sensitizing dye on sensitivity was studied and the results of measurements are given. The mechanism of the sensitizing process is discussed. II. John Eggert and Friedrich G. Kleinschrod. *Ibid.* 37–45.—A brief discussion of recent latent image theories is given. A series of emulsions was made, and the spectral distribution of sensitivity of each was measured. Ripening was found to have little effect on NH_3 emulsions as regards the wave length at which the break in the distribution curve occurs; at long wave lengths (greater than 600 mμ) the sensitivity curves were found to vary with the ripening times. Peptized and diffusion emulsions were similar to NH_3 and non-NH_3 emulsions in sensitivity-wave length reactions. The effect of various gelatins was studied. The break at 500 mμ is independent of the gelatin used, but the shape of the sensitivity curve at longer wave lengths varies with the gelatin. J. A. Leermakers

Investigations in atomic physics by means of the photographic layer. Erwin Schopper. *Veroffentl. wiss. Zentral-Lab. phot. Abt. AGFA* **6**, 170–8(1939); cf. *C. A.* **34**, 9513.—The possibilities of employing a photographic method to record single particles by means of their tracks in the photographic emulsion are demonstrated. The method proves to be especially advantageous for the investigation of rare at. processes. The particles comprising cosmic rays can be identified and nuclear processes of formerly unknown high-energy exchanges can be observed. C. H. Evans

Working with Isopan-Ultra film. Heinrich Freytag. *Phot. Chronik* **47**, 20–1(1940).—To obtain max. speed with Agfa Isopan-Ultra film, the following 2-bath developer is suggested: *A*: metol 10 g., Na_2SO_3 100 g. and H_2O 1 l., *B*: borax 50 g. and H_2O 1 l. Develop in *A* until the image is just visible (usually 60–100 sec.), then immerse in *B* for 30 sec. Return the film to the 1st soln. for about 2 min. and finally to the 2nd for 30 sec. L. E. Muehler

Statistical investigations of the interrelations of Callier quotient, graininess and limit of enlargement. John Eggert and Alfred Kuster. *Veroffentl. wiss. Zentral-Lab phot. Abt. AGFA* **6**, 186–97(1939); cf. *C. A.* **31**, 6123[3]. —E. and K. show statistically that values of graininess for neg. materials detd. subjectively from enlargements of negatives are paralleled by the *K* values detd. by phys. measurements on the negatives ($K = 100 \log_{10} Q$ where Q is the Callier quotient at a diffuse d. of 0.50). It is further shown that the limits of satisfactory enlargement of 2 neg. materials are inversely proportional to their *K* values, detd. as above. C. H. Evans

Graininess of photographic papers for exposure to quanta of high energy. John Eggert and Erwin Schopper. *Veroffentl. wiss. Zentral-Lab. phot. Abt. AGFA* **6**, 159–69 (1939); cf. *C. A.* **33**, 2829[9].—For films exposed to x-rays it is observed that graininess increases with increasing quantum energy of the exposing radiation. By the method of the Callier quotients, it is found experimentally that an increase of av. grain diam. occurs. A simultaneous deviation of grain distribution from the purely statistical distribution is probable. The phenomenon of increasing graininess is explained upon the assumption that grains in the neighborhood of the absorbing grain are influenced by secondary particles arising from the absorption of a quantum of high energy. The effect also occurs upon exposure to high-speed electrons. The resulting "electron halo" limits the resolving power of the emulsion. For x-rays, the lack of sharpness may be directly visible. C. H. Evans

The duplication of documents, etc., by photographic methods. A. de Waele. *F. I. D. Commun.* **6**, 15–16 (1939).—Various methods of reproducing printed matter to be used in an office are briefly reviewed. R. P. L.

Carbon tissue. F. Heigl. *Deut. Drucker* **45**, 623–5 (1939).—A general description of the manuf., sensitization and use of photogravure tissue. A. Murray

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Lowe, Edmund W.: What You Want to Know about Developers, Fine Grain and Otherwise. San Francisco: Camera Craft Publishing Co. 175 pp.

Moholy, Lucia: A Hundred Years of Photography, 1839–1939. London: Penguin Books. 6d.

Movilia, Luigi M.: Tecnica del processo negativo. Con nozioni di merceologia fotografica e di analisi chimica qualitativa. Turin: L. Rattero. 234 pp. L. 20.

Trompetter, H.: Handleiding voor de Chromo-Lithographie en Foto-Lithographie. 2nd ed. Amsterdam: Amsterdamsche Grafische School. 283 pp. Fl. 2.50.

Windisch, Hans: The New Photo-School. Translated from the German by Walter Dreisorner. Harzburg, Germany: Heering-Verlag. 264 pp. $2.75. Reviewed in *J. Documentary Reproduction* **2**, 162(1939).

Color photography. Eastman A. Weaver (to Comstock & Wescott, Inc.). U. S. 2,186,053, Jan. 9. A method of reproducing a color picture by superimposing records of several color aspects involving deficient coloring matter properly absorbing light transmitted by the taking filter of its color aspect, but improperly absorbing light which should only be absorbed by coloring matter for a second aspect, comprises making a photographic record of the first color aspect of the picture, the record and the first aspect being of opposite sign, printing from the first record in register with the color picture a colored corrective record combined from the record and the second aspect, and then printing a corrected picture with the color picture and the corrective record in registered combination. U. S. 2,186,054 relates to a method of color photography on Ag halide emulsions which involves exposing a sensitized layer of emulsion to one color aspect, while leaving in the layer an amt. of unexposed Ag halide forming a corresponding positive, and emulsion in addn. to that amt., developing the layer into a negative, removing the Ag from the developed negative, exposing the Ag halide from one side in register through a positive of another color aspect, the latter exposure being incomplete, and the emulsion therefore correctively affected by the light absorption of the positive and again developing the layer whereby a corrected positive of the first color aspect is formed. Cf. C. A. **34**, 2271[2].

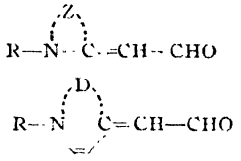
Subtractive color film. Gerd Heymer (to Agfa Ansco Corp.). U. S. 2,186,070, Jan. 9. A process of producing fade-outs in a subtractive 3-color motion picture film contg. 3 differently colored dye images, in which the fade-outs are produced by decreasing the exposure of successive frames of the color image record, involves uniformly applying to each of the frames an addnl. dye complementary in light-absorption to the color tending to predominate and in such quantity as to give a neutral black with the color.

Color photographic pictures. Wilhelm Schneider (to Agfa Ansco Corp.). U. S. 2,186,045, Jan. 9. Pictures in color are produced by use of a photographic Ag halide emulsion contg. a binding agent such as gelatin and α-indolinone or a substituted α-indolinone such as 6-amino-α-indolinone contg. a group capable of making the compd. fast to diffusion in the binding agent.

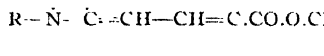
Photographic emulsions containing dyes. Rene Stevens. U. S. 2,185,798, Jan. 2. Photographic emulsions of special sensitivities comprise a Ag halide emulsion with addn. of a dye of the general formula S.CR′R″.NR.NXY: CCH:(CHCH)$_n$C.Z.NX′, where R is a phenyl, naphthyl or the monohalogen-substituted phenyl, while R′ is H or alkyl, R″, X and X′ are alkyls, Y is an anion and Z represents the nonmetallic atoms necessary to complete a heterocyclic 5- or 6-membered heterocyclic nucleus, *n* being a member of the group constituted by the integers including 0.

Nondiffusing photographic dyes and color formers. Wilhelm Schneider and Alfred Fröhlich (to General Aniline & Film Corp.). Can. 387,215, Mar. 5, 1940. Dyes or intermediates are treated with anhydrides of polybasic org. acids, substituted by radicals that prevent diffusion of the reaction product. In one of several examples, 1-amino-5-naphthol is treated with dodecylcyclohexylpyrotartaric anhydride, added in alk. soln. with Na_2CO_3 to a Ag halide emulsion and cast as a layer. After exposure, development with a color-forming developer produces a blue-dye picture.

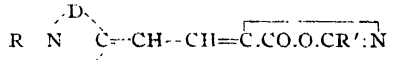
Polymethine dyes suitable for sensitizing photographic emulsions. Grafton H. Keyes and Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 2,185,343, Jan. 2. By the reaction of a monoacylated aminoacetic acid such as aceturic acid, hippuric acid or naphthoylaminoacetic acid (suitably in the presence of a water-binding agent such as Ac_2O or the like) with a formylmethylene compd. of one of the formulas



where D represents the nonmetallic atoms necessary to complete a heterocyclic nucleus, such as a pyridine or a quinoline nucleus for example, Z represents the nonmetallic atoms necessary to complete a heterocyclic nucleus, such as a 5-membered or 6-membered heterocyclic nucleus for example, and R represents an aliphatic radical, i. e., an alkyl group, sensitizing dyes are produced of one of the formulas

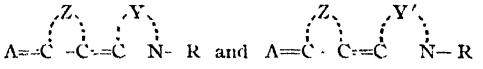


and



Numerous examples with details are given.

Merocyanine dyes. Leslie G. S. Brooker (to Eastman Kodak Co.). U. S. 2,185,182, Jan. 2. Numerous examples are given of the production of dyes having one of the formulas



where A represents a bivalent O or S atom, R represents an alkyl group, Y represents the nonmetallic atoms necessary to complete a heterocyclic nucleus selected from the group consisting of azole, azoline, indolenine, pyridine and quinoline nuclei, Y′ represents the nonmetallic atoms necessary to complete a heterocyclic nucleus selected from the group consisting of pyridine and quinoline nuclei and Z represents the nonmetallic atoms necessary to complete a heterocyclic nucleus selected from the group consisting of 5-membered heterocyclic nuclei contg. a nuclear S atom, 5-membered heterocyclic nuclei contg. a nuclear N atom and 6-membered heterocyclic nuclei contg. a nuclear N atom. Various of these dyes are suitable for *prepg. sensitized photographic emulsions*, and they may be prepd. by treating a cyclammonium quaternary salt contg. a reactive group, such as a halogen atom, particularly an I atom, a substituted-mercapto group or an aryloxy group, for example, in the α or γ position, i. e., one of the so-called reactive positions, with a heterocyclic org. compd. contg. a nuclear methylene group adjacent to a nuclear carbonyl group, such as an oxocarbonyl or thiocarbonyl group (suitably in the presence of an org. base such as triethylamine or of various other basic condensing agents and with heating of the reactants).

Direct-printing light-sensitive films. E. A. Bukatin. Russ. 55,985, Oct. 31, 1939. Ag bromide or chloride emulsion on any carrier is sensitized by immersion in, or coating with, aq. alc. soln. of salts of phenylhydrazine.

Obtaining desired intensities in photographic reproductions. Kenneth L. Henderson. U. S. 2,186,138, Jan. 9. A method of making a photographic reproduction

of a desired range of intensities from a photographic negative comprises exposing a photosensitive strip to the subject to be photographed, simultaneously photographing on the strip along with the image of the subject, an image of an approx. white object exposed through a graduated scale located in adjacent substantial parallel relation with the strip, the scale comprising tone areas progressively varying from approx. transparency to approx. opaqueness, developing the photographed strip to provide a negative, printing a positive from the negative, and developing the positive, the printing of the positive being effected so that a given tone in the printed image of the scale on the positive bears a definite intensity relation to a corresponding tone in a previously made print. App. is described.

6—INORGANIC CHEMISTRY

W. C. FERNELIUS AND L. L. QUILL

History of Prussian blue. L. J. M. Coleby. *Ann. Sci.* **4**, 206–11 (1939). C. L. B.

Symposium on the chemistry of liquid-ammonia solutions. Introduction to the symposium. Warren C. Johnson. *Chem. Rev.* **26**, 1–2 (1940). Louise Kelley

Ammonolysis in liquid ammonia. W. Conard Fernelius and Glade B. Bowman. *Chem. Rev.* **26**, 3–48 (1940). A review with many references. Louise Kelley

Sulfamic acid, sulfamide and related aquo-ammonosulfuric acids. L. F. Audrieth, M. Sveda, H. H. Sisler and M. Josetta Butler. *Chem. Rev.* **26**, 49–94 (1940). A review with many references. Louise Kelley

Reactions and reagents in liquid ammonia. Charles A. Kraus. *Chem. Rev.* **26**, 95–104 (1940). A review. Louise Kelley

Reaction between ammonia and $SeO_2.2HCl$ and $SeO_2.2HBr$. Julius Jackson and G. B. L. Smith. *J. Am. Chem. Soc.* **62**, 543–4 (1940).—The products of the reaction of $SeO_2.2HCl$ or $SeO_2.2HBr$ with NH_3 are $(NH_4)_2SeO_3$ and the corresponding halide and NH_4 dihaloselenite, $(NH_4)_2SeO_3X_2$. The formation of the NH_4 salts of dichloroselenious acid and dibromoselenious acid shows that these acids are present in $SeO_2.2HCl$ and $SeO_2.2HBr$; however, the formation of the NH_4 salts of selenious acid and of HX indicates that no single structure can be assigned to $SeO_2.2HCl$ or $SeO_2.2HBr$. It is suggested that these materials comprise an equil. mixture (dynamic isomers) of the type: $H_2SeO_2X_2 \rightleftarrows SeOXH_2O.X$. The H_2O in the $SeOXH_2O.X$ is replaced by NH_3, forming $SeONH_2X$; the H_2O so liberated causes hydrolysis of the $SeO_2X_2^-$ ion yielding HX and H_2SeO_3. A. B. Garrett

Selenium oxychloro compounds of pyridine, pyridinium chloride and related substances. Julius Jackson and G. B. L. Smith. *J. Am. Chem. Soc.* **62**, 544–6 (1940).—$SeOCl_2$ forms two series of compds. with pyridine, quinoline and isoquinoline of the general formulas $RSeOCl_2$ and R_2SeOCl_2. The quinoline and isoquinoline compds. of the type R_2SeOCl_2 are not decomposed at 61°, whereas the similar pyridine compd. decomposes to the "monopyridinate" at 61° in 167 hours. Isoquinoline has the greatest tendency to combine in a 2–1 ratio; pyridine has the least. The compds. of the type $RSeOCl_2$ are all stable at 61°. The findings agree with the thesis that $SeOCl_2$ is the parent solvent of a system of compds. (cf. *C. A.* **32**, 8975⁴), and that pyridine and related substances act as bases in $SeOCl_2$. A. B. Garrett

Formation of hydrogen peroxide by the explosive method. M. V. Polyakov, I. E. Neimark and F. G. Maksimuk. *Ber. Inst. physik. Chem., Akad. Wiss. Ukr. S. S. R.* **7**, No. 1, 21–8 (in Russian, 29; in English, 29) (1937); cf. *C. A.* **33**, 4895⁴, 8095³, 8482⁷. Results are reported on the yields of H_2O_2 by exploding mixts. of $2H_2 + O_2$ under pressures of 80–130 mm. Hg and wall temps. ranging from −40 to −180°. At 100 and 130 mm. the yield of peroxide increases noticeably as the temp. of the walls is decreased to −120°, but any further drop in temp. causes a very small increase in the yield. The yields at 100 mm. were higher than at 130 mm. At 80 mm. the yield below −120° increases considerably down to −180°. The resp. yields of peroxide at −180° at 80, 100 and 130 mm. were 2.28, 1.3 and 0.62%. Within the interval of −40 to −120° the yield and wall temp. are expressed by $K = \log(a T^{3/2})$, where a is yield and T is abs. temp.; K is about 3. Mechanism of peroxide formation is discussed. B. Z. Kamich

Data on the chemical composition of gold cupride. M. P. Lozhechkin. *Compt. rend. acad. sci. U. R. S. S.* **24**, 451–4 (1939) (in English).—Native gold cupride is mixed with gold argentide. The compn. of gold cupride can vary from Cu_2Au_3 to Cu_3Au. S. Bradford Stone

The chemical nature of precipitated basic magnesium carbonate. Jack R. I. Hepburn. *J. Chem. Soc.* **1940**, 96–9.—Pptns. carried out over a concn. range of 1.0–0.05 *M*, by the addn. of $MgSO_4$ solns. to Na_2CO_3 solns., lead to the conclusion that the CO_2 content of the ppt. is a continuous function of the amt. of CO_2 remaining in the soln. It is therefore possible that freshly pptd. basic Mg carbonate is produced by the adsorption of HCO_3 ions by $Mg(OH)_2$. H. C. Thomas

Peculiar isomerism in synthetic and mineral inorganic compounds. A. Quartaroli and O. Beltori. *Rend. seminar. facolta sci. univ. Cagliari* **7**, 111–42 (1937); *Chem. Zentr.* **1938**, II, 3380–1.—The amorphous $Ca_3(HPO_4)_2$ obtained as a voluminous ppt. from H_3PO_4 and $Ca(OH)_2$ dissolves in H_3PO_4 with the formation of $Ca(H_2PO_4)_2$. When allowed to stand at ordinary temps., compact, cryst. $Ca_3(HPO_4)_2$ seps. from this soln. In cryst. $Ca_3(HPO_4)_2$ the 2 Ca atoms are equiv. and are displaced by acids simultaneously (sym. formula I); in the amorphous salt the Ca atoms can be displaced one after the other (asym. formula II). The chem. symmetry is shown by the morphological form with the smaller vol. and cryst. character. There are 4 possibilities (formulas III–VI) for the triphosphate.

$$\{HPO_4\}_2Ca_2 \text{ (I)} \quad \{(HPO_4)_2Ca\}Ca \text{ (II)} \quad \{PO_4\}_2^{(1,2,3)}Ca_3 \text{ (III)}$$

$$\left\{\left[(PO_4)_2Ca\right]^{(1)}_{Ca}\right\}^{(2)}_{Ca}\Big\}^{(3)} \text{ (IV)} \quad \{(PO_4)_2Ca\}^{(2,3)}Ca_2 \text{ (V)}$$

$$\{(PO_4)_2Ca_2\}^{(1,2)}_{Ca} \text{ (VI)}$$

The indexes indicate the order of displacement. Several indexes within the same brackets indicate that the Ca atoms designated are displaced simultaneously. When treated with acids, III should give neither diphosphate nor monophosphate but only H_3PO_4 directly and should not be hydrolyzable, since no diphosphate can be formed. IV could give all 3 successively; V only dicalcium phosphate and H_3PO_4; and VI only monocalcium phosphate and H_3PO_4. IV and V are hydrolyzable but VI is not. The behavior of pptd. tricalcium phosphate and of bone meal corresponds to formula VI; that of phosphorite and apatite to a mixt. of III and VI. A study of the phosphates of Ba and of Li indicated a similar type of isomerism. In general, the sym. form was produced at higher temps. It was shown experimentally that synthetic and natural $MgCO_3$ have different solubilities. The former, which is amorphous and voluminous and readily converted into $Mg(HCO_3)_2$ by weak acids, corresponds to the formula $\{(CO_3)_2Mg\}Mg$. Magnesite, which is less sol. than the synthetic salt and is scarcely attacked by weak acids, corresponds to the formula $\{CO_3\}_2Mg_2$. Magnesite cannot be converted into $Mg(HCO_3)_2$. According to the formulas suggested, the reaction between H_2S and synthetic $MgCO_3$ should take place in accordance with the equation: $2\,MgCO_3 + H_2S = Mg(HCO_3)_2 + MgS$ and that with magnesite in accordance with the equation: $MgCO_3 + H_2S = MgS + H_2O + CO_2$. Detn. of CO_2 in the reaction products verified both equations. The behavior of various carbonates is discussed. Ca and Mg give predominantly the asym. forms (only magnesite is

sym.) which can be converted into bicarbonate; this tendency decreases with Zn, Co and Ni. Those metals which give bicarbonates readily also give hydrosulfides readily. The behavior of NiS and CoS is explained by the assumption that {S_2Ni|Ni and {S_2Co|Co are first formed. These are sol. in acids. In alk. soln. S_2Ni_2 and S_2Co_2 are formed directly. These are attacked by acids with difficulty, not because H_2S reacts with greater difficulty than HS but because the sym. pairs Ni_2 and Co_2 must be displaced simultaneously. ZnS behaves in a similar manner. The possibility of the existence of isomers of CO_2 and $COCl_2$, as evidenced by their manner of formation, is discussed. CO + O should give the asym. CO_2 while C + O_2 should give the sym. mol. CO + Cl_2 should give a product differing from that obtained from CCl_2 + O, since in the 2nd product the Cl atoms have the same type of bond as in CCl_4 while in the first product the C- Cl bond is weakened by the presence of the =C=O bond. An explanation of some of the properties of water is offered (with reservations), in which it is assumed that water is a mixt. of the sym. form H_2O and the asym. form (HO)H. By analogy with the above examples, the asym. form possesses a greater vol. than the sym. form; raising the temp. favors the formation of the sym. form. Since with falling temp. the amt. of the more voluminous, asym. form increases, it is possible that at a certain point an increase in vol. should take place in spite of the cooling. At 0° a soln. of H_2O in (HO)H is present. With increase in pressure the amt. of H_2O increases. After the eutectic is passed a soln. of (HO)H in H_2O is present from which H_2O crystallizes out. In this way the lowering of the f. p. with pressure is explained as well as the fact that at high pressures an ice having a d. > 1 can be obtained. The compressibility coeff. of water decreases from 0 to 50°. This is attributed to the progressively smaller role played by the conversion of (HO)H into H_2O by pressure (with reduction in vol.) with increasing temp. as a result of the decreasing concn. of (HO)H. The relation between reaction velocity and temp. is given empirically by the formula $v_1 = v_0 + a^{t_1 - t_0}$, where in general $a \approx 2$. In reactions in which water takes part a is often definitely greater between 0 and 50°. In the reaction COS + H_2O = CO_2 + H_2S, a is 3.68 (15 40°). In the blackening of $Cu(OH)_2$ $a > 7$; this is due to the fact that between 0 and 50° the amt. of H_2O and therefore the amt. of the active H_2O mols. (2 H + O) increases. Expts with $Cu(OH)_2$ are described in detail. M. G. Moore

Reactions of chromates at high temperatures. X. Decomposition of mixtures of calcium chromate with sodium carbonate and with ferric oxide. D. S. Datar and S. K. K. Jatkar. *J. Indian Inst. Sci.* **22A**, 225–36(1939); cf. *C. A.* **33**, 6190⁶.– A 2:1 mixt. of $CaCrO_4$ and Na_2CO_3 when heated decomposes with evolution of CO_2 to form the basic chromate, $4Na_2O.8CaO.8CrO_3$, which on heating further decomposes in stages corresponding to 25%, 33⅓% and 10% decompn. of the chromate to form, resp., $4Na_2O.8CaO.6CrO_3.Cr_2O_3$, $3Na_2O.6CaO.4CrO_3.Cr_2O_3$ and $5Na_2O.10CaO.6CrO_3.2Cr_2O_3$. Measurements of the characteristic decompn. pressures of the mixed chromates indicate respective heats of decompn. of 14.9, 43.6, 24.4 and 37.4 cal. per mole of O. Evidence is found for a basic chromium chromate of Fe. **XI. Structure of chromium chromates.** *Ibid.* 287–307.—Structures are suggested for 23 compds. of general formula $aCr_2O_3.bCrO_3$, formed by thermal decompn. of CrO_3 and of chromates of Ca, Sr and Ba. These structures contain the units —Cr(O)(O)Cr—O— and —Cr(=O)(=O)—. CaO, SrO and BaO may be added where Cr is doubly linked to O. **XII. Magnetic properties of chromium chromates.** *Ibid.* 309–15.—Magnetic susceptibilities calcd. on the basis of the formulas in XI for the oxides of Cr agree fairly well with reported measurements. Av. valencies of Cr calcd. from the magnetic susceptibilities also agree with expt. Discrepancies are attributed to traces of magnetic impurities and to polymerization factors. Wm. E. Trout, Jr.

The molecular volume of water in certain complex compounds. Petru G. Spacu. *Bull. sect. sci. acad. roumaine* **21**, 35–7(1938–39).—From the observed ds. of the complexes, *trans*-[Co en_2Cl_2]Cl, *cis*-[Co en_2Cl_2]Cl, *cis*-[Co $en_2(H_2O)Cl]Cl_2$ and *cis*-[Co $en_2(H_2O)_2]Cl_3$, where en = ethylenediamine, the mol. vols. are, resp., 157.16, 166.38, 180.56 and 194.76. The increases in vol. on addn. of the 1st and 2nd mols. of H_2O are, resp., 14.18 and 14.20; these vols. are approx. the vol. of H_2O at zero abs. The vols. at zero abs. of the components, Co = 6.5, Cl = 16.3, en = 55, yield a value of 165.4 for [Co en_2Cl_2]Cl, which corresponds within 0.6% to the observed vol. of the cis but not to that of the trans complex. L. E. Steiner

Ferritartrates. Eliane Poulenc-Ferrand. *Compt. rend.* **210**, 299–301(1940).—To equal amts. (10 cc.) of *M* $FeCl_3$ and *M* $C_4H_6O_6$ (H_2T) varying amts. (*x* cc.) of *M* Na_2CO_3 were added. If *x* is less than 10 cc. no ppt. occurs; if *x* = 10–20 an insol. ocher-colored ppt. (I); with *x* = 35 partial re-soln. occurs followed by deposition of a brick-red solid (II). Analysis shows that I is $H_4[Fe_4T_3(OH)_4]$, and II a salt thereof. The Na_4, Na_3H and Na_2H_2 salts were prepd. as were also the corresponding K salts. I and its salts are insol. in EtOH and Et_2O. Soly. in H_2O increases from I (insol.) to the neutral salt (very sol.); salts of K are less sol., but more stable than those of Na; I decomposes above 58°, the Na_4 salt above 90°. All are sensitive to light. The Na_4 and K_4 salts alone are cryst., forming brick-red needles, several mm. long. No other complexes resulted from 10 cc. *M* $FeCl_3$ + 10 cc. Na_2CO_3 or K_2CO_3 + *x M* H_2T, or by using 0.1 *M* solns. in place of *M*. Cf. Franke, *C. A.* **25**, 5145, and Pariselle, *et al.*, *C. A.* **28**, 2678⁹. C. A. Silberrad

Inner complex salts of the 8-hydroxyquinoline-5-sulfonic acid. Jacob Molland. *J. Am. Chem. Soc.* **62**, 541–2(1940).—The salts formed in the reaction of $Fe_2(SO_4)_3$ and $CuSO_4$ with 8-hydroxyquinoline-5-sulfonic acid were studied by a spectrophotometric method. Tables of extinction coeffs. are given. The compn. of the salts corresponds to the formulas $(C_9H_6O_4NS)_3Fe$ and $(C_9H_6O_4NS)_2Cu$. A. B. Garrett

Magnetochemical investigations. XXXV. Heavy-metal complexes of the phthalocyanines. Heinz Senff and Wilhelm Klemm. *J. prakt. Chem.* **154**, 73–81(1939); cf. *C. A.* **33**, 6102⁶.—Magnetic susceptibilities of phthalocyanines, purified by sublimation in a high vacuum, are ($\chi_a \times 10^6$): $CoC_{32}H_{16}N_8$, 20°, 2.9; −183°, 9.8; $FeC_{32}H_{16}N_8$, 20°, 10.5; −183°, 32; $MnC_{32}H_{16}N_8$, 20°, 15; −78°, approx. 21; −183°, 61; $VOC_{32}H_{16}N_8$, 20°, 1.6; −183°, 6.4. From a comparison of the exptl. mol. susceptibilities with those calcd. for normal and penetration types of complexes, it was found that neither Ni, Co, Fe nor Mn phthalocyanine represents a single type of complex, but possibly they represent types in resonance with one another. With $VOC_{32}H_{16}N_8$ the calcd. values of susceptibility for normal and penetration types of complex are identical and throw no light on the actual state of the substance; the metal in this compd. is quadrivalent. Samples of the Fe phthalocyanine were extd. with pyridine and quinoline, resp., for several hrs.; after removal of most of the solvent by distn., crystals sepd.; these were washed with alc. and dried *in vacuo*. $C_{32}H_{16}N_8Fe.2C_5H_5N$ and $C_{32}H_{16}N_8Fe.xC_9H_7N$ are both diamagnetic, the former having a magnetic susceptibility at room temp. of χ_a = −0.30 × 10^{-6}. George Ayers

Oxidation of complex compounds of platinum with hydrogen peroxide. A. V. Babaeva. *Compt. rend. acad. sci. U. R. S. S.* **24**, 145–8(1939)(in English).—A study of the reaction of complex electrolytes of bivalent Pt ($K_2[PtCl_4]$, $K_2[Pt(NO_2)_4]$, $[Pt(NH_3)_4]Cl_2$, $[Pt(NH_3)_4](NO_3)_2$) with H_2O_2 disclosed the formation of dihydroxo compds. of quadrivalent Pt and some addnl. compds. $K_2[PtCl_4(OH_2)]$ (I) could be obtained only by strict control of temp. and H_2O_2 concn. Oxidation of $K_2[PtCl_4]$ led to formation of I, $KH[PtCl_3(OH)_4]$, $K_2[PtCl_6]$ and $K_2[PtCl_3(OH)_2H_2O]$. Oxidation of $K_2[Pt(NO_2)_4]$ led to formation of $K_2[Pt(NO_2)_4(OH)_2]$, $KH[Pt(NO_2)_3OH]$ and

$K_2[Pt(NO_3)_4(OH)_2]$. Oxidation of the Alexander base $[(NH_2OH)_4Pt](OH)_2$ gave the hexahydroxo acid $H_2[Pt(OH)_6]$. 4 references. A. H. Krappe

Chlorogermanic acid and chlorogermanates (Laubengayer, *et al.*) 2. Fluorination of thionyl chloride (Booth, Mericola) 2.

Gmelins Handbuch der anorganischen Chemie. 8th ed. System-Nr. 67. Iridium. Berlin: Verlag Chemie. 196 pp. M. 34.

Passerini's Corso di chimica inorganica dalle lezioni del Mario Passerini. Collected by R. Roberto and V. Parrotta. Florence: Casa editoriale poligrafia universitaria di C. Cya. 192 pp.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Qualitative analysis. I, II. A system to include some of the rarer elements. J. E. Clennell. *Mining Mag.* **62**, 19–26, 81 8(1940).—The outlined scheme includes W, Tl, Mo, Ti, U, Ce, Th, V and Li but does not include Be, Zr, Ta, Cb, precious metals or rare earths and little attention is paid to methods for handling minerals that are difficult to attack. Group I contains the usual Pb, Hg and Ag together with Tl and W. The TlCl is dissolved in hot water together with $PbCl_2$ from which it is sepd. by pptg. the Pb as $PbSO_4$ and detected by the formation of yellow TlI, black Tl_2S and by the flame test. WO_3 is dissolved from the ppt. together with AgCl by the usual treatment with NH_3 and identified by the test with Zn + HCl and by the formation of a white ppt. with cinchonine-HCl. Group I may also contain Sb, Sn, Bi, Mo, Ti, Ba and Sr under some circumstances although these elements belong to other groups. Sb, Sn, Bi and Ti are carried down as a result of hydrolysis, for the most part. Ba and Sr may be present in the sample as insol sulfates. Group II includes Hg, Pb, Bi, Cu, Cd, (Tl), As, Sb, Sn and Mo. The usual sepn. into 2 subgroups is made with alk. solus. contg. sulfide. The analysis of the Cu group follows conventional lines except that the effect of Tl in the higher state is considered. Alternate procedures are given for detecting As, Sb and Sn but no new test is described. The Mo is detected by the blue color that usually results upon evapg. with HCl + HNO_3 and by the test with KCNS + $SnCl_2$. Provision is also made for pptg. Mo as $PbMoO_4$. Group III contains Fe, Al, Cr, Ti, U, Ce, Th and possibly Tl and V. The detection of Zr, Hf, Be, Ta, Cb, Yt, etc., which also belongs in this group, is not considered. The analysis proceeds conventionally except for the following points: (1) The group is not pptd. as a whole by NH_4OH + $(NH_4)_2S$ at the start but the older method of pptg. one part of the group with an excess of NH_3 and considerable NH_4Cl is recommended. (2) The first ppt. is dissolved in HCl and treated with oxalic acid to ppt. Ce and Th. These elements are both detected by H_2O_2 tests after treatment with strong $(NH_4)_2C_2O_4$ to dissolve the oxalate of Th. (3) Ti is sepd. from Fe by pptg. the latter as FeS from ammoniacal soln. contg. tartrate. (4) The $K_4Fe(CN)_6$ test for UO_2^{++} is made after the soln. contg. Fe, Al, etc., is heated with strong $(NH_4)_2CO_3$ soln. Groups IV and V contain no new test except that after the Ba, Sr and Ca are pptd. as carbonates, one portion of the filtrate is boiled with NaOH till all NH_4^+ salt is decompd. and the Mg pptd. as $Mg(OH)_2$ and then in the filtrate the $LiPO_4$ is pptd. by adding Na_2HPO_4 and the $LiPO_4$ is proved sol in dil. AcOH. Flame tests alone are relied upon for the identification of Na and K. A skilled, practical chemist will undoubtedly get useful results from this scheme of analysis, which is much simpler than other schemes that have been proposed. W. T. H.

The spectrograph in quantitative analysis. Wm. C. Lee. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 102–7 (1940).—A review of work done since 1933 by the Physics department of the Univ. of Michigan, in cooperation with the department of internal medicine, of the Medical School and with certain industrial plants. L. S.

Rare and nonferrous metals. Spectral analysis of solutions and minerals. A. K. Rusanov. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) **147**, 69–82(1939).—See *C. A.* **34**, 1589⁷. Chas. Blanc

Rare and nonferrous metals. Methods for the determination of disseminated and rare metals in mineral ores. I. P. Alimarin. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) **147**, 33–68(in English, 69) (1939).—A crit. discussion of the common methods of phys., chem. and x-ray analysis based on the literature. Approx. 100 references. Chas. Blanc

Preparation of sodium hydroxide reagent free from carbonate. A. M. Kellog. *Chemist-Analyst* **29**, 1 8(1940). —Various methods are reviewed and a suitable procedure for prepg. the soln. and for standardizing it against $KHC_8H_4O_4$ is described. W. T. H.

The drop method for the rapid qualitative analysis of metals and alloys. G. T. Mikhal'chishin. *Univ. Stal Kiev, Bull. sci., Rec. chim.* **2**, 85–96(1936).—A review. W. A. Moore

Assay for platinum metals in ore concentrates. John Scath and F. E. Beamish. *Ind. Eng. Chem., Anal. Ed.* **12**, 169–71(1940).—The Pt metals are quite commonly assocd. with minerals contg. considerable Ni, Cu and Fe sulfides and in attempts to effect mech. concn. of the Pt metals, a considerable accumulation of these base metals results. In the dry assay considerable difficulty is encountered in collecting all the precious metals in a Pb button after a single fusion, it is hard to slag off the base metals so as to produce a clean button and there is invariably so much base metal left after cupellation that the residue does not give reliable indication of the actual values present. The conclusions drawn from considerable study are (1) One or 2 fusions of the first slag are necessary for a complete collection of the Pt metals when much Ni is present. (2) Considerable quantities of Cu and Fe oxides do not prevent the collection of Pt metals in the Pb button. (3) Various silicates, excess PbO and KNO_3 charges over a wide temp. range do not serve to improve the recovery of Pt metals when much Ni is present. (4) In the absence of considerable Rh, Ir and Ru, proper washing of the Pb regulus permits the application of the all-dry assay. If the proportion of insol. to sol. Pt metals is high the assay bead is not coherent and Pb is retained even after heating 3 hrs. at 1300° in O_2. If 1 Pd, 1 Pt or more is present a wt. of concentrate should be chosen to make the residue weigh 10–15 mg. Even when a little Pb is retained, the absence of Ag facilitates the wet analysis of the regulus. (5) The all-dry assay has a limited application. It should be used primarily for the detection of the Pt metals but not for their detn. W. T. H.

Simple test for arsenic in lead alloys. R. G. Robinson *Analyst* **65**, 159(1940).—Heat 2 g. of alloy in a 250 ml. Erlenmeyer flask with 3 g. Na_2SO_4 and 15 ml. concd. H_2SO_4. When the alloy is completely decompd., cool, carefully add 75 ml. of water and heat to boiling. Add 75 ml. of concd. HCl and 2 drops $HgCl_2$ soln. + 3 ml. H_3PO_2, d. 1.114. Heat to boiling. All Pb salts will be dissolved and if 0.1 mg. or more of As is present, a brown colloidal ppt. will form. W. T. H.

Cerimetric determination of small amounts of arsenic after reduction with hypophosphite reagent. I. M. Kolthoff and Elias Amdur. *Ind. Eng. Chem., Anal. Ed.* **12**, 177–9(1940); cf. Evans, *C. A.* **26**, 5027.— The As is reduced to the free state by heating for 10 min. at 80–90° with excess of a soln. of $Ca(H_2PO_2)_2$ in 6 *N* HCl. The As is coagulated by heating, filtered, oxidized and dissolved in a measured vol. of approx. 0.005 *N* $Ce(SO_4)_2$ soln. The excess Ce^{++++} is titrated with 0.005 *N* arsenite soln. in the presence of OsO_4 as catalyst. The method will

detn. 1 mg. As within 0.5% of the truth, and 0.1 mg. As with 2%. Sb and Sn do not interfere. T. H. D.

Separation of cadmium from zinc by the use of granular aluminum. F. E. Townsend and Geo. N. Cade, Jr. *Ind. Eng. Chem., Anal. Ed.* **12**, 163–4(1940).—Expts. show that 0.06–0.10 g. of Cd can be sepd. from 0.01–2.0 g. of Zn by boiling the soln. in 0.2 *N* H_2SO_4 for 5 min. with 0.3–1.0 g. of granular Al. Filter through cotton and test the filtrate for more Cd by adding 0.1 g. of Al, boiling another 5 min. and filtering through paper. To the residue, add 5 ml. of 50% NaOH soln. and when all excess Al has dissolved, filter and wash the residue. Dissolve this in HCl + Br_2 and titrate the suitably treated soln. with $K_4Fe(CN)_6$ or electrolyze it. One pptn. with Al is usually adequate. Before making the $K_4Fe(CN)_6$ titration, interfering ions can be removed by pptn. with excess NH_4OH in the presence of NH_4Cl and before the electrolytic detn. interfering elements can be removed by pptg. the Cd as CdS. The electrolytic method is regarded as the more accurate but requires more time. W. T. H.

Colorimetric determination of columbium and tantalum. N. F. Krivoshlykov. *Trudy LKKhTI* **1939**, No. 7, 103–22; *Khim. Referat. Zhur.* **2**, No. 5, 59–60 (1939).—The method is based on the color produced by Cb and Ta compds. with pyrogallol in acid and alk. solns. The oxides of Cb, Ta and Ti are fused with $NaHSO_4$ and the soln. of the melt is treated with $(NH_4)_2C_2O_4$ soln. Ti is detd. with H_2O_2. For the detn. of Cb the soln. is mixed with an equal amt. of a 5% soln. of pyrogallol in a satd. aq. soln. of Na_2SO_3 and the intensity of the color is measured. Ta in an alk. soln. does not interfere with the detn. of Cb; Ti gives a color similar to that produced by Cb. A correction can be made for small amts. of Ti, detd. by the H_2O_2 method. If present in greater amt than Cb, Ti must be sepd. Ta is detd. colorimetrically with pyrogallol in an acid soln. without the use of Na_2SO_3. Cb and Ti do not interfere. By means of pyrogallol 0.05 mg. of Cb_2O_5 and 0.05–0.07 mg. of Ta_2O_5 in 1 cc. of soln. can be detected. W. R. Henn

Iodofluoride method for the determination of copper. Effects of antimony, aluminum and calcium. Wm. R. Crowell and Alan T. Spiher. *Ind. Eng. Chem., Anal. Ed.* **12**, 147(1940); cf. *C. A.* **34**, 2870.—The paper refers to the iodometric detn. of Cu when no previous elimination of other ions is effected and the effect of Fe^{+++} is prevented by conversion into FeF_6^{---}, which does not undergo reduction by contact with I^-. It is here shown that erratic results may be due to the presence of Sb, Al or Ca. Not more than 0.02 of Sb can be present or the results will be low and some I_2 will be used in oxidizing the Sb^{+++}. Not more than 0.3 g. of Al can be present as there is danger of an insol. fluoride forming which will carry some Cu down with it. Ca can be present up to 0.4 g. and Ca + Fe up to 0.3 g. of each. Ca, Fe and As can all be present up to 0.2 g. of each provided the sample is fumed well and any $CaSO_4$ ppt. is filtered off before adding NH_3. W. T. H.

Spectral-analytical determination of traces of iron in very pure aluminum. J. Wilken. *Metallwirtschaft* **19**, 121–4(1940).—The lines Al II 26669, 17 A. and Fe 2755, 7 A. were chosen. To prevent oxidation, all observations were made in an atm. of N_2. As neutral gas, neither H_2 nor A was satisfactory because these gases show strong continuous bands or lines. The results obtained in detg. 0.0025%, 0.0075%, 0.095% and 0.17% Fe are tabulated and complete details given concerning the procedure and the app. used. Except with 1 sample, the results appear to be within 4.3% of the truth. W. T. H.

New test for the detection of molybdenum and tungsten. J. Hubert Hamence. *Analyst* **65**, 152–4(1940).—Dithiol-(4-methyl-1,2-dimercaptobenzene) can serve to detect Mo and W. To detect either alone, take 10 ml. of soln. contg. between 0.02 and 1.0 mg. of the element and add NaOH soln. or HCl until neutral to litmus. Add 10 drops of concd. HCl and 3 drops of thioglycollic acid. If Mo is present a bright-yellow ppt. will form; W shows no color. Now add 1 ml. of the dithiol reagent (cf. Clark, *C. A.* **30**, 3741[9]). Mo now gives a dark-green ppt. and W a light greenish blue ppt. Cool the mixt. and add an excess of concd. NH_3 soln. Mo gives a bright-blue color but with W there is no color. The following procedure has been found satisfactory to detect W in the presence of Mo. To 20 ml. of soln. contg. 10 mg. Mo and 0.1 mg. W, add NaOH till basic to litmus, then 2 g. tartaric acid and 0.2 ml. of concd. H_2SO_4. Heat to 60° and sat. with H_2S. Filter off the MoS_3 ppt., evap. the filtrate to dryness and ignite to destroy tartaric acid. Add to the residue a few drops of 20% NaOH, dil. and test for W as above described W. T. H.

Estimation of praseodymium and neodymium in solutions from their absorption spectra. J. Newton Friend and Douglas A. Hall. *Analyst* **65**, 144–8(1940).—Three methods have been used for detg. rare earths by means of the absorption spectra shown by their solns. (1) The widths of the chief bands in the visible range are compared with bands obtained from known concns. (2) The diln. necessary to effect the disappearance of the most persistent band is detd. (3) The soln. studied is dild. until the intensities of suitable bands appear by direct vision to equal those of standard solns. placed in juxtaposition. This last procedure has often been used to det. traces of Pr, Nd and other colored earths in modern at.-wt. detns. The work described in this paper was undertaken to det., in the case of the nitrates of Pr and Nd, the accuracy of the procedure and to ascertain what concns. of HNO_3, $Ce(NO_3)_3$ and $Mg(NO_3)_2$ can be present without appreciably affecting the results. A Hilger const.-deviation spectrometer was used and illuminated by 40-watt, gas-filled, opal lamps. The absorption cells were 6 cm. long and the slit was set at the min. to yield a clear spectrum with least eye strain. The results show that in solns. contg. about 3–4% of Nd or Pr nitrate the concn. of either element separately can be detd. within about 1% of the truth by comparing the intensities of suitable bands with those of standard solns. For Nd three bands were selected yielding, resp., (*a*) lines at 5263 and 5203 A., (*b*) a line at 5216 A. and (*c*) a line at 5203 A. For Pr, the most suitable band extended from 5980 to 5825 A. and yielded 5890 A. as the most persistent line. There is considerable overlapping of the Pr and Nd bands; it is possible to det. Nd in the presence of as much as 50% Pr with an accuracy of about 1%. In the case of Nd, the presence of 63 g. HNO_3, 70 g. $Mg(NO_3)_2$, 85 g. $NaNO_3$, 65 g. $Ce(NO_3)_3$ or 76 g. $La(NO_3)_3$ per l. is tolerated and for detg. Pr, 50 g. HNO_3, 60 g. $Mg(NO_3)_2$ or 65 g. $Ce(NO_3)_3$ does no harm. W. T. H.

A modified tin subgroup procedure. A. R. Hanke and J. H. Reedy. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 104–5(1939).—A procedure based on the reduction of Sb^{+++} and Sn^{++++} by sheet lead to Sb and Sn^{++}, resp. J. H. Reedy

Determination of tungsten. A volumetric method. M. L. Holt and Allen G. Gray. *Ind. Eng. Chem., Anal. Ed.* **12**, 144–6(1940).—The method is based upon the reduction of H_2WO_4 to W^{+++} in the presence of HCl by treatment with Pb-Hg amalgam at 60°. As soon as the liquid amalgam comes in contact with the sexivalent W, a blue color develops. The color changes to violet, red, yellow and finally to a deep yellow. This deep yellow color signifies complete reduction but it is well to keep the strongly acid soln. in contact with the reductor for about 5 min. longer. Then the reductor is removed, the soln. is treated with an excess of ferric alum soln. and the reduced Fe^{++} titrated with $K_2Cr_2O_7$ in the presence of diphenylaminesulfonic acid as indicator. W. T. H.

New applications of the silver reductor. Determination of uranium and copper. Nathan Birnbaum and Sylvan M. Edmonds. *Ind. Eng. Chem., Anal. Ed.* **12**, 155–7 (1940).—UO_2^{++} in the presence of hot, 4 *N* HCl is reduced completely to U^{++++} by the Ag reductor and the reduced soln. can be titrated with $Ce(SO_4)_2$ soln. in the presence of *o*-phenanthroline ferrous complex as indicator. In 2 *N* HCl, Cu^{++} is reduced to $Cu_2Cl_4^{--}$. Direct titration of the cuprous salt gives low results because of atm. oxidation. If, however, the reduced soln. is run into ferric alum soln., this serves to prevent low results and the soln.

can then be titrated with $Ce(SO_4)_2$ in the presence of *o*-phenanthroline ferrous complex. The presence of HNO_3, Fe, Mo, V and Cu interfere with the detn. of U by means of the Ag reductor but in the detn. of Cu, the presence of HNO_3, Zn, Sn, H_3AsO_4, Bi and Cd do no harm. Otherwise the results are excellent for both detns. W. T. H.

Determination of vanadium in ferromanganese. N. Motohasi. *Bull. Inst. Phys. Chem. Research* (Tokyo) **18**, 196-203(1939).—The $FeSO_4$-persulfate method for detg. V in Fe-Mn can be used after removal of Mn by Na_2O_2. Much Mn renders the end point of the titration indistinct. B. C. P. A.

Empirical mercurimetric method for zinc. Albert C. Titus and Jack S. Olsen. *Ind. Eng. Chem., Anal. Ed.* **12**, 133-5(1940).—A routine method is described which is suitable for the analysis of many samples with speed and satisfactory accuracy. The procedure consists in pptg. the Zn as $ZnHg(SCN)_4$ from an acid soln., dissolving the washed ppt. in standard KI soln. and titrating the apparent excess of KI with standard $Hg(NO_3)_2$ soln. If the method were strictly stoichiometric, the $ZnHg(SCN)_4$ would react with 4 I^- to form $Zn^{++} + HgI_4^- + 4SCN^-$ and the excess I^- would react with Hg^{++} in the final titration to form HgI_4^{--}. In practice a pos. error is caused by the fact that the red ppt. of HgI_2, which indicate the end point forms before enough Hg^{++} has been added, by the reaction $Hg^{++} + HgI_4^-$ and a neg. error results from too much Hg being used for the initial formation of $ZnHg(SCN)_4$. The relationship between the apparent iodide consumption and the actual quantity of Zn present is a straight-line function so that an empirical curve can be constructed which will serve for calcg. the results. W. T. H.

Indicator available for the determination of nitrogen in iron and steel. Isaburo Wada and Raizo Isii. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **37**, 65-78 (1940).—The standard procedure adopted in Japan for detg. N in Fe and steel consists in dissolving the sample in HCl, adding excess NaOH to the resulting soln., distg. off NH_3 into a known vol. of standard H_2SO_4 and titrating the excess acid with NaOH to an end point with Na alizarinsulfonate as indicator. It is now shown that bromocresol blue is a more satisfactory indicator for this reaction. W. T. H.

Determination of nitrogen in iron and steel by the Kjeldahl method. I. New apparatus for the distillation. Takayuki Sōmiya. *Tetsu-to-Hagane* **26**, 43-6(1940). - Details of the manipulation and app. are changed somewhat. M. Ishida

Microdetermination of amino nitrogen by the manometer method. Danzi Matukawa. *Saikingaku Zasshi* No. **520**(May, 1939); *Kitasato Arch. Exptl. Med.* **16**, *Abstracts* 3(Nov., 1939).—A combination of Warburg's manometer method and the formalin titration method is recommended. J. Pinchack

Determination of amino nitrogen with formalin and degree of digestion of various peptone preparations determined by amino nitrogen. Danzi Matukawa. *Saikingaku Zasshi* No. **520** (May, 1939); *Kitasato Arch. Exptl. Med.* **16**, *Abstracts* 3(Nov., 1939).— A modified Sorensen formalin titration method and Willstatter's alc. method were applied. A partly digested peptone is necessary for toxin production, but when digestion has gone too far strong toxin is not produced although the organisms grow well. J. Pinchack

Rapid determination of oxygen in steel. L. Singer. *Ind. Eng. Chem., Anal. Ed.* **12**, 127-30(1940).—The procedure is like that of the well-known vacuum fusion method except that a temp. of 1200-1250° suffices and the oxidation of the C in a graphite bucket by the O of the oxide or dissolved O_2 present in the steel is accomplished in an atm. of pure N_2. The N_2 is passed through a purifying train to remove small quantities of H_2 and O_2 that are present. The sample is weighed into a conditioned graphite bucket which is provided with a layer of pure Sn; this effects the fusion of the steel at a temp. lower than would be necessary otherwise. Most of the air is removed at the start by applying a vacuum and then the N_2 stream is started. About 15 min. is all that is required for the analysis. The CO formed is passed over hot CuO and the resulting CO_2 is absorbed in ascarite after the gas is properly dried. A blank must be run which, for a 15-g. sample of steel, is about 0.0005% for each 5 min. of reduction period. In detg. 0.012 0.025% O in steel the results usually agree within 0.001%. W. T. H.

An adaptation of the Bodansky method for phosphorus to the photoelectric colorimeter. Morris Rhian. *Proc. S. Dakota Acad. Sci.* **19**, 115-17(1939); cf. B., *C. A.* **31**, 8573[4]. Walter H. Seegers

Quick method for determining silicon in iron and steel. Raizo Isii. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **36**, 491-6(1939).—The Si is estd. from the vol. of silicic acid (I) formed from the HCl soln. Heat 1 g. of steel or 2 g. cast Fe with 10 cc. of 6 *N* HCl (with cast Fe preliminary treatment with 2 *N* HCl is advisable) add 1 cc. of concd. HNO_3 and heat the mixt. cautiously until the vol. is reduced to 1-2 cc. Now add about 5 cc. concd. HCl and evap. again to 1-2 cc. Dil with 20 cc. H_2O and centrifuge in a conical, graduated measuring tube. The method fails when less than 0.1% Si or appreciable W is present. C. R. Addinall

Spectroscopic analysis of zinc alloys. Gisela Lueg and F. Wolbank. *Metallwirtschaft* **18**, 1027-9(1939). A special permanent casting mold was used; the elec. equipment is described. A spark generator in resonance wiring was used. It is necessary to take several pictures for each group which differ by exposure time. With each analysis a series of standard alloys with at least 3 different alloying percentages is used. For detg. Al, Mg and Cu the intensity of the following lines was measured: Al 3082 A. against Zn 3076 A., Mg 2798 A. against Zn 2801 A., Cu 2545 A. against Zn 2570 A. The tested concn. ranges were, 2-13% Al, 0.01-0.1% Mg and 0.3-3% Cu. The comparison (standard) alloys for detg. Mg should have approx. the same Al content as the analyzed material. The most important impurities Fe, Cd and Pb were measured by lines: Fe 2382 A. against Zn 2394 A., Cd 2144 A. against Zn 2138 A., Pb 2204 A. against Zn background next to the line. The comparison with the background calls for most uniform exposure. Richard P. Seelig

Microchemical examination of Prussian blue writing ink. Cecil L. Wilson. *Chemistry & Industry* **1940**, 163.- In exams. the ink on a forged British bank note, treatment with 5 *N* HCl gave a soln. which showed a pos. Fe^{+++} test with ferrocyanide. Treatment with $(CH_2)_6N_4$ as recommended by Chamot and Mason (*Handbook of Chem. Microscopy*, *C. A.* **25**, 2635) gave rise to the formation of prisms and rectangular plates which showed strong birefringence and parallel extinction. According to C. and M. the extinction should be oblique in the ferrocyanide test. Expts. made with Prussian blue confirmed the conclusion that the ink used in the forgery contained Prussian blue and oxalic acid. W. T. H.

Separation of chloride, thiocyanate and cyanide, and a qualitative test for chloride in potassium thiocyanate. A. Slooff and D. van Duyn. *Chem. Weekblad* **37**, 69-72 (1940).—Slight changes in the exptl. procedure are suggested. The test for Cl^- is made after boiling with dil. HNO_3 to oxidize HCN + HCNS. J. C. Jurrjens

Analysis of free sodium cyanide in brass-plating solutions. Wallace M. McNabb and Samuel Heiman. *Ind. Eng. Chem., Anal. Ed.* **12**, 161-3(1940).—Pan (*C. A.* **26**, 4758) in applying the argentometric method of Liebig (*Ann. Chem. Pharm.* **77**, 102) to the detn. of free cyanide came to the conclusion that in brass plating solns. the *free cyanide* can be regarded as the alkali cyanide that is present over that required to form $Na_2Cu(CN)_3$ and $NaZn(CN)_3$. P. did not test the purity of his reagents and did did not study the effect of pH. The expts. here described show that the Liebig method yields reproducible results only when the concns. of Na_2CO_3, NH_3 and the pH are controlled carefully. Although under certain conditions the results indicate mathematically that $Na_2Cu(CN)_3$ and $NaZn(CN)_3$ are formed, yet there is no pos. proof that the latter compd. really exists. In fact it seems more plausible that a brass plating soln. is likely to contain a

mixt. of $NaCu(CN)_2$, $Na_3Cu(CN)_4$, $Na_2Zn(CN)_4$ and Na_2ZnO_2. The equil. between these complexes, and consequently the actual free cyanide, is governed by the pH and the concns. The Liebig titration, however, is useful for evaluating plating solns. W. T. H. 1

Analysis of cyanide slimes. J. A. Klyushnikov. *Zolotaya Prom.* **1938**, No. 11, 39–40; *Khim. Referat. Zhur.* 2, No. 5, 83(1939).—The slime obtained from the cyanide process is dried, sifted through a 1-mm. sieve and divided into 2 equal portions, each of which is in turn divided in 5 parts. Each part is carefully mixed and samples are taken by quartering for detns. H_2O, Au, Ag and Zn. Au and the other components are detd. by dry assay. W. R. H. 2

Rapid methods for determining free sulfur trioxide in fuming sulfuric acid. Zyoosuke Kubota. *Waseda Applied Chem. Soc. Bull.* **16**, No. 2, 3–10, *Abstracts* (in English) 19(1939).—To secure a rapid and accurate method for the detn. of "free SO_3" present in oleum K. examd. (*a*) the fume-vanishing method, (*b*) thermometric titration and (*c*) the thermal method based on the detn. of temp. rise. Of these methods *b* with dil. H_2SO_4 gave the best results; the titration could be carried out with water, though the results obtained were somewhat inferior to those with dil. acid. In the temp.-rise method oleum to be examd. and H_2SO_4 to be admixed therewith were measured volumetrically rather than gravimetrically. The app. and procedures of the 3 methods used by K. are detailed along with the results obtained and crit. observations. E. J. C. 3

Analytical procedures employing the Karl Fischer reagent. IV. Determination of acid anhydrides. Donald M. Smith, W. M. D. Bryant and J. Mitchell, Jr. *J. Am. Chem. Soc.* **62**, 608–9(1940); cf. *C. A.* **34**, 1276[2,4].—The method depends upon complete hydrolysis of the anhydride in the presence of excess H_2O and subsequent titration of the residual H_2O with the Karl Fischer reagent (*C. A.* **29**, 6532[2]). It is best suited for the detn. of acyclic aliphatic anhydrides. Analytical data are given for acetic, propionic, butyric, crotonic, valeric, caproic, heptylic, glutaric, benzoic, furoic, succinic, maleic and phthalic anhydrides. A. B. Garrett 4

Potentiometric titration of the antimonic ion with the aid of potassium iodide and sodium thiosulfate. G. Spacu and C. DrAgulescu. *Bull. sect. sci. acad. roumaine* **21**, 85–105(1938–39).—In neutral solns. Sb can be oxidized completely from the valence 3 to 5 by means of I_2 provided $NaHCO_3$ or Na_2HPO_4 is present to prevent the soln. becoming acid. H_3SbO_4, on the other hand, can be reduced completely to $HSbCl_4$ by means of HI in the presence of considerable HCl. The last reaction is slow, however, and it is more advantageous to make the reaction take place quantitatively by adding $Na_2S_2O_3$, which reacts with the I_2 formed by the action of HI on quinquevalent Sb. In this paper, the results obtained in a series of potentiometric detns. show that for titrating 67 mg. of Sb in 100 ml. of soln., the HCl soln. must be at least 1.2 *N* and good results can be obtained when only a slight excess of KI is added. W. T. H. 5

Technique for micro and semimicro elementary organic analysis for carbon and hydrogen, using the apparatus of Natelson, Brodie and Conner. Humberto Teixeira Cardoso *Mem. inst. Oswaldo Cruz* **34**, 441–6(1939); cf. Natelson and Conner, *C. A.* **32**, 4470[2], Natelson, Brodie and Conner, *C. A.* **32**, 8986[9]. L. E. Gilson 6

Semimicrodetermination of nitrogen by method of Dumas. F. Cruz. *Rev. centro estud. farm. bioquim.* **29**, 137–45 (1939). —The construction and operation of an app. suitable for samples yielding not more than 5 cc. N_2 gas are described. L. E. Gilson 7

Importance of chemical tests for detection of seminal stains in medico-legal investigations. K. N. Bagchi. *Indian Med. Gaz.* **74**, 683–6(1939).—Since choline, upon which the development of choline periodide crystals constituting the Florence test depends, may be decompd. by bacteria, a neg. test has no medico-legal value, but no biol. fluid other than semen contains it. Therefore a pos. test is of value, reliable in aspermia or when spermatozoa are not demonstrable. J. McAfee 8

Determination of formaldehyde with dimedon. The fate of formaldehyde in the process of toxoid preparation. Danzi Matukawa. *Saikingaku Zasshi* No. 520(May, 1939); *Kitasato Arch. Exptl. Med.* **16**, *Abstracts* 2(Nov., 1939); cf. *C. A.* **34**, 2284[3].—The method is applicable when over 0.1 mg. CH_2O is present. The concn. of CH_2O in the prepn. of toxoid is parallel with fixation. J. P. 9

A new color test for ketones. S. M. Efros. *Trudy LKKhTI* **1939**, No. 7, 123–6; *Khim. Referat. Zhur.* 2, No. 5, 65(1939).—A soln. of $K_4Fe(CN)_6$ with NH_4 molybdate gives a brown color with certain ketones. The sensitivity of the test with acetylacetone is about 1.6 γ/cc. and for dipropyl ketone 114 γ/cc. Other ketones give unstable or very slight colorations. The test is useful for detg. acetylacetone in the presence of other ketones. W. R. Henn 10

A new method for clarification of plant extracts for the determination of reducing sugars. B. W. Doak. *New Zealand J. Sci. Tech.* **21B**, 90–5(1939).—An application of the method of Fujita and Iwatake (*C. A.* **26**, 1313) accomplishes efficient clarification without any loss of fructose or glucose. $CdSO_4$ soln. can bring about clarification at a dilu. suitable for the direct application of micromethods. Basic Pb acetate, NaOAc + alum, $CaCl_2$ + NaF, colloidal SiO_2 and a mixt. of Na_2WO_4 + alum were tested. All gave high values except the last and this had no advantage over $Cd(OH)_2$, which removes more reducing substances from grass exts. than does $Zn(OH)_2$. Clarification with $Cd(OH)_2$ is almost as efficient as with basic Pb acetate, does not destroy fructose and glucose and can be applied directly to alc. exts. Reducing substances left after $Cd(OH)_2$ clarification were fermentable by yeasts. Analyses for reducing sugars were made by the Fujita and Iwatake modification of the original Hagedorn-Jensen (*C. A.* **17**, 2721) ferricyanide method. 14 references. F. W. Marsh 11

Microscopic identification of sugars. R. J. Martin and A. M. Rongiovanni. *Mendel Bull.* **12**, 46–7(1940).—A comparative study of the osazone test and that described by Quense and Dehn (*C. A.* **33**, 9199[5]). J. S. H. 12

Modified method for determination of benzene in air. J. Siegel and W. J. Burke. *Ind. Bull.* (N. Y.) **18**, 17–18 (1939).—A modification of the microcolorimetric method developed at the U. S. Bureau of Mines is reported. B. C. P. A. 13

Determination of acetanilide. G. Vaisman. *Farmatsiya i Farmakol.* **1938**, No. 4, 17; cf. *C. A.* **27**, 3557.—The poor results obtained by Khaletskĭ and Mikryukova (cf. *C. A.* **33**, 9200[6]) were caused by failure to follow the directions. W. A. Moore 14

Potentiometric estimation of glucose with potassium ferricyanide in sodium carbonate solution. H. T. S. Britton and Leslie Phillips. *Analyst* **65**, 149–52(1940); cf. *C. A.* **34**, 1592[3].—The titrations described were carried out in a cell combination of $Pt/K_3Fe(CN)_6$ + Na_2CO_3 + glucose soln./satd KCl soln./*N* KCl/*N* calomel. The solns. were titrated with glucose soln. added to the soln. of ferricyanide + Na_2CO_3 which was kept at approx. 100°. The completion of the reduction of the ferricyanide was shown clearly by inflections in the curves formed when e. m. f. was plotted against vol. of glucose added. It took 20–30min. to titrate to the inflection but after that the titration was even slower. In the concns. used 5.9 mols. of ferricyanide was required to oxidize 1 mol. of glucose. The potentiometric titrations also show that methylene blue is a suitable indicator for the reaction. W. T. H. 15

Colorimetric microdetermination of some phenols. A. Ionescu-Matiu, Const. Popesco and Ana Popesco. *J. pharm. chim.* **30**, 49–58(1939).—Phosphotungstic acid (*A*) is used as the color reagent. For reoxidation, $K_3Fe(CN)_6$ reagent (*B*) in presence of a 20% aq. soln. of $Na_2CO_3.10H_2O$ is used. To prep. *A*, boil 10 g. Na tungstate and 8 cc. H_3PO_4 (d. 1.71) with 90 cc. H_2O under reflux for 1.5 hrs., cool and fill to 100 cc. To prep. *B*, dissolve 1.65 g. $K_3Fe(CN)_6$ with 1.65 g. KOH in H_2O to make 100 cc. (= a 0.1 *N* soln.; verify by Mohr's method). The phenol solns. (*C*) are about 0.1%. Mix *C* with *A*, make alk. with Na_2CO_3 soln. and titrate with *B* until the blue color 16

turns a final lemon yellow; pyrocatechol produces pink. The equivs. of 1 cc. of 0.1 *N B* are, in g., as follows: pyrocatechol 0.001376; hydroquinone 0.002752; pyrogallol 0.0010578; gallic acid 0.0015675; tannin 0.001923; tannigen 0.002525; quinine tannate 0.003125. Phloroglucinol gives neg. results; also phenol (cf. *C. A.* **32**, 7904[8]). All other results are accurate when the quantities indicated in a table are taken. S. Waldbott

Color reaction for β-naphthol identification and determination of very small quantities. J. A. Gautier. *J. pharm. chim.* **30**, 70-8(1939).—To 1 cc. of β-naphthol (*A*), 0.05 *M* – 0.001 *M* in 30% alc. soln., add $NaNO_2$ in 0.1 *M* soln. 1 drop to 2 cc., then a vol. of *N* HCl = that of the $NaNO_2$ soln., and dil to 10 cc. with H_2O. A pink or red-dish color develops. If 0.1 mol. of *A* is taken, a noncharacteristic yellowish ppt. is formed. Within the limits given, the intensity of the color is proportional to the concn. S. Waldbott

Determination of sterols. I. V. V. Oppel and A. A. Grigor'eva. *Biokhimiya* **3**, 175-89(in English, 189-90) (1938); *Chimie & industrie* **41**, 527; cf. *C. A.* **33**, 2927[9].—A study of the Liebermann-Burchard method based on the formation of a green color. The intensity and shade of the color vary according to the solvent used; from this standpoint $CHCl_3$ is preferable to C_6H_6, as solns. of sterols in the latter change more rapidly from green to brown. The intensity of the color of solns. of mixts. of sterols is equal to the sum of the colors due to the individual constituents. A. Papineau-Couture

Availability of Mn in natural and pptd. $MnCO_3$ [detn. of Mn] (Bandemer, *et al.*) **11E**. Hg cathode in metallurgical analysis (Pavlish, Sullivan) **4**. Structural chem. investigations—nickelous-ion-specific groups (Erlenmeyer, Ueberwasser) **10**. Identification of org. compds. (Huntress, Carten) **10**.

Caron, H., and Raquet, D.: Tableaux d'analyse chimique qualitative, à l'usage des étudiants en P.C.B., en pharmacie, des élèves des écoles de chimie. 3rd ed. Paris: Vuibert. 88 pp. Fr. 45.

Evans, William L., Garrett, Alfred B., and Quill, Laurence L.: Semimicro Qualitative Analysis. Boston: Ginn and Co. 246 pp. $2.00.

Analyzing gases. G. F. Knorre. Russ. 55,939, Oct. 31, 1939. Gas under pressure is passed at const. vol. velocity into the lower part of an absorption vessel and the amt. absorbed is detd. by the change of the liquid level in the absorption vessel

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

ARTHUR M. BRANT

Note on the fluorine content of rocks and ocean-bottom samples. E. S. Shepherd. *Am. J. Sci.* **238**, 117-28 (1940).—The Willard and Winter procedure (cf. *C. A.* **27**, 681) furnishes an easy and accurate method for F detn. Analyses of >100 samples show that F is present in rocks in about the same amt. as Cl and must be considered in rock analysis. A tentative av. of 0.04% is suggested. Ocean-bottom samples contain about the same quantities as rocks. F content varies with nature of the material. Alden H. Emery

Isotopic composition of oxygen in carbonate rocks and iron oxide ores. Malcolm Dole and Robert J. Slobod. *J. Am. Chem. Soc.* **62**, 471-9(1940).—The variations in the oxygen-isotope ratios were detected by means of the totally submerged float method; the temp. of the floating equil. was measured with a Pt resistance thermometer. No significant difference in the isotopic compn. of the O in the rocks as a function of age was detected for Grenville Marble, Niagara dolomite, Pennsylvania limestone and clam shells, all carbonates of widely different geol. age. A table of change in d. due to O alone is given for these different carbonates. D. variations observed for carbonates decompd. with acid or with heat are attributed to the isotopic fractionation which takes place when the carbonate ion is decompd. by acid. The observed d. variation resulting from the thermal treatment is explained quantitatively with the aid of the isotopic exchange equil. theory of Urey and Greiff (cf. *C. A.* **29**, 2842[1]). The O in iron ores of the Keewatin and Middle Huronian ages does not differ significantly in its isotopic compn. from that of O in normal H_2O, the slight excess d. observed in the expts. on the oölitic and fossil type Silurian ores is probably due to the presence of carbonates in the ores. A. B. Garrett

Jordanite, wurtzite and rhodocrosite from the Yumo-Sawa mine. M. Watanabe and O. Nakano. *J. Japan. Assoc. Mineral. Petrol. Econ. Geol.* **15**, 211-23(1936); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 801.—Thin alternate layers of jordanite and wurtzite form crustlike overgrowths on barite in druses in a Tertiary epithermal vein carrying barite, galena and sphalerite. Radial overgrowths of wurtzite are also frequent. Formation at a low temp. is indicated. C. A. Silberrad

Blue rock salt. J. Newton Friend and John P. Allchin. *Nature* **145**, 266-7(1940).—A sample of blue anhydrite contained 4 p. p. m. Au; a deep blue Stassfurt halite contained 23 p. p. m. Au. Au was found in blue and pink halite from other sources. If the Au is in the colloidal condition, it would be ample to account for the observed color. Other theories of the color of halite are reviewed, with 8 references. G. M. Petty

Crystallographic and minerogenetic investigation of fluorite from a new locality in Bulgaria. Ivan Kostov. *Ann. univ. Sofia, II. Faculte phys.-math.*, Livre 3, **35**, 255-89(in German, 290-2)(1938-9).—A detailed discussion is given of the minerals assocd. with the fluorite, the habits of the fluorite crystals, and the mode of origin, which is replacement of limestone by magmatic emanations. W. F. Bradley

Hydrated cobalt oxides of Katanga. V. Billiet and A. Vandendriessche. *Bull. soc. belge géol., paléontol hydrol.* **49**, 63-78(1940).—X-ray examn. of 2 samples of stainerite, one of mindigite, 2 of trieuite and 3 of heterogenite of different origins (Katanga, Nevada and Ontario), considerations of the best recorded analyses, with one new one (of trieuite) and dehydration results, and the fact that an apparently vitreous sample of trieuite was transformed into a cryst form resembling that of the other samples by heating in steam under pressure, lead to the conclusion that all are merely hydrated oxides of Cu and Co of compn. $(CuO.Co_2O_3)H_2O$, differing in the ratio CuO Co_2O_3, and in hygroscopic H_2O. It is, therefore, proposed to designate all as the heterogenite group, abandoning the other 3 names. 20 references. C. A. Silberrad

Iceland spar mine in New Mexico. J. Harlan Johnson. *Mines Mag.* (Colo. School of Mines) **30**, 59-60(1940).—A discussion of sources of Iceland spar, its properties and uses, location of deposits in New Mexico, geology, origin and methods of mining. Leopold Scheflan

Cerussite at Tisovo near Valjevo (Western Serbia). St. Pavlovitch. *Bull. serv. géol. roy. Yougoslav.* **7**, 313-27 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 257.—The Pb ores of Tisovo and of the tract extending 25-30 km. to Medvednik consist mainly of cerussite in mid-Triassic diplopore limestone, which is bounded by propylitized and partially silicified microdiorite. The cerussite, though usually white, often contains a kernel of, or is enclosed in galena. This black cerussite contains more (up to 78.28 %) Pb than the white (to 67.56%). Occasionally it is red from limonite, goethite or pyrite and then contains Au (up to 12 g./t.). When pink or yellow, As is present (up to 9.38-12.38%). The formation of the deposit has resulted from (1) a porphyritic intrusion, preceded and followed by fissuring; (2) metasomatic ore accumulation in the limestone; (3) further tectonic activity and (4) oxidation of

galena by surface water along fissures, which extends to a depth of some 200 m. C. A. Silberrad

Structure of orthoclase. S. H. Chao, A. Hargreaves and W. H. Taylor. *Mineralog. Mag.* **25**, 498–512(1940); cf. *C. A.* **27**, 5684; **28**, 3691⁸.—The orthoclase examd. was glass-clear from the Ruby Mines, Mogok, Burma, and contained K_2O 9.1, Na_2O 6.5 and lime-feldspar 2.5% (cf. Spencer, *C. A.* **31**, 3827⁴). The structure has been quantitatively detd., diffraction diagrams and at. coordinates given for all constituents to a probable accuracy of less than ±0.1 A. The results are discussed at length and compared with those for sanidine. C. A. Silberrad

Celestite at Rochefort. Pierre de Béthune. *Bull. soc. belge géol., paléontol. hydrol.* **49**, 128–31(1940).—The celestite occurs in geodes in limestone at Rochefort (30 miles S.E. of Namur). The larger crystals are pale blue, smaller practically colorless, they are crystallographically described, d. 3.92. The lightness is probably due to numerous inclusions, apparently liquid. C. A. Silberrad

Bavenite in Switzerland. G. F. Claringbull. *Mineralog. Mag.* **25**, 495–7(1940); cf. Schaller and Fairchild, *C. A.* **26**, 5515.—Bavenite occurs at 2 localities in the neighborhood of Graubunden (Grisons). It is assocd. with albite, adularia, chlorite, etc.; x-ray examn. gives a 19.34, b 23.06, c 4.95 A., indicating probably 4 mols. of $Ca_4(Si_9Al_2Be)O_{24}(OH)_2$ as the unit cell (cf. Ksanda and Merwin, *C. A.* **28**, 1305⁹). Spectrum analysis indicates the presence of minute quantities of B, Mg and Fe. C. A. Silberrad

Polymorphism of the micas. Sterling B. Hendricks and Merrill E. Jefferson. *Am. Mineral.* **24**, 729–71(1939).—X-ray examn. of 99 micas showed 7 different cryst. modifications. There were 45 of the single-layer monoclinic hemihedral type with space group $C_s^1 - Cm$, $a_0 = 5.3$, $b_0 = 9.2$, $c_0 = 10.2$ A. In the unit of structure there are 2 mols. of $[R_3(Al,Si)_4O_{10}(OH,F)_2K]$ (I) where R = Mg^{II}, Fe^{II}, Fe^{III}, Li^{I}, Ti^{IV}, etc. Five micas were two-layer monoclinic holohedral, octophyllite type, with 4 I in unit of structure. Space group is $C_{2h}^6 - C2/c$ and a_0, b_0 and c_0 = 5.3, 9.2, and 20.2 A., resp. 21 micas were also two-layer monoclinic holohedral, space group $C_{2h}^6 - C\,2/C$, but showed (06l) reflections with l odd. This is the muscovite type and has a_0, b_0 and c_0 = 5.2, 9.0 and 20.0 A. The unit of structure is $4[(Al,R)_2(Al,Si)_2O_{10}(OH,F)_2K]$. The 3-layer rhombohedral enantiomorphic hemihedral structure with $D_3^3 - C_3^1 12$ or $D_3^5 - C_3^2 12$ occurs in 8 specimens; $a = 5.3$, $c_0 = 30.0$ A.; unit of structure is 3 I. 6-layer monoclinic hemihedral with $C_s^1 - Cc$ occurs 3 times; a, b, c = 5.3, 9.2, 60.0 A.; unit is 12 I. 6-layer triclinic holohedral, $C_i^1 - P\bar{1}$, occurs 3 times; a, b, c = 5.3, 5.3, 60.0 A.; unit is 6 I. One example of 24-layer triclinic holohedral, $C_i^1 - P\bar{1}$, a, b, c = 5.3, 5.3, 240.0 occurs; structure unit is 24 I. In 13 micas mixts. of the various structures exist. Diffuse scattering of x-rays in some crystal zones is explained. C. H. Hale

Chemical constitution of Belgian clays. C. Camerman. *Bull. soc. belge géol., paléontol. hydrol.* **49**, 80–115(1940).—An account is given of the clays of Belgium, of which there is a large variety and quantity, classified according to their geological origin and the uses to which they are put. 120 analyses. C. A. Silberrad

Djalmaíta, a new radioactive mineral. Caio Pandiá Cuimaraens. *Ann. acad. brasil. sci.* **11**, 347–50(1939).—A crystallographic study of djalmaíta, recently discovered in Brazil, (n 1.97) is followed by a chem. analysis of the mineral: Ta_2O_5 72.27, Cb_2O_5 1.41, TiO_2 2.54, SnO_2 traces, ZrO_2 0.80, UO_2 2.17, UO_3 9.38, WO_3 0.18, Bi_2O_3 0.98, PbO 1.10, FeO 0.56, CaO 3.40, MgO 0.24, H_2O 4.62. A brief summary of the properties is given. A. H. Krappe

Minerals from deep sea cores and surface deposits of Bermudian calcareous sediments. John A. Young, Jr. *Am. J. Sci.* **237**, 798–810(1939).—Biotite, pyroxene, some if not all of the minerals of the accessory group, serpentine, possibly hornblende, and the feldspars, except microcline could have been derived from the volcanic series underlying the islands. Phillipsite, glauconite, and Fe oxides probably were formed by chem. alteration on the sea bottom from the minerals derived from volcanic rocks. The only mineral of any importance for whose origin it seems necessary to look elsewhere is quartz. Alden H. Emery

Boxhole meteoritic iron, Central Australia. C. T. Madigan. *Mineralog. Mag.* **25**, 481–6(1940); cf. *C. A.* **34**, 1596⁹.—The Boxhole meteorite crater is some 120 miles north of Alice Springs, in it fragments of Fe and shale balls have been found. The former show the meteorite to be a medium octahedrite contg. kamacite, taenite, plessite, hydrated lawrencite and brassy grains of troilite, av. d. 7.80. Analysis, Fe 91.77–91.54, Ni 7.80–7.54, Co 0.44–0.37, P 0.08, S 0.03–0.01, C 0.049–0.013, SiO_2 0.01–0.03. Sections are described in detail with photomicrographs. C. A. Silberrad

Rare and nonferrous metals; metallogeny of Central Caucasus. P. S. Saakyan. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) **147**, 19–33(in English, 33)(1939).—Preliminary analyses indicate 4 types of acid intrusions in the recently surveyed deposits of the region: (1) quartz-type intrusions, contg. Au and rare metals, in the Precambrian porphyry-like granites; (2) Sn-bearing pegmatites in the Precambrian even-grained granites; (3) Au-bearing quartz in the Variscian red granites, and (4) sulfidic minerals (As, Mo, W and Sb) in the Alpine granodiorites. Chas. Blanc

Some australite structures and their origin. George Baker. *Mineralog. Mag.* **25**, 487–94(1940).—The structures of several glassy australites are minutely described. All are consistent with the view that the glassy material became plastic and evolved, or was accompanied by hot gases on its passage through the atm. A specimen was unaffected by 2 months immersion in concd. HCl or KOH. C. A. Silberrad

Geology of Baguio gold district (Philippine Islands). A. Leith. *Geol. Survey, Philippines, Bur. Mines, Tech. Bull.* **9**, 91 pp.(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 801.—Andesite dikes penetrated rocks of various kinds in Pliocene times, causing much contact metamorphism and epithermal Au mineralization, and forming long systems of veins. The enclosing rock is intensely propylitized, kaolinized and silicified. Some veins contain calcite, quartz, and rhodocrosite, with Au, others only quartz and Au. Sulfides are almost absent and tellurides rare. The ratio Au:Ag = 1.8:1. C. A. Silberrad

Young volcanic gold and silver deposits of the Carpathian arc. Adolf Heike. *Arch. Lagerstattenforsch.* No. **66**, 175 pp.(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 791–4. A detailed and comprehensive account of these mixed deposits, which include native Au, ores of Te and Au, pyrite, marcasite, magnetic pyrite, mispickel, chalcopyrite, sphalerite, galena, tetrahedrite, stibnite, berthierite, bournonite, Pb-Sb sulfides, rhodocrosite, barite, siderite, and fluorite. Numerous photomicrographs and analyses are given. The ores are of typically hydrothermal origin, and were probably formed at temps. not exceeding 350°, and in the case of the Te ores below 184°. They appear to be connected with a batholith at comparatively small depth. C. A. Silberrad

Geology and petrology of the gold mine at Valea lui Stan (Rumania). St. Ghika-Budesti. *Dări de seamă ale Sedintelor* **22**, 33–6(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 796.—Following on regional metamorphism accompanied by tectonic movements and consequent perimagmatic phenomena the hydrothermal phase resulted in the introduction of mispickel, pyrite, chalcopyrite and Au. Subsequent movements caused mylonitization. C. A. S.

Geology and natural resources of Tannu-Tuwa (Urjanchai). H. Hauser. *Z. prakt. Geol.* **46**, 199–207, 228–33 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 391–4.—A detailed description is given of the Au placers at the headwaters of the Yenisei, also of occurrences of Pt and iridosmium. Near contacts between granite and other plutonic rocks are indications of chalcopyrite, bornite and pyrite, and elsewhere hematite and magnetite occur. Coal, magnesite and asbestos are also reported. C. A. S.

Gold deposits of the Ogayu mine. M. Watanabe. *J. Japan. Assoc. Mineral., Petrol. Econ. Geol.* **15**, 97–109

(1936); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 779.— These consist of katathermal pneumatolytic deposits at the contact of diabase dikes with granodiorite, and contain quartz with Au-bearing mispickel and chalcocite, passing into tourmaline-bearing veins further down. C. A. S.

Magmatic gold-copper deposits of the Sanmaeyama mine, Japan. M. Watanabe. *J. Japan. Assoc. Mineral., Petrol. Econ. Geol.* 18, 10–22, 57–68(1937); 19, 280–92 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 758–9.—The ore body consists of plagioclase, diopside, titanomagnetite and magnetic pyrite as products of first crystn., followed by hornblende and chalcocite, the whole in a fine-grained gabbro. The hornblende is an autometamorphic transformation product of augite, partly accompanied by quartz, often poikilitically intergrown. Magnetite and magnetic pyrite are displaced by chalcocite, which often shows sepn. of cubanite, and younger ilmenite. C. A. S.

Some minerals of the (Italian) empire. Enrico Abbolito. *Ricerca sci.* 10, 1099–1106(1939).—Au occurs at Ad Nepas (Eritrea) as a concentrate from the weathering of pyritiferous quartzitic schist; the Au was apparently in solid soln. in the pyrite. Quartz veins traversing chloritic schist in Domiscioba carry Au in assocn. with pyrite and Cu minerals. A Fe-Mn mineral from Monte Ghedem carries up to 57.47% Mn. O. W. Willcox

Silver ores of the Hassei mine. M. Watanabe. *J. Japan. Assoc. Mineral. Petrol. Econ. Geol.* 16, 185–94 (1936); 17, 119–26(1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 801.—Tertiary schists are intimately penetrated by shoots and impregnations of galena, sphalerite, tetrahedrite, polybasite, quartz, barite and witherite. The witherite partly penetrates the barite indicating an increased concn. of CO_2. The deposits are epithermal. C. A. Silberrad

Geology of the Upper Harz lead-zinc lodes. Ernst Becksmann. *Z. prakt. Geol.* 46, 106–11, 127–32 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 237–40.—The order and times of deposition and relative positions of these ores, and of the accompanying vein filling materials, the origin of which is hydrothermal and connected with a granite intrusion, is discussed in detail. C. A. Silberrad

Origin of lead and zinc ores in Rauschenberg district near Inzell (S. E. Bavaria). Joseph Knauer. *Abh. geol. Landesunters. bayer. Oberbergamt.* No. 30, 3–15(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 357.—These ores are mainly limited to the space between 2 great faults. They are probably of epigenetic origin and are of metasomatic formation filling hollow spaces resulting from orogenic disturbances, the mineralizing solns. coming from above, so that the ores will probably become poorer in depth. It seems probable that other similar deposits may be found in the neighborhood. C. A. Silberrad

"Spark-ore" from Bleiberg. O. Friedrich. *Carinthia* II, 128, 30–2(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 248.—Microscopic examn. of a polished section of spark-ore shows fragments of yellow to brown dolomite and grayish calcite in a groundmass of fine-grained dolomite and galena, the latter sometimes penetrated by spears of barite. Pyrite and marcasite were also observed. The sphalerite is always very bright, frequently of conchoidal fracture and occasionally intergrown with the galena. It is occasionally accompanied by an isotropic material which is possibly fluorite. Mineralization probably followed the brecciation. C. A. Silberrad

Central Germany as source of ores in old Germany. Wilhelm Witter. *Germanen-Erbe* 1, 24–6(1936); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 734–5.—Occurrences of native Cu, with malachite and azurite, and of Sn-Cu alloys point to the Vogtland as the probable source of the earliest Cu and bronze. C. A. Silberrad

Geology of Stripa iron ores. Per Geijer. *Sveriges Geol. Undersökning Avhandl.* No. 28, 43 pp.(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 358–9.—The Stripa mine, 47 km. north of Örebo, yields some 300,000 tons of ore (banded Fe quartzite) annually, about ⅔rds. contg. 50% Fe with 0.001% P, the remainder 42% Fe and 0.011–0.015% P. The chief surrounding rock is leptite: dikes of amphibolite and granite-aplite intersect the deposits. 1 The leptites have the compn. of granite and are recrystd. eruptives and tuffs; gneisses and hälleflinta also occur. The banded Fe-quartzite is composed of specular iron ore and quartzite in thin alternating bands, resp. 4–7 and 3–4 cm. thick in green skarn, magnetite occurs sparingly in porphyroblasts 1.5 cm. across. The main body of ore is 16–17 m. thick with a few inclusions of leptite. A 2nd ore-body lies below. The deposit was probably formed by 2 chem. pptn., perhaps from hot springs, and probably as alternating layers of hematite and SiO_2 alternating with acid tuffs. C. A. Silberrad

The iron ore deposits in Manchoukuo. The iron ores of Tohendo iron ore beds located at Rorei Dairishiko and Hachidoko. Tosio Sudo. *Rept. Inst. Sci. Research Manchoukuo* 3, 317–70(Abstract in English 17–18) (1939).—The Rorei Fe ore deposit in Tohendo, Manchoukuo, and about 30 kilometers northwest of Tinko is classified 3 as a shallow sea deposit showing irregular enrichment (Fe 60%) on Utai cryst. dolomitic lime. The Dairishiko deposit is about 10 kilometers southwest of Tinko and is an irregular mass of goethite with parallel beds of Utai dolomitic limestones contg. hematite, chlorite, pyrite, chalcopyrite and Zn blende, with some dolomite and quartz veins. The Hachidoko deposit is 8 kilometers northwest of Hachidoko and is an Fe ore bed at the basal portion of Sinan quartzite, classified as a shallow sea deposit. This 4 deposit is composed largely of a quartz-hematite sandstone contg. quartz, hematite, orthoclase, plagioclase and microcline, cemented with sericite. H. E. Messmore

Iron ore deposits of E. Sudetenland. E. Bederke. *Z. Berg- Hütten-u. Salinenw. deut. Reich* 86, 481–7(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 803.—The Fe ores form lenticular deposits in diabase tuffs, and consist partly of silicious, partly of oxidized material. One de-5 posit consists mainly of magnetite (about 50% Fe), the other of hematite (59–63% Fe) contg. resp. estd. totals of 2 and 1.6×10^6 tons. There is a remarkable parallelism between the formation of magnetite and the degree of metamorphism. C. A. Silberrad

Magnetite in the region of Jequié, Bahia. O. H. Leonardos. *Mineração e metallurgia* 3, No. 14(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 402–3.—A preliminary examn. indicates extensive deposits of magnetite in 6 probably metamorphosed Archaean sediments, possibly amounting to several million tons, and contg. some 65% ore, in this region. Being within 80 km. of the sea it is likely to be of economic value. C. A. Silberrad

French limonite deposits. V. Charrin. *J. usines gaz* 56, 537–9(1939).—Limonite occurs in France mostly in the departments Gard and Herault. The former has been worked extensively, the limonite is, however, mixed with clay and with hematite and some pyrite, hence is not very 7 suitable for use in the gas works. Extensive production has taken place recently in the Marc valley, the layer is from 2 to 10 m. thick. The objection to many of the limonite deposits is that at greater depths they change to hematite or pyrite. A promising territory is in Vaucluse, gas-works limonite also has been recovered at Béhobie in southwest France. B. J. C. van der Hoeven

The nickel deposits in the North of Finland (Petsamo). Legraye. *Rev. universelle mines* 16, 61–2(1940).—Geographical conditions and geol. formations are described. 8 The Ni minerals occur in Precambrian rocks and are composed of pyrrhotite, pentlandite, chalcopyrite, magnetite and silicates; the pyrrhotite carries the Ni and Cu. The deposits vary in thickness from 2.5 to 20 m. The Ni content varies from about 3.0 to 6.5% according to depth, the Cu content from 1.3 to 3.11%. The estd. capacity in this region is about 220,000 tons. M. Hartenheim

The nickel-silicate ore deposits of the Orsk-Khalilovo region. D. G. Ul'yanov, G. S. Gritsaenko, G. A. Krutov, E. A. Petrova and M. G. Shishulina. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) No. 118, 8–122(in English, 123–5)(1937).—The ore bodies are confined to the almost completely serpentinized ultra-basic rocks, mainly harzburgites; they are closely connected with fissures filled with quartz-ferruginous matter. The Ni minerals, chiefly garnierite with some kerolith, are

assocd. with the later generations of quartz and chalcedony. Carbonatization, a later process, produced intense replacement of quartz and serpentine. Later still a superficial nontronitization process enriched the Ni in the upper portions of the deposit. The minerals of the 2 ore deposits, Khalilovo and Akkermanovka, are described (in the Russian part) from the following points of view: morphology, phys. and optical properties, x-ray measurements; chem. compn.; thermal analysis. D. W. Pearce

Tin deposits of the Black Hills, South Dakota. E. D. Gardner. *U. S. Bur. Mines, Circ.* **7069**, 78 pp.(1939). C. L. B.

Materials of the Yakutian expedition of the Institute of Economic Mineralogy. I. Geology and metallogeny of the northeastern part of the watershed of the Allakhyuna and Yudoma rivers. N. I. Zaitsev, F. A. Zakharkin, M. A. Minakov and M. Ya. Stolyar. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) No. **113**, 6–63 (in English, 64–5)(1936).—Tin ore deposits in veins are related to the granodiorite intrusions; 2 types are distinguishable: the oxide type (pneumatolytic) has the paragenesis Sn, Li, Be, F, W, As, S, Cu and Fe; the sulfide type (hydrothermal) has the paragenesis Sn, S, As, Fe, Zn and Pb. Most important are quartz-fluorite and quartz-sulfide (arsenopyrite) veins. The richest among the latter contain 3–4% of stannite. Mo mineralization is also present. **II. Geological explorations in the upper Tyra region and along the route across the Verkhoyansky and Kolymsky ranges.** N. D. Sobolev and P. I. Egorov. *Ibid.* No. **114**, 5–84(in English, 85–8)(1937).—Cassiterite is assocd. with the granodiorite of Dybinsk. In the Kysal-Tass region Sn was found in veins of the following types: pyrrhotite (0.04%), Pb pyrite (0.21%) and Pb arsenopyrite (0.92%). In the Russian part many analyses are reported. D. W. Pearce

Tin-tungsten mineralization at Mawchi, Karen states, Burma. J. A. Dunn. *Records Geol. Survey India* **73**, 209–37(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 777.—A large granite mass has penetrated metamorphosed argillaceous schists, sandstone and limestone. It contains veins of aplite-pegmatite and tourmaline-quartzite, with streaks of tourmaline, cassiterite, wolframite and scheelite. The granite, especially the orthoclase, is much kaolinized, and the biotite chloritized; muscovite is abundant and contains Li. Fluorite, topaz, cassiterite, calcite and other pneumatolytic-hydrothermal minerals occur. Twenty-seven workable occurrences of Sn and W are known. The order of sepn. has been tourmaline, wolframite, cassiterite, (beryl, phenakite, molybdenite), quartz, mispickel, pyrite, sphalerite, (stannite, chalcocite, bismuthinite), calcite, scheelite, lepidolite and chlorite (the rarer minerals are bracketed). C. A. Silberrad

Scheelite in skarns of the eastern slope of the Kuznetsk Ala-Tau. E. F. Ziv. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) No. **145**, 4–158(in English, 159–61)(1939).—See *C. A.* **32**, 4109[8]. D. W. Pearce

Childs-Adwinkle mine, Copper Creek, Arizona. T. H. Kuhn. *Arizona Bur. Mines Bull.* **145**, 127–30(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 778.—The ore body occurs in a crush zone in granodiorite, and is composed of 2 elliptical pipes, 90 × 50 and 70 × 30 m., which in depth diminish or ramify, probably uniting lower down —they are at present known to 280 m. They contain a breccia of granodiorite, largely transformed into chlorite-sericite, cemented together by a mass of quartz, orthoclase, biotite, calcite, pyrite, molybdenite, bornite and chalcocite. In depth molybdenite diminishes, Cu ores increase. In 5 years 3000 tons MoS_2 and 2200 tons Cu with some Au and Ag have been obtained. C. A. S.

Manganese in the Czywczyn hills (Eastern Polish Carpathians). Roman Krajewski. *Inst. géol. Pologne Bull.* **2**, 1–26(French summary 25–7)(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 360.—The deposits consist of carbonates, silicates and oxides and contain on an av. Mn 30, Fe 8 and SiO_2 23%, and are estd. to contain 10,000 tons. They are a prolongation of the Rumanian deposits, and are contact deposits along a zone of disturbance in gneisses and schists. C. A. Silberrad

Rare and nonferrous metals; cobalt-bearing ores of the South Ural. G. A. Krutov, M. A. Mamedov and D. G. Ul'yanov. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) **147**, 5–19(1939).—The results of a survey of Co-bearing Ni and Mn deposits in the region, carried out by the Inst. in 1934–1937, are reviewed and tentative methods for the recovery of Co by complex treatments of the ores are discussed from tech. and economical viewpoints. Chas. Blanc

Joachimstal, the birthplace of radium. H. Schneiderhöhn. *Umschau* **42**, 951(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 243–4.—The ore deposits here are connected with a granite mass. They consist of a large no. of small veins which form 3 zones: the uppermost the richest Ag ores; the middle, Co-Ni and Bi-As; the lowest, the U—pitchblende with quite subordinate galena, sphalerite, pyrite and chalcopyrite, with hornstone, dolomite and some fluorite. The dolomite has been reddened by radioactive action and the fluorite colored a dark-violet and given an unpleasant smell by dispersed Ca and F ions, resp. The enclosing schists have been silicified and impregnated with pitchblende. C. A. Silberrad

Uranium ore on the Goten. G. Konjarov. *Trud. podz. bogat. i min. ind. Bulgarija* **8**, 236–44(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 789–90.—The deposit occurs 200 m. below the summit of the Goten 7 km. from Buhovo (20 km. N. of Sofia) in a zone of contact metamorphism caused by the intrusion of eruptives into clay slate. The ores consist of (1) torbernite, dark-green tetragonal crystals, d. 3.4–3.6, H 2–2.5, n_ω 1.598, n_ε 1.592, pleochroic. Compn. $Cu(UO_2)_2(PO_4)_2.12H_2O$, loses $4H_2O$ at 45°; (2) Metatorbernite I, emerald green, tetragonal, compn. $Cu(UO_2)_2(PO_4)_2.8H_2O$, contains Ra, U:Ra = $1:3.3 \times 10^{-7}$; (3) Metatorbernite II, canary-yellow, rhombic, compn. as of (2), double refraction strong, n 1.657 and 1.740 and (4) limonite, in places weathered to ocher. It is estd. that there is in all some 25,000 tons of ore. Origin: The area was the scene of vigorous hydrothermal action in Silurian times resulting in kaolinization and formation of siderite, galena, stibnite and hematite. As temp. fell, but kept still above 65°, limonite was formed and last of all the U ores. C. A. Silberrad

Minerals of the Tsumeb ore deposits (S. W. Africa). W. Klein. *Allg. Z. Windhuk* Sept. 23–24, **1938**; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 255–6.—A brief account of the minerals found in the mines at Tsumeb, and the levels at which each mainly occurs. They include ores of Cu, Pb, Zn, Ag and V. C. A. Silberrad

The lodes of Neu Bulach in the Württemberg Black Forest. Manfred Frank. *Württ. Jb. Statistik u. Landeskd.* **1936/37**, 102–13(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 237.—A detailed account of the Neu Bulach lodes. Of these the most important is a Bi tetrahedrite, with which occur emplectite, chalcopyrite and siderite, and in the secondary cap-formation limonite, turgite, arseniosiderite, cuprous manganese (lampadite), azurite and malachite, and more rarely erinite, olivenite, mixite and pharmacosiderite. A little auriferous pyromorphite gave hopes (unfulfilled) of paying Au. In the upper parts of the veins barite occurs, but in depth this is replaced by quartz. The adjacent bunter-sandstone is strongly silicified and impregnated with ores. The ore content rapidly decreases in depth. The origin is hydrothermal. C. A. S.

Preliminary note on metal occurrences in the region of the curvature of the eastern Carpathians. T. P. Ghitulescu. *Bull. sect. sci. acad. roumaine* **21**, 73–80(1938–39) (in French).—The region is at the intersection of the Carpathian and the ancient Variscan ranges, and the metallogenetic zone is a continuation of that of eastern Transylvania. The deposits, found in the districts Buzău, Râmnicul-Sărat, Putna and Trei Scaune, contain chiefly pyrite, sphalerite and galena with minor amts. of Cu, Au and Ag, the gang minerals being quartz, calcite, barite and rhodochrosite. The largest deposits yet found are near

Plešu. Here some marcasite and pyrrhotite are also present. Two partial analyses of ore are given. M. F.

Recent hydrothermal ore formation. G. Vasil'ev. *Trud. podz. bogat. i min. ind. Bulgarija* **8**, 227–33(1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 780–1.—Hot springs yielding some 1470 l./min. at 50–59.2° occur along a line of fault between tertiary trachyte and intrusive rhyolite. The water contains 1.6131 g./l.—predominantly SO_4^{--} with some Na^+, K^+ and HCO_3^- and at least 0.05% Fe ion, which is deposited as limonite in fissures or as hematite deeper. Pyrite is also being deposited as shown by the state of coins and metal objects found in the spring. These show deposits thereof at the rate of about 1 mm. in 700 years. C. A. Silberrad

Paleozoic deposits on the headwaters of the Lower Tunguska and Chona rivers, and in the Njuja basin. V. G. Vasil'ev. *Bull. soc. naturalists Moscow, Sect. géol.* **16**, 53–72(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 520–2.—Elaborate discussions on the dolomitization and silicification of some of the deposits are given. C. A. S.

Magnesite in Jugoslavia. G. Petunnikov. *Rud. i Top. Vesnik* **9**, 42/43, 44/45, 46/47, 48/49(1937); **10**, 1/2, 3/4, 5/6, 7/8(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 260.—Numerous deposits of magnesite occur. The veins are up to 10 m. wide and sometimes extend for 2.5 km., though as yet but comparatively little worked. They mostly represent gelatinized magnesite, and when cryst. there is usually so much $CaCO_3$ that it almost becomes dolomite. Analyses of 5 samples give $MgCO_3$ 93.22–97.08; $CaCO_3$ 0.06–2.88; R_2O_3 0.33–1.52; SiO_2 0.14–3.30; H_2O 0.15–0.50. Material contaminated with serpentine contains more $MgCO_3$ than that which is quite or nearly free therefrom. C. A. Silberrad

Kieselguhr of the Vardar Banat. L. Marić. *Bull. serv. géol. roy. Yougoslav.* **7**, 333–6(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 503.—Several deposits of infusorial earth occur here consisting of diatoms with admixt. of clay, limonite, muscovite, feldspar and quartz, and in one case considerable NaCl and perhaps $MgSO_4$. Analyses of 2 samples are given. C. A. Silberrad

Geological features of some deposits of bleaching clay. G. Austin Schroter and Ian Campbell. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1139**, 31 pp.(1940).—Mineralogy and properties are reviewed briefly with chem. analyses of 9 typical bleaching clays. Origin and classification are discussed at length. Com. deposits formed by the action of ascending thermal solns are rare. Deposits formed in place (authigenic) by cold meteoric solns. are the commonest. 85 references. Alden H. Emery

The Shabry deposit of talc-magnesite stone. B. P. Ural'skiĭ. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) No. **129**, 5–67(in English, 68–9)(1938).—The talc-magnesite rock is a vertically dipping body in mica-chlorite-quartz schist; gradual transitions from it to serpentinites are observed. Besides talc and magnesite (in nearly equal amts.) chlorite, serpentine, magnetite, hematite, chromite and pyrite are present. Analyses of the material from different parts of the deposit as well as of the genetically related pyroxenite and serpentinite are given (in the Russian part). Hydrothermal emissions from granite intrusions are believed to have been the metamorphosing agents. *Bricks* are sawed directly from the quarry faces; some material is also sepd. into talc and magnesite; the former has only about 2% Fe_2O_3 + FeO; the latter is suitable for the production of refractory brick. D. W. Pearce

Agalmatolite deposits and diaspore pebbles of Mitsuishi. Koziro Kinizuka. *J. Japan. Ceram. Assoc.* **47**, No. 567, Suppl. 1–13(1939).—This article relates to the geology of Mitsuishi agalmatolite mine, production and distribution at the mine, the origin of the agalmatolite, the mechanism of the formation of the deposits, and Medamaishi (diaspore pebbles). (1) The Mitsuishi agalmatolite (Roseki) is a soft but compact aggregate of pyrophyllite, kaolinite, diaspore, unaltered rock, pyrites and alunite. It is the most important raw material of agalmatolite refractories. It is classified into 17 classes whose pyrometric cone equiv. varies from cone 41 to 28. (2) The mine consists of liparite, felso-liparite, pyrophyllitized liparite, shale, pyrophyllitized shale, and agalmatolite. (3) As to the origin of the deposits, K. advanced a new theory that the agalmatolite was formed by the action of gases and heat on lumps of liparite and especially shale caught in magma of felso-liparite. It is likely that magma of the liparite and especially that of felso-liparite had contained a considerable amt. of F, since liparite deposits with well-developed fluorspar veins have been found not very far from Mitsuishi. Diaspore seems to be the end product of the metamorphosis, pyrophyllite and kaolinite being intermediate products. (4) "Medamaishi" or diaspore pebbles are contained in the agalmatolite. Their diam. varies from 30 cm. to 3 mm. It is claimed that they were formed by the pneumatolytic action on the small pieces of rocks which had been produced on the lumps of shale and liparite caught in the magma of felso-liparite. S. Kondo

Phlogopite deposits of south Madagascar. Alfred Lacroix. *Compt. rend.* **210**, 273–6(1940).—These deposits have now been worked at Betroka to a depth of 80 m. Below layers (1), sometimes 60 m. thick, whence everything sol. has been leached out by surface water, and (2), usually only a few m. thick, where the minerals so removed have been deposited, is (3) the intact zone, where the original minerals exist unattacked. These are all distinguished by the size of their crystals, and consist of green or grayish diopside in crystals up to 10 cm. across; red and yellow calcite sometimes 15 cm. across; and phlogopite, of which one crystal measured 3.5 × 1.2 m. In smaller amts. there occur: fluorapatite in blue or green crystals up to 70 cm. in diam.; anhydrite up to 20 cm.; fluorite in masses weighing up to 20 kg.; deep-green spinel of which one mass weighed 4 kg.; allanite in blocks weighing up to 2 kg., rich in Ce and La, with small quantities of Pr, Nd, Sm and Th, which last explains its radioactivity. *Seyrigite*, a new mineral in broken golden, translucent quadratic crystals up to 7 cm. across, occurs embedded in calcite and enveloped in a mixt. of quartz, opal and sepiolite; its luster is vitreous to adamantine, d. 5.484, and in compn. it is intermediate between scheelite and powellite, a sample contg. 26.01% MoO_3. Enormous crystals of sphene, together with a little molybdenite, pyrrhotite, pyrite, chalcopyrite, scapolite and anorthite are also found. C. A. S.

The Sysertsky deposit of anthophyllite-asbestos. V. V. Arshinov, B. P. Ural'skiĭ and A. P. Bocharova. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* (U. S. S. R.) No. **125**, 4–88(in English, 89–92)(1937).—The anthophyllite seems to have been derived from enstatite (itself derived from orthopyroxene dike or schlieren masses) at high temp. and pressure by action of H_2O and CO_2 from granite magma intrusions. The paragenesis is compared with that of the Idaho and Georgia (U. S.) and Finnish deposits. The rocks with long-fiber asbestos form irregularly shaped vein-like bodies of coarsely cryst. texture. Data are given (in the Russian part) on: tensile strength (before and after various heat-treatments); heating curves (early dehydration and later oxidation of FeO takes place), comparisons in this respect are made with chrysotile and crocidolite; acidproof qualities (MgO is more readily dissolved than is FeO); treatments with NaOH and KOH and with various salts were also studied. Up to 550° the strength of anthophyllite asbestos decreases slowly and to a small extent; beginning at 550° the strength exhibits a sharp decrease and at 700° is practically lost. The decrease at 550° is simultaneous with the increase in the intensity of the oxidation of FeO. Analyses of the various rocks and minerals are given; lower content of (Mg, Fe) and higher OH in the short-fiber asbestos is due to the partial alteration to talc and to the formation of asbestine. D. W. Pearce

Sulfate in salt deposits of N. W. Argentine. S. D. Villareal. *Univ. nacl. Tucuman, Cuadernos min. y geol.* **1**, 30–5(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 272.—The amts. of Na_2SO_4 in *saline waters* or deposits in Belén, Tinogasta and the Santa Maria Lake are, resp., 0.466, 0.122 and about 15%. The large amt. in the last-named case probably accounts for the liver troubles of the inhabitants who use water from the lake. C. A. S.

Barite at Radis, near Kaade (N. W. Bohemia). W. R. Zartner. *Lotos* **86**, 81–3(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 251–2; cf. *C. A.* **33**, 2853[6]. —Hematite and sporadic pyrolusite occur in hornblende and barite veins 0.5–1.5 m. wide in gneiss near Radis, 8 km. northwest of Kaade. The barite is yellowish to brownish, and contains $SrSO_4$ 1.05, $CaSO_4$ 0.05, $Al_2O_3 + Fe_2O_3$ 1.0, SiO_2 10.34 and H_2O 0.6%. It is usually fine-grained and compact, but in places crystals up to 2 cm. long occur which have grown on massive violet-blue fluorite. Elsewhere the hematite is accompanied by earthy Mn, and in one place there is a bed of white kaolin. The deposit is pneumatolytic-hydrothermal. C. A. Silberrad 1

Barite vein in granite in the Spessart near Aschaffenburg. Rudolf Mosebach. *Senckenbergiana* **17**, 218–23 (1935); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 790–1.—The position and origin of this barite are discussed, and it is thought to have resulted from a pneumatolytic-hydrothermal process, rather than, as once suggested, from the meeting of ascending and descending solns. C. A. Silberrad 2

Gas measurements over petroleum deposits. G. Selzer and R. Weber. *Petroleum Z.* **34**, Nos. 39–40, 11–13 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 301.—An app. is described showing the concn. of CH_4, etc., over petroleum deposits, whereby "isogas" lines (i. e., lines of equal gas concn.) are detd., whence combined with gravity detns., information as to oil distribution and geological structure is deduced. The method was applied only where the oil was at a depth of 60–90 m. C. A. S. 3

Earth structure and earth origin. K. F. Mather. *Science* **89**, 65–70(1939).—An address. B. C. P. A. 4

Structural and magmatic processes in the isostatic layer. Malvin G. Hoffmann. *Bull. Am. Assoc. Petroleum Geol.* **23**, 1320–51(1939).—Formation of magmas is discussed. Pressure increases the crystn. temp. of minerals and the viscosity of glass. Erosion may reduce pressure and heat may be developed through movement. Thus erosion may initiate fractional crystn. and magma formation. The rest magma will become increasingly acidic, the percentage of mineralizers will grow and eventually intrusion and extrusion will occur until the whole body is solidified. Alden H. Emery 5

Pegmatite dikes of the Bridger Mountains, Wyoming. Thad G. McLaughlin. *Am. Mineral.* **25**, 46–68(1940).—Pre-Cambrian black hornblende schist, probably of igneous origin, has been invaded by large masses of granite followed by 2 sep. intrusions of pre-Cambrian granite pegmatite dikes. The older dikes follow a joint set paralleling the schist foliation; they contain approx. 70% microcline and 30% quartz. The younger dikes follow a jointing across the foliation of the schist; hydrothermal solns. have partially replaced the original dike minerals, pptg. muscovite, lepidolite and petalite, then cleavelandite which replaced much petalite, followed by tourmaline, beryl, garnet, columbite and tantalite. Banding paralleling both strike and dip occurs in several dikes, apparently due to rhythmic pptn. C. H. Hale 6

Feldspar-free rocks connected with the sakenites. Alfred Lacroix. *Compt. rend.* **210**, 193–6(1940); cf. *C. A.* **34**, 621[1].—The sakenites are locally accompanied by rocks contg. no feldspar, but consisting of pyroxene or amphibole with one or more Al- and/or Mg-contg. minerals. These include the sapphirinites, composed almost entirely of sapphirine with sometimes a little spinel, and an alteration product thereof related thereto somewhat as antigorite is to peridotite in serpentinization; several varieties of spinellite, sometimes composed almost entirely of a bluish or more rarely deep-green spinel; and spinel- and sapphirine-pyroxenes and a sapphirine-amphibolite, which last consists mainly of a greenish-white amphibole rich in Al_2O_3, belonging to the edenites. Twelve complete analyses are given, showing compns. similar to those of magnesian marls rich in clay, with no trace of any external material, characterized by high Al_2O_3 and CaO content, low SiO_2 and very little Fe, indicating a special class of plagioclasites and pyroxenites. C. A. Silberrad 7 8

Petrography of Baveno granite. P. Gallitelli. *Atti soc. tosc. sci. nat. Pisa, Mem.* **46**(1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 496–9; cf. *C. A.* **33**, 91[6].—A connected and detailed account of the Baveno granite and its constituent minerals and rocks. C. A. Silberrad 9

Nushagak district, Alaska. J. B. Mertie, Jr. *U. S. Geol. Survey Bull.* **903**, 96 pp.(1938).—The geology of the district is described. Chem. analyses of 4 granites and 3 monzonites are recorded. No metal deposits of com. value have as yet been found, but the country is probably mineralized. Au occurs in small quantities at widely-sepd. localities. B. C. P. A.

Volcanic history and petrology of Montserrat with observations on Mt. Pelé in Martinique. A. G. MacGregor. *Trans. Roy. Soc.* (London) **B229**, 1–90(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 525.—After giving an account of the various volcanic phenomena, the eruptive rocks are described microscopically and chemically with 16 analyses, several new. These include analyses of labrador-dacites (of quartz-dioritic, belugitic, and peleitic types) and olivine-basalts (of belugitic and ossypitic types). C. A. Silberrad

Ejectamenta of the Laacher See area (Eifel). IV. Sanidinites. Georg Kalb and Maximiliane Bendig. *Decheniana* **98, A**, 1–11(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 470–2.—The sanidinites, the formation of which is to be ascribed to a phonolitic magma, are classified as (1) nosean-, (2) aegirine- and (3) scapolite-sanidinites, or (1) nephelite-syenite-pegmatite, (2) fenite and (3) huttenbergite. They are described in detail with complete analyses. Finally the subterranean processes (8 stages of pyrometamorphism) leading to their formation are briefly described. C. A. Silberrad

The labrador-andesites of Crni Vrh and Ješevac in Šumadija (Central Serbia). B. Dimitrijević and M. Ilić. *Bull. serv. géol. roy. Yougoslav.* **7**, 291–312(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 503–4.—The massif of Crni Vrh and Ješevac consists in its lower part of gray to reddish dacite and andesite with andesine phenocrysts; the upper and central portion of dark, rarely reddish andesite with labradorite. These labradorite-andesite rocks are classified in 3 types according as the phenocrysts are labradorite and hornblende; labradorite with a little hypersthene; or augite with a little biotite and hypersthene. They are described in detail, and their origin, probably from the dacite-andesite, discussed. C. A. Silberrad

A new rock in the Altvater hills (Sudeten Gebirge). J. Wilschowitz. *Firgenwald* **11**, 155–6(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 488–9.—The new rock resembles basalt; it is of lamellar structure with a yellowish gray weathered surface, a metallic ring, and when breathed on emits a clayey smell. It contains sporadic crystals of calcite 1 mm. across, with pyrite and magnetic pyrite. The microscope shows dark biotite and laths of plagioclase. The dark color is due to ore. There is a little diopside, usually transformed to chlorite. It appears to be an altered kersantite. C. A. Silberrad

Eruptives of the Raška region. (Mid-Serbia). M. Ilić. *Bull. serv. géol. roy. Yougoslav.* **7**, 217–90(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 504–5.—These rocks are the result of 4 magma movements; resulting in (1) Palæozoic peridotites, chromitite, picotite and gabbros; (2) post-Senonian diorites, syenites, albitites and granite; (3) Neogene outpourings of andesine-andesites and dacite and (4) probably still younger labrador- and bytownite-andesites. Microscopic detns. of the various constituents divide the rocks into 8 classes, the first of which includes rocks contg. no felspar; these form about half the whole and consist of olivine, enstatite, diopside with subordinate pigeonite and accessory spinel, magnetite, and in places chromite, which last also occurs in nests 1–3 m. across in serpentinized peridotite. Secondary minerals are serpentine, forming 37–95% of the rock. The other classes are characterized by the predominance, resp., of gabbros, diorite, albite-syenite, albitite, granite, andesine-andesite, and labrador- and bytownite-andesite, all of which are described in considerable detail. C. A. Silberrad 10

An inclusion in the basalt-lava of Daun (Eifel). H. Winter. *Decheniana* **97, A,** 47–50(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 472–3.—Complete analyses of the basalt-lava, d. 3.120, and of the inclusion, a felso-quartzite, d. 2.567, contg. 90.64% SiO_2 are given. C. A. Silberrad 1

Physiography, chemical composition and genesis of the gabbroid massif of Dren-Boula (S. Serbia). M. Tajder. *Rad jug. ak. znan. i umjet Mat. pr. r.* **268**, 1–54(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 501–3.—The various rocks found in this massif are described, with complete analyses and parameters of many (verlite, troctolite, several gabbros including olivine-, uralite- and amphibolite-gabbros, diorites and diabases). Their mutual relations are discussed, and their formation by differentiation from a common original magma illustrated by diagrams. C. A. Silberrad 2

Structural petrology of the schists of Eastern Otago, New Zealand. F. J. Turner. *Am. J. Sci.* **238**, 73–106 (1940).—Oriented sections have been cut and subjected to petrofabric analysis. Alden H. Emery 3

Metamorphism and igneous action. H. H. Read. *Advancement of Sci.* **1**, 223–51(1940).—An address. D. W. Pearce

Kibara formations, Katanga. G. Mortelmans. *Bull. soc. belge géol., paléontol. hydrol.* **49**, 163–70(1940). These consist of phyllites, quartzites, schists, etc., exhibiting epizonal and mesozonal metamorphism resulting from granitic intrusions which also caused in places stanniferous mineralization and the formation of pegmatites, aplites, tourmalinites, etc., which are described. C. A. S. 4

Geology and petrography of the Rottenmanner and Solker Tauern, (Styria). II. Wieseneder. *Mineralog.-petrog. Mitt.* **50**, 273–304(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 484–6.—Descriptions of many rocks are given, including an intermediate gneiss the original material of which was a biotite-rich gneiss, the biotite contg. many pleochroic halos around crystals of allanite; a group of garnetiferous mica schists in which occur amphibolites, mica schists and various biotite gneisses. The group has been variously metamorphosed with formation of garnet amphibolite, staurolite- and kyanite-contg. rocks and tremolite marble. There is also a serpentine stock which probably originated independently. C. A. Silberrad 5

Tourmaline-zoisite rock from Loh-Oeolo, Java. Cath. M. Koomans. *Leidsche Geol. Meded.* **10**, 104–9(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 522.—The rock consists of 16–19% colorless to pale-green tourmaline, 35–37% phlogopite, 39–44% zoisite and some muscovite. Its probable origin is discussed and thought to be connected with a neighboring diabase dike contg. lenses of Mg-rich limestone. C. A. Silberrad 6

The metamorphic rock of Siedlec near Krzeszowice (Poland). A. Bolewski. *Ann. soc. géol. Pologne* **14**, 1–44 (1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 492–3.—The rock is a much decompd. quartz-porphyry similar in compn. to a potash-rich porphyry west of Cracow. Compared to fresh rock, K_2O and SiO_2 are remarkably high and H_2O low. A sample placed in a 1% soln. of K_2CO_3 at 100° absorbed K_2O. Immersion in 5% K_2CO_3 followed by immersion in hot H_2SO_4 showed the stability of the newly formed constituent, which appears to be a feldspar. In the clayey by-product formed at the same time the ratio $SiO_2:Al_2O_3 = 4.41$; alkali $Al_2O_3 = 0.045$, total H_2O 9.54%; m. p. about 1700°. No kaolin was observed. There were 0.3–1.5% of zircon, rutile, tourmaline and apatite, and 7.1–10.1% of isotropic material. C. A. Silberrad 7

Geology of eastern Crna Gora (Kara Daga) (South Serbia). M. Luković. *Bull. serv. géol. roy. Yougoslav.* **7**, 1–27(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 506.—These mountains run north and south to the north of Skoplje (Uskub). The north and northeast portions consist of gneiss, mica schist and granite-gneiss with veins of aplite and pegmatite. The south and southwest portion is much more varied; phyllite, quartz, marble, magnetite-chlorite, diabase-chert, peridotite, gabbro, granite, syenite, andesite and dacite all occur. Various ores are worked in or near Lojane. Chromite and stibnite of pneumatolytic-hydrothermal origin occur, connected with the dacite-andesite. At the contact with the cryst. schists Ni and Mn ores, magnetite and veins bearing Fe and Cu, and impregnations thereof in quartzite and finally pyrite impregnations 10–20 m. in width occur in diabase-chert. C. A. Silberrad 8

Sedimentary siliceous rocks, hornstone and the flint problem. J. Kühnel. *Z. deut. geol. ges.* **91**, 207–31 (1939).—The possible origin of hornstone and flint is discussed. B. C. P. A. 9

Is a thermal hypothesis of flint formation possible? W. Wetzel and D. Wirtz. *Z. deut. geol. ges.* **91**, 231–6 (1939).—Kühnel's views (preceding abstr.) are criticized. B. C. P. A.

Tubular siliceous concretions in gravels at the base of the Upper Eocene. Marcel E. Denaeyer. *Bull. soc. belge géol., paléontol. hydrol.* **49**, 161–2(1940).—Certain specimens labelled as fulgurites, found in gravel at Saint Gilles (Brussels) consist of 3 generations of spherulites and fibers of chalcedony, the oldest outside. It is considered that they are not fulgurites but originated as tubes formed by Polychaetae, which acted as geodes favoring crystn. of the SiO_2, the chalcedony being of secondary origin. C. A. Silberrad

Koppite-carbonatite and koppite-marble from Schelingen-im-Kaiserstuhl. H. Metschke. *Ber. Naturforsch. Ges. Freiburg i. B.* **36**, 28–56(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 225–6.—Koppite occurs here much more extensively than at first thought, being present in approx. const. proportion in all the cryst. limestone of the neighborhood. It is now worked as a source of Cb. In these cryst. limestones there were formed by pneumatolytic addn., at the contact with essexite, koppite, apatite, magnesioferrite, etc. A somewhat similar product, termed koppite-carbonatite, has been similarly formed in a tephrite-breccia. C. A. Silberrad

Microstructure and composition of "cone-in-cone" of Lower Devonian metamorphics from Morhet (Belgian Ardennes). Marcel E. Denaeyer. *Bull. soc. belge géol., paléontol. hydrol.* **49**, 119–25(1940).—The microscopic examn. of the section of cone-in-cone previously macroscopically described (*Ibid.* **48**, 408(1938)) is now described. It consists of veinlets of phyllite more or less regularly arranged, and phenoblasts of biotite irregularly scattered in a fine groundmass of quartz and ilmenite. Analysis gives SiO_2 69.29, Al_2O_3 4.16, Fe_2O_3 1.12, FeO 5.57, MgO 2.29, CaO 1.58, Na_2O 0.95, K_2O 1.44, TiO_2 5.51, P_2O_5 0.19, $H_2O +$ 7.38, $H_2O -$ 1.11; or quartz 33.01, biotite and phyllites 33.64, ilmenite and magnetite 12.11, other 0.40, $H_2O -$ 1.11. No conclusion as to the origin of the structure is suggested. C. A. Silberrad

The nature and the age of the basement deposits of the Sarmatian found in a drill core at Horodnic-Bucovine (Rumania). M. G. Filipescu. *Bull. sect. sci. acad. roumaine* **21**, 30–4(1938–39) (in French).—Overlying the limestone is a bed of friable sandstone at depths 1114 to 1156 m., and a bed of anhydrite at depths 1054 to 1114 m. The mineralogy of the sandstone (quartz, feldspar, zircon, ilmenite, etc.) indicates volcanic activity or igneous extrusion in the region shortly after the limestones were laid down. Michael Fleischer

The cost of soil in rocks and time. W. H. Twenhofel. *Am. J. Sci.* **237**, 771–80(1939).—The amt. of rock and the time to form 1 ft. of soil from various types of rock under different conditions are discussed. Alden H. Emery

Physical and mineralogical description of loess from Tschak am Wardak (Afghanistan). R. Köhler and J. H. Hellmers. *Z. prakt. Geol.* **46**, 207(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 435–6.—The loess is a yellowish gray porous, friable material, contg. 22.3% $CaCO_3$, with a negligible amt. of org. matter, and (dried at 105°) 1.6% H_2O. Mech. and mineralogical analyses are given showing it to be rather a loess-loam. C. A. Silberrad

Supplementary notes on pyroschists in France (Charrin) 22. Petrography and coking qualities of coals of Nieder-

bank-saddle-seam (Doktorowiez-Hrebnicki) **21.** Petrographic study of bonding clays and of clay substance of molding sands (Grim) **9.** Jet and its plastification (Losev, Losev) **13.** Peculiar isomerism in synthetic and mineral inorg. compds. (Quartaroli, Belfiori) **6.**

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9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, OSCAR E. HARDER AND RICHARD RIMBACH

Metallurgy in industry. Carl T. Hewitt. *Rept. New Engl. Assoc. Chem. Teachers* **41**, 118-23(1940).—An address. Leopold Scheflan

Rare metals and minerals. Zay Jeffries. *Mining and Met.* **21**, 10-12(1940).—A review of 1939 developments in Be, Co, Li, Mo, Pt, Pd, Ru, Rh, Ra, Se, Te, Ta, W, U and V. Co is being used in armament. Mo is being recovered from Cu ore. Pt-alloy spinnerets are being used for producing glass fiber. Large Pt crucibles are being 4 used to produce large crystals for optical uses. Pt-clad Ni is now available. Pt-alloy electrodes in aircraft sparkplugs resist erosion and are free of fouling. Pd photographic printing papers have great permanence. Ru is twice as effective as Ir in hardening Pt. Se and Te are being added to Cu alloys to improve machinability. Alden H. Emery

Principles of flotation. IX. Influence of the anion on air-mineral contact in presence of collectors of xanthate type and its consequent influence on differential flotation. Ian W. Wark and Keith L. Sutherland. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1130**, 23 pp.(1939); cf. *C. A.* **33**, 9220⁸.— The influence of certain anions, viz., carbonate, chloride, nitrate, formate, acetate, propionate, tartrate, phosphate, silicate and ferricyanide, on flotation by K Et xanthate was studied. Except for carbonate, 6 phosphate, silicate and ferricyanide, all were added as Cu salts replacing the usual $CuSO_4$ addns. Apart from its influence on pH, Na_2CO_3 has no influence on contact in the absence of heavy metal salts. It has an effect in the presence of a cation (Cu) with which it forms a ppt. Even in the presence of a Cu salt, if xanthate concn. is sufficiently high and temp. is not excessively low, Na_2CO_3 has no specific effect. An amt. of xanthate slightly in excess of the stoichiometric equiv. of the Cu present maintains a 7 standard "contact curve" whatever the nature of the anions present and whatever the temp. If xanthate concn. is reduced and (or) the temp. is lowered, Na_2CO_3 induces departures from the standard type of curve. Formation of a second or "island" area of noncontact is favored by (1) low xanthate concn., (2) high concn. of Cu salts, (3) low temp. or (4) high concn. of Na_2CO_3. Either in the presence or absence of Cu salts, lime may be substituted for NaOH without altering the contact curves. Presence 8 of lime means almost complete absence of CO_2, consequently data on CO_2 free systems should be used at plants in which lime is used as the alkali. Differential flotation is often based upon the more-ready formation of islands of noncontact with some minerals than others and on the differentiation that persists as the islands expand into alk. regions. Pyrite is more susceptible to their formation than sphalerite which is more susceptible than chalcopyrite. Cleiophane is as susceptible to island formation as sphalerite but marmatite is not as susceptible. Pyrrhotite is not as susceptible as pyrite. Probably conditions suitable for the sphalerite-pyrite sepn. will serve for marmatite-pyrrhotite. Sphalerite is coated with a Cu-bearing activation film in the island region of noncontact. Galena carries a similar film, but it is responsible for depression. Arsenopyrite more closely resembles sphalerite than pyrite in island formation. Substitution of other Cu salts for sulfate leads to more-ready depression within the island region of noncontact. In order of increasing depressant action on sulfide minerals they are sulfate, nitrate, chloride, tartrate, propionate, acetate and formate. Island formation begins at pH 6-7; some cyanide also is required. As depressant conditions are intensified, the island increases in size and may fuse with the upper region of noncontact. It may expand until depression is possible in the absence of cyanide. The growth of the island is more regular at 35° than at 10°; this may be due to nonattainment of equil. at the lower temp. Island regions of noncontact are obtained with other collectors of the xanthate type—Aerofloat 25 and mercaptobenzothiazole Addn. of a relatively high concn. of NaCl has little influence on the size and position of the island when CuCl is used. The island region of noncontact is primarily due to xanthate deficiency arising from its more or less pptn. by the Cu salt. Thus a small concn. of cyanide ions may prevent adsorption of the xanthate and in certain instances there may be enough hydroxyl ions to prevent adsorption. The products of decompn. of Na_2CO_3 solns. induced by the growth of a mold are harmful in pyrite flotation. Alden H. Emery

Experiments in flotation of sulfide-hübernite ores. F. N. Belash and O. V. Pugina. *Tsvetnye Metal.* **1939**, No. 7, 72-5.—Ore contg. quartz, muscovite, fluorite, hubernite, calcite, galena, pyrite and chalcopyrite was subjected to flotation with oleic acid and sodium oleate as frothers and collectors and water glass and $K_2Cr_2O_7$ as depressors. With wet grinding to minus 100 mesh the results were unsatisfactory because of considerable flotability of quartz. With dry grinding better results were obtained, the loss of WO_3 in tails being 2 to 2.5%. Water glass was found to act as depressor of hübernite; $K_2Cr_2O_7$ gave better results. In further expts. $K_2Cr_2O_7$ was substituted by ammonium dichromate. Expts. in wet grinding were made using porcelain, steel and cast iron mills and balls in various combinations. Best results were obtained with porcelain mills and balls. Apparently Fe ions from steel mills and balls activate the quartz and float it. Cast iron was found to be still more harmful than Mn steel. The use of porcelain in industry is impracticable; therefore the authors tried chem. treatment of the pulp. Addn. of soda to grinding mills prevents transfer of Fe ions into the pulp and prevents activation and flotation of quartz. The method was also found helpful in the flotation of Mo concentrates. Best results are obtained with solid:liquid ratio of 1:4; ratio of 1:2 is acceptable. Recovery of W is 95% with coeff. of extn. of 25 and consumption of 700 g. sodium oleate per ton. Expts. also showed that for economy green soap can be substituted successfully for 9 Na oleate and oleic acid. B. N. Daniloff

Effect of the percentage of solids in pulp on the time of flotation and the efficiency of the apparatus. V. D. Benenson. *Tsvetnye Metal.* **14**, No. 3, 63-9(1939); *Chimie & industrie* **42**, 821.—Tests carried out on Cu-Zn ores, Zn-Pb ores and pyrites-quartz mixts. showed that the efficiency of the flotation app. is inversely proportional to $1 + \delta R$, where δ is the d. of the ore and R the ratio of liquid to solids in the pulp. The time of flotation depends

on the d. of the pulp; the relative speed of flotation is max. for a d. corresponding to $R = 2.5:1$. A. Papineau-Couture

Oxygen-free flotation. II. Further experiments with galena. S. F. Ravitz. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1147**, 7 pp.(1940); cf. *C. A.* **28**, 1309[1].—Products of oxidation are not necessary for flotation of galena. Galena cleaned with a soln. of NH_4Cl and HCl could be floated with no reagent, terpineol alone or Et xanthate alone, the rate increasing in the foregoing order. H_2O_2, $K_2Cr_2O_7$ and particularly starch were strong depressors for cleaned galena in the absence of a collector. At moderate concns. Na_2S, $Pb(NO_3)_2$, Na arsenate, Na_2HPO_4, acetone, EtOH, petr. ether and Et_2O had no effect on flotation of cleaned galena in the absence of a collector. Na arsenate and Na_2HPO_4 depressed aged galena in the presence of 0.05 lb. K Et xanthate per ton. No contact could be detected between an air bubble and cleaned galena in H_2O. Alden H. Emery

Experimental flotation of Washington magnesite ores. J. B. Clemmer, H. A. Doerner and F. D. DeVaney. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1148**, 10 pp (1940).—A selectively mined, high-grade ore analyzing MgO 42.76, CaO 2.0, R_2O_3 1.6, SiO_2 3.6 and insol. in HCl 4.8% was treated in a pilot plant. With cationic-type reagents (DLT 699, Emulsol 903-L and du Pont 243), 1 lb. per ton, SiO_2 was removed by flotation to give a product contg. less than 1% SiO and less than 2% CaO with 85% recovery of MgO. Caustic starch and tannic acid assisted in the flotation of siliceous minerals. Low-grade mine rejects analyzing MgO 34–40, CaO 5–9, R_2O_3 1.6–2.1, and insol. 6–9% were treated by a 2-stage process. Siliceous minerals and calcite were removed with cationic-type collectors, then magnesite was floated from dolomite by usual soap-flotation methods. A broad range of magnesite products, well within specifications for refractory magnesite, was obtained. Alden H. Emery

Ore concentration and milling. E. W. Engelmann. *Mining and Met.* **21**, 36–9(1940).—Improvements in grinding, gravity sepn., cyanidation, flotation and dust control in 1939 are reviewed. Use of rod mills between intermediate crushing and coarse grinding is increasing. They eliminate dusting and the closed-circuit operation of fine crushers and the product is suitable for secondary mills. Low-level mills increase grinding capacity. Several new float-and-sink processes are in operation; halogenated hydrocarbons are used in the du Pont process, a heavy suspension of $PbSO_4$ at Mascot, Tenn., and ferrosilicon suspensions on the Fe ranges; subsequent treatment is described. A new process provides simultaneous soln. and adsorption of Au. Peru Sb-Au ores are roasted at 600–700°F. and the calcine is washed with H_2O, then lime water to remove Sb prior to cyanidation. Atomization of cyanide pulp in a tank is superior to mech. or air agitation. Cleaning of mineral surfaces prior to flotation is beneficial. Alaska Juneau has improved grade of concentrate by intermittent conditioning with starch for C depressant. Use of jigs in grinding circuits is increasing. Dispersing table pulps enables effective handling of smaller material. Deep flotation cells are being installed. Procedures at 2 Cu mills for recovering Mo concentrates are sketched. Alden H. Emery

Ore-testing studies of the ore-dressing Section. A. L. Engel and S. M. Shelton. *U. S. Bur. Mines, Rept. Investigations* **3484**, 34 pp.(1940).—Results of lab. tests on 21 ores are presented. They include 9 Mn ores from Ala., Calif., Colo., Ida., Mo., Nev. and New Mex.; $PbCO_3$ ore from Nev.; Sb ore from Calif.; anorthosite feldspar from Minn.; crude white lead from Mo.; Calif. talc.; chromite ore from Calif.; Ohio SiO_2 sand; sphalerite-barite ore from Mo.; and Cu ores from Colo. Lab. tests of fluorspar-mill tailings were carried into pilot-plant stage. Alden H. Emery

Reduction of purple ore. Yutaka Huzii and Satou Taniguti. *Tetsu-to-Hagane* **26**, 1–13(1940).—The ore contains approx. Fe 60, SiO_2 10, S 1–2, P 0.02 and Cu 0.1–0.25%. An attempt was made to reduce this ore to a product that could be used in place of steel scrap in steel manuf. Sponge iron and iron lumps can be made in a rotary kiln, tunnel kiln, reverberatory furnace, Detroit elec. furnace, etc., by reduction with CO and solid carbon at very high temps. However, S is not eliminated; hence the product is used only in basic elec. furnaces. M. Ishida

Humidification of cyanide muds with aqueous solutions of wetting agents, as a means of overcoming their pulverulence. M. E. Lipets. *Tsvetnye Metal.* **13**, No. 12, 29–30(1938); *Chimie & industrie* **42**, 486.—Preliminary treatment of cyanide muds with aq. solns. of various wetting agents (sulfonic acids, soaps, naphthenic derivs.) of suitable concn. prevents pulverulence of the muds which produces considerable loss of Au. A. P.-C.

Precipitation and refining practice at Wright-Hargreaves mill. V. C. Lindsay. *Can. Mining Met. Bull.* No. **333**, 39–43(1940).—After clarification in Merrill sluicing clarifying presses, the pregnant soln. is deacrated under vacuum. Au is pptd. with Zn dust. Zn consumption is 0.50 oz. per ton of soln. A typical ppt. analysis (dry basis) is Au 43.20, Ag 6.38, Cu 12.26, Te 3.08, Zn 7.62, Pb 0.44 and insol. 15.00%. To this are added borax glass 28, niter 30, SiO_2 17, NaCl 10, lime 7, soda ash 5 and Fe_2O_3 7%. Refinery plant practice is described. Costs of clarification and pptn. are $0.063 per oz. of Au and of refining $0.030. Alden H. Emery

Low-grade ore at Young-Davidson mine. N. J. Southern. *Can. Mining Met. Bull.* No. **333**, 44–55 (1940).—This Au ore after crushing and grinding is classified and tabled. The coarse concentrate contains most of the free Au and sulfides. Au extn. is by cyanidation. The flow sheet is given. Alden H. Emery

Observations on the mineralogy and treatment of auriferous rocks of the Black Reef series from the New Machavie mine. J. J. Frankel. *J. Chem., Met. Mining Soc. S. Africa* **40**, 115–33(1939).—The ore contains carbonaceous material that interferes with Au extn. by cyanidation. Results of a careful study of the mineralogy of the ore are presented. Satisfactory extn. of Au should be obtained by grinding and removal of free Au and some pyrite on corduroy tables followed by flotation and fine grinding and cyanidation of the flotation concentrates. Alden H. Emery

Some recent uses of charcoal as a gold precipitant in conjunction with flotation. M. W. Von Bernewitz. *Eng. Mining J.* **141**, 43–7(Mar., 1940).—Instances are noted from operations and lab. work conducted in the U. S. A. and abroad. W. H. Boynton

Reduction of iron ores under pressure by carbon monoxide. Michael Tenenbaum and T. L. Joseph. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1134**, 18 pp.(1939).—The most rapid rate of reduction was obtained with H. Rate was increased 40% by doubling pressure. With pure CO, the rate was about 1/4 that with pure H. Doubling the pressure increased rate of reduction by 23%. Dilu. of CO with N to form bosh gas lowered reduction rate by 1/2. Doubling the pressure increased the rate about 20%. Substitution of 8.2% CO_2 for an amt. of CO in bosh gas reduced rate still further. Pressure is most effective when applied to strongly reducing gases, rather than to those approaching equil. compn. Theoretical considerations are discussed. Alden H. Emery

Effect of the nitrogen content of reduced gases on the reduction of oxides of iron. M. M. Lelbovich and I. P. Lampsakova. *Metallurg* **13**, No. 9, 61–6(1938); *Chimie & industrie* **42**, 276.—A study of reduction at progressively increasing temps. (400–900°) showed that increasing the proportion of reducing agent in the gas lowers the reduction temp. The effect of gas compn. is most marked at 600–700°. A. Papineau-Couture

Metallurgy of copper. P. D. I. Honeyman. *Mining and Met.* **21**, 16(1940).—A review of progress in 1939. The new smelter at Hurley, New Mex., is described briefly. Alden H. Emery

Metallurgy of lead. R. G. Bowman. *Mining and Met.* **21**, 13–14(1940).—A review of 1939 developments in Pb smelting, refining and use. Wider and longer sintering machines are being used. An ignition device for sintering

machines that saves 60% in oil consumption has been installed at Trail. Sn is being removed from Pb with gaseous Cl. Alden H. Emery

Platinum deposits of the Goodnews Bay District, Alaska. J. B. Mertie, Jr. *U. S. Geol. Survey, Bull.* **910-B**, 115–45(1939). E. H.

Platinum. H. W. Lohse. *Can. Mining J.* **61**, 161–2 (1940).—Canada leads the world in Pt production, where it is obtained from the treatment of Ni-Cu matte at Sudbury, Ont. Uses of Pt, and other metals of the 8th group in the periodic system, are named. W. H. Boynton

Deleading zinc concentrates at the Pend Oreille mill. C. A. R. Lambly and Frank R. Milliken. *Eng. Mining J.* **141**, 29–31(Mar., 1940).—Operations at the Pend Oreille Mines & Metals Co. plant near Metaline Falls, Wash., treat 750–850 tons of ore daily. Flotation of the Pb is accomplished in two 10-cell Union Iron Works flotation machines using Aerofloat 31 as a collector, and no reagents for depressing the Zn are needed. Pb tailings are conditioned with $CuSO_4$ then floated in two 12-cell Denver machines and three 10-ft. Southwestern cleaners. Pine oil and Et xanthate are used in the Zn circuit except when the feed is high in pyrite, in which case xanthate is replaced by Na-Aerofloat. Pb rougher concentrates are double-cleaned and the Zn rougher concentrates triple-cleaned. Tailings from the primary Zn cleaner are fed to an 8-ft. (2.44 m.) cone classifier. The classifier sands are reground in closed circuit with the classifier, the overflow being returned to the Zn conditioner. Final concentrates are filtered in disk-type filters. A recovery of 92.1% of the Pb in a 62.3% concentrate was obtained from heads assaying 1.65% Pb and 4.46% Zn. The cyanide used averaged over a 2-month period 4–5 lbs. per ton of concentrate treated, and the flotation feed was maintained below a crit. d. of 22% solids. The flotation is accomplished in a 6-cell Weinig 30-in. (76.4-cm.) flotation machine using the 1st cell as a single-stage cleaner. The flowsheet, aside from the deleading unit, follows standard practice for floating Zn-Pb. Flowsheets are shown, including one for the present deleading unit. W. H. B.

Metallurgy of zinc. H. R. Hanley. *Mining and Met.* **21**, 15–16(1940).—A review of 1939 developments in metallurgy of Zn. Production per retort in horizontal-retort distg. plants continued to increase. Ag-Pb alloy is now standard for anodes at most electrolytic Zn plants. Cast Pb anodes coated with electrolytically deposited Pb by the Betts process (cf. *C. A.* **4**, 2071) are giving satisfactory results in stabilizing these electrodes at 1 plant producing cathodes of high-grade Zn. A. H. E.

Roasting of Beattie concentrate. F. R. Archibald, F. J. Martin and A. T. Koenen. *Trans. Can. Inst. Mining Met.* **42**(in *Can. Mining Met. Bull.* No. **332**), 608–31 (1939).—Arsenic in flotation concentrates resulted in poor cyanide extn. More consistent and higher extn. is obtained if As and S are eliminated under certain controlled conditions of time, temp. and gas concn. (*a*) SO_2 and H_2O vapor concn. are regulated through early stages of treatment in the roasters, wherein the charge is brought to a temp. within the range 750–850°F. The concn. of gas should be such that slow surface oxidation is prevented. (*b*) Inlet of air is regulated and such a condition is maintained that the roast proceeds steadily and without local surface cooling below roasting temp. At this stage, the SO_2 concn. is maintained by the roasting charge. (*c*) Toward the end of active roasting, temp. is raised and may reach 1200°. During this and subsequent cooling, free access of air is desirable. (*d*) If roasting is unduly prolonged by excess SO_2 concn. and if the temp. becomes excessively high, magnetite and other ferrites will form and extn. will not be good. Slimes also may be contributory. An extensive lab. investigation of the effect of different variables on roasting is presented. A. H. E.

Roasting of sulfides with air enriched with oxygen. IV. Oxidation of copper concentrate. N. P. Diev, Yu. V. Karyakin and A. G. Loshkarev. *J. Applied Chem.* (U. S. S. R.) **12**, 655–61(1939); cf. *C. A.* **33**, 6204[8].—The oxidation of Cu concentrate (a sulfide complex) proceeded at 500° according to a mechanism related to the oxidation of individual sulfides. At the same temp. desulfurization proceeded with a considerable velocity and reached 81–81.5% in 52–78 min. A relative acceleration of the oxidation in the presence of various concns. of O (over that in the presence of air) was independent of temp. and on av. equal to 59 for 10% O, 123 for 30% O, 136 for 40% O, 144 for 50% O and 149% for 66% O, with an exception for 50 and 66% O at 500° where relative accelerations were 185 and 194%, resp. V. **Oxidation of zinc concentrate.** *Ibid.* 661–8.—All S can be removed from the Zn concentrate at 1100° in 36–44 min. The velocity of oxidation increased by 11–93% with an increase of O concn. to 60%, depending on temp. The final step of desulfurization at 500° was independent of the O concn. VI. **Oxidation of sulfide ore.** *Ibid.* 668 73(in French, 673 4).—The oxidation of sulfide ore proceeded in the same way as that for individual sulfides. At 700–1100° an increase of desulfurization was observed at 40% O concn.; above this concn. the desulfurization increased but slightly. At 500° the effect of O concn. on desulfurization was greatest. The size of ore grains (within 1-3 mm.) had no effect on oxidation velocity. 23 references. A. A. Podgorny

An apparatus for determining thermomagnetic behavior of slags, and some preliminary results obtained with it. B. A. Rogers and K. O. Stamm. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1133**, 11 pp.(1939).—A convenient app. for detg. thermomagnetic behavior of slags and metal oxides is described. It is based on the principle that if a ferromagnetic substance such as a slag is placed in a nonuniform magnetic field it experiences a force that tends to move it into the region of max. field strength. A Frantz magnet with an isodynamic field was employed for supplying the nonuniform magnetic field. Detns. of force on the sample with a magnetic balance were rapid, convenient and as accurate as desired. The use of the app. is illustrated with measurements on Fe oxides. Alden H. Emery

Structure of the slags in the basic open-hearth process. W. Bischof. *Arch. Eisenhüttenw.* **13**, 325–32(1940).—Expts. are described and discussed which were undertaken to clear up the relations between the changes in the slag (chem. and phys.) during the melting process and its appearance. Four different groups of slags could be distinguished: (1) slags with a creased, wrinkled surface, (2) with smooth surface, (3) with a mesh-like surface, showing fine cracks, and (4) slags with irregular surface. These groups differ by their CaO and SiO_2 content: group 1 is observed only at high SiO_2 and low CaO contents, group 2 comprises slags of about 42% CaO and 20% SiO_2, group 3 is found around 45% CaO and 18% SiO_2, and group 4 are ladle slags. MnO, FeO and Fe_2O_3 occur mainly in the more acid slags, an effect on surface quality could not be established. P_2O_5 is said to favor formation of group 3 but this is not at all certain. Appearance and structure bear a certain relation with the fluidity as found by Herty, *et al.* (*C. A.* **29**, 3275[8]). The Mn reaction between slag and steel melt and the Mn utilization was found to increase with increasing CaO content up to a ratio of $CaO/SiO_2 = 2$, when a slight decrease begins. Seventeen references. M. Hartenheim

Reverberatory melting of slags. V. S. Sokolov. *Tsvetnye Metal.* **1939**, No. 7, 88–92.—Exptl. melting of slags with the purpose of recovering metals therefrom was tried at the Molotov Copper Smelter. The slags contained about 1.4% Cu, 0.8–1.4% Pb, 8.5% Zn and 25–9% FeO. By the addn. of 10–15% of coal and 10–15% of FeS to the charge a recovery of 90–1% of Cu, 83–7% Zn and 94% Pb is claimed; however, troublesome formation of large solid skulls on the furnace hearth was encountered. The skulls consisted mostly of Fe and Cu. In order to prevent the reduction of Fe and the formation of skulls it was necessary to add S to convert the Fe to FeS or to dissolve it in FeS. Exptl. lab. melts with varying amts. of coal and pyrite added showed that the reduction of the metals is directly related to the amt. of coal; Fe is reduced along with these. Tests made at the smelter with addn. of 12% coal and 17% pyrite produced very good results with only

a negligible amt. of reduced Fe in the skull. The loss of S amounted to 23%, the remainder going into mat as FeS. B. N. Daniloff

Melting difficultly fusible charges in reverberatory furnaces. D. M. Yukhtanov. *Tsvetnye Metal.* **13**, No. 12, 47–51(1938); *Chimie & industrie* **42**, 659–60.—The use of difficultly fusible charges lowers the efficiency of metallurgical furnaces and increases the fuel consumption. These disadvantages can be overcome by incorporating with the charge a small proportion of a powerful fluxing agent: fluorspar, Na and K salts, etc., which lower the m. p. of the slag. A. Papineau-Couture

Thermal work in reverberatory furnaces. I. D. Semikin and M. D. Shabli. *Tsvetnye Metal.* **14**, No. 3, 71–85 (1939); *Chimie & industrie* **42**, 821.—The chief reason for the low efficiency of existing reverberatory furnaces lies in their insufficient thermal power. The optimum thermal power of these furnaces is 50–60 million cal. per hr., or about 300,000 cal. per hr. per sq. m. of hearth area, corresponding, for a 180-sq.-m. furnace, to a production of 1400 tons of Cu per 23 hr. with a heat consumption of 800,000 cal. per ton. It is necessary to modify the heat balance of the furnaces so as to obtain complete and intense combustion of the fuel over as short a distance as possible. A. Papineau-Couture

Furnace for melting Al—description of its construction and operation. T. A. Booth. *Metal Ind.* (London) **56**, 168–70(1940).—The immersion heating is carried out with internally-(gas) fired radiant tubes of a new nonferrous alloy (compn. not stated). The alloy tubes are very resistant to molten Al. Two cu. ft. of town gas is consumed per lb. of Al. Sizes from 100 lb. to 5 tons are obtainable. F. W. Fink

Method for the manufacture of low-cost aluminum. Paul Drossbach. *Chem.-Ztg.* **63**, 606–8(1939).—A modified blast furnace with combined elec. and coke heating (operating temp. 2200°) is charged with Al-, Fe- and Si-bearing ores; e. g., phyllite and iron ore. The Fe-Al-Si alloy is refined in a special furnace at 1400° resulting in pure Al and 20% Fe-Si. The latter alloy can be sold, or further refined into steel. Economic and thermodynamic considerations indicate that the new method is advantageous. No details of furnaces and operation are given. F. W. Fink

Material, energy and plant requirements in direct extraction [of iron]. Hugo Bansen. *Stahl u. Eisen* **59**, 785–90(1939).—A discussion of costs, with especial reference to salzgitter ores, and in comparison with normal procedures. B. C. P. A.

The manufacture of pig iron in America. Wm. A. Haven. *J. Iron Steel Inst.* (London) Advance copy May, 1940, 43 pp.—Discussion of economics, construction and operation of furnaces for 6 districts each with its own materials: Nova Scotia, Eastern New York State, Youngstown, Chicago, Birmingham, Utah. Numerous illustrations and tables of data are included. F. G. N.

Crystal orientation in silicon-iron sheet. J. T. Burwell. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1178**, 4 pp.(1940).—The component crystals are oriented with a (110) plane in the rolling plane and a (001) axis in the rolling direction. Alden H. Emery

Iron and steel. M. J. R. Morris. *Mining and Met.* **21**, 54–6(1940).—Use of plain C steel has increased as its quality has improved owing to better control at various stages. Lower-alloyed steels are being used in automobiles. Use of steels in aircraft is increasing. Wt. per h. p. has been reduced. Use of stainless and high-tensile low-alloy steels in railroad and other construction has increased. Such steels are demanding better welding practice and more attention to structural design. Even more attention than previously is being given to stainless steels. Use of complex steels is increasing, but as they increase in complexity, addnl. Mn is needed to maintain workability. Use of Cu in deep-hardening steels is increasing. Use of the elec. furnace for steel-making and of induction heating has increased. Alden H. Emery

Dust concentrations in foundries. T. Hatch, C. E. Williams and B. G. Dolin. *N. Y. State Dept. Labor, Ind. Bull.* **18**, 89–95(Feb., 1939); *U. S. Pub. Health Eng. Abstracts* **20**, IHS, 5(Feb., 1940).—From a survey of 12 foundries it is concluded that dust concns. should be kept below 30,000,000 particles per cu. ft., and can be reduced to ½ this figure with ordinary care. C. R. F.

Relation of ingot surface as reflected by mold wall surface to billet or bloom surface. T. J. Woods. *Iron Age* **145**, No. 8, 37–9(1940).—The relation of mold condition to the surface of direct rolled billets and blooms was studied on 61 heats of hot-topped medium-carbon and alloy steel deoxidized to give fine grain. Tarring improves the surface of the product in a new mold. When the mold becomes fire checked (which happens between 65 and 100 pours) the tar collects in the crevasses of the mold and reacts with the metal to form blow holes. It is then easier for the original ingot surface to be scaled off in the soaking pits with resulting poor surface of the product. F. G. N.

Effect of elevated temperatures on steels and mixtures. A report on progress of research. H. L. York. *Foundry Trade J.* **62**, 59–62(1940).—Several siliceous sands with bentonite and fireclay bonds, and a natural molding sand were investigated to det. their behavior at high temps. The following conclusions were reached: (1) Neither the bentonite nor the fireclay-bonded sands as a group are unaffected by heat shock. (2) Some sand mixts. were sensitive to heat shock and cracked at comparatively low temps. Other mixts. were unaffected by heat shock and developed the same strength under shock test conditions as when treated slowly. (3) The strength of the sand mixts. tested increased with temp. up to the point at which the bond began to fuse. At higher temps. the strength decreased rapidly and approached zero at the temp. of complete fusion of the bond. (4) The fireclay-bonded sands in every case reached their max. strength on slow heating at a higher temp. than the corresponding bentonite-bonded sands; the difference averaged 75°. (5) (*a*) The bentonite-bonded sands disintegrated on cooling from any temp. between 900 and 1200°. (*b*) The fireclay-bonded sands became very fragile but did not disintegrate on cooling from any test temp. (*c*) Sands bonded with either bentonite or fireclay developed a high strength on being cooled from the temp. at which the bond became completely fused. (6) The total deformation of the specimens at the max. load did not increase appreciably with temp. until the bond began to fuse. (7) The hot strength at a given temp. in the plastic zone was always higher for the fireclay-bonded sands than for those bonded with bentonite. I. Hartmann

Antipiping compounds and their influence on major segregation in steel ingots. E. Gregory. *J. Iron Steel Inst.* (London) Advance copy, May, 1940, 10 pp. Analysis of drillings and S prints from blooms are shown from ingots with (I) ordinary feeder head, (II) feeder head covered with antipiping compd. or asbestos, and (III) same as II and then after poured. The height of the center of segregation and the extent of segregation increased from I to III. S segregation is most pronounced. The extreme is 0.228% S from a ladle analysis of 0.030% S. The basic cause of major segregation may be the formation of a partially miscible liquid complex. The rate of demulsification depends on casting conditions, but complete sepn. of the 2 liquids cannot take place in practice. Delayed freezing favors coalescence and sepn. of the particles of the conjugate liquid solns. Differential freezing is a cause, but not the complete explanation of segregation in steel ingots. Only with delayed freezing in the head did the position of the major segregate approach the base of the primary pipe. F. G. N.

High-strength cast steels. Georges Delbart. *Trans. Am. Foundrymen's Assoc.* **47**, 179–94(1939).—See *C. A.* **34**, 1601⁶. J. E. D.

Metals in drilling. XI. Rotary drilling bits. W. L. Nelson. *Oil Gas J.* **38**, No. 36, 45, 52(1940); cf. *C. A.* **34**, 1954⁶.—The metallurgy of bits, reamers, cutters, etc. **XII. Hard facing materials.** *Ibid.* No. 39, 50.—The metallurgy of facing materials, inserts and rods. W. Andrew Wright

Elements of the petrographic study of bonding clays and of the clay substance of molding sands. Ralph E. Grim. *Trans. Am. Foundrymen's Assoc.* **47**, 895–908 (1940). E. H.

Metals as engineering materials. C. H. Desch. *Foundry Trade J.* **62**, 149–51(1940).—Three lectures dealing with (1) historical development of metals; (2) metals as engineering components; mech. properties; (3) structures of metals; transformation of austenite; alloy steels; development of powder metallurgy. I. Hartmann

Metallurgical researches with the electrostatic ultramicroscope. H. Mahl. *Z. tech. Physik* **21**, 17–18(1940).—Microphotographs are shown for *Fe oxide* and *ZnO smoke*, *rust* from electrolytic Fe and a rail, and *oxide films from Al and electrolytic Fe*. The film from the Fe shows about 10^8 pores per sq. mm., while that from the Al shows substantially no pores. J. B. Austin

Measuring metallic luster. Richard Springer. *Z. Elektrochem.* **46**, 3–13(1940).—Based on American research, especially on work of B. Egeberg and N. E. Promisel, S. defines the measurement of luster: to arrange a given series of specimens of different lusters in the same order as one would do visually and with approx. the same spacing between samples. It shall be used to standardize metal surfaces, to study metal-plating baths, as a specification for metal orders, to define the polishing of the parent metal in metal plating, to study surface changes due to corrosion in air and to study different pickling and polishing compds. A Pulfrich photometer (binocular) is used perpendicular to the surface to be measured while the light is hitting the surface at 45°. One eye is focused on the surface the other on a standard $MgCO_3$ plate. Standard filters define the readings, 0–2% being the highest degree of brightness. All measurements are taken for max. and min. and by 3 individuals. 74 surfaces were studied mostly Cu and brass, pure, with surface treatment, with nickel plating, Ni-Cr plating, Cr-, Ag-, Cd-, Zn- and Sn-plating. Different methods and degrees of polishing for parent metal and plating were compared. The classification checks surprisingly well with the visual judgement which is given. J. M. Noy

The melting point of metals. V. N. Svechnikov. *Metallurg* **14**, No. 3, 28–36(1939).—The m. p. of metals is related to the av. coeff. of thermal expansion by the equation $(V_f - V_0)/V_0 = 0.08$, where V_f is the vol. at the m. p. and V_0 is the vol. at 0°K. Coeff. of expansion curves for Cu, Al, Ag, Au and Pt exhibit a sharp break at 70–190°K. and correspond very closely to the at. heat capacity curves for the same elements. H. W. R.

Some notes on liquid shrinkage and contraction. E. Longden. *Foundry Trade J.* **62**, 81–2, *84(1940).—A lecture discussing soundness of castings and the factors influencing it, as the constitution of the metals, gases, etc.; densifiers and chills; contraction and distortion of alloys. I. Hartmann

Gating and pouring temperatures in nonferrous foundry practice. J. Laing. *Foundry Trade J.* **62**, 99–101(1940).—L. discusses the correct gating methods and pouring temps. in manuf. of castings of gun metals, P bronze, yellow brass, Al bronze, Al alloys and Ni Cu alloys. I. Hartmann

The balanced-blast cupola and fluidity. Wm. Y. Buchanan. *Foundry Trade J.* **62**, 113–14, 133–4, 141 (1940).—The balanced-blast cupola gives higher fluidity than the ordinary type. The Saeger and Krynitsky fluidity test (cf. *C. A.* **26**, 2149) is very useful in foundry work and in research when reasonable precautions are taken in its use; it can be of considerable service in maintaining good fluidity as a precaution against gas-hole defects in castings. Fluidity can be improved by ladle addns., in particular addn. of graphite. Si has an adverse effect on fluidity. The effect of S in the presence of normal Mn is not so serious as is generally supposed, and it might be usefully employed as addn. to cast iron when Cr is used. I. Hartmann

Elements promoting graphitization and those retarding graphitization according to their position in the periodic system of Mendeleev. Yu. A. Tomin. *Liteĭnoe Delo* **9**, No. 6, 29–32(1938); *Chem. Zentr.* **1938, II**, 3361.—The elements that retard graphitization are divided into 2 groups: the Fe group (Cr, Mn, V, Mo and W) and the C group (O, S, B, Sn and Sb). The Fe group forms a characteristic cross in the periodic table with Cr as the element in the middle having the greatest retarding action on graphitization. The C group is less characteristic and the regularity in the periodic system not so pronounced at first glance. The elements that promote graphitization can also be divided into a C group (P, Si, Al, Mg) and an Fe group (Ti, Ni and Cu). M. G. Moore

Absorption of graphite in hardening and tempering cast iron. J. E. Hurst. *Metallurgia* **21**, 91–4(1940).—Data are given to prove that cast Fe contg. no combined C can be hardened by quenching. Properties of some quenched and tempered irons are given. J. L. Gregg

Autogenous hardening of cast iron and malleable cast iron. Gottfried Kritzler and Franz Roll. *Z. Ver. deut. Ing.* **84**, 148–50(1940).—See *C. A.* **33**, 2085³. J. E. D.

Precipitation hardening of copper-silicon-beryllium and copper-manganese-beryllium alloys. M. I. Zakharova. *Metallurg* **14**, No. 2, 80–6(1939).—Cu alloys contg. Be 0.5 and Si 2.75–4.00% or Be 0.5–1.0 and Mn 2.76–10.4% after quenching from 800° can be aged at 300–350° to a Brinell hardness of 330. The hardening process is accelerated by cold working after quenching. H. W. R.

Precipitation hardening of supercooled austenite in high-speed steel. I. I. Bornatskiĭ. *Metallurg* **14**, No. 3, 56–64(1939).—Steel contg. C 0.75, W 17.4, Cr 4.2 and V 0.62% was heated to 900–1350° and cooled in air. Dilatometric measurements showed that the temp. of the austenite-martensite transformation was lowered if the steel was heated to higher temp. owing to the increased C content of the austenite. Similarly, specimens were heated to 1300°, cooled in air to 600–700°, held at that temp. for 10 min. to 7 hrs. to permit pptn. of carbides and cooled in air. The transformation temp. was higher in those specimens held at 600–700° for a long time as more carbides were pptd. H. W. Rathmann

Time quenching. John L. Burns and Victor Brown. *Trans. Am. Soc. Metals* **28**, 209–29(1940).—A qual. hardness study of effects produced when the cooling rates of fine-grained S. A. E. 1040 and 1060 steels were interrupted during quenching revealed concentric rings which differ structurally in a typical condition produced. The behaviors of the steels are explained on the basis of transformation shown by the "S" curve. W. A. Mudge

X-ray investigation of the tempering of carbon steel. K. I. Alekseeva and A. P. Komar. *J. Tech. Phys.* (U. S. S. R.) **9**, 1643–8(1939).—Steel (C 0.8%) was quenched from 750° to 15° and then tempered at rising temps. for 30–40 min. at each temp. The intensity of the X-ray lines produced by the faces (110) and (112) increased with the temp. of tempering to a limit reached at 500–600°. The increase is slow between 250° and 300° and near 320°, presumably because of a formation of carbides. J. J. Bikerman

Aging of elastically deformed metal. A. A. Zolotarev. *Metallurg* **14**, No. 4–5, 76–82(1939).—After normalizing at 830° Bessemer rail steel was stressed within the elastic limit over a period of 224 days and changes in impact strength, hardness and elec. cond. were detd. Aging occurred, decreasing the impact strength 25% and increasing the hardness and elec. cond. H. W. Rathmann

Deformation of steel during nitriding. G. F. Kosolapov. *Metallurg* **1938**, No. 11, 88–93; *Khim. Referat. Zhur.* **2**, No. 5, 80(1939).—Steel plates 10 × 3 × 200 mm. were nitrided (*a*) at 520° for 24 hrs. or (*b*) at 500° for 10 hrs., at 600° for 10 hrs. and at 500° for 4 hrs. The increase of the vol. of the nitrided layer was found to be the main cause of deformation. With increase of the temp. of nitriding the elasticity decreased and the plastic deformation increased. Addn. of 1% of Cr increased the hardness after nitriding to 500–600° Brinell, Al acts similarly and addn. of 1% Cr + 1% Al increases the hardness to 1000–2000°. The deformation is greater in steels which show the greatest increase of hardness; C steels with Cr

addns. were much less deformed than were Cr and Al steels. The deformation and the hardness after nitriding are detd. mainly by the nature of the solid soln. of N and steel, i. e., the α phase. W. R. Henn

Gaseous nitrocementation. V. I. Prosvirin. *Metallurg* 1938, No. 11, 84–7; *Khim. Referat. Zhur.* 2, No. 5, 79 (1939).—N accelerates the diffusion of C into iron. Steel or Fe is heated to 800–25° in an elec. furnace and treated alternately with NH_3 (for 1 min.) and CH_4 (for slightly more than 1 min.). The samples are then cooled in water. The microstructures produced resemble the structures of steels obtained by cyaniding. In the nitrocementation process satn. of the solid solns. with C and N must be avoided, because from the moment of satn. the N begins to sep. from the solid soln. in the form of Fe nitrides; this causes brittleness of the nitrocemented layer. N and C in the nitrocemented layer are contained in the solid soln. of the α and γ phases. W. R. H.

Furnaces used in the working of aluminum and its alloys. I. Physical and chemical characteristics of aluminum and its alloys in the hot and problems relative to the construction and use of the furnaces employed. II. Furnaces for fusion. III. Furnaces for reheating, annealing and thermal treatment. A. de Biran. *Rev. aluminium* 15, 1000–1010, 1196–1214(1938); 16, 1546–67 (1939).—A review. C. L. B.

Rapid annealing of steel strip to obtain granular pearlite. N. T. Gudtsov, N. F. Vyaznikov and M. I. Peisikhis. *Metallurg* 14, No. 4–5, 63–75(1939).—Steel contg. C 1.04, Mn 0.25, Si 0.37, S 0.017 and P 0.010% was hot-rolled to 2 × 55 mm. and then cold-rolled to 1.5 × 55 mm. Specimens were then annealed by various methods to a granular pearlitic structure to det. the most rapid method of annealing for subsequent cold rolling. The best procedure was to heat at 780° for 5 min., transfer to Pb bath at 500° for 20 sec. and spheroidize at 700° for 60 min. This gave a tensile strength of 65 kg. per sq. mm. and an elongation of 20%. Steel contg. C 0.67, Mn 0.65, Si 1.45, S 0.016, P 0.007 and Cr 0.37% was best annealed by heating at 870° for 15 min., transferring to a Pb bath at 500° for 2 min. and spheroidizing at 710° for 60 min. This gave a tensile strength of 77 kg. per sq. mm. and an elongation of 17%. H. W. Rathmann

The structural changes in copper effected by cold rolling and annealing. Maurice Cook and T. Ll. Richards. *J. Inst. Metals* 66, No. 859, 1–15(1940).—Pieces of Cu (99.95%) were given 10–97% cold reduction and examd. by x-ray (transmission and glancing) and microscopic methods. Each individual crystal distorted on its own slip planes up to 50% reduction. Material reduced over 50% showed two sets of crystals having preferred orientations. On annealing, no preferred orientation was observed in material given less than 50% reduction. On reductions greater than 50% some of the material recrystd. into two sets of crystals with orientations corresponding to the two textures, while the rest recrystd. into a single preferred orientation. The greater the amt. of reduction, the greater the part of the recrystn. that is of the single preferred orientation type. James W. Poynter

Hot-working of crude iron under pressure. V. Tikhovskiĭ and I. Karlinskaya. *Stal* 7, No. 10, 28–32(1937); *Chem. Zentr.* 1938, II, 3448.—Gray iron contg. C 3.71, graphite 3.27, Si 2.1, Mn 1.3, P 0.145 and S 0.064% could not be pressed but could only be stamped by the use of light hammer blows. Probably gray iron having a lower C content can be more easily hot-worked. In order to prevent the formation of cracks the temp. should be in the neighborhood of the m. p. (1050–60°). Certain changes in structure were observed after hot-working. From this it can be assumed that the mech. properties are also changed. M. G. Moore

Solution potential of cemented iron in acidulated water. Stéfan Procopiu. *Compt. rend.* 210, 219–21(1940).—The soln. potential, V, was detd. by means of 2 cells: Hg|Hg_2Cl_2|KCl.aq, satd.|acid, aq.|Fe(cem.) (giving E volts) and Fe(cem.)|acid aq.|Fe (pure) (giving e volts). Changes with time of cementation, t, and of soln., T, until V becomes that of pure Fe, indicate that a surface-oxidized layer is first removed and then the cemented layer, the thickness (δ) of which, as shown by the loss in wt. of the electrode in time T, is represented by Kt, K depending on the temp. of cementation, C, and increasing therewith, as well as on the time during which it continues; thus for t = 10 min., and C = 900°, δ = 125 μ and for C = 950°, δ = 139 μ, corresponding figures for t = 20 are 164 and 259 μ. The thickness of the oxidized layer is similarly detd. as of the order of 1 μ.

C. A. Silberrad

Antifriction and abrasion-resisting qualities of cast iron. IV. Masahiro Tasaki. *Imono* 12, 25–40(1940); cf. *C. A.* 34, 1287⁶.—The coeff. of friction and the amount of abrasion are parallel to some extent. Abrasion-resistance is best between 2 samples of the same pearlitic cast iron. Cast iron contg. C 3.0, Si 1.3, Mn 0.7, Cr 0.8, P 0.2, S 0.1%, of Brinell hardness 240–60 is recommended.

M. Ishida

The rate of solution of graphite in liquid cast iron. I. N. Bogachev and L. D. Lobacheva. *Metallurg* 13, No. 7–8, 55–8(1938); *Chimie & industrie* 42, 279.—Soln. of the graphite is very rapid at first; then, when there remains in the Fe but a small amt. of graphite (which is a function of the chem. compn. of the Fe and of its original graphite content), the rate of soln. slows down. It can be supposed that Fe_3C is present in the liquid phase; the endothermic reaction of the formation of cementite being reversible, its dissocn. takes place simultaneously; under definite conditions a mobile equil. is reached.

A. Papineau-Couture

The accelerating effect of certain metallic elements on graphitization. H. A. Schwartz, Vincent Fiordalis, John L. Fisher, James F. Shumar and M. J. Trinter. *Trans Am. Soc. Metals* 28, 143–52(1940); cf. *C. A.* 31, 5731⁸.—The graphitization-accelerating effects of Cu and Ni on white cast Fe were detd. to study the mechanism by which metallic alloys alter graphitizing rates. Wt. for wt. the effectiveness of Cu and Ni at 900°F. is closely alike. One % of either metal approx. doubles the rate of an Fe already contg. approx. 0.90% Si; neither element, in amts. up to 1%, greatly affects the soly. of graphite in γ-Fe, Cu has little effect on nodule no. at 1650°F.; Ni has little effect on the nodule no. but increases the no. of very small nodules, and either element increases the migratory rate of C in γ-Fe. The data at 1290°F. are less conclusive. Both elements produce approx. similar acceleration but Cu seems to be effective mainly by decreasing nodule no.

W. A. Mudge

Examination of a wrought-iron cannon of the fifteenth century. A. Pomp and F. Spies. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* 22, 1–8(1940).—This museum piece (from Vienna) is built up of longitudinal bars kept together by transverse rings not welded together; between the bars and rings an intermediate layer was found of nonmetallic nature, mostly oxide. The chem. compn. of the outer rings was 0.026% C, 0.06 Si, 0.0 Mn, 0.043 P, 0.008 S, 0.01 Cu; that of the bars 0.01–0.06% C, traces to 0.05 Si, 0.0 Mn, 0.049–0.092 P, 0.006–0.010 S, 0.04 Cu; and that of the intermediate layer 69–7% Fe_2O_3, 2.15 FeO, $Fe_{met.}$ 0.78, 0.72 SiO_2, 0.0 Al_2O_3, 0.048 P, 2.0 S, 0.49 CaO, trace MgO, 0.0 MnO, loss by annealing 14.6%. It seems that the intermediary layer was a cement to fill the interstices between ring and bars, this would account for the high S of the entirely corroded layer. Macro- and microscopic etchings showing the irregular structure are added. M. Hartenheim

Presence of oxygen in cast iron. N. P. Kalashnikov. *Metallurg* 13, No. 2, 104–7(1938); *Chimie & industrie* 40, 896.—O can be present in cast iron in the form of FeO, SiO_2, Mn oxides and their compds., CO and CO_2. To det the total quantity, only the hot extn. method must be used. For gray iron the content varies from 0.002 to 0.015%; for malleable iron, from 0.002 to 0.02%.

A. Papineau-Couture

Chromium-silicon cast iron. A. L. Norbury and E. Morgan. *Foundry Trade J.* 62, 137–41(1940).—A survey of the microstructures, tendency to chill, and air- and oil-hardening capacities of cast irons having Cr con-

tents between 0 and 15% and Si contents between 1 and 11%. The following conclusions are drawn: (1) One % of 69% ferrochromium added to crucible melts increased the Cr content of the resulting cast an av. of 0.6% Cr. (2) Increasing the Cr content stabilized the pearlite and secondary cementite and caused white iron eutectic to replace graphite, but did not cause self-hardening or the replacement of pearlite by martensite. (3) In cast irons of normal total C content, the chill-producing action of 1% Cr neutralized the chill-reducing action of about 1% Si. (4) Cr increased the Brinell hardness and reduced the machineability. In most compns. it increased the mech. strength and reduced the deflection. (5) As the Cr content increased, the white iron eutectic assumed the form of carbide crystals in a ferrite matrix, instead of austenite globules in a carbide matrix. (6) Cr raises the f. p. of the white iron eutectic. I. Hartmann

The α,γ-transformation of iron at high pressures, and the problem of the earth's magnetism. Francis Birch. *Am. J. Sci.* **238**, 192–211(1940).—The change with pressure of the temp. of the α,γ-transformation in very pure Fe was detd. by a dilatometric method to more than 4000 kg./sq. cm. in N and A. The mean value for several different irons for the rate of change above 1000 kg./sq. cm. is $-8.5°/1000$ kg./sq. cm.; at lower pressures, some curvature is found with A as the pressure medium, probably due to small N content of A. The latent heat found from this rate and the change of vol. is about 4 cal./g. α-Fe can be of only limited importance in the earth's magnetism, since its existence is restricted to a thin shell near the surface. Alden H. Emery

Isothermal transformation of austenite in die steels. M. P. Braun and L. D. Khabinskaya. *Metallurg* **14**, No. 3, 71–80(1939).—Steel contg. C 0.60, Si 0.48, Mn 1.60, Cr 0.81, Ni 0.53 and Mo 0.26% was quenched from 800° in a salt bath at 550°, held for 25 min., quenched in oil and drawn for 1 hr. at 550°. With this treatment it was a satisfactory substitute in dies for steel contg. C 0.46, Si 0.33, Mn 0.64, Cr 0.77, Ni 1.59 and Mo. 0.20%. H. W. Rathmann

Steels of special quality for use in the gas industry. P. Thomas. *J. usines gaz* **56**, 430–42(1939).—A review on special steels. They are subdivided into the α and γ types and their structures are discussed. The mechanism of mech. and of chem. destruction is reviewed as well as the effect of high temps. Typical compns. and their useful ranges are given. B. J. C. van der Hoeven

Twenty years of alloy steel. I. James H. Critchett. *Chem. Industries* **46**, 285–90(1940). E. H.

Solubility of nitrogen in steel. Lennart Eklund. *Jernkontorets Ann.* **123**, 545–55(1939).—The soly. of O-free N_2 in molten steel was detd. by passing it into the melt through a Pythagoras tube. The compn. of the steel was: 0.03–0.04% C, 0.07% Mn, 0.01% P, 0.014% S, with traces of Si. The crucible was alumina, and heated in a high-frequency furnace. Samples were taken by dipping steel tubes (0.15% C) into the melt and chilling, or by ladling. A stream of N_2 was maintained through the furnace during sampling to avoid contamination with air. Borings or turnings from the chilled sample were taken for analysis for C and N. Nitrides were detd. by dissolving in dil. HCl followed by distn. of NH_3 with NaOH. Insol. nitrides were filtered off and dissolved in concd. H_2SO_4 and Na pyrosulfate. The N content was 0.042% at 1550°; 0.043% at 1650°; and 0.044% at 1700°. At 1550° the effect of C on the soly. was studied. Up to 0.05% C, the N content was 0.042%, dropping to 0.034% with 1% C, 0.022% with 2% C and 0.011% with 4% C. Al has relatively slight influence on the N content, the increase being 0.002% for an increase of Al from 1% to 3%. The rate of satn. was found to be 100 min. at 1400°, 60 min. at 1550°, 50 min. at 1650° and 25 min. at 1700°. Temps. were measured by a Holborn-Kurlbaum pyrometer through a total reflecting prism. H. C. D.

X-ray diffraction study of grain boundary inclusions in steel. Raymond Morgan, Sylvia Steckler and E. B. Schwartz. *J. Franklin Inst.* **229**, 191–9(1940).—Samples were cold-worked, annealed, the surface was removed by filing, and the then-cleaned samples were dissolved in NH_4 persulfate. No α FeOOH (goethite) was found in the grain boundaries of either transformer steel or low-C steel. The x-rays showed that the impurities segregated at the grain boundaries occur principly in cryst. form and only to a small extent as amorphous material. 9 references. J. N. Lynn

The fatigue resistance of steels as affected by acid pickling. G. L. Kehl and C. M. Offenhauer. *Trans. Am. Soc. Metals* **28**, 238–54(1940).—A 0.54% plain C steel was used. Pickling under standard conditions (12 min. in 10% H_2SO_4 at 149°F.) reduced fatigue resistance 2%; increase of pickling time further decreased fatigue resistance most pronouncedly from times of 5 to 22 min., and to a const. level after 105 min. Di-*o*-tolythiourea and Acitrol-100 inhibitors minimized the formation of deleterious surface notches and prevented decrease in fatigue properties. After 22 min. the results were practically the same as those from an uninhibited bath. The fatigue life of the material is independent of the acid concns. investigated (5 to 20%), other conditions of time and temp. remaining const. Increase in temp. of the pickling bath between 131° and 167°F. resulted in a pronounced decrease in fatigue properties. Photomicrographs of av. surface conditions are included. W. A. Mudge

Some problems on quenched steels. I. Cracks of quenched steels. Kaizo Monma. *Science Repts. Tohoku Imp. Univ., First Ser.*, **28**, 128–34(1939).—Quenching cracks are due to shrinkage of a thin layer of martensite on the surface of the sample, obeying the reaction $\alpha \rightarrow \beta$ (martensite) accompanied by a vol. change. Tempering at 150° allows the entire specimen to transform to β martensite; this prevents cracking. **II. Temper cracks of quenched high-speed steel.** *Ibid.* 134–42.—After quenching high-speed steel from 1300° no cracks were observed. However, tempering between 500° and 650° only caused temper cracks. In this case, the temper cracks were due to tensional stresses in a decarburized zone by martensitization of the retained austenite of the inner portion. Freedom from decarburization prevents this type of crack. J. N. Lynn

Carbide heterogeneity of ball-bearing steel and means of eliminating it. V. P. Remin. *Metallurg* **14**, No. 4–5, 57–63(1939).—Carbide segregation in ingots of 52100 steel is caused by a heterogeneous melt and can be avoided by adding the ferro-Cr in the early part of the heat. Even rapidly cooled samples from heterogeneous melts had carbide segregation. Before rolling, steel should be soaked at 850–1100° to permit diffusion of carbides and avoid carbide stringers in the rolled product. H. W. Rathmann

Heat capacity of carbon steel. Ya. A. Turovskiĭ. *J. Tech. Phys.* (U. S. S. R.) **9**, 1613–25(1939).—From Gruneisen's equation (*C. A.* **7**, 722) of state an expression is deduced giving c_p as a function of density, thermal expansion, Young modulus, and shearing modulus. The c_p of a carbon steel (C 0.5%) calcd. from this expression rises from 0.14 at 500° to 0.43 at 720° and falls to 0.18 at 800°. For the calcn. unpublished values of Young modulus and modulus of shear between 600° and 1000° were used, e. g., at 900° 970,000 kg./sq. cm. for the first and 370,000 kg./sq. cm. for the second one. J. J. B.

Hardness characteristics of some medium-carbon S. A. E. steels. P. Klain and C. H. Lorig. *Trans. Am. Soc. Metals* **28**, 83–121(1940).—The hardening characteristics of 16 S. A. E. plain C and alloyed medium-C steels, as revealed by a definite testing procedure, were examd. on quenched and on quenched and tempered specimens ½ in., 1 in., 2 in. and 3 in. in diam. by 7 in. in length. Transverse hardnesses were detd. from duplicate specimens after suitable machining. The results are summarized in many tables and curves, the latter plotted to show changes in hardness for different tempering temps. at the surface, at half radius and at the center of the specimens of different diams., and to show the change in hardness across the section for each tempering temp. W. A. M.

The effect of hardness and of temperature on the strength, ductility and toughness of a heat-treated carbon steel. S. W. Lyon. *Trans. Am. Soc. Metals* **28**, 128–40

(1940).—Tension, impact-tension and impact-bending tests were made on unnotched specimens of a 0.73% C steel, heat-treated to produce a range of hardness of Rockwell C-22 to C-65, at temps. from plus 70° to minus 70°F. The steel lost strength quite markedly in the range of Rockwell C-47 to C-52. The toughness was not greatly affected. A useful curve is given to det. the energy correlation between full-size and fractional-width unnotched impact specimens. W. A. Mudge 1

The effect of speed of loading upon the ductility of structural steel. Gordon L. Jeppesen. *Bull. Assoc. State Eng. Soc.* **14**, 96–100, 102–4(Apr., 1939).—Tests were made of plates and of joints. Conclusions: (1) A brittle-appearing fracture in a member is not proof that the member has had no appreciable elongation before failure. (2) The ductility of structural steels tends to increase rather than decrease with an increase in speed of loading. (3) To the naked eye, the fracture under static and the high-speed loadings used in these tests is the same in appearance. (4) A wide thin plate is as strong as a narrow thick plate. (5) For specimens tested, a welded member is more effective in resisting energy loads than is a plate with a hole in it, of the same net area. W. H. Boynton 2 3

Hardenability variations in the alloy steels. Some investigations with the end-quench test. Gordon T. Williams. *Trans. Am. Soc. Metals* **28**, 157–81(1940).—S. A. E. Steels 1035, X-1020, 3140, 3150, 4150 and 4340, and 2 special alloy steels contg. C 0.63, Mn 0.66, Cr 0.58 and Ni 1.15%, and C 0.55, Mn 1.19 and Cr 0.57, resp., were studied. The Jominy-Boegehold end-quenched hardenability test is not crit. with respect to length or diam. of specimen, nor as to quenching-water temp., and gives excellent reproducibility of results. Steels closely similar in chem. analysis for principal elements may require widely different times at heat to develop max. hardenability below grain-growth temp. Homogeneous austenite before quenching is required for max. hardenability; degree of banding is a possible indication of the ease or difficulty with which this will be attained. Deoxidation with Al, V and Ti gives fine grain size coupled with intense hardenability. Curves give exptl. results. W. A. Mudge 4 5

An analysis of machinability data from cold-finished and heat-treated S. A. E. 1045 Steel. O. W. Boston and W. W. Gilbert. *Trans. Am. Soc. Metals* **28**, 186–205 (1940).—The results of a series of tests to det. the relation between mech. properties and microstructure to machinability for several logs of a 3-in.-diam S. A. E. 1045 steel show (1) if the cutting speed for a given tool life of the oil-quenched log = 100, then quenched and drawn at 600° = 111, quenched and drawn at 1000° = 124, cold-finished = 168 and annealed = 180; and (2) values of tool life in min., for a cutting speed of 130 ft. per min., are 0.3, 0.8, 20, 37 and 64, resp. Typical photomicrographs are given. W. A. Mudge 6

Choice of the quality of the steel and the heat treatment of heavy-duty springs. T. V. Sergievskaya. *Kachestvennaya Stal* **6**, No. 2, 29–33(1938); *Chem. Zentr.* **1938, II**, 3451.—Investigations are reported on 3 spring steels: (1) a Cr-Si steel contg. C 0.6, Cr 1.54 and Si 1.15%; (2) also a Cr-Si steel contg. C 0.47, Cr 1.66 and Si 1.15%; and (3) a Ni-Si steel contg. C 0.6, Si 1.37 and Ni 1.4%. The most satisfactory treatment for the first was hardening in oil at 830° and annealing in Pb at 400–420° with subsequent cooling in air. For the 2nd steel hardening at 925° and Pb annealing at 400–430° are recommended and for the 3rd steel hardening at 870° followed by annealing at 380–420°. After tempering, this last steel possesses a tensile strength of 130 kg./sq. mm. with a reduction of area of 40%. M. G. Moore 7 8 9

Transformation of residual austenite in alloy steels at temperatures below 0°. A. P. Gulyaev. *Metallurg* **14**, No. 3, 64–71(1939); cf. *C. A.* **33**, 7254⁸.—Specimens of steel contg. (1) C 0.74, W 18.2, Cr 4.01 and V 0.58%; (2) C 1.85 and Cr 10.38%; and (3) C 0.44, Cr 11.0 and Si 3.85% were quenched in oil from 900–1300° and immediately further cooled to −183°. Magnetic measurements showed that the austenite-martensite transformation occurred between definite temp. limits and that these limits were below 0° if the steel was quenched from 1200° or 1300°. If the steel was quenched from a lower temp. the transformation took place above 0°. The amt. of residual austenite was greater if the steel was quenched from a high temp. If the specimen was held at room temp. after quenching the austenite became stabilized and did not transform so readily nor completely on subsequent cooling below 0°. H. W. Rathmann 10

Effect of manganese concentration on the rate of combustion of carbon and on the quality of steel. L. Katsen and Ofenhaenden. *Metallurg* **13**, No. 9, 37–40(1938); *Chimie & industrie* **42**, 276.—Addn. of ferro-Mn during the fusion of steel is undesirable because it considerably reduces the rate of combustion of C and thereby affects the quality of the steel. The optimum Mn content of the steel is not always the same: if the Mn comes from reduction of the slag, the optimum is 0.35–0.45%; if it comes from the addn. of ferro-Mn it should not exceed 0.32%. A. Papineau-Couture 11

Steel with 1.5% chromium for permanent magnets. V. A. Erakhtin. *Kachestvennaya Stal* **6**, No. 2, 26–8 (1938); *Chem. Zentr.* **1938, II**, 3451.—Studies are reported on 2 steels contg. about 1% C and 1.5% Cr in order to det. the most satisfactory heat-treatment to give high permanent magnetic properties. The following twofold treatment is recommended: (a) hardening at 1050–1100° with a retention period of 5 min. and cooling in air and (b) hardening to martensite at 830–50° with a 10-min. retention period and cooling in oil. In special cases hardening to martensite can be done from temps. of 780–800° in warm or cold water (with the addn. of salt). Such a treatment assures a coercive force of ≥58 oersted and a remanence of ≥9000 gausses. M. G. Moore 12

Changes of the carbide phase in stainless steel with a high content of carbon, chromium and molybdenum during its thermal treatment. I. G. Oreliovich. *Metallurg* **1938**, No. 12, 61–7; *Khim. Referat. Zhur.* **2**, No. 5, 78 (1939).—The phase changes on hardening and annealing of stainless steels contg. C 0.67, Cr 16.2, Mo 2.06, Si 0.37, Mn 0.27, S 0.006, and P 0.004% were investigated. The basic crit. points and the temps. of hardening and annealing were investigated by dilatometric analysis, by study of the microstructures and by analysis of the carbides. The optimum temp. for hardening in oil was found to be 1050–75°; that for annealing, 750–800°. W. R. Henn 13

The effect of heat-treatment on the stress-strain diagram of chrome-nickel steel. Keiiti Ota. *J. Iron Steel Inst., Japan* **23**, 1198–1207(1937); *Chem. Zentr.* **1938, II**, 3450.—Studies are reported on the effect of various types of heat-treatment of Cr-Ni steel contg. C 0.3, Ni 3.3 and Cr 0.8% on the stress-strain diagrams, especially the yield point and the yield ratio (ratio of tensile strength to yield point). When annealing is done after quenching at a temp. of 40° above Ac_1, the carbides begin to agglomerate in crystallographic planes. For this reason the diagram changes, the yield point becomes lower and the yield ratio suddenly increases. When the annealing temp. is held in the neighborhood of Ac_1 the agglomerated carbides form a beautiful striated structure, which is designated as laminar sorbite. The yield point gradually falls while the yield ratio rises considerably. By reducing the velocity of cooling during the quenching process the yield point is likewise lowered while the yield ratio increases. Changing the velocity of cooling during annealing is without effect. By the use of a double quenching (the 2nd quenching following the 1st and preceding annealing) it is possible to obtain 2 completely different sets of properties in the steel depending on the temp. of the 2nd quenching. When the 2nd quenching is from 680–730° a laminar sorbite structure is obtained with a low yield point and a comparatively high yield ratio. When this temp. is 740–70° granular pearlite forms and the yield point is relatively high while the yield ratio is unusually low. M. G. Moore 14

Impact properties of some low-alloy nickel steels at

temperatures down to −200°F. T. N. Armstrong and A. P. Gagnebin. *Trans. Am. Soc. Metals* **28**, 1–19 (1940).—Keyhole-notch and vee-notch impact tests with exptl. cast steels contg. C 0.03–0.18, Ni 0–4.95 and Mo 0–0.45%, and with exptl. wrought steels contg. C 0.09–0.17, Ni 0–3.61 and Mo 0–0.31%, together with tests on specimens of com. steels, were made at temps. down to −200°F. Good impact values were obtained with (1) properly deoxidized, normalized and drawn cast steels contg. C max. 0.15 and Ni 3.50–4.00%, and with the same C, Ni 2.75 and Mo approx. 0.30%; (2) normalized and drawn wrought steels contg. C max. 0.17 and Ni min. 2.75%; (3) normalized and drawn wrought steels contg. low C and substantial quantities of Ni and Mo, that have been deoxidized with Al; (4) any of these wrought steels after liquid quenching and drawing; and, (5) higher-C, fine-grained Ni, Ni-Mo and other Ni alloy steels that have been quenched and drawn. Providing the soundness of welds can be assured by non-destructive methods, welds made with heavily coated, low-C, 2.50% Ni, 0.20% Mo steel electrodes will meet most impact-resistance requirements down to −150°F. and possess a better combination of tensile and low-temp. impact properties than many other steels. W. A. Mudge

Effect of carbon and molybdenum on the isothermal transformation of austenite. F. V. Vdovin and E. P Akimova. *Teoriya i Praktika Metallurgii* **1938**, No. 10, 53–9; *Khim. Referat. Zhur.* **2**, No. 5, 78–9(1939).—For detn. of the transformation of austenite the magnetometric method gave the same results as did the study of the microstructures of tempered alloys. In steels contg. 0.5–1.1% of C and 1.0–8% Mo the temp. region of the max. stability of austenite is lower than that of plain C steels. Increase of the content of Mo from 1.0 to 8.0% increases the stability of austenite only at temps. of tempering so high that all its components pass into the solid soln. Increase of the C content from 0.5 to 1.1% with a given content of Mo increases the stability of austenite in the same manner as in Mo-free steels. W. R. H.

New ways for the production of hard metals. R. Mitsche. *Berg- u. hüttenmann. Monatsh. montan. Hochschule Leoben* **87**, 185–6(1939).—The com. sintered hard metals have either Ti or W carbide as bases. The Ti-contg. carbides are especially suitable for steel, while those on a pure W basis are particularly well suited for working cast metals or others giving short chips. The heat cond. of sintered W carbide is improved by addn. of about 6% Co as binder, to 0.185 cal./sec./°C./cm., which is about 3 times as high as for the ordinary high-speed steels (0.061). A new process for producing Ta carbides consists in dissolving Ta and C in molten Al and heating the melt in a graphite crucible to about 2000°; after cooling, the solidified melt is treated with acids so that Al and the Al carbide also formed are dissolved and Ta carbide remains as golden-colored crystals. This Ta carbide differs considerably in its phys. properties (d. 14.85 and C content 6.22%, which corresponds exactly to TaC) from that obtained by carburization of Ta (d. 14.05 and C 5.75%). Tools made of this material with binders of W and Ni had a higher mech. strength and resistance to abrasion, heat cond. being about the same as that of the high-speed steels. $WTiC_2$ is made in a similar manner but in a Ni bath in which W, Ti and graphite are dissolved in a graphite crucible and heated to more than 2000°; the $WTiC_2$ formed is sepd. from the solidified melt by dissolving in aqua regia. Tools and cutters are made by grinding the crystals so formed with Co and W as binders, compressing the powders in hydraulic presses and sintering in a vacuum furnace. This so-called "Kenna" metal is made in 3 grades of 75.7–78 Rockwell hardness by changing the Co content; heat cond. for the hardest grade is 0.07, for the softest 0.12 cal/sec./°C./cm. M. Hartenheim

A survey of the more recently developed cutting materials. H. W. Pinder. *Heat Treating Forging* **25**, 387–90(1939); **26**, 73, 76–7(1940).—The properties, prepn., treatment, and application of cutting tools are considered under the following headings: high-speed steels, cast and cemented cutting alloys, and dispersion-hardening alloys. I. Hartmann

Influence of interfacial tension on the size of the solidification grain of metallic alloys. Paul Bastien. *Compt. rend.* **210**, 248–50(1940).—The grain size on solidification of pure Al (99.998%) is sharply reduced by small addns. of Mg, Fe or Si. This reduction is not explicable by any peritectic reaction (Nishimura, *et al.*, *C. A.* **31**, 1337[1]) or change in velocity of crystn. (Czochralski, *et al.*, *C. A.* **32**, 5743[2]). But the surface tension of such alloys, detd. in a bath of molten cryolite by the drop method (*C. A.* **30**, 3759[3]) shows that change in grain size is accompanied by decrease in surface tension; thus the values for the pure Al and the Al with addn. of Mg 2.07, Mg 6.98, Fe 0.1, Fe 0.5, Si 0.1 and Si 0.5%, are, resp. 168, 40, 36, 77, 70.5, 83 and 77 dynes/cm. C. A. Silberrad

The influence of continuous heating on the mechanical-technological properties of purest aluminum as dependent on cold-deformation. H. Wolf and H. Tuxhorn. *Aluminium* **22**, 14–20(1940).—When purest Al is used in industrial applications it is important that it is not subjected to continuous heating or that this is considered in the design, e. g., Al bus bars or cables exposed to sunshine, in chem. app., etc. Very extensive tests are described in which a material contg. Al 99.9968, Si 0.0020, Fe 0.0006 and Cu 0.0006% was heated at 20, 50, 70 and 100° in an oil bath and at 200, 300, 400 and 500° in air furnaces and in salt baths for 1, 10, 100 and 1000 hrs. and elastic limit, tensile strength, elongation, Brinnell hardness and Erichsen deepening were detd.; all the results in hard, semihard and soft state are given in tables and curves. For practical purposes it can be stated that when heated for a long time, purest Al loses its strength, independent of the degree of cold-deformation, at as low a temp. as 50° The deterioration in strength at 200° is so great that the soft annealed state is practically reached even in short-time heating. Up to 100°, the differences in mech. strength due to various degrees of cold-deformation remain unchanged. The greatest softness can be obtained by annealing the hard-rolled material at 200°. Continuous heating above 400° should be avoided as coarse-grain formation takes place in this range. In many practical applications it will, therefore, be correct to base the strength only on the figures of the soft-annealed state. M. Hartenheim

The behavior of the various structural constituents precipitated in pure aluminum in chipless deformation. H. Röhrig and J. Roch. *Aluminium* **22**, 21–4(1940).—If a plastic material is deformed, enclosed brittle foreign particles are gradually crushed; the splinters arrange themselves in lines and can have an extremely serious effect on the mech. properties of the material. The com. pure Al (99.5%) usually has enclosures of brittle Al_4FeSi_2 crystals; their behavior was followed step by step metallographically during the transformation from soft-annealed sheets of the Al to (preserving) cans. The hard crystals were clearly comminuted but the plastic base material fills the formed interstices completely. The eutectic Al-Al_4FeSi_2 pptd. in spherical form in the Al is practically not at all deformed or even crushed. In the production of cold-extruded cans, which must have a high corrosion resistance, it is more advantageous to use a material with less than 0.5% inclusion. M. Hartenheim

The recrystallization of aluminum. Ernst Kratz. *Aluminium-Arch.* **6**, 7–25(1937); *Chem. Zentr.* **1938**, II, 3452.—By means of measurements of hardness, x-ray investigations and microscopic studies, the influence of small amts. of the metals Mg, Si, Mn and Cu on the recrystn. temp. of very pure Al (99.9967% Al of the Compagnie de Produits Chimiques d'Alais, Froges et Camargues) was detd. The addn. of these metals up to the limits of soly. raised the recrystn. temp. A relation between the amt. of dissolved metal and the recrystn. temp. could be detected only with Mg. Pure Al with 90% deformation begins to recrystallize after heating 2 hrs. at 100°. At 150° the recrystn. is ended after 24 hrs.; at 220° after only 2 hrs. Al contg. 0.5% Mg (also 90% deformation) first begins to recrystallize at 200° and at

320° recrystn. is complete after 2 hrs. With increasing Mg content the temp. at which recrystn. begins rises; at 2% Mg, it is 240°. The addn. of up to 0.1% Si increases the temp. at which recrystn. begins to 210°. With the addn. of about the same amt. of Mn the recrystn. begins after heating 2 hrs. at 230° and at 350° is complete after 2 hrs. At a Cu content of 0.05–0.4% recrystn. begins after heating 2 hrs. at 180° and is complete after 7 hrs. at 300°. M. G. Moore

The solubility of iron in aluminum. Albert Roth. *Z. Metallkunde* **31**, 299–301(1940).—Elec.-cond. and tensile-strength measurements were carried out on alloys contg. 0.0019–0.310% Fe. The soly. of Fe in Al was detd. to be about 0.01% at 320° and 0.02% at 600°. The cond. of hard-drawn wires of Al contg. a small amt. of Fe and only traces of Si reaches a well-defined max. at 325° on annealing. This is ascribed to pptn. of Fe from the solid soln., the beginning of which is also marked by an increase in the tensile strength. E. A. Peretti

The production of aluminum cable covering. Walter Deisinger. *Z. Metallkunde* **31**, 305–10(1940).—Expts. performed in the Cable Works of the Siemen-Schuckert firm are described, and pictures of the app. used and products made are presented. The process used is similar to that used to cover cables with Pb. Working temps. for 99.5% Al metal have to be 4 times higher than those for Pb. Al having a purity of 99.99% can be handled satisfactorily at temps. 2.5 to 3 times higher than for Pb. The relationship of temp. and pressure was detd. for both Pb and Al. E. A. Peretti

Shrinkage of aluminum alloys at solidification. O. N. Podvoiskaya. *J. Tech. Phys.* (U. S. S. R.) **9**, 1626–42 (1939).—The vol. change Δv due to solidification of Al-Si alloys cannot be correctly detd. by measuring the apparent weight of a sample immersed in salt melt at temps. above and below the f. p. since the solidified metal contains bubbles and pores. Consequently the sp. gr. of liquid alloys near the f. p., the sp. gr. at 20° and the thermal expansion between 20° and a temp. approx. 50° below the f. p. were measured; for the measurement of expansion an optical dilatometer was used. From these values Δv was calcd.; it was 6.5% for Al, 6.7% for Al + Si, 1.8 and Fe 0.2%, 4.1% for Al + Si 10.6 and Fe 0.3, and 2.1% for Al + Si 16.8 and Fe 0.3%. Al has d_{20} 2.707, and Al + Si 15.1 and Fe 0.4% has d_{20} 2.633. The coeff. of expansion of Al between 20 and 600° is 29×10^{-6}. The porosity of Al ingots increases with its Si content. 34 references. J. J. Bikerman

Aluminum-magnesium alloys. Ernst Herrmann. *Aluminium-Arch.* **7**, 7–24(1937); *Chem. Zentr.* **1938, II**, 3453; cf. *C. A.* **32**, 1637[1], 4130[1], 6999[5]. —A review is given of the historical development of Al-Mg alloys contg. more than 5% Mg. The effects of various admixts. as well as of different heat-treatments are discussed with references to the literature. A list is given of German, Swiss, French, American, English and Italian patents with their dates of application and publication, priority, and brief reports of their contents. M. G. Moore

Aluminium-silicon alloys. A survey of their properties and applications. George Sachs. *Metal Ind.* (London) **56**, 203–6(1940). G. G.

Development of texture in sheets of brass, aluminum and Dural at rolling. A. E. Bryukhanov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1754–62(1939); cf. *C. A.* **33**, 5175. The Young modulus E of a rolled sheet of brass (Zn 38%) has a max. normal to the direction of rolling and a min. in this direction or under an angle of 18–36° to it. Al and Dural usually have $E_{max.}$ normal to the direction of rolling and $E_{min.}$ at 36–54° to it. The *elastic anisotropy* $(E_{max.}-E_{min.})/E_{min.}$ of brass, Al and Dural is approx. in the ratio 21:6:5. These data and x-ray patterns indicate that after a short rolling of brass the face (135) is in the plane, and direction [21$\bar{1}$] in the direction of the rolling; after a strong rolling (110) is parallel, and [112] normal to this direction. In rolled Al (135) is in the plane, and [21$\bar{1}$] in the direction of rolling. J. J. Bikerman

Recovery and recrystallization of metals with cubic symmetry after cold-rolling. A. E. Bryukhanov. *J. Tech. Phys.* (U. S. S. R.) **9**, 1745–53(1939); cf. preceding abstr.—Annealing at 225–250° increases the E of rolled brass sheet irrespective of direction, and annealing at 300–750° increases the E in, and strongly lowers it normally to, the direction of rolling. The elastic anisotropy has a min. at 300–400°. X-ray patterns show a recrystn. between 215 and 300°; the new texture is destroyed above 400°. The E of rolled Al at an angle of 36–54° rises with temp. of annealing; at the other angles it increases to 250° and then diminishes again. J. J. Bikerman

Properties of monel containing beryllium, silicon and cobalt. I. Ya. Berkovskiĭ and F. N. Stepanov. *Metallurg* **14**, No. 2, 86–91(1939).—Monel contg. 1% Be has better mech. properties than a Cu-Be alloy contg. 2.5% Be or a Ni-Be alloy contg. 2% Be. Si up to 2.26% improves the properties of monel contg. 1% Be by as much as 18%. Addn. of Co has no beneficial effect. Monel contg. over 0.87% Be is subject to pptn. hardening. H. W. Rathmann

Properties and aging of Y alloy. Hideo Nishimura. *Japan Nickel Rev.* **8**, 8–21(1940).—The Al-Cu-Mg, Al-Cu-Ni, Al-Mg-Ni and Al-Cu-Mg-Ni systems are discussed. The effects of various amts. of Ni, Mg and Si and of different soln. and aging treatments on the mech. properties of Y alloy are investigated. Dialometric changes were found at 80 and 280° in specimens quenched from 500°. Cast Y alloy has a tensile strength of 21.5 kg./sq. mm. at room temp., 21.2 at 200°, 18.4 at 300°, 8.2 at 400° and 2.0 at 500°. James W. Poynter

The effect of nitrogen on chromium-containing alloys. A. M. Samarin, M. L. Korolev and I. V. Paisov. *Metallurg* **1938**, No. 11, 80–3; *Khim. Referat. Zhur.* **2**, No. 5, 78(1939); cf. *C. A.* **33**, 1645[6]. —N increases the strength and lowers the malleability of high-Cr alloys. With an increase of N the structure becomes more fine-grained. The smaller the ferrite grains the greater the tensile strength, the limit of plastic flow and the notch-bar impact strength. W. R. Henn

Bronzes for resisting water pressure. Syuzô Yamato. *Imono.* **12**, 1–24(1940).—Studies were made on large bronze cylindrical castings for resisting water pressure. A zinc bronze contg. 0.5–1.0% Ni and 0.5% Pb is best; for a satisfactory casting a feed head or heads should be located on the cylindrical part and chill plates should only be used on the inner face of the cylinder. The pouring temperature is 1100–1150°. M. Ishida

Antifrictional properties of manganese bronze. N. N. Serafimov. *Metallurg* **13**, No. 1, 112–14(1938); *Chem. Zentr.* **1938, II**, 3451–2. —A bronze contg. Cu 54, Mn 2.6, Pb 1.10, Fe + Al 0.40%, and the rest Zn, which showed the structure of α/β brass, was found to possess antifrictional properties inferior to those of Cr-Ni steel. This was true of the bronze in the wrought or forged condition or when used as screw or worm gears. It can thus be used for a substitute for ordinary brass only when the economic advantage is particularly important. M. G. Moore

Analysis of the Gahlstorf gold ring, and its relation to other finds. Helmut Otto. *Jahresschr. Focke-Museum, Bremen* **1939**, 48–62; *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 732.—Spectroscopic analysis of the Gahlstorf gold ring gives Au 75.49, Ag 19.52, Cu 4.86, Sn 0.05, with traces (i. e., less than 0.01%) of Pb, Si, As and Zn, and no Bi, Sb, Fe, Pt, Ti or Ni; d. 15.3. This compn. resembles that of 2 ancient rings found in Ireland, but differs from that of several samples of native Au. C. A. Silberrad

Transitions of the solid solution in iron-chromium alloys. V. N. Svechnikov. *Metallurg* **13**, No. 4, 45–9 (1938); *Chem. Zentr.* **1938, II**, 3372; cf. *C. A.* **31**, 4942[7].—A crit. review of the $\alpha \rightarrow \gamma$ transition in solid Fe-Cr solns. M. G. Moore

Some observations on the recrystallization of an iron-nickel alloy. Geo. Sachs and J. Spretnak. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1143**, 7 pp.(1940).—**The rolling and annealing structures of a relatively pure Fe-Ni (36%) alloy were investigated with x-rays. Pole**

figures for the rolling structure were similar to those of other face-centered cubic crystd. metals, owing to superimposition of (111) and (112) structures. A certain amt. of cubic structure was detected. The pole figures of the annealed and the annealed plus 10% reduced samples showed mainly cubic structure, with some remaining rolling structure. Alden H. Emery

The solubility of lead in tin. A. Stockburn. *J. inst. Metals* **66**, No. 861, 33-8(1940).—The m. ps. of Pb-Sn alloys contg. 1.0, 1.5 and 2.0% Pb were detd. by microscopic examn. and by an elec. resistance method. The solidus of the 1.0% Pb alloy is 208-212°, of the 1.5% Pb alloy 193-198°, and of the 2.0% Pb alloy 183-186°. James W. Poynter

Fusion of magnesium alloys in hydrogen, K. V. Peredel'skiĭ. *Tsvetnye Metal.* **1938**, No. 8, 102-5; *Khim. Referat. Zhur.* **2**, No. 5, 81 2(1939).—Ordinary electron metal, contg. 8-10% of Al, was melted in a crucible heated in an elec. resistance furnace in an atm. of pure dry H. The alloy was mixed and held for 5-10 min. at 700-10°, then cast. The operation must be completed in 20-40 min. to insure good quality in the cast alloy. A slower procedure produces a porous metal with imperfections and with considerably poorer mech. properties. The alloy properly fused under H has a breaking strength of 17.4 kg./sq. mm. with an elongation of 2.7%; its microstructure does not differ from that of electron metal obtained by ordinary fusion. W. R. Henn

Magnesium alloys for photoengraving. Robert T. Wood. *Metals & Alloys* **11**, 33-41(1940).—The Mg alloy found most suitable for photoengraving is one contg. 3% Al and 1% Zn. The prepn. of the plate for etching, the etching technique, the repair of damaged plates, and their life are discussed. The most suitable etching soln. for Mg consists of 1 part 40°Bé. HNO_3 to 15 or 20 parts water. The following advantages are listed for Mg etching plates: (1) Mg plates can be processed by all 3 commonly employed light-sensitive tops; (2) they are suitable for line cuts, coarse-screen or fine-screen work and thus capable of replacing both Cu and Zn, allowing the plant to standardize on one plate material and one processing method; (3) the plates can be processed more rapidly than either Cu or Zn plates; (4) they allow longer runs when used for direct printing; (5) the plates weigh less than one-quarter as much as Zn plates and less than one-fifth as much as Cu plates. I. Hartmann

Compressed alloys of magnesium containing intermetallic compounds. K. V. Peredel'skiĭ. *Aviapromyshlennost* **1939**, No. 1, 32-4; *Khim. Referat. Zhur.* **2**, No. 5, 82(1939); cf. *C. A.* **34**, 699[9], 700[1].—Alloys of Mg with a content of $ZnSb_2$ 5, Pb_4Sn_3 2, $MgZn$ 10, Al_3Mg_4 15 and Cu_6Sn 10% were subjected to compression after fusion and casting into molds to produce a rod 10 mm. in diam. The compressed samples of the alloys were subjected to thermal treatment at 380° for 30 hrs., quenched in water and aged at 170° for 24 hrs. The investigation of the mech. properties of the alloys after the thermal treatment showed (as compared with the results obtained before the thermal treatment) that the breaking strength increased in the Mg alloys with 10% of MgZn, but decreased slightly in the remaining alloys. The elongation of the alloys increased, except that of the alloys with 2% of $PbSn_3$. W. R. Henn

Some properties of calcium-bearing magnesium alloys. Walter Bulian. *Z. Metallkunde* **31**, 302-4(1940).—The elastic limit, yield point and tensile strength of extruded rods of Magnewin (2% Mn, 0.3% Al, rest Mg) are increased considerably by the addn. of 0.1-0.2% Ca. Ca also improves the elongation of rolled metal without deleteriously affecting the resistance to corrosion. Ca has little effect on the properties of 3 and 6% Al-Mg alloys. E. A. Peretti

Melting practice and furnaces for zinc alloys. H. Barbier. *Metallwirtschaft* **18**, 1020-3(1939).—Two types of Zn alloys are most widely used: I contg. Al 3.8-4.3, Cu 0.9-1.3, Mg 0.02-0.06% and II contg. Cu 3-5, Al 0.15-0.25%. I should not be heated beyond 500° or II beyond 600°; the casting temp. for I is 450-480° and for II 550-580°. It is important to stay within these temp. ranges. In general, crucible furnaces are to be preferred. Gas- and oil-fired furnaces are most popular. The temp. can be controlled well and held const.; this is important especially when small castings are to be produced and a ladle is used. The burner tip is flat and the flame strikes the crucible tangentially so that local overheating is avoided. Another type uses a burner which strikes the foot of the crucible. Furnace design for oil and gas heat is alike. In elec.-resistance furnaces care must be taken that the alloy does not come in contact with the windings. The heating-up time is relatively long. Otherwise this type is very well suited as far as furnace atm. and temp. control are concerned. Induction furnaces are used only for continuous operation. For large charges the furnaces should be pivotable. It is advantageous to withdraw the crucible from the furnace. For I, graphite or iron crucibles can be used. II requires graphite crucibles. Waste and turnings should not be used. Virgin metal is to be preferred and up to 50% waste from risers, lugs, etc., can be added. R. P. S.

Fine zinc-base bearing metals. E. Schmid and R. Weber. *Metallwirtschaft* **18**, 1005-10(1939).—Alloys with 4 and 10% Al, 0.5 and 1% Cu and 0.03% Mg for compensation of any traces of Pb and Cd were compared with ordinary bearing alloys. In static and fatigue strength the Zn alloys are superior and also the hardness is surpassed only by the Sn-bronzes. The elongation is low, however. The heat cond. of the Zn alloys exceeds that of the others tested. In order to test the running properties the bearing shells were chill-cast and then mounted in steel backings. The bearing surfaces were diamond finished, the shanks were unhardened, the surface ground. Temp. curves during the break-in period at max. speed and appearance of the surfaces afterward show that the Zn alloys act essentially like the red brass, some were similar to Sn bronze and in 2 instances the break-in characteristics were equiv. to those of babbit metal. Also in the service test with varying speed and loads the Zn alloys proved equiv. to the orthodox metals. A few emergency tests without lubrication gave an indication of superior characteristics of the Zn-base bearing alloys. There is not sufficient evidence to decide which of the tested Zn alloys is to be preferred. Tests with centrifugally cast shells are considered essential. Richard P. Seelig

Production and subsequent working of zinc-alloy tubing. H. Kästner. *Metallwirtschaft* **18**, 1010-15.—Cu-bearing Zn alloys are extruded between 200° and 240°; these low temps. require high pressures and high speed. Alloys with 4% Al and minor Cu contents are extruded between 240° and 270° and with 10% Al between 270° and 300°. The extrusion dies must have tapered entrance. The extrusion speed is considerably lower than for brass. The extrusion pressure is higher than for brass, about the same as for high-strength Al-Cu-Mg alloys. The initial pressure drops on continued extrusion. Since the mech. and technological properties of most Zn alloys are impaired by cold-working the tubing should be hot-extruded as close to the desired dimensions as possible. Cold-drawing is used mostly for finishing and the reciprocating rolling process is gaining in importance. In the latter process a much higher reduction per pass is possible; the deformation is more uniform. The effect of intermediate annealing depends largely on the alloy used; as a rule annealing does not improve drawing properties. The change of properties with deformation was studied by comparing the tensile properties of two Zn alloys with those of an Al alloy and a brass after each rolling or drawing pass, resp. In all cases a stress velocity of 15 mm./min. was maintained; for Zn alloys a wide variation of readings was found with changing rate of loading in the tensile test. The Zn alloys act very differently from the other materials. The tensile strength rises first, without any drop in elongation. With increased reduction in cross section by drawing, the tensile strength drops sharply and the elongation rises. The hardness of 63% brass increases uniformly with the degree of deformation. The Zn-Al (4%) alloy has practically const. hardness after it

is increased up to a certain value. The Brinell nos. for the Zn-Cu (4%) alloy rise first, pass a broad max. and drop later to the original value of the extruded tubing. A comparison of the same degree of reduction, one produced by rolling, the other by drawing of the Zn-Cu alloy, showed a slight increase in strength and marked increase in elongation by rolling, and a decrease in strength and unchanged elongation by drawing. The bending of Zn-alloy tubing can be done hot or cold; the tools and tubing are preferably preheated. In order to avoid cross-sectional changes during bending the tubing should be filled with fine absolutely dry sand. The use of low-melting materials such as Wood's metal or Pb is not recommended. All other working operations (spinning, twisting, etc.) are to be performed on hot material. 1 2

Richard P. Seelig

The practical value of the copper sulfate test in galvanizing. Carlos F. Hickethier. *Mecanica Metalurgica* No. 65, 5 pp.(1938); *Chem. Zentr.* 1938, II, 3455.—The $CuSO_4$ immersion test was found to be only poorly suited for the abs. estn. of the thickness of a Zn coating but it does offer a means of judging the uniformity of the coating. 3

M. G. Moore

The hot-dip zinc coatings of welded gas pipes. Yasuzo Ogino. *Tetsu-to-Hagane* 26, 20–42(1940).—O. utilized, in his expts., a zinc-bath, 7000 × 760 × 1200 mm. deep, so that his results would be easily comparable with the results obtained from the daily factory work. For the same reason ¾" butt-welded pipe was used. M. Ishida 4

Pinhole corrosion in galvanized watering tanks. W. M. Pierce and G. C. Bartells. *Metals & Alloys* 11, 42–4 (1940).—High Sn content (approx. 0.4% or more) is the primary factor leading to pinhole corrosion of galvanized steel sheets under conditions of total water immersion. The following explanation is offered for this: Sn is present in a Sn-Zn alloy as free Sn in the grain boundaries, and as such it is known that it electrolytically accelerates the corrosion of both Zn and iron; it may be expected to behave similarly with respect to the alloy layers whose potentials are between those of Zn and iron. 5

I. Hartmann

The change of the zinc potential toward a nobler value in hot tap water. G. Schikorr. *Metallwirtschaft* 18, 1036–8 (1939); cf. *C. A.* 33, 7671⁶.—In hot tap water Zn can become nobler than Fe. This is explained by the fact that above 60° the corrosion products of Zn are deposited in a very dense and adherent form. The app. used for measuring the potentials is described. The failure of pipes in certain spots is attributed not to material flaws but to a combination of unfavorable conditions; e. g., it is assumed that when air bubbles are present the Zn coating may be destroyed before a protective film can be formed and that later, when the air is swept away, corrosion can proceed unhampered. 6 7

Richard P. Seelig

Preventing rust and corrosion. Wilhelm Lambrecht. *Farben-Chem.* 10, 304–8(1939).—This is a review of methods known in the 19th century for preventing rusting of Fe, e. g., by formation of a protective coating of oxide or basic salt, by coating with another metal, such as Zn or Sn, by application of paints made from boiled linseed oil, asphalt, etc. 8

J. W. Perry

Researches on the stress-corrosion of aluminum-magnesium forging alloys. Annaliese Mühlenbruch and Hugo J. Seemann. *Z. Metallkunde* 31, 293–9(1940).—Alloys of Al with 8–9% of Mg, 0.3% Mn, 0.3% Fe and 0.1–0.2% Si were tested by the salt spray and alternate-immersion tests after various heat and mech. treatments. All the alloys were less resistant to corrosion in the aged state than in the cold-rolled, homogenized and slightly heterogenized states. Alloys heterogenized by slow cooling from the homogeneous state behaved somewhat better than did those quenched from the homogeneous range and heterogenized by reheating just below the solid-soln. line. Aging for 1 day at 100° gave more resistant metal than did aging at 75° for 14 days. Alloys made from Fe- and Si-free Al were less resistant than those made from com. metal. The addn. of 1% Zn to the alloys had no beneficial effect in any of the states tested. No relation could be established between grain size and the tendency to stress-corrosion. E. A. Peretti 9

Stress-corrosion cracking of the austenitic chromium-nickel steels and its industrial implications. James C. Hodge and John L. Miller. *Trans. Am. Soc. Metals* 28, 25–67(1940).—Service failures and exptl. results indicate that the austenitic Cr-Ni steels are susceptible to stress-corrosion cracking which may occur independently of its condition with respect to susceptibility to intergranular corrosion. Intercryst. corrosion favors stress corrosion cracking which is intercryst. or transcryst. dependent upon the corrosive medium, the stress magnitude and the degree of susceptibility. Aq. solns. of C_2H_5Cl, $FeCl_3$ and of $HgCl_2$ gave accelerated results. The tendency to stress-corrosion cracking increases with increasing stresses such as result from cold bending, welding or rapid cooling from elevated temps., and also by the use of composite structures such as a welded attachment between austenitic and ferritic steels having different thermal expansions. Removal of fabricating stress by thermal treatments utilizing slow cooling, which require the use of stabilized alloys contg. Cb or Ti to avoid intergranular corrosion, will eliminate stress-corrosion cracking. The mechanism of stress-corrosion failure is believed to be similar to that of corrosion-fatigue cracking. Excellent photomicrographs are given.

W. A. Mudge

Factors influencing external corrosion of tin containers. K. G. Dykstra. *Canner* 90, No. 12, Pt. 2, 68–71(1940) – General.

C. R. Fellers

Control of external corrosion of cans. C. L. Smith. *Canner* 90, No. 12, Pt. 2, 65–8(1940).—Conditions responsible for surface corrosion and discoloration are discussed. Some of these factors are sweating, corrosive cooling waters, Fe retort crates, hygroscopic residual salts, and poor cleaning.

C. R. Fellers

Electrolytic corrosion of metal objects in the soil using constant direct-current potential in Zurich and Neuhausen. H. Bourquin. *Schweiz. Ver. Gas- u. Wasserfach., Monats-Bull.* 19, 262–6(in French, 266–70)(1939).—In a set of expts. on soil corrosion at Neuhausen 200 × 50 × 2 mm. plates provided with elec. connection of the same metal were buried in a wooden box of 160 × 60 × 25 cm. filled with soil. The sidewalls of this box were provided with C electrodes. The boxes were set in the ground. In one box the metals were cathodes, in another one anodes, a const. voltage of 10 v. being applied to all. Fifteen metals were tested: bare steel, steel with Al bronze coating, Pb, Pb with asphalt coating, Cu, 99.99% Al, pickled 99.7% Al, pickled 99.7% Al treated by MBV process, 99.7% Al oxidized in H_2SO_4, 99.7% Al oxidized in CrO_3, Anticorodal Ho, pickled soft Al, pickled Peraluman 7, pickled Peraluman 2, pickled and cast Anticorodal of 2.5% Si. The expts. were conducted for 1 yr. and the test pieces weighed. The Fe anodes show more wt. loss than calcd., Pb anode losses are between those calcd. for bi- and quadrivalent Pb, Cu anode losses between those calcd. for uni- and bivalent Cu. The Al anodes all showed higher loss than calcd. Fe, Pb or Cu cathodes showed very little loss (a few %), Al or Al alloy cathodes showed appreciable loss, almost double the theoretical figure. Hence const. potential does not protect the light metal. Similar tests were conducted at Zurich using pipes made of the different materials and amp. hr. *vs.* time curves are given, a 6.3-v. potential used. Details of these expts. are given. The sp. resistance of the soil medium used was 20,000 Ohm. cm. With cathodic Al an addnl. resistance due to oxide crust is found. Conclusions: The basic difference between Fe, Pb, Cu on the one hand and Al alloys on the other is that the former are corroded only anodically, the latter both ways. Wt. losses for heavy-metal anodes as well as light-metal ones can roughly be calcd. by Faraday's law, light-metal cathodes suffer higher losses owing to a secondary reaction caused by alky. of the medium near the cathode. The use of Al or its alloys in the soil such as for cable covering is not advisable. It is too sensitive to stray currents. 10 11

B. J. C. van der Hoeven

Corrosion resistance of monel to beer. H. Siegfried. *Schweiz. Brau. Rundschau* 50, 197–98(1939).—Small

polished plates of monel immersed in fermenting wort lost a total of 37.2 mg. as compared to 50.3 mg. for unpolished plates after a total fermentation time of 129 days; in each case the beer stone was removed after each fermentation. When the stone was left, early fermentations gave a loss in wt., followed by a gain in wt. for later fermentations. After 94 days of fermentation only 6.3 and 7.1 mg. of Ni from the unpolished and polished plates, resp., passed into the beer; the difference must have passed into the yeast. Monel piping indicated negligible corrosion in the presence of flowing beer. Louis Laufer

Change of the composition of the electrode coating OMM-1. G. I. Bukreev and A. L. Polyakov. *Avtogennoe Delo* 8, No. 4, 20–2(1937); *Chem. Zentr.* **1938**, I, 4231.—In the welding of a steel contg. C 0.11, Si 0.11 and Mn 0.44% the use of a 4-mm.-thick electrode contg. C 0.24, Si traces and Mn 0.49% having a coating made up of Mn ore (26% Mn), 30, quartz 8.4, Fe oxide 4.4 and lamp-black 3 parts by wt. gave the most satisfactory results as regards strength of the weld seam. M. G. Moore

Theoretical principles involved in the production of electrode coatings in the welding of carbon steels. A. A. Erokhin. *Avtogennoe Delo* 8, No. 9, 30–4(1937); *Chem. Zentr.* **1938**, I, 4231; cf. *C. A.* **31**, 4255[1].—A brief review of the theoretical principles of slag formation in the welding of steel with the use of coated electrodes. M. G. Moore

Is the removal of forge scale from sheet iron for roll welding with a high-frequency arc expedient? V. A. Lapidus. *Avtogennoe Delo* 8, No. 8, 29–31(1937); *Chem. Zentr.* **1938**, I, 4230.—It is unwise to remove forge scale before welding for the following reasons: Removal of a forge scale layer 0.01–0.1 mm. in thickness from sheet iron 0.3–2 mm. thick before welding with a high-frequency arc is unprofitable. There is an unavoidable lack of uniformity in the thickness of the forge scale layer, and the strength of the sheet iron varies with the thickness of this layer. Cleaning the scale from the sheet metal is a slow process and impairs the quality of the material, especially in the case of thin sheets. M. G. Moore

Metallurgical processes in arc welding. I. D. Davydenko. *Avtogennoe Delo* 8, No. 3, 11–17; No. 4, 11–16 (1937); *Chem. Zentr.* **1938**, I, 4230.—Changes in the chem. compn. of the steel during arc welding and the effect of such changes on the mech. properties of the weld were studied. About 88% of the C content and about 50% of the Mn burn out, while the N content is greatly increased. Oxygen is present in the weld seam in the form of slag inclusions of various oxides, in the form of a solid soln. of Fe with FeO, and in the form of Fe droplets which are covered with a thin oxide coating. During welding, the oxidation of the fused steel is caused by direct contact with atm. O, by atm. O above the slag, by O in constituents of the electrode coatings, and the O of the slag oxides. These various oxidation processes are individually discussed. Other matters considered are the compn. of the weld slag and its importance in the area of the weld as well as deoxidation of the welded area under an acid or basic slag with Mn, Si, Al, Ni, Mo, Ca boride and ferrotitanium as deoxidizing agents. M. G. Moore

The nature of the spatter in arc welding. V. D. Taran. *Avtogennoe Delo* 8, No. 9, 17–19(1937); *Chem. Zentr.* **1938**, I, 4230–1.—The fine structure of the material spattered in the welding of hypereutectoid steel with electrodes of high C content shows cementite needles in an austenite field. The spatter produced in the welding of hypereutectoid steel with low-C (0.17%) electrodes shows the same structure as is obtained in the welding of hypoeutectoid steel (0.21% C) with electrodes of the same compn. From this it is concluded that the spatter is produced essentially from the material of the electrodes. M. G. Moore

The production of high-quality welds by automatic arc welding. P. P. Bustedt and V. I. Dyatlov. *Avtogennoe Delo* 8, No. 5–6, 3–8(1937); *Chem. Zentr.* **1938**, I, 4231.—Welding tests using thickly coated electrodes and an automatic welding device are reported. The electrode coating consisted of ilmenite 25.6, pyrolusite 12.8, fluorspar 25.6, ferromanganese 6.8, rye meal 17.2 and water glass 12%. The current used was 250–330 amp. M. G. Moore

Welding of heat-resistant austenite steels. K. G. Nikolaev. *Avtogennoe Delo* 8, No. 4, 37–9(1937); *Chem. Zentr.* **1938**, I, 4231.—Satisfactory arc welding of 2 such steels is reported. One steel contained C 0.26–0.42, Si 1.9–9.2, Cr 17–21, Ni 24–7, Mn 0.4–0.6% and the other C 0.15–0.22, Si 0.6–1.25, Cr 23–7, Ni 11–13 and Mn 0.33–0.5 %. The compn. of the electrodes used was C 0.15–0.6, Si 0.4–0.6, Mn 0.5–0.6, Ni 8–9, Cr 18–19 and Ti 0.5%. The electrode coatings were made up of a mixt. the dry portion of which consisted of fluorspar 48, marble 26, kaolin 6, ferrotitanium (12%) 12, ferrosilicon 3, and ferromanganese 5% and the liquid portion of water glass 75 and KOH (60% soln.) 25%. The electrodes were 4 mm. thick and the welding current 120–40 amps. The welded specimens possessed a tensile strength of 61–72 kg./sq. mm. with an elongation of 23–35% and a bending angle of 160–80°. M. G. Moore

The welding of stainless EJa-IT steel. I. L. Tukatsinskiĭ. *Avtogennoe Delo* 8, No. 8, 27–8(1937); *Chem. Zentr.* **1938**, I, 4231.—It is recommended that austenite stainless Cr-Ni steel (18% Cr, 8–9% Ni, and 0.4–0.6% Ti) be welded with the use of an electrode coating made up of 50 parts by wt. of marble, 50 parts fluorspar, and 15 parts ferromanganese to which has been added 78 cc. water glass and 70 cc. water per 500 g. of dry material. Data are given regarding the carrying out of the welding. M. G. Moore

Welding of high-manganese Hatfield steels. V. A. Batmanov, P. V. Sklyuev and S. G. Eiche. *Avtogennoe Delo* 8, No. 4, 17–19(1937); *Chem. Zentr.* **1938**, I, 4231.—The welding of hard Mn steel contg. C 0.9–1.3, Si 0.2–0.35, Mn 11.5–14.5 and Ni up to 0.25% is reported. After preliminary quenching in water from 1050–1100°, such steel can be satisfactorily welded with the use of the oxy-acetylene flame or with the arc if low-C electrodes contg. Mn 11–14 and Ni 3.5–4.5% are used. M. G. Moore

Electric welding of cast iron by the bath process. V. A. Lapidus. *Avtgennoe Delo* 8, No. 516, 28–30(1937); *Chem. Zentr.* **1938**, I, 4375.—Defective cast iron pieces can be repaired by elec. welding by the bath method of Slavyanov. The defective portion is first removed as far as possible by mech. means in such a manner that the depression remaining has smooth perpendicular side walls. Suitable forms are arranged to give the desired shape to the portion being rebuilt. The cast-iron specimen is then carefully heated and welded electrically with the use of a cast-iron electrode contg. C 4, Si 3.5, Mn 0.8, S up to 0.1, and P 0.5%, after which the specimen is carefully cooled. M. G. Moore

Welding of pure lead by pressure at various temperatures. Bruno Meyer and Heinrich Hanemann. *Z. Metallkunde* **30**, 422–4(1938).—Two pieces of Pb cannot be welded together by pressure in the air at any temp. below the m. p. Clean surfaces can be welded by pressure in absence of air, e.g., in the cable sheath extrusion press. It is therefore concluded that an oxide film forms immediately on exposing clean Pb surfaces to the air. B. C. P. A.

Solders for zinc alloys. G. Wassermann. *Metallwirtschaft*, **18**, 1018–20(1939).—By using a soldering fluid contg. Pb and small amts. of Sn a solder with very little Sn can be used. The relatively high m. p. of Pb is a disadvantage; flame-soldering is recommended. The method is not applicable to Al-contg. Zn alloys. This can be achieved by adding Zn to the solder in amts. of 1/4 to 1/2 of the Pb content. A small percentage of Bi lowers the m. p. and improves the bond. The joint should be absolutely clean and preferably coated with a little solder before joining the pieces. For Al-contg. alloys 40% NaOH soln. is used as soldering fluid. For all other alloys HCl can be used. The best and most universal solders for Zn alloys have Cd as their main constituent and some Zn and Pb. Pb can be substituted partly or completely by Sn. The same soldering fluids are used. Richard P. Seelig

Metallurgical control and fourdrinier wires (Dudley) 23. Can oil-free binders prevent corrosion (Hebberling) 26. Protective lacquers on Al foil (Ehrbacher, Haug) 26. Methods of testing enamelled copper wire (Weh) 13. Causes of bond between steel and concrete (Pogány) 20. Effect of SO_2 on nutritive value of alfalfa hay [smelter fumes] (Loosli, *et al.*) 11E. Rare and nonferrous metals (Krutov, *et al.*) 8. Application of x-ray inspection to oil-refining equipment (Isenburger) 22. Coal and ore in Sudetenland (Heugel) 21. Refractories used in steel foundry (Leun) 19. Electrolytic prepn. of Cu-Zn-Ni alloy (Izgaryshev, Ravikiovich) 4. Measurement of temp. and flow in furnace systems [partition and stratification of flow in open-hearth furnace uptakes] (Leckie) 1. Action of light-metal alloys on sugar juices (David) 28. Microscopic forms of Fe rust (Ackermann) 2. Equilibria in liquid Fe with C and Si (Darken) 2. Checkerwork for regenerators such as those used with blast furnaces (U. S. pat. 2,185,559) 19. Coated dispersible thiocarbanilide [for froth flotation operations] (U. S. pat. 2,185,591) 13.

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Concentrating ores. Anderson W. Ralston, Wm. O. Pool and James Harwood (to Armour and Co.). U. S. 2,185,968, Jan. 2. Froth-flotation sepn. is effected in the presence of a mixt. of satd. and unsatd. aliphatic amines having 3–10 C atoms and satd. and unsatd. aliphatic straight-chain hydrocarbons.

Flotation of gold and other minerals. B. V. Nevskiĭ. Russ. 56,085, Nov. 30, 1939. Au is recovered and the flotation power of the froth is increased by adding to the pulp disintegrated wood chips after treatment with such reagents as tar, or heavy crude-oil bottoms, which moisten the gold or other minerals to be extd. but which do not moisten gang.

Flotation oils. L. M. Pesin, R. L. Globus, T. V. Sheremet'eva, T. L. Fabrikant and V. I. Lyubomilov. Russ. 52,225, Nov. 30, 1937. By-products of the manuf. of camphor from pinene are treated with HCl, the hydrochloride is heated with aq. alkali and the oil obtained is sepd. by rectification.

Depression of carbonaceous material in ore flotation. Robert B. Booth (to American Cyanamid Co.). Brit. 508,929, July 7, 1939. See U. S. 2,145,206 (*C. A.* **33**, 3319[8]).

Chlorinating chromium ores. Irving E. Muskat and Norman Howard (to Pittsburgh Plate Glass Co.). U. S. 2,185,218, Jan. 2. A Cr ore is chlorinated at a temp. (suitably about 850°) sufficient to volatilize Fe chloride, in the presence of sufficient gaseous O simultaneously to minimize the tendency of the ore toward sintering within the furnace. App. is described.

Chlorinating ores containing iron and titanium. Irving E. Muskat and Robert H. Taylor (to Pittsburgh Plate Glass Co.). U. S. 2,184,887, Dec. 26. A material such as ilmenite ore contg. Ti 20–50 and Fe 10–50% is treated by a continuous process with 15–35% of C and with Cl at such a rate that sufficient heat is evolved from the reaction to maintain the temp. at 600° or higher within at least a portion of the reaction zone, so that chlorides of Fe and Ti are formed and volatilized. App. is described.

Removing iron from titanium ores. Irving E. Muskat and Robert H. Taylor (to Pittsburgh Plate Glass Co.). U. S. 2,184,884, Dec. 26. A mixt. of C and a Ti ore contg. Fe is subjected to the action of controlled amts. of Cl and O at a temp. above 500° to effect formation and volatilization of Fe chloride. U. S. 2,184,885 relates to a generally similar process, except that O need not be used.

Roasting zinc concentrates. A. N. Vol'skiĭ and R. A. Agracheva. Russ. 52,217, Nov. 30, 1937. The formation of ferrite is inhibited in roasting zinc concentrates at low temps. by the addn. of sulfate-forming substances.

Apparatus suitable for melting metals such as lead for extrusion. Daniel V. McParlin (to Okonite-Callender Cable Co.). U. S. 2,185,376, Jan. 2. See Brit. 500,391 (*C. A.* **33**, 5352[3]).

Apparatus for producing filaments from materials such as molten lead. Adolph F. Krauss (to Richardson Co.). U. S. 2,185,442, Jan. 2. Various details of manuf. and operation.

Batch process for producing iron or steel. Fritz Eulenstein and Adolf Krus (to Sachtleben A.-G. für Bergbau und Chemische Industrie). U. S. 2,185,911, Jan. 2. A batch process for the production of iron in a rotary drum furnace comprises charging the furnace to its normal vol. capacity with a mixt. comprising more than a normal batch of ore, at least part of the reducing carbon required for the treatment of the ore, and less lime than is required for the treatment of the ore, heating the mixt. by direct flame, after the charged mixt. has contracted in vol. introducing sufficient lime to complete the treatment of the ore and agitating the contents of the furnace by rotary

movement of the furnace about a substantially horizontal axis.

Horizontal furnace for the continuous annealing of metal sheets, wire or the like. Emil Vits. U. S. 2,185,655, Jan. 2. Various structural, mech. and operative details.

Apparatus (with thermostatic control) heated by gas combustion and suitable for annealing metal plates, etc. John E. MacConville, Neel I. Cockley and James L. Whitten (to Brown Instrument Co.). U. S. 2,184,975, Dec. 26. Various structural, elec. and operative details.

Heat-treatment of magnesium-base alloys such as those for casting and heat treatment. Robert T. Wood (to Magnesium Development Corp.). U. S. 2,185,452, Jan. 2. A method of producing, in a casting of a Mg-base alloy contg. Mg together with Al 1–12, Zn 0.3–5, Mn 0.05–0.3 and Ca 0.03–0.3%, properties commensurate with those obtained by a 2-step soln. heat-treatment, involves subjecting the casting to a single step soln. heat-treatment at a temp. of about 380–415° for 5–30 hrs. and then rapidly cooling to below 205°. U. S. 2,185,453 relates to a similar heat-treatment of alloys of generally like compn. except that they do not contain Mn.

Deseaming blooms, bars, etc., of nickel and its alloys. Herman M. Brown (to International Nickel Co.). U. S. 2,185,496, Jan. 2. A process of deseaming blooms, billets, sheet bars and the like made of Ni or a Ni alloy involves striking an arc between the bloom, billet, sheet bar, etc., contg. a surface defect, and an electrode; moving the electrode along a surface defect to be removed while contolling the current in excess of about 300 amp. to cause metal about the defect to become molten and to be automatically removed as a result of elec. forces generated in the molten metal incident to the passage of current therethrough, thereby producing a groove adjacent to the surface defect in the bloom, billet, sheet bar, etc., and correlating the speed of the electrode along the defect with the current and the depth of the defect to produce a groove in the metal having a depth at least equal to the depth of the defect to be removed whereby a grooved bloom, billet, sheet bar, etc., free from surface defects is obtained which, when worked, provides an acceptable product having a surface free from seams, splits, cracks and other surface defects.

Multi-ply metal foil. Gustav Ruoff (to Calif. Fruit Growers Exchange). U. S. 2,185,649, Jan. 2. A material suitable for use with food products, etc., comprises 2 metal foils intimately united by an intervening layer of pectin.

Aluminum production and refining. Charles B. Willmore (to Aluminum Co. of America). U. S. 2,184,705, Dec. 26. A mixt. is formed contg. Al and a halide such as Na_3AlF_6 or MgF_2 and the mixt. is heated in an atm. "effectively inert" to Al, such as H, to vaporize the Al and the halide, resulting vapors are condensed, and the Al is sepd. from the condensate.

Prevention of porosity in aluminum castings. John H. Alden, Philip T. Stroup and Pasqual M. Budge (to Aluminum Co. of America). Can. 387,067, Feb. 27, 1940. Al or its alloys are melted, transferred to a holding chamber, a current of air contg. moisture not above 0.5 grain/cu. ft. is passed through the chamber, the alloy is degassed by bubbling Cl through it while it is protected by the air current, the vol. of current is decreased and the alloy heated to the desired pouring temp.

Magnesium. Hirosi Suzuki. Brit. 508,814, July 6, 1939. This corresponds to Fr. 838,761 (*C. A.* **33**, 6732[7]). The Mg compd. is preferably $Mg(OH)_2$.

Nickel. I. G. Farbenindustrie A.-G. Brit. 509,076, July 11, 1939. Ni poor in C is produced from crude Ni carbonyl (I) contg. Fe carbonyl by subjecting to thermal decompn. the I which has been purified previously to such an extent that it contains at most only 0.1% Fe, e. g., by dephlegmation or fractional distn.

Pretreating tantalum scrap for disintegration in the preparation of compact tantalum. N. P. Penkin. Russ. 55,886, Oct. 31, 1939. The scrap is made brittle by heating to incandescence in an atm. of H or N or a mixt. of these gases.

Regenerating spent pickle liquor or the like containing ferrous sulfate. Rowland P. Smith and John Belding (to Chemical Construction Corp.). U. S. 2,185,095, Dec. 26. A method of regenerating spent pickle liquor comprises (1) mixing with the spent pickle liquor an amt. of H_2SO_4 sufficient to restore it to its original free acid content and the quantity of $FeSO_4$ heptahydrate produced in step (5), (2) evapg. water from the resulting soln. and filtering off at temps. above 64° an amt. of $FeSO_4$ monohydrate chemically equiv. to the amt. of acid added, (3) recovering the S content of the $FeSO_4$ monohydrate as H_2SO_4 and returning the acid to step (1), (4) applying a vacuum to the filtrate and thereby cooling and concg. it to the point where the amt. of $FeSO_4$ heptahydrate will crystallize out that would be needed to maintain a satd. soln. in the filtration of step (2) if no other iron were present, (5) sepg. the $FeSO_4$ heptahydrate and returning it to step (1), and returning the resulting soln. to the pickling plant for reuse.

Cementation. P. A. Piterkin. Russ. 56,110, Nov. 30, 1939. Articles are cemented with coke breeze impregnated with liquid hydrocarbons (kerosene, fuel oil) and carbonates.

Cementation paste. G. L. Sorokin, B. A. Gutkin and P. K. Ivanov. Russ. 52,206, Nov. 30, 1937. The paste consists of the usual carburizers mixed into K oxalate or Na oxalate or in a 5% soln. of glue in water.

Carburizing metals such as steel. Wm. A. Darrah. U. S. 2,184,972, Dec. 26. App. is described, and a process of carburizing metals in a heated chamber by treating with a hot gaseous atm. contg. 2 different types of constituents, one constituent consisting of relatively inert gases and the second being active as a carburizing agent, the process including the step of introducing a hydrocarbon into the chamber and heating same by passing it into proximity to a source of heat so as to condition the hydrocarbon before it comes into contact with the metal to be carburized and then transferring the conditioned hydrocarbon into contact with the metal by thermal circulation.

Aluminothermic mixture for making permanent magnets. Hugh A. Howell (to Frank Raffles). U. S. 2,185,464, Jan. 2. A mixt. is used contg. Al, Ni, a compd. of Fe such as Fe_3O_4 and a compd. of Zr such as ZrO_2 in such amounts that after ignition and sepn. of the slag the remaining melt will contain Ni 5–40, Al 7–20, and Zr an effective amount up to 5%, the major part of the remainder being Fe, suitable for conversion into a permanent magnet upon solidification.

Cutting tools. Wm. P. Cottrell. U. S. 2,184,776, Dec. 26. In forming tools such as oil-well drilling tools, a piece of metal such as soft steel is coated with a ferro-W alloy, and other metal such as softer steel is cast to the coated piece of metal thus produced, and the article formed may be heat treated.

Preventing frothing in metal-cutting emulsions. P. I. Karasik and V. I. Dobashkin. Russ. 51,921, Nov. 30, 1937. The frothing of cooling emulsions used in metal cutting is hindered by addn. of $Fe_2(SO_4)_3$.

Malleable iron Axel G. E. Hultgren. U. S. 2,185,894, Jan. 2. A method of producing malleable iron from cast iron comprises making castings of white cast iron contg. Ni, Cr or Mn which increases the depth of hardening so that the castings will be hardened to sufficient depth to a largely martensitic-austenitic state by cooling from a temp. exceeding A_1 in a cooling medium not more efficacious than oil, and subjecting the castings to such a cooling and then to a malleabilizing anneal.

Detecting superficial flaws in materials such as cast iron or steel bars. Greer Ellis (to Magnaflux Corp.). U. S. 2,186,014, Jan. 9. A method of making superficial flaws in a rigid article of high-elastic limit capable of easy detection involves coating the article with a continuous adherent film such as a brittle lacquer having a rupture limit substantially lower than the elastic limit of the article and applying to the article a load of such magnitude and direction that the resulting stresses will exceed

the rupture limit of the film only above the flaws while remaining below the elastic limit of the rigid article.

Cleaning stainless steel and rustless iron surfaces. Charles J. Geng (to Wilson-Imperial Co.). U. S. 2,186,017, Jan. 9. H_3PO_4 is used (suitably in 10–20% aq. soln.) together with orthodichlorobenzene or methyl isobutyl ketone, etc.

Vessels such as steel dephlegmating towers formed of one metal and lined with different metal such as one more resistant to corrosion. Wayne A. Howard and Turner C. Smith (to Socony-Vacuum Oil Co.). U. S. 2,185,463, Jan. 2. A method of permanently placing an internally projecting supporting member such as a tray-supporting bracket within a metallic vessel having a liner of a metal different from that of the vessel involves abutting the supporting member directly against the internal face of the wall of the vessel; cutting away the liner to expose an annular area of the internal face around the periphery of the abutment; bringing the liner into contact with the internal face, and filling the annulus so formed with fused metal, whereby the supporting member and the liner are welded to the internal face of the vessel and to each other.

Transformer steel. V. S. Mes'kin and Yu. M. Margolin. Russ. 52,189, Nov. 30, 1937. The magnetic and technological properties of Si steel are improved by the introduction of Ti, V or Be together or individually in amts. less than 0.1%.

Cold-drawn steel tubing. Fred C. Raab and Edwin C. Wright (to National Tube Co.). U. S. 2,184,624, Dec. 26. A method for the manuf. of cold-drawn tubing of steel contg. Fe together with C 0.15–0.45, Mn 0.4–0.9, Ni 1–2, Cr 0.20–0.75 and Si 0.15–0.30%, a max. of 0.01% P and a max. of 0.05% S, to produce tubing of high machinability, involves heating the tubular blank to about 815–925°, holding the blank at such temp. for about an hr., pptg. the excess ferrite from the austenite in a uniformly dispersed condition and promoting the formation of carbide constituents in the form of coarse lamellar pearlite by slowly cooling the blank at a rate of about 11–28° per hr. to a temp. below 480°, and finally cold-drawing the blank to effect a reduction in area of 20–70% so as to form hard and soft layers which are freely machinable. Cf. *C. A.* **34**, 2317[9].

High-speed steels. Elmer B. Welch and Lewis G. Firth (to Firth-Sterling Steel Co.). U. S. 2,185,616, Jan. 2. Tool steels are formed contg. Mo 7.09–10, V 1.2–2.0, B 0.22–0.5, Cr 1.5 or less, Co 2.59–10 and C 0.5–1.0%. U. S. 2,185,617 relates to steels substantially free of Cr and contg. C 0.3–1.1, Si 0.05–1.0, Mn 0.1–1.0, V 0.25–2.5, Mo 5–12, B 0.05–0.5, and Co or Ni 0.5–20%. U. S. 2,185,618 relates to high-speed steels contg. Cr not in excess of 1.5% of the Fe content, together with C 0.28–1.04, V 0.24–2.8, Mo 4.72–9.61, Cu 0.09–4.01, B 0.05–0.8, and Fe 94.47–80.12%. U. S. 2,185,619 relates to generally similar high-speed steels contg. slightly less Fe and also contg. a small proportion of Ni.

High-speed tool steel. Elmer B. Welch and Lewis G. Firth (to Firth-Sterling Steel Co.). U. S. 2,185,006, Dec. 26. High-speed steels contain Fe 89.29–91.21, C 0.07–0.9, V 0.68–2.12, Mo 7.06–8.59, and B 0.09–0.81% (the B and C together not exceeding 1.13%, and the steel being free of Cr in excess of 1.5% of the Fe content).

High-tensile alloy steel. Wm. H. Hatfield (to Thos. Firth & John Brown Ltd.). U. S. 2,185,996, Jan. 9. A high-tensile alloy steel (various properties of which are given) contains Ni and Cr each 3–7%, Mo 2–5, and C 0.12% or less, and is air cooled from about 900° and subsequently tempered for an hr. and air cooled from the tempering temp.

High-manganese steel articles such as levers, brake shoe heads, etc. Frank T. Ward. U. S. 2,185,483, Jan. 2. App. is described, and a method of processing a mech. part composed of high manganese steel having a bore therein, which comprises forming the part of high manganese steel contg. about 11 to 14% Mn with an undersized bore therein and subjecting the part at the surface of the bore to pressure to size and harden it.

Making alloys of iron and steel. Casimer J. Head (to Metallurgical Development Co. Ltd.). U. S. 2,185,081, Dec. 26. A method is employed which includes prepg. a suitable bath of ferruginous molten metal, in any suitable type or kind of furnace supplying heat throughout the process, removing the oxidizing slag accumulated during the melting stage, and covering the metal bath with a fresh slag, composed of lime and fluorspar, to which a small quantity of ferrosilicon is added, introducing on to the surface of the metal bath relatively heavy molded blocks contg. one or more of the oxides of the alloying materials and a noncarbonaceous reducing agent, all in a comparatively fine state of division, being cemented together with the aid of slaked lime and water, and being of such d. as to penetrate the slag and come into direct contact with the surface of the molten metal of the bath, such molded blocks, after being air dried, being sprayed over with a milk of lime wash and allowed to dry, are then heated to above 900° for freeing them from any combined water formed by the chem. reaction upon air drying of the pugged mass of ore and lime.

Separating the component parts of alloys or of metal mixtures. Paul Kemp. Brit. 508,925, July 7, 1939. The constituents are sepd. by liquation, the mixt. of the constituent parts that are liquid and solid, resp., at the temp. at which liquation occurs being forced against a sepg. member pervious to the liquid constituents under a pressure of at least 500, and preferably at least 1000, atm., e. g., by means of compressed gas or mech. means.

Refractory hard alloy. V. I. Voloshin. Russ. 56,039, Nov. 30, 1939. Powd. Fe, Ni, Co and corundum are sintered together.

Antifriction alloy. V. E. Borisov. Russ. 51,989, Nov. 30, 1937. The alloy contains Zn 46–75, Pb 15–35, Al 6–20 and Cu 4–6%.

Aluminum alloys. I. G. Farbenindustrie A.-G. Brit. 508,975, July 10, 1939. Al alloys contain Zn 2–6, Mg up to 12, Cr 0.05–1 and, if desired, Mn up to 1%, the Mg exceeding by at least 3% that required for the formation of $MgZn_2$. Ca 0.05–1% may be added. Work pieces of the alloys may be heat-treated by homogenizing and subsequent aging at ordinary or elevated temps. below 150° to improve their mech. strength and resistance to intercrystn. and stretch corrosion. Cf. *C. A.* **33**, 7724[3].

Free-cutting aluminum alloys. Adolf Beck and Hans Bohner (to I. G. Farbenind. A.-G.). U. S. 2,184,692, Dec. 26. See Brit. 492,228 (*C. A.* **33**, 1653[9]). U. S. 2,184,693 relates to alloys of generally similar compn. except that they do not contain Si.

Aluminum alloys suitable for casting. Wm. E. Mansfield. U. S. 2,185,348, Jan. 2. Alloys of finer-grain structure, higher-tensile strength and better casting properties than otherwise similar alloys not contg. a W-group metal contain Al together with Sb 0.05–15% and W or V or a like metal up to 3%.

Copper alloys suitable for paper-pulp chests and other apparatus. Elmore S. Straug, Richard O. Farmer and Edward H. Koenig (to New Haven Copper Co.). U. S. 2,185,956, Jan. 2. A corrosion- and abrasion-resistant alloy is formed of Cu together with Si 1–5% and about 0.5% each of Ni, Fe and Mn. U. S. 2,185,957 (Elmore S. Strang and Richard O. Farmer, joint inventors) relates to an alloy suitable for like uses, which may contain Cu 95, Si 3.5, Ni 0.5 and Fe 1%, having a tensile strength of about 70,000–118,000 PSI, a yield-point range of about 30,000–65,000 PSI, a modulus of elasticity of about 16.6×10^6, and an elongation rage of from about 2 to 47% in 2 in. U. S. 2,185,958 (Elmore S. Strang and Edward H. Koenig, joint inventors) relates to an alloy contg. Si 3.5, Ni 1.0 and Cu 95.5%, having a tensile-strength range from about 65,000 to 118,000 PSI, a yield point range from about 18,000 to 78,000 PSI, a modulus of elasticity of 17.4×10^6, and an elongation range of from about 2 to 60% in 2 in.

Copper-aluminum alloys suitable for light reflectors. Willem Hermsen and Francis J. Delves. U. S. 2,184,716, Dec. 26. See Brit. 491,223 (*C. A.* **33**, 959[9]).

Copper-zinc-tin alloys containing manganese. Stephen F. Hackley (to Bridgeport Rolling Mills Co.). U. S.

2,185,809, Jan. 2. Cold-workable alloys of good toughness, ductility, spring quality, tensile strength and elec. cond. contain Cu 87–90, Zn 9–12, Sn 2–4 and Mn 2% or less, added as a flux.

Iron or iron alloys. I. G. Farbenindustrie A.-G. Brit. 509,024, July 10, 1939. These are manufd. from Fe-bearing residues obtained in the pressure hydrogenation of carbonaceous materials, particularly coals, with the use of masses contg. Fe as catalysts by removing oily matter from the residues by filtration, centrifuging or low-temp. carbonization, e. g., at 500°, in such manner that so much oily matter remains in the residue as is required for the reduction of the metal compds. contained therein and smelting the thus prepd. residues.

Cast iron alloys. Wm. A. Oubridge. Brit. 508,850, July 4, 1939. Cylinder liners of internal-combustion engines are made of cast Fe of austenitic structure contg. Ni 10–20 and Cr 2–4% and having a coeff. of expansion exceeding 0.000016 per 1°. Other elements, e. g., Al, Mo, Ti, V, W and (or) Zr up to a total of 6% may be added. Cu up to 9% may be substituted for an equiv. wt. of the Ni. Suitable alloys contain C 2.5–3.5, 2.8; Si 1–3, 2.0; S up to 0.14, 0.10; P 1.2, 0.8; Mn 0.4–2, 1.0; Ni 10–20, 14.0; Cr 2–4, 3; Cu 0, 6.0; Fe being the remainder in each case.

Magnetic alloys of zirconium suitable for permanent magnets. Peter P. Alexander (to Metal Hydrides, Inc.). U. S. 2,184,769, Dec. 26. A powd. alloy contg. Zr together with Ni, Fe or Co is heat treated at about 345–800° in order to give high magnetic permeability and retentivity.

Thermostatic element. Romaine G. Waltenberg (to H. A. Wilson Co.). Can. 387,019, Feb. 20, 1940. An iron alloy of high expansion coeff., contg. Ni + Co 17–20, Co 0.10 max., Cr 6–15, C 0.15 max., Mn 0.9–1, Si 0.15 max., S 0.02 max., P 0.02% max., is combined with an iron alloy of low expansion coeff., contg. Ni + Co 36–42, Co 0.4 max., Cr 5–9.5, C 0.15 max., Mn 0.50 max., Si 0.15 max., S 0.02 max., P 0.02% max. Cf. *C. A.* **33**, 3325[4].

Protective film on iron, steel and aluminum. E. I. Zabyvaev and I. I. Ershov. Russ. 56,037, Nov. 30, 1939. The metals are treated with a soln. of saltpeter, $CuCO_3$, Cr_2O_3 and H_2O at a temp. not over 115°.

Finishing the surfaces of metal articles such as zinc or brass castings, etc. Joseph Lupo, Jr. U. S. 2,185,262, Jan. 2. The articles are tumbled in a dry mass contg. vegetable-ivory chips, and abrasive material with lubricating and adhesive vehicles.

Apparatus for surfacing steel billets, etc., by the action of a blowpipe. James H. Bucknam (to Linde Air Products Co.). U. S. 2,186,096, Jan. 9. Various structural, mech. and operative details.

Use of phosphate coating solutions on ferrous metal surfaces. Gerald C. Romig (to American Chemical Paint Co.). U. S. 2,186,177, Jan. 9. A method of coating a ferrous metal surface by treating it with an aq. acid phosphate coating soln. where the surface is first cleaned with an alk. cleaning soln. includes the step of rinsing the surface after the cleaning operation with an aq. soln. having an acidity within the range pH 4.2 to 6 before treating it with the coating soln. Cf. *C. A.* **33**, 8166[7].

Use of molten metal (such as that for galvanizing) for coating pipes. Geo. T. Church (to Fretz-Moon Tube Co.). U. S. 2,184,610, Dec. 26. Various details of app. and operation.

Compositions for rustproof coating of metals such as iron. John C. Zimmer and Jack B. Crutchfield (to Standard Oil Development Co.). U. S. 2,184,952, Dec. 26. A hydrocarbon coating vehicle is used contg. at least 5% of an aldehyde-free unsatd. distn. residue of acids produced by the low-temp. liquid-phase catalytic oxidation of hydrocarbon wax at atm. pressure. An arrangement of app. is described.

Metal-blasting material. Gustave H. Kann (to Globe Steel Abrasive Co.). U. S. 2,184,926, Dec. 26. A material in the form of shot or grit, suitable for use in "sand blasting" machines, contains Fe together with C 2–4, Si 0.5–3, Mn 0.2–2, S 0.3 or less and P 0.05–2%, and is at least partially malleabilized from white iron and cooled at such a rate that its toughness is increased and its hardness is decreased to within a range from 125 to 500 on the Brinell scale.

Corrosion-resistant ferrous alloys suitable for casting. James A. Parsons, Jr. (to Durion Co.). U. S. 2,185,987, Jan. 2. Alloys contg. Ni 23–30, Cr 17–22, Si 0.5–2, Cu 3–5, Mo 2–4 and C up to 0.12%, the remainder being practically all Fe (the Mo always predominating over Si and both together not exceeding 5%) are resistant to corrosion, have good casting properties and good cold-bending properties as cast (a standard specimen as cast withstanding a cold bend of at least 90° without failure). Cf. *C. A.* **33**, 960[3].

Inhibiting rusting of ferrous metal surfaces such as those of plates, wires, etc. Wm. K. Griesinger (to Atlantic Refining Co.). U. S. 2,186,018, Jan. 9. There is applied to the surface a substantially nonsticky and nongummy film of viscous hydrocarbon oil substantially free from constituents tending to stain, corrode or react with the ferrous metal surface and contg. about 10% (more or less) of an alkyl stearate or naphthenate such as butyl stearate.

Filler material suitable for use in welding, etc. Arthur R Lytle (to Oxweld Acetylene Co.). U. S. 2,186,115, Jan. 9. Filler material contains Cu 62–47, Cd 1–6, Si 0.01–0.5%, the remainder being Zn. U. S. 2,186,116 relates to a filler material contg. Pb 8–18, Sn 5–12, Zn 8–15, Si 0.05–0.5%, the remainder being Cu. U. S. 2,186,117 relates to filler material contg. Cu 62–47, Cd 1–6, Ag 10% or less, Si 0.01–0.5%, the remainder being Zn.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Raw-material base for the organic chemical industry in the United States of America. I. G. Gershman. *Org. Chem. Ind.* (U. S. S. R.) **6**, 116–19(1939).—A review of the sources of raw materials and their methods of reworking based on the literature. Extensive bibliography.
Chas. Blanc

Synthetic organic chemicals; United States production and sales. Anon. U. S. Tariff Comm., Rept. No. **136**, 59 pp. (1938). G. G.

Physical properties of some purified aliphatic hydrocarbons. Donald B. Brooks, Frank L. Howard and Hugh C. Crafton, Jr. *J. Research Natl. Bur. Standards* **24**, 33–45(1940)(Research Paper No. 1271); cf. *C. A.* **34**, 1969[8]. —Four olefin and 7 paraffin hydrocarbons have been obtained in a high state of purity by careful fractionation. Eight of these were synthesized; two, heptane (I), and 2,2,4-trimethylpentane (II), were obtained from com. sources; and one, 2,3,4-trimethylpentane (III), was isolated from synthetic crude. Their consts. are given below in the order: compd., f. p., b_{760}, dt/dP (degrees/mm. Hg), n_D^{20}, n_D^{25}, dn/dt (20° to 25°) per degree, d_{20}, d_{25}, dd/dt (20° to 25°) (g./ml./degree). 3,3-Dimethyl-1-butene, −115.53°, 41.239°, 0.0397°, 1.37604, 1.37295, −0.000618, 0.65293, 0.64786, −0.001014; 2,3-dimethyl-1-butene, −140.1°, 55.615°, 0.0410°, 1.39022, 1.38724, −0.000596, 0.67801, 0.67322, −0.000958; 2,3-dimethyl-2-butene, −75.4°, 73.24°, 0.0414°, 1.4121, 1.4092, −0.00057, 0.7088, 0.7045, −0.00086; 2,3,3-trimethyl-1-butene, −111.40°, 77.874°, 0.0447°, 1.40292, 1.40004, −0.000576, 0.70501, 0.70054, −0.000890; 2,2-dimethylbutane, −100.06°, 49.731°, 0.0407°, 1.36864, 1.36592, −0.000543, 0.64902, 0.64432, −0.000940; 2,3-dimethyl-

butane, −129.79°, 57.999°, 0.0412°, 1.37490, 1.37212, −0.000556, 0.66150, 0.65699, −0.000921; 2,2,3-trimethylbutane, −25.059°, 80.879°, 0.0449°, 1.38947, 1.38683, −0.000528, 0.69000, 0.68576, −0.000848; 3-ethylpentane, −118.65°, 93.473°, 0.0446°, 1.39337, 1.39084, −0.000506, 0.69818, 0.69377, −0.000882; I, −90.60°, 98.424°, 0.0449°, 1.38764, 1.38511, −0.000506, 0.68368, 0.67943, −0.000849; II, −107.37°, 99.233°, 0.0465°, 1.39155, 1.38915, −0.000480, 0.69189, 0.68778, −0.000822; III, −109.97°, 113.391°, 0.0479°, 1.40431, 1.40193, −0.000476, 0.71903, 0.71507, −0.000791.

Amos G. Horney

Chemistry and mechanism of pyrolysis of ethylene. (Method for production of technically valuable butadiene.) M. Schultze and G. R. Schultze. *Oel Kohle Erdoel Teer* 15, 193–8, 215–20, 233–41; *Kautschuk* 15, 182–5, 195–201 (1939).—The pyrolysis of C_2H_4 has been studied in a statical system at 400–680°/300–1156 mm. and in a flow system (admixed with N_2) at 777–884°/1 atm. (reaction time 0.2–1.5 sec.). The reaction vessels were of SiO_2. The principal reactions were $2C_2H_4 = C_4H_8$ in the statical expts. and $2C_2H_4 = C_4H_6 + H_2$ in the flow expts. The first reaction was of the 2nd order; it was strongly catalyzed by traces of O. Analysis of the results on the basis of the Arrhenius equation showed the existence of a large steric factor. Among the other reaction products were C_2H_2, C_6H_6 and H. A scheme for the reaction mechanism is suggested, based on the above results and on supplementary expts. on the decompn. of various mixts. (e. g., $C_2H_4 + C_4H_6$ and $C_2H_2 + C_2H_4$) in the flow app. The thermal decompn. of C_2H_4 offers a means for the tech. production of butadiene. B. C P. A.

Influence of the substituents on the velocity of catalytic hydrogenation of certain trisubstituted ethylenes in the presence of platinum. B. A. Kazanskiĭ and G. T. Tatevosyan. *J. Gen. Chem.* (U. S. S. R.) 9, 1458–64(1939). 1-Methyl-2,2-diethyl- (I), 1,2-dimethyl-1-phenyl- (II), 1-methyl-2,2-diphenyl- (III) and triphenylethylene (IV) were prepd. by known methods. The individual ethylenes and equimol. mixts. of I with II, III and IV were hydrogenated in 96% alc. in the presence of Pt black at room temp. by the method described in an earlier paper (*C. A.* 33, 4204⁴). The graphic results show that the velocity of hydrogenation of trisubstituted ethylenes decreases with increasing no. of aryl substituents in the mol. The drop in velocity is particularly sharp with the introduction of a 2nd aryl substituent. The hydrogenation of mixed hydrocarbons proceeds simultaneously. However, because of the different character of substituents and the resulting difference in the hydrogenation velocity of the individual hydrocarbons and the distribution of H between the components of mixts., the reaction shows some selectivity, which becomes more pronounced with greater no. of Ph substituents in the 2nd component. Chas. Blanc

Determination of the specific gravity of vinylacetylene. K. Kuchinskaya and Anitina. *Shornik Trudov Otdynogo Zavoda im. S. V. Lebedeva* 1938, 26–7; *Khim. Referat. Zhur.* 2, No. 5, 65(1939).—The detn. of d. of pure vinylacetylene (b. 5°) was performed in a sealed dilatometer. The following data were obtained for d. −10°, 0.7187; −5°, 0.7128; 0°, 0.7067; 5°, 0.7010; 10°, 0.6954; 15°, 0.6895; 20°, 0.6835; 25°, 0.6780; 30°, 0.6679.

W. R. Henn

The theory of the structure and the questions of the dynamics of organic molecules. A. E. Favorskiĭ. *Uchenye Zapiski Leningrad. Gosudarst. Univ.* 3, No. 17, 171–80(1937).—A discussion of advances made in the field of structural rearrangements, isomerism, tautomerism, etc. A successful utilization on an industrial production scale of the synthesis of butadiene rubber starting with EtOH is described. A modified German method for the synthesis of isoprene rubber was developed in which the expensive $NaNH_2$ was replaced with KOH, and the yield of the alc. increased from 35 to 85% of the theoretical yield. By means of the electrolytic hydrogenation of $Me_2C(OH)C{:}CH$ the isoprene rubber is being produced on a semi-industrial scale with a yield of dimethylvinylcarbinol up to 95%, while by hydrogenation a higher-boiling fraction is obtained (1-isobutenylcarbinol). It was found that an equil. isomerism exists between these 2 substances (dimethylvinylcarbinol and 1-isobutenylcarbinol). A no. of investigations were devoted to the transformations of α-keto alcs. The process of alc. fermentation is explained as a no. of reactions of simultaneous oxidations and reductions. A scheme of successive transformations is given.

W. R. Henn

Hydrolysis of tertiary alkyl halides. Nicholas D. Cheronis. *Trans. Illinois State Acad. Sci.* 32, No. 2, 101–2(1939).—Measured amts. of *tert*-amyl halides were heated at 100° for 100 hrs. in sealed ampoules, and the resultant mixts. extd. by hexane. The org. layer was analyzed for unreacted halide by shaking with standard $AgNO_3$ soln. and for olefin by titrating with standard bromide-bromate soln. About 60% of the chloride and bromide was hydrolyzed, and about 50% of the iodide. Alkali increases the yield of olefin, but does not repress entirely the formation of carbinol. Equil. mixts. seem to be formed, since the resultant products are strongly affected by excess water. Further the resultant mixt. can be approached by heating together olefin, acid and water. Some of the results are unexpected, and it is concluded that no single generalization can be made about the hydrolysis of tertiary halides. J. H. Reedy

The iodine-sensitized decomposition of methyl alcohol. G. K. Rollefson and Warren Garrison. *J. Am. Chem. Soc.* 62, 588–90(1940).—The I-sensitized decompn. of MeOH has been studied at 325°. The net over-all reaction may be represented by the equation $3MeOH = 2CH_4 + CO + 2H_2O$. This is the resultant of 2 parallel reactions, one an oxidation of the alc. by I to CO, the other a reduction by HI to CH_4. These reactions are represented by the equations $MeOH + 2I_2 = CO + 4HI$ and $MeOH + 2HI = CH_4 + I_2 + H_2O$. Tables are given for the distribution of I and for the amts. of CH_4 and CO present during the reaction. A. B. Garrett

Preparation of higher alcohols by the Grignard method. Victor S. Webster and Arnold E. Schaefer. *Proc. S. Dakota Acad. Sci.* 19, 124–9(1939). Light-yellow waxy cetyl bromide (I), m. 10–17°, prepd. in 80% yield by refluxing 320 g. cetyl alc. with 1056 g. const.-boiling HBr for 4 hrs., was converted to the Grignard compd. and treated with gaseous HCHO (prepd. by heating paraformaldehyde on an oil bath at 260°) to form waxy heptadecyl alc. (II), m. 53°, in 53% yield (on basis of 160 g. I, 390 cc. anhyd. ether and 20 g. Mg powder with a trace of I). II (18 g.), refluxed with 54 g. const.-boiling HBr, gave the yellow waxy bromide (III), m. 28°, in 82% yield. III (17 g.) in 33 cc. Et_2O was added to 2.5 g. Mg powder in 35 cc. ether, and HCHO from 9 g. paraformaldehyde passed into the mixt., yielding waxy octadecyl alc. (IV), m. 58°, in 64% yield. IV (6 g.) refluxed with 27 g. const.-boiling HBr gave the yellow waxy bromide, m. 52°, in 79% yield. Forms, yields and m. ps. of the iodides prepd. by the method of Gascard (*C. A.* 16, 48) and acetates prepd. by the method of Meyer and Reid (*C. A.* 27, 2420) were resp.: cetyl, yellow wax, 76%, 23°, white wax, 42%, 21–2°; heptadecyl, yellow-orange wax, 78%, 33–34°, white wax, 48%, 24–5°; octadecyl, yellow-orange wax, 73%, 33°, white wax, 56%, 27°. Creams contg. 8 g. stearic acid, 2 g. borax, 16 cc. olive oil and 80 cc. water are stabilized with 1% of heptadecyl or octadecyl alc.

George Ayers

Preparation of higher tertiary alcohols. V. V. Korshak. *J. Gen. Chem.* (U. S. S. R.) 9, 1470–2(1939).—A mixt. of 20 g. cetyl bromide, 10 g. Et stearate and 1.6 g. Mg in 100 ml. ether was refluxed 20 hrs. and filtered hot. Fractional recrystn. of the filtrate ppt. from ether, petr. ether and alc. gave dotriacontane, m. 64–5°, *dihexadecylheptadecylmethanol*, $(C_{16}H_{33})_2C(OH)C_{17}H_{35}$, m. 45–6°, and a product, m. 39–40°, which was not investigated. Refluxing 1 hr. the Grignard reagent from 51 g. PhBr and 9 g. Mg in 100 ml. ether with 33 g. Et stearate in 50 ml. ether and decompg. the reaction mixt. with aq. NH_4Cl gave *diphenylheptadecylmethanol*, $Ph_2C(OH)C_{17}H_{35}$, m. 51–2°. When vacuum-distd. it cleaved H_2O and gave *1,1-diphenyl-2-hexadecylethylene*, $C_{16}H_{33}CH{:}CPh_2$, m. 6°, b_{10} 228–30°, d_4^{25}

0.9297, n^{25}_D 1.5295, M. R.$_D$ 134.2; *dibromide*, m. 34°. Condensation of 32 g. PhBr and 5 g. Mg with 25.3 g. stearone in 300 ml. (iso-Am)$_2$O gave *phenyldiheptadecylmethanol*, $PhC(OH)(C_{17}H_{35})_2$, m. 46–7°; *bromide*, m. 70–1°. Chas. Blanc

Chemistry of substituted acetylenes and their derivatives. XXXVII. Addition of hydroxy compounds to acetylenic alcohols. J. F. Froning and G. F. Hennion. *J. Am. Chem. Soc.* **62**, 653–5(1940); cf. *C. A.* **34**, 2321⁹.— $Me_2C(OH)C{:}CH$ (I) and MeOH with the HgO-BF_3 catalyst (4–5 g. red HgO, 5 ml. Et_2O-BF_3, 5 ml. MeOH and 1–3 g. Cl_3CCO_2H), heated 3 hrs. at 45–55°, give 80% of *3,3-dimethoxy-2-methyl-2-butanol* (II), b_{50} 81°, n^{25}_D 1.4248, d^{20} 0.974, and 4.4% of *2,5-dimethoxy-2,3,3,5,6,6-hexamethyl-1,4-dioxane* (III), $Me_2C.C(OMe)Me.O.CMe_2.C(OMe)Me.O$, m. 107°. Hydrolysis of II or III with dil. H_2SO_4 gives $Me_2C(OH)Ac$, b_{50} 65°, b_{760} 139°, n^{25}_D 1.4150, d^{20} 0.950. When boiled with MeOH contg. a trace of acid III gives II. I and AcOH with the above catalyst give 49% of 2-acetoxy-2-methyl-3-butanone (IV), b_{50} 93°, n^{25}_D 1.4180, d^{20} 1.008 (Scheibler and Fischer, *C. A.* **17**, 1419). $Me_2C(OH)C{:}CC(OH)Me_2$ and MeOH or AcOH with the HgO-BF_3 catalyst give 77–8% of 2,2,5,5-tetramethyltetrahydro-3-furanone, b_{50} 71°, n^{25}_D 1.4197, d^{20} 0.9255 (semicarbazone, m. 190° (Dupont, *C. A.* **8**, 1579); the triple bond is hydrated before the cyclization. Heating 351.5 g. II and 0.1 g. *p*-$MeC_6H_4SO_3H$ at 150–80° for 8 hrs. gives 110 g. distillate, b. 64° (MeOH); neutralization of the residue and distn. gives 115 g. of a mixt., b_{750} 123–65°, which yields MeOH, V and VI on further distn. A 2nd fraction (67 g.), b_{50} 78–82°, gives on redistn. *1,3,3,4,6,6-hexamethyl-2,5,7-trioxabicyclo[2.2.1]heptane* (V), $Me_2C{<}O{>}CMe_2$ (O bridges), b_{750} 165°, n^{25}_D 1.4199, d^{20} 0.972; this was also prepd. by S. and F. by the action of P_2O_5 upon IV but they gave it the formula $(O.CMe_2.CMe)_2O$; formula V is favored by the parachor measurements and by the fact that it is unchanged after prolonged boiling with MeOH contg. *p*-$MeC_6H_4SO_3H$. A 3rd fraction b_{50} 110–12°, n^{25}_D 1.4533, d^{20} 0.979, is the dioxane, $MeOCMe.CMe_2.O.C(:CH_2).CMe_2.O$ (VI). In the presence of acid VI adds MeOH to give III. When heated with a trace of acid III loses MeOH to give V and VI. C. J. West

Synthesis of isopropyl ether. VII. Dehydration of isopropyl alcohol into isopropyl ether in an atmosphere of propylene under pressure and some supplementary experiments. Masaharu Katuno. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 422–4(1939); cf. *C. A.* **33**, 6237¹.—A mixt. of H_2SO_4 and iso-PrOH was placed in an enameled beaker and inserted in an agitating autoclave. A definite amt. of C_3H_6 was liquefied on the surface of the mixt. The autoclave was heated for several hrs. and then allowed to cool. C_3H_6 formed was collected in a gas holder and measured. The highest yield of $(iso\text{-}Pr)_2O$, 62% of theory and 16% greater than without the addn. of C_3H_6, was obtained at 140° for 6 hrs. with a ratio of iso-PrOH:H_2SO_4 of 10:1 and a final pressure of 27 atm. The recovery of iso-PrOH was also increased from 18% to 20–21%. Decreasing the space in the autoclave by increasing the reaction mixt., without compressing in addnl. C_3H_6 also increased the yield of $(iso\text{-}Pr)_2O$ to 51–52% of theoretical. These results support the reaction mechanism previously postulated. Mark Plunguian

Synthesis of the sodium salt of tetradecamethylenedisulfonic acid. Gilbert C. H. Stone. *J. Am. Chem. Soc.* **62**, 571–2(1940); cf. *C. A.* **30**, 2918⁴.—The earlier work showed that the synthesis of the C_{10} disulfonate by the Strecker reaction required 168 hrs. for complete conversion; to avoid the long period of heating which would be necessary for the higher members, other methods were sought. The dixanthate was found to be a suitable intermediate. $(CH_2)_{14}(OH)_2$ and HBr give 65% of *tetradecamethylene dibromide* (I), b_{2-3} 172–5°. I (402 g.) in 2 l. hot EtOH was added slowly to 480 g. of K ethylxanthate in 2 l. EtOH and refluxed with stirring for 24 hrs. Removal of the EtOH and purification of the ether soln. give a yellow liquid which was dissolved in dioxane, H_2O added to turbidity and then in alternate small portions 2720 g. Br and 1000 ml. H_2O; after several hrs. the Br and HBr are removed on the steam bath and by repeated distn. under reduced pressure, $AgNO_3$ is added and the ppt. is extd. with hot H_2O to remove the Ag disulfonates; the Ag is removed as Ag_2S and the soln. neutralized with NaOH, giving 54% of *Na tetradecamethylenedisulfonate*, with a grayish cast and not very sol. in H_2O; the salt showed no tendency to hydrolyze. C. J. West

2-Aminobutane, di-*sec*-butylamine and butyl-*sec*-butylamine and their preparation in the optically active state. Andrée Fleury-Larsonneau. *Bull. soc. chim.* **6**, 1576–82 (1939).—The catalytic reduction of 80 g. MeCOEt in 200 g. of 10% NH_4OH in the presence of a divided Ni catalyst (or Raney Ni) contg. 10 g. of Ni, at a pressure of 25 kg. at 60–120° in a rocking stainless-steel lined autoclave gave 54 g. of 2-aminobutane (I), b. 66°, and 5.4 g. of di-*sec*-butylamine (II), b. 132–4°, in an over-all yield of about 80%. By a modification of the method of Thomé (*Ber.* **36**, 582 (1903)) I was resolved. I (48 g.) dild. with 50 cc. H_2O was treated with 30% *d*-tartaric acid until neutral to litmus and with an equal addnl. amt. to form the bitartrate. The mixt. was evapd. down to 265 g. and, on cooling, gave 125 g. of bitartrate. Two recrystns. from hot H_2O gave 52 g. of hard brilliant crystals of the *d*-bitartrate (III). Decompn. of III with boiling NaOH and distn. gave 15 g. of *d-2-aminobutane*, $[\alpha]_D$ 7.4°. The mother liquors from III were neutralized with racemic acid and the soln. was evapd. down to 300 g., yielding 100 g. of crystals. These crystals were recrystd. twice from hot H_2O, producing mother liquors (IV) and 54 g. of crystals, and, again, mother liquors (V) and 30 g. of crystals (VI). Concn. of IV and V gave 39 and 30 g. of crystals, which on recrystn. and seeding with VI, gave 25 g. of VI. VI gave an amine, $[\alpha]_D$ −5.0°, of which 12 g. on neutralization with 20% *l*-tartaric acid gave fine, hard brilliant crystals, yielding 8 g. of *l-2-aminobutane*, $[\alpha]_D$ −7.1°. A mixt. of 18 g. of 2-bromobutane and 10 g. I was heated for 15 hrs. in the presence of 15 g. abs. alc. After neutralization with H_2SO_4, the product was distd. free from unreacted bromobutane and alc. The sulfates were decompd. with NaOH and extd. with ether. Distn. of the residue from the ext. gave unreacted I and then 12 g. of colorless II; picrate, m. 65°. A similar prepn. from bromobutane and I by heating for 4 hrs. in alc. gave butyl-*sec*-butylamine (VII), b. 146–8°; picrate, m. 105°. From *d*-2-aminobutane the *d-forms* of II and VII, $[\alpha]_D$ 23.6° and 16.1°, resp., were also prepd. C. R. Addinall

Action of nitrous acid on formaldehyde. Henrietta Margaret Halliday and Thomas H. Reade. *J. Chem. Soc.* **1940**, 142–3.—In an attempt to repeat Vanino and Schinner's expts. (*C. A.* **7**, 1461) in which they reported that HNO_2 and HCHO give CO_2, H_2O and N_2, it was found that 94% of the gaseous products consist of NO and 6% of N; nitrate from 29 to 41% remained in soln. The total amt. of gas was approx. const. whether collected over Hg, H_2O, $Ca(OH)_2$ or 50% KOH and corresponded to about 66% of the HNO_2 used. The CO_2 formed was less than 1/50 of that demanded by V. and S.'s equation. Almost the whole of the HCHO is recovered unchanged, not more than 3.8% of it being decompd. or lost in any expt. The reaction therefore consists almost entirely in the thermal decompn. of HNO_2 into HNO_3, NO and H_2O. C. J. West

The chlorination of carbon chains. Max I. Bowman. *Proc. S. Dakota Acad. Sci.* **19**, 112–14(1939).—Chlorination of PrOH in the presence of catalysts such as $AlCl_3$, Mg turnings or chromyl chloride below 45–50° gave $MeCHCl\text{-}CHO$ (I) as the chief product, as well as an acetal, b_{23} 105–8°, of unknown constitution but possibly derived from $ClCH_2CH_2CHO$ (II). Sunlight had a varied effect on the reaction, II possibly being formed in one instance. Electrolytic chlorination of PrOH gave only a small yield of I

and no II. Chlorination of BuOH (1) in sunlight gave a chloro acetal of unknown compn. and (2) at low temp. gave, besides polymers, a monochlorobutyraldehyde (III), b. 105–6°. The di-Et acetal of III, b_{15} 102–5°, was less stable than the di-Et acetal of $MeCHClCH_2CHO$. Chlorination of the di-Et acetal of $MeCH_2CH_2CHO$ gave a fairly stable mono-Cl deriv., b_{15} 98–101°, b. 182–5°, in which the Cl possibly has the γ-position, as well as small amts. of other isomeric products. George Ayers

Physical properties and chemical constitution. V. Alkyl ketones. David M. Cowan, Geo. H. Jeffrey and Arthur I. Vogel. *J. Chem. Soc.* **1940**, 171–6; cf. *C. A.* **33**, 8180[8]; **34**, 1625[8].—Details are given of the elec. furnace used in the prepn. of the ketones and of the prepn. of the *MnO catalyst* by absorption of $MnCO_3$ on pumice and heating in a N stream at 400–50° for 8 hrs. One l. of acid is circulated over the catalyst in from 72 to 94 hrs. $EtCO_2H$ (I) gives 59% Et_2CO (II); $PrCO_2H$ (III) gives 50% of Pr_2CO (IV); 8 mols. AcOH (V) and 4 mols. III give 31% Me_2CO (VI), 35% AcPr (VII) and 16% IV; 4 mols. each of V and III, 32% VI, 34% VII and 19% IV; 2 mols. V and 6 mols. III, 15.5% VI, 42% VII and 31% IV; 6 mols. V and 2 mols. III, 43% VI and 44% VII; 2 mols. V and 4 mols. III, 21% VI, 44% VII and 27% IV; 8 mols. I and 4 mols. III, 59% II, 49% EtCOPr (VIII) and 15% IV; 4 mols. each of I and III, 57% II, 54% VIII and 29% IV; 2 mols. I and 4 mols. III, 21% II, 41% VIII and 25% IV; 2 mols. I and 6 mols. III, 31% II, 66% VIII and 30% IV; 6 mols. I and 2 mols. III, 62% II and 18% VIII. AcBu and AcAm could not be prepd. by this method because of the production of resinous compds. The fraction of the ketones b. over 1–2° was purified through the semicarbazone and the ketone liberated with $(CO_2H)_2$. *n* is given for C, D, F and G′ (in this order); values are given for R_L for C, D, F and G′ and for G′-C and F-C; d. and γ are given for 3 or 4 temps., from which *P* (parachor) is calcd.; the no. in parentheses after γ is the temp. coeff. In each case the m. p. of the semicarbazone is given. VI, b_{762} 56°, *n* 1.35827, 1.36023, 1.36190, 1.36818, d_4^{20} 0.7960, γ_{20} 23.90 (0.10) (other values for d. and γ at 20°), *P* 161.6. AcEt, $b_{762.5}$ 81°, *n* 1.37683, 1.37881, 1.38333, 1.38712, d. 0.8058, γ 24.50(0.10), *P* 199.5. II, b_{751} 102°, *n* 1.39012, 1.39220, 1.39702, 1.40064, d. 0.8138, γ 25.29(0.11), *P* 237.4. VII, b_{756} 102°, *n* 1.38815, 1.39018, 1.39511, 1.39846, d. 0.8089, γ 24.82(0.11), *P* 238.0. VIII, b_{760} 125°, 1.39844, 1.40072, 1.40563, 1.41064, d. 0.8118, γ 25.54(0.11), *P* 277.3. IV, b_{767} 145°, *n* 1.40465, 1.40692, 1.41185, 1.41568, d. 0.8145, γ 25.38(0.10), *P* 315.1; AcBu, b_{757} 127.5°, *n* 1.39861, 1.40072, 1.40585, 1.40943, d. 0.8095, γ 25.43(0.10), *P* 277.5; iso-BuAc, b_{766} 118.5°, *n* 1.39352, 1.39562, 1.40064, 1.40420, d. 0.7978, γ 23.64(0.09$_5$), *P* 276.5. AcAm, b_{766} 151°, *n* 1.40640, 1.40860, 1.41380, 1.41755, d. 0.8111, γ 26.60 (0.10), *P* 319.1. Me hexyl ketone b_{758} 175°, *n* 1.41309, 1.41536, 1.42058, 1.42409, d. 0.8179, γ 25.73(0.07$_5$), *P* 355.7. $(iso\text{-}Bu)_2CO$, $b_{760.5}$ 168°, *n* 1.40990, 1.41206, 1.41727, 1.42109, d. 0.8053, γ 24.09(0.08$_5$), *P* 391.6. The chief feature of these results is the steady increase in the *P* difference for CH_2 in passing from VI to AcAm (37.9 to 41.6); this may be due largely to the Thorpe-Ingold valency deflexion effect. C. J. West

The reduction of aliphatic acid amides under high pressure. I. Sei-iti Ueno and Sin-itiro Takase. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 409–10(1939)(in German).—Me laurate, b_{15} 140–4°, heated in an autoclave with 33% NH_4OH, gives the amide (I), m. 98° after recrystn. from alc. Myristoyl and palmitoyl chlorides, treated with ammonia, gave the corresponding amides (II and III), m. 102–3° and 103–4°. Reduction of I, II and III, resp., in dioxane by Adkins' method (*C. A.* **26**, 2828) in the presence of $CuO\text{-}Cr_2O_3\text{-}BaO$ catalyst under 96–100 atm. initial and 203–210 atm. max. H pressure at 240–310° gave products consisting mostly of the corresponding secondary amines (didodecylamine, m. 51–3°; ditetradecylamine, m. 56–8°; and dicetylamine, m. 64–5°), NH_3 and possibly very small amts. of the corresponding primary amines. The formation of secondary amine is explained by: $RCONH_2 + 4H \rightarrow RCH_2NH_2 + H_2O$; and $2RCH_2NH_2 \rightarrow (RCH_2)_2NH + NH_3$, the 2nd reaction being more rapid than the first. George Ayers

Synthesis of acetylene γ-glycols. A. Babayan, B. Akopyan and R. Gyuli-Kevkhyan. *J. Gen. Chem.* (U. S. S. R.) **9**, 1631–2(1939); cf. *C. A.* **34**, 1616[9].—Preliminary expts. showed that the method of Favorskiĭ (*J. Russ. Phys.-Chem. Soc.* **1902**, 242) of alk. condensation of C_2H_2 and ketones to alcs. can be used in the prepn. of acetylene γ-glycols in good yields. The synthesis is effected by treating 10 g. ketone and 30 g. KOH in 100 ml. ether at 9–10° with 14 l. C_2H_2 in 1–2.5 hrs. and hydrolyzing the reaction mixt. the next day with H_2O. The reaction mixt. is freed from the ether and fractionated. The reaction with Me_2CO gave 59.6% *2,5-dimethyl-3-hexyne-2,5-diol*, m. 94–5°, and some butynol. MeCOEt gave 43% *3,6-dimethyl-4-octyne-3,6-diol*, m. 54°, and pentynol. Cyclohexanone gave 38% *bis(hydroxycyclohexyl)acetylene*, m. 105–6°, and (hydroxycyclohexyl)acetylene. C. B.

The reaction between acetylenedimagnesium dibromide and carbonyl compounds. Yu. S. Zal'kind and S. M. Labuzov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1525–32(1939). —The influence of the structure of CO compds. on the condensation of aldehydes and ketones with $(BrMgC{:})_2$ (I) in the synthesis of acetylene γ-glycols by the Iotzich method is studied. To this end, I, prepd. from 2 g. Mg, 12 g. EtBr and 100 ml. ether, is treated at 0° with a definite quantity of an aldehyde and ketone for measured periods of time and the reaction mixt. is decompd. with H_2O contg. H_2SO_4. The vol. of liberated C_2H_2 gives the amt. of unaltered I and indirectly the C_2H_2 used in the reaction. The exact content of I in the reagent was detd. by expelling the ether and decompg. the residue with H_2O. It was 915 ± 10 ml. C_2H_2, corresponding to 98.06% I. This figure was used in calcg. the results of the condensation reactions. Furthermore, since some C_2H_2 is dissolved by ether in the I reagent, its mean content was detd. by decompg. the reagent with water without the preliminary removal of the ether and heating the mixt. on a water bath. A vol. of 1249 ml. C_2H_2 was collected or 334 ml. in excess of the amt. liberated in the decompn. of I reagent with the previous expulsion of the ether. This C_2H_2 amt. was deducted from the C_2H_2 formed in the decompn. of the condensation reaction mixt. In the condensation with Me_2CO, MeCOEt, MeCOPr, Et_2CO, MeCOPh and Ph_2CO the reaction proceeds rapidly in the first 15 min. with the decompn. of 56.63% I and reaches a max. of 57.8% in 1 hr. This limit is not exceeded by longer duration of the reaction (4 hrs.) or by the use of a large excess of ketones (10 times). In the presence of I excess the condensation proceeds nearly quantitatively. The results show that the reaction is not reversible, hence the incomplete condensation is not caused by a reaction equil. in conformity with the law of mass action. It is probable that the reaction stops because of the occlusion of I by the insol. Mg complex formed in the reaction. The reaction proceeds in 2 stages: $Me_2CO + I \rightarrow Me_2C(OMgBr)C{:}CMgBr$; $Me_2C(OMgBr)C{:}CMgBr + Me_2CO \rightarrow [Me_2C(OMgBr)C{:}]_2$. This is confirmed by the formation of a glycol (tetramethyl-2-butyne-1,4-diol) and alc. $(Me_2C(OH)C{:}CH)$. In general, the velocity of condensation decreases with increasing mol. wt. of ketones. Aldehydes (AcH, EtCHO, PrCHO and BzH) react with I more rapidly to a max. of 70.16% decompn. (AcH). Chas. Blanc

The interaction of sodamide with carbonyl compounds incapable of enolization. L. Kh. Freĭdlin, A. I. Lebedeva and N. A. Kuznetsova. *J. Gen. Chem.* (U. S. S. R.) **9**, 1589–97(1939); cf. *C. A.* **33**, 8566[6].—The investigation of the interaction between $NaNH_2$ and carboxylic acids and ketones in the absence of a solvent is continued with higher ketones of the aliphatic, aromatic and terpene series. Again the reaction resulted in the formation of $NaHCN_2$, corresponding hydrocarbons and H. The reaction with the compds. in which the CO group is linked with a metal ($Fe(CO)_5$ and $W(CO)_6$) and with N ($CO(NH_2)_2$ and $CO(HNPh)_2$) formed $NaHCN_2$ and metal, NH_3 and $PhNH_2$, resp. The mechanism of the reactions is explained according to the general equations given in earlier papers (*C. A.* **32**, 1651[7], 9040[8]). The solid ketones were fused with Na-

NH_3 and volatile ketones were passed over $NaNH_2$ in an elec. furnace. The exothermic reactions were regulated to prevent excessive decompn. $(Me_3C)_2CO$ at 220° gave 33% Me_3CH. β-Benzopinacolone at 200° gave 80.88% Ph_3CH and C_6H_6; if the solid reaction product is reworked with C_6H_6 instead of PhMe, it forms the complex compd. $Ph_3CH.C_6H_6$, m. 77–8°. Michler's ketone at 180° formed 85% $PhNMe_2$. The reaction with fenchone at 280° afforded 36% of 1-methyl-3-isopropylcyclopentane, b_{762} 137–8.5°, d_4^{20} 0.7771, n_D^{20} 1.4278 M.R.$_D$ 41.74. It is identical with the product obtained from dihydrocamphorone by Kazanskiĭ (cf. *C. A.* **24**, 75). The reaction with Ph_2CO at 120° failed to give the expected Ph_2CH_2. $(CO_2Et)_2$ does not react at 100°. At 215° it gave H and $NaHCN_2$. Evidently the McONa is formed and decompd. in the reaction. HCO_2Et acts analogously. Urea at 140° formed NH_3, and $(PhNH)_2CO$ at 235° gave 26.6% $PhNH_2$. $Fe(CO)_5$ is completely decompd. at 156°, giving Fe, 85.7% H and 14.3% CO. $W(CO)_6$ is decompd. at 215° with a greater proportion of CO in the gaseous reaction products as the result of a more drastic thermal decompn. Chas. Blanc

Possible existence of polyiodides in mixed alcoholic solutions of iodine and 1,3-bis(dimethylamino)-2-propanol dimethiodide. Mario Covello. *Ann. chim. applicata* **29**, 187–9(1939); cf. *C. A.* **31**, 2168[7].—Absorption spectra of solns. of $Me_3N(I)CH_2CH(OH)CH_2NMe_3I.I_4$, $C_9H_{24}ON_2I_2.I_6$, $C_9H_{24}ON_2I_2.I_8$ show more and more the absorption of I in soln., giving evidence of increasing dissocn. on dilu. A. W. Contieri

Synthesis of the choline ester of β-glycerophosphoric acid. Herbert Arnold. *Ber.* **73B**, 87–90(1940).—Contardi and Ercoli (*C. A.* **27**, 3488, 4258) found that the 2 fat acid residues of lecithin can be split off stepwise by lecithases, leaving choline glycerophosphate (I). This fat-free component of lecithin they were able to isolate only in impure form, however, and for the study of its physiol. properties its prepn. in pure form by synthesis was therefore desirable This was effected by treating di-Ag β-glycerophosphate with $BrCH_2CH_2NMe_3Br$ in hot alc. I seps. from abs. alc., after addn. of a little dry ether to turbidity, in the ice chest in needles, m. 104–5° after careful drying over P_2O_5 at the temp. of boiling CH_2Cl_2, readily absorbs moisture from the air and forms in water a soln. with pH 4.2; $CdCl_2$ in alc. splits off the choline group and gives a ppt. of a Cd glycerophosphate. Di-Ag α-glycerophosphate with $BrCH_2CH_2NH_3Br$ also gave a product which in its solubilities, hygroscopicity and m. p. (sinters 60°, m. 80–90°) was quite similar to the colamine glycerophosphate obtained by Feulgen and Bersin (*C. A.* **33**, 8635[7]), but it could not be crystd. and therefore did not give satisfactory analytical results (found, P 12.55, N 6.57%; calcd. for $C_5H_{14}O_6NP$ 14.42, 6.52; for $C_5H_{14}O_6N$-P.H_2O 13.32, 6.01). The activity of synthetic I on the frog heart and the cat blood pressure is about 1/1000th that of acetylcholine (II), i. e., equal to that of free choline. On the intestine and skeletal muscle it also acts qualitatively like II but quantitatively much less powerfully. On the leech a concn. of 10^{-5} of I has the same effect as a concn. of 10^{-8} of II; on heating 2 min. at 100° the activity increases 3- to 4-fold but decreases greatly on further heating for 15–30 min. The initial increase in activity may be due to a change from the endo-salt form $(HOCH_2)_2CHOPO.O.CH_2.CH_2.NMe_3.O$ to the hydrated form $(HOCH_2)_2CHOPO(OH)OCH_2CH_2NMe_3OH$. Toward alkalies, I is quite resistant as regards physiol. activity. C. A. R.

Chaulmoographosphatides. Herbert Arnold. *Ber.* **73B**, 90–4(1940).—The chaulmoogra oil prepns. used in the treatment of leprosy are for the most part water-insol. esters of the chaulmoogric and hydnocarpic acids present in the oil. It seemed desirable, in order to increase the resorption, to prep. derivs. similar in structure to substances normally present in the body. The Na salts of mono- and dichaulmoogroyl-β-glycerophosphoric acids have been found to have distinct chemotherapeutic effects (cf. Kudicke, *Med. Welt*, in press). It was hoped that the therapeutic action of these compds. might be still further increased by converting them into choline esters analogous to the natural lecithins. *Choline esters of hydnocarpoyl-* (I) and *chaulmoogroylhydnocarpoyl-β-glycerophosphic acids* (II) were prepd. from the corresponding Ag salts and $BrCH_2CH_2NMe_3Br$; in m. p. and solubilities they greatly resemble natural lecithins but the hope that they might show increased therapeutic activity in rat leprosy has not been fulfilled. I, viscous yellowish mass with a faint amine-like odor, m. 160–5°, dissolves clear in water; the soln. (pH 4) is unchanged by neutralization with 2 *N* Na_2CO_3 but *N* HCl produces a faint turbidity and on heating hydnocarpic acid seps. II, microcryst. spherical aggregates from dry acetone, softens 70°, m. 170–5°. C. A. R.

The amino derivatives of pentaerythritol. II. Tetraaminotetramethylmethane. F. Govaert and M. Beyaert. *Proc. Acad. Sci. Amsterdam* **42**, 637–40(1939); cf. *C. A.* **28**, 4038[1].—The tetra-HBr salt (I) of the amine (II) obtained as previously described was added in alc. to satd. aq. KOH. The filtered soln. was again treated with KOH and the ppt. filtered. On concn. and cooling, the soln. sepd. into 2 layers. The lower layer being solidified KOH, the supernatant alc. soln. was decanted and the alc. distd. off. Finally $C(CH_2NH_2)_4.H_2O$, white, $b_{0.7}$ 108°, m. 41–2°, was sepd. from the residual KOH by distn. I refluxed with NaOAc and Ac_2O for 6 hrs. gave $C(CH_2NHAc)_4$, b_3 72.5–3°, m. 60°. $C(CH_2NHCONH_2)_4$, m. 230° (decompn.), was prepd. by dissolving I in freshly prepd. aq. AgCNO. H_2CO_3 salt of II, $C(CH_2NH_2)_4.2H_2CO_3$, m. 125° with loss of CO_2. The addn. of $HgCl_2$ soln. to II gave a white ppt. insol. in alc., slightly sol. in H_2O, $C(CH_2NH_2)_4.2HgCl_2$. III. **Dihydroxydiaminotetramethylmethane.** *Ibid.* 641–8.—The prepn. of the diamine was attempted in 2 ways: (1) Treatment of dibromopentaerythritol with alc. NH_3 followed by acetylation gave *3,3-bis(acctaminomethyl)oxacyclobutane*, $CH_2.O.CH_2.C(CH_2NHAc)_2$, in a low yield. With liquid NH_3 is reacted readily when the temp. was raised to 100°, but no definite product could be sepd. from the mixt. (2) The dihydroxydiaminotetramethylmethane $(HOCH_2)_2C(CH_2NH_2)_2.H_2O$, $b_{0.002}$ 200°, was finally prepd. by the action of aq. NH_3 satd. at 0° on dioxaspiroheptane, $CH_2.O.CH_2.C.CH_2.O.CH_2$, at 100° for 12 hrs. Yield, 78%. The diamine was further characterized as the dioxalate, m. 168° (decompn.), dipicrate, m. 223° (decompn.), and monocarbonate, which reverts to the pure diamine at 164°. Mark Plunguian

Chemistry of naturally occurring monoanhydrohexitols. II. Synthetic tetramethylstyracitol. Werner Freudenberg and John T. Sheehan. *J. Am. Chem. Soc.* **62**, 558–60 (1940); cf. *C. A.* **31**, 7846[1].—Zervas (*C. A.* **24**, 5027) has synthesized styracitol (I) but his method did not permit a decision as to whether it was a sorbitol or mannitol deriv. Oxidation rates with $Pb(OAc)_4$ (part I) favored the mannitol structure for I and the sorbitol structure for polygalitol (II). The following synthesis shows that I has the configuration of 1,5-anhydro-*d*-sorbitol as announced by Z. I yields a *tetra-Me deriv.* (III), $b_{1.5}$ 110° (all b. ps. for bath temp.), $[\alpha]_D^{25}$ −36.5° (no solvent unless indicated), n^{25} 1.4520, d. 1.0849. Tetramethylglucose (30 g.) in 75 cc. H_2O and 15 cc. EtOH, reduced for 7 hrs. at 135° and 1300 lb. H pressure in the presence of Raney Ni, gives *tetramethylsorbitol* (IV), b_2 145°, $[\alpha]_D^{25}$ 10.3° (EtOH, *c* 6.3), 4.7° ($CHCl_3$, *c* 10.5), n^{20} 1.4612; heating 15 g. IV and 2 cc. of 13% H_2SO_4 *in vacuo* for 0.5 hrs. at 140° gives *tetramethyl-1,5-anhydrosorbitol*, identical with III. That VI is not formed in the reduction is shown by the further methylation of IV to *hexamethylsorbitol*, $b_{1.5}$ 100°, $[\alpha]_D^{25}$ 1.97°, n^{22} 1.4367, d. 1.0334, which was also prepd. by direct methylation of sorbitol. II yields a *tetra-Me deriv.* (V), b_3 80°, $[\alpha]_D^{25}$ 67.67°, n^{22} 1.4444, d. 1.0571. Reduction of tetramethylmannose as above gives *tetramethylmannitol* (VI), b_3 150°, $[\alpha]_D^{25}$ 20.7° (EtOH, *c* 10.15), 17.5° ($CHCl_3$, *c* 10.6), n^{24} 1.4605; dehydration with 13% H_2SO_4 gives *tetramethyl-1,5-anhydromannitol* (VII), b_3 95°, $[\alpha]_D^{25}$

30.6°, n^{25} 1.4479, d. 1.0435; thus, **VII** is not identical with V, and I and II are not epimeric. *Hexamethylmannitol*, b_2 95°, $[\alpha]_D^{25}$ 12.53°, n_D^{25} 1.4403, d. 1.0458, was prepd. from VI or from mannitol. C. J. West

Benzoylation of *d*-sorbitol and *meso*-erythritol. S. Hanai. *Bull. Inst. Phys. Chem. Research* (Tokyo) **17**, 1224–35(1938).—Examn. of the decompn. products of partly benzoylated *d*-sorbitol and *meso*-erythritol shows that primary OH is more easily substituted than secondary. B. C. P. A.

Composition of lactic acid. Production of a highly concentrated acid. Paul D. Watson. *Ind. Eng. Chem.* **32**, 399–401(1940).—Lactic acid solns. can be concd. by distn. with liquids that form low-boiling binary mixts. with water. The anhyd. acid forms an equil. mixt. of 25% of the free acid and 80% of lactyllactic acid (expressed as free acid). Amy LeVesconte

1,2-Disulfide dicarboxylic acids, the corresponding disulfones and their decomposition products. Jan A. Reuterskiold. *Uppsala (Appelborgs Boktryckeriaktiebolag)* **1939**, 272 pp. (Separate.)—*Ethylenebisthioglycolic acid* (I), m. 107–8° (from PhMe), was prepd. by refluxing 1 mol. $CH_2(SH)CO_2H$ (in 95 cc. alc. and 100 cc. H_2O and neutralized with 2.2 mols. NaOH in 150 cc. H_2O) on the water bath with 0.5 mol. $C_2H_4Br_2$, and acidifying. *Ethylenebisthiolactic acid* (II), prepd. in 80% yield either from inactive $MeCHBrCO_2H$ (10% excess) and $C_2H_4(SH)_2$ in alk. soln. or from inactive $MeCH(SH)CO_2H$ and $C_2H_4Br_2$ in alk. soln., is 3 parts *dl*-acid and 5 parts *meso*-acid but the product of the 2nd method is more easily purified. Resolution of *dl*-**II**, m. 88.5–90° (sepd. from the H_2O filtrate from meso-II by addn of HCl at 0° and recrystn. from CCl_4 or C_6H_6), by means of the brucine salt was extremely difficult. Small amts., $[\alpha]_D$ 131° and −135°, were obtained in one case, but $[\alpha]_D$ 115° was obtained in another. The difficulties are ascribed to mixed crystals. *meso*-**II**, m. 116–18° (from $CHCl_3$), is less sol. than *dl*-II and gives cryst. mono-K, guanidine and *d*-$MeCHPhNH_2$ salts. *Ethylenebis-α-mercaptoisobutyric acid* (III), m. 167–8°, could be prepd. only from α-mercaptoisobutyric acid and $C_2H_4Br_2$ (85% yield). It gives a Cu salt. The mixt. of *dl*- and *meso*-*ethylenebismercaptophenylacetic acid* (IV), prepd. from inactive $PhCHClCO_2H$ and $C_2H_4(SH)_2$ in alk. soln. at 0° can be sepd. by fractional pptn. from AcOH by H_2O. *dl*-**IV**, m. 125–8°, satd. H_2O soln. 0.001 *N* at room temp., gives cryst. brucine, strychnine, quinine and $MeCHPhNH_2$ salts but could be resolved only by using the brucine or strychnine salts, giving an acid, $[\alpha]_D$ 66°. *meso*-**IV**, m. 155–8°, satd. H_2O soln. 0.0006 *N* at room temp., forms a neutral *d*-$MeCHPhNH_2$ salt. *Propylenebisthioglycolic acid* (V), m. 32–5° (from $MeCH(SH)CH_2SH$ and $ClCH_2CO_2H$, purified through the Cu salt (*C. A.* **25**, 1487)), with SO_2Cl_2 gives the *chloride* which with $PhNH_2$ in $CHCl_3$ gives the *dianilide*, m. 155-7°. The K, Na, Ca, and Ba salts are amorphous, the Cu salt decomp. on long heating in H_2O; the Ag salt (pptd. from the neutral H_2O soln. with $AgNO_3$) dissolves in a H_2O soln. of V to form the silver acid. V can be partially resolved (highest $[\alpha]_D$ 15.5°) through the brucine, strychnine or $MeCHPhNH_2$ salts. *Hydroxyethylthioglycolic acid* (VI) was prepd. from 94 g. $CH_2(SH)CO_2H$ by neutralizing with 120 g. soda crystals in 80 cc. H_2O, treating with $BrCH_2CH_2OH$ and ⅓ of a NaOH soln. (40 g. in 65 cc. H_2O) with cooling. The reaction was followed by titrating the unused $CH_2(SH)CO_2H$ with I in Na_2CO_3 soln., more NaOH added and if necessary more $BrCH_2CH_2OH$ to use up the acid as completely as possible. **VI** is purified by pptg. the Cu salt, treating with H_2S and H_2SO_4, filtering, adding $MgSO_4$, evapg., extg. with ether and drying with $NaSO_4$. On drying in air or with $CaCl_2$, or leaving the H_2O soln. 24 hrs., VI forms the *lactone*, m. 45–50° (from AcOH), which is not sol. in hot NaOH or acid solns. possibly because it is polymerized. VI forms a dark blue Cu salt; warmed with Ag_2CO_3 it gives a bright yellow *Ag salt*, with AcOEt in the presence of HCl or AcOH it forms $AcOCH_2CH_2SCH_2CO_2Et$ (**VII**), b_8 134.5–6.0°, which gives the complex $PtCl_4.2VII$, m. 100–1°. Attempts to oxidize VI with BzO_2H, H_2O_2 and $KMnO_4$ were unsuccessful. The 1,2-disulfide dicarboxylic acids, neutralized by NaOH, were oxidized by 5% $KMnO_4$ at 0° in an atm. of CO_2 or in the presence of $MgSO_4$ or H_2PO_4 or AcOH to give the corresponding 1,2-disulfonyl dicarboxylic acids whose equiv. wts. were detd. by titration with alkali at 0° and the SO_2 and CO_2 split off detd. by heating in a special absorption app. (*C. A.* **25**, 277). *Ethylenebissulfonylacetic acid* (**VIII**), m. 228–30° (Tiberg, *C. A.* **11**, 949), was sepd. from the acid K salt by heating with HCl and was recrystd. from HCO_2H and H_2O. *Ethylenebissulfonyl-α-propionic acids* (**IX**): the *dl-acid* m. 151–4° (from AcOH by addn. of petr. ether); the *active acid*, $[\alpha]_D$ −15°, is 80% racemized in soln. in 24 hrs.; the *meso*-form (recrystd. from AcOH by addn. of petr. ether), m. 183–6° without decompn., solidifies and then m. const. 150–60°, probably because some *dl*-acid is formed. *meso*-II (2.9 g.) in 150 cc. $CHCl_3$, oxidized at 15° with 81.5 cc. 1.21 *N* BzO_2H in Et_2O, and allowed to stand 3 days, distd. *in vacuo*, and the residue recrystd. from AcOH and petr. ether gives 40% of pure *meso*-**IX** but the method has no advantage over the $KMnO_4$ method. *Ethylenebissulfonyl-α-isobutyric acid* (**X**), recrystd. from AcOH and H_2O, m. 234–6° (decompn.). *Ethylenebissulfonyl-α-phenylacetic acids* (**XI**): the *dl-acid* decomp., giving off CO_2 so readily on heating in soln. that it could not be obtained pure. The *meso*-form, m. 220° (decompn.), gives a Ba salt. On heating with excess alkali **XI** decomp., giving a ppt. of vinyl benzyl sulfone. After extg. the concd. filtrates with ether and acidifying, $PhCH_2CO_2H$, m. 76–8.5°, ppts. *Propylenebissulfonylacetic acid*, m. 185–6°, was prepd. by the oxidation of V with solid $KMnO_4$. The 1,2-disulfone dicarboxylic acids are decompd. by adding 3.2 equivs. alkali slowly, giving sulfinic carboxylic acids which are sepd. by removing SO_4, SO_3, and CO_3 ions as Ba salts, neutralizing the solns., adding 1 mol. $SrCl_2.6H_2O$, heating to 35–40° and pptg. the Sr salts by the gradual addn. of Me_2CO (yield 90%). The sulfinic acids decomp. by heating with H_2SO_4 into the corresponding fatty acids, SO_2 and a small amt. of CO_2. The reaction velocity of the decompn. of Sr sulfinoacetate (from VIII and XII) is proportional to the H-ion concn. *Sr sulfino-α-propionate* ($3H_2O$) (from **IX**) is oxidized by H_2O_2 to sulfo-α-propionic acid. **X** gives *Sr sulfino-α-isobutyrate*. *1-Hydroxyethylsulfonylacetic acid* formed by the oxidation of VIII is sepd. from the mother liquor after the pptn. of the sulfino acid as Sr salt, by pptn. as a Pb salt (*C. A.* **25**, 277). The free acid, m. 87–9°, is obtained after the pptn. of PbS. **XII**, decompd. with NaOH, the soln. freed from sulfinic acid, SO_3 and Sr and dried, gives *Na 2-propene-3-sulfonylacetate* (**XIII**) which is freed from NaCl by extn. with MeOH. Bromination of XIII gives $Br_3CSO_2CBr_3$, m. 131–2.5°, and AcOH. The dissocn. consts. of the sulfide and sulfonyl acids were detd. with a quinhydrone electrode, the sulfino acids with a glass electrode. The calcd. distances between the charges on the carboxyl groups of the sulfide and sulfonyl acids agree with those calcd. for a plane mol. model and the sequence of the dissocn. consts. conforms to Ingold's + *I* effect of the alkyl. Thermodynamic dissocn. consts. are calcd. from the titration curve of a dil. soln. The decompn. of the 1,2-disulfone dicarboxylic acids in alk. soln. was studied alkalimetrically and by a special potentiometric method for low OH-ion concn. The bimol. reaction const. increases with decreasing OH-ion concn. The reaction is bimol. for concns. between 10^{-3} and 10^{-5}. The methods (*C. A.* **27**, 5727[1]) and theory of the methods are described in detail. Deviations from the course of a bimol. reaction are ascribed to the presence of various configurations of the acids with limited rotation and, because of the potentials in the reaction centers, dissimilar reaction velocities. The 1,2-disulfone dicarboxylic acids decomp. in acid soln. at 100°, giving off CO_2 and a small amt. of SO_2. The velocity of this reaction decreases with increasing H-ion concn. The mechanism of the alk. decompn. is discussed. 231 references. Janet E. Austin

Glycidic acid amides with hypnotic properties. Study of the Claisen-Darzens reaction. Ernest Fourneau and J. R. Billeter. *Bull. soc. chim.* **6**, 1616–25(1939).—It is considered that, for want of a better explanation, the glycidic

esters are formed by the condensation of $ClCH_2CO_2Et$ with the enolates of ketones and aldehydes when enolization is possible and with an assocn. product when enolization cannot take place. Glycidic esters have been prepd. by using NaOEt, $NaNH_2$ and Na, the last being preferable since it avoids the prepn. of NaOEt. A mixt. of 50 g. of MeCO-C_6H_{13} (m. 128°) and 48 g. $ClCH_2CO_2Et$ in an equal vol. of ether was added dropwise to 9 g. Na in ether. The cooled reaction mixt. was kept overnight and boiled for 2–3 hrs The product was poured into H_2O and the dried ether layer was evapd. down and distd., yielding 41% of Et β-hexyl-β-methylglycidate, $b_{0.9}$ 118–22°. A mixt. of 10 g. of methylpropylglycidic esters (I) and 5 mol. of 20% $MeNH_2$ in aq. alc. was heated 4 days at 80°, 18 hrs. at 100° and 18 hrs. at 140°. The reaction mixt. was acidified with HCl, extd. with ether and made alk. with NaOH and dry Na_2CO_3. The thick mass was extd. with ether, yielding 4 g. of MePrC(OH)CH(NHMe)CONHMe, m. 119°; HCl salt, m. 198°. Similarly, heating a mixt. of 20 g. I, 60 g. of 33% $NHMe_2$ in benzene, 10 cc. MeOH and 2 cc. H_2O for 18 hrs. at 150° gave 1.2 g. of *EtCH:CMeCH₂NMe₂*, b_{30} 76°; *MeI deriv.*, m. above 300°. The passage of 4 g. of dry HBr through 3 g. of diethylglycidamide in 60 cc. of anhyd. ether gave 3.8 g. of a product quite different from the expected bromohydrin. The tetra-substituted amides have very distinct hypnotic properties. C. R. Addinall

Isolation of a crystalline derivative of pantothenic acid. D. W. Woolley. *Science* **91**, 245-6(1940).—The Na salt of concentrates of the lactone of the acid fragment of pantothenic acid was acetylated The Ac acid was converted into the acid chloride by means of $SOCl_2$ and the chloride was poured into concd. NH_4OH. The alc.-sol. fraction of the reaction product was slowly crystd. from a small vol. of alc. and Me_2CO as long needles. After hydrolysis by means of NaOH the crystals were active when tested by the use of hemolytic streptococcus. Recrystn. from an alc.-ether mixt. or an EtOAc-Me_2CO mixt. or sublimation in a high vacuum did not alter the activity. A few mg. of the crystals was hydrolyzed and the HO acid recombined with β-alanine. The resulting product was highly active in promoting growth of *Lactobacillus casei* or rats fed a synthetic ration. Felix Saunders

Structure of pantothenic acid. Roger J. Williams and Randolph T. Major. *Science* **91**, 246(1940).—From concentrates contg. 3–40% Ba pantothenate a cryst. lactone, $C_6H_{10}O_3$, m. 91–2°, was isolated after degradation of the pantothenate. The lactone was shown to be α-hydroxy-β,β-dimethyl-γ-butyrolactone (I). Synthetic I was condensed with β-alanine to give physiologically active pantothenic acid. Felix Saunders

Reduction over a Raney catalyst of the esters of α-amino acids to corresponding alkamines. G. Ovakimian, Martin Kuna and P. A. Levene. *J. Am. Chem. Soc.* **62**, 676–7(1940).—A note stating that reductions of the esters of leucine (*dl* and *l*) and phenylaminoacetic acid (*dl* and *l*) have been carried out with Raney Ni at 150 atm. pressure and temps. of 135°, 70°, 40° and 40°, resp. The yields vary from 40 to 60%. C. J. West

Multivalent amino acids and peptides. XI. Synthesis of diglycyl-*l*-cystine. J. P. Greenstein. *J. Biol. Chem.* **128**, 241–3(1939); cf. *C. A.* **32**, 7489⁴.—Treatment of carbobenzyloxyglycine with PCl_5 in ether, followed by *l*-cystine in aq. KOH, and reduction (Na in liquid NH_3) of the product yield cryst. diglycyl-*l*-cystine ($+1H_2O$) (Fischer and Suzuki, *Ber.* **37**, 4575(1904)), m. 232°, $[\alpha]_D^{25}$ −108° in *N* HCl, rapidly hydrolyzed by intestinal erepsin (the *l*-cystine produced being fully active), but not by carboxypeptidase. B. C. P. A.

Hydroxylysine. D. D. Van Slyke, Alma Hiller, Douglas A. MacFadyen, A. Baird Hastings and Friederich W. Klemperer. *J. Biol. Chem.* **133**, 287–8(1940); cf. *Proc. Soc. Expt. Biol. Med.* **38**, 548(1938).—Evidence is presented which indicates that the diamino acid crystd. from gelatin in all probability has one of the 2 following structures: $NH_2CH_2CH(OH)(CH_2)_2CH(NH_2)CO_2H$ or $CH_2(OH)CH(NH_2)(CH_2)_2CH(NH_2)CO_2H$. A. P. L.

Synthesis and determination of the lipotropic activity of the betaine hydrochlorides of *dl*-serine, *dl*-threonine and *dl*-allothreonine. Herbert E. Carter and Donald B. Melville. *J. Biol. Chem.* **133**, 109–16(1940).—Methylation of *dl*-serine, *dl*-threonine and *dl*-allothreonine was accomplished by use of Me_2SO_4 under carefully controlled conditions. The hydroxy betaine HCl salts do not prevent the development of a fatty liver in rats fed a high-fat, low-protein diet, thus differing from choline and betaine. The betaines of *dl*-threonine and *dl*-allothreonine undergo a retrograde aldol condensation in alk. soln., giving betaine and AcH. *dl-Serine betaine-HCl* m. 198–9°. *dl-Threonine betaine-HCl* m. 162–4°. *dl-Allothreonine betaine-HCl* m. 166–8°. A. P. Lothrop

Preparation of galacturonic and mucic acids from pectic substances. Hugh H. Mottern. *Research Studies, State College Washington* **7**, 153–4(1939); cf. *C. A.* **34**, 379⁶.—This is an abstract without data of a thesis at Wash. State College (Document 1291, Bibliofilm Service, U. S. Dept. Agr. Library, Wash., D. C.). The nomenclature of pectic substances is discussed. Two new addns. are suggested, namely *polygalacturonic acid* and *pectinic acid*. Pectin is essentially a linear, high-mol.-wt. polymer of galacturonic acid with the carboxyl groups more or less esterified with MeOH, and with the arabinose and galactose occurring in a side chain if attached to the polymer. Methods for the prepn. of polygalacturonic acid, a polymer consisting only of galacturonic acid units, and for its enzymic hydrolysis to α-*d*-galacturonic acid are described. The enzymic hydrolysis of com. available polygalacturonic acid by pectinase enzyme prepns. gave a simple, satisfactory method for prepg. galacturonic acid. Galacturonic acid yielded mucic acid on oxidation with HNO_3. C. R. Fellers

Isolation of keturonic acids. II. L. T. Crews, J. P. Hart and M. R. Everett. *J. Am. Chem. Soc.* **62**, 491–3(1940); cf. *C. A.* **33**, 6801¹.—Oxidation of 1% carbohydrate solns., prepn. of the mixed Ba salts and isolation of the cryst. brucine salts were conducted according to the methods of part I. Yields of mixed Ba salts from 4-g. quantities of the carbohydrates were: *l*-xylose 4.1 g.; *l*-arabinose 3 g., *d*-glucosamine-HCl 1.7 g. *Brucine l-xyloketuronate* (I), with 1 mol. H_2O, results in 2.5-g. yield from 3.75 g. Ba salts; recrystd. from H_2O, it m. 147–8° (decompn.), $[\alpha]_D^{25}$ −29.5° (1% aq. soln.). *Brucine l-araboketuronate*, with 2 mols. H_2O, m. 160–1°, $[\alpha]_D^{25}$ −13° (1% aq. soln.), results in 0.78-g. yield from 2.9 g. Ba salts; this closely resembles the *d*-isomer of I but complete identity has not been proven. *Brucine d-chuloketuronate*, with 1.5 mols. H_2O, m. 177–8°, $[\alpha]_D^{25}$ −50.5° (1% aq. soln.), results in 0.52-g. yield from 1.95 g. of the mixed Ba salts from *d*-glucosamine. During concn. of the Ba salt soln. prepd. from oxidized levoglucosan (II) there sepd. *ketolevoglucosan* (0.65 g. from 4 g. II), $C_6H_8O_5.0.5H_2O$, m. 181–2° (decompn.), $[\alpha]_D^{25}$ −62° (1% aq. soln.); a 1% soln. in H_2O is obtained only by warming; it reduces Sumner reagent at room temp.; hydrolysis with 6 *N* H_2SO_4 for 2.5 hrs. on a boiling water bath decreases the rotation from −62 to −34° and causes a 33% reduction in reducing power; there is probably a hydrolysis of the anhydride linkage; subsequent oxidation of the hydrolyzate with Br for 48 hrs. at 25° causes a 50% loss of reduction, which indicates the appearance of an aldose radical during hydrolysis. The original reducing substance was not affected by similar Br oxidation. This compd. is an anhydride of a dicarbonyl sugar. Suggestions are made for naming dicarbonyl sugars. The anhydro derivs. are probably unimol. C. J. West

Preparation of ethyl tetramethylenedicarboxylate by the Kizhner method. B. A. Kazanskiĭ. *J. Gen. Chem.* (U. S. S. R.) **9**, 1568(1939).—A polemic with Venus-Danilova, *C. A.* **32**, 7897⁵. Chas. Blanc

Ethyl hydrogen methyldiglycolates. Pierre Vièles and Mohammed Amir. *Compt. rend.* **209**, 457–9(1939).—V. and A. prepd. the *dl*-forms by 2 different methods: the action of EtOH on the anhydride of *dl*-methyldiglycolic acid (*C. A.* **1**, 2683) and half-sapon. of di-Et *dl*-methyldiglycolate. In both methods viscous liquids were obtained, sol. in H_2O (alkali and alk. earth salts as well), sol. in Et_2O, EtOH, and C_6H_6. The phys. consts. appear the

same because of exptl. errors: b_{30} 168–70°, d^{25}_4 1.148, n^{25}_D 1.4331, mol. refraction 38.8 (calcd. 39.4). Nevertheless these 2 products are not identical for it can be shown that the monoester prepd. by half-sapon. saponifies more rapidly than that obtained from the anhydride; thus at 75° with 10 times the theoretical quantity of *N*/80 alc. HCl, the velocity consts. are in the ratio of 1.6:1. In order to establish the structure of the active forms of the mono-Et methyldiglycolates, esterification with MeOH was employed. In the case of mixed active isomers the ratio is established from the observed rotatory power and the known rotatory power of pure active forms previously detd. (*C. A.* **30**, 4818[3]). W. A. Cook

Derivatives of calcium cyanamide. V. Formation of guanidine from dicyanodiamide. 1. Formation of guanidine from dicyanodiamide by electrolytic reduction. Kiitiro Sugiao. *J. Chem. Soc. Japan* **60**, 111–21(1939); cf. *C. A.* **34**, 2273[3]; *J. Electrochem. Assoc. Japan* **6**, 292 (1938). —The structures assigned to dicyanodiamide (I) by Bamberger (*Ber.* **26**, 1584–5(1893)) and by Bell (*C. A.* **21**, 2444) do not correspond to all the reactions of the compd. Cathodic reduction of 1% I in 1% H_2SO_4 with a Hg or Pb cathode and c. d. of 1 amp. per sq. dm. gave $C_2H_8N_4$ (II), stable in acid soln., but undergoing hydrolysis and reduction as the soln. becomes alk. by further electrolysis. II is hydrolyzed according to: $C_2H_8N_4 + H_2O = NH_2C(:NH)NH_2 + NH_3 + HCHO$. A small amt. of $MeNH_2$ found with NH_3 indicates also the reaction: $C_2H_8N_4 + 2H = NH_2C(:NH)NH_2 + MeNH_2$. That neither HCN nor guanylurea was detected in the product disproves Bell's theory. However, guanylurea is produced at the early stage when I is electrolytically reduced in 20% H_2SO_4. These results indicate the presence of both a guanidine group and an isonitrile group. The reactions at high temp. of I with amine salt and with phosphoric acid indicate the presence of —C:N; reactions in dil. aq. soln. indicate the presence of —N:C. These facts are explained by the structures in equil.: $NH_2C(:NH)NHCN \rightleftarrows NH_2C(:NH)NHNC$. For electrolytic reduction of I, metals having high overvoltage give the best yield e. g., at c. d. 1 amp. per sq. dm. with Hg 31%, with Pb 49%, with Zn 6%, with Zn amalgam 15% yields; Cu and Ni give no II. High c. d. gives better yield. I is not reduced in neutral or alk. soln. K. Shinohara

Some ninhydrylureas and alloxanylureas and their constitution. Michel Polonovski, Pierre Gonnard and Genevieve Glotz. *Bull. soc. chim.* **6**, 1557–76(1939).—The real state of urea (I) in soln. may be an equil. mixt. of the amphoteric $OC(NH_2)NH_2$ form and the tautomeric isourea, $HOC(NH_2):NH$, in different proportions according to the nature of the solvent, in particular with respect to its polarity. Chem. and spectrographic studies of compds. of I and several substituted ureas with xanthydrol (II), triketohydrindene hydrate (III) and alloxan (IV) show that in many cases, the 2 N functions of I do not react symmetrically and that, according to the polarity of the solvent, a different equil. of the 2 tautomeric forms is established. Tests were made with $MeNHCONH_2$ (V), Me_2NCONH_2 (VI), $CO(NHMe)_2$ (VII), $PhNHCONH_2$ (VIII) and $CO(NHPh)_2$ (X). II reacts symmetrically with I, monoxanthyl compds. are formed with V and VI, but no compd. is formed with VII. Although the activities of the 2 NH_2 groups may differ the affinity of each for II in acid media is sufficiently strong to prevent the detection of the monoxanthyl intermediate. II replaces I and its asym.-substituted compds. from the majority of their other combinations. Mixts. of 0.004 mol. III in 10 cc. of hot H_2O and 0.004 mol. of substituted urea in 1–2 cc. H_2O were heated for 30 min. at 100°, concd. and recrystd. from hot H_2O, yielding *ninhydrylmethylurea*, $C_{11}H_{10}N_2O_4$, m. 230°; *ninhydryl-asym-dimethylurea*, $C_{12}H_{12}N_2O_4$, m. 260° (decompn.), and *ninhydrylphenylurea*, $C_{16}H_{12}N_2O_4$, m. 105° (decompn.). No combination was possible with sym.-disubstituted ureas. Thus an NH_2 group must be free and it is probable that I reacts in the tautomeric form. Mixts. of aq. solns. of IV and of I, V and VII gave alloxanylureas. By the addn. of a trace of Br, IV was condensed with VI to give *alloxanyl-asym-dimethylurea*, $C_7H_{10}N_4O_5$, m. 180–1° (decompn.). A mixt. of 1 g. VIII in a min. of H_2O at 80° and 4 g. IV in a min. of hot H_2O was heated at 80–90° for 40 min. The cooled soln. gave *alloxanylphenylurea*, $C_{11}H_{10}N_4O_5$, m. 180–5° (decompn.). No oximes or semicarbazones could be prepd. and it seems that the ureas combine through 1 NH_2 group with the C atom in the 5-position of the alloxan. Since the chem. study failed to give any convincing evidence as to the existence of an imidazole ring in most of the compds. a spectrographic study was made of solns. at various pH values of urea compds. with III, IV and of the following barbiturates; nitrobarbituric acid, pseudouric acid, uramil, cyanacetylurea, aminodihydroxypyrimidine and aminouramil. The spectra obtained with III indicated a more or less ionized mol. in alc. soln. but gave no further information as to the intimate structure of the compds. Below pH 7, the compds. with IV showed an equivalence of the 2 NH_2 groups and the possibility of a cyclic structure whereas, in solns. above pH 7, the compds. seemed to be present in an equil. mixt. of the various possible forms. The absorption spectra of the barbiturates showed that all the compds. exist in equil. between the various tautomeric forms in proportions which are functions of the polarity of the solvent. Adsorption curves are presented in 10 plates and show several new spectra of the barbiturates. C. R. Addinall

Diliturates (5-nitrobarbiturates) of some physiologically important bases. C. E. Redemann and Carl Niemann. *J. Am. Chem. Soc.* **62**, 590–3(1940).—Dilituric acid (I) surpasses picric acid, styphnic acid, picrolonic acid, nitroanilic acid and 3-nitrodiketohydrindene as a reagent for the isolation of many naturally occurring bases. The soly. of I (in millimoles per l.) at 25° is: MeOH 99, 95% EtOH 85, H_2O 63, abs. EtOH 35, Me_2CO 25, Et_2O 0.9, C_6H_6 0.4. I behaves like a strong monobasic acid, the acid strength being between picric acid and HCl. I is a satisfactory reagent for the sepn. of K from binary mixts. contg. Na and is an excellent reagent for the isolation of Mg. Soly. of inorg. salts of I in H_2O at 25°: Mg 0.1, Ba 1.3, Sr 1.7, Cu 4.8, K 3.9, Ca 5.7, Ag 12, Na 38. Soly. of org. salts of I in H_2O at 25°: $C_2H_4(NH_2)_2$ 0.6, NH_3 7.3, $EtNH_2$ 13, Me_2NH 15, Ph(iso-Pr)NH 15, $BuNH_2$ 17, $AmNH_2$ 24, $PhNH_2$ 26, $MeNH_2$ 37, Bu_3N 51, quinoline 23, imidazole 36, C_5H_5N 54, d(+)-glucobenzimidazole 65, morpholine 80, *dl*-ephedrine 8.7, β-$HOC_6H_4CH_2CH_2NH_2$ 13, *l*-ephedrine 30, *d*-pseudoephedrine 32, *l*-adrenaline 37, $HOCH_2CH_2NH_2$ 53, *d*-glucosamine 85, $(HOCH_2CH_2)_3N$ 132, $H_2NCH_2CH(OH)Me$ 134, quinine 1.6, brucine 3.7, strychnine 3.9, cinchonine 9.0, nicotine 12.3, caffeine 68, *l*-diiodotyrosine 2.2, *dl*- and *l*-lysine 6.4 and 9.0, *l*-histidine 7.9, *l*-tyrosine 10.0, *l*-arginine 10.2, *l*-cystine 15, *dl*-phenylalanine 16, *dl*-α-aminoisobutyric acid 20, *l*-tryptophan 20, *dl*-aminophenylacetic acid 28, sarcosine 34, betaine 34, *dl*-α-aminobutyric acid 40, *l*- and *dl*-alanine 43 and 50, glycine 49, *dl*- and *l*-aspartic acid 61 and 94, *l*- and *dl*-glutamic acid 67 and 90, *dl*-γ-aminobutyric acid 77, *l*-cysteine 92, *dl*- and *l*-leucine 94 and 105, *l*-proline 100, *l*-asparagine 103, *dl*-valine 107, *dl*-isoleucine 107, *dl*-norleucine 109, *dl*-norvaline 110, *dl*-methionine 112, *dl*-serine 112, *l*-hydroxyproline 141, guanidine 7.0, tyramine 8.7, histamine 17, phenylethylamine 19, creatinine 23, urea 36. Regeneration of bases from their diliturates can be achieved in the majority of cases by simply replacing the base in question by either $C_2H_4(NH_2)_2$, Mg or NH_4; the glycine salt with NH_3 gives 89% of cryst. glycine. C. J. West

Hydrogenation of saccharides. II. K. Yosikawa and S. Hanai. *Bull. Inst. Phys. Chem. Research* (Tokyo) **17**, 1262–77(1938); cf. *C. A.* **29**, 5080[1].—Hydrogenation of glucose (70–120°) and of sucrose and starch (160–80°) at 80–300 atm. with Ni or Ni-Fe catalysts yields mixts. of hexitols. At 190–240°, propylene glycol and glycerol are formed in good yields, together with $(CH_2OH)_2$, EtOH, and MeOH. The mechanism of the hydrogenation is discussed. B. C. P. A.

Synthesis of 5,6-dimethylglucose. M. R. Salmon and Garfield Powell. *J. Am. Chem. Soc.* **61**, 3507–10(1939).—In the abstract in *C. A.* **34**, 992[4], the yield of 3-benzyloxymethylacetoneglucose (1.23 g.) is an error; the crude

yield is about 110% (private communication). In line 18 of this abstract delete the phrase: "this also results from II and PhNCO." The derivs. of dimethylglyceric acid mentioned in the last 2 lines are those of the *dl*-acid.
C. J. West

Oxidation of aldose by hypoiodite. VI. Glucosone (2-ketoglucose). Karl Myrbäck. *Svensk Kem. Tid.* 51, 225–9(1939); cf. *C. A.* 34, 9928.—Glucosone is less stable in alk. solns. than glucose but in sufficiently dild. NaOH and $NaHCO_3$ solns. the oxidation by hypoiodite is about the same. The conversion of HCOH to CO at the 2nd C atom has no effect on the oxidation velocity of the aldehyde group.
A. R. Rose

Nature of the carbohydrate residue in ovomucoid. I. The glucosamine constituent. M. Stacey and J. M. Woolley. *J. Chem. Soc.* 1940, 184–91.—Ovomucoid (I) is prepd. in 3% yield by tryptic digestion of com. egg albumen, $[\alpha]_D^{20}$ −44° (H_2O, *c* 1); Sevag's method (*C. A.* 29, 1122[5]) gives 4%, $[\alpha]_D^{20}$ −57° (H_2O, *c* 1); dried egg white gives 10% of a I with $[\alpha]_D^{20}$ −57° (H_2O, *c* 1); color reactions indicate the probable presence of tryptophan, tyrosine, arginine and histidine. The carbohydrate residue (II) is prepd. by a modification of the method of Fraenkel and Jellinek (*C. A.* 21, 3603) in 16% yield; it contains 5.5% N (Dumas) and 4.9% amino N and has 0° rotation; further hydrolysis with $Ba(OH)_2$ did not alter materially the N content of II. It was proved, in part at least, that H atoms of the NH_2 groups in the glucosamine residue in I are replaced by Ac groups and that in the prepn. of II the $Ba(OH)_2$ treatment causes considerable deacetylation; apart from this, the method of isolation did not materially alter the nature of the II. Hydrolysis of 4 g. II with 100 cc. 5 *N* H_2SO_4 at 100° for 36 hrs. gives glucosamine (isolated as the HCl salt), mannose (as the phenylhydrazone) and galactose (identified by mucic acid formation). II with Ac_2O and C_5H_5N, heated for a few min. at 70° and then vigorously shaken at 15° for 24 hrs., and the treatment repeated with the insol. portion until almost complete soln. is effected, gives the *Ac deriv.* as a light brown powder, $[\alpha]_D^{20}$ −20° (H_2O, *c* 2), 29% *O*-Ac; heating with 10% $Ba(OH)_2$ at 95° for 1 hr. gives the *N-Ac deriv.*, $[\alpha]_D$ 0° (H_2O, *c* 1.4), 11.5% *N*-Ac. Attempts to methylate I or II with Me_2SO_4 and NaOH result in almost complete destruction of the polysaccharide. MeI and Ag_2O or MeI in liquid NH_3 also fails to give satisfactory products. Me_2SO_4 and NaOH in CCl_4 give 10% of a Me deriv. with 23.8% of MeO. Finally a method was used (full details given) which avoids excess alky. in the initial stages of methylation; the acetate in H_2O and CCl_4 was treated with Me_2SO_4 and NaOH at 50° and the product of this reaction with MeI and Ag_2O, giving a *Me deriv.* (III) with 31.5% MeO, $[\alpha]_D^{20}$ 0° in H_2O or $CHCl_3$. Complete details are given of the hydrolysis of III with 2% MeOH-HCl for 48 hrs. and the sepn. of the components; the products include 10% of 2-acetamido-3,4,6-trimethyl-α-methylglucoside (IV) (Cutler, Haworth and Peat, *C. A.* 32, 1661[1]), 30% of a sirupy fraction of 3,4,6-trimethyl-α-methylglucosaminide (V), which yields IV on acetylation, 10% of a sirupy mixt. of partially methylated hexoses (methylation, hydrolysis and reaction with $PhNH_2$ gives a mixt. of tetramethylmannose and tetramethylgalactose anilides in the ratio of approx. 4:1) and 50% of a sirup which on methylation with Ag_2O and MeI gives a light brown powder which appears to be a compd. of AgI with glucosamine derivs. From the quantities of IV and V it is possible to state that at least 40% of III is built up of methylated glucosamine residues. The quantity of IV shows that at least 10% of these residues are "end-groups" joined by glucosidic links to the rest of the mol. and the yield of V indicates that at least a further 30% of the residues are joined by glucosidic links or through the NH_2 groups. Inasmuch as III has an Ac content of about 10% it appears likely that the major part of V is also linked glucosidically.
C. J. West

Polysaccharides. XXXIX. The constitution of certain levans formed by bacterial action. R. R. Lyne, S. Peat and M. Stacey. *J. Chem. Soc.* 1940, 237–41; cf. *C. A.* 34, 1624[4].—The polysaccharides produced from sucrose by *B. megaterium*, *Bact. pruni* and *Bact. prunicola* are polyfructoses of the levan type. From an examn. of the products of hydrolysis of the methylated levans it was demonstrated that each levan could be structurally represented by a terminated chain of 10–12 contiguous fructofuranose units mutually linked through positions 2 and 6 as in the levan formed by *B. subtilis;* thus, certain differences in properties between the levans were probably due to varying degrees of aggregation of the "repeating unit." Anomalies in the optical rotations of levan acetates have been shown to arise from incomplete acetylation of the levan. Details are given of the methylation and hydrolysis of the methylated product of each levan. The rotation of the acetates varied in a remarkable manner according to the proportion of H_2O present; within certain limits a decreased quantity of water present in the acetylation mixt. gives a product with an increased Ac content; the more highly acetylated products showed a higher pos. rotation than those which were incompletely acetylated; with 44.8% Ac $[\alpha]_D$ is 23° ($CHCl_3$); with 43.2% Ac, $[\alpha]_D$ is −13° ($CHCl_3$); each yielded the same levan on deacetylation.
C. J. West

Structure of γ-sugars. III. Preparation of 3,4,6-trimethylfructose. Frank Hartley and Wilfred H. Linnell. *Quart. J. Pharm. Pharmacol.* 12, 743–52(1939).—3,4,6-Trimethylfructose (I) has been prepd. by hydrolysis of methylated inulin and purified by conversion to the Me fructoside followed by hydrolysis. The position of the substituents in I has been established by the identity of its phenylosazone with that of 3,4,6-trimethylglucose. The synthesis of I has been effected by an unambiguous route. 24 references.
W. O. E.

Extraction of ethyl galactoside from yellow sweet lupines. F. E. Nottbohm and F. Mayer. *Vorratspflege u. Lebensmittelforsch.* 1, 243–7(1938); *Chem. Zentr.* 1938, II, 3402–3; cf. *C. A.* 31, 5719[8].—In the extn. of phosphatides from yellow sweet lupines it was found possible to isolate *α-Et galactoside*[2] (I). The lupines were ground and extd. with a 4:1 benzene-alc. mixt. in a Soxhlet app. for 3 hrs. After the liquid was evapd. to a sirup, I was obtained by crystn. from $CHCl_3$, then from alc. in fine platelets m. 143°, $[\alpha]_D$ 185° (water). Since I does not crystallize from the $CHCl_3$ soln., it can be obtained only after pptn. of the phosphatides with acetone from the evapd. mother liquor. It is thought that I occurs in the lupines as a lupine phosphatide-galactoside.
M. G. Moore

Labiose, a new trisaccharide of the trehalose type. S. M. Strepkov. *J. Gen. Chem.* (U. S. S. R.) 9, 1489–92 (1939).—A new trisaccharide (I), named *labiose*, was isolated from *Eremostachys labiosa*, fam. *labiata*, growing wild in the mountainous regions of Central Asia. I crystallizes with 3 mols. H_2O from the alc. ext. of the dry and crushed plant tubers, preliminarily washed with ether. It is a slightly sweet sugar, m. 126–8° to a glass-like mass and becomes brown at 205°. With anhyd. NaOAc and Ac_2O it gives a *hendecaacetate*, m. 88°, $[\alpha]_D^{20}$ 122.5° ($CHCl_3$). I has $[\alpha]_D^{20}$ 136.7°, does not reduce Fehling soln. and gives the Selivanov ketose reaction. It is completely hydrolyzed by invertase at 47–8° in 20 hrs. and by 1% HCl at 68–70° in 10–12 min. to 1 mol. of galactose and 2 mols. of fructose. Emulsin does not hydrolyze I. It follows that I is related to the α-series and, probably, has the galactose in the center position of the mol. Pressed yeast ferments I but little.
Chas. Blanc

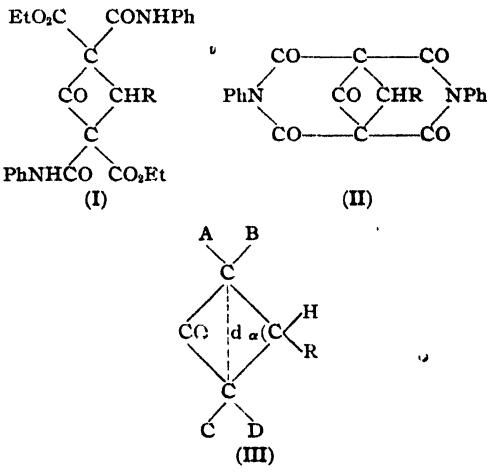
Enzymic degradation of polymeric carbohydrates. IV. Comparative enzymic degradation of some isolated wood constituents. Theodor Ploetz. *Ber.* 73B, 57–60(1940); cf. *C. A.* 34, 1169[8].—As reported in part III, native (linden) wood, contrary to the fraction obtained from $(CH_2NH_2)_2$-CuO soln., is very difficultly attacked by enzymes.[9] The work of Karrer, *et al.* (*C. A.* 20, 1416), on the snail enzyme, showing that native cellulose offers much greater resistance to enzymic attack than a cellulose which has undergone some repptn. process, raises the question whether or not this resistance of native cellulose may explain the difficulty with which wood is attacked. To test this point cellulose was isolated from woods by the Cl process and its behavior on enzymic degradation studied.

The skeletal substances obtained by the Schmidt ClO_2 process, which contain almost the whole of the carbohydrate complex of the wood, are of special interest in this connection, and samples of spruce- and beechwood skeletal substances furnished by S. were included in this investigation. The degree of degradation of the cellulose or skeletal substance by various purified snail enzyme prepns., measured by detg. the reducing sugar formed, was compared with the degradation, by the same prepn., of cuprophan (a reppd. cellulose), because the degradation of the woods themselves was too slow for comparison. The results showed that celluloses prepd. by the Cl process are degraded, depending on the activity of the enzyme, only very little more slowly than, or even as rapidly as, cuprophan. Beechwood skeletal substance is degraded about half as rapidly as the same wt. of cuprophan and spruce-wood skeletal substance is attacked even more rapidly. An interesting fact is that an enzyme prepn. free of cellulase but contg. an active lichenase did not attack beechwood skeletal substance in spite of the hemicellulose content of the latter. That the enzymic degradation of the complex polysaccharide mixt. which constitutes beechwood skeletal substance is selective was shown by the increase in C content of the undissolved residue as the degradation progressed. These expts. show that the increased resistance of the native cellulose or the total native carbohydrate complex which, with the lignin, makes up the wood substance does not suffice to explain the difficulty with which the wood is attacked by the snail ferment. If the behavior which these substances show when isolated conditioned the velocity of degradation the degradation of wood should be considerably more rapid. There remain 2 possible explanations of the behavior of wood: either the cellulose or the greater part of the carbohydrates is so protected, purely mechanically, by the lignin that the enzyme cannot gain access to it, or the polysaccharides are chemically combined with the lignin component and the enzyme cannot dissolve the union. **V. Enzymic degradation of some native lignin-containing materials.** *Ibid.* 61–73.— P. has for the first time been able to effect extensive degradation of native lignin-contg. materials with isolated enzymes. As shown in earlier papers, various samples of trunk wood, even when very finely ground, are very resistant toward the snail enzyme. The resistance is never absolute but the degradation comes to a stop when a few percent of the wood has gone into soln. Only when the wood has previously been subjected to chem. attack does this condition alter materially. It occured to P. to use, instead of the dead trunk wood, a lignified (i. e., lignin-contg.) but still living tissue. He chose as starting materials the pith of the elder tree and of the Australian *Araucaria excelsa*. The elder-tree pith was sepd. into the material obtained from the still green shoots of the current year's growth and that obtained from older parts of the tree. The difference in age was clearly manifested by the lignin content (the residue obtained by digestion with H_2SO_4 and subsequent treatment with dil. HCl according to the Klason method). Below are the values (%) found for 1 young and 3 old piths, resp.: ash 1.8, 0.8, 1.15, 2.97; pentoses 27.45, 33.9, 27.0, 22.6; lignin 14.07, 17.4, 18.5, 25.6; pure cellulose (crude cellulose corrected for pentose content) —, —, 35.61, 35.38. Compn. of original pith: C 48.21, 48.66, 49.14, 48.88; H 6.71, 6.43, 6.3, 6.15; MeO 4.82, 5.21, 5.03, 5.48. Compn. of lignin: C 65.18, 67.24, 66.17, 65.49; H 6.28, 6.46, 6.04, 5.74; MeO 18.80, 17.78, 19.66, 17.20. As shown by these values, only 54.9, 59.4, 72.3 and 80.3% of the total MeO of the 4 original piths, resp., are recovered as lignin, and since the original MeO contents differ but little it may be concluded that the increase in lignin formation with age is not accompanied by the formation of new MeO; the lignin would seem to be the result of a chem. transformation or merely condensation or polymerization of constituents of the young plant. The microscopic picture of the phloroglucinol-HCl reaction of sections of the elder-tree pith shows a uniform coloration, i. e., distribution of lignin through the tissue, whereas in the araucaria pith the tissue is practically lignin-free but permeated with strongly colored individual cells. In addn. to the pith, which offers the advantage that a quantitatively cleaner sepn. from the other parts of the wood can be effected, the extreme outside layer of the trunk, the cambial tissue and the bast also seem suitable for enzymic degradation expts. The following values were obtained for the pith, bast (extd. with benzene-alc.) and trunk wood (extd. with benzene-alc.), resp., of araucaria: pentoses 14.4, 14.0, 12.3; lignin 16.03, 17.25, 28.55; pure cellulose —, 37.8, 40.1. Compn. of original material: C 47.88, 52.73, —; H 6.29, 52.73, —; MeO 3.50, 3.97, —. Compn. of lignin: C 62.57, —, 68.32; H 5.15, —, 5.62; MeO 6.55, —, 15.32. As expected, araucaria pith and bast, unlike the resistant trunk wood, readily undergo enzymic degradation. The most important result of the expts. was that in the course of the degradation the C and MeO contents of the residue increase greatly, confirming the results with materials pretreated chemically (see part VI, below) and apparently proving that in wood substances of higher C content (lignins) are preformed. The real object of the work, the isolation of a pure lignin by enzymic means, was not attained because, even with these easily attacked materials, the degradation gives a product contg. both lignin and carbohydrate. Depending on the starting materials, there is more or less of a difference between the amts. of lignin (based on the Klason method of detn.) in the native tissue and in the residue of the degradation. A part of the substances in the original material which are detd. as lignin must therefore dissolve during the degradation. In fact, the degradation soln. contains MeO. But this is also the case where, as with young elder-tree pith, there is no disappearance of lignin during the degradation. The 2 solns. behave differently toward dil. H_2SO_4, however. Where lignin disappears during the degradation, the soln. on heating with 2% H_2SO_4 gives a slight brown flocculation which dissolves in dil. NaOH, while the degradation solns., also contg. MeO, of materials which show no loss of lignin form no such flocculations. Whether the MeO-contg. substances which, when they dissolve, produce a loss of lignin belong to the carbohydrate series or are true lignin units, perhaps rendered sol. only because of a smaller degree of polymerization when they are liberated, could not be established. Nevertheless, from the fact that in every case the extent of degradation as detd. from the loss in wt. agrees within the limits of exptl. error with that calcd. from the sugar detns., it is evident that the substances in question behave like carbohydrates under the conditions of the Willstätter-Schudel method. In addn. to the age and extent of lignification of the substrate, the nature of the enzyme also influences, in some as yet unexplained manner, the extent of the degradation. Thus, when samples of young and an old elder-tree pith were degraded with a not very active enzyme prepn., the young pith was much more readily attacked than the old pith and the latter even on subsequent treatment with a more active enzyme could not be degraded more than about 30%, but when it was treated from the very first with the stronger enzyme it was degraded to as great an extent as the young pith. With the weaker enzyme the degradation of the old pith (contg. 18.5% lignin) stopped at 26.8%. The residue contained 24.8% lignin whose MeO content was 14.77% as against 19.66% in that of the original pith. In the H_2SO_4 used for the lignin detn. was found 92% of the theoretical amt. of polysaccharides. The pentosan content of the residue was 18.4%, hence the residue was made up of 0.439 mol. polysaccharides (0.304 mol. hexosan and 0.135 mol. pentosan) and 0.135 mol. lignin. Starting with the strong enzyme from the beginning, the old pith was degraded 63%. The residue consisted of 0.303 mol. polysaccharides (0.237 mol. hexosan and 0.066 mol. pentosan) and 0.309 mol. lignin; the MeO content of the lignin was 12.13%. The young pith was 70.7% degraded; the residue consisted of 0.279 mol. polysaccharides (0.206 mol. hexosan and 0.073 mol. pentosan) and 0.259 mol. lignin, and the lignin contained 16.33% MeO as against 18.80% in that of the original pith. Hence, even in these easily degraded materials the enzymic degradation does not lead directly to lignin; rather, there seem to be 2 kinds

of degradation, giving definite residues in which the polysaccharides and lignin bear to each other mol. ratios which are whole nos. VI. **The state of combination of lignin in wood.** *Ibid.* 74–8.—It had been found (part III) that the residue (R), which remains undissolved when linden wood is treated with $(CH_2NH_2)_2$-CuO and forms the greater part of the material, was degraded only 18.6% by enzymes, and as it contained 60.5% cellulose and 20.55% lignin, it was suggested that the enzymic degradation affected only the hemicelluloses (18.5%). The residue should then consist of 3 parts by weight of carbohydrate to 1 of lignin. The fraction (F) pptd. from the $(CH_2NH_2)_2$-CuO soln. by acids was much more readily attacked by enzymes (51.4%). As it contained 26.14% lignin, the opinion was expressed that the rapid hydrolysis stops when the residue consists of equal parts of lignin and carbohydrate units. By continued action of the enzyme the degradation could be pushed somewhat further, to be sure, but only very slowly (an addnl. 13.4% in the same length of time required for the first 54.8%). Furthermore, after the ratio carbohydrate.lignin = 1·1 has been reached, the properties of the substrate change. The residue now remains practically unchanged in compn., behaving like a difficultly degraded, homogeneous substance. The residue from the degradation of R consisted of 0.434 mol. polysaccharides (0.389 mol. hexosan and 0.045 mol. pentosan) and 0.129 mol. lignin, the residue from F of 0.323 mol. polysaccharides (0.268 mol. hexosan and 0.055 mol. pentosan) and 0.300 mol. lignin. Unlike those of young plant material (see part V above) the lignins in the degradation residues were not poorer in MeO than the lignins in the original materials. Hence in fractions R and F there is no loss of lignin, irrespective of the extent of enzymic degradation. This was also found to be true of the elder-tree pith samples; only araucaria pith showed some loss of lignin. It is a striking fact that the enzymic degradation of these different materials yields resistant residues of analogous compn. as shown by the following values for hexosan, pentosan, polysaccharides, lignin (all in mol. %) ratio polysaccharide/lignin, and ratio lignin/pentosan, resp.: old elder-tree pith (sample I) 55.1, 21.8, 76.9, 23.1, 3.32, 1.06; old elder-tree pith (sample III, with weak enzyme) 52.9, 23.5, 76.4, 23.5, 3.25, 1.00; linden fraction R 69.2, 7.9, 77.1, 22.9, 3.36, 2.90; araucaria pith 38.3, 11.9, 50.2, 49.8, 1.01, 4.18; young elder-tree pith 38.3, 13.5, 51.8, 48.2, 1.07, 3.57; old elder-tree pith (sample III, with active enzyme) 38.7, 10.8, 49.5, 50.5, 0.98, 4.68; linden fraction F 43.0, 8.8, 51.8, 48.2, 1.07, 5.47. Since the degradation of these easily degraded materials comes to a stop when the residue consists of equal parts of carbohydrate and lignin, there must be an inner relationship between these components. What the nature of this complex is, the available data do not show. It might be a chem. combination, such as a glucosidic lignin-carbohydrate union. Furthermore, there may be structural units of a still higher order, such as that obtained from old elder-tree pith with a weak enzyme, contg. 3 parts carbohydrate to 1 of lignin and broken down by a stronger enzyme prepn. to a 1·1 complex. C. A. R.

Synthesis of α,α-dimethyltricarballylic and 1-carboxycyclopentane-1-α-succinic and 1-carboxy-3-methylcyclopentane-1-α-succinic acids. R. D. Desai and G. S. Sahariya. *J. Univ. Bombay* **8**, Pt. 3, 235–8(1939). —When in RR'C(CN)C(CN)CO_2Et, R and R' together are cyclopentane or methylcyclopentane rings, there are obtained with CH_2BrCO_2Et (I) excellent yields of tricarballylic acids which are characterized by their toluidide *N*-tolylimides. A mixt. of the Et sodiocyanoacetate (II) from 24 g. cyanoacetate and 21 g. cyclopentanone cyanohydrin is allowed to stand for 48 hrs. After addn. of 32 g. I the mixt. is kept at room temp. for 2 days and then refluxed until it is neutral. The EtOH is distd. off, the residue dild. with H_2O and the oil extd. with ether, dried and distd. into 3 fractions, b_4 90–120°, 120–65° and 185–7°. The 2nd fraction is retreated with I. *Et 1-cyanocyclopentane-1-α-cyanosuccinate* (III), b_4 185–7°, is obtained in 45% yield. **Hydrolysis of III with concd. H_2SO_4 gives 1-carboxycyclopentanesuccinic acid (IV), m. 165°** (cf. Chatterji, *C. A.* **31**, 7409[7], found 159°). Its anilide *N*-phenylimide, prepd. by heating IV with $PhNH_2$ at 170–5° for 3 hrs., m. 156°; *p-toluidide N-p-tolylimide* m. 189–90°. *Et 1-cyano-3-methylcyclopentane-1-α-cyanosuccinate* (V), prepd. as II, b_{12} 205°. Hydrolysis of V gives 1-carboxy-3-methylcyclopentanesuccinic acid, m. 144°; its *p-toluidide N-tolylimide* m. 167°. *Di-Et 2-methyl-3,3-dicyanobutane-3,4-dicarboxylate* (VI), prepd. from II, $Me_2C(OH)CN$ and I, in 45% yield, b_5 176–8°. Sapon. of VI with H_2SO_4 gives α,α-dimethyltricarballylic acid, m. 160° (C, found 156°). Its *anilide N-phenylimide* m. 140°; the *p-toluidide N-p-tolylimide* m. 170°. F. E. Brauns

Influence of groups on the formation of certain tricyclic compounds. Tejendra Nath Ghosh. *Science and Culture* **5**, 372–3(1939); cf. *C. A.* **30**, 2553[9].—It was previously shown that the formation of the tricyclic compd. (II) from the cyclobutane deriv. (I) is conditioned by the at. vol. of the group R, the greater the vol. the greater tendency of I to pass into II with the elimination of 2 mols. of alc. An attempt is now made to explain this influence of



the group R on the basis of the theory of valency deflection of Thorpe and Ingold (Beesley, I. and T., *C. A.* **9**, 3059). If R has a high at. vol. the angle (α) between the valency directions will be smaller (III); the interat. distances (d) between the C atoms will decrease and the groupings "A and C" and "B and D" will come closer and form II. Mark Plunguian

Thiocyano derivatives of hydnocarpic and chaulmoogric acids. Herbert Arnold. *Arch. Pharm.* **277**, 206–11 (1939).—Hydnocarpic acid and $(CNS)_2$ (prepared *in situ*) in AcOH give *2,3-dithiocyanodihydrohydnocarpic acid*. Impure *Et 2,3-dithiocyanodihydrochaulmoograte* is similarly prepd. *3-Thiocyanodihydrochaulmoogric acid* (*Et ester*, $b_{0.3}$ 200–30°) is obtained from the 3-bromo acid by NaCNS in AcOH. None of these products (all oils) cures leprosy in mice. B. C. P. A.

Epimeric alcohols of the cyclohexane series. III. Glucoside formation. D. T. C. Gillespie, A. Killen Macbeth and J. A. Mills. *J. Chem. Soc.* **1940**, 243–5; cf. *C. A.* **34**, 844. —Miescher and Fischer (*C. A.* **33**, 4994[8]) concluded that glucoside formation could be applied as a criterion of trans configuration, since borneol but not isoborneol reacted with bromotetraacetylglucose (I). *l*-Menthol (6 g.), 20 g. I and 10 g. Ag_2O in ether, shaken 60–70 hrs. at room temp., give 11 g. of *tetraacetyl-l-menthyl-d-glucoside*, m. 129.5°, $[\alpha]_D$ −90.3° (EtOH, *c* 2.02); *d-neomenthyl isomer*, m. 144.5°, $[\alpha]_D$ 3.3° (EtOH, *c* 2.073); *dl-isomenthyl isomer*, m. 103–5°; *dl-neoisomenthyl isomer*, m. 128–30°. *Tetraacetyl-cis-dihydrocryptylglucoside*, m. 102°, $[\alpha]_{5461}$ −32.8° (EtOH, *c* 1.93); *trans isomer*, m. 107.5°, $[\alpha]_{5461}$ −25.8° (EtOH, *c* 1.96). *Tetraacetyl-trans-l-3-methylcyclohexyl-d-glucoside*, m. 103°, $[\alpha]_{5461}$ −31.5° (EtOH, *c* 1.97); *cis isomer*, m. 105°, $[\alpha]_{5461}$ −38.9° (EtOH,

c 2). *Tetraacetyl-trans-4-methylcyclohexylcarbinylglucoside* (II), m. 113°, $[\alpha]_D^{25}$ −28.6° (EtOH, *c* 1.92); *cis isomer*, m. 72–3°, $[\alpha]_D^{25}$ −23.4° (EtOH, *c* 1.97). *trans-4-Isopropyl analog* of II, m. 112°, $[\alpha]_D^{25}$ −26.9° (EtOH, *c* 2.08); *cis isomer*, m. 103–4°, $[\alpha]_D^{25}$ −25.8° (EtOH, *c* 1.96). *Tetraacetyl-trans-l-cryptylglucoside*, m. 99–9.5°, $[\alpha]_D$ −80.6° (EtOH, *c* 2.27); *cis isomer*, m. 106.5°, $[\alpha]_D^{25}$ −90.7°. This work makes the conclusion of M. and F. untenable. C. J. West

Dehydration of some tertiary alcohols containing the cyclohexane ring. Wm. A. Mosher. *J. Am. Chem. Soc.* **62**, 552–4(1940).—In order to obtain data on the manner of dehydration of tertiary alcs. contg. the cyclohexane ring, as well as to gain some insight into the process as applied to the group as a whole, 1-Me, 1-Et, 1-iso-Pr and di-Me derivs. of cyclohexanol have been prepd. and dehydrated; dehydration was effected by heating with I under a column so that the olefin and H_2O distd. out of the mixt. as formed. The use of ozonolysis offers a simple and satisfactory approach to the problem as it makes phys. sepn. of the isomers unnecessary. The 1-Me deriv. gave no HCHO, indicating that no methylenecyclohexane was formed and that only 1-methylcyclohexene was formed by the dehydration. In the case of the 1-Et deriv. only a trace of AcH was found, indicating that less than 1% of ethylidenecyclohexane was formed; the other 99% was probably 1-ethylcyclohexene. An amt. of Me_2CO corresponding to approx. 5% of the theory was found in the products from the 1-iso-Pr deriv., indicating this percentage of isopropylidenecyclohexane in the olefin mixt. The di-Me deriv. gives approx. 50% each of Me_2CO and HCHO, indicating equal amts. of isopropylidenecyclohexane and isopropenylcyclohexane in the mixt. Dehydration apparently will take place in such a manner that the double bond occurs principally in the ring when this is possible; in other words, the H atoms attached to the ring are less firmly bound than those of a more aliphatic nature. It is noted that a proton is lost from the cyclohexane ring more readily than from a Me, Et or iso-Pr group. C. J. West

Methylation of ethyl methylcyclohexylidenecyanoacetates and reduction of ethyl 2-methylcyclohexylidenecyanoacetate. R. D. Desai and G. S. Sahariya. *J. Univ. Bombay* **8**, Pt. 3, 239–42(1939).—Et 4-methyl-, 3-methyl- and 2-methylcyclohexylidenecyanoacetates (I, II, III) are methylated in the presence of EtONa in order to study whether they are tautomerized to the β,γ-form similar to the Et cyclohexylidenecyanoacetate (cf. Kon and coworkers, *C. A.* **17**, 2870). I (16 g.) is added to 2 g. Na in 40 cc. EtOH and 20 g. MeI is added to the mixt. After standing for 4 hrs. at room temp. and heating for 1 hr. on a water bath, the mixt. is dild. with H_2O and extd. with ether. *Et α-cyano-α-4-methylcyclohexenylpropionate* (IV), b_{12} 152–4°. IV readily adds Br. When 7 g. IV is treated with 0.7 g. Na in 15 cc. MeOH at 35° for 5 hrs. and the pptd. oil is extd. with ether, dried and distd., *α-4-methylcyclohexylidenepropionitrile*, b_{12} 106°, is obtained, which on oxidation with $KMnO_4$ yields 4-methylcyclohexanone. In the same way II gives *Et α-cyano-α-3-methylcyclohexenylpropionate*, b_{12} 146–7°, and *α-3-methylcyclohexylidenepropionitrile*, b_{12} 107–8°. III gives *Et α-cyano-α-2-methylcyclohexenylpropionate*, b_{12} 144–5°, and *α-2-methylcyclohexylidenepropionitrile*, b_{12} 110°. Reduction of III with Al-Hg in moist ether gives *Et 2-methylcyclohexylcyanoacetate*, b_{12} 135–6°, which, when sapond. by refluxing it with alc. KOH, gives 2-methylcyclohexylmalonic acid, m. 154°. No bimol. product is obtained such as was found by Vogel and Oommen (*C. A.* **24**, 3225) on reduction of I and II with Al-Hg. F. E. Brauns

Identification of organic compounds. I. Chlorosulfonic acid as a reagent for the identification of aryl halides. Ernest H. Huntress and Frederick H. Carten. *J. Am. Chem. Soc.* **62**, 511–14(1940).—The object of this work was to find a set of conditions such that treatment of the sample with $ClSO_3H$ would yield readily the corresponding arylsulfonyl chloride which in turn could be converted to the sulfonamide. The process of introducing the $-SO_2Cl$ group is designated as *chlorosulfonylation*. Two standard procedures are used, the 1st of which uses $CHCl_3$ as a solvent; the 2nd uses no solvent. The yields of arylsulfonyl chloride thus obtained are generally 60–90%. Conversion to the amide is effected by treatment with concd. NH_4OH or with solid $(NH_4)_2CO_3$, the yields being nearly quant. In a few cases the reaction with $ClSO_3H$ is abnormal. PhF without solvent yields 71–4% of *4,4'-difluorodiphenyl sulfone*, m. 97–8°; heating at 40° for 1 hr. gives a 100% yield. PhI gives the *4,4'-di-I analog*, m. 201–2°. *o*-$C_6H_4Cl_2$ gives *3,4,3',4'-tetrachlorodiphenyl sulfone*, m. 175–6° (3–4% of 3,4-$Cl_2C_6H_3SO_2NH_2$ is also formed); *o*-$C_6H_4Br_2$ gives the *3,4,3',4'-tetraBr analog*, m. 176–7°. *p*-$C_6H_4I_2$, heated with 5 parts $ClSO_3H$ at 50° for 5 min., gives *2,3,5,6-tetrachloro-1,4-diiodobenzene*, m. 210–11°. 1,2,4,5-$C_6H_2Cl_4$ (5 g.) and 20 g. $ClSO_3H$, refluxed 1 hr., give 78% of C_6Cl_6. *p*-ClC_6H_4Br and 5 parts $ClSO_3H$, refluxed 1 hr. and the chloride reacted with NH_3, give 86% of 2,5-$BrClC_6H_3SO_2NH_2$, m. 189–90°. M. ps. are given for 28 sulfonamides (6 are new but are not indicated) and for 4 sulfones (2 new). Derivs. of C_6H_6 studied: Cl, Br, F, 1,2-, 1,3- and 1,4-di-Cl and -di-Br, 1,2,3-, 1,2,4- and 1,2,5-tri-Cl and 1,3,5-tri-Br; of PhMe: 2-, 3- and 4-Cl, -Br and -F and 2,4- and 2,6-di-Cl; of $C_{10}H_8$: 1- and 2-Cl and -Br. Since the 3 isomeric $C_6H_3Cl_3$ yield sulfonamides which are not well adapted for their pos. identification, the utility of nitration for this purpose was studied; soln. of 1 g. in 5 g. fuming HNO_3 gives a quant. yield of the mono-NO_2 deriv.; addn. of 5 g. concd. H_2SO_4 to the HNO_3 soln. and refluxing 1 hr. give a quant. yield of the di-NO_2 deriv. Heating 4,5,6,1,3-$Cl_3C_6H(NO_2)_2$ with $PhNH_2$ for 1 hr. on the water bath gives *4,6-dianilino-5-chloro-1,3-dinitrobenzene*, m. 136–8°; *2,6-dianilino isomer*, m. 182°. III. **Chlorosulfonic acid as a reagent for the characterization of aromatic ethers.** *Ibid.* 603–4.—The use of $ClSO_3H$ has been extended to 36 aromatic ethers. In the following the parent ether and the yield of the amide are given and m. ps. are recorded for the new derivs. of *benzenesulfonamide:* PhOMe 53 (*p-MeO*, m. 110–11°); PhOEt 78; PhOPr 68 (*p-propoxy*, m. 116–17°); PhOBu 35 (*p-butoxy*, m. 103–4°); *o-*, *m-* and *p*-MeC_6H_4OMe 84, 69, 86, resp.; *o-*, *m-* and *p*-MeC_6H_4OEt 71, 61, 77, resp. (*3-methyl-4-ethoxy*, m. 148–9°; *2,4-isomer*, m. 110–11°); *p*-MeC_6H_4OPr 54 (*2-propoxy-4-methyl*, m. 126–7°); *o*-MeC_6H_4OBu 44 (*4-butoxy-5-methyl*, m. 95–6°); *o*-$C_6H_4(OMe)_2$ 89; *m*-isomer 53; *p*-isomer 53 (*2,5-dimethoxy*, m. 148°); *o*-$C_6H_4(OEt)_2$ 81 (*3,4-di-EtO*, m. 162–3°); *m*-isomer 59 (*2,4-di-EtO*, m. 184–5°); *p*-isomer 47; 1,2,3-$C_6H_3(OMe)_3$ 29 (*2,3,4-tri-MeO*, m. 123–4°); *o-* and *p*-ClC_6H_4OMe 85, 82; *o-* and *p*-BrC_6H_4OMe 78, 81 (*3-bromo-4-methoxy*, m. 139–40°; *5,2-isomer*, m. 147–8°); *p*-FC_6H_4OMe 86 (*5-fluoro-2-methoxy*, m. 174–5°); *o-* and *p*-ClC_6H_4OEt 73, 71 (*3-chloro-4-ethoxy*, m. 132–3°; *5,2-isomer*, m. 134–4.5°); *o-* and *p*-BrC_6H_4OEt 76, 68 (*3-bromo-4-ethoxy*, m. 134–5°; *5,2-isomer*, m. 144–4.5°); *p*-BrC_6H_4OPh 67. *α-* and *β*-$C_{10}H_7OMe$ 55, 65 (*4-* and *7-methoxynaphthalenesulfonamides*, m. 156–7° and 150–1°); *α-* and *β*-$C_{10}H_7OEt$ 64, 58; Ph_2O 86; $(CH_2OPh)_2$ 74 (*α,β-diphenoxyethane-4,4'-disulfonamide*, m. 228–9°); $CH_2(CH_2OPh)_2$ 44 (*α,γ-diphenoxypropane-4,4'-disulfonamide*, m. 245–55°). Satisfactory monochlorosulfonylation could not be obtained with *o-* and *p*-$MeOC_6H_4Ph$, $PhCH_2OMe$, $PhCH_2OEt$, diphenylene oxide and $(4\text{-}BrC_6H_4)_2O$. The color usually observed during the reaction varies from pale yellow to brown. C. J. West

Iodoso compounds as oxidizing agents. Rudolf Criegee and Hans Beucker. *Ann.* **541**, 218–38(1939).—The reaction velocity of anethole with $RI(OAc)_2$ in AcOH at 20° falls in the order R = *p*-MeC_6H_4, *m*-4-xylyl (I), *m*-MeC_6H_4, *o*-MeC_6H_4, Ph (II), *p*-$PhO_2SC_6H_4$, *p*-$O_2NC_6H_4$ (III); the bimol. coeffs. gradually decrease with time in all cases and are all of the same order (as is that for $Pb(OAc)_4$ (IV)). Previous work with cyclopentadiene (V) and IV (*C. A.* **24**, 5286) showed that besides the normal addn. product ($1,2\text{-}C_5H_8(OAc)_2$) there was also obtained $1,2\text{-}C_5H_8(OAc)OCOCH_2OAc$ (VI). V reacts with I, II or III in AcOH at 30° within a short time to give 52–73% of a mixt. of diacetoxycyclopentenes (VII) but VI could not be detected. Hydrolysis of VII and hydrogenation give a mixt. of cyclopentanediols (VIII). Destruction of

the 1,2-isomers of VIII shows that 43–60% consists of these isomers; the remainder consists of the 1,3-isomers of VIII, b_1 85–93° (*bisphenylurethans*, m. 142° and 173°). The 1,2-isomers contain 41–59% of the cis and 59–41% of the trans compd. IV in AcOH gives 57% of the 1,2-isomer (76% cis form) and 43% of 1,3-isomer and in C_6H_6, 81% of the 1,2-diol (96% cis form) and 19% of the 1,3-diol. The production of the 1,3-diol shows preliminary 1,4-addn. of 2 AcO groups to the conjugated system. Fissions of α,β-glycols by II occur much more slowly than with IV; the reaction is bimol. and the velocity coeffs. at 20° are (values for IV given first for comparison): *cis*- and *trans*-diphenylacenaphthenediol 33,000, 115; 284, 1.21; isohydrobenzoin (IX) 2820, 0.28; *cis*- and *trans*-diphenyldihydrophenanthrenediol 286, 0.073; 24.7, 0.0084; *cis*-decalin-9,10-diol 15, 0.0084; *cis*- and *trans*-cyclohexanediol 5.04, 0.0008; 0.224, very small. It is probable that the reaction proceeds through the cyclic intermediate .C.O.IPh.O.C:. Data are given for k_{20} for IX and the half-period time for anethole and IX with 12 iodosoacetates; in general the results for IX are the reverse of those for anethole. There is no simple relationship between the reaction velocity and the strength of the acid in the oxidation of IX by derivs. of PhIO; k_{20} for the acetate, chloro-, dichloro- and trichloroacetates are 2, 9.4, 10.4 and 8.3, resp. Iodochlorides are not capable of splitting glycols and free PhIO does not lend itself because of its insoly. in all solvents. Oxidation of $(CO_2H)_2$ with I–III gives k_{20} values of 2.45, 7.33 and 15.2, resp. $PhCH(OH)CO_2H$ and PhIO in H_2O-C_6H_6 give 88% of BzH. *Iodosobenzene monochloroacetate*, $PhI(O_2CCH_2Cl)_2$, decomps. 116°, 65% yield upon rubbing 11.5 g. of PhIO and 10 g. $ClCH_2CO_2H$ in a mortar and crystg. from C_6H_6; *dichloroacetate*, $PhI(O_2CCHCl_2)_2$, decomps. 112°, by addn. of PhIO to a concd. soln. of Cl_2CHCO_2H in C_6H_6. C. J. West

Action of aromatic amines on 3-nitro-6-iodonitrostyrene. David E. Worrall and Frederick Benington. *J. Am. Chem. Soc.* **62**, 493–4(1940); cf. *C. A.* **33**, 1284⁹.—*o*-IC_6H_4CHO and $MeNO_2$ in Et_3N give 65–70% of *α-nitro-β-(2-iodophenyl)ethylene* (I), pale yellow, m. 113–14°; fuming HNO_3 gives *α-nitro-β-(6-iodo-3-nitrophenyl)ethylene* (II), pale yellow, m. 145–6°. I and Br give an oil on treatment with warm EtOH-AcOK; fuming HNO_3 gives a yellow *compd.*, $C_8H_4BrIN_2O_4$, m. 136–7°; it gives an addn. compd. with *p*-$MeC_6H_4NH_2$ but was not investigated further. The previous procedure was used for prepg. the *addn. compds.* of II, which were crystd. from EtOH; they are yellow or orange-yellow and are deeper in color than II; *β-derivs.* of α-nitro-β-(6-iodo-3-nitrophenyl)ethane: *anilino*, m. 115–16°; *o-*, *m-* and *p-toluidino*, m. 168–70°, 113–14° and 130–2°; *o-*, *m-* and *p-anisidino*, m. 146–8°, 140–2° and 123–4°; *phenylhydrazino*, m. 142–4°; *β-naphthylhydrazino*, m. 143–4°; *hydroxylamino*, m. 103–5°; *semicarbazido*, m. 187–8° (the last 2 are colorless) II in. C_6H_6, satd. with NH_3 and allowed to evap. spontaneously, gives *α,α'-di(6-iodo-3-nitrophenyl)-β,β'-dinitrodiethylamine*, m. 113–14°. II is the most active nitrostyrene thus far studied. C. J. West

Action of nitrous acid on *p*-nitrodimethylaniline in hydrochloric acid. Henrietta Margaret Halliday and Thomas H. Reade. *J. Chem. Soc.* **1940**, 138–41.—In the reaction of substituted $PhNMe_2$ with HCl and $NaNO_2$, the fate of the Me group and the mechanism of the reaction are studied. Quant. results were unreliable in the presence of air. The largest yield of *p*-$O_2NC_6H_4N(NO)Me$ (I) from *p*-$Me_2NC_6H_4NO_2$ (II) in 5 *N* HCl in a N atm. was obtained when 5.5 mols. of $NaNO_2$ were used for each mol. of II; for every mol. of II decompd., 1.5 mols. of gas were evolved, consisting of NO and N in the proportion 93.7:6.3; there was only a trace of CO_2 in the gas. A max. yield of HCHO was obtained with 2 mols. of $NaNO_2$, falling almost to 0 when large amts. of nitrite were used; 2.2 mols. of $NaNO_2$ were required to decomp. 1 mol. of HCHO in 5 *N* HCl; the evolved gases accounted for 95.5% of the N in the original nitrite as NO with 6% N; they were free of CO and CO_2; most of the C remained in the aq. acid but attempts to isolate org. substances from the dil. soln. were unsuccessful, although from concd. solns. small quantities of substances m. 55° and 95–100° and 0.15 mol. of carbonate were obtained. The reactions involved are: $2II.HCl + 3HNO_2 \rightarrow 2O_2NC_6H_4NHMe.HCl$ (III) + $2HCHO + 3NO + H_2O + (H)$; $III + HNO_2 \rightarrow I + HCl + H_2O$; $HCHO + 2HNO_2 \rightarrow 2NO +$ unidentified org. compds. The NO always contains about 6% N, attributed to the action of H from the 1st equation not actually liberated as such. Attempts to ascertain the order of the reaction between $NaNO_2$, HCHO and HCl by estg. the rate of decompn. of the HCHO at different dilns. gave conflicting results; in some expts. the HCl probably performed some function other than merely liberating the HNO_2 from the nitrite. The results are given in 5 sets of curves. C. J. West

Condensation of butyraldehyde with aniline. M. S. Kharasch, Isadore Richlin and Frank R. Mayo. *J. Am. Chem. Soc.* **62**, 494–7(1940).—$PhNH_2$ and PrCHO (both freshly distd.), mixed with stirring and cooling and allowed to stand for 18–24 hrs., give 78% of butylideneaniline dimer (I), PhN:CHCHEtCHPrNHPh, m. 92.5°; the purest material in the best yield is obtained by the complete absence of acid (by addn. of a small amt. of aq. Na_2CO_3 to the reaction and to the EtOH used for crystn.). The mol. wt. of I in Ph_3CH is 281.4 (calcd. 294.4); in camphor the values vary from 176 (5% soln.) to 251 (10% soln.), indicating dissocn. If H_2O and acid are excluded, up to 75% of pure crystals can be recovered from vacuum distn. of the I. I takes up 1 mole of H on catalytic reduction, giving an oil b_{20} 240–50°; the di-Ac deriv. (*1,3-diacetanilino-2-ethylhexane*) m. 131°. In the presence of small amts. of acid, as when an old PrCHO is used or when as little as 0.03 mole % of AcOH or $PrCO_2H$ is added to the reaction, the product is the *anil* (II) of α-ethyl-β-propylacrolein (III), PhN:CHCEt:CHPr, yellow, b_{18} 146–8°; cryst. I may or may not sep. during the reaction. II is formed from I on standing in the air for several days. II with BzCl in C_6H_6 gives 93% of PhNHBz and AcCl gives 60% of PhNHAc. 2,4-$(O_2N)_2C_6H_3NHNH_2$ and H_2SO_4 with II or III give the 2,4-dinitrophenylhydrazone of III, m. 119–20°; the yield from II is 60%. II results in 70% yield from III and $PhNH_2$. Using PrCHO and $PhNH_2$ in the ratio of 2:1 and adding 0.1, 0.5, 1, 1.5, 2 and 5 moles of HCl per mole $PhNH_2$ (20–24 hrs. at room temp.) there results 20, 58, 79, 60, 56 and 54% of 3-ethyl-2-propylquinoline (V); I and 1 mole HCl give 50% V; II and 2 moles HCl give 15% V; II and $PhNH_2$ with 1 mole HCl give 20% V; $PhNH_2$ and II with 2 moles HCl give 15% V. V is isolated and identified as the picrate. By-products of the Doebner-Miller synthesis of V are *N*-butylaniline (67% of the yield predicted on the basis of V formed) (*naphthylurea*, m. 277°) and a fraction b_{18} of over 200°, which may contain di- and tetrahydro derivs. of V. The compd. of V described by Kahn (*Ber.* **18**, 3361(1885)) is the *HI salt*, m. 171–2° (also prepd. from V and HI in ligroin); V forms a *methiodide*, m. 160–5°. A mechanism is suggested for the Doebner-Miller synthesis. C. J. West

Action of chlorine on aryl thiocarbimides and the reactions of aryl isocyanodichlorides. G. Malcolm Dyson and Thomas Harrington. *J. Chem. Soc.* **1940**, 191–4.—PhNCS (20 g.) in 64 g. $CHCl_3$, treated with Cl without cooling until the increase in wt. is 2 g., gives *bis(phenylthiocarbimide) oxide*, yellow, m. 118°; *p-tolyl analog*, m. 139°; *m*-isomer, m. 128°; *p-bromophenyl analog*; no oxides were obtained from *o*-MeC_6H_4NCS or from *o-*, *m-* and *p*-$O_2NC_6H_4NCS$. PhNCS (20 g.) in 10 g. $CHCl_3$, treated with Cl until the increase in wt. is 7 g., gives 1-anilinobenzothiazole (I), m. 159° (picrate, yellow, m. 221°). $CS(NHPh)_2$ and Br in $CHCl_3$, boiled 0.5 hr., give red needles of a Br addn. product; reduction with SO_2 in H_2SO_3 and treatment with hot 2 *N* NaOH give I. PhNCS (318 g.) in 289 g. PhN:CCl_2 (II), treated with Cl with cooling for 8 hrs. (increase in wt. of 363 g.) gives 256 g. of II, b. 209–11°, d^{16} 1.285; the following isocyanodichlorides were prepd. by treatment with Cl in 2–3 times their wt. of CS_2; they are colorless or pale yellow lachrymatory oils with unpleasant odors: *p-bromophenyl*,

b_{15} 122–4°, d^{15} 1.5; *p-anisyl*, b_{15} 155–60°, d^{15} 1.5; *p-tolyl*, b_{20} 121–4°, d^{15} 1.2; *m-tolyl*, b_{10} 130°, d^{15} 1.35; *o-tolyl*, b_{15} 125–30°, d^{15} 1.3; *m-nitrophenyl*, prepd. in warm $CHCl_3$, pale yellow, b_{15} 165–70°, m. 68°; *m-isomer*, m. 80°; the *o*-isomer could not be prepd. II (5 g.) and 3.5 g. AcOH in 20 cc. C_6H_6, refluxed 2 hrs., give $CO(NHPh)_2$ (III); the *o*- and *p*-tolyl analogs were similarly obtained; however, boiling 10 g. II with 25 cc. AcOH in 50 cc. C_6H_6 for 10 hrs. gives PhNHAc (IV); *o*-, *m*- and *p*-MeC_6H_4NHAc were similarly prepd. Thus the reaction with AcOH proceeds as follows: $2II + 3AcOH \rightarrow III + CO_2 + HCl + 3AcCl$; $III + AcCl + AcOH \rightarrow 2IV + CO_2 + HCl$. III is only very slowly hydrolyzed to IV by AcOH alone whereas in the presence of AcCl the reaction is rapid and proceeds to completion. The *m*-tolyl analog yields an unidentified N compd. m. 278°. *p*-$BrC_6H_4N{:}CCl_2$ and AcOH in C_6H_6 give $(p\text{-}BrC_6H_4NH)_2CO$ on refluxing 5 hrs. and *p*-BrC_6H_4NHAc on further boiling; *m*-$O_2NC_6H_4N{:}CCl_2$ behaves similarly. II, $PhNH_2$ and C_6H_6, refluxed 5 hrs., give triphenylguanidine-HCl; analogs were prepd. as follows, the m. p. of the HCl salt and the free base being given: *phenyldi-p-tolyl* 222–3°, 109°; *m-isomer* 206, 93°; *o-isomer* 205°, 100°; *phenyldi-p-bromophenyl* 257 62°, oil; *p-tolyldiphenyl* 230°, 128°; *tri-p-tolyl* 231°, 125°; *p-tolyldi-p-bromophenyl* 262–6°, 178°; *tri-m-tolyl* 221°, 107°; *m-tolyldi-p-tolyl* 218°, 105°; *tri-o-tolyl* 213–15°, 129°; *o-tolyldi-p-tolyl* 205–8°, 87°; *tri-p-bromophenyl* 270 6° (decompn.), 126°; *p-bromophenyldi-p-tolyl* 251°, 123°; *m-nitrophenyldi-p-tolyl* 201–5°, 179°; *m-tolyl isomer* 218 25°, 139°. The method constitutes a simple approach to the unsym. guanidines. C. J. West

Hydration of stearanilide. B. A. Toms. *Nature* **145**, 227(1940). The formation of hydrated stearanilide is described. After drying, the prepn. contained almost 80% water. E. D. Walter

***p*-Cymene studies. IV. Mononitration of 2-amino-*p*-cymene. Preparation of 3-amino-*p*-cymene and *o*- and *p*-cymylenediamine.** Thomas F. Doumani and Kenneth A. Kobe. *J. Am. Chem. Soc.* **62**, 562–5(1940); cf. *C. A.* **33**, 4209[2,4].—2-Amino-*p*-cymene (1 mol.) and 1.76 mols. HCO_2H, refluxed for 2 hrs., give the *formyl deriv.*, m. 108.8–9.4° (all m. ps. cor.); nitration with HNO_3 in H_2SO_4 at 0° gives 90% of crude formyl deriv. and hydrolysis with 30% NaOH (refluxing 1 hr.) gives 99% of the isomeric nitramines. Fractionation of 98.2 g. gives 64.5 g. b_1 114–16° (I) and 26.6 g. b_1 144 8°, m. 57–60° (II). I is *2-amino-3-nitro-p-cymene*, b_5 142.9°, b_{20} 175.6°; it is purified through the *Ac deriv.*, m. 167.6–7.8° (refluxing with Ac_2O for 3 hrs.); *formyl deriv.*, m. 139.6–40° (refluxing with 90% HCO_2H for 5 hrs.); *Bz deriv.*, m. 193.4–3.8° (BzCl at 90° for 5 min.). The yield of I is 70%. Reduction of 35 g. I in 35 ml. EtOH and 30 ml. 30% NaOH with Zn (addn. so that the soln. gently refluxes and then refluxing for an addnl. hr.) gives 26 g. (88%) of *o-cymylenediamine* (III), m. 95–5.8°; *di-Ac deriv.* (IV), m. 235.1–5.3° (formed by soln. of III in Ac_2O); refluxing III in Ac_2O for 1 hr. gives a mixt. of IV and V. Distn. of IV at atm. pressure (b. 326–7°) gives *2,7-dimethyl-4-isopropylbenzimidazole* (V), m. 179.5–9.9°; V also results on refluxing III in glacial AcOH for 1 hr.; V forms salts with mineral acids. Refluxing III, benzil and EtOH for 15 min. gives *2,3-diphenyl-5-isopropyl-8-methylquinoxaline*, m. 136.7–7.3°; H_2SO_4 gives a blood-red color, changing to yellow on diln. III and phenanthraquinone in AcOH, refluxed 15 min., give *10-isopropyl-13-methyldibenzophenazine*, light yellow, m. 181.2–1.4°; concd. H_2SO_4 gives a purplish red color; concd. HCl gives a yellow color. Fraction II is *2-amino-5-nitro-p-cymene*, canary-yellow, m. 66.6–7.6° (30% yield); *Ac deriv.*, m. 142.8–3.2°; *formyl deriv.*, yellow, m. 101.6–2.2°; *Bz deriv.*, light yellow, m. 139–9.4°. Reduction of II with Zn in 50 ml. EtOH and 25 ml. 40% NaOH gives 86% of *p-cymylenediamine* (VI), b_1 120–5°, m. 50–50.5°; *di-Ac deriv.*, m. 262–2.2°. Oxidation of VI with $FeCl_3$ gives thymoquinone. VI is fairly stable in light; in aq. EtOH it is more rapidly destroyed. Decompn. of the diazo compd. from I with abs. EtOH gives 52% of 3-nitro-*p*-cymene, light yellow, b_{10} 116.7°, b_{20} 133.5°; 20 g. II gives only 2.3 g.; reduction with Fe and HCl gives 3-amino-*p*-cymene, b_{10} 105.7°, b_{760} 240.2°; *formyl deriv.*, m. 106.2–6.6°. Nitration of 2-acetamino-*p*-cymene (which is extremely difficult to purify) gives 52% I and 48% II; nitration of 2-amino-*p*-cymene gives approx. 60% of I and 40% II. This work shows that the compd. of Wheeler and Brooks (*C. A.* **22**, 228), which they believed to be II, is really I. C. J. West

Oxidizability of thioarylhydrazides to disulfides. H. Wuyts and A. Lacourt. *Bull. soc. chim. Belg.* **48**, 193–200(1939); cf. *C. A.* **31**, 4978[8].—The authors present addnl. evidence for the existence of a tautomeric mercaptan form in which thioarylhydrazides undergo reactions. Thus α-phenyl-β-thiobenzoylhydrazine is quantitatively oxidized by I in C_6H_6 to its corresponding *disulfide*, m. 149° ($2PhC(:NNHPh)SH + I_2 \rightarrow [PhC(:NNHPh)S]_2 + 2HI$). Its insoly. in alkali in which the parent hydrazide is sol., its mol. wt., which is twice that of the hydrazide, the presence of 2 active H atoms with respect to Mg and the fact that it can be acetylated, represent the properties upon which its structure is based. Similarly the corresponding disulfides (I and II) were prepd. from α-phenyl-β-(α-thionaphthoyl)hydrazine (m. 161°), and from α-methyl-α-phenyl-β-cyclohexylcarbothioylhydrazine (m. 108°); I m. 165° (EtOH and C_6H_6); II could not be purified because of further oxidation. Attempts to oxidize *p*-$MeC_6H_4C(SMe){:}NNHC_6H_4Me$-*p* failed. This substantiates the conclusion that the hydrazides which forego oxidation exist in a tautomeric mercaptan form. The above-mentioned disulfides are readily reduced to their corresponding thiohydrazides in C_6H_6 soln. upon agitation with a mixt. of $SnCl_2$ and concd. HCl. Reaction of the disulfides with Mg yields the corresponding hydrazide and a mixed sulfide. The latter reaction with the Grignard reagent establishes the presence of a disulfide linkage in the oxidation product of the thioarylhydrazides. W. A. C.

Associating effect of the hydrogen ion. V. Nitroarylhydrazones. Louis Hunter and John A. Marriott. *J. Chem. Soc.* **1940**, 166–70; cf. *C. A.* **33**, 4220[8].—Cryoscopic measurements have been made of the mol. wts. of a no. of NO_2-substituted arylhydrazones over a range of concn. The results provide direct evidence of a type of H-bond assocn. long assumed on theoretical grounds to be operative in certain substances, viz., that due to the union of unlike groups in sep. mols. Two kinds of H-bond assocn. are therefore distinguishable: *homogeneous assocn.*—between typical assocg. groups of the same kind, as in phenols (—OH-------HO—), oximes (:NOH-------HON:), amides (—CONHR-------NHRCO—), etc., and *heterogeneous assocn.*—between electron-donor and electron-acceptor groups of different kinds, e. g., $-NO_2$-------HO—, $-NO_2$-------NHArN=, and presumably many others. PhCH:NNHPh is weakly assocd. Substitution of a NO_2 group in either Ph nucleus causes a high degree of assocn. *o*-$PhCH{:}NNHC_6H_4NO_2$, in which the H bonding can occur intramol., is not assocd. Substitution of a Me or Ph group for the imino-H atom of the $O_2NC_6H_4CH{:}NNHPh$ checks assocn. *m*-$O_2NC_6H_4CMe{:}NNHPh$ is assocd. but *m*-$O_2NC_6H_4CMe{:}NNPh_2$ is not. By dispensing with the NO_2 group (as in PhCMe:NNHPh) and the imino-H atom (as in $PhCMe{:}NNPh_2$) assocn. is again checked. Salicylidene-*o*-nitrophenylhydrazine (I) is unassocd. in $C_{10}H_8$; it is evident that both hydroxyl- and imino H atoms are chelated and therefore not free to undertake intermol. bonding. On the other hand the *p*-isomer (II) is assocd.; it seems clear that assocn. is due to intermol. union of the NO_2 and hydrazone groups. The m.-p. depression of II is 41°, of I 18°. Three solvents were used: C_6H_6, $C_{10}H_8$ (III) and *p*-$C_6H_4Br_2$ (IV). The 3 $O_2NC_6H_4CH{:}NNHPh$ (V), though assocd. in IV, are considerably less assocd. in $C_{10}H_8$; this is due to compd. formation. *o*-V and III form an unstable 1:1 compd., m. 123°; eutectic pt. for mixts. rich in III at 77° and eutectic arrest for mixts. rich in V at 113°. *m*-V and III form an unstable 1:1 compd. m. 85°; eutectic pt. (40% by wt. of III) at 67°. *m-Nitroacetophenone diphenylhydrazone*, bright yellow, m. 105°. C. J. West

Action of mixed organomagnesium compounds on *sym*-acylphenylhydrazines. Panos Grammaticakis. *Compt.*

rend. **207**, 239–41(1938); cf. *C. A.* **31**, 4954.—Although *sym*-acylphenylhydrazines do not react with a mixed organomagnesium compd. in ether, they do so when heated at 116–20° for 7–12 hrs. with a large excess thereof. Under these circumstances *sym*-formylphenylhydrazine and PhMgBr yield mainly Ph_2CO with a very little $Ph_2C{:}NNHPh$ and $Ph_2C{:}NPh$; the *sym*. Ac Ph deriv. gives α-phenylindole and a little $MePhC{:}NNHPh$ and $MeCOPh$; and the *sym*. Bz Ph deriv. gives $Ph_2C{:}NNHPh$, $Ph_2C{:}NPh$, $Ph_2C{:}NH$ and Ph_2CO. In all cases a little $PhNH_2$ and H_2NNHPh are also formed. It is suggested that the formation of some at least of these side-products is due to the organomagnesium interacting with the tautomeric form $RC(OH){:}NNHPh$. C. A. Silberrad

General methods of preparing *sym*- and *asym*-alkylphenylhydrazines. Panos Grammaticakis. *Compt. rend.* **210**, 303–5(1940); cf. *C. A.* **31**, 4952[2]; **34**, 1977[4].—*sym*-Alkylphenylhydrazines are readily obtained in good yield by acting with an alkyl halide or sulfate on the Na deriv. (I) of *sym*-diformylphenylhydrazine (II) and hydrolyzing with cold concd. HCl. (I is prepd. as a white hygroscopic powder by acting with $NaNH_2$ on II in suspension or soln. in ether, C_6H_6 or xylene). In this way *sym*-methyl-, -ethyl-, -benzyl- and -(α-phenylpropyl)-phenylhydrazines were prepd. Other *sym*-diacylphenylhydrazines (e.g., diacetyl, dibenzoyl, succinyl) act similarly. If, however, a *sym*-acylphenylhydrazine is used a mixt. of *sym*- and *asym*-alkylphenylhydrazines is obtained in proportions depending on the exptl. conditions. In place of the Na deriv., complexes such as $MgX(CHO)NNPh(CHO)$ formed by acting with MeMeBr or EtMgBr on the acylphenylhydrazine may be used (cf. preceding abstr.). *sym*-Alkylphenylhydrazines of the type $RCH_2HNNHPh$ are readily oxidized to the hydrazone, whence the aldehydes can be prepd.; in this way benzaldehyde, *o*-, *m*- and *p*-tolualdehyde and *p*- and *m*-anisaldehydes have been prepd. *asym*-Alkylphenylhydrazines (cf. Michaelis, *Ann.* **252**, 266(1889)) are readily obtained by adding H_2NN-PhNa (prepd. by slowly adding NH_2NHPh to a C_6H_6 or ether suspension of NH_2Na) to an equimol. amt. of RX and heating for 5 hrs. In this way *asym*-methyl-, ethyl-, isopropyl- and benzyl-phenylhydrazines have been prepd. C. A. Silberrad

Decomposition of $RHgC_6H_5$ (where R is an acid radical) in alcohols. M. M. Koton. *J. Gen. Chem.* (U. S. S. R.) **9**, 1622–5(1939); cf. *C. A.* **34**, 392[6].—Previously it was shown that derivs. of Ph_2Hg are decompd. in alcs. with sepn. of Hg and formation of the corresponding hydrocarbons. The reaction proceeds with the formation of small quantities of the corresponding free aldehydes and esters. RHgPh, where R is an acid radical, react similarly in MeOH, iso-AmOH and EtOH at 125° and 200°. RHgPh, prepd. by the previous method, are more easily decompd. than Ph_2Hg with sepn. of 75–100% Hg. The rate of decompn. increases with the mol. wt. of the alcs. The rate of decompn. of RHgPh decreases in the following order: HCO_2HgPh, *o*-$HOC_6H_4CO_2HgPh$, $C_3H_6(OH)CO_2HgPh$, $C_2H_4(OH)CO_2HgPh$ (lactate), $AcOHgPh$, $EtCO_2HgPh$, $PrCO_2HgPh$, $C_5H_{11}CO_2HgPh$ (caproate), $C_{17}H_{35}CO_2HgPh$ (stearate) and $BzOHgPh$. The probable scheme of the reaction is: $RHgPh \rightleftarrows R—$ and $PhHg—$ the free radicals react with the alc.: $2\ R— + EtOH \rightarrow 2\ RH + AcH$; $2\ PhHg— + EtOH \rightarrow 2\ Hg + 2\ C_6H_6 + AcH$. The acid (RH), formed in the reaction, reacts with the alc. to give the Et ester: $C_{17}H_{35}CO_2H + EtOH \rightarrow H_2O + C_{17}H_{35}CO_2Et$. Chas. Blanc

Condensation of arsenic chloride with dialkyl aromatic amines. Phuldeo S. Varma, K. S. V. Raman and K. M. Yashoda. *J. Indian Chem. Soc.* **16**, 515–18(1939).—$AsCl_3$ (I) condenses with dialkyl aromatic amines to form *p*-dialkylaminophenylarsenious chlorides. The reaction with $PhNMe_2$ proceeds further with the formation of $(Me_2NC_6H_4)_3As$. The reaction has been extended to $PhNMeEt$ (II), $\alpha\text{-}C_{10}H_7NMe_2$ (III), $m\text{-}MeC_6H_4NMe_2$ (IV) and $p\text{-}MeC_6H_4NMe_2$ (V). A mixt. of 15 g. II and 25 g. I was heated at 100° for 2 hrs. and the reaction product was poured into cold H_2O. After neutralization with 10% NaOH, filtration from solids (VI) and acidification, the product was pptd. with Na_2CO_3. The crude oxide was purified by dissolving in dil. HCl and repptg. with Na_2CO_3, yielding *p-methylethylaminophenylarsenious oxide*, $C_9H_{12}AsNO$, m. 74–5°; *sulfide*, m. 157°; *chloride-HCl*, m. 99°, converted by Na_2CO_3 to the oxide; *bromide-HBr*, m. 143°; *iodide-HI*, light yellow unstable powder; *arsonic acid*, $C_9H_{14}AsNO_3$, m. above 250°. VI was freed from unreacted II by treatment with petr. ether and was recrystd. from $CHCl_3$, giving *tris(p-methylethylaminophenyl)arsine*, $C_{27}H_{36}AsN_3$, m. 206°, which was also produced in better yield (3 g.) by the reaction of equimol. amts. of II (5 g.) and I (7 g.). Similarly the reaction of 10 g. III and 26 g. I and isolation with Na_2CO_3, gave 7 g. of white, amorphous *4-dimethylamino-1-naphthylarsenious oxide*, $C_{12}H_{12}AsNO$, m. 98–100°; *sulfide*, m. 144°; *chloride-HCl*, m. 110–2°; *bromide-HBr*, sol. in org. solvents except ether; *iodide-HI*, m. 119–20°, pale yellow powder; *tris(4-dimethylamino-1-naphthyl)arsine*, $C_{36}H_{36}AsN_3$, m. 148°, formed as a by-product. Similarly *4-dimethylamino-2-methylphenylarsenious oxide*, $C_9H_{12}AsNO$, m. 108° (*sulfide*, m. 137°; *arsonic acid*, m. above 250°), and *tris(4-dimethylamino-2-methylphenyl)arsine*, $C_{27}H_{36}AsN_3$, m. 98°, were prepd. from IV and I. V gave the corresponding *2-dimethylamino-5-methylphenylarsenious oxide*, m. 63–5°; *sulfide*, m. 68°; *arsonic acid*, m. above 250°. C. R. Addinall

Autometalation with *m*-tolylsodium. Henry Gilman and H. A. Pacevitz. *J. Am. Chem. Soc.* **62**, 673–4(1940). —$m\text{-}ClC_6H_4Me$ and Na in petr. ether (b. 85–100°) first give $m\text{-}MeC_6H_4Na$, as evidenced by the formation of $m\text{-}MeC_6H_4CO_2H$ on carbonation. On refluxing the mixt., the $m\text{-}MeC_6H_4Na$ is converted to $PhCH_2Na$. It is difficult to account for the migration on the basis of an allylic rearrangement. C. J. West

Conversion of arylbismuth halides to triarylbismuth compounds. Henry Gilman and H. L. Yablunky. *J. Am. Chem. Soc.* **62**, 665–6(1940).—Ph_2BiCl (4 g.), added to 2 g. $N_2H_4.H_2O$ in 60 cc. abs. EtOH (reaction occurs immediately) and the mixt. stirred for 1 hr., heated to boiling, filtered and the insol. material again extd. with EtOH, the EtOH poured into 400 cc. H_2O and the ppt. extd. with Et_2O, gives 93.5% Ph_3Bi (I). Ph_3BiCl_2 (2.56 g.) in 60 cc. 95% EtOH and 2 g. $N_2H_4.H_2O$ give 95.4% I which ppts. in 0.5 min.; the mixt. is stirred for 1 hr., poured into 300 cc. H_2O and the I is extd. with Et_2O. $PhBiBr_2$ gives 81.5% I, Ph_2BiBr_3 100% I and Ph_3BiF_2 97.8% I. $(o\text{-}MeC_6H_4)_3BiCl_2$ and $(o\text{-}MeC_6H_4)_3BiBr_2$ give 99 and 100% $(o\text{-}MeC_6H_4)_3Bi$; $(p\text{-}MeC_6H_4)_3BiCl_2$ gives 100% of $(p\text{-}MeC_6H_4)_3Bi$. $(p\text{-}ClC_6H_4)_3BiCl_2$ gives 78% of $(p\text{-}ClC_6H_4)_3Bi$; this is the only reaction in which apparent decompn. occurs. $Ph_2(\alpha\text{-}C_{10}H_7)BiCl_2$ gives 96.2% of $Ph_2(\alpha\text{-}C_{10}H_7)Bi$. C. J. West

Behavior of acyl derivatives of aminobenzenesulfonamide in the presence of hydrochloric acid. Antonio Mossini. *Boll. soc. ital. biol. sper.* **14**, 387–9(1939).—N^4-Acyl derivs. of *p*-aminobenzenesulfonamide were partially sapond. (up to 47%) in the presence of HCl at body temp. for 3 hrs. Helen Lee Gruehl

Some fluorine and chlorine derivatives of sulfanilamidobenzenesulfonic acids. C. M. Suter and Arthur W. Weston. *J. Am. Chem. Soc.* **62**, 604–6(1940); cf. *C. A.* **33**, 1686[9], 8593[2], 8588[5].—$p\text{-}FC_6H_4NHAc$ and 100% H_2SO_4, heated until the solid melted and kept at this temp. until AcOH is no longer evolved, then heated at 170–80° for 2 hrs., give 64% of *4-fluoroaniline-2-sulfonic acid* (I), decomps. above 310°; *4-Cl analog* (II), decomps. above 325° (49% yield). I (0.5 g.) with excess 5% aq. Br gives 0.6 g. *2,6-dibromo-4-fluoroaniline*, m. 63–4°; II gives $4,2,6\text{-}ClBr_2C_6H_2NH_2$, m. 94.5–5.5°. $4\text{-}FC_6H_4NHAc$ and 15% oleum, heated to 140–5°, give 63% of *4-fluoroaniline-3-sulfonic acid* (III), decomps. above 310°; *4-Cl analog* (IV), decomps. above 310° (30–4% yield). Bromination of III in H_2O gives no ppt.; evapn. of the soln. gives the *compd.* $C_6H_4O_3SNBr_2F$, which crystallizes from concd. HCl; the *analog* from IV decomps. above 310°; the compd. is hygroscopic. $p\text{-}FC_6H_4NH_2$ (0.08 mol.), 0.015 mol. Na_2CO_3 and 60 ml. H_2O, treated with 0.08 mol. of $p\text{-}AcNHC_6H_4SO_2Cl$ and 30% NaOH to keep the pH at about

10, stirred 30 min., 8 g. solid NaOH added and the mixt. refluxed 90 min., give 47% of *N-sulfanilyl-4-fluoroaniline* (V), m. 163–4°. The above sulfonic acids give the following: *2-sulfanilamido-5-fluorobenzenesulfonic acid*, decomps. 285°, 14% yield; *5-sulfanilamido-2-fluoro isomer*, with 1 mol. H_2O decomps. 260°, 42% yield; *2-sulfanilamido-5-chlorobenzenesulfonic acid*, with 1 mol. H_2O, decomps. 300°, 20% yield; *5-sulfanilamido-2-chloro isomer*, decomps. 310°, 57% yield. These acids did not exhibit therapeutic action against streptococcus and Type I pneumococcus infections in white mice. V showed a slight effect against streptococcus infections. C. J. West

Synthesis of sulfonyl chlorides by chlorination of sulfur compounds. Treat B. Johnson. *Proc. Natl. Acad. Sci. U. S.* **25**, 448–52 (1939).—In addn. to work previously reported by Johnson and his coworkers on the chlorination of S compds. (*C. A.* **32**, 1176, 5777[1], 6248[8]; **33**, 1682[4]), it is found that *S*-benzyl-*N,N,N'*-trimethylisothiourea-HCl reacts smoothly with Cl (Cl water) to yield benzylsulfonyl chloride and trimethylurea, m. 74–5°. Rachel Brown

The esters of sulfurous, chlorosulfinic and chlorosulfonic acids. III. Wm. Gerrard. *J. Chem. Soc.* **1940**, 218–30; cf. *C. A.* **33**, 2483[6].—The decompn. of PhOSOCl (I) and certain typical aliphatic chlorosulfinates in the presence of C_5H_5N, quinoline (II), $PhNMe_2$ and their HCl salts has been examd. with special reference to the fate of the base or its HCl salt. It is shown that, not only is the decompn. mechanism in the presence of the base quite different from that in the presence of the HCl salt but there is a fundamental difference between the modes of decompn. of the aromatic and the aliphatic chlorosulfinates. I (23.75 g.) in 30 cc. dry ether and 10.7 g. C_5H_5N in 20 cc. ether at −10° show no reaction after 3 days at room temp.; addn. of 12.2 g. PhOH in 20 cc. ether at −10° ppts. 9.2 g. of C_5H_5N.HCl (IIA) and gives 18.5 g. of Ph_2SO_3, showing the presence of I in the reaction mixt. I reacts explosively with C_5H_5N or II at 122° and is decompd. vigorously by their HCl salts at 98° and 100°, resp. Although I reacts explosively within 1 min. of being mixed with $PhNMe_2$, no such reaction occurs when it is heated in the presence of the HCl salt, slow evolution of gas occurring at about 50°. Thick oils or brown solids are produced in these reactions which will be characterized later. $SOCl_2$ (0.5 mol.) in 50 cc. ether, added slowly to 1 mol. PhOH in 200 cc. ether and 1 mol. of C_5H_5N at −5°, causes the pptn. of 153 g. of IIA and gives 91% of Ph_2SO_3. Using 1 mol. of II, 15.9 g. of IIA is pptd. and 9.6 g. of Ph_2SO_3 may be isolated. I (17.6 g.) and 5.5 g. of 100% HCO_2H react at room temp., giving 3.45 g. of HCl, 5.77 g. of SO_2 and 508 cc. CO; distn. after 4 hrs. gives 7.8 g. b_{18} 77–85° and 3.6 g. of a sirupy residue; the distillate contains 84% of the formate. I (17.6 g.), added slowly to 15.6 g. of *l*-menthol and 8 g. C_5H_5N in ether at −5°, gives a ppt. of 11.4 g. of IIA and 3.8 g. of *Ph menthyl sulfite*, b_{2-3} 156–60°, $[\alpha]_D^{25}$ 10.61°. Ph_2SO_3 and $SOCl_2$ after 48 hrs. give 10% of I. BuOSOCl (III) (0.1 mol.), mixed with C_5H_5N at −10° and kept at 0°, gives a red oil within a few min., the temp. rising to 10°; treatment with dil. H_2SO_4 gives a lower aq. layer contg. the butylpyridinium ion, 0.1 mol. SO_2, 1.6 g. Cl ion and 60% of C_5H_5N; the upper layer yields 42% of BuCl. II and III (0.1 mol. of each) at −10° give 4 g. SO_2, 8.3 g. II, 60% BuCl and 8.8 g. of an oil, which gives *butylquinolinium chloroplatinate*, m. 223–4° (decompn.). Et α-chlorosulfinoxypropionate (IV) and C_5H_5N react gradually at 0°; after removal of the cooling medium, the mixt. becomes quite hot in 4–5 min., forming a dark red liquid and emitting very little SO_2 and HCl; addn. of ether gives 11.3 g. of a dark red oil, from which H_2O exts. 3.74 g. SO_2, 4.5 g. C_5H_5N and 55% of $MeCHClCO_2Et$ (V), but no Cl ion. II and IV evolve SO_2 when heated to 55°; 75% of V is formed; *α-carbethoxyethylquinolinium chloroplatinate*, m. 170–1°. IV and II in ether at 16° give about the same products as without ether. MeOSOCl reacts rapidly with II in ether at −10°; EtOSOCl reacts less rapidly, giving *ethylquinolinium chlorosulfinate*, a solid tending to change to a red sticky mass; other chlorosulfinates give oils. IV and $PhNMe_2$, mixed at −10°, become hot in 3 min. after the cooling bath is removed, SO_2 being evolved; the residue gives 50% of V and a trace of α-ethoxycarbethoxyl sulfite (VI); III and $PhNMe_2$ react vigorously at −10°, SO_2 and BuCl being evolved; BuCl and Bu_2SO_3 were isolated after addn. of dil. HCl. In ether IV and $PhNMe_2$ give V and VI; III yields BuCl and Bu_2SO_3; Me, Et, Pr, iso-Bu and Am chlorosulfinates react with $PhNMe_2$ in ether below room temp. IV with IIA, gently heated to 60°, begins to evolve SO_2 at 39° and gives a nearly quant. yield of IIA and V; $PhNMe_2$.HCl causes a slow evolution of SO_2 up to 97° (heating during 1 hr.) and gives a quant. yield of V. Et lactate and C_5H_5N (2 mols. of each) in ether at −10°, treated dropwise with 1 mol. of $SOCl_2$, give a quant. yield of IIA and 90% of VI; subsequent heating of the mixt. decreases the yield of VI to 25%; II and $PhNMe_2$ give similar results. BuOH gives Bu_2SO_3. III (39.1 g.), added slowly to a mixt. of *l*-menthol and C_5H_5N in ether, gives 56 g. *l-menthyl Bu sulfite*, b_1 98–9°, $[\alpha]_D^{18}$ −32.5°, d_4^{17} 1.0025. IV and BuOH give 80% of *α-carbethoxyethyl Bu sulfite*, b_{19} 141–2°. Addn. of 9 g. $SOCl_2$ in 10 cc. ether to 19.5 g. β-octanol (VII) and 12 g. C_5H_5N in 50 cc. ether at −10° causes the pptn. of 16.7 g. IIA; half of the filtrate treated with 4.5 g. $SOCl_2$ and after 18 hrs. with 6 g. C_5H_5N, gives 6 g. of a dark red oil contg. a β-octylpyridinium compd. and 43% of β-octyl chloride (VIII); washing the other half of the above filtrate gives 7.2 g. of β-octyl sulfite. VII (39 g.) in an equal vol. of ether, added slowly to 60 g. $SOCl_2$ in ether at −10°, gives 67.9 g. (calcd. 63.6 g.) of *β-octyl chlorosulfinate* (IX), pale yellow; with ice 15 g. IX gives 7.5 g. VII; 21.2 g. IX gives with C_5H_5N 81% of VIII; IX with HCO_2H gives SO_2 and HCl in the ratio of 1 1, CO_2 and probably β-octyl formate. Et mandelate (X) and C_5H_5N in ether, treated with $SOCl_2$ in ether, give a ppt. of IIA; there is no apparent reaction when 3 g. $SOCl_2$ is added to the ether filtrate but after 12 hrs. addn. of C_5H_5N ppts. an oil not completely sol. in H_2O; the aq soln. gives *α-carbethoxybenzylpyridinium ferrocyanide* (XI), yellow, and the ether soln. gives 36% of $PhCHClCO_2Et$ (XII). X (18 g.), added dropwise to 20 g. $SOCl_2$ in ether at −10° and allowed to stand 1 hr. at 16°, gives 26.8 g. of *α-carbethoxybenzyl chlorosulfinate* (XIII); reaction of XIII with C_5H_5N in ether at −10° and treatment with H_2O gives XI and 46% of XII; with HCO_2H XIII gives SO_2 and HCl in the ratio of 1·1 and CO; with ice XIII yields X and XII. PhMeCHOH (XIV) and $SOCl_2$ give *α-phenylethyl chlorosulfinate*, pale yellow; C_5H_5N yields $PhCHClMe$; $SOCl_2$, added to XIV and C_5H_5N in ether, give a ppt. of IIA; addn. of $SOCl_2$ to the ether filtrate produced no apparent effect but addn. of H_2O or C_5H_5N gives $PhCHClMe$. Iso-PrOH and *sec*-BuOH give the corresponding chlorosulfinates with $SOCl_2$ in 75–80% yields; *isopropylpyridinium ferrocyanide; sec-Bu analog*, yellow. Addn. of PCl_5 to BuOH, VII or X and C_5H_5N at −10° gives a nearly quant. ppt. of IIA; further addn. of PCl_5 produces no apparent effect. $POCl_3$ gives similar results but the pptn. of IIA is slower. Passing Cl into 75.5 g. of VI at 0° for 6 hrs. gives 53.1 g. V and 43 g. *Et α-chlorosulfonoxypropionate* (XV), b_2 90–2°; this was also prepd. from Et lactate and SO_2Cl_2 in 65% yield. XV and C_5H_5N in ether at −10° gives $C_5H_5N.SO_3$ and 85% of V. II and XV yield *quinoline-SO_3* (if the washing with ice water is not rapidly carried out, the sulfate is formed) and V. Addn. of $COCl_2$ in PhMe to Et lactate and C_5H_5N in PhMe at −10° gives IIA and 90% of *α-carbethoxyethyl carbonate*, b_1 110–10.5°, $d_4^{16.5}$ 1.1280, d_4^{27} 1.1080, n_D^{15} 1.4280. No pptn. occurs when $PhOSO_2Cl$ (XV) is added to C_5H_5N or II in ether even when BuOH is added to the resulting mixt. In the absence of ether these bases gave no indication of a reaction when added to XV. $PhNMe_2$ appears to react and gives a vivid deep blue liquid, slowly in the cold, rapidly on heating on a water bath; the oil is insol. in H_2O but is sol. in EtOH, giving rise to a blue soln. which exhibits a "universal indicator" effect, violet (alkali) → yellow (acid). A general theory is submitted to account for the exptl. results of other workers in this field; 1 section discusses the Walden inversion and $SOCl_2$.

C. J. West

Sulfanilamide derivatives. VI. Substituted *N*[1]-ali-

phatic sulfanilamides. M. L. Crossley, E. H. Northey and M. E. Hultquist. *J. Am. Chem. Soc.* **62**, 532–4 (1940); cf. *C. A.* **34**, 2379[1].—The following derivs. were prepd. by the general procedure used previously (*C. A.* **32**, 8381[6]) except in the case of the amino-acid ester derivs. The *N*-sulfanilylamino acids were first prepd. and were esterified by boiling with the corresponding alc. and HCl. *N*[1]-*Octylsulfanilamide*, m. 114–19.5°; *dodecyl homolog*, m. 118–24°; *octadecyl homolog*, m. 127–30°; *9-octadecenyl analog*, m. 118–22.5°; *1,2-bis(sulfanilamido)-ethane*, m. 229.4–31.2° (cryst. as the Na salt from H_2O); *1,2-bis(N*[4]*-sulfanilylsulfanilamido)ethane*, m. above 118° (decompn.); *N*[1],*N*[1]*-bis(2-sulfanilamidoethyl)sulfanilamide-3HCl*, m. 241.5–4°; *N*[1]*-methyl-N*[1]*-2-hydroxyethylsulfanilamide*, m. 124.5–6.3°; *2-methyl-2-sulfanilamido-1-propanol*, m. 154–5.8°; *2-methyl-2-sulfanilamido-1,3-propanediol*, m. 131.8–4°; *1,3-bis(sulfanilamido)-2-propanol*, m. 184.2–6.5°; *N*[1]*-2-hydroxyethyl-N*[1]*-(2-sulfanilamidoethyl)sulfanilamide*, m. 163–4.5°; *N*[1],*N*[1]*-difurfurylsulfanilamide*, m. 134–6.5°; *N-(2-sulfanilamidoethyl)-morpholine*, m. 98–100.4°; *Et N-sulfanilylglycinate*, m. 90.4 2°; *di-Bu N-sulfanilylglutamate-HCl*, m. 138.4 41.6°. $4\text{-}O_2NC_6H_4SO_2Cl$ and excess aq. $2\text{-}HOC_2H_4NH_2$ give *N*-2-hydroxyethyl-4-nitrobenzenesulfonamide, m. 126–7°; dodecanoyl chloride in C_5H_5N at 90–100° gives 4-nitrobenzenesulfonamidoethyl dodecanoate, m. 72–3.5°; reduction with Fe and HCl in PhMe-H_2O gives *2-sulfanilamidoethyl dodecanoate*, m. 63.4–4.8°. The available pharmacol. data indicate that these compds. as a class are less effective than sulfanilamide against infections by β-hemolytic streptococci in mice. C. J. West

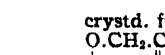
Tin derivative of dithiopyrocatechol. Harold P. Brown and James A. Austin. *J. Am. Chem. Soc.* **62**, 673 (1940). —In the prepn. of dithiopyrocatechol (I) from $o\text{-}C_6H_4(SO_2Cl)_2$ by reduction with Sn and HCl, Guha and Chackladar (*C. A.* 20, 1797) obtained a red solid which they considered to be the lactone of benzene-1-thiol-2-sulfonic acid. It is shown that this red compd. is probably $(o\text{-}C_6H_4S:)_2Sn$. Redistn. of the distillate contg. the red compd. from concd. HCl yields pure I. The red compd. on standing in concd. HCl gives I. The completeness of the reaction of I with $SnCl_2$ or $SnCl_4$ suggests the possible application of I to the qual. and perhaps quant. detn. of Sn and certain other elements; Sb, Zn, Fe^{+++}, Pb and Tl react with I. C. J. West

Action of nitrosylsulfuric acid on *m*-fluorophenol. New red *o*-quinonimine. Herbert H. Hodgson and Donald E. Nicholson. *J. Chem. Soc.* **1940**, 205–7; cf. *C. A.* **34**, 738[3].—$m\text{-}FC_6H_4OH$ (2 g.) in 20 cc. AcOH, added below 20° to 2 g. $NaNO_2$ in 10 cc. concd. H_2SO_4 (previously heated to 70°) and, after 10 min. at 0°, poured onto ice, give a yellow-brown ppt. (a mixt. of a red and a green compd.); extn. with boiling petr. ether (80–100°) removes a very small quantity of *3-fluoro-4-nitrosophenol* or *3-fluorobenzoquinone 4-oxime* (I), green, m. 158°; the residue (1.8 g.) seps. from EtOH in dark red plates which do not m. below 300°; this is *4,2′-difluoro-4′-hydroxy-o-benzoquinone-1-phenylimine* (II). II evolves NH_3 when boiled with NaOH. II is compared with the reaction product (*m,m′*-difluoro-*o*-indophenol (III)) of $m\text{-}FC_6H_4OH$ with aq. HNO_2. II is more sol. in aq. alkali hydroxides and carbonates and less sol. in AcOH. Reductive acetylation of II gives *N-acetyl-4,2′-difluoro-2,4′-diacetoxydiphenylamine*, very pale yellow, no m. p.; concd. H_2SO_4 gives a blue-green color; III gives *N-acetyl-4,4′-difluoro-2,2′-diacetoxydiphenylamine*, very pale yellow, m. 175°; concd. H_2SO_4 gives a violet color. II and $PhNH_2$ in AcOH give *4,2′-difluoro-4′-hydroxy-o-benzoquinonebisphenylimine*, maroon, m. 200°; III gives *4,4′-difluoro-2′-hydroxy-o-benzoquinonebisphenylimine*, deep red, m. 175°. II, boiled with aq. $KMnO_4$ and H_2SO_4, gives a steam-volatile *p*-benzoquinone but III gives a non-steam-volatile *o*-benzoquinone. Reduction of II in glacial AcOH with Zn gives a colorless leuco compd. which is reoxidized in the air in HCl to reform II, whereas III gives a blue oxazine. Oxidation of I with $K_3Fe(CN)_6$ gives $3,4\text{-}F(O_2N)C_6H_3OH$. It is suggested that $m\text{-}FC_6H_4OH$ is first nitrosated in position 4 (and in a small degree nitrated in position 6), followed by rapid condensation of the NO compd. with unchanged $m\text{-}FC_6H_4OH$ to give II. C. J. West

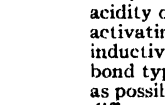
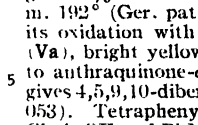
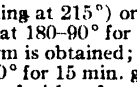
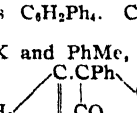
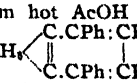
Hydrogen fluoride as a condensing agent. X. Rearrangements. J. H. Simons, S. Archer and D. I. Randall. *J. Am. Chem. Soc.* **62**, 485–6 (1940); cf. *C. A.* **34**, 232[6].—PhOH and *tert*-BuPh with HF at 0° for 13 hrs. give C_6H_6 and about 10% of $p\text{-}tert\text{-}BuC_6H_4OH$. $Ph_2C{:}NOH$ in AcOH or ether with HF gives about 72% of $BzNH_2$; PCl_5 gives a nearly quant. yield. AcOPh and HF at room temp. give no appreciable yield of rearranged product; heating in a sealed vessel for 24 hrs. at 100° gives $p\text{-}HOC_6H_4Ac$, although the reaction is not smooth and the yield is poor. $p\text{-}MeC_6H_4OSO_2Ph$ and HF in ligroin, heated in a Cu bomb for 14 hrs. at 100°, give 10% of $4,2\text{-}Me(HO)C_6H_3SO_2Ph$ (I). $p\text{-}MeC_6H_4OMe$ and $PhSO_2Cl$ with $AlCl_3$ in CS_2, refluxed 5 hrs., give 71% of *2-methoxy-4-methyldiphenyl sulfone* (II), m. 137–8°. Heating 3 g. II and 6 g. $AlCl_3$ at 140–50° for 2 hrs. gives 95% I, m. 137–8°. C. J. West

Composition of laccol. G. Bertrand, H. J. Backer and N. H. Haack. *Bull. soc. chim.* **6**, 1670–6 (1939).—Bertrand and Brooks (*C. A.* **27**, 4534) obtained laccol (I), m. 23°, in the cryst. state. I, initially isolated by Bertrand in 1894, was investigated by Majima (*C. A.* **16**, 2331) who obtained it as a thick, brown liquid (to which he attributed the formula $2,3\text{-}(HO)_2C_6H_3C_{17}H_{31}$) and who prepd. the tetrahydrolaccol (II) and its di-Me ether (III). Backer and Haack (*C. A.* **32**, 4965[2]), continuing their work on the toxic principles of the fruits of Renghas, have isolated a product, of which the hydrogenation product, m. 63°, was identified as 2,3-dihydroxyheptadecylbenzene (III). Com. cetyl alc. (1 kg.) and 600 g. AcOH were heated together for 2 hrs. at 100° with dry HCl. The heating was continued for 4 hrs. and the reaction product was washed with Na_2CO_3 and H_2O. Fractional distn. gave 388 g. of pure $C_{16}H_{33}OAc$, b_6 176–7°, sapond. by alc. KOH to yield 300 g. of pure $C_{16}H_{33}OH$, m. 45–6°, b_{15} 189–90°, converted by refluxing with HBr and H_2SO_4 to 200 g. of $C_{16}H_{33}Br$ (IV), b_4 169–70°. Methylation of 152 g. $2,3\text{-}HO(MeO)C_6H_3CHO$, m. 43.5–4.5°, with Me_2SO_4 in NaOH gave 85% (139 g.) of $2,3\text{-}(MeO)_2C_6H_3CHO$ (V), m. 51–2°, b_{16} 139.5–40°. A mixt. of 46 g. IV in 50 cc. anhyd. ether and 3.65 g. Mg in 50 cc. anhyd. ether was gently warmed in the presence of a trace of I. The cooled soln. was treated with 16.6 g. of V in 25 cc. ether. The next day the product was dild. with H_2O and 200 cc. of 2 *N* H_2SO_4. The ether ext. was washed, dried and evapd. and the residue was dissolved in 100 cc. of hot alc. On cooling, bicetyl, $C_{32}H_{66}$, m. 68–70°, crystd. out. The filtered soln. was concd. to 50 cc. and yielded 50% (19.5 g.) of *2,3-dimethoxyphenylhexadecylmethanol* (VI), $C_{25}H_{44}O_3$, m. 55–6°. Heating 17.7 g. VI at 210° with 0.5 g. $KHSO_4$ and recrystg. the product from alc. and petr. ether gave 62% (10.6 g.) of *2,3-dimethoxyheptadecenylbenzene* (VII), $C_{25}H_{42}O_2$, m. 47.0–7.5°, b_2 235–8°. Reduction of 9.4 g. VII in 100 cc. AcOH in the presence of 0.5 g. PtO_2 gave 84% (8 g.) of 2,3-dimethoxyheptadecylbenzene (VIII), $C_{25}H_{44}O_2$, m. 44.5–5.0° (corresponding to Majima's tetrahydrolaccol di-Me ether, m. 43–4°). Demethylation of 3.77 g. VIII by heating in a sealed tube for 10 hrs. at 180° with 10 cc. HI (d. 1.7), 5 cc. AcOH, a crystal of PhOH and a little red P gave 1.7 g. (50%) of III, $C_{23}H_{40}O_2$, m. 63–4°, identical with II as prepd. by B. and B. Acetylation of III with Ac_2O gave the *diacetate*, $C_{27}H_{44}O_4$, m. 57.8–8.3°, identical with the diacetyltetrahydrolaccol of B. and B. I has the formula attributed to it by M. on the basis of an impure oil which gave other results on analysis than those obtained from cryst. I. C. R. Addinall

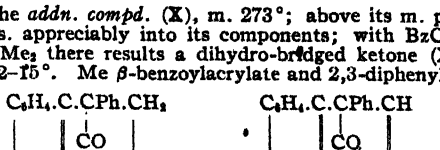
The steric effect of the nitro group on the orientation of a third substituent in *m*-nitrophenol. D. R. Mehta and P. Ramaswami Ayyar. *J. Univ. Bombay* **8**, Pt. 3, 176–83 (1939).—The orienting effect of the NO_2 group in $m\text{-}O_2NC_6H_4OH$ (I) in the reaction with CH_2O (II), $CHCl_3$ (III) and NaOH, and $Hg(OAc)_2$ is studied. When 5 g. I is refluxed with 25 cc. concd. HCl and 4 g. of a 40% soln. of II at 130–40° for 2–3 hrs., the supernatant clear soln. poured off and the residue, after washing with 2 *N* NaOH,

crystd. from EtOH, 0.85 g. of the methylene ether (IV)  , m. 77°, of a nitrohydroxybenzyl alcohol is obtained. Structure of IV is proved by its oxidation with Cr_2O_3 in AcOH whereby 6-nitrosalicylic acid (V), m. 166–7°, is formed. Warming of 0.231 g. IV with 30 cc. of a soln. of 3 g. phloroglucinol in 60 cc. H_2SO_4 and 200 cc. H_2O at 80–90° for 2 hrs. gives in almost quant. yield a $C_7H_7O_2$-phloroglucinol condensation product. The formation of IV shows that the phenolic OH group has a predominating influence in directing the entrance of the oxymethyl group into the C_6H_6 ring. When to a soln. of 5 g. I in 35 cc. H_2O contg. 6.5 g. NaOH, 7 cc. III is added and the mixt. refluxed on a water bath for 1 hr., the excess of III removed, the residue acidified with dild. H_2SO_4 and steam-distd., there comes over a mixt. of I and 6-nitrosalicylaldehyde (VI), m. 50 1°, which are sepd. by extn. with $NaHSO_3$ soln. Oxidation of VI with $KMnO_4$ gives V. When a mixt. of 5 g. I and 11.5 g. $Hg(OAc)_2$ in 100 cc. EtOH is refluxed for 0.5 hr., the soln. poured off from the residue and cooled, *acetoxymercurinitrophenol* (VII), m. 207–8°, crystallizes. Treatment of VII with NaCl yields the *chloromercuri deriv.* m. 179–80°. The latter, when treated with 1.8 *N* Br in KBr, yields 2,4,6-tribromo-3-nitrophenol, m. 87–8°. An attempt to prep. the mono-Br deriv. failed. This result shows that the AcOHg group has entered the C_6H_6 ring in either the 1-, 4- or 6-position, indicating again that the OH group chiefly directs the orientation of the AcOHg group. F. E. Brauns

Aromatic stabilized double bonds. Mills-Nixon problem. Richard T. Arnold and Robert L. Evans. *J. Am Chem. Soc.* **62**, 556–8(1940); cf. *C. A.* **33**, 8598⁸.—In the light of recent structural studies on C_2H_4 and C_2Me_4, some of the original assumptions of the Mills-Nixon postulate are questionable. Values for pK in EtOH-H_2O (50% by wt.) and the temp. are: 2-$O_2NC_6H_4OH$ 8.20, 29°; 4,5,2-$Me_2(O_2N)C_6H_2OH$ (I) 8.81, 28°; 8.90, 37°; 5-hydroxy-6-nitrohydrindene (II) 8.96, 37°; 6-hydroxy-7-nitrotetralin (III) 9.05, 37°; 4-methyl-2-nitrophenol (IV) 8.57, 28°; 5,2-$Me(O_2N)C_6H_3OH$ (V) 8.43, 28°. The acidity of the HO group depends on 4 factors: the type of activating group present, strength of the chelate ring, the inductive effect of all the dipoles present and the C—C bond type between the HO and activating group. As far as possible the 1st 3 factors have been held const. in I–III; differences in the dissocn. consts. for these compds. must then indicate a dissimilarity in bond type. Actually the acidities of I–III are almost identical. A study of any interaction (ortho effect) between the 2 Me groups in I has been made by detns. on IV and V. Such interactions seem to be active but appear to be const. in I–III. This has been recognized in dipole-moment studies. C. J. W.

Addition reactions of vinyl phenyl ketone. VI. The diene synthesis. C. F. H. Allen, A. C. Bell, Alan Bell and James Van Allan. *J. Am. Chem. Soc.* **62**, 656–64 (1940); cf. *C. A.* **29**, 5835².—The original purpose of this work was the synthesis of 3,4-$Ph_2C_6H_3Bz$ (I), previously obtained as a degradation product of a dimeric diphenylcyclopentadienone (*C. A.* **27**, 5071). CH_2:CHBz (II) adds readily to many substances contg. a conjugated system of double bonds and, in general, the addn. products have the expected properties. The reaction is most useful with unsatd. ketones; it is less satisfactory with hydrocarbons and fails with furans. 2,3-Diphenyl-1,3-butadiene (11 g.), 9.2 g. of $BzCH_2CH_2Br$, 5.4 g. AcONa and 75 cc. xylene, refluxed 60 hrs., give 8.5 g. of *3,4-diphenyltetrahydrobenzophenone* (III), m. 83°; *2,4-dinitrophenylhydrazone*, orange, m. 203°; dehydrogenation of 7.8 g. III in 15 cc. $CHCl_3$ with 8 g. of Br in 20 cc. $CHCl_3$ gives 97% of I, m. 133° (*2,4-dinitrophenylhydrazone*, orange, m. 248°). $NaNH_2$ and I in cymene give 70% of *o*-$C_6H_4Ph_2$ and 7% of 3,4-$Ph_2C_6H_3CO_2H$. 1,4-Diphenylbutadiene does not add II nearly as readily as the 2,3-isomer and a cryst. addn. product was not obtained; refluxing for 48 hrs. produces about 30% addn.; dehydrogenation by heating with S at 200° for 2 hrs. gives *2,5-diphenylbenzophenone*, m. 130°; $NaNH_2$ gives *p*-$C_6H_4Ph_2$, showing that a 6-membered ring had been formed in the addn. 2,3-Dimethylbutadiene and $BzCH_2CH_2Br$ (heating for 24 hrs.) give *3,4-dimethyltetrahydrobenzophenone* (IV), b_6 163–5° (*2,4-dinitrophenylhydrazone*, orange-yellow, m. 152°); there is no reaction of IV with Br in the cold; on warming HBr is split off and a *dibromide*, m. 132°, results. Dehydrogenation of IV with S at 190–230° gives 3,4-$Me_2C_6H_3Bz$, m. 45° (*2,4-dinitrophenylhydrazone*, m. 252°). 1-Phenyl-4-methylbutadiene and $BzCH_2CH_2Cl$ with AcOK in $C_6H_3Cl_3$, refluxed 8 hrs., give 5 g. of *benzoylmethylphenylcyclohexene*, MeCH.CH:CH.CHPh.CH_2.-CHBz or MeCH.CH:CH.CHPh.CHBz.CH_2, b_1 157–9°, m. 61°; *dibromide*, m. 125°. Cyclopentadiene and $BzCH_2CH_2Cl$ with AcOK in PhMe, heated at 95–100° for 30 hrs., give *1-benzoyl-1,2,3,6-tetrahydro-3,6-methanobenzene*,  , b_3 122–4°, n_D^{25} 1.5648 (*semicarbazone*, m. 178–80°). The liquid product from isoprene decompd. on distn., but a ketonic *deriv.*, b_2 120 2°, was prepd. from 1 fraction, whose *2,4-dinitrophenylhydrazone*, $C_{30}H_{20}O_4N_8$, m. 137°. Phellandrene gives a hopeless mixt. (37% of an oil, b_2 183–5°) which decolorizes Br instantly with evolution of HBr. Cyclohexadiene gives only *β-ethoxypropiophenone* (V). Methyleneanthrone (5.2 g.), $BzCH_2CH_2Cl$ (6 g.) and AcOK in $PhNO_2$, refluxed 2.5 hrs. at 180–90°, give 84% of *bz*-1-benzoylbenzanthrone, brownish yellow, m. 192° (Ger. pat. 420,412); the structure follows from its oxidation with CrO_3 to *α-benzoylformylanthraquinone* (Va), bright yellow, m. 174°, which is cleaved by Na_2O_2 to anthraquinone-α-carboxylic acid; with NaCl-$AlCl_3$ it gives 4,5,9,10-dibenzopyrene-3,8-quinone (Ger. pat. 412,053). Tetraphenylcyclopentadienone (VI), $BzCH_2CH_2Cl$, AcOK and PhMe, refluxed 3 hrs., give a nearly quant. yield of *3,4,5,6-tetraphenyl-7-keto-1-benzoyl-1,2,3,6-tetrahydro-1,6-methanobenzene* (VII),  , 210° (gas evolution); it is recovered unchanged after boiling with $KMnO_4$ in Me_2CO, glacial AcOH and SeO_2 or H_2O_2; Br in $CHCl_3$ and CrO_3 in AcOH slowly attack VII, giving ill-defined products. VII also results when II and VI in C_6H_6 are refluxed for 2 hrs. or when the components are heated in the absence of a solvent at 130°; it is also obtained when the $BzCH_2CH_2Cl$ is replaced by an equiv. amt. of $BzCH_2CH_2NMe_2$ (after 24 hrs. the yield is 25%). Pyrolysis of VII or carrying out the addn. reaction in $C_6H_3Cl_3$ or $PhNO_2$ gives *dihydro-3,4,5,6-tetraphenylbenzophenones* (VIII), CPh:CPh.CH_2.CHBz.CPh:CPh or CHPh.CH:CBz.CHPh.CPh.CPh, pale yellow, m. 177° (from VII on heating at 215°) or m. 158–9° (from the reaction in $C_6H_3Cl_3$ at 180–90° for 3 hrs.); with $PhNO_2$ the higher-melting form is obtained; heating the higher-melting form at 250–70° for 15 min. gives the form m. 156–8°. Dehydrogenation of either form with Br, $KMnO_4$ or S gives *2,3,4,5-tetraphenylbenzophenone* (IX), m. 190°; with $NaNH_2$ IX gives $C_6H_2Ph_4$.  , Bz-CH_2CH_2Cl, AcOK and PhMe, heated 2 hrs., give the addn. compd.  , yellow, m. 189–90°; crystn. from hot AcOH and then from $CHCl_3$-MeOH gives  , yellow, m. 194–5. Biphenylenediphenylcyclopentadienone and $BzCH_2CH_2Cl$

give the *addn. compd.* (X), m. 273°; above its m. p. it dissocs. appreciably into its components; with $BzCH_2$-CH_2NMe_2 there results a dihydro-bridged ketone (XI), m. 312–15°. Me β-benzoylacrylate and 2,3-diphenylbu-



(X) (XI)

tadiene, heated 15 hrs. at 165°, give 52% of *Me 2-benzoyl-4,5-diphenyltetrahydrobenzoate* (XII), $C_{27}H_{24}O_3$, m. 147°; it also results in 20% yield by refluxing the components in xylene for 60 hrs. XII does not react with Br in cold $CHCl_3$ but on warming HBr is evolved, giving a *dibromide*, $C_{27}H_{22}O_3Br_2$, m. 183° (decompn.). Dehydrogenation of XII gives 3,4,6-$Ph_2(HO_2C)C_6H_2Bz$, m. 240–1°. Et sorbate (12.8 g.) and 16.8 g. $BzCH_2CH_2Cl$ with AcOK in xylene, refluxed 18 hrs., give 13.4 g. of mixed esters, b_3 165–70°; hydrolysis with EtOH-KOH gives the mixed isomers, $MeCH.CH_2.CHBz.CH(CO_2H).CH:CH$ or $MeCH.CHBz.CH_2.CH(CO_2H).CH:CH$, m. 128–33°; crystn. from EtOH gives 75% of 1 form, m. 162–3°. Dehydrogenation of the mixed ester, hydrolysis and heating with 20% fuming H_2SO_4 give β-methylanthraquinone; thus the keto acid was almost entirely 2,4-benzoylmethylbenzoic acid. Tetraphenylcyclopentadienone and PhCH:CHBz in $C_6H_3Cl_3$, refluxed 24 hrs., give Ph_5C_6Bz, which yields C_6HPh_5 with $NaNH_2$. Methyleneanthrone and *trans*-(:CHBz)$_2$ in $C_6H_3Cl_3$ give *bz-1-bz-2-dibenzoylbenzanthrone*, m. 208°; in $PhNO_2$ the polymorphic form, m. 286°, is formed; oxidation with CrO_3 gives Va. Furan, sylvan or 2,5-dimethylfuran do not add II. In EtOH II and furan give V (2,4-dinitrophenylhydrazone, orange, m. 158°). Details are given of the isolation of II in 71–8% yield from the reaction of $BzCH_2CH_2Cl$ and AcOK in EtOH; II forms a dimer on standing at room temp.; a specimen contg. hydroquinone becomes viscous in 6 weeks but is not further changed after 5 years.

C. J. West

Chalcones: Production of isoxazoles from some chalcone derivatives. R. B. Shenoi, R. C. Shah and T. S. Wheeler. *J. Chem. Soc.* 1940, 247–51.—The action of NH_2OH in the presence of alkali on a RCOCHBrCHBrR′ (I) provides an unambiguous synthesis of the resulting isoxazole (II) and the reaction can therefore be employed to det. which of the 2 possible isoxazoles (II (RC:CH.CR′:N.O) or III (R′C:CH.CR:N.O)) is obtained from the related R′COCH$_2$COR (IV) and NH_2OH. No simple relation can be traced between the substituents in IV and the structure of the preferred II. *p-Anisyl p-methylstyryl ketone* (V), yellow, m. 126°; *β-naphthyl styryl ketone* (VI), yellow, m. 106°; *o*-HOC_6H_4COCH:CHPh and Br in CS_2 give *o-hydroxyphenyl α,β-dibromophenylethyl ketone*, m. 192°; V yields *p-anisyl α,β-dibromo-β-p-tolylethyl ketone* (VII), m. 169°; a C_5H_5N soln. of VII, heated at the b. p. for 0.5 min., gives *p-anisyl α-bromo-p-methoxystyryl ketone*, yellow, m. 129°. VI forms *β-naphthyl α,β-dibromo-β-phenylethyl ketone* (VIII), m. 173°; C_5H_5N gives *β-naphthyl α-bromostyryl ketone*, yellow, m. 116°. Boiling VII with MeONa in MeOH for 1.5 hrs. gives *p*-anisoyl-*p*-toluylmethane, yellow, m. 104°; it also results from the action of dil. HCl on *p*-tolyl *β-p*-dimethoxystyryl ketone (obtained as an oil from *p*-tolyl *α,β*-dibromo-*β-p*-anisylethyl ketone and MeONa). VIII yields *benzoyl-β-naphthoylmethane*, yellow, m. 99°. The II were prepd. by 3 methods: IV is boiled with $NH_2OH.HCl$ in EtOH with or without alkali; an EtOH soln. of the corresponding I contg. $NH_2OH.HCl$ is treated gradually at the b. p. during 30 min. with aq. alkali, cooled and dild. with H_2O; the chalcone ether is boiled with $NH_2OH.HCl$ with addn. of aq. NaOH to form a neutral or alk. soln. or of excess of AcONa. The following new *isoxazoles* are reported: *3-p-anisyl-5-p-tolyl*, m. 148°; *5-p-anisyl-3-p-tolyl*, m. 130°; *5-phenyl-3-o-hydroxyphenyl*, m. 231°; *3-phenyl-5-(3′,4′-methylenedioxyphenyl)*, m. 130° (*6′-Br deriv.*, m. 157°); *5-phenyl-3-(6′-bromo-3′,4′-methylenedioxyphenyl)*, m. 179°; *3-phenyl-5-β-naphthyl*, m. 160°; *5-phenyl-3-β-naphthyl*, m. 152°. An examn. of the results shows that with *p*-NO_2, *o*-HO, *p*-MeO and *p*-Me derivs. of CH_2Bz_2, the Ph group is in the 5-position in the isoxazoles; i. e., the carbonyl-C atom to which the N atom becomes attached is remote from the Ph group. With 3,4-CH_2O_2, 6-Br-3,4-CH_2O_2 and Ph derivs. of CH_2Bz_2 and with $BzCH_2COCH$:CHPh and $BzCH_2C_{10}H_7$-β, 3-phenylisoxazoles are formed. *p*-Tolyl takes the 3-position in preference to *p*-anisyl and the methylenedioxyphenyl group; the latter also takes the 5-position in the product from 4-chloro-3′,4′-methylenedioxydibenzoylmethane.

C. J. West

Condensations brought about by bases. IX. The relationship between the Claisen and Perkin types of condensations. Charles R. Hauser and David S. Breslow. *J. Am. Chem. Soc.* 62, 593–7 (1940); cf. *C. A.* 34, 1618[8].—The mechanisms for the Claisen and Perkin types of condensation are compared and reactions in which both types of condensation are possible are discussed. It is shown that in the presence of EtONa iso-$PrCO_2Et$ does not condense with BzH. The condensation product that would be formed, Et β-phenyl-β-hydroxypivalate (I), is decompd. by EtONa to give BzH and iso-$PrCO_2Et$. Although iso-$PrCO_2Et$ condenses with BzH in the presence of Ph_3CNa to give I, the latter on standing in the presence of this base is again decompd. The mechanisms of these decompns. are discussed.

C. J. West

Interaction of sulfuryl chloride with arylamides of aromatic acids. III. G. V. Jadhav and D. R. Sukhatankar. *J. Univ. Bombay* 8, Pt. 3, 170–3 (1939); cf. *C. A.* 34, 1640[8].—As previously found (*C. A.* 33, 5827[2]) the basic part of a mol. contg. 2 aromatic rings is deactivated by the introduction of an electron-accepting group such as NO_2. To study the effect of the introduction of a NO_2 group into the acidic part of the mol., the anilides and *o*- and *p*-toluidides of *m*- and *p*-nitrobenzoic acid are prepd. The mol. is so much deactivated that the reaction in some cases can be carried out only by boiling the reagents without any solvent. Even under these drastic conditions only mono-Cl derivs. with Cl in the basic part of the mol. can be obtained. *m*-Nitro-*p*′-chlorobenzanilide (I), prepd. by refluxing 3 g. *m*-$NO_2C_6H_4$-CONHPh and 5 g. SO_2Cl_2, m. 175°; *m*-nitrobenzo-*o*-toluidide, prepd. from *o*-$MeC_6H_4NH_2$ and *m*-$NO_2C_6H_4$-COCl, m. 154°; *m*-nitro-5′-chlorobenzo-*o*-toluidide (Me = 1′), prepd. as I, m. 183°; *m*-nitro-3′-chlorobenzo-*p*-toluidide, m. 173°; *p*-nitro-*p*′-chlorobenzanilide, m. 219°; *p*-nitro-5′-chlorobenzo-*o*-toluidide, m. 210°; *p*-nitro-3′-chlorobenzo-*p*-toluidide, m. 158°.

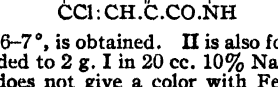
F. E. Brauns

Racemization of carboxylic esters by sodium ethoxide and its bearing on Claisen's condensation. J. Kenyon and D. P. Young. *J. Chem. Soc.* 1940, 216–18.—The optically active ester was added to 1 mol. (or less) of an approx. satd. soln. of the alkoxide in the corresponding alc. After the appropriate interval a slight excess of cold dil. HCl was added and the liberated ester extd. with ether. The amt. of distd. ester recovered was of the order of 80–90%; the rest of the reaction product was generally insufficient for anything but a detn. of its b. p. which was much higher than that of the ester from which it was derived. (−)-$PhMeCHCO_2Me$ is completely racemized with 1 mol. proportion of MeOK in 20 hrs. at room temp. (5% with 0.042 mol.) and 98.7% with 0.5 mol. EtONa in 24 hrs. (56.8% in 10 sec.). (−)-$EtBuCHCO_2$-Et is unchanged after 5 min. with 1 mol. EtONa, 10% in 20 hrs. and 100% in 20 min. at 80°. (−)-$MeEtCHCO_2Et$ is completely racemized with K in 15 min. and with EtONa after 70 hrs. at room temp. or 45 min. at 80° (15% after 1 hr. and 68% after 40 hrs. at room temp.). This is considered to afford strong support for the view that ionized Na derivs. of the esters are formed under these conditions as has been suggested in several postulated mechanisms for Claisen's condensation.

C. J. West

Tautomerism of phenylbutenoic acids. N. L. Phalnikar and K. S. Nargund. *J. Univ. Bombay* 8, Pt. 3, 184–9 (1939); cf. *C. A.* 32, 4152⁸.—In continuation of the study of the influence of an α-Ph group on tautomerism, the equil. systems of 3,4-diphenyl-2-butenoic acid ⇄ 3,4-diphenyl-3-butenoic acid and 2,3-diphenyl-2-butenoic acid ⇄ 2,3-diphenyl-3-butenoic acid are studied. Et β,γ-diphenyl-β-hydroxybutyrate (I), m. 60°, is prepd. from CH_2BrCO_2Et and desoxybenzoin according to Reformatskiĭ. Sapon. of I gives the free acid (II), m. 126–7°. When 25 g. II is refluxed with 38 g. Ac_2O for 3 hrs. 12 g. *3,4-diphenyl-2-butenoic acid* (III), m. 114°, is obtained. Its *anilide* m. 135°; *p-toluidide*, m. 156°; *Et ester*, prepd. from the Ag salt and EtI, b_{10} 210°. The constitution of III is proved by ozonization whereby desoxybenzoin is formed as the only product. *3,4-Diphenyl-3-butenoic acid* (IV), m. 173°, is prepd. by refluxing 28 g. $PhCH_2C(OH)PhCH_2CO_2Et$ (V) in 50 cc. C_6H_6 and 21 g. P_2O_5 for 3 hrs. The *Et 3,4-diphenyl-3-butenoate* b_{12} 210–15° and on hydrolysis gives IV. The *anilide* of IV m. 172°; *p-toluidide*, m. 160–1°. Oxidation of IV with $KMnO_4$ in alk. soln. gives BzOH. Attempts to dehydrate V with $KHSO_4$, $POCl_3$ or $SOCl_2$ and pyridine were unsuccessful. α,β-Diphenyl-β-hydroxybutyric acid (VI), m. 192°, is prepd. according to Ivanoff and Spasoff (*C. A.* 25, 2987) who found a m. p. of 182°. Dehydration of VI is carried out by refluxing it with Ac_2O for 3 hrs., giving *2,3-diphenyl-2-butenoic acid* (VII), m. 160°. Its constitution is proved by ozonization whereby PhCOMe and BzOH are obtained. The *anilide* of VII m. 148°. Esterification of VII with EtOH contg. 5% HCl gives the *Et ester* (VIII), b_{10} 130°. All dehydration expts. with VIII failed. For the detn. of the mixt. of the unsatd. acids the Br addn. method of Kon, Linstead and Wright (*C. A.* 28, 4699³) is used and the results calcd. by the method of P. and N. They show that III and IV have an equil. of 17% of α,β-isomeride which indicates the influence of a β-Ph group. The existence of 100% of α,β-isomeride in VII confirms the conclusion of Goldberg and Linstead (*C. A.* 23, 96) that butenoic acids with no γ-substituents show no stability of the β,γ-form even when substituted on the β-C. F. E. Brauns 1

Dehydration product of chloral-3,5-dichlorosalicylamide. N. W. Hirwe and K. N. Rana. *J. Univ. Bombay* 8, Pt. 3, 243–6 (1939).—When 5 g. chloral-3,5-dichlorosalicylamide (I) (*C. A.* 33, 7760²) is dissolved in 20 cc. concd. H_2SO_4, allowed to stand for 24 hrs. and then poured on ice, *6,8-dichloro - 2 - trichloromethyl - 1,3,2 - benzoxaz - 4(3) - one*



(II), m. 176–7°, is obtained. II is also formed when 2 cc. Ac_2O is added to 2 g. I in 20 cc. 10% NaOH. II is insol. in alkali, does not give a color with $FeCl_3$ and forms a *mono-Ac deriv.*, m. 123–5°. Warming of II with aq. NH_4OH (d. 0.888) yields *α-aminochloral-3,5-dichlorosalicylamide* (III), m. 125–7°. III is sol. in NaOH and gives a red color with $FeCl_3$. Its *Ac deriv.* m. 207–8°. III forms a *HCl salt* and a *sulfate*. Heating of III with dil. NaOH gives 3,5-dichlorosalicylic acid. Treatment of III with NO_2 gives I, m. 158–9° (decompn.). II may also have the imino hydroxy structure. F. E. Brauns 2

Condensation of *p*-methoxyphenylsuccinic anhydride with anisole and cresol methyl ethers. G. A. Dalal, K. V. Bokil and K. S. Nargund. *J. Univ. Bombay* 8, Pt. 3, 190–7 (1939).—Condensation of O.CO.GHR.CH_2.CO by the Friedel-Crafts reaction yields 2 different γ-keto acids in various amts. depending upon the solvent used. O.CO.CH(*p*-$MeOC_6H_4$).CH_2.CO (I) is condensed with PhOMe (II) and with cresol Me ethers using different solvents. In $PhNO_2$ or CS_2 I and II give *α-p-methoxyphenyl-β-p-methoxybenzoylpropionic acid* (III), m. 163°, in 77% and 35% yield, resp. In $(CHCl_2)_2$ (IV) III is obtained in 95% yield in addn. to a small amt. of a compd. m. 83°. The constitution of III is proved by its synthesis according to the method of Hahn and Lapworth (*J. Chem. Soc.* 85, 1358 (1904)). III is also obtained when *α-p*-methoxyphenyl-β-*p*-methoxybenzoyl-α,β-dibromoethane reacts with KCN and the CN compd. formed is hydrolyzed. Oxidation of III with $KMnO_4$ gives anisic acid, m. 180°. With *o*-HOC_6H_4CHO (V) and HCl, III forms a pyrylium deriv. The *Me ester* of III m. 98°; *Et ester*, m. 85°. *o*-MeC_6H_4OMe and I give, in various solvents, *α-p-methoxyphenyl-β-4-methoxy-m-toluylpropionic acid* (VI), m. 170°, in 95% yield in IV, 65% in CS_2 and 92% in $PhNO_2$. 3-Methyl-4-methoxyacetophenone (VII), prepd. by methylating the HO deriv. (cf. Nencki and Stober, *Ber.* 30, 1770), b. 260–5°. VII and anisaldehyde give *4,4'-dimethoxy-3'-methylchalcone* (VIII), an oil, which on treating with Br yields *α-p*-methoxyphenyl-β-3-methyl-4-methoxybenzoyl-α,β-dibromoethane (IX), m. 121°. Neither VIII nor IX reacts with KCN. A synthesis of VI is achieved by treating a Grignard reagent prepd. from 2-methoxy-5-bromotoluene with I. The *Me ester* of VI m. 98°; *Et ester*, m. 82°. *α-p-Methoxyphenyl-β-4-methoxy-o-toluylpropionic acid* (X), obtained from *m*-MeC_6H_4OMe and I, in 90% yield in IV, 15% in CS_2 and 75% in $PhNO_2$, m. 148°. Its *Me ester* b_8 210–15°; its pyrylium deriv., insol. in dil. NaOH, is deep red and does not m. up to 300°. X is synthesized from 4-methoxy-2-methylacetophenone and anisaldehyde, giving 4,4'-dimethoxy-2'-methylchalcone (XI), m. 147°, which on treatment with Br yields *α-p*-methoxyphenyl-β-4-methoxy-*o*-toluyl-α,β-dibromoethane, m. 160°. On treatment with KCN followed by hydrolysis, it gives X. *α-p-Methoxyphenyl-β-6-methoxy-m-toluylpropionic acid* (XII), m. 168°, is prepd. from *p*-MeC_6H_4OMe and I in 90% yield in IV, 10% in CS_2 and 45% in $PhNO_2$. Its *Me ester* b_{18} 250°; *Et ester*, m. 95°. The synthesis of XII from 2-methoxy-5-methylacetophenone, b_8 120°, b. 154°, failed since the latter could not be condensed with anisaldehyde to the corresponding chalcone. Its synthesis, however, is achieved by the reaction of a Grignard reagent from 3-bromo-4-methoxytoluene on I. XII gives a deep red pyrylium deriv. which does not m. up to 300°. **Condensation of *p*-methoxyphenylsuccinic anhydride with the methyl ethers of pyrocatechol, resorcinol and hydroquinone.** G. S. Savkar, K. V. Bokil and K. S. Nargund. *Ibid.* 198–202.—Condensation of I with veratrole gives *α-p-methoxyphenyl-β-3,4-dimethoxybenzoylpropionic acid* (XIII), m. 188°, in 64% yield in $PhNO_2$ and 85% in IV, while in CS_2 no reaction takes place. The *Me ester* of XIII m. 138°; *Et ester*, m. 88°; *semicarbazone*, m. 176°. Condensation of XIII with V gives a deep red pyrylium deriv. which does not m. up to 300°. XIII is synthesized by the reaction of KCN with *α-p*-methoxyphenyl-β-3,4-dimethoxybenzoyl-α,β-dibromoethane, m. 138°, prepd. from 4,3',4'-trimethoxychalcone and sapon. of the CN deriv. Guaiacol, *p*-$C_6H_4(OH)_2$ and *p*-HOC_6H_4OMe do not condense with I. *m*-$C_6H_4(OMe)_2$ and I give *α-p-methoxyphenyl-β-2,4-dimethoxybenzoylpropionic acid* (XIV) m. 201°, in 64% yield in $PhNO_2$, 34% in IV, and 95% in CS_2. The *Me ester* of XIV m. 107°; *Et ester*, m. 112°; *semicarbazone*, m. 211°. 2',4',4-Trimethoxychalcone, m. 86°, is prepd. from resacetophenone di-Me ether and anisaldehyde. Addn. of Br gives *α-p*-methoxyphenyl-β-2,4-dimethoxybenzoyl-α,β-dibromoethane, m. 118°, which reacts with KCN but no cryst. acid is obtained from the reaction. XIV, however, is synthesized from I and a Grignard reagent prepd. from 4-iodoresorcinol di-Me ether. *m*-$MeOC_6H_4OH$ and I give *α-p-methoxyphenyl-β-2-hydroxy-4-methoxybenzoylpropionic acid* (XV), m. 169°, in 69% yield in $PhNO_2$, 78% in IV, and 21% in CS_2. Its *Me ester*, prepd. from the Ag salt and MeI, m. 92°; *Et ester*, m. 111°; *semicarbazone*, m. 157°. *p*-$C_6H_4(OMe)_2$ and I give *α-p-methoxyphenyl-β-2,5-dimethoxybenzoylpropionic acid* (XVI), m. 168°, in 29% yield in $PhNO_2$ and 14% in IV. Its *Me ester* m. 102°; *Et ester*, m. 75°; *semicarbazone*, m. 126°. XVI is synthesized from 4,2',5'-trimethoxychalcone, m. 99°, by addn. of Br, giving *α-p*-methoxyphenyl-β-2,5-dimethoxybenzoyl-α,β-dibromoethane, m. 112°, and hydrolysis of the corresponding CN deriv. **Condensation of succinic anhydride** 3 4 5 6 7 8 9

with the methyl ethers of orcinol and pyrogallol. G. A. Dalal, K. V. Bokil and K. S. Nargund. *Ibid.* 203–4.—I and orcinol di-Me ether give *β-2,4-dimethoxy-6-methylbenzoylpropionic acid* (XVII), m. 120°, in 40% yield in CS_2, 60% in $PhNO_2$ and 45% in IV. The *Me ester* b_{16} 160°; *Et ester*, b_{20} 170°. Orcinol mono-Me ether and I give *β-2-methoxy-4-hydroxy-6-methylbenzoylpropionic acid*, m. 145°, in 25% yield in $PhNO_2$. When recrystd. from H_2O, it m. 125°. It gives no color with $FeCl_3$ and on methylation gives XVII. I and pyrogallol tri-Me ether give *β-2-hydroxy-3,4-dimethoxybenzoylpropionic acid*, m. 153°; its *Me ester* m. 110°; *Et ester*, m. 58°; *semicarbazone*, m. 185°. F. E. Brauns

Condensation of α-substituted acetoacetates with phenols. II. Use of various condensing agents with ethyl α-acetoglutarate. N. M. Shah. *J. Univ. Bombay* 8, Pt. 3, 205–7(1939); cf. *C. A.* 33, 5481.—Et α-acetoglutarate (I) reacts with phenols in the presence of H_2SO_4 with the formation of coumarin-3-propionic acid derivs. Since the course of the reaction is affected by the condensing agent, P_2O_5 (II), H_3PO_4 (III), $AlCl_3$ (IV) and gaseous HCl (V) are tried as condensing agents. *m*-$C_6H_4(OH)_2$ and I give with II, III and IV 7-hydroxy-4-methylcoumarin-3-propionic acid, m. 224°, IV giving the highest yield. Orcinol and I with V give Et 5-hydroxy-4,7-dimethylcoumarin-3-propionate, m. 162–3°, and with II the corresponding free acid. Pyrogallol and II, α-naphthol and II or III, β-naphthol and II or IV, and *m*- and *p*-cresols with any condensing agent give no definite product. F. E. Brauns

γ-Substitution in the resorcinol nucleus. V. The Gattermann reaction with 4-acylresorcinols. H. A. Shah and R. C. Shah. *J. Chem. Soc.* 1940, 245–7; cf. *C. A.* 33, 6813[3].—Respropiophenone (10 g.) in AcOH, treated with 14 g. of $Zn(CN)_2$ and 1.5 g. KCl and then with 16 g. $AlCl_3$ in ether, HCl passed through for 4 hrs., 200 cc. H_2O added and the mixt. heated for 0.5 hr. at 100°, gives 7.5 g. of *2,4-dihydroxy-3-formylpropiophenone* (I), m. 140 1°; alkali gives a bright yellow color and EtOH-$FeCl_3$ gives a deep red color; *2,4-dinitrophenylhydrazone*, yellow, m. 265–7° (decompn.). I (1 g.) and 1 g. $NCCH_2CO_2H$ in 15 cc. 20% NaOH give 0.9 g. of *5-hydroxy-6-propionylcoumarin-3-carboxylic acid*, straw-colored, m. 185–6° (decompn.); I (1 g.), 1 g. $AcCH_2CO_2Et$ and 4 drops piperidine give 0.6 g. of *5-hydroxy-3-acetyl-6-propionylcoumarin*, yellow, m. 188–90°. 2-Methylresorcinol (II) (1 g.) and 1 g. EtCN in 30 cc. ether, satd. with HCl in the presence of $ZnCl_2$, give 0.5 g. of *2,4-dihydroxy-3-methylpropiophenone*, m. 128–30°; Clemmensen reduction yields *2-methyl-4-propylresorcinol* (III), m. 102–3°; $AcCH_2CO_2Et$ and H_2SO_4 give *7-hydroxy-4,8-dimethyl-6-propylcoumarin*, m. 160–2°. Reduction of I by Clemmensen's method gives III, proving its constitution. Resobutyrophenone, $Zn(CN)_2$, $AlCl_3$ and KCl with HCl give *2,4-dihydroxy-3-formylbutyrophenone* (IV), yellow, m. 42–3° (*semicarbazone*, m. 242–5° (decompn.)); $NCCH_2CO_2H$ gives *5-hydroxy-6-butyrylcoumarin-3-carboxylic acid*, straw-colored, m. 198–200° (decompn.). II, PrCN, $Zn(CN)_2$ and HCl give *2,4-dihydroxy-3-methylbutyrophenone*, straw, m. 155–7°; Clemmensen reduction gives *2-methyl-4-butylresorcinol*, m. 74–6°, which is also formed from IV. 2,4-$(HO)_2C_6H_3Bz$ (10 g.) gives 4 g. of *2,4-dihydroxy-3-formylbenzophenone* (V), pale yellow, m. 117–18°; *2,4-dinitrophenylhydrazone*, yellow, m. 228–30° (decompn.); $NCCH_2CO_2H$ gives *5-hydroxy-6-benzoylcoumarin-3-carboxylic acid*, m. 244° (decompn.); Clemmensen reduction of V gives *4-benzyl-2-methylresorcinol*, m. 96–8°, also prepd. from 3,2,4-$Me(HO)_2C_6H_2Bz$. 2,4-$(HO)_2C_6H_3COCH_2Ph$ (10 g.) gives 6 g. of *2,4-dihydroxy-3-formylphenyl benzyl ketone*, m. 110.5–12°; *2,4-dinitrophenylhydrazone*, yellow, m. 252–3° (decompn.); *semicarbazone*, m. 248–9° (decompn.)); $CH_2(CO_2Et)_2$ gives *Et 5-hydroxy-6-phenylacetylcoumarin-3-carboxylate* (VI), yellow, m. 200–1°; $AcCH_2CO_2Et$ gives *5-hydroxy-3-acetyl-6-phenylacetylcoumarin*, yellow, m. 198–200°; $NCCH_2CO_2H$ gives the free *acid* corresponding to VI, m. 215–17° (decompn.); II and $PhCH_2CN$ give *2,6-dihydroxy-m-tolyl benzyl ketone*, m. 157–9°; reduction gives *2-methyl-4-β-phenylethylresorcinol*, m. 115–16° (*di-p-nitrobenzoyl deriv.*, straw-colored, m. 140–2°).

C. J. West

Synthesis of 3-aminocoumarin. Kantilal C. Pandya and Tejpal S. Sodhi. *J. Univ. Bombay* 8, Pt. 3, 173–5 (1939); cf. *C. A.* 33, 7300[4].—When 3 g. *o*-HOC_6H_4CHO, 1.25 g. $NH_2CH_2CO_2H$ and 0.1 cc. pyridine are heated in an oil bath at 130–40° for 5 hrs., the reaction product extd. with EtOH and the latter distd. off, 3-aminocoumarin, m. 130°, is pptd. in 81% yield on addn. of H_2O.

F. E. Brauns

Condensation of nitroanilines and diaminobenzenes with the anhydride of phthalic acid. J. Hadáček. *Časopis Českého Lékárnictva* 19, 183–191, 199–207(1939).—*o*-Nitroaniline gives $C_{14}H_8O_4N_2$ (I), m. 164°; *m*-nitroaniline, $C_{20}H_{14}O_8N_4$ (II), m. 265°; *p*-nitroaniline, $C_{20}H_{16}O_8N_2$ (III), m. 196°; *o*-diaminobenzene, $C_{16}H_{12}O_2N_2S$ (IV), m. 261°; *m*-diaminobenzene, m. 198°; *p*-diaminobenzene, m. 196°; the formulas for the last 2 compds. were not detd. By the chlorination of I there was obtained dichloronitroacetanilide; of II, tetrachloroaniline-HCl; of III, chloroacetanilide; and of IV, tetrachloroaminophenylphthalimide. Bromination of I gave dibromonitroaniline; of II, tribromonitroacetanilide and bromonitroacetanilide; of III, tribromoacetanilide; and of IV, dibromoaminophenylphthalimide. V. D. Karpenko

Nature of addition of aliphatic diazo compounds to conjugated double-bonded systems; action of diazomethane and ethyl diazoacetate on cyclopentadiene and cyclohexadiene and their derivatives. P. C. Guha and G. D. Hazra. *J. Indian Inst. Sci.* 22A, 263–74(1939).—Cyclopentadiene (I) could not be induced to react with CH_2N_2 in dry ether at 0°, at room temp. or in the presence of MeOH as catalyst. I reacted with N_2CHCO_2Et at 0°, but exploded when warmed to room temp. 1,3-Cyclohexadiene (II) did not react with CH_2N_2. *Et norcarene-carboxylate* (III) was prepd. in a 64% yield from a warm mixt. of 16 g. II with 1.5 g. Cu bronze under reflux by adding dropwise 22.5 g. N_2CHCO_2Et, heating on the H_2O bath for 6 hrs., filtering and fractionally distg. at 84°/2.5 mm. The structure of III was established by hydrolysis to *norcarenecarboxylic acid*, m. 82.5° (*anilide*, m. 195–96°); and by reducing catalytically to *Et norcaranecarboxylate*, b_{18} 112–14°, which was hydrolyzed to *norcaranecarboxylic acid* (IV), m. 97°. The Ba salt of IV when distd. with ZnO gave *norcarane*. These compds. are identical with those of Ebel, Brunner and Mangeli (*C. A.* 23, 2707[6]). 2,3-Dimethyl-1,3-cyclohexadiene (cantharene) (V), b. 135°, was prepd. by heating 40 g. dimethyldibromocyclohexane with 90 g. freshly distd. quinoline. It was purified by redistg., washing with dil. HCl and H_2O, drying over $CaCl_2$ and distg. thrice over Na. V did not react with CH_2N_2. To 23 g. V with 0.5 g. Cu bronze heated to 70° 24.2 g. N_2CHCO_2Et was added dropwise and allowed to stand for 17 hrs. After filtration, about 9 g. unreacted V was removed by distn. to 140°. The residual liquid on fractional distn. gave an oil, $b_{2.5}$ 91–5°; yield, 11 g. The product, *Et dimethylnorcarenecarboxylate*, was hydrolyzed with 5% alc. KOH, giving in very poor yield a C_6H_6-sol. acid, m. 140°, and a C_6H_6-insol. acid, m. 282°. *Di-Me 2,3-dihydroterephthalate* (VI) was prepd. from *di-Me terephthalate* (VII); 40 g. VII, 5 g. Pt oxide (Adam's catalyst) and 250 cc. glacial AcOH were placed in a soda-water bottle, the air removed and the bottle connected with an aspirator contg. H under 3 atm. pressure and shaken mechanically at room temp. for 2.5 hrs. The mixt. was filtered and freed from AcOH by distn. and washing with H_2O. The residual oily liquid gave 37 g. *di-Me hexahydroterephthalate* (VIII), b_2 132–3°. VIII (146 g.) heated under reflux with 1.5 l. 8% HCl for 6 hrs., the clear soln. evapd. nearly to dryness, cooled, filtered and the solid residue consisting of 125 g. of a mixt. of *trans-* and *cis-hexahydroterephthalic acids* (IX) was extd. with $CHCl_3$; 85 g. of the cis acid, m. 168–70°, was obtained from the soln., and 42 g. of the trans acid, m. 308°, was left undissolved in the $CHCl_3$. *cis-IX* (20 g.) was converted into the acid chloride with $SOCl_2$. The excess $SOCl_2$ was removed under suction and the diacid chloride

was heated with 40 g. Br at 150° for 4 hrs. After cooling in a freezing mixt., excess abs. MeOH was added, and the soln. allowed to stand overnight and then heated for 3 hrs. under reflux on the H_2O bath. The MeOH was removed by distn. and the residual liquid poured into ice-cold $NaHCO_3$ soln. when a mixt. of the *cis*- and *trans-di-Me 1,4-dibromohexahydroterephthalates* sepd. out. The solid trans ester, sepd. by filtration and crystd. from MeOH, m. 150°; yield, 10 g. The liquid cis ester, purified by distn. under reduced pressure, soon solidified, and m. 68°; yield, 11 g. A mixt. of the *trans*-Br ester (81 g.) and the *cis*-Br ester (69 g.) was treated with 750 g. 50% alc. KOH and the mixt. allowed to stand at room temp. with frequent trituration for 48 hrs. The paste was acidified with dil. H_2SO_4 under ice-cooling when *2,3-dihydroterephthalic acid* sepd. out (application of heat tends to the formation of the *2,5-isomer*). The acid was converted to the acid chloride by $SOCl_2$ and the latter converted into VI by heating under reflux with MeOH for 3 hrs., then poured into H_2O and the monoester removed by Na_2CO_3 soln. VI, purified by crystn. from MeOH, m. 85°; yield, 25 g. VI (20 g.) was treated with 4.2 g. CH_2N_2 in ether at 0° for 2 days. After removal of the ether, N was removed by heating at 140°, caution being necessary to prevent an explosion. Yield of *di-Me bicyclo[2.2.1]heptenedicarboxylate* (X), b_3 132–34°, 13 g. To prove that addn. had taken place in the 1,4-position, the free acid of X was oxidized with 3% $KMnO_4$ at 0° in Na_2CO_3 soln. to give *cyclopentane-1,1,3,3-tetracarboxylic acid*, m. 188°, identical with a genuine sample previously prepd. (*C. A.* **30**, 5208[7]). Conclusions: (1) CH_2N_2 does not react with 5- and 6-membered cyclic hydrocarbons contg. a system of conjugated double bonds. (2) N_2CHCO_2Et reacts with them, giving 1,2-addn. products. (3) When the C atoms in positions 1 and 4 carry neg. groups like CO_2Et, the addn. of CH_2N_2 takes place in the 1,4-positions.

Mark Plunguian

Condensation product of methyl *o*-aldehydobenzoate and malonic acid. S. Hanai. *Bull. Inst. Phys. Chem. Research* (Tokyo) **17**, 1236–40(1938).—*o*-$OHCC_6H_4CO_2Me$ and $CH_2(CO_2H)_2$ yield a compd., m. 311–12°, a decompn. product of which is *o*-$HO_2CC_6H_4(CH_2)_2CO_2H$. Diphthalide ether m. 235–36°. B. C. P. A.

The catalytic oxidizing properties of the phthalocyanines. Charles Paquot. *Compt. rend.* **209**, 171-3(1939).—*α*-Pinene oxidized with 2.5–5% Fe (I), Co (II), Ni (III) phthalocyanines at 50–100° for 8–40 hrs. yields 10–25% *verbenone* (IV), 1–3% *pinacol hydrate* and 40–70% unoxidized pinene. Oxidation with II at 100° yields in addn. 2–7% *verbenene*, resulting from the dehydration of verbenol. The optimum condition for the prepn. of IV are: III (as catalyst) 0.5–1%, temp., 80°, time, 30–50 hrs.; yield 40–50%. Oxidation of cyclohexene with III (0.4%) for 60 hrs. at 65° yields *3-cyclohexen-1-one* (17%), *3-cyclohexen-1-ol* (6%), *1,3-cyclohexadiene* (2%), *epoxycyclohexane* (2%) and *1,2-cyclohexanediol* (4%). The identification of the different fractions is confirmed by a study of their Raman spectra. C. W. Sondern

Optical superposition. H. Rupe and Franz Häfliger. *Helv. Chim. Acta* **23**, 53–90(1940); cf. *C. A.* **30**, 5960[7].—To test the principle of optical superposition the esters of *d*-, *l*- and *dl*-camphorylmethanol (I) and of the corresponding unsatd. *d*-, *l*-, and *dl*-hydroxymethylenecamphor (II) with *d*- and *dl*-camphorylacetic acid (III), *d*- and *dl*-camphorylpropionic acid (IV) and *d*- and *dl*-camphorylideneacetic acid (V) were prepd. and polarimetrically examd. *New compds.* are the *dl*-forms of IV, m. 85° (active form, m. 63–64°), of V, m. 143° (active form, m. 99.5–101°), and of III, m. 115° (active form, m. 83–84°), and the esters, *d*-II *d*-IV, m. 143°; *l*-II *d*-IV, m. 133°; *d*-II *dl*-IV, m. 128°; *l*-II *dl*-IV, m. 126 *dl*-II *d*-IV, m. 139°; *d*-I *d*-IV, m. 90°; *l*-I *d*-IV, m. 113 *d*-I *dl*-IV, m. 94°; *l*-I *dl*-IV, m. 96°; *dl*-I *d*-IV, m. 94 *d*-*β*-I *d*-IV, m. 103°; *d*-II *d*-V, m. 145°; *l*-II *d*-V, m. 121 *d*-II *dl*-V, m. 146°; *l*-II *dl*-V, m. 146°; *dl*-II *d*-V, m. 143 *d*-I *d*-V, m. 102°; *l*-I *d*-V, m. 90°; *d*-I *dl*-V, m. 90 *l*-I *dl*-V, m. 91°; *dl*-I *d*-V, m. 92°; *l*-II *d*-III, m. 111 *d*-II *dl*-III, m. 101°; *dl*-II *d*-III, m. 120°. Camphorylidenepropionic acid (VI) gives no acid chloride but a lactone with $SOCl_2$, while the Na salt of VI with $POCl_3$ gives no acid chloride but only some bismethylenecamphormethane, $(C_{11}H_{16}O)_2CH_2$. The rotations of the esters do not correspond simply to an algebraic sum of two consts., e. g., $[M]_D$ for IV as dctd. from the ester with I is 52.37° while from the ester with II it is −5.70°, indicating the influence of the substituent groups on C*. From the [M] values for the *d*-*d* and *l*-*d* forms of a given ester the *d*-*dl*, *l*-*dl*, *dl*-*d* and *dl*-*l* ester values should be calculable if the principle of optical superposition holds. In the formation of the half-racemic esters, i. e., *dl*-*d* (or -*l*) and *d* (or *l*)-*dl*, partial steric resolution occurs in some cases as the *dl*-component recovered from the sapon. of the ester shows optical activity. R. and H. conclude from a crit. examn. of their data and correcting for errors that the principle of optical superposition is valid for the esters with 1 or both components satd. and is not valid for the esters with both components unsatd. A. P. Sachs

Preparation of borneol glucuronide. Harvey K. Murer and Lathan A. Crandall, Jr. *J. Am. Chem. Soc.* **62**, 674–5(1940).—Zn borneol glucuronide (prepd. by the method of Quick, *C. A.* **21**, 3373)(200 g.) is added with stirring to 800 ml. warm Me_2CO contg. 14.7 ml. concd. H_2SO_4; the $ZnSO_4$ and unreacted Zn salts are sepd. by centrifugation, washed with warm Me_2CO, 50 ml. of H_2O is added to the Me_2CO and borneol glucuronide crystd. at room temp. A more suitable method for the hydrolysis of the glucuronide could not be found. C. J. West

Camphorone and pulegenone. Hydrogenation products and their structure. IV. Hydrogenation in the presence of metal catalysts. Raymond Calas. *Bull. soc. chim.* **6**, 1485-93(1939); cf. *C. A.* **34**, 92[2].—Catalytic hydrogenation of 150 g. of camphorone (I) in the presence of Adams' Pt catalyst in AcOH or in abs. alc. gave 120 g. of a *dihydrocamphorone* (II), b. 179–81° (*semicarbazone* (III), m. 198°), or 145 g. of a *dihydrocamphorone* (IV), b. 179–81° (*semicarbazone* (V), m. 209°). Similar results were obtained by catalytic hydrogenation of pulegenone (VI). The reduction does not stop at the ketone stage, as in reduction in the presence of Raney Ni catalyst, but continues with formation of the alc., $C_9H_{18}O$, in traces since, apparently, the reduction is accompanied by a dehydration. Reduction in the presence of a Pt-Fe catalyst (prepd. from a mixt. of 10 g. dried residue from H_2PtCl_6, 3 cc. of 30% $FeCl_3$, 7 g. of 40% HCHO and 10 cc. H_2O, by pptg. with 10 g. NaOH in H_2O and filtering after 24 hrs.) satd. only the ethylenic linkage. Reduction is most rapidly accomplished in the presence of Pt but excellent results are obtained by the use of large amts. of the less expensive Raney Ni; with Pt-Fe the rates of reduction are very low. In alk. or neutral soln., with any catalyst, the trans form of the dihydrocamphorone is mainly produced; in acid media, the cis form is the main product, in accordance with the views of Skita. VI is reduced more slowly than I in accordance with its intranuclear double bond, in contrast to the nuclear bond in I. **V. cis- and trans-Dihydrocamphorones.** *Ibid.* 1493–8.—A mixt. of 100 g. III, 300 g. $(CO_2H)_2$ and 500 cc. H_2O was boiled for several min., extd. with ether, neutralized with $NaHCO_3$ and distd., yielding 70 g. II, b_{14} 70°; *oxime*, b_{15} 118–19°, m. 76–7°; *carbanilidoxime*, $C_{18}H_{22}N_2O_2$, m. 142°. A similar hydrolysis of V gave IV, b_{14} 70°; *oxime*, b_{16} 117°; *carbanilidoxime*, m. 139°. II has viscosity 0.1563, surface tension 31.10 dynes/cm., parachor 372 (calcd. 369), M. R. 41.44 (calcd. 41.57), and IV has viscosity 0.1577, surface tension 31.20 dynes/cm., parachor 373, M. R. 41.47. The lower M. R. and viscosity of II indicate that it has the cis form, according to the rule of Auwers. A study of the rate of oximation showed that the oxime of IV was formed 1.33 times more rapidly than that of II and this is in accordance with the assignment of a trans structure to IV. IV is mainly produced in the hydrogenation of I or VI in neutral or alk. media and, according to Skita, should have the trans form. A tabular comparison of various synthetic dihydrocamphorones, as reported by divers investigators, shows that *syn*-dihydrocamphorone is mainly IV, whereas the products of oxidation and re-

duction are chiefly II. VI. **Hydrogenation of dihydrocamphorones; transposition of the trans ketone into its cis isomer.** *Ibid.* 1499–1505.—Although catalytic reduction of I or VI gave only the ketones (II and IV), further reduction to a mixt. of *cis*- and *trans*-dihydrocamphorols (VII, VIII) (cf. *C. A.* 18, 1659) is possible by hydrogenation of either II or IV with Na in either ether or abs. alc. This phenomenon can be interpreted by the assumption of an enolization of II and IV to a common enol form prior to reduction. In the presence of iso-PrMgBr in ether, II and IV show 17.2 and 18.5% enolization, resp. Decompn. of the product of the treatment with the Grignard reagent and isolation as the semicarbazone showed that about 15% of IV is in the enol form which, on hydrolysis, yields the cis ketone, as the most stable modification. Thus reduction of II and IV with Na in ether or abs. alc. is preceded by an enolization, after which the double bond is satd. and the Me and iso-Pr groups orient themselves in the more stable cis configuration. The formation of the same dihydrocamphorols from I and VI is similarly explained and the lack of unsatd. alcs. or of dihydrocamphorone on reduction with Na in aq. ether confirms the conception of a reduction of the enolic modification. VII. **Dehydration of the previously described dihydrocamphorols; structure of the corresponding ketone.** *Ibid.* 1505–10.—It has been previously indicated that VII and VIII are derived from a cis ketone (IX) in which the Me and iso-Pr groups are on the same side of the nuclear ring. This assumption is confirmed by the dehydration of VII and VIII to one and the same hydrocarbon, 1-methyl-3-isopropylcyclopentene (X). It is considered that the alcs. corresponding to a trans ketone would give rise to 2 different hydrocarbons. A mixt. of 5 g. VII (prepd. by regeneration from the acid phthalate, m. 114°) and 10 g. $(C_6H_4CO)_2O$ at 130–40° was distd. and the distillate was extd. with ether, yielding 4 g. of X, C_9H_{16}, b. 138–9°, d_4^{18} 0.7935, n_{5893}^{18} 1.44354, M. R. 41.47 (calcd. 41.10), viscosity 0.724, surface tension 27.8 dynes/cm., parachor 358 (calcd. 349); *NOCl deriv.*, m. 119° (piperidide, m. 161°). Accordingly, X is regarded as a pure compd., prepd. for the first time in the pure state, and distinct from the 1-methyl-3-isopropyl-2-cyclopentene which might have been formed by dehydration of VII. Similarly, dehydration of VIII (prepd. from the acid phthalate, m. 84°) gave X. Since dehydration of both VII and VIII gives only X, it is reasoned that the corresponding ketone has the cis configuration by an argument which would be without value if the difference in the lability of the H atoms in positions 2 and 5 is such that the same atom should always combine with the OH group whatever its position with respect to the group. C. R. Addinall

1,2,2 - Trimethylcyclopentane - 1,3 - dialdehyde: (Camphoceandialdehyde). Franz Häfliger. *Helv. Chim. Acta* 23, 90-2(1940).—Camphor glycol (25 g.) in 150 cc. C_6H_6 and 15 cc. AcOH oxidized with 71.6 g. $Pb(OAc)_4$ yields with ring rupture 16 g. (63% of theory) of 1,2,2-trimethylcyclopentane - 1,3 - dialdehyde (camphoceandialdehyde), m. 97°, b_{12} 120–2°. A. P. Sachs

Camphorquinone and diazomethane (preliminary communication). H. Rupe and Franz Häfliger. *Helv. Chim. Acta* 23, 139–43(1939).—Camphorquinone (20 g.) in 90 cc. benzene was chilled and treated with CH_2N_2 in benzene (from 20 g. ON(Me)NCONH$_2$) and 5 cc. MeOH. After 3 hrs. at 0° and 12 hrs. at room temp. the benzene was distd. off and the residue in more benzene was again treated with CH_2N_2. The process was again repeated and the benzene-free product was shaken out with ether. The residue from the ether ext. was distd., yielding 90% (21 g.) of a light yellow, viscous oil, b_{12} 145–7°. Purification through the perchlorate gave a colorless oil, b_{12} 145°, of which 70 g. yielded 20 g. of prismatic crystals of a *neutral substance* (I), $C_{12}H_{18}O_2$, m. 55–6° (*perchlorate*, m. 90°; *oxime*, $C_{12}H_{19}NO_2$, m. about 195°), and a liquid crude product (II) which gives a yellow color with $C(NO_2)_4$, forms a white bisulfite addn. product, yields a white ppt. with $H_4Fe(CN)_6$, forms a solid bromide, and is changed by cold concd. HCl or warm dil. HCl or H_2SO_4 into an acid compd. (III). II (20 g.) was heated with 50 cc. of 10% HCl for 4 hrs. at 100° with frequent shaking. The cooled reaction mixt. was alkalinated and shaken out 5 times with ether. The ether-free aq. layer was acidified and the crude product was recrystd. from a benzene-petr. ether mixt. or H_2O, yielding fine colorless needles of III, $C_{11}H_{16}O_3$, m. about 220°, sol. in $NaHCO_3$, aq. soln. pH 4–5; *Ag salt*, light-sensitive; *phenylurethan*, $C_{18}H_{21}NO_3$, m. 91°; *bromide*, $C_{11}H_{15}BrO_3$, m. about 191°. Transformation of I into III by heating with 20% H_2SO_4 for 3 hrs. gave MeOH, identified as the 3,5-dinitrobenzoate, m. 109° (α-$C_{10}H_7NH_2$ addn. compd., m. 121°). Methylation of III with MeOH and concd. H_2SO_4, treatment of the product with $HClO_4$ and decompn. of the perchlorate gave I. Oxidation of III with CrO_3 produced camphoric acid. Catalytic hydrogenation of III in the presence of Ni at 70° and 120 atm. gave isoborneol whereas reduction with Na and alc. produced borneol and camphor glycol, m. 234° (bis(phenylurethan), $C_{24}H_{28}N_2O_4$, m. 171°). The oxidation and reduction products prove that III has an unaltered camphor structure. C. R. A.

Triterpene group. VI. The oxidation of β-amyrin benzoate. A new route to the thio compound $C_{30}H_{44}OS$. James C. E. Simpson. *J. Chem. Soc.* 1940, 230–7; cf. *C. A.* 33, 6326[7].—The oxidation of β-amyrin benzoate (I) is shown to be considerably more complex than would appear from the work of Beynon, Sharples and Spring (*C. A.* 32, 8407[4]) and in consequence cannot be regarded as comparable with oxidation of certain derivs. of β-boswellic acid (II), which give rise to single products in high yields (S. and Williams, *C. A.* 33, 553[7]). In view of this intrinsic dissimilarity and also in consequence of the work of Ruzicka, Müller and Schellenberg (*C. A.* 33, 6820[8]), the criticism of Spring as to the validity of the evidence on which the present tentative structure of II is based is no longer justifiable. I (10 g.) in 450 cc. glacial AcOH is treated under reflux with 7 g. CrO_3 in 30 cc. H_2O and 30 cc. AcOH added dropwise during 35–45 min.; after refluxing an addnl. hr. the product is pptd. with H_2O and crystd. from aq. AcOH, giving 50% of β-amyrenonyl benzoate (IIA), m. 255–60°; hydrolysis and acetylation give pure β-amyrenonyl acetate, m. 261.5–2.5°, $[\alpha]_D^{25}$ 96° ($CHCl_3$). The mother liquor from IIA is pptd. with H_2O and taken up in ether; 3% NaOH exts. an acid fraction (III); the neutral portion was refluxed for 6 hrs. with a large excess of 10% C_6H_6-EtOH-KOH and the resulting material acetylated, giving about 2% of an *acetate*, $C_{32}H_{50}O_4$, m. 322–4°, $[\alpha]_D^{25}$ −110° ($CHCl_3$, *c* 3.34); hydrolysis with 0.1 *N* EtOH-KOH in C_6H_6 gives the corresponding *alc.*, $C_{30}H_{48}O_3$, m. 284–5°; in another expt. the alc. m. 262–4°. This alc. does not react with EtOH-$FeCl_3$ or with *o*-$C_6H_4(NH_2)_2$ and since it does not contain an α,β-unsatd. ketonic group (absorption spectra) and shows little selective absorption in the ultraviolet, it is thought to be a ketonic oxide. III (20–5% of the total oxidation product), on methylation with CH_2N_2 and benzoylation, gives on crystn. from C_6H_6-EtOH a small quantity of a sparingly sol. *benzoate*, $C_{37}H_{50}O_4$, m. 293–4° (MeO-free) and a sol. *Me ether* (IV), $C_{48}H_{66}O_3$, m. 228–9°, $[\alpha]_D^{25}$ 16.7° ($CHCl_3$, *c* 3.62); IV does not react with $NH_2OH.AcOH$; the formula corresponds to the dibenzoate of an (enolized) hydroxy keto Me ester. β-Amyranonol yields a *benzoate* (V), m. 260.5–1.5°, $[\alpha]_D^{25}$ 7.3° ($CHCl_3$, *c* 2.21). β-Amyrenonol, on reduction and refluxing with its own wt. of fused AcONa in 9 parts of Ac_2O for 2.5 hrs., yields *dehydro-β-amyrenol* (VI), m. 209–11°, purified through the acetate (VII), m. 216–17°, $[\alpha]_D^{25}$ 3.9° ($CHCl_3$, *c* 1.88), gives an intense brown color with $C(NO_2)_4$ in $CHCl_3$. A 2nd prepn. of VII m. 221.5–3°, $[\alpha]_D^{25}$ 223° ($CHCl_3$, *c* 1.68), absorption max. 2820 A., log ϵ 3.76; hydrolysis yields a VI m. 195–7° (clears 208°). The phys. properties of VII appear to vary with small changes in exptl. conditions. VI yields a *benzoate* (VIII), m. 238–9°, $[\alpha]_D^{25}$ 219° ($CHCl_3$, *c* 2.21). Oxidation of VII with CrO_3 in aq. AcOH gives 25–30% of *β-amyradienone* (IX), $C_{30}H_{46}O$, m. 170–1°, $[\alpha]_D^{25}$ 108° ($CHCl_3$, *c* 1.2), shows selective absorption at 2540 and 2680 A., log ϵ 3.18, gives a deep yellow color with $C(NO_2)_4$ in $CHCl_3$ and a purple-crimson color with the Liebermann-Burchard

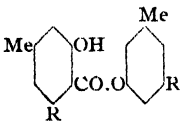
reagent. Another prepn. of **IX** m. 176.5–8°; its *oxime* m. 268.5–70° (decompn.). Refluxing **VIII** with S in $AcOCH_2Ph$ in N atm. for 3.5 hrs. gives the thio compd. $C_{30}H_{44}OS$ (**X**); **IIA** and **V** were recovered unchanged. A comparison of the behavior of **IX** with the 2 ketones from **X** leads to the conclusion that the chromophoric group in **X** and its derivs. cannot consist of a conjugated system of 2 double bonds. C. J. West

Triterpenes. LII. Conversion of α-boswellic acid into β-amyrin. L. Ruzicka and W. Wirz. *Helv. Chim. Acta* **23**, 132–5(1940); cf. *C. A.* **34**, 1642⁸.—The method used in the conversion of β-boswellic acid into α-amyrin (*C. A.* **33**, 8594⁹) has been extended to the α-boswellic acid (**I**) also found in olibanum. A mixt. of 5 g. of pure acetyl-α-boswellic acid and 30 g. $SOCl_2$ was kept overnight, freed from excess $SOCl_2$ and crystd. from hexane, yielding *acetyl-α-boswellyl chloride* (**II**), $C_{32}H_{49}ClO_3$, m. 195–6° (all m. ps. cor.). Reduction of 1 g. **II** in 10 cc. toluene by boiling in the presence of 1 g. Pd-$BaSO_4$ catalyst according to Rosenmund for 3 hrs. until 85% of the calcd. HCl was split off, filtration, concn. and recrystn. from hexane gave *acetyl-α-boswellaldehyde* (**III**), $C_{30}H_{50}O_3$, m. 203–6°, $[\alpha]_D$ 33.9° (*c* 1.87 in $CHCl_3$); *semicarbazone*, $C_{33}H_{53}N_3O_3$, m. 203–5°; *hydrazone* (**IV**), $C_{32}H_{52}N_2O_3$, m. 207–9°. Both **III** and **IV** give a yellow color with $C(NO_2)_4$. A mixt. of 900 mg. **IV** and 900 mg. $H_2NNH_2.H_2O$ was heated with 1 g. Na in 20 cc. abs. alc. in a sealed tube for 14 hrs. at 200°. The product was decompd. with H_2O, extd. with ether, taken up in petr. ether and filtered through a column of Al_2O_3. Elution with benzene gave 550 mg. of an as-yet *unknown product*, m. 224–5°, and further elution with ether yielded β-amyrin (**V**), $C_{30}H_{50}O$, m. 191–3°, $[\alpha]_D$ 91.3° (*c* 1.45 in $CHCl_3$) (Ac deriv., $C_{32}H_{52}O_2$, m. 242.0–2.5°; Bz deriv., $C_{37}H_{54}O_2$, m. 235.6°), identical with a pure sample from elemi resin. Further confirmation for the assignment of I to the β-amyrin type was provided by oxidation. I (1 g.) in 50 cc. AcOH was stirred with 500 mg. CrO_3 in 3 cc. H_2O and 15 cc. AcOH for 1 hr. and the mixt. was kept at 55–60° for another hr. The CrO_3 was eliminated with MeOH and the resulting keto acid was decarboxylated by boiling. The soln. was evapd. down, taken up in ether and the acid portion was sepd. out, yielding 780 mg. of neutral product, m. 188–94°, recrystd. 10 times from MeOH to a product, m. 217–20°. Chromatographing in petr. ether, elution with benzene in 5 fractions and a triple recrystn. of the last 2 fractions gave a *diketone*, $C_{29}H_{46}O_2$, m. 222–5°, $[\alpha]_D$ 7.6° (*c* 0.93 in $CHCl_3$), absorption max. at 2520 A. (characteristic for α,β-unsatd. ketones) identical with a diketone obtained by R. and Marxer from nor-β-amyrin, produced by the rearrangement of hederagenin. **LIII. Conversion of hederagenin into a rearrangement product of α-boswellic acid.** L. Ruzicka and A. Marxer. *Ibid.* 144–52.—According to similarities in structure and reactions the triterpenes are divisible into the 4 sub-groups: squalene, β-amyrin, α-amyrin and lupeol. These transformations are tabulated with the corresponding references. Wolff-Kishner reduction of the triterpene aldehydes converts glycyrrhetaldehyde to hydroxy-β-amyrin and oleanolaldehyde to erythrodiol. An analogous reduction of α-boswellaldehyde (**I**) should yield a diol, *hederadiol* (**II**), identical with that obtained from hederagenin by conversion of the CO_2H into a Me group. **II** is not identical with any of the known triterpene diols, of which a tabulation with m. p., sp. rotations and literature references is given. Treatment of diacetylhederagenin, m. 161°, with $SOCl_2$ and recrystn. of the product from hexane gave cryst. *diacetylhederagenin chloride* (**III**), $C_{34}H_{51}ClO_5$, m. 174°. Reduction of 500 mg. **III** in 2 cc. of xylene in the presence of 500 mg. of 5% Pd-$BaSO_4$ catalyst in 14 cc. xylene was carried out for 3 hrs. at 150° in a H atm. and with the addn. of 0.25 cc. of catalyst poison (1.2 g. quinoline and 0.2 g. S heated for 2 hrs. and taken up in 100 cc. xylene) until 80–90% of the calcd. amt. of HCl was evolved. After filtration and concn. the product was crystd. from pentane, yielding *diacetylhederaldehyde* (**IV**), $C_{34}H_{52}O_5$, m. 108–9°; *semicarbazone* (**V**), $C_{35}H_{55}N_3O_5$, m. 210–2°. **V** (2 g.) was reduced by heating for 20 hrs. with 2 g. Na in 40 cc. abs. alc. at 190–200° in sealed tubes. The cooled mixt. was poured into dil. HCl and extd. with ether. The crude product (1.6 g.) was taken up in benzene and chromatographed. Elution with a benzene-ether mixt. (1:1) dissolved the main amt. of (**VI**) (920 mg.) and a further elution with acetone gave 500 mg. of **II**, $C_{30}H_{50}O_2$, m. 259–61°, $[\alpha]_D$ 86.8° (*c* 1.012 in $CHCl_3$) (non-identical with soy sapogenol, erythrodiol, faradiol or hydroxy-β-amyrin); *di-Bz deriv.*, $C_{44}H_{58}O_4$, m. 186–8°, $[\alpha]_D$ 128.0° (*c* 1.015 in $CHCl_3$). CrO_3 oxidation of **II** (analogous to that of hederagenin to hederagone) gave a mixt. of oxidized compds. instead of a ketone identical with nor-β-boswellenone, $C_{29}H_{46}O$. **VI** was recrystd. from a $CHCl_3$-MeOH mixt. and yielded *nor-β-amyrin* (**VII**), $C_{29}H_{48}O$, m. 223–5°, $[\alpha]_D$ 118.2° (*c* 1.1015 in $CHCl_3$); *Ac deriv.*, $C_{31}H_{50}O_2$, m. 198°, $[\alpha]_D$ 113.5° (*c* 0.987 in $CHCl_3$). **VII** is satd. to Br and gives, as does its Ac deriv., the same yellow color with $C(NO_2)_4$ as **II**. **VII** (100 mg.) in 15 cc. AcOH and a few drops of $CHCl_3$ was oxidized with 100 mg. CrO_3 in 12 cc. AcOH at room temp. for 12 hrs. The product was worked up and sepd. into acid (10 mg.) and neutral (80 mg.) fractions. Recrystn. and chromatographic sepn. of the neutral fraction gave a diketone, $C_{29}H_{46}O_2$, m. 218–20°, $[\alpha]_D$ 8.0° (*c* 0.82 in $CHCl_3$), identical with the diketone from α-boswellic acid (cf. part LII, above). C. R. Addinall

Biphenyl series. V. Preparation of asymmetrical biaryl derivatives. Herbert H. Hodgson and Ewart Marsden. *J. Chem. Soc.* **1940**, 208–11; cf. *C. A.* **29**, 152⁴.—Diazonium salts stabilized by 1-$C_{10}H_7SO_3H$ (**I**), 1,5-$C_{10}H_6(SO_3H)_2$ (**II**) or $ZnCl_2$ have been decompd. in hydrocarbon and $PhNO_2$ suspensions in a manner analogous to the exisiting procedure for Na benzenediazotate and PhN(NO)Ac. The greater reactivity of $PhNO_2$, compared with C_6H_6, with respect to the diazotate as found by Grieve and Hey (*C. A.* **29**, 749³) has been confirmed for the stabilized diazonium salts. Decompns. of the stabilized salts by fused AcONa in conjunction with Ac_2O or glacial AcOH have afforded yields of biaryls amounting to 70% in some cases. The last-named processes appear to be far superior to the alk. decompn. of diazotates. The amine (0.1 g.-mol.) was diazotized at 0° in a mixt. of HCl (24 cc., d. 1.6) and 150 cc. H_2O and treated with finely powd. I (0.1 g.-mol.), **II** (0.2 g.-mol.) or anhyd. $ZnCl_2$ (0.1 g.-mol.). Some stabilized diazonium salt sepd. immediately but the mixt. was stirred for about 1 hr. to complete the pptn. $PhNH_2$ and α- and β-$C_{10}H_7NH_2$ did not give serviceable salts with I, since they sepd. as uncrystallizable oils. Diazotized $PhNH_2$ (**IV**), stabilized with **II**, decompd. in C_6H_6 at room temp. for 48 hrs. and then at 80° until N evolution ceases, gives 10.2, 10.2 and 7.6% Ph_2 with NaOH, KOH and Na_2CO_3; with $ZnCl_2$ as stabilizer the following yields (%) result: EtOH-KOH 14.6, NaOH 2.8, Na_2CO_3 9, Ac_2O and AcONa 20.2, AcOH and AcONa 12.3. The salt (10 g.) from α-$C_{10}H_7N_2Cl$ and **II** in AcOH and AcONa yields 3.3 g. $C_{10}H_8$ and 1.1 g. of α-$C_{10}H_7OH$ but no $(\alpha\text{-}C_{10}H_7)_2$. Using the stabilizers listed, the following products were obtained with Na_2CO_3 in C_6H_6: **IV** with **II**, 17% Ph_2, *o*-NO_2 deriv. of **IV** (**V**) with I, 35.2% of 2-$O_2NC_6H_4Ph$; *m*-isomer (**VI**) with I 54.4% of 3-$O_2NC_6H_4Ph$ (**VIA**); *p*-isomer (**VII**) with I 58.2% 4-$O_2NC_6H_4Ph$ (**VIII**); α-$C_{10}H_7N_2Cl$ (**IX**) with **II**, 15.2% of α-$C_{10}H_7Ph$; β-isomer (**X**) with **II**, no reaction. In $PhNO_2$ the following products were formed: **IV** 35.1% **VIII**; **VI** 48.7% of *3,4′-dinitrobiphenyl* (**XI**), pale yellow, m. 137°; **VII** 42.6% of $(4\text{-}O_2NC_6H_4)_2$ (**XII**); no reaction with **IX** or **X**. With fused AcONa and glacial AcOH in $PhNO_2$ **IV** gives 33% of **VIII**, **V** 30% of the 2,4′-isomer of **XI**, **VI** 54% of **XI** and **VII** 69% of **XII**; **IX** gives 38.8% of *1-nitro-4-phenylnaphthalene*, yellow, m. 151°; **IX** in C_6H_6 gives 17.3% of α-$C_{10}H_7Ph$ and **X** in C_6H_6 or $PhNO_2$ gives mixts. of azo compds. With fused AcONa and Ac_2O in C_6H_6 **IV** gives 46.6% Ph_2, **VI** 55.6% of **VIA**, (in $PhNO_2$ 54% of **XI**), **VII** 57.4% of **VIII**, **IX** 30.3% α-$C_{10}H_7Ph$ and **IX** in $PhNO_2$ or **X** in C_6H_6 give mixts. contg. azo compds. Using $ZnCl_2$ as the stabilizer **IV** gives 17.6% Ph_2, **VII** gives 37.2% **VIII**, *p*-$ClC_6H_4N_2Cl$ gives 34.2%

4-ClC$_6$H$_4$Ph and p-MeOC$_6$H$_4$N$_2$X gives 26.5% 4-MeOC$_6$H$_4$Ph. Decompn. of p-O$_2$NC$_6$H$_4$N$_2$X with 30% EtOH-KOH or with fused AcONa and Ac$_2$O gives with the use of I 25.1 and 50.4% VIII, with II 39.6 and 70.2% and with ZnCl$_2$ 16.4 and 26.3%. IV in PhMe with AcONa and Ac$_2$O gives no biaryl but with Na$_2$CO$_3$ it yields a small quantity of 4-MeC$_6$H$_4$Ph. C. J. West 1

Chemistry of β-arylglutaconic acids. V. α,γ-C-Diacetylation of β-arylglutaconic anhydrides. Synthesis of biphenyl derivatives. G. R. Gogte. *J. Univ. Bombay* **8**, Pt. 3, 208–19(1939); cf. *C. A.* **33**, 5389[3].—In earlier work it was found that α-*C*-acetyl-β-arylglutaconic anhydrides (I) could be further acetylated, giving products which were considered to be neutral *O*-Ac derivs. These more highly acetylated compds. (II) titrated as strong monobasic acids and gave pronounced colors with FeCl$_3$. It is proved in the present paper that II are α,γ-*C*-diacetyl-β-arylglutaconic anhydrides. α-Aceto-β-(4-methoxyphenyl)glutaconic anhydride (III), m. 132°, gives on further acetylation *α,γ-diaceto-β-(4-methoxyphenyl)glutaconic anhydride* (IV), m. 108°. IV is also obtained by direct acetylation of β-(4-methoxyphenyl)glutaconic acid. IV gives a violet color with FeCl$_3$ and an insol. *Na salt*. Its *PhNH$_3$ salt* m. 144° and gives a blue color with FeCl$_3$; it dissolves in cold Na$_2$CO$_3$ soln. and decomps. immediately to PhNH$_2$ and IV. When steam-distd. with dil. HCl, IV gives β-(4-methoxyphenyl)propylene, and, when refluxed with concd. HCl, a *lactone*, m. 112°. In these reactions 1 AcO group is removed with the formation of III. When 5 g. IV is heated with 50 cc. 10% NaOH soln. for 15 min. and acidified, a ppt. seps. after 2 hrs. This is treated with 10% Na$_2$CO$_3$ soln. from which, on cooling, *4'-methoxy-5-methyl-3-hydroxybiphenyl* (V), m. 118°, seps. Its *Bz deriv.* m. 120°. From the Na$_2$CO$_3$ soln. on acidification *4'-methoxy-5-methyl-3-hydroxybiphenyl-2-carboxylic acid* (VI), m. 182° (decompn.), is obtained. On refluxing with dil. HCl for 3 hrs. it is converted into V. V is also obtained by oxidation of 3-methyl-5-(*p*-methoxyphenyl)-2-cyclohexen-1-one with FeCl$_3$ according to Rabe and Pollock (*C. A.* **7**, 999); this fixes the constitution of V. When VI is heated at 200° and 40 mm. a compd. (VII), m. 119°, is formed which gives a green color with FeCl$_3$ and on refluxing with 10% NaOH dissolves and is converted into V and VI. VII therefore is an ester 2 3 4 5 6



(R = p-MeOC$_6$H$_4$), of VI and V.

Acetylation of β-(2-methoxy-5-methylphenyl)glutaconic anhydride gives *α,β-diaceto-β-(2-methoxy-5-methylphenyl) glutaconic anhydride* (VIII), m. 168°. It gives a violet color with FeCl$_3$ and on refluxing with concd. HCl for 3 hrs. 2-methoxy-5-methyl-β-acetonylcinnamic acid, m. 101°, is formed. When VIII is refluxed with 10% NaOH *2'-methoxy-5,5'-dimethyl-3-hydroxybiphenyl* (IX), m. 85°, is formed. Its *Ac deriv.* b$_6$ 181–5°. In addn. to this, *2'-methoxy-5,5'-dimethyl-3-hydroxybiphenyl-2-carboxylic acid* (X), m. 213° (decompn.), and *2'-methoxy-3,5'-dimethyl-5-hydroxybiphenyl-2-carboxylic acid* (XI), m. 192° (decompn.), are formed. X gives an *Ac deriv.*, m. 161°, and on thermal decompn. at 200° and 35 mm., IX and an *ester* corresponding to VII, m. 127°. This ester is decompd. by alkali into X and IX. XI gives a deep violet color with FeCl$_3$ and loses CO$_2$ on refluxing with mineral acids, giving IX. When X is dissolved in concd. H$_2$SO$_4$ and kept at 70° for 1 hr. *3,8-dimethyl-5-methoxy-3-hydroxyfluorenone* (XII), m. 168°, is formed in addn. to the lactone (XIII) of X, m. 194°. When XIII is refluxed with 20% NaOH and the alkali soln. treated with an excess of Me$_2$SO$_4$ at 100° and acidified, X is formed. The *Ac deriv.* of XIII m. 163°, the *Ac deriv.* of XII m. 191°. When XI is treated with H$_2$SO$_4$, *1,8-dimethyl-5-methoxy-3-hydroxyfluorenone*, m. 264°, is formed; its *Ac deriv.* m. 172°. Acetylation of β-(4-methoxy-3-methylphenyl)glutaconic acid with Ac$_2$O and AcONa gives the *α,γ-C-diacetylated* deriv. (XIV), m. 158° (decompn.), which gives a violet color with FeCl$_3$ and dissolves in cold dil. alkali. When XIV is treated with 10% NaOH, *3',5-dimethyl-4'-methoxy-3-hydroxybiphenyl* (XV), m. 69°, and *3',5-dimethyl-4'-methoxy-3-hydroxybiphenyl-2-carboxylic acid* (XVI), m. 172° (decompn.), are formed. Decarboxylation of XVI by mineral acids or heat gives XV, and its *ester* with XV m. 108°. F. E. Brauns 7 8 9

Formation of ketyls by the action of potassium on benzopinacol. Tudor John and Sydney T. Bowden. *J. Chem. Soc.* **1940**, 251–2.—Benzopinacol (I) (5.3 g.) in xylene, treated under N with K, gives the blue ketyl; on heating to the m. p. of the metal there is a vigorous evolution of H and the soln. changes in color from green to blue; K benzohydryloxide (II) is pptd. and if the soln. is cooled the color sequence is reversed; hydrolysis gives 4.2 g. benzohydrol (III) and 0.2 g. of Ph$_2$CO (IV). An equimol. mixt. of 2.7 g. III and 2.6 g. IV behaves in similar manner with K and the products of hydrolysis are 4.6 g. III and 0.2 g. IV. K reacts slowly with IV and only 30% of the metal forms the ketyl after boiling 5 hrs. The hydroxyl H of I is directly replaced by metal with the formation of mono- and di-K derivs.; the latter suffers partial dissocn. to the unimol. ketyl and is then reduced to II. I reacts almost instantly in the cold with Ph$_3$COK to form the ketyl system and Ph$_3$COH. C. J. West

Free radicals and radical stability. VII. The influence of the phenoxy group on the stability of ketylic derivatives. The preparation of carbon monoxide from carbonates. Sydney T. Bowden and Tudor John. *J. Chem. Soc.* **1940**, 213–16; cf. *C. A.* **33**, 3364[5].—CO is evolved when Ph$_2$CO$_3$ is treated with metallic Na. The only other product is PhONa and the over-all reaction may be represented as Ph$_2$CO$_3$ + 2Na = 2PhONa + CO. The gas is 100% pure and since it is formed in a system contg. free Na, it does not explode when sparked with dry O. The reaction thus furnishes a convenient and rapid method of prepg. CO in a sufficiently dry condition for demonstrating the catalytic effect of moisture on combustion. The mechanism of the reaction is briefly discussed. The absence of color in the reaction mixt. and the fact that a similar reaction occurs with aliphatic derivs. such as Et$_2$CO$_3$ would seem to point to simple scission of the carbonate. If, however, the reaction actually involves the ketyl mechanism, as found in the case of other esters, then the ketyl system formed from the carbonate must either be colorless or suffer rapid transformation into a colorless intermediate which subsequently eliminates Na alkoxide or aryloxide. The formation of Na triphenylmethoxide through the condensation of Et$_2$CO$_3$ and PhCl in the presence of Na is readily explained on the basis of the ketyl mechanism. C. J. West 10

Enediols. III. 1,2-Dimesitylacetylene glycol. Reynold C. Fuson, C. H. McKeever and Joseph Corse. *J. Am. Chem. Soc.* **62**, 600–2(1940); cf. *C. A.* **33**, 7756[2].—Exptl. details are given of the work reported in *C. A.* **33**, 4228[9]. (2,4,6-Me$_3$C$_6$H$_2$C(OH):)$_2$ (I) is prepd. in 35% yield by the action of Mg + MgI$_2$ upon 2,4,6-Me$_3$C$_6$H$_2$COCl or in 60% yield with mesitil; hydrogenation of mesitil gives 85–95% of I. Refluxing 1.3 g. of I and 6 cc. MeOH-HCl for 45 min. gives 1.2 g. of mesitoin (*acetate* (II), m. 106–7°). I and Ac$_2$O, refluxed for 3 hrs., give the *di-Ac deriv.*, one of which is insol. in MeOH (III), m. 218°; the other (IV), m. 164–5°, crystallizes from the MeOH at room temp.; other products are II and mesitil; the I obtained by reduction of mesitil gives 20–30% of III and a trace or none of IV, a good yield of II and a small amt. of mesitil; if mesitil is reduced in Ac$_2$O 90% of IV is obtained; I and AcCl give 70–80% of II. I and BzCl in C$_5$H$_5$N give the di-Bz deriv., m. 188.5–9.5° (V); a 2nd di-Bz deriv. could not be found; the I prepd. by catalytic reduction in MeOH yields the di-Bz deriv. m. 235° and V. C. J. West 11

A *p,p'*-biradical of biphenyl of the triphenylmethyl type. I. Walter Theilacker and Werner Ozegowski. *Ber.* **73B**, 33–43(1940).—It has been found (*Angew. Chem.* **52**, 373(1939)) in the study of substituted benzidines that N-

contg. derivs. of diphenoquinone, O:C_6H_4:C_6H_4:O (I), are not formed when there are substituents in the *o*-positions to the central union between the benzene rings; apparently the coplanar position of the 2 rings is disturbed by the spatial influence of the substituents so that a planar arrangement of the substituents about a C:C bond between the rings is impossible and the double bond is not formed. To prevent the formation of the I grouping all 4 of the *o*-positions to the central union need not be substituted; 2 relatively small substituents (e. g., Me) suffice. As the 2,2'-derivs. are readily available, they afford a simple means of investigating chemically a no. of problems involving the question of quinoid and nonquinoid structure. The Chichibabin hydrocarbons (II) (*C. A.* 1, 2103), for which a quinoid formulation, Ph_2C:C_6H_4:C_6H_4:CPh_2, is possible, has, because of its sensitivity to O, often been considered to be a biradical, $Ph_2CC_6H_4$-$C_6H_4CPh_2$, but its quinoid structure has been established by magnetic and electron-affinity studies (Müller and Müller-Rodloff, *C. A.* 29, 5320[6]; Bent and Gould, *C. A.* 29, 6234[8]). If substituents are introduced into II in the *o*-positions to the central union, the quinoid structure becomes impossible and it should be possible to isolate the true biradical. To secure the most exact possible comparison of the phys. and chem. properties of the expected biradical with those of II, the 2,2'-di-Me compd. was chosen because the introduction of a Me group into the nucleus of an aromatic compd. hardly alters the properties of the latter. *m*-Tolidine was converted by the Sandmeyer reaction into *2,2'-dimethyl-4,4'-dicyanobiphenyl* (21% yield), b_2 176°, m. 113°, which was hydrolyzed with boiling H_2SO_4 (3 vols. concd. acid +2 vols. water) to the *dicarboxylic acid* (94% yield), m. 326°. The *di-Et ester* (III) (79% from the acid with alc. and dry HCl), b_2 220°, m. 70°, with 8 mols. of PhMgBr gave 96% of *2,2'-dimethyl-4,4'-bis(diphenylhydroxymethyl)biphenyl* (IV). The purification of IV offered some difficulty and was best effected through the *di-Et ether* (V) (82%, based on III, from IV with hot 6% alc. HCl), m. 199 200°. IV forms a 1:1 *AcOH compd.*, m. 121° on rapid heating, resolidifies and m. again 173°, and a 2:1 *AcOEt compd.*, m. 136°, resolidifies and m. again 172°. Like [*p*-Ph_2C-(OH)C_6H_4]$_2$, IV shows with $SnCl_4$, $SbCl_5$ and $ZnCl_2$ the typical halochromic phenomena of triarylmethanols. IV and V with HCl in AcOH readily form the *dichloride* (VII), m. 210°, which, when shaken in benzene under CO_2 with Hg at room temp., reacts readily with the metal, and filtration gives a deep red-brown soln. with the characteristic properties of radical solns. Addn. of much petr. ether ppts. a greenish yellow product which is washed with petr. ether, dried at about 50° in air-free CO_2 and repeatedly repptd. from benzene with petr. ether. The *2,2'-dimethyl-4,4'-bis(diphenylmethyl)biphenyl* (VIII) thus obtained forms not a colorless but a faintly yellowish green powder, m. 176–8° to viscous red-brown droplets which begin to flow only above 200°. It becomes strongly electrified on rubbing and shows striking colors in soln. A very dil. (0.01%) soln. in benzene is bluish green, changing with increasing concn. to yellow-green and then becoming dichroic (green in transmitted, red-brown in incident light) and finally (at about 5% concn.) deep brown-red. In benzene-ligroin (1:5), in which it is but little sol., very dil. solns. are dichroic (green with reddish shimmer, brownish lilac). All solns. are sensitive to light and show brown-yellow fluorescence in ultraviolet light. Even to the naked eye dil. solns. of VIII (green) appear markedly different from the violet solns. of II. The spectroscope brings out these differences even more distinctly; VIII shows a relatively narrow band in the yellow and then absorbs from the blue-green toward the shorter wave lengths, while II shows only a broad band extending from the orange-red to the blue. The corresponding glycols in concd. H_2SO_4, on the other hand, show an extraordinary similarity. The magnetic method not being available for obtaining decisive confirmation of the radical nature of VIII, other means were resorted to. 1 VIII, both in soln. and in the solid state, is exceedingly sensitive to O. In the air the faintly yellow-green VIII instantly changes to a faint yellow (peroxide formation). When air is passed through the deep red-brown benzene soln. (about 5%) a short time, the soln. becomes light yellow but red-brown streamers appear rapidly and the soln. again becomes red-brown; the expt. can be repeated 8–10 times until the radical is completely oxidized. The 2 adsorption band in the yellow changes correspondingly; it disappears when the soln. becomes light yellow and reappears as the brown color is restored. The *peroxide* is an amorphous, very faintly yellow powder, softens 152–3°, decompg. on further heating, sol. in benzene with light yellow color. The same conclusions as to the radical nature of VIII can be drawn from the behavior of its solns. on heating and cooling. The properties of VIII agree closely with those of the analogous biradical 3 with 4 Cl atoms in the *o*-positions described by Müller and Neuhoff (*Ber.* 72B, 2063 (1939)), but T. and O. interpret the exptl. data differently. The assocn. of triarylmethyls occurs most simply by dimerization, whereby 2 of the radicals mutually sat. each other's free valences to form a hexaarylethane. In a biradical the mutual satn. of the free valences may be intramol. or, if this is not possible because of spatial effects, intermol., involving several mols. If the Ph_2 mol. is assumed to be 4 rigidly linear, assocn. of 2 mols. VIII to a cyclic dimer would require a 20° distortion of each of the 2 free valences or of the central union between the 2 benzene rings. The smallest strainless ring which could be formed from such radicals would be one made up of 3 radicals. It is a quite general fact, however, that the formation of such multimembered rings is never quant.; there are always formed polymeric compds., which may become the main 5 products if the reaction is not effected in extremely dil. soln. This is also undoubtedly the case with VIII. Since its assocn. increases with increasing concn. but there is still a radical equil. in the more concd. solns. it is highly probable that even if cyclic systems are formed in very dil. soln. they change with increasing concn., by chain-like combination, into polymers which are still radicals in that they have free valences at the ends of the chains. The conditions are much more complex than in the case of 6 simple radicals of the triarylmethyl series and the content of monomeric radical can no longer be detd. by mol. wt. detns., magnetic measurements, etc. C. A. R.

Tetraarylmethanes and their decomposition by the action of a liquid alloy of potassium and sodium. P. P. Shorygin and I. V. Machinskaya. *J. Gen. Chem.* (U. S. S. R.) 9, 1546–58 (1939).—The generally accepted explanation of the existence of free Ph_3C is that the affinities of the 7 central C atom are exhausted by the 3 Ph groups to such an extent that it is incapable of forming $(Ph_3C)_2$. Huckel (*Theoretische Grundlagen der org. Chemie*, 2, p. 312, *C. A.* 25, 3357) refutes this theory because it does not make clear the ability of greatly weakened C valency in Ph_3C to combine with an addnl. Ph group to form the stable Ph_4C, b. 413° without decompn. Sh. and M. do not see a contradiction in this with the instability of $(Ph_3C)_2$ and its dissocn. into Ph_3C, because the aggregate valency of the 8 central C atom in Ph_4C is distributed uniformly between the like Ph groups and therefore the sym. hydrocarbon does not tend to dissoc. into the radicals Ph_3C and Ph. Hence it could be postulated that derivs. of Ph_4C in which the sym. structure is disturbed would tend to dissoc. This could be possibly demonstrated by comparing the relative stability to dissocn. or cleavage of Ph_4C and its asym. derivs., such as *p*-benzohydryltetraphenylmethane, $Ph_2CHC_6H_4CPh_3$ (I). Ph_4C and I failed to dissoc. on boiling 9 in EtOBz and tetralin (cf. Schlenk and Herzenstein, *C. A.* 5, 1104). I is also stable to the action of Na in liquid NH_3 (cf. *C. A.* 31, 5777[8]). A complete cleavage was effected by the method of Ziegler and Thielmann (*C. A.* 18, 252) by mech. shaking of I and Ph_4C in ether with K-Na in a N atm. for 34–100 hrs. Among the decompn. products of I were identified 2-benzylcyclohexene (II), b. 235–40°, probably a mixt. with the 3-isomer, and a new compd., *dihydrotetraphenylmethane*, $Ph_3CC_6H_7$, m.

168.5–9.5°. Ph_4C gave **II**, Ph_3CH_3, Ph_3CH and a few drops of C_6H_6, contg. probably some dihydrobenzene. The probable scheme of the complex reaction is tautomerization of Ph_4C and I with the addn. of K at the double bonds and cleavage of the hydrocarbon chains (cf. Shorygin, *C. A.* **21**, 579). 40 references. Chas. Blanc

The isomeric *p,p'*-dihydroxy-3,4-diphenyl-*n*-hexenes. F. Wessely and A. Kleedorfer. *Naturwissenschaften* **27**, 567–8(1939).—In the course of work on the products of dehydration of 3,4-dianisyl-3-hexanol there were prepd. 2 isomeric compds. of the constitution *p,p'*-$ROC_6H_4C(:CHMe)CHEtC_6H_4OR$. For the 2 isomers the consts. are, with R=H, m. 153° and 143.5°; with R=Ac, no m. p. (oily) and 74°; with R=Bz, m. 126° and 184°; with R=Me, m. 50° and oily. Both isomeric di-Me ethers (R=Me) are converted with I to the diethylstilbestrol di-Me ether, m. 127°. Catalytic hydrogenation (Pd) converts both compds. to 3,4-dianisylhexane, m. 146°, in 50–60% yield. The estrogenic activity of the HO compd. m. 143.5° is 100% estrus with 1000-γ dose; for that m. 153°, 100% for 2.5-γ dose. For the 2 isomeric *p,p'-dihydroxy-3,4-diphenylhexanes* the activity is 100-γ dose for the one m. 130°, 2-γ dose for the one m. 186° to give 100% estrus. B. J. C. van der Hoeven

Oximes of 4,4'-dinitrobenzil. Wanda Brydówna. *Roczniki Chem.* **18**, 396–403(1938).—$(p\text{-}NO_2C_6H_4CO)_2$ (I) heated with $NH_2OH.HCl$ and NaOAc in MeOH yields *α-4,4'-dinitrobenzilmonoxime* (II), m. 193–4° (decompn.) (*Cu*^{II}, *Co*^{II}, *Fe*^{II} *salts*), the *Ac deriv.*, m. 139–40°, of which with 1% NaOH yields *p*-$NO_2C_6H_4CN$ (III) and *p*-$NO_2C_6H_4CO_2H$ (IV). A mixt. of the *α*- and *β-monoxime* (V), m. 164–6° (*Ac deriv.*, m. 157–8°), is obtained from I and $NH_2OH.HCl$ in boiling EtOH. V is instantaneously converted by 1% NaOH into III and IV, and by heating at 165° into II. By the Beckmann rearrangement V yields *p-nitrobenzoylform-p'-nitroanilide*, *p*-$NO_2C_6H_4COCONHC_6H_4NO_2$-*p'*, m. 142–7° (*dioxime*, m. 251–3°), readily decomp. to yield IV and *p*-$NO_2C_6H_4NH_2$. II with PCl_5 in ether gives III, IV, and $(p\text{-}NO_2C_6H_4CO)_2NH$. I and excess of $NH_2OH.HCl$ with NaOAc in boiling EtOH (20 hrs.) afford the *α*-dioxime, m. 268–70° (decompn.) (*Ni*^{II}, *Co*^{II}, *Fe*^{II} *salts*); the *β-dioxime*, m. 245–6°, obtained similarly in absence of NaOAc, gives $(p\text{-}NO_2C_6H_4NHCO)_2$ by the Beckmann rearrangement. B. C. P. A.

Dicinnamoylmethane series. I. Synthesis of three isomeric dinitro derivatives. W. Lampe and Z. Maciorewicz. *Roczniki Chem.* **18**, 668–79(1938).—PhCH:CHCO$CHNaCO_2Et$ and *o*-$NO_2C_6H_4CH:CHCOCl$ (I) are condensed, and the product is heated to yield *Et o-nitrodicinnamoylacetate* (II), m. 119–20°, converted by autoclaving into *o-nitrodicinnamoylmethane*, m. 156.5–7.5°, and by heating with 60% AcOH into *Et o-nitrocinnamoylacetate*, m. 70°, an ether soln. of which with I and MgMeI yields *Et di-o-nitrocinnamoylacetate*, m. 181°, autoclaved as above, to yield *di-o-nitrocinnamoylmethane*, m. 210°. $CHNaAcCO_2Et$ (III) and *m*-$NO_2C_6H_4CH:CHCOCl$ give *Et m-nitrocinnamoylacetoacetate*, m. 116°, converted by hot AcOH into *Et m-nitrocinnamoylacetate*, m. 88–9°, from which *Et di-m-nitrocinnamoylacetate*, m. 208°, and *3,3'-di-m-nitrocinnamoylmethane* are prepd. as above. *Et p-nitrocinnamoylacetoacetate*, m. 118° [from III and *p*-$NO_2C_6H_4CH:CHCOCl$], autoclaved with H_2O yields *p-nitrocinnamoylacetone*, m. 154–5° (decompn.). *Et p-nitrodicinnamoylacetate*, m. 188.5–9.5°, is prepd. analogously to II, and similarly yields *p-nitrodicinnamoylmethane*, m. 185°, *Et p-nitrocinnamoylacetate*, m. 110–11° (decompn.), *Et p-dinitrocinnamoylacetate*, m. 196° (decompn.), and *di-p-nitrocinnamoylmethane*, m. 254–6°. 5-Nitrosalicylaldehyde and $CH_3(CO_2Et)_2$ in the presence of piperidine (90 min. at 100°) give *Et 6-nitrocoumarin-3-carboxylate*, m. 198–9.5°, hydrolyzed (10% NaOH) to the *acid*, m. 234.5°, the *chloride*, m. 171–2°, of which with cinnamoylacetone yields *6-nitro-3-cinnamoylacetylcoumarin*, m. 264–5° (decompn.). B. C. P. A.

Synthesis of hydroxy derivatives of dicinnamoylmethane. M. Trenknerówna. *Roczniki Chem.* **18**, 830–9 (1938).—Et *o*-carbomethoxyoxycinnamoylacetoacetate with boiling aq. AcOH yields *Et o-carbomethoxyoxycinnamoylacetate*, the *Cu salt*, m. 209°, of which with Mg-EtBr and *o*-carbomethoxyoxycinnamoyl chloride gives *Et di-o-carbomethoxyoxycinnamoylacetate*, m. 130–2°; this is autoclaved, to yield *di-o-carbomethoxyoxycinnamoylmethane*, m. 123–5°, hydrolyzed ($NaOH\text{-}COMe_2$) to *di-o-hydroxycinnamoylmethane*, m. 170°. *o-Hydroxy-*, m. 165–70° (decompn.), and *2,4,2',4'-tetrahydroxydicinnamoylmethane*, decompn. 123–5°, were prepd. analogously. The following intermediates were obtained: *Et 2-carbomethoxy-*, m. 121–3°, and *2,4,2',4'-tetracarbomethoxyoxydicinnamoylacetate*, m. 155°, *Et 2,4-dicarbomethoxyoxycinnamoylacetate*, m. 74° (*Cu salt*, m. 190°), and *2,4,2',4'-tetracarbomethoxyoxydicinnamoylmethane*, m. 147°. B. C. P. A.

α-Vinylnaphthalene. M. M. Koton. *J. Gen. Chem.* (U. S. S. R.) **9**, 1626–30(1939).—1-$C_{10}H_7CH:CH_2$ was prepd. by the method of Shoruigin and Shoruigina (*C. A.* **29**, 6885[6]) and polymerized without a catalyst at 50–250° for 48–408 hrs. and at 15–20° for 30–90 days. In their dielec. strength the polymers are comparable to styrene polymers, but are inferior in mech. strength. C. Blanc

Replacement of the diazo group by hydrogen. Herbert H. Hodgson and Ewart Marsden. *J. Chem. Soc.* 1940, 207–8.—Stabilized diazotized amines are prepd. by diazotizing 0.1 g.-mol. of the amine in HCl or H_2SO_4, the total vol. being kept at the min. and the soln. (filtered if necessary) is stirred into a paste of 0.1 g.-mol. of 1,5-$C_{10}H_6(SO_3H)_2$ in 60 cc. H_2O; the stabilized diazonium salt, which ppts. in about 30 min., is filtered and dried at 30–40° (yield usually exceeds 90%); a 2nd method consists in treating the diazotized amine with AcONa to remove the mineral acid and stirring the soln. into a paste of 0.1 g.-mol. of 2, 1-$HOC_{10}H_6SO_3H$; these products are often colored by a small quantity of dye but even when somewhat tarry they can be used in the deamination process. These stabilized diazotized amines are decompd. by suspending 20 g. of the dry salt in 80 cc. EtOH and gradually treating at room temp. with Zn dust (about 30 g.) until the initial vigorous evolution of N subsides; the yields in all cases are almost theoretical; with Zn and Me_2CO the yields are about 5% less. The action of Cu powder in EtOH is more sluggish than that of Zn and a temp. of 30–5° is necessary. MeOH, Et_2O, $PhNO_2$, C_6H_6, $CHCl_3$ and CCl_4 may also be used; the reaction is sluggish in the last 3 solvents and boiling is necessary for efficient decompn. Several amines have been tested by this method. The decompn. appears to be a simple exchange of the H from 1 of the SO_3H groups via the agency of the metal, since no AcOH could be detected when EtOH was used. The action of EtOH alone on the stabilized salt of α-$C_{10}H_7N_2X$ was to produce $C_{10}H_8$, AcH and a tar contg. α-$C_{10}H_7OEt$. C. J. West

The mechanism of catalytic phenylation and its inhibition by iron. Herbert H. Hodgson and Ewart Marsden. *J. Soc. Chem. Ind.* **58**, 290–2(1939); cf. *C. A.* **33**, 6826[8].—The phenylation of α-naphthylamine by $PhNH_2$ was carried out in the usual way, using various acids as catalysts. With HI as a catalyst, the yield was 94%; with H_2SO_4, 43%; and with HCl, 30%. With peri acid and $PhNH_2$, HI gave a yield of 83%, HCl 83%, and H_2SO_4 86%. These yields were reduced by decompn. of peri acid during the course of the reaction. Since the reaction is unimol., both in the presence and absence of catalysts, it seems that the velocity-detg. step is the decompn. of an intermediate; e. g., $C_{10}H_7NH_2.PhNH_2.HI \rightarrow C_{10}H_7NHPh + NH_3 + HI$. In the presence of dry Fe filings, no α-$C_{10}H_7NHPh$ is formed; likewise, none when the reactants were heated in an iron vessel with a polished interior. However, if the container was allowed to rust, good yields were obtained. The phenylation of peri acid also proceeded better in the presence of rust. Ordinary FeI_2, contg. more or less water of hydration, is an efficient catalyst, while anhyd. FeI_2 is inactive. J. H. Reedy

Octahydrodinaphthyline and octahydronaphthidine. G. D. Parker and G. N. Walton. *J. Chem. Soc.* 1940, 201–2.—Azonaphthalene (4 g.), suspended in a boiling soln. of 8.5 g. of KOH in 800 cc. MeOH, is reduced with Zn dust

(2 hrs. boiling); the boiling soln. was rapidly decanted into a mixt. of 95 cc. concd. HCl and 100 cc. H_2O, kept for 24 hrs. in a tightly corked flask and then poured into 4 l. H_2O; the colorless filtrate on neutralization with concd. KOH gives 3.2 g. of a mixt. of dinaphthyline (I) and naphthidine (II); this is sepd. by soln. in 50 cc. of 3% HCl at 70–80° in a N atm. and addn. of 50 cc. concd. HCl, giving 1.2 g. of II (as HCl salt); neutralization of the filtrate gives 1.8 g. I. Reduction of 1 g. of I in boiling AmOH with Na gives 0.53 g. of *ar-octahydro deriv.* (III), m. 213°; it is stable when dry but is oxidized slowly in moist air or in EtOH; III does not form a cryst. HCl salt. The yellow tetrazotized soln. yields a bright red azo compd. with alk. β-$C_{10}H_7OH$. III does not form an Ac or a Bz deriv.; the *bisphenylurethan* m. 168°. II yields an *ar-octahydro deriv.*, m. 50°; *di-Ac deriv.*, m. 317°. III in suspension in aq. EtOH (soln. in EtOH and pptn. with H_2O) with Me_2SO_4 and anhyd. K_2CO_3 gives the *tetra-Me deriv.* (IV), m. 154°. I yields a *tetra-Me deriv.* (V), m. 212°, which is reduced by Na in AmOH to IV. The tetra-Me deriv. of II could not be crystd.; MeI gives *hexamethylnaphthidineammonium diiodide*, m. 220° (decompn.). Neither IV nor V forms quaternary derivs. This work was intended as the 1st stage of an investigation of the effect of condensed rings on the resolvability and ease of racemization of certain biphenyl derivs.; it is now proposed to use a different series of substances for the investigation. C. J. West

Synthesis of substituted α-naphthoquinones. C. F. Koelsch and D. J. Byers. *J. Am. Chem. Soc.* **62**, 560–2 (1940).—*o*-$C_6H_4(CO_2Et)_2$ and Na at 115°, treated with $PrCO_2Et$ and heated 4 hrs., give 32% of 2-ethylindan-1,3-dione (I), b_7 135–40°, m. 53–5°; the Me (31%), Pr (17%) and Bu analogs (18%) were also prepd. Boiling 13.6 g. of I, 4,4 g. of KOH and 13 g. $BrCH_2CO_2Et$ in EtOH for 2.5 hrs. gives 68% of *Et 2-ethylindandionyl-2-acetate* (II), m. 77–8.5°; the *2-Me analog* (62%), m. 91–2° (Gheorgin, *C. A.* **31**, 391[1], gives a m. p. of 161–2°, possibility of a hydrolysis product); the 2-Pr and 2-Bu analogs are oils which were not purified. II (13.8 g.) in EtONa in EtOH in H atm., boiled 2 hrs. and acidified, gives 68% of *2-ethyl - 3 - carbethoxy - 1,4 - naphthohydroquinone* (III), m. 110.5–11°; the *2-Me* (62%), *2-Pr* (14%) and *2-Bu analogs* (24%) m. 100–1°, 125–6.5° and 98.5–100°, resp. Oxidation of III with CrO_3 in cold AcOH gives 88% of the yellow *2-ethyl-3-carbethoxy-1,4-naphthoquinone* (IV), m. 47.5–8°; the *2-Me analog* (92%) m. 99–100°. Alk. hydrolysis (1% NaOH) of IV gives 36% of *2-ethyl-3-hydroxy-1,4-naphthoquinone*, yellow, m. 137.5–8.5°; the Bu analog (55%) m. 100–1°. Heating IV with 5% NaOH for 2 hrs. in H atm. gives 77% of 2-ethylnaphthoquinone, yellow, m. 87–8°. This appears to be a general method for the prepn. of 1,4-naphthoquinones and hydroquinones which contain a hydrocarbon residue in position 2 and bear a H, a HO or a CO_2Et group in position 3. C. J. West

Reaction between dihydroanthracene and benzoquinone. E. I. Prokopets and A. V. Pavlenko. *J. Gen. Chem.* (U. S. S. R.) **9**, 1468–9 (1939).—Fries, Schilling and Littmann (*C. A.* **26**, 5944) proposed a method for the detn. of anthracene (I) in the presence of dihydroanthracene (II) in xylene based on the quant. sepn. of I by benzoquinone (III) as the insol. anthracenebenzoquinone (IV) and the inability of II to react with III (cf. Clar, *C. A.* **25**, 5159). It was found that the method is impractical because of the following reactions: (1) III is reduced by II to hydroquinone which reacts with excess III to form quinhydrone; (2) I, formed in the oxidation of II, reacts with III to give IV; (3) quinhydrone, forming an equil. system with III and hydroquinone, is decompd. by I with the formation of IV and hydroquinone. Chas. Blanc

New route to 9-alkyl- and 9-arylanthracenes. Charles K. Bradsher. *J. Am. Chem. Soc.* **62**, 486–8 (1940).—*o*-$NCC_6H_4CH_2Ph$ (I) was prepd. in 30–50% yields by the method of Bergmann (*C. A.* **33**, 4225[7]) and in 54% yield by heating *o*-$ClC_6H_4CH_2Ph$ with CuCN at 250° for 23 hrs. I and MeMgI in C_6H_5-Et$_2$O, refluxed overnight, give 72% of *o-benzylacetophenone* (II), b_5 167°, m. 49–50°. Refluxing 2 g. II, 20 cc. AcOH and 20 cc. 34% HBr for 4 days gives 80% of 9-methylanthracene, yellow, m. 80–1°. I and EtMgBr give 73% of *o-benzylpropiophenone*, yellow oil, b_5 156 (*phenylhydrazone*, m. 97–8°, decomps. on standing 2 days); heating with HBr in AcOH gives 69% of 9-ethylanthracene, yellow, m. 58–9°. I and PhMgBr give 82% of *o*-benzylbenzophenone, m. 50–2°; HBr in AcOH yields 75% of 9-phenylanthracene, fluorescent plates, m. 154–5°. The theory is presented that the cyclization involved is one characteristic of the β-(β-styryl)vinyl alc. system, PhC:CC:COH. This explains the slow rate at which the anthracene hydrocarbons are formed, since it would not be expected that *o*-benzylphenyl ketones would exist in the enolic form to any great extent. C. J. West

Photooxidizability of 1,2-cyclo-substituted diphenylanthracenes. Léon Velluz. *Bull. soc. chim.* **6**, 1541–8 (1939).—The heating of the photooxide of diphenylanthracene (I) liberates at least 95% of the O contained, whereas thermal decompn. of the photooxides of the diphenylnaphthacenes (II) takes place without liberation of O. A study has been made of the 1,2-cyclo-substituted diphenylanthracenes, 9,10-diphenyl-1,2-benzanthracene (III) and 9,10-diphenyl-1,2-tetrahydrobenzanthracene (IV), in which the meso summits belong partially to a benzanthracenic and partially to a benzophenanthrenic system. Cyclization of *o*-tetrahydronaphthoylbenzoic acid with H_2SO_4 contg. 25% of SO_3 gave a mixt. of 1,2- and 2,3-tetrahydrobenzanthraquinones, sepd. by crystn. from benzene and petr. ether, hot and cold ligroin, ether and benzene, yielding yellow needles of 1,2-tetrahydrobenzanthraquinone (V), m. 136°. Treatment of V with 5 parts of PhMgBr in cold benzene gave 40% of the glycol, *9,10 - diphenyl - 9,10 - dihydro - 9,10 - dihydroxy - 1,2-tetrahydrobenzanthracene* (VI), $C_{30}H_{26}O_2$, m. 222°. VI (0.2 g.) in 10 cc. AcOH was treated with 0.2 g. KI and 0.50 g. NaH_2PO_2 and boiled for 15 mins. The yellow cryst. ppt. formed on cooling was washed with AcOH, H_2O and alc., yielding 80% of a mixt. of hydrocarbons, $C_{30}H_{24}$, of which 80% (assumed to be IV) m. 224° and 20% m. 298°. Both compds. have similar ultraviolet absorption spectra and both undergo complete photooxidation to reversible oxidation compds. similarly to all aryl anthracenes previously studied. Dehydrogenation of V by heating with PbO at 320–30° for 15–20 mins., extn. with boiling xylene and recrystn. from AcOH gave 30% of fine yellow needles of 1,2-benzanthraquinone, $C_{18}H_{10}O_2$, m. 169°, converted by the action of PhMgBr into 9,10-diphenyl-9,10-dihydroxy - 9,10 - dihydro - 1,2 - benzanthracene, $C_{30}H_{22}O_2$, m. 249°. Reduction with KI in AcOH gave 70% of III, m. 196°, giving 20% of a photooxide which liberated 57% of O on thermal decompn. at 130°. Thus this angular benzanthracene is intermediate in its reversible oxidizability between the naphthacenes and anthracenes. C. R. Addinall

3,3-Diphenyl-1-hydrindone and 3,3-diphenylindandione. Synthesis of triphenylmethane-2-(α-oxocarboxylic) acid. Paul E. Gagnon, R. Hudon, I. Cantin and J. Ganas. *Trans. Roy. Soc. Can.* III, **33**, 47–58 (1939).—Condensation of Ph_3COH with $CH_2(CO_2Et)_2$ in the presence of Ac_2O, with subsequent elimination of H_2O and CO_2, gave 3,3-diphenyl-1-hydrindone (I) (cf. Hellerman, *C. A.* 21, 2670). Oxidation of 5 g. I by heating for 10 hrs. with 9 g. $KMnO_4$ and 3.5 g. KOH in 400 cc. H_2O gave 4 g. diphenylphthalide (II), m. 115–17° (alc.). Oxidation of 10 g. I by heating with 300 cc. HNO_3 (d. 1.2) gave a mixt. (III), m. 130–50°, contg. II, *3,3-diphenyl-2,2-dinitro-1-hydrindone* (IV) and 3,3-diphenylindandione (V). Sepn. of IV was accomplished by dissolving the mixt. in anhyd. C_5H_5N and satg. with NH_3, resulting in the formation of canary-yellow crystals, $C_{21}H_{17}O_3N_3$ (VI), m. 170–1° (with liberation of NH_3). A constitution analogous to a hydrate, with the NH_3 group attached to the $-C(NO_2)_2$ group was ascribed to VI, since it is sol. in cold water, and since IV is readily regenerated from it by dissolving in HCl or Ac_2O, or by heating. When purified by regeneration from VI, IV m. 190–2° (decompn.). Heating III in AcOH or (better) heating without solvent under reduced pres-

sure at 160° converted the IV in the mixt. to V, m. 152–3°. The identity of V with the substance obtained by Schönberg and Michaelis (*C. A.* **31**, 4293[1]) was established by detg. the m. p. of a mixt. of the 2. Heating V with concd. KOH, followed by diln. and acidification gave *triphenylmethane-2-(α-oxocarboxylic) acid*, (*o*-$Ph_2CHC_6H_4COCO_2H$) (VII), m. 224–6°; *Me ester*, m. 93–4°; *Et ester*, m. 69–70°; *hydrazone*, m. 205°. Oxidation of VII in alk. soln. with H_2O_2 gave triphenylmethane-2-carboxylic acid, m. 155–7°. Attempts to prepare derivs. of V in which both carbonyl groups participated were not successful, but the following derivs. were prepd.: *dichloride*, m. 134–5°; *dibromide*, m. 110–15°; *oxime*, m. 100–1°; *hydrazone*, m. 163–4°; *phenylhydrazone*, m. 186–8°; *p-nitrophenylhydrazone*, m. 348–40°; *2-o-aminophenylene deriv.*, m. 241–2°. The carbonyl in position 1 was regarded as the reactive group, since the dibromide had a different m. p. than 3,3-diphenyl-2,2-dibromo-1-hydrindone. W. Gordon Rose

Dissociable organic oxides. Comparative oxidations of anthrahydroquinone and *meso*-dimethoxyanthracene. Influence of light. Charles Dufraisse and Robert Priou. *Bull. soc. chim.* **6**, 1649–56(1939).—The autoxidation of $C_6H_4[C(ONa)]_2C_6H_4$ (I) was studied in an all-glass app. in total darkness. Pure dry oxanthranol in a reaction flask contg. an open tube holding a slight excess of fused NaOH was treated with 25 cc. of distd. H_2O in a closed evacuated system which included a system for the introduction of a measured amt. of O. The reaction flask was covered with black paper and the remaining oxidation was carried out in a dark room. I was oxidized rapidly in total darkness and the oxidation was not increased by further illumination. The only product isolated was anthraquinone (II), without a trace of org. peroxide. The autoxidation of 9,10-dimethoxyanthracene (III) is extremely sensitive to light but does not take place in darkness. III was produced by treating 2.46 g. of *meso*-methoxyanthrone, m. 104–5°, in 245 cc. of 96% alc., at 70° in a H atm., with alternate addns. of 50% KOH and Me_2SO_4 until the addn. of alkali no longer produced a red color. Recrystn. of the product from benzene gave 60% of III, m. 202°. III (0.16 g.) in 400 cc. CS_2, distd. over Cu, was irradiated by sunlight with agitation in the air until the yellow color almost disappeared. The soln. was evapd. *in vacuo*, in total darkness, taken up in 50 cc. petr. ether, filtered and allowed to evap. in darkness, yielding 0.12 g. of *photoöxodimethoxyanthracene* (IV), $C_{16}H_{14}O_4$, m. 144–5° (decompn.), reduced quant. to II by KI in AcOH. Heating IV in the open gave an excellent yield of II. IV is extremely volatile but, in a sealed tube, the decompn. is complete at 180°, yielding only a small amt. of O and no CO_2, indicating a partial dissocn. of IV.
C. R. Addinall

A new method for the synthesis of amino carboxylic acids of the aromatic series. A. I. Kizber. *Compt. rend. acad. sci. U. R. S. S.* **24**, 440(1939)(in English).—Kolbe's reaction can be used to prep. 1- and 2-aminoanthraquinonecarboxylic acids, and 2-naphthylaminecarboxylic acid. S. Bradford Stone

β-Phenyl-β-(9-anthron-10-yl)propionic acids and their derivatives. Paul E. Gagnon and R. Hudon. *Trans. Roy. Soc. Canada* III, **33**, 37–46(1939).—The action of H_2SO_4 on β-phenyl-β-(9-anthron-10-yl)propionic acid (I), or of $AlCl_3$ on the acid chloride of I yields 3-(9-anthron-10-yl)-1-hydrindone whereas β-(3-nitrophenyl)-β-(9-anthron-10-yl)propionic acid (II), similarly treated, gave β-(3 - nitrophenyl) - β - (9 - hydroxy-9,10 - dihydro - 10-oxo-9-anthryl)propionic acid and the corresponding lactone (cf. *C. A.* **27**, 5321; Gravel, *C. A.* **28**, 169[6]; Vachon, *et al.*, *C. A.* **29**, 1087[8]; Kane, *C. A.* **29**, 3333[9]). Because of this difference in behavior, which was attributed to the presence of the nitro group, β-(4-nitrophenyl)-β-(9-anthron-10-yl)propionic acid was prepd. to compare its reactions with those of I and II. Condensation of 4-$NO_2C_6H_4CHO$ with $CH_2(CO_2Et)_2$ gave di-Et 4-nitrobenzylidenemalonate (68%) which was condensed with anthrone, using C_5H_5N as catalyst, giving β-(4-nitrophenyl)-β-(9-anthron-10-yl)isosuccinic acid (III) (89%); decarboxylation of III with H_2SO_4-AcOH gave β-(4-*nitrophenyl*)-β-(*9-anthron-10-yl*)*propionic acid* (IV). Heating 5 g. IV, 2.8 g. PCl_5 and 34 cc. CS_2 for 2 hrs. gave the *acid chloride* (V), m. 170–5°. The following derivs. of IV were prepd. from V: *amide* (93%), m. 225–7°; *anilide*, m. 110°; *Me ester*, m. 202–3°; *Et ester* (83%), m. 137–8°. To 200 cc. C_6H_6 and 14 g. V was added 6 g. $AlCl_3$ and the mixt. stirred 3 hrs. at room temp.; another 6 g. $AlCl_3$ was then added and stirring continued 3 hrs. longer. The reaction mixt. was then poured onto ice and HCl. The product (73%), m. 170–72°, was assigned the constitution *10-oxo-9-[α-(4-nitrophenyl)-β-benzoylethyl)-9,10-dihydroanthracene* (*oxime*, m. 187–8°). The corresponding *3-nitrophenyl compd.*, m. 174–6°, (oxime, m. 189–90°), was obtained (70%) by similar treatment of the acid chloride of II. No reaction occurred when $AlCl_3$ was added to V in CS_2, and the reaction mixt. heated to boiling for 5.5 hrs. Oxidation of 20.6 g. I with 6.8 g. $KMnO_4$ and 6.0 g. KOH in 1 l. H_2O, at room temp. for 24 hrs., gave β-phenyl-β-(10-hydroxy-9-anthron-10-yl)propionic acid, which was converted to a lactone (VI), m. 213–15°, when attempts were made to purify the HO acid by recrystn., or by heating. Further oxidation of the lactone with $KMnO_4$ gave BzOH and anthraquinone. A similar oxidation of IV gave 4-$NO_2C_6H_4CO_2H$ and anthraquinone directly; no HO acid or lactone could be isolated. No hydrindone or benzanthrone derivs. were obtained by the action of H_2SO_4 on IV. W. Gordon Rose

Bromination of anthraquinone-2-sulfamic acid. W. Leśniański and H. W. Turska-Jaroszewiczowa. *Roczniki Chem.* **18**, 680–7(1938).—Aq. Br is added in 10% excess to aq. Na anthraquinone-2-sulfamate at pH 6.5 (room temp.). Aq. Na_2CO_3 is added at intervals, to maintain the pH at 6.5, until free Br is no longer present, when the soln. is made feebly alk., boiled and then made strongly acid. The yield of 1-bromo-2-aminoanthraquinone is 83% on the aminoanthraquinone originally taken.
B. C. P. A.

New synthesis of phenanthrene derivatives. I. Phenanthrene-9,10-dicarboxylic anhydride and phenanthrene-9-carboxylic acid. T. A. Geissman and Roy W. Tess. *J. Am. Chem. Soc.* **62**, 514–16(1940).—Details are given of the synthesis of *o*-$PhC_6H_4CH_2NH_2$ (I) by heating 122.5 g. *o*-NCC_6H_4Ph, Raney Ni, 150 cc. liquid NH_3 and 50 cc. ether in a bomb under pressure of 3350 lb. H; upon heating to 120° the pressure rises to 4500 lb., then gradually falls to 1670 lb. in 4 hrs. I (12 g.) with $NaNO_2$ in AcOH gives 11.5 g. *o*-$PhC_6H_4CH_2OH$, b_{15} 177–84°, which was transformed into the chloride and then the cyanide (II). Refluxing 43.3 g. of II and 45 g. concd. H_2SO_4 in 55 g. 95% EtOH for 13 hrs. gives 55.2 g. of 2-$PhC_6H_4CH_2CO_2Et$ (III), b_{15} 180–5°. III (12 g.) and 7.5 g. $(CO_2Et)_2$ with EtOK in ether give the oxalyl ester, an oil; with 50 cc. AcOH and 30 cc. 48% HBr this yields 2.7 g. III and 7.95 g. of a pale yellow solid, contg. 67% of phenanthrene-9-carboxylic acid and 13% of phenanthrene-9,10-dicarboxylic anhydride, sepd. by recrystn. from Ac_2O. C. J. West

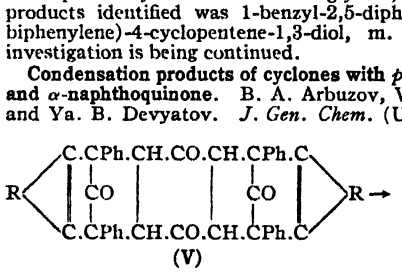
Catalytic transformation of dimeric 1,3-cyclohexadiene. E. V. Alekseevskiĭ. *J. Gen. Chem.* (U. S. S. R.) **9**, 1586–8(1939).—Kazanskiĭ and Vol'fson (*C. A.* **33**, 4966[8]) showed that dicyclohexadiene (I) is dehydrogenated over platinized charcoal at 240–5° to 1,4-endoethylenetetrahydronaphthalene, m. 63.5°. The expt. was repeated with dehydrogenation of I over reduced Pd at 320–80° by the method of Zelinskiĭ (*C. A.* **17**, 2567). The catalyzate gave a product, m. 62.5°, and another, m. 42–2.5°. The latter could not be obtained again. The cleavage of 2 mols. H from I could form 1,4-dimethyl-, 1-ethyl- and 1,4-endoethylenenaphthalene. In the hydrogenation of I in alc. in the presence of Pt black, it absorbed 2 mols. H to form *tetrahydrodicyclohexadiene* or *endoethylenedecahydronaphthalene*, $b_{7.5}$ 101.9°, d_4^{20} 0.9657, M. R.$_D$ 50.55, exaltation 0.48. Heating I and floridin at 232–360° gave mixed polymers, which are easily oxidized in air at room temp. Chas. Blanc

Synthesis of 6-hydroxy-3,4-benzopyrene and 8-isopropyl-1,2-benzanthracene from 9,10-dihydrophenanthrene. Louis F. Fieser and Wm. S. Johnson. *J. Am. Chem. Soc.* **62**, 575–7(1940).—4-Keto-1,2,3,4-tetrahydro-

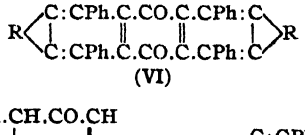
chrysene (I) (2 g.) and 1.2 g. $BrCH_2CO_2H$ with 4 g. activated Zn in 40 cc. C_6H_6, heated almost to boiling and a crystal of I introduced, react vigorously; after 1 hr. the Zn is completely coated with an oily complex; the mixt. is cooled, MeOH added to dissolve the oil, the soln. is decanted from the Zn, shaken with 10% HCl, H_2O and satd. NaCl soln. and filtered through Na_2SO_4. After removal of the solvent, the residual oil is boiled for 15 min. with excess *N* EtOH-KOH; addn. of H_2O and cooling gives 1 g. unchanged I; acidification of the alk. liquor gives 1.1 g. (94% based on reacting I) of crude *4-chryseneacetic acid* (II). Crude II (1.7 g.) in 250 cc. MeOH is satd. in the cold with HCl, refluxed for 12 hrs., dild. and extd. with Et_2O, giving 1.44 g. of the ester; this was heated with 0.18 g. S for 2 hrs. at 210° and after heating with a pinch of Zn for 5 min., distn. and crystn. from Me_2CO-MeOH gave 0.59 g. pure *Me ester*, m. 109–10°; hydrolysis yields 0.34 g. pure II, m. 207–8° (this is 20% on the basis of crude II). Cyclization of II with HF gives 57% of *6-hydroxy-3,4-benzopyrene*, light yellow, m. 195–6° (decompn.); it yields a red azo compd. with *p*-$O_2NC_6H_4N_2X$ and a red color with concd. H_2SO_4 which with HNO_3 gives a transient green and then a deep blue color. 8-Keto-3,4,5,6,7,8-hexahydro-1,2-benzanthracene (III) (3 g.) and iso-PrMgBr, refluxed 2 hrs., the product dehydrated at 220°, distd. and treated with petr. ether, give 0.73 g. unchanged III and 1.83 g. (73.5%) of an oil; heating the oil with S at 205–50° for 45 min. gives 35% of the *picrate* (IV), red, m. 155.5-6.5°, of *8-isopropyl-1,2-benzanthracene*, yellow, m. 97–8°. IV is decompd. by filtration of a C_6H_6 soln. through Al_2O_3. All m. ps. are cor. C. J. West

Reaction of phencyclone with organomagnesium halides. V. S. Abramov and P. G. Mal'skiĭ. *J. Gen. Chem.* (U. S. S. R.) 9, 1533-6(1939).—2,5-Diphenyl-3,4-(*o,o'*-biphenylene)-2,4-cyclopentadien-1-one was prepd. by condensation of phenanthraquinone and $(PhCH_2)_2CO$ in hot EtOH-KOH (cf. Dilthey, *et al.*, *C. A.* 29, 7323[1]). When treated with RMgBr in ether by the method of Ziegler and Schnell (*C. A.* 20, 383), it formed the corresponding 1-aryl- and 1-alkyl-1-methanols in 53–75% yield. R = Ph (from PhMgBr), m. 255–7°; Et (from EtMgBr), m. 179–80°; Bu (from BuMgBr), m. 237–9°; $PhCH_2$ (from $PhCH_2MgBr$), m. 264–5°. The condensation is accompanied by formation of some glycols; one of the by-products identified was 1-benzyl-2,5-diphenyl-3,4-(*o,o'*-biphenylene)-4-cyclopentene-1,3-diol, m. 158–9°. The investigation is being continued. Chas. Blanc

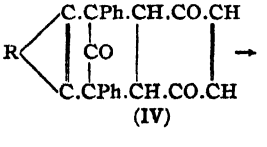
Condensation products of cyclones with *p*-benzoquinone and α-naphthoquinone. B. A. Arbuzov, V. S. Abramov and Ya. B. Devyatov. *J. Gen. Chem.* (U. S. S. R.) 9,



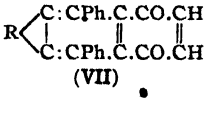
(V)



(VI)



(IV)



(VII)

1559–63(1939).—Dilthey and co-workers (*C. A.* 31, 2197[1]; 32, 140[6]) produced highly arylated compds. from cyclones by diene synthesis. It was expected that *p*-quinones would react similarly with cyclones to form corresponding anthraquinone and naphthoquinone derivs. Attempts to obtain the products of addn. of α-naphthoquinone (I) and *p*-benzoquinone (II) to cyclone and acecyclone gave neg. results. The components either failed to react or under more drastic conditions of condensation were resinified. The reaction with phencyclone (III) gave expected results. Condensation of 2.1 g. I and 5 g. III in 40 ml. $PhNO_2$ on a water bath for 4 hrs. and at room temp. for 12–14 hrr. gave 73% of *1,4-endocarbonyl-2,3-(o,o'-biphenylene)-1,4-diphenyl-11,12-dihydroanthraquinone*, colorless crystals, m. 265–7°. Dehydrogenation with cleavage of the endo-CO group in boiling $PhNO_2$ gave 85% of *1,4-diphenyl-2,3-(o,o'-biphenylene)anthraquinone*, yellow, m. 359°. Condensation of equivs. of II and III as above gave *1,4-endocarbonyl-2,3-(o,o'-biphenylene)-9,10-dihydronaphthoquinone* (IV, R = —$C_6H_4.C_6H_4$—), m. 194°. If 2 mols. III to 1 mol. II are used the condensation products are 50% of the *diendocarbonyl deriv.* (V), m. 310°, and IV. Decompn. of V in $PhNO_2$ gave *1,4,5,8-tetraphenyl-2,3,6,7-bis-o,o'-biphenylene)anthraquinone*, (VI), m. 460–1°. The decompn. of IV gave VII, brown, m. 405–8°. Chas. Blanc

Dibenzofuran. XVIII. Isomeric metalation products of some phenols and their methyl ethers. Henry Gilman, H. B. Willis, T. H. Cook, F. J. Webb and R. N. Meals. *J. Am. Chem. Soc.* 62, 667-9(1940); cf. *C. A.* 34, 2369[9].—Metalation by BuLi of 2-methoxydibenzofuran gives 2-methoxy-1- and -3-dibenzofuryllithium, and 4-methoxydibenzofuran gives 4-methoxy-6- and -3-dibenzofuryllithium. However, metalation of the corresponding phenols gives but 1 product in each case: 2-hydroxydibenzofuran gives 2-hydroxy-1-dibenzofuryllithium and 4-hydroxydibenzofuran gives 4-hydroxy-6-dibenzofuryllithium. In contrast, metalation of *m*-$C_6H_4(OMe)_2$ gives apparently but 1 product (2,6-dimethoxyphenyllithium), whereas *m*-$C_6H_4(OH)_2$ gives the 2 isomers, 2,6- and 2,4-dihydroxyphenyllithium. *4-Methoxy-3-dibenzofurancarboxylic acid* (I), m. 182–3°; this also results by $KMnO_4$ oxidation of 3-acetyl-4-methoxydibenzofuran; the *6-isomer* of I m. 240–2° (*Me ester*). C. J. West

The reactions between thiophene and calcium hypochlorite solutions. E. G. R. Ardagh, W. H. Bowman and A. S. Weatherburn. *J. Soc. Chem. Ind.* 58, 249-51 (1939); cf. *C. A.* 29, 6888[8].—The reaction was studied over the pH range 4.1–8.0. At the higher pH values in the presence of a large excess HOCl nearly 90% of the thiophene S was oxidized to SO_4 ion. R. E. Reeves

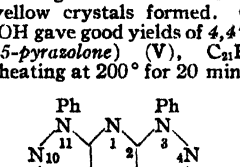
Constituents of derris root. III. Th. M. Meyer. *Rec. trav. chim.* 58, 1119-23(1939) (in English); cf. *C. A.* 33, 8613[4].—Addnl. evidence for the structure of derride (I) has been obtained. A mixt. of 5 g. I, 50 cc. of 10% KOH and 70 cc. alc. was refluxed for 4 hrs. in a N atm.; the dild. reaction mixt. was acidified with HCl and extd. with ether. The ext. was shaken out with 10% $NaHCO_3$ and 5% KOH. The $NaHCO_3$ ext. was acidified with dil. H_2SO_4 and extd. with ether, yielding 0.8411 g. of residue. Distn. at 110–20° and 0.001 mm., and recrystn. of the yellow sublimate from alc. and petr. ether gave cryst. 4-hydroxycoumarone-5-carboxylic acid (II), $C_9H_6O_4$, m. 214°, identical with a sample obtained by Manjunath (*C. A.* 33, 5591[7]) from karanjin from *Pongamia glabra*. Further evidence for the presence of the furan nucleus in I was obtained by oxidizing 0.5 g. of derridenone in 50 cc. of 5% KOH by addn. of 25 cc. of 8% H_2O_2. The mixt. was heated for 1 hr., acidified, extd. with ether and the residue was sublimed at 180–200° in high vacuum, yielding yellow crystals of furan-2,3-dicarboxylic acid, m. 224–5° (decompn.). Oxidation of 2 g. of dehydroderride in 120 cc. of acetone at 0° with 7.2 g. of powd. $KMnO_4$ and vacuum distn. of the crude brown product gave sublimates at 110–20°, 140° and 190–200°. Recrystn. of the 140° fraction from MeOH and redistn. in a high vacuum gave 2,4,5-HO(MeO)$_2C_6H_2CO_2H$ (*C. A.* 26, 2727), m. 209.0–11.5°. Extn. of the fraction 190–200° with MeOH and redistn. *in vacuo* gave rissic acid, $C_{11}H_{12}O_7$, m. 256°. The above results, together with previously published findings, confirm the formula formerly assigned to I.
C. R. Addinall

Alkaline hydrolysis of condensation products of hydantoin with aldehydes. Henry R. Henze, Wm. B. Whitney and Margaret A. Eppright. *J. Am. Chem. Soc.* 62,

565–8(1940).—Wheeler and Hoffman (*C. A.* **5**, 2072) stated that anisalhydantoin (I) with alkali gives *p*-MeO-$C_6H_4CH_2COCO_2H$ (II) but gave no details. Heating 1 g. of I with 100 cc. 5% NaOH at 80–90° for 5 hrs. gives NH_3, $(CO_2Na)_2$ and some *p*-$MeOC_6H_4Me$ (III) and II. Digesting 35 g. I, 300 g. cryst. $Ba(OH)_2$ and 400 cc. H_2O at 120–35° for 100 hrs., during which 150 cc. distillate was collected, gives 7.5 cc. of (mainly) III, some Ba oxalate, 1 cc. anisyl alc., 9 g. of anisic acid and a trace of anisaldehyde. 2-Phenyl-4-(*p*-methoxyphenyl)oxazolone (anisal azlactone) (50 g.) and 750 cc. of 40% NaOH, heated at 110–15°, give some III and 13 g. II. Reaction of $Ba(OH)_2$ upon II in H_2O at 115–20° (15 hrs.) gives III and oxalate. Furfurylhydantoin (30 g.), 320 g. $Ba(OH)_2$ and 350 cc. H_2O, digested 60 hrs. at 110–20°, give oxalate and 8 cc. of 2-methylfuran, b. 63.2°, d_4^{20} 0.9032, n_D^{20} 1.4310. *o*-ClC_6H_4CHO yields 66% of *o-chlorobenzalhydantoin* (IV), m. 275°; $Ba(OH)_2$ gives *o*-ClC_6H_4CHO. Refluxing 10 g. IV, 45 cc. HI (d. 1.7) and 10 cc. AcOH for 2 hrs. gives 7.5 g. of *o-chlorobenzylhydantoin*, m. 240°; hydrolysis with $Ba(OH)_2$ (refluxing 50 hrs.) gives 88% of *o-chlorophenylalanine*, m. 260–1° (*HCl salt*, m. 255–6°). *m-Nitrobenzalhydantoin* (V), bright yellow, m. 277° (58% yield); soly. in boiling AcOH, 1.75–2 g. per 100 cc.; $Ba(OH)_2$ gives *m*-$O_2NC_6H_4Me$ and oxalate. Reduction of V with concd. HCl and Sn (HCl being passed through the soln. at 120° for 6 hrs.) gives *5-(m-aminobenzyl)hydantoin*, whose *HCl salt* m. 270°; $Ba(OH)_2$ gives *m-aminophenylalanine-HCl*, m. 225°. All m. ps. and b. ps. are cor. The above results are to be predicted on the basis of a mechanism previously advanced by H. and Blair (*C. A.* **29**, 148[8]) for the cleavage of the condensation products of hydantoin with isatin and 5-methylisatin. C. J. West

Heterocyclic local anesthetics. Carbazole, dibenzofuran and dibenzothiophene derivatives. Robert R. Burtner and Gerhard Lehmann. *J. Am. Chem. Soc.* **62**, 527–32(1940).—In the study of local anesthetics the effect of the nuclear NH_2 group has been studied, whereas the introduction of an aryl group has received little or no attention; a series of dialkylaminoalkyl esters of the isomeric carbazolecarboxylic acids have been prepd. and to study the effect of replacement of the heterocyclic element by O and S a series of esters of dibenzofuran and dibenzothiophenecarboxylic acids were investigated. Carbazole-2-carboxylic acid (I) (21 g.), 47 g. Bu_2SO_4, 42 g. NaOH in 28 cc. H_2O and 146 g. Me_2CO, shaken for 10 min., poured into 1 l. H_2O contg. 50 g. NaOH, concd. to 500 cc., acidified and the dried ppt. crystd. from petr. ether, give 15 g. of *5-butylcarbazole-2-carboxylic acid* (II), m. 157°. Carbazole-3-carboxylic acid (III) could not be alkylated directly with an iodide or sulfate. 3-Acetylcarbazole (15 g.) and 15 cc. Et_2SO_4 with NaOH in Me_2CO give 15 g. of *5-ethyl-3-acetylcarbazole* (IV), m. 97°; KOH fusion yields 40% of *5-ethylcarbazole-3-carboxylic acid* (V), m. 248°; the *5-Bu analog* of IV m. 74.5–5.°; the *5-Bu analog* (VI) of V m. 198°. III (5.5 g.) in 80 cc. AcOH at 90°, treated with 2 g. $NaNO_2$ and then dropwise with 4.5 cc. concd. HNO_3 in 5 cc. AcOH at 80–5°, gives 6 g. of the *8-NO_2 deriv.* (VII), yellow, m. 338°. *p*-Hydrazinobenzoic acid (38 g.) and 38 cc. cyclohexanone, heated on a steam bath for 15 min. and then refluxed with 400 cc. 10% H_2SO_4 (by vol.) for 15 min., give 40 g. *6,7,8,9-tetrahydrocarbazole-2-carboxylic acid* (VIII), m. 279°. The dialkylaminoalkyl esters were prepd. by conversion to their resp. acid chlorides (by means of PCl_3), followed by treatment with the desired alc., or by way of the ω-chloroalkyl ester which was then treated with the appropriate amine. Passing a slow stream of HCl into a refluxing soln. of 10 g. I in 50 cc. $HOCH_2CH_2Cl$ for 6 hrs. gives 8 g. of the *β-chloroethyl ester*, m. 141°; $HO(CH_2)_3Cl$ gives 18 g. of the *γ-chloropropyl ester* (IX), m. 129°. The acid chloride from 10 g. 5-ethylcarbazole-2-carboxylic acid (X) (heating with PCl_3 on the steam bath for 1.5 hrs.) and 50 cc. $Et_2NCH_2CH_2OH$, heated 10 min. on the steam bath, allowed to stand overnight at room temp., dild. with 500 cc. H_2O contg. 50 cc. 10% NaOH, extn. of the base with ether, and treatment of the crude, distd. base in ether with HCl, give 7 g. of *β-diethylaminoethyl 5-ethylcarbazole-2-carboxylate-HCl*, m. 204°. Heating 17 g. of IX and 11 g. Et_2NH at 110° for 36 hrs. gives 8 g. of *γ-diethylaminopropyl carbazole-2-carboxylate-HCl*, m. 169°. VII yields the *HCl salt* of the *β-diethylaminoethyl ester*, m. 225–7°; reduction with Fe and AcOH gives *β-diethylaminoethyl 8-aminocarbazole-3-carboxylate*, yellow, m. 146–7°. *β-Diethylaminoethyl ester-HCl* of X, m. 195°; of III (free base), m. 127°; of *carbazole-4-carboxylic acid*, viscous oil; of V, m. 174°; of VI, a viscous oil; of VIII, m. 234°; of II (sulfate), a glass. *p*-$PhOC_6H_4CHO$ (35 g.), Ac_2O and AcONa, refluxed 8 hrs., give 10 g. of *p-phenoxyacrylic acid*, m. 135°. Dibenzofuran-2-carboxylic acid (XI) chloride (23 g.) and $HO(CH_2)_3Cl$, heated 5 hrs. at 150°, give 20 g. of the *γ-chloropropyl ester*, m. 85°. The 7-NO_2 deriv. of XI with $SOCl_2$ yields the chloride, m. 225°; $Et_2NCH_2CH_2OH$ gives 85% of the *β-diethylaminoethyl ester* of the 7-NO_2 deriv., m. 161°; reduction with Fe and AcOH gives *β-diethylaminoethyl 7-aminodibenzofuran-2-carboxylate-HCl*, m. 255°. XI yields a *β-diethylaminoethyl ester-HCl*, m. 185°; the *ester* of the *3-isomer* m. 221° and that of the *4-isomer* m. 210°. The *γ-diethylaminopropyl ester-HCl* of XI m. 185°; the *β-isobutylaminoethyl ester-HCl* of XI, m. 212°; the *β-amylaminoethyl ester-HCl* m. 160°. *β-Diethylaminoethyl dibenzofuran-2-acrylate-HCl*, m. 185°. *β-Diethylaminoethyl dibenzothiophene-2-carboxylate-HCl*, m. 219°; *4-isomer*, m. 213°. *β-Diethylaminoethyl p-phenoxybenzoate-HCl*, m. 136°. *β-Diethylaminoethyl p-phenoxyphenylacrylate-HCl*, m. 129–30°. *β-Diethylaminoethyl p-thiophenylbenzoate-HCl*, m. 137°. *β-Diethylaminoethyl dibenzofuran-2,8-dicarboxylate-2HCl*, m. 251–3°. Data are given for the min. duration of visual anesthesia in rabbits for 0.1, 0.5 and 1% solns. and for the av. subcutaneous toxicity in mice. The best compd. of the series is β-diethylaminoethyl 5-ethylcarbazole-3-carboxylate-HCl, which is more than 3 times as potent as cocaine and only 20% as toxic. The activity of these compds. appears to be predominantly a function of the position of the CO_2H group rather than other structural variations. Opening of the C–C bridge in the dibenzofuran and dibenzothiophene derivs. does not improve the therapeutic efficiency. All of the compds. were more or less irritating to the rabbit's eye and to human skin, so that they cannot be regarded as useful anesthetics. C. J. West

Action of carboxylic acid substitution products on methylenepyrazolones. G. Perroncito. *Atti X° congr. intern. chim.* **3**, 267–76(1939); cf. *C. A.* **31**, 6653[8].—After a study of mobile CH_2 in pyrazolones with respect to CO_2Et, the action of carboxylic acid substitution products including $CH_2(CO_2Et)_2$ (I), $(CH_2CO_2Et)_2$ (II), $HCONH_2$ (III), $COCl_2$ and $(COCl)_2$ on 1-phenyl-3-methyl-5-pyrazolone (IV) was investigated. A mixt. of 174 g. IV and 90 g. I was heated at 190° for 3 hrs. and the cooled reddish mass was extd. with petr. ether and washed with toluene. The residue was recrystd. from AcOH, yielding pink silky platelets of *ethoxymethylmethanebis-4-(1-phenyl-3-methyl-5-pyrazolone)*, $C_{24}H_{24}N_4O_3$, m. 281°. Condensation of IV with II similarly gave *γ,γ-bis(1-phenyl-3-methyl-5-pyrazolonyl)-γ-butyrolactone*, $C_{34}H_{24}N_4O_4$, m. 184°. A mixt. of 5 g. IV and 6 g. III was heated for 60–70 min. at 150–60° until yellow crystals formed. Crystn. of the product from AcOH gave good yields of *4,4'-methenylbis(1-phenyl-3-methyl-5-pyrazolone)* (V), $C_{21}H_{18}N_4O_2$. Continuation of the heating at 200° for 20 min. longer caused



(VI)

an evolution of H_2O and NH_3 and converted the yellow crystals into the compd. of III with *3,11-diphenyl-5,9-dimethylpyridinediazole* (VI) (dimethyldiphenyldipyrazolopyridine), $C_{21}H_{17}N_5$.$HCONH_2$, m. 155°. Similar condensation of III with 1,3-diphenyl-5-pyrazolone (VII) gave the

known methenyl analog (VIII) and the corresponding *tetraphenylpyridinediazole* (tetraphenyldipyrazolopyridine), $C_{31}H_{21}N_5$.$HCONH_2$, m. 175°. With $(CONH_2)_2$ at 190° for 1 hr. the pyrazolones IV and VII gave V, m. 180°, and VIII, m. 246°. The reactions of the CH_2 group in IV with substituted CO_2H groups are not general but are controlled by the particular compd. in question.

C. R. Addinall

New research in the group of the isoxazoles. VIII. Sulfonic acid derivatives. Adolfo Quilico and Romeo Justoni. *Gazz. chim. ital.* **70**, 1–11(1940); cf. *C. A.* **34**, 1316⁵.—The β-sulfonic acids and sulfonyl chlorides of α- and γ-methylisoxazole and of α,γ-dimethylisoxazole were obtained by direct sulfonation of the acids with $ClSO_3H$. To 350 g. $ClSO_3H$ add with shaking 83 g. α-methylisoxazole, then reflux on a steam bath for 24 hrs., cool, pour onto ice, filter, dissolve the solid in CCl_4 (soln. *A*) and cool the aq. soln. with ice (soln. *B*). After drying *A* with $CaCl_2$, evap. the CCl_4, and distil *in vacuo*, the α-methylisoxazole-β-sulfonyl chloride, $C_4H_4O_3NSCl$ (I), b_{14-15} 98–9°. On cooling in ice, the colorless oil with strong characteristic odor yields large radiating crystals, m. 23°. I is also obtained in 50% yield by the action of 50 g. PCl_5 on 40 g. of the *sulfonic acid* (II) (see below), heating, and distg. *in vacuo*. I is stable to H_2O, reacts easily with NH_3 and aniline; *sulfonanilide* (III), white shining scales, m. 64°, very sol. in alc., slightly sol. in H_2O. Soln. *B* is treated with 1400 g. $PbCO_3$, filtered, washed with 700 cc. H_2O, the filtrate concd. on a steam bath, H_2S is passed in, the filtrate evapd. and the residual oil extd. with ether, the ether evapd. and the II obtained as a yellow oil is dried and crystd. over H_2SO_4. II is a strong acid, decompg. on heating, and yields *Na, Ca, Ba and Pb salts*, easily sol. in H_2O, sol. in hot alc., slightly sol. in cold alc. and decompg. on heating. *γ-Methylisoxazole* (46 g.) was refluxed with 260 g. $ClSO_3H$ for 46 hrs. and gave 12 g. *sulfonyl chloride* (IV) and 114 g. of the Pb salt of *γ-methylisoxazole-β-sulfonic acid* (V). V is a strong acid, hydrolyzed on boiling in H_2O, yielding low-melting, very hygroscopic crystals. The *Na salt* is obtained from concd. aq. soln. as white needles of the *dihydrate*, yielding the *anhyd. salt* at 100°, and decompg. on stronger heating (evolution of SO_2). The *Ca, Ba and Pb salts* are *anhyd.* when dried at 135°. IV is a colorless oil, b_{21-22} 113–14°; the yield obtained by the action of PCl_5 on V is 60%; it is more stable than the α-isomer (I). *Anilide*, white scales from hot H_2O, m. 62.5°. **IX. Properties of the isoxazolesulfonic acids.** *Ibid.* 11–18. —*α,γ-Dimethylisoxazole-β-sulfonic acid* (VI) was obtained on refluxing 22 g. of α,γ-dimethylisoxazole with 80 g. $ClSO_3H$ for 24 hrs.; yield of *Pb salt*, 35 g. = 87%. VI, m. 50°, is a strong acid in aq. soln., is less hygroscopic than II and V (part VIII, above), and hydrolyzes only on long boiling with H_2O or alkali. The *Na salt* is obtained as a *monohydrate* on evapn. from a satd. soln. at room temp. The *sulfonyl chloride* (VII) is fairly stable even to *hot* H_2O; it forms colorless tablets, m. 34.8°, b_{14} 102–3°, and reacts normally with NH_3 and aniline; the *sulfonamide*, cryst. powder from alc., sol. in hot H_2O, m. 166–7°, and *sulfonanilide*, cryst. powder from 50% alc., m. 122°, are stable to acids and alkalies. When α- or γ-methylisoxazolesulfonic acid or their sulfonanilides are treated with 30% alkali, the N—O bond is broken, NH_3 is liberated, and the mols. decompose. When 5 g. of the Na salt of II (part VIII, above) is treated with 25 cc. of 30% NaOH, a vigorous reaction takes place, and white crystals of *α-sulfoacetoacetic ester* (VIII), sol. in H_2O, stable to air, sep. On boiling with 20% HCl, VIII yields acetone, CO_2 and H_2SO_4. III similarly yields *α-cyanoacetone-α-sulfonanilide*; on boiling with aniline, the *anil* of an acyclic isomerization product, $NCCH(SO_2NHPh)CMe{:}NPh$, white crystals from alc., m. 159–60°, is formed. Similarly the γ-isomer (V, above) of II yields sulfoacetic acid, identified as the Ba salt, and MeCN; finally NH_3 and AcOH.

F. H. Rathmann

Aspartylhistidine. Jesse P. Greenstein and Friedrich W. Klemperer. *J. Biol. Chem.* **128**, 245–50(1939).—*N*-Carbobenzyloxy-*l*-aspartic anhydride with *d*-histidine Me ester in $CHCl_3$ yields the *Me ester*, m. 95–105° (decompn.), of *carbobenzyloxy-l-aspartyl-d-histidine*, m. 171° (decompn.), reduced (Pd in AcOH) to *α-aspartylhistidine*, m. 210°, $[\alpha]_D^{25}$ −6.0° in H_2O. The apparent dissocn. consts. of this and of the β-isomeride (*C. A.* **32**, 7974⁵) have been measured by electrometric titration, and are discussed.

B. C. P. A.

Preparation of substituted xanthones. A. Lespagnol, J. Bertrand and J. Dupas. *Bull. soc. chim.* **6**, 1625–9 (1939).—The method of Dhar (*C. A.* **15**, 231) for obtaining xanthones by treating *o*-hydroxybenzoic acids with phenols in the presence of Ac_2O is not absolutely general. Distn. of the reaction product from the treatment of *o*-$HOC_6H_4CO_2H$ with thymol (I) gave a xanthone (II), m. 169–70°, which was reduced to the xanthydrol with Na-Hg and condensed with urea, yielding dixanthylurea. Thus it appears that reaction had taken place between *o*-$HOC_6H_4CO_2H$ and the phenol resulting from its decarboxylation with the production of II and not the 1-methyl-4-isopropylxanthone (III) expected. A mixt. of 25 g. I and 1.50 g. Na was heated at 100° and the excess Na was destroyed by addn. of MeOH. The product was heated with 5 g. of *o*-$ClC_6H_4CO_2H$ on an oil bath at 150° and treated with 0.10 g. of Cu powder. After the vigorous reaction subsided the heating was continued at 200° for 20 min. The reaction mass was taken up in H_2O, extd. free from I by ether, and pptd. with dil. HCl. The ppt. was taken up in Na_2CO_3, re-extd. with ether and repptd. with HCl. Recrystn. from 50% alc. gave thymylsalicylic acid (IV), $C_{17}H_{18}O_3$, m. 98°. Cyclization of 3 g. IV by heating with 40 g. concd. H_2SO_4 for 1 hr. on the steam bath and working up the product gave III, m. 85°, reduced by Na-Hg to the xanthydrol (V), m. 85°. A mixt. of 0.01 g. urea, 5 cc. AcOH and 0.15 g. V in 2 cc. MeOH gave dimethyldiisopropyldixanthylurea, m. 243°. Similarly an attempt to obtain a xanthone from I and *o*-cresotic acid (VI) by condensation with Ac_2O gave 1,8-dimethylxanthone (VII), m. 165°, by decarboxylation of VI, and condensation of the resulting phenol with the unchanged acid. VII was reduced to a xanthydrol, m. 132°, which was condensed with urea to give tetramethyldixanthylurea.

C. R. Addinall

Structural chemical investigations. I. Nickelous-ion-specific groups. H. Erlenmeyer and H. Ueberwasser. *Helv. Chim. Acta* **23**, 197–206(1940).—Although 4-covalent Ni compds. similar to those with HON:CMe-CMe:NOH are not formed by 1,2-benzoquinone dioxime, 1,2-naphthoquinone dioxime or 1,2-cyclohexanone dioxime, such compds. are given by 2-pyridyl Me ketoxime and the lower-melting form of 2-pyridyl Ph ketoxime. It seemed, therefore, of interest to study the effect of the substitution of the similar isosteric thiazole for pyridine and to prep. the corresponding 4-thiazolyl Me ketoxime (I). A mixt. of 1.8 g. of $BrCH_2COC(:NOH)Me$ (II) (*C. A.* **4**, 2817) in 2.5 cc. acetone and 0.76 g. of thiourea in 15 cc. acetone was warmed, cooled and filtered, yielding 2.3 g. of H_2O-sol. HBr salt, neutralized to give 2-amino-4-thiazolyl Me ketoxime, $C_6H_7N_3OS$, m. 194°. Similar condensation of 1.8 g. II with 2 g. of crude $HCSNH_2$ in 30 cc. ether gave 2 g. of HBr salt (III), neutralized to give the free oxime, crystg. from alc. or benzene in colorless prisms of *4-thiazolyl Me ketoxime* (III), $C_6H_8N_2OS$, m. 153–4°. III (5 g.) in 40 cc. AcOH was heated with 10 g. $NaHSO_3$ for 30 min., and with a further addn. of 5 g. $NaHSO_3$ in 20 cc. AcOH for 1 hr. The hot soln. was treated portionwise with 40 cc. concd. HCl and boiled for 30 min. The soln. was cooled to 50°, filtered and concd., layered with benzene, made alk. with 30% NaOH and extd. with benzene, yielding 2.1 g. of crude ketone, purified by crystn. from petr. ether and sublimation, giving colorless needles of *4-acetylthiazole* (V), C_5H_5NOS, m. 56°. Oxim ation of V with $HONH_2$ in dil. HCl, dil. AcOH or in dil. K_2CO_3 gave only IV and not the 2 syn and anti forms of the oxime. A mixt. of 3 g. AcBr (*C. A.* **1**, 429) in 25 cc. CS_2 and 1.6 g. Br in 10 cc. CS_2 was refluxed in the sunlight, evapd. down, taken up in ether and condensed with 2 g. of crude thiourea in 30 cc. ether

at 30° for 20 min. The crude HBr salt was taken up in 4 *N* HCl, filtered, alkalinated with Na_2CO_3 and shaken out with benzene. The crude extn. product was recrystd. from petr. ether in the presence of charcoal, yielding colorless prisms of *4-benzoylthiazole* (VI), $C_{10}H_7NOS$, m. 49.5°. Oximation of 0.9 g. VI in 50% alc. with 1.5 g. $HONH_2$.HCl and excess AcONa gave yellow prisms, m. about 165°, and colorless needles (VII), m. 104–5°. Recrystn. of the prisms from benzene gave colorless prisms of *4-thiazolyl Ph ketoxime* (VIIa), $C_{10}H_8N_2OS$, m. 174–5°. VIIa was also prepd. by direct synthesis from 1.2 g. of 1-bromo-3-phenylacetone, m. 143° (prepd. by the bromination of 3.3 g. of PhC(:NOH)COMe (*C. A.* **1**, 429) in MeOH satd. with NaBr with 3.2 g. Br), in a little acetone and 1 g. of crude thiourea in 15 cc. ether at 30° for 5 hrs. The crude HBr salt (1.1 g.) was decompd. and recrystd. from benzene, yielding VIIa, m. 174–5°. Alc. solns. of IV, VII and VIIa were treated with $NiSO_4$ soln. and NH_4OH was carefully added to the mixts. but in none of the expts. was there any sign of complex salt formation. The reaction tendency of the nickelous-ion-sp. groups depends on the mesomeric structure of the groups. The relation between structure and sp. activity must not only be sought in the criteria expressed by the classical formula but in the characteristic differences made evident by the findings of modern structural chemistry. The mesomer of IV, which should give a secondary valence ring with nickelous ion, is not constituted like the corresponding mesomer of pyridine. It is conceivable that the 3,4-N—C linkage of thiazole and the corresponding 1,2-N—C linkage of pyridine, are both aromatic in nature but not equiv. C. R. Addinall

β-Arylaminoacrylic esters. II. Synthesis of *N*-aryl-4-pyridone-3-carboxylic acids. M. V. Rubtsov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1517–24(1939); cf. *C. A.* **32**, 526[1]. —By following previous procedures, β-arylaminoacrylic esters are prepd. by condensation of $HOCH:CHCO_2Et$ with arylamines in dil. AcOH; the esters on heating *in vacuo* 10–15° below the m. ps. form β-aryliminodiacrylic esters (I); these when sapond. with alc. KOH cyclize to the corresponding *N*-aryl-4-pyridone-3-carboxylic acids. In the prepn. of *N-(2-naphthyl)-4-pyridone-3-carboxylic acid* (II) and *N-phenyl-4-pyridone-3-carboxylic acid* (III) the intermediate I could not be isolated. *β-2-Naphthylaminoacrylic ester*, leaflets, m. 134–5°. II exists in 2 isomeric forms, m. 306–7° and 252–3°, which were sepd. as the K salts. *β-Anilinoacrylic ester*, m. 105–6°. III, needles, m. 263–4°. *β-6-Quinolylaminoacrylic ester* (from 6-aminoquinoline), prisms, m. 155–6°. The *diacrylic ester*, needles, m. 127–8°. *N-(6-Quinolyl)-4-pyridone-3-carboxylic acid*, powder, m. 353–5° (decompn.); *chloride*, m. 262–3°; *Et ester*, m. 116–17°; *diethylamide*, m. 155–6°. Most of these compds. are pale yellow of different shades. Chas. Blanc

Pyridine and piperazine derivatives of sulfanilamide. Wm. O. Kermack and Walter Tebrich. *J. Chem. Soc.* 1940, 202–5.—*o*-Aminopyridine (0.5 g.) and 1.4 g. of $3,4\text{-}O_2N(AcNH)C_6H_3SO_2Cl$ in C_5H_5N give 1.2 g. of *2-(3'-nitro-4'-acetamidobenzenesulfonamido)pyridine* (I), yellow, m. 270°. Heating 5 g. I with 25 cc. 5 *N* HCl on the water bath for 0.5 hr. gives 4 g. of the free *amine* (II), yellow, m. 232°; refluxing 4 g. II with 40 cc. 25% NaOH and acidifying with 10% HCl give 3.8 g. of *2-(3'-nitro-4'-hydroxybenzenesulfonamido)pyridine*, pale yellow, m. 234°; reduction of 1 g. in 12 cc. *N* NaOH with 2 g. of $Na_2S_2O_4$ gives 0.4 g. of the *3'-NH_2 deriv.*, m. 211°; it is readily oxidized in the air, especially in aq. soln. Shaking 2.36 g. of *p*-$AcNHC_6H_4SO_2Cl$ (III) in wet ether with 1 g. piperazine (with 6 H_2O) in 0.1 *N* NaOH gives 1.75 g. of the *di-Ac deriv.*, m. 324°, of *1,4-di(p-aminobenzenesulfonyl)piperazine*, m. 331–2°. Since the monosubstituted deriv. could not be prepd. in this manner, 9.6 g. Et piperazine-1-carboxylate and 13.8 g. of III were condensed with 0.1 *N* NaOH in MeOH-Et_2O, giving 18.5 g. of the *Ac deriv.*, m. 132°, of *Et 4-(p-aminobenzenesulfonyl)piperazine* (IV), m. 170° (HCl salt, m. 198°); refluxing 2 g. of IV with 10% EtOH-NaOH for 4 hrs. gives 0.8 g. of *1-p-aminobenzenesulfonylpiperazine*, m. 204°. IV (1.6 g.) and 1.2 g. III in C_5H_5N give 1.2 g. of *Et 4-(p-acetamidobenzenesulfonamidobenzenesulfonyl)-piperazine-1-carboxylate*, m. 194°; this could not be hydrolyzed. C. J. West

Separation of β-picoline, γ-picoline and 2,6-lutidine from their mixture. Alan G. Lidstone. *J. Chem. Soc.* 1940, 241–3.—A "β-picoline fraction" (I), b. 142–4° (100 cc.), is warmed to 80°, 110 g. com. anhyd. $(CO_2H)_2$ added during 10 min. and 150 cc. boiling abs. EtOH stirred in; after cooling and sepn. of the cryst. mass the filtrate and wash EtOH are reserved for the prepn. of 2,6-lutidine (II). Crystn. of the pptd. oxalates from abs. EtOH (twice without filtration and a 3rd time with hot filtration) gives γ-picoline (III) oxalate, m. 137–8°; the mother liquor gives the β-isomer (IV), m. 112–21°. The use of hydrated $(CO_2H)_2$, treatment of batches larger than 100 cc. at a time and heating solns. for more than the min. time necessary seriously diminish the yield. III and IV are obtained from the oxalates by soln. in the min. quantity of H_2O and distn. with an excess of 50% KOH. The initial filtrate and washings give a const. boiling mixt. of II and H_2O, 200 cc. of which is dild. with 100 cc. concd. HCl and 150 cc. H_2O and treated with 200 g. of $HgCl_2$ in 1 l. boiling H_2O; the $HgCl_2$ salt m. 187–8°; steam distn. with 30% NaOH gives II. I (700 cc.) yields 158 g. III, 71 g. IV and 267 g. II; 100 g. recovered base is mostly IV and is again treated as above. The rather less satisfactory sepn. of the IV oxalate is probably due to some esterification of the $(CO_2H)_2$, as the mother liquor on repeated evapn. becomes sirupy. C. J. West

Some α-picolines substituted in the β-position. Alfred Dornow. *Ber.* **73B**, 78–80(1940).—As was recently reported, 2,3-derivs. of pyridine are readily obtained by the action of $EtOCH:CHCH(OEt)_2$ on ketimine-enamine compds. of the general type $RC(:NH)CH_2R' \rightleftarrows RC(NH_2):CHR'$ (*C. A.* **33**, 8200[9]). The 2-methylnicotinic ester (I) obtained in this way is peculiarly well suited for the prepn., by transformations of the carboxyl group, of α-picolines substituted in the adjacent β-position. Because of the great physiol. importance of nicotinamide, *2-methylnicotinamide* (II) was prepd. from I with NH_3 but it gave a neg. anti-rat pellagra test. A no. of other derivs. of α-picoline prepd. from II are described. II (4.2 g. from 10 g. I shaken in 100 cc. of 25% NH_4OH until completely dissolved (about 2 days)), m. 158°; *picrate*, m. 180–1° (decompn.). *2-Methyl-3-aminopyridine* (III) (2.5 g. from 4.2 g. II in 80 cc. of 10% KOH heated 0.5 hr. on the water bath with 30 cc. NaOCl soln. (Raschig, *C. A.* **2**, 636)) sublimes about 60° *in vacuo*, m. 115–16°; *picrate*, m. 234° (decompn.). *3-Benzoylamino compd.* (0.8 g. from 0.5 g. III by the Schotten-Baumann method), m. 114–15°. *3-I compd.*, from III diazotized in cold HCl and treated with KI, m. 36–7°, is easily volatile and has a characteristic odor; *picrate*, m. 168° (decompn.). *3-HO compd.* (IV) (0.35 g. from 0.5 g. III diazotized in H_2SO_4 with the calcd. amt. of $NaNO_2$ and heated on the water bath until the evolution of N ceased), m. 167–8°, gives a deep red color with $FeCl_3$; *picrate*, m. 204° (decompn.). IV showed no adermine-like physiol. action. C. A. R.

Action of methyl isothiocyanate on ethyl acetonedicarboxylate. David E. Worrall. *J. Am. Chem. Soc.* **62**, 675(1940); cf. *C. A.* **34**, 766[2].—The di-Na deriv. from 0.1 g.-mol. of $CO(CH_2CO_2Et)_2$ and 2 equivs. of MeNCS, heated 1 hr. and decompd. in the usual way, give 4.5 g. *1-methyl-2,4-dioxo-5-carbethoxy-6-thiopiperidine-3-thioformmethylamide* (I), bright yellow, m. 98°; the original material contains 0.3 g. of an insol. portion, pale yellow, m. 235–6°; the formula may be $C_{13}H_{14}N_4O_5S_4$. I and MeI-EtOH, boiled 30 min., give the *6-methylmercapto compd.* (II), m. 110°. Bromination of II in AcOH gives *dispiro-3,3'-di(1-methyl-2,4-dioxo-5-carbethoxy-6-thiopiperidine)-3'',3'''-(1,4-dimethyl-2,5-dithiopiperazine)*, cream, m. 180°. C. J. West

Aryl isothiocyanates and ethyl acetonedicarboxylate. David E. Worrall. *J. Am. Chem. Soc.* **62**, 578(1940); cf. *C. A.* **34**, 766[2].—Addn. of 0.05 g.-mole of $CO(CH_2CO_2Et)_2$ to 0.1 g.-mole of pulverized Na in ether and then

0.05 g.-mole of the isothiocyanate, decompn. after several hrs. with cold dil. HCl and crystn. from EtOH or EtOH-C_6H_6 give 3–8 g. of the following derivs. of *2,4-dioxo-5-carbethoxy-6-thiopiperidine-3-thioformic acid;* MeI in EtOH gives the 6-MeS compds., bright yellow. *1-Ph anilide,* CO.NPh.CS.CH(CO_2Et).CO.CHCSNHPh, m. 188–9° (all these derivs., m. with decompn.) (*6-MeS compd.,* m. 148–9°); *1-m-tolyl m-toluide,* m. 125–6° (*MeS compd.,* m. 137–8°); *1-p-anisyl aniside,* m. 162–3° (*Me compd.,* m. 152–3°); (*1-p-phenetyl phenetide,* m. 195–7° (*MeS compd.,* m. 114–15°); *1-p-bromophenyl p-bromoanilide,* m. 179–81° (*MeS compd.,* m. 152°). The (*2',4'-dioxo-5'-carbethoxy-6'-thiopiperidyl*)*benzothiazoles* ppt. from glacial AcOH by the action of Br; the m. ps. were too high to be recorded with a H_2SO_4 bath: *1'-Ph, 1'-m-tolyl-4*(or 6)*-methyl, 1'-p-anisyl-5-methoxy, 1'-p-phenetyl-5-ethoxy* and *1'-p-bromophenyl-5-bromo.* C. J. West

ms-**Derivatives of acridine. XIV. Alkylation of 9-chloroacridines.** N. S. Drozdov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1456–7(1939); cf. Cherntsov and Drozdov, *C. A.* **34**, 1667[6,7].—Alkyl esters of *p*-$MeC_6H_4SO_3H$ and derivs. of 9-chloroacridine when heated 1 hr. at 130° give good yields of alkylacridones (cf. *C. A.* **32**, 568[8]). The reaction probably proceeds by decompn. of unstable intermediate 9-chloro-10-alkylacridinium *p*-toluenesulfonates. In this way were prepd. 10-methyl-, m. 198–9°, 2,10-dimethyl-, m. 150–1°, and 3-chloro-7-methoxy-10-methylacridone, m. 245–6°.

Chas. Blanc

Local anesthetics of the 4-quinolinecarboxylic acid series. I. S. I. Lur'e. *J. Gen. Chem.* (U. S. S. R.) **9**, 287–98(1939).—To study the effect of the ester group and of substituents in the 2-position on the anesthetic properties, a no. of 2-substituted cinchoninic acids (as Na salts) are condensed with $Et_2N(CH_2)_2Cl$ (I), $Et_2N(CH_2)_3Cl$ (II), *Et*$_2$*NCH*$_2$*CMe*$_2$*CH*$_2$*Cl* (III) and *Et*$_2$*NCH*$_2$-(*CHMe*)$_2$*Cl* (IV) in xylene to form the corresponding dialkylaminoalkyl esters. The m. ps. of the 2-EtO (V), 2-PrO (VI), 2-BuO (VII), 2-iso-BuO (VIII) and 2-iso-AmO (IX) derivs. of cinchoninic acid are 144–5°, 136–7°, 98° (111°), 145–6° and 120–2°, resp. The m. ps. of the diethylaminoethyl esters of cinchophen (X), V, VI, VII, VIII and IX, as the HCl salts, are 185–6°, 170.0–0.5°, 169.5–170.5°, 149°, 152–3° and 160–1°, resp. The m. ps. of the *diethylaminopropyl esters* of X and VI, as *HCl salts,* are 178–9° and 136°, resp. II with V gives a hygroscopic *HCl salt; amine,* as *citric acid salt,* m. 99–100°. II with VII gives the *di-HCl salt,* amorphous mass; free *amine,* yellow oil, $b_{2.5}$ 207–11°, whose *citric acid salt,* m. 115–16°. The m. ps. of the *β,β-dimethyl-γ-diethylaminopropyl esters* of V, VI, VII and X, as *HCl salts,* are 115–16° (free *amine,* yellow oil, b_3 207°), 123–4°, 137–8° (free *amine,* b_3 207–10°) and 176–7° (*amine,* cream, m. 44–6°), resp. IV with VII gives the corresponding *ester* (XI), yellow oil, b_3 214–17°; *citric acid salt,* m. 78–9°. *α,α*-Dimethyl-*β*-diethylaminopropionaldehyde, b. 173–9°, reduction with Na-Hg in AcOH gives the *alc.*, b_{14} 90–2°, which with $SOCl_2$ in C_6H_6 gives (69% yield) III, b_{10} 72°. MeCOEt with paraformaldehyde and Et_2NH.HCl in EtOH gives (70% yield) *MeCOCHMeCH*$_2$*NEt*$_2$, b_{15} 78–80°, from which is obtained the secondary *alc.*, $C_9H_{21}NO$, b_{12} 84°. The alc. with $SOCl_2$ gives (80% yield) IV, b_{12} 78–9°. All of the above esters exert a strong anesthetic action when placed on the cornea, the potency depending somewhat on the structure of the 2-alkoxy group but chiefly on the ester group, increasing with the no. of C atoms in the side chain. The most toxic of the esters, whose toxicities lie between those of novocaine and cocaine, is the diethylaminopropyl ester of VII. Nearly all of the esters are irritating to the mucous membranes, those with a 5-C ester group producing the most intense irritation.

John Livak

Isoquinoline series. III. 1-Chloroalkylisoquinolines and their derivatives. B. B. Dey and T. R. Govindachari. *Arch. Pharm.* **277**, 177–92(1939); cf. *C. A.* **32**, 171[8].—The Cl of 1-(*α*-chloroalkyl)-3,4-dihydroisoquinolines can be exchanged for OH or CN, but not for NH_2 or NR_2; it is eliminated by hydrogenation. Piperonal (20 g.) yields successively 3,4-methylenedioxyphenylacrylic (22 g.), m. 247°, and -propionic acid (17 g.), m. 87°, the amide (13 g.), m. 122°, of the latter acid, and homopiperonylamine (I) (6.5 g.), b_{10} 200°. $(CH_3ClCO)_2O$ (modified prepn. from AcOH and PCl_5), b_{25} 128–30°, in $CHCl_3$ then gives *chloroacethomopiperonylamide,* m. 71°, which with hot $POCl_3$ yields *6,7-methylenedioxy-1-chloromethyl-3,4-dihydroisoquinoline* (II), m. 109° (decompn.) (*HCl salt,* m. 190°; *methiodide,* m. 230°; *picrate,* m. 180°). Zn dust in 2 *N* H_2SO_4 eliminates the Cl from II, yielding *6,7-methylenedioxy-1-methyl-1,2,3,4-tetrahydroisoquinoline,* an oil (*picrate,* m. 185°; *HBr salt,* m. 268°), also obtained from I by successive treatment with Ac_2O, $POCl_3$, and Zn-H_2SO_4. Only resins are obtained from II with NH_3 or NH_2Ph, and Mg does not react. With NaOH-EtOH at 50° II gives *6,7-methylenedioxy-1-hydroxymethyl-3,4-dihydroisoquinoline,* m. 215° (acetate and benzoate could not be purified), reconverted into II by $POCl_3$ at 100°. With KCN-EtOH, II gives *6,7-methylenedioxy-1-cyanomethyl-3,4-dihydroisoquinoline* (III), m. 187° [*vanillylidene,* sinters at 230°, m. 250° (*HCl salt,* sinters at 250°, m. 255°), *benzylidene,* sinters at 160°, m. 180° (*HCl salt,* m. 204°), and *piperonylidene derivs.,* m. 268–9° (*HCl salt,* sinters at 259°, m. 265°), hydrolyzed when reduced, even by H_2-Pt], reduced by Zn dust in 4 *N* H_2SO_4 to *6,7-methylenedioxy-1-cyanomethyl-1,2,3,4-tetrahydroisoquinoline,* m. 93° (*picrate,* m. 190°; *HCl salt,* m. 254°; *methiodide,* m. 215°; *Ac,* m. 139°, and *NO derv.*, m. 138°). III reacts with H_2O_2 to yield AcOH and *1-keto-6,7-methylenedioxy-1,2,3,4-tetrahydroisoquinoline,* m. 183° (cf. Perkin, *J. Chem. Soc.* **57**, 992(1890)), reduced by Na-EtOH to 6,7-methylenedioxy-1,2,3,4-tetrahydroisoquinoline, which is also obtained from $CH_2O_2C_6H_3(CH_2)_2NHCHO$ by $POCl_3$, followed by Zn-H_2SO_4. 3,4-$CH_2O_2C_6H_3(CH_2)_2NHCOCH$-MeOH (prepd. from the base by HOCHMeCO_2H at 180°) and $POCl_3$ give *6,7-methylenedioxy-1-α-chloroethyl-3,4-dihydroisoquinoline,* an oil (*picrate,* m. 184°; *methiodide,* m. 275°), reduced by Zn-H_2SO_4 to *6,7-methylenedioxy-1-ethyl-1,2,3,4-tetrahydroisoquinoline,* an oil (*picrate,* m. 207°; *HCl salt,* m. 240°), which is also obtained from I and $(EtCO)_2O$, followed by $POCl_3$ and Zn-H_2SO_4. The 1-*α*-NH_2 deriv. could not be prepd. By methods outlined above are obtained *6,7-methylenedioxy-*, an oil (*picrate,* m. 178°), and *6,7-dimethoxy-1-α-cyanoethyl-3,4-dihydroisoquinoline* (*picrate,* m. 186°), *6,7-dimethoxy-1-α-chloroethyl-3,4-dihydroisoquinoline,* m. 175° (*methiodide,* m. 260°), and *6,7-dimethoxy-1-ethyl-1,2,3,4-tetrahydroisoquinoline,* an oil (*picrate,* m. 186°; *HCl salt,* m. 214°).

B. C. P. A.

Carbethoxy substitution on the nitrogen atom of barbitals. Harold J. Termey and Glenn W. Humphreys, Jr. *St. Bonaventure Sci. Studies* **8**, No. 2, 9–16(1940).—*N*-Substituted barbitals are suggested as possible new derivs. which have pharmacol. activity. 1-Na 5-ethyl-5-phenylbarbiturate (42 g.) refluxed with 33.4 cc. of $ClCO_2Et$ (with agitation) for 4 hrs. gave a milky uniform mixt. which on diln. with 400 cc. of H_2O, filtration and sepn. gave 40 cc. of an immiscible yellowish brown oil. This oil crystd. on standing into rosettes of needles, m. 69.5–70°. Alc. extn. of the residue (from the above H_2O diln. and filtration) followed by evapn. gave crystals of the same m. p. as the crystals obtained from the oil. Repeated crystn. from alc. gave a m. p. of 73–3.5° (cor.) for the purified product. Analysis of this product gave C 57.77, H 5.13, N 7.55, O 29.55% (by difference), mol. wt. 310.15, neutralization equiv. 384. Except for the mol. wt., these values agree fairly closely with those calcd. for 1,3-dicarbethoxy-5-ethyl-5-phenylbarbituric acid. Min. effective dose (orally to mice) 2000–2200 mg./kg., min. lethal dose 2400 mg./kg. where the tests were made 8 months after prepn. Tests made 14 months after prepn. showed no pharmacol. response. R. F. D.

2-Methyl-3-hydroxyethyl-*N*-(2-methyl-4-amino-5-pyrimidylmethyl)pyridinium bromide, a heterovitamin B_1. Paul Baumgarten and Alfred Dornow. *Ber.* **73B**, 44–6 (1940).—In view of the frequently observed similarity in phys. and chem. and also in physiol. properties of thia-

zoles and the corresponding pyridine compds. it was to be expected that replacement of the thiazole component in vitamin B_1 (I) by a corresponding pyridine complex would give a *heterovitamin* B_1 (II) with similar, though perhaps quantitatively different, physiol. activity. 2-Methylpyridine-3-carboxylic acid-HCl (5 g.), refluxed in 5 parts $SOCl_2$ until dissolved, freed from the excess of $SOCl_2$ by distn. *in vacuo*, and gradually treated in ether suspension at 0–5° with 3.25–3.5 mols. CH_2N_2 in ether, gave 3.2 g. *2-methyl-3-diazoacetylpyridine*, m. 58–9° (*picrate*, m. 147°), which, cautiously heated in AcOH until the evolution of N ceased and refluxed 10–15 hrs. with amalgamated Zn and concd. HCl, yielded *2-methyl-3-hydroxyethylpyridine* (III), b_{12} 142–3°, b_{18} 147.5°, hygroscopic oil smelling like poppyseed oil (*methiodide*, m. 135°; *benzoate picrate*, yellow, m. 190–200° (decompn.)). Allowed to stand overnight at about 40° with 2-methyl-4-amino-5-bromomethylpyrimidine-2HBr in $MeNO_2$, 0.4 g. II gave 0.25 g. *2-methyl-3-hydroxyethyl-N-(2-methyl-4-amino-5-5-pyrimidylmethyl)pyridinium bromide-HBr*, $C_{14}H_{20}ON_4Br_2$ (II), m. 246–7°. II was physiologically active in the pigeon test but only $^1/_{26}$th as much as I. In the meantime the prepn. of II by another method has been reported by Schmelkes and Joiner (*C. A.* **33**, 8615[8]). C. A. R.

Formation of aldimine-amine complexes in the hydrogenation of aminonitriles by catalytic nickel. Marcel Delépine and K. A. Jensen. *Bull. soc. chim.* **6**, 1663–70 (1939); cf. *C. A.* **32**, 8427[7].—Three new examples of the transformation of the CN function into a CH:NH group in the hydrogenation of 2 aminonitriles and a cyanophenol by Raney Ni are reported. The aldimines sep. out in complexes due to participation of Ni in the reaction. A mixt. of 2 g. of 2-ethyl-4-amino-5-cyanopyrimidine (I), m. 207°, 2 g. Raney Ni, 25 cc. alc., 25 cc. of 20% NH_4OH, 2 g. $NiCl_2.6H_2O$ and 200 g. H_2O took up 313 cc. H in 50 min., yielding a yellow ppt. Extn. with boiling dil. AcOH gave 0.15 g. of aldehyde (II) and 0.10 g. of oxime (III). The mother liquors were heated with an excess of NH_4OH on the steam bath and yielded 0.50 g. of an orange complex (IV). The filtrate from the yellow ppt. was concd., acidified with HCl and filtered. The mother liquors from the cryst. NH_4Cl were pptd. with picric acid and gave 1.1 g. of long needles of a diamine dipicrate (V). Repetition of the hydrogenation with 5 g. I and proportional parts of the other ingredients gave a fixation of 1.4 mol. H in 100 min. and yielded 0.75 g. II. A 3rd expt. with 5 g. I but with limited solvents and operation at 3 atm. gave 1.05 g. II, 1.20 g. IV and 3.65 g. V. II, $C_7H_9N_3O$, m. 164° (*2,4-dinitrophenylhydrazone*, m. 290° (decompn.)), when shaken for 24 hrs. with Raney Ni, alc. 20% NH_4OH and H_2O gave IV, $(C_7H_9N_4)_2Ni.4H_2O$, on extn. with boiling 70% alc. and air drying. V, $C_7H_{12}N_4.2C_6H_2(NO_2)_3OH$, m. 240° (decompn.). Catalytic hydrogenation of 2 g. of *o*-$H_2NC_6H_4CN$ with 1.65 mol. H gave the diamine $H_2NC_6H_4CH_2NH_2$ but the complex isolated by Pfeiffer (*C. A.* **32**, 512[7]) was too sol. in $PhNO_2$ to permit its isolation. The reduction was repeated and limited to 1 mol. H. The red ppt. formed was extd. with boiling $PhNO_2$ and gave red crystals of $C_{14}H_{14}N_4Ni$ (VI), corresponding to the product prepd. by Pfeiffer from *o*-$H_2NC_6H_4CHO$ (VII). VII behaves in a more complicated manner on reduction with Raney Ni in the presence of NH_4OH for, in addn. to the formation of VI, $CHCl_3$-sol. compds. are formed consisting of amino-aldehyde condensation products which have formed imines and produced a Ni complex. A mixt. of 5 g. of 2-HOC_6H_4CN, 4 g. Ni, 50 cc. MeOH, 250 cc. H_2O, 6 g. $NiCl_2.6H_2O$ and 25 cc. of 20% NH_4OH was reduced with 1070 cc. H in 140 min. The product was extd. with boiling pyridine and dild. with an equal vol. of MeOH, yielding red crystals identical with the combination prepd. from 2-HOC_6H_4-CHO, NH_4OH and a Ni salt. All the expts. show that Ni is not restricted to a catalytic role in these reductions but also takes part in the chem. reactions by participating in complex formation. C. R. Addinall

Series of 2-methyl-5-alkyl-4,6-dihydroxypyrimidines. Livingston P. Ferris II and Anthony R. Ronzio. *J. Am. Chem. Soc.* **62**, 606–7(1940).—Acetamidine-HCl ($^1/_8$ mol.), added to 150 cc. abs. EtOH and 3.3 g. Na, followed by 0.05 mol. of $CH_2(CO_2Et)_2$ or its monoalkyl deriv., and allowed to stand 2–3 days, the soln. exactly neutralized with concd. HCl, H_2O added to dissolve the NaCl, the undissolved pyrimidine filtered, decolorized in boiling AcOH and repptd. with Et_2O, gives the following 2-methyl-5-alkyl-4,6-dihydroxypyrimidines, the group in position 5 being: *H* (I) (43%), *Me*, (18%), *Et* (15%), *Pr* (22%), *Bu* (II) (33%) and *Am* (26%). These do not show definite m. ps. but sublime between 260–350°; in a sealed tube they decomp. without melting. The absorption spectra curves are given for I in H_2O, HCl and KOH and for II in EtOH. C. J. West

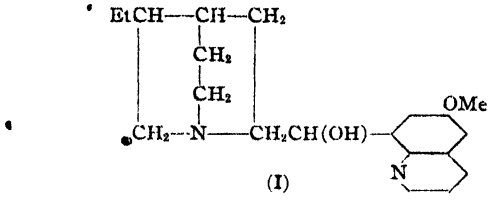
Pyrazine series. II. Preparation and properties of aminopyrazine. Stanley A. Hall and Paul E. Spoerri. *J. Am. Chem. Soc.* **62**, 664–5(1940); cf. *C. A.* **32**, 2535[8].—Pyrazinecarboxylic acid, m. 225° (decompn.), results in 70% yield by heating pyrazine-2,3-dicarboxylic acid at 210° in a vacuum sublimation chamber; Me ester, m. 59°; amide (I), m. 189° (Brit. pat. 451,304, *C. A.* **31**, 2191). Addn. of 6.9 g. of I to 4.2 g. of Cl and 13.8 g. NaOH in 150 cc. ice and H_2O gives, on standing overnight, 3.5 g. of a product (II), the alk. soln. of which evolves CO_2 on acidification; evapn. of the AcOEt ext. gives 1.5 g. aminopyrazine (III), sublimes at 100° and 3 mm., m. 117–18° (Gabriel and Sonn, *C. A.* **2**, 851 give 110–17°); the picrate decomps. 214–50°; *Ac deriv.*, m. 133°; the yield of III as such and as picrate is 55%. II is *Na pyrazinecarbamate*, $C_5H_4N_3O_2Na$, blackens 275°; its formation confirms Mohr's theory of the mechanism of the Hofmann reaction (*J. prakt. Chem.* **73**, 117, 229(1906)) and also shows the characteristic stabilizing effect of the pyrazine ring upon certain functional groups. C. J. West

Coloration phenomena of derivatives of 2-thio-3-aryl-4-hydroxy-1,2,3,4-tetrahydroquinazolines. Lucie Manolescu-Pavelescu. *Bull. sect. sci. acad. roumaine* **20**, No. 6, 28–9(1938)(in French); cf. *C. A.* **33**, 4994[8].—Derivs. of 2-thiotetrahydroquinazoline with *o*-tolyl or *p*-tolyl radicals in position 3 give yellow mercaptanic salts with $AgNO_3$. A short review of some of the data in *C. A.* **33**, 4994[6] is also given. George Ayers

New series of alkyl derivatives of *asym*-tetrahydro-oxothiotriazines. Eugène Cattelain. *Compt. rend.* **210**, 301–3(1940); cf. *C. A.* **34**, 991[3].—2-Alkylthiosemicarbazides combine with phenylpyruvic acid to form 2-alkylthiosemicarbazones (I): $PhCH_2COCO_2H + SC(NH_2)NRNH_2 = PhCH_2C(CO_2H):NNRCSNH_2$ (I) + H_2O, which by further dehydration under the influence of cold dil. alkali readily cyclize to benzyltetrahydroöxothiotriazines, $PhCH_2C{:}N.NR.CS.NH.CO$ (II). The I are very sol. in EtOH, $COMe_2$ and Et_2O, insol. in cold, sol. in hot H_2O and decomp. alkali carbonates. With R = Me, I m. about 250° but sublimes at 230–40° (partial decompn.); I with R = $PhCH_2$, m. 174°. The II are insol. in H_2O, slightly sol. in cold, very sol. in hot EtOH, sol. in dil. alkali, and repptd. by CO_2; II with R = Me, m. 153–5°; R = $PhCH_2$, m. 123°. C. A. Silberrad

Synthesis of isomers of hydroquinine. I. (5-Ethyl-2-quinuclidyl)(6-methoxy-8-quinolyl)methanol. M. V. Rubtsov. *J. Gen. Chem.* (U. S. S. R.) **9**, 1493–1506 (1939).—The physiol. effect of the transfer of the quinuclidyl group from the 4- to the 8-position in the quinine mol. is studied. I was prepd. by a somewhat modified method of Rabe, *et al.* (*C. A.* **26**, 475), for the synthesis of hydroquinine. Et 6-methoxyquinoline-8-carboxylate and benzoylhomocincholoipon Et ester were condensed by the Claisen method to the *keto ester*, m. 54–6°; sapon. with 17% HCl gave *isohydroquinotoxine* (*$PtCl_4$ salt*, m. 282–5° (decompn.)). The toxine reacts with 2 mols. HBr to give the *di-HBr salt*, m. 193–4° (decompn.). The dibromide was cyclized into *isohydroquininone*, m. 152–3°, by the action of 10% Na_2CO_3 and C_6H_6. Reduction of the ketone with Al isopropylate in dry C_6H_6 gave a mixt. of optical isomers of the isohydroquinine (I). To sep. the stereoisomers, these were converted into bitartrates and extd. with $CHCl_3$ and a little H_2O. The distn. residue was decompd. with dil. Na_2CO_3

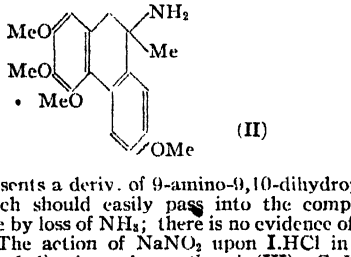
and recrystd. from ether, giving an isomer of hydroquinine, m. 177.5–8°, $[\alpha]_D^{20}$ 135.9°. The aq. ext. of bitartrates with Na_2CO_3 formed a glass-like mass, m. below 50°, $[\alpha]_D^{20}$ 64.3°. If analyzed for I, but was a mixt. of stereoisomers, since its picrolonate gave a base with lower sp. rotation ($[\alpha]_D^{20}$ 52°). The compds. when tested on finches infected with *Plasmodium praecox*, showed no antimalarial action. The anesthetic action was retained. 30 references.



(I)

Chas. Blanc

Colchicine and related compounds. I. Some observations on the structure of colchicine. A. Cohen, J. W. Cook and E. M. F. Roe. *J. Chem. Soc.* **1940**, 194–7.—On the basis of Windaus' structure for colchicine (*C. A.* **18**, 3374) the degradation product colchinol Me ether (I) should have the formula



(II)

but this represents a deriv. of 9-amino-9,10-dihydrophenanthrene which should easily pass into the completely aromatic state by loss of NH_3; there is no evidence of such instability. The action of $NaNO_2$ upon I.HCl in 10% AcOH (ice-cooled) gives the *methanol* (III), $C_{19}H_{22}O_5$, b_3 230°, m. 115–16.5° (*p-phenylbenzoate*, m. 146–7°). III could not be oxidized with CrO_3 or $KMnO_4$ with the production of cryst. or acidic products (in 1 case a semicarbazone, m. 149–50°, was isolated). In other expts. there was obtained a *compd.*, m. 133–4°, which appears to be an isomer of III. III does not react in C_6H_6 with $C_6H_4(CO)_2O$ but yields a *H phthalate*, m. 143–4°, on heating the components at 180° for 1 hr. III is not dehydrogenated on heating with $(iso\text{-}Am)_2S_2$ at 210°; it gives a compd. m. 157–60°, which yields a *p-phenylbenzoate*, m. 108–9°. *N*-Acetylcolchinol Me ether (IV) is recovered unchanged after heating with Pt black at 280°. The ultraviolet absorption curves of III and IV in EtOH are given. The curve for IV is very similar to that for 9,10-dihydrophenanthrene; that for III has much the same intensity but the band is considerably displaced toward the visible region; it is evident that III is not a phenanthrene deriv. If I is a dihydrophenanthrene deriv., the tetra-MeO deriv. should be 2,3,4,6- or 2,3,4,7-tetramethoxy-9-methylphenanthrene, whose synthesis is being undertaken. There is the possibility that the action of HNO_2 upon I is attended by mol. rearrangement. II. **Synthesis of a simple analog of *N*-acetylcolchinol methyl ether.** J. W. Cook and Lewis L. Engel. *Ibid.* 198–200.—3,4,5-$(MeO)_3C_6H_2CHO$ (I) (9.8 g.), 9 g. of $PhCH_2CO_2Na$ and 25 cc. Ac_2O, heated at 150–60° for 5 hrs., give 5.5 g. of *α-phenyl-β-(3,4,5-trimethoxyphenyl) acrylic acid*, m. 186–7°; *p-phenylphenacyl ester*, m. 123.5–4.5°; hydrogenation in HOAc with Pd black for 4 hrs. at room temp. give 3.9 g. *α-phenyl-β-(3,4,5-trimethoxyphenyl)propionic acid* (II), $b_{0.5}$ 215–19°; *p-phenylphenacyl ester*, m. 94–5°. Condensation of 6.9 g. of I and 4.1 g. $PhCH_2CN$ by shaking with aq. NaOH in EtOH gives 6.8 g. of *α-cyano-α-phenyl-β-(3,4,5-trimethoxyphenyl)ethylene*, m. 77–9°; reduction by H and Pt oxide, followed by boiling with 25% EtOH-KOH for 11 hrs. gives II. Nitration expts. with II lead to profound decompn. of the acid. I (9.8 g.), 9.4 g. *p*-$MeOC_6H_4CH_2CO_2Na$ and 25 cc. Ac_2O, heated 5 hrs. at 140–60°, give 4.9 g. of *α-p-anisyl-β-(3,4,5-trimethoxyphenyl)acrylic acid* (III), m. 207–8°; *Et ester*, m. 84–5°; *p-phenylphenacyl ester*, m. 169–70°. Neutral products from the prepn. of III are *3,4,5,4'-tetramethoxystilbene*, yellow, m. 159.5–60.5°, and the *anhydride* of III, m. 143–4°. Reduction of III with PtO_2 at 60–70° gives the corresponding *propionic acid* (IV), m. 95.5–6.5°; *p-phenylphenacyl ester*, m. 94–5°. I (4.9 g.) and 3.7 g. of *p*-$MeOC_6H_4CH_2CN$ with aq. NaOH in EtOH give 8.1 g. of *α-cyano-α-p-anisyl-β-(3,4,5-trimethoxyphenyl)ethylene*, m. 114–15°, with a violet fluorescence. Catalytic reduction gives *β-p-anisyl-γ-(3,4,5-trimethoxyphenyl)propylamine* (V), and *α-cyano-α-p-anisyl-β-(3,4,5-trimethoxyphenyl)ethane*, m. 96.5–7.5° (hydrolysis gives IV). V was characterized as the *N-Ac deriv.* (VI), m. 124.5–5.5° (prepd. by heating with Ac_2O and then refluxing with 10% EtOH-KOH for 4 hrs.), the *p-toluenesulfonyl deriv.*, m. 135–6°, and the *β-naphthalenesulfonyl deriv.*, m. 129.5–31°. In a test on mitosis in the liver of the rat 10 mg. of VI gave a completely abnormal nuclear picture and 1 mg. a slightly modified picture; the fatal dose is 100 mg. Thus it seems that VI has something of the biol. properties of alkaloids contg. condensed ring systems.

C. J. West

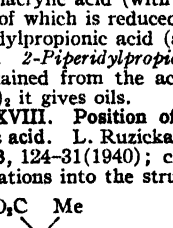
Alkaloids of papaveraceous plants. IV. Alkaloids of Roemeria refracta D. C. Constitution of remerine and synthesis of 2,3-methylenedioxyphenanthrene. R. A. Konovalova, S. Yunusov and A. P. Orekhov. *Bull. soc. chim.* **6**, 1479–85; *J. Gen. Chem.* (U. S. S. R.) **9**, 1507–11 (1939); cf. *C. A.* **33**, 6825[1].—Hofmann degradation of remerine (I) led to the formation of a methylenedioxyphenanthrene (II) of unknown constitution. The synthesis of *2,3-methylenedioxyphenanthrene* (III) was undertaken from 6-nitropiperonal (IV). A mixt. of 20 g. IV (dried at 65–70° and 12 mm.), 16.5 g. of dry $PhCH_2CO_2Na$, and 100 cc. of Ac_2O was heated at 100° for 24 hrs., distd. *in vacuo*, dild. with 200 cc. H_2O and extd. with 700 cc. ether. The ext. was shaken out with 400 cc. of 10% NH_4OH, acidulated with 30% HCl and extd. with ether, yielding 73% (26 g.) of *α-phenyl-6-nitro-3,4-methylenedioxycinnamic acid*, $C_{16}H_{11}NO_6$, m. 199–200°, reduced by NH_3-$FeSO_4$ to the corresponding *6-amino deriv.* (V), m. 207–8°. V (17.4 g.) in 1 l. of 70% alc. was diazotized at 0° by addn. of 200 cc. of 10% H_2SO_4 and 6 g. $NaNO_2$ in 25 cc. H_2O. After stirring for 30 min. at room temp., 35 g. of Cu powder was added. The mixt. was stirred for 2 hrs., filtered the next day, concd. *in vacuo*, crystd. out and extd. with AcOEt, producing 13.4 g. of long, fine needles of *2,3-methylenedioxyphenanthrene-9-carboxylic acid* (VI), $C_{16}H_{10}O_4$, m. 255–6°. A mixt. of 1 g. VI and 3 g. of Cu chromite catalyst in 10 cc. quinoline was boiled for 1 hr. until the evolution of CO_2 ceased completely. The cooled mixt. was dild. with 150 cc. ether and filtered. The filtrate and washings were washed with 10% HCl, 5% NaOH and H_2O. Concn. and recrystn. from alc. gave 0.7 g. of colorless tablets of III, $C_{15}H_{10}O_2$, m. 99–100° (mixed m. p. with II, 50°); *picrate*, m. 149–50°; *di-Br deriv.*, m. 228–9°. The CH_2O_2 group was hydrolyzed by heating 3.4 g. III with 8 g. phloroglucinol and 40 cc. HCl (d. 1.18) in sealed tubes for 5 hrs. at 140–50°. The product was dild. with 40 cc. H_2O, alkalinated with 25% NH_4OH and extd. with ether. The cleavage product was methylated by CH_2N_2 in ether (from 17 g. $MeN(NO)CO_2Et$) and crystd. from alc., yielding 2,3-dimethoxyphenanthrene, m. 130–1° (*di-Br deriv.*, m. 159–60°), and establishing the structure of III. The nonidentity of II and III excludes the positions 2,3 and 6,7 for the CH_2O_2 group in the mol. of I and leaves open the choice between the positions 1,2, 3,4 and 5,6. The acid mother liquors from the sepn. of the HCl salt of I from 70 kg. of *R. refracta*, were alkalinated by 40% NaOH and thoroughly extd. with petr. ether, yielding 4.2 g. of *d*-pseudoephedrine (VII), m. 118–19°, $[\alpha]_D$ 55.55° (HCl salt, m. 182–3°), and 30.5 g. of an oil which, on treatment with alc. $(CO_2H)_2$, gave 12.3 g. of *l*-ephedrine oxalate, m. 239–40°, yielding *l*-ephedrine (VIII), m. 38–9°; HCl salt, m. 216–17°, $[\alpha]_D$ −34.4°. Further working

up of the mother liquors gave final total yields of 16.5 g. VII and 11.2 g. VIII (0.024 and 0.016% of plant wt.). VIII is widely distributed and has previously been reported from *Ephedra*, *Taxus baccata*, *Sida cordifolia*, *Catha edulis* and *Aconitum napellus*, of the Gnetaceae, Taxaceae, Malvaceae, Celastraceae and Renonculaceae, resp. This is the 1st report of the occurrence of VIII in the Papaveraceae. C. R. Addinall

Lupine studies. XV. The alkaloids of Lupinus sericeus Pursh. James F. Couch. *J. Am. Chem. Soc.* **62**, 554–6(1940); cf. *C. A.* **34**, 1024⁶.—The silky lupine, *Lupinus sericeus* Pursh, gives 3.68% of crude alkaloids; extn. with cold Me_2CO and crystn. from hot Me_2CO give spathulatine (I), $C_{32}H_{44}O_6N_4$, with 4.5 mols. H_2O of crystn., m. 233–4° (cf. C., *C. A.* **19**, 289). I and KI in H_2O give the *compd.* $I.3KI$, prisms, m. 260–1°. Passing SO_2 through 2 g. I in 10 cc. H_2O for 2 days gives a brownish oil which has not been identified. Boiling 3 g. I with 10 cc. concd. HCl and 25 cc. H_2O for 6 hrs. gives the *compd.* $C_{16}H_{24}N_2$, a yellow oil, whose *perchlorate* m. 216–17°; it gives a ppt. with $HgCl_2$ and forms a *picrate* m. 214–16°; this is an isomer of spartyrine; the behavior indicates the probability of hydrolysis with subsequent ring closure to form the sparteine skeleton and relates I to the other lupine alkaloids. The Me_2CO mother liquor from I gives a residue which, recrystd. several times from iso-BuAc, gives *nonalupine* (II), $C_{15}H_{24}ON_2$, with 2 mols. of H_2O of crystn., b_{18} 260–70°, m. 91.5–2.5°; dried to const. wt. it m. 235°; recrystn. from H_2O gives the hydrate; $[\alpha]_D^{25}$ −21.3° (EtOH). The $AuCl_3$ *salt*, $II.2HAuCl_4.5H_2O$, yellow needles, m. 177.5–8° (decompn.); *picrate*, m. 185–6°. II does not yield salts with mineral acids or with camphorsulfonic acid; it is not affected by SO_2 in H_2O. Oxidation of II with $KMnO_4$ in cold H_2O gives *hydroxynonalupine*, m. 168.5–70.5°; it is unchanged by SO_2 in H_2O; the *gold salt*, $C_{15}H_{24}O_2N_2.HAuCl_4$, yellow, m. 238–9°. C. J. West

Lupine alkaloids. XVII. Attempted synthesis of allolupinine. K. Winterfeld and F. W. Holschneider. *Arch. Pharm.* **277**, 192–203(1939); cf. *C. A.* **33**, 3799⁸; **34**, 111².—The attempted synthesis failed. The structure of /-lupinine (I) is confirmed by its oxidation (CrO_3) to isomeric *lupinic acids* (*hydrochlorides*, m. 255°, $[\alpha]_D$ 64.25°, and m. 130°, $[\alpha]_D$ −10.25°) (Steinsiek, *Dissertation*, 1928; cf. *C. A.* **22**, 4532). The prepn. of 4 pyridine acids (Winterfeld, *et al.*, *C. A.* **25**, 3005) shows the presence of allolupinine in impure I. 2-γ,γ,γ-Trichloro-β-hydroxypropylpyridine (modified prepn.) and alkali give 2-pyridylacrylic acid (with H_2-Pd-black gives oils), the HCl salt of which is reduced by H_2-Pd-$BaSO_4$ in H_2O to β-2-pyridylpropionic acid (acid chloride could not be obtained). *2-Piperidylpropionyl chloride-HCl*, m. 118–20°, is obtained from the acid-HCl by $SOCl_2$; with $CHNa(CO_2Et)_2$ it gives oils. B. C. P. A.

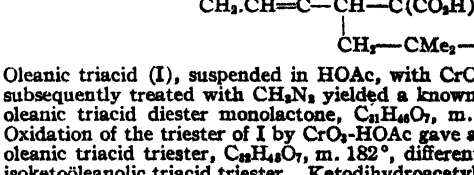
Diterpenes. XXXVIII. Position of the ring double linkage in *d*-pimaric acid. L. Ruzicka and L. Sternbach. *Helv. Chim. Acta* **23**, 124–31(1940); cf. *C. A.* **33**, 4978¹. —Previous investigations into the structure of *d*-pimaric



(I)

acid (I) have elucidated the skeleton, the position of the Me and CO_2H groups and the probable attachment of a vinyl group in the 14-position. It has been shown that the remaining double linkage is in the 7,8 position in the phenanthrene nucleus, thus establishing the structural formula of I. Oxidation of Me *d*-pimarate (II) with BzO_2H and *o*-$HO_2CC_6H_4CO_2H$ showed that the rate of oxide formation depends on the nature of the solvent used. By variation of the reaction temp. approx. 1 atom O could be introduced into II, but the resulting *monoxide*, $C_{21}H_{32}O_3$, $b_{0.05}$ 180°, gave an amorphous product by loss of 1 mol. H_2O, in all expts. attempting the cleavage of the oxide ring. Further investigations of II were abondoned and attention was directed to the reduced Me dihydro-*d*-pimarate oxide (III). MeMgI (40 g. MeI and 7.5 g. Mg) in ether was treated dropwise with 4 g. III in ether, and the mixt. was refluxed for 48 hrs. and decompd. with iced dil. H_2SO_4. The reaction mixt. was extd. with ether and the reaction product (3.5 g.) was heated with 4–5 g. Se for 6–12 hrs. at 330–45°. The product was extd. with ether and distd. in a high vacuum, yielding 1.5–2.0 g. of crude hydrocarbon which was taken up in alc. and treated with trinitrobenzene. Recrystn. of the products from 2 such dehydrogenations gave 4 g. of crude orange-yellow *deriv.* (IV), m. 143–9°, and 20 more recrystns. yielded 130 mg. of trinitrobenzene compd. (V), m. 173–7°. V was taken up in hot hexane, filtered through Al_2O_3 and the liberated hydrocarbon was eluted. The eluate (60 mg.) was recrystd. from MeOH, yielding 1,7,8-trimethylphenanthrene (VI), $C_{17}H_{16}$, m. 145–6° (all m. ps. cor.), identical with the hydrocarbon from dihydrosclarene (*C. A.* **32**, 4992⁸) and from cassaic acid. VI was converted into the trinitrobenzene deriv., m. 193.0–3.5°, also identical with the corresponding deriv. of the 1,7,8-trimethylphenanthrene from dihydrosclarene and cassaic acid. The mother liquors from the recrystn. of IV gave yellow needles of pimanthrene trinitrobenzene deriv., $C_{32}H_{17}N_3O_6$, m. 158.0–60.5°. III (0.5 g.) in 10–20 cc. anhyd. ether was satd. with dry HCl. Recrystn. of the reaction product from a mixt. of AcOEt and hexane or from hexane gave colorless rods of *Me 8-chloroisodihydro-d-pimarate*, $C_{21}H_{33}ClO_2$, m. 122–5°, converted, by treatment with MeMgI, decompn. of the Grignard product, Se dehydrogenation, recrystn. through the trinitrobenzene deriv. and decompn. of the latter by filtration through Al_2O_3, into VI. III (3.19 g.) in 20 cc. $CHCl_3$ was treated with 1.6 g. Br in 15 cc. $CHCl_3$ at −10°. The reaction mixt. was evapd. *in vacuo* at low temp., treated with hexane and again evapd. down to remove traces of $CHCl_3$. The residue was taken up in ether, treated with MeMgI, dehydrogenated and purified through the trinitrobenzene deriv., yielding VI. From the findings of previous investigations and the results of the above transformations in which a Me group is attached to a C atom of the ring double-linkage it appears to be highly probable that the ethylenic linkage is situated between the 7- and 8-C atoms of the phenanthrene nucleus. C. R. Addinall

Constitution of acid sapogenins. XV. Hederagenin and oleanolic acid. Zenziro Kitasato. *Acta Phytochim.* (Japan) **11**, 1–25(1939); cf. *C. A.* **33**, 1741⁴.—K. now proposes the following to represent the structure of oleanolic acid (R=Me) and of hederagenin (R=CH_2OH).



Oleanic triacid (I), suspended in HOAc, with CrO_3, and subsequently treated with CH_2N_2 yielded a known ketooleanic triacid diester monolactone, $C_{31}H_{46}O_7$, m. 227°. Oxidation of the triester of I by CrO_3-HOAc gave a ketooleanic triacid triester, $C_{33}H_{48}O_7$, m. 182°, different from isoketoöleanolic triacid triester. Ketodihydroacetyloleanolic ester (II) was obtained by treating acetyloleanolic ester (III) in HOAc with perhydrol. II with CrO_3-H_2SO_4-HOAc (IV) gave a diketolactone, $C_{32}H_{46}O_6$, m. 286°, difficultly sol. in ether. Under like conditions III yielded the same compd. A diketohydroxylactone, $C_{32}H_{46}O_7$, decompg. 286°, resulted from the action of IV on ketoacetyloleanolic ester. Ketodiacetylhederagenin ester with IV gave a diketohydroxylactone, $C_{36}H_{48}O_9$, m. 274°. Treatment of diacetylhederagenin ester with IV gave a diketo acid (V), $C_{30}H_{46}O_7$, m. 267°, which gave a green color with H_2SO_4. CH_2N_2 in ether converted V

into the ester (VI) $C_{31}H_{48}O_7.0.5H_2O$, m. 210°. H_2SO_4 gave with it a green color, by warming becoming violet-brown. Ac_2O and NaOAc produced from VI a di-Ac deriv., $C_{35}H_{52}O_9$, m. 229–30°, giving the color reactions of VI and difficultly sol. in ether. When the substance obtained by pptg. the mother liquor from VI with H_2O was acetylated a neutral product, probably a lactone, $C_{34}H_{48}O_8$, m. 285°, resulted, which gave a bright yellow color with hot conc'd. H_2SO_4. Dehydroacetyloleanolic acid with IV yielded an acid, which with CH_2N_2 gave $C_{34}H_{50}O_8$, m. 256°, not identical with acetyloleanolic diacid ester lactone (VII), or its iso form. The pentacarboxylic monolactone tetraester, resulting from VII by oxidation, with 50% MeOH-KOH yielded an isomer, m. 198–200°. Ketoacetyloleanolic acid lactone brominated in HOAc gave $C_{32}H_{47}O_6Br$ (VIII), m. over 300°. The free acid with like treatment produced $C_{32}H_{47}O_4Br$ (IX), m. 240–5° (decompn.). ψ-Ketoacetyloleanolic acid (X) similarly treated yielded $C_{32}H_{45}O_6Br$ (XI), m. 256–7° (decompn.), not identical with the product from the ketolactone. When ψ-ketohederagenin was subjected to similar treatment it gave a monobromolactone (XII) $C_{30}H_{45}O_5Br$, m. 247° (decompn.). VIII with Zn dust and boiling HOAc gave a ketodihydroacetyloleanolic acid, $C_{32}H_{50}O_5$, m. over 300°. This yielded with CH_2N_2 a known ester, $C_{33}H_{52}O_5$, m. 193°. IX by a like reduction gave an acid, $C_{32}H_{52}O_5$, m. 250° (decompn.), which yielded an ester, $C_{33}H_{52}O_5$, m. 272°, $[\alpha]_D^{28.5}$ −39° in $CHCl_3$. X was regenerated from XI by Zn and HOAc. When XII was reduced as above and the product methylated and acetylated it gave the known ψ-ketodiacetylhederagenin Me ester, $C_{34}H_{52}O_2$, m. 222°. VIII with MeOH-KOH (XIII) gave $C_{30}H_{46}O_5$, a lactone, m. 265°. With Ac_2O-NaOAc this yielded neutral $C_{32}H_{48}O_6$, m. 232°. With XIII, XI regenerated X. XII yielded hederagenin by Zn and HOAc reduction. The identity of the synthetic with the natural product was established by the prepn. of the Me esters and the di-Ac derivs. of the same, and by comparing the sp. rotations of all of these substances. G. A. Hill

Osage orange pigments. III. Fractionation and oxidation. M. L. Wolfrom and A. S. Gregory. *J. Am. Chem. Soc.* 62, 651-2(1940); cf. *C. A.* 34, 430[2].—Repeated crystn. of the crude pigments of the osage orange alternatively from xylene and 95% EtOH gives 14.1 g. osajin (I) and 15.8 g. pomiferin (II), indicating that the 2 pigments are probably present in about equal amts. The m.-p. diagram of I and II is given. I and Me_2SO_4 with KOH in Me_2CO give the *di-Me ether* (III), m. 118.5°. Oxidation of III with alk. H_2O_2 gives *p*-$MeOC_6H_4CO_2H$; the tri-Me ether of II gives 3,4-$(MeO)_2C_6H_3CO_2H$. C. J. West

Constituents of certain species of Helenium. III. The ester nature of tenulin. E. P. Clark. *J. Am. Chem. Soc.* 62, 597-600(1940); cf. *C. A.* 33, 6844[9].—Tenulin (I) in 10 cc. Me_2CO, 10 cc. H_2O and 8 cc. 30% H_2O_2, heated to boiling and treated gradually with 5 cc. of 10% NaOH and 10 cc. H_2O, gives 0.57 g. *tenulinic acid* (II), $C_{15}H_{20}O_7$, m. 343–4°, η_α 1.507, η_γ 1.595. Isotenulin (III) gives the same acid. *Me ester* of I, m. 209°. Oxidation of 3 g. of I in 50 cc. Me_2CO and 25 cc. H_2O with 300 cc. 1% aq. $KMnO_4$, followed by addn. of 3.3 g. cryst. $KMnO_4$, gives 1.8 g. of *acetyltenulinic acid* (IV), with 0.5 mol. of H_2O, m. 245° (decompn.); from AcOH it m. 234–5°; η_ω 1.544, η_ϵ 1.552; IV also results from II and Ac_2O in C_5H_5N and on hydrolysis with 10% NaOH it yields II. *Me ester* of IV, m. 259–60°. III (1 g.) in 4 cc. conc'd. H_2SO_4, heated 1 min. at 90°, gives 0.3 g. of *desacetylisotenulin* (V), $C_{15}H_{20}O_4$, m. 255°; the acid mother liquor contains AcOH; V was previously obtained as a by-product in the prepn. of III; Ac_2O yields IV. Dihydrotenulin yields the *desacetyl deriv.*, m. 203°; 10 or 50% aq. KOH may also be used as the hydrolyzing agent; this is not attacked by $KMnO_4$ or alk. H_2O_2 and therefore the formation of II from I involves the double bond of I. Distn. of I gives *pyrotenulin*, $C_{13}H_{16}O_3$, m. 235–6°. I contains a double bond, an Ac_2O group and a HO and a CO group, the last 2 being sterically hindered. *H. quadridentatum* contains helenalin and *H. montanum* contains I. C. J. W.

The preparation of canavanine from Canavalia obtusifolia. M. Damodaran and K. G. A. Narayanan. *Biochem. J.* 33, 1740–2(1939).—Canavanine was readily prepd. in pure form from the seeds of this plant in yields above 20 g. per kg. of fat-free seed meal. The method of Kitagawa and Yamada (*C. A.* 27, 1020) was followed except for a preliminary treatment of the crude canavanine soln. with basic Pb acetate. E. W. Scott

Preparation and degradation of lithocholic acid. Willard M. Hoehn and Harold L. Mason. *J. Am. Chem. Soc.* 62, 569–70(1940); cf. *C. A.* 32, 5847[1].—Me desoxycholate and 1 equiv. of BzCl in C_6H_6-C_5H_5N at 5° give 87–9% of the *3-Bz deriv.* (I), with 0.5 mol. of Et_2O, m. 78–80°; oxidation with CrO_3 in AcOH at 15° gives *Me 3-benzoxy-12-ketocholanate*, m. 94–5°, which is usually not isolated but transformed into the *semicarbazone* (II), m. 160–2° (95% based on I). Reduction of II with Na in EtOH (7 hrs. at 200°) gives 64.6% of lithocholic acid (III). III also results in 62.5% yield by heating the disemicarbazone of Me 3-benzoxy-7,12-diketocholanate with Na in EtOH at 175° for 6 hrs. The degradation of III by the Wieland and Barbier method was carried out as described for desoxycholic acid; data are given for the intermediates since some of these are not given in the literature: 3-acetoxybisnorcholanyldiphenylethylene, m. 158–60°, $[\alpha]_{4461}^{25}$ 75.5° ($CHCl_3$); 3-acetoxypregnanyldiphenylethylene, m. 150–2°, $[\alpha]_{4461}^{25}$ 140° ± 3° ($CHCl_3$); 1,1-diphenylmethyl(3-acetoxyetiocholanyl)ethylene, m. 158–60°, $[\alpha]_{4461}^{25}$ 398 ± 2° ($CHCl_3$); pregnan-3(α)-ol-20-one, m. 148–9°, $[\alpha]_{4461}^{25}$ 129 ± 3° (EtOH); 21-benzalpregnanolone, m. 228–30°, $[\alpha]_{4461}^{25}$ 181 ± 3° (EtOH); 3-acetoxyetiocholanic acid, m. 226–9°, $[\alpha]_{4461}^{25}$ 86.4 ± 3° (EtOH); etiolithocholic acid (IV), m. 270–2°. Oxidation of IV with CrO_3 gives 84% of dehydroetiolithocholic acid, m. 246–8°; *4-Br deriv.*, m. 190–2° (63.5% yield). Corrections for names in the preceding paper are given as follows: 3,12-diacetoxynorcholanyldiphenylethylene should be *3,12-diacetoxybisnorcholanyldiphenylethylene*, 3,12-diacetoxybisnorcholanyldiphenylethylene should be *3,12-diacetoxypregnanyldiphenylethylene* or *3,12-diacetoxyternorcholanyldiphenylethylene* and 3,12-diacetoxyternorcholanyldiphenylethylene should be *1,1-diphenylmethyl(3,12-diacetoxyetiocholanyl)ethylene;* the previous names included 1 C atom in both the ethylene group and the cholanyl radical. C. J. West

Preparation of Δ^5-pregnene-3,17-diol-20-one from 17-ethynyl-Δ^5-androstene-3,17-diol. Homer E. Stavely. *J. Am. Chem. Soc.* 62, 489–91(1940); cf. *C. A.* 33, 1754[4].—17-Ethynyl-Δ^5-androstene-3,17-diol (1 g.), 500 mg. HgO, 0.3 cc. BF_3-Et_2O and 5 cc. $PhNH_2$, allowed to stand at room temp. for 1 week, the $PhNH_2$ removed by steam distn., the residue satd. with H_2S and, after standing overnight, extd. with Et_2O and crystd. from aq. MeOH, give 500 mg. of *Δ^5-pregnene-3,17-diol-20-one anil* (I), m. 148°, $[\alpha]_D^{25}$ −196 ± 2° (12.3 mg. in 2 cc. $CHCl_3$), probably identical with that of Goldberg and Aeschbacher (*C. A.* 34, 1330[7]); $HgCl_2$ may also be used as the catalyst but the above method of purification is preferable to that of G. and A. I seems to be hydrolyzed on standing in aq. MeOH, for after 10 days the mother liquor of I yields *Δ^5-pregnene-3,17-diol-20-one* (II), m. 161–3°; however, the hydrolysis is not complete even on prolonged boiling; apparently an equil. between I and II is established. Sepn. of the II from the mixt. is difficult but after acetylation it is possible to sep. the sparingly sol. acetate of I. II (50 mg.) was acetylated in C_5H_5N and Ac_2O, the solvents removed and the residue heated with 50 mg. $NH_2OH.HCl$, 50 mg. AcOK and 10 cc. EtOH for 2 hrs., giving *3-acetoxy-Δ^5-pregnen-17-ol-20-one oxime* (III), m. 254–6°. Refluxing 2 g. I with aq. MeOH for 28 hrs. gives a mixt. m. over a 30° range; acetylation and crystn. from a large vol. of MeOH give 900 mg. of *3-acetoxy-Δ^5-pregnen-17-ol-20-one anil*, m. 232–4°, $[\alpha]_D^{25}$ −176 ± 2° (13 mg. in 2 cc. $CHCl_3$); the mother liquors yield 520 mg. of *3-acetoxy-Δ^5-pregnen-17-ol-20-one* (IV), m. 196–8°, $[\alpha]_D^{25}$ −61 ± 1.5° (9.2 mg. in 2 cc. $CHCl_3$). Oxidation of IV with CrO_3 (after addn.

of 43 mg. Br to 100 mg. IV) by heating 4 hrs. at 45° gives 3-acetoxydehydroandrosterone, isolated as the semicarbazone. The oxime from IV was identical with III. When sapon. of the Ac group of IV was attempted by heating with MeOH-KOH the alc. so obtained was 3,17-dihydroxy-18-keto-Δ^5-chrysopregnene, previously obtained by the direct hydration of 17-ethynyl-Δ^5-androstene-3,17-diol (S., *C. A.* **33**, 1754[4]). I and IV appear to be sensitive to dil. acid also. The influence of both acid and alkali is being studied more extensively. C. J. West

Sterols. LXXXVII. Cholesterol and sitosterol derivatives. Russell E. Marker and Ewald Rohrmann. *J. Am. Chem. Soc.* **62**, 516–17(1940); cf. *C. A.* **34**, 1681[3].—Oxidation of 2 g. cholesterol (I) in 150 cc. AcOH with 75 cc. *N* aq. $KMnO_4$ and 75 cc. AcOH (6 hrs. at room temp.) gives 1.6 g. of a *cholestan-5-ol-3,6-dione* (II), m. 248–51°, which is probably identical with that obtained by oxidizing with CrO_3 the alk. $KMnO_4$ oxidation product of I. Cholesteryl acetate at room temp. or at 45–50° gives a *3-acetoxy-5-hydroxy-6-ketocholestane*, m. 231–3° (*oxime*, m. 204–6°); there is apparently little tendency for ring B to open between C-5 and C-6. Sitosterol gives similar *compds.*, m. 240° and 251°. Neocholestene and $KMnO_4$ in AcOH give 2,3-cholestanedicarboxylic acid (III), m. 193–5°; β-cholestanol at room temp. gives cholestanone (IV), m. 126–8°; at 55° (3 hrs.) the latter gives a mixt. of III and IV. Heating II and $KHSO_4$ in a high vacuum at 150–80° gives Δ^4-cholestene-3,6-dione, m. 121–3°. Sitosteryl chloride and CrO_3 in AcOH give *7-ketositosteryl chloride* (V), m. 155–6°. Refluxing V with $(iso\text{-}PrO)_3Al$ in iso-PrOH for 12 hrs. gives *7-hydroxysitosteryl chloride*, m. 138–9°; refluxing 200 mg. V and 200 mg. KOH in 9 cc. EtOH and 0.5 cc. H_2O gives *7-ketositosterylene*, pale yellow, m. 106–7°; catalytic reduction of V in Et_2O gives *7-ketositostyl chloride* (VI), m. 128–9°; reduction in AcOH gives sitostyl chloride. VI is not oxidized by CrO_3 by heating 2 hrs. at 60°. **LXXXVIII. Pregnanediols from sarsasapogenin.** *Ibid.* 518–20.—Heating 8 g. of the acetate (I) of sarsasapogenin (II) and 30 cc. Ac_2O in a bomb tube at 195–200° for 10 hrs. and hydrolysis of the residual sirup with EtOH-KOH give 70% of *pseudosarsasapogenin* (III), $C_{27}H_{44}O_3$, m. 171–3°; *di-p-nitrobenzoate*, pale yellow, m. 156.5–9°; III does not yield an acetate. Acidification of the aq. alk. layer from the hydrolysis gives the lactone of II, m. 199–200°; Ac_2O gives the *acetate*, m. 184.5–5.5°. I gives a good yield of III with $(EtCO)_2O$; the only product isolated after heating I in AcOH at 210° for 7 hrs. was a small amt. of II. Heating I with succinic anhydride at 195–200° for 10 hrs. gives a smaller yield of III than does Ac_2O; phthalic anhydride gives no cryst. products; III results on refluxing I with $(PrCO)_2O$ for 8 hrs. Oxidation of III with CrO_3 in about 90% AcOH at room temp. (1 hr.) gives 50–70% of Δ^{16}-pregnene-3,20-dione (IV), m. 200–2° (Masch, *Diss., Danzig*, 1938); *semicarbazone*, m. 310° (decompn.); the acidic fraction is 3-ketoetiobilianic acid. Reduction of IV with Na in EtOH gives pregnane-3(α),20(α)-diol (V), m. 236–9°; *diacetate*, m. 177–9°. Catalytic reduction of IV with Pd-$BaSO_4$ gives pregnane-3,20-dione, m. 117.5–19° (*disemicarbazone*, m. 244° (decompn.)). Reduction of IV with the Adams catalyst in EtOH gives a mixt. of the 3(β),20(β)-, the 3(β),20(α)- and the 3(α),20(β)-isomers; appreciable amts. of other products are formed in these reductions but products other than those of the regular pregnane series have not been isolated. The transformation of II into IV indicates the presence of a C-21 Me group and of an HO group at C-3. **LXXXIX. Reactions of pseudosarsasapogenin.** *Ibid.* 521–5.—Pseudosarsasapogenin (I) is very readily oxidized by SeO_2. It reacts with Br but definite cryst. products have not been isolated. I does not react with $H_2NNHCONH_2$. AcOH. I (2.5 g.) and 15 cc. Ac_2O, refluxed for 30 min., the Ac_2O removed *in vacuo*, the residue taken up in 60 cc. AcOH and heated on the water bath while 5 g. CrO_3 in 50 cc. 80% AcOH is added during 1 hr., 10 cc. EtOH added, the soln. evapd. to 50 cc., H_2O added, the ppt. taken up in ether and the soln. washed with 3% NaOH and H_2O, the NaOH soln. heated on the water bath for 20 min., cooled and acidified, give 600 mg. of 3(β)-hydroxyetiobilianic acid (II), m. 220–2°; hot Ac_2O gives the *acetate anhydride*, m. 204.5–6.5°. The ether soln. gives a *compd.* $C_{23}H_{34}O_4$, m. 284–7°. Oxidation of acetylated I with CrO_3 at room temp. gives II and the *acetate* (III) of Δ^{16}-pregnen-3(β)-ol-20-one, m. 144–6°; the *semicarbazone* of III m. 250–2°; the filtrate from III on hydrolysis gives some II, indicating that some of the II is present as the anhydride. Oxidation of III with CrO_3 in AcOH (16 hrs. at room temp.) gives II. Hydrolysis of III with EtOH-KOH (refluxing 10 min.) gives *Δ^{16}-pregnen-3(β)-ol-20-one*, with 1 mol. of EtOH, m. 207–9° (*semicarbazone*, m. 240° (decompn.)); oxidation with CrO_3 gives Δ^{16}-pregnene-3,20-dione (IV). Reduction of III with Na in boiling EtOH gives pregnane-3(β),20(α)-diol; the Adams catalyst yields pregnane-3,20-dione after oxidation with CrO_3. Catalytic reduction of I in AcOH, EtOH or acidic EtOH yields *dihydropseudosarsasapogenin* (V), m. 168–70°; *diacetate* (VI), m. 95–7°; *di-p-nitrobenzoate*, m. 196–7.5°; V does not react noticeably with SeO_2; in AcOH it absorbs Br slowly. VI is also formed by catalytic reduction of acetylated I. Oxidation of V with CrO_3 in AcOH gives IV and a *diketo acid* (VII), $C_{27}H_{42}O_4$, m. 233–6°; *disemicarbazone*, m. 209° (decompn.); *Me ester*, m. 85–7°. Further oxidation of VII gives IV. Oxidation of VI with CrO_3 in AcOH at room temp. or at 90° gives II; no reaction occurs below 20°; the neutral product at room temp. is III. The presence of an Ac group at C-27 hinders the oxidation of a reactive group at C-22. Suggested formulations for I are given. **XC. Oxidation products of sarsasapogenin. Pregnane-3,16,20-triol.** Russell E. Marker, Ewald Rohrmann, Harry M. Crooks, Eugene L. Wittle, Eldon M. Jones and D. L. Turner. *Ibid.* 525–7[5].—Refluxing 1 g. sarsasapogenin acetate (I), 4 g. $K_2S_2O_8$, 150 cc. 90% AcOH and 1 cc. concd. H_2SO_4 for 2 hrs. and hydrolyzing the residue with EtOH-KOH gives 20–40% of *pregnane-3(β),16,20-triol* (II), m. 223–6°; *benzoate*, m. 185–7°; *triacetate*, m. 108–11°. Oxidation of the epi isomer of I gives the *3(α)-isomer* of II, m. 206–7°; *benzoate*, m. 153–5°. Mild oxidation of II with CrO_3 and reduction with Na in EtOH give pregnane-3(α),20(α)-diol. The acidic fractions have not been investigated. **XCI. Oxidation of the diacetate of cholestane-3,6-diol.** Russell E. Marker, John Krueger, John R. Adams, Jr., and Eldon M. Jones. *Ibid.* 645–6.—Oxidation of the diacetate of cholestane-3,6-diol with CrO_3 in AcOH gives a mixt. of allohyodesoxycholic acid (I), m. 280° (Me ester, m. 181°), and 6-hydroxyisoandrosterone, m. 205°. I, transformed into the Me ester by refluxing with 1% MeOH-HCl for 1 hr. and treated with 16 mols. of PhMgBr (refluxing 2 hrs. in Et_2O-PhMe and then heating overnight on the steam bath with PhMe alone), the carbinol acetylated, dehydrated and oxidized with CrO_3, gives *norallohyodesoxycholic acid*, m. 225°. Bisnorhyodesoxycholic acid (part LXXXIV) (15 g.) with CrO_3 in AcOH at 12–15° for 25 min., gives 12 g. *3,6-diketobisnorcholanic acid*, m. 185° (*Me ester*, m. 170°); refluxing the acid with AcOH contg. a little HCl for 45 min. gives *3,6-diketobisnorallocholanic acid* (II), m. 244° (*Me ester*, m. 211°); catalytic reduction (Adams catalyst) in AcOH of 5.5 g. II gives 5 g. *bisnorallohyodesoxycholic acid*, m. 259° (*Me ester*, m. 233°); *diacetate*, m. 115° (*Me ester*, m. 135°). **XCII. The preparation of neotigogenin from sarsasapogenin.** Russell E. Marker and Ewald Rohrmann. *Ibid.* 647–8.—Dibromosarsasapogenone (5 g.) and 50 cc. C_5H_5N, refluxed 8 hrs., give a *compd.*, $C_{32}H_{45}O_3NBr_2$, m. 235° (decompn.) (probably a pyridinium salt), and 2.2 g. *bromo-Δ^4-dehydrosarsasapogenone* (I), m. 185–8° (decompn.). Reduction of 2 g. of I with Na in boiling EtOH and sepn. of the isomers with digitonin give 600 mg. of neotigogenin, m. 198–200° (*acetate*, m. 173–5°). This indicates that tigogenin, chlorogenin and diosgenin differ from sarsasapogenin in the side-chain configuration and are of the "isosarsasapogenin configuration." The stability of gitogenin and digitogenin to aq. EtOH-HCl suggests that these likewise have the same configuration. **XCIII. Epipseudosarsasapogenin, pseudosarsasapogenone and pseudochlorogenin.** Russell E. Marker, Ewald Rohrmann and Eldon M. Jones. *Ibid.* 648–9.—Epi-sarsasapogenin (m. 205–7°) forms an *acetate*, m. 191–3°;

heating 2 g. with 20 cc. Ac_2O at 200° for 10 hrs. and hydrolysis give *epipseudosarsasapogenin* (I), m. 211–13°; the Adams catalyst in AcOH (17 hrs. at room temp.) gives the *dihydro deriv.*, m. 135–7°. Oxidation of I with CrO_3 in AcOH gives 16-pregnene-3,20-dione (II). Heating 4 g. sarsasapogenone and 30 cc. Ac_2O at 200° for 10 hrs., followed by hydrolysis, gives *pseudosarsasapogenone* (III), m. 165–6°; *semicarbasone*, m. 215–16° (decompn.). Oxidation of III gives II. Isosarsasapogenin acetate (3.3 g.) and 25 cc. Ac_2O, heated at 195° for 9 hrs., give 1.7 g. of pseudosarsasapogenin. Dihydrosarsasapogenin is unchanged after heating with Ac_2O. Heating chlorogenin (2.5 g.) and 30 cc. Ac_2O at 200° for 10 hrs. gives 1.4 g. of *pseudochlorogenin*, m. 268–70°; *dihydro deriv.*, m. 269–72° (*triacetate*, m. 149–52°). **XCIV. Persulfate oxidation of allopregnane derivatives.** Russell E. Marker, Ewald Rohrmann, Eugene L. Wittle, Harry M. Crooks, Jr., and Eldon M. Jones. *Ibid.* 650–1.—Oxidation of allopregnan-20-one with $K_2S_2O_8$ in AcOH-H_2SO_4 gives a mixt. of carbinols, which could not be sepd. and etioallocholanic acid, m. 228–30° (Me ester, m. 141–3°). Allopregnan-3(β)-ol-20-one with $K_2S_2O_8$ gives a mixt. of carbinols, oxidized to androstanedione, m. 130°, and as the acidic fraction 3(β)-hydroxyetioallocholanic acid, m. 250–2°.

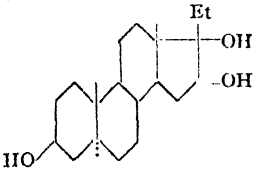
C. J. West

Catalytic hydrogenation of several 5,6-dibrominated derivatives of the sterol group. J. Décombe and J. Rabinowitch. *Bull. soc. chim.* **6**, 1510–22(1939).—The addn. of a mol. of halogen to the double bond of cholestene (I) or of cholesterol (II) produces 2 asym. C atoms and 4 possible isomers, 2 from the cholestane and 2 from the coprostane skeleton. An attempt has been made to fix the steric structure of several such dihalogenated derivs. by a study of the products of catalytic hydrogenation. Bromination of I in $CHCl_3$ and recrystn. of the product from alc.-ether gave cholestene dibromide (β-form) (III), m. 106°. The alc.-ether mother liquor yielded a small amt. of the α-form (IV), m. 148°, in rhombohedrons, on recrystn. from ether and petr. ether. Reactions involving the debromination of III bring about a partial stereomutation resulting in the formation of the stable IV. III (20 g.) in 200 cc. petr. ether was irradiated with ultraviolet light for 240 hrs. and evapd. down. The residue was taken up in acetone, yielding 50% of felted needles of form γ (V), m. 116–17°. V appears to be a relatively stable intermediate in the transposition of III into IV under the action of ultraviolet light. I in anhyd. ether was chlorinated with a slight excess of Cl in CCl_4. The reaction mixt. was concd. and treated with AcOH. The ppt. was recrystd. from a mixt. of ether and alc., yielding brilliant leaflets of cholestene dichloride (VI), m. 121–2°. Addn. of 25 g. Br in 250 cc. AcOH to 50 g. II in 500 cc. ether and recrystn. of the quant. yield of crystals from acetone gave cholesterol dibromide (VII), m. 113–5°, $[\alpha]_{578}$ −50°, $[\alpha]_{546}$ −54.1°, $[\alpha]_{436}$ −104.1° (*c* 0.5% in $CHCl_3$). II (20 g.) in 250 cc. CCl_4 was chilled and treated portionwise with a 5% excess of 12% Cl in CCl_4. After 1 hr. at room temp. the CCl_4 was removed at 40° *in vacuo*. The viscous residue was dissolved in ether and dild. with 4 vols. of warm alc. The cryst. product obtained on cooling was recrystd. from boiling alc., yielding 40% of cholesterol dichloride (VIII), m. 136–7°, $[\alpha]_{578}$ −35.3°, $[\alpha]_{546}$ −40°, $[\alpha]_{436}$ −69.6° (*c* 2% in $CHCl_3$). Oxidation of 10 g. VII in 250 cc. AcOH with 2.5 g. CrO_3 in 5 cc. H_2O and crystn. of the product from acetone gave unstable 5-cholestenone dibromide (IX), m. 80°, $[\alpha]_{578}$ −55.8°, $[\alpha]_{546}$ −60°, $[\alpha]_{436}$ −122.5° (*c* 1% in $CHCl_3$). Similar oxidation of VIII (23 g.) produced *5-cholestenone dichloride* (X), $C_{27}H_{44}Cl_2O$, m. 110–11°, $[\alpha]_{578}$ −30°, $[\alpha]_{546}$ −35°, $[\alpha]_{436}$ −60° (*c* 1% in $CHCl_3$). The dihalogen derivs. (0.01 or 0.005 mol.) in 50–200 cc. of pure ether (for catalysis) were hydrogenated in the presence of PtO_2 and 20 cc. H_2O. IV was not reduced and III and V yielded I and HBr. VI was not reduced. Hydrogenation of VII eliminated 2 atoms of Br and produced II. Similarly reduction of IX gave cholestenone and HBr. Thus the dibromides lose their Br atoms and regenerate the initial ethylenic compd. Hydrogenation of VIII with 1 vol. of H gave 6-chlorocholestanol (XI), $C_{27}H_{47}ClO$, m. 136–7°, $[\alpha]_{578}$ −16.6°, $[\alpha]_{546}$ −21°, $[\alpha]_{436}$ −33.3° (*c* 1% in $CHCl_3$). Absorption of 2 vols. of H gave β-cholestanol, m. 140–1°. Thus VIII may be regarded as a 5,6-dichlorocholestanol. The addn. of 1 vol. H to X gave an impure VIII whereas the absorption of 2 vols. H gave a monohalogenated alc. (XII), $C_{27}H_{45}ClO$, m. 94°, $[\alpha]_{578}$ −16.6°, $[\alpha]_{546}$ −25°, $[\alpha]_{436}$ −42°. On further reduction with 3 vols. H a definite formation of β-cholestanol indicates that X is a 5,6-dichlorocholestanone and that XII is a 6-cholorocholestanol, differing from XI in its spatial disposition. The reduction of the chlorinated compds., by yielding satd. monohalogen derivs. and cholestane derivs. fixes the nature of the C skeleton.

C. R. Addinall

Constituents of the adrenal cortex and related compounds. Diazoprogesterone. T. Reichstein and J. v. Euw. *Helv. Chim. Acta* **23**, 136–8(1940); cf. *C. A.* **34**, 1029[8].—Dehydrogenation of secondary alcs. to the corresponding ketone according to Oppenauer can be carried out at room temp. by allowing the reaction to continue for 2–3 weeks. The yields are just as good but the variation permits the handling of heat-sensitive compds. A mixt. of 200 mg. of 21-chloropregnenolone, 500 mg. of freshly sublimed (*tert*-BuO)$_3$Al (I), 12 cc. abs. benzene and 6 cc. acetone was kept at room temp. for 20 days in a sealed ampoule. The gelatinous product was taken up in ether and the washed and dried ext. was evapd. down. Crystn. of the residue from abs. ether gave 145 mg. of 21-chloroprogesterone (II), m. 202–4° (all m. ps. cor.). Similarly dehydrogenation of 200 mg. of 21-diazo-5-pregnan-3-ol-20-one (*C. A.* **31**, 7880[2]) gave 136 mg. of *21-diazoprogesterone* (III), $C_{21}H_{28}N_2O_2$, m. 182–4°, of which 20 mg. was converted by dry HCl in ether into 14 mg. II. Boiling 20 mg. III with 0.5 cc. of purest anhyd. AcOH for 3 min. gave 10 mg. of desoxycorticosterone acetate, m. 158–9°. III was converted into free desoxycorticosterone by heating with dil. H_2SO_4, thus confirming the constitution assigned. **XXXII. Three stereoisomeric allopregnane-3 β,17,20-triols.** H. Reich, M. Sutter and T. Reichstein. *Ibid.* 170–80.—Dehydration of allopregnane-3 β,17α-diol monoacetate (I) with anhyd. $CuSO_4$ gave a crude dehydrated product (II) which on hydroxylation with OsO_4 gave some substance J and an isomeric triol (*C. A.* **33**, 6329[1]). A more uniform dehydration was obtained by the procedure of Butenandt and co-workers (*C. A.* **31**, 5862[8]). A mixt. of 10.5 g. I and 4.4 cc. $POCl_3$ in 44 cc. anhyd. pyridine was heated at 135° for 45 mins., poured into 176 cc. concd. HCl and ice, and extd. with ether, yielding 9.5 g. of crude product. Crystn. from 100 cc. alc. gave 5.1 g. of colorless needles, m. 114–17°, 1.34 g. of less pure crystals, m. 104–12°, and further yields by chromatography of the mother liquor. Recrystn. of the material from MeOH gave II, 3 β-acetoxyallo-17-pregnene, $C_{23}H_{36}O_2$, m. 120.0–1.5°, of which 500 mg. was sapond. with 5% KOH in MeOH to give 463 mg. of 3 β-hydroxyallo-17-pregnene, m. 136–7°. Hydroxylation of 4.9 g. II, m. 114–17°, in 92 cc. abs. ether was carried out by standing with 4 g. OsO_4 in 23 cc. abs. ether for 3.5 days at room temp. The mixt. was evapd. down, taken up in 150 cc. alc. and treated with 25 cc. of 2 *N* NaOH and 20 cc. of 40% HCHO for 12 hrs. at room temp. The mixt. was boiled for 30 min., filtered, dild., satd. with CO_2 and concd. *in vacuo*. The residue was shaken out with much AcOEt and finally with ether. The washed and dried united ext. gave 4.7 g. of crude product on evapn. *in vacuo*. The material was acetylated with 20 cc. of dry pyridine and 10 cc. Ac_2O at room temp. for 16 hrs. and at 60° for 1 hr. The soln. was evapd. *in vacuo*, extd. with ether, concd. and pptd. with pentane, yielding 2 g. of crystals. Sublimation at 170° and 0.03–0.05 mm. left very little residue. The sublimate was recrystd. from a mixt. of ether and pentane, yielding, as main product, substance J diacetate (III), m. 159–61°, and a new *triol diacetate* (IV), m. 135–6°. The non-cryst. material from the mother liquors was sublimed in a high vacuum, giving a thick colorless resin at 0.02 mm. and 170–200°. Recrystn. from ether-pentane yielded III

and IV. The mother liquors (V) also produced 535 mg. of a cryst. mixt. (VI), m. 170–222°. VI was dissolved in 1 part of benzene and 9 parts of pentane and chromatographed over a 16-g. Al_2O_3 column. Elution with various benzene-pentane mixts., benzene, benzene-ether mixts., ether and acetone, recrystn. of each eluated product from ether-pentane and washing with pentane gave 25 fractions of which 3–5 gave the "*first by-product*" (VII), m. 160–1°; 8–11 yielded IV; 12–14 gave III; 16–21, by repeated recrystn. from ether-pentane and from ether produced III and substance O diacetate (VIII), m. 250–1°; and 22–25 gave crystals, m. 169–94°, which were discarded. Similar treatment of V (1.76 of oily material) produced fractions contg. II, a "second by-product" (IX), m. 207–9°, VII, III and VIII. In all, the following yields were obtained: III, about 2 g.; IV, 0.85 g.; VII, 135 mg.; VIII, 15–20 mg.; and IX, 15–20 mg. IV, $C_{23}H_{40}O_5$, $[\alpha]_D^{25}$ −18.2 ± 1°, $[\alpha]_{5461}^{25}$ −21.75 ± 1°, was sapond. with 5% KOH in MeOH and the product from 100 mg. was recrystd. from dil. MeOH, yielding 86.2 mg. of the free *allopregnane-3β,17,20-triol* (X), m. 202–15°, $[\alpha]_D^{25}$ −16.7 ± 2°, $[\alpha]_{5461}^{25}$ −18.7 ± 2°. Degradation of 20 mg. X in 1 cc. MeOH with 30 mg. HIO_4 in 4 cc. H_2O and 1.5 cc. MeOH for 17 hrs. at room temp., decompn. with 10 drops of $NaCO_3$, evapn., extn. with ether and concn. gave crystals, m. 169–74°, which on recrystn. from dil. MeOH yielded *trans*-androsterone, m. 172.5–4.0°, identical with an authentic sample. The 2 isomeric allopregnanetriols, substances J and O, have different configurations at the 17-position. Since substance J and substance O differ only in the disposition of the OH group at C atom 20, the 2 isomeric triols belong to the 17 α and 17 β series and thus hydroxylation of substances of the type of II does not give 17β-HO derivs. exclusively as previously stated. Sublimation of VIII in high vacuum and recrystn. from ether gave colorless needles, $C_{28}H_{40}O_5$, m. 250–1°, identical with a sample from adrenal cortex. Recrystn. of VII from ether-pentane yielded crystals of a *diacetate*, $C_{28}H_{40}O_5$, $[\alpha]_D^{25.5}$ −60.9 ± 2°; $[\alpha]_{5461}^{26.5}$ −74.5 ± 2°; sapond. to give prisms of the free *triol*



(XI), m. 234–40°, $[\alpha]_D^{25}$ −28.5 ± 2°, $[\alpha]_{5461}^{25}$ −32.5 ± 3°. Degradation of XI with HIO_4 failed to produce *trans*-androsterone. Oxidation with CrO_3 converted XI into an *acid*, $C_{21}H_{32}O_4$, m. 195–7°, showing that it may have 2 adjacent OH groups of which 1 is tertiary. It is possible that XI is formed from an impurity of II, contg. stable ring double bonds. Recrystn. of IX from ether-pentane gave fine needles of the *monoacetate*, $C_{23}H_{34}O_5$, m. 207–9°, sapond. to give needles of the *triol* (XII), m. 197–9°. Oxidative degradation of XII with CrO_3 in AcOH produced a *neutral product*, $C_{19}H_{28}O_2$, m. 230°, which was not identical with androstanedione. Thus despite earnest search, the 4th allopregnane-3β,17,20-triol was not found. C. R. Addinall

Electroörg. chem. prepns. (Swann) 4. Splitting the CONH linkage by ultraviolet (Carpenter) 3. Color tests for ketones (Efros) 7. Chlorinated derivs. of C_3H_2 (Marcheguet) 13. Arylation of oils and fats—synthesis of tolylstearic acid, methyl tolylstearate and the *p*-xenylamide of tolylstearic acid (Kimura, Turugi) 27. Ammonolysis in liquid NH_3 (Fernelius, Bowman) 6. Sulfamic acid, sulfamide and related aquo-ammonosulfuric acids (Audrieth, *et al.*) 6. Reactions and reagents in liquid NH_3 (Kraus) 6. Magnetochem. investigations—heavy-metal complexes of phthalocyanines (Senff, Klemm) 6. Replacement of aromatic Cl by amino group (Vorozhtsov, Kobelev) 2.

Schlenk, Wilhelm, Jr.: Organische Chemie. 2nd ed. Berlin: W. de Gruyter and Co. 224 pp. M. 1.26. Cf. *C. A.* **31**, 7002.

G. Kränzlein's Aluminiumchlorid in der organischen Chemie. 3rd ed. Revised by **Paul Kränzlein**. Berlin: Verlag Chemie G. m. b. H. 281 pp. M. 15.

Beilsteins Handbuch der organischen Chemie. Bd. XXIX. General-Formelregister für die Bände I–XXVII des Hauptwerks und ersten Ergänzungs-Werks. Tl. 1. 4th ed. Edited by Deutsche Chemische Gesellschaft. Revised by Friedrich Richter. Berlin: J. Springer. 1207 pp. M. 244. Cf. *C. A.* **33**, 3808.

Liquid hydrocarbon products from gaseous olefins. Walter Flemming and Wilhelm Baumeister (to I. G. Farbenind. A.-G.). U. S. 2,185,405, Jan. 2. Gaseous olefins such as C_3H_6, are subjected to polymerization in the presence of an anhyd. halide of Al, as a polymerization catalyst, and of a halogen hydrocarbon having a double C linkage, such as perchloroethylene, as a dispersion agent, suitably at 0–20°.

Polymerizing olefin hydrocarbons. Melvin M. Holm and Wm. H. Shiffler (to Standard Oil Co. of Calif.). U. S. 2,186,021, Jan. 9. A catalyst is used comprising a thin film of an active polymerizing agent such as H_3PO_4 carried on the surface of particles of a nonporous inert solid material such as quartz. U. S. 2,186,022 relates to the use of a catalyst of generally similar character for effecting reactions such as *isomerization* without polymerization.

Preparing mixtures of carbon monoxide and hydrogen suitable for use in catalytic synthesis. Geo. Roberts, Jr. (to M. W. Kellogg Co.). U. S. 2,185,989, Jan. 2. An arrangement of app. is described, and a method of prepg. a mixt. of CO and H for catalytic synthesis including the steps of desulfurizing methane to remove objectionable S compd., subjecting a CO_2-bearing gas to absorption by an absorption menstruum selective to CO_2 in an absorption zone, stripping the absorbed CO_2 from the absorption menstruum by means of the CH_4 removed from the desulfurizing zone and thereby forming a mixt. of CO_2 and CH_4, generating the desired synthesis gas comprising CO and H by heating the mixt. of CO_2 and CH_4 in a synthesis gas generating zone at temps. above 815° in the presence of a catalyst.

Removing alcohol from commercial amyl acetate. A. L. Likhtman. Russ. 51,928, Nov. 30, 1937. Amyl acetate is treated with concd. H_2SO_4, then petroleum ether. The upper layer of amyl acetate is sepd. from the lower H_2SO_4 layer, the H_2SO_4 layer is extd. with petroleum ether, the ext. is added to the amyl acetate soln., and this soln. is washed with Na_2CO_3, dried and distd.

Methyl ketones. B. N. Dashkevich. Russ. 51,926, Nov. 30, 1937. Ketene is treated with an ether soln. of an organomagnesium bromide.

Esters of aliphatic polyhydric nitro alcohols. Walter E. Gloor (to Hercules Powder Co.). U. S. 2,185,297, Jan. 2. Esters suitable for use in plasticizing cellulose acetate and other cellulose derivs., etc., are formed from trimethylolnitromethane or dimethylolnitroethane by reaction with propionic or butyric acid or anhydride (suitably in the presence of $ZnCl_2$ or other esterification catalyst and at a temp. of about 100–150°). Trimethylolnitromethane triacetate b_{5-10} 160–70°. Trimethylolnitromethane tripropionate b_{5-10} 170–185°. Trimethylolnitromethane tributyrate b_{5-10} 185–205°. Dimethylolnitroethane diacetate b_{5-10} 152–160°. Dimethylolnitroethane dipropionate b_{5-10} 150–165°. Dimethylolnitropropane diacetate b_{5-10} 135–158°. Tri-α-ethylolnitromethane triacetate also is mentioned.

Fatty acid mono-esters of monochlorohydrin. I. G. Farbenindustrie A.-G. Brit. 509,072, July 11, 1939. These are produced by causing aliphatic monocarboxylic acids having at least 4 C atoms to react with epichlorohydrin in the presence of catalysts of the Friedel-Crafts' type.

Esters of methacrylic acid. Herman A. Bruson and Robert N. Washburne (to Röhm & Haas Co.). U. S.

2,184,934, Dec. 26. For converting an ester of α-hydroxy-isobutyric acid, such as the Et or Me ester, to the corresponding ester of methacrylic acid its vapor is brought into contact with a dehydrating catalyst such as a mixt. of Al phosphate and Mn or Mg phosphate at a temp. of about 325–425°.

Preparing sulfo carboxylic ester salts. Frank J. Cahn and Morris B. Katzman (to Emulsol Corp.). U. S. 2,185,455, Jan. 2. A method of prepg. esters of alcs. contg. at least 8 C atoms and sulfocarboxylic acids contg. less than 8 C atoms, such as lauryl sulfoacetate, the H of the sulfonic groups of which is replaced by an org. nitrogenous base, involves the reaction of an org. nitrogenous base, such as triethanolamine, an ester of an alc. contg. at least 8 C atoms, and a sulfocarboxylic acid contg. less than 8 C atoms the H of the sulfonic group of which is replaced by a metal cation, such as lauryl K sulfoacetate, and an acid such as tartaric acid which reacts with the metal salt to form a less sol. salt which is pptd., and sepg. the resulting ppt.

Halogenated amides and imides of cyanuric acid and polymers of cyanamide. Irving E. Muskat and Albert G. Chenicek (to Pittsburgh Plate Glass Co.). U. S. 2,184,888, Dec. 26. Products of this type in which a substantial amt. of the contained halogen is present as active halogen are suitable for use as *bleaching* and *sterilizing agents* and may, e. g., be obtained by bromination or iodination of melamine or dicyandiamide.

Epithio alkanes. N. V. de Bataafsche Petroleum Maatschappij. Brit. 508,932, July 7, 1939. These are obtained by causing halothiols, in which the halogen atom and the thiol group are bound to C atoms adjacent to each other, to react with substances capable of binding H halides, the reaction medium remaining neutral or practically so, e. g., at pH 5.5–11.5. Thus, chloro-2-ethanethiol is stirred with $NaHCO_3$ and H_2O, a uniform stream of CO_2 escaping and the temp. remaining practically const.; after completion of the reaction, the mixt. is distd. under reduced pressure to obtain a distillate consisting of an aq. bottom layer and a top layer contg. epithioethane, the latter, after sepn., being dried over $CaCl_2$ and, after introduction of H_2S for stabilization, fractionated.

Substituted 3-aminopyrenes. Martin Corell, Heinrich Vollmann and Hans Becker (to General Aniline Works). U. S. 2,185,661, Jan. 2. By the use of solvents such as alc., benzene, toluene, xylene or pyridine, sepn. is effected of assocd. isomeric 3,8- and 3,10-disubstituted pyrenes in which one of the substituents is an amino group and the other may be amino, acetylamino, acetyl, Cl or carboxyl. Various examples with details are given, including the production of 3-amino-8-chloropyrene, m. 142°, 3-aminopyrene-8-carboxylic acid, etc.

***N*-Substituted lutidones.** Albert B. Boese, Jr. (to Carbide and Carbon Chemicals Corp.). U. S. 2,185,243, Jan. 2. For prepg. an *N*-substituted lutidone such as *N*-phenyllutidone, a primary amine such as aniline is treated with diacetylacetone in the presence of a volatile water-insol. org. solvent such as benzene which is inert to the reactants (suitably by refluxing for 2 hrs.). Details are given of the production of *N*-phenyllutidone, *N*-β-naphthyllutidone, *N*-benzyllutidone, *N*-hydroxyethyllutidone, *N*-cyclohexyllutidone and *N*-methyllutidone.

Separation of thiophenols from alkylphenol mixtures. Daniel B. Luten, Jr. and Samuel B. Thomas (to Shell Development Co.). U. S. 2,184,928, Dec. 26. An arrangement of app. is described, and a process involving extg. the mixt. in countercurrent with aq. NH_3 having a concn. not less than about 10% in an amt. substantially in excess of that which is equiv. to the content of thiophenols in the mixt., so as to produce 2 layers only, an alkylphenol layer and a layer of aq. NH_3 contg. thiophenols, and sepg. these layers.

***N*-Alkylacridines.** N. S. Drozdov. Russ. 51,927, Nov. 30, 1937. 9-Phenoxyacridine or its derivs. are heated with an ester of *p*-toluenesulfonic acid, and the product is sepd. in the usual manner.

Purifying pyridine bases. A. A. Kharkharov. Russ. 55,844, Oct. 31, 1939. An aq. soln. of a diazonium salt is added to the pyridine base; the base is then sepd. by known mthods from the azo dye formed by the admixt.

Sterol derivatives. Russell E. Marker (to Parke, Davis & Co.). Brit. 509,063, July 11, 1939. A 7-ketocholesteryl halide is reduced to the corresponding 7-hydroxycholestyl halide (I), which by further reduction gives 7-hydroxycholestane capable of oxidation to 7-ketocholestane. The 1st reduction may be a direct and complete catalytic hydrogenation, or a partial reduction without use of H to 7-hydroxycholesteryl halide followed by a further reduction of the latter at its unsatd. double bond to give I. Both the direct 1-step reduction and the reduction by way of 7-hydroxycholesteryl halide give α-cholestyl halide as a 2nd product of the reduction. The 7-hydroxy group of I may be oxidized to give a 7-ketocholestyl halide. Cf. *C. A.* **33**, 2909[5].

Polymeric basic compounds. I. G. Farbenindustrie A.-G. Brit. 509,012, July 6, 1939. These are made by causing a polymerization compd. of high mol. wt. that contains free alc. OH groups, e. g., polyvinyl alc. (I) or a deriv. thereof contg. free alc. OH groups, or that may be transformed into such a compd. to react with an amino aldehyde or an amino ketone, e. g., by heating them together in the presence of a catalyst of strongly acid reaction. Solvents or diluents may be present. Among examples, (1) pulverized I is suspended in MeOH, *p*-dimethylaminobenzaldehyde sulfate introduced into the suspension with stirring and the mixt. heated 2.5 hrs., the acetalization being accelerated by the addn. of a little H_2SO_4; the greater part of the product seps. on cooling, sepn. being completed by addn. of further MeOH, and the highly elastic resinous mass is washed with MeOH and dried; it does not dissolve in org. solvents but, being the sulfate, readily dissolves in H_2O from which the free polymeric amino compd., which is sol. in various org. solvents, e. g., glacial AcOH, and, on addn. of acid, e. g., HCl, H_2SO_4, HCOOH, in H_2O, may be pptd. by alkali; (2) I is dissolved in concd. HCl and 1,2-dimethylindole-3-aldehyde introduced into the soln. at 10–20° with stirring; after 8 hrs. the viscous soln. is neutralized with dil. NaOH soln., the condensation product being obtained as red-brown flakes that are sol. in mineral acid and AcOH and swell in tetrahydrofuran or in mixts. of Me_2CO and H_2O.

Benzylideneaniline compounds. Frederick H. Kranz (to National Aniline and Chemical Co.). U. S. 2,185,854, Jan. 2. In the production of a compd. such as a benzylideneaniline by the reaction of CH_2O with a *p*-*N*-alkylaminonitrosobenzene and an *N*-alkylaminobenzene compd. free from *p*-substituents, to form the corresponding benzylideneaniline, the nitroso compd. and CH_2O at least are added, at a temp. below reaction temp., to the hot reaction zone wherein reaction of the 3 reactants is effected.

Aminoanthraquinone compounds. James Ogilvie and Richard S. Wilder (to National Aniline & Chemical Co.). U. S. 2,185,709, Jan. 2. A process for converting a leucoaminoanthraquinone compd. contg. an amino radical in the 1-position of the anthraquinone nucleus and in the 4-position a radical selected from the group consisting of amino radicals and the hydroxyl radical to the corresponding aminoanthraquinone compd. involves oxidizing the leucoaminoanthraquinone compd. with an aromatic nitroso compd. whereby the corresponding aminoanthraquinone compd. is obtained.

Compounds of the polyhydrocyclopentanophenanthrene series. I. G. Farbenindustrie A.-G. Brit. 508,804, July 5, 1939. These are made by oxidizing or reducing, by means of an Al alcoholate in the presence of substances that accept or yield H, a deriv. of a 3-hydroxy- or 3-oxopolyhydrocyclopentanophenanthrene that has a side chain contg. a basic nitrogenous group at the C atom in 17-position. Among examples, (1) 3-hydroxyternorcholenylamine and tertiary Al butylate (I) are boiled under reflux in anhyd. C_6H_6 and Me_2CO, the soln. being then poured into H_2O, NaOH soln. added to the colloidal mixt. until the pptd. $Al(OH)_3$ dissolves and the whole extd. with Et_2O; the 3-oxoternorcholenylamine may be pptd.

from the dry Et_2O ext. by H_2SO_4 in Et_2O, and (2) a mixt. of 3-hydroxyandrostenemethylketimine, I, C_6H_6 and Me_2CO is boiled 11 hrs. under reflux and then shaken 24 hrs. with 0.5 *N* H_2SO_4 to hydrolyze the ketimine group in the oxidation product, the C_6H_6 soln. is sepd., dried and evapd. under reduced pressure; by crystn. of the org. residue from Et_2O and aq. alc., the progesterone is obtained. Cf. *C. A.* **33**, 7316[5,6]. 1

Stabilized alkali metal alcoholates. Geo. L. Cunningham and Richard S. Robinson (to Mathieson Alkali Works). U. S. 2,185,247, Jan. 2. Stabilization of an alcoholate such as Na ethylate is effected by adding about 2% or less of a catalytic amine, amine hydrochloride or amide, such as ethylenediamine, free from any substituent groups exerting a proöxidant effect. 2

Purifying tritolyl phosphate after use for extraction of phenols. Hinrich Havemann and Karl Smeykal (to I. G. Farbenind. A.-G.). U. S. 2,184,697, Dec. 26. See Ger. 670,273 (*C. A.* **33**, 2912[2]). 3

Stabilizing sulfides such as ethylene sulfide. Willem Coltof and Siegfried L. Langedijk (to Shell Development Co.). U. S. 2,185,660, Jan. 2. Deterioration under ordinary storage and transportation conditions is inhibited by the addn. of H_2S, an alkyl mercaptan or an alkyl sulfide.

Dialkylbenzenoid sulfides. Bruno H. Wojcik (to Hooker Electrochemical Co.). U. S. 2,185,007, Dec. 26. A process for the production of dibenzenoid alkyl compds., such as dibenzyl disulfide, in which 2 alkyl benzenoid groups are joined through their alkyl groups by at least one S atom, comprises adding a benzenoid alkyl halide, such as benzyl chloride, to an aq. soln. of a compd. of an alkali metal with S such as Na sulfide, in the absence of any mutual solvent for the reagents, the rate of addn. being regulated to maintain a reacting temp. without causing boiling, allowing the resulting mixt. to cool and the product to solidify, and sepg. the product from the aq. medium in the absence of any solvent. U. S. 2,185,008 relates to a generally similar process for the production of dibenzenoid polyalkyl compds. such as dixylyl polysulfide with use of a benzenoid polyalkyl halide such as xylyl chloride as an initial reactant. 4 5

Sulfonium sulfonates. Adrianus J. van Peski and Johan M. Hoeffelman (to Shell Development Co.). U. S. 2,185,654, Jan. 2. For the production of a sulfonium sulfonate, reaction is effected between an aromatic sulfonic acid such as *p*-toluenesulfonic acid, a dialkyl thio ether having a low-mol. hydrocarbon radical directly attached to the S atom, such as methyl cetyl sulfide, and an aliphatic monohydric primary alc. contg. up to 6 C atoms in the mol., such as MeOH, at a temp. of about 100–200°, in the presence of an inert solvent such as excess MeOH. 6 7

Nitriles of α-naphthyl-substituted lower aliphatic acids. John Weijlard and Wm. H. Engels (to Merck & Co.). U. S. 2,185,237, Jan. 2. For the production of a product such as α-naphthylacetonitrile, naphthalene is condensed, at a temp. of about 165–185° and in the presence of anhyd. $FeCl_3$, with a halogenated nitrile of a lower aliphatic acid, such as chloroacetonitrile.

Recovery of glutamic acid from solutions. Geza Braun (to Standard Brands Inc.). U. S. 2,186,162, Jan. 9. Pptn. of glutamic acid from solns. is effected by the addn. of an NH_4 salt such as NH_4 formate or NH_4 acetate. Cf. following abstr. 8

Glutamic acid. Geza Braun (to Standard Brands, Inc.). Brit. 508,841, July 5, 1939. Glutamic acid (I) is recovered from solns. by processes in which the I is first pptd. by means of NH_4 or Ca formate or acetate. Cf. preceding abstr. In Brit. 508,842, July 5, 1939, pure I is prepd. from crude I-HCl contg. NH_4Cl as an impurity by treating a soln. thereof with an aliphatic or aromatic amine or a N base, e. g., $NHEt_2$, $PhNH_2$, pyridine, quinoline, or with $(NH_4)_2CO_3$ or with a salt of a weak org. acid, e. g., a formate, butyrate or lactate of NH_4 or an alkali or alk.-earth metal, in such proportion as possesses a selective affinity for the combined HCl constituting a portion of the I-HCl, whereby free I is liberated and pptd., and sepg. the pptd. acid from assocd. substances, including NH_4Cl, dissolved in the resulting liquid. The pure I recovered may be treated in an aq. vehicle with an NH_4 or alkali metal hydroxide or carbonate to form a salt thereof, the soln. of salt being evapd. to a thick sirup, the salt crystd. from the sirup and dried. In Brit. 508,927, July 5, 1939, divided on 508,841, I is recovered from mother liquor remaining after an initial recovery of I from a soln. of I-HCl and contg. salt of an alk. earth metal or of NH_4 by removing such salt from the liquor by means of an alk. earth metal precipitant, e. g., H_2SO_4, $(COOH)_2$, or an agent that liberates NH_3 and then adding to the purified soln. HCl or other agent that ppts. the I either as a compd. or as free I. The liberated NH_3 may be distd. from the soln. The NH_3 may be liberated by an alk. earth metal hydroxide, the metal being subsequently pptd. The distd. NH_3 may be combined with HCOOH, the $HCOONH_4$ being used to effect pptn. of the I from a I-contg. soln. 9

Aromatic arsonic and stibonic acids Max Bockmühl and Gustav Ehrhart (to Winthrop Chemical Co.). U. S. 2,185,972, Jan. 2; Can. 387,168, Feb. 27, 1940. Various examples with details are given of the production of compds. of the general formula $RR_1NCHR_1CONR_1R_2$, where R stands for a radical of the benzene series contg. a substituent arsonic or stibonic acid radical, R_1 stands for H, alkyl or a lower hydroxyalkyl, and R_2 stands for an hydroxyalkyl having at least 2 hydroxyl groups and contg. up to 6 C atoms, the compds. being white powders readily sol. in water, sparingly sol. in alc. and charring, when heated, without melting, products obtained including, *inter alia*: *N*-chloroacetyl-*N*-methylglucamide, and phenylglycidemethylglucamidestibonic acid, 4-hydroxy-3-methylglucamidoacetaminobenzenearsonic acid, etc. The compds. are of therapeutic value.

Nitration of 1-naphthalenesulfonic acid. A. M. Volodarskiĭ and V. S. Kaliuzhnyĭ. Russ. 55,967, Oct. 31, 1939. 1-Naphthalenesulfonic acid is mononitrated in the presence of $CuSO_4$; this increases the yield of the 1,8-isomer.

Formamide. Nauchnyi Institut po Udobreniyam i Insektofungisidam (S. S. Dragunov and A. S. Shilina, inventors). Russ. 55,842, Oct. 31, 1939. NH_3 and CO are caused to react at ordinary pressure in the presence of Cr_2O_3 catalyst.

β-Phenethyl alcohol. Joseph W. Britton, Gerald H. Coleman and Bartholdt C. Hadler (to Dow Chemical Co.). U. S. 2,185,141, Dec. 26. A method of prepg. β-phenethyl alc. comprises hydrolyzing a β-haloethylbenzene with an aq. inorg. alk. agent, such as Na_2CO_3 or $Ca(OH)_2$ which when mixed with water to the extent of one chem. equiv. per kg. of water raises the pH to about 7.5-11.5.

Butane-1,4-diol and its derivatives containing two hydroxyl groups. I. G. Farbenindustrie A.-G. Brit. 508,944, June 26, 1939. Acetylene glycols of formula $R^1R^2C(OH)C{:}CC(OH)R^3R^4$, where R^1, R^2, R^3 and R^4 are H or identical or different alkyl, cycloalkyl, aralkyl or aryl groups or heterocyclic radicals, are converted into the corresponding satd. glycols by hydrogenation. In examples, butyne-1,4-diol and 1,1,4,4-tetramethyl-2-butynediol are hydrogenated in the presence of Ni catalysts.

Ketene and its homologs. Karl T. Steik (to Standard Oil Development Co.). U. S. 2,184,963, Dec. 26. In the manuf. of ketene and its homologs by pyrolysis of compds. such as acetone in contact with Cu at about 750°, the hot gaseous products of pyrolysis including ketene issuing from the pyrolysis zone are rapidly and immediately brought into contact with a liquid cooling medium such as acetone under conditions adapted to cool the gaseous products rapidly to a temp. below that at which the ketene present tends substantially to decompose or polymerize.

Xanthene. A. A. Vansheidt and T. N. Erlykov. Russ. 55,968, Oct. 31, 1939. A mixt. of phenol and formaldehyde in the ratio of 10:1 is heated above 175° under pressure in the presence of HCl as catalyst; unchanged

phenol is distd. off *in vacuo*, while the xanthene is distd. off with steam.

6-Ethoxyquinaldine. A. N. Iordanskiĭ. Russ. 52,-327, Dec. 31, 1937. To *p*-phenetidine is added 20% HCl and the mixt. is heated with AcH.

Refining benzanthrone. A. O. Orzhekhovskiĭ. Russ. 56,124, Nov. 30, 1939. Benzanthrone is recrystd. from org. water-immiscible solvents in the presence of small amts. of inorganic acid or base.

Preparing 2-methyl-5-chloromethyl-6-aminopyrimidine hydrochloride. Gustav A. Stein (to Research Corp.). U. S. 2,184,964, Dec. 26. A soln. of 2-methyl-5-ethoxymethyl-6-aminopyrimidine in a lower aliphatic alc. such as BuOH is treated with HCl (suitably on a steam bath, by passing in dry HCl).

Purifying isoviolanthrone. L. G. Krolik. Russ. 56,-094, Nov. 30, 1939. Isoviolanthrone is treated with 15–20 vols. of a 92–3% H_2SO_4 at 40°, kept at this temp. for 4–5 hrs., filtered, and washed first with H_2SO_4, and then with water to complete removal of the H_2SO_4.

11—BIOLOGICAL CHEMISTRY

PAUL E.

A—GENERAL

ARTHUR W. DOX

Catalysts, catalyst-modifiers, life and the specificity of vital processes. Jerome Alexander. *Biodynamica* No. 54, 32 pp.(1939).—The physicochem. mechanism of catalysis is understandable as consequent upon the effects of highly specific residual electronic fields on particles which enter the electronic jurisdiction of the catalyst in proper presentation and remain long enough to be united or broken up. Specific substances which enter the catalyst surface and alter the specificity of the surface and of the catalyst, are termed "modifiers." The simplest living units appear as self-reproducing (autocatalytic) catalyst particles, endowed with 2 essential functions: self-duplication and the catalytic direction of chem. change. The orderly course of life and of differentiation in a developing zygote may be understood as based on the activity of specific catalysts, modified at definite stages by specific modifiers. A mechanism is suggested whereby modifiers present in the zygote cytoplasm may serve as templets to reproduce their like. Abnormalities of structure and function may result from abnormal modifiers; thus methylcholanthrene which leads to cancerous growth, may be regarded as a modifier of this type. The concept of cytoplasmic modifiers opens the door to an understanding of cytoplasmic inheritance and of the slight differences in identical twins. It also discloses a mechanism whereby acquired characteristics might be inherited, and evolutionary changes, apart from gene mutations and chromosomal anomalies, might occur. Substances considered as secondary constituents or "negligible impurities" may serve as prosthetic groups or as "carriers" in catalysts, or as "cohesive colloids," exerting a potent influence on structure and function, e. g., in tissue formation, diffusion, filtration, etc. Assembly in a crystal space lattice being a potential min. toward which mols. tend, the crystn. of some living units is not surprising. Apart from gross crystn., proteins show sp. aggregative tendencies. At a certain stage of particulate organization we must envisage the possibility of particulate unions and dissocns. which are not understandable in terms of simple stoichiometry. Jerome Alexander

Denaturation and molecular splitting of ovalbumin by ultraviolet radiant energy. F. W. Bernhart. *J. Biol. Chem.* 128, 289–95(1939).—Irradiation of aq. ovalbumin at 25° by Hg arc causes the formation of secondary protein derivs. which can be dialyzed at pH 4.8. The wts. of ovalbumin pptd. at the isoelec. point after irradiation indicate that the formation of denatured protein and of sol. protein derivs. from the denatured protein are first-order processes. O does not influence the denaturation process but increases the formation of sol. protein derivs. B. C. P. A.

Symplexes of proteins with other tissue components. St. J. Przyłecki. *Roczniki Chem.* 18, 743–6(1938); cf. *C. A.* 33, 3823⁶.—Types of symplexes are classified. B. C. P. A.

***β-h*-Fructosidase.** IV. R. Weidenhagen and L. Nenninger. *Z. Wirtschaftsgruppe Zuckerind.* 89, Tech. Tl., 149–70(1938); cf. *C. A.* 31, 2244⁵.—The dialyzates of the elutions of the product obtained by treating slightly acid yeast autolyzates with $Sr(OH)_2$ contain a chromoprotein (cytochrome?) which is pptd. by suitable addn. of AcOH. The activity of the soln. is almost unchanged and small amts. of another pigment are readily removed by active $Al(OH)_3$. Further purification of *β-h*-fructosidase [invertase] cannot be effected by treating the dialyzate with $Sr(OH)_2$, but, under defined conditions, good results are obtained by pptn. with uranyl acetate and elution with $(NH_4)_2HPO_4$. The use of aged autolyzates offers no advantage. If the temp. is kept below 7°, further purification of the invertase can be effected by addn. of MeOH to the soln. whereby the ppt. retains the whole of the activity. As the temp. is raised there is more pronounced inactivation and loss of soly. in water until at about 37° complete inactivation and insolubility are attained. EtOH can replace MeOH and can be used with large quantities of enzyme. Inactivation by alc. probably depends on a reversal of the change, coenzyme + apoenzyme → holoenzyme, and denaturation of the protein carrier (dehydration?) in such a manner that it is no longer able to unite with the coenzyme. The purest prepns. obtained by the authors still contain a polysaccharide which gives mannose when hydrolyzed with H_2SO_4 or HCl; it is uncertain whether this is due to yeast gum which accompanies the enzyme. B. C. P. A.

Action of colored light on the growth of young homeotherms (phototropism). M. Baccino. *Ann. physiol. physicochim. biol.* 15, 785–9(1939).—The growth of young rabbits, guinea pigs, white rats and kittens was retarded by light that had passed through blue, yellow or green cellophane screens (neg. tropism), but was definitely stimulated by light from red or violet screens (pos. tropism), probably because of the effect on the tropism and the various mechanisms comprising the cellular metabolism. The intermediary processes leading to this retardation or stimulation may be governed by a physicochem. humoral mechanism, a nervous mechanism or a combination of both. Ruth Berggren

An aspect of intercellular electric transmission: the synaptic delay. A. M. Monnier and G. Coppée. *Ann. physiol. physicochim. biol.* 15, 890–6(1939).—An important synaptic delay is not an index of a chem. transmission, especially when the post-synaptic element tends to become rhythmical. This delay would then result from the periodic character of the processes of elec. excitation produced by the potential of presynaptic action. Ruth Berggren

Action of heat on hemoglobin and reversible stages of protein coagulation. Jean Roche and Mohamed-Salah Chouaïech. *Compt. rend.* 209, 1017–19(1939); cf. *C. A.* 32, 2149⁸, 2150⁷, 6302⁹.—Reversed beef hemoglobin (Hb) was prepd. by coagulating Hb at 90°, treating with faintly alk. KCN (cf. Anson and Mirsky, *C. A.* 24, 1399; 25, 308, 4899), reducing and dialyzing the soln. and then shaking with O. The reversed Hb was not identical with the native Hb. Both showed the same spectrum characteristics, but the reversed Hb was less resistant to alkalies, and its mols. in dil. solns. were smaller. The mol. wt. (detd. osmometrically) of the native Hb was 68,000; that of the reversed Hb was about 33,000 in very dil. solns., but increased progressively up to 68,000 with increase in the protein concn. The spectrum characteristics

of Hb are not an abs. index of the integrity of the mol., nor can the speed of cleavage in 0.05 *M* NaOH characterize in itself a native Hb. The cohesive forces between the 4 mol. units in the native Hb are changed reversibly under certain conditions, while the affinity of the globin for the hematin diminishes during coagulation by heat. Ruth Berggren

The inhibitory effect of the serum proteins on the alteration of bilirubin in alkaline solution. Augustin Boutaric and Madeleine Roy. *Compt. rend.* **209**, 1021–3(1939).—The optical d. of 0.01% bilirubin in soln. A (0.8% NaCl; Na = 0.01 *M*) diminished rapidly upon dilu. with an equal vol. of soln. A but remained const. for 11 days upon dilu. with an equal vol. of horse serum. The bilirubin soln. remained essentially unchanged for 24–48 hrs. upon the addn. of serum in the proportion of 1–2 cc. per 25 cc. In buffered solns. (pH 6.85–7.20) contg. 1, 5 and 10 mg. bilirubin and 0.2, 1 and 2 g. serum albumin per 100 cc., resp., the oxidation of the bilirubin was arrested for a practically indefinite period. Ruth Berggren

Enzymic degradation of polyamines. VI. The diamine-diamine oxidase reaction. E. A. Zeller, R. Stern and M. Wenk. *Helv. Chim. Acta* **23**, 3–17(1940)(in German); cf. *C. A.* **34**, 1700[8]. *l*-Ephedrine acts as a competitive inhibitor on diamine oxidase (I); this reaction is, therefore, not sp. for the monoamine oxidase. Only in amts. greatly exceeding those which are pharmacologically active does curare exert its action on I. Amino aldehydes are probably products of the diamine-I reaction. New material has been introduced to show that the cyanide inhibition of I differs from the 2 previously known mechanisms of inactivation of enzymes by cyanides. I is broken down into an apoenzyme and a coenzyme; the latter apparently has a flavin group. The enzymic oxidation of the products of the diamine-I reaction are discussed. Rat liver causes oxidative deamination of β-alanine. Ruth Berggren

The solubility of glycine anhydride. Kurt H. Meyer and O. Klemm. *Helv. Chim. Acta* **23**, 25–7(1940)(in French).—The solubilities of glycine anhydride (diketopiperazine) (I) in 0.25, 0.5, 1, 2 and 3 *M* LiBr, LiI, NaCl, NaBr, NaI, KCl, KBr, KI and KF at 20° are given in tabular form and plotted. In 0.25–1 *M* LiBr, 0.25 *M* NaCl, 0.25 *M* NaBr, 0.25–1 *M* KCl, 0.25–0.50 *M* KBr and 0.25–3 *M* KF the soly. of I was lower than in H_2O (1.43 g. in 100 cc.), while in the remaining solns. it was higher. At low salt concns. electrostatic effects cause pptn., while at higher concns. sol. complexes are formed as the result of sp. forces of attraction between the ions and the characteristic groups. The behavior of certain peptides, as synthetic polyglycines and silk fibroin, is probably similar to that of I. The soln. or marked swelling of some proteins in LiBr, alk. iodides and $Ca(SCN)_2$, as well as the soly. of I and proteins in concd. urea solns., may also be explained on the basis of the formation of sol. complexes. Ruth Berggren

Thermochemical studies on enzyme action. M. Isihama. *Fukuoka Acta Med.* **31**, 150–1(1938). C. L. B.

The effects of certain fat acids on peptic activity. E. Tria. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 699–701(1939).—By the same technique as in (*C. A.* **32**, 5014[1]), the effects of oleic, stearic and capric acids on the activity of pepsin were measured. All these fat acids retard the action of pepsin, oleic having the greatest retarding effect. A. W. Contieri

Ecological conditions in a brackish lagoon. G. Clifford Carl. *Ecology* **21**, 65–74(1940).—The chlorinity of the water was greater in summer than in winter in Lost Lagoon near Stanley Park, Vancouver, B. C. The amt. of dissolved O_2 was correlated with the amt. of sunlight through the photosynthetic activities of phytoplankton and larger aquatic plants. The total carbonate content varied directly as the chlorinity. They were detected in the normal form in summer only, when the animal component of the plankton was low. The pH was influenced to some extent by the nature of the plankton as well as by the chlorinity and carbonate content of the water. The NH_3 nitrogen content was generally low while the albuminoid N content was high and the increased amts. of nitrogenous matter may have been produced by the decay of the plankton crop. The presence of nitrite was detected only in the winter, possibly because oxidizing processes are slowed down at that time. C. R. Fellers

The effect of phosphate buffers on the electrical mobility of hemoglobin. M. H. Gorin, H. A. Abramson and L. S. Moyer. *J. Am. Chem. Soc.* **62**, 643–4(1940).—The data of Davis and Cohn (cf. *C. A.* **33**, 8080[9]) on the electric mobility of hemoglobin in phosphate buffers are reasonably explained by considering the 2 ways that the elec. mobility of a protein can be affected by variations of the ionic strength of a buffer at const. pH; the 2 effects that must be considered are (1) a change in the ion atm., and (2) a change in the charge of the protein due to sp. interaction with ions of the buffer. A. B. Garrett

Should colchicine be considered a stimulant of cell division? V. Bureau and V. Vilter. *Compt. rend. soc. biol.* **132**, 558–62(1939).—Discussion, with neg. conclusion. L. E. Gilson

Extracellular and intracellular hydrogen-ion concentration in relation to anesthetic effects of barbituric acid derivatives. G. H. A. Clowes, A. K. Keltch and M. E. Krahl. *J. Pharmacol.* **68**, 312–29(1940).—The effects were studied of 30 substituted barbituric acids on the cell division of sea-urchin (*Arbacia punctata*) eggs under various conditions of pH. L. E. Gilson

The role of changes in extracellular and intracellular hydrogen-ion concentration in the action of local anesthetic bases. M. E. Krahl, A. K. Keltch and G. H. A. Clowes. *J. Pharmacol.* **68**, 330–50(1940); cf. *C. A.* **32**, 5421[3].—The relation of pH to the action of cocaine, procaine and 14 other anesthetic bases on sea-urchin (*Arbacia punctata*) eggs and larvae is discussed. L. E. Gilson

The biochemistry of the thyroid gland. C. R. Harington. *Dansk Tids. Farm.* **13**, 285–94(1939). **New chemical investigations on peptides and proteins.** *Ibid.* 294–304. **Researches in synthetic immunochemistry.** *Ibid.* 304–14.—Lectures given before the Danish Pharmaceutical Soc. Otto Johnson

Micelle formation in aqueous solutions of bile salts. Raymond R. Roepke and Harold L. Mason. *J. Biol. Chem.* **133**, 103–8(1940).—Detns. of the osmotic coeff.-concn. and equiv. cond.-concn. curves for Na glycocholate, cholate, glycodesoxycholate and oleate at 25° indicate that the bile salts form ionic micelles above a crit. concn. It is suggested that soln. of water-insol. substances by the bile may be assocd. with micelle formation of the bile salts in a manner similar to the soln. of oils by soap solns. A. P. Lothrop

The action of papain and trypsin on certain dehydrogenases. Frederick Bernheim. *J. Biol. Chem.* **133**, 141–4(1940).—Amine oxidase and *d*-amino acid oxidase are inactivated much more slowly by papain and trypsin than succinoxidase, choline oxidase and the cytochrome-cytochrome oxidase system. The O_2 uptake but not the methylene blue reduction by succinoxidase is inactivated more rapidly by trypsin than papain. The succinoxidase and choline oxidase are inactivated at about the same rate and the cytochrome oxidase system more slowly by the proteinases. The liver and kidney of the rat were used as the source of the dehydrogenases. A. P. Lothrop

The action of fat acids on the choline oxidase of rat liver. Frederick Bernheim. *J. Biol. Chem.* **133**, 291–2(1940); cf. preceding abstr.—0.004 *M* stearic acid in buffer inhibits choline oxidase activity 61%. It seems possible that the concn. of fat acid may det. how much free choline can be oxidized in the liver and how much can be used for the synthesis of phospholipides. Increasing concns. of stearic acid inhibit succinoxidase next and then cytochrome oxidase. Palmitic and oleic acids in equiv. concns. caused 41 and 29% inhibition, resp. The inhibition occurs only below pH 7; this indicates that the undissocd. acid is the active agent. Fats such as olive and cod-liver oils and a mixt. of cephalin and lecithin were without effect. A. P. Lothrop

The occurrence of leucylpeptidase. Julius Berger and Marvin J. Johnson. *J. Biol. Chem.* **133**, 67–72(1940);

cf. *C. A.* **33**, 9334[8].—Leucylpeptidases are present in the proteolytic systems of the human duodenum, rat intestine, rat carcinoma tissue, chick intestine, trout tissues, lobster tissues, cockroach intestine and in the bacteria *Pseudomonas fluorescens* and *Rhizobium trifolii*. They are absent from brewers' yeast and from the molds *Aspergillus parasiticus* and *Penicillium citrinum* and *terrestre*. Pure leucylpeptidase prepns. can be conveniently prepd. by pptn. of crude exts. at pH 6–7 with 1 vol. of Me_2CO. The H_2O-sol. portion of the resulting ppt. contains the enzyme. A. P. Lothrop

Mucinase: a bacterial enzyme which hydrolyzes synovial fluid mucin and other mucins. Wm. van B. Robertson, Marian W. Ropes and Walter Bauer. *J. Biol. Chem.* **133**, 261–76(1940).—An enzyme, *mucinase*, has been isolated from broth cultures of *Clostridium perfringens* and is present in varying concns. in broth cultures of several other microörganisms. Adsorption on $Ca_3(PO_4)_2$ from a 50% Me_2CO soln. concentrates it 900-fold. Mucinase causes loss of viscosity of solns. of synovial fluid mucin or of the prosthetic polysaccharide and subsequent liberation of amino sugars and reducing substances. It is active in the pH range 3.0–8.5. The temp. coeff. is K_{10} 1.75 and inactivation occurs at 60°. A reversible inactivation is caused by removal of salts. It is inactivated irreversibly by cyanide, arsenite or I. Its specificity is significant; it does not hydrolyze mucins from mucous membranes and glands but does hydrolyze mucins formed by mesothelial tissues (umbilical, synovial and connective tissues) as well as vitreous mucin, the histogenetic origin of which is unknown. This specificity suggests that the mucin extd. from connective tissue is identical with that of synovial fluid and gives further support for the concept that synovial fluid is formed, at least in part, by the connective tissue cells surrounding the joints. The fact that the mucins of the tissues so regularly involved in rheumatoid arthritis are digested by mucinase suggests that the presence of mucin in these tissues is of fundamental importance in the localization of this disease. A. P. Lothrop

Absorption and fluorescence spectra in relation to the photolethal action of methylcholanthrene on yeast. Alexander Hollaender, Peter A. Cole and F. S. Brackett. *Am. J. Cancer* **37**, 265–70(1939).—The toxic effect of radiation of wave lengths of 3450–4500 A. on suspensions of yeast was greatly enhanced by the presence of methylcholanthrene (I) in a dil. of 1 to 10^8 and the effect was recognizable in dils. of 1 to 10^9. When the yeast incubated with I in the dark, stimulation of growth was observed, shown by a breaking of the early resting phase. E. R. M.

Protein structure and the Procter-Wilson theory. W. E. Braybrooks. *J. Intern. Soc. Leather Trades' Chem.* **23**, 515–22(1939).—The original theory assumed that the degree of swelling was detd. by a balance between osmotic forces and structural strength of the protein, which latter was thought to be const. But from the zwitterion concept it follows that fixation of acid or alkali reduces structural strength. z (= concn. of protein anions) in the Donnan equil. equation is dependent on the concn. of the protein, i. e., ratio of protein to total H_2O for a sol. protein, or protein to H_2O inside the protein structure in the case of an insol. protein. Calcn. of e (= excess diffusible ions in the internal phase) for different arbitrary values of z indicates that the difference in pH value between the internal and the external soln. increases with the concn. of the gel, that max. swelling pressure increases with gel concn. and that max. swelling occurs at a higher pH in more dil. gels. Resistance to swelling of a protein is detd. by its degree of organization. From observed max. swelling of gelatin, collagen and wool, max. values of e are calcd. as 1 pH unit for leaf gelatin, 1.4 for collagen and 1.6 for wool. The effect of diln. on pH value of max. swelling explains some of the differences previously reported. The difference in effect between HCl and H_2SO_4 is believed to be due to repressed ionization of the second hydrogen of H_2SO_4 below pH = 3.4. Swelling increases with temp. because of the weakening of protein structure caused by heat. H. B. Merrill

The fraction precipitated with trichloroacetic acid in extracts of liver in the first stage of autolysis. Mario Calcinai. *Biochim. terap. sper.* **26**, 407–16(1939).—The fraction that can be pptd. with CCl_3CO_2H and that is contained in exts. from autolyzed guinea-pig livers shows at certain phases an increase which is explained by the theory of new formation of complexes of merely phys. character. The addn. of ascorbic acid to the liver causes an immediate decrease of the precipitable fraction but enhances the increase that follows. A. E. Meyer

Modifications of the complexes precipitable with trichloroacetic acid by the action of hydrogen peroxide on products of cleavage of various proteins. Mario Calcinai. *Biochim. terap. sper.* **26**, 437–48(1939).—The resynthesis of protein by the action of H_2O_2 on a mixt. of egg albumin and peptone digested with papain was investigated by pptg. with CCl_3CO_2H and tannic acid. The digestion was performed at 0 and 37°. Depending on conditions, the quantity of ppt. was increased or decreased; the effect seems to depend on phys. phenomena created by H_2O_2. A. E. Meyer

Electrolysis of blood corpuscles. V. The action of direct current on chicken erythrocytes. L. A. Semenov. *J. Physiol.* (U. S. S. R.) **21**, 271–82 (1936); *Chem. Zentr.* **1938, I**, 4201; cf. Petropavlovskiĭ, *C. A.* **33**, 6363[1].—The action of d. c. on chicken erythrocytes was studied under the microscope by means of a special glass chamber with Pt electrodes. After a certain period, which depended on the magnitude of the applied potential, a hemolysis took place. This phenomenon appeared sooner at the cathode than at the anode. OH ions appearing at the cathode and H ions appearing at the anode were responsible for the qualitatively different types of changes occurring. M. G. Moore

Group enzymes of saliva. N. I. Blinov and L. D. Zaslavskiĭ. *J. Physiol.* (U. S. S. R.) **22**, 878–84(1937); *Chem. Zentr.* **1938, I**, 4193.—The group substance A in pepsin and peptone is not destroyed by the group enzyme of human blood of the A group; on the other hand, it is completely destroyed by the enzyme of human blood of groups B and O. Upon mixing a pepsin soln. with serum of the blood group B, the group substance of the pepsin forms a compd. with the agglutinin which is not destroyed by the group enzymes of saliva. M. G. Moore

The phenomenon of autocatalysis in biology. N. B. Medvedeva. *Klin. Med.* (U. S. S. R.) **15**, 1080–3 (1937); *Chem. Zentr.* **1938, I**, 4477.—An effort is made to apply the chem. concept of autocatalysis to various biol. processes. M. G. Moore

Secretin and its biochemistry. V. Celentano. *Riv. fis., mat. sci. nat.* **12**, 256–8(1938); *Chem. Zentr.* **1938, I**, 4199.—A review of the discovery and properties of the substance M. G. Moore

Methemoglobin formation. XIII. Pyridine. Herbert Riedel. *Arch. exptl. Path. Pharmakol.* **192**, 39–42(1939); cf. *Ibid.* **190**, 224–5(1938).—By means of absorption spectra, it is proved that dil. aq. solns. of pure pyridine do form methemoglobin with hemolyzed blood, as previously suggested. Cf. *C. A.* **33**, 3880[9]. J. Pinchack

Xanthine oxidase and milk flavoprotein. H. S. Corran, J. G. Dewan, A. H. Gordon and D. E. Green. *Biochem. J.* **33**, 1694–1706(1939).—A method was described for prepg. a flavoprotein from milk. The flavoprotein catalyzed the oxidation of hypoxanthine, aldehydes and dihydrocoenzyme I and was about 1000 times more active per mg. dry wt. than milk. The 3 catalytic activities, although assocd. with the same flavoprotein, could be differentially inactivated. Drying and incubation with cyanide abolished hypoxanthine-aldehyde activity without affecting either dihydrocoenzyme I activity or the spectral and chem. properties of the flavoprotein. The flavin moiety was very similar to, if not identical with, flavinadenine dinucleotide. Flavin accounted for only 35% of the total absorption at 450 mμ. Evidence was noted for the existence of a colored nonflavin group in the mol. The catalytic role of this addnl. group was not clarified. No direct evidence was obtained to show that the flavin groups undergo a cycle, first of reduction by the

3 substrates and then of oxidation by oxidizing agents. **Addendum.** J. St. L. Philpot. *Ibid.* 1707–8.—Examn. of this new material in the ultracentrifuge indicated that there were 1.4–3.1 flavin groups per mol. The previous conclusion, based on higher flavin content, that there were 8 flavin groups per mol. has been revised. Cf. *C. A.* **32**, 3230[4]. E. W. Scott

The actions of iodine and hypoiodous acid on pepsin. John St. L. Philpot and Percy A. Small. *Biochem. J.* **33**, 1727–33(1939).—When I acted on pepsin the initial ratio of fall in Folin blue value to fall in peptic activity decreased with increasing pH and temp., reaching a very low figure at pH 6 and 38°. The same result was obtained with pepsin that had been first treated with HNO_2. When pepsin was treated with HIO the initial ratio of fall in Folin blue value to amt. of HIO was much lower than for tyrosine, being practically nil at pH 5.4. The amt. of HIO required to produce a faintly perceptible fall in the Folin blue value was sufficient to destroy most of the peptic activity. Conclusion: Groups other than tyrosine are concerned in the effect of I and HIO on the peptic activity of pepsin and these groups are probably not other amino acids. E. W. Scott

The spreading of different hemoglobins, muscle hemoglobins and cytochrome c. J. H. P. Jonxis. *Biochem. J.* **33**, 1743–51(1939).—The max. areas of all hemoglobins in the compressed state were the same, 9400 sq. cm. per mg.; this indicated that they contained the same no. of amino acids per Svedberg unit. The time after which the max. area was reached at the isoelec. point differed for the various hemoglobins and was independent of the total ion concn. of the soln. on which the films were spread. Small amts. of urea had no influence, but concd. solns. of urea decreased the unfolding time and the surface-pressure curve was flattened. In these solns. there were no differences in the behavior of horse and sheep hemoglobins, although the former was dissocd. into mols. of half the normal mol. wt. and the latter was not. Reduced hemoglobin spread more rapidly than oxyhemoglobin. Oxidized cytochrome spread more rapidly than reduced cytochrome. Muscle hemoglobin did not form monolayers on solns. at a pH between 4 and 11, but reduced muscle hemoglobin formed monolayers at pH 6.8. The max. area was reached after 5 min. E. W. Scott

Peptic digestion of egg albumin. Arne Tiselius and Inga-Britta Eriksson-Quensel. *Biochem. J.* **33**, 1752–6 (1939).—A study of solns. of egg albumin partially digested with cryst. pepsin in AcOH medium, using electrophoresis, sedimentation and diffusion methods, indicated that appreciable amts. of unchanged, acid-denatured egg albumin were present even after prolonged digestion, together with the end products, whereas no significant amt. of intermediary split products could be observed. This result suggests that the peptic digestion of egg albumin is an "all-or-none" type of reaction rather than a gradual breakdown process. E. W. Scott

The mechanism of urea formation. Stefan J. Bach. *Biochem. J.* **33**, 1833–44(1939).—Citrulline (I), when added to liver slices in the presence of NH_4 lactate (II), gave rise to urea. The ratio: ammonia-N disappearance to urea-N formation was approx. 1. Amino N remained practically unchanged during the synthesis and was markedly increased when I was replaced by arginine (III); hence no ornithine (IV) was formed from I. A marked urea formation was also obtained in the presence of II but in the absence of I or any other amino acid. When II was replaced by α-ketoglutaric acid (V) and NH_4Cl the urea formed in the absence of I was accompanied by a rise in the amino N and amide N (interpreted as a synthesis of glutamine (VI)). Urea formation in this case was inhibited by glycine and partially by alanine owing to their action on V, during which amino N disappeared. The fact that formation of a small amt. of urea took place in the presence of I and V or pyruvic acid in the absence of NH_3 indicated that I is oxidized by ketonic acids to form urea and glutamic acid (II). VI and VII gave rise to urea in the presence of NH_3, but not in its absence. The results suggest a cyclic formation and disappearance of VI, which catalyzes urea synthesis. IV also gave rise to urea formation in the presence of V and NH_4Cl, but not in the absence of the latter. Urea synthesis from III in the presence of V and NH_4Cl was 3 times as fast, and from I 1.5 times as fast as from IV. Amino N was markedly increased with III. The disappearance of NH_3 was the same in the 3 cases. The role of CO_2 or its precursors as a source of C for the urea was studied. HCO_3Na markedly increased the formation of urea from VI and VII in the presence of NH_4Cl. A scheme was outlined suggesting urea synthesis from IV, from I and also by hydrolysis from III, thus connecting the mechanism shown by Krebs (*C. A.* **27**, 760, 3978) with that observed by Leuthardt (*C. A.* **32**, 4640[2]). E. W. Scott

Chemical properties of ascorbic acid oxidase. II. Tetutaro Tadokoro and Naomiki Takasugi. *J. Chem. Soc. Japan* **60**, 61–3(1939); cf. *C. A.* **33**, 2154[7]; **34**, 2405[1].—Action of pancreatin upon the ascorbic acid oxidase (I) of cucumber juice was detd. as follows: To 2 mg. pancreatin add 2 cc. cucumber juice and 1 cc. citrate buffer of pH 7.8. After 2 hrs. at 37° add a buffer of pH 3.8 to bring the pH of the mixt. to 5.8. Add 2 cc. ascorbic acid soln. and after 1.5 hrs. at 37° titrate with Tillmann's indophenol soln. Compare with a blank in which pancreatin is omitted. The test soln. consumed 1.1 cc. of the indophenol soln., the blank 2.05 cc.; this indicates a considerable decrease in I activity by pancreatic digestion. A mixt. of 1 cc. of pumpkin juice, 1 cc. buffer of pH 5.8 and ascorbic acid soln. was kept for 1.5 hrs. at 37°. A mixt. of equal amts. of metaphosphate and sulfosalicylic acid solns. was then added, and the resulting soln. was titrated as above. The test soln. consumed 0.52 cc. of indophenol, the blank 2.0 cc. This indicates the presence of I in pumpkin juice. Acetone-treated pumpkin juice has less I activity than has juice obtained by boiling and $(NH_4)_2SO_4$ treatment. The supposition that ascorbic acid in plant tissues is in combination with proteins and other substances was proved by the following expt.: To pumpkin juice ascorbic acid soln. and a buffer of pH 5.8 were added and the mixt. was kept for 2 hrs. at 38°. Crystals formed on cooling were washed with acetone to remove free ascorbic acid. From the crystals a large amt. of ascorbic acid was extd. by metaphosphate soln. The filtrate was adjusted to pH 7.0 and shaken for 2 hrs. with china clay. The clay was washed with water and acetone, and extd. with 2% metaphosphate soln. This ext. contained a large amt. of ascorbic acid. The soln. obtained by the extn. of the clay with dil. alkali gave biuret, xanthoproteic, and Millon reactions for protein. Albumin obtained from filtered cucumber juice by treatment with $(NH_4)_2SO_4$ and pptn. with alc. contained C 46.86, H 6.45, N 18.79, P 0.34%; it is higher in N and P and lower in C than milk proteins and phaseolin.

K. Shinohara

Phosphorescence of the three last rings of the glow-worm. Georges Brooks. *Compt. rend.* **210**, 228–30 (1940).—Spectroscopic examn. of the greenish yellow light emitted from the 3 last abdominal rings of the glow-worm show the phosphorescent material to which it is due to contain a considerable amt. of flavin in the state of flavoproteid. The spectrum extends from λ 5700 to 5620 A. Cf. *C. A.* **33**, 4681[6], 8220[7]. C. A. S.

Photodynamic effect on oral mucosa. II. The role of omentum. Tinkyoku Hai. *J. Chosen Med. Assoc.* 29, 2595–607 (German abstr. 157–8) (1939); cf. *C. A.* **34**, 1696[8].—Omentectomy temporarily increases photodynamic effect (*A*) on oral mucosa if trypaflavine is injected intravenously, as a result of loss of a part of the reticulo-endothelial system (*R*). When an aq. ext. of omentum is given intravenously, *A* is greatly increased. Omentum must contain an active principle that makes oral mucosa more photosensitive to sunlight in the presence of the dye. **III. Relation between endogenous photodynamic substance and reticulo-endothelial system in hepatic disorder.** *Ibid.* 2608–24(German abstr. 158–9).—The rabbit with biliary obstruction or treated with hepatic poisons produces an endogenous photosensitive substance, since the oral mucosa suffers a similar reaction on exposure

to sunlight without trypaflavine injection. The presence of porphyrins is probably responsible. This action of endogenous photodynamic substance is also accelerated by the stimulation of *R* and diminished by blockade of *R* or splenectomy. **IV. Relation between sensitivity of oral mucosa to ultraviolet rays and reticulo-endothelial system.** *Ibid.* 2625–38(German abstr. 159–60).—The sensitivity of oral mucosa to ultraviolet rays increases as *R* is stimulated and decreases when *R* is blocked. Lithioncarmine and India ink produce the same effect on *R*. In either case, ultraviolet-sensitive substance is formed in the blood, the quantity of which is detd. by the extent of the damage to *R*. S. Tashiro

Mechanism of the enzymic phosphorylation of thiamine. M. A. Lipton and C. A. Elvehjem. *Nature* **145**, 226–7 (1940); cf. *C. A.* **32**, 6272[7].—The production of cocarboxylase and adenylic acid by the enzymic phosphorylation of thiamine can be accelerated in the presence of phosphoglyceric acid. Synthesis is stimulated by the addn. of cozymase and inhibited by iodoacetate. This is explained by the finding that glucose inhibits the synthesis of cocarboxylase in the presence of phosphoglyceric acid and adenylic acid. E. D. Walter

The constitution of conjugated phenolphthalein formed in the animal body. August A. Di Somma. *J. Biol. Chem.* **133**, 277–84(1940).—Phenolphthalein injected into rabbits and guinea pigs is excreted in the urine in conjugated form as phenolphthalein mono-β-glucuronide. It was crystd. as the cinchonidine salt which contains 1 mol. of alc. or dioxane of crystn. None was excreted as the sulfate. At best only about 45% of the administered drug was recovered, indicating that a large proportion had been broken down. The chem. properties of the conjugate are described. A. P. Lothrop

Industrial biochem. processes (Mazza) **13**. Distribution of doses in assay of estrone (Heubner, Brockmeier) **17**. Prepn. of galacturonic and mucic acids from pectic substances (Mottern) **10**. Colloidal chem. properties of thermolyzed gelatin and potentiometric titration of products of its acid decoupn. (Khenokh) **2**. Multivalent amino acids and peptides (Greenstein) **10**.

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B—METHODS AND APPARATUS

Hormone studies in the ultracentrifuge. III. An application of Toepler's schlieren method to the analytical ultracentrifuge. James A. Chiles, Jr., and Aura E. Severinghaus. *Rev. Sci. Instruments* **11**, 71–6(1940); cf. *C. A.* **32**, 8532[6].—An image of a slit is formed by a schlieren lens just above a knife-edge diaphragm. The slit image is deflected by a sedimentation boundary, having a refractive index gradient, placed between the lens and the slit. The movement of the boundary in a centrifugal force field is followed by moving the knife edge. The optical system and centrifuge are described with the aid of 4 figures. The instrument is calcd. to be able to detect index gradients of the order of 5×10^{-4} per cm. H. G. Bowlus

Nebulizer for inhalation experiments. Rolland J. Main. *Ind. Eng. Chem., Anal. Ed.* **12**, 117(1940).—An all-glass nebulizer capable of producing a stable smoke-like mist without spattering is described. At 11 lb. per sq. in. air pressure the app. uses 4.5 to 8 cc. of kerosene soln. per hr. and 8 l. of air per min. W. F. Bruce

Method of plasma phosphatase determination for differentiation of alveolar crest bone types in periodontal disease. Rudolph H. Pelzer. *J. Dental Research* **19**, 73–85(1940).—Add blood (50 cu. mm.) to 1000 cu. mm. 0.9% NaCl soln., and remove the corpuscles by centrifugation. To 200 cu. mm. of the supernatant liquid add 200 cu. mm. of substrate (contg. 8 cc. *N* NH_4OH, 12 cc. *N* NH_4Cl, 1 g. Na_2 β-glycerophosphate and 2 cc. *M* $MgCl_2$, dild. to 100 cc. with H_2O). Incubate for 24 hrs. at a temp. of 37°, then add 300 cu. mm. 10% AcOH. Make a control expt., omitting the incubation. Remove the ppt. by centrifugation, and det. phosphate colorimetrically, using 400 cu. mm. of the supernatant liquid, 100 cu. mm. of H_2SO_4-molybdate soln. (100 cc. 7.5% $(NH_4)_2SO_4$ soln. + 45 cc. 10 *N* H_2SO_4 + 105 cc. H_2O) and 100 cu. mm. of amidol soln. (15 g. amidol + 15 g. Na_2SO_4 in 100 cc. H_2O, and dild. 5-fold with H_2O prior to use). Allow 15 min. for development of the blue color. The mean no. of units of blood plasma phosphatase were: Radiographically normal and arrested alveolar bone, finger plasma 11.9, gingiva plasma 12.6, radiographically slow alveolar crest bone destruction, finger plasma 7.6, gingiva plasma 14.2, radiographically rapid alveolar crest bone dissoln., finger plasma 7.8, gingiva plasma 20.0. The phosphate differences (gingiva-finger) in the 3 groups were, resp., 0.6, 6.6 and 12.1 units. In 6 cases, plasma phosphatase was not increased in the region of alveolar crest bone destruction. 16 references. Joseph S. Hepburn

Ascorbic acid determination. L. Rosenthaler. *Z. Vitaminforsch.* **9**, 342–4(1939).—In an acid (HCl) soln., ascorbic acid reduces $HgCl_2$ to HgCl. The latter compd. is either weighed or detd. iodometrically. J. S. H.

Preparation and properties of a potent lactic dehydrogenase powder. Charles Gurchot and Arnold Lowman. *Univ. Calif., Pub. Pharmacol.* **1**, 221–34(1939).—A lactic dehydrogenase powder was prepd. from washed bakers' yeast by grinding it in a ball mill for 18 hrs. with *M*/15 phosphate buffer of pH 5.5 with Et_2O as a bactericide, centrifugation at 2000 r.p.m. for 2 hrs., pptn. by means of $(NH_4)_2SO_4$, and drying. The product contained lactic dehydrogenase, catalase, protein and no sulfhydryl groups. The dehydrogenase was activated by cysteine, apparently by deinhibition, had an optimum temp. of 26°, an optimum pH of 5.2–5.5, an activity inversely proportional to the log of the concn. of the reagents but linear for methylene blue. A standard lactic dehydrogenase powder is a prepn. 25 mg. of which reduces 0.4 mg. methylene blue per min. at a temp. of 26°, a pH of 5.2, and a total vol. of 10 cc. Joseph S. Hepburn

The estimation of histidine. Richard J. Block. *J. Biol. Chem.* **133**, 67–9(1940).—The histidine present in a protein hydrolyzate can be quantitatively recovered by pptn. with Ag at pH 7.4 followed by pptn. by nitranilic acid and weighing the histidine nitranilate. It must be remembered, however, that a varying proportion of the histidine may be destroyed during hydrolysis with 8 *N* H_2SO_4. Recoveries of histidine added to hydrolyzates of gelatin, casein and blood proteins were 99, 96 and 103%, resp. A. P. Lothrop

Determination of paraldehyde in biological fluids. Harry Levine and Meyer Bodansky. *J. Biol. Chem.* **133**,

193–8(1940).—The paraldehyde is removed from the biol. fluid by vacuum distn. and bubbled through a $K_2Cr_2O_7$-H_2SO_4 oxidizing mixt. and the excess of dichromate is titrated iodometrically with $Na_2S_2O_3$. The paraldehyde depolymerizes to MeCHO which is immediately oxidized to AcOH. The method is simple, rapid and accurate and duplicate detns. check within 1.5 mg. % when a microburet is used and within 3 mg. % with an ordinary buret. The method permits detn. of concns. up to 500 mg. with 2-ml. samples and 1 g. % with 1-ml. samples. A. P. L.

A simple oxygen analyzer for use in oxygen-tent therapy. Capt. S. Hoechstetter. *Military Surgeon* **85**, 384–6(1939). —The app. for O-tent gas analysis consists of a 20-ml. syringe contg. a roll of copper screen extending from the tip to the 12- or 13-ml. mark. A rubber stopper connects the tip to a 10-ml. syringe. The large syringe is filled with reagent, 1 part 28% ammonia to 2 parts satd. NH_4Cl soln., and excess is expelled by pushing the plunger against the screen. A 10-ml. sample is introduced from the moistened small syringe. After rocking gently 1 min. the gas is returned to the 10-ml. syringe for vol. measurement. Percentage of O_2 equals 10 (10-residual vol.). Av. error is −1%, the range −4 to +2%. Analysis should be checked frequently with atm. air. Janet McAfee

Method of colorimetric determinations in fluids from organisms and in other biological material. Renzo Benigni. *Biochim. terap. sper.* **26**, 397–406(1939).—Colorimetric standards are frequently difficult to prep. because (1) the test fluid contains coloring matter that cannot be matched, (2) other substances present influence the shade of the color developed by the reaction. Prep. a standard contg. *a* mg. per cc., in a solvent miscible with the fluid to be tested. Mix 1 cc. of the latter with 1 cc. standard and another cc. with 1 cc. of the solvent. The quantity of substance to be detd. is in the first sample $x + a$, in the second x. Otherwise the compn. is the same in both fluids; this leads to a perfect match of colors developed by the reaction. The variable influence of the natural color of the fluid itself can be eliminated by the use of monochromatic light corresponding to the color of the reaction. A combination of colorimeter with spectroscope is recommended. A. E. Meyer

The determination of nitrogen according to the method of Acel. I. I. Kotlyarov. *J. Physiol.* (U. S. S. R.) **21**, 317–19(1936); *Chem. Zentr.* **1938, I**, 4360.—For the *detn. of residual N in the blood* the method of Acel (cf. *C. A.* **15**, 3649) was modified so as to use the Dubosque colorimeter. Mix a 0.5-cc. sample of blood with 5.5 cc. of phosphomolybdic acid according to the procedure of Bang (cf. *C. A.* **13**, 27) and filter after 30 min. In test tubes 1 and 2 heat a drop of concd. H_2SO_4 with 0.5 cc. of the filtrate until fumes of SO_3 appear and, after the addn. of a drop of H_2O_2, ash over a period of 15–20 sec. In test tubes 3 and 4 ash a drop of H_2SO_4 and a drop of H_2O_2 without the addn. of filtrate in like manner. Test tube no. 3 serves for the detn. of the N in the reagents and no. 4 for the soln. for comparison. Dil. the solns. to 15 cc. with water and add 0.3 cc. 50% NaOH and 0.5 cc. Nessler reagent. To test tube no. 4, after the addn. of water, add 0.5 cc. of an $(NH_4)_2SO_4$ soln. contg. exactly 0.05 mg. N per cc. Colorimetrically compare the solns. in test tubes 1, 2 and 3 with that in 4. Calc. the N content of the blood sample in the usual manner, making a correction for the N contained in the reagents. This modification of the method reduces the mean error to 1.4%. M. G. M.

The use of the method of Nicloux-Osuka for the determination of residual carbon in the blood and of carbon in the urine in the presence of protein. I. I. Kotlyarov. *J. Physiol.* (U. S. S. R.) **21**, 321–4(1936); *Chem. Zentr.* **1938, I**, 4360.—In the detn. of the C:N ratio in the blood and urine after extirpation of the suprarenal capsules, the method of Osuka (cf. *C. A.* **26**, 2480) was used not only for the detn. of C in the urine but also for that of the residual C in the blood. The blood protein was pptd. with phosphotungstic acid according to the method of Stepp. A 10–20-cc. portion of the filtrate in a small flask was neutralized, in accordance with the method of Osuka, with 2 *N* KOH, a drop of 0.05 *N* NaOH to which methyl red had been added serving as indicator. By use of the vacuum created by a water pump, the liquid in the flask was evapd. at 40°. The residue was then ashed according to the method of Osuka. Albumin-contg. urine was treated in like manner. The vol. of the small flask in the app. of Osuka was increased to 50 cc. Control detns. of the C in urea gave a mean error of 1.4%. The difference between the results of parallel detns. was on an av. 2.9% for blood and 2% for urine. M. G. Moore

The intravenous dextrose-tolerance test. R. E. Tunbridge and E. C. Allibone. *Quart. J. Med.* **9**, 11–35 (1940).—A standard test is suggested in which 27.6 g. of dextrose is injected intravenously in 3 min. (92 cc. of 30% aq. dextrose soln.). Samples of blood (0.1 cc.) are taken from the lobe of the ear at intervals of 1.5 to 7.5 min. for 60 min. after the end of the injection. With 40 healthy medical students the blood sugar returned to the preinjection level within 60 min. With diabetic patients the time was longer. The actual time was const. for each normal person but differed with different individuals. The response is altered by age, infection, disease, diet and the amt. of dextrose injected but not by normal variations in wt. or by the substitution of isotonic saline for water as a solvent for the dextrose. 82 references. J. T. Myers

Detection of chloralose in urine. P. Cheramy. *Ann. méd. légale criminol. police sci.* **19**, 630–1(1939).—Reflux 20 cc. urine + 1 cc. H_2SO_4 + 0.5 g. charcoal (e. g., Norit) for 5–10 min., cool and filter; to the filtrate in a test tube add 2–3 cc. colorless C_5H_5N and an equal vol. of NaOH soln. (presumably 17–25%), shake well and heat 1–2 min. in a boiling-water bath. In presence of chloralose (0.1 g. per l. or more) the supernatant C_5H_5N turns pink to cherry red. The reaction is also given by chloral, $CHCl_3$, $CHBr_3$, CHI_3, but not by barbiturates, and is therefore useful to eliminate possibility of intoxication by the latter. A. Papineau-Couture

The detection of the rupture of fetal membranes [through change in vagi. pH] with the nitrazine indicator. Tom Abe. *Am. J. Obstet. Gynecol.* **39**, 400–4(1940). J. Pinchack

Studies on preservation and use for transfusion of placental blood. Charles S. Fine, Robert L. Alter and Arthur Baptisti, Jr. *Am. J. Obstet. Gynecol.* **39**, 462–8 (1940).—The use of placental blood for transfusion is impractical because of tech. difficulties in its collection and sterile preservation. The best preservative is 1.5% Na citrate in *N* saline. J. Pinchack

A specific method for determining alcohol in blood. H. Kluge. *Z. Untersuch. Lebensm.* **78**, 449–58(1939).—The Et dinitrobenzoate deriv. is prepd., identified, sapond. and the amt. of C_2H_5OH detd. Heat just to boiling 0.2 g. of recrystd. 3,5-dinitrobenzoyl chloride and 5 cc. C_6H_6 in a 100-cc. Erlenmeyer flask under reflux. In a 100-cc. flask add 30 cc. C_6H_6, 2 g. anhyd. $CuSO_4$ and dropwise while shaking 1 cc. of sample (blood serum, urine, etc.). On lumping, disintegrate the $CuSO_4$ with a thick glass rod and treat the mixt. with an addnl. 2 g. of $CuSO_4$. Stopper and shake 30 min. Place in a centrifuge tube and centrifuge. Pour 25 cc. of the clear soln. down the reflux condenser into the 5 cc. C_6H_6 and dinitrobenzoyl chloride mixt., add 0.1 cc. pyridine, let stand ½ hr., bring to boiling and allow to stand ½ hr. at room temp. Boil and let stand ½ hr. again, then reflux gently for 4 hrs., during which add dry C_6H_6 to replace any lost during the process. Remove reflux, cool in water bath and pour into a separatory funnel contg. 10 cc. of 5% HCl. Shake well, remove aq. soln. and wash twice with water. Filter the reaction mixt. through a fluted filter into a measuring cylinder. Det. the alc. in the aliquot (about 24 cc.) according to the method of Liebesny as described by Heiduschka and Steulmann (*C. A.* **31**, 1444[1]). With known samples the method proved accurate and also checks other known methods on blood samples. For qual. identification evap. the reaction mixt. after it has been washed with dil. HCl and water, and filter. Take up the residue twice with petr. ether and evap. Take up with ether again, wash with 1% NaOH soln., filter and evap. The crystals obtained with samples contg. C_2H_5OH should melt at 93°. Other criteria for

identification are crystal form, soly., mixed m. p. with pure ester, detn. of C, H, N and O and color reaction with α-naphthylamine. The latter is used for small yields of crystals. The procedure is more tedious and time consuming than other common methods but since it is specific, it should serve that purpose in medico-legal chemistry. M. M. Piskur

Colloid reaction in the diagnosis of cerebrospinal fluid. Werner Herrmann. *Kolloid-Z.* **89**, 297–301(1939).—The prepn. of Au sol according to the Fowweather method (cf. *C. A.* **23**, 405) is described. This sol is more easily prepd. than other sols and more sensitive to pathol. protein. The collargol reaction of Riebeling (*C. A.* **32**, 8488[8]) is a valuable contribution to the research methods of colloid chemistry. The Au sol and collargol reactions have different chem. bases. They can be used to det. different pathol. constituents of the cerebrospinal fluid. Both methods should be used for complete diagnosis of the cerebrospinal fluid. Felix Saunders

A critical examination of the chemical methods for determining ascorbic acid, and a method for the titration of ascorbic acid in strongly colored berries and fruits. Lisa Swenander Lanke. *Kgl. Fysiograf. Sällskap. Lund, Forh.* **8**, 225–43(1938)(Pub. 1939)(in German).—See *C. A.* **33**, 5019[8]. W. C. Tobie

A colorimetric semimicrodetermination permitting the control of arsenuria in the neoarsphenamine treatment in massive doses. J. V. Harispe. *J. pharm. chim.* **30**, 58–70(1939).—See *C. A.* **33**, 9346[9]. S. Waldbott

Determination of carotene. Geo. Kernohan. *Science* **90**, 623(1939).—A 1-g. sample of alfalfa is placed in a flask, to which is added 100 cc. of petr. ether. The flask is stoppered and set aside overnight. The soln. of plant pigments is poured on a column of finely divided soda ash and drawn through the column by the aid of suction. A chromatograph of the various plant pigments forms on the column with the sepn. of carotene, which passes through with the petr. ether. The carotene should be washed through with more petr. ether. F. S.

Standard Methods of the Division of Laboratories and Research of the New York State Department of Health. 2nd ed. **Augustus B. Wadsworth**, Director. Baltimore: Williams & Wilkins. 681 pp. $7.50.

D—BOTANY

THOMAS G. PHILLIPS

Ecological studies on the rain forest of Southern Nigeria. II. The atmospheric environmental conditions. G. C. Evans. *J. Ecol.* **27**, 436–82(1939); cf. *C. A.* **33**, 9510[1].—The concn. of CO_2 in the undergrowth of the Nigerian rain forest did not exceed 0.06% by vol., and thus was of the same order as that in temperate woods. There was a marked diurnal variation; values much above "normal" were recorded only in the morning and there was a steady fall from sunrise to noon. There were no significant differences between the concns. observed in primary and in 14-yr.-old secondary forest. J. R. Adams

"Second growth" of potato tubers. K. Schmalfuss. *Angew. Botan.* **20**, 430–3(1938).—The basal (older) portion of tubers showing "second growth" (occurring after heavy rain following a dry period) contains more water and total and reducing sugars and less starch, protein and total N than does the new growth. B. C. P. A.

Comparative effects of cobalt, nickel and copper on plant growth. W. E. Brenchley. *Ann. Applied Biol.* **25**, 671–94(1938).—In water cultures small concns. of Co, Ni and Cu bivalent ions have no detrimental effects on barley or beans. With increasing concns. toxic symptoms appear abruptly at concns. which differ for each element and for each species. Cu was more toxic than Co or Ni, and $CuCl_2$ than $CuSO_4$, to barley. Beans were affected more by Co than by Cu or Ni. Cu in toxic proportions caused shortening and bunching of barley whereas Ni and Co caused attenuation but not shortening. B. C. P. A.

Variation in [plant] cellular function according to the composition and concentration of the nutrient solution. P. Mazé, P. J. Mazé, Jr., and R. Anxionnaz. *Ann. inst. Pasteur* **62**, 224–48(1939).—The method of culture in which the root system is divided between two independent solns. (*C. A.* **32**, 1752[8]) is further developed. Effects of the concn. of the nutrient and of light intensity on growth and on intake of water and nutrients by corn plants are examd. The alky. of the ash of roots immersed in water exceeds that of roots placed in a complete nutrient soln. When part of the root is placed in aq. KI and part in a complete nutrient the intake of I is inversely related to the concn. of the complete nutrient. Comparison of the rates of intake of N from various nitrates and NH_4 salts shows N to enter the root in an ionic form, the ratio of cations to anions absorbed varying with the N source. The rate of intake of NH_4 ions may be greater or less than that of NO_3 ions according to the concn. of nutrient supplied. B. C. P. A.

Genetics and chemistry of flower color variation in Lathyrus odoratus. G. H. Beale, G. M. Robinson, R. Robinson and R. Scott-Moncrieff. *J. Genetics* **37**, 375–88(1939).—The inheritance of two new color factors is examd., viz., "bright" an incomplete recessive, and "salmon" a recessive factor hypostatic to red. The factors red and salmon are assocd. with a difference in the degree of oxidation of anthocyanins in the flowers and that of leucoanthocyanins in seed coats. The factor "dull" is associated with a pH difference in flower saps. Seven factors, dark wing, copper, maroon, mauve, bright, picotee and hooded, are associated with differences in relative amts. of anthocyanin and anthoxanthin copigment. Variation in methylation of anthocyanin is correlated with quantity of anthoxanthin. B. C. P. A.

Energetics of germinating seeds. II. Wanda Sołodkowska. *Roczniki Chem.* **19**, 277–88(1939).—The O_2 intake and CO_2 output of sunflower seeds rise to a max. on the 4th day of germination when the R. Q. is min. On the assumption that the heat of germination (815.3 g.-cal. perg.) is due to oxidation of fats alone, and on the basis of the above results, it is calcd. that combustion of fats yields 602.3, and transformation into carbohydrates 274.3, a total of 876.6 g.-cal. perg. Cf. *C. A.* **33**, 6392[1]. B. C. P. A.

The autumnal yellowing of beet leaves. Henri Colin and Simone Lemoyne. *Compt. rend.* **209**, 970–2(1939); cf. *C. A.* **29**, 8386[5]; **31**, 1072[1]; **32**, 2977[1].—At the end of the season the parenchyma of the green and the yellow, older outer beet leaves contain 17.4 and 18.6% dry matter, resp. The percentages of various components in the dry matter of the green and the yellow leaves are as follows: reducing sugars 4.36, 9.65; sucrose 4.03, 4.03; sol. org. N 1.15, 0.81; insol. org. N 2.85, 1.52; sol. P 0.118, 0.101; insol. P 0.145, 0.089; sol. ash 9.9, 8.2; insol. ash 4.8, 5.0; sol. alky. (in cc. *N* soln.) 94, 70.5; insol. alky. 112, 102.5, resp. Migration toward the root probably causes the lower org. N content of the yellow leaves. Younger leaves, taken at the same time, contain on an av. 15% dry matter, 7% sugar, 17% ash and 5% N, most of which is insol. Ruth Berggren

The assimilation of carbon dioxide by green plants. III. The light absorption of suspensions of algae. W. Noddack and H. J. Eichhoff. *Z. physik. Chem.* **A185**, 241–59(1939); cf. *C. A.* **34**, 2415[1].—Light was passed through suspensions of *Chlorella pyrenoidosa* and the intensity of the light emerging was detd. as a function of the angle of emergence. This was done for dil. and concd. (approx. 1.14×10^7 algae/cc.) suspensions with wave lengths of 6600 and 5420 A. From the absorption of the normal suspensions and of suspensions decolorized with Br water the absorption due to the pigments in the living cell was evaluated. An *ellipsoidal photometer* for collecting all the light emerging from a scattering body is described; with this app. the light absorption of chlorophyll in ether soln. and in the living cell was detd. as a function of λ from 5150 to 8325 A. The curves obtained in the 2 cases are similar in shape but the max. and min. absorptions in ether soln. occur at lower λ than the corresponding values in the cell. In the cell the max. absorption is at 6680 A.; in ether soln. it is at 6580 A. On the long-wave-length side of the max. the absorption in ether soln. is lower than in the cell:

on the other side and at the max. it is considerably greater. T. H. Dunkelberger

Physiological study of the winter wheat plant at different stages of its development. Edwin C. Miller. *Kansas Agr. Expt. Sta., Tech. Bull.* **47**, 2-167(1939).—The extensive data are presented in 28 tables. Kanred and Harvest Queen varieties were studied for several seasons. The N content of the 2 varieties at different periods of growth were similar. There was a marked decrease in the N content of the stem from the beginning of grain formation to maturity. The amt. of N, expressed in g. per 100 plants, increased in amt. from the seedling stage in early Oct. to the middle of May. The decrease in N after that period per week varied from 1.5 to 17.5% of the total amt. present the preceding week. The amt. of N absorbed by wheat plants from Oct. to Mar. was very small. From 80 to 90% of the N in the plants was absorbed during the 7-12 weeks following the middle of March. The max. amt. of N in the stems and leaves occurred at heading time. The protein-free N in the stems and leaves ranged from 14% to 38% of the total N. The amt. of total P in the stems and leaves and other aerial parts never reached 1% on a dry basis. The max. percentage of about 0.8% was reached in the 1st seedlings and the min. or 0.03% at harvest time. The P content of Kanred was always lower than that of Harvest Queen. P reached its max. in the plants at harvest. The plants absorbed 12–25% of their P by Mar. 1st. The P decreased to a min. in the stem and leaves at or near maturity. A part of the P migrated directly to the grain from the soil. There was a greater amt. of water-sol. P than water-insol. P in both Kanred and Harvest Queen plants. The P in the water-sol. form averaged about 75% of the total. The max. amt. of K in the wheat plants occurred about 4 weeks before harvest. The max. amt. of K in the plants was 6% and the min. 1%. Only 12% of the max. K had been absorbed by the plants by Mar. 15th. K was much reduced in amt. in the stems and leaves with approaching maturity of the grain. At harvest, the grains contained only 45–57% of the max. amt. of K that they possessed 4 weeks earlier. Possibly leaching accounts for some of the loss of K from the plant previous to harvest. The heads of both varieties increased gradually in K content as harvest time approached. The nonreducing sugars predominated in the seed and at all stages of development of the plant. The max. percentage of sugars occurred during the earlier periods of growth. Sugars increased markedly when growth of the plants began in the spring. Sugars were highest in total amt. at the milk stage of the grain. The time of max. sugar in the grain coincided exactly with that of the max. quantity of sugar in the stems and leaves. The greatest gains in the amt. of carbohydrates in the stems and leaves occurred during the earlier stages of the formation of the heads. The percentage of starch in the stems and leaves varied from 0.2 to about 2.5%, but more frequently it was less than 1%. The hemicelluloses increased in amt. in the plant from the seedling stage to maturity but apparently they were not utilized by the plant. When grown under the same conditions Kanred, a typical hard winter wheat, and Harvest Queen, a typical soft winter wheat, showed no striking differences in the amt. or distribution of the various components detd. 92 references. C. R. F.

Effect of root temperature on the absorption of water by the cucumber. R. A. Schroeder. *Missouri Agr. Expt. Sta., Research Bull.* **309**, 3-27(1939).—A deficiency of water in the leaves and fruit causes serious injury to the fall com. cucumber crop in Mo. Respiration is greatly reduced at low temps. Factors which can decrease the flow of water through cucumber roots include increased viscosity of both water and colloidal cellular matter and the reduction in metabolic activity which occurs at lower temps. Injury was marked at 60°F. and could occur up to 70°F. C. R. Fellers

Effect of certain treatments on the carbohydrate reserves of asparagus crowns. L. E. Scott, J. H. Mitchell and R. A. McGinty. *S. Carolina Agr. Expt. Sta., Bull.* **321**, 5-36(1939).—The fleshy roots are permanent carbohydrate storage structures for the asparagus plant. The rhizome is of comparatively little importance in the matter of total storage of reserve food. The reserve carbohydrates are largely nonreducing sugars with a small amt. of starch. Seasonal variation in compn. involved chiefly dry matter and nonreducing sugars, the percentage of reducing sugars and starch remaining fairly const. There was no consistent relation between fertilizer treatment and percentage of carbohydrate reserves in the crown. The rhizome contained most of its sugars in the form of reducing sugars, which may thus possibly be the transitional form of carbohydrates in the asparagus plant. Most of the carbohydrates in the fleshy roots are found in the cortex region. Carbohydrate depletion took place rapidly for about 4 weeks during the harvesting season and following it, until the plants had attained max. growth. Extension of the harvesting season by 2 weeks had no permanent harmful effect on the carbohydrate compn. of the crowns. The chem. studies point to the necessity of maintaining vigorous top growth of the plant until late fall to assure max. production of spears the following spring. C. R. Fellers

Mineral nutrition of higher plants. P. Mazé and P. J. Mazé, Jr. *Compt. rend. soc. biol.* **132**, 375-7(1939).—Corn plants were grown with their roots in liquid media. Small amts. of Co and Ni salts in the medium had an injurious action, small amts. of Ti, V and Be chlorides had a slight beneficial action and K_2CrO_4 had no effect. L. E. Gilson

Absorption of solutions of sucrose by the roots of Zea mays. P. Mazé and P. J. Mazé, Jr. *Compt. rend. soc. biol.* **132**, 377-8(1939); cf. *C. A.* **33**, 4628⁴.—Corn plants were grown with part of their roots in a mineral soln. and part in a sucrose soln. Considerable sucrose was absorbed from a 1% soln. but very little from 2–4% solns. L. E. Gilson

Influence of low temperatures on amylolysis and amylogenesis in the lupine. Georges Deloffre. *Compt. rend. soc. biol.* **132**, 503-4(1939).—Portions of embryonic lupine axes in contact with water or glucose soln at 0–1° carry on amylolysis but not amylogenesis. This suggests that these activities are not due to the same amylase acting reversibly. L. E. Gilson

The incorporation of growth hormones in seed dressings. H. E. Croxall and L. Ogilvie. *J. Pomology Hort. Sci.* **17**, 362-84(1940).—Dry seed dressings (a proprietary mercurial, talc, Cu_2O and ZnO) contg. from 5 to 20 p. p. m. of α-naphthaleneacetic acid, mixed naphthylideneacetic acids and β-indolylbutyric acid were applied to the seeds of 7 varieties of peas and 2 of dwarf beans. No acceleration of the rate of germination occurred in lab. tests. With sterile soil in the greenhouse the rate of emergence of pea seeds was accelerated and the dry wt. of the seedlings after 3 weeks' growth was increased by pretreating the seeds with either talc, Cu_2O or the mercurial dressing, all of which contained the growth-promoting substances. The check to growth caused by the mercurial and Cu_2O dressings under certain greenhouse conditions was greatly reduced or entirely overcome by the incorporation of the hormones with these dressings. In greenhouse soil contaminated with damping-off fungi a higher percentage emergence from several varieties of peas and one of beans was obtained by treating the seeds with hormone-treated dressings than by the use of the same dressings without hormones. In field trials the crop yields of 3 varieties of peas treated with the hormone dressings were up to 80% greater than those from seeds treated with the same dressings without hormones, or from untreated seeds. There was a considerable difference in the response of different varieties to the dressings used. The effect of the dressings contg. hormones varied with different external conditions. No single dressing produced an optimum effect on all varieties and under all conditions. Five p. p. m. of α-naphthaleneacetic acid and mixed naphthylideneacetic acids may safely be used on the varieties of peas and beans employed in these trials, and may cause considerable stimulation under some conditions. Eleven references. John O. Hardesty

Action of vitamin E on plants. W. H. Schopfer and S.

Blumer. *Z. Vitaminforsch.* 9, 344–9(1939).—Vitamin E (tocopherol) exerted an inhibitory action on the growth of *Melandrium* (*lychnis* Trans.) *album*. J. S. H.

The genetics and chemistry of flower color variation. W. J. C. Lawrence and J. R. Price. *Biol. Rev. Cambridge Phil. Soc.* 15, 35–58(1940).—A review. E. H.

Leaf pigments of tobacco. Werner Nagel. *Botan. Arch.* 40, 1–57(1939).—The abs. quantity of chloroplast pigments in the tobacco leaf increases with the growth of the leaf, after which there follows a rapid decompn. The relative value, based on leaf surface or fresh or dry wt., does not parallel the growth but begins to decrease much earlier than does the abs. value. With the exception of the 2–3 youngest leaves, the upper leaves of a plant contain the highest relative amt. of pigments. In the very young leaves (heart leaves), the pigments are not evenly distributed, the tips having the highest concn. The chlorophyll recedes from the basal portion of these leaves, giving in this region a lower ratio: chlorophyll a + chlorophyll b/xanthophyll (x) + carotene (c). In general, a/b increases very early to an av. value of 3–4 and x/c reaches a value of 2–3.5. The ratio of a + b/x + c is in the earliest development of the leaf less than 1, then it increases rapidly to 3–5 and falls again during the early decompn. of chlorophyll to less than 1. No trace of chloroplast pigments was detected in the dead brown leaves. The yellow H_2O-sol. glucoside pigment "rutin" was detected in young leaves, but with ripening the presence of brown red-brown substances interfered with its detn. Increasing the N supply to a certain limit causes a stronger production of pigments, the max. corresponding with max. growth. The dark blue-green leaves resulting from 3 times the normal application of N is due to the higher ratios: a + b/x + c and a/b. The color intensity of the dry brown leaves also increases with the higher N applications. 39 references. C. K. Horner

The chemical composition of flowering bulbs—tulips, hyacinths and narcissi. F. C. Thompson and J. Hargrave. *Agr. Inst. Exptl. Sta., Kirton, Report on Bulb Expts.* No. 6, 34–7(1939).—A review and discussion, with 13 references. K. D. Jacob

Technique in colchicine treatment of pasture plants and seeds. O. E. Sell. *Proc. Assoc. Southern Agr. Workers* 40, 63–4(1939).—Colchicine in even weak concns. allowed only a low survival of alfalfa, bur clover, vetches, crimson clover and subterranean clover. Treatment of these seeds with Hormodin subsequent to the colchicine treatment allowed the use of more concd. colchicine solns. with a satisfactory survival of seedlings. K. D. Jacob

Girdling of cotton plants as affecting survival of Phymatotrichum omnivorum [the causal organism of root rot]. Walter N. Ezekiel. *Proc. Assoc. Southern Agr. Workers* 40, 185(1939).—Plants girdled on July 29 showed bronzing of the foliage in 11 days and a third of the plants died within a month. Meanwhile, there was a rapid decrease in alc.-sol. solids and total sugars in the roots. The roots of the plants showed no viable *P. omnivorum* 3–8 weeks after girdling. Girdling on Sept. 3 produced no change in the above-ground appearance of the plants and had no effect on the viability of *P. omnivorum* on the roots. K. D. Jacob

Permeability of the testa of normal and treated cotton seeds. J. G. Brown. *Proc. Assoc. Southern Agr. Workers* 40, 185–6(1939).—Normal, fuzzy cotton seeds sprouted erratically, whereas acid-treated seeds of the same lot sprouted promptly. Acid-treated seeds absorbed water more rapidly than did normal seeds and in both cases the water intake increased with the temp. The imbibitional "pull" of cotton seeds was strong enough to absorb water from satd. solns. of NaCl and LiCl. K. D. Jacob

Nature of the different forms of urease found in the seeds of various Canavalia. II. Matunosuke Kitagawa and Suburo Yosue. *Bul. Sci. Fakult. Terkultura, Kyusyu Imp. Univ.* 8, 293–312(in English, 313–14)(1939); cf. *Ibid.* 192-202 (in English, 203).—The amts. of urease are compared with the amts. of protein found in the seeds of various *Canavalia*. An American sample of *C. ensiformis* had a protein content (I) of 22.41% and urease activity II (in cc. 0.25 *N* NH_3) per g. of bean meal of 1360; while some Japanese specimens gave a I of 18.30–22.14 and II of 135–1320. Japanese *C. gladiata* had I of 17.41–19.61 and II of 1188–1100. Japanese *C. lineata* gave a II of 183. There seems to be little relation between I and II. Degree of permeability of collodion membrane to urease particles was also studied, as was also the size of the urease particles by means of Elford's ultrafiltration method (*C. A.* 25, 5189). Values for porosity ($m\mu$), urease activities (*N*/25 NH_3 in cc.) before filtration and after filtration, and degree of filtrability of urease particles (%) for 4 samples are: 107, 5.23, 0.34, 6; 202, 5.18, 1.65, 32; 320, 5.23, 2.91, 56; 590, 5.23, 4.68, 89. Values of the filtrabilities of the American and the Japanese jack bean urease are compared. A. H. Krappe

The effect of oxygen surrounding the aerial part of the plant on the elongation of the root and the cell division of the root tip. Hitosi Kozima. *Bul. Sci. Fakult. Terkultura, Kyusyu Imp. Univ.* 8, 315–18(in English, 319–20)(1939).—Continuing previous research on the young root of *Vicia faba*, K. attempted to det. whether or not the root, cultured in an aq. medium from which O_2 had been removed by boiling, could be supplied with the needed O_2 indirectly through the aerial parts of the plant. The aerial parts were kept (1) in normal air, (2) in air from which O_2 had been removed by means of pyrogallol soln. and (3) in pure O_2. The rates of root elongation were small in all 3 sets, amounting to about 10% of that of the control material cultured in O_2-satd. H_2O and to less than 10% of that of the control material cultured in moist sawdust. The frequencies of cell division were equally small, amounting to about 2–3% of those observed in the control plants on sawdust. These facts show that the physiological function of the root tip is hardly affected by the O_2 supplied by the atm. to the aerial part of the plant. A. H. K.

Seasonal changes in the water and reserve-substance content of mulberry stems and roots. Ryohei Taguti. *Bul. Sci. Fakult. Terkultura, Kyusyu Imp. Univ.* 8, 350–71(in German, 372–3)(1939).—The seasonal fluctuations in the content of H_2O, carbohydrates hydrolyzable with dil. acid and crude fats were examd. chemically, i. c., by Kôketsu's powder method (*Botan. Mag.* (Tokyo) 39, 169–75(1925)). The H_2O content was found to be fairly high in spring, to decrease in early summer and to reach a max. about midsummer, to decrease again rapidly in the autumn and more slowly in winter. The carbohydrate content gradually rises from spring to late autumn, when it reaches a max., though it falls temporarily about midsummer. The curve of the fat content is much the same, but it falls in the late autumn, to increase in winter, more so in the bark than in the wood. The max. starch content coincides, in spring, with the min. fat content. The change in the starch content closely agrees with that of the content of hydrolyzable carbohydrates, from which it is concluded that the carbohydrate economy of the mulberry tree is largely based on starch. A. H. Krappe

Biochemical changes in oats affected with the virus disease "zakuklivanie." V. L. Ryzhkov, M. N. Vorob'eva and E. P. Gromuko. *Compt. rend. acad. sci. U. R. S. S.* 24, 301–3(1939)(in English).—Tests disclosed that (1) oat leaves show no important N-content change; the dwarfs increase somewhat in total N and decrease in protein N; (2) the content of reducing and nonreducing sugars and starch is increased by the disease; (3) the ratio carbohydrates/N favors the classification of the disease with the yellows, though there also are some typical symptoms of mosaic; (4) the P metabolism is greatly affected by the disease; the leaves of sick plants decrease in lipoid P and increase in P combined in compds. sol. in 0.05 *N* HCl; (5) the decrease in lipoid P appears to be related to the reduction and disintegration of plastids. 5 references. A. H. Krappe

Thermal denaturation of tobacco mosaic virus. Max A. Lauffer and W. C. Price. *J. Biol. Chem.* 133, 1–15 (1940); cf. *Phytopathology* 29, 20(1939).—The thermal denaturation of tobacco mosaic virus is a reaction of the 1st order and is readily reproducible. The energy of ac-

tivation of the reaction in 0.1 *M* phosphate buffer at pH 7 is about 153,000 cals. per mole. The rate of reaction is strongly influenced by changes in pH and is more rapid in alk. than in acid solns. The rate varies inversely with the initial virus concn. Thermal inactivation proceeds more rapidly than thermal denaturation measured by pptn. A. P. Lothrop

The biological action of metals on the growth of plants. Oreste Cocorullo. *Riv. fis., mat. sci. nat.* **12**, 512–22 (1938); *Chem. Zentr.* **1938, II**, 3409.—The development of seeds of *Raphanus sativus* (radishes) when grown in pots of glass, Pb, Zn and Cu was studied. The controls were grown in wooden boxes. The controls attained a length of 5.31 cm.; the plants grown in glass, Pb, Zn and Cu grew to lengths of 7.80, 6.58, 4.32 and 3.36 cm., resp. M. G. Moore

Potassium deficiency in ammonium- and nitrate-fed tomato plants. M. E. Wall and V. E. Tiedjens. *Science* **91**, 221–2(1940).—Four groups of seedling tomato plants were grown in sand and were supplied with the following solns.: (1) complete nutrients with nitrate N, (2) complete nutrients with ammonium N, (3) lacking K with nitrate N, (4) lacking K with ammonium N. The plants supplied with the 2 complete mediums grew luxuriantly for the duration of the expt. After 3 weeks the plants supplied with (3) showed early deficiency symptoms (stunted growth, foliage contg. abundant starch, pin-point necrotic areas on the curled margins of the older leaves). The plants supplied with (4) exhibited symptoms on the 7th day which were very different from those of the nitrate plants. The foliage was darker green. The plants were stunted and contained considerable starch. This starch rapidly disappeared after 4 days. The leaves wilted and died in 24 hrs. after the appearance of the first symptoms without changing color or exhibiting any of the symptoms assocd. with the nitrate-supplied plants. The comparatively high concn. of NH_4 N in the plants supplied with (4) apparently was responsible for the rapid deterioration and collapse of the leaf tissue. Carbohydrates likewise decreased very rapidly as NH_4 N increased in the foliage. The cause of the injury must be attributed to the lack of K in preventing conversion of NH_4N to amino and protein N. The chem. reactions involved in the metabolic cycles of K-deficient plants supplied with nitrate or ammonium N differ only in that the NH_4 N plants have at hand a large supply of readily assimilated N. The nitrate plants, on the other hand, must first form NH_3 through the reduction of nitrates. Felix Saunders

Experiments with boron on some cereals. W. Schropp and B. Arenz. *Bodenkunde u. Pflanzenernähr.* **16**, 169–84 (1940).—Summer barley, panicled millet and Sudan grass were grown in a modified Crone's nutrient soln. with Hoagland's A-Z without B, the latter specially supplied as H_3BO_3 at 0, 0.01 and 0.1 mg. B/l. for barley and also at 0.5 mg. B/l. for the others. The expts. showed that B is indispensable for all the plants tested. The chief B-deficiency symptom with barley is a continued shoot formation and failure to form kernels; the latter were not formed with 0.01 mg., but normally, with 0.1 mg. B/l. B deficiency was assocd. with a relatively and absolutely greater uptake of N. B had no direct influence either on CO_2 assimilation or protein transformations in the plant. Its action is indirect, and by preventing any unusual swelling of the plasma colloids it has a favorable influence on water economy. The lower requirement for B shown by monocotyls as compared with dicotyls is assocd. with the lack of a secondary growth in stem thickness with the former; if such growth takes place, the H_2O-conducting vessels of the stem may thereby be more or less constricted and their functioning impeded. At the start, these expts. were conducted in glass vessels, and furnished no very conclusive indications, because B was being supplied by the glass; later, vessels of "Mipolam," a polystyrene plastic, were substituted, with sponge rubber used to support the plants therein, and it is believed that no B was then available to the plants, except as it was intentionally added. These expts. showed the abs. necessity for excluding the trace element under study and sufficiently long continuation of the expts. for deficiency symptoms fully to develop. Twenty-four references. C. J. S.

The action of boron on carrots, sunflowers and buckwheat. W. Schropp and B. Arenz. *Bodenkunde u. Pflanzenernähr.* **16**, 185–91(1940).—Expts. similar to those described in the preceding abstr., but in enamelled and glass vessels, and with H_3BO_3 supplied to some at a single rate, 0.5 mg. B/l., led to the conclusion that B is indispensable to carrots, sunflowers and buckwheat. Plants grown without sufficient B assimilated relatively more N, and the ratio of total to protein N in their tissues was greater. In the severest cases of B deficiency, the symptoms resembled those of NH_3 poisoning, suggesting an internal accumulation of NH_3 from protein decompn. consequent upon lack of carbohydrates, but the previous conclusions as to the mechanism of action of B and lack of direct connection between B and these phenomena are unchanged. Six references. C. J. Schollenberger

The influence of boron with various potash-nitrogen ratios on the growth of field beans. B. Arenz and W. Schropp. *Bodenkunde u. Pflanzenernähr.* **16**, 191–205 (1940).—*Vicia faba*, plants grown in vessels contg. 18 kg. Hohenbocka glass-sand, fertilized with 0.0 and 0.5 g. N as $NaNO_3$, 1.0 g. P_2O_5 as $CaHPO_4$, 1.0, 2.0 and 3.0 g. K_2O as K_2SO_4, 0.0 and 1.0 mg. B as H_3BO_3, with rain water to 40–80% holding capacity, were harvested after 12 weeks' growth. Dry-matter production was significantly increased, nodulation and percentage total and protein N were decreased by $NaNO_3$, although abs. crude and pure protein production were increased, especially with increased K_2O. pH of root and nodule sap was increased by $NaNO_3$, further by K_2SO_4. Without B, increase in K_2O supplied decreased dry-matter production, especially with N in addn. In the latter case, nodulation was strongly depressed with increasing K_2O, although without N it increased with K_2O supplied. With B and without N, dry matter production varied inversely, nodulation varied directly, and with both B and N, yields and percentage total and protein N increased with K_2O fertilization. Without both B and N, the latter relations were inverted. With increasing K_2O, pH of sap generally increased; it varied 5.4–5.7 in stems, 5.7–6.9 in roots, 5.1–6.0 in nodules. With few exceptions, B greatly increased dry-matter production, and nodulation still more. B seemed to further utilization of N supplied by nodules and of increased K_2O as fertilizer; the effect is attributed to improved water economy and translocation, and general vitality of the plants as well. The ratio protein:sol. N was not affected by B. Plants grown without B showed great variation in the appearance of deficiency symptoms, indicating either differences in natural resistance or varying stocks of B in the seed. Eight references. C. J. S.

Chemical investigations of sugar sorgo. Ezio Emiliani. *Ricerca sci.* **10**, 1131–6(1939); cf. *C. A.* **33**, 6079[6].—Carbohydrates found in sorgo juice include sucrose, glucose, fructose, starch, pectins and "gum." The sugars are more abundant in the middle internodes, decreasing toward bottom and top; in this part the ratio of reducing sugars to sucrose is lowest. Glucose is always in excess of fructose. In nearly all varieties the middle internodes contain most of the starch. Among products of hydrolysis of the alc.-insol. "gum" left after fermenting the juice were identified xylose, glucose, rhamnose and a uronic acid, probably glucuronic acid. O. W. Willcox

Influence of artificial fertilizers on photosynthetic efficiency of *Andropogon sorghum* (Singh, *et al.*) **15**. Alkaloids of papaveraceous plants (Manske) **17**.

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E—NUTRITION

PHILIP B. HAWK

Rapidity of the appearance of vitamin A deficiency in chicks. Madeleine Vermès, G. Lisot, Paul Meunier and Yves Raoul. *Compt. rend. acad. agr. France* **25**, 1090–2 (1939).—The natural reserves of vitamin A of the egg yolk and liver of chicks are small. All trace of vitamin A disappears from the liver by the end of the 8th day. Ingestion or injection of large doses of vitamin A does not build up large reserves. Chicks should receive the vitamin in frequent small doses. J. R. Adams

Vitamin C in athletic exercise. Hermann Brandt and William Schusselé. *Compt. rend. soc. phys. hist. nat. Genève* **55**, 102–8 (in *Arch. sci. phys. nat.* **20**, Nov.-Dec., 1938).—Muscular effort in some cases increases, and in others decreases, the reducing power of the urine, the direction of the change being const. for the same subject. B. C. P. A.

Factor W and its relation to vitamin B complex. D. V. Frost and C. A. Elvehjem. *J. Biol. Chem.* **128**, 23–34 (1939); cf. *C. A.* **32**, 981[8].—Factor *W* is weakly acidic, sol. in phenol and aniline, and insol. in ether. No appreciable proportion of the activity is pptd. from fuller's earth filtrates by $AgNO_3$, Pb acetate, picric acid, $HgCl_2$ or H_2PtCl_6. Factor *W* is distinct from vitamin B_6, the chick antidermatitis factor, and nicotinic acid. It is equally well adsorbed at pH 1 or 6 on C, from which it can be eluted by org. solvents. B. C. P. A.

Vitamin B_1 metabolism in health and disease. H. Schroeder and L. Benacchio. *Klin. Wochschr.* **18**, 148–50 (1939).—The normal excretion of vitamin B_1 in the urine is 100–400 γ per day; in various diseases only 0–100 γ was excreted. After intravenous injection of 5–10 mg. of aneurin normal excretion rises to 3–9 mg.; in most diseases the value was less than 3 mg. Gastric juice has no influence on vitamin B_1, but traces of hemin destroy most of it. Excessive intake of carbohydrates in addn. to an ordinary diet stops vitamin B_1 excretion. B. C. P. A.

Avitaminoses in Czechoslovakia. J. Charvat. *Bull. office intern. hyg. pub.* **30**, 591–602(1938). R. Berggren

The control of alimentary and medicinal vitamins in Poland. R. Truszkowski. *Bull. office intern. hyg. pub.* **30**, 2280–5(1938). Ruth Berggren

The progress of work on nutrition in India. W. R. Aykroyd. *Bull. office intern. hyg. pub.* **30**, 2328–32(1938). Ruth Berggren

Attempt at preventive vitaminization. Georges Mouriquand, Maurice Dauvergne and Violette Edel. *Compt. rend.* **209**, 1023–4(1939).—The ascorbic acid content of the adrenal glands of normal guinea pigs did not increase after the daily oral administration of 50 mg. ascorbic acid for 15 days in addn. to the regular diet. When placed on a scorbutogenic diet, the guinea pigs which had been given this extra ascorbic acid showed no greater resistance to scurvy than those which had not. The addn. of vitamin C to a diet which already contains adequate amts. of vitamin C is apparently not indicated therapeutically. Ruth Berggren

The effect of feeding on the constants of butter fat and the quality of butter. Fr. Kieferle. *Vorratspflege u. Lebensmittelforsch.* **1**, 376–81(1938); *Dairy Sci. Abstracts* **1**, No. 1, 10. C. L. B.

The ascorbic acid content of human milk in summer and winter. H. Winkler and E. Heins. *Z. Geburtsh. Gynäk.* **117**, 148–64(1938); *Dairy Sci. Abstracts* **1**, No. 1, 92–3 (1939).—The measurements covered late pregnancy and the first ten days *post partum*. There was a steady rise in the vitamin C level from colostrum (av. in winter 2.5 mg./100 ml., in summer 3.3 mg.) to true milk which reached after the fourth day a steady level at 4.1 mg./100 ml. in winter and 5.7 mg. in summer. C. L. B.

"Swayback" studies in North Derbyshire. I. The feeding of copper to pregnant ewes in the control of "swayback." G. Dunlop, J. R. M. Innes, G. D. Shearer and H. E. Wells. *J. Comp. Path. Therap.* **52**, 259–65(1939); cf. *C. A.* **33**, 8702[8].—The administration to pregnant ewes of Cu contained in salt licks has a remarkably beneficial effect on the prevention of "swayback" in the progeny. The Cu requirement is max. when cerebral myelination is active in the lamb. Rachel Brown

Vitamin C and peptic activity. E. Tria. *Atti accad. Lincei, Classe sci. fis., mat. nat.* **29**, 632–4(1939).—The action of vitamin C on pepsin was studied by the method of Northrop, with casein in the substrate. There is a definite increase in enzyme activity amounting to 10–25%. In order to det. whether the effect was due to any change in oxidation-reduction potential, a duplicate test was made with *cystine*-HCl; it is known to affect this potential. No change was noted. Thus the activation is due to the vitamin present. A. W. Contieri

More recent development of vitamin investigation. K. Brunner. *Pharm. Zentralhalle* **80**, 725–30, 737–41, 749–53(1939).—A review. W. O. E.

Role of vitamins in chemical metabolism. Oskar Bauer. *Pharm. Zentralhalle* **81**, 13–18, 27–9(1940).—An address, with 10 references. W. O. E.

Protein levels of rations for White Leghorn pullets. A. E. Tomhave. *Delaware Agr. Expt. Sta., Bull.* **219**, 57 pp.(1939); cf. *C. A.* **34**, 2035[3].—For best results in growing White Leghorn pullets, the growing ration should contain 18% protein for the 1st 8–12 weeks, and 16% protein from 8 to 12 weeks of age until the laying ration is fed. The protein required to produce a lb. of gain is in direct proportion to the level of protein fed in the growing ration. The protein level fed during the growing period has but little influence on the no. of eggs produced during the 1st year of production. C. R. Fellers

Chronic selenium poisoning of rats as influenced by dietary protein. Ross A. Gortner, Jr. *J. Nutrition* **19**, 105–12(1940).—Diets contg. 30% casein exerted marked protective action against the toxic effect of Se in rats. Lactalbumin is only slightly less protective than casein. Edestin and gelatin, when fed at high levels in seleniferous diets, exerted no detoxifying action. The toxic effect of as much as 35 p. p. m. of Se in the diet was neutralized by the use of casein or lactalbumin (cf. Smith, *C. A.* **33**, 8715[6]). C. R. Fellers

Comparison of the utilization by guinea pigs of equivalent amounts of ascorbic acid (vitamin C) in lemon juice and in the crystalline form. E. Neige Todhunter, R. C. Robbins, G. Ivey and W. Brewer. *J. Nutrition* **19**, 113–19 (1940).—Pure ascorbic acid and lemon juice contg. equiv. amts. of ascorbic acid had comparable scurvy-preventing effects in guinea pigs. The lemon juice produced fewer hemorrhages than the equiv. amt. of ascorbic acid. C. R. Fellers

Comparison of the utilization by college women of equivalent amounts of ascorbic acid (vitamin C) in red raspberries and in crystalline form. E. Neige Todhunter and Alva S. Fatzer. *J. Nutrition* **19**, 121–30(1940).—The ascorbic acid present in red raspberries was as efficiently utilized as pure ascorbic acid. Results were based on urinary excretion and blood-plasma levels after administration of ascorbic acid from both sources. C. R. F.

The amount of ascorbic acid required to maintain tissue saturation in normal adults. E. Neige Todhunter and Ruth C. Robbins. *J. Nutrition* **19**, 263–70(1940).—The requirement for 3 adults averaged about 1.65 mg. per kg. wt. per day. Urinary excretion, even under controlled conditions, was far from const. Values above 1 mg. of ascorbic acid per 100 ml. of blood plasma were obtained when the total intake was 60 mg. C. R. Fellers

Metabolism of tyrosine, aspartic acid and asparagine, with special reference to respiratory exchange and heat production. Max Kriss and Lawson F. Marcy. *J. Nutrition* **19**, 297–309(1940); cf. *C. A.* **33**, 6411[8].—Tyrosine, aspartic acid and asparagine fed to rats as supplements to a mixed maintenance ration, in quantities supplying 7.5, 5.8 and 6.0 kg. cal. per day, resp., appeared to be absorbed to the extent of 97%, 95% and 97%. The balances of N indicated that of the total N ingested as aspartic acid and as asparagine 25.1% and 13.7%, resp., were retained in the body, and that none of the tyrosine was retained. The C:N ratios of the urinary constituents from the different supplements were: from tyrosine 2.77:1, from

aspartic acid 0.50:1, and from asparagine 0.45:1. The calcd. fractions of the urinary N representing metabolized amino acids were approx., for tyrosine 65%, for aspartic acid 97%, and for asparagine 98%. The metabolizable energy values of tyrosine, aspartic acid and asparagine (corrected to a basis of N equil.) were 59.2%, 71.8% and 60.6%, resp., of the gross energy of the amino acids. The values obtained for O_2, CO_2 and cal. per g. of urinary N are approx. twice as great for aspartic acid as the corresponding values for asparagine. C. R. Fellers

Carotenoid pigments: occurrence, properties, methods of determination, and metabolism by the hen. W. J. Peterson, J. S. Hughes and L. F. Payne. *Kansas Agr. Expt. Sta., Tech. Bull.* **46**, 3–74(1939).—A comprehensive review of the subject with 164 references. C. R. Fellers

Utilization of food elements by growing chicks. VIII. Comparison of alfalfa meal and artificially dried Sudan grass meal in a ration for growing chicks. C. W. Ackerson, M. J. Blish and F. E. Musschl. *Nebraska Agr. Expt. Sta., Research Bull.* **116**, 2–7(1939); cf. *C. A.* **33**, 9376[8].—Consumption was approx. the same in the feeding trial and there were no significant differences in growth rate or chem. compn. of the chicks after 6 weeks. C. R. Fellers

Effect of sulfur dioxide on the nutritive value of alfalfa hay. J. K. Loosli, B. L. Richards, Jr., L. A. Maynard and L. M. Massey. *N. Y. (Cornell) Agr. Expt. Sta., Mem.* **227**, 39 pp.(1939).—Hay grown in the area subject to smelter fumes and intermittently exposed to SO_2 concns. which ranged from traces to 0.42 p. p. m. served as sole diet for rabbits from weaning through reproduction and lactation. It produced as satisfactory results as were obtained with a hay grown under similar conditions outside the smelter fume area. Similar results were obtained with guinea pigs. Digestion coeffs. for both hays with rabbits and lambs were similar. Hays fumigated in cabinets where the gas concns. varied from 0.15 to 1.10 p. p. m. were also fed to the lab. animals without ill effects. The increase in S content of the alfalfa was nearly all in inorg. S. There was some increased body retention of S from the sulfured hays. The field samples of hay which were exposed to SO_2 fumes, as well as the artificially fumigated hays, showed the same carotene and vitamin A contents as controls. High exptl. doses of the gas which resulted in extensive burning of the leaves adversely affected the carotene content. C. R. Fellers

Methods of feeding laying hens. E. I. Robertson, J. S. Carver and J. W. Cook. *Wash. Agr. Expt. Sta., Bull.* **381**, 5–15(1939).—Five methods of feeding were compared. Nutritional. C. R. Fellers

Protein requirements of White Leghorn pullets. J. S. Carver, V. Heiman, J. W. Cook and J. L. St. John. *Wash. Agr. Expt. Sta., Bull.* **383**, 5–30(1939); cf. *C. A.* **30**, 2237[9], 3862[6].—A 17% protein level maintained a satisfactory growth up to 6 weeks of age; 15% level from 7 to 12 weeks, and 13% from 13 to 22 weeks. The birds fed a 19% protein ration showed no improvement over the 17%. Protein requirements decrease with increasing age of chicks. Up to 12 weeks of age the pullets in all groups required about the same no. of units of feed to produce a unit of gain. The greatest efficiency in utilizing protein was during the 1st 6 weeks. There was better utilization of protein at the lower levels. The level of protein fed did not affect the av. gain in wt. or final body wts. of the birds during the laying period. Similarly, there was no effect on egg production. Sexual maturity was attained a few days earlier on the high-protein levels. C. R. Fellers

Rickets and similar bone diseases. IV. Comparative experiments with swine on various feeds. József Marek, Oszkár Wellmann and László Urbányi. *Állatorvosi Lapok* **63**, 1–3, 8–9(1940); cf. *C. A.* **34**, 1053[9].—Rickets can occur in swine as a result of (1) insufficient Ca or P salts or (2) a one-sided lime-rich or phosphorus-rich diet. The lowest normal values for each 10 kg. live wt. of swine are 5.7354 g. Ca and 4.2340 g. P_2O_5 with an excess of alk. earth of 25 mg. Various types of pigs showed different susceptibilities to rickets. Feeds low in Ca and P decreased the P_2O_5 content of the ash of bones significantly; feeds high in Ca and P increased the P_2O_5 of the bone ash. Excess of Mg caused an increase in the content of Mg and P_2O_5 only in simultaneous Ca deficiency and with a proper dosage of P. Ca deficiency caused an increase of inorg. P in the blood serum; excess Ca diminished the inorg. P content of the serum. Excess Mg seemed to increase slightly the Mg content of the serum. VI. **Effect of the mineral salt ratio and of the vitamin D content of the feed on the utilization of mineral substances in the organism.** *Mezögazdasági Kutatások* **12**, 251–62(1939).—Feeding expts. were made on 27 swine for 6 days. Various Ca and P salts and vitamin D were added to the feed; in some expts. vitamin D was injected. The Ca/P quotient of the feces was the reverse of that of the feed. Most suitable are feed mixts. that have an excess of alk. earth of 5–25 mg. An unfavorable ratio of Ca/P in the feed is only slightly affected by vitamin D. The antirachitic effect of vitamin D is attributed to the control of metabolism and the acceleration of the resorption of nutritive salts. S. S. de F.

Production of prothrombin deficiency and response to vitamins A, D and K. Margaret C. Elliott, Bertha Isaacs and A. C. Iyy. *Proc. Soc. Exptl. Biol. Med.* **43**, 240–5(1940).—Prothrombin deficiency was produced in rats by feeding an adequate diet contg. 20% by wt. of mineral oil. Subcutaneous injections of vitamin K corrected the deficiency, activated ergosterol partially corrected it, while vitamin A had no effect. A method of detg. prothrombin time in rats is described in detail. L. E. Gilson

Bacteriological control of vitamin C. A. S. Dantsiger. *Lab. Prakt.* (U. S. S. R.) **14**, No. 9–10, 2–3(1939).—The colonies were counted after a 48-hr. incubation in the thermostat on 1% sugar agar-agar with a dilu. of from 0.01 to 0.0001 cc. The coli titer was detd. by the usual method on Endo's medium in dilns. of from 10.0 to 0.01 cc. The yeast was cultivated on ordinary agar-agar (pH = 7.4) with 0.25% of glucose at 26–8°. The growth was observed after 5–7 day in the dark. The colonies were grayish white or yellowish. A potato medium was used for the inoculation of molds. Add 1 l. of distd. water to 200 g. of skinned potatoes, boil for 1 hr., pass through a double paper filter, add glucose 20 g. and "Arkhangelsk" agar-agar 30 g. and sterilize in Koch's app. for 30 min. An acid reaction is necessary (pH = 5.6). The vitamin C concentrate was artificially contaminated with cultures of the typhus and the paratyphus rods. After standing for 3 days in the dark in a thermostat the vitamin gave no growth of the typhus-paratyphus group. W. R. Henn

Determination of vitamin B_1 with Phycomyces blakesleeanus. T. Ya. Paleĭ. *Lab. Prakt.* (U. S. S. R.) **14**, No. 9–10, 4–5(1939).—The investigation was based on the fact that *Phycomyces* does not grow in avitaminized media without addns. of vitamin B_1. The synthetic culture medium was prepd. by adding to 100 cc. of distd. water glucose 10%, asparagine 0.1%, KH_2PO_4 0.05% and $MgSO_4$ 0.05%. Incubate the cultures in a thermostat at 25–8° for 10–12 days, boil the cultures, remove the films, wash with water and alc. and dry to const. wt. at 37–45° for 2–3 days. The activity of the vitamin B_1 prepn. was detd. from the wt. of the *Phycomyces* films. Usually the wt. of the mycelium obtained in a synthetic medium was 3–15 mg. From an addn. of cryst. vitamin B_1 or of an active prepn. of vitamin B_1 the wt. increased to 70–90 mg. *Phycomyces* is 20–100 times as sensitive to the action of vitamin B_1 as are pigeons or rats. Addn. of only 0.15–1.0 γ of the vitamin causes a considerable growth. The results obtained from the action of vitamin B_1 prepns. on *Phycomyces* agreed with the biol. expts. on pigeons. Minute amts. of vitamin B_1 can be detected by means of *Phycomyces* that cannot be detected by expts. on animals. The deſn. of vitamin B_1 in cooked fruits, vegetables, etc., is doubtful since the exts. of these substances have different mineral compns., and the changing amts. of org. acids can affect the development of *Phycomyces*. W. R. Henn

Effect on the blood of the administration of thiamine chloride (vitamin B_1). David L. Farley. *Bull. Ayer Clin. Lab. Penna. Hosp.* **3**, 335–8(1939).—When thiamine chloride is administered to rabbits by mouth or hypo-

dermically a remarkable increase occurs in the power of their serum to inhibit hemolysis by digitonin. Solns. of thiamine chloride in serum or in 0.85% NaCl soln. lack this inhibitory power. Apparently thiamine stimulates the production in the rabbit of an inhibitory substance which is a cocarboxylase. A further increase in this inhibitory power of the serum of thiamine-treated rabbits follows the administration of typhoid vaccine. J. S. H.

Estimation of the inhibitory power of serum against saponin hemolysis as a possible guide in the administration of vitamin B_1. David L. Farley. *Bull. Ayer Clin. Lab. Penna. Hosp.* 3, 339–43(1939); cf. *C. A.* 34, 2445[8].—In 1 normal and 6 diseased persons, administration of thiamine chloride or yeast increased the antihemolytic power of their blood serum toward digitonin. It is suggested that detns. of the inhibitory or antihemolytic power of the serum may establish an index of the effective therapeutic level of the substance produced by administration of thiamine. Joseph S. Hepburn

Relative toxicity of sodium fluoride in a dry diet, in milk and in water. Cecelia Schuck. *J. Dental Research* 18, 491–6(1939).—The exptl. animals were albino rats. When 0.05% NaF was used in the water, most of the rats died in 2 weeks; the same concn. in milk markedly depressed the rate of growth, and, in a dry ration, produced a lesser depression of that rate. Dental signs of fluorosis appeared in all 3 groups, but developed earliest in the surviving rats which received NaF in water. 11 references. Joseph S. Hepburn

Animal experimental investigations concerning the influence of the vitamin preparation Tetravitol upon the vitamin C metabolism and the bactericidal power of the blood. Gertrud Brühl. *Z. Vitaminforsch.* 9, 297–308 (1939).—Addn. of vitamins A, B_1–B_6, C and D, in the form of unboiled Tetravitol, to the deficient ration of rabbits for a period of 19 days produced increases in body wt., the bactericidal power of the blood, and the excretion of vitamin C in the urine. Addn. of boiled Tetravitol to the deficient ration gave rise to a distinct decrease in body wt., and in the vitamin C content of the urine, and did not influence the bactericidal power of the blood. 40 references. Joseph S. Hepburn

Excretion, absorption and storage of ascorbic acid in guinea pigs. Ole Jacob Broch. *Z. Vitaminforsch.* 9, 309–25(1939).—The ascorbic acid content of the adrenal capsule, spleen and intestine depends upon the amt. ingested, but does not exceed a max. even if massive doses be given. The reducing power of the urine is not appreciably affected by ingestion of large doses, but is affected definitely by injected doses. Small doses have the same effect, regardless of the mode of administration. In guinea pigs infected with tuberculosis, the consumption of ascorbic acid is normal during the period of incubation, but increases with the development and severity of the clinical symptoms. 43 references. Joseph S. Hepburn

Experimental vitamin A deficiency in man. Wolf v. Drigalski. *Z. Vitaminforsch.* 9, 325–30(1939).—A vitamin A-deficient diet was used for 72 days, and adaptometric tests were made. Subnormal dark adaption did not necessarily indicate vitamin A deficiency, but normal dark adaption occurred only when the supply of vitamin A was adequate. 10 references. Joseph S. Hepburn

Does citrin (vitamin P) occur in milk? W. Neuweiler. *Z. Vitaminforsch.* 9, 338–42(1939).—Citrin (eriodictyol) was not detected in human milk or cow milk. It was not secreted in human milk even when 50 mg. was administered intravenously daily for 6 days. It was not appreciably retained by healthy women in the puerperium. Citrin is not a supplement to, or activator of, ascorbic acid. Joseph S. Hepburn

Ascorbic acid in the cell and its influence upon cellular activity. E. Tonutti. *Z. Vitaminforsch.* 9, 349–64(1939). —A review. 14 references. Joseph S. Hepburn

Availability of manganese in natural and precipitated manganese carbonate [for prevention of perosis in chickens]. Selma L. Bandemer, J. A. Davidson and P. J. Schaible. *Poultry Sci.* 19, 116–25(1940).—Rhodochrosite failed to prevent perosis, but pptd. $MnCO_3$ protected against it. The latter prevented perosis at a level of 30 p. p. m. Mn in the ration, whereas 300-mesh rhodochrosite was unsatisfactory at 125 p. p. m. Rhodochrosite, either roasted or dissolved in acid, and pptd. $MnCO_3$ with addns. of known impurities of the ore, were effective. Excess, in the ration, of certain mineral supplements, such as $Ca_3(PO_4)_2$, which are known to be perosis-producing, decreased the soly. of both carbonates in 0.1 *N* HCl, but the reduction was more pronounced with the ore. If both carbonates were in soln. this effect was less, with no distinction between the 2. The sol. Mn did not seem to be correlated with the pH of the ext. Methods for the *detn. of Mn* and the *differentiation of rhodochrosite from pptd. $MnCO_3$* are given. K. D. Jacob

The effect of a riboflavin deficiency in the hen upon embryonic development of the chick. R. W. Engel, P. H. Phillips and James G. Halpin. *Poultry Sci.* 19, 135–42 (1940).—Hens fed a diet low in riboflavin (I) produced fewer eggs and eggs of lower hatchability than did hens fed the same diet supplemented with 400 γ per 100 g. of ration (II). Myelin sheath degeneration occurred in the sciatic nerve in about 60% of the surviving embryos obtained from eggs produced by hens on I and less than 10% with hens on II. Fertile eggs which were laid by riboflavin-deficient hens and which consistently failed to develop beyond the 1st week of incubation produced normal embryos if injected with 50 γ riboflavin on the 1st day of incubation. Hens kept on I for 7 months and producing eggs of very low hatchability could be restored to the production of eggs of normal hatchability by daily oral doses of 50 γ of addnl. riboflavin. Hens kept on I produced eggs with lowered riboflavin content in the albumin, which could be increased by daily oral administration of riboflavin. The riboflavin content necessary in fertile eggs for the development of normal embryos was 2.5–3.0 γ per g. of albumin. Developing embryos from hens kept on I stored less riboflavin in their livers than did those from hens kept on II. K. D. Jacob

Mineral research in animal nutrition. V. R. Berliner, E. W. Sheets and J. S. Moore. *Proc. Assoc. Southern Agr. Workers* 40, 70–1(1939).—Based on over 1000 blood analyses of beef and dairy cattle, it appears that in most sections of Mississippi the forage Ca is sufficient to maintain the serum Ca at a normal level only in spring and fall during the growth season of pasture legumes, whereas in other seasons of the yr. the serum Ca is slightly below normal (9–11 mg. Ca per 100 ml. serum, instead of the normal level of 11–13 mg.). K. D. Jacob

Hypermagnesemia without critical symptoms in dairy cattle. M. W. Eveleth, D. F. Eveleth and F. E. Walsh. *J. Dairy Sci.* 23, 85–9(1940).—An increase in the level of serum Mg of dairy cattle was found which was apparently due to drought conditions affecting the pasture. There appeared to be no clinical symptoms assocd. with a temporary hypermagnesemia in cattle. The level of Mg in the blood stream is influenced by many factors, most of which are of dietary origin. A. H. Johnson

Comparative physiological responses of dairy calves fed rations having different levels of milk proteins. G. H. Wise, W. E. Petersen and T. W. Gullickson. *J. Dairy Sci.* 23, 91–102(1940).—The responses of 2 major groups of milk-fed calves, one receiving a ration of normal nutritive ratio, and the other a narrow nutritive ratio were compared. All the calves regardless of the supplements possessed a depraved and erratic appetite. The consumption of abnormally large amts. of casein by calves did not adversely affect growth or general appearance but induced lethargy and occasionally digestive disturbances. The most pronounced differences observed in the blood constituents of the 2 groups were in the plasma N, which was high in the calves receiving the protein-supplemental ration and comparatively low in the sugar-supplemented ration. The results did not substantiate the postulate that milk proteins constitute the principal etiological factor in the disturbance of the mineral metabolism of milk-fed calves. A. H. Johnson

Carotene and vitamin A in the nutrition of growing dairy cattle. R. E. Ward, S. I. Bechdel and N. B. Guerrant.

J. Dairy Sci. **23**, 115–24(1940).—The data show that the requirement of growing dairy calves is 11 γ per day per lb. of body weight. This level of carotene intake was sufficient to maintain growth and to prevent the usual vitamin A-deficiency symptoms. The adequacy of this amt. of carotene, however, depends on the source of supply. While it appears desirable that the carotene intake should be consistently above the min., it was not found that such excess resulted in any marked improvement in the growth rate. The availability of the carotene to calves from the various sources studied was: carotene concentrate, alfalfa hay, corn silage, corn meal, timothy hay and alfalfa-molasses silage. A. H. Johnson

The comparative nutritive values of butterfat and certain vegetable oils. E. J. Schantz, C. A. Elvehjem and E. B. Hart. *J. Dairy Sci.* **23**, 181–9(1940).—Good growth was obtained in rats on a diet of 4% butterfat, corn oil, coconut oil, cottonseed oil or soybean oil homogenized into mineralized skimmed milk. Sufficient amts. of all the known vitamins were supplied to each diet. Rats on butterfat, however, made better and more efficient gains during the first 2 or 3 weeks on the expt. than rats on vegetable oils homogenized into skimmed milk. The growth-stimulating property of butterfat appeared to lie in the saponifiable fraction since feeding the nonsaponifiable fraction along with corn oil or coconut oil did not give the same response as was obtained with butterfat. Rats raised on butterfat milk had a much smoother appearing coat of hair throughout the expt. than rats raised on vegetable oil milks. It appears that the kind of fat in the diet is important in the nutrition of the young growing animal. A. H. Johnson

The substitution of fats in the Sherman-Spohn basal diet. V. V. Efremov and E. M. Maslenikova. *Voprosy Pitaniya* **8**, No. 4, 40–3(in English, 43)(1939).—The substitution of sunflower oil for butter in the Sherman-Spohn basal diet gives a uniform av. curve of weekly gain in wt. in animals without showing harmful effects. S. A. K.

Importance of economical milk in human nutrition. Marietta Eichelberger. *Am. J. Pub. Health* **30**, 169–74 (1940).—Thirty-five references. J. A. Kennedy

Vitamin K activity of some naphthoquinones and derivatives. (Preliminary). Bertil Sjögren. *Z. physiol. Chem.* **262**, I–III(1939).—The vitamin K activity of 2-methyl-1,4-naphthoquinone is 30–35 × 10^6 Dam units per g. Of the hydroquinone it is practically the same, while the diacetate of the hydroquinone has 20 × 10^6 units per g. 2-Ethyl-1,4-naphthoquinone is much less active. M. L.

Effect of vitamin B_1 on the adrenaline contents of adrenals and of blood. Elisabeth Sárfy. *Z. physiol. Chem.* **262**, 87–94(1939).—The figures given after the nature of the exptl. animals are, resp., the no. of animals, the av. adrenaline content of the adrenals in mg./g., the range, the av. adrenaline contents of the blood in γ%, the range. Normal pigeons (spring) 11, 2.29, 1.70–2.86, 6.62, 5.66–8.42; after 2 weeks on a vitamin B_1-free diet 4, 2.78, 2.56–3.27, 4.97, 4.22–6.48; terminal beriberi 8, 1.30, 0.98–1.85, 10.84 (4 animals only), 9.47–14.66; normal (autumn) 3, 1.57, 1.35–1.76, 6.71 (1 animal only); 5 days on 1 mg. B_1 per day 3, 0.90, 0.71–1.26, 10.73, 10.41–11.05 (2 animals); 10 days on same 3, 1.79, 1.38–2.49, 11.99, 10.13–13.84; 15 days on same 3, 1.56, 1.32–1.75, 9.37, 8.87–9.73; normal rats 8, 1.88, 1.54–2.34, —, —; 14 days on a vitamin B_1-free diet 3, 2.92, 2.80–3.04, —, —; 3 weeks vitamin B_1-free diet 3, 3.12, 2.95–3.31, —, —; 4 weeks 2, 1.26, 1.10–1.42, —, —; terminal beriberi 5, 0.90, 0.57–0.94, —, —. The conclusion is a qual. restatement of the behavior of the averages. Milton Levy

The glycogen contents of the livers of B_1-avitaminotic rats. Vilma Sz. Hermann. *Z. physiol. Chem.* **262**, 95–102 (1939).—After the exptl. periods, rats were fasted 12 hrs., given 1 g. fructose per 100 g. and after 7 hrs. killed. The glycogen contents of the livers of normal rats on a B_1-free diet to which 5 mg. of B_1 was given daily by injection showed (averages of 3 rats each) 4% glycogen after 10 days, 3.1% after 20 days, and 6.9% after 40 days; when 1 mg. of B_1 was given, the corresponding figures were 5.0%, 3.5% and 4.0%. Avitaminotic rats after 2 weeks showed 3.6%, 3 weeks 5.0%, 4 weeks 3.0%, 5 weeks 2.9% and 6 weeks 2.1%. The distribution of figures in the 5- and 6-week rats show about equal nos. of normal and very low values, the latter probably represent an inanition symptom. The increase at the 3-week period is considered significant. From 4 to 7 rats are included in each average. Milton Levy

Mineral metabolism of rats on an extremely sodium-deficient diet. Elsa Orent-Keiles and E. V. McCollum. *J. Biol. Chem.* **133**, 75–81(1940); cf. *C. A.* **31**, 6299[9].—Young rats were fed a diet contg. 0.002% Na and their metabolism was studied over a 19-week period at 7-day intervals. There was a continuous neg. Na balance accompanied by a striking retention of K and some increase in Mg. The Ca, P and Cl metabolism was apparently unaffected. The N retention was pos. although it progressively decreased until the 14th week after which time it became neg. simultaneously with the extreme pathol. changes of the eyes and the onset of rapid wt. loss. The delicate mechanism in the organism regulating the osmotic pressure and acid-base balance was not appreciably disturbed since the Na-depleted animal was sufficiently compensated by the increased retention in K and Mg for neutralization of the metabolic acids excreted in the urine despite the unbalance in the diet between base and acid. A. P. Lothrop

The vitamin K activity of 4-amino-2-methyl-1-naphthol and 4-amino-3-methyl-1-naphthol. A. D. Emmett, Oliver Kamm and E. A. Sharp. *J. Biol. Chem.* **133**, 285–6 (1940).—4-Amino-2-methyl- and 4-amino-3-methyl-1-naphthol as hydrochlorides are readily sol. in H_2O or saline soln. and can be given either orally or parenterally. The 2-methyl compd. is almost 3 times as potent as vitamin K_1 and has given excellent clinical results. Daily doses ranging from 3600 to 7200 curative chick units given intravenously restored to normal severe prothrombin deficiency of obstructive jaundice within 2–3 days, and infants have responded within 12 hrs. to a dosage of 1800 units. A. P. Lothrop

The composition of the diet of the Chinese in Batavia. L. W. J. Holleman, D. R. Koolhaas and J. A. Nijholt. *Mededeel. Dienst Volksgezondheid Nederland.-Indië* **28**, 306–20(1939).—Qual. descriptions, frequency of occurrence and chem. analyses of Chinese foods in Batavia are given. The relatively greater amt. of cholesterol in the food is suggested as a clue to the higher incidence of carcinoma of the stomach in Chinese than in Japanese. Janet McAfee

The dark-adaptation test: its reliability as a test for vitamin A deficiency. Leslie J. Harris and M. A. Abbasy. *Lancet* **1939, II**, 1299–1305, 1355–9; cf. *C. A.* **32**, 4636[8].—Improvements in the app. and technique are described. Results of tests on children from various social classes show that lowered dark-adaptation is assocd. with dietary deficiency in vitamin A. Deficiencies seem to be less common in adults than in children. While the theoretical basis of the test is reliable, the test is capable of detecting deficiency, but not of assessing different levels of normality. E. R. Main

Prothrombin and vitamin K therapy. John D. Stewart and G. Margaret Rourke. *New Engl. J. Med.* **221**, 403–7 (1939); cf. *C. A.* **34**, 1055[3].—The prothrombin content of the blood may be greatly reduced in obstructive jaundice and is rapidly restored to the normal level after oral administration of a vitamin K-cholic acid mixt. No decrease in prothrombin is observed in hemophilia, aplastic anemia and thrombocytopenic purpura. Decreases may occur in chronic ulcerative colitis, malnutrition and cachexia, but further study is needed to det. the value of vitamin K therapy in these conditions. The method of Warner, Brinkhous and Smith for detg. prothrombin (*C. A.* **30**, 4191[5]) is discussed. E. R. Main

Pigment excretion in pellagra. Arnold P. Meiklejohn and Robert Kark. *New Engl. J. Med.* **221**, 519–21(1939). —Urine specimens from patients with endemic pellagra gave a pos. Jaffe test for indican without the addn. of the oxidizing agent. After removal of the indigo with $CHCl_3$, a red pigment could be extd. with AmOH (cf. Watson, *C. A.* **33**, 8712[5]). A pos. reaction to the test of Beckh,

Ellinger and Spies (*C. A.* **31**, 7519[7]) appears to be due to pigments capable of producing the urorosein reaction rather than to porphyrin-like substances. E. R. Main

Riboflavin deficiency in man. Norman Jolliffe, Harry D. Fein and Louis A. Rosenblum. *New Engl. J. Med.* **221**, 921–6(1939).—Lesions are described which are similar to, though more advanced than, those produced experimentally by riboflavin deficiency (cf. Sebrell and Butler, *C. A.* **32**, 2187[6]). The lesions are improved after administration of natural or synthetic riboflavin, but fail to respond to administration of nicotinic acid or use of diets inadequate in vitamin B complex. E. R. Main

The treatment of hypoprothrombinemia with synthetic vitamin K_1. Report of two cases. Howard A. Frank, Alfred Hurwitz and Arnold M. Seligman. *New Engl. J. Med.* **221**, 975–7(1939).—Synthetic vitamin K_1 (cf. Fieser, *C. A.* **33**, 8602[2]), given intravenously in a dose of 10 mg. to patients with obstructive jaundice, reduced the clotting time to a normal level within 4 hrs. The method of prepg. the compd. for intravenous injection is described. No untoward reactions were noted after oral or intravenous administration to human subjects or to animals. E. R. M.

The vitamins. Arnold P. Meiklejohn. *New Engl. J. Med.* **222**, 313–18(1940); cf. *C. A.* **33**, 5039[2].—A review of recent research, with 44 references. E. R. Main

Avitaminosis B_1 and cardiac insufficiency. Alcoholic myocardium damage representing a case of beriberi. L. Langeron. *Presse méd.* **47**, 1189–91(1939). A. E. Meyer

Ascorbic acid therapy in infancy. Javier R. Mendilaharzu and Eduardo L. Zavala Rodriguez. *Semana méd.* (Buenos Aires) **1940, I**, 365–77.—During the first 12 months of life the infant is able to synthesize ascorbic acid. The 1 to 1.5 mg. daily necessary are amply supplied in the maternal milk. The requirements are increased in infections and gastric disturbances. Favorable results obtained with intravenous injections of ascorbic acid in a variety of diseases are reported. A. E. Meyer

The influence of combined lime-vitamin D therapy on growth and tooth formation. U. Rheinwald. *Deut. zahnärztl. Wochschr.* **41**, 535–7(1938); *Chem. Zentr.* **1938, II**, 3418.—Supplementary feeding of Ca (Calipot) to guinea pigs receiving a normal diet had no effect on growth and tooth formation. When Ca and vitamin D (Calipot "D," contg. also irradiated yeast) were added to the diet the final wt. of the animals was greater and was attained in $^3/_4$ the time required for the controls. In addn., the upper and lower incisors reached their normal length in $^2/_3$ the time required for the controls. The blood Ca was also higher than that of the controls. M. G. M.

Vitamins and their role in nutrition. L. A. Cherkes. *Klin. Med.* (U. S. S. R.) **15**, 1047–57(1937); *Chem. Zentr.* **1938, I**, 4350.—Permanent injuries resulting from vitamin and protein deficiencies and persisting even after long periods on a normal diet are discussed. Weakening of the ability to resist infection, derangement of certain organic functions, and shortening of the life span can, under certain conditions, be due to permanent injury, especially to the mesenchyme and nervous system, as the result of an insufficient supply of high-quality protein and vitamins during the period of growth. M. G. Moore

Calcium urolithiasis. The role of calcium metabolism in the pathogenesis and treatment of calcium urolithiasis. R. H. Flocks. *J. Urol.* **43**, 214–33(1940). J. Pinchack

Calcium citrate uroliths on a low-phosphorus diet. H. A. Schneider and H. Steenbock. *J. Urol*, **43**, 339–44 (1940).—Urinary calculi composed primarily of Ca citrate were produced in rats by feeding a diet low in P (0.04%) but complete in other respects. The mechanism of this formation and its physiol. significance are discussed. J. Pinchack

The biophotometric study of vitamin A in dermatological conditions. Harry L. Baer and Harold R. Vogel. *Urol. Cutaneous Rev.* **44**, 176–81(1940).—The biophotometer is not precise for detg. vitamin A deficiency in skin diseases. Where such deficiency exists, percutaneous and oral use of the vitamin is helpful in some skin conditions. Vitamin A is probably absorbed through the skin. J. Pinchack

Anemia due to iron deficiency. Clark W. Heath. *Symposium on the Blood and Blood-Forming Organs, Univ. Wisconsin* **1939**, 41–51.—Fe deficiency does not occur in the adult without blood loss or pregnancy. Inorg. Fe given by mouth in fairly large amt. is the treatment of choice. It is rarely, if ever, necessary to give Fe by injection. Fe is very toxic when given parenterally and the treatment dose is very close to the toxic dose. It takes 25 mg. Fe to produce a rise of 1% hemoglobin, and the injection of this amt. may cause nausea. Cu, HCl, liver ext. and the combinations of Fe with various substances are not necessary in the practical treatment of human hypochromic anemia. It is appropriate to give Fe in small prophylactic doses to infants after the 3rd month, to adolescent girls and to pregnant women. Maurice M. Rath

Liquid ammonia as a dietary supplement. Richard G. Roberts and Herman J. Horvitz. *Trans. Illinois State Acad. Sci.* **32**, No. 2, 124–6(1939).—Casein, starch and yeast were digested in liquid NH_3 until fluid, and the excess NH_3 was removed by evapn. *in vacuo*. The ammonolyzed material retains up to about 2% of the N, bound in the form of a deriv. Diets thus treated were fed to albino rats and, with certain exceptions, normal growth followed. The failure in the neg. cases was not due to any toxicity, but to the inactivation of the vitamin B present by the NH_3 treatment. Compared with NH_4 salts, ammonolyzed foods have certain advantages: They are cheap, they show less tendency to spoil, and apparently increase the digestibility of proteins. Besides inactivating vitamin B, they have the disadvantage of being unable to increase the protein N more than 20% without making the diet inedible. J. H. Reedy

Vitamin A deficiency in diseases of the liver: its detection by dark-adaptation method. Michael G. Wohl and J. B. Feldman. *J. Lab. Clin. Med.* **25**, 485–94(1940); cf. *C. A.* **33**, 5458[8].—In a group of patients with liver disease the degree of dark-adaptation pathology, as detd. with the instrument devised by F., appeared to run parallel with the degree of liver damage. In 3 patients with hepatocellular jaundice, who showed minimal liver damage as evidenced by the clinical course of illness and liver-function tests, the dark-adaptation readings were normal. Nine out of 10 alc. addicts showed vitamin A deficiency by this test. The diet of these patients prior to hospitalization was poorly balanced and was inadequate in vitamin A and vitamin B. Howard W. Robinson

Licanic acid of oiticica fat and a study of its nutritive value and efficiency. C. F. Krewson and C. A. Elvehjem. *Oil and Soap* **17**, 30–3(1940).—From the exptl. evidence obtained in feeding tests with young albino rats it appears that licanic acid possesses no apparent energy value and that under the conditions of the test it is slightly deleterious to the growth of young rats. It has some efficiency in the animal and assists in the utilization of lactose in milk as indicated by its prophylactic action in preventing sugar loss via the urine. 59 references. E. Scherubel

Spectroscopic changes in fat acids. IV. Acids from specimens of butterfat from cows under different nutritional treatments. James Houston, Albert G. Cotton, Stanislaw K. Kon and Thomas Moore. *Biochem. J.* **33**, 1626–9(1939); cf. *C. A.* **31**, 4517[7].—Fractions of the mixed fat acids obtained by high-vacuum distn. of the butterfat of cows at pasture showed spectroscopic absorption at 230 mμ. The intensity of absorption increased rapidly with the ascending I value (i. v.) of the fractions, in agreement with the conclusion that this absorption is attributable to polyethylenic acids. Similar results were obtained for fractions of the liquid acids from the butter of cows given cod-liver oil. Both the i. v. and absorption at 230 were greater in this case. No evidence was obtained of transference to the milk of the acids present in cod-liver oil which absorb at 270 mμ. Tung oil was poorly tolerated by cows, but small doses resulted in the appearance of absorption at 270 mμ in the butter acids at an intensity suggesting the inclusion of about 0.5% of unchanged eleostearic acid. There was no evidence of increased absorption at 230 mμ reported in the rat and hen when given tung

oil. **V. The effect of dietary fat on the body fat and egg fat of the hen.** Ethel M. Cruickshank, James Houston and Thomas Moore. *Ibid.* 1630–4.—The dietary fat had a marked effect on the amt. of polyethylenic acids present in the egg fat and abdominal fat as observed spectrographically after refluxing with KOH. When sperm oil was added to the diet the increases in absorption at 230 and 270 mμ were about equal. When linseed oil was added to a fat-free diet the absorption at 230 mμ was greater. The inclusion of tung oil in the diet caused a marked increase in the preformed absorption at 230 mμ in the egg and body fat acids. This change in the absorption max. is probably due to the loss of one of the conjugated unsatd. linkages of eleostearic acid. The results show a marked difference in the treatment of polyethylenic acids by the cow and the hen. **VI. General.** Thomas Moore. *Ibid.* 1635–8.—Catalytic reduction of tung oil caused a change in the position of the absorption max. of the mixed acids from 270 to 230 mμ. This finding supports the conclusion obtained from the results *in vivo*. Evidence was obtained to support the view that the increased absorption of polyethylenic acids when they are refluxed with KOH is caused by a re-orientation of the unsatd. bonds from unconjugated to conjugated positions. When large amts. of "pro-absorptive" polyethylenic acids were included in the diet of the rat, they were stored unchanged (spectroscopically). The predominance of absorptive acids found in the fats of some mammals, as the cow, cannot therefore be made the basis of a general rule. The absorption of the acids from rats receiving an almost satd. fat indicated, however, that when the intake of polyethylenic acids was low, these were converted into the absorptive form. Polyethylenic acids from dried grass were in the "pro-absorptive" state. Since the acids of the fats of herbivorous animals are in the "absorptive" form, they must have been converted in the animal. E. W. Scott

Vitamins in rat and guinea-pig milk. James Houston and Stanislaw K. Kon. *Biochem. J.* **33**, 1655–9(1939).—In rat milk the concn. per 100 ml. of vitamin A, carotene, vitamin B_1, riboflavin and vitamin C, resp., was 0.13 mg., not measurable, 50–80 I. U., 0.4–0.8 mg., 0.4 mg.; in guinea-pig milk the concns. in the same order were 0.09 mg., 0.011 mg., 20 I. U., 0.085 mg. and 29.0 mg. Phys. and chem. methods were used for the detns. When compared to cow milk, rat milk was richer in vitamin B_1 and riboflavin and much poorer in vitamin C. The amt. of the latter in guinea-pig milk is relatively enormous. When lactating rats were fed large amts. of riboflavin, its concn. in the milk was increased, but the feeding of vitamins B_1 and C had no effect on their concn. in the milk. The milk of rats on a vitamin B_1-deficient diet showed a sharp decrease in the concn. of this factor. E. W. Scott

The liver filtrate factor of the vitamin B_2 complex. T. F. Macrae, A. R. Todd, B. Lythgoe, C. E. Work, H. G. Hind and M. M. El Sadr. *Biochem. J.* **33**, 1681–7(1939); cf. *C. A.* **33**, 4648[1].—Liver filtrate factor (I) was not pptd. by salts of Pb, Hg, Ag, quinine or brucine, but was pptd. from alc. soln. by $Ba(OH)_2$. I was not adsorbed even on exhaustive treatment with fuller's earth, but it was adsorbed by large amts. of norite. AmOH and ether extd. I from acidified solns. By a combination of several methods of concn. a material was obtained that contained a rat day dose in 0.180 μg. of dry matter. Acetylation of I gave a product that was easily extd. from aq. soln. with $CHCl_3$ and had only weak activity; mild hydrolysis yielded a material that possessed a biol. activity similar to that of the starting material. The concentrate of I was not affected by treatment with CH_3N_3. E. W. Scott

Vitamin A and carotenoids in the livers of mammals, birds, reptiles and man, with particular regard to the intensity of the ultraviolet absorption and the Carr-Price reaction of vitamin A. H. B. Jensen and T. K. With. *Biochem. J.* **33**, 1771–86(1939).—The amts. of vitamin A (I) and carotenoids in the livers of 33 mammals of 21 species, 41 birds of 36 species, 4 reptiles of 2 species and 8 human subjects were detd. Most livers gave typical ultraviolet absorption curves similar to the curve of cod-liver oil. Tables were given showing the extinction coeff. of I at 328 mμ, the Carr-Price reaction with filters S59, S61 and S66.6 of the Pulfrich photometer and certain ratios of the extinction values, a brief description of the absorption curves and the zoölogical classification of the species examd. The absorption of I at 328 mμ and the extinction of the Carr-Price reaction with filter S61 had a fairly const. relation, the latter being 2.60–2.75 times the former with a coeff. of variation of 10–15%. In no instance was vitamin A_2 found. The Carr-Price absorption was fairly const. for all the livers examd. The variation in the amt. of I was very considerable, as was the variation in the amt. of carotene (II) in the livers examd. There was no simple relation between the amts. of I and II in the food ingested and the amts. in the liver. II was present in considerable amts. in the livers of certain beasts of prey and birds as well as in the herbivora, but most of the livers contained no carotenoid. E. W. Scott

Metabolism of sulfur. X. The replaceability of *dl*-methionine in the diet of albino rats with the partially oxidized derivative, *dl*-methionine sulfoxide. Mary A. Bennett. *Biochem. J.* **33**, 1794–7(1939); cf. *C. A.* **34**, 2002[2].—Albino rats showed identical growth curves when either compd. was fed as a supplement to a methionine-deficient diet. E. W. Scott

Maintenance nutrition in the pigeon. Further evidence for the presence of dietary essentials in yeast and liver and their relation to vitamin B_6. Cyril W. Carter and John R. O'Brien. *Biochem. J.* **33**, 1810–15(1939); cf. *C. A.* **32**, 2992[8].—Evidence was presented that the pigeon requires, in addn. to aneurin and riboflavin, a fuller's earth eluate factor and a fuller's earth filtrate factor that are present in yeast and liver. The eluate fraction from yeast had a marked wt.-restorative action, which attained a max. when the filtrate fraction was also added. Cryst. vitamin B_6 in daily doses of 0.040 mg. also increased the activity of the filtrate fraction, but its action was less than that of the eluate. The filtrate fraction of yeast and liver had little wt.-restorative action when it was supplemented with aneurin or riboflavin. E. W. Scott

The effect upon rickets of parenterally administered vitamins D_2 and D_3. A. Nitschke. *Z. Kinderheilk.* **61**, 385–96(1939).—The effect of the vitamins on infantile rickets was checked by clinical, röntgenological, and chem. methods. No cure was obtained in 9 infants with rickets and rickets plus tetany when vigantol (vitamin D_2) was given intramuscularly, intracutaneously and percutaneously. Both conditions were promptly turned to normal, however, by administering vitamin D_3 *per os* or by intramuscular administration of vitamin D_3 (20 times 1 cc. to 25 times 2 cc. of 7-dehydrocholesterol). Probably, vitamin D_3 is the natural form of the vitamin occurring in the human body and during or after intestinal absorption vitamin D_2 is changed into this active form. The theory considering infantile tetany as a "healing crisis" of rickets is not borne out by N.'s observations and should be abandoned. H. P. G. Seckel

The clinical picture of so-called renal rickets. U Stechele. *Z. Kinderheilk.* **61**, 448–60(1939).—Three types of renal rickets may be distinguished: (1) the classical type with interstitial nephritis, (2) the pyelonephritic type, and (3) the glycosuric-nephrotic type of Fanconi. A hyperphosphatemic case of the first type of renal rickets was observed over three years: After a dental infection and lobar pneumonia the boy, at the age of 6 years, developed a chronic nephritis with definitely impaired renal function and anemia (44% hemoglobin). Acute rickets with osteoporosis appeared. After a 6 weeks' course of salt-free and meat-free diet, the patient developed a hypochloremic coma. Blood analyses are given. A hypophosphatemic case of the third type (without glycosuria) with curable rickets and severe retardation of growth also is described. The hypophosphatemia was not corrected when rickets was cured and a Na_2HPO_4 tolerance test brought the serum P up from 3.3 to 8.6 mg.% in 2 hrs. and after 5 hrs. it was still as high as 5.2 mg.%. H. P. G. Seckel

Nutrition in war time. Katharine H. Coward. *Pharm. J.* **143**, 425(1939).—Progress made since 1914 in recogniz-

ing and utilizing essential food constituents to avoid deficiency diseases, is discussed as to starches, fats, proteins, vitamins and mineral salts. S. Waldbott

The production of uncomplicated riboflavin deficiency in the dog. A. E. Axelrod, M. A. Lipton and C. A. Elvehjem. *Am. J. Physiol.* **128**, 703–8(1940).—The basal ration of Street (*C. A.* **31**, 7474[8]) is shown to be adequate for the growing dog when supplemented with thiamine, nicotinic acid, vitamin B_6, the acid-acetone or hexane-butanol filtrate of liver ext. and riboflavin. In the absence of added riboflavin, acute deficiency is produced in 6 to 8 weeks. E. D. Walter

α-Picolines substituted in β-position [relation to nicotinamide] (Dornow) **10**.

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F—PHYSIOLOGY

HOMER W. SMITH

Carbohydrate metabolism of various organs. E. S. London and N. P. Kochneva. *Acta Med. U. R. S. S.* **1**, 396–9(1938).—A review of authors' recent studies. B. C. P. A.

Progestin content of mature and early human placenta. J. Haffner. *Acta Obstet. Gynecol. Scand.* **18**, 125–35 (1938).—Detns. of progestin in an ext. of 10 kg. of mature placenta prepd. in 2 equal portions showed an av. content of ½ K. E. (Clauberg) per placenta. Twenty-seven placentas (deciduate tissue) from the first 3 months of pregnancy had an av. content of ⅛–½ K. E. per placenta. It is claimed that progestin is formed in the placenta as early as the first months, and concluded that habitual abortion is due to a failure of that function. B. C. P. A.

Endometrium of the monkey and estrone–progesterone balance. E. T. Engle and P. E. Smith. *Am. J. Anat.* **63**, 349–65(1938); cf. *C. A.* **33**, 6930[7].—Estrone was given for 10 days to spayed monkeys; increasing doses of progesterone were then injected together with a gradually reduced amt. of estrone. A more typical progestational phase of the cycle was produced than by an abrupt transition from estrone to progesterone. More glycogen is present in the endometrium and stroma in hyperestrinized monkeys than in those treated with progesterone. It is difficult to produce a benign hyperplasia of the endometrium in the monkey with estrone alone. B. C. P. A.

Anoxia and neural metabolism. R. W. Gerard. *Arch. Neurol. Psychiat.* **40**, 985–96(1938).—Brain respiration is 30 times as intense as that of resting muscle. The cerebellar cortex has the highest respiration rate and the highest contents of ascorbic acid and K. All the various current therapies for schizophrenia induce an increase in brain respiration either directly or on the rebound. B. C. P. A.

Nature of unsaponifiable substances of human serum. M. Bürger and K. Plötner. *Deut. Z. VerdauKr. Stoffw.* **1**, 225–35(1939).—4 fractions were isolated from the noncholesterol unsaponifiable substances, by the chromatographic method. One was a cryst. carbohydrate (C 84.48, H 15.35%), nonfluorescent in ultraviolet light; another contained C 81.58, H 11.82% and showed blue fluorescence. Fat acids are also present. The concn. of the whole group is increased under pathol. conditions. B. C. P. A.

Hypochloremia produced by posterior-pituitary extract. W. Ecke. *Deut. Z. VerdauKr. Stoffw.* **1**, 275–85(1939).—Two dogs on a salt-poor diet received multiple daily injections of 1–3 cc. of posterior-pituitary exts. subcutaneously for 9–12 days. Plasma Na and Cl fell without assocd. water loss. When treatment ceased hydremia set in and blood urea and nonprotein N rose. B. C. P. A.

Blood phosphatase in pregnancy. J. C. de Kerleau and J. Cayla. *Gynéc. obstét.* **39**, 112–15(1939).—Blood phosphatase begins to increase in the last trimester of pregnancy, reaching its highest level during the 9th month, and falls abruptly at delivery to a level equal to that of the newborn infant. B. C. P. A.

Histological distribution of potassium in muscle. J. Porto and A. D. Marenzi. *Rev. soc. argentina biol.* **14**, 483–5(1938).—The gastrocnemius and other muscles of *Bufo arenarum* were stained for K (MacCallum's technique modified by Rubin and Syrocki (*C. A.* **31**, 2297[5]) and Marza (*C. A.* **29**, 1117[9])). The K was uniformly distributed throughout the whole fiber. In the connective tissue, K is less abundant, especially toward the tendinous end of the muscle. The distribution of nerve fibers (stained by Cajal's method) did not coincide with the distribution of K. B. C. P. A.

Teeth of man, ape, dog and pig. G. Bremer. *Upsala Läkareforen. Forh.* **44**, 219–46(1938-39).—Methods and chem. analyses are given. B. C. P. A.

Effect of adrenaline on blood pressure in newborn dogs. G. Thiele. *Z. Kreislaufforsch.* **31**, 137–42(1939).—The blood-pressure response of dogs to adrenaline rises rapidly from very low values during the first 30 days of life and reaches normal values at 3–4 months. Up to 4 months bradycardia after adrenaline is almost regularly superseded by tachycardia. During the first days of life pain stimuli have a paradoxical effect on blood pressure but increase the rate and depth of breathing. Carotid sinus effects on blood pressure were slight at 9 days and reached their max. at 30 days. After denervation of the carotid sinuses and section of the vagi adrenaline apnea still occurred even in young dogs. B. C. P. A.

The physicochemical processes of muscular contraction. M. Dubuisson. *Ann. physiol. physicochim. biol.* **15**, 443–508(1939); cf. *C. A.* **33**, 207[9], 2200[7].—A review with 271 references. Ruth Berggren

Local vascular regulations. J. Malméjac. *Ann. physiol. physicochim. biol.* **15**, 621–775(1939); cf. *C. A.* **32**, 4204[4], 5068[7]; **33**, 3883[8].—A review with extensive bibliography. Ruth Berggren

Oxyphoric power of the blood and resistance to progressive anoxia. D. Cordier and J. Français. *Ann. physiol. physicochim. biol.* **15**, 812–15(1939).—Diminution of the oxyphoric power of the arterial blood by bleeding of normal or splenectomized dogs or by blocking of part of the hemoglobin by CO (in the latter case the oxyphoric power is the content of hemoglobin which can be oxygenated) up to about 10 vols. % does not modify perceptibly the resistance to progressive asphyxia due to O lack. This oxyphoric power of 10 vols. % appears to be a crit. value below which resistance to progressive anoxia becomes impossible. Ruth Berggren

Importance of the realization of the normal ascorbic acid value. A. Giroud and R. Ratsimamanga. *Ann. physiol. physicochim. biol.* **15**, 831–2(1939); cf. *C. A.* **33**, 704[7]; **34**, 476[8]. Ruth Berggren

The course of sympathin in the blood. Henri Hermann, F. Jourdan, G. Morin and J. Vial. *Ann. physiol. physicochim. biol.* **15**, 849–51(1939); cf. *C. A.* **32**, 2202[9].—A reply to various criticisms of earlier work. Whether sympathin exists normally in the blood is still an open question. Ruth Berggren

Relation between the amount and the fat content of human milk. U. S. Ružičić. *Monatschr. Kinderheilk.* 72, 71–3(1938); *Dairy Sci. Abstracts* 1, No. 1, 43. C. L. B.

Further investigations of chlorine metabolism with work and heat. Gunther Lehmann and Alexander Szakáll. *Arbeitsphysiol.* 10, 608–46(1939); cf. *C. A.* 32, 8502[1,2,3,4].—With a 19-year-old man a study was made of the metabolism of Cl and H_2O, body temp., pulse rate, basal metabolism, and R. Q. (Douglas-Haldane method, cf. *C. A.* 16, 2542), and morphological and chem. character of blood as influenced by work (bicycle ergometer) and high and low environmental temps. In one exptl. series the room temp. was 18–20° (relative humidity, 80–90%) and in others 37° (relative humidity, 50%). At the high temp. there were 3 groups of expts. with normal, min. and excessive Cl intake. With excessive intake, heat and work caused a loss of 8 g. of Cl and with lowered intake, 12 g. Strenuous work caused a marked dyspnea with hyperventilation, and the lowest utilization of O_2, air and blood. These results, ascribed to insufficient blood supply to the respiratory center, led to alky. of blood, decrease in level of blood Ca and tetanus cramps. With change from work and cold to work and heat, there was increased energy consumption, but this was overcompensated by progressive training. The R. Q. with work and heat was higher than at low temp. The blood Cl decreased regularly until the start of sweat secretion and then increased. The plasma protein increased greatly at start of work and, irrespective of different initial values, reached the same level under all conditions. Body temp. increased greatly at start of work at 37°, but gradually became lower with habituation. The striking parallelism between curves of body temp. with work and Cl concn. of sweat was due to the direct influence of body or skin temp. on activity of sweat glands. With work, blood sugar decreased much more at high than at normal temp., because of insufficiency of adrenaline production. The data for lactic acid agree with the view that its entrance into the blood is ascribable to the opening of inactive capillaries. Calcn. of the necessary amt. of liquid intake (based on idea that thirst depends on increase in osmotic pressure in tissues) gave results agreeing with the amt. drunk at will. These calcns. confirm the earlier rule that, in general, during work about half the loss of liquid should be replaced. Because the highly trained worker eliminates greater amts. of Cl-poorer sweat than the untrained individual, he needs greater amts. of liquid for equalization of osmotic pressure. Permanent changes in Cl content of blood resulting from work and heat are individually very different. Cl balance and body wt. do not parallel each other. T. M. Carpenter

Determination of the volume of heart stroke during rest and work, by gas-analytical and physical methods. Hans-Ulrich Matthes. *Arbeitsphysiol.* 10, 668–79(1939); cf. *C. A.* 26, 182.—With several 20–26-year-old students and a few 60–70-year-old workers, during rest and work (bicycle ergometer), comparisons were made of vol. of heart stroke as measured by Grollmann's C_2H_2 method (cf. *C. A.* 23, 3942), Knipping's N method (cf. *C. A.* 31, 4706[6]) and the sphygmographic methods of Broemser-Ranke and Böger-Wezler. Under rest conditions, the results by the 4 methods agreed. With change in position, the changes in circulation observed by the B.-R. method averaged less than those by the G. method. With light work, the G. method showed a 73% increase in vol. of stroke and the B.-R. method 35%. The Grollmann values probably were too high. With severe work, the values by the K. method agreed with those by the B.-R. method. As detns. during work were not possible by the B.-W. method, pharmacol. expts. (padutin by mouth) were made to compare the results by this method with those by the B.-R. method. In one group of these expts. the changes in circulation caused by padutin agreed by both methods; in a 2nd group the agreement was not so good but the results were nearly parallel; in a 3rd group the deviations between the 2 methods were great. With severe work, the vol. of stroke increased at first but gradually sank with onset of fatigue; circulation became insufficient when extreme exhaustion occurred. The results seemed greatly dependent on age. With static work (holding a weight in the hand, with arm outstretched), reactions did not occur until the utmost voluntary effort had been exerted. T. M. Carpenter

Preparation of pyrogen-free urogastrone. J. S. Gray, C. U. Culmer, E. Wieczorowski and J. L. Adkison. *Proc. Soc. Exptl. Biol. Med.* 43, 225–8(1940).—Exts. of normal human male urine prepd. by the BzOH adsorption method of Katzman and Doisy (*C. A.* 27, 762) contain large amts. of a pyrogenic substance in addn. to the gastric inhibitory substance urogastrone. From the crude mixt. a fraction, sol. in a 0.1 *N* soln. of HCl in 70% Me_2CO and insol. in 95% Me_2CO, was obtained which contained urogastrone but no pyrogen. L. E. Gilson

Histological demonstration of vitamin A in human liver by means of fluorescence microscopy. Hans Popper. *Proc. Soc. Exptl. Biol. Med.* 43, 234–6(1940); cf. *C. A.* 34, 1997[7]. L. E. Gilson

Studies on preserved human blood. V. Decrease in prothrombin titer during storage. E. D. Warner, Elmer L. DeGowin and Walter H. Seegers. *Proc. Soc. Exptl. Biol. Med.* 43, 251–4(1940).—In citrated blood stored aseptically at 5° the prothrombin decreased 9% in 10 days, 50% in 21 days and 70% in 30 days (av. of 12 samples). L. E. Gilson

Inactivation of methyltestosterone in castrate male rats. Gerson R. Biskind. *Proc. Soc. Exptl. Biol. Med.* 43, 259–61(1940); cf. *C. A.* 33, 9413[7].—Methyltestosterone, like testosterone propionate, does not exert its sp. effect on the genital organs of castrate male rats when implanted in pellet form in the spleen. It appears to be destroyed in the liver. When implanted subcutaneously, or in a transplanted spleen with the splenic vessels ligated, it exerts the expected effect. L. E. Gilson

Observations on [citrated] human blood stored at 4°. Wm. F. Lipp and Roger S. Hubbard. *Proc. Soc. Exptl. Biol. Med.* 43, 265–7(1940).—Albumin, globulins and fibrinogen all seemed to increase gradually for 30 days. Hemoglobin and erythrocyte count did not change significantly. Leucocyte count and sedimentation rate decreased. L. E. Gilson

Bisulfite-binding substances in the blood and cerebrospinal fluid. Herman Wortis, Ernest Bueding and Wm. E. Wilson. *Proc. Soc. Exptl. Biol. Med.* 43, 279–82 (1940).—Methods are described. The normal range of bisulfite-binding substances for human spinal fluid is 0.42–3.07, and for blood 2.0–5.7 mg. % (calcd. as pyruvic acid). The detn. cannot be used as an indicator of vitamin B_1 deficiency, it is often normal in various psychiatric disorders, and it is not an accurate measure of the pyruvic acid level. It is elevated after administration of paraldehyde because deproteinization of the fluids with CCl_3CO_2H partially hydrolyzes paraldehyde to AcH which binds bisulfite in the detn. L. E. Gilson

Factors in saliva correlated with the occurrence of calculus. Benjamin Tenenbaum and Maxwell Karshan. *J. Am. Dental Assoc.* 26, 1965–71(1939).—The av. concns. of total Ca and inorg. phosphate in both unstimulated and stimulated saliva and the av. pH of stimulated saliva of persons who form calculus were relatively such as to favor pptn. of the inorg. salts of the deposit. The protein content of the saliva was without significance. Joseph S. Hepburn

Comparison between dietary and hormonal factors in the development of dentin. Gerrit Bevelander and Margaret M. Hoskins. *J. Dental Research* 18, 533–46 (1939).—Disturbances in the dentin of rats, of a permanent nature, were produced by a low-Ca ration, variations in the Ca:P ratio and parathyroidectomy plus a Ca-deficient ration; similar disturbances with a reversion to normal followed parathyroidectomy. 11 references. Joseph S. Hepburn

Composition of pre-Columbian teeth. Calcium, phosphorus and carbon dioxide determinations on all the dentin and all the enamel. Ethel L. French, Helen Tefft,

Margaret Rathbun, Janet Eckhardt, Eileen Welch and Harold C. Hodge. *J. Dental Research* **18**, 547–56(1939).—In 32 pre-Columbian teeth, on the dry basis, the enamel contained 98.0% inorg. compds., the dentin 80.0%. The av. percentage compn. of the inorg. constituents was: enamel, Ca 37.1, P 17.6, CO_2 1.98; dentin, Ca 35.7, P 16.6, CO_2 3.31. No significant differences were noted between 5 carious teeth and the sound teeth.
Joseph S. Hepburn

Acid solubility of human enamel. J. F. Wolker. *J. Dental Research* **19**, 1–10(1940).—Gravimetric detns. of the soly. of human enamel in an AcOH-AcONa buffer of pH 4.0 in 1 hr. showed deciduous enamel to be more sol. than permanent enamel, with no striking difference between enamel from carious and from noncarious teeth or between young and old permanent enamel, but a possible decrease in the soly. with age. 18 references.
Joseph S. Hepburn

The saliva of the hen. E. E. Leasure and R. P. Link. *Poultry Sci.* **19**, 131–4(1940).—The saliva of 30 mature hens (av. 12 cc./24 hrs.) was a milky gray to clear fluid with a characteristic odor, bordering on putrid, with a pH of 5.92–7.15 (av. 6.75) and an av. d. of 1.0135. Microscopic examn. showed mucin shreds, bacteria, spirilla, debris, epithelial cells, leucocytes, fungi (1 sample only) and fat droplets. Salivary amylase was always present, salivary lipase was present, though relatively inactive or in extremely small quantities, salivary proteinase was negligible or absent and salivary rennin was absent.
K. D. Jacob

Response of pullets to androgens. W. R. Breneman. *Poultry Sci.* **19**, 147–53(1940); cf. *C. A.* **33**, 8255[8].—Pullets injected with Oreton (testosterone propionate) or Oreton-B (dihydroandrosterone benzoate) from the 1st to 4th or 5th to 9th day after hatching do not give as marked response to these androgens as do cockerels of the same age and there is no clear difference in response between the combs of these chicks which receive 0.125 or 0.25 mg. hormone daily. After cessation of injections, the combs continue to grow but more slowly than do those of cockerels given similar treatment. Subsequent to the 20th day there is an indication of hormone antagonism. There is evidence of the probable secretion of an estrogen by the ovary which acts antagonistically to the androgen at this time. Addnl. support for the possibility that an estrogen may be responsible for the comb growth in the pullet is furnished by the fact that comb sizes in capons injected with theelin exceed those in control birds. Some exptl. evidence of the inhibition of Oreton-B by theelin is presented.
K. D. Jacob

Composition of the blood of horses, asses and mules in connection with heterosis of mules. Kh. F. Kushner. *Bull. acad. sci. U. R. S. S., Sér. biol.* **1939**, 171–88(in English, 188); cf. *C. A.* **34**, 498[1].—The chief constituents of the blood responsible for its oxidizing functions (no. of erythrocytes, hemoglobin content, blood alky.) show the highest indexes in the mules, then in horses and asses. Thus the heterosis of the mules in respect to the working ability and resistance is partly conditioned by the higher oxidation capacity of their blood. 46 references.
C. Jarowski

Investigation of the composition of the blood of Yaroslav cattle in connection with their productivity. Kh. F. Kushner. *Bull. acad. sci. U. R. S. S., Sér. biol.* **1939**, 189–205(in English, 206); cf. *C. A.* **34**, 498[1].—The hemoglobin content, size and no. of erythrocytes and reserve alky. were all greater in cows of the high record class, distinguished from all the other cows by their higher milk productivity, greater body wt. and higher index of eurysomy. The lower the index of eurysomy in other breeds, the lower is the index of the oxidizing ability of the blood. 59 references.
C. Jarowski

Mineral composition of colostral milk. O. F. Garrett and O. R. Overman. *J. Dairy Sci.* **23**, 13–17(1940).—At parturition sp. gr., total solids, total ash, total protein and fat are high. The initial high values are followed by a fairly steady decline during the colostral period. The lactose was low at parturition but gradually increased as the milk became normal. Ca, Mg, Na, P_2O_5 and Cl are all high at parturition and during the early hrs. of lactation, but a rather rapid decline toward a fairly const. level sets in as the milk becomes normal. On the other hand, K is low at parturition but gradually increases toward a fairly const. level as the milk progresses toward normality.
A. H. Johnson

The composition of bovine blood. II. Seasonal variations in the level of magnesium in the blood plasma of growing dairy calves. C. W. Duncan, C. C. Lightfoot and C. F. Huffman. *J. Dairy Sci.* **23**, 125–34(1940); cf. *C. A.* **33**, 7081.—The detn. of plasma Mg in 2286 samples of blood from 107 calves showed changes in concn. of Mg for the various months of the year and a marked seasonal drop that occurred during the transition from winter to summer conditions when the calves had to adjust themselves to new weather conditions. A no. of direct environmental factors, temp., sunshine, precipitation, barometric pressure and relative humidity were considered and linear correlations are indicated to show some apparent relationships with plasma Mg, but none have been found wholly satisfactory in explaining why these alterations occur in the animal body. Lower plasma Mg values were assocd. with those months during which there were more than 8 hrs. of sunshine per day and when the mean and max. temps. were above 55 and 70°F., resp. The change in concn. of Mg cannot be ascribed to the effect of solar radiation, because the Mg values obtained from the young calves which did not have access to direct sunlight responded in the same manner as those which were turned out to pasture. The results of the study suggest a striking parallelism in the concn. of Mg to changes in season. Periods of high and low concn. not attributable to age or to the ingestion of food are definitely indicated.
A. H. Johnson

Renal mechanisms controlling composition of the body fluids. Donald D. Van Slyke. *Chem. Rev.* **26**, 105–27 (1940).—A review.
Louise Kelley

Peroxidase reaction. CXXIII. Arakawa's reaction and vitamin C content of human milk. 5. Difference between Arakawa-negative human milk and human milk made Arakawa-negative by added ascorbic acid. Siroku Isono. *Tohoku J. Exptl. Med.* **37**, 216–21(1939); cf *C. A.* **33**, 8275[7].—Arakawa reagent III oxidized the vitamin C of human milk. The presence of H_2O_2 and guaiacol is required for this oxidation. The reagent permits differentiation between Arakawa-neg. milk and A.-pos. milk made A.-neg. by addn. of vitamin C. **CXXIV. Qualitative reactions for methylglyoxal in human milk and their results compared with the quantitative value of the methylglyoxal-like substance in it.** Siu Sato. *Ibid.* 222–9.—The methylglyoxal-like substance in milk was successfully identified and detd. Fischler and Boettner's method (*C. A.* **22**, 2901), the Denigès' reaction, the pyrrole reaction and the pptn. reaction with 2,4-dinitrophenylhydrazine were used. It is probable that the substance extd. by Takamatsu (*C. A.* **28**, 4080[8]) from Arakawa-neg. milk is methylglyoxal. **CXXV. Variation of the amount of methylglyoxal-like substance in human milk on administration of vitamin B_1 with or without yakriton, and on antisyphilitic treatment; initial and temporary exacerbation of Arakawa's reaction on administration of vitamin B_1.** *Ibid.* 230–40.—The methylglyoxal content decreases in Arakawa-neg. milk on treatment of the mothers with vitamin B_1, with or without yakriton, and in luetic cases on antiluetic treatment. This is preceded by an initial and temporary increase and a corresponding weakening of the A. reaction. **CXXVI. Further report on the blood platelet count of mothers with different Arakawa reactions.** Siguo Kimura. *Ibid.* 241–54.—The weaker the reaction, the higher the count. **CXXVII. The increase of methylglyoxal-like substance and the change of Arakawa's reaction in rabbit milk on administration of monoiodoacetic acid; recovery through vitamin B_1 and yakriton.** Siu Sato. *Ibid.* 255–62.—The acid was injected into lactating rabbits, causing a steady increase in methylglyoxal. The Arakawa's reaction became neg. The animals lost wt. In mild cases these toxic symptoms receded on vitamin B_1

treatment. In severe cases recovery resulted only when the vitamin was supplemented by yakriton. Cf. *C. A.* **34**, 2051[4]. T. Laanes

Calcium metabolism and teeth. Rudolph Kronfeld. *Illinois Dental J.* **9**, 95–7, 117(1940).—Review. H. M. Leicester

Antiketogenic and glycogenic activity of citric acid. Eaton M. MacKay, Herbert O. Carne and Anne N. Wick. *J. Biol. Chem.* **133**, 59–65(1940).—Citric acid is as effective as glucose in relieving insulin hypoglucemia in rats. It is active in the formation of liver glycogen and has a marked antiketogenic action. A. P. Lothrop

Basic amino acid content of human serum proteins. The influence of the ingestion of arginine on the composition of the serum proteins. Richard J. Block. *J. Biol. Chem.* **133**, 71–4(1940).—Human serum proteins prepd. by heat coagulation or by pptn. with 2 vols. of alc. or 5 vols. of Me_2CO have approx. the same basic amino acid compn., and proteins pptd. from serum contg. 0.5% of arginine-HCl yield little if any extra arginine. The arginine content of the serum proteins was not appreciably increased by the ingestion of relatively large amts. of arginine-HCl by 2 human beings. These findings are not in accord with those reported by Dirr (*C. A.* **33**, 7898[5]). A. P. Lothrop

Effect of repeated insulin hypoglucemia on the lipide composition of rabbit tissues. Lowell O. Randall. *J. Biol. Chem.* **133**, 129–36(1940); cf. *C. A.* **32**, 9248[6].—A small but statistically significant decrease in the phospholipide and neutral fat content of nervous tissues followed repeated insulin hypoglucemic convulsions induced in 17 rabbits. There was no change in the cholesterol content and there was also no effect on the phospholipide and cholesterol content of the liver, kidney, spleen and muscle. Neutral fat was increased in the liver and kidney only. The adrenal glands hypertrophied and there were increases in the abs. amts. of phospholipide and neutral fats. The free and ester cholesterol remained const. On a percentage basis the amts. of phospholipide and free cholesterol remained const.; the ester cholesterol was decreased and neutral fat increased. A. P. L.

Ketosis. XVII. The rate of disappearance of β-hydroxybutyric acid in fasted and fed rats. Harry J. Deuel, Jr., Lois F. Hallman, Paul O. Greeley, Joseph S. Butts and Nellie Halliday. *J. Biol. Chem.* **133**, 173–82(1940); cf. *C. A.* **33**, 7856[3].—When *l*-β-hydroxybutyrate was injected intraperitoneally into fasted, nephrectomized rats, the rate of disappearance was significantly lower than in animals receiving glucose. This finding together with the decrease in ketonuria earlier observed following administration of carbohydrate seems to indicate that glucose increases the rate of disappearance of β-hydroxybutyric acid from the tissues of the fasting rat by an acceleration of oxidation (ketolysis) rather than by a suppression of its formation from endogenous sources (antiketogenesis). A. P. Lothrop

The distribution of ketone bodies in tissues. Helen C. Harrison and C. N. H. Long. *J. Biol. Chem.* **133**, 209–18(1940).—When ketosis of endogenous origin is produced by fasting, treatment with anterior pituitary ext. or injection of phlorizin, there is an increase of ketone bodies in the liver cell water. The ratio $Ket._l/Ket._p$ remains const. at all levels of plasma concns. within the limits of exptl. error. On the other hand, appreciable amts. of ketones are not found in the muscle cell water until the concn. in the plasma is elevated to about 70–80 mg. per 100 cc. (expressed as β-hydroxybutyric acid). As the concn. in the plasma increases above this level, the amt. in the muscle cell also increases. The distribution ratio $Ket._m/Ket._p$ increases with increasing concns. of ketones in the plasma but it never reaches the value for $Ket._l/Ket._p$. After administration of β-hydroxybutyric acid the distribution of ketone bodies in the liver and muscle is similar to that observed in ketosis of endogenous origin. These findings indicate that the ketogenic effects of fasting, anterior pituitary ext. and phlorizin are due to their action upon liver cell metabolism in bringing about an increased ketone body production and also that ketones are utilized by the muscle cell. A. P. Lothrop

The lipide content of blood, liver and yolk sac of the newly hatched chick and the changes that occur in these tissues during the first month of life. C. Entenman, F. W. Lorenz and I. L. Chaikoff. *J. Biol. Chem.* **133**, 231–41(1940); cf. *C. A.* **33**, 2195[8], 4642[9].—The bird enters the external world with a lipemia and a fatty liver which contains an enormous amt. (7.3%) of cholesterol, 90% of which is in the esterified form. The blood contains as much as 1000 mg. of total lipide per 100 cc. of whole blood and all the lipide constituents are present in amts. greater than in the blood of the mature male and nonlaying female bird. On the 3rd day after hatching a rapid decline in the lipide content of the blood and liver sets in and the rapid fall in esterified cholesterol is assocd. with a temporary rise in triglycerides. At hatching the yolk sacs contain about 12% fat acids, 1.6% phospholipide and 1.3% total cholesterol but their absorption proceeds rapidly and is nearly complete by the time the chicks are 5 days old. Neutral fat is absorbed more rapidly than the other lipide constituents. A. P. Lothrop

Preparation and assay of anterior pituitary fractions rich in ketogenic and respiratory quotient-reducing substances. Joseph D. Greaves, Irene K. Freiberg and H. E. Johns. *J. Biol. Chem.* **133**, 243–59(1940).—A method of assay is described for the R. Q.-reducing substance of the anterior pituitary gland, based on the effect of the intraperitoneal injection of the ext. upon the R. Q. of rats fasted 20 hrs. before and fed glucose 2 hrs. after the injection of the ext. under assay. An approx. unit is defined as that amt. of material which will reduce the R. Q. to 0.8 (from the control values of 0.86–0.94). The effects of the same exts. on the blood and urinary ketone body levels are also studied in the fasted rats. The factor is best isolated from frozen glands by extn. at pH 11.0 rather than by neutral, acid, buffer or saline solvents. It is heat-labile (100° at pH 10 for 15 min.) and non-diffusible through cellophane or collodion. The activity of different exts. does not parallel their melanophore content. The larger part of the factor is salted out by full satn. with NaCl or 0.2 to 0.45 satn. with $(NH_4)_2SO_4$. Isoelectrically a large part is pptd. at pH 6.7–5.75 and the activity is not destroyed with excess cysteine at pH 8. It is more stable in the pH range 9.5–11.0 than at higher or lower pH and is much less stable in acid soln. Prepns. have been obtained which were active in a unit dose of 0.17 mg. of protein. The best fractions were rich in growth factor and contained only small amts. of lactogenic and adrenocorticotropic material. The ketogenic and R. Q.-reducing potencies ran approx. parallel but sepn. of the 2 has not been effected. Forty-five references. A. P. Lothrop

Separation in nearly pure form of luteinizing (interstitial cell-stimulating) and follicle-stimulating (gametogenic) hormones of the pituitary gland. R. O. Greep, H. B. van Dyke and Bacon F. Chow. *J. Biol. Chem.* **133**, 289–90(1940); cf. *Proc. Am. Physiol. Soc.*, *Am. J. Physiol.* **126**, P 462(1939).—A method is described for the sepn. and purification of the luteinizing and follicle-stimulating hormones of the pituitary gland based on pptn. of the former by Na_2SO_4 and of the latter by $(NH_4)_2SO_4$ from purified exts. contg. acetate buffer at pH 4.41. In immature hypophysectomized rats a total dose of 0.002 mg. caused a detectable gonadotropic effect and definite ovarian hypertrophy was produced by 0.01 mg. of follicle-stimulating hormone but not by 0.002 mg. A. P. L.

Hibernation of the hedgehog. VII. Cholesterol metabolism. Paavo Suomalainen. *Ann. Zool. Soc. Zool.-Botan. Fennicae Vanamo* **8**, No. 2, 12 pp.(1939); cf. *C. A.* **34**, 1723[4].—Cholesterol content of the serum, adrenal, spleen, brain, liver, kidney and hibernating gland of hedgehogs is detd. by Theorell's modification (cf. *C. A.* **24**, 5362) of Bloor's method (total) and Kalaja's modification of Katsura, Hatakeyama and Tajima's method (cf. *C. A.* **28**, 4094[1]) (ester). Serum total cholesterol is highest during hibernation, falls on awakening, throughout the spring, and rises during the summer.

Esters/total cholesterol ratio does not change. Awakening is accompanied by an increase of 1000 mg. % total cholesterol in the adrenal, 900 mg. % of which is ester. A less pronounced increase, not occurring in the ester fraction, is found in the spleen. Rise in hibernating gland content may be due to its decrease in size. Total cholesterol is const. in brain and kidney throughout the year. Liver content changes only slightly, being highest in Sept. Adrenal changes may be assocd. with activity of the sex organs. Janet McAfee 1

The fate of prolan in the organism. C. M. Stamler. *Bull. biol. méd. exptl. U. R. S. S.* **3**, No. 1, 35–8(1937); *Chem. Zentr.* **1938, I**, 4197.—Prolan administered intravenously disappears only slowly from the blood of dogs and geldings, and at least 11% is excreted again in the urine in the case of dogs and 5% in the case of geldings. In being excreted in this manner prolan differs from the gonadotropic hormone obtained from the serum of pregnant mares. M. G. Moore 2

Extractive substances of the heart muscle. II. Creatine, methylguanidine and anserine in the heart muscle. M. Mogilevskiĭ. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 291–2(1937); *Chem. Zentr.* **1938, I**, 4352; cf. *C. A.* **33**, 6415[4].—Creatine, methylguanidine and a substance whose properties were very like those of anserine were isolated from aq. exts. of the heart muscle of large, horned, domestic animals. M. G. Moore 3

The influence of prolan on the sexual activity of mares. B. M. Zavadovskiĭ and M. B. Goldberg. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 357–9(1937); *Chem. Zentr.* **1938, II**, 3411.—Previously sterile mares were treated with relatively small doses of prolan (500–1000 mouse units was divided into 3 doses administered on the first 3 days of estrum). In 50–60% of cases pregnancy followed. Nymphomania should be treated with larger doses (2000–7500 mouse units). After repeated matings, some of the treated animals became pregnant at once, some the following year. No control expts. in order to det. the percentage of spontaneous recovery from the condition are reported. M. G. Moore 4

Quantitative investigations in the case of treatment with prolan. Ya. M. Kabak. *Bull. biol. méd. exptl. U. R. S. S.* **3**, 360–1(1937); *Chem. Zentr.* **1938, II**, 3411.—Groups of rats were given preliminary treatment with doses of prolan of varying size over a long period of time (3 months) and then tests were made to det. the threshold dose of prolan for the various animals. Animals which had received large doses during the preliminary treatment showed a greatly reduced sensitivity to the prepn. Thus for animals which had received 10 mouse units (M. U.) daily the threshold was 250 M. U.; this value was reduced to 5 M. U. when the animals had received only 0.1 M. U. of prolan daily; it was 100 M. U. when the daily dose had been 1 M. U. Thus the threshold value and the preliminary daily dose are not directly proportional. This increasing lack of sensitivity of the organism to prolan must be taken into consideration in cases where the prepn. has already been administered. M. G. Moore 5

Action of the thyrotropic hormone of the anterior lobe of the pituitary body on the animal organism. C. I. Ratner. *Problemy Endokrinol.* **2**, 175–94(1937); *Chem. Zentr.* **1938, I**, 4487.—The influence of the thyrotropic hormone on the thyroid gland and on the protein, carbohydrate and I metabolism of guinea pigs and dogs was studied. The daily dose was 5 units for guinea pigs and 25 units for dogs. An increase in post-mortem autolysis was observed. There was also a sharp decrease in the liver glycogen which persisted up to the 12th injection, after which this substance increased again up to normal. The blood sugar was not essentially changed. In dogs the I content of the blood increased up to the 10th injection and then decreased to normal. Changes in the histological picture of the thyroid showed the same regularity, which indicated a close relationship to the metabolic changes. The latter, therefore, are to be regarded as a result of a hyperfunctioning of the thyroid, which under long continued influence of the thyrotropic hormone becomes insensitive to it. M. G. Moore 6

Reducing substances (vitamin C) in saliva. H. Bober. *Zahnärztl. Rdsch.* **47**, *Paradentium* **10**, 155–9(1938); *Chem. Zentr.* **1938, II**, 3417.—A crit. review. M. G. Moore 7

Hormones and resistance. An acute antinarcotic and antitoxic effect of the estrogenic hormones. Tore P. Stortebecker. *Acta Path. Microbiol. Scand.*, Suppl. **41**, 1–283(1939).—Animals and human beings show great individual variations in their tolerance to narcotics and numerous poisons. The endocrine system has some bearing on this variation. The blood ether was detd. in rabbits which exhibited the same degree of narcotic effect (corneal and lid reflexes). Rabbits in estrus showed higher blood ether values indicating a high tolerance. Castrated rabbits and mice showed low ether values. After castration in estrus, the previous high ether values decreased; this indicated that castration decreased the tolerance. Castration decreased resistance to alc. intoxication, and treatment with estrone brought the resistance back up. The administration of estrogens increased resistance to Mg and KCN. Neither vitamin D, progesterone, thyroxine, parathyroid hormone, nor the gonadotropic factor of the pituitary had any effect on Mg narcosis in spayed animals. In normal animals the blood Ca is fairly consistent, but after castration it is augmented as much as 30%, then the administration of estrone causes it to fall as much as 20% in 2 hrs. Treating castrated female guinea pigs or pigs with atrophic ovaries with estrone produced abnormal fat accumulation in the parenchymatous organs especially the liver, and a tumor-like fat accumulation in the parametrium consisting of adipose tissue, connective tissue and phagocyte-like cells. These antinarcotic and antitoxic effects of estrogens are probably due to: (1) changes in the nervous system which are connected with Ca metabolism and which may thus influence permeability of the cells, (2) an increase in the power and capacity of the organism, (3) increased detoxification processes in the liver. 700 references. John T. Myers 8

The direct and indirect determinations of estrogenic and gonadotropic hormones. E. von Haam. *Am. J. Clin. Path.* **10**, 205–21(1940).—Good results were obtained in the detn. of gonadotropic and estrogenic substances in the urine by the alc. or tungstic acid pptn. of an aliquot part of a 24-hr. specimen with subsequent assay by the Levin-Tyndale method (cf. *C. A.* **31**, 7978[2]) for gonadotropic substances, and the Lauson method (*C. A.* **33**, 2198[7]) for estrin (hydrolysis and benzene extn. with tests on the uterus of immature mice). Single hormone assays, even if properly correlated, showed results other than normal in 70% of endocrine disorders. A weekly study of the cycle is a much better method of differentiating endocrine disturbances. An increase or decrease as compared with the normal standard given by the method employed has more clinical value than an expression of mouse units. For an adequate survey of sex hormones in the urine of menstruating women, at least 3 weekly detns. during one cycle should be made on 24-hr. specimens. In pregnancy women should be examd. monthly, and in other conditions twice at biweekly intervals. For quick orientation on the field of female endocrine disorders, detn. of the prolan content of a 24-hr. specimen will suffice. If abnormally increased in relation to the period of the cycle, primary ovarian hypofunction is suggested. Its permanent absence assocd. with amenorrhea is a definite sign of hypogonadism. John T. Myers 9

The normal bromine content of the blood of healthy individuals. Helen L. Wikoff, Richard A. Brunner and H. Willard Allison. *Am. J. Clin. Path.* **10**, 234–7(1940).—In 170 cases the Br value ranged from 0.33 mg. % to a high value of 1.73 mg. In 70 cases the figure did not differ from the av. of 0.81 mg. by more than 0.1 mg. In 137 cases the difference was not more than 0.2 mg. All of the cases were relatively young, no figures being given for middle aged or elderly persons. John T. Myers

The respiration and the circulatory system in females with ovarian dysfunction. David Scherf. *Ann. Internal Med.* **13**, 1413–30(1940).—In patients with ovarian hypofunction prolonged conduction time and abnormal sinal

deflections may be found in the electrocardiogram. There are also changes in respiration. These changes disappear with the administration of follicular hormone. Such findings may be due to overactivity of the pituitary with the production of such hormones as the thyrotropic and adrenotropic substances, when the retarding effect of folliculin is decreased or removed. 35 references. John T. Myers

Chemical specificity in growth and development. Frederick S. Hammett and Stanley P. Reimann. *Ann. Internal Med.* 13, 1483-8(1940).—A discussion with 22 references. John T. Myers

Conditions for estrogenic action. H. Druckrey. *Arch. exptl. Path. Pharmakol.* 192, 85–9(1939).—Yohimbine and its α-bromoisovaleryl, diethylacetyl and monostearyl esters are not estrogenic, contrary to other reports. High doses of vitamin A (120,000 units Vogan) do not inhibit the action of estrone. The estrogenic dose of follicular hormone necessary in castrated rats is increased by hysterectomy. J. Pinchack

Preliminary report on effect of cold on oxygen content of the blood. Malcolm C. Grow. *Military Surgeon* 86, 225-35(1940).—The mental distortion, confusion, incoherence, coma and death seen in cases of frost-bite and exposure to extreme cold are also found in anoxemia. These symptoms are due not to toxic substances in the blood, but to anoxia. Preliminary tests in animals and human subjects indicate that extreme cold decreases O utilization of the tissues. If anoxia is an important factor in such cases, O and a small percentage of CO_2 should be a valuable first-aid measure. The entire subject has a bearing on industrial efficiency where work is performed at low temps. J. Pinchack

A qualitative difference in the effect of compounds separated from the adrenal cortex on distribution of electrolytes and on atrophy of the adrenal and thymus glands of rats. B. B. Wells and E. C. Kendall. *Proc. Staff Meetings Mayo Clinic* 15, 133–9(1940).—A highly concd. cortin fraction (I) substantially free from cryst. substances related to corticosterone (II) maintains adrenalectomized dogs, but even in 30 times the maintenance dose of II it does not atrophy the adrenal cortex, as does II and its acetate. Desoxycorticosterone (III) and its acetate also do not produce adrenal atrophy. I reduces the thymus wt. 27%, II 63%, III not at all. Only III acetate suppresses the serum K to 2.8 or 3.0 milliequiv./l. These results can only mean differences in the chem. structure of the 3 substances studied. The atrophy produced by II and the presence of an OH group on C_{11} appear to be essentially related. The ester form of II and III is more active physiologically. J. Pinchack

The biologic characteristics of equine gonadotropic hormone. C. F. Fluhmann. *Western J. Surg., Obstet. Gynecol.* 48, 63–74(1940).—Equine gonadotropic hormone is an entity separate from either the anterior pituitary or the chorionic gonadotropic principles. Theoretically, it is indicated in failing ovulation not of primary ovarian origin, but preliminary clinical results with it have not been encouraging. J. Pinchack

Menstrual disorders treated with follicle hormone. Herman Anker. *Acta Obstet. Gynecol. Scand.* 19, 9–27 (1939).—Of 7 cases of menorrhagia (6 of the juvenile type), who were treated by daily injections of 10,000 mouse units of different prepns. of follicle hormone, 2 developed normal menstrual cycles, 3 showed a decrease in hemorrhages followed by amenorrhea for several months and in 2 the hemorrhage was slightly diminished. Of 5 cases of secondary amenorrhea or oligomenorrhea treated with follicle hormone alone or combined with corpus luteum hormone 3 reacted favorably. Two showed enlargement of infantile organs and 1 became pregnant. Hemorrhages occurred during or immediately following cessation of treatment with follicle hormone. In the 2nd group 10,000-50,000 mouse units of follicle hormone were used. Maurice M. Rath

Pulmonary gaseous exchange at low barometric pressure and in air mixed with nitrogen. D. B. Dill, H. T. Edwards and S. Robinson. *J. Aviation Med.* 10, 3–11 (1939).—Studies were made on physiol. function during exposure to reduced O in a low-pressure chamber. The O uptake by the blood at 90 mm. Hg partial pressure of O in inspired air, at a barometric pressure of 755 mm., was the same when the partial pressure was 86 mm. Hg at barometric pressure of 435 mm. (even though the addn. of CO_2 and H_2O vapor in the lungs at higher barometric pressure reduces the partial pressure of O less than it does at lower pressure). Under conditions of the expt., reduction in free and combined CO_2 of arterial blood and increase in alky. were twice as great at low pressures. The results are interpreted as a more complete mixing of alveolar air with air in the dead space which occurs when air in the lungs is reduced in density. Replacing part of the O of air with N, without change of total pressure, did not modify the rate at which CO_2 left the pulmonary membrane. When the ratio of O to N was kept const., while the total pressure was reduced, movement of both CO_2 and O mols. within the air spaces of the lungs was freer than at ordinary pressure. Maurice M. Rath

Can medical induction of labor be improved with estrin? S. Schürger. *Zentr. Gynäkol.* 63, 207(1939).—In 18 cases with labor absent after term, labor was induced by the administration of castor oil in addn. to 10,000 or 50,000 units of estrin followed by 2 to 8 doses of 0.2 to 0.3 cc. thymophysin. In 15 cases birth followed in 5 to 16 hrs. Maurice M. Rath

Modified Fluhmann procedure. Usefulness and evaluation of estimation of fluids containing small amounts of folliculin. Karl v. Pallos. *Zentr. Gynäkol.* 63, 506–15 (1939).—The Fluhmann technique (cf. *C. A.* 28, 199[6,8]) for injecting blood serum into mice, after which the vaginal mucosae are sectioned and examd. histologically, was tested with simple aq. solns. of estrogen. The reaction occurred in 4 stages: inactivity, proliferation, mucification and cornification, which occurred in that order with increasing doses of estrogen. The results of the expts. confirmed Fluhmann's findings. The method is a quant. expression of increasing dose. The end point can be read with equal facility in 36 or 48 hrs. Maurice M. Rath

The sympathicotropic activity of follicle hormone. G. Effkemann and H. Strüver. *Zentr. Gynäkol.* 63, 1248–54(1939).—The effects of estrogens were evaluated by photographic recording of the pupillary accommodation of the cat exposed to const. light stimulus, when under morphine, atropine or *d*-pseudoephedrine, with and without pretreatment with estrogen. The graphic records showed greater dilation of pupils with estrogen pretreatment, the effect being most marked with morphine. The pupil was larger from estrogen alone, before use of the mydriatic drugs. Maurice M. Rath

The fate of oxaloacetic acid in different organs. F. L. Breusch. *Biochem. J.* 33, 1757–70(1939).—Freshly minced spleen, lung, placenta and peripheral nerves decarboxylated added oxaloacetic acid (I) to pyruvic acid (II). Muscle, liver, kidney and pancreas reduced I to *l*-malic acid (III) in addn. and also reduced the II formed to lactic acid (IV). Kidney also condensed I with II to form citric acid (V). Muscle did not form citric acid, contrary to the citric acid cycle theory of Krebs (*C. A.* 31, 8655[6]). A new method of extg. the enzyme that reduced I to III was described. Its pH optimum was in the alk. range. It was very unstable, needed coenzyme and was destroyed by heating. The enzyme (termed *citrogenase*) that condensed I with II to form V was heat-labile and had a pH optimum at 7. It was not present in detectable traces in any muscle examd. In the competition for I between reduction to III and formation of V, the former reaction was definitely predominant. The formation of V appeared to be chiefly an elimination process and occurred only above a certain threshold of I. It was probably used as a means of eliminating C_4-dicarboxylic acids not excretable in the urine. The enzyme that catalyzed the reaction of I with glutamic acid (VI) was extd. from tissue by phosphate and purified by pptn. with $(NH_4)_2SO_4$. It was heat-labile, had a pH optimum of 7 and was present to the same extent in all organs. The order of spontaneous inactivation of the enzymes in minced

kidney tissue was studied. The one that reduced I to III disappeared first, then that which condensed I with II and finally the one that condensed I with VI. The thermostable substance that catalyzed the decarboxylation of I to II remained unchanged. The spontaneous decarboxylation of I was twice as fast in acid soln. as in alk. soln. E. W. Scott

Magnesium and muscle respiration. Sidney Elsden. *Biochem. J.* **33**, 1890–4(1939).—Mg, especially in the presence of succinic or fumaric acids, stimulated the respiration of minced pigeon-breast muscle. The stimulating action of boiled muscle ext. on this respiration could not be completely accounted for by its content of Mg and dicarboxylic acids. Iodoacetic acid (0.001 *M*) completely inhibited the succinic acid-Mg effect after a latent period of 30 min. E. W. Scott

The interrelation of lipides in the blood plasma of White Leghorn cockerels. Eldon M. Boyd and Eleanor L. Clarke. *Can. J. Research* **18, D**, 49–52(1940); cf. *C. A.* **32**, 4646[1].—The blood plasma of 22 healthy, young, White Leghorn cockerels was analyzed by oxidative micromethods and found to contain the following mean lipide values, in mg. per 100 ml. of plasma: total lipide 520, neutral fat 225, total fatty acids 361, total cholesterol 100, ester cholesterol 66, free cholesterol 34, phospholipide 155. In general, the amts. of the various lipides were proportionately related to the total lipide. J. W. Shipley

Antinarcotic substance in the normal serum of rabbits. Komao Ito. *J. Chosen Med. Assoc.* **29**, 2639–63(German abstr. 160–1)(1939).—The serum of the normal rabbit contains anticholoral hydrate (**A**) and anti-Mg (**B**) substances as tested with mice, but no anti-luminol (**C**). Normal serum plus anterior pituitary hormone (hypophorin) produces **C** effect. In serum of pregnant rabbits, **A** is still present, but not **B**, while **C** appears. The serum of the animals freed from sex, pituitary or thyroid glands loses all. If pinealectomized, the serum loses **B**, but **C** appears. Parathyroidectomy causes a loss of only **B**. When the reticulo-endothelial system is stimulated, the rabbit loses both **A** and **B**, but produces **C**, while with blockade of the system, all antinarcotic substances are lost. S. Tashiro

Electrolyte and water exchanges between mammalian muscle and blood in relation to activity. E. H. Wood, D. A. Collins and G. K. Moe. *Am. J. Physiol.* **128**, 635–52(1940). E. D. Walter

Uterine changes in the rabbit with the advent of pregnancy. Mark Graubard and Gregory Pincus. *Am. J. Physiol.* **128**, 653–61(1940).—Young female rabbits injected with pituitary exts. show an increase in the concn. of ascorbic acid in their pituitaries. Evidence is presented that the reducing substances of all the tissues tested (uterus, ovary, adrenal and pituitary) are composed of ascorbic acid and glutathione only. All these organs show in 3-day pregnant animals increased concns. of ascorbic acid and glutathione. The concns. then decline, reaching normal level by the 12th day. Uterine tissue contains very active concns. of cytochrome oxidase but extremely small amts. of cytochrome. The oxidase concn. of uterine tissue shows an increase on the 3rd day of pregnancy. During the remaining days it is only slightly higher than normal. The cytochrome oxidase of rabbit uteri is usually inactivated by washing tissue with water. E. D. Walter

Changes in the brain resulting from depletion of extracellular electrolytes. Herman Yannet. *Am. J. Physiol.* **128**, 683–9(1940).—Analyses of the serum and brains of animals whose extracellular electrolyte were depleted to varying levels are presented. The data indicate that the brain cells adjust to this depletion by releasing intracellular K in amts. proportional to the decrease in the concn. of extracellular Na. The data are consistent with the view that all the Na and probably all the Cl in the brain is diffusible. E. D. Walter

The antipressor action of renal extracts and their capacity to reduce the blood pressure of hypertensive rats. T. R. Harrison, Arthur Grollman and J. R. Williams, Jr. *Am. J. Physiol.* **128**, 716–24(1940).—Renal exts. were prepd. which had no significant effects on the blood pressure when given parenterally or orally to normal rats. The rats so treated showed, however, a marked diminution in the pressor response to renin when compared to control rats which did not have preliminary treatment with the pressor-free renal ext. The agent responsible for this effect is called the "renal antipressor substance." It inhibits not only the response to renin but also that of ephedrine and possibly reduces also the pressor effect of pitressin. Exts. contg. the renal antipressor substance cause declines in the blood pressure of hypertensive rats when given either parenterally or orally. Similar treatment does not alter the blood pressure of normal rats. E. D. Walter

Gastric carbonic anhydrase in dogs. Horace W. Davenport. *Am. J. Physiol.* **128**, 725–8(1940); cf. *C. A.* **33**, 1805[2]; **34**, 1043[2].—Carbonic anhydrase is present in high concn. in the parietal cells and in lower concn. in the cells of the surface epithelium of the gastric mucosa of the dog. It is probably not present in any other type of cell in the gastric mucosa. E. D. Walter

Effect of cortin after partial and complete hepatectomy. Hans Selye and Christiane Dosne. *Am. J. Physiol.* **128**, 729–35(1940).—Expts. on partially hepatectomized rats indicate that the decrease in the blood vol., blood chlorides and blood sugar caused by ablation of 85% of the liver tissue in fasted rats is inhibited by administration of an adrenal cortical ext., rich in the life-preserving principle. The decrease in blood sugar produced by complete hepatectomy is not significantly influenced even by large doses of cortin. E. D. Walter

The influence of postpituitary extract on the excretion of water and chlorides by the renal tubules. Herbert Silvette. *Am. J. Physiol.* **128**, 747–53(1940).—The expts. seem to indicate that the increased chloride excretion brought about by postpituitary ext. administration, like the decreased water excretion, is a renal and not a tissue phenomenon. The hypothesis is advanced that the antidiuretic hormone of the post-pituitary gland acts directly on the kidney, leading to a decreased tubular reabsorption of salt (chloride) coincident with the increased tubular reabsorption of water. E. D. Walter

The effect of endocrine extracts on the amino acids in the blood with incidental findings on the blood sugar and urea. Lee E. Farr and Louis K. Alpert. *Am. J. Physiol.* **128**, 772–81(1940).—The intravenous injection into dogs of the growth and metabolic factors of anterior pituitary ext., pitressin, antuitrin S, adrenal cortical hormone, testosterone propionate and thyroxine were each followed by marked increases in the concn. of amino acids in the blood plasma. The intraperitoneal injection of growth factor of anterior pituitary ext. produced a transient fall in plasma amino-acids. There were no consistent changes in blood sugar or urea. Subcutaneous injection of insulin and adrenaline, resp., produced sharp decreases in plasma amino acids with mutually opposite effects on the blood sugar. Changes in the plasma amino acids after insulin were not accompanied by corresponding change in the cell amino acids. E. D. Walter

Blood plasma protein production and utilization. The influence of amino acids and of sterile abscesses. S. C. Madden, C. A. Finch, W. G. Swalbach and G. H. Whipple. *J. Exptl. Med.* **71**, 283–97(1940).—When blood plasma proteins (I) are depleted by bleeding with return of the washed red blood cells (plasmapheresis) it is possible to bring dogs to a steady state of hypoproteinemia and a uniform I production on a basal low-protein diet. These dogs are clinically normal. Introduction of variables into their standardized life gives insight into the production of I. Casein retested as the basal protein in the ration may show high yield of I, equal to 33% of the protein fed. This equals the potency of liver protein (17–33%) and approaches the utilization of I by mouth (40%). Zein has no effect on I regeneration but when it is supplemented with cystine (II), tryptophan, lysine and glycine (III) there is a doubling of the liver basal I production and a retention of the fed protein N. Threonine does not modify the above reaction. Liver protein supplemented with II, leucine (IV), glutamic acid (V) and III in the basal diet

yields double the amt. of new-formed I compared with liver alone. This combination is then as potent as I itself when given by mouth—40% utilization. Tyrosine (VI) or lysine, arginine and isoleucine do not modify the above responses. Methionine is not as effective as II in supplementing gelatin and VI to produce I. II, IV and V appear to be of primary importance in the building of new I in these expts. I formation is dependent on materials coming from the body reserve and from the diet. Given an exhaustion of the reserve store there is very little I produced during a protein fast (3–6 g. per week). A turpentine abscess does not modify this fasting I reaction. Homologous plasma given by vein will promptly correct exptl. hypoproteinemia due to bleeding. It will maintain N equil. and replenish protein stores. Even during hypoproteinemia I may promptly pass out of the circulation to supply body needs for protein. Perhaps the most significant concept which derives from these expts. is the *fluidity* of the body protein (including I)—a ready give and take between the protein deposits—a "dynamic equil." of body protein. C. J. West

Isomeric *p,p'*-dihydroxy-3,4-diphenyl-*n*-hexenes [estrogenic activity] (Wessely, Kleedorfer) **10**. Synthesis and detn. of lipotropic activity of betaine hydrochlorides of *dl*-serine, *dl*-threonine and *dl*-allothreonine (Carter, Melville) **10**.

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G—PATHOLOGY

Urinary excretion of indoxyl (as indican) by infants with eczema. Herman Sharlit. *Arch. Dermatol. Syphilol.* **41**, 113–18(1940).—Detn. shows definitely increased excretion of indoxyl, probably because of intestinal stasis. Philip D. Adams

Blood iodine of patients with acne vulgaris. Eugene F. Traub and Richard Emmet. *Arch. Dermatol. Syphilol.* **41**, 506–8(1940).—The av. blood I of 22 apparently normal controls was 6 γ per 100 cc. Forty-five patients with acne vulgaris average 5.975. In a group of 45 patients with acne and 13 with miscellaneous cutaneous diseases, 25 males average 5.3 and 33 females average 6.65. Philip D. Adams

Advances in clinical chemistry. W. W. Hall and P. S. Gault. *U. S. Naval Med. Bull.* **38**, 1–27(1940).—The following methods are presented and discussed: sulfosalicylic acid method for the detn. of albumin in urine and protein in spinal fluid; phosphatase test for pasteurization; Weltman serum coagulation test; hippuric acid liver function test; Hehner test for HCHO in milk and cream; detn. of sulfanilamide and sulfapyridine in blood and body fluids; prothrombin coagulation test for vitamin K deficiency in jaundice and liver disease. Modifications of the hippuric acid test and Hehner test are presented. Philip D. Adams

Renal calcification in infancy and childhood. W. A. D. Anderson. *J. Pediat.* **14**, 375–81(1939).—Deposition of Ca in the kidney is of frequent occurrence in infancy and childhood owing to hypercalcemia, dystrophy or both. In 20 reported cases the Ca deposition was limited to the cortical region and involved tubules except in 4 patients who had received parathyroid ext. and Ca salts, where the Ca was also found in the small blood vessels. Renal damage, both clinically and at autopsy, was almost invariably found. Acute infection, intestinal obstruction, dehydration and acidosis were each present in a no. of cases and each seemed to be a factor of importance. Vitamin D administration was not an important factor in the cases reported. C. R. Addinall

Hyperparathyroidism, with death from parathormone intoxication. F. M. Hanes. *Am. J. Med. Sci.* **197**, 85–90(1939).—A case of hyperparathyroidism from parathyroid adenoma with fatal parathormone intoxication showed a characteristic type of parenchymatous renal calcification, and a blood Ca of 20 mg.%. B. C. P. A.

Mechanism of compensatory changes in anemia, especially as regards blood CO_2 and pH. F. L. Apperly and M. K. Cary. *Am. J. Med. Sci.* **197**, 219–29(1939).—In cases of increasing anemia the plasma CO_2 fell at first more rapidly and then more slowly. Whole-blood CO_2 and venous pH remained unchanged. The arteriovenous O, CO_2 and pH differences were little affected until the hemoglobin fell to about 40%, but thereafter fell rapidly. B. C. P. A.

Circulating blood volume in cardiac disease. B. Steinmann. *Arch. exptl. Path. Pharmakol.* **193**, 24–33 (1939); cf. *C. A.* **33**, 9343⁹.—Blood vol. was detd. by a spectrophotometric CO method. In cardiac disease the blood vol. was usually increased. There were marked variations in the CO concn. of blood in various parts of the body B. C. P. A.

Resorption of amyloid substance in man. D. B. I. Migounow. *Arch. intern. méd. exptl.* **13**, 437–47(1938).—Intravenous injection of staphylococci in rabbits results in amyloid production in the spleen, liver and kidney; the deposition is preceded by appearance of crystals in the liver only. Resorption of amyloid by giant cells occurred in the spleen of animals previously injected with antistaphylococcal vaccine. The amyloid in the neighborhood of the giant cells changed its chem. nature as shown by staining reactions. In a patient with hydatid cyst of the lung who died in spite of drainage of the cyst, amyloid was found in the spleen, liver, and kidney. It was undergoing resorption in the spleen and liver owing to the presence of giant cells. The resorption was attributed to the previous pus drainage. B. C. P. A.

Potential differences of lesions. C. Bartorelli. *Boll. soc. ital. biol. sper.* **14**, 209–10(1939).—The p. d. between injured and normal tissue does not occur in iodoacetate-poisoned muscle; hence lactic acid formation is a factor in the production of d. of lesions. B. C. P. A.

Nature of leucemic blood cells as determined by their metabolism. W. Kempner. *J. Clin. Investigation* **18**, 291–300(1939).—The metabolism of the blood cells from 15 patients with lymphatic leucemia and 40 patients with myelogenous leucemia was detd. by the Warburg method (cf. *C. A.* **26**, 1661). Myeloblasts as well as lymphoblasts, in contrast to the more mature cells, have a purely oxidative metabolism and do not form lactic acid under aerobic conditions. B. C. P. A.

Relation between stomach and kidneys. C. Dienst. *Klin. Wochschr.* **18**, 541–4(1939).—9 patients with renal disease showed high gastric acidity and normal nonprotein N in blood; 11 other patients had low values for gastric HCl, and 7 of these showed raised nonprotein N values. B. C. P. A.

Serum potassium and sodium in pre-eclamptic conditions. F. Posatti and W. Beiglböck. *Mschr. Geburtsh. Gynäk.* **108**, 237–46(1938).—Serum K and Na in pre-eclamptic conditions are normal; if insulin is given serum K decreases and Na increases. B. C. P. A.

Attempt at immunization with some paravenins. A. Arthus, M. Provoost and G. S. de Sacy. *Ann. physiol. physicochim. biol.* **15**, 776–84(1939).—Cobra venin was immediately detoxified by $KMnO_4$ but not by H_2O_2, KIO_3, $K_2Cr_2O_7$ or K_2CrO_4. Cobra venin which had been dild. with an equal vol. of 0.05 *N* NaOH, KOH or $Ca(OH)_2$ and allowed to stand for 12 hrs. was still toxic when neutralized and injected into rabbits. If the concn. of the alkalies was higher or the period of contact longer, the detoxification of the venin was very pronounced; only NH_4OH was inactive. Whether an alkali or an alk. salt is used, the speed of detoxification depends on the alky. The detoxification of cobra venom reported by Binet, Weller and Robillard (*C. A.* **33**, 8796⁹) is attributed to the alky. produced by the Na_2PO_4 and not to the action of the glutathione. Modified venin was prepd. by treating cobra venin with $KMnO_4$ (1:1000) for 1/4 hr. at room temp. or with 0.025 *N* $Ca(OH)_2$ for 7 days. Rabbits were given 8 subcutaneous injections of 0.25 mg.

modified venin in 2 cc. physiol. saline soln. at 5-day intervals (total amt. of modified venin = 2 mg.); 15 days after the last injection 2 mg. non-transformed venin was injected intravenously. Rabbits prepd. with venin + $KMnO_4$ showed a slight immunity, while those prepd. with venin + $Ca(OH)_2$ had an unquestionable immunity. A similar expt. using a total of 0.5 mg. each of modified and of original venin was performed on guinea pigs. The immunity of the guinea pigs prepd. with venin + $Ca(OH)_2$ was superior to that of the animals prepd. with venin + $KMnO_4$. Ruth Berggren

The mechanism of anaphylactic shock. Conceptions of the part played by diastase in anaphylaxis. Jean L. Parrot. *Ann. physiol. physicochim. biol.* 15, 903–11 (1939); cf. *C. A.* 33, 3868[8].—The formation of histamine by diastase during shock has not been demonstrated exptly. During sensitization histamine does not accumulate in the tissues to form a supply available at the time of reinjection. As a working hypothesis it is suggested that the intracellular antigen-antibody reaction is followed by cytological modifications which permit the release from the cells of certain normal constituents including antithrombin and histamine. Ruth Berggren

Electrical activity of cerebral cortex in insulin hypoglycemia and in different conditions modifying the metabolism of the centers. Giuseppe Moruzzi. *Arch. intern. physiol.* 48, 45–101(1939); cf. *C. A.* 33, 2211[9]. C. L. B.

Electrical double layer and virus stability. Arthur S. McFarlane. *Trans. Faraday Soc.* 36, 257–64(1940).—The stability of protein suspensions, of cells and bacteria and of viruses is discussed. Electrophoresis expts. on the Bushy stunt virus are described. The surface of the vaccinia body does not seem to be delimited by a semipermeable membrane. The stability of the virus toward lipoid solvents precludes the existence of the familiar type of semipermeable membrane which is based on a lipoid-protein duplex film. When spread on a water surface the virus particles are not significantly deformed. Virus sedimentation measurements in electrolytes at 0.01 to 0.001 *M* show a high ζ-potential and that the ion atm. must extend a considerable distance from the surface of the virus. In dil. salt solns. relatively enormous amts. of water are assocd. with the virus particle. Victor R. Deitz

Gastric analyses and gastric symptoms in diabetes insipidus. Harry Blotner. *Am. J. Digestive Diseases Nutrition* 7, 73–5(1940).—Gastric analyses in 6 patients showed greater vol., acidity and pepsin and rennin contents than in normal subjects. These high levels were decreased by pituitrin administration. E. Eagle

An abnormal mechanism for the excitation of gastric secretion in the dog. A. C. Ivy and W. H. Bachrach. *Am. J. Digestive Diseases Nutrition* 7, 76–8(1940).—The authors advance the hypothesis that hypersecretory response to a meal or a hypercontinuous secretion of gastric juice may be due to an elaboration of histamine by an irritated or inflamed mucosa. Edward Eagle

Sensitization of rabbits to uveal tissue by the synergistic action of staphylotoxin. Hugo Lucic. *Arch. Ophthalmol.* (Chicago) 22, 359–69(1939).—Repeated intracutaneous injections of bovine uveal tissue toxin produced hypersensitivity to swine, rabbit and autogenous uveal pigment in 6 of the 22 rabbits used. E. Eagle

The effect of severe hemorrhage on the concentration of copper in the blood of sheep. A. T. Dick. *Australian J. Exptl. Biol. Med. Sci.* 17, 271–4(1939).—Contrary to the observations of others on the rabbit, pigeon, goose and dog that the concn. of Cu in the blood rises severalfold after severe hemorrhage, D. found that in the sheep the anemia resulting from the loss of large vols. of blood (up to 25 ml. of blood / kg. body wt.) is not followed by any disturbance of the concn. of the Cu in the blood. Edward Eagle

Passive immunity in experimental pertussis. E. A. North, E. V. Keogh, G. Anderson and Stanley Williams. *Australian J. Exptl. Biol. Med. Sci.* 17, 275–84(1939).—Demonstration is made of antibody protecting mice against infection with *H. pertussis* injected intranasally under anesthesia. This protective antibody is found in the serum of adult contacts of whooping cough, of children convalescent from whooping cough, of children immunized with *H. pertussis* (Phase I) and in rabbits immunized with living cultures of *H. pertussis*, both virulent (Phase I) and avirulent (Phase III) strains. The protective antibody is antibacterial in its action. There is no correlation between Phase I agglutinin titer and the protective potency of serums. Edward Eagle

The serology of the tobacco mosaic virus. I. The agglutination reaction with homologous antiserums. Nancy Atkinson. *Australian J. Exptl. Biol. Med. Sci.* 17, 333–43(1939).—No marked difference was observed between the behavior of the purified virus prepn. and the crude virus in a wide range of const. antibody and const. antigen tests. With both antigens, however, serological tests showed the following features: The const. antibody optimal ratio depends on the concn. of serum, but the const. antigen optimal ratio was const. over a wide range of antigen concns., the 2 optimal ratios differing markedly. Dialysis of the antiserum did not affect the const. antibody test, but interfered with the const. antigen test. Solns. of antibody-globulin obtained from antiserum behaved like whole serum in the const. antibody test, and like dialyzed serum in the const. antigen test. Edward Eagle

Subgroups of agglutinogen B [in blood]. R. Dujarric de la Rivière and N. Kossovitch. *Compt. rend. soc. biol* 132, 415–17(1939).—Discussion. The separn. of agglutinins β_1, β_2 and β_3 from bloods is described. L. E. Gilson

Presence of neutralizing antibodies in the cerebral tissue of animals inoculated [intracerebrally] with vaccine virus. J. Vieuchange and F. Galli. *Compt. rend. soc. biol* 132, 423–5(1939). L. E. Gilson

Phenomena of neutralization of vaccine virus by an antiserum, and passive immunity, studied in vitro. J. Vieuchange and L. Stamatin. *Compt. rend. soc. biol.* 132, 426–9(1939). L. E. Gilson

Appearance of mammary carcinoma in mice treated with estrone plus doses of testosterone fifty times as great. A. Lacassagne and A. Raynaud. *Compt. rend. soc. biol.* 132, 431–4(1939); cf. *C. A.* 32, 7995[9]; 33, 7382[1].—Male mice were treated with 50 γ estrone benzoate plus 1.0–2.5 mg. testosterone propionate per week. The hypophysis, adrenals and genital tract remained normal but some developed mammary adenocarcinomas. Females treated in the same manner developed intersexual characteristics and some developed mammary tumors after a long delay. L. E. Gilson

Adsorption of the antibodies, of serums of horses prepared with [human] nitroserum and diazoserum, by nitrostromas and diazostromas prepared from sheep erythrocytes. W. Mutsaars. *Compt. rend. soc. biol.* 132, 467–9(1939); cf. *C. A.* 33, 1383[8].—Both stroma prepns. adsorbed the antibodies from the serums. L. E. Gilson

Action of benzaldehyde on the antigenic properties of horse serum. W. Mutsaars and J. Robert. *Compt. rend. soc. biol.* 132, 469–72(1939).—Horse serum was shaken with BzH, then injected into a group of rabbits. All the antiserums obtained gave precipitin reactions with normal and BzH-treated horse serum, and some also gave reactions with normal serums from man and all the common exptl. animal species. Antiserums from rabbits injected with horse serum treated with phenylacetaldehyde, phenylpropionic aldehyde, cinnamic aldehyde, furfural and salicylaldehyde gave reactions only with horse serum. L. E. Gilson

Comparative absorption of ferrous chloride in different pathological states. H. Cosyns. *Compt. rend. soc. biol.* 132, 472–5(1939); cf. *C. A.* 33, 4654[1].—The subjects were given 225 mg. Fe, as $FeCl_2$, by mouth. In normal subjects and patients with pernicious anemia absorption of the Fe was slight, while in cases of hemorrhagic anemia and hypochrome anemia with achylia the absorption was very marked. L. E. Gilson

Antihemolytic properties of the serum of newborn infants. Pierre Van Rossum. *Compt. rend. soc. biol.* 132,

475–8(1939).—*In vitro*, the plasma of newborn infants has a much weaker antihemolytic protective power, with respect to lysocithin, than plasma of adults. L. E. G.

Concentration and detection of a dye in abscesses. H. Kroll, Siegfried F. Strauss and H. Necheles. *Proc. Soc. Exptl. Biol. Med.* 43, 228–34(1940).—When injected intravenously the bisazo dye T1824 (Evans blue) is selectively fixed by abscess tissue (cf. *C. A.* 33, 2872[4]). After substitution of 1 atom of Br in the dye it is still localized in abscesses and the amt. present can be estd. by detg. the Br content of the tissue. If 2 or 4 atoms of Br are substituted in the dye localization is less selective and some is fixed by the liver, kidneys and spleen. L. E. G.

Specific action of an antiserum for placental proteins on placenta and normal progress of pregnancy. Harold R. Cohen and A. J. Nedzel. *Proc. Soc. Exptl. Biol. Med.* 43, 249–50(1940).—An antiserum for full-term guinea-pig placentas reacted with liver and kidney autolyzates. These precipitins were removed by absorption *in vitro*. The serum still reacted strongly with placental autolyzates. Injection of this serum into pregnant guinea pigs caused them to abort. The blood serums of 2 women known to be habitual aborters gave pos. precipitins with proteins prepd. from full-term human placentas. L. E. Gilson

Effect of estrogens and androgens on growth of mammary fibroma in rats. Frederic E. Mohs. *Proc. Soc. Exptl. Biol. Med.* 43, 270–2(1940).—Transplantability and growth rate of a pure mammary fibroma were markedly enhanced by physiol. levels of injected estrogens in the host rats. Physiol. levels of androgens had no such effect The tumor-stimulating effect of estrogens was greater in male castrates than in female castrates. With onset of malignancy the connective tissue tumors lost their responsiveness to hormones. L. E. Gilson

Potassium as a toxic factor in intestinal obstruction. Myron N. Jorgensen, Nicholas Dietz and Frederick C. Hill. *Proc. Soc. Exptl. Biol. Med.* 43, 282–7(1940).—Results of a large no. of dog expts. indicate that hyperpotassemia cannot be considered as a contributing factor to the cause of collapse and death in exptl. intestinal obstruction. L. E. Gilson

Allergic reactions to an antigen from the chigger, Trombiculum irritans. Arch Sherrod Morrow. *Proc. Soc. Exptl. Biol. Med.* 43, 303–5(1940).—An antigen was prepd. by grinding chiggers and extg. with distd. water. Only certain individuals gave a pos. skin reaction. A passive transfer gave pos. results. Heat destroys a portion of the antigen and makes it less irritating. L. E. Gilson

Acute circulatory failure (shock) following subcutaneous injection of hypertonic sodium chloride solution. Harry A. Davis. *Proc. Soc. Exptl. Biol. Med.* 43, 354–7(1940).— The subcutaneous injection of 25 cc./kg. of 25% NaCl soln. in dogs is followed by acute circulatory failure, assocd. with hemoconcn. and an increase in the sugar, nonprotein N and NaCl of the blood. **Relative significance of water and protein loss in dehydration shock.** *Ibid.* 357–9.—Shock which follows subcutaneous injection of hypertonic NaCl soln. is due to loss of fluid from the blood into the NaCl soln. This fluid contains very little protein. L. E. Gilson

Prolonged maintenance of a mammary carcinoma in vitamin E-deficient rats. W. Lamar Bryan and Karl E. Mason. *Proc. Soc. Exptl. Biol. Med.* 43, 375–9(1940).—Maintenance of the Walker 256 mammary carcinoma in vitamin E-deficient rats for 2½ yrs. by 22 successive implantations, produced no apparent alteration in the rate of growth, transplantability, histologic organization or cytologic characteristics of the tumor. Normal rats fed concentrates of wheat-germ oil failed to show the neoplastic growths observed by Rowntree and associates (*C. A.* 32, 3012[3]). L. E. Gilson

Whealing response of human skin to ultraviolet light, and the histamine theory of allergic reactions. Harold A. Abramson. *Proc. Soc. Exptl. Biol. Med.* 43, 410–12 (1940).—Preliminary. The observations do not support the view that histamine or a readily diffusible H-substance of low mol. wt. is responsible for the skin response to ultraviolet irradiation. L. E. Gilson

Determination of pneumococcal capsular polysaccharide by photonreflectometric titration of precipitation with excess antibody. Samuel C. Bukantz and Jesse G. M. Bullowa. *Proc. Soc. Exptl. Biol. Med.* 43, 418–22 (1940).—Preliminary. L. E. Gilson

An electrophoretic study of tetanus antitoxin serums. J. Van der Scheer and Ralph W. G. Wyckoff. *Proc. Soc. Exptl. Biol. Med.* 43, 427–8(1940); cf. *C. A.* 33, 9432[8].—Results are shown graphically. L. E. Gilson

The differential diagnosis of chronic arthritis in bovines. J. G. van der Wath. *J. S. African Vet. Med. Assoc.* 10, 91–102(1939).—At least 3 major diseases (contagious abortion, chronic arsenical poisoning and P deficiency) are responsible for chronic arthritis in bovines in S. Africa. As shown by analyses of numerous samples, the blood of cattle and the grass and soil along parts of the coastal belt of the Transkei and Tsitsikei and in the district of Umtata are very low in P and aphosphorosis of cattle is common, especially in parts of the coastal belts of Flagstaff and East London districts. Chronic arsenical poisoning is likely to occur wherever extensive and heavy spraying operations of As have been conducted during locust-control campaigns. K. D. Jacob

Caries: a new theory of the cause. Paul Pincus. *Illinois Dental J.* 9, 80–8(1940).—The importance of the org. compds. in the enamel is stressed in relation to dental caries. H. M. Leicester

Hyaluronic acid in the pleural fluid associated with a malignant tumor involving the pleura and peritoneum. Karl Meyer and Eleanor Chaffee. *J. Biol. Chem.* 133, 83–91(1940); cf. *C. A.* 34, 1381[1].—The viscous component of a pleural fluid assocd. with a malignant tumor of the pleura and peritoneum has been isolated and shown to be hyaluronic acid, similar in compn. and rotation to this polysaccharide obtained from other sources. The viscosity of the tumor fluid was about 95 times greater than that of the isolated polysaccharide in an equiv. concn., dropping sharply on dilu. The fluid is characterized as a gel formed by the polysaccharide acid and the copresent protein. It is tempting to speculate that in malignant tumors hyaluronic acid or similar constituents may prevent the normal restraining influences of the host tissues, so that the inherent growth tendencies of the tumor tissues become dominant. A. P. Lothrop

Anaphylactic shock and nitrogen metabolism in the dog. Leon L. Miller. *J. Biol. Chem.* 133, 93–101(1940).—Anaphylactic shock in dogs results in increased urinary N excretion which parallels in severity the clinical symptoms of the shock. This response is strictly comparable with that resulting from very obvious tissue injury and substantiates the view that anaphylactic shock may be marked by tissue injury of considerable severity. There is also an increased creatine and uric acid excretion, a finding which supports the contention that both muscle and liver tissue undergo injury in anaphylactic shock. A. P. Lothrop

Gout and rheumatism. K. Sedláček. *Acta Rheumatol.* No. 43, 5–14(1939).—A substance from the froth of urine belonging to the stalagmon group (cf. Bechhold and Reiner, *C. A.* 15, 261, 1562) is isolated by adsorption in benzine emulsion and sepd. after other stalagmons are hydrolyzed by electrolysis and crystalloids removed by dialysis. Given subcutaneously in physiological saline it causes rapid improvement of gouty and other arthritic symptoms. S. believes it to be a colloid of a protein nature liberated from inflammative foci, acting as an enzyme and preventing colloidal stabilization of urates. The mechanism of healing effect is believed to be that of active immunity. J. McAfee

Lymphoid tumors in mice receiving estrogens. W. U. Gardner, A. Kirschbaum and L. C. Strong. *Arch. Path.* 29, 1–7(1940).—15.4% of 149 C_3H-strain mice injected with estrogens (estradiol dipropionate, estradiol benzoate, equilin benzoate, cholesterol, cholesterol benzoate, carotene, testosterone propionate, the last and estradiol benzoate simultaneously) develop leucemia or nonleucemic lymphoid tumors. None of 117 uninjected

rats and 1 of 86 briefly treated mice of the same strain develop lymphoid tumor. J. McAfee

Production of internal tumors with chemical carcinogens. H. P. Rusch, C. A. Baumann and G. L. Maison. *Arch. Path.* 29, 8–19(1940).—3,4-Benzopyrene or 1,2,5,6-dibenzanthracene injected into internal organs of mice and rats give rise to tumors at the site of injection. Injection into bone marrow does not change the blood picture. Feeding of crude wheat-germ oil does not give rise to tumors. J. McAfee

Chemistry of atherosclerosis. I. Lipide and calcium content of the intima and of the media of the aorta with and without atherosclerosis. Sidney Weinhouse and Edwin F. Hirsch. *Arch. Path.* 29, 31–41(1940).—The lipide and Ca of human aortic media increase with age, not in relation to intimal atherosclerosis. Combined cholesterol increases absolutely and relatively to the free. Ether-insol. phosphatide (sphyngomyelin) increases much more than ether-sol. decreases, and galactoside values parallel the former. Intima free of gross deposit contains more lipide and less Ca than media. As atherosclerotic intimal lesions become more severe the free / combined cholesterol ratio increases until necrosis sets in; after that it declines. Ether-sol. phospholipide decreases, ether-insol. increases while the total remains const. Neutral fat-fatty acid and galactoside decrease. High Ca is found after onset of fibrous thickening. Partition of lipide constituents of early intimal lesions closely resembles that of blood plasma. J. McAfee

Phosphocreatinemia in uremia. A. Grunberg. *Rev. méd.* 56, 382–6(1939).—A discussion. The value of detg. phosphocreatine in the blood as a test for renal sufficiency is questionable. A. E. Meyer

Determination of the codehydrogenases I and II (cozymase) in the blood of diabetic patients in severe acidosis. Richard W. Vilter, Sue Potter Vilter and Tom D. Spies. *Am. J. Med. Sci.* 197, 322–6(1939); cf. *C. A.* 33, 5482⁷.—The blood of diabetic patients with severe acidosis supports growth of influenza bacilli less effectively than blood from a normal person or from the same diabetic patient when regulated or given nicotinic acid. Codehydrogenase I (cozymase) added to such deficient blood or to autoclaved media without blood supports luxuriant growth, although nicotinic acid amide shows no such stimulation. Conclusion: Codehydrogenase I is deficient in the blood of diabetic patients in severe acidosis and the hypothesis is supported that the therapeutic effect of nicotinic acid depends on the synthesis in the body of nicotinic acid nucleotide and finally of a codehydrogenase. Ferrin B. Moreland

Studies in diabetes mellitus. VII. Nondiabetic glycosuria. Alexander Marble, Elliott P. Joslin, Louis I. Dublin and Herbert H. Marks. *Am. J. Med. Sci.* 197, 533–56(1939).—Of 14,000 cases of glycosuria seen between 1900 and 1935, about 2,000 were diagnosed as nondiabetic. Of these, 10% later developed diabetes, usually mild. No case of true renal glycosuria progressed to diabetes. Both among those becoming diabetic and those remaining nondiabetic, the incidence of deaths from cardiovascular and renal diseases was strikingly high. The incidence of *cancer* as a cause of death was 5 times as high in the nondiabetic as in the diabetic group. In the absence of complications, nondiabetic glycosuria seems to exert little or no influence on length of life. Diagnostic standards and procedures, particularly as regards *sugar-tolerance tests*, are discussed. Four cases of *pentosuria* and one of *fructosuria* were found. Ferrin B. Moreland

Chemical changes in the blood of patients with pyloric obstruction. Paul H. Noth and Dwight L. Wilbur. *Ann. Internal Med.* 13, 1285–96(1940).—There is a pos. correlation between the amt. of vomiting and the decreased plasma chlorides, increased blood urea, and increased CO_2-combining power of the blood. No correlation could be seen between the above 3 factors and type of lesion, age of the patient, the amt. of retained gastric content, the concn. of free HCl in the gastric content or any combination of these factors. The decrease in plasma chlorides seems due to loss of chlorides by vomiting. As a rule patients with achlorhydria show similar blood chem. findings to those with pyloric obstruction although HCl is present in the latter. Quant. studies or the metabolism of Na, Cl, N and bicarbonates will be necessary to explain these changes. John T. Myers

Oil aspiration pneumonia and pneumolipoidosis. Philip G. C. Bishop. *Ann. Internal Med.* 13, 1327–59(1940).—Final diagnostic proof is obtained by chem. analysis of the oil or lipoid in the involved lung tissue with identification of the offending agent. 107 references. J. T. M.

A case of acute idiopathic hematoporphyria with acute ascending paralysis. Harold W. Palmer. *Ann. Internal Med.* 13, 1500–8(1940).—12 references. J. T. M.

Xanthoma of tendon sheaths and synovial membranes. A clinical and pathologic study. John D. B. Galloway, Albert C. Broders and Ralph K. Ghormley. *Arch. Surg.* 40, 485–538(1940).—Xanthoma in these locations is assocd. primarily with an alteration in the lipoid metabolism, secondarily set off by trauma, infection or both. It is classified under the head of primary essential xanthomatosis. 139 references. John T. Myers

The histamine content of organs in white mice. J. Martin and A. Valenta. *Arch. exptl. Path. Pharmakol.* 193, 305–7(1939).—The histamine content of organs of white mice is no different from that of other lab. animals. Consequently, the superior shock resistance of white mice is not due to the small concn. of histamine, but to their resistance to biol. anaphylactic substances. J. Pinchack

Effect of sensitization on the response of guinea pigs and rats to histamine, choline and acetylcholine. J. Martin and S. Went. *Arch. exptl. Path. Pharmakol.* 193, 308–11(1939).—Sensitization increases the choline effect on the isolated guinea-pig heart 400- to 500-fold. It has no effect on the reactivity of blood pressure, bronchial muscles and isolated hearts to histamine or acetylcholine. J. Pinchack

Antithyroglobulin and antithyroxine. S. Went, K. Piribauer and L. Kesztyüs. *Arch. exptl. Path. Pharmakol.* 193, 312–24(1939).—Prolonged parenteral administration of thyroglobulin (I) markedly decreases O consumption in white rats or guinea pigs, even after subcutaneous injection of thyroxine (II). More than 15 g. II is necessary to increase O consumption under these conditions. I probably acts as a chemospecific antigen, since normal animals passively immunized with serum of animals treated with I are capable of inhibiting the metabolic action of II. Rabbits show a definite increase in metabolism after I injection and a further rise in O consumption after addnl. II. J. Pinchack

The effect of various bacterial toxins on Jensen tumors in rats. V. Baroni. *Arch. roumaines path. exptl. microbiol.* 11, 125–42(1938) (in French).—Streptococcal and gonococcal toxins have an unspecific antitumorigenic action in rats when injected prior to grafting on Jensen tumors. The mortality is greater if injections, which are of themselves very toxic, are made after grafting. J. Pinchack

Synthetic immunochemistry. IV. Further investigation of *O*,β-glucosidotyrosyl derivatives of proteins. J. H. Humphrey and M. E. Yuill. *Biochem. J.* 33, 1826–32 (1939); cf. *C. A.* 32, 9255⁴.—The techniques of complement fixation and bulk pptn. were used to confirm and extend the previous observations on the immunological properties of the *O*-β-glucosido-*N*-carbobenzyloxytyrosyl derivs. of gelatin and insulin. The results indicated that the carbobenzyloxy group has a hapten function and that *N*-carbobenzyloxytyrosyl gelatin behaves as a full antigen. E. W. Scott

Crofton, W. M.: The True Nature of Viruses. London: J. Bale, Sons & Danielsson, Ltd. 182 pp. 15s.

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H—PHARMACOLOGY

CARL F. SCHMIDT

A preliminary note on the anthelmintic efficiency of phenothiazine against Trichostrongylus spp. in sheep, Hugh McL. Gordon. *J. Council Sci. Ind. Research* 12. 345–7(1939).—Phenothiazine, in the form of Thiox, in doses of 0.6 g. per kg. of body wt., administered in capsules, showed a very high degree of efficiency against *Trichostrongylus* spp. in sheep. Doses of 0.3 g. reduced this efficiency and it was greatly reduced when the dosage was dropped to 0.15 g. Phenothiazine was equally efficient whether administered in capsules or as a powder shaken up in Cu sulfate soln. J. R. Adams

The tissue concentration of bismuth in man. Julius R. Scholtz and Albert L. Chaney. *Am. J. Syphilis, Gonorrhea, Venereal Diseases* 23, 759–70(1939).—A study of the toxicology of Bi and its distribution in the tissues after clinical treatment with Bi compds. Philip D. Adams

Pathological changes in rats and in dogs fed diets containing lead and arsenic compounds. L. L. Finner and H. O. Calvery. *Arch. Path.* 27, 433–46(1939); cf. *C. A.* 33, 1815[4].—Pb arsenate and acetate, As_2O_5 and $Ca_3(AsO_4)_2$ were used. The kidneys of all dogs which had been on diets with Pb up to the time of death showed tubular degeneration. The bones of many were hard, brittle and thickened, with constricted marrow cavities. In the As-treated animals there was generalized dilatation of the capillaries in the viscera and parenchymatous degeneration of the liver. The bone marrow was slightly hyperplastic. The Pb was the more potent poison and some dogs fed as little as 0.33 mg. of Pb per kg. died. (3 photomicrographs.) B. C. P. A.

Sympatholytic effect of ergotamine. F. Guercio and M. Pezzini. *Boll. soc. ital. biol. sper.* 13, 1115–16(1938); cf. *C. A.* 33, 8788[3].—In dogs and rabbits, ergotamine increases arterial pressure and weakens or reverses the hypertension due to stimulation of the hypogastric, or central end of the cut vagus; even large doses do not abolish the hypertension due to adrenaline. After hypogastric stimulation of the uterus (rabbit), relaxation is induced only by direct injection of ergotamine into the internal iliac artery, the corresponding vein being ligatured. Parts of the sympathetic nervous system are thus sensitive to ergotamine and others insensitive. B. C. P. A.

Ammonium chloride and lime injuries to the eye. G. C. Pether. *Brit. Med. J.* 1939, I, 668–70.—NH_4Cl soln. (4%) was successfully used in the treatment of eye injuries caused by CaO; it is more efficient and no more painful than other irrigating fluids. B. C. P. A.

Role of pressor substances in treatment of arsenic shock. J. Kucharik. *Magyar Orvosi Arch.* 39, 613–20(1938).—Cats (dial) were given 7 mg. of As_2O_3 per kg. intravenously. When a low level of blood pressure was reached, various drugs were injected. Adrenaline consistently increased blood pressure, and in small repeated doses doubled the life period. Ephedrine, pituitrin and $CaCl_2$ were ineffective. B. C. P. A.

Comparison of the changes provoked by insulin in the lipide and glycogen contents of the liver with those produced by the administration of large quantities of glucose in the absence of insulin. P. Cristol, L. Hédon, A. Loubatières and P. Monnier. *Ann. physiol. physicochim. biol.* 15, 820–3(1939); cf. *C. A.* 33, 220[6], 735[2], 5066[3].—Arguments are given in favor of the hypothesis that the inverse modifications of the glycogen and lipide contents of the liver under the influence of insulin result from the direct intervention of this hormone in the metabolism of the liver cells. A completely depancreatized dog was treated with insulin until fully recovered, then deprived of insulin for 5 days. In spite of a fast of 40 hrs. the diabetes was severe and the urinary D/N ratio 2.8. After the injection of 136 g. glucose with the simultaneous ingestion of 70 g. glucose, the glycogen and total lipides in the fresh liver tissue rose from 0.15 and 10.47%, resp., to 1.05 and 15.52%, resp., while the blood sugar rose from 0.388 to 1.306%. Ruth Berggren

Action of yeast extracts on the carbohydrate metabolism. J. Ledrut. *Ann. physiol. physicochim. biol.* 15, 865–8 (1939).—*Prepn. of yeast ext.* (I): The yeast cells were destroyed with CO_2 snow and the product ground with sand. The mixt. was extd. with alc. and filtered. The filtrate was distd. *in vacuo* and the fat removed by extn. with anhyd. ether free from peroxide. The insol. portion was treated with 75% alc. and centrifuged; this process was repeated until the alc. remained colorless. The alc. solns. were combined and abs. alc. added to ppt. the insulin-like substance as a sirupy mass. The mixt. was centrifuged and the ppt. dissolved in water and purified by pptn. with $(NH_4)_2SO_4$ by the method of Simola (*C. A.* 22, 436). The ppt. was converted into the picrate and then the hydrochloride by the method of Dudley (*C. A.* 18, 3399). The product (I), after washing with alc. and with ether, was a yellow, H_2O-sol. powder. It was kept in the cold. Intrasaphenous injections of 2 mg. I/kg. into dogs produced a distinct lowering of the blood sugar, the max. occurring in about the 5th hr. The blood sugar in a rabbit decreased from 130 to 77 mg. % 7 hrs. after the administration of 100 mg. I/kg. The oral administration of 6 mg. I/kg. to dogs caused a slight, variable reduction in the blood sugar. Ruth Berggren

Sensitization to potassium ions by veratrine. Z. M. Bacq. *Ann. physiol. physicochim. biol.* 15, 948(1939); cf. *C. A.* 33, 5913[8]; 34, 527[2]. Ruth Berggren

Prolonged treatment of the depancreatized dog with protamine zinc insulin. Irreversible nervous disturbances during this treatment. (Demonstration with a cinematographic film.) L. Hédon and A. Loubatières. *Ann. physiol. physicochim. biol.* 15, 961(1939); cf. *C. A.* 33, 744[6,8], 5503[1].—A note on a film showing the excellent general condition of completely depancreatized dogs, in which the diabetes is fully controlled by a single daily injection of protamine Zn insulin, as well as the typical phases of severe, irreversible, hypoglucemic symptoms induced by excessive doses of this insulin. R. B.

The influence of echitamine on the hypertension and renal vasoconstriction produced by adrenaline. Raymond-Hamet. *Compt. rend.* 209, 1013–15(1939); cf. *C. A.* 28, 6481[3].—Two successive injections of 8 mg. echitamine-HCl/kg. into a dog distinctly increased both in amplitude and duration the renal vasoconstriction produced by 0.02 mg. adrenaline and intensified and prolonged the adrenaline hypertension. Five injections of echitamine-HCl, totalling 256 mg./kg., lowered and prolonged the adrenaline hypertension and caused a marked dilatation in renal vol. after an initial, very slight vasoconstriction. In moderate doses echitamine has a definite sympathicosthenic action, in very high doses a minor sympathicolytic action. Ruth Berggren

The fate of copper in the blood stream. Alfred Eden and H. H. Green. *J. Comp. Path. Therap.* 52, 301–15 (1939).—The min. lethal dose of Cu injected intravenously as sulfate is about 1.5 mg. per kg. body wt. for the rabbit and below 2 mg. for the sheep. Administered in soln. by stomach tube 50 mg. per kg. is a borderline toxic dose for the rabbit. After intravenous injection of $CuSO_4$ into rabbits and sheep, the immediate rise of blood Cu is followed by rapid distribution over the tissues, and almost normal values are approached within 5 hrs. of a nonfatal injection. The Cu content of cells and plasma in normal blood of sheep and cattle is approx. the same. After injection of $CuSO_4$ the plasma Cu level is at first higher than that of the whole blood and the rate of disappearance from plasma is higher. After equil. is established between cells and plasma the rate of disappearance is the same for both. After very large doses of $CuSO_4$ the rate of fall for plasma is at first faster and then slower than for whole blood. When high doses of $CuSO_4$ are given in soln. by stomach tube the blood Cu rises to levels representing the balance between rate of absorption into the blood and rate of disappearance from it. No significant rise occurs if the soln. is previously dried on food. The upper level of nonfatal blood Cu lies between 1.2 and 1.6 mg. % for the rabbit and is somewhat lower for the sheep. Rachel Brown

Pervitin as a means of increasing efficiency. O. Leh-

mann, H. Straub and A. Szakáll. *Arbeitsphysiol.* 10, 680–91(1939).—With 3 men, 21–26 yrs. old, observations were made during rest and work (bicycle ergometer) of body temp., pulse rate, blood pressure, ventilation rate, O_2 consumption, and R. Q., with and without 5–15 mgs. Pervitin (1-phenyl-2-methylaminopropane). In some expts. the subjects worked with const. load and speed, in others with automatically increasing load, until exhausted. No changes in metabolism were observed after Pervitin administration either during rest or work. At times considerably more work was performed with, than without, Pervitin. After work continued to exhaustion, the efficiency was lowered considerably more when the subjects had received Pervitin than when they worked without it. The subject without Pervitin discontinued work shortly before reaching the limit of max. O_2 absorption, whereas the subject with Pervitin could work to the limit of max. efficiency. For workmen and sportsmen working to the limit of capacity, Pervitin is dangerous because it suppresses the subjective limits of exhaustion and leads to consumption of reserves of strength normally retained by the organism as protection against too great exhaustion. T. M. Carpenter

Influence of Pervitin on some psychic and psychomotor functions. O. Graf. *Arbeitsphysiol.* 10, 692–705(1939). —With 4 men (2 of them blind) a study was made of psychic and psychomotor functions during mental arithmetic, stringing of pearls, and riding a bicycle ergometer, with and without doses of 9–15 mg. of Pervitin (1-phenyl-2-methylaminopropane). For comparative purposes, the observations with and without Pervitin were made on the same day. The Pervitin eliminated the feeling of fatigue and inhibitions and led to increased activity and feeling of efficiency. It lessened the ability to concentrate, but acted favorably on efficiency because it lowered the too high tension of attentiveness which, with fine work, leads to disturbance in bodily movements. Marked euphoria was lacking. The effect of Pervitin is variable and seems to depend considerably on the initial condition under which it is given. Pervitin combined with caffeine has a potent effect in increasing the stimulus to an unpleasant degree. Graf cautions against the use of Pervitin except when specially indicated. T. M. C.

Aberrant action of sodium (1,3-dimethylbutyl)ethylbarbiturate. Edward E. Swanson and K. K. Chen. *Quart. J. Pharm. Pharmacol.* 12, 657–60(1939).—This compd. causes convulsions in mice, rats, guinea pigs, rabbits, cats, dogs and monkeys but depression and anesthesia in frogs and toads. The convulsant action in rabbits may be suppressed by the hypnotic action of Na amytal, although the substance is not detoxified by the latter. Seven references. W. O. E.

Influence of general anesthetics on adrenergic transmission. C. S. Jang. *Quart. J. Pharm. Pharmacol.* 12, 661–76(1939).—Expts. were made on the effects of a dozen general anesthetics on the actions of adrenaline and sympathetic stimulation on perfused rabbit ears, isolated frog hearts and the nictitating membrane and blood pressure of spinal cats. In concns. somewhat lower than the estd. anesthetic concns., they all, except chloralose, diminish the effect of adrenaline. The effect of nervous stimulation is diminished, though usually less than that of adrenaline, but once seriously diminished under the influence of stronger solns., its recovery is slower. Chloralose increases the action of adrenaline on the perfused rabbit ear vessels and the nictitating membrane of spinal cats, but diminishes the effect of sympathetic stimulation. Sixty-two references. W. O. E.

Effect of adrenaline on the toxicity of local anesthetics. M. R. Gurd and I. Sachs. *Quart. J. Pharm. Pharmacol.* 12, 713–23(1939).—A study was made of the effect of adrenaline, added in various concns. to solns. of cocaine, on the toxicity of the latter when given subcutaneously to white mice. The lethality curves of cocaine, alone and in combination with various const. doses of adrenaline, show that doses of 0.2 μg./g. (a concn. of 1 in 50,000 of the soln. injected) or more of adrenaline cause a substantial increase in the toxicity of cocaine. Doses of 0.118 μg./g. (a concn. of 1 in 85,000) or less of adrenaline do not have a significant effect on the toxicity of cocaine. Doses of 0.2 μg./g. (a concn. of 1 in 50,000) or more of adrenaline increase the toxicity of procaine in the same way, and roughly to the same extent, as they do that of cocaine. Eleven references. W. O. E.

Pharmacology of the nitrogen group. (Nitrogen, phosphorus, arsenic, antimony and bismuth compounds of the DAB 6.) Hans Braun. *Süddeut. Apoth.-Ztg.* 79, 863–5, 869–71(1939).—71 references. W. O. E.

Pharmacology of the potassium, sodium, lithium and ammonium compounds of the DAB 6. Hans Braun. *Süddeut. Apoth.-Ztg.* 79, 842–5(1939).—39 references. W. O. E.

Effect of ferric chloride on the utilization of calcium and phosphorus in the animal body. Peggy Rehm and Jet C. Winters. *J. Nutrition* 19, 213–22(1940).—When mineral intake was equalized in paired feeding expts. with rats, the addn. of $FeCl_3$ supplements resulted in decreased Ca and P metabolism. When the amt. of cod-liver oil in the diet was reduced by 50%, the addn. of $FeCl_3$ resulted in a less drastic lowering of body Ca and P. C. R. Fellers

Further results on the biological assay of Adonis vernalis glucosides by the guinea-pig method. Fernand Mercier and S. Macary. *Compt. rend. soc. biol.* 132, 529–31(1939); cf. *C. A.* 33, 6956⁹.—The action of the glucosides on the guinea-pig myocardium is quite variable. The guinea pig is not a suitable animal for the assay. L. E. Gilson

Nature of the pilomotor response to acetylcholine; some observations on the pharmacodynamics of the skin. Julius M. Coon and Stephen Rothman. *J. Pharmacol.* 68, 301–11(1940); cf. *C. A.* 34, 519⁷.—Intracutaneous injection of very dil. solns. of acetylcholine and other drugs with a nicotine-like action caused a strong, transient pilomotor activity in the vicinity of the injection. In human skin and in the tail of the cat this response was abolished by sympathetic nerve degeneration, remained active in areas anesthetized by nerve block and could be elicited in extirpated pieces of skin. Local anesthetics, in dilns. as high as 1:200,000, inhibited the reaction. Pitressin and histamine had no inhibitory action. The pilo-erection is apparently effected through an axon reflex involving the terminal ramifications of the post-ganglionic sympathetic fibers supplying the pilomotor muscles. Preliminary observations indicate an accompanying axon reflex involving similarly the terminal branches of the nerves supplying the sweat glands. L. E. Gilson

Thiocyanate formation in cyanide poisoning as affected by methylene blue and sodium nitrite. Ralph G. Smith, B. Mukerji and John H. Seabury. *J. Pharmacol.* 68, 351–64(1940).—The av. normal serum SCN concn. was 111 γ per 100 cc. in dogs and 42 γ in rabbits. The injection of sublethal doses of NaCN resulted in a greater and more rapid increase and a more rapid fall in the serum SCN of the rabbit than of the dog. $NaNO_2$ caused a definite initial depression of the increase in serum SCN after injection of NaCN, in keeping with the hypothesis that part of the cyanide would be held as cyanomethemoglobin and be made unavailable for SCN formation. This effect was more marked in dogs than in rabbits. Methylene blue produced a stimulation of SCN formation in rabbits and a questionable depression of the process in dogs. The excretion of thiocyanates in the urine of the animals was also studied. L. E. Gilson

Respiratory alkalosis during anesthesia. I. Effects on circulatory, respiratory and muscular activity. M. H. Seevers, R. T. Stormont and H. R. Hathaway. *J. Pharmacol.* 68, 365–82(1940); cf. *C. A.* 34, 1077⁸.—Dogs anesthetized with cyclopropane, morphine-ether, morphine-chloretone, barbital, pentobarbital or pentothal were hyperventilated mechanically for 1–15 hrs. Arterial CO_2 decreased 40–87%, the av. of 57 expts. being 66%. The marked arterial hypotension which resulted was due to the combined effects of loss of CO_2 and narcosis, and was proportional to the depth of anesthesia rather than to the loss of CO_2. Fatal circulatory failure and the tetany characteristic of alkalosis did not occur. The duration of

apnea after cessation of forced ventilation was inversely proportional to the duration of hyperventilation and no fatal respiratory paralysis was produced. The relation of these findings to the theory of acapnial "shock" is discussed. II. Influence on survival. M. H. Seevers and R. T. Stormont. *Ibid.* 383–8.—Permanent survival occurred in 17 of 20 barbitalized dogs subjected to excessive mech. hyperventilation sufficient to produce a 40–80% decrease in arterial CO_2 for 1–15 hrs. Two of the others died of lung injuries. Hemoglobinemia and hemoglobinuria were frequent. One dog survived 140 min. of hyperventilation. Fatal respiratory failure after hyperventilation did not occur, the period of apnea ranging from 15 to 200 sec. L. E. Gilson

The effect of quantity on the intensity and duration of local anesthesia, determined by a new test. A. J. Leser. *J. Pharmacol.* 68, 389–94 (1940).—Procaine-HCl in Locke soln. was injected under the conjunctiva of the upper and lower eyelid of the rabbit and the sensitivity of the cornea tested at intervals. The depth of anesthesia depended more on the concn. than on the quantity of drug. The duration was only slightly increased by increasing the concn. L. E. Gilson

A comparative study of twenty-five alkyl thiobenzoates with respect to surface anesthesia, toxicity and systemic effects. H. R. Hulpieu, John H. Kitchel and J. H. Weatherby. *J. Pharmacol.* 68, 395–405 (1940).—Animal expts. were made with 25 compds. of the type $RSC_6H_4COOCH_2CH_2R'$, where R = Me, Et, Pr or Bu in the *o*, *m* or *p* position and R′ = NEt_2, NPr_2, $—CH_2NEt_2$ or $NCH_2(CH_2)_3CH_2$ (piperidyl). All had some surface anesthetic activity but only β-piperidinoethyl *o*-propylthiobenzoate appeared worthy of further study. All produced profound disturbances of the central nervous system and all were irritating. L. E. Gilson

Therapeutic activity of sulfanilamide and allied compounds in experimental brucellosis of mice. John A. Kolmer and Anna M. Rule. *J. Pharmacol.* 68, 406–12 (1940).—In mice infected with *Brucella abortus* aldanil saved 56%, sulfanilamide 37.5%, neoprontosil and sulfapyridine each saved 31% and dagenan 25%. In mice infected with *Br. melitensis* sulfapyridine saved 37.5%, neoprontosil and dagenan 25% each, aldanil 6% and sulfanilamide saved none. None of the compds. saved any mice infected with *Br. suis*. L. E. Gilson

Excretion of a combined form of morphine in tolerant and nontolerant dogs. E. G. Gross and Vincent Thompson. *J. Pharmacol.* 68, 413–18 (1940).—By the use of suitable hydrolysis methods it was shown that dogs excrete morphine in the urine in a free and a combined form. Total recoveries from nontolerant dogs were 80–92% of the amt. administered. Recoveries from habituated dogs were 35–66%, indicating extensive destruction. The nature of the conjugating substance is uncertain but it is apparently not glucuronic acid. L. E. Gilson

Effect of variation of blood pressure on the autonomic nervous system. E. Gellhorn, C. W. Darrow and L. Yesinick. *Proc. Soc. Exptl. Biol. Med.* 43, 236–40 (1940).—Increase in blood pressure induced by adrenaline or injection of Ringer soln. decreases the pupillary diam. and relaxes the nictitating membrane in cats. A fall in pressure induced by amyl nitrite leads to dilation of the normal and sympathectomized pupil. These effects show that a rise in blood pressure produces parasympathetic excitation and sympathetic inhibition and a fall produces the opposite effects. These effects are still produced after bilateral vagotomy and denervation of the carotid sinuses. L. E. Gilson

Destructive effects on carcinoma of colchicine followed by distilled water. M. F. Guyer and P. E. Claus. *Proc. Soc. Exptl. Biol. Med.* 43, 272–4 (1940).—After administration of colchicine to the rats 15 hrs. earlier, Flexner-Jobling carcinomas were frequently rapidly destroyed by distd. water injected directly into the tumor tissue. L. E. Gilson

Comparative clinical values of zinc insulin crystals in solution and unmodified insulin. Garfield G. Duncan, Tracy D. Cuttle and Eric C. O. Jewesbury. *Bull. Ayer Clin. Lab. Penna. Hosp.* 3, 293–306 (1939).—The effects of Zn insulin crystals in soln. and of unmodified insulin in identical doses were observed on 9 diabetic and 9 nondiabetic subjects. The rate and degree of reduction of the blood sugar concn. and its return to the normal or hyperglucemic level were similar in all cases. No evidence of any cumulative effect was noted after use of the respective insulins for 1 week. The effect of com. Zn insulin crystals in soln. was indistinguishable clinically from that of unmodified insulin. Joseph S. Hepburn

Toxicity and rubefacient action of sulfonated higher alcohols. E. H. Hatton, L. S. Fosdick and J. Calandra. *J. Dental Research* 19, 87–92 (1940).—Continued ingestion of large amts. of Na lauryl sulfate (a total of over 100 mg. per kg. of body wt. in daily doses of 30–60 mg.) produced degenerative changes in the liver and intestinal mucosa of rats; these doses were far in excess of the amts. present in tooth pastes and powders. The degree of surface irritation of human mucous membranes produced by 1.25% of this alkyl sulfate (its max. concn. in tooth powder and paste) was less than that produced by castile soap in concns. of 5–16%. Joseph S. Hepburn

Comparative physiological actions of alkyltrimethylammonium and alkali metal salts. Gorden A. Alles and Peter K. Knoefel. *Univ. Calif., Pub. Pharmacol.* 1, 187–211 (1939).—Quant. comparison of muscarine-like and nicotine-like physiol. actions of the *n*-alkyltrimethylammonium salts in the series Me to nonyl showed max. activity in the Bu, Am or hexyl derivs. The same comparison of these actions of the alkali metal salts in the series Li to Cs showed max. activity in K or Rb. Among the lower members of both series of salts, a min. activity might be noted. Both series of salts apparently act only as ions, and the intensity of the physiol. activity is detd. in a limiting way by a dimensional factor. 30 references. Joseph S. Hepburn

Toxicity of certain allylamines. E. Ross Hart. *Univ. Calif., Pub. Pharmacol.* 1, 213–20 (1939).—All but 1 or 2 of 30 albino mice, exposed to the stated concn. (mM per l.) of each of the following compds. in their air supply, died during an exposure period of 10 min.: 1.27 allylamine, 2.1 β-methylallylamine, 0.88 diallylamine, and 0.18 di-(β-methylallyl)amine. The mice which survived exposure to di(β-methylallyl)amine recovered completely; the other mice which survived exposure nevertheless died within 48 hrs. The symptoms in order of appearance were nasoöral irritation, flushing of the ears, irregular respiration, cyanosis, delirium, convulsions, coma and death. When 0.05 cc. allylamine, 0.025 cc. methylallylamine, 0.1 cc. diallylamine, or 0.1 cc. di(β-methylallyl)-amine was applied for 1 hr. to 1 sq. cm. of shaved skin on the abdomen of the albino rat, severe necrosis, sloughing of the skin, and, at times, death resulted. 9 references. Joseph S. Hepburn

Effect of nicotine injections on the secretory functions of the adrenal medulla of the rat. Carroll A. Handley and George F. Warner. *Univ. Calif., Pub. Pharmacol.* 1, 249–69 (1939).—Injection of 1 mg. nicotine into rats rapidly excited the adrenal medulla, increased the liberation of adrenine and had a prompt secondary depressant effect. No further liberation of adrenine occurred on splanchnic nerve stimulation 5 min. after the injection of nicotine. 27 references. Joseph S. Hepburn

Pharmacological comparison between synthetic glycerol and glycerol prepared from natural oils. E. Ross Hart. *Univ. Calif., Pub. Pharmacol.* 1, 271–4 (1939).—Natural glycerol and synthetic glycerol, manufd. from propylene, did not exhibit any significant differences in toxicity expts. on oral administration, on striated muscle or as a local irritant. Doses as large as 25 g. of undild. glycerol per kg. of body wt. were administered to rats by means of a stomach tube without ill effects. Direct application of 0.1–1.0 cc. of undild. glycerol to the conjunctival sac of rabbits produced only a very transient irritation, owing to the dehydrating action of the glycerol and it was rapidly counteracted by the secretion of tears. Glycerol de-

creased the rate of relaxation of the frog gastrocnemius after faradic stimulation. Joseph S. Hepburn

Carbon monoxide poisoning of chicks and poults in poorly ventilated brooders. Geo. W. Stiles. *Poultry Sci.* **19**, 111–15(1940).—Several hundred dead chicks and poults from poorly ventilated brooders in the Denver area gave pos. blood tests for CO poisoning. Tests of air in poorly ventilated, overcrowded brooder houses usually showed CO. Exptl. gassing of 30 3-week-old chicks in an atm. of approx. 0.4% CO, with CO_2 removed, showed varying tolerances to CO. In a similar lot exposed to 0.8% CO, without removal of CO_2, only 8 survived after 60 min. CO poisoning seems to cause as many deaths in poultry houses as does pullorum disease. K. D. J.

Chemical agents in the prevention and treatment of experimental poliomyelitis. E. W. Schultz. *Am. J. Pub. Health* **30**, 175–9(1940).—A review. J. A. K.

Effect of testosterone on serum lipides in schizophrenia. Lowell O. Randall. *J. Biol. Chem.* **133**, 137–40(1940); cf. *C. A.* **33**, 7901[8].—The injection of testosterone propionate during a period of 3 weeks into 9 schizophrenic subjects produced a continuous rise in serum lipides followed by a return toward the initial level after medication. Sesame oil injections had no significant effect in 10 subjects. It is possible that the male sex hormone affects the low lipide metabolism of schizophrenic individuals by an indirect action on other glands of internal secretion. A. P. Lothrop

The excretion of volatile selenium compounds after the administration of sodium selenite to white rats. Julius Schultz and Howard B. Lewis. *J. Biol. Chem.* **133**, 199–207(1940); cf. *C. A.* **34**, 815[8].—After subcutaneous injection of 2.5–3.5 mg. of Se per kg. of body wt. as Na selenite into white rats, 17 to 52% of the injected Se was excreted as a volatile compd. which was absorbed by concd. H_2SO_4. This excretion was not increased by administration of either methionine or choline chloride, sources of Me groups which might assure ready methylation. Thus far Hofmeister's hypothesis (*Arch. exptl. Path. Pharmakol.* **33**, 198(1893–4)) that the volatile Se compd. excreted is di-Me selenide lacks adequate exptl. proof. A. P. Lothrop

The concentration of sulfanilamide in the saliva following oral administration. Stanley Williams, Beryl Splatt and Rachel Jakobowicz. *Med. J. Australia* **27**, 120–4(1940).—In single doses, sulfanilamide, approx. 50 mg. per kg., failed to produce any excretion of the drug in the saliva, but after repeated doses of 70 mg. or more per kg. a few mg. of the drug was present in the saliva. The amts. excreted in the saliva were in no way affected by the concn. found in the blood. G. H. W. L.

Rash following the use of sulfanilamide. J. E. Barker. *Med. J. Australia* **27**, 124–5(1940).—A report of painful skin lesions following the administration of sulfanilamide. G. H. W. Lucas

Naphthalene poisoning. N. R. Konar, H. K. Roy and M. N. De. *Indian Med. Gaz.* **74**, 723–5(1939).—A patient suffering from acute naphthalene poisoning showed coma with hemiplegia, severe jaundice, rapidly developing anemia, hyperthermia and, post-mortem, patchy hepatic necrosis. The fever may have resulted from cholemia or possibly formation of naphthylamine. J. McAfee

The influence of liver extract on the oxygen consumption of mammalian erythrocytes. III. The mechanism of the reaction. Ascorbic acid systems. G. A. Overbeek. *Rec. trav. chim.* **59**, 14–20(1940); cf. *C. A.* **34**, 1745[1,8].—The possibility that the system of Michaelis and Salomon is identical with that of v. Szent Gyorgyi (cf. *C. A.* **32**, 1732[7]) is made remote by the facts that ascorbic acid and glutathione, alone or together or added to liver ext., or ascorbic acid with irradiated liver ext., do not augment respiration. The possibility that blood destruction due to liver ext. consumes O (cf. Fischer and Lindner, *C. A.* **20**, 3016; Karrer, v. Euler and Hellström, *C. A.* **27**, 2180; Lemberg, *Perspectives in Biochem.* 1938, p. 137) is excluded by the facts that activity in changing spectroscopic bands from hemochromogen to verdohemochromogen resides chiefly in liver pulp, the action of which is augmented by less active spleen pulp and ext., and that respiration is not augmented by spleen pulp. **IV. The mechanism of the reaction. Yellow enzymes.** *Ibid.* 21–6.—That the "original" yellow enzyme of Warburg participates in the reaction is rendered likely by the known presence of yellow enzyme in liver, the inactivation of liver ext. by ultraviolet light and partial insensitivity to poisoning by cyanide. Lactoflavin without carrier combined with rabbit erythrocytes does not augment respiration, so the complete substance, if responsible, is necessary. Exts. of livers from adrenalectomized rats are not less effective (cf. Verzár, Hübner and Laszt, *C. A.* **31**, 7971[3]), rendering the participation of yellow enzyme in a large part of the reaction unlikely. Amino acid oxidase is excluded by nonproduction of ammonia or urea. Xanthine oxidase is probably not responsible, although *p*-aminophenol partially inhibits respiration (cf. Bernheim, Bernheim and Michel, *C. A.* **32**, 1332[1]) since uric acid could not be detected (by the method of Flatow, cf. *C. A.* **21**, 932 and of Dekker (*Handleiding voor het klinisch chemisch onderzoek*, J. W. Groen, Leiden 1939, p. 161)) even when respiration increased after adding hypoxanthine. J. McAfee

The development of fibrosarcoma as a result of the intra-articular injection of radium chloride for therapeutic purposes. A new form of radium poisoning in human beings. Flemming Mørgaard. *Am. J. Cancer* **37**, 329–42(1939).—Tibial fibrosarcoma, hyperplasia of the bone marrow and radiation osteitis, indicating Ra poisoning, were found in a patient who, 9 yrs. previously, had received an injection of 10 γ $RaCl_2$ into the knee joint as treatment for arthritis. Radioactivity of the patient was detected by the Geiger counter. E. R. Main

Intravenous use of mandelic acid for urinary antisepsis. I. An experimental study of excretion and toxicity. S. McMahon. *J. Urol.* **41**, 611–21(1939).—Intravenous injections of 2.5–20% solns. of Na mandelate of pH 7.2–7.4 are well tolerated by dogs, providing the total dose is less than 20 g. After injection of a 20% soln., the concn. of the salt in the urine remains high for about 4 hrs. The pH of the urine is not affected. Large doses may cause impairment of kidney function and changes in the tissues of the kidney and liver, but these effects do not persist. Other salts of mandelic acid are unsuitable for intravenous injection. E. R. Main

Acetylsulfanilamide. Its absorption, excretion and toxicity in man. Nelse F. Ockerblad and Hjalmar E. Carlson. *J. Urol.* **41**, 801–7(1939).—Dogs which received acetylsulfanilamide (I), in a dose of 4 g. per kg., showed toxic symptoms after 8–12 hrs. The symptoms lasted 8–10 hrs. and were accompanied by a reduction in the CO_2-combining power of the blood. The max. concns. of I in the blood ranged from 28.6 to 32.3 mg. % and free sulfanilamide was found in concns. as high as 6.3 mg. %. From 52.7 to 91.8% of the amt. of I given was recovered in the urine and feces. The rate of absorption and excretion of I by man was slow. No toxic reactions were observed when I was given in doses of 1.94 g. 4 times a day for periods of 3 to 14 days. The CO_2-combining power of the blood was reduced but no significant changes were observed in nonprotein N, urea, creatinine, sugar and chloride contents. The max. concn. of I in the blood was 6.2 mg. %, that of free sulfanilamide 1.0 mg. %. The drug showed a slight degree of therapeutic effectiveness against gonococcic urethritis and no demonstrable effect in chronic prostatitis. E. R. Main

M. and B. 693 (sulfapyridine) in the saliva. B. W. Fickling, Paul Pincus and Brian Boyd-Cooper. *Lancet* **1939, II**, 1310–11.—The concn. of sulfapyridine in the saliva of patients receiving 3 g. daily ranged from 3 to 6 mg. %. E. R. Main

Report on medical progress: pharmacology. G. Philip Grabfield. *New Engl. J. Med.* 221, 464–8(1939).—A review of the literature of 1939 with 34 references. E. R. Main

The reciprocal pharmacologic effects of amphetamine (benzedrine) sulfate and the barbiturates. Abraham Meyerson. *New Engl. J. Med.* **221**, 561–4(1939).—The

undesirable effects arising from the use of large doses of barbiturates in treatment of epilepsy, depressions and other disturbances can be in part or wholly counteracted by small doses of amphetamine sulfate (I). Similarly, the effects of large doses of I can be mitigated by small doses of barbiturates. E. R. Main

The effect of amphetamine (benzedrine) sulfate and paredrine hydrobromide on sodium amytal narcosis. Abraham Myerson, Julius Loman, Max Rinkel and Mark F. Lesses. *New Engl. J. Med.* 221, 1015–19(1939).—The narcosis produced by intravenous administration of Na amytal is prevented or counteracted by amphetamine sulfate but is unaffected by paredrine (*p*-hydroxy-α-methylphenylethylamine). E. R. Main

The effect of cinchonine on salivary secretion. Luigi Liaci. *Biochim. terap. sper.* 26, 429–36(1939).—Cinchonine causes a decrease in salivation but does not lead to complete inhibition. Pilocarpine completely overcomes the effect of cinchonine, but large doses of the latter do not decrease the flow of saliva caused by the former. Both alkaloids exert their action on the same nervous pathways. A. E. Meyer

Treatment of pain after amputations with synthetic vitamin B_1. A. Sliosberg. *Presse méd.* 47, 1589–91 (1939).—Injections of vitamin B_1 caused prompt subsidence of pain. The improvement was lasting. The action is not on the stump itself but by way of the nervous system. A. E. Meyer

Preliminary report on the presence of an estrogenic substance and a poisonous substance in the storage root of Butea superba Roxb. Sup Vatna. *Thai Sci. Bull.* (Bangkok) No. 4, 3–9(1939).—The storage root of *Butea superba* Roxb. (a climbing legume growing wild in Thailand, Burma and India) contains both an estrogenic substance and a poison. The poisonous substance dissolves readily in water but sparingly in 95% alc. An aq. ext. equiv. to 0.06 g. of the dried powder of the *Butea* root produces symptoms of poisoning in adult mice, while doses greater than this are fatal. Very large doses of an alc. ext., evapd. to dryness and suspended in olive oil, produce only mild symptoms of poisoning. However, an injection of this ext. equiv. to 0.002 g. of the dried powder is the min. dose which will cause estrus in spayed female mice. The aq. ext. from 0.015 g. of the powder is the min. amt. which will cause estrus, and at this diln., the poison dissolved produces no visible effect on the mice. Dorothy A. Meyer

The mechanism of the action of a series of medicinal agents on the biliary tract. Yu. A. Petrovskiĭ. *J. Physiol.* (U. S. S. R.) 21, 293-310(1936); *Chem. Zentr.* 1938, I, 4205.—The investigations (on dogs) were carried out by the method of the isolated Oddi sphincter and fistula of the entire biliary tract. The action of concd. solns. of $MgSO_4$ *in situ* as well as on the isolated organs produced a weakening of the tone of the distal portion of the entire biliary tract which can be of importance as regards the mechanism of the bile flow. *Papaine* had a similar effect. Large doses of *pilocarpine* strengthened the tone of the distal portion of the entire biliary tract and of the gall-bladder system. The opposite effect was observed with *atropine*. The mobility of the smooth musculature of the bile tract was not paralyzed by atropine but only weakened, while the periodic increase in tone was maintained. *Adrenaline* produced a periodic weakening of the tone of the gall-bladder system with an equally great periodic strengthening of the tone of the distal portion of the general biliary tract. The reverse effect was observed with *gynergen*. Under the influence of *peptone* a more or less pronounced shortening of the musculature of the gall-bladder system appeared. The action of peptone was less pronounced on the distal portion of the whole biliary tract. Under the influence of *pituitary prepns.* (Pituglandol "Roche") a more or less definite strengthening of the tone of the musculature of the gall-bladder system could be detected. In one series of expts. a weakening of the tone of the distal portion of the whole gall-bladder system was also observed. Under the influence of *egg yolk* a weakening of the tone of the distal portion of the entire biliary tract occurred together with a strengthening of the tone of the gall bladder. Dil. *salt solns.* weakened the tone of the Oddisphincter; *alkalies* strengthened it. Under the influence of *morphine* an increase in the tone of the gall-bladder system as well as that of the distal portion of the general biliary tract could be detected. With a series of prepns. (egg yolk, histamine, adrenaline, gynergen) an "interplay" of the distal portion of the general biliary tract and of the gall-bladder system was observed. This interplay was disturbed by the action of vagotropic substances such as morphine and papaverine. Substances which affect the bile flow can be divided into 2 groups: the "cholespasmolytica" which primarily weaken the tone of the distal portion of the general biliary tract, and the "cholekinetica" which increase the tone of the smooth musculature of the gall-bladder system. Use of the substances of the first group is indicated in spastic conditions of the bile tract (spastic forms of dyskinesia) while the substances of the 2nd group are indicated in atonic conditions (atonic forms of dyskinesia). M. G. Moore

The action of iodine salts on the supply of vitamin C in the organism. G. A. Uzbekov. *Klin. Med.* (U. S. S. R.) 15, 1092-5(1937); *Chem. Zentr.* 1938, I, 4351.—After the administration of 2 doses of 0.5 g. KI daily to rabbits for 30 days there were observed reductions in the ascorbic acid contents of the suprarenal capsule of 67%, testicle 57%, spleen 43.5% and cerebrospinal fluid 50%. In the blood the concn. of dehydroascorbic acid increased by 25%. The possibility of the development of a hypovitaminosis during treatment of syphilis, Basedow's disease and arteriosclerosis with I therapy is suggested. M. G. Moore

The new anesthetic convocaine. V. A. Avrutova. *Sovet. Rachelny Zhur.* 41, 837–42(1937); *Chem. Zentr.* 1938, I, 4496.—Three derivs. of convolvine and convolamine (prepd. from *Convolvulus pseudocanthabricus*) are designated convocaine. They are readily sol. in water and resistant to boiling. The best effect is obtained with convocaine I, which in 1–2% soln. produces excellent surface and deep anesthesia of the eyeball for 35 min. There is no irritation of the epithelium of the cornea nor any effect on accommodation. In contrast to cocaine, convocaine I possesses the advantage that it does not alter the intraocular pressure. The toxicity of the prepn., as measured with white mice, is about double that of cocaine. The prepn. has been tested by use for various eye operations. Convocaine II and III show a weaker anesthetic action and a slight irritating effect on the epithelium. M. G. Moore

Lipoid-sarcoid reaction induced by foreign body (silica). Wm. M. German. *Am. J. Clin. Path.* 10, 245–50(1940). —A case is reported which shows a subcutaneous tissue tuberculoid reaction in which the etiological reagent is presumably silica. Every effort was made to rule out a coexistent tuberculosis. 12 references. J. T. Myers

The influence of intravenous glucose injections on abnormal erythrocyte sedimentation speed in relation to activity of infection. S. S. Lichtman. *Ann. Internal Med.* 13, 1297–1305(1940).—Daily intravenous glucose injections administered to 19 subjects with various types of disease and infection, including rheumatic fever and pulmonary tuberculosis marked by abnormal erythrocyte sedimentation speed, slowed the rate in 7 cases. No slowing was noted in the presence of fever or leucocytosis. 26 references. John T. Myers

Arsphenamine poisoning with report of four cases. Gerald C. Parker and Orman C. Perkins. *Ann. Internal Med.* 13, 1307–16(1940).—The administration probably causes an agglutination of the erythrocytes resulting in minute emboli which lodge in the brain and other special organs and cause rupture of the weakened vessel. John T. Myers

A method for determining the effect of chemical antisepsis on phagocytosis. Henry Welch. *J. Bact.* 39, 337–8(1940). John T. Myers

Hematopoietic affections in experimental poisoning by barium salts. G. G. Zolezzi and A. Stazzi. *Med. lavoro* 30, 9–20, 44–55(1939); *Chimie & industrie* 42,

271.—The rabbit was used as exptl. animal. Lethal doses of $BaCl_2$ and of $Ba(NO_3)_2$ cause a notable increase in red and particularly in white corpuscles, especially at the expense of polymorphonuclear forms; the increase seems to be temporary. There is probably an initial vasoconstriction followed by hemolysis. In small doses Ba salts stimulate the blood-forming organs: the bone marrow is stimulated, while toxic doses cause degeneration of the various tissues in the marrow. Under the action of Ba salts the liver becomes congested and diffuse vascular degeneration ensues. There is an increase in the no. of Kupffer's cells and of eosinophilic polynuclear elements in the liver. In acute and subacute intoxications the spleen undergoes the following changes: hyperplasia of the gray pulp and of the red pulp and finally sclerofibrosis of the gland. A. Papineau-Couture

The effect of urea and narcotics on the action of acetylcholine on the frog heart. Fritz Heim. *Arch. exptl. Path. Pharmakol.* 192, 1–17(1939).—Urea annuls, reverses or increases the action of acetylcholine on the frog ventricle, depending on its ability to increase or decrease the swelling and permeability of ventricular tissue. Narcotics (chloral hydrate, urethan, $CHCl_3$) which decrease such swelling and permeability enhance acetylcholine action. J. Pinchack

Intestinal effects of intravenously administered saline purgatives. Zengo Kanda. *Arch. exptl. Path. Pharmakol.* 192, 64–9(1939).—Given intravenously, Na_2SO_4, $Na_2S_2O_3$, $MgCl_2$, $MgSO_4$ and K_2SO_4 are completely inactive on intestinal peristalsis in guinea pigs. $MgSO_4$ and K_2SO_4, however, have a paralyzing effect which can be annulled by $CaCl_2$. J. Pinchack

Elimination of parenterally administered metrazole from the organism. K. Hinsberg. *Arch. exptl. Path. Pharmakol.* 192, 90–5(1939); cf. Esser and Kühn, *C. A.* 27, 5815.—An improved method of extg. metrazole from organs is based on pptg. the $CHCl_3$-extd. material with phosphotungstic acid in the presence of 2.5% HCl. The difficultly sol. product of const. wt. obtained is decompd. and the metrazole in the filtrate pptd. by sublimate and its m. p. detd.; exptl. error was about 2%. With this method no more than 5.2% of the injected metrazole could be recovered from the organs of guinea pigs. The drug was found in the intestine and feces, but was too firmly combined in the latter to be detectable. J. Pinchack

Pharmacological action on the vegetative centers. II. Hans T. A. Haas. *Arch. exptl. Path. Pharmakol.* 192, 117–30(1939); cf. *C. A.* 33, 8787[3].—The influence of pilocarpine (I), adrenaline (II) and ergotamine (III) on the vegetative centers was demonstrated by their ability to decrease the acetylcholine (IV) content of the brain stem and cortex of eserinized leeches. This decrease was apparent with large doses of I and II and small doses of III given intracisternally; IV, itself, was inactive. Neither I nor III was active intravenously, as was II. Paraldehyde, but not III, antagonized the effect of II. III. *Ibid.* 350–60.—The study was continued with intracisternal or intravenous injections of I, II, IV and picrotoxin (V), and intravenous injections of III or ergometrine (VI) in rabbits previously subcutaneously injected with paraldehyde (VII) or intravenously with atropine. The direct central action of I, II and V and the highly improbable one of III, IV and VI were indicated by the fact that VII reduced the fall in temp. and rise in blood sugar after I and V, but not after III, IV and VI, and that it counteracted the effect of II on blood sugar and leucocytes. J. P.

Investigations of the cumulation of digitalis substances. Werner Lindner. *Arch. exptl. Path. Pharmakol.* 192, 155–68(1939).—Functional and necrotic cardiac changes were produced in cats with digitoxin and oleandrin given in large single doses up to a total of 55% of the Hatcher dose, or in small single doses given for a prolonged period (3.3 or 5% of Hatcher dose daily for as long as 44 days). J. Pinchack

The cumulation of genins of cardioactive glucosides. Werner Lindner. *Arch. exptl. Path. Pharmakol.* 192, 169–78(1939).—Digitoxigenin (I), k-strophanthidin (II), ditoxigenin (III), oleandrigenin (monodiacetylgitoxigenin, IV) and oleandrin (V) were administered for 6 days to cats which then received an infusion of g-strophanthin. Definite cumulative symptoms appeared with 15% of the m. l. d.'s of I and II, but although 15–25% of the m. l. d. of III and 7–15% of the m. l. d. of IV produced toxic reactions, there was no cumulation. III and IV then have a different mode of action from that of the other digitalis glucosides. The cumulative dose of V was 3–5% of its m. l. d. J. Pinchack

Change in acetylcholine action through adsorption of proteins. Fritz Heim. *Arch. exptl. Path. Pharmakol.* 192, 276–91(1939).—Acetylcholine action on ventricular contractility in the frog is retarded and prolonged when serum albumin or pure serum is added to the perfusing Ringer soln. The change is due to adsorption of the acetylcholine on the protein. J. Pinchack

Changes in the hydrogen-ion concentration of the blood in experimental circulatory shock [produced by histamine, peptone or procaine]. E. Lerche. *Arch. exptl. Path. Pharmakol.* 192, 309–20(1939). J. Pinchack

Carbon monoxide poisoning and gastric juice secretion. G. Walther. *Arch. exptl. Path. Pharmakol.* 192, 361–71 (1939).—Neither acute nor chronic CO poisoning changes the gastric-juice curve appreciably; anacidity is never found. A restricted gastritis is evident after 3–4 months of CO-allyl formate poisoning, attributable to the formate; anacidity is still absent. J. Pinchack

Blood-pressure experiments with adrenaline and acetylcholine. W. Riechert and E. Schipkus. *Arch. exptl. Path. Pharmakol.* 192, 372–82(1939).—The hypertensive action of adrenaline (I) is shortened by acetylcholine (II), whose efficacy depends upon how soon it is given after I. Gynergen prolongs the effect of II through its sympatholytic action. J. Pinchack

The anti-inflammatory action of pure azulene from Matricaria chamomilla L. Wolfgang Heubner and Wolfgang Albath. *Arch. exptl. Path. Pharmakol.* 192, 383–8 (1939); cf. *C. A.* 33, 1441[4].—Tests in rats, rabbits, cats and man show that the anti-inflammatory principle of the essential oil of *Matricaria chamomilla* L. is azulene. It was pptd. from the oil by ferrocyanic acid and purified by chromatography. J. Pinchack

Strophanthin action and cholinergic mechanism of the heart. J. Kull. *Arch. exptl. Path. Pharmakol.* 192, 447–56(1939); cf. *C. A.* 33, 6961[1]. J. Pinchack

Action mechanism of organic nitro compounds. Ed. Keeser. *Arch. exptl. Path. Pharmakol.* 192, 618–24 (1939).—Nitro compds. act primarily on the sympathetic nervous system, but also influence basal metabolism, decreasing reduction processes in muscles and sometimes catalase activity. The latter effect of nitrobenzene and nitrophenol is inhibited *in vitro* by sympathol (I), pilocarpine (II), acetylcholine (III) and glutathione (IV). In guinea pigs, thiourea, thiodiglycol, $FeSO_4$, cholic acid, lecithin-cholesterol (V), Hepatrat, I, II and III have no effect on $EtONO_2$ poisoning. $MnSO_4$ and KI retard the appearance of symptoms, cysteine enhances toxicity, while IV, ergotamine tartrate (VI), thionine and hemin are increasingly antagonistic in that order. Ascorbic acid is inactive against $EtONO_2$ poisoning, but annuls the effects of toxic doses of dinitroglycol in guinea pigs and dogs. In contrast, IV, V, VI, hemin and Ca lactate enhance dinitroglycol toxicity. J. Pinchack

The effect of circulatory-active drugs on veins. R. Domonjoz and A. Fleisch. *Arch. exptl. Path. Pharmakol.* 192, 645–63(1939).—A similar relation exists between chem. constitution and vasoconstrictor action of sympathomimetic substances as between constitution and sympathomimetic action. The drugs tested included veritol, adrianol, sympathol, 2 - (3′,4′,5′ - trimethoxybenzyl)imidazoline (Ciba 2020), ephedrine, pseudoephedrine, *m* - hydroxyephedrine, suprifen, benzedrine, pervitin, *N* - dimethyl - 1 - phenylisopropylamine, *N*-methyl - 2 - phenylpropylamine, tyramine, *m*- and *p*-hydroxynorephedrine, 1 - (*m* - hydroxyphenyl) - 2-methylaminobutanol, 1 - (3′,4′ - dihydroxyphenyl) - 2-propylaminopropanol and corbasil and their optical

isomers. The weakest drugs are those without a phenolic OH group. Oxidation of the benzene ring in para position slightly increases vasoconstriction, in meta position greatly increases it. The dihydroxybenzene derivs. are somewhat less active than the *m*-phenol derivs., probably because of lesser stability. Substitution on the NH_2 group decreases vasoconstriction, double substitution being no more detrimental. The 2-membered side chain is the most active. Lengthening the side chain decreases activity. J. Pinchack

Toxicology of *p* - sulfanilamidoacetophenone. H. Möller. *Arch. exptl. Path. Pharmakol.* 192, 708–14 (1939).—*p*-Sulfanilamidoacetophenone forms a slightly yellowish white cryst. powder which m. after sintering at 207–9°. It is very slightly sol. in water, but is more sol. in dil. alkalies and in NH_3, as well as in hot MeOH and acetone. The mol. wt. is 290. The compd. is very similar to sulfanilamide in its antistreptococcal action but is much less toxic in mice, rats and cats. The rate of urinary excretion of the 2 compds. in the dog is about the same. J. Pinchack

Nativinsulin. Siegfried Irle. *Med. Klin.* 35, 1316–17 (1939).—Insulin treated with $MgCl_2$ (nativinsulin) shows the prolonged (24 hrs.) antiglycosuric action of protamine Zn insulin, without the attending hypoglycemic reactions. J. Pinchack

Experimental poisoning with heavy metals; function of the thyroid and porphyria. Istvan Sümegi and Gyula Putnoky. *Arch. Gewerbepath. Gewerbehyg.* 9, 566–91 (1939).—Rats were subjected to minute doses of Pb, Bi, Hg, Au, Ag, Cu, Zn and Fe. With Bi, there was a min. damage to the liver and kidneys; with Au, the kidneys functioned normally while the liver showed slight damage. Zn caused slight functional changes in the kidney. All these metals produced hepatorenal disturbance with simultaneous hyperfunction of the thyroid and porphyrinuria, the latter due to injury of the bone marrow. Later, these metals stimulated the autonomic nerve centers in the midbrain and pituitary gland, resulting in thyrotoxicosis of central origin. Maurice M. Rath

The toxicity of carbon monoxide at high altitudes. J. W. Heim. *J. Aviation Med.* 10, 211–15 (1939).—The literature lacks information on the tolerance to CO at high altitudes, on the accurate detn. of the behavior of this gas at reduced atm. pressures, and on permissible concns. in aircraft compartments operating at great heights. Based on O-CO distribution laws in the blood and available data of partial pressures of O in the alveolar air at various altitudes, H. has derived equations to det. the effect of various concns. of CO. It was calcd. that a concn. of 0.01% CO in the air at 10,000 ft. reduces the O-carrying capacity of the hemoglobin by 10.5%, which is enough to produce some anoxemia. Curves were constructed showing the variation in arterial O tension at different altitudes for different CO concns. Concns. of CO which are innocuous at sea level become dangerous at even moderate altitudes, and it is imperative that not a trace of this gas should be permitted to exist in airplane compartments. Maurice M. Rath

Prontosil in the treatment of cholangitis and its experimental foundation. R. Mancke, K. Plötner and W. Siede. *Münch. med. Wochschr.* 86, 1550–5 (1939).—Expts. on dogs with biliary fistulas were conducted to study the elimination of prontosil. The content in the bile was studied by chromatographic adsorption analysis. 1 cc. of bile is placed in an adsorption tube 15 cm. long and 0.8 cm. in diam. which is filled with Al_2O_3 and washed with distd. H_2O. The bilirubin and biliverdin are adsorbed completely in the upper part of the tube. Prontosil, however, migrates to the bottom as a red ring and can be washed out with distd. H_2O. H_2O is added up to 25 cc. and the amt. detd. in a wedge photometer. Clinical observations were made on patients with biliary disorders. Maurice M. Rath

A new chemotherapeutic agent for the treatment of brucellosis in man. Hans Scholer. *Schweiz. med. Wochschr.* 69, 685–6 (1939).—Treatment of a case of undulant fever with sulfapyridine (total dosage of 17.5 g. in 8½ days) resulted in rapid therapeutic effects. No other medication was given except for a small amt. of vitamin C. Eight hrs. after the first dose, the temp. fell. On the twelfth day, the patient was afebrile, had gained weight and had resumed full work with no recurrence of symptoms. At the start of treatment the agglutination titer of *Brucella abortus* was 1:3200; 23 days later, it was 1:400. Maurice M. Rath

The excretion of stilbene preparations. P. Caffier and E. S. Oeskayaalp. *Zentr. Gynäkol.* 63, 1218–31 (1939).—Rapid excretion of stilbene prepns. resulted when injected into rabbits, with castrated mice as recipients for untreated urine. The responses were graded into 10 stages, from castrate to full estrous response. The smallest recognizable reaction was produced by 0.005 γ. The acetate or propionate esters had a prolonged activity. Excretion was detected within 5 hrs. in the human subject, and after a single dose of 2.5 or 5 mg. excretion continued for 10 to 16 days. Max. excretion seemed over by the 5th day, suggesting this as the time for repeated injection if sustained effects are desired. From the 5th to 11th days after 5 mg. was injected, about 7.5% of the dose was recovered in the urine. Maurice M. Rath

Selenium and duck sickness. Arthur C. Twomey, Sarah J. Twomey and Loring R. Williams. *Science* 90, 572–3 (1939).—Livers of ducks and shore birds found dying of duck sickness in seleniferous regions show definite traces of Se. There is also a marked decrease in the size and wt. of the livers. Ducks fed Se in concns. up to 18 p. p. m. show the same symptoms. Higher concns. of Se kill the birds in 10–24 hrs. without symptoms of liver shrinkage. Felix Saunders

The pharmacology of soaps. The irritant action of refined oil soaps on human skin. Byron E. Emery and Leroy D. Edwards. *Oil & Soap* 17, 64–6 (1940).—Neutral Na and K soaps of 19 oils were prepd. and 5% solns. were applied to the skin of males and females. It was found, as would be expected, that soaps from oils contg. lauric and myristic acids such as coconut, palm, palm kernel, cottonseed and avocado caused irritation. These oils produced irritant soaps in an approx. order of their lauric and myristic acid content. Castor oil soaps are the most irritant of all the soaps studied. This oil does not contain any of the irritant soap acids and its action is unexplainable. In general the K soaps are more irritant than the Na soaps. Females are more subject to soap irritation than males. E. Scherubel

Experimental investigation on the absorption of mercury vapors. Folco Domenici. *Rass. med. ind.* 10, 703–11 (1939).—Expts. were conducted on rabbits in a special box maintained at temps. below those of the animals, which could be exposed to the fumes of Hg in such a way that they either inhaled them through the respiratory system or took them into the digestive tract. When the fumes were taken into the respiratory tract intestinal lesions appeared in only a small percentage of the animals, and the nervous system was affected as well as the nasal passages. When the fumes entered the digestive system the typical intestinal hemorrhagic lesions were present. In this way may be explained the nervous disorders occurring in cases of Hg poisoning. Marcelle Schubert

The effect of administration of an acetate on detoxication and therapeutic activity of sulfanilamide. G. V. James. *Biochem. J.* 33, 1688–93 (1939).—Mice receiving AcONa along with sulfanilamide (I) excreted more acetylsulfanilamide (II) than mice which received the same dose of I alone. Such combined treatment did not diminish the curative value of I but was effective in modifying the acute toxic symptoms resulting from a large dose of I. When smaller doses were given over a longer period, acetate did not affect the result. E. W. Scott

In vitro action of insulin on minced avian and mammalian muscle. Ephraim Shorr and S. B. Barker. *Biochem. J.* 33, 1798–1809 (1939).—The insulin effect described by Krebs and Eggleston (*C. A.* 32, 7134[3]), consisting of the better maintenance of O consumption in minced pigeon-breast muscle, was confirmed. No com-

parable effect could be observed on the respiration of minced chicken-breast muscle, minced skeletal muscle of the cat, dog and rabbit, or minced dog cardiac muscle. Therefore, it is doubtful if the insulin effect in pigeon-breast muscle exemplifies the general mechanism of insulin action on carbohydrate oxidation. The result of disruption of the intercellular organization of muscle by mincing is to stimulate the oxidation of carbohydrate, even in the absence of insulin. E. W. Scott

The fate of strontium after intravenous administration to normal persons. Robert A. McCance and Elsie M. Widdowson. *Biochem. J.* **33**, 1822–5(1939).—Daily doses of 47 mg. of Sr were injected intravenously into 2 normal subjects for 5 days. The Sr was excreted slowly, 90% of it by the kidney. E. W. Scott

Permeability of the lymphatic vessels of the skin. I. The effect of various stimulants. Heigaku Choh. *J. Chosen Med. Assoc.* **29**, 2469–88(1939).—The permeability (A) of lymphatic vessels of the ear of the rabbit is increased by mech. and chem. stimuli. Oral administration of 0.5–2.5% NaCl, 2.5% $NaHCO_3$, 5% sucrose, 10% glucose and 5% $CaCl_2$ solns. increases A, and this is due to water intake, since distd. H_2O per se produces the same effect. Subcutaneous injection of adrenaline or pilocarpine inhibits A, but injection of atropine increases it. Narcosis with Et_2O and $CHCl_3$ increases A, so does cervical sympathectomy, section of the auricular nerve or direct stimulation of the ear by faradic current. A was measured by the time required for Trypan Blue to begin to diffuse out of the lymphatic vessels. **II. Its role in edema formation.** *Ibid.* **30**, 39–55(English abstr. for I and II, 4–5)(1940).—In edema due to starvation, or exptl. nephritis caused by cantharidin or $K_2Cr_2O_7$, both A and turgidity of the cutaneous tissues, increase. In edema due to local stasis, thyroidectomy, or reticulo-endothelial blockade, A rises together with the water content of the tissue, but does not always change in parallel with the turgidity of the tissue. S. Tashiro

Experimental and clinical studies on the influence of chronic poisoning with opium and allied drugs on the female genital organs. VI. Genital organs of rabbits and mice chronically poisoned with opium, and endocrine organs of a mouse fetus of a mother chronically poisoned with opium. T. R. Ko. *J. Oriental Med.* **31**, 1333–49 (German abstr. 117)(1939); cf. *C. A.* **34**, 526[4]. S. T.

Effect of continuous feeding of inorganic iron. IV. The content of deposit iron by the feeding of ferrous carbonate. Nobumasa Hayasi. *J. Oriental Med.* **31**, 1351–76(English abstr. 118)(1939); cf. *C. A.* **34**, 172[7,8].—Iron contents of various tissues were analyzed after feeding with 0.6 g. $FeCO_3$ daily for 2–35 days, either at the end of feeding or at 3–34 days after the end of the last feeding. The results are given in 10 tables and 38 charts. In general the data show there are remarkable increases of deposit iron in spleen, liver, bone marrow, appendix, colon, lung and kidney, the increase being noted soon after the feeding started; it reaches a certain height and remains there regardless of further feeding. The content of deposit iron in the tissues does not return to normal even at the end of 34 days after the discontinuance of the iron feeding. S. Tashiro

The responses of the nictitating membrane of the cat to certain stimulants after ergotoxine. G. H. Acheson. *Am. J. Physiol.* **128**, 695–702(1940).—The nictitating membrane of the ergotoxinized cat responds to adrenaline or noradrenaline with a relaxation, but to nerve impulses or acetylcholine with a contraction followed by a relaxation. Dale's theory of the mode of action of ergotoxine reversal is held to be inapplicable to certain organs. An alternative theory is tentatively adopted. The explanation proposed by Dale and Gaddum (*C. A.* **25**, 3046) is adopted to account for the difference in response between nervous stimulation and adrenaline. E. D. Walter

The effect of dinitro-*o*-cresol on fish. W. Speyer. *Nachbl. deut. Pflanzenschutzdienst* **19**, 43(1939).—Dinitro-*o*-cresol caused the death in all cases of *Gasterosteus aculeatus* L. in 3 hrs. at concns. as low as 0.0005%. V. L. F.

Local anesthetics of 4-quinolinecarboxylic acid series (Lur'e) 10. Constitution of conjugated phenolphthalein formed in animal body (Di Somma) 11A. Thiocyano derivs. of hydnocarpic and chaulmoogric acids [effect on leprosy in mice] (Arnold) **10.** Glycidic acid amides with hypnotic properties (Fourneau, Billeter) **10.** Carbethoxy substitution on N of barbitals (Tormey, Humphreys) **10.** Synthesis of choline ester of β-glycerophosphoric acid [physiol. properties] (Arnold) **10.** Chaulmoographosphatides (Arnold) **10.** Heterocyclic local anesthetics (Burtner, Lehmann) **10.**

Pellerat, Jacques-P.: Chimiothérapie sulfamidée ou sulfonée de la blennorragie féminine. Faculté de médecine de Paris, 1938. Paris: L. Arnette. 132 pp.

Handbuch der experimentellen Pharmakologie. Ergänzungs-Werk. Bd. VIII. Edited by **Wolfgang Heubner and Josef Schüller.** Berlin: J. Springer. 184 pp. M. 22.50. Cf. *C. A.* **33**, 756[2].

I—ZOÖLOGY

R. A. GORTNER

pH of tissue fluid in frog muscle at rest and after exercise. N. Rundquist. *Upsala Läkareförens. Förh.* **44**, 263–6(1938–39).—By means of a glass electrode the pH of the tissue fluid from the muscle of a frog at rest and after tetanization was detd. In 25 expts. the mean pH at rest was 7.07 ± 0.025, and after tetanization 6.56 ± 0.024 (difference of 0.51 ± 0.017). B. C. P. A.

Action of eserine on the nerve-muscle preparations of Sipunculus. G. Coppée and Z. M. Bacq. *Ann. physiol. physicochim. biol.* **15**, 949(1939); cf. *C. A.* **32**, 661[1], 7137[6], 8009[9].—Eserine in sea water (1:20,000) increases the response to stimulation of nerve-muscle prepns. of *Sipunculus;* this demonstrates the cholinergic nature of motor innervation in worms. Ruth Berggren

The distribution of water and electrolytes in the blood of dolphins (Tursiops truncatus). Lillian Eichelberger, E. S. Fetcher, Jr., E. M. K. Geiling and B. J. Vos, Jr. *J. Biol. Chem.* **133**, 145–52(1940); cf. *C. A.* **34**, 2049[1].—The data were obtained with blood from live animals under conditions which precluded contamination or post-mortem changes. The oxygen capacity of the blood was 19.1 vol.% and the CO_2 content 30.9 mM per l. Except for the high value for Na (153.3 mM ± 2.4) and the low albumin:globulin ratios (0.6–1.31), the values for the inorg. cations and all other constituents in serum agreed within exptl. limits with those for dog serum. On the other hand, the total base of the red cells is composed mainly of K instead of Na, in this more nearly resembling those of man, but the concn. of K (99.4 mM ± 3.8) is higher than in man. The findings suggest that the blood system of the bottle-nosed dolphin is not appreciably different from that of terrestrial mammals. In this respect the adaptation which these animals have undergone is less pronounced than the structural changes which the cetaceans underwent in order to make their existence compatible with an aquatic environment. A. P. Lothrop

Nutrition and infection of the mussel of Provence (Mytilus gallo-provincialis Lmk.). L. Berner. *Bull. inst. océanograph.* No. 778, 28 pp.(1939).—The mussel eats by mouth, as the org. matter in sea water is too decompd. to be absorbed directly. The mussel is omnivorous, eating diatoms, spicules, marine algae, infusoria, larvae, marine eggs, etc. Five diastases were found in the digestive tract: amyolytic and tryptic enzymes, a lipase and a cytase. Intoxication can occur, due to intolerance or anaphylaxis. Infections are often those of typhoid and paratyphoid fever. Some bacteria are agglutinated by mucus in the digestive tract; others stay in the intervalvar water, the intestines or the glands. The amt. of infection of mussels is high in Italy, especially in the fall. Purification of the water by antiseptics reduces the amt. of infection. Dorothy A. Meyer

Distribution of flavins and certain other fluorescent substances in the skin and eyes of teleosts. Maurice Fontaine and René G. Busnel. *Bull. inst. océanograph.*

No. 782, 18 pp.(1939).—Certain blue fluorescent substances resemble flavin in chem. characteristics, histological localization and their form *in vivo*. They are found in particularly high concn. in eyes of certain fish (teleosts). These substances and flavin are extd. from the macerated tissues in 55% MeOH at 38–40°, centrifuged, and the supernatant liquid shaken with $CHCl_3$. If the $CHCl_3$ ext. shows a yellow, green or blue fluorescence and is oxidized with $KMnO_4$ in AcOH, the resulting fluorescence is due solely to flavin. If the MeOH ext. is not oxidized and a satd. soln. of $Na_2S_2O_4$ is added under ultraviolet light, a blue fluorescence appears. On addn. of too much $Na_2S_2O_4$ the fluorescence disappears. Flavin can be sepd. from the other fluorescent substances by distg. an alc.-water ext. under reduced pressure, adsorption of the aq. liquid on franconite, and elution with a mixt. of pyridine, MeOH and water. Repeat until flavin is completely isolated. Generally, there is more flavin in the eyes than in the skin, but there are species and even individual variations. The relation between the biochem. groups and the systematic position of species in the evolutionary scale is considered. Dorothy A. Meyer

Locus of the action of the galvanic current in the earthworm, Lumbricus terrestris Winnefred E. Bradway and A. R. Moore. *J. Cellular Comp. Physiol.* 15, 47–54 (1940).—It is shown by means of expts. with narcotized earthworms and with those made supersensitive by treatment with nerve excitants that the tropistic effects of the galvanic current are independent of general narcosis. Felix Saunders

Effects of salts upon "spontaneous" activity in the nervous system of the crayfish. C. Ladd Prosser. *J. Cellular Comp. Physiol.* 15, 55–65(1940); cf. *C. A.* 34, 2075⁹.—A soln. contg 0.42 g. K per l. keeps the "spontaneous" activity in isolated abdominal ganglia of the crayfish at approx. the same level as that maintained by blood. When the ganglia are bathed with solns. contg. lower concns. of K the "spontaneous" activity is greatly increased; when they are bathed with high-K solns. the activity is diminished. K acts largely on the no. of active units and only in small part on the frequency of activity of each unit. The relation between "spontaneous" activity and K outside the cells can be described by the normal probability integral. Ca does not antagonize the effects of K on "spontaneous" activity. Change in Na content (±25%) of the soln. is without effect. Whether or not a neurone fires "spontaneously" may depend on the ratio of concns. of K inside and outside the cell. The stimulating action of low K is counteracted by another ion of high mobility, Rb. A rise in intracellular acidity which would increase the free K inside the cell increases the "spontaneous" activity; alky. acts in the opposite direction. F. S.

Excystment of protozoa. Isolation of crystalline excystment factors for Colpoda duodenaria. Arthur N. Prater and A. J. Haagen-Smit. *J. Cellular Comp. Physiol.* 15, 95–101(1940).—Two *cryst. compds.* were isolated from the leaves and tops of corn plants. One has the compn. $C_{13}H_{24}O_2$ and m. 61.0–1.5°; the other has the compn. $C_{26}H_{44}O_2$ and m. 125.5–7.0°. These substances are active in promoting excystment of *C. duodenaria* in dilns. of 1 part in 25–50 million when tested in the presence of suitable cofactors. The cofactor effect necessary for this excystment-producing activity can be supplied, at least in part, by a carbohydrate soln. and suitable combinations of adenylic acid, nicotinic acid, nicotinamide, K citrate and malate, and thiamine. Felix Saunders

Differentiation of two principles from the crustacean sinus gland. F. A. Brown, Jr., and H. H. Scudamore. *J. Cellular Comp. Physiol.* 15, 103–19(1940).—A comparative survey of the effects of sinus gland exts. from 7 different species of crustaceans on the red chromatophores of *Palaemonetes* and the black chromatophores of *Uca* was made. The exts. from the different sinus glands show dissimilar relative effects on the 2 chromatophore types which cannot be explained in terms of different concns. of a single chromatophoric substance found in all the sinus glands. All sinus glands investigated yield an EtOH ext. which has strikingly different properties from a water ext. of the alc.-insol. residue. The effects of the whole sinus gland exts. can be explained in terms of different ratios of these 2 components. There is no evidence to support the statement that boiling activates eyestalk ext. A quant. examn. of the effects of boiled and unboiled exts. of *Carcinus* sinus glands shows no significant difference between their activities. Felix Saunders

Total nitrogen content of the Arbacia egg. Robert Ballentine. *J. Cellular Comp. Physiol.* 15, 121–2(1940).—*A. punctulata* eggs contain 26.8 mg. N/cc. cells, 0.107 mg. N/mg. dry wt., 5.86 mg. N/10^6 cells, 265 mg. dry wt./cc. cells and 58 mg. dry wt./10^6 cells. Felix Saunders

Heavy water and longevity. H. G. Barbour and F. S. Hammett. *Science* 90, 538–9(1939) —D_2O up to 10% retards growth activities of *Obelia geniculata*. Regressive and senile stages are also retarded so that life is prolonged. Felix Saunders

Effect of diet on eye-color development in Drosophila melanogaster. E. L. Tatum and G. W. Beadle. *Biol. Bull.* 77, 415–22(1939); cf. *C. A.* 33, 2229⁹.—The production of v^+ eye-color hormone and development of pigment in the double-recessive vermilion brown of *D. melanogaster* may be brought about by feeding the larvae on suboptimal levels of dead yeast under aseptic conditions. At 17° the starvation effect is intensified, and at 28° it is decreased. Carbohydrates, acetates, fat and EtOH, under aseptic conditions, completely inhibit the starvation effect by direct action on larval metabolism and development. Proteins and amino acids have very little influence but lower the carbohydrate level required completely to inhibit pigment production. The starvation effect is always assocd. with prolongation of larval life, but great prolongation of life is possible without any modification of eye-color. Walter H. Seegers

The nutritional biology of Amphioxus lanceolatus. P. B. van Weel. *Pub. staz. zool. Napoli* 16, 221–72(1937) (in German).—The anatomical aspects of feeding are described. The pH along the gut was: gills, 8.2–8.5; stomach and cecum, 6.3–6.8; intestines, 7.5–8.0. Fats are absorbed phagocytically, principally into the wall of the cecum. No phagocytosis of raw or cooked starch was observed, but broken granules are apparently hydrolyzed in the lumen to some extent. Glycogen was demonstrated histologically in several tissues. Proteins are mainly phagocytized but are possibly slightly hydrolyzed in the lumen. Phagocytosis is but little affected by the elec. charge of particles. No reserve deposits of fat or protein were found, although after fat feeding the fat content of the notochord temporarily increased. 91 references. W. C. Tobie

Simpson, George G., and Roe, Anne: Quantitative Zoology. New York: McGraw-Hill Book Co. 414 pp. $4.00. Reviewed in *Quart. Rev. Biol.* 15, 112 (1940).

Wieman, H. L.: General Zoology. New York: McGraw-Hill Book Co. 497 pp. $3.50. Reviewed in *Ohio J. Sci.* 39, 64(1939).

12—FOODS.

H. A. LEPPER

Glycine determination in foodstuffs. Karl Brecht and Gerolf Grundmann. *Biochem. Z.* 302, 42–9(1939).—Hydrolyze 3–6 g. protein with 20% HCl (in ratio of 1:20) for 40 hrs. Add about 1 cc. benzaldehyde for every 3 g. protein and distil at about 70° *in vacuo* to remove HCl and benzaldehyde. Add to the pulp 100 cc. H_2O, a little BuOH and make alk. with $NaHCO_3$. Remove NH_3 by evapg. to 20 cc. in a 30-mm. Hg vacuum at 35°, and check with Nessler's reagent. Filter off the pptd. NaCl, wash with 70% alc. and neutralize with HCl. Evap.

again *in vacuo* to about 10 cc., filter, wash with alc. and dil. to 50 or 100 cc. If all the fat was not removed by hydrolysis, ext. the soln. with ether in a separatory funnel. It is recommended, however, to defat before performing the hydrolysis. Add 0.5 cc of the soln. to 2 cc. of a mixt. of 25 parts *M*/15 phosphate buffer, pH 8, and 75 parts of a freshly prepd. aq. soln. of *o*-phthalaldehyde, shake well and 2 min. later add 2 cc. of a freshly prepd. mixt. of 5 parts concd. H_2SO_4 with 30 parts 95% alc. After 2 min. add 5 cc. $CHCl_3$ and shake 1/2 min. Pipet off 3 cc. of the $CHCl_3$ layer, add 0.5 cc. 95% alc. and exam. in a step photometer using filter S_{72}. Prep. a calibration curve; the values of the extinction coeff. follow a linear course only within a range of 150 to 600 γ. Data on the glycine content of a no. of foodstuffs are presented. S. Morgulis 1

Flavin (vitamin B_2) content of foodstuffs. M. Sumi and Z. Tuzuki. *Bull. Inst. Phys. Chem. Research* (Tokyo) **17**, 1296–9(1938).; cf. *C. A.* **34**, 2072⁵.—The flavin content of mushrooms, fermentation products (soya-miso, soy sauce and liquors), and milk has been detd. photochemically. B. C. P. A. 2

Experiments with the insecticide "Littacid-liquid." K. Göpp. *Wochschr. Brau.* **56**, 90–3(1939).—The conclusions are very favorable for the use of this insecticide if 3 days are given after spraying and drying before the grain is stored in order to ventilate the storage. S. Józsa 3

Chemical and technological examination of the Lybian barley. Spartaco Copertini. *Agr. coloniale* (Italy) **33**, 626–34(1939).—Analyses are given of barley samples collected in the years 1935–1937 in 4 provinces of Lybia. The min. and max. values are, resp.: H_2O 9.53, 13.6; total N 1.00, 2.03; H_2O-ext. 63.5, 78.1; ash 1.06, 4.28%. G. A. B. 4

Simple hints on flour analysis. E. Berliner. *Mühlenlab.* **9**, 13–16(1939).—Rye flour in wheat is detected by the pptn. of characteristic threads from the flour ext. by $COMe_2$. Bean flour coagulates Fe_2O_3 sols in a similar manner to aleurone cells. Corn is detected by swelling in paraldehyde or by lack of staining in mucicarmine. Potato starch is easily recognized under the microscope. The methyl red test for acidity is suitable for microscopical use, and a quick preliminary test for diastase or maltose can also be carried out with Fehling soln., under the microscope. To distinguish between malt and sprouted grain, the flour ext. is heated to 70° before testing. The microscopical examn. of bread for yeast or bacteria is described. B. C. P. A. 5

A new method for the determination of diastatic action of grain flour and factors affecting the diastatic activity. Ivan D. Popov. *Biochem. Z.* **302**, 177–86(1939).—Weigh 5 g. of flour (accurately to 0.05 g.) and suspend in 46 cc. distd. H_2O at 30°. Keep at this temp. for 1 hr., shaking every 15 min., and stop the enzymic action by adding 2 cc. 0.8 *N* H_2SO_4 and 2 cc. 12% Na tungstate. Filter and det. the reducing sugar in 5-cc. aliquots with $K_3Fe(CN)_6$ according to the Blish-Standstedt procedure (cf. *C. A.* **27**, 3533). The amt. of maltose is obtained from a table. The diastatic activity of 10 g. flour is calcd. by multiplying this value by 20. The effects of diln., temp., fineness of flour and of the germ on diastatic activity have been detd. S. Morgulis 6 7

Bread aroma. I. Determining the biacetyl and acetoin contents in various sour-dough breads and breads made with dough containing acidifying agents. E. Komm and G. Lehmann. *Z. Untersuch. Lebensm.* **78**, 458–64(1939).—The combined contents (I) of biacetyl and acetoin of materials analyzed were: sour-dough bread 0–1.36, bread baked from dough contg. com. acidifying agents 2.01–3.22, wheat-flour bread made with yeast 8.12, sour dough 0.41–0.82 and yeast dough 2.0 mg. %. I in bread ingredients is too small to contribute appreciably to I in finished breads. The results indicate that biacetyl and acetoin were formed during fermentation and chiefly in yeast dough. M. M. Piskur 8

Dairy products, milk and cream. Elmer R. Tobey. *Maine Agr. Expt. Sta., Official Inspections, Bull.* **171**, 123–58(1939).—The chem. compn. and bacteriol. count of 1312 samples of milk and 311 samples of cream are given as a basis for grading these foods. C. R. Fellers 9

Determination of butter, milk and egg content of foods. J. Grossfeld. *Chem.-Ztg.* **63**, 381–3(1939).—The principles underlying such detns. are reviewed. Butter is detd. indirectly from the $PrCO_3H$ value, milk from the milk fat, lactose, Ca, and casein contents, and egg from the lecithin-P_2O_5, choline, and cholesterol contents. B. C. P. A. 10

Preparation of dairy by-products. E. Capstick. *J. Brit. Dairy Farmers' Assoc.* **51**, 50–8(1939).—A review, describing the manuf. of dried and condensed whole and sepd. milk and whey. B. C. P. A. 11

Lactic acid milk in the tropics. J. H. de Haas. *Indian J. Pediat.* **6**, 108–11(1939).—The prepn. of lactic acid milk (fat 2.6, protein 2.3, lactose 3.2, ash 0.5, sugar 4.5, meal 1.6, and H_2O 85%) from fresh or evapd. milk is described. In addn. the milk contains rice meal, sugar, lactic acid, cod-liver oil and ascorbic acid. It is an excellent artificial food for infants who are not, or are only partly, breast-fed. The milk is readily digested, has a high calorific value (700–730 kg.-cal./l.), and can be kept for 24 hrs. at tropical room temp. B. C. P. A. 12

Grading milk by resazurin test. J. G. Davis. *Food Manuf.* **14**, 196–8, 207(1939).—Methods of carrying out this reduction test instead of the longer methylene blue test are described. Rapid reduction of the dye is given by mastitis milk, which must not be confused with milk produced under unhygienic conditions. B. C. P. A. 13

Fiji milk constants. W. J. Blackie. *Agr. J.* (Fiji) **10**, 68–71(1939).—Analyses of 240 samples of milk show that herd milk from the wet dairy areas of Viti Levu has a high percentage of butterfat. The evening milk gives higher results for fat than the morning milk. Seasonal variation in butterfat percentage is not marked. The solids-not-fat are distinctly on the low side even for tropical milk. The mean f.-p. figure for 190 samples is −0.543° and 96% of the samples fall between −0.533 and −0.555°. These f.-p. values are up to temperate country standard. Under Fiji conditions, the f.-p. test is the most reliable method for detecting adulteration. J. R. Adams 14

Accuracy of plate counts made from milk products as affected by the temperature of incubation. Carl S. Pederson and Robert S. Breed. *Am. J. Pub. Health* **30**, 162–4(1940).—It appears to be impossible to make a perfect incubator for milk-control work. Even if one were made and operated at 37°, counts obtained in examn. of milk supplies would be subject to a considerable uncontrolled error. It, therefore, seems logical to change the temp. required for incubation to that temp., i. e., 32°, at which slight variations have no material effect on the plate count and at which the counts obtained from various samples of milk would be a more constant percentage of the total max. count obtainable. Seven references. J. A. Kennedy 15

Recent investigations of goat milk. A. K. Besley. *Am. J. Pub. Health* **30**, 182–5(1940).—Milk from the Toggenburg and Saanen breeds of goats has been found to be a healthful, nutritious food, not unlike the milk from the Holstein breed of cows in general compn. and nutritive value. The goat milk had an av. curd tension considered to be within the upper limits of soft-curd milk, possessing values indicating a curd 31% softer than that of the milk from Holstein cows. A small-sized fat globule of 1/3 the vol. occupied by the fat globule of Holstein milk appeared as another outstanding species difference between the 2 milks. The apparent ability of goats to produce milk exceptionally low in bacterial nos. operates in its favor when milks are appraised on the basis of their microbial content. J. A. Kennedy 16

The deposition of burnt skim milk. W. Mohr and M. Kelting. *Deut. Molkerei-Ztg.* **60**, 1411–12(1939).—Skim milk burns more readily on scratched and damaged than on smooth surfaces. The use of a low gas flame or better still a water bath is recommended. Skim milk preheated above 90° and sterilized skim milk burn on vessels less readily than raw skim milk, which in turn burns on less readily than condensed skim milk. Skimmed sweet 17

cream buttermilk does not burn on as readily as fresh skim milk, an observation which is accounted for on the the basis of the higher lecithin content of buttermilk. Thus the addn. of 0.15 to 0.2% lecithin to skim milk exerts a favorable influence. A. Leviton

Quality control data in the production of preserved milk in the years 1936–38. IV. Milk powder. G. Schwarz and H. Mumm. *Deut. Molkerei-Ztg.* **60**, 1008–10(1939).—Data pertaining to 300 samples of drum-dried skim milk and to 300 samples of whole-milk powder are given. Variations in and average values of moisture, fat, H-ion concn., degree of acidity and soly. are given for the interval 1936–1938. A. Leviton

Determining chlorine in milk. I. M. Zakharchenko. *Molochno-Maslodel'naya Prom.* **5**, No. 4, 7–8(1938); *Chimie & industrie* **42**, 359.—The principle of the method is based on the direct argentometric titration of Cl by Kolthoff's method in presence of adsorption indicators (bromophenol blue) and a certain excess of AcOH. Titration is carried out on the filtrate obtained after addn. to 20 cc. of milk of 25 cc. distd. water and 2–5 cc. of 6% AcOH. A. Papineau-Couture

Determination of water in condensed milk. V. Zimaiev. *Molochno-Maslodel'naya Prom.* **6**, No. 2, 14(1939); *Chimie & industrie* **42**, 719–20.—Water can be detd. in condensed milk by Teichert's method, refractometrically or by the xylene method, provided the result is corrected for lactose. The correction for each % of lactose in the condensed milk is 0.05% for Teichert's method and the xylene method and 0.075% for the refractometric method. A. Papineau-Couture

Low-fat evaporated milk in infant feeding. A. C. Edwards. *Wisconsin Med. J.* **37**, 1004–6(1938); *Dairy Sci. Abstracts* **1**, No. 1, 51.—It is claimed that a low-fat evapd. milk is more satisfactory in infant feeding than the regular evapd. milk. This new product is a half-skimmed evapd. milk, the percentage compn. is fat, 4.08; lactose, 10.50; protein, 7.15; ash, 1.80. It is dild. and a sol. carbohydrate added before use. The method of manuf. is given. C. L. B.

Fat content of whole cheese as a standard. T. J. Drakeley. *J. Brit. Dairy Farmers' Assoc.* **51**, 59–66 (1939).—It is suggested that the fat content be reported on whole cheese and not on dry-matter content and that whole-fat cheese should contain not less than 30% of fat for raw, or not less than 29% for processed, cheese. All other cheese should be labelled with the min. fat percentage and whether processed. It is claimed that this scheme obviates the difficulty in assessing the compositional quality of cheese owing to varying fat and H_2O contents. B. C. P. A.

Fat separation from sour-cream buttermilk. W. Mohr, A. Arbes and M. Kelting. *Molkerei-Ztg.* (Hildesheim) **53**, 2153–5(1939). Using a closed foamless Westphalia centrifuge delivering 1000 l. per hr., the authors obtained a sepd. buttermilk contg. 0.12 to 0.2% fat—this from buttermilk contg. 0.3 to 0.6% fat. It is essential that the sepn. be carried out at low temps. (14°–16°). The buttermilk cream should not contain more than 18–20% fat, and the valves of the centrifuge should be adjusted to obtain this condition. Neither in taste nor in graininess does the sepd. buttermilk differ from the untreated; nor is there any greater tendency toward sedimentation. Buttermilk whose fat content exceeds 1.4% yields sepd. milk contg. 0.4–0.45% fat. A. Leviton

Preparation of milk fat (butterfat) from milk. C. H. Lea and H. P. Hale. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 26–9(1939).—Milk fat was prepared via butter and directly from cream. If the fat is to be used for the reconstitution of milk or butter, evapn. of the water from the cream must be carried out at a relatively low temp. to avoid production of a "butter-toffee" flavor. J. S. Hicks

The applicability of methods for determining biacetyl in sour cream and sour skim milk and the effect of dairy wash water on the biacetyl content of butter. W. Mohr and A. Arbes. *Fette u. Seifen* **46**, 214–17(1939).—Comparative tests, with dil. aq. solns. contg. known amts. of biacetyl (I) and with butter, showed reasonably good agreement between the method of M. and Wellm (*C. A.* **32**, 8025[1]) and the rapid method of Schmalfuss and Werner (*C. A.* **32**, 4677[7]). When milk or cream was treated with certain metal salts and then (*a*) soured and stored for approx. 20 hrs. or (*b*) allowed to sour during such storage, the I content was increased over that of the control sample without addn. of metal salt. The metal salts tested were, in order of increasing effectiveness, $CuCl_2$, $MnCl_2$, $FeCl_3$ and a combination of all 3. The salts were added in amts. of 0.5–2 mg./l. of milk or cream. Addn. of the salts to cream or milk immediately before detg. I was without effect on the results. Washing butter with water contg. 0.5–1.5 mg./l. of various salts of Fe, Mn and Cu had no effect on the I content of the butter. J. W. Perry

Effects of tomato juice on the production of flavor contributants in butter cultures. Clement W. Abbot. *Iowa State Coll. J. Sci.* **14**, 3–5(1939).—Fresh tomato juice or pulp or sliced tomatoes dried in the sun or some samples of canned tomato juice hastened the rate of formation of acetylmethylcarbinol and biacetyl which are assocd. with the aroma of fine butter. No significant concn. of the potency was effected and it seems certain that the citric acid content has but slight effect. F. E. Brown

Rapid objective determination of the flavoring agent of enzymes used in butter making. L. Khikalo. *Molochno-Maslodel'naya Prom.* **5**, No. 4, 25–6(1938); *Chimie & industrie* **42**, 559.—The method is similar to that used for detecting the flavoring agent ("acetoin-biacetyl") in butter. Shake 2 cc. of the enzyme with 2 cc. of 30% KOH soln.; after 15–20 min. when the reaction is pos. there appears a pink coloration which progressively turns red. A. Papineau-Couture

Application of the phosphatase test to butter. E. H. Parfitt, W. H. Brown and G. W. Shadwick. *Am. J. Pub. Health* **30**, 240–6(1940); cf. *C. A.* **33**, 2234[8].—No relation was found to exist between the phosphatase value of the butter and its yeast and mold count, total bacterial count and its keeping quality as measured by drop in score. The agreement secured between 2 labs. on identical samples of butter was closer with the short methods than with the 1-hr. method. A higher percentage of phosphatase pos. reactions was found coming from plants using flash systems of pasteurization than from plants using vat systems. However, some plants which were flash pasteurizing consistently yielded neg. phosphatase reactions; this indicated that the process was not at fault. Owing to the possibility that the enzyme is concd. in butter, and because of the lack of knowledge concerning its partition in butter from cream, further studies on this point are indicated. It has been found that under the conditions which butter is marketed a significant no. of samples will react neg. when fresh, and pos. after receiving treatment comparable to com. methods of distribution. Six references. J. A. Kennedy

Development of the Norwegian margarine industry, 1929–1938. L. Erlandsen. *Allgem. Oel- u. Fett-Ztg.* **36**, 250–3(1939); cf. *C. A.* **34**, 536[3].—A review. Statistics illustrating production and the changes in raw material compn. are quoted. B. C. P. A.

Susceptibility of pig fat to oxidation. C. H. Lea. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 60–4(1939); cf. *C. A.* **33**, 252[3].—Three factors are: the inherent tendency of the particular mixt. of fatty glycerides present to oxidize, the concn. or activity of the natural antioxidants or inhibitors deposited with the fat and the activity of the fat-oxidizing enzyme ("lipoxidase"). The degree of unsatn. as measured by the I value is not necessarily the limiting factor in detg. stability. J. S. Hicks

Rancidity in fats. A. Banks. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 106–12 (1939).—During the storage of frozen herring, the activity of the oxidizing enzyme at the temp. of storage and the change in potency (or concn.) at that temp. are two important factors affecting the development of rancidity. The enzyme is more active in the presence of NaCl, and its

potency is greater the lower the temp., so that −10° is not suitable for the storage of herring. J. S. Hicks

Effect of antioxidants on the stability of vitamin A in ghee exposed to sunlight. N. S. Doctor and B. N. Banerjee. *Current Sci.* 8, 513(1939); cf. *C. A.* 31, 4714.—Although hydroquinone, Na citrate and Na tartrate retard the rate of autoxidation in ghee they do not retard or minimize the destructive action of light on the vitamin A of ghee. The carotene naturally present has no protective action against the effect of light. H. L. M.

The vitamin A content of cheese. Alan W. Davies and Thomas Moore. *Biochem. J.* 33, 1645-7(1939).—English Cheddar cheese in biol. tests showed about 7.5 I.U. per g. vitamin A. This was about the amt. to be expected from its milk fat content and from colorimetric estns. of vitamin A and carotene. Colorimetric detns. on other full-milk cheeses gave similar results. Lower values were obtained for cheeses of lower fat content. E. W. S.

Munster-type ewe-milk cheese. A. S. Kara-Oglanov. *Molochno-Maslodel'naya Prom.* 1939, No. 1, 19; *Chimie & industrie* 42, 717-18.—The manuf. of this cheese is described. Its av. compn. is as follows: H_2O 39.5, fat 35, fat on dry basis 57, salt 3, total N 3.18, sol. N 2.27 and proteins 20.5%. A. Papineau-Couture

The addition of new substances in the manufacture of cheese. W. Scheimpflug. *Molkerei-Ztg.* (Hildesheim) 53, 1964-5(1939).—Gum tragacanth 0.176%, "Johannisbrotkernmehl" 0.513%, and pectin solns. 0.0274% were examd. for stability. Only the pectin soln. was found to be free of sediment. One part of either gum tragacanth or "Johannisbrotkernmehl" formed a gel with 30 parts H_2O. These observations formed the basis for the conclusion that neither the gum nor the "Johannisbrotkernmehl" could be used in the manuf. of cheese with the same favorable results obtained with pectin. A. L.

Methods of improving egg quality. L. A. Wilhelm. *Poultry Sci.* 19, 3-8(1940); cf. *C. A.* 33, 9394[5].—Eggs of known albumin index were prepd. for storage in several ways, namely, in standard 2 by 6 egg cartons (I), sealed in airtight containers under normal atm. conditions (II), sealed in airtight containers in an atm. of CO_2 (III), sealed in containers under vacuum (IV) and subjected to a vacuum with release of the vacuum with CO_2 before the container was sealed (V). The containers were stored at 30, 50, 70 and 90°F. None of the treatments was superior to I for short-time holdings at the usual storage temp. (30°F.). When eggs were held at temps. above 30°F., II effectively reduced quality losses from those in I, III, while resulting in a turbid albumin, was effective in preventing the loss of interior quality even at high temps. IV was superior to I but had little advantage over II and usually resulted in an adhering of the thick albumin to the shell membrane. V did not give results that were consistently superior to those obtained with III. Eggs packed in airtight containers developed molds quite rapidly when held at high temps. unless CO_2 was added. K. D. J.

Dried meat. T. Moran and E. C. Bate Smith. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* 1938, 34-5(1939).—Minced meat dried rapidly at ordinary temp. *in vacuo* over $CaCl_2$ retains its fresh color and flavor and reabsorbs water, so that it is soft and elastic when cooked. J. S. Hicks

Chemical composition of some canned meats. V. Kirillov. *Myasnaya Ind. S. S. S. R.* 9, No. 9, 33-4 (1938); *Chimie & industrie* 42, 721.—Chem. analysis (total N, fat, H_2O, NaCl, ash) of various canned meats (smoked beef, boiled beef, beef tongue, liver pâté) showed that the latter possessed the highest cal. value (336 cal., as compared with 224-245 cal. for the other products examd.) and the highest fat content (28.32% as compared with 12.28-17.09%). A. Papineau-Couture

New method for determining collagen in meat and sausage. N. Krylova. *Myasnaya Ind. S. S. S. R.* 10, No. 6, 29-32(1939); *Chimie & industrie* 42, 721.—The method is based on extn. of the collagen in the autoclave (after sepn. of the plasma proteins) for 2 hrs. under 1.5 atm. After concn. of the filtrate, alc. is added, then $CuSO_4$, and N is detd. in the ppt. by Kjeldahl's method. A. Papineau-Couture

Use of nitrites and nitrates in preservation of meat. J. Sampaio Fernandes. *Rev. soc. brasil. quim.* 7, 184-9 (1938).—After clarification with tannic acid, nitrate ion is detd. by $OHC_6H_4SO_3H$. The soln. is distd. to small bulk and nitrite ion detd. in the distillate. B. C. P. A.

Modification undergone during storage by meat frozen by various processes. N. Golovkin. *Myasnaya Ind. S. S. S. R.* 10, No. 2, 29-34(1939); *Chimie & industrie* 42, 654.—In meat that has been frozen by the accelerated process, formation of lactic acid during storage is smaller than in meat frozen by the standard process, rapid cooling retarding the decompn. of glycogen. Though variations in the physicochem. consts. seem to indicate that meat which has been frozen rapidly keeps less well, organoleptic tests would seem to indicate the contrary. This contradiction is due to the fact that, in rapidly frozen meat, decompn. of glycogen and of lactic acid plays a relatively unimportant part, the crust protecting the meat against the development of the microflora. A. P.-C.

Swelling of quick-frozen and slow-frozen meats. S. P. Bystrov. *Kholodil'naya Prom.* 17, No. 1, 41-2 (1939); *Chimie & industrie* 42, 807; cf. *C. A.* 33, 3474[6].—Quick-frozen meat swells more than slow-frozen meat. It can be deduced that quick-frozen meat undergoes less change than meat which has been frozen progressively. When frozen meat is swollen in buffer solns., equil. is reached in 24 hrs. A. Papineau-Couture

Meat packing plant installations for the treatment of wastes. G. L. Childress. *Proc. Texas Water Works Sewage Short School* 21, 129-33(1939).—See *C. A.* 33, 8841[5]. J. E. D.

Oil used in packing sardines. Elmer R. Tobey. *Maine Agr. Expt. Sta., Official Inspections Bull.* 171, 163-5 (1939); cf. *C. A.* 33, 7414[6].—All 50 samples of cottonseed oil used for packing sardines contained less than 0.05% dissolved moisture and 0.10% free fat acid. C. R. Fellers

Shellfish. Elmer R. Tobey. *Maine Agr. Expt. Sta., Official Inspections Bull.* 171, 166-9(1939).—Clams opened under proper conditions, washed but not soaked, show an analysis of free liquids not more than 10%, solids on the drained meats not less than 16% and a score not exceeding 50. In 72 samples examd., the free liquid varied from none to 20.56%, with only 2 exceeding 10%. Fifteen samples contained less than 15% solids on the drained meats. Shucked oysters showed 11.27-17.56% solids on the drained meats. C. R. Fellers

Spoilage of fish. J. M. Shewan. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* 1938, 79-87 (1939).—By the borate distn. method, spoilage was followed over a period of 25-30 days and was found to proceed quite differently in the 3 species studied. Both secondary amines and tertiary amines can be used as indexes of freshness in haddock stowed in ice. Perch and dogfish spoilage were also studied. J. S. Hicks

Electrometric titration of fish's muscle. C. L. Cutting. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* 1938, 89-95(1939); cf. *C. A.* 33, 2526.—A study of perch, pike, trout and haddock did not explain the loss of buffering capacity in fish's muscle during cold storage. J. S. Hicks

Cold storage of herring. A. Banks. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* 1938, 95-6 (1939).—The peroxide values of the fish stored at −30° ranged from 0.2 to 1.0 (ml. 0.002 *N* thiosulfate per g. of fat). J. S. Hicks

Production of volatiles by apples: effects of temperature, maturity, technique of estimation, etc. F. Kidd and C. West. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* 1938, 136-9(1939).—There was no evidence that accumulations of volatile matter and of CO_2 such as may normally be met with in ordinary storage or cold storage depress the production of volatile matter. J. S. Hicks

Gas storage of Cox's orange pippin apples on a commercial scale. F. Kidd and C. West. *Dept. Sci. Ind. Re-*

search (Brit.), *Rept. Food Invest. Board* **1938**, 153–6 (1939); cf. *C. A.* **34**, 1855.—After 5 months' storage the amt. of wasty fruit in 5% CO_2 + 2.5% O was only about 15%, as compared with 47% in air controls and 54% in 5% CO_2 + 16% O. J. S. Hicks

Rise in insoluble ("protein") fraction of the total nitrogen during the climacteric in apples and pears, and effect on this phenomenon of retarding the climacteric by carbon dioxide or stimulating the climacteric by ethylene. F. Kidd, C. West and A. C. Hulme. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 119–25 (1939).—In air, "protein" N increases at the expense of sol. N during the climacteric rise in respiratory activity. When the climacteric is delayed by CO_2, the rise in "protein" N is also delayed. Whether the climacteric is induced by C_2H_4 or whether it occurs normally, the parallelism between the respiration-climacteric and the increase in "protein" N holds. J. S. Hicks

Alcohol-insoluble (protein) nitrogen fraction of the apple fruit. A. C. Hulme. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 125–7(1939); cf. *C. A.* **33**, 1991.—Extn. under reflux on a boiling water bath with 0.25% NaOH for 1.5 hrs. caused 82% of the N of the tissue to go into soln. At pH 3.5 a brownish red ppt. formed, which represented 80% of the N of the ext. This material gave a strong xanthoproteic reaction for protein and also a pos. test for P. On acid hydrolysis, the hydrolyzate gave strongly pos. tests for tyrosine and arginine. J. S. Hicks

Relationship between protein content and rate of respiration in the cell of the apple. A. C. Hulme and W. H. Smith. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 127–8(1939).—The rate of respiration is approx. proportional to the content of alc.-insol. ("protein") N. J. S. Hicks

Grape-wastage investigations, 1938. J. M. Rattray. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 65–74(1939); cf. *C. A.* **33**, 9471.—Wastage of grapes in storage, caused by *Botrytis* infection, was considerably less in bunches wrapped in sulfite paper than in those wrapped in Crystalline paper. K. D. Jacob

The use of alkyl chloramines and tertiary alkyl hypochlorites as volatile preservatives for grapes. J. E. Van der Plank and J. M. Rattray. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 74–6(1939).—Diethylchloramine (0.18–0.35 cc. in 0.65–0.82 cc. triacetin) and tertiary butyl hypochlorite (0.1–0.4 cc. in 0.8–1.9 cc. mineral oil or 0.2 cc. in 0.8 cc. of triacetin or ethylene glycol diacetate), impregnated into plugs as solns. in mineral oil or in nonvolatile satd. esters, were sufficiently volatile and fungicidal to control *Botrytis* waste in table grapes. In some cases the grapes exhibited a definite off-flavor after storage, while in others there was no off-flavor or odor of the preservative. K. D. Jacob

A device for the regulated release of sulfur dioxide in packages of stored table grapes. J. E. Van der Plank. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 76–8(1939).—An intimate mixt. of finely divided, dehydrated $Al_2(SO_4)_3$ and $NaHSO_3$ is stable when dry, but gives off SO_2 as water is absorbed from humid atms. Evolution of the SO_2 is controlled either by (1) enclosing suitable amts. of the mixt. in packets of varying permeability to water vapor, (2) reducing the absorbing surface of the packet or (3) including within the packet a hygroscopic substance capable of temporarily withholding water from the hydrolytic reaction (an excess of dehydrated $Al_2(SO_4)_3$ is suitable for this purpose). Two types of containers suitable for holding the reagent are described and exptl. results obtained therewith are given. K. D. Jacob

Further investigations of factors affecting "drop" and desiccation of stalks of Waltham Cross [grapes] in storage. E. Beyers. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 79–87 (1939); cf. *C. A.* **33**, 9471.—The amber color and good amber color and good flavor of high-quality Waltham Cross grapes necessitate picking at a stage of maturity slightly more advanced than the min. requirements for the sugar:acid ratio and this tends to reduce drop after storage, but undue delay in picking results in deterioration of keeping quality in other respects. K. D. Jacob

Composition and by-products of pineapples. J. C. Bodenstein. *Farming S. Africa* **12**, 437, 448(1937).—Analyses of pineapple juice are recorded and discussed. The ash of the juice contains approx. 50% K_2O. The CaO content is approx. 3 times that of MgO. A neg. correlation exists between the K_2O and CaO values. B. C. P. A.

Treated wraps for the prevention of fungal rotting. R. G. Tomkins. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 186–9(1939).—Wraps treated with *o*-phenylphenol and either benzidine or hexamine do not injure oranges and retard rotting due to *P. digitatum*. The most suitable proportions to use are 35 parts hexamine to 170 parts of *o*-phenylphenol. J. S. Hicks

Dipping for the control of fungal rotting of citrus fruit. J. C. Fidler and R. G. Tomkins. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 189–90 (1939).—Two % borax solns. were much more effective with the addn. of 1% NaOH in reducing rotting due to green mold, and dipping oranges in 2% NaOH reduces the mold as effectively as dipping in 5% borax, and leads to less injury to the skin. J. S. Hicks

The use of wraps impregnated with *o*-phenylphenol against decay in oranges. J. E. Van der Plank and J. M. Rattray. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 142–5(1939); cf. Tomkins, *C. A.* **32**, 5521.—*Penicillium* decay of oranges was reduced by the use of wraps impregnated with *o*-phenylphenol (3 g./100 sq. ft. of paper), but there was severe scalding of the rind and this injury was not prevented by the use of tech. white rose mineral oil 25 cc. or paraffin wax 56 g./100 sq. ft. of paper as solvents. Appreciable amts. of *o*-phenylphenol remained in the papers for some weeks and its retention was not affected by the presence of mineral oil or paraffin. K. D. Jacob

Dipping experiments with oranges. J. M. Rattray. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 170–6(1939).—Wyandotte Sterichlor (contg. 16% of Na *N*-chloro-*p*-toluenesulfonamide), Shirlan WS (contg. about 66% of Na salicylanilide), *o*-phenylphenol, *p*-phenylphenol, trichlorophenol, dichloro-*o*-cresol, Na *o*-phenylphenoxide, Na 2,4,5-trichlorophenoxide, Na chloro-*o*-phenylphenoxide and Na tetrachlorophenoxide were compared as disinfectants for oranges that had been suitably wounded and heavily loaded with spores of green mold. In general, the best controls were obtained with Shirlan WS (0.5% plus 0.03% of Agral 2), *o*-phenylphenol (0.5% plus 0.03% Agral 2 plus NaOH) and Na *o*-phenylphenoxide (0.02–0.08%) used at temps. of 95–109° F. The *o*-phenylphenol was injurious to the oranges. K. D. Jacob

Comparative study of quality in oranges from Louisiana and other states. W. D. Kimbrough and Guy Noel Page. *Louisiana Agr. Expt. Sta., Bull.* **311**, 3–16(1939).—Satsuma oranges are seldom exceeded in quality by sweet or navel oranges. La. oranges surpass all others in flavor of the juice. The rinds are thin. The percentages of sol. solids and total sugars are fully as high as fruit from other citrus-growing areas. Analyses of various varieties are given. Ascorbic acid values are not given. C. R. F.

The storage of lemons. J. E. Van der Plank, J. M. Rattray, P. A. Crous and J. Kriel. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 156–69(1939).—Fruit which had been picked moderately green developed more extractable juice, sol. solids and acid if stored at a temp. near 50° F. K. D. J.

Transformation of pectic constituents of plums during normal and abnormal ripening. C. S. Hanes and T. N. Morris. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 129–32(1939).—In each pick there was a gradual decrease in the content of total pectin; in fruit of the immature and mature picks there occurred an increase in sol. pectin at the expense of the insol. pectin

fraction, whereas the sol. pectin of the fully ripe pick remained const. over the short period during which these fruits became overripe. The sol. pectin of plums normally becomes much less viscous in character when the fruits pass from the immature to the mature stage, either while attached to the tree or during storage at temps. at which normal ripening occurs. J. S. Hicks

Sorbitol in pears and its conversion during storage into fructose units. F. Kidd, C. West, D. G. Griffiths and N. A. Potter. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 132–6(1939).—Sorbitol was estd. by the prepn. of the dibenzal deriv., which was hydrolyzed by boiling with 5% H_2SO_4. As a further means of identification, hexaacetylsorbitol was prepd. from the sorbitol obtained from the benzal compd., by heating with Ac_2O in the presence of a few drops of pyridine. Much of the sorbitol is converted into fructose units. J. S. Hicks

Rate of respiration and production of volatiles of conference pears: effects of treatment with ethylene, temperature and wounding. F. Kidd and C. West. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 139–42(1939).—A 3-day application of C_2H_4 to pears 2 weeks after gathering caused the immediate onset of the climacteric and a corresponding rise in the rate of production of volatile matter. The rate of production of volatile matter does not increase with temp. over the usual biol. range, but appears to be at a max. at 5–10°. J. S. Hicks

Production of a physiologically active vapor by unripe pears. R. Gane. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 142–3(1939).—William's Bon Chretien pears, when hard and green and without any yellow color, stored at 0°, evolve a vapor that causes bananas to ripen. J. S. Hicks

Melon-storage investigations, 1938. J. M. Rattray. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 55–65(1939); cf. *C. A.* **33**, 9470⁹. —Wastage, particularly in melons stored at 45°F., was not reduced by dipping Honeydew melons for 1–5 min. in either Shirlan WS (1% soln. plus 0.05% of Agral 2) or Na *o*-phenylphenate (0.1% soln. plus 0.05% Agral 2) at either 75° or 110°F. K. D. Jacob

Gas storage of English-grown Doyenne du Comice pears. F. Kidd and C. West. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 157–60(1939); cf. *C. A.* **33**, 254⁵.—The max. storage life obtained was about 5 months in gas storage, as compared with approx. 4 months in air at the same temp. The incidence of brown-heart is related to the degree of maturity of the fruit when placed in gas storage. J. S. Hicks

Gas storage of Monarch plums. W. H. Smith. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 161–5(1939).—When stored at 45° F., a reduction in the concn. of O_2 to 5%, with or without 2.5% CO_2, wastage from rots and breakdown were considerably reduced. A storage temp. of 34° F. is optimal for these plums. J. S. Hicks

The biochemistry of figs. A. K. Salkova. *Sovet. Subtropiki* **1938**, No. 10, 48–9; *Chimie & industrie* **42**, 563.—Of the various methods of drying figs, sun-drying gives the most satisfactory results and is least injurious to the flavor of the fruit. It is useful to fumigate the fruit with S before drying in order to prevent acidification. The sugar content of figs does not increase with age; it depends only on the amt. of sunlight to which they were exposed, degree of ripeness, etc. A. Papineau-Couture

Storage of plums. Rees Davies, W. W. Boyes and D. J. R. de Villiers. *Union S. Africa, Dept. Agr. & Forestry, Rept. Low-Temp. Research Lab.* **1937–38**, 13–28 (1939); cf. *C. A.* **33**, 3014⁹.—Prestorage treatment of Kelsey plums in high concn. of CO_2 (30%) did not assist color development and ripening after storage. Storage in high concns. of O_2 (40–80%) had no effect on the rate of ripening or on the incidence of internal breakdown. K. D. Jacob

Does the quinhydrone procedure yield false pH values for fruit juices, silage, etc.? Holger Jørgensen. *Biochem. Z.* **302**, 281–6(1939).—The quinhydrone electrode is shown to be specially suited for the study of the pH of fruit juices, and results obtained by this procedure agree within about 0.1 of a pH unit with the glass-electrode detns. S. Morgulis

Gas-storage of broccoli. W. H. Smith. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 202–8(1939).—At 38° F. the broccoli kept best in the atm. contg. 10% of CO_2 and 5% O_2. The more preferable storage temp. of 32°F. indicated that a storage life of 4 weeks might reasonably be expected in an atm. contg. 10% of CO_2 plus 10% of O_2. J. S. Hicks

Variety and strain of Alaska and sweet types of peas for canning in Maryland. C. H. Mahoney, W. A. Frazier, H. A. Hunter and Albert White. *Maryland Agr. Expt. Sta., Bull.* **425**, 219–34(1939).—Varietal tests were correlated with canning quality, especially with tenderness as detd. by a *tenderometer*. The several Alaska strains had approx. the same degree of tenderness and quality. The sweet varieties must be harvested at a relatively immature stage to obtain satisfactory quality. C. R. Fellers

Determining the grade of peas from the raw product. E. P. Walls, W. B. Kemp and H. L. Stier. *Canner* **90**, No. 15, 28–30(1940).—From tenderometer readings on the raw peas it was possible to predict with a fair degree of accuracy the grade of the canned product. There was closer correlation in the smaller sizes of peas than in the larger sizes. Texturemeter readings were not as reliable in grade prediction as tenderometer data. C. R. F.

Reducing substances in the potato. F. A. Isherwood. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board* **1938**, 198–9(1939); cf. *C. A.* **33**, 2568.—Besides tyrosine, a small amt. of tryptophan is present in the exts. of the potato. Evidence indicates the presence of a second phenolic compd., related to tyrosine, which gives a strongly pos. Millon reaction. J. S. Hicks

Ascorbic acid content of potatoes. S. S. Zilva and J. Barker. *Dept. Sci. Ind. Research* (Brit.), *Rept. Food Invest. Board*, **1938**, 199–201(1939).—Immature King Edward VII potatoes are rich in ascorbic acid, and the content decreases rapidly in storage. In one sample the concn. fell from 38.9 mg./100 g. to 16.0 mg./100 g. after about 3 weeks. J. S. Hicks

The vitamin C content of dried potatoes. Javillier. *Compt. rend. acad. agr. France* **25**, 1093(1939).—Processing of potatoes in the prepn. of vermicelli does not entirely destroy the vitamin. The vitamin C content of the dried potatoes is about 20 mg. per 100 g. and for the untreated potatoes (70% H_2O) is 6 mg. per 100 g. J. R. Adams

Inhibition of sprouting of potatoes. G. I. Grechka. *Spirto-Vodochnaya Prom.* **15**, No. 12, 12–14(1938); *Chimie & industrie* **42**, 564; cf. *C. A.* **34**, 1710⁸.—Treatment of potatoes with chloro and bromo derivs. of aliphatic hydrocarbons for 24 hrs. at a concn. of 1.1000 prevents sprouting for a certain length of time. The bromo derivs. are more effective in this respect than the chloro derivs.; neither affect the flavor of the potatoes nor destroy vitamin C. A. Papineau-Couture

Maple sirup. Elmer R. Tobey. *Maine Agr. Expt. Sta., Official Inspections Bull.* **171**, 159–62(1939).—The moisture, sucrose, ash, Pb no. and Pb content are given for 81 com. brands of maple sirup. The sucrose content varied from 50.89 to 71.1% with an av. of about 66.5%. Eleven samples contained 0.02 or more grains per lb. of Pb. Maple sirup contains not more than 35% water. C. R. Fellers

Flavor in confections. I. The physiological aspects. Talbot Clendenning. *Mfg. Confectioner* **20**, No. 1, 17–19 (1940). **II. Methods of evaluation.** *Ibid.* No. 2, 23–5.—This includes tests (with sucrose and citric acid solns.) and requisites for tasters. **III. Taste-provoking agents.** *Ibid.* No. 3, 21–2.—A review of substances having (1) sweet, (2) sour, (3) salt and (4) bitter tastes. George Ayers

Physical and chemical properties of California honeys. J. E. Eckert and H. W. Allinger. *California Agr. Expt. Sta., Bull.* **631**, 3–27(1939).—Analyses of 37 honey types characteristic of Calif. are given. The av. Calif. honey contains moisture 16.5, total sugars 77.58, levulose 40.41,

dextrose 35.54, sucrose 2.53, dextrin 0.91, ash 0.21, formic acid 0.16 and undetd. matter 4.72%. The levulose/dextrose ratio is 1.17, the wt. per gal. 11.88 lb. and color 49, or extra light amber. The use of the Abbé refractometer gives fairly accurate results for moisture, solids and wt.-per-gal. detns. Heat darkens honey in proportion to the temp., within limits. Since 22.6% of the natural Calif. honeys exceeded the Federal standard of 0.25% ash, a higher ash tolerance should be set in order to prevent discrimination against Calif. honeys. "Honeydew" honeys are made by bees from the saccharine exudates of certain trees and insects, and while they are indistinguishable by analysis, the flavor and color are usually poor. Some samples are also very viscous. They are of value mainly to the bakery trade. C. R. Fellers

Flavoring characteristics of individual cacao varieties. P. S. Lucas and I. A. Gould. *Michigan Agr. Expt. Sta., Quart. Bull.* 22, 12–17 (1939).—Ash and fat contents of cacao samples used for dairy foods were very similar but there were marked variations in their pH values. In general, the stronger varieties of cacao beans having a chocolate flavor of the bitter type were preferred. C. R. F.

Rapid method of determining nitrogen for estimation of protein content of grain and feeding stuffs. H. Schroder and D. Seidel. *Allgem. Mühlen-Ztg.* 42, 215 (1939).—After digesting with a Se mixt. in the usual manner, the dild. and neutralized liquid is treated with CH_2O. This, with the NH_4 salt present, forms $(CH_2)_6N_4$ and H_2SO_4; the latter is titrated. The accuracy is high, even with inexperienced workers. B. C. P. A.

Production and use of Hevea oilcake. L. Enderlin and J. Le Bras. *Rev. botan. appl. agr. trop., Reprint* 17, 175, 268, 22 pp. (1937).—A review is given covering the yield, character and treatment of the seeds and the compn. of the pressed cake with especial reference to HCN. In connection with possible use of the cake for cattle, a comparison is drawn with linseed cake; its use as a fertilizer would be economically unattractive. B. C. P. A.

Fermentation as a method of biologically influencing feeds and productivity of livestock. M. I. D'yakov, N. P. Okladnov and P. M. Kruppennikov. *Soviet Zootechnics* 1, 27–57 (1939) (English summary); *Dairy Sci. Abstracts* 1, No. 1, 8.—Concd. and mixed feeds fermented with yeasts, when compared with silage, gave no increase in milk yields and did not change the compn. of the milk. C. L. B.

Ensiling potatoes and spinach. O. Ulvesli. *Meldinger Norges Landbrukshøiskole* 18, 460–89 (1938); *Chimie & industrie* 42, 569.—Tests on ensiling potatoes were carried out: (1) without any addn., on tubers that had been rasped; (2) by the A.I.V. process, on both rasped and unrasped tubers. The results of nearly all the tests were satisfactory. The exceptions were due to defective moistening in the case of whole potatoes. Ensilage, however, produces a loss in proteins, which is due chiefly to entrainment by the water that drains from the tubers. The protein loss may reach 50% in the 1st case and 30% in the 2nd. An ensilage of spinach carried out according to the A.I.V. process showed a loss of 18% of protein and a certain amt. of waste in the top layer. A. P.-C.

Epidemic of ascending peripheral polyneuritis at Mauritius in March and April, 1938. J. Balfour Kirk and R. Lavoipierre. *Bull. office intern. hyg. publ.* 31, 1480–4 (1939).—This epidemic was probably caused by the ingestion of soybean oil contaminated with tri-*o*-tolyl phosphate. Ruth Berggren

Determination of total acidity in ensiled fodder. M. I. Ivchenko. *J. Applied Chem.* (U. S. S. R.) 12, 1104–8 (in French, 1108) (1939).—The acids were completely extd. by boiling the sample with water for 15 min. A. A. P.

The acidification process in silage. Carlo Arnaudi and Isidoro Politi. *Boll. sez. ital., Soc. intern. microbiol.* 11, 217–27 (1939).—In silage of *Medicago sativa* and *Sorghum saccharatum* the acidity developed is due principally to the enzymic action of microörganisms. G. A. Bravo

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Effects of milk wastes on Bristol Avon (Pentelow, *et al.*) 14. Factors influencing external corrosion of Sn containers (Dykstra) 9. Control of external corrosion of cans (Smith) 9. Investigations on content of grit and dust-forming constituents in dried chips, Steffen chips and original sugar-beet chips [all used as cattle feeds] (Spengler, *et al.*) 28. Working up animal cadavers [for feed for animals] (Friedsam) 27. Sedimentation and diffusion measurements on pectic substances [from apples, currants and citrus fruits] (Saverborn) 2. Viscosity-lowering condensation products from higher fatty acids and their esters [for use in foods] (U. S. pat. 2,185,592) 13. Multiply metal foil [for use with food products] (U. S. pat. 2,185,649) 9. Mixing powders with liquids, as in prepg. regenerated milk (U. S. pat. 2,186,033) 1.

Balzli, Hans: Inulin-Gemüse; neue Speisen für Zuckerkranke und fur Gesunde. Leipzig: A. Müller. 145 pp.

Damblon, Heinrich: New Method of the Manufacture of Chocolate, Cocoa Powder and Confectionery. Cologne: Buch- und Kunsthandlung J. Höfer in Komm. 155 pp. M. 12.50.

Hinton, C. L.: Fruit Pectins—Their Chemical Behavior and Jellying Properties. New York: Chemical Publishing Co. $1.75.

Lunde, Gulbrand: Vitamine in frischen und konservierten Nahrungsmitteln. Berlin: Hirschwaldsche Buchhandlung. 271 pp. M. 18.60; bound M. 20.40.

Plimmer, Violet G.: Food Values at a Glance, and How to Plan a Healthy Diet. 2nd ed. London: Longmans, Green and Co., Ltd. 190 pp. 6s. Reviewed in *J. Roy. Inst. Pub. Health Hyg.* 3, 86 (1940).

Scotti, Giuseppe: Corso di chimica bromatologica dalle lezioni di G. Scotti. Florence: Casa editoriale poligrafia universitaria di C. Cya. 578 pp.

Heat-treating cereals and other food products. Logan A. Dils (45% to Robert M. Foster; 50% to H. S. Cramer; and 5% to Douglas McCabe). U. S. 2,185,053, Dec. 26. App. is described, and the use of a mixt. such as one contg. NaCl 91.5–82.5, KCl 3–5, $CaCl_2$ 2–3.5, tribasic Ca phosphate 1–2, $FeSO_4$ 0.5–1.0, LiCl 0.5–1.0, $CaCO_3$ 0.5–3 and $MgCO_3$ 1–2% (suitably at a temp. of about 230–300°) for dry-cooking or roasting cereals, legumes, coffee or other food products, the cooking being followed by flaking or puffing if desired. U. S. 2,185,054 relates to a generally similar process for treating rice, etc.

Dextrinized bread ingredient prepared from potatoes. William S. Bowen. U. S. 2,185,368, Jan. 2. A product intended for use as a yeast activator, gluten strengthener, crust-color improver and aid to moisture retention in making bread or the like is prepd. by cooking potatoes, removing the skins, mixing about 7 parts of the peeled potatoes with about 1 part of a slightly acid mixt. such as one contg. mono-Ca phosphate 62, $CaSO_4.2H_2O$ 10, NH_4Cl 8 and NaCl 20% and with water and heating to about 70–95° to form a smooth paste or liquid which may then be spray-dried.

Device (with slotted telescoping tubes) for taking samples of milk or other fluids. John Sollie. U. S. 2,185,661, Jan. 2. Various structural and operative details.

Stabilizing the natural green color of vegetables such as peas, asparagus or spinach. James S. Blair (to American Can Co.). U. S. 2,186,003, Jan. 9. A method of stabilizing the natural green color of vegetables during canning and storage comprises, blanching the vegetable product in water which has been made mildly alk. by the addition of $NaHCO_3$ at about 82–88°, cooling the blanched vegetables in water which has been made mildly alk. by the addn. of lesser amts. of $NaHCO_3$ than that used in blanching, soaking the blanched and cooled vegetables in a water bath contg. NaCl at room temp. for approx. 3 hrs. to render the product more susceptible to the establishment of an alk. reserve, adding to water a mixt. of Mg and Ca hydroxides to provide a brine, incorporating the treated brine with the blanched product, hermetically sealing the same, and processing the sealed product by heat.

Pectin preservation and extraction. Philip B. Myers

and Wm. W. Cowgill (to Sardik Inc.). U. S. 2,185,472, Jan. 2. Loss of jelly units from pectic raw material such as apple pomace is prevented by soaking the material in a 3–4% aq. soln. of glycerol and then drying the material. Cf. *C. A.* **33**, 7920[4].

Jellies, etc. Gustave T. Reich (to Pennsylvania Sugar Co.). U. S. 2,185,064, Dec. 26. App. is described, and a process which involves removing water from a mixt. of fruit juices and sugar, and inverting the major portion of the sugar content, in separate operations, the inversion of the sugar being effected at a temp. below the b. p. of the soln. before concn. by evapn. of water.

Treated paper suitable for wrapping foods. Arthur Ryner (to Preservators Ltd.). U. S. 2,185,954, Jan. 2. A wrapping or packing material such as paper is treated with a compd. which evolves NH_3 when subjected to the action of CO_2.

Self-sealing waxed paper for bread wrappers. William N. MacDonald and Walter Noble. U. S. 2,185,470, Jan. 2. A continuous strip adapted to be cut during a wrapping operation to form individual self-sealing bread loaf wrappers comprises a continuous strip of waxed paper or the like having an edge portion of one of its surfaces coated with a nonwax adhesive which is nonadhesive at ordinary temps. but which becomes adhesive under heat and pressure, the adhesive being in the nature of a terpene resin whose formula is 6-isopropyl-3-methyl-3,6-endoethylenetetrahydrophthalic anhydride, the adhesive being sealed within the wax coating of the strip, and including water. U. S. 2,185,469 (William N. MacDonald, inventor; to George T. Trumbull) relates to a self-sealing wax-coated paper wrapper comprising a sheet of wax-coated paper folded over the object to be wrapped and having its edges lapped, with the laps having a multiplicity of registering perforations filled with wax integral with the wax of the coating, these wax fillings of the holes forming integral wax rivets which bond to one another and to the coating and rivet the laps to each other.

13—CHEMICAL INDUSTRY AND MISCELLANEOUS INDUSTRIAL PRODUCTS

(PLASTICS, RESINOIDS, INSULATORS, ADHESIVES, ETC.)

A. BRUSON

War gases and toxic substances. Louis Diserens. *Teintex* **5**, 45–54 (1940); cf. *C. A.* **34**, 2489[9].—The prepn., phys. and chem. properties, and physiol. action of the following are discussed: *Respiratory irritants;* $C_2H_5AsCl_2$, $(C_6H_5)_2AsCl$, $(C_6H_5)_2AsCN$, and diphenylaminochloroarsine, *Lachrymators;* $C_6H_5COCH_2Cl$ and $C_6H_5CHBrCN$, *General poisons;* CO, HCN, CNCl, and CNBr. Prepn. of papers and solns. used for the detection of poison gases is discussed and formulas are given. A chart is included which gives the name, formula, phys. properties, action, detection, and disinfection for each of the gases included in the paper. Saverio Zuffanti

Chemical war materials. XIII. Light absorption of eye irritants in short wave length ultraviolet. H. Mohler and J. Sorge. *Helv. Chim. Acta* **23**, 100–3 (1940); cf. *C. A.* **33**, 3482[7].—The absorption spectra from 2500 to 1800 A. are given for the following materials dissolved in hexane: bromoacetone, bromomethyl ethyl ketone, ω-chloroacetophenone, ω-bromoacetophenone, benzyl bromide, xylyl bromide and bromobenzyl chloride. **XIV Spectrographic determination of war materials.** *Ibid* 104–119.—M. and S. give extinction-coeff. curves for 17 poisons in hexane soln. and discuss the applicability of spectral analysis to their detn. **XV. Parachor of β,β′-dichloro diethyl sulfide, β-chlorodiethyl sulfide, diethyl sulfide and thiodiglycol. A simple apparatus for surface tension measurement.** *Ibid.* 119–24.—Surface tension and d. of the above substances were measured at several temps. near 20° and the parachors calcd. These agree fairly well with the theoretical values. A simple capillary-rise surface-tension app. is described. W. E. Vaughan

Prevention of industrial dermatitis, with reference to protective hand creams, soap and the harmful role of some cleansing agents. Joseph V. Klauder, Elmer R. Gross and Herman Brown. *Arch. Dermatol. Syphilol.* **41**, 331–58 (1940). Philip D. Adams

Professional dermatoses and their combating. J. Strandberg. *Acta Dermato-Venereol.* **20**, 613–31 (1939).—"Dowicide" substances used to impregnate wood have caused 75% of all occupational diseases known to the insurance companies. These substances, composed partly of chlorinated compds. of naphthol or phenol and their derivs., are causes of occupational diseases and should be compensated. Maurice M. Rath

The incidence of occupational dermatoses and their causes in the basic industries. Louis Schwartz. *J. Am. Med. Assoc.* **111**, 1523–8 (1938). E. H.

Toxicology, clinical aspects and pathological anatomy of nickel-carbonyl poisoning. O. Bayer. *Arch. Gewerbepath. Gewerbehyg.* **9**, 592–606 (1939).—Among 15 cases of Ni-carbonyl poisoning by inhalation, headache, dizziness, then marked dyspnea, cough, fever, and leucocytosis were observed. The urine and blood contained Ni. Intravenous administration of large doses of glucose in high concn., Ca, strophanthin and circulatory stimulants were useful in treating these cases. Autopsy of 2 fatal cases showed hepatization of the lungs and that the alveoli were filled by fibrin with cellular blood elements almost completely lacking. Ni carbonyl acts as an inhalation toxin on the large surface of the respiratory epithelium and produces the symptoms of a toxic pneumonia. M. M. R.

Examinations of printers and female assistants at machines with sprayers. K. Humperdinck. *Arch. Gewerbepath. Gewerbehyg.* **9**, 559–65 (1939).—Paraffin or gum arabic in alc. and H_2O, used for quick drying of printed matter, caused untoward effects. Asthma, bronchitis, nasal catarrh and eczema developed. Common complaints of headache, fatigue and irritability were partly due to inhalation of the alc. In many cases blood examn. showed increases of eosinophils and lymphocytes. Maurice M. Rath

Dust masks and filters. Efficiency and resistance to respiration. Limits of utility in stone and mineral industries. G. Hass. *Arch. Gewerbepath. Gewerbehyg.* **9**, 97–112 (1938).—Tests of various types of respirators are recorded. Desirable properties of such respirators are discussed. B. C. P. A.

Practical application of industrial exhaust ventilation for the control of occupational exposures. B. F. Postman. *Am. J. Pub. Health* **30**, 149–61 (1940). J. A. Kennedy

Larvicides and contact sprays used in mosquito control. E. I. McDaniel. *Michigan Agr. Expt. Sta., Quart. Bull.* **22**, 32–4 (1939).—Both larval and pupal stages of mosquitoes can be killed with a pyrethrum emulsion made up according to the following specifications: liquid soap (actual soap 40%) 5, fuel oil or high-grade kerosene 95, pyrethrum ext. (20-fold) 5 and water 45 gal. Pour the water into the soap and agitate until a heavy foam is formed. Combine the fuel oil with pyrethrum, then pour into the soap and water and agitate for at least 30 min. The resulting concd. emulsion mixes readily with water. The fuel oil should have the following specifications: sp. gr. 32–37°Bé., flash 150 P. F., cold 0°F. pours, b. 350–675°F., viscosity 50–100 Saybolt per sec., surface tension 20 dynes. The color is straw. In using the stock emulsion it is dild. with 12 parts of water and is used at the rate of about 25 gal. of finished spray per acre. This pyrethrum emulsion will not kill fish or plants in ponds. C. R. Fellers

Investigation of jet and of its plastification. I. P. Losev and B. I. Losev. *Wiss. Werke moskau. mendelejeff. chem.-teeh. Inst.* **1938**, No. 3–4, 85–90; *Khim. Referat. Zhur.* **2**,

No. 1, 108–9(1939).—The Matagan, Zhilkin, Zorin, Caucasus-Dushet, and Anabarsk-Olenev samples of jet can be classified with lignite-sapropelites of the ordinary lignite type known as "Iager" or "Iais." They are easily worked on a lathe and polished. Sp. gr. 1.19–1.232. Moisture content after 5 days 0.132%. The investigated samples are acid- and base-resistant, and are insol. in ordinary org. solvents. They become brittle from the action of H_2SO_4. The main disadvantages of jets are their heterogeneous nature, their low heat cond., and the presence of foreign admixts. which cause changes in their electrolyzing properties. Plastification treatments of jets with pine tar, synthetic rubber, and S caused lowered mech. properties as compared with the initial material. The treatment of jet with superheated steam up to 180° and a further compressing at 250° with a 250 atm. pressure gave samples with a temporary resistance to bending of 300 kg./sq. cm. (ebonite 1100). A preliminary treatment with HCl before compressing is proposed in order to obtain a material suitable for the elec. industry. W. R. Henn

Alkyd resin potentialities from unusual reactants. A. G. Hovey and T. S. Hodgins. *Paint, Oil & Chem. Rev.* 102, No. 2, 9–12, 37–8, 42(1940).—This is a discussion of the possibilities of prepg. glyptal or alkyd type resins from (1) hydroxycarboxylic acids, e. g., lactic, citric, tartaric or gluconic, (2) carbohydrates, (3) polyhydric phenols, (4) phthalic acid isomers and chlorinated derivs. thereof or (5) various other polyfunctional compds. 55 references. J. W. Perry

Vinyl resins. S. D. Douglas. *Ind. Eng. Chem.* 32, 315–19(1940).—Although the strong and H_2O-resistant polymers of vinyl chloride (I) are incompatible with the easily molded polymers of vinyl acetate (II), interpolymers of I and II are clear resins combining the good properties of each pure polymer. For these resins, the tensile and impact strengths, abrasion resistance, and viscosity in soln. increase as the mol. wt. increases, while H_2O resistance, *n*, hardness, and elec. properties remain practically const. For surface coatings (e. g., baked lacquers), a copolymer made with 85–7% I, with mol. wt. from 8500 to 9500, is used. A mol. wt. from 9500 to 10,500 is preferred for coating paper by callendering. The same resin is used for injection molding, radio transcription records, and floor tile. For compression molding, the mol. wt. should be 12,000 to 13,000 and for sheet stock, 15,000 to 16,000 with the resin made with 88–90% I in the latter case. Fibers are made by extruding a soln. of this last resin through spinnerets. Since these have high wet strength and are not attacked by molds, etc., they are of interest in awnings, fish lines, etc. Woven with other fibers, they produce interesting effects, such as crease permanence and crease resistance. The copolymers with mol. wt. 20,000 to 22,000 made with 95% I can be plasticized to rubber-like masses suitable for coating wire. Pertinent patents are listed. Arnold M. Collins

Technology of hardenable synthetic resins. W. Röhrs. *Atti X° congr. intern. chim.* 4, 190–9(1939).—History of the development of applications of synthetic resins in Germany. Arnold M. Collins

New method of obtaining coumarone resin with simultaneous purification of benzene fractions. G. N. Tyutyunnikov. *Coke and Chem.* (U. S. S. R.) 9, No. 1, 31–2(1939); *Chimie & industrie* 42, 536; cf. *C. A.* 34, 1465[2,6].—The method is based on the fact that diene compds.: cyclopentadiene, indene, coumarone, etc., present in crude benzene fractions (solvent naphtha, medium-light fraction) readily react with maleic anhydride, quinone, α-naphthoquinone and similar substances, with formation of high-melting resinous substances. Maleic anhydride, more particularly, gives alkali-sol. products, m. 168–70°, that can replace rosin. A. P.-C.

Linear coefficient of thermal expansion of ambroid. E. W. Yetter. *Rev. Sci. Instruments* 10, 147(1939).—The linear coeff. of expansion of ambroid (used for bushings in a high-pressure ionization chamber) varies from 5.36 to 5.56×10^{-5} from 20° to 60°. B. C. P. A.

The synthesis of plastic masses. III. S. N. Ushakov. *Priroda* 25, No. 7, 29–37; 26, No. 5, 11–20/No. 8, 29–38 (1937); *Chem. Zentr.* 1937, I, 2273; 1938, I, 1006, 4540.—A review. M. G. Moore

Polyacrylic acid glasses. Ernst Jenckel and Erwin Bräucker. *Z. physik. Chem.* A185, 465–8(1940).—Polymerized acrylic acid is a typical glass; this is shown by its temp.-vol. curves in both the sol. and insol. forms. The rate of polymerization of the acid dissolved in xylene was detd. qualitatively from 80° to 250°; below 80° it is immeasurably slow and above 130° it is practically explosive. The mol. wts. of the products obtained below 130° ranged between 21,000 and 17,000, indicating a degree of polymerization of 290 to 240. The behavior in soln. was essentially the same as that without a solvent. T. H. D.

Polystyrene glasses of different chain length and the water-permeability of milled polystyrene. E. Jenckel, K. Ueberreiter and F. Woltmann. *Atti X° congr. intern. chim.* 4, 184(1939); cf. *C. A.* 33, 452[1].—All polystyrenes are glasses which soften without the formation of a new phase and show a break in the vol.-temp. curve which is also characteristic of glass. The freezing range is raised by increase in chain length and broadened by mixing polymers of different mol. wt. Introduction of small mols. (e. g., paraffin oil) into the polymer lowers the freezing temp. and flattens both branches of the vol.-temp. curve. The elastic deformation is analogous to the vol. after-effect in glass and consists of a momentary deformation and a temporary after-effect, whose speed increases exponentially with temp. The modulus of elasticity increases as the temp. rises. The permeability to H_2O increases with temp. After heating above 60°, where the milled sheets shrink, the H_2O-permeability decreases in spite of the greater thickness but increases somewhat if the sheets are mechanically stretched. A. M. Collins

Directions for the preparation and examination of lactic acid raw casein. Walter Muller and S. Lichtenberger. *Deut. Molkerei-Ztg.* 60, 1010–13(1939); cf. *C. A.* 34, 534[7].—Directions are given for the prepn. of lactic acid casein involving the use of butter cultures and sour whey. Methods of examn. are also given. A. Leviton

Rapid determination of moisture in casein. D. Volotovskii. *Molochno-Maslodel'naya Prom.* 5, No. 4, 8–10 (1938); *Chimie & industrie* 42, 359.—The powd. casein is heated in an Al dish over an alc. lamp in a nonaq. medium consisting of paraffin or ceresin to protect the casein against overheating. A. Papineau-Couture

Determination of moisture in commercial casein by Dean and Stark's method. P. Paradnia. *Molochno-Maslodel'naya Prom.* 5, No. 4, 10–11(1938); *Chimie & industrie* 42, 360.—Water is displaced from the casein by means of toluene vapors; the water and solvent vapors condense in the graduated portion of the app.; the emulsion seps. into 2 layers, and the vol. of the lower aq. layer is then read. A. Papineau-Couture

Asbestos industry in 1938. Oliver Bowles and K. G. Warner. *Rocks and Minerals* 15, 82–4(1940). L. S.

Asbestos. O. Jay Myers. *Rocks and Minerals* 15, 3–12(1940).—A discussion of occurrence, mining, manufg. and uses. Leopold Scheflan

Heat insulation for modern American steam power plants. E. T. Cape and W. F. Kinney. *J. Inst. Fuel* 13, 44–9(1939).—Tests for detg. the properties of various insulating materials are discussed and 9 such materials are compared in regard to working temp., installation d. and thermal cond. D. A. Reynolds

The selection of an emulsifier for the preparation of oil emulsions. A. A. Ghellerova. *Farm. Zhur.* 12, No. 1, 22–6(1939); *Chimie & industrie* 42, 868.—Na caseinate is a good emulsifier for oils and can replace gum arabic for this purpose. Emulsions prepd. with caseinate are more stable than those prepd. with gelatin. A. P.-C.

Recovery of used solvents. D. G. Miller. *Ind. Finishing* 16, No. 4, 14–16, 21;. No. 5, 46, 48, 50, 52(1940).—A discussion of distn. of used solvents. George Ayers

Chlorinated derivatives of acetylene. L. Marcheguet. *Méd. usine* 2, 170–90(1939); *Chimie & industrie* 42, 470.—A general review of the physicochem. properties of these

compds., with a discussion of measures required to reduce to a min., health and other hazards. A. P.-C.

Detergents from kerosene. Alkyl amine hydrochlorides. A. R. Padgett and Ed. F. Degering. *Ind. Eng. Chem.* **32**, 486-8(1940); cf. *C. A.* **34**, 1774[1].—The 95–100° (15-mm.) fraction was chlorinated and the 120–135° (15-mm.) fraction (I) of monochlorides collected. I was refluxed with excess $(HO\text{-}C_2H_4)_2NH$ at 185° for 18 hrs., dissolved in Et_2O and $(HO\text{-}C_2H_4)_2NH$ extd. with H_2O. The *N,N-diethanolkerosylamine* (II) was extd. with 5% HCl, liberated with excess NaOH, dried with NaOH and fractionally distd. in 30% yield. A soln. of II in Me_2CO was satd. with HCl to give almost theoretical yield of II-HCl in noncryst. form. By drop nos. of 0.2% solns. laurylamine-HCl is slightly more efficient than Na lauryl sulfate. Both are markedly more effective than *N,N*-diethanollaurylamine-HCl or *N,N*-diethyllaurylamine-HCl which are in turn markedly more effective than II-HCl. The stability of foam fell in the same sequence. F. D. Snell

Chemical treatment in the preparation of "agaroid" from the seaweed Phyllophora nervosa. V. Gryuner and L. Veronyan. *Colloid J.* (U. S. S. R.) **5**, 851–63(1939).—The algae were soaked and then boiled for 4 hrs. The soln. was filtered and cooled; the strength of the 6% gels obtained was measured. The highest strength was observed when the algae were soaked for a short time in a 0.005 *N* acid (H_2SO_3, H_2SO_4, or HCl) and boiled with a 0.001–0.01 *N* soln. of KH_2PO_4, KCl, NH_4Cl, or K_2SO_4. Higher concns. of acids, other salts, and all alkalies have either a small pos. or a neg. effect on the strength. A long soaking in water or aq. solns. is unnecessary. J. J. B.

Modern dental fillings. Hermann Hildebrandt. *Pharm. Zentralhalle* **81**, 25–7(1940).—A discussion of materials entering into dental fillings. H. divides the fillings into 2 classes, metal and nonmetal. W. O. E.

The modern purifier—activated carbon. Joseph Wrench. *Chem. Industries* **46**, 291–5(1940). E. H.

A study of fractional time counts on knockdown in the Peet-Grady chamber. Harold G. Ledeer. *Soap* (*Sanit. Products Sect.*) **16**, No. 3, 99(1940).—The speed of knockdown of different types of household fly sprays was noted by detg. the no. of houseflies knocked down 1, 3, 5, 7 and 10 min. after spraying in the Peet-Grady chamber (*C. A.* **22**, 4734). The max. variation amounted to 30% for all sprays up to 5 min. but by 7 min. 86–100% of the flies were knocked down. Henry H. Richardson

Recent progress in industrial biochemical processes. F. P. Mazza. *Chimica e industria* (Italy) **21**, 663–9(1939).—Catalytic enzymic processes, biol. synthesis of the proteins and fats, the fermentation industries, citric acid, aceto-butyl and butyric fermentation processes, lactic fermentation, cellulose fermentation, prepn. of sorbite, gluconic acid, the action of colchicine on seeds, org. zeolites, Italian lignites and other recent advances are summarized. A. W. Contieri

The nature of patents. Stanley I. Levy. *Chemistry & Industry* **1940**, 159–62. E. H.

Annual report of the Nonmetals Division fiscal year 1939. Oliver C. Ralston, *et al. U. S. Bur. Mines, Rept. Investigations* **3473**, 40 pp.(1939); cf. *C. A.* **33**, 2611[1].—SiC elements with air-ventilated terminals have been used in ceramic furnaces at temps. up to 1310° for 1176 hrs. with 11.2% less power input than required for graphite resistors. The av. increase in elec. resistance for 14 resistors in 1176 hrs. was 46.9%. Resistance of graphite changes little with service and low voltages can be used for high operating temps. Long life of graphite resistors depends on gas-tight assemblies and proper allowances for differences in expansion and contraction between tube (SiC) and resistor during thermal change. Sealing of SiC surfaces with high-temp. glazes and use of Ni and nichrome sleeves over terminal leads increased protection against O. Temp. distribution in periodic elec. kilns for ceramic firing was comparable to that in the best combustion-fired kilns, but temp. control was easier. Plate warpage is being studied; 60% occurred during drying. Better support was given by use of machined and prefired refractory rings than by the use of sand. By flotation of clay washery rejects from Macon, Ga., a concentrate was made that was comparable to coating and filler clays from the washery. Substitution of Am. for English clays in sanitary ware is being studied. A high content of Am. ball clays (25–38%) is required for easy casting. Characteristics of clays for use in oil-well drilling are being studied. An eykometer has been developed in which the static yield point and gel-forming or thixotropic characteristics of clay or mud suspensions can be measured. The slurry-handling problem at coal-prepn. plants is being studied; progress is reported. The most important factor affecting the rate of drainage of water from coal is the size distribution in the coal. A lab. drainage test has been developed. A coal suitable for electrode mfg., hydrogenation, or internal-combustion motors (less than 1% ash) was obtained from 1 Ala. coal at 77.9% yield. A char suitable for removing taste and odor from H_2O was made by activation of coal-mine refuse. The lower the ash, the better the phenol no. High-ash refuse treated with a diln. soln. of NH_4OH, followed by a dil. H_3PO_4 wash in the presence of $AlPO_4$ (best treatment) was 75% as efficient in decolorizing oil at room temp. as a good activated clay, less effective at higher temps. A satisfactory base-exchange material was made from high-coal fractions of refuse. H_2SO_4 digestion at 100° gave a H base exchanger. Autoclaving this with dil. alkali under 11 atm. steam pressure produced a Na exchanger. A grinding machine permitting direct recording of net power is described. Sepn. of feldspar from quartz by agglomerate tabling and flotation was successfully carried out in lab. and pilot plant. A 47% Fe concentrate was obtained from 24% ore (low-P ferruginous sandstone) by scruffing with small steel plate punchings in a ball mill, then floating with cheap sulfate soap in an acid pulp (90% recovery). Several cyanite ores were concd. successfully by flotation; best results were a 99% cyanite – 0.3% Fe_2O_3 product at 96% recovery. Dry-pressed refractories of several grades were made of finely ground cyanite without precalcination if properly bonded and subjected to pressures around 10,000 lb. per sq. in. and 1525–1650°. A satisfactory light-wt. aggregate was made from slate quarry and mill wastes. Si combines with Ca to give compds. that strongly absorb lime; max. amt. was 1.45 mols. CaO per mol. of SiO_2 of 1.35 parts by wt. The principal compd. is $CaO.SiO_2.aq.$ which exists between 0.173 g. CaO per l. and lime satn. or 1.1 g. CaO per l. This compd. absorbs up to 0.45 mol. of CaO per mol. of compd. $3CaO.4SiO_2.aq.$ exists between 0.0506 and 0.173 g. CaO per l. At 0.0506 g. CaO per l. $CaO.2SiO_2.aq.$ appears. It dissolves congruently in H_2O. Excellent refractories were made from olivine of the Pacific Northwest. An embrittlement alarm and detector to duplicate conditions in a riveted boiler seam were developed. Tests show that mixts. of Na_2SO_4 and NaCl or Na phosphate do not offer satisfactory protection against intercryst. cracking. Lignin, quebracho and cutch are effective. Progress in electrostatic sepn. of minerals, particularly of fine powders, is reported. Various types of mineral sepn. are improved by attrition scrubbing. The problems pertinent to the fluid properties of suspensions were evaluated.
Alden H. Emery

Statistical summary of mineral production. Martha B. Clark. *U. S. Bur. Mines, Minerals Yearbook* **1939**, 1–48. **World production of minerals and economic aspects of international mineral policies.** J. S. McGrath. *Ibid.* 49–62. **Gold and silver.** Chas. W. Henderson and J. P. Dunlop. *Ibid.* 63–89. **Copper.** J. W. Furness and H. M. Meyer. *Ibid.* 91–123. **Lead.** E. W. Pehrson and H. M. Meyer. *Ibid.* 125–45. **Zinc.** E. W. Pehrson. *Ibid.* 147–70. **Lead and zinc pigments and zinc salts.** H. M. Meyer and A. W. Mitchell. *Ibid.* 171–84. **Gold, silver, copper and lead in Alaska.** Chas. W. Henderson. *Ibid.* 185–97. **Gold, silver, copper, lead and zinc in Arizona.** T. H. Miller and Paul Luff. *Ibid.* 199–230. **Gold, silver, copper, lead and zinc in Idaho.** *Ibid.* 335–58. **Gold, silver, copper, lead and zinc in Montana.** *Ibid.* 359–85. **Gold, silver, copper, lead and zinc in Utah.** *Ibid.* 461–77. **Gold, silver, copper, lead and zinc in Washington.** *Ibid.* 479–92. **Gold, silver, copper, lead**

and zinc in California. Charles W. Merrill and H. M. Gaylord. *Ibid.* 231–69. **Gold, silver, copper, lead and zinc in Nevada.** *Ibid.* 387–413. **Gold, silver, copper, lead and zinc in Oregon.** *Ibid.* 435–48. **Gold, silver, copper, lead and zinc in the Eastern and Central States.** J. P. Dunlop and H. M. Meyer. *Ibid.* 313–34. **Gold, silver, copper, lead and zinc in Colorado.** Chas. W. Henderson and A. J. Martin. *Ibid.*, 271–311. **Gold, silver, copper, lead and zinc in New Mexico.** *Ibid.* 415–33. **Gold, silver, copper and lead in South Dakota.** *Ibid.* 449–55. **Gold, silver, copper, lead and zinc in Texas.** *Ibid.* 457–60. **Gold, silver, copper and lead in Wyoming.** *Ibid.* 493–5. **Secondary metals—nonferrous.** J. P. Dunlop. *Ibid.* 497–511. **Scrap iron and steel.** James S. Earle. *Ibid.* 513–31. **Iron ore, pig iron, ferroalloys and steel.** Robert H. Ridgway and H. W. Davis. *Ibid.* 533–75. **Manganese and manganiferous ores** *Ibid.* 577–92. **Molybdenum, tungsten and vanadium.** *Ibid.* 615–31. **Chromite.** Robert H. Ridgway. *Ibid.* 593–602. **Nickel and cobalt.** H. W. Davis. *Ibid.* 603–13. **Platinum and allied metals.** *Ibid.* 735–45. **Bauxite and aluminum.** Herbert A. Franke and M. E. Trought. *Ibid.* 633–53. **Magnesium.** *Ibid.* 705–14. **Mercury.** H. M. Meyer. *Ibid.* 655–70. **Tin.** E. W. Pehrson and John B. Umhau. *Ibid.* 671–94. **Antimony and cadmium.** *Ibid.* 715–33. **Arsenic and bismuth.** Herbert A. Franke. *Ibid.* 695–704. **Minor metals.** Paul M. Tyler. *Ibid.* 747–61. **Bituminous coal.** M. E. McMillan, R. L. Anderson, L. N. Plein, F. G. Tryon and J. W. McBride. *Ibid.* 763–830. **Pennsylvania anthracite.** M. Van Sicklen, L. Mann and J. R. Bradley. *Ibid.* 831–62. **Coke and by-products.** H. L. Bennit. *Ibid.* 863–910. **Fuel briquets and packaged fuel.** G. S. Goodman. *Ibid.* 911–22. **Peat.** F. M. Shore. *Ibid.* 923–6. **Crude petroleum and petroleum products.** A. G. White, G. R. Hopkins and H. A. Breakey. *Ibid.* 927–1014. **Natural gas.** F. S. Lott and G. R. Hopkins. *Ibid.* 1015–50. **Natural gasoline and liquefied petroleum gases.** G. R. Hopkins. *Ibid.* 1051–67. **Carbon black.** G. R. Hopkins and H. Backus. *Ibid.* 1069–76. **Helium.** H. S. Kennedy and C. W. Seibel. *Ibid.* 1077–9. **Asphalt and related bitumens.** A. H. Redfield. *Ibid.* 1081–92. **Cement.** Oliver Bowles and E. V. Balser. *Ibid.* 1093–1117. **Stone.** Oliver Bowles and M. Schauble. *Ibid.* 1119–53. **Slate.** *Ibid.* 1155–62. **Sand and gravel.** H. Herbert Hughes and G. Egge. *Ibid.* 1163–78. **Gypsum.** Forrest T. Moyer. *Ibid.* 1179–88. **Lime.** Forrest T. Moyer and A. T. Coons. *Ibid.* 1189–1206. **Kaolin (china clay and paper clay), ball clay, fire clay, bentonite, fuller's earth (bleaching clays) and miscellaneous clay.** Paul M. Tyler and R. W. Metcalf. *Ibid.* 1207–23. **Abrasive materials.** Bertrand L. Johnson and M. Schauble. *Ibid.* 1225–40. **Sulfur and pyrites.** Robert H. Ridgway and A. W. Mitchell. *Ibid.* 1241–53. **Phosphate rock.** Bertrand L. Johnson and K. G. Warner. *Ibid.* 1255–72. **Talc, pyrophyllite and ground soapstone.** *Ibid.* 1273–80. **Fluorspar and cryolite.** H. W. Davis and M. E. Trought. *Ibid.* 1281–95. **Feldspar.** Robert W. Metcalf. *Ibid.* 1297–1307. **Asbestos.** Oliver Bowles and K. G. Warner. *Ibid.* 1309–18. **Barite and barium products.** Bertrand L. Johnson and K. G. Warner. *Ibid.* 1319–28. **Potash.** J. H. Hedges. *Ibid.* 1329–41. **Mica.** Paul M. Tyler and K. G. Warner. *Ibid.* 1343–53. **Salt.** A. T. Coons and F. E. Harris. *Ibid.* 1355–66. **Magnesium compounds, bromine, calcium chloride, iodine, sodium sulfate, borates and miscellaneous salines.** Paul M. Tyler and A. T. Coons. *Ibid.* 1367–84. **Gem stones.** Sydney H. Ball. *Ibid.* 1385–96. **Minor nonmetals: Carbon dioxide, graphite, greensand, cyanite, andalusite, dumortierite, lithium minerals, meerschaum, mineral wool, monazite, olivine, serpentine, strontium minerals, topaz and vermiculite.** Paul M. Tyler. *Ibid.* 1397–1410; cf. *C. A.* **32**, 8033[4]. G. G.

American Society for Testing Materials, Standards, 1939. I. Metals. 1308 pp.; cf. *C. A.* **33**, 5089[5], 5090[6].—*Standards issued or revised in 1939* are given for steel for bridges and buildings; mild steel plates; structural steel for locomotives, cars and ships; structural Ni-, Si- and rivet-steel; structural-quality steel plates for forge welding; boiler and firebox steel for locomotives; C-steel, C-Si steel, Cr-Mn-Si alloy-steel, low-C Ni-steel and Mo-steel plates for boilers and other pressure vessels; C-steel plates of flange and firebox qualities; flange-quality open-hearth Fe plates; boiler rivet steel and rivets; billet-steel and axle-steel bars for concrete reinforcement; com.-quality hot-rolled bar steels; open-hearth C-steel rails; high-C-steel and quenched C-steel joint bars; bars for springs of C steel (with and without special Si requirements), of Si-Mn steel and of Cr-V steel; steel helical and elliptical springs; normalized quenched-and-tempered alloy-steel forgings; wrought-steel wheels; steel tires; C-steel castings for miscellaneous industrial uses; alloy-steel castings for valves, flanges and fittings for service at 750–1100°F.; elec.-fusion-welded steel pipe; lap-welded and seamless steel pipe for high-temp. service; seamless cold-drawn intermediate alloy-steel heat-exchanger and condenser tubes; seamless intermediate alloy-steel still tubes for refinery service; forged or rolled steel pipe flanges for high-temp. service; forged or rolled alloy-steel pipe flanges, forged fittings, and valves and parts for service at 750–1100°F.; alloy-steel bolting material for high-temp. service; C- and alloy-steel nuts for bolts for high-pressure and -temp. service; sheet, strip and plate corrosion-resisting Cr and Cr-Ni steel; Cr and Cr-Ni alloy-steel castings; Zn-coated Fe or steel wire fencing and barbed wire; tests for wt. of coating on Zn-coated Fe or steel articles; rolled wrought-Fe bars and shapes; solid and hollow-rolled staybolt wrought Fe; rolled or forged wrought-Fe blooms and forgings; Fe and steel chain; welded wrought-Fe pipe; wrought-Fe plates; uncoated and Zn-coated wrought-Fe sheets; wrought-Fe rivets and rivet rounds; cupola malleable Fe; ferromanganese; ferromolybdenum; ferrosilicon; ferrotungsten; ferrovanadium; Mo salts and compds.; tests for magnetic properties of Fe and steel; definitions of terms, with units and symbols, relating to magnet testing; Mg ingot and stick for remelting; hot-rolled Cu rods for elec. purposes; hard-drawn, medium-hard-drawn, and soft or annealed Cu wire; tinned soft or annealed Cu wire for elec. purposes; hard-drawn Cu alloy wires for elec. conductors; bronze and Cu trolley wire; Cu cable; Al-bronze and Mn-bronze sand castings; Mn-bronze ingots for sand castings; Cu-Si alloy rods, bars and shapes; Cu water tube; Cu-Si alloy sheet; Cu-Si alloy wire for general purposes; rolled Zn; Ni-Cr and Ni-Cr-Fe drawn or rolled alloy for elec. heating units; accelerated life test for metallic materials for elec. heating; test for linear expansion of metals; test for change of resistance with temp. of metallic materials for elec. heating; test for temp.-resistance consts. of sheet materials for shunts and precision resistors; and a method of bend-testing for ductility of metals. *Tentative standards issued or revised in 1939* are given for high-strength structural rivet steel; Mn-V steel plates for boilers and other pressure vessels; heat-treated C- and alloy-steel track bolts and nuts; hard-drawn-steel, oil-tempered-steel and Cr-V-steel spring wire; steel music spring wire; C-steel and Cr-V steel valve-spring-quality wire; C-steel forgings; C-steel and alloy-steel castings suitable for fusion welding; seamless C-Mo alloy-steel pipe; seamless alloy-steel boiler and superheater tubes; elec.-resistance-welded steel boiler, superheater, heat-exchanger and condenser tubes; alloy-steel bolting materials for high-temp. service; recommended practice for conducting plant corrosion tests; Zn-coated steel wire strand; electrodeposited coatings of Cd, Ni and Cr, and Zn on steel; test for local thickness of electrodeposited coatings on steel; single and double refined wrought-Fe bars; cast-Fe pit-cast pipe for water and other liquids; cast-Fe soil pipe and fittings; pearlitic malleable Fe castings; ferrochromium; spiegeleisen; test for measuring interlamination resistance and lamination factor of Fe and steel; Al for use in Fe and steel manuf.; Al ingots for remelting; Al-base alloys in ingot form for die castings; Al-alloy (duralumin) bars, rods, wire, shapes, sheet and plate; Al-Mn alloy sheet and plate for use in welded pressure vessels; Al-Mg-Cr alloy

sheet and plate; test for dielec. strength of anodized Al; Mg-base alloy ingot for remelting; rectangular and square soft Cu wire for elec. conductors; Cu trolley wire for ind. haulage; leaded-Ni brass and leaded-Ni-bronze alloys in ingot form for sand castings; classification of cast Cu-base alloys; Cu-base alloy forging rods, bars and shapes; brass and Cu pipe; seamless bright-annealed Cu tubing; Cu and Cu-alloy seamless condenser tubes and ferrule stock; brass and leaded-brass sheet and strip; phosphor-bronze sheet and strip; Be-Cu alloy bars, rods, sheet, strip and wire; Cu-Ni-Zn and Cu-Ni alloy sheet and strip; Cu-Si alloy plate and sheet; Ni-Cu alloy plate, sheet and strip; Al-base, Pb- and tin-base, and Mg-base alloy die castings; testing of Ni and Ni-alloy wire and ribbon for electronic tube filaments; test for flexivity of thermostat metals; salt-spray testing of nonferrous metals; classification of austenite grain size in steels; prepn. of metallographic specimens; prepn. of micrographs of metals and alloys including recommended practice for photography as applied to metallography; radiographic testing of metal castings; and test for Rockwell superficial hardness of metallic materials. *Tentative revisions (submitted in 1939) of standards* are given for boiler and firebox steel for locomotives; boiler rivet steel and rivets; tests for magnetic properties of Fe and steel; terms, with units and symbols, relating to magnetic testing; Mn-bronze ingots for sand castings; and Mn-bronze sand castings. **II. Nonmetallic materials, constructional.** 1217 pp.—*Standards issued or revised in 1939* are given for high-early-strength portland cement; methods of chem. analysis and of sampling and phys. testing of portland cement; quicklime and hydrated lime for water treatment; sand for use in plaster; definitions of terms relating to lime and to gypsum; gypsum plasters; methods of testing gypsum and gypsum products; sand-lime building brick; methods of sampling and testing brick; structural clay wall and floor tile; definitions of terms relating to structural clay tile; hollow load-bearing and non-load-bearing concrete masonry units; concrete masonry units for construction of catch basins and manholes; sampling and testing concrete masonry units; fireclay brick for malleable furnaces with removable bungs, for annealing ovens and for stationary boiler service; refractories for construction of incinerators; fireclay and Al_2O_3-diaspore refractories; chem. analysis of refractory materials; tests for cold-crushing strength and modulus of rupture of refractory brick and shapes; definitions of symbols for heat transmission; concrete irrigation pipe; concrete aggregates; light-wt. aggregates for concrete; tests for abrasion of coarse aggregate by use of the Los Angeles Machine, for clay lumps in aggregates, for coal and lignite in sand, for sieve analysis of fine and coarse aggregates, for sp. gr. and absorption of coarse and of fine aggregate, for structural strength of fine aggregate using const. water-cement-ratio mortar, for unit wt. of aggregate, for compressive strength of concrete, for flow of portland-cement concrete, for flexural strength of concrete, and for yield of concrete; methods of securing specimens of hardened concrete from the structure, for making and storing compression test specimens of concrete in the field, and for slump test for consistency of portland-cement concrete; definition of terms relating to concrete and concrete aggregates; granite block for pavements; mineral filler for sheet asphalt and bituminous concrete pavements; medium-setting emulsified asphalt; tests for emulsified asphalts and for ductility of bituminous materials; recommended practice for bituminous paving plant inspection; methods for mech. analysis of soils and for prepg. soil samples for mech. analysis and detn. of subgrade soil consts.; test methods for centrifuge moisture equiv., field moisture equiv., liquid limit, plastic limit and plasticity index, and shrinkage factors of soils; Zn chloride (for use as timber preservative); test for distn. of creosote; Al powder for paints (Al bronze powder); Al pigment paste for paint; reduced Para Red; Para Red toner; Prussian blue; red lead; TiO_2 pigments; Zn oxide; Zn sulfide pigments; Zn yellow; test for relative dry hiding power of white pigments in a linseed oil vehicle; tests for sp. gr. of pigments; chem. analysis of dry Cu_2O, of white pigments, and of Zn yellow pigment; petroleum spirits; testing of drying oils; methods of sampling and analysis of shellac; synthetic Am acetate; Am acetate made from fusel oil; methods of testing sol. nitrocellulose base solns.; tests for relative dry hiding power and spectral apparent reflectivity of paints; thermometers; and sieves for testing purposes. *Tentative standards issued or revised in 1939* are given for chem. analysis of portland cement; building brick; sewer brick; glazed building units; freezing-and-thawing test of brick; solid, load-bearing concrete masonry units; aggregate for masonry mortar; testing of insulating fire-brick for compressive strength, flexural strength, and permanent linear change after heating; load test at high temps. of fireclay and Al_2O_3-diaspore refractories; tests for apparent porosity, water absorption, apparent sp. gr., and bulk d. of burned refractory products; tests for size and bulk d. of refractory brick; definition of terms relating to refractories; chem. analysis of glass sand; hydrostatic pressure test on, polariscopic examn. of, and thermal shock test on glass containers; test for soundness of aggregates by use of Na_2SO_4 or $MgSO_4$; crushed stone and slag for bituminous macadam or concrete base and surface courses; preformed expansion-joint fillers for concrete and testing thereof; test for sieve analysis of mineral filler; sampling stone, slag, gravel, sand and stone block for use as highway materials; asphalt filler for brick pavements; sampling bituminous materials; test for loss on heating of oil and asphaltic compds.; primer for use with asphalt in dampproofing and waterproofing; asphalt mastic for use in waterproofing; bituminous grout for waterproofing above and below ground level; woven cotton fabrics satd. with bituminous substances for use in waterproofing; testing of bituminous mastics, grouts and like mixts.; recommended practice for accelerated weathering test of bituminous materials; test for tar acids in creosote and creosote-coal tar solns.; Zn dust and its chem. analysis; shellac varnishes; test for toluene dilu. ratio of lacquer solvents; test for elongation of attached lacquer coatings with the conical mandrel test app., test for specular gloss of paint finishes; thermometers, and test for softening point (of asphalt, tars, pitches, rosins or resins). *Tentative revisions (submitted in 1939) of standards* are given for testing gypsum and gypsum products; definition of terms relating to gypsum; definitions of fireclay and alumina-diaspore refractories, of symbols for heat transmission and of terms relating to concrete and concrete aggregates; and testing drying oils. **III. Nonmetallic materials, general.** 1175 pp. *Standards issued or revised in 1939* are given for definitions of com. varieties of bituminous and subbituminous coals, petroleum spirits; tests for acid heat of gasoline, burning quality of kerosene, C residue of petroleum products, cloud and pour points, distn. of natural gasoline, gravity of petroleum and its products by means of the hydrometer, knock characteristics of motor fuels, S in petroleum oils by bomb method and thermal value of fuel oil; conversion of kinematic to Saybolt universal viscosity; viscosity-temp. charts for liquid petroleum products; definitions of terms relating to petroleum; testing of molded materials used for elec. insulation; testing of laminated tubes, laminated round rods and sheet and plate materials used in elec. insulation; testing of elec. porcelain; testing of pasted mica used in elec. insulation; chem. analysis of rubber products; sample prepn. for phys. testing of rubber products; test for adhesion of vulcanized rubber (friction test) and of its adhesion to metal; test for hardness of rubber; textile testing machines; general methods of testing woven textile fabrics; tests and tolerances for knit goods; test for fastness of colored textile fabrics to light; Osnaburg cement sacks and tests therefor; tests and tolerances for cotton sewing threads, for carded cotton gray goods, and for spun rayon yarns and threads; test for max. residual shrinkage of silk and rayon woven fabrics; tests and tolerances for yarns spun from wool mixed with fibers other than wool; testing of pile floor covering; bar soap; chip soap; powd. soap; milled toilet soap; white floating toilet soap; sampling and chem. analysis of soaps

and soap products and special detergents; test for particle size of soaps and other detergents; caustic soda; modified soda (sesquicarbonate type); soda ash; and definition of terms relating to soaps and other detergents. *Tentative standards issued or revised in 1939* are given for fuel oils; tests for index of dustiness of coal and coke, for C residue of petroleum products, for color of lubricating oil and petrolatum by means of A. S. T. M. union colorimeter, for distn. of plant-spray oils, for gum stability of gasoline, for loss on heating of oil and asphaltic compds., for sapon. no., for Et_4Pb in gasoline, for vapor pressure of petroleum products and for kinematic viscosity; varnished cloth tape for elec. insulation; testing of varnishes and of flexible varnished tubing used for elec. insulation; method of measuring shrinkage from mold dimensions of molded materials used for elec. insulation; testing of pin-type lime-glass insulators and of glass spool insulators; tests for dielec. strength, power factor and dielec. const. of elec. insulating materials; sampling and testing of untreated paper used in elec. insulation; tests for power factor and dielec. const. of natural mica, for n of transparent org. plastics, for resistance of plastics to chem. reagents, and for indentation of rubber; tension testing of vulcanized rubber; testing of rubber hose and of flat rubber belting; insulated wire and cable of various grades of rubber compd.; rubber sheath compd. for elec. insulated cords and cables; testing of rubber-insulated wire and cable and of sponge-rubber and hard-rubber products; test for viscosity and total solids content; definition of terms relating to textile materials; tests for apparent fluidity of dispersions of cellulose fibers in cuprammonium hydroxide; tests and tolerances for woven tapes, for single jute yarn, and for continuous-filament rayon yarns; testing of rayon staple; tests for bulking thickness of, machine direction of, resin in, and water-sol. acidity or alky. of paper; palm-oil bar soap and chip soap; powd. built soap; alk. soap powder; Na metasilicate; trisodium phosphate; sampling and chem. analysis of special detergents; and definitions of terms relating to soaps and other detergents. *Tentative revisions (submitted in 1939) of standards* are given for testing molded materials, sheet and plate materials, and laminated tubes and rods used in elec. insulation; testing woven textile fabrics; and textile-testing machines. G. G.

Base metals of Rhodesia. B. Lightfoot. *Proc. Rhodesia Sci. Assoc.* 35, 75–82(1938).—A review of developments in the production of Cr ore, coal, Cu, mica, As compds., Pb, W ores, Fe pyrite, Sn ore, limestone, Ni, Zn, corundum, baryte, ochre, Ta, lepidolite and magnesite. K. D. Jacob

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Mining Year Book, 1940. Compiled by **W. E. Skinner.** London: W. E. Skinner. 20s.

Science and Mechanization in Land Warfare. New York: Chemical Publishing Co. $2.00.

Reactions at high pressures. V. S. Gavrilov. Russ. 51,919, November 30, 1937. The temp. and the pressure of reacting gases is lowered by releasing the reaction products through a throttle directly after the withdrawal from the reaction vessel.

Casein plastics. D. N. Vaskevich. Russ. 55,867, Oct. 31, 1939. Paraform or a substance that produces CH_2O is mixed with casein, plasticizers and urea. The product is treated in the usual manner on rollers or other similar equipment, pressed and tanned.

Use of plastic materials such as "asphalt plank" compositions in forming wall slabs or the like. Albert C. Fischer. U. S. 2,185,335, Jan. 2. Products formed of a plastic material subject to cold flow are provided with a plurality of keys in their opposite faces filled with a cementitious material of harder character such as a cement and asbestos compn. to prevent distortion.

Apparatus for extrusion of plastic materials such as rubber sheathing extruded about a wire. James S. Boyle (to Anaconda Wire & Cable Co.). U. S. 2,185,701, Jan. 2. Various structural, mech. and operative details.

Apparatus for cutting and joining thermoplastic sheet material such as that of rubber or celluloid. Ralph L. Penn, Ralph W. Penn and Norman H. Nye (25% to Edwin J. McIlvried). U. S. 2,185,647, Jan. 2. Apparatus for cutting and sealing by use of heat and pressure includes an electrically heated wire directly coming into contact with one side of the material. 1

Apparatus for molding bottles or other articles of plastic materials such as glass. Earl R. Odom (10% to John B. Sisson). U. S. 2,185,678, Jan. 2. Various structural, mech. and operative details. 2

Apparatus for molding articles such as steering wheels, of thermoplastic materials. Dwight M. Anderson (to Standard Products Co.). U. S. 2,186,160, Jan. 9. Various structural, mech. and operative details.

Resinous compositions. Ben E. Sorenson (to E. I. du Pont de Nemours and Co.). Can. 387,247, Mar. 5, 1940. An aliphatic hydrocarbon is added as a precipitant to a soln. of the resinous reaction product of urea, formaldehyde and aliphatic monohydric alc., contg. about 0.5–1.0 mol. of alc. per mol urea. The products may be used for coatings or molding material. 3

Alkyd resins. G. S. Petrov. Russ. 55,831, Oct. 31, 1939. In the prepn. of alkyd resins, the acidic resin obtained in the first stage is mixed with dehydrating, water-sol. salts and the mixt. is hot-rolled and extd. by known methods.

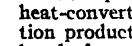
Artificial resins. K. M. Malin, A. M. Nastyukov and M. P. Polyakov. Russ. 56,044, Nov. 30, 1939. Acid sludge is treated with 3–9% formalin (of the weight of the sludge) with cooling, the reaction mass dild. with water, and the condensation product filtered off and treated in known manner. 4

Artificial resins. B. V. Zikeev and V. V. Chernov. Russ. 52,114, Nov. 30, 1937. Phenol-aldehyde condensation products are treated in EtOH with SCl_2 or SCl_4 to effect polymerization. 5

Synthetic resins. Charles G. Moore (to Glidden Co.). Can. 387,025, Feb. 20, 1940. Glycerol is heated and caused to react with a fatty oil and a small proportion of caustic alkali, the product heated and caused to react with phthalic anhydride, and the temp. raised. The products are characterized by low acid no., and their solns. produce a hard tough film having unusual adhesion and durability. Several examples are given. 6

Synthetic resin. G. A. Kotlyarovskiĭ. Russ. 55,866, Oct. 31, 1939. Epichlorohydrin and phthalic anhydride in equimol. proportions are condensed in the presence of tertiary amines at about 100° for 3–5 hrs. The product is heated *in vacuo* at not above 210° until the desired consistency is obtained.

Synthetic resin products. Arthur Haroldson (to Continental-Diamond Fibre Co.). U. S. 2,185,080, Dec. 26. A product convertible by heat into an infusible, insol. state comprises the reaction product of an oil-incompatible, heat-convertible, phenol-formaldehyde resin with a reaction product of a double bond of tung oil and a double bond of an unsatd. aliphatic, dicarboxylic acid having a 7



—CO—C=C— group, such as maleic acid, there being present at the time of the conversion of the oil-incompatible resin into the tung oil-phenol-formaldehyde resin only the oil-incompatible resin and the tung oil-dicarboxylic acid reaction product as substantial reactants, the tung oil-phenol-formaldehyde resin yielding no sepn. of the oil during curing of the resin. 8

Synthetic resin compositions for molding. Silvio Pellerano (to Garfield Mfg. Co.). U. S. 2,185,354, Jan. 2. Compns. suitable for molding and hardening by heating are formed of an inert filler such as asbestos 500–800 parts together with 180–190 parts of a binder made up of an oil such as China wood and linseed oils 8–16, a coumarone-indene resin 16–30, a glycerolphthalate resin 4–8, stearin pitch 40–80, a solvent such as mixed naphthas 12–24 parts, and a small proportion of a plasticizer such as tritolyl phosphate. 9

Phenol-aldehyde resins. G. S. Petrov. Russ. 56,108, Nov. 30, 1939. Phenol-aldehyde resins are prepd. by the repeated condensation of the novolac resins with methylene-contg. substances in acid or alk. medium in the presence of water-absorbing salts (e. g., Na_2SO_4) which are sol. in water but insol. in alc. The resin is sepd. from the salt by dissolving the salts in water or the resin in alc.

Synthetic resin sheathing, etc., for electric cables. Jesse B. Lunsford. U. S. 2,185,558, Jan. 2. A multiconductor suitable for use on shipboard, etc., comprises a plurality of individual conductors, a sheathing of asbestos individually inclosing each conductor, sheathing of synthetic resin inclosing each asbestos sheathing, a second asbestos sheathing inclosing the synthetic resin sheathing, a common asbestos sheathing inclosing the plurality of conductors and the insulation individual thereto, asbestos fiber filling interstitial spaces between the several conductors, a sheathing of synthetic resin of sufficient thickness to have the desired mech. strength inclosing the common asbestos sheathing, a second common asbestos sheathing inclosing the last-mentioned synthetic resin sheathing, and a protecting armor inclosing the latter asbestos sheathing, the resin being resistant to deterioration by storage-battery electrolyte and fumes and by oil, substantially incombustible in the absence of continued application of heat above its kindling temp., permanently flexible and of high dielec. strength.

Resinous laminated sheet material suitable for radio dials, etc. Wesley R. Thompson and Wm. E. Flood (to Catalin Corp. of America). U. S. 2,185,477, Jan. 2. A process of producing flexible laminated sheet material, which is sufficiently nonbrittle to be stamped and punched without fracturing and is stable against changes in dimension with varying moisture conditions, comprises impregnating a fibrous sheet with an alc. soln. of a hardenable phenol-CH_2O resin sol produced by treating 1 mol of phenol with 1.5 to 3 mols of CH_2O in the presence of an alk. catalyst followed by neutralization of the excess alkali and dehydration of the reaction product to produce a hydrophilic sol contg. an appreciable amt. of water and adding alc.; heating the impregnated sheets sufficiently to effect substantial removal of the alc. in the sol, but leaving a substantial amt. of water therein and heating sufficiently to convert the hydrophilic sol into a gel *in situ* on the sheets, the gel having the residual water colloidally dispersed throughout its mass, pressing together the sheets impregnated with the hydrophilic gel and heating the sheets while under pressure to harden the gel into a rigid, infus. cellular form which bonds the sheets together, and retains colloidally dispersed water droplets entrapped in the cells of the cellular mass whereby a laminated sheet material having the specified characteristics is produced. 4

Sheet material such as paper or cloth treated with vinyl-resin. Harold F. Robertson (to Union Carbide and Carbon Corp.). U. S. 2,185,356, Jan. 2. A pervious base sheet of fibrous material is coated to render it substantially greaseproof and waterproof on at least one surface by a smooth, continuous, impervious, preformed film of vinyl resin compn. having a thickness from about 0.0006 in. to 0.001 in. in which the vinyl resin is substantially identical with a resin resulting from the conjoint polymerization of a vinyl halide with a vinyl ester of a lower aliphatic acid and contg. about 80% of vinyl halide, the surface of the base sheet and vinyl resin-contg. film being firmly bonded in permanently fused union so that the resin does not strike through or substantially impregnate the base sheet, in the absence of a solvent for such resin, by heat and pressure at a temp. below about 130° and at a pressure not more than about 250 lb. per sq. in., and the base sheet being unaltered in its fibrous structure. 7

Condensation products of urea or thiourea. E. N. Freidberg and D. D. Chegodaev. Russ. 52,209, Nov. 30, 1937. Urea or thiourea is condensed with butyraldehyde, and the product treated with CH_2O with or without addn. of urea. 8

Shaped polyvinyl chloride articles. I. G. Farbenindustrie A.-G. Brit. 508,851, July 4, 1939. Articles are made from polyvinyl chloride (I) or from an interpolymerizate from vinyl chloride and another monomeric 9

compd. that, if it contains a vinyl group, contains no C to C unsatd. linkage other than in the vinyl group by mixing the I or interpolymerizate intimately with 0.5–5% of S (calcd. on the total wt.) and shaping the mixt. by a thermoplastic method.

Electrical insulating materials. Karl Stuckardt and Reinhold Reichmann (to Westinghouse Elec. & Mfg. Co.). U. S. 2,185,280, Jan. 2. An insulating material is prepd. by mixing Na-Ca silicate 3–7, K fluosilicate 15–30, Al_2O_3 10–15, MgO 25–30, and quartz 25–35 parts, fusing the mixt. at 1310–1360° until it becomes colorless, and then adding K fluosilicate in a further quantity of 2–3 parts.

Metal-sheathed electric conductors, such as sheathed with lead. James D. Burby (to Anaconda Wire & Cable Co.). U. S. 2,185,429, Jan. 2. App. is described, and a method which comprises disposing a body of molten metal around a longitudinally moving insulated conductor, circulating a confined cooling medium in heat-exchange relationship therewith in the zone intermediate the conductor and the surrounding molten metal, allowing part of the metal to solidify and thus form a tube-like body of greater diam. than the insulated conductor to be covered, feeding the body longitudinally and subjecting it to forces which materially reduce its diam.

Use of a vacuum in the adhesive application of labels of cellophane, etc., to articles. Geo. W. Von Hofe (to New Jersey Machine Corp.). U. S. 2,184,824, Dec. 26. Various details of app. and operation.

α-Derivatives of higher carboxylic acids (wetting, emulsifying, cleaning, antispattering and ore flotation agents, etc.). Frank J. Cahn (to Emulsol Corp.). U. S. 2,185,541, Jan. 2. Compds. are formed and used consisting of carboxylic acids having at least 6 C atoms, their salts, esters and amides, where at least one H attached to the C atom adjacent to the carboxyl group is replaced by the radical $—OCOCH_2SO_3Y$, where Y is a cation. Details are given of the production of the α-sulfate ester Na salt of Na stearate, the glycerol ester of α-bromopyridinium stearic acid, and sulfoacetic acid esters of α-hydroxy coconut oil fatty acid K salts, and general mention is made of the production of various other compds. of like character and derivation.

Sulfonic derivatives (wetting agents and detergents, etc.). Morris B. Katzman (to Emulsol Corp.). U. S. 2,184,770, Dec. 26. Various examples are given of the production of compds. of the general formula $RO—(alk—NY)_m—CO—Z(X)_w$, where R is an org. radical contg. at least 4 C atoms, alk and Z are each from the class of hydrocarbon radicals or substitution products thereof, Y is H, alkyl, cycloalkyl, alkoxyl, aralkyl, aryl or alkylol. *m* and *w* are whole numbers, and X is a sulfonic radical, suitable for use as dispersing agents in compns. for different uses, and which may be obtained by treating an amino alkyl ester of an aliphatic acid contg. at least 4 C atoms with a lower mol. wt. sulfo carboxylic acid, ester or halide of such an acid.

Sulfonated aromatic ether alcohols. Herman A. Bruson and Clinton W. MacMullen (to Röhm & Haas Co.). U. S. 2,184,935, Dec. 26. A sulfonated ether alc. of the general formula ROXOH in which R is a sulfonated aromatic nucleus and X is an alkylene or polyalkylene ether radical having at least 2 C atoms in each alkylene group is prepd. by sulfonating a compd. of the general formula R'OXOH in which R' is an aromatic nucleus, such as α,α,γ,γ-tetramethylbutylphenoxyethanol, to introduce a sulfonic group into the aromatic nucleus and to form a sulfuric ester group, and subsequently heating the product in aq., acid soln. to hydrolyze the sulfuric ester group. Products thus derived may be used as *wetting, emulsifying, cleansing* or *textile finishing agents*.

Polyoxyalkyleneammonium compounds. Heinrich Ulrich (to I. G. Farbenind. A.-G.). U. S. 2,185,163, Dec. 26. Nitrogenous condensation products suitable for use as *assistants in the textile* and *other industries* are produced by causing an amine oxide of tertiary amines such as trimethylamine oxide to react at a temp. above 50° and in the presence of water with an alkylene oxide such as ethylene oxide.

Sulfonated terpenyl alkyl phenols. Robert Zink (to American Cyanamid & Chemical Corp.). U. S. 2,186,132, Jan. 9. *Wetting* and *emulsifying agents* are prepd. by condensing a terpene such as α- or β-pinene with an alkyl phenol contg. at least one alkyl group of 4–8 C atoms such as *p-tert*-amylphenol and sulfonating the resulting condensation product. Several examples with details are given.

Emulsions. Otto Kress and Charles E. Johnson (to Institute of Paper Chemistry). Can. 387,131, Feb. 27, 1940. Stable aq. wax emulsion is prepd. by adding molten paraffin with agitation to an amt. of protein such that the paraffin particles are surrounded by a protein film preventing agglomeration when the emulsion is broken by the addn. of acidic material. The dry emulsion contains at least about 18% protein and the ratio of protein to paraffin is at least about 1:4. Examples are described.

Water-soluble urea-formaldehyde-ethylene glycol condensation products. Theodore S. Hodgins and Almon G. Hovey (to Reichhold Chemicals, Inc.). U. S. 2,185,167, Dec. 26. A process of prepg. water-sol., water-white, heat-convertible resinous products comprises simultaneously refluxing 3 mols. of aq. CH_2O, 150 parts of H_2O, 1–2 mols of ethylene glycol, 1 mol. of urea, 5 parts of 26% NH_4OH at boiling temp. for a period of 30 min. under agitation and cooling, the resulting product being characterized by its stability in soln., the urea, ethylene glycol and CH_2O constituting the principal reacting ingredients. Cf. *C. A.* **33**, 9491[1].

Viscosity-lowering condensation products from higher fatty acids and their esters. Stroud Jordan. U. S. 2,185,592, Jan. 2. A product suitable *for use in foods* such as sugar-chocolate coating mixts. is prepd. by treating an oil, fat or wax, such as cacao butter or its fatty acids or beeswax with P_2O_5 with controlled heating starting at the temp. of boiling water, without any substantial formation of phosphoric acid esters. Various examples with details are given.

Coated dispersible thiocarbanilide. David W. Jayne, Jr. (to American Cyanamid Co.). U. S. 2,185,591, Jan. 2. A product readily dispersible in water and remaining dispersed in froth flotation operations comprises thiocarbanilide, the individual particles of which are coated with a film of a hydrophilic, readily rehydratable protective carbohydrate colloid, slop from the alc. fermentation of molasses, lignin sulfonate or saponin.

Artificial leather. I. A. Skorov and Z. Ya. Shchekin. Russ. 55,986, Oct. 31, 1939. Softeners, leather fiber and vulcanization agents are passed through cold rollers into rubber preliminarily treated with 2–3 parts of a soln. of spruce tar and naphthalene in an org. solvent. The mass is rolled into sheets, dried and worked in the usual manner.

Sulfonated detergent products, etc. Ernst A. Mauersberger (to Alframine Corp.). U. S. 2,185,817, Jan. 2. Detergent, foam-forming and oil-emulsion-breaking agents are produced by the reaction at elevated temps. of aliphatic aldehydes contg. 1–5 C atoms in the mol. with compds. having the general formula: $RCO(NHC_xH_{2x})_nOH$ in which R represents any alkyl or hydroxy-substituted alkyl chain of a fatty acid contg. at least 7 C atoms, *x* represents a number from 2 to 5 inclusive and *n* represents a number from 1 to 4 inclusive, and sulfonating the resulting product. Various examples with details are given.

Stable urea-chlorine compounds suitable for use in bleaching and sterilizing. Irving E. Muskat and Fred C. Trager (to Pittsburgh Plate Glass Co.). U. S. 2,185,864, Jan. 2. A compd. of high active Cl content is prepd. by evapg. a mixt. of urea and HCl to substantial dryness and chlorinating the resultant product.

Chlorinated ammeline, etc. Irving E. Muskat and Albert G. Chenicek (to Pittsburgh Plate Glass Co.). U. S. 2,184,886, Dec. 26. A product of high active Cl content suitable for use as a *bleaching* or *sterilizing agent* is produced by treating an amide or imide of cyanuric acid such as ammeline or ammelide with a chlorinating agent such as Cl, in aq. dispersion.

Chlorinated melamine, etc. Irving E. Muskat and Albert G. Chenicek (to Pittsburgh Plate Glass Co.).

U. S. 2,184,883, Dec. 26. A chlorinated melamine in which a substantial amt. of the contained Cl is present as active Cl is prepd. by chlorination in an aq. dispersion. It is suitable for use as a *bleaching* and *sterilizing agent* and, similarly, active-Cl-contg. derivs. of compds. such as dicyanodiamide derivs. may be obtained, which have like uses.

Bleaching surfaces such as those of wood without immersion. Wilfred B. Hill and Bertram P. Ridge (to Imperial Chemical Industries Ltd.). U. S. 2,185,632, Jan. 2. A surface to be bleached is treated with a bleaching agent which will gel to a paste-like consistency, consisting of a mixt. of Na silicate soln. of a strength between 80° and 120°Tw. and H_2O_2, the mol. ratio of SiO_2 to Na_2O in the Na silicate soln. being between 1.8:1 and 2.2:1 and the mixt. having a concn. of H_2O_2 between 30 volume and 100 volume strength.

Compositions for dispersing vapors. Clellan R. Pleasants. Brit. 509,047, July 10, 1939. A fog or H_2O-vapor dispelling material is made by applying a hygroscopic material to extremely finely divided amorphous carrier particles of carbonaceous material, which may be of colloidal size. The hygroscopic materials may be gaseous, liquid or solid. The application preferably takes place substantially at the instant of formation of the particles, e. g., by spraying liquid or solid hygroscopic material into the fumes produced by the combustion of carbonaceous fuel. The hygroscopic material in finely divided form may be mixed with coal dust and the mixt. heated in a closed receptacle. Cf. *C. A.* **32**, 9344[8]; **33**, 7157[1].

Apparatus suitable for coating sheet materials with adhesives, etc. Horace J. Paynter (to American Can Co.). U. S. 2,185,223, Jan. 2. A rotating coating roller is used with a scraping doctor including a relatively soft material such as brass serving as a base for harder material such as Cr.

Wax composition for coating the inner surface of tin-plated metal containers. Frederick H. MacLaren and Elmer W. Adams (to Standard Oil Co. of Ind.). U. S. 2,185,031, Dec. 26. "Halowax" 0.5% or more and a condensation product obtained by treating chlorinated paraffin wax with naphthalene in the presence of $AlCl_3$ 0.5% or more are used with 99% or less of a tough amorphous-like petroleum wax m. about 71–76° and obtained by pressing slack wax sepd. from a 50 S. A. E. motor oil distillate from crude oils of the Salt Creek type.

Zein solutions suitable for coating paper or other materials or as a printing-ink vehicle. Roy E. Coleman (to Zein Corp. of America). U. S. 2,185,110, Dec. 26. A substantially nonaq. liquid coating compn. comprises zein and a substantially anhyd. solvent for the zein having a proportion of polar to nonpolar radicals which lies within a range extending between the limits of the proportion of polar to nonpolar radicals of MeOH and the proportion of polar to nonpolar radicals of EtOH, the solvent and compn. contg. not in excess of 5% of added water, and the compn. being stable against sepn. of the zein at temps. of about 20° and being relatively nongelling. U. S. 2,185,111 relates to a soln. of like character contg. zein and a solvent mixt. such as may be formed of propylene glycol and diethylene glycol monoethyl ether. U. S. 2,185,112 gives as an example of solvent mixt. diacetone alc. and ethylene glycol. U. S. 2,185,113 gives as example propylene glycol and benzyl alc. U. S. 2,185,114 gives as example MeOH and benzene or toluene. U. S 2,185,115 gives as example EtOH and ethylene glycol. U. S. 2,185,116 gives as example iso-PrOH and ethylene glycol. U. S. 2,185,117 gives as example ethylene glycol monoethyl ether. U. S. 2,185,118 gives as example diethylene glycol mixed with ethylene glycol. U. S. 2,185,119 gives as example benzyl alc. U. S. 2,185,120 gives as example acetone-free diacetone alc. U. S. 2,185,121 relates to a heat-hardening liquid coating compn. comprising a soln. of a prolamin such as zein and a water-insol. urea-aldehyde resin dispersed uniformly therein, in a solvent such as 95% alc. U. S. 2,185,122 relates to otherwise generally similar compns. contg. a partially reacted resinous polyhydric alc.-org. acid resin ester such as one formed from glycerol and phthalic anhydride instead of the urea-aldehyde resin. U. S. 2,185,123–4 relate to solns. of zein in 95% alc. in specified proportions. U. S. 2,185,125–6 relate to coating printed surfaces or paper, etc., with zein varnishes.

Decorative plates, slabs or panels. Cristallex Soc. anon. Brit. 508,791, July 3, 1939. A plate, etc., constituted by a decorative support of wood, cork, asbestos fiber cement, slate or marble is coated by application thereto of polyvinyl chloroacetate, which is used without the addn. of solvents and in powd. form, adhesion being obtained directly by heat and pressure. The plates, etc., may be used in facing walls or in the manuf. of furniture.

Sulfonamide derivatives. I. G. Farbenindustrie A.-G. Brit. 508,801, July 5, 1939. Condensation products having capillary activity are made by causing a sulfonic acid amide of formula RSO_2NHR', where R is an aliphatic, aliphatic-cycloaliphatic or aliphatic-aromatic radical contg. at least 12 C atoms, which may contain substituents and (or) may contain an O, S or N atom as a hetero atom in an aliphatic chain or as a bridge directly linking an aliphatic portion of the radical to a cycloaliphatic or aromatic nucleus, and R′ is H, Me, Et or $—CH_2CH_2NHSO_2R$, R being as above, to react at ordinary or raised temp. with CH_2O or a polymer thereof and an acid, an acid anhydride or an acid salt of a polybasic acid in the presence of a tertiary base or thiourea (I) or an alkyl deriv. of I capable of reacting in the iso-form. In a modification, a methylol compd. obtained by reaction of CH_2O or a polymer thereof with the sulfonic acid amide is caused to react with an acid, acid anhydride or acid salt of a polybasic acid in the presence of the tertiary base or I or alkyl deriv. of I capable of reacting in the iso-form; this modification may be further modified by causing the methylol compd. to react with a salt of the tertiary base or I or alkyl deriv. of I capable of reacting in the iso-form. In another modification, a *N*-halomethyl compd. of the sulfonic acid amide is caused to react with the tertiary base, I or alkyl deriv. of I capable of reacting in the iso-form. The reaction may be conducted in the presence of a solvent, e. g., H_2O, C_6H_6, toluene, PhCl, methylene chloride, ethylene chloride, CCl_4. The products are generally solid to semisolid, wax-like or lard-like, H_2O-sol. and easily dispersible in H_2O. They may be used for the *treatment of textiles, paper, leather, plastic masses*, etc. Among examples, (1) octadecanesulfonamide is heated at 90–95° for 8 hrs. with CH_2O and pyridine-HCl in pyridine (II) as solvent and the II is removed by evapn. to obtain a lard-like H_2O-sol. product of probable formula $C_{18}H_{37}SO_2NHCH_2(C_5H_5N)Cl$, an aq. soln. of which gives an insol. product on being heated or on addn. of aq. Na_2CO_3, (2) dodecane-*N*-chloromethylsulfonamide is dissolved in methylene chloride and I is added while cooling; on evapn. a lard-like mass is obtained and (3) *p*-isododecylcyclohexanol is condensed with Na chloroethanesulfonate by the Schotten-Baumann method, the corresponding sulfonyl chloride is obtained by reaction with PCl_5 and the compd., *p*-iso-$C_{12}H_{23}C_6H_{10}O$-$CH_2CH_2SO_2NH_2$ that is produced by subsequent treatment with NH_3 is heated with I, $(CH_2O)_x$ and dichloroacetic acid for 4 hrs. at 80–5°, a salve-like product being obtained on evapn. of excess I.

Refrigerant mixtures. David Crampton. U. S. 2,185,332, Jan. 2. A dehydrating and acid-neutralizing reagent for volatile refrigerants of the type in which water is difficultly sol., such as dichlorodifluoromethane, comprises a soln. of a metallic alcoholate such as NaOEt in a mixt. of MeOH to increase the soly. of water in the refrigerant and BuOH, cyclohexanol or 2-ethoxyethanol, to aid the soln. of the alcoholate in the lubricating oil used in the refrigerating system.

Use of methyl chloride in refrigerating systems. Frederick L. Koethen (to E. I. du Pont de Nemours & Co.). U. S. 2,186,028, Jan. 9. For inhibiting objectionable Cu plating in a refrigerating system in which MeCl is condensed and then evapd., the compression is effected in the presence of a mineral oil contg. triphenylguanidine.

Packaging material. A. A. Slesarev. Russ. 52,162, Nov. 30, 1937. The inner surface of the wooden packag-

ing material is covered with a 3–4% soln. of ammonium alginate and this is converted into the insol. Ca salt by treatment with a 20% soln. of $CaCl_2$.

Preparing chemical-treated pads such as those used in hair waving. Enno L. Long. U. S. 2,184,959, Dec. 26. Various details of app. and operation.

Colored flame candle. Wm. M. Fredericks. U. S. 2,184,666, Dec. 26. A candle with a wick is provided with metallic salts such as $SrCl_2$, etc., extending spirally about the wick, a coating of wax to seal the untreated portion of the wick and a combustible candle material about the wick and metallic salts.

Making beveled gaskets of asbestos, etc. Geo. T. Balfe (to Detroit Gasket & Mfg. Co.). U. S. 2,185,908, Jan. 2. Various mfg. details.

Flexible smooth-surface rugs. Frank M. Allen (to Congoleum-Nairn Inc.). U. S. 2,184,970, Dec. 26. A unitary sheet of fibrous material such as felt is impregnated with a waterproofing material such as an asphaltic compn. or synthetic resin compn., and an elongated tear-resistant element, such as a wire of stainless steel, is completely embedded in and approx. coextensive with an elongated recess penetrating a substantial distance laterally into the sheet adjacent one of its edges (various mfg. and structural details being described). U. S. 2,184,971 relates to details of rugs with a surface layer contg. a filler together with drying oils, cellulose esters or synthetic resins, etc.

Decalcomania. Ferdinand W. Humphner (to Mid-States Gummed Paper Co.). U. S. 2,185,983, Jan. 2. There are used together a plurality of paper sheets, colored adhesive between the sheets, adhesive over one of the sheets, a transfer body over the last-mentioned adhesive and an imprint on the body, the colored adhesive being water-sol. and tending to color the paper sheets when water is brought into contact with them. Cf. *C. A.* **34**, 2501[2].

Noncorrosive antifreeze liquids suitable for engine cooling systems. Fred R. Whaley (to Carbide and Carbon Chemicals Corp.). U. S. 2,185,238, Jan. 2. An alc. is used with about 1% or less of ethyl nitrate, isoamyl nitrate, nitromethane or nitroethane which serve as corrosion preventives. Cf. *C. A.* **34**, 200[3].

Laminated sheet material suitable for containers for tobacco products, etc. John W. Rash (to E. I. duPont de Nemours & Co.). U. S. 2,186,124, Jan. 9. A thin film of a nitrocellulose ink is applied to a smooth transparent base material such as regenerated cellulose and a film is also applied contg. polymerized isobutylene and rosin, with subsequent application of a layer of filled, uncured rubber compn.

Oil and grease containers, etc., of coated sheet materials. Ogden Johnson (to American Sealcone Corp.). U. S. 2,186,073, Jan. 9. Various mfg. details.

Material for brake blocks or linings. Harry B. Denman (to Detroit Gasket & Mfg. Co.). U. S. 2,185,333, Jan. 2. A method of making a brake block or lining comprises mixing together asbestos fibers and comminuted cork, wetting the surfaces of the cork and fibers with a wetting agent which is a solvent for a synthetic resin, incorporating in the mixt. a partially reacted synthetic resin in granular state sol. in the wetting agent and subjecting the mixt. to heat and pressure.

Polarizing structure suitable for automobile windshields. Hans Sauer (to Zeiss Ikon A.-G.). U. S. 2,185,018, Dec. 26. A base of transparent material has a foil of transparent material over the entire area of one of its surfaces, a portion of the foil located within the outline of the surface being adapted to polarize light passing through it, the polarizing portion of the foil merging with decreasing polarizing effect into the surrounding nonpolarizing area of the foil.

Tracing sheet. Robert F. Scott (to Carbide and Carbon Chemicals Ltd.). Can. 387,116, Feb. 27, 1940. A tracing sheet having at least one surface roughened so as to receive and retain pencil and ink impressions is composed of a transparent vinyl resin film prepd. by the conjoint polymerization of vinyl chloride with vinyl acetate, the proportion of vinyl chloride being 70–95% by wt.

Sound films. Jacques O. van Leer. U. S. 2,186,157, Jan. 9. A method of optical sound registration whereby the blackening is detd. by the light falling upon it, comprises throwing a spectrum on a film through a slit while the spectrum is moved in accordance with the sound being recorded whereby the wave length of the light varies in accordance with the sound being recorded whereas the film has a sensibility which is a function of the wave length.

Gas containers such as those of balloons. Harlan L. Trumbull (to B. F. Goodrich Co.). U. S. 2,186,183, Jan. 9. At least part of a gas-container wall comprises a film of plasticized γ-polyvinyl chloride compn.

Wicking containing glass filaments. Errol B. Shand (to Owens-Corning Fiberglas Corp.). U. S. 2,184,899, Dec. 26. Wicking suitable for use in lamps or stoves comprises glass filaments coated with an org. material such as a phenolic resin and woven into a textile fabric.

Projection screens, etc., comprising cellulose ester material such as cellulose acetate. Fred W. Jackman (to Warner Bros. Pictures, Inc.). U. S. 2,184,672, Dec. 26. A method of making a translucent projection screen involves spraying on a matrix such as glass or Al a plurality of initial coats of cellulose ester material such as cellulose acetate soln. to form a part of the body portion of the screen, allowing each of the coats to dry, applying a border strip of fabric on such partial body portion at its edge, spraying a second plurality of coats of the cellulose ester material over the partial body portion and border strip to build up the screen to the desired thickness and integrally to unite the strip with the body of the screen, allowing each of such last mentioned coats to dry and stripping the sheet from the matrix.

Thiocyanoalkyl ethers of alkylphenols. Gerald H. Coleman and Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,185,183, Jan. 2. By treating a haloalkyl ether of an alkylphenol with an alkali metal thiocyanate (suitably in abs. alc. and with refluxing), *insecticidal compds.* are obtained (suitable for use in kerosene or the like as a solvent), such as: β-thiocyanoethyl ethers of 4-*tert*-butylphenol, $b_{2.5}$ 158–163°; of carvacrol, b_{10} 189–196°; of hardwood tar phenols, $b_{15.5}$ 190–5°; of mixed xylenols, b_{10} 175–190°; of thymol, b_5 173–6°; of 2-methyl-4-*tert*-butylphenol, b_{10} 195–8°; of 2-methyl-4-cyclohexylphenol, $b_{5.5}$ 210–220°; and γ-thiocyanopropyl ether of 2,4-di-*tert*-butylphenol, b_2 173–5°; thiocyanoalkyl ethers of such phenols, as 2-ethylphenol, 3-isopropylphenol, 4-*sec*-butylphenol, 4 - hexylphenol, 3,5 - dimethylphenol, 2,4,6-trimethylphenol, 2 - methyl - 4,6, - diisopropylphenol, 4 - *tert* - octylphenol, 2 - cyclohexyl - 4 - *tert* - butylphenol, 3 - cyclohexyl - 4 - methylphenol and the like. The ether compds. which may be so prepd. include β-thiocyanoethyl ethers, β-thiocyanopropyl ethers, γ-thiocyanopropyl ethers, γ-thiocyanoisobutyl ethers, thiocyanopentyl ethers and the like.

Thiocyanoalkyl ethers of alkylhalophenols. Gerald H. Coleman and Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,185,184, Jan. 2. By treating a haloalkyl ether of an alkylhalophenol with an alkali metal thiocyanate (suitably in abs. alc. and with refluxing), *insecticidal compds.* (suitable for use in a solvent such as kerosene, *for killing house flies*, etc.), are obtained, such as: β-thiocyanoethyl ether of 2 - bromo - 4 - ethylphenol, b_3 170–1°; γ-thiocyanoisobutyl ether of 2-chloro-4-*tert*-butyl phenol, b_3 184–5°; β-thiocyanoethyl ether of 2-chloro - 4 - *tert*-butylphenol, b_{20} 230–5°; β-thiocyanoethyl ethers of 5-bromocarvacrol, b_5 203–8°; and thiocyanoalkyl ethers of such phenols as trichloro - *m* - cresol, 2,6-dichloro - 4 - ethylphenol, 4 - chloro - 2,5 - dimethylphenol, 2 - chloro - 4 - amylphenol, 2 - chloro - 4 - *tert*-butyl - 6 - methylphenol, 2 - chloro - 4 - *tert* - octylphenol, 4 - bromo - *o* - cresol, 2,4 - dimethyl - 6 - bromophenol, 2,6 - dibromo - 4 - *tert*-butylphenol, 2,4 - dichloro - 6-bromo - *m* - cresol, iodocresol, 2,4 - dibromothymol and the like. The ether compds. which may be so prepd.

include β-thiocyanoethyl ethers, β-thiocyanopropyl ethers, γ - thiocyanopropyl ethers, γ-thiocyanoisobutyl ethers, thiocyanopentyl ethers and the like.

Thiocyanoalkyl ethers of halophenols. Gerald H. Coleman (to Dow Chemical Co.). U. S. 2,185,185, Jan. 2. By treating a haloalkyl ether of a halophenol with an alkali metal thiocyanate (suitably in abs. alc. and with refluxing), *insecticidal compds.* are produced such as: γ-thiocyanopropyl ether of 2,4,6-trichlorophenol, b_4 195–6°; β - thiocyanoethyl ether of 2,4,6 - trichlorophenol, b_3 185–6°; β-thiocyanoethyl ether of 4-chlorophenol, b_3 153–5°; β-thiocyanoethyl ether of 4-bromophenol, b_3 181–2°; and thiocyanoalkyl ethers such as β-thiocyanoethyl ether of pentachlorophenol, β-thiocyanoethyl ether of 2,4,6 - tribromophenol, β - thiocyanoethyl ether of 2,4,5 - trichlorophenol, β - thiocyanoethyl ether of 2,4,5 - trichloro - 6 - bromophenol, β - thiocyanopropyl ether of 2,4,6 - trichlorophenol, β - thiocyanopropyl ether of 2,4-dichlorophenol, γ-thiocyanopropyl ether of 2 - bromo - 4 - chlorophenol, γ - thiocyanopropyl ether of 3 - chlorophenol, γ - thiocyanoisobutyl ether of 2,4,6-trichlorophenol, thiocyanopentyl ether of 4-chlorophenol, β-thiocyanoethyl ether of 4-iodophenol and the like.

Thiocyanoalkyl ethers of cyclohexylphenols. John E. Livak (to Dow Chemical Co.). U. S. 2,185,207, Jan. 2. By treating a haloalkyl ether of a cyclohexylphenol with an alkali metal thiocyanate (suitably in abs. alc. and with refluxing for several hrs.), *insecticidal compds.* are produced such as: β-thiocyanoethyl ether of 2-cyclohexylphenol, b_3 174–8°; γ-thiocyanopropyl ether of 2-cyclohexylphenol, b_3 215–18°; β-thiocyanoethyl ethers of *p*-cyclohexylphenol and of *m*-cyclohexylphenol, β-thiocyanopropol ether of *o* - cyclohexylphenol, γ - thiocyanopropyl ether of *p*-cyclohexylphenol, γ-thiocyanoisobutyl ether of δ-cyclohexylphenol, thiocyanopentyl ether of *o*-cyclohexylphenol, etc.

Thiocyanoalkyl ethers of phenylphenols. John E. Livak, Gerald H. Coleman and Clarence L. Moyle (to Dow Chemical Co.). U. S. 2,185,208, Jan. 2. By treating a haloalkyl ether of a phenylphenol or a nuclear substituted deriv. with an alkali metal thiocyanate (suitably in abs. alc. and with prolonged refluxing), *insecticidal compds.* are produced such as γ-thiocyanopropyl ether of 2-phenylphenol, b_3 198–200°; β-thiocyanoethyl ether of 3 - phenylphenol, b_2 207–12°; β - thiocyanoethyl ether of 2 - phenyl - 4 - chlorophenol, b_6 218–221°; β - thiocyanoethyl ether of 2-phenyl-4-*tert*-butylphenol, $b_{1.2}$ 225–230°; β - thiocyanoethyl ether of 2 - phenylphenol, b_3 182–6°; γ - thiocyanopropyl ether of 3 - phenylphenol, b_5 243–6°; β - thiocyanoethyl ether of 4-phenylphenol, m. 100–102°; and reaction products similarly derived from the β-chloroethyl ether of 2-phenylphenol; β - chloroethyl ether of 3-chlorophenylphenol, b_5 179–181°; β - chloroethyl ether of 4 - phenylphenol, b_3 163–5°; γ - chloroisobutyl ether of 2-phenylphenol, b_5 170–3°; β - chloroethyl ether of 2-phenyl - 4 - chlorophenol, b_3 149–150°; β - chloroethyl ether of 2 - phenyl - 4 - isopropylphenol, b_2 150–3°; β - chloroethyl ether of 2 - bromo - 4 - phenylphenol; β - bromoethyl ether of 2 - methyl - 4 - phenylphenol; β-chloropropyl ether of 2-phenylphenol; chloropentyl ether of 3-phenylphenol, etc.

Fire-resisting compositions. British Insulated Cables Ltd., Francis J. Brislee and Laurence Macfarlane. Brit. 509,069, July 11, 1939. Addn. to 498,181 (*C. A.* **33**, 4356[3]). The compns., suitable *for coating* or *impregnating textile materials*, etc., contain white lead 50–73, boiled linseed oil 3.5–11, chlorinated rubber 3–10 and chlorinated paraffin wax 2–10 or, in place of the last, chlorinated Ph_2 3–13 parts with a solvent for the chlorinated rubber according to the consistency desired; 12–37 parts of whiting may be added. The whiting may be replaced in part by approx. the same wt. of red ocher or French chalk, the remaining whiting being not less than 10% of the compn., the wt. of solvent being ignored in the calcn.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Hydrology of cretaceous subsoil of environs of Antwerp. F. Halet. *Bull. soc. belge géol., paléontol. hydrol.* **49**, 51–5 (1940).—A boring 375 m. deep at Hemixem, south of Antwerp, met chalk with flint at 327 m., but failed to yield potable or industrially useful water, a sample contg. 7 g. NaCl per l. with 0.139 g. CaO, 0.111 MgO and 0.028 SO_3. C. A. Silberrad

A biological survey of the Lower Hudson watershed. V. Chemical investigation of the Lower Hudson area. H. M. Faigenbaum. *N. Y. State Conservation Dept., Biol. Survey* (1936) No. 11, 146–216(1937)(Suppl. to 26th Ann. Rept.).—Pollution studies, involving detns. of free CO_2, dissolved O_2, alky. and H-ion concn., as well as measurements of temp. and depth, were made on the Hudson River, 7 major and 17 minor tributaries, the Bronx River and 3 New Jersey tributaries. Analyses were also made of 110 lakes and ponds and hatchery field station waters, in use or proposed. The effects of the principal types of pollution are discussed, including those resulting from sewage, milk and milk products, laundry wastes, bleaching, finishing and dyeing wastes, paper and assocd. wastes and miscellaneous wastes. **VIII. A limnological study of some lakes in the Lower Hudson area.** Willis L. Tressler and Ruby Bere. *Ibid.* 249–63.—$CuSO_4$ treatment of reservoir waters was very effective against the blue-green algae, but appeared to have a marked stimulating effect on copepoda, Cladocera and Rotifera. K. D. Jacob

Preliminary researches on the action of water on copper pipes. L. Tronstad and R. Veimo. *J. Inst. Metals* **66**, No. 860, 17–32(1940).—Addn. of Na_2CO_3, $NaHCO_3$ or CO_2 increases the soly. of Cu in still tap water in a closed system. This increase is probably due to a complex ion formation. The amt. of Cu in soln. increases until most of the O is used up and then decreases toward a limiting value. Equil. conditions are obtained in 3–15 hrs. The Cu content is a min. when the pH is 8.5. The amt. of Cu in soln. increases with temp. James W. Poynter

Ish River mineral springs. Z. N. Blyumshtein. *Uchenye Zapiski Kazan Gosudarst. Univ.* **98**, No. 2, 5–203 (1938).—An exhaustive description is given of the history, geology and hydrogeology of a no. of springs on the left bank of the Ish River, near its confluence with the Kama River. Numerous analyses of the waters (for solid and gaseous solutes) are given, and cond. and radioactivity data are recorded. B. C. P. A.

A rapid method of checking the accuracy of reported water analyses. V. P. Sokoloff. *Soil Sci.* **49**, 57–61 (1940).—The ratio of the sum of the cations or anions in water to the sp. elec. conductance at 25° ordinarily falls between 0.085 and 0.122. The variations between these limits are affected by (*a*) the ratio of Na to total cations, (*b*) the ratio of chloride to total anions and (*c*) the total concn. of electrolytes. After the conductance of a water and its Na and chloride content are detd., the total electrolyte content of the water and the sum of Ca plus Mg expressed as milliequiv. can be calcd. with considerable accuracy by means of the factors presented. The method described is not a substitute for complete analysis but rather a means of detecting errors made either in the course of such analyses or in calcg. and recording the results. Where a rough est. of Ca plus Mg is all that is needed, the method is satisfactory, provided important amts. of bases other than Ca, Mg and Na are absent. J. R. Adams

The development of water examination in the management of water supplies. C. H. H. Harold. *Water & Water Eng.* **40**, No. 500, 50–60(1938).—A discussion of the various chem. and biol. tests carried out in the treatment of water supplies. W. A. Moore

Standard methods for the examination of water and sewage. John F. Norton, *et al.* *Am. Pub. Health Assoc. Year Book* **10**, 110–11(1939–40).—Progress report. J. A. Kennedy

Determination of aluminum in filtered Neva River water according to the method of Hatfield. A. I. Ettinger. *Vodosnabzhenie Sanit. Tekh.* **1939**, No. 2, 68–71; *Khim. Referat. Zhur.* **2**, No. 5, 96(1939).—Hatfield's method (cf. *C. A.* **18**, 2213) permits rapid detn. of the dissolved Al and the highly dispersed $Al(OH)_3$. Since $Al(OH)_3$ cannot be detd. when in the form of a gel, the highly dispersed samples of $Al(OH)_3$ must be kept on ice to prevent their transformation into the gel state. W. R. H.

A study of procedures for detection of coliform organisms in Minnesota drinking water. Dean M. Taylor. *J. Am. Water Works Assoc.* **32**, 98–104(1940).—The *Standard Methods* "completed test" and 2 selective liquid media, using brilliant green lactose bile, and fuchsin lactose broth were compared. Brilliant green lactose bile was considered better than the fuchsin lactose broth, and compared so favorably with the "completed test" that it might replace it with advantage. D. K. French

Automatic apparatus for taking and bacteriologically inoculating samples of water. Raúl Ferramola. *Bol. obras sanit. nacion* (Buenos Aires) **3**, 391-5(1939); cf. *C. A.* **33**, 7449[6,6].—The app (described) consists of a chamber enclosing a rack holding 48 tubes contg. nutrient soln.; the rack is slowly propelled by clockwork past a pipet which at hourly intervals discharges into a tube 10 ml. of water from the main. The filled tubes are collected at suitable intervals and incubated as usual O. W. W.

Determination of boric acid in mineral waters. Michael L. Perteses. *Chim. Chronika* (Greece) **1938**, No. 10–12, 227–32(in Greek).—Pptn. of alk. earths from water with Na_2CO_3 carries down the H_3BO_3 (I) and this increases with the concn. From analyses of salt wells it is shown that a diln. up to a hardness of 200 German units is necessary, besides a double pptn. of the alk. salts. In the treatment of these salts with EtOH, where they have been sepd. as a moist saline mass, it is not possible to ext. the whole amt. of I. In order to avoid loss in distn. its vol. must be doubled with distd. water. When the amt. of alk. salts in the distg. flask reaches a max. it does not suffice to add only 2–3 cc. of water for 4 distns. with MeOH, but they must again be dissolved in water in order that after subsequent distn. of the aq. soln. the whole amt. can be recovered by double distn. from MeOH. For detn. of I the volumetric method is to be preferred. Lucien Y. Dyrenforth

Systematic investigation of waters for bromine. Ernesto E. J. Bachmann and Francisco C. T. Pertini. *Bol. obras sanit. nacion* (Buenos Aires) **3**, 396–402(1939).—Ten ml. of the concd. water is mixed in a wash bottle with a H_2SO_4 soln. of CrO_3; a slow current of air is aspirated through the liquid and through a disk of filter paper (S. & S. thick paper for spot tests) impregnated with a 0.2% soln. of fluorescein; about 10 min. is required to sweep out the liberated Br. The paper disk is then exposed to fumes of NH_3 to develop the color of the NH_4 salt of eosin which is compared with a previously prepd. scale. Iodine and nitrate do not interfere, nor does Cl in amts. not exceeding 100 mg./l.; in that case the Br is first absorbed in a soln. of 1% Na_2SO_3 + 0.2% Na_2CO_3 which is concd. and treated as above. No Br was found in the water of the Plata, Uruguay or other large streams; some well waters contained up to 0.8 mg./l. O. W. Willcox

Simplification of Powers' method for the determination of carbon dioxide in natural waters and comparison with the titration method. C. A. Peters, Sidney Williams and Paul C. Mitchell. *Ecology* **21**, 107–9(1940).—The method of Powers (cf. *C. A.* **21**, 3242; **22**, 3473) for detg. CO_2 in natural waters consists in finding the pH of the water as it naturally exists, and in addn., finding it at 2 specific CO_2 levels. From these data, with ionization consts., the air-CO_2 ratios and the CO_2 content are calcd. This paper introduces temp. corrections and shortens the calcns. by means of tables. For calcg. purposes the CO_2 content of the atm. is assumed to be 0.031%. The method checks well with the standard titration procedure with phenolphthalein as the indicator. C. R. Fellers

The Reddick nomogram for calculating the free carbon dioxide of waters, its application to natural, settled and final waters of the Palermo Establishment. Daniel J. Bengolea. *Bol. obras sanit. nacion* (Buenos Aires) **3**, 262–6(1939).—Application of the Reddick nomogram to the low-salinity Rio de la Plata River water for detg. the 3 variables alky., pH and free CO_2 results in discrepancies in the CO_2 figures unless the pH is detd. potentiometrically (glass electrode) instead of colorimetrically. Detn. of the alky. also introduces a slight discrepancy unless the methyl orange end point is controlled by a pH = 4 buffer soln. to which the same amt. of indicator has been added. CO_2 is best detd. on a sample of 250 ml. to which the phenolphthalein indicator has been measured from a pipet instead of by drops. O. W. Willcox

Determination of the pH of water. F. R. McCrumb. *Water Works & Sewerage* **86**, 403–6(1939).—A general discussion. W. A. Moore

Determination of iodide in mineral waters containing bromide and chloride. Ernst Müller and Walter Stump. *Z. anal. Chem.* **118**, 90–3(1939).—When small quantities of I^- in mineral waters are detd. by measuring the color produced in a solvent immiscible with water, after treatment with KNO_2 + HCl, the results are usually low because some of the I^- is oxidized to IO_3^-. The presence of considerable Cl^- or Br^- seems to catalyze this oxidation to HIO_3. If, however, the quantities of KNO_2 and HCl used are restricted, the oxidation to HIO_3 is avoided, although the slight excess of oxidizer or acid may cause incomplete oxidation of I^- to I_2. It is proposed, therefore, to carry out a rough detn. of the I^- in a preliminary expt. and then prep. a soln. contg. approx. the same quantities and det. the I^- content of this soln. with the quantities of KNO_2 and HCl in very slight excess. From this analysis with a known quantity of I^- an empirical factor can be obtained to be used in the analysis. W. T. H.

The continuous stability indicator. A simple device which provides the marble test and Langelier corrosivity index continuously. Linn H. Enslow. *Water Works & Sewerage* **86**, 107–8(1939).—The raw water flows continuously through a glass tube filled with chalk and then through a twin tube filled with marble or limestone chips. The pH and total alky. are detd. on the raw water and the effluent. W. A. Moore

Recent developments in water purification. Lewis V. Carpenter. *Proc. 12th Ann. Conf. Water Purif., in West Va. Univ., Eng. Expt. Sta., Tech. Bull.* No. **11**, 39–45(1938). G. G.

Recent developments in the purification of streams in the United States. Legislative measures and other questions of general interest. R. E. Tarbett. *Bull. office intern. hyg. pub.* **30**, 603–10(1938). R. Berggren

Programs for training of water-works operators. A. F. Dappert, *et al.* *Am. Pub. Health Assoc. Year Book* **10**, 67–74 (1939–40). J. A. Kennedy

British water-works practice. John Bowman. *Water & Water Eng.* **41**, 595–9(1939); *J. New Engl. Water Works Assoc.* **53**, 385–411.—A comparison between water-works practice in the New England states and in Great Britain. W. A. Moore

Significant experiences in the treatment of water in New York state. C. R. Cox. *J. New Engl. Water Works Assoc.* **53**, 444–57(1939).—At Delhi, N. Y., in addn. to coagulation and filtration it was found necessary to sterilize, and because there was so much opposition to Cl, ozone was tried. Results were not entirely satisfactory. With enough ozone water was adequately disinfected, but control was very difficult. Cost of operation was excessive. At South Fallsburg, where heavy chlorination was followed by dechlorination, failure to get satisfactory results was due to improper coagulation and filter washing. At Elba a hard water was softened with zeolite. Unevenness of the supply interfered with consistent results, and the treated water was corrosive. D. K. French

Reforming Florida waters. A. P. Black. *Water Works Eng.* **92**, 726, 729–30, 733–4, 737(1939). W. A. M.

Operating results at Louisville (Ky.). Nathan N. Wolpert. *Water Works Eng.* **92**, 738, 741–2, 745(1939).—Approx. 33% of suspended solids is removed in the sedimentation basins, 65% by coagulation and 2.3% by the filter. The av. alum dosage is 0.86 gr./gal. Activated C, in amts. varying from 10 to 30 lb./million gal., is applied to the water leaving the coagulation basins. Filters are washed with a 2% caustic soln. to remove Mn. W. A. Moore 1

Studies at water works using a very impure source of water. M. Gundel and K. Stundl. *Z. Hyg. Infektionskrankh.* **120**, 633–9(1938).—H_2O from 2 works was examd., at both of which a very impure supply is treated first with $Al_2(SO_4)_3$ to ppt. suspended matter and remove a large proportion of the organisms, and then chlorinated. The treated H_2O was quite satisfactory for human consumption. B. C. P. A. 2

Water-works improvements at Charlotte, N. C. J. B. Marshall and C. S. Rawlins. *Water Works & Sewerage* **86**, 83–90(1939). W. A. Moore 3

Soft water comes to the city of Clarksburg (W. Va.). Recent additions to purification plant involve zeolite softening. Scotland G. Highland. *Water Works & Sewerage* **86**, 123–6(1939). W. A. Moore

Effect of the mineral acid hardness of water on the lime-carbon dioxide equilibrium. Hans Wette. *Gas- u. Wasserfach* **83**, 37–9(1940).—The equil. value for free CO_2 increases and the equil. pH value falls for const. carbonate hardness with increase in the mineral acid hardness. The exact equil. CO_2 content cannot be calcd. by the use of Tillmans' tables or curves when the water contains natural or added mineral acid hardness. Only a slight difference prevails between the equil. pH values calcd. by Strohecker's (cf. *C. A.* **31**, 7568[8]) and Tillmans' methods (cf. *C. A.* **25**, 1310). The value for excess free CO_2 and const. carbonate hardness falls with increase of mineral acid hardness, but the pH is unchanged. R. W. Ryan 4

Improving the bacterial quality of water. John R. Bayliss. *Water Works & Sewerage* **86**, 96–8(1939).—It is recommended that for small plants at least ten 10-cc. tubes be inoculated daily and for large plants at least 40 such tubes be inoculated. If more than 10% of the 10-cc. tubes or all the 100-cc. tubes inoculated with finished water show gas formation either for 2 consecutive days or 3 days in one week corrective measures must be taken. The total no. of bacteria per cc. on agar at 37° should not average more than 2. It is also recommended that the water should carry a Cl residual of 0.5 p. p. m. 2 hrs. after its application. If considerable pollution is present, this value should be 1.0 p. p. m. W. A. Moore 5

Submerged combustion. L. H. Scott and F. C. Abbott. *Water Works & Sewerage* **86**, 381–5(1939).—Lime-softened water is recarbonated by submerged combustion of a mixt. of air and natural gas. The advantages of this process over the conventional method of recarbonation are: easier controllability, simplicity of equipment, greater chem. efficiency, elimination of corrosion trouble and elimination of scrubbing towers. W. A. M. 6

Methods of removing free carbon dioxide from natural waters. E. L. Streatfield. *J. Soc. Chem. Ind.* **58**, No. 10, 313–17(1939).—Both Na_2CO_3 and NaOH effectively removed the theoretical amt. of CO_2. When these 2 reagents were used, the pptn. of the $CaCO_3$ was very slow. Aeration by means of a fountain cascade with air diffusion was effective in reducing the CO_2 content from 45 to 10 p. p. m. With a given vertical drop, the amt. of CO_2 removed by aeration increases with the no. of trays used in the cascade and also with the quantity of air used. A 78% removal of CO_2 was obtained with a fountain cascade with air diffusion when 3 million gal. per day is treated. W. A. Moore 7

Acid waters and their correction. Éd. Imbeaux. *Rev. hyg. méd. prévent.* **61**, 585–6(1939–40); cf. *C. A.* **33**, 6491[3]. —Methods in use in various cities are outlined. The com. prepn., Neutralite, developed by the Degremont Co. of Cateau (Nord) is used most widely. This is a granular substance contg. Ca and Mg salts. C. R. Fellers 8

Studies in the use of sodium silicates. H. E. Lordley and Marsden C. Smith. *J. Am. Water Works Assoc.* **31**, 2149–56(1939).—Na silicate properly prepd., used and apportioned will almost always produce a better floc than alum alone, and a larger floc, which is better physically, and which settles more rapidly. It does not react well with iron salts, and at low temps. and turbidities iron salts are to be preferred to the alum with silicates. D. K. French 9

Coagulation studies on Rio de la Plata River water. F. Aurelio Mazza. *Bol. obras sanit. nacion* (Buenos Aires) **3**, 357–62(1939).—Further coagulation studies with Al sulfate were made to compare single injections with fractional injection wherein at first $^2/_3$ of the total amt. was used and followed by a period of agitation, addn. of the remaining $^1/_3$, and repeated agitation. Fractional injection now appears to offer no practical advantage; the previous contrary opinion was based on noncomparable expts. O. W. Willcox 10

A vacuum chlorinator. B. M. Romesnitskiĭ. *Vodosnabzhenie Sanit. Tekh.* **1939**, No. 1, 48–53; *Khim. Referat. Zhur.* **2**, No. 5, 95(1939).—A chlorinator (either stationary or portable) is described for disinfection of drinking water without the use of special indicator solns. A cylinder can be used for the supply of Cl. W. R. Henn 11

Experimental laboratory investigations of double chlorination of the Neva River water. S. V. Moiseev. *Vodosnabzhenie Sanit. Tekh.* **1939**, No. 2, 61–8; *Khim. Referat. Zhur.* **2**, No. 5, 95(1939).—Double chlorination lowers the cost of the technol. process of water purification. Addn. to water of not less than 0.7 mg./l. of Cl 2 min. after coagulation and before settling, and of not less than 0.1 mg./l. in the final chlorination was effective. The water should contain 0.2–0.3 mg./l. of residual Cl with a total Cl expenditure in the double chlorination of 1.5–1.6 mg./l. W. R. Henn 12

The role of ammonia in the treatment of water with chloramines. R. Buydens. *Rev. hyg. méd. prévent.* **61**, 576–84(1939–40).—This is a chem. study of the effect of the addn of NH_3 to water followed by Cl treatment. The efficacy of treatment increases as the pH decreases from 8.0 to 6.5. Both mono- and di-chloramines are formed in most waters. The chloramines are more stable in water contg. limited amts. of org. matter than was supposed. In fact the presence of org. matter did not materially delay bacterial destruction by the NH_3-Cl treatment of water. It is important that the Cl be thoroughly mixed with the water pretreated with NH_3. The NH_3-Cl reaction should be further studied by bacteriol. means. C. R. Fellers 13

Free ammonia in the presence of chloramine. E. E. Wolfe. *Water Works & Sewerage* **86**, 509–11(1939).—To 250 cc. of the water add 0.5 cc. of a 5% Na_2CO_3 soln. Transfer a portion to a 50-cc. Nessler tube and add a few g. of Folins Permutite to the remainder and shake the mixt. for 5 min. Filter the suspension through a cotton plug (rejecting the first filtrate) into another Nessler tube. Add 0.2 cc. of H_2SO_4 (1–10) to both tubes, then allow to stand for 1 min. Add Nessler's soln. (2 cc.) and compare the developed color with standards. The difference in readings between the 2 tubes is a measure of the amt. of free ammonia present. W. A. Moore 14

Chlorine vs. chloramine residuals. A method of differentiation between the two forms of available chlorine. A. E. Griffin. *Water Works & Sewerage* **86**, 275–6(1939); cf. *C. A.* **33**, 7006[9].—The total Cl is detd. in the usual manner (call *A*). A second sample is then divided and to one portion is added $NaNO_2$ soln. equiv. to 1.5 times the amt. of Cl as detd. in *A*. After 1 min. *o*-tolidine reagent (excess acid type) is added to each portion at the rate of 2.0 cc./100-cc. sample. The tubes are placed in the dark and after sufficient time for color development they are compared with standards. The Cl_2 as detd. on the untreated portion represents the total available Cl_2 while that detd. on the $NaNO_2$-treated portion approximates the amt. of chloramine present. The total Cl_2 − chloramine Cl_2 = oxidative Cl_2 or hypochlorite present. W. A. Moore 15

Method for the preparation of silver-plated sand no. 56. S. V. Moiseev. *Trudy Vtorogo Leningrad. Med. Inst.* **8**,

11-47(1937); *Chem. Zentr.* **1938, II,** 3424; cf. *C. A.* **29,** 1910⁹.—Sand having a diam. of 0.5–1 mm. is most suitable for silver-plating. The sand is heated at 600° and while still hot poured into cold water, dried and finally shaken in a 0.5-mm. sieve to remove particles smaller than 0.5 mm. Soln. *A* is prepd. by dissolving 20 g. $AgNO_3$ in 150–200 cc. distd. water, adding 2.5% NH_3 until the ppt. formed is almost dissolved, filtering and dilg. to 2 l. Soln. *B* is prepd. by adding 10 g. $AgNO_3$ and 8.3 g. Seignette salt to 5 l. boiling water, boiling 1 min., and storing in the dark. The sand is plated by adding 500 cc. of soln. *A* and 500 cc. of soln. *B* to 500 g. of sand. After silvering, the sand is washed with distd. water to remove the Cl. The amt. of pptd. Ag should amount to 0.28–0.32%. The olygodynamic action of the prepn. is good. W. A. M.

Development and use of the bone filter for removing fluorine from drinking water. H. V. Smith and W. B. Davey. *Ariz. Agr. Expt. Sta., Tech. Bull.* **81,** 249–92 (1939); cf. *C. A.* **30,** 7664⁶.—The Sanchis method (*C. A.* **28,** 2813⁴) for the detn. of F gives only approx. results. PO_4 ions cause low results and SO_4 ions cause high results. Bone is prepd. for use in removing F from drinking water by boiling with alkali until it has lost its flinty characteristics and has become snow white in appearance, washing out the excess alkali with H_2O, and neutralizing with dil. HCl. The bone can be regenerated after use by similar treatment. Calcination of the bone at 400–600° for 10 min., followed by 10-min. acid treatment, yields a better bone product for the F-removal process. Bone prepd. in this way will not putrefy as do some of the alkali-acid treated products. A bone fragment size of 40–60 mesh was most desirable. The period of contact directly affects the percentage removal of F. pH of the water had little effect unless it was too alk. The presence of salts other than fluorides had little effect on F removal. Double treatment of water with 2 portions of bone was no better than a single treatment with twice as much bone. The mechanism by which bone removes F from water appears to be through the formation of solid solns. rather than simple anion exchanges as was at first supposed. Other phosphates were tried in filters but none worked as well as bone. Bone is about twice as effective as the com. $Ca_3(PO_4)_2$. Defluorite. It is entirely practical to remove excess F from drinking water supplies by means of bone filters. 37 references. C. R. Fellers

Filter-plant experiences. L. R. Mathews. *Water Works Eng.* **92,** 1484–5(1939). W. A. Moore

The filtration plant of Willimantic, Conn. George H. Buck. *Water Works & Sewerage* **86,** 267–70(1939). W. A. Moore

New all-steel filter plant. John T. Campbell. *Water Works & Sewerage* **86,** 331–3(1939). W. A. Moore

Operating Denver's newest filter plant. Dwight D. Gross. *Water Works Eng.* **92,** 714, 717–18, 721–2, 785 (1939).—The turbidity of the raw water varies from 4.3 to 140 p. p. m. Alum required varies from 0.26 to 3.41 gr./gal. while the lime required varies from 0.15 to 1.7 gr./gal. Ammonia-chlorine is used in amts. of 1.75 to 4 lb./million gal. for sterilization. W. A. Moore

Flow in trickling units. Sverre Stene. *Gesundh.-Ing.* **63,** 52–6(1940).—A criticism of Pönninger's math. interpretations, theories and methods relating to the flow in trickling units (cf. *C. A.* **33,** 791⁵). E. W. Roth

Progress in softening of public water supplies. F. Kenneth Sinclair. *Water & Water Eng.* **40,** No. 500, 101–2, 107–14(1938).—A general discussion. W. A. M.

Water softening at Minneapolis. J. Arthur Jensen. *Water Works Eng.* **92,** 672–8(1939). W. A. Moore

Sodium hexametaphosphate. K. M. Markuze. *Legkaya Prom.* **1938,** No. 11, 108–12; *Khim. Referat. Zhur.* **2,** No. 4, 110(1939); cf. *C. A.* **33,** 6533⁹; **34,** 890¹.—The Na hexametaphosphate method for the purification of water, which is used for washing textiles, improves the quality of the dyes and increases their stability. But it cannot be always used instead of the permutite method, especially for washing textiles contg. ppts. of Ca soaps, for washing wool which contains a large amt. of lime contamination, and for washing silk which also contains salts of Ca, etc. The decision to use either the permutite method or the Na hexametaphosphate method depends on what the purified water is to be used for after the washing. W. R. Henn

Treatment of water with sodium silicate. E. F. Kurgaev. *Vodosnabzhenie Sanit. Tekh.* **1939,** No. 2, 71–2; *Khim. Referat. Zhur.* **2,** No. 5, 96(1939).—Addn. to the coagulant of 3–6 mg. of SiO_2 for each l. of water increases the rate of coagulation and the size and the transparency of the flakes, decreases to $^1/_8$ to $^1/_{10}$ the amt. of coagulant required, permits the use of coarser filtering material, increases the life of the filters and makes possible the use of smaller settling reservoirs. W. R. Henn

The stabilization of lime-softened water. A comparison of three methods and practical methods of testing. H. O. Hartung. *Water Works & Sewerage* **86,** 56–60(1939); *Rept. 14th Ann. Missouri Water Sewerage Conf.* **10,** 44–53 (1938).—A comparison of results obtained by recarbonation, addn. of Na hexametaphosphate, and tetra Na pyrophosphate. In using the latter method it was found that 0.05 p. p. m. was sufficient to stabilize the water at room temp. for at least 24 hrs. After higher temps. its effectiveness decreased. The results indicate that there is little choice between the use of the pyro- or hexametaphosphates. W. A. Moore

Container "tops" again. C. C. Harrington. *Paper Ind. Paper World* **21,** 868–72(1939).—A description of the new water-conditioning system and boiler plant at the Carthage, Ind., plant of Container Corp. A. P.-C.

The application of hydrogen-ion concentration to boiler water treatment. pH control of feed water by automatic pH recording and chemical dosage apparatus. G. W. Bond. *J. Chem., Met. Mining Soc. S. Africa* **40,** 59–73 (1939).—A general discussion. Alden H. Emery

Swimming pool water treatment. Herbert L. White. *J. Am. Water Works Assoc.* **32,** 105–14(1940).—In the control of turbidity, algae and other impurities, too much coagulant and chemical frequently defeat its purpose. Restriction to small amts. is most important. Algae which resisted $CuSO_4$ were destroyed by overchlorinating. D. K. French

Sewage disposal in Germany. Karl Imhoff. *Water Works & Sewerage* **86,** 99–102(1939). W. A. M.

Hoopeston, Ill. builds sewage-treatment plant. K. V. Hill. *Water Works & Sewerage* **86,** 423–6(1939). W. A. Moore

The sewage-treatment plant of Olean, N. Y. Joseph E. Rehler and Newell L. Nussbaumer. *Water Works & Sewerage* **86,** 374–9(1939).—Preliminary treatment with sep. sludge digestion is used. Provision is made for pre- and post-chlorination if necessary. W. A. Moore

The sewage-treatment plant of Lakewood, Ohio. Rollin F. MacDowell. *Water Works & Sewerage* **86,** 350–3 (1939).—The plant provides for preliminary treatment with sep. sludge digestion together with pre-chlorination and post-chlorination if necessary. W. A. Moore

Design of sedimentation tanks [for sewage]—detention periods and efficiency in removing suspended solids. L. B. Escritt. *Sewage Purif.* **1,** 151–6(1939).—A study of the theory of sedimentation of nonflocculating particles from the formulas of Stokes and Hagen leads to the conclusion that the surface area of the tank is of primary importance in design, whereas the capacity is of secondary importance. In practice the inlets, outlets, variability of rates of flow and strength of sewage, short-circuiting, etc., upset such theoretical considerations. Sedimentation tanks are designed on the probable max. flows [or on 3 times the dry-weather flow (d.-w. f.)] and at this rate of flow the upward flow should be not greater than 6 ft./hr. (i. e., it should have a surface area of 1 sq. ft./300 gallons/day of the d.-w. f.). Under standard conditions with a tank of good efficiency, when the max. rate of flow is 3 × d.-w. f. a satisfactory detention period should be 2 hrs., i. e., the tank capacity = 6 hr. d.-w. f. In the design of pyramidal, semiupward-flow tanks, capacity is important. The size of a tank of any particular detention period is limited by the max. length of advantageous weir and min. workable capacity. As a general rule, a

tank with 6 hr. d.-w. f. might be designed not to exceed 28 ft. square, with castellated weirs for smaller sizes. The period of desludging affects the capacity as the depth of sludge is considerable, owing to the low capacity of the apex of the pyramid. Thus a tank of 6 hr. d.-w. f. capacity will have $^2/_3$ of its depth of sludge after 4 days with sludge containing $97^1/_2\%$ of H_2O at $^1/_2$ gallon of sludge/head/day and 25 gallons of sewage/head/day, and therefore must be desludged at least twice per week. The inlet is important: it should extend not greater than $^1/_3$ of the depth down, should have no downward action liable to disturb settled sludge and should be of low velocity (not greater than $1^1/_3$ ft./sec. at max. flow). The efficiencies of tanks, mech. flocculation, etc., are compared. B. C. P. A.

Percolating filters and humus tanks: their design, construction, and operation. L. B. Escritt. *Sewage Purif.* **1**, 243–50(1939).—The grading of media has been reversed in recent work on rapid filtration, so that the surface material is coarser than the general mass of the bed, in order to prevent ponding. The capacity of the filter bed is ascertained from the dosing rate per cubic yard (Y), which for medium material = $(2250/x) + 2.5$, $6000/x$, and $(7750/x) + 21$, resp., for liquor after detritus tank, continuous settlement, or continuous pptn. treatment, where x = concn. of sewage by McGowan's formula. For economy the filter bed should be as deep as possible, but this means increased rates of surface discharge, resulting in ponding, especially if the surface material be fine. To avoid this the rate of flow per yard super is limited (e. g., 1 yard super per 133 gal. dry weather flow), from which the depth can be calcd. The types of filters, feed distribution, bed construction, humus tanks, operation, and maintenance are discussed. B. C. P. A.

The determination of hydrogen sulfide. Geo. Martin. *Water Works & Sewerage* **86**, 501(1939). An app. *for the detn. of H_2S in sewage, polluted water* or *sewage gas*. Air is drawn through the liquid which is contained in a suction flask for 2 min. The H_2S which is released from soln. is drawn up through Pb acetate paper. The amt. of H_2S is detd. by comparing the degree of darkening of the paper with standard papers. W. A. Moore

Dilution of crude sewage. Its importance in disposal methods. J. Finch. *Sewage Purif.* **1**, 197–202(1939).—Advantages of diln. by rain H_2O, especially to the activated-sludge process, are that a denser, better-settling sludge is obtained and increased purification results. This superiority is due to the dissolved O of the rain, and can be artificially reproduced by dilg. the incoming strong sewage with a portion of the final effluent. To effect this, thin surplus sludge in the activated-sludge process or thin humus sludge in the biofiltration plant may be returned to the sewage inlet, either continuously or periodically according to the vol. and concn. (i. e., the load) of the sewage. Continuous diln. is the better as it evens out irregularities of the sewage. B. C. P. A.

Copper and copper alloys in sewage treatment. Richard S. Burr. *Water Works & Sewerage* **86**, 362–4(1939). W. A. Moore

Rate of solution of air and rate of transfer for sewage treatment by activated-sludge processes. R. Hicks and G. E. P. Box. *Sewage Purif.* **1**, 271–8(1939).—Methods of detg. the rates of O absorption in sewage sludge mixts. are discussed. Tests on the relationship between the rates of O demand and dissolved-O concn. confirm Phelp's law over a wide range of values that the biochem. oxidation is independent of the O content of the sewage sludge mixt., except at less than a crit. point when the dissolved O concn. falls to less than 1 p. p. m. Rates of O absorption detd. by the Odeeometer (*C. A.* **30**, 2298[8]) were compared with those by the dissolved O depletion method. With the Odeeometer, the change of speed of the aeration paddle caused changes in concn. of dissolved O, so that until this has reached equil., the figures obtained for absorption rates will be misleading, owing to the sludges absorbing some O at the expense of the dissolved O instead of wholly from the air. At very low paddle speeds the max. rate of soln. of O from air was reached and the dissolved O falls to a crit. value below which the sludge was deprived of O. This crit. min. value lies between 0.5 and 1.0 p. p. m. of dissolved O. Tests confirm that the O-demand of activated sludge is the deficiency demand of the liquid with which it is in contact at any particular concn. of dissolved O. B. C. P. A.

Diffusers and diffuser plates in activated-sludge systems. J. W. Lewis. *Sewage Purif.* **1**, 174–7(1939).—High operation cost of diffused aeration due to general inefficiency of compressed-air systems is increased by the resistance of small pipes and diffusion plates, which increases by clogging with use. Plates of min. resistance compatible with efficient diffusion should be employed. A high permeability is essential as liability to clog, pressure loss, and power consumption are less with coarse pores. Permeabilities of 40–60, instead of 10–20, are now used, as the bubbles must reach a certain size to overcome the surface tension that holds them. Clean, dry, oil-free air is essential and is best provided by turbo-machinery after prefiltering the air. Clogging on the liquor side of the plate is liable during temporary stoppages of aeration (fine solids enter the pores) and by org. growths due to uneven diffusion. Plates can be cleaned *in situ* (after emptying the tanks) by high-rate air-blowing, followed by sand-blasting to remove the surface $^1/_{32}$ in.; 30% HCl treatment with stiff brushing, etc. Removable plates can be soaked in 30% HCl for 4 hrs. and washed, and if greasy they can be boiled in NaOH and washed, or stacked in a furnace with $^1/_2$-in. spaces between each plate, raised to 1000°, and slowly cooled (16 hrs.). Tubular-type diffusers are described and the materials used are discussed. B. C. P. A.

Sludge filtration. LeRoy W. Van Kleeck. *Water Works & Sewerage* **86**, 91–5, 135–9, 277–81, 310 13, 415–19 (1939); cf. *C. A.* **33**, 3041[9].—The following topics are discussed: construction of vacuum filters, elutriation of sludge, chemicals used in sludge conditioning together with the amts. used and methods of feeding, industrial waste in sludge, sludge conditioning, dry solid yields of vacuum filters, disposal of filtered sludge, bacteria in the filter cakes, and lab. control of sludge filtration. W. A. M.

Study of hydrolytic enzymes in activated sludge. Robert S. Ingols. *New Jersey Agr. Expt. Sta., Bull.* **669**, 3–32(1939); cf. *C. A.* **32**, 8052[8].—There is a marked increase in pepsin during the development of activated sludge from sewage. Lipase, diastase and trypsin increase slightly. Lipase, pepsin and diastase are found only on the surface of the sludge floc; trypsin is found also in the liquor surrounding the floc. The enzyme activities of a mixt. of the activated sludge and sewage change during the 6-hr. aeration period. Slight fluctuations had but little effect on the enzymes studied. When activated sludge is aerated continuously for several weeks, the importance of the enzymes is demonstrated, because the enzymes increase during the 1st 3 days and only after that decrease gradually. Diastatic activity can be increased by as much as 500% by adding starch to the sewage at 5°. The rate of hydrolysis is influenced by the rate of assimilation of its hydrolyzate by the sludge organisms. Diastase reacts better at a concn. of salts slightly higher than that found in the activated sludge liquors. Plasmolysis of the sludge organisms leads to an increase in the free enzymes. Clarification of the sewage is correlated with the biophys. properties of the activated sludge floc. Purification is correlated with the biochem. property, enzyme activity, of the sludge floc. 33 references. C. R. Fellers

Sludge disposal at Minneapolis, Buffalo and Chicago. F. W. Mohlman. *Sewage Works J.* **11**, 1089–90(1939).—Vacuum filtration and drying in incinerators at these 3 cities present 3 distinctively different problems in kinds of sludge handled, chem. treatments and amts. of water evapd. A valuable comparison of the data in the 3 annual reports is tabulated. W. D. Hatfield

Significance of raw water pollution load. Norman J. Howard. *Water Works Eng.* **92**, 687–8(1939). W. A. Moore

The control of stream pollution. Henry S. Graves. *Am. Forests* **46**, 113–14, 141(1940).—A survey of the

advances made in the U. S. in the disposal and treatment of municipal wastes and in reducing the discharge of deleterious matter from industrial plants and active mines.
Leopold Scheflan

Contamination of ground water by chemicals. Alexander Lang and Hayo Bruns. *Gas- u. Wasserfach* **83**, 6–9(1940).—The danger of ground-water contamination by sol. materials is pointed out and examples of contamination by picric acid residues, slag quenching water and coal wastes are given. The use of fluorescein is a valuable aid in detg. the source of chem. contamination. Hydrologists and hygienists need to coöperate in studying the effect of ground-water flow on contamination. R. W. Ryan

Raritan River pollution. II. Willem Rudolfs. *New Jersey Agr. Expt. Sta., Bull.* **659**, 22 pp. (1939); cf. *C. A.* **24**, 1918.—The natural waters of the Raritan River are fairly const. in chem. compn. and in bacteriol. content. Because of the softness and low mineral content the water is particularly suited for industrial uses. The increase in chem. pollution comes largely from the towns of Bound Brook and Somerville. The discharge of chem. wastes in the river interferes with self-purification and oxidation power of the stream, is detrimental to fish life, and prevents the fullest recreational use of the river. Bacteriol. results show that the river is unfit for swimming. Calcns. show that the sludge and other O_2-consuming substances removed by the treatment in sewage plants along the river are equiv. to 8750 lb. of O_2 or to the addn. of 90–120 million gals. of clean water daily. Completion of the sewage-treatment plants now under construction will reduce the content of intestinal bacteria in the summer months by about 99.9%. Until industrial pollution is removed, the general improvement of the river will be less than could be expected from the investment in sewage-treatment plants by various communities. C. R. Fellers

Trade effluents. IV. Influence on later stages of sewage purification. J. Hurley. *Sewage Purif.* **1**, 158–63 (1939); cf. *C. A.* **33**, 8871[1,5].—Certain trade wastes (e. g., phenols of gas liquors, cyanides of metal-plating liquors, etc.) are liable to cause sterilization of the biol. purification processes. Generally, if they both serve the same population, a sewage works can deal with the gas-works liquor of its own area if the flow is properly regulated and the tar and oil are sepd.; when, however, the discharge of gas liquor is 0.5% of the total sewage flow great care is necessary. In the main, trade wastes are warmer than is domestic sewage, and thus maintain temp. conditions favorable to biol. processes. Aerial nuisances by overdosing sewage-sick land and during dosing of percolating filters through the escape of odor (especially if badly designed) are usually increased by trade waste; some decomp. (e. g., tannery, fellmongery, milk-product wastes, etc.); some wastes (e. g., milk products, breweries, distilleries, etc.) containing sugar encourage organisms which decompose offensively. The trouble caused in biological processes by pulsations in strength and vol. of sewage through not being levelled out sufficiently in the sedimentation tanks is often not realized. Percolating filters give their best results with careful supervision but tolerate considerable ill-usage; they cannot, however, withstand sudden heavy flushes of trade wastes. Most trade wastes can be treated in admixt. with domestic sewage if the flow is regulated and any other necessary precautions (e. g., pretreatment at the factory, chem. pptn., etc.) are taken, depending on individual circumstances. Overloading is the chief cause of filter-clogging. Ponding results from deposition of mineral matters, excessive org. growths, fibrous matter, grease or fat, etc. Acidity or alkalinity of a trade waste is not likely to damage the filter media by disintegration as it is so dild. Although trade wastes increase the load on the filtration plant, most can be purified reasonably if the ratio to domestic sewage is not too high and suitable precautions have been taken. **V. Influence on the later stages of sewage purification.** J. Hurley. *Ibid.* 203–6(1939).—The activated-sludge process is more prone to complication due to trade waste than is the percolating filter, except for Fe liquors, which are beneficial to the activated-sludge process, tending to coagulate the floc, whereas it tends to clog percolating filters. The activated-sludge process is more sensitive than the percolating filters to variation in concn. of most trade wastes, but usually works satisfactorily if the flow is regulated, and tar and oils are removed from gas liquors. With the diffused-air type of activated-sludge process, clogging of the diffuser plates by trade wastes [e. g., $Fe(OH)_3$ from pickling liquor, grease from wool scouring, etc.] may be serious, especially if the air supply is interrupted. pH 6.5–8.0 gives good effluents with the activated-sludge process, but flocculation is aided by slight acidity and nitrification by slight alky. The corrosive effects of trade waste on cement, mortar, etc., are aggravated in the activated-sludge process by the rapid motion of the liquor. Bulking in presence of trade waste is usually due to under-aeration caused by the increased load. Rising of sludge in settling tanks is not confined to industrial sewage. **VI. Influence on disposal of sewage sludge.** *Ibid.* 251–5.—Trade wastes increase the sludge-forming solids for disposal. Some trade wastes (e. g., Fe liquors, etc.) encourage flocculation, causing denser sludges more readily dried on beds, and easier to filter-press. Others (e. g., soaps, greases, etc.) tend to convert the sludge into a gel state, hindering drying and filter-pressing. Trade wastes cause little trouble in digestion except influencing the gas yield and grease and fat tending to cause acidic conditions. Pumping of sludge, other mech. H_2O-removing processes, grease recovery from sludge at Bradford and Halifax, and the utilization as fertilizer are discussed. **VII. Treatment at the factory.** *Ibid.* 295–300.—The pretreatment of various trade effluents prior to their discharge to the sewers and the recovery of by-products from gas liquor, textile waste, grease, metal-pickling liquors, etc., are discussed. Only the min. treatment necessary to prevent damage to sewers and disposal works should be given. If the pH is adjusted, the corrosive action of the wastes from the viscose process of rayon manuf. can largely be prevented by removal of S compds. (particularly sulfides). Biol. filtration (particularly on enclosed aerated filters) can effectively oxidize sulfide liquors and appears to be a better method than pptn. B. C. P. A.

Limitations of Euglenidae as polluted water indicators. James B. Lackey and Russell S. Smith. *U. S. Pub. Health Repts.* **55**, 268–80(1940).—Sixteen references. J. A. Kennedy

Outbreaks of water-borne diseases in the New England States, 1920 to 1936. Arthur E. Gorman. *J. New Engl. Water Works Assoc.* **53**, 473–504(1939). D. K. French

The arsenic-containing waste waters from the production of Schweinfurth green and calcium arsenite. S. N. Cherkinskiĭ and F. I. Ginzburg. *Vodosnabzhenie Sanit. Tekh.* **1939**, No. 2, 99–106; *Khim. Referat. Zhur.* **2**, No. 5, 96(1939).—The waste waters from the production of Schweinfurth green are contaminated with the complex As-Cu compds. and As_2O_3, and the waste waters from the production of Ca arsenite are contaminated with As compds. and As_2O_3. These waters are rendered harmless by removal of the As compds. or by great diln. in reservoirs. W. R. Henn

Purifying action of pure cultures of protozoa on domestic waste water. G. Jäger. *Z. Hyg. Infektionskrankh.* **120**, 620–5(1938).—Viehl's observation, that flocculation of the colloids is accelerated by presence of protozoa, is confirmed. A pure culture of *Paramecium caudatum* is practically as effective as a mixed culture of *P. caudatum, Euplotes charon, Vorticella alba*, and small colorless flagellates. The effectiveness of the last 3 decreased in the order given. The differences in activity are due to differences in nutrient uptake and in sensitivity to impurities in the H_2O. B. C. P. A.

Albermarle's (N. C.) new combination waste-disposal plant. Geo. S. Moore. *Water Works & Sewerage* **86**, 143–5(1939).—Treatment consists of primary settling, chem. coagulation and septic sludge digestion. A reduction of approx. 90% in suspended solids and 80–95% in B. O. D. is obtained. W. A. Moore

Some aspects of combined garbage-sewage disposal.

K. C. Lauster. *N. Dakota Water & Sewage Works Conf., Official Bull.* 7, No. 11, 6–8(Aug., 1939); *U. S. Pub. Health Eng. Abstracts* 20, IHS, 2(Feb., 1940).—Assuming for domestic sewage, 350 p. p. m. suspended solids, 100 gal. per day daily flow with 60% removal of suspended solids, and for garbage, 0.55 lb. per capita per day, of which 0.14 lb. per capita per day are dry solids and that 41% of this will settle out, L. has calcd. that garbage discharged ahead of sedimentation devices requires an increase of 32% in digestion capacity and that garbage discharged directly into the digestion tanks requires a 9% increase. This theoretical calcn. gives results that are contradictory to statements that garbage addn. has little or no effect on digestion-tank requirements.

C. R. Fellers

An investigation of the effects of milk wastes on the Bristol Avon. F. T. K. Pentelow, R. W. Butcher and J. Grindley. *Ministry of Agr. and Fisheries* (Gt. Brit.), *Fishery Investigations*, Ser. 1, 4, No. 1, 76 pp.; *Dairy Sci. Abstracts* 1, No. 1, 26–7.—A detailed chem. and biol. examn. of the River Avon above and below a milk-condensing and -drying factory. During the early part of the investigation the effluent contained washings from floors and milk cans, and condenser water from vacuum pans; later only condenser water was discharged into the river, the condition of which improved markedly. No bacteriol. examns. were made. The vol. of effluent was not measured; levels of the river were recorded, but not the vol. of flow. Details are given of chem. analyses and also analyses of the distribution of flora and fauna.

C. L. B.

Ventilation and atmospheric pollution. I. Suggested standards. *Am. Pub. Health Assoc. Year Book* 10, 90 (1939–40).—See *C. A.* 33, 3046[2]. **II. Standard methods for the examination of air.** Emery R. Hayhurst, *et al. Ibid.* 90–1. **1. Report of subcommittee on physical procedures in air analysis.** C. P. Yaglou, *et al. Ibid.* 91.—Slight changes are recommended in its report of 1938–1939; cf. *C. A.* 33, 2633[8]. **2. Report of subcommittee on chemical methods in air analysis. Sampling and sampling devices.** F. H. Goldman, *et al. Ibid.* 92–7.—Listed and briefly described are 17 sampling devices. There is a discussion of sampling, testing the efficiency of sampling devices and classification of gases. Sixteen references and an appendix—tabulation of gases detd. by various absorbing devices and giving for each gas the air flow, absorbing reagent, efficiency and reference. **3. Report of subcommittee on dust procedures in air analysis.** J. J. Bloomfield, *et al. Ibid.* 99. **4. Report of subcommittee on bacteriological procedures in air analysis. State of suspension.** W. F. Wells, *et al. Ibid.* 99–101. **Relation of state of suspension of bacteria in air to their quantitative enumeration by various techniques.** Earle B. Phelps. *Ibid.* 102. **Droplet nuclei.** W. F. Wells. *Ibid.* 103–4.

J. A. Kennedy

Meat packing plant installations for treatment of wastes (Childress) 12. Recovery of fats from waste water (Passavant) 27. Aspects of viscose industry (Hearen) 23. Sulfate in salt deposits of N. W. Argentine [saline waters] (Villareal) 8. Effect of water hardness on formation of floc from Na aluminate (Miller, Lanz) 23. Investigations on fermentations appearing in diffusers with reuse of waste water (Reindel, *et al.*) 28. Sulfite liquor developments [waste effluent] (Howard) 23.

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Treating waste water, etc. Kai Petersen. Brit. 508,881, July 7, 1939. Water contg. convertible or decomposable org. matter is purified according to the activated sludge method by subjection to an aerobic biol. treatment comprising addn. thereto of a part of already treated water, if desired after an addnl. aerobic biol. treatment, the 1st-mentioned aerobic biol. treatment being effected in a rotating or oscillating solid-walled container through which O-contg. gases are passed. The treatment may be promoted by means of freely movable distributing bodies, e. g., small stone chippings, slags, pieces of wood or cork, operating as culture-carrying bodies for the aerobic microorganisms, and thin constantly active films of microorganisms maintained thereon by the mutual movement of the same.

Sedimentation of materials such as sewage. John V. N. Dorr, Wm. C. Weber, Geo. M. Darby and Elliott J. Roberts (to Dorr Co.). U. S. 2,185,785, Jan. 2. App. is described, and a process of sepg. suspended solids from liquids by concomitant flocculation and sedimentation within a single tank characterized by the maintenance of a disturbed flocculation zone superimposed on a quiescent sedimentation zone, continuously introducing and uniformly distributing the solids-liquid mixt. to be treated over the region constituting the boundary between the flocculation and sedimentation zones, the sedimentation zone being of sufficient depth to dissipate the kinetic energy of the introduced solids-liquid mixt. and permit quiescent settlement of the flocculated particles toward the bottom of the tank where sludge thickening takes place under quiescent conditions, continuously conveying the settled solids to a point of discharge, removing supernatant liquid from the upper portion of the flocculation zone and maintaining in the flocculation zone substantially vertically rising fluid currents and substantially vertically rising and falling solid bodies.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

M. S. ANDERSON AND K. D. JACOB

Physical characteristics of soils. V. The capillary tube hypothesis of soil moisture. Amar Nath Puri. *Soil Sci.* 48, 505–20(1939).—Data are given relating the moisture content and relative humidity of soils. Detns. of capillary force of soils by measuring the max. height to which moisture can rise are fundamentally wrong. This can be done only by completely satg. the soil and applying gradually increasing suction pressure until the capillaries break. This force is correlated with the size of particles.

M. S. Anderson

Factorial diagrams. J. E. A. den Doop. *Soil Sci.* 48, 497–504(1939).—A system of diagrams is proposed for expression of relationships of fertilizer constituents added to crop yields. Also, a similar system is proposed which relates cost of fertilizing to yield of a particular constituent such as starch.

M. S. Anderson

Biochemical methods of structural formation of soil. I. I. Kanivets, N. P. Korneeva and S. F. Morochkovskii. *Vsesoyuz. Nauch.-Issledovatel. Inst. Sakharnoi Prom., Osnovnye Vyvody Nauch.-Issledovatel. Rabot V. N. I. S.'a* **1936**, 19–21(1937); *Chimie & industrie* 42, 565; cf. *C. A.* 33, 4724[7].—Tests on the improvement of the structure of soil by inoculation of microorganisms such as *Trichoderma lignorum* and *Aspergillus niger*. Both organisms

increased considerably, after composting, the quantity of soil aggregate resistant to the disintegrating action of water. A. Papineau-Couture 1

A new contribution to a universal objective classification of soils. Emile Huguet del Villar. *Soil Research* **6**, 221–6(1939)(in English).—The increased use of chem. data in classifying soils is advocated, and other features of the system developed by the author (cf. *C. A.* **33**, 3515[4]) are outlined. C. J. Schollenberger

Sodium ferrocyanide as dispersing agent in mechanical analysis of soils. Baradananda Chatterjee and Basanta Kumar Das. *Soil Research* **6**, 227–31(1939)(in English). —Data obtained in a comparison of $Na_4Fe(CN)_6$ and NaOH as dispersing agents in the International-A method of mech. analysis are tabulated and discussed. $Na_4Fe(CN)_6$ is superior to NaOH, as might be expected from the high valence of the anion and its adsorption by soil colloids increasing the neg. charge thereon (cf. R. Mittra, *Proc. 25th Indian Sci. Congr.* III, 223(1938)). Method: To 10 g. soil in a 600-ml. beaker add 50 ml. 6% H_2O_2, heat gently with stirring to break froth. When the reaction moderates, evap. to ½ vol. If much org. matter remains, repeat as necessary. Cool and filter on paper in a Buchner funnel. Leach with about 500 ml. *N* NaCl, 2 × 100 ml. 0.01 *N* NaCl, and 3 × 25 ml. H_2O. Transfer to a 500-ml. shaker bottle with 400 ml. H_2O, add 1 ml. *M* $Na_4Fe(CN)_6$, shake mechanically for about 2 hrs., transfer to a 500-ml. cylinder and pipet off samples as usual. The wt. of suspended material found is corrected for $Na_4Fe(CN)_6$ added. Comparisons indicated that leaching with NaCl as described is as effective as with NaOAc at pH 7. The pH of the suspensions thus prepd. was 6.5–9.5 with the different soils tested, compared with 10.8–11.5 with the regular NaOH method. The results showed that a laterite can be dispersed as well at pH 6.5 with $Na_4Fe(CN)_6$ as at pH 11.3 with NaOH, and the objectionably high alky. of the latter, formerly considered necessary, can be avoided. Eight references. C. J. Schollenberger 2

Absorption of cations by soil. I. A. Geller. *Vsesoyuz. Nauch.-Issledovatel Inst. Sakharnoĭ Prom., Osnovnye Vyvody Nauch.-Issledovatel. Rabot V. N. I. S.'a* **1936**, 27–8(1937); *Chimie & industrie* **42**, 566.—In the arable horizon, and partly also in the underlying horizon, the cation-absorption capacity varies proportionally to the org. matter content. At deeper horizons no such relation exists. A. Papineau-Couture 3

Properties of soils related to termite control. I. G. L. Hackenyos *Pests* **8**, No. 3, 10–12(1940).—Soil fumigants such as CS_2 and dichloropentane disappeared most rapidly from loamy soils contg. much org. matter, most slowly from pure sand. H_2O was held most tenaciously by soils. Other chemicals were held in the following order: tar acid oil (most), creosote oil, neutral creosote oil and petroleum oil. Light mineral oils were more easily displaced than more viscous fractions. Water and coal-tar creosote displaced each other very little in soils. The addn. of soap to termite liquids retarded rather than speeded penetration in most soils apparently because of the formation of insol. soaps. The addn. of various com. wetting agents up to 1% had little effect on speed of percolation through soil. Oil penetrates soil faster than water possibly because of (1) lower surface tension and (2) soil shrinkage (whereas water swells soils). Henry H. Richardson 4

The basaltic and associated soils of the far north coast districts of New South Wales. N. H. Barbery. *Dept. Agr., N. S. Wales, Regional Soils Ser.* No. 2, 22 pp. (1939).—Studies were made of the red basaltic soils (I), black basaltic soils (II), alluvial soils (III) and gray podzol soils derived from sedimentary rocks (IV). In most samples of I the degree of unsatn. with bases exceeded 75% and the most significant aspect of the exchangeable-base status was the low values for Ca and Mg; many of the samples were low in exchangeable K, but they were generally high in org. matter. Samples of II were much higher in Ca and Mg than were those of I and the K content was also higher; in many cases the org. matter content was appreciably lower than in I. III contained considerably more Ca (both total and exchangeable) than did I, but the Mg content was less than in II; the K content was fairly satisfactory. IV showed the low base status common to these soils, but in relation to their satn. capacity they were better provided with bases than were many of the laterized basaltic soils. I had pH values of 4.6–5.4; II were less acid. I showed a high Ti content, present as ilmenite in the fine sand fraction. Chem. and Neubauer tests, as well as field expts., showed that I are, in general, very deficient in available P; II and III are much better supplied with P. I showed a very high capacity for adsorbing and fixing sol. phosphates. In lab. expts. fixation equiv. to as much as 135,000 lb. superphosphate per 2.5 million lb. soil was obtained in 5 hrs. and 172,000 lb. in 5 days. In general, fixation of P by II and III was much less than by I. K. D. Jacob 5

Soil deterioration in the canal-irrigated areas of the Punjab. III. Formation and characteristics of soil profiles in alkaline alluvium of the Punjab. Amar Nath Puri, E. McKenzie Taylor and A. G. Asghar. *Punjab Irrigation Research Inst., Research Pub.* **4**, No. 9, 7 pp. (1937); cf. *C. A.* **30**, 3137[7].—A typical profile in the alk. alluvium of the Punjab consists of 3 well-marked layers, (1) an upper highly alk. layer compact and impervious, (2) a layer of medium alky. contg. $CaCO_3$ nodules (kankar), (3) a layer with a lower alky. and higher permeability than (1) and (2), and (4) at lower depths usually sand. Exchangeable Ca is usually low in the surface layer and increases with depth. The hypothesis is advanced that the underground water contg. $CaHCO_3$ in soln. deposits $CaCO_3$ in the form of nodules on coming in contact with alk. Na clay. At the same time the exchangeable Na in the clay complex is replaced by Ca and the Na_2CO_3 produced thereby travels upward and increases the alky. of the upper soil layer. In extreme cases this Na_2CO_3 may reach the surface. The factors that seem to be concerned in the formation of $CaCO_3$ nodules are a high content of exchangeable Na in the surface soil, a high water-table within the reach of the alk. zone and a water-table capable of fluctuating in level. K. B. Jacob 6

Soils of the Isle of Crete. K. Nevros and I. Zvorykin. *Soil Research* **6**, 242–308(1939)(in German with English summary).—The geol. and climatic features contributing to the character of the soils are discussed, with detailed descriptions, fusion and exchange analyses and data for H_2O- and 5% KOH-sol. constituents of numerous profiles. Topography has been most important in soil formation; the steep central mountain mass caused a short, abrupt erosion curve, and skeletal or truncated profiles are widespread. The following regions of soil formation are distinguished: talc schists with siallitic unsatd. soils, frequently red; hard limestones with karst formation (depressed areas over collapsed caverns) and terra rossa and transported soils in all stages of transformation; tertiary marls with light or dark, also red, rendzina soils. In a few parts of the coastal plain there are saline soils which contain principally chlorides of Na and Mg. Twenty-six references. C. J. Schollenberger 7

Rumanian work in soil science 1934–1938. Teodor Saidel. *Soil Research* **6**, 309–18(1939)(in German).—A review with 64 references. C. J. Schollenberger

Reclamation of saline (alkali) soil in the Yakima Valley, Washington. Carl A. Larson. *Washington Agr. Expt. Sta., Bull.* **376**, 5–39(1939).—Excess salts move downward into the subsoil water as a result of abundant irrigation. Corrugations at 3-foot intervals without other cultural practices and copious irrigation during the season were effective in removing excessive sol. salts. About ⅔ of the sol. salts were removed from the surface foot by 2 irrigations when the corrugations were changed between the previous ones. Pptn. causes a marked variation in salt content of the surface 12 in. of soil. The max. elec. conductance for normal plant growth in this type of soil is approx. 200. Cf. Scofield, *C. A.* **27**, 2519. C. R. F. 8

The effect of natural gas on the growth of microörganisms and the accumulation of nitrogen and organic matter in the soil. Horace J. Harper. *Soil Sci.* **48**, 461–6 (1939).—Natural gas escaping from leaking pipes in various parts of Okla. markedly increased the N and org. 9

matter contents of the soils of the areas exposed. The av. N content of 12 gassed soils was 0.203%, while the corresponding content in normal soil was 0.084%. Org. matter in these same gassed soils averaged 6.41%, while the corresponding normal soils had 2.39%. The ratio of org. matter to N was a little higher in the gassed soils than in the corresponding normal group. The activity of microörganisms was favorable in the gassed soils when moisture and temp. conditions were suitable for growth. Dark colored residues which accumulate in soils exposed to natural gas remain for several years after the gas leaks are repaired. M. S. Anderson

The occurrence and activities of Azotobacter and Clostridium butyricum in Victorian soils. R. J. Swaby. *Australian J. Exptl. Biol. Med. Sci.* **17**, 401–23(1939). Edward Eagle

Survival of Azotobacter in soil. H. Katznelson. *Soil Sci.* **49**, 21–35(1940).—Palouse silt loam and 4 soils from the N. J. Agr. Expt. Sta. plots 7A, 7B, 5A and 5B were found to lack *Azotobacter*. The inoculation of *Az. chroococcum* resulted in a sharp decrease in nos., especially in the more acid soils 7A and 5A, where they tended to disappear shortly after introduction. No lytic agents could be isolated. The organism survived in the Palouse soil when Mo and $CaCO_3$ or $MgCO_3$ were added alone or together; i. e., Mo + $CaCO_3$ or Mo + $MgCO_3$. An increase in nos. occurred only in the presence of readily available sources of energy in appropriate concns. (0.5%). At higher concns. (1%) Et alc., Bu alc. and Ca benzoate completely suppressed *Azotobacter*. Alfalfa, straw and manure did not serve as sources of energy. Dried blood was definitely injurious. Phosphate, alone or in combination with various org. materials was inhibitive in concns. of 1 and 0.5%. The repression of *Azotobacter* by K_2HPO_4 was possibly due to successful competition by the soil microflora for nutrients and even to the production by this active population of substances toxic to *Azotobacter*. *Az. chroöcoccum* persisted in soils 5A and 7A only upon addn. of lime. The addn. of readily available sources of energy to soils 7A, 7B, 5A and 5B, in the presence of lime, stimulated multiplication of *Azotobacter* to a certain extent. The organism could be recovered from the limed soils 7B and 5B even after a considerable period had elapsed after inoculation; mannitol or glucose enabled the organism to develop in the presence of $CaCO_3$. *Az. indicum* could not survive in the acid soil 7A for 24 hrs., but in the presence of lime it persisted, and upon addn. of lime and dextrose it multiplied. The disappearance of *Az. chroococcum* from this soil was partly caused by the low pH and the sol. Al but no explanation could be found for the elimination of *Az. indicum* from this soil in 24 hrs. Unsuccessful competition with the microflora and microfauna, the presence of toxic substances and the absence of certain nutrients, such as P_2O_5 and K, may be considered as among the factors responsible for the inability of *Azotobacter* to survive in soils. However, it is possible, by appropriate soil amendments, to establish *Azotobacter* and to stimulate its development in soils originally inimical to it. 42 references. J. R. Adams

The influence of amino acids and proteins on nitrogen fixation by Azotobacter chroöcoccum. J. E. Greaves, Louis Jones and Alice Anderson. *Soil Sci.* **49**, 9–19 (1940).—The results are given of a study of the influence of varying amts. of 17 amino acids and 3 proteins on N fixation by *Azotobacter chroöcoccum*. Tyrosine, *dl*-isoleucine, hydroxyproline and *l*-histidine greatly increase the N fixation. The other amino acids tested, with the exception of phenylalanine and *d*-arginine, both of which retard N fixation, either slightly increase fixation or are without effect. Cystine and *dl*-methionine increase N fixation approx. 20%, and their actions nearly parallel each other throughout the concns. used. Phenylalanine is the only amino acid tested which may occur in soils in sufficient concns. to retard N fixation by *A. chroöcoccum*. Casein and albumin materially increase N fixation by *Azotobacter*, whereas gelatin greatly retards it. J. R. Adams

Characterization of organic materials in soils. N. P. Penchev. *Ann. univ. Sofia, II. Faculté phys.-math.*, Livre 2, **35**, 1–32(in German, 33–4)(1938–39); cf. *C. A.* **32**, 8987[3].—The pressure-time curves for gas evolution (after passage over P_2O_5) during the burning (under approx. 10^{-3} mm. pressure) at approx. 580° of org. materials in soils, with and without the presence of CuO, are used for the characterization of these materials. Such curves are given for gas black, Ceylon graphite, humus acids and several Bulgarian soils. Georges Ayers

Effect of narrow carbon-nitrogen ratio and of naturally occurring tannins in decomposing plant materials upon the production of mucus. J. G. Shrikhande. *Soil Sci.* **49**, 1–8(1940); cf. *C. A.* **31**, 1463[1].—An app. is described for measuring the stickiness of materials as a criterion of mucus formation during decompn. The results are given of a study of the stickiness resulting from aerobic fermentation of 12 different plant tissues without any external source of N, in the presence of $(NH_4)_2SO_4$, in the presence of $NaNO_3$ and with an adjustment of the final reaction with NaOH, H_2SO_4 and tannic acid. The degree of stickiness varies with the final reaction and the degree of decompn. of a particular material. $(NH_4)_2SO_4$ rots are invariably less sticky than rots without any treatments, which are generally less sticky than $NaNO_3$ rots. The protein richness of a plant material seems to have an effect on the degree of rotting but does not seem to have any direct influence on the quantity of mucus. Provided the reaction developed is suitable, production of stickiness during fermentation appears to be independent of the nature of the plant material, with the exception of plant materials contg. tannin. The presence of tannins in refuse tea, tea leaf prunings and gordonia exerts a toxic effect on the microflora concerned in the decompn., and the inhibition of mucus production seems to be a microbial process rather than a chem. one. Production of stickiness indicates the reaction and the nature of fermentation (aerobic or anaerobic) of a fermenting vegetable heap. J. R. Adams

A soil zinc survey in California. P. L. Hibbard. *Soil Sci.* **49**, 63–72(1940).—About 140 samples of soil and rock collected from numerous places in central California were analyzed for Pb and available Zn. Cu, Co and Ni were detd. in some of the samples. In general, the amt. of Zn found was only 1 to 5 p. p. m. Many samples showed that Zn as well as some other minor metals were accumulated in the surface soil by action of vegetation, and that this accumulated Zn was only very slowly leached down because of the high fixing power of soil for Zn. Many samples of rock assocd. with the soil had Zn contents similar to the soil, indicating that the soil was derived from the rock. It seemed probable that soil-forming agencies, excepting vegetation, tended to produce soils having everywhere a similar content of Zn and other minor metals. Though the amt. present may be adequate, the Zn in alk. soils seemed to be relatively unavailable to some species of plants. J. R. Adams

Consistency and physicochemical data of a loess pampaneo soil. I. Physicochemical properties of samples from different depths of a profile. Hans F. Winterkorn and Geo. W. Eckert. *Soil Sci.* **49**, 73–82(1940).—Data on the mech. compn., consistency properties, heat of wetting and sorption of liquids of soil samples from different depths of a profile of loess pampaneo are used as a basis for discussing the various factors which influence the soil-water relationship. A large clay content and a large plastic index indicate rather the potential H_2O-holding capacity of a soil than the behavior of the natural soil toward the action of H_2O *in situ*. The actual behavior of a relatively dry soil system toward H_2O can be represented as a dynamic equil. between the wetting energy of the H_2O and the cohesive forces at play in the soil system. The mechanism of the H_2O attack is a function of the accessibility of the internal surface of the soil. The H_2O sorption in the Winterkorn-Baver app. (cf. *C. A.* **29**, 1557[9]) appears to be more dependent on wetting phenomena and on the amt. of silt present than on the total clay content. The amt. and type of org. material in a soil exert a considerable influence on the behavior of the soil toward H_2O.

The change of the C/N ratio of the org. material with change in depth of the profile is probably of importance. Practically, soil from the surface 8 in. should make a better subgrade for roads than the subsoil. Its preferential wetting with benzene indicates better results in bituminous stabilization. J. R. Adams

Saturation degree of soil and nutrient delivery to the crop. Wm. A. Albrecht and N. C. Smith. *J. Am. Soc. Agron.* **32**, 148–53(1940).—Much larger yields of forage resulted when the nutrients (Ca or P_2O_5) were applied to satd. highly limited soil areas in the immediate root zone rather than to give a low degree of satn. of the soil throughout the plowed layer. Analyses of the crops showed a higher Ca or P_2O_5 content when these nutrients were applied in limited areas than when they were broadcast. The N content of the crops from the plots of limited fertilization was also higher than from the plots where the fertilizer was broadcast although no N fertilizer was used in this work. These data show that in liming and fertilizing the soil, attention must go to the degree of satn. of the soil. J. R. Adams

The influence of degree of saturation of soil colloids on the nutrient intake by roots. H. Jenny and A. D. Ayers. *Soil Sci.* **48**, 443–59(1939); cf. *C. A.* **33**, 9516⁷.—A quant. theory was developed relating base exchange to degree of satn. of soil colloids. The exchangeability of adsorbed K decreases with decreasing degree of satn. The nature of complementary ions markedly affects the relationships. For instance, a K Ca clay releases nearly as much K at 40% satn. as at 100% while a K Na clay releases markedly less K as degree of satn. is decreased. Clay particles having an effective settling diam. of less than 0.2 μ were sepd. from Yolo clay loam. These colloids were leached with salt solns. or electrodialyzed with subsequent addn. of hydroxides. The base-exchange capacity varied from 59 to 67 milliequiv. per 100 g. Excised barley roots were grown in solns. and suspensions (cf. *C. A.* **30**, 8299¹). Special studies were made to ascertain the influence of K concn. and time period on the absorption of K by roots. Max. absorption was reached in about 10 hrs. from K concns. of about 10 milliequiv. in 3 liters. In all cases roots absorbed more K from KCl than from K clay. A satd. soln. of CO_2 replaces a smaller percentage of the K present as the degree of satn. is decreased. From the viewpoint of agricultural practice it is noteworthy that Ca is the least retarding cation in the process of K liberation. This again demonstrates the superiority of neutral Ca-satd. soils. According to the curves given, neutralizing soils with Ca should render K more available. M. S. Anderson

The adsorption of proteins by montmorillonitic clays. L. E. Enaminger and J. E. Gieseking. *Soil Sci.* **48**, 467–73(1939); cf. *C. A.* **33**, 3721⁴.—X-ray diffraction data show that albumin and gelatin are adsorbed within the characteristic expansible portion of the montmorillonite crystal lattice. The proteins are more completely adsorbed in suspensions of low pH values than in suspension with high pH values. Untreated gelatin was more completely adsorbed than gelatin treated with HNO_2 to destroy its basic properties. Adsorption of proteins as cations is probably partly responsible for their combinations with montmorillonite. M. S. Anderson

Content of 0.2 *N* hydrochloric acid-soluble potash in Tyosen soils. II. Hideo Misu. *J. Agr. Chem. Soc. Japan* **14**, 805–23(1938); cf. *C. A.* **32**, 3069⁷.—A further analysis of 0.2 *N* HCl-sol. potash content (A) of different soils in Kokai Province. In both paddy field, and farm field, the clay soil has more A and the sandy field the least A. In general, the soil having more clay has the greater A. Geologically compared, the granite gneiss and Tyosen systems contain the greatest A, and the Heihan system contains the least. Av. A of all cultivated soils is 0.0391% (paddy field 0.0355%, and farm field 0.0425%). S. T.

The genesis of Davidson clay loam. F. Hardy and G. Rodrigues. *Soil Sci.* **48**, 483–95(1939); cf. *C. A.* **34**, 2111⁵.—A study is made of Davidson clay loam soil of North Carolina in comparison with red earth formations of British Guiana and Granada. Quant. chem. methods employed included total analysis of whole materials and of clay fractions, both after fusion and after tri-acid digestion (for quartz), also alizarin adsorption detns. after ignition for free Al_2O_3. A colloidal clay fraction from a red earth sample was subjected to a sulfide-oxalate treatment which resulted in a nearly white clay. This material contained SiO_2 36.8%, Al_2O_3 (gibbsitic) 1%, Al_2O_3 (combined) 30.3%, and Fe_2O_3 9.5%. The SiO_2/Al_2O_3 is very nearly 2, which is that of halloysite. During the treatment about 68% of the Fe_2O_3 and 27% of the SiO_2 were lost. The genesis of the halloysitic component of red earths is believed to be the resilication of gibbsite occurring in the weathering crusts, and chiefly derived from lime-soda feldspars in the parent igneous rock. The Davidson soil profile displays a partially podzolized *A* horizon with slight accumulation of Fe_2O_3 in the B_2 horizon. Much more pronounced differentiation is usually found in the humid tropical red earth profiles. M. S. Anderson

A few determinations of the pH of forest soils. V. T. Aaltonen. *Metsät. Tutkimusl. Julkaisuja* **1937–38**, No. 25, 1–52; *Chimie & industrie* **42**, 902.—On the whole, the acidity of the soils decreased on storage; the decrease is more marked in strongly podzolized soils and is smaller in brown soils and weakly podzolized soils. The pH value of the soil at first increases with depth; the max. is reached at the lower layer of the *B* horizon; beyond this the pH falls, but increases again to the value corresponding to the reaction of the subsoil. A. Papineau-Couture

A comparison of the pH value of some soils from the Netherlands and from the tropics by means of the quinhydrone and the glass electrodes. B. J. Blomberg. *Landbouwkund. Tijdschr.* **51**, 767–71(1939).—The results of comparative tests for pH by the quinhydrone and the glass electrode app. indicate that 24 samples of Dutch soils gave good agreement between the 2 methods, the figures usually being somewhat higher for the glass electrode. Thirty-two samples of tropical soils did not give as good an agreement. Most of the acid soils gave very similar results by both methods, but the soils of higher pH usually gave a considerably lower figure when the glass electrode was used. Harry Humfeld

The "amphoteric" double layer and the double ionic exchange in soils. Sante Mattson and Lambert Wiklander. *Trans. Faraday Soc.* **36**, 306–19(1940).—The highly amphoteric soils, such as the brown and red earths of the Unden series of profiles from Sweden, adsorb and exchange, simultaneously, large quantities of anions and cations at or near the pH at which equiv. amts. of anions and cations are adsorbed. It is found that this exchange takes place according to the mass law as expressed by the Donnan equil. The valence effect expresses itself in the form of maxima in exchange acidity and exchange alky. in dil. solns. A diln. favors the entrance (into the soil complex) of the bivalent and the exit (in the soil soln.) of the univalent ions; a concn. reverses the process. This double ionic exchange has led to the conception of an amphoteric elec. double layer. Victor R. Deitz

Attempts to decrease the infiltration of water through the deep layers of the soil by means of sodium chloride. S. Zolotarev and L. Dachevski. *Sovet. Khlopok* **1939**, No. 6, 31–5; *Chimie & industrie* **42**, 899.—By introduction of sea salt in weakly saline chernozem soils, the loss of water by infiltration through the deep layers can be reduced considerably. The NaCl content should be equiv. to the total absorption capacity of a soil layer at least 20 cm. thick; in the case under consideration, this amounts to about 3.0 kg. per sq. m. of surface. A. P.-C.

A simple apparatus and procedure for the determination of the carbon content of the soil. Bert E. Christensen, Glenn Simkins and Virgil Hiatt. *Soil Sci.* **49**, 51–6 (1940).—A cut and description are given of a simple app., in which either dichromate or iodate is used, for the measurement of either the C content or both the reducibility and C content of the soil. Concd. H_2SO_4 (3 ml.) is added to the reaction chamber which contains the 250-mg. sample of soil and 250 mg. of dichromate or iodate. The temp. of the reaction chamber is maintained between 160 and 180° in a phosphoric acid bath and the reaction

proceeds at this temp. for 20 min. Then, after addn. of 5 ml. of 6 *N* H_2SO_4 plus water, the reaction chamber is flushed out with CO_2. The generated gas passes through 0.5 *N* KI soln. to a slow combustion chamber, where it is held for 2 min. over a fairly red heat. The gas is then collected in $Ba(OH)_2$, 5 ml. of acetone is added to improve the end point and the excess $Ba(OH)_2$ is titrated with 0.05 *N* HCl to the thymol blue end point. The CO_2 formed is calcd. from these data. When iodate is used as the oxidant, charges of the same size are used but the time of heating is increased to 30 min. and the temp. is kept between 185 and 195°. The heating coil in the slow combustion chamber is unnecessary in this case. Preference is given to the use of iodate as the oxidant. Analyses of pure org. compds. show that this procedure is capable of a high degree of precision. The results are given of the detn. of the C content and O consumed values of a no. of soil samples. The principal sources of error that interfere with the measurement of the reducible org. matter are unoxidized inorg. constituents and halides in the soil. The use of both sets of data shows promise as an index of the state of oxidation of soil org. matter.

J. R. Adams

Use of chemical data in the prognosis of phosphate deficiency in soils. John S. Burd and H. F. Murphy. *Hilgardia* **12**, 323–40(1939).—The causes of failure to obtain correlations between plant growth and acid-extractable phosphate of soils are partly inherent and partly tech. The roles of adsorption complexes, hydrogels and acid buffers, as affecting the analytical figures obtained by acid extn. of soils, are outlined. The sp. "acidity effect" of reagents cannot be measured in soils contg. substantial amts. of adsorbing colloids if the anion of the reagent is itself adsorbed by the soil. If acid-extractable phosphate is 9 mg. or more per 100 g. of soil, plants will usually acquire P without difficulty, but the difficulty will be greatly enhanced if the buffer capacity is low and the adsorptive index is high. If the acid-extractable phosphate is intermediate, plants will probably have difficulty obtaining P when the buffer capacity is extremely high, or even in the absence of high buffer capacity when the adsorption index is high. The effect of a high adsorptive power in preventing a plant from acquiring potentially acid-sol. P in the field is directly assocd. with the buffering power of the soil: (1) if the adsorption index is high and the buffering capacity is low, the conditions are highly adverse; (2) if the buffer capacity is high, the adsorption index is of no import in this connection. Chem. data on 14 soils are analyzed in the light of these findings to illustrate how the present physiol. supplying power of the soil can be deduced. Tentative standards are suggested as a basis for predicting the current phosphate-supplying power of soils.

C. R. Fellers

Determination of the mobile forms of organic matter in peats and soils of the podzolic zone. Ya. V. Pelve. *Chemisation Socialistic Agr.* **7**, No. 10, 64–73(1938); *Chimie & industrie* **42**, 726.—A direct method based on the biol. evaluation of mobile forms, liberated chemically, from the org. matter of humus and from Ca humates. Peat and soil liberate 2 forms of mobile org. matter: (1) treatment of peat or soil with 0.02 *N* NaOH exts. humic acid or α-humates; (2) treatment with 2% $(NH_4)_2C_2O_4$ exts. Ca humates or β-humates. Org. matter is detd. in the exts. by coagulating with HCl and comparing with a standard scale.

A. Papineau-Couture

Calcium-salt resources of Tartary in relation to soil fertility. V. Makarov. *Uchenye Zapiski Kazan. Gosudarst. Univ.* **98**, No. 4, 3–21(1938).—Various deposits of Ca salts (chiefly $CaCO_3$) found in the Tartary U. S. S. R. are described. Directions for addn. of Ca salts to various soils are given.

B. C. P. A.

Determination of the salt content of soil and of water by means of a galvanic couple. M. Budanov. *Sovet. Khlopok* **1939**, 67; *Chimie & industrie* **42**, 566.—The method is based on the property of galvanic couples of creating in electrolytes an e. m. f. which is proportional to the amt. of dissolved salts and which is measured by means of a galvanometer. A temp. correction is applied.

A. Papineau-Couture

Occurrence of available potassium in orchard soils. I. W. Wander and J. H. Gourley. *Proc. Am. Soc. Hort. Sci.* **35**, 326(1938); cf. *C. A.* **33**, 7459[2].—K fertilizers applied to these soils were rapidly rendered unavailable, and after 10 years' continuous treatment penetration of available K was not greater than 6 in. Continuous heavy mulching maintained high available K contents to a depth of 2–3 ft.

B. C. P. A.

Methods of measuring soil erosion. Helmut Kohnke and F. R. Dreibelbis. *Soil Research* **6**, 232–41(1939) (in English).—The methods for investigating removal of soil and fertility elements from the erosion plots at Coshocton, Ohio, are briefly described. The usual Soil Conservation Service method is a comparison of the existing soil profile with that of the nearest virgin soil of the same type and topography. Its principal defect is that the thickness of the *A* horizon naturally tends to vary inversely with the slope. The sediment survey method depends upon an estimate of the amt. of soil deposited at the foot of the slope, or wherever deposition occurred; it probably does not include the colloidal materials carried beyond that point in the runoff. Other methods det. the erosion as it occurs—the runoff is sampled and measured and its load of soil or content of fertility elements detd. in the lab. A 5.4 acre field of silt loam residual from sandstone and shale with 5–20% slope, first cultivated 100 yrs. ago, was estd. from decrease in depth of the originally 8-in. *A* horizon and from the amt. of sediment deposited to have lost 400 tons/acre of soil during the 20 yrs. it was in corn, 90 tons in 15 yrs. in oats, 90 tons in 15 yrs. dropped to wheat, 20 tons in the remaining 50 yrs. in pasture. The indications at present being obtained from plots by runoff sampling methods are in line with the foregoing.

C. J. Schollenberger

Increasing and stabilizing crop yields on so-called "moorland heath" diseased sand and humus soils. C. Husemann. *Z. Pflanzenkrankh. Pflanzenschutz* **47**, 211–32 (1937).—On these Cu-deficient soils crop yields were improved by loosening the subsoil and by heavy applications of fertilizers. K phosphates, applied in the autumn, were beneficial, and treatment with K_2SO_4-$MgSO_4$ shortly before planting gave good results. Supplementary applications of $CuSO_4$ markedly increased yields in all cases.

B. C. P. A.

An investigation of the effect of continued applications of Chilean nitrate of soda and of ammonium sulfate on the properties of a soil. H. J. Hardon. *Landbouw.* **15**, 309–23(1939).—A report of a lab. examn. of samples of soil from fertilizer test plots on the East Coast of Sumatra. The soil was classified as an acid, white, dacite-liparite-tuff loam. In the series of test plots, some received yearly applications of Chilean nitrate of soda and others NH_4 sulfate, while the controls received no fertilizer. Continued fertilization with Chilean nitrate of soda for 17 years resulted in a considerable increase in exchangeable sodium. About two-thirds of the quantity applied was present as absorbed sodium in the 0–40 cm. layer of soil. This absorption was considered large as the annual rainfall was 246.4 cm. as there was no pronounced dry season. The applications increased the pH of the soil, reduced its permeability and increased the dispersibility of the clay fraction. The NH_4 sulfate treatment had an opposite effect. There was an increase in acidity and the rate of leaching of Ca was increased. The dispersibility of the clay fraction was reduced to some extent and the permeability was increased. The $SiO_2 \cdot Al_2O_3 + Fe_2O_3$ ratio of the soil fertilized with Chilean nitrate of soda was higher than that of the soil fertilized with NH_4 sulfate.

H. H.

Effect on perennial grasses of the physicochemical condition of the soil. V. A. Chorny. *Chemisation Socialistic Agr.* **7**, No. 10, 74–6(1938); *Chimie & industrie* **42**, 725.—Perennial grasses produce a strong soil structure, the effect being more marked according as the grasses are older. The quantity of CaO and of MgO absorbed, and the amt. of total humus, of N and of N in the humus also

increase with the age of the grasses. The quantity of P varies in the opposite direction. A. Papineau-Couture

The assimilation of phosphatic fertilizers as a function of the soil reaction. A. A. Sanfourche and B. Tallibart. *Compt. rend. acad. agr. France* **26**, 123–8(1940); cf. *C. A.* **34**, 1798⁴.—The Neubauer method, using winter rye, was used to det. the availability of the P_2O_5 of basic slag or superphosphate as a function of the soil reaction. A sand medium was used and the phosphatic material was added at the rate of 0.0585 g. P_2O_5 per test. The sand was mixed with pptd. $CaCO_3$ for the alk. soil, which had a pH of 7.5. The acid soils were formed by mixing the sand with K diphthalate soln. which was more or less neutralized with soda so as to give any desired pH. In the alk. and neutral soils, the availability of the P_2O_5 of superphosphate was greater than the availability of the P_2O_5 in the slags and the latter showed a little higher P_2O_5 availability than natural phosphate. In slightly acid soils (pH 6.0) the superiority of superphosphate over the slags was not as great while the superiority of the slags over the natural phosphate was greater. In the very acid soils (pH 5.0) the P_2O_5 availability of the slags surpassed that of the other 2 sources of P_2O_5. The soly. of the slag in acid soils was attributed to its constitution. The low availability of natural phosphate and tricalcium phosphate was attributed to their apatitic constitution. J. R. Adams

Direct and secondary action of chloropicrin on crops as a function of the nature of the soil and of the mineral fertilizers. D. M. Guselnov. *Chemisation Socialistic Agr.* **7**, No. 8–9, 74–7(1938); *Chimie & industrie* **42**, 733.—The effectiveness of chloropicrin depends not only on the quantity and nature of the org. matter of the soil, but also on the mineral compn. of the soil, the nature of the fertilizer and certain other conditions. The increase in crop yield produced by the application of chloropicrin is due to improvement in the conditions of nutrition of the plants; more particularly, chloropicrin reduces the transformation of nutritive elements into forms which are not available to the plants. A. Papineau-Couture

Mineral nutrition of fodder cabbage. E. V. D'yakova. *Chemisation Socialistic Agr.* **7**, No. 8–9, 95(1938); *Chimie & industrie* **42**, 735.—The cultivation of fodder cabbage requires increased amts. of fertilizers: about 120 kg. per ha. of N and of K_2O and about 90 kg. per ha. of P_2O_5. Na_2HPO_4 is preferable to phosphorite which is not so well utilized by cabbage. K_2SO_4 gives better results than KCl, and still more so than sylvinite. A. Papineau-Couture

Effects of varying amounts of nitrogen, potassium and phosphorus on growth and assimilation of young apple trees. L. P. Batjer and E. S. Degman. *Proc. Am. Soc. Hort. Sci.* **35**, 255(1938).—In sand-cultured, 1-year trees diminution in N content of the nutrient below 60 p. p. m. caused proportionate decrease in growth. Deficiency symptoms appeared with less than 10 p. p. m. of K, but growth increased with K supply up to more than 60 p. p. m. Approx. uniform growth occurred with all P concns. exceeding 4 p. p. m., and visible deficiency symptoms were apparent only when P was omitted from the nutrient. Rates of photosynthesis diminished rapidly as the N concn. and to a smaller extent when K concn. was lowered. Trees grown in low-N nutrients until the terminal bud had formed and then transferred to high-N media showed marked increase in leaf color and CO_2 assimilation within 7 days. B. C. P. A.

Comparative effects of organic and mineral fertilizers in the cultivation of Italian hemp. M. K. Altukhov. *Chemisation Socialistic Agr.* **7**, No. 8–9, 95(1938); *Chimie & industrie* **42**, 725.—It was observed that the application of 30–40 tons of manure per ha. produced results equiv. to the application of a complete N-P-K fertilizer at the rate of 90 kg. of each element per ha. It is advantageous to combine smaller amts. of manure with appropriate amts. of N-P-K fertilizers. A. Papineau-Couture

Peat as a source of nitrogen (plant) food. N. S. Rozanov and T. S. Krnatian. *Chemisation Socialistic Agr.* **7**, No. 8–9, 96(1938); *Chimie & industrie* **42**, 725.—Peat contains a considerable proportion of N, largely in the form of amines, which can be activated by hydrolysis. At the present time the most rational method of activation consists in composting peat with manure, liquid manure and lime. A. Papineau-Couture

Vivianite as a fertilizer for flax crops. Ya. V. Pelve. *Chemisation Socialistic Agr.* **7**, No. 8–9, 96–7(1938); *Chimie & industrie* **42**, 725.—In vivianite P_2O_5 is combined chiefly with Fe. It can be used as a source of P_2O_5 in both weakly and strongly podzolized soils. To obtain max. effect from it, the soil must be limed and nitrate fertilizer applied; under these conditions, the effect of vivianite on flax is not inferior to that of superphosphate or of phosphorite. A. Papineau-Couture

Effect of the systematic use of different forms of nitrogenous fertilizers. Nichik. *Chemisation Socialistic Agr.* **7**, No. 8–9, 63–8(1938); *Chimie & industrie* **42**, 725.—The expts. were carried out on a clayey podzolized soil. With beet, $NaNO_3$ applied over a basal application of P and K gives better results than the other forms of N, which is due not only to the physiol. alky. of the compd., but probably also to the form of the N and possibly also to the presence of Na. Ca cyanamide also produced favorable results, though not quite as good as $NaNO_3$, while NH_4 salts give neg. results. A. P.-C.

Mobility of phosphoric acid in the soil: technique for the application of superphosphate in the cultivation of sugar beets. Gorshkov. *Chemisation Socialistic Agr.* **7**, No. 8–9, 94(1938); *Chimie & industrie* **42**, 725.—The degree of absorption of P_2O_5 from superphosphates depends on the size of the fertilizer particles and their contact with the soil. Tests carried out with sugar beets showed that the greatest activity is possessed by particles 2–5 mm. in diam., coarser and finer fractions both giving poorer results. The large fertilizer particles are probably not readily accessible to the plants owing to their irregular distribution throughout the soil, while the P_2O_5 of the finer particles is probably strongly fixed by the soil. A. P.-C.

Increasing the efficiency of the liming of acid soils in crops which are sensitive to excessive amounts of lime. M. V. Katalymov. *Chemisation Socialistic Agr.* **7**, No. 8–9, 93–4(1938); *Chimie & industrie* **42**, 725.—Application of B to soil not only permits of overcoming the harmful effect of excessive amts. of lime on crops which are sensitive to liming, but also produces a supplementary beneficial effect. A. Papineau-Couture

The presence of rhizogenic substances in certain natural media. Raymond Chaminade and Jean Boucher. *Compt. rend. acad. agr. France* **26**, 69–76(1940).—Tests with geranium plants showed that the root formation of slips was not accelerated nor the root system improved by the use of exts. from garden soil, moor soil, leaf mold, manure or hot-bed mold. The last 3 even appeared to have a depressive effect. The slips treated with peat exts. showed a marked improvement in their root system. Ivy exts. accelerated the root production and increased the quantity of roots produced. J. R. Adams

Forage production on irrigated Crau soil: role of phosphatic fertilizer. L. Maume. *Compt. rend. acad. agr. France* **26**, 97–103(1940); cf. *C. A.* **33**, 5933⁹.—The use on irrigated Crau soil of superphosphate at the rate of 250 kg. of P_2O_5 per hectare almost doubled the total hay yield for the season (3 cuttings) and increased the proportion of leguminous plants in the hay. The protein content of the crop was increased 2.3 fold. J. R. Adams

Economic return from fertilizers in Brittany. P. Boischot and J. Herviaux. *Compt. rend. acad. agr. France* **25**, 1099–1105(1939).—On the granitic soils of Brittany the use of nitrogenous fertilizers is advisable for cereals up to applications of 30 kg. per hectare and up to 60 kg. for potatoes. Beets and clover derive no benefit from these fertilizers. K_2O fertilizers at the rate of 140 kg. K_2O per hectare increase beet yields. Even though P_2O_5 and K_2O fertilizers are of no advantage to the other crops of the rotation (wheat, barley, oats, clover) during the yr. of application, annual addns. of 100–150 kg. of K_2O and 70–80 kg. of P_2O_5 are necessary to maintain the fertility of the soil. J. R. Adams

Effect of waste sulfite liquor on soil properties and plant growth. J. B. Spulnik, R. E. Stephenson, W. E. Caldwell

and W. B. Bollen. *Soil Sci.* **49**, 37–47(1940).—Waste sulfite liquor in concns. below 80 tons per acre was not toxic to sunflowers grown on Newberg loam. It was a satisfactory source of S for sunflowers grown on S-deficient soils. Treating the soil with waste sulfite liquor increased the concn. of K, Ca and sulfate in the water ext. of the soil and decreased the nitrate content. Waste sulfite liquor increased the rate of CO_2 evolution in the soil, indicating an increased org. decompn., and increased the microbial population in the soil. Waste sulfite liquor addns. to Newberg loam soil lowered the pH of the soil suspension; on incubation the pH gradually increased. J. R. Adams

Balanced fertilization for apple orchards. M. B. Davis. *Better Crops with Plant Food* **24**, No. 2, 6–10, 43–6(1940).—The role of the major elements as affecting leaf and tree characters is discussed. Drought spot, cork or internal cork and corky core are fruit diseases which are corrected by B. J. R. Adams

The effect of the additions of calcium ions and of sodium ions in fertilizing with nitrates. J. Hudig and J. J. Lehr. *Landbouwkund. Tijdschr.* **51**, 654–781(1939).—The effect of $Ca(NO_3)_2$ is compared with that of $NaNO_3$, with the addns. of various amts. of K. A sandy soil, with a pH of 6.5, 3.4% humus and 4.3% fraction of 2 μ was used in pot expts., in which 6.8 kg. soil per pot was used. The soil contained per 100 g., 54 milliequivalents Ca, 3.0 K, 0.9 NH_4 and 4.3 Mg. $Ca(NO_3)_2$ and $NaNO_3$ were added at the rate of 2400 mg. N, without and with addn. of 6310 γ B per pot. Sugar beets were grown. Total green and total dry weight, green and dry weight of beets, dry weight of leaves and weight of sugar were reported. Results indicate that Arcadian nitrate and B gave the highest yield, followed by Chilean nitrate, Arcadian nitrate, $Ca(NO_3)_2$ plus B and $Ca(NO_3)_2$ alone, in the order named. The larger addns. of K as a rule increased the yield slightly, possibly not a sufficient amt. to warrant the larger applications. Harry Humfeld

Providing plants with boron and cyclic salt. C. H. Edelman. *Landbouwkund. Tijdschr.* **51**, 650–3(1939).—Cyclic salt is salt which is picked up by the wind in small droplets of sea water and deposited by snow and rain on the soil. The coastal plains of the Netherlands are calcd. to receive an average of 80 kg. per hectare per year. About 80 g. of this is B_2O_3. The B content of soils is very low and it seems probable that the B supplied in this manner plays an important part in the nutrition of plants grown on these soils. Harry Humfeld

The effect of iron and aluminum on the quality of Ammophos. Sand cultures. A. V. Sokolov, L. I. Obolenskaya and N. V. Koshel'kova. *Trudy NIUIF, Shornik "Fosfor. Udobr. i ikh Kachestva."* No. **141**, 98–104(1938); *Khim. Referat. Zhur.* **2**, No. 3, 93(1939).—Treatment of different kinds of Ammophos with excess water gave residues (as a result of hydrolysis) which contained the main part of P_2O_5 and N in the citric-sol. form and small amts. of water-sol. N and P_2O_5. Vegetation expts. showed that the Ammophos residues are less available to plants than the phosphates of NH_4. $NH_4H_2Fe(PO_4)_2$ and $NH_4H_2Al(PO_4)_2$, like the Ammophos residues, contain water-insol. N and P_2O_5. They are inferior to the mech. mixts. of $NH_4H_2PO_4$ and RPO_4 in availability of P_2O_5 to plants. The presence of similar compds. in Ammophos is possible. The water-insol. Ammophos residue consists of the citric-sol. $NH_4H_2Fe(PO_4)_2$ and of a citric-insol. substance of the approx. compn. $NH_3.2FePO_4.4H_2O$. N cannot be detd. in Ammophos by aq. extn.; it is detd. by distn. of NH_3 from a HCl ext. prepd. for the detn. of the total P. W. R. Henn

The potash content of meadow hays from different fertilized and unfertilized soils. B. Tacke. *Ernähr. Pflanze* **36**, 31–2(1940).—Expts. over a period of 10 yrs. showed that the av. K_2O content of air-dried hay from high and low moor soils which received adequate fertilizers was 2%. John O. Hardesty

Transformation of organic matter and nitrogen in manure as a function of storage conditions. I. F. Romashkevich. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 2, 29–40(1939); *Chimie & industrie* **42**, 901.—Great decompn. of manure and intense humification of its org. matter during storage produce considerable loss of org. matter and of N, and result in a decrease in soly. of the N compds., of the coeff. of utilization of the N by plants and of the quality of the org. matter. A strongly degraded manure is therefore less effective than normal manure. A. Papineau-Couture

Tests on the fertilization of citrus crops. V. Belyaeva. *Sovet. Subtropiki* **1939**, No. 1, 50–1; *Chimie & industrie* **42**, 905; cf. *C. A.* **34**, 1352[8].—Generally speaking, farm manure sufficiently enriches the soil in nutritive elements required for citrus plants: P, K, Ca, Mg and S. In certain cases it is advisable in addn. to spray the trees with Zn salt solns. when the Zn content of the soil is too low. From 0.9 to 1.4 kg. of available N is required per tree; but a considerable portion of this quantity is not used but is removed from the soil by atm. pptns., irrigation, etc. A. Papineau-Couture

Mineral fertilizers as a means of increasing the resistance of plants to drought. K. S. Mirolyubov. *Sovet. Botan.* **1938**, No. 4–5, 89–110; *Chimie & industrie* **42**, 725.—P and K fertilizers increase the resistance of plants to drought whether they are applied at sowing or before haytime. N and complete fertilizers exert a pos. action in this respect only if applied before haytime; when applied at sowing they decrease the resistance of the plants to atm. or soil drought. A. Papineau-Couture

Nitrogen fertilization in pine forests. N. P. Remezov. *Sovet. Botan.* **1938**, No. 6, 34–51; *Chimie & industrie* **42**, 725.—Pine consumes larger quantities of N than of the other nutritive elements. A study of the nitrogenous nutrition of the Briansk pine forests shows that the greater portion of the org. N compds. of the soil undergoes hydrolysis. The ammonifying and nitrifying powers of pine-forest soils vary during the course of vegetation; on the whole, ammoniacal nutrition predominates, though in certain cases nitric nutrition is also possible to a slight extent. A. Papineau-Couture

Effects of fertilizers on the crop and chemical composition of summer wheat. A. M. Sveshnikov, R. L. Sai, V. V. Staroverova and G. I. Nevskaya. *Chemisation Socialistic Agr.* **7**, No. 8–9, 91–2(1938); *Chimie & industrie* **42**, 725.—N fertilizers increase the protein content and decrease the starch content of the grain. K fertilizers produce the opposite effect. P fertilizers act in the same way as K fertilizers, but not so strongly. A. P.-C.

Effect of molybdenum on red clover crops. K. A. Dmitriev. *Chemisation Socialistic Agr.* **7**, No. 10, 80–1(1938); *Chimie & industrie* **42**, 726.—Mo applied with B over CaO + P and K produces a strong pos. effect on the yield of red clover seed. The quantity of CaO must be equiv. to once or twice the hydrolytic acidity of the soil. A. Papineau-Couture

Periodicity of mineral nutrition of plants as a factor in improved yield and quality of crops. I. G. Dikussar. *Chemisation Socialistic Agr.* **7**, No. 11, 28–37(1938); *Chimie & industrie* **42**, 726.—The periodicity of the nutrition of plants is due to the fact that the cycle of the vital development of the plant comprises several stages which differ from one another both as regards the general level of nutrition and as regards the ratio between the various nutritive elements. Mineral nutrition must include all the elements necessary to plant life. The N nutrition, however, exerts a very powerful and varied effect which governs the physiol. condition of the organism as a whole. Judicious dosage of N during the different stages is therefore particularly important. During germination and the early stage of life the nutritional level (especially nitric) must be relatively low. On the contrary, it must be max. during the formation of the aerial organs of the plant. A. Papineau-Couture

Efficiency of potash fertilizers in peat bogs. II. M. D. Bakhulin. *Chemisation Socialistic Agr.* **7**, No. 10, 78–80(1938); *Chimie & industrie* **42**, 726; cf. *C. A.* **33**, 6506[1].—All sol. K fertilizers are suitable for fertilizing peaty soils, and permit of obtaining max. crops of beets and other cultivated plants, provided sufficient quantities of N and

of P are applied. The complementary effect of K fertilizer in peaty soils is very marked and there is no danger of washing out of the K nor of its fixation by the peat. Insol. K fertilizers produce a retarding effect (during the second half of the vegetative period), and they must be applied early and in larger quantities than the sol. fertilizers. A. Papineau-Couture

Distribution of microörganisms and of the soluble forms of nitrogen in the various "zones" of agglomerations of the soil. I. I. Kanivets and N. P. Korneeva. *Vsesoyuz.-Nauch.-Issledovatel. Inst. Sakharnoĭ Prom., Osnovnye Vyvody Nauch.-Issledovatel. Rabot V. N. I. S.'a* **1936**, 21-3(1937); *Chimie & industrie* **42**, 565; cf. *C. A.* **33**, 4724⁷.—The soil aggregates most resistant to water are those of 1–10 mm. size; next come those larger than 10 mm. The first-named aggregates are the richest in easily sol. N. The largest nos. of bacteria are found in the 1-20-mm. aggregates; they occur mostly at the surface of the aggregates. A. Papineau-Couture

Fertilization of beet crops. I. I. Shaposhnikov and F. Yu. Adamenko. *Vsesoyuz. Nauch.-Issledovatel. Inst. Sakharnoĭ Prom., Osnovnye Vyvody Nauch.-Issledovatel. Rabot V. N. I. S.'a* **1936**, 67–9(1937); *Chimie & industrie* **42**, 566.—Complete mineral fertilizers give at least as good results as manure, especially on podzolized soils. Application in the fall of a mixed N-P fertilizer is less effective than that of a complete fertilizer. The effect of dild. fertilizers is the stronger according as the solr. is introduced nearer the roots. A. Papineau-Couture

Influence of dressing on the development of the root system of the sugar beet. S. I. Slukhai. *Chemisation Socialistic Agr.* (U. S. S. R.) **7**, No. 11, 80(1938); *Chimie & industrie* **42**, 548.—Nitrogenous dressing ($NaNO_3$) over a K-P fertilizer produces an increase in the no. of lateral roots of the sugar beet, especially at a depth of 10–20 cm. At greater depths (30 cm. and over) there was no such effect. At the same time, there was noted an increase in crop yield. A. Papineau-Couture

Manganese fertilizer. P. A. Vlasyuk. *Vsesoyuz. Nauch.-Issledovatel. Inst. Sakharnoĭ Prom., Osnovnye Vyvody Nauch.-Issledovatel. Rabot V. N. I. S.'a* **1936**, 52–5(1937); *Chimie & industrie* **42**, 729.—Mn accelerates the decompn. of org. matter in the soil, stimulates microbiol. processes, raises the electrokinetic potential of soil colloids and increases the amts. of H_2O-sol. forms of N, P and K. In the plant, Mn governs an activation of N, P and K, accelerates photosynthesis, contributes to the accumulation and migration of sugars and improves N metabolism and other physicochem. and physiol. processes. A. Papineau-Couture

Organic fertilizers as a source of carbon dioxide. V. A. Tyulin. *Chemisation Socialistic Agr.* **7**, No. 11, 52–8 (1938); *Chimie & industrie* **42**, 726.—Org. fertilizers introduced into the soil or just applied to the surface can constitute a source of aerial nutrition for plants through carbon dioxide. They permit of increasing considerably (two- or three-fold and even more) the concn. of CO_2 in the lower layers of the atm., which accelerates the development and ripening of the plants, increases the crop yield and raises the proportion of leaves. In the case of potatoes, the increase in crop yield under the influence of CO_2 is governed chiefly by the accumulation of starch and dry matter in the tubers. A. Papineau-Couture

Effects of farm manure and mineral fertilizers on soil humidity. L. B. Saksaganskiĭ and M. V. Malych. *Chemisation Socialistic Agr.* **7**, No. 11, 79(1938); *Chimie & industrie* **42**, 726.—Tests carried out over a period of 6 yrs. on sugar-beet crops showed that manure produced an increase in the moisture reserves of the soil and moreover intensified the water-nutrition of beets. N-P-K fertilizers had very little influence on soil humidity. A. Papineau-Couture

Effect of fractional application of nitrogenous fertilizers with irrigation on the crop yield and quality of summer wheat. M. M. Morozov. *Chemisation Socialistic Agr.* **7**, No. 11, 81(1938); *Chimie & industrie* **42**, 727.—Fractional application of N fertilizers produces a pos. effect on plant nutrition and avoids the N deficiency which is observed after the simultaneous application of the whole amt. of fertilizer with intense irrigation. A. P.-C.

Influence of artificial fertilizers on the photosynthetic efficiency of Andropogon sorghum. B. N. Singh, K. N. Lal and M. B. Lal. *Proc. Indian Acad. Sci.* **9B**, 151–68 (1939).—The influence of fertilizers [$(NH_4)_2SO_4$, double superphosphate and K_2SO_4] on the photosynthesis, chlorophyll content and respiration rate has been studied in different amounts and in different combinations on *A. sorghum* (var. Cawnpore 46). When supplied singly K_2O and P_2O_5 fertilizers are more effective than nitrogenous fertilizers in increasing the photosynthetic efficiency (P. E.) of leaves; with each the photosynthesis rises with increasing amt. of fertilizer up to a certain optimum level and later declines. Addn. of mixts. of the 3 fertilizers (in varying proportions) has less effect on P. E. than optimum doses of K_2O and P_2O_5 applied singly. This is probably due to the decrease in the rate of CO_2 intake by leaves; when one or other is reduced or removed P. E. increases. The effect of fertilizers on respiration and chlorophyll content is analogous to the effect on photosynthesis since in general an increase in assimilatory activity is followed by an increase in respiration and chlorophyll. The possible mechanisms of the photosynthetic augmentation under the influence of fertilizers are discussed. B. C. P. A.

Peculiarities of nitrogenous nutrition of the sugar beet during the early stages of vegetation. I. F. Buzanov. *Vsesoyuz. Nauch.-Issledovatel. Inst. Sakharnoĭ Prom., Osnovnye Vyvody Nauch.-Issledovatel. Rabot V. N. I. S.'a* **1936**, 45–6(1937); *Chimie & industrie* **42**, 546.—Before the onset of photosynthesis, the germ and young shoots of beets not only do not require any nitrogenous food, but are adversely affected thereby. This explains why N introduced in the soil with sugar-beet seed lowers the crop yield as compared with the cases where the same quantity of N fertilizers was applied at the side of the seed. A. Papineau-Couture

Effect of chlorinated potash fertilizers on crop yield and resistance to cold of red clover. V. V. Koperzhinskiĭ. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 2, 51–6 (1939); *Chimie & industrie* **42**, 901–2; cf. *C. A.* **34**, 1711⁶.—Red clover is very sensitive to the Cl content of the soil and of fertilizers. Chlorinated potash fertilizers, especially sylvinite, do not increase red clover crop yield as much as K_2SO_4; when the K deficiency is slight, it is irrational to use sylvinite. This latter fertilizer, and also to some extent 40% potash salt, influences the biochem. processes related to the resistance of red clover to cold. A. Papineau-Couture

The function of liming light podzolic soils which have received acid mineral fertilizers. V. N. Prokoshev. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 2, 41–50 (1939); *Chimie & industrie* **42**, 902.—Prolonged application of acid mineral fertilizers (especially ammoniacal) to a light sandy or clayey podzolic soil produces a large decrease in crop yield as a result of the increase in hydrolytic and exchangeable acidity of the soil and in mobile Al, and of the inhibition of the microbiol. activity. Liming corrects this; the amt. of CaO required corresponds to 50–100% of the hydrolytic acidity of the soil. A. P.-C.

Effect of soil improvers on summer wheat crops under conditions of drought. A. M. Shelegov. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 4, 26–30(1939); *Chimie & industrie* **42**, 902.—By combining the application of mineral fertilizers and manure before sowing, with a complementary application of N, P and K, the crop yields are increased. It is not advisable, however, to include as much K in the complementary as in the main application; e. g., best results were obtained with 20 N, 30 P and 20 K in the main application and 20 N, 15 P and 10 K in the complementary application. A. P.-C.

Complementary application of nitrogen to winter cereals during the spring months. V. N. Prokoshev. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 4, 18–21(1939); *Chimie & industrie* **42**, 901.—N fertilizers applied before sowing are less effective than the same amts. applied after

sowing. Max. effect is obtained when N is applied late in the fall or early in the spring. A. Papineau-Couture

Effectiveness of complementary application of nitrogen to winter wheat during the spring months. I. N. Kuksa. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 4, 22–5 (1939); *Chimie & industrie* **42**, 902.—Under the conditions prevailing in the soil zone other than chernozem, max. crop increase of winter wheat is obtained if a complete fertilizer is used for the complementary application; the chief part, however, is played by the N fertilizers. A. Papineau-Couture

Water culture experiments relating to the question of [antagonism between] calcium and potassium. F. Alten and H. Orth. *Ernähr. Pflanze* **36**, 13–16(1940).—Nutrient solns. contg. 12 mg. equiv. of cations per 1.6 l. gave optimum development of oat plants when the proportions of K, Ca, Na and Mg were 6.5, 3, 2 and 0.5 mg. equiv., resp. Increasing the Mg content of the soln. to 4 mg. equiv. increased the reactivity of the plant toward any change in the ratio K:Ca. In this respect the highest value for fresh wt. of crop occurred when K:Ca = 5:1 mg. equiv. per 1.6 l. soln. K-deficient plants did not develop properly and they completely absorbed Na as it was supplied. Ca-deficient plants contained no more Na than plants which were normally fertilized. Vegetative growth was better and the uptake of Mg was less with 0.5 than with 4 mg. equiv. of Mg in the nutrient soln. Utilization of surplus Ca in the nutrient soln. was retarded by deficiency of K. Uptake of K decreased with increasing amts. of Ca in the nutrient soln. and was further decreased by increasing the Mg content of the soln. Extreme deficiency of K and excess of Ca diminished the yield about 75%; the reverse condition, about 20%. The total amt. of K, Na, Ca and Mg in the plant ash remained nearly const. in spite of the great variation in the quantity of nutrients supplied. John O. Hardesty

Mineral fertilizers as a means of overcoming wind-blown wheat. I. A. Volkov. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 4, 31–9(1939); *Chimie & industrie* **42**, 902.—Increased P application accelerates the development of the stalk and thereby increases the resistance to wind. N fertilizers, on the contrary, retard stalk development. K fertilizers contribute to the formation of mechanically weak stalks. A. P.-C.

Effectiveness of the fertilization of barley under drought conditions. Ya. I. Til'man. *Chemisation Socialistic Agr.* (U. S. S. R.) **8**, No. 4, 49–51(1939); *Chimie & industrie* **42**, 902.—Manure and mineral fertilizers produce a considerable increase in barley crop yield, even under drought conditions. The effectiveness of the fertilizers depends on the crop that preceded the barley and also on the preliminary soaking of the seed. A. P.-C.

The role of kaolinite in phosphate fixation. H. F. Murphy. *Hilgardia* **12**, 343–82(1939).—Soils with a kaolinic type of clay have a high capacity to fix sol. phosphates, as is shown by both greenhouse and field expts. Phosphate fixation by the various iron systems alone is not considered sufficient to account for all the properties that these soils show with respect to phosphate availability. Kaolinite when ground to colloidal dimensions has a high phosphate-fixing capacity. The fixation is greatest at acid reactions and this indicates that the H_2PO_4 ion is the most favored phosphate ion for the reaction. An increase in base-exchange capacity accompanies the increase in phosphate fixed. Greenhouse expts. show that the availability of the phosphate in the "kaolinite phosphate" is directly proportional to the degree of phosphate satn. This is taken to indicate that a light phosphate fertilizer application would be ineffective on soils having a kaolinic kind of clay. Even a little kaolin in soils, if in a colloidal condition, will bind the phosphate and make it unavailable to plants. Bentonite has a much lower capacity to fix P in an inaccessible form for plant growth than does colloidal kaolinite. The results are considered sufficient to explain why soils with a kaolinic type of clay have a high capacity to fix phosphate and a low phosphate availability as measured by plant growth. 51 references. C. R. Fellers

Effect of soaking cottonseed in a nutritive solution on the rate of germination. T. Ivanovskaya. *Sovet. Khlopok* **1939**, No. 2, 56–7; *Chimie & industrie* **42**, 724.—Soaking cottonseed in a soln. contg. KH_2PO_4 1, NH_4NO_3 2.40, $MgSO_4$ 0.60, KCl 1.50 and $FeCl_3$ 0.25 g. in 10 l. gave pos. results in every case and accelerated germination irrespective of the nature of the soil and the variety of the seed. A. Papineau-Couture

Symptoms of citrus malnutrition in Florida. A. F. Camp and B. R. Fudge. *Florida Agr. Expt. Sta., Bull.* **335**, 3–55(1939); cf. *C. A.* **33**, 3949[3], 5572[1].—Deficiencies in plant nutrition due to Cu, Zn, Mn, Mg, Fe, B and N and B toxicity are described with the aid of photographs in color. 196 references. C. R. Fellers

Effect of nitrogen, phosphorus and potassium in fertilizers on the earliness of cotton. H. B. Brown and H. W. Pope. *Louisiana Agr. Expt. Sta., Bull.* **306**, 3–15(1939).—P increases early flowering and fruiting, which are important factors in areas heavily infested with cotton-boll weevils. In general, K fertilizers give increased yields. N promotes growth and also increases fruiting. Well-nourished plants will often mature earlier and be more fruitful than nutritionally deficient plants. C. R. Fellers

Effects of fertilizer treatments on the keeping qualities of Cox's orange pippin apples. F. Kidd and C. West. *Dept. Sci. Ind. Research* (Brit.), *Food Invest. Board* **1938**, 143–8(1939); cf. *C. A.* **33**, 2516.—Land receiving 8 different fertilizer treatments showed the best-flavored fruit was produced by complete fertilizer treatment (N-P-K). J. S. Hicks

Effect of potash fertilizers on the resistance of perennial grasses during winter. A. Chepikova. *Chemisation Socialistic Agr.* **7**, No. 10, 76–8(1938); *Chimie & industrie* **42**, 725–6.—K fertilizers help increase the resistance of perennial grasses to low temps. They increase the water-retention power of hydrophylic colloids (measured by swelling), raise the viscosity of the cellular fluids and produce an increased accumulation of colloids before the hibernating period. A. Papineau-Couture

Effect of successive applications of different forms of potash fertilizers on potato and beet crops and on soil properties. R. I. Pevzner. *Chemisation Socialistic Agr.* **7**, No. 10, 53–8(1938); *Chimie & industrie* **42**, 726.—Results are presented of tests carried out for 4 yrs. on heavy clayey soils. The best form of K fertilizer is K_2SO_4 which gives max. yields of tuber and max. starch yield. Sylvanite and carnallite are the least advantageous fertilizers for potatoes; on the other hand, they give excellent results with fodder beets, better than KCl or K_2SO_4. In both cases the 40% K salts occupy an intermediate position. A. Papineau-Couture

Investigations and patents on trace elements in fertilizers. I. Bruno Waeser. *Kolloid-Z.* **90**, 251–6(1940).—A review. G. G.

Continuous apparatus for manufacturing superphosphate. Measurement of phosphate and acid. Mixing. J. Moritz. *Atti X° congr. intern. chim.* **4**, 30–40(1939).—The scales, weighing machines, poidometers and rotary cell feeders are described and shown. The const temp.-const. concn. acid is fed by controllable valve, feed meter, acid-measuring bottle, or dipper cup feeder. Continuous mixers are used. E. M. Symmes

The mechanism of destruction of the eggs of Chilo simplex Butler by nicotine sulfate. II. The relation of the evaporation of nicotine sulfate to its ovicidal power. Kaduhusa Misaka. *J. Imp. Agr. Expt. Sta. Japan* **3**, 239–74(1938)(in German with Japanese summary); cf. *C. A.* **27**, 2752.—In lab. expts. a current of moist air was passed over eggs of *C. simplex* varying in age from 1 to 5 days, after they had been brushed with nicotine sulfate soln. Vaporization of the nicotine was regulated by the addn. of varying amts. of H_2SO_4 to the soln., the nicotine concn. being 0.032% and the pH of the solns. varying from 2.12 to 7.74. The eggs were not killed by suffocation but were poisoned by the nicotine vapor from the soln. If the soln. was alk. so that the nicotine evapd. quickly, it killed the older eggs but not the younger ones. But if the soln. was acid so that the nicotine evapd.

slowly, the small quantity of vapor was insufficient to kill the old eggs, but killed or retarded the development of many young eggs because they were exposed to the gradually evapg. nicotine during development. Thus no nicotine sulfate soln. alone can kill eggs of all ages. In further expts., wetting agents were tested better to control nicotine evapn., and since alk. wetters were obviously unsatisfactory, tests were made with colloidal substances which limit evapn. by forming a thin layer. Addn. of 5% glycerol or 1% glue to 0.05% nicotine solns. improved the toxicity of the solns., but the most effective ones against eggs of all ages were those contg. 1% gum arabic, which gave 100% control. Physiol. observations indicate that nicotine acts on the nervous system and therefore that sensitivity to it increases with increased embryonic development. 36 references. E. J. S.

Report of provincial plant pathologist. J. W. Eastham. *Ann. Rept. Brit. Columbia Dept. Agr.* **1937**, 43–51(1938). —Cracking of *cherries* was considerably reduced by spraying the fruit with Bordeaux mixt. 2–3–40 about 5 weeks before picking (cf. Foster, *C. A.* **32**, 2277[8]). Methods for control of *snapdragon rust* were worked out (cf. Foster, *C. A.* **32**, 9378[6]). Data from expts. on *soil sterilization* and its effect on growth of tomato seedlings were tabulated. Steam sterilization of peat and loam together reduced growth. Application of $NaNO_3$, superphosphate, K_2SO_4, $(NH_4)_3PO_4$, phosphate + potash, before or after steam sterilization with peat added after, produced seedlings of approx. the same wt. $(NH_4)_2SO_4$, KCl (slightly) and a complete fertilizer with peat applied after steam sterilization improved seedling growth. Best growth was obtained by superphosphate and phosphate + potash before or after steaming with peat applied after, and complete fertilizer and peat applied after. Manure applied before or after steam sterilization of the soil, with fertilizers (except K_2SO_4) applied before or after, did not affect growth much. K_2SO_4 with manure applied after steaming improved growth. *Ibid.* **1938**, 42–8(1939).—Results of 2 yrs.' expts. on application of B as borax or boric acid to control *drought-spot* and *corky core* of apples and pears (B-deficiency diseases) do not show an appreciably increased percentage of disease-free fruit; this indicates that B may not be the limiting factor under coast conditions. Further tests are necessary to det. whether the trees are getting the B. Expts. during 1936–38 showed that both Bouisol at 5 lb./100 gal. H_2O and Bordeaux mixt. 4–4–40, applied at pink, calyx and 3 weeks after, were equally as satisfactory for control of *pear scab* as the standard lime S 1–40 gal. H_2O.

Edwin J. Seiferle

Direct capture of the larvae of Cydia pomonella L. Francesco Dotti. *Riv. frutticultura* **2**, 101–16(1938) (French, English and German summaries).—Field expts. in 1934–37 in Italy showed that the application of a single β-naphthol band per tree gave roughly the same nos. of captured larvae of *C.* [*Carpocapsa*] *pomonella* as were obtained by several bands. Bands treated with β-naphthol captured many more larvae than those without β-naphthol; in 1 expt. 55 larvae per tree with treated bands against 20 with untreated bands. Use of these bands has resulted in almost 50% less infested fruit in the same year of application, 5.75% against 9.66%, and further in a progressive decrease in no. of larvae captured, and hence in no. of larvae present, after application of the bands for several consecutive years. β-Naphthol bands were ineffective in capturing *Cydia molesta* Busch on peach trees, but were very efficacious against *C. pomonella putaminana* Stgr. on walnut trees. E. J. Seiferle

Value and defects of Bordeaux mixture and calcium polysulfides used on apple trees. Francesco Dotti. *Riv. frutticultura* **1**, 197–224(1937).—In field expts. against *Venturia inaequalis*, apple scab, lime-S and Bordeaux mixt. gave equally good results in 5 tests on certain varieties of apple; in 6 tests lime-S gave good results but poorer than those given by Bordeaux; in 1 test lime-S gave results considerably poorer than those given by Bordeaux; and in 6 other tests on 2 varieties lime-S gave neg. results while Bordeaux gave satisfactory results. Both fungicides were tested at 1 to 1.5% concns. and 5 applications were made in each test. Edwin J. Seiferle

Report of horticultural branch. W. H. Robertson. *Ann. Rept. Brit. Columbia Dept. Agr.* **1937**, 24–43 (1938).—In 3 yrs.' expts. in control of *anthracnose* on apples, Bordeaux mixt. was slightly more effective than Bouisol at 4.5 pints/100 gal. H_2O; the latter, however, gave fairly good control at this rate, and was less effective as the rate was decreased to 3 and 1.5 pints/100 gal. H_2O. In expts. in 1937 the no. of anthracnose lesions on 25 twigs per tree sprayed with Bordeaux was 3–10% of that on unsprayed trees. In expts. for control of *apple scab*, an unsprayed tree showed only 38% scab-free fruit, while 85–98% scab-free fruit was obtained by use of the spray schedules consisting of a prepink spray of 1–35 lime-S, and (1) calyx 1–60 lime-S, cover 1–60 lime-S + Ca arsenate 4 lb. to 80 gal. H_2O, giving light leaf-spot burn after calyx spray; (2) calyx and cover, 1–60 lime-S + 3 lb. Pb arsenate/80 gal. H_2O; (3) calyx and cover, micronized S 5 lb./100 gal. H_2O + 4 lb. Ca arsenate/80 gal. H_2O, giving no spray injury; (4) same as (3) but with 3 lb. Pb arsenate instead of Ca arsenate; (5) calyx and cover, lime-S 1–100 + Kolofog 6 lb., hydrated lime 8 lb. and Ca arsenate 4 lb./80 gal. H_2O. Treatments consisting of a prepink spray of 1–35 lime-S and calyx and cover sprays of 1–400 or 1–500 cosmic S gave only 55–58% scab-free apples. An addnl., later spray of 1–500 cosmic S to the former raised the scab-free percentage to 70, and a late spray of 5 lb. micronized S/100 gal. H_2O + 3 lb. Pb arsenate/80 gal. H_2O after the latter increased the scab-free apples to 86%. Field expts. against the codling moth, *Carpocapsa pomonella*, on apple, showed that Pb arsenate at 8 lb./240 gal. H_2O + 2.5 quarts fish-oil with 5% oleic acid added gave the best control on 3 varieties tested. Pb arsenate at the same rate + 0.5 lb. Fluxit gave good control on McIntosh apples and fair control on Jonathan and Stayman, poorer on Newtown. Colloidal Pb arsenate at 5 pints/240 gal. H_2O and Ca arsenate at 12 lb./240 gal. H_2O + 0.75 lb. $ZnSO_4$ + 0.75 lb. lime + 3 oz. blood albumin gave good control on McIntosh, Jonathan and Stayman apples, poorer on Newtown. Phenothiazine at 5 lb./240 gal. H_2O gave fair control on Jonathan and Stayman, poorer on McIntosh and poor on Newtown. It was shown that 2 cover sprays do not afford sufficient protection. Expts. against the mealy bug [*Pseudococcus* sp.] indicated that a 6% dormant oil spray gave fairly satisfactory control of this pest on apples. *Ibid.* **1938**, 27–42(1939).—In apple scab control expts. some edge-burn and stunting of the foliage were observed after the prepink spray with lime-S, but none was observed in neutral S plots. In a plot sprayed with a mixt. of lime-S 1–60 and Ca arsenate 4 lb./100 gal. H_2O, scabby apples were 0.02% of the total as compared with 84.2% in a check tree. In expts. to control the codling moth, *Carpocapsa pomonella*, on apple, Black Leaf 155 and phenothiazine were equal if not slightly superior to Pb arsenate, but were more costly to spray. In expts. to control the European red mite, *Paratetranychus pilosus*, on apples of variety Yellow Newtown, 1% Elgetol and sol. S at 10 lb./50 gal. H_2O were applied as delayed dormant sprays. Elgetol was of no value while sol. S gave fair control. As summer sprays, 1% home-mixed and com. oils of viscosity 70–75 sec. and sulfonation 90, 10% home-mixed oil + Na_3AlF_6, cosmic S 1–200, and Stantex oil + Rotox 1–100 gave good control of severe infestations. Santobane 100 gave severe burning at the strength used. When H_2O alone was sprayed excellent control was obtained. No explanation for this fact is offered, but the work will be repeated. Expts. against the mealy bug [*Pseudococcus* sp.] showed that good control was obtained by dormant sprays consisting of Oliver's oil, 4% actual oil + lime-S 1–15, or 1% Elgetol (by wt.). Slightly poorer control was given by dormant sprays of Oliver's oil, 6% actual oil, or 1% Stantex dispersing oil + 0.5 pint 5% rotenone ext. and 2 lb. Lux soap flakes/100 gal. H_2O. All vols. are given in Brit. measure.

Edwin J. Seiferle

Resistance of the apple to fungal invasion. A. S.

Horne and W. A. Roach. *Dept. Sci. Ind. Research* (Brit), *Rept. Food Invest. Board* **1938**, 173–83(1939).—Exptl. results indicate higher internal resistance of fruit from Ulster than that from localities in Kent. Resistance in relation to injection of apple trees with solns. contg. phosphate, K, N and other chemicals was studied and showed no very definite effect. J. S. Hicks

Additional experience with the apple and pear sawflies (Hoplocampa testudinea Klg. & H. brevis Klg.). H. Velbinger. *Nachbl. deut. Pflanzenschutzdienst* 20, 3–5 (1940); cf. *C. A.* **34**, 1437[7].—Sprays contg. quassia and CuO applied 2–3 days after petal fall controlled the sawflies as evidenced by the marked reduction in subsequent fruit fall. Pear trees sprayed with a spray contg. 3% quassia + 1% CuO showed a 3.1% fruit fall as compared with a 34.1% for the controls. Apple trees sprayed, resp., with 0.1% quassia + 0.75% CuO and 1.2% quassia + 0.4% CuO gave reductions in fruit fall from 18.3% to 1.6% and 32.5% to 6.4%. Vernon L. Frampton

Borax for the control of internal black spot of beets. J. C. Walker. *Canner* 90, No. 15, 31(1940); cf. *C. A.* **34**, 211[6].—B deficiency in certain Wis. soils is the cause of black spot in beets. This injury is worse after a drought followed by wet weather with rapid growth. The defect is corrected by the addn. to the soil of 50 lb. of borax per acre. If the borax is applied as a ribbon or band not closer than 1½ in. from the seed, no injury results. C. R. Fellers

Relation of root reserves to control of European bindweed, Convolvulus arvensis L. A. L. Bakke, W. G. Gaessler and W. E. Loomis. *Iowa Agr. Expt. Sta., Research Bull.* **254**, 115–44(1939); cf. *C. A.* **32**, 2278[6].—The reserves of the bindweed roots are largely sucrose and dextrin-like compds. Reducing sugars and true starch played less important roles. Acid-hydrolyzable substances were not depleted by starving bindweed roots. Polysaccharide reserves were rapidly depleted in the surface roots with either fallowing or $NaClO_3$ treatments. Max. reserves were found in roots 6–8 ft. deep and these were exhausted only after prolonged fallowing. Chlorate treatments resulted in immediate lowering in root reserves. Total N, which does not decrease with respiration, showed a drop in the fallowed plots which paralleled the drop in carbohydrates but showed an increase in the chlorate-treated roots during the 1st season of treatment. Diurnal changes in the leaves, stems and roots of bindweed plants showed sucrose and the dextrin-like compds. to be important carbohydrates of all tissues, both as regards total quantities and diurnal fluctuations. On the basis of analyses of total tissues, the gradients of all of the substances assumed to be available for translocation were neg. in every detn., being lowest in the leaves, intermediate in the stems and highest in the roots. **Control of European bindweed, Convolvulus arvensis L.** A. L. Bakke. *Ibid.* **259**, 367–440(1939).—$NaClO_3$ was the most effective herbicide studied. A concn. of 1 lb. per gal. with 4 g. powd. glue and 3 cc. of concd. H_2SO_4 is the recommended formula. Climatic conditions have much to do with the effectiveness of sprays. Three successive applications of either $NaClO_3$ or the com. prepn. Atlacide gave complete eradication in 1 season. Spraying should be done when there is a heavy development of leaf surface. NaCl was of very limited value in bindweed eradication. Similarly borax, $FeSO_4$, $ZnSO_4$, kainite and $Ca(ClO_3)_2$ were of little herbicidal value. $KClO_3$ was equally as effective as $NaClO_3$. Soybeans are particularly sensitive as a follow-up crop on soil treated with $NaClO_3$ and should not be planted the 1st season following treatment. Corn is not so sensitive as wheat, oats or barley. Alfalfa is very tolerant to traces of the herbicide left in the soil and can be sown soon after treatment. C. R. Fellers

Insects of the blackberry, raspberry, strawberry, currant and gooseberry. A. J. Hanson and R. L. Webster. *Wash. Agr. Expt. Sta. Popular Bull.* No. 155, 38 pp.(1938).—A résumé of the pests and methods for their control. B. C. P. A.

Control of the cabbage fly on the west coast of Schleswig-Holstein. E. Riggert and H. Goffart. *Z. Pflanzenkrankh. Pflanzenschutz* **47**, 394–401(1937).—Comparative trials with aq. $HgCl_2$, $C_{10}H_8$ and carbolineum are recorded. B. C. P. A.

Factors affecting the recovery of hydrocyanic acid from fumigated citrus tissues. E. T. Bartholomew, Walton B. Sinclair and Byron E. Janes. *Hilgardia* **12**, 473–95 (1939); cf. *C. A.* **30**, 4195[1].—Citrus tissues do not contain autogenous HCN. A modified Liebig $AgNO_3$ volumetric method was employed for the detn. of HCN, the end point of titration being detd. by the use of a photoelec. turbidimeter (*C. A.* **30**, 7061[8]). Details of the method required to obtain the HCN from citrus tissue are given. As little as 10–15 mg. of HCN was recovered and estd. H_2S from the fumigated citrus leaves and fruits passed into the distillate and interfered with the detns. of HCN with standard $AgNO_3$. This trouble was overcome by placing $CdSO_4$ in the distn. flask at the time of making the 1st or 2nd distn. Tissues of citrus leaves or fruits are already acid; so only a small amt. of concd. H_2SO_4 had to be added to ensure the recovery of HCN during distn. No destruction of the HCN occurred as a result of using small amts. of H_2SO_4. Results show that citrus leaves and fruits fix or alter a portion of the HCN during fumigation so that it cannot be recovered by distn. From 73 to 85% of the HCN could be recovered from the leaves. HCN penetrates the leaf tissue and does not merely adhere to the surface. The amts. of HCN recovered were directly proportional to the amts. placed in the fumatorium. In a 40-min. fumigation green fruit contained 10–14 times as much HCN as there was in an equal vol. of air in the fumatorium. C. R. F.

Fourth annual report of the coffee research and experimental station, Lyamungu, Moshi, 1937; Report of the agricultural officer. F. R. Sanders. *Dept. Agr. Tanganyika Terr. Pamphlet* No. 22, 41(1938).—Spraying with nicotine sulfate failed to give control of the leaf miner [*Leucoptera*] injuring coffee, when applied in Jan. or Feb., but was effective against pupae on the lower surface of the leaf. **Report of entomologist.** F. B. Notley. *Ibid.* 51–2.—Sprays of Derrisol in H_2O or Bordeaux mixt. (1:500) were effective against the thrips [*Diarthrothrips coffeae* Will.] on coffee. Baits of maize flour and Paris green (1:50) gave 90.9 to 98.5% mortality of the beetle, *Dasus* (*Gonocephalum*) *simplex* F. Through *Rev. Applied Entomol.* **27A**, 126–7(1939). Edwin J. Seiferle

The use of oil or oil containing pyrethrins for earworm [Heliothis armigera Hbn.] control in sweet corn. Geo W. Barber. *U. S. Dept. Agr., Bur. Entomol. Plant Quarantine* **E-497**, 9 pp.(Feb., 1940); cf. *C. A.* **33**, 8898[1].—White mineral oil (150–250 Saybolt viscosity at 100°F.) contg. 0.05% pyrethrins was nearly as effective as that contg. larger amts. of pyrethrins. Oil contg. 0.2% pyrethrins gives reasonably satisfactory control under usual conditions. Oil should not be applied to the ears before about the 3rd day after silk exposure. Oil contg. pyrethrins can be applied efficiently several days later than is satisfactory for oils alone. The application should be 0.75–1.0 cc. per ear. An improved oiler for applying the larvicide is described and figured. K. D. Jacob

[Report of] entomological section. H. K. Sen. *Indian Lac Research Inst. Ann. Rept.* **1937–38**, 16–26(1938).—Expts. were made on control of the coccid, *Aspidiotus orientalis*, a major pest of the host trees of lac, *Laccifer lacca*. A lime-S spray gave only 30% mortality after 10 days and less than 100% in 4 weeks. A spray of waste motor car oil gave 100% kill in 10 days but the trees were so badly burned that the oil was abandoned. A spray of a completely refined, low-boiling paraffin distillate (closely allied to kerosene) produced 91% mortality in 10 days and 100% in 3 weeks, with no damage to the trees. Fumigation of termitaria with com. prepns. showed that gasoline was most effective in termite control. E. J. S.

New winter sprays for combating Lygus spinolae in Styria (spring 1938). L. Fulmek. *Neuheiten Gebiet Pflanzenschutz* **31**, 151–6(1938); *Rev. Applied Entomol.* **27A**, 45(1939); cf. Speyer, *C. A.* **30**, 8498[8]; Tomaszewski and Fischer, *C. A.* **30**, 8498[8].—Eight proprietary

sprays were tested against *L. spinolae* Meyer on grape vines, by application in March before new growth began. A tree spray at 8 and 7% gave 82.18 and 79.73% control, resp., and a normal fruit tree carbolineum with a relatively high mineral oil content at 6% gave 78.96% control, but caused some injury to the stocks during frost. Two prepns. of org. dyes contg. dinitrocresol gave 69.54 and 69.41% control. During subsequent frosty weather vines sprayed with mineral oil emulsions suffered most, so these insecticides must be rejected in spite of the good control results obtained with them. E. J. Seiferle

White grubs in lawns and golf courses. Clyde C. Hamilton. *New Jersey Agr. Expt. Sta., Circ.* **394**, 1–4 (1939).—The grubs are those of the Japanese beetle (*Popillia japonica* Newm.), the Asiatic garden beetle (*Autoserica castanea* Arrow), the Oriental beetle (*Anomala orientalis* Waterh.) and a native June beetle (*Ochrosidia villosa* Burm.). The best chem. treatment consists of applying powd. Pb arsenate at the rate of 10 lb. for each 1000 sq. ft. of surface. In order to secure an even mixt. 1 part of Pb arsenate is mixed with 3 parts of sand, soil or fertilizer at the time of application. The best seasons to apply the Pb arsenate are early spring and early fall. C. R. Fellers

Occurrence and spread of the ring spot disease of lettuce caused by Marssonina panattoniana. G. B. Stevenson. *J. Pomology* **17**, 27–50(1939).—In seedling crops the disease is checked by spraying with Bordeaux mixt. (3.6:50). Seed can be disinfected by dipping (4–6 hrs.) in aq. $CaOCl_2$ (1:10). B. C. P. A.

Report of field crops branch. Cecil Tice. *Ann. Rept. Brit. Columbia Dept. Agr.* **1938**, 61–7(1939).—Field work on weed control showed that $NaClO_3$ gave good control of morning glory, *Convolvulus arvensis*, and Canada thistle, *Carsium arvense;* variable control, in one case, of couch grass, *Agropyron repens;* and poor results on hoary pepper grass, *Lepidium draba*. Further tests against *A. repens* showed that spraying at 2 lb. $NaClO_3$/gal. H_2O gave satisfactory kill, but that mixing with sand or dry soil and broadcasting at 180 lb./acre gave no control. Activated CS_2 gave poor control of *L. draba* and $CaCN_2$ was unsatisfactory against wild mustard. Edwin J. Seiferle

Series of experiments with substances attractive to the olive fly. G. Bua. *L'Olivicoltore* **15**, 19 pp.(1938)(reprint); *Rev. Applied Entomol.* **27A**, 98(1939); cf. *Ann. ist. super. agrar. Portici* (3) **6**, 125–45(1933)(Pub. 1934); *Rev. Applied Entomol.* **22A**, 365(1934).—Expts. carried out in 1934 and 1935 in Italy on attractants for the olive fly, *Dacus oleae* Gmel., are described. In 1934, the pans were baited with NH_4 salts, several types of com. molasses prepns. called Dachicida and Dacivoro, combinations of these and NH_4 salts, Clensel, cinnamon oil and infusions of bran and of dried figs, both with the addn. of borax. The most attractive of these was a 10% diln. of Dachicida P, a new prepn. of molasses contg. 2.5% Na arsenite, 3.5% H_2O, 1% olive oil and 0.5% $(NH_4)_2SO_4$. It lost its attractiveness, however, in a few days. Dachicida P was tested only in the fall, and in late spring and summer 5 or 10% dilns. of NH_4NO_3 were more attractive than any other baits. Clensel also showed good attractive power at 3.3% and was 2nd in efficiency in the fall. In the late spring and summer of 1935, highest catches were obtained with baits of 3% dilns. of NH_4NO_3 or $(NH_4)_2HPO_4$, while Dachicida P was not even best of the molasses baits; but in the fall Dachicida P gave the highest catches. The variations given by the molasses prepns. are attributed to variations in compn. Their inferiority to NH_4 salts in summer was due to fermentation at high temps., since Dachicida P retained its attractiveness longer if borax or $KHSO_4$ was added. These baits also catch the olive moth, *Prays oleellus* F. Edwin J. Seiferle

Experiments against Cydia molesta by means of oil-sulfur-lime dusts. M. Mariani, G. Goia and C. Gerbaldi. *Riv. frutticultura* **2**, 145–51(1938)(French, English and German summaries).—In field tests against *C. molesta* Busk. on peach trees, good control was obtained by use of a dust contg. 60 parts S, 35 parts hydrated lime and 5 parts summer oil, applied 7 times at rates from 0.147 to 0.352 kg. per tree. This control method was equally as satisfactory as the method of cutting off the infested shoots, but was more expensive. Edwin J. Seiferle

Infusion of quassia in work against Hoplocampa on plums. Francesco Dotti. *Riv. frutticultura* **1**, 59–88 (1937); *Rev. Applied Entomol.* **27A**, 97–8(1939); cf. following abstr.—Expts. were made in northern Italy to compare the value against the plum sawflies, *H. minuta* Christ and *H. flava* L., of 1.5 or 2% quassia infusions (obtained by soaking the chips in water for 48 hrs. and straining) with 0.3 or 0.4% Pb arsenate. Applications were made about Mar. 23 at full blossom, Mar. 31 at petal fall, and 18 days later at calyx fall. Av. percentages of infestation of fruits were 1.76 in trees sprayed with quassia, 5.54 in those sprayed with Pb arsenate, and 13.16 in unsprayed controls. The stronger quassia spray appeared only slightly more effective than the weaker. Quassia was equally effective against the aphid, *Hyalopterus arundinis* F., but was inferior to Pb arsenate against *Hipponomeuta padellus* L. It did not scorch the leaves or poison bees. Edwin J. Seiferle

Further research on the insecticidal value of infusions of quassia. Francesco Dotti. *Riv. frutticultura* **2**, 29–33 (1938); cf. preceding abstr.—A 2% quassia infusion applied to pear trees at the time of full blossom and again at petal fall allowed infestation of 3.35% of the fruit by *Hoplocampa brevis* Kl., as against 31.56% infestation in untreated trees. A similar infusion was applied to apple trees on April 18, May 29, June 11 and 23 and July 14 and was compared with Pb arsenate used at 0.3% in the 1st application, 0.5% in the 2nd to 4th and 0.6% in the last application. In untreated controls infestation by *Cydia* [*Carpocapsa*] *pomonella* was 11.2%, in trees treated with quassia 4.9%, in trees treated with Pb arsenate 2% and in trees treated with the 2 insecticides together 1.7%. Quassia is therefore inferior to Pb arsenate against *C. pomonella*. Edwin J. Seiferle

[Control of wireworms.] H. W. Miles and M. Cohen. *J. Roy. Lancashire Agr. Soc.* **1938**, 31 pp.(reprint); *Rev. Applied Entomol.* **27A**, 97(1939).—In expts. in 1937, $C_{10}H_8$ had no effect on foliage, vigor or yield of potatoes when applied at 300 lb./acre before the land was ridged up, but did not appreciably reduce injury by wireworms. Growth was also unaffected by dressings of 150–600 lb./acre applied in the drills so that the sets were in contact with it. The percentage germination of wheat seed planted in Oct. was very severely reduced by mixing it with $C_{10}H_8$ at 16 lb./bushel and less markedly with superphosphate at 32 lb. or more per bushel. After a week, 4% of the untreated seedlings were destroyed by wireworms, whereas less than 1% of those treated were injured. Edwin J. Seiferle

Prickly pear eradication and control. W. H. Dameron and H. P. Smith. *Texas Agr. Expt. Sta., Bull.* **575**, 5–55 (1939).—Prickly pears (*Opuntia* spp.) on cattle and sheep ranges are best eliminated by treatment with an arsenical. A satisfactory formula consists of 3 lb. As_2O_3 (96–98% pure) to 1 gal. of water to which 1 pint of conc. H_2SO_4 is added. Both sides of the slabs should be well sprayed with a mist of this poison by using 110–120 lb. air pressure. Spraying during the hot summer months gives best results. A metal alloy of 18% Cr, 8% Ni and not over 0.07% C, generally termed 18-8-S stainless steel, showed practically no corrosion after a 31-day test when the metal was partly immersed in the prickly pear poison. This alloy is suitable for the construction of the atomizer tanks. C. R. F.

Root aphids and ants as pests of rubber-producing plants. M. S. Gilyarov. *Pests and Diseases of Rubber-bearing Plants* (Moscow) **2**, 49–67(1938)(in Russian with English summary); *Rev. Applied Entomol.* **27A**, 43–4 (1939).—Soil fumigation with chloropicrin in plantations of *Scorzonera tau-saghyz* gave complete mortality of the green root aphid, *Xerophilaphis scorzonerae* Morav. only when the dosage was 1.2 oz./sq. yd., which injured the plants. Applications of Paris green round the entrance holes to the nests of *Lasius* at the rate of 1 teaspoonful per hole caused desertion of 70% of the ant hills in one plot and 94.8% in another. This method as well as the use

of poisoned honey-baits and fumigation of the nests with chloropicrin or SO_2 was ineffective against large ants of the genus *Formica*. Edwin J. Seiferle

Control of the strawberry blossom weevil. O. Jancke. *Obst. u. Gemüsebau* **84**, 53–4(1938); *Rev. Applied Entomol.* **27A**, 155(1939).—Tests with several com. insecticidal dusts in 1937 against *Anthonomus rubi* Hbst. showed that the best (88%) control was given by a single application of derris dust, which was more effective than pyrethrum dust alone or mixts of pyrethrum and derris. E. J. S. 2

Sweet-potato leaf beetle. L. W. Brannon. *U. S. Dept. Agr., Circ.* No. **495**, 9 pp.(1938).—In tests with caged insects 80% $BaSiF_6$-infusorial earth (1:2), synthetic cryolite-talc (3:2) or undiluted Ca arsenate gave a high percentage kill of adult insects. B. C. P. A.

Controlling tobacco downy mildew (blue mold) with *p*-dichlorobenzene. W. B. Tisdale and Randall R. Kincaid. *Florida Agr. Expt. Sta., Bull.* **342**, 16 pp.(1939).—The vapor from *p*-dichlorobenzene crystals suspended above the seedling beds but not more than 3 ft. from the plants effectively controls downy mildew in tobacco. From 2 to 3 lb. per night for 3 nights for 100 sq. yards of bed is recommended. The crystals are thinly distributed on a cloth screen stretched above the plants. The life of the cloth can be greatly increased by soaking it in a soln. made up of 4 lb. $ZnSO_4$, 4 lb. Na_2SO_4, 1 lb. tartaric acid and 150 gals. of water. C. R. Fellers 3 4

Control of seedling injury and root rot of tobacco in seed beds by chemical means. K. Böning. *Z. Pflanzenkrankh. Pflanzenschutz* **45**, 385–415(1935).—Control measures include treatment of soil with $CaCN_2$, CH_2O, Ceresan or Bordeaux mixt. and subsequent spraying of seedlings with Cu prepns. B. C. P. A.

Control of tomato leaf-mold. The value of different sprays. K. M. Curtis. *New Zealand J. Sci. Tech.* **21A**, 187–92(1939); cf. *C. A.* **31**, 8803².—Control of the fungus (*Cladosporium fulvum*) was satisfactory with either Shirlan A. G. or Shirlan W. S. (H_2O-sol.) used at the rates of 3 lb. per 100 gal. spray mixt. Applications of Shirlan W. S. with a power spray produced some damage to leaves. Considering crop yield, quality of fruit, earliness of yield, noninjury to blossom or leafage and cost of sprays, the 2 Shirlan sprays were more satisfactory than those made from either Cu_2O and oil, $CuSO_4$ and soap soln., Bouisol and soap soln., Bouisol and oil, malachite green and amyl alc., Bordeaux and oil, $KMnO_4$ or bleaching powder. John O. Hardesty 5 6

Control of the wheat midge by cultivation and fertilization. H. Klee and B. Rademacher. *Z. Pflanzenkrankh. Pflanzenschutz* **47**, 232–50(1937).—Treatment with kainite, CaO or $CaCN_2$ destroyed the majority of larvae of *Contarinia tritici* and *Silodiplosis mosellana* in soil. Kainite + $CaCN_2$ (2:1) gave still better results. B. C. P. A. 7

Controlling seed-borne stinking smut of wheat by disinfectants. Roderick Sprague. *Oregon Agr. Expt. Sta., Bull.* **363**, 5–33(1939).—New Improved Ceresan, a new Hg fungicide at the rate of 14 22 g. per bu. or 50% basic Cu carbonate at the rate of 85 g. a bu. for winter wheat or 57 g. per bu. for spring wheat, will effectively free the seed from smut (*Tilletia tritici* or *T. levis*). Conditions are more favorable for smut development in late fall plantings and under these conditions seed treatments are less effective. C. R. Fellers 8

Toxicity of ethylene oxide to Calandra oryzae, C. granaria, Tribolium castaneum and Cimex lectularis. J. R. Bosvine. *Ann. Applied Biol.* **25**, 605–32(1938).—The technique of toxicity detns. and the influence of physiol. factors on the percentage kill of insects are examd. The relative order of resistance to HCN, SO_2 and ethylene oxide varied with the species tested. B. C. P. A. 9

The modern chemical arsenal and what it means in the fight against insects. M. D. Leonard. *Pests* **8**, No. 3, 7–9(1940).—A review of insecticide problems. Henry H. Richardson 1

The necessity of regulating the use of hydrocyanic acid vapors in the destruction of animal parasites of vegetables, vegetable products and agricultural commodities. M. Vayssière. *Bull. office intern. hyg. publ.* **31**, 877–81(1939). —Disinfection with HCN is cheap, effective and harmless when proper precautions are taken. No HCN is retained by the substances treated (food, tobacco, etc.). Ruth Berggren

Decomposition of copper-lime [fungicidal] complexes. P. Reckendorfer. *Z. Pflanzenkrankh. Pflanzenschutz* **46**, 418–38(1936).—Decompn. of Bordeaux-mixt. residues on sprayed foliage with production of sol. Cu compds. requires the presence of CO_2 and H_2O. The end products are probably $CuSO_4$ and $Cu(HCO_3)_2$. Under lab. conditions complete conversion of Cu into sol. forms may occur in about 45 days. The maintenance of toxic Cu-ion concn. on sprayed foliage under field conditions is examd. B. C. P. A.

Expts. with B on cereals (Schropp, Arenz) **11D.** Action of B on carrots, sunflowers and buckwheat (Schropp, Arenz) **11D.** Influence of B with various K-N ratios on growth of field beans (Arenz, Schropp) **11D.** Incorporation of growth hormones in seed dressings (Croxall, Oglivie) **11D.** Production and use of *Hevea* oilcake [as fertilizer] (Le Bras) **12.** Prized wines of Verona Province [analyses of soils] (Dalmasso, *et al.*) **16.** $(NH_4)_2C_2O_4$ for use as fertilizer (Uno) **18.**

Kaserer, Hermann: Der Kunstdünger. Kurzgefasste Beschreibung der künstlichen Düngemittel nebst Anleitung fur Ankauf und Verwendung derselben und einem Anhang über die Düngung der einzelnen Kulturpflanzen. 5th ed. Vienna: Scholle-Verlag. 64 pp. M. 150.

Lüstner, Gustav: Krankheiten und Feinde der Obstbäume, Beerensträucher und des Strauch- und Schalenobstes. Ein Wegweiser für ihre Erkennung und Bekämpfung. 4th ed. Stuttgart: Ulmer. 187 pp. M. 3.

Vigneron, H.: L'industrie chimique des engrais. Paris: Masson et Cie. 280 pp. Fr. 60.

Spraying plants to prevent freezing. Oliver P. Greenstreet and Thomas C. Hall. U. S. 2,185,663, Jan. 2. For spraying plants such as those of fruit orchards, use is made of an emulsion contg. petroleum oil and water and an alc. (suitably also contg. glycerol, honey and blood albumin). 6

Fertilizer. S. S. Dragunov, D. V. Zaikin and Yu. N. Bezobrazov. Russ. 52,305, Dec. 31, 1937. Comminuted peat is impregnated with tar water from the dry distn. of peat, coal, etc., treated with NH_3 and dried.

Fertilizer. A. Ya. Zvorykin. Russ. 55,840, Oct. 31, 1939. Polyhalite is freed of NaCl, treated with dil. H_3PO_4, satd. with NH_4 salts, freed of gypsum and evapd. to dryness.

Fertilizers. A. Ya. Zvorykin. Russ. 56,095, Nov. 30, 1939. Solns. contg. 35–6% ammonium phosphate are treated with a 2–18% soln. of KCl at temps. of −5 to +65°.

Phosphatic fertilizers. Röchling'sche Eisen- und Stahlwerke G. m. b. H. Brit. 508,830, July 6, 1939. Addn. to 461,869 (*C. A.* **31**, 5503⁸). Mineral phosphate is melted in a hearth furnace, e. g., an intermittently or continuously operated rotary furnace, together with the soda slag obtained in the treatment of pig Fe according to 461,869, the furnace lining consisting of a mixt. of burnt dolomite or magnesite with tar or of bricks pressed from such mixt. Corrosion of the furnace lining is thus minimized. The products are citric acid- and citrate-sol.

Insecticide and fungicide. N. D. Pelikh and S. I. Lyukin. Russ. 52,159, Nov. 30, 1937. Ca trichloromethanesulfonate is specified.

Treating seeds. Ya. P. Berkman, B. A. Voloshinov and I. G. Gurdzhi. Russ. 55,849, Oct. 31, 1939. The seeds are treated with Mg, Fe or Zn salts of sulfonated crude anthracene, anthracene oil or heavy oil.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Effect of the quantity of yeast on the fermentation of cereal worts. A. Ashkenuzi. *Spirto-Vodochnaya Prom.* **16**, No. 2, 10–14(1939); *Chimie & industrie* **42**, 887.—Increasing the quantity of yeast above 2% accelerates fermentation during the 1st period of 24–36 hrs., but does not shorten total time of fermentation. In order that it may be possible to shorten the total time of fermentation, the fermenting liquid must contain only maltose, with possibly a small quantity of dextrin. A. P.-C.

Practical treatment of decomposed potatoes. I. Nemlikher. *Spirto-Vodochnaya Prom.* **15**, No. 9, 35(1938); *Chimie & industrie* **42**, 553.—By adding a certain amt. of chloride of lime (500 g. per t. of potatoes) to the saccharified wort obtained from deteriorated potatoes, the acidity of the wort is reduced and the alc. yield is considerably increased. A. Papineau-Couture

Fermentation of clear filtered grain and potato worts. A. Zabrodskiĭ and A. Movchan. *Spirto-Vodochnaya Prom.* **15**, No. 9, 12–18(1938); *Chimie & industrie* **42**, 553.—Clear filtered worts do not ferment as easily as unfiltered worts, irrespective of the nature of the raw material, degree of saccharification, acidity, concn., filtration temp. and duration of fermentation. The alc. yield is 0.5–1.5% lower with the filtered worts, fermentation takes place more slowly, and multiplication of the yeast is poor. It is the filtered corn and barley worts that ferment with greatest difficulty. A. Papineau-Couture

Determination of original wort content by the new [German] excise procedure. H. Bausch. *Wochschr. Brau.* **56**, 97–8(1939).—Either (*a*) the refractometer method or (*b*) the pycnometric-distn. process can be used. Method (*a*) involves detn. at 20° of d. and of the refraction in the Zeiss dipping refractometer, whence the original wort content can be read from a nomogram. If, in using this method, the result is found to be outside certain specified limits, varying for different classes of beer, the detn. is repeated, with method (*b*). B. C. P. A.

Continuous saccharification of wort in the brew kettle. V. Fremel and V. Lebedev. *Spirto-Vodochnaya Prom.* **15**, No. 10, 10–14(1938); *Chimie & industrie* **42**, 706.—Continuous saccharification in the brew kettle by uninterrupted introduction of cooked wort and malt suspension, with continuous removal of the saccharified wort, gives good results. There may, however, result an increased contamination of the wort, which may be avoided by heating the wort before saccharification for 15–20 min. at 61–2°. A. Papineau-Couture

Biochemical evaluation of barley for malting. V. Evteev, P. Danilenko, M. Eiber and A. Polojichnik. *Spirto-Vodochnaya Prom.* **15**, No. 10, 18–23(1938); *Chimie & industrie* **42**, 706–7.—Barley which has a high diastatic activity yields a malt with good saccharifying power; barley with low diastatic power gives a malt with rather poor saccharifying power. It is therefore rational to det. the diastatic power of barley to evaluate its suitability for malting. A. Papineau-Couture

Disinfection of fermentation tanks. K. Sotonin. *Spirto-Vodochnaya Prom.* **16**, No. 5, 24(1939); *Chimie & industrie* **42**, 888.—Good results are obtained with CH_2O or with chloride of lime. Introduce into the tank 100 cc. CH_2O on 200 g. chloride of lime per 100 hl. of capacity, close hermetically and steam. A. P.-C.

Effect of various defecating agents in the determination of sugar in intermediate distillery products. V. Semevskaya. *Spirto-Vodochnaya Prom.* **16**, No. 4, 36–9(1939); *Chimie & industrie* **42**, 888.—The best defecating agents for grain- or potato-worts are Herles' reagent (mixt. of a 340 g. per l. $Pb(NO_3)_2$ soln. and a 32 g. per l. NaOH soln.) and phosphotungstic acid (5% soln.); Herles' reagent only is suitable for molasses worts. A. Papineau-Couture

Methods of analysis of molasses used in the fermentation industries. W. A. Davis. *Research Labs., Distillers Co. Ltd., Epsom*, Separate 16 pp.; *Analyst* **64**, 517–18; cf. *C. A.* **32**, 6901[8].—The chief value of molasses from the point of view of the distiller is the quantity of EtOH that can be obtained from it. The methods used in testing it from this point of view are described in detail including a fermentation test which takes several days to carry out. 2 The detn. of fermentable sugars is made as described in a previous paper. Procedures for detg. the spirit yield and unfermentable sugars are also given. W. T. H.

Valuation of sulfuric acid recovered from acid tar in the manufacture of molasses alcohol. E. Kvasnikov and B. Reiser. *Spirto-Vodochnaya Prom.* **16**, No. 5, 20–2(1939); *Chimie & industrie* **42**, 888; cf. *C. A.* **33**, 4737[1].—The tests showed the possibility of substituting H_2SO_4 re- 3 covered from acid tar for the ordinary com. H_2SO_4 generally used in molasses distilleries. The regenerated acid can even be used in the manuf. of brandies and of liqueurs. A. Papineau-Couture

Use of antiseptics in alcoholic fermentation. L. Loginova. *Spirto-Vodochnaya Prom.* **16**, No. 3, 10–12 (1939); *Chimie & industrie* **42**, 888.—Under certain concn. conditions SO_2, salicylic acid and Na salicylate exert an inhibiting action on bacteria without affecting 4 the activity of yeasts. Other antiseptics tested (BzOH, BzONa, PhOH, malachite green, brilliant green) gave neg. results. A. Papineau-Couture

Controlling the rectification of alcohol. G. Fertman and A. Pokrovskiĭ. *Spirto-Vodochnaya Prom.* **16**, No. 3, 13–22(1939); *Chimie & industrie* **42**, 888.—Continuous automatic control of rectification, both in Barbet continuous stills and in Savalle batch stills, can be effected by means of recording manometric thermometers suitably 5 placed at different points of the app. A. P.-C.

Determination of petroleum products in crude and rectified alcohol. M. Kotlyarenko. *Spirto-Vodochnaya Prom.* **16**, No. 4, 33–4(1939); *Chimie & industrie* **42**, 888.—Petroleum products are first detected by their odor and taste, by treating the alc. on the one hand with $KMnO_4$ and on the other with activated charcoal. To det. them they are extd. with powd. activated charcoal, 6 the latter is distd., and the distillate is evaluated volumetrically or nephelometrically. A. P.-C.

The prized wines of the Verona Province. G. Dalmasso, I. Cosmo and G. Dell'Olio. *Annuar. stas. sper. viticolt. enol. Conegliano* **9**, appendix 1–197(1939).—The chemical analyses of 60 soils and 534 wines are tabulated. G. A. Bravo

Ebulliometric grade [alcohol content] of sweet wines. M. Procopio. *Ann. chim. applicata* **29**, 74–7(1939).— 7 The error due to the sugar content in the detn. of EtOH in sweet wines by Malligand's method is corrected by the use of a modified form of Emiliani's formula (cf. *C. A.* **33**, 8351[8]). B. C. P. A.

Bromine in the musts and wines. M. Venezia. *Annuar. staz. sper. viticolt. enol. Conegliano* **9**, 69–84(1939).—Of 84 samples of Italian musts and wines Br was found by the method of Chelle and Vitte (*Ann. fals.* **1936**, 98) in only 12 (0.005–0.06%). Br is not to be considered a 8 normal constituent of the wines, but it may be found in the products obtained from grapes cultivated in soils near to the sea, or fertilized with K salts. When Br content is greater than 0.001 g. per l., there is a suspicion of treatment with a Br-contg. antiseptic (e. g., $CH_2BrCOOH$). G. A. Bravo

Use of methyl orange as indicator for the determination of the alkalinity of brandies. A. Antonov. *Spirto-Vodochnaya Prom.* **16**, No. 1, 39(1939); *Chimie & industrie* **42**, 706.—Methyl orange is not suitable for this 9 purpose as its sensitiveness is affected by alc.; for strong alc. solns. it indicates too high an alky. A. P.-C.

Germination of malt in presence of potassium permanganate. I. Filatov. *Spirto-Vodochnaya Prom.* **15**, No. 12, 24–5(1938); *Chimie & industrie* **42**, 554.—By adding 0.01 g. $KMnO_4$ per l. of soaking water the time of germination is shortened by as much as 2 days, the starch

loss is reduced and germination yield is increased by more than 10%. A. Papineau-Couture

Report on malt analyses for the months of November and December, 1938. F. Ancker. *Wochschr. Brau.* **56**, 22(1939); cf. *C. A.* **33**, 8909[8].—Summary and discussion of 375 barley malt and 8 wheat malt samples. S. J.

Report on malt analyses for January and February, 1939. F. Ancker. *Wochschr. Brau.* **56**, 86–7(1939); cf. preceding abstr.—Summary and discussion of results on 346 barley malt and 7 wheat malt samples. S. Jozsa

Determination of malting losses. R. Kutscha. *Wochschr. Brau.* **56**, 98–101(1939).—The following losses are considered: (1) difference between moisture content of barley and malt, (2) losses due to handling, (3) steeping losses, (4) loss on sprouts and (5) respiration losses. The following figures for pale and dark malt are given (3) 1.0 and 1.0, (4) 3.7 and 4.5, (5) 5.8–7.5 and 10.5 and 13.5% for total losses. It is more convenient to det. the total loss than to calc. it from the sum of individual losses. The total loss might be detd. by weighing the barley steeped and the malt obtained or by detg. the 1000 kernel wt. of barley and malt. In order to det. the yield on dry basis the moisture content of barley and malt must be taken into consideration. Figures of earlier investigators suggest that 1% subtracted from the 1000 kernel wt. value gives a figure in close agreement with weighing. An increased loss must be taken into consideration with barley of high protein content. Protein contents ranging from 8.88 to 11.44% were found to correspond to dry basis losses of 9.78 to 12.49% for undried barley and 9.47 to 10.85% for dried barley. In case the 1000 kernel wt. is used two batches of 4000 kernels each should be tested. The error is still 0.5–1.0%. S. Jozsa

Estimation of lactates in soured mashes. F. Monroe Powers. *Chemist-Analyst* **29**, 4(1940).—Take sample to correspond to about 0.5 g. lactic acid. Add 5 drops H_2SO_4 and 50 ml. of ether. Stir, add 12 g. of Na_2SO_4 and allow to stand at least an hr. with occasional breaking up of the solid layer. Filter and wash the residue with Et_2O. Evap. to 5 ml., take up in 50 ml. of water, boil with 2 g. $BaCO_3$ and filter off $BaSO_4$ and excess $BaCO_3$ after 15 min. Wash with water, bring to a boil and titrate with 0.1 *N* H_2SO_4 to a methyl red indicator. Or, add to the filtrate from the $BaSO_4$ ppt., 5 drops of HCl and 5 drops H_2SO_4 while stirring, filter through a Gooch crucible and weigh the $BaSO_4$ which is equiv. to the lactic acid present. W. T. H.

Degradation of starch in cooked (heated) mashes. P. Kolbach and G. W. Haase. *Wochschr. Brau.* **56**, 105–9, 113–18, 124–8, 134–6, 140–3(1939).—Windisch, Kolbach and Schild investigated the starch degradation in mashes in regard to time, temp., pH and concn. (cf. *C. A.* **26**, 1382). The present investigation is concerned with the inhibition of amylase and proteinase at higher temps. (70–100°). The "cooked mash" was prepd. by using 50 g. malt flour and 200 ml. water at 35° and rapidly heating the infusion on a water bath to approx. 100° in order to eliminate enzyme action as well as possible. A practically complete inhibition was attained when the "cooked mash" was prepd. at pH 7.6. The starch degradation was studied on these mashes by addns. of a malt infusion. The effects of various quantities of enzyme, temp., time of mashing and pH were followed up in regard to starch liquefaction and maltose formation. The increase in total ext. was a measure for the liquefaction and an increase in fermentable ext. was the indication for maltose produced. The effect of various quantities of enzyme on maltose formation showed that amts. of enzyme ext. exceeding 2.5 ml. (of an original cold infusion of 100 g. malt in 400 ml. water) did not materially increase the maltose content. Up to a cleavage limit of 33% the law of proportion is valid. The temp. optimum for liquefaction depends on the pH. For a one-hour mashing period with 5 ml. malt infusion the pH values and temp. optimums, resp., were: 6.6, 55–60°; 6.0, 60–65°; 5.1, 55–60°; 4.5, 50–55°; 4.2, 45–50°. The temp. optimum for maltose formation at normal pH values barely depends on the time of mashing and is within 55–60°. The highest temp. is particularly favorable, but at lower temps. only a small decrease in maltose formation was found. The pH values and optimum temps. for one hr. with 5 ml. malt infusion follow: 6.6, 55–60°; 6.0, 55–60°; 5.1, 50–55°; 4.5, 45–50°; 4.2, 35–40°. The pH optimum for liquefaction depends on the temp.; however, the optimal zones are rather broad and not well defined. Values for temps. and pH optimums for one hour mashing with 5 ml. infusion are: 20–40°, 4.0–4.5; 50°, 4.9–5.3; 60°, 5.1–5.5; 65°, 5.5–5.9. It was difficult to det. correctly the pH optimum for maltose formation. The regions investigated represent a broad optimal zone with a sharp break toward the acid side. The following figures for temps. and pH optimums were obtained under the same technique as used for liquefaction: 20–40°, 4.0–4.5; 50°, 4.4–5.0; 60–70°, 5.7–6.2. A decided inhibition in maltose formation took place at a max. cleavage of 60%. The study of a max. of fermentable ext. in a "cooked mash" was made in line with Lüers' and Weininger's method used on barley starch (cf. *Z. ges. Brauw.* **1925**, 35). The addn. of yeast complement did not increase the amt. of maltose. At 40° and 48 hrs. 50 ml. malt infusion at pH 5.0 produced the max. fermentable ext. The difference between a regular and a "cooked mash" is readily shown by the velocity with which fermentable ext. is formed. An addn. of malt infusion to a "cooked mash" causes but slight protein cleavage. S. Jozsa

Acidification of brewers' spent grain. II. R. Koch and R. Weissmann. *Wochschr. Brau.* **56**, 81–5, 101–3, 109–11(1939); cf. *C. A.* **33**, 3899[2], 7039[4].—Silage of grain was studied under the following conditions: (1) with lactic acid organism and ½% of sugar as nutrient; (2) like (1) but 1% sugar; (3) with 1.46 l. of concd. HCl per 1000 kg. of grain and 1% sugar; (4) like (3) but including lactic organisms; and (5) without any addn. Little change was noticed on (1) and (2); they remained practically solid masses. A considerable gas formation took place in (3) and (4) and decompn. took place on (5). The pH was found to be 3.9, 3.7, 4.2, 3.9 and 4.5, resp. In testing the finished grain for sugar all gave neg. reaction except (5) which was faintly pos. The indole test was neg. on all samples showing the absence of *B. coli*. Total and free lactic, butyric and acetic acids were studied. A quant. and qual. study of the microörganisms present follows. The final conclusions are in line with the chem. examn. A spontaneous fermentation will produce an objectionable fodder. Acidification with HCl is unnecessary and it has a disadvantage in suppressing the lactic organisms. S. Jozsa

Oxidation in beers. III. Oxidation in the brewing process. Philip P. Gray, Irwin Stone and Harold Rothchild. *Wallerstein Labs. Commun. Sci. Practice Brewing* No. **7**, 49–60(1939); cf. *C. A.* **33**, 9537[6].—The origin of reducing substances of beer has been studied. They are present largely in a sol. condition in malt, but the amts. present are increased by extractives from the hops and as a result of reactions taking place during wort boiling. Contrary to the findings of previous investigators, significant development of reducing power for the beer itself during fermentation does not take place. The beer itself is continuously subjected to oxidation factors from the mashing stage to the end of the brewing process, including fermentation. Various factors involved at each stage of the brewing process are noted, and the role of oxidation in practical brewery work is discussed. G. W. Kirby

Neutralization and purification of the hydrolyzate of straw for use as a medium for growth of forage yeast. S. G. Mashevitskaya. *J. Applied Chem.* (U. S. S. R.) **12**, 1034–8(in French, 1038)(1939).—The hydrolyzate was passed through a layer of powd. phosphorite and the pH adjusted by means of NH_4OH. The product contained amts. of phosphate and N necessary for the growth of yeast. The pH of hydrolyzate during the fermentation stayed within 5.4–5.6 and a white yeast of normal consistency was obtained. A. A. Podgorny

Preparation of autolyzates from spent yeast. S. Konovalov. *Spirto-Vodochnaya Prom.* **15**, No. 9, 22–4(1938); *Chimie & industrie* **42**, 553.—The autolysis medium must

have the optimum pH of 6.5. If dried unwashed yeast (contg. acid wort residues) is used, it is necessary to add a certain amt. of alkali (about 0.12 g. per 100 cc.). Optimum autolysis temp. is 48–9°; the water should be heated before adding to the yeast. After autolysis the soln. is sepd. from the yeast and heated at 100° for 10–20 min. to sterilize the autolyzate. A. Papineau-Couture 1

New yeast types produced by hybridization. O. Winge and O. Laustsen. *Compt. rend. trav. lab. Carlsberg, Sér. physiol.* 22, 337–55(1939).—Fourteen hybrids have been produced as a result of micromanipulation of the spores of selected parents, giant colony appearances of parents and hybrids being shown and other characters described. Production of sp. enzymes (invertase, raffinase, or melibiase) is a dominant character. Consideration of percentage of spore germination allows decision as to whether the parents are of the same species. Biochem. differences run parallel with differences of species. Spores of top yeast may segregate bottom yeast types. Use of raffinose-fermenting power as a distinction between bottom and top yeasts is unjustified. Appearance of spores does not distinguish wild and culture yeasts. One of the new hybirds has found satisfactory tech. application. B. C. P. A. 2

Chem. and technological examn. of Lybian barley (Copertini) 12. Corrosion resistance of monel to beer (Siegfried) 9. Investigations on fermentations appearing in diffusers with reuse of waste water, and their control (Reindel, *et al.*) 28. Vitamin B and C concentrate from yeast (U. S. pat. 2,184,748) 17.

Fehr, J. H., and Norrenberg, Heinrich: Likörfabrikation auf kaltem Wege. Lehr- und Rezeptbuch d. Likörfabrikation, umfassende Nachbildungen berühmter französischer und holländischer Liköre sowie Konsumbranntweine. 5th ed. Berlin: Verlagsgesellschaft Müller. 123 pp. M. 4.20.

3 **Macher, Lorand:** Praktische Brennereibetriebskontrolle. Tl. 2. Brennereitechnisches Rechenbuch. Aus der Praxis, für die Praxis. Pressburg: Verlag Concordia. 335 pp.

17—PHARMACEUTICALS, COSMETICS AND PERFUMES

W. O. EMERY

Unit operations in drug manufacture. G. W. Bengert. *Ind. Eng. Chem.* 32, 461–4(1940).—In drug manuf., where numerous products are made, the use of equipment for multiple processing operations becomes an economic necessity. Because of the fact that most pharmaceutical manufg. operations are of the batch type, the nature of these operating problems demands small versatile operating units, easy to handle and to clean. Only certain processes, such as the prepn. of milk of magnesia, can be continuous and they can take advantage of the economy to be derived from a planned unit, designed for one purpose and for a max. efficiency. B. describes how one company has adapted unit equipment to numerous processing requirements in its drug extn., liquid prepn. and ointment product departments. The production of milk of magnesia by countercurrent decantation methods is also described. Edward A. Ackermann 5

Distribution of doses in assay of estrone. W. Heubner and J. Brockmeier. *Arch. exptl. Path. Pharmakol.* 191, 355–7(1939).—Estrone in oily soln. was injected into rats. There was no difference in effect whether the total amt. was given in the course of 2 or 3 days. B. C. P. A. 6

The vitamin B_1 potency of tiki-tiki extract, CPUP brand. Segundino G. Jao. *Acta Med. Philippina* 1, 153–69(1939).—The prepn. of tiki-tiki ext., CPUP brand (made by the College of Pharmacy, Univ. of the Philippines), as described by Santos in 1936, is given in detail. One cc. of the ext. contained 12.5 I.U. vitamin B_1 or approx. 50 Sherman units, when assayed by the rat growth method recommended by the U. S. P. XI Vitamin Committee. Ruth Berggren 7

The essence of Cymbopogon nardus of Sicily. F. Sorges. *Chim. ind. agr. biol.* 16, 21–3(1940).—The *C. nardus* Rendle (Java or Ceylon citronella) was imported into Italy from Java in 1928, and cultivated in Sicily. The essences obtained in summer, autumn and winter had, resp., d_{15} 0.889, 0.875, 0.890; n_D^{15} 1.470, 1.469, 1.471; α_D +1, +1, +1.6; soly. in 80% alc. 1:1.3, 1:1, 1:1.5; total geraniol 84.67, 70.36, 71.18%; free geraniol 30.62, 21.94, 5.80; citronellol 22.30, 20.03, 19.40; citronellal 21.60, 27.54, 52.18; citral 13.10, 24.25, 20.82; methylheptenone 0.8, 0.94, 1.20; alcs. other than those above 1.15, 0.85, 0.60; terpenes 2.25, 4.45, 6.20%. G. A. B. 8

Alkalimetry of "llipta" and its influence in the native cocaine mania. José Miguel Vallenas. *Bol. soc. quim. Peru* 5, 178–84(1939).—The llipta of Cuzco is prepd. from the dried stems of the goosefoot plant, and that of Puno is made from a similar plant, native to the Titicaca plateau, which the natives call Cañihua. The sun-dried stems of the plant without the fruit are collected in sheds and burned with free access of air. The stems are then kneaded with water and a little wine into small loaves, in accord with ancient custom, and dried. Llipta is a hard dense material powdered with gray powder which appears to be the ashes of the plant. It is easily ground in a mortar to give a black powder with a caustic astringent earthy taste, insol. in org. solvents and sol. in acids. The aq. soln. is strongly alk. Samples from Cuzco and Puno contain, resp., 38.0, 45.0% sol. in cold H_2O; 47.2, 52% sol. in hot H_2O; 89.0, 88.4% sol. in 20% HCl; 87.0, 88.7% sol. in 20% HNO_3; 44.0, 77.8% sol. in 20% H_2SO_4; 89.0, 84.6% sol. in aqua regia. Qual. analysis of the Cuzco product showed carbonate, chloride, sulfate and phosphate, Cd, Mn, Fe, Ca, Na and K. Quant. analysis showed the following percentages of the anions for the Cuzco and Puno products, resp.: 20.000, 23.000; 2.9275, 4.225; 4.4106, 3.1524; 16.608, 13.920. Further analysis showed 1.327, 0.646% NH_3; 6.259, 1.302% K; 3.881, 9.976% Na; 11.2956, 6.4605% Ca; 0.000, 10.886% Al; 0.5908, 3.886% Fe; 11.240, 15.800% H_2O; 11.000, 11.300% insol. in acid. Titration with *N* acid and phenolphthalein showed the equiv. of NaOH as follows: cold-extd. Cuzco 5.52, 12.72%; Puno 10.00, 21.20%; hot-extd. 6.4, 13.04%; 7.40, 19.80%, resp. By Winkler's method, detn. of Na_2CO_3 showed 19.875, 23.585% and 25.44, 27.95%, resp. An attempt to det. hydroxides in the presence of carbonates by the method of R. B. Warder gave neg. results. Detn. of alk. bicarbonate gave values from 13.8631–36.5435%, and of carbonate from 0.265 to 14.84%, in addn. to 25–35% $CaCO_3$. Colorimetric detn. of pH of 5% solns. of llipta from Cuzco and Puno gave 9.6 and 9.8, resp. The Indians chew 30–50 g. of coca leaves per day and add 5% of llipta, which liberates the alkaloid. Treatment of 30 g. of coca leaves with 5% llipta and extn. of the alkaloid showed isolation of 0.701% (Cuzco) and 0.827% (Puno), corresponding to 0.2103–0.2408 g., of cocaine. W. F. Bruce 9

The activity of chlorine-containing disinfectants in different nitrogenous substrates with special reference to azochloramide. R. W. Vierthaler and H. Gebauer. *Z. Hyg. Infektionskrankh.* 122, 281–9(1939).—Azochloramide retains marked oxidizing properties even after 24 hrs. of contact with large amts. of nitrogenous material. It is recommended as a good wound disinfectant. Rachel Brown

Anesthesia. The conquest of pain. Edward Podolsky. *Am. Professional Pharmacist* 6, 30–2, 98–9(1940); cf. *C. A.* 34, 1074⁸.—Spinal, basal and local anesthesia and anesthetics are discussed. H. M. Burlage

Assay of ointment of mercurous chloride. *Rept. Am. Pharm. Assoc. Lab. Bull. Natl. Formulary Comm.* 8,

157–60(1940).—The following volumetric method which is applicable for the detn. of the Hg ion only and not for the Cl ion is found to be a suitable substitute for the gravimetric method: Weigh 10 g. of the ointment into a 250-cc. wide-mouth Erlenmeyer flask, add 15 cc. of HCl and 25 cc. of Br-H_2O, heat on a steam bath for 15 min. with occasional vigorous shaking. After the aq. layer has completely sepd. from the base, chill in cold H_2O and when the base has solidified at the surface, puncture it with a stirring rod and transfer the aq. layer to a 250-cc. volumetric flask, filtering through cotton. Digest the base again with 10 cc. HCl, 10 cc. H_2O and 5 cc. Br-H_2O, cooling and sepg. as before; repeat this procedure twice more, filtering the aq. acid exts. into the 250-cc. volumetric flask. Dil. to vol. and mix thoroughly. Transfer a 50-cc. aliquot of this soln. to the 250-cc. glass-stoppered Erlenmeyer flask and boil gently to remove the Br_2. Cool, dil. to about 50 cc. and make alk. with 10% NaOH, adding 15 cc. in excess. Add 2 cc. of 40% HCHO and let stand for 30 mins. with occasional agitation. Make acid with AcOH, adding 2–3 cc. in excess, and add 40 cc. of 0.1 *N* I_2, shake vigorously to dissolve the Hg. Titrate the excess I_2 with 0.1 *N* $Na_2S_2O_3$ using starch paste as indicator. 1 cc. 0.1 *N* I_2 = 0.0118 g. HgCl. H. M. Burlage

Assay of ephedrine spray and compound ephedrine spray. Charles O. Wilson. *Bull. Natl. Formulary Comm.* 8, 166–7(1940).—Weigh accurately into a small tared beaker 5–10 g. of the sample; transfer to a small separator, rinsing the beaker several times with 5-cc. portions of Et_2O until the inhalant is completely transferred. Add 10 cc. aq. soln. of H_2SO_4 (1–50) and shake gently. Transfer the acid layer to a 2nd separator, shake the oily residue with four 10-cc. portions of the acid. Test for complete removal of the alkaloid. Neutralize the combined acid solns. with dil. NH_4OH and add 5 cc. in excess. Ext. the alk. soln. with 30 cc. of washed ether. Wash the ether ext. with 1 cc. H_2O, adding the washing to the main aq. soln. Filter the ether ext. into a 250-cc. Erlenmeyer flask through a pledget of cotton wet with ether. Test for complete removal of the alkaloid. Wash each of the ether exts. with 1 cc. H_2O. Evap. the ether to about 5 cc. on a H_2O bath so adjusted that the temp. of the ether will not rise above 30°. Remove from the bath, add 50 cc. 0.02 *N* H_2SO_4 and heat further on the bath to completely dissolve the alkaloid and evap. the remainder of the ether. Titrate the excess acid with 0.02 *N* NaOH with bromothymol blue as indicator. Each cc. 0.02 *N* H_2SO_4 = 0.0033 g. ephedrine. H. M. Burlage

Antiseptic tests. Esther Meyer and E. N. Gathercoal. *Bull. Natl. Formulary Comm.* 8, 171–80(1940).—A report dealing with exptl. work carried out in order to perfect testing methods for colloidal HgCl ointment and compd. powder of $ZnSO_4$. The tests and materials recommended are described in detail. H. M. Burlage

The assay of ichthamol. Rept. Am. Pharm. Assoc. Lab. *Bull. Natl. Formulary Comm.* 8, 193(1940).—The following method was used: Transfer 0.7–1.0 g. of the sample, accurately weighed, into a Kjehdahl flask with the aid of 30 cc. H_2O. Add 5 g. $KClO_3$, then add slowly 30 cc. of HNO_3 and evap. the mixt. to about 5 cc. Transfer the residue into a 300-cc. beaker with the aid of about 25 cc. HCl and again evap. to about 5 cc. Add 100 cc. H_2O, heat to boiling, filter and wash. If no insol. residue remains, ppt. the hot soln. with $BaCl_2$, filter, wash, ignite the resulting $BaSO_4$ and weigh. H. M. B.

The synthesis of pentadecanoic acid. Charles F. Krewson. *Pharm. Arch.* 11, 12–6(1940); cf. *C. A.* **34**, 1614⁴.—Procedures are outlined with tetradecyl bromide and tetradecyl iodide as intermediaries. The results indicate that the iodide procedure is far less time consuming and gives substantially better yields. The prepn. of tripentadecanoin is described. H. M. Burlage

The vitamin A and vitamin D contents of some Australian fish liver oils. M. M. Cunningham and E. C. Slater. *Australian J. Exptl. Biol. Med. Sci.* 17, 457–64(1939).—The vitamin A content of snapper shark (*Galeorhinus australis*) liver oil is highest in the winter, corresponding to a min. oil content of the liver. The livers of 4 species of the tuna and the skate had lower vitamin A contents than did snapper shark liver. Gummy shark (*Mustelus antarcticus*) and snapper shark liver oils gave the very low results of 1 and 2 international units per g., resp. Edward Eagle

Application of inert gases in medicine. Gerhard Siewert. *Deut. Apoth.-Ztg.* 54, 1200–1(1939).—The application of helium, neon, argon, krypton, xenon and emanation to certain phases of medical practice is described. Ten references. W. O. E.

Estimation of alkaloids in cinchona. Hans Wojahn. *Deut. Apoth.-Ztg.* 54, 1224–6(1939); cf. *C. A.* 33, 3968⁶, 8355⁴.—It is shown that in estg. alkaloids in cinchona (Swiss Pharm. V), the prescribed HCl for liberation of the alkaloids is omitted and the drug heated only with H_2O, so that a bark of 5–6 sieve fineness yields scarcely differing alkaloid values. If HCO_2H is used, however, the alkaloid content is greater. In drugs of 4 sieve fineness the alkaloid content becomes greater with HCl than if heated only with H_2O. The highest values are obtained with HCO_2H. If cinchona is heated only with H_2O, about 50% of the available alkaloids goes into soln. Even by use of HCl and HCO_2H only incomplete resolution of alkaloid-tannin compds. is possible. In estg. alkaloids in cinchona, a certain portion is liberated only by an excess of alkali. W. O. E.

Yarrow oil. W. Peyer. *Deut. Apoth.-Ztg.* 55, 1–2 (1940).—Yarrow blossoms yield a blue oil in amts. of about 0.5%. The plant itself (stem and leaves) also yields the blue oil. The color is darker than that of camomile but the oil is not preformed in the plant. Steam is required for its formation, or rather for the formation of the azulene portion. For the complete exhaustion of the drug, a distillate of at least 1200 cc. is necessary. W. O. E.

Coffee char and its possibilities. W. Peyer. *Pharm. Zentralhalle* 81, 1–5(1940).—Coffee char is efficacious on various surface wounds, notably supperative and foul-smelling wounds. Five com. coffee chars were examd. with respect to mineral content, hot-H_2O ext., alky. of ash, adsorptivity for methylene blue and acid-fixation capacity (due to adsorption and in part also neutralization). The presence of essential oils could not be verified. The mineral content of coffee char is, as expected, higher than that of the ordinarily roasted bean. Only in the case of 2 coffee chars could the odor of roasted coffee be detected. 14 references. W. O. E.

Pharmaceutical iron preparations and their estimation. G. Dultz. *Pharm. Zentralhalle* 81, 37–43, 49–54(1940). W. O. E.

Behavior of Belgian frogs in relation to Trevan's dose-mortality curve in the assay of digitalis. P. Deltour *Quart. J. Pharm. Pharmacol.* 12, 677–9(1939).—The dose-mortality curve obtained by the injection of digitalis into Belgian frogs shows complete accordance with Trevan's curve. Two references. W. O. E.

Suppository bases for use in tropical countries. A. F. Caldwell. *Quart. J. Pharm. Pharmacol.* 12, 680–8 (1939).—The addn. to cacao butter of substances sol. in fats rapidly lowers the m. p. and also lowers the transition temp. The use of hardening agents such as beeswax is not recommended, as the transition temp. is too close to the temp. at which the mixt. softens sufficiently to mold suppositories. In temperate climates hardening agents may be satisfactory, but for the extemporaneous dispensing of suppositories in the tropics they are useless. With proper manipulation and correct control of temp., with a thermometer, suppositories can be made in tropical countries with cacao butter provided they do not contain medicaments that lower the m. p. to such an extent that they remain soft at room temp. It is recommended that the monographs of the Brit. Pharmacopeia and Brit. Pharmaceutical Codex be modified, as they are of no assistance in the present form to dispensers in the warmer parts of the Brit. Empire. The statement that the base should melt at 37° means very little unless the method of taking the m. p. is given. It is recommended that a base should be just pourable at temps. not above 40°. Hydrogenated palm kernel oil having the phys. and chem.

characters shown in the previous report is suitable for use as a suppository base in warm climates. In cases where the base is too soft owing to a high temp. or where the m. p. is lowered by sol. medicaments it may be hardened by the addn. of hydrogenated soybean oil, m. 56°, or beeswax. For general use in Malaya in suppositories contg. no sol. medicament the addn. of 5% of hardened soybean oil is satisfactory, but if fat-sol. substances are present the amt. of hardening agent must be increased. There is little change in a metastable state when the palm kernel oil is heated to temps. well above the softening point and the lowering of the m. p. due to this change is too small to be of any practical significance. The cost of hardened palm kernel oil compares favorably with that of cacao butter. W. O. E.

Hydrogenated fats in the preparation of ointment bases for tropical countries. A. F. Caldwell. *Quart. J. Pharm. Pharmacol.* **12**, 689–98(1939).—Hydrogenated palm-kernel oil, m. 40–2°, is a suitable fat to replace lard and suet in ointments in tropical countries. By varying the degree of hydrogenation the m. p. of the hydrogenated fat can be altered. It shows little tendency to become rancid. A mixt. of hydrogenated palm-kernel oil with 12.5% of soft paraffin forms a suitable ointment base for use in Malaya, where absorption or penetration of the ointment is required. Six references. W. O. E.

Stability of staphylococcus α-antitoxin at different temperatures. M. Llewellyn Smith. *Quart. J. Pharm. Pharmacol.* **12**, 699–700(1939).—The loss of potency of staphylococcus α-antitoxin, when stored in sealed ampoules, is independent of the original potency of the antitoxin, of the protein content, of the processes involved during prepn. and of the presence of phenolic preservative. Stored at 35° the antitoxin loses potency at a rate of about 30% per annum during the 1st 18 months. Stored at room temps. not exceeding 20°, the rate of loss of potency is not greater than 10% per annum, while at 4° the antitoxin is very stable, since after storage at this temp. for 3.5 yrs., the loss of potency was only 5%. W. O. E.

Stability of solutions of standard diphtheria antitoxin at different temperatures. M. Llewellyn Smith. *Quart. J. Pharm. Pharmacol.* **12**, 707–12(1939).—Solns. of standard diphtheria antitoxin in 66% glycerol-saline were found to lose less than 10% of their potency during storage at −4° for 6 yrs.; at room temp. a loss of about 23% occurred after storage for 4 yrs.; and at 35° the potency declined to ½ after storage for 9 months. W. O. E.

Dosage-response relation in the cross-over rabbit test for insulin. II. E. C. Fieller, J. O. Irwin, H. P. Marks and E. A. G. Shrimpton. *Quart. J. Pharm. Pharmacol.* **12**, 724–42(1939); cf. *C. A.* **33**, 8357⁷.—In a previous paper the cross-over rabbit tests for insulin were discussed when conducted over a period of 10 yrs. The present paper deals with similar tests, the object being to investigate the behavior of the log (dose)-response relation underlying the cross-over test, and hence the degree of accuracy of the test, when the criterion used for interpreting the test is taken as (1) the difference between the av. percentage reductions in blood sugar on test and on standard (standard test); (2) the ratio of these av. reductions (test/standard). On part of the data the effect has been studied of taking as the criterion the difference between av. reductions (standard-test) corrected for the difference between av. initial blood-sugar levels. Seven references. W. O. E.

Cough remedies familiar to the ancients. H. Schwab. *Süddeut. Apoth.-Ztg.* **79**, 237–8(1939). W. O. E.

Plant narcotics and intoxicants. R. Lillig. *Süddeut. Apoth.-Ztg.* **79**, 875–6, 883–4, 891–2(1939). W. O. E.

More recent works on domestic drug plants. Heinz Harms. *Süddeut. Apoth. Ztg.* **80**, 2–6, 9–10(1940); cf. *C. A.* **34**, 1441⁹.—An address. 43 references. W. O. E.

Vitamin A contents of liver oils of Brazilian desmobranchs (sharks and rays). Genneville Hermsdorff and Oswaldo de Lazzarini Peckolt. *Bol. ministério agr. (Brazil)* **28**, No. 7–9, 83–104(1939).—Vitamin A was detd. in the oils by the $SbCl_3$ method. Liver oil of *Sphyrna zygaena* (hammerhead shark) contained 36–40, that of *Carcharias limbatus* 10–25, that of *Carcharias lamia* 10, that of *Odontaspis americanus* 2–10 and that of *Isurus oxyrhynchus* about 5 times as much vitamin A as standard cod-liver oil. Liver oils of *Rhinoptera jussieui* and *Manta ehrenbergii* contained about the same amt. as cod-liver oil and that of *Galeocerdo maculatus* contained less. L. E. Gilson

Passage of procaine salts through a cellophane membrane. Influence of addition of sodium chloride, variations in pH and temperature and thickness of the membrane on the passage of procaine hydrochloride. Jean Régnier, André Quevauviller and André Fieyre. *Compt. rend. soc. biol.* **132**, 399–402(1939); cf. *C. A.* **34**, 1442⁷.—Rate of diffusion through the membrane was decreased by addn. of NaCl, increased by increase in temp., little affected by change in pH, and it varied inversely with the thickness of the membrane. **Influence of the acid combined with the procaine base.** *Ibid.* 402–4.—The rate of diffusion of procaine salts through a cellophane membrane decreased in the order, hydrochloride, salicylate, phenylpropionate, phenylacetate, isobutyrate, benzoate, tartrate, glyconate and citrate. **Passage of hydrochlorides of various local anesthetic bases through an inert cellophane membrane.** *Ibid.* 457–9.—The HCl salts diffused through the membrane in the following decreasing order, percaine, cocaine, stovaine and procaine. L. E. G.

Bark and leaves of Cecropia adenopus Mart. (family Moraceae). Luis Floriani. *Rev. centro estud. farm. bioquím.* **29**, 132–6(1939).—The fresh bark of this South American tree yields about 0.015% of the alkaloid cecropine. The leaves contain a heteroside, hambain, which yields glucose and (h)ambaic acid upon hydrolysis. The leaves also contain hambainine (or ambainine), $C_{12}H_{16}N_2O$, which is neither a heteroside nor an alkaloid, though basic, and which has no hemolytic action. The roots contain the alkaloids cecropine and cecropidine. An infusion of the leaves is used as an expectorant, antiasthmatic and cardiotonic. It reinforces the action of digitalis. L. E. G.

Bleach ointments. D. D. Moir. *Analyst* **65**, 154–8(1940).—Bleach ointment is a mixt. of equal parts bleaching powder and white petroleum jelly. It is used for first-aid treatment of mustard gas casualties. The available Cl of the powder used should not be less than 30%. *To det. available Cl*, take 1 g. of ointment in a glass-stoppered flask of about 200 ml. capacity. Add 20 ml. of CCl_4, rotate gently and heat if necessary to dissolve all the jelly. Add 100 ml. of water and shake. Now add 2 g. KI and 5 ml. of 33% AcOH by vol. Shake and titrate the liberated I_2 with 0.1 *N* $Na_2S_2O_3$. The analytical results obtained in examg. some 40 com. samples are tabulated. Of these 21 were passed as satisfactory and the av. available Cl was 14.8%. After about 3 months the av. was reduced to 13.3%. Some of the poorer samples contained only about 2% available Cl. It is felt that the purchaser of ointment should get about 14% available Cl. W. T. H.

Simple and rapid procedure for the analyses of essences, concrete and absolute, by codistillation with ethylene glycol in a partial vacuum. Sébastien Sabetay. *Ann. chim. anal. chim. appl.* **21**, 173–6(1939).—When an ethereal soln. of a perfume is distd. under reduced pressure, the residue contg. the essential oil and some of the plant waxes is called a *concrete*. If this is dissolved in alc. and the plant waxes are removed, the residue after evapn. of the alc. is called an *absolute*. Thus, one can purchase on the market both concrete flower oils and absolute flower oils, the latter being more expensive. These are usually evaluated by detg. various consts. of the oil. If a mixt. of concrete or absolute essence is mixed with glycol and distd. under 8–15 mm. pressure at 95–100°, all of the essential oil can be driven over, sepd. and measured. Take 1–10 g. of the perfume and 20 ml. of glycol and distil at 90–100°. As a rule, the residue in the flask will have little odor, but, if necessary, 20 ml. more of glycol can be added and the distn. repeated a second and possibly a third time. To the first distillate add 100 ml. of water and to the second 50 ml. of water. Sat. each with about 30 g. of salt and shake 3

times with 20-ml. portions of a mixt. of equal parts pentane and ether. Sat. with anhyd. Na_2SO_4, filter and wash with the ether+pentane. Filter and distil off the solvent under 15–20 mm. pressure, weigh and det. the physicochem. consts. of the residue. The results obtained in the study of some 14 perfumes are tabulated. W. T. H.

Detection of streptocide. S. E. Burkat. *Farm. Zhur.* 1938, No. 3, 26–9; *Khim. Referat. Zhur.* 2, No. 5, 105 (1939).—Streptocide is *p*-(2,4-diaminophenyl)azobenzenesulfonamide hydrochloride. Its most characteristic reactions are: (1) An examn. of the streptocide sublimate under a microscope shows fern-like aggregates, which sometimes have a shape of jagged crosses. With a drop of a 36% HCl soln. they form colorless rectangular crystals. (2) One cc. of the aq. soln. of streptocide is decolored by heating it with Zn dust and 1–2 cc. of 2 *N* H_2SO_4. The decolored soln. produces a red color when heated with 2–3 drops of a 3% H_2O_2 soln., a cherry-red color with 3–4 drops of $(NH_4)_2S_2O_3$ and a violet-red color with 2–3 drops of a Br soln. in KBr. (3) Aq. streptocide soln. produces characteristic needles (visible under the microscope) when heated for 1–2 min. with 4–5 drops of Ac_2O. The sensitivity is 15 γ. (4) After having boiled 0.01 g. of streptocide with 1 cc. of a 36% HCl soln. the examn. of a drop of the hot filtered soln. under a microscope shows orange prismatic crystals. W. R. Henn

The polarographic method in pharmaceutical chemistry. F. Reimers. *Dansk Tids. Farm.* 14, 1–27(1940).—A discussion of the application of the method of Heyrovsky (cf. *C. A.* 29, 4896[9]) and co-workers to biochem. solns. Otto Johnson

Sucrose solutions for injection. Knud K. Jesperson. *Dansk Tids. Farm.* 14, 27–32(1940)(English summary).—A 50% sucrose soln. was prepd. by substituting 100 ml. of McIlvaine's phosphate-citrate buffer of pH 7.8 for 100 ml. of water in each l. The resulting soln. had a pH of 7.4 and withstood hydrolysis on heating to 100° for 1 hr. and on storage for 2 to 3 months. Otto Johnson

The chemical assay of ergot. Svend Aage Schou and Mogens Tønnesen. *Dansk Tids. Farm.* 14, 33–44(1940)(English summary); cf. *C. A.* 33, 1444[2].—A report of a comparison between the methods of Hampshire and Page (cf. *C. A.* 30, 5364[8]) and Daglish and Wokes (cf. *C. A.* 34, 851[9]). Slightly higher results are reported for the second method. **The alkaloid content in fluidextract of ergot and in soft extract of ergot.** *Ibid.* 44–7(English summary).—Fluidextract prepd. according to Danish Pharm. 1907 contained 90% of the ergometrine of the original drug and 52% of the ergotoxine. The ext. prepd. according to Danish Pharm. 1933 contained 90% of the ergometrine and 85% of the ergotoxine. Otto Johnson

Method for determining the effect of chemical antiseptis on phagocytosis. Henry Welch and Albert C. Hunter. *Am. J. Pub. Health* 30, 129–37(1940).—The method is based on the complete inhibition by antiseptics of the phagocytes of artificially opsonized staphylococci. The toxicity and germicidal power of 10 germicides are reported. The "toxicity indices" agree closely with those computed by Salle, *et al.* (cf. *C. A.* 32, 6395[8]). Seven references. J. A. Kennedy

The latex of Ficus pumila L. I. History, proximate composition and anthelmintic properties. Conrado F. Asenjo. *Puerto Rico J. Pub. Health Trop. Med.* 15, 141–7 (1939).—The latex of *Ficus pumila* L. possesses proteolytic activity. The latex has been resolved into 6 proximate constituents besides water. Of these, there are 2 cryst. substances with sharp m. p. (184–185°; 68–69°, waxy). There are also a yellow-green dialyzable substance, a crude protein fraction, an inert powder, and a sticky transparent substance sol. in petr. ether and benzene. The proteolytic activity is present in the protein fraction and is totally destroyed at 85–90° for 5 min. The crude latex and also the protein fraction obtained from it digest certain species of parasites. The active principle of the protein fraction does not hemolyze rabbit blood. A review of all the pharmacol. and pharmacochem. literature on the latexes of *Ficus*. 50 references. J. A. Kennedy

Anomalous reaction of aristochin. M. Wagenaar. *Pharm. Weekblad* 76, 1544–5(1939).—When quinine salts are prepd. by dissolving the carbonate, aristochin, in dil. mineral acids, they exhibit anomalous behavior. Thus the bisulfate fluorescence is greenish blue instead of blue. Crystn. of the iodo-sulfate or -selenate of quinine from aristochin is more difficult than from the pure salts. It is facilitated by use of acetone. Since the resulting crystals are identical the impurity is probably a deriv. or conjugate substances. The speed of reaction and the yield are a function of the purity of the quinine salt, e. g., as obtained by repeated recrystn. from aristochin. The iodosulfate can be crystd. by slow heating of aristochin in dil. NaOH. The residue is dissolved in dil. H_2SO_4 and KI-I_2 soln. is added. The brown ppt. is dissolved and the crystals are obtained from acetone. The nature of the impurity was not detd. S. R. Korman

Nicotine content in commercial cigarets. Carlos A. Grau, D. M. G. de Máspero and B. M. Agüero de García. *Semana méd.* (Buenos Aires) 1940, I, 410–12.—The nicotine content varied between 0.31 and 1.82%. It bore no relation to price, color or "strength" of the tobacco. A. E. Meyer

Acetylcholine and nervous inhibition in the heart of Venus mercenaria. C. Ladd Prosser. *Biol. Bull.* 78, 92–102(1940).—The isolated heart of the clam *Venus mercenaria* can be used as test material for drug assay. By use of a perfusion chamber, and keeping the tension and rate of flow of the perfusion fluid (van't Hoff's soln.) const. and keeping the temp. at 15–20°, a prepn. is obtained which is stable for at least 24 hrs. The clam heart was found to be sensitive to acetylcholine in dilns. of 10^{-12} during spring and 10^{-9} during fall. This drug seems to leave the contracting mechanism intact and to act on the pacemaker and conducting mechanisms of the heart. Stimulation of the visceral ganglion causes inhibition in diastole resembling the effect of acetylcholine. Atropine is very toxic to the heart. In nontoxic concns. it antagonizes neither the effect of acetylcholine nor of nerve inhibition. Fluid from a heart inhibited by visceral ganglion stimulation often depresses the beat of an eserinized test heart. Eserine prolongs the inhibition due to acetylcholine and that due to nerve stimulation. It appears likely that acetylcholine is liberated as the normal cardiac inhibitory agent in *Venus*. Dorothy A. Meyer

The alkaloid content of ergot. I. Quantitative determination of ergot alkaloids in separate sclerotia. Miklos v. Békésy. *Biochem. Z.* 302, 187–97(1939).—Details are given of the procedure for the colorimetric detn. of the alkaloid content of single sclerotia. In numerous analyses it was found that many sclerotia were entirely devoid of alkaloid while others were very rich in alkaloid content, which in some instances exceeded 1%. S. Morgulis

Preparation of colloidal gold solution. Rosalind Klaas. *Am. J. Clin. Path., Tech. Suppl.* 4, 42–4(1940).—Make a preliminary titration as follows: To 50 cc. of water add 0.5 cc. of 1% Na oxalate and 0.5 cc. of 1% gold chloride. To each of 8 Pyrex tubes add 5 cc. of this. To the first tube add 0.05 cc. of 0.02 *N* NaOH, to the second 0.1 cc., to the third 0.15 cc., etc. Place the tubes in a beaker of water and bring to boiling in 2 min., then boil 1 min. Usually only 1 tube will show the characteristic orange-red color. To 500 cc. of water in a l. Erlenmeyer flask add 5.0 cc. of the oxalate soln. and 5.0 cc. of the gold sol. with shaking, then add the amt. of NaOH as detd. by the preliminary titration. Neutralize with HCl using alizarin as an indicator as detd. by titrating a 5.0-cc. portion. Test the sensitivity by placing 5-cc. portions of the Au sol in a series of 6 test tubes, and adding to tube 1 0.1 cc. of a 1:400 soln. of edestin in 10% NaCl, to the remaining tubes add, resp., 0.2, 0.3, 0.4, 0.5 and 0.6 cc. of edestin. The reading after 18 hrs. should be 0, 1–2, 3, 4–5, 5, 5. J. T. M.

A study of the antibacterial activity of some fluorinated aromatic mercurials. Melvin F. W. Dunker and Thomas C. Grubb. *J. Bact.* 39, 243–54(1940); cf. *C. A.* 34, 399[4].—The antibacterial activity of the following compds. was studied: 4-fluorophenylmercuric chloride (I), 3-fluorophenylmercuric chloride (II), 2-fluorophenylmer-

curic chloride (III), 4-fluoro-2-acetoxymercuriphenol (IV), and 4-fluoro-3-chloromercuribenzoic acid (V). Against *Staphylococcus aureus*, III was most effective in aq. soln. and II in serum dilns. Against *E. typhosa* I was most effective in aq. soln. and V in serum dilns. When all factors were considered V was the most active compd. of the group. In serum dilns., the presence of F in the ring gave definitely more antibacterial activity than Cl in a similar position. This was not true for tests in aq. solns. 20 references. John T. Myers

Determination of the ester value of pharmaceutical waxes. B. Bobranski and A. Kowalewska. *Acta Polon. Pharm.* 2, 279–82(1938); *Chimie & industrie* 42, 672.—Comparison of Koettstorfer's standard method for the sapon. of the esters of waxes was made with Berg's modified method, which gives higher results owing to more complete sapon. Berg's modifications consist in: (1) use of a more active solvent (mixt. of abs. alc. and xylene instead of 95% alc.) and (2) heating over a wire gauze instead of in a water bath. A. Papineau-Couture

Chemical study of the flowers of Verbascum thapsiforma. S. Biniecki. *Acta Polon. Pharm.* 2, 287–98 (1938); *Chimie & industrie* 42, 672.—Analysis of the flowers of *Verbascum thapsiforma:* H_2O 11.18, ash 4.35, reducing sugars (as glucose) before inversion 20.45 (after inversion 1.45), pentosans 10.54, pectic matter (as galacturonic acid) 12.38, crude fiber 15.94, lignin 8.75, dextrins 1.19, tannins 3.84, waxes and volatile oils 4.02, N (as albumin) 6.41%. The ash contained: P_2O_5 0.63, K_2O 1.68, CaO 0.37, MgO 0.24, Fe trace, Mn trace, SiO_2 0.68, SO_3 0.23, Cl 0.07%. A. Papineau-Couture

Observations relative to the formation of stains on cigarettes. K. Tomur. *Inhys. Tutün Inst. Rap.* 2, 59–63(1938); *Chimie & industrie* 42, 561.—The production of stains on cigarettes is due chiefly to the hygroscopic properties of the veins of tobacco leaves, as compared to the parenchyma. To this defect of the veins must be added the lignin content which affects the taste of the cigarette. Other stains (greasy) can be due to caterpillars which are crushed between the tobacco leaves; to avoid them, these parasites must be vigorously combatted in the warehouses where the tobacco is stored.
A. Papineau-Couture

Hashish. Remziye Hisar and Sazile Edesen. *Kimya Annali* 3, 167–83(in Turkish)(in French, 183–93)(1938); *Chimie & industrie* 42, 561.—A study of the adsorption of the resin of *Cannabis* (in petroleum ether soln.) by animal charcoal, as a function of resin concn., of amt. of charcoal and of time of contact. The quantity of resin adsorbed is proportional to the quantity of charcoal and to the time of contact, but inversely proportional to the concn. of the soln. The higher the dilu., the greater the adsorption; it is complete for 100 cc. of soln. contg. 0.5 g. of resin, left in contact with 1 g. of charcoal for 2 hrs. A. P.-C.

Effect of heating on the physicochemical properties of tobacco. K. P. Dobrokhov, N. N. Batenina, V. A. Kossiak and M. A. Petrova. *Tabak* 9, No. 13, 8–9(1939); *Chimie & industrie* 42, 897.—Heating does not affect the nicotine content of high-grade tobaccos; with low-grade tobaccos, the nicotine decreases with temps. of 75° or over. With temps. above 75° the quality of high-grade tobaccos is impaired and that of low-grade tobaccos is improved.
A. Papineau-Couture

Relations between chemical form and activity of vitamin A in concentrates from fish-liver oils. Assay of vitamin A preparations. W. Grab. *Arch. exptl. Path. Pharmakol.* 193, 170–210(1940).—The conversion factor 1600 for calcg. the International Units (I. U.)/g. of vitamin A on the basis of the extinction coeff. is considered inaccurate because the biol. activity of vitamin A prepns. does not always correspond with this result. The difference is attributed to the chem. form of the vitamin, i. e., ester (I) or unsapond. (native), and alc. (axerophthol, II) or sapond. form. The I form is more active than II and more stable in oil solns. Thus the spectrophotometrically detd. *E* value and the blue value of I change little, if at all, under the influence of atm. O and light, while those of II drop to 1/3 the original figures. The conversion factor of 3400 ≐ 600 instead of 1600 is recommended for the I form and 1800 ≐ 400 for the II form of vitamin *A*. Vogan, an example of I, shows 120,000 ≐ 20,000 I. U./g. 63 references. J. Pinchack

New conceptions of the pharmacology and therapeutic use of iron. Fr. Eichholtz. *Med. Klin.* 35, 1279–82 (1939).—E. classifies Fe salts into ferrous and ferric salts not on an ionic but on a pharmacol. basis. He groups under ferrous salts ferrum reductum DAB, ferrous bicarbonate, $FeSO_4$, $FeCl_2$, ferrous ammonium sulfate, ferrum carbonicum cum Saccharo DAB, ferrous salts stabilized by sugar (ferrostabil), ascorbic acid (ferro 66) or ascorbic acid + cysteine (ceferro), ferrum lacticum DAB, ferrum citricum oxydatum and Na ferrocitrate. Under ferric salts he lists liquor ferri sesquichlorati DAB, $FeCl_3$, ferrum lacticum oxydatum, Fe_2O_3, $Fe(OH)_3$, ferrum oxydatum saccharatum DAB, liquor ferri albuminati DAB and Baudisch's active Fe_2O_3. Complex Fe compds. include hemoglobin, prepns. contg. hemoglobin or hemin, and compds. without Fe action (K ferro- and ferricyanide, dipyridyl Fe). J. Pinchack

New digitalis glucosides [review with bibliography]. A. H. Hrenoff. *Med. Record* 151, 175–5(1940).
J. Pinchack

Scientific advances in 1939 in disinfectants and antiseptics. Emil Klarmann. *Soap* (*Sanit. Products Sect.*) 16, No. 3, 109, 111, 113, 115, 117, 119, 121(1940); cf. *C. A.* 33, 4378⁴.—A review discussing methods, phenolic disinfectants, quaternary NH_4 compds., org. Hg compds., halogens, alcs., dyes, org. acids, arylsulfonamides, and radiation. Eighty references. Henry H. Richardson

The alkaloids of papaveraceous plants. XXIII. Glaucium flavum Crantz. Richard H. F. Manske. *Can. J. Research* 17, B, 399–403(1939).—Only two alkaloids have been found in *Gl. flavum* (cf. Fischer, *Arch. Pharm.*, 239, 427–37(1901); Gadamer, *C. A.* 6, 2140).—It therefore appeared to be of interest to search diligently for other alkaloids, since if only 2 alkaloids are elaborated by *Gl. flavum* it might be that several other species of *Glaucium* would elaborate only the same 2, and an attempt to elucidate, by means of the chem. constituents present, moot points in botanical classification of some of the poorly defined species would fail. Actually, in addn. to the 2 known ones, 4 other alkaloids were found in the mixt. of alkaloids obtained from 28.8 kg. material comprising young and mature plants and roots. The HCl salts of the alkaloids extd. from aq. soln. with $CHCl_3$ contained the nonphenolic bases glaucine (I) (0.67%), luteanine (0.018%), m. 183°, $[\alpha]_D^{25}$ 205° (*c* 0.4, MeOH) and alkaloid F 47 (less than 4 p. p. m.), m. 280°, an apparently *new* alkaloid that dissolved in H_2SO_4 to yield a yellow soln. that darkened on heating and then turned purple. Isocorydine (about 4 p. p. m.), m. 184°, was isolated from the phenolic base fraction, extd. as HCl salt from aq. soln. by $CHCl_3$, but no corydine could be found. In the fraction not extd. as HCl salts from aq. soln. by $CHCl_3$, protopine (II) (0.046%), m. 210°, was the only nonphenolic base, and aurotensine (38 p. p. m.), m. 126–7°, was the only phenolic base pptd. by CO_2. Only I and II were found in *Gl. flavum* by earlier investigators. W. Gordon Rose

Mineral peat in the Altvatergebirge (N. Moravia). J. Holluta, W. Herrmann and F. Neukomm. *Verh. Naturforsch. Ver. Brünn* 69, 1–13(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 840–1.—Detailed analyses and phys. properties of the peat used for the Karlsbrunn baths are given, with similar details of 4 similar peats. C. A. S.

Soap perfuming in relation to odor-carrying alc. group (Ruemele) 27. Control of alimentary and medicinal vitamins in Poland (Truszkowski) 11E. Phenolic compds. from petroleum sources [germicides] (Field, *et al.*) 22. Decompn. and stabilization of H_2O_2 and metal peroxide solns. [for mouthwashes] (Henk) 18. Leaf pigments of tobacco (Nagel) 11D. Prepn. of higher alcs. [for creams] (Webster and Schaefer) 10.

Aschenbrenner, Helmuth, and Stahl, Günther: Hand-

buch des Handels mit Tabakwaren. Berlin: R. Gahl. 224 pp.

Fischer, Wilhelm J.: Heilpflanze der Heimat in Wort und Bild. 2nd ed. Leipzig: Quelle & Meyer. 119 pp. M. 5.80.

Mosig, A.: Die Lehrapotheke. Bd. III. Pharmakognosie. Tl. 1. Dresden: T. Steinkopff. 64 pp. M. 3. Cf. *C. A.* **33**, 7492[4].

Odierna, Giuseppe: Alcaloidi dell'aconito. Rome: A. Signorelli. 156 pp. L. 15.

Spitzen, H. J., Jr.: De Bereiding der Galenische Preparaten van de Nederlandsche Pharmacopee. 5th ed., 6th revised printing. Amsterdam: D. B. Centen's Uitgevers-Maatschappij. 55 pp. Fl. 1.25.

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Clear aqueous therapeutic solutions of lipins. Hermann E. Schultze (to Winthrop Chemical Co.). U. S. 2,185,969, Jan. 2. Various details and examples are given of the prepn. of clear solns. suitable for injection, as by a process involving heating 1 part of cholesterol and 3 parts of cholesterol oleate in a physiol. NaCl soln. contg. 6 parts of polyethylene glycol oleyl ether and a small quantity of $CHCl_3$ and subsequently eliminating substantially all the $CHCl_3$, or by a process which comprises heating to about 60° in a closed vessel 1 part of vitamin D, 1 part of triolein, 6 parts of polyethylene glycol oleyl ether, 0.4 part of methylene chloride and 90 parts of physiol. NaCl soln. and subsequently eliminating substantially all the methylene chloride.

Furfuryltrimethylammonium iodide and similar therapeutic compounds. Fred P. Nabenhauer (to Smith, Kline & French Laboratories). U. S. 2,185,220, Jan. 2. Various examples and details are given of the production of *medicinal agents* capable of producing effects simulating those of stimulation of neuromuscular mechanisms under control of the parasympathetic nervous system, and producing physiol. effects qualitatively cholinergic or muscarinic in character and physiol. effects resulting therefrom, the agent comprising as the essential and therapeutically active ingredient thereof a compd. from the group consisting of alkyldimethylammonium salts having the following formula: $RCH_2NMe_2R'X$ in which R is furfuryl or tetrahydrofurfuryl, R' is an alkyl group having 1–5 C atoms, and X is a radical of an acid producing nontoxic ions. Tetrahydrofurfuryltrimethylammonium iodide m. 122–4°.

Medicine for application to mucosal membranes such as those of nose or eye. Gordon A. Alles. U. S. 2,185,824, Jan. 2. A medicinal agent for administration by application to mucosal membranes to stimulate peripheral neuromuscular mechanisms under control of the sympathetic nervous system comprises 1-(*p*-hydroxyphenyl)-2-aminopropane acid tartrate suitably extended by assocn. with an excipient adapting it for application to mucosal membranes, such as water. Cf. *C. A.* **34**, 2139[3].

Globin insulinate, etc. Laszlo Reiner (to Burroughs Wellcome & Co. (U. S. A.) Inc.). Brit. 508,983, July 10, 1939. See U. S. 2,161,198 (*C. A.* **33**, 7495[6]).

***N*-Furfurylmorpholine methiodide, etc.** Fred P. Nabenhauer (to Smith, Kline & French Laboratories). U. S. 2,185,219, Jan. 2. Various details are given of the prepn. of intermediates and final products stimulative to the parasympathetic nervous system, such as *N*-furfuryl morpholine methiodide and other alkyl halides in which the alkyl group is Et, Pr, iso-Pr, Bu and Am groups.

Arsonic acids. Walter Herrmann, Hans Hilmer and Friedrich Hampe (to Winthrop Chemical Co., Inc.). Can. 386,379, Jan. 16, 1940. Arsonic acids having therapeutic properties are prepd. by causing a carbethoxyaminobenzenearsonic acid to react with a hydroalkylamine or melting an asymmetrical aryl- or aminoarylhydroxyalkylurea with arsenic acid or by diazotizing it and treating the diazo compd. with arsenious acid. Several examples are described.

Refining and improving the odor and taste of ethereal oils by fermentation. Willy Ekhard. U. S. 2,184,637, Dec. 26. A process for improving crude terpenes, camphor and peppermint oil or mixts. contg. such crude ethereal oils, involves the steps of emulsifying the substances to be improved with a fermenting culture medium for yeast and bacterial acid formers, subjecting the substances to a biol. fermentation by yeast or bacterial acid formers, and sepg. the substances thus improved from the culture medium after the fermentation. A catalyst such as Sn or Zn and an oxidizing agent such as ozonized air may be used to facilitate the process, as may also ultraviolet rays. A pH of 4 to 7 is suitable.

Isolation of sterols. Russell E. Marker (to Parke, Davis & Co.). Brit. 509,062, July 11, 1939. Pregnanolone compds. are prepd. by (1) treating the carbinol fraction of, e. g., human pregnancy urine, from which phenols and phenolic estrogenic hormones have been removed, with a dibasic org. acid acylating agent to convert the alcs. therein into the corresponding acid monoesters, (2) causing the monoesters to react with a basic or alk. agent to convert them into their H_2O-sol. ester salts, (3) sepg. the salts in aq. soln. from H_2O-insol. impurities by washing out the aq. soln. with H_2O-immiscible org. solvent, (4) converting the sepd. and purified ester salts into their acid monoesters by treatment with acid, (5) sapong. the monoesters to produce a mixt. contg. epiallopregnan-3-ol-20-one (I) and *epipregnan-3-ol-20-one* (II), (6) treating the purified mixt. from (5) with a ketone reagent capable of reacting with the 2 pregnanolones (preferably with a hydrazine (III) compd. capable of forming a H_2O-sol. III deriv. with I) but not with nonketonic alcs., (7) sepg. the mixt. of ketone derivs. of (6) from nonketonic derivs., (8) crystg. out the less-sol. I deriv. from an org. solvent in which the 2 ketone derivs. have different solubilities and sepg. the crystals from the mother liquor, (9) crystg. out the more-sol. II deriv. from the mother liquor of (8), (10) separately regenerating purified I and II from the cryst. products of (8) and (9) and removing the regenerated pregnanolone in each case from the decompn. products of this step. A *new* 3-epipregnanediol is obtained by reduction of the new II; it differs from natural pregnanediol in pregnancy urine by having a different configuration of the OH group at C_{20}. The new II may be oxidized to the corresponding known pregnanedione. The I may be oxidized to the corresponding allopregnanedione compd.

Vitamin B and G concentrate from yeast. Robert F. Light and Charles N. Frey (to Standard Brands Inc.). U. S. 2,184,748, Dec. 26. A process for the prepn. of a vitamin B and G concentrate from yeast comprises plasmolyzing yeast, adjusting the pH of the mass to 5.0 to 6.5, coagulating protein material by adding MeOH, EtOH or EtOAc to a concn. of 50–60% of the mass whereby filterability thereof is increased, filtering and concg. the filtrate so obtained at a temp. not exceeding 75–80°.

Preparation of vitamin B_1. Taizo Matukawa and Masaki Ota (to K. K. Takeda Tyobei Syoten). U. S. 2,184,720, Dec. 26. 2-Methyl-4-amino-5-formaminomethylpyrimidine is treated with γ,γ-diaceto-γ-mercaptopropyl alc. and glacial HOAc contg. HCl (suitably by heating at 100–110° for 2 hrs.) Details of making the initial reacting materials are given, and a cryst. product, m. 245°, is obtained.

***l*-Ascorbic acid.** Richard Pasternack and Gordon O. Cragwall (to Charles Pfizer & Co.). U. S. 2,185,383, Jan. 2. 2-Keto-*l*-gulonic acid and its readily hydrolyzable derivs. such as diacetone-2-keto-*l*-gulonic acid are converted to *l*-ascorbic acid by the combined action of a solvent capable of reacting with the hydroxyl groups of the 2-keto-*l*-gulonic acid, such as glacial HOAc, and a sufficient amt. of concd. HCl or H_2SO_4 to make a soln. of at least twice normal strength. Various details and modifications of procedure are described.

Separation of dihydroequilin and estradiol from mixtures containing them. Schering A.-G. (formerly Kokswerke und Chemische Fabriken A.-G.). Brit. 509,075, July 11, 1939. The mixts. are caused to react with

saponins, e. g., digitonin, and the product or products that have not entered into reaction and the saponin compds. of the products that have entered into reaction are sepd., whereupon, by splitting of the saponin compds., the product(s) contained in the latter are sepd. To sep. estrone and equilin, the mixt. is initially converted by known methods, e. g., with Na and alc., into the corresponding diols; the estradiol only, in fact, the *trans*-estradiol, is pptd. by the reaction with the saponin; the mother liquor contains chiefly the dihydroequilin together with a little *cis*-estradiol, which can be easily removed by crystn.

Hormone preparations of high purity. Erwin Schwenk, Friedrich Hildebrandt and Max Gehrke (to Schering Corp.). U. S. 2,184,775, Dec. 26. Various details of procedure are described, including a method for sepg. germinal hormones from crude oily exts. obtained from the urine of pregnant women contg., among other compds., the follicle hormones $C_{18}H_{22}O_2$, follicle hormone hydrate $C_{18}H_{24}O_3$, the male sex hormones, pregnanediol and allopregnanediol, comprising treating the crude oil with phthalic acid anhydride, distributing the reaction product between ether and an alkali carbonate soln. so as to sep. the same into a salt-forming fraction dissolved in the alkali carbonate soln., and a nonsalt-forming fraction dissolved in the ether saponifying both fractions, extg. the water-dild. saponification liquid of the nonsalt-forming fraction after satn. with CO_2 with ether, treating the ethereal extract with concd. alkali hydroxide soln. and isolating from the alk. soln. obtained a cryst. follicle hormone prepn. contg. the follicle hormone $C_{18}H_{22}O_2$, while the water-dild. saponification soln. of the salt-forming fraction, after satn. with CO_2, is extd. with ether, whereupon the ethereal extract is treated with concd. alkali hydroxide soln., whereby from the alk. soln. obtained the follicle hormone hydrate in a high state of purity is obtained while the remaining ethereal soln. is subjected to fractional crystn., first yielding pregnanediol and allopregnanediol and on complete evapn. to dryness of the ether the male sex hormone in a state of high purity.

Skin-protecting composition. M. I. Khesin. Russ. 56,097, Nov. 30, 1939. The skin is protected from the effects of petroleum products, coal tar, etc., by the use of a mixt. contg. gelatin, glycerol, starch and Al acetate.

Analgesic and vaso-constrictive dusting powder. Reinhard Beutner (to Parke, Davis & Co.). U. S. 2,185,178, Jan. 2. A partially condensed fusible phenol-formaldehyde resin substantially free from the irritating action of free phenol and CH_2O and from which uncombined phenol and CH_2O have been expelled is used in finely powd. form (the resin being one capable of being heated without being converted into the final, infusible state).

Saponaceous shaving composition. Hugo Kröper and Erich Thomae (to Chemische Fabrik Promonta G. m. b. H.). U. S. 2,185,255, Jan. 2. Use is made (suitably with various admixts.) of a hemostatic lipoid-sol. substance derived from soybeans by treating them with petroleum ether, ether, benzine or benzene, adding EtOH or acetone to the resulting soln., and recovering the lipoid-sol. substance from the resulting materials, as by dissolving and repptn.

Hair-dye compositions. Wolf Kritchevsky (to Rit Products Corp.). U. S. 2,185,467, Jan. 2. With an org. dye such as Brown BN, C. I. 422, etc., use is made, as an agent to cause adherence of the dye to the hair, of formamide or other water-sol. compd. having the nucleus RCON= in which R represents H, a lower alkyl, cycloalkyl, aryl, aralkyl, alkylol, aralkylol or derivs.

18—ACIDS, ALKALIES, SALTS AND OTHER HEAVY CHEMICALS

E. M. SYMMES

New acetic anhydride process. G. Benson. *Chem. & Met. Eng.* **47**, 150-1(1940).—AcH is oxidized by air in the presence of a catalyst, such as Co or Mn acetate, and a diluent. Sepn. of diluent and H_2O, excess AcH, AcOH and Ac_2O is accomplished in bubble column stills under vacuum. The reaction is mainly $CH_3CHO + O_2 \rightarrow CH_3COOOH$; $CH_3COOOH + CH_3CHO \rightarrow 2CH_3COOH$. There is also the reaction $CH_3COOH + CH_3CHO \rightarrow (CH_3CO)_2 + H_2O$; $(CH_3CO)_2 + H_2O \rightarrow 2CH_3COOH$. Rapid handling of the products favors fractionation of the Ac_2O. E. M. Symmes

Viscosity of strong phosphoric acids. D. S. David. *Chem. & Met. Eng.* **47**, 155(1940).—A nomograph. G. G.

The nitric oxide process in sulfuric acid manufacture. Hugo Petersen. *Atti X° congr. intern. chim.* **4**, 57–64 (1939) (in German).—A review, mainly of tower processes. E. M. Symmes

The manufacture of sulfuric acid by means of vanadium catalyst on an intermediate scale. II. Increase of the draft-resistance in a small converter. Gohei Osame and Taizo Hirai. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 434(1939).—Vanadium catalyst, fouled by Fe sulfate, is slightly inferior to the uncontaminated catalyst in layers at 425°. H. G. Bowlus

Alumina obtained from thermal decomposition of ammonium alum. P. G. Guseva and A. S. Ivanov. *Trudy Tsentral. Nauch.-Issledovatel. Lab. Kamneĭ Samotsvetov Trudy "Russkie Samotsvety"* **1938**, No. 4, 35–43; *Khim. Referat. Zhur.* **2**, No. 5, 85–6(1939).—Decompn. of NH_4 alum at 1045–1110° gave isotropic γ-Al_2O_3, with admixts. of undecompd. $Al_2(SO_4)_3$ (up to 2.5%). Decompn. at 1155° gave almost exclusively γ-Al_2O_3, but in some isotropic plates of the γ-Al_2O_3 a beginning of the transformation into the hexagonal α-Al_2O_3 was observed. At 1250° even more of the α-Al_2O_3 was found and the admixts. of $Al_2(SO_4)_3$ decreased to 0.76%. The prepn. obtained at 1300° consisted almost wholly of α-Al_2O_3. The normal mixt. for the synthesis of corundum must consist of γ-Al_2O_3. The alum should not be heated above 1130°. W. R. Henn

Continuous carbonation of aluminate solutions. I. N. Prokhnitskiĭ. *Tsvetnye Metal.* **13**, No. 10, 85(1938); *Chimie & industrie* **42**, 282; cf. *C. A.* **33**, 3975[8].—Continuous carbonation of aluminate solns. can be effected by establishing between the carbonators an uninterrupted stream of $Al(OH)_3$ pulp in soda soln. by the principle of the mammoth pump, which can raise the pulp from a lower into a higher container. The operation of such a pump is based on the fact that a column of the pulp contg. air bubbles is lighter than a column of the pulp alone. A. Papineau-Couture

Contact properties of chromium oxide in the oxidation of sulfur dioxide to trioxide. I. E. Adadurov. *J. Applied Chem.* (U. S. S. R.) **10**, 470–1(1937); *Chem. Zentr.* **1938, I**, 4516.—A comment on the paper by the same title by Postnikov, Kunin and Ashtasheva (*C. A.* **31**, 2363[4]). Attention is called to the lack of agreement in the methods there employed for the calcn. of yields and to the existence of nonstable catalysts in their work. M. G. Moore

Automatization of control and regulation in the soda process. B. A. Sass-Tisovskiĭ. *Avtomatika i Telemekhanika* **1938**, No. 4–5, 127–43; *Khim. Referat. Zhur.* **2**, No. 5, 73–4(1939).—After a short description of existing technological processes in the production of soda instructions are given for the modernization of the automatic app. W. R. Henn

Influence of titanium oxide on the sintering of magnesite. III. Temperature-change stability. Yasuo Tanaka and Tomoatu Takagi. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 405–6(1939); cf. *C. A.* **33**, 9558[8].—Compressed magnesite test pieces, contg. 4% Ti oxide, Fe oxide or ilmenite, were sintered at 1200–1600°. The addn. of these materials improved the porosity at the lower burning temps. The amt. of added material was not critical in the region 2–6%. H. G. Bowlus

Ammonium oxalate for use as fertilizer. I. Hygroscopicity of ammonium oxalate monohydrate. Syohei Uno. *Waseda Applied Chem. Soc. Bull.* 17, 1–4, *Abstracts* (in English)36(1940).—The vapor pressure of a satd. soln. of NH_4 oxalate in the range of 15–40° was measured and the following empirical formula for the vapor pressures obtained: $\log p$ (mm.) $= -(2282/T) + 9.0265$. $(NH_4)_2C_2O_4.H_2O$ is less hygroscopic than K_2SO_4, Ca superphosphate and KNO_3. II. **The double decomposition between sodium oxalate and barium hydroxide in the preparation of ammonium oxalate.** *Ibid.* 5–12, *Abstracts* (in English) 37.—The reaction between $Na_2C_2O_4$ and $Ba(OH)_2$ was studied in the course of prepn. of $(NH_4)_2C_2O_4$ from CO by reaction with NaOH, decompn. of the NaO_2CH formed to H_2 and $Na_2C_2O_4$, treating the latter with $Ba(OH)_2$ to give NaOH, which is used again, and BaC_2O_4 which is treated with $(NH_4)_2CO_3$ to give the desired product and $BaCO_3$ which is decompd. to Ba(OH) and used again. The reaction between $Na_2C_2O_4$ and $Ba(OH)_2$ proceeded very rapidly and yielded more than 99.7% BaC_2O_4. More concd. NaOH was recovered than that obtained in the caustification of Na_2CO_3 with $Ca(OH)_2$. A very slight excess of $Ba(OH)_2$ was necessary in the reaction. The ppt. of BaC_2O_4 produced at the high temp. was easily filterable. C. L. B.

Barium chloride from barite and calcium chloride. Factors affecting production. R. Norris Shreve and R. K. Toner. *Ind. Eng. Chem.* 32, 568–73(1940); cf. *C. A.* 30, 8321[9]; 33, 7966[8].—The reaction $BaSO_4 + CaCl_2 = BaCl_2 + CaSO_4$ was examd. in concd., aq. solns. at 175° and in fusion. The reaction has a true equil. in each case. In aq. soln. a reaction time of 6–12 hrs., in the presence of sufficient $CaCl_2$ to form a satd. soln., gives large, practicable conversion to $BaCl_2$. In fusions, time and temp. have no appreciable effect on conversion. Aq. MeOH is a satisfactory extn. solvent if insol. type of barite is formed, otherwise anhyd., org. solvent must be used to ext. $BaCl_2$ from the reaction mass. E. M. Symmes

Purification of brine intended for electrolysis. E. Salvatore. *Atti X° congr. intern. chim.* 4, 64–70(1939).—Addn. of CaO, then Na_2CO_3, purifies brines better than Na_2CO_3 alone. E. M. Symmes

Calcining of coarsely crystalline calcite. J. J. Frankel. *Minerals Research Lab. S. Africa Bull.* No. 2, 11 pp. (1937); *Ceram. Abstracts* 19, 76.—The thermal decompn. of coarsely cryst. calcite was studied in an app. made by F. Subsequent tests were made in a Herresoff lab. furnace and a kiln designed by F. The decrepitation of calcite is discussed. Analyses are given of ores used and the cost or erection of the kiln is given. C. L. B.

New method for technical chalk production. A. I. Ivanov, B. V. Fabritsiev and A. I. Kolomytseva. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* No. 117, 7–53(in English, 54)(1936).—A description is given of the commercially developed chalk deposits in the Soviet Union, including petrographic study, technology of dressing, methods of testing. The Inst. of Econ. Mineral. has developed a method for the flotation of chalk. The solid: liquid ratio was 1:4. The most effective flotation agents were carboxylic acids and naphthenic acid soaps, with yields of the concentrates ranging up to 99.12% and 98.40%, resp. At temps. below 20° the efficiency of flotation decreases and the consumption of reagents increases. An increase in temp. above 20° has no practical results. As regards the activity of the chalk in rubber mixts. it was found that carboxylic, stearic and palmitic acids give the greatest activation. The reagent consumption should not exceed 0.3 kg./ton. The chalk obtained by flotation was satisfactory as a rubber filler. B. Z. Kamich

Iron perchlorate. Folke Linstrand. *Separate, A.-B. Gleerupska Univ.-Bokhandeln, Lund,* 1939, 103 pp.—A review. 109 references. R. D. Deese

Kaolin industry in the Soviet Union and standardization of its products. V. P. Aleksandrov, A. E. Voitsekhovskii and V. I. Luchitskii. *Trans. All-Union Sci. Research Inst. Econ. Mineral.* No. 126, 5–154(1938).—A review of the present status of the kaolin industry in the Soviet Union is followed by a description of the properties of Ukrainian, Siberian and Ural kaolins. The kaolins of the chief Ukrainian deposits are considered of equal quality to the best foreign grades. Standards are discussed for kaolin to be used in porcelain, paper, rubber, perfume, soap and refractory industries. Forty-eight references. B. Z. Kamich

Alkali slurry for carbon dioxide recovery. Gustave T. Reich. *Chem. & Met. Eng.* 47, 152–5(1940).—A satd. soln. of alkali bicarbonate and alkali carbonate is carbonated to produce a soln. contg. solid alkali bicarbonate in suspension. The suspended alkali bicarbonate is then dissocd. to alkali carbonate and CO_2 by heat; this leaves a soln. still satd. with bicarbonate. CO_2 is recovered more efficiently, with lower heat expenditure and less heating surface, than by known absorption processes. E. M. Symmes

Decomposition and stabilization of hydrogen peroxide and metal peroxide solutions. Hans-Joachim Henk. *Seifensieder-Ztg.* 67, 75–6(1940).—Decompn. of peroxides is catalyzed by salts or oxides of Cu, Fe, Pb, Hg, Co, Ni and Mn. Decompn. is restricted by H ions, especially by 0.1% H_3PO_4 or H_2SO_4. The most applicable stabilizers include Mg, Ca, Sn^{++} and Sn^{++++} compds., such as phosphates. Mono and secondary phosphates, alkali pyrophosphates plus salicylic acid, Na benzoate and Me *p*-hydroxybenzoate are effective also. The activity of pos. catalysts can be restricted by addn. of capillary-active materials, which are adsorbed by the catalysts in preference to the peroxides. These include alcs., ketones and org. series including uric acid, barbituric acid and the methanes. Urea is valueless. Thio- and phenyl-ureas are better. Phenol derivs. including phenacetin, Et ether of acetyl-*p*-aminophenol, acetanilide, aniline, NH_4CNS, K bromodioxalate and NH_2OH are effective. For *mouth washes*, acetic or citric acids, or Mg and Ca bicarbonates are usable. For bleaches, both anticatalyst and a capillary-active material should be used. A. Guillaudeu

Rapid extraction of free sulfur from antimony sulfide. Herbert C. Haller. *Chemist-Analyst* 29, 11(1940).—Simplified directions are given for boiling the sample with Me_2O under a reflux condenser. W. T. H.

Utilization of the pyrite waste products in Karabash. N. M. Nikolich. *Tsvetnye Metal.* 1938, No. 11, 49–52; *Khim. Referat. Zhur.* 2, No. 5, 75–6(1939).—Utilization of pyrite tailings contg. 8–40% of S is described. They can be floated in the presence of 0.115 kg./ton of $CuSO_4$, 0.013 kg./ton of the tank residues and 0.12 kg./ton of xanthene. The extn. of S was not less than 85% and its content in the concentrate was 40–2%. W. R. Henn

Nonmetallic minerals. Kenneth E. Hickok. *Mines Mag.* (Colo. School of Mines) 30, 65–6, 74(1940).—Over 70 different nonmetallic minerals are being produced commercially. They include naturally occurring minerals of submetallic or earthy luster, which cannot be plastically deformed, are poor conductors of heat and electricity and are used industrially without conversion to a metallic constituent of the mineral. Applications are described of natural abrasives, asbestos, barite, bauxite, borax, cement materials, chalk, chromite, clays, gem stones, graphite, limestone, Li minerals, magnesite, Mn minerals, mica, nitrates, phosphates, potash, pumicite, NaCl, sand and gravel, sillimanite, S, talc and Ti minerals. L. S.

Alunite. VI. Yahei Asada. *Bull. Inst. Phys. Chem. Research* (Tokyo) 17, 1300–68(1938); cf. *C. A.* 33, 4502[8].—The thermal decompn. of $K_2SO_4.Al_2(SO_4)_3.24H_2O$ and of $Al_2(SO_4)_3$ was investigated. B. C. P. A.

Certain physical and chemical factors influencing the activity of charcoal. VII. E. V. Alekseevskii and I. N. Semenov. *J. Gen. Chem.* (U. S. S. R.) 9, 1577–85(1939); cf. *C. A.* 29, 6372[8].—Extensive expts. in activation of charcoal and several kinds of bituminous coal by extn. with various solvents are described. Charcoal was extd. by refluxing it in a solvent for 9 hrs. and drying the residue *in vacuo* at 450°. Bituminous coals were extd. in the Soxhlet app. and in an autoclave at 225–60° and 45–50 H atm. for 6 hrs., followed by extn. in the Soxhlet app. and vacuum-drying at 300°. The treated and untreated C

products were tested for adsorptive capacity for $CH_4 + N$ vapor and for H_2O_2, AcOH, I, PhOH and other products in aq. solns. Tabulated results show that the adsorptive power of extd. charcoal is considerably increased. The most active solvents are EtOH, MeOH, CCl_4, Me_2CO, AcOEt, $PhNO_2$, $PhNH_2$ and naphtha. The adsorptive capacity of extd. bituminous coals is increased comparatively little (up to 10%). The best solvents are Me_2CO, EtOH, CCl_4, CS_2 and $C_2H_4Cl_2$. The resulting C products show poor mech. strength. Fifty references. C. B.

Activation and clarifying properties of fuller's earth. VI. Adsorption of coloring matter by fuller's earth in decolorizing oils. B. S. Kulkarni and S. K. K. Jatkar. *Kolloid-Z.* 89, 54–9; *J. Indian Inst. Sci.* 22A, 331–40 (1939); cf. *C. A.* 33, 4746⁸.—Three Jodhpur earths, a local earth and an earth designated as pure, were tested by decolorization of acid-free safflower oil having a Lovibond color value of 16.7 yellow. The earths were previously activated by digestion in HCl and were sieved to 100 mesh. In 4 series of expts. earth equal to 1, 2, 3 and 5% of the wt. of the oil was heated in the oil for 15 min. at 90–95° with stirring, then filtered hot. In another series of expts. the color concn. of the oil was varied and the earth concn. kept const. at 1%. The data thus obtained were tested on the Freundlich isotherm equation: $\text{Log } x = n \log c + \log a + \log m$ in which x is the percentage of color removed, c the percentage remaining, m the wt. % of earth used and a and n are consts. The color removed by the highly active Jodhpur earth was not proportional to the wt., but for the less active used earths in lower proportions, was proportional. The relation between log c and log x was clearly not linear in the lower and higher concns. and the curve was more pronounced for some earths than for others. Phys. adsorption appears to predominate at low color concns. and chem. chiefly at higher. The requirements of the Freundlich isotherm are not fulfilled, part of the color apparently being removed by a definite chem. combination with exchangeable H of the earth.

A. Lloyd Taylor

Coal and ore in Sudetenland [graphite of Böhmerwald] (Heugel) 21. Developments in dispersion of C black (Venuto) 26. Geol. features of deposits of bleaching clay (Schroter, Campbell) 8. Clays and fuller's earths (Schwarz) 9.

Aall, Ch.: Contribution à l'étude du carbure de calcium industriel. Paris: H. Dunod. 179 pp. Fr. 48 plus 3%.

Kopp, H. Fr.: Der deutsche Marmor. Munich: Pohl. 48 pp. M. 2.50.

Nitric acid. Herman A. Beekhuis, Jr. (to Solvay Process Co.). U. S. 2,185,579, Jan. 2. NO_2 is treated with an aq. liquid in the presence of Cl, with the formation of HNO_3 and NOCl; the NOCl is oxidized with O to form NO_2 and Cl, and the products of this oxidation, together with addnl. NO_2, are caused to react with aq. liquid to form HNO_3. An arrangement of app. and various details of operation are described. U. S. 2,185,580 describes app., and a process for the production of concd. HNO_3 by treating NO_2 and an aq. HNO_3 contg. about 70% or more HNO_3 to form a HNO_3 contg. an increased proportion of HNO_3 to H_2O; this comprises treating the NO_2 and aq. HNO_3 in a reaction mixt. contg. concns. of NO_2 and HNO_3 for which the equil. partial pressure of NO is below 0.01 atm., contg. free Cl in amt. sufficient to reduce the partial pressure of NO of the reaction mixt. to below the equil. partial pressure and contg. the Cl, NO_2 and H_2O and HNO_3 in the aq. HNO_3 in proportions resulting in the formation of a HNO_3 contg. dissolved therein more than 0.5% total Cl (calculated as HCl).

Nitric acid. L. V. Saradzhev. Russ. 55,902, Oct. 31, 1939. In the manuf. of HNO_3 from NH_3 the processes of cooling, oxidation and absorption of nitrous gases are carried out at pressures in excess of 200 atm.

Phosphoric acid. O. D. Kashkarov. Russ. 52,336, Dec. 31, 1937. A mixt. of phosphorite, coal and silica is chlorinated at high temp. in the presence of chlorides of Si, Fe and Al. $POCl_3$ is sepd. by fractionation and converted to H_3PO_4.

Pressure synthesis of sulfuric acid. Ernst Berl. U. S. 2,184,707, Dec. 26. App. is described, and a method which involves treating a soln. of nitrosylsulfuric acid in H_2SO_4 with roast gases contg. SO_2 at a pressure of about 30–50 atm. to cause an absorption of the SO_2 in the soln., whereby oxidation of the SO_2 by the nitrosylsulfuric acid occurs in the liquid phase.

Concentration of sulfur dioxide. Z. P. Rozenknop and I. N. Shokin. Russ. 51,942, Nov. 30, 1937. Gases contg. SO_2 are mixed with NH_3 generated by heating $(NH_4)_2SO_4$. The mixt. of SO_2 and NH_3 is washed with a soln. of $(NH_4)_2SO_3$ and NH_4HSO_3 and the concd. soln. of sulfites thus obtained is treated with NH_4HSO_4 formed in the generation of NH_3 from $(NH_4)_2SO_4$.

Alkalies. Ya. M. Pesin. Russ. 55,943, Oct. 31, 1939. Alkali permutite is treated with a soln. of NH_4OH and the NH_4 permutite is regenerated by known methods by means of the chloride of the corresponding alkali metal.

Compounds of thorium and cerium. G. P. Aleksandrov and G. O. Byk. Russ. 55,894, Oct. 31, 1939. Nitrates of the rare earth metals are boiled in the presence of marble, the ppt. obtained is dissolved in HNO_3, the soln. treated with a reducing agent, and again boiled in the presence of marble, the ppt. of basic Th nitrate is filtered, and Ce obtained from the soln. in known manner.

Aluminum hydroxide. Carlo Toniolo and Azogeno Soc. anon. Brit. 508,911, July 7, 1939. $Al(OH)_3$ is produced in a form readily separable from the substances with which it is mixed by causing a sufficiently pure H_2O-sol. simple or double, or mixed simple and (or) double, Al salt or salts in a solid comminuted form to react with 1 or more powd. alkali metal or NH_4 carbonates, bicarbonates or carbamates to produce a mixt. comprising meal-like $Al(OH)_3$ and an alkali salt or salts other than carbonates, bicarbonates or carbamates. The $Al(OH)_3$ may be sepd. by lixiviation and converted to Al_2O_3 by calcination.

Recovery of ammonia from used cuprammonium rayon precipitation liquors. Alfred Haltmeier (to I. G. Farbenind. A.-G.). U. S. 2,184,923, Dec. 26. An arrangement of app. is described, and a process of recovering NH_3 and heat from used cuprammonium rayon pptn. liquors, which comprises bringing the warm liquors with substantially the temp. they have when coming from the pptn. treatment into countercurrent contact with a current of steam having a pressure corresponding substantially to the pressure of satd. steam at a temp. equal to the temp. of the liquors, at least a part of the steam being obtained by evapn. of the still warm pptn. liquors after the countercurrent treatment at a pressure lower than that of the steam employed for the countercurrent treatment of the pptn. liquors and compressing the part of the steam to the pressure employed for the countercurrent treatment, introducing the compressed steam into the countercurrent app. and removing the NH_3 and the steam carrying the NH_3 and condensing the NH_3 and the steam together.

Recovery of metals and ammonia from ammoniacal metal salt solutions. Karl Pattock and Hans Wassenegger (to I. G. Farbenind. A.-G.). U. S. 2,184,943, Dec. 26. A process of recovering metals and NH_3 from highly dild. aq. ammoniacal solns. involves passing the solns. through a plurality of filters contg. a granular water-insol. resin of the group consisting of condensation products of a polyhydric phenol and CH_2O and condensation products of a phenol and CH_2O, contg. sulfonic acid radicals, interrupting the filtration when satn. of the first filter with metal ions occurs, and sepg. the metal from the filter by regenerating it with an acid which forms sol. salts of the metal.

Oxidation of ammonia. Ralph S. Richardson (to Chemical Construction Corp.). U. S. 2,185,607, Jan. 2. In the production of oxides of N by the catalytic oxidation of NH_3, a method of starting the process comprises passing a stream of air through a catalyst gauze, then injecting hot combustion gases other than the gases resulting from the combustion of NH_3 into the stream of air, then passing the resulting hot gas mixt. in heat-exchange relation with an earlier portion of the air stream to preheat the latter

and finally, when the catalyst gauze is heated to ignition temps., vaporizing NH_3 into the air stream in advance of the heat-exchange step. App. is described.

Crystalline boric oxide. Leon McCulloch (to Westinghouse Elec. & Mfg. Co.). U. S. 2,186,257, Jan. 9. A cryst. boric oxide m. about 460–470° and having a d. about 2.42 is produced by a described treatment from boric acid. Cf. *C. A.* 33, 1454[6].

Inhibiting oxidation of cuprous oxide. Loren C. Hurd (to Röhm & Haas Co.). U. S. 2,184,617, Dec. 26. Finely divided Cu_2O has its particles coated with a thin layer of protein material, such as glue or gelatin or egg albumin.

Lead arsenate from arsenic acid and lead-oxygen compounds such as lead oxide. James W. Swaine (to General Chemical Co.). U. S. 2,184,890, Dec. 26. A Pb-O compd. and arsenic acid are continuously fed into a reaction zone which may contain HOAc soln. and Pb acetate for reaction in an initial reaction phase to form Pb arsenate, while the feed of materials is regulated so as to maintain an excess of the Pb compd., while minor portions of the reacting ingredients are fed, and remaining major portions of the reacting materials are then fed into the reaction mass, with use of an excess of arsenic acid, for a second phase and completion of the reaction. Cf. *C. A.* 34, 1827[1].

Magnesium fluosilicate. A. G. Pavlovich-Volkovyskiĭ and I. I. Zaring. Russ. 56,096, Nov. 30, 1939. F-contg. gases obtained in the acid treatment of phosphorites and apatite are treated with an aq. suspension of $MgCO_3$ or $MgCl_2$.

Magnesium hydroxide. A. A. Shikin and N. S. Spiro. Russ. 51,980, Nov. 30, 1937. A soln. of the Mg salt is treated with lime in the presence of tanning ext. to accelerate the settling, filtration and washing of the $Mg(OH)_2$.

Activated silica. A. A. Chizhik and V. Ya. Ketkovich. Russ. 55,548, Oct. 31, 1939. A product suitable as an active filler for rubber mixts. is prepd. by the interaction of H_2SiF_6 and NH_3, washing the product free of F ions, and treatment with weak soln. of alkali.

Sodium bicarbonate crystals. K. F. Pavlov. Russ. 52,168, Nov. 30, 1937. Large crystals of $NaHCO_3$ are obtained by inoculation with $NaHCO_3$ crystals in the carbonation tower.

Removing iron and arsenic from stibnite. G. K. Rebrov. Russ. 55,942, Oct. 31, 1939. The above stibnite is fused with a mixt. of Na_2SO_4, Na_2SO_3 and quartz sand in an oxidizing atom.

Apparatus for continuous sorption of iodine from well waters by means of activated carbon. T. T. Filippos'yants. Russ. 56,132, Nov. 30, 1939. Construction details.

Nitrogen-hydrogen mixture. V. M. Alekseevskiĭ and A. I. Morozov. Russ. 52,280, Dec. 31, 1937. Producer gas is compressed to 10–20 atm. and cooled to −45° before introduction into the scrubber, first by heat exchange with the finished N_2-H_2 mixt. and then in two stages by evapn. of the liquid CO obtained in the scrubber.

Combined manufacture of yellow phosphorus and power gas. I. S. Rozenkrants. Russ. 55,908 Oct., 31, 1939. **Phosphorites are reduced in a blast furnace operated with oxygen and peat coke.** The peat coke is obtained by low-temp. carbonization of peat in a current of gas composed of blast-furnace gas freed in a known manner of P vapors and low-temp.-carbonization gas freed of tar vapors and preheated in heat recuperators.

Combined manufacture of yellow phosphorus and power gas. I. S. Rozenkrants. Russ. 56,046, Nov. 30, 1939. Addn. to Russ. 55,908 (preceding abstr.). The low-temp. carbonization of peat is carried out with an admixt. of phosphorites.

Utilizing the heat of furnace gases obtained in the vaporization of phosphorus. E. I. Dunaevskiĭ. Russ. 56,122, Nov. 30, 1939. The heat of the furnace gases contg. P is used in preheating the reducing agent (coke), together with a part of the phosphorite and the flux, while the flue gases are used in a common or in individual heat exchangers to heat the basic mass of the components of the mixt. free of C. Russ. 56,123, addn. to the above, Nov. 30, 1939. The entire charge, or part of it, is heated by an external heat source, e. g., producer gases.

Removing acetylene from oxygen. I. G. Malkiel. Russ. 52,207, Nov. 30, 1937. A liquefied mixt. of the two gases is passed through activated carbon.

Cryolite. G. S. Morozov. Russ. 56,000, Nov. 30, 1939. Cryolite is prepd. by treating basic Al fluoride with a soln. of NaOH, sepg. the ppt. of $Fe(OH)_3$ and pptg. the cryolite by known methods from the soln. contg. NaF and $Na_2Al_2O_4$.

Concentrating phosphatic minerals such as Florida phosphates. Oliver C. Ralston (to the Government of the U. S., represented by the Secretary of the Interior). U. S. 2,185,224, Jan. 2. A pulp of the ore is agitated with 2–5 lb. per ton of a cationic compd. of short-chain amino type with substituents contg. 2–5 C atoms, by which clay present is made water repellent, such as diamylamine, and the pulp is treated in an aq. suspension process to remove the filmed clay; the resulting tailing is agitated with a mineral oil and a cationic substituted ammonium compd. with 1 to 4 substituents carrying over 12 C atoms, such as laurylamine, in the presence of an Fe or Al salt, by which quartz particles are made water repellent, and there is sepd. from the pulp a material relatively rich in siliceous gang and relatively poor in phosphate values as a concentrate, and the tailing is collected as a relatively rich phosphate.

Acid decomposition of phosphorites. G. A. Yakovkin. Russ. 55,832, Oct. 31, 1939. The aq. or H_2SO_4 suspension of phosphorite is treated with a mixt. of SO_2 gas and N oxides are introduced in amts. sufficient for the formation of an amt. of H_2SO_4 equiv. to the H_3PO_4.

Catalysts for the removal of organic sulfur from gases. A. V. Avdeev. Russ. 52,333, Dec. 31, 1937. The catalyst is prepd. from a mixt. of slag cement with ferrous bauxite and the addn. of small amts. of powd. metallic Al, which produces pore-forming H_2.

Iron catalyst for ammonia synthesis. S. S. Lachinov and V. G. Telegin. Russ. 52,384, Dec. 31, 1937. Reducing gases are passed through a mass of oxide at a vol. velocity not less than 4000 with stepwise increase of temp. from 375° to 500°.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Developing Canada's nephelite syenite—a review. C. M. Nicholson. *Can. Mining J.* 61, 135–46(1940).—Lakefield nephelite is desirable for introducing Al_2O_3 into glass batches because it is high in Al_2O_3 (24%), high in alkalies (Na_2O 10 and K_2O 5%), low in SiO_2 (no free quartz), low in Fe oxide (0.06%), and excellent in its Na_2O:K_2O ratio. W. H. Boynton

Volcanic rocks as raw materials in glass manufacture. Z. Schaefer. *Sklarské Rozhledy* 16, 72–6(1939); *Chimie & industrie* 42, 840; cf. *C. A.* 33, 7059[9], 7062[8].—Phonolite glasses have a high Al_2O_3 content and consequently a high viscosity. As phonolites contain large proportions of alkalies, their uses permit large savings of Na carbonate or sulfate. The fused glasses obtained are of good quality and resistant to washing; they are suitable for the manuf. of colored bottles. Glasses made from Russian nephelitic syenites also have a high viscosity. Addn. of limestone favorably influences this property. The proportion of Na carbonate or sulfate to sand should be 25–30%.

A. Papineau-Couture

Concentration of sand used in glass melting. A. M. Tsekhomskiĭ and S. E. Fridman. *Steklonaya Prom.* 15,

No. 8–9, 16–18(1939).—An analysis of the chem. compn. of the chief Russian sand deposits is given. Methods of concentrating, such as by magnetic sepn., and washing, are mentioned. M. V. Condoide

Lengthening the life of glass-melting pots. Semenov. *Stekolnaya Prom.* **15**, No. 1, 18(1939).—The usual life of glass-melting pots made from Druzhkovskiĭ clays is about 25 to 30 melts. In order to lengthen this to 40 or 50 melts without lowering the qualities of glass, special precautions should be taken while the glass is being melted. Very often the temp. of the furnace is raised unnecessarily high. This cannot exceed 1500° with new pots and 1470 or 1480° with older pots. The max. temp. of 1500° should not last more than 30 or 40 min. During cooling, the temps. previously detd. should not be exceeded. M. V. Condoide

Production of cast plate glass. A. D. Bardenko. *Stekolnaya Prom.* **15**, No. 8–9, 13–15(1939).—Different defects occurring in cast plate glass are due mostly to irregular cooling between the time of casting and annealing. M. V. Condoide

Permissible rate of cooling glass when annealing. A. N. Dauval'ter. *Stekolnaya Prom.* **15**, No. 11, 28–31 (1939).—The formulas of Murgatroyd (*C. A.* **24**, 2564) used in computations of glass annealing are analyzed and criticized. M. V. Condoide

Cooling of glass. Milota Fanderlík. *Sklářské Rozhledy* **16**, 128–30(1939); *Chem. Zentr.* **1939, II**, 4305.—Deformation during cooling produces lasting inner strains if the cooling is rapid. These deformations may be removed only in a definite temp. range, "the cooling interval." The increase of the temp. by 10° within this range means doubling the cooling time for tech. glasses. The cooling time increases approx. with the square of the thickness of the wall of the article. M. V. Condoide

Decreasing the alkali content and increasing chemical stability of sheet glass produced according to the Fourcault method. S. Ya. Raf and I. E Shapiro. *Stekolnaya Prom.* **15**, No. 10, 15–21(1939).—The introduction of Al_2O_3 in the form of sifted refractory clay and in an amt. of about 0.8% does not complicate the melting and working of glass. No addnl. defects related to the use of clay (streaks or stones) were observed; the qual. indexes remained unchanged. The melting of glass of the compn. SiO_2 71.7, Al_2O_3 1.8, Fe_2O_3 0.1, CaO 8.5, MgO 3.5, SO_3 0.4 and Na_2O 14.0% and the addn. of 10% Na_2O in the form of sulfate proceeds normally. This glass possesses good working properties. It does not tend to crystallize more than the glass of the old compn. which contained 15% Na_2O. Chem. stability of this glass is higher than that contg. 15–15.2% Na_2O. M. V. Condoide

Antimony ruby glass. P. B. Bukarinova and A. A. Kefeli. *Stekolnaya Prom.* **15**, No. 8–9, 28–31(1939).—Soda lime glasses are satisfactory for the production of antimony ruby. The optimum concentrates of Sb, S and C are: (*a*) with 1.5% Sb_2O_3, 0.15–1.5% S and 1.25–0.15% C; (*b*) with 3% Sb_2O_3, 0.50–1.5% S and 1.5–0.5% C. Soda lime glasses contg. 0.5% Sb are not suitable for obtaining antimony ruby as they are very dark and are little permeable to visible light. With the introduction of small amts. of S and C, glasses remain yellow; with larger concns. they become dark and little permeable. The rubies produced are in the majority of cases dark red. Curves of spectral absorption of the visible part of the spectrum have a gentle slope, which fact distinguishes them from selenium ruby; however, they have a great similarity to those of copper ruby. Antimony ruby can be used as decorative and signal red glass. Zinc glasses are unsuitable for antimony ruby because Zn combines with S during melting and forms a compd. which is too stable. M. V. Condoide

Structure and optical properties of iridescent glass. C. V. Raman and V. S. Rajagopalan. *Proc. Indian Acad. Sci.* **9, A**, 371–81(1939); *Chem. Zentr.* **1939, II**, 2576.—On the basis of observations of numerous tests and 30 photomicrographs, 6 optical types of glass decompn. are distinguished: (1) pores with step-like walls; (2) iridescent layers of different colors without visible boundaries; (3) multicolored coats with sharply defined limits; (4) coats with undissolved or incompletely dissolved structures dispersing light; (5) porous coats; (6) dark spots which do not disperse or reflect light. The colors of decomposed glasses are more evident when covered by a liquid. They are even visible when the liquids have the same *n* as the coats. M. V. Condoide

Improving qualities of Fourcault debiteuse. M. S. Kazanskiĭ and V. I. Orzhevskiĭ. *Stekolnaya Prom.* **15**, No. 8–9, 5–13(1939).—A general discussion of the necessity of improving the compn., production and constructional details of Fourcault debiteuse. M. V. C.

Stones in glass. M. Fanderlík. *Sklářské Rozhledy* **16**, No. 6, 105–12(1939); *Chem. Zentr.* **1939, II**, 2958.—These defects are accounted for by difficultly fusible parts of the batch, refractories from the furnace and devitrifications. They are recognized by microscopical or chem. means. A table showing the type, origin and character of those defects is given. M. V. Condoide

Conductometric method of determining chemical stability of glasses. G. G. Samartsev and V. S. Molchanov. *Optiko-Mekhan. Prom.* **9**, No. 8, 7–13(1939).—The conductometric method developed by Kohlrausch (*Wied. Ann.* **44**, 577 (1891)) was somewhat modified and used in the present expts. with good results. Distd. water and a 0.001 *N* HCl soln. were used for the expts. The general conclusion is that the quantity of acid, neutralized by glass at a given time, increases with increased content of metallic oxides in the glass and with decreased silica content. It is important to note that acids destroy glass to a greater depth than water. Difficultly sol. metallic oxides, besides SiO_2, increase the protection of glass in water, but when in an acid soln., these oxides are dissolved and the protective layer is composed of colloidal silica. For a practical characterization of the chem. stability of glass it is important to det. not only the depth of destruction for a given moment of time but also the rate of increase of this depth. M. V. Condoide

Accelerated methods of chemical control in the glass industry. O. V. Krasnovskiĭ. *Stekolnaya Prom.* **15**, No. 7, 29–30(1939).—The accelerated analysis of glass is based on the detn. of SiO_2 and total oxides of Al and Fe from one sample, CaO from another sample, and MgO and total oxides of Na and K from the 3rd sample. Several persons may work together. (1) SiO_2 is sepd. from glass by melting it with NaOH at 480 or 500°. The melt is dissolved with strong HNO_3 and then dried. Surplus HNO_3 is removed. The dry sediment is treated with NH_4NO_3 and filtered, washed and calcined. An acid reaction is present, so that the silica is free from impurities. The total quantities of the oxides of Al and Fe are detd. in the silica filtrate by sepg. Al and Fe in the form of hydroxides with ammonia and purifying the remnants of oxides as usual. (2) Ca detn.: Glass is dissolved with HF and oxalic acid. With repeated oxalic acid treatment of the residue, fluorine is removed and fluorides are changed into oxalates. The residue is washed and treated with AcOH, the oxalates are removed. The residue contains Ca oxalate, which is sepd., calcined, treated with H_2SO_4 to change it into sulfate from which Ca is detd. (3) Detn. of MgO and Na_2O and K_2O: Glass is dissolved with HF and the residue is removed by H_2SO_4. Calcining will change sulfates of Al and Fe into oxides. The residue is treated with water. Al and Fe are sepd. as hydroxides. They are sepd. by ammonia in the presence of ammonia and AcOH. Ca is sepd. in the form of carbonates. The residue is filtered and Mg is sepd. in the form of a double salt of $MgCO_3$ (method of Shafgost). The residue is calcined and Mg is detd. as oxide. The dry filtrate of ammonium and Mg carbonates is calcined and the sulfates of K and Na are obtained. An accelerated chem. analysis of the chief glass-forming raw materials has been developed also. M. V. Condoide

Purifying effect of cullet containing arsenic and antimony. I. M. Prok and L. B. Polyakova. *Optiko-Mekhan. Prom.* **9**, No. 10, 1–7(1939).—Arsenic and Sb present in cullet completely preserve their purifying effects. These properties are observed in the temp. range which promotes the

dissocn. of As_2O_5 and Sb_2O_5 and the sepn. of oxygen. It is possible to replace the poisonous As_2O_3 by a nonpoisonous siliceous As melt. A method of purifying is suggested, based on the introduction of As and Sb not into the batch in the form of trioxides of As and Sb, but directly into the batch in the form of glass of a similar compn. rich in As and Sb. The introduction of such a concentrate changes the compn. of bubbles in the glass mass, enriching them with oxygen, increasing the sizes of bubbles and hence promoting their elimination from the melt. Such a change of bubble compn. shows the chem. effect of the fining agents used, as contrasted with the phys. effect produced by the "bubbling" lumps of As. The behavior of trioxides of As and Sb is not always identical in different glasses. An As concentrate purifies the borosilicate glass L-14 better than the flint glass L-8. M. V. Condoide

Properties of cords and methods of recognizing them. M. A. Bezborodov. *Stekolnaya Prom.* 15, No. 10, 25–32 (1939).—Cords are glass-like inclusions in glass and differ from it in chem. compn. and phys. properties, chief of which is the refraction of light. They are caused by a no. of factors, such as: (1) changes in the glass surface because of the evapn. of some components at high temps.; (2) the introduction of cullet of unsuitable compn.; (3) incomplete diffusion which depends upon viscosity of silicate melts. There are surface and inner cords. Methods used for recognizing cords are briefly discussed. M. V. Condoide

Significance of impurities in coal in the glass industry. *United Glass Bottle Manufrs., Ltd., Combustion Appliance Makers' Assoc.* (*Solid Fuel*), Apr., 1939, 4 pp.(preprint).—The injurious effects of Fe and S on glass quality are discussed. Serious trouble is avoided if the coal employed contains less than 1% of total S. B. C. P. A.

Temperature regulation in glass and enamel furnaces. Otto Th. Koritnig. *Glashütte* 69, 833–5(1939).—K. explains the construction and adjustment of different types of temp. regulators, time-temp. and "program" regulators, etc., and their operation. M. V. Condoide

Trends and developments in ceramic wares for industrial use. J. Gordon Adderson. *Pacific Pulp Paper Ind.* 13, No. 10, 17–19(1939). A. Papineau-Couture

Pebbles for pot mills. Zirokiti Kumazawa. *J. Japan. Ceram. Assoc.* 47, 202–4(1939).—In Japan, larger pebble mills are lined with slabs of Korean hard quartzite, porcelain or granite, preference being in the order given. Agate pebbles are most resistant to abrasion, Ataka flint is next, porcelain pebbles are least. S. Kondo

Apparatus for determination of air in ceramic masses. S. V. Glebov and A. K. Karklit. *Ogneupory* 7, 492–4 (1939).—A sample of known vol. is introduced into the app., the air is forced out by petroleum, petroleum is forced out by hot water and the sample is washed with hot water *in vacuo;* readings are taken in a connected buret. The device can be used to det. the extent of deaeration of plastic and semidry masses. E. E. S.

Ceramic properties and slag-resistance of dunite masses. A. S. Bazilevich. *Ogneupory* 7, 373–82(1939).—MgO reacts only with the fine-grained part of the batch; the reaction product serves as a binder for unchanged dunite grains. With different dunites, the highest refractoriness and resistance to slags are attained by the addn. of 20% magnesite; a further addn. of magnesite has but slight effect. To reduce porosity, dunite ware should be fired at 1600–1650°. The stability of pure dunite to open-hearth slag is low. With a 20% magnesite addn. the stability is higher than that of grog and SiO_2 ware, but lower than that of magnesite and chromite. E. E. S.

Producing keramsite globules in a rotatory kiln. S. P. Loginov. *Keramika* 1939, No. 5, 56–9: cf. *C. A.* 33, 7508⁹.—Clays with low Fe content, that swell in the batch, can be used with Fe addns. (Fe oxide, limonite, flue dust, roasted pyrites, etc.) and combustible addns. (coal, peat, etc.). The former should be about 3%, the latter 2%. These addns. lead to the formation of a thin crust on the keramsite globules, impermeable to water. Changes of the burning schedule make it possible to obtain crusts of different characteristics and outer appearance. E. E. Stefanowsky

Clay minerals and their hydration in raw clays and calcined bodies. Gustav Keppeler and Gerhard Aurich. *Sprechsaal* 72, 71–5, 83–6, 93–5, 109–13(1939).—Zettlitz kaolin, halloysites, bentonite, allophane and mica were submitted to the following examns.: chem. analysis, isothermal (21°) dehydration over 10 and 96% H_2SO_4 solns. and P_2O_5, isobaric dehydration over 96% H_2SO_4 soln. at 21–792°, detn. of the Al_2O_3 and Fe_2O_3 contents of the dehydrated products sol. in HCl, differential heating curves, hydration and "H_2O expansion" of calcined kaolin and of calcined kaolin + Na_2O and kaolin + CaO mixts., and the dehydration of the artificially hydrated materials. Extensive data are recorded. The results confirm the previously detd. constitution of kaolin, and halloysite and allophane were essentially hydrargillite, and Kärlich blue clay was chiefly montmorillonite. The H_2O adsorption and swelling of calcined kaolin + Na_2O mixts. are due to the hydration of Na_2O-Al_2O_3-SiO_2 compds. of a permutite nature. The corresponding kaolin + CaO compds. are not sensitive to H_2O. These observations explain the relative resistances of Na_2O- and CaO-whiteware bodies to moisture expansion. B. C. P. A.

Bentonite clays in U. S. S. R. N. K. Sazonova. *Trudy LKKhTI, Lab. Keram.* 1939, No. 7, 217–44; *Khim. Referat. Zhur.* 2, No. 5, 88–9(1939).—The bentonites showed the presence of crystals of montmorillonite and admixts. of feldspar and biotite. They swell 3–4 times as much as do the best plastic clays. Their plasticity was studied by the amt. of adsorbed moisture from air satd. with water vapor. During 5 days most samples adsorbed ⅔ of the amt. of moisture which corresponds to a complete adsorption. The refractoriness did not exceed 1300°. Addn. of 5% bentonite lowered the refractoriness of the grog of the Chasov-Yar clay by 10–30°. The Oglanlin bentonites have the best plasticity, adhesion, binding power and swelling properties. Addn. of 5% bentonite to slightly plastic substances increased their plasticity and binding properties. Adding bentonite as a binding material had no appreciable effect on refractoriness. W. R. Henn

Clays and fuller's earths. IV. Isobaric dehydration and moistening of clays. F. Schwarz. *Sprechsaal* 72, 147–8(1939); cf. *C. A.* 33, 6010⁶.—After drying at a temp. θ, clays and fuller's earth reabsorb H_2O at room temp., but reabsorption is most complete and rapid when θ is 160–300°, and very small and slow when θ is greater than 700°. B. C. P. A.

The determination of the pH value of clay by means of the glass electrode. Frank W. Selfridge. *Rubber Age* (N. Y.) 46, 287–8(1940).—It is difficult to obtain precise results by the usual pH methods and a modified procedure was used. Stir 5 g. of clay in 100 cc. of boiled distd. H_2O in a 150-cc. beaker for 1 min. with a glass rod, allow to stand for 20 min. (stirring frequently), centrifuge 50 cc. until clear, decant the clear supernatant liquid, add 5 drops of aq. KCl (36 g. in 100 cc. of boiled distd. H_2O) and det. the pH value. By this procedure, the pH values of dry-ground clays from So. Carolina and Georgia varied from 4.40 to 5.70. Specially prepd. and treated clays showed in some cases pH values of 8.0 or higher. If a centrifuge is unavailable or if the pH value is merely for detg. the uniformity of clay, a procedure for detg. the adsorptive power of clay for K ions is useful. Stir 5 g. of clay, 1 cc. of aq. KCl (as above) and 100 cc. of boiled distd. H_2O with a glass rod for 1 min., transfer 40 cc. to a 50-cc. beaker, allow to settle for 20 min. and det. the pH value of the supernatant liquid. C. C. Davis

Experiments for the production of bricks with addition of schist ash. A. I. Aladinskiĭ. *Stroitel. Materialy* 1938, No. 12, 1–13; *Khim. Referat. Zhur.* 2, No. 5, 94(1939).—Increase in schist ash increased the d. when the moisture content was not over 23–24%. The addn. of ash to clays with a higher moisture content increased the d. only slightly. A max. effect was obtained from the addn. of 1.3% of schist ash to the dry ground clay. In its thickening effect 1 kg. of schist ash was equiv. to 15.1 kg. of clay

dried to a moisture content of 1.4%. The addn. of schist ash to the mixt. lowered the compressive strength of the raw bricks. Burned bricks contg. schist ash have lower compressive strength and high water absorption. W. R. Henn

Effect of batch composition, of the order of charging in the kiln and of the firing schedule in Mendheim gas-chamber kilns on the quality of silica brick. I. S. Smelyanskiĭ and V. D. Tsigler. *Ogneupory* **7**, 382–7(1939).—The quality of coke-oven brick is improved by adding cryst. quartzites to the batch and by firing in a reducing or neutral atm. E. E. Stefanowsky

Floor tile from brick clays of high iron content. P. K. Vaulin and A. A. Novopashin. *Keramika* **1939**, No. 5, 50–4.—Batches prepd. from mixts. of clays high in Fe required longer firing than normal. Semiplant results indicate the necessity of addnl. research, in order to improve the process. E. E. Stefanowsky

A furnace for determination of spalling resistance. V. A. Lebedev. *Ogneupory* **7**, 495–500(1939).—The furnace has an iron frame and a nichrome resistance. E. E. S.

Refractory materials for the bottoms of furnaces. A. I. Kramarenko and L. A. Tseĭtlin. *Stal* **1938**, No. 11, 26–35; *Khim. Referat. Zhur.* **2**, No. 5, 89(1939); cf. *C. A.* **34**, 1144[2].—Chromite bricks with phosphorite and bottoms of chromite concrete were found to give max. resistance to thermal and abrasion agents at temps. above 1300°. At 1300–1400° these substances react very little with Fe oxide. Chromite concrete is a good refractory above 1750°. It was prepd. from clay cement, Saranov chromite, metallurgical magnesite and sol. glass by mixing the dry components without cement, adding cement with 7–8% of water (on the dry wt. of the mixt.), mixing thoroughly and forming into cubes and cylinders under a pressure of 400 kg./sq. cm. The samples were burned at 1450° and kept at the max. temp. for 1 hr. Tests of furnace bottoms of the chromite-magnesite concretes under production conditions verified the data obtained from the lab. expts. W. R. Henn

A monolithic floor of a tunnel kiln car made from refractory concrete. S. N. Vasil'ev. *Ogneupory* **7**, 469–72 (1939).—Best results were obtained with a batch contg. 30% of Al_2O_3 cement. E. E. Stefanowsky

The preparation of refractory material with a high alumina content. Fernando Babini. *Corriere dei Ceramisti* **18**, 391–3(1937); *Chem. Zentr.* **1938**, I, 4366.—Mixts. of clay and Al_2O_3 having the compn. $2SiO_2.3Al_2O_3$ were divided after the addn. of water and portions molded by hand while other portions were treated by the Weber filter method. The masses were all fired at 1350° and tested. The material prepd. by the Weber method was less porous, possessed a higher resistance to breaking, and showed fewer flaws after firing. M. G. Moore

Refractories used in the steel foundry. A. V. Leun. *Trans. Am. Foundrymen's Assoc.* **47**, 534–46(1940).—See *C. A.* **33**, 7062[1]. J. E. D.

Investigation of the expansion and compression curves of Dinas for use in the construction of the diagrams of the heating and cooling of coke ovens. I. S. Smelyanskiĭ and N. L. Pevsner. *Coke and Chem.* (U. S. S. R.) **7**, No. 4–5, 80–90(1937); *Chem. Zentr.* **1938**, I, 4222.—Curves for various qualities of Dinas brick (of U. S. S. R.) were detd and from them the conditions of heating and cooling of coke ovens derived. M. G. Moore

Thermal splintering [chipping] of heat-resistant magnesite stones. Seizi Kondo and Hirosi Yosida. *J. Japan. Ceram. Assoc.* **46**, 4–8(1938); *Chem. Zentr.* **1938**, I, No. 14, 2936.—Water chilling is not a satisfactory test because steam which is generated hydrates the MgO and affects tensile strength. Air chilling gives satisfactory relations between resistance to splintering and tensile strength but errors in measurements become large. Compressive strength is often increased by air chilling. The decrease in modulus of fracture in air chilling shows satisfactory agreement with the modulus of elasticity at high temps. Karl Kammermeyer

Production of refractories from South African magnesite. H. Jacobs. *Minerals Research Lab. S. Africa Bull.* No. 1, 44 pp.(1936); *Ceram. Abstracts* **19**, 69.—J. investigated the manuf. of magnesite brick from pure South African cryptocryst. magnesite. The sintering temp. of the ore was detd., and the effect of adding talc-carbonate rock was studied. Dead-burning was effected in a high-frequency elec. furnace. A complete investigation of the refractoriness under load, spalling and slag resistance, crushing strength, etc., was made. C. L. B.

Determination of water absorption by refractories. M. A. Melamed. *Ogneupory* **7**, 502–8(1939).—Boiling the sample for 30 min. is sufficient. It is not necessary to pour water slowly on the sample before boiling or to let the sample stand for 24 hrs. after boiling. E. E. S.

Stoneware glazes free from lead and boron. Heinrich Roch, Jr. *Sprechsaal* **73**, 54–5(1940).—Several oxides may be used in place of PbO and B_2O_3. BaO and MgO should be avoided. ZnO and CaO together with alkali metal oxides are satisfactory. A recommended glaze is 0.38–0.45 KNaO (Na:K between 2:1 and 1:2), 0.62–0.55 CaO or ZnO, 0.32–0.48 Al_2O_3, and SiO_2 7–10 × Al_2O_3. The glost temp. is cone 2a – 3a. J. M. Noy

The resistance of enamels to acids (a new method for its determination). Gerhard Schmidt. *Chem. Fabrik* **1940**, 49–54; cf. *C. A.* **30**, 1963[9], 6154[1].—Pieces of the enamel are exposed to the acid for different lengths of time and the losses plotted against times. A math. law is developed from the curve and by extrapolation the results of long-time exposures can be predicted. A method of developing the law from short exposures is given. 9 references. J. H. Moore

Testing the "scratch hardness" of different enamels. A. Königer. *Glashütte* **69**, 465–8, 484–6, 499–501, 515–18, 531–3(1939).—See *C. A.* **33**, 1899[1]. In the 15th line of the abstract for "A fluorspar content of 90% or over," read "A fluorspar content of 9% or over." M. V. C.

Enamels with low boric acid content. R. Aldinger. *Glashütte* **69**, 797–9(1939).—The B_2O_3 content of most enamels could be reduced by half without materially affecting their properties. In many cases borax can be eliminated entirely, though the resulting enamels possess different properties and require special prepn. Enamels with low or no borax content can be obtained by the substitution of other fluxes partly or entirely by partial or complete replacement of the refractory materials feldspar and quartz, by other more easily fusible natural or artificial silicates or silicate mixes or by a combination of both. The following ground enamel with low borax content can be used as a starting point in tests: quartz 15 parts, feldspar 32, $BaCO_3$ 5, ZnO 4, fluorspar 16, borax 10, Na_2CO_3 16, $NaNO_3$ 2, CoO 0.3 and NiO 0.3. Mill batch: frit 100, fluorspar 10–15, clay 10, borax 1 and Na_2CO_3 1. The batch compn. of other ground and coat enamels with low borax content is given. M. V. C.

Preventing loss of raw materials and enamel. Richard Aldinger. *Glashütte* **69**, 617–20(1939). M. V. C.

Utilization of the gold-containing waste materials in porcelain faience plants. B. A. Khizh. *Stroitel. Materialy* **1938**, No. 12, 34–5; *Khim. Referat. Zhur.* **2**, No. 5, 88 (1939).—The materials which have been in contact with the Au paint are first burned. The ashes are then transferred to the refinery for extn. Instructions for the collection, storing and regeneration of the gold-contg. materials are given. W. R. Henn

An analysis of the body material of ancient faience found at Antioch-on-the-Orontes. Earle R. Caley. *Tech. Studies Field Fine Arts* **8**, 151–4(1940).—The body was devoid of glaze, was white, very friable and composed of fine grains of cemented quartz. The compn. was: SiO_2 98.64, CuO 0.27, R_2O_3 0.29, CaO 0.11, K_2O 0.12, Na_2O 0.08 and loss on ignition 0.55. The presence of Cu seems to support the theory that the glaze was sometimes used as a binder for quartz particles that formed the body material of ancient faiences. A. W. King

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Shabry deposit of talc-magnesite stone [bricks] (Ural'skiĭ) **8.** Crystals of quartz glass (Shishakov) **2.** Viscosity of system B_2O_3–SiO_2 (Leont'eva) **2.** Apparatus fo

molding bottles or other articles of glass (U. S. pat. 2,185,678) 13.

Arnold, Hugh: Stained Glass of the Middle Ages in England and France. London: A. & C. Black, Ltd. 283 pp. 15s.

Ceramic Data Book, 1939–40. 12th ed. Chicago: Industrial Publications, Inc. 268 pp. Reviewed in *Can. Chem. Process Inds.* 24, 150(1940).

Glass. Algemeene Kunstvezel Maatschappij N. V. Brit. 509,007, July 10, 1939. Molten glass free from stones, bubbles and seeds is produced by heating or melting glass stock in the form of rounded bodies, e. g., ovoids, in a highly internally strained condition. A heat-supply body of molten glass may be provided and the glass stock fed thereto, the heat of the supply body being permitted to melt and cause the stock to slump and form part of the body. The stock may be fed at 1 end of the body and molten glass withdrawn at the other end.

Furnaces for heating glass, etc. Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny et Cirey. Brit. 509,008, July 10, 1939. Liquid baths, e. g., molten glass or salts and other electrically conducting liquids, are heated in furnaces in which at least a part of the heating is effected by passage through the liquid of elec. current from electrodes immersed therein, at least 1 electrode being hollow and formed of a material permeable by gases, e. g., graphite, the hollow of the electrode being closed to the liquid and open to atm. or connected to evacuating means or to means for supplying gas. Undue formation of bubbles at the surface of the electrode is thus avoided.

Furnace and container for melting glass. Paul G. Willetts (to Hartford-Empire Co.). U. S. 2,186,223, Jan. 9. A container for molten glass comprises a bottom including an under support, and an inner portion formed of refractory blocks resistant to the attack of molten glass, granular material disposed between the under support and blocks and of such character as to remain granular during the heating up of the blocks to the highest temp. which they attain during normal use, and material disposed between the blocks of such character that it will seal the joints therebetween and prevent penetration of molten glass through the joints between the blocks to the granular material thereunder. Cf. *C. A.* **34**, 1829[9].

Apparatus for feeding mold charges of molten glass. Thomas F. Pearson (to Crown Cork & Seal Co.). U. S. 2,185,565, Jan. 2. Various structural, mech. and operative details.

Controlling arrangements for the pneumatic operation of automatic machines for feeding and shaping glass. The Sheppee Motor and Engineering Co. Ltd., Samuel G. Jowitt and Frank B. Jackson. Brit. 509,022, July 10, 1939.

Apparatus for making glass bottles, jars, etc. Thomas F. Pearson (to Crown Cork & Seal Co.). U. S. 2,186,174, Jan. 9. Various structural, mech. and operative details.

Apparatus for the manufacture of blown glass articles. Jérôme & Bonnefoy & Cie. S. à r. l. Brit. 508,784, July 4. 1939.

Apparatus for drawing glass tubes. S. I. Korolev. Russ. 55, 962, Oct. 31, 1939. Construction details.

Apparatus for drawing window glass. Don R. Limbers (to Pittsburgh Plate Glass Co.). U. S. 2,184,873, Dec. 26. Various structural, mech. and operative details.

Tongs for use in tempering glass sheet. Lloyd V. Black (to Pilkington Bros., Ltd.). Can. 387,278, Mar. 5, 1940. Structural details.

Regulating the temperature of metal cylinders such as those used in the manufacture of glass sheets. André Do Huu Chan (to Soc. anon. des manufactures des glaces et produits chimiques de Saint-Gobain, Chauny & Cirey). U. S. 2,184,908, Dec. 26. A device for regulating the temp. of a cylinder of the kind used in connection with the manuf. of glass comprises, in combination, a frame, a multiplicity of fine elastic metallic elements mounted in the frame so as to be elastically applied against the surface of the cylinder, whereby an interchange of heat with the cylinder is performed through the elements, the frame being rotatable and the elements forming a cylindrical brush about the axis of rotation of the frame.

Safety glass. James H. Sherts (to Pittsburgh Plate Glass Co.). U. S. 2,184,876, Dec. 26. A plate of safety glass comprises a single glass sheet, a layer of a polymerized incomplete poly-vinyl acetal resin formed by the reaction of poly-vinyl alc. with butyraldehyde mixed with a glycol dihexoate as a plasticizer adhered to one face of the glass sheet, and a layer of polymerized incomplete vinyl acetal resin substantially free from plasticizer and formed by the reaction of poly-vinyl alcohol with CH_2O adhered to the outer face of the first resin layer.

Sealing electric conductors into quartz and like highly refractory vitreous material. The General Electric Co. Ltd., Norman L. Harris and Walter A. Lewis. Brit. 509,077, July 11, 1939.

Ceramic building bricks, etc. Kamillo Konopicky. U. S. 2,184,601, Dec. 26. A ceramic building brick or the like resistant to spalling comprises a base mass of ceramic material which forms its main body, and a surfacing material comprising bodies of ceramic material such as coarse grains spaced at least at the portions of the bodies adjacent the outer surface of the brick from the adjacent ceramic material by interfaces of dividing material such as Al compds. of less tensional strength than the base mass and nonreactive with the adjacent surfaces at temps. to which it is subjected during the formation of the brick.

High-temperature refractory. John D. Morgan (to Power Patents Co.). Can. 387,286, Mar. 5, 1940. A refractory for continuous use up to 3000°F. is prepd. by mixing equal parts of milled and grained zircon with the following based on the wt. of the zircon, MnO 4.6, CuO 1.5, and H_3PO_4 11.6%, thoroughly mixing and digesting, molding to shape, and firing at above 500°F.

Porous refractory. John D. Morgan (to Power Patents Co.). Can. 387,287, Mar. 5, 1940. Milled grain zircon, grain zircon, Al, rosin, gelatin, $Ca(OH)_2$ and water are formed into a porous refractory by reaction at high temp., mixed with 25–75% by wt. of a native refractory and a bonding agent, and the mixt. is fired at a high temp.

Porous refractory. John D. Morgan (to Power Patents Co.). Can. 387,288, Mar. 5, 1940. Milled grain zircon 100, $Al(OH)_3$ 2, H_3PO_4 about 12 parts and enough water are intimately mixed, a granulated solid org. material is intimately dispersed in the plastic mass, the mixt. is dried, and the org. material burned out by firing at a high temp.

Bonded refractory. John D. Morgan (to Power Patents Co.). Can. 387,285, Mar. 5, 1940. A refractory aggregate is mixed with a halide of Mg, Sn, Th, Ca, Al, Zr or Ti, sufficient H_3PO_4 is added to form the metal phosphate, and the product is fired. The amt. of metal halide is 5–15% by wt. of the combined mass on a dry basis.

Mold for casting refractory oxides such as fused alumina. John C. McMullen (to Carborundum Co.). U. S. 2,185,772, Jan. 2. A facing for contact with the molten material is formed of an unfired mixt. of 75–95% of inert refractory granules of about 14–50 mesh and 5–25% of finely divided carbon, with use of a temporary binder such as pitch.

Checkerwork for regenerators such as those used with blast furnaces. Albert Mohr, Jr., Fredrik Wille and John P. Grilli. U. S. 2,185,559, Jan. 2. Various structural details.

Insulating beads for supporting electric conductors. The General Electric Co. Ltd., James R. Lait and Marcello Pirani. Brit. 508,812, July 6, 1939. The beads are made by forming a ceramic body having a thermal expansion approx. that of the wires and provided with holes into which the wires fit, filling the holes, not necessarily completely with molten glass also having a thermal expansion approx. that of the wires, and forcing the ends of the wires into the holes. For Mo wires, a suitable ceramic compn. has the compn. Al_2O_3 64, SiO_2 25, BeO 7, MgO 2 and ThO_2 2%, and a suitable glass, the compn. SiO_2 54.7, Al_2O_3 + Fe_2O_3 20.9, CaO 13.7, B_2O_3 7.7 and BaO 3.0%. Steatite

may be used as the ceramic with Ni-Fe wires of similar expansion.

Abrasive sheet material. Howard G. Bartling (to Minnesota Mining & Mfg. Co.). U. S. 2,186,001, Jan. 9. A flexible backing such as paper or cloth carries an adhesive bonding material in which abrasive grit grains are embedded and which is sepd. from the backing by a layer of hygroscopic material such as gelatin which serves to give pliability.

Coated abrasive sheet material. Nicholas H. Oglesby (to Behr-Manning Corp.). U. S. 2,184,896, Dec. 26. A cellulosic backing such as one of paper or cloth has a layer of grit bonded to it by a layer of synthetic substantially unplasticized resin cured to an inflexible state, at least one third of the vol. of the grits of the grit layer being above the av. level of the resinous adhesive, the bond between the grains extending under and forming a stratum between the bottoms of the grains and the backing and the backing having a substantial portion of its thickness unpenetrated by and unmodified by the resinous adhesive, the resin bond being cured for such time periods and temps. as to have the characteristics of being water-resistant, hard, rigidly holding the grains in place and having a high tensile strength substantially above 6000 lb. per sq. in. and being tough enough to prevent disintegration of the binder or dislocation of the grains from the binder under impacts encountered in use but being sufficiently brittle to permit mech. flexing in which the bond is cracked to impart flexibility to the abrasive articles without serious injury to the bond.

Tunnel kiln. A. F. Krasikov. Russ. 52,273, Dec. 31, 1937. Construction details.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Structure of hydrated portland cement. B. Tavasci. *Chimica e industria* (Italy) **21**, 656–61(1939).—The structures of several old mixes of portland cement which were completely set were observed. The nonhydrated portion shows clearly 4 constituents: *A*, *B*, *C* and *D*, while the hydrated clinker shows a 5th constituent *E*. These constituents are identified as: *A* cryst. $Ca(OH)_2$, *B* the isotropic gel, *C* $2CaO.SiO_2.Al_2O_3.aq.$, *D* a hydration product of celite in alk. medium, created within the cement, *E* is either added $CaCO_3$ or some aluminate formed by added $CaCO_3$ with other cement constituents. Two pages of photographs of these constituents are shown.
A. W. Contieri

Georgia ocher in portland cement. Guy W. Jordan and David P. Hale, Jr. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. **1135**, 7 pp.(1939).—Cartersville ochers offer the cement industry a large source of a high-Fe product, low in SiO_2, const. in compn., and requiring little grinding. The Fe oxide lowers fuel consumption, increases ease of proper burning, lessens destructive action on refractories, and improves the quality of the cement by reducing expansion and contraction, increasing strength, increasing resistance to freezing and thawing, and increasing resistance to sea water. Alden H. Emery

Mineral content of aluminous cement. N. Sundius. *Proc. Symposium Chem. Cement, Stockholm*, **1938**, 395–421; *Chem. Zentr.* **1939**, II, 3736.—A report on the chem. compn. and mineral content of 4 types of aluminous cements. M. Y. Condoide

Controlling the quality of clinker. J. H. Jennings. *Cement Lime Manuf.* **12**, 47–53(1939).—Mill tests indicate that there is a fairly uniform predictable relationship between the weight per l. of a definitely graded sample of clinker and the optimum quality (min. proportion of free lime and high strength). The clinker as it comes from the kiln passes a sieve having square openings 7 mm. on a side and are retained on a sieve with square openings 4.5 mm. on a side. The test is performed in a few min. and enables the burner-man to produce a more uniform quality of clinker. A. W. King

Manufacture of mortar materials from dolomite. Albert Grimm. *Tonind.-Ztg.* **63**, 463–4(1939).—Better-binding products are obtained when the dolomite is incompletely burned so as to leave 20–30% of CO_2 in the material. This is difficult in the usual types of limekiln, but can be smoothly carried out in a rotary kiln.
B. C. P. A.

Investigation of the corrodibility of mortar and concrete by the determination of the velocity of diffusion. V. V. Kind and I. D. Zaporozhets. *Tsement* **1938**, No. 12, 33–5; *Khim. Referat. Zhur.* **2**, No. 4, 108(1939).—The method proposed by Pshenitsyn and Il'ina (*C. A.* **32**, 6421[8]) is unsatisfactory because the stability of mortar or concrete depends principally, not on its impermeability, but on its chem. compn. and on the compn. of the aggressive liquid or gas. Also, the permeability differs for different ions, whose diffusion velocity depends on their radii and on the adsorptive power of the mortar or concrete for the given ions. W. R. Henn

An answer to the article of V. V. Kind and I. D. Zaporozhets which criticizes the investigation of the corrodibility of mortar and of concrete by the determination of the velocity of diffusion. P. A. Pshenitsyn and N. P. Il'ina. *Tsement* **1938**, No. 12, 35–8; *Khim. Referat. Zhur.* **2**, No. 4, 108(1939); cf. preceding abstr.—The hydrolysis products of the cement are always lime, Ca silicates and aluminates regardless of the compn. of the cement. Numerous other considerations are presented which are in favor of their proposed method for the detn. of the stability of cements. W. R. Henn

Causes of the bond between steel and concrete. B. Pogány. *Cement Lime Manuf.* **12**, 99–102(1939).—Various theories of the causes of the bond are discussed. It is concluded that it is not due to capillary forces and shrinkage alone, but that an additional effect is produced by the gel and cryst. substances of the mortar filling the pores of the steel. The bond may be increased by using larger bars with a softer surface and looser texture, softening the surface of the steel by annealing, roughening the steel surface with acids, and accelerating the setting and drying out of the mortar by raising the temp.
B. C. P. A.

Effect of storage on the moisture content of lumber. J. S. Matthewson. *Wood Products* **45**, No. 2, 12–14(1940).—For the most satisfactory service, such products as flooring and interior finishing woodwork in heated dwellings in most parts of the U. S. should be installed at about 8% moisture content. Curves are given relating relative humidity and temp. to moisture content of wood. Lumber seasoned to low moisture content values should be stored in heated sheds. Whether an unheated shed is closed or nearly closed makes little difference in its effect on the av. moisture changes of the lumber stored therein.
George Ayers

Reconstruction of the ice skating rink at the University of Illinois. John Doak. *J. Am. Concrete Inst.* **11**, No. 1, *Proc.* **36**, 1–20(1939).—A concrete floor contg. steel and brass contraction-joint strips, in which were imbedded black-steel brine pipes, was so disintegrated after 6 years of service that an entirely new floor was built. The brine pipes had failed because of external corrosion; the inside of pipes was intact; much of the concrete was porous, and corrosion was more pronounced in the presence of porous concrete; a potential of 50 mv. existed between the brass joint strips and the pipe, with the pipe positive; wood blocks left imbedded in the concrete and in contact with the steel pipe hastened pipe corrosion. The new floor is made without joints, of torpedo sand, crushed limestone and high-early-strength portland cement, with care to reduce voids to a minimum. **Discussion.** Roy Peck. *Ibid.* **11**, No. 4, *Proc.* **36**, 20–1, 20–4(1940).—P. attributes the failure of the concrete floor to damaging differential

stresses between the brine circulating pipes and the surrounding concrete caused by sudden and wide temp. changes that cracked the pipe and let $CaCl_2$ brine to leak out; electrolytic corrosion is claimed to have continued destruction at these cracks. It is recommended that bond between the pipe and the enveloping concrete be broken by coating the pipe with some liquid film just prior to placing the concrete. A. W. King

Bituminous protective coatings for buildings. Walter Becker. *Angew. Chem.* **53**, 82–8(1940).—A summary which covers the following subjects: prepn. and properties of base materials; types of coatings; application and processing; and standards and regulations. Data and 23 references are given. Karl Kammermeyer

Building decays and their control in the South. Arthur F. Verrall. *Pests* **8**, No. 3, 15–17(1940).—A review referring to chem. control as well as other measures. Henry H. Richardson

Dangers in the use of arsenic compounds in the preservation of wood and paper used in the construction and management of dwellings. H. C. Dudley. *Bull. office intern. hyg. pub.* **30**, 2612–13(1938).—The wall papers generally in use in the U. S. do not contain dangerous amts. of As. Because of the relatively small quantity of As compds. used in the treatment of wood intended for home construction, the danger of As poisoning of the inhabitants from this source is probably small in the U. S. Ruth Berggren

Toximetric method for oil-soluble wood preservatives. Ernest E. Hubert. *Ind. Eng. Chem., Anal. Ed.* **12**, 139–41(1939); cf. *C. A.* **32**, 5531[3], 7239[4]; **34**, 1179[4].—As a standardized method wood blocks uniformly impregnated were tested for permanence of toxicants, resistance to leaching in water and volatilization. In detg. the toxicity of oil-sol. materials against fungi the following allowances for exptl. error should be made for losses in wt. of treated test blocks: (*a*) a 4% max. loss in wt. in any single treated test block, and (*b*) a 1% av. loss in wt. for all treated test blocks in a test run. As a preliminary measure of the resistance to volatilization of any toxicant, the vapor-pressure data at 100° should be used as a guide. Numbered test blocks of ponderosa pine sapwood conforming to specified size are exposed to each fungus used, with controls. All blocks are conditioned to a stated moisture content, wts. and vols. noted. Test fungus for decay is *Lenzites trabea* and for staining of wood *Homiscium gelatinosum*, cultured in a special agar medium. The inoculated containers are incubated at 26–28° for 21 days before the blocks are placed in them. The preservative used is dild. with an equal vol. of solvent naphtha and the test blocks are impregnated, after which they are weighed. They are then reconditioned and incubated at 26–28° for 63 days, scraped, dried and weighed. Computations are given for estg. wt. losses due to decay. For resistance to volatilization and leaching the same method with certain exceptions is used. Lucien Y. Dyrenforth

Properties of soils related to termite control (Hackenyos) **15.** Detection of radioactive cement in cased wells (Howell, Frosch) **22.** Monolithic floor of tunnel kiln car made from refractory concrete (Vasil'ev) **19.** Use of method of thermal analysis [for cement components] (Kind, *et al.*) **2.**

Garner, F. H., Gabriel, L. G., and Prentice, H. J.: Modern Road Emulsions. 2nd ed. London: Road Emulsion and Cold Bituminous Roads Assoc., Ltd. 245 pp. 10s. Reviewed in *J. Inst. Petroleum* **26**, 112A (1940).

Haegermann, Gustav: Die Beeinflussung des Schwindens von Portlandzement durch Sulfate. Berlin-Charlottenburg: Zementverlag. 24 pp. M. 1.60.

Kupfer, Carl: Der Betonbauer. Ein Lehr- u. Nachschlagewerk. Bd. IV. Die Bewehrungsarbeiten. Werkzeug. Allgemeines über Zement und Beton. Der Werkstoff Eisen. Berlin: Elsner Verlagsgesellschaft. 133 pp. M. 8; bound M. 9.20.

Schwiete, Hans E., and Tscheischwili, Leonid: Die Verarbeitbarkeit von Zementen (System Zement–Wasser). Berlin: Volk und Reich Verlag. 77 pp. M. 2.

Beton-Kalender. Taschenbuch für Beton- u. Eisenbetonbau sowie die verwandten Fächer. Berlin: Ernst & Sohn. 476 pp. M. 6.20.

Apparatus for drying cement slurry. Niels S. Borch and Kristian Middelboe (to F. L. Smidth & Co.). Can. 387,004, Feb. 20, 1940. Structural details.

Asbestos cement. Mikael Vogel-Jorgensen (to F. L. Smidth & Co.). U. S. 2,185,959, Jan. 2. Various details of app. and operation.

Apparatus for making shingle stock from asbestos fibers and cement. Arthur G. Leonard, Jr. (to Lehon Co.). U. S. 2,184,619, Dec. 26. Various structural and operative details of app. for forming a web and spray-coating it with material such as a coloring compn.

Lining pipes or the like with cementitious material. Harry Ridley. U. S. 2,185,570, Jan. 2. Various details of app. and operation.

Tube mill suitable for treating fuel used in firing cement kilns. Mikael Vogel-Jorgensen (to F. L. Smidth & Co.). U. S. 2,185,960, Jan. 2. Various structural and operative details of an air-swept mill.

Apparatus for manufacture of porous pipe from concrete, etc. Karl Klemschofski and Paul Vrana. U. S. 2,185,597, Jan. 2. Various structural, mech. and operative details.

Plaster of Paris. A. V. Volzhenskiĭ. Russ. 52,113, Nov. 30, 1937. Gypsum stone is ground in a mixt. with burned lime. The gypsum is dehydrated by the heat generated in the slacking of the lime with H_2O present in the gypsum stone.

Cementitious shingles. Norman P. Harshberger (to Bakelite Building Products Co.). U. S. 2,185,195, Jan. 2. A method of making and curing cementitious shingles comprises applying a surface layer of plastic hydraulic cement upon fibrous base material of sufficient rigidity to support by itself the cement surfacing, which extends over certain edges of the base material; forming a compact grouping consisting of a plurality of units of the cement-surfaced base material, and flexible membranes that will not bond to hydraulic cement and of greater dimensions than the units, forming the group while the cement is still plastic with the sides of the units facing each other and with the flexible membranes projecting beyond the edges of the units and covering the cementitious surfacings of the units substantially to prevent bonding of the hydraulic cement side or edge surfacing of one unit with the side or edges of an adjoining unit in curing, and curing the units as thus arranged. The units are adapted for packaging without regrouping the individual layers.

Composition flooring. Robert M. Freer and Geo. Morris (to Imperial Chemical Industries Ltd.). U. S. 2,184,811, Dec. 26. See Brit. 500,650 (*C. A.* **33**, 5625[5]).

Wood preservative. Karl Wolman and Richard Huber. U. S. 2,185,533, Jan. 2. A wood preservative in solid, stable and readily sol. form is formed of an alkali metal chromate, $NH_4F.HF$ or $KF.HF$, and sufficient K_2CO_3 that an aq. soln. of the mixt. has a pH of about 7. Cf. *C. A.* **33**, 2308[3].

Compositions for preserving wood, etc. Alfred D. Chapman and Ralph M. Lindgren (to A. D. Chapman & Co.). U. S. 2,186,134, Jan. 9. A compn. for use in the preservation of cellulosic materials from decay, stain and mold fungi and insects, comprises a water sol. mixt. of an alkali metal salt of tetrachlorophenol or pentachlorophenol, and an alkali metal borate, the ratio of alkali metal salt of the halogenated phenolic compd. to the alkali metal borate being approx. 1 to 1.5.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND A. GEORGE STERN

Some fundamentals of smoke abatement. J. F. Barkley. *U. S. Bur. Mines, Circ.* 7090, 59 pp.(1939). Alden H. Emery

A comparison of producer fuels. A. A. Mitchell. *Gas J.* 229, 301–2(1940).—Tests were made on the inside-type producers of the Woodall-Duckham continuous vertical retorts at Dunfermline with screened coke (over 3/4 in.), unscreened coke and coke nuts (3/4–3/8 in.), resp. The corresponding ash contents of the ashes were found to be 95%, 85%, and 77.8%. P. J. Wilson, Jr. 2

Survey of fuel consumption at refineries in 1938. G. R. Hopkins. *U. S. Bur. Mines, Rept. Investigations* 3485, 6 pp.(1939); cf. *C. A.* 33, 3123[8]. Alden H. Emery

The development and the present position of the I. G. hydrogenation process [for production of liquid fuel]. W. Boesler. *Chem.-Ztg.* 64, 81–4(1940). E. H. 3

Industrial synthesis of hydrocarbons from hydrogen and carbon monoxide. A. J. V. Underwood. *Ind. Eng. Chem.* 32, 449–54(1940).—The Fischer-Tropsch synthesis (Ger. pat. 484,337, *C. A.* 25, 1119) is a process in which liquid hydrocarbons are produced from a mixt. of 1 part CO and 2 parts H_2. The industrial applications and practices of this synthesis are discussed. Co, Ni and Fe are effective catalysts. A Co catalyst supported on kieselguhr gives highest yields and has the longest life. Max. yields are obtained by pressures of 5 to 15 atms. The gasoline fraction is greatest at near atm. pressure. The raw-material sources do not affect the character of the products obtained. Amos G. Horney 4

A method for the determination of the yield of the distillate up to 180° in crude benzene. M. I. Lyukimson. *Coke and Chem.* (U. S. S. R.) 1938, No. 12, 30–1; *Khim. Referat. Zhur.* 2, No. 5, 98(1939).—The amt. of the distillate up to 180° is usually detd. at the moment the temp. is reached without waiting for the product to pass from the condenser. This gives results 1–2% low. W. R. Henn 5

Carbon-residue test not closely related to performance. W. L. Nelson. *Oil Gas J.* 38, No. 35, 48, 51(1940).—The Conradson carbon-residue test is applied to gas enrichment and fuel oils and oils for use in internal-combustion engines. A survey of available data indicates little relationship between carbon residue and service, especially in internal-combustion engines. W. Andrew Wright 6

Rating aviation fuels in full-scale aircraft engines. H. K. Cummings. *S. A. E. Journal* 43, 497–503T(1938).—The A. S. T. M. procedure for rating fuels satisfactorily predicts full-scale values of highly unsatd. fuels, both leaded and unleaded, up to octane no. 84, but fuels of octane no. 74 are underrated by 6–8 nos. and 100-octane no. fuel by 2–4 nos. B. C. P. A. 7

The ignition quality of Diesel fuel. Teturo Suwa and Takeo Inatome. *Rept. Imp. Fuel Research Inst.* No. 40, 96 pp.; *J. Fuel Soc. Japan* 18, No. 201, *Abstracts* (in English)49–58; *Fuel* 18, 310–15(1939). D. A. Reynolds

Laboratory determination of ignitibility of Diesel fuels. G. Vorberg. *Oel Kohle Erdoel Teer* 15, 497–9(1939).—As a measure of ignitibility the H content is unreliable, but the "Diesel index," based on the aniline point and d., and the derived cetene no. (*C. A.* 31, 3677[5]) show good correlation with motoring tests. B. C. P. A. 8

Ignition lag and propagation of combustion in direct-injection Diesel engine. L. Herele. *Forsch. Gebiete Ingenieurw.* 10, 15–27(1939).—Expts. were carried out on a 3-cylinder, 2-stroke, Krupp Diesel engine developing 75 h. p. at 500 r. p. m. The engine was operated under full-load conditions and the ignition lag and the propagation of combustion were measured by the ionization method, using special point electrodes placed inside the combustion space of one cylinder. Ignition starts almost simultaneously at various isolated regions in the confines of the fuel jet which do not occupy a fixed position for successive explosions. The combustion is not propagated along the jet, but spreads out laterally, conforming to local turbulence variations. The irregularities in the spread of the combustion revealed by the ionization method were confirmed by observations of the radiation emitted through a window in the combustion chamber. B. C. P. A. 9

Motor fuel of high octane number. Synthesis of isooctane from water gas. Giulio Natta and M. Baccaredda. *Riv. ital. petroli* 6, No. 65, 14–19(1938); *World Petroleum* 10, 69(1939); cf. *C. A.* 33, 8955[5].—Isobutylene (obtained by dehydrogenation of *sec*-BuOH produced in the synthesis of MeOH from water gas) mixed with a small amt. of gaseous HCl is heated to 100–250° and passed over solid Al_2O_3 previously activated by heating to 400–450°. The isooctene produced is then hydrogenated to isooctane. B. C. P. A. 10

Selective absorption of hydrogen sulfide. D. V. Bezuglyi and M. M. Rudakov. *J. Applied Chem.* (U. S. S. R.) 12, 697–703(in German, 703)(1939).—The conditions for selective absorption of H_2S of coke-oven gas with carbonates and sulfides of alkali metals was investigated. At low velocity of gas stream (0.03 m./sec.) the absorption coeff. of H_2S depends on the pH of the absorption liquid, and the absorption coeffs. of H_2S and CO_2 decrease simultaneously. With an increase of the velocity of gas stream (to 0.5–1 m./sec.), the effect of pH of the absorption liquid gradually diminishes and the selective absorption of H_2S reaches 90–8% and that of CO_2 7–9%. The phenomenon of absorption is explained by slow absorption of CO_2 which proceeded through a stage of slow reaction of hydration of CO_2. A. A. Podgorny 11

Combustion calculations using the mol. H. L. Norris, Jr. *Combustion* 11, No. 9, 41–4(1940).—Combustion calcns. are simplified by expressing the quantities in pound mols. rather than in pounds. This is discussed with reference to the burning of coal, natural gas and oil. Joseph H. Wells 12

The Mizpah coal field, Custer County, Montana. Frank S. Parker and David A. Andrews. *U. S. Geol. Survey, Bull.* 906-C, 85–133(1939). E. H.

Petrography and coking qualities of coals of the Niederbank-saddle-seam. St. Doktorowicz-Hrebnicki. *Panstw. Inst. Geologiczny, Sprawozdania* 8, 209–75(1937); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 846–7.—A detailed account of these coals is given with numerous diagrams and analyses. The volatile constituents vary from 30 to 34% in the durites in which semifusinite and micrinite predominate; they exceed 40% (occasionally reaching 45–46%) in the spore-durite with increased coking capacity; vitrite and clarite are intermediate. Progressive coalification is indicated by a decrease in the ratio O:H from 2.4 to 2.0; the content of free H increases from 3.6 to 4.0; the content of hygroscopic H_2O falls from 4.6 to 2.6 with proportional increase in coking capacity. C. A. Silberrad 13

Coal and ore in Sudetenland. E. Heugel. *Z. Ver. deut. Ing.* 82, 1503–7(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, 1939, 912–13.—A summary account of the coals of the Sudetenland, which include estd. amts. of 11.6×10^9 tons of brown coal in 3 basins, and over 1.5×10^9 tons of bituminous coal in 3 fields. Their proximate analyses and calorific values are given. The ash of the Idastollen seams contains 2.4% Cu and a good deal of Ag. The only other valuable minerals are those of Joachimstahl—ores of Sn, Co, Ni, W, U and Ra, of which only the 2 last are of much value, and the graphite of the Böhmerwald. C. A. S.

(Coal) research. Gilbert H. Cady. *Mining and Met.* 21, 32–3(1940).—A listing of coal research in progress in 1939; cf. *C. A.* 33, 2678[8]. Alden H. Emery 14

Recent developments in coal research. H. Lowry. *Proc. 2nd Ann. Coal Conf.*, in *West Va. Univ., Eng. Expt. Sta., Tech. Bull.* No. 13, 67–85(1939).—A review. G. G.

Physical and chemical survey of coals from Canadian collieries—Nova Scotia—Inverness County coalfield. R. A. Strong, E. Swartzman, E. J. Burrough, J. H. H.

Nicolls and R. E. Gilmore. *Can. Dept. Mines and Resources, Bur. Mines Mem. Ser.* No. 74, 70 pp.(1939).—Detailed chem. and phys. tests of 4 coals are presented. Data include size distribution, density, size stability, grindability, proximate analysis, ultimate analysis, calorific value, fusibility of ash, analysis of ash, S forms in coal, classification, washing characteristics, and coking properties. Alden H. Emery

Coal preparation. C. P. Proctor. *Mining and Met.* 21, 28(1940).—A review of progress in 1939. For oil-spraying, heavier oils are being used. Heat-drying of coal after washing is increasing. New types of cleaning equipment are listed. Alden H. Emery

Coal flotation. F. L. Kühlwein. *Kohle u. Erze* 36, 247–52(1939).—The economic importance and the merits and disadvantages of the flotation method of coal cleaning are discussed. B. C. P. A.

Processing and carbonization. A. C. Fieldner. *Mining and Met.* 21, 33–5(1940); cf. *C. A.* 33, 2678[8].—Research and construction in 1939 are reviewed. In the complete gasification of coal and coke, progress has been made in the installation of carbureted water-gas machines designed for the use of heavy oil. Further developments have been made in the reform oil-gas process for use in coal-gas ovens and the retort oil-gas process for use in retort benches of all types. This will give greater flexibility by increasing the gas-mfg. capacity of the units. A. H. E.

Washing coal in a dense medium by the loess process of the Dutch State mines. Ch. Berthelot. *Rev. ind. minérale* No. 449, 65–71(1940).—After a brief account of the liquids—heavy or contg. solid in suspension, used in coal-washing, the Staatsminjen loess system as used in the Dutch State mines in Limburg is described in detail, including in particular details of the cyclone thickener. The loess used consists of 75% sand and 25% clay, and costs nothing save for its extn. and carriage. The suspension is very stable, showing no marked increase in viscosity with increase in density until this is almost 1.6. The loss in use is less than 2 kg./ton, and the requirement of water only 700 l. (cf. Driesens, *C. A.* 33, 8956[9]). C. A. S.

Coal analysis. Carl B. Curtis, Jr. *Chemist-Analyst* 29, 9–11(1940).—Simplified directions for the proximate analysis of coal, including the detn. of S by the Eschka method, are given. W. T. H.

Correlation of analysis of coal with the products of carbonization in externally heated retorts. V. F. Parry. *U. S. Bur. Mines, Rept. Investigations* 3482, 37 pp.(1939).—Results from carbonization tests of 125 coals were correlated with their proximate analyses. The amt. of tar that will form, in an externally heated retort is directly proportional to the square of the O-free volatile matter (percentage of volatile matter − percentage of O combined with coal) contained in the coal charged to the retort and inversely proportional to the abs. temp. of carbonization. For the BM-AGA 13-in. retort, tar yield percentage = $10.4\ V^2/T$, where T is the abs. temp. of carbonization and V is the percentage of O-free volatile matter in the coal as charged. The amt. of water that will form during destructive distn. at low temps. is directly proportional to the O content of the coal substance raised to the 1.3 power. The average of 100 distns. in the Fischer retort shows H_2O formed percentage = $0.35 \times O^{1.3}$. The amt. of gas in B. t. u. per lb. of coal is directly proportional to the volatile heating value and inversely proportional to the square of the volatile matter in the coal. The formation of gas at 500–725° is proportional to the av. abs. temp. of the wall of the retort raised to the 3.5 power and at 725–1100° to the square root of the av. abs. temp. of the wall of the retort. The amt. of coke from carbonization = fixed C + ash + R. Factor R is called residual volatile matter and is the percentage of the original coal that remains in the coke as a product of decompn. from volatile matter in the coal. It is related to O-free volatile matter, abs. temp. of carbonization and shape and size of retort. A. H. E.

An x-ray study of carbonization. The effect of inorganic admixtures. H. E. Blayden, J. Gibson, H. L. Riley and A. Taylor. *Fuel* 19, 24–7(1940); cf. *C. A.* 33, 7521[8].—The addn. of certain inorg. reagents to cellulose brings about only small alterations in the crystallographic properties of the chars prepd. from it at 600 and 1000°. Small changes in the a dimension are recorded in certain cases, but none in the c. The considerable increase in C yield which occurs in every case indicates that the primary action of the admixt. is the formation of nuclei around which aromatic condensation can occur. D. A. Reynolds

Advantages of coal carbonization as exemplified in the Curran-Knowles process. M. D. Curran. *Mining and Met.* 20, 560–2(1939).—The Curran-Knowles oven consists of a horizontal hearth, heated by flues beneath, and inclosed by an arched top. The coal charge is approx. 12 in. thick; it may be 8–10 ft. wide and 40 ft. or more long. Cracking of gases and deposition of C are a min. The coke formed ignites easily and sustains combustion at low temps. Fireclay brick is used in the oven construction except in the floor and sole flues; most is of standard size. Distn. products leave the oven at 1000°F. less than retorts. About 45% of the gas produced is required to heat the ovens and furnish power. Feebly coking coals make strong coke. Breeze can be mixed with the coal without impairing the quality of the coke. Expanding coals can be carbonized as easily as shrinking. Power is derived from automobile motors fueled with gas from the process. Tar produced contains a higher percentage of oils and less pitch than the av. grade of tar. Alden H. Emery

Disco [Wisner] plant of Pittsburgh Coal Carbonization Co. [for low-temperature carbonization of coal]. C. E. Lesher and R. E. Zimmerman. *Coal Age* 44, No. 3, 45–9(1939).—A com. plant with a daily throughput of 325 tons of washed screenings or dust is diagrammatically described. The domestic coke (Disco) obtained, which represents about 72% of the coal treated, is dense (d. 8.5), highly reactive, and contains ash 9–10 and volatiles 15–18%. The tar yield is 16 gallons/ton. 4000–5000 cubic ft. (475 B. t. u./cu. ft.) of gas containing 2.5 gallons of light oil are also obtained. B. C. P. A.

The Nürnberg experimental low-temperature carbonization plants and coals tested therein. Josef Ipfelkofer. *Gas- u. Wasserfach* 83, 26–31(1940).—This plant is designed to produce coke of definite form by coking the coal in small sheet iron boxes of 80 mm. height in 3 cast iron upright chambers, 2.375 m. high, 0.26 m. wide and 1.52 m. long, the chambers being heated by combustion products of producer or coal gas mixed with enough air to give the desired temp. Each chamber carbonized approx. 1000 kg. of coal per 24 hrs. Coals available for carbonization included the Peissenberg "pitch" coal from upper Baden and the Stockheim coal which contained 71.1% vitrain. Difficulty had been found in burning or carbonizing this latter coal owing to its friability, low m. p., caking tendency, high ash, etc. The Stockheim coal gave a slightly higher lab. swelling test than the Peissenberg coal, but had 3 times as high an expansion pressure. It also showed an abnormally high resistance to gas flow by the Foxwell test, with a max. at approx. 400°. While the Peissenberg coal was essentially noncaking, and showed but little change in form on carbonization, the Stockheim coal foamed out of the small carbonization chambers, requiring the admixt. of about 90% of other coal to eliminate this. Successful carbonization was obtained by the use of much higher forms and a usable coke was produced. Other coals and blends were carbonized in the smaller forms without difficulty. Further tests will be reported later. R. W. R.

Kinetics of hydrogen consumption, oxygen removal, and liquefaction in coal hydrogenation; effect of rank. C. H. Fisher, George C. Sprunk, Abner Eisner, Loyal Clarke, M. L. Fein and H. H. Storch. *Fuel* 19, 13–16(1940).—A previous investigation (*C. A.* 33, 9587[9]) was continued to include the effect of rank. Anthraxylons were used to eliminate the difference attributable to petrography. Conclusions: The effect of rank on the H consumption rate, and on the total H consumed in a given time is small, and within the limits of exptl. error. That fraction of the O in anthraxylons that is rapidly eliminated as CO_2 and water in the early stages increases with decreasing rank. The course of the elimination of the remaining O is about the same for all samples tested. D. A. Reynolds

Hydrogenation of coal and petroleum. Roberto L. Valverde. *Bol. soc. quim. Peru* **5**, 159–77(1939).—A review of the Bergius process (Brit. pat. 244,730, *C. A.* **21**, 315) and its recent applications. W. F. Bruce 1

The sulfur content of Donetz coals. S. N. Zyman. *Coke and Chem.* (U. S. S. R.) **9**, No. 9, 15–16(1939); *Chimie & industrie* **42**, 797.—The S is distributed throughout the different seams of the deposit in zones; within each zone the variations in the total S content are relatively small. In most cases the org. S content is fairly const., while the pyritic S throughout the deposit varies from 0.02 to 6.48%. The sulfate S generally does not exceed 0.1%. Pyritic S can be calcd. from total S by means of the formula: $S_{pyr} = -0.38 + 0.737S_{tot}$. A. P.-C. 2

Desulfurization of coals. A. Z. Yurovskiĭ, M. M. Lifshits, A. A. Chemeris and A. L. Rubinshtein. *Coke and Chem.* (U. S. S. R.) **9**, No. 4–5, 17–21(1939); *Chimie & industrie* **42**, 800; cf. *C. A.* **33**, 8956[5].—Desulfurization by oxidation of sulfurous compds. by means of a mixt. of O (air) and steam is not suitable for coking coals because it produces a decrease in its agglutinating power. Semicoke can be easily desulfured in this way. Coke can be freed from sulfide S by this method. It is advantageous to use water instead of steam. A. Papineau-Couture 3

Industrial significance of impurities in coal. Sulfur and deposits in boiler-flue gases. J. Mayer and E. P. B. Wilson. *Combustion Appliance Makers' Assoc.* (*Solid Fuel*), Apr., 1939, 9 pp.(preprint); *Colliery Guardian* **158**, 699(1939).—The failure in service of stoker-fired boilers as a result of chem. deposition of condensates from the flue gases is discussed. It is considered that the immunity of pulverized-fuel-fired boilers from acid deposits, e. g., $NaHSO_4$, is due to the gas stream having a dust content of sufficient alkalizing power to neutralize acid deposits, or sufficient absorptive power to deal effectively with any acid mist present. B. C. P. A. 4

Industrial significance of impurities in coal. Impurities and characteristics of industrial coals. W. I. Jones. *Combustion Appliance Makers' Assoc.* (*Solid Fuel*), Apr., 1939, 16 pp.(preprint).—The nature of the impurities present in coals is discussed in relation to the choice of coals for specific purposes. B. C. P. A. 5

Texas lignite. II. Characteristics and combustion. Carl J. Eckhardt. *Southern Power and Ind.* **58**, No. 3, 38–42(1940).—Lignite as now mined in this area has a moisture content of about 35%; as burned the moisture content of the lignite corresponds to a loss of 5 to 6.5%. The danger of spontaneous combustion in piles of lignite has been overemphasized. The C content of lignite is approx. 40% and the H content of the Texas lignite varies from 2 to 4.5%, S from 0.2 to 1.5%, and ash from 7 to 11%. This ash is high enough for satisfactory combustion on grates. R. W. Ryan 6

New methods for the drying of lignite. Helmut Piascheck. *Z. Ver. deut. Ing., Beiheft Folge* **1939**, No. 6, 181–6.—A summary covering the following methods: steam drying, flue-gas drying, flue-gas turbine driers, pneumatic flue-gas driers, and flue-gas recirculation drying. Equipment diagrams are presented. K. K. 7

Process design of wet grinding installations for crude lignite processing. H. J. Hermisson. *Z. Ver. deut. Ing., Beiheft Folge* **1939**, No. 5, 149–54.—A comprehensive treatise with equipment and flow diagrams, and corresponding screen analyses of processed materials. K. K. 8

Combined water in peat. G. I. Porovskiĭ. *Za Torfyanuyu Ind.* **1939**, No. 1, 28–30; *Chimie & industrie* **42**, 640.—The quantity of combined H_2O in peat can be detd. from the displacement of the vol.-temp. curves on freezing. This is not a const. value, for it depends on the moisture content of the peat; at the start, the quantity of combined H_2O increases with the moisture content, and then it begins to decrease. The combined H_2O freezes at a temp. appreciably lower than 0°. A. P.-C. 9

Manufacture of charcoal in portable kilns. G. H. Donald. *Dept. Sci. Ind. Research* (Brit.), *Forest Products Research Records* No. 29, 20 pp.(1939).—Preliminary results obtained in an investigation of the essential conditions for a successful burn are given. The exptl. kiln consisted of a thin steel cylindrical shell, 6 ft. in diam. and 5.5 ft. high, fitted with inlet air pipes and outlet flues, and closed by a slightly conical lid, also of sheet steel. The methods of loading the kiln, igniting the charge, regulating the burning, and "flashing" the charge are all discussed in detail. The rate of burning was regulated by the outlet flues, pyrometers being used to follow the progress of burning. The majority of tests were made on beech cordwood. The size of wood carbonized ranging from 2 to 20 in. in diam., and from 3 to 4 ft. in length. It is estd. that with a kiln of this capacity, and using thoroughly air-dried cordwood which has been seasoning in the woods for not less than 6 months, yields of 450–550 lb. of well-made charcoal of an average volatile content of 12% should be obtained per burn. Two methods for detg. the volatile matter in charcoal are described. B. C. P. A. 10

Gas-producer operation. F. J. Matthews. *Glass* **17**, 44–6, 49(1940).—Elementary theory and outline of operation. Herbert S. Willson 11

Gas purification in small plants. D. K. Taylor. *Gas Age* **85**, No. 6, 28–9, 32(1940).—A description. Joseph H. Wells 12

Gasification of [fuel] particles in suspension. W. Gumz. *Feuerungstech.* **26**, 361–70(1938); cf. *C. A.* **34**, 871[6].—The principles involved are mathematically investigated and basic formulas are developed for the design of suspension gasifiers. B. C. P. A. 13

Cooling coke-oven gases by means of oil. I. Ya. Kryuger. *Coke and Chem.* (U. S. S. R.) **9**, No. 2, 35–7(1939); *Chimie & industrie* **42**, 642.—Use of solar oil or gas oil, instead of water, for cooling coke-oven gases offers the following advantages: lower NH_3 losses owing to its slight soly. in the oil; more complete extn. of the naphthalene from the gases; less corrosion of the cooling pipes; practically no choking of the piping; possibility of recovering the phenols extd. from the gases by the oil. A. P.-C. 14

Regeneration by desorption with a rich gas, of spent oil used for the removal of naphthalene from coke-oven gases. V. V. Zhdanov and D. E. Zil'bermann. *Coke and Chem.* (U. S. S. R.) **9**, No. 3, 42–4(1939); *Chimie & industrie* **42**, 642.—At const. temp. the yield of regenerated gas oil decreases with increase in the degree of desorption of naphthalene from the oil, but the decrease in yield is greater than the reduction in naphthalene concn. At const. naphthalene concn. the yield of regenerated gas oil increases with rise in desorption temp.; the latter should be at least 90°. The quantity of rich gas required increases especially during the elimination of the last traces of naphthalene from the oil. A. Papineau-Couture 15

Use of producer gas for motor transport. Committee on the Emergency Conversion of Motor Vehicles to Producer Gas. Harold Hartley, Chairman. *Gas J.* **229**, 351, 353 (1940).—Results of over 400 road tests covering approx. 50,000 miles with 9 vehicles, 22 producers of 9 different types, and over 120 distinct fuels, including 40 types of anthracite or fuels derived from anthracite are reviewed. Provided suitable equipment and fuels are used, producer gas can be regarded as a practicable alternative fuel for motor vehicles, and can be recommended for use in an emergency for certain types of road transport. Certain types of anthracite and of low-temp. coke have been found to be suitable fuels immediately available in relatively large quantities in Great Britain. Almost any process for low-temp. carbonization of coal can be made to produce fuels suitable for transport producers. High-temp. coke normally made in gas works and coke ovens is not suitable for existing types of producers. P. J. Wilson, Jr. 16

[Intermittent] vertical chambers with continuous [external] water-gas generation. A. Thau. *Oel Kohle Erdoel Teer* **15**, 419–25(1939).—The advantages of narrow, vertical chambers with inset, externally heated water-gas generator are described, with working results (cf. *C. A.* **31**, 4790[9]). The water-gas fuel may be coke, brown coal, or noncoking coal. Although the coal gas mixes with the water gas in the upper part of the generator there is no loss of tar by cracking. B. C. P. A. 17

Standards for manufactured gas and the Wobbe index. Paul Holthaus: *Gas- u. Wasserfach* **82**, 262–3(1939).—

The permissible variations in the Wobbe index for manufd. gas, given in German standards, are erroneous in that they are not consistent with the permissible variations in gross heating value and the related sp. gr. New standards are suggested in which the permissible variations in (abs.) gross heating value are fixed at not over ±25 kg.-cal. (between tests, ±75 kg.-cal.). An equation is then given which relates the permissible variations in gas d. to the heating value and the Wobbe index. R. W. Ryan

New Western Kansas gas-treating plant uses glycol in dehydration process. J. C. Albright. *Gas* **16**, No. 3, 27–9(1940).—This plant treated 20,000,000 cu. ft. (standard conditions) of natural gas per 24 hrs. at around 750 lb./sq. in. The gas is first scrubbed to remove butane and higher hydrocarbons and is then passed through the diethylene glycol contactor, counter current to a glycol flow of 5 gallons per min., reducing the dew point of the gas to 28°F. The glycol contactor has an inside diam. of 48 in. and an overall height of 27 ft. The diethylene glycol is concd. in a bubble type column, the glycol entering at about the half way point and being heated to 295°F. (top temp. of the still 266°F.). R. W. Ryan

A rapid method for determining the hydrocyanic acid content of coal-distillation and similar gases. Constanz Eymann. *Gas- u. Wasserfach* **83**, 52–5(1940).—The Feld method for detg. HCN in coal gas is inconvenient and time-consuming and leads to low values. The rapid and convenient ICN method yields values which are too low and the vol. of gas taken is so low (about 500 cc.) that even a series of such spot tests will fail to give reliable results if the HCN content of the gas is variable. A simple and rapid iodometric method is described which depends on the formation and measurements of BrCN. 50 to 150 l. of gas is passed through 40 cc. of 4 *N* KOH soln. Half of this soln. is slowly added (below surface) to 30 cc. of 8 *N* H_2SO_4 soln. contg. sufficient Br, extra Br water being added if required. Both HCN and HCNS are converted to CNBr. Excess Br is removed by adding a few cc. of 5% phenol soln. After 1/4 hr. 0.5 g. KI is added with shaking; after 0.5 hr. in the dark the soln. is titrated with 0.1 *N* $Na_2S_2O_3$ with starch as indicator. The soln. must remain colorless longer than 10 min. 1 cc. 0.1 *N* thiosulfate soln. = 0.00135 g. HCN. This method checks very well with the $NiCO_3$ method, and is simpler and more convenient than other control methods. It is especially adapted to continuous tests. R. W. Ryan

Concentrated ammonia liquor. Details of an investigation carried out in Australia. South Australian Gas Co. *Gas World* **112**, 76–7(1940).—A still was constructed of tin plate. With a feed of 24 gal. per hr. at 62.5° it produced a liquor contg. 20% NH_3 without deposition of NH_4 carbonate. P. J. Wilson, Jr.

Recovery of pyridine bases from the waste gases from the ammonia saturator. W. Klempt and R. Röber. *Chem. Fabrik* **1940**, 65–8.—Expts. were made to see if it would be possible to recover profitably the pyridine bases from the gas system of by-product coke plants, and, if so, at what point. The work is described in some detail pyridine balances are shown on flow-sheets for 2 types of plant, and it is concluded that recovery is feasible and that in practical operation a suitable washer with strong H_2SO_4 should be inserted behind the NH_3 saturator. J. H. M.

Solution of various fuels in phenol under hydrogen pressure. I. B. Rappoport and A. D. Khudyakova. *J. Applied Chem.* (U. S. S. R.) **12**, 759–66(in French, 766) (1939).—Equal quantities of coal and phenol were heated in a 2-l. autoclave at 250, 300, 350, 375, 400 and 420° under initial H pressure of 80 atm., at a velocity of heating of 3.3° per min. The amt. of ext. varied with the temp. used; under suitable conditions coal can be completely dissolved. Depolymerization takes place at high temp. in the presence of solvents, but without mol. decompn., since the gas obtained during extn. contained only a small amt. of methane hydrocarbons. A. A. Podgorny

Purification and stabilization of high-boiling phenols from peat tar. E. V. Lipkina. *J. Applied Chem.* (U. S. S. R.) **12**, 1172–7(in French, 1177)(1939).—These phenols can be stabilised and purified with $CuCl_2$ at 18–20°. $FeCl_3$ had about the same effect. $AlCl_3$, $ZnCl_2$, $NiCl_2$, Cu_2Cl_2, HCl and H_2SO_4 gave no positive results. Of all inhibitors now used, furfural gave a stable product. A. A. Podgorny

Results of coal tar research in the last 30 years. O. Kruber. *Angew. Chem.* **53**, 69–74(1940).—A comprehensive summary with 60 references. Karl Kammermeyer

Catalytic hydrogenation of phenolic oil in low-temperature tar. VIII. Effect of some catalysts on the desulfurization of phenolic oil. Singo Andō. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 358(1939); cf. *C. A.* **33**, 8961[1].—A pitch-free low-temp. tar phenolic oil was treated with 4.0–5.6% of H at 90–110 atms. in a rotating autoclave at 462–9° in the presence of 5% Fe_2O_3, Ni_2O_3, $SnCl_2$, and a mixed catalyst (10% $(NH_4)_2MoO_4$, 9% Ni_2O_3, 36% Fe_2O_3 and 45% Al_2O_3). The products made without catalyst and with Fe_2O_3 required 8.0 and 6.5%, resp., of Ni_2O_3 for hydrogenation at 300° to give the higher alcs. of the cyclohexanol series. For the products made with the other catalysts, only 2% of Ni_2O_3 was required for the hydrogenation, indicating a more complete preliminary desulfurization. Arnold M. Collins

Coking acid tar. V. K. Shchitikov and G. N. Krutikov. *Neftyanoe Khoz.* **20**, No. 3, 34–8(1939); *Chimie & industrie* **42**, 647–8.—Coking acid tar yields 14.2–19.7% of distillate, 33.3–34.8% of coke and 27.3–37.3% of gas and losses. The coke contains on the av. 2.65–3.85% of ash and 2.21–3.37% of S. It is not suitable for the manuf. of electrodes but can be used as fuel. The distillate contains 22.8–26.3% of crude motor spirit and 25–29.3% of kerosene fractions. Purification of the crude spirit with H_2SO_4 and clay yields a stable product. The kerosene, on the other hand, does not lend itself to combined or acid refining. A. Papineau-Couture

Methylated semicoking. G. I. Deshalit. *Coke and Chem.* (U. S. S. R.) **9**, No. 4–5, 44(1939); *Chimie & industrie* **42**, 709.—Methylated semicoking consists in carbonizing coal (lignite) in presence of certain addns. (soln. of $Ca(OAc)_2$ or of Na_2CO_3) so as to decrease the proportion of phenols in the tar and increase the methylated hydrocarbon content therein. Expts. showed that the compn. of the coking gases was but little modified. A high yield of light motor spirit is obtained. A. P.-C.

Coking of coal with the addition of portland cement. Influence of the addition on the coking process, especially on the distribution of sulfur and on the properties of the resulting coke. Ivan Trifonov and Mstislav Kurchatov. *Ann. univ. Sofia, II. Faculté phys.-math.*, Livre 2, **35**, 249–83(in German, 284–8)(1938–39); *Brennstoff-Chem.* **20**, 163–8(1939).—Based on results obtained by coking, under various conditions, 5 types of coal, pulverized and mixed with 1, 3, 5 and 10% of portland cement, the addn. of the cement had no influence on (1) hygroscopicity of the coke, (2) yield of coke and volatile products except with large addns. of cement where there is a decrease in coke yield and increase in yield of volatile products, (3) S present in the coke as sulfate (the sulfate of the cement forms sulfide during the coking process), (4) org.-S content of the coke except with large addns. of cement where it is increased and (5) pressure resistance of the coke stored in wet condition. The addn. of cement raised (1) the ash content of the coke, (2) the total S content of the coke (with rapid coking of the pressed and moistened mixt.), (3) the noncombustible-S content of the coke in proportion to the amt. of cement added, (4) S present in the coke as sulfide, especially with the pressed and wet mixt., (5) yield of distillate, (6) free-Fe content of the coke and (7) sp. gr. of the coke. It decreased (1) the total S content (with slow coking), (2) the volatile S (with increasing cement addn.), (3) combustible portion of the S in the coke, (4) coke porosity and (5) pressure resistance of the coke stored in dry condition. The mech. properties of the coke were improved by cement addn. during the coking process. George Ayers

Behavior of the so-called organic coke-sulfur at temperatures above 1000°. Ivan Trifonov and Viktor Ivanov. *Ann. univ. Sofia, II. Faculté phys.-math.*, Livre **2**, **35**, 201–25(in German, 226–31)(1938–39).—A metal-

lurgical coke and a bituminous coke, after extn. with dild. HCl at 70–80° to remove inorg. S compds., were heated at various temps. between 1100° and 1600° in both N and H atms., resp.; only a small portion of the so-called org. S was liberated up to 1500°, the S liberated being greater in the case where H was present. At 1500° the amt. of S liberated was an exponential function of the temp. and, by comparison with the amt. of S liberated by heating natural graphite, the S would probably be completely liberated above 2000° (about 2200° for the graphite). The S is probably in "solid soln." in the carbon as a mixed crystal system, graphite–carbon, where S atoms occupy positions in the graphite crystal lattice. George Ayers

The effect of ash components on the reactivity of coke. R. N. Golovatyi. *J. Applied Chem.* (U. S. S. R.) **12**, 1178–86(in French, 1186)(1939).—The action of chlorides of Fe, Ca, Al, Mg, Mn and K and silicic acid, on the reactivity of coke was investigated at 700°. The reactivity of coke increased with an increase of the relation (Fe + Ca)/(Al + Si). The most effective catalysts were Fe, Ca and K; less effective were Mg and Mn; Al and SiO_2 were neg. catalysts. Their action depends on the nature of coke The mixt. of catalysts was more effective than a sep. component. With an increase of temp. to 1000° the activity of catalysts increased. Fe increased and SiO_2 decreased the reactivity of coke at the temp. of beginning of the reaction between CO_2 and C. A. A. Bodgorny

X-ray examination of the fissuring of coke. V. I. Danilov, M. A. Levachevich and I. Z. Olifirenko. *Coke and Chem.* (U. S. S. R.) **9**, No. 4–5, 50–1(1939); *Chimie & industrie* **42**, 800.—X-ray examn. confirmed that the formation of fissures is caused by inclusions in the coke, the pieces contg. the largest no. of inclusions being the most fissured. A. Papineau-Couture

Improving the physicomechanical properties of coke. A. Bruk and B. Shtromberg. *Stal* **8**, No. 11, 1–5(1938); *Chimie & industrie* **42**, 642.—When the charges for coking are prepd., consideration must be given to the other properties, in addn. to the plastometric properties, of the coal. The degree and nature of fissuring are a better indication of the quality of coke than is the drum test. On the whole, increasing the rate of heating of the coal lowers the mech. qualities of the coke. By addn. to the charge of finely crushed coke or nonagglutinating coal, under suitable conditions, the mech. strength of the resultant coke can be increased. A. Papineau-Couture

Physical and chemical properties of cokes made or used in Washington. H. F. Yancey, R. E. Zane, R. W. Fatzinger and J. A. Key. *U. S. Bur. Mines, Tech. Paper* **597**, 44 pp.(1939).—Cokes made from Washington coals were resistant to shattering; the av. 2-in. shatter index for Wilkeson cokes was 82, while many of the eastern and southern cokes have indexes about 70. Wilkeson beehive coke had a high stability factor; lower stabilities were shown by by-product cokes from Wash. and British Columbia. Utah coke had the lowest stability factor, but highest hardness index. Friabilities were Wilkinson 58.9–68.5, Wash. by-product 73.8–77.0, Utah 79.9 and low-temp. Coalene 86.1. Wash. cokes were more resistant to breaking up into smaller pieces than eastern and southern cokes but were less resistant to abrasion. Wash. cokes have 1 undesirable feature—a high ash content. S is low. The cokes were fairly reactive. Ignition temps. were 460–570°. Alden H. Emery

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Fractionating app. of light construction [for C_6H_6 hydrocarbons] (Belsen) **1**. Significance of impurities in coal in glass industry (United Glass Bottle Manufrs., Ltd.) **19**. Investigation of expansion and compression curves of Dinas for use in construction of diagrams of heating and cooling of coke ovens (Smelyanskiĭ, Pevsner) **19**. Obtaining coumarone resin with simultaneous purification of benzene fractions (Tyutyunnikov) **13**. Steels of special quality for use in gas industry (Thomas) **9**. Explosibility of semianthracite, low-volatile bituminous coal and medium-volatile bituminous coal dusts (Greenwald) **24**. Suggest correlation of gas gravity and gasoline content (Davison) **22**. Work of Royal Expt. Station for Oil and Fat Industry of Milan in field of prevention of waste [tars obtained by carbonization of lignite] (Martinenghi) **27**. Gas measurements over petroleum deposits (Selzer, Weber) **8**. French limonite deposits [for use in gas works] (Charrin) **8**. Phase diagram of mixt. of natural gas and natural gasoline near crit. condition (Katz, *et al.*) **2**. Skin-protecting compn. [from effects of coal tar, etc.] (Russ. pat. 56,097) **17**. Combined manuf. of yellow P and power gas (Russ. pats. 55,908 and 56,046) **18**.

Lavine, Irvin: Lignite, Occurrence and Properties. Grand Forks, N. Dak.: Dept. of Chem. Engineering, Univ. of North Dakota. 178 pp. $1.00. Reviewed in *News Ed.* (*Am. Chem. Soc.*) **18**, 261(1940).

Motor fuels. Standard Oil Development Co. Brit. 508,913, July 7, 1939. A relatively small proportion, e. g., 0.1–1%, of a fatty oil., e.g., rapeseed or fish oil, that has been thickened by voltolization, preferably to a viscosity of 50–3500 sec. Saybolt at 210°F. is added to motor fuels. The voltolization product may be hydrogenated and it may be blended with an unvoltolized oil, e. g., a lubricating oil. It may be extd. with solvents, e. g., BuOH, PrH, Me_2CO, and only the high mol. wt. portion employed.

Gasoline recovery from materials such as various hydrocarbon mixtures. Raymond C. Lassiat (to Houdry Process Corp.). U. S. 2,186,029, Jan. 9. An arrangement of app. is described, and a process of recovering a max. quantity of com. gasoline from a composite hydrocarbon stream which comprises subjecting the stream to a series of fractionating operations to segregate therefrom a low-vapor-pressure gasoline and a cut composed substantially of hydrocarbons of the 4 carbon group, subjecting the cut under polymerizing conditions to a polymerizing operation to convert at least a part of the unsaturates therein into liquid hydrocarbons utilizing the liquid polymers from the polymerizing operation as reflux in one of the fractionating operations so as to augment the quantity of the low-vapor-pressure gasoline, and adding to the gasoline sufficient gaseous material from the polymerizing operation to raise the vapor pressure thereof.

Liquid gasolinic hydrocarbons from olefinic materials. Arthur L. Lyman (to Standard Oil Co. of Calif.). U. S. 2,186,031, Jan. 9. A process for the production of gasoline-boiling liquid hydrocarbons from a mixt. consisting substantially of hydrocarbons having less than 5 C atoms per mol. and contg. normally gaseous olefin hydrocarbons comprises bringing the mixt. into contact with a dil. acid soln. for the removal of potential catalyst-poisoning impurities and subsequently polymerizing the normally gaseous olefin hydrocarbons producing gasoline-boiling liquid hydrocarbons in contact with an acidic polymerization catalyst effective to polymerized normally gaseous olefin hydrocarbons to gasoline-boiling liquid hydrocarbons.

Diesel fuel. Edwin M. Nygaard and Geo. S. Crandall (to Socony-Vacuum Oil Co.). U. S. 2,185,157, Dec. 26. To accelerate ignition of the fuel in an engine of the Diesel type, there is mixed with it a minor proportion (suitably about 0.5%) of tetranitromethane. Cf. *C. A.* **34**, 1155[9].

Apparatus for spraying liquid fuels into combustion chambers. John W. Smith. U. S. 2,186,216, Jan. 9. Various structural and operative details.

Destructive hydrogenation of solid carbonaceous materials. International Hydrogenation Patents Co. Ltd., Siegfried Kiesskalt and Karl Winnacker. Brit. 508,813, July 6, 1939. Addn. to 463,602 (*C. A.* **31**, 6852[8]). In the process of 463,602 the sludgy residue is provided with an acid which is mixed thoroughly therewith before the sludgy residue is kneaded with the aq. paste of finely comminuted initial material for removal of the ash therefrom.

Preparing and utilizing pulverized fuels. Walter G. Noack. U. S. 2,184,845, Dec. 26. App. is described in which combustion gases of a boiler furnace are used for driving a gas turbine for driving a blower for combustion air and a turbine for operating a coal pulverizer.

Apparatus for pulverizing briquets such as those made

from pulverized coal. Ralph M. Hardgrove (to Babcock & Wilcox Co.). U. S. 2,185,459. Jan. 2. Various details of an app. for supplying pulverized fuel to a furnace.

Treating lump coal to inhibit degradation from weathering and handling. Richard C. Marmaduke (to Sherman Marmaduke). U. S. 2,184,621, Dec. 26. A process of treating solid, individual lumps of coal to resist degradation incidental to weathering and handling the coal involves coating the coal with a crystallizable soln. consisting of paraffin wax and a liquid hydrocarbon having a burning time of more than 16 hrs. and a Saybolt viscosity of less than 150 sec. at 38°, and effecting crystn. of the applied soln. for forming a dry substantially nonvolatile film covering on the lumps.

Treatment of crude anthracene. I. Ya. Postovskiĭ, B. I. Ardashev and V. I. Khmelevskiĭ. Russ. 52,391, Dec. 31, 1937. Crude anthracene is treated with maleic anhydride and alkali to form a sol. compd. The soln. is sepd., acidified, and heated to 270° to sep. anthracene. From the anthracene-free residue carbazole is obtained by treatment with H_2SO_4 in the presence of C_6H_6.

Recovery of tar from peat-tar waters. V. A. Radtsig. Russ. 52,167, Nov. 30, 1937. The sp. gr. of the water is increased by adding inorg. salts and, after settling, the tar is sepd. in the usual manner.

Gasifying solid fuels. B. K. Klimov. Russ. 55,852, Oct. 31, 1939. In the gasification of solid fuels in a producer-type app. accompanied by cracking of the tar vapors, the tar vapors are kept in the gaseous state by subdividing the producer into a number of zones each heated separately through gases preheated in a separate furnace.

Gasification of solid fuel. M. K. Grodzovskiĭ and Z. F. Chukhanov. Russ. 55,961, Oct. 31, 1939. The gasification is effected in only one oxidizing zone, with the blowing velocity such that contact of the gases formed in the zone as the result of the primary interchange of the fuel with the oxygen of the stream (such as CO and H_2) is of shorter duration than required for a practically noticeable interchange of these gases and the O of the stream.

Muffler and carbon-removing filter for engine exhaust gases. Hiram H. Boyce (50% to Glenn W. Pierce). U. S. 2,185,584, Jan. 2. Various details are described, of a device in which a filtering mixt. is used contg. about 7 parts of a mixt. of equal parts of $CaCO_3$ or $Ca(OH)_2$ and one part of $CaSO_4.H_2O$ together with one part of charcoal.

Water-vapor control in gas-producer operation. Albert L. Galusha. U. S. 2,185,077, Dec. 26. Various structural and operative details are described of a gas producer having a water jacket, means for heating and moistening in the water jacket all air supplied to the gas-producer fire, means for supplying water to the water jacket and means for removing ash from a wall of the water jacket to maintain substantially uniform conditions for the transfer of heat from the fire to the water jacket, and thermostatic means controlled by the temp. of the supplied air and for controlling the supply of water.

Combustible gas from liquid fuels such as fuel oil, gasoline or an alcohol. Henry Gault. U. S. 2,185,549, Jan. 2. App. is described, and a continuous method of generating a combustible gas mixt., which comprises, directly pouring in a continuous manner onto the top portion of a red hot mass, having interstices therein consisting solely of a refractory material, a liquid fuel in the compact state in the presence of a combustion-sustaining gas, so as to produce complete combustion of the fuel as it flows through the whole of the mass and to maintain the latter at red heat, and simultaneously introducing into the mass thus heated, at an intermediate point thereof, a further amt. of fuel together with an amt. of air insufficient for sustaining the combustion thereof, so that the last-mentioned amt. of fuel is subjected to the heating action of the mass and generates, at the outlet thereof, a gaseous combustible mixt.

Breaking water-gas-tar emulsions. Harry B. Pearson, Jr. (to Semet-Solvay Engineering Corp.). U. S. 2,185,710, Jan. 2. An arrangement of app. is described, and a process which involves continuously adding an alk. demulsifying agent such as NaOH soln. to a stream of water-gas-tar emulsion, in an amt. to produce a mixt. having an alky. corresponding to a pH of at least about 8, continuously heating the mixt. to about 24–175° under a gage pressure of about 50–120 lb., permitting the mixt. to sep. into water and tar layers in a settling zone to which the mixt. is passed under such pressure, separately withdrawing the water and tar and then releasing the pressure thereon.

Evaporator for phenol-containing waters of gas plants. M. A. Nechaev. Russ. 52,223, Nov. 30, 1937. Construction details.

Recovering sulfur from used gas-purifying masses. Alexander Wacker Gesellschaft für elektrochemische Industrie G. m. b. H. Brit. 508,966, July 7, 1939. The masses are extd. with perchloroethylene in the liquid and (or) vapor phases. The mass may be treated first with the vapor to remove S and any tar, the earlier portions being run off separately, and the treatment then continued with hot liquid solvent, or liquid and vapor may be used simultaneously.

Dry desulfurization of gas. V. G. Bocharov. Russ. 55,930, Oct. 31, 1939. To regulate the temp. and moisture content of the gas, it is passed through coal or coke before passage through Fe oxide.

Apparatus for regulating the flow of tar, oils, etc. Herbert Ziebolz (to Askania-Werke A.-G.). U. S. 2,185,970, Jan. 2. Various structural, mech. and operative details.

Separating solid-oil mixtures. I. G. Farbenindustrie A.-G. Brit. 508,849, July 3, 1939. Solid substances are sepd. by filtration from the oily constituents of mixts. obtained, e. g., in the distn. or solvent extn. or the pressure hydrogenation of solid carbonaceous substances such as coals, peat, shales, wood, etc., or as residues in the pressure hydrogenation or cracking of liquid carbonaceous materials such as tars or crude oils, by using as filter aids liquid or liquefied hydrocarbons, rich in H and contg. at least 4 C atoms in the mol., that boil below 325° and consist of 1 or more fractions in which the H:C ratio is at least 15:100 by wt. insofar as they boil within 200–325° and contain constituents boiling within 300–325°, at least 17:100 insofar as they boil within 200–300° and at least 17.5:100 insofar as they boil below 200° and taking care that the mixts. have attained a temp. above 120° within such a short time that no lasting pptn. of asphalts occurs and that the temp. is maintained or not decreased below a temp. at which asphalt is pptd. during the filtration.

Separating phenols from tar oils and like products. Herbert Wittek. Brit. 509,083, July 11, 1939. See Fr. 838,900 (*C. A.* **33**, 7082[6]).

Coke ovens. Carl Otto and C. Otto & Co. G. m. b. H. Brit. 508,920, July 7, 1939. An under-fired oven in which the heating gas is supplied to the heating flues by horizontal distributing pipes running in the longitudinal direction of the oven chamber and by transverse pipes that connect the distributing pipes with vertical pipes leading to the flues has the transverse and distributing pipes located in the cellar-like space of the oven structure wherein the transverse pipes accommodate, at their ends adjacent the vertical pipes, nozzles each of which is detachably secured by screw means to a cross member that connects the assocd. transverse and vertical pipes and is removable through an aperture in the cross member closable by a removable cap, the arrangement being such that the nozzle projects into the transverse pipe and neither it nor its securing means forms an obstruction in the bore of a vertical pipe or a downward extension thereof.

Coking-retort oven. Fred Denig (to Koppers Co.). U. S. 2,186,237, Jan. 9. Various structural and operative details.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER AND STEWART S. KURTZ, JR.

Bureau of Mines—A. P. I. pressure core barrel. D. B. Taliaferro and R. E. Heithecker. *U. S. Bur. Mines, Rept. Investigations* 3481, 20 pp.(1939).—Progress is described in the design and development of a device to cut and seal specimens of rock with their naturally contained fluids. Alden H. Emery

Practices and methods of preventing and treating crude-oil emulsions. G. B. Shea. *U. S. Bur. Mines, Bull.* 417, 106 pp.(1939).—S. describes causes of emulsification, methods now used to prevent formation of emulsions in oil-producing operations, modern practices and methods of economically dehydrating crude-oil emulsions, and recent advances in emulsion-treating technique. Alden H. Emery

Properties of a petroleum-reservoir liquid and its residua with applications of the data to production problems. Kenneth Eilerts, R. Vincent Smith and Alton B. Cook. *U. S. Bur. Mines, Rept. Investigations* 3474, 47 pp.(1939).—New app. developed included a steel pycnometer for measuring the sp. vol. of fluids having high vapor pressure, a simplified variable-vol. cell for detg. expansibility of fluids under conditions of phase equil. and a fractional distn. assembly for analyzing gaseous and liquid hydrocarbons. Methods for detg. properties of a reservoir fluid were developed. The equipment and procedures are described. Data from a typical fluid are presented. An important development is an analytical method for comparing compns. and other properties of hydrocarbon liquids obtained at different points in the flow stream. The amt. of gas liberated from liquid soln. and the resultant vol. change in the solvent can be detd. without knowledge of pressure and temp. gradients and the type of liberation in the flow stream between the points at which the samples were taken. Alden H. Emery

Survey of crude oils of the producing fields of Arkansas. O. C. Blade and George C. Branner. *U. S. Bur. Mines, Rept. Investigations* 3486, 40 pp.(1940).—Analyses are given of 45 samples of crude oil from 25 fields in 6 Ark. counties. The most predominant characteristic is high S content, averaging 1.51%, with 35 contg. more than 0.7%. In general, A. P. I. gravity decreases, C residue increases, residuum increases, and gasoline and naphtha decrease with increasing S. The largest no. of samples are of intermediate base; the 2nd largest class is naphthene-intermediate. Alden H. Emery

The (petroleum) oils of Lobato. Mario da Silva Pinto. *Bol. ministerio agr.* (Brazil) 28, No. 1-6, 57-80(1939).—The crude oils of the Lobato district are of the paraffin-base type, with 0–20% gasoline, low in S and unaccompanied by salt water. Numerous analyses are given. O. W. Willcox

Properties of Louisiana crude oils. II. Additional samples. E. L. Garton. *U. S. Bur. Mines, Rept. Investigations* 3476, 85 pp.(1939).—Complete analyses of 72 samples of crude oil from 45 fields in 23 parishes in La. are tabulated and discussed. Cf. *C. A.* 29, 6029[1]. Alden H. Emery

A comparison of the chemical characteristics of crude oils produced in the old and new Illinois fields. O. W. Rees and P. W. Henline. *Trans. Illinois State Acad. Sci.* 32, No. 2, 122–3(1939).—Crude oils from the newer Illinois fields in general show higher gravities, lower viscosities, higher gasoline yields, lower b. ps. and lower av. mol. wts. than those from the older fields. S values for the new oils appear to be somewhat higher. Characterization factors (*C. A.* 27, 5522) are appreciably higher; this indicates that the newer oils are more paraffinic than the older productions. J. H. Reedy

Results of the preliminary investigations of the Ukraine crude oils. V. I. Fomenko. *Trudy Neftyanoĭ Konf. Kiev., 1938, Akad. Nauk U. S. S. R.* (Inst. Geol. Nauk) 1939, 243–53.—The crude oil from well 2-B had d_{20} 0.954, E_{50} 22.37, E_{100} 2.73, Holde-Sakhanov pour point −10°, paraffin 0.75%, acidity 0.43%, resins as detd. by the tax or "excise test," about 40%, asphaltenes 0.7%, and total S (Eschke) 0.05%. The resin complex was broken up into "excise test" resins 36%, silica gel resins 16.94% and asphaltenes 1.01%. The initial b. p. of the crude oil was 235°. The crude oil from well No. 3 had d_{20} 0.8369, S 0.44%, pour point below −105°, paraffin 0.56% (m. 4°), Brenken flash 17°, acidity 0.028 mg. KOH, or 0.002% SO_3, "excise test" resins 8.5% and silica gel resins 3.36%, and initial b. p. 48°. It contains 35.5% b. below 200°. A. A. Bochtlingk

Determining presence of oil by estimation of hydrocarbon content of soil. I. Milton Le Baron. *Oil Gas J.* 38, No. 35, 43, 46, 47(1940).—Various methods of detg. the volatile and nonvolatile hydrocarbon contents of soil samples are discussed and app. for ultimate analysis is described. Much work is needed to confirm this type of field evaluation. W. Andrew Wright

Well logging by radioactivity. G. H. Westby and S. A. Scherbatskoy. *Oil Gas J.* 38, No. 41, 62–4(1940).—A new logging method is described. All rocks have small but definite radioactivity dependent on the type of rock. Shales are usually the most radioactive, while the sandstones and pure limestone exhibit the least activity. The method permits logging of wells either with or without casing being present. Sample log sheets are given. W. Andrew Wright

Detection of radioactive cement in cased wells. Lynn G. Howell and Alex Frosch. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 1113, 8 pp.(1939).—A device for measuring relative intensity of γ-rays in wells is described. If a radioactive substance is incorporated in cement results of cementing of wells can be detd. accurately. Alden H. Emery

Complex phosphates for deflocculation of drilling mud. C. F. Bonnet. *Oil Gas J.* 38, No. 38, 39, 42(1940).—Examn. of the various com. sodium phosphates indicates that only the "complex" phosphates are effective for deflocculating drilling muds. The effects on viscosity and the cumulative effects of added chemicals are discussed. Na tetraphosphate was found to be especially suitable. W. Andrew Wright

Effect of temperature on plastering properties and viscosity of rotary drilling muds. H. T. Byck. *Am. Inst. Mining Met. Engrs., Tech. Pub.* No. 1116, 8 pp. (1939).—The plastering properties of 6 representative Calif. drilling muds were studied at 70–175°F. at several mud wts. In all tests, filtration rates at elevated temps. were higher than at low temps. and in nearly every case this increased filtration rate was notably longer than could be attributed alone to the decreased viscosity of H_2O (the flowing medium) at elevated temps. No existing method will permit even an approx. detn. of filtration rate at high temp. from data at room temp. There was no relationship between mud viscosity and plastering properties; chem. treatment of muds for viscosity reduction shifted the temp. of min. viscosity to appreciably higher values than for untreated muds. Alden H. Emery

Gravity-correction chart for emulsified petroleum. Anon. *Oil Gas J.* 38, No. 38, 34(1940).—A nomographic chart is given for rapid detn. of the wet or dry gravity of an oil contg. water, if either gravity is known. W. Andrew Wright

Treating emulsions in the Permian basin. D. H. Stormont. *Oil Gas J.* 38, No. 35, 34, 35, 50(1940).—A description of the mech., elec., chem. and heating methods of emulsion breaking. W. Andrew Wright

History and archeology of petroleum. *IIme Congr. mondial pétrole* 4, Sect. 5, 5–95(1937).—Papers have been written on the following subjects: **History of the petroleum industry.** R. J. Forbes. *Ibid.* 15–20(in English); cf. *C. A.* 32, 7317[7]. **The Aryan myth of naphtha.** Ernst Herzfeld. *Ibid.* 21–3(in English). **Petroleum in ancient Egypt.** Andre Seguin. *Ibid.* 25–30 (in French). **Petroleum in ancient Eastern Asia-Elam**

and Mesopotamia. *Ibid.* 31–42(in French). **Petroleum in some ancient Oriental countries. Canaan, Phoenicia, Carthage, Land of Hittites.** *Ibid.* 43–51(in French). **Petroleum in Latin and Greek antiquity.** *Ibid.* 53–69 (in French). **Persian petroleum in ancient and medieval times.** Laurence Lockhart. *Ibid.* 71–80(in English); cf. *C. A.* **33**, 2687[6]. **History of the Polish petroleum industry.** Tadeusz Mikucki. *Ibid.* 81–5(in French). **Laboratory verification of some historical petroleum facts.** Maurice Mercier. *Ibid.* 87–95(in French).

Edward J. Mahler

Supplementary notes on pyroschists in France. V. Charrin. *J. usines gaz* **56**, 463–5(1939).—Addnl. data are given on pyroschists. Besides the bituminous schists of Autun there are considerable deposits in the Basse-Isére range, above the coal deposits; these schists are probably Permian deposits, contain 50–150 l. oil per ton, thickness 10–30 m., so far unexploited. The amt. available is certainly more than in the Autun basin. The schists of Gévaudan are likewise of importance; they extend over 500,000 hectares, in 10–20 m. thickness, partly recoverable by stripping. These schists are of Toarcian age and give an oil yield of 45–60 l. per ton; the Gévaudan oil is low in S. B. J. C. van der Hoeven

Phenolic compounds from petroleum sources. Edward Field, Fred H. Dempster and George E. Tilson. *Ind. Eng. Chem.* **32**, 489–96(1940).—Three grades of phenolic compds. from petroleum sources were investigated, light, medium and heavy. Each grade was fractionated into 3° cuts, and the chem. and phys. properties were detd. Analysis of the cuts showed that the individual phenolic compds. were present in irregular proportions. Individual compds. present in such proportions as to make petroleum acids and excellent source for their recovery include *o*-cresol, 1,4,2- and 1,3,4-xylenols and isopseudocumenol. Petroleum cresylic acids make highly active *germicides*, and the various fractions showed an increase in the phenol coeff. with the boiling range. P. J. Wilson, Jr.

The constitution of mineral lubricating oils (preliminary communication). N. Dănăilă and Jacob Samuel. *Bul. chim. Soc. Române Chim.* **39**, 3–13(1937–8)(in German); *Bull. sect. sci. acad. roumaine* **20**, 69–78(1938)(in German).—The 200–250° cuts (0.1–0.3 mm.), (I) and (II), from two com. lubricating oils were treated after diln. with naphtha with 3 vols. of 70% H_2SO_4, followed by 3 vols. of 98.33% H_2SO_4, by which unsatd. and aromatic hydrocarbons were removed. After washing with 15% NaOH and water and removal of naphtha, the oils were distd. and the 200–250° cuts (0.1–0.3 mm.), (III) and (IV), taken for analysis. III and IV were dehydrogenated over Pt asbestos at 280–300° under 0.1–0.3 mm. pressure and treated in naphtha soln. with 3 vols. of 98.33% H_2SO_4, washed as above and the 200–250° cuts (0.1–0.3 mm.) taken. These cuts, (V) and (VI), represented III and IV with the hexamethylenic naphthenes removed. V and VI were treated below 10° with 3 parts of a mixt. of 62% H_2SO_4 (d. 1.84), 25% HNO_3 (d. 1.52) and 13% H_2O and the temp. was maintained 3 hrs. at 70°; the oils were then treated with 3 vols. of 98.33% H_2SO_4, reduced with Sn and HCl, washed successively with 15% NaOH, 30% $NaHSO_3$ and water, dried over $CaCl_2$, the naphtha was removed and the fractions (VII and VIII) distilling at 200–250° (0.1–0.3 mm.) were taken for analysis. This treatment removed most of the pentamethylenic naphthenes from VII and VIII. Fractions I–VIII, inclusive, analyzed as follows: olefins (*C. A.* **28**, 3569[9]) none; aromatic compds. 24.0, 6.0, 1.0, 0.5, 0.0, 0.5, 0.5, 0.0%; hexahydroaromatic compds. (*C. A.* **21**, 2787) 7.70, 0.0, 10.14, 0.0, 0.0, 0.0, 0.0, 0.0; C 87.07, 86.23, 86.61, 86.08, 86.71, 85.91, 86.04, 85.27; H 12.89, 13.51, 13.28, 13.89, 13.24, 14.05, 13.61, 14.24%; S (in I and II), 0.24, 0.27%; cryoscopic mol. wt. in C_6H_6 397.5, 365.0, 406.0, 426.0, 393.0, 432.0, 416.0, 429.0; no. of rings in mol. (from preceding data), —, —, 3.55, 2.21, 3.61, 1.82, 2.66, 1.18; d_4^{20} 0.9244, 0.8747, 0.9110, 0.8571, 0.9118, 0.8555, 0.9065, 0.8536; n_D^{20} 1.5118, 1.4870, 1.4998, 1.4742, 1.4998, 1.4734, 1.4932, 1.4704; pour point, °C., −1, −7, 8, −4, 5, −4, 14, −4; $PhNH_2$ point, °C., 89.3, 103.6, 97.2, 110.0, 97.0, 109.7, 101.7, 108.0; Saybolt viscosity at 100°F., 1214, 266, 941, 174, 878, 160, 751, 150; and at 210°F., 73.7, 51.0, 68.7, 46.3, 67.3, 45.4, 64.1, 45.0; Dean and Davis viscosity index, 19.1, 103.2, 34.0, 118.4, 36.9, 120.7, 42.8, 126.1; Hill and Coats viscosity-gravity const. 0.8643, 0.8165, 0.8486, 0.8006, 0.8507, 0.8007, 0.8455, 0.7996; Walther const. (*C. A.* **27**, 406) 4.0654, 3.5050, 4.0051, 3.4810, 3.9923, 3.4778, 3.9704, 3.4474; Vlugter, Waterman and van Westen (*C. A.* **29**, 7057[6]) analysis: no. of rings in mol. 2.9, 2.3, 3.0, 1.5, 3.0, 1.5, 3.4, 2.0; aromatic rings, 12.0, 3.0, 5.0, 3.0, 4.0, 4.0, 1.0, 3.0%; naphthenic rings, 30.0, 19.0, 38.0, 19.0, 40.0, 18.0, 47.0, 23.0%; paraffins, 58.0, 78.0, 57.0, 78.0, 56.0, 78.0, 52.0, 74.0%.

George Ayers

Ultraviolet spectrum of paraffins and petrolatums. Edmond Vellinger and Bernard Thomas. *Compt. rend.* **210**, 296–7(1940); cf. *C. A.* **34**, 1467[4].—The ultraviolet (λλ 2000–4000 A.) spectra of pure paraffins and pure cyclanes show no characteristic differences. But crystd. paraffin extd. from petroleum shows an absorption some 100 times greater than that of a paraffin oil from which all aromatic nuclei have been removed by oleum. Again the solid residue remaining when petrolatum is fractionated in the cathode vacuum is highly absorbent. Conclusion: This is due to the presence, in addn. to true paraffins and cyclanes, of highly substituted aromatic hydrocarbons. Cf. Yannaquis, *C. A.* **33**, 9611[2]. C. A. Silberrad

Hazard of mercury vapor in analytical petroleum laboratories. C. F. McCarroll. *U. S. Bur. Mines, Rept. Investigations* **3475**, 16 pp.(1939).—Use of liquid Hg in analytical labs. is a potential hazard. Precautions and recommendations in handling Hg are outlined.

Alden H. Emery

Naphthenic acids from Gulf Coast petroleum. Composition of higher-boiling acids. Roy W. Harkness and Johannes H. Bruun. *Ind. Eng. Chem.* **32**, 499–502 (1940).—The naphthenic acids in the lubricating oil portion of a Gulf Coast petroleum have a mol. wt. range of about 220–440, corresponding to 14–29 C atoms per mol. The H deficiency below the fatty acid series ($C_nH_{2n}O_2$) is 4–10 atoms per mol. This is not due to simple unsatn. but to naphthenic rings with possible admixt. with aromatic rings. If aromatic acids are absent, at least 5 naphthene ring closures are indicated in some of these acids. The acids are substantially monobasic.

P. J. Wilson, Jr.

Conversion of naphthenic acids to naphthene hydrocarbons. Chemical constitution. Gilbert E. Goheen. *Ind. Eng. Chem.* **32**, 503–8(1940).—A fraction of naphthenic acids isolated from the lubricating oil portion of a Gulf Coast crude petroleum had an av. mol. wt. of 317 and an av. mol. formula of $C_{20.7}H_{38.2}O_{2.1}$. The corresponding naphthene hydrocarbons were prepd. from these acids by way of the Et esters, alcs. and iodides. These hydrocarbons had higher viscosity indexes than those of a typical naphthene-base oil. Evidence was obtained to indicate that the acids were monobasic compds. contg. on the av. about 2.6 rings per mol. No more than about 5% by wt. of aromatic material was present. P. J. Wilson, Jr.

Theory of reaction of the thermal transformation of hydrocarbons. A. V. Frost. *Uspekhi Khim.* **8**, 956–69 (1939); cf. *C. A.* **33**, 843[7].—Review and theoretical discussion. F. H. Rathmann

Petroleum sulfonic acids. S. Pilat and J. Sereda. *Refiner Natural Gasoline Mfr.* **19**, 50–2(1940).—See *C. A.* **33**, 4007[2]. C. H. Brooks

The production of high-speed Diesel fuel from Fushun shale oil. IX. Comparison of the ignition qualities of crude petroleums and crude shale oil. Koki Isibasi. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 428–9 (1939); cf. *C. A.* **33**, 3571[9].—Two shale oils (refined by washing with acid and soda) and gas oil cuts (b. 200–360°) from 5 representative Japanese and 2 foreign crude petroleums, 1 oil from the liquefaction of coal and 2 low-temp. tars were examd. The d_4^{20}, aniline point, Diesel index, av. b. p., cetane no. (CFR motor method) and compn. (percentage of unsatd. compds., aromatic compds., naphthenes and paraffins) of the cut b. 200–300° are

tabulated. The cetane nos. were over 50 for paraffin-base crude oils, 40 to 50 for mixed paraffin-naphthene-base crude oils, and under 40 for the naphthene and tar-base crude oils. Aniline points and cetane nos. were obtained (values not given) on 7–8 20° cuts on these gas oils and were found to be closely related. Ignition quality (I) for any main cut was almost the av. of the values for the 20° cuts. Except for the first fraction, all the fractions of shale oil had uniform I, comparable to those of paraffin-base crude oils. B. p. affects I of refined oils from a given crude oil because different constituents are present in the different boiling ranges. **X. Comparison of the ignition quality of petroleum and shale Diesel oils.** *Ibid.* 429.—Fifteen straight-run and cracked Diesel fuels were examd. The oils had sp. grs. between 0.84 and 0.88, aniline points 44 to 68, and cetane nos. (CFR motor method) 38 to 53, the high cetane oils being highly paraffinic. The following oils were fractionated into 4 to 7 20° cuts (for each of which cuts are tabulated b. p., percentage of total cut, d_4^{20}, aniline point and cetane no.): a shale oil, a paraffin-base petroleum oil, a paraffin-naphthene-base petroleum oil, a cracked shale oil and a cracked petroleum oil. Except for the first and last fractions, ignition quality (I) of straight-run petroleum oils increases with b. p., is remarkably const. for straight-run shale-oil fractions, and is const. up to about b. 240° after which it decreases rapidly for both cracked petroleum and cracked shale oils. Conclusion: I is influenced by the treatment of the crude oil and the b. p. of the fractions. **XI. The ignition quality calculated for shale oil.** *Ibid.* 429–30.—The d_4^{20}, surface tension, sp. parachor and av. b. p. of straight-run, cracked, solvent-refined and hydrogenated shale oils and straight-run and cracked petroleum oils were detd. and the data used to calc. the cetane no. by the sp. gr. and sp. parachor methods of Heinze and Marder (cf. *C. A.* 32, 1437[4]). The cetane nos. calcd. by the second method are in good agreement with the exptl. values for both types of oils, but as much as 5 cetane no. difference was obtained with the sp. gr. method on shale oils. All the data are tabulated. **XII. The ignition quality of the constituents of shale oil.** *Ibid.* 430.—A cracked shale oil and a straight-run petroleum oil were sepd. into olefins, aromatic compds., cycloölefins, naphthenes and paraffins by selective solvents (Steinbrecker's method, *C. A.* 31, 8898[5,7,9]) and percentage sol. in H_2SO_4, cetane no. and Conradson carbon were detd. for each constituent sepd. by the solvents; the data are shown in 2 tables. The cracked shale-oil (cetane no. 49.1) contained 8.7% olefins (cetane no. about 22), 14.5% cycloölefins (cetane no. −10.5), 12.0% aromatic compds. (cetane no. 35.8), 44.1% naphthenes (cetane no. 59.6) and 17.2% paraffins—probably largely straight-chain compds. (cetane no. 117.3). The olefins and aromatic compds., which have a high sp. gr., n, and Conradson carbon, could be removed easily by treating the cracked shale oil with H_2SO_4. **XIII. The production of maximum high-speed Diesel oil.** *Ibid.* 430–1.—Crude shale oil on distn. gives 45% gas oil b. below 340°, the "light fraction" from which (a Diesel-oil (I), b. 200–340°) after refining with H_2SO_4 has the following properties: d_4^{20} 0.8435, η 36.4 Saybolt Universal sec. at 38°, solidifying point −4°, av. b. p. 287.5, cetane no. 55. The heavy shale-oil fraction, b. above 340°, can be cracked by distn. at 10–15 kg./sq. cm. and 400–420° to yield approx. 18% finished gasoline (II), 44% finished Diesel-oil (III), 19% "pitch" and 6% gas and loss. After refining II has the following properties: sp. gr. 0.7315, initial b. p. 28.5°, 10% point 75°, 50% point 122.5°, 95% point 191°, end point 215°, octane no. 50.5. III has the following properties after refining: sp. gr. 0.8430, η 35.8 Saybolt Universal sec. at 38°, solidying point +4°, Conradson carbon 0.08%, av. b. p. 291.8, aniline point 64.3°, Diesel index 52.1, cetane no. 59. III requires less acid refining than I. Accordingly, a max. of approx. 60% high-quality Diesel oil and about 10% low-grade gasoline can be obtained from Fushun shale oil. The properties of various straight-run Diesel cuts, one cracked cut and a 50–50 straight-run and cracked Diesel blend, are tabulated as well as the properties of the crude and refined cracked Diesel oil. A flow plan shows the conditions of the distn. and cracking process together with the yields at each step.

Anna Louise Nestmann

Analysis of high-molecular hydrocarbons by means of physical-chemical measurements. Richard Heinze, Maximilian Marder and Herbert Pohl. *Mitt. Ges. Braunkohlen- u. Mineralölforsch. Tech. Hochschule Berlin* No. 12, 60–75(1936); *Chem. Zentr.* 1938, I, 4561.—The detn. of the phys.-chem. characteristics offers the best possibility of detg. the constitution and compn. of the hydrocarbons and hydrocarbon mixts. occurring in petroleum and tars. The additive character of the phys. properties as well as the great accuracy with which they can be measured makes it possible to express the compn. of a mixt. from a knowledge of the properties of the constituents and the phys. data on the mixt. The density, aniline point, viscosity, n, mol. refraction and parachor were investigated to det. their suitability for estg. the compn. of such mixts. of high-mol. hydrocarbons. Side chains and rings are quantitatively expressed in the parachor since they influence its magnitude; its use offers the possibility of establishing the finer mol. structure of the constituents of the mixt. Data experimentally obtained in specific cases for the parachor, aniline point, course of the viscosity, and specific refraction are presented in tables and curves and compared with calcd. values. Beside the parachor, the values for mol. refraction are especially valuable in detg. constitution. Studies are reported on some com. paraffins, a ceresin obtained from Boryslaw ozocerite, hard paraffin produced by the Fischer-Tropsch synthesis, and highly refined paraffin oil. The consts. for calcn. of the parachor were detd. on paraffin-petroleum mixts. of varying concns., from which the parachor of paraffin was obtained by extrapolation. The exptl. findings agree with generally accepted ideas regarding the structure of the materials investigated. In the Boryslaw ceresin, branching of the C chain was qualitatively and quantitatively demonstrated (on the av., about 3 side chains per mol.) Com. paraffin was recognized (from the exptl. results) as a normal, satd. aliphatic hydrocarbon; paraffin oil, as a mixt. of naphthenes. M. G. Moore

Suggest correlation of gas gravity and gasoline content. K. Davison. *Oil Gas J.* 38, No. 39, 54(1940).—A chart is given relating the sp. gr. of natural or casinghead gas and its gasoline content. W. Andrew Wright

Determination of saturated hydrocarbons. Aliphatic, aromatic and hydroaromatic hydrocarbons of the cyclohexane series. E. Berl and W. Koerber. *Ind. Eng. Chem., Anal. Ed.* 12, 175–6(1940).—The mixt. is nitrated with a mixed acid composed of 55% H_2SO_4, 25% HNO_3 and 20% H_2O; thus the aromatic hydrocarbons are converted into mononitro derivs. which are sol. in the mixed acid; the other compds. are not affected. Dehydrogenation of the original mixt. by passing it over a specially prepd. Pt catalyst converts the hydroaromatic compds. into aromatic compds. and subsequent nitration of the resulting mixt. gives a measure of the sum of the 2 types of compds. The material unattacked in the second nitration represents the aliphatic compds. present in the original mixt. Special app. is described for carrying out the detn. of 2.5–5 cc. of sample. The method cannot be used in the presence of unsatd. aliphatic hydrocarbons.

T. H. Dunkelberger

Dehydrogenation and nitration of hydrocarbons of the cyclopentane series. E. Berl and Regis Raab. *Ind. Eng. Chem., Anal. Ed.* 12, 177(1940); cf. preceding abstr.—Cyclopentane and methylcyclopentane are practically unattacked by the mixed nitrating acid and show practically no dehydrogenation when submitted repeatedly to the catalytic treatment of Zelinskiĭ (*C. A.* 7, 2224) at 325° and 385°. This is contrary to the action of members of the cyclohexane series. T. H. Dunkelberger

Physical constants of asphaltic bitumens. I. R. N. J. Saal, W. Heukelom and P. C. Blokker. *J. Inst. Petroleum* 26, 29–39(1940).—*Sp. gr.* The sp. gr. of bitumens having a penetration at 25° greater than 5 was detd. by means of a pycnometer, that of harder bitumens by means

of a Mohr balance; for residual and blown types the sp. gr. increased with hardness from 1.01 ± 0.02 for a bitumen of 300 penetration to 1.07 ± 0.03 for one of less than 5 penetration. For bitumens prepd. from cracked residues the sp. gr. varies from 1.13 ± 0.02 for a bitumen of 100 penetration to 1.16 ± 0.02 for one of less than 5 penetration. *Coeff. of cubical expansion.* By means of the instruments used for dètn. of sp. gr., straight-run bitumens, for the temp. range 15–200°, were found to have practically a const. coeff. of cubical expansion; this coeff. seemed to increase slightly with the hardness of the bitumen, varying from 0.00060 (penetration of 196) to 0.00062 (penetration of 23). *Sp. heat.* A new app. was devised, consisting of a small bucket-like container for the bitumen brought to the predetd. temp. in a vertical Cu tube entirely surrounded by the vapors from a boiling liquid; the container is dropped through a hole into a Cu block bored to receive it and also provided with a lid. The Cu block is contained in a double-walled calorimeter provided with H_2O circulation. After calibration of the Cu block with a Ag block of the same dimensions as the container sp. heats at 100, 200 and 300° were run on different bitumens. Data show that sp. heat increases with temp. and is a linear function of the temp.; it follows that a transition point, and consequently a definite m. p., does not occur. Among the values reported are the following for sp. heat$_0$ (cal./g./°C.) and a (change of sp. heat/°C.), resp.: for Venezuelan distd. bitumen of 177 penetration, 0.425, 0.00047; for the same bitumen of 7 penetration, 0.382, 0.00073; for distd. Mexican bitumen of 22.5 penetration, 0.429, 0.00035; for blown Mexican of 39 penetration, 0.430, 0.00032; for blown Mexican of 25 penetration, 0.402, 0.00056; for bitumen from cracked residue, of 2 penetration, 0.449, 0.00040. *Thermal cond.* The app. consisted of a small Cu sphere, provided with a heating element and a thermocouple, placed in the center of a larger hollow sphere immersed in a H_2O-bath, the space between the solid sphere and the inner wall of the larger sphere being filled with the bitumen under test. Data show that thermal cond. decreases with temp. from 0° to 70°, and for the same bitumen, increases slightly with the hardness; typical values for a distd. Mexican bitumen of 22.5 penetration are 0.137 at 0° and 0.131 at 60° in kg.-cal./m./°C./hr. *Surface tension and total surface energy.* The app. consisted of a du Noüy app. run in an atm. of H_2. The surface tension decreased with increase in temp.; the total surface energy varied between 50 and 52 ergs/sq. cm. for the 6 bitumens tested; a distd. Mexican of 50 penetration had a surface tension of 26.2 dynes/cm. at 150° and 34.2 at 25° (obtained by extrapolation); its total surface energy was 52 ergs/sq. cm. *Permeability to H_2O vapor.* The authors did not det. this property but reported values found by other workers, which agree fairly well; Badum (*C. A.* **33**, 9486[7]) gives 1.4×10^{-8} g./hr./cm./mm. Hg as the diffusion coeff. 13 references and 6 tables. Henri Marc

Chemical research laboratory of the Ethyl Gasoline Corporation. Harold A. Beatty. *Ind. Eng. Chem., Anal. Ed.* **12**, 185-6(1940). G. G.

Temperature coefficient of preflame reactions and the knocking value of motor fuels. A. S. Sokolik. *Acta Physicochim. U. R. S. S.* **11**, 379–402(1939)(in English).—For spontaneous ignition of various hydrocarbon-air mixts., the relation of time lag to temp. is given by $te^{-\gamma/T} = C$ for the lower temp. zone and by $tp^n = c$ for the upper temp. zone (t = time lag, γ = temp. coeff., T = critical temp. of spontaneous ignition, p = critical pressure of spontaneous ignition, n = order of reaction). From exptl. data on ethane, propane, propylene, heptane, octane, isooctane and diisopropyl ether as well as some other fuels, S. finds that the tendency of a fuel to knock is greater the greater the temp. coeff. of the preflame reaction, or (in the low-temp. zone) the higher the pressure. The behavior of a fuel can be predicted from $\gamma(1 - (1/\epsilon_{crit.}\ 0.32)) = A$. The calcd. and exptl. crit. compression ratios $\epsilon_{crit.}$ are, resp.: octane 2.2, < 2.8; heptane 2.6, 2.8; hexane 3.0, 3.3; pentane (mixt.) 4.0, 3.8–5.7; propane 12.3, 12; propylene 9.6, 8.4; ethyl ether 3.3, < 3.9; CS_2 5.3, > 5.15. The temp. coeffs. detd. as above are the av. values for the complete oxidation process rather than for any single definite reaction, and are a measure of the accumulation or destruction of the intermediate active products. For $(iso\text{-}Pr)_2O$, γ is negative at 280°. F. H. Rathmann

High antiknock "safety" aviation fuel. M. G. Van Voorhis. *Refiner, Natural Gasoline Mfr.* **19**, 19–21 (1940).—A general discussion, based on the papers presented at the Am. Petroleum Inst. meeting, Nov., 1939. C. H. Brooks

Octane number as a function of the boiling range of gasolines. Manole Cosmin. *IIme Congr. mondial pétrole* **3**, Sect. 4, 760–8(1937)(in French).—Gasolines produced from Rumanian crude oils have been divided into 3 groups: (1) straight-run gasolines from paraffinic oils having an octane no. of 55–70 and b. 20% at 10° and 85% at 100°; (2) gasolines from nonparaffinic oils having the same boiling range as gasolines in (1) and having an octane no. of 60-73; and (3) cracked gasolines of 65–70 octane no. having a close boiling range, about 39–40% distg. at 100°. Each straight-run gasoline was distd. into some 10 narrow fractions and the octane no. of each fraction was detd. By plotting the octane no. *vs.* A. S. T. M. distn. for each of the gasolines, a set of curves is obtained showing the relation between octane no. and b. p. at the following temps.: 90, 100, 110, 120, 130 and 140°. The curve is a straight line for paraffin base gasolines at 100°, and for naphthenic base gasolines at 130°. Properties of gasoline are given. E. J. Mahler

A study of knocking in Otto engines by means of electroacoustic measuring devices. Albert W. Schmidt and Kurt Generlich. *Deut. Kraftfahrtforsch.* No. **33**, 15 pp. (1939).—An electroacoustic method for measuring the knock intensity is described, in which the noises received by the microphone are amplified and converted into optical signals by means of a Braun tube. The range of amplitudes obtained with these oscillograms covers all intensities of knock originated by the motor fuel. Since the app. is not in immediate communication with the combustion chamber, no drilling of bores in the cylinder head is necessary, and knock measurements can be made in any one of the cylinders of a multiple-cylinder engine with a single setup. It has been found that individual differences in the fuel supply on the suction stroke, slight differences in the ignition timing and configuration of the cooling jacket around each cylinder account for individual differences in the octane no. detd. for the various cylinders. Bruno C. Metzner

Cylinder and piston-ring wear. Georg Beck. *Deut. Kraftfahrtforsch.* No. **29**, 11 pp.(1939).—Accurate measurements of the wear of piston rings and cylinder walls in gasoline engines show that wear is greatest when the engine operates in the cold, especially with frequent starting. Rupture of the lubricant film and corrosion are the main causes. Thermal breakdown of the film is responsible for wear at high temps. Progressive aging of the oil also increases the wear. Paraffin-, asphalt-, naphthene- and mixed-base oil ranged in this order with reference to increased wear of piston rings. An addn. of castor oil and graphite to the mixed-base oil proved to be of advantage, particularly for the first ring. The addn. of tetraethyl lead or iron carbonyl to the motor fuel increases the wear. A rapid wear-testing method based on measurement of the strength of elec. current passed to each of the piston rings and back through the cylinder wall appears to be promising. Bruno C. Metzner

Coöperative research and standardization for automotive petroleum products in the U. S. C. B. Veal. *IIme Congr. mondial pétrole* **4**, Sect. 5, 293–306(1937)(in English).—The activity of the Coöperative Fuel Research Comm., the Soc. of Automotive Engineers and the American Soc. for Testing Materials, CFR, SAE and ASTM, resp., with regard to organization, present and past projects is explained. A bibliography of CFR and SAE research work is appended, together with a list of recent ASTM standards. E. J. Mahler

Lubrication of internal-combustion engines. Paul

Marchand. *J. soc. ing. automobile* **12**, 353–63(1939).— Improper lubrication in internal-combustion engines may be due to chem. or phys. changes in the lubricant, corrosion of mech. parts by impurities present or formed in the lubricant, faulty mounting or poor maintenance of the engine. Crankcase diln., C and varnish deposits, formation of emulsions and overheating of bearings are the typical causes discussed in detail. Bruno C. Metzner

A critical investigation of the basic principles of viscosity and a special lubricating process. H. Brillié. *Bull. assoc. tech. marit. aéronaut.* No. 41, 105–29(1937); *Chem. Zentr.* 1938, I, 4404; cf. *C. A.* **32**, 6848[8].—The results of a series of exhaustive investigations in the National Phys. Lab. (Teddington) on the friction of lubricating films are in good agreement with the general laws of friction. It is shown, however, that the coeff. of friction corresponds better to some property of the film other than its observed thickness. An attempt is made to explain this contradiction by a new development of the fundamental differential equation of Reynolds. Such a treatment indicates that the oil film between 2 moving parts consists of 2 parts. One of these is a region promoting the lubricating action, in which the counter-pressure as well as the passive resistance acts. The 2nd is a region in which only the injurious frictional resistance acts. It is shown how this latter effect can be reduced by suitable shaping of the bearings, longitudinal grooves, etc. M. G. Moore

The static friction of lubricated surfaces. A. Fogg and S. A. Hunwicks. *J. Inst. Petroleum* **26**, 1–18(1940).— The "boundary lubricating" properties or "oiliness" of various substances were obtained by means of a modified Deeley machine in which the 3 flat pegs resting on the disk were replaced by 3 balls, 1/2 in. in diam. F. and H. experimented with various methods for cleaning the steel surfaces and found that by rubbing the friction surfaces with "0000 blue black" emery paper the traces of adsorbed oils or cleaning solvents were completely removed. After several hundreds of observations the coeff. of static friction for steel varied between 0.56 and 0.60 with a mean value of 0.58. The following av. values are reported by F. and H. as coeffs. of static friction: *Fatty oils:* castor oil, 0.095 at 20° to 0.105 at 100°; rape oil, 0.105; olive oil, 0.105; coconut oil, 0.08 from 40° to 100°; sperm oil, 0.10; pale whale oil, 0.095; neatsfoot oil, 0.095; lard oil, 0.085. *Mineral oils:* light machine oil, 0.16 at 20° to 0.19 at 100°; motor car engine oil, 0.13 at 20° to 0.15 at 100°; thick gear oil, 0.125 at 20° to 0.15 at 100°; solvent-refined oil, 0.15 at 20° to 0.20 at 100°; extreme-pressure lubricating oils, from 0.09 to 0.10 with practically no variation with temp.; graphited oil, i. e., solvent-refined oil contg. colloidal graphite, 0.15; graphited oil heated and allowed to cool for 24 hrs., 0.125. *Common liquids:* $CHCl:CCl_2$, 0.33; C_6H_6, 0.48; C_2H_5OH, 0.43; distd. H_2O, 0.20 to 0.40; glycerol, 0.20 at 20° to 0.25 at 100°. By compounding solvent-refined oil with rape oil F. and H. found that the friction at 100% rape oil was less than for any mixt. but that for practical purposes approx. 75% of the total possible gain is obtained at 20% rape-oil concn.; similar results were obtained when oleic acid (μ:0.08) is added to Brit. Pharm. paraffin (μ:0.18 at 20° to 0.22 at 100°). P. and H. conclude that with the revised Deeley machine the relative "oiliness" values of lubricants can be detd. with a reasonable degree of accuracy, that this property is not of the liquid in bulk but only of the boundary layer and that it is not connected with viscosity. Henri Marc

Surface-tension measurements of lubricating oils. M. Freund. *Petroleum Z.* **35**, 295–300(1939); cf. *C. A.* **33**, 8459.—The surface-tension-temp. graphs of 6 oils are almost parallel and very slightly convex toward the axes over the range 25–200°. Of specimens of similar origin and prepn., the denser oil has the higher surface tension. The Eötvös const., K, increases at first with mean mol. wt., but approaches a limit of about 5.6 when M = 850. The high values of K may be due to inapplicability of the expression $(M/d)^{2/3}$ for molar surface energy, in the case of long oriented mols. such as the higher paraffins; they fall slowly as temp. rises. B. C. P. A.

Asphalt in motor [engine lubricating] oils. Edmund Graefe. *Petroleum Z.* **35**, 178–9(1939).—Asphalt does not accumulate in the oil provided that suspended impurities (metal particles, C deposit, road dust, etc.) are continuously removed, because the asphalt is adsorbed by, and removed with, the C. Aging tests where no C is present do not represent actual conditions. B. C. P. A.

Lubricating power [of oils]. E. H. Kadmer. *Petroleum Z.* **35**, 171–8, 271–7(1939); cf. *C. A.* **33**, 4775[4].—The merits of the Thoma testing machine (*C. A.* **33**, 364[2]) are pointed out and the results of tests on a large no. of oils adjusted by temp. control to 2 standard values of η are given. Satisfactory relative values of lubricating power, L, are obtained although tests with several metals and alloys show that they are affected by the nature of the rubbing surfaces. Thirty-eight mineral oils show a roughly linear relationship of d_{20} to L which, however, is greatly influenced by refining so that over-refined oils notably have low values of L. Four synthetic oils have low d. compared with mineral oils of equal L. Three oils of high S content have high L compared with normal oils of equal d., and the latter are improved by adding S in various forms. Fatty oils show high L, but there is no correlation with d. B. C. P. A.

Extraction of mercaptans with alkaline solutions. D. L. Yabroff. *Ind. Eng. Chem.* **32**, 257–62(1940).—The differences in extractability of the various mercaptans from an oil (or gasoline) phase by an aq. soln. are due almost entirely to differences in soly. of the unneutralized mercaptan in the aq. phase, rather than to differences in the acidity of the mercaptans. As the NaOH concn. in the aq. phase increases, the improvement in extn. is less than might be expected, owing to the salting-out of the unneutralized mercaptan from the aq. phase by the NaOH. The extent of extn. increases as the temp. is lowered, essentially because of decreased hydrolysis of the mercaptide in the aq. phase. The extn. const. Kq, or the equil. ratio of total mercaptan and mercaptide concn. in the aq. phase to that in the oil phase, is expressed in terms of the partition and ionization consts. and readily estd. data. Kq for various mercaptans between approx. 0.5 N NaOH and isooctane at 20°: ethyl, 77.9; propyl, 15.6; butyl, 3.6; *tert*-butyl, 2.46; amyl, 0.753; *tert*-amyl, 0.362; heptyl, 0.0342. The effects of temp. on the overall extn., partition, ionization and hydrolysis correspond to heats of reaction of −7400, −600, 6800, and 6800 cal. per g.-mole, resp. "Solutizers," or org. addns., increase the soly. in the aq. phase, and some give rather remarkable results on the com. scale. Twenty-six references. R. W. Higbie

Improvement in octane number and lead susceptibility. D. L. Yabroff and A. C. Nixon. *Oil Gas J.* **38**, No. 41, 74–6(1940); *Natl. Petroleum News* **32**, R-56-62(1940).—Sulfur compds. decrease octane nos. as well as lead susceptibility. Polysulfides are more detrimental than mercaptans in this respect. Conventional sweetening methods convert mercaptans to disulfides and polysulfides to some extent, resulting in lowering of octane no. and lead susceptibility. Extg. sulfur compds. in Solutizer soln. (6 N KOH, 3 N K isobutyrate) yields gasoline with improved octane rating compared to the sour gasoline and permits lowering of leading costs. W. Andrew Wright

Petroleum refineries, including cracking plants, in the United States, January 1, 1939. G. R. Hopkins and E. W. Cochrane. *U. S. Bur. Mines, Circ.* 7091, 29 pp. (1939). Alden H. Emery

Nomenclature of technical terms used in the petroleum industry. *IIme Congr. mondial pétrole* **4**, Sect. 5, 105–260(1937).—Tech. petroleum terms are listed alphabetically in English, and their German and French equivs. are given in sep. columns. The dictionary includes terms in all branches of the industry. E. J. Mahler

Nomenclature of extraction processes. II. A. W. J. Mayer. *IIme Congr. mondial pétrole* **4**, Sect. 5, 271–9 (1937); cf. *C. A.* **32**, 7790[8].—Nomenclature of American

and British processes is held untenable. A classification of the extn. processes into elementary and multiple processes is drawn up. The term "continuous" extn. is discussed. New definitions are given for "non-intermittent," "intermittent," "batch" and "continuous" processes. A study of the methods of flow in extn. processes has led to the new conception of "cross-stream" flow. Gradual and multiple processes are discussed. All the processes are described in French, German and English terminology. E. J. Mahler 1

Cracking coal-oil distillates. Gustav Egloff, G. B. Zimmerman, J. C. Morrell and W. E. Lemen. *Oil Gas J.* **38**, No. 35, 36, 39, 52, 53(1940).—A pilot plant cracking coal-oil distillate from a South Yorkshire bituminous gas coal is described. The properties of the original distillates and cracking plant products are given, together with operating conditions and yields. A 78 octane gasoline was produced. W. Andrew Wright 2

Gas-recovery system installed by Kendall. J. P. O'Donnell. *Oil Gas J.* **38**, No. 39, 34, 35(1940).—A description of the equipment. W. Andrew Wright 3

Sample computations of natural gasoline absorber data. R. H. Turner. *Petroleum Engr.* **10**, No. 3, 54, 56, 58 (1938); cf. *C. A.* **33**, 6034⁴.—Bubble-tower capacity depends on the distance between trays and plates, mol. wt. of the gas, operating pressure, quantity of liquid passing downward, and depth of liquid on the plates. Typical calcns. are given of the allowable cap velocity and the capacity of an absorber under specified conditions. B. C. P. A. 4

The petroleum industry in France. I. Introduction. Ernest Mercier. *Mém. soc. ing. civils France* **92**, 82–9 (1939).—An economic review. **II. The petroleum-refining industry and its recent evolution in France.** X. Normand. *Ibid.* 90–101. A general review of refining processes, with statistics. **III. Fuels, lubricating oils and pitches from the point of view of the producer and consumer.** Jacques André. *Ibid.* 102–10.—An economic review. **IV. Liquid fuels as the essential goal of the petroleum industry.** P. Dumanois. *Ibid.* 111–23.—A discussion of standards for gasolines and gas oils. **V. Distillation, cracking, reforming; general principles.** P. Minard. *Ibid.* 124–40.—The evolution of these processes is discussed. The operation of the combination distg. and cracking plant at Martigues is described. This plant combines the following features: (1) max. production of gasoline compatible with a very concd. liquid cracking residue, (2) polymerization of 3- and 4-C hydrocarbons of the cracking gases, with increased gasoline yield, (3) sepn. of cracked gasolines into 2 fractions, (4) concn. of the heavy pitch constituents and production of good quality fuel oil of low S content. **VI. Chemical synthesis in the petroleum industry; polymerization, cyclization, manufacture of lead tetraethyl.** Jacques Barbière. *Ibid.* 141–53.—The production of high octane gasoline by polymerization of the olefins of cracking gases in presence of H_2SO_4 or P_2O_5 and by catalytic reaction between the olefins and paraffins of these gases, as developed by the Shell and Standard Oil companies, is described. Low yields of iso- compds. are obtainable by isomerization of paraffins and olefins in presence of metallic chlorides or P_2O_5. Catalytic cyclization of aliphatic hydrocarbons is discussed and the manuf. of $PbEt_4$ is described. **VII. The role of scientific research in the education of petroleum engineers.** H. Weiss. *Ibid.* 154–61. **VIII. Conclusion.** P. Pineau. *Ibid.* 162–5. M. M. Flannery 5 6

Burning of sulfur-containing Ishimbajev mazut in admixture with gaseous fuels in Martin furnaces. I. G. Arsamaszev and S. M. Shegal. *Ural. Met.* **1937**, No. 4, 39–43; *Chem. Zentr.* **1938**, I, 4557.—When the smelting is carried out with Ishimbajev fuel oil (2–3% S) in mixts. with gaseous fuels, the metal produced contains only up to 0.04% S. The fuel oil consumption amounts to up to 6%; the S content of the combustion gases amounts to as much as 0.85 g. per cu. m. M. G. Moore 7

Application of x-ray inspection to oil-refining equipment. Herbert R. Isenburger. *Refiner Natural Gasoline Mfr.* **19**, 22–9(1940).—X-ray inspection of castings, forgings, etc., will show defects (size and location), which might be overlooked otherwise. A brief description of the technique used is included, together with exposure charts for steel. C. H. Brooks 8

The development of the pit-kilns for the carbonization of wood. Fritz Fromm. *Wien. allgem. Forstztg.* **55**, 165–6 (1937).—A review of the Austrian patents on this field. 2 drawings. F. Fromm 9

The utilization of waste timber and waste lumber. Fritz Fromm. *Wien. allgem. Forstztg.* **55**, 67–8(1937).—A short report of the studies of Austrian committees on the production of glucose, oxalic acid and charcoal from wood. A transportable metallic kiln (constructed by A. Hölzel) for the carbonization of wood is described. It works automatically and yields 18–20% charcoal. F. Fromm 10

Wooden rosin barrels. J. B. Cuno. *U. S. Forest Products Lab.*, Mimeographed Rept. **1939**.—C. discusses the advantages to naval stores industry of continued use of the wooden rosin barrel, describes weaknesses in the present type because of shrinkage, improper wood, faulty manuf. and assembly, and gives detailed recommendations with several illustrations, for an improved wooden barrel. C. E. Curran 11

The chemical wood industry in Austria. Rudolf Scheuble. *Centr. ges. Forstwesen* **64**, No. 1, 1–31(1938); *Chem. Zentr.* **1938**, I, 4253–4.—A review. Topics considered include the lignocellulose industry, the resin and turpentine industry, charcoal burning, the production of wood gas, etc. The wood required by these industries is also considered. M. G. Moore 12

Chemistry in the Forest of Dean. Wood carbonization still holds out. M. Schofield. *Ind. Chemist* **16**, 65–9 (1940).—Wood distn. is described. E. H. 13

Gas measurements over petroleum deposits (Selzer, Weber) **8**. Bituminous protective coatings for buildings (Becker) **20**. Detn. of petroleum products in crude and rectified alc. (Kotlyarenko) **16**. Effect of petroleum products on Neoprene vulcanizates (Fraser) **30**. Method for extinguishing burning petroleum products (Bezuglov) **24**. Hydrogenation of coal and petroleum (Valverde) **21**. Phase diagram of mixt. of natural gas and natural gasoline near crit. conditions (Katz, *et al.*) **2**. Metals in drilling (Nelson) **9**. Skin-protecting compn. [from effects of petroleum products] (Russ. pat. 56,097) **17**. Artificial resins [from acid sludge] (Russ pat. 56,044) **13**. App. for regulating flow of oils (U. S. pat. 2,185,970) **21**. Sepg. solid-oil mixts. (Brit. pat. 508,849) **21**. Polymerizing fatty oils [for use in lubricants] (U. S. pat. 2,184,957) **27**.

Evaluation of Petroleum Products. Philadelphia: Am. Soc. for Testing Materials. 52 pp. 75 cents.

Conversion of petroleum oil. Philip S. Nisson (to Pure Oil Co.). U. S. 2,185,516, Jan. 2. An arrangement of app. is described, and a method of converting crude oil into motor fuel of high octane rating which comprises sepg. crude oil into a vapor and a liquid fraction without cracking the oil, simultaneously cracking the vapors in a vapor-phase-cracking stage and the unvaporized liquid in a liquid-phase-cracking stage, sepg. cracked vapors from unvaporized residue in both cracking stages, commingling and fractionating the vapors, separately withdrawing the unvaporized oil produced in the liquid-phase-cracking step from the system without further cracking, withdrawing unvaporized residue from the vapor-phase cracking and recycling it to the liquid-phase-cracking stage, withdrawing and cooling condensate formed in the fractionating stage and fringing the products issuing from the vapor-phase-cracking stage into contact with the cooled condensate.

Hydrogenating heavy petroleum oils. Elbridge W. Stevens (to Wachovia Bank and Trust Co.). U. S. 2,185,070, Dec. 26. An arrangement of app. is described,

and a process of converting heavy petroleum oil fractions to lighter fractions, which comprises vaporizing the heavy oil fractions, mixing the heated vapor with H gas, passing the vapor-gas mixt. through a space encircled by a catalytic material, producing a high-frequency silent dark discharge of elec. current through the space, raising the temp. of the vapor-gas mixt. so treated above the original temp. of the vapor while maintaining the treated vapor-gas mixt. below 360° and again passing the vapor-gas mixt. through a high-frequency elec. field forming a silent dark discharge in a space enclosed by a catalytic material, such as a mixt. of Al, Fe and Zn.

Ethylene from hydrocarbon material such as petroleum oils. Frank Porter and John M. Duncan (to Solvay Process Co.). U. S. 2,185,566, Jan. 2. App. is described, and a method of operating a pair of refractory regenerative units, A and B, for cracking hydrocarbons to produce C_2H_4.

Separating naphthenic and other organic acids from oily materials such as petroleum oils. Arthur Lazar and Lionel S. Galstaun (to Tide Water Associated Oil Co.). U. S. 2,186,249, Jan. 9. A process of sepg. org. acids from oily material contg. the same comprises treating the material with a basic reagent of higher volatility than the acids whereby soaps are formed and at a temp. below that at which amides tend to be formed, sepg. the soaps from the oily material, then dissocg. the soaps by distn. to recover separately the org. acids and basic reagent. NH_3 or an alkylamine or alkylolamine may be used as the basic reagent.

Rendering mineral oils resistant to oxidation. Adrianus J. van Peski (to Shell Development Co.). U. S. 2,184,944, Dec. 26. A process of improving the resistance to oxidation of a mineral lubricating or insulating oil involves selectively hydrogenating an aromatic, liquid SO_2-sol. ext. of a mineral lubricating oil contg. olefinic and nonhydrocarbon impurities under conditions to eliminate at least a major portion of the impurities and to produce a purified aromatic ext., and adding a small amt. of the latter to the mineral oil.

Extraction of asphalt-free hydrocarbon mixtures. N. V. de Bataafsche Petroleum Maatschappij (A. W. J. Mayer, inventor). Dutch 47,238, Dec. 15, 1939. Hydrocarbon mixts. such as lubricating oils or gasolines are sepd. into components of diff. H contents by extn. with mixts. of anhydrous selective solvents; one of the solvents is a monosubstituted ring (preferably aromatic), in which the substituent produces a dipole moment of more than 10^{-18} e. s. u.; the other solvent is a cyclic compd. contg. more than one substituent. Examples of solvent mixts. are phenol and resorcinol, nitrobenzene and *p*-nitrophenol, nitrobenzene and 1,2,4-dinitrochlorobenzene. Diluents may be added to oil or solvent; nonpolar cyclic compds. are used for this purpose. The solvents may have the same polar group. Mixts. of aromatic mono- and polyamines made by reduction of nitrated coal-tar hydrocarbons are excepted specifically.

Effecting catalytic conversions such as hydrocarbon treatments. Thomas P. Simpson, John W. Payne, John A. Crowley, Jr. and Clark S. Teitsworth (to Socony-Vacuum Oil Co.). U. S. 2,185,928-9, Jan. 2. Various structural and operative details of an app. with parallel tubes and a surrounding shell, etc. U. S. 2,185,930 relates to a process for effecting the conversion of hydrocarbons into others of the gasoline type, involving passing the hydrocarbons to be converted, in vapor phase, in a plurality of paths through a body of contact material while maintaining all portions of the contact material and contacting vapor within a temp. range where substantial conversion of the hydrocarbons will take place with resultant deposition of a contaminating combustible substance upon the contact material, continuing such passage of hydrocarbons and the conversion thereof until the deposit upon the contact material renders it inefficient and regeneration is desirable, removing vapor products from contact with the contact material, passing combustion-supporting gas through the used contact material to effect regeneration thereof *in situ* by blowing the gas through the body of contact material in the form of thin streams sufficiently thin in at least one dimension to maintain the temp. difference between portions of the contact material across transverse sections of respective thin streams within a range not exceeding the difference between a min. temp. at which the burning of the contaminating deposit occurs and a max. temp. above which substantial damage to the contact material occurs and being of a length several times their narrowest cross-sectional dimension, and continuously removing heat from the burning areas within the contact material to maintain the temp. thereof below that at which substantial damage occurs, by maintaining a heat-control medium in indirect heat-exchange relationship with the contact material. App. is described, and U. S. 2,185,931 relates to app. for use and regeneration of catalytic material so used.

Vapor-phase hydrogenation of olefin polymers. Jan D. Ruys and Ewald D. Pyzel (to Shell Development Co.). U. S. 2,184,930, Dec. 26. A mixt. of olefin and H is passed through a catalyst until the portion of the catalyst that first comes into contact with the mixt. is decreased in activity by catalyst poisons to a predetd. degree, then the direction of the mixt. is reversed. By repetition of this procedure the two ends of the catalyst are alternately poisoned and regenerated during the course of the hydrogenation.

Refining aromatic hydrocarbon oils. David F. Gould (to Barrett Co.). U. S. 2,185,406, Jan. 2. A process of refining a hydrocarbon oil from the group consisting of benzene, toluene, xylene or mixts. thereof, solvent naphtha and drip oil comprises adding H_2SO_4 of a strength not exceeding about 70% to the oil, heating the resulting mixt. in the liquid phase, thereafter, without neutralizing acidic constituents in the oil, distg. off the oil, and then neutralizing acidic constituents in the resultant oil distillate.

Refining hydrocarbon oil distillates. Warren W. Johnstone (to Universal Oil Products Co.). U. S. 2,185,768, Jan. 2. For refining, with removal of mercaptans, etc., but without removing deterioration-inhibiting materials, a distillate such as one from a cracking process is treated with an aq. Pb acetate soln. of PbO (suitably a 10–30% soln.) and the aq. and oil layers formed are sepd., S is added to the oil layer to convert substantially all oil-sol. Pb mercaptides into Pb sulfide and dialkyl disulfides, and the treated distillate is recovered.

Extraction process for separating different constituents of hydrocarbon oils. Johannes A. Buchel and Reyerus N. J. Saal (to Shell Development Co.). U. S. 2,185,291, Jan. 2. For sepg. an oil such as a mineral lubricating oil into portions of "different degrees of paraffinicity," use is made of a selective solvent for nonparaffinic hydrocarbons such as furfural in the presence of $CHCl_3$ and the liquid ext. and raffinate phases are sepd.

Cracking hydrocarbon oils. Victor Stapleton (to Texas Co.). U. S. 2,185,041, Dec. 26. An arrangement of app. is described, and a process which involves heating a confined stream of condensate oil to a cracking temp. above 480° to effect a high rate of cracking per pass, directing the stream of cracked products into an enlarged cracking chamber wherein sepn. of vapors from liquid takes place, maintaining a cracking temp. above 455° under superatm. pressure in the enlarged cracking chamber, separately withdrawing liquid from the enlarged cracking chamber at a rate adequate to prevent the accumulation of liquid therein, passing the sepd. vapors without further heating directly into a second cracking chamber below the liquid level therein, introducing fresh charging stock for the process into the system, directing the greater part thereof into a dephlegmating zone in the second cracking chamber above the liquid level therein whereby the stock thus introduced flows countercurrent to the rising vapors sepd. therein and dephlegmates the sepd. vapors before reaching the body of liquid oil, maintaining a large body of liquid oil therein at a cracking temp. of a lower order than that of the first cracking chamber by substantially only the heat derived from the vapors, passing the minor part of the fresh charging stock into the enlarged cracking chamber in proximity to the point of withdrawal of liquid

therefrom to prevent substantial coking at the point, removing the dephlegmated vapors from the dephlegmating zone of the second cracking chamber and subjecting them to fractionation to sep. out a condensate and conducting the condensate to the confined stream.

Cracking hydrocarbon oils. Richard F. Trow (to Texas Co.). U. S. 2,185,162, Dec. 26. An arrangement of app. is described, and a method of cracking which comprises passing a stream of oil such as a gas oil or the like under superatm. pressure through primary and secondary sections of an elongated heating zone of restricted cross section such as a pipe coil and applying heat to the primary section to subject the oil therein to cracking temp. and effect substantial cracking, introducing oil formed as hereinafter specified into the secondary section of the elongated heating zone so that the resultant mixt. of oil and the products from the primary section of the elongated heating zone constitutes the stream flowing in the secondary section thereof, applying heat to the secondary section of the elongated heating zone to subject the stream flowing therein to cracking temp. and continue the cracking, delivering the resultant cracked products from the secondary section of the elongated heating zone to an enlarged sepg. zone maintained under superatm. pressure wherein sepn. of vapors from residue takes place, passing the sepd. vapors to a second elongated heating zone of restricted cross section, wherein the vapors are heated and subjected to vapor-phase cracking, directing the resultant cracked products into a second enlarged sepg. zone wherein sepn. of vapors from residue takes place, passing sepd. vapors from the second enlarged sepg. zone to a primary fractionating zone, withdrawing residue from the first enlarged sepg. zone and subjecting it to flash distn. under reduced pressure to produce a flashed condensate, introducing resultant flashed condensate into the primary fractionating zone wherein fractionation takes place to sep. uncondensed vapors from a fraction comprising reflux condensate and unvaporized constituents of the introduced flashed condensate, conducting the fraction comprising reflux condensate and unvaporized constituents of the flashed condensate from the primary fractionating zone as the oil introduced into the secondary section of the first elongated heating zone, subjecting sepd. vapors from the primary fractionating zone to further fractionation to separate a reflux condensate from lighter products and cycling the reflux condensate to the primary section of the first elongated heating zone.

Cracking hydrocarbon oils. Percival C. Keith, Jr., and Joseph K. Roberts (50% each to Standard Oil Co. of Ind. and Gasoline Products Co.). U. S. 2,185,200, Jan. 2. Numerous details of app. arrangement are described, and a process which involves subjecting crude petroleum in a primary fractionating zone to fractionation to form a residue and a lighter fraction, passing the residue to a primary viscosity-breaking zone wherein the residue is subjected to cracking temp. under conditions to effect the formation of a high yield of gas-oil constituents adapted for conversion into gasoline, directing the viscosity-broken products into a sep. evapg. zone wherein sepn. of vapors from residue takes place. The sepd. vapors are passed into a sep. fractionating zone and subjected therein to fractionation to form a heavy reflux condensate and a lighter fraction; the resultant heavy reflux condensate is passed to a secondary viscosity-breaking zone wherein the heavy condensate is subjected to cracking temp. under conditions to effect the formation of a high yield of gas-oil constituents adapted for conversion into gasoline. The latter viscosity-broken products are sepd. into vapors and residue and the sepd. vapors passed into the sep. fractionating zone. The lighter fractions obtained from the viscosity-broken products and from the crude petroleum fractionation are combined and subjected to cracking in a sep. cracking zone under high-cracking temp. and under conditions of high-cracking per pass to effect conversion to gasoline of high antiknock quality and the resultant products of the latter cracking are directed into a sep. fractionating zone to recover the desired gasoline product.

Cracking hydrocarbon oils. Charles W. Nofsinger and David T. Shaw (to Gasoline Products Co.). U. S. 2,185,222, Jan. 2. Crude petroleum is sepd. in a primary zone into vapors and residue. The vapors are sepd. in a first fractionating zone into gasoline and higher-boiling constituents. The residue is cracked in a primary cracking zone. The products from this zone are sepd. into vapor and residue in a second sepg. zone, and vapors fractionated in a second fractionating zone. Heavy reflux from this zone is passed to a second cracking zone, the products from which are introduced into the second sepg. zone. Vapors in the second fractionating zone are further fractionated to gasoline and intermediate constituents. Gasoline fractions from the first and second fractionating zones are reformed to produce a high-antiknock fuel. Vapors from this process are fractionated in a third fractionating zone, the higher-boiling constituents from which are combined with higher-boiling constituents from the first fractionating zone and the intermediate constituents from the second fractionating zone and sent to a recycling cracking zone.

Preventing corrosion of oil-cracking apparatus by sulfur-bearing petroleum oils. Thomas L. McGee (to Jenkins Petroleum Process Co.). U. S. 2,185,380, Jan. 2. An arrangement of app. is described, and a process for preventing the corrosive action of S-bearing petroleum hydrocarbons toward the metal of the app. in which such hydrocarbons are treated which comprises continuously injecting into the hydrocarbons upon attainment of an initial critical corrosive temp. specific to the hydrocarbons finely divided iron dispersed in a carrier oil of relatively low S content heated to a temp. approx. 83° in excess of the initial corrosive temp. and maintaining such contact while the hydrocarbons exist at a corrosive temp.

Reforming hydrocarbon oil distillates such as gasoline of poor antiknock value. Kenneth Swartwood (to Universal Oil Products Co.). U. S. 2,185,757, Jan. 2. An arrangement of app. is described, and a process which comprises subjecting the distillate in a heating zone to cracking conditions adequate to enhance its antiknock value, sepg. the resulting products into vaporous and nonvaporous components in a sepg. zone, subjecting the vaporous components to fractional condensation to sep. the same into a heavy reflux condensate substantially devoid of gasoline, a lighter reflux condensate contg. high-boiling gasoline fractions, a distillate product contg. substantially all of the low-boiling gasoline fractions in the vaporous products and a normally gaseous product, recovering the distillate product, bringing into contact at least a portion of the gaseous product with the lighter reflux condensate to absorb high-boiling components including propylene and butenes of the former in the latter, subjecting resultant enriched lighter reflux condensate to cracking conditions of temp., pressure and time controlled independently of those employed for the distillate charging stock and adequate to convert the same into high yields of good antiknock gasoline, and subjecting the vaporous products of the last-mentioned cracking step to the fractional condensation, together with the vaporous products of the first-mentioned cracking step.

Desulfurizing gasoline. Alexis Voorhies, Jr., and Eldon E. Stahly (to Standard Oil Development Co.). U. S. 2,185,577, Jan. 2. An arrangement of app. is described, and a process for desulfurizing S-contg. gasoline composed predominantly of olefinic polymers which comprises intimately mixing the gasoline with H_2SO_4 of about 45–75% concn. and at a temp. sufficient to render a substantial part of the acid miscible with the polymers, sepg. the resulting mixt. into a hydrocarbon layer contg. more S than the gasoline originally contained and a H_2SO_4 layer contg. hydrocarbon polymers and less of the S compds. than the polymers originally contained, and recovering from the H_2SO_4 layer a hydrocarbon mixt. boiling within the gasoline range and having a reduced S content.

Motor fuel. Edwin R. Gilliland and Raphael Rosen (to Standard Oil Development Co.). U. S. 2,184,956, Dec. 26. A motor fuel comprising gasoline hydrocarbons is blended with about 10% or more of a glycol or glycerol ether boiling within the gasoline range and having only a single

O atom linked directly to a C atom of an ether group, such as mono- or di-Et ether of ethylene glycol which serves to improve the antiknock properties of the fuel. Cf. *C. A.* **33**, 9589[1].

Apparatus (containing steel wool or the like) for vaporizing liquid hydrocarbon fuels for engines, etc. John H. Seitz (50% to Joseph Fuhringer). U. S. 2,186,152, Jan. 9. Various structural details.

Treatment of alkaline oil-refining sludge. E. A. Eminov and L. N. Frumen. Russ. 51,920, Nov. 30, 1937. Alkali petroleum sludge is treated with a soln. of NaOH of at least 16°Bé., settled, the oil removed, the alkali soln. again treated with at least 16°Bé. NaOH, and settled, and the sepd. naphthenic soaps are treated with kerosene alkali sludge for final sepn. of the oil. The soaps are then sepd. in the usual manner.

Treatment of oil wells. Donald A. Limerick and Howard C. Lawton (to Shell Development Co.). Can. 386,745, Feb. 6, 1940. To clean oil wells from deposits of mixed paraffinic and inorg. matter a liquid comprising an inorg. oxidizing compd. (e. g., water-sol. metal nitrates), a comminuted electropos. metal (e. g., Al or Zn), an aq. soln. of a strong acid reacting with the metal and the inorg. obstructing matter (e. g., HCl or H_2SO_4), and a solvent (e. g., benzene or kerosene) is introduced, heat generated in the well by the interaction of the agents melts the paraffinic matter and the solvent dissolves it, and acid dissolves the inorg. matter.

Sealing off water-bearing formations. Franklin A. Bent, Albert G. Loomis and Howard C. Lawton (to Shell Development Co.). Can. 386,744, Feb. 6, 1940. Brine-bearing formations traversed by a well are sealed off by introducing into the well and forcing into the formation a treating soln. of fluosilicic acid.

Mixed esters. Melvin De Groote (to Petrolite Corp., Ltd.). U. S. 2,184,794, Dec. 26. Esters suitable for use in demulsifying water-in-oil type crude oil emulsions and for other purposes as substitutes for soaps, Turkey-red oils, sulfonated alcs., etc., are produced by treating triricinolein with maleic acid, maleic anhydride or maleyl chloride to produce an acid ester and then treating the acid ester with glycerol to produce a neutral ester, and sulfonating the product with a bisulfite.

Opaque paraffin waxes. Vanderveer Voorhees (to Standard Oil Co. of Ind.). U. S. 2,185,046, Dec. 26. An opaque product is prepd. by heating paraffin wax to above its m. p., dissolving in it about 0.2% or more of a froth stabilizer which may be an alkali sulfonic acid soap, Na stearate, hydroxy ethyl stearate or an alkyl xanthate, in the absence of an aq. medium, and vigorously agitating the resulting mixt. with a gaseous medium such as O, CO_2, N or air while the wax cools to its solidification point.

Filter suitable for use in engine oil circulating systems. Harry R. Tear (to Lubrication Corp.). U. S. 2,185,281, Jan. 2. Various structural details.

Lubricating, insulating and similar oils. Standard Oil Development Co. Brit. 509,071, July 11, 1939. The stability of the oils is improved and their decompn. at elevated temps. prevented by addn. of, e. g., 0.2–5%, of oxidation inhibitors and sludge dispersers of the alkyl thiophosphite class of formula $P(SR)_3$, in which R is alkyl, e. g., triamyl, trihexyl or tributyl thiophosphate. The alkyl radical may contain halogen, e. g., Cl, substituents.

Solvent extraction of lubricating oils. August Schlageter (to Standard Franco-Americaine de Raffinage). U. S. 2,184,961, Dec. 26. An arrangement of app. is described, and a countercurrent solvent treatment of lubricating oils, as with a selective solvent, which involves cooling the ext. phase in a series of cooling stages, removing the cycle oil phase from each cooling stage and returning the first obtained cycle oil to a point approx. the middle of the treating zone and the last obtained cycle oil to a point of the treating zone nearer the extn. end before the first cooling stage, intermediate cycle oils being returned to points intermediate between those into which the first and last cycle oils are introduced.

Recovery of solvents such as sulfur dioxide and benzene used for treating lubricating oils. Edward G. Ragatz and Donald E. McFaddin (to Union Oil Co. of Calif.). U. S. 2,185,311, Jan. 2. Various details of app. arrangement are described, and of a process for scpg. a solvent soln. of SO_2, benzene and water comprising vaporizing the soln., fractionating the vapors in contact with liquid SO_2 reflux substantially free from and at a temp. and pressure which will condense substantially all of the benzene vapors but will allow water vapor to remain uncondensed and producing thereby fractionated overhead vapors consisting of SO_2 and water substantially free from benzene.

Solvent refining of petroleum lubricant fractions. Douglas L. Hooker and Carl M. Fabian (to Socony-Vacuum Oil Co.). U. S. 2,184,838, Dec. 26. An arrangement of app. is described, and a method for double solvent refining of petroleum lubricant fractions which comprises causing a paraffinic solvent such as propane and a naphthenic solvent such as "selecto" to flow through a series of stages each consisting of a mixing step and a settling step, introducing an oil to be treated to a stage intermediate the ends of the series, removing paraffinic solvent and a raffinate oil from one end of the series, removing naphthenic solvent and an ext. oil from the other end of the series, and by-passing a portion of one solvent across at least one intermediate stage so that the throughput of solvent in that intermediate stage may be less than the total throughput, the throughput at the initial and end stages may be equal to the total throughput, and the relative concn. of solvent in the solvent-solute phase formed by the solvent at the point of reintroduction may be greater than in the absence of such by-passing.

Lubricant. Michael J. Galvin, assignee of one-fourth interest to Viola R. MacMillan. Can. 387,328, Mar. 5, 1940. MoS_2 in its natural state is ground to a semicolloidal condition and mixed with a lubricant thinner, e. g., graphite or Al. It prevents oxidation and friction of a metallic surface.

Dialkylhalobenzenoid sulfides. Jesse H. Babcock and Anthony Loverde (to Hooker Electrochemical Co.). U. S. 2,185,009, Dec. 26. Compds. which may be added to lubricating oils to improve their film strength, such as dichlorophenyl methyl polysulfide, dichloronaphthyl methyl polysulfide or dichloroanthracyl methyl polysulfide, are produced by a process typified by treating a halobenzenoid alkyl halide having at least one halogen atom and at least one halogenated alkyl group attached to the C ring with a compd. of an alkali metal with S having at least one S atom per mol. substantially free from hyposulfide and sulfate, in an aq. soln., and mechanically sepg. the product from the aq. medium contg. the by-product. Various examples with details of procedure are given.

Apparatus (with an immersion heater) suitable for heating and melting bituminous materials. Geo. P. Kittel. U. S. 2,185,594, Jan. 2. Various structural and operative details of an app. which may be heated by a directed flame burner.

Apparatus for testing the ductility of asphaltic, bituminous, and like materials. Charles S. Howe (to Industrial Developments Inc.). U. S. 2,185,340, Jan. 2. Various structural and operative details are described.

23—CELLULOSE AND PAPER

CARLETON B. CURRAN

The Sauter diagrams of natural cellulose. T. Kubo. *Naturwissenschaften* **27**, 857–8(1939).—Sauter (*C. A.* **31**, 3257[8]) found 4 addnl. interference points inside the usual diffraction interferences of natural cellulose, and Kiessig (*C. A.* **33**, 6585[9]) partly confirmed this. By use of a Cr anticathode a no. of successive equator diagrams were

made of natural cellulose (ramie); the Sauter lines did not show in the first diagram taken with polished, clean anticathode but gradually appeared with increasing intensity in later diagrams with the same anticathode. With Cu anticathode the Sauter lines did not appear. It is assumed that the Sauter lines are not due to cellulose structural effect but to lack of monochromatism of the x-rays. Comparison of the wave lengths calcd. from Sauter diagrams with $WL\alpha$ and $L\beta$ radiation and direct calcite spectrograms of the radiation used confirmed this view.
B. J. C. van der Hoeven

The trend of progress in the cellulose industry, with special reference to the paper and allied industries Julius Grant. *World's Paper Trade Rev.* 112, TS153–6, 161–5 (1939).—See *C. A.* **33**, 7094[9]. A. Papineau-Couture

Solubility of β-cellulose in aqueous solutions of inorganic and organic compounds. J. R. Katz and J. Seiberlich. *Paper Trade J.* 110, No. 7, 37-8(1940).—S-contg. 3 compds. affect the soly. to a greater extent than the corresponding O-contg. compds. The dissolving power of halogen compds. increases with the at. wt. of the halogen atom present. The dissolving power of a compd. increases with the no. of halogen atoms present. The dissolving power of org. lyotropic compds. is improved by increasing the length of the chain of the mol. The introduction of several hydrophobic groups into the mol. decreases the dissolving power of the compds.
A. Papineau-Couture

Fluidity of cotton in dimethyldibenzylammonium hydroxide—measure of cotton degradation. W. Walker Russell and Norman T. Woodberry. *Ind. Eng. Chem., Anal. Ed.* 12, 151-4(1940).—Different samples of bleached cotton cellulose (I) were found to dissolve readily in 0.5% concn. in the optimum dilf. 1.96 ± 0.01 *N* dimethyldibenzylammonium hydroxide (Triton F) (II) to produce 5 solns. whose fluidities (or viscosities) are a measure of the extent to which the I has been degraded. For the I studied the II fluidities are very nearly a tenth, and the II sp. viscosities very nearly twice the corresponding cuprammonium hydroxide values. The II method is simpler, as it can be carried out in the air and light, and is faster. Mark Plunguian

Vacuum filters for washing cellulose. A. S. Birillo. *Bumazhnaya Prom.* 1939, No. 1, 45–7; *Khim. Referat. Zhur.* 2, No. 5, 121-2(1939).—A no. of difficulties encountered during filtration and methods of overcoming them are described. In order to avoid loss of vacuum the temp. of the wash waters should not exceed 50–60°. To obtain alkalies of a max. d. a 2-fold or 3-fold washing in the same vacuum filter is recommended by sepg. the zones of washing into subzones (primary, secondary, tertiary). With the use of 2 vacuum filters it is possible to effect 6-fold washing and to reduce to a min. the amt. of weak alkalies which are used for the diln. of the stronger alkalies. This min. cannot be reached in the diffusers. W. R. H.

The modification of cellulose by oxidation. G. F. Davidson. *J. Soc. Dyers Colourists* 56, 58-63(1940).—A cellulosic material whose chem. and phys. properties have been modified by oxidation is here regarded as oxycellulose, and the insol. products of the hydrolytic action of acids on cellulose are regarded as hydrocelluloses. The work of investigators on these products is reviewed briefly. The recent investigations of the oxidation of cellulose by the methods of org. chemistry are of great importance and their extension to include other oxidants is desirable. In view of the diversity of the products obtained by the action of various oxidizing agents it appears certain that the oxidation of cellulose is, in general, a complicated process, but probably the primary oxidative attack on the cellulose chain-mol. is confined to a few simple reactions. Twenty-five references. W. H. Boynton

The mechanism of deformation and the fine structure of hydrated cellulose. XVI. The optical polarization analysis of the process of deformation of isotropic fibers of hydrated cellulose. 2. Double refraction in the swollen condition. P. H. Hermans and P. Platzek. *Z. physik. Chem.* A185, 269–305(1939); cf. *C. A.* **34**, 2586[9].—Swollen and progressively stretched fibers of hydrated cellulose, prepd. as previously described, were examd. with polarized 1 Na light. The results are interpreted on the basis of Wiener's (*C. A.* **6**, 950) double-refracting curves. Twenty-seven different liquids were used to swell the fibers by imbibition; the values obtained for the total double refraction of the treated fibers vary in a fairly systematic way with the n of the liquids. The total double refraction (G) is resolved into 2 components: (1) characteristic double refraction (E) due to an anisotropic arrangement of 2 the refracting particles and (2) double refraction due to stretching (S). The way in which these 3 quantities depend on the treatment of the fiber is considered in detail. E is not an invariant property of the material but increases with the tension. The sp. double refraction (G/d) for the air-dried and swollen (benzyl alcohol) conditions can be calcd. one from the other provided the degree of swelling does not exceed 2. The results make it necessary to 3 discard the idea that the fiber structure consists of cryst. rods which can orient themselves but which do not change their form. A structure which consists of long straight mols. which undergo a change in cross section when their long axes are oriented is consistent with the exptl. facts, as is also a structure made up of coiled mols. Analogies are drawn between the degree of swelling and the corresponding optical properties of hydrated cellulose and rubber. T. H. Dunkelberger

Esterification of cellulose and cellulose hydrate. V. I. Shettle, N. Klyuchkin and M. Fuks. *J. Applied Chem.* (U. S. S. R.) 12, 1143–6(in German, 1146)(1939); cf. *C. A.* **33**, 6587[7].—The degree of esterification of cellulose in the presence of pyridine by means of acid chlorides 4 in $CHCl_3$ soln. was lower than in C_6H_6 soln. The substitution of pyridine by quinoline lowered the degree of esterification. A. A. Podgorny

New processes for producing cellulose derivatives. R. Steinmann. *Kunststoffe* 29, 282–6(1939).—This review 5 cites 39 recent references. J. W. Perry

Preparation of cellulose derivatives with maintenance of their fibrous structure. IV. Cellulose nitroacetate. 3. I. Simoda and S. Kamihara. *Cellulose Ind.* (Tokyo) 15, 161-66, *Abstracts* (in German) 34-41(1939); cf. *C. A.* **33**, 7559[6].—The acetylation of cellulose nitrate was investigated, the ratio of HNO_3:H_2SO_4 being 1:1. Also the ef- 6 fects of adding urea to the nitrating bath, and treating the cellulose nitrate with MeOH before acetylation, were studied. Nitration was carried out at varying temp. and time, but with a pulp to acid ratio of 1:50; stabilization was effected by boiling with H_2O. Acetylation took place at 30°, with 25 cc. of a mixture of C_6H_6 (180 g.), Ac_2O (60 g.), and H_2SO_4 (d. 1.84, 1.5 g.) per 1 g. of the nitrate. The reduction in HNO_3 content reduced the η, but not below that of com. cellulose acetates. The intermediate MeOH treatment greatly accelerated the acetylation even in comparison with Ac_2O, used in previous expts. Raising the temp. of nitration from 0° to 20° also accelerated the reaction without affecting the η, but addn. of urea produced no apparent improvements. The formation of coagula in the acetate, however, was a disadvantage, and these could not be avoided, except by modifications to the method of acetylation which would seriously affect 8 the properties of the acetate. B. C. P. A.

Cellulose esters of dibasic organic acids. Carl J. Malm and Charles R. Fordyce. *Ind. Eng. Chem.* 32, 405-8 (1940).—Cellulose alkyl dicarboxylates, ROOCR'COOR", in which R is a residue of cellulose (I) or cellulose acetate (II) with 35% Ac, R' is C_2H_4 or C_6H_4, and R" is Me, Et or Bu, were prepd. according to the general method of Clarke and Malm (*C. A.* **27**, 600) by heating 100 g. cotton linters, 500 g. $(ClCH_2CO)_2O$, 2 g. $Mg(ClO_4)_2$, and slightly more 9 than the theoretical amt. of the succinic or phthalic half ester for 2–5 hrs. at 70° and pptg. and washing with MeOH. Tables give m. p. and qual. soly. in MeAc, EtAc, AcOEt, AcOBu, $MeCHCl_2$, PhH, PhMe and dioxane. As coating compns., they have good soly. and moisture resistance but tend to be brittle. The corresponding free acids were prepd. according to the patents of Malm and Waring (*C. A.* **31**, 8194[8]) and Schultze (*C. A.* **31**, 2430[4]) by heating 100 g. I, 400 g. phthalic anhy-

dride, and 500 g. pyridine 12 hrs. at 100°, then adding 400 cc. concd. HCl. These acids had very limited soly. but those made from II, particularly if contg. more than 15% phthalyl, were sol. in ketones, AcOEt, dioxane, dil. NaOH, $NaHCO_3$ and NH_4OH. The Ca, Co and Zn salts are also sol. in H_2O; but the Ba, Cu, Ag, Cd, Ni, Cr and Pb salts are insol. The sol. salts give viscous solns. in H_2O, showing the same form of viscosity-concn. curve as solns. of the acid in MeAc. They give clear, nonhygroscopic films on evapn. which do not become brittle at low humidity if softened by a H_2O-sol. plasticizer. Fibers made of II with a small amt. of these acids have much increased affinity for basic dyes. Arnold M. Collins

Cellulose formate. XI. Effects of the ratio of formic acid to cellulose material on qualities of ester produced. Y. Ueda, S. Nakamura and T. Simada. *Cellulose Ind.* (Tokyo) 15, 212–17, *Abstracts* (in English) 49–50(1939); cf. *C. A.* 33, 4419⁷.—The effect is investigated of varying the quantity of pulp to be formylated and the amount of HCO_2H (I), the ratio $I:H_2SO_4$ (40:3) being kept const. The optimum results as regards the I content and sp. η of the cellulose formate, and the tensile strength and elongation of fibers produced from C_5H_5N soln., were obtained by treating 4 g. of pulp at 25° for 16–30 hrs. in 40 g. of 98.5% I and 3 g. of H_2SO_4 (d. 1.84). B. C. P. A.

Cellulose sheet swelling—effect of temperature and concentration of sodium hydroxide solutions. Geo. A. Richter and Kenneth E. Glidden. *Ind. Eng. Chem.* 32, 480–6(1940).—Data are presented (graphs and tables) for 4 wood pulps (a coniferous and a hardwood sulfite, an alpha pulp of sulfite origin, and a bleached sulfate) and one cotton linter pulp of rayon type, showing their dimensional changes when submerged in NaOH solns. ranging from 6 to 30% at temps. from 5 to 35°. The process history markedly affects the differences in degree of swelling, as well as wt. increases. In all cases volumetric swelling and liquor absorption are max. at concns. of 10–12% NaOH and more pronounced at the lower temps. C. E. Curran

Hexylcellulose and ethylhexylcellulose. I. The synthesis of hexylcellulose. N. N. Iznairskaya, G. S. Rubinson and P. I. Kagan. *J. Applied Chem.* (U. S. S. R.) 12, 1050–5(in French, 1056)(1939).—Linter was mercerized with 50% NaOH soln., matured for 24 hrs. and then etherified with hexyl chloride (the ratio of cellulose to hexyl chloride 1:10 was optimal) in the autoclave under pressures up to 4 atm. at 125° for 16–24 hrs. with const. stirring. The vessel and stirrer were silver-plated. The ether was distd. under 5–10 mm. at 135–40°, then steam-distd., washed with water, and dried *in vacuo* at 50°. It contained C 62.15 and H 10.04%, it was sol. in the alc.-C_6H_6 (1:4) mixt. to the extent of 94.71% and its 3% soln. had a viscosity of 1.49 (Ostwald). Stepwise treatment of cellulose with hexyl chloride did not increase the percentage of substitution. The product was dihexylcellulose. **II. The synthesis of ethylhexylcellulose.** N. N. Iznairskaya and G. S. Rubinson. *Ibid.* 1057–9(in French, 1059).—Seven mols. of EtCl, 2–3 mols. of hexyl chloride and 1 mol. of cellulose were autoclaved in the presence of equimolar amts. of alkali. The product was purified as above. The ethylhexylcellulose was not sol. in water. The degree of substitution could not be detd. by the Zeisel method. A. A. Podgorny

Some lesser known nitrocellulose sols and their properties. A. de Waele. *J. Oil Colour Chem. Assoc.* 22, 57–65, 67–72(1939).—Different degrees of affinity between nitrocellulose (I) and various plasticizers become evident on examg. sols and gels formed therefrom. Plasticizers of the true solvent type overcome the attractive forces between the mols. of I and direct formation of a fluid sol is possible. With tritolyl phosphate (II), which has less affinity for I, a powerful solvent must be used to overcome the attractive forces between mols. of I. A sol can then be obtained by evapg. off such solvent from a soln. of I and II. Sols so obtained are only apparently homogeneous. Their true emulsoid character becomes more apparent when certain plasticizers are used which have still less affinity for I, e. g., castor oil, diglycol laurate. Sol-gel reversibility is attributed to a phase inversion, solid-in-liquid to liquid-in-solid. In general, the greater the affinity of a plasticizer is for I, (1) the smaller the proportion of acetone in the alc.-acetone solvent mixt. which just dissolves a film of I and 8 times that amt. of plasticizer and (2) the less the permeability of such films to benzene. Relationships between a plasticizer's chem. structure and its affinity for I are discussed, e. g., decrease in affinity caused by long alkyl chains and increased affinity due to carboxylic ester groups and increasing unsatn. in long alkyl chains as in linoleates. Cf. following abstr. J. W. P.

The gelation of nitrocellulose sols induced by antimony oxide. A. de Waele. *J. Oil Colour Chem. Assoc.* 22, 65–7, 67–72(1939); cf. preceding abstr.—Gelation of a sol of nitrocellulose (I), Sb oxide or TiO_2 and diglycol laurate (II) in BuOAc and alc. was attributed to reaction between the pigment and —COOH groups formed in I by oxidation. Such reaction causes tridimensional linkage between the emulsoid I particles. No gelation, but rather loss in viscosity, occurred in absence of II or on replacing the pigments mentioned by $BaSO_4$. J. W. P.

The chemical nature of Douglas fir lignin. E. B. Brookbank, Jr., and F. E. Brauns. *Paper Trade J.* 110, No. 5, 33–5(1940); cf. *C. A.* 33, 4024⁷.—Six lignin products were prepd. from Douglas fir heartwood and sapwood: H_2SO_4-lignin, Willstätter lignin, thioglycolic acid lignin, Et_2O-insol. PhOH-lignin A, Et_2O-insol. PhOH-lignin B and methylated Et_2O-insol. PhOH-lignin A. Their analyses were compared with those of similar compds. prepd. from sprucewood. The differences between the 3 types were so small that they make chem. differences in their compn., other than polymerization and isomerism, improbable. A. Papineau-Couture

Aspects of the viscose industry. G. S. Heaven. *Soc. Chem. Ind., Chem. Eng. Group, Proc.* 20, 112–15(1938).—The application of the viscose process to the production of cellulose films is considered in relation to the raw materials used and the effluents to be disposed of. B. C. P. A.

A method for the determination of the macroheterogeneous condition of viscose. Atanazy Boryniec. *Przemysl Chem.* 22, 278, 85(1938); *Atti X° congr. intern. chim.* 4, 707–18(1939).—Viscose solns. contain varying quantities of undissolved or jelled particles which, when present in larger quantities, cause breakages during spinning and in the production of films. It is important to check on the heterogeneous condition of the viscose spinning soln. A method is described for an estn. of the macroheterogeneity of viscose solns. It is based on the deformation of a viscose thread which is dropping into a paraffin oil bath. This deformation is proportionate to the macroheterogeneous condition of the viscose soln. and it is registered by a photoelec. recorder. The effects of various phys. and chem. conditions of the heterogeneity of viscose can be studied and recorded by this method. D. Jorysch

Pulp and staple rayon, a cellulose problem. Richard E. Dörr. *Angew. Chem.* 53, 13–17(1940).—A discussion covering raw materials and processing problems. Karl Kammermeyer

Correlation of forestry industries. H. O. Chute. *News Ed.* (*Am. Chem. Soc.*) 18, 256(1940). E. J. C.

Wood chemistry. XIII. Chemical composition of Korean rakuyosho (Larix dahurica, var. Coreana nakai). Y. Ueda and T. Nebu. *Cellulose Ind.* (Tokyo) 15, 211, *Abstracts* (in English) 48–9(1939); cf. *C. A.* 33, 6590⁸.—The wood contains lignin 25.1, total cellulose 45.2 (with 70.3% of α-cellulose), ash 0.13 and EtOH-C_6H_6 ext. 5.0%. Loss on drying is 9.14%. B. C. P. A.

Notes on the quality of groundwood. James D'A. Clark. *Paper Trade J.* 110, No. 9, 29–32(1940).—Visual and manual practical tests for the quality of groundwoods are described with a discussion of the interpretation of results obtained from instruments and sheet-making equipment. Data are given on the effect of beating on fairly fine groundwoods which, as far as quality improvement is concerned, appears to be negligible. Marked anomalies in the use of freeness testers for detg. slowness are noted and attributed to the escape of important fine material through the grid plate of the app.; for this reason the

value of the freeness reading for fine pulps or pulps contg. much fine material is questioned. Classification of pulps and blending tests are shown to be very valuable in addn. to common tests and in some cases indispensable for distinguishing between pulps of obviously widely different characteristics. A. Papineau-Couture

The wet strength of groundwood. K. C. Logan. *Pacific Pulp & Paper Ind.* 13, No. 12, 29-30(1939).—A simple and quick method, giving reproducible results, is described for detg. the wet strength of groundwood. It consists essentially in forming the pulp sample into a sheet according to any suitable method (e. g., T.A.P.P.I. method 205M), removing from the press without giving the 2nd pressing, and subjecting to a uniformly increasing pressure differential until it ruptures. A simple, compact app., requiring little care, for carrying out the test is described. A. Papineau-Couture

The sulfonation of western hemlock lignin. Arthur L. Mottet. *Pacific Pulp & Paper Ind.* 13, No. 10, 22-5 (1939).—The sulfonation reaction of lignin was studied by means of cation-exchange phenomena, with a slight modification of Kullgren's method (*C. A.* 26, 2315). The rate of sulfonation of western hemlock liguin with $NaHSO_3$ soln. (at const. temp. and time) varies with the $NaHSO_3$ concn.; about 15% greater sulfonation was obtained with 9.0% soln. than with 3.0%; at higher concns. small changes were not as effective in changing the sulfonation rate as changes at lower concns., which may be due to the fact that, at higher concns. increases in $NaHSO_3$ concn. are not accompanied by corresponding increases in "effective concns." of HSO_3 ions. NH_4HSO_3 produces significantly higher sulfonation than Na, Ca or Mg bisulfites, which explains the superior cooking action of NH_3-base sulfite cooking liquors. The lignins of Sitka spruce and of western hemlock exhibit substantially the same ease of sulfonation; Douglas fir lignin is much more difficult to sulfonate, the difference possibly originating in chem. differences in the lignins of these species. Max. rate of sulfonation develops when the cooking liquor contains somewhat less than 20% of combined SO_2 (of the total SO_2); the min. rate apparently falls somewhere between 80 and 100% combined SO_2. There is a straight-line relationship between sulfonation rate and temp., the reaction rate increasing only very slowly with increase in temp. (20% increase for a 30° rise in temp.). About one-half of the lignin seems to be sulfonated much more rapidly than the remainder; the difference may be due partly to the difference in accessibility of middle-lamella lignin and secondary wall lignin to the HSO_3 ions and partly to differences in the sulfonatable groups in the lignin. A. Papineau-Couture

Disintegration of larch wood from Honsyû by the sulfate cooking process. I. Y. Hukuda and M. Horio. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 367-9(1939) (in German).—Two samples of larch wood (500 g. of each), one from the lowlands and one from the mountainous regions of Nagano, were heated, resp., 5 hrs. in an autoclave (last 4 hrs. at 160°) with 2 l. of a soln. contg. 100 g. NaOH, 44 g. Na_2S, 40 g. Na_2CO_3, 6 g. $Na_2S_2O_3$ and 20 g. Na_2SO_4, the max. pressure being 6-7 kg./sq. cm. The yields of unbleached cellulose were 42.9 and 37.1%, resp., as compared with 36.6% for the first sample by the sulfite process. The crude cellulose was chlorinated, washed with alkali soln., then bleached twice with Ca hypochlorite soln. The yields were 94 and 93%, resp., as compared with 80% for the first sample, treated by the sulfite process but with omission of one of the Ca hypochlorite treatments. The yield and quality of the sulfate-cooked cellulose are much better than those of the sulfite-processed material. The sulfite cellulose is slightly bluish, while the sulfate cellulose is faintly yellow. George Ayers

Tropical woods for manufacture of pulp. IV. Composition of British North Borneo woods. I. Miura and S. Kitano. *Cellulose Ind.* (Tokyo) 15, 167-70, *Abstracts* (in English) 42-3(1939); cf. *C. A.* 33, 8402[7].—Thirteen British North Borneo woods were analyzed to det. their value as raw materials for papermaking. The woods are stated to compare favorably as regards their chem. consts. with Philippine and Dutch New Guinea woods. Of the North Borneo woods, taukawang had the highest total cellulose content (56.6%) and α-cellulose (on the total cellulose, 79%), and at the same time it was among the lowest as regards extractable matter in H_2O (1.6%), EtOH-C_6H_6 (1.6%) and 1% NaOH (8.0%). Majau gave the highest lignin content (34.8%) and balsa the lowest (22.9%). B. C. P. A.

Manchurian woods for manufacture of pulp. IV. Cooking of hardwoods. I. Miura and T. Nakatuka. *Cellulose Ind.* (Tokyo) 15, 218-20, *Abstracts* (in English) 50-2(1939); cf. *C. A.* 34, 1845[8].—Ten species were digested by the sulfite process and the chem. consts. of the bleached and unbleached pulps detd. An unusually low yield of bleached pulps was obtained, which is ascribed to unsuitable cooking conditions. The highest yield of unbleached and bleached pulps, however, was obtained with *Fraxinus mandshurica* (51.9% and 43.9%), while the lowest was with *Ulmus japonica* (34.3% and 22.5%). The α-cellulose (bleached) varied between 81.4% and 91.5%, and the EtOH-C_6H_6 exts. between 0.7% and 1.8%, while the η (about 1.5) and ash contents (about 0.5%) were fairly const. *Maackia amurensis*, Rupr. et Max., and *Phellodendron amurense*, Rupr., were not satisfactorily digested. B. C. P. A.

Chemical investigation of wood substances. XIII. Sulfite pulps from forest thinnings and their properties. K. Nisida, R. Miyama and J. Soezima. *Cellulose Ind.* (Tokyo) 15, 203-10, *Abstracts* (in German) 45-8(1939); cf. *C. A.* 33, 6590[5].—The following woods were cooked by the sulfite process and the chem. consts. of their bleached (two-stage) pulps detd.: *Cryptomeria japonica* [Masugi (I), Kurosinsugi (II)], *Chamoecyparis obtusa* (III), *Pinus densiflora* (IV), and *P. thunbergii* (V). The cooks were carried out with about 5-6% of total SO_2 and about 4-5% free SO_2. Thus I, IV and V gave bleached pulps suitable for viscose production, in 40.7, 39.8 and 40.5% yields, resp. II and III, however, with yields of 35.7% and 41.6%, resp., were comparatively less favorable for this purpose. B. C. P. A.

Infrared photomicrography reveals plant cell-wall structure. W. Frank Fowler, Jr., and Wm. M. Harlow. *Paper Ind. Paper World* 21, 1159-60(1940).—A method of prepg. photomicrographs of thin sections of chemically untreated eastern white pine wood is described, wherein neocyanine (an infrared-absorbing dye) is used to stain the section and infrared radiation and special infrared sensitive film are used. The resulting photomicrographs show clearly the structure of the "compd. middle lamella," resolving it into its component parts, the primary walls and the true intercellular substance. Previous observations on the primary wall made after chem. treatment of thin sections were confirmed. A. Papineau-Couture

Practical hints on mechanical pulping for newsprint. J. D. Brown. *Pulp Paper Mag. Can.* 41, 91-7, 103 (1940). A. Papineau-Couture

Report of the wood chemistry committee (of the Technical Section of the Canadian Pulp & Paper Association). Appendix A. Advances in the chemistry of wood 1938-1939. F. H. Yorston. *Pulp Paper Mag. Can.* 41, 144-8(1940).—A review with 54 references. **Appendix B. Recent advances in the utilization of lignin in waste sulfite liquor.** Allan C. Hill. *Ibid.* 148-50, 196.—A review of the general direction of recent advances, with comments on their probable contributions to a final solution of the sulfite waste liquor problem; with 33 references. A. P.-C.

The economic possibilities of using high-density wood. C. McMichael and R. J. McInnis. *Pulp Paper Mag. Can.* 41, 194-5(1940).—A discussion of the advantageous results which may be expected from the use of high-d. wood (0.400) as compared with low-d. (0.330) in the wood-handling departments, the grinder room, the sulfite mill and the paper mill. A. Papineau-Couture

Effect of grinding consistency and temperature using a miniature grinder. H. Andrews. *Pulp Paper Mag. Can.* 41, 87-90(1940).—At consistencies over 5% erratic results were secured, so no data are given with respect to the effect of consistency. With const. freeness of the pulp

produced, increasing grinding temp. from 132°F. to 172°F. resulted in a decrease in production, no change in power consumption, increase in Mullen test, slight increase in tear resistance and bulk, and a slight increase in "long" fiber fractions and slight decrease in "fines." A. Papineau-Couture 1

Forced digester circulation and chip packing. L. C. Kelley. *Pulp Paper Mag. Can.* **41**, 113–16, 122(1940).—From a general discussion of the problem it is concluded that chip packing without forced circulation results in an increase in screenings, and that the combination of packing with a steam packer and forced circulation with indirect heating and hot acid seems to be about the ideal combination. A. Papineau-Couture 2

The effect of chipping on the suitability of wood for sulfite pulping. H. Green and F. H. Yorston. *Pulp Paper Mag. Can.* **41**, 123–6(1940).—Chips prepd. in several sulfite pulp mills were found to contain 10–15% of wood which had been subjected to high compressive stress. The situation of the damaged wood in the chip showed that the greater part of the damage had taken place during chipping. Presence of stressed wood in the chips does not affect the yield or the bleachability of the pulp, but causes appreciable loss of strength. A. Papineau-Couture 3

Effect of acid concentration and temperature schedule in pulping resinous woods. G. H. Chidester and J. N. McGovern. *Paper Trade J.* **110**, No. 10, 39–42(1940).—Increasing the SO_2 concn. and using lower temps. together with a longer cooking time have a beneficial effect in pulping jack pine, Douglas fir and southern pine. By using suitable conditions the quantity of screenings obtained from the heartwood of the various samples could be reduced to a value sufficiently low to indicate a satisfactory degree of pulping for the whole wood contg. ordinary quantities of heartwood. Some improvement was shown in the color, strength, and in the amt. of screenings produced by the sapwood when cooked in the presence of heartwood, but the effects were much less pronounced than in the case of heartwood. The results are believed to be generally applicable to representative samples of jack pine pulpwood. Douglas fir up to 100 yrs. old and contg. up to 78% heartwood was reduced to a satisfactory degree; but it is possible that wood of extreme age would require further modification for complete reduction. The results on southern pine were obtained on only one thoroughly seasoned sample and are considered only as indicative of a trend. A. Papineau-Couture 4 5

The practical application of the classification of groundwood pulp. Bruno A. Koskinen. *Pulp Paper Mag. Can.* **41**, 132–8(1940).—A method of detg. groundwood quality and expressing it in numerical terms is described. It consists in a classification test carried out by means of a modification of the Abitibi classifier (cf. Campbell, *C. A.* **24**, 5489). The results are empirical, and the actual details of test conditions must be worked out to suit the conditions of the individual mill where it is to be used. Curves prepd. from operating records over a period of 2 yrs. at the Manitoba Paper Co.'s Pine Falls mill are presented and discussed, showing the relation between groundwood quality and the strength and porosity of a sheet of newsprint. A. Papineau-Couture 6 7

Pulping bagasse by chlorination method. Lilly Gomez and Geminiano O. Aguila. *Univ. Philippines Nat. and Applied Sci. Bull.* **7**, 227–31(1939).—Lab. pulping expts. with bagasse from several sources, in which Cl gas and a dil. NaOH soln. followed by NaOCl bleaching are used, gave a 37% yield of pulp with an α-cellulose content too low (approx. 76.5%) for satisfactory use for rayon production. Complete analyses of the chem. compn. of the bagasse and resulting pulp are given. C. E. Curran 8

Sulfite hardwood pulps and their applications. M. O. Schur and W. L. Hearn. *Paper Mill* **62**, No. 38, 18–19 (1939).—The characteristics of hardwood sulfites made by Brown Co. are tabulated and compared with those of soda pulps and softwood sulfites. The uses for hardwood sulfites are briefly indicated. A. P.-C. 9

The effect of white-water loss in the testing of mechanical pulp. W. S. Morris and R. De Montigny. *Pulp Paper Mag. Can.* **41**, 107–12(1940).—Tests were made on 84 groundwood pulps with handsheets made by the standard procedure established by the Brit. pulp evaluation committee, and also by a modified method which eliminates loss of fine material. With the exception of drainage time, differences were not large enough to affect routine testing in mill operation and correlation of properties was not improved; the species of wood yielding low-strength pulps of high freeness assocd. with high percentage of fine material showed the largest differences. With respect to testing for research purposes, the modified method does not seem to offer any marked advantage other than slightly better accuracy. A. Papineau-Couture 10

Better pulp with rubber. H. H. Burrows. *Paper Mill* **62**, No. 42, 49(1939).—A brief discussion of the use of rubber linings in the pulp and paper industry and of their merits. A. Papineau-Couture 11

Investigation of damages caused by fungi in wet mechanical wood pulp. E. Rennerfelt. *World's Paper Trade Rev.* **112**, TS169–75(1939); **113**, TS1–3(1940); cf. *C. A.* **33**, 3148[3].—The chief sources of fungal infection of groundwood are: (1) the wood, (2) the fresh water, (3) the mill air, (4) the white water. Source (1) can be discarded as such high temp. is developed at the grinding that both mycelium and spores are killed and the newly ground pulp is practically sterile. In most mills (3) contributes only a very small part of the infection, generally not more than about 0.1%. The proportion of infection due to (2) varies from about 10% in mills with an open water system, to about 0.5–2% in mills with a closed water system; the remainder of the infection comes from (4). The most important factor influencing the growth and compn. of the microflora is apparently the temp. of the system and the assocd. degree of closeness of the system. Possible methods of control are discussed. Best results have so far been obtained with Lignasan and Pulpasan, prepns. contg. about 6% ethyl mercury chloride; in lab. tests the pulp was protected by using an amt. equiv. to 25–50 g. per t. of wet pulp (costing 2–4 d. per ton), but in practice it is necessary to add more of the chemicals (about 200 g. per ton) to keep the pulp in good condition during several months' storage. A. Papineau-Couture 12

Some economic aspects of the use of sawmill "waste" for chemical pulp in Quebec and the Maritime Provinces. J. B. Prince and E. S. Fellows. *Pulp Paper Mag. Can.* **41**, 185–90(1940).—The quantity available at the present time amounts to over 400,000 cords annually. The full advantages of a plan for chipping and pulping this material cannot be realized unless the scheme is dealt with on a large scale. A. Papineau-Couture 13

Pulps. XIV. Sulfite cooking of larch from Honsyu. 2. Y. Hukuda. *Cellulose Ind.* (Tokyo) **15**, 154–7, *Abstracts* (in German) 29–32(1939).—Since previous expts. indicate that Honsyu larch (*Larix kaempferi*, Sarg.) was difficult to digest, because of the resistance of the heartwood, exptl. cooks with the heartwood and sapwood sepd. were undertaken. The results showed that although the two woods were similar in compn. initially, the pulps produced from them under the same conditions varied considerably. Thus the sapwood and heartwood pulps, resp., contained 1.3 (13.6)% of lignin and 95.7 (82.9)% of α-cellulose. To obtain uniform digestion, therefore, the cooking schedule should be so designed as to obtain complete liberation of the heartwood. The changes in the chem. consts. of the mixed pulp after applying three-stage bleaching methods are tabulated. **XV. Analysis of red pine.** M. Kinoto. *Ibid.* 158–60, *Abstracts* (in German) 32–3.—The chem. consts. of pinewood from three different inland districts of Japan are tabulated. In each case the trees were sampled at the upper and lower extremities and in the middle of the trunk. Thus the α-cellulose varied from 51 to 57%, the lignin from 26.9 to 30.8%, and the EtOH-C_6H_6 ext. from about 3.0 to 11.8%. The ext. values varied considerably within each tree. B. C. P. A. 14

Sulfite liquor developments. Guy C. Howard. *Chem. & Met. Eng.* **46**, 618–19(1939).—A method of recovering Ca sulfite and a Ca salt of lignisulfonic acid from waste

sulfite liquor has been accomplished by means of a three-stage lime pptn. treatment. The inorg. salt is returned for use in making fresh cooking acid. The org. salt can serve as boiler fuel or be processed into vanillin, plastics, tanning reagents, etc. Tests on waste effluent show a reduction of 80% in the B. O. D. over the untreated liquor; this reduces materially the stream-pollution problem.
R. M. Boarts

Regeneration of sulfur dioxide and heat in cooking sulfite cellulose. S. A. Fotiev. *Bumazhnaya Prom.* 1939, No. 1, 8–14; *Khim. Referat. Zhur.* 2, No. 5, 122(1939).—Different systems for the regeneration of SO_2 and of heat are described. The method of Rosenblad (*C. A.* **32**, 8135[4]) gives best results. W. R. Henn

Sulfite liquor. III. Sulfonated lignin from waste liquor as an emulsifying agent. Leo Friedman and Carl L. Lindekin. *Pacific Pulp & Paper Ind.* 14, No. 1, 27–9 (1940); cf. *C. A.* **33**, 9632[3].—C_6H_6-water and kerosene-water emulsions were prepd. by using lignin sulfonate from *sulfite waste liquor* as the emulsifying agent. Less than 0.5% by wt. was sufficient to make good stable emulsions. The effects of phase-vol. relationship, of intermittent agitation, and of pH on emulsification in these systems were studied. A. Papineau-Couture

Industrial uses of waste liquor from sulfite pulp mills. A. J. Bailey. *Pacific Pulp & Paper Ind.* 13, No. 11, 34–5 (1939).—A description of the recovery of valuable by-products from sulfite waste liquor at the plant of Marathon Paper Mills Co., Rothschild, Wis. A. P.-C.

The recovery of heat in sulfite mill operation. H. Mason. *Pulp Paper Mag. Can.* **41**, 127–31(1940).—A brief discussion of the possibilities of reduction of various heat losses in sulfite operations, from which it is concluded that the av. sulfite mill might reduce steam costs and heat waste by about 50% by attaining the efficiency of recovery, in all respects, that certain mills do attain with respect to one or more of the controlling factors. A. P.-C.

Testing sulfite acid for combined. C. H. Nystrom. *Paper Ind. Paper World* 21, 1266(1940).—A brief discussion of the relative reliability (or otherwise) of different methods, from which it is concluded that Sander's I-KIO_3 method is the most accurate and satisfactory for mill control purposes. The method is as follows: titrate 2 cc. of sulfite acid with $^1/_{16}$ *N* I, using starch indicator (*A* cc.); add 20 cc. or an excess of 3% KIO_3 soln. and titrate fairly slowly with const. stirring with $^1/_{16}$ *N* $Na_2S_2O_3$ (*B* cc.); 0.1 *A* = percentage total SO_2; 0.1 *B* = percentage free SO_2; percentage combined SO_2 = total − free.
A. Papineau-Couture

The Pusey and Jones stream-flow vat. Philip H. Goldsmith. *Paper Mill* **62**, No. 42, 62, 65(1939).—A brief description of the vat and discussion of its merits.
A. Papineau-Couture

A new step in mill control. Arthur B. Green. *Paper Mill* **63**, No. 6, 14, 24(1940).—A device is described which indicates and records freeness of the stock leaving the jordans, the detn. being effected automatically at 5-min. intervals. A. Papineau-Couture

Metallurgical control and Fourdrinier wires. D. C. Dilley. *Paper Mill* **63**, No. 8, 140–6; No. 9, 16–18 (1940).—Methods used for the metallurgical control of the metal wires used in the manuf. of Fourdrinier wires for paper machines are described and illustrated by means of examples. Also in *Metals & Alloys*, **11**, 50–5, 77–81(1940).
A. Papineau-Couture

The reduction of sulfite in newsprint. D. D. Carr-Harris. *Pulp Paper Mag. Can.* **41**, 75–8(1940).—Over the range of 12–18% of sulfite there is very little change in the strength of sulfite-groundwood mixts., the observed variation being not much greater than the ordinary variation in groundwood properties experienced in many newsprint mills; it would, therefore, appear that addn. of sulfite to a sheet of newsprint effects some other change in the furnish and one which is highly important. Increasing fiber length by addn. of long groundwood fibers greatly increases bulkiness and freeness and slightly increases tear and fold; the effect becomes less marked as the change in fiber length becomes neg. with addn. of the finer fractions of groundwood. From a study of the relation between bulk and freeness of groundwood produced from different wood species, and of drainage factor *vs.* bulk for different wood species, it is deduced that grinding the wood to produce a stock of high surface area, i. e., of low bulk and drainage factor (fast-draining) might help to make possible the production of a newsprint sheet with lower sulfite content in the furnish. This theory can account for: (1) the increased strength of pulp brought on by addn. of flour material or white water which though possessing no strength itself does add to strength when used in small quantities; (2) the fact that a sulfite sheet on a filter appears drier than a groundwood sheet at the same moisture content. A. Papineau-Couture

The use of vortraps in pulp and paper mills. Fred B. Schilling. *Paper Mill* **62**, No. 38, 20–1(1939).—A brief description of the device and discussion of its merits.
A. Papineau-Couture

Pulp brightness in papermaking. G. A. Day. *Paper Mill* **62**, No. 41, 14, 19–20(1939).—Pulp brightness as a fixed value is a delusion. What actually is detd. is the brightness of a sheet of paper made from a given pulp alone, and the results depend on the exact conditions under which the sheet was prepd. Factors affecting the absorption coeff. *K* and the scattering coeff. *S* (of the Kubelka-Munk formula) are discussed. It is concluded that the most consistent values are obtained by observing the following points, which are believed valid on the basis of practical expts. and also from theory: the sheet should be heavy, of uniform formation; distd. water should be used; pressing should be light; the sample sheet should be completely air-dried at room temp., with the surface protected.
A. Papineau-Couture

Twenty-five years of the Technical Section (of the Canadian Pulp and Paper Association). J. N. Stephenson. *Pulp Paper Mag. Can.* **41**, 71–4(1940).—Historical.
A. Papineau-Couture

Research and counter-research in papermaking. S. A. Cohen. *Paper Mill* **62**, No. 36, 16–20(1939).
A. Papineau-Couture

Much remains to be learned in papermaking. F. C. Clark. *Paper Mill* **62**, No. 37, 49(1939).—An address.
A. Papineau-Couture

Standards in their relation to production control. Sanford E. Thompson. *Paper Trade J.* 109, No. 21, 31–5 (1939).—A discussion of the utilization of standards of different types in paper and pulp manuf. and their relation to production control, with illustrations of the effect on quality and cost of the paper. A. Papineau-Couture

Pulp and paper mill utilization of hardwoods and other "little used" species. K. D. Running. *Pulp Paper Mag. Can.* **41**, 181–4, 190(1940).—A discussion of the possibilities, both economic and technological, of utilizing birch, maple, aspen, jack pine, white pine, beech and tamarack in Canadian pulp and paper mills, together with recommendations for future study. A. P.-C.

Advanced stock preparation-cyclifining. Joe Baxter, Jr. *Pacific Pulp & Paper Ind.* 14, No. 1, 16–20(1940); cf. *C. A.* **33**, 7099[9].—A general discussion of its merits.
A. Papineau-Couture

Some hints on crepe raw paper production. H. G. Wiener. *World's Paper Trade Rev.* 112, TS165–6(1939). —Brief practical operating hints. A. P.-C.

Flocculation of papermaking fibers. Friedrich Göbelhoff. *Zellstoff u. Papier* 20, 31–6(1940).—A brief theoretical discussion of fiber flocculation is given, and a method for detg. the flocculation point is described. Alum alone had but little effect on the flocculation of sulfite fibers in distd. H_2O. The addn. of bentonite, Karaya gum or a wetting agent caused increased flocculation. An increase in temp. also caused flocculation. Thicker and longer fibers flocculate more readily. S. I. Aronovsky

Retention of aluminum ion and hydrogen ion in papers. Herbert F. Launer. *Paper Trade J.* 110, No. 10, 29–34 (1940).—See *C. A.* **34**, 1848[8]. A. Papineau-Couture

Retention of fillers. S. W. Martin and W. R. Willets. *Paper Trade J.* 110, No. 8, 111–17(1940); cf. *C. A.* **29**, 7651[7].—In a system where only filler and fiber are present,

there can be no colloidal attraction, because both constituents are negatively charged; in such cases retention is a simple mech. filtration and will be governed by the wt. of the fiber mat, size of the interstices, etc. Alum has a great effect in improving retention because of its hydrolysis to positively charged Al_2O_3 which is adsorbed on the negatively charged fibers and acts as an electrostatic cement for the filler. The addn. of H_2SO_4 lowers the amt. of Al_2O_3 adsorbed by reversing the reaction to sol. $Al_2(SO_4)_3$; in spite of the fact that this $Al_2(SO_4)_3$ can ionize and thereby exert its flocculating action, retention is impaired to the point of mech. filtration. Flocculating effects cannot be discounted completely as the addn. of $MgSO_4$ increases the retention of filler somewhat. Rosin, which is known to have a definite particle size and to be a negatively charged colloid, has little effect on the retention of fillers; apparently alum acts on rosin in much the same manner as it does on filler. Addn. of alkali (as Na_2CO_3) decreases retention, probably because the electropos. nature of the Al_2O_3 is affected by an adsorption of OH ions. Addn. of Na aluminate increases the amt. of Al_2O_3 retained by the sheet but does not aid retention; this leads to the observation that Al_2O_3 produced by the action of Na aluminate on alum does not have the same electropos. characteristics as that produced by the hydration of alum alone. Synthetic Al_2O_3 is fairly well retained in the sheet but does not give rise to improved retention. Apparently there are 2 types of Al_2O_3: (1) an electropos. type resulting from the hydrolysis of alum with a high adsorption capacity for the fiber; (2) a type with different colloidal properties, which is retained mechanically by the fibrous network and has little or no effect on retention primarily because of the nature of its interface. Starch, being a neg. colloid and not being adsorbed to any great extent by paper fibers, does not have a beneficial effect on retention; there may even exist between the starch and the fiber a competitive selectivity for Al_2O_3, which acts as an inhibitor for the cementation of the filler on the fiber. The effect of more dil. stock and higher temps. in increasing retention can be explained on the basis of colloidal phenomena. The hydration of stock with its increase of fiber surface is shown to have a colloidal effect as well as a mech. effect. 1

A Papineau-Couture

Recent developments on papermaking cylinder vat construction. J. W. Joslyn. *Paper Trade J.* **110**, No. 7, 14–15(1940).—Attention is briefly drawn to a no. of devices recently developed by Sandy Hill Iron and Brass Works, Hudson Falls, N. Y.; Bertrams flow distributor, adjustable flow vat, combination slice and making board. 6

A. Papineau-Couture

Paper-machine wires. Harry G. Specht. *Pacific Pulp & Paper Ind.* **13**, No. 12, 17–19(1939).—A discussion of factors affecting wire life, sheet formation, drainage, printability, ink absorption and "show through." 7

A. Papineau-Couture

Some aspects of white-water flocculation. Edward N. Poor. *Paper Trade J.* **110**, No. 10, 37–8(1940).—A discussion of the flocculation of white water contg. highly filled solids, with a comparison of the action of various chem. treating agents. It is shown that the formation of gelatinous compds. promoting flocculation is not essential, and it is claimed that the efficiency of flocculating agents is to a great extent dependent on rates of ionization. Surface tension has a great influence on the efficiency of flocculation and flotation, in gelatinous media. A. P.-C. 8

Slime control at the Ontario Paper Co., Ltd. J. M. Forrester and E. G. Kirby. *Pulp Paper Mag. Can.* **41**, 83–6(1940).—A description of the method of slime control by means of chloramine in use at the Thorold, Ont., pulp and newsprint mill of the Ontario Paper Co., discussing its merits and the savings which were actually obtained. 9

A. Papineau-Couture

Instrumentation studies. XXXV. The Clark paper softness tester, with an important note on the Gurley stiffness tester. Staff of the Institute of Paper Chemistry. *Paper Trade J.* **110**, No. 7, 29–37(1940); cf. *C. A.* **34**, 2598⁸.—The overhanging length of the paper strip inserted in the roller mechanism of the Clark paper softness tester bears a straight-line relationship to the angle of rotation necessary to cause the strip to fall over. The correlation between Clark rigidity and Gurley stiffness is poor for limp papers, but somewhat better for stiff papers; one of the principal reasons for this poor correlation was found in a large source of error in the Gurley method, wherein errors range up to about 90% of the apparent Gurley stiffness. Clark rigidity correlates well with flexural rigidity as detd. by a research method involving a torsion pendulum. Subjective tests for softness of facial tissue, towel tissue, waxing glassine and bread wrappers correlate with the mean of the machine direction and the cross direction Clark softness values. The accuracy of detns. carried out on the Clark paper softness tester depends largely on the nature of the paper tested; for heavy uniform papers 5 detns. in each direction are sufficent but at least 10 representative strips in each direction are necessary for light-weight papers. A. Papineau-Couture 2 3

The effect of water hardness on the formation of floc from sodium aluminate. Lewis B. Miller and Ralph L. Lanz. *Paper Trade J.* **110**, No. 8, 131–3(1940).—A preliminary exptl. investigation showed that, where the water hardness is due primarily to Ca salts, the effect on floc formation from Na aluminate is small at a pH of about 9 to 11. Hardness due to Mg salts, on the contrary, has a very pronounced effect on the character of and conditions for floc formation. It is indicated that under certain conditions the addn. of Mg salts to Na aluminate in soft waters may be used to advantage in paper manuf. 4

A. Papineau-Couture

Promoting satisfactory bacteriological conditions in the paper mill. Robert F. Huntley and R. Hamilton Torrey. *Paper Trade J.* **110**, No. 8, 108–10(1940).—An outline of methods and controls which have been found by certain mills to enable them to produce a paper with a low bacterial count which is satisfactory to the public health authorities for use in milk containers. A. P.-C. 5

The background of sizing troubles. C. C. Irving. *Paper Mill* **62**, No. 45, 18–21(1939).—A brief discussion touching in turn on gum and wood rosin, size prepn., diln., methods of use, formation, and pressing and drying.

A. Papineau-Couture

Sizing. O. F. Hutchinson and P. M. Loddengaard. *Paper Mill* **62**, No. 50, 14–22(1939).—A brief description of Bewoid size and its method of manuf. together with a discussion of its merits and data on its performance.

A. Papineau-Couture

The practical properties of paper for spinning. Walter Frenzel. *Zellstoff u. Papier* **20**, 38–42(1940).—Paper for yarn or twine must have high water absorption, and high wet and tensile strength. While soda pulp is more suitable than sulfite for spinning paper, the sulfite pulp is mainly used for this purpose. The various phys. properties (tear resistance, tearing length, stretch, water absorption and sizing) of com. spinning papers are given.

S. I. Aronovsky

An evaluation of calcium carbonate coating colors formulated with various adhesives. Howard F. Roderick and A. E. Hughes. *Paper Trade J.* **110**, No. 8, 104–8 (1940).—Various adhesives suitable for use in the prep. of coated papers (casein, soybean protein, a no. of the starches) are described. Their evaluation is based on the properties they impart to finished coated papers. Each adhesive was incorporated in varying amts. in coating colors carrying 100% $CaCO_3$ as pigment and also in required amts. for a Dennison wax test of 4 to 5 with blends of $CaCO_3$ and clay. The evaluations given are taken from the calendered sheets and the effect of each adhesive on the various characteristics of the finished paper is presented graphically. A. Papineau-Couture

Drier waste heat recovery. R. J. Chambers. *Pulp Paper Mag. Can.* **41**, 104–6, 112(1940).—Decreasing mill system temps. in winter have an adverse effect on mill operation. In many mills drier waste heat could raise shower water temp. sufficiently to avoid some of this disturbance. Data are given showing the performance of three mill installations of towers and water sprays added to Brisar economizers; one mill shows appreciable im-

provements in steam consumption and sheet quality as a result of using this hot water. A. Papineau-Couture

Prevention of oxidation and rancidity in paper with oat flour. Sidney Musher. *Paper Trade J.* **110**, No. 8, 117–20(1940).—A description and discussion of the application of oat flour as a surface sizing to paper or board to prevent oxidation and rancidity of foodstuffs wrapped or packaged therein. A. Papineau-Couture

Laboratory evaluation of paper-coating raw materials. C. G. Landes. *Paper Trade J.* **110**, No. 11, 38-46(1940). —A detailed description of lab. procedures for mixing coating colors and prepg. and testing coated paper, illustrated by several examples of how the data obtained may be useful in evaluating raw materials and in formulating new coatings; together with suggestions as to improvements needed in the lab. procedures described. A. Papineau-Couture

Opaque papers. Wm. R. Willets. *Paper Ind. Paper World* **21**, 1261-3(1940).—A discussion of the use of TiO_2 for opacifying and brightening paper. A. P.-C.

Paper quality in relation to printing. R. H. Simmons. *Paper Trade J.* **109**, No. 21, 37-8(1939).—An outline of the tests used to evaluate the printing quality of papers prior to actual press work, enumerating the instruments and the significance of the results obtained in predicting probable defects. A. Papineau-Couture

The measurability of printing quality [of paper]. Warren Beazley. *Pulp Paper Mag. Can.* **41**, 117-22(1940).—A theoretical discussion dealing with the effect of smoothness (presenting several objections to present-day methods of measuring smoothness), oil-absorbency and wettability to oil. A. Papineau-Couture

The printability of newsprint. C. Bendtsen. *Pulp Paper Mag. Can.* **41**, 20–6, 43, 232 4(1940).—A simple method is described for showing the degree of sizing of newsprint and its tendency for giving strike-through. It consists essentially in detg. the water or brine absorption of the paper under very exactly defined conditions. The results are easily reproducible. Brine absorption gives a lower absorption figure than water for poor papers, and a higher figure than water absorption with good papers. The method is fairly reliable as regards the extreme points, but somewhat unreliable for medium qualities of paper. Four new paper-testing instruments are described and discussed. A smoothness (or more properly a roughness) tester differs from the Bekk smoothness tester in that it measures the passing of air under a narrow edge allowing the air to pass down into the recesses on the one side, under the edge and then up on the other side. The principle of measuring the velocity of the air current has also been used for the construction of a porosity tester, which is an auxiliary to the roughness tester, which operates at const. air pressure and which shows the result instantaneously. A spherical opacimeter has been designed to measure the transparency of paper. A substance-variation tester, by means of which the basis wt. variations in a paper strip can be tested in a few min., is based on the fact that variations of moisture and degree of compression do not essentially affect the opacity of the paper which, broadly speaking, depends only on the varying contents of dry substance and the compn. of the furnish. A paper strip is automatically passed between a const. source of light and a photoelec. cell; by means of an electron tube amplifier the elec. impulses from the cell are amplified sufficiently to operate a recording device which makes a transparency curve, which may be expressed in such units as to give directly the basis wt. A. Papineau-Couture

Waste into production in newsprint operation. F. A. Soy. *Pulp Paper Mag. Can.* **41**, 79-82(1940).—A review of what has been accomplished from 1931 to 1939 in the mills of Price Bros. & Co. by way of making a max. amt. of paper from a given unit of wood (the saving resulting from lowering the sulfite content of the paper is disregarded). The percentage total loss was reduced from 8.3 in 1931 to 6.0 in 1935 and to 1.1 in 1939. A. Papineau-Couture

How the properties of adhesives are related to the properties of paper surfaces. F. Camps-Campins. *Paper Trade J.* **110**, No. 8, 120-2(1940).—The comparative pore structures for a few papers are evaluated from their air-content values. The penetrating properties of the adhesives have to counterbalance the pore size of the paper; papers with small pores require penetrating types of adhesive, while papers with large pores need filming types. Further, pore size affects the rate at which adhesives set, and also the behavior of wet glue films under pressure. The properties of the adhesive must compensate for these factors and for unequal porosities in the surfaces to be adhered. A. Papineau-Couture

A new arrangement for measuring the stiffness of paper and cartons. Julius Bekk. *Zellstoff u. Papier* **20**, 6–8 (1940).—The ends of the paper sample are held in a double holder, fixed over one pan of a balance, so that the suspended paper forms a semicircle below the holder. The wt. required to be placed on the other pan sufficient to flatten and raise the paper to a predetd. point is taken as a measure of the stiffness of the sample. A no. of different types of paper and board were tested in this manner at relative humidities of 40, 65 and 90%. The stiffness of all papers decreased with increase in relative humidity, but the actual loss in stiffness differed for the various papers. The decrease in stiffness of the paper in the machine direction was considerably greater than in the cross direction. This difference varied somewhat with the sheet wt. A comparison between stiffness and tear resistance showed good agreement for some of the papers. S. I. Aronovsky

Bending tests of corrugated board and their significance. T. A. Carlson. *Paper Trade J.* **110**, No. 8, 123-7(1940). —The stiffness of corrugated fiberboard depends not only on the stiffness of the liners but also on the shear rigidity of the corrugated sheet. In bending tests with flutes perpendicular to the span the amt. of shear deformation has an important influence on stiffness. In spans of 5 in. or less the amt. of deflection due to shear in A-flute boards with 0.016-in. liners can be as great as or greater than the deflection due to tension and compression. With flutes parallel to the span, the shear deformation is considerably less and in spans greater than 10 in. may for practical purposes be neglected. The amt. of overhang used in bending tests also affects the stiffness; it is believed that an overhang of 0.5 in. would generally be within practical limits for moderate to long spans; bearing plates at supports and under the loading block are suggested to minimize local bending and crushing. A. Papineau-Couture

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Container "tops" again (Harrington) **14**. Synthesis of plastic masses (Ushakov) **13**. Solvents for nitrocellulose —detn. of rate of soln. (Kraus) **26**. Nature of adhesion [adhesives and cellulosic materials] (De Bruyne) **2**.

Vogel, Hans: Die Sulfitzellstoff-Ablauge und ihre Verwertung. Aus der Sammlung chemischer und chemisch-technischer Vorträge. Neue Folge, H. 43. Stuttgart: F. Enke. 73 pp. M. 6; for subscribers, M. 5.20.

Jahrbuch der Papierverarbeitung. Jg. 1. Berlin: Verlag der Deutschen Arbeitsfront. 194 pp. M. 1.

Kunstseiden- und Zellwolle-Taschenbuch. Ein praktisches Nachschlagewerk für alle Zweige der Kunstseide und Zellwolle herstellenden und verarbeitenden Industrien unter besonderer Berücksichtigung der Chemo-Technik auf den Gebieten der Veredlung und Verarbeitung. 7th ed. Berlin: Finanzverlag. 597 pp. M. 15.

Cellulose. Thomas Dillon, Donal T. Flood, Vincent C. Barry and Pádraig O'Muineacáin. Brit. 508,671, July 4, 1939. Divided on 508,715 (*C. A.* **34**, 2544[1]). Pulp for making wallboard, papier maché or paper is obtained by digesting seaweed with an aq. soln. of acid, e. g., H_2SO_4, sepg. the liquor, disintegrating the residual weed and mixing it with straw pulp, wood pulp or other fibrous material and then subjecting the mixt. to an alk. treatment that consists of heating in an aq. suspension with milk of lime to form insol. Ca derivs. that act as binding agents, and also to liberate amines, or consists of heating with an alkali such as soda whereby sol. alkali derivs. are

formed that may be pptd. in the fibers to act as binders by the addn. of acid or a sol. Al salt, e. g., $Al_2(SO_4)_3$. If desired, the weed may be fermented or retted before the digestion with acid.

Purified wood cellulose suitable for making cellulose derivatives. Lyle M. Sheldon, Lionel E. Goff, Milton L. Herzog and Fredrich Olsen (to Cellulose Research Corp.). U. S. 2,185,776, Jan. 2. A process of producing a purified wood cellulose having a viscosity above a predetd. min. comprises providing sulfite pulp having a viscosity above 20 centipoises as defined, subjecting the pulp to purification treatments, comprising chlorinating with an amount of Cl equiv. to 14-18% of the bleach value of the pulp and continuing the treatment at least until exhaustion of the Cl, treating the chlorinated pulp in dil. NaOH soln. at elevated temp. until the chlorinated compds. are dissolved, decolorizing and further purifying the pulp by treating in a hypochlorite soln. of not more than 3% concn. at a temp. in the range of 20–35° at a pH not less than 8.0 for not more than 4 hrs., boiling in a non-mercerizing caustic soda soln. and mercerizing the pulp so that the pulp has a cuprammonium viscosity of not less than 15 centipoises as defined, an α-cellulose content of not less than 98% and a soda soly. of not more than 3% detd. by boiling for about 3 hrs. in a 7.14 % NaOH soln. Cf. *C. A.* **34**, 1849[3].

Introducing nonacidic nitrogen into cellulose and its derivatives such as cellulose acetate. Henry Dreyfus. U. S. 2,186,101, Jan. 9. Cellulose or a cellulose deriv. is caused to react with NH_3 or an org. N-contg. compd. such as methylamine or diethylamine in the presence of a metal or metal compd. as a catalyst, such as Ni, Fe, Cu, or a sulfate of Mn or Cu. Several examples with details are given.

Coated cellulose hydrate sheets and films. British Cellophane Ltd. Brit. 508,822, July 6, 1939. An anchoring layer is provided between a cellulose hydrate sheet or film, which usually contains glycerol, glycol or like softener, and a hydrophobic coating, e. g., of a moistureproofing lacquer compn. or of a permanent adhesive or H_2O-resistant glue, the layer consisting of a polymerization product or products formed by the mixed polymerization of polymerizable compds. that contain an olefinic double bond with an ethylene α,β-dicarboxylic acid or with the anhydride or substitution product or other deriv. of such an acid. The product(s) may be formed by mixed polymerization of a vinyl ether with maleic anhydride (I). Thus, a cellulose hydrate film is coated with a soln. of the condensation product of I and vinyl methyl ether in AcOMe and cyclohexanone (II), excess soln. being squeezed off, the film dried at 80–100° and the thus pretreated film coated with a nitrocellulose lacquer. In another example, a condensation product of I and vinyl octadecyl ether in C_6H_6, AcOBu and II is used for the pretreatment.

Digester for the treatment of chips. James Fletcher (to Babcock & Wilcox Co.). U. S. 2,185,962, Jan. 2. Various structural, mech. and operative details.

Pressing wood pulp. E. I. Luk'yanov. Russ. 55,868, Oct. 31, 1939. The pulp is first satd. with a soln. of sulfite cellulose lye treated with $Fe_2(SO_4)_3$, filtered from the ppt., and treated with aq. soln. of albumin. The pulp is then dried at 60–80° to a 12–14% H_2O content and pressed at 160–80°.

Bleaching and refining paper pulp. Harold R. Murdock (to Champion Paper and Fibre Co.). U. S. 2,186,034, Jan. 9. A process of prepg. a bleached paper stuff comprises chlorinating the chlorinatable lignin compds. of a chemically produced raw pulp by treatment of the latter with Cl as such, solubilizing the chlorinated lignin compds. by treating the pulp with mild caustic alkali soln. and washing the so-solubilized compds. from the pulp; beating and partially hydrating the pulp to a degree just short of that required for hydrating the pulp to a degree approx. that required for papermaking; subjecting the substantially refined and hydrated pulp to an oxidizing bleach with a hypochlorite under conditions to bleach the pulp; and mechanically hydrating the bleached pulp, to the degree of hydration appropriate for paper-making, under mild hydration conditions.

Emptying apparatus for diffusers, pulp bins, etc., used in the manufacture of cellulose and paper. Olaf Qviller. U. S. 2,185,567, Jan. 2. Various structural, mech. and operative details.

Apparatus for screening cellulose fiber. Lauritz B. Schibbye (to Linköpings Armatur-och Metallfabriks Aktiebolag). U. S. 2,185,955, Jan. 2. Various structural details.

Papermaking machine. Geo. J. Forman. U. S. 2,185,913, Jan. 2. Various structural, mech. and operative details.

Papermaking machine. Wm. H. Millspaugh (to Sandusky Foundry and Machine Co.). U. S. 2,186,171, Jan. 9. Various structural, mech. and operative details.

Apparatus for delivering stock to the paper machine. Richard T. Lang (to American Voith Contact Co. Inc.). Can. 386,952, Feb. 20, 1940. Structural details.

Cotton yarn for drier felts. Boris Monsaroff and Walter S. Burrill (to Cosmos Imperial Mills Ltd.). Can. 387,121, Feb. 27, 1940. Cotton yarn is treated with a soln. of phenol or urea contg. a suspension of a powd. inorg. material, partially dried to remove surplus moisture, impregnated with formaldehyde, and heated to form a condensation on product with the powder interposed therein.

Alkaline earth paper filler. Otto Kress and Charles E. Johnson (to Institute of Paper Chemistry). Can. 387,132, Feb. 27, 1940. An emulsion of paraffin stabilized by a substantial proportion of casein in colloidal form is mixed with a sludge of finely divided alk. earth solids, the ratio of casein to paraffin being about 1:4, and an acidic reagent is added to set the emulsion.

Coated paper suitable for printing. Peter J. Massey. U. S. 2,185,859, Jan. 2. Various details of app. and operation for coating wet paper webs and then drying them.

Apparatus for coating paper or other film with a sensitized emulsion. Geo. C. Beidler. U. S. 2,185,049, Dec. 26. Various details of an app. designed to prevent buckling of the film.

Apparatus for testing the rupturing strength of sheet materials such as paper or textile fabrics. Samuel N. Senna (to B. F. Perkins & Sons, Inc.). U. S. 2,186,213, Jan. 9. Various structural, mech. and operative details.

24—EXPLOSIVES AND EXPLOSIONS

C. G. STORM

Firedamp: its occurrence in mines and possible utilization. J. Ivon Graham. *Colliery Guardian* **159**, 582–5, 626–30(1939).—CH_4 is the main constituent of the gases evolved from coal, but N and CO_2 may exist in appreciable quantity. Coal may contain extremely large amts. of CH_4, especially under pressure. Many samples of anthracite coal contained over 1000 cc. of CH_4 per 100 g., and com. grades of such coal evolve the CH_4 so slowly that they may retain a considerable quantity of the gas even after 5 months of storage. Bituminous coal has rarely been found that contains more than 300 cu. ft. of CH_4 per ton; it readily loses most of the gas. CH_4 from coal mines may be used (1) as a fuel for autos and buses (when compressed into cylinders) and (2) for fuel requirements at the mines. George Ayers

The determination of the firedamp content in mine air. T. David Jones and W. L. Gyles. *Colliery Guardian* **159**, 588–90(1939).—A comparison of (1) the McLuckie gas detector, (2) the M.S.A. methane detector, (3) the M.S.A. methane tester, (4) the Léon-Montlucon firedamp de-

tector and (5) the Ceag Monthuçon gas detector for CH_4-air mixts. up to 4.06% CH_4 content was made both in the lab. and underground (except for the M.S.A. methane tester). All were satisfactory, the max. differences in results obtained underground being: (1) 0.08; (2) 0.06; (4) 0.05; and (5) 0.07, resp. The time required for a detn. was: (1) approx. 10 min.; (2), (4) and (5) less than 1 min. George Ayers

Explosibility of semianthracite, low-volatile bituminous coal, and medium-volatile bituminous coal dusts. H. P. Greenwald. *U. S. Bur. Mines, Rept. Investigations* **3489**, 11 pp.(1940).—Data on the explosibility of 22 coal dusts contg. 8–31% volatile matter are presented. Rock dusting is necessary in mines working coals contg. more than 11% volatile matter unless the incombustible content of the coal dust is abnormally high. Alden H. Emery

Coal-mine explosions and coal- and metal-mine fires in the United States during the fiscal year ending June 30, 1939. D. Harrington and W. J. Rene. *U. S. Bur. Mines, Circ.* **7092**, 21 pp.(1939); cf. *C. A.* **33**, 2718[8]. 3
Alden H. Emery

Danger of explosion in N. W. Bohemian brown coal mines. F. Mayer. *Z. Berg-, Hütten- u. Salinenw. deut. Reich* **86**, 537–44(1938); *Neues Jahrb. Mineral., Geol.*, Ref. II, **1939**, 840–2.—Although CH_4 is present in comparatively small quantity combustible gases are in these brown coal mines because of the spontaneous inflammability of the coal; the gases consist of air, N_2, CO_2, CO, H_2, CH_4, C_2H_6, C_3H_4 and heavier hydrocarbons. Explosions are usually less violent than those due to fire-damp, but the brown-coal dust must be regarded as dangerous.
C. A. Silberrad

Method for extinguishing burning petroleum products. P. T. Bezuglov. *Neftyanoe Khoz.* **1939**, No. 8, 44–7.—A general discussion of causes of oil fires and methods of combating them. A. A. Boehtlingk

Carbon dioxide gas and water extinguish steel shaving fire. David E. Hatt. *Fire Eng.* **93**, 112(1940).—Approx. 2400 tons of warm, oil soaked shavings of fine texture ignited spontaneously. To extinguish the fire the material was spread out about 15 in. deep, cooled with CO_2 and wetted with water from spray and fog nozzles. About 3000 lb. of CO_2 and 700,000 gal. of water were used. Water alone could have been employed to extinguish the fire but it is likely that without the use of CO_2 the fire would have remained burning for a much longer period. Leopold Scheflan

History of the development of the rocket. Albert Hausenstein. *Z. ges. Schiess- u. Sprengstoffw.* **34**, 135–9, 170–4, 206–10, 237–42, 286–8, 306–8, 331–3(1939); **35**, 8–9, 32–4(1940). C. G. Storm

Ammonium nitrate explosives. Clyde O. Davis (to E. I. du Pont de Nemours & Co.). U. S. 2,185,248, Jan. 2. NH_4NO_3 about 92% is used together with a normally solid nitrated aromatic hydrocarbon such as dinitrotoluene or mononitronaphthalene 4–5% and with a normally solid O-free org. "fuel" sol. in the nitrated aromatic hydrocarbon when the latter is molten, such as diphenylamine or *p*-toluidine in a proportion no greater than that of the nitrated aromatic hydrocarbon. Such explosives have good sensitiveness. Cf. *C. A.* **33**, 9648[1].

Smokeless powder. Hercules Powder Co. Brit. 508,914, July 7, 1939. A small amt., e. g., 1%, of ground glass, Ca silicide, Sb sulfide, powd. Sb, Sb oxide, $CdCO_3$, CdO, Cd and (or) Co, capable of preventing rust formation in the gun barrel after firing without increasing the speed of combustion, is incorporated in smokeless powder during the prepn. thereof. The powder may be coated with the rust-preventative substance(s). 4

Delay detonators. Lawton A. Burrows and Walter E. Lawson (to E. I. du Pont de Nemours & Co.). U. S. 2,185,371, Jan. 2. A delay compn. of predetd. burning speed is used contg. an oxidizing agent such as $KMnO_4$ and an alloy of Sb with at least one metal such as Fe, Bi, Cu, Cd or Pb whose heat of combustion per unit volume is substantially different from that of Sb. 5

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Dyes and other synthetic organic chemicals in the United States. Anon. *U. S. Tariff Comm.*, Rept. No. **132**, 57 pp.(1937). G. G.

The membrane-permeability of dyestuffs. I. Information on the dialysis velocity of Orange II. Tetunosuke Nisi. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 341–2 (1939)(in German).—The dialysis const., k, equals $2.303v\{1/[At(v + V)]\}\log\{1/[1 - (c(v + V)/vC_0)]\}$, where A = surface of the parchment, paper membrane, V = vol. of outer liquid, v = vol. of inner liquid, c = concn. of Orange II in outer liquid in mg./l., C_0 = initial concn. of Orange II in inner liquid in mg./l. and t = time in min. With decreasing concn. of Orange II solns., k reaches a max. and then decreases with further decrease in concn. With increasing NaCl concn., k quickly becomes const. with high Orange II concns., but only slowly rises to a const. value with low Orange II concns. Increase in temp. results in a linear increase in k. With increasing H_2SO_4 concn. up to 0.5 N, k increases; with a definite H_2SO_4 concn., an increase in NaCl concn. results in rapid increase of k to a const. value. G. Ayers 7

Vat dyes of the flavanthrone series. III. Tosio Maki and Seni-iti Kitamura. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 410–12(1939)(in German); cf. *C. A.* **31**, 4499[9].—Into 50 g. $PhNO_2$ and 8.5 g. $SbCl_5$ at 20° 3 g. powd. 2,3-bromaminoanthraquinone (I) was introduced and the mixt. allowed to stand overnight (approx. 18 hrs.); it was then heated rapidly to 210°, maintained at that temp. for 15–20 min, and the dyestuff filtered off at approx. 140° by suction, washed thoroughly with $PhNO_2$ at approx. 100°, then with alc., then extd. with 10% HCl soln.; it gives pure 3,3′-dibromoflavanthrone (II) (0.93 g.) in 33.1% yield. Increase in the reaction temp. up to 210° increases the yield of II and decreases the yield of by-products; prolonged heating at 210° gives a brownish impure product. The highest yield of II is given when $SbCl_5$:I = 2.8:1. II crystallizes from hot $PhNO_2$ in reddish yellow needles; it colors H_2SO_4 orange-red and, from an alk. hyposulfite bath, colors cotton a bright yellowish orange (deeper tint than that given by ordinary flavanthrone and rather similar to that of the pyranthrones). II is not identical with Indanthrene Yellow R (probably formed by partial bromination of flavanthrone), which contains less Br and is yellower than II. When the time of heating at 210° is 5 min., 3,3′-dibromoindanthrone (III) is the main product; III is a blue dyestuff (for cotton from the hyposulfite bath) which can be purified by extn. with hot $PhNO_2$. When the time of heating at 210° is prolonged (60 min.), III by further condensation forms a yellow-green *substance*, $C_{48}H_{18}O_4N_2Br_2$ (IV), somewhat sol. in boiling PhCl and in $PhNO_2$ with a clear-green color (without fluorescence). IV crystallizes from $PhNO_2$ as a dark-green cryst. powder having a green streak; it colors H_2SO_4 yellow-brown and dyes cotton yellow-green from a hyposulfite bath at 60°. When the $PhNO_2$ from the prepn. of II is allowed to stand, III and IV sep. in amts. equal to about 5% of the I used. A red-brown, cryst. mol. compd. is formed from 1 mol. each of $PhNO_2$, $SbCl_5$ and I. When the $PhNO_2$ in the above method for the prepn. of II is replaced by *o*-$C_6H_4Cl_2$, and the mixt. boiled 60 min., there result no II, no mol. compd. and only traces of dibromindanthrone. George Ayers 8 9

Removal of a sulfur black dye from suspension by flotation methods. B. R. Clanton, F. K. Cameron and J. E. Magoffin. *Textile Research* **10**, 201–6(1940).—The flotation of S black suspensions is dependent on the

electrokinetic potential of the dye as measured by the migration velocity. Some new floating agents, including mono-, di-, and tri-amylamine, have been found effective alone and in mixts. Partial coagulation of the dye with electrolytes or pos. colloids before addn. of floating agents is effective. The improvement is directly connected with the change in the electrokinetic potential of the dye caused by the coagulating agent. W. H. Boynton

The phthalocyanine dyes. Albert Sander. *Chem.-Ztg.* 64, 73–5(1940).—A review with 35 references. E. H. 2

Pechman dyes. Formation of the ester of a new acid, isomeric with the yellow monoacid. Paul Chovin. *Compt. rend.* 209, 169–71(1939); cf. *C. A.* 33, 2341[8], 4980[8].—Hydrolysis of the red and yellow dyes of Pechman with alc. KOH yields a monohydrated acid (I), a yellow dihydrated acid (II) and a white pseudo-dihydrated acid (III). The Me esters of I and II are not stable. The Me ester of III is canary-yellow, m. 165°. C. W. Sondern 3

The "suprafiks" dyes. N. S. Aleksandrov and A. G. Kolesnikova. *Byull. Ivanovo Nauch.-Issledovatel. Tech. Inst.* 1938, No. 6–7, 86–7; *Khim. Referat. Zhur.* 2, No. 5, 107(1939).—The use of indanthrene dyes requires a preliminary partial reduction of the dye by heating it with $NaHSO_3$ and with a base. About 12–20% of the indanthrene pastes possessing a fine structure can be used without preliminary reduction. However, the particles become denser when subjected to freezing temps. The "suprafiks" dyes are indanthrenes in the form of exceedingly fine pastes and are devoid of these disadvantages. Results of production-scale tests with 4 samples of "suprafiks" are given: Violet RRN, Violet BBK, Yellow GGD and Orange GK. In the dyeing of the textiles with the "suprafiks" dyes the textiles were satd. with the unreduced dispersed dye and reduced in a jigger. An even color without specks was obtained. W. R. Henn 4

Three-phase light sources of interest to the textile industry as applied to accelerated light-fastness testing equipment and color-matching lamps. M. J. Dorcas. *Am. Dyestuff Reptr.* 29, No. 5, *Proc. Am. Assoc. Textile Chem. Colorists* P110–16(1940).—A discussion of machines for the accelerated testing of the fastness to light of dyed fabrics and other colored objects and an artificial light to supplement or replace inadequate or varying daylight for the purpose of matching colors or detg. the color of objects as practiced in the com. classification of commodities. W. H. Boynton 5

An accelerated light-fastness test in use at Shirley Institute. H. Hunter. *J. Soc. Dyers Colourists* 56, 64–7 (1940).—The problem was to devise a method of subjecting test samples to irradiation equiv. as nearly as possible in quantity and quality to sunshine amounting to at least 2000 hrs. in a min. practical test period. A Stelmor cinema projector consuming 65 amps. at 40 v. has the arc situated just outside the focus of a Cr-plated twin parabolic mirror of 8.5-in. aperture. A glass lens 3 in. in diam. is mounted on the axis of the projector system 5 in. from the arc crater. Light is concd. on the target at a distance of 30 in. from the arc and light intensity is about 200,000 foot candles or 20 times that of noon summer sunlight. A blast of air (250 cu. ft. per min.) directed onto the samples reduces the temp. of the samples below 20°. The air is humidified by steam jets. The equipment is described and the technique of testing is outlined. The first cost of the method is little over that of the fadometer, but running costs are much higher. Advantages are speed and accuracy. W. H. Boynton 6

Mechanized equipment for the production of diazo solutions. A. V. Lebedev and V. Ya. Davydov. *Byull. Ivanovo Nauch.-Issledovatel. Tech. Inst.* 1938, No. 6–7, 87–96; *Khim. Referat. Zhur.* 2, No. 5, 106–7(1939).—When diazo solns. are prepd. by manual labor in textile mills the amt. of the oxides of N in air reaches 0.18 mg./l. during the prepn. and 0.24 mg./l. during the filtration of the product. In mills that use semimechanized methods the content of the oxides of N in air was reduced to 0.008–0.01 mg./l. (normal 0.015 mg./l.). L. and D. developed a mechanized equipment which ensures all sanitary and hygienic requirements. W. R. Henn 7

Colors in the Renaissance. L. G. Derjisseau. *Ciba Rev.* 2, 601–3(1939).—A historical discussion of the use of various dyes. Leopold Scheflan 8

Dyeing in France before Colbert. H. Wescher. *Ciba Rev.* 2, 618–25(1939).—A historical description of dyeing textiles. Leopold Scheflan 9

The French dyeing industry and its reorganization by Colbert. H. Wescher. *Ciba Rev.* 2, 643–6(1939).—Historical. Leopold Scheflan 10

Great masters of dyeing in 18th Century France. H. Wescher. *Ciba Rev.* 2, 626–41(1939).—A historical description including an illustration of an old app. for the manuf. of "oxidized chlorate of lime" for Turkey-red dyeing and other ancient app. Leopold Scheflan 11

Weaving and dyeing in North Africa. Jean Gallotti. *Ciba Rev.* 2, 738–45, 747–51, 753–6, 758–60(1939).—A survey of the industry in Morocco, Algeria and Tunisia. Leopold Scheflan 12

Stable color with indigosols. P. V. Moryganov and S. A. Plaksin. *Byull. Ivanovo Nauch.-Issledovatel. Tech. Inst.* 1938, No. 6–7, 66–87; *Khim. Referat. Zhur.* 2, No. 5, 105–6(1939).—Methods for the dyeing with different dyes are given. To avoid the premature oxidation of indigosols during drying it is recommended to add NH_3 to counteract the acidity produced by the addn. of the NH_4 salts. Best results were obtained by addn. of $(NH_4)_2C_2O_4$. Addn. of alizarin and ricin soap gave good results. $K_4Fe(CN)_6$ and NH_4 vanadate were investigated as catalysts. A prolonged boiling caused up to 23.5% loss of strength of the fibers. W. R. Henn 13

Rayon dyeing and finishing. E. Hazeley. *Can. Textile J.* 57, No. 6, 30, 32, 39–41, 52–3(1940).—Practical data are presented on faults which can be corrected during dyeing processes (use of softened and purified water for processing, bleaching with H_2O_2, routine test for degradation of cellulose, uneven dyeing around the skein, poor penetration in skein dyeing), faults for which the dyer is not responsible (weft or filling bars due to yarn shading and cloth structure, streakiness in crepe fabrics, warp stripes, streaks due to scouring and sizing, tendering by vat dyes and tension effects), and dyeing faults in the production of rayon (age of viscose, operative defects and coagulating bath constituents, effective control of yarn quality, selection of level dyeing dyes and the performance of dyes). Leopold Scheflan 14

Dyeing of fabrics for work clothes. E. Dutoit. *Teintex* 5, 54–7(1940).—A discussion of the prepn. and dyeing of clothes made of 80% cotton and 20% cellulose schappe. Saverio Zuffanti 15

A noninjurious dyeing process for Tiolan-wool mixtures. Karl Soiron and Wilh. Thierron. *Melliand Textilber.* 20, 646–9(1939).—Tests showed that Tiolan is more severely weakened than wool by the concns. of acid used in dyeing. This is attributed to the splitting off of HCHO. Tiolan also takes up dyes more rapidly than wool; thus dyeing is uneven on mixts. of the 2 fibers. This effect is increased by the fact that the HCHO which is split off from the Tiolan tends to reserve the wool. When hexamethylenetetramine is added to the dye bath the Tiolan retains its strength to a much greater degree. Levelling is effected by dyeing 1st at low temp. and low acidity, then adding fresh dye and more acid and bringing to a boil. Exptl. data and sp. dyeing recipes are given for 6 different classes of dyes. Anthony M. Schwartz 16

Density of wool in relation to acid dyeing. P. M. Heertjes. *Atti X° congr. intern. chim.* 4, 755–62(1939).—The dyeing process of wool by acid dyes is studied. By means of gas-volumetric d. detns. using He gas as an imbibition medium, it has been shown that the dyeing of wool with acid dyes is a chem. process by which the dye penetrates, at least partly, into the micelle substance. By the acid dye process an extra increase of vol. of the micelle substance is caused. This extra increase of vol. is directly proportional to the size of the dye mol., however, on the understanding that only mols. above a certain size will commence to cause the said increase of vol. This can be 17

explained by the peculiar structure of the wool keratin. D. Jorysch

The technique of early cloth printing. R. Haller. *Ciba Rev.* 2, 933–7(1939).—Historical. L. S.

The earliest specimens of cloth printing. Gustav Schaefer. *Ciba Rev.* 2, 914–19(1939).—Historical. Leopold Scheflan

Medieval cloth printing in Europe. Gustav Schaefer. *Ciba Rev.* 2, 921–32(1939).—Historical. L. S.

Textile printing up to the year 1500. Gustav Schaefer. *Ciba Rev.* 2, 938–9(1939).—Historical. L. S.

"Painted" printing process. Metzl. *Melliand Textilber.* 20, 287(1939).—A new style of textile printing, especially suitable for rayon and silk fabrics, is described. It allows the production of an appearance closely resembling that of a H_2O- or oil-painting by printing a lustrous fabric with a matt pattern before or after printing with a multicolor or 2-tone pattern with the aid of acid, basic, and vat dyes. Recipes of printing pastes for obtaining the matt and color effects are given. B. C. P. A.

Printing on plush. L. Ferré. *Teintex* 5, 57–62(1940).—For plate printing the following mixt. is recommended: 310 g. of an acid dye, 325 g. of powd. British-gum, 75 g. of glycerol, 25 g. $KClO_3$, 130 g. $Na_2C_2O_4$, 130 cc. NH_4OH, and 5 l. of H_2O. Several other mixts. are also included. Saverio Zuffanti

The physical properties of thickeners (for textile printing). Georg Hasse. *Melliand Textilber.* 20, 655–8(1939).—Viscosity as measured by the falling-ball method gives no indication of how a thickener will behave in actual practice on the printing machine. The use of a rotating-cylinder type of viscometer, however, shows that most thickeners possess a structural viscosity due to their colloidal nature. The viscosity decreases with increasing speed of the cylinder. Such measurements can be directly correlated with the behavior of the thickener in practice, and afford an excellent method of scientifically evaluating these substances. Anthony M. Schwartz

Causes and effects of pulmonary tuberculous infection among seamstresses. G. Wohlhueter de Loriol and R. Wohlhueter de Loriol. *Schweiz. med. Wochschr.* 69, 1228(1939).—In Strasbourg, the amt. of dust is very high, even in well-equipped factories. The dust comes not only from the cloth itself but also from the dressing of the material. Chem. examn. frequently showed large amts. of Si. It was found that 90 women had a developing tuberculosis. Maurice M. Rath

Color test for the detection of bleached woolen fibers. J. Pinte. *Atti X° congr. intern. chim.* 4, 785–8(1939).—The bleaching of woolen fibers leaves residual reaction products on the fibers. These products are produced by the action of oxygen on the proteids. They are difficultly removed by washing and they can be detected by treatment with KI and starch in presence of HCl. Woolen fibers are macerated in distd. water which has been repeatedly boiled to remove dissolved oxygen and gases. A mix of a soln. of KI, starch paste and dil. HCl is slowly added and allowed to diffuse without agitation. Bleached woolen fibers produce a violet color which turns blue on standing. This reaction is sp. for wool and silk and will be pos. only if bleached fibers are present. Chlorinated wool will give a neg. test. The residual quantity of combined oxygen can be estd. quantitatively. A weighed quantity of woolen fibers is macerated with distd. water and is treated with NaI, $MnCl_2$, dil. HCl and starch paste. The reaction mix is titrated with $Na_2S_2O_3$. The end point is the disappearance of the blue color. A blank is run on unbleached fibers. The difference in titration corresponds to the residual oxygen on the fibers. D. Jorysch

The sampling of domestic wool for shrinkage determination. Robert H. Burns. *Textile Research* 10, 193–200(1940).—The terms shrinkage, yield and clean content are defined, methods of obtaining shrinkages on lots of wool are explained and research work on wool shrinkage tests are reviewed. Selection methods and lab. and mill-scouring methods are explained. The grading of 10 bags, of 5 bags and of every *n*th fleece is compared to that of an entire clip. The grading of the 1st bag sheared from each band is usually coarser than that of the last bag sheared from each band. The cause is explained. The variations in shrinkage of samples drawn by different operators and between the 1st and 4th samples are given and are found not to be significant. W. H. Boynton

Degradation of staple rayon by washing [with detergents.] H. Böhringer and H. Seyfert. *Melliand Textilber.* 20, 353–5(1939).—Numerous curves are given to show the relative decreases of tensile strength and degree of cellulose polymerization (*P*) produced by washing cotton and 2 types of cellulose staple rayon 0–50 times with various soap + Na_2CO_3 and soap + oxidant detergent solns.; the results are further correlated with data obtained by fractionating solns. of the nitrocelluloses (Rath method) derived from these fibers. It is concluded that *P* is a satisfactory criterion of the durability of a staple rayon material although refinement of the Staudinger method of detn. is desirable. Oxidizing detergents deteriorate staple rayon and are not recommended for general use. B. C. P. A.

Recent developments in rayon and some of the newer manufactured textile fibers. F. Bonnet. *Rayon Textile Monthly* 21, 82–3, 108, 145–6(1940); cf. *C. A.* 34, 1490⁶.—A review. W. H. Boynton

Physical and chemical methods for testing staple rayon. Walther Schieber. *Melliand Textilber.* 20, 617–25(1939); *Angew. Chem.* 52, 561–8(1939); cf. *C. A.* 34, 1181⁹.—Undue emphasis has been laid on wet and dry tensile strength as an index of the quality of staple rayon. Material of high tensile strength may have other characteristics which render it unfit for general use. Phys. tests which should be applied to completely evaluate the fiber are: fastness to knotting, wet and dry tensile strength, wet and dry total elongation, elastic elongation, relative wet strength, fastness to creasing, retention of flexibility, work required for elongation to the elastic limit, work required for elongation to the breaking point. Chem. tests which should be applied are: titer, av. polymerization no., alkali soly., area under the Dolmetsch soly. diagram, orientation and packing d. Quant. relations among these properties are presented for a no. of com. fibers. The bearing of each phys. and chem. property considered on working characteristics, wearing quality, and resistance to washing and bleaching is thoroughly discussed. These tests are especially important and valuable in developing new types of rayon and fibers for special purposes. Anthony M. Schwartz

Determination of lanital in the mixed fabrics with natural wool. G. Chessa. *Chim. ind. agr. biol.* 16, 37(1940).—Wash 1 g. of sample with alc.-Et_2O, then with H_2O, dry at 110–20°, treat with 50 cc. of a reagent formed from 100 cc. of 28°Bé. glycerol and 15 cc. of 10% HCl, and boil under reflux for exactly 3 min. Dil. the soln. with 50% alc., filter, wash the insol. matter, dry at 110–20° and weigh. The reagent dissolves lanital but not natural wool. G. A. Bravo

Studies on the protein artificial fiber. III. Chemical change occurring, during ripening of alkali caseinate. H. Z. Utaka. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 412–13(1939); cf. *C. A.* 34, 2179⁹.—In the presence of a slight excess of alkali, casein reacts rapidly with NaOH soln., forming a series of gelatinous hydrates which finally pass into soln. During ripening of the soln. at 15–20° for 7–11 days, the slight excess of NaOH, present at the beginning of the ripening period, gradually combines with the casein. Acids ppt. hydrated casein from an alk. soln. **IV. Behavior of metallic hydrate toward the formation of metallic alkali caseinate.** *Ibid.* 413–14.—The best soln. for spinning is prepd. by bringing together the reagents in water in the proportion, casein:NaOH:Cu = 1:0.05:0.006. A complex Na Cu caseinate soln. is formed and finally this soln. is not coagulated by acids. It is from this soln. that wool-like fiber of great tenacity is prepd. The soly. of casein in alkali soln. is markedly increased by Cu and Co hydroxides, resp. The colloidal state of alkali caseinate is not influenced by the valency of Fe in Fe hydroxide. George Ayers

Vinyon—a new textile fiber. F. Bonnet. *Am. Dye-*

stuff Reptr. **29**, No. 5, *Proc. Am. Assoc. Textile Chem. Colorists* P116–20(1940).—See *C. A.* **34**, 2179⁹. W. H. Boynton

The quantitative determination of casein fiber content of mixed goods. K. Hartung. *Melliand Textilber.* **20**, 697–8(1939).—Casein fibers are attacked and rendered sol. by pepsin and HCl, provided their HCHO content has been previously removed by treatment with H_2SO_4. Wool and other fibers are unaltered by this treatment. 2
The method of analysis, applicable to dyed or undyed material, is as follows: a 5 g. sample is extd. with ether in a Soxhlet app., dried at 105°, and weighed. It is then boiled ½ hr. in 200 cc. of 0.1–0.2% H_2SO_4, the sol. being maintained by addns. of hot water. After thorough rinsing it is added to a soln. of 2 g. pepsin and 0.5 cc. concd. HCl in 100 cc. water, and kept at 60° for 3 hrs. with occasional stirring. It is then rinsed in cold water, dried and weighed. A brief review of previous qual. and 3
quant. methods is given. Anthony M. Schwartz

The structure of artificial fibers and its relation to mechanical and dyeing properties. W. Weltzien. *Melliand Textilber.* **20**, 645(1939).—Cu-ammonia-process rayon (I) takes up dyes from aq. soln. much more rapidly than does viscose-process rayon (II). Similarly, the dyeings on I are less fast to water washing than the dyeings on II. A preliminary treatment with NaOH soln. has no 4
effect on the dyeing rate of I but greatly increases the dyeing rate of II. Preliminary stretching has no effect on the dyeing rate of I but increases the dyeing rate of II. These effects cannot be explained by the very small differences in av. polymerization no., chain length, and orientation between the 2 rayons. They are readily explained if we postulate that II possesses a thin surface layer or zone which is resistant to penetration and swelling, and that I has no such cortex. This theory is borne out 5
by microscopic examn. of the cross-sectioned dyed fibers. Lengthwise stretching or shrinking of II in NaOH solns. is greatly affected by addns. of salt to the bath, but no such effect is observed in the case of I. This also indicates that II has a relatively impenetrable outer zone, whereas I is homogeneous throughout its cross section.
Anthony M. Schwartz

New methods of evaluating staple rayon. Otto Eisenhut. *Melliand Textilber.* **20**, 625–30; *Angew. Chem.* **52**, 568–72(1939).—See *C. A.* **34**, 1182⁵. A. M. S. 6

The rapid preparation of cross sections of cotton fibers. Z. Yosida. *Melliand Textilber.* **20**, 696–7(1939).—A detailed procedure for cross sectioning is given, which is applicable to cotton and other fibers of small diam. Previous rapid methods have been successful only with fibers of relatively large diam. such as the coarser rayons.
Anthony M. Schwartz 7

Testing the stiffness of yarns and twines. Donald C. Scott. *Am. Dyestuff Reptr.* **29**, 77–80(1940).—A paper dealing with the stiffness of bending. Methods of deflecting yarn are discussed. The elastic theory of loop, the application of theory to practice and the effect of sizing on yarn stiffness are considered briefly. High drying temps. produce yarn stiffness. Increase in moisture content or regain usually makes for a softer and more 8
pliable yarn or fabric. W. H. Boynton

Sisal research. W. H. Gibson. *Research Linen Ind. Assoc., Lambeg* **1939**, No. 3, 14 pp.—A report on work carried out at Lambeg from July 1, 1937, to Dec. 31, 1938, dealing with the growth of the plant and the separation, treatment and applications of the fiber.
B. C. P. A.

Newer ideas in textile chemistry. T. W. Whattam. *Can. Textile J.* **57**, No. 6, 34–6(1940); cf. *C. A.* **34**, 2607⁸. 9
—The phys. activities of surface-active agents are related to emulsification, detergency, and penetration during dyeing and wet processing operations. Wetting agents are not necessarily good penetrating agents for textile-chem. purposes. Penetration depends on the size of the mol. aggregates of the agent as compared to the spaces between the mols. of the fiber. Cation-active compds., e. g., cetylpyridinium bromide, are discussed; they ppt. 1
direct cotton dyes and can be used for the fixation of such dyes on cotton. Textile-fiber structure, the x-ray analysis of fiber structure and the sepn. of mols. relating to dyeing processes are discussed. Leopold Scheflan

Influence of finishing treatments on weight, dimensions and quality of textile materials. Schmidt. *Melliand Textilber.* **20**, 201–4, 273–6, 345–52, 421–8(1939).—Complete data and numerous graphs of special interest to fabric designers are given to show the changes produced in woolen and worsted fabrics by such treatments as drying, shearing, pressing, decatizing, shrinking, tentering, and milling. B. C. P. A.

Creping of cloths. Joseph Ricre. *Teintex* **5**, 21–8(1940).—A historical discussion of creping, which covers many patents and formulas, is followed by some industrial applications. Prepn. of bath, impregnation, choice of catalyst, drying, and polymerization are discussed. Pictures and drawings of the equipment are included. *Ibid.* 66–70.—The effect of various creping processes on 217 dyes is discussed and a list of the changes of shade produced is given. Means of measuring creping are given and pictures of app. included. Saverio Zuffanti

Preparation, dyeing and finishing of crepe rayon fabrics. Louis Bonnet. *Teintex* **4**, 519–25(1939).—B. discusses the following types of fabrics: fancy crepes; crepe de Chine and crepe marocain; acetate chain and viscose tram; acetate chain, viscose crepe; chain and tram of Cu rayon; acetate chain and tram of Cu rayon; chain and tram of viscose; crepe satins with viscose chain and crepe viscose tram and with chain and tram of Cu rayon; crepon; georgette crepe; craquelé; flamenga. S. Z.

The technique of modern carpet manufacture in Europe. A. Varron. *Ciba Rev.* **2**, 822–5(1939).—A brief illustrated description of various chem. and mech. treatments.
Leopold Scheflan

Treatment of furs. Vandenhaute. *Teintex* **5**, 29–32(1940).—Bleaching, tanning and dyeing of furs are discussed. The skins should not be soaked too long. A little PhOH added to the soaking bath prevents bacterial putrefaction. The soaking should be accelerated by agitation. For bleaching the following are recommended: $KMnO_4$, SO_2 or, better, H_2O_2. For tanning the following bath is strongly recommended: 5 kg. $Al_2(SO_4)_3$, 5 kg. common salt, 2 kg. gambier, 6 kg. rye flour, and 100 l. of H_2O. Glycerol or a sulfonated olive oil may also be added to soften the pelts. Other tanning baths are also discussed. Numerous dye-bath formulas are included. S. Z.

Finishing of loose plushes. L. Ferré. *Teintex* **5**, 17–21(1940).—A discussion of treating and dyeing of plushes. Detailed conditions and bath formulas are included. Saverio Zuffanti

Quality control in a woolen mill. Werner Von Bergen. *Am. Dyestuff Reptr.* **29**, No. 4, *Proc. Am. Assoc. Textile Chem. Colorists* P84–92(1940).—Lab. facilities at the plant of the Forstmann Woolen Co. are outlined. Control work is done by the chem., phys. and optical depts. Lab. methods of treating raw wool and scoured wool for judging purposes are outlined. A rapid method for fat detn. is as follows: Place one 5-g. sample in a metal cup and pour in 29 cc. of CCl_4. Press the wool down hard in the cup with the plunger 10 times, let stand 1 min., press down 10 times more and let stand 1 min. Now plunge 10 times and then hold the cup over the graduate and squeeze till 13 cc. of liquor is in the graduate. Empty the graduate into the container. For scoured wool, top and worsted yarn: Place the container in the greasometer and dry about 3 min. Remove from the greasometer and let cool with cover off 1 min. Put cover on, weigh and from this wt. subtract the clean wt. of the container. Divide the difference by 2. If the result is less than 0.3% add 0.2%, if between 0.30 and 0.50%, add 20% of the result and if over 0.50% add 10% of the result. The amt. of the size on warp yarns for best weaving conditions should be 15%. The test for acids in carbonized cloth is important because percentage of H_2SO_4 above 1% may result in severe damage. W. H. Boynton

Health hazards in the dry-cleaning industry [with special reference to chlorinated hydrocarbon and petro-

leum solvents]. J. P. Russell, *Calif. State Dept. Pub. Health, Weekly Bull.* 19, 5–6(1940). J. Pinchack

Development of rancidity in Stoddard dry-cleaning solvent. Adrian C. Smith, Charles S. Lowe and George P. Fulton. *Ind. Eng. Chem.* 32, 454–60(1940).—Fatty matter accumulates in dry-cleaning solvent primarily from the soap used and secondarily from soil in the garments which are cleaned. If not removed from the solvent this becomes rancid and causes an objectionable odor in the garments that are cleaned later. A series of practical runs were made during which only filtration and adsorption methods of treating the solvent were used. The increase in acid no. and residue in the solvent was followed. A modification of the Kreis test and a modified peroxide detn. were developed which were useful in detg. incipient rancidity. These were usually pos. several runs before objectionable odors developed in the clothes. Electrometric titration of the residue obtained from the used solvent indicates that as rancidity develops low-mol.-wt. acids are produced which have a buffering action. Serious objections are raised against using the H_2SO_4 absorption test for checking the condition of the solvent with respect to rancidity. Charles R. Phillips

The souring operation [in laundering]. I. Functions of the sour, properties of sours, notes on application. C. H. Bayley. *Laundry Dry Cleaning J. Can.* 19, No. 11, 15–17, 21(1939).—A discussion containing a tabulation of various properties of the common laundry sours. Charles R. Phillips

Fabric damage [in laundering]. J. Bryn Lewis. *Laundryman* 5, No. 10, 5–7, 16–17(1939).—Fabric damage during laundering can be traced largely to faulty laundering practice, to fabric or dye construction not suitable to laundering, or to misuse in the hands of the owner. Damage of the first type can be largely eliminated by care in the use of bleaches, alkalies and sours by the laundry operator. Photographs are given of several fabric defects. Charles R. Phillips

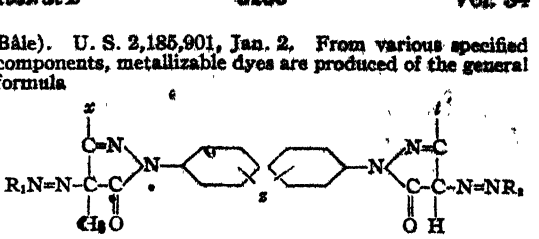
The effect of sodium bicarbonate on the bleaching of linen. B. V. Moryganov and L. V. Gur'yanov. *L'no-Pen'ko-Dzhutovaya Prom.* 1938, No. 10, 35–42; *Khim. Referat. Zhur.* 2, No. 2, 116(1939); cf. *C. A.* 33, 9657[5].—The bleaching process was controlled by the amt. of Cl_2 used, by the breaking strength of the cloth, by the elongation on breaking, by the capillarity, by the degree of whiteness and by the stability of the white color to steaming. The addn. of $NaHCO_3$ in the first treatment increases the whiteness of the cloth 3–4% and reduces the time of the treatment from 3 to 1 hr. The treatment should be performed at a 4 g./l. concn. of the active Cl with addns. of Na_2CO_3 (0.5 mol./mol. of NaOCl) at 20–30° for 1 hr. The second treatment of the cloth should be performed at a concn. of NaOCl corresponding to 3 g./l. of the active Cl with an addn. of $NaHCO_3$ (1.5 mol./mol. of NaOCl) and should last for not more than 1 hr. The whiteness of the cloth is thereby increased 1.2%. Expts. performed under production conditions confirmed the lab. results. A bleaching of flax textiles in a continuous process with an addn. of $NaHCO_3$ into the bleaching soln. was successfully obtained. W. R. Henn

Old and present techniques of bleaching silks. C. Thibaud. *Teintex* 5, 62–6(1940).—Boiled silks, supple silks and ordinary silks are discussed. A discussion on scouring and bleaching is also included. S. Z.

Sodium hexametaphosphate (Markuze) 14. Fire-resisting compns. [for coating or impregnating textiles] (Brit. pat. 509,069) 13. App. for testing the rupturing strength of textile fabrics (U. S. pat. 2,186,213) 23.

Koch, Paul A.: Jahresschau geschaffener deutscher Faserstoffe 1939. Leipzig: Klepzig. 34 pp. M. 2.50.
Zanker, W.: Deutscher Faerber-Kalender, 1940. Munich: F. Eder Verlag. M. 5 or $2.00. Reviewed in *Rayon Textile Monthly* 21, 194 (1940).

Azo dyes. Max Schmid (to Soc. pour l'ind. chim. à Bâle). U. S. 2,185,901, Jan. 2. From various specified components, metallizable dyes are produced of the general formula



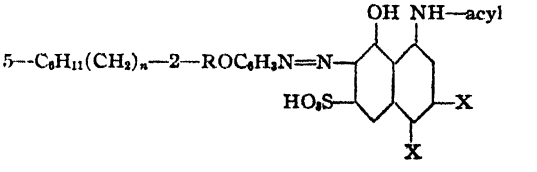
where R_1 and R_2 are monocyclic aromatic nuclei of the benzene series contg. a COOH group standing in *o*-position to the —N=N— group, *x* and *i* stand for H, CH_3, COOH, $COOC_2H_5$ or phenyl, and *z* stands for a connecting member of the formula —NH—*a*—NH—, where *a* stands for a member of the group consisting of the carbonyl group and a triazine compd. and, where the —NH— groups are linked in a position different from the 2′-position to the phenyl radicals standing in 1-position to the pyrazolone nuclei, which products are yellow to brown powders dyeing fast yellow tints.

Azo dye. Werner Zerweck and Ernst Heinrich (to General Aniline Works). U. S. 2,186,226, Jan. 9. From 2-(2,3-hydroxynaphthoylamino)naphthalene and 1-methoxy-2-aminobenzene-4-sulfonbutylamide, a monoazo dye is obtained which when prepd. on vegetable fiber yields bright red shades of good fastness to washing and boiling and to light.

Vat dyes. R. P. Lastovskiĭ. Russ. 55,839, Oct. 31, 1939. 3,6-Diaminocarbazole is condensed with *α*-chloroanthraquinone in the presence of anhyd. AcONa and Cu salts or Cu powder.

Vat dyes. V. D. Lyashchenko and I. V. Grachev. Russ. 55,969, Oct. 31, 1939. Vat dyes are prepd. from 1,4,5,8-naphthalenetetracarboxylic acid or 3,4,9,10-perylenetetracarboxylic acid and aromatic *o*-diamines by heating in an aq. medium under pressure.

Acid wool dyes. Carl T. Schultis and Ernst Korten (to General Aniline Works). U. S. 2,184,948, Dec. 26. From various specified components, acid wool dyes are obtained of the general formula



where C_6H_{11} is cyclohexyl, acyl stands for a member selected from the group consisting of aliphatic and aromatic carboxylic and sulfonic acid radicals, R stands for a member selected from the group consisting of lower alkyl radicals and of araliphatic and aromatic radicals of the benzene series, *n* stands for one of the numbers 1, 2 and 3, one X means H and the other X a sulfonic acid group, which dyes dye animal fibers red shades of good fastness. Cf. *C. A.* 33, 4795[6].

Triarylmethane dyes. I. G. Farbenindustrie A.-G. Brit. 508,856, July 5, 1939. Addn. to 472,757 (*C. A.* 32, 1480[6]). Chromable dyes are made by condensing 1 mol. of a halomellitic acid or an anhydride thereof with 2 mols. of an aromatic OH compd. having in *m*-position to the OH a substituted NH_2, 2nd OH or alkoxy group and having a reactive H atom in *p*-position to the substituted NH_2, 2nd OH or alkoxy group, and then exchanging the halogen atom in the product by reaction with NH_3, an amine, an aromatic sulfamide or a hydrolyzing agent. They dye animal fibers in an acid bath orange, yellow to bluish-red and violet shades, the fastness of which is enhanced by after-chroming; they are also suitable for chrome-printing on cotton, viscose rayon, etc. They may be chromed in substance to form Cr complex salts that dye fibers in an acid bath clear fast tints. They may also be chlorinated to form dyes. Among examples, *m*-diethylaminophenol and 5-bromotrimellitic acid anhydride are

stirred together 2 hrs. at 170–180°, the melt is dissolved in a Na_2CO_3 soln. which is then acidified with AcOH and the dye, sepg. as free acid, is filtered with suction, washed with H_2O and dried; it dyes animal fibers red.

Sulfur dyes. N. A. Zaitsev. Russ. 55,822, Oct. 31, 1939. A mixt. of S, 3-nitrocarbazole and phenol is heated to the b. p.

Blue sulfur dye. V. N. Polyakov and L. I. Vasil'eva. Russ. 55,850, Oct. 31, 1939. 4-Aminotolyl-4-hydroxyphenylamine is treated with a soln. of sulfite at a temp. not exceeding 5° and the product is heated with a polysulfide.

Sulfur dyes. N. A. Zaitsev. Russ. 55,845, Oct. 31, 1939. A mixt. of benzidine, carbazole and S is heated above 180° with the addn. of sodium acetate or sodium formate or glycerol or sugar-like substances. The dye is sepd. in the usual manner.

Dyes of the anthraquinonebenzacridone series. Wilhelm Bauer (to General Aniline Works). U. S. 2,185,140, Dec. 26. Examples with details are given of the production of blue dyes such as 4-*p*-chloro- and -bromo-benzoylaminoanthraquinone-6′-chlorobenzacridone, giving dyeings of good fastness to Cl, to boiling and to light.

Colored condensation products. Soc. pour l'ind. chim. à Bâle. Brit. 508,803, July 5, 1939. These are made by condensing a compd. of formula, $YXNCOCH_2CN$, where X is a C_6H_4 residue, which may contain substituents, and Y is H, an alkyl group or a hydroxyalkyl group, which may be etherified or esterified, with an aldehyde of formula, *p*-R′R″NC_6H_4CHO, in which R′ is an alkyl group and R″ an etherified or esterified hydroxyalkyl group, or with a benzylidene compd. of an aldehyde of said formula with an aromatic aminosulfonic acid. They are yellow to orange substances that dissolve in org. solvents, e. g., Me_2CO, AcOEt, to intensely yellow to greenish yellow solns. and may be used *for coloring lacquers* that are produced on a basis of natural or artificial resin, nitrocellulose, acetylcellulose, etc., and for coloring artificial materials, e. g., condensation products of phenols or urea and CH_2O; they are also especially suited for *dyeing cellulose esters* and *ethers*, particularly acetate rayon. Among examples, cyanoacetic acid anilide and (*N*-ethyl-*N*-methoxyethyl)-*p*-aminobenzaldehyde (obtainable by the methods of Ger. 103,578, 105,103 and 105,105) are dissolved in alc. and the soln., after addn. of a base, e. g., piperidine, an alkali or EtONa, is boiled under reflux; on cooling with stirring, the yellow condensate sepa. as a powder.

Base for ice colors. V. M. Rodionov, B. M. Bogoslovskiĭ and L. M. Tsil'man. Russ. 56,131, Nov. 30, 1939. A base for ice colors of the type of arylazo-1-naphthylamine is prepd. by the interaction of diazo compds. obtained from 2(or 4)-methoxy-5-nitroaniline and 1-naphthylamine.

Diazo derivatives of guanidylsulfonic acids. Hans Z. Lecher and Henry P. Orem (to American Cyanamid Co.). U. S. 2,185,152, Dec. 26. Numerous examples are given of the production of stabilized ice color diazo components of the general formula, $X—(N{=}N—G)_n$, in which X is a radical of an ice color diazo component, G is a satd. aliphatic and cycloaliphatic guanidylsulfonic acid radical or of their alkali metal and ammonium salts having at least 2 C atoms between the guanidine and the nearest sulfonic group, and *n* is 1 or 2. Such products are useful in the *printing of ice colors* with a coupling component in a stable alk. printing paste with subsequent development of the prints with weak acid or acid vapors. U. S. 2,185,153, relates to color-producing compns. including stabilized ice color diazo components of the character specified and admixed coupling components. U. S. 2,185,154 (Hans Z. Lecher, Henry P. Orem and Frederic H. Adams, joint inventors; to American Cyanamid Co.) relates to stabilized diazo compds. suitable for use as in the printing of ice colors and having the general formula, $5—X—2—YC_6H_3—N{=}N—G(—Q—Z_n)_m$, in which X and Y are radicals included in the group consisting of alkyl, alkoxy, aryloxy, nitro, halogen and CF_3 radicals, G is a guanidyl radical free from substituents capable of azoic coupling, Q is a radical incapable of azoic coupling and included in the group consisting of aromatic, aromatic-aliphatic, aliphatic and alicylic radicals, Z is a member of the group consisting of carboxylic acid radicals, sulfonic acid radicals and their alkali metal and NH_4 salts, and *n* is a whole number included in the group consisting of 1, 2 and 3 and *m* is a whole number included in the group consisting of 1 and 2.

Pastes of dyes of the dibenzanthrone class. Otto Stallmann (to E. I. du Pont de Nemours & Co.). U. S. 2,185,871, Jan. 2. A process for prepg. microcryst. dye pastes and powders of the alkylation derivs. of *Bz*-2,*Bz*-2′-dihydroxydibenzanthrone comprises converting a compd. of the class consisting of the normal leuco compd. of the color and its alkali metal salt to a stable reduction deriv. by heating in soln. or suspension at a temp. of from 55 to 100° while maintaining the suspension or soln. at a pH of 9–12 and reoxidizing the pptd. stable reduction deriv. to the parent ketonic form.

Textile printing inks. Ruwin Bronsztajn. U. S. 2,185,181, Jan. 2. With a vehicle such as water, there is used a powd. mixt. contg. a pigment such as ZnO, a hydrophilic gum such as gum tragacanth and a mixt. of thermally noncoagulable, sol. vegetable protein, and such a quantity of uncoagulated albumin as will be capable of rendering the whole mixt. heat-coagulable.

Black dyeings. Moses L. Crossley and Lawrence D. Lytle (to American Cyanamid Co.). U. S. 2,185,143, Dec. 26. Materials are dyed with a black vat dye of the dibenzanthrone series which is obtained by fusing with caustic alkali a dibenzanthrone compd. such as dinitrodibenzanthrone having a group capable of promoting condensation of dye mols. (the dye being fast to acetone solns. of cellulose acetate), and after dyeing the material is impregnated with a soln. of an org. plastic such as a cellulose acetate compn. to render it stiff and creaseproof.

Dyeing vegetable fibers. Fritz Straub, Walter Hanhart and Walter Anderau (to Soc. pour l'ind. chim. à Bâle). U. S. 2,185,905, Jan. 2. A process for the production of fast tints with use of complex metal compds. of direct cotton dyes involves at least one treatment of the material in a caustic alk. medium which is heated to not exceeding its b. p., and serves to give a better dyeing.

Improving the dyeing properties of cellulose textile fibers. Leon Lilienfeld. U. S. 2,185,795, Jan. 2. Fibers such as cotton or rayon are treated with at least one org. compd. (such as a reaction product of NH_3 on a dihalohydrin of glycerol) which contains an aliphatic chain of C atoms connected C to C and contg. halogen, O and N, each bonded to a different C atom in the chain (suitably in a 20–30% aq. soln. at 20°). Numerous examples are given.

Printing designs on textile fabrics. Walter Robinson, Joseph Westemeyer, Jr., and Charles A. Borloz. U. S. 2,186,176, Jan. 9. A process of printing designs on textile fabrics involves producing a master pattern comprising a plurality of distinct arbitrary figures in the colors embodied in the finished design and covering such master pattern with a monotone outline pattern for producing the ground coloration outlining the design to be produced leaving the differently colored arbitrary figures of the master pattern within the outline unaffected and the areas outside thereof obliterated, the arbitrary figures of the master pattern having no fitting relationship with the outline pattern.

Threads and fibers of highly polymerized materials such as afterchlorinated polymerized vinyl chloride, etc. Heinrich Jacqué (to I. G. Farbenind. A.-G.). U. S. 2,185,789, Jan. 2. A process of producing threads and fibers from highly polymerized org. materials comprises forming a thin film of the material and stretching it in the direction of its length sufficiently to produce an orientation of the mols. in the direction of length and to render the film capable of disintegration by friction into fibers, and frictionally working the film to disintegrate it into fibers.

Treating filaments, fibers, yarns, etc. Wm. I. Taylor and Leslie B. Gibbins. Brit. 508,968, July 7, 1939. Textile materials are crimped by deformation by applying lateral pressure locally thereto in the presence of an agent that softens the substance thereof, simultaneously rubbing

the materials in a direction transverse to the direction of application of the pressure and then removing the deformed material from the influence of the softening agent so as to set the deformation therein. App. is described. The process is particularly applicable to continuous filaments or staple fibers of cellulose acetate (I) or other thermoplastic cellulose deriv., e. g., esters such as the formate, propionate or butyrate or ethers such as Et or benzyl cellulose. A hot aq. medium, e. g., at 95–100°, or wet steam at atm. or superatm. pressure may be used as softening agent. The materials may be pretreated with a liquid adapted to facilitate softening, e. g., an aq. EtOH soln. for I.

Treating filaments, yarns, foils, etc. Henry Dreyfus, Robert W. Moncrieff and Frank B. Hill. Brit. 509,010, July 5, 1939. In treating filaments, etc., particularly those having a basis of an org. deriv. of cellulose, in order to improve their tenacity, with fluid media under pressure by a process wherein the material passes through a small orifice in a wall of substantially closed app. contg. a fluid, e. g., steam, under pressure, a substantial proportion of the medium is diverted from entering the orifice, e. g., by withdrawing the proportion before the remainder passes through the orifice to the atm., so that the flow of the fluid from the orifice will not exert an undesirable tension on the material.

Conditioning yarns such as those of cellulose acetate. Joseph B. Dickey and James G. McNally (to Eastman Kodak Co.). U. S. 2,184,008, Dec. 19. A process of conditioning yarn to render it more amenable to textile operations including knitting, weaving, spinning, etc., comprises applying thereto a lubricating and softening compn. contg. a carbamate having the general formula: $ROCONHR'$, where R is an alkyl or alkoxyalkyl group and R′ is an alkyl, the hydroxy- or alkoxy-substituted alkyl group. E. g., use may be made of β-ethoxyethyl *N*-propylcarbamate. U. S. 2,184,009 (Joseph B. Dickey and James B. Normington, joint inventors; to same assignee) relates to the like use of α-tetrahydrofurfuryloxy-β-ethoxyethoxyethyl ether or various other acetal ethers having the general formula $ROCH_2CH(OR')(OR'')$, where R is an alkyl, aryl, or substituted alkyl group, R′ is an alkyl, aryl or substituted alkyl group, and R″ is an alkyl group.

Crepe thread of cellulose acetate or the like. Wm. Whitehead (to Celanese Corp. of America). U. S. 2,186,056, Jan. 9. In production of highly twisted crepe thread of filaments such as those of cellulose acetate, a resin such as a polymerized methyl methacrylate compn. is incorporated in the thread and it is subjected to the action of a hot aq. fluid while undergoing crepe twisting.

Continuous production of cellulose acetate and other cut staple yarn or the like. Henry R. Childs (to Eastman Kodak Co.). U. S. 2,186,135, Jan. 9. App. is described and a continuous process of producing a uniform blend of cellulose org. deriv. cut staple fibers contg. a plurality of deniers of fibers all having crimped, kinky and woolly appearance and a resiliency and other phys. characteristics closely simulating natural wool, which comprises extruding in the form of filaments a cellulose org. deriv. dope contg. a crimping agent from the group consisting of high-boiling solvents, semi-solvents and plasticizers, through a plurality of spinnerettes, a given one of which is adapted to produce filaments of different denier from the others, removing solvent from the filaments, cutting them into staple lengths, drying the staple fibers to remove traces of residual solvent, treating the fibers first in a crimp-inducing bath composed of a cellulose deriv. nonsolvent from the group consisting of water, ethers and chlorinated hydrocarbons, while the fibers are in an open, heterogeneously disposed condition and then in an antistatic bath contg. an antistatic agent from the group consisting of the amine salts of sulfated aliphatic alcs. contg. at least 10 C atoms and the salts formed by the interaction of an org. base from the group consisting of the alkylamines, the substituted alkylamines, the alicyclic amines, the alkylolamines, and the amines contg. an ether linkage, with a compd. from the group consisting of the aromatic sulfonic acids, the org. acids contg. a cyclic ether residue and the org. acids contg. an open-chain ether residue, and thereafter drying the crimped staple product.

Crepe effects on fabrics containing cellulose acetate threads, etc. Cyril M. Croft (to Celanese Corp. of America). U. S. 2,185,627, Jan. 2. Fabrics contg. highly twisted yarns at least some of which contain org. derivs. of cellulose are introduced into a treating bath such as plain water at a temp. below 90° and the bath and fabric are then heated to near, but below, the b. p. of the bath.

Nitrogenous condensation products suitable for treating (as in "animalizing") vegetable fibers or rayon, etc. Heinrich Ulrich and Karlhugo Küspert (to I. G. Farbenind. A.-G.). U. S. 2,185,480, Jan. 2. By condensing an alkylenimine contg. at least one H atom attached to N, such as monomeric ethylenimine with an ester such as the sulfuric ester of an alc. contg. at least 6 C atoms in the mol., such as the Na salt of octodecenyl sulfuric acid ester, a product is obtained suitable for treating textiles.

Colored filaments, foils, etc., from viscose. Schlesische Zellwolle A.-G. Brit. 509,085, July 11, 1939. CS_2 is caused to act on alkali cellulose of the compn. generally used in the rayon and staple-fiber industries, e. g., contg. cellulose 30 and alkali 15%, in the presence of dyes that contain 1 or more free OH groups. Examples of dyes are Naphthol AS coupled with Fast Red 3GL base to give scarlet, Naphthol AS-E coupled with Variamine Blue Salt FG to give fast blue, Naphthol AS-SG coupled with Fast Red B-base to give fast black, Diazo Brilliant Green 3G as a diazotizing dye, Alizarin Fast Blue BHG and Diamond Black PV as chrome lacquer pigment dyes, Immedial pure blue, etc.

Treating textiles. Röhm & Haas Co. Brit. 509,079, July 11, 1939. A tertiary amine salt, e. g., dimethylcetylamine-HCl, or a quaternary NH_4 salt, e. g., dimethylbenzylcetylammonium chloride, sulfate or stearate, or dimethylphenylcetylammonium chloride, contg. at least 12 C atoms, is incorporated in the bath contg. artificial resin, e. g., a urea-CH_2O resin, used to finish a textile material, e. g., to render it more resistant to crushing or to produce a nonslip finish.

Treating textile fabrics such as those of regenerated cellulose to improve their texture. Karl Brodersen, Matthias Quaedvlieg, Max Zabel and Albert Schneider (to I. G. Farbenind. A.-G.). U. S. 2,185,427, Jan. 2. The fabrics are treated in a bath contg. a water-sol. salt of a polyhydroxyalkylated biguanide of an aliphatic base contg. at least 10 C atoms and formed with an org. carboxylic or org. sulfonic acid, such as the salicylate of polyhydroxyethylated stearyl biguanide.

Forming slivers of fibrous materials such as cellulose acetate rayon. Charles L. Norton. U. S. 2,185,417, Jan. 2. Various details of app. and operation.

Rayon, etc. Aktien-Gesellschaft für Vermögensverwertung. Brit. 508,840, June 26, 1939. Divided on 508,781 (*C. A.* **34**, 8874). Rayon, spun fibers, horsehair, bands, films, etc., are prepd. from solns. of soybean casein to which have been added carboxylic acids having at least 3 C atoms, e. g., propionic, stearic, heptylic, caprylic, capronic, and (or) their derivs., e. g., esters or amides, the soln. being spun or extruded. Aliphatic amines or amino acids may be added to the soln., NH_2Pr, allylamine or NH_2Bu being suitable. The spinning properties are also improved by small addns. of CS_2. Substances that form insol. compds. with 1 another and (or) with the casein by polymerization or condensation, e. g., phenolaldehyde, Me_2CO-aldehyde, polyvinyl, aldehyde-urea, ketone-urea and ketone-phenol types of resin, may be added. Acid or alk. catalysts may be added to accelerate the formation of said insol. compds. The casein soln. may be treated according to the dry-spinning process and the spinning channel charged with vapors of aldehyde, e. g., CH_2O, AcH, or alternatively or additionally with vapors of org. or inorg. acids. The AcH or phthalic acid anhydride may be hardened with glyoxal.

Finishing fabrics such as those containing wool and cellulose acetate. Herbert Platt (to Celanese Corp. of

America). U. S. 2,186,121, Jan. 9. A fabric having a "good hand" is obtained by wet-finishing operations followed by subjecting the material, contg. 1.2–2 times its wt. of moisture, to tenter-drying.

Apparatus for sizing and drying warp yarns. Ira L. Griffin. U. S. 2,185,747, Jan. 2. Various structural, mech. and operative details.

Size for yarns. William Whitehead (to Camille Dreyfus). Can. 387,173, Feb. 27, 1940. A size comprises gelatin 10–15 parts, a water-sol. boric acid ester of a water-sol. polyhydric alc. 0.5–2 parts, a sulfonated vegetable oil or a sulfonated higher alc. 1–3 parts, and sufficient water.

Desizing cellulose fabrics, etc. Stanley I. Garnett (to American Cyanamid Co.). U. S. 2,185,548, Jan. 2. In removing carbohydrate sizing, use is made of an aq. SO_2 soln. (suitably a 0.5% soln. at about 38°).

Textile-treating composition. Adolph Scholler, deceased (to Scholler Bros., Ltd.). Can. 387,153, Feb. 27, 1940. A delustering, waterproofing and finishing compn. for textiles operating in a single bath at dilns. of 50–300 vols. comprises an aq. dispersion of a wax 2–10, an insol. inorg. delustrant 1–8, $Al_2(SO_4)_2$ 0.5–5.0, gelatin 0.05–0.5, and tapioca 3–10%.

Sheening the pile of wool rugs. James D. MacMahon, Lorenzo D. Taylor and Varton M. Kalusdian (to Mathieson Alkali Works). U. S. 2,185,210, Jan. 2. The pile is subjected to treatment in an aq. caustic alkali soln. (suitably a 0.035% soln. of NaOH) of a concn. insufficient adversely to affect the pile, and is then treated with an aq. $Ca(OCl)_2$ soln. of a strength (suitably about 0.3% of Cl) insufficient to cause a substantial loss of tensile strength of the fiber and insufficient to alter the color of the pile.

Permanent glaze chintz. Denis De Goencz, Edmund C. Tarnuzzer and Alfred F. Stockwell (to Arnold Print Works). U. S. 2,185,746, Jan. 2. A method of producing glazed chintz comprises applying to the cloth a temporary filler, drying and calendering the filled cloth to a smooth, dense surface to limit penetration of a subsequently applied urea-CH_2O coating prepn., applying upon the smooth, dense surface thus provided a coating of aq. prepn. of an initial stage of a urea-CH_2O resin, drying the coating to a nontacky state, friction calendering the coated goods while the setting of the urea-CH_2O resin is in progress to obtain a highly glossy surface and to force the resin coating into firm contact with the filled cloth, further setting the urea-CH_2O resin to a substantially water-insol. state, after the friction-calendering operation, removing the temporary filler and breaking up the continuity of the urea-CH_2O resin coating. The temporary filler may be tapioca starch.

Coated and impregnated fabrics. Donald E. Edgar and Paul Robinson (to E. I. du Pont de Nemours & Co.). Can. 387,248, Mar. 5, 1940. A silk fabric is impregnated with a resin from urea, aldehyde and monohydric alc. and, as softening agent, blown castor oil or hydrogenerated castor oil phthalate. The fabric substantially retains its flexibility at low temps.

Compositions suitable for waterproofing fabrics. John B. Cleaveland. U. S. reissue 21,311, Jan. 2. A reissue of original patent No. 2,046,305 (*C. A.* **30**, 5816[5]).

Waterproof coatings on carpets, rugs, tent and awning fabrics, etc. David P. Moore. U. S. 2,185,217, Jan. 2. A process for coating flexible porous material involves feeding the material from a roll in stretched condition, distributing simultaneously and from 2 different sources a finely divided dehydrating and setting Ca compd. such as portland cement, plaster of Paris or CaO and an aq. dispersion of rubber, so as to produce a uniform adhering waterproof coating which will congeal into a nontacky condition before the material is wound on a take-up roll.

Mothproofing detergent compositions. Hermann Stötter and Theodor Hermann (to Winthrop Chemical Co.). U. S. 2,184,951, Dec. 26. A mothproofing detergent compn. is formed essentially of an acid soapy washing agent and triphenyldichlorobenzylphosphonium chloride, at most only slightly colored in the dry state, sol. in water, and suitable for treating wool, feathers, hair, etc., for simultaneous cleaning and mothproofing.

Fireproofing cellulose fibrous materials such as loose cotton fibers. Ralph R. Oliver (to Lockport Cotton Batting Co.). U. S. 2,185,695, Jan. 2. See Can. 383,902 (*C. A.* **33**, 9010[5]).

26—PAINTS, VARNISHES AND LACQUERS

A. H. SABIN AND CARLTON H. ROSE

Luminous paint. A. E. Lain and H. A. Collinson. *Pharm. J.* **143**, 427(1939).—The "black-out" conditions imposed by the war brought out this subject. Tech. principles of manuf. are discussed. To avoid "poisoning" the light effect, Pb, Cu and Fe must be kept out of the "undercoat." By exposure to a 100-watt elec. bulb for 30 min., a 13-hr. luminosity can be obtained.
S. Waldbott

Underwater paints for ships' hulls. Gerhard Schröder. *Farben-Chem.* **10**, 275–6, 283(1939).—A discussion of formulation of suitable paints for preventing corrosion and fouling.
J. W. Perry

Problems of protecting structures with paint. Hans Wagner. *Chem.-Ztg.* **64**, 57–9(1940).—W. discusses protective coatings for masonry and wood structures. Metallic soaps are considered, with or without the admixt. of fillers that are added to raw masonry materials before they are mixed together as protective agents; however, such protective admixts. are not classified as paints. Nor are gel protective coatings such as are formed by the double decompn. of the coating materials with the surface of the masonry considered as paints (aq. solns. of $ZnSO_4$ applied to stucco, concrete, etc.). A coating of water glass is considered as a paint, but its protective qualities are reduced by residual alkali that often causes efflorescence. A preliminary acid wash or application of Al salts soln. to form Al silicate lessens this danger, but does not prevent blooming. Silicofluoride coatings that react with the surface of masonry are considered as paints; however, masonry contractors are disinclined to use silicofluorides because of alleged failures. According to the author, these failures are due to faulty technique and to the great variation in the chem. compn. of com. silicofluorides, that are discussed in detail. Such colorless coatings as Carbolineum and clear varnish are also considered as paints. Colored and white enamel-like coatings for precast asbestos-portland-cement-, and Sorel- (magnesia) cement-sawdust slabs are also discussed. In referring to protective emulsions and solns. made from latex, bitumen, fatty acids esters, resins of the vinyl and acrylic acid groups, synthetic rubber, unsaponifiable waxes, mineral and drying oils, emphasis is placed on the necessity for providing ventilation through the pores of masonry. If the surface is hermetically sealed so that water, water vapor and salt solns. cannot find egress, then scaling, spalling occurs. Bitumens have the drawback of unsightliness, latex, of instability in the presence of alkalies. Synthetic rubber with Cl-content is very stable in contact with acids and alkalies. Urea-formaldehyde-condensates deserve much wider use for protecting wood surfaces because of cheapness and fire-retarding qualities. The same applies to the highly chlorinated hydrocarbons. Protective emulsions made from waste sulfite liquors, with or without asbestos and other fillers are also suggested as effective fire-retardant coatings.
A. W. King

The loss of drying power of black paints caused by aging. J. E. Rose and H. A. Bennett. *Paint, Oil Chem. Rev.* **101**, No. 23, 114–18(1939).—See *C. A.* **34**, 6424.
J. W. Perry

Loss of drying power in brown paints. Kansas City Paint & Varnish Production Club. *Paint, Oil Chem.*

Rev. **101**, No. 23, 52–4(1939).—See *C. A.* **34**, 6434. J. W. Perry

Primers for nonferrous metals. I. Golden Gate Paint & Varnish Production Club. Harry Eastwood, *et al. Paint, Oil Chem. Rev.* **101**, No. 23, 60–2(1939).—See *C. A.* **34**, 6448. J. W. Perry

Preventing dermatitis in the paint and varnish industry. H. Pfanner. *Farben-Chem.* **10**, 269–71(1939); *Farben-Ztg.* **44**, 1215–16(1939).—Tendencies toward dermatitis can be counteracted by avoiding washing the skin with alk. agents, e. g., soap, using instead one of the newer acidic washing agents. Such agents cleanse without changing the natural condition of the skin and thus rendering it susceptible to external influences. J. W. Perry

A study of the effect of pigment concentration on the hiding power of white pigments. Baltimore Paint & Varnish Production Club. E. B. Schuler, *et al. Paint, Oil Chem. Rev.* **101**, No. 23, 64–8(1939).—See *C. A.* **34**, 6446. J. W. Perry

Some aspects of the fading of colored pigments. I. Mackenzie-Richards. *Natl. Paint Bull.* **4**, 12–15(Feb., 1940).—The only really permanent compds. are those whose color depends on oxides of Fe or Cr or on Fe silicate. The fading power of the sun is proportional to its power to affect Ag halide. W. H. Boynton

Dispersion of pigments in aqueous medium. I. Mechanism and evaluation of dispersing agents. F. K. Daniel. *India Rubber World* **101**, No. 3, 50–2(1939).—The relations between wetting, dispersing and protective agents and the mechanisms of their actions are discussed, and known methods for testing degree of dispersion are described. **II. Induced dilatancy and its relation to dispersion.** *Ibid.* No. 4, 33–7(1940).—A new *method for detg. degree of dispersion*, which is based on dilatancy, is described. Dilatancy has been regarded as an inherent property of certain minerals and liquids, and no case has been reported heretofore where the addn. of a compd. in soln. induces dilatancy in a solid and liquid which otherwise does not show this phenomenon. A study of the relation between pigment concn. and dilatancy and flocculation indicated that flocculation, thixotropy, passive dilatancy and active dilatancy represent various stages of dispersion, with no sharp demarcation sepg. 1 stage from another. Close and loose packing (cf. Freundlich and Röder, *C. A.* **32**, 2806[8]) are not opposing conditions, but are the 2 limits of the entire range of dispersion, from complete flocculation to complete dispersion. All intermediate stages can be produced in all types of flocculated systems by the addn. of surface-active substances. This has been clearly understood before because the gradual transition of a substance from flocculation to active dilatancy has not been known before. Many pigments other than ZnO can be rendered actively dilatant, e. g., Sb_2O_3, white lead, toluidine toner, chrome yellow and chrome orange. Since active dilatancy represents the highest degree of dispersion, it can be used as a criterion of the effectiveness of a dispersing agent, although this is true only for comparing systems of commensurate particle size. Furthermore there may be agents which disperse a pigment fairly well without forming an actively or passively dilatant system. The same dispersing agent is not equally effective with all pigments, but in general dispersing agents which produce dilatancy have wider applicability than those which do not. The dilatancy test may be accepted as a rapid and convenient method of evaluating dispersions in all cases where dispersions of relatively high degrees are obtained. An inconsistency in the results of the sedimentation vol. and dilatancy tests on the one hand and the consistency test on the other hand is discussed. Systems contg. 1 of the dispersing agents showed no dilatancy and had relatively large sedimentation vols., yet they remained fluid at concns. higher than those attainable with dilatant systems. This discrepancy cannot be satisfactorily explained, but it is not believed to invalidate the conclusions already drawn regarding the relation between dilatancy and small vol. of sedimentation on the one hand and dispersion on the other hand. The mechanism of dilatancy is discussed. The difference in the dilatancy effects of 2 agents may depend largely on the magnitude of the ζ potential, and a high ζ potential is apparently the chief factor in forming actively dilatant systems, i. e., in preventing the attractive or adhesive forces between particles from becoming dominant (cf. Buzágh, *C. A.* **24**, 3938, 4684). In actively dilatant systems the repelling forces are so strong that a pattern with the particles equidistant is established, but this pattern can be reversibly upset by external forces, with the known mech. manifestations. Passively dilatant systems are partially flocculated or at least have a less oriented, rigid pattern and weaker repelling forces, as evidenced by the higher proportion of water to make a paste and by their thixotropy. Although mech. forces do not change the degree of dispersion of actively dilatant systems, reduction of the electrokinetic forces below a crit. value destroys the dilatancy immediately. Small percentages of electrolytes, i. e., discharging cations, change an actively dilatant system to a passively dilatant system, and larger percentages cause complete flocculation. Except for minor deviations, the coagulating effect of electrolytes on hydrophobic sols parallels their ability to decrease the cataphoretic velocity of the dispersed particles. Also the influence of electrolytes on flocculation is governed by the valency rule. The parallelism between the increase in adhesion between particles and in electrolyte concn. is fairly strict for all dispersions. Electrolytes do not act chemically but change the ζ potential of the particles on the solvation layers. Hence, irrespective of the effectiveness of a dispersing agent, salts and acids can nullify its effect. C. C. D.

Production of electrolytic white lead. J. F. Sacher. *Farben-Chem.* **10**, 125–6(1939).—Claims made by Dévai (*C. A.* **32**, 8948[3]) concerning the uniformity of electrolytic white Pb and its tech. advantages over chamber products are contested. B. C. P. A.

Developments in the dispersion of carbon black. L. J. Venuto. *Am. Paint J.* **24**, 68, 70–8(Mar. 11, 1940). Particle size, structure and volatile layer are closely related to the color, dispersing and other properties of C black. Factors influencing the dispersion are charted and comparisons tabulated of color and oil absorption of C black, obtained by the new and the old process. Properties of typical paint and ink blacks and ultimate analyses of typical blacks are also shown. Types of mills are discussed. Certain types of C black possess an active surface which allows rapid wetting and easy dispersion. The phys. condition of the black has a marked effect on its dispersion properties. The wetting characteristics of the vehicle are important in the speed of dispersion of C black and in the stability of the resulting product. Certain addn. agents and solvent mixt. have proved beneficial. Premixing and sweating help to reduce milling time. The combination of high viscosity, milling and certain sp. dispersing agents yields the highest com. degree of true colloidal dispersion with the accompanying brilliant blackness, gloss and other desirable properties. In ball and pebble milling, a careful balance between resin, black and solvent must be retained to secure efficient dispersion. W. H. Boynton

The manufacture of lithopone. Modern processing and patents. E. F. Mactaggart. *Ind. Chemist* **16**, 72–7 (1940).—A review. E. H.

Process inks. Elbert M. Ludlam. *Am. Ink Maker* **18**, No. 2, 25–7(1940).—Current development toward improving transparency and gloss of inks is discussed from the standpoint of "subtractive" and "additive" color reproduction. L. Wilson Greene

Ink consistency and its relation to printing problems. Andrew Voet. *Am. Ink Maker* **18**, No. 3, 20–3, 27 (1940). E. H.

The drying oils of the Aleurites. L. Adriaens. *Congo* **1**, 499–519(1938); *Chem. Zentr.* **1938, II**, 3480.—The oils of the varieties of *Aleurites* dry more rapidly than linseed oil although they have a lower apparent I no. This is due to the fact that the α- and β-elaeostearic acids, constituents of *Aleurite* oil, possess a system of 3 conjugated double bonds. It dries rapidly but reacts with the theoretical amt. of I only very slowly. Of the oils which

are obtained in the Belgian Congo, the following characteristic properties are reported: Oil from *Aleurites triloba:* d^{15} 0.9276, $n^{22.5}$ 1.4745, acid no. 33.1, sapon. no. 193.9, apparent I no. (Wijs) 159.1–162; two oils of *Aleurites cordata:* d^{15} 0.9378 and 0.9390, n^{45} 1.5180 and $n^{20.5}$ 1.4989, acid no. 2.0 and 1.42, sapon. no. 201.6 and 189.0, apparent I no. (Wijs) 167.0–71 and 162.9, true I no. for the 2nd oil (Wijs) 196.0; 2 oils from *Aleurites montana* d^{15} 0.9402 and 0.9275; $n^{20.5}$ 1.4983 and n^{20} 1.4761, acid no. 0.92 and 1.69; sapon. no. 196.86 and 199.0, apparent I no. (Wijs) 170.8 and 143.7–51.5, true I no. (Wijs) 196.0 and 158.8. Varieties of *Aleurites* acclimated in Belgian Congo yield oils with the properties of wood and tung oils. The oils from *Aleurites montana* contain 1 or 2 eleostearic acids. M. G. Moore

The use of nondrying and semidrying oils in paint and lacquer industry. N. A. Suvorovskaya. *Org. Chem. Ind.* (U. S. S. R.) **6**, 227–31(1939).—Several formulas are given for the prepn. of drying oils from cottonseed, corn, sunflower and seal oils and from Glyptal resins combined with semidrying oils and treated castor oil. The best results in cold drying are obtained with lacquers prepd. from Glyptal resin and castor oil at 280°. Glyptal lacquers with semidrying oils give satisfactory films by hot drying. Oxidized and dehydrated semidrying oils are suited for black lacquers. Chas. Blanc

Dehydrated castor oil. Paul W. Greubel. *Am. Ink Maker* **18**, No. 2, 20–1(1940); cf. Bogatyrev, Dridze and Kuzyuberdin, *C. A.* **33**, 8846.—The chemistry of castor oil is reviewed and the production of the dehydrated product and its use in lithographic varnishes are discussed. The prepn. of the so-called "synthetic tung oil" in Switzerland by dehydrating castor oil is briefly described. L. Wilson Greene

Can oil-free binders prevent corrosion? H. Heilberling. *Oberflächentech.* **17**, 17–18(1940).—The so-called "classical" binders for paints, viz., linseed oil and wood oil, owe their importance exclusively to their ability to form with certain basic pigments the so-called "metal soaps" which prevent the natural deterioration of the film and besides give it a considerable chem. and mech. resistance. Substitutes are investigated. Most of the substitutes have a higher acidity than linseed oil, e. g., alkyd and phenol resins, and this might give rise to changes in the film which in time attack the iron. Phenols, although only weakly acid, are not much more reliable in this respect. A basic ground coating is absolutely necessary, and lead white "Z" and the basic zinc oxides should always be employed if such substitutes have to be used. Red lead is then necessary as a priming coat. Six references. M. Hartenheim

Solvents for nitrocellulose. I. Determination of the rate of solution. A. Kraus. *Farben-Chem.* **10**, 236–7, 242, 301–4(1939).—Rate of soln. of nitrocellulose (I) is best detd. by vertically suspending a 5 × 50 mm. strip 0.1 mm. thick in such a way that a 1-cm. portion of the film is below the surface of the solvent under test and then observing the time elapsing before the submerged segment breaks away. Test with motion-picture film base and films of I prepd. without plasticizer gave the same relative order of rate of soln. with 22 org. solvents belonging to the alc., ester or ketone class. Lesser rapidity of soln. in a solvent was assocd. with greater viscosity of a 15% soln. of I therein, but there was no correlation with ability to tolerate addn. of nonsolvent diluents, e. g., toluene or naphtha. Comparative tests with 2 varieties of I, sol. (*A*) in esters and (*B*) in alc., showed similarities in comparative soln. rates with highly polar solvents, e. g., Et_2CO_3 or ethylene glycol derivs.; with the less strongly polar esters of carboxy acids with monohydric alcs., e. g., Bu propionate, the dissolving power became greater for *A* than for *B* as the no. of carbon atoms in the solvent mol. increased, i. e., as the polarity decreased. Detns. of rates of soln. with mixts. of solvents and nonsolvents showed (1) that the different nonsolvents, as a rule, decrease the rate of soln. to a different degree and (2) that for certain solvent-nonsolvent combinations the rate of soln. may actually be increased by limited proportions of nonsolvents. This effect is not general; it cannot be predicted whether it will be observed with any particular solvent-nonsolvent combination. With highly polar solvents, e. g., Et lactate, addn. of even hexane or octane (amt. 20%) increased the rate of soln. and decreased the viscosity of a 3.2% soln. of I. Practical use may be made of these phenomena in formulating lacquers having a min. tendency to lift previously applied lacquer films. II. **Increased solvent power due to water.** *Farben-Ztg.* **44**, 1031–2, 1052(1939).—The soln. rate was increased by addn. of water (0.5–1% or satn. amt.) to various org. solvents, such as esters, ketones and glycol derivs. and to a 40–60 alc.-ether mixt. Such addn. of limited amts. of water also decreased the viscosity and minimized the turbidity of solns. of I. With increased amts. of water, e. g., 10%, in alc.-ether solns. contg. 10% of I, the solns. tended toward return of turbidity and of the original higher viscosities observed with anhyd. solvent. Addns. of even small amts. of water to HCO_2H or AcOH diminished their solvent power for I, while with propionic and butyric acid, rate of soln. for I first increased (10% water) and then decreased again (15–25% water). J. W. P.

The new conception of petroleum solvents and thinners. Edward M. Toby, Jr. *Am. Paint J.* **24**, 15–16, 18, 21–2, 24, 26–8(1940).—A review. W. H. Boynton

Proximate analysis of hydrocarbon thinners. II. Philadelphia Paint & Varnish Production Club. *Paint, Oil Chem. Rev.* **101**, No. 23, 99–101(1939).—See *C. A.* **34**, 6469. J. W. Perry

Varnish kettles from the manufacturer's viewpoint. Alvin Hock. *Paint Ind. Mag.* **55**, 92–3, 94–5(1940); *Paint Oil Chem. Rev.* **102**, No. 5, 28, 30–2.—A general classification. Al and 18-8 stainless steel kettles are more corrosion-resistant than Cu, Ni or nichrome kettles. Stainless steel kettles lack the heat-transfer properties, to an extent, possessed by Cu or monel kettles. The properties, advantages and disadvantages of the various metals are tabulated. W. H. Boynton

Spirit varnishes. F. von Artus. *Farben-Chem.* **10**, 131–2, 137(1939).—A review of products consisting mainly of resins dissolved in alc. J. W. Perry

Varnish losses in weight and in volume. Chicago Paint & Varnish Production Club. R. J. Gnaedinger, *et al. Paint, Oil Chem. Rev.* **101**, No. 23, 69–72(1939).—See *C. A.* **34**, 6473. J. W. Perry

"Viscosity reduction method" for commercial evaluation of hydrocarbon solvents for synthetic varnish resins. Los Angeles Paint & Varnish Production Club. Ralph H. Huff, *et al. Paint, Oil Chem. Rev.* **101**, No. 23, 90–4, 96–8(1939).—See *C. A.* **34**, 6476. J. W. Perry

Effect of resins on kauri reduction. Louisville Paint & Varnish Production Club. A. E. Rheineck, *et al. Paint, Oil Chem. Rev.* **101**, No. 23, 78–80(1939).—See *C. A.* **34**, 6482. J. W. Perry

A study of natural resins in combination with synthetic resins for floor varnishes. New England Paint & Varnish Production Club. B. H. Kropel, *et al. Paint, Oil Chem. Rev.* **101**, No. 23, 80–9(1939).—See *C. A.* **34**, 6474. J. W. Perry

Studies of alkyl-phenolic resin lacquers with special reference to their technical properties. C. Dold. *Eidgenöss. Materialprüfungs- u. Versuchsanstalt Ind., Bauw. Gewerbe, Zürich, Ber.* No. **113**, 30 pp.(1938).—The exothermic reaction involved in the prepn. of lacquers by heating alkyl-phenolic resins with drying oils was studied. According to Hönel (Brit. pat. 334,572, *C. A.* **25**, 1110), this reaction comprises not only (*a*) further condensation of the resin mols., but (*b*) interaction of the resin and the drying oil esters. From the results summarized below, as well as the temp. curves of the reaction and the heats of combustion of the resin, oil and lacquer, D. concludes that (*a*) only is involved. The *viscosities* of the lacquers prepd. by heating 20% of reactive alkyl-phenolic resin (I) and modified phenolic resin (II) with linseed oil were, resp., 22.3 and 4 times that of linseed oil similarly treated. When a mixt. of 6 g. I and 20 g. paraffin, linseed or wood oil was heated under standard conditions in a current of dry N_2, the amt. of H_2O evolved was the same in each case.

The viscosity, drying power, hardness to scratching, and resistance to gas of lacquers prepd. from several phenolic resins are tabulated. The *tensile strength* and *load-elongation curves* of films prepd. from I and II were similar. Films prepd. from I have a higher weathering resistance than those from II. M. M. Flannery

Why does a nitrocellulose lacquer raise an artificial resin priming coat? Gerhard Schröder. *Farben-Chem.* 10, 161–3(1939).—If the priming coat on a metal surface is not merely softened but also swollen by the active solvents in the finishing coat of nitrocellulose lacquer, then danger exists that the priming coat may be raised with resultant permanent unevenness. Since this kind of trouble is encountered most frequently with primers formulated with large proportions of drying oils or O_2-convertible alkyds, it is recommended that primers be formulated with film-forming materials, e. g., polyvinyl resins, which are not O_2 convertible. J. W. Perry

Protective lacquers on aluminum foil. E. Erbacher and H. Haug. *Farbe u. Lack* 125–6(1939).—The testing of lacquers for Al foil which is used for wrapping cheese, etc., is outlined. B. C. P. A.

The measurement of adhesion of dried coatings. New York Paint & Varnish Production Club. Robert J. Moore, *et al. Paint, Oil Chem. Rev.* 101, No. 23, 102–13 (1939).—See *C. A.* 34, 6469. J. W. Perry

The new zinc resinates, including their use with tung-oil substitutes. Edwin Edelstein. *Paint Ind. Mag.* 55, 90–2(1940); *Paint Oil Chem. Rev.* 102, No. 6, 9–11; cf. *C. A.* 34, 2622⁸.—Research has permitted the production of Zn resinates having a high Zn content, higher m. p., lower acid no. and paler color than was possible previously. Zn resinate has been successfully incorporated into oiticica oil varnishes. Zn resinate apparently affects each paint and varnish in about the same manner, regardless of the oil or combinations used. Conclusions: (1) Zn resinates are an aid to thorough drying, particularly in conjunction with synthetic resins and ester gum; (2) they promote wetting and dispersion of pigment; (3) they help to improve the gloss and adhesion of a film; (4) they help to eliminate skinning and wrinkling; (5) they are excellent dispersing agents for oil gels and therefore make it possible to cook the drying oils in new ways; (6) when used with the usual drier combinations they inhibit loss of drying strength; (7) owing to the relatively high m. ps. of the Zitro and Zirex resin they exert an immediate hardening effect which is followed by thorough drying due to the Zn. A Zn resinate (Zirex resin) serves as a good constituent of exterior varnishes and enamels. W. H. Boynton

Three case studies in inert gas application. Harry W. Smith, Jr. *Gas* 16, No. 3, 24–7(Mar., 1940); *Gas. J.* 229, 304(1940).—Three *paint* factories use inert gas, produced by the combustion of natural gas in special generators, throughout the plant for stirring varnish kettles, especially where synthetic resins are used, and for protective atms. over storage tanks. This is much cheaper than the previously used bottled or solid CO_2. Provision will also be made to use this inert gas for extinguishing fires. R. W. Ryan

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Methods of testing enamelled Cu wire (Weh) 13. Molten-lead, lead oxides, white lead and lead dry colors (Eckfeldt) 13. Effect of granulometric compn. of powders on their liquid-binding capacity [pigment powders] (Gurevich, Berezhinskaya) 2. Microchem. examn. of Prussian blue writing ink (Wilson) 7. Mixing powders with liquids, as in dispersing barytes in paint vehicles (U. S. pat. 2,186,033) 1. Zein solns. for printing-ink vehicle (U. S. pat. 2,185,110) 13. Grinding-mills [for paint] (Brit. pat. 508,877) 1. Colored condensation products [for coloring lacquers] (Brit. pat. 508,803) 25.

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National Paint Dictionary. New York: Chemical Publishing Co. $5.00.

Drying paint with special radiations. Frederick J. Groven (to Ford Motor Co.). U. S. 2,186,067, Jan. 9. Drying is effected with use of radiations (in part direct and in part reflected) of a wave length between 0.6 and 1.6 microns, such as may be produced by use of a carbon 2 filament lamp bulb with a reflecting surface of Au or other suitable metal.

Pigments. Joseph E. Plumstead (to Raffold Process Corp.). U. S. 2,186,040, Jan. 9. A process of prepg. a pigment product comprises treating particles of alk. earth metal carbonate such as $CaCO_3$ in the presence of water with a reactive, inorg. substantially water-sol. compd. having a sulfite radical, partially to dissolve the carbonate particles to form particles with corroded surfaces, 3 and subsequently pptg. alk. earth metal sulfite on the corroded particles.

Separation of fine and coarse pigment particles. James E. Booge and Charles F. Oppermann (to E. I. du Pont de Nemours & Co.). U. S. 2,186,095, Jan. 9. In sepg. finely divided ZnS-contg. pigment particles in aq. suspension from coarser particles by wet grinding, a small amt. of an alkali metal pyrophosphate is added.

Compressed metal powder aggregates suitable for use as pigments. Clarence P. Harris. U. S. 2,185,194, Jan. 2. A substantially dustless solid or plastic aggregate is formed by mixing a metal powder such as a bronze powder with 0.5–10% its wt. of a binding liquid such as a petroleum fraction and subjecting the mixt. to a pressure of 1000 to 10,000 lb. per sq. in. without destroying the leafing power of the powder.

Titanium pigments. Sandford S. Cole (to National 5 Lead Co.). U. S. 2,184,938, Dec. 26. A method of prepg. thermally stable solid solns. of TiO_2 in Zn orthotitanate involves heating a mixt. of ZnO or a compd. yielding ZnO on heating or Zn orthotitanate or a solid soln. of TiO_2 in Zn orthotitanate unsatd. with respect to TiO_2, and TiO_2, hydrous Ti oxide or a Ti compd. yielding TiO_2 on heating, in proportions supplying less than 2 mols. ZnO for each mol of TiO_2, and an inorg. phosphate such as K_3PO_4 or H_3PO_4 proportioned to supply P_2O_5 6 0.05–5% based on the TiO_2 content of the mixt., at temps. of 450–1100°.

Red oxide of iron. Peter Fireman (to Magnetic Pigment Co.). U. S. 2,184,738, Dec. 26. App. is described, and a method of producing a red oxide of Fe of fine texture and purity from com. copperas which comprises maintaining an uninterrupted flow of finely divided copperas from a source of supply and subjecting the finely 7 divided copperas during transit to drying at regulated temp. sufficiently low that at no stage of the drying operation is the material being treated melted in its water of crystn. and is continuously maintained in its finely divided state, to remove from the copperas 6 of its 7 mols. of water, then transferring the resulting finely divided product to a rotating calcining zone and subjecting it during passage through the zone to heating gases at a 8 regulated temp. sufficiently high to produce Fe_2O_3 maintaining a bed of material being calcined during calcination in the zone, and rotating the calcining zone at such rate that the material is mixed with the bed and is only momentarily exposed to the heated gases so that overheating is avoided, whereby Fe_2O_3 of a fineness suitable *for pigment purposes*, without grinding, is obtained.

Removing lead acetate from white lead. B. D. Sholomovich. Russ. 55,833, Oct. 31, 1939. The washing off 9 of lead acetate from white lead is accelerated and losses of the pigment are reduced by mixing with oil before washing.

Lithographic printing inks. Interchemical Corp.[6] Brit. 508,917, July 7, 1939. A vehicle for such inks comprises a resin binder and a solvent consisting essentially of paraffin hydrocarbons that are substantially nonvolatile at ordinary room temps. The solvent may comprise a paraffin hydrocarbon cut of a petroleum hydrocarbon, the cut

having a Me_2SO_4 value below 5, preferably below 1. A plasticizer for the resin, e. g., a vegetable or animal oil such as peanut, linseed, soybean, corn or fish oil or an ester such as Me abietate, tritolyl phosphate, for the resin may be included; or plastic synthetic resins, e. g., oil-modified alkyds, may be used. The ink comprises a dispersion of pigment in the vehicle. An object is printed with the ink which is then dried by exposure to a high temp. for a predetd. time to volatilize the solvent. Cf. *C. A.* **33**, 2354[8].

Increasing the drying properties of weak drying and semidrying oils. Robert S. McKinney (to the People of the U. S. A. for free use). U. S. 2,185,414, Jan. 2. Oils such as soybean oil, cottonseed oil or corn oil are heated to 200–250° for 2–18 hrs. with about 0.1% of an alk. hydroxide such as $Ca(OH)_2$ or a salt such as Ca linolenate.

Emulsifiable substitute resin oil. Arthur Lazar (to Tide Water Associated Oil Co.). U. S. 2,186,248, Jan. 9. An oil suitable for use in lacquers, etc., comprises unsatd. and aromatic hydrocarbons derived from the treatment of a petroleum fraction contg. org. acids and heavier than kerosene by distg. off in the presence of an alkali about 80–90% of the liquid SO_2-sol. portion of such fraction, the residual oil contg. in soln. sufficient alkali metal soaps of the acids to render it readily emulsifiable alone with water and being sol. in mineral oil without the addn. of solvency-promoting agents because of the presence in the residual oil of products of reaction from the distn.

Varnish for rubber footwear. A. A. Aleksandrov, P. I. Nazarov, A. V. Panova, N. L. Eidel'nant and N. P. Protopopov. Russ. 56,121, Nov. 30, 1939. A mixt. of oxidized or polymerized fat or oil with tar and S dissolved in turpentine, white spirit or other solvents (S 10–25% of the wt. of oil or fat) is boiled down to a varnish.

Coating articles with nitrocellulose material. Elvin M. Bright (to John M. Wallace). Can. 387,022, Feb. 20, 1940. Nitrocellulose material dissolved in a solvent composed of acetone 60, isopropyl acetate 25, and anhyd. isopropyl alc. 15% is applied to an article to be coated, and the coating is treated in cycles, each cycle including the rapid withdrawal of the solvent for a short time by dipping the article into gasoline, and surrounding the article by air contg. solvent fumes, to effect shrinking of the nitrocellulose material. An app. is described.

Finishing composition. Thomas McCreery (to E. I. du Pont de Nemours and Co.). Can. 386,975, Feb. 20, 1940. About 62 parts of carnauba wax is dispersed in 55 parts of heat-bodied linseed oil by stirring at about 600°F., cooled to about 150°F., and about 223 parts of mineral spirits, b. 150–215°C., added.

Apparatus for applying enamel to wire by immersion. David S. Starring and Geo. B. Horn (to Wheeler Insulated Wire Co.). U. S. 2,184,704, Dec. 26. Various structural, mech. and operative details.

Linoxin-like material suitable for coating burlap, etc. Remmet Priester (to Koninklijke Industrieele Maatschappij v. h. Noury & van der Lande). U. S. 2,185,967, Jan. 2. A product similar to linoxin is produced by blowing with air an oil having drying properties which greatly increase the viscosity of the oil, and then treating it with an atm. of a strong nonoxidizing O-contg. acid such as H_2SO_4 or H_3PO_4 not substantially over 2% and allowing the material to stand until it is converted into a jelly-like mass.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Tenth Meeting of the International Commission for the Study of Fatty Materials. Anon. *Olii minerali, grassi e saponi, colori e vernici* **19**, 150–3(1939).—A report of exptl. work done to develop better standard methods for detg. oils in oil-bearing seeds, volatile sol. and insol. fatty acids in food fats, and for analyzing soap for resin, free alky. and total fatty acids. J. W. Perry

Collaborate studies of the D(eutsche) G(esellschaft für) F(ettforschung). VIII. Program of the Ninth Congress of the International Commission for the Study of Fats. Rome, 1938. General analytical methods. Anon. *Fette u. Seifen* **45**, 232–8(1938).—Improved variations of methods for detg. (1) polybromide value, (2) OH no. and (3) hydroxy fatty acids are given (cf. *C. A.* **32**, 4811[9]; **33**, 5211[3]). Definition of unsaponifiable matter and its detn. are discussed briefly. J. W. Perry

Recent work of the Royal Experiment Station for the Oil and Fat Industry of Milan (Italy) in the field of prevention of waste. G. B. Martinenghi. *Olii minerali, grassi e saponi, colori e vernici* **19**, 100–3(1939).—The recent development in Italy of the extn. of neat's foot oil and recovery of accompanying slaughter house by-products is discussed. Recovery of by-products from Dum palm kernel residues is reviewed (cf. *C. A.* **33**, 5212[4]). Possibilities of working up into valuable products, *tars obtained by carbonization of lignite* are pointed out. Dissatisfaction is expressed with Italian progress in the field of extn. of oil from oil seeds. J. W. Perry

Establishing objective standards for evaluating the color of fats. I. Volk. *Myasnaya Ind. S. S. S. R.* **9**, No. 9, 27–30(1938); *Chimie & industrie* **42**, 328.—The color of fats is governed essentially by the presence of carotene. Its intensity is a function of numerous other factors: origin, method of production, amt. of dissolved impurities, etc. The simplest method of evaluating the color is to compare it with that of a standard fat of good quality. To obtain objective values, these should be measured in a Lovibond colorimeter. A. Papineau-Couture

Recovery of fats from waste water. W. Passavant. *Fette u. Seifen* **46**, 583–5(1939).—The latest types of fat traps are discussed with drawings. J. W. Perry

The chemistry of the spoiling of fats. VII. The effect of heating on the keeping qualities of fats. J. Köchling and K. Täufel. *Fette u. Seifen* **46**, 206–9(1939); cf. *C. A.* **33**, 4445[9].—The effect of heating fats to various temps. or for varying periods on the rate of peroxide (Lea method, *C. A.* **33**, 1527[1]) formation during subsequent storage was studied. The peroxide content, both before and after storage for periods up to 60 days, increased on raising the temp. from 50° to 150° (20-min. heating period) and then decreased somewhat on going from 150° to 250° although never decreasing to the value of the unheated fat samples. These relationships hold for samples heated in the presence of air or of N_2, although the samples heated in presence of air showed much greater tendency to peroxide formation than those heated under N_2. On increasing the period of heating from 0.5 to 4 hrs., at 95° and 150° (the only temps. so investigated), peroxide formation during subsequent storage was accelerated. Rate of peroxide formation during storage depends on (1) initial peroxide content and (2) natural inhibitol content. Evidently, heating up to 150° increased peroxide content, while above 150° inhibitol content was reduced and peroxide formation was less than at 150°. Addn. of various samples of heated fats to unheated fats (3 cc. per 15 cc.) increased peroxide content after storage 42 days. J. W. Perry

Commercial filtration of animal fats. A. Sokolov and F. Yur'ev. *Myasnaya Ind. S. S. S. R.* **9**, No. 12, 9–15 (1938); *Chimie & industrie* **42**, 866.—The capacity of the filter press depends essentially on the temp. of the fat, increasing with the temp. The possible effect of temp. on the quality of the fat should be taken into consideration. The efficiency of the filter press can be increased by first passing through it the upper layers of the fat, which are less contaminated. A. Papineau-Couture

The use of fatty acid ester distillation methods in fat analysis. Herbert E. Longenecker. *Oil & Soap* **17**, 53–7 (1940).—This is a review of fractional distn. methods used in fat analysis. 63 references. E. Scherubel

Working up animal cadavers with attention to the process of the Gesellschaft zur Verwertung Fauth'scher Patente m. b. H., Wiesbaden. A. Friedsam. *Fette u. Seifen* 46, 586–7(1939).—According to the best modern practice, the cadavers are first cut up into small pieces, boiled with a NaCl soln. at 130° (under pressure), the fat sepd. off, the NaCl soln. drawn off for reuse and the slurry of bones and flesh dried for *feed for animals*. J. W. Perry

Discussion of the determination of glycerol in fats and oils. L. B. Smith and H. Matthews. *Oil & Soap* 17, 58–61(1940).—The results of the study of a dichromate method for detg. glycerol resulting from the sapon. of oils and fats are given. The method is given in detail; and the results appear to indicate that the method is capable of giving reliable results in the hands of the av. analyst; the av. difference between the calcd. glycerol and that detd. by the method was 0.12%. E. Scherubel

Linoleic acid content of seed fats and the isomerism of linoleic acid. J. P. Kass, W. Q. Lundberg and G. O. Burr. *Oil & Soap* 17, 50–3(1940).—The linoleic acid content of a series of seed fats was detd. by the thiocyanometric and the tetrabromide pptn. methods in a search for isomeric linoleic acids. The results indicated the presence of only one form of linoleic acid. The tetrabromide no. was shown to be affected by the pronounced soly. of α-tetrabromostearic acid in the other bromides and in the solid acids, its detn. therefore being of limited value. The thiocyanogen nos. of pure linoleic and linolenic acids were found to be empirical values differing markedly from the theoretical consts.; they require a revision of the accepted equations for the calcn. of the percentage concn. of the unsatd. acids in oils and mixed fat acids. Results are tabulated. E. Scherubel

Arylation of oils and fats. III. Synthesis of tolylstearic acid, methyl tolylstearate and the *p*-xenylamide of tolylstearic acid. W. Kimura and J. Turugi. *J. Soc. Chem. Ind., Japan* 42, Suppl. binding 390–1(1939)(in German); cf. *C. A.* 33, 8591[5].—Camelia oil (Wijs I no. 82.70) was tolylated under the optimum conditions listed previously, yielding a product (I) having: I no. 9.92; acid no. 7.36; ester no. 152.8; sapon. no. 160.16; and n_D^{30} 1.4700. After 2 fractional distns. of the Me esters of the fatty acids from I, about half of the material distg. under 3 mm. consisted of Me tolylstearate (II), a slightly yellow liquid, b_3 232–245°, n_D^{30} 1.4751–1.4781, d^{30} 0.9153–0.9167 and η^{30} (centipoises) 26.8–26.68; the other portion consisted of Me esters of sapon. no. 143.1–181.0, one fraction of which was solid. The tolylstearic acid (III), from II, had: n_D^{30} 1.4847–1.4879, d^{30} 0.9315–0.9324 and η^{30} (poises) 2.227–2.809. Since III gives one *p*-xenylamide, m. 86.5°, as the main product, and another *p*-xenylamide, m. 79°, in small quantities, III is probably a mixt. of isomeric tolylstearic acids. George Ayers

Titer of rosin fat acid mixtures. W. D. Pohle. *Soap* 16, No. 3, 61(1940).—Titer tests were made on 3 fat acids, stearic, lauric and oleic and on mixts. contg. 3 parts of one of these acids and one part of resin acid. The titer of rosin cannot be detd. since there is no break in the time-temp. curve when rosin passes from the liquid to the solid state. From the data it is evident that the calcn. of an equiv. titer for rosin is impossible, since the change in titer of a given fat acid by the addn. of a second component is not a function of the titer of the second component. At present the application of the titer test to fat acid-rosin mixts. appears to be limited to mixts. for which the relation between the titer test and the factory results have previously been detd. E. Scherubel

The detection of fat acids containing an even or odd number of carbon atoms and the analysis of cocoanut oil. E. Jantzen and H. Witgert. *Fette u. Seifen* 46, 563–9 (1939).—Preliminary expts. showed that distn. of the Me esters at 10 mm. pressure is the most practical method for sepn. of mixts. of satd. fat acids: Five careful fractionations of approx. 24 kg. of Me ester of cocoanut oil acid, with recovery of 97% of the starting material, resulted in isolation of the C_9, C_{11} and C_{13} odd fat acids. However, at least 99.5% of the acids of cocoanut oil had an even no. of C atoms. The m. ps. of very carefully purified fat acids were: C_8 16.5°; C_{10} 31.5°; C_{12} 43.9–44.0°; C_{14} 54.0–54.1°; the m. ps. and points of loss of transparency of crystals for very pure odd fat acids were C_9 12.5°, 1.5°; C_{11} 28.5°, 12.0°; C_{13} 41.5°, 28.0°. J. W. Perry

The distribution of the fat acids in halibut intestinal oil, with a note on the presence of free fat acids in the intestines of fish. John A. Lovern and Richard A. Morton. *Biochem. J.* 33, 1734–9(1939); cf. *C. A.* 33, 6627[4].—Halibut intestines were extd. with ether and the resulting oil was partially sepd. into its components. The products sepd. included free fat acids, phosphatides, vitamin and cholesterol esters and a neutralized oil. The fat acids were quantitatively analyzed and it was shown that both vitamin A and cholesterol were esterified with all the various acids present and that the amt. of the different esters present was proportional to the amts. of the acids present in the main fatty ext. The fat acids of the phosphatides were appreciably different from those of the main fat fraction and for this reason it seems likely that the phosphatide was not directly concerned in fat absorption. Even when the utmost speed was used in obtaining the intestines and extg. the fat from them, the oil contained more than 5% free fat acids and it seemed very probable that this amt. was present in the living fish. E. W. Scott

The Hanus method for determining the iodine number of olive oil. B. Frenguelli and R. Travaglini. *Olii minerali, grassi e saponi, colori e vernici* 19, 162–4(1939).—Tabulated data of the I nos. of 11 different Italian olive oils show excellent agreement between the Hübl and the Hanus method, when allowing 15 min. for the halogenation reaction of the oil sample with the latter method. If this period were extended to 1 hr. the agreement with the Hübl method was impaired somewhat. Adoption of the Hanus method as official is urged because of the ease of prepg. and storing the solns. used and the ease and rapidity of the detn. itself. J. W. Perry

Determination of some constants of iodated oils. M. Herold and M. Mastný. *Časopis Českého Lékárnictva* 19, 215–18(1939).—The oils taken into consideration are those which contain a high amt. of I (20–40%). The sample is weighed into a Ni crucible, several small pieces of KOH are added and followed by the addn. of 1 cc. of distd. water. The contents are mixed by gently rotating, then dried in an oven at 105° until free from water. The oil is then evapd. and ignited after several crystals of KNO_3 are added. The cooled substance is dissolved in hot water and transfered to a volumetric flask. An aliquot part is then taken and I detd. by titration according to the Volhard method. It was found that there is a dependence between sp. gr. of iodated oils and the contents of I. Tables were accordingly drawn up showing the relation between sp. gr. and the I content for certain oils so that the I content could be detd. from the sp. gr. of the iodated oil. V. D. Karpenko

Hydrogenation of vegetable oils. IV. Conjugated hydrogenation of sunflower oil with alcohols. V. A. Rush and I. L. Dvinyaninova. *J. Applied Chem.* (U. S. S. R.) 12, 1060–63(in French, 1064)(1939); cf. *C. A.* 33, 6629[1,4].—Sunflower oil contg. oleic acid 30.3, linoleic acid 61.4 and satd. acids 8.6% was hydrogenated in the presence of Ni catalyst ("Steol") by means of MeOH, EtOH, PrOH, iso-BuOH and iso-AmOH. The products contained, resp., oleic acid 57.6, 51.4, 54.6, 56.6 and 53.6; isoöleic acid 20.4, 26.6, 26.8, 16.6 and 26.4; satd. acids 10.6, 14.8, 13.4, 12.7 and 12.9; and linoleic acids 11.4, 7.2, 5.2, 14.1 and 7.1%. Thus the products approximated olive oil in compn. The yields of aldehydes formed from the respective alcs. were 16.7, —, 23.0, 33.9 and 60.2%; 5.1, —, 13.7, 3.6 and 10.9% of the aldehydes, resp., were decompd. and the rest was not accounted for. The hydrogenation of oil in the presence of iso-PrOH yielded a product contg. satd. acid 11.1, oleic acid 60.5, isoöleic acid 16.5 and linoleic acid 11.9%. In this case the yield of acetone was 72.5%, the decompn. of acetone amounted to 0.9% and the rest was unaccounted for. A. A. Podgorny

Detecting paraffin oil in oil of almond. Scipione Anselmi. *Olii minerali, grassi e saponi, colori e minerali* 19,

103–8(1939).—After tabulating data on the consts. of oil of almond (I), methods of detecting adulteration with paraffin oil (II) are reviewed. Attempts at detecting small proportions of II in I by saponifying in alc. soln. and dilg. with water so as to observe turbidity due to II were not very successful because soap tends to ppt. when the diln. is carried out at temps. sufficiently low to obtain turbidity in the presence of II. Much better results were obtained by dilg. with alc. contg. varying amts. of water. 2 The recommended method saponifies a 10-cc. oil sample by heating on a steam bath with 15 cc. of a KOH soln. (prepd. by dissolving 150 g. KOH in 100 cc. water and dilg. to 1 l. with 95% alc.) until sapon. is complete as indicated by a clear soln. After cooling to room temp., the soap soln. is dild. gradually with 70% alc. If 250 cc. of the latter can be added without appearance of turbidity at any time, the sample of I is not adulterated with II. The proportion of II present in adulterated I dets. the amt. of 3 70% alc. required for appearance of turbidity; this varies, e. g., from 200 cc. for 1% II to 135, 70, 23, 3 cc. for 2%, 4%, 10%, 25% I, resp. An unadultered sample of I, obtained by lab. extn. with petroleum ether, gave a different type of turbidity than that observed in presence of II. This turbidity, which might lead to false conclusions, was not observed if the soap soln. were filtered before dilg. with the 70% alc. Such filtration does not interfere with detection of II if actually present. J. W. Perry 4

Dielectric determination of the water content of oil seed (press) cake meals. H. Clever. *Fette u. Seifen* **46**, 676–8 (1939).—The heart of the instrument is a vertical glass cell with 2 pairs of condenser plates so arranged that the dielec. const. of the contents of the upper and lower parts of the cell can be detd. separately. In carrying out a moisture detn., the cell is filled with benzene and then enough sample, e. g., of an oil seed press cake, is added to 5 fill the lower part of the cell. Small increments of $PhNO_2$ are thoroughly mixed with the cell contents until the dielec. consts. of the upper and lower portions of the well-settled cell contents are equalized. At this point, the sample and the fluid in the cell have the same dielec. const. The moisture content of the sample is then established by consulting a curve obtained by plotting the dielec. const. of sample whose moisture content was detd. in some other way. J. W. Perry 6

Liver oils of some terrestrial animals. Mitumaru Tuzimoto and Hanzi Koyanagi. *J. Soc. Chem. Ind., Japan* **42**, Suppl. binding 421B-2(1939).—By extg. the minced livers with alc. and Et_2O the liver oil was sepd. from the combined ext. by soln. in Me_2CO. Yields of elephant, dog, rabbit and hen liver oils were, resp.: sample, 517, 970, 535, 1561 g.; liver oil, 5.8, 16.4, 11.2, 56.3 g. The dark brownish yellow oils had: d_4^{25} 0.9137, 0.9246, 0.9222, 0.9239 (d_4^{40}); n_D^{40}, 1.4695, 1.4730, 1.4660, 1.4700; acid value, 7.0, 4.5, 8.1, 2.3; sapon. value, 147.9, 152.7, 169.8, 167.8; Wijs I value, 146.0, 144.9, 109.3, 95.9; percentage of unsaponifiable matter, 21.13, 22.35, 14.81, 14.60; cod-liver oil value, 0, 39, 14, 50. Tests on the fat acids were: m. p., 48.5–49.5, 39–40, 40–41, 38–39; neutralization value, 189.9, 192.1, 198.6, 195.1; I value, 141.8, 139.7, 116.5, 90.3; Et_2O-insol. bromides, 33.5, 35.0, 16.0, 10.3; percentage of Br in the bromides, 65.59, 8 69.66, 68.50, 69.98. Cholesterol content of the unsaponifiable matter was (%): above 40, 56.5, 79.5 and 61.8. Palmitic, stearic and oleic acids were identified in the fat acids from hen liver oil and vitamin A was present in hen and dog liver oils. From the unsaponifiable matter of elephant, dog and hen liver oils, by satn. of the Et_2O soln. with HCl below 0°, hydrochlorides were obtained which melt about 129–130° and contain 29.70–30.15% Cl. The unsaponifiable matter of rabbit liver oil also yielded a trace of hydrochloride. George Ayers

Oleins. H. P. Kaufmann. *Olii minerali, grassi e saponi, colori e vernici* **20**, 4–8(1940)(in German and Italian).—A discussion of previous work. Cf. *C. A.* **33**, 6073[5,7,8]. J. W. Perry

Testing of waxes, particularly ozocerite. Edmund Graefe. *Petroleum Z.* **35**, 223–6(1939).—The m. p. is considered to be inadequate for the evaluation of wax. In order to obtain indication of the hardness of wax the type of penetrometer used in the asphalt industry has been adapted. Results therewith show that although a synthetic wax may have m. p. of 96° its penetration may be 32; such a wax would thus be much softer than, e. g., a montan wax with m. p. of 74° and penetration value 5. A list of 15 waxes, mainly synthetic ceresins, is presented; it includes: carnauba wax, m. 83°, penetration 1; ozocerite ceresine, 92° and 5; Borneo paraffin wax, 63° and 11. In detg. the m. p. of blends of waxes it is essential to use methods depending on latent heat, e. g., cooling curves. It has been found that the drop-point method may give results which are too high owing to the higher-m. p. constituents retaining the structure of an otherwise molten wax. B. C. P. A.

The characteristics, contaminants, processing and uses of beeswax. Geo. H. Vansell and C. S. Bisson. *U. S. Dept. Agr., Bur. Entomol. Plant Quarantine* E-495, 11 pp. (Feb., 1940).—Sixty samples of crude beeswax had acid no. 16.8–35.8, av. 19.2; I no. (Hanus) 6.8–16.4, av. 10.2; sapon. no. 89.3–149.0, av. 96.7; ash content 0.005–0.037, av. 0.019%; m. 143.6–149.0, av. 147.2°F.; solidifying point 141.3–146.3, av. 144.9°F.; d. at 68°F. 0.947–0.987, av. 0.961; *n* at 176°F. 1.4388–1.4527, av. 1.4407; color pale yellowish to white. The corresponding values for pure beeswax were 17.0, 5.8, 84.4, near zero, 147.9 ± 1, 146.3 ± 0.9, 0.963, 1.4402 and white. The av. acid no. of wax collected from scales was 17, whereas that for a sample of *propolis* was 125. Contamination of beeswax with propolis is very objectionable in the manuf. of cosmetics and ruins the wax for candle making, but is not objectionable when the wax is to be used for plant grafting, thread waxing and waterproofing. The gums and pitches which constitute propolis are not secreted by the bee, but originate from numerous plant sources, especially species of poplar in the western states. The relation between the pollen species and the color of beeswax is discussed. The color of beeswax is affected very adversely by contact with Fe during the rendering process, but Ni, Al, Monel metal, stainless steel and glass vessels have little or no effect. Galvanized Fe is satisfactory for solar extractors but is very objectionable for hot-water rendering. Partial clarification of the strained wax can be effected by boiling for at least 10 min. in 5% H_2SO_4. Oxalic acid can be substituted for H_2SO_4, but H_3PO_4 is not satisfactory. Acid treatment, followed by thorough washing, has little effect on the original acid no. of the wax, but the wax appears to be slightly harder and more brittle. The time required for bloom to form on beeswax ranged from 3 weeks to 3 months. The bloom melts at 102°F., more than 40° below the m. p. of the wax. The bloom is cryst.; its 7 nature and the cause of its formation are not well understood. Eight references. K. D. Jacob

Glycerin and its substitutes. F. Ohl. *Allgem. Oel- u. Fett-Ztg.* **36**, 245–50(1939).—A lecture. The possibilities of glycols, sugars, "perglycerin" (as a hygroscopic medium), ethanolamines, etc., as partial substitutes for glycerol are reviewed. B. C. P. A.

The use of standards in the control of soap-plant operations. W. A. Peterson. *Oil & Soap* **17**, 66–9(1940).—8 Standards can be used to control the following phases of plant operations: (1) the output of kettles, driers, evaporators, stills, etc.; (2) the loss of materials such as NaOH, NaCl, fats and glycerol during processing; (3) the quality of products; (4) the efficiencies of packing units such as presses, wrappers and filling machines; (5) the labor and controllable costs of unit operations; (6) the wastage of packing materials; and (7) the amt. of allowable scrap in bar soap cutting and pressing. A good standard 9 should be a measure of the normal performance under good operation. It must never be set so high that it is rarely attained, and should be based upon studies of each operation. E. Scherubel

Standard methods for sampling and analyzing soaps and soap products in the U. S. A. H. Fiedler. *Fette u. Seifen* **46**, 224–7, 355–9(1939). J. W. Perry

Soap solutions. Kurt Hess. *Fette u. Seifen* **46**, 572–5 (1939).—In further developing ideas (cf. *C. A.* **33**, 8471[7])

as to the structure of soap micelles, it is postulated that the micelles are built up of sheets of orientated soap mols. with –COONa groups forming one surface of the sheet and the terminal CH_3– groups of the parallel alkyl groups forming the other surface. In the micelles, the sheets are so arranged that pairs of –COONa surfaces face each other as do also pairs of CH_3– surfaces. On increasing the C chain length of the soap from C_4 to C_{10}, the amt. of water held between the –COONa surfaces of the adjacent sheets increases from 1 to 6 mols. per mol of soap. When clear dispersions of benzene are produced by addn. of limited amts. to a soap soln. contg. micelles, changes in the x-ray diagram showed that the benzene is taken up between the CH_3– surfaces of the sheets of soap mols. J. W. Perry

Determination of fat acids in soaps containing clay. Oskar Hagen. *Seifensieder-Ztg.* **67**, 72(1940).—A weighed sample (0.5 g. of 40% fat acids to 2.0 g. of high fat acid content) of soap is dissolved in hot water, transferred to a spherical separatory funnel (500–600 cc. capacity), acidified to methyl orange with 1:1 HCl, extd. with 75 cc. Et_2O, acid water is drawn off, any emulsion is broken so far as possible by use of 10% NaCl soln. Anhyd. Na_2SO_4 is added to combine with remaining water. The dried ethereal soln. is filtered, evapd. in a current of air and the ext. is weighed. A. Guillaudeu

Notes on the determination of phosphates in soap. L. B. Parsons and C. F. Haberstroh. *Oil & Soap* **17**, 62–4 (1940).—Complex phosphates as pyrophosphate and Na hexametaphosphate in soap are not completely pptd. with NH_4 molybdate when treated in the manner described by the present A. O. C. S. method for phosphate. Phosphates of this type are hydrolyzed to the ortho form when boiled steadily for 15 min. in a HNO_3 soln. Silicates interfere with the detn. by occluding phosphates if during dehydration they are heated at too high a temp. The vol. method for the detn. of phosphate is more rapid than the gravimetric method and yields results which are reliable and reproducible to within 1.5%. The method will det. total P_2O_5 but will not differentiate between the different types of phosphate; and is convenient where only one type is present. For mixts. of phosphates addnl. specific analyses must be used. E. Scherubel

Controlling naphthenic soap size. A. I. Gershzon. *Kozhevenno-Obuvnaya Prom.* **18**, No. 2, 40–1(1939); *Chimie & industrie* **42**, 874; cf. *C. A.* **33**, 8989[4,5].—The method is based on titration of the soap with a standard soln. at $Al_2(SO_4)_3$, with formation of a suspension of particles of Al naphthenate which is stabilized by the excess of naphthenic soap. The end of the reaction is marked by the fact that no further ppt. forms in the soln. at the points where the $Al_2(SO_4)_3$ drops strike it.
A. Papineau-Couture

Control of soap rancidity. Paul I. Smith. *Am. Perfumer* **40**, No. 3, 59–61(1940).—A review. E. H.

Making powdered soap with gas. Victor M. Alexieff. *Gas* **16**, No. 3, 17(1940).—A light, fluffy, powd. soap is made by spray-drying in a current of air mixed with products of combustion of gas at 255°F. Soap made in the usual way, but without addns. other than preservative to prevent rancidity, is conditioned at the desired temp. by the use of steam coils. It is then passed through a low-pressure pump, and then a high-pressure hydraulic pump to give a spraying pressure of 1000 to 3000 lb. per sq. in., then through a "saponifying valve" and finally through the spray nozzle having a 0.036-in. opening. The spray chamber is shaped very much like a centrifugal collector of cyclone type. The liquid soap is dried almost instantly, and is sucked by a fan into cooling and storing collectors. About 1.5 cu. ft. of natural gas was required per lb. of finished soap. R. W. Ryan

Soap perfuming in relation to the odor-carrying alcohol group. T. Ruemele. *Deut. Parfüm.-Ztg.* **25**, 141–2, 144 (1939).—A review of the source and properties of a no. of primary, *sec.*, and *tert.* perfumery alcs. and their use for soap perfumes. B. C. P. A.

Activation and clarifying properties of fuller's earth—adsorption of coloring matter by fuller's earth in decolorizing oils (Kulkarni, Jatkar) **18. Vitamin A contents of liver oils of Brazilian desmobranchs** (Hermsdorff, Lazzarini Peckolt) **17. Relations between chem. form and activity of vitamin A in concentrates from fish-liver oils** (Grab) **17. Pharmacology of soaps** (Emery, Edwards) **11H. Mixed esters [substitutes for soaps]** (U. S. pat. 2,184,794) **22.**

Wittka, F. Moderne fettchemische Technologie. H. 2. Gewinnung der höheren Fettsäuren durch Oxydation der Kohlenwasserstoffe. Leipzig: J. A. Barth. 167 pp. M. 13.80. Cf. *C. A.* **34**, 2199[4].

Attachment for feeding hydrogen into the hydrogenation autoclave for fats. E. Ya. Vol'fson and I. A. Prokhorov. Russ. 55,897, Oct. 31, 1939. Construction details.

Apparatus for crushing soybeans in preparation for oil extraction. Henry Ford and Robert A. Boyer (to Ford Motor Co.). U. S. 2,186,066, Jan. 9. Various structural, mech. and operative details.

Apparatus for expressing oil-containing seeds. Max Duchscher. Brit. 508,909, July 7, 1939. The app. is provided with 2 swinging press containers, a swinging discharge carrier, a main pressing piston and an auxiliary piston.

Device for operating the cake-molding press in an oil-pressing installation. N. V. Oliefabrieken "Het Hart" en "De Zwaan" v. h. Adriaan Honig. Brit. 509,017, July 10, 1939.

Apparatus for acid treatment in delinting cottonseed, etc. Oscar L. Kettenbach (to Chemical Seed Treating and Delinting Corp.). U. S. 2,185,408, Jan. 2. Various details of app. with juxtaposed treating and washing drums, etc.

Polymerizing fatty oils. Anthony H. Gleason and Raphael Rosen (to Standard Oil Development Co.). U. S. 2,184,057, Dec. 26. A polymer of a semidrying fatty oil such as rapeseed oil suitable *for use in lubricating compns.* and which has a viscosity above 1000 sec. at 99°, is sol. in mineral oil, and has a substantially lower I No. than the original oil, is prepd. by dilg. the initial oil with a halogenated gaseous hydrocarbon such as ethylene dichloride, adding B fluoride to the oil and polymerizing at a temp. of about 25° for a prolonged period (suitably about 12 hrs. or longer) and stopping the reaction before the polymer becomes insol. (the B fluoride being passed through the mixt. while maintained at substantially room temp.).

Solid high-molecular alcohols from sperm oil. T. P. Egupov, A. A. Bag and S. V. Smirnov. Russ. 55,903, Oct. 31, 1939. Alcs. are prepd. from sperm oil by hydrogenation, sapon. with alc. alkali, and pptn. of the soaps with an alc. soln. of $CaCl_2$. The high-mol. alcs. are sepd. in the usual manner from the filtered soln.

Wax substitute. Ya. G. Sabun. Russ. 56,017 Nov. 30, 1939. Ca soap prepd. by treatment of fish oil with $Ca(OH)_2$ is distd. at 300–20°, and the distillate is hydrogenated.

Apparatus for making, removing and processing soap or the like. Benjamin H. Thurman (to Refining, Inc.). U. S. 2,185,653, Jan. 2. Various details are described of an app. comprising: a container, means for reducing the pressure in the container to form a low-pressure zone therein; means for continuously delivering a mixt. of soap particles to the low-pressure zone to evap. the volatile material and collect a mass of soap in the zone; an agitator in the low-pressure zone; means for moving the agitator through the soap particles in the low-pressure zone; conveyor means beneath the agitator for continuously withdrawing the soap particles from the low-pressure zone; and a star valve receiving the soap particles from the conveyor means for maintaining a sub-atm. pressure in the conveyor means.

28—SUGAR, STARCH AND GUMS

J. K. DALE

The keeping quality of sugars. H. D. Sen and J. P. Shukla. *J. Sci. Tech. India* 4, 43–52(1938).—The type of infection and the extent of deterioration of Indian white (sulfitation) sugars under the usual conditions of storage was studied. There seemed to be no effect on the keeping quality by either washing the sugar with alc. or storing in bags lined with corrocreppe paper or twill cloth. There was an enormous increase in bacterial count during the 3 month's storage. The av. loss of polarization between June and Sept. was 5.4 and the increase in reducing sugar was about 3.18%. J. C. Jurrjens

Beet milling. Fritz Teschner. *Deut. Zuckerind.* 65, 57–8(1940).—Better beet preservation methods and frequent change of milling disks improve beet milling. W. W. Binkley

Action of light-metal alloys on sugar juices. H. David. *Deut. Zuckerind.* 64, 98(1939).—Eight specified alloys of Al and two of Mg gave varying effects on the coloration of sugar juices. All gave evolution of H, Al or Mg passing into soln. and the alky. thereby increasing. B. C. P. A.

Unaccounted loss in beet-sugar manufacture. H. Claassen. *Deut. Zuckerind.* 64, 165–7, 187–8(1939).—See *C. A.* 34, 1506³. C. L. B.

Unaccounted loss in beet-sugar manufacture. J. Meyer. *Deut. Zuckerind.* 64, 227–8(1939).—While the solution of araban under Italian conditions of working would probably upset the balance (cf. preceding abstr.), the position with regard to German working is not clear. B. C. P. A.

Factory losses with different sugar content of the beets. E. Troje. *Deut. Zuckerind.* 65, 43–8(1940). W. W. B.

Simplification of the determination of harmful nitrogen in sugar beets. O. Unverdorben and G. Spielmeyer. *Bodenkunde u. Pflanzenernahr.* 16, 280–44(1940).—N compds. extd. in processing sugar beets interfere with recovery of sugar; their detn. is important to the refinery operator and beet breeder. Expts. with various modifications in procedure designed to reduce difficulties in Kjeldahl detn., including the use of H_2O_2 or $HClO_4$ as aids in digestion, are described. A source of error in this detn., for which no practical remedy has been found, is the presence of more or less nitrate in beet juices, causing low results for total N by reaction with amide N in the Kjeldahl digestion. It is proposed to det. N in the $Pb(OAc)_2$-purified juice after the regular polarization; expts. showed that the usually detd. "harmful N" averages very nearly 80% of the "$Pb(OAc)_2$-sol. N," so that the latter should serve equally as well for the index. It is pointed out that micro-Kjeldahl digestion using H_2O_2 and nesslerization instead of titration of NH_3 would make the detn. very rapid, and the information thus furnished should be as useful as that from the laborious technique now in use. Eleven references. C. J. Schollenberger

Micromethods for determining "injurious nitrogen." A. Janke, J. Holota and E. Mikschik. *Z. Wirtschaftsgruppe Zuckerind.* 89, 516–25(1939).—Two micromethods are described for the detn. of "injurious amino-nitrogen" in 0.1–0.3 cc. samples of sugar-beet juice. One method makes use of the Pulfrich photometer (Zeiss step-photometer), with microattachment, for the abs. colorimetry of the blue-colored solns. obtained when Cu sulfate and alkali are added to the clarified beet juice. The other method consists in a potentiometric formol-titration with a micro glass electrode. Results obtained with both methods show good agreement. The micro formol-titration method was used to det. the distribution of "injurious amino-nitrogen" within the sugar beet, and this was found progressively to decrease from the top to the tip, being particularly high in the former. Louis Pruess

Investigations on the fermentations appearing in diffusers with reuse of waste water, and their control. F. Reindel, A. Frey and B. Mändl. *Z. Wirtschaftsgruppe Zuckerind.* 89, 525–57(1939).—Reuse of diffuser run-off liquors and chip press-waters, as economy and stream pollution preventive measures, sometimes leads to a reduction in the output capacity of the diffusion battery. Signs of such a disturbance are gas formation in the diffusers, a decrease in the pH values of the liquors, and strong corrosion of pipes and pumps. These are brought about by the activity of microörganisms producing CO_2, H_2, acetic, butyric and lactic acids. Gas formation is greatest in the primary diffusers of the battery in which there is a low sugar concn. and favorable development temps. (60–65°). With increasing sugar concns. and absence of temp. optima the fermentation decreases. The main infection, as long as the waste liquors are outside of the diffusers, takes place in the chip pit, chip gutter and waste water storage reservoir. Two methods were studied for the suppression of the infectious fermentations: the use of disinfectants and heat sterilization. An hourly addn. of 2 kg. Cl (as Mg hypochlorites) per 100 cu. m. of waste liquor, or sterilization temps. of at least 85–90° were found effective. Louis Pruess

Investigations on the content of grit and dust-forming constituents in dried chips, Steffen chips and original sugar-beet chips. O. Spengler, K. Zablinsky and A. Wolf. *Z. Wirtschaftsgruppe Zuckerind.* 89, 503–12(1939).—The grit plus dust content, detd. by sieving, of dried chips (117 samples), Steffen chips (8 samples), and dried sugar-beet chips (59 samples), all used as *cattle feeds*, was found to be very low, in most cases less than 1%. In those samples contg. a high percentage of fine material it was shown that this consisted mainly of original beet substance (low ash content). Louis Pruess

Molasses yield and [beet-] juice purification. F. W. Meyer. *Deut. Zuckerind.* 64, 227(1939).—Modified methods of working, leading to better removal of non-sucrose and improvement in the phys. condition of the juice, have given improved yields of sucrose and diminished yields of molasses. B. C. P. A.

Yield of molasses from beets of different polarization and juices of different purity. H. Claassen. *Z. Wirtschaftsgruppe Zuckerind.* 89, 513–16(1939).—Two nomograms are presented showing the yield of molasses (48% polarization), as percentage of the sugar beet, which can be expected from beets with a polarization of 15–21% and thick juices with purities of 91–95. One diagram gives the molasses yields when the beets are worked up for crystal white sugar and the second diagram for crude sugar; both contain the data for molasses of 60 and 63 purity. L. P.

Conditions of precipitation of calcium saccharate from molasses after fermentation with noninverting yeast. H. D. Sen and N. R. Khanna. *J. Sci. Tech., India* 4, 53–8(1938); cf. *Proc. 6th Ann. Convention, Sugar Tech. Assoc., India* 1937, 359–69.—A study of the selective fermentation of molasses with 3 noninverting yeast types, *S. mali duclauxi* (I), *S. marxianus* and *S. citrus* showed that I was the most effective in decreasing the reducing sugar content. In 42 hrs. with a molasses of 45.7° Brix and an adjustment of pH at 6.4, the reducing sugar content was decreased from 27.10 to 5.07% (dry basis). The fermented sample was dild., cooled in an ice bath and 1/8 of the theoretical amt. of CaO added to ppt. the impurities such as gums and to remove color. The rest of the theoretical amt. of CaO was then added to ppt. sucrose as Ca saccharate (II). A sirup of 88.31% purity was obtained by decompn. of II with CO_2. Recovery of sucrose as II was more complete when pptn. was made from dil. soln. (17.5° Brix, 43.05% recovery; 10° Brix, 53.5% recovery). A. J. Stirton

The condition of starch solutions at extremely high shear velocities. W. Seck and G. Fischer. *Kolloid-Z.* 90, 51–8(1940).—The Hurrell colloid mill (*C. A.* 25, 2338) was used to obtain extremely high shear or displacement velocities and a theoretical discussion of its operation is given. Various root, seed and stem starches, namely potato, arrowroot, cassava, corn, wheat, rice and sago, were used in these expts. It is shown that mech. treat-

ment of all the starches resulted in greatly reduced viscosities (losses were up to 98% of the original viscosity). These high losses of viscosity can be correlated with the swelling properties of the various starches; the starch kernels showing the highest degree of swelling without disintegration suffer the greatest reduction in viscosity. The viscosity differences of the individual starches disappear to a large extent when the starches undergo mech. treatment. This viscometric equalization can be assumed to be due to the natural viscosity of the starch, uninfluenced by swelling phenomena. S. I. Aronovsky

Modified starches. III. Degradation of starches by acid and alkaline oxidizing agents, acids, etc. G. B. Jambuserwala and K. R. Kanitkar. *J. Textile Inst.* **31**, T1–16(1940).—Similar studies to those previously recorded (*C. A.* **33**, 9036[1]) on the degradation of starches are reported. The agents used were (*a*) mixts. of $K_2Cr_2O_7$ and H_2SO_4, with six concns. of the acid (ranging from 0.05 to 0.5 N), the quantity of $K_2Cr_2O_7$ being kept const. in all 6 cases (0.2%); (*b*) H_2SO_4 alone of the same concns. as in (*a*); (*c*) alk. hypochlorite solns.; (*d*) H_2SO_3; and (*e*) wetting agents, viz., Nekal BX and Igepon T. In addn. to the properties previously studied, the "binding values" of the modified starches were detd., and the chem. and textile qualities of these starches were compared with those of some of the com. "thin boiling" starches. Considering all the properties, farina starch is most affected by the treatments, followed by sago, wheat and corn in decreasing order of degradation. This is in agreement with earlier findings. The inherent tendency of raw starches to thin down on continuous boiling and stirring is eliminated on modification. The modified products in aq. soln. do not change in consistency on continued boiling and they give smooth homogeneous pastes in a much shorter cooking time. The present modified products compared favorably with raw and com. products as regards their textile qualities. They are considered more adaptable to textile operations than the raw varieties. Ruby K. Worner

Measurements of structure viscosity of various types of potato-starch products. H. Geinitz. *Kolloid-Z.* **90**, 58–65(1940).—The "Tsuda" viscometer (*C. A.* **23**, 10) was used for detg. the structure viscosity of dild. potato starch pastes. The starches were obtained from various types of com. potato flours. The effects of temp. and age of the pastes on the structure viscosity were measured. The viscosity decreased with increasing age of the paste, owing to purely chem. causes, mainly decompn. Increased temp. also lowered the viscosity. S. I. Aronovsky

Experiments on the preparation of starch and soluble starch. R. Kishore and K. C. Mukherji. *J. Sci. Tech., India* **4**, 27–32(1938). A. J. Stirton

Preliminary report on the chemistry of gum ghatti. Delbert Hanna, Leo McReynolds and Edwin H. Shaw, Jr. *Proc. S. Dakota Acad. Sci.* **19**, 130–2(1939); cf. *C. A.* **30**, 2456[1].—The H_2O-sol. portion of gum ghatti, after dialysis for 10 days against distd. water, evapn. on the water bath and final dehydration by boiling with CCl_4, had: pH of aq. soln. 5.5; P, none; N, 0.72%; ash, 1.9% (possibly Na and Ca compds.); and mol. wt. 2878 (from f.-p. depression) and 11,920 (from osmotic pressure). Dialysis of a soln. of gum ghatti in *N* H_2SO_4 and dehydration by boiling with CCl_4 gave a material which had: pH of aq. soln., 2.9; mol. wt. 1340–1735 per acid group; and galactose (AOAC method) 12%. The crude gum ghatti contained 26% of pentosans (AOAC method) and changed from *l*-rotatory to *d*-rotatory upon hydrolysis with H_2SO_4. The hydrolysis mixt. after treatment with $Ba(OH)_2$, concn. and drying, yielded a product (neutral to litmus) which was very sol. in water, and contained 33% Ba and 1.3% Cl and gave a weak reaction for reducing sugars (Benedict's reagent), a neg. resorcinol test for ketose, a pos. orcinol test for pentoses, galactose or uronic acid and galactosazone upon treatment with $PhNHNH_2$. The data seem to support the conclusion that gum ghatti is the tetra-Ca salt of an acidic polysaccharide of approx. 12,000 mol. wt., contg. galactose, uronic acid and pentose. George Ayers

Chem. investigations of sugar sorgo (Emiliani) **11D.** Pulping bagasse by chlorination method (Gomez, Aguila) **23.** Peculiarities of nitrogenous nutrition of sugar beet during early stages of vegetation (Buzanov) **15.**

Schiebl, Karl, and Bošnjakovic, F.: Wärmewirtschaft in der Zuckerindustrie. 2nd ed. Leipzig: T. Steinkopff. 178 pp. M. 12.50; bound M. 14.

Agar-agar. I. E. Smuskovich. Russ. 56,068, Nov. 30, 1939. The ext. obtained by boiling seaweed in water is beaten to a froth to obtain a porous gel; this is cooled and dried in the usual manner.

Sugar-crystallizing apparatus with helical cooling coils and stirrers. Charles A. Boyd, Frederick B. Kraft and Peter Ragborg (to Kilby Mfg. Co.). U. S. 2,186,234, Jan. 9. Various structural and operative details.

Dextrose-containing products by acid hydrolysis of starch. Waldemar Kröner and Heinz Kothe. U. S. 2,186,075, Jan. 9. In order to minimize discoloration of liquors undergoing acid hydrolysis, all high-temp. operations or at least the final stages of such operations are carried out at a pH of 2.3–3.0.

Starch from corn, etc. Albert Peltzer and Albert Peltzer, Jr. (to Merco Centrifugal Co.). U. S. 2,186,037, Jan. 9. See Brit. 487,552 (*C. A.* **33**, 4267).

Starch-washing apparatus with an endless filter belt, etc. Curt C. Schaefer. U. S. 2,185,868, Jan. 2. Various structural, mech. and operative details.

29—LEATHER AND GLUE

MERRILL

Report on the work of the [Italian] Royal Experimental Station of the Leather and Tannins Industries. Vittorio Casaburi. *Boll. staz. sper. ind. pelli mat. concianti* **17**, 252–70(1939).—Among the data reported are results of expts. on the Italian tannins (both domestic and from the Colonies) in substitution of the quebracho wood and exts., and expts. on the leathers obtained; a new method of examg. sectioned leathers; studies on rabbit hair; the porosity of leather and the detn. of the true d. G. A. Bravo

Preparation of light skins for tannage. D. J. Lloyd. *Leather World* **31**, 247–9, 347–51(1939).—Free SH groups are present in the mols. of keratin in hair freshly plucked from a living animal, but they become oxidized after prolonged atm. exposure. The peptide linkings are protected from hydrolysis by such oxidation, which, however, can be reversed by the action of a reducing agent. The —SS— linkings prevent the alkali mols. from reaching the peptide chains. Sulfides, polysulfides, stannous salts, cyanides, and amines can reduce the oxidized keratin. Reduction with Na_2S is accompanied by such swelling and plumping that the necks of the hair follicles are closed and the hairs break off at the surface, leaving the hair roots in them. If possible, hairs should be loosened by weakening their roots. The mech. and phys. properties of leather depend on the condition of the fibers. The elastin network is weakened by bating. The reticular tissue must be weakened so that it will rupture under the swelling pressure of the collagen fibers; this can be brought about by soaking at pH 12.5 or by 5% aq. NaCl. The collagen fibers are not affected by the processes which affect the other proteins. B. C. P. A.

Introduction to the study of the chemical reactions of tannage. A. Deforge. *Halle aux cuirs* **1940**, 2–6.—As a preliminary to a study of the chemistry of tannage, D. discusses the various reactive groups of collagen, and the

types of chem. combination into which they may enter under different conditions. H. B. Merrill 1

Rapid control methods for the tanning industry. A. V. Vedeneteskil. *Koshevenno-Obuvnaya Prom.* **18**, No. 1, 38–9 (1939); *Chimie & industrie* **42**, 881.—Fat is detd. by extg. the sample with $CHCl_3$ in an extn. app., evapg. the solvent, and weighing. H_2O is detd by drying the defatted residue in a current of air, under reduced pressure. A. Papineau-Couture

Method of liming [calf] skins for chrome-tannage. H. Anderson. *J. Federation Curriers, Light Leather Tanners Dressers* **20**, 91–6, 115–20(1939).—The time of liming should be as short as possible and the skins very well swollen in order to produce a full feel and tight grain. The rate of swelling can be diminished by treating the skins with milk of lime before adding Na_2S, but this causes delayed depilation. Treatment with aq. $Ca(OH)_2$ (I) results in the formation of a stable S.Ca.S linking. The absorption of I by calf hair is greater than that of NaOH under similar conditions. The time of alk. treatment of the hair necessary to reduce the supercontraction on subsequent treatment with $NaHSO_3$ to zero is much greater with NaOH than with I. Bivalent metals form a link which is not formed by univalent metals. Addn. of a compd., e. g., NH_2Me, capable of reacting with the CHO formed by the loss of H_2S from the cystines in hair invariably prevents I from exerting its full protective effect on hair. Unhairing is not brought about by reduction in a pure I liquor. B. C. P. A. 2 3 4

Bates. A. Dohogne. *Bourse aux cuirs Belg.* **66**, 410–12, 511, 513, 515, 517, 519, 521, 523, 525(1938).—A review on the prepn., properties, activity and methods of use of fecal, mold, bacterial and enzymic bates for leather. Considerable attention is given to proprietary prepns. Methods of assay are described in some detail. References. W. C. Tobie 5

Porosity of leather. E. Salmoiraghi. *Boll. staz. sper. ind. pelli mat. concianti Napoli* **17**, 97–108(1939).—Detns. of the porosity by a modified Bergmann's app. (*C. A.* **22**, 1249) give results which are not strictly comparable. Leather is not a rigid substance and the sample disk used becomes curved under applied pressure. The size of capillaries does not remain const. II. *Ibid.* 175–87.—Satisfactory results were obtained by having the leather test-disks (diameters 49 and 35 mm.) enclosed between perforated metal disks. An applied pressure of 500 mm. H_2O is recommended and porosity expressed by the formula nr^4 (n = no. of pores, r = radius of average pore). B. C. P. A. 6

Analysis of leather split into sections. IV. Bohemian and Danish sole leather. C. Corradini. *Boll. staz. sper. ind. pelli mat. concianti Napoli* **17**, 139–48(1939); cf. *C. A.* **33**, 5696[6].—The author's method of sectional analysis has been applied to samples of Bohemian sole leather, one made by slow tannage and one by rapid, and to a rapid-tannage Danish sole leather, Normal values for degree of tannage were obtained. B. C. P. A. 7

Perspiration—its effects on the wearing qualities of shoes. Frederick L. Hilbert. *Shoe & Leather Reporter* **216**, No. 7, 27–9(1939).—The well-known destructive action of sweat on leather is laid to detannization by alk. decompn. products produced by bacteria. The remedy is to make the shoemaking materials bacteriostatic. H. B. Merrill 8

Protein fibers. W. Grassmann. *Atti X^mo congr. intern. chim.* **4**, 753–4(1939).—Most protein fibers have many structural modifications. Their mol. orientation can best be detd. by x-ray technique. Shrinkage of collagen fibers by heating with water can be measured by x-rays and by enzymic action. Crude fibers are not attacked by enzymes, while fibers that have been shrunk by exposure to heat are readily digested by enzymes. H ions favor shrinkage while OH ions have no effect. Tannins reduce shrinkage and strengthen the fibers. Heat treatment of collagen fibers in stretched condition prevents subsequent shrinkage. Chem. analysis of fibrous proteins point to chain linkages of amino acids with similar type amino acids recurring frequently. The amino acids of the collagen mol. stand to each other in a simple numerical ratio. D. Jorysch 9

Production of gelatin from bones defatted by organic solvents. D. I. Virnik and A. V. Zharkova. *Kino-Foto-Khim. Prom.* **1938**, No. 10, 42–6; *Khim. Referat. Zhur.* **1939**, No. 5, 123; cf. *C. A.* **33**, 2755[5].—For the prepn. of gelatin, bones were defatted by dichloroethane, benzene and water. The time required for maceration of bones defatted with org. solvents is 15–40% less than for bones defatted with water. A max. yield of gelatin was obtained from bones defatted with dichloroethane. The concn. of HCl during the maceration affected the following processes of the treatment of ossein as well as the yield of gelatin. Gelatin obtained from bones defatted with org. solvents was of higher quality. W. R. Henn 10

Treatment of furs (Vandenhaute) 25. Colloidal chem. properties of thermolyzed gelatin and potentio metric titration of products of its acid decompn. (Khenokh) 2. Artificial leather (Russ. pat. 55,986) 13.

Tanning compositions. Gustav Mauthe and Hermann Noerr (to I. G. Farbenind. A.-G.). U. S. 2,184,622, Dec. 26. A process for the manuf. of tanning substances by treating a lignin sulfonic compd. with an unsulfonated condensation product, being sol. or dispersible therein, of an aromatic hydroxy compd. and an agent known to be capable of linking aromatic nuclei, selected from the group consisting of org. compds., S, S halogen compds. and H_2SO_4, involves treating the lignin sulfonic compd. in the course of this manuf. with an alkali at elevated temp., whereby a substantial amt. of H_2SO_3 is split off from the lignin sulfonic compd. without forming insol. compds.

Leather-dyeing machines. Michael F. Flynn. Brit. 508,928, July 7, 1939.

Patent-leather finishes. Donald E. Edgar and Paul Robinson (to E. I. du Pont de Nemours & Co.). Can. 387,249, Mar. 5, 1940. Leather is treated with japanner's oil, and a top coating of the resinous reaction product of urea, formaldehyde and an aliphatic monohydric alc. is applied and baked. The resinous product contains 0.5–1.0 mol. alc./mol. of urea, and yields upon treatment with $ZnCl_2$ and Ac_2O the acetate of the alc. The leather product did not crack at −5°F.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The rubber industry abroad fifty years ago. L. Thakar. *India Rubber World* **101**, No. 1, 67–72, 88(1939).—A review, with portraits of Macintosh, Hancock, Guibal and Pirelli. C. C. Davis

History of the Division of Rubber Chemistry of the American Chemical Society. E. V. Osberg. *India Rubber World* **101**, No. 1, 83–8(1939); *Rubber Chem. Tech.* **13**, 1–10(1940). C. C. Davis

Compounding in the nineteenth century. Webster Norris. *India Rubber World* **101**, No. 1, 60–2(1939).—Historical. C. C. Davis

Nineteenth century patent models relating to rubber. Kimball H. Stark. *India Rubber World* **101**, No. 1, 55–9 (1939).—Descriptive, with numerous illustrations. C. C. Davis

Abridged summary of reports of the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society. Crude Rubber Committee (R. H. Gerke, E. B. Babcock, L. M. Freeman, G. A. Sackett and J. C. Walton). *Rubber Chem. Tech.* **12**, 638–45(1939).—The 7 progress reports of the Comm., only 3 of which have appeared in complete form and in different

publications (cf. *C. A.* **30**, 8679[2]; *Rubber Age* (N. Y.) **38**, 33(1935); *Rubber Chem. Tech.* **10**, xxvii(Oct., 1937)), are assembled as 7 individual condensed reports, embodying the features of lasting historical and tech. value in each report. Report III, not published heretofore, mentions a large amt. of exptl. work on *plasticity* by 6 methods, which shows that there is considerable variation in the plasticity of No. 1 smoked sheet, that different methods of detg. plasticity place rubber in different orders, and that mastication does not minimize these differences in plasticity. There seems to be no relation between the extent of smoking of sheet and plasticity nor between the extent of smoking and the rate of vulcanization. Report IV, not published heretofore, recommends new *methods for detg. Mn and Cu in crude rubber*. *Mn.*—Ash 10 g. rubber at the lowest practicable temp. (first over an open flame, then at dull red heat, finally in a muffle furnace for 1 hr., not necessarily to a white ash), fuse with 10–15 g. of $K_2S_2O_7$, heat at low red until all C particles are burned off, dissolve in 80–100 cc. of 5% H_2SO_4, add 5 cc. of 85% H_3PO_4, 15 cc. of H_2SO_4 (d. 1.84) and 20 cc. of HNO_3 (d. 1.42), filter through asbestos, wash with 10–15 cc. of HNO_3, heat the filtrate to 90–100 cc., add 0.2 g. of $NaIO_4$, keep at 90–100° for 5 min., and dil. to 250 cc. (soln. *A*). To 1 cc. of standard Mn soln. (from 0.406 g. of $MnSO_4.4H_2O$ in 1000 cc. of water) add 5 cc. of 85% H_3PO_4, 15 cc. of H_2SO_4 (d. 1.84) and 20 cc. of HNO_3 (d. 1.42), heat to 90–100°, add 0.2 g. of $NaIO_4$, heat for 5 min., and dil. to 100 cc. (soln. *B*). Place 25 cc. of *A* in a Nessler tube, place different vols. of *B* in other Nessler tubes, and dil. to the marks, until a soln. is found to match the color of the sample. % Mn = [(cc. of *B*)(g. of Mn per cc.)(10)/(wt. of sample)] × 100. *Cu.*—Ash 20 g. of sample as for Mn, add 5 cc. of concd. HCl, heat to boiling, dil., boil for a few min., cool, make alk. with NH_4OH, conc. to 15 cc. on a steam plate, add several drops of Br water (unnecessary if the rubber contains less than 0.001% Mn), heat to boiling, filter through a Gooch crucible into a graduated tube, dil. to 30 cc., place 10 cc. in a 50-cc. Nessler tube (if the percentage of Cu is high (0.01%) use 5 cc.; if very low, use 20 cc.), and add 22.5 cc. of 95% pure EtOH and 2.5 cc. of a 1% soln. of Na diethyldithiocarbamate in 95% pure EtOH (soln. *A*). The standard soln. (*B*) should contain 0.00001 g. of Cu per cc. (prepd. from $CuSO_4$ in 5% aq. NH_4OH and standardized by electrolysis, with Pt electrodes). Prep. a soln. like the sample, using 10 cc. of water in place of the portion of the sample and add standard soln. until the colors are alike. % Cu = [(cc. of *B*)(g. of Cu per cc.)(3)/(wt. of sample)] × 100. Expts. failed to confirm reports of other investigators that light smoked sheet tends to be harder and more difficult to masticate than dark smoked sheet. Both had practically the same plasticity and rate of vulcanization. Coöperative work by the London Advisory Comm. for Rubber Research has led to tentative standards for raw rubber. Two mixts. have been adopted, and in each case limits are recommended for the properties of rubber vulcanized in this way. Mixt. *A* (rubber 100, S 10) should give a "good technical cure" within the limits of 70 and 100 min. at 148°, and the tensile strength should be at least 130 kg. per sq. cm. Mixt. *B* (rubber 100, S 3.5, mercaptobenzothiazole 0.5, stearic acid 0.5, ZnO 6) should give a "good technical cure" within the limits of 30 and 60 min. at 125°; the tensile strength should be at least 130 kg. per sq. cm. and the stress at 700% elongation should be within the limits of 60 and 130 kg. per sq. cm. A desirable improvement of this modulus requirement to obtain rubber of greater uniformity and medium rate of vulcanization would be limits of 85 to 120 kg. per sq. cm. The plasticity of mixt. *B* is detd. by maintaining a piece 1 cm. high and 1 cm. in diam. at 95° for 30 min., applying a load of 600 g. for 30 sec., and measuring the recovery in height 30 sec. after the load is removed; this recovery should not be more than 30% of the vertical deformation under the load at the end of 30 sec. The adaptability of mixt. *B* for detg. the plasticity of crude rubber is questionable. C. C. Davis

Variability of plantation latex. Surface tension. D. S. Villars. *Ind. Eng. Chem.* **32**, 368–72(1940).—An investigation of some of the factors which affect the surface tension of latex shows that the system of tapping, part of tapping month, soil, differences between trees, fertilizing and temp. at which the latex is aged have, from a practical point of view, no significant influence on the surface tension of latex contg. 1.25% of NH_4OH. From a statistical point of view, very significant seasonal effects were found, but they were not sufficiently well defined to distinguish them from consistent errors in technique which vary from time to time. The surface tension of freshly ammoniated latex was found always to decrease with aging. C. C. Davis

Investigation of synthetic and plant latexes by microscopic and ultramicroscopic methods. K. Mikhallova and M. Bass. *Sbornik Trudov Opytnogo Zavoda im. S. V. Lebedeva* **1938**, 53–74; *Khim. Referat. Zhur.* **2**, No. 5, 66 (1939).—The particles of 1 sample of plant latex (I), 3 samples of bivinyl latex (II) and 6 samples of chloroprene latex (III) were measured microscopically and ultramicroscopically. Photomicrographs of the latexes were taken and the diams. of the microparticles were measured according to the method of Green. The mean diams. of the microparticles were: I 0.988 μ, II 0.64 μ and III 0.66 μ. The mean diams. of the ultramicroparticles were: I 0.139 μ, II 0.118 μ and III 0.085 μ. The mean diams. of all particles were: I 0.3018 μ, II 0.119 μ and III 0.086 μ. The nos. of particles ($\times 10^{-10}$) in 1 g. of a 35% latex were: I 2589, II 50008, III 95045. The nos. of microparticles ($\times 10^{-10}$) in 1 g. of a 35% latex were: I 66.8, II 1.9 and III 4.1. The wt. fractions of rubber in a 35% latex attributed to the larger particles were: I 90.5, II 0.76 and III 1.92. The degree of dispersion of synthetic latexes was considerably greater than that of plant latexes, and chloroprene latex was less uniform than bivinyl latex (min. diam. of the particles and a larger no. of the coarser particles). Small amts. of Na oleate caused no visible changes either in bivinyl or in the chloroprene latexes. Borax caseinate increased considerably the size of the microparticles (the wt. of one sample increased from 1.02 to 19.81%), except in bivinyl latexes. No changes were observed in the plant latexes during storage, whereas in synthetic latexes the no. of the larger particles increased at the expense of an arbitrary increase of the size of the submicroscopic particles. W. R. Henn

The preparation of preserved latex and of concentrated latex. Anon. (Algem. Proefsta. A. V. R. O. S.). *Vlugschr.* No. **39**(in Dutch), 5–24, 40–56; in English, 25–39) (1939).—A crit. review and discussion, with data and diagrams, of the several processes for concg. latex which are, or have been, of com. importance, including the important features of the patents. Storage, packing and shipping problems also are considered. C. C. Davis

The viscosity of preserved and concentrated latex. I. Relation between dry rubber content and viscosity. Edgar Rhodes and H. Fairfield Smith. *J. Rubber Research Inst. Malaya* **9**, 171–88(1939).—A revision of the paper by Rhodes, *et al.*, *C. A.* **33**, 3203[4]. The best-fitting regressions are changed in the revision to: $\log \eta = 0.055 + 0.938 \tan p$ for preserved field latex; and $\eta = -228.4 + 4.525\ p$ for centrifugal concentrates where p is the dry rubber content in percentage. The latter equation holds only in the region $\tan p = 1.5$ to 1.9. C. L. B.

Distribution of flock size in the creaming of Hevea latex. E. M. McColm. *India Rubber World* **101**, No. 3, 38–42 (1940).—The concn. gradient in *Hevea* latex, which becomes visible during the process of creaming, induced by artificial creaming agents was utilized to est. flock-size distribution by a modification of ordinary sedimentation methods. The results obtained with any particular latex with 2 different creaming agents which act differently are attributed to a difference in the distribution of flock size which results. If under given exptl. conditions a creaming agent yields a cream contg. more rubber than that in a cream obtained by another creaming agent, then the former creaming agent causes a wider distribution of flock size, which in turn results ultimately in tighter packing. This concept would still hold true if a state of semithixo-

tropy were to be established during the creaming process. C. C. Davis

Hevea latex sludge. Existence of a sludge fraction in fresh unpreserved latex. E. M. McColm. *Ind. Eng. Chem.* **32**, 439–40(1940).—Although latex sludge, which consists largely of $MgNH_4PO_4.6H_2O$, has long been a problem on the plantations, it has not been generally recognized that a sludge can be sepd. from latex fresh from the tree. Newly tapped latex was dild. immediately and passed through a Sharples supercentrifuge, all latex was removed from the sludge by centrifuging the latter repeatedly, and the sludge was treated in 3 ways: (1) dried at 100°, giving a slightly elastic, slightly cohesive, oily product; (2) dried at room temp. *in vacuo* over H_2SO_4, giving a bad-smelling product, probably from bacterial or enzyme action; and (3) washed with acetone and dried *in vacuo* over H_2SO_4. Analyses of the products by (1) and (3) gave in percentages: dry sludge in undild. latex 0.11; dry sludge in latex total solids 0.27; acetone ext. of dry sludge 29.5; rubber in dry sludge 36.0; N in extd residue (based on dry sludge) 3.44; N in ext. (based on dry sludge) 0.63; ash in extd. residue (based on dry sludge) 1.5; ash in ext. (based on dry sludge) 2.5. The acetone ext. (20.6% was in the acetone washings of the wet sludge) was oily and had an acid no. of 7.25, i. e., equiv. to 36.13% free acid (as stearic acid). The remaining 8.9% of acetone ext. was removed slowly, was a yellow, waxy semisolid, its acid no. was 4.8, and it resembled the lipide of Rhodes and Bishop (*C. A.* **25**, 3512). *Hevea* lipide gave an acid no. of 2.3, whereas R. and B. reported 14. The sludge from new latex, when still wet, can be dispersed rapidly in dil. NH_4OH or other alkalies; the suspension is permanent and only by prolonged centrifuging can even traces of sediment be sepd. The residue from the acetone and $CHCl_3$ extns. is slightly dispersible in dil. NH_4OH, although sufficiently so to give a strong biuret test for protein. C. C. Davis

Antipercussion latex films. P. Mabb. *Rubber Age* (N. Y.) **46**, 229–31(1940).—See *C. A.* **33**, 9711[9]. C. C. Davis

Measurement of the mechanical properties of natural rubber and of synthetic rubber. W. Philippoff. *Kautschuk* **15**, 191–4(1939).—A crit. discussion of the physics of deformation, with particular reference to plasticity and its methods of measurement. C. C. Davis

The development of basic rubber-processing machinery. S. C. Stillwagon. *India Rubber World* **101**, No. 1, 50–4, 62(1939).—Illustrated. C. C. Davis

A mechanical oscillograph for routine tests of rubber and rubber-like materials. Felix L. Yerzley. *Rubber Chem. Tech.* **13**, 149–58(1940).—See *C. A.* **33**, 6645[7]. C. C. Davis

Influence of the nature of solvent on the properties of fractions of natural rubber. B. M. Kovarskaya and S. M. Lipatov. *Colloid J.* (U. S. S. R.) **5**, 767–79(1939); cf. *C. A.* **34**, 923[7].—Solns. of pale crepe rubber in Et_2O and in C_6H_6 were pptd. by EtOH in steps, and the 6 fractions were dissolved in various solvents. The viscosity of these solns. showed a behavior inconsistent with the theory of Staudinger (cf. *C. A.* **32**, 3236[9]). (1) Two of the 6 fractions gave viscosities not proportional to the concn. (2) The fractions from Et_2O had lower viscosities than those from C_6H_6; this shows that the solvent affected the properties of the rubber. (3) The apparent mol. wt. of a fraction depended on the solvent used for measurements of η. (4) The ratio of the viscosities of 2 fractions depended on the solvent. (5) The η value of a mixt. of 2 fractions was not equal to the sum of the single viscosities; this indicates an adsorption of smaller mols. by larger micelles. J. J. Bikerman

Buna rubbers. Albert Koch. *Ind. Eng. Chem.* **32**, 464–7(1940).—The characteristics, processing and practical applications of Buna-85 (I), Buna-S (II), Perbunan (Buna-N) (III) and Perbunan Extra (IV) are described in more detail than in previous papers (*C. A.* **30**, 8680[9], 8681[1]; **31**, 2859[8]) and further information is added, particularly about III. Essentially I is a relatively low-mol. polymer of $H_2C{:}CHCH{:}CH_2$ (V); II is a mixed polymer of V and $PhCH{:}CH_2$; III is a mixed polymer of V and $H_2C{:}CHCN$ (VI); IV is the same as III but with a higher proportion of VI. Although IV has the same general properties as III, it is characterized by greater resistance to solvents, oils, etc. Unlike II (cf. Hagen, *C. A.* **33**, 897[8], 7146[7]), III and IV cannot be plasticized by hot air but only by mastication and addn. of softening agents. The compounding and processing of III are discussed. In general, S, org. accelerators, C black, etc., have the same effects on III as on natural rubber. C. C. Davis

Refractometer studies of rubber-pigment mixtures. H. C. Jones. *Ind. Eng. Chem.*, **32**, 331–4(1940).—A refractometric examn. of mixts. of rubber and ZnO showed that the n value increases when ZnO is milled into rubber and that the magnitude of this change is a function of the particle size of the ZnO and of the proportion added to the rubber. This effect was proved to depend on mastication (cf. McPherson and Cummings, *C. A.* **29**, 5395[6]), for the n value does not increase until the dried latex-ZnO film is milled. When ZnO is dissolved out of a rubber-ZnO mixt., the n value decreases to approx. that of the rubber to which no ZnO has been added. Addn. of pptd. $CaCO_3$ to rubber increases the n value of the latter, but to a less degree than does ZnO. Other pigments increase the n value still less. The opacity of some pigments and the large particle size of others prevent satisfactory examn. by transmitted light. C. C. Davis

The colloidal structure of rubber in solution. Colloidal aspects of vulcanization. S. D. Gehman and J. E. Field. *Ind. Eng. Chem.* **32**, 282–7(1940).—Colloidal changes which take place in solns. of purified rubber under the influence of a vulcanizing system composed of S, piperidinium pentamethylenedithiocarbamate and Zn propionate were followed by measuring changes in viscosity, and in depolarization and intensity of transversely scattered light. A study of the time required to vulcanize C_6H_6 solns. of rubber by the combined agents mentioned above showed that temp. coeff. of vulcanization is approx. the same value as that of the same mixt. vulcanized in the dry state. The light-scattering measurements indicate that the addn. of vulcanizing agents to rubber solns. increases the size of the colloidal units. The coincident decrease in viscosity is attributed to a diminution in the "interlocking" of the units. An equil. between the various colloidal processes is reached during vulcanization of such solns., and when this equil. is attained, the viscosity becomes const. during the greater part of the subsequent vulcanization. On the contrary, light-scattering changes continuously throughout vulcanization, and the magnitude of this continuous change indicates that the clusters of mols. in the gelled soln. probably do not differ very much from those in the original soln. However, viscosity measurements indicate that the forces between these clusters have been strengthened greatly. C. C. Davis

Questions of priority in the kinetic theory and thermodynamics of rubber-type elasticity. A correction of the work of K. H. Meyer. Edgar Wöhlisch. *Helv. Chim. Acta* **22**, 1358–62(1939).—See *C. A.* **34**, 905[4]. S. R. K.

The packaging of smoked sheets for plantation shipment. Don E. Andrews. *India Rubber World* **101**, No. 6, 33–7(1940).—The method used on the U. S. Rubber Co. estates is described and illustrated. C. C. Davis

The resistance of rubber to dynamic forces. I. R. Ariano. *Gomma* **3**, 97–103(1939); *Rubber Chem. Tech.* **13**, 81–91(1940).—The work of deformation by impact forces acting on a rubber-S (100-8) vulcanizate and on a vulcanizate of the solid tire type was detd. It is proved that the work expended in reaching a given elongation is greater by application of a dynamic force than a static force. The difference in the 2 values increases with increase in elongation for a given velocity of impact and increases with the velocity at impact for a given elongation. Estimates of the elongation at rupture by an impact force lead to the conclusion that, at least for vulcanized rubber contg. no fillers, this elongation is less than that reached with a slowly increasing stress. C. C. Davis

Characterization of the plastic-elastic state. E. Rohde. *Kautschuk* **15**, 64–8; *Rubber Chem. Tech.* **12**, 799–804 (1939).—When stressed repeatedly, vulcanizates prepd.

publications (cf. *C. A.* **30**, 8679[7]; *Rubber Age* (N. Y.) **38**, 33(1935); *Rubber Chem. Tech.* **10**, xxvii(Oct., 1937)), are assembled as 7 individual condensed reports, embodying the features of lasting historical and tech. value in each report. Report III, not published heretofore, mentions a large amt. of exptl. work on *plasticity* by 6 methods, which shows that there is considerable variation in the plasticity of No. 1 smoked sheet, that different methods of detg. plasticity place rubber in different orders, and that mastication does not minimize these differences in plasticity. There seems to be no relation between the extent of smoking of sheet and plasticity nor between the extent of smoking and the rate of vulcanization. Report IV, not published heretofore, recommends new *methods for detg. Mn and Cu in crude rubber*. *Mn.*—Ash 10 g. rubber at the lowest practicable temp. (first over an open flame, then at dull red heat, finally in a muffle furnace for 1 hr., not necessarily to a white ash), fuse with 10–15 g. of $K_2S_2O_7$, heat at low red until all C particles are burned off, dissolve in 80–100 cc. of 5% H_2SO_4, add 5 cc. of 85% H_3PO_4, 15 cc. of H_2SO_4 (d. 1.84) and 20 cc. of HNO_3 (d. 1.42), filter through asbestos, wash with 10–15 cc. of HNO_3, heat the filtrate to 90–100 cc., add 0.2 g. of $NaIO_4$, keep at 90–100° for 5 min., and dil. to 250 cc. (soln. *A*). To 1 cc. of standard Mn soln. (from 0.406 g. of $MnSO_4.4H_2O$ in 1000 cc. of water) add 5 cc. of 85% H_3PO_4, 15 cc. of H_2SO_4 (d. 1.84) and 20 cc. of HNO_3 (d. 1.42), heat to 90–100°, add 0.2 g. of $NaIO_4$, heat for 5 min., and dil. to 100 cc. (soln. *B*). Place 25 cc. of *A* in a Nessler tube, place different vols. of *B* in other Nessler tubes, and dil. to the marks, until a soln. is found to match the color of the sample. % Mn = [(cc. of *B*)(g. of Mn per cc.)(10)/(wt. of sample)] × 100 *Cu.*—Ash 20 g. of sample as for Mn, add 5 cc. of concd. HCl, heat to boiling, dil., boil for a few min., cool, make alk. with NH_4OH, conc. to 15 cc. on a steam plate, add several drops of Br water (unnecessary if the rubber contains less than 0.001% Mn), heat to boiling, filter through a Gooch crucible into a graduated tube, dil. to 30 cc., place 10 cc. in a 50-cc. Nessler tube (if the percentage of Cu is high (0.01%) use 5 cc.; if very low, use 20 cc.), and add 22.5 cc. of 95% pure EtOH and 2.5 cc. of a 1% soln. of Na diethyldithiocarbamate in 95% pure EtOH (soln. *A*). The standard soln. (*B*) should contain 0.00001 g. of Cu per cc. (prepd. from $CuSO_4$ in 5% aq. NH_4OH and standardized by electrolysis, with Pt electrodes). Prep. a soln. like the sample, using 10 cc. of water in place of the portion of the sample and add standard soln. until the colors are alike. % Cu = [(cc. of *B*)(g. of Cu per cc.)(3)/(wt. of sample)] × 100. Expts. failed to confirm reports of other investigators that light smoked sheet tends to be harder and more difficult to masticate than dark smoked sheet. Both had practically the same plasticity and rate of vulcanization. Coöperative work by the London Advisory Comm. for Rubber Research has led to tentative standards for raw rubber. Two mixts. have been adopted, and in each case limits are recommended for the properties of rubber vulcanized in this way. Mixt. *A* (rubber 100, S 10) should give a "good technical cure" within the limits of 70 and 100 min. at 148°, and the tensile strength should be at least 130 kg. per sq. cm. Mixt. *B* (rubber 100, S 3.5, mercaptobenzothiazole 0.5, stearic acid 0.5, ZnO 6) should give a "good technical cure" within the limits of 30 and 60 min. at 125°; the tensile strength should be at least 130 kg. per sq. cm. and the stress at 700% elongation should be within the limits of 60 and 130 kg. per sq. cm. A desirable improvement of this modulus requirement to obtain rubber of greater uniformity and medium rate of vulcanization would be limits of 85 to 120 kg. per sq. cm. The plasticity of mixt. *B* is detd. by maintaining a piece 1 cm. high and 1 cm. in diam. at 95° for 30 min., applying a load of 600 g. for 30 sec., and measuring the recovery in height 30 sec. after the load is removed; this recovery should not be more than 30% of the vertical deformation under the load at the end of 30 sec. The adaptability of mixt. *B* for detg. the plasticity of crude rubber is questionable. C. C. Davis

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